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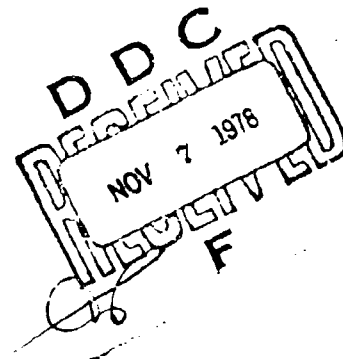
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The Diagnostic Rhyme Test (DRT): An Air Force Implementation

STEVEN MEISTER, Capt, USAF



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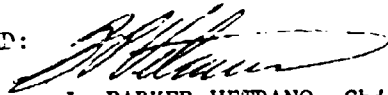
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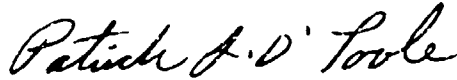
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
14 1. REPORT NUMBER	2. GOVT ACQUISITION NO.	3. RECIPIENT'S CATALOG NUMBER	
6 RADC-TR-78-120		4. TYPE OF REPORT & PERIOD COVERED	
THE DIAGNOSTIC RHYME TEST (DRT): AN AIR FORCE IMPLEMENTATION		In-house Report	
7. AUTHOR(s)		8. CONTRACT OR GRANT NUMBER(s)	
10 Steven/Meister / Capt, USAF			
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS	
Deputy for Electronic Technology (RADC/ETC) Hanscom AFB Massachusetts 01731		78200201	
11. CONTROLLING OFFICE NAME AND ADDRESS		12. DATE	
Deputy for Electronic Technology (RADC/ETC) Hanscom AFB Massachusetts 01731		11 May 1978	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		13. NUMBER OF PAGES	
		207	
		15. SECURITY CLASS (of this report)	
		Unclassified (12) 2940	
		16. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report)			
Approved for public release; distribution unlimited.			
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)			
18. SUPPLEMENTARY NOTES			
19. KEY WORDS (Continue on reverse side if necessary and identify by block number)			
Voice communication Speech intelligibility Test and evaluation Diagnostic rhyme test DRT			
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)			
* The Diagnostic Rhyme Test (DRT) for intelligibility of voice communica- tions systems has been implemented at the Air Force Voice Processing Facility, Hanscom AFB, Massachusetts. This report describes the recruiting and training of listeners and the usage of software to score the DRT. In addition, performance of the in-house DRT is described. It is concluded that the in-house DRT is an economical measure of intelligibility that yields highly reliable results and adequately discriminates small differences in intelli- gibility. It is further concluded that in-house DRT results are comparable to			

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The Diagnostic Rhyme Test (DRT): An Air Force Implementation

I. INTRODUCTION

The Diagnostic Rhyme Test (DRT)¹ for intelligibility was initially developed under Contract No. F19628-70-C-0182 for the Air Force Electronic Systems Division, Voice Processing Laboratory (formally part of the Air Force Cambridge Research Laboratories, Data Sciences Laboratory). In recent years the DRT has emerged as a DoD Standard for testing the intelligibility of voice communications terminals. This is evidenced by its extensive use by the DoD Narrowband Secure Voice Consortium during its FY75 and FY76 Test and Evaluation of candidate narrowband digital voice algorithms for use in the 1980's. The DRT's used by the Consortium were evaluated under contract by Dynastat, Inc., Austin, Texas, the developers of the test. This report documents the development of an in-house capability to administer and score the DRT.

(Received for publication 16 June 1978)

1. Volers, W. D., Sharpley, A. D., and Hehmoth, C. J. (1973) Research on Diagnostic Evaluation of Speech Intelligibility, AFRL-72-0894.

2. THE DIAGNOSTIC RHYME TEST

2.1 Introduction

The DRT is a test for intelligibility rather than user acceptance, or quality, of voice systems. Although related, it is important to note the distinction between intelligibility and quality. It is possible for a voice system to be perfectly intelligible yet have a very unnatural sound or not permit speaker recognition. In such a case the system is likely not to be acceptable to the user. On the other hand, a system having poor intelligibility will certainly be unacceptable to the user. Thus, a prerequisite for user acceptance is high intelligibility. The DRT is a measure of that characteristic of a voice system. The test is structured in such a way as to allow a detailed analysis of the ability of a system to reproduce certain classes of phonemes. These classes are categorized by the binary attributes VOICING, NASALITY, SUSTENTION, SIBILATION, GRAVENESS, and COMPACTNESS. The test provides a means of measuring the performance of the voice system for each state, present or absent, of these six attributes as well as total intelligibility. Using these results, specific weaknesses in the voice system can be pinpointed and corrected. This method of diagnostic analysis has been successfully used.^{2,3}

2.2 Usage

A series of master tape recordings have been prepared by Dynastat, Inc. under various Government contracts to be used as input speech material for testing the intelligibility of the voice system under consideration. Each tape recording consists of one or more speakers uttering a known randomized sequence of words. Each word has been selected from a pair of rhyming words differing only in the leading consonant. Figure 1 presents the sequence of events for DRT usage. In order to conduct a DRT one or more master tape recordings are used as input speech material to the voice system under test. The processed output speech is tape recorded for later presentation to a crew of listeners for evaluation. The listeners' task is to determine which of the rhyming words had been uttered by the speaker. After all tape recordings processed by the system under test have been heard by the listening crew, computer analysis of the listeners' responses takes place and a comprehensive printout of the results is provided. Further analysis by the user can then take place.

2. Smith, C. P. (1976) Comparative Evaluations of Speech Intelligibility Performance of Three Narrowband Voice Communications Methods: Trivoc, Linear Prediction Coding (LPC) and Piecewise Linear Prediction Coding (PLPC) ESD-TR-77-131.
3. Smith, C. P. (1977) Intelligibility Performance of Narrowband Linear Predictive Vocoder in the Presence of Bit Errors, ESD-TR-77-328.

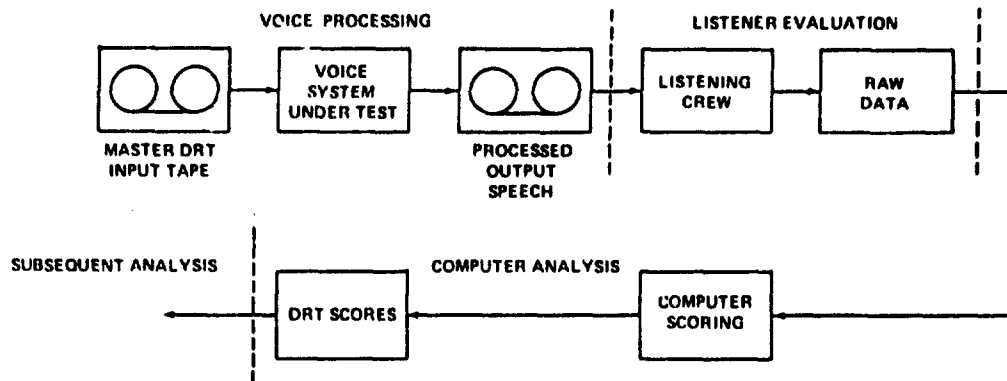


Figure 1. DRT Usage. The sequence of events

2.3 Structure of the DRT

A complete DRT consists of one speaker uttering 464 words of which 384 words are actually scored. The remainder are filler and experimental words. DRT's are normally administered in half tests (192 words) using multiple speakers. The complete list of words used in the DRT appear in Figures 2a through 2d. The DoD Narrowband Secure Voice Consortium has prepared a set of DRT master input tapes using various microphones and ambient acoustic noise backgrounds. These tapes are in the possession of this office and are available for DRT testing. Table 1 is a summary of these tapes. In addition, master DRT tapes as indicated in Tables 3, 4, and 5 are also available.

2.3.1 THE TEST BOOKLET

Each listener who is tasked to evaluate a processed tape recording has before him a four page test booklet for each speaker he will hear. The booklet is sufficient to score one half test. The booklet is shown in Figures 2a through 2d. The speech material the listener hears consists of 232 words uttered by each speaker. The words are one word from each of the word pairs in the test booklet. The listener is instructed to strike out the word he thinks he hears. The booklet is structured so that the word pairs on Figures 2a and 2c are the same but presented in the reverse order. Similarly, the word pairs on Figures 2b and 2d are the same but appear in reverse order. In addition, the present state of each of the six attributes are represented by the left word in each column on Figures 2a and 2b while the absent state is represented by the right word in each column on those pages. The reverse is true for Figures 2c and 2d.

Table 1. Available Master DRT Tapes

Tape ID	DRT TAPES Speaker / List	*Environ- ment	**Microphone					
			1	2	3	4	5	6
E-1-A	LI 302A, CH 308B, RH 310A	Quiet	X	X	X	X		
E-1-B	JE 306A, BV 303A, PK 309A	"	X	X	X	X		
E-2-A	LI 302B, CH 307A, RH 310B	"	X	X	X	X		
E-2-B	JE 306B, BV 303B, PK 312B	"	X	X	X	X		
E-3-A	LI 301A, CH 308A, RH 311A	"	X	X	X	X		
E-3-B	JE 305A, BV 304A, PK 312A	"	X	X	X	X		
E-4-A	LI 301B, CH 307B, RH 311B	"	X	X	X	X		
E-4-B	JE 305B, BV 304B, PK 309B	"	X	X	X	X		
E-5-A	JS 317A, LS 315A, MP 314A	"	X	X	X	X		
E-5-B	JS 317B, LS 315B, MP 314B	"	X	X	X	X		
E-6-A	JS 318A, LS 316A, MP 313A	"	X	X	X	X		
E-6-B	JS 318B, LS 316B, MP 313B	"	X	X	X	X		
G-1-A	RH 318A, JE 310A, CH 314A	ABCP	X		X		X	
G-1-B	RH 318B, JE 310B, CH 314B	"	X		X		X	
G-2-A	RH 317A, JE 309A, CH 313B	HEL	X		X			X
G-2-B	RH 317B, JE 309B, CH 313A	"	X		X			X
G-3-A	RH 303A, JE 311A, CH 315A	SHIP	X		X		X	
G-3-B	RH 303B, JE 311B, CH 315B	"	X		X		X	
G-4-A	RH 304A, JE 312A, CH 316A, JS 305A	Office	X		X		X	
G-4-B	RH 304B, JE 312B, CH 316B, JS 305B	"	X		X		X	

*Environment: Ambient Acoustic Noise Simulated in a Sound Room.
 ABCP - Airborne Command Post
 HEL - Helicopter
 SHIP - Shipboard

** See Table 2 for microphone identification.

Table 2 Microphone Identification Used in Table 1.

1 - Altec 659A Dynamic Microphone
2 - Western Electric T1 Carbon Microphone
3 - Grason-Stadler E7300M Throat Microphone
4 - General Radio 1560-P5 Ceramic Studio Microphone
5 - Roanwell Dynamic Noise Cancelling Microphone
6 - Electrovoice M-78/AIC Dynamic Helicopter Microphone

Table 3 Available Word Lists and Speakers (100 Series)

Word List	Speaker	Word List	Speaker
102A	BV	108A	CH
102B	BV	108B	CH
103A	BV	111A	JE
103B	BV	111B	JE
104A	RD	112A	SN
104B	RD	112B	SN
105A	RD	113A	JE
105B	RD	113B	JE
106A	BL	115A	SN
106B	BL	115B	SN
107A	CH	116A	BL
107B	CH	116B	BL

Table 4. E-4a Advanced Airborne Command Post Master DRT Tapes

Tape ID	DRT Tapes Speaker/List	Environment	*Microphone				
			1	2	3	4	5
S-1-A	SM 301A, SK 307A, BD 311A	Quiet	X	X	X	X	
S-1-B	HH 303A, MM 305A, IP 309A	Quiet	X	X	X	X	
S-2-A	SM 301B, SK 307B, BD 311B	Quiet	X	X	X	X	
S-2-B	HH 303B, MM 305B, IP 309B	Quiet	X	X	X	X	
T-1-A	SM 302A, SK 308A, BD 312A	E-4A Noise	X	X	X		X
T-1-B	HH 304A, MM 306A, IP 310A	E-4A Noise	X	X	X		X
T-2-A	SM 302B, SK 308B, BD 312B	E-4A Noise	X	X	X		X
T-2-B	HH 304B, MM 306B, IP 310B	E-4A Noise	X	X	X		X

*Microphones:

- 1 - ALTEC 659A Dynamic Microphone
- 2 - Roanwell Confidencer Microphone P/N 240100001
- 3 - Grason-Stadler E7300M Throat Microphone
- 4 - General Radio 1560-P5 Ceramic Studio Microphone
- 5 - Noise only - General Radio 1560-P5

Table 5. E-3A AWACS Master DRT Tapes

Tape ID	DRT Tapes Speaker/List	Environment	*Microphone				
			1	2	3	4	5
S-3-A	CH 301A, JE 305A, SM 309A	Quiet	X	X	X	X	
S-3-B	IP 303B, MC 307A, GM 311A	Quiet	X	X	X	X	
S-4-A	CH 301B, JE 305B, SM 309B	Quiet	X	X	X	X	
S-4-B	IP 303A, MC 307B, GM 311B	Quiet	X	X	X	X	
T-3-A	CH 302A, JE 306A, SM 310A	E-3A Noise	X	X	X		X
T-3-B	IP 304A, MC 308A, GM 312B	E-3A Noise	X	X	X		X
T-4-A	CH 302B, JE 306B, SM 310B	E-3A Noise	X	X	X		X
T-4-B	IP 304B, MC 308B, GM 312A	E-3A Noise	X	X	X		X

*Microphones:

- 1 - ALTEC 659A Dynamic Microphone
- 2 - H-335/A1C Headset Microphone
- 3 - Grason-Stadler E7300M Throat Microphone
- 4 - General Radio 1560-P5 Ceramic Studio Microphone
- 5 - Noise only - General Radio 1560-P5

DRT 'A' Nr.

(A)

ROW		
1	GOB - BOB	COOT - TOOT
2	DAUNT - TAUNT	BOND - POND
3	MOOT - BOOT	MOAN - BONE
4	SHEET - CHEAT	VILL - BILL
5	JAB - GAB	JEST - GUEST
6	POT - TOT	FOUGHT - THOUGHT
7	GHOST - BOAST	COOP - POOP
8	LIP - RIP	LEAP - REAP
9	ZED - SAID	VAST - FAST
10	GNAW - DAW	KNOCK - DOCK
11	SHOES - CHOOSE	THOSE - DOZE
12	CHEEP - KEEP	SING - THING
13	BANK - DANK	MET - NET
14	GOT - DOT	CAUGHT - TAUGHT
15	LOAD - ROAD	LEWD - RUDE
16	DINT - TINT	BEAN - PEEN
17	NECK - DECK	MAD - BAD
18	THONG - TONG	VOX - BOX
19	CHOO - COO	JOE - GO
20	WEED - REED	BID - DID
21	SHAG - SAG	YEN - WEN
22	LOT - ROT	LAW - RAW
23	VOLE - FOAL	ZOO - SUE
24	NIP - DIP	NEED - DEED
25	FENCE - PENCE	THAN - DAN
26	SAW - THAW	CHOP - COP
27	POOL - TOOL	FORE - THOR
28	YIELD - WIELD	HIT - FIT
29	LAP - RAP	LEST - REST

Name

Date / Time

Figure 2a. DRT Test Booklet

DRT IV Nr.

(8)

ROW

1	PEST - TEST	FAN - PAN
2	VAULT - FAULT	JOCK - CHOCK
3	NEWS - DUES	NOTE - DOTE
4	VEE - BEE	THICK - TICK
5	SANK - THANK	CHAIR - CARE
6	WAD - ROD	BONG - DONG
7	SHOW - SO	YOU - RUE
8	LID - RID	LEEK - REEK
9	DENSE - TENSE	GAFF - CALF
10	MOSS - BOSS	MOM - BOMB
11	FOO - POOH	THOUGH - DOUGH
12	ZEE - THEE	JILT - GILT
13	FAD - THAD	PENT - TENT
14	HOP - FOP	YAWL - WALL
15 +	LOW - ROW	LOOT - ROOT
16	GIN - CHIN	VEAL - FEEL
17	MEND - BEND	NAB - DAB
18	SHAW - CHAW	VON - BON
19	JUICE - GOOSE	SOLE - THOLE
20	PEEK - TEAK	FIN - THIN
21	GAT - BAT	KEG - PEG
22	LOCK - ROCK	LONG - WRONG
23	GOAT - COAT	DUNE - TUNE
24	MIT - BIT	MEET - BEET
25	THEN - DEN	SHAD - CHAD
26	JAWS - GAUZE	JOT - GOT
27	MOON - NOON	BOWL - DOLE
28	KEY - TEA	GILL - DILL
29	LAMP - RAMP	LEND - REND

NameDate / Time

Figure 2b. DRT Test Booklet

DRT IV Nr.

(C)

ROW

1	BOB - GOB	TOOT - COOT
2	TAUNT - DAUNT	POND - BOND
3	BOOT - MOOT	BONE - MOAN
4	CHEAT - SHEET	BILL - VILL
5	GAB - JAB	GUEST - JEST
6	TOT - POT	THOUGHT - FOUGHT
7	BOAST - GHOST	POOP - COOP
8	RIP - LIP	REAP - LEAP
9	SAID - ZED	FAST - VAST
10	DAW - GNAW	DOCK - KNOCK
11	CHOOSE - SHOES	DOZE - THOSE
12	KEEP - CHEEP	THING - SING
13	DANK - BANK	NET - MET
14	DOT - GOT	TAUGHT - CAUGHT
15+	ROAD - LOAD	RUDE - LEWD
16	TINT - DINT	PEEN - BEAN
17	DECK - NECK	BAD - MAD
18	TONG - THONG	BOX - VOX
19	COO - CHOO	GO - JOE
20	REED - WEED	DID - BID
21	SAG - SHAG	WREN - YEN
22	ROT - LOT	RAW - LAW
23	FOAL - VOLE	SUE - ZOO
24	DIP - NIP	DEED - NEED
25	PENCE - FENCE	DAN - THAN
26	THAW - SAW	COP - CHOP
27	TOOL - POOL	THOR - FORE
28	WIELD - YIELD	FIT - HIT
29	RAP - LAP	REST - LEST

Name

Date/Time

Figure 2c. DRT Test Booklet

60 11 02 001

DRT IV Nr.

(D)

ROW

1	TEST - PEST	PAN - FAN
2	FAULT - VAULT	CHOCK - JOCK
3	DUES - NEWS	NOTE - NOTE
4	BEE - VEE	TICK - THICK
5	THANK - SANK	CARE - CHAIR
6	ROD - WAD	DONG - BONG
7	SO - SHOW	RUE - YOU
8	RID - LID	REEK - LEEK
9	TENSE - DENSE	CALF - GAFF
10	BOSS - MOSS	BOMB - MOM
11	POOH - FOO	COUGH - THOUGH
12	THEE - ZEE	GILT - JILT
13	THAD - FAD	TENT - PENT
14	FOP - HOP	WALL - YAWL
15	ROW - LOW	ROOT - LOOT
16	CHIN - GIN	FEEL - VEAL
17	BEND - MEND	DAB - NAB
18	CHAW - SHAW	BON - VON
19	GOOSE - JUICE	THOLE - SOLE
20	TEAK - PEEK	THIN - FIN
21	BAT - GAT	PEG - KEG
22	ROCK - LOCK	WRONG - LONG
23	COAT - GOAT	TUNE - DUNE
24	BIT - MIT	BEET - MEET
25	DEN - THEN	CHAD - SHAD
26	GAUZE - JAWS	GOT - JOT
27	NOON - MOON	DOLE - BOWL
28	TEA - KEY	DILL - GILL
29	RAMP - LAMP	REND - LEND

NameDate/Time

Figure 2d. DRT Test Booklet

2.3.2 THE MAJOR ATTRIBUTES

The six attributes tested by the DRT are VOICING, NASALITY, SUSTENTION, SIBILATION, GRAVENESS, and COMPACTNESS. Each of the 192 word pairs in a half-test has been selected so that the leading consonant differs only in the present or absent state of a single attribute. The particular attribute tested by each word pair is shown in Figure 3. The 1st, 8th, 15th, 22nd and last words in each column are not scored. These words are included to allow time for turning pages, moving to the top of the next column, and for inclusion of experimental words. A couple of examples will serve to clarify this.

Example 1. In Figure 2a, the 11th word pair in the left hand column is SHOES-CHOOSE. In Figure 3, the attribute corresponding to the 11th word pair is SUSTENTION. Thus, the word pair SHOES-CHOOSE tests the attribute SUSTENTION. Further, since this word pair is shown on the first page of the booklet, the leading consonant in SHOES exhibits the present state of the attribute while the leading consonant of the word CHOOSE exhibits the absent state of the attribute, thus, SHOES represents a SUSTAINED consonant while CHOOSE represents an ABRUPT consonant.

Example 2. In Figure 2d, the third word pair in the right column is DOTE-NOTE. From Figure 3, it can be seen that this word pair tests the attribute NASALITY. Since this word pair is shown on the fourth page of the booklet, we observe that DOTE represents the absent state of NASALITY (Non-Nasal) while NOTE represents the present state of NASALITY (Nasal).

2.3.3 THE SUB-FEATURES

The following constraints were observed in constructing the set of test words:

- (a) Half of the items designed to test VOICING are fricatives; the other half are stop consonants,
- (b) Half of the NASALITY phoneme pairs are grave; the rest acute,
- (c) Half of the SUSTENTION items are voiced; half unvoiced,
- (d) Half of the phoneme pairs that test SIBILATION are voiced, the remainder unvoiced,
- (e) Half of the GRAVENESS test items are voiced; the other half unvoiced,
- (f) Half of the COMPACTNESS items are voiced; the remainder unvoiced.

<u>Row</u>	Filler	Filler
1		
2	Voicing	Voicing
3	Nasality	Nasality
4	Sustention	Sustention
5	Sibilantion	Sibilantion
6	Graveness	Graveness
7	Compactness	Compactness
8	Experimental	Experimental
9	Voicing	Voicing
10	Nasality	Nasality
11	Sustention	Sustention
12	Sibilantion	Sibilantion
13	Graveness	Graveness
14	Compactness	Compactness
15	Experimental	Experimental
16	Voicing	Voicing
17	Nasality	Nasality
18	Sustention	Sustention
19	Sibilantion	Sibilantion
20	Graveness	Graveness
21	Compactness	Compactness
22	Experimental	Experimental
23	Voicing	Voicing
24	Nasality	Nasality
25	Sustention	Sustention
26	Sibilantion	Sibilantion
27	Graveness	Graveness
28	Compactness	Compactness
29	Experimental	Experimental

Figure 3. Attribute Tested-Word Pair Position

Figure 4 can be used in conjunction with Figures 2a-d and 3 to determine exactly which word pairs are presented with the sub-features indicated above. A plus (+) in Figure 4, indicates that the two words exhibit the present state of the sub-feature; a minus (-) the absent state. The sub-feature assignments are the same for pages 1 and 3 of the DRT test booklet as well as for pages 2 and 4. The columns of pluses and minuses in Figure 4, correspond to the columns of word pairs in the DRT test booklet. Notice that in Figure 3 each major attribute is tested four times in each column. Thus, there are four pluses and minuses in each column for each major attribute in Figure 4. The following examples will serve to illustrate the use of Figures 2a-d, 3, and 4 to determine the major attribute and sub-feature of each word pair.

<u>Page No.</u>	<u>VOICING</u>	<u>NASALITY</u>	<u>SUSTENTION</u>	<u>SIBILATION</u>	<u>GRAVENESS</u>	<u>COMPACTNESS</u>
1&3	- -	+ +	- +	+ +	- -	+ -
	+ +	- -	- +	- -	+ +	+ -
	- -	- +	- +	- +	+ +	- +
	+ +	- -	- +	- -	- -	+ -
2&4	+ +	- -	+ -	- -	+ +	- +
	- -	+ +	- +	+ +	- -	- +
	+ +	+ -	- +	+ -	- -	+ -
	- -	+ +	+ -	+ +	+ +	- +
		<u>Main Attribute</u>	<u>Sub-Feature (+/-)</u>			
		Voicing	Frictional/Non-Frictional			
		Nasality	Grave/Acute			
		Sustention	Voiced/Unvoiced			
		Sibilation	Voiced/Unvoiced			
		Graveness	Voiced/Unvoiced			
		Compactness	Voiced/Unvoiced			

Figure 4. Sub-Feature State Location in Test Booklet

Example 1. The second word pair shown on page 1 of the DRT test booklet (Figure 2a) in the left column is DAUNT-TAUNT. Figure 3 indicates that this word pair tests the attribute VOICING. Since this word pair is shown on page 1, (Figure 2a) we conclude that DAUNT represents the voiced case and TAUNT represents the unvoiced case. Referring to Figure 4, we observe that the first pair of words in the left hand column of page 1 of the DRT test booklet that tests the attribute VOICING exhibit the absent (-) state of the sub-feature. That is, the words DAUNT and TAUNT are non-frictional. The word pair ZED-SAID shown on page 1 (Figure 2a) also tests the VOICING attribute. However, these words are frictional.

This can be observed by noting that they are the second word pair in the left column shown on page 1 (Figure 2a) that tests the attribute VOICING. Figure 4 indicates that these two words are frictional (+).

Example 2. The 17th word pair shown on page 4 of the DRT test booklet (Figure 2d) in the right column is DAB-NAB. From Figure 3, we ascertain that this word pair tests the attribute NASALITY. Further, since this word pair is shown in page 4 (Figure 2d), we conclude that DAB is non-nasal and NAB is nasal. The sub-feature for NASALITY is graveness. Referring to Figure 4 we see that the third word pair in the right column shown on page 4 (Figure 2d) that tests the attribute NASALITY exhibits the absent (-) state of the sub-feature graveness. Thus the leading consonant of the word DAB is non-nasal and acute while the leading consonant of the word NAB is nasal and acute. In contrast, the 17th word pair in the left column shown on page 4 (Figure 2d) is BEND-MEND. This pair also tests NASALITY. Figure 4 indicates that these words are grave (+).

2.3.4 THE WORD LISTS

The words in Figures 2a-d have been spoken by each speaker in a predetermined sequence called a word list. Each word list is identified by a three digit number followed by the letter A or B. The letter A is used to identify the first half of the DRT and B to identify the second half. Tables 1, 3, 4, and 5 contain summaries of word lists available and the associated speaker's initials. Appendix A contains the actual word lists.

3. EARLY IN-HOUSE DEVELOPMENT

3.1 Rationale

The DRT has proven itself to be a useful diagnostic tool for finding weaknesses in narrowband digital voice processing algorithms. However, the cost of a DRT using contractor resources was considered too high (approximately \$550.00 for a six speaker DRT in FY 78) to make it practical for testing the many algorithm changes required on a week to week basis. In addition, the cost was too high to repeat the test for each configuration in order to obtain estimates of measurement errors needed for a complete statistical analysis (that is, Analysis of Variance⁴). It was determined that DRTs could be conducted at the Air Force Voice Processing Facility, Hanscom Air Force Base using existing hardware for approximately one-tenth the contractor cost, excluding the scoring software development costs. In-house resources were to be used to develop the software.

4. Guenther, W.C. (1964) Analysis of Variance, Prentice-Hall, Inc., Englewood Cliffs, N.J.

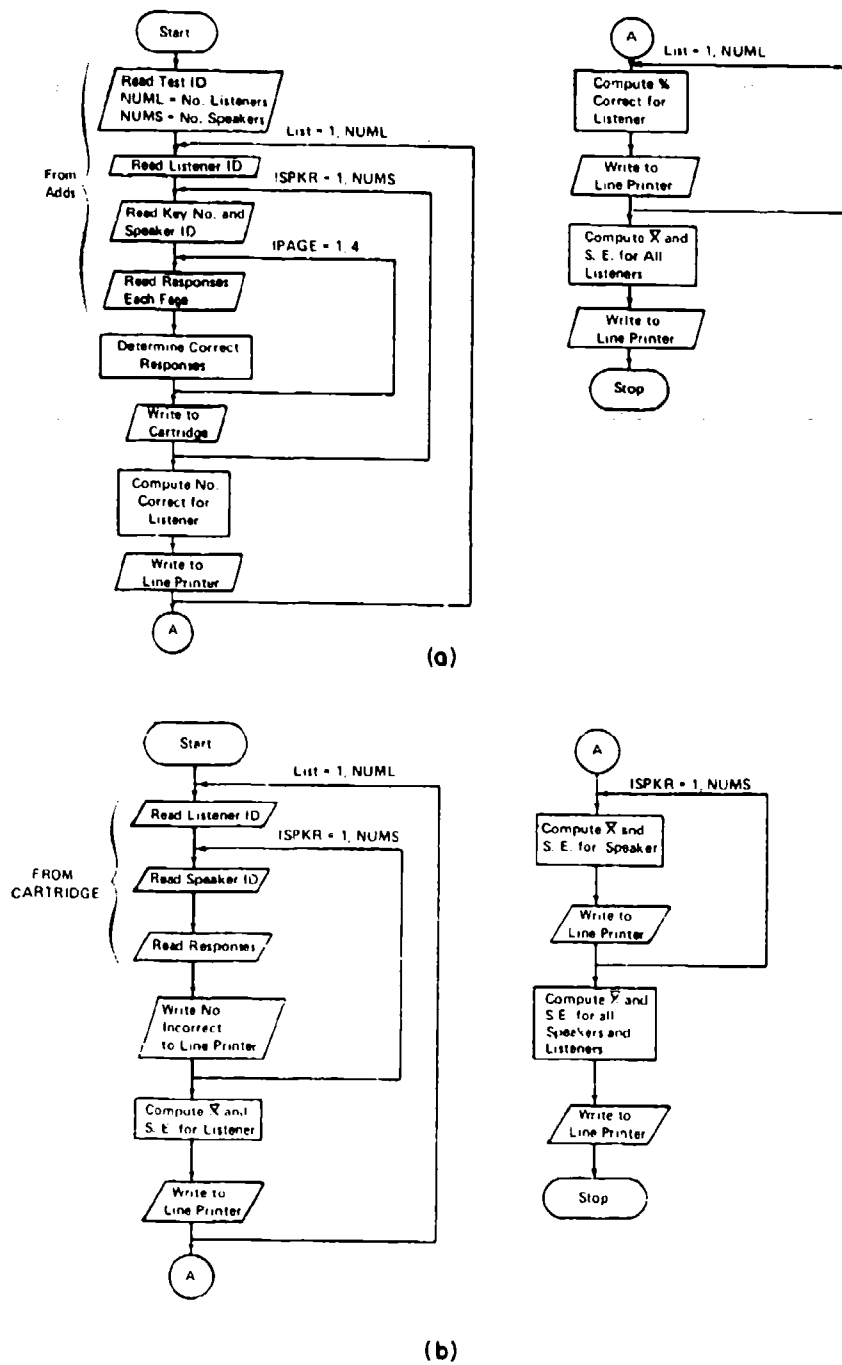


Figure 5. DRT Scoring

positions. This indicates that something other than 1 or 2 was entered in those positions and corrections should be made.

n. If no corrections are needed enter 0 followed by new line. Anything other than 0 implies a correction is to be made. ADIS will display:

ROW AND COLUMN TO CHANGE? ENTER 999 TO CHANGE ENTIRE PAGE
RRC

Enter the row number in 12 format followed by the column number in 11.

o. If 999 was entered program will go to step 1 above. If a row outside the range 1 to 29, other than 99, or a column other than 1 or 2 is entered, program goes to step n above. If row and column are within the specified range, ADIS displays:

NEW ENTRY?

R

Enter a 1 or 2. Program goes to step m above.

p. After corrections to rows 1 through 15 are made, rows 16 through 29 are displayed and corrected in a similar manner. (NOTE: Corrections to any row can be made regardless of the rows being displayed.)

q. After all pages for listener I, key XXXA have been scored, the next speaker is scored in the same way. After all speakers for listener I have been scored the data is output to the cartridge and a printout of listener I's correct responses is made.

r. The next listener is scored in the same way.

s. After all listeners have been scored, a percent correct printout is made for each listener using the transformation

$$\text{SCORE} = \frac{R-W}{T} \times 100$$

Where R = Number correct

W = Number incorrect

T = Total number of items

t. A summary of all scores and standard errors across listeners is then printed (see Appendix B). Program stops.

u. Load the DRT Scoring Program (Cartridge Input).

v. Run at starting address = 0.

w. ADIS will display:

INSERT CARTRIDGE IN UPPER DECK

I/O RESET-CONTINUE

Insert the cartridge containing the DRT data into the upper Tri-Data deck. After hitting I/O Reset and Continue, the program will execute as in Figure 5b. A comprehensive printout of DRT results will be made as shown in Appendix B. No further interaction with the ADIS terminal is required.

3.3 Listeners

It was considered crucial to the success of the in-house DRT program that sufficient numbers of listeners be recruited and that their performance on the DRT be consistent. The reliability of the DRT as a useful tool in measuring intelligibility so that meaningful comparisons between voice systems can be made is dependent on the repeatability of the scores. That is, if a particular DRT is administered to a crew of listeners at different points in time, are the results different? If they are, the credibility of the test is in question. It has been shown that the DRT is highly reliable in this regard if a properly selected and trained listening crew is used.⁵

In addition, for the in-house DRT program to be of maximum utility, the results obtained should be comparable to those obtained by others who administer the same test to their listeners. In particular, we felt it essential that in-house DRT results be comparable to those obtained by Dynastat, Inc.

During the period February-October 1976, 21 volunteer listeners participated in DRT tests to determine the feasibility of implementing an in-house DRT program. The volunteers were recruited from the Hanscom AFB community. They consisted of U.S. Air Force military, civilian employees, military dependents and in-house contractor personnel. Each listener was subjected to a pure tone audiometric test for hearing loss and passed the requirements for an H-1 profile as specified in AFM 160-1 (C9) Attachment 3, 2 May 1975. During the period February-March 1976 four listening sessions were conducted. Each session was approximately two hours in duration. From four to seven listeners participated in each session. The purpose of this initial trial period was to gain some insight into the feasibility of conducting in-house DRTs and to determine if comparability with contractor results can be obtained. A second trial period consisting of three sessions was conducted in October 1976. The purpose of this trial period was to measure the repeatability of scores for in-house DRTs and to detect any significant learning trends when a listener is repeatedly exposed to the same test. Seven listeners were used during this second trial period. All but two had been used in the previous tests.

3.3.1 COMPARABILITY

Tables 6a to 6c contain summaries of the results of in house listening Sessions 2, 3, and 4 conducted during February and March 1976 as well as Dynastat scores for the same DRT tapes. The systems used in the tests were all vocoders at various narrowband data rates. Only those scores for listeners who participated in two or more sessions are reported. Session 1 is not included because it served as an orientation for the listeners. The tables also include 95 percent confidence intervals

5. Voiers, W. D. (1965) Performance Evaluation of Speech Processing Devices II, The Role of Individual Differences, AFCTR-66-24.

based on the Dynastat means and standard errors. In addition, the differences between in-house and Dynastat means are included. Those in-house mean scores that lie outside the confidence interval are marked with an asterisk (*). Some observations follow:

a. No attempt was made to screen and eliminate listeners for the purpose of improving in-house means.

b. Of the listeners used in this trial period only two participated in three sessions. All others participated in two or fewer sessions.

c. The general tendency for in-house scores was to approach Dynastat scores as listeners gained experience. In the second listening session seven in-house means fell below their confidence intervals while six fell below their confidence intervals for Sessions 3 and 4. The median difference between in-house and Dynastat means improved from -3.2 to -2.05 from Session 2 to Session 3. For Session 4 the median difference was -2.3.

Table 6a. In-House and Dynastat DRT Scores.
Listening Session 2 - 25 Feb 1976

System	Speaker	IN-HOUSE					MEAN	DYNASTAT			DIFF
		LISTENER						MEAN	S.E.	95% C.I.	
		1 ^a	2 ^b	3 ^a	4 ^b	5 ^a					
1102	BL	87.5	87.5	86.5	76.0	89.6	84.4*	89.6	1.35	(86.4, 92.8)	-5.2
	CH	86.5	89.6	88.5	84.4	87.5	87.3	89.8	1.19	(87.0, 92.6)	-2.5
	SN	82.3	72.9	82.3	76.0	78.1	78.3*	83.5	1.27	(80.5, 86.5)	-5.2
1103	BL	89.6	82.3	88.5	85.4	87.5	86.7	86.6	1.74	(82.5, 90.7)	+0.1
	CH	91.7	85.4	85.4	87.5	90.6	88.1*	91.7	0.88	(89.6, 93.8)	-3.6
	SN	75.0	74.0	78.1	80.2	75.0	76.5*	79.7	1.04	(77.2, 82.2)	-3.2
1104	BL	85.4	82.3	86.5	85.4	85.4	85.0*	88.3	1.19	(85.5, 91.1)	-3.3
	CH	83.8	85.4	88.5	85.4	87.5	88.1	90.8	1.16	(88.1, 93.5)	-2.7
	SN	83.3	82.3	81.3	80.2	81.3	81.7	82.8	1.55	(79.1, 86.5)	-1.1
1105	BL	81.3	79.2	83.3	79.2	82.3	81.1*	84.8	1.23	(81.9, 87.7)	-3.7
	CH	87.5	83.3	83.3	84.4	88.5	85.4	88.5	1.67	(84.6, 92.4)	-3.1
	SN	82.3	76.0	82.3	80.2	74.0	79.0*	82.2	0.80	(80.3, 84.1)	-3.2

a - First session for this listener.
b - Second session for this listener.
* - Below 95% confidence interval.

Table 6b. In-House and Dynastat DRT Scores.
Listening Session 3 - 4 Mar 1976

System	Speaker	IN-HOUSE				MEAN	DYNASTAT			DIFF
		LISTENER					MEAN	S.E.	95% C.I.	
		3 ^a	4 ^a	6 ^a	7 ^a					
1106	BL	82.3	86.5	93.8	80.2	85.7	87.8	1.70	(83.3, 91.8)	-2.1
	CH	88.5	90.6	90.6	83.3	88.1*	91.7	0.86	(89.7, 93.7)	-3.4
	SN	74.0	83.3	91.7	77.1	81.5	82.2	1.09	(77.7, 86.7)	-0.7
1108	BL	86.5	86.5	92.7	84.4	88.0	88.2	1.69	(84.2, 92.2)	-0.2
	CH	88.5	95.8	90.6	88.5	90.1*	91.9	0.73	(90.2, 93.6)	-1.8
	SN	76.0	89.6	87.5	82.3	83.9	85.9	1.73	(81.8, 90.0)	-2.0
1110	BL	86.5	89.6	87.5	86.5	87.5*	92.6	1.05	(90.1, 95.1)	-5.1
	CH	85.4	87.5	93.8	83.3	87.5*	93.0	0.70	(91.3, 94.7)	-5.5
	SN	76.0	86.5	82.3	82.3	81.8	83.7	1.57	(79.5, 86.9)	-2.0
1112	BL	86.5	93.8	91.7	80.5	90.1*	92.4	0.67	(90.8, 94.0)	-2.3
	CH	90.6	87.5	92.7	95.8	91.7*	94.8	1.08	(92.2, 97.4)	-3.1
	SN	85.4	88.5	87.5	84.4	86.5	87.0	1.59	(83.2, 90.8)	-0.5

a - Second session for this listener.
* - Below 95% confidence interval.

