R96-02W

Pilot Data Base for

Corpus of Noisy Speech

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Prepared for: Massachusetts Institute of Technology
Lincoln Laboratory
244 Wood Street
Lexington, MA 02173

In response to: P.O. AX-P29121

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1.0 Introduction

ARCON was contracted by Massachusetts Institute of Technology, Lincoln Laboratory (MIT/LL) to prepare speech material for digital speech research and development. The RFP defined the parameters of the recording project. These parameters included the development of a pilot speech data base for use in the evaluation of speech enhancement methods to be used by the law enforcement community. The pilot data base consists of audio recordings of two staged scenarios from six male and six female talkers. The talkers were instructed to converse in the vernacular during conversational speech. These talkers were paired to balance sex with two pairs male/male, two female/female, and two male/female. They were also paired to optimize the output from the role plays conducted to produce conversation during the scenarios. The two scenarios selected were a party in a large room with food, drink, music, and constant conversation and a highly reverberant stairwell with the interruption of a person walking through and normal hall noises.

2.0 Specifications

2.1 Talkers

Talkers for this effort were recruited through the comprehensive data base ARCON has amassed from previous efforts and by recruiting within local and regional theater groups. All prospective talkers were screened using a structured telephone interview. Final selection was made after evaluation of each talker on their availability, willingness to meet the time commitment, perceived verbal facility, and other requirements of the project. A formal screen for normal hearing was conducted according to ITU guidelines prior to recording and all talkers were within the normal range. No talker reported any history of hearing, reading or speech problems. As discussed in ARCON's proposal, the age range of 18 to 60 was modified to a narrower range. In order to facilitate conversational pairings, all talkers were between the ages of 20 and 40 and were paired according to age grouping. All talkers were from the northeastern United States with most indicating they considered themselves from New England. However, many had theater or music background and for the most part they showed little evidence of a regional accent. All talkers had some level of college education. All talkers signed a standard release form. One of the recording scenarios required additional conversational speech as a background. These extra talkers also signed release forms. A copy of the forms used is presented in Appendix A. The signed releases are on file at ARCON Corp.

2.2 Materials

The recorded materials included both scripted and conversational speech. The scripted material was chosen to allow comparisons with previous test material recorded by some of the same talkers and to allow possible subjective quality testing. Harvard Phonetically Balanced Sentences, Sentence Verification Sentences, and Semantically Anomalous Sentence Material were used to generate approximately five minutes of scripted material for each talker in each scenario. This material was presented to the talkers in a paced manner through the use of laptop computers. The scripted material for each talker may be found in Appendix B.

The conversational material for this project was comprised of five minutes of natural conversation for each pair of talkers. The natural conversation was designed to include varied intonation and vocabulary in North American English vernacular. The methodology used to stimulate conversation in these settings included the use of role play discussions. Each of the six communicator pairs used the same role play discussion topic to stimulate conversation for a given scenario. The role plays facillitate the production of spontaneous and natural speech recordings, but with a defined topic and discussion position. In that way, the discussion topic provides a vehicle to allow comparisons to be made more accurately across communicator pairs or groups. The methodology also is a good approach for generating conversation between individuals that are minimally acquainted, reducing the degree of influence of individual personality differences and the possibility of personal opinions or viewpoints being inhibiting or controversial.

The talkers in this project presented a difficult challenge for the development of role play topics due to the requirement for balanced pair mix by sex. Several topics were evaluated for suitability for the discussion as well as the settings designated in the Statement of Work. Laboratory personnel were used to evaluate the topics. For the two scenarios, two different topics were required. In addition, three topics were selected for talker training along with one pair familiarization topic. The topics for the role play were developed to fulfill the following requirements:

- Each topic had to promote a minimum of five minutes discussion between all individuals. This meant that the topics had to be something familiar and potentially of interest to males and females between the ages of 20 to 40.
- The topic should not be offensive to any member of the target group mentioned above.
- The topic should be able to be discussed with individuals not well known to each other.
- The topic should be a reasonable match for the scenario in which it is to be recorded.

The training and recording discussion outlines developed for this effort are presented in Appendix C.

2.3 Schedule

Cost considerations required that all recording be accomplished in one extended day. This lead to the tight schedule outlined in the following.

0830 UNLOAD and SETUP (ALL)
Arrive at ARCON Corp. Unload Equipment - All equipment for Ambient Mic Pairs and for one talker is setup in hall. All Noise Characterization equipment is setup in hall. One portable DAT with Altec Mic, Stand, headphones and Lavalier Pair, M100 equipment setup in quiet office for baseline scripted material recording. Audiometer setup in separate quiet office for hearing screenings

0900 TALKER PREPARATION, BASELINE RECORDING, DISTANCE MIC SETUP
The following activities are conducted in parallel.
Paperwork, Hearing Screenings, M100 training.
Baseline recording.
Role Play training.
The Distance Mics will be positioned in the hall. Final decisions on pair positioning and walk-on actions will be made. VCR Setup.

1100 Characterization of Scenario 1 Acoustic Noise Environment
The portable DAT used for baseline recordings, along with the lavalier and Altec mic & stand will be brought down to the hall. The Altec Mic & Stand will be packed. A 5-10 minute recording will be made using a single lavalier and a B&K mic positioned based on decisions made during distance mic setup. Calibrator tones, SPL levels and a strip recorder sample will be made before

and during recording. Distance Mic DATs will also record. A diagram of the setup will be generated.

1110 Talker Recordings: Scenario 1 -Hallway
SPL equipment will be packed. The two portable DATs and 4 lavalier mics will be readied. One talker of a pair will record their sentence lists while the other holds the M100, then the second talker will record. After the scripted material is recorded, the scenario will be recorded. All DATs will record all material. 3 Pairs of Talkers will record to one set of DATs. The other five pairs will continue in this manner.

1330 Pack up equipment. Label and store recorded DATs.

1500 MOVE TO SECOND LOCATION
Arrive at Main Sail Lounge. Unpack equipment. Decisions on positioning are made. All equipment for Ambient Mic Pairs and for talkers are setup. All Noise Characterization equipment is setup. Distance Mics are positioned. VCR is setup.

1530 Characterization of Scenario 2 Acoustic Noise Environment
A portable DAT, along with the lavalier and B&K mic & tripod will record the environment. A 5-10 minute recording will be made using a single lavalier and a B&K mic positioned based on decisions made during distance mic setup. Calibrator tones, SPL levels and a strip recorder sample will be made before and during recording. Distance Mic DATs will also record. A diagram of the setup will be generated.

1540 Talker Recordings: Scenario 2 -PUB
SPL equipment will be packed. The two portable DATs and 4 lavalier mics will be readied. One talker of a pair will record their sentence lists, then the second talker will record. All DATs will record all material. 3 Pairs of Talkers will record to one set of DATs. The other five pairs will continue in this manner.

1600 Pack up equipment. Label and store recorded DATs.

On test day there were numerous delays. Changes were made to the schedule in order to complete the project. All of the changes had to do with either the amount of material recorded or the procedures used during recording. For the scripted material there is normally an announcement that identifies the talker, the record date and the material. This announcement was dropped for some of the recording sessions. During scripted material, repeats are often used if the talker stumbles over the material. It was found that these repeats were doubling the allowed time for the baseline recordings. Repeats were eliminated for the scripted material during the scenarios. Some scripted material was also eliminated for some talkers.
A given talker's complete set of scripted materials included:

3 HPB Lists
2 Anomalous Lists
2 Sentence Verification Lists

In the Baseline Recording Effort - All talkers recorded all lists. Multiple takes were made for all talkers when necessary. In the Hallway recording effort, no retakes were made for any talker/lists. Talkers KCf, MCm, CPm, DCm, JKf, and ATf recorded all material. Talkers SCm, MBm, LMf, EAf, RWm, and CBm recorded HPB Lists only.

In the Party recording effort, no retakes were made for any talker/lists. No announcements were made for any talker/lists. Talkers KCf, MCm, CPm, DCm, SCm, and MBm recorded all material. Talkers JKf, ATf, LMf, EAf, CBm, and RWm recorded HPB's and Anomalous Lists only.

2.4 Equipment
The following table provides a complete list of all equipment used during this project.

Description	Make	Model #	Units	S/N
Lavalier Microphones	Sony	ECM77B	8	
DATs	Maxell	DM-60	30	
Audiometer	Maico	MA27	1	5974
Sound Level Meter	B&K	2230	1	1133715
AA Batteries			4	
Tripod	B&K		1	
Level Recorder	B&K	2317	1	1362404
D Size Batteries			1	
Mic Calibrator	B&K	4230	1	861297
DAT Recorders	Panasonic	SV03900	2	AA1BA01750 AA1CA01867
Microphone PreAmps	ATI	M1000-1	2	29524 29525
Port. DAT Recorders	Sony	TCD-10Pro	2	15357 15358
DAT Batteries	Sony		4	
DAT Battery Charger	Sony		2	
DAT AC Adapters	Sony		2	
DAT Shoulder Straps	Sony		2	
Power Conditioner	Furman	PL-Plus	1	
Dynamic Microphone	Altec	659A	1	1469
Headphones	Sony	MDR-V2	2	
Mic Stands	Atlas		3	
Mic Backboards			2	
30' Mic Cables			4	
2' Mic Cables			4	
Laptops	Tandy	M100	4	
Power Adapters	Tandy		4	
AA Batteries			8	
Disk Drives	Tandy		2	
M100 Stand & Peg			1	
Power Strips			2	
Pop/Rock Music CD (LL Supplied)				

3.0 Data Collection
3.1 Project Procedures and Training
The day began with an explanation of the project which included the activities for the day. Paper work was filled out and hearing screens were given. All talkers exhibited normal range hearing. Talkers were given their individual scripted material hard copy to study. Each was given time to practice reading aloud with machine for pacing. As soon as two pairs completed the baseline recording, the pair introductions and role play training began.

Role Play Training
They were told that they would be working as a pair, and the group would consist of the same members for both recording sets. Instructions included the following:

* It is important to have fun and enjoy this, but we have a lot invested in it and the project results will be used to make very important decisions. We want you to take it seriously, too. Do your best all the time.
  ...no accents
  ...take it serious
  ...five minutes

* Roles are assigned. Talkers are to "pretend" to believe, feel, and act like the assigned role whether or not that is how they really feel.

  An attempt has been made to keep roles gender neutral, adapt to the situation as best you can. Although an attempt has been made to avoid truly controversial issues, some of the discussions may be more meaningful to individuals than others. You are to remember that an individual who is doing a "good" job at presenting a role is doing just that, a good JOB, and does not necessarily feel that way.

  One good way to approach the task is to put oneself in a role by thinking of, or visualizing someone you know or have had experience with, who might believe or act as you have been instructed. Do not identify this person.

Each was given time to practice and given feedback on realism, staying with role, and ability to think quickly as the situation changed.

As the talker pairs were prepared for a scenario it was stressed that they should discuss the role play as though they were trying to have a private conversation. During the party scenario talkers were reminded that even as part of the background they were being recorded and to keep conversations non-personal and anonymous. The talkers were paired for the role plays in both scenarios as indicated in Table 3.1. This table also reports the talkers' gender, age, region of the US where they have lived most of their lives and if they have received any vocal training.

Pair	Talker	ID	Gender	Age	Yrs College	Region	Vocal Tr.
Pair #1	Talker #1	MC	Male	27	4	NE	No
	Talker #2	KC	Female	28	6	NE	No
Pair #2	Talker #1	CP	Male	38	4	NE	Yes
	Talker #2	DC	Male	33	4	NE	Yes
Pair #3	Talker #1	JK	Female	22	4	NE	Yes
	Talker #2	AT	Female	26	4	NE	No
Pair #4	Talker #1	MB	Male	26	4	NE	No
	Talker #2	SC	Female	22	4	Texas	No
Pair #5	Talker #1	LM	Female	20	3	NE	No
	Talker #2	EA	Female	22	5	NE	No
Pair #6	Talker #1	RW	Male	28	4	NE	No
	Talker #2	CB	Male	23	4	NYC	No

Table 3.1 Role Play Pairings

3.2 Baseline Recording

Baseline recordings in a quiet office environment were made for each talker. These recordings consisted of approx. 5 minutes of scripted material using the ECM77B microphones attached to the talker and a Dynamic reference microphone.

3.3 Scenario Recording

The scenario recording effort required the use of eight Sony ECM-77B Lavalier Microphones. The mics were grouped into stereo pairs. Two of these pairs were mounted on the talkers. They were fastened with the mics facing up, to clothing 6 inches apart and centered 6 inches below the mouth. An article of clothing (sport jacket, zippered sweatshirt, light outdoor coat) was placed over the mics.

The third and fourth pairs were used as near and far field distance mics. These pairs were mounted to 9 inch by 9 inch acoustic ceiling tiles. Two holes, just large enough to accommodate the bodies of the microphones, were placed 6 inches apart and centered on the two tiles. Mics were installed with their faces flush to the tile surface. These tiles were then attached to microphone stands to allow placement of the stereo pair anywhere within the scenario and between 3 and 6 feet off the ground.

