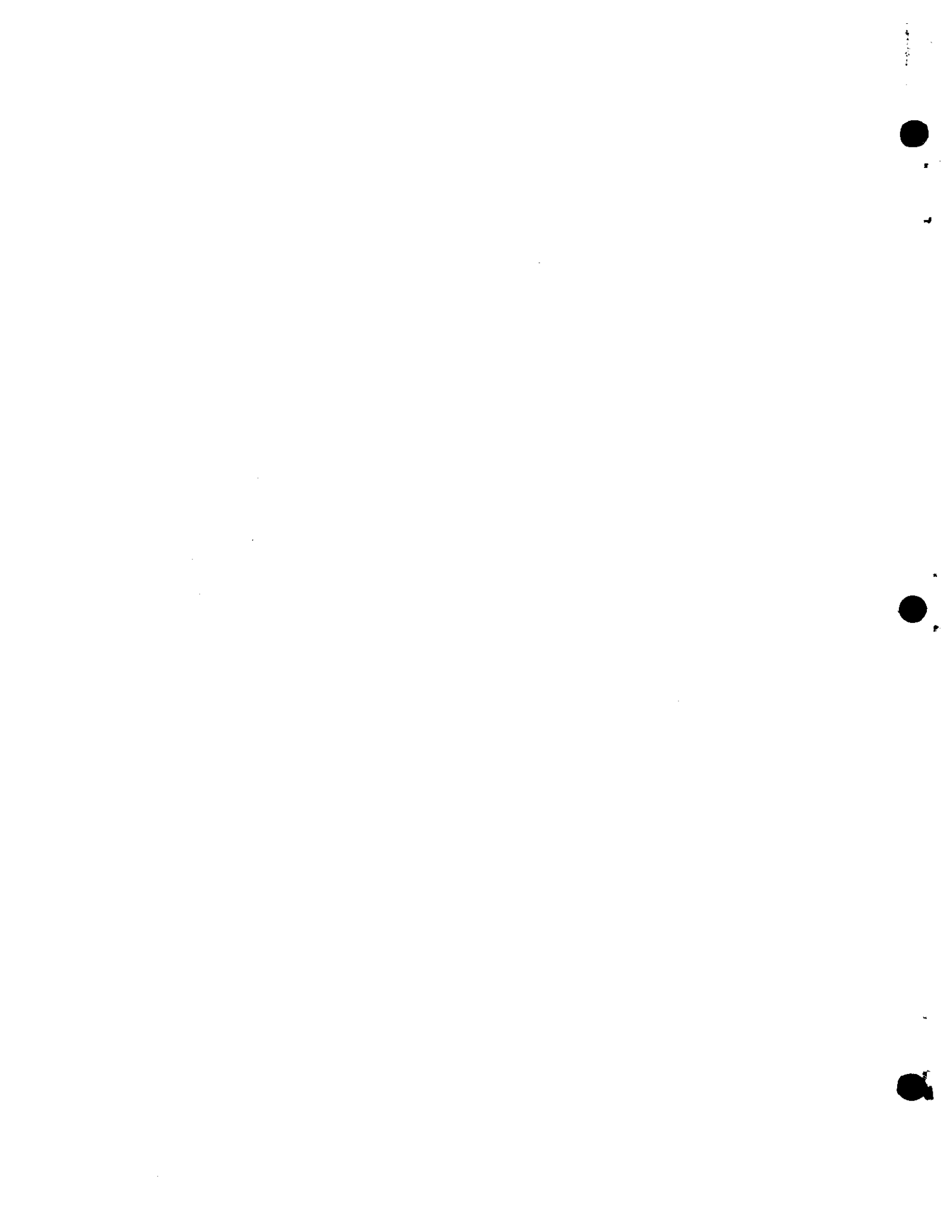


INTRODUCTION

CSR1 is a phoneme-input speech synthesizer program set up to operate with the Computalker Model CT-1 Speech Synthesizer. It contains definitions in the form of various table entries for 55 different input symbols which represent the phonemes of the English language along with several punctuation marks. CSR1 accepts a phonetic input string consisting of these phonemes and punctuation symbols and decimal digits which specify vowel stress levels. This input string is parsed to fill out a phonetic feature matrix for the desired synthetic phrase. A set of phonetic structure rules scans the matrix to look for feature patterns and combinations which must be adjusted to conform to English pronunciation. After these adjustments, a parameter generator algorithm scans the matrix and produces the control parameters needed to operate the CT-1 Synthesizer.

As coded in assembly language for the 8080 CPU, this system contains 5½K of executable code, which may be placed in ROM, and requires additional RAM space for the feature matrix and the parameter buffer. At least 4K of RAM is recommended for this buffer space. For complete details of the 8080 version, including full assembly source listings, see the CSR1 Synthesis-by-Rule 8080 Implementation Manual.



COMPUTALKER CSR1 Speech Synthesis-by-Rule
Software package installation notes

This preliminary documentation packet for the CSR1 software system includes miscellaneous pages from each of the complete manuals which are now in preparation. There will be 2 manuals, "CSR1 Theory and Operation", and "CSR1 8080 Implementation Notes". In addition to the material included here, the theory manual will contain complete and detailed flowcharts of the entire synthesis by rule system, sufficient to allow recoding the system for another CPU other than the 8080. Complete source code listings are included here, which will be part of the 2nd manual for the 8080 chip. As this material becomes available, it will be sent to all present purchasers in the form of a newsletter.

OBJECT CODE Module CSR1 Version 1

The system is assembled at 2000-38FF, with the parameter buffer set up to start at 3900 and not use beyond 5FFF. The buffer allocation is easily changed by setting 2 16-bit pointers at 2006-2007 (BUFADR, now = 3900H) and at 2008-2009 (BUFEND, now = 5FFF). Allocation of the various parts of the system are currently as follows:

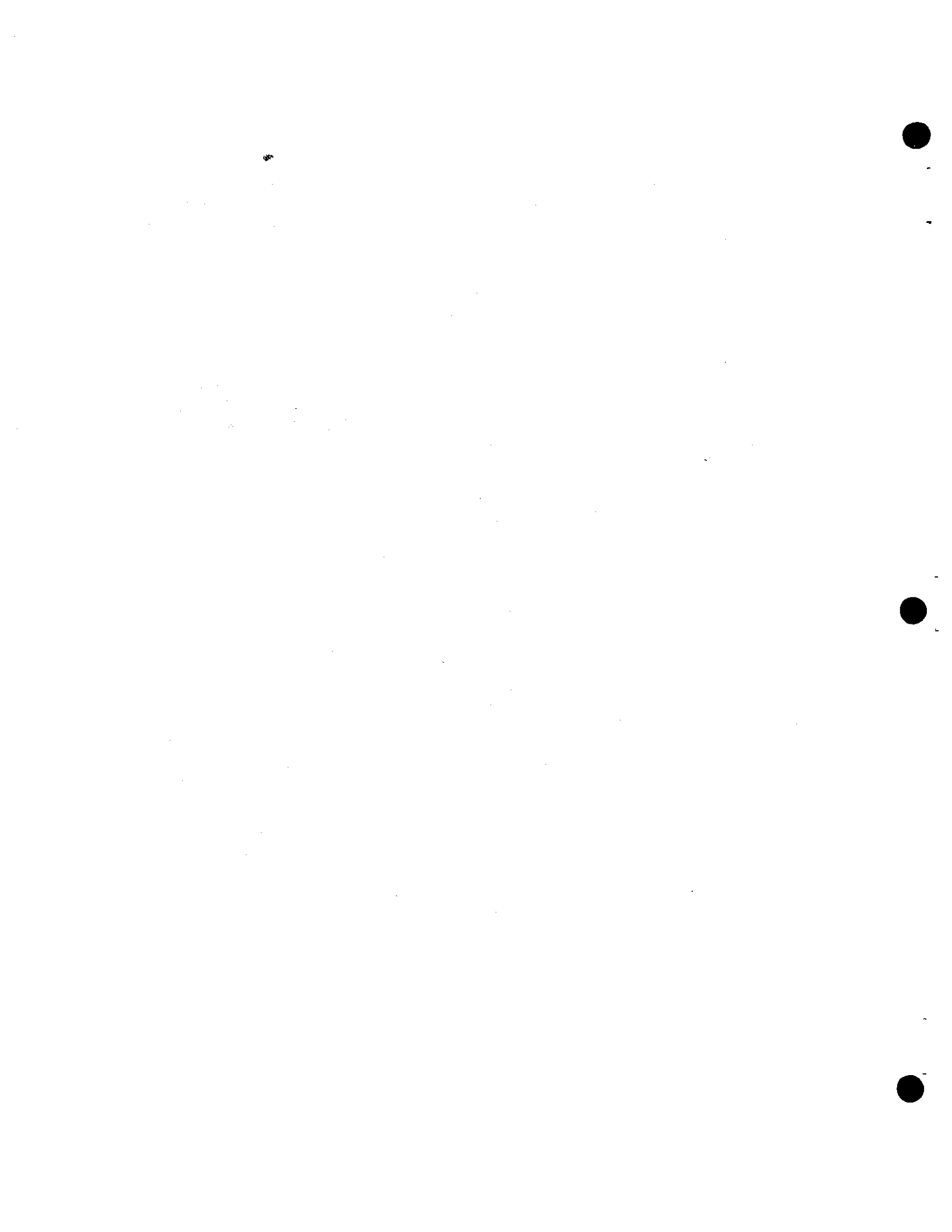
	2000-23B4	Section 1	CSR1 MAIN and PARSE
	23C0-2767	Section 2	RULES1 and RULES2
	2770-2B00	Section 3	RULES3 and Duration definition
	2B10-2DFC	Section 4	GENFØ
	2E00-323F	Section 5	GENPRM
	3250-34F7	Section 6	PLAY and target tables
	3500-36FF	MATRIX	Feature Matrix and COMRAM
SA=3700H	3700-38FF	Monitor	Text entry and diagnostics
	3900-5FFF	BUFFER	CT-1 parameter buffer

I originally intended to supply the Object code in various assemblies set up to start at any 8K boundary, considering that everybody has their ROM and RAM and stuff all at different places. If you find that the object tape as now assembled is unuseable in your system, and you do not have the facilities to reassemble it, let me know, and I will send a tape set up for any 8K load address. (Section 1 would begin at 0000,2000,4000, etc.).

CSRMON Calling monitor, text input and diagnostic dump routines

This part is essentially independent of the CSR1 subroutine itself. and may be assembled to run anywhere in memory. The only connections are CALLs patched into the CSR1 code to call the diagnostic Matrix dump. More about this below. All I/O is done by the Monitor. I am enclosing copies of the assembled listing of the monitor which I ran off on the TTY so you can see what you need to do to get it running in your system. It is all pretty straight forward code with no surprises.

Start the system at loc 3700H. The first instruction is the only stack operation, so you can put the stack anywhere you like. Maximum stack depth is approx. 10H pushes (20H locs). The input is basically like the ARPABET as described in the Dobbs reprint, except that word separations are indicated by space instead of "/". Type a CTRL-B to dump the entire parameter buffer to the TTY (via CALL CHROUT).



Getting Started

The input to the CSR1 Synthesis by Rule program is a phonetic spelling closely related to the ARPABET(1) phonetic alphabet. Table 1 lists the symbols used by CSR1 together with the corresponding symbol in the International Phonetic Alphabet (IPA) and an example English word which contains that sound. The phonetic input symbols have been chosen to be fairly close to normal English spelling for most words and still be able to express the 40 or so phonemes of English pronunciation unambiguously using only the upper-case letters on the standard TTY-compatible ASCII keyboard.

Consonants			Vowels			Punctuation	
P	p	pie	IY	i	heed	space	word boundary
T	t	tie	IH	ɪ	hid	,	pause/silence
K	k	key	EY	eɪ	hayed	.	falling pitch
B	b	by	EH	ɛ	head	?	rising pitch
D	d	die	AE	æ	had	return	end of input
G	g	guy	AA	ɑ	hod		
M	m	my	AO	ɔ	hawed		
N	n	nigh	OW	oʊ	hoed		Stress Marks
NX	ŋ	hang	UH	ʊ	hood		
F	f	fie	UW	uʊ	who'd	∅	no stress
V	v	vie	ER	ɛr	herd	1	primary (max) stress
TH	θ	thigh	AH	ʌ	Hudd	2	secondary stress
DH	ð	thy	AY	aɪ	hide	3	tertiary stress
S	s	sigh	AW	aʊ	how	4	etc.
Z	z	zoo	OY	ɔɪ	boy	5	
SH	ʃ	shy	AX	ə	about	> 5	no stress
ZH	ʒ	vision	IX	ɪ			
L	l	lie	OH	o	core		
W	w	we	UX	u	too		
R	r	rye					
Y	j	you					
HH	h	high					
CH	tʃ	chime					
JH	dʒ	jive					
WH		why				KX	coo (K before back vowel)
EL	ɛ	battle				GX	goo (G before back vowel)
EM	m	bottom				RX	card (R after a vowel)
EN	n	button				LX	kill (L after a vowel)
Q	ʔ	(glottal stop)				DX	pity (T between vowels)
						YX	diphthong ending
						WX	diphthong ending

Table 1 CSR1 Phonetic Input Symbols

Stress marks may be placed on any vowel in the form of a following digit from 5 (weakest stated stress) to 1 (maximum stress). Any stress digit greater than 5 will be ignored. Ending an input string with a period or question mark has the effect of changing the ending pitch, falling or rising, respectively. A comma has no effect on the pitch, but only introduces a pause in the pronunciation.



Learning to spell phonetically

The CSR1 system provides an ideal environment for learning the phonetic spelling system, because you have immediate feedback of the results of each attempt. First try the examples in set 1. Sound the word out to yourself as you type it to help form the association with the spelling of the different sounds. Generally, the consonants will not be any problem, but pay close attention to the vowel sounds.

HHIYD	heed	HHUHD	hood
HHIHD	hid	HHUWD	who'd
HHEYD	hayed	HHERD	herd
HHEHD	head	HHAHD	Hudd
HHAED	had	HHAYD	hide
HHAAD	had	HHAW	how
HHAOD	hawed	HHOY	hoy
HHOWD	hoed		

Example set 1 Learning the vowels

The consonant HH was used in front of these tests because it has the least influence on the sound of a following vowel. Try some of these with different initial consonants, and notice the effect on the vowel. It is this sort of variation that makes it so difficult to produce good quality speech with a synthesis by rule system. For example, try NNAW (now) compared with HHAW (how). Actually, the vowel sound should be modified somewhat for the different context. The CSR1 system provides a few extra vowel symbols for use in certain contexts where none of the above vowels sound right. Another possibility is to lengthen the sound by doubling the symbol. Compare the sounds of KOWR (core, /k^owr/), KOHR, and KOHOHR (core, /k^or /).

In almost any English word longer than one syllable, the vowels have different degrees of strength or emphasis. CSR1 provides two mechanisms for adjusting the relative strength of a vowel sound, by adjusting the vowel quality, or by assigning a stress level. First, considering differences in vowel quality, several "weak" vowels are included in the set of available sounds. Phonetically, these vowels are described as centralized or reduced. If we plot the vowel space in terms of the values of their F1 and F2 targets as in figure 1, we see that most of the points lie around the edges of the cluster, while 3 points, IX, AH and AX, lie nearer the center. Moving a vowel closer to the center of the vowel space causes the sound to be phonetically weaker. The front vowels IH and EH may be weakened by substituting IX, and the back vowels AO, OW and OH by substituting AH. A vowel may be completely "reduced" by replacing it with AX. Besides having more central F1 and F2 targets, these reduced vowels also have shorter than average durations.



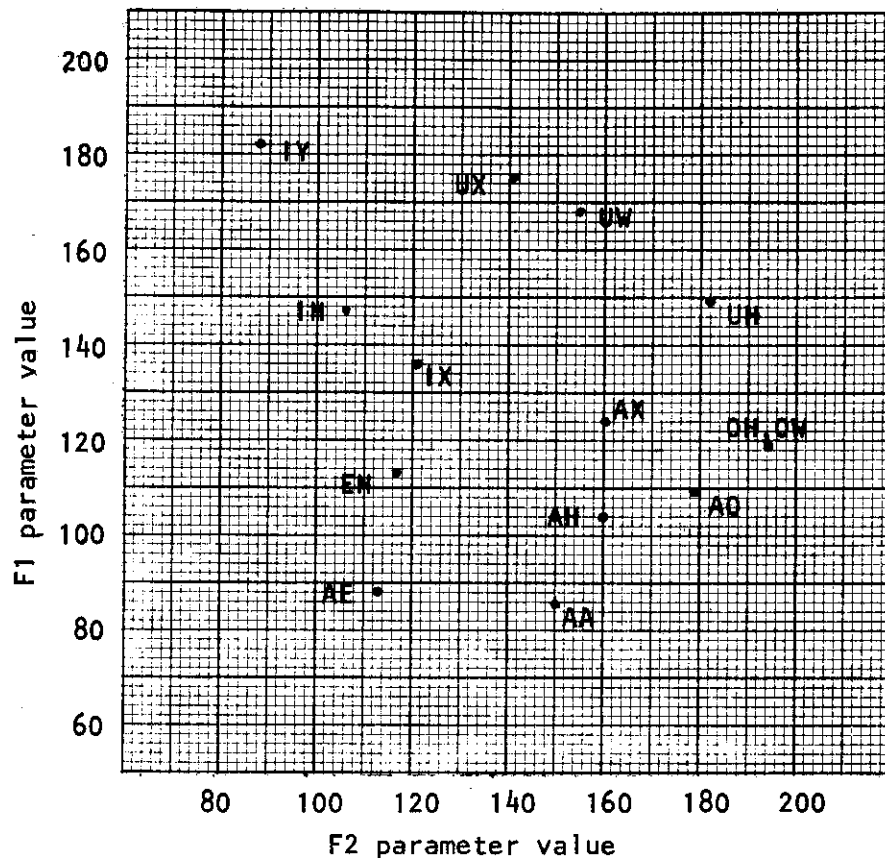


Figure 1 The F1 - F2 Vowel Space

Alternatively, a vowel may be strengthened by specifying a non-zero stress level to apply to that vowel. In accordance with the usual linguistic conventions, the primary or maximum level of stress possible is indicated by a number 1 following the vowel. Progressively weaker degrees of stress are indicated by 2, 3, 4 or 5, with stress 6 or higher numbers the same as no specified stress. Specifying a stress level has two direct effects on the pronunciation of a vowel; the pitch or F₀ parameter rises to a higher peak, and the duration increases, in some cases nearly doubling, depending on the surrounding context. In addition to the direct effects, stress levels also affect the surrounding consonants in various ways, primarily by duration changes, but occasionally changing the entire character of a neighboring consonant. Example set 2 illustrates a variety of effects resulting from vowel strength changes.

AXBAWT	(? , no stress)	AXBAW3T	(about, 2nd vowel stressed)
SAHMPTHIHNX	(?)	SAH3MPTHIXNX	(something)
TEHL MIY	(tell me, dull)	TEH1L MIY	(tell me, commanding)
HHEHLOW	(hello, no stress)	HHIX3LOW1.	(hello, more expressive)

Example set 2 Vowel Strength Changes



WAH2N	SIH2KS
TUW2	SEH2VEN
THRIY2	EHIY2T
FOH2R	NAY2IYN
FAY2V	TEH2EHN

AY1 AEMAX KAAMPYUWITER.

AY2 KAEN TA01LK PRIXTIY WEHL.

WHAHIT DUW YUW WAH3NT MIY TUW SEY.

Compare the above with ...
WHAHIT DUW YUW WAH3NT MIY TAH SEY.

KAE4N YUW1 MEYK MIY SEY3 SAHMPTHIHNX?

PLIY1Z FIH3KS MAY FRIH2KAHTIHVZ?

TAY2MZ TEH2EHN TUH DHAX FOH4RTH PAW3WER.

Try different combinations and variations of these inputs. In many cases, a word is not pronounced with the distinctness that it would have if you spelled it out "normally", as the TUW above in "What do you want me to say?" Such words can be downplayed by using a relaxed vowel instead of the normal vowel that word would have. The relaxed vowels available in this system are AX, completely relaxed or neutralized, IX, with some "front vowel" quality, and AH, a slightly stronger vowel with some "back" quality. IX is a good relaxed version of IY, EH, or AE, while AH is better to use for softer versions of AA, AO, OW or UW. AX is used where there is nothing left of the original vowel quality, as in the usual pronunciation of "the". Another means of adjusting the strength of a vowel is of course by varying the stress attached to that vowel. This affects primarily the pitch, changing the sentence intonation pattern, and also affects the durations of itself and surrounding consonants by the actions of several rules in the system. Try accentuating a word by changing the stress on the major vowel of the word, also on the secondary vowels. Stress effects can be heard the best in the context of the whole phrase, not as well just by listening to the single word.

At any time, you can hit a CTRL-P and hear the last item over again. This does not interfere with the one you're now typing in.



Additional notes on CSR1 Implementation

CSR1 is set up as a general callable subroutine, which has no internal stack resetting instructions and does no I/O other than to the CT-1 Speech Synthesizer.

CALLING ADDRESS = 2000H for the standard assembly

The HL register pair is set to point to the first character of the text string to be synthesized. The string consists of 7-bit ASCII characters. The most significant bit is ignored (Bit 7). The text string is terminated with an ASCII carriage return code (ODH or 8DH).

On return to the calling program, registers B,C,D and E have been restored to their original values. CSR1 sets the zero condition, (Z=1), if no error has occurred and synthesis has proceeded normally. If an error occurs, CSR1 returns with the non-zero condition active (Z=0), and HL contains a pointer to the first character of an error message string. The string consists of ASCII characters with the most significant bit low, and is terminated by a return character. All buffer and matrix information is left just as last used by CSR1, whether or not an error has occurred, to facilitate error analysis.

Playback Rate

In the present version of CSR1 (Version 1), the rate of playback of the speech data is determined by a software timing loop in Section 6. The constant assembled into the code is set for an 8080A CPU using 450ns memory (no waits) and a clock cycle of 2 Mhz. For other combinations of CPU or memory, it may be necessary to change the ~~constant~~ constant. At location 328BH, the value 800₁₀ (320H) is loaded into HL to give the desired 10msec delay between updates. For a Polymorphic Systems POLY-88, with a 1.8432 Mhz clock, the constant should be 737₁₀ (2E1H).

<u>location</u>	<u>is now</u>	<u>change to</u>	
328B	21 20 03	21 E1 02	LXI H,737

Of course, this constant may also be changed if it is desired to speed up the playback by a small amount. In some contexts, the speech output sounds better when speeded up slightly.



CSR1 Distribution Media and Formats

The CSR1 software system is distributed on one of the following types of media, paper tape, Tarbell cassette, MITS ACR cassette, and (for an extra charge) on North Star mini-floppy diskettes (2 req'd). The data and record formats are written as follows:

Paper tape:

Source code is punched with no line numbers and with horiz. tab (09) before and after each operator field. Not punching the line numbers makes the tape significantly shorter. Most users will have a relatively easy means of reinserting these as the tape is read in. Similarly, punching the spaces to format the lines properly would take a lot of tape. Since not all assemblers have the mechanism to reformat the line during assembly with only a single space as a field separator, it seems desirable to use a distinctive character which can be detected and expanded into the necessary spaces while reading. Each line is followed by a CR,LF with no null characters following.

Object code is punched in standard INTEL hex format* with a colon at the beginning of each record.

Cassette:

The Tarbell and MITS ACR cassette formats are similar except for the SYNC byte at the beginning of a Tarbell record (0E6H). In other words, the data stream seen by the software is identical between the two. Source records begin with a record type byte of 0FEH, followed by a 2-byte byte count, the data, and a positive, 8-bit, no-carry checksum. Object records are similar, with a record type byte of OFFH. In each case, the 16-bit byte count is 1 less than the actual byte count of the data. The checksum is the sum of the data values only.

Source code is written from the memory image of the PDS1 editor (an offspring of Proc Tech's System 1). Each line begins with a byte count (1 byte), a decimal line number in 4 ASCII digits, a space, the ASCII text of the line, and finally, a RETURN char (0DH). The end-of-file is indicated by a byte count value of 01. The largest source text file in Version 1 in Section 5, which occupies 19,42210 bytes.

Object code is dumped directly from the assembled memory image. The record type byte, byte count, and checksum are as described above.

* see next page for INTEL HEX specs.



INTEL HEX FORMAT

The assembled Hex Object paper tape of the CSR1 system is punched in INTEL HEX format. The following is a definition of that format.

Frame 0	Record Mark. Signals the start of a record. The ASCII character colon (":" HEX 3A) is used as the record mark.
Frames 1,2 (0-9,A-F)	Record Length. Two ASCII characters representing a hexadecimal number in the range 0 to 'FF' (0 to 255). This is the count of actual data bytes in the record type or checksum. A record length of 0 indicates end of file.
Frames 3 to 6	Load Address. Four ASCII characters that represent the initial memory location where the data following will be loaded. The first data byte is stored in the location pointed to by the load address; succeeding data bytes are loaded into ascending addresses.
Frames 7, 8	Record Type. Two ASCII characters. Currently all records are type 0. This field is reserved for future expansion.
Frames 9 to 9+2* (Record Length) -1	Data. Each 8 bit memory word is represented by two frames containing the ASCII characters (0 to 9, A to F) to represent a hexadecimal value 0 to 'FF'H (0 to 255).
Frames 9+2* (Record Length) to 9+2* (Record Length) +1	Checksum. The checksum is the negative of the sum of all 8 bit bytes in the record since the record mark (":") evaluated modulus 256. That is, if you add together all the 8 bit bytes, ignoring all carries out of an 8-bit sum, then add the checksum, the result is zero.