Table 6c. In-House and Dynastat DRT Scores.
Listening Session 4 - 22 Mar 1976

System	Speaker	IN-HOUSE				MEAN	DYNASTAT			DIFF
		LISTENER					MEAN	S.E.	95% C.I.	
		1 ^a	2 ^b	4 ^b	5 ^b					
1113	BL	90.6	86.5	89.6	85.4	88.0	90.1	0.90	(88.0, 92.2)	-2.1
	CH	92.7	89.6	89.6	91.7	90.9	92.2	0.65	(90.7, 93.7)	-1.3
	SN	80.2	86.5	89.6	83.3	84.9*	88.0	1.15	(85.3, 90.7)	-3.1
1146	BL	90.6	87.5	88.5	86.5	88.3*	90.8	0.80	(88.9, 92.7)	-2.5
	CH	92.7	92.7	92.7	92.7	92.7	94.8	0.88	(92.7, 96.9)	-2.1
	SN	81.3	84.4	87.5	86.5	84.9*	91.3	1.16	(88.6, 94.0)	-6.4
1150	BL	87.5	85.4	96.9	85.4	88.8	88.4	0.89	(86.3, 90.5)	+0.4
	CH	92.7	90.6	90.6	92.7	91.7*	94.4	0.71	(92.7, 96.1)	-2.7
	SN	84.4	81.3	85.4	86.5	84.4*	88.8	1.14	(86.1, 91.5)	-4.4
1152	BL	88.5	91.7	94.8	89.6	91.2	92.2	0.81	(90.3, 94.1)	-1.0
	CH	92.7	88.5	89.6	88.5	89.8*	92.8	0.80	(90.9, 94.7)	-3.0
	SN	85.4	83.3	85.4	88.5	85.7	87.4	1.05	(84.9, 89.9)	-1.7

a - Second session for this listener.
b - Third session for this listener.
* - Below 95% confidence interval.

3.3.2 REPEATABILITY

During the three listening sessions in October 1976 seven listeners were exposed repeatedly to the same DRT tape. Speaker CH was used for all repetitions. Table 7 contains a summary of the number of repetitions each listener participated in for each of the three sessions. Table 8 contains the mean and standard deviation across repetitions for each listener for each session. For those listeners that participated in two sessions the tendency was for the mean score to rise slightly and the standard deviation to decrease. This is what might be expected from listeners who are relatively inexperienced and are still rising on the "learning curve." A simple linear regression model was fitted to the data for each listener for each session. The independent variable was the repetition number; the dependent variable the DRT score. The intent was to examine the slope of the regression line to determine if a significant linear trend in the listeners' scores existed. Table 9 contains the intercept and slope for each listener as well as a 95 percent confidence interval for the slope of each line. The confidence interval did not contain zero in only two of the twelve cases. This means that the slopes of the remaining ten lines are not significantly different from zero indicating no significant learning trend. Further analysis consisted of computing the DRT mean and standard error across listeners for each repetition during the first and last listening sessions. Table 10 contains these results. Figure 6 is a scatter diagram of this data and contains a linear regression line for each session. The slope of each of these lines is significantly different from zero, however, it can be observed that the rate of increase is smaller for the third session than for the first session. Additionally, the standard errors in Table 10 are reducing and becoming more consistent as the listeners gain experience. Also included in Figure 6 is a 95 percent confidence interval for the mean score for speaker CH based on the mean obtained by Dynastat for the same tape used in our in-house sessions. A reliable estimate for the standard error for this score is not available. However, typical standard errors obtained by Dynastat for speaker CH when the mean is near 93.0 are less than 1.00. The confidence interval shown in Figure 6 was constructed using an estimated standard error of 0.75. All in-house scores for the 20 October 1976 session lie within the confidence interval as well as four of the last five scores on 6 October 1976.

The foregoing results led to the conclusion that a properly selected and trained listening crew used in an in-house program could produce results that are not only repeatable but also comparable to those obtained by Dynastat.

Table 7. Number of DRT Repetitions
Listeners Were Exposed to for Speaker
CH

Listener	6 Oct 76	12 Oct 76	20 Oct 76
4	9	0	9
8	9	0	9
9	9	9	0
10	9	0	9
11	9	8	0
13	0	0	12
14	0	0	12

Table 8. DRT Means and Standard Deviations Across
Repetitions for Each Listener at Each Session

Listener	6 Oct 76		12 Oct 76		20 Oct 76	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
4	93.3	2.28	-	-	95.0	1.25
8	95.6	1.86	-	-	96.8	0.63
9	92.0	1.80	92.6	2.05	-	-
10	91.6	3.10	-	-	92.9	1.79
11	87.0*	4.00	92.1	1.66	-	-
13	-	-	-	-	91.7	1.89
14	-	-	-	-	95.3	2.79

*First exposure to the DRT for this listener.

Table 9. Simple Linear Regression Models for Repetition (X) and DRT Score (Y) for Each Listener

Listener	6 OCT 76			12 OCT 76			20 OCT 76		
	Intercept	Slope	95% C.I. for Slope	Intercept	Slope	95% C.I. for Slope	Intercept	Slope	95% C.I. for Slope
4	92.9	0.07	(-0.67, 0.81)	-	-	-	94.6	0.09	(-0.31, 0.49)
8	94.1	0.30	(-0.25, 0.84)	-	-	-	96.1	0.14	(-0.02, 0.30)
9	90.4	0.33	(-0.18, 0.84)	90.2	0.49	(-0.02, 0.99)	-	-	-
10	86.9	0.94*	(0.37, 1.50)	-	-	-	90.9	0.40	(-0.06, 0.86)
11	82.5	0.90	(-0.21, 2.01)	92.8	-0.16	(-0.82, 0.50)	-	-	-
13	-	-	-	-	-	-	91.2	0.07	(-0.29, 0.44)
14	-	-	-	-	-	-	90.7	0.71*	(0.50, 0.93)

*Slope significantly different from zero.

Table 10. DRT Mean and Standard Error Across Listeners for Each Repetition for First and Last Sessions

Repetition	6 Oct 76		20 Oct 76	
	Mean	Std Error	Mean	Std Error
1	88.3	2.01	93.8	0.81
2	90.4	2.47	92.9	1.29
3	91.3	2.12	93.3	1.07
4	94.2	0.78	94.0	1.06
5	92.1	1.50	94.2	1.38
6	90.8	2.04	94.0	0.83
7	92.9	0.77	94.2	1.49
8	93.3	1.38	95.0	1.01
9	93.7	1.47	94.8	1.19

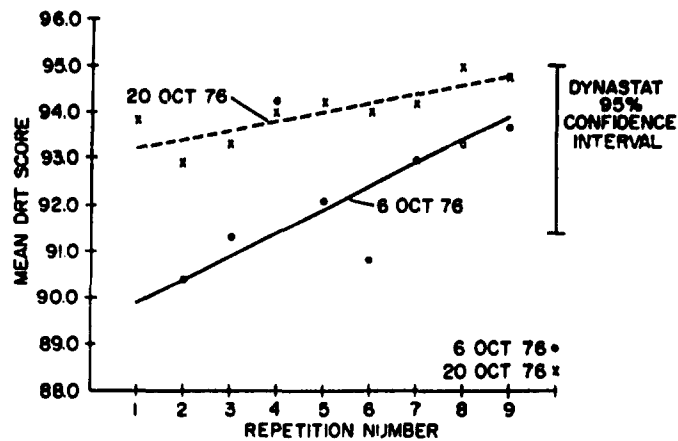


Figure 6. Scatter Diagram and Linear Regression for Mean DRT Score as a Function of Repetition Number

3.4 Conclusions and Recommendations

It was concluded that the DRT scoring software as implemented on the CSP-30 functioned properly, however, the manual entry of the raw data was unsatisfactory. A six speaker, ten listener DRT required approximately two hours to enter the data. The CSP-30 is a single user system, the primary function of which is research and development of voice algorithms. To dedicate the CSP-30 to the time required to enter DRT data is a waste of a valuable resource. In addition, this method of data entry proved to be susceptible to key punch errors. It was recommended that the DRT scoring software be implemented on an existing in-house PDP-11 mini-computer. It was further recommended that an optical mark reader be procured and interfaced to the PDP-11 and that special DRT test forms be designed so that automated data entry could be used in the scoring procedure.

It was further concluded that a listening crew could be trained in-house to perform in a consistent manner and obtain results comparable to those obtained by Dynastat. However, it was considered unsatisfactory to depend on volunteer listeners. Our experience was that it was difficult to obtain volunteers who were willing or able to participate in DRT listening the number of hours and frequency required for them to become consistent, reliable listeners. It was recommended that listeners be hired and that they participate in listening tests a minimum of one-half day each week.

It was further recommended that procedures be developed to recruit, train, and control the listeners and to monitor their performance. In addition, the

development of a method for screening and eliminating those listeners who are unsatisfactory was required.

4. FOLLOW-ON DEVELOPMENT

The decision was made to fully develop the in-house DRT program. The recommendations of Section 3.4 were adopted and implemented. The following Sections describe this development.

4.1 Optical Mark Reader

A search through several issues of the Excess ADP Equipment Bulletin published by the Defense Logistics Agency, Cameron Station, Alexandria, VA 22314 revealed that two (2) Decision Optical Mark Readers (OMR), model OMR 6510 were listed as excess. Further investigation revealed that these readers were located within ESD on Hanscom AFB. Contact with the users was immediately established. A review of the OMR documentation and discussions with the users resulted in the determination that the OMR could easily be interfaced with our PDP-11 and that forms could be designed and procured to satisfy our requirements. A no cost transfer of the OMRs to the Voice Processing Facility was accomplished. It was immediately learned that the interface hardware required was already available in our PDP-11. All that was required was to plug an existing connector into the OMR.

4.1.1 OMR TEST BOOKLETS

DRT test booklets were designed and procured for use with the OMR. Two different test booklets were procured; one for the 100 series word lists (ESD Form 36) and one for the 300 series word lists (ESD Form 37). Each booklet consists of four (4) pages joined together at the left edge by a perforated binding. This is referred to as a four part snapak. This allows the pages to be separated so that they may be fed into the OMR. Figure 7 is a copy of a page from one of the booklets. The only differences between this page and other pages are the words themselves and the position of the black rectangle in the upper right hand corner. This rectangle is used to indicate the booklet page number by its location. The listeners are required to fill in certain header information on the first page of each booklet before the test begins as indicated in Figure 7. The information is entered by first writing it in the large boxes to the left of each information block. The listeners then blacken in the appropriate rectangles using a No. 2 pencil. During the test listeners strike through the word of their choice as before. After much experimentation it was determined that wide, dark marks are required over the words for reliable OMR reading. A certain amount of practice was required before the listeners

mastered the technique of properly marking the words. The time required for this practice was minimal when compared to the total listener training period. It was determined that the best marker to use is a black tube-type, felt-tip marker, Federal Stock Number 7520-00-973-1059. These markers are available in adequate supply and if stored tip down between listening sessions have a reasonable usable life. Rectangles in the extreme left and right hand margins of each test booklet page are provided to give the listener an opportunity to change his answer by simply marking through the rectangle closest to the word pair to be changed. The test form pages measure 8-1/2 in. X 11 in. after separation. They were designed on a 5446 Decision format sheet (54 columns by 46 rows). The forms were printed using Pantone Purple 185 ink (12 parts warm red, 4 parts rubine red). Complete specifications for the forms are available in the Hanscom Air Force Base, Central Base Administration (DA) office.

4.1.2 SOFTWARE

The software functions required to interface the OMR to the PDP-11 and provide data that can be used by the DRT scoring software consisted of:

a. An OMR driver. This function is required to do the necessary handshaking between the OMR and the PDP-11 interface card (DC-11) and to send and receive necessary status, control, and data words.

b. A page reader. This software module is required to store an image of the test booklet page being read. It consists of filling in a 46 x 54 matrix of zeroes and ones. Each element of the matrix corresponds to a position on the test form page. A zero indicates no mark in that position, a one indicates a mark.

c. A page interpreter. This module interprets the matrix of zeroes and ones constructed by the page reader and extracts the following information:

1. System ID.
2. Listener ID.
3. Word List ID.
4. Speaker ID.
5. Page number.
6. The responses. These are stored in a similar manner as the CSP-30 version.

These functions are drawn together into a program called XXX on the PDP-11 disk file. The output of this program is a disk file containing the data described above. In addition, a program called XFLR is used before actual scoring takes place. This program accesses the data file created by XXX and creates a new file after performing the following:

d. Translates the XXX file into a new file in the format required for the scoring program.

e. Offers the opportunity to correct word list identification that may have been entered incorrectly.

f. Permits the elimination of selected listeners from the scoring run.

g. Permits the elimination of selected speakers from the scoring run.

The final step in the process is the execution of the scoring program itself. This program is called SCORE and is substantially the same as implemented on the CSP-30. The fundamental differences are:

h. It has been modified to accept data from the disk file rather than the ADDS terminal.

i. The printout of results has been expanded to include a page which consists of a matrix of listener/speaker scores.

Appendix C contains the listings for the above described software and an example DRT printout.

4.2 Program Usage

A step-by-step procedure for using the DRT scoring software follows. It is assumed that the operating system is the RSX-11M and the user is familiar with it. The scoring programs have been written to prompt the use by asking specific questions and waiting for a reply. Also, various error messages are written on the Decwriter when OMR read errors occur. Figure 8 is a copy of the Decwriter output for a DRT scoring run. The example in Figure 8 is for a single listener and a single speaker. Items marked with an asterisk (*) are entered by the user. Figure 9 is the resulting printout of the scoring process for this example. Before starting the procedure the test booklets should be prepared by first arranging them so that the speakers are in the same order for each listener. It is convenient, but not necessary, to arrange the speakers alphabetically and the listeners numerically. Listeners are identified by the last four digits of their social security account number. After arranging the booklets in the desired order the bindings should be removed so that the pages separate:

a. Turn the OMR on and press the feeder clear and reset buttons.

b. Run program XXX and follow instructions printed on the Decwriter. (See Figure 8.)

c. Enter date of test.

d. Enter up to 50 ASCII characters describing the system tested.

e. A disk write option is then selected. If a 1 is entered a disk file will be created. If 0 is entered no file is created. This option is useful for checking the OMR or forms alignment. See paragraph f below. Normal operation is to enter a 1.

f. A line printer output option is then selected. A 0 will cause no line printer output. A 1 will cause a printout to be made of the matrix of zeroes and ones for

each test booklet page. This option is selected when checking forms alignment and OMR operation. Normal procedure is to enter a 0.

g. Follow instructions for entering the number of listeners and speakers and the system identification number.

h. Follow instructions for entering the word list key and speaker identification. This has been added to eliminate the need for the listeners to blacken in the rectangles on their test booklets corresponding to this information. They should continue to write this information in the large boxes to the left of the rectangles.

i. After entering all word list keys and speakers they will be typed out on the Decwriter for verification. Carefully check their accuracy. If there is an error start over by aborting XXX. This is accomplished by typing in C while holding the CTRL key down followed by ABORTXXX after the MCR prompt. If the word list keys and speakers are correct type in RESUME followed by a carriage return.

j. At this time the pages are manually fed into the OMR. Each page should be placed face down on the glass platen with the header end of the page against the paper gate. After the page is read it is removed from the platen and the next page placed in position. This process is repeated until all pages are read. After the last page is read a blank page (could use reverse side of last page) is placed on the platen and read. This will cause the program to pause.

k. After the pause, if more pages are to be read in enter a 0. If the scoring run is complete enter a 1. A printout of "bad marks" is made on the Decwriter. These numbers are the number of listener responses not read by the OMR for each listener. This information is used when training new listeners to master the technique of using the markers and to detect OMR read problems. After this printout, XXX stops.

l. Various error conditions can occur while reading pages in. These may be due to the pages being read in the wrong order, a page not properly aligned over the glass platen, or a page read in twice. Error messages are printed on the Decwriter for each of these conditions. Simply correct the problem and type in RESUME.

m. The next step in the process is to execute XFER. Run XFER in the usual way (see Figure 8) and follow instructions.

n. The final step is the actual scoring. Run SCORE and follow instructions. Be sure the line printer is on-line. The result will be a disk file called FOR006 DAT containing the scored DRT results. Output this file to the line printer using PIP to obtain hardcopies.

```

* RUN DF:XXX

ENTER DATE OF TEST DD-MMM-YY (15-NOV-77) :21 MAR 78
THIS IS WHAT YOU SAID... 21 MAR 78

ENTER HEADER INFO...A50
* DRT SCORING EXAMPLE

***COPY TO DISK?..TYPE 0 FOR NO; 1 FOR YES
* 1

***COPY TO PRINTER?..TYPE 0 FOR NO; 1 FOR YES
* 0

ENTER #LISTENERS,#SPEAKERS,#SYSTEM..I2I2I4
FOR EXAMPLE:08061104 FOLLOWED BY CARRIAGE RETURN
* 01011000
ENTER KEY AND SPEAKER (E.G.:102BBV) FOR SPEAKER 1
* 304BBV

CHECK THE KEYS...

304BBV
TTO -- PAUSE ***** READY TO GO *****

* >RES
>
EOF. ENTER 0 TO GO OR 1 TO STOP
* 1

BAD MARKS,MARKS X ... 1. 232. 0.4
****SYSTEM # 1000
LISTENER 1277 0 ERRORS X 0.0
00000 00000 00000 00000 00000 00000 00000 00300 00000 0000
TTO -- STOP *** FINISHED ***
>

* RUN DF:XFER

ENTER SYSTEM ID ...I4
* 1000

21 MAR 78 DRT SCORING EXAMPLE

HOW MANY LISTENERS TO DELETE?..I2
* 0

HOW MANY SPEAKERS TO DELETE?..I2
* 0

ENTER ANY INCORRECT-CORRECTED KEY PAIR (0 IF OK)
* 0
TTO -- STOP
>

```

Figure 8. Sample Decwriter Output During DRT Scoring on PDP-11

SYSTEM TESTED: 1000 21 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS = 1
 NUMBER SPEAKERS = 1

 FOR LISTENER: 1277 *

SPKR SCORE

BV 99.62

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	75.00	0.00	87.50	0.00
FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NON-FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	100.00	0.00	87.50	0.00	93.75	0.00
VOICED	100.00	0.00	75.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
SIBILATION	87.50	0.00	100.00	0.00	93.75	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	87.50	0.00	75.00	0.00	81.25	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
COMPACTNESS	100.00	0.00	75.00	0.00	87.50	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
TOTALS	99.62	0.00	85.42	0.00	99.62	0.00

 * MEAN = 99.62 *
 * S.E. = 0.00 *

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11

SYSTEM TESTED: 1888 21 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS * 1
 NUMBER SPEAKERS * 1

 FOR SPEAKER: BV *

LISTENER SCORE
 1277 98.62

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	75.00	0.00	87.50	0.00
FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NON-FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	100.00	0.00	87.50	0.00	93.75	0.00
VOICED	100.00	0.00	75.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
SIBILATION	87.50	0.00	100.00	0.00	93.75	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	87.50	0.00	75.00	0.00	81.25	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
COMPACTNESS	100.00	0.00	75.00	0.00	87.50	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
TOTALS	95.83	0.00	88.42	0.00	98.62	0.00

 * MEAN * 98.62 *
 * S.E. * 0.00 *

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11 (Cont)

SYSTEM TESTED: 1000 21 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS = 1
 NUMBER SPEAKERS = 1

COMBINED RESULTS = STANDARD ERRORS ACROSS SPEAKERS AND LISTENERS *****

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	75.00	0.00	87.50	0.00
FRictionAL	100.00	0.00	75.00	0.00	87.50	0.00
NON-FRictionAL	100.00	0.00	75.00	0.00	87.50	0.00
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	100.00	0.00	87.50	0.00	93.75	0.00
VOICED	100.00	0.00	75.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
SIBILATION	87.50	0.00	100.00	0.00	93.75	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	87.50	0.00	75.00	0.00	81.25	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
COMPACTNESS	100.00	0.00	75.00	0.00	87.50	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
TOTALS	85.83	0.00	85.42	0.00	85.62	0.00

 * MEAN = 85.62 *
 *
 * S.E. = 0.00 *

BY
 MEAN 85.62
 S.E. 0.00

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11 (Cont)

SYSTEM 1000 01 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS = 1
NUMBER SPEAKERS = 1

	SPEAKERS		
LIST.	BV		
1277	98.82	98.82	0.00
MEAN	98.82		
S.E.	0.00		

TOTAL DRT SCORE:	*****
	• MEAN = 98.82 •
	• S.E. = 0.00 •

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11 (Cont)

4.3 Listeners

4.3.1 LISTENER BEHAVIORAL CONTROLS

A study was made to determine those controls required to minimize the effects of listener behavior on the DRTs conducted in-house. The study included a search of the applicable literature and a personal interview with Dr. W. D. Volers, one of the creators of the DRT. A report of this study is included as Appendix D. In addition, a committee was formed to make a determination as to the applicability of AFR 80-33, Use of Volunteers in Aerospace Research to the in-house DRT program. The committee found that the provisions of AFR 80-33 do not apply. A report of these findings is on file at the COMSEC Engineering Office.

4.3.2 RECRUITING

Listeners were recruited by advertising in local newspapers during November 1976. Over one hundred responses were received. Initial screening was accomplished by administering a pure tone audiometric test as was done during the trial period earlier in the year. Those who did not pass the test were not considered for the job. The nature of the work was explained to each application. They were offered \$2.50 per hour for one-half day (4-1/2 hours) per week with the understanding that they must successfully complete a training period and that they were subject to removal from the program at any time if their performance was not consistent and reliable. The first eighteen that qualified and were willing entered a training program. Approximately 50 names were retained on a backup list. Since then the 50 names have been exhausted to replace listeners (many did not want the job when called back several weeks later). On one other occasion an advertisement in the newspaper was used again to recruit listeners. Other than that one time, word of mouth through the listening crew has been adequate to recruit replacement listeners.

4.3.3 TRAINING

A training program consisting of four sessions, each four and one-half hours in length, was conducted during December 1976. Of the eighteen listeners who started the program, three quit after the first session, two after the second session, and four were not accepted for the job after the fourth session. The remaining nine stayed on as part of the listening crew. A second training period consisting of three sessions, each four and one-half hours in length, was conducted in January 1977. Five candidates from the backup list participated. Two quit after the second session, the remaining three became part of the listening crew. Of the twelve who were selected four are still part of the listening crew after one year. The remaining eight quit at various times. The first left after 22 weeks. The mean length of time these eight listeners stayed on the crew was 30 weeks. Replacements were recruited and trained as required.

4.3.3.1 Training Material

Training material consisted of repeated applications of two three-speaker DRTs that had been processed by two different narrowband vocoders. The two DRTs were administered 13 times during the December training program. Fifteen single speaker tests were administered the first session and 21 on each of the remaining sessions. After three sessions it was clear which listeners would not be selected, therefore, the January training program consisted of only three sessions. The same training material was used. Fifteen single speaker tests were administered during the first session and 21 the second and third sessions. The speakers were heard repeatedly in the order: BV JE RD BL SN CH. The first three speakers had been processed by a tenth order Linear Predictive Vocoder (LPC)⁶ at a 3.6 kbps data rate, the last three by TRIVOC (4-14)⁷ at 2.4 kbps. These DRTs had been previously evaluated by Dynastat. Table 11 contains the mean DRT scores and standard deviations obtained by Dynastat for each of the systems used during the training.

Table 11. DRT Scores Obtained by Dynastat for the Test Material Used During In-house Training Program in December 1976 and January 1977

System	Speaker	Mean	Standard Deviation*
1104 (LPC)	BV	86.1	2.80
	JE	84.6	1.53
	RD	89.7	1.32
2003 (TRIVOC)	BL	87.2	1.61
	SN	86.8	2.88
	CH	95.2	1.64

*Standard deviations were computed from furnished standard errors using the formula

$$\text{Standard Error} = \frac{\text{Standard Deviation}}{\sqrt{N-1}}$$

where

N = number of listeners.

6. Wiggins, R. H. (1976) Narrowband Digital Voice Processing (CSP-30 LPC Software Documentation), Volume I, ESD-TR-76-282.
7. Roberts, J. E., Smith, C. P., and Wiggins, R. H. (1975) Triple-function voice coder (TRIVOC), J. Acous. Soc. Am. 57 Suppl. 1:535.

4.3.3.2 Training Results

Time and space does not permit complete exposure of the results for every listener who entered the training program in this report. Three listeners were randomly selected to illustrate the kinds of results obtained during the training. Listener 3299 participated in the December 1976 training period and was not selected to continue in the program. Table 12a contains a summary of all DRT scores achieved by this listener. Listener 5699 also participated in the December training. This listener's scores are contained in Table 12b. Listener 5699 was selected to continue in the program and remained with the listening crew for 25 weeks. Listener 9557 was a member of the January training group. Scores for this listener are contained in Table 12c. Listener 9557 was selected and continues to be a member of the crew after 14 months. Tables 12a, b, and c also contain entries for the last two training sessions which are the number of standard deviations the listeners' DRT scores are from the Dynastat scores. These entries are based on the data in Table 11. Table 13a is a summary of the number of times each listeners' score was two or more standard deviations below Dynastat. Table 13b is a summary of the number of times each listeners' score was three or more standard deviations below Dynastat. Over half the time listener 3299 scored more than three standard deviations below Dynastat. In addition, this listener did not perform consistently as can be observed in Table 12a. For these reasons listener 3299 was not retained. Listener 5699 was above three standard deviations below Dynastat over 80 percent of the time. Listener 9557, after only three training sessions, scored above three standard deviations below Dynastat over 70 percent of the time. Both of these listeners scored above Dynastat on several occasions. In addition, except for an occasional "outlier", both of these listeners were consistent. These two listeners were selected to continue. These results are representative of all who participated in both the December and January training periods. Those who were eliminated from the program performed as did listener 3299. Those who were selected performed in a similar manner as listeners 5699 and 9557.

Table 12a. Training History for Listener 3299. Top number is DRT score. Bottom number (for last two sessions only) is number of standard deviations listener score is from Dynastat score

Speaker	REPITION NUMBER												
	1	2	3	4	5	6	7	8	9	10	11	12	13
BV	61.5	71.9	74.0	74.0	71.9	70.8	78.1	76.0	78.1	68.8	77.1	77.1	80.2
							-2.36	-3.61	-2.86	-6.18	-3.21	-3.21	-2.11
JE	68.8	74.0	79.2	70.8	76.0	78.1	78.1	82.3	79.2	85.4	83.3	76.0	81.3
							-4.25	-1.50	-3.53	+0.52	-0.85	-5.62	-2.16
RD	80.2	78.1	78.1	77.1	82.3	79.2	83.3	86.5	84.4	85.4	83.3	87.5	88.5
							-4.85	-2.42	-4.02	-3.26	-4.85	-1.67	-0.91
BL	69.8	69.8	71.9	80.2	83.3	78.1	74.0	75.0	83.3	77.1	85.4	79.2	83.3
							-8.20	-7.58	-2.42	-6.27	-1.12	-4.97	-2.42
SN	68.8	76.0	69.8	81.3	76.0	74.0	81.3	78.1	80.2	82.3	82.3	77.1	79.2
							-1.91	-3.02	-2.29	-1.56	-1.56	-3.36	-2.64
CH	90.6	85.4	83.3	89.6	87.5	84.4	88.5	87.5	89.6	93.8	86.5	88.5	86.5
							-4.09	-4.70	-3.41	-0.85	-5.30	-4.09	-5.30
	2 December			9 December			16 December				20 December		

Table 12b. Training History for Listener 5699. Top number is DRT score. Bottom number (for last two sessions only) is number of standard deviations listener score is from Dynastat score

Speaker	REPITION NUMBER												
	1	2	3	4	5	6	7	8	9	10	11	12	13
BV	71.9	83.3	81.3	82.3	82.3	82.3	81.3	82.3	85.4	82.3	80.2	87.5	85.4
							-1.71	-1.36	-0.25	-1.36	-2.11	+0.50	-0.25
JE	76.0	78.1	79.2	78.1	81.3	78.1	80.2	83.3	74.0	81.3	77.1	79.2	79.2
							-2.88	-0.85	-6.93	-2.16	-4.90	-3.53	-3.53
RD	89.6	86.5	90.6	91.7	88.5	87.5	87.5	90.6	92.7	88.5	90.6	92.7	90.6
							-1.67	+0.68	+2.27	-0.91	+0.68	+2.27	+0.68
BL	84.4	86.5	86.5	86.5	85.4	82.3	84.4	85.4	83.3	87.5	84.4	86.5	84.4
							-1.74	-1.12	-2.42	+0.19	-1.74	-0.43	-1.74
SN	74.0	77.1	75.0	81.3	81.3	76.0	81.3	83.3	81.3	79.2	81.3	77.1	84.4
							-1.91	-1.22	-1.91	-2.64	-1.91	-3.37	-0.83
CH	88.5	95.8	91.7	90.6	94.8	87.5	93.8	88.5	88.5	90.6	90.6	92.7	94.8
							-0.85	-4.09	-4.09	-2.80	-2.80	-1.52	-0.24
	2 December			9 December			16 December				20 December		

Table 12c. Training History for Listener 9557. Top number is DRT score. Bottom number (for last two sessions only) is number of standard deviations listener score is from Dynastat score

Speaker	REPETITION NUMBER									
	1	2	3	4	5	6	7	8	9	10
BV	67.7	83.3	78.1	83.3 -1.00	88.5 +0.86	87.5 +0.50	84.4 -0.61	83.3 -1.00	80.2 -2.11	82.3 -1.36
JE	71.9	83.3	83.3	77.1 -4.90	82.3 -1.50	81.3 -2.16	83.3 -0.85	82.3 -1.50	79.2 -3.53	82.3 -1.50
RD	78.1	90.6	86.5	91.7 +1.52	89.6 -0.08	94.8 +3.86	92.7 +2.27	91.7 +1.52	88.5 -0.91	93.8 +3.11
BL	72.9	82.3	77.1 -6.27	81.3 -3.66	85.4 -1.12	81.3 -3.66	82.3 -3.04	79.2 -4.97	83.3 -2.12	
SN	81.3	83.3	71.9 -5.18	79.2 -2.64	81.3 -1.91	83.3 -1.22	81.3 -1.91	78.1 -3.02	83.3 -1.22	
CH	87.5	93.8	89.6 -3.41	91.7 -2.13	91.7 -2.13	91.7 -2.13	81.3 -8.48	89.6 -3.41	91.7 -2.13	
	6 January			13 January			20 January			

Table 13a. Number of Times Listeners' Score Was Two or More Standard Deviations Below Dynastat Score (last two sessions only)

Speaker	Listener		
	3299	5699	9557
BV	7	1	1
JE	4	6	3
RD	5	0	0
BL	6	1	6
SN	4	2	3
CH	6	4	7
Total	32 (76%)	14 (33%)	20 (48%)

Table 13b. Number of Times Listeners' Score Was Three or More Standard Deviations Below Dynastat Score (last two sessions only)

Speaker	Listener		
	3299	5699	9557
BV	4	0	0
JE	3	4	2
RD	4	0	0
BL	4	0	5
SN	2	1	2
CH	6	2	3
Total	23 (55%)	7 (17%)	12 (29%)

5. PERFORMANCE OF IN-HOUSE DRTs

As discussed earlier in this report, it is essential that DRT scores be repeatable for a successful in-house program. In addition, it is desirable that in-house DRT scores be comparable to Dynastat scores. Results obtained over the first 12 months of the in-house program indicate that both repeatability and comparability have been achieved.

5.1 Listener Elimination

Normally a DRT is administered to 10 or 12 listeners. However, it is likely that one or two of them are trainees and one or two may not be performing up to their normal standard. Therefore a screening process is used to eliminate listeners from a given scoring run. The number of listeners is reduced to eight for each scoring run. This is the number that Dynastat uses. The elimination procedure used has been developed to improve the consistency of the listeners as a group by eliminating outliers. Let L = number of listeners and s = number of speakers for a particular DRT. Suppose X_{ij} is the i th listener's DRT score for speaker j where $i = 1, \dots, L$ and $j = 1, \dots, s$. We compute the mean DRT score for each speaker j .

$$\bar{X}_j = \frac{1}{L} \sum_{i=1}^L X_{ij}, \quad j = 1, \dots, s.$$

We then form a matrix whose elements D_{ij} are the differences between the i th listener's score for speaker j and the mean for speaker j . Thus,

$$D_{ij} = X_{ij} - \bar{X}_j, \quad i = 1, \dots, L; \quad j = 1, \dots, s.$$

Those listeners who are performing at or near the mean for all speakers will have differences that are near zero. Those that perform exceptionally low or high for one or more speakers might be considered outliers. A measure based on the magnitude of these differences is used to eliminate the listener who is an outlier. The measure is

$$VAR_i = \frac{1}{s} \sum_{j=1}^s D_{ij}^2, \quad i = 1, \dots, L.$$

The listener having the largest VAR_i is eliminated from the scoring run. L is then reduced by one and the process is repeated by computing new speaker means and differences. Again VAR_i is computed for each listener and the next listener is eliminated. This procedure is repeated until only eight listeners remain. This

process allows for the possibility of very high scoring listeners to be eliminated. However, it has been our experience that only rarely is a high scoring listener eliminated.

5.2 Repeatability and Comparability

Every listening session is started by administering the same three-speaker DRT. We refer to this DRT as the probe. The probe was also used during the training periods in December 1976 and January 1977. It consists of the first three speakers from Table 11. The scores obtained by each listener for the probe is closely tracked in order to monitor the listeners' consistency. The mean score for the probe each week provides us a measure of repeatability as well as a comparison with Dynastat scores. Additionally, from time to time a particular DRT is administered to the listening crew a second or third time in order to measure repeatability. Figure 10 is a scatter diagram of mean DRT scores for the probe for 40 repetitions. Each point represents one administration of the test. The first test was given on 14 January 1977 and the last on 22 December 1977. Each mean is based on only eight listener scores. Elimination of listeners was accomplished as described in Section 5.1. Also included in the figure is a confidence interval for the mean based on a Dynastat score of 86.8 and standard error of 0.75 for these speakers. A rapid learning trend during the first four sessions is apparent in the figure. After that time the scores are rather consistent except for a drop after the 22nd repetition. This was a time when several new listeners were added to replace departing members of the crew. The low scores for repetition numbers 23, 29, and 35 can be explained by noting that a full listening crew was not available on those dates and trainees' scores are included in the mean. 95 percent confidence intervals for the mean DRT score in the range 88 to 90 are typically two to three points wide. Most of the scores reflected in Figure 10 are well within a three-point band. This indicates that the in-house listening crew performs consistently over time. In-house DRT scores are shown to be comparable with scores obtained by Dynastat in Table 14. Table 14 contains mean DRT scores and standard errors for those systems that have been tested at least three times using either in-house or Dynastat resources. A one-way classification analysis of variance⁴ was performed on the scores for each system. No significant differences were found. This indicates that in-house and Dynastat DRT scores for the same system are essentially the same. Thus, direct statistical comparisons can be made using a mix of in-house and Dynastat DRT results.

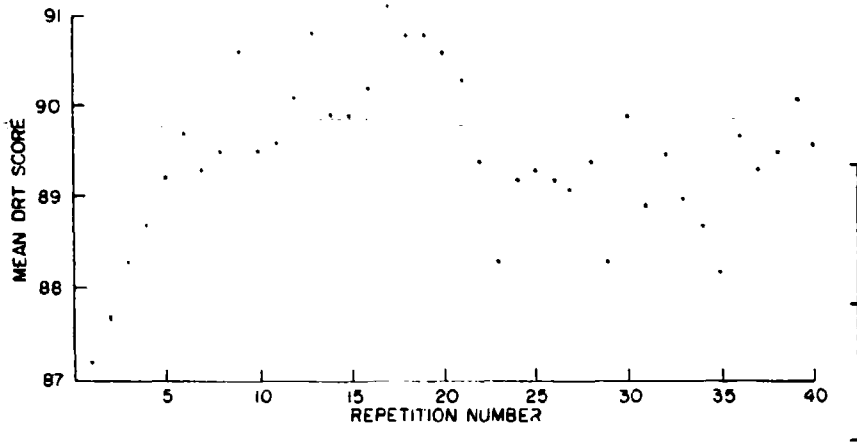


Figure 10. Mean DRT Scores for Probe After Eliminating Outlier Listeners

Table 14. In-House and Dynastat DRT Scores

SYSTEM ID	IN-HOUSE (MEAN/STANDARD ERROR) REPETITION			DYNASTAT (MEAN/STANDARD ERROR) REPETITION	
	1	2	3	1	2
2001	91.9/0.46			90.6/0.62	90.4/0.65
2017	87.5/0.46			85.0/0.93	85.9/0.51
2023	91.3/0.44	91.0/0.43		89.6/0.74	
2043	92.2/0.48	92.6/0.41		90.9/0.28	
2047	87.7/0.63	88.4/0.58		87.1/0.56	
2048	79.8/0.59	81.4/0.56	78.9/0.74	81.5/0.85	
2049	70.5/0.90	71.9/0.85		72.3/0.95	
2050	90.6/0.40	91.3/0.35		91.7/0.37	
2051	85.2/0.63	86.7/0.54		86.0/0.38	
2052	76.7/0.76	77.5/0.71	75.9/0.90	77.2/0.70	
2054	68.8/0.86	68.3/0.80		69.1/1.29	
2058	81.2/1.41	81.5/1.43		83.5/0.80	
2060	81.0/1.17	79.3/1.49		82.6/0.65	
2069	88.6/0.52	89.7/0.55	89.7/0.42	88.7/0.30	
2070	84.7/0.72	86.2/0.73		87.6/0.57	
2071	69.2/1.12	69.3/1.21		71.4/0.96	
2072	66.5/1.81	70.2/1.74		72.8/0.59	
2073	84.7/0.60	85.3/0.63		84.5/0.73	

6. COST

The weekly costs to conduct in-house DRTs are summarized below:

Listener salaries		\$162.00
12 listeners, 4-1/2 hours at \$3.00 per hour		
Test booklets		27.72
252 booklets at \$.11 each		
Test Administrator Salary		40.00
5 hours at approximately \$8.00 per hour		
Scoring Cost:		
Scorer salary (6 hours at \$3.00 per hour)	\$18.00	
Computer	No Charge	18.00
Total cost for three six-speaker DRTs:		\$247.72
Cost for one six-speaker DRT:		
In-house	\$82.85	

The above in-house cost does not include development and implementation of the in-house capability. These additional costs, if apportioned over a 3-year period, would add less than \$50.00 to the cost of a single six-speaker DRT. Overhead costs have not been included in the above figures. Allowing for as much as 100 percent for overhead results in a final in-house cost for a six-speaker DRT that is significantly lower than that charged by a contractor. Sufficient demand exists to utilize the entire in-house capability of 150 six-speaker DRTs each year, thus realizing a large cost savings.

7. CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the in-house DRT capability is a cost-effective means of providing a needed measure of voice communications intelligibility. It provides reliable data that is based on a widely accepted measure of intelligibility that is fast becoming a DoD Standard. It has been shown that the in-house testing provides results that are equivalent to those provided by contractor resources at a large cost savings. The in-house capability provides the additional advantage of rapid turnaround time, thus allowing decisions to be made in a timely fashion. The reduced unit cost of in-house DRTs allows us to perform the large number of DRTs required for our on-going algorithm development. Contractor costs for the number of DRTs required would be prohibitive. In addition to substantial cost savings and speedy turn-around, it is essential for the Government to have an in-house mechanism for validating results that might otherwise only be available from one, or very few other sources. This is particularly important in view of the decisions based on these results. It is recommended that the in-house capability be maintained.

It is a valuable resource that has widespread application throughout the Department of Defense. This capability could be expanded to serve the needs of other agencies requiring intelligibility testing and thus realize its maximum potential benefit. It is further recommended that continued use of contractor resources be made for conducting DRTs so that independent, unbiased results can be obtained at key points in our investigations. This will further serve to verify in-house results and provide a periodic comparison between in-house and contractor DRT scores.

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Appendix A

**Diagnostic Rhyme Test
Word Lists**

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DIAGNOSTIC RHYME TEST

WORD LIST
192A

PAGE 1		PAGE 2		PAGE 3		PAGE 4	
BOB	COOT	TEST	PAN	BOB	TOOT	PEST	FAN
DAUNT	BOND	FAULT	CHOCK	TAUNT	POND	VAULT	JOCK
ROOT	MOAN	NEWS	DOE	MOOT	BONE	DUES	NOTE
CHEAT	GILL	VEE	THICK	SHEET	VILL	SEE	TICK
JAB	GUEST	THANK	CHAIR	GAB	JEST	BANK	CARE
TOY	FOUGHT	WAD	DONG	POT	THOUGHT	ROD	BONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
LIP	LEAP	RID	REEK	RIP	REAP	LIO	LEEK
SAID	VAST	DENSE	CALF	ZED	FAST	TENSE	GAPP
GNAW	KNOCK	BOSS	BOMB	DAW	DOCK	MOSS	MOH
CHOOSE	DOZE	FOO	THOUGH	SHOES	THOSE	POOH	DOUGH
CHEEP	SING	THEE	GILT	KEEP	THING	ZEE	JILT
DANK	NET	FAD	PENT	BANK	NET	THAD	TENT
OOT	TAUGHT	HOP	YAWL	GOT	CAUGHT	POP	HALL
LOAD	RUDE	ROW	LOOT	ROAD	LEWD	LOW	ROOT
TINT	BEAN	GIN	FUEL	DINT	PEEN	CHIN	VEAL
NECK	HAD	BEND	DAB	DECK	SAD	MEND	NAB
THONG	VOX	CHAN	BON	TONG	BOX	SHAW	VON
CHOO	JOE	GOOSE	THOLE	COO	GO	JUICE	SOLE
WFED	BID	TEAK	THIN	NEED	DID	PEEK	FIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAT	KEG
ROY	RAW	LOCK	LONG	LOT	LAW	ROCK	WRONG
VOLE	SUE	COAT	DUNE	FOAL	ZOO	GOAT	TUNE
NIP	NEED	BIT	BEEY	NIP	DEED	MIT	MEET
FENCE	DAN	DEN	SHAD	PENCE	THAN	THEN	CHAD
SAW	CHOP	GAUZE	GOT	THAW	COP	JAWB	JOT
POOL	THOR	NOON	BOWL	TOOL	FORE	MOON	SOLE
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	DILL
LAP	LEST	RAMP	RENO	RAP	REST	LAMP	LENO

DIAGNOSTIC RHYME TEST

WORD LIST
1928

PAGE 1

BOB
DAUNT
BOOT
CHEAT
JAB
TOT
GHOST
LIP
SAID
DAN
CHOOSE
KEEP
BANK
OOT
LOAD
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THONG
CHOO
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POOL
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COOT
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VILL
GUEST
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LEAP
FAST
KNOCK
DOZE
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CAUGHT
LEWD
PEEN
HAD
VOX
JOE
DID
WREN
LAW
ZOO
NFED
DAN
COP
THOR
FIT
LEST

PAGE 2

PEST
FAULT
NEWS
VEE
THANK
HAD
BO
RID
DENSE
HOSS
FOO
ZEE
THAD
HOP
ROW
CHIN
MEND
CHAW
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TEAK
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LOCK
GOAT
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DEN
JAWS
NOON
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LAMP

PAN
JOCK
DOTE
TICK
CHAIR
BONG
RUE
REEK
GAPP
BOMB
THOUGH
JILT
TFNT
WALL
RODY
VEAL
DAB
BON
THOLE
PIN
KEG
WRONG
TUNF
BEET
SHAD
JOY
BOWL
GILL
REND

PAGE 3

BOB
TAUNT
MOOT
SHEET
GAR
ROT
ROAST
RIP
ZED
GNAW
SHOES
CHEEP
DANK
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ROAD
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NECK
TONG
COO
REED
SHAG
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VOLE
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TOOT
BOND
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BILL
JEST
FOUGHT
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VAST
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THAN
CHOP
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PAGE 4

TEST
VAULT
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PCE
SANK
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SHOW
LID
TENSE
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POOH
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LONG
DUNP
MEET
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DILL
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DIAGNOSTIC RHYME TEST

WORD LIST
193A

PAGE 1

ROB
TAUNT
ROOT
CHEAT
GAB
TOT
BOAST
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CHOOSE
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WREN
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SUE
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CHOP
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PAGE 2

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SHOW
RID
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DOTF
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PAGE 3

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PAGE 4

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HOWL
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DIAGNOSTIC RHYME TEST

WORD LIST
1938

PAGE 1

BOB
TAUNT
ROOT
CHEAT
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SHOES
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PAGE 2

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PAGE 3

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PAGE 4

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DIAGNOSTIC RHYME TEST

WORD LIST
104A

PAGE 1

GOR
DAUNT
MOOT
SHEET
GAB
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BOAST
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PAGE 2

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PAGE 3

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PAGE 4

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COAT
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THEN
GAIZE
MOON
KEY
RAMP

FAN
CHOCK
DOTE
THICK
CHAIR
BONG
RUE
REEK
GAPP
BOMB
THOUGH
JILT
PENT
WALL
ROOT
FEEL
NAB
VON
THOLE
PIN
PEG
WRONG
TUNE
BERT
CHAD
JOY
BOWL
GILL
REND

DIAGNOSTIC RHYME TEST

WORD LIST
1948

PAGE 1		PAGE 2		PAGE 3		PAGE 4	
ROB	TOOT	PEST	FAN	ROB	COOT	TEST	PAN
TAUNT	POND	VAULT	JOCK	DAUNT	BOND	PAULT	CHOCK
BOOT	BONE	NEWS	NOTE	MOOT	MOAN	QUES	DOVE
CHEAT	VILL	VEE	TICK	SHEET	BILL	BEE	THICK
GAB	GUEST	SANK	CHAIR	JAB	JEST	THANK	CARE
POT	FOUGHT	ROD	OONG	TOT	THOUGHT	HAD	BONG
GHOST	PROP	SO	YOU	ROAST	COOP	SHOW	RUE
LIP	REAP	RID	LEEK	RIP	LEAP	LID	REEK
ZED	FAST	TENSE	GAPP	SAID	VAST	DENSE	CALF
DAN	DOCK	MOSS	MOH	GNAW	KNOCK	BOSS	BOMB
CHOOSE	THOSE	POO	DOUGH	SHOES	DOZE	POOM	THOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	TREE	GILT
BANK	NET	THAD	PENT	DANK	MEY	PAD	TENT
GOT	CAUGHT	POP	WALL	DOT	TAUGHT	HOP	YAWL
ROAD	RUDE	LOW	LDDY	LOAD	LEWD	ROW	ROOT
TINY	BEAN	GIN	FEEL	DINT	PEEN	CHIN	VEAL
NECK	BAD	BEND	NAB	DECK	HAD	MEND	DAB
TONG	VOX	SHAW	BON	THONG	BOX	CHAW	VON
CHOD	JOE	GOOSE	THOLE	CON	GO	JUICE	SOLE
REED	DIO	PEEK	FIN	WEED	BIO	TEAK	THIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAY	KEG
ROT	LAW	LOCK	WRONG	LOT	RAW	ROCK	LONG
FOAL	ZOO	GOAT	TUNE	VOLE	SUE	COAT	DUNE
NIP	NEED	BIT	BEET	DIP	DEED	HIT	MEET
PENCE	THAN	DEN	CHAD	PENCE	DAN	THEN	SHAD
THAW	COP	JAWB	JOT	SAW	CHOP	GAUZE	GOT
TOOL	FORE	MOON	DOLE	POOL	THOR	NOON	BOWL
YIELD	PIT	TEA	GILL	WIELD	HIT	KEY	DILL
LAP	LEST	RAMP	REND	RAP	REST	LAMP	LEND

DIAGNOSTIC RHYME TEST

WORD LIST
195A

PAGE 1		PAGE 2		PAGE 3		PAGE 4	
GOB	COOT	TEST	PAN	ROB	TOOT	PEST	FAN
TAUNT	BOND	VAULT	CHOCK	DAUNT	POND	FAULT	JOCK
BOOT	BONE	NEWS	NOTE	MOOT	MOAN	DUES	DOVE
CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
JAB	JEST	THANK	CARE	GAR	GUEST	BANK	CHAIR
POT	FOUGHT	ROD	OONG	TOY	THOUGHT	WAD	BONG
BOAST	POOP	SMON	YOU	GHOST	COOP	SO	RUE
RIP	REAP	LID	LEEK	LIP	LEAP	RIO	REEK
SAID	VAST	DENSE	CALF	ZED	PAST	TENSE	GAPP
GNAW	DOCK	BOSS	MON	DAW	KNOCK	MOSS	BOMB
CHOOSE	DOZE	FOO	THOUGH	SHOES	THOSE	POOH	DOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	THEE	GILT
BANK	NET	THAD	PENT	DANK	NET	FAD	TENT
GOT	TAUGHT	POP	YAWL	DOT	CAUGHT	MOP	WALL
ROAD	RUDE	LOW	LOOT	LOAD	LEWD	ROW	ROOT
TINT	PEEN	GIN	VEAL	DINT	BEAN	CHIN	FEEL
NECK	BAD	BEND	NAB	DECK	HAD	HEND	OAB
THONG	BOX	CHAW	VON	TONG	VOX	SHAW	BON
COO	GO	JUICE	SOLE	CHOO	JOE	GOOSE	THOLE
WEED	BIO	TEAK	THIN	REED	DIO	PEEK	PIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAT	KEO
LOT	LAW	ROCK	WRONG	ROT	RAM	LOCK	LONG
POAL	ZOO	GOAT	TUNF	VOLE	SUE	GOAT	DUNE
NIP	NEED	BIT	BEET	DIP	DEED	HIT	HEET
PENCE	DAN	THEN	SHAD	FENCE	THAN	DEN	CHAD
THAW	COP	JAWS	JOT	SAW	CHOP	GAUZE	GOT
POOL	THOR	NOON	BOWL	TOOL	PORE	MOON	DOLE
YIELD	PIT	TEA	GILL	WIELD	HIT	KEY	OILL
RAP	REST	LAMP	LEND	LAP	LEST	RAMP	REND

DIAGNOSTIC RHYME TEST

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DIAGNOSTIC RHYME TEST

WORD LIST
1988

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BOB TOOT
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SHEET BILL
GAB JEST
POT THOUGHT
GHOST COOP
RIP REAP
BAID VAST
DAN DOCK
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ROAD RUDE
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FENCE THAN
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PEST FAN
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ROD SONG
SO RUE
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BAT KEG
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GOB COOT
DAUNT POND
MOOT NOAN
CHEAT VILL
JAB GUEST
TOT FOUGHMY
BOAST POOP
LIP LEAP
ZED PAST
GNAW KNOCK
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THANK CHAIR
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RID REEK
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DIAGNOSTIC RHYME TEST

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DIAGNOSTIC RHYME TEST

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DIAGNOSTIC RHYME TEST

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GOB TOOT
DAUNT BOND
ROOT BONE
CHEAT VILL
GAB GUEST
POY FUGHT
GHOST COOP
LIP LEAP
SAID VAST
GNAW KNOCK
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BOB COOT
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LOT RAM
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BOB	TOOT	TEBT	PAN	BOB	COOT	PEST	PAN
DAUNT	BOND	FAULTY	CHOCK	TAUNT	POND	VAULT	JOCK
HOOT	BONE	DUES	NOTE	BOOT	MOAN	NEWS	DOTE
CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
GAB	GUEST	BANK	CHAIR	JAB	JEST	THANK	CARE
TOT	FOUGHT	HAD	DONG	POT	THOUGHT	ROD	BONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
RIP	LEAP	LID	REEK	LIP	REAP	RID	LEEK
SAID	VAST	DENSE	CALF	ZED	FAST	TENSE	GAPP
GNAW	DOCK	BOBS	MOM	DAW	KNOCK	HOSS	BOMB
SHOES	DOZE	POOH	THOUGH	CHOOSE	THOSE	POO	DOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	THRE	GILT
CANK	MET	FAD	TENT	BANK	NET	THAD	PENT
GOT	TAUGHT	FOP	YAWL	DOT	CAUGHT	HOP	WALL
ROAD	LEWD	LOW	ROOT	LOAD	RUDE	RON	LOOT
TINT	PEEN	GIN	VEAL	DINT	BEAN	CHIN	FEEL
DECK	BAD	MEND	NAB	NECK	MAO	BEND	DAB
THONG	VOX	CHAN	BON	TONG	BOX	SHAW	VON
CHOD	GO	GOOSE	SOLE	COO	JOB	JUICE	THOLE
REED	DID	PEEK	PIN	WEED	SID	TEAK	THIN
SAG	WREN	GAT	KEG	SHAG	YEN	BAT	PEG
ROT	RAW	LOCK	LONG	LOT	LAW	ROCK	WRONG
VOLE	ZOO	COAT	TUNE	FOAL	SUE	GOAT	DUNE
OIP	NEED	MIT	BEET	NIP	DEED	BIT	MEET
PENCE	THAN	DEN	CHAD	PENCE	DAN	THEN	SHAD
THAW	COP	JANS	JOT	SAW	CHOP	GAUZE	GOT
POOL	PORE	NOON	OOLE	TOOL	THOR	MOON	BOWL
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	OILL
RAP	REST	LAMP	LEND	LAP	LEST	RAMP	REND

DIAGNOSTIC RHYME TEST

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PAGE 1		PAGE 2		PAGE 3		PAGE 4	
BOB	TOOT	TEST	PAN	BOB	COOT	PEST	PAN
GAUNT	BOND	FAULT	CHOCK	TAUNT	POND	VAULT	JOCK
BOOT	MOAN	NEWS	DOZE	HOOT	BONE	DUES	NOTE
CHEAT	BILL	VEE	THICK	SHEET	VILL	SEE	TICK
GAB	GUEST	BANK	CHAIR	JAB	JEST	THANK	CARE
POT	FOUGHT	ROD	DONS	TOY	THOUGHT	HAD	SONG
GHOST	COOP	SO	RUE	BOAST	POOP	SHOW	YOU
RILL	NEAP	NIP	WREATH	NILL	REAP	RIP	NEATH
SAID	PAST	DENSE	GAPP	ZED	VAST	TENSE	CALF
GNAM	KNOCK	BOSS	BOMB	DAM	DOCK	HOSS	MON
SHOES	DOZE	POOH	THOUGH	CHOOSE	THOSE	FOO	DOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	TNEE	GILY
BANK	NET	THAD	PENT	DANK	NET	PAD	TENT
GOY	CAUGHT	FOP	WALL	DOY	TAUGHT	HOP	YAWL
NOSE	NUDE	RODE	ROOSE	ROSE	RUDE	NOSE	NOOSE
TINT	SEAN	GIN	PEEL	NINT	PEEN	CHIN	VEAL
DECK	MAD	MEND	DAB	NECK	BAD	BEND	NAB
THONG	BOX	CHAW	VON	TONG	VOX	SHAW	SON
COO	GO	JUICE	SOLE	CHEN	JOE	GOOSE	THOLE
NEED	DID	TEAK	PIN	REED	BID	PEEK	THIN
SAG	WREN	GAT	KEG	SHAG	YEN	BAT	PEB
KNOB	WROUGHT	ROT	GNAW	ROB	NOUGHT	NOT	RAW
VOLE	ZOO	COAT	TUNE	FOAL	BUR	GOAT	DUNE
DIP	NEED	HIT	BERT	NIP	DEED	BIT	MEET
FENCE	DAN	THEN	SHAD	FENCE	THAN	DEN	CHAD
SAW	COP	GAUZE	JOT	THAW	CHOP	JAWB	GOT
TOOL	THOR	MOON	BOWL	POOL	FORE	NOON	DOLE
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	DILL
SNAY	REST	RAP	NEO	RAY	NEST	NAP	RED

DIAGNOSTIC RHYME TEST

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GOB	COOT	TEST	PAN	ROB	TOOT	PEST	PAN
TAUNT	BOND	VAULT	CHOCK	DAUNT	POND	FAULT	JOCK
BOOT	BONE	NEWS	NOTE	MOOT	NOAN	DUES	DOZE
CHEAT	VILL	VEE	TICK	SHEET	BILL	SEE	THICK
GAB	GUEST	SANK	CHAIR	JAR	JEST	THANK	CARE
POT	FOUGHT	ROD	DONG	TOT	THOUGHT	WAD	BONG
BOAST	COOP	SHOW	RUE	GHOST	POOP	SO	YOU
MILL	REAP	RIP	NEATH	MILL	NEAR	NIP	WREATH
ZED	VAST	TENSE	CALF	SAID	FAST	DENSE	GAPP
GNAW	KNOCK	BOSS	ROMB	DAH	DOCK	MOSS	HOM
CHOOSE	DOZE	FOO	THOUGH	SHOES	THOSE	POOH	DOUGH
CREEP	SING	THIR	GILT	KEEP	THING	ZEE	JILT
BANK	NET	THAD	PENT	DANK	HET	FAD	TENT
JOT	TAUGHT	HOP	YAWL	GOT	CAUGHT	FOP	WALL
ROSE	NUDE	NODE	ROOSE	NOSE	RUDE	RODE	NOOSE
TINT	BEAN	GIN	PEEL	DINT	PEEN	CHIN	VEAL
NECK	BAD	BEND	NAB	DECK	HAD	HEND	DAB
THONG	VOX	CHAW	BON	TONG	BOX	SHAW	VON
CHEN	JOE	GOOSE	THOLE	COO	GO	JUICE	SOLE
NEED	BIO	TEAK	THIN	REED	DIO	PEEK	PIN
SHAG	YEN	BAT	PEG	RAG	WREN	GAT	KEG
ROB	NOUGHT	NOT	RAW	KNOB	WROUGHT	ROT	GNAW
VOLF	ZOO	COAT	TUNE	FOAL	BUE	GOAT	DUNE
NIP	NEED	BIT	BEET	DIP	DEED	HIT	MEET
FENCE	THAN	DEN	CHAD	FENCE	DAN	THEN	SHAD
THAW	COP	JAWS	JOT	SAW	CHOP	GAUZE	GOT
POOL	FORE	NOON	DOLE	TOOL	THOR	MOON	BOWL
WIELD	HIT	KEY	DILL	YIELD	PIT	TEA	GILL
GNAT	NEST	RAP	RED	RAT	REST	NAP	NEO

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CHEAT	BILL	VEE	THICK
GAB	JEST	SANK	CARE
TOT	THOUGHT	HAD	BONG
BOAST	POOP	SHOW	YOU
HILL	REAP	RIP	NEATH
ZED	PAST	TENSE	SAPP
DAM	DOCK	MOSS	HOM
CHOOSE	DOZE	FOO	THOUGH
CHEEP	THING	THEE	JILT
BANK	NET	THAD	PENT
DOT	TAUGHT	HOP	YAWL
ROSE	NUDE	NODE	ROOSE
TINT	BEAN	GIN	FEEL
DECK	BAG	MEND	NAB
THONG	VOX	CHAW	BON
COO	SO	JUICE	SOLE
REED	BID	PEEK	TWIN
SHAB	WREN	BAT	KEG
ROB	NOUGHT	NOT	RAW
FOAL	SUE	GOAT	DUNE
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FENCE	THAN	DEN	CHAD
SAW	CHOP	GAUZE	GOT
POOL	PORE	NOON	SOLE
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GNAT	NEST	RAP	RED
BOB	TOOT	BOB	PEST
DAUNT	BOND	DAUNT	FAULT
MOOT	BONE	MOOT	DUES
SMERT	VILL	SMERT	SEE
JAB	GUEST	JAB	THANK
POT	FOUGHT	POT	ROO
SHOBT	COOP	SHOBT	SO
RILL	NEAP	RILL	NIP
SAID	VAST	SAID	DENSE
SNAN	KNOCK	SNAN	BOSS
SMORS	THOSE	SMORS	POOH
KEEP	SING	KEEP	SEE
DANK	NET	DANK	PAD
GOT	CAUGHT	GOT	ROE
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NECK	HAD	NECK	BEND
TONG	BOX	TONG	SHAN
CHEN	JOE	CHEN	GOOSE
WEED	DIO	WEED	TEAK
BAG	YEN	BAG	GAT
KNOB	WROUGHT	KNOB	ROT
VOLE	ZOO	VOLE	COAT
DIP	DEED	DIP	HIT
PENCE	DAN	PENCE	THEN
THAM	COP	THAM	JAMB
TOOL	THOR	TOOL	NOON
HIELD	HIP	HIELD	KEY
RAT	REST	RAT	NAP
PAN	CHOCK	PAN	NOTE
CHOCK	NOTE	CHOCK	TICK
NOTE	TICK	NOTE	CHAIR
TICK	CHAIR	TICK	DONG
CHAIR	DONG	CHAIR	RUE
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TENT	WALL	TENT	MOOSE
WALL	MOOSE	WALL	VKAL
MOOSE	VKAL	MOOSE	DAB
VKAL	DAB	VKAL	VON
DAB	VON	DAB	THOLE
VON	THOLE	VON	FIN
THOLE	FIN	THOLE	PEG
FIN	PEG	FIN	SNAN
PEG	SNAN	PEG	TUNE
SNAN	TUNE	SNAN	MEET
TUNE	MEET	TUNE	SHAD
MEET	SHAD	MEET	JOT
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CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
JAB	GUEST	THANK	CHAIR	GAB	JEST	BANK	CARE
POT	THOUGHT	ROD	BONG	TOY	FOUGHT	WAD	DONG
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NILL	NEAP	RIP	WREATH	RILL	REAP	NIP	NEATH
ZED	FAST	TENSE	GAFF	SAID	VAST	DENSE	CALF
DAW	KNOCK	HOBS	BOMM	GNAW	DOCK	BOSS	MOM
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	THEE	GILT
BANK	MEY	THAD	TENT	DANK	NET	PAD	PENT
GOT	CAUGHT	POP	WALL	DOT	TAUGHT	HOP	YAWL
ROSE	RUDE	NODE	NNOSE	NOSE	NUDE	RODE	ROOSE
DINT	PEEN	CHIN	VEAL	TINT	BEAN	GIN	PEEL
NECK	MAD	BEND	DAB	DECK	BAD	MEND	NAB
THONG	BOX	CHAW	VON	TONG	VOX	SHAW	BON
CHEW	JOE	GOOSE	THOLE	COO	GO	JUICE	SOLE
WEED	BID	TEAK	THIN	REED	DID	PEEK	FIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAT	KEG
ROB	NOUGHT	NOT	RAW	KNOB	WROUGHT	ROT	GNAW
POAL	ZOO	GOAT	TUNE	VOLE	SUE	COAT	DUNE
NIP	DEED	BIT	MEET	DIP	NEED	MIT	BRET
FENCE	THAN	DEN	CHAD	PENCE	DAN	THEN	SHAD
THAW	CHOP	JAWS	GOT	SAW	COP	GAUZE	JOT
POOL	THOR	NOON	BOWL	TOOL	PORE	MOON	DOLE
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	DILL
RAT	NEST	NAP	RED	GNAT	REST	RAP	NED

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ROB	COOT	REST	PAN	GOR	TOOT	TEST	FAN
DAUNT	BOND	FAULT	CMOCK	TAUNT	POND	VAULT	JOCK
MOOT	BONE	DUES	NOTE	ROOT	MOAN	NEWS	DOE
CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
JAB	JEST	THANK	CARE	GAB	GUEST	SANK	CHAIR
TOT	THOUGHT	HAD	BONG	POT	FOUGHT	ROD	DONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
RILL	REAP	NIP	NEATH	HILL	NEAP	RIP	WREATH
ZED	FAST	TENSE	GAFF	SAID	VAST	DENSE	CALF
GNAW	DOCK	BOSS	NOM	DAW	KNOCK	MOSS	BOMB
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEF	JILT	CHEEP	SING	THEE	GILT
DANK	NET	FAD	TENT	BANK	NET	THAD	PENT
DOT	CAUGHT	HOP	KALL	GOT	TAUGHT	FOP	YAWL
NOSE	NUDE	RODE	ROOSE	ROSE	RUDE	NODE	NOOSE
DINT	PEEN	CHIN	VEAL	TINT	BEAN	GIN	FEEL
DECK	BAD	HEND	NAB	NECK	HAD	BEND	DAB
THONG	VOX	CHAW	BON	TONG	BOX	SHAW	VON
CHEW	JOE	GORSE	THOLE	COO	GO	JUICE	SOLE
REED	BID	PEEK	TWIN	WEED	DID	TEAK	FIN
SHAG	YEN	BAT	PEG	SAG	WREN	GAT	KEG
KNOB	WROUGHT	ROT	GNAW	ROB	NOUGHT	NOY	RAW
VOLE	SUE	COAT	DINE	FOAL	ZOO	GOAT	TUNE
DIP	NEED	HIT	BEET	NIP	DEED	BIT	MEET
PENCE	THAN	THEN	CHAD	FENCE	DAN	DEN	SHAD
THAW	COP	JAW	JOT	SAW	CHOP	GAUZE	GOT
TOOL	THOR	MOON	BOWL	POOL	FORE	NOON	DOLE
WIELD	HIT	KEY	DILL	YIELD	FIT	TEA	GILL
RAT	REST	NAP	NED	GNAT	NEST	RAP	RED

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BOB	COOT	PEST	PAN
DAUNT	BOND	FAULT	CHOCK
BOOT	MOAN	NEWS	DOT
CHEAT	BILL	VEE	THICK
GAB	JEST	SANK	CARE
TOY	THOUGHT	WAD	BONG
BOAST	COOP	SHOW	RUE
RILL	NEAP	NIP	WREATH
SAID	FAST	DENSE	GAFF
GNAW	DOCK	BOSS	MOM
SHOES	THOSE	POOH	DOUGH
CHEEP	THING	THEE	JILT
DANK	NET	FAD	TENT
GOT	CAUGHT	FOT	WALL
NOSE	NUDE	FOE	ROOSE
TINT	BEAN	GIN	PEEL
DECK	HAD	HEND	DAB
THONG	VOX	CHAW	BON
CHEW	JOE	GOOSE	THOLE
REED	BID	PEEK	THIN
SHAG	YEN	BAT	PEG
ROB	WROUGHT	NOT	GNAW
VOLE	ZOO	COAT	TUNE
NIP	NEED	AIT	BEEF
PENCE	DAN	THEN	SHAD
THAN	COP	JAWS	JOT
TOOL	THOR	MOON	BOWL
WIELD	HIT	KEY	DILL
RAT	NEST	NAP	REO
			GOR
			TAUNT
			MOOT
			SHEET
			JAB
			POT
			GHOST
			NILL
			ZED
			DAW
			CHOOSE
			KEEP
			RANK
			DOT
			ROSE
			DINT
			NECK
			TONG
			COO
			WEED
			SAG
			KNOB
			FOAL
			DIP
			FENCE
			SAW
			POOL
			YIELD
			GNAT
			TOOT
			POND
			BONE
			VILL
			GUEST
			FOUGHT
			POOP
			REAP
			VAST
			KNOCK
			DOZE
			SING
			NET
			TAUGHT
			RUDE
			PEEN
			BAD
			BOX
			GO
			OID
			WREN
			NOUGHT
			SUE
			DEED
			THAN
			CHOP
			FORE
			FIT
			REST
			TEST
			VAULT
			QUES
			BEE
			THANK
			ROD
			SO
			RIP
			TENSE
			MOSS
			FOO
			ZEE
			THAD
			HOP
			NODE
			CHIN
			BEND
			SHAW
			JUICE
			TEAK
			GAT
			ROT
			GOAT
			HIT
			DEN
			GAUZE
			NOON
			TEA
			RAP
			FAN
			JOCK
			NOTE
			TICK
			CHAIR
			ROD
			YOU
			NEATH
			CALF
			BOMB
			THOUGH
			GILT
			PENT
			YAWL
			NOOSE
			VEAL
			NAB
			VON
			SOLE
			PIN
			KEG
			RAW
			DUNE
			MEET
			CHAD
			GOT
			DOLE
			GILL
			NEO

DIAGNOSTIC RHYME TEST

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GOB	COOT	TEST	PAN	ROB	TOOT	PEST	FAN
TAUNT	BOND	VAULT	CHOCK	DAUNT	POND	FAULT	JOCK
BOOT	BONE	NEWS	NOTE	MOOT	MOAN	DUES	DOE
CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
JAB	GUEST	THANK	CHAIR	GAB	JEST	SANK	CARE
TOT	FOUGHT	WAD	DONG	POT	THOUGHT	ROD	BONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
HILL	REAP	RIP	NFATH	RILL	NEAP	NIP	WREATH
SAID	FAST	DENSE	GAPP	ZED	VAST	TENSE	CALF
GNAW	KNOCK	BOSS	BOMB	DAW	DOCK	MOSS	NOM
SHOES	THOSE	POOH	DOUGH	CHOOSE	DOZE	FOO	THOUGH
KEEP	SING	ZEE	GILT	CHEEP	THING	THEE	JILT
DANK	NET	PAD	PENT	RANK	NET	THAD	TENT
GOT	TAUGHT	FOP	YAWL	DOT	CAUGHT	HOP	WALL
ROSE	NUDE	NODE	ROOSE	NOSE	RUDE	RODE	NOOSE
DINT	PEEN	CHIN	VEAL	TINT	BEAN	GIN	FEEL
DECK	BAD	MEND	NAB	NECK	MAD	BEND	DAB
THONG	VOX	CHAW	BON	TONG	BOX	SHAW	VON
CHEW	JOE	GOOSE	THOLE	COO	GO	JUICE	SOLE
WFEED	DIO	TEAK	FIN	REED	BID	PEEK	THIN
SHAG	WREN	BAT	KEG	SAG	YEN	GAT	PEG
KNOB	NOUGHT	ROT	RAW	ROB	WROUGHT	NOT	GNAW
FOAL	SUE	GOAT	OLINE	VOLE	ZOO	COAT	TUNE
DIP	NEED	HIT	BFEY	NIP	DEED	BIT	HEET
PENCE	DAN	THEN	SHAD	FENCE	THAN	DEN	CHAD
THAM	CHOP	JAWS	GOT	SAW	COP	GAUZE	JOT
POOL	FORE	NOON	DOLE	TOOL	THOR	MOON	BOWL
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	OILL
RAT	REST	NAP	NED	GNAT	NEST	RAP	RED

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ROB	TOOT	PEST	FAN	GOR	COOT	TEST	PAN
TAUNT	POND	VAULT	JOCK	DAUNT	BOND	FAULTY	CHOCK
ROOT	BONE	NEWS	NOTE	HOOT	MOAN	QUES	DOPE
SHEET	VILL	BEE	TICK	CHEAT	BILL	VEE	THICK
JAB	JEST	THANK	CARE	GAR	GUEST	SANK	CHAIR
POT	FOUGHT	ROD	DONG	TOT	THOUGHT	WAD	BONG
GHOST	POOP	SO	YOU	ROAST	COOP	SHOW	RUE
NILL	REAP	RIP	NEATH	RILL	NEAP	NIP	WREATH
SAID	VAST	DENSE	CALF	ZED	FAST	TENSE	GAFF
DAW	DOCK	MOSS	MOM	GNAW	KNOCK	BOSS	BOMB
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POOH	THOUGH
CHEEP	SING	THEE	GILT	KEEP	THING	ZEE	JILT
RANK	NET	THAD	PENT	DANK	MET	PAO	TENT
GOT	CAUGHT	FOP	WALL	DOT	TAUGHT	HOP	YAWL
ROSE	NUDE	NODE	ROOSE	NOSE	RUDE	RODE	NOOSE
DINT	BEAN	CHIN	FEEL	TINT	PFEN	GIN	VEAL
NECK	BAD	BEND	NAB	DECK	MAD	MEND	DAH
THONG	VOX	CHAW	BON	TONG	ROY	SHAW	VON
COO	JOE	JUICE	THOLE	CHEW	GO	GOOSE	SOLF
REED	DIO	PEEK	FIN	WEED	BIO	TEAK	THIN
SHAG	WREN	RAT	KFG	SAG	YEN	GAT	PEG
ROB	NOUGHT	NOT	RAW	KNOR	WROUGHT	ROT	GNAW
FOAL	SUE	GOAT	DUNE	VOLE	ZOO	COAT	TUNE
DIP	DEED	MIT	MEET	NIP	NEED	HIT	BEEF
FENCE	DAN	DEN	SHAD	PENCE	THAN	THEN	CHAD
SAW	CHOP	GAUZE	GOT	THAW	COP	JAWS	JOT
POOL	FORE	NOON	OLF	TOOL	THOR	MOON	BOWL
WIELD	FIT	KEY	GILL	YIFLO	HIT	TEA	DILL
RAT	NEST	NAP	RED	GNAT	REST	RAP	NEO

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BOB
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JUICE
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GOAT
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DAN
JAWS
MOON
TEA
RAP

FAN
CHOCK
DOYE
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CHAIR
DONS
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WREATH
GAFF
MON
DOUGH
JILY
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NOOSE
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BOB	TOOT	PEST	PAN	GOB	COOT	TEST	PAN
DAUNT	BOND	FAULTY	CHOCK	TAUNT	POND	VAULT	JOCK
MOOT	MOAN	DUES	DOTE	ROOT	BONE	NEWS	NOTE
CHEAT	VILL	VEE	TICK	SHEET	BILL	BEE	THICK
JAB	JEST	THANK	CARE	GAB	QUEST	SANK	CHAIR
POT	THOUGHT	ROD	BONG	TOY	POUGHT	HAD	DONG
GHOST	COOP	SO	RUE	ROAST	POOP	SHOW	YOU
NILL	NEAP	RIP	WREATH	RILL	REAP	NIP	NEATH
SAID	VAST	DENSE	CALF	ZED	PAST	TENSE	GAPP
GNAW	KNOCK	BOSS	BOMB	DAW	DOCK	MOSS	MON
CHOOSE	DOZE	POD	THOUGH	SHOES	THOSE	POOH	DOUGH
CHEEP	SING	THEE	GILT	KEEP	THING	ZEE	JILT
BANK	HET	THAD	TENT	DANK	NET	PAD	PENT
GOT	CAUGHT	POP	WALL	DOT	TAUGHT	HOP	YAWL
ROSE	RUDE	NOOE	NOOSE	NOSE	NUDE	RODE	ROOSE
DINT	PEEN	CHIN	VEAL	TINT	BEAN	GIN	FEEL
DECK	MAD	MEND	DAB	NECK	BAD	BEND	NAB
THONG	VOX	CHAW	BON	TONG	BOX	SHAW	VON
CHEW	JOE	GOOSE	THOLE	COO	GO	JUICE	SOLE
WEED	DIO	TEAK	PIN	REED	BID	FEEK	THIN
SAG	YEN	GAT	PEG	SHAG	HREN	BAT	KEG
KNOB	WROUGHT	ROT	GNAW	ROB	NOUGHT	NOT	RAW
FOAL	ZOO	GOAT	TUNE	VOLE	SUE	COAT	DUNE
DIP	DEED	HIT	MEET	NIP	NEED	BIT	BEEF
FENCE	DAN	DEN	SHAD	PENCE	THAN	THEN	CHAD
SAW	COP	GAUZE	JOT	THAW	CHOP	JAWS	GOT
TOOL	THOR	MOON	BOWL	POOL	FORE	NOON	DOLE
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	DILL
GNAT	NEST	RAP	RED	RAT	REST	NAP	NEO

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GOB TOOT
DAUNT POND
MOOT MOAN
SHEET VILL
GAB JEST
TOT THOUGHT
BOAST POOP
RILL NEAP
ZED VAST
DAM DOCK
SHOES DOZE
CHEEP THING
DANK MET
GOT CAUGHT
NOSE RJOE
DINT BEAN
NECK MAD
THONG VOX
CHEW JOE
REED DID
SAG YEN
KNOB NOUGHT
FOAL ZOO
NIP DEED
PENCE THAN
SAW CHOP
TOOL FORE
YIELD HIT
RAT REST

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TEST FAN
FAULT JOCK
DUFF DOTE
REE TICK
SANK CARE
WAO BONG
SMOW YOU
NIP WREATH
TENSE CALF
MOSS MOM
POOH THROUGH
THRE JILY
FAD TENT
FOP WALL
RODE NOOSE
CHIN FEEL
BEND DAB
CHAW BON
GOOSE THOLE
PEEK FIN
GAT PEG
ROT RAW
GOAT TUNF
BIT MEET
OEN CHAD
GAUZE GOT
MOON ONLE
TEA DILL
NAP NED

PAGE 3

ROB COOT
TAUNT BONO
ROOT BONE
CHEAT BILL
JAR GUEST
POT FROUGHT
GHOST COOP
NILL REAP
SAID FAST
GNAW KNOCK
CHOOSE THOSE
KEEP SING
RANK NET
DOT TAUGHT
ROSE NUOE
TINT PEEN
DECK BAD
TONG ROX
COO GO
WEED RID
SHAG WREN
ROR WROUGHT
VOLE SUE
DIP NEED
PENCE DAN
THAW COP
POOL THOR
WIFLD FIT
GNAT NEST

PAGE 4

PEST PAN
VAULT CHOCK
NEWS NOTE
VEE THICK
THANK CHAIR
ROD DONG
SO RUE
RIP NEATH
DENSE GAFF
BOSS BOMB
FOO DOUGH
ZEE GILT
THAD PENT
HOP YAWL
NODE ROOSE
GIN VEAL
MEND NAB
SHAW VON
JUICE SOLE
TEAK THIN
BAT KEG
NOT GNAW
COAT DUNE
MIT BEET
THEN SHAD
JAWS JOT
NUCH BOWL
KEY GILL
RAP RED

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BOB	COOT	PEST	PAN	GOR	TOOT	TEST	FAN
BAUNT	POND	FAULT	JOCK	TALINT	BOND	VAULT	CMOCK
MOOT	BONE	DUES	NOTF	ROOT	MOAN	NEWS	OOZE
SHEET	BILL	BEE	THICK	CHEAT	VILL	VEE	TICK
GAB	JEST	SANK	CARE	JAR	GUEST	THANK	CHAIR
POT	FOUGHT	ROD	DOOR	TOY	THOUGHT	WAD	BONG
GHOST	POOP	SO	YOU	ROAST	COOP	SHOW	RUE
RILL	REAP	NIP	NEATH	MILL	NEAP	RIP	WREATH
SAID	FAST	DENSE	GAPP	ZED	VAST	TENSE	CALF
DAW	DOCK	MOSS	MOH	GNAW	KNOCK	BOSS	BOMB
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POOH	THOUGH
CHEEP	THING	THEE	JILT	KEEP	SING	ZEE	GILT
RANK	MET	THAD	TENT	DANK	NET	FAD	PENT
OOT	TAUGHT	HOP	YAWL	GOT	CAUGHT	POP	HALL
NOSE	RUDE	RODE	NOOSE	ROSE	NUDE	NODE	ROOSE
DINT	PEEN	CHIN	VPAL	TINT	BEAN	GIN	FEEL
NECK	MAD	BEND	DAB	DECK	BAD	MEND	NAB
THONG	BOX	CHAW	VON	TONG	VOX	SHAW	BON
COO	GO	JUICE	SOLE	CHFW	JOE	GOOSE	THOLE
HEED	DID	TEAK	FIN	REFD	BID	PEEK	THIN
SHAG	WREN	BAT	KFG	SAG	YEN	GAT	PEG
ROB	WROUGHT	NOT	GNAW	KNOB	NOUGHT	ROT	RAW
VOLE	SJE	COAT	DUNE	FOAL	ZOO	GOAT	TUNE
NIP	DEED	BIT	MEET	DIP	NEED	NIT	BEEY
FENCE	THAN	THEN	CHAD	FENCE	DAN	DEN	SHAD
THAW	CHOP	JAWS	ROT	SAW	COP	GAUZE	JOT
TOOL	FORE	MOON	DOLE	POOL	THOR	NOON	BOWL
WIELD	HIT	KEY	DILL	YIELD	FIT	TEA	GILL
RAT	REST	NAP	NED	GNAT	NEST	RAP	RED

DIAGNOSTIC RHYME TEST

WORD LIST
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PAGE 1

BOB TOOT
DAUNT BOND
MOOT MOAN
CHEAT BILL
JAB GUEST
TOT FOUGHT
BOAST POOP
RILL NEAP
ZED VAST
DAN DOCK
SHOES DOZE
KEEP THING
DANK NET
GOT TAUGHT
NOSE RUDE
TINT PEEN
NECK BAD
THONG VOX
COO JOE
REED OIO
SAG YEN
KNOB WROUGHT
FOAL SUE
DIP NEED
PENCE DAN
SAM COP
TOOL FORE
YIELD MIT
RAT NEST

PAGE 2

PEST FAN
FAULT CHOCK
DUES DATE
VEP THICK
THANK CHAIR
WAO DONG
SHOW YOU
NIP WREATH
TENSE CALF
MOSS MOM
POOH THOUGH
ZEE JILT
FAD PENT
POP YAWL
RODE NOOSE
GIN VEAL
BEND NAB
CHAW BON
JUICE THOLE
PEEK PIN
GAT PEG
ROT GNAM
GOAT DUNE
MIT BEET
DEN SHAD
GAUZE JOT
MOON DOLE
TEA DILL
NAP RED

PAGE 3

GOB COOT
TAUNT POND
BOOT BONE
SHEET VILL
GAB JEST
POT THOUGHT
GHOST COOP
NILL REAP
SAID PAST
GNAW KNOCK
CHOOSE THOSE
CHEEP SING
RANK MEY
DOT CAUGHT
ROSE NUDE
DINT BEAN
DECK MAD
TONG BOX
CHEN GO
WEED BID
RHAG WREN
ROR NOUGHT
VOLE ZOO
NIP DEED
PENCE THAN
THAW CHOP
POOL THOR
WIELD FIT
GNAT REST

PAGE 4

TEST PAN
VAULT JOCK
NEWS NOTE
BEF TICK
SANK CARE
ROD BONG
SO RUE
RIP NEATH
DENSE GAFF
BOSS BOMB
FOO DRUGH
THEE GILT
THAD TENT
HOP WALL
NODE ROOSE
CHIN FEEL
HEND DAB
SHAW VON
GOOSE SOLE
TEAK THIN
BAT KEG
NOT RAW
COAT TUNE
BIT MEET
THEN CHAD
JAWS GOT
NOON BOWL
KEY GILL
RAP NED

DIAGNOSTIC RHYME TEST

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PAGE 1		PAGE 2		PAGE 3		PAGE 4	
BOB	COOT	PEST	PAN	GOB	TOOT	TEST	FAN
TAUNT	POND	VAULT	JOCK	DAUNT	BOND	FAULT	CHOCK
ROOT	BONE	NEWS	NOTE	MOOT	MOAN	OUES	DOE
SHEET	BILL	BEE	THICK	CHEAT	VILL	VEE	TICK
JAR	JEST	THANK	CARE	GAB	GUEST	SANK	CHAIR
TOT	THOUGHT	WAD	BONG	POT	FOUGHT	ROD	DONG
BOAST	COOP	SHOW	RUE	GHOST	POOP	SO	YOU
NILL	REAP	RIP	NEATH	RILL	NEAP	NIP	WREATH
ZED	VAST	TENSE	CALF	SAID	PAST	DENSE	GAPP
GNAW	KNOCK	BOSS	BOMB	DAN	DOCK	MOSS	HOM
SHOES	DOZE	POOM	THOUGH	CHOOSE	THOSE	POO	DOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	THEE	GILT
DANK	MEY	FAD	TENT	RANK	NET	THAD	PENT
DOT	CAUGHT	HOP	WALL	ROY	TAUGHT	POP	YAWL
ROSE	RUDE	NODE	NOOSE	NOSE	NUDE	RODE	ROOSE
TINY	BEAN	GIN	PEEL	DINT	PREN	CHIN	VEAL
DECK	BAD	MEND	NAB	NECK	HAD	BEND	OAB
THONG	BOX	CHAW	VON	TONG	VOX	SHAW	BON
CHEW	GO	GOOSE	SOLE	COO	JOE	JUICE	THOLE
REED	BID	PEEK	THIN	NEED	DIO	TEAK	FIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAT	KEG
KNOB	WROUGHT	ROT	GNAW	ROB	NOUGHT	NOT	RAW
FOAL	SUE	GOAT	DIJNE	VOLE	ZOO	COAT	TUNE
DIP	DEED	MIT	MEET	NIP	NEED	BIT	BEET
FENCE	DAN	DEN	SHAD	PENCE	THAN	THEN	CHAD
SAW	CHOP	GAUZE	GOT	THAW	COP	JAWS	JOT
POOL	FORE	NOON	DOLF	TOOL	THOR	MOON	BOWL
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	DILL
RAT	NEST	NAP	RED	GNAT	REST	RAP	NED

DIAGNOSTIC RHYME TEST

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GOB
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DIAGNOSTIC RHYME TEST

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GOB	TOOT	TEST	PAN	ROB	COOT	PEST	PAN
DAUNT	POND	FAULT	JOCK	TAUNT	ROND	VAULT	CHOCK
MOOT	MOAN	QUES	DOPE	ROOT	BONE	NEWS	NOTE
CHEAT	BILL	VEE	THICK	SHFET	VILL	SEE	TICK
GAB	JEST	SANK	CARE	JAB	GUEST	THANK	CHAIR
TOY	FOUGHT	HAD	DONG	POT	THOUGHT	ROD	BONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
RILL	NEAP	NIP	WREATH	NILL	REAP	RIP	NEATH
ZED	FAST	TENSE	GAPP	SAID	VAST	DENSE	CALF
GNAW	KNOCK	BOSS	BOHB	PAW	DOCK	MOSS	MOM
SHOES	DOZE	POOH	THOUGH	CHOOSE	THOSE	POH	DOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	THEE	GILT
DANK	NET	FAD	PENT	RANK	MET	THAD	TENT
GOT	TAUGHT	POP	YAWL	DOT	CAUGHT	HOP	WALL
NOSE	RUDE	RODE	NOOSE	ROSE	NUDE	NODE	ROOSE
DINT	BEAN	CHIN	PEEL	TINT	PEEN	GIN	VEAL
NECK	BAD	MEND	NAB	NECK	HAD	BEND	DAB
THONG	VOX	CHAW	RON	TONG	BOX	SHAW	VON
COO	JOE	JUICE	THOLE	CHEW	GO	GOOSE	SOLE
FEED	DIO	PEEK	FIN	WEED	BID	TEAK	THIN
SHAG	WREN	BAT	KEG	SAG	YEN	GAT	PEG
KNOB	NOUGHT	ROT	RAW	ROR	WROUGHT	NOT	GNAW
VOLE	SUE	COAT	DIINE	FOAL	ZOO	GOAT	TUNE
DIP	DEED	HIT	MEET	NIP	NEED	BIT	BEEF
PENCE	THAN	THFN	CHAD	FENCE	DAN	DEN	SHAD
SAW	CHOP	GALIZE	GOT	THAW	COP	JAWS	JOT
TOOL	THOR	MOON	BOWL	POOL	FORE	NOON	DOLE
WIELD	HIT	KEY	DYLL	YIFLD	FIT	TEA	GILL
RAT	NEST	NAP	RFD	GNAT	REST	RAP	NEB

DIAGNOSTIC RHYME TEST

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DIAGNOSTIC RHYME TEST

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PAGE 3

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PAGE 4

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BOB TOOT
GAUNT POND
BOOT BONE
SHEET VILL
GAB JEST
POT FOUGHT
GHOST POOP
NILL REAP
ZED VAST
DAN DOCK
SHOES DOZE
CHEEP THING
DANK MET
GOT TAUGHT
ROSE RUDE
TINT BEAN
NECK BAD
TONG VOX
COD JOE
REED DID
SMAG YEN
KNOB WROUGHT
VOLE ZOO
DIP NEED
FENCE THAN
THAW COP
POOL THOR
WIELD HIT
GNAT REST

PAGE 2

PEST FAN
FAULT JOCK
NEWS NOTE
BEE TICK
BANK CARE
ROD DRUG
SO YOU
RIP NEATH
TENSE CALF
MOSS MOM
POOH THOUGH
THFE JILT
FAD TENT
POP YAWL
NODE NOOSE
GIN FEEL
BEND NAB
SHAW BON
JUICE THOLE
PERK FIN
RAY PEG
ROT GNAW
COAT THUP
MIT BEET
DEN CHAD
JAWS JOT
NOON BOWL
KEY DILL
RAP NED

PAGE 3

GOR COOT
TAUNT BOND
MOOT HOAN
CHEAT BILL
JAB GUEST
TOT THOUGHT
ROAST COOF
RILL NEAP
SAID FAST
GNAW KNOCK
CHOOSE THOSE
KEEP SING
RANK NET
DOT CAUGHT
NOSE NUDE
DINT PEEN
DECK MAD
THONG BOX
CHEW GO
WEFD BIO
SAG WREN
ROB NOURHT
FOAL SUE
NIP DEED
PENCE DAN
SAW CHOP
TOOL FORE
YIELD FIT
RAT NEST

PAGE 4

TEST PAN
VAULT CHOCK
DUES DOTE
VEE THICK
THANK CHAIR
MAD BONG
SHOW RUE
NIP WREATH
DENSE GAFF
BOSS BOMB
POD DOUGH
ZEE GILT
THAD PENT
HOP WALL
RODE ROOSE
CHTN VEAL
MEND DAB
CHAW VON
GOOSE SOLE
TEAK THIN
GAT KEG
NOT RAW
GOAT DUNE
BIT MEET
THEN SHAD
GAUZE GOT
MOON DOLE
TEA GILL
NAP RED

Appendix B

Diagnostic Rhyme Test
Scoring Software
and
Sample Printout
CSP-30 Implementation

PRECEDING PAGE BLANK-NOT FILMED

DIAGNOSTIC RHYME TEST SCORING PROGRAM
WITH CARTRIDGE OUTPUT

CSP-30 IMPLEMENTATION

5 MAR 76

FOR INFORMATION CONCERNING THIS PROGRAM CONTACT:

CAPTAIN STEVEN MEISTER
ESD/MCE
HANSCOM AFB, MA 01731

TELEPHONE:
COMM. (617) 861-4433
AUTOVON 478-4433

WRITTEN BY STEVEN MEISTER, ESD/DCWL, HANSCOM AFB, MA 01731

NUMSUB = NUMBER OF SUBFEATURES CORRECT EACH LISTENER
NUMT = NUMBER OF MAIN FEATURES CORRECT EACH LISTENER
NUML = NUMBER OF LISTENERS
NUMS = NUMBER OF SPEAKERS
LIST = CURRENT LISTENER
ISPKR = CURRENT SPEAKER
IKEY = CURRENT KEY NUMBER
NKEY = CURRENT KEY INDEX NUMBER FOR KEY ARRAY
IPAGE = PAGE BEING SCORED
IFEAT = INDEX FOR MAIN FEATURE:
1 = VOICING
2 = NASALITY
3 = SUSTENTION
4 = SIBILATION
5 = GRAVENESS
6 = COMPACTNESS
7 = EXPERIMENTAL

FEATURE ARRAY KEY:

	PRESENT	ABSENT	
MAIN FEATURE	(L,1,1)	(L,2,1)	L = LISTENER NUMBER
SUB FEAT PRES	(L,1,2)	(L,2,2)	
SUB FEAT ABS	(L,1,3)	(L,2,3)	

FEAT(10,N,M) = MEAN FOR N,M
FEAT(20,N,M) = STANDARD ERROR FOR N,M
FEAT(10,1,M) = MEAN FOR PRESENT + ABSENT STATE OF M
FEAT(10,2,M) = S.E. FOR PRESENT + ABSENT STATE OF M
TOT(1,1) = TOTAL FOR PRESENT STATE ALL FEATURES
TOT(2,1) = TOTAL FOR ABSENT STATE ALL FEATURES
TOT(3,1) = TOTAL FOR PRESENT + ABSENT ALL FEATURES
WHERE 1 = 1 FOR MEAN
 2 = 2 FOR S.E.

C
C
C
C
C
C
C
C
C
C

PAGE(I,J,K) AND NPAGE(I,J,K):
I = FEATURE
J = 1:PRESENT 2:ABSENT
K = 1:MAIN 2:SUB PRES 3:SUB ABS

DIMENSION KEY(58,60),KEYSUB(58,2)
COMMON IRESP(2,29),VOIC(20,2,3),XNASAL(20,2,3),SUST(20,2,3),
1 SIBIL(20,2,3),GRAV(20,2,3),COMP(20,2,3),EXPER(20,2),TOT(3,2),
1 ISYSTE(58),NAME(12,24),NPAGE(7,2,3),PAGE(7,2,3)

C
C

102 A KEY

DATA KEY/0,0,1,1,0,1,1,0,1,0,1,1,0,1,4*0,
1 1,1,10*0,1,1,0,1,3*0,1,0,3*1,0*0,1,1,0,1,0,1,1,0,

C
C

102 B KEY

1 1,0,1,1,0,1,0,0,4*1,0,1,0,0,1,3*0,4*1,
1 0,1,0,1,1,0,1,0,0,1,1,0,0,1,0,1,1,3*0,1,3*0,1,1,3*0,4*1,0,

C
C

103 A KEY

1 7*1,3*0,4*1,0,1,1,0,1,0,1,0,0,4*1,0,0,
1 1,1,0,0,1,1,0,1,1,5*0,1,1,0,1,0,0,3*1,0,1,3*0,1,

C
C

103 B KEY

1 5*1,0,1,1,0,1,0,1,1,0,3*1,0,1,0,4*1,
1 4*0,1,1,0,1,1,0,0,1,0,0,1,5*0,1,0,1,0,1,0,0,3*1,0,0,

C
C

104 A KEY

1 4*0,1,0,1,0,1,1,0,1,3*0,1,1,0,1,1,0,0,
1 1,0,0,1,0,0,1,0,1,1,3*0,1,1,0,1,3*0,3*1,0,0,1,0,5*1,3*0,1,

C
C

104 B KEY

1 5*1,4*0,3*1,0,0,1,1,0,1,0,4*1,0,0,1,1,
1 0,0,3*1,0,1,0,4*1,0,1,1,0,1,0,1,0,0,1,5*0,1,0,1,0,

C
C

105 A KEY

1 0,3*1,0,0,3*1,0,1,1,0,0,1,1,0,0,1,0,1,
1 0,1,0,1,1,0,0,1,0,0,1,1,0,0,1,1,0,10*1,5*0,5*1,

C
C

105 B KEY

1 0,1,0,4*1,0,1,3*0,3*1,3*0,1,0,1,1,0,1,
1 0,1,0,1,0,1,1,0,1,1,0,1,0,0,1,4*0,3*1,0,1,1,0*0,

C
C

106 A KEY

1 0,3*1,0,0,1,0,1,0,0,1,0,1,0,0,1,0,1,0,0,3*1,0,
1 0,0,4*1,0,1,0,1,0,1,0*0,3*1,0,1,0,0,3*1,0,

C
C

106 B KEY

1 3*1,0,1,0,0,11*1,5*0,1,3*0,1,1,
1 1,0,1,1,0,1,0,1,0,1,0,1,1,0,1,3*0,1,0,1,1,4*0,1,0,0,

C
C

107 A KEY

1 0,1,0,0,1,1,4*0,1,0,0,1,1,4*0,1,0,1,0,0,1,0,3*1,
1 0,0,3*1,0,0,1,1,0,0,1,0,4*1,0,3*1,0,0,1,1,0,0,1,1,

C
C

107 B KEY

1 1,0,1,0,1,1,0,1,1,0,0,1,0,1,0,4*1,0,1,1,0,1,1,0,1,
1 0,0,1,0,1,0,1,1,0,1,0,0,1,0,1,0,0,5*1,0,1,0,0,3*1,

C
C

108 A KEY

1 1,3*0,3*1,0,1,4*0,1,0,1,0,0,1,1,0,0,1,1,0,3*1,0,
 1 3*1,3*0,5*1,0,1,1,0,1,0,0,1,0,1,4*0,4*1,
 C
 C 100 B KEY
 1 0,0,1,1,3*0,3*1,0,0,1,1,3*0,5*1,0,1,0,0,3*1,
 1 0,0,3*1,5*0,1,0,1,1,0,0,3*1,0,3*1,0,0,1,1,0,1,
 C
 C 111 A KEY
 1 1,1,0,0,3*1,3*0,3*1,3*0,1,0,1,0,0,1,
 1 3*0,3*1,0,0,6*1,0,1,0,1,1,3*0,4*1,0,0,3*1,0,0,1,0,1,
 C
 C 111 B KEY
 1 0,0,3*1,3*0,1,0,1,0,1,1,4*0,1,1,0,1,0,
 1 3*1,0,3*1,0,1,0,1,7*0,1,1,0,1,1,3*0,1,0,0,1,0,1,1,
 C
 C 112 A KEY
 1 1,3*0,1,1,3*0,3*1,0,1,1,0*0,1,5*0,1,0,
 1 0,1,0,0,1,5*0,1,1,0,1,0,1,0,0,1,0,1,4*0,4*1,
 C
 C 112 B KEY
 1 0,4*1,0,1,0,0,1,0,0,1,0,4*1,3*0,1,3*0,4*1,
 1 4*0,1,0,4*1,0,0,1,1,3*0,1,1,3*0,1,1,0,1,1,0,1,
 C
 C 113 A KEY
 1 3*0,6*1,0,0,1,1,0,3*1,0,0,3*1,0,1,0,1,
 1 0,0,1,1,0,3*1,0,1,0,0,3*1,0,1,0,1,1,0,4*1,3*0,1,0,1,1,
 C
 C 113 B KEY
 1 1,0,1,1,0,0,1,0,1,1,0,1,1,0,1,0,4*1,
 1 0,1,0,1,0,1,0,0*1,0,1,0,1,6*0,1,0,3*1,0,1,4*0,1,
 C
 C 115 A KEY
 1 1,0,1,1,0,5*1,0,0,1,1,0,0,1,0,1,1,0,1,0,3*1,3*0,
 1 0,1,0,1,3*0,4*1,0,4*1,0,0,1,0,0,1,3*0,1,0,1,1,
 C
 C 115 B KEY
 1 4*0,1,4*0,3*1,3*0,1,1,4*0,1,0,3*1,3*0,
 1 1,1,0,0,4*1,4*0,3*1,0,1,0,3*1,0,3*1,0,3*1,
 C
 C 116 A KEY
 1 0,4*1,0,1,0,1,0,0,1,0,0,1,0,1,3*0,1,0,0,1,0,1,1,0,1,
 1 0,1,1,3*0,4*1,0,5*1,6*0,1,0,4*1,0,
 C
 C 116 B KEY
 1 3*1,0,0,3*1,5*0,1,3*0,1,0,1,0,1,0,1,1,0,0,1,0,
 1 0,0,3*1,0,0,3*1,0,0,1,0,0,1,0,1,0,1,0,0,1,0,1,0,3*1,
 C
 C 301 A KEY
 1 0,0,1,1,1,0,0,0,1,0,0,1,0,0,0,1,1,0,1,0,1,0,0,1,1,0,0,
 1 1,0,0,1,1,0,0,0,1,0,1,1,1,0,0,0,0,1,1,1,0,0,0,1,1,1,1,
 C
 C 301 B KEY
 1 0,0,1,1,1,0,1,1,0,0,0,1,0,1,1,1,1,0,1,0,0,0,0,0,1,1,1,
 1 1,1,1,0,1,1,0,0,1,0,1,1,0,0,0,1,0,1,0,1,0,0,1,0,1,0,1,
 C
 C 302 A KEY
 1 0,1,0,1,0,0,1,0,1,1,1,1,0,0,1,1,1,0,0,1,0,1,0,0,1,0,1,1,
 1 0,0,0,0,1,0,0,0,1,1,1,0,1,0,0,0,1,1,0,0,1,0,0,1,0,0,1,1,
 C
 C 302 B KEY
 1 0,0,1,1,0,0,0,1,0,1,1,1,0,0,0,0,1,1,1,0,1,0,0,0,1,0,0,1,0,
 1 0,1,1,0,0,0,1,0,1,0,0,0,0,0,1,0,1,1,0,1,0,0,0,0,1,1,1,0,1,
 C
 C 303 A KEY

1 0,0,1,0,0,1,1,0,0,1,0,0,1,0,1,1,0,0,1,0,0,0,1,1,1,1,0,0,1,
 1 1,0,1,1,1,0,1,1,1,1,0,1,1,0,0,0,0,1,0,0,1,0,1,1,0,0,1,1,
 C
 C 303 B KEY
 1 0,1,1,1,1,0,1,1,0,0,1,0,0,1,1,1,0,0,0,0,1,0,0,0,1,0,1,0,
 1 0,0,1,0,1,0,0,1,0,0,1,0,1,1,0,0,1,0,0,0,1,0,0,0,1,0,0,0,
 C
 C 304 A KEY
 1 0,1,1,1,1,1,1,1,0,1,1,0,0,1,1,1,1,0,1,1,0,1,1,0,0,0,0,0,
 1 0,1,0,1,0,1,1,1,1,1,1,1,1,1,0,0,1,0,1,0,1,1,1,0,0,0,0,1,0,
 C
 C 304 B KEY
 1 1,1,0,1,1,0,0,0,1,0,0,0,1,1,1,1,1,0,1,0,1,1,0,1,1,1,1,1,1,
 1 0,1,1,0,0,0,0,1,1,0,0,1,1,0,1,0,1,0,0,0,0,0,0,0,0,0,0,0,1,0,
 C
 C 305 A KEY
 1 0,1,0,0,1,0,1,0,1,1,0,1,1,1,1,0,0,1,0,1,1,0,1,1,1,1,0,0,0,
 1 0,0,1,0,0,0,1,1,1,0,1,0,1,1,1,1,1,0,0,0,0,1,1,0,1,0,0,1,1,
 C
 C 305 B KEY
 1 1,1,0,1,0,0,0,1,1,1,1,1,1,0,0,0,1,1,0,1,1,1,1,1,0,1,1,1,0,
 1 1,0,1,0,1,0,1,1,1,0,1,0,0,1,0,0,1,0,0,1,0,1,0,0,1,1,1,0,1,
 C
 C 306 A KEY
 1 1,1,0,1,1,1,1,0,1,1,1,0,1,1,0,1,1,1,0,1,1,0,0,0,1,0,1,1,0,
 1 0,0,0,1,1,1,1,1,0,0,0,0,1,0,0,0,0,0,0,1,0,0,0,1,1,0,1,1,1,
 C
 C 306 B KEY
 1 0,1,0,1,0,1,1,0,1,0,1,1,0,1,1,1,0,0,0,1,0,1,1,0,1,0,1,0,1,
 1 0,1,0,1,0,1,1,0,1,1,1,0,0,1,0,1,1,0,1,1,1,0,1,0,1,1,1,1,1,
 C
 C 307 A KEY
 1 1,1,1,0,0,0,1,1,1,0,0,1,1,0,0,1,1,1,1,0,0,0,1,1,1,1,0,1,1,
 1 0,1,0,0,0,1,0,1,0,1,1,1,0,0,0,1,1,1,1,1,0,1,0,1,0,1,1,0,0,
 C
 C 307 B KEY
 1 1,0,1,1,1,0,1,0,1,1,1,1,1,1,0,0,1,0,0,0,1,1,0,1,1,0,0,1,1,
 1 1,1,1,0,0,0,1,1,0,1,0,1,1,1,1,1,0,1,1,1,0,0,1,0,0,1,0,1,0,
 C
 C 308 A KEY
 1 1,0,1,0,1,0,1,0,1,1,0,0,1,1,0,1,1,0,0,1,1,1,0,0,0,0,0,0,0,
 1 0,1,1,1,0,0,1,0,0,1,1,1,1,1,0,1,0,0,1,0,0,1,1,0,1,1,0,0,1,
 C
 C 308 B KEY
 1 1,1,1,1,1,1,0,1,0,0,1,0,0,1,0,1,1,1,1,1,0,1,0,0,1,1,0,1,0,
 1 0,0,0,0,0,0,0,0,1,0,0,1,1,0,1,0,1,0,0,0,1,0,0,1,0,0,0,0,0,
 C
 C 309 A KEY
 1 1,1,0,0,1,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,1,0,0,1,1,0,
 1 0,0,1,0,0,0,1,1,0,0,0,1,0,0,1,1,1,0,0,0,1,0,0,0,0,0,1,1,0,
 C
 C 309 B KEY
 1 0,1,1,1,0,0,1,0,0,0,0,0,0,0,0,1,0,0,1,0,0,1,0,1,1,0,1,0,0,
 1 1,0,1,0,0,1,1,0,1,1,1,0,1,1,0,1,1,0,1,0,1,1,0,1,1,0,0,0,0,
 C
 C 310 A KEY
 1 1,0,0,1,0,0,1,1,0,1,1,1,0,0,1,0,0,0,0,0,1,1,1,0,0,1,0,0,1,
 1 1,1,0,1,1,1,0,0,1,0,0,1,0,0,1,1,0,1,0,0,0,1,0,1,0,0,1,1,0,
 C
 C 310 B KEY
 1 1,0,0,1,0,1,1,0,0,0,1,1,1,1,0,0,1,0,0,1,0,0,0,1,1,1,1,1,1,
 1 0,0,1,1,0,1,1,1,1,1,0,1,0,0,0,1,1,0,0,0,0,0,1,0,0,1,1,0,1,
 C
 C 311 A KEY

1 1,0,1,1,1,1,1,0,1,0,0,0,1,0,0,1,1,0,0,1,0,1,0,0,1,1,1,1,1,
 1 0,0,0,1,0,1,0,0,1,1,0,1,0,0,0,0,0,0,0,0,0,0,0,0,1,1,1,0,0,
 C
 C 311 B KEY
 1 0,1,1,1,0,1,1,1,1,0,0,1,1,0,1,0,1,0,0,0,0,1,1,1,1,0,0,1,
 1 0,0,1,1,1,0,1,1,1,0,0,0,1,1,0,1,1,0,0,1,1,1,1,0,1,0,0,1,1,
 C
 C 312 A KEY
 1 1,1,1,0,0,0,0,1,1,1,1,0,0,0,1,0,0,0,1,1,0,1,1,1,0,0,0,1,1,
 1 1,1,1,0,0,0,1,1,0,1,0,0,1,0,0,0,1,0,0,1,1,1,1,1,1,0,0,1,0,
 C
 C 312 B KEY
 1 0,1,1,0,0,0,1,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,0,1,0,
 1 0,0,0,0,1,1,0,1,1,0,1,0,0,0,1,1,0,1,1,1,0,1,0,0,0,1,0,1,0,
 C
 C 313 A KEY
 1 0,0,0,1,0,1,0,1,0,0,1,1,1,1,0,1,0,1,0,1,0,1,0,0,0,1,1,
 1 0,1,1,1,0,1,0,1,0,0,1,0,0,0,0,0,1,0,1,1,1,0,0,0,1,1,1,0,
 C
 C 313 B
 1 1,0,0,1,0,0,0,1,1,0,1,0,0,0,1,0,1,0,0,0,1,0,1,1,0,0,1,0,0,
 1 1,0,0,0,0,1,0,0,0,0,1,0,0,0,1,1,0,0,0,1,0,0,0,1,1,1,1,1,0,
 C
 C 314 A KEY
 1 0,0,0,0,1,1,1,0,0,1,0,0,1,0,0,0,0,0,0,1,1,0,1,0,0,0,1,0,1,
 1 1,1,0,0,0,1,1,0,0,1,1,1,0,0,1,0,0,0,0,1,0,1,0,1,0,0,0,0,1,
 C
 C 314 B KEY
 1 1,0,0,0,1,0,0,0,1,1,1,0,0,1,0,0,0,0,1,0,0,1,0,0,1,1,1,1,1,
 1 0,1,1,1,0,0,1,1,1,1,0,1,0,1,1,1,0,1,1,1,1,0,1,1,0,0,0,0,1,
 C
 C 315 A KEY
 1 1,0,0,1,0,1,1,0,0,1,0,1,1,0,0,1,0,0,1,1,1,0,1,1,0,0,1,0,1,
 1 1,0,0,1,1,0,1,0,0,1,1,1,1,1,1,1,1,1,0,0,1,0,0,1,0,1,1,0,0,0,
 C
 C 315 B KEY
 1 1,1,1,0,0,0,1,1,1,1,0,0,0,1,1,0,0,1,1,0,0,1,0,1,1,1,1,1,1,
 1 0,1,1,1,1,0,0,1,1,0,0,0,0,1,0,0,1,0,0,0,1,0,0,0,1,0,1,0,0,0,1,
 C
 C 316 A KEY
 1 1,1,1,0,0,1,1,1,0,0,0,1,1,1,1,1,1,0,0,1,1,0,1,1,0,0,0,0,1,
 1 0,1,1,1,0,0,1,0,0,1,1,0,0,1,0,1,1,0,0,1,1,1,0,0,0,1,1,1,0,0,1,0,
 C
 C 316 B KEY
 1 0,1,0,1,1,1,1,1,0,0,0,1,0,0,1,0,0,1,0,1,1,0,0,1,1,1,0,0,1,
 1 0,0,1,0,0,1,1,0,1,0,1,0,1,1,1,1,1,1,1,1,0,0,0,0,0,0,1,1,0,1,
 C
 C 317 A KEY
 1 0,0,0,1,1,1,1,0,0,0,0,1,1,0,0,0,1,0,1,1,0,0,0,1,1,0,1,1,1,
 1 1,1,0,1,0,0,1,0,1,0,1,1,1,1,1,0,1,0,0,1,1,1,1,1,0,0,1,0,0,
 C
 C 317 B KEY
 1 0,1,0,1,0,1,1,0,1,1,0,0,1,0,1,1,0,1,0,1,1,1,1,0,1,1,1,1,0,
 1 0,0,0,0,0,1,1,0,0,0,0,1,0,0,1,1,1,0,0,0,1,1,1,0,1,0,0,1,1,
 C
 C 318 A KEY
 1 0,1,1,1,1,1,0,1,1,1,0,0,1,1,1,0,1,1,1,1,1,0,1,0,0,0,1,0,1,
 1 0,1,1,1,0,0,0,0,0,1,0,0,1,0,0,0,0,1,1,1,0,1,1,1,1,1,1,0,1,
 C
 C 318 B KEY
 1 1,0,1,0,1,0,0,1,0,1,0,0,1,0,1,1,0,1,1,1,0,0,0,1,0,1,0,1,0,
 1 1,1,1,0,0,0,1,1,0,1,1,1,0,1,1,0,1,0,0,1,0,0,0,0,0,0,0,1,0,1/
 C
 C SUB FEATURES KEY


```

DATA KEYSUB/0,0,1,0,1,0,3,1,3,0,1,1,5,0,1,0,1,1,4,0,1,3,0,3,1,
1 3,0,1,0,1,0,1,3,0,7,1,0,1,4,0,1,1,0,1,0,1,3,0,1,0,1,1,3,0,1,1,
1 0,1,0,1,1,0,4,1,3,0,1,3,0,3,1,0,3,1,0,3,1,0,1,0,0,1,0,4,1/
CNCT(X,Y) = (2.*X/Y - 1.)*100.
SE(X,Y,Z) = SQRT((X/2-Y*Y)/Z)
DO 1 I=1,20
DO 1 J=1,2
EXPER(I,J)=0.
DO 1 K=1,3
VOIC(I,J,K)=0.
XNASAL(I,J,K)=0.
SUST(I,J,K)=0.
SIBIL(I,J,K)=0.
GRAV(I,J,K)=0.
COMP(I,J,K)=0.
1 CONTINUE
DO 315 I=1,3
DO 315 J=1,2
315 TOT(I,J)=0.
02420,0116000,014
WRITE(6,270)
270 FORMAT(30X,'DIAGNOSTIC RHYME TEST'///)
WRITE(6,271)
271 FORMAT('LISTENER SUMMARIES')
02400,0116000,014
WRITE(5,100)
100 FORMAT('' DIAGNOSTIC RHYME TEST SCORING'///)
WRITE(5,000)
000 FORMAT('INSERT 150 FT CARTRIDGE IN UPPER DECKI/
1 '1/U RESET * CONTINUE'//)
PAUSE
WRITE(5,1000)
1000 FORMAT('SYSTEM UNDER TEST?'/I '1,50(1S'))
READ(5,1001)(ISYSTE(I),I=1,50)
1001 FORMAT(50A1)
WRITE(5,101)
101 FORMAT('HOW MANY LISTENERS?'/I LL')
READ(5,102)NUML
102 FORMAT(12)
WRITE(5,103)
103 FORMAT('/HOW MANY SPEAKERS?'/I SS')
READ(5,102)NUMS
NUMT = 16*NUMS
NUMSUB = 8*NUMS
WRITE(7,601)(ISYSTE(I),I=1,50),NUML,NUMS
601 FORMAT(50A1,2I3)
DO 200 LIST = 1,NUML
WRITE(6,3001)
WRITE(6,3000)(ISYSTE(I),I=1,50)
3000 FORMAT(50A1)
3001 FORMAT(' ')
WRITE(5,2000)LIST
2000 FORMAT('/LISTENER',I3,' NAME'/I '1,24(1N'))
READ(5,2001)(NAME(LIST,J),J=1,24)
2001 FORMAT(24A1)
WRITE(6,275)LIST,(NAME(LIST,J),J=1,24)
WRITE(7,2001)(NAME(LIST,J),J=1,24)
DO 010 ISPKR = 1,NUMS
DO 010 I=1,7
DO 010 J=1,2
DO 010 K=1,3
010 PAGE(I,J,K) = 0.0
10/ WRITE(5,104)LIST,ISPKR

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184  FORMAT(/'FOR LISTENER',I3,' SPEAKER',I3//
      1  'ENTER KEY NUMBER AND LETTER/' MNML)
      HEAD(5,100)IKEY,LETTER
185  FORMAT(I3,A1)
470  FORMAT(/6X,'*****',16X,'**/'IKEY = ',I3,A1,
      1  5X,'SPEAKER IS ',A2/6X,'*****',16X,'**/'IF OK ENTER 0'//)
476  FORMAT(I1)
      IF(IKEY,EQ,102)NKEY = 10MSPK#'BV'OGOTO 150
      IF(IKEY,EU,103)NKEY = 30MSPK#'BV'OGOTO 150
      IF(IKEY,EU,104)NKEY = 80MSPK#'RD'OGOTO 150
      IF(IKEY,EU,105)NKEY = 70MSPK#'RD'OGOTO 150
      IF(IKEY,EU,106)NKEY = 90MSPK#'BL'OGOTO 150
      IF(IKEY,EU,107)NKEY = 110MSPK#'CH'OGOTO 150
      IF(IKEY,EU,108)NKEY = 130MSPK#'CH'OGOTO 150
      IF(IKEY,EU,111)NKEY = 150MSPK#'JE'OGOTO 150
      IF(IKEY,EU,112)NKEY = 170MSPK#'SN'OGOTO 150
      IF(IKEY,EU,113)NKEY = 190MSPK#'JE'OGOTO 150
      IF(IKEY,EU,115)NKEY = 210MSPK#'SN'OGOTO 150
      IF(IKEY,EU,116)NKEY = 230MSPK#'BL'OGOTO 150
      IF(IKEY,GT,318)GOTO 151
      IF(IKEY,GT,300)NKEY = 25+2*(IKEY-301)*OGOTO 150
      GOTO 151
150  IF(LETTER,EQ,'B')NKEY = NKEY+1OGOTO 152
      IF(LETTER,EQ,'A')GOTO 152
151  WRITE(5,100)IKEY,LETTER
180  FORMAT(/'***** NO KEY',I4,A1,' *****'//)
      GOTO 107
152  CONTINUE
      IF(IKEY,LT,117)GOTO 700
      WRITE(5,701)
701  FORMAT(/'SPEAKER ?'/' SS)
      READ(5,702)MSPK
702  FORMAT(A2)
700  WRITE(5,475)IKEY,LETTER,MSPK
      READ(5,476)KEYCHK
      IF(KEYCHK,NE,0)GOTO 107
      WRITE(6,200)MSPK,IKEY,LETTER
200  FORMAT(21X,A2,7X,I3,A1)
      DO 110 IPAGE = 1,4
350  WRITE(5,100)IKEY,LETTER,LIST,IPAGE
100  FORMAT(/'FOR KEY',I4,A1,' LISTENER',I3,' PAGE',I2//
      1  'ENTER RESPONSE BY COLUMNS'//'; = FIRST WORD 2 = SECOND WORD'//
      1  ' RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR')
      DO 112 I=1,2
112  READ(5,111)(IRESP(I,J),J=1,20)
111  FORMAT(20I1)
      CALL CHECK(0350)
      DO 202 I=1,2
      DO 202 J=1,20
202  IRESP(I,J)=IRESP(I,J)+1
      DO 203 ICOL=1,2
      DO 204 IROW 42,20
C  ESTABLISH FEATURE BEING SCORED
      IF(IROW,LE,8)IFEAT=IROW+1
      ITEMP =IROW+1
      IFEAT=MOD(ITEMP,7)
      IF(IFEAT,EQ,0)IFEAT=7
C  ESTABLISH WHICH COLUMN PRESENT STATE OF FEATURE IS IN.
      IPRES=1
      IF(IPAGE,LE,2)IPRES=0
C  FIND KEY ELEMENT
      KEYEL=IROW
      IF(ICOL,EU,2)KEYEL=IROW+20
      INDEX = 2

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IF(IPAGE, EQ, 1) GOTO 200
IF(IPAGE, EQ, 3) GOTO 200
IF(KEY(KEYEL, NKEY), NE, IPRES) INDEX=1
GOTO 299
298 IF(KEY(KEYEL, NKEY), EQ, IPRES) INDEX=1
C INDEX =1 IMPLIES MAIN FEATURE PRESENT; 2 IMPLIES ABSENT,
C SCORE THE RESPONSE
299 ANSWER = 0.0
IF(IPAGE, EQ, 1) GOTO 295
IF(IPAGE, EQ, 3) GOTO 295
IF(KEY(KEYEL, NKEY), NE, IRESP(ICOL, IROW)) ANSWER=1.0
GOTO 296
295 IF(KEY(KEYEL, NKEY), EQ, IRESP(ICOL, IROW)) ANSWER=1.0
296 CONTINUE
IF(IFEAT, EQ, 7) GOTO 257
ISUBP=2
NSUBP=2
IF(IPAGE, EQ, 1) ISUBP=1
IF(IPAGE, EQ, 3) ISUBP=1
IF(KEYSUB(KEYEL, ISUBP), EQ, 0) NSUBP=3
GOTO(251, 252, 253, 254, 255, 256), IFEAT
251 VOIC(LIST, INDEX, 1) = VOIC(LIST, INDEX, 1) + ANSWER
VOIC(LIST, INDEX, NSUBP) = VOIC(LIST, INDEX, NSUBP) + ANSWER
PAGE(1, INDEX, 1) = PAGE(1, INDEX, 1) + ANSWER
PAGE(1, INDEX, NSUBP) = PAGE(1, INDEX, NSUBP) + ANSWER
GOTO 260
252 XNASAL(LIST, INDEX, 1) = XNASAL(LIST, INDEX, 1) + ANSWER
XNASAL(LIST, INDEX, NSUBP) = XNASAL(LIST, INDEX, NSUBP) + ANSWER
PAGE(2, INDEX, 1) = PAGE(2, INDEX, 1) + ANSWER
PAGE(2, INDEX, NSUBP) = PAGE(2, INDEX, NSUBP) + ANSWER
GOTO 260
253 SUST(LIST, INDEX, 1) = SUST(LIST, INDEX, 1) + ANSWER
SUST(LIST, INDEX, NSUBP) = SUST(LIST, INDEX, NSUBP) + ANSWER
PAGE(3, INDEX, 1) = PAGE(3, INDEX, 1) + ANSWER
PAGE(3, INDEX, NSUBP) = PAGE(3, INDEX, NSUBP) + ANSWER
GOTO 260
254 SIBIL(LIST, INDEX, 1) = SIBIL(LIST, INDEX, 1) + ANSWER
SIBIL(LIST, INDEX, NSUBP) = SIBIL(LIST, INDEX, NSUBP) + ANSWER
PAGE(4, INDEX, 1) = PAGE(4, INDEX, 1) + ANSWER
PAGE(4, INDEX, NSUBP) = PAGE(4, INDEX, NSUBP) + ANSWER
GOTO 260
255 GRAY(LIST, INDEX, 1) = GRAY(LIST, INDEX, 1) + ANSWER
GRAY(LIST, INDEX, NSUBP) = GRAY(LIST, INDEX, NSUBP) + ANSWER
PAGE(5, INDEX, 1) = PAGE(5, INDEX, 1) + ANSWER
PAGE(5, INDEX, NSUBP) = PAGE(5, INDEX, NSUBP) + ANSWER
GOTO 260
256 COMP(LIST, INDEX, 1) = COMP(LIST, INDEX, 1) + ANSWER
COMP(LIST, INDEX, NSUBP) = COMP(LIST, INDEX, NSUBP) + ANSWER
PAGE(6, INDEX, 1) = PAGE(6, INDEX, 1) + ANSWER
PAGE(6, INDEX, NSUBP) = PAGE(6, INDEX, NSUBP) + ANSWER
GOTO 260
257 EXPER(LIST, INDEX) = EXPER(LIST, INDEX) + ANSWER
PAGE(7, INDEX, 1) = PAGE(7, INDEX, 1) + ANSWER
260 CONTINUE
204 CONTINUE
203 CONTINUE
110 CONTINUE
DO 611 I=1,7
DO 611 J=1,2
DO 611 K=1,3
611 NPAGE(I, J, K) = IFIX(PAGE(I, J, K) * .5)
WRITE(7, 675) MSPK
675 FORMAT(A2)
WRITE(7, 612) (((NPAGE(I, J, K), I=1,7), J=1,2), K=1,3)