The ambient acoustic noise environments of the two scenarios were recorded and characterized prior to the recording of any talkers. This included unweighted Sound Pressure Level(SPL) measurements and SPL measurements using "C" and "A" weighting filters. Microphones for acoustic recording and SPL measurement were set up directly between the assigned positions for the talkers at head level oriented perpendicular to the talkers and facing out into the scenario space. SPLs are averaged over approximately 30 seconds. In order to understand the variability in SPLs over time, a strip recorder was used to generate a hard copy of SPLs during the unweighted measurements. Microphone calibrators were used to record 94 dB reference tones at the top of the stereo acoustic noise audio recordings and on the SPL strip recordings.

Scenario #1

Scenario number one was described in the specification and proposal as follows.

Environment: A hard walled reverberant stairwell platform of approx. 64 sq.ft. with stairways going both up and down.

Acoustic Background:

Constant - ventilation

Intermittent - background conversation, doors, walking

Obstructions: People walking between the stationary microphones and the talkers. Over the 5 minute recorded scenario, three people will walk into and up or down the stair well. One will be alone and the other two will be together.

Talker Location: Standing on the platform facing each other except when interrupted by passerby's in the stair well.

Expected ambient SPL: 50dB

Expected Microphone Distances:

Talker Mics - three feet from each other.

Wall Mic #1 - six to eight feet from talkers

Wall Mic #2 - ten to twelve feet from talkers

The final site is shown in Figure 3.1. It differed from the specification as follows. The talkers were located in the first floor hallway of the ARCON office building just beyond the stairway to the second floor. They stood facing each other at the intersection of two corridors approx. 2 to 3 feet from each other. The entries to the men's and women's rooms are in the second corridor. The closest bathroom was closed, while the second door was left open. There was an automatic air freshener in the second bathroom that generated an audible tone every second. Ceiling heights were 9 feet. The first wall mic pair was located on the stairwell landing approx. 6 feet from the talkers. The second wall mic pair was located around the corner of the bathroom corridor, approx. 22 feet from the talkers. Both wall mic pairs were mounted as previously described. There was no direct line of sight between either wall mic pairs and the talkers.

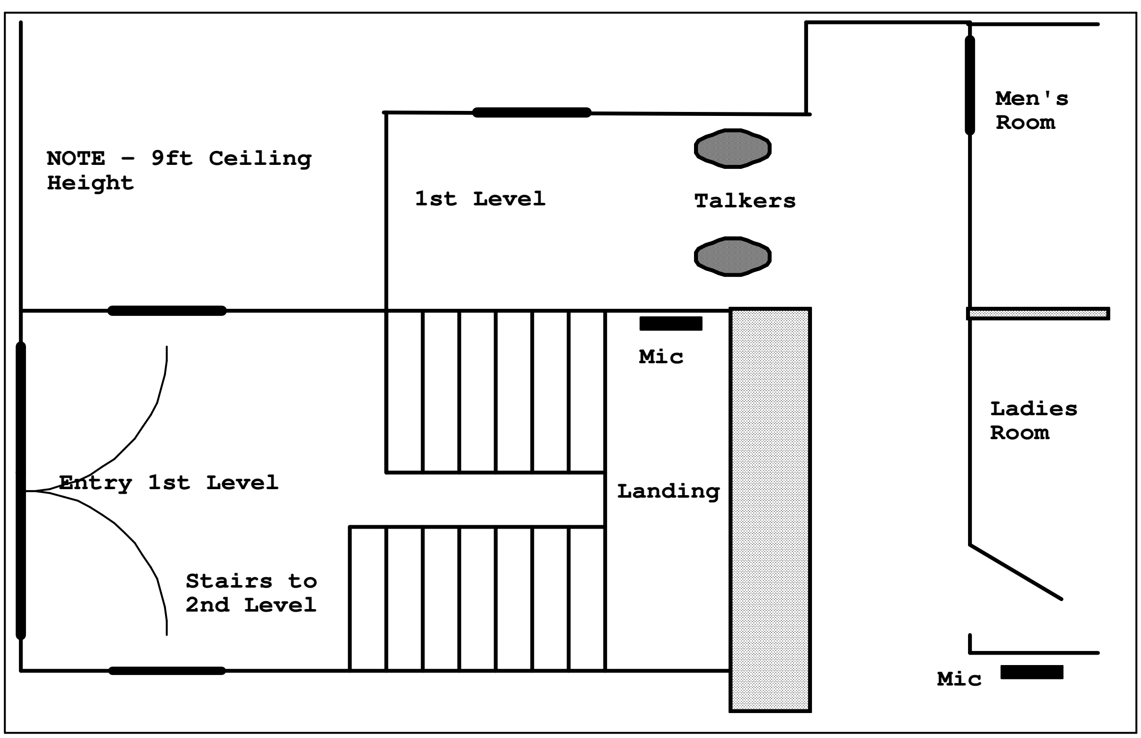

Figure 3.1 Hallway Scenario

The direct line from the talkers to the first mic pair was obstructed by the hallway ceiling and the stairway wall. The direct line from the talkers to the second mic pair was obstructed by the two hallway corners. During the scenario a third party would leave a second floor office opening and closing a door, walk down the stairwell, pass between the talkers and enter the first bathroom closing the door behind him. The urinal would be flushed and water run in the sink. The person would then leave the bathroom closing the door behind him, pass between the talkers and go out the front door of the entry hallway, closing the door behind him. Timing of these events was kept as constant as possible between sets of talkers. The interruption started approx. 3 minutes into the scenario and lasted for approx. 1 minute.

Scenario #2

Scenario number two was described in the specification and proposal as follows.

Environment: A restaurant lounge or bar of approx. 400 sq.ft. with stationary tables along two walls, a bar and entry along the other walls and central standing area.

Acoustic Background:

Constant - Ventilation, speech babble and movement from a "happy hour" crowd of approx. 15 individuals, CD music as supplied by MIT/LL.

Intermittent - glass and plate noise, doors.

Obstructions: none

Talker Location: Seated 90deg to each other, at a table in the corner or against a wall. To remain at the table for the full 5 minute scenario.

Expected ambient SPL: 75dB

Expected Microphone Distances:

Talker Mics - 2 to 3 feet from each other.