Example: If memory locations 1 through 3 contain 53F8EC, the format of the hex file produced when these locations are punched is:

```
:0300010053F8ECC5
```



CSRMON Monitor

Source Listing

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
3700				0010	* CSRMON			3768	0D			0580		DCR	C
3700				0020	* KEYBOARD INPUT CONTROLLER TO CALL CSRL			3769	2B			0590		DCX	H
3700				0030	* LLOYD RICE, COMPUTALKER CONSULTANTS			376A	00			0600		NOP	*
3700				0040	* VERSION 1.06 MAY 30, 1977			376B	00			0610		NOP	*
3700				0050	* DEFINE INPUT STRING BUFFER LENGTH			376C	C3	2C	37	0620		JMP	DSP2
3700				0060	* EQU 76			376F				0630			*
3700				0070	* LXI SP, 2000H * THIS IS THE ONLY STACK INSTR 3773			376F	CD	73	37	0640		CALL	TTVIN * REDEFINE AS NEEDED
3700				0080	* LXI H, MSG1 * DISPLAY HEADING AND CUE			3772	C9			0650		CALL	TTVIN * REDEFINE AS NEEDED
3700				0090	* CALL DISPLA * THEN ANOTHER CR			3773				0660		RET	
3700				0100	* MVI A, 0DH * THEN ANOTHER CR			3773				0670			*
3700				0110	* LXI H, BUFF * READ A CHAR FROM KBD			377D				0680			*
3700				0120	* MVI C, INBFLN-2			377D				0690			*
3700				0130	* CALL CHROUT * READ A CHAR FROM KBD			377D				0700			*
3700				0140	* ANI 7FH			377D				0710			*
3700				0150	* CPI 1			377D				0720			*
3700				0160	* JNC GTZ			377D				0730			*
3700				0170	* DCR C			377D				0740			*
3700				0180	* JNZ DSP2-2			377D				0750			*
3700				0190	* INR C			377D				0760			*
3700				0200	* JMP CHLOOP			377D				0770			*
3700				0210	* MOV M, A			377D				0780			*
3700				0220	* INX H			377D				0790			*
3700				0230	* CALL CHROUT * DISPLAY THE CHAR			377D				0800			*
3700				0240	* JMP CHLOOP * GET ANOTHER			377D				0810			*
3700				0250	* CPI 18H			377D				0820			*
3700				0260	* JZ DSP1			377D				0830			*
3700				0270	* L0H			377D				0840			*
3700				0280	* JZ REPLAY			377D				0850			*
3700				0290	* CPI 2			377D				0860			*
3700				0300	* JZ BUFDIS			377D				0870			*
3700				0310	* CPI 0DH			377D				0880			*
3700				0320	* JNZ CHLOOP * IGNORE ALL ELSE BUT CR			377D				0890			*
3700				0330	* MOV M, A			377D				0900			*
3700				0340	* CALL CHROUT * ECHO THE RETURN			377D				0910			*
3700				0350	* LXI H, BUFF			377D				0920			*
3700				0360	* CALL CSRL * COMPUTE AND SAY IT			377D				0930			*
3700				0370	* CNZ ERRORT * SOMPLN' HAPND, WRITE ERR MSG			377D				0940			*
3700				0380	* LXI H, MSG2			377D				0950			*
3700				0390	* JMP DSP0			377D				0960			*
3700				0400	* PUSH H			377D				0970			*
3700				0410	* PUSH B			377D				0980			*
3700				0420	* CALL PLAY			377D				0990			*
3700				0430	* POP B			377D				1000			*
3700				0440	* POP H			377D				1010			*
3700				0450	* JMP CHLOOP			377D				1020			*
3700				0460	* CUE1			377D				1030			*
3700				0470	* JMP DSP0			377D				1040			*
3700				0480	* REPLAY			377D				1050			*
3700				0490	* H			377D				1060			*
3700				0500	* B			377D				1070			*
3700				0510	* C3 20			377D				1080			*
3700				0520	* C1			377D				1090			*
3700				0530	* E1			377D				1100			*
3700				0540	* C3 13 37			377D				1110			*
3700				0550	* * * * *			377D				1120			*
3700				0560	* GTZ			377D				1130			*
3700				0570	* CHLOOP			377D				1140			*

* NVI A, XX WITH CHAR TO ECHO
 * ON RUBOUT (IF NOT 7FH)
 * CHAR INPUT (CALLED FOR CONSOLE KBD INPUT)
 * REDEFINE AS NEEDED
 * MESSAGE OUTPUT LOOP, STOP ON CHAR=04
 * GET CHAR
 * RETURN IF EOT
 * NO, OUTPUT IT
 * ERROR MSG OUTPUT, STOP ON CR (ODH)
 * FIRST CLEAR THE SCREEN
 * SYNTHESIS BY RULE!
 * ENTER TEXT!
 * PHONEME STRING INPUT BUFFER
 * END OF CSRMON KEYBOARD INPUT HANDLER
 * * * * *
 * DIAGNOSTIC DUMP ROUTINES FOR INFO & DEBUGGING

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADJR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
3800					1070	*	ORG	CSRMON+100H	JZ	CUE1	381B	CA	53	37	1640		JZ	CUE1	
3800					1080				PUSH	H	381E	E5			1650		PUSH	H	
3800					1090	*			LXI	D, MATLEN*4	381F	11	7C	01	1660		LXI	D, MATLEN*4	
3800					1100	*			XCHG		3812	EB			1670		XCHG		
3800					1110	*			DAD		3813	19			1680		DAD		
3800	21	EF	38		1120	MATDIS	LXI	H, MDTX	D		3814	7E			1690		D		
3803	CD	7D	37		1130		CALL	DISPLA * DISPLAY "FEATURE MATRIX"	MOV	A, M	3815	47			1700		MOV	A, M	
3806	2A	02	35		1140		LHLD	NEGEND	MOV	B, A	3816	B7			1710		MOV	B, A	
3809	11	06	35		1150		LXI	D, MATRIX+2	ORA	A	3816	B7			1710		ORA	A	
380C	19				1160		DAD	D	JZ	ENDLP	3817	CA	98	38	1720		JZ	ENDLP	
380D	7D				1170		MOV	A, L	XCHG		381A	EB			1730		XCHG		
380E	2F				1180		CMA		CALL	CODOUT	381B	CD	9D	38	1740		CALL	CODOUT	
380F	4F				1190		MOV	C, A	LHLD	BUFPTR	381E	2A	DF	36	1750		LHLD	BUFPTR	
3810	06	14			1200		MVI	B, 20 * NUMBER OF COLS TO DISPLAY	JMP	PHLP3	3811	C3	7D	38	1760		JMP	PHLP3	
3812	B8				1210		CMP	B	CALL	BLANK	3814	CD	D1	38	1770		CALL	BLANK	
3813	DA	17	38		1220		JC	\$+4	CALL	BLANK	3817	CD	D1	38	1780		CALL	BLANK	
3816	48				1230		MOV	C, B	CALL	BLANK	381A	CD	D1	38	1790		CALL	BLANK	
3817	C5				1240		PUSH	B	MVI	C, 9	381D	0E	99		1800		MVI	C, 9	
3818	21	05	35		1250		LXI	H, MATRIX+1	CALL	BLANK	3817	CD	D1	38	1810		CALL	BLANK	
381B	23				1260	DL1	INX	H	MOV	A, M	3812	7E			1820		MOV	A, M	
381C	CD	9D	38		1270		CALL	CODOUT	CALL	BYTE	3813	CD	BD	38	1830		CALL	BYTE	
381F	0D				1280		DCR	C	INX	H	3816	23			1840		INX	H	
3820	C2	1B	38		1290		JNZ	DL1	DCR	C	3817	0D			1850		DCR	C	
3823	CD	D6	38		1300		CALL	CROUT	JNZ	FRLOOP	3818	C2	7F	38	1860		JNZ	FRLOOP	
3826	C1				1310		POP	B	CALL	CROUT	381E	05			1870		CALL	CROUT	
3827	06	04			1320		MVI	B, 4	DCR	B	381B	CD	D6	38	1880		DCR	B	
3829	21	05	35		1330		LXI	H, MATRIX+1	JNZ	PHLP2	381F	C2	74	38	1890		JNZ	PHLP2	
382C	C5				1340	DL2	PUSH	B	SHLD	BUFPTR	3812	22	DF	36	1900		SHLD	BUFPTR	
382D	11	5F	00		1350		LXI	D, MATLEN	NOP		3815	00			1910		NOP		
3830	19				1360		DAD	D	NOP		3816	00			1920		NOP		
3831	E5				1370		PUSH	H	NOP		3817	00			1930		NOP		
3832	23				1380	DL3	INX	H	POP	H	3818	E1			1940		POP	H	
3834	CD	BD	38		1390		MOV	A, M	INX	H	3819	23			1950		INX	H	
3837	CD	D1	38		1400		CALL	BYTE	JMP	PHLOOP	381A	C3	58	38	1960		JMP	PHLOOP	
383A	0D				1410		CALL	BLANK			381D				1970				
383B	C2	32	38		1420		DCR	C	PHONEME CODE OF CURRENT MATRIX COLUMN		381D				1980				
383E	CD	D6	38		1430		JNZ	DL3	CODOUT		381D				1990				
3841	E1				1440		CALL	CROUT			381D				2000				
3842	C1				1450		POP	H			381D	7E			2010				
3843	05				1460		POP	B			381E	87			2020				
3844	C2	2C	38		1470		DCR	B			3810	2A	0A	20	2030				
3847	00				1480		JNZ	DL2			3813	85			2040				
3848	00				1490		NOP				3814	6F			2050				
3849	00				1500		NOP				3815	7C			2060				
384A	C9				1510		NOP				3816	CE	00		2070				
384B					1520		RET				3818	67			2080				
384B					1530	*					381A	CD	D8	38	2090				
384B					1540	*	BUFDIS				381D	23			2100				
384B					1550	*	DUMP THE CURRENT BUFFER CONTENTS				381E	7E			2110				
384B					1560	*	(CALLED BY CTRL B DURING INPUT)				381F	B7			2120				
384B	2A	06	20		1570	BUFDIS	LHLD	BUFADR			3810	C2	B5	38	2130				
384E	11	0B	00		1580		LXI	D, 11			3813	3E	20		2140				
3851	19				1590		DAD	D			3815	CD	D8	38	2150				
3852	22	DF	36		1600		SHLD	BUFPTR			3818	CD	D1	38	2160				
3855	21	05	35		1610		LXI	H, MATRIX+1			381B	EB			2170				
3858	7E				1620	PHLOOP	MOV	A, M			381C	C9			2180				
3859	FE	04			1630		CPI	4			381D				2190	*			
											2200	*			2200	*			

THE FOLLOWING ROUTINES ARE USED ONLY BY

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
38BD	F5				2210	* LOCAL CALLS, NOT BY CSRI			2008					2740	BUFEND	DS	2
38BD	0F				2220	BYTE	PUSH	PSW	200A					2750	PVTAB	DS	2
38BE	0F				2230		RRC		200C					2760	*		
38BF	0F				2240		RRC		200C					2770	* OTHER CSRI LOCATIONS DEPENDENT ON LOC OF COMRAM		
38C0	0F				2250		RRC		200C					2780	COMRAM	EQU	3500H
38C1	0F				2260		RRC		200C					2790	NEGEND	EQU	COMRAM+2
38C2	CD	6	38		2270		CALL	HEXO	200C					2800	MATRIX	EQU	COMRAM+4
38C5	F1				2280		POP	PSW	200C					2810	MATLEN	EQU	95
38C6	E6	0F			2290	HEXO	ANI	0FH	200C					2820	BUFPTR	EQU	MATLEN*5+MATRIX
38C8	C6	90			2300		ADI	90H	200C					2830	*		
38CA	27				2310		DAA										
38CB	CE	40			2320		ACI	40H									
38CD	27				2330		DAA										
38CE	C3	D8	38		2340		JMP	CHROUT									
38D1					2350	*											
38D1	3E	20			2360	BLANK	MVI	A, '									
38D3	C3	D8	38		2370		JMP	CHROUT									
38D6					2380	*											
38D6	3E	0D			2390	CHROUT	MVI	A, 0DH									
38D8					2400	*											
38D8					2410	*											
38D8					2420	*											
38D8	CD	DC	38		2430	CHROUT	CALL	TTYOUT									
38DB	C9				2440		RET										
38DC					2450	*											
38DC	F5				2460	*											
38DD	DB	00			2470	TTYOUT	PUSH	PSW									
38DF	E6	01			2480		IN	0									
38E1	CA	DD	38		2490		ANI	1									
38E4	F1				2500		JZ	\$-4									
38E5	D3	01			2510		POP	PSW									
38E7	FE	0D			2520		OUT	1									
38E9	C0				2530		CPI	0DH									
38EA	3E	0A			2540		RNZ										
38EC	C3	DC	38		2550		MVI	A, 0AH									
38EF					2560	*	JMP	TTYOUT									
38EF	0D				2570	*											
38F0	46	45	41		2580	*											
38F3	54	55	52		2590	MDTX	DB	0DH									
38F6	45	20	4D		2600		DT	'FEATURE MATRIX'									
38F9	41	54	52														
38FC	49	58															
38FE	0D				2610		DB	0DH									
38FF	04				2620		DB	4									
3900					2630	*											
3900					2640	*****											
3900					2650	*											
3900					2660	*											
3900					2670	*											
3900					2680	*											
3900					2690		ORG	2000H									
2000					2700	*											
2000					2710	CSRI	DS	3									
2003					2720	PLAY	DS	3									
2006					2730	BUFADR	DS	2									

A PORTION OF THE CSRI JUMP TABLE IS DEFINED TO ALLOW ACCESS TO MISC. CSRI ADDRESSES

* LAST CHAR WAS CR, ...
* ADD A LINE FEED

* OUTPUT HEX DIGIT & TAKE LAST RET

* OUTPUT (A) AS 2 HEX DIGITS

CSR1 Section 1

Source Listing

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2000				0010	* PARSE			2018				0580	RULES3	DS	3
2000				0020	*			201B				0590	GENFO	DS	3
2000				0030	* SECTION 1 OF THE CSRI SYNTHESIS BY RULE SYSTEM			201E				0600	CLREUF	DS	3
2000				0040	*			2021				0610	GENPRM	DS	3
2000				0050	* LLOYD RICE, COMPUTALKER CONSULTANTS			2024				0620	DUMMY	DS	22
2000				0060	* VERSION 1.07 MAY 30, 1977			203A				0630	*		
2000				0070	*			203A				0640	SECTAD	EQU	\$
2000				0080	* THE ENTIRE CSRI SOFTWARE SYSTEM IS PROVIDED			203A				0650	*		
2000				0090	* BY COMPUTALKER CONSULTANTS WITH THE UNDERSTANDING			203A				0660	*****		
2000				0100	* THAT IT MAY BE REPRODUCED FOR NON-COMMERCIAL			203A				0670	*		
2000				0110	* PURPOSES, PROVIDED THAT THE SOURCE IS QUOTED.			203A				0680	* COMRAM ORIGIN DEFINITION		
2000				0120	* OTHERWISE, ALL COPYRIGHTS ARE RETAINED.			203A				0690	*		
2000				0130	* (C) 1977, COMPUTALKER CONSULTANTS			203A				0700	ORG COMJMP+1500H		
2000				0140	*			3500				0710	COMRAM	EQU	\$
2000				0150	*****			3500				0720	*		
2000				0160	*			3500				0730	* CSRI SYSTEM RAM SPACE DEFINITION		
2000				0170	* ASSEMBLE ALL SECTIONS TO BEGIN AT THE SAME			3500				0740	*		
2000				0180	* STARTING ADDRESS. THIS WILL BE THE ADDRESS			3500				0750	MATPTR	DS	2
2000				0190	* AT WHICH TO CALL THE CSRI SYSTEM			3502				0760	NEGEND	DS	2
2000				0200	*			3504				0770	MATRIX	EQU	\$
2000				0210	*****			3504				0780	MATLEN	EQU	95
2000				0220	*			3504				0790	PHCODE	DS	MATLEN
2000				0230	* COMMON (JUMP) ADDRESS REFERENCE TABLE			3533				0800	FEATA	DS	MATLEN
2000				0240	* THIS TABLE ALLOWS REASSEMBLING ANY SECTION			35C2				0810	FEATB	DS	MATLEN
2000				0250	* WITHOUT CHANGING REFERENCES IN OTHER SECTIONS			3621				0820	STRES	DS	MATLEN
2000				0260	*			3680				0830	DUR	DS	MATLEN
2000				0270	* ANY SECTION MAY BE MOVED BY CHANGING THE ORG			36DF				0840	MATEND	EQU	\$
2000				0280	* AT SECTAD (SECTION 1 IS SLIGHTLY DIFFERENT).			36DF				0850	*		
2000				0290	* ALL REFERENCES WILL BE HANDLED CORRECTLY.			36DF				0860	* PARSE (LOCAL) RAM WORKSPACE		
2000				0300	* THE COMMON RAM WORKSPACE DOES NOT SHARE THIS			36DF				0870	*		
2000				0310	* NICE PROPERTY. IT MUST BE DEFINED THE SAME			36E0				0880	CHAR	DS	1
2000				0320	* IN ALL SECTIONS.			36E2				0890	PHON	DS	2
2000				0330	*			36E3				0900	NUM	DS	1
2000				0340	*****			36E5				0910	INPTR	DS	2
2000				0350	*			36E5				0920	*		
2000				0360	* THE PARAMETER BUFFER IS DEFINED BY CONSTANTS IN			36E5				0930	*****		
2000				0370	* LOCATIONS BUFADR AND BUPEND. BUFADR CONTAINS THE			36E5				0940	*		
2000				0380	* ADDRESS OF THE 1ST BYTE OF THE FRAME COUNT, AND			36E5				0950	* CSRI SYSTEM MAIN ROUTINE		
2000				0390	* BUFFER CONTAINS THE LAST ADDRESS AVAILABLE AS			36E5				0960	*		
2000				0400	* BUFFER SPACE.			36E5				0970	*		
2000				0410	* THESE LOCATIONS ARE DEFINED ONLY IN SECT1 SOURCE			203A				0980	*		
2000				0420	*			203A				0990	* DEFINE PHONEME CODES FOR PARSE		
2000				0430	*****			203A				1000	*		
2000				0440	*			203A				1010	CPAUSE	EQU	2
2000				0450	* COMMON JUMP ADDRESS TABLE			203A				1020	CTERM	EQU	4
2000				0460	*			203A				1030	CAX	EQU	15
2000				0470	CONJMP EQU \$			203A				1040	CEL	EQU	29
2000				0480	*			203A				1050	CEM	EQU	30
2000	C3	3A	20	0490	PLAY JMP CSRI			203A				1060	CEN	EQU	31
2000				0500	DS 3			203A				1070	CL	EQU	33
2006	00	39		0510	BUFADR DW COMJMP+1900H * 1ST BUFFER LOC AVAIL			203A				1080	CM	EQU	36
2008	FF	5F		0520	BUFEND DW COMJMP+3FFFH * LAST LOC AVAILABLE			203A				1090	CN	EQU	37
2000	C5	22		0530	DW PVTAB			203A				1100	CT	EQU	40
200C	C3	AC	22	0540	JMP MATPAK			203A				1110	CD	EQU	44
200F	C3	9A	22	0550	JMP MATERR			203A				1120	CSH	EQU	51
2012				0560	RULES DS 3			203A				1130	C2H	EQU	55
2015				0570	SETDUR DS 3			203A				1140	CCH	EQU	56

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
203A				1150	CJH	EQU	57	1720	*			1720	*	PARSE CODE	
203A				1160	*			1730	*			1730	*		
203A				1170	*	DEFINE FEATURE LABELS		1740	*****			1740	*****		
203A				1180	*			1750	*			1750	*		
203A				1190	VOWEL	EQU	80H	2063	22	E3	36	1760	PARSE	SHLD	INPTR
203A				1200	CONS	EQU	40H	2066	21	04	35	1770		LXI	H,MATRIX
203A				1210	FRONT	EQU	20H	2069	22	00	35	1780		SHLD	MATPTR
203A				1220	DIPHTH	EQU	10H	206C	AF			1790		XRA	A
203A				1230	WDBND	EQU	4	206D	32	E2	36	1800		STA	NUM
203A				1240	PBND	EQU	2	2070	3E	04		1810		MVI	A,CTERM
203A				1250	IGNORE	EQU	1	2072	CD	7A	22	1820		CALL	MATSET
203A				1260	STOP	EQU	80H	2075	3E	02		1830		MVI	A,CPAUSE
203A				1270	VOICE	EQU	40H	2077	CD	7A	22	1840		CALL	MATSET
203A				1280	PLOS	EQU	20H	207D	FE	0D		1850	PARSA	CALL	GET
203A				1290	PLOSA	EQU	10H	207F	3E	00		1860	PARSB	CPI	TERM
203A				1300	FRIC	EQU	8	2081	32	E2	36	1870		MVI	A,0
203A				1310	LIQUID	EQU	4	2084	CA	3F	21	1880		STA	NUM
203A				1320	NASAL	EQU	2	2087	67			1890		JZ	FINUP
203A				1330	DENTAL	EQU	1	2088	6F			1900		MOV	H,A
203A				1340	*			2089	22	E0	36	1910		MOV	L,A
203A				1350	*	DEFINE INPUT STRING TERMINATOR		208C	4F			1920		SHLD	PHON
203A				1360	*			208D	7A			1930		MOV	C,A
203A				1370	TERM	EQU	ODH	208E	17			1940		MOV	A,D
203A				1380	*			208F	DA	A6	20	1950		RAL	
203A				1390	*****			2092	17			1960		JC	VOWELA
203A				1400	*			2093	DA	CD	20	1970		RAL	
203A				1410	*	CSR1 MAIN LOOP		2096	17			1980		JC	CONSB
203A				1420	*			2097	DA	18	21	1990		JC	CONSA
203A	C5			1430	CSR1			209A	17			2000		RAL	
203B	D5			1440		PUSH B		209B	DA	33	21	2010		RAL	
203C	CD	63	20	1450		PUSH D		209E	E6	C0		2030		JC	COMMT
203C	C2	60	20	1460		CALL PARSE		20A0	C2	20	21	2040		JNZ	PLKPA
2042	00			1470		JNZ CSERR		20A3	C3	5F	21	2050		JMP	ERROR
2043	00			1480		NOP		20A6				2060	*		
2044	00			1490		NOP		20A6	CD	B1	21	2070	VOWELA	CALL	PUSHP
2045	CD	12	20	1500		CALL RULES		20A9	7A			2080		MOV	A,D
2048	C2	60	20	1510		JNZ CSERR		20AA	1F			2090		RAR	
204C	00			1520		NOP		20AB	D2	5F	21	2100		JNC	ERROR
204D	00			1530		NOP		20AE	CD	B1	21	2110		CALL	PUSHP
204D	00			1540		NOP		20B1	7A			2120	GETDIG	MOV	A,D
204E	CD	1B	20	1550		CALL GENFO		20B2	1F			2130		RAR	
2051	C2	60	20	1560		JNZ CSERR		20B3	1F			2140		RAR	
2054	00			1570		NOP		20B4	D2	DA	20	2150		JNC	LKPNG
2055	00			1580		NOP		20B7	3A	DF	36	2160		LDA	CHAR
2056	00			1590		NOP		20BA	D6	30		2170		SUI	'0'
2057	CD	21	20	1600		CALL GENPRM		20BC	47			2180		MOV	B,A
205A	00			1610		NOP		20BD	79			2190		MOV	A,C
205B	00			1620		NOP		20BE	87			2200		ADD	A
205C	00			1630		NOP		20BF	87			2210		ADD	A
205D	CD	03	20	1640		CALL PLAY		20C0	81			2220		ADD	C
2060	D1			1650		POP D		20C1	87			2230		ADD	A
2061	C1			1660		POP B		20C2	80			2240		ADD	B
2062	C9			1670		RET		20C3	4F			2250		MOV	C,A
2063				1680	*			20C4	32	E2	36	2260		STA	NUM
2063				1690	*			20C7	CD	BD	21	2270		CALL	GET
2063				1700	*****			20CA	C3	B1	20	2280		JMP	GETDIG
2063				1710	*										

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	COMMENT
20CD	CD	B1	21	2290	*	CALL	PUSHP	214B	CD	7A	22	2860		CALL	MATSET	* TERMINATE MATRIX
20DD	FE	48		2300	CONSB	CPI	'H'	214E	CD			2870		RNZ		
20D0	CA	F0	20	2310		JZ	GETH	214F	2A	00	35	2880		LHLD	MATPTR	
20D5	FE	58		2320		CPI	'X'	2152	7C			2890		MOV	A,H	
20D7	CA	20	21	2330		JZ	PLKPA	2153	2F			2900		CMA		
20DA	CD	0B	22	2340	LKPNG	CALL	LOOKUP	2154	67			2910		MOV	H,A	
20DD	C0			2350		RNZ	*	2155	7D			2920		MOV	A,L	
20DE	3A	DF	36	2360	PARSBG	LDA	CHAR	2156	2F			2930		CMA		
20E1	CD	CA	21	2370		CALL	GETFLG	2157	6F			2940		MOV	L,A	
20E4	C3	7D	20	2380		JMP	PARSB	2158	23			2950		INX	H	
20E7				2390	*			2159	23			2960		INX	H	
20E7	0C			2400	INCRH	INR	C	215A	22	02	35	2970		SHLD	NEGEND	* -ADDRESS OF TERM PHON
20E8	CD	BD	21	2410		CALL	GET	215D	AF			2980		XRA	A	
20EB	FE	48		2420		CPI	'H'	215E	C9			2990		RET		
20ED	C2	03	21	2430		JNZ	LKPH	215F				3000		ERROR	MESSAGE RETURN	
20F0	CD	BD	21	2440	GETH	CALL	GET	215F				3010	*	SYNTAX ERROR		
20F3	FE	48		2450		CPI	'H'	215F				3020	*	ERROR		
20F5	CA	E7	20	2460		JZ	INCRH	215F	21	80	36	3030		LXI	H,DUR	* USE DURATION ARRAY FOR MSG
20F8	3A	E1	36	2470		LDA	PHON+1	2162	11	9F	21	3040		LXI	D,ERTX1	
20FB	32	E0	36	2480		STA	PHON	2165	CD	98	21	3050		CALL	MOVCH	* MOVE 1ST PART OF MSG
20FE	3E	48		2490		MVI	A,'H'	2168	C2	65	21	3060		JNZ	\$-3	
2100	32	E1	36	2500		STA	PHON+1	216B	36	0D		3070		MVI	M,ODH	* TERMINATE IT
2103	CD	0B	22	2510	LKPH	CALL	LOOKUP	216D	11	E1	36	3080		LXI	D,PHON+1	* SEE IF ANYTHING IN PHON
2106	C0			2520		RNZ		2170	1A			3090		LDAX	D	
2107	79			2530		MOV	A,C	2171	47			3100		MOV	B,A	
2108	B7			2540		ORA	A	2172	1B			3110		DCX	D	
2109	CA	DE	20	2550		JZ	PARSBG	2173	1A			3120		LDAX	D	
210C	3E	48		2560		MVI	A,'H'	2174	80			3130		ORA	B	
210E	32	E0	36	2570		STA	PHON	2175	CA	92	21	3140		JZ	NZRET	* NO, SET NON-0 & RETURN
2111	32	E1	36	2580		STA	PHON+1	2178	11	AB	21	3150		LXI	D,ERTX2	* YES, ADD MORE TO MSG
2114	0D			2590		DCR	C	217B	CD	98	21	3160		CALL	MOVCH	
2115	C3	03	21	2600		JMP	LKPH	217E	C2	7B	21	3170		JNZ	\$-3	
2118	CD	B1	21	2610	*	CALL	CONSA	2181	11	E0	36	3180		LXI	D,PHON	* MOVE NON-0 PARTS OF PHON & CHA
211B	FE	48		2620	CONSA	CPI	'H'	2184	CD	98	21	3190		CALL	MOVCH	
211D	C2	5F	21	2630		JNZ	ERROR	2187	CD	98	21	3200		CALL	MOVCH	
2120	3A	E1	36	2640		LDA	PHON+1	218A	CD	98	21	3210		CALL	MOVCH	
2123	32	E0	36	2650	PLKPA	STA	PHON	218D	36	22		3220		MVI	M,'A'	
2126	3A	DF	36	2660		LDA	CHAR	218F	23			3230		INX	H	
2129	32	E1	36	2670		STA	PHON+1	2190	36	0D		3240		MVI	M,ODH	* TERMINATE THE MSG
212C	CD	0B	22	2680		CALL	LOOKUP	2192	21	80	36	3250		LXI	H,DUR	
212F	C0			2690		RNZ		2195	F6	FF		3260		ORI	255	
2130	C3	7A	20	2700		JMP	PARSA	2197	C9			3270		RET		
2133	CD	BD	21	2710	*	CALL	COMMT	2198				3280	*			
2136	7A			2720	COMMT	MOV	A,D	2198	1A			3290		LDAX	D	
2137	E6	10		2730		ANI	10H	2199	13			3300		INX	D	
2139	CA	33	21	2740		JZ	COMMT	219A	B7			3310		ORA	A	
213C	C3	7A	20	2750		JMP	PARSA	219B	C8			3320		RZ		
213F	AF			2760	*	XRA	A	219C	77			3330		MOV	M,A	
2140	32	E2	36	2770	FINUP	STA	NUM	219D	23			3340		INX	H	
2143	3E	02		2780		MVI	A,C	219E	C9			3350		RET		
2145	CD	7A	22	2790		CALL	MATSET	219F				3360	*			
2148	C0			2800		RNZ		219F	49	4E	50	3370		DT	'INPUT ERROR'	
2149	3E	04		2810		MVI	A,CTERM	21A2	55	54	20	3380		DB	0	' AT "
				2820				21A5	45	52	52	3390		DT		
				2830				21A8	4F	52						
				2840				21AA	00							
				2850				21AB	20	41	54					