```

```

012   FORMAT(I3)
201   CONTINUE
      IPASS = 1
276   FORMAT(/5X,'LISTENER',I3,' SPEAKER',3X,' KEY',5X,24A1)
      WRITE(6,201)
291   FORMAT(/5X,'NUMBER OF CORRECT RESPONSES',I//)
303   WRITE(6,276)
276   FORMAT(10X,'MAIN ATTRIBUTE:',10X,'PRESENT',7X,'ABSENT'//)
      WRITE(6,277) (VOIC(LIST,I,1),I=1,2)
277   FORMAT(15X,'VOICING',20X,F7,2,6X,F7,2)
      WRITE(6,278) (VOIC(LIST,I,2),I=1,2)
278   FORMAT(20X,'FRICTIONAL',13X,F7,2,6X,F7,2)
      WRITE(6,279) (VOIC(LIST,I,3),I=1,2)
279   FORMAT(20X,'NON-FRICTIONAL',9X,F7,2,6X,F7,2//)
      WRITE(6,280) (XNASAL(LIST,I,1),I=1,2)
280   FORMAT(15X,'NASALITY',10X,F7,2,6X,F7,2)
      WRITE(6,281) (XNASAL(LIST,I,2),I=1,2)
281   FORMAT(20X,'GRAVE',10X,F7,2,6X,F7,2)
      WRITE(6,282) (XNASAL(LIST,I,3),I=1,2)
282   FORMAT(20X,'ACUTE',10X,F7,2,6X,F7,2//)
      WRITE(6,283) (SUST(LIST,I,1),I=1,2)
283   FORMAT(15X,'SUSTENTION',17X,F7,2,6X,F7,2)
      WRITE(6,284) (SUST(LIST,I,2),I=1,2)
284   FORMAT(20X,'VOICED',17X,F7,2,6X,F7,2)
      WRITE(6,285) (SUST(LIST,I,3),I=1,2)
285   FORMAT(20X,'UNVOICED',15X,F7,2,6X,F7,2//)
      WRITE(6,286) (SIBIL(LIST,I,1),I=1,2)
286   FORMAT(15X,'SIBILATION',17X,F7,2,6X,F7,2)
      WRITE(6,284) (SIBIL(LIST,I,2),I=1,2)
      WRITE(6,285) (SIBIL(LIST,I,3),I=1,2)
287   FORMAT(15X,'GRAVENESS',10X,F7,2,6X,F7,2)
      WRITE(6,284) (GRAV(LIST,I,2),I=1,2)
      WRITE(6,285) (GRAV(LIST,I,3),I=1,2)
      WRITE(6,286) (COMP(LIST,I,1),I=1,2)
288   FORMAT(15X,'COMPACTNESS',16X,F7,2,6X,F7,2)
      WRITE(6,284) (COMP(LIST,I,2),I=1,2)
      WRITE(6,285) (COMP(LIST,I,3),I=1,2)
      IF (IPASS.EQ.2) GOTO 304
      02420,0116000,014
200   CONTINUE
      X=FLOAT(NUMT)
      Y=FLOAT(NUMSUB)
      DO 300 L=1,NUML
      DO 300 I=1,2
      DO 300 J=1,3
      Z=0
      IF (J.GT.1) Z=0
      W=VOIC(L,I,J)
      VOIC(L,I,J)=CRCT(W,Z)
      W=SUST(L,I,J)
      SUST(L,I,J)=CRCT(W,Z)
      W=GRAV(L,I,J)
      GRAV(L,I,J)=CRCT(W,Z)
      W=COMP(L,I,J)
      COMP(L,I,J)=CRCT(W,Z)
      W=XNASAL(L,I,J)
      XNASAL(L,I,J)=CRCT(W,Z)
      W=SIBIL(L,I,J)
      SIBIL(L,I,J)=CRCT(W,Z)
300   CONTINUE
      IPASS=2
      DO 301 LIST=1,NUML

```

```

1      R2420,0110000,014
      WRITE(6,3001)
      WRITE(6,3000)(ISYSY(I),I=1,50)
      WRITE(6,302)LIST,(NAME(LIST,J),J=1,24)
302    FORMAT('LISTENER',I3,' PERCENT CORRECT WITH GUESSING',
1      ' TRANSFORMATION'/24A1//)
      GOTO 303
304    CONTINUE
301    CONTINUE
      DO 310 I=10,20
      M=1
      IF(I.EQ.20)M=2
      Z=FLOAT(NUML)
      IF(I.EQ.20)Z=1.0
      DO 310 J=1,2
      DO 310 K=1,3
      DO 310 L=1,NUML
      VOIC(I,J,K)=VOIC(I,J,K)+VOIC(L,J,K)*M/Z
      XNASAL(I,J,K)=XNASAL(I,J,K)+XNASAL(L,J,K)*M/Z
      SUST(I,J,K)=SUST(I,J,K)+SUST(L,J,K)*M/Z
      SIBIL(I,J,K)=SIBIL(I,J,K)+SIBIL(L,J,K)*M/Z
      GRAY(I,J,K)=GRAY(I,J,K)+GRAY(L,J,K)*M/Z
      COMP(I,J,K)=COMP(I,J,K)+COMP(L,J,K)*M/Z
310    CONTINUE
      Z=FLOAT(NUML)
      DO 312 J=1,2
      DO 312 K=1,3
      X=VOIC(20,J,K)
      Y=VOIC(10,J,K)
      VOIC(20,J,K)=SE(X,Y,Z)
      X=XNASAL(20,J,K)
      Y=XNASAL(10,J,K)
      XNASAL(20,J,K)=SE(X,Y,Z)
      X=SUST(20,J,K)
      Y=SUST(10,J,K)
      SUST(20,J,K)=SE(X,Y,Z)
      X=SIBIL(20,J,K)
      Y=SIBIL(10,J,K)
      SIBIL(20,J,K)=SE(X,Y,Z)
      X=GRAY(20,J,K)
      Y=GRAY(10,J,K)
      GRAY(20,J,K)=SE(X,Y,Z)
      X=COMP(20,J,K)
      Y=COMP(10,J,K)
      COMP(20,J,K)=SE(X,Y,Z)
312    CONTINUE
      Z=FLOAT(2*NUML)
      DO 313 J=1,3
      DO 313 L=1,NUML
      DO 313 K=1,2
      VOIC(10,1,J)=VOIC(10,1,J)+VOIC(L,K,J)/Z
      XNASAL(10,1,J)=XNASAL(10,1,J)+XNASAL(L,K,J)/Z
      SUST(10,1,J)=SUST(10,1,J)+SUST(L,K,J)/Z
      SIBIL(10,1,J)=SIBIL(10,1,J)+SIBIL(L,K,J)/Z
      GRAY(10,1,J)=GRAY(10,1,J)+GRAY(L,K,J)/Z
      COMP(10,1,J)=COMP(10,1,J)+COMP(L,K,J)/Z
313    CONTINUE
      DO 420 K=1,3
      DO 420 L=1,NUML
      VOIC(10,2,K)=VOIC(10,2,K)+(VOIC(L,1,K)+VOIC(L,2,K))*2/4,
      XNASAL(10,2,K)=XNASAL(10,2,K)+(XNASAL(L,1,K)+XNASAL(L,2,K))*2/4,
      SUST(10,2,K)=SUST(10,2,K)+(SUST(L,1,K)+SUST(L,2,K))*2/4,
      SIBIL(10,2,K)=SIBIL(10,2,K)+(SIBIL(L,1,K)+SIBIL(L,2,K))*2/4,
      GRAY(10,2,K)=GRAY(10,2,K)+(GRAY(L,1,K)+GRAY(L,2,K))*2/4,

```

```

420  COMP(10,2,K)=COMP(10,2,K)+(COMP(L,1,K)+COMP(L,2,K))*2/4.
      Z=FLOAT(NUML)
      DO 311 K=1,3
      X=VOIC(10,2,K)
      Y=VOIC(10,1,K)
      VOIC(10,2,K)=SE(X,Y,Z)
      X=XNASAL(10,2,K)
      Y=XNASAL(10,1,K)
      XNASAL(10,2,K)=SE(X,Y,Z)
      X=SUST(10,2,K)
      Y=SUST(10,1,K)
      SUST(10,2,K)=SE(X,Y,Z)
      X=SIBIL(10,2,K)
      Y=SIBIL(10,1,K)
      SIBIL(10,2,K)=SE(X,Y,Z)
      X=GRAY(10,2,K)
      Y=GRAY(10,1,K)
      GRAY(10,2,K)=SE(X,Y,Z)
      X=COMP(10,2,K)
      Y=COMP(10,1,K)
      COMP(10,2,K)=SE(X,Y,Z)
311  CONTINUE
      DO 316 L=1,NUML
      DO 316 J=1,2
      DO 316 K=1,2
      Z=FLOAT(6*NUML)
      IF(K,EQ,2)Z=1.0
      SUM=VOIC(L,J,1)
      SUM=SUM+XNASAL(L,J,1)
      SUM=SUM+SUST(L,J,1)
      SUM=SUM+SIBIL(L,J,1)
      SUM=SUM+GRAY(L,J,1)
      SUM=SUM+COMP(L,J,1)
      IF(K,EQ,2)SUM=SUM/6.0
      TOT(J,K)=SUM*K/Z +TOT(J,K)
316  CONTINUE
      DO 800 III=1,2
      TOT(3,1)=0.0
      TOT(3,2)=0.0
      N2420,0110000,014
      WRITE(6,400)NUML
      WRITE(6,401)(ISYSTE(I),I=1,50)
      WRITE(6,402)NUMS
      WRITE(6,551)
801  FORMAT('LISTENER MEAN DRT')
      DO 401 L=1,NUML
      SUM=0.0
      DO 502 J=1,2
      SUM = SUM + VOIC(L,J,1)
      SUM = SUM + XNASAL(L,J,1)
      SUM = SUM + SUST(L,J,1)
      SUM = SUM + SIBIL(L,J,1)
      SUM = SUM + GRAY(L,J,1)
      SUM = SUM + COMP(L,J,1)
502  CONTINUE
      XSUM = SUM/12.0
      WRITE(6,550)L,XSUM,(NAME(L,J),J=1,24)
800  FORMAT(I0,F11.2,3X,24A1)
      TOT(3,1) = TOT(3,1) + SUM/FLOAT(NUML)/12.0
      TOT(3,2) =TOT(3,2)+(SUM/12.0)**2
401  CONTINUE
      Z = FLOAT(NUML)
      X=TOT(3,2)

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```

Y = TOT(3,1)
TUT(3,2) = SE(X,Y,Z)
DO 317 J=1,2
Z=FLOAT(NUML)
X=TOT(J,2)
Y=TOT(J,1)
TUT(J,2)=SE(X,Y,Z)
317 CONTINUE
400 FORMAT('DRT MEANS AND STANDARD ERRORS FOR',I3,' LISTENERS')
401 FORMAT('SYSTEM UNDER TEST' 1,80A1/)
402 FORMAT('NUMBER OF SPEAKERS =',I2/)
WRITE(6,403)
403 FORMAT('/MAIN ATTRIBUTE',12X,'PRESENT',10X,'ABSENT',
1 12X,'TOTAL'/)
WRITE(6,404)
404 FORMAT(20X,3(4X,'MEAN      S.E.  ')/)
WRITE(6,405)((VOIC(I,J,1),I=19,20),J=1,2),(VOIC(10,I,1),I=1,2)
405 FORMAT(3X,'VOICING',9X,3(3X,F6,2,2X,F6,2))
WRITE(6,406)((VOIC(I,J,2),I=19,20),J=1,2),(VOIC(10,I,2),I=1,2)
406 FORMAT(6X,'FRICTIONAL',4X,3(3X,F6,2,2X,F6,2))
WRITE(6,407)((VOIC(I,J,3),I=19,20),J=1,2),(VOIC(10,I,3),I=1,2)
407 FORMAT(6X,'NON-FRICTIONAL',3(3X,F6,2,2X,F6,2)/)
WRITE(6,408)((XNASAL(I,J,1),I=19,20),J=1,2),
1 (XNASAL(10,I,1),I=1,2)
408 FORMAT(3X,'NASALITY',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,409)((XNASAL(I,J,2),I=19,20),J=1,2),
1 (XNASAL(10,I,2),I=1,2)
409 FORMAT(6X,'GRAVE',9X,3(3X,F6,2,2X,F6,2))
WRITE(6,410)((XNASAL(I,J,3),I=19,20),J=1,2),
1 (XNASAL(10,I,3),I=1,2)
410 FORMAT(6X,'ACUTE',9X,3(3X,F6,2,2X,F6,2)/)
WRITE(6,411)((SUST(I,J,1),I=19,20),J=1,2),(SUST(10,I,1),I=1,2)
411 FORMAT(3X,'SUSTENTION',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,412)((SUST(I,J,2),I=19,20),J=1,2),(SUST(10,I,2),I=1,2)
412 FORMAT(6X,'VOICED',8X,3(3X,F6,2,2X,F6,2))
WRITE(6,413)((SUST(I,J,3),I=19,20),J=1,2),(SUST(10,I,3),I=1,2)
413 FORMAT(6X,'UNVOICED',6X,3(3X,F6,2,2X,F6,2)/)
WRITE(6,414)((SIBIL(I,J,1),I=19,20),J=1,2),(SIBIL(10,I,1),I=1,2)
414 FORMAT(3X,'SIBILATION',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,412)((SIBIL(I,J,2),I=19,20),J=1,2),(SIBIL(10,I,2),I=1,2)
WRITE(6,413)((SIBIL(I,J,3),I=19,20),J=1,2),(SIBIL(10,I,3),I=1,2)
WRITE(6,415)((GRAV(I,J,1),I=19,20),J=1,2),(GRAV(10,I,1),I=1,2)
415 FORMAT(3X,'GRAVENESS',7X,3(3X,F6,2,2X,F6,2))
WRITE(6,412)((GRAV(I,J,2),I=19,20),J=1,2),(GRAV(10,I,2),I=1,2)
WRITE(6,413)((GRAV(I,J,3),I=19,20),J=1,2),(GRAV(10,I,3),I=1,2)
WRITE(6,416)((COMP(I,J,1),I=19,20),J=1,2),(COMP(10,I,1),I=1,2)
416 FORMAT(3X,'COMPACTNESS',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,412)((COMP(I,J,2),I=19,20),J=1,2),(COMP(10,I,2),I=1,2)
WRITE(6,413)((COMP(I,J,3),I=19,20),J=1,2),(COMP(10,I,3),I=1,2)
WRITE(6,417)((TOT(I,J),J=1,2),I=1,3)
417 FORMAT(3X,'TOTALS',10X,3(3X,F6,2,2X,F6,2))
WRITE(6,400)TOT(3,J),J=1,2)
400 FORMAT('/30X,1'*****'/
1 30X,1' MEAN =',F6,2,1' 0'/
1 13X,1'TOTAL DRT SCORE =',10X,1'0'/
1 30X,1' S.E. =',F6,2,1' 0'/
1 30X,1'*****'/)
NUMTOT = 192*NUML*NUMS
WRITE(6,555)NUMTOT
555 FORMAT('/10X'TOTAL NUMBER OF TEST ITEMS =',I7)
600 CONTINUE
STOP
END

```

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SUBROUTINE CHECK(IOVER)

THIS SUBROUTINE CHECKS FOR CORRECT ENTRY OF DATA

```
DIMENSION LINE(31)
COMMON IRESP(2,20)
31 IPASS = 1
   N=1
   M=15
20 IF (IPASS, EQ, 2) N=160M*20
   M2400, M110000, M14
   WRITE(5, 21)
21 FORMAT(10X, '11', 10X, '12'//)
   DO 1 I=N, M
   DO 3 II = 1, 31
3   LINE(II) = ' '
   IF (IRESP(1, I), EQ, 2) GOTO 4
   L=5
   IF (IRESP(1, I), NE, 1) L=13
   DO 2 J=1, L
2   LINE(J) = 'X'
   GOTO 5
4   CONTINUE
   DO 6 J = 9, 13
6   LINE(J) = 'X'
5   CONTINUE
   IF (IRESP(2, I), EQ, 2) GOTO 8
   L=23
   IF (IRESP(2, I), NE, 1) L=31
   DO 7 J=19, L
7   LINE(J) = 'X'
   GOTO 9
8   CONTINUE
   DO 10 J=27, 31
10  LINE(J) = 'X'
9   CONTINUE
   WRITE(5, 11) I, (LINE(J), J=1, 31)
11  FORMAT(0X, 12, 5X, 31A1)
1   CONTINUE
   WRITE(5, 12)
12  FORMAT('/IF OK ENTER 0')
   READ(5, 13) IANS
13  FORMAT(I1)
   IF (IANS, EQ, 0) GOTO 14
30  WRITE(5, 15)
15  FORMAT('/ROW AND COLUMN TO CHANGE? ENTER 999 TO CHANGE ENTIRE',
1    ' PAGE'// ' RRC')
   READ(5, 16) IROW, ICOL
   IF (IROW, EQ, 99) RETURN IOVER
   IF (IROW, GT, 29) GOTO 30
   IF (IROW, LT, 1) GOTO 30
   IF (ICOL, GT, 2) GOTO 30
   IF (ICOL, LT, 1) GOTO 30
16  FORMAT(I2, I1)
   WRITE(5, 17)
17  FORMAT('/NEW ENTRY?'// ' R')
   READ(5, 13) IRESP(ICOL, IROW)
```



```
14      IF (IRUN,LE,15)GOTO 31  
        GOTO 29  
        IF (IPASS ,EQ,2)RETURN  
        IPASS = 2  
        GOTO 20  
        END
```

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DIAGNOSTIC RHYME TEST SCORING W/CARTRIDGE INPUT

CSP-30 IMPLEMENTATION

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```
COMMON ARRAY(60), ISYS(50), NAME(11,24), NPAGE(7,2,3),
1 DATA(11,7,36), MSPK(11,6)
DIMENSION SEND(6)
WRITE(5,50)
50 FORMAT(////20X,'ORT CARTRIDGE DATA CHECKOUT'//
1 'INSERT CARTRIDGE IN UPPER DECK '//
1 'I/O RESET = CONTINUE'//)
PAUSE
READ(7,75)(ISYS(I), I=1,50), NUML, NUMS
75 FORMAT(50A1,2I3)
1 FORMAT(50A1//'NUMBER LISTENERS =',I3/'NUMBER SPEAKERS =',I3//)
1 02420,0110900,014
DO 2 LIST = 1, NUML
READ(7,3)(NAME(LIST,I), I=1,24)
3 FORMAT(24A1)
DO 4 ISPK = 1, NUMS
WRITE(6,500)
500 FORMAT(' ')
WRITE(6,1)(ISYS(I), I=1,50), NUML, NUMS
READ(7,30)MSPK(LIST, ISPK)
30 FORMAT(A2)
READ(7,5)((NPAGE(I,J,K), I=1,7), J=1,2), K=1,3)
5 FORMAT(13)
WRITE(6,40)(NAME(LIST,I), I=1,24), MSPK(LIST, ISPK)
40 FORMAT(9X,20(1+1),10X,6(1+1),/
1 'LISTENER: ',24A1,' * SPEAKER: ',1X,A2,' *'/
1 9X,20(1+1),10X,6(1+1),//
1 'NUMBER OF INCORRECT RESPONSES: '//)
DO 20 I=1,6
DO 22 K=1,3
DO 41 J=1,2
L = 6*I+J+2*K-8
NTOT = 16
IF(K,NE,1)NTOT=8
61 TOT = FLOAT(NTOT)
DATA(LIST, ISPK, L) = (2,8*FLOAT(NPAGE(I,J,K))*TOT) = 100./TOT
NPAGE(I,J,K) = NTOT*NPAGE(I,J,K)
41 CONTINUE
22 CONTINUE
20 CONTINUE
WRITE(6,276)
WRITE(6,277)(NPAGE(1,J,1), J=1,2)
WRITE(6,278)(NPAGE(1,J,2), J=1,2)
```

```

WRITE(6,270)(NPAGE(1,J,3),J=1,2)
WRITE(6,280)(NPAGE(2,J,1),J=1,2)
WRITE(6,281)(NPAGE(2,J,2),J=1,2)
WRITE(6,282)(NPAGE(2,J,3),J=1,2)
WRITE(6,283)(NPAGE(3,J,1),J=1,2)
WRITE(6,284)(NPAGE(3,J,2),J=1,2)
WRITE(6,285)(NPAGE(3,J,3),J=1,2)
WRITE(6,286)(NPAGE(4,J,1),J=1,2)
WRITE(6,284)(NPAGE(4,J,2),J=1,2)
WRITE(6,285)(NPAGE(4,J,3),J=1,2)
WRITE(6,287)(NPAGE(5,J,1),J=1,2)
WRITE(6,284)(NPAGE(5,J,2),J=1,2)
WRITE(6,285)(NPAGE(5,J,3),J=1,2)
WRITE(6,288)(NPAGE(6,J,1),J=1,2)
WRITE(6,284)(NPAGE(6,J,2),J=1,2)
WRITE(6,285)(NPAGE(6,J,3),J=1,2)
21 02420,0110800,014
4  FORMAT(10X,15,5X,15)
2  CONTINUE
CONTINUE
DO 200 LIST=1,NUML
02420,0110800,014
WRITE(6,500)
WRITE(6,1)(ISYS(I),I=1,50),NUML,NUMS
WRITE(6,201)(NAME(LIST,I),I=1,24)
201  FORMAT(13X,27(' ')/'FOR LISTENER: ',24A1,' *1/
1  13X,27(' ')//
1  'SPKR SCORE'/)
DO 204 ISPKR=1,NUMS
SUM = 0.0
DO 202 I=1,31,6
J=I+1
202  SUM = SUM + DATA(LIST,ISPKR,I) + DATA(LIST,ISPKR,J)
SUM = SUM/12.0
WRITE(6,203)MSPK(LIST,ISPKR),SUM
203  FORMAT(1X,A2,1X,F7.2)
204  CONTINUE
WRITE(6,403)
WRITE(6,404)
DO 209 I=1,6
209  SEND(1)=0.0
DO 210 I=1,35,2
J=I+1
DO 211 K=1,NUMS
211  ARRAY(K)=DATA(LIST,K,I)
CALL STATS(NUMS,X,3)
SEND(1)=X
SEND(2)=S
DO 212 K=1,NUMS
212  ARRAY(K)=DATA(LIST,K,J)
CALL STATS(NUMS,X,3)
SEND(3)=X
SEND(4)=S
DO 213 K=1,NUMS
213  ARRAY(K)=(ARRAY(K)+DATA(LIST,K,I))/2.0
CALL STATS(NUMS,X,3)
SEND(5)=X
SEND(6)=S
210  CALL OUT(I,SEND)
CONTINUE
DO 215 K=1,NUMS
SUM = 0.0
DO 214 I=1,31,6
214  SUM = SUM + DATA(LIST,K,I)

```

```

215  ARRAY(K) = SUM/6.0
      CALL STATS(NUMS,X,S)
      SEND(1)=X
      SEND(2)=S
      DO 216 K=1,NUMS
        SUM = 0.0
217  SUM = SUM + DATA(LIST,K,I)
218  ARRAY(K) = SUM/6.0
      CALL STATS(NUMS,X,S)
      SEND(3) = X
      SEND(4) = S
      DO 219 K=1,NUMS
        SUM = 0.0
      DO 218 I=1,31,6
        J = I+1
219  SUM = SUM + DATA(LIST,K,I) + DATA(LIST,K,J)
219  ARRAY(K) = SUM/12.0
      CALL STATS(NUMS,X,S)
      SEND(5) = X
      SEND(6) = S
      CALL OUT(36,SEND)
      WRITE(6,400)X,S
200  CONTINUE
      DO 300 ISPKR = 1,NUMS
        N2420,0110000,014
        WRITE(6,500)
        WRITE(6,1)(ISYS(I),I=1,50),NUML,NUMS
        WRITE(6,301)MSPK(1,ISPKR)
301  FORMAT(12X,'*****'/FOR SPEAKER: 'A2',' '
1  12X,'*****'//LISTENER',10X,'SCORE'/)
      DO 304 LIST = 1,NUML
        SUM = 0.0
      DO 302 I=1,31,6
        J=I+1
302  SUM = SUM+DATA(LIST,ISPKR,I)+DATA(LIST,ISPKR,J)
        SUM = SUM/12.0
        WRITE(6,303)(NAME(LIST,L),L=1,24),SUM
303  FORMAT(24A1,F7.2)
304  CONTINUE
        WRITE(6,403)
        WRITE(6,404)
      DO 310 I=1,35,2
        J=I+1
      DO 311 K=1,NUML
311  ARRAY(K)=DATA(K,ISPKR,I)
        CALL STATS(NUML,X,S)
        SEND(1)=X
        SEND(2)=S
      DO 312 K=1,NUML
312  ARRAY(K)=DATA(K,ISPKR,J)
        CALL STATS(NUML,X,S)
        SEND(3)=X
        SEND(4)=S
      DO 313 K=1,NUML
313  ARRAY(K) = (ARRAY(K)+DATA(K,ISPKR,I))/2.0
        CALL STATS(NUML,X,S)
        SEND(5)=X
        SEND(6)=S
        CALL OUT(1,SEND)
310  CONTINUE
      DO 315 K=1,NUML
        SUM = 0.0
      DO 314 I=1,31,6

```

```

314 SUM = SUM + DATA(K,ISPKR,I)
315 ARRAY(K) = SUM/6,0
CALL STATS(NUML,X,S)
SEND(1)=X
SEND(2)=S
DO 316 K=1,NUML
SUM = 0,0
DO 317 I=2,32,6
317 SUM = SUM+DATA(K,ISPKR,I)
318 ARRAY(K) = SUM/6,0
CALL STATS(NUML,X,S)
SEND(3)=X
SEND(4)=S
DO 319 K=1,NUML
SUM = 0,0
DO 318 I=1,31,6
J=I+1
319 SUM = SUM+DATA(K,ISPKR,I)+DATA(K,ISPKR,J)
319 ARRAY(K) = SUM/12,0
CALL STATS(NUML,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(36,SEND)
WRITE(6,490)X,S
300 CONTINUE
0242H,0110000,014
WRITE(6,500)
WRITE(6,1) (ISYS(I),I=1,50),NUML,NUMS
WRITE(6,320)
320 FORMAT('COMBINED RESULTS - STANDARD ERRORS ACROSS ',
1 'SPEAKERS AND LISTENERS *****'//)
WRITE(6,403)
WRITE(6,404)
NUMT = NUML*NUMS
DO 321 L=1,35,2
J=I+1
DO 322 K=1,NUML
DO 322 L=1,NUMS
M=NUMS*(K-1)+L
322 ARRAY(M)=DATA(K,L,I)
CALL STATS(NUMT,X,S)
SEND(1)=X
SEND(2)=S
DO 323 K=1,NUML
DO 323 L=1,NUMS
M=NUMS*(K-1)+L
323 ARRAY(M)=DATA(K,L,J)
CALL STATS(NUMT,X,S)
SEND(3)=X
SEND(4)=S
DO 324 K=1,NUML
DO 324 L=1,NUMS
M=NUMS*(K-1)+L
SUM = DATA(K,L,1)+DATA(K,L,J)
324 ARRAY(M) = SUM/2,0
CALL STATS(NUMT,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(1,SEND)
321 CONTINUE
DO 325 K=1,NUML
DO 325 L=1,NUMS
M=NUMS*(K-1)+L

```

```

SUM = 0.0
DO 326 I=1,31,6
326 SUM = SUM+DATA(K,L,I)
325 ARRAY(M)=SUM/6.0
CALL STATS(NUMT,X,S)
SEND(1)=X
SEND(2)=S
DO 327 K=1,NUML
DO 327 L=1,NUMS
M=NUMS*(K-1)+L
SUM=0.0
DO 328 I=2,32,6
328 SUM = SUM + DATA(K,L,I)
327 ARRAY(M)=SUM/6.0
CALL STATS(NUMT,X,S)
SEND(J)=X
SEND(4)=S
DO 330 K=1,NUML
DO 330 L=1,NUMS
M=NUMS*(K-1)+L
SUM=0.0
DO 331 I=1,31,6
J=I+1
331 SUM = SUM+DATA(K,L,I)+DATA(K,L,J)
330 ARRAY(M)=SUM/12.0
CALL STATS(NUMT,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(36,SEND)
WRITE(6,490)X,S
02420,0110000,014
WRITE(6,500)
WRITE(6,1)(1SYS(I),I=1,50),NUML,NUMS
DO 70 I=1,NUML
DO 70 J=1,NUMS
WRITE(6,71)(DATA(I,J,K),K=1,36)
71 FORMAT(/(6(2X,F10.2)))
70 CONTINUE
STOP
276 FORMAT(10X,'MAIN ATTRIBUTE!',10X,'PRESENT',7X,'ABSENT'//)
277 FORMAT(15X,'VOICING',23X,12,11X,12)
278 FORMAT(20X,'FRICTIONAL',10X,12,11X,12)
279 FORMAT(20X,'NON-FRICTIONAL',12X,12,11X,12/)
280 FORMAT(15X,'NASALITY',22X,12,11X,12)
281 FORMAT(20X,'GRAVE',21X,12,11X,12)
282 FORMAT(20X,'ACUTE',21X,12,11X,12/)
283 FORMAT(15X,'SUSTENTION',20X,12,11X,12)
284 FORMAT(20X,'VOICED',20X,12,11X,12)
285 FORMAT(20X,'UNVOICED',10X,12,11X,12/)
286 FORMAT(15X,'SIBILATION',20X,12,11X,12)
287 FORMAT(15X,'GRAVENESS',21X,12,11X,12)
288 FORMAT(15X,'COMPACTNESS',19X,12,11X,12)
400 FORMAT('DRT MEANS AND STANDARD ERRORS FOR',13,' LISTENERS'//)
401 FORMAT('SYSTEM UNDER TEST: ',50A1//)
402 FORMAT('NUMBER OF SPEAKERS =',12//)
403 FORMAT(//'MAIN ATTRIBUTE!',12X,'PRESENT',10X,'ABSENT',
1 12X,'TOTAL'//)
404 FORMAT(20X,3(4X,'MEAN S,E, '))
405 FORMAT(/30X,'.....'/
1 30X,' MEAN = ',F6.2,' ')/
1 13X,'TOTAL DRT SCORES =',15X,' ')/
1 30X,' S,E, = ',F6.2,' ')/
1 30X,'.....')
END

```

C
C
C
C
C
C

SUBROUTINE STATS(N,XMEAN,STDERR)

```
COMMON ARRAY(60)
X=0.0
XN = FLUAT(N)
DO 1 I=1,N
X = X + ARRAY(I)
1 CONTINUE
XMEAN = X/XN
STDERR = 0.0
DO 2 I=1,N
2 STDERR = STDERR + (ARRAY(I)-XMEAN)*(ARRAY(I)-XMEAN)
STDERR = SQRT(STDERR/XN/XN)
RETURN
END
```

C
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C

```
SUBROUTINE OUT(N,X)
DIMENSION X(6)
IF(N.EQ.30)GOTO 19
K=(N+1)/2
IF(K.EQ.11)K=8
IF(K.EQ.14)K=8
IF(K.EQ.17)K=8
IF(K.EQ.12)K=9
IF(K.EQ.15)K=9
IF(K.EQ.18)K=9
IF(K.EQ.13)K=11
IF(K.EQ.16)K=12
GOTO(1,2,3,4,5,6,7,8,9,10,13,16),K
1 WRITE(6,405)(X(I),I=1,6)
RETURN
2 WRITE(6,406)(X(I),I=1,6)
RETURN
3 WRITE(6,407)(X(I),I=1,6)
RETURN
4 WRITE(6,408)(X(I),I=1,6)
RETURN
5 WRITE(6,409)(X(I),I=1,6)
RETURN
6 WRITE(6,410)(X(I),I=1,6)
RETURN
7 WRITE(6,411)(X(I),I=1,6)
RETURN
8 WRITE(6,412)(X(I),I=1,6)
RETURN
9 WRITE(6,413)(X(I),I=1,6)
RETURN
10 WRITE(6,414)(X(I),I=1,6)
RETURN
13 WRITE(6,415)(X(I),I=1,6)
```