Wall Mic #1 - 4 to 6 feet from talkers

Wall Mic #2 - eight to twelve feet from talkers

The final site is shown in Figures 3.2 and 3.3. It differed from the specification as follows. The talkers were seated at a table in a cocktail lounge, facing each other at an angle approx. 3 feet apart. The lounge is approx. 500 square feet in area and the "party" was limited to an area of approx. 250 square feet around the talkers. There were a total of 24 people in the party scenario including the talkers. There was a food table approx. 20 feet from the talkers and a bar approx. 15 feet from them. People talked, ate, drank and played darts. Music was being played over the lounge sound system with the level set by the MIT/LL representative. The music was the CD supplied by MIT/LL. One of the audio speakers was within 6 feet from the talkers, the other speakers were approximately 10 feet and 20 feet away. The wall mic pairs were placed against the nearest wall to the talkers. They were in the same plane and were separated by a distance of 2 feet. The nearest wall mic was 2 feet from the 4 foot table at which the talkers were seated. The distance to the first talker was approx. 4.5 feet, and 6.5 feet to the second talker. There was a direct line of sight from the second talker to the wall mic pairs. The first talker was partially turned away from the wall mic pairs. For most of the time, it could be considered that the first talker had their back to the second wall mic pair.

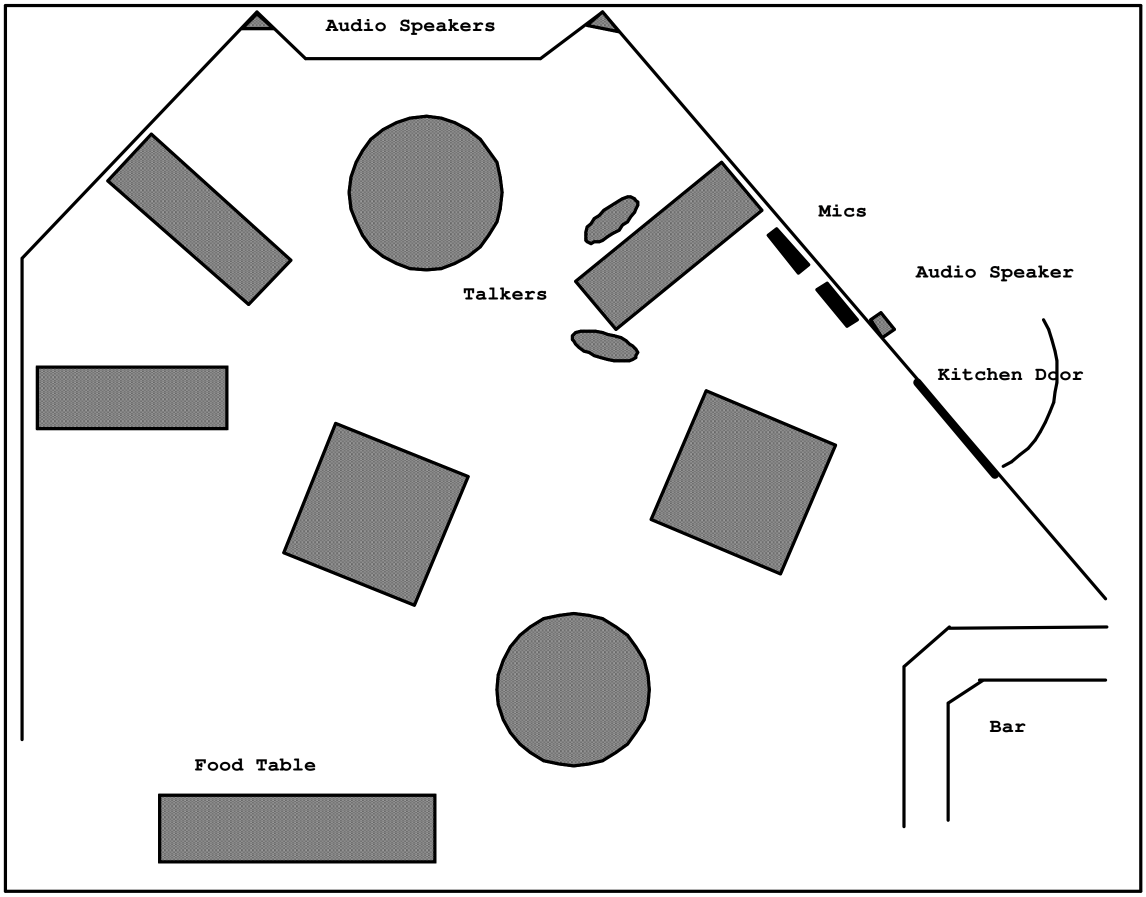

Figure 3.2 Party Scenario from Above

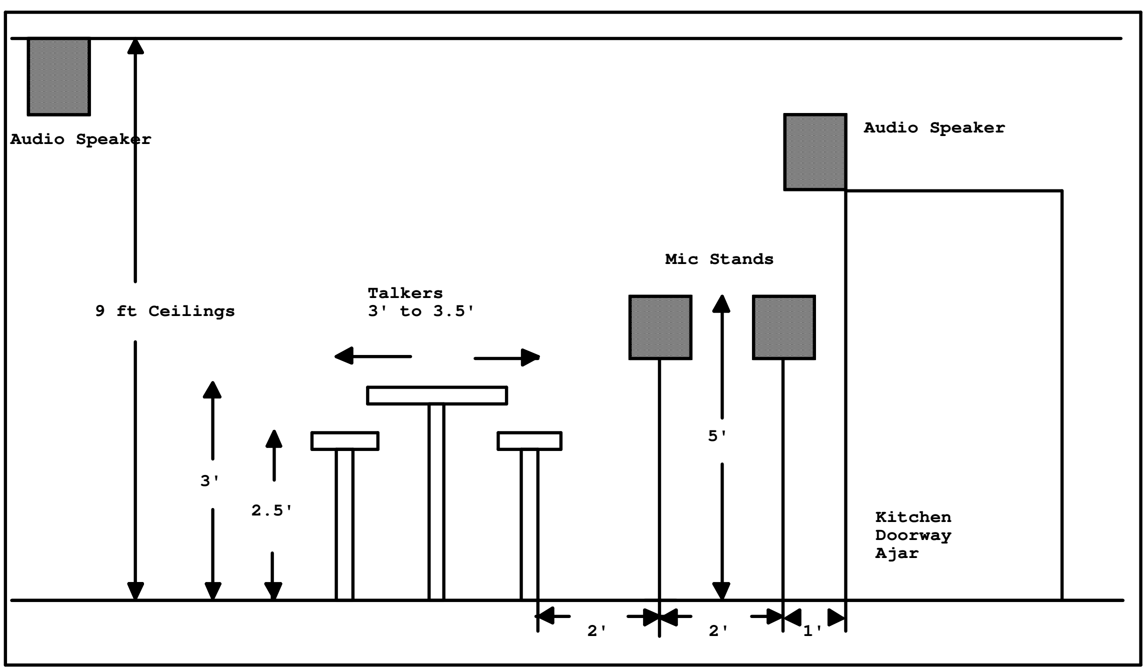

Figure 3.3 Party Scenario from Side

In addition to the audio recordings, the environments' Sound Pressure Level were measured.

