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Laboratory Study of the Noticeability and Annoyance of Sounds of Low Signal-to-Noise Ratio

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Abstract

This report describes a study of the noticeability and annoyance of intruding noises to test participants who were engaged in a distracting foreground task. Ten test participants read material of their own choosing while seated individually in front of a loudspeaker in an anechoic chamber. One of three specially constructed masking noise environments with limited dynamic range was heard at all times. A laboratory computer produced sounds of aircraft and ground vehicles as heard at varying distances at unpredictable intervals and carefully controlled levels. Test participants were instructed to click a computer mouse at any time that a noise distinct from the background noise environment came to their attention, and then to indicate their degree of annoyance with the noise that they had noticed.

The results confirmed that both the noticeability of noise intrusions and their annoyance were closely related to their detectability. The current data support plausible definitions of noticeability roughly from $D'L = 10$ dB to $D'L = 25$ dB. A relationship between $D'L$ and the percentage of test subjects moderately or more annoyed by noticed sounds exhibited a well ordered monotonic growth function similar to that observed in large scale social surveys.

1   INTRODUCTION

1.1   PURPOSE OF STUDY

Prediction of the noticeability and annoyance of low level noise intrusions has been a matter of longstanding concern in assessment of environmental noise exposure effects. Annex A of a current working draft of ANSI S12.9 ("Quantities and Procedures for Description and Measurement of Environmental Sound—Part 4. Assessment Methods"), for example, contains a lengthy treatment of the relationship between the levels of intruding noises and background environments in which they are heard, discussing conditions under which "background noise adjustments" may or may not be appropriate to assessments of the annoyance of intrusive sounds. As noted by Fidell, Teffeteller, Horonjeff and Green (1979),

> "...noises that neither materially affect L_{dn} nor cause speech interference may create considerable annoyance. In fact, the relationship between annoyance and exposure levels below about L_{dn} = 65 dB is not strong enough to support confident prediction of annoyance... Instead, it appears that the degree to which low-level noises annoy people may be related to the degree to which they intrude upon awareness."

Fidell *et al.* (1979) have shown that the detectability[1] of a set of two dozen common environmental sounds predicted their annoyance when these sounds were heard at levels that did not greatly exceed the background noise environment. Fidell and Teffeteller (1981) have further demonstrated that annoyance ratings for low level sounds are proportional to their detectability. Recent applications of such findings include:

> (1) establishment for National Park Service administrative purposes of a threshold of "noticeability" of low level aircraft noise intrusions referenced to a detectability level of D′L = 17 dB.

> (2) incorporation of an integrated detectability metric (in units of d'-seconds) into an aircraft noise effects prediction software intended or use in park and wilderness settings (*cf.* Fidell and Reddingius, 1992; Fidell *et al.*, 1992; and Reddingius, 1994).

The National Park Service has recently recommended to the Federal Interagency Committee on Aircraft Noise that major changes be made in standard methods of assessment of environmental noise impacts and criteria for gauging of land use compatibility. These changes concern the case in which noise intrusions do not differ greatly in level from background noises.

The present study was designed to develop information about the noticeability and annoyance of noise intrusions with D′L values as high as 30 dB that may be useful in refining noise assessment methods. It was hypothesized that the noticeability and annoyance of sounds that do not differ greatly from ambient noise levels would be readily predictable from their detectability.

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[1] Detectability is determined acoustically by bandwidth-adjusted signal-to-noise ratio. Appendix A describes a system of units based on the scalar quantity, d', to quantify detectability.

1.2 ORGANIZATION OF REPORT

Chapter 2 describes the methods adopted for testing the hypotheses of current interest. Chapter 3 presents the results of this study, while Chapter 4 discusses several implications of these findings. Chapter 5 contains conclusions and recommendations for further study.

2 METHOD

The prior study of the noticeability and annoyance of sounds of low signal-to-noise ratio with goals most directly comparable to those of the current study presented test signals to subjects by the psychophysical method of limits. Fidell and Teffeteller (1981) required test subjects engaged in a foreground task intended to distract their attention from noise intrusions to report when a staircase of sequential, fixed duration signal presentations reached a level at which a signal was noticed. A different signal presentation schedule was adopted for the present study to avoid errors of anticipation inherent in the method of limits.

2.1 OVERVIEW OF SIGNAL PRESENTATION CONDITIONS

All sounds were presented for judgment in the current study under free-field listening conditions in an anechoic chamber. Five different signals (described in Section 2.3) were presented to individual test subjects at four levels, in the presence of three broadband background noise environments (described in Section 2.4), for a total ensemble of 60 signal/presentation level/background noise conditions per test subject.

Signal presentation levels were selected such that each signal was heard in each background noise environment over a range of detectability levels from approximately $D'L = 5$ dB through approximately $D'L = 30$ dB. The order of presentation of test signals as well as their presentation levels were randomized independently for each test subject. Spectra for these signals and the background noise environments in which they were presented may be found in Appendix D.

2.2 INSTRUMENTATION

All aspects of data collection were directed by custom software executing on an IBM PC that controlled Tucker-Davis Technologies signal processing modules shown schematically in Figure 1. Test signals were digitally processed, stored on disk, and reproduced during testing through a 16-bit D-A converter as described in Section 2.3. Background noise environments were synthesized as described in Section 2.4, and stored on digital audio tape. The start of the tape was marked by a cue that permitted the tape to be synchronized with the clock in the computer controlling the remainder of the signal processing equipment. Thus, signal-to-noise ratios could be determined on a moment-by-moment basis throughout the course of data collection.

2.3 TEST SIGNALS

The five signals selected for this study were an L-1011 landing, a B-1B low-altitude flyby, a commercial truck driveby, a mid-sized automobile driveby, and a three-car commuter train passby. Efforts were made to preserve the realism of relationships among signal presentation level, spectral content and signal duration. This was accomplished by producing four variants of prototype recordings that had been made of each noise source at relatively short ranges. Use of the identical noise source for each distance condition minimized the possibility that test subjects would notice uncontrolled attributes of different recordings.

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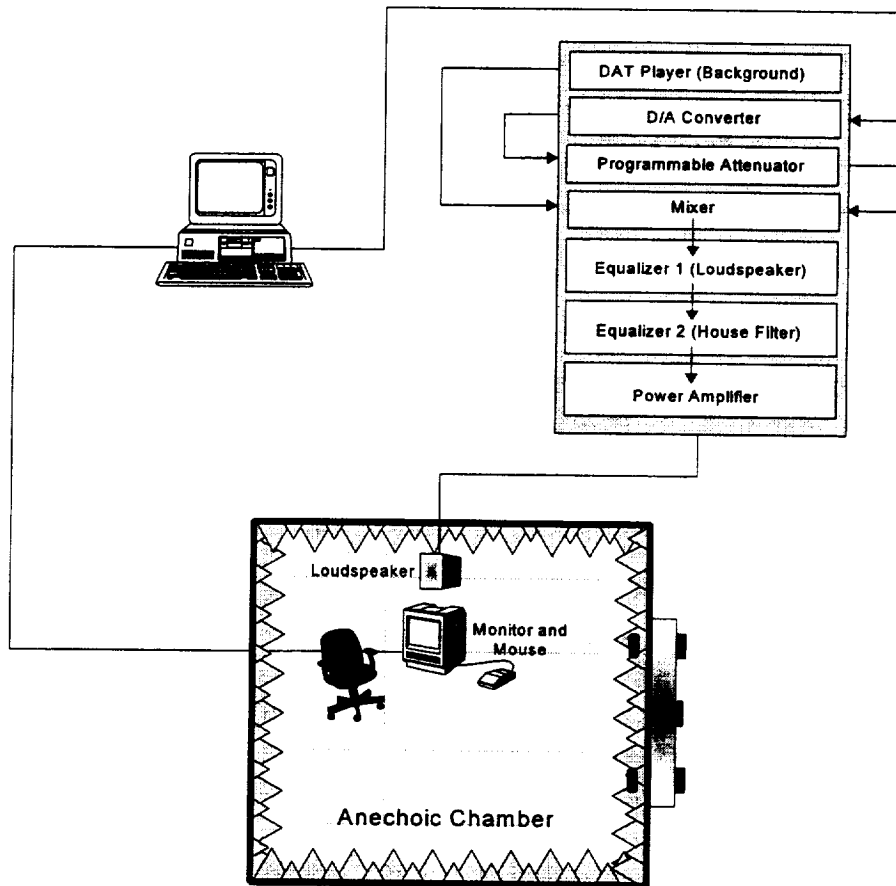
Figure 1   Diagram of adaptive signal generation and response recording system.

Field recordings of the five signals were digitized and processed to give the impression of four different ranges as follows:

- The original recording of each signal was digitally compressed to create the appropriate level-*vs*-time profile for increased listening distance.

- The absolute signal level was reduced to account for the spherical spreading losses at each new distance.

- The resulting signal was low-pass filtered to account for the additional atmospheric attenuation at each new distance, using the standard-day SAE atmospheric absorption coefficients.

The nominal durations of the resulting signals ranged from 20-30 sec.

2.4 BACKGROUND NOISE ENVIRONMENTS

Three continuous background noises depicted in Appendix D were created for use in this study:

- An "urban" background containing readily recognizable street and traffic sounds. The spectrum shape of this background fell at approximately 4 dB/octave between 125 Hz and 2,000 Hz.

- A "voices" background composed of the indistinct babble of twelve simultaneous speakers with no individually recognizable words. The spectrum shape of this background fell at approximately 2 dB/octave between 125 Hz and 2,000 Hz.

- A "rural" background containing distinct birdsong and running water sounds. The spectrum shape of this background was nearly flat between 125 Hz and 2,000 Hz.

These backgrounds were synthesized by mixing an appropriately shaped pink noise spectrum with actual environmental recordings. The mixed signals were then compressed in a manner that reduced the wide dynamic range of the original environmental recording but preserved its character. This process yielded a set of realistic-sounding backgrounds with stable and well-controlled spectral and temporal characteristics. Each background was transferred to a 2-hour DAT cassette for reproduction during testing sessions.

As heard during the course of data collection, the mean A-weighted presentation levels of the three background noise environments were 47.3 dB, 44.1 dB, and 44.2 dB, respectively.

2.5 SIGNAL PRESENTATION LEVELS

Prior to testing, each of the DAT recordings of the three background noise environments and each of the digitized test signals were separately reproduced in the anechoic chamber and measured at the test subjects' listening position. One-third octave band spectra were stored at one-half second intervals to permit exact calculation of the detectability levels of signals on an individual presentation basis when they were noticed by test subjects during data collection. Nominal maximum detectability levels (*i.e.*, the maximum one-half second d' level) for all 20 test signals in the urban background noise environment are shown in Table 1. Presentation levels of the other two background noise environments were adjusted to yield very similar detectability levels.

D'L calculations were made each one-half second by separately calculating d' in each one-third octave band from 40 Hz to 10 kHz and taking the maximum as the d' for that one-half second sample. The resulting time series of d' was either integrated (to obtain integrated D'L), or the peak value was retained (to obtain maximum D'L).

For a given test session, the playback from the selected background tape was mixed with the test signals reproduced by the computer. The combined signal was passed through two one-third octave band equalizers and then to the power amplifier and loudspeaker. The first equalizer provided loudspeaker equalization, and the second equalizer provided the insertion loss shown in Figure 2 to approximate the noise reduction of a typical house.

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Table 1   Typical values of maximum D'L for each test signal at each simulated listening distance.

TEST SIGNAL	SIMULATED LISTENING DISTANCE			
	Closest to source	First intermediate distance	Second intermediate distance	Farthest from source
Military aircraft flyover	26.4 dB	21.5 dB	15.0 dB	10.4 dB
Transport aircraft landing	30.0 dB	21.2 dB	15.0 dB	9.9 dB
Automobile driveby	24.2 dB	19.5 dB	13.1 dB	8.0 dB
Truck driveby	28.7 dB	21.4 dB	14.1 dB	10.1 dB
Commuter train passby	24.5 dB	20.7 dB	14.3 dB	9.1 dB
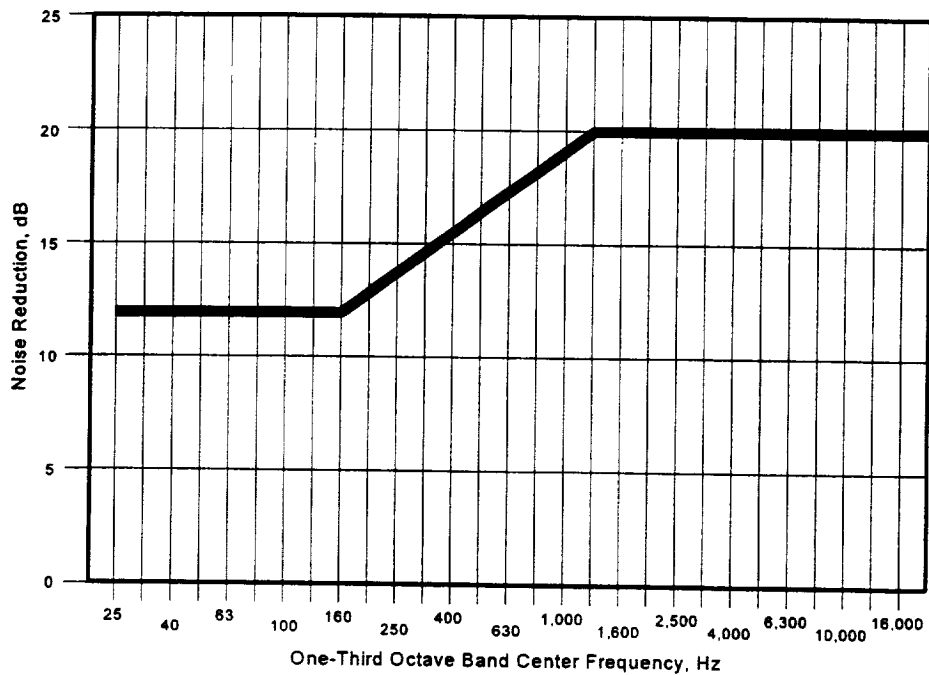
Figure 2   Response of filter used to approximate the noise reduction provided by a typical one-family frame house with windows partly open.

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2.6 TEST SUBJECTS AND INSTRUCTIONS

Informed consent was obtained from seven women and three men, ranging in age from 18 to 54 years, to take part in this study. Subjects were audiometrically screened to within a hearing level of 20 dB re audiometric zero over the frequency range from 100 to 6,000 Hz.

Test subjects reading self-selected newspapers, magazines, or similar light material of their own choice were asked to click a mouse on a screen icon when they noticed a sound that they found notable, annoying, or otherwise would rather not have heard. They were asked at the conclusion of each noticed signal presentation for a forced choice rating of the annoyance of each sound in one of the following response categories:

1. Not at all annoying
2. Slightly annoying
3. Moderately annoying
4. Very annoying
5. Extremely annoying

A failure to respond within 5 seconds of the termination of a sound was considered as a failure to notice the occurrence of the sound. A response made during the presentation of a sound was registered, but did not affect the level or duration of the remainder of the presentation.

Subjects were provided an opportunity at the start of each data collection period to familiarize themselves with the background noise environment for that session. They were told that any sounds heard during the first several minutes of each session were to be considered as part of the background rather than as intrusive sounds. An incentive plan that paid a bonus to the test subject whose responses came closest to the grand mean annoyance rating for all signals was implemented to minimize the likelihood of non-responsive test subjects.

Further details of informed consent and test instructions may be found in Appendix B.

2.7 TRIAL PROCEDURE

Testing was conducted in five 2-hour sessions, with rest breaks provided every 30 minutes in which test subjects were required to leave the anechoic chamber. One of three background noises was continuously present during each of the 2-hour sessions. Five test signals were scheduled for presentation at random times during each 25-minute period with intervals between presentations ranging from about 3 to 5½ minutes. Figure 3 is a representative time line for a single trial.

Test subjects' responses occurring during *bona fide* signal presentations and false alarm responses were treated identically. In both cases, annoyance judgments were solicited between 0 and 35 seconds after a response was made. The occurrence of a false alarm caused the same length delay as that used for legitimate signals (ranging from 3 to 5½ minutes), prior to presentation of the next signal. Because of this, false alarms had the net effect of extending the duration of the test sessions.

All test subjects completed ten hours of testing, with two sessions (four hours) using the "rural" background signal, two sessions using the "voices" background, and one session using the "urban" background.

Signal presentation
20 to 30 seconds

Listener response interval
Subject-dependent (typically 5 seconds)

Inter-signal interval
150 to 270 seconds

Waiting period
5 seconds

Inter-signal interval
150 to 270 seconds

Listener Signal Detection Anytime Within This Period
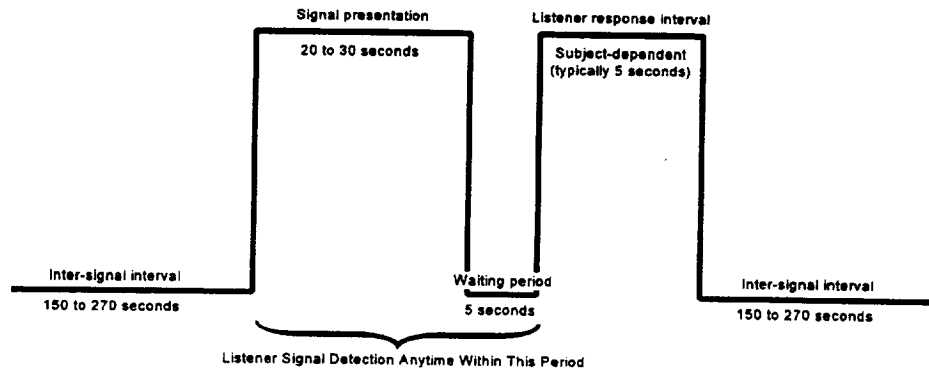
Figure 3   Representative time line for single trial.

3   RESULTS

Each response made during the course of data collection was a report that a test subject had noticed a sound. These reports were classified as either hits or false alarms. A "hit" was a response made during the presentation of a signal or within a grace period of 5 seconds after the conclusion of the signal. A response made at any other time was considered to be a "false alarm," in that the sound that the subject had noticed was a part of the background noise environment rather than one of the test signals.

A failure to respond during a signal presentation or within the grace period of 5 seconds was considered a "miss." Annoyance ratings were solicited for hits and false alarms. Appendix E contains a record of each test subject's responses in all test sessions. This section describes summary relationships among signal presentation levels and responses.

3.1   RELATIONSHIP BETWEEN DETECTABILITY LEVEL AND PERCENTAGES OF NOTICED AND MISSED SIGNAL PRESENTATIONS

Figure 4 shows the distributions of D'L values for both missed and noticed signal presentations. The means of the two distributions are significantly different from one another at the .01 level of confidence ($t_{df=356}$ = -14.1).

Figure 5 shows percentages of hits and misses as a function of D'L for all signals in all background noise environments. These D'L values were calculated on a per-event basis with reference to the measurements described in Section 2.4 from knowledge of the time at which the signal was presented and of the starting time of the DAT recording. Signals with D'L values smaller than about 15 dB did not reliably come to the attention of test subjects. Signals with D'L values between about 20 dB and 30 dB were missed only about 10% of the time. Signals with D'L values greater than 30 dB only rarely escaped notice.

3.2   RELATIONSHIP BETWEEN MAXIMUM A-WEIGHTED SIGNAL LEVEL AND PERCENTAGES OF NOTICED AND MISSED SIGNAL PRESENTATIONS

Figure 6 displays information similar to that seen in Figure 5 as a function of the maximum A-weighted signal presentation level. Signals presented at levels below about 45 dB were not reliably noticed. Those presented at A-weighted levels between 45 dB and 52 dB were missed only about 10% of the time. Signals presented at levels in excess of about 53 dB were only rarely missed. (As noted in Section 2.4, the A-weighted background levels ranged from 44-47 dB.)

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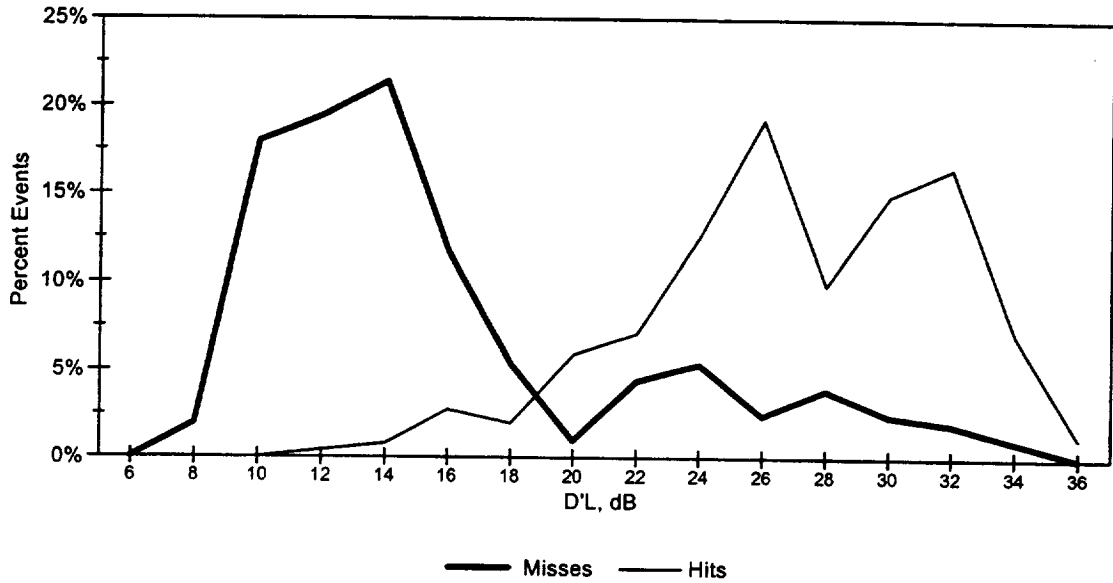
Figure 4   Distribution of misses and hits.
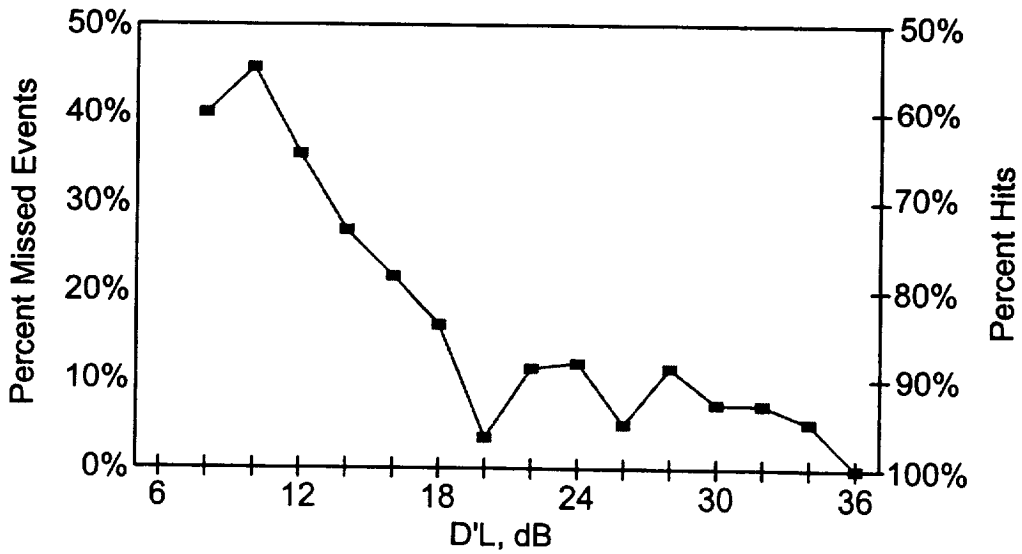
Figure 5   Percent of missed events and hits (all data).

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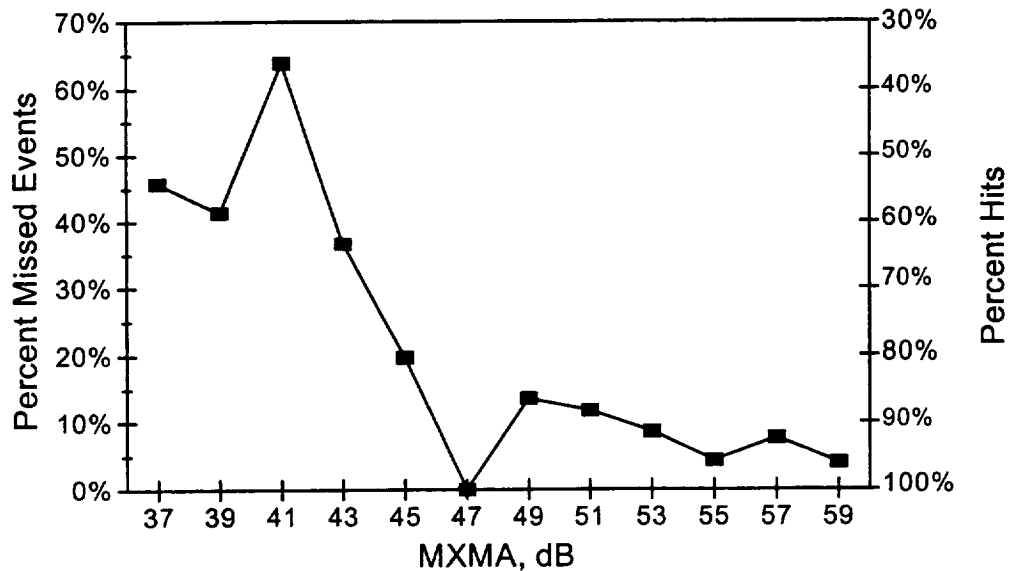
Figure 6   Percent of missed events and hits (MXMA).

3.3   DIFFERENCES IN FALSE ALARM RATES IN BACKGROUND NOISE ENVIRONMENTS

Figure 8 shows that test subjects made many more false alarms in the urban background noise environment than in the other two background recordings. The urban background environment contained many more recognizable noise events than the other two. While a few test subjects were able to discriminate reasonably well between the discrete noise events that could be heard in the urban environment and the test signals (see, for example, the results in Appendix E for Subject 2010 in Session 5), most made so many false alarms that insufficient time remained for presentation of the actual test signals (e.g., Subject 2009 in session 5). The urban background recording contained so many recognizable noise sources that performance in this test condition was not directly comparable with performance in other test conditions. It may be possible to perform separate, additional analyses on the urban dataset in the future.

3.4   OVERVIEW OF ANNOYANCE AND MISSED SIGNAL DATA

Figure 7 presents an overview of the relative proportions of annoyance ratings assigned to noticed signal presentations and the prevalence of missed signal presentations. The data are grouped in 5 dB intervals of D'L values. As D'L values increase, the proportions of missed signal presentations and annoyance judgments in the categories of lesser intensity generally decline, while the proportions of annoyance judgments in the categories of greater intensity generally increase.

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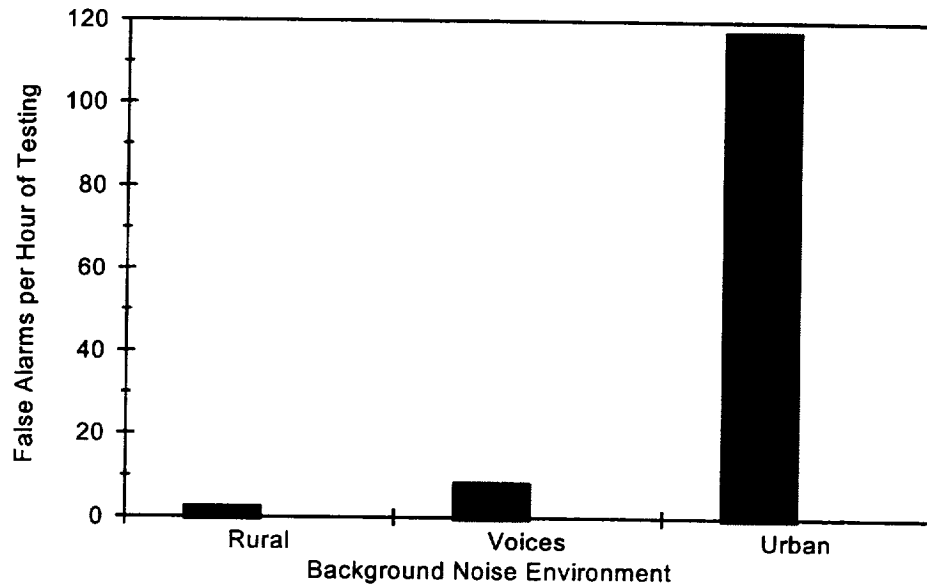
Figure 8   False alarm rate.
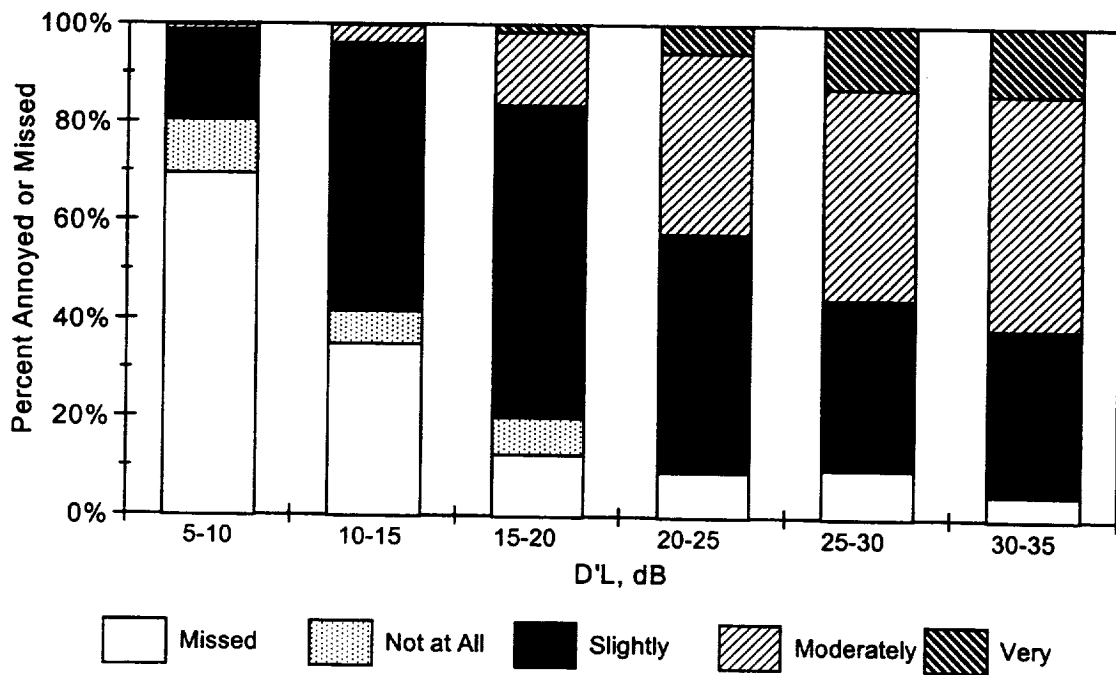
Figure 7   Percent annoyed or missed (all backgrounds).

3.5 RELATIONSHIP BETWEEN DEGREE OF NOTICEABILITY AND ANNOYANCE JUDGMENTS

Figure 9 shows the distribution of annoyance ratings over D'L values that were made in all three background noise environments. The mean value for each rating group is indicated by a horizontal mark. Perhaps the most obvious feature of these distributions is their large variance. The modal judgment was "slightly" annoying. The mean value of the distribution of "slight annoyance" judgments occurred at a D'L value of 19 dB. Mean values for judgments in other annoyance categories were monotonically related to D'L values.

Figure 10 summarizes the relationships between D'L and annoyance judgments for two groupings of response categories. The leftmost set of points represents the percentage of noticed sounds judged to be at least slightly annoying (that is, "slightly," "moderately," "very," or "extremely" annoying). The rightmost set of points represents the percentages of noticed sounds judged to be moderately annoying (that is, "moderately," "very" or "extremely" annoying).
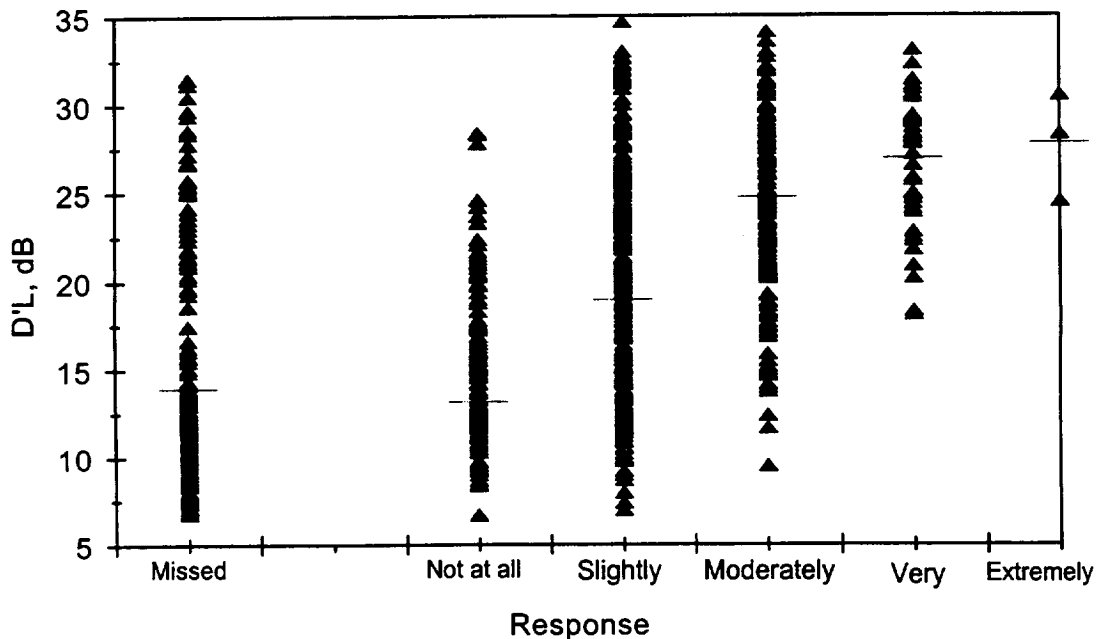
Figure 9   Signal levels for annoyance ratings (all data).

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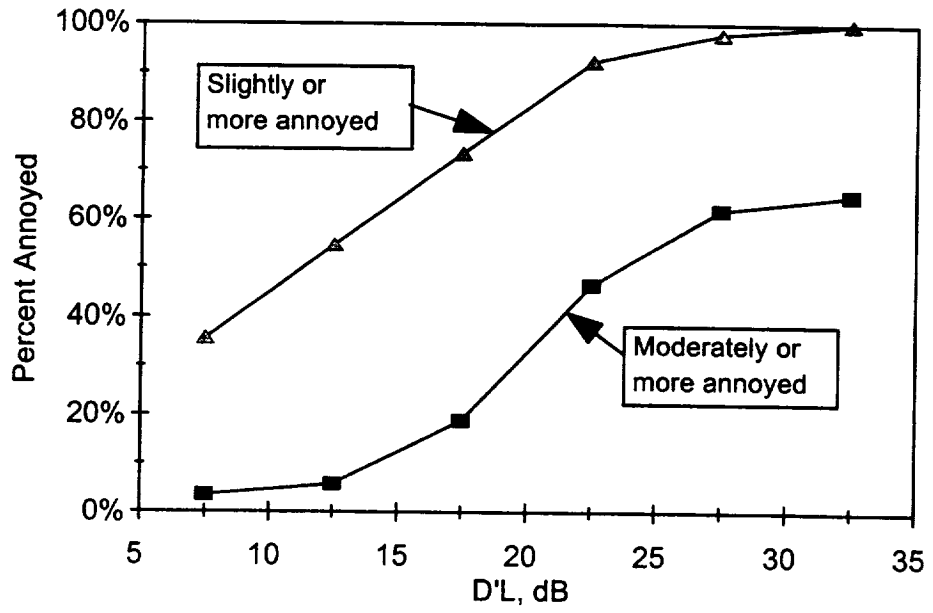
Figure 10   Comparison of two sets of cumulative annoyance ratings: slight or greater annoyance, and moderate or greater annoyance.

4 DISCUSSION

The orderly and readily interpretable patterns of findings reported in Chapter 3 suggest that despite the modest numbers of signal presentation conditions, test subjects and judgments, inferences meriting reasonable confidence may be drawn from this study. These patterns include most notably monotonic relationships between D'L values and probabilities of noticing signals, and monotonic relationships between D'L values and annoyance judgments of increasing intensity.

4.1 IMPLICATIONS OF FINDINGS CONCERNING NOTICEABILITY

A d' of 4 (D'L = 6 dB) suffices for test subjects whose attention is focused on an acoustic signal detection task (for example, in a repetitive series of yes-no trials with well defined listening intervals) to correctly report the presence of a signal 95% of the time with a 1% false alarm rate (Swets, 1964). Figure 11 shows the ratio of missed events to total events as a function of D'L, grouped in 2-dB wide intervals, for the voices and rural background data. An exponential function of the form $y = e^{-(x-a)/b}$ provides a reasonable fit to these data ($r^2 = .76$) in the current study. While there is no particular theoretical basis for fitting these data with an exponential, doing so illustrates that there is no single point at which noises become noticeable. For example, signals with D'L values of 12 dB will be noticed approximately 50% of the time, while signals with D'L values of 18 dB will be noticed approximately 85% of the time, and so on. Therefore, setting a criterion for noticeability of signals of this type requires a clear definition of the hit rate of a "noticeable" signal.

Laboratory findings of the current sort will require substantiation under field conditions before they are widely accepted for environmental assessment purposes. They nonetheless provide some indication of a "floor" for evaluating the effects of low level noise intrusions, based on an argument that sounds that escape notice are unlikely to have any meaningful impacts.

It is not particularly surprising that test subjects made many more false alarms in the urban noise environment than in the other two, since the urban background, which contained many more recognizable and diverse noise events than the other two, was a more complex one. Several speculations about the large number of false alarms made in the urban noise condition are plausible. It seems probable, for example, that the test subjects would have made fewer false alarms in the urban environment if they had had greater familiarity with its complexity, gained perhaps through an additional half hour of listening experience. By the same token, it seems likely that the number of false alarms in the urban noise condition might have decreased if the experiment had lasted longer. On the other hand, the high false alarm rate might have been attributable to the relatively large number of different audible sounds: "noticeability," in other words, may depend on the diversity of a set of sounds as well as their signal-to-noise ratios.

4.2 IMPLICATIONS OF FINDINGS CONCERNING RELATIONSHIP BETWEEN NOTICEABILITY AND ANNOYANCE

The fact that a noise event is sufficiently audible to intrude upon awareness does not imply that it is particularly annoying. The mean difference observed in the present study between the D'L value for noticeability and the D'L value for moderate annoyance was 12 dB.

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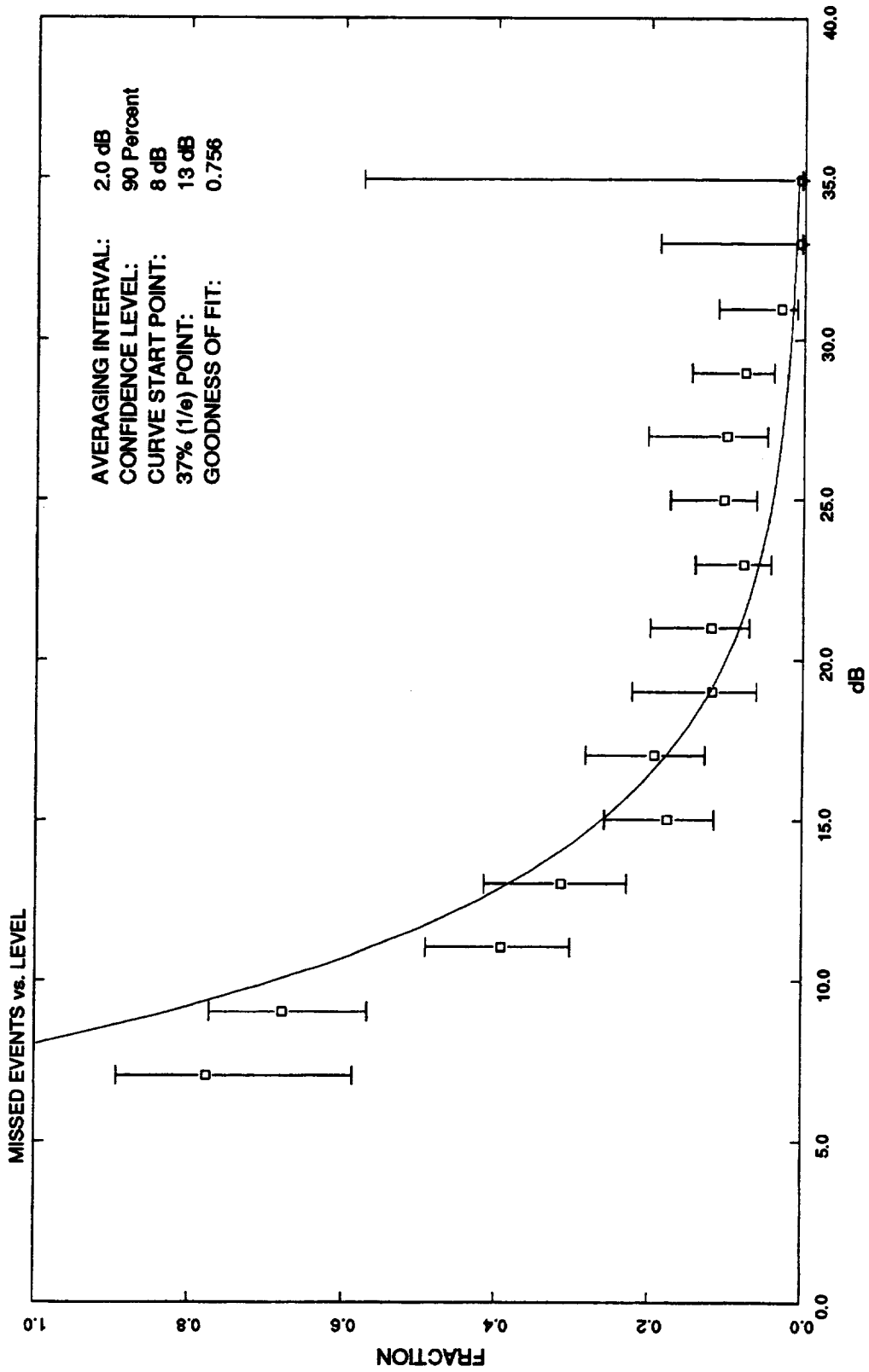
Figure 11   Missed events as a function of D'L for the voices and rural background trials.

5   CONCLUSIONS

The present findings warrant the following conclusions:

- Relationships between the detectability of noise intrusions, their likelihood of notice by people engaged in tasks other than specifically listening for them, and their annoyance, are orderly and interpretable.

- An exponential function provides a reasonable fit to the observed miss rate as a function of signal D'L. The least-squares exponential yields

  50% noticed at 11 dB
  80% noticed at 16 dB
  90% noticed at 20 dB
  95% noticed at 23 dB

This transition band (23 - 11 = 12 dB) is very broad when compared to the corresponding band (6.0 - 3.6 = 2.4 dB) when detection of the signal is made the primary task (Swets, 1964). It is possible that the increased width of the transition reflects variations in attentiveness in the primary reading task of the study.

A larger body of observations collected under a wider range of conditions can support inference of dosage-response relationships for the noticeability and annoyance of low-level noise intrusions that will be useful for noise impact assessment purposes.

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APPENDIX A   DEFINITION OF TERMS AND QUANTIFICATION OF DETECTABILITY

Terms in this appendix are defined in the sense in which they are used in this report, rather than in their broadest sense. Terminology generally follows that of Green and Swets (1966).

Ambient noise: A distribution of sound pressure levels observed for some duration at some location. The term subsumes the legislative phrase "natural quiet" when applied to a distribution of indigenous sound levels.

d′: Abbreviation and symbol for signal detectability.

D′L: Abbreviation for Detectability Level (*q.v.*).

decibel: The unit for expressing the amplitude of a given quantity on a logarithmic scale. The number of decibels is equal to ten times the logarithm to the base 10 of the ratio of a quantity of interest to a reference quantity, abbreviated dB.

Detectability: The ability to detect a signal in the presence of noise, quantified by the bandwidth adjusted signal-to-noise ratio:

$$d' = \eta \sqrt{\sum_{i=1}^{N} \Delta f_i \left(\frac{s_i}{n_i}\right)^4}$$

where

η is the efficiency of a human detector (assumed 0.4 for a human observer);
Δf_i is the bandwidth of the ith one-third octave band;
s_i is the sound pressure of the signal in the ith one-third octave band;
n_i is the sound pressure of the noise in the ith one-third octave band.

note: Δf_i for all calculations reported in this document is the one-third octave bandwidth, or approximately .23 of the center frequency of interest.

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Detectability Level: The ratio of the detectability of a signal to a reference detectability of 1. Formally:

$$D'L = 10\log\left(\frac{d'}{d'_{ref}}\right)$$

where $d'_{ref} = 1$.

Detectability Exposure Level: (D'EL) Time-integrated detectability over a specified time period, expressed in dB.

n': Abbreviation and symbol for noticeability

N'L: Abbreviation for the noticeability level in dB

Noticeability: Amount by which the detectability of a signal exceeds the threshold of noticeability, *i.e.* that level at which an individual engaged in a particular activity other than listening for events, becomes aware of the event without other cues or prompts.

Noticeability Level: The ratio of the noticeability of a signal to a reference noticeability of 1. Formally:

$$N'L = 10\log\left(\frac{n'}{n'_{ref}}\right)$$

where $n'_{ref} = 1$.

Noticeability Exposure Level: (N'EL) Sum of noticeabilities over time, expressed in dB.

Noticeability time: Amount of time the audibility of an event exceeds a specified d' value.

Signal-to-Noise Ratio: The relative level (in dB) of some characteristic of a signal (*e.g.*, its rms value) and the corresponding characteristic of a distribution of noise.

Sound pressure: A fluctuating pressure superimposed on the static atmospheric pressure by the presence of sound.

Sound pressure level: In decibels, 20 times the logarithm to the base 10 of the ratio of the time period, rms value of the sound pressure, to the standard reference sound pressure of 20 μPa.

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APPENDIX B   INSTRUCTIONS TO TEST SUBJECTS

We are trying to find out when certain sounds heard in different backgrounds come to the attention of people while they are reading. We are therefore paying about ten people $100 each to sit for a couple of hours per day in a special sound-controlled room and read magazines or other suitable material. You will hear typical city or country background sounds whenever you are in this room. You need not pay any particular attention to these background sounds, nor do anything about them. Your main job is simply to read the material that you have chosen.

If a sound comes to your attention while you're reading that you find inappropriate, unexpected, annoying, or simply one that you would rather not have heard, you will use a computer mouse to tell us as soon as you notice such a sound. At the end of each sound that you notice, you must also tell us (by another mouse click) whether the sound was **Not At All**, **Slightly**, **Moderately**, **Very**, or **Extremely Annoying**.

During a break at the end of each 25 minute testing session, we would like you to fill out a brief form describing what you read about during the session, and how interesting it was to you. The form that you will fill out is attached to these instructions.

Only background sounds will be heard within the first few minutes of the start of each testing session. This gives you a chance to get used to these background sounds. Even after the first few minutes of each test session, the other sounds will occur only occasionally, without any particular pattern, and at unpredictable intervals—so there is no point in trying to anticipate them. Besides, we don't want you to spend every moment thinking about each of the background sounds that you hear in any event. Remember, your main job is simply to read the material that you have selected.

Obviously, there are no "right" or "wrong" answers in this study. However, we will be comparing your answers to those of all other test subjects. At the end of all data collection, the test subject who comes closest to the average number of sounds noticed by the entire group of test subjects will be paid a bonus of $100 in addition to the base pay of $100 for taking part in this study. The purpose of this bonus is to encourage you to understand and carefully follow these instructions. If you have any questions about what you are supposed to do, please ask the experimenter for clarification.

SUMMARY OF READING MATERIAL

Subject Number:
Date:
Session Number:

What was the general topic(s) of the material that you read during the previous testing session?

How interesting was this material to you?

> Continuously interesting throughout the entire test session
> Interesting for most of the time
> Occasionally interesting
> Rarely interesting
> Not at all interesting

APPENDIX C CONSENT FORM FOR PARTICIPATION

BBN Systems and Technologies (BBN) is conducting a laboratory study of the noticeability and annoyance of certain sounds, and would like you to take part in this research project. This form explains what is expected of people who wish to take part in this study. If you would like to take part in this study, please sign this form at the bottom after you have read it.

I understand that I will be seated in a special chamber where I will be provided with reading materials. If I notice a sound that seems inappropriate or annoys me, I will so indicate by clicking on a screen icon. Each testing session will last approximately two hours, with five minute breaks (during which I will leave the test chamber) provided every half hour.

My participation in this test will not pose any risk of hearing damage. Nonetheless, I understand that I will be given an audiogram prior to the start of my participation in these listening tests, and upon completion of testing. No other audiometric or medical services will be provided in connection with this testing.

I understand that I will be expected to take part in about half a dozen such listening sessions, and that I will be paid at a daily rate of $20.00 for each two-hour-long session. I will also be eligible for a bonus payment of $100 if I complete the study. This bonus payment will be made to the test subject whose ratings of test sounds most closely resembles the average of all other test subjects' ratings.

I understand that I may change my mind about taking part in this study at any time. If I decide to stop taking part in the study, I will be paid for the amount of time that I did take part.

I have read the information on this page, and want to take part in this study of aircraft noise annoyance.

Signed _____

Date _____

APPENDIX D   SIGNAL SPECTRA

D.1   BACKGROUND SIGNALS
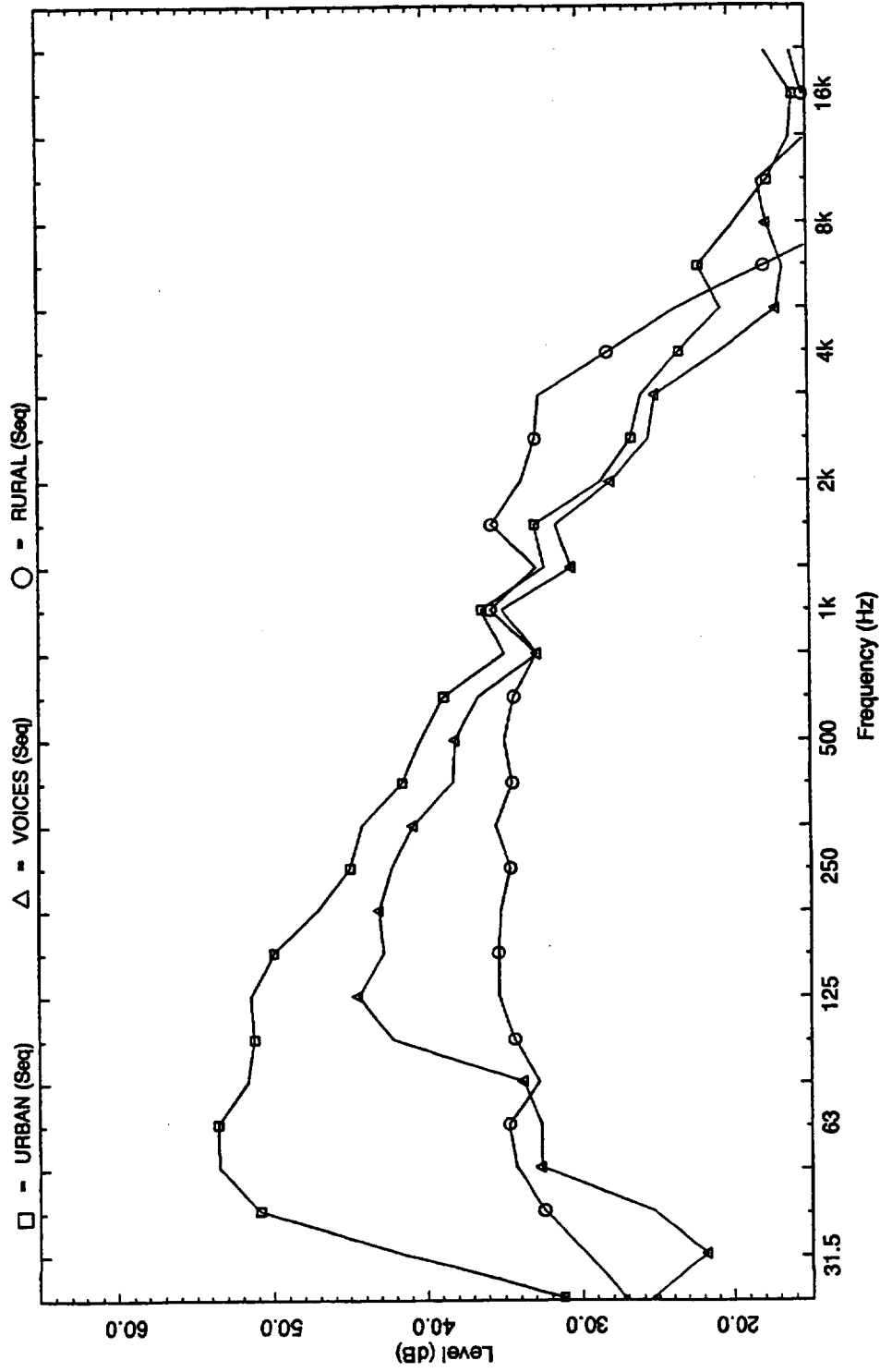
Figure 12   Time-averaged background spectra.
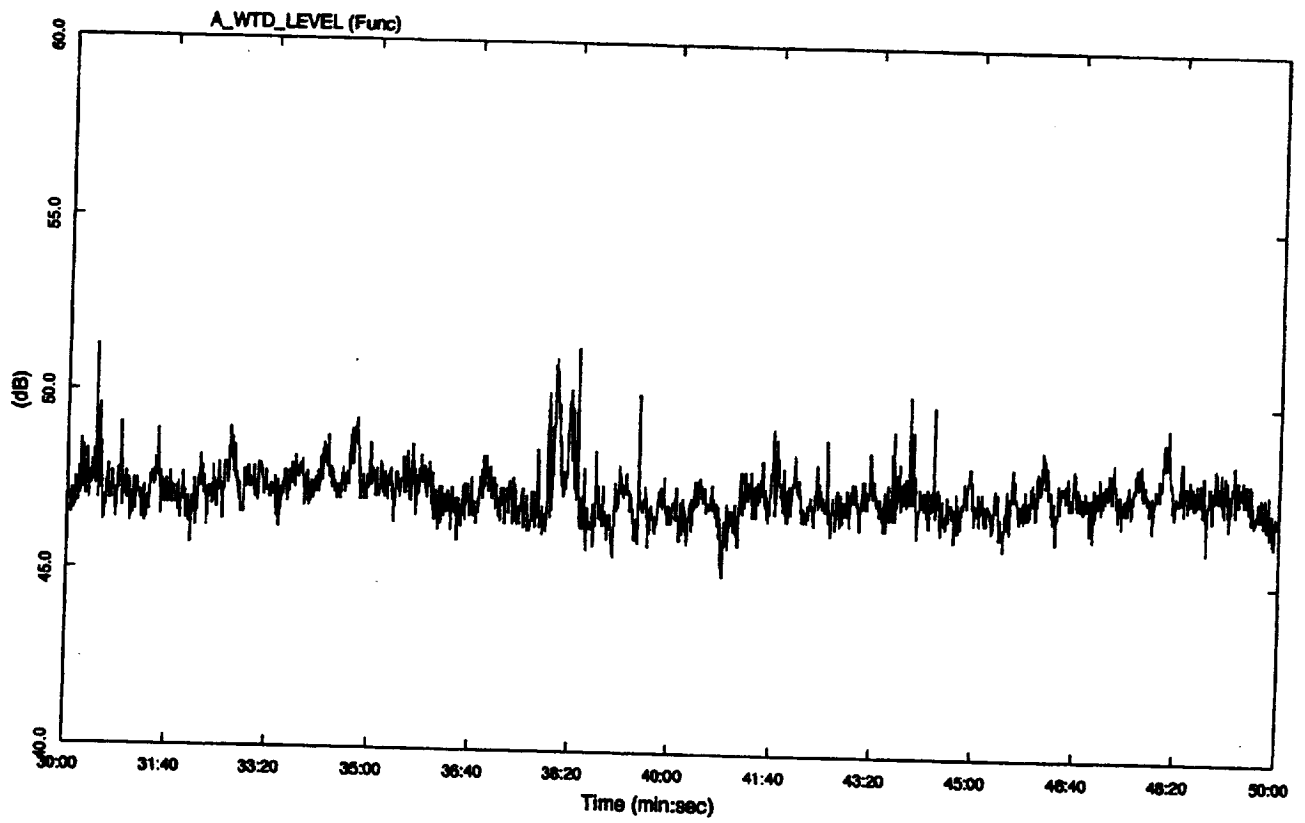
Figure 13   Representative time history of urban background.
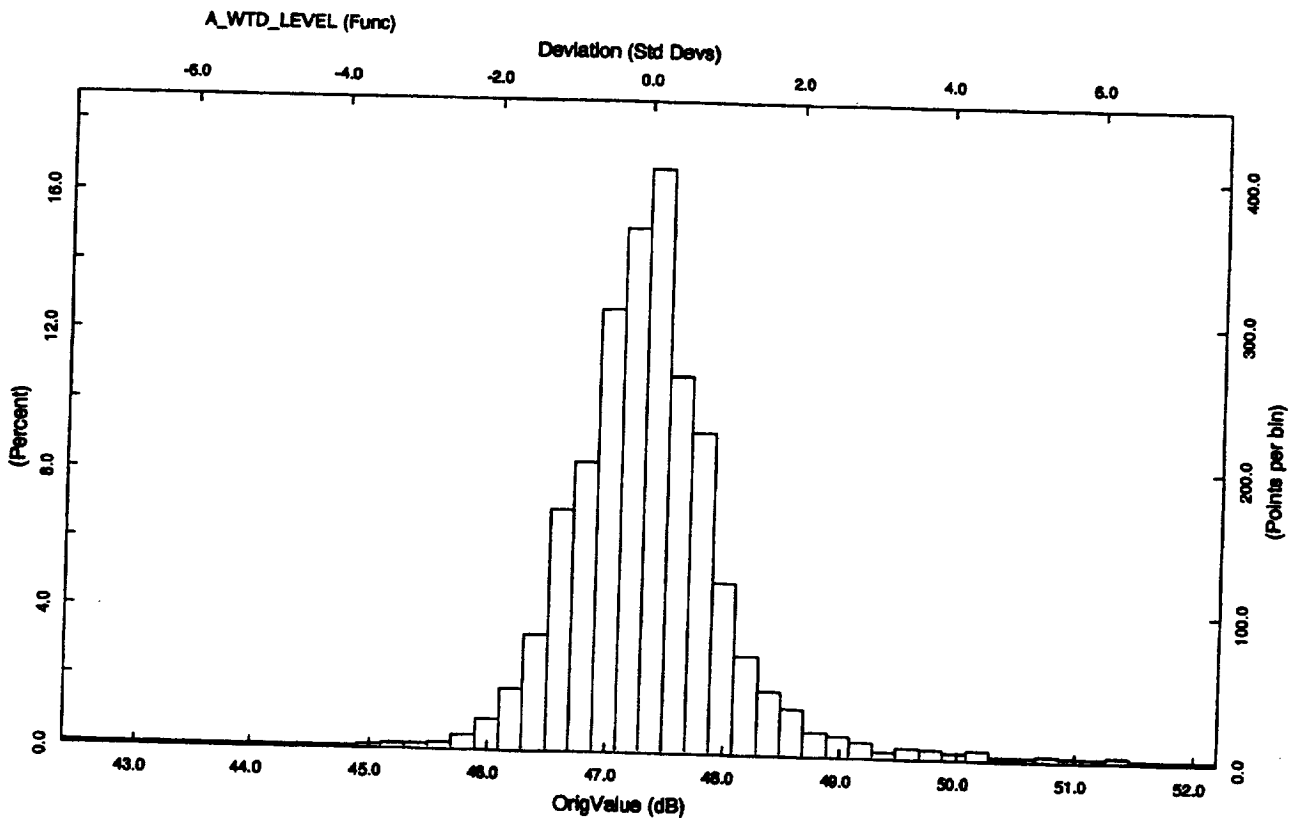
Figure 14   Representative histogram of urban background levels.

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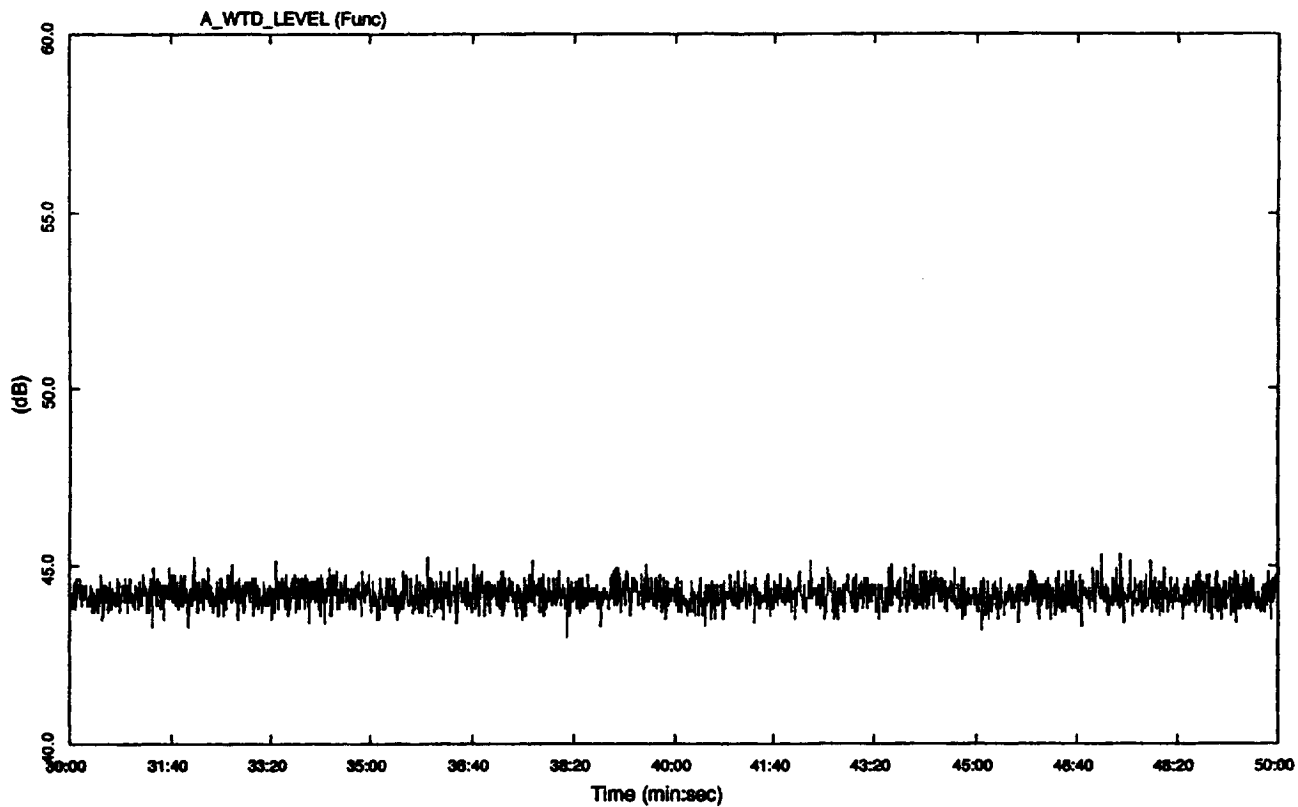
Figure 15 Representative time history of voices background.
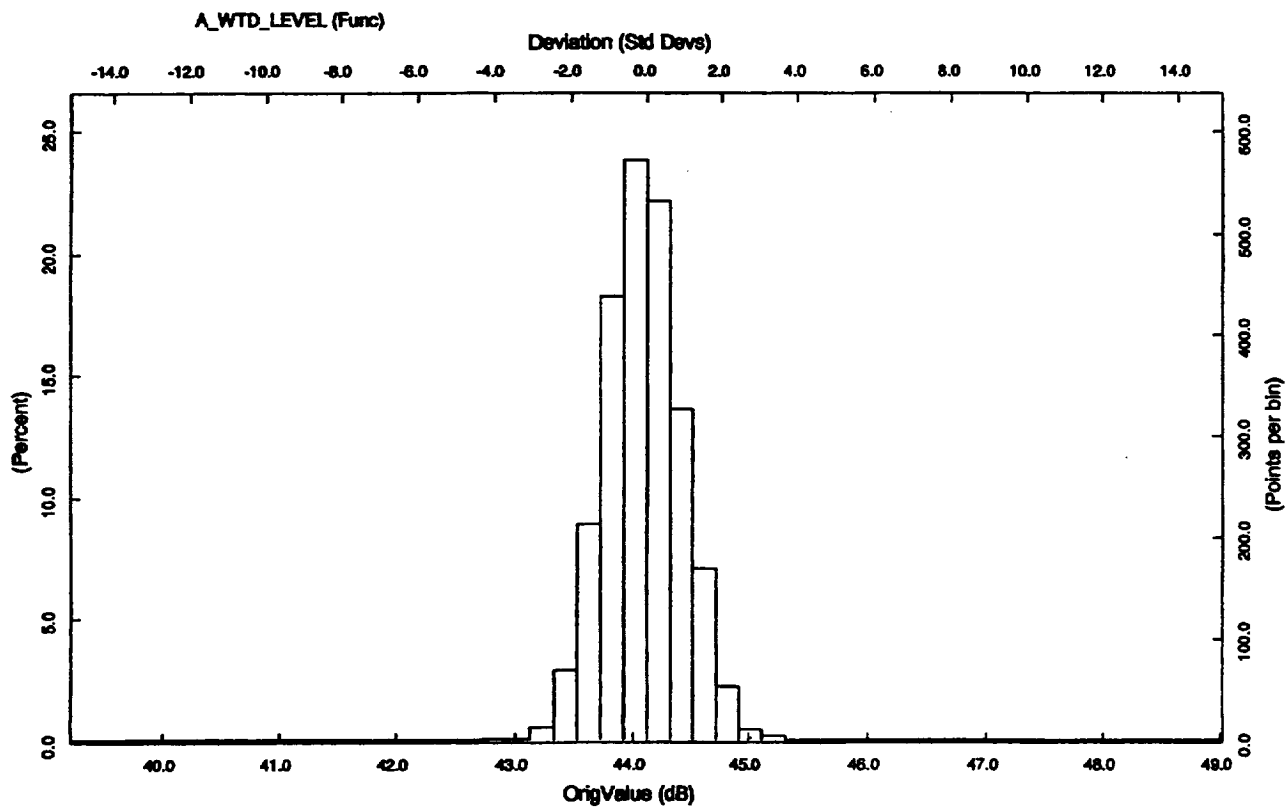
Figure 16 Representative histogram of voices background levels.
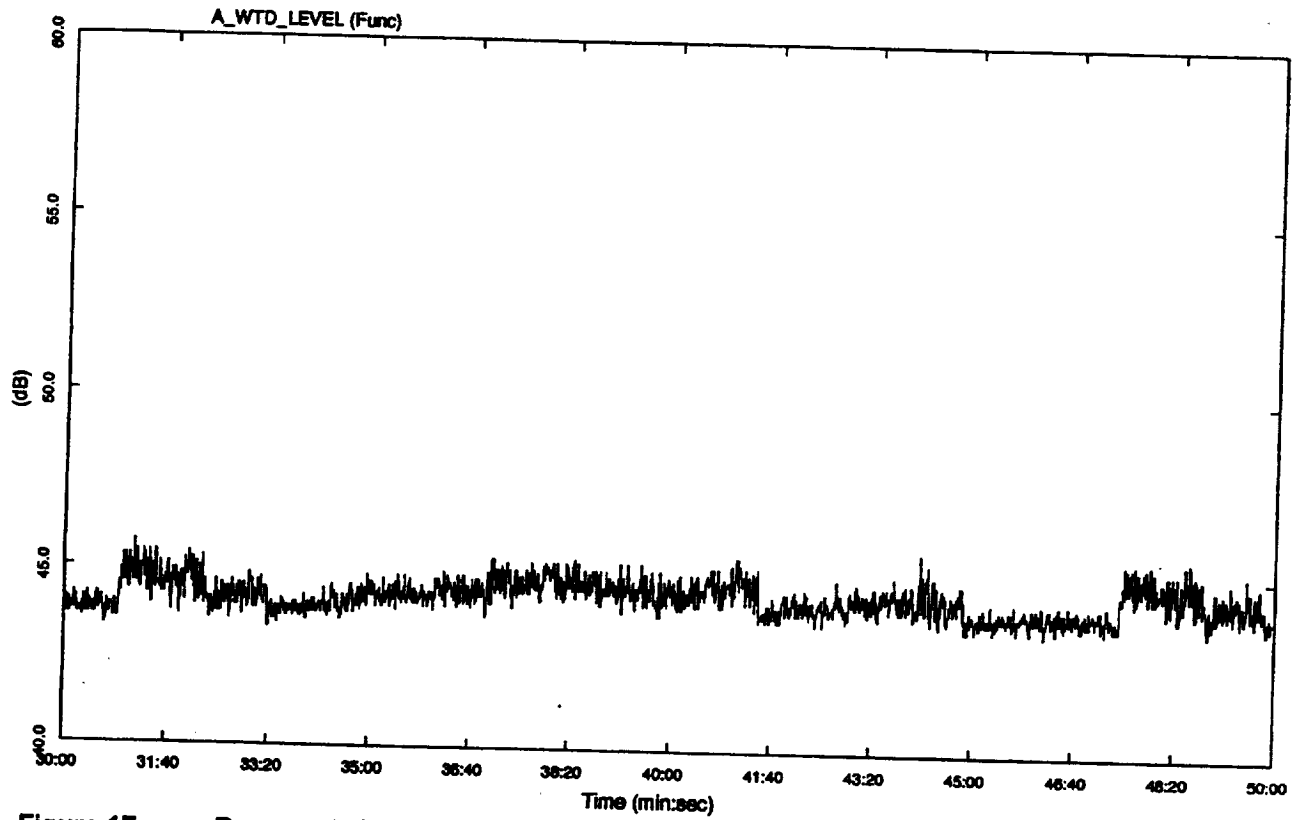
Figure 17   Representative time history of rural background.
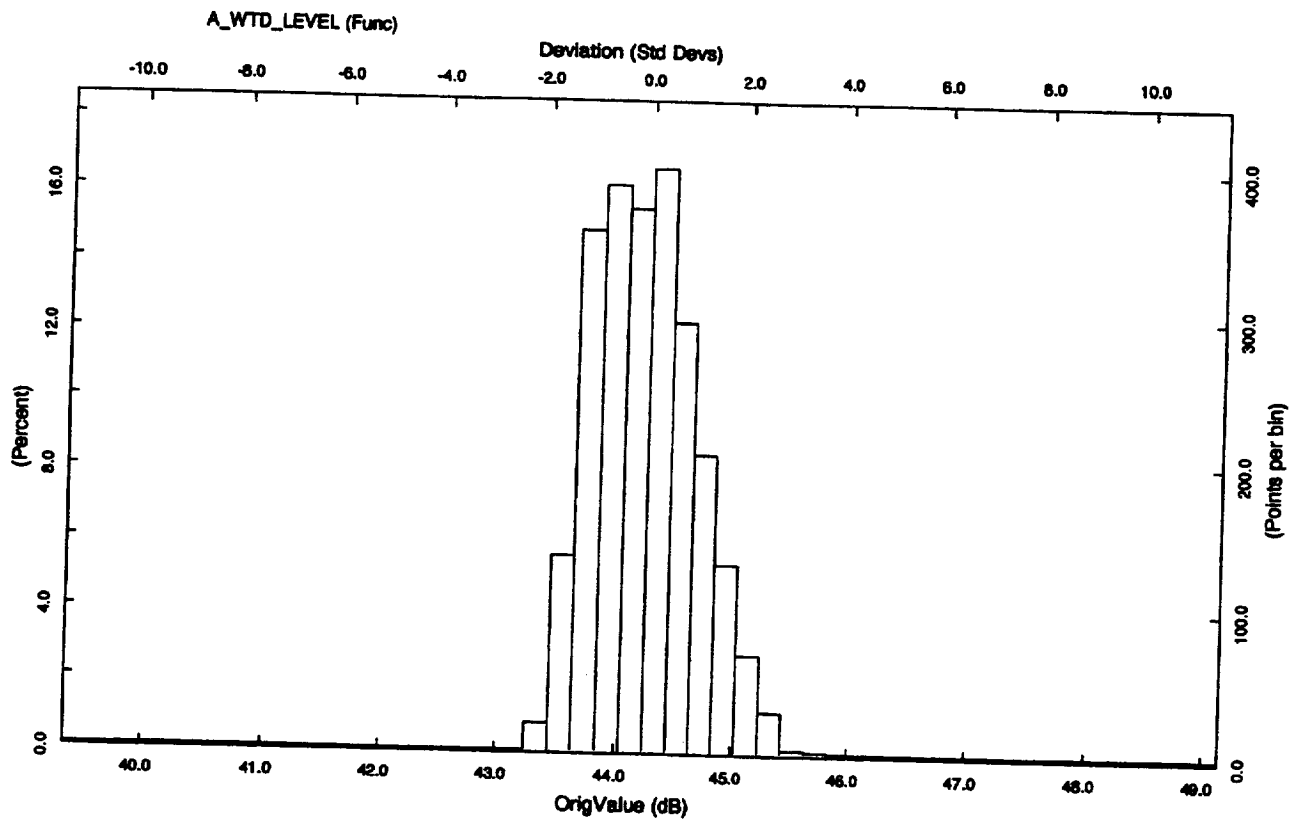
Figure 18   Representative histogram of rural background levels.