```

RETURN
10 WRITE(6,416)(X(I),I=1,6)
RETURN
19 WRITE(6,417)(X(I),I=1,6)
RETURN
405 FORMAT(3X,'VOICING',9X,3(3X,F6.2,2X,F6.2))
406 FORMAT(6X,'FRICTIONAL',4X,3(3X,F6.2,2X,F6.2))
407 FORMAT(6X,'NON-FRICTIONAL',3(3X,F6.2,2X,F6.2)/)
408 FORMAT(3X,'NASALITY',8X,3(3X,F6.2,2X,F6.2))
409 FORMAT(6X,'GRAVE',9X,3(3X,F6.2,2X,F6.2))
410 FORMAT(6X,'ACUTE',9X,3(3X,F6.2,2X,F6.2)/)
411 FORMAT(3X,'SUSTENTION',6X,3(3X,F6.2,2X,F6.2))
412 FORMAT(6X,'VOICED',8X,3(3X,F6.2,2X,F6.2))
413 FORMAT(6X,'UNVOICED',6X,3(3X,F6.2,2X,F6.2)/)
414 FORMAT(3X,'SIBILATION',6X,3(3X,F6.2,2X,F6.2))
415 FORMAT(3X,'GRAVENESS',7X,3(3X,F6.2,2X,F6.2))
416 FORMAT(3X,'COMPACTNESS',5X,3(3X,F6.2,2X,F6.2))
417 FORMAT(3X,'TOTALS',10X,3(3X,F6.2,2X,F6.2))
END

```


DIAGNOSTIC RHYME TEST

LISTENER SUMMARIES:

SAMPLE TEST RUN

LISTENER 1 SPEAKER KEY DOE, JOHN
 BY 1028
 JE 113A

NUMBER OF CORRECT RESPONSES:

MAIN ATTRIBUTE	PRESENT	ABSENT
VOICING	32,00	29,00
FRICTIONAL	16,00	13,00
NON-FRICTIONAL	16,00	16,00
NASALITY	31,00	30,00
GRAVE	16,00	15,00
ACUTE	15,00	15,00
SUSTENTION	24,00	25,00
VOICED	13,00	11,00
UNVOICED	11,00	14,00
SIBILATION	31,00	31,00
VOICED	15,00	16,00
UNVOICED	16,00	15,00
GRAVNESS	25,00	29,00
VOICED	15,00	16,00
UNVOICED	09,99	13,00
COMPACTNESS	32,00	29,00
VOICED	16,00	14,99
UNVOICED	16,00	15,00

SAMPLE TEST RUN

LISTENER 2 SPEAKER KEY JONES, ROBERT
 BV 102B
 JE 113A

NUMBER OF CORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	32.00	30.00
FRICTIONAL	16.00	16.00
NON-FRICTIONAL	16.00	14.00
NASALITY	32.00	31.00
GRAVE	16.00	15.00
ACUTE	16.00	16.00
SUSTENTION	25.00	26.00
VOICED	11.00	12.00
UNVOICED	14.00	14.00
SIBILATION	26.00	32.00
VOICED	14.00	16.00
UNVOICED	14.00	16.00
GRAVENESS	31.00	29.00
VOICED	16.00	16.00
UNVOICED	16.00	13.00
COMPACTNESS	32.00	32.00
VOICED	16.00	16.00
UNVOICED	16.00	16.00

SAMPLE TEST RUN
 LISTENER 1 PERCENT CORRECT WITH GUESSING TRANSFORMATION
 DUE, JOHN

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	099,99	81,25
FRICTIONAL	099,99	82,50
NON-FRICTIONAL	099,99	099,99
NASALITY	93,75	87,80
GRAVE	099,99	87,50
ACUTE	87,50	87,50
SUSTENTION	50,00	56,25
VOICED	62,50	37,50
UNVOICED	37,50	75,00
SIBILATION	93,75	93,75
VOICED	87,50	099,99
UNVOICED	099,99	87,50
GRAVENESS	56,25	81,25
VOICED	87,50	099,99
UNVOICED	25,00	62,50
COMPACTNESS	099,99	81,25
VOICED	099,99	75,00
UNVOICED	099,99	87,50

SAMPLE TEST RUN
 LISTENER 2 PERCENT CORRECT WITH GUESSING TRANSFORMATION
 JONES, ROBERT

MAIN ATTRIBUTE	PRESENT	ABSENT
VOICING	899,99	97,50
FRICTIONAL	899,99	499,99
NON-FRICTIONAL	899,99	75,00
NASALITY	499,99	93,75
GRAVE	899,99	87,00
ACUTE	899,99	899,99
SUBSTENTION	88,25	82,50
VOICED	37,50	58,00
UNVOICED	75,00	75,00
SIBILATION	75,00	899,99
VOICED	75,00	899,99
UNVOICED	75,00	899,99
GRAVENESS	83,75	81,25
VOICED	899,99	899,99
UNVOICED	87,00	82,00
COMPACTNESS	499,99	899,99
VOICED	899,99	499,99
UNVOICED	899,99	899,99

DRT MEANS AND STANDARD ERRORS FOR 2 LISTENERS

SYSTEM UNDER TEST: SAMPLE TEST RUN

NUMBER OF SPEAKERS = 2

LISTENER MEAN DRT

1 81,25 DOE, JOHN
2 87,50 JONES, ROBERT

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899,99	0,00	84,37	2,21	92,19	1,10
FRICITIONAL	899,99	0,00	81,25	13,26	90,62	6,63
NON-FRICITIONAL	899,99	0,00	87,50	8,84	93,75	4,42
NASALITY	96,87	2,21	90,62	2,21	93,75	2,21
GRAVE	899,99	0,00	87,50	8,80	93,75	8,80
ACUTE	93,75	4,42	93,75	4,42	93,75	4,42
SUSTENTION	53,12	2,21	50,37	2,21	56,25	2,21
VOICED	50,00	8,84	43,75	4,42	46,87	2,21
UNVOICED	56,25	13,26	75,00	8,80	65,62	6,63
SIBILATION	84,37	6,63	96,87	2,21	90,62	2,21
VOICED	81,25	4,42	899,99	8,80	90,62	2,21
UNVOICED	87,50	8,84	93,75	4,42	90,62	2,21
UNRAVENESS	75,00	13,26	81,25	8,80	78,12	6,63
VOICED	93,75	4,42	899,99	8,80	96,87	2,21
UNVOICED	56,25	22,10	62,50	8,80	59,37	11,05
COMPACTNESS	899,99	0,00	90,62	6,63	86,31	3,31
VOICED	899,99	0,00	87,50	8,84	93,75	4,42
UNVOICED	899,99	0,00	93,75	4,42	96,87	2,21
TOTALS	84,90	1,84	83,85	2,58	84,37	2,21

 * MEAN = 84,37 *
 TOTAL DRT SCORE: *
 * S.E. = 2,21 *

TOTAL NUMBER OF TEST ITEMS = 760

DRT MEANS AND STANDARD ERRORS FOR 2 LISTENERS

SYSTEM UNDER TEST: SAMPLE TEST RUN

NUMBER OF SPEAKERS = 2

LISTENER MEAN DRT
 1 81.25 DOE, JOHN
 2 87.50 JONES, ROBERT

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899.99	0.00	84.37	2.21	92.19	1.10
FRICTIONAL	899.99	0.00	81.25	13.26	90.82	6.63
NON-FRICTIONAL	899.99	0.00	87.50	8.84	93.75	4.42
NASALITY	96.87	2.21	90.62	2.21	93.75	2.21
GRAVE	899.99	0.00	87.50	0.00	93.75	0.00
ALUTE	93.75	4.42	93.75	4.42	93.75	4.42
SUSTENTUM	53.12	2.21	59.37	2.21	56.25	2.21
VOICED	50.00	8.84	43.75	4.42	46.87	2.21
UNVOICED	56.25	13.26	75.00	0.00	65.62	6.63
SIBILATION	84.37	6.63	96.87	2.21	90.62	2.21
VOICED	81.25	4.42	899.99	0.00	90.62	2.21
UNVOICED	87.50	8.84	93.75	4.42	90.62	2.21
GRAVENESS	75.00	13.26	81.25	0.00	78.12	6.63
VOICED	93.75	4.42	899.99	0.00	96.87	2.21
UNVOICED	56.25	22.10	62.50	0.00	59.37	11.05
COMPACTNESS	899.99	0.00	90.62	6.63	95.31	3.31
VOICED	899.99	0.00	87.50	8.84	93.75	4.42
UNVOICED	899.99	0.00	93.75	4.42	96.87	2.21
TOTALS	84.90	0.00	83.85	0.00	84.37	2.21

 * MEAN = 84.37 *
 * S.E. = 2.21 *

TOTAL NUMBER OF TEST ITEMS = 768

SAMPLE TEST RUN

NUMBER LISTENERS • 2
 NUMBER SPEAKERS • 2

 LISTENER: DOE, JOHN • SPEAKER: • BV •

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	2
FRictionAL	0	2
NON-FRictionAL	0	0
NASALITY	1	2
GRAVE	0	1
ACUTE	1	1
SUSTENTION	5	3
VoICED	2	1
UNVoICED	3	2
SIBILATION	1	1
VoICED	1	0
UNVoICED	0	1
GRAVENESS	4	2
VoICED	1	0
UNVoICED	3	2
COMPACTNESS	0	3
VoICED	0	2
UNVoICED	0	1

SAMPLE TEST RUN

NUMBER LISTENERS ■ 2
 NUMBER SPEAKERS ■ 2

 LISTENER: DUE, JOHN * SPEAKER: * JE *

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	1
FRICTIONAL	0	1
NON-FRICTIONAL	0	0
NASALITY	0	0
GRAVE	0	0
ACUTE	0	0
SUSTENTION	3	4
VOICED	1	4
UNVOICED	2	0
SIBILATION	0	0
VOICED	0	0
UNVOICED	0	0
GRAVENESS	3	1
VOICED	0	0
UNVOICED	3	1
COMPACTNESS	0	0
VOICED	0	0
UNVOICED	0	0

SAMPLE TEST RUN

NUMBER LISTENERS : 2
 NUMBER SPEAKERS : 2

 LISTENER: JONES, ROBERT * SPEAKER: * BV *

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	0
FRICTIONAL	0	0
NON-FRICTIONAL	0	0
NASALITY	0	0
GRAVE	0	0
ACUTE	0	0
SUSTENTION	3	4
VOICED	3	2
UNVOICED	0	2
SIBILATION	2	0
VOICED	2	0
UNVOICED	0	0
GRAVENESS	0	2
VOICED	0	0
UNVOICED	0	2
COMPACTNESS	0	0
VOICED	0	0
UNVOICED	0	0

SAMPLE TEST RUN

NUMBER LISTENERS = 2
 NUMBER SPEAKERS = 2

 LISTENER: JONES, ROBERT * SPEAKER: JE *

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	2
FRICTIONAL	0	0
NON-FRICTIONAL	0	2
NASALITY	0	1
GRAVE	0	1
ACUTE	0	0
SUSTENTATION	4	2
VOICED	2	2
UNVOICED	2	0
SIBILATION	2	0
VOICED	0	0
UNVOICED	2	0
GRAVENESS	1	1
VOICED	0	0
UNVOICED	1	1
COMPACTNESS	0	0
VOICED	0	0
UNVOICED	0	0

SAMPLE TEST RUN

NUMBER LISTENERS = 2
 NUMBER SPEAKERS = 2

 FOR LISTENER: DOE, JOHN *

SPKR SCORE

BY 75.00
 JE 87.50

MAIN ATTRIBUTE	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	000,00	0,00	81,25	4,42	90,62	2,21
FRICTIONAL	000,00	0,00	62,50	8,84	81,25	4,42
NON-FRICTIONAL	000,00	0,00	000,00	0,00	000,00	0,00
NASALITY	93,75	4,42	87,50	8,84	90,62	6,63
GRAVE	000,00	0,00	87,50	8,84	93,75	4,42
ACUTE	87,50	8,84	87,50	8,84	87,50	8,84
SUSTENTION	50,00	8,84	56,25	4,42	53,12	2,21
VOICED	62,50	8,84	37,50	26,52	50,00	8,84
UNVOICED	37,50	8,84	75,00	17,68	56,25	13,26
SIBILATION	93,75	4,42	93,75	4,42	93,75	4,42
VOICED	87,50	8,84	000,00	0,00	93,75	4,42
UNVOICED	000,00	0,00	87,50	8,84	93,75	4,42
GRAVENESS	56,25	4,42	81,25	4,42	68,75	4,42
VOICED	87,50	8,84	000,00	0,00	93,75	4,42
UNVOICED	25,00	0,00	62,50	8,84	43,75	4,42
COMPACTNESS	000,00	0,00	81,25	13,26	90,62	6,63
VOICED	000,00	0,00	75,00	17,68	87,50	8,84
UNVOICED	000,00	0,00	87,50	8,84	93,75	4,42
TOTALS	82,29	3,68	88,21	5,16	81,25	4,42

 * MEAN * 81,25 *
 * S.E. * 4,42 *

SAMPLE TEST RUN

NUMBER LISTENERS * 2
 NUMBER SPEAKERS * 2

 FOR LISTENER: JONES, ROBERT *

SPKM SCORE

BV 88,54
 JE 86,46

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899,99	0,00	87,50	8,84	93,75	4,42
FRICTIONAL	899,99	0,00	899,99	0,00	899,99	0,00
NON-FRICTIONAL	899,99	0,00	75,00	17,68	87,50	8,84
NASALITY	899,99	0,00	93,75	4,42	96,87	2,21
GRAVE	899,99	0,00	87,50	8,84	93,75	4,42
ACUTE	899,99	0,00	899,99	0,00	899,99	0,00
SUSTENTIUM	56,25	4,42	62,50	8,84	59,37	2,21
VOICED	37,50	8,84	50,00	0,00	43,75	4,42
UNVOICED	75,00	17,68	75,00	17,68	75,00	8,84
SIBILATION	75,00	0,00	899,99	0,00	87,50	0,00
VOICED	75,00	17,68	899,99	0,00	87,50	8,84
UNVOICED	75,00	17,68	899,99	0,00	87,50	8,84
GRAVENESS	93,75	4,42	81,25	4,42	87,50	0,00
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	87,50	8,84	88,50	8,84	75,00	0,00
COMPACTNESS	899,99	0,00	899,99	0,00	899,99	0,00
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	899,99	0,00	899,99	0,00	899,99	0,00
TOTALS	87,50	1,47	87,50	0,00	87,50	0,74

 * MEAN * 87,50 *
 * S.E. * 0,74 *

SAMPLE TEST RUN

NUMBER LISTENERS * 2
 NUMBER SPEAKERS * 2

 FOR SPEAKER: BV *

LISTENER SCORE
 ODE, JOHN 75,00
 JONES, ROBERT 88,54

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899,99	0,00	87,50	8,84	93,75	4,42
FRictionAL	899,99	0,00	75,00	17,68	87,50	8,84
NON-FRictionAL	899,99	0,00	899,99	0,00	899,99	0,00
NASALITY	93,75	4,42	87,50	8,84	90,62	6,63
GRAVE	899,99	0,00	87,50	8,84	93,75	4,42
ACUTE	87,50	8,84	87,50	8,84	87,50	8,84
SUSTENTION	50,00	8,84	56,25	4,42	53,12	2,21
VOICED	37,50	8,84	62,50	8,84	50,00	8,84
UNVOICED	62,50	26,52	50,00	0,00	56,25	13,26
SIBILATION	81,25	4,42	83,75	4,42	87,50	0,00
VOICED	62,50	8,84	899,99	0,00	81,25	4,42
UNVOICED	899,99	0,00	87,50	8,84	93,75	4,42
GRAVENESS	75,00	17,68	75,00	0,00	75,00	8,84
VOICED	87,50	8,84	899,99	0,00	93,75	4,42
UNVOICED	62,50	26,52	50,00	0,00	56,25	13,26
COMPACTNESS	899,99	0,00	81,25	13,26	90,62	6,63
VOICED	899,99	0,00	75,00	17,68	87,50	8,84
UNVOICED	899,99	0,00	87,50	8,84	93,75	4,42
TOTALS	83,33	4,42	86,21	5,16	81,77	4,79

 * MEAN * 81,77 *
 * S.E. * 4,79 *

SAMPLE TEST RUN

NUMBER LISTENERS • 2
 NUMBER SPEAKERS • 2

 FOR SPEAKER: JE •

LISTENER SCORE
 OUE, JOHN 87,50
 JONES, ROBERT 86,46

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899,99	0,00	81,25	4,42	90,62	2,21
FRictionAL	899,99	0,00	87,50	8,84	93,75	4,42
NON-FRictionAL	899,99	0,00	75,00	17,68	87,50	8,84
NASALITY	899,99	0,00	93,75	4,42	96,87	2,21
GRAVE	899,99	0,00	87,50	8,84	93,75	4,42
ACUTE	899,99	0,00	899,99	0,00	899,99	0,00
SUSTENTION	56,25	4,42	62,50	8,84	59,37	2,21
VOICED	62,50	8,84	25,00	17,68	43,75	4,42
UNVOICED	50,00	0,00	899,99	0,00	75,00	0,00
SIBILATION	87,50	8,84	899,99	0,00	93,75	4,42
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	75,00	17,68	899,99	0,00	87,50	8,84
GRAVENESS	75,00	8,84	67,50	0,00	81,25	4,42
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	50,00	17,68	75,00	0,00	62,50	8,84
COMPACTNESS	899,99	0,00	899,99	0,00	899,99	0,00
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	899,99	0,00	899,99	0,00	899,99	0,00
TOTALS	86,46	0,74	87,50	0,00	86,98	0,37

 • MEAN • 86,98 •
 • S.E. • 0,37 •

SAMPLE TEST RUN

NUMBER LISTENERS • 2
NUMBER SPEAKERS • 2

COMBINED RESULTS • STANDARD ERRORS ACROSS SPEAKERS AND LISTENERS •••••

MAIN ATTRIBUTE	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899,99	0,00	84,37	5,18	92,19	2,59
FRICTIONAL	899,99	0,00	81,25	10,36	90,62	5,18
NON-FRICTIONAL	899,99	0,00	87,50	10,83	93,75	5,41
NASALITY	98,87	2,71	90,62	5,18	93,75	3,83
GRAVE	899,99	0,00	87,50	6,25	93,75	5,18
ACUTE	93,75	5,41	93,75	5,41	93,75	5,41
SUSTENTION	53,12	5,18	59,37	5,18	56,25	2,21
VOICED	50,00	8,84	43,75	13,62	46,87	5,18
UNVOICED	56,25	13,62	75,00	12,50	65,62	8,12
SIBILATION	84,37	5,18	96,87	2,71	90,62	2,71
VOICED	81,25	10,36	899,99	0,00	90,62	5,18
UNVOICED	87,50	10,83	93,75	5,41	90,62	5,18
GRAVENESS	75,00	9,00	81,25	3,12	78,12	5,18
VOICED	93,75	5,41	899,99	0,00	96,87	2,71
UNVOICED	56,25	16,24	82,50	6,25	59,37	8,12
COMPACTNESS	899,99	0,00	90,62	8,12	95,31	4,00
VOICED	899,99	0,00	87,50	10,83	93,75	5,41
UNVOICED	899,99	0,00	93,75	5,41	96,87	2,71
TOTALS	84,98	2,37	83,85	3,16	84,37	2,73

•••••
 • MEAN • 84,37 •
 • S.E. • 2,73 •
 •••••

Appendix C

Diagnostic Rhyme Test
Scoring Software
and
Sample Printout
PDP-11 Implementation

PRECEDING PAGE BLANK-NOT FILMED

** RSX=11M V03 **	21-MAR-78	13147159	DF01 (200,200)XXX,FTN,171
** RSX=11M V03 **	21-MAR-78	13147159	DF01 (200,200)XXX,FTN,171
** RSX=11M V03 **	21-MAR-78	13147159	DF01 (200,200)XXX,FTN,171

```

X  X X  Y X  Y
X  X X  X X  Y
  X X  X X  X X
    X      X  Y
  X X  X X  X X
X  X X  X X  Y
X  X Y  X X  Y

```

```

FFFF TTTT N  N  11  1  7777  1
F      T  N  N  11  11  7  11
F      T  NN N  1  1  7  1
FFFF  T  N N N  11  1  7  1
F      T  N NN  11  1  7  1
F      T  N  N  1  1  7  1
F      T  N  N  1  11  7  111

```

** RSX=11M V03 **	21-MAR-78	13147159	DF01 (200,200)XXX,FTN,171
** RSX=11M V03 **	21-MAR-78	13147159	DF01 (200,200)XXX,FTN,171
** RSX=11M V03 **	21-MAR-78	13147159	DF01 (200,200)XXX,FTN,171

```

C
DIMENSION IBITS(16),IPACK(4)
DIMENSION ISYS(4),INDLST(4),ISPK(2),ILISTN(4),
XICOL1(20),ICOL2(20)
DIMENSION IEQUIV(74)
DIMENSION IALPH(26)
DIMENSION NLTO(23),IERR(23),KEYN(12),KEYL(12),KSPK1(12)
DIMENSION KSPK2(12),NAME(4),LSYS(2),IHEAD(30)
EQUIVALENCE (IRECNO,IEQUIV(1)),(IOPGNO,IEQUIV(2)),
X(ISYS(1),IEQUIV(3)),(INDLST(1),IEQUIV(7)),(ISPK(1),IEQUIV(11)),
X(ILISTN(1),IEQUIV(13)),(ICOL1(1),IEQUIV(17)),(ICOL2(1),IEQUIV(46))
COMMON/PAGE/IPAGE(46,54)
COMMON/ERRORS/IAWANT(54)
DATA NMAX/74/
DATA IBITS/'1','2','4','8','16','32','64','128','256','512','1024',
X'2048','4096','16384','65536','262144','1048576',
DATA NAME(1),NAME(2),NAME(3),NAME(4)/'M',',',',',',
DATA NAMEC/'M',
DATA K114,K118,MASK,MASK1,IBLNK
X/'114','118','377','77','2M' /
DATA IGNORE,ISTART,ISTOP,IOROP,IENDFL
X/'10000','10001','10002','10003','10010'/
DATA IALPH(1),IALPH(2),IALPH(3),IALPH(4),IALPH(5),
X IALPH(6),IALPH(7),IALPH(8),IALPH(9),IALPH(10),
X IALPH(11),IALPH(12),IALPH(13),IALPH(14),IALPH(15),IALPH(16),
X IALPH(17),IALPH(18),IALPH(19),IALPH(20),IALPH(21),IALPH(22),
X IALPH(23),IALPH(24),IALPH(25),IALPH(26)
X /'MA','MR','MC','MD','ME','MP','MG','MH','MI','MJ','MK','ML','MM','MN',
X 'MO','MP','MQ','MR','MS','MT','MU','MV','MW','MX','MY','MZ'/
DATA NLTO
X/22,8158,9339,9923,1277,4096,6854,8667,3345,5154,1529,7121,3128,
X8096,7358,2258,5488,9403,9557,8178,3345,9849,6864/

```

```

C
DO 50 KK=1,30
IHEAD(KK)=IBLNK
50 IERR(KK)=1
OU 49 KK=1,54
49 IAWANT(K)=0
NDRSP=1,
NRSP=0,
IRECNO=0
IOPGNO=0
IPTTF=1
CALL ASSIGN(3,'OPR1')
CALL ASSIGN(4,'LPH1')
CALL ASSIGN(5,'TI1')
CALL ASSIGN(6,'TI1')

```

```

C
WRITE(6,107)
107 FORMAT(/'NB, ENTER DATE OF TEST DD=MM=YY (15=NOV=77) ')
READ(5,571) (IHEAD(KK),KK=1,5)
571 FORMAT(4A2,A1)
WRITE(6,572) (IHEAD(KK),KK=1,5)
572 FORMAT('X, THIS IS WHAT YOU SAID:.. ',4A2,A1)
WRITE(6,108)
108 FORMAT(/'X, ENTER HEADER INFO...A50')
READ(5,109) (IHEAD(KK),KK=6,30)
109 FORMAT(25A2)
101 FORMAT(I1)
WRITE(6,102)
102 FORMAT(/'X, ***COPY TO DISK?, TYPE N FOR NO, Y FOR YES')
READ(5,101) IPOPI

```

```

WRITE(6,193)
193  FORMAT(//IX,'***COPY TO PRINTER?'.TYPE 6 FOR NO; 1 FOR YES')
      READ(5,195)IPDPLP
195  FORMAT(I2)
      IREFFOR
      IREST=0
      IREST=IREST
      WRITE(6,199)
199  FORMAT(//IX,'ENTER #LISTENERS,#SPEAKERS,#SYSTEM.,I2I2I4',
X//IX,'FOR EXAMPLE188881184 FOLLOWED BY CARRIAGE RETURN')
      READ(5,202)NL,N8,LSYS(1),LSYS(2)
202  FORMAT(I2,I2,A2,A2)
      NAME(2)=LSYS(2)
      DECODE(4,1999,LSYS)ISYS
1999  FORMAT(4I1)
      IF(IPDP11.EQ.1)CALL ASSIGN(S.NAME)
      DO 318 K=1,N8
      WRITE(6,203)K
203  FORMAT(IX,'ENTER KEY AND SPEAKER (E,G,110288V) FOR SPEAKER',I2)
      READ(5,204)KEYN(K),KEYL(K),KSPK1(K),KSPK2(K)
204  FORMAT(I3,A1,A1,A1)
318  CONTINUE
      WRITE(6,206)(KEYN(K),KEYL(K),KSPK1(K),KSPK2(K),K=1,N8)
206  FORMAT(///IX,'CHECK THE KEYS... '///(IX,I3,A1,A1,A1))
      PAUSE '***** READY TO GO *****'
      KLCTR=0
C
1  CONTINUE
   CALL RDPAGE
C
1001 CONTINUE
     IRECNO=IRECNO+1
C
     IPGNO=0
     DO 2 K=1,4
     IF(IPAGE(1,K+50).EQ.1)IPGNO=IPGNO+K
     CONTINUE
2  IF(IPGNO.EQ.0)WRITE(6,208)
208  FORMAT(IX,'EOF. ENTER R TO GO OR 1 TO STOP')
     IF(IPGNO.EQ.0)READ(5,191)ISW
     IF(IPGNO.GT.4)PAUSE 'BAD PAGE#.FIXARESUME'
     IF(IPGNO.GT.4)GO TO 1
     IF(((ISW.AND.1).EQ.1).AND.IPGNO.EQ.0)GO TO 9999
     IF(IPGNO.EQ.0)GO TO 1
     IF(IREST.EQ.1)GO TO 21
     IF(((IPGNO=IOPGNO).EQ.1).OR.((IPGNO=IOPGNO).EQ.-3))GO TO 21
     IF(IPGNO.EQ.1)OPGNO=IPGNO
     WRITE(6,198)IOPGNO,IPGNO
198  FORMAT(//IX,'SEQUENCE ERROR PG ',I1,' TO ',I1)
     PAUSE 'LOAD RIGHT PAGE,RESUME'
     GO TO 7003
22  CONTINUE
471  FORMAT(IX,'DO YOU WANT TO END THE RUN? 0=N,1=Y')
     WRITE(6,194)
     WRITE(6,471)
     READ(5,191)IQPLQ
     IF(IQPLQ.EQ.1)GO TO 9999
194  FORMAT(IX,'REDUNDANT PAGE IGNORED..')
     GO TO 7003
21  CONTINUE
     IREST=0
     IOPGNO=IPGNO
     IF(IPGNO.NE.1)GO TO 41

```

```

C
      KLCTR=KLCTR+1
C
      ISYS=1000+ISYS(1)+100*ISYS(2)+10*ISYS(3)+ISYS(4)
C
      ITEM=MOD(KLCTR-1,N8)+1
      IWLST(1)=KEYN(ITEM)/100
      IWLST(2)=MOD((KEYN(ITEM)/10),10)
      IWLST(3)=MOD(KEYN(ITEM),10)
      IWLST(4)=KEYL(ITEM),AND,MASK1
C
      IDLIS=1000+IWLST(1)+10*IWLST(2)+IWLST(3)
C
      DO 3002 KK=1,4
      ILISTN(KK)=0
      DO 3002 K=1,10
      IF(IPAGE(KK+5,K+36),EQ,1) ILISTN(KK)=K-1
      CONTINUE
3002  IDLIS=1000+ILISTN(1)+100*ILISTN(2)+10*ILISTN(3)+ILISTN(4)
C
      ISPK(1)=KSPK1(ITEM),AND,MASK1
      ISPK(2)=KSPK2(ITEM),AND,MASK1
C
C
      CONTINUE
      ITEM=NLID(1)+1
      DO 9110 KK=2,ITEM
      IF(IDLIS,EQ,NLID(KK)) GO TO 9200
      CONTINUE
9110  WRITE(6,9100) IDLIS
9100  FORMAT(/1X,'HEADER ERROR,BAD LISTENER ID ',I4/1X,
X'ENTER CORRECTED ID... EXAMPLE:56951')
      READ(5,9093) (ILISTN(ITEM),ITEM=1,4)
9093  FORMAT(4I1)
      IDLIS=1000+ILISTN(1)+100*ILISTN(2)+10*ILISTN(3)+ILISTN(4)
      GO TO 9100
9200  CONTINUE
      IF(IERR(KK),LT,0) IERR(KK)=0
C
      CONTINUE
41
C
      DO 5 KK=1,20
      ISUM=0
      IF(IPAGE(KK+14,8),EQ,1) ISUM=ISUM+4
      IF(IPAGE(KK+14,9),EQ,1) ISUM=ISUM+3
      IF(IPAGE(KK+14,10),EQ,1) ISUM=ISUM+2
      IF(IPAGE(KK+14,11),EQ,1) ISUM=ISUM+1
      IF(IPAGE(KK+14,13),EQ,1) ISUM=ISUM+1
      IF(IPAGE(KK+14,14),EQ,1) ISUM=ISUM+2
      IF(IPAGE(KK+14,15),EQ,1) ISUM=ISUM+3
      IF(IPAGE(KK+14,16),EQ,1) ISUM=ISUM+4
      IF(IPAGE(KK+14,3),EQ,1) ISUM=ISUM
      ICOL1(KK)=MOD(KK,2)
      IF(ISUM,LT,0) ICOL1(KK)=0
      IF(ISUM,GT,0) ICOL1(KK)=1
      RRSP=RRSP+1
      IF(ISUM,NE,0) GO TO 501
      RDRSP=RDRSP+1
      ITEM=NLID(1)+1
      DO 01 K=2,ITEM
      IF(IDLIS,EQ,NLID(K)) IERR(K)=IERR(K)+1
      CONTINUE
01

```

501 CONTINUE
6 CONTINUE

C

```
DO 6 KK=1,29  
ISUM=0  
IF (IPAGE(KK+14,39),EQ,1) ISUM=ISUM+4  
IF (IPAGE(KK+14,40),EQ,1) ISUM=ISUM+3  
IF (IPAGE(KK+14,41),EQ,1) ISUM=ISUM+2  
IF (IPAGE(KK+14,42),EQ,1) ISUM=ISUM+1  
IF (IPAGE(KK+14,44),EQ,1) ISUM=ISUM+1  
IF (IPAGE(KK+14,45),EQ,1) ISUM=ISUM+2  
IF (IPAGE(KK+14,46),EQ,1) ISUM=ISUM+3  
IF (IPAGE(KK+14,47),EQ,1) ISUM=ISUM+4  
IF (IPAGE(KK+14,50),EQ,1) ISUM=ISUM  
ICOL2(KK)=MOD(KK,2)  
IF (ISUM.LT,0) ICOL2(KK)=0  
IF (ISUM.GT,0) ICOL2(KK)=1  
RRSP8=RRSP8+1  
IF (ISUM.NE,0) GO TO 601  
RBORSP=RBORSP+1  
ITEMP=NLID(1)+1  
DO 52 K=2,ITEMP  
IF (IDLIS.EQ,NLID(K)) IERR(K)=YERR(K)+1  
CONTINUE  
52 CONTINUE  
601 CONTINUE  
6 CONTINUE
```

C

```
IF (IPOPLP,EQ,0) GO TO 7001  
WRITE(4,90) IPGNO, IDSYS, IALPH(ISP(1)), IALPH(ISP(2)),  
XIDLIS, IDNLIS, IALPH(IDLST(4))  
90 FORMAT(1H/56X,5HPAGE ,11,5H OF 4/  
X 1X,8MSYSTEM1 ,14/1X,8MSPEAKR1 ,2A1/1X,  
X8MLISNER1 ,14/1X,8HWDLIST1 ,1S.A1//) )  
DO 7 K=1,29  
IF ((ICOL1(K),EQ,0),AND,(ICOL2(K),EQ,0)) WRITE(4,91) K,K  
IF ((ICOL1(K),EQ,0),AND,(ICOL2(K),EQ,1)) WRITE(4,92) K,K  
IF ((ICOL1(K),EQ,1),AND,(ICOL2(K),EQ,0)) WRITE(4,93) K,K  
IF ((ICOL1(K),EQ,1),AND,(ICOL2(K),EQ,1)) WRITE(4,94) K,K  
91 FORMAT(5X,I2,3H,,,10X,4HX ,16X,4HX ,10X,3H,,,I2)  
92 FORMAT(5X,I2,3H,,,10X,4HX ,16X,4H X,10X,3H,,,I2)  
93 FORMAT(5X,I2,3H,,,10X,4H X,16X,4HX ,10X,3H,,,I2)  
94 FORMAT(5X,I2,3H,,,10X,4H X,16X,4H X,10X,3H,,,I2)  
7 CONTINUE
```

C

7001 CONTINUE

C

```
9 CONTINUE  
IF (IPOPI1,NE,1) GO TO 7003  
IF (IPTYP1,EQ,0,OR,IIREBY,EQ,1) GO TO 910  
IPTYP1=0  
WRITE(3) NL,NS, (IHEAD(K),K=1,30)  
WRITE(1) NL,NR, (IHEAD(K),K=1,30)  
910 CONTINUE  
WRITE(3) (IE JIV(K),K=1,NMAX)  
DO 3701 K=1  
IPACK(K)=0  
DO 3702 K=1,3  
DO 3702 NBIT=1,16  
IF (IEQUIV(16*K+NBIT),NE,0) IPACK(K)=IPACK(K),OR,IBITS(NBIT)  
3702 CONTINUE  
DO 3703 K=4,4  
DO 3703 NBIT=1,16  
IF (IEQUIV(16*K+NBIT),NE,0) IPACK(K)=IPACK(K),OR,IBITS(NBIT)
```

```

3703 CONTINUE
WRITE(1) (IEQUIV(K),K=1,10), (IPACK(K),K=1,4)
C
7003 CONTINUE
C
GO TO 1
C
9999 CONTINUE
RTEMP=(RBDSP/RRSPB)+100
WRITE(6,200)RBDSP,RRSPB,RTEMP,INDSYS
200 FORMAT(/1X,'BAD MARKS,MARKS % ... ',F7.0,1X,F7.0,1X,F5.1/
X1X,'...SYSTEM # ',I4)
ITEMP=NLID(1)+1
DO 53 KK=2,ITEMP
RTEMP=(IERR(KK)/RRDRSP)+100
IF(IERR(KK).GE.0)WRITE(6,201)NLID(KK),IERR(KK),RTEMP
201 FORMAT(1X,'LISTENER ',I4.5X,I4,' ERRORS',2X,' X',F5.1)
53 CONTINUE
WRITE(6,9999)(MIN0(IAWANT(K),9),K=1,54)
9999 FORMAT(1X,10(5I1,1X),4I1)
STOP '... FINISHED ...'
END
SUBROUTINE RDPAGE
C
DIMENSION ICOM(3)
COMMON/CHARB/ICHARB(500)
COMMON/IOPAGE/IARRAY(4000)
DATA ICOM/'001','005','021',ICR/'215',IEP/'012/
C
IBASE=(((170500).AND.'77777')+'00000')/2)+1
C
CALL WAIT(4,2,MDUMMY)
C
100 CONTINUE
IARRAY(IBASE+2)='21
IARRAY(IBASE+0)='21
OLDTIM=SECND8(N,)
DO 103 K=1,3
101 CONTINUE
IF((IARRAY(IBASE+2).AND.'200').NE.'000')GO TO 102
IF((SECND8(0.)=OLDTIM).LT.'.5')GO TO 101
WRITE(6,1000)
1000 FORMAT(1X,'... OMR NOT RECEIVING. YOU MUST RESET OMR.!)
PAUSE 'RES TO CONTINUE'
GO TO 100
102 CONTINUE
IARRAY(IBASE+3)=ICOM(K)
103 CONTINUE
C
INX=1
OLDTIM=SECND8(N,)
CONTINUE
200 CONTINUE
IF((IARRAY(IBASE+0).AND.'200').EQ.'000')GO TO 300
ICHARB(INX)=IARRAY(IBASE+1).AND.'377
TIME=SECND8(N,)
OLDTIM=TIME
IF((ICHARB(INX).EQ.ICR).AND.(INX.GT.1).AND.(ICHARB(INX-1)
X.EQ.IEP))GO TO 400
INX=INX+1
GO TO 200
300 CONTINUE
IF((SECND8(N.)=OLDTIM).LE.'.1')GO TO 200
WRITE(6,1001)

```

```

1001  FORMAT(1X,'... OMR NOT SENDING EP/CR. YOU MUST RESET OMR AND RE
      XREAD THE PAGE!')
      PAUSE 'RES TO CONTINUE!'
      GO TO 100
400   CONTINUE
      CALL SCAN(IERRFG,INX)
      IF(IERRFG,EQ,1)GO TO 100
      RETURN
      END
      SUBROUTINE SCAN(IERRFG,INX)
      DIMENSION IBITS(8)
      COMMON/CHARB/ICHARB(500)
      COMMON/PAGE/IPAGE(46,54)
      COMMON/ERRORS/IAWANT(54)
      DATA IBITS/'40','20','10','4','2','1/'
C
      IVAL(K)=ICHARB(K),AND,'77
C
      DO 99 KK=1,46
      DO 99 KK=1,54
99    IPAGE(K,KK)=0
C
      IROW=1
      NPTR=0
100   CONTINUE
      NPTR=NPTR+1
      IF(ICHARB(NPTR),EQ,'215')GO TO 200
      IF(NPTR,LT,INX)GO TO 100
      STOP 'IMPOSSIBLE!'
200   CONTINUE
      MPTR=NPTR
201   CONTINUE
      MPTR=MPTR+1
      IF(ICHARB(MPTR),EQ,'215')GO TO 300
      IF(MPTR,LT,INX)GO TO 201
      STOP 'IMPOSSIBLE!'
300   CONTINUE
      N=((MPTR-NPTR)-1)/10
      NPTR=NPTR+1
      DO 301 KKK=1,N
      ITEMP=IVAL(NPTR+10*(KKK-1))
      IF(ITEMP,GT,IROW)GO TO 3001
      IAWANT(IROW+1)=IAWANT(IROW+1)+1
      GO TO 301
3001  CONTINUE
      IROW=ITEMP
      DO 301 K=1,9
      DO 301 KK=1,8
      IF((IBITS(KK),AND,ICHARB(NPTR+10*(KKK-1)+K))'.NE,0)
XIPAGE(IROW+1,6*(KK-1)+KK)=1
301   CONTINUE
      NPTR=MPTR-1
      IF(MPTR,LT,INX)GO TO 100
      IERRFG=0
      NROWER=0
      DO 401 K=15,43
      DO 400 KK=1,54
      IF(IPAGE(K,KK),EQ,1)GO TO 401
400   CONTINUE
      NROWER=NROWER+1
401   CONTINUE
      IF(NROWER,LE,1)RETURN
      WRITE(6,1000)NROWER

```