3.4 Exceptions

As noted in Section 2.3 Schedule, some of the scripted material was skipped because of time constraints. In addition, other recordings were lost because of equipment failure. The Hallway scenario required the use of portable, battery powered DAT players to record the microphones mounted directly on the talkers. The battery power levels could not be monitored during recording and consequently some amount of material was lost when batteries failed prematurely. This applied to the hallway scenario only. Baseline recordings and the Party scenario recordings are complete. All materials were recorded by the Near and Far Distance mic pairs.

Specifically, the following materials were not recorded from the body mics in the Hallway Scenario.
Talkers CPm and DCm: Only a portion of this pair's role play was recorded on either talker's tapes.
Talkers JKf and ATf : This pair's role play was not recorded from either talker's body mics.
Talkers SCf and MCm: Talker SC's recorder failed for the entire session (lists and role play). Talker MC's microphones were recorded properly for the entire session.

4.0 Results

4.1 Recordings

The data base was delivered to MIT/LL in edited form. It is contained on ten DATs and consists of the following.

DAT #	Title	Material	Length
#1	Baseline recordings	Sentence Material	120min
#2	Hallway and Party Scenario	Ambient Acoustic Noise	60min
#3	Hallway Scenario Body Mics	Sentence and Role Play	120min
#4	Hallway Scenario Body Mics	Sentence and Role Play	90min
#5	Hallway Scenario Far Distance	Sentence and Role Play	120min
#6	Hallway Scenario Near Distance	Sentence and Role Play	120min
#7	Party Scenario Body Mics	Sentence and Role Play	120mins
#8	Party Scenario Body Mics	Sentence and Role Play	120mins
#9	Party Scenario Far Distance	Sentence and Role Play	120min
#10	Party Scenario Near Distance	Sentence and Role Play	120min

Each DAT is labeled and has an annotated listing of its contents as addressable by DAT program numbers. A rough edit removed silence and extraneous information from the ends of recording sessions.
Notes on the data base structure were included with the DATs. These notes are presented in Appendix D of this report. The following tables indicate where the various recorded material is located within the DAT data base. In each table the columns under the heading "DAT/PGM" provide the number of the DAT and the program number on the DAT where the specific recorded material can be found. The caption "Not Recorded" indicates data that was skipped because of schedule restraints or lost because of equipment failures. For the scenarios the recorded material is also separated by microphone pair with the talker's initials indicating their body mics and "Near" - "Far" indicating the closest and furthest wall microphone pairs from the talkers. Table 4.1 provides information for the Baseline Recordings, Table 4.2 for the Hallway Scenario, and Table 4.3 for the Party Scenario.

	Baseline Recordings			
Talker	Gender	HPBs	Anomalous	Verification
		DAT/PGM	DAT/PGM	DAT/PGM
KC	Female	1/1	1/5	1/7
		1/3	1/6	1/9
		1/4		
MC	Male	1/10	1/14	1/18
		1/12	1/16	1/19
		1/13		
DC	Male	1/20	1/23	1/27
		1/21	1/26	1/28
		1/22		
CP	Male	1/29	1/32	1/34
		1/30	1/33	1/35
		1/31		
AT	Female	1/36	1/49	1/53
		1/40	1/52	1/54
		1/44		
JK	Female	1/56	1/62	1/64
		1/58	1/63	1/65
		1/60		
EA	Female	1/66	1/71	1/73
		1/68	1/72	1/74
		1/69		
LM	Female	1/75	1/79	1/82
		1/77	1/81	1/83
		1/78		
SC	Female	1/84	1/87	1/89
		1/85	1/88	1/90
		1/86		
MB	Male	1/91	1/95	1/97
		1/92	1/96	1/98
		1/93		
CB	Male	1/99	1/102	1/104
		1/100	1/103	1/105
		1/101		
RW	Male	1/106	1/110	1/113
		1/107	1/112	1/114
		1/108		

Table 4.1 Baseline Recordings

		Hallway Scenario				
Talker	Gender	Mics	HPBs	Anomalous	Verification	Role Play
			DAT/PGM	DAT/PGM	DAT/PGM	DAT/PGM
KC	Female	KC's	4/1	4/1	4/1	4/3
		MC's	3/1	3/1	3/1	3/3
		Near	5/1	5/1	5/1	5/3
		Far	6/1	6/1	6/1	6/3
MC	Male	MC's	3/2	3/2	3/2	
		KC's	4/2	4/2	4/2	
		Near	5/2	5/2	5/2	
		Far	6/2	6/2	6/2	
DC	Male	DC's	4/4	4/4	4/4	3/6
		CP's	3/4	3/4	3/4	4/6
		Near	5/4	5/4	5/4	5/6
		Far	6/4	6/4	6/4	6/6
CP	Male	CP's	3/5	3/5	3/5	
		DC's	4/5	4/5	4/5	
		Near	5/5	5/5	5/5	
		Far	6/5	6/5	6/5	
AT	Female	AT's	4/8	4/8	4/8	4/9
		JK's	3/8	3/8	3/8	Not Recorded
		Near	5/8	5/8	5/8	5/9
		Far	6/8	6/8	6/8	6/9
JK	Female	JK's	3/7	3/7	3/7	
		AT's	4/7	4/7	4/7	
		Near	5/7	5/7	5/7	
		Far	6/7	6/7	6/7	
EA	Female	EA's	4/14	Not Recorded	Not Recorded	4/15
		LM's	3/10	Not Recorded	Not Recorded	3/11
		Near	5/14	Not Recorded	Not Recorded	5/15
		Far	6/14	Not Recorded	Not Recorded	6/15
LM	Female	LM's	3/9	Not Recorded	Not Recorded	
		EA's	4/13	Not Recorded	Not Recorded	
		Near	5/13	Not Recorded	Not Recorded	
		Far	6/13	Not Recorded	Not Recorded	
SC	Female	SC's	Not Recorded	Not Recorded	Not Recorded	Not Recorded
		MB's	4/11	Not Recorded	Not Recorded	4/12
		Near	5/11	Not Recorded	Not Recorded	5/12
		Far	6/11	Not Recorded	Not Recorded	6/12
MB	Male	MB's	4/10	Not Recorded	Not Recorded	
		SC's	Not Recorded	Not Recorded	Not Recorded	
		Near	5/10	Not Recorded	Not Recorded	
		Far	6/10	Not Recorded	Not Recorded	
CB	Male	CB's	4/16	Not Recorded	Not Recorded	4/18
		RW's	3/13	Not Recorded	Not Recorded	3/14
		Near	5/16	Not Recorded	Not Recorded	5/18
		Far	6/16	Not Recorded	Not Recorded	6/18
RW	Male	RW's	3/12	Not Recorded	Not Recorded	
		CB's	4/17	Not Recorded	Not Recorded	
		Near	5/17	Not Recorded	Not Recorded	
		Far	6/17	Not Recorded	Not Recorded	

Table 4.2 Hallway Scenario Recordings

		Party Scenario				
Talker	Gender	Mics	HPBs	Anomalous	Verification	Role Play
			DAT/PGM	DAT/PGM	DAT/PGM	DAT/PGM
KC	Female	KC's	7/1	7/1	7/1	7/3
		MC's	8/1	8/1	8/1	8/3
		Near	9/1	9/1	9/1	9/3
		Far	10/1	10/1	10/1	10/3
MC	Male	MC's	8/2	8/2	8/2	
		KC's	7/2	7/2	7/2	
		Near	9/2	9/2	9/2	
		Far	10/2	10/2	10/2	
DC	Male	DC's	7/4	7/4	7/4	7/6
		CP's	8/4	8/4	8/4	8/6
		Near	9/4	9/4	9/4	9/6
		Far	10/4	10/4	10/4	10/6
CP	Male	CP's	8/5	8/5	8/5	
		DC's	7/5	7/5	7/5	
		Near	9/5	9/5	9/5	
		Far	10/5	10/5	10/5	
AT	Female	AT's	8/11	8/11	Not Recorded	8/12
		JK's	7/11	7/11	Not Recorded	7/12
		Near	9/11	9/11	Not Recorded	9/12
		Far	10/11	10/11	Not Recorded	10/12
JK	Female	JK's	7/10	7/10	Not Recorded	
		AT's	8/10	8/10	Not Recorded	
		Near	9/10	9/10	Not Recorded	
		Far	10/10	10/10	Not Recorded	
EA	Female	EA's	7/14	7/14	Not Recorded	7/15
		LM's	8/14	8/14	Not Recorded	8/15
		Near	9/14	9/14	Not Recorded	9/15
		Far	10/14	10/14	Not Recorded	10/15
LM	Female	LM's	8/13	8/13	Not Recorded	
		EA's	7/13	7/13	Not Recorded	
		Near	9/13	9/13	Not Recorded	
		Far	10/13	10/13	Not Recorded	
SC	Female	SC's	8/8	8/8	8/8	8/9
		MB's	7/8	7/8	7/8	7/9
		Near	9/8	9/8	9/8	9/9
		Far	10/8	10/8	10/8	10/9
MB	Male	MB's	7/7	7/7	7/7	
		SC's	8/7	8/7	8/7	
		Near	9/7	9/7	9/7	
		Far	10/7	10/7	10/7	
CB	Male	CB's	8/16	8/16	Not Recorded	8/18
		RW's	7/16	7/16	Not Recorded	7/18
		Near	9/16	9/16	Not Recorded	9/18
		Far	10/16	10/16	Not Recorded	10/18
RW	Male	RW's	7/17	7/17	Not Recorded	
		CB's	8/17	8/17	Not Recorded	
		Near	9/17	9/17	Not Recorded	
		Far	10/17	10/17	Not Recorded	

Table 4.3 Party Scenario Recordings

4.2 Sound Pressure Levels

Table 4.4 provides the results from the noise level measurements made during the recordings. Figures 4.1 and 4.2 are strip chart output that indicates any variability in these sound levels for the two scenarios. Measurements were made from the locations indicated in Figures 3.1 to 3.3.

	SPL - unweighted	SPL - C weight	SPL - A weight
Scenario 1: Hallway	67.0 dB	57.0 dB	40.0 dB
Scenario 2: Party	71.2 dB	71.0 dB	65.0 dB

Table 4.4 Sound Pressure Levels

Figure 4.1 Hallway Scenario Strip Chart

Figure 4.2 Party Scenario Strip Chart

4.3 Transcriptions

Rough hand written transcriptions have been made of the conversations from the two scenarios. These transcription have been provided to MIT/LL, in this rough form, separate from this report. The transcriptions are also on file at ARCON Corp.

Appendix A - Talker Release Forms

ARCON, Corp.
260 Bear Hill Road
Waltham, MA 02154
(617) 890-3330
(617) 377-2067

The following contains a brief description of the current project. The purpose of the project and the tasks you are being employed to complete are explained. Carefully read all of the information. Feel free to ask any questions you may have. If you do not feel the answers are adequate or require clarification, please indicate that and further information will be provided. When you are sure you understand the conditions date and sign where indicated.

ARCON Field Recording Effort

This effort is designed to record scripted materials and brief discussions for the future testing of communication devices. You have been selected for this project because of your ability to speak clearly and comfortably in a group situation. You will be asked to read lists of sentences and provide five minutes of discussion on a topic of our choice. Sentence pacing will be determined by the laptop computer presenting the material. In order to minimize the number of repeats that could be required, you will be asked to practice the materials and discussions for a period prior to recording. Breaks will be provided as needed.

Communication does not always take place under ideal circumstances. Therefore, these recordings will be made under realistic conditions. At times you will be asked to provide some of the background environment. Complete instructions will be give. **During recording, it is essential that you use the speaking voice you would normally use for that level of noise and situation.**

A pre-screen hearing evaluation will be administered as a part of your tasking for this project. Recordings will be made of all communications and will become the sole property of ARCON Corporation. These recordings will be used in the future for demonstrations and communication tests. However, talker names and other identifying information will not be used. Informal video taping will be conducted in order to better indicate the timing of events during the audio recordings. These video tapes will not be used for any other purpose than the one indicated, but again will become the sole property of ARCON Corporation.

You have agreed to participate for the time required; 9AM to 6PM on 23 June 1996. You will be paid $100.00 for the day. Although your presence may not be required during a portion of the day, it is **CRITICAL** that you complete all the recording we have scheduled in both the morning and late afternoon. Thus, you **must** be present for the afternoon session at the time indicated, regardless of when you complete the morning recordings. If you do not complete the full set of recordings (excepting ARCON problems such as equipment failure), you will be paid at the rate of $5.00 per hour for the hours worked.

Appendix A (Continued)

If there are any questions or problems in the future regarding this effort they should be addressed to:

JOHN TARDELLI
or
ELIZABETH WOODARD KREAMER
ARCON, Corp.
260 Bear Hill Road
Waltham, MA 02154
(617) 890-3330

Copies of this task description are available for your future reference.

****

I have read the task description presented above and agree to participate under the conditions presented. I understand that my speech recordings may be used in the future by ARCON and their customers for communication tests or demonstrations, but that I will never be identified by name or other personal data.

Signed:

Please Print Name:

SSN: _______-_______-

Today's Date: ______-______-
Month Day Year

Birth Date: ______-______-
Month Day Year

Appendix A (Continued)

ARCON, Corp.
260 Bear Hill Road
Waltham, MA 02154
(617) 890-3330

ARCON Field Recording Effort

This effort is designed to record scripted materials and brief discussions for the future testing of communication devices. You have volunteered to be an Extra in the party scenario for this project. You will be asked to provide interchange and party sounds typical of a barroom environment. Complete instructions will be give. **During recording, it is essential that you use the speaking voice you would normally use for that level of noise and situation.**

Recordings will be made of all communications and will become the sole property of ARCON Corporation. These recordings will be used in the future for demonstrations and communication tests. However, names and other identifying information will not be used. Informal video taping will be conducted in order to better indicate the timing of events during the audio recordings. These video tapes will not be used for any other purpose than the one indicated, but again will become the sole property of ARCON Corporation.

You have agreed to participate until 6PM on 23 June 1996. If there are any questions or problems in the future regarding this effort they should be addressed to JOHN TARDELLI or ELIZABETH WOODARD KREAMER. Copies of this task description are available for your future reference. Carefully read all of the information. Feel free to ask any questions you may have. If you do not feel the answers are adequate or require clarification, please indicate that and further information will be provided. When you are sure you understand the conditions date and sign where indicated.

****

I have read the task description presented above and agree to participate under the conditions presented. I understand that recordings may be used in the future by ARCON and their customers for communication tests or demonstrations, but that I will never be identified by name or other personal data.

Signed:

Please Print Name:

SSN: ______-______-

Today's Date: _____-_____-
Month Day Year

Birth Date: _____-_____-
Month Day Year

Appendix C - Conversational Role Plays

PRACTICE ROLE PLAY 1

Person A

You and a friend are discussing the merits of having cats or dogs as pets. You have four cats and feel that you have the freedom to do what you want when you want. Among other things, having a dog requires that it be walked, cleaned up after and that you keep some sort of schedule that has you home even when you don't want. You also like the independence of cats, but feel that they are very much in tune with you and your needs.

Person B

You and a friend are discussing the merits of having cats or dogs as pets. You have two dogs and feel that you have the freedom to do what you want when you want. Having a cat requires that it be cleaned up after. Cats destroy furniture, crawl all over everything, and are spooky. A dog worships its owner while a cat lets you take care of it with little thanks.

PRACTICE ROLE PLAY 2

Person A

You and several friends are planning on a night out next weekend to go to a dinner and a movie. Like most groups, no one wants to be the one to make the plans so you are meeting with one of the group to discuss where to go and what movie to see. You are not picky about what movie you see, as long as it is an action or adventure. Also, since you have become a vegetarian, you are concerned about the restaurant. You definitely want to go someplace where you can have a good time and not spend a lot of money. Someplace where you can have a vegetarian pizza would be ideal. You feel that the rest of the crowd would have a good time at a place like this.

Person B

You and several friends are planning on a night out next weekend to go to a dinner and a movie. Like most groups, no one wants to be the one to make the plans so you are meeting with one of the group to discuss where to go and what movie to see. You do not care what movie you see, but you want to see a comedy. Also, since you have become concerned about your health and/or weight, you are picky about the restaurant. You figure that since the group does not get out together often you are not worried about spending a lot of money and don't think anyone else should be either. You believe that you should go somewhere quiet and posh where everyone can get what they want. You feel that you know what is best for the group since you have known most of them longer than your friend.

PRACTICE ROLE PLAY 3

Person A

You have purchased an outfit that once washed frayed at several seams. It cost $150. You have had it with low quality merchandise and decided to take it back to the store. You did not pay attention to the refund policy when you bought it and now have been told that you must accept store credit at the price it is on sale for now. You do not have your receipt. You paid full price. You do not want to purchase anything else here. You want all of your money back. Remember it is a role play and do not get too hostile.

Person B

Someone has just come to return an outfit that looks worn. You have been directed not to accept returns without a receipt unless absolutely cornered. At that point you must give store credit for the lowest price that an item was ever sold at. This outfit is currently on clearance at $75.00. You are looking at going into management, so you want to impress with your finesse at handling of this issue. Remember it is a role play and do not get too hostile.

Appendix C (Continued)

Hallway Scenario - Stereo Equipment Role Play

Person A: Is selling stereo equipment

You have access to a stereo set-up that you have agreed to try to sell with the understanding that you will split the proceeds with the owner. The guy (Bruno ???) who has it is not someone you know well. He told you he was new to the area and since you know a lot more people than he does and he really needed cash, he is willing to share the profit to get it sold. He requires $500 for himself and he said it **has** to be a cash sale. You are pretty sure it is stolen property, but you are not sure how or from whom.

Because you are really short of cash, you see this as an opportunity to get some without Uncle Sam knowing about it. You have seen the stereo and figure you can get over a thousand easily from an acquaintance who has just gotten into a new place and really wants a stereo system, but does not have a lot of money either. Since you both work in the same place, you are going to present the idea and firm up the deal the next time you see him/her in a private place without them ever seeing the equipment.

The stereo includes Dolby pro-logic (home theater capable) tuner, CD player, some sort of home theater speaker system, and whatever else you want to add to make it a deal.

You have just bumped into this person in the hallway of the building where you work. You believe you are known to be assertive and out-going so the other individual should not be surprised that you are making an offer like this. You figure they are pretty laid back and should be easy to manipulate. You want to do a lot of the talking so they can not ask too many questions.

Please present as much as you can about the stereo and discuss the deal for 5 minutes.

Person B: Is buying stereo equipment

You have just moved into a new place and your really old component stereo amplifier and tuner just died. You have looked into repairing it, but were told that it was not going to be worth the cost particularly since the rest of the components are the same age. You have an extensive music collection that includes videos, CDs, tapes, and some very old disks. You have looked at several systems but to really get one that will cover all of your needs, you would have to spend a lot more than you can readily afford. Particularly with all of the other furnishings you would like to get for your new place. You do have access to about $1500 cash, but since you have been saving for lots of things you hate to blow it all on a stereo system.