D.2 TEST SIGNALS
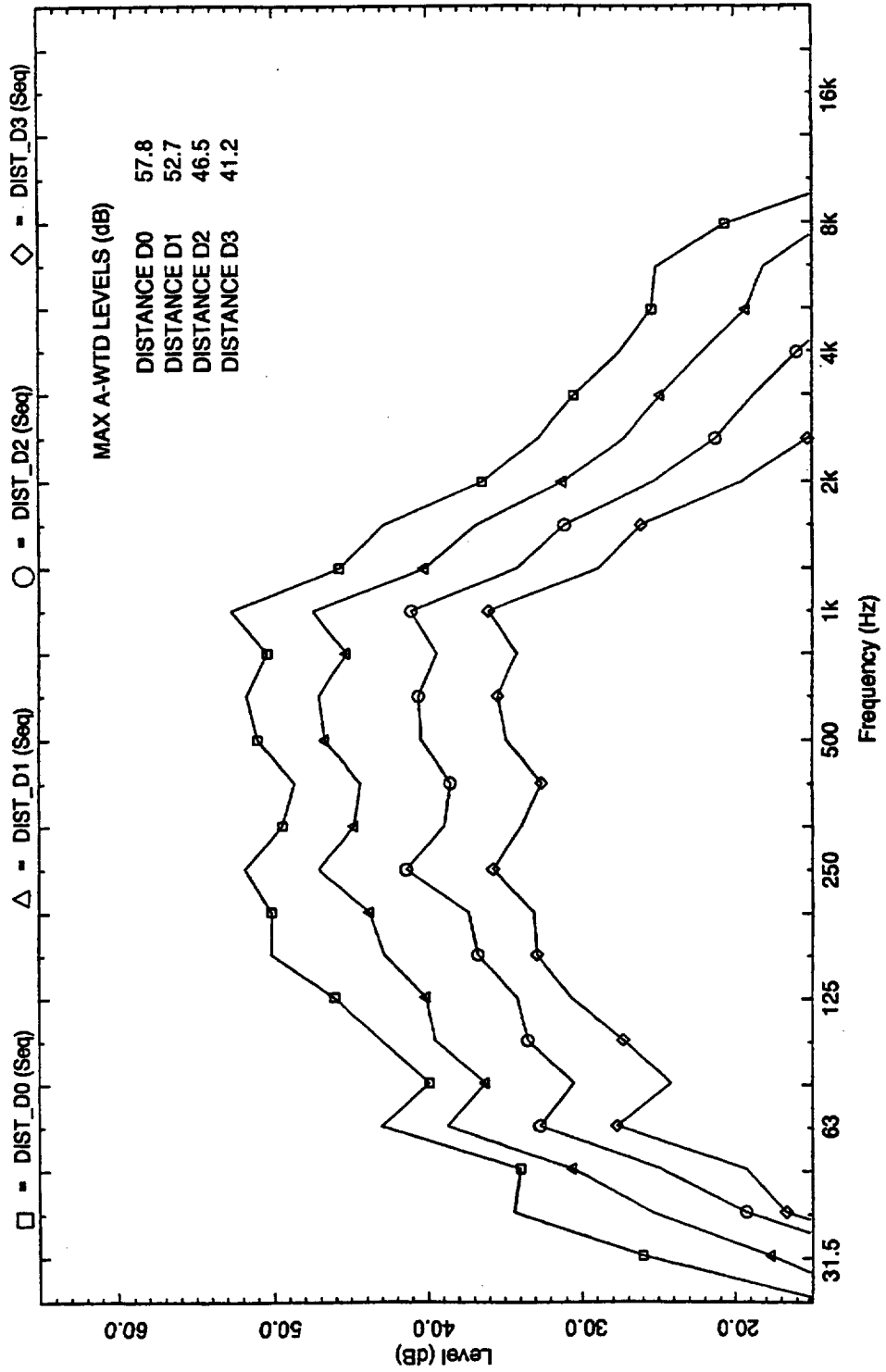
Figure 19   Spectra (at maximum A-level) for the automobile driveby test signal.

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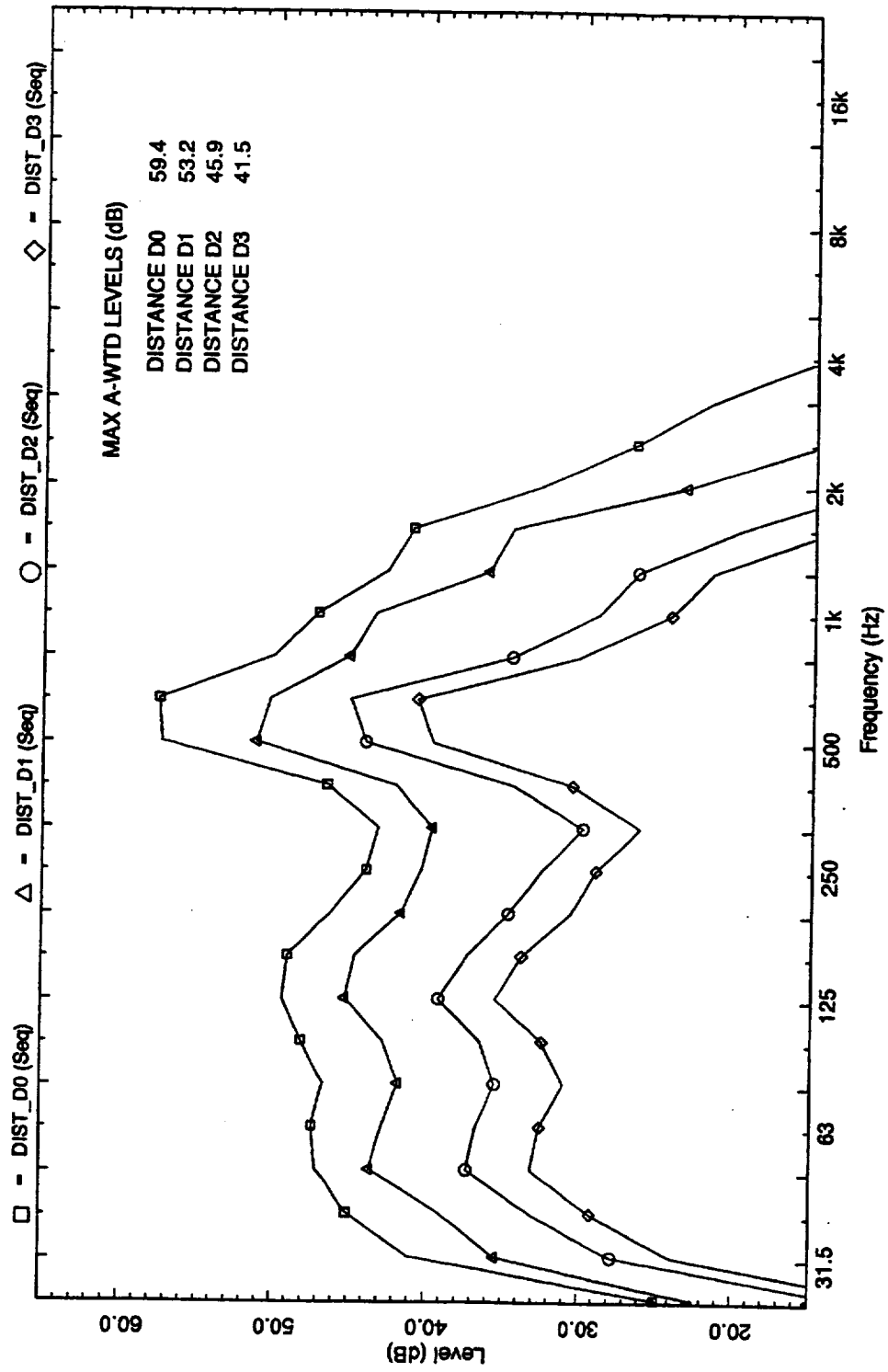
Figure 20   Spectra (at maximum A-level) for the military aircraft flyover test signal.
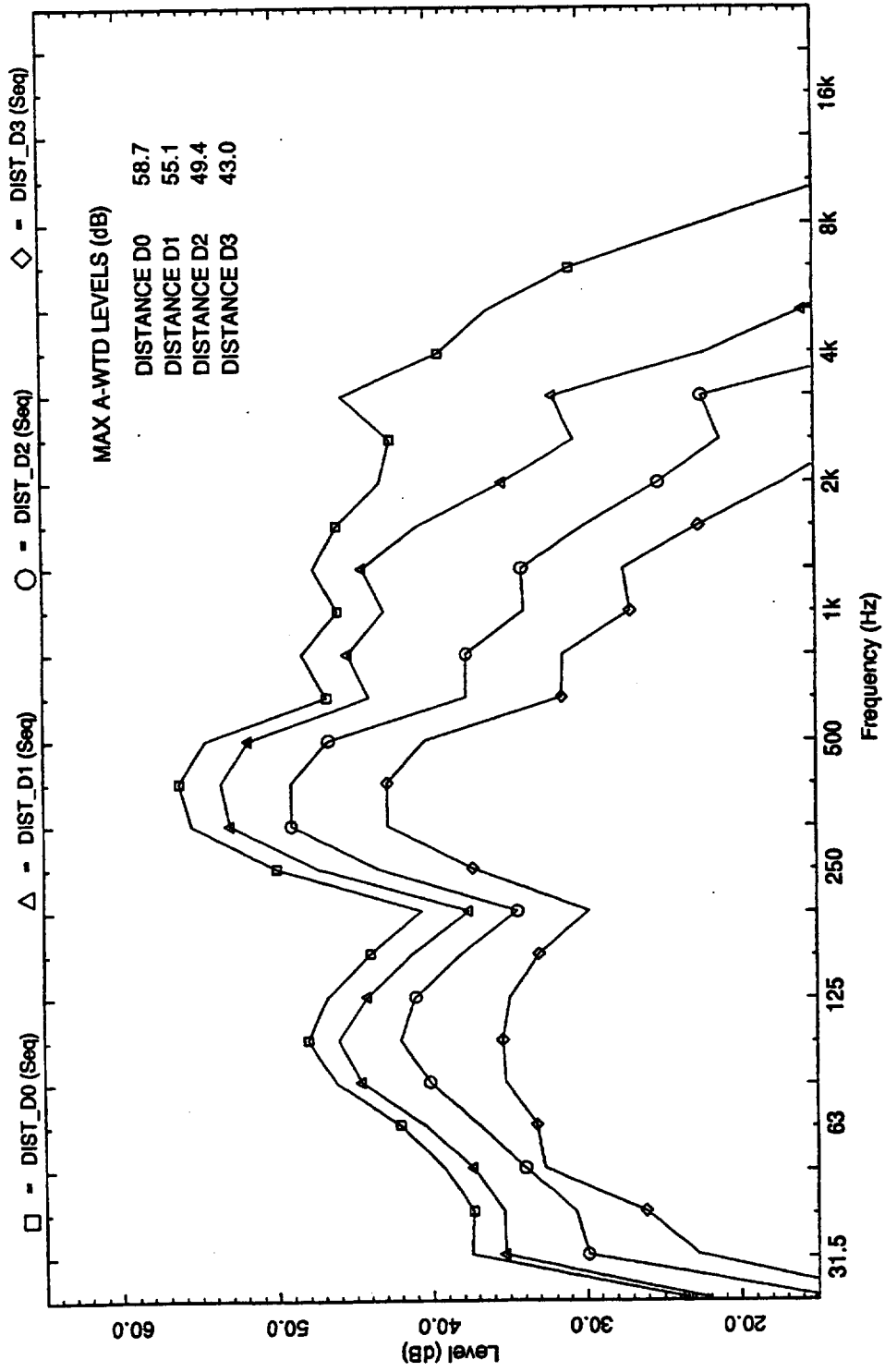
Figure 21 Spectra (at maximum A-level) for the transport aircraft landing test signal.
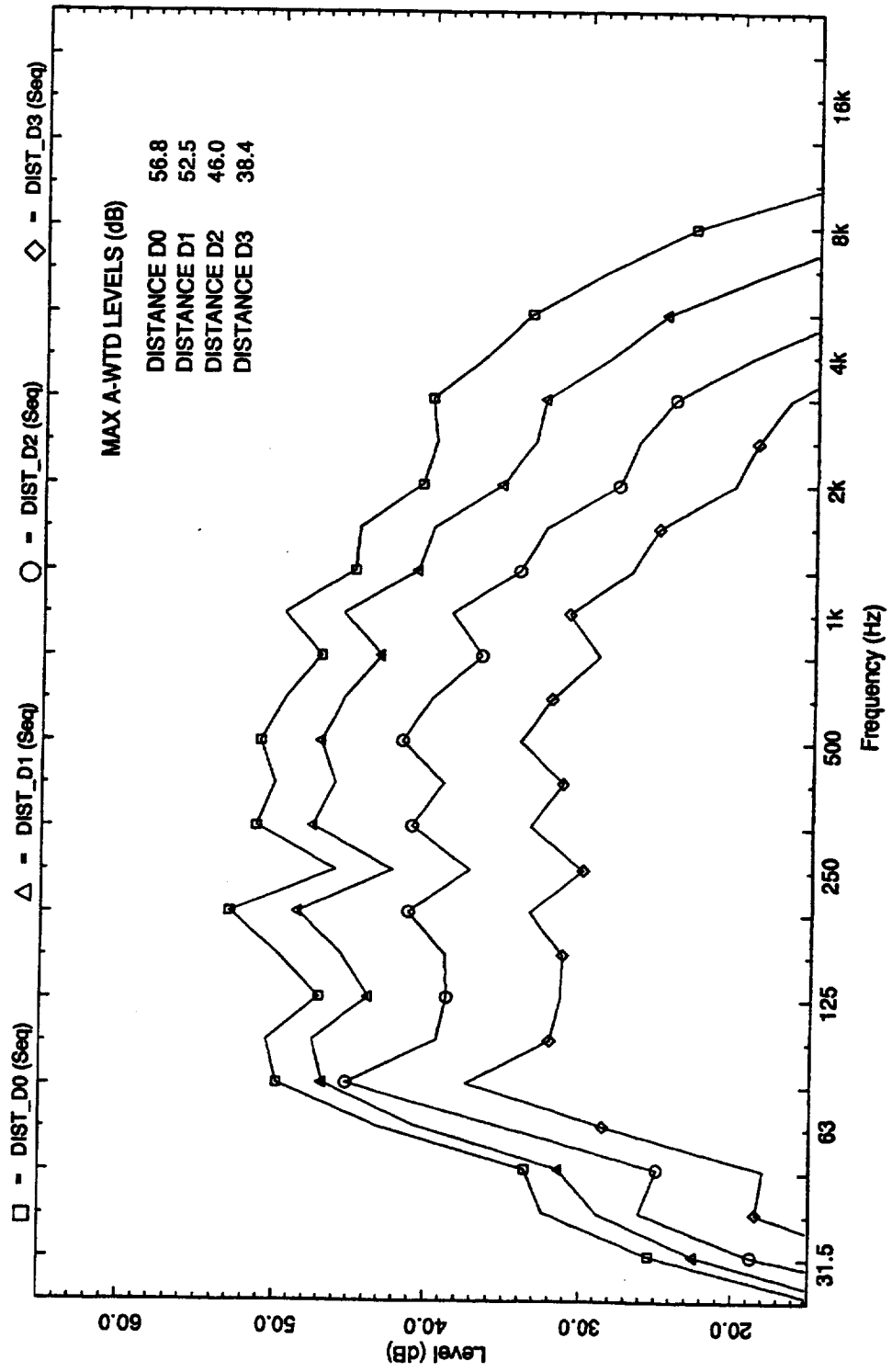
Figure 22 Spectra (at maximum A-level) for the commuter train passby test signal.
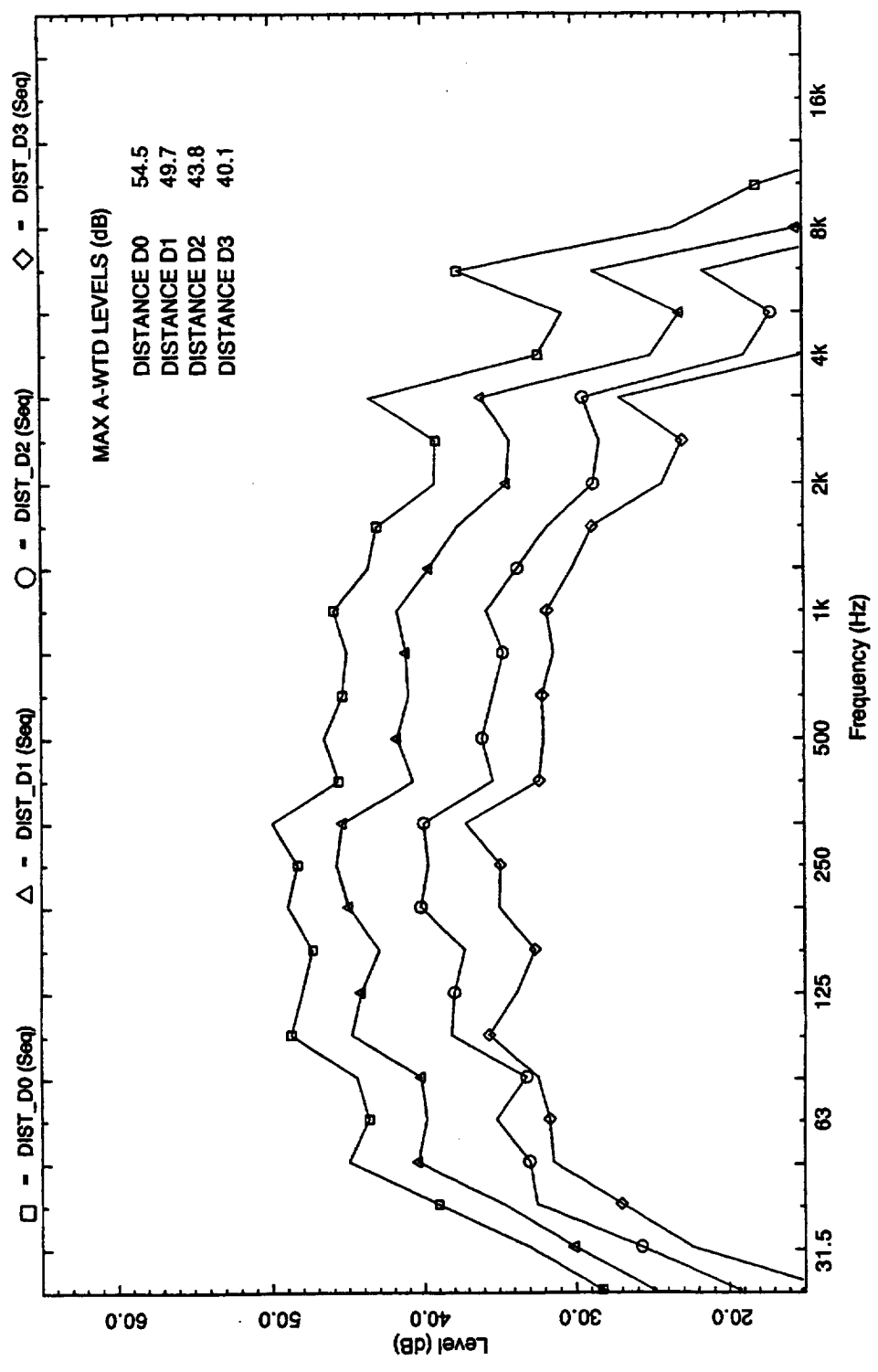
Figure 23   Spectra (at maximum A-level) for the commercial truck driveby test signal.

APPENDIX E   RESPONSES OF EACH TEST SUBJECT

This appendix contains information about the responses of each test subject to all signal presentations. Note that annoyance ratings were solicited both for hits and for false alarms.

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

```
Test Subject:   2001
Session:        1
Ambient Type:   VOICES
Run number:     115777
Analysis Date:  15-May-96
Analysis Time:  16:30:27
Prepared by:    SNEDDON
```

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response
1	1	09:19:39	6	L1011	D1	22.5	32.7	2 Slightly
1	2	09:24:28	1	B1B	D0	28.3	34.9	1 Not at all
1	3	09:28:45	18	TRAIN	D1	21.5	30.8	-1 MISSED EVENT
1	4	09:33:05	4	B1B	D3	13.0	21.6	-1 MISSED EVENT
1	5	09:37:02	11	AUTO	D2	14.0	22.8	-1 MISSED EVENT
2	1	09:46:57	17	TRAIN	D0	26.6	34.6	2 Slightly
2	2	09:51:48	12	AUTO	D3	10.5	20.3	-1 MISSED EVENT
2	3	09:55:57	20	TRAIN	D3	8.8	19.2	-1 MISSED EVENT
2	4	09:59:09	15	TRUCK	D2	17.9	25.2	-1 MISSED EVENT
2	5	10:02:12	13	TRUCK	D0	32.3	35.7	2 Slightly
3	1	10:10:55	2	B1B	D1	23.7	30.4	1 Not at all
3	2	10:14:10	8	L1011	D3	12.8	22.0	1 Not at all
3	3	10:18:38	9	AUTO	D0	25.9	31.8	2 Slightly
3	4	10:21:40	14	TRUCK	D1	21.3	29.1	2 Slightly
3	5	10:26:07	5	L1011	D0	31.4	37.9	3 Moderately
4	1	10:39:16	3	B1B	D2	16.5	24.8	1 Not at all
4	2	10:46:37	10	AUTO	D1	21.7	27.8	1 Not at all
4	3	10:50:31	19	TRAIN	D2	14.3	24.6	1 Not at all
4	4	10:54:56	7	L1011	D2	17.5	27.1	2 Slightly
4	5	11:00:07	16	TRUCK	D3	11.8	22.3	1 Not at all

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2001
Session: 2
Ambient Type: RURAL
Run number: 115777
Analysis Date: 15-May-96
Analysis Time: 17:15:00
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no	type	ID-- dist	---- d' Level ---- max	integ		Test subject response
5	1	12:12:33	13	TRUCK	D0	28.6	32.7	-1	MISSED EVENT
5	2	12:16:49	14	TRUCK	D1	23.6	29.3	-1	MISSED EVENT
5	3	12:21:38	6	L1011	D1	25.4	32.3	-1	MISSED EVENT
5	4	12:25:41	10	AUTO	D1	21.0	27.2	-1	MISSED EVENT
5	5	12:28:58	12	AUTO	D3	9.9	20.0	-1	MISSED EVENT
6	1	12:46:35	9	AUTO	D0	25.7	31.0	3	Moderately
6	2	12:50:35	2	B1B	D1	23.9	31.5	2	Slightly
6	3	12:55:29	17	TRAIN	D0	24.6	32.6	3	Moderately
6	4	12:59:55	4	B1B	D3	12.1	23.4	1	Not at all
6	5	13:04:17	1	B1B	D0	28.4	35.6	3	Moderately
7	1	13:14:08	11	AUTO	D2	14.6	22.5	1	Not at all
7	2	13:17:17	3	B1B	D2	18.2	27.7	2	Slightly
7	3	13:20:20	7	L1011	D2	19.9	28.3	1	Not at all
7	4	13:23:52	16	TRUCK	D3	7.8	21.0	-1	MISSED EVENT
7	5	13:24:38	---------	FALSE	ALARM ---------			1	Not at all
7	6	13:28:17	15	TRUCK	D2	16.8	24.3	1	Not at all
8	1	13:40:34	18	TRAIN	D1	23.0	31.7	3	Moderately
8	2	13:45:04	8	L1011	D3	13.8	23.8	1	Not at all
8	3	13:49:57	5	L1011	D0	29.9	36.5	3	Moderately
8	4	13:55:07	20	TRAIN	D3	10.9	22.7	1	Not at all
8	5	13:58:37	19	TRAIN	D2	17.4	27.1	1	Not at all

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2001
Session: 3
Ambient Type: VOICES
Run number: 115777
Analysis Date: 15-May-96
Analysis Time: 16:58:46
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ		Test subject response
9	1	12:14:30	14	TRUCK	D1	22.4	29.2	2	Slightly
9	2	12:18:06	6	L1011	D1	23.5	32.7	2	Slightly
9	3	12:22:16	15	TRUCK	D2	17.2	24.9	-1	MISSED EVENT
9	4	12:26:33	3	B1B	D2	16.3	24.4	1	Not at all
9	5	12:31:20	7	L1011	D2	17.8	27.3	1	Not at all
10	1	12:40:45	8	L1011	D3	11.2	22.2	1	Not at all
10	2	12:45:54	18	TRAIN	D1	20.7	30.2	3	Moderately
10	3	12:50:05	16	TRUCK	D3	12.0	22.5	1	Not at all
10	4	12:54:03	2	B1B	D1	23.0	29.9	2	Slightly
10	5	12:57:22	12	AUTO	D3	10.1	20.4	-1	MISSED EVENT
11	1	13:04:06	13	TRUCK	D0	30.6	34.5	3	Moderately
11	2	13:08:56	1	B1B	D0	29.8	35.6	3	Moderately
11	3	13:12:13	4	B1B	D3	11.7	21.4	-1	MISSED EVENT
11	4	13:15:35	19	TRAIN	D2	14.6	24.4	2	Slightly
11	5	13:19:09	10	AUTO	D1	20.7	27.7	2	Slightly
12	1	13:31:21	5	L1011	D0	30.8	37.9	3	Moderately
12	2	13:36:01	9	AUTO	D0	26.8	31.9	2	Slightly
12	3	13:39:38	20	TRAIN	D3	8.4	19.5	1	Not at all
12	4	13:43:09	11	AUTO	D2	15.5	23.1	1	Not at all
12	5	13:46:15	17	TRAIN	D0	27.2	35.1	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2001
Session: 4
Ambient Type: RURAL
Run number: 115777
Analysis Date: 15-May-96
Analysis Time: 17:02:00
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no type	ID--dist	---- d' Level ---- max	integ	Test subject response	
13	1	12:05:17	15 TRUCK	D2	16.0	24.3	1	Not at all
13	2	12:08:35	11 AUTO	D2	14.3	22.4	1	Not at all
13	3	12:13:09	7 L1011	D2	19.8	28.2	2	Slightly
13	4	12:16:35	9 AUTO	D0	26.5	31.7	3	Moderately
13	5	12:20:15	2 B1B	D1	24.3	31.7	3	Moderately
14	1	12:33:12	5 L1011	D0	29.1	36.3	3	Moderately
14	2	12:37:06	8 L1011	D3	13.8	23.7	1	Not at all
14	3	12:41:22	14 TRUCK	D1	20.8	28.5	2	Slightly
14	4	12:44:40	6 L1011	D1	23.9	32.1	3	Moderately
14	5	12:47:54	3 B1B	D2	19.6	27.9	2	Slightly
15	1	13:08:44	20 TRAIN	D3	9.3	22.4	1	Not at all
15	2	13:12:49	12 AUTO	D3	9.0	19.9	1	Not at all
15	3	13:16:00	4 B1B	D3	12.0	23.2	1	Not at all
15	4	13:20:46	17 TRAIN	D0	24.9	32.6	3	Moderately
15	5	13:25:56	1 B1B	D0	28.9	35.7	3	Moderately
16	1	13:38:13	10 AUTO	D1	20.6	27.1	2	Slightly
16	2	13:41:54	19 TRAIN	D2	15.8	27.0	2	Slightly
16	3	13:46:52	18 TRAIN	D1	21.7	31.4	3	Moderately
16	4	13:51:34	16 TRUCK	D3	8.5	21.2	-1	MISSED EVENT
16	5	13:55:08	13 TRUCK	D0	28.9	33.4	3	Moderately

