



AEROSPACE INFORMATION REPORT

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EVALUATION OF HEADPHONES FOR DEMONSTRATION OF AIRCRAFT NOISE

1. INTRODUCTION

It has been proposed that the use of headphones might provide an inexpensive means of furnishing comparative demonstrations of aircraft noise presented through playback on magnetic tape. It is not intended that use of such headphones would replace properly designed "listening rooms" intended for critical subjective evaluation of noise, but would merely provide a portable system whereby concerned parties such as government officials, airport operators, airline representatives, etc., might be provided with essentially identical presentations of reasonable fidelity at remotely located sites.

In order to assure that diverse listeners would be exposed to essentially identical acoustical presentations, it is necessary to assure that individual headphones have good response characteristics.

2. PURPOSE

The purpose of this AIR is to present the results of an engineering evaluation of commercially available headphones from the standpoints of frequency range, flatness of response and tolerances, and dynamic range.

3. DATA

The information upon which the subject evaluation is based was obtained from three sources:

- a. Manufacturers' brochures
- b. Government laboratories
- c. Industrial laboratories

The following are typical manufacturers' specifications for "high quality" headphones as published in their brochures:

Type A: Frequency response 20 to 20,000 Hz, ± 3 db; distortion

1% at 1000 Hz at 125 db SPL (360 microbar).

Type B: Frequency response 20 to 20,000 Hz, distortion below

0.5% at normal listening level.

(Note: Smoothness of response not specified.)

Type C: Frequency response 30 to 20,000 Hz, distortion less than

1% at 120 db SPL.

(Note: Smoothness of response not specified.)

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Typical response curves for the above headphones obtained in the laboratory are shown in Fig. 1. It is apparent from inspection of Fig. 1 that the test characteristics of the headphones are at variance with the claims of the manufacturers. Further, discussions with personnel who have actually run laboratory tests on headphones indicate that if one should actually find a set of headphones with good response characteristics, the probability of finding another good set of the identical type is very low. In other words, quality control is poor.

4. CONCLUSIONS

It is concluded that headphones may be suitable for casual listening of tape recorded noise. However, caution should be used if the headphones are used for comparative value judgments of noise where the spectrum of the noise is in excess of one-third octave in frequency. Further, the user should accurately know the performance characteristics of the headphones and should also realize that these characteristics may be different from the manufacturer's specified performance.

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