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
21AE	20	22			3400		DB	0	DB	45H	21F5	45			3960		DB	45H	* N,
21B0	00				3410	*****			DB	85H	21F6	85			3970		DB	85H	* O, /
21B1					3420				DB	0AH	21F7	0A			3980		DB	0AH	* P, 0
21B1					3430	* PARSE SUBROUTINES			DB	0AH	21F8	0A			3990		DB	0AH	* Q, 1
21B1					3440				DB	43H	21F9	43			4000		DB	43H	* R, 2
21B1					3450				DB	42H	21FA	42			4010		DB	42H	* S, 3
21B1	3A	E1	36		3460	PUSH	LDA	PHON+1	DB	42H	21FB	42			4020		DB	42H	* T, 4
21B4	32	E0	36		3470		STA	PHON	DB	83H	21FC	83			4030		DB	83H	* U, 5
21B7	3A	DF	36		3480		LDA	CHAR	DB	0AH	21FD	0A			4040		DB	0AH	* V, 6
21BA	32	E1	36		3490		STA	PHON+1	DB	43H	21FE	43			4050		DB	43H	* W, 7
21BD	2A	E3	36		3500				DB	43H	21FF	03			4060		DB	43H	* X, 8
21C0	7E				3520	GET	LHLD	INPTR	DB	44H	2201	44			4080		DB	44H	* Z, :
21C1	E6	7F			3530		MOV	A, M	DB	0	2202	04			4090		DB	0	* [; BACK SLASH, <
21C3	32	DF	36		3540		ANI	7FH	DB	0	2203	00			4100		DB	0	*],-
21C6	23				3550		STA	CHAR	DB	0	2204	00			4110		DB	0	* * UP ARROW, >
21C7	22	E3	36		3560		INX	H	DB	0	2205	00			4120		DB	0	* * LEFT ARROW, ?
21CA	C5				3570	GETFLG	SHLD	INPTR	DB	0	2206	04			4130		DB	0	* * PARSER FLAGS BIT MASKS
21CB	4F				3580		PUSH	B	DB	0	2207				4140		DB	0	* * CONTROL CHAR, CLEAR FLAGS
21CC	E6	1F			3590		MOV	C, A	DB	16H	2208	16			4160		DB	16H	* PUNCTUATION, USE BITS 4, 2, 1
21CE	5F				3600		ANI	1FH	DB	0E9H	2209	E9			4190		DB	0E9H	* UPPER CASE, USE BITS 7, 6, 5, 3, 0
21CF	21	E7	21		3610		MOV	E, A	DB	0	220A	00			4200		DB	0	* LOWER CASE, CLEAR FLAGS
21D2	16	00			3620		LXI	H, PARFLG	DB	0	220B				4210		DB	0	
21D4	19				3630		MVI	D, 0	DB	0	220C				4220		DB	0	
21D5	46				3640		DAD	D	DB	0	220D				4230		DB	0	
21D6	79				3650		MOV	B, M	DB	0	220E				4240		DB	0	
21D7	07				3660		MOV	A, C	DB	0	220F				4250		DB	0	
21D8	07				3670		RJC		DB	0	2210				4260		DB	0	
21D9	07				3680		RJC		DB	0	2211				4270		DB	0	
21DA	E6	03			3690		RJC		DB	0	2212				4280		DB	0	
21DC	5F				3700		ANI	3	DB	0	2213				4300		DB	0	
21DD	21	07	22		3710		MOV	E, A	DB	0	2214	6C			4320		DB	0	
21E0	19				3720		LXI	H, CHRMASK	DB	0	2215	67			4330		DB	0	
21E1	7E				3730		DAD	D	DB	0	2216	EB			4340		DB	0	
21E2	A0				3740		ANA	B	DB	0	2217	0E	40		4350		DB	0	
21E3	57				3750		ANA	A, M	DB	0	2218	7A			4360		DB	0	
21E4	79				3760		MOV	D, A	DB	0	2219	21	C5	22	4370		DB	0	
21E5	C1				3770		MOV	A, C	DB	0	2220	7A			4380		DB	0	
21E6	C9				3780		POP	B	DB	0	2221	BE			4390		DB	0	
21E7					3790		RET		DB	0	2222	7B			4400		DB	0	
21E7					3800				DB	0	2223	BE			4410		DB	0	
21E7					3810				DB	0	2224	CA	30	22	4420		DB	0	
21E7	04				3820	PARFLG			DB	04H	2225	23			4430		DB	0	
21E8	81				3830				DB	81H	2226	0D			4440		DB	0	
21E9	08				3840				DB	08H	2227	C2	1C	22	4450		DB	0	
21EA	20				3850				DB	20H	2228	00			4460		DB	0	
21EB	40				3860				DB	40H	2229	C2	5F	21	4470		DB	0	
21EC	81				3870				DB	81H	222C	C1			4480		DB	0	
21ED	08				3880				DB	08H	2230	3E	3A		4490		DB	0	
21EE	40				3890				DB	40H	2232	85			4500		DB	0	
21EF	21				3900				DB	21H	2233	0F			4510		DB	0	
21F0	81				3910				DB	81H	2234	FE	1D		4520		DB	0	
21F1	30				3920				DB	30H	2236	CA	50	22			DB	0	
21F2	40				3930				DB	40H							DB	0	
21F3	45				3940				DB	45H							DB	0	
21F4	0D				3950				DB	0DH							DB	0	

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2239	FE	1E		4530		CPI	CEM	22AB	0D			5070		DB	0DH
2238	CA	55	22	4540		JZ	INSAXM	22AC				5080	*		
223E	FE	1F		4550		CPI	CEN	22AC				5090	*		
2240	CA	5A	22	4560		JZ	INSAXN	22AC				5100	*		
2243	FE	38		4570		CPI	CCH	22AC				5110	*		
2245	CA	61	22	4580		JZ	INSTSH	22AC	2A	00	35	5120	MATPAK	LHLD	MATPTR
2248	FE	39		4590		CPI	CJH	22AF	77			5130		MOV	M,A
224A	CA	68	22	4600		JZ	INSDZH	22B0	EB			5140		XCHG	
224D	C3	75	22	4610		JMP	PUMAT	22B1	07			5150		RLC	
2250				4620	*			22B2	4F			5160		MOV	C,A
2250	06	21		4630	INSAXL	MVI	B,CL	22B3	06	00		5170		MVI	B,0
2252	C3	5C	22	4640		JMP	INS1	22B5	21	3D	23	5180		LXI	H,FEATAB
2255	06	24		4650	INSAXM	MVI	B,CM	22B8	09			5190		DAD	B
2257	C3	5C	22	4660		JMP	INS1	22B9	EB			5200		XCHG	*
225A	06	25		4670	INSAXN	MVI	B,CN	22BA	01	5F	00	5210		LXI	B,MATLEN
225C	3E	0F		4680	INS1	MVI	A,CAX	22BD	09			5220		DAD	B
225E	C3	6C	22	4690		JMP	INS2	22BE	1A			5230		LDAX	D
2261	3E	28		4700	INSTSH	MVI	A,CT	22BF	77			5240		MOV	M,A
2263	06	33		4710		MVI	B,CSH	22C0	13			5250		INX	D
2265	C3	6C	22	4720	INSDZH	JMP	INS2	22C1	1A			5260		LDAX	D
2268	3E	2C		4730		MVI	A,CD	22C2	09			5270		DAD	B
226A	06	37		4740		MVI	B,CZH	22C3	77			5280		MOV	M,A
226C	CD	7A	22	4750	INS2	CALL	MATSET	22C4	C9			5290		RET	
226F	3E	00		4760		MVI	A,0	22C5				5300	*		
2271	32	E2	36	4770		STA	NUM	5310	*****			5310			
2274	78			4780		MOV	A,B	5320				5320	*		
2275	CD	7A	22	4790	PUMAT	CALL	MATSET	22C5				5330	*		
2278	C1			4800		POP	B	22C5				5340	*		
2279	C9			4810		RET		22C5				5350			
227A				4820	*			22C6				5360			
227A				4830	*			22C7	2E			5370			
227A	2A	00	35	4840	MATSET	LHLD	MATPTR	22C8	00			5380			
227D	11	9C	CA	4850		LXI	D,-MATRIX-MATLEN-1	22C9	2C			5390			
2280	19			4860		DAD	D	22CA	00			5400			
2281	DA	9A	22	4870		JC	MATERR	22CB	3F			5410			
2284	C5			4880		PUSH	B	22CC	00			5420			
2285	CD	AC	22	4890		CALL	MATPAK	22CD	23			5430			
2288	09			4900		DAD	B	22CE	00			5440			
2289	3A	E2	36	4910		LDA	NUM	22CF	49	59		5450			
228C	77			4920		MOV	M,A	22D1	49	48		5460			
228D	09			4930		DAD	B	22D3	45	48		5470			
228E	16	00		4940		MVI	M,0	22D5	41	45		5480			
2290	C1			4950		POP	B	22D7	41	41		5490			
2291	2A	00	35	4960		LHLD	MATPTR	22D9	41	41		5500			
2294	23			4970		INX	H	22DB	41	4F		5510			
2295	22	00	35	4980		SHLD	MATPTR	22DD	4F	57		5520			
2298	AF			4990		XRA	A	22DF	55	48		5530			
2299	C9			5000		RET		22E1	55	57		5540			
229A				5010	*			22E3	41	58		5550			
229A	21	A0	22	5020	MATERR	LXI	H,MERTX	22E5	49	58		5560			
229D	F6	FF		5030		ORI	255	22E7	45	52		5570			
229F	C9			5040		RET		22E9	55	58		5580			
22A0				5050	*			22EB	4F	48		5590			
22A0	4D	41	54	5060	MERTX	DT	'MATRIX FULL'	22ED	41	57		5600			
22A3	52	49	58					22EF	41	59		5610			
22A6	20	46	55					22F1	4F	59		5620			
22A9	4C	4C						22F3	45	59		5630			

PHONEME VALIDATION TABLE

ADDR B1 B2 B3 E LINE	LABEL	OPCD	OPERAND	ADDR B1 B2 B3 E LINE	LABEL	OPCD	OPERAND
22F5 52 58		DT	'RX'	234D 05		DB	WDBND+IGNORE * SPACE
22F7 4C 58	5640	DT	'LX'	233E 00	FEATAB	DB	0
22F9 57 58	5650	DT	'WX'	233F 03		DB	PHBND+IGNORE * PERIOD
22FB 59 58	5660	DT	'YX'	2340 00		DB	0
22FD 57 48	5670	DT	'WH'	2341 02		DB	PHBND * COMMA
22FF 45 4C	5680	DT	'EL'	2342 00		DB	0
2301 45 4D	5690	DT	'EM'	2343 03		DB	PHBND+IGNORE * QUESTION
2303 45 4E	5700	DT	'EN'	2344 00		DB	0
2305 52	5710	DB	'R'	2345 03		DB	PHBND+IGNORE * TERMINATOR
2306 00	5720	DB	0	2346 00		DB	0
2307 4C	5730	DB	'L'	2347 A0		DB	VOWEL+FRONT * IY
2308 00	5740	DB	0	2348 40		DB	VOICE
2309 57	5750	DB	'W'	2349 A0		DB	VOWEL+FRONT * IH
230A 00	5760	DB	0	234A 40		DB	VOICE
230B 59	5770	DB	'Y'	234B A0		DB	VOWEL+FRONT * EH
230C 00	5780	DB	0	234C 40		DB	VOICE
230D 4D	5800	DB	'M'	234D A0		DB	VOWEL+FRONT * AE
230E 00	5810	DB	0	234E 40		DB	VOICE
230F 4E	5820	DB	'N'	234F A0		DB	VOWEL+FRONT * AA
2310 00	5830	DB	0	2350 40		DB	VOICE
2311 4E 58	5840	DT	'NX'	2351 A0		DB	VOWEL+FRONT * AH
2313 50	5850	DB	'P'	2352 40		DB	VOICE
2314 00	5860	DB	0	2353 80		DB	VOWEL * AO
2315 54	5870	DB	'T'	2354 40		DB	VOICE
2316 00	5880	DB	0	2355 90		DB	VOWEL+DIPHTH * OW
2317 4B	5890	DB	'K'	2356 40		DB	VOICE
2318 00	5900	DB	0	2357 80		DB	VOWEL * UH
2319 4B 58	5910	DT	'KX'	2358 40		DB	VOICE
231B 42	5920	DB	'B'	2359 90		DB	VOWEL+DIPHTH * UW
231C 00	5930	DB	0	235A 40		DB	VOICE
231D 44	5940	DB	'D'	235B 80		DB	VOWEL * AX
231E 00	5950	DB	0	235C 40		DB	VOICE
231F 47	5960	DB	'G'	235D 80		DB	VOWEL * IX
2320 00	5970	DB	0	235E 40		DB	VOICE
2321 47 58	5980	DT	'GX'	235F 80		DB	VOWEL * ER
2323 44 58	5990	DT	'DX'	2360 40		DB	VOICE
2325 46	6000	DB	'F'	2361 80		DB	VOWEL * UX
2326 00	6010	DB	0	2362 40		DB	VOICE
2327 54 48	6020	DT	'TH'	2363 80		DB	VOWEL * OH
2329 53	6030	DB	'S'	2364 40		DB	VOICE
232A 00	6040	DB	0	2365 90		DB	VOWEL+DIPHTH * AW
232B 53 48	6050	DT	'SH'	2366 40		DB	VOICE
232D 56	6060	DB	'V'	2367 B0		DB	VOWEL+FRONT+DIPHTH * AY
232E 00	6070	DB	0	2368 40		DB	VOICE
232F 44 48	6080	DT	'DH'	2369 B0		DB	VOWEL+FRONT+DIPHTH * OY
2331 5A	6090	DB	'Z'	236A 40		DB	VOICE
2332 00	6100	DB	0	236B 80		DB	VOWEL+FRONT+DIPHTH * EY
2333 5A 48	6110	DT	'ZH'	236C 40		DB	VOICE
2335 43 48	6120	DT	'CH'	236D 80		DB	VOICE
2337 4A 48	6130	DT	'JH'	236E 40		DB	VOWEL * LX
2339 48 48	6140	DT	'HH'	236F 80		DB	VOWEL * WX
233B 51	6150	DB	'Q'	2370 40		DB	VOICE
233C 00	6160	DB	0	2371 80		DB	VOWEL * YX
233D	6170	DB	0	2372 40		DB	VOICE
233D	6180	DB	0	2373 80		DB	VOICE
233D	6190	DB	0	2374 40		DB	VOICE
233D	6200	DB	0	2375 40		DB	CONS

FEATURE DEFINITION TABLE

CSR1 Section 2

Source Listing

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND
2000					0010	* RULES, GROUPS 1 AND 2				
2000					0020	*				
2000					0030	SECTION 2 OF THE CSRL SYNTHESIS BY RULE SYSTEM				
2000					0040	*				
2000					0050	* LLOYD RICE, COMPUTALKER CONSULTANTS				
2000					0060	* VERSION 1.07 MAY 30, 1977				
2000					0070	*				
2000					0080	*****				
2000					0090	*				
2000					0100	* COMMON JUMP ADDRESS TABLE				
2000					0110	* THIS TABLE ALLOWS REASSEMBLING ANY SECTION				
2000					0120	* WITHOUT CHANGING REFERENCES IN OTHER SECTIONS				
2000					0130	*				
2000					0140	*****				
2000					0150	*				
2000					0160	COMJMP EQU \$				
2000					0170	*				
2000					0180	CSRI DS 3				
2000					0190	PLAY DS 3				
2003					0200	BUFADR DS 2				
2006					0210	BUFEND DS 2				
2008					0220	PVTAB DS 2				
200A					0230	MATPAK DS 3				
200C					0240	MATERR DS 3				
200F					0250	JMP RULES				
2012					0260	SETDUR DS 3				
2015					0270	RULES3 DS 3				
2018					0280	GENF0 DS 3				
201B					0290	CLRBUF DS 3				
201E					0300	GENPRM DS 3				
2021					0310	DUMMY DS 22				
2024					0320	*				
203A					0330	*****				
203A					0340	*				
203A					0350	* COMRAM ORIGEN DEFINITION				
203A					0360	*				
203A					0370	ORG COMJMP+1500H				
3500					0380	COMRAM EQU \$				
3500					0390	*				
3500					0400	* CSRL SYSTEM RAM SPACE DEFINITION				
3500					0410	*				
3500					0420	MATPTR DS 2				
3502					0430	NEGEND DS 2				
3504					0440	MATRIX EQU \$				
3504					0450	MATLEN EQU 95				
3504					0460	PHCODE DS MATLEN				
3563					0470	FEATA DS MATLEN				
35C2					0480	FEATB DS MATLEN				
3621					0490	STRES DS MATLEN				
3680					0500	DUR DS MATLEN				
36DF					0510	MATEND EQU \$				
36DF					0520	*				
36DF					0530	* RULES (LOCAL) RAM WORKSPACE				
36DF					0540	*				
36DF					0550	MOVAD DS 2				
36E1					0560	COUNT DS 1				
36E2					0570	*				
36E2					0580	*****				
36E2					0590	*				
36E2					0600	* RULES GROUPS 1 AND 2				
36E2					0610	*				
36E2					0620	*				
23C0					0630	* ORG COMJMP+3C0H				
23C0					0640	* PHONEME CODE DEFINITIONS FOR RULES				
23C0					0650	*				
23C0					0660	CSPACE EQU 0				
23C0					0670	CTERM EQU 4				
23C0					0680	CUM EQU 14				
23C0					0690	CUX EQU 18				
23C0					0700	CRX EQU 24				
23C0					0710	CLX EQU 25				
23C0					0720	CWX EQU 26				
23C0					0730	CYX EQU 27				
23C0					0740	CWH EQU 28				
23C0					0750	CR EQU 32				
23C0					0760	CW EQU 34				
23C0					0770	CL EQU 33				
23C0					0780	CM EQU 36				
23C0					0790	CN EQU 37				
23C0					0800	CNX EQU 38				
23C0					0810	CP EQU 39				
23C0					0820	CT EQU 40				
23C0					0830	CK EQU 41				
23C0					0840	CKX EQU 42				
23C0					0850	CB EQU 43				
23C0					0860	CD EQU 44				
23C0					0870	CG EQU 45				
23C0					0880	CGX EQU 46				
23C0					0890	CDX EQU 47				
23C0					0900	CS EQU 50				
23C0					0910	CSH EQU 51				
23C0					0920	CZ EQU 54				
23C0					0930	CZH EQU 55				
23C0					0940	CHH EQU 58				
23C0					0950	CQ EQU 59				
23C0					0960	*				
23C0					0970	* DEFINE FEATURE LABELS				
23C0					0980	*				
23C0					0990	VOWEL EQU 80H				
23C0					1000	CONS EQU 40H				
23C0					1010	FRONT EQU 20H				
23C0					1020	DIPHTH EQU 10H				
23C0					1030	WBAND EQU 4				
23C0					1040	PHEND EQU 2				
23C0					1050	IGNORE EQU 1				
23C0					1060	STOP EQU 80H				
23C0					1070	VOICE EQU 40H				
23C0					1080	PLOS EQU 20H				
23C0					1090	PLOSA EQU 10H				
23C0					1100	FRIC EQU 8				
23C0					1110	LIQUID EQU 4				
23C0					1120	NASAL EQU 2				
23C0					1130	DENTAL EQU 1				
23C0					1140	*				

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
23C0					1150	*			2402	CA	IC	24	1720			JZ	RIB
23C0					1160	*****			2405	09			1730			DAD	B
23C0					1170	*			2406	7E			1740			MOV	A,M
23C0					1180	*	RULES CODE		2407	E6	80		1750			ANI	VOWEL
23C0					1190	*	*****		2409	CA	IC	24	1760			JZ	RIB
23C0					1200	*****			240C	09			1770			DAD	B
23C0					1210	*	RULES MAIN		240D	09			1780			DAD	B
23C0					1220	*			240E	7E			1790			MOV	A,M
23C0					1230	*			240F	B7			1800			ORA	A
23C0	CD	D8	23		1240	RULES	CALL	RULES1	2410	CA	IC	24	1810			JZ	RIB
23C3	C0				1250		RNZ	*	2413	3E	3B		1820			MVI	A,CQ
23C4	00				1260		NOP	*	2415	CD	0A	27	1830			CALL	MATNSR
23C5	00				1270		NOP		2418	C0			1840			RNZ	
23C6	00				1280		NOP		2419	C3	65	24	1850			JMP	ENDRI
23C7	CD	78	24		1290		CALL	RULES2	241C				1860	*			
23CA	00				1300		NOP		241C				1870	*	RX	<=	VOWEL/R/
23CB	00				1310		NOP		241C				1880	*			
23CC	00				1320		NOP		241C	2A	00	35	1890	RIB		LHLD	MATPTR
23CD	CD	15	20		1330		CALL	SETDUR	241F	7E			1900			MOV	A,M
23D0	00				1340		NOP		2420	FE	20		1910			CPI	CR
23D1	00				1350		NOP		2422	C2	2A	24	1920			JNZ	RIC
23D2	00				1360		NOP		2425	16	18		1930			MVI	D,CRX
23D3	CD	18	20		1370		CALL	RULES3	2427	C3	31	24	1940			JMP	RIB
23D6	AF				1380		XRA	A	242A				1950	*			
23D7	C9				1390		RET		242A				1960	*	LX	<=	VOWEL/L/
23D8					1400	*			242A	FE	21		1970	*			
23D8					1410	*			242A	C2	46	24	1980	RIC		CPI	CL
23D8					1420	*****			242C	16	19		1990			JNZ	RID
23D8					1430	*			242F	16	19		2000			MVI	D,CLX
23D8					1440	*	RULE GROUP 1		2431	2B			2010	RIB		DCX	H
23D8					1450	*			2432	7E			2020			MOV	A,M
23D8	21	05	35		1460	RULES1	LXI	H,MATRIX+1	2433	FE	04		2030			CPI	CTERM
23DB	22	00	35		1470		SHLD	MATPTR	2435	CA	65	24	2040			JZ	ENDRI
23DE	01	5F	00		1480		LXI	B,MATLEN	2438	09			2050			DAD	B
23E1					1490	RILoop	EQU	\$	2439	7E			2060			MOV	A,M
23E1					1500	*			243A	E6	80		2070			ANI	VOWEL
23E1					1510	*			243C	CA	65	24	2080			JZ	ENDRI
23E1					1520	*			2440	CD	0C	20	2100			CALL	MATPAK
23E1	09				1530	RIA	DAD	B	2443	2A	00	35	2110	*		LHLD	MATPTR
23E2	7E				1540		MOV	A,M	2446				2120	*			
23E3	E6	80			1550		ANI	VOWEL	2446				2130	*	YX	<=	DIPHTH FRONT//
23E8	09				1560		JZ	RIB	2446				2140	*	WX	<=	DIPHTH -FRONT//
23E9	09				1570		DAD	B	2446				2150	*			
23EA	7E				1580		DAD	B	2446				2160	RID		DCX	H
23EA	7E				1590		MOV	A,M	2446	2B			2170			MOV	A,M
23EB	B7				1600		ORA	A	2447	7E			2180			CPI	CTERM
23EC	CA	IC	24		1610		JZ	RIB	2448	FE	04		2190			JZ	ENDRI
23EF	2A	00	35		1620		LHLD	MATPTR	244A	CA	65	24	2200			DAD	B
23F2	2B				1630		DCX	H	244D	09			2210			MOV	A,M
23F3	7E				1640		MOV	A,M	244E	7E			2220			ANI	DIPHTH
23F4	FE	04			1650		CPI	CTERM	244F	E6	10		2230			JZ	ENDRI
23F6	CA	65	24		1660		JZ	ENDRI	2451	CA	65	24	2240			MOV	A,M
23F9	FE	00			1670		CPI	CSPACE	2454	7E			2250			ANI	FRONT
23FB	C2	IC	24		1680		JNZ	RIB	2455	E6	20		2260			JZ	BACK
23FE	2B				1690		DCX	H	2457	CA	5F	24	2270			MVI	A,CYX
23FF	7E				1700		MOV	A,M	245A	3E	1B		2280			JMP	GLIDE
2400	FE	04			1710		CPI	CTERM	245C	C3	61	24					

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	LINE	LABEL	OPCD	OPERAND
245F	3E	1A		2290	BACK	MVI	A,CWX	LHLD	MATPTR	2860	R2B	LHLD	MATPTR
2461	CD	0A	27	2300	GLIDE	CALL	MATNSR	MOV	A,M	2870		MOV	A,M
2464	C0			2310		RN2		CPI	CS	2880		CPI	CS
2465				2320	*			JNZ	R2C	2890		JNZ	R2C
2465				2330	*	END OF RULE GROUP 1		INX	H	2900		INX	H
2465				2340	*			MOV	A,M	2910		MOV	A,M
2465	00			2350	ENDR1			CPI	CTERM	2920		CPI	CTERM
2466	2A	00	35	2360				JZ	ENDR2	2930		JZ	ENDR2
2469	23			2370	H			DAD	B	2940		DAD	B
246A	22	00	35	2380				DAD	B	2950		DAD	B
246D	AF			2390				MOV	A,M	2960		MOV	A,M
246E	EB			2400	XCHG			XRI	PLOS	2970		XRI	PLOS
246F	2A	02	35	2410	LHLD	NEGEN		ANI	PLOS+VOICE	2980		ANI	PLOS+VOICE
2472	19			2420	DAD	D		JNZ	R2C	2990		JNZ	R2C
2473	D8			2430	RC	*		INX	H	3000		INX	H
2474	EB			2440	XCHG			INX	H	3010		INX	H
2475	C3	E1	23	2450	JMP	R1LOOP		MOV	A,M	3020		MOV	A,M
2478				2460	*			MOV	A,M	3030		MOV	A,M
2478				2470	*****			CPI	CTERM	3040		CPI	CTERM
2478				2480	*			JZ	ENDR2	3050		JZ	ENDR2
2478				2490	*	RULE GROUP 2		DAD	B	3060		DAD	B
2478				2500	*			MOV	A,M	3070		MOV	A,M
2478	21	05	35	2510	RULES2	LXI	H,MATRIX+1	ANI	VOWEL	3080		ANI	VOWEL
247B	22	00	35	2520		SHLD	MATPTR	JZ	R2C	3090		JZ	R2C
247E	01	5F	00	2530		LXI	B,MATLEN	DAD	B	3100		DAD	B
2481				2540	R2LOOP	ECU	\$	DAD	B	3110		DAD	B
2481				2550	*			MOV	A,M	3120		MOV	A,M
2481				2560	*	STRESSX=1 <= /CONS STRESS.GE.0/VOWEL STRESS.NE.C		ORA	A	3130		ORA	A
2481				2570	*			JZ	R2C	3140		JZ	R2C
2481	09			2580	R2A	DAD	B	DCX	H	3150		DCX	H
2482	7E			2590		MOV	A,M	MVI	M,-1	3160		MVI	M,-1
2483	E6	40		2600		ANI	CONS	DCX	H	3170		DCX	H
2485	CA	FD	25	2610		JZ	R2G	MVI	M,-1	3180		MVI	M,-1
2488	09			2620		DAD	B			3190	*		
2489	09			2630		DAD	B			3200	*		
248A	7E			2640		DAD	B			3210	*		
248B	B7			2650		ORA	A			3220	*		
248C	FA	AA	24	2660		JM	R2B			3230	R2C		
248F	2A	00	35	2670		LHLD	MATPTR			3240			
2492	23			2680		INX	H			3250			
2493	7E			2690		MOV	A,M			3260			
2494	FE	04		2700		CPI	CTERM			3270			
2496	CA	FD	25	2710		JZ	R2G			3280			
2499	09			2720		DAD	B			3290			
249A	7E			2730		MOV	A,M			3300			
249B	E6	80		2740		ANI	VOWEL			3310			
249D	CA	AA	24	2750		JZ	R2B			3320			
24A0	09			2760		DAD	B			3330	R2C1		
24A1	09			2770		DAD	B			3340			
24A2	7E			2780		MOV	A,M			3350			
24A3	B7			2790		ORA	A			3360			
24A4	CA	7D	25	2800		JZ	R2E			3370			
24A7	2B			2810		DCX	H			3380			
24A8	36	01		2820		MVI	M,1			3390			
24AA				2830	*					3400			
24AA				2840	*	STRESSX,X+1=-1 <= /S,PLOS -VOICE/VOWEL STRESS.NE.0				3410			
24AA				2850	*					3420			