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Test Subject: 2001
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 15-May-96
Analysis Time: 17:17:58
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal ID--			---- d' Level ----		Test subject response	
			no	type	dist	max	integ		
17	1	12:11:39	---------	FALSE	ALARM	---------		1	Not at all
17	2	12:12:21	---------	FALSE	ALARM	---------		1	Not at all
17	3	12:14:15	---------	FALSE	ALARM	---------		1	Not at all
17	4	12:24:31	20	TRAIN	D3	9.8	19.6	1	Not at all
17	5	12:28:21	9	AUTO	D0	26.0	31.0	3	Moderately
17	6	12:29:49	---------	FALSE	ALARM	---------		1	Not at all
17	7	12:32:35	18	TRAIN	D1	20.4	29.1	3	Moderately
17	8	12:35:56	---------	FALSE	ALARM	---------		2	Slightly
17	9	12:36:55	---------	FALSE	ALARM	---------		2	Slightly
17	10	12:37:47	---------	FALSE	ALARM	---------		3	Moderately
17	11	12:41:01	---------	FALSE	ALARM	---------		2	Slightly
17	12	12:43:21	---------	FALSE	ALARM	---------		2	Slightly
17	13	12:43:54	---------	FALSE	ALARM	---------		2	Slightly
17	14	12:47:53	15	TRUCK	D2	20.4	26.8	2	Slightly
17	15	12:49:51	---------	FALSE	ALARM	---------		2	Slightly
17	16	12:52:46	1	B1B	D0	26.9	32.6	3	Moderately
18	1	13:02:38	---------	FALSE	ALARM	---------		1	Not at all
18	2	13:06:29	8	L1011	D3	9.7	21.1	-1	MISSED EVENT
18	3	13:10:48	11	AUTO	D2	13.7	21.6	-1	MISSED EVENT
18	4	13:15:11	14	TRUCK	D1	20.4	27.4	2	Slightly
18	5	13:19:25	19	TRAIN	D2	15.0	23.8	3	Moderately
18	6	13:21:34	---------	FALSE	ALARM	---------		3	Moderately
18	7	13:25:47	4	B1B	D3	9.7	19.6	-1	MISSED EVENT
19	1	13:33:19	13	TRUCK	D0	31.9	35.0	3	Moderately
19	2	13:37:34	10	AUTO	D1	18.4	24.9	2	Slightly
19	3	13:39:54	---------	FALSE	ALARM	---------		2	Slightly
19	4	13:40:44	---------	FALSE	ALARM	---------		3	Moderately
19	5	13:45:01	3	B1B	D2	17.8	24.3	2	Slightly
19	6	13:49:39	6	L1011	D1	21.1	30.7	3	Moderately
19	7	13:54:48	5	L1011	D0	31.5	37.9	-1	MISSED EVENT

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2002
Session: 1
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 10:08:43
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response
1	1	11:40:07	13	TRUCK	D0	32.2	34.7	2 Slightly
1	2	11:44:02	10	AUTO	D1	20.4	27.0	2 Slightly
1	3	11:47:43	6	L1011	D1	24.0	32.1	2 Slightly
1	4	11:52:45	14	TRUCK	D1	23.9	29.3	2 Slightly
1	5	11:57:17	12	AUTO	D3	10.2	20.0	-1 MISSED EVENT
2	1	12:05:24	9	AUTO	D0	26.0	31.5	2 Slightly
2	2	12:08:30	17	TRAIN	D0	24.1	32.3	3 Moderately
2	3	12:13:06	4	B1B	D3	11.2	23.0	2 Slightly
2	4	12:17:47	2	B1B	D1	24.0	31.5	2 Slightly
2	5	12:21:13	1	B1B	D0	28.9	35.6	3 Moderately
3	1	12:30:19	11	AUTO	D2	14.4	22.5	2 Slightly
3	2	12:32:42		-------- FALSE ALARM ---------				2 Slightly
3	3	12:36:16	3	B1B	D2	18.8	27.7	3 Moderately
3	4	12:39:53	7	L1011	D2	19.9	28.4	2 Slightly
3	5	12:44:17	16	TRUCK	D3	7.4	20.9	2 Slightly
3	6	12:47:30	15	TRUCK	D2	13.0	23.4	2 Slightly
4	1	12:55:02		-------- FALSE ALARM ---------				2 Slightly
4	2	12:57:59	20	TRAIN	D3	12.7	23.1	2 Slightly
4	3	13:02:43	8	L1011	D3	13.5	23.7	2 Slightly
4	4	13:07:51	5	L1011	D0	28.6	36.0	2 Slightly
4	5	13:09:54		-------- FALSE ALARM ---------				2 Slightly
4	6	13:12:39	18	TRAIN	D1	22.2	31.7	2 Slightly
4	7	13:17:20	19	TRAIN	D2	15.8	27.0	2 Slightly

Test Subject: 2002
Session: 2
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 10:34:28
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ	Test subject response	
5	1	12:15:20	6	L1011	D1	23.8	32.6	2	Slightly
5	2	12:16:53	--------- FALSE ALARM ---------					1	Not at all
5	3	12:18:26	--------- FALSE ALARM ---------					2	Slightly
5	4	12:21:27	1	B1B	D0	28.1	34.6	3	Moderately
5	5	12:25:46	4	B1B	D3	13.1	21.5	-1	MISSED EVENT
5	6	12:29:02	--------- FALSE ALARM ---------					2	Slightly
5	7	12:31:07	--------- FALSE ALARM ---------					2	Slightly
5	8	12:31:38	--------- FALSE ALARM ---------					2	Slightly
5	9	12:35:08	--------- FALSE ALARM ---------					2	Slightly
5	10	12:37:46	--------- FALSE ALARM ---------					2	Slightly
5	11	12:40:44	18	TRAIN	D1	20.6	30.2	2	Slightly
5	12	12:42:52	--------- FALSE ALARM ---------					2	Slightly
5	13	12:47:11	--------- FALSE ALARM ---------					2	Slightly
5	14	12:51:12	11	AUTO	D2	15.1	22.9	2	Slightly
6	1	12:56:24	--------- FALSE ALARM ---------					2	Slightly
6	2	13:00:15	15	TRUCK	D2	16.7	24.9	2	Slightly
6	3	13:02:09	--------- FALSE ALARM ---------					2	Slightly
6	4	13:04:58	12	AUTO	D3	10.2	20.5	2	Slightly
6	5	13:07:30	--------- FALSE ALARM ---------					2	Slightly
6	6	13:11:38	20	TRAIN	D3	7.0	18.7	2	Slightly
6	7	13:13:44	--------- FALSE ALARM ---------					2	Slightly
6	8	13:14:38	--------- FALSE ALARM ---------					2	Slightly
6	9	13:15:55	--------- FALSE ALARM ---------					2	Slightly
6	10	13:16:49	--------- FALSE ALARM ---------					2	Slightly
6	11	13:18:53	--------- FALSE ALARM ---------					2	Slightly
6	12	13:22:22	17	TRAIN	D0	28.4	35.4	3	Moderately
6	13	13:24:24	--------- FALSE ALARM ---------					2	Slightly
6	14	13:27:31	13	TRUCK	D0	32.3	35.6	4	Very
7	1	13:33:30	--------- FALSE ALARM ---------					2	Slightly
7	2	13:36:21	8	L1011	D3	11.7	22.2	2	Slightly
7	3	13:39:02	--------- FALSE ALARM ---------					2	Slightly
7	4	13:40:40	--------- FALSE ALARM ---------					2	Slightly
7	5	13:42:26	--------- FALSE ALARM ---------					2	Slightly
7	6	13:46:04	--------- FALSE ALARM ---------					2	Slightly
7	7	13:48:54	2	B1B	D1	23.9	30.3	-1	MISSED EVENT
7	8	13:49:51	--------- FALSE ALARM ---------					2	Slightly
7	9	13:53:47	14	TRUCK	D1	23.3	29.4	2	Slightly
7	10	13:57:17	9	AUTO	D0	27.1	32.0	3	Moderately
7	11	13:59:34	--------- FALSE ALARM ---------					2	Slightly
7	12	14:02:15	5	L1011	D0	31.2	38.0	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2002
Session: 3
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 10:47:03
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response	
9	1	15:16:55	7	L1011	D2	18.9	28.0	2	Slightly
9	2	15:20:45	15	TRUCK	D2	17.3	24.3	2	Slightly
9	3	15:25:22	11	AUTO	D2	14.6	22.3	2	Slightly
9	4	15:29:52	9	AUTO	D0	25.5	31.4	3	Moderately
9	5	15:34:34	2	B1B	D1	23.9	31.4	4	Very
10	1	15:47:27	14	TRUCK	D1	25.5	30.4	-1	MISSED EVENT
10	2	15:51:04	5	L1011	D0	29.1	36.3	2	Slightly
10	3	15:54:50	6	L1011	D1	24.4	32.1	2	Slightly
10	4	15:59:02	8	L1011	D3	14.2	23.8	2	Slightly
10	5	16:03:42	3	B1B	D2	18.0	27.8	2	Slightly
11	1	16:15:25	12	AUTO	D3	9.2	19.8	2	Slightly
11	2	16:20:03	17	TRAIN	D0	25.7	33.4	2	Slightly
11	3	16:24:12	20	TRAIN	D3	12.0	22.7	2	Slightly
11	4	16:27:56	4	B1B	D3	12.5	23.2	2	Slightly
11	5	16:31:24	1	B1B	D0	28.9	35.5	3	Moderately

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2002
Session: 4
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 10:49:28
Prepared by: SNEDDON

Session grp no.		Signal time	no	--Signal type	ID-- dist	---- d' Level ---- max	integ		Test subject response
13	1	15:25:35	15	TRUCK	D2	17.0	24.9	2	Slightly
13	2	15:29:18	3	B1B	D2	16.4	24.5	2	Slightly
13	3	15:33:56	14	TRUCK	D1	23.7	29.4	2	Slightly
13	4	15:37:39	6	L1011	D1	22.8	32.7	2	Slightly
13	5	15:42:41	7	L1011	D2	18.4	27.4	2	Slightly
14	1	15:56:01	18	TRAIN	D1	20.1	29.9	2	Slightly
14	2	16:01:02	16	TRUCK	D3	11.8	22.4	2	Slightly
14	3	16:04:11	8	L1011	D3	12.2	22.4	2	Slightly
14	4	16:07:39	2	B1B	D1	22.2	29.8	3	Moderately
14	5	16:11:01	12	AUTO	D3	10.8	20.7	-1	MISSED EVENT
15	1	16:21:39	13	TRUCK	D0	33.6	36.2	3	Moderately
15	2	16:24:47	19	TRAIN	D2	14.3	25.0	2	Slightly
15	3	16:29:13	4	B1B	D3	12.0	21.5	2	Slightly
15	4	16:32:35	1	B1B	D0	28.2	34.9	4	Very
15	5	16:36:11	10	AUTO	D1	22.1	27.9	2	Slightly

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2002
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 10:51:50
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
17	1	15:16:18	20 TRAIN	D3	10.4	20.1	-1	MISSED EVENT
17	2	15:19:41	4 B1B	D3	11.7	20.4	-1	MISSED EVENT
17	3	15:21:03	--------- FALSE ALARM ---------				2	Slightly
17	4	15:25:04	7 L1011	D2	15.7	24.8	2	Slightly
17	5	15:29:01	2 B1B	D1	22.9	29.5	3	Moderately
17	6	15:33:25	11 AUTO	D2	12.2	21.6	-1	MISSED EVENT
18	1	15:45:54	8 L1011	D3	11.0	21.7	2	Slightly
18	2	15:50:39	12 AUTO	D3	9.0	19.7	-1	MISSED EVENT
18	3	15:53:40	1 B1B	D0	25.9	31.9	4	Very
18	4	15:57:42	15 TRUCK	D2	19.5	26.2	-1	MISSED EVENT
18	5	16:02:13	5 L1011	D0	31.0	37.6	3	Moderately
19	1	16:16:18	13 TRUCK	D0	28.9	32.9	2	Slightly
19	2	16:20:45	18 TRAIN	D1	20.7	28.7	2	Slightly
19	3	16:24:52	--------- FALSE ALARM ---------				2	Slightly
19	4	16:28:42	6 L1011	D1	23.0	32.0	2	Slightly
19	5	16:32:53	10 AUTO	D1	20.1	26.5	2	Slightly
19	6	16:37:09	17 TRAIN	D0	24.6	31.8	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2003
Session: 1
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 10:54:38
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
1	1	13:47:06	14 TRUCK	D1	25.7	30.0	-1	MISSED EVENT
1	2	13:50:07	15 TRUCK	D2	16.6	25.0	-1	MISSED EVENT
1	3	13:54:29	6 L1011	D1	22.4	32.7	1	Not at all
1	4	13:59:14	3 B1B	D2	15.6	24.1	2	Slightly
1	5	14:02:53	7 L1011	D2	16.9	26.6	2	Slightly
2	1	14:07:49	18 TRAIN	D1	19.7	29.6	-1	MISSED EVENT
2	2	14:12:43	16 TRUCK	D3	12.2	22.3	1	Not at all
2	3	14:16:20	2 B1B	D1	23.1	30.3	2	Slightly
2	4	14:20:24	8 L1011	D3	12.2	22.8	-1	MISSED EVENT
2	5	14:23:42	12 AUTO	D3	9.8	20.3	-1	MISSED EVENT
3	1	14:32:33	1 B1B	D0	28.7	35.0	3	Moderately
3	2	14:36:48	13 TRUCK	D0	32.7	35.9	2	Slightly
3	3	14:40:09	19 TRAIN	D2	15.5	25.2	-1	MISSED EVENT
3	4	14:44:23	4 B1B	D3	12.7	21.6	-1	MISSED EVENT
3	5	14:48:59	10 AUTO	D1	21.8	27.9	-1	MISSED EVENT
4	1	14:58:20	9 AUTO	D0	26.8	31.9	2	Slightly
4	2	15:03:10	11 AUTO	D2	15.6	22.8	1	Not at all
4	3	15:07:42	5 L1011	D0	31.5	38.0	2	Slightly
4	4	15:11:25	20 TRAIN	D3	6.9	18.8	-1	MISSED EVENT
4	5	15:14:55	17 TRAIN	D0	27.7	35.3	3	Moderately

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2003
Session: 2
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 10:58:10
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response	
5	1	14:32:39	9	AUTO	D0	25.6	31.3	2	Slightly
5	2	14:37:39	15	TRUCK	D2	16.8	24.3	1	Not at all
5	3	14:40:54	7	L1011	D2	19.4	28.1	2	Slightly
5	4	14:44:41	11	AUTO	D2	14.5	22.6	2	Slightly
5	5	14:48:25	2	B1B	D1	24.4	31.7	2	Slightly
6	1	15:00:10	8	L1011	D3	13.3	23.7	-1	MISSED EVENT
6	2	15:05:00	5	L1011	D0	28.7	36.1	2	Slightly
6	3	15:08:30	14	TRUCK	D1	22.3	28.8	2	Slightly
6	4	15:12:05	6	L1011	D1	24.1	32.0	2	Slightly
6	5	15:15:32	3	B1B	D2	17.4	27.5	2	Slightly
7	1	15:26:19	4	B1B	D3	11.6	22.8	2	Slightly
7	2	15:31:21	12	AUTO	D3	9.0	19.8	-1	MISSED EVENT
7	3	15:36:02	20	TRAIN	D3	10.6	22.5	2	Slightly
7	4	15:41:06	17	TRAIN	D0	24.6	32.5	3	Moderately
7	5	15:45:03	1	B1B	D0	28.7	35.5	3	Moderately
8	1	15:54:16	10	AUTO	D1	21.2	27.0	-1	MISSED EVENT
8	2	15:57:59	19	TRAIN	D2	15.7	26.7	-1	MISSED EVENT
8	3	16:02:36	16	TRUCK	D3	8.7	21.3	-1	MISSED EVENT
8	4	16:07:17	18	TRAIN	D1	24.6	31.9	3	Moderately
8	5	16:11:58	13	TRUCK	D0	26.2	31.5	3	Moderately

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2003
Session: 3
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:01:14
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no type	ID-- dist	---- d' Level ---- max	integ	Test subject response
9	1	14:38:16	6 L1011	D1	23.5	32.9	2 Slightly
9	2	14:43:02	1 B1B	D0	29.9	35.1	3 Moderately
9	3	14:48:09	4 B1B	D3	12.0	21.3	-1 MISSED EVENT
9	4	14:52:25	18 TRAIN	D1	20.4	29.6	3 Moderately
9	5	14:57:29	11 AUTO	D2	15.3	23.0	1 Not at all
10	1	15:07:53	20 TRAIN	D3	6.8	18.8	-1 MISSED EVENT
10	2	15:12:25	12 AUTO	D3	9.8	20.4	-1 MISSED EVENT
10	3	15:15:59	15 TRUCK	D2	17.4	25.0	2 Slightly
10	4	15:20:13	17 TRAIN	D0	27.8	35.4	3 Moderately
10	5	15:23:37	13 TRUCK	D0	29.5	34.0	3 Moderately
11	1	15:36:02	8 L1011	D3	11.8	22.2	1 Not at all
11	2	15:40:11	2 B1B	D1	24.8	30.4	2 Slightly
11	3	15:44:29	14 TRUCK	D1	22.7	29.2	2 Slightly
11	4	15:48:43	9 AUTO	D0	25.8	31.4	2 Slightly
11	5	15:52:13	5 L1011	D0	30.9	37.9	2 Slightly
12	1	16:04:05	10 AUTO	D1	21.4	27.8	2 Slightly
12	2	16:07:15	3 B1B	D2	16.2	24.5	2 Slightly
12	3	16:11:58	19 TRAIN	D2	13.8	24.5	3 Moderately
12	4	16:16:15	7 L1011	D2	16.7	26.5	1 Not at all
12	5	16:20:51	16 TRUCK	D3	12.2	22.3	1 Not at all

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2003
Session: 4
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:05:02
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response	
13	1	14:40:38	14	TRUCK	D1	20.4	28.3	-1	MISSED EVENT
13	2	14:41:05	--------- FALSE ALARM ---------					2	Slightly
13	3	14:45:20	13	TRUCK	D0	30.3	34.1	2	Slightly
13	4	14:49:19	6	L1011	D1	23.4	31.7	3	Moderately
13	5	14:53:23	10	AUTO	D1	20.9	26.9	-1	MISSED EVENT
13	6	14:58:04	12	AUTO	D3	9.0	19.8	-1	MISSED EVENT
14	1	15:07:08	17	TRAIN	D0	24.2	32.6	3	Moderately
14	2	15:11:18	2	B1B	D1	25.1	31.7	3	Moderately
14	3	15:15:51	4	B1B	D3	11.6	22.8	-1	MISSED EVENT
14	4	15:20:04	9	AUTO	D0	26.3	31.6	2	Slightly
14	5	15:23:39	1	B1B	D0	29.3	35.8	4	Very
15	1	15:32:21	16	TRUCK	D3	8.0	21.1	-1	MISSED EVENT
15	2	15:37:00	7	L1011	D2	18.6	28.1	2	Slightly
15	3	15:40:53	3	B1B	D2	19.0	27.8	2	Slightly
15	4	15:44:02	11	AUTO	D2	14.3	22.3	2	Slightly
15	5	15:47:03	15	TRUCK	D2	15.4	24.0	-1	MISSED EVENT
16	1	15:59:55	20	TRAIN	D3	11.5	22.9	2	Slightly
16	2	16:03:34	5	L1011	D0	28.7	36.2	3	Moderately
16	3	16:07:54	18	TRAIN	D1	22.6	31.5	3	Moderately
16	4	16:12:26	8	L1011	D3	13.8	23.8	-1	MISSED EVENT
16	5	16:16:52	19	TRAIN	D2	17.2	27.3	3	Moderately

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Test Subject: 2003
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:08:18
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal ID--			---- d' Level ----		Test subject response	
			no	type	dist	max	integ		
17	1	14:45:57	---------	FALSE	ALARM ---------			1	Not at all
17	2	14:50:13	18	TRAIN	D1	20.7	29.4	3	Moderately
17	3	14:53:52	15	TRUCK	D2	16.4	24.3	3	Moderately
17	4	14:56:29	---------	FALSE	ALARM ---------			2	Slightly
17	5	14:56:53	---------	FALSE	ALARM ---------			2	Slightly
17	6	14:57:11	---------	FALSE	ALARM ---------			2	Slightly
17	7	14:59:58	---------	FALSE	ALARM ---------			2	Slightly
17	8	15:03:37	20	TRAIN	D3	9.5	19.7	-1	MISSED EVENT
17	9	15:05:19	---------	FALSE	ALARM ---------			2	Slightly
17	10	15:08:07	---------	FALSE	ALARM ---------			2	Slightly
17	11	15:11:49	9	AUTO	D0	26.3	30.7	2	Slightly
17	12	15:13:28	---------	FALSE	ALARM ---------			3	Moderately
17	13	15:17:28	1	B1B	D0	25.2	31.6	3	Moderately
18	1	15:25:51	8	L1011	D3	11.0	21.6	-1	MISSED EVENT
18	2	15:27:57	---------	FALSE	ALARM ---------			2	Slightly
18	3	15:29:50	---------	FALSE	ALARM ---------			2	Slightly
18	4	15:30:53	---------	FALSE	ALARM ---------			2	Slightly
18	5	15:33:55	11	AUTO	D2	12.8	21.9	-1	MISSED EVENT
18	6	15:34:59	---------	FALSE	ALARM ---------			3	Moderately
18	7	15:37:16	---------	FALSE	ALARM ---------			2	Slightly
18	8	15:37:42	---------	FALSE	ALARM ---------			3	Moderately
18	9	15:41:13	14	TRUCK	D1	22.4	29.4	3	Moderately
18	10	15:44:06	---------	FALSE	ALARM ---------			2	Slightly
18	11	15:47:20	19	TRAIN	D2	12.3	22.2	2	Slightly
18	12	15:52:30	4	B1B	D3	10.2	19.4	-1	MISSED EVENT
19	1	15:59:50	---------	FALSE	ALARM ---------			2	Slightly
19	2	16:00:18	---------	FALSE	ALARM ---------			2	Slightly
19	3	16:04:32	3	B1B	D2	15.7	23.2	2	Slightly
19	4	16:06:03	---------	FALSE	ALARM ---------			2	Slightly
19	5	16:06:39	---------	FALSE	ALARM ---------			2	Slightly
19	6	16:10:30	---------	FALSE	ALARM ---------			1	Not at all
19	7	16:14:42	---------	FALSE	ALARM ---------			2	Slightly
19	8	16:18:09	---------	FALSE	ALARM ---------			2	Slightly
19	9	16:18:29	---------	FALSE	ALARM ---------			3	Moderately
19	10	16:21:21	---------	FALSE	ALARM ---------			2	Slightly
19	11	16:23:41	---------	FALSE	ALARM ---------			2	Slightly
19	12	16:23:59	---------	FALSE	ALARM ---------			2	Slightly
19	13	16:24:30	---------	FALSE	ALARM ---------			3	Moderately
19	14	16:28:35	13	TRUCK	D0	29.4	33.8	3	Moderately
19	15	16:30:31	---------	FALSE	ALARM ---------			2	Slightly
19	16	16:30:53	---------	FALSE	ALARM ---------			2	Slightly
19	17	16:31:29	---------	FALSE	ALARM ---------			2	Slightly
19	18	16:34:45	---------	FALSE	ALARM ---------			1	Not at all

Test Subject: 2004
Session: 1
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:11:56
Prepared by: SNEDDON

Session grp	no.	Signal time	no	--Signal type	ID-- dist	d' Level max	integ	Test subject response
1	1	13:40:08	7	L1011	D2	19.7	28.4	-1 MISSED EVENT
1	2	13:43:46	11	AUTO	D2	14.4	22.4	-1 MISSED EVENT
1	3	13:48:14	15	TRUCK	D2	16.4	24.4	-1 MISSED EVENT
1	4	13:51:25	9	AUTO	D0	25.8	31.1	-1 MISSED EVENT
1	5	13:54:45	2	B1B	D1	25.1	32.0	-1 MISSED EVENT
2	1	14:06:30	8	L1011	D3	13.6	23.7	-1 MISSED EVENT
2	2	14:11:00	5	L1011	D0	27.7	36.0	2 Slightly
2	3	14:15:01	14	TRUCK	D1	24.6	29.5	1 Not at all
2	4	14:19:03	6	L1011	D1	25.2	32.4	2 Slightly
2	5	14:23:25	3	B1B	D2	17.5	27.7	-1 MISSED EVENT
3	1	14:32:05	12	AUTO	D3	8.7	19.8	-1 MISSED EVENT
3	2	14:35:43	20	TRAIN	D3	10.5	22.6	-1 MISSED EVENT
3	3	14:40:44	4	B1B	D3	11.6	23.0	-1 MISSED EVENT
3	4	14:45:22	17	TRAIN	D0	25.2	33.0	3 Moderately
3	5	14:50:35	1	B1B	D0	28.5	35.6	3 Moderately
4	1	15:02:09	16	TRUCK	D3	9.2	21.2	-1 MISSED EVENT
4	2	15:06:22	18	TRAIN	D1	23.3	31.8	3 Moderately
4	3	15:11:28	10	AUTO	D1	20.4	27.3	1 Not at all
4	4	15:15:57	19	TRAIN	D2	15.8	27.0	-1 MISSED EVENT
4	5	15:20:24	13	TRUCK	D0	32.2	34.3	3 Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2004
Session: 2
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:14:56
Prepared by: SNEDDON

Session grp no.	Signal time	--Signal no type dist			---- d' Level ---- max	integ	Test subject response	
5	1	11:10:03	15	TRUCK	D2	17.4	25.0	-1 MISSED EVENT
5	2	11:14:36	14	TRUCK	D1	21.8	29.0	-1 MISSED EVENT
5	3	11:18:32	3	B1B	D2	15.5	24.2	-1 MISSED EVENT
5	4	11:22:48	6	L1011	D1	23.5	32.8	3 Moderately
5	5	11:27:37	7	L1011	D2	17.4	26.8	2 Slightly
6	1	11:37:13	16	TRUCK	D3	12.1	22.5	-1 MISSED EVENT
6	2	11:40:06	8	L1011	D3	12.7	22.7	-1 MISSED EVENT
6	3	11:44:46	18	TRAIN	D1	20.5	30.5	3 Moderately
6	4	11:49:20	2	B1B	D1	23.2	30.3	3 Moderately
6	5	11:53:28	12	AUTO	D3	10.3	20.4	-1 MISSED EVENT
7	1	12:02:12	13	TRUCK	D0	32.0	35.5	3 Moderately
7	2	12:06:56	19	TRAIN	D2	13.8	24.1	2 Slightly
7	3	12:10:35	1	B1B	D0	29.8	35.4	3 Moderately
7	4	12:15:31	4	B1B	D3	13.4	21.9	-1 MISSED EVENT
7	5	12:19:15	10	AUTO	D1	21.4	27.8	2 Slightly
8	1	12:27:27	9	AUTO	D0	26.7	31.9	2 Slightly
8	2	12:31:18	11	AUTO	D2	14.9	22.9	-1 MISSED EVENT
8	3	12:36:04	5	L1011	D0	31.4	37.9	3 Moderately
8	4	12:39:19	20	TRAIN	D3	7.1	18.9	-1 MISSED EVENT
8	5	12:43:21	17	TRAIN	D0	27.2	35.1	3 Moderately

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2004
Session: 3
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:18:31
Prepared by: SNEDDON

| Session | | Signal | --Signal | ID-- | ---- d' Level ---- | | Test subject | |
grp	no.	time	no	type	dist	max	integ		response
9	1	10:24:42	10	AUTO	D1	20.6	27.1	2	Slightly
9	2	10:28:30	14	TRUCK	D1	25.0	30.1	2	Slightly
9	3	10:33:24	13	TRUCK	D0	29.4	33.2	3	Moderately
9	4	10:38:12	6	L1011	D1	24.7	31.9	3	Moderately
9	5	10:42:13	12	AUTO	D3	9.7	19.9	-1	MISSED EVENT
10	1	10:54:11	17	TRAIN	D0	24.0	32.3	3	Moderately
10	2	10:59:09	2	B1B	D1	24.8	31.9	3	Moderately
10	3	11:03:45	9	AUTO	D0	25.6	31.4	2	Slightly
10	4	11:08:16	4	B1B	D3	11.7	23.3	2	Slightly
10	5	11:11:55	1	B1B	D0	29.1	35.6	3	Moderately
11	1	11:23:25	11	AUTO	D2	14.3	22.4	1	Not at all
11	2	11:26:46	7	L1011	D2	19.0	28.3	2	Slightly
11	3	11:31:32	16	TRUCK	D3	8.5	21.3	-1	MISSED EVENT
11	4	11:34:26	3	B1B	D2	18.3	27.6	3	Moderately
11	5	11:38:22	15	TRUCK	D2	16.2	24.4	2	Slightly
12	1	11:48:46	5	L1011	D0	29.1	36.2	3	Moderately
12	2	11:53:03	8	L1011	D3	12.5	23.8	-1	MISSED EVENT
12	3	11:56:20	20	TRAIN	D3	13.7	23.5	2	Slightly
12	4	12:01:03	18	TRAIN	D1	21.7	31.6	3	Moderately
12	5	12:04:41	19	TRAIN	D2	17.4	27.2	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2004
Session: 4
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:22:42
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response
13	1	10:26:58	6	L1011	D1	23.6	33.0	2 Slightly
13	2	10:31:37	1	B1B	D0	30.6	35.6	3 Moderately
13	3	10:35:54	18	TRAIN	D1	20.2	29.3	3 Moderately
13	4	10:40:39	4	B1B	D3	12.1	21.7	2 Slightly
13	5	10:44:33	11	AUTO	D2	15.3	22.9	2 Slightly
14	1	10:54:26	20	TRAIN	D3	11.9	19.3	-1 MISSED EVENT
14	2	10:58:11	15	TRUCK	D2	17.4	25.1	2 Slightly
14	3	11:02:36	17	TRAIN	D0	27.8	35.3	3 Moderately
14	4	11:05:59	12	AUTO	D3	9.0	20.1	-1 MISSED EVENT
14	5	11:08:47	13	TRUCK	D0	31.4	34.7	4 Very
15	1	11:18:36	9	AUTO	D0	27.8	32.7	-1 MISSED EVENT
15	2	11:23:17	2	B1B	D1	25.5	30.9	3 Moderately
15	3	11:26:37	14	TRUCK	D1	21.2	29.0	3 Moderately
15	4	11:31:38	8	L1011	D3	11.5	22.1	2 Slightly
15	5	11:36:11	5	L1011	D0	30.8	37.7	3 Moderately
16	1	11:46:33	19	TRAIN	D2	14.0	24.8	3 Moderately
16	2	11:50:06	10	AUTO	D1	21.5	27.8	3 Moderately
16	3	11:54:48	3	B1B	D2	14.2	23.8	3 Moderately
16	4	11:59:48	7	L1011	D2	17.5	27.0	2 Slightly
16	5	12:04:53	16	TRUCK	D3	12.1	22.4	-1 MISSED EVENT

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2004
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:25:43
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ	Test subject response	
17	1	10:12:19	20	TRAIN	D3	9.4	19.7	1	Not at all
17	2	10:16:58	7	L1011	D2	15.2	25.1	3	Moderately
17	3	10:18:39	--------- FALSE ALARM ---------					2	Slightly
17	4	10:20:05	--------- FALSE ALARM ---------					2	Slightly
17	5	10:23:33	--------- FALSE ALARM ---------					3	Moderately
17	6	10:26:22	2	B1B	D1	21.9	27.9	-1	MISSED EVENT
17	7	10:30:09	4	B1B	D3	9.8	19.5	-1	MISSED EVENT
17	8	10:33:27	11	AUTO	D2	13.3	21.7	2	Slightly
18	1	10:39:55	--------- FALSE ALARM ---------					2	Slightly
18	2	10:44:23	8	L1011	D3	11.1	21.5	-1	MISSED EVENT
18	3	10:48:26	15	TRUCK	D2	18.8	25.5	2	Slightly
18	4	10:53:08	12	AUTO	D3	8.5	19.4	-1	MISSED EVENT
18	5	10:56:17	--------- FALSE ALARM ---------					3	Moderately
18	6	10:58:11	--------- FALSE ALARM ---------					4	Very
18	7	11:00:56	1	B1B	D0	26.7	32.3	3	Moderately
18	8	11:04:46	5	L1011	D0	30.0	37.2	3	Moderately
19	1	11:12:25	--------- FALSE ALARM ---------					2	Slightly
19	2	11:16:14	6	L1011	D1	22.5	31.5	3	Moderately
19	3	11:20:35	18	TRAIN	D1	18.6	27.3	3	Moderately
19	4	11:24:33	13	TRUCK	D0	29.1	33.0	4	Very
19	5	11:27:38	10	AUTO	D1	21.4	27.1	-1	MISSED EVENT
19	6	11:31:30	17	TRAIN	D0	27.2	34.3	4	Very

Test Subject: 2005
Session: 1
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:29:08
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ	Test subject response	
1	1	11:26:32	4	B1B	D3	9.5	20.9	3	Moderately
1	2	11:28:01	--------- FALSE ALARM ---------					2	Slightly
1	3	11:31:39	6	L1011	D1	23.5	32.7	3	Moderately
1	4	11:35:29	18	TRAIN	D1	24.4	31.1	4	Very
1	5	11:38:53	1	B1B	D0	29.2	35.0	4	Very
1	6	11:42:32	11	AUTO	D2	14.9	22.9	-1	MISSED EVENT
2	1	11:51:18	20	TRAIN	D3	9.6	19.2	-1	MISSED EVENT
2	2	11:55:55	12	AUTO	D3	11.5	20.6	-1	MISSED EVENT
2	3	12:00:23	17	TRAIN	D0	26.6	35.4	4	Very
2	4	12:05:06	15	TRUCK	D2	17.9	25.2	-1	MISSED EVENT
2	5	12:09:00	13	TRUCK	D0	32.0	35.9	3	Moderately
3	1	12:20:49	9	AUTO	D0	26.1	31.4	2	Slightly
3	2	12:24:25	8	L1011	D3	12.3	22.4	2	Slightly
3	3	12:29:15	2	B1B	D1	21.8	29.6	4	Very
3	4	12:33:18	14	TRUCK	D1	23.0	29.6	3	Moderately
3	5	12:34:10	--------- FALSE ALARM ---------					1	Not at all
3	6	12:38:01	5	L1011	D0	31.1	38.0	4	Very
4	1	12:52:54	7	L1011	D2	17.1	27.0	3	Moderately
4	2	12:57:43	3	B1B	D2	15.5	24.2	3	Moderately
4	3	12:58:31	--------- FALSE ALARM ---------					1	Not at all
4	4	13:02:22	19	TRAIN	D2	14.8	24.9	3	Moderately
4	5	13:06:24	--------- FALSE ALARM ---------					1	Not at all
4	6	13:10:43	10	AUTO	D1	22.0	28.1	2	Slightly
4	7	13:14:58	16	TRUCK	D3	11.7	22.4	-1	MISSED EVENT

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2005
Session: 2
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:33:25
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
5	1	12:18:57	7	L1011	D2	19.3	28.2	-1	MISSED EVENT
5	2	12:23:22	15	TRUCK	D2	17.3	24.5	-1	MISSED EVENT
5	3	12:26:43	9	AUTO	D0	26.7	31.9	-1	MISSED EVENT
5	4	12:31:01	11	AUTO	D2	15.1	22.7	-1	MISSED EVENT
5	5	12:34:55	2	B1B	D1	24.2	31.8	-1	MISSED EVENT
6	1	12:44:48	5	L1011	D0	28.9	36.0	3	Moderately
6	2	12:48:18	8	L1011	D3	13.4	24.0	2	Slightly
6	3	12:51:56	14	TRUCK	D1	22.5	28.6	3	Moderately
6	4	12:54:27	--------- FALSE ALARM ---------					2	Slightly
6	5	12:59:00	6	L1011	D1	24.4	31.9	3	Moderately
6	6	13:02:19	3	B1B	D2	17.4	27.3	3	Moderately
7	1	13:13:16	17	TRAIN	D0	24.7	32.8	4	Very
7	2	13:17:38	4	B1B	D3	11.9	23.3	2	Slightly
7	3	13:21:24	12	AUTO	D3	9.5	20.0	1	Not at all
7	4	13:26:19	20	TRAIN	D3	12.0	22.8	2	Slightly
7	5	13:29:50	1	B1B	D0	29.1	35.8	3	Moderately
8	1	13:41:08	16	TRUCK	D3	8.0	21.2	2	Slightly
8	2	13:44:51	18	TRAIN	D1	22.6	31.7	3	Moderately
8	3	13:49:10	10	AUTO	D1	21.3	27.5	3	Moderately
8	4	13:52:43	19	TRAIN	D2	18.3	27.4	3	Moderately
8	5	13:56:57	13	TRUCK	D0	30.5	33.6	5	Highly

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Test Subject: 2005
Session: 3
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:36:28
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
9	1	12:12:21	15 TRUCK	D2	16.4	24.7	1	Not at all
9	2	12:15:35	14 TRUCK	D1	23.0	29.0	3	Moderately
9	3	12:20:29	6 L1011	D1	23.0	32.8	3	Moderately
9	4	12:25:36	3 B1B	D2	16.7	24.5	-1	MISSED EVENT
9	5	12:28:48	7 L1011	D2	17.5	27.2	2	Slightly
10	1	12:40:27	18 TRAIN	D1	20.9	30.3	4	Very
10	2	12:44:29	8 L1011	D3	11.8	22.4	-1	MISSED EVENT
10	3	12:47:57	16 TRUCK	D3	12.1	22.3	-1	MISSED EVENT
10	4	12:52:25	2 B1B	D1	23.8	30.4	3	Moderately
10	5	12:57:09	12 AUTO	D3	8.9	20.2	-1	MISSED EVENT
11	1	13:06:29	4 B1B	D3	13.5	21.9	-1	MISSED EVENT
11	2	13:10:32	13 TRUCK	D0	34.1	36.8	3	Moderately
11	3	13:14:44	19 TRAIN	D2	14.7	24.2	3	Moderately
11	4	13:19:25	1 B1B	D0	30.9	36.2	4	Very
11	5	13:22:39	10 AUTO	D1	20.5	27.4	2	Slightly
12	1	13:35:27	11 AUTO	D2	15.1	23.0	-1	MISSED EVENT
12	2	13:39:19	9 AUTO	D0	27.2	32.4	-1	MISSED EVENT
12	3	13:43:25	20 TRAIN	D3	7.6	19.0	-1	MISSED EVENT
12	4	13:47:19	5 L1011	D0	31.2	38.0	-1	MISSED EVENT
12	5	13:51:09	17 TRAIN	D0	28.4	35.6	-1	MISSED EVENT

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2005
Session: 4
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:39:31
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response	
13	1	11:02:55	10	AUTO	D1	20.7	27.0	2	Slightly
13	2	11:07:49	13	TRUCK	D0	31.9	34.8	2	Slightly
13	3	11:11:53	14	TRUCK	D1	25.0	29.7	2	Slightly
13	4	11:16:40	6	L1011	D1	24.5	32.1	3	Moderately
13	5	11:19:58	12	AUTO	D3	8.4	19.7	-1	MISSED EVENT
14	1	11:30:04	4	B1B	D3	11.9	23.2	2	Slightly
14	2	11:34:29	17	TRAIN	D0	24.7	32.8	3	Moderately
14	3	11:39:04	9	AUTO	D0	26.4	31.5	3	Moderately
14	4	11:43:16	2	B1B	D1	24.9	32.0	3	Moderately
14	5	11:47:51	1	B1B	D0	28.4	35.4	4	Very
15	1	11:59:51	3	B1B	D2	18.9	27.7	2	Slightly
15	2	12:03:55	16	TRUCK	D3	8.0	21.1	-1	MISSED EVENT
15	3	12:07:44	7	L1011	D2	19.2	28.2	2	Slightly
15	4	12:11:36	11	AUTO	D2	14.6	22.7	2	Slightly
15	5	12:16:31	15	TRUCK	D2	16.8	24.5	-1	MISSED EVENT
16	1	12:35:13	18	TRAIN	D1	22.8	31.7	4	Very
16	2	12:39:07	5	L1011	D0	29.1	36.2	3	Moderately
16	3	12:43:54	8	L1011	D3	13.1	23.6	1	Not at all
16	4	12:47:50	20	TRAIN	D3	12.3	22.8	2	Slightly
16	5	12:51:57	19	TRAIN	D2	17.5	26.8	3	Moderately

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2005
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:42:27
Prepared by: SNEDDON

Session grp	no.	Signal time	no	Signal type	ID dist	d' Level max	integ	Test subject response	
17	1	12:02:29	9	AUTO	D0	24.5	29.8	3	Moderately
17	2	12:05:58	18	TRAIN	D1	18.9	27.5	3	Moderately
17	3	12:10:30		--------- FALSE	ALARM	---------		4	Very
17	4	12:13:23		--------- FALSE	ALARM	---------		3	Moderately
17	5	12:16:02		--------- FALSE	ALARM	---------		3	Moderately
17	6	12:16:28		--------- FALSE	ALARM	---------		4	Very
17	7	12:19:36	20	TRAIN	D3	9.3	19.8	-1	MISSED EVENT
17	8	12:24:04	15	TRUCK	D2	17.8	25.5	2	Slightly
17	9	12:28:16	1	B1B	D0	27.0	32.8	3	Moderately
18	1	12:37:41	14	TRUCK	D1	21.2	28.8	3	Moderately
18	2	12:41:37	11	AUTO	D2	14.0	21.9	-1	MISSED EVENT
18	3	12:45:32	8	L1011	D3	10.4	21.2	-1	MISSED EVENT
18	4	12:46:24		--------- FALSE	ALARM	---------		3	Moderately
18	5	12:46:34		--------- FALSE	ALARM	---------		1	Not at all
18	6	12:48:16		--------- FALSE	ALARM	---------		3	Moderately
18	7	12:50:08		--------- FALSE	ALARM	---------		3	Moderately
18	8	12:51:21		--------- FALSE	ALARM	---------		3	Moderately
18	9	12:54:16		--------- FALSE	ALARM	---------		3	Moderately
18	10	12:57:17	19	TRAIN	D2	14.3	23.7	2	Slightly
18	11	13:00:59	4	B1B	D3	9.1	19.4	-1	MISSED EVENT
19	1	13:13:48	3	B1B	D2	16.1	23.0	-1	MISSED EVENT
19	2	13:15:19		--------- FALSE	ALARM	---------		3	Moderately
19	3	13:16:23		--------- FALSE	ALARM	---------		2	Slightly
19	4	13:16:47		--------- FALSE	ALARM	---------		3	Moderately
19	5	13:20:52	10	AUTO	D1	19.2	26.3	3	Moderately
19	6	13:25:16	6	L1011	D1	20.3	30.2	3	Moderately
19	7	13:29:28	13	TRUCK	D0	27.9	32.5	4	Very
19	8	13:32:55	5	L1011	D0	29.3	35.8	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2006
Session: 1
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:19:25
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response	
1	1	15:20:09	14	TRUCK	D1	23.0	28.7	-1	MISSED EVENT
1	2	15:23:38	13	TRUCK	D0	31.6	34.6	2	Slightly
1	3	15:28:09	6	L1011	D1	25.1	32.2	2	Slightly
1	4	15:32:38	10	AUTO	D1	20.5	26.9	1	Not at all
1	5	15:36:19	12	AUTO	D3	9.8	19.8	-1	MISSED EVENT
2	1	15:50:07	2	B1B	D1	24.1	31.4	2	Slightly
2	2	15:54:49	17	TRAIN	D0	24.8	32.6	3	Moderately
2	3	15:58:05	4	B1B	D3	12.0	23.0	1	Not at all
2	4	16:01:10	9	AUTO	D0	26.4	31.7	2	Slightly
2	5	16:05:10	1	B1B	D0	29.4	35.4	-1	MISSED EVENT
3	1	16:19:08	16	TRUCK	D3	9.2	21.3	1	Not at all
3	2	16:23:02	3	B1B	D2	17.6	27.6	1	Not at all
3	3	16:26:41	7	L1011	D2	19.0	28.3	1	Not at all
3	4	16:31:13	11	AUTO	D2	14.6	22.5	1	Not at all
3	5	16:35:57	15	TRUCK	D2	16.4	24.4	1	Not at all
4	1	16:49:38	5	L1011	D0	28.5	36.2	2	Slightly
4	2	16:54:49	18	TRAIN	D1	23.5	31.7	2	Slightly
4	3	16:58:21	20	TRAIN	D3	10.3	22.9	1	Not at all
4	4	17:02:24	8	L1011	D3	12.9	23.6	1	Not at all
4	5	17:06:14	19	TRAIN	D2	15.9	26.8	1	Not at all

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2006
Session: 2
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:22:40
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal ID-- no	type	dist	---- d' Level ---- max	integ	Test subject response	
5	1	14:20:51	14	TRUCK	D1	22.1	28.9	1	Not at all
5	2	14:24:37	3	B1B	D2	16.9	25.0	1	Not at all
5	3	14:28:34	15	TRUCK	D2	16.7	24.6	1	Not at all
5	4	14:32:48	6	L1011	D1	23.2	33.0	2	Slightly
5	5	14:37:13	7	L1011	D2	17.4	27.0	1	Not at all
6	1	14:51:55	18	TRAIN	D1	20.2	30.8	2	Slightly
6	2	14:57:06	16	TRUCK	D3	11.7	22.3	1	Not at all
6	3	15:00:22	2	B1B	D1	23.3	30.4	1	Not at all
6	4	15:03:43	8	L1011	D3	11.1	22.4	-1	MISSED EVENT
6	5	15:08:17	12	AUTO	D3	9.1	20.2	-1	MISSED EVENT
7	1	15:22:19	19	TRAIN	D2	16.0	25.4	1	Not at all
7	2	15:26:16	13	TRUCK	D0	34.7	37.1	2	Slightly
7	3	15:29:38	4	B1B	D3	12.1	21.5	-1	MISSED EVENT
7	4	15:33:16	1	B1B	D0	27.9	34.7	2	Slightly
7	5	15:37:56	10	AUTO	D1	21.3	27.6	1	Not at all
8	1	15:50:12	5	L1011	D0	31.2	37.9	2	Slightly
8	2	15:53:29	20	TRAIN	D3	6.9	18.8	-1	MISSED EVENT
8	3	15:58:28	11	AUTO	D2	15.5	22.9	1	Not at all
8	4	16:01:33	9	AUTO	D0	27.8	32.5	1	Not at all
8	5	16:04:41	17	TRAIN	D0	27.8	35.1	2	Slightly

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2006
Session: 3
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:27:57
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
9	1	15:46:08	11 AUTO	D2	14.3	22.4	1	Not at all
9	2	15:49:56	15 TRUCK	D2	17.3	24.6	1	Not at all
9	3	15:53:26	7 L1011	D2	19.0	28.3	1	Not at all
9	4	15:58:16	9 AUTO	D0	25.8	31.3	2	Slightly
9	5	16:02:59	2 B1B	D1	23.8	31.6	2	Slightly
10	1	16:16:22	5 L1011	D0	27.8	35.7	2	Slightly
10	2	16:19:44	8 L1011	D3	13.7	23.8	1	Not at all
10	3	16:23:17	14 TRUCK	D1	25.5	30.3	2	Slightly
10	4	16:27:27	6 L1011	D1	24.8	32.0	2	Slightly
10	5	16:31:51	3 B1B	D2	18.8	27.9	1	Not at all
11	1	16:44:10	12 AUTO	D3	9.6	19.8	1	Not at all
11	2	16:47:38	20 TRAIN	D3	9.7	22.4	1	Not at all
11	3	16:51:46	17 TRAIN	D0	24.1	32.6	2	Slightly
11	4	16:56:02	4 B1B	D3	11.7	23.0	1	Not at all
11	5	16:59:37	1 B1B	D0	29.4	35.8	2	Slightly
12	1	17:08:28	10 AUTO	D1	20.8	27.3	1	Not at all
12	2	17:12:47	16 TRUCK	D3	9.7	21.4	1	Not at all
12	3	17:16:04	19 TRAIN	D2	16.0	26.9	1	Not at all
12	4	17:20:44	18 TRAIN	D1	22.8	31.6	2	Slightly
12	5	17:25:01	13 TRUCK	D0	31.3	34.2	2	Slightly

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2006
Session: 4
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:31:09
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ	Test subject response	
13	1	10:15:22	6	L1011	D1	22.4	32.5	2	Slightly
13	2	10:19:57	1	B1B	D0	28.8	34.6	2	Slightly
13	3	10:24:07	18	TRAIN	D1	20.9	30.5	2	Slightly
13	4	10:27:40	4	B1B	D3	12.3	21.4	1	Not at all
13	5	10:32:31	11	AUTO	D2	16.1	23.3	1	Not at all
14	1	10:45:37	12	AUTO	D3	9.6	20.3	1	Not at all
14	2	10:49:11	20	TRAIN	D3	7.5	18.8	-1	MISSED EVENT
14	3	10:52:23	15	TRUCK	D2	17.0	24.8	-1	MISSED EVENT
14	4	10:55:42	17	TRAIN	D0	28.4	35.1	2	Slightly
14	5	11:00:09	13	TRUCK	D0	31.4	35.3	2	Slightly
15	1	11:14:44	14	TRUCK	D1	22.4	29.3	-1	MISSED EVENT
15	2	11:15:39	---------	FALSE	ALARM	---------		1	Not at all
15	3	11:20:09	2	B1B	D1	23.7	30.4	2	Slightly
15	4	11:23:28	8	L1011	D3	11.1	22.3	1	Not at all
15	5	11:28:02	9	AUTO	D0	27.0	32.2	2	Slightly
15	6	11:32:57	5	L1011	D0	31.4	37.9	2	Slightly
16	1	11:44:10	10	AUTO	D1	21.5	27.8	1	Not at all