An acquaintance from work has just bumped into you in the hallway and makes you an offer for a system he has access to. This person is known to a bit pushy and have shady pals, so you are not surprised at an offer like this. The deal being offered sounds pretty good - too good. You would like to see the stereo. But you really want the system for no more than $750. Since you are pretty sure it has come from a less than legal source, you figure it should be pretty easy.

You are pretty sure people think you are gullible and easily manipulated, but that is **not** the case. If anything you are quite stubborn and determined when you want something your way. You will not let this person monopolize the conversation.

Please find out as much as you can and discuss the deal for 5 minutes.

Appendix C (Continued)

Party Scenario - Used Car Role Play

Person A: Is selling a used car

You have a used car that you have to sell in order to buy the new car of your dreams. It is a 92 Ford Tempo that has given you lots of little problems in the two years you have owned it. It has an air conditioner, electronic windows etc., a good stereo and looks good even though it is a boring gray. It originally was a lease car the dealer got back, and you figure that was because of the fact it runs rough. That is one of the small problems you have taken it in for and they have never been able to figure out why. It still has 6 months on the extended warranty you were given when you bought it from the dealer. The blue book value is over $8500. The dealer you went to for your new car offered you $3500 for it as a trade. You absolutely need $7000 to afford your car...obviously anything more would be nice.

You placed an ad in the paper and have had little response. Someone has just introduced you to a friend of theirs who is in the market for the car. You figure this is the perfect place to sell it because they probably have had a few drinks. The two of you just took it out for a short ride and are discussing the deal. You believe you are known to be assertive and out-going. They look pretty laid back and should be easy to manipulate.

Please discuss the deal for 5 minutes.

Person B: Is buying used car

You need a car. Yours was just totaled and the insurance company paid off $6000. Although you have some other cash available, you really do not want to use it. A friend has just introduced you to someone who has a 92 Ford Tempo for sale. It has an air conditioner, electronic windows etc., a good stereo and looks good even though it is a boring gray. You just took it out for a drive and it ran a bit rough but otherwise seemed really decent.

You definitely would like to buy it. However, you do not want to feel like you are getting taken advantage - again - particularly in light of the 11 month-old, laptop computer that you bought from a store that is part of a chain of computer distributors. It died and you are still trying to get them to fix it, so you know what dealing with warranties entails. You want as much information about the car as you can get.

You are pretty sure people think you are gullible and easily manipulated, but that is **not** going to be the case this time. If anything you are quite stubborn and determined when you want something your way. You will not let this person monopolize the conversation.

Please discuss the deal for 5 minutes.

Appendix D - Notes on the Pilot Data Base

Notes on DATs for the Pilot Data Base: A Corpus of Noisy Speech 02-July-1996
Paul D. Gatewood -ARCON Corporation

There are ten DAT tapes that comprise all data gathered for this effort. A brief description of each follows:

1) Baseline Recordings - This two hour DAT contains all sentence list material used by all talkers. This includes Harvard Phonetically Balanced sentences, Anomalous sentences, and Verification sentences. Talkers were recorded in a quiet office using the Sony ECM77-B Lavalier Microphone and an Altec 659A Dynamic microphone. This DAT is unedited. Multiple takes exists for various lists. There has been no attempt to equalize presentation levels across lists or talkers. Each take has it's own Program Number.

2) Ambient Noise Environment Recordings - This one hour DAT contains 5 minute samples of the environment without talkers. A B&K Type 4155 microphone and a Sony ECM77-B microphone were used for the recordings made at the talker's assigned location for both the Hallway and the Party scenarios. A 94dB SPL Calibration Tone is included on the B&K track. Announcements include the SPLs at various weightings. Simultaneous recordings were generated using the Near and Far Distance microphone Pairs (Sony ECM77-Bs). These are also included on this DAT.

DATs #3-6 were recorded simultaneously
3 - 4) Hallway: Body Mics - These two tapes include all sentence and Role Play material recorded for all talkers in the Hallway scenario. Two Sony ECM77-B Lavalier Mics were used on each talker. For a given talker pair, tape 3 has Talker A's mics recording Talker A's sentence lists, Talker B's sentence lists and Talker A & B's Role Play while tape 4 has Talker B's mics recording Talker A's sentence lists, Talker B's sentence lists and Talker A & B's Role Play. Program numbers mark the start of each talker's sentence lists and the start of each Role Play. Synchronization Signals are at the start of a pair of talkers wordlists and each Role Play.

5) Near Distance Mics - This DAT includes all sentence and Role Play material recorded for all talkers in the Hallway scenario. This pair actually ended up being farther from the talkers than the Far Distance Mics (about 10' away and 3/4 up an open staircase) Two Sony ECM77-B Lavalier Mics were used. Program numbers mark the start of each talker's sentence lists and the start of each Role Play. Synchronization Signals are at the start of a pair of talkers wordlists and each Role Play.

5) Far Distance Mics - This DAT includes all sentence and Role Play material recorded for all talkers in the Hallway scenario. This pair actually ended up being closer to the talkers than the Near Distance Mics (about 8' away and around 2 corners). Two Sony ECM77-B Lavalier Mics were used. Program numbers mark the start of each talker's sentence lists and the start of each Role Play. Synchronization Signals are at the start of a pair of talkers wordlists and each Role Play.

DATs #7-10 were recorded simultaneously
7 - 8) Party: Body Mics - These two tapes include all sentence and Role Play material recorded for all talkers in the Party scenario. Two Sony ECM77-B Lavalier Mics were used on each talker. For a given talker pair, tape 7 has Talker A's mics recording Talker A's sentence lists, Talker B's sentence lists and Talker A & B's Role Play while tape 8 has Talker B's mics recording Talker A's sentence lists, Talker B's sentence lists and Talker A & B's Role Play. Program numbers mark the start of each talker's sentence lists and the start of each Role Play. Synchronization Signals are at the start of a pair of talkers wordlists and each Role Play.

9) Near Distance Mics - This DAT includes all sentence and Role Play material recorded for all talkers in the Party scenario. Distance was about 6' away. Two Sony ECM77-B Lavalier Mics were used. Program numbers mark the start of each talker's sentence lists and the start of each Role Play. Synchronization Signals are at the start of a pair of talkers wordlists and each Role Play.

10) Far Distance Mics - This DAT includes all sentence and Role Play material recorded for all talkers in the Party scenario. Distance was about 8' away. Two Sony ECM77-B Lavalier Mics were used. Program numbers mark the start of each talker's sentence lists and the start of each Role Play. Synchronization Signals are at the start of a pair of talkers wordlists and each Role Play.