```
1000  FORMAT(IX,'... ',I2,' MISSED RESPONSE ROWS ON THIS PAGE, '/  
XIX,'TYPE IN A 1 TO REREAD THE PA ...')/  
XIX,'TYPE IN A 0 TO ACCEPT PAGE AS IS...')  
      READ(S,1001)ITEMP  
1001  FORMAT(I)  
      IF(ITEMP.EQ.0)RETURN  
      PAUSE 'RES TO CONTINUE'  
      IERRFG=1  
      RETURN  
      END
```


•• RSX=11M V03 ••	21-MAR-78	13148154	DF01 (200,200) XFER,FTN1504
•• RSX=11M V03 ••	21-MAR-78	13148154	DF01 (200,200) XFER,FTN1504
•• RSX=11M V03 ••	21-MAR-78	13148154	DF01 (200,200) XFER,FTN1504

```

X X FFFF EEEE RRRR
X X F E R R
X X F E R R
X FFFF EEEE RRRR
X X F E R R
X X F E R R
X X F E R R
X X F EEEE R R

```

```

FFFF TTTT N N 11 5555 000 4 4
F T N N 11 5 0 0 4 4
F T N N 555 0 00 4 4
FFFF T N N N 11 5 0 0 4444
F T N NN 11 5 00 0 4
F T N N 1 5 5 0 4
F T N N 1 555 000 4

```

•• RSX=11M V03 ••	21-MAR-78	13148154	DF01 (200,200) XFER,FTN1504
•• RSX=11M V03 ••	21-MAR-78	13148154	DF01 (200,200) XFER,FTN1504
•• RSX=11M V03 ••	21-MAR-78	13148154	DF01 (200,200) XFER,FTN1504

```

C
LOGICAL*1 KYRADL,KYGODL
DIMENSION IEQUIV(74)
DIMENSION NAME(4),LSYS(2),IMEAD(30),LDEL(20),LSDEL(6)
DIMENSION ISYS(4),IMDLST(4),ISPK(2),ILISTN(4),
X ICOL1(20),ICOL2(20)
EQUIVALENCE (IRECNO,IEQUIV(1)),(IPGNO,IEQUIV(2)),
X (ISYS(1),IEQUIV(3)),(IMDLST(1),IEQUIV(7)),
X (ISPK(1),IEQUIV(11)),(ILISTN(1),IEQUIV(13)),
X (ICOL1(1),IEQUIV(17)),(ICOL2(1),IEQUIV(40))
DATA MASK/'377',MIRR/'100'/
DATA IGNORE,ISTART,ISTOP,IOROP,IFNDEL
X /'100000','100001','100002','100003','100010'/
DATA NAME(1),NAME(2),NAME(3),NAME(4)/2HZ.,P,B,B/

```

```

C
CALL ASSIGN(3,'DF:1')
CALL ASSIGN(4,'OF:1')
CALL ASSIGN(5,'TI:1')
CALL ASSIGN(6,'TI:1')
KEYBAD=0
IOLIO=0
ICSP=0
IOSIO1=0
IOSIO2=0
DO 101 K=1,6
101 LSDEL(K)=0
DO 100 K=1,20
100 LDEL(K)=0

```

```

C
WRITE(6,100)
100 FORMAT(/1X,/)
X1X,'ENTER SYSTEM ID ...I4')
READ(5,101)LSYS(1),LSYS(2)
101 FORMAT(A2,A2)
NAME(2)=LSYS(2)
DECODE(4,1000,LSYS)ISYSIN
1000 FORMAT(I4)
CALL ASSIGN(3,NAME)
READ(3)NL,NS,(IMEAD(K),K=1,30)
WRITE(6,1004)(IMEAD(K),K=1,30)
1004 FORMAT(/1X,30A2/)
WRITE(6,102)
102 FORMAT(/1X,'HOW MANY LISTENERS TO DELETE?..I2')
READ(5,103)NDEL
103 FORMAT(I2)
WRITE(6,100)
100 WRITE(6,102)
102 FORMAT(/1X,'HOW MANY SPEAKERS TO DELETE?..I2')
READ(5,103)NSDEL
IF(NDEL.LE.0)GO TO 300
DO 300 K=1,NDEL
WRITE(6,104)
104 FORMAT(/1X,'ENTER LISTENER ID TO DELETE..I4')
READ(5,105)LDEL(K)
105 FORMAT(I4)
300 CONTINUE
CONTINUE
IF(NSDEL.LE.0)GO TO 310
DO 301 K=1,NSDEL
WRITE(6,106)
106 FORMAT(/1X,'ENTER SPEAKER TO DELETE...A2')
READ(5,109)LSDEL(K)
109 FORMAT(A2)

```

```

3001 CONTINUE
310 CONTINUE
WRITE(6,196)
196 FORMAT(/IX,'ENTER ANY INCORRECT-CORRECTED KEY PAIR (0 IF OK)')
READ(5,197)KYRAD,KYBADL,KYGOOD,KYGOODL
197 FORMAT(I3,A1,I3,A1)
NL=NL-NOEL
NS=NS-NSDEL
C
IF(ICSP.EQ.1)CALL CSPID(1,ISTART)
IDATA=ISYSID.AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=ISMFT(ISYSID,-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=NL.AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=ISMFT(NL,-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=NS.AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=ISMFT(NS,-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
DO 8R K=1,3R
IDATA=ISMFT(IMEAD(K),-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=IMEAD(K).AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
8R CONTINUE
IF(ICSP.EQ.1)CALL CSPID(1,ISTOP)
IF(ICSP.EQ.8)WRITE(4,8000)ISYSID,NL,NS,(IMEAD(K),K=1,3R)
8000 FORMAT(I4,I3,I3,30A2)
C
1 CONTINUE
READ(3,END=999)(IEQUIV(K),K=1,74)
IF(IPGND.NE.1)GO TO 2
ITLIO=1000+ILISTN(1)+100+ILISTN(2)+10+ILISTN(3)+TLISTN(4)
IDATA=ISMFT(((IEQUIV(12).AND.MASK)+M100),8)+
X(((IEQUIV(11).AND.MASK)+M100)
IF(NSDEL.LE.8)GO TO 109
DO 109I K=1,NSDEL
IF(IDATA.EQ.LSDEL(K))GO TO 1
1091 CONTINUE
109 CONTINUE
IF(NOEL.LE.8)GO TO 110
DO 11 K=1,NOEL
IF(ITLIO.EQ.LDEL(K))GO TO 1
11 CONTINUE
110 CONTINUE
IF(ITLIO.NE.IOLIO)GO TO 31
21 CONTINUE
GO TO 32
22 CONTINUE
2 CONTINUE
IF(NSDEL.LE.8)GO TO 211
DO 211R K=1,NSDEL
IF(IDATA.EQ.LSDEL(K))GO TO 1
2110 CONTINUE
211 CONTINUE
IF(NOEL.LE.8)GO TO 210
DO 12 K=1,NOEL
IF(ITLIO.EQ.LDEL(K))GO TO 1
12 CONTINUE
210 CONTINUE

```

```

IF (ICSP, EQ, 1) CALL CSPIO(1, ISTART)
DO 3 K=17, 74
IDATA=IEQUIV(K), AND, MASK
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IDATA=ISHFT(IEQUIV(K), -8)
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
3 CONTINUE
IF (ICSP, EQ, 1) CALL CSPIO(1, ISTOP)
IF (ICSP, EQ, 0) WRITE(4, 89A1) (IEQUIV(K), K=17, 74)
89A1 FORMAT(5R11)
GO TO 1

C
31 CONTINUE
IF (ICSP, EQ, 1) CALL CSPIO(1, ISTART)
IDATA=ITLID, AND, MASK
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IDATA=ISHFT(ITLID, -8)
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IF (ICSP, EQ, 1) CALL CSPIO(1, ISTOP)
IF (ICSP, EQ, 0) WRITE(4, 89A2) ITLID
89A2 FORMAT(I4)
ITLID=ITLID
GO TO 21

C
32 CONTINUE
IF (ICSP, EQ, 1) CALL CSPIO(1, ISTART)
IDATA=(IEQUIV(12), AND, MASK)+M100
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IDATA=(IEQUIV(11), AND, MASK)+M100
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IIDATA=ISHFT(((IEQUIV(12), AND, MASK)+M100), 8)+
X((IEQUIV(11), AND, MASK)+M100)
IKEYN=100+IEQUIV(7)+1+IEQUIV(8)+IEQUIV(9)
IF (IKEYN, EQ, KYBAD) KEYBAD=1
IF (IKEYN, EQ, KYRAD) IKEYN=KYGOOD
IDATA=IKEYN, AND, MASK
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IDATA=ISHFT(IKEYN, -8)
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IDATA=(IEQUIV(10), AND, MASK)+M100
IKEYL=ISHFT(((IEQUIV(10), AND, MASK)+M100), -8)+
X((IEQUIV(10), AND, MASK)+M100)
IF (KEYRAD, EQ, 1) IKEYL=KYGOOD
KEYBAD=0
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IF (ICSP, EQ, 1) CALL CSPIO(1, IDATA)
IF (ICSP, EQ, 1) CALL CSPIO(1, ISTOP)

C
C
891A IF (ICSP, EQ, 0) WRITE(4, 891A) IIDATA, IKEYN, IKEYL, IKEYL
891A FORMAT(A2, I3, A1, A1)
I0SID1=ISPK(1)
I0SID2=ISPK(2)
GO TO 22

C
999 CONTINUE
IF (ICSP, EQ, 1) CALL CSPIO(1, IENDFL)
IF (ICSP, EQ, 1) CALL CSPIO(1, IENDFL)
IF (ICSP, EQ, 0) ENDFILE 4
IF (ICSP, EQ, 0) ENDFILE 4
STOP
END

```

```

** RSX=11M VR3 **      21-MAR-7R      13149129      DF01 (200,200) SCORE,FTN)7
** RSX=11M VR3 **      21-MAR-7R      13149129      DF01 (200,200) SCORE,FTN)7
** RSX=11M VR3 **      21-MAR-7R      13149129      DF01 (200,200) SCORE,FTN)7

```

```

SSSSSSSS      CCCCCCCC      OOOOOO      WRRRRRRR      EEEEEEEEE
SSSSSSSS      CCCCCCCC      OOOOOO      WRRRRRRR      EEEEEEEEE
SS           CC           OO           OO      RR           RR      EE
SS           CC           OO           OO      RR           RR      EE
SS           CC           OO           OO      RR           RR      EE
SS           CC           OO           OO      RR           RR      EE
SSSSSS      CC           OO           OO      WRRRRRRR      EEEEEEE
SSSSSS      CC           OO           OO      WRRRRRRR      EEEEEEE
           SS      CC           OO           OO      RR      RR      EE
           SS      CC           OO           OO      RR      RR      EE
           SS      CC           OO           OO      RR      RR      EE
           SS      CC           OO           OO      RR      RR      EE
SSSSSSSS      CCCCCCCC      OOOOOO      RR      RR      EEEEEEEEE
SSSSSSSS      CCCCCCCC      OOOOOO      RR      RR      EEEEEEEEE

```

```

FFFFFFFFFF      TTTTTTTTTT      NN           NN           1111      77777777
FFFFFFFFFF      TTTTTTTTTT      NN           NN           1111      77777777
FF           TT           NN           NN           1111      77
FF           TT           NN           NN           1111      77
FF           TT           NNNN          NN           1111      77
FF           TT           NNNN          NN           1111      77
FFFFFFFFFF      TT           NN      NN      NN           1111      77
FFFFFFFFFF      TT           NN      NN      NN           1111      77
FF           TT           NN           NNNN          1111      77
FF           TT           NN           NN           11           77
FF           TT           NN           NN           11           77
FF           TT           NN           NN           11           77
FF           TT           NN           NN           11           77

```

```

** RSY=11M VR3 **      21-MAR-7R      13149129      DF01 (200,200) SCORE,FTN)7
** RSY=11M VR3 **      21-MAR-7R      13149129      DF01 (200,200) SCORE,FTN)7
** RSY=11M VR3 **      21-MAR-7R      13149129      DF01 (200,200) SCORE,FTN)7

```

COMMON/4/IDSYS,ISYS(50),NAME(15),NPAGE(7,2,3),
 X MSPK(15,9),MKEY,LETTER,LIST,ISPK,NUML,NUMS,ARRAY(84),IRESP(2,29),
 XDATA(12,6,30)

CALL ASSIGN(3,IDEFINKEY,KEY)
 CALL ASSIGN(4,IDEF0,1)
 TCOM=0
 CONTINUE
 CALL CTL(ICOM)
 CALL SCORE(TCOM)
 IF(TCOM,EO,0)CALL MATR
 GO TO 1
 END
 SUBROUTINE CTL(ICOM)

DIAGNOSTIC RHYME TEST SCORING PROGRAM

3 DEC 76

STEVEN HEISTER, FSD/MCEL, HANSCOM AFB, MA 01731

NUMSH = NUMBER OF SUBFEATURES CORRECT EACH LISTENER
 NUMT = NUMBER OF MAIN FEATURES CORRECT EACH LISTENER
 NUML = NUMBER OF LISTENERS
 NUMS = NUMBER OF SPEAKERS
 LIST = CURRENT LISTENER
 ISPKR = CURRENT SPEAKER
 IKEY = CURRENT KEY NUMBER
 NKEY = CURRENT KEY INDEX NUMBER FOR KEY ARRAY
 IPAGE = PAGE BEING SCORED
 IFEAT = INDEX FOR MAIN FEATURE:
 1 = VOICING
 2 = NASALITY
 3 = SUSTENTION
 4 = SIBILATION
 5 = GRAVENESS
 6 = COMPACTNESS
 7 = EXPERIMENTAL

FEATURE ARRAY KEY:

	PRESENT	ABSENT	
MAIN FEATURE	(L,1,1)	(L,2,1)	L = LISTENER NUMBER
SUB FEAT PRES	(L,1,2)	(L,2,2)	
SUB FEAT ABS	(L,1,3)	(L,2,3)	

FEAT(10,N,M) = MEAN FOR N,M
 FEAT(20,N,M) = STANDARD ERROR FOR N,M
 FEAT(1R,1,M) = MEAN FOR PRESENT + ABSENT STATE OF M
 FEAT(1R,2,M) = S.E. FOR PRESENT + ABSENT STATE OF M


```

807 IF(NKEY,NE,111)GO TO 808
    NKEY=15
    GO TO 150
808 IF(NKEY,NE,112)GO TO 809
    NKEY=17
    GO TO 150
809 IF(NKEY,NE,113)GO TO 810
    NKEY=19
    GO TO 150
810 IF(NKEY,NE,115)GO TO 811
    NKEY=21
    GO TO 150
811 IF(NKEY,NE,116)GO TO 812
    NKEY=23
    GO TO 150
812 IF(NKEY,GT,300)GO TO 151
    IF(NKEY,LE,300)GO TO 151
    NKEY=25+2*(NKEY-301)
    GO TO 150
150 IF(LETTER,NE,[ALPHR])GO TO 1501
    NKEY=NKEY+1
    GO TO 152
1501 IF(LETTER,FO,[ALPHA])GO TO 152
151 WRITE(5,300)NKEY,LETTER
300 FORMAT(///'. ***** NO KEY '.I3,A1,' *****'///)
    STOP
152 CONTINUE

```

C
C
C

```

DO 1527 K=1,58
1527 KEY(K)=NF*NKEY(K,NKEY)

```

C
C
C

```

DO 110 IPAGE = 1,4

```

C
C
C

```

READ CURRENT PAGE

```

C
C
C

```

106 READ(4,107)((IRESP(ICOL,INOW),IROW=1,29),ICOL=1,2)

```

C
C
C
C
C

```

107 FORMAT(58I1)
DO 203 ICOL=1,2
DO 204 IROW =2,29
    ESTABLISH FEATURE BEING SCORED
    IF(IROW,LE,4)IFEAT=IROW-1
    ITEMP =IROW-1
    IFEAT=MOD(ITEMP,7)
    IF(IFEAT,EQ,0)IFEAT=7
    ESTABLISH WHICH COLUMN PRESENT STATE OF FEATURE IS IN,
    IPRES=1
    IF(IPAGE,LE,2)IPRES=0
    FIND KEY ELEMENT
    KEYEL=IROW
    IF(ICOL,EQ,2)KEYFL=IROW+29
    INDX = 2
    IF(IPAGE,EQ,1)GOTO 208
    IF(IPAGE,EQ,3)GOTO 208

```

C

C

C


```

IF (KEY(KEYFL),NE,IPRES)INDEX=1
GOTO 299
298 IF (KEY(KEYEL),EQ,IPRES)INDEX=1
C INDEX =1 IMPLIES MAIN FEATURE PRESENT; 2 IMPLIES ABSENT.
C SCORE THE RESPONSE
299 ANSWER = 0
IF (IPAGE,EO,1)GOTO 295
IF (IPAGE,EO,3) GOTO 295
IF (KEY(KEYEL),NE,IRESP(ICOL,IRDW))ANSWER=1
GOTO 298
295 IF (KEY(KEYEL),EQ,IRESP(ICOL,IRDW))ANSWER=1
296 CONTINUE
IF (IFEAT,EO,7)GOTO 257
ISUBP=2
NSUBP=2
IF (IPAGE,EO,1)ISUBP=1
IF (IPAGE,EO,3)ISUBP=1
IF (KEYSUB(KEYEL,ISUBP),EQ,0)NSUBP=3
GOTO(251,252,253,254,255,256),IFEAT
251 NPAGE(1,INDEX,1)=NPAGE(1,INDEX,1)+ANSWER
NPAGE(1,INDEX,NSUBP) =NPAGE(1,INDEX,NSUBP)+ANSWER
GOTO 260
252 NPAGE(2,INDEX,1)=NPAGE(2,INDEX,1)+ANSWER
NPAGE(2,INDEX,NSUBP)=NPAGE(2,INDEX,NSUBP)+ANSWER
GOTO 260
253 NPAGE(3,INDEX,1)=NPAGE(3,INDEX,1)+ANSWER
NPAGE(3,INDEX,NSUBP)=NPAGE(3,INDEX,NSUBP)+ANSWER
GOTO 260
254 NPAGE(4,INDEX,1)=NPAGE(4,INDEX,1)+ANSWER
NPAGE(4,INDEX,NSUBP)=NPAGE(4,INDEX,NSUBP)+ANSWER
GOTO 260
255 NPAGE(5,INDEX,1)=NPAGE(5,INDEX,1)+ANSWER
NPAGE(5,INDEX,NSUBP)=NPAGE(5,INDEX,NSUBP)+ANSWER
GOTO 260
256 NPAGE(6,INDEX,1)=NPAGE(6,INDEX,1)+ANSWER
NPAGE(6,INDEX,NSUBP)=NPAGE(6,INDEX,NSUBP)+ANSWER
GOTO 260
257 NPAGE(7,INDEX,1)=NPAGE(7,INDEX,1)+ANSWER
260 CONTINUE
261 CONTINUE
262 CONTINUE
C
C
C
C
110 CONTINUE
C
C
C
ICOM=1
RETURN
C
C
C
201 CONTINUE
C
C
C
202 CONTINUE
ICOM=2
RETURN
END
SUBROUTINE SCORE (NPLACE)

```

C
C

```
COMMON/A/IDSYS,ISYS(50),NAME(15),NPAGE(7,2,3),  
1 MSPK(15,9),MKEY,LETTER,LIST,ISPK,NUMI,NUMS,ARRAY(60),IRESP(2,29),  
XDATA(12,6,36)  
DIMENSION SFND(6),TEMP(2,9)  
IF(NPLACF,NE,1)GOTO 2  
1 FORMAT(' SYSTEM TESTED: ',I4,3X,30A2//5X,'NUMBER LISTENERS =',I3/  
5X,'NUMBER SPEAKERS =',I3//)  
5000 FORMAT(1H1)  
5000 CONTINUE  
DO 20 I=1,6  
DO 20 K=1,3  
DO 41 J=1,2  
L = 6*I+J+2*K-8  
NTOT = 16  
IF(K,NE,1)NTOT=8
```

C
C
C
C

```
61 TOT = FLOAT(NTOT)  
DATA(LIST,ISPK,I)=(2,0+FLOAT(NPAGE(I,J,K))-TOT)*100./TOT  
NPAGE(I,J,K) = INTOT-NPAGE(I,J,K)  
41 CONTINUE  
22 CONTINUE  
20 CONTINUE  
IF((ISW,AND,1).EQ,0)RETURN  
0 WRITE(6,276)  
0 WRITE(6,277)(NPAGE(1,J,1),J=1,2)  
0 WRITE(6,278)(NPAGE(1,J,2),J=1,2)  
0 WRITE(6,279)(NPAGE(1,J,3),J=1,2)  
0 WRITE(6,280)(NPAGE(2,J,1),J=1,2)  
0 WRITE(6,281)(NPAGE(2,J,2),J=1,2)  
0 WRITE(6,282)(NPAGE(2,J,3),J=1,2)  
0 WRITE(6,283)(NPAGE(3,J,1),J=1,2)  
0 WRITE(6,284)(NPAGE(3,J,2),J=1,2)  
0 WRITE(6,285)(NPAGE(3,J,3),J=1,2)  
0 WRITE(6,286)(NPAGE(4,J,1),J=1,2)  
0 WRITE(6,287)(NPAGE(4,J,2),J=1,2)  
0 WRITE(6,288)(NPAGE(4,J,3),J=1,2)  
0 WRITE(6,289)(NPAGE(5,J,1),J=1,2)  
0 WRITE(6,290)(NPAGE(5,J,2),J=1,2)  
0 WRITE(6,291)(NPAGE(5,J,3),J=1,2)  
0 WRITE(6,292)(NPAGE(6,J,1),J=1,2)  
0 WRITE(6,293)(NPAGE(6,J,2),J=1,2)  
0 WRITE(6,294)(NPAGE(6,J,3),J=1,2)  
021 FORMAT(10X,15,5X,15)
```

C
C
C
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C

```
RETURN  
2 CONTINUE  
DO 204 LIST=1,NUMI  
WRITE(6,500)  
WRITE(6,1)IDSYS,(ISYS(I),I=1,30),NUMI,NUMS  
WRITE(6,201)NAME(LIST)  
201 FORMAT(13X,7(' '),1) FOR LISTENERS: ',I4,' *1/  
1 13X,7(' '),//  
1 ' SPKR SCORE'//  
DO 204 ISPK=1,NUMS  
SUM = 2,2
```

```

DO 202 I=1,31,6
J=I+1
202 SUM = SUM + DATA(LIST,ISPKR,I) + DATA(LIST,ISPKR,J)
SUM = SUM/12.0
WRITE(6,203)MSPK(LIST,ISPKR),SUM
203 FORMAT(1X,A2,1X,F7.2)
204 CONTINUE
WRITE(6,403)
WRITE(6,404)
DO 209 I=1,6
209 SEND(I)=0.0
DO 210 I=1,35,2
J=I+1
DO 211 K=1,NUMS
211 ARRAY(K)=DATA(LIST,K,I)
CALL STATS(NUMS,X,S)
SEND(1)=X
SEND(2)=S
DO 212 K=1,NUMS
212 ARRAY(K)=DATA(LIST,K,J)
CALL STATS(NUMS,X,S)
SEND(3) = X
SEND(4) = S
DO 213 K=1,NUMS
213 ARRAY(K)=(ARRAY(K)+DATA(LIST,K,I))/2.0
CALL STATS(NUMS,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(I,SEND)
210 CONTINUE
DO 215 K=1,NUMS
SUM = 0.0
DO 214 I=1,31,6
214 SUM = SUM + DATA(LIST,K,I)
215 ARRAY(K) = SUM/6.0
CALL STATS(NUMS,X,S)
SEND(1)=X
SEND(2)=S
DO 216 K=1,NUMS
SUM = 0.0
DO 217 I=2,32,6
217 SUM = SUM + DATA(LIST,K,I)
216 ARRAY(K) = SUM/6.0
CALL STATS(NUMS,X,S)
SEND(3) = X
SEND(4) = S
DO 219 K=1,NUMS
SUM = 0.0
DO 218 I=1,31,6
J = I+1
218 SUM = SUM + DATA(LIST,K,I) + DATA(LIST,K,J)
219 ARRAY(K) = SUM/12.0
CALL STATS(NUMS,X,S)
SEND(5) = X
SEND(6) = S
CALL OUT(36,SEND)
WRITE(6,400)X,S
207 CONTINUE
DO 300 ISPKR = 1,NUMS
WRITE(6,500)
WRITE(6,1)IDSYS,(ISYS(I),I=1,30),NUML,NUMS
WRITE(6,301)MSPK(1,ISPKR)
301 FORMAT(12X,'*****'/1 FOR SPEAKER I',A2,' *'/

```

```

1  12Y,1000001// LISTENER1,4X,1 SCORF1/)
DO 304 LIST = 1,NIIML
SUM = 0,0
DO 302 I=1,31,6
J=I+1
302  SUM = SUM+DATA(LIST,ISPKR,I)+DATA(LIST,ISPKR,J)
SUM = SUM/12,0
WRITE(6,303)NAME(LIST),SUM
303  FORMAT(1Y,14,6X,F7.2)
304  CONTINUE
WRITE(6,403)
WRITE(6,404)
DO 310 I=1,35,2
J=I+1
DO 311 K=1,NIIML
311  ARRAY(K)=DATA(K,ISPKR,I)
CALL STATS(NIIML,Y,S)
SEND(1)=Y
SEND(2)=S
DO 312 K=1,NIIML
312  ARRAY(K)=DATA(K,ISPKR,J)
CALL STATS(NIIML,Y,S)
SEND(3)=Y
SEND(4)=S
DO 313 K=1,NIIML
313  ARRAY(K) = (ARRAY(K)+DATA(K,ISPKR,I))/2,0
CALL STATS(NIIML,Y,S)
SEND(5)=Y
SEND(6)=S
CALL OUT(I,SEND)
310  CONTINUE
DO 315 K=1,NIIML
SUM = 0,0
DO 314 I=1,31,6
314  SUM = SUM + DATA(K,ISPKR,I)
315  ARRAY(K) = SUM/6,0
CALL STATS(NIIML,Y,S)
SEND(1)=Y
SEND(2)=S
DO 316 K=1,NIIML
SUM = 0,0
DO 317 I=2,32,6
317  SUM = SUM+DATA(K,ISPKR,I)
318  ARRAY(K)=SUM/6,0
CALL STATS(NIIML,Y,S)
SEND(3)=Y
SEND(4)=S
DO 319 K=1,NIIML
SUM = 0,0
DO 318 I=1,31,6
J=I+1
318  SUM = SUM+DATA(K,ISPKR,I)+DATA(K,ISPKR,J)
319  ARRAY(K)=SUM/12,0
CALL STATS(NIIML,Y,S)
SEND(5)=Y
SEND(6)=S
CALL OUT(30,SEND)
WRITE(6,400)X,S
TEMP(1,ISPKR)=Y
TEMP(2,ISPKR)=S
300  CONTINUE
WRITE(6,500)
WRITE(6,1)IDSYS,(ISYS(I),I=1,30),NIIML,NUMS

```

```

320 WRITE(6,320)
   FORMAT(' COMBINED RESULTS - STANDARD ERRORS ACROSS 1,
1 1 SPEAKERS AND 1 LISTENERS *****')
WRITE(6,403)
WRITE(6,404)
NIIMT = NIIML * NUMS
DO 321 I=1,35,2
  J=I+1
  DO 322 K=1,NIIML
    DO 322 L=1,NUMS
      M=NUMS*(K-1)+L
322  ARRAY(M)=DATA(K,L,J)
      CALL STATS(NIIMT,X,S)
      SEND(1)=X
      SEND(2)=S
  DO 323 K=1,NIIML
    DO 323 L=1,NUMS
      M=NUMS*(K-1)+L
323  ARRAY(M)=DATA(K,L,J)
      CALL STATS(NIIMT,X,S)
      SEND(3)=X
      SEND(4)=S
  DO 324 K=1,NIIML
    DO 324 L=1,NUMS
      M=NUMS*(K-1)+L
324  SUM = DATA(K,L,I)+DATA(K,L,J)
      ARRAY(M)=SUM/2.0
      CALL STATS(NIIMT,X,S)
      SEND(5)=X
      SEND(6)=S
      CALL OUT(I,SEND)
321  CONTINUE
  DO 325 K=1,NIIML
    DO 325 L=1,NUMS
      M=NUMS*(K-1)+L
      SUM = 0.0
  DO 326 I=1,31,6
326  SUM = SUM+DATA(K,L,I)
325  ARRAY(M)=SUM/6.0
      CALL STATS(NIIMT,X,S)
      SEND(1)=X
      SEND(2)=S
  DO 327 K=1,NIIML
    DO 327 L=1,NUMS
      M=NUMS*(K-1)+L
      SUM=0.0
  DO 328 I=2,32,6
328  SUM = SUM + DATA(K,L,I)
327  ARRAY(M)=SUM/6.0
      CALL STATS(NIIMT,X,S)
      SEND(3)=X
      SEND(4)=S
  DO 329 K=1,NIIML
    DO 329 L=1,NUMS
      M=NUMS*(K-1)+L
      SUM=0.0
  DO 331 I=1,31,6
  J=I+1
331  SUM = SUM+DATA(K,L,I)+DATA(K,L,J)
330  ARRAY(M)=SUM/12.0
      CALL STATS(NIIMT,X,S)
      SEND(5)=X
      SEND(6)=S

```

```

CALL OUT(36,SEND)
WRITE(6,400)X,S
WRITE(6,501)(HSPK(I,J),J=1,NIIMS)
WRITE(6,502)(TFMP(I,K),K=1,NIIMS)
WRITE(6,503)(TFMP(2,K),K=1,NIIMS)
501  FORMAT(//9X,9(A2,5X))
502  FORMAT(// MEAN  ',9(2X,F5.2))
503  FORMAT(// S.F.  ',9(2X,F5.2))
      NPLACE=0
      RETURN
276  FORMAT(10X,'MAIN ATTR:',10X,'PRES',7X,'ABS'//)
277  FORMAT(15X,'VOIC',23X,I2,11X,I2)
278  FORMAT(20X,'FRIC',16X,I2,11X,I2)
279  FORMAT(20X,'NON-FRIC',12X,I2,11X,I2/)
280  FORMAT(15X,'NASAL',22X,I2,11X,I2)
281  FORMAT(20X,'GRAVE',21X,I2,11X,I2)
282  FORMAT(20X,'ACUTE',21X,I2,11X,I2/)
283  FORMAT(15X,'SUSTEN',20X,I2,11X,I2)
284  FORMAT(20X,'VOICED',20X,I2,11X,I2)
285  FORMAT(20X,'UNVOICED',18X,I2,11X,I2/)
286  FORMAT(15X,'STBL',20X,I2,11X,I2)
287  FORMAT(15X,'GRAVENESS',21X,I2,11X,I2)
288  FORMAT(15X,'COMPACTNESS',19X,I2,11X,I2)
400  FORMAT(' DRT MEANS AND STANDARD ERRORS FOR',I3,' LISTENERS')
401  FORMAT(' SYSTEM UNDER TEST:  ',50A1/)
402  FORMAT(' NUMBER OF SPEAKERS = ',I2/)
403  FORMAT(// ' MAIN ATTRIBUTES:',12X,'PRESENT',10X,'ABSENT',
1 12X,'TOTAL'//)
404  FORMAT(20X,3(4X,'MEAN  S.E.' '))
400  FORMAT(//30X,'*****'/
1 30X,'* MEAN = ',F6.2,' *'/
1 13X,'TOTAL DRT SCORE: +',15X,'*'/
1 30X,'* S.E. = ',F6.2,' *'/
1 30X,'*****'/)
      END

```

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SUBROUTINE STATS(N,XMEAN,STDERR)

```

COMMON/A,IN SYS,ISYS(50),NAME(15),NPAGE(7,2,3),
XMSPK(15,9),HKEY,LETTER,LIST,ISPK,NUML,NIIMS,ARRAY(60),IRESP(2,29),
XDATA(12,6,36)
X=0.0
XN = FLOAT(N)
DO 1 I=1,N
X = X + ARRAY(I)
1 CONTINUE
YMEAN = X/XN
STDERR = 0.0
DO 2 I=1,N
STDERR = STDERR + (ARRAY(I)-YMEAN)*(ARRAY(I)-YMEAN)
STDERR = SORT(STDERR/XN/XN)
RETURN
END
SUBROUTINE OUT(N,X)
DIMENSION Y(6)
IF(N.EQ.36)GOTO 10
K=(N+1)/2

```

```

      IF(K.EQ.11)K=8
      IF(K.EQ.14)K=8
      IF(K.EQ.17)K=8
      IF(K.EQ.12)K=9
      IF(K.EQ.15)K=9
      IF(K.EQ.18)K=9
      IF(K.EQ.13)K=11
      IF(K.EQ.16)K=12
      GOTO(1,2,3,4,5,6,7,8,9,10,13,16),K
1     WRITE(6,405)(X(I),I=1,6)
      RETURN
2     WRITE(6,406)(X(I),I=1,6)
      RETURN
3     WRITE(6,407)(X(I),I=1,6)
      RETURN
4     WRITE(6,408)(X(I),I=1,6)
      RETURN
5     WRITE(6,409)(X(I),I=1,6)
      RETURN
6     WRITE(6,410)(X(I),I=1,6)
      RETURN
7     WRITE(6,411)(X(I),I=1,6)
      RETURN
8     WRITE(6,412)(X(I),I=1,6)
      RETURN
9     WRITE(6,413)(X(I),I=1,6)
      RETURN
10    WRITE(6,414)(X(I),I=1,6)
      RETURN
13    WRITE(6,415)(X(I),I=1,6)
      RETURN
16    WRITE(6,416)(X(I),I=1,6)
      RETURN
19    WRITE(6,417)(X(I),I=1,6)
      RETURN
405   FORMAT(3X,'VOICING',9X,3(3X,F6.2,2X,F6.2))
406   FORMAT(6X,'FRICTIONAL',4X,3(3X,F6.2,2X,F6.2))
407   FORMAT(6X,'NON-FRICTIONAL',3(3X,F6.2,2X,F6.2)/)
408   FORMAT(3X,'NASALITY',8X,3(3X,F6.2,2X,F6.2))
409   FORMAT(6X,'GRAVE',9X,3(3X,F6.2,2X,F6.2))
410   FORMAT(6X,'ACUTE',9X,3(3X,F6.2,2X,F6.2)/)
411   FORMAT(3X,'SUSTENTION',6X,3(3X,F6.2,2X,F6.2))
412   FORMAT(6X,'VOICED',8X,3(3X,F6.2,2X,F6.2))
413   FORMAT(6X,'UNVOICED',6X,3(3X,F6.2,2X,F6.2)/)
414   FORMAT(3X,'SIBILATION',6X,3(3X,F6.2,2X,F6.2))
415   FORMAT(3X,'GRAVENESS',7X,3(3X,F6.2,2X,F6.2))
416   FORMAT(3X,'COMPACTNESS',5X,3(3X,F6.2,2X,F6.2))
417   FORMAT(3X,'TOTALS',10X,3(3X,F6.2,2X,F6.2))
      END
      SUBROUTINE MATR
      COMMON/4/IDSYS,ISYS(50),NAME(15),NPAR(7,2,3),
      X4SPK(15,9),MKEY,LETTER,LIST,ISPK,NUML,NUMS,ARRAY(60),IRESP(2,29),
      XDATA(12,6,36)
      DIMENSION XMATR(15,6),ITALK(9),ANS(2,6)
      DIMENSION DEV(15,6),VAR(15),YLM(15),SM(6),FSTAT(15)
      DIMENSION NMEL(6)
      DATA IBLNK/24 /
C
      KKK=4
      NUMF=0
C
      DO 200 I=1,NUML
      DO 200 K=1,NUMS

```

```

SUM=0.
DO 202 I=1,31,1
  JJ=II+1
202  SUM=SUM+DATA(I,K,II)+DATA(I,K,JJ)
      SUM=SUM/12.
200  YMATR(I,K)=SUM
C
312  CONTINUE
      DO 2002 JJJ=1,KKK
          DO 203 I=1,9
203   ITALK(I)=IBLNK
          DO 204 I=1,NUMS
204   ITALK(I)=MSPK(1,I)
C
      WRITE(6,100)
      WRITE(6,107)IDSYS,(ISYS(I),I=1,30),NUML,NUMS
      WRITE(6,103)
      WRITE(6,100)(ITALK(I),I=1,9)
      IF(NUMS.EQ.6)WRITE(6,1001)
      IF(NUMS.EQ.3)WRITE(6,1002)
1001  FORMAT(1H+,40X,4HMFAN,4X,4HS'E.')
1002  FORMAT(1H+,20X,4HMFAN,4X,4HS'E.')
      WRITE(6,102)
C
C
      DO 201 LIST=1,NUML
          DO 205 ISPK=1,NUMS
205   ARRAY(ISPK)=YMATR(LIST,ISPK)
          CALL STATS(NUMS,X,S)
201   WRITE(6,101)NAME(LIST),(YMATR(LIST,ISPK),ISPK=1,NUMS),X,S
          DO 206 ISPK=1,NUMS
          DO 207 LIST=1,NUML
207   ARRAY(LIST)=YMATR(LIST,ISPK)
          CALL STATS(NUML,X,S)
          ANS(1,ISPK)=X
          ANS(2,ISPK)=S
206   CONTINUE
          WRITE(6,104)(ANS(1,I),I=1,NUMS)
          WRITE(6,105)(ANS(2,I),I=1,NUMS)
          DO 208 ISPK=1,NUMS
          DO 208 LIST=1,NUML
          K=NUMS+(LIST-1)+ISPK
208   ARRAY(K)=YMATR(LIST,ISPK)
          NUMT=NUMS+NUML
          CALL STATS(NUMT,X,S)
          WRITE(6,106)X,S
2002  CONTINUE
      VHTG=0.
      WRITE(6,100)
      WRITE(6,107)IDSYS,(ISYS(I),I=1,30),NUML,NUMS
      WRITE(6,300)
300   FORMAT(//2X,'LISTENER DEVIATIONS FROM SPEAKER MEANS'//)
      WRITE(6,103)
      WRITE(6,100)(ITALK(I),I=1,9)
      IF(NUMS.EQ.6)WRITE(6,1003)
      IF(NUMS.EQ.3)WRITE(6,1004)
1003  FORMAT(1H+,51X,3HVAR)
1004  FORMAT(1H+,30X,3HVAR)
      WRITE(6,102)
      XNUMS=NUMS
      XNUML=NUML
      TOTAL=XNUMS*XNUML
      DO 301 J=1,NUMS

```

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```

      SUM=0.
      DO 302 I=1,NUML
302    SUM=SUM+XMATR(I,J)
303    SM(J)=SUM/XNUML
      DO 303 I=1,NUML
      SUM=0.
      DO 304 J=1,NUMS
304    SUM=SUM+XMATR(I,J)
305    XLM(I)=SUM/XNUMS
      SUM=0.
      DO 305 I=1,NUML
305    SUM=SUM+XLM(I)
      GM=SUM/XNUML
C
      DO 306 I=1,NUML
      DO 307 J=1,NUMS
307    DEV(I,J)=XMATR(I,J)-SM(J)
      SS=0.
      DO 308 J=1,NUMS
308    SS=SS+DEV(I,J)+DEV(I,J)
      VAR(I)=SS/XNUMS
      IF(VAR(I).LE.VRIG)GO TO 330
      VRIG=VAR(I)
      LRIG=I
330    WRITE(6,101)NAME(I),(DEV(I,J),J=1,NUMS),VAR(I)
C
      CALL OUTTR(XMATW,NUML,NUMS,I,F,ESTAT)
C
306    CONTINUE
C
      KMP=NUML-NUMS-1
      WRITE(6,400)NUMS,KMP
400    FORMAT(// ' F STATISTIC FOR TESTING EACH LISTENER
X AS AN OUT-LYER'// ' COMPARE WITH F PERCENTAGE POINT
X WITH DF= ',I3, ' AND ',I2//)
      WRITE(6,401)
401    FORMAT(' LIST.   F'//)
      DO 402 I=1,NUML
      WRITE(6,403)NAME(I),ESTAT(I)
403    FORMAT('5,F8.3)
402    CONTINUE
      IF(NUML.LE.8)STOP
      NUME=NUMF+1
      NMEL(NUMF)=NAME(LRIG)
      WRITE(6,500)(NMEL(I),I=1,NUMF)
500    FORMAT(// 'X, 'WILL ELIM',4I6)
      IF(LRIG.EQ.NUML)GO TO 310
      DO 311 I=LRIG,NUML
      IP1=I+1
      NAME(I)=NAME(IP1)
      DO 311 J=1,NUMS
311    XMATR(I,J)=XMATR(IP1,J)
310    NUML=NUML-1
      KKK=1
      GO TO 310
CCCCCCCCCCCC
CCCCCCCCCCCC
CCCCCCCC
100    FORMAT(5X,9(3X,A2,2X))
101    FORMAT(//1X,I4,1X,11(2X,F5,2)/)
102    FORMAT(' LIST, ')
103    FORMAT(8X,'SPEAKERS'//)
104    FORMAT(// ' MEAN',1X,11(2X,F5,2)/)