* COL X NOT AN S
 * GET COL X+1 CODE
 * S IN LAST COL, END GROUP
 * GET COL X+1 FEATB
 * PLOS+VOICE
 * X+1 IS NOT UNVOICED PLOSIVE
 * GET COL X+2 CODE
 * GET COL X+2 FEATA
 * NOT A VOWEL
 * X+2 STRESS MUST BE NON 0
 * SET STRESS X+1 =-1
 * SET STRESS X =-1
 * STRESSX,X+1=-1 <= /PLOS OR (FRIC -VOICE),LIQUID OR NASAL/VOWEL STRESS.NE.0
 * GET COL X FEATE
 * COL X IS PLOSIVE
 * FRIC+VOICE
 * NEITHER PLOS NOR FRIC -VOICE
 * GET COL X+1 CODE
 * GET COL X+1 FEATB
 * LIQUID+NASAL
 * NEITHER LIQUID NOR NASAL

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2508	2A	00	35	3430	R2C2	LHLD	MATPTR	LHLD	MATPTR	2564	7E		4000			MOV	A,M
250B	23			3440		INX	H	MOV	ANI	2565	E6	80	4010			ANI	VOWEL
250C	23			3450		INX	H	JZ	ENDR2	2567	CA	F8	26	4020		JZ	ENDR2
250D	7E			3460		MOV	A,M			256A	09		4030			DAD	B
250E	FE	04		3470		CPI	CTERM			256B	09		4040			DAD	B
2510	CA	42	26	3480		JZ	R2JK			256C	7E		4050			MOV	A,M
2513	09			3490		DAD	B			256D	B7		4060			ORA	A
2514	7E			3500		MOV	A,M			256E	CA	F8	26	4070		JZ	ENDR2
2515	E6	80		3510		ANI	VOWEL			2571	2B		4080			DCX	H
2517	CA	42	26	3520		JZ	R2JK			2572	36	FF		4090		MVI	M,-1
251A	09			3530		DAD	B			2574	2B		4100			DCX	H
251B	09			3540		DAD	B			2575	36	FF		4110		MVI	M,-1
251C	7E			3550		MOV	A,M			2577	2B		4120			DCX	H
251D	B7			3560		ORA	A			2578	36	FF		4130		MVI	M,-1
251E	CA	42	26	3570		JZ	R2JK			257A	C3	F8	26	4140		JMP	ENDR2
2521	2B			3580		DCX	H			257D			4150	*			
2522	36	FF		3590		MVI	M,-1			257D			4160	*	STRESSX,X+1=-1	<= /T OR D,SH OR ZH/VOWEL STRESS.NE.0	
2524	2B			3600		DCX	H			257D			4170	*			
2525	36	FF		3610		MVI	M,-1			257D	2A	00	35	4180	R2E	LHLD	MATPTR
2527	C3	42	26	3620		JMP	R2JK			2580	7E		4190			MOV	A,M
252A				3630	*					2581	FE	28	4200			CPI	CTERM
252A				3640	*					2583	CA	8B	25	4210		JZ	R2E1
252A				3650	*					2586	FE	2C	4220			CPI	CD
252A				3660	*					2588	C2	1D	26	4230		JNZ	R2H
252A				3670	R2D					258B	23		4240	R2E1		INX	H
252A				3680						258C	7E		4250			MOV	A,M
252D	7E			3690		CPI	CS			258D	FE	04	4260			CPI	CTERM
252E	FE	32		3700		JNZ	R2E			258F	CA	42	26	4270		JZ	R2JK
2530	C2	7D	25	3710		INX	H			2592	FE	33	4280			CPI	CSR
2533	23			3720		MOV	A,M			2594	CA	9C	25	4290		JZ	R2E2
2534	7E			3730		CPI	CTERM			2597	FE	37	4300			CPI	CZH
2535	FE	04		3740		JZ	ENDR2			2599	C2	BA	25	4310		JNZ	R2F
2537	CA	F8	26	3750		DAD	B			259C	23		4320	R2E2		INX	H
253A	09			3760		DAD	B			259D	7E		4330			MOV	A,M
253B	09			3770		MOV	A,M			259E	FE	04	4340			CPI	CTERM
253C	7E			3780		XRI	PLOS			25A0	CA	42	26	4350		JZ	R2JK
253D	EE	20		3790		PLOS	PLOS+VOICE			25A3	09		4360			DAD	B
253F	E6	60		3800		JNZ	ENDR2			25A4	7E		4370			MOV	A,M
2541	C2	F8	26	3810		LHLD	MATPTR			25A5	E6	80	4380			ANI	VOWEL
2544	2A	00	35	3820		INX	H			25A7	CA	42	26	4390		JZ	R2JK
2547	23			3830		INX	H			25AA	09		4400			DAD	B
2548	23			3840		MOV	A,M			25AB	09		4410			DAD	B
2549	7E			3850		CPI	CTERM			25AC	7E		4420			MOV	A,M
254A	FE	04		3860		JZ	ENDR2			25AD	B7		4430			ORA	A
254F	09			3870		DAD	B			25AE	CA	42	26	4440		JZ	R2JK
2550	09			3880		DAD	B			25B1	2B		4450			DCX	H
2551	7E			3890		MOV	A,M			25B2	36	FF	4460			MVI	M,-1
2552	E6	04		3900		ANI	LIQUID			25B4	2B		4470			DCX	H
2554	CA	F8	26	3910		JZ	ENDR2			25B5	36	FF	4480			MVI	M,-1
2557	2A	00	35	3920		LHLD	MATPTR			25B7	C3	42	26	4490		JMP	R2JK
255A	23			3930		INX	H			25BA			4500	*			
255B	23			3940		INX	H			25BA			4510	*	DX	<= VOWEL/T OR D/(WDBND,VOWEL) OR VOWEL STRESS.EQ.0	
255C	23			3950		INX	H			25BA			4520	*			
255D	7E			3960		MOV	A,M			25BA	2A	00	35	4530	R2F	LHLD	MATPTR
255E	FE	04		3970		CPI	CTERM			25BD	2B		4540			DCX	H
2560	CA	F8	26	3980		JZ	ENDR2			25BE	7E		4550			MOV	A,M
2563	09			3990		DAD	B			25BF	FE	04	4560			CPI	CTERM

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND
25C1	CA	42	26	4570		JZ	R2JK		
25C4	09			4580	* COL X IS 1ST COL	DAD	B	JMP	R2HI
25C5	7E			4590	* GET COL X-1 FEATA	MOV	A,M		
25C6	E6	80		4600	* NOT A VOWEL	ANI	VOWEL		
25C8	CA	42	26	4610		JZ	R2JK		
25CB	23			4620		INX	H		
25CC	23			4630		INX	H		
25CD	7E			4640	* GET COL X+1 FEATA	MOV	A,M		
25CE	E6	04		4650	* IT'S A WORD BOUNDARY	ANI	WDBND		
25D0	C2	E3	25	4660	* GET FEAT A AGAIN	JNZ	R2F2		
25D3	7E			4670	* IT'S NOT A VOWEL	MOV	A,M		
25D4	E6	80		4680	* GET COL X+1 STRESS	ANI	VOWEL		
25D6	CA	42	26	4690		JZ	R2JK		
25D9	09			4700		DAD	B		
25DA	09			4710		DAD	B		
25DB	7E			4720		MOV	A,M		
25DC	B7			4730		ORA	A		
25DD	CA	F5	25	4740		JZ	R2F3		
25E0	C3	42	26	4750		JMP	R2JK		
25E3	2A	00	35	4760		LHLD	MATPTR		
25E6	23			4770		INX	H		
25E7	23			4780		INX	H		
25E8	7E			4790		MOV	A,M		
25E9	FE	04		4800		CPI	CTERM		
25EB	CA	42	26	4810		DAD	B		
25EE	09			4820		MOV	A,M		
25EF	7E			4830		MOV	A,M		
25F0	E6	80		4840		ANI	VOWEL		
25F2	CA	42	26	4850		JZ	R2JK		
25F5	3E	2F		4860		MVI	A,CDX		
25F7	CD	0C	20	4870		CALL	MATPAK		
25FA	C3	F8	26	4880		JMP	ENDR2		
25FD				4890	* UX <= DENTAL/UW/				
25FD				4910					
25FD				4920					
25FD	2A	00	35	4930		LHLD	MATPTR		
2600	7E	0E		4940		MOV	A,M		
2601	FE	0E		4950		CPI	CUW		
2603	C2	1D	26	4960		JNZ	R2H		
2606	2B			4970		DCX	H		
2607	7E			4980		MOV	A,M		
2608	FE	04		4990		CPI	CTERM		
260A	CA	F8	26	5000		JZ	ENDR2		
260D	09			5010		DAD	B		
260E	09			5020		DAD	B		
260F	7E			5030		MOV	A,M		
2610	E6	01		5040		ANI	DENTAL		
2612	CA	F8	26	5050		JZ	ENDR2		
2615	3E	12		5060		MVI	A,CUX		
2617	CD	0C	20	5070		CALL	MATPAK		
261A	C3	F8	26	5080		JMP	ENDR2		
261D				5090	* KX <= /K/VOWEL -FRONT				
261D				5100					
261D	FE	29		5110		CPI	CK		
261F	C2	27	26	5120		JNZ	R2I		
2622	1E	2A		5130		MVI	E,CKX		

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	
267D	7E			5710		MOV	A,M			26D9	CA	F8	26	6280		JZ	ENDR2	* NOT A VOWEL
267E	E6	20		5720		ANI	PLOS			26DC	09			6290		DAD	B	
2680	CA	F8	26	5730		JZ	ENDR2			26DD	09			6300		DAD	B	
2683	EB			5740		XCHG	*			26DE	7E			6310		MOV	A,M	* GET COL X+1 STRESS
2684	23			5750		INX	H			26DF	B7			6320		ORA	A	
2685	7E	04		5760		MOV	A,M			26E0	C2	F8	26	6330		JNZ	ENDR2	* VOWEL IS STRESSED, END GP 2
2686	FE	04		5770		CPI	CTERM			26E3	2A	00	35	6340		LHLD	MATPTR	
2688	CA	F8	26	5780		JZ	ENDR2			26E6	2B			6350		DCX	H	
268B	FE	00		5790		CPI	CSPACE			26E7	7E			6360		MOV	A,M	* GET COL X-1 CODE
268D	C2	97	26	5800		JNZ	R2L2			26E8	FE	04		6370		CPI	CTERM	
2690	23			5810		INX	H			26EA	CA	F8	26	6380		JZ	ENDR2	
2691	7E	04		5820		MOV	A,M			26ED	09			6390		DAD	B	
2692	FE	04		5830		CPI	CTERM			26EE	7E			6400		MOV	A,M	* GET COL X-1 FEATA
2694	CA	F8	26	5840		JZ	ENDR2			26EF	E6	06		6410		ANI	WDBND+PHBND	
2697	09			5850	R2L2	DAD	B			26F1	C2	F8	26	6420		JNZ	ENDR2	* EITHER BOUNDARY STOPS THE RULE
2698	09			5860		DAD	B			26F4	1A			6430	R2MN	LDAX	D	* GET COL X FEATB
2699	7E			5870		MOV	A,M			26F5	E6	EF		6440		ANI	255-PLOSA	
269A	E6	80		5880		ANI	STOP			26F7	12			6450	*	STAX	D	* DELETE COL X PLOSA FEATURE
269C	CA	A6	26	5890		JZ	R2M			26F8				6460	*			
269F	1A			5900		LDAX	D			26F8				6470	*			
26A0	E6	CF		5910		ANI	255-PLOSA			26F8	00			6480	*			
26A2	12			5920		STAX	D			26F8	2A	00	35	6490	ENDR2	NOP	*	BREAKPOINT LOC
26A3	C3	F8	26	5930		JMP	ENDR2			26F9	2A	00	35	6500		LHLD	MATPTR	
26A6				5940	*					26FC	23			6510		INX	H	
26A6				5950	*					26FD	22	00	35	6520		SHLD	MATPTR	
26A6				5960	*					2700	EB			6530		XCHG		
26A9	54			5980		LHLD	MATPTR			2701	2A	02	35	6540		LHLD	NEGEND	
26AA	5D			5990		MOV	E,L			2704	19			6550		DAD	D	
26AB	09			6000		DAD	B			2705	D8			6560		RC	*	* RETURN IF AT END OF MATRIX
26AC	09			6010		DAD	B			2706	EB			6570		XCHG		
26AD	7E			6020		MOV	A,M			2707	C3	81	24	6580		JMP	R2LOOP	
26AE	E6	10		6030		MOV	A,M			270A				6590	*			
26B0	CA	F8	26	6040		ANI	PLOSA			270A				6600	*****			
26B3	EB			6050		JZ	ENDR2			270A				6610	*			
26B4	23			6060		XCHG	*			270A				6620	*			
26B5	7E			6070		INX	H			270A				6630	*			
26B6	FE	04		6080		MOV	A,M			270A				6640	*			
26B8	CA	F8	26	6090		CPI	CTERM			270A	11	61	35	6650	*			
26BB	FE	00		6100		JZ	ENDR2			270D	2A	02	35	6660	MATNSR	LXI	D,MATRIX+MATLEN-2	
26BD	C2	C7	26	6110		CPI	CSPACE			2710	19			6670		LHLD	NEGEND	* IS THERE ROOM TO INSERT
26C0	23			6120		JNZ	R2M2			2711	D2	0F	20	6680		DAD	D	
26C1	7E			6130		INX	H			2714	F5			6690		JNC	MATERR	* NO
26C2	FE	04		6140		MOV	A,M			2715	2A	00	35	6700		PUSH	PSW	* YES, SAVE THE NEW CODE
26C4	CA	F8	26	6150		CPI	CTERM			2718	EB			6710		LHLD	MATPTR	* COMPUTE # OF COLS TO MOVE
26C7	FE	1C		6160	R2M2	JZ	ENDR2			2719	2A	02	35	6720		XCHG		
26C9	CA	F4	26	6170		CPI	CWH			271C	19			6730		LHLD	NEGEND	
26CC	FE	3A		6180		JZ	R2MN			271D	7D			6740		DAD	D	
26CE	CA	F4	26	6190		CPI	CHH			271E	2F			6750		MOV	A,L	
26D1				6200	*	JZ	R2MN			271F	3C			6760		CMA		
26D1				6210	*					2720	3C			6770		INR	A	
26D1				6220	*					2721	32	E1	36	6780		INR	A	
26D1	2A	00	35	6230	R2N					2724	6F			6790		STA	COUNT	
26D4	23			6240		LHLD	MATPTR			2725	26	00		6800		MOV	L,A	
26D5	09			6250		INX	H			2727	19			6810		MVI	H,0	
26D6	7E			6260		DAD	B			2728	22	DF	36	6820		DAD	D	
26D7	E6	80		6270		MOV	A,M			272B	2A	DF	36	6830		SHLD	MOVAD	
						ANI	VOWEL			272B	2A	DF	36	6840	INSR1	LHLD	MOVAD	

* COMPUTE NEW ADDR OF LAST COL

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
272E	54				6850		MOV	D, H
272F	5D				6860		MOV	E, L
2730	1B				6870		DCX	D
2731	3A	E1	36		6880		LDA	COUNT
2734	4F				6890		MOV	C, A
2735	1A				6900	INSR2	LDAX	D
2736	77				6910		MOV	M, A
2737	1B				6920		DCX	D
2738	2B				6930		DCX	H
2739	0D				6940		DCR	C
273A	C2	35	27		6950		JNZ	INSR2
273D	2A	DF	36		6960		LHLD	MOVAD
2740	11	5F	00		6970		LXI	D, MATLEN
2743	19				6980		DAD	D
2744	22	DF	36		6990		SHLD	MOVAD
2747	11	21	C9		7000		LXI	D, -MATEND
274A	19				7010		DAD	D
274B	D2	2B	27		7020		JNC	INSR1
274E	F1				7030		POP	PSW
274F	CD	0C	20		7040		CALL	MATPAK
2752	09				7050		DAD	B
2753	36	00			7060		MVI	M, 0
2755	09				7070		DAD	B
2756	36	00			7080		MVI	M, 0
2758	2A	02	35		7090		LHLD	NEGEND
275B	2B				7100		DCX	H
275C	22	02	35		7110		SHLD	NEGEND
275F	2A	00	35		7120		LHLD	MATPTR
2762	23				7130		INX	H
2763	22	00	35		7140		SHLD	MATPTR
2766	AF				7150		XRA	A
2767	C9				7160		RET	
2768					7170			
2768					7180	*		* END OF SECT2

* MOVE A ROW RIGHT 1 LOC

* UPDATE NEW POINTER

* ANY MORE ROWS?

* YES

* GET THE NEW CODE

* SET CODE AND FEATURES

* PUT 0 STRESS IN NEW COL

* PUT 0 DURATION IN NEW COL

* DONE, DECREMENT NEGEND

* AND INCREMENT MATPTR

* CLEAR ERROR CONDITION

CSR1 Section 3

Source Listing

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2000				0010	* RULES GROUP 3			36E3				0580	*		
2000				0020	*			36E3				0590	*	CSRI SECTION 3	CODE
2000				0030	* SECTION 3 OF THE CSRI SYNTHESIS BY RULE SYSTEM			36E3				0600	*		
2000				0040	*			36E3				0610		ORG COMJMP+770H	
2000				0050	* LLOYD RICE, COMPUTALKER CONSULTANTS			2770				0620	SECTAD	EQU	\$
2000				0060	* VERSION 1.08 MAY 30, 1977			2770				0630	*		
2000				0070	*			2770				0640	*****		
2000				0080	*****			2770				0650	*		
2000				0090	*			2770				0660	*	PHONEME CODE DEFINITIONS FOR RULES	
2000				0100	* COMMON JUMP ADDRESS TABLE			2770				0670	*		
2000				0110	*			2770				0680	CSPACE	EQU	0
2000				0120	COMJMP EQU \$			2770				0690	CTERM	EQU	4
2000				0130	*			2770				0700	CW	EQU	14
2000				0140	CSRI DS 3			2770				0710	CUX	EQU	18
2003				0150	PLAY DS 3			2770				0720	CRX	EQU	24
2006				0160	BUFADR DS 2			2770				0730	CLX	EQU	25
2008				0170	BUFEND DS 2			2770				0740	CWX	EQU	26
200A				0180	PVTAB DS 2			2770				0750	CYX	EQU	27
200C				0190	MATPAK DS 3			2770				0760	CR	EQU	32
200F				0200	MATERR DS 3			2770				0770	CW	EQU	34
2012				0210	RULES DS 3			2770				0780	CL	EQU	33
2015	C3	70	27	0220	JMP SETDUR			2770				0790	CM	EQU	36
2018	C3	1F	28	0230	JMP RULES3			2770				0800	CN	EQU	37
201B				0240	GENFO DS 3			2770				0810	CNX	EQU	38
201E				0250	CLREUF DS 3			2770				0820	CP	EQU	39
2021				0260	GENPRM DS 3			2770				0830	CT	EQU	40
2024				0270	MUL DS 3			2770				0840	CK	EQU	41
2027				0280	DIV DS 3			2770				0850	CKX	EQU	42
202A				0290	DUMMY DS 16			2770				0860	CB	EQU	43
203A				0300	*			2770				0870	CD	EQU	44
203A				0310	*****			2770				0880	CG	EQU	45
203A				0320	*			2770				0890	CGX	EQU	46
203A				0330	* COMRAM ORIGIN DEFINITION			2770				0900	CDX	EQU	47
203A				0340	*			2770				0910	CS	EQU	50
203A				0350	ORG COMJMP+1500H			2770				0920	CSH	EQU	51
3500				0360	COMRAM EQU \$			2770				0930	CZ	EQU	54
3500				0370	*			2770				0940	CZH	EQU	55
3500				0380	* CSRI SYSTEM RAM SPACE DEFINITION			2770				0950	CQ	EQU	59
3500				0390	*			2770				0960	*		
3500				0400	MATPTR DS 2			2770				0970	*	DEFINE FEATURE LABELS	
3502				0410	NEGEND DS 2			2770				0980	*		
3504				0420	MATRIX EQU \$			2770				0990	VOWEL	EQU	80H
3504				0430	MATLEN EQU 95			2770				1000	CONS	EQU	40H
3504				0440	PHCODE DS MATLEN			2770				1010	FRONT	EQU	20H
3563				0450	FEATA DS MATLEN			2770				1020	DIPHTH	EQU	10H
35C2				0460	FEATB DS MATLEN			2770				1030	WDBND	EQU	4
3621				0470	STRES DS MATLEN			2770				1040	PBND	EQU	2
3680				0480	DUR DS MATLEN			2770				1050	IGNORE	EQU	1
36DF				0490	MATEND EQU \$			2770				1060	STOP	EQU	80H
36DF				0500	*			2770				1070	VOICE	EQU	40H
36DF				0510	* RULES GROUP 3 (LOCAL) RAM WORKSPACE			2770				1080	PLOS	EQU	20H
36DF				0520	*			2770				1090	PLOSA	EQU	10H
36DF				0530	PREVBD DS 2			2770				1100	FRIC	EQU	8
36E1				0540	NV DS 1			2770				1110	LIQUID	EQU	4
36E2				0550	NEXT DS 1			2770				1120	NASAL	EQU	2
36E3				0560	*			2770				1130	DENTAL	EQU	1
36E3				0570	*****			2770				1140	*		

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2770				1150	*****					27AF	00			1720			
2770				1160	*					27B0	00			1730			* TERM
2770				1170	*		ALL DURATIONS ARE ASSIGNED AND MANIPULATED			27B1	22			1740			* IY, UNSTRESSED
2770				1180	*		IN UNITS OF 2.5 MSEC IN THIS SECTION.			27B2	2B			1750			* IY, STRESSED
2770				1190	*		FINALLY, AT THE END OF RULES3, THE DURATION			27B3	1D			1760			* IH, UNSTRESSED
2770				1200	*		VALUES ARE DIVIDED BY 4 TO GIVE UNITS OF			27B4	22			1770			* IH, ETC.
2770				1210	*		10 MSEC, CORRESPONDING TO THE ACTUAL FRAME			27B5	22			1780			* EH
2770				1220	*		COUNT FOR EACH PHON (EACH MATRIX COLUMN).			27B6	2B			1790			
2770				1230	*					27B7	1F			1800			
2770				1240	*		SET DURATION ROW OF MATRIX FROM TABLE			27B8	3A			1810			* AE
2770				1250	*					27B9	2B			1820			* AA
2770	21	05	35	1260	SETDUR		LXI H, MATRIX+1			27BA	3C			1830			
2773	22	00	35	1270			SHLD MATPTR			27BB	18			1840			* AH
2776	01	5F	00	1280			LXI B, MATLEN			27BC	2A			1850			
2779	5E			1290	SDLOOP		MOV E, M * GET CODE X INTO E			27BD	30			1860			* AO
277A	09			1300			DAD B			27BE	40			1870			* OW
277B	09			1310			DAD B			27C0	3A			1880			
277C	09			1320			DAD B			27C1	29			1890			* UH
277D	7E			1330			MOV A, M * GET STRESS X INTO A			27C2	2E			1900			
277E	EE	06		1340			CPI 6			27C3	24			1910			* UW
2780	FA	86	27	1350			JM SD1			27C4	38			1920			
2783	3E	00		1360			MVI A, 0			27C5	16			1930			* AX
2785	77			1370			MOV M, A			27C6	18			1940			* IX
2786	E5			1380	SD1		PUSH H			27C7	16			1950			* ER
2787	C6	FF		1390			ADI 255			27C8	18			1960			* UX
2789	7B			1400			MOV A, E			27CA	38			1970			* OH
278A	17			1410			RAL			27CB	24			1980			* AW
278B	5F			1420			MOV E, A			27CC	38			1990			* AY
278C	16	00		1430			D, 0			27CD	26			2000			* OY
278E	21	A7	27	1440			LXI H, DURTAB			27CE	38			2010			* EY
2791	19			1450			DAD D			27D0	3A			2020			* RX
2792	7E			1460			MOV A, M			27D1	30			2030			* LX
2793	E1			1470			POP H			27D2	3A			2040			* WX
2794	09			1480			DAD B			27D3	30			2050			* YX
2795	77			1490			MOV M, A			27D4	3A			2060			* WH
2796	2A	00	35	1500			LHLD MATPTR			27D5	35			2070			* EL
2799	23			1510			INK H			27D6	37			2080			* EM
279A	22	00	35	1520			SHLD MATPTR			27D7	26			2090			* EN
279D	EB			1530			KCHG			27D8	30			2100			* R
279E	2A	02	35	1540			LHLD			27D9	26			2110			
27A1	19			1550			DAD D			27DA	28			2120			
27A2	D8			1560			RC *			27DB	20			2130			
27A3	EB			1570			KCHG			27DC	20			2140			
27A4	C3	79	27	1580			JMP SDLOOP			27DD	1D			2150			
27A7				1590	*					27DE	20			2160			
27A7				1600	*		TABLE OF DURATION VALUES (IN 2.5 MSEC UNITS)			27DF	22			2170			
27A7				1610	*		EACH PHON HAS A STRESSED DURATION VALUE			27E0	2A			2180			
27A7				1620	*		AND AN UNSTRESSED DURATION VALUE.			27E1	00			2190			
27A7				1630	*					27E2	00			2200			
27A7	00			1640	DURTAB		DB 0 * SPACE (WDBNC)			27E3	00			2210			
27A8	00			1650			DB 0 * PERIOD			27E4	00			2220			
27A9	00			1660			DB 0			27E5	00			2230			
27AA	00			1670			DB 72 * COMMA (PAUSE)			27E6	00			2240			
27AB	48			1680			DB 72			27E7	1C			2250			
27AC	48			1690			DB 0 * QUEST			27E8	00			2260			
27AD	00			1700			DB 0			27E9	00			2270			
27AE	00			1710			DB 0			27EA	00			2280			

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
27E8	28			2290		DB	40	281F				2860	*		
27E9	18			2300		DB	24	281F				2870	*	RULES GROUP 3	
27EA	22			2310		DB	34	281F				2880	*		
27EB	20			2320		DB	32	281F				2890	*	*****	
27EC	20			2330		DB	32	281F				2900	*		
27ED	18			2340		DB	24	281F	00			2910		RULES3	
27EE	20			2350		DB	32	2820	AF			2920			
27EF	1C			2360		DB	28	2821	32 E1	36		2930			
27FO	1E			2370		DB	30	2824	32 E2	36		2940			
27F1	1C			2380		DB	28	2827	01 5F	00		2950			
27F2	1E			2390		DB	30	282A	21 05	35		2960			
27F3	1C			2400		DB	28	282D	22 00	35		2970			
27F4	1E			2410		DB	30	2830				2980		R3LOOP	
27F5	20			2420		DB	32	2830				2990	*		
27F6	20			2430		DB	32	2830				3000	*		
27F7	10			2440		DB	16	2830				3010	*		
27F8	18			2450		DB	24	2830				3020	*		
27F9	18			2460		DB	24	2830				3030	*		
27FA	18			2470		DB	24	2830				3040	*		
27FB	18			2480		DB	24	2830				3050	*		
27FC	18			2490		DB	24	2830	09			3060		R3A	
27FD	18			2500		DB	24	2831	01 E1	36		3070			
27FE	1A			2510		DB	26	2834	7E			3080			
27FF	12			2520		DB	18	2835	E6 06			3090			
2800	14			2530		DB	20	2837	C2 46	28		3100			
2801	18			2540		DB	24	283A	7E			3110			
2802	18			2550		DB	24	283B	E6 80			3120			
2803	18			2560		DB	24	283D	CA AB	28		3130			
2804	18			2570		DB	24	2840	0A			3140			
2805	0A			2580		DB	10	2841	3C			3150			
2806	0C			2590		DB	12	2842	02			3160			
2807	2A			2600		DB	42	2843	C3 AB	28		3170			
2808	2C			2610		DB	44	2846	0A			3180		R3A2	
2809	26			2620		DB	38	2847	FE 02			3190			
280A	28			2630		DB	40	2849	DA A1	28		3200			
280B	30			2640		DB	48	284C	3C			3210			
280C	30			2650		DB	48	284D	6F			3220			
280D	2C			2660		DB	44	284E	26 00			3230			
280E	2C			2670		DB	44	2850	29			3240			
280F	1A			2680		DB	26	2851	29			3250			
2810	1E			2690		DB	30	2852	29			3260			
2811	18			2700		DB	24	2853	29			3270			
2812	18			2710		DB	24	2854	29			3280			
2813	18			2720		DB	24	2855	29			3290			
2814	18			2730		DB	24	2856	EB			3300			
2815	18			2740		DB	24	2857	0A			3310			
2816	18			2750		DB	24	2858	6F			3320			
2817	00			2760		DB	0	2859	26 00			3330			
2818	00			2770		DB	0	285B	23			3340			
2819	0G			2780		DB	0	285C	CD 27	20		3350			
281A	00			2790		DB	0	285F	7D			3360			
281B	18			2800		DB	24	2860	02			3370			
281C	1C			2810		DB	28	2861	2A DF	36		3380			
281D	0A			2820		DB	10	2864	23			3390			
281E	0A			2830		DB	10	2865	7C			3400			
281F				2840		DB	10	2866	2F			3410			
				2850		DB	10	2867	5F			3420			

* CLEAR VOWEL COUNTER (RULE 3A)
 * CLEAR NEXT (RULE 3B)
 * EITHER BOUND, COMPUTE THE SPAN
 * NOT A BOUNDARY, IS IT A VOWEL?
 * NO
 * YES, INCREMENT NV
 * GET COL X FEATA
 * GET NV
 * 0 OR 1 VOWEL, NO DUR CHANGE
 * PUT (N+1)*64 IN HL
 * THEN INTO DE
 * GET NV AGAIN
 * RESULT IS DUR RATIO IN 64THS
 * SAVE IT IN NV
 * -(PREVBD)-2 INTO DE

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	LINE	E	LINE	LABEL	OPCD	OPERAND	COMMENT
2868	7D				3430		MOV	A,L			4000			DAD	B		
2869	2F				3440		CMA	E,A			4010			MOV	B,M		* GET PRESENT DUR INTO B
286A	5F				3450		MOV	E,A			4020			MVI	E,50H		* 1.38 (SHIFTED) INTO E
286B	2A	00	35		3460		LHLD	MATPTR			4030			CALL	MUL		* (B)*(E) INTO DE
286E	19				3470		DAD	D			4040			XCHG	H		* SHIFT BIN PT TO BYTE BOUNDARY
286F	5D	01	5F	00	3480		MOV	E,L			4050			DAD	H		
2870	01	5F	00		3490	R3A3	LXI	B,MATLEN			4060			DAD	H		
2873	2A	DF	36		3500		LHLD	PREVBD			4070			XCHG	H		
2876	23				3510		INX	H			4080			MOV	M,D		* UPDATE DURATION
2877	22	DF	36		3520		SHLD	PREVBD			4090			POP	H		
287A	09				3530		DAD	B			4100			LXI	B,MATLEN		* RESTORE B,C,H,L
287B	7E				3540		MOV	A,M			4110			MOV	A,M		* GET FEATA AGAIN
287C	E6	80			3550		ANI	VOWEL			4120			ANI	VOWEL		
287E	CA	9D	23		3560		JZ	R3A4			4130			JZ	R3B2		* NOT A VOWEL, CONTINUE
2881	09				3570		DAD	B			4140						
2882	09				3580		DAD	B			4150						
2883	7E				3590		MOV	A,M			4160						
2884	B7				3600		ORA	A			4170	R3C					
2885	CA	9D	28		3610		JZ	R3A4			4180			NOP			
2888	09				3620		DAD	B			4190			LHLD	MATPTR		
2889	3A	E1	16		3630		LDA	NV			4200			MOV	A,M		* GET COL X FEATA
288C	47				3640		MOV	E,A			4210			ANI	VOWEL		
288D	D5				3650		PUSH	D			4220			JZ	R3F		* NOT A VOWEL
288E	5E				3660		MOV	E,M			4230			LHLD	MATPTR		
288F	CD	24	20		3670		CALL	MUL			4240			INX	H		
2892	EB				3680		XCHG				4250			MOV	A,M		* GET COL X+1 CODE
2893	29				3690		DAD	H			4260			CPI	CTERM		
2894	29				3700		DAD	H			4270			JZ	ENDR3		
2895	EB				3710		XCHG				4280			DAD	B		
2896	7B				3720		MOV	A,E			4290			MOV	A,M		* GET COL X+1 FEATB
2897	17				3730		RAL				4300			MOV	A,M		
2898	7A				3740		MOV	A,D			4310			XRI	PLOS		
2899	CE	00			3750		ACI	0			4320			ANI	PLOS+VOICE		
289B	77				3760		MOV	M,A			4330			JNZ	R3D		* NOT AN UNVOICED PLOSIVE
289C	D1				3770		POP	D			4340			MVI	E,26H		* OK, MULTIPLY BY 0.6 (SHIFTED)
289D	1D				3780	R3A4	DCR	E			4350			JMP	R3CDE		
289E	C2	70	28		3790		JNZ	R3A3			4360						
28A1	AF				3800	R3A5	XRA	A			4370						
28A2	32	E1	36		3810		STA	NV			4380						
28A5	2A	00	35		3820		LHLD	MATPTR			4390	R3D		MOV	A,M		* GET COL X+1 FEATB AGAIN
28A8	22	DF	36		3830		SHLD	PREVBD			4400			CMA			
28AB					3840						4410			ANI	FRIC+VOICE		
28AB					3850						4420			JNZ	R3E		* NOT A VOICED FRICATIVE
28AB					3860						4430			MVI	E,50H		* SET MULTIPLIER TO 1.25 (*64)
28AB					3870						4440			JMP	R3CDE		
28AB					3880						4450						
28AB					3890						4460						
28AB					3900						4470						
28AB					3910						4480	R3E		LHLD	MATPTR		
28AB					3920						4490			INX	H		
28AB					3930	R3B2					4500			MOV	A,M		* GET COL X+1 CODE
28AB					3940						4510			CPI	CRX		
28AB					3950						4520			JZ	R3E2		
28AB					3960						4530			CPI	CLX		
28AB					3970						4540			JNZ	ENDR3		* NO GOOD, END GROUP 3
28AB					3980						4550			INX	H		
28AB					3990						4560			MOV	A,M		* GET COL X+2 CODE

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2919	FE	04		4770		CPI	CTERM			2979	36	24		5140		MVI	M,36
291B	CA	DD	2A	4780		JZ	ENDR3			297B	C3	8D	29	5150		JMP	R3H
291E	09			4790		DAD	B			297E				5160	*		
291F	7E			4600		MOV	A,M			297E				5170	*		
2920	E6	40		4610		ANI	CONS			297E				5180	*		
2922	CA	DD	2A	4620		JZ	ENDR3			297E				5190	*		
2925	1E	20		4630		MVI	E,20H			297E	7E			5200	R3G	MOV	A,M
2927	2A	00	35	4640	R3CDE	LHLD	MATPTR			297E	EE	20		5210		XRI	PLOS
292A	09			4650		DAD	B			2981	E6	60		5220		ANI	PLOS+VOICE
292C	09			4660		DAD	B			2983	C2	8D	29	5230		JNZ	R3H
292C	09			4670		DAD	B			2986	23			5240		INX	H
292D	46			4680		MOV	B,M			2987	09			5250		DAD	B
292E	CD	24	20	4690		CALL	MUL			2988	09			5260		DAD	B
2931	EB			4700		XCHG				2989	7E			5270		MOV	A,M
2932	29			4710		DAD	H			298A	C6	08		5280		ADI	8
2933	29			4720		DAD	H			298C	77			5290		MOV	M,A
2934	EB			4730		XCHG				298D				5300	*		
2935	72			4740		MOV	M,D			298D				5310	*		
2936	C3	DD	2A	4750		JMP	ENDR3			298D				5320	*		
2939				4760	*					298D	2A	00	35	5330	R3H	LHLD	MATPTR
2939				4770	*					2990	09			5340		DAD	B
2939				4780	*					2991	09			5350		DAD	B
2939	2A	00	35	4790	R3F	LHLD	MATPTR			2992	7E			5360		MOV	A,M
293C	7E			4800		MOV	A,M			2993	E6	40		5370		ANI	CONS
293D	FE	22		4810		CPI	CW			2995	CA	DD	2A	5380		JZ	ENDR3
293F	CA	4C	29	4820		JZ	R3F2			2998	09			5390		DAD	B
2942	FE	20		4830		CPI	CR			2999	7E			5400		MOV	A,M
2944	CA	4C	29	4840		JZ	R3F2			299A	B7			5410		ORA	A
2947	FE	21		4850		CPI	CL			299B	F2	AD	29	5420		JP	R3I
2949	C2	8D	29	4860		JNZ	R3H			299E	09			5430		DAD	B
294C	09			4870	R3F2	DAD	B			299F	46			5440		MCV	B,M
294D	09			4880		DAD	B			29A0	1E	33		5450		MVI	E,33H
294E	09			4890		DAD	B			29A2	CD	24	20	5460		CALL	MUL
294F	7E			4900		MOV	A,M			29A5	EB			5470		XCHG	
2950	B7			4910		ORA	A			29A6	29			5480		DAD	H
2951	F2	AD	29	4920		JP	R3I			29A7	29			5490		DAD	H
2954	2A	00	35	4930		LHLD	MATPTR			29A8	EB			5500		XCHG	
2957	23			4940		INX	H			29A9	72			5510		MOV	M,D
2958	7E			4950		MOV	A,M			29AA	01	5F	00	5520		LXI	B,MATLEN
2959	FE	04		4960		CPI	CTERM			29AD				5530	*		
295B	CA	8D	29	4970		JZ	R3H			29AD				5540	*		
295E	09			4980		DAD	B			29AD				5550	*		
295F	7E			4990		MOV	A,M			29AD	2A	00	35	5560	R3I	LHLD	MATPTR
2960	E6	80		5000		ANI	VOWEL			29B0	54			5570		MOV	D,H
2962	CA	8D	29	5010		JZ	R3H			29B1	5D			5580		MOV	E,L
2965	2A	00	35	5020		LHLD	MATPTR			29B2	13			5590		INX	D
2968	2B			5030		DCX	H			29B3	7E			5600		MOV	A,M
2969	7E			5040		MOV	A,M			29B4	FE	28		5610		CPI	CT
296A	FE	04		5050		CPI	CTERM			29B6	C2	DD	29	5620		JNZ	R3J
296C	CA	8D	29	5060		JZ	R3H			29B9	1A			5630		LDAX	D
296F	FE	32		5070		CPI	CS			29BA	FE	04		5640		CPI	CTERM
2971	09			5080		DAD	B			29BC	CA	78	2A	5650		JZ	R3N
2972	09			5090		DAD	B			29BE	FE	33		5660		CPI	CSH
2973	C2	7E	29	5100		JNZ	R3G			29C1	C2	78	2A	5670		JNZ	R3N
2976	23			5110		INX	E			29C4	09			5680		DAD	B
2977	09			5120		DAD	B			29C5	09			5690		DAD	B
2976				5130		DAD	B			29C6	09			5700		DAD	B

ADDR B1 B2 B3 E	LINE LABEL	OPCD	OPERAND	ADDR B1 B2 B3 E	LINE LABEL	OPCD	OPERAND
2A88 FE 04	6850	CPI	CTERM	2ADD	7420 *		
2A8A CA A6 2A	6860	JZ	R3N3	2ADD	7430 *	END OF RULE GROUP 3	
2A8D 5A	6870	MOV	D,H	2ADD	7440 *		
2A8E 5D	6880	MOV	E,L	2ADD 2A 00 35	7450 ENDR3	LHLD MATPTR	
2A8F 09	6890	DAD	B	2AE0 23	7460	INX H	
2A90 7E	6900	MOV	A,M	2AE1 22 00 35	7470	SHLD MATPTR	
2A91 E6 04	6910	ANI	WDBND	2AE4 EB	7480	XCHG	
2A93 CA 9F 2A	6920	JZ	R3N2	2AE5 2A 02 35	7490	LHLD NEGEND	
2A96 EB	6930	KCHG		2AE8 19	7500	DAD D	
2A97 2B	6940	DCX	H	2AE9 EB	7510	XCHG	
2A98 7E	6950	MOV	A,M	2AEA D2 30 28	7520	JNC R3LOOP	* LOOP AGAIN IF NOT DONE
2A99 FE 04	6960	CPI	CTERM	2AED	7530 *		
2A9B CA A6 2A	6970	JZ	R3N3	2AED	7540 *	READJUST DURATIONS FROM 2.5 MSEC TO 10 MSEC	
2A9E 09	6980	DAD	B	2AED	7550 *	(SO DUR UNIT = FRAME TIME)	
2A9F 09	6990	DAD	B	2AED	7560 *		
2AA0 7E	7000	MOV	A,M	2AED 11 FB CA	7570	LXI D,-MATRIX-1	
2AA1 E6 20	7010	ANI	PLOS	2AF0 19	7580	DAD D	
2AA3 C2 C9 2A	7020	ANI	R3N5	2AF1 4D	7590	MOV C,L	
2AA6	7030 *			2AF2 21 80 36	7600	LXI H,DUR	
2AA6	7040 *			2AF5 23	7610	INX H	
2AA6	7050 *			2AF6 7E	7620	MOV A,M	
2AA6 2A 00 35	7060 R3N3	LHLD	MATPTR	2AF7 B7	7630	ORA A	* CLEAR CARRY, DIV BY SHIPTING
2AA9 23	7070	INX	H	2AF8 1F	7640	RAR	
2AAA 7E	7080	MOV	A,M	2AF9 B7	7650	ORA A	
2AAB FE 04	7090	CPI	CTERM	2AFA 1F	7660	RAR	
2AAD CA DD 2A	7100	JZ	ENDR3	2AFB CE 09	7670	ACI 0	* ROUND UP 1 IF CARRY SET
2AB0 54	7110	MOV	D,H	2AFD 77	7680	MOV M,A	
2AB1 5D	7120	MOV	E,L	2AFE 0D	7690	DCR C	
2AB2 09	7130	DAD	B	2AFF C2 F5 2A	7700	JNZ ADJDUR	
2AB3 7E	7140	MOV	A,M	2B02 C9	7710	RET	
2AB4 E6 04	7150	ANI	WDBND	2B03	7720 *		
2AB6 CA C2 2A	7160	JZ	R3N4	2B03	7730 *	END OF SBCT3	
2AB9 EB	7170	XCHG					
2ABA 23	7180	INX	H				
2ABB 7E	7190	MOV	A,M				
2ABC FE 04	7200	CPI	CTERM				
2ABE CA DD 2A	7210	JZ	ENDR3				
2AC1 09	7220	DAD	B				
2AC2 09	7230 R3N4	DAD	B				
2AC3 7E	7240	MOV	A,M				
2AC4 E6 20	7250	ANI	PLOS				
2AC6 CA DD 2A	7260	JZ	ENDR3				
2AC9 2A 09 35	7270 R3N5	LHLD	MATPTR				
2ACC 09	7280	DAD	B				
2ACD 09	7290	DAD	B				
2ACE 09	7300	DAD	B				
2ACF 09	7310	DAD	B				
2AD0 C5	7320	PUSH	B				
2AD1 46	7330	MOV	B,M				
2AD2 1E 20	7340	MVI	E,20H				
2AD4 CD 24 20	7350	CALL	MUL				
2AD7 EB	7360	XCHG					
2AD8 29	7370	DAD	H				
2AD9 29	7380	DAD	H				
2ADA EB	7390	XCHG					
2ADB 72	7400	MOV	M,D				
2ADC C1	7410	POP	B				

* STORE NEW DURATION

* GET COL X DURATION
* MULTIPLY BY 0.5

* NO, END GROUP 3

* MOVE TO FEATB

* GET COL X+2 CODE

* NOT A WDBND, TEST FOR PLOS

* GET COL X+1 FEATA

* X IS LAST COL, END GROUP

* GET COL X+1 CODE

* MOVE TO FEATB

* OK, DO RULE 3N

* MOVE TO FEATB

* GET COL X-2 CODE

* NOT A WDBND, TEST FOR PLOSIVE

* GET COL X-1 FEATA

* X IS 1ST COL, TRY PLOS AFTER

CSR1 Section 4

Source Listing

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2000				0010	* GENFO		
2000				0020	*		
2000				0030	* SECTION 4 OF THE CSRI SYNTHESIS BY RULE SYSTEM		
2000				0040	*		
2000				0050	* LLOYD RICE, COMPUTALKER CONSULTANTS		
2000				0060	* VERSION 1.11 MAY 30, 1977		
2000				0070	*		
2000				0080	*****		
2000				0090	*		
2000				0100	* COMMON JUMP ADDRESS TABLE		
2000				0110	*		
2000				0120	COMJMP EQU \$		
2000				0130	*		
2000				0140	CSR1 DS 3		
2003				0150	PLAY DS 3		
2006				0160	BUFADR DS 2		
2008				0170	BUFEND DS 2		
203A				0180	PVTAB DS 2		
200C				0190	MATPAK DS 3		
280F				0200	MATERR DS 3		
2012				0210	RULES DS 3		
2015				0220	SETDUR DS 3		
2018				0230	RULES3 DS 3		
201B C3 10 2B				0240	JMP GENFO		
201E C3 D9 2D				0250	JMP CLRBUF		
2021				0260	GENPRM DS 3		
2024				0270	MUL DS 3		
2027				0280	DIV DS 3		
202A				0290	DUMMY DS 16		
203A				0300	*		
203A				0310	*****		
203A				0320	*		
203A				0330	* COMRAM ORIGEN DEFINITION		
203A				0340	*		
203A				0350	ORG COMJMP+1500H		
3500				0360	COMRAM EQU \$		
3500				0370	*		
3500				0380	* CSRI SYSTEM RAM SPACE DEFINITION		
3500				0390	*		
3500				0400	MATPTR DS 2		
3502				0410	NEGEND DS 2		
3504				0420	MATRIX EQU \$		
3504				0430	MATLEN EQU 95		
3504				0440	PHCODE DS		
3504				0450	FEATA DS		
3504				0460	FEATB DS		
3621				0470	STRES- DS		
3680				0480	DUR DS		
36DF				0490	MATEND EQU \$		
36DF				0500	BUFPTR DS 2		
36E1				0510	*		
36E1				0520	* GENFO (LOCAL) RAM WORKSPACE		
36E1				0530	*		
36E1				0540	STRSX DS 1		
36E2				0550	DURX DS 1		
36E3				0560	DURX4 DS 1		
36E4				0570	HFO DS 2		

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
36E6				0580	FTERM DS 1		
36E7				0590	DELTA DS 2		
36E9				0600	SD DS 2		
36EE				0610	NEGBUF DS 2		
36ED				0620	NEGPSE DS 2		
36EF				0630	NEGBND DS 2		
36F1				0640	*		
36F1				0650	*****		
36F1				0660	*		
36F1				0670	* GENFO		
36F1				0680	*		
36F1				0690			
2B10				0700	SECTAD ORG COMJMP+0B10H		
2B10				0710	*		
2B10				0720	*****		
2B10				0730	*		
2B10				0740	* PHONEME CODE DEFINITIONS FOR GENFO		
2B10				0750	*		
2B10				0760	CPER EQU 1		
2B10				0770	CQUEST EQU 3		
2B10				0780	CTERM EQU 4		
2B10				0790	*		
2B10				0800	* FEATURE LABEL DEFS FOR GENFO		
2B10				0810	*		
2B10				0820	VOWEL EQU 80H		
2B10				0830	WDBND EQU 4		
2B10				0840	VOICE EQU 40H		
2B10				0850	*		
2B10				0860	*****		
2B10				0870	*		
2B10 2A 06 20				0880	GENFO LHLB BUFADR * GET (BUFADR) IN DE		
2B13 EB				0890	XCHG		
2B14 21 0B 00				0900	LXI H,11		
2B17 19				0910	DAD D		
2B18 0E 09				0920	MVI C,9		
2B1A 2B				0930	DCX H		
2B1B 36 00				0940	MVI M,0 * CLEAR FRAME 1		
2B1D 0D				0950	DCR C		
2B1E C2 1A 2B				0960	JNZ S-4		
2B21 23				0970	INX H		
2B22 22 DF 36				0980	SHLD BUFPTR * POINT TO F0 BYTE IN FRAME 1		
2B25 7A				0990	MOV A,D		
2B26 2F				1000	CMA		
2B27 67				1010	MOV H,A		
2B28 47				1020	MOV B,A		
2B29 7B				1030	MOV A,E		
2B2A 2F				1040	CMA		
2B2B 6F				1050	MOV J,A		
2B2C 4F				1060	MOV C,A		
2B2D 2B				1070	DCX H		
2B2E 2B				1080	DCX H		
2B2F 22 EB 36				1090	SHLD NEGBUF * NEGBUF--(BUFADR)-3		
2B32 21 5E FF				1100	LXI H,-9*18		
2B35 09				1110	DAD B		
2B36 22 ED 36				1120	SHLD NEGPSE * IN LAST FRAME OF INITIAL PAUSE		
2B39 2A 08 20				1130	LHLB BUFEND * GET LAST AVAILABLE BUFFER LOC		
2B3C 09				1140	DAD B		

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	OPCD	OPERAND	OPCD	OPERAND
2B3D	EB				1150		XCHG		ORA	M				
2B3E	21	09	00		1160		LXI	H,9	JNZ	RAMP				* FOUND A NON 0 VALUE
2B41	CD	27	20		1170		CALL	DIV	DAD	B				
2B44	54				1180		MOV	D,H	XCHG					
2B45	5D				1190		MOV	E,L	LHLD	NEGBUF				
2B46	29				1200		DAD	H	DAD	D				
2B47	29				1210		DAD	H	JNC	NOF0				* HIT FRONT OF BUFFER, EXIT
2B48	29				1220		DAD	H	XCHG					
2B49	19				1230		DAD	D	JMP	ENDS1				
2B4A	0B				1240		DCX	B	LDA	FTERM				* NON 0 F0 + CHANGE
2B4B	79				1250		MOV	A,C	ADD	N				
2B4C	95				1260		SUB	L	CPI	15				
2B4D	6F				1270		MOV	L,A	JNC	RAMP1				
2B4E	78				1280		MOV	A,F	MVI	A,15				* FINAL F0 < 15, MAKE IT 15
2B4F	9C				1290		SBX	H	JMP	RAMP2				
2B50	67				1300		MOV	H,A	JC	125				
2B51	22	EF	36		1310		SHLD	NEGBND	ADD	A,125				* FINAL F0 > 125, MAKE IT 125
2B54	21	05	35		1320		LXI	H,MATRIX+1	STA	FTERM				* THE REAL FINAL F0 OFFSET
2B57	22	00	35		1330		SHLD	MATPTR	MVI	B,29				* END-OF-RAMP ADDR TO DE
2B5A					1340				MOV	A,B				* TENTATIVE RAMP LENGTH
2B5A					1350	*****			ADD	A				
2B5A					1360	*****			ADD	A				
2B5A					1370	*****			ADD	A				
2B5A					1380	*****			ADD	A				
2B5A					1390	*****			ADD	A				
2B5A					1400	*****			ADD	A				
2B5A					1410	*****			ADD	A				
2B5A	00				1420	F0LOOP	NOF		ADD	A				
2B5B	2A	00	35		1430		LHLD	MATPTR	ADD	A				
2B5E	01	5F	00		1440		LXI	B,MATLEN	ADD	A				
2B61	5E				1450		MOV	E,M	ADD	A				
2B62	09				1460		DAD	B	ADD	A				
2B63	56				1470		MOV	D,M	ADD	A				
2B64	09				1480		DAD	D	ADD	A				
2B65	7E				1490		MOV	A,M	ADD	A				
2B66	09				1500		DAD	B	ADD	A				
2B67	E6	40			1510		ANI	VOICE	ADD	A				
2B69	C2	22	2C		1520		JNZ	VOICED	ADD	A				
2B6C	09				1530		DAD	B	ADD	A				
2B6D	7E				1540		MOV	A,M	ADD	A				
2B6E	32	E2	36		1550		STA	DURX	ADD	A				
2B71	7B				1560		MOV	A,E	ADD	A				
2B72	1E	D8			1570		MVI	E,-40	ADD	A				
2B74	FE	01			1580		CPI	CFER	ADD	A				
2B76	CA	80	2B		1590		JZ	ENDS	ADD	A				
2B79	1E	28			1600		MVI	E,40	ADD	A				
2B7B	FE	01			1610		CPI	COUEST	ADD	A				
2B7D	C2	13	2C		1620		JNZ	NOF0	ADD	A				
2B80					1630				ADD	A				
2B80					1640				ADD	A				
2B80					1650				ADD	A				
2B80					1660				ADD	A				
2B80	7B				1670	ENDS			ADD	A				
2B81	32	E6	36		1680		MOV	A,E	ADD	A				
2B84	AF				1690		STA	FTERM	ADD	A				
2B85	01	F7	FF		1700		LXI	B,-9	ADD	A				
2B88	2A	DF	36		1710		LHLD	RUFTR	ADD	A				

* DIVIDE AVAILABLE SPACE BY 9
 * IGNORE REMAINDER
 * MOVE MAX FRAME COUNT TO DE
 * (HL) = 9*FRAME COUNT
 * (BC) = -(RUFADR)-2
 * EACH PASS THRU F0LOOP GENERATES F0 DATA INTO
 * FRAMES I+1 THRU I+DURATION X, CORRESPONDING TO
 * THE PHONEME IN MATRIX COLUMN X. BUFFER ALWAYS
 * POINTS TO F0(I) AT THE BEGINNING OF THE LOOP.
 * BREAKPOINT LOC
 * GET COL X CODE IN E
 * GET COL X FEATA IN D
 * GET COL X FEATB IN A
 * MOVE PTR TO STRESS X
 * IT'S A VOICED PHONEME
 * SAVE DURATION X
 * TERMINAL DROP IF ".
 * TERMINAL RISE IF "?
 * COMPUTE PHRASE-TERMINAL F0 CHANGE
 * ENTER WITH F0 OFFSET IN E
 * SAVE F0 CHANGE VALUE
 * SCAN BACK FOR LAST NON 0 F0

