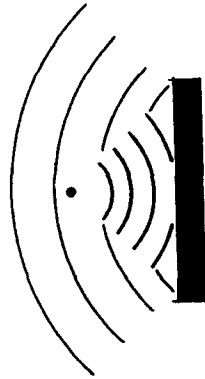


ACOUSTICS

SUMMARY

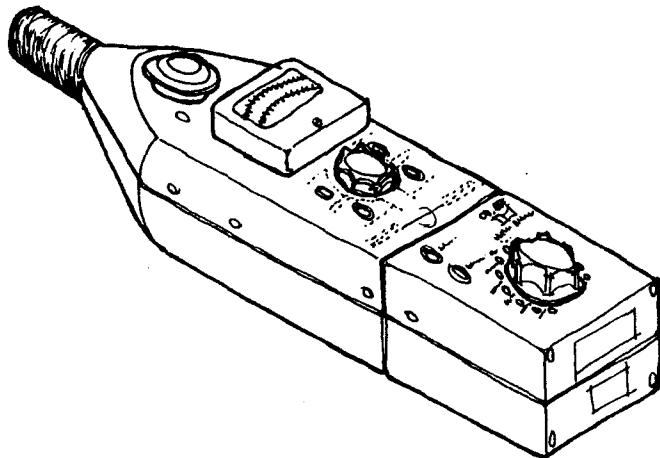


The primary objective of the acoustical environment is to be responsive to the activities within the building. To support clear communications and to provide privacy and a lack of acoustical interference. Field tests in this area emphasize these primary objectives and are directed at conditions which impair this performance.

The transmission of interfering sound between adjacent activities is a major characteristic to be tested although in large spaces the background or ambient sound level and the 'echo' effects can also be potential problems.

PERFORMANCE OBJECTIVE: PROVIDE AN ACCEPTABLE ACOUSTICAL ENVIRONMENT

TEST # 1: Correct Ambient Sound Level

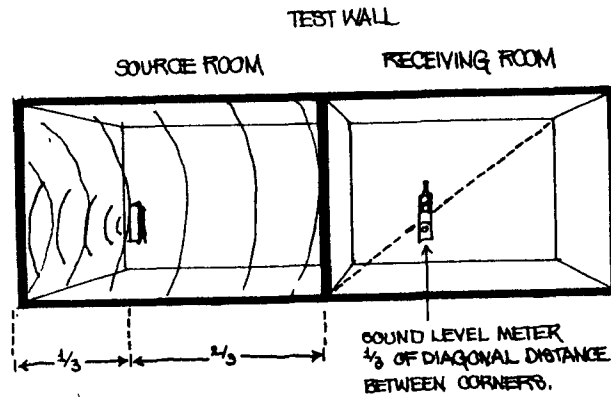


Test Method: Determine past performance if possible. Test by using a sound level meter with an 'A' scale and preferably a reading to 30 decibels. If possible, a meter with an octave band analyzer should be used. Sound level readings are taken within the area to be tested with and without normal activities present in the space. These readings should be taken on both the 'A' scale and at various frequencies. The meter should be used in an upright position and readings taken at the center of the room.

Measures: Ambient sound level

- In empty room: 'A' scale ± 1 db.
- Multiple readings with space in use: 'A' scale ± 3 db.
- Frequency distribution in empty room at 125, ± 50 , 500, 1,000, and 2,000 HZ ± 1 db.

TEST # 2: Control Sound Transmission Between Spaces



Test Method: Determine past performance if possible. Test by using two rooms. One room contains a sound source and a sound level meter in the second room determines the amount of the transmitted sound. A good quality cassette recorder playing prerecorded 'white' noise at a level of 75 db, or more is a suitable source. A sound level meter with an 'A' scale is used as a receiver. Note #1

The cassette recorder is placed $\frac{2}{3}$ of the distance from the wall being tested and facing away from the wall, The preferred placement of the sound level meter in the receiving room is $\frac{1}{3}$ along one of the diagonals from the lowest corner of the room near the wall being tested to the far opposite upper corner of the room. Since there are four such diagonals, choose the one closest to non-sound absorbent surfaces. Measurements should be taken at least 30" from reflective surfaces.

A measurement is made in the source room with the source on and in the receiving room with the source off. A second reading in the receiving room with the source on will complete the test.

Note: The ambient sound level in the receiving room should be at least 10 dbA below the source level in the adjacent room. The test should simulate normal conditions. For example, if a door to the corridor connecting the two rooms is usually left open, the test should be done with the door open (and closed too!)

Measures: Ambient sound level

- Ambient sound level, ± 1 dbA, in receiving room without source on;

- Ambient sound level, \pm dbA, in source room with source on;
- Ambient sound level, \pm dbA, in receiving room with source on.

TEST # 3: Control Reverberation Within Spaces

Test Method: Determine past performance if possible. Test by using 18 inch diameter balloons to provide an instantaneous and loud sound source. A tape recorder specifically modified for the purpose records the reverberation test. Two trials are recorded in each space. The tape is analyzed in a laboratory to determine the reverberation time. Measurement is made at least 30 inches from any reflecting surface.

Since the equipment used in this test is quite expensive and sophisticated and since reverberation detrimental to normal speech should be heard using the balloons, it is possible to burst balloons and simply note the discernible reverberation if any.

Measures: Reverberation times

- Reverberation times for the following frequencies: 125, 250, 500, 1,000, and 2,000 HZ.

TEST # 4: Control Mechanical Systems' Noise

Test Method: Determine past performance if possible. Same as test #1. Readings are taken with lighting and mechanical systems turned off and turned on.

Measures: Mechanical systems noise

- Mechanical systems on dbA and 60, 125, 250, 500, 1,000, 2,000 HZ
- Mechanical systems off dbA and 60, 125, 250, 500, 1,000, 2,000 HZ
- Lighting on only dbA and 60, 125, 250, 500, 1,000, 2,000 HZ
- Mechanical on only dbA and 60, 125, 250, 500, 1,000, 2,000 HZ

TEST # 5: Control Impact-Generated Sound Transmission

Test Method: Test by using on typical sounds generated by impact such as footfalls or desk and chair movement. A 35 dbA white noise is used as background to determine if it masks the impact noises.

Measures: Impact noise

- Easily discernible noise from 20 feet
- Easily discernible noise from 15 feet
- Easily discernible noise from 10 feet
- Easily discernible noise from 5 feet

REFERENCES

- ASTM E 90-66T, ASTM E 336-67T Transmission of sound through partitions
- ASTM C423-66 Sound absorption of acoustical materials (reverberation)

"A Simplified Field Transmission Test", Siekman and Yerges,
Sound and Vibration, V.5, #10

NOTE #1: White noise can be found in a telephone dial tone,
T.V. station signal before programming begins, interstation
hum on radios, etc.

SUMMARY OF ACOUSTICS PERFORMANCE TESTS

PERFORMANCE OBJECTIVE: PROVIDE AN ACCEPTABLE ACOUSTICAL ENVIRONMENT

TEST # 1: Correct Ambient Sound Level

TEST # 2: Control Sound Transmission Between Spaