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LETTER REPORT 12

RECOMMENDED SOUND-PRESSURE LEVELS
FOR NON-DETECTABILITY AT 100 FEET IN A
JUNGLE AMBIENT NOISE LEVEL

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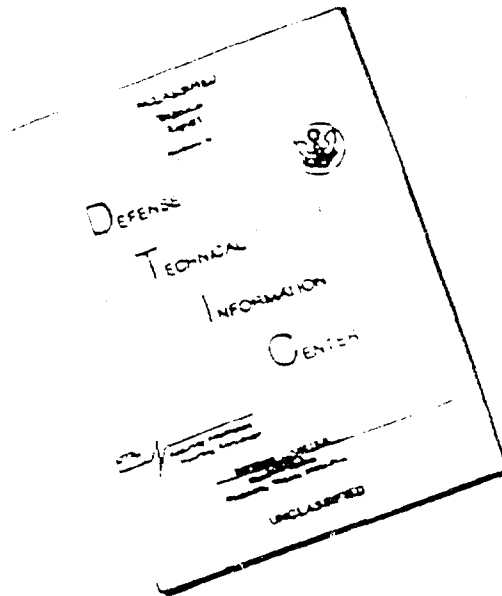
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RECOMMENDED SOUND-PRESSURE LEVELS FOR NON-DETECTABILITY
AT 100 FT. IN A JUNGLE AMBIENT NOISE LEVEL

HEL feels that the maximum sound-pressure levels as measured 100' from the source shall not exceed (a) the ambient noise levels in a quiet jungle environment without insect or animal noises and/or (b) the listener's threshold of audibility.

Table I

Ambient Noise Level in a Quiet Jungle Without Insect or Animal Noise (1)	
<u>Octave Band</u>	<u>Sound-pressure Level in dB re 0.0002 microbar</u>
75-150	23
150-300	24
300-600	24
600-1200	18
1200-2400	18
2400-4800	24
4800-9600	25

However the sound-pressure levels shown in Table I must be corrected for a source which emits a pure tone. These pure tone corrections are shown in Table II* along with the corrected ambient noise level in a quiet jungle.

Table II

Corrected Ambient Noise Level in a Quiet Jungle Without Insect or Animal Noises for a Source Which Emits Pure Tones		
<u>Octave Band</u>	<u>Pure Tone Corrections (dB)</u>	<u>Corrected Sound-pressure Level in dB re 0.0002 microbar</u>
75-150	-3	20
150-300	-8	16
300-600	-11	13
600-1200	-12	6
1200-2400	-12	6
2400-4800	-12	12
4800-9600	-11	14

*Harris, Cyril. Handbook of Noise Control., New York, 1957 Chap 5, P. 16

Now, some of the levels shown in Table II are lower than a listener's threshold. When the listener's threshold is taken into account in Table II, the maximum levels for non-detectability at the listener are established. Table III shows the listener's threshold and the resulting maximum sound-pressure levels for non-detectability at the listener's position.

Table III

Free Field Binaural Threshold of Audibility for a Listener With Acute Hearing and the Maximum Sound-Pressure Levels for Non-Detectability at the Listener's Position

Octave Band	Threshold of Audibility* (dB re 0.0002 microbar)	Maximum S.P.L. (dB re 0.0002 microbar)
75-150	38	38
150-300	22	22
300-600	9	13
600-1200	0	6
1200-2400	-2	6
2400-4800	-6	12
4800-9600	5	14

* American Standards for Noise Measurement; Z 24.2-1942
American Standards Association, New York, New York

Having established the maximum levels for non-detectability at 100 ft. (or ambient noise level), we now have the task of measuring the sound source to see that it meets the levels shown in Table III. Clearly it is nearly impossible to measure such low levels. Since there is negligible excess attenuation due to absorption in air at distances of 100 ft. or less, we can assume a 6 dB increase in sound-pressure level for each halving of distance from the source.** These extrapolated sound-pressure levels at 5' are shown in Table IV. Therefore, the sound-pressure level as measured 5' in any direction from the side of the equipment shall not exceed the levels shown in Table IV.

** Care must be taken to insure that the distance from the source is not reduced to a point where the far field ends. This is usually accomplished when the distance from the source is greater than twice the largest source dimension. For example, a piece of equipment that is 2 ft x 2 ft x 2 ft, the minimum distance from the source for free field conditions should be about 4 ft.

Table IV

The Maximum Sound-Pressure Level Measured Five Feet in any Direction From the Side of the Equipment if it is to be Unheard at 100 Ft. in a Jungle Ambient Noise Without Attenuation from Trees

Octave Band (cps)	Sound-Pressure Level (dB re 0.0002 microbar)
75-150	64
150-300	48
300-600	39
600-1200	32
1200-2400	32
2400-4800	38
4800-9600	40

The levels shown in Table IV represent the maximum sound-pressure levels as measured 5' when the equipment is to be unheard at 100' without a dense surrounding of woods. (The levels shown in Table IV can be used if the equipment is to be operated in open terrain, i.e., a quiet desert.) However, it should be noted that the sound-pressure levels shown in Table IV do not take into account the excess attenuation provided by dense woods or jungle. The effect of excess attenuation due to dense woods is shown in Table V along with the maximum sound-pressure levels at 5' when the equipment is to be used in dense woods or jungles.

Table V

Maximum Sound-Pressure Levels Measured 5 Ft. in Any Direction From the Side of the Equipment if the Equipment is to be Unheard at 100 Ft. in dense woods or Jungles

Octave Band Limits (cps)	Excess Attenuation in Dense Woods (dB)	Maximum Sound-Pressure Level at 5 Ft. (dB re 0.0002 microbar)
75-150	-	64
150-300	-	48
300-600	-	39
600-1200	7	39
1200-2400	17	49
2400-4800	24	62
4800-9600	25	65

REFERENCE

1. Eyring, Carl F. Jungle Acoustics (Madden and Las Cruces, Panama, jungles). OSRD Report No. 4699, Rutgers University, New Brunswick, N. J., February 1945.