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2BEB	67			2290		MOV	H,A	MOV	C,A	2C43	4F			2860		MOV	C,A
2BEC	7D			2300		MOV	A,L	LDA	STRSX	2C44	3A	E1	36	2870		MOV	B,A
2BED	2F			2310		CMA		MOV	B,A	2C47	47			2880		LHLD	BUFPTR
2BEE	6F			2320		MOV	L,A	MOV	L,A	2C48	2A	DF	36	2890		CALL	FPARAB
2BEF	23			2330		INX	H	INX	H	2C4B	CD	12	2D	2900		RNZ	*
2BFO	22			2340	RAMP4	SHLD	DELTA			2C4E	3A	E3	36	2920		LDA	DURX4
2BF3	11	00	00	2350		LXI	D,0			2C52	47			2930		MOV	B,A
2BF6	C3	FD	2B	2360		JMP	RAMP5+4			2C53	3A	E2	36	2940		LDA	DURX
2BF9	E5			2370	RAMP5	PUSH	H			2C56	90			2950		SUB	B
2BFA	2A			2380		LHLD	DELTA			2C57	4F			2960		MOV	C,A
2BFD	19			2390		DAD	D			2C58	3A	E1	36	2970		LDA	STRSX
2BFE	E3			2400		XTHL	*			2C5B	47			2980		MOV	B,A
2BFF	EB			2410		XCHG	*			2C5C	CD	7F	2D	2990		CALL	BPBARB
2C00	21	09	00	2420		LXI	H,9			2C5F	C0			3000		RNZ	*
2C03	19			2430		DAD	D			2C60	C3	E7	2C	3010		JMP	ENDFO
2C04	D1			2440		POP	D			2C63				3020			
2C05	7E			2450		MOV	A,M			2C63				3030			
2C06	B7			2460		ORA	A			2C63				3040			
2C07	CA	0C	2C	2470		JZ	\$+5			2C63				3050			
2C0A	82			2480		ADD	D			2C63				3060			
2C0B	77			2490		MOV	M,A			2C63	2A	DF	36	3070		LHLD	BUFPTR
2C0C	05			2500		DCR	B			2C66	7E			3080		ORA	A
2C0D	C2	F9	2B	2510		JNZ	RAMP5			2C68	C2	6D	2C	3090		MVI	M,69
2C10	C3	E7	2C	2520		JMP	ENDFO			2C6B	36	45		3100		LHLD	MATPTR
2C13				2530						2C70	23			3110		INX	H
2C13				2540						2C71	54			3130		MOV	D,H
2C13				2550						2C72	5D			3140		MOV	E,L
2C13	3A	E2	36	2560	NOF0	LDA	DURX			2C73	7E			3150		MOV	A,M
2C16	4F			2570		MOV	C,A			2C74	FE	04		3160		CPI	CTERM
2C17	06	05		2580		MVI	B,5			2C76	CA	A6	2C	3170		JZ	DOWNDR
2C19	2A	DF	36	2590		LHLD	BUFPTR			2C7A	7E			3180		DAD	B
2C1C	CD	12	2D	2600		CALL	FPARAB			2C7B	E6	04		3200		ANI	WDBND
2C1F	C3	E7	2C	2610		JMP	ENDFO			2C7D	CA	84	2C	3210		JZ	VNXT2
2C22				2620						2C80	EB			3220		XCHG	
2C22				2630						2C81	C3	70	2C	3230		JMP	VNXT1
2C22	5E			2640						2C85	E6	80		3250		MOV	A,M
2C22				2650						2C87	CA	A6	2C	3260		ANI	VOWEL
2C22				2660						2C88	09			3270		DAD	B
2C22				2670	VOICED					2C8B	09			3280		DAD	B
2C22	09			2680		MOV	E,M			2C8C	7E			3290		MOV	A,M
2C23	09			2690		DAD	B			2C8E	CA	A6	2C	3300		ORA	A
2C24	7E			2700		MOV	A,M			2C91	32	E1	36	3310		JZ	DOWNDR
2C25	32	E2	36	2710		STA	DURX			2C94	09			3330		DAD	B
2C28	7A			2720		MOV	A,D			2C95	4E			3340		MOV	C,M
2C29	E6	80		2730		ANI	VOWEL			2C96	3A	E2	36	3350		LDA	DURX
2C2B	CA	63	2C	2740		JZ	VNXT			2C99	47			3360		MOV	B,A
2C2E	7B			2750		MOV	A,E			2C9A	81			3370		ADD	C
2C2F	B7			2760		ORA	A			2C9B	32	E2	36	3380		STA	DURX
2C30	CA	63	2C	2770		JZ	VNXT			2C9E	EB			3390		XCHG	
2C33	32	E1	36	2780		STA	STRSX			2CA2	79			3400		SHLD	MATPTR
2C36	06	00		2790		MVI	B,0			2CA3	C3	3B	2C	3410		MOV	A,C
2C38	3A	E2	36	2800	VSTRS	LDA	DURX									JMP	VSTRS
2C3B	B7			2810		ORA	A										
2C3D	B7			2820		RAR	A										
2C3E	1F			2830		ORA	A										
2C3F	80			2840		RAR	B										
2C40	32	E3	36	2850		STA	DURX4										

* MOVE STRESS INTO B
 * COMPUTE FRONT OF PARABOLA
 * ERROR RETURN
 * FULL DUR - FRONT DUR INTO C
 * COMPUTE BACK OF PARABOLA
 * ERROR RETURN
 * CURRENT VOICED PHON IS NOT A STRESSED VOWEL
 * IF NEXT ONE IS, GENERATE PARABOLA ACROSS BOTH
 * GET LAST F0 OF PREV PHON
 * LAST F0 WAS 0, MAKE IT 69
 * GET NEXT COL CODE
 * END OF MATRIX, FINISH X
 * NOT A WORD BOUNDARY
 * X+1 IS WBOUND, BUMP AGAIN
 * GET COL Y FEATA
 * Y NOT A VOWEL, DOWNDRIFT X
 * GET COL Y STRESS
 * Y IS VOWEL BUT NOT STRESSED
 * GET COL Y DURATION
 * DURX=DUR X + DUR Y
 * MOVE MATPTR UP TO COL Y
 * GET COL Y DURATION

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	OPCD	OPERAND	OPCD	OPERAND
2CA6				3430	*								
2CA6				3440	*	LET F0	DRIFT DOWNWARD TOWARD 43 (100 HZ)						
2CA6				3450	*								
2CA6	2A	00	35	3460	DOWNDR	LHLD	MATPTR						
2CA9	01	7C	01	3470		LXI	B,WATLEN*4						
2CAC	09			3480		DAD	B						
2CAD	4E			3490		MOV	C,M						
2CAE	2A	DF	36	3500		LHLD	BUFPTR						
2CB1	56			3510		MOV	D,M						
2CB2	1E	00		3520		MVI	E,0						
2CB4	D5			3530		PUSH	D						
2CB5	E3			3540	DNWI	XTHL	*						
2CB6	7C			3550		MOV	A,H						
2CB7	29			3560		DAD	H						
2CB8	29			3570		DAD	H						
2CB9	29			3580		DAD	H						
2CBA	6C			3590		MOV	L,H						
2CBB	07			3600		RLC							
2CBC	07			3610		RLC							
2CBE	E6	07		3620		ANI	7						
2CC0	67			3630		MOV	H,A						
2CC1	2F			3640		CMA							
2CC2	57			3650		MOV	D,A						
2CC3	7D			3660		MOV	A,L						
2CC4	2F			3670		CMA							
2CC5	5F			3680		MOV	E,A						
2CC6	13			3690		INX	D						
2CC7	29			3700		DAD	H						
2CC8	29			3710		DAD	H						
2CC9	29			3720		DAD	H						
2CCA	29			3730		DAD	H						
2CCB	29			3740		DAD	H						
2CCC	19			3750		DAD	H						
2CCD	19			3760		DAD	H						
2CCD	11	58	01	3770		LXI	D,8*43						
2CD0	19			3780		DAD	D						
2CD1	7C			3790		MOV	A,H						
2CD2	D1			3800		POP	D						
2CD3	E5			3810		PUSH	H						
2CD4	21	09	00	3820		LXI	H,9						
2CD7	19			3830		DAD	D						
2CD8	EB			3840		KCHG							
2CD9	2A	EF	36	3850		LHLD	NEGBND						
2CDC	19			3860		DAD	D						
2CDD	DA	AC	2D	3870		JC	BFERR-1						
2CE0	EB			3880		KCHG							
2CE1	77			3890		MOV	M,A						
2CE2	0D			3900		DCR	C						
2CE3	C2	B5	2C	3910		JNZ	DNWI						
2CE6	D1			3920		POP	D						
2CE7				3930	*								
2CE7				3940	*	END FOLOOP,	STEP MATRIX TO NEXT PHON						
2CE7				3950	*								
2CE7	22	DF	36	3960	ENDFO	SHLD	BUFPTR						
2CEA	2A	00	15	3970		LHLD	MATPTR						
2CED	23			3980		INX	H						
2CEE	22	00	15	3990		SHLD	MATPTR						

* THERE'S MORE TO THIS MATRIX

* BUFFER SPACE USED /9

* = OVERALL FRAME COUNT

* BUT THAT WAS 1 FRAME SHORT

* PUT IT IN 1ST 2 BYTES OF BUFFER

PARABOLA GENERATOR SUBROUTINES

CONSTRUCT FRONT PARABOLA CURVE UP TO PEAK

(B)=STRESS X, (C)=FRAME COUNT TO PEAK

ON ENTRY: HL POINTS TO F0 IN LAST FRAME OF PREV PHON

* RETURN IF N (FRAME COUNT) =0

* GET PREV F0 INTO D

* PREV F0 WAS NON-0, USE IT

* PREV WAS 0, GET ONE FROM TABLE

* INDEX TO 2ND COL OF TABLE

* GET F0 LEVEL AT PARAB PEAK

* SET HFO TO STARTING PT

DELTA=2*((256*DIF)/(N+1))

* MOVE FRAME COUNT TO E

* MOVE B & C OUT OF MUL'S WAY

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND
2D3B	43			4570		MOV	B,E		
2D3C	04			4580		INR	B		
2D3D	CD	24	20	4590		CALL	MUL		
2D40	4D			4600		MOV	C,L		
2D41	EB			4610		XCHG	E,0		
2D42	1E	00		4620		MVI	E,0		
2D44	CD	27	20	4630		CALL	DIV		
2D47	29			4640		DAD	H		
2D48	7C			4650		MOV	A,H		
2D49	2F			4663		CMA			
2D4A	67			4670		MOV	H,A		
2D4B	7D			4680		MOV	A,L		
2D4C	2F			4690		CMA			
2D4D	6F			4700		MOV	L,A		
2D4E	23			4710		INX	H		
2D4F	22	E9	36	4720		SHLD	SD		
2D52	AF			4730		XRA	A		
2D53	32	E4	36	4740		STA	HFO		
2D56	E1			4750		POP	H		
2D57	EB			4760	PARAB3	XCHG			
2D58	21	09	00	4770		XCHG	H,9		
2D5B	19			4780		DAD	D		
2D5C	EB			4790		XCHG	NEGRND		
2D5D	2A	EF	36	4800		LHLD			
2D60	19			4810		DAD	D		
2D61	DA	AD	2D	4820		JC	BFERR		
2D64	D5			4830		PUSH	D		
2D65	2A	E7	36	4840		LHLD	DELTA		
2D68	EB			4850		XCHG			
2D69	2A	E4	36	4860		LHLD	HFO		
2D6C	19			4870		DAD	D		
2D6D	22	E4	36	4880		SHLD	HFO		
2D70	44			4890		MOV	B,H		
2D71	2A	E9	36	4900		LHLD	SD		
2D74	19			4910		DAD	D		
2D75	22	E7	36	4920		SHLD	DELTA		
2D78	E1			4930		POP	H		
2D79	70			4940		MOV	M,B		
2D7A	0D			4950		DCR	C		
2D7B	C2	57	2D	4960		JNZ	PARAB3		
2D7E	C9			4970		RET			
2D7F				4980					
2D7F				4990					
2D7F				5000					
2D7F				5010					
2D7F				5020					
2D7F				5030					
2D7F	AF			5040	BPARAB	XRA	A		
2D80	B9			5050		CHP	C		
2D81	C8			5060		RE			
2D82	56			5070		MOV	D,M		
2D83	E5			5080		PUSH	H		
2D84	3E	0A		5090		MVI	A,10		
2D86	CD	BF	2D	5100		CALL	GETFO		
2D89	7A			5110		MOV	A,D		
2D8A	32	E5	36	5120		STA	HFO+1		
2D8D	96			5130		SUB	M		

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND
2D8E	47			5140		MOV	B,A		
2D8F	21	00	00	5150		LXI	H,0		
2D92	59			5160		MOV	E,C		
2D93	1D			5170		DCR	E		
2D94	C2	16	2D	5180		JNZ	PARAB2		
2D97	3A	E5	36	5190		LDA	HFO+1		
2D9A	80			5200		ADD	B		
2D9B	D1			5210		POP	D		
2D9C	21	09	00	5220		LXI	H,9		
2D9F	19			5230		DAD	D		
2DA0	EB			5240		XCHG	NEGBND		
2DA1	2A	EF	36	5250		LHLD			
2DA4	19			5260		DAD	D		
2DA5	DA	AD	2D	5270		JC	BFERR		
2DA8	EB			5280		XCHG			
2DA9	77			5290		MOV	M,A		
2DAA	AF			5300		XRA	A		
2DAB	C9			5310		RET			
2DAC				5320					
2DAC				5330					
2DAC				5340					
2DAD	D1			5350		POP	D		
2DAD	21	B3	2D	5360		LXI	H,BFTX		
2DB0	F6	FF		5370		ORI	255		
2DB2	C9			5380		RET			
2DB3				5390					
2DB3	42	55	46	5400	BFTX	DT	'BUFFER FULL'		
2DB6	46	45	52						
2DB9	20	46	55						
2DBC	4C	4C							
2DBE	0D			5410		DB	ODH		
2DBF				5420					
2DBF				5430					
2DBF				5440					
2DBF				5450					
2DBF				5460					
2DBF				5470					
2DBF				5480					
2DBF	21	C9	2D	5490	GETFO	LXI	H,STRSF0-1		
2DC2	80			5500		ADD	B		
2DC3	85			5510		ADD	L		
2DC4	6F			5520		MOV	L,A		
2DC5	3E	00		5530		MVI	A,0		
2DC7	8C			5540		ADC	H		
2DC8	67			5550		MOV	H,A		
2DC9	C9			5560		RET			
2DCA				5570					
2DCA				5580					
2DCA				5590					
2DCA	63			5600	STRSF0	DB	99		
2DCB	59			5610		DB	89		
2DCC	54			5620		DB	84		
2DCD	52			5630		DR	82		
2DCE	51			5640		DR	81		
2DCF	6C			5650		DB	108		
2DD0	63			5660		DE	99		
2DD1	5E			5670		DB	94		

* DIFF TO NEW F0 INTO B

* N>1, COMPUTE PARABOLA

* N=1, STORE I POINT

* INCR PTR TO NEXT FRAME

* NO MORE ROOM

* ENTRY HERE FROM DOWNDR

* BUFFER FULL

* GET AN F0 LEVEL FROM STRSF0 TABLE (SET HL TO IT)

* ON ENTRY:

A TELLS THE COLUMN, 0=SP, 5=MP, 10=EP

B CONTAINS THE STRESS LEVEL 1-5

ON RETURN, HL POINTS TO THE DESIRED ENTRY

H,STRSF0-1

F0 TABLE FOR DIFFERENT STRESS LEVELS

* PARAB STARTING PT., STRESS 1

* S.P., STRESS 2

* ETC.

* PARAS MID POINT (PEAK)

GET EITHER N OR N-1 FROM E

DENOM=(B)*((B)-1)

S=2*((256*DIFF)/DENOM)

CLEAR LS PART OF HFO

MOVE BUFFER PTR TO NEXT FRAME

RAN OUT OF ROOM!

HFO=HFO+DELTA

H CONTAINS NEW F0 VALUE

DELTA=DELTA+S

GET BUF PTR BACK

CONSTRUCT BACK PARABOLIC CURVE DOWN FROM PEAK

STRESS X, (C)=FRAME CNT DOWN FROM PEAK

HL POINTS TO F0 PARAM AT PEAK

RETURN IF FRAME COUNT =0

GET PREV F0 VALUE

SET HL TO END-PARAB LEVEL

SAVE OLD F0

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2DD2	5C				5680		DB	92
2DD3	5B				5690		DB	91
2CD4	59				5700		DB	89
2DD5	4F				5710		DB	79
2DD6	4A				5720		DB	74
2DD7	47				5730		DB	71
2DD8	46				5740		DB	70
2DD9					5750	*		
2DD9					5760	*****		
2DD9					5770	*		
2DD9					5780	*		
2DD9					5790	*		
2DD9					5800	*		
2DD9					5810	*		
2DD9					5820	*		
2DD9					5830	*		
2DD9					5840	*		
2DD9	2A	06	20		5850	CLRBUF	LHLD	BUFADR
2DD9	11	0B	00		5860		LXI	D,11
2DD9	19				5870		DAD	D
2DD9	16	80			5880		MVI	D,128
2DD9	1E	AC			5890		MVI	E,172
2DD9	4F				5900	CLOOP	XRA	A
2DD9	77				5910		MOV	M,A * AV=0
2DD9	23				5920		INX	H
2DD9	23				5930		INX	H
2DD9	72				5940		MOV	M,D * F1=128
2DD9	23				5950		INX	H
2DD9	72				5960		MOV	M,D * F2=128
2DD9	23				5970		INX	H
2DD9	73				5980		MOV	M,E * F3=172
2DD9	23				5990		INX	H
2DD9	77				6000		MOV	M,A * AH=0
2DD9	23				6010		INX	H
2DD9	77				6020		MOV	M,A * AF=0
2DD9	23				6030		INX	H
2DD9	72				6040		MOV	M,D * FF=128
2DD9	77				6050		INX	H
2DD9	23				6060		MOV	M,A * AN=0
2DD9	23				6070		INX	H
2DD9	0B				6080		DCX	B
2DD9	B0				6090		ORA	B
2DD9	B1				6100		ORA	C
2DD9	C2	E4	2D		6110		JNZ	CLOOP
2DD9	C9				6120		RET	
2DD9					6130	*		
2DD9					6140	*		

CLRBUF IS CALLED BY GENPRM TO INITIALIZE
 THE PARAMETER BUFFER (OR PART OF IT)
 VALUES IN THE FO PARAMETER ARE NOT DISTURBED
 ON ENTRY: (BC) = THE # OF FRAMES TO INITIALIZE
 STARTING WITH THE 2ND FRAME OF THE BUFFER

END OF SECT4



CSR1 Section 5

Source Listing

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2000					0010	* GENPRM			36E1					0580	* THE NEXT 19 LOCATIONS ARE ACCESSED BY ROUTINES		
2000					0020	*			36E1					0590	* IN SECTION 6 AND MUST NOT BE MOVED		
2000					0030	* SECTION 5 OF THE CSKI SYNTHESIS BY RULE SYSTEM			36E1					0600	*		
2000					0040	*			36E1					0610	OCODE	DS	1
2000					0050	* LLOYD RICE, COMPUTALKER CONSULTANTS			36E2					0620	OFEATA	DS	1
2000					0060	* VERSION 1.04 MAY 30, 1977			36E3					0630	OFEATE	DS	1
2000					0070	*			36E4					0640	ODUK	DS	1
2000					0080	*****			36E5					0650	OCID	DS	1
2000					0090	*			36E6					0660	ORANK	DS	1
2000					0100	* COMMON JUMP ADDRESS TABLE			36E7					0670	OPCT	DS	1
2000					0110	*			36E8					0680	OTIMES	DS	1
2000					0120	CUMJMP	ECU	\$	36E9					0690	*		
2000					0130	*			36E9					0700	CODEX	DS	1
2000					0140	CSKI	DS	3	36EA					0710	FEATAX	DS	1
2000					0150	PLAY	DS	3	36EB					0720	FEATDX	DS	1
2000					0160	BUFADR	DS	2	36EC					0730	DURX	DS	1
2000					0170	BUFLN	DS	2	36ED					0740	CLDX	DS	1
2000					0180	PVTAB	DS	2	36EE					0750	RANKX	DS	1
2000					0190	MATPAK	DS	3	36EF					0760	PCTX	DS	1
2000					0200	MATERK	DS	3	36F0					0770	TIMESK	DS	1
2000					0210	RULES	DS	3	36F1					0780	*		
2000					0220	SETDUR	DS	3	36F1					0790	BT	DS	1
2000					0230	RULES3	DS	3	36F2					0800	FT	DS	1
2000					0240	GENFU	DS	3	36F3					0810	FC	DS	1
2000					0250	CLRBUF	DS	3	36F4					0820	*		
2021	C3	00	2E		0260	JMF	GENPRM		36F4					0830	* GENPRM (LOCAL) RAM WORKSPACE		
2024	C3	00	32		0270	JMP	MUL		36F4					0840	*		
2027	C3	13	32		0280	JMF	DIV		36F4					0850	TARG	DS	1
202A					0290	GUTCNS	DS	3	36F5					0860	BVAL	DS	1
202D					0300	PCBFT	DS	3	36F6					0870	SD	DS	2
2030					0310	FITAR	DS	2	36F8					0880	DELTA	DS	2
2032					0320	F2TAR	DS	2	36FA					0890	PCOUNT	DS	1
2034					0330	F3TAR	DS	2	36FB					0900	NTARGS	DS	1
2036					0340	AVHTAR	DS	2	36FC					0910	ASPT	DS	1
2038					0350	AVHTAR	DS	2	36FD					0920	*		
203A					0360	*			36FD					0930	*****		
203A					0370	*****			36FD					0940	*		
203A					0380	*			36FD					0950	* GENPRM		
203A					0390	* COMMON ORIGIN DEFINITION			36FD					0960	SECTAD	CRG	COMJMP+0E0CH
203A					0400	*			2E00					0970	ECU	\$	
3500					0410	CONRAM	ORG	COMJMP+1500H	2E00					0980	SECTAD	CRG	COMJMP+0E0CH
3500					0420	CONRAM	ECU	\$	2E00					0990	*		
3500					0430	*			2E00					1000	*****		
3500					0440	* CSKI SYSTEM RAM SPACE DEFINITION			2E00					1010	*		
3500					0450	*			2E00					1020	* PHCNAME CODE DEFINITIONS		
3500					0460	MATPTR	DS	2	2E00					1030	*		
3502					0470	NEGERD	DS	2	2E00					1040	CTERM	ECU	4
3504					0480	MATPIX	ECU	\$	2E00					1050	CP	ECU	39
3504					0490	MATLER	ECU	95	2E00					1060	*		
3504					0500	PHCODE	DS	MATLEN	2E00					1070	* FEATURE LABEL DEFINITIONS		
3563					0510	FEATA	DS	MATLEN	2E00					1080	*		
3520					0520	FEATS	DS	MATLEN	2E00					1090	IGNORE	ECU	1
3621					0530	STRES	DS	MATLEN	2E00					1100	STOP	ECU	30H
3680					0540	DUR	DS	MATLEN	2E00					1110	PLOS	ECU	20H
36DF					0550	MATEND	ECU	\$	2E00					1120	PLOSA	ECU	10H
36DF					0560	BUFPTR	DS	2	2E00					1130	*		
36E1					0570	*			2E00					1140	* OUTPUT CHANNEL DEFINITIONS		

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2EBC	06	0C			2290	* SETAMP	MVI	B, U			2F13	3E	03		2860	*			
2EBE	CD	2D	2C		2300		CALL	PCBFT			2F13	3E	03		2870		MVI	A, 3	* PC= .5 FOR NASAL
2EC1	2A	36	20		2310		LHLD	AVHTR			2F15	32	F3	36	2880		STA	PC	
2EC4	3A	E9	36		2320		LDA	CODEX			2F18	3D			2890		DCR	A	
2EC7	16	0C			2330		LDA	CODEX			2F19	32	F1	36	2900		STA	BT	* BACK & FORW. TIMES = 2 FRAMES
2EC9	5F				2340		MVI	D, 0			2F1C	32	F2	36	2910		STA	FT	
2ECA	14				2350		MOV	E, A			2F1F	F1			2920		POP	PSW	* GET NASAL TARGET
2ECB	7E				2360		DAD	D			2F20	E6	03		2930		ANI	3	
2ECB	F5				2370		MOV	A, M			2F22	87			2940		ADD	A	
2ECB	F5				2380		PUSH	PSW			2F23	87			2950		ADD	A	
2ECD	E6	F0			2390		ANI	QFCH			2F24	87			2960		ADD	A	
2ECF	01	00	00		2400		LXI	B, CHANAV			2F25	87			2970		ADD	A	
2ED2	CD	C6	3C		2410		CALL	GENAX			2F26	87			2980		ADD	A	* MULT BY 32
2ED5					2420						2F27	01	08	00	2990		LXI	B, CHANAN	
2ED5					2430						2F2A	CD	C8	3C	3000		CALL	GENAX	* SET AMPLITUDE OF NASAL
2ED5					2440						2F2D	C3	7C	3C	3010		JMP	ENDPRM	
2ED5					2450						2F30				3020	*			
2ED6	E6	0F			2460		POP	PSW			2F30				3030	*			
2ED8	87				2470		ANI	QFCH			2F30				3040	*			
2ED9	87				2480		ADD	A			2F30				3050	*			
2EDA	01	05	00		2490		ADD	A			2F30				3060	*			
2EDD	CD	C6	3C		2500		LXI	B, CHANAH			2F30				3070	*			
2EE0					2510		CALL	GENAX			2F30				3080	*			
2EE0					2520						2F30	3A	E1	30	3090	*			
2EE0					2530						2F33	D6	27		3100	*			
2EE0					2540						2F35	4F			3110	*			
2EE2	CD	2D	20		2550		CALL	PCBFT			2F36	06	00		3120	*			
2EE5	2A	38	20		2560		LHLD	FRNTR			2F38	21	36	32	3130	*			
2EE8	3A	E9	36		2570		LDA	CODEX			2F3B	09			3140	*			
2EEB	5F				2580		MOV	E, A			2F3C	7E			3150	*			
2EEC	16	0C			2590		MVI	D, 0			2F3D	47			3160	*			
2EEE	19				2600		DAD	D			2F3E	87			3170	*			
2EEF	7E				2610		MOV	A, M			2F3F	87			3180	*			
2EFO	F5				2620		PUSH	PSW			2F40	37			3190	*			
2EF1	E6	1C			2630		ANI	ICH			2F41	80			3200	*			
2EF4	01	06	00		2640		ADD	A			2F42	2F			3210	*			
2EF4	01	06	00		2650		LXI	B, CHANAF			2F43	3C			3220	*			
2EF7	CD	C6	3C		2660		CALL	GENAX			2F44	4F			3230	*			
2EFA					2670						2F45	78			3240	*			
2EFA					2680						2F46	06	FF		3250	*			
2EFA					2690						2F48	2A	DF	36	3260	*			
2EFA	F1				2700		POP	PSW			2F4B	09			3270	*			
2EFB	3B				2710		DCX	SP			2F4C	01	06	00	3280	*			
2EFC	3B				2720		DCX	SP			2F4F	09			3290	*			
2EFD	E6	E0			2730		ANI	QFCH			2F50	01	09	00	3300	*			
2EFF	57				2740		MOV	D, A			2F51	09			3310	*			
2F00	01	07	00		2750		LXI	B, CHANFF			2F54	36	24		3320	*			
2F03	2A	DF	36		2760		LHLD	BUFRTR			2F56	1D			3330	*			
2F06	09				2770		DAD	B			2F5A				3340	*			
2F07	3A	EC	36		2780		LDA	DURX			2F5A				3350	*			
2F0A	01	09	00		2790		LXI	B, 9			2F5A				3360	*			
2F0D	09				2800		MOV	M, D			2F5A	3A	EE	36	3370	*			
2F0E	72				2810		MOV	M, D			2F5D	EE	03		3380	*			
2F0F	3D				2820		DCR	A			2F5F	D2	71	2F	3390	*			
2F10	C2	0D	2F		2830		JNZ	SETFF			2F62	3E	02		3400	*			
2F13					2840						2F64	12	F3	36	3410	*			
2F13					2850						2F67	3A	E8	36	3420	*			