Test Subject: 2006
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:40:36
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID dist	d' Level max	integ	Test subject	response
17	1	12:22:03	---------	FALSE	ALARM	---------		1	Not at all
17	2	12:25:09	---------	FALSE	ALARM	---------		1	Not at all
17	3	12:27:36	---------	FALSE	ALARM	---------		1	Not at all
17	4	12:28:39	---------	FALSE	ALARM	---------		1	Not at all
17	5	12:29:37	---------	FALSE	ALARM	---------		1	Not at all
17	6	12:30:30	---------	FALSE	ALARM	---------		2	Slightly
17	7	12:33:36	2	B1B	D1	19.7	26.2	2	Slightly
17	8	12:35:51	---------	FALSE	ALARM	---------		1	Not at all
17	9	12:38:43	20	TRAIN	D3	9.5	19.6	1	Not at all
17	10	12:40:02	---------	FALSE	ALARM	---------		1	Not at all
17	11	12:44:08	7	L1011	D2	15.7	25.1	1	Not at all
17	12	12:46:44	---------	FALSE	ALARM	---------		1	Not at all
17	13	12:50:28	4	B1B	D3	10.9	20.2	1	Not at all
17	14	12:53:51	---------	FALSE	ALARM	---------		1	Not at all
17	15	12:56:57	---------	FALSE	ALARM	---------		1	Not at all
17	16	12:58:58	---------	FALSE	ALARM	---------		1	Not at all
17	17	13:03:07	11	AUTO	D2	13.0	21.8	-1	MISSED EVENT
18	1	13:13:57	---------	FALSE	ALARM	---------		2	Slightly
18	2	13:16:57	1	B1B	D0	27.6	33.3	2	Slightly
18	3	13:20:17	---------	FALSE	ALARM	---------		1	Not at all
18	4	13:23:16	15	TRUCK	D2	19.7	26.3	1	Not at all
18	5	13:24:27	---------	FALSE	ALARM	---------		1	Not at all
18	6	13:27:55	12	AUTO	D3	8.1	19.3	-1	MISSED EVENT
18	7	13:30:46	---------	FALSE	ALARM	---------		1	Not at all
18	8	13:34:39	8	L1011	D3	11.5	21.5	-1	MISSED EVENT
18	9	13:35:56	---------	FALSE	ALARM	---------		1	Not at all
18	10	13:38:51	5	L1011	D0	31.7	38.2	2	Slightly
19	1	13:44:55	---------	FALSE	ALARM	---------		1	Not at all
19	2	13:46:59	---------	FALSE	ALARM	---------		1	Not at all
19	3	13:50:27	18	TRAIN	D1	19.4	27.6	2	Slightly
19	4	13:54:04	6	L1011	D1	20.9	29.9	2	Slightly
19	5	13:56:50	---------	FALSE	ALARM	---------		1	Not at all
19	6	13:57:31	---------	FALSE	ALARM	---------		1	Not at all
19	7	13:58:06	---------	FALSE	ALARM	---------		2	Slightly
19	8	14:00:51	---------	FALSE	ALARM	---------		1	Not at all
19	9	14:04:05	13	TRUCK	D0	30.0	33.9	2	Slightly
19	10	14:04:52	---------	FALSE	ALARM	---------		1	Not at all
19	11	14:08:53	10	AUTO	D1	19.8	25.7	1	Not at all
19	12	14:10:18	---------	FALSE	ALARM	---------		1	Not at all
19	13	14:13:17	---------	FALSE	ALARM	---------		1	Not at all

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2007
Session: 1
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:51:20
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ	Test subject	response
1	1	10:22:16	6	L1011	D1	23.3	32.8	2	Slightly
1	2	10:26:53	1	B1B	D0	28.6	34.7	2	Slightly
1	3	10:30:10	4	B1B	D3	11.2	21.4	-1	MISSED EVENT
1	4	10:33:08	18	TRAIN	D1	20.6	29.9	3	Moderately
1	5	10:36:20	11	AUTO	D2	15.1	22.8	1	Not at all
2	1	10:45:31	15	TRUCK	D2	17.0	25.0	2	Slightly
2	2	10:49:25	12	AUTO	D3	9.2	20.1	-1	MISSED EVENT
2	3	10:53:24	20	TRAIN	D3	8.6	19.0	-1	MISSED EVENT
2	4	10:58:07	17	TRAIN	D0	29.1	35.5	3	Moderately
2	5	11:01:36	13	TRUCK	D0	32.0	35.2	3	Moderately
3	1	11:11:21	8	L1011	D3	10.9	22.3	1	Not at all
3	2	11:15:34	14	TRUCK	D1	22.4	29.3	2	Slightly
3	3	11:18:37	2	B1B	D1	21.4	29.6	2	Slightly
3	4	11:22:17	9	AUTO	D0	26.1	31.7	3	Moderately
3	5	11:25:34	5	L1011	D0	30.6	37.8	3	Moderately
4	1	11:34:21	3	B1B	D2	15.0	24.5	3	Moderately
4	2	11:38:44	7	L1011	D2	18.4	27.3	2	Slightly
4	3	11:43:17	19	TRAIN	D2	14.6	24.6	2	Slightly
4	4	11:48:00	10	AUTO	D1	21.1	27.5	2	Slightly
4	5	11:52:36	16	TRUCK	D3	12.3	22.6	1	Not at all

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2007
Session: 2
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:54:14
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ		Test subject response
5	1	10:09:44	13	TRUCK	D0	29.1	33.0	3	Moderately
5	2	10:13:02	14	TRUCK	D1	18.8	28.2	2	Slightly
5	3	10:17:09	6	L1011	D1	24.4	32.2	2	Slightly
5	4	10:20:25	10	AUTO	D1	20.3	26.7	2	Slightly
5	5	10:23:26	12	AUTO	D3	9.7	19.9	-1	MISSED EVENT
6	1	10:29:57	4	B1B	D3	12.2	23.3	2	Slightly
6	2	10:34:45	2	B1B	D1	24.1	31.8	3	Moderately
6	3	10:38:36	17	TRAIN	D0	24.0	32.2	3	Moderately
6	4	10:43:16	9	AUTO	D0	26.1	31.4	2	Slightly
6	5	10:47:06	1	B1B	D0	28.9	35.4	3	Moderately
7	1	10:57:00	16	TRUCK	D3	8.5	21.2	1	Not at all
7	2	11:00:03	3	B1B	D2	18.3	27.6	2	Slightly
7	3	11:04:41	11	AUTO	D2	14.5	22.6	2	Slightly
7	4	11:08:23	7	L1011	D2	18.4	28.0	2	Slightly
7	5	11:11:39	15	TRUCK	D2	16.4	24.0	1	Not at all
8	1	11:19:46	20	TRAIN	D3	10.3	22.4	1	Not at all
8	2	11:24:10	5	L1011	D0	28.7	36.1	3	Moderately
8	3	11:28:01	18	TRAIN	D1	22.3	31.6	3	Moderately
8	4	11:32:19	8	L1011	D3	13.4	23.9	1	Not at all
8	5	11:37:04	19	TRAIN	D2	15.5	26.9	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2007
Session: 3
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 11:57:19
Prepared by: SNEDDON

Session grp	no.	Signal time	no	Signal type	ID-- dist	d' Level max	d' Level integ	Test subject response	
9	1	10:19:23	14	TRUCK	D1	22.1	29.1	2	Slightly
9	2	10:22:56	3	B1B	D2	14.7	24.0	2	Slightly
9	3	10:27:40	15	TRUCK	D2	16.6	24.9	1	Not at all
9	4	10:31:20	6	L1011	D1	23.5	32.8	2	Slightly
9	5	10:34:49	7	L1011	D2	17.5	26.9	1	Not at all
10	1	10:44:14	18	TRAIN	D1	20.1	30.1	2	Slightly
10	2	10:48:16	2	B1B	D1	22.2	30.2	2	Slightly
10	3	10:51:23	16	TRUCK	D3	12.0	22.1	1	Not at all
10	4	10:54:41	8	L1011	D3	12.2	22.5	1	Not at all
10	5	10:58:52	12	AUTO	D3	10.4	20.2	-1	MISSED EVENT
11	1	11:07:54	13	TRUCK	D0	29.0	34.5	2	Slightly
11	2	11:12:31	1	B1B	D0	29.3	35.1	3	Moderately
11	3	11:17:10	4	B1B	D3	12.0	21.5	1	Not at all
11	4	11:20:36	19	TRAIN	D2	13.6	24.0	2	Slightly
11	5	11:23:52	10	AUTO	D1	20.8	27.7	2	Slightly
12	1	11:34:38	11	AUTO	D2	14.2	22.8	1	Not at all
12	2	11:38:48	5	L1011	D0	31.0	37.9	3	Moderately
12	3	11:43:39	20	TRAIN	D3	7.8	18.9	-1	MISSED EVENT
12	4	11:47:11	9	AUTO	D0	27.8	32.3	2	Slightly
12	5	11:51:14	17	TRAIN	D0	28.4	35.4	3	Moderately

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2007
Session: 4
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 12:00:25
Prepared by: SNEDDON

Session grp no.		Signal time	Signal no	type	ID-- dist	d' Level max	integ	Test subject response	
13	1	10:05:26	9	AUTO	D0	26.0	31.4	3	Moderately
13	2	10:09:59	11	AUTO	D2	15.0	22.5	2	Slightly
13	3	10:14:48	7	L1011	D2	19.2	28.2	2	Slightly
13	4	10:18:18	15	TRUCK	D2	12.7	23.5	2	Slightly
13	5	10:22:13	2	B1B	D1	24.1	31.6	3	Moderately
14	1	10:32:46	5	L1011	D0	28.5	36.3	3	Moderately
14	2	10:36:11	8	L1011	D3	13.9	23.8	2	Slightly
14	3	10:41:09	6	L1011	D1	24.1	32.1	3	Moderately
14	4	10:44:52	14	TRUCK	D1	24.2	29.7	2	Slightly
14	5	10:48:30	3	B1B	D2	18.6	27.7	-1	MISSED EVENT
15	1	10:58:58	20	TRAIN	D3	11.2	22.9	2	Slightly
15	2	11:02:47	4	B1B	D3	11.9	23.1	1	Not at all
15	3	11:06:40	12	AUTO	D3	8.4	19.8	-1	MISSED EVENT
15	4	11:10:21	17	TRAIN	D0	25.2	32.7	-1	MISSED EVENT
15	5	11:14:22	1	B1B	D0	28.9	35.5	3	Moderately
16	1	11:24:32	16	TRUCK	D3	7.9	21.1	-1	MISSED EVENT
16	2	11:29:03	18	TRAIN	D1	22.9	31.8	3	Moderately
16	.3	11:34:01	19	TRAIN	D2	16.0	26.7	2	Slightly
16	4	11:38:24	10	AUTO	D1	20.0	27.0	2	Slightly
16	5	11:41:33	13	TRUCK	D0	33.0	35.1	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2007
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 12:03:40
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal ID-- no type dist			d' Level max	integ	Test subject response	
17	1	10:21:57	15	TRUCK	D2	18.5	25.4	2	Slightly
17	2	10:23:36	---------	FALSE	ALARM ---------			2	Slightly
17	3	10:26:57	20	TRAIN	D3	8.5	18.9	-1	MISSED EVENT
17	4	10:28:41	---------	FALSE	ALARM ---------			3	Moderately
17	5	10:29:41	---------	FALSE	ALARM ---------			3	Moderately
17	6	10:30:45	---------	FALSE	ALARM ---------			3	Moderately
17	7	10:31:37	---------	FALSE	ALARM ---------			4	Very
17	8	10:33:30	---------	FALSE	ALARM ---------			3	Moderately
17	9	10:34:30	---------	FALSE	ALARM ---------			2	Slightly
17	10	10:34:50	---------	FALSE	ALARM ---------			3	Moderately
17	11	10:37:12	---------	FALSE	ALARM ---------			2	Slightly
17	12	10:37:40	---------	FALSE	ALARM ---------			3	Moderately
17	13	10:41:47	9	AUTO	D0	25.0	30.5	3	Moderately
17	14	10:45:47	18	TRAIN	D1	20.3	28.8	3	Moderately
17	15	10:47:53	---------	FALSE	ALARM ---------			2	Slightly
17	16	10:51:13	---------	FALSE	ALARM ---------			2	Slightly
17	17	10:54:33	1	B1B	D0	26.8	32.3	3	Moderately
18	1	11:04:59	11	AUTO	D2	12.5	21.1	-1	MISSED EVENT
18	2	11:06:28	---------	FALSE	ALARM ---------			2	Slightly
18	3	11:07:30	---------	FALSE	ALARM ---------			3	Moderately
18	4	11:09:25	---------	FALSE	ALARM ---------			4	Very
18	5	11:12:30	---------	FALSE	ALARM ---------			3	Moderately
18	6	11:15:55	8	L1011	D3	9.8	21.6	2	Slightly
18	7	11:20:34	19	·TRAIN	D2	14.5	23.6	2	Slightly
18	8	11:25:20	14	TRUCK	D1	21.2	28.3	3	Moderately
18	9	11:28:33	4	B1B	D3	11.2	20.2	-1	MISSED EVENT
19	1	11:39:56	3	B1B	D2	16.8	23.3	2	Slightly
19	2	11:44:16	13	TRUCK	D0	30.5	33.9	3	Moderately
19	3	11:47:48	6	L1011	D1	21.0	30.5	3	Moderately
19	4	11:52:42	10	AUTO	D1	21.2	26.6	3	Moderately
19	5	11:56:08	---------	FALSE	ALARM ---------			3	Moderately
19	6	11:58:41	---------	FALSE	ALARM ---------			1	Not at all
19	7	11:59:18	---------	FALSE	ALARM ---------			3	Moderately
19	8	12:02:14	---------	FALSE	ALARM ---------			2	Slightly
19	9	12:05:49	5	L1011	D0	31.7	37.7	2	Slightly

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2008
Session: 1
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 13:43:32
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ	Test subject response	
1	1	14:37:08	10	AUTO	D1	20.3	26.9	1	Not at all
1	2	14:41:17	13	TRUCK	D0	31.3	34.7	2	Slightly
1	3	14:45:24	14	TRUCK	D1	24.2	29.4	1	Not at all
1	4	14:49:06	6	L1011	D1	24.3	32.0	2	Slightly
1	5	14:53:26	12	AUTO	D3	8.9	19.8	-1	MISSED EVENT
2	1	15:04:14	--------- FALSE ALARM ---------					1	Not at all
2	2	15:08:41	2	B1B	D1	25.3	31.9	2	Slightly
2	3	15:12:28	4	B1B	D3	12.6	23.2	1	Not at all
2	4	15:15:39	9	AUTO	D0	26.2	31.7	2	Slightly
2	5	15:20:15	17	TRAIN	D0	24.8	32.3	2	Slightly
2	6	15:25:20	1	B1B	D0	28.1	35.4	3	Moderately
3	1	15:38:11	11	AUTO	D2	15.0	22.6	1	Not at all
3	2	15:42:42	7	L1011	D2	18.8	28.0	1	Not at all
3	3	15:47:30	3	B1B	D2	18.3	27.5	1	Not at all
3	4	15:51:29	16	TRUCK	D3	8.1	21.2	-1	MISSED EVENT
3	5	15:56:10	15	TRUCK	D2	14.9	24.0	1	Not at all
4	1	16:08:24	18	TRAIN	D1	23.3	31.9	3	Moderately
4	2	16:13:24	5	L1011	D0	29.5	36.3	2	Slightly
4	3	16:18:06	8	L1011	D3	12.2	23.5	-1	MISSED EVENT
4	4	16:23:06	20	TRAIN	D3	13.7	23.2	1	Not at all

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2008
Session: 2
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 13:20:54
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ	Test subject response	
5	1	14:03:19	6	L1011	D1	23.3	33.2	-1	MISSED EVENT
5	2	14:07:43	4	B1B	D3	11.1	21.4	-1	MISSED EVENT
5	3	14:11:35	18	TRAIN	D1	20.5	30.4	2	Slightly
5	4	14:14:20	--------- FALSE ALARM ---------					1	Not at all
5	5	14:17:32	1	B1B	D0	30.0	35.2	3	Moderately
5	6	14:22:33	11	AUTO	D2	14.7	22.7	1	Not at all
6	1	14:32:18	12	AUTO	D3	10.9	20.7	-1	MISSED EVENT
6	2	14:36:39	17	TRAIN	D0	27.5	35.0	3	Moderately
6	3	14:41:14	20	TRAIN	D3	9.3	19.2	1	Not at all
6	4	14:44:40	15	TRUCK	D2	16.7	25.0	2	Slightly
6	5	14:49:40	13	TRUCK	D0	32.0	35.4	2	Slightly
7	1	15:00:37	9	AUTO	D0 ·	26.0	31.7	2	Slightly
7	2	15:05:10	14	TRUCK	D1	24.6	29.8	2	Slightly
7	3	15:08:44	8	L1011	D3	12.2	22.5	-1	MISSED EVENT
7	4	15:12:58	2	B1B	D1	23.5	30.3	2	Slightly
7	5	15:17:36	5	L1011	D0	31.3	38.1	3	Moderately
8	1	15:28:09	7	L1011	D2	17.1	27.0	2	Slightly
8	2	15:31:29	10	AUTO	D1	21.8	27.9	2	Slightly
8	3	15:35:19	3	B1B	D2	17.3	24.8	1	Not at all
8	4	15:39:22	19	TRAIN	D2	14.4	24.8	2	Slightly
8	5	15:42:36	--------- FALSE ALARM ---------					1	Not at all
8	6	15:47:01	16	TRUCK	D3	11.8	22.3	1	Not at all

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2008
Session: 3
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 13:25:49
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	integ		Test subject response
9	1	14:25:56	9	AUTO	D0	26.1	31.4	2	Slightly
9	2	14:30:54	11	AUTO	D2	14.6	22.5	1	Not at all
9	3	14:35:55	7	L1011	D2	19.4	28.3	1	Not at all
9	4	14:39:48	15	TRUCK	D2	15.3	23.7	1	Not at all
9	5	14:44:47	2	B1B	D1	23.4	31.7	2	Slightly
10	1	14:55:50	14	TRUCK	D1	24.6	29.7	2	Slightly
10	2	15:00:11	8	L1011	D3	13.0	23.5	1	Not at all
10	3	15:01:44	---------	FALSE	ALARM ---------			1	Not at all
10	4	15:04:41	5	L1011	D0	28.7	36.6	2	Slightly
10	5	15:08:04	6	L1011	D1	23.8	32.0	2	Slightly
10	6	15:12:36	3	B1B	D2	18.4	27.6	2	Slightly
11	1	15:24:47	20	TRAIN	D3	9.9	22.3	2	Slightly
11	2	15:29:56	12	AUTO	D3	9.7	19.9	1	Not at all
11	3	15:34:40	4	B1B	D3	12.5	23.2	1	Not at all
11	4	15:39:33	17	TRAIN	D0	25.2	33.2	3	Moderately
11	5	15:44:30	1	B1B	D0	29.4	35.6	4	Very
12	1	15:54:03	19	TRAIN	D2	16.9	27.1	2	Slightly
12	2	15:59:12	10	AUTO	D1	20.8	27.3	2	Slightly
12	3	16:02:54	18	TRAIN	D1	22.6	31.8	3	Moderately
12	4	16:06:24	16	TRUCK	D3	8.4	21.3	-1	MISSED EVENT
12	5	16:10:35	13	TRUCK	D0	33.0	35.6	2	Slightly

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2008
Session: 4
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 13:54:17
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	ID-- type	dist	---- d' Level ---- max	integ		Test subject response
13	1	14:13:39	---------	FALSE	ALARM	---------		1	Not at all
13	2	14:18:09	14	TRUCK	D1	19.7	27.7	2	Slightly
13	3	14:21:22	3	B1B	D2	17.8	25.0	1	Not at all
13	4	14:25:27	6	L1011	D1	23.1	32.5	2	Slightly
13	5	14:29:22	15	TRUCK	D2	18.5	25.4	2	Slightly
13	6	14:34:03	7	L1011	D2	17.7	27.0	3	Moderately
14	1	14:46:10	2	B1B	D1	21.9	29.8	2	Slightly
14	2	14:51:11	16	TRUCK	D3	12.4	22.4	2	Slightly
14	3	14:54:15	8	L1011	D3	11.3	22.2	1	Not at all
14	4	14:57:39	18	TRAIN	D1	20.2	30.4	4	Very
14	5	15:02:35	12	AUTO	D3	10.0	20.5	-1	MISSED EVENT
15	1	15:12:27	4	B1B	D3	11.5	21.9	1	Not at all
15	2	15:16:11	19	TRAIN	D2	18.2	25.8	3	Moderately
15	3	15:21:18	13	TRUCK	D0	32.3	35.8	2	Slightly
15	4	15:24:22	1	B1B	D0	28.2	34.7	3	Moderately
15	5	15:28:05	10	AUTO	D1	21.1	27.6	2	Slightly
16	1	15:42:10	5	L1011	D0	30.9	37.8	3	Moderately
16	2	15:46:12	20	TRAIN	D3	6.7	18.7	1	Not at all
16	3	15:50:40	9	AUTO	D0	26.4	31.9	2	Slightly
16	4	15:54:41	11	AUTO	D2	15.5	22.9	2	Slightly
16	5	15:57:59	17	TRAIN	D0	28.7	35.5	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2008
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 13:57:49
Prepared by: SNEDDON

Session grp no.	Signal time	--Signal ID-- no type dist	---- d' Level ---- max integ	Test subject response
17 1	14:21:21	4 B1B D3	10.9 19.8	1 Not at all
17 2	14:25:28	7 L1011 D2	15.0 25.0	1 Not at all
17 3	14:28:00	-------- FALSE ALARM --------		1 Not at all
17 4	14:30:43	-------- FALSE ALARM --------		2 Slightly
17 5	14:32:11	-------- FALSE ALARM --------		1 Not at all
17 6	14:33:49	-------- FALSE ALARM --------		1 Not at all
17 7	14:36:40	-------- FALSE ALARM --------		1 Not at all
17 8	14:39:19	-------- FALSE ALARM --------		1 Not at all
17 9	14:42:11	20 TRAIN D3	8.8 19.4	-1 MISSED EVENT
17 10	14:47:03	2 B1B D1	21.3 28.0	1 Not at all
17 11	14:50:54	11 AUTO D2	13.7 22.5	-1 MISSED EVENT
18 1	14:59:21	12 AUTO D3	8.1 19.2	-1 MISSED EVENT
18 2	15:03:47	15 TRUCK D2	18.2 25.3	-1 MISSED EVENT
18 3	15:08:27	-------- FALSE ALARM --------		2 Slightly
18 4	15:11:20	8 L1011 D3	9.3 20.1	1 Not at all
18 5	15:15:18	-------- FALSE ALARM --------		2 Slightly
18 6	15:19:53	1 B1B D0	27.2 33.1	2 Slightly
18 7	15:23:51	5 L1011 D0	28.8 35.6	2 Slightly
19 1	15:31:45	-------- FALSE ALARM --------		2 Slightly
19 2	15:33:37	-------- FALSE ALARM --------		2 Slightly
19 3	15:37:04	13 TRUCK D0	30.5 33.2	-1 MISSED EVENT
19 4	15:40:28	6 L1011 D1	21.0 31.0	1 Not at all
19 5	15:43:48	10 AUTO D1	20.2 26.1	-1 MISSED EVENT
19 6	15:46:58	18 TRAIN D1	19.3 27.8	3 Moderately
19 7	15:51:43	17 TRAIN D0	26.5 33.9	3 Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2009
Session: 1
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:44:11
Prepared by: SNEDDON

Session grp	no.	Signal time	no	Signal type	ID-- dist	d' Level max	integ	Test subject response	
1	1	12:42:51	15	TRUCK	D2	16.9	25.0	1	Not at all
1	2	12:46:17	14	TRUCK	D1	25.1	29.7	2	Slightly
1	3	12:51:04	6	L1011	D1	23.0	32.8	2	Slightly
1	4	12:54:50	3	B1B	D2	15.9	24.3	2	Slightly
1	5	12:58:36	7	L1011	D2	18.7	27.1	2	Slightly
2	1	13:09:42	2	B1B	D1	23.2	30.5	3	Moderately
2	2	13:14:25	8	L1011	D3	11.5	22.0	-1	MISSED EVENT
2	3	13:18:43	16	TRUCK	D3	11.9	22.4	-1	MISSED EVENT
2	4	13:22:37	18	TRAIN	D1	21.1	30.6	1	Not at all
2	5	13:26:11	12	AUTO	D3	10.0	20.4	-1	MISSED EVENT
3	1	13:35:06	1	B1B	D0	30.4	36.1	4	Very
3	2	13:38:39	4	B1B	D3	10.0	21.0	2	Slightly
3	3	13:43:21	19	TRAIN	D2	14.4	24.4	-1	MISSED EVENT
3	4	13:46:40	13	TRUCK	D0	32.7	36.0	3	Moderately
3	5	13:49:52	10	AUTO	D1	21.1	27.6	-1	MISSED EVENT
4	1	14:01:00	5	L1011	D0	31.2	37.8	3	Moderately
4	2	14:04:38	11	AUTO	D2	14.8	23.1	1	Not at all
4	3	14:09:17	20	TRAIN	D3	7.4	18.8	-1	MISSED EVENT
4	4	14:14:05	9	AUTO	D0	26.8	32.2	-1	MISSED EVENT
4	5	14:17:03	17	TRAIN	D0	28.4	35.6	1	Not at all