```

```

105   FORMAT(/' S.F.',1X,11(2X,F8.2)/)
106   FORMAT(/30X,17(' ')/
      X30X,10 MEAN =',F8.2,' *'/
      X13X,10 TOTAL DNT SCORE: =',15X,10'/'
      X30X,10 S.E. =',F8.2,' *'/
      X30X,17(' '))
107   FORMAT(' SYSTEM ',14,3X,30A2//
      X5X,10NUMBER LISTENERS =',13/
      X5X,10NUMBER SPEAKERS =',13//)
108   FORMAT(1H1,' ')
C
C
      END
      SUBROUTINE STATS(N,XMEAN,STDERR)
      COMMON/A/(NSYS,ISYS(50),NAME(15),NPAGE(7,2,3),
      YMSPK(15,9),MKEY,LETTER,LIST,ISPK,NIMI,NUMS,ARRAY(60),TRESP(2,20),
      XDATA(12,6,36)
C
      Y=0.
      XN=FLOAT(N)
      DO 1 I=1,N
      Y=Y+ARRAY(I)
1    CONTINUE
      XMEAN=Y/XN
      STDERR=0.
      DO 2 I=1,N
2    STDERR=STDERR+(ARRAY(I)-XMEAN)*(ARRAY(I)-XMEAN)
      STDERR=SQRT(STDERR/XN/XN)
      RETURN
      END
C
C
      SUBROUTINE OUTLR(DATA,N,IP,IOUT,F,FSTAT)
      DIMENSION S(6,6),DATA(15,6),XMEAN(6),TEMP(6),SINV(6,6)
      DIMENSION FSTAT(15)
C
      P=IP
      K=N-1
      XK=K
      KMP=K*(K-IP)
      KSD=IP*(K+K-1)
      XKMP=XKMP
      XKSD=XKSD
      RATIO=XKMP/XKSD
      DO 100 I=1,IP
100  XMEAN(I)=0.
C
      DO 101 J=1,IP
      DO 101 I=1,N
      IF(I.EQ,IOUT)GO TO 101
      XMEAN(I)=XMEAN(J)+DATA(I,J)
101  CONTINUE
      DO 102 J=1,IP
102  XMEAN(J)=XMEAN(J)/XK
C
      XK=N-1
C
      DO 103 I=1,IP
      TEMP(I)=0.
      DO 103 J=1,IP
103  S(I,J)=0.
      II=0
      DO 104 I=1,N

```

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        IF(I.EQ.IDOUT)GO TO 104
        DO 105 J=1,IP
105     TEMP(J)=DATA(I,J)-XMEAN(J)
        DO 106 J=1,IP
        DO 106 JJ=1,IP
106     S(J,JJ)=S(J,JJ)+TEMP(J)*TEMP(JJ)
104     CONTINUE
        DO 107 I=1,IP
        DO 107 J=1,IP
107     S(I,J)=S(I,J)/XKM
C
        CALL INVERS(S,SINV,IP)
C
        DO 111 J=1,IP
111     TEMP(J)=DATA(IDOUT,J)-XMEAN(J)
C
C
        D=0.
        DO 112 I=1,IP
        DO 112 J=1,IP
112     D=D+TEMP(I)*SINV(I,J)*TEMP(J)
        KMP=K-IP
        FSTAT(IDOUT)=RATIO*D
        RETURN
        END
C
C
C ***** SUBROUTINE INVERSE *****
C
C
        SUBROUTINE INVERS(A,B,N)
        DIMENSION A(6,6),B(6,6)
        EPS=.0001
        DO 6 I=1,N
        DO 5 J=1,N
        IF(I=J)4,3,4
3         R(I,J)=1.0
        GOTO 5
4         R(I,J)=0.0
5         CONTINUE
6         CONTINUE
        DEL=1.0
        DO 15 K=1,N
        IF(K=N)12,30,30
12        IMAX=K
        AMAX=ABS(A(K,K))
        KP1=K+1
        DO 20 I=KP1,N
        DIFF=AMAX-ABS(A(I,K))
        IF(DIFF)15,20,20
15        IMAX=I
        AMAX=ABS(A(I,K))
20        CONTINUE
        IF(IMAX=K)25,30,25
25        DO 29 J=1,N
        ATMP=A(IMAX,J)
        A(IMAX,J)=A(K,J)
        A(K,J)=ATMP
        RTMP=R(IMAX,J)
        R(IMAX,J)=R(K,J)
29        R(K,J)=RTMP
        DEL=D*DEL
30        CONTINUE

```

```

      DIFF=ABS(A(K,K)-EPS)
      IF(DIFF)93,93,35
35    DEL=A(K,K)*DEL
      DIV=A(K,K)
      DO 38 J=1,N
      A(K,J)=A(K,J)/DIV
38    R(K,J)=R(K,J)/DIV
      DO 43 I=1,N
      AMULT=A(I,K)
      IF(I=K)39,43,39
39    DO 42 J=1,N
      A(I,J)=A(I,J)-AMULT*A(K,J)
      B(I,J)=B(I,J)-AMULT*B(K,J)
42    CONTINUE
43    CONTINUE
45    RETURN
90    WRITE(9,113)
113   FORMAT(/'SINGULAR MATRIX.'/)
      END *

```

SYSTEM TESTED: 1104 16-DEC-77 PHASE 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: 1277 *

SPKR SCORE

RV 80.50
 IE 89.50
 RD 93.75

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	87.50	5.89	93.75	2.95
FRICTIONAL	100.00	0.00	83.33	6.80	91.67	3.40
NON-FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NASALITY	95.83	3.40	100.00	0.00	97.92	1.70
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	91.67	6.80	100.00	0.00	95.83	3.40
SUSTENTION	83.33	6.80	50.00	3.40	70.83	4.50
VOICED	75.00	11.70	50.00	20.41	62.50	11.70
UNVOICED	91.67	6.80	66.67	13.61	79.17	3.40
SIRILATION	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
GRAVENESS	91.67	3.40	70.17	9.00	85.42	3.40
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	83.33	6.80	58.33	16.00	70.83	6.80
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	94.44	2.27	87.50	0.00	90.97	1.13

 * MEAN = 90.97 *
 * S.E. = 1.13 *

SYSTEM TESTED: 1104 16-DEC-77 PRORF 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: 3345 *

SPKR SCORE

RV 88.54
 JE 82.29
 RD 93.75

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	95.83	3.48	91.67	6.88	93.75	5.18
FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NON-FRICTIONAL	91.67	6.88	83.33	13.61	87.50	18.21
NASALITY	100.00	0.00	95.83	3.48	97.92	1.78
GRAVE	100.00	0.00	91.67	6.88	95.83	3.48
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	58.33	12.27	75.00	5.89	66.67	8.51
VOICED	58.33	11.79	75.00	11.79	62.50	18.21
UNVOICED	58.67	18.00	75.00	11.79	78.83	6.88
SIBILATION	79.17	9.08	100.00	0.00	89.58	4.58
VOICED	75.00	11.79	100.00	0.00	87.50	5.89
UNVOICED	83.33	13.61	100.00	0.00	91.67	6.88
GRAVENESS	91.67	3.48	78.83	3.48	81.25	2.95
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	83.33	6.88	41.67	6.88	62.50	5.89
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	87.50	3.93	88.89	1.98	88.19	2.78

 * MEAN = 88.19 *
 * S.E. = 2.78 *

SYSTEM TESTED: 1104 16-DEC-77 FROM: 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: 4025 *

SPKR SCORE

BV 88.50
 JE 88.21
 RD 92.71

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	91.67	6.80	95.83	3.40
FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NON-FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	58.33	9.00	62.50	5.80	60.42	7.41
VOICED	50.00	20.41	41.67	18.00	45.83	14.83
UNVOICED	66.67	13.61	83.33	13.61	75.00	8.00
SIBILATION	66.67	12.27	100.00	0.00	83.33	6.13
VOICED	83.33	6.80	100.00	0.00	91.67	3.40
UNVOICED	50.00	20.41	100.00	0.00	75.00	10.21
GRAVENESS	91.67	6.80	70.17	3.40	85.42	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	83.33	13.61	58.33	6.80	70.83	3.40
COMPACTNESS	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
TOTALS	85.42	4.50	88.89	1.50	87.15	3.00

 TOTAL DRT SCORE: *
 * MEAN = 87.15 *
 * S.E. = 3.00 *

SYSTEM TESTED: 1144 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: 4345 *

SPKR SCORE

AV 87.50
 JE 84.37
 RD 84.70

MAIN ATTRIBUTE:

	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING						
FRICTIONAL	100.00	0.00	91.87	6.80	95.83	3.40
NON-FRICTIONAL	100.00	0.00	91.87	6.80	95.83	3.40
NASALITY						
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION						
VOICED	75.00	5.80	68.87	9.00	70.83	6.80
UNVOICED	86.67	13.61	58.33	18.00	62.50	15.50
	83.33	6.80	75.00	11.70	79.17	3.40
SIBILATION						
VOICED	87.50	0.00	100.00	0.00	93.75	0.00
UNVOICED	83.33	6.80	100.00	0.00	91.87	3.40
	91.87	6.80	100.00	0.00	95.83	3.40
GRAVNESS						
VOICED	86.67	9.00	70.17	3.40	72.92	6.13
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
	83.33	18.00	58.33	6.80	45.83	12.27
COMPACTNESS						
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	88.10	2.47	89.58	2.60	88.89	2.52

 * MEAN = 88.89 *
 * * * * *
 * S.E. = 2.52 *
 * * * * *

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: 5496 *

SPKR SCORE

RV 86.46
 JE 88.54
 RD 92.62

FROM COPY BUNDLES

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	83.33	0.00	91.67	4.50
FRICTIONAL	100.00	0.00	83.33	6.80	91.67	3.40
NON-FRICTIONAL	100.00	0.00	83.33	13.61	91.67	6.80
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	79.17	9.00	58.33	6.00	68.75	2.95
VOICED	66.67	13.61	50.00	0.00	58.33	6.80
UNVOICED	91.67	6.80	66.67	13.61	79.17	3.40
SIBILATION	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
GRAVENESS	66.67	3.40	79.17	9.00	72.92	6.13
VOICED	91.67	6.80	100.00	0.00	95.83	3.40
UNVOICED	41.67	6.80	58.33	18.00	50.00	11.79
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	91.28	1.50	88.81	1.50	88.54	0.98

 TOTAL DRT SCORE: * MEAN = 88.54 *
 * S.E. = 0.98 *

SYSTEM TESTED: 1104 16-DEC-77 PROF 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: R004 *

SPKR SCORE

RV 89.58
JE 87.52
RD 85.83

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	95.83	3.40	97.92	1.70
FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NON-FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NASALITY	100.00	0.00	95.83	3.40	97.92	1.70
GRAVE	100.00	0.00	91.67	6.80	95.83	3.40
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	70.17	0.00	70.83	3.40	75.00	5.80
VOICED	58.33	18.00	75.00	11.70	66.67	13.61
UNVOICED	100.00	0.00	66.67	13.61	83.33	6.80
SIBILATION	87.50	5.80	100.00	0.00	93.75	2.95
VOICED	91.67	6.80	100.00	0.00	95.83	3.40
UNVOICED	83.33	13.61	100.00	0.00	91.67	6.80
GRAVENESS	91.67	6.80	70.83	3.40	81.25	2.95
VOICED	91.67	6.80	100.00	0.00	95.83	3.40
UNVOICED	91.67	6.80	41.67	6.80	66.67	3.40
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	93.86	3.00	88.80	1.13	90.97	2.04

* MEAN = 90.97 *
* S.E. = 2.04 *

SYSTEM TESTED: 1134 16-DEC-77 PROF 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: AH54 *

SPKR SCORE

AV 88.54
 JL 82.21
 RD 92.71

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	91.67	6.88	83.33	6.88	87.50	6.88
FRICTIONAL	91.67	6.88	86.67	13.61	79.17	3.40
NON-FRICTIONAL	91.67	6.88	100.00	0.00	95.83	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	75.00	15.50	54.17	14.83	64.58	14.83
VOICED	75.00	11.70	33.33	24.53	54.17	18.88
UNVOICED	75.00	20.41	75.00	11.70	75.00	11.70
SIBILATION	91.67	3.40	100.00	0.00	95.83	1.70
VOICED	91.67	6.88	100.00	0.00	95.83	3.40
UNVOICED	91.67	6.88	100.00	0.00	95.83	3.40
GRAVENESS	75.00	5.80	79.17	6.88	77.00	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	50.00	11.70	58.33	13.61	64.17	3.40
COMPACTNESS	100.00	0.00	95.83	3.40	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	91.67	6.88	95.83	3.40
TOTALS	82.80	5.04	85.42	0.00	87.15	3.00

 * MEAN = 87.15 *
 * S.F. = 3.00 *

SYSTEM TESTED: 1104 16-DEC-77 PRBRF 1

NUMBER LISTENERS * 11
 NUMBER SPEAKERS * 3

 FOR LISTENER: RRRR *

SPKR SCORE

RV 91.67
 JE 92.62
 RD 91.67

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.F.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	95.83	3.40	97.92	1.70
FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NON-FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NASALITY	100.00	0.00	95.83	3.40	97.92	1.70
GRAVE	100.00	0.00	91.67	6.80	95.83	3.40
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	91.67	3.40	75.00	0.00	83.33	1.70
VOICED	83.33	6.80	83.33	13.61	83.33	9.80
UNVOICED	100.00	0.00	66.67	13.61	83.33	6.80
SIBILATION	79.17	3.40	95.83	3.40	87.50	2.95
VOICED	83.33	6.80	100.00	0.00	91.67	3.40
UNVOICED	75.00	11.79	91.67	6.80	83.33	6.80
GRAVNESS	87.50	5.80	75.00	10.21	81.25	2.95
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	75.00	11.79	50.00	20.41	82.50	5.80
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	93.06	1.50	89.58	0.00	91.32	0.28

 * MEAN = 91.32 *
 * S.E. = 0.28 *

SYSTEM TESTED: 1144 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 9330 *

SPKR SCORE

RV 84.37
JE 87.50
RU 97.42

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	91.67	6.00	95.83	3.40
FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NON-FRICTIONAL	100.00	0.00	83.33	13.61	91.67	6.80
NASALITY	95.83	3.40	100.00	0.00	97.92	1.70
GRAVE	91.67	6.00	100.00	0.00	95.83	3.40
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	75.00	11.70	66.67	13.61	70.83	12.27
VOICED	75.00	11.70	50.00	23.57	62.50	15.59
UNVOICED	75.00	11.70	83.33	13.61	79.17	12.27
SIBILATION	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	91.67	6.00	100.00	0.00	95.83	3.40
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	79.17	9.00	75.00	5.00	77.00	4.50
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	58.33	18.00	50.00	11.70	54.17	9.00
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	90.97	3.97	88.89	2.84	89.93	3.34

* MEAN = 89.93 *
TOTAL DRT SCORE: *
* S.E. = 3.34 *

SYSTEM TESTED: 1104 18-DEC-77 PROBF 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: 0463 *

SPKR SCORE

RV 91.67
 JE 90.62
 RD 92.62

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	95.83	3.40	95.83	3.40	95.83	1.70
FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NON-FRICTIONAL	91.67	6.80	100.00	0.00	95.83	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	75.00	13.21	75.17	3.40	77.08	4.50
VOICED	66.67	18.00	75.00	11.79	70.83	6.80
UNVOICED	83.33	13.61	83.33	6.80	83.33	3.40
SIBILATION	95.83	3.40	95.83	3.40	95.83	1.70
VOICED	100.00	0.00	91.67	6.80	95.83	3.40
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
GRAVENESS	75.17	3.40	75.00	5.80	77.08	4.50
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	58.33	6.80	50.00	11.79	54.17	9.00
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	90.97	2.04	90.97	2.27	90.97	0.28

 * MEAN = 90.97 *
 * S.E. = 0.28 *

SYSTEM TESTED: 1104 16-DEC-77 PRORF 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR LISTENER: 9557 *

SPKR SCORE

HV 89.58
 JE 89.58
 RD 92.71

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	83.33	3.40	91.67	1.70
FRICTIONAL	100.00	0.00	83.33	6.00	91.67	3.40
NON-FRICTIONAL	100.00	0.00	83.33	6.00	91.67	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTATION	79.17	9.00	66.67	3.40	72.92	6.13
VOICED	58.33	10.00	58.33	13.61	58.33	14.83
UNVOICED	100.00	0.00	75.00	11.70	87.50	5.89
SIBILATION	91.67	3.40	100.00	0.00	95.83	1.70
VOICED	91.67	6.00	100.00	0.00	95.83	3.40
UNVOICED	91.67	6.00	100.00	0.00	95.83	3.40
GRAVENESS	79.17	3.40	87.50	5.89	83.33	1.70
VOICED	91.67	6.00	100.00	0.00	95.83	3.40
UNVOICED	66.67	13.61	75.00	11.70	70.83	3.40
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	91.67	2.60	89.58	0.00	90.62	0.85

 * MEAN = 90.62 *
 * S.E. = 0.85 *

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR SPEAKER: JE *

LISTENER	SCORE
1277	89.58
3345	82.20
4026	84.21
5345	84.37
5426	88.54
6004	87.50
8854	80.21
8856	90.62
9319	87.50
9463	92.62
9557	80.58

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	45.45	2.42	81.82	3.76	88.64	1.35
FRICTIONAL	97.73	2.17	88.64	3.75	93.18	1.68
NON-FRICTIONAL	93.18	3.76	75.00	5.57	84.89	2.63
NASALITY	100.00	0.00	96.59	1.88	98.30	0.84
GRAVE	100.00	0.00	93.18	3.36	96.59	1.68
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	61.36	4.94	61.36	4.87	61.36	4.88
VOICED	54.55	5.40	25.00	7.87	39.77	5.84
UNVOICED	68.18	7.93	97.73	2.17	82.05	4.62
SIBILATION	79.55	4.80	100.00	0.00	89.77	2.45
VOICED	93.18	3.76	100.00	0.00	96.59	1.68
UNVOICED	65.91	8.05	100.00	0.00	82.05	4.82
GRAVENESS	73.86	3.30	88.64	2.99	81.25	2.54
VOICED	97.73	2.17	100.00	0.00	98.86	1.08
UNVOICED	50.00	7.10	77.27	5.97	63.66	4.94
COMPACTNESS	100.00	0.00	98.86	1.88	99.43	0.54
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	97.73	2.17	98.86	1.08
TOTALS	85.24	1.60	87.88	0.96	86.46	1.15

* MEAN = 86.46 *
* *
* S.E. = 1.15 *

SYSTEM TESTED: 1144 14-DEC-77 PROBE 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR SPEAKER: BV *

LISTENER	SCORE
1277	89.58
3345	88.54
4026	88.54
5345	87.50
5406	86.48
6004	89.58
8854	88.54
8866	81.67
9339	84.37
9463	81.67
9557	89.58

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	94.32	2.47	97.16	1.24
	100.00	0.00	88.64	4.94	94.32	2.47
	100.00	0.00	100.00	0.00	100.00	0.00
FRictionAL						
NON-FRictionAL						
NASALITY	97.73	1.45	100.00	0.00	98.86	0.73
	97.73	2.17	100.00	0.00	98.86	1.00
	97.73	2.17	100.00	0.00	98.86	1.00
GRAVE						
ACUTE						
SUSTENTION	69.32	3.72	61.36	3.39	65.34	2.46
	45.45	5.40	70.45	5.40	57.95	3.32
	93.18	4.65	52.27	2.17	72.73	2.70
VOICED						
UNVOICED						
SIBILATION	88.64	2.52	100.00	0.00	94.32	1.26
	79.55	4.33	100.00	0.00	89.77	2.17
	97.73	2.17	100.00	0.00	98.86	1.00
VOICED						
UNVOICED						
GRAVNESS	81.82	4.05	72.73	2.70	77.27	2.31
	100.00	0.00	100.00	0.00	100.00	0.00
	83.64	0.11	83.45	5.40	54.55	4.62
VOICED						
UNVOICED						
COMPACTNESS	88.86	1.00	100.00	0.00	99.43	0.54
	100.00	0.00	100.00	0.00	100.00	0.00
	97.73	2.17	100.00	0.00	98.86	1.00
VOICED						
UNVOICED						
TOTALS	89.30	0.82	88.07	0.81	88.73	0.61

 * MEAN = 88.73 *
 * S.E. = 0.61 *

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

 FOR SPEAKER: RD *

LISTENER	SCORE
1277	93.75
3345	93.75
4025	92.71
5345	94.79
5406	90.62
6004	95.83
6854	92.71
8066	91.67
9339	97.92
9463	90.62
9557	92.71

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	94.32	2.95	97.16	1.47
- FRICTIONAL	100.00	0.00	90.91	4.85	95.45	2.42
NON-FRICTIONAL	100.00	0.00	97.73	2.17	98.86	1.08
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTATION	95.45	2.42	77.27	3.88	86.36	2.18
VOICED	97.73	2.17	81.82	5.65	89.77	2.78
UNVOICED	93.18	4.65	72.73	5.97	82.95	2.91
SIBILATION	95.45	2.42	97.73	1.45	96.59	1.68
VOICED	97.73	2.17	97.73	2.17	97.73	1.45
UNVOICED	93.18	3.36	97.73	2.17	95.45	2.42
GRAVENESS	89.77	3.53	70.45	2.42	80.11	2.18
VOICED	95.45	2.91	100.00	0.00	97.73	1.45
UNVOICED	84.09	5.81	40.91	4.85	62.58	3.94
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	96.78	0.73	89.98	1.83	93.37	0.63

 * MEAN = 93.37 *
 * *
 * S.E. = 0.83 *

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
 NUMBER SPEAKERS = 3

COMBINED RESULTS - STANDARD ERRORS ACROSS SPEAKERS AND LISTENERS *****

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	98.48	0.80	98.15	1.09	94.32	1.05
FRICTIONAL	99.24	0.75	89.30	2.63	94.32	1.32
NON-FRICTIONAL	97.73	1.25	98.91	2.80	94.32	1.62
NASALITY	99.24	0.52	98.88	0.63	99.05	0.39
GRAVE	99.24	0.75	97.73	1.25	98.48	0.71
ACUTE	99.24	0.75	100.00	0.00	99.62	0.37
SUSTENTION	75.38	3.37	66.47	2.66	71.02	2.57
VOICED	65.91	4.77	59.00	5.65	62.50	4.22
UNVOICED	84.85	4.00	74.24	3.93	79.55	2.20
SIBILATION	87.88	2.30	90.24	0.52	83.56	1.18
VOICED	90.15	2.38	99.24	0.75	94.70	1.20
UNVOICED	85.61	3.87	99.24	0.75	92.42	2.00
GRAVENESS	81.82	2.40	77.27	2.11	79.55	1.37
VOICED	97.73	1.25	100.00	0.00	98.95	0.63
UNVOICED	65.91	4.77	54.55	4.21	60.23	2.70
COMPACTNESS	99.62	0.37	99.62	0.37	99.62	0.25
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	99.24	0.75	99.24	0.75	99.24	0.52
TOTALS	90.40	1.06	88.64	0.57	89.52	0.70

 * MEAN = 89.52 *
 * S.E. = 0.70 *

	BV	JF	RD
MEAN	88.73	86.46	93.37
S.E.	0.61	1.15	0.63

SYSTEM 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

LIST.	SPEAKERS			MEAN	S.E.
	BV	JE	RD		
1277	89.58	89.58	93.75	90.97	1.13
3345	88.54	82.29	93.75	88.19	2.70
4026	88.54	80.21	92.71	87.15	3.00
5345	87.50	84.37	94.79	88.80	2.52
5406	86.46	88.54	90.62	88.54	0.98
6004	89.58	87.50	95.83	90.97	2.04
5854	88.54	80.21	92.71	87.15	3.00
8066	91.67	90.62	91.67	91.32	0.28
9339	84.37	87.50	97.92	89.93	3.34
9463	91.67	90.62	90.62	90.97	0.28
9557	89.58	89.58	92.71	90.62	0.85
MEAN	88.73	86.46	93.37		
S.E.	0.61	1.15	0.63		

TOTAL DRT SCORE:

* MEAN = 89.52 *
* S.E. = 0.70 *

Appendix D

Use of Listeners and Behavioral Controls in the In-House Diagnostic Rhyme Test Evaluation

Lt. John J. Bowen
Speech Processing Lab
Hanscom AFB, Massachusetts
5 November 1976

D1. INTRODUCTION

The purpose of this report is to review the behavioral aspects of handling listeners for an in-house evaluation capability of the Diagnostic Rhyme Test.

The Diagnostic Rhyme Test (DRT) uses a group of trained listeners involved in a speech discrimination task. The test is designed to compare speech intelligibility between voice communication systems; digital voice processors in this case. The comparison is based upon the listeners' reception, recognition, association, and response of the processed stimulus. Since the validity of the DRT depends on human behavioral processes, which are variable from one listener subject to the next, the use of test controls to minimize these individual variables should improve the consistency and reliability of test results.

The test controls covered in this report will include the experimental effects of the test situation. Experimental effects are the sum of variables introduced into

the test situation by the test administrator, the test subjects, and the test environment itself. A brief section on listener selection and preparation will be included also. Continued research is needed in the areas of listener training and performance tracking to improve the control of consistent results. The report will close with conclusions and recommendations on the handling of listeners for in-house DRT evaluations.

D2. EXPERIMENTAL EFFECTS

As mentioned previously, experimental effects are the summation of all the outside variables contributed by the test administrator, subjects, and environment which contribute to the biasing of the test results. Ideally, a test should measure only those characteristics intended to be measured. Differences among individuals and environments however, can influence and alter test results. If controls can be placed upon the test situation, experimental or test effects can be minimized.

D2.1 Administrator Effects

From research in experimental design and testing, Rosenthal¹ concludes that a variety of biosocial, psychosocial and social psychological factors which interact between the test administrator and his subjects can effect the subjects' behavior and response. Physical characteristics such as age, sex, race, etc. and personality characteristics such as anxiety, hostility, warmth, dominance, etc. can alter the way a subject responds to the administrator and the test itself. The nature of the DRT however, tends to minimize administrator effects. After the initial training period, the listener subjects know how the test is administered and what the administrator expects of them. When a series of DRTs are being conducted, only one administrator should give the test. It is possible that listener responses could be influenced by a change of test administrators in a test.

The test administrator can influence subjects very easily in the instructions he gives them, according to Rosenthal¹. He also points out that a test of simple data collection can be biased by the experimenter or administrator.¹ The administrator must be careful not to tell the listeners anything which could influence their responses. Voiers said that the listeners should not be told their test scores or should never be told to try harder on one test than others.² Listeners should not be told how many tests are left in a series or how much longer they have until the end of a test. The administrator should never give a subject any doubt that he may fail to be a good listener or that he will be removed from the program if he cannot

1. Rosenthal, R. (1966) Experimental Effects in Behavioral Research, Appleton-Century-Crofts, New York.

2. Interview with W. D. Voiers on 28 Sept 1976 at Dynastat, Austin, Texas.

perform adequately. Any such instructions could influence a listener's motivation or attention and cause inconsistent, and thus, unreliable performance.

The best method to control administrator effects is to develop and use standardized procedures for the administration of the DRT.

D2.2 Environmental Effects

Environmental effects are all physical variables present in the test situation which can affect a subject's response. Environmental effects include the comfortability of the test room, temperature, lighting, quietness distractions, etc. A change in one of these variables can decrease a subject's attention to the task and affect the subject's response.

If the environment is kept constant, the listener will know what to expect and will be able to keep his attention focused on listening. Before the test starts, the administrator should insure that the shades are down in the test room, the partitions between the booths are drawn, distractions are removed from the room, headphones work properly, volume is adjusted comfortably, room temperature is comfortable, and that listeners are supplied with the necessary pens and answer sheets. Voiers³ says the DRT is insensitive to volume level but he uses an average vowel peak level of 80 db SPL in his tests. Comfortable room temperature for working is between 70 and 74 degrees. Precautions should be taken to insure that all test booklets are complete. Speaker tapes should be introduced and started the same way so the listeners are not taken by surprise when the tape begins. With the presentation of all the tests standardized, the listeners will not have to worry about distractions which would influence their attention and response.

D2.3 Subject/Listener Effects

Subject effects can be the most variable of the three effects in a test situation. Personality differences among individuals cause them to respond differently in the test situation. The number of speakers and listeners in the DRT tend to minimize listener effects. Controls on listeners' motivation, attention, and expectancies should increase test reliability although studies have not been performed to support this hypothesis.

Listeners' motivation and attention will be discussed as part of listener effects. Rosenthal¹ proposes that individuals who volunteer for studies have three aims or motives which vary among individuals. These aims will also be discussed in this section regarding their impact on listener effects.

3. Voiers, W. D. (1967) Performance Evaluation of Speech Processing Devices, III. Diagnostic Evaluation of Speech Intelligibility, Final Report, Contract No. AF19(628)4987.

D2.4 Motivation

Individuals must be properly motivated to do a task or they will not do it well. Subjects can find both extrinsic and intrinsic motivation in a task like the DRT listener program. Extrinsic motivation includes pay or recognition. For example, letters of appreciation can be sent to the listeners' supervisors. Intrinsic rewards derive from a personal sense of satisfaction, accomplishment, or providing a useful service. Past volunteer listeners have expressed a feeling of high self-satisfaction in participating in the program. Motivation should not be a problem in the in-house DRT program.

D2.5 Attention

Span of attention can vary from one listener to the next. Listeners should understand that they should try to pay an equal amount of attention throughout tests. Listeners who try harder on some tests than others will yield inconsistent results.

Attention is largely a variable of time. Swets and Kristofferson⁴ point out that there are conflicting opinions as to the decrement of word identification performance vs time. Baker says that the "auditory sense is relatively slow to fatigue".⁵

Woodworth and Schlosberg⁶ found that subjects may experience "blocks" in a mental task. Blocks are defined as a person's momentary inability to focus attention. They are involuntary rest periods which delay the onset of fatigue. Rest periods should be used in a test to prevent blocks from occurring since they could cause unwanted variations in test performance.

Voiers uses two groups of listeners and alternates the groups in 20-min work/20 min rest periods for his DRT listeners. He uses 3 to 4-hr sessions.

In-house studies have shown that sets of 20 min work/10 min rest/20 min work periods are most efficient for test with one group of listeners. A minimum of at least 15 min break should be given between these sets.

D2.6 Three Aims of Test Subjects

As was mentioned in the introduction of this section of the report, Rosenthal suggests that there are three reasons or aims of people who volunteer for studies or tests.¹ These three aims are related to subject effects upon a test. These aims should be satisfied to minimize the individuals' effects upon the test.

4. Swets, J. A., and Kristofferson, A. B. (1970) Attention, Annual Review of Psychology, 21:339-366.

5. Baker, L. M. (1960) General Experimental Psychology, Oxford University Press, New York.

6. Woodworth, R. J., and Schlosberg, H. (1965) Experimental Psychology revised, Holt, Rinehart and Winston, Inc., New York.

First, test subjects expect to receive a reward for participating in the study. The different types of extrinsic and intrinsic rewards and their effects have been discussed previously under the topic of subject motivation.

Second, test subjects are usually interested in discovering the rationale behind the test. In some studies, the administrator does not want the subjects to know what they are being tested on, so he uses a blind; a false front for the test. Voiers³ says that familiarity with the DRT does not affect the test. To satisfy the listeners' interest in discovering the rationale of the test, give them a brief explanation of the purpose of the DRT. A summary of voice processors and how the DRT is used to evaluate intelligibility should satisfy the listeners' curiosity and may even develop in them more interest in the program.

The third aim of a subject in a test is to represent himself in a favorable light to the administrator. Subjects are usually curious about their performance. Voiers does not give the test results to his listeners since it could bias later responses. Subjects also try to conform to the expectations of the experimenter, which could lead to biasing through experimenter effects if the administrator is not careful. To solve this problem for the listeners, the administrator should encourage the listeners by recognizing their efforts. He can assure them and show appreciation without giving them the test results. Rosenthal¹ says that a "self-fulfilling prophecy" works on test subjects. If the administrator does not give the listeners any reasons why they would fail as good listeners, and assures them that they are performing well, they should not worry about how they are performing. This, in turn, should minimize any effects due to the listeners doubting their performance.

D3. LISTENER PREPARATION

This section will briefly discuss some aspects of listener selection and use of listeners in the DRT.

Since the DRT is a speech discrimination task, subjects must pass certain hearing tests before they can become listeners in the program. First, the subject must have normal hearing as determined by an audiometer test. Voiers uses a range of 250 to 8000 Hz.⁷ Second, the subject must be able to discriminate between the present and absent states of all six voice attributes. Voiers et al found that hearing impairment is not unidimensional⁸ and may go beyond simple tone reception. Different aspects of speech discrimination performance are affected depending on

7. Voiers, W. D. (1969) The Effects of Masking Voices on the Apprehensibility of Six Consonant Attributes, Scientific Report No. 1, AFCRL Contract No. AF19(628)-5883.

8. Voiers, W. D., Sharpley, A. D., and Hehmsoth, C. J. (1973) Research on Diagnostic Evaluation of Speech Intelligibility, Final Report, AFCRL Contract No. F19628-70-C-0182.

the degree and nature of the hearing impairment.⁸ This aspect of hearing impairment can be determined by checking the performance of trainee listeners over a control DRT tape. Performance in each voice attribute should level out after a period of practice. Erratic performance on any attribute would indicate a hearing impairment in that individual and he should not be used as a listener. Further tests need to be performed in this area however, since it is unknown how long it takes the average listener to find a consistent level of performance in all attributes. Answers to this question would define the training period for new listeners and would discriminate between good and bad listeners.

After a pool of listeners is established and you are ready to test, trained listeners need a warm-up test before each session of DRTs. Voiers says two speaker lists prove enough warm-up to get the listeners reaccustomed to the DRT.³ In-house tests have supported this finding. The warm-up lists should not be the same lists which are to be evaluated in the test.

During each DRT session, each listener should be tested to make sure he is performing satisfactorily. Responses from a listener who is under emotional stress, tired, etc. during one session will differ from his normal performance. If this occurs, the listeners' results should not be used in that evaluation. Since eight listeners are used in the DRT, ten listeners should be tested to allow for two sets of results to be discarded for the preceding reason. A control tape, played once each session, can be used to track the listeners' performance for that day and compare it to their standard performance. Research is necessary in this area to establish criteria on acceptable performance limits for listeners.

04. CONCLUSIONS AND RECOMMENDATIONS

The DRT is designed so as to minimize experimental effects. The precautions suggested previously in this report, are an aid to insure experimental effects are minimized. The test administrator should be aware of the influence he has on a test, even the DRT. The environment should be kept comfortable and free of changes. After the training period, the listeners should settle into a comfortable understanding and consistency in taking the DRT. Therefore, very little in the way of recommendations on a standard set of instructions can be given to the listeners every time they come to take the test. They will know what their job is. All the administrator need do is remind them to pay consistent attention and how to score the answer sheet. They should become familiarized enough not to require detailed instructions for every session.

There are only two major areas that need refining to better implement the in-house DRT evaluation. The first area involves the discrimination between good

and bad listeners. A good listener is a consistent scorer. An inconsistent listener can not be used in the DRT program. A statistical test to define the limits of consistency has not been developed as of yet. Once criteria have been developed, the bad listeners can be identified and a pool of good listeners can be established for use in the in-house program.

The second area of research involves the tracking of listener performance. Once again, statistical tests have yet to be developed to record the on-going performance of the established listener pool. A statistical test to establish confidence intervals for each individual's performance must be developed to validate each listeners' performance during each DRT.

Once statistical tests to discriminate between consistent and inconsistent listeners and statistical tests to track each individual's performance are developed, the in-house capabilities for the DRT should be sufficient to conduct reliable testing.

References

1. Rosenthal, R. (1966) Experimental Effects in Behavioral Research, Appleton-Century-Crofts, New York.
2. Interview with W. D. Voiers on 28 Sept 1976 at Dynastat, Austin, Texas
3. Voiers, W. D. (1967) Performance Evaluation of Speech Processing Devices, III. Diagnostic Evaluation of Speech Intelligibility, Final Report, Contract No. AF19(628)4987.
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