* PC = .5 FOR NASAL
 * BACK & FORW. TIMES = 2 FRAMES
 * GET NASAL TARGET
 * MULT BY 32
 * SET AMPLITUDE OF NASAL
 * STOP AFTER PLOSIVE
 * SETASP SETS THE PLOSIVE BURST PULSE
 * AND IF NEEDED, ASPIRATION IN THE FOLLOWING PHON.
 * PLOSIVE CODE - CODE OF "p"
 * MAKE POINTER TO PLOSC TABLE
 * GET LENGTH OF BURST PULSE
 * A = PULSE LENGTH
 * BC = -9*(PULSE LENGTH)
 * PLOSIVE BURST AFTER PLOSIVE
 * COMPUTE FORMANTS FOR PHON AFTER PLOSIVE
 * CURR RANK > PLOS RANK (=2)
 * CURR RANK <= 2, PC=0.5
 * FT = OLD 1SEC

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	LINE	LABEL	OPCD	OPERAND
2F6A	0F				3430		RRC				4000		DCR	A
2F6B	0F				3440		RRC				4010		JNZ	SETAN
2F6C	0F				3450		RRC				4020	*		
2F6D	0F				3460		RRC				4030	*		
2F6E	C3	7A	2F		3470		JMP	SETIMS			4040	*		
2F71					3480	*					4050	*		
2F71	3A	EF	36		3490	GPELOS	LDA	PCTX			4060		LDA	OFEATB
2F74	32	F3	36		3500		STA	PC			4070		ANI	
2F77	3A	F0	36		3510		LDA	TIMESX			4080		JZ	FINASP
2F7A	E6	0F			3520	SETIMS	ANI	UFH			4090		LDA	DURX
2F7C	32	F2	36		3530		STA	FT			4100		MVI	D,5
2F7F	3C	01			3540		MVI	A,1			4110		CMP	D
2F81	32	F1	36		3550	*	STA	ET			4120		JC	S+4
2F84					3560	*					4130		MOV	A,D
2F84					3570	*					4140	*	STA	ASPT
2F84					3580	*					4150	*		
2F84	2A	30	20		3590		LHLD	FITAR			4160	*		
2F87	EB				3600		XCHG				4170	*		
2F88	01	02	00		3610		LXI	B,CHANF1			4180		LHLD	BUFPTR
2F8B	CD	AE	30		3620		CALL	GERFX			4190		LXI	D,CHANAV
2F91	EA	32	20		3630		LHLD	F2TAR			4200		DAD	D
2F92	01	C3	00		3640		XCHG				4210		DAD	B
2F95	CD	AE	30		3650		LXI	B,CHANF2			4220		MVI	M,C
2F98	2A	34	20		3660		CALL	GENFX			4230		DCR	A
2F9B	EB				3670		LHLD	F3TAR			4240	*	JNZ	SETAV
2F9C	01	04	00		3680		XCHG				4250	*		
2F9F	CD	AE	30		3700		CALL	GENFX			4260	*		
2FA2					3710	*					4270	*		
2FA2					3720	*					4280	*		
2FA2					3730	*					4290	*		
2FA2	2A	38	20		3740		LHLD	FRNTAR			4300		LDA	ASPT
2FA5	3A	E9	36		3750		LDA	CODEX			4310		LHLD	BUFPTR
2FA8	5F				3760		MOV	E,A			4320		LXI	D,CHANAF
2FA9	16	00			3770		MVI	D,0			4330		DAD	D
2FAB	19				3780		DAD	D			4340		DAD	B
2FAC	7E				3790		MOV	A,M			4350	*	MVI	M,0
2FAD	E6	EO			3800		ANI	CEUH			4360	*	DCR	A
2FAF	57				3810		MOV	D,A			4370	*	JNZ	SETAF
2FB0	2A	DF	30		3820		LHLD	BUFPTR			4380	*		
2FB3	01	07	00		3830		LXI	B,CHANFF			4390	*	XRA	A
2FB6	09				3840		DAD	B			4400		STA	TARG
2FB7	3A	EC	36		3850		LDA	DURX			4410		LDA	ASPT
2FBA	01	C9	00		3860		LXI	B,9			4420		MOV	B,A
2FBD	09				3870	SETFF2	DAD	B			4430		MOV	C,A
2FBE	72				3880		MOV	M,D			4440		LHLD	BUFPTR
2FBF	3D				3890		DCR	A			4450		LXI	D,CHANAH
2FC0	C2	8D	2F		3900	*	JNZ	SETFF2			4460		DAD	D
2FC3					3910	*					4470	*	MVI	M,50
2FC3					3920	*					4480	*	CALL	FRWRD
2FC3					3930	*					4490	*		
2FC3	2A	DF	36		3940		LHLD	BUFPTR			4500	*		
2FC6	11	08	00		3950		LXI	D,CHANAN			4510		LDA	ASPT
2FC9	19				3960		DAD	D			4520		MOV	B,A
2FCA	3A	EC	36		3970		LDA	DURX			4530		LDA	DURX
2FCD	09				3980	SETAN	DAD	B			4540		SUB	B
2FCE	36	00			3990		MVI	M,0			4550		JZ	ENDPRM

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND
302B	78				4570		MOV	A,E		
302C	87				4580		ADD	A		
302D	87				4590		ADD	A		
302E	87				4600		ADD	A		
302F	80				4610		ADD	B		
3030	4F				4620		MOV	C,A		* ASPT*9 INTO BC
3031	06	00			4630		MVI	B,0		
3033	2A	DF	36		4640		LHLD	BUFPTR		
3036	09				4650		DAD	B		
3037	22	DF	36		4660		SHLD	BUFPTR		* BUFPTR=BUFPTR+9*ASPT
303A					4670		COMPUTE	AV FOR REMAINDER OF PHON		
303A					4680					
303A	06	00			4690					
303A	06	00			4700	FINASE				
303C	CD	2D	20		4710		CALL	PCBET		* GET AV/AH VALUES FOR PC & FT
303F	3E	01			4720		MVI	A,1		
3041	32	F1	36		4730		STA	BT		* BT=1 SETS BVAL FROM TARG
3044	2A	36	20		4740		LHLD	AVHTAR		
3047	3A	E9	36		4750		LDA	CODEX		
304A	16	00			4760		MVI	D,0		
304C	5F				4770		MOV	E,A		
304D	19				4780		DAD	D		
304E	D5				4790		PUSH	D		* SAVE CODEX TABLE OFFSET
304F	7E				4800		MOV	A,M		* GET AV/AH TARGET BYTE
3050	F5				4810		PUSH	PSW		* SAVE IT
3051	E6	FC			4820		ANI	0F0H		* MASK TO KEEP AV
3053	01	00	00		4830		LXI	B,CHANAV		
3056	CD	C3	30		4840		CALL	GENAX		* FINISH AV CURVE
3059					4850		COMPUTE	AH FOR REMAINDER OF PHON		
3059					4860					
3059	F1				4870					
305A	E6	0F			4880		POP	PSW		
305C	87				4890		ANI	0FH		* MASK TARGET BYTE TO KEEP AH
305D	87				4900		ADD	A		
305E	01	05	00		4910		ADD	A		* MULT BY 4
305E	01	05	00		4920		LXI	B,CHANAH		
3061	CD	C8	30		4930		CALL	GENAX		* FINISH AH CURVE
3064					4940		COMPUTE	AF FOR REMAINDER OF PHON		
3064					4950					
3064	3E	03			4960					
3064	3E	03			4970		MVI	A,3		
3066	32	F2	16		4980		STA	FT		* FT = 3
3069	3C				4990		INR	A		
306A	32	F3	36		5000		STA	PC		* PC = 1.00
306D	2A	38	20		5010		LHLD	FRNTAR		
3070	D1				5020		POP	D		
3071	19				5030		DAD	D		
3072	7E				5040		MOV	A,M		* GET FRIC/NASAL TARGET BYTE
3073	E6	1C			5050		ANI	1CH		* MASK TO KEEP AF
3075	87				5060		ADD	A		
3076	01	06	00		5070		LXI	B,CHANAF		
3079	CD	C6	30		5080		CALL	GENAX		* FINISH AF CURVE
307C					5090					
307C					5100					
307C	00				5110	ENDPRM				* BREAKPOINT LOC
307D	2A	EC	16		5120		LHLD	DURX		
3083	26	00			5130		MVI	H,0		
3082	54				5140		MOV	D,H		
3083	5D				5150		MOV	E,L		
3084	23				5160		DAD	H		* MULTIPLY DURX BY 9
3085	29				5170		DAD	H		
3086	29				5180		DAD	H		
3087	19				5190		DAD	D		
3088	EB				5200		XCHG			
3089	2A	DF	36		5210		LHLD	BUFPTR		
308C	19				5220		DAD	D		
308D	22	DF	36		5230		SHLD	BUFPTR		* BUFPTR=BUFPTR+9*DURX
3090	21	E9	36		5240		LXI	H,COEXH		
3093	11	E1	36		5250		LXI	D,OCODE		
3096	0E	08			5260		MVI	C,8		
3098	7E				5270	CNSLP	MOV	A,M		* MOVE CURR CONSTANT VALUES
3099	12				5280		STAX	D		* INTO OLD CONSTANTS
309A	23				5290		INX	H		
309B	13				5300		INX	D		
309C	0D				5310		DCR	C		
309D	C2	98	30		5320		JNZ	CNSLP		
30A0	2A	00	35		5330		LHLD	MATPTR		
30A3	23				5340		INX	H		
30A4	22	0C	35		5350		SHLD	MAIPTR		
30A7	7E				5360		MOV	A,M		
30AB	FE	04			5370		CPI	CTERM		* SEE IF NEW CODE IS TERMINATOR
30AA	C2	22	2E		5380		JNZ	GPLOOP		* NO, DO ANOTHER COLUMN
30AD	C9				5390		RET	*		* THAT'S IT, LETS GO LISTEN
30AE					5400					
30AE	5410				5410	*****				
30AE					5420					
30AE					5430					
30AE					5440					
30AE					5450					
30AE					5460	*****				
30AE					5470					
30AE					5480					
30AE					5490					
30AE					5500					
30AE					5510					
30AE					5520					
30AE					5530					
30AE	3A	E9	36		5540	GENFX	LDA	CODEX		
30B1	6F				5550		MOV	L,A		
30B2	26	00			5560		MVI	H,0		
30B4	19				5570		DAD	D		
30B5	7E				5580		MOV	A,M		
30B6	32	F4	36		5590		STA	TARG		* SET TARGET VALUE
30B9	2A	DF	36		5600		LHLD	BUFPTR		
30BC	09				5610		DAD	B		* SET HL TO FORMANT, FRAME I
30BD	96				5620		SUB	M		
30BE	CD	D2	11		5630		CALL	MULPC		* MULT TARG-FX(I) BY PC
30C1	86				5640		ADD	M		
30C2	32	F5	36		5650		STA	BVAL		* BVAL=FX(I)+PC*(TARG-FX(I))
30C5	C3	D8	10		5660		JMP	GENBF		
30C8					5670					
30C8					5680		GENAX	SUBROUTINE		
30C8					5690					
30C8					5700					

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
30C8				5710	* ON ENTRY: A CONTAINS THE PARAM TARGET VALUE			CALL	DIV	3114	CD	13	32	6280			
30C8				5720	BC CONTAINS THE OUTPUT CHAN NO.			DAD	H	3117	29			6290			
30C8				5730				MOV	D,H	3118	54			6300			
30C8	32	F4	36	5740	GENAX	STA	TARG			3119	5D			6310			
30CE	2A	DF	36	5750	* SET TARGET VALUE	LHLD	BUFPTR			311A	F1			6320			
30CE	09			5760	* SET HL TO PARAM IN FRAME 1	DAD	B			311B	D2	26	31	6330			
30CF	86			5770		ADD	M			311E	7C			6340			
30D0	1F			5780		RAR				311F	2F			6350			
30D1	B7			5790		ORA	A			3120	67			6360			
30D2	CD	D2	31	5800	* DIVIDE BY 2, CLEAR CARRY	CALL	MULPC			3121	7D			6370			
30D5	32	F5	36	5810		STA	BVAL			3122	2F			6380			
30D8	3A	F1	36	5820	* BVAL=PC*(TARG+Y)/2	LDA	BT			3123	6F			6390			
30DB	47			5830		MOV	B,A			3124	21			6400			
30DC	CD	0B	31	5840	* MODIFY CURVE BACK FROM BOUNDARY	CALL	BKWRD			3125	37			6410			
30DF	3A	EC	36	5850		LDA	DURX			3126	E5			6420	FRW2		
30E2	4F			5860		MOV	C,A			3127	F5			6430			
30E3	3A	F2	36	5870		LDA	FT			3128	09			6440			
30E6	47			5880		MOV	B,A			3129	26	00		6450			
30E7				5890						312B	CD	13	32	6460			
30E7				5900	* FRWRD					312E	F1			6470			
30E7				5910	* STORES THE NEXT N FRAMES BEYOND THE PARAM VALUE					312F	DA	39	31	6480			
30E7				5920	* CURRENTLY INDICATED BY HL. B CONTAINS THE NUMBER					3132	7C			6490			
30E7				5930	* OF FRAMES NEEDED TO REACH THE VALUE IN LOC TARG.					3133	2F			6500			
30E7				5940	* C CONTAINS THE TOTAL NO. OF NEW FRAMES TO BE					3134	67			6510			
30E7				5950	* STORED. B MAY BE ANY SIZE RELATIVE TO C					3135	7D			6520			
30E7				5960						3136	2F			6530			
30E7	AF			5970	FRWRD	XRA	A			3137	6F			6540			
30E8	B9			5980		CRP	C			3138	23			6550			
30E9	C8			5990	* RETURN IF NOTHING TO STORE	RZ				3139	22	F6	36	6560	FRW3		
30EA	3C			6000		INR	A			313C	E1			6570			
30EB	B8			6010		INR	B			313D	51			6580			
30EC	D2	5E	31	6020	* B<=1, SET PARAM=TARG	JNC	SETARG			313E	1E	00		6590			
30EF	79			6030		MOV	A,C			3140	3A	FA	36	6600			
30F0	90			6040		SUB	B			3143	44			6610	FWDLP		
30F1	F2	F8	30	6050	* POS # OF TARG AFTER PARABOLA	JP	FINPB			3144	4D			6620			
30F4	AF			6060		XRA	A			3145	19			6630			
30F5	C3	FB	30	6070		JNF	DOPE			3146	D1			6640			
30F8	48			6080		MOV	C,E			3147	E5			6650			
30F9	0D			6090		DCR	C			3148	19			6660			
30FA	3C			6100		INR	A			3148	21	09	00	6670			
30FB	32	FB	36	6110	* SET FOR N TARG AFTER PARAB.	DCR	A			314B	19			6680			
30FE	79			6120		STA	NTARG			314C	D1			6690			
30FF	32	FA	36	6130		STA	A,C			314D	E5			6700			
3102	4E			6140	* SET # OF PARABOLA POINTS	STA	PCOUNT			314E	72			6710			
3103	E5			6150	* GET PREV PARAM INTO C	MOV	C,M			314F	2A	F6	36	6720			
3104	3A	F4	36	6160		PUSH	H			3152	09			6730			
3107	91			6170		LDA	TARG			3153	3D			6740			
3108	F5			6180		SUB	C			3154	C2	43	31	6750			
3109	D2	0E	31	6190		PUSH	PSW			3157	E1			6760			
310C	2F			6200		JNC	\$+5			3158	3A	FB	36	6770			
310D	3C			6210		CMA				315B	B7			6780			
310E	77			6220		INR	A			315C	C8			6790			
310F	68			6230	* ABS(TARG-PREV) INTO D	MOV	D,A			315D	4F			6800	SETARG		
3110	2C			6240		MOV	L,B			315E	3A	F4	36	6810			
3111	AF			6250		INR	L			3161	11	09	00	6820	SETAL		
3112	67			6260		XRA	A			3164	19			6830			
3113	5F			6270	* HL=N+1 (N IS DIST TO PEAK)	MOV	H,A			3165	77			6840			
						MOV	E,A			3166	0D			6850			

* ABS(256*(TARG-PREV)/(N+1))
 * SAVE ASR(DELTA)=2*QUOTIENT

* FIX SIGN OF DELTA
 * AND SAVE IT
 * AND ITS SIGN
 * COMPUTE ABS(DELTA/N)

* SECOND DIFF = -DELTA/N
 * GET DELTA INTO HL
 * PREV PARAM TO DE
 * AND PARAM COUNT TO A

* Y=Y+DELTA

* ADDR=ADDR+9
 * STORE NEW Y VALUE
 * DELTA=DELTA+SD

* GET ADDR POINTER
 * NO. OF TARG VALUES TO WRITE

* SET PARAM=TARG

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND
3167	C2	64	31	6850		JNZ	SETAL		
3168	C9			6860		RET			
3169				6870					
3170				6880					
3171				6890					
3172				6900					
3173				6910					
3174				6920					
3175				6930					
3176				6940					
3177				6950					
3178				6960					
3179				6970					
3180				6980					
3181				6990					
3182				7000					
3183				7010					
3184				7020					
3185				7030					
3186				7040					
3187				7050					
3188				7060					
3189				7070					
3190				7080					
3191				7090					
3192				7100					
3193				7110					
3194				7120					
3195				7130					
3196				7140					
3197				7150					
3198				7160					
3199				7170					
3200				7180					
3201				7190					
3202				7200					
3203				7210					
3204				7220					
3205				7230					
3206				7240					
3207				7250					
3208				7260					
3209				7270					
3210				7280					
3211				7290					
3212				7300					
3213				7310					
3214				7320					
3215				7330					
3216				7340					
3217				7350					
3218				7360					
3219				7370					
3220				7380					
3221				7390					
3222				7400					
3223				7410					

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
31A8	29			7420		DAD	H
31A9	22	F6	36	7430		SHLD	SD
31AA	D1			7440		POP	D
31AB	1E	00		7450		MVI	E,0
31AC	78			7460		MOV	A,B
31AD	3D			7470		DCR	A
31AE	01	00	00	7480		LXI	B,0
31AF	2A	F6	36	7490	BWLPL	LHLD	SD
31B0	44			7500		DAD	B
31B1	4D			7510		MOV	B,H
31B2	19			7520		MOV	C,L
31B3	E5			7530		DAD	D
31B4	21	09	00	7540		POP	D
31B5	19			7550		PUSH	H
31B6	01	00	00	7560		LXI	H,9
31B7	19			7570		DAD	D
31B8	D1			7580		POP	D
31B9	E5			7590		PUSH	H
31BA	72			7600		MOV	M,D
31BB	3D			7610		DCR	A
31BC	C2	B4	31	7620		JNZ	BWLPL
31BD	D1			7630		POP	D
31BE	11	09	00	7640		LXI	D,9
31BF	19			7650		DAD	D
31C0	3A	F5	36	7660	SETIB	LDA	BVAL
31C1	77			7670		MOV	M,A
31C2	C5			7680		RET	
31C3	D2			7690			
31C4	E5			7700			
31C5	D2			7710			
31C6	D2			7720			
31C7	D2			7730			
31C8	D2			7740			
31C9	D2			7750			
31CA	D2			7760			
31CB	D2			7770	MULPC	PUSH	H
31CC	D2			7780		MVI	E,0
31CD	D2			7790		JNC	MPC1
31CE	D2			7800		CMA	
31CF	D2			7810		INR	A
31D0	D2			7820		DCR	E
31D1	D2			7830		MOV	L,A
31D2	D2			7840		LDA	PC
31D3	D2			7850		RAR	
31D4	D2			7860		MOV	H,A
31D5	D2			7870		MVI	A,0
31D6	D2			7880		JNC	MPC2
31D7	D2			7890		ADD	L
31D8	D2			7900		RAR	
31D9	D2			7910	MPC2	MOV	D,A
31DA	D2			7920		MOV	A,H
31DB	D2			7930		RAR	
31DC	D2			7940		MOV	H,A
31DD	D2			7950		MOV	A,D
31DE	D2			7960		JNC	MPC3
31DF	D2			7970		ADD	L
31E0	D2			7980		RAR	

* SD=256*SECCND DIFF
 * GET Y0 VALUE BACK
 * (DE)=256*YU
 * LOOP COUNT IS N-1
 * INIT DELTA=C
 * DELTA=DELTA+SD INTO BC
 * Y=Y+DELTA
 * NEW ADDR=ADDR+9
 * CLEAN UP THE STACK
 * PUT BVAL IN LAST FRAME
 * MULTIPLY ABS(A) BY PC, SIGN(A) IS IN CARRY
 * POSSIBLE VALUES OF PC ARE 0,1/4,1/2,3/4, & 1
 * STORED WITH THE BIN PT TO THE RIGHT OF BIT 2
 * RETURN RESULT IN A
 * (DE) LOST, (BC) & (HL) RESTORED
 * IF CARRY SET, ...
 * COMPL A, SAVE CARRY IN E



CSR1 Section 6

Source Listing

ADDR	BI	B2	B3	E	LINE	LABEL	OPCD	OPERAND
2000					0010	* PLAY ROUTINE, TARGET TABLES, & MISC		
2000					0020	* SECTION 6 OF THE CSRI SYNTHESIS BY RULE SYSTEM		
2000					0030	* LLOYD RICE, COMPUTALKER CONSULTANTS		
2000					0040	* VERSION 1.08 MAY 30, 1977		
2000					0050	*****		
2000					0060	* COMMON JUMP ADDRESS TABLE		
2000					0070			
2000					0080			
2000					0090			
2000					0100			
2000					0110			
2000					0120	COMJMP	EQU	\$
2000					0130			
2000					0140	CSRI	DS	3
2003	C3	50	32		0150	BUFADR	JMP	PLAY
2006					0160	BUFEND	DS	2
2008					0170	PVTAB	DS	2
200A					0180	MATPAK	DS	3
200C					0190	MATERR	DS	3
200F					0200	RULES	DS	3
2012					0210	SETDUR	DS	3
2015					0220	RULES3	DS	3
2018					0230	GENFO	DS	3
201E					0240	CLRBUF	DS	3
2021					0250	GENPRM	DS	3
2024					0260	MUL	DS	3
2027					0270	DIV	DS	3
202A	C3	96	32		0280	JMP	GETCNS	
202D	C3	D0	32		0290	JMP	PCBFT	
2030	IC	33			0300	FITAR	DW	
2032	58	33			0310	F2TAR	DW	
2034	94	33			0320	F3TAR	DW	
2036	D0	33			0330	AVHTAR	DW	
2038	0C	34			0340	PRNTAR	DW	
203A					0350	*****		
203A					0360			
203A					0370			
203A					0380			
203A					0390	* COMRAM ORIGIN DEFINITION		
203A					0400			
203A					0410	ORG	COMJMP+1500H	
3500					0420	COMRAM	EQU	\$
3500					0430			
3500					0440	* CSRI SYSTEM RAM SPACE DEFINITION		
3500					0450			
3500					0460	MATPTR	DS	2
3502					0470	NEGEND	DS	2
3504					0480	MATRIX	EQU	\$
3504					0490	MATLEN	DS	95
3504					0500	PHCODE	DS	
3504					0510	FEATA	DS	
3504					0520	FEATB	DS	
3504					0530	STRES	DS	
3504					0540	DUR	DS	
3504					0550	MATEND	EQU	\$
3504					0560	BUFTR	DS	2
3504					0570			
36E1					0580	* THE NEXT 19 LOCATIONS ARE USED IN COMMON		
36E1					0590	* WITH SECTION 5. THEY MUST NOT BE MOVED		
36E1					0600			
36E1					0610	OCODE	DS	1
36E2					0620	OFEATA	LS	1
36E3					0630	OFEATB	DS	1
36E4					0640	ODUR	DS	1
36E5					0650	OCID	DS	1
36E6					0660	ORANK	DS	1
36E7					0670	CFCT	DS	1
36E8					0680	OTIMES	DS	1
36E9					0690			
36E9					0700	CODEX	DS	1
36EA					0710	FEATX	DS	1
36EB					0720	FEATBX	DS	1
36EC					0730	DURX	DS	1
36ED					0740	CIDX	DS	1
36EE					0750	RANKX	DS	1
36EF					0760	PCTX	DS	1
36F0					0770	TIMESX	DS	1
36F1					0780			
36F1					0790	BT	DS	1
36F2					0800	FT	DS	1
36F3					0810	PC	DS	1
36F4					0820			
36F4					0830	*****		
36F4					0840			
36F4					0850	* PLAY (LOCAL) RAM WORKSPACE		
36F4					0860			
36F4					0870	CTO	DS	3
36F7					0880			
36F7					0890	*****		
36F7					0900			
36F7					0910	ORG	COMJMP+1250H	
3250					0920	SECTAD	EQU	\$
3250					0930			
3250					0940			
3250					0950	* DEFINITIONS FOR PLAY SUBROUTINE		
3250					0960			
3250					0970	CTBASE	EQU	GECH
3250					0980	CHANSW	EQU	15
3250					0990			
3250					1000	*****		
3250					1010			
3250					1020	* PLAYBACK SUBROUTINE		
3250					1030			
3250					1040	PLAY	LXI	H,CTO
3253	F4	36			1050		MVI	M,CD3H
3255	D3				1060		INX	H
3256	23				1070		INX	H
3257	36	C9			1080		MVI	M,OC9H
3259	2A	06	20		1090		LHLD	BUFADR
325C	5E				1100		MOV	E,M
325D	23				1110		INX	H
325E	56				1120		MOV	D,M
325F	23				1130		INX	H
3260	0D	77	32		1140		CALL	CTOUT