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2009
Session: 2
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:47:38
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max	integ		Test subject response
5	1	12:44:42	15 TRUCK	D2	14.5	23.7	2	Slightly
5	2	12:49:41	9 AUTO	D0	26.2	31.6	2	Slightly
5	3	12:53:27	11 AUTO	D2	14.8	22.5	1	Not at all
5	4	12:56:36	7 L1011	D2	19.8	28.2	2	Slightly
5	5	13:01:02	2 B1B	D1	24.7	31.7	3	Moderately
6	1	13:10:34	5 L1011	D0	29.2	36.2	4	Very
6	2	13:14:39	14 TRUCK	D1	23.0	29.0	2	Slightly
6	3	13:17:57	8 L1011	D3	12.9	23.7	2	Slightly
6	4	13:21:25	6 L1011	D1	24.4	32.0	3	Moderately
6	5	13:25:29	3 B1B	D2	18.0	27.8	2	Slightly
7	1	13:37:51	4 B1B	D3	11.6	22.9	2	Slightly
7	2	13:41:40	20 TRAIN	D3	10.5	22.5	1	Not at all
7	3	13:46:05	12 AUTO	D3	9.3	19.8	-1	MISSED EVENT
7	4	13:50:31	17 TRAIN	D0	24.1	32.2	2	Slightly
7	5	13:54:47	1 B1B	D0	28.0	35.3	3	Moderately
8	1	14:08:39	10 AUTO	D1	21.0	26.8	2	Slightly
8	2	14:11:45	19 TRAIN	D2	15.1	26.6	2	Slightly
8	3	14:16:34	16 TRUCK	D3	8.7	21.4	1	Not at all
8	4	14:19:47	18 TRAIN	D1	22.3	31.7	2	Slightly
8	5	14:23:12	13 TRUCK	D0	23.5	31.1	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2009
Session: 3
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:50:33
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max integ		Test subject response	
9	1	13:02:55	6	L1011	D1	23.5	32.8	3	Moderately
9	2	13:07:49	18	TRAIN	D1	22.0	30.5	2	Slightly
9	3	13:11:44	4	B1B	D3	13.1	21.7	2	Slightly
9	4	13:16:19	1	B1B	D0	29.7	35.5	-1	MISSED EVENT
9	5	13:20:03	11	AUTO	D2	16.1	23.2	2	Slightly
10	1	13:29:51	17	TRAIN	D0	28.3	35.2	2	Slightly
10	2	13:33:42	12	AUTO	D3	9.2	20.3	-1	MISSED EVENT
10	3	13:38:30	20	TRAIN	D3	11.1	19.7	-1	MISSED EVENT
10	4	13:42:04	15	TRUCK	D2	17.3	25.0	2	Slightly
10	5	13:46:30	13	TRUCK	D0	28.4	34.1	-1	MISSED EVENT
11	1	13:57:17	2	B1B	D1	22.0	30.1	3	Moderately
11	2	14:02:02	9	AUTO	D0	25.6	31.7	2	Slightly
11	3	14:06:57	14	TRUCK	D1	21.2	29.1	2	Slightly
11	4	14:11:10	8	L1011	D3	12.6	22.7	2	Slightly
11	5	14:15:35	5	L1011	D0	31.0	37.9	3	Moderately
12	1	14:24:50	19	TRAIN	D2	14.8	25.0	2	Slightly
12	2	14:29:33	10	AUTO	D1	21.2	27.4	2	Slightly
12	3	14:33:08	3	B1B	D2	15.9	23.9	3	Moderately
12	4	14:37:05	7	L1011	D2	18.0	26.9	3	Moderately
12	5	14:40:38	16	TRUCK	D3	11.9	22.3	2	Slightly

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2009
Session: 4
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:53:34
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
13	1	09:11:00	6	L1011	D1	24.6	32.1	2	Slightly
13	2	09:15:59	13	TRUCK	D0	32.6	35.2	2	Slightly
13	3	09:19:13	14	TRUCK	D1	25.0	30.0	-1	MISSED EVENT
13	4	09:24:01	10	AUTO	D1	21.0	27.3	2	Slightly
13	5	09:28:11	12	AUTO	D3	8.9	19.9	-1	MISSED EVENT
14	1	09:36:32	4	B1B	D3	11.3	23.3	1	Not at all
14	2	09:39:56	2	B1B	D1	24.1	31.3	3	Moderately
14	3	09:43:09	9	AUTO	D0	26.4	31.6	2	Slightly
14	4	09:46:47	17	TRAIN	D0	24.6	32.5	2	Slightly
14	5	09:50:34	1	B1B	D0	28.7	35.8	4	Very
15	1	09:58:55	11	AUTO	D2	15.2	22.6	2	Slightly
15	2	10:03:43	3	B1B	D2	18.8	27.9	2	Slightly
15	3	10:07:24	16	TRUCK	D3	9.7	21.4	-1	MISSED EVENT
15	4	10:10:39	7	L1011	D2	18.9	28.1	2	Slightly
15	5	10:13:54	15	TRUCK	D2	16.8	24.2	2	Slightly
16	1	10:21:54	5	L1011	D0	28.1	35.9	4	Very
16	2	10:25:32	20	TRAIN	D3	10.5	22.7	1	Not at all
16	3	10:30:10	8	L1011	D3	12.5	23.5	1	Not at all
16	4	10:33:42	18	TRAIN	D1	22.2	31.9	2	Slightly
16	5	10:38:05	19	TRAIN	D2	17.3	27.1	2	Slightly

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Test Subject: 2009
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 14:58:04
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal ID-- no type dist			---- d' Level ---- max integ		Test subject response	
17	1	09:10:24	-------- FALSE ALARM ---------					1	Not at all
17	2	09:12:28	-------- FALSE ALARM ---------					2	Slightly
17	3	09:15:58	-------- FALSE ALARM ---------					2	Slightly
17	4	09:16:40	-------- FALSE ALARM ---------					1	Not at all
17	5	09:17:32	-------- FALSE ALARM ---------					2	Slightly
17	6	09:18:20	-------- FALSE ALARM ---------					1	Not at all
17	7	09:18:35	-------- FALSE ALARM ---------					2	Slightly
17	8	09:19:33	-------- FALSE ALARM ---------					2	Slightly
17	9	09:20:11	-------- FALSE ALARM ---------					1	Not at all
17	10	09:20:27	-------- FALSE ALARM ---------					2	Slightly
17	11	09:22:20	-------- FALSE ALARM ---------					2	Slightly
17	12	09:23:20	-------- FALSE ALARM ---------					2	Slightly
17	13	09:23:39	-------- FALSE ALARM ---------					3	Moderately
17	14	09:24:59	-------- FALSE ALARM ---------					2	Slightly
17	15	09:25:50	-------- FALSE ALARM ---------					2	Slightly
17	16	09:26:27	-------- FALSE ALARM ---------					3	Moderately
17	17	09:27:03	-------- FALSE ALARM ---------					2	Slightly
17	18	09:27:58	-------- FALSE ALARM ---------					2	Slightly
17	19	09:28:36	-------- FALSE ALARM ---------					1	Not at all
17	20	09:30:17	-------- FALSE ALARM ---------					1	Not at all
17	21	09:31:49	-------- FALSE ALARM ---------					2	Slightly
17	22	09:32:28	-------- FALSE ALARM ---------					2	Slightly
17	23	09:33:28	-------- FALSE ALARM ---------					3	Moderately
17	24	09:34:38	-------- FALSE ALARM ---------					1	Not at all
17	25	09:36:15	-------- FALSE ALARM ---------					3	Moderately
17	26	09:36:59	-------- FALSE ALARM ---------					1	Not at all
17	27	09:39:46	-------- FALSE ALARM ---------					2	Slightly
17	28	09:39:56	-------- FALSE ALARM ---------					3	Moderately
17	29	09:40:19	-------- FALSE ALARM ---------					2	Slightly
17	30	09:40:33	-------- FALSE ALARM ---------					2	Slightly
17	31	09:41:28	-------- FALSE ALARM ---------					3	Moderately
17	32	09:42:41	-------- FALSE ALARM ---------					2	Slightly
17	33	09:45:16	-------- FALSE ALARM ---------					2	Slightly
17	34	09:45:39	-------- FALSE ALARM ---------					3	Moderately
17	35	09:46:56	-------- FALSE ALARM ---------					2	Slightly
17	36	09:47:42	-------- FALSE ALARM ---------					1	Not at all
17	37	09:49:50	-------- FALSE ALARM ---------					1	Not at all
17	38	09:50:29	-------- FALSE ALARM ---------					2	Slightly
17	39	09:51:55	-------- FALSE ALARM ---------					2	Slightly
17	40	09:53:15	-------- FALSE ALARM ---------					2	Slightly
17	41	09:53:43	-------- FALSE ALARM ---------					2	Slightly
17	42	09:54:25	-------- FALSE ALARM ---------					1	Not at all
17	43	09:55:17	-------- FALSE ALARM ---------					3	Moderately
17	44	09:56:03	-------- FALSE ALARM ---------					3	Moderately
17	45	09:56:19	-------- FALSE ALARM ---------					3	Moderately
17	46	09:57:17	-------- FALSE ALARM ---------					3	Moderately

17	47	09:57:55	--------- FALSE ALARM ---------		3	Moderately
17	48	09:58:11	--------- FALSE ALARM ---------		3	Moderately
17	49	09:59:06	--------- FALSE ALARM ---------		2	Slightly
17	50	09:59:45	--------- FALSE ALARM ---------		2	Slightly
17	51	10:00:04	--------- FALSE ALARM ---------		2	Slightly
17	52	10:11:57	--------- FALSE ALARM ---------		1	Not at all
17	53	10:12:25	--------- FALSE ALARM ---------		2	Slightly
17	54	10:14:29	--------- FALSE ALARM ---------		1	Not at all
17	55	10:15:35	--------- FALSE ALARM ---------		1	Not at all
17	56	10:18:26	--------- FALSE ALARM ---------		2	Slightly
17	57	10:18:38	--------- FALSE ALARM ---------		2	Slightly
17	58	10:18:55	--------- FALSE ALARM ---------		2	Slightly
17	59	10:20:31	--------- FALSE ALARM ---------		2	Slightly
17	60	10:21:28	--------- FALSE ALARM ---------		3	Moderately
17	61	10:22:19	--------- FALSE ALARM ---------		2	Slightly
17	62	10:22:31	--------- FALSE ALARM ---------		3	Moderately
17	63	10:23:25	--------- FALSE ALARM ---------		3	Moderately
17	64	10:24:17	--------- FALSE ALARM ---------		2	Slightly
17	65	10:25:16	--------- FALSE ALARM ---------		1	Not at all
17	66	10:26:15	--------- FALSE ALARM ---------		3	Moderately
17	67	10:26:46	--------- FALSE ALARM ---------		3	Moderately
17	68	10:27:19	--------- FALSE ALARM ---------		2	Slightly
17	69	10:27:38	--------- FALSE ALARM ---------		3	Moderately
17	70	10:28:14	--------- FALSE ALARM ---------		1	Not at all
17	71	10:30:33	--------- FALSE ALARM ---------		1	Not at all
17	72	10:31:47	--------- FALSE ALARM ---------		1	Not at all
17	73	10:32:05	--------- FALSE ALARM ---------		3	Moderately
17	74	10:32:31	--------- FALSE ALARM ---------		2	Slightly
17	75	10:32:42	--------- FALSE ALARM ---------		2	Slightly
17	76	10:33:07	--------- FALSE ALARM ---------		3	Moderately
17	77	10:33:47	--------- FALSE ALARM ---------		2	Slightly
17	78	10:34:57	--------- FALSE ALARM ---------		1	Not at all
17	79	10:35:20	--------- FALSE ALARM ---------		2	Slightly
17	80	10:36:08	--------- FALSE ALARM ---------		2	Slightly
17	81	10:36:58	--------- FALSE ALARM ---------		2	Slightly
17	82	10:37:16	--------- FALSE ALARM ---------		2	Slightly
17	83	10:37:42	--------- FALSE ALARM ---------		1	Not at all
17	84	10:40:13	--------- FALSE ALARM ---------		2	Slightly
17	85	10:40:29	--------- FALSE ALARM ---------		2	Slightly
17	86	10:42:53	--------- FALSE ALARM ---------		2	Slightly
17	87	10:43:05	--------- FALSE ALARM ---------		3	Moderately
17	88	10:43:54	--------- FALSE ALARM ---------		2	Slightly
17	89	10:44:09	--------- FALSE ALARM ---------		3	Moderately
17	90	10:44:42	--------- FALSE ALARM ---------		2	Slightly
17	91	10:45:00	--------- FALSE ALARM ---------		3	Moderately
17	92	10:45:47	--------- FALSE ALARM ---------		2	Slightly
17	93	10:46:33	--------- FALSE ALARM ---------		1	Not at all
17	94	10:47:33	--------- FALSE ALARM ---------		1	Not at all
17	95	10:47:51	--------- FALSE ALARM ---------		2	Slightly
17	96	10:48:12	--------- FALSE ALARM ---------		3	Moderately
17	97	10:48:49	--------- FALSE ALARM ---------		2	Slightly
17	98	10:49:33	--------- FALSE ALARM ---------		2	Slightly
17	99	10:50:28	--------- FALSE ALARM ---------		2	Slightly
17	100	10:50:48	--------- FALSE ALARM ---------		3	Moderately
17	101	10:50:57	--------- FALSE ALARM ---------		3	Moderately
17	102	10:51:27	--------- FALSE ALARM ---------		2	Slightly
17	103	10:52:30	--------- FALSE ALARM ---------		2	Slightly
17	104	10:54:48	--------- FALSE ALARM ---------		3	Moderately
17	105	10:56:22	--------- FALSE ALARM ---------		2	Slightly
17	106	10:56:46	--------- FALSE ALARM ---------		2	Slightly
17	107	10:56:59	--------- FALSE ALARM ---------		2	Slightly
17	108	10:57:57	--------- FALSE ALARM ---------		3	Moderately

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17 109   10:59:11    --------- FALSE ALARM ---------     2  Slightly
17 110   11:00:20    --------- FALSE ALARM ---------     3  Moderately
17 111   11:00:49    --------- FALSE ALARM ---------     2  Slightly
17 112   11:01:14    --------- FALSE ALARM ---------     1  Not at all
```

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2010
Session: 1
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 15:05:34
Prepared by: SNEDDON

Session grp	no.	Signal time	Signal no	type	ID-- dist	d' Level max	d' Level integ	Test subject response	
1	1	14:48:48	7	L1011	D2	20.4	28.6	2	Slightly
1	2	14:53:51	11	AUTO	D2	15.0	22.4	2	Slightly
1	3	14:57:15	15	TRUCK	D2	15.7	23.8	3	Moderately
1	4	15:01:53	9	AUTO	D0	25.7	31.4	4	Very
1	5	15:04:57	2	B1B	D1	24.6	31.9	3	Moderately
2	1	15:16:57	8	L1011	D3	13.9	23.7	1	Not at all
2	2	15:20:22	5	L1011	D0	29.0	36.5	4	Very
2	3	15:25:25	14	TRUCK	D1	22.3	28.9	4	Very
2	4	15:30:25	6	L1011	D1	24.0	32.0	3	Moderately
2	5	15:33:58	3	B1B	D2	19.2	27.7	2	Slightly
3	1	15:47:06	4	B1B	D3	11.8	23.2	-1	MISSED EVENT
3	2	15:50:24	20	TRAIN	D3	11.9	22.6	2	Slightly
3	3	15:55:05	12	AUTO	D3	9.1	19.8	-1	MISSED EVENT
3	4	15:58:33	17	TRAIN	D0	24.1	32.4	4	Very
3	5	16:03:00	1	B1B	D0	29.2	35.7	4	Very
4	1	16:15:13	18	TRAIN	D1	22.7	31.6	-1	MISSED EVENT
4	2	16:19:05	19	TRAIN	D2	16.3	26.8	-1	MISSED EVENT
4	3	16:23:03	16	TRUCK	D3	8.7	21.2	-1	MISSED EVENT
4	4	16:25:43	--------- FALSE ALARM ---------					1	Not at all

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2010
Session: 2
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 15:08:22
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
5	1	14:45:05	14 TRUCK	D1	25.7	30.0	2	Slightly
5	2	14:48:27	3 B1B	D2	15.8	23.9	2	Slightly
5	3	14:53:03	6 L1011	D1	21.7	32.4	3	Moderately
5	4	14:58:00	15 TRUCK	D2	16.3	24.7	-1	MISSED EVENT
5	5	15:01:41	7 L1011	D2	17.0	27.0	2	Slightly
6	1	15:12:00	2 B1B	D1	21.9	29.8	3	Moderately
6	2	15:16:05	18 TRAIN	D1	20.8	30.3	3	Moderately
6	3	15:19:32	16 TRUCK	D3	11.4	22.2	-1	MISSED EVENT
6	4	15:22:58	8 L1011	D3	10.7	22.3	1	Not at all
6	5	15:27:47	12 AUTO	D3	8.6	20.3	-1	MISSED EVENT
7	1	15:40:15	13 TRUCK	D0	33.1	36.1	4	Very
7	2	15:45:12	1 B1B	D0	30.6	35.4	4	Very
7	3	15:48:55	4 B1B	D3	11.5	21.5	-1	MISSED EVENT
7	4	15:52:50	19 TRAIN	D2	15.1	25.4	2	Slightly
7	5	15:56:22	10 AUTO	D1	21.1	27.7	2	Slightly
8	1	16:06:05	5 L1011	D0	30.9	37.9	3	Moderately
8	2	16:09:41	9 AUTO	D0	26.7	32.1	3	Moderately
8	3	16:12:39	11 AUTO	D2	15.5	23.1	2	Slightly
8	4	16:15:50	20 TRAIN	D3	7.2	18.6	-1	MISSED EVENT
8	5	16:20:43	17 TRAIN	D0	28.3	35.4	5	Highly

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2010
Session: 3
Ambient Type: RURAL
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 15:11:11
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal ID-- no type dist			---- d' Level ---- max integ		Test subject response	
9	1	14:59:57	10	AUTO	D1	20.8	27.1	2	Slightly
9	2	15:04:17	13	TRUCK	D0	31.3	34.7	3	Moderately
9	3	15:08:21	14	TRUCK	D1	25.0	29.6	3	Moderately
9	4	15:13:08	--------- FALSE ALARM ---------					1	Not at all
9	5	15:17:33	6	L1011	D1	24.4	32.2	3	Moderately
9	6	15:21:58	12	AUTO	D3	9.3	19.9	-1	MISSED EVENT
10	1	15:34:47	2	B1B	D1	24.3	31.8	3	Moderately
10	2	15:38:52	4	B1B	D3	12.4	23.6	2	Slightly
10	3	15:43:46	9	AUTO	D0	26.1	31.3	3	Moderately
10	4	15:48:34	17	TRAIN	D0	24.5	32.3	5	Highly
10	5	15:53:15	1	B1B	D0	29.3	35.6	4	Very
11	1	16:02:48	3	B1B	D2	18.1	27.3	4	Very
11	2	16:06:31	7	L1011	D2	19.6	28.5	-1	MISSED EVENT
11	3	16:10:37	16	TRUCK	D3	7.7	21.1	-1	MISSED EVENT
11	4	16:13:45	11	AUTO	D2	13.9	22.4	2	Slightly
11	5	16:16:46	15	TRUCK	D2	14.9	23.7	2	Slightly
12	1	16:28:16	20	TRAIN	D3	11.4	23.1	2	Slightly
12	2	16:33:10	18	TRAIN	D1	22.5	31.7	4	Very
12	3	16:37:14	8	L1011	D3	12.7	23.7	1	Not at all
12	4	16:42:15	5	L1011	D0	27.8	36.0	4	Very
12	5	16:46:28	19	TRAIN	D2	16.9	26.9	3	Moderately

SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2010
Session: 4
Ambient Type: VOICES
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 15:14:16
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal-- no type	ID-- dist	---- d' Level ---- max integ		Test subject response
13	1	14:43:09	6 L1011	D1	23.0	32.8	3 Moderately
13	2	14:46:27	4 B1B	D3	14.4	25.0	-1 MISSED EVENT
13	3	14:51:14	1 B1B	D0	29.4	35.3	4 Very
13	4	14:55:00	18 TRAIN	D1	20.3	29.7	3 Moderately
13	5	14:59:21	11 AUTO	D2	13.9	22.7	-1 MISSED EVENT
14	1	15:10:44	17 TRAIN	D0	28.3	35.7	4 Very
14	2	15:15:25	20 TRAIN	D3	8.7	19.0	-1 MISSED EVENT
14	3	15:19:23	12 AUTO	D3	10.5	20.4	-1 MISSED EVENT
14	4	15:23:20	15 TRUCK	D2	15.9	24.5	-1 MISSED EVENT
14	5	15:26:15	13 TRUCK	D0	31.4	35.5	3 Moderately
15	1	15:36:08	2 B1B	D1	23.5	30.2	3 Moderately
15	2	15:39:45	14 TRUCK	D1	22.1	29.4	2 Slightly
15	3	15:43:49	8 L1011	D3	10.2	21.9	-1 MISSED EVENT
15	4	15:47:40	9 AUTO	D0	26.1	31.6	3 Moderately
15	5	15:51:29	5 L1011	D0	30.9	37.8	3 Moderately
16	1	16:04:05	3 B1B	D2	15.9	24.7	2 Slightly
16	2	16:07:58	19 TRAIN	D2	13.4	24.7	2 Slightly
16	3	16:12:36	10 AUTO	D1	20.3	27.5	3 Moderately
16	4	16:17:30	7 L1011	D2	17.7	27.1	2 Slightly
16	5	16:22:02	16 TRUCK	D3	12.3	22.4	-1 MISSED EVENT

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SUMMARY TABLE OF D'L CALCULATIONS
NASA TASK ORDER NUMBER 8

Test Subject: 2010
Session: 5
Ambient Type: URBAN
Run number: 115777
Analysis Date: 16-May-96
Analysis Time: 15:17:22
Prepared by: SNEDDON

Session grp no.		Signal time	--Signal no	type	ID-- dist	---- d' Level ---- max	integ	Test subject response	
17	1	14:21:36	20	TRAIN	D3	9.5	19.7	-1	MISSED EVENT
17	2	14:24:39	4	B1B	D3	11.0	20.0	-1	MISSED EVENT
17	3	14:28:10	7	L1011	D2	16.0	25.4	2	Slightly
17	4	14:33:05	2	B1B	D1	22.7	28.5	3	Moderately
17	5	14:37:43	11	AUTO	D2	14.4	22.3	-1	MISSED EVENT
18	1	14:46:23	1	B1B	D0	26.4	32.6	3	Moderately
18	2	14:50:10	15	TRUCK	D2	17.4	25.1	-1	MISSED EVENT
18	3	14:54:25	8	L1011	D3	10.7	21.4	-1	MISSED EVENT
18	4	14:59:20	12	AUTO	D3	8.9	19.6	-1	MISSED EVENT
18	5	15:04:05	5	L1011	D0	31.4	38.1	4	Very
19	1	15:14:42	13	TRUCK	D0	29.7	33.6	-1	MISSED EVENT
19	2	15:18:44	10	AUTO	D1	21.5	26.8	-1	MISSED EVENT
19	3	15:22:42	18	TRAIN	D1	18.3	27.3	4	Very
19	4	15:26:53	6	L1011	D1	20.9	31.5	3	Moderately
19	5	15:31:23	17	TRAIN	D0	25.0	31.6	4	Very
20	1	15:38:39	9	AUTO	D0	24.9	30.4	4	Very
20	2	15:43:01	3	B1B	D2	16.3	23.1	-1	MISSED EVENT
20	3	15:47:24	19	TRAIN	D2	15.2	23.9	1	Not at all
20	4	15:51:55	16	TRUCK	D3	7.0	19.9	-1	MISSED EVENT
20	5	15:56:15	14	TRUCK	D1	21.0	28.1	-1	MISSED EVENT

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13. ABSTRACT (Maximum 200 words)

This report describes a study of the noticeability and annoyance of intruding noises to test participants who were engaged in a distracting foreground task. Ten test participants read material of their own choosing while seated individually in front of a loudspeaker in an anechoic chamber. One of three specially constructed masking noise environments with limited dynamic range was heard at all times. A laboratory computer produced sounds of aircraft and ground vehicles as heard at varying distances at unpredictable intervals and carefully controlled levels. Test participants were instructed to click a computer mouse at any time that a noise distinct from the background noise came to their attention, and then to indicate their degree of annoyance with the noise that they had noticed.

The results confirmed that both the noticeability and annoyance of noise intrusions were closely related to their audibility.

14. SUBJECT TERMS
Prediction of noticeability and annoyance of low level noise intrusions; free-field listening conditions; anechoic chamber

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