

INDUSTRIAL NOISE

● Variability in the test environment is caused mainly by changing ambient noise levels in the testing area. Unless test areas are specially treated to reduce ambient noise levels below certain specified values, the measured thresholds of persons with normal hearing may be masked. The usual ambient noises in test environments are predominantly low frequency sounds, and most of the masking is at 1,000 c and below. It is usually easy to detect masked low frequency thresholds on audiograms made in poorly sound-treated environments. These audiograms show normal or near normal hearing at 1,000 c and hearing losses as large as 10 db at 250 c and at 500 c. Thresholds at 1,000 c may show the effect of masking if the ambient levels are moderately high. Unless hearing tests are made under extremely bad conditions there is very little, if any, masking effect seen at 2,000 c and higher frequencies.

Ambient noise in the testing environment is perhaps the most frequent environmental cause of variations in audiograms, but it is by no means the only cause. The subject must be comfortable so that he will not become restless and squirm or fidget. Humidity, temperature, barometric pressure, and the size and décor of the test room are all factors that influence comfort and it is important to pay attention to these details in order to provide optimum conditions for producing good audiograms.

● Variability caused directly by the subject may be caused by his past experience with hearing tests, to intelligence, education, and physiological condition, or to his hearing and attitude towards the test. In this latter category for example, subjective tinnitus (a purely subjective sensation of noise, such as ringing in the ears) is sometimes loud enough to mask the signal tone and produce spurious records. The attitude of the subject toward the test is of extreme importance.

● Variability caused by the tester is dependent to a large extent upon his motivation. A tester may be extremely well trained, but if he is careless, the test results may be completely invalid. A minimum amount of training in giving hearing tests is absolutely essential, especially actual practice training with an audiometer. Careful testing is important also.

Screening audiometry Screening audiometry has only limited use in industry. It can be used successfully for followup audiometry since only a change in hearing status is sought. Usually screening is accomplished by testing at several frequencies with a level of 15-20 db. The subject is passed if he hears the tone and failed if not. Those who fail are retested with threshold audiometry.

Automatic audiometry The need for testing the hearing of large numbers of persons has stimulated an interest in automatic audiometry, which allows the subject to operate the only manual control of the test instrument required during the test. When the test is started the intensity of the signal tone increases automatically. The subject has been instructed to press a button when he first hears the signal. This button operates a switch which reverses the direction of the signal intensity, thus decreasing the signal strength. When the subject no longer hears the signal he releases the button and the signal again increases in intensity. The procedure is continued for a set interval during which the subject may "cross" his own threshold as many as ten or fifteen times. When the proper time has elapsed the audiometer output automatically shifts to the next frequency and the procedure is repeated. The test continues until an arbitrarily chosen number of frequencies has been tested. A record of the test may be made with any of several devices which record the continuous change in output level of the signal as it crosses and recrosses the subject's threshold level. Automatic audiometers have been variously adapted to record the test on specially designed cards, on IBM cards, by automatic typewriter, or by an adding machine. In principle all automatic audiometers are much the same; the intensity of the output signal is regulated through a switch which is controlled by the subject. Its validity has been well established.

The usefulness of automatic audiometry depends upon the conditions under which it is to be used. As far as the subject is concerned, automatic audiometry does not save time as most automatic instruments run for six to ten minutes to complete a test, about the time required to complete a test with a manual instrument. As far as the tester is concerned, however, the instrument makes