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
3263	1B			1150		DCX	D	32A1	12			1720		STAX	D
3264	3E	FF		1160		MVI	A,255	32A2	09			1730		DAD	B
3266	D3	EF		1170		OUT	CTBASE+CHANSW * TURN ON CT-1	32A3	13			1740		INX	D
3268	CD	77	32	1180	PLALP	CALL	CTCUT * PLAY THE BUFFER	32A4	7E			1750		MOV	A,M
326B	CD	8A	32	1190		CALL	DLY1C * WAIT 10 MSEC	32A5	12			1760		STAX	D
326E	1B			1200		DCX	D	32A6	09			1770		DAD	B
326F	7A			1210		MOV	A,D	32A7	09			1780		DAD	B
3270	B3			1220		ORA	E	32A8	13			1790		INX	D
3271	C2	68	32	1230		JNZ	PLALP * LOOP UNTIL BUFFER DONE	32A9	7E			1800		MOV	A,M
3274	D3	EF		1240		OUT	CTBASE+CHANSW * TURN OFF CT-1	32AA	12			1810		STAX	D
3276	C9			1250		RET		32AB	13			1820		INX	D
3277				1260	*			32AC	2A	00	35	1830		LHLD	MATPTR * GET CODE AGAIN
3277				1270	*	CTOUT	PLAYS ONE DATA FRAME FROM THE BUFFER	32AF	4E			1840		MOV	C,M
3277				1280	*		ON ENTRY: HL POINTS TO AV OF THE FRAME TO PLAY	32B0	06	00		1850		MVI	B,0
3277				1290	*		SUBC CTO HAS BEEN SET UP AS:	32B2	21	40	34	1860		LXI	H,RAPCID
3277				1300	*		CTO OUT CIBASE	32B5	09			1870		DAD	B
3277				1310	*		RET	32B6	7E			1880		MOV	A,M
3277				1320	*		(DE) ARE UNCHANGED	32B7	6F			1890		MOV	L,A
3277	06	EC		1330	*			32B8	E6	07		1900		ANI	7
3277	06	EC		1340	CTCUT	MVI	B,CTBASE * RE-INITIALIZE CTO ROUTINE	32BA	12			1910		STAX	D
3279	0E	09		1350		MVI	C,9	32BB	13			1920		INX	D
327B	76			1360	CTIP	MOV	A,B	32BC	60			1930		MOV	H,B
327C	32	F5	36	1370		STA	CTO+1	32BD	29			1940		DAD	H
327F	7E			1380		MOV	A,M	32BE	29			1950		DAD	H
3280	CD	F4	36	1390		CALL	CTO	32BF	29			1960		DAD	H
3283	23			1400		INX	B	32C0	7C			1970		MOV	A,H
3284	04			1410		INR	B	32C1	12			1980		STAX	D
3285	0D			1420		DCR	C	32C2	13			1990		INX	D
3286	C2	7B	32	1430		JNZ	CTIP * GO AROUND 9 TIMES	32C3	60			2000		MOV	H,B
3289	C9			1440		RET		32C4	29			2010		DAD	H
328A				1450	*			32C5	29			2020		DAD	H
328A				1460	*		DELAY 10 MILLISECONDS (ASSUMES 2MHZ CLOCK)	32C6	7C			2030		MOV	A,H
328A				1470	*		(A) CHANGED, ALL ELSE RESTORED	32C7	12			2040		STAX	D
328A	E5			1480				32C8	13			2050		INX	D
328B	21	20	03	1490	DLY1C	PUSH	H	32C9	21	84	34	2060		LXI	H,TTIMES
328E	2B			1500		LXI	H,800	32CD	7E			2070		DAD	B
328F	7C			1510		DCX	H	32CE	12			2080		MOV	A,M
3290	B5			1520		MOV	A,H	32CF	C9			2090		STAX	D
3291	C2	8E	32	1530		ORA	L	32D0				2100		RET	
3294	E1			1540		JNZ	\$-3					2110	*		
3295	C9			1550		POP	H					2120	*	PCBFT	SUBROUTINE
3295	C9			1560		RET						2130	*	GET	PERCENT AND TIME VALUES FROM MATRIX ARRAYS
3296				1570	*							2140	*	SET	PC=PCVF(CIDX,OCID)
3296				1580	*****							2150	*	SET	BT=TAVF(OCID)
3296				1590	*							2160	*	SET	BT=TAVF(CIDX)
3296				1600	*		GETCNS SUBROUTINE					2170	*	ON	ENTRY: B=0 TO GET AV/AH INFO
3296				1610	*		GET MISC CONSTANTS PERTAINING TO THE CURRENT PHOR					2180	*	B#0	TO GET AF INFO
3296				1620	*		PUT DATA INTO TABLE BEGINNING AT (DE)					2190	*		
3296				1630	*		ALL REGISTERS MODIFIED					2200	PCBFT		
3296				1640	*			32D0	3A	E5	36	2200	OCID	LDA	OCID
3296	2A	00	35	1650	GETCNS	LHLD	MATPTR	32D3	4F			2210		MOV	C,A
3299	01	5F	00	1660		LXI	B,MATLEN	32D4	87			2220		ADD	A
329C	7E			1670		MOV	A,M	32D5	81			2230		ADD	C
329D	12			1680		STAX	D	32D6	87			2240		ADD	A
329E	09			1690		DAD	B	32D7	81			2250		AED	C
329F	13			1700		INX	D	32D8	57			2260		MOV	D,A
32A0	7E			1710		MOV	A,M	32D9	3A	ED	36	2270		LDA	CIDX
								32DC	82			2280		ADD	D

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
32DD	5F			2290		MOV	E,A	332A	A8			2560		DB	* UW
32DE	16	0J		2300		MVI	D,C	332B	48			2570		DE	* AX
32EO	21	CO 34		2310		LXI	H,PCVF	332C	88			2580		DB	* IX
32E3	19			2320		DAD	D	332D	8D			2590		DB	* ER
32EA	AF			2330		XRA	A	332E	AF			2900		DB	* UX
32E5	BC			2340		ORA	B	332F	77			2910		DB	* OH
32E6	7E			2350		MOV	A,M	3330	55			2920		DB	* AW
32E7	CA	ED 32		2360		JZ	5+6	3331	55			2930		DB	* AY
32EA	1F			2370		RAK	*	3332	6D			2940		DB	* OY
32EB	1F			2380		RAR		3333	71			2950		DB	* EY
32EC	1F			2390		RAR		3334	8D			2960		DB	* RX
32ED	E6 07			2400		ANI	7	3335	95			2970		DB	* LX
32EF	32 F3 36			2410		STA	PC	3336	AR			2980		DB	* WX
32F2	59			2420		MCV	E,C	3337	38			2990		DB	* YX
32F3	21 F1 34			2430		LXI	H,IAVF	3338	A5			3000		DB	* WH
32F6	EB			2440		XCHG		3339	00			3010		DB	* EL
32F7	19			2450		DAD	D	333A	00			3020		DB	* EM
32F6	AF			2460		XRA	A	333B	00			3030		DB	* EN
32F5	8U			2470		ORA	B	333C	A8			3040		DB	* R
32FA	7E			2480		MOV	A,M	333D	A2			3050		DB	* L
32FB	CA 01 33			2490		JZ	5+6	333E	B3			3060		DB	* W
32FE	1F			2500		RAR		333F	C2			3070		DB	* Y
3300	1F			2510		RAR		3340	EF			3080		DB	* M
3301	E6 07			2520		RAR	*	3341	EF			3090		DB	* N
3303	32 F1 30			2530		ANI	7	3342	EF			3100		DB	* NX
3306	3A ED 36			2540		STA	BT	3343	BE			3110		DB	* P
3309	6F			2550		LDA	CIDX	3344	BE			3120		DB	* T
330A	26 00			2560		MOV	L,A	3345	BE			3130		DB	* K
330C	19			2570		MVI	H,0	3346	BE			3140		DB	* KX
330D	AF			2580		DAD	D	3347	BE			3150		DB	* B
330E	BC			2590		XRA	A	3348	BE			3160		DB	* D
330F	7E			2600		ORA	B	3349	BE			3170		DB	* G
3310	CA 16 33			2610		MOV	A,M	334A	BE			3180		DB	* GK
3313	1F			2620		JZ	5+6	334B	BE			3190		DB	* DX
3314	1F			2630		RAR		334C	BE			3200		DB	* F
3315	1F			2640		RAR		334D	BE			3210		DB	* TH
3316	E6 07			2650		RAR		334E	BE			3220		DB	* S
3318	32 F2 36			2660		ANI	7	334F	BE			3230		DB	* SH
331B	C9			2670		STA	FI	3350	9E			3240		DB	* V
331C				2680		RET		3351	BE			3250		DB	* DH
331C				2690				3352	BE			3260		DB	* Z
331C				2700				3353	BE			3270		DB	* ZH
331C				2710				3354	0C			3280		DB	* CH
331C				2720				3355	00			3290		DB	* JH
331D	00			2730				3356	80			3300		DB	* HH
331E	80			2740				3357	80			3310		DB	* HH
331F	00			2750				3358				3320		DB	* Q
3320	00			2760				3358				3330		DB	* Q
3321	B6			2770				3358				3340		DB	* Q
3322	93			2780				3358	00			3350		DB	* Q
3323	71			2790				3359	00			3360		DB	* Q
3324	58			2800				335A	80			3370		DB	* Q
3325	55			2810				335B	00			3380		DB	* Q
3326	67			2820				335C	00			3390		DB	* Q
3327	6D			2830				335D	58			3400		DB	* Q
3328	77			2840				335E	6A			3410		DB	* Q
3329	95			2850				335F	75			3420		DB	* Q

* F2 TARGET TABLE

* F1 TARGET TABLE

* SPACE
 * PERIOD
 * COMMA (PAUSE)
 * QUEST
 * # (TERMINATOR)
 * IY
 * AH
 * AO
 * OW
 * EH

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	OPCD	OPERAND
3360	71			3430		DB	113 * AE	DB	172 * CMMMA (PAUSE)
3361	50			3440		DB	150 * AA	DB	0 * QUEST
3362	AC			3450		DB	160 * AH	DB	0 * # (TERMINATOR)
3363	B3			3460		DB	179 * AO	DB	132 * IY
3364	C2			3470		DB	194 * OM	DB	167 * IH
3365	B0			3480		DB	182 * OH	DB	175 * EH
3366	98			3490		DB	155 * UW	DB	181 * AE
3367	AC			3500		DB	160 * AX	DB	155 * AA
3368	79			3510		DB	121 * IX	DB	159 * AH
3369	52			3520		DB	146 * ER	DE	172 * AO
336A	8D			3530		DB	141 * UX	DB	200 * OW
336B	C2			3540		DB	194 * OH	DB	190 * UH
336C	96			3550		DB	150 * AW	DB	190 * UW
336D	56			3560		DB	150 * AY	DB	163 * AX
336E	D3			3570		DB	179 * OY	DE	181 * IX
336F	6A			3580		DB	106 * EY	DB	255 * ER
3370	8D			3590		DB	141 * PX	DB	190 * UX
3371	B1			3600		DB	177 * LX	DB	155 * AW
3372	CC			3610		DB	204 * WX	DB	155 * AY
3373	64			3620		DB	180 * YX	DB	172 * OY
3374	CC			3630		DB	204 * WH	DE	176 * EY
3375	00			3640		DB	0 * EL	DB	255 * RA
3376	00			3650		DB	0 * EM	DB	139 * LX
3377	00			3660		DB	0 * EN	DB	200 * WX
3378	B1			3670		DB	177 * R	DB	172 * YX
3379	B8			3680		DB	184 * L	DB	185 * WH
337A	DC			3690		DB	220 * W	DB	0 * EL
337B	64			3700		DB	100 * Y	DB	0 * EM
337C	BE			3710		DB	190 * M	DB	255 * R
337D	79			3720		DB	121 * N	DB	136 * L
337E	6A			3730		DB	106 * NX	DB	185 * W
337F	BE			3740		DB	190 * P	DB	132 * Y
3380	79			3750		DB	121 * T	DB	220 * M
3381	4D			3760		DB	77 * K	DB	163 * N
3382	8D			3770		DB	141 * KX	DB	243 * NX
3383	BE			3780		DB	190 * R	DB	220 * P
3384	79			3790		DB	121 * D	DB	163 * T
3385	4D			3800		DB	77 * G	DB	255 * K
3386	8D			3810		DB	141 * GX	DB	220 * B
3387	79			3820		DB	121 * DX	DB	172 * D
3388	8E			3830		DB	190 * F	DB	255 * KX
3389	80			3840		DB	128 * TH	DB	220 * G
338A	92			3850		DB	146 * S	DB	172 * G
338B	5E			3860		DB	94 * SH	DB	255 * GX
338C	DE			3870		DB	190 * V	DB	163 * DX
338D	80			3880		DB	128 * DH	DB	155 * TH
338E	92			3890		DB	146 * Z	DB	167 * S
338F	5E			3900		DB	94 * ZH	DB	210 * V
3390	00			3910		DB	0 * CF	DB	155 * Z
3391	0C			3920		DB	0 * JH	DB	155 * DH
3392	83			3930		DB	128 * FH	DB	167 * Z
3393	03			3940		DB	128 * Q	DB	155 * SH
3394				3950		DB		DB	167 * Z
3395	00			3960		DB		DB	155 * DH
3396				3970		DB		DB	167 * Z
3397				3980		DB		DB	155 * SH
3398				3990		DB		DB	167 * Z
3399				4000		DB		DB	155 * DH
3400				4010		DB		DB	167 * Z
3401				4020		DB		DB	155 * SH
3402				4030		DB		DB	167 * Z
3403				4040		DB		DB	155 * DH
3404				4050		DB		DB	167 * Z
3405				4060		DB		DB	155 * SH
3406				4070		DB		DB	167 * Z
3407				4080		DB		DB	155 * DH
3408				4090		DB		DB	167 * Z
3409				4100		DB		DB	155 * SH
3410				4110		DB		DB	167 * Z
3411				4120		DB		DB	155 * DH
3412				4130		DB		DB	167 * Z
3413				4140		DB		DB	155 * SH
3414				4150		DB		DB	167 * Z
3415				4160		DB		DB	155 * DH
3416				4170		DB		DB	167 * Z
3417				4180		DB		DB	155 * SH
3418				4190		DB		DB	167 * Z
3419				4200		DB		DB	155 * DH
3420				4210		DB		DB	167 * Z
3421				4220		DB		DB	155 * SH
3422				4230		DB		DB	167 * Z
3423				4240		DB		DB	155 * DH
3424				4250		DB		DB	167 * Z
3425				4260		DB		DB	155 * SH
3426				4270		DB		DB	167 * Z
3427				4280		DB		DB	155 * DH
3428				4290		DB		DB	167 * Z
3429				4300		DB		DB	155 * SH
3430				4310		DB		DB	167 * Z
3431				4320		DB		DB	155 * DH
3432				4330		DB		DB	167 * Z
3433				4340		DB		DB	155 * SH
3434				4350		DB		DB	167 * Z
3435				4360		DB		DB	155 * DH
3436				4370		DB		DB	167 * Z
3437				4380		DB		DB	155 * SH
3438				4390		DB		DB	167 * Z
3439				4400		DB		DB	155 * DH
3440				4410		DB		DB	167 * Z
3441				4420		DB		DB	155 * SH
3442				4430		DB		DB	167 * Z
3443				4440		DB		DB	155 * DH
3444				4450		DB		DB	167 * Z
3445				4460		DB		DB	155 * SH
3446				4470		DB		DB	167 * Z
3447				4480		DB		DB	155 * DH
3448				4490		DB		DB	167 * Z
3449				4500		DB		DB	155 * SH
3450				4510		DB		DB	167 * Z
3451				4520		DB		DB	155 * DH
3452				4530		DB		DB	167 * Z
3453				4540		DB		DB	155 * SH
3454				4550		DB		DB	167 * Z
3455				4560		DB		DB	155 * DH
3456						DB		DB	167 * Z

* F3 TARGET TABLE
 * SPACE
 * PERIOD
 F3TABR DB C
 F3TABR DB C

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
33CF	AC			4570		DB	172 * Q	3405	E0			5140		DB	224 * DH
33D0				4580	* AV/AH	TARGET TABLE		3406	E5			5150		DB	229 * Z
33D1	CU			4600		DB	0	3407	E8			5160		DB	232 * ZH
33D2	CU			4610	AVHTAR	DB	0	3408	00			5170		DB	0 * CH
33D3	CU			4620		DB	0	3409	00			5180		DB	0 * JH
33D4	CU			4630		DB	0	340A	0A			5190		DB	10 * HH
33D5	EC			4640		DB	0	340B	30			5200		DB	128 * Q
33D6	EC			4650		DB	224	340C				5210		DB	
33D7	EC			4660		DB	224	340C				5220		DB	
33D8	EC			4670		DB	224	340C				5230		DB	
33D9	EC			4680		DB	224	340C				5240		DB	
33DA	EC			4690		DB	224	340E	80			5250		DB	
33DB	EC			4700		DB	224	340F	80			5260		DB	
33DC	EC			4710		DB	224	340F	80			5270		DB	
33DD	EC			4720		DB	224	3410	80			5280		DB	
33DE	EC			4730		DB	224	3411	80			5290		DB	
33DF	EC			4740		DB	224	3412	80			5300		DB	
33E0	EC			4750		DB	224	3413	80			5310		DB	
33E1	EC			4760		DB	224	3414	80			5320		DB	
33E2	EC			4770		DB	224	3415	80			5330		DB	
33E3	EC			4780		DB	224	3416	80			5340		DB	
33E4	EC			4790		DB	224	3417	80			5350		DB	
33E5	EC			4800		DB	224	3418	80			5360		DB	
33E6	EC			4810		DB	224	3419	80			5370		DB	
33E7	EC			4820		DB	224	341A	80			5380		DB	
33E8	EC			4830		DB	224	341B	80			5390		DB	
33E9	EC			4840		DB	224	341C	80			5400		DB	
33EA	EC			4850		DB	224	341D	80			5410		DB	
33EB	EC			4860		DB	224	341E	80			5420		DB	
33EC	EA			4870		DB	224	341F	80			5430		DB	
33ED	EC			4880		DB	224	3420	80			5440		DB	
33EE	EC			4890		DB	234	3421	80			5450		DB	
33EF	EC			4900		DB	0	3422	80			5460		DB	
33F0	AO			4910		DB	0	3423	80			5470		DB	
33F1	AO			4920		DB	0	3424	80			5480		DB	
33F2	AO			4930		DB	160	3425	80			5490		DB	
33F3	AO			4940		DB	160	3426	80			5500		DB	
33F4	AO			4950		DB	160	3427	80			5510		DB	
33F5	AO			4960		DB	160	3428	80			5520		DB	
33F6	AO			4970		DB	160	3429	80			5530		DB	
33F7	AO			4980		DB	160	342A	80			5540		DB	
33F8	AO			4990		DB	160	342B	80			5550		DB	
33F9	AO			5000		DB	0	342C	80			5560		DB	
33FA	AO			5010		DB	0	342D	80			5570		DB	
33FB	AO			5020		DB	0	342E	80			5580		DB	
33FC	AO			5030		DB	0	342F	80			5590		DB	
33FD	AO			5040		DB	64	3430	82			5600		DB	
33FE	AO			5050		DB	64	3431	82			5610		DB	
33FF	AO			5060		DB	64	3432	82			5620		DB	
3400	AO			5070		DB	64	3433	80			5630		DB	
3401	AO			5080		DB	0	3434	80			5640		DB	
3402	05			5090		DB	0	3435	80			5650		DB	
3403	08			5100		DB	0	3436	80			5660		DB	
3404	EC			5110		DB	0	3437	80			5670		DB	
				5120		DB	8	3438	80			5680		DB	
				5130		DB	224	3439	80			5690		DB	
						DB		343A	80			5700		DB	

FF/AF/AN TARGET TABLE

128 * SPACE

128 * PERIOD

128 * COMMA (PAUSE)

128 * QUEST

128 * IY (TERMINATOR)

128 * IH

128 * EH

128 * AE

128 * AA

128 * AH

128 * AO

128 * OW

128 * UH

128 * UW

128 * AX

128 * IX

128 * ER

128 * UX

128 * OH

128 * AR

128 * YX

128 * AY

128 * OY

128 * EY

128 * RX

128 * LX

128 * WX

128 * YH

128 * EL

128 * EM

128 * EN

128 * R

128 * L

128 * W

128 * Y

128 * N

128 * NX

128 * P

128 * T

128 * K

128 * KX

128 * B

128 * D

128 * G

128 * GX

ADDR B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	ADDR D1	B2	B3	E	LINE	LABEL	OPCD	OPERAND
343B	80			5710		DB	126 * DX	3471	52			6260		DB	82 * K
343C	80			5720		DB	176 * F	3472	52			6290		DB	82 * KX
343D	70			5730		DB	112 * TH	3473	53			6300		DB	83 * P
343E	98			5740		DB	152 * S	3474	53			6310		DB	83 * D
343F	74			5750		DB	116 * SH	3475	53			6320		DB	83 * G
3440	80			5760		DB	176 * V	3476	53			6330		DB	83 * GX
3441	74			5770		DB	116 * DH	3477	53			6340		DB	83 * DX
3442	98			5780		DB	152 * Z	3478	7C			6350		DB	124 * F
3443	74			5790		DB	116 * ZH	3479	7C			6360		DB	124 * TH
3444	60			5800		DB	128 * CH	347A	7C			6370		DB	124 * S
3445	80			5810		DB	128 * JH	347B	7C			6380		DB	124 * SH
3446	80			5820		DB	128 * HH	347C	7D			6390		DB	125 * V
3447	80			5830		DB	128 * Q	347D	7D			6400		DB	125 * DH
3448				5840		DB		347E	7D			6410		DB	125 * Z
3448				5850		DB		347F	7D			6420		DB	125 * ZH
3448				5860		DB		3480	00			6430		DB	0 * CH
3448	00			5870		DB		3481	00			6440		DB	0 * JH
3449	00			5880		DB		3482	86			6450		DB	134 * HH
344A	80			5890		DB		3483	83			6460		DB	131 * Q
344E	00			5900		DB		3484				6470		DB	
344C	00			5910		DB		3484				6480		DB	
344D	11			5920		DB		3484				6490		DB	
344E	11			5930		DB		3484				6500		DB	
344F	11			5940		DB		3484				6510		DB	
3450	11			5950		DB		3485	00			6520		DB	
3451	11			5960		DB		3485	00			6530		DB	
3452	11			5970		DB		3487	00			6540		DB	
3453	11			5980		DB		3488	00			6550		DB	
3454	11			5990		DB		3489	AA			6560		DB	
3455	11			6000		DB		348A	AA			6570		DB	
3456	11			6010		DB		3488	AA			6580		DB	
3457	11			6020		DB		348C	AA			6590		DB	
3458	11			6030		DB		348D	AA			6600		DB	
3459	11			6040		DB		348E	AA			6610		DB	
345A	11			6050		DB		348F	AA			6620		DB	
345B	11			6060		DB		3491	AA			6630		DB	
345C	11			6070		DB		3491	AA			6640		DB	
345D	11			6080		DB		3492	AA			6650		DB	
345E	11			6090		DB		3493	AA			6660		DB	
345F	11			6100		DB		3494	AA			6670		DB	
3460	11			6110		DB		3495	AA			6680		DB	
3461	3E			6120		DB		3496	AA			6690		DB	
3462	31			6130		DB		3497	AA			6700		DB	
3463	31			6140		DB		3498	AA			6710		DB	
3464	3E			6150		DB		3499	AA			6720		DB	
3465	00			6160		DB		349A	AA			6730		DB	
3466	00			6170		DB		349B	AA			6740		DB	
3467	00			6180		DB		349C	77			6750		DB	
3468	3E			6190		DB		349D	74			6760		DB	
3469	3E			6200		DB		349E	AA			6770		DB	
346A	3E			6210		DB		349F	AA			6780		DB	
346B	3E			6220		DB		34A0	74			6790		DB	
346C	53			6230		DB		34A1	00			6800		DB	
346D	53			6240		DB		34A2	00			6810		DB	
346E	53			6250		DB		34A3	00			6820		DB	
346F	52			6260		DB		34A4	74			6830		DB	
3470	52			6270		DB		34A5	74			6840		DB	
						DB		34A6	74					DB	

TRANSITION TIMES TABLE

OPCD	OPERAND	TTIMES
0	* SPACE	0
0	* PERIOD	0
10	* COMMA (PAUSE)	10
0	* QUEST	0
0	* # (TERMINATOR)	0
170	* IY	170
170	* IH	170
170	* EH	170
170	* AE	170
170	* AA	170
170	* AH	170
170	* AO	170
170	* OW	170
170	* UW	170
170	* AX	170
170	* IX	170
170	* ER	170
170	* UX	170
170	* OH	170
170	* AW	170
170	* AY	170
170	* EY	170
119	* RX	119
116	* LX	116
170	* WX	170
170	* YX	170
116	* WH	116
0	* EL	0
0	* EM	0
116	* RR	116
116	* LL	116
116	* W	116

ADDR	B1	B2	B3	E	LINE	LABEL	OPCD	OPERAND	AF/AV	TRANSITION	TIME	TABLE
34A7	74				6850		DB	116 * Y				
34A8	60				6860		DB	96 * M				
34A9	70				6870		DB	112 * N				
34AA	90				6880		DB	144 * NX				
34AB	50				6890		DB	80 * P				
34AC	70				6900		DB	112 * T				
34AD	90				6910		DB	144 * K				
34AE	90				6920		DB	144 * KX				
34AF	60				6930		DB	96 * B				
34B0	70				6940		DB	112 * D				
34B1	90				6950		DB	144 * G				
34B2	90				6960		DB	144 * GX				
34B3	70				6970		DB	112 * DX				
34B4	54				6980		DB	84 * F				
34B5	54				6990		DB	84 * TH				
34B6	54				7000		DB	84 * S				
34B7	54				7010		DB	84 * SH				
34B8	54				7020		DB	84 * V				
34B9	54				7030		DB	84 * DH				
34BA	54				7040		DB	84 * Z				
34BB	54				7050		DB	84 * ZH				
34BC	00				7060		DB	0 * CH				
34BD	00				7070		DB	0 * JH				
34BE	0A				7080		DB	10 * HH				
34BF	0A				7090		DB	10 * Q				
34C0					7100							
34C1	09				7110		DB	32+4				
34C2	00				7120		DB	8+1				
34C3	00				7130		DB	0				
34C4	09				7140		DB	0				
34C5	09				7150		DB	8+1				
34C6	09				7160		DB	8+1				
34C7	09				7170		DB	8+1				
34C8	24				7180		DB	8+1				
34C9	12				7190		DB	32+4				
34CA	12				7200		DB	16+2				
34CB	12				7210		DB	16+2				
34CC	14				7220		DB	16+2				
34CD	24				7230		DB	16+4				
34CE	00				7240		DB	32+4				
34CF	12				7250		DB	0				
34D0	24				7260		DB	16+2				
34D1	00				7270		DB	16+2				
34D2	12				7280		DB	16+4				
34D3	12				7290		DB	32+4				
34D4	12				7300		DB	0				
34D5	00				7310		DB	16+2				
34D6	12				7320		DB	32+4				
34D7	00				7330		DB	0				
34D8	24				7340		DB	16+2				
34D9	12				7350		DB	16+2				
34DA	12				7360		DB	0				
34DB	12				7370		DB	16+2				
34DC	09				7380		DB	0				
34DD	12				7390		DB	32+4				
34DE	12				7400		DB	16+2				
34DF	12				7410		DB	16+2				
34E0	24				7420		DB	32+4				
34E1	24				7430		DB	32+4				
34E2	12				7440		DB	16+2				
34E3	09				7450		DB	8+1				
34E4	14				7460		DB	16+4				
34E5	12				7470		DB	16+2				
34E6	12				7480		DB	16+2				
34E7	22				7490		DB	32+2				
34E8	24				7500		DB	32+4				
34E9	14				7510		DB	16+4				
34EA	09				7520		DB	8+1				
34EB	24				7530		DB	16+2				
34EC	12				7540		DB	32+4				
34ED	12				7550		DB	16+2				
34EE	12				7560		DB	16+2				
34EF	14				7570		DB	16+2				
34F0	24				7580		DB	16+4				
34F1					7590		DB	8+1				
34F2	08				7600		DB	0				
34F3	00				7610		DB	0				
34F4	00				7620		DB	0				
34F5	18				7630		DB	24+0				
34F6	18				7640		DB	24+3				
34F7	08				7650		DB	8+3				
34F8					7660		DB	8+3				

* AF/AV TRANSITION TIME TABLE
 (BITS 3-5)/8 = AF TRANSITION TIME IN FRAMES
 (BITS 0-2) = AV TRANSITION TIME IN FRAMES
 * CID=0
 * CID=1
 * CID=2
 * CID=3
 * CID=4
 * CID=5
 * CID=6

END OF SECTION 6

* AF PC/AV PC ARRAY, PERCENT CROSSING VALUES
 (BITS 3-5)/12 = AF PERCENT BOUNDARY XING VALUE
 (BITS 0-2)/4 = AV PERCENT BOUNDARY XING VALUE
 * OLD CID=0, NEW CID=0
 * OLD CID=0, NEW CID=1
 * OLD CID=1, NEW CID=1
 * OLD CID=1, NEW CID=0
 * OLD CID=0, NEW CID=2
 * OLD CID=1, NEW CID=2
 * OLD CID=2, NEW CID=0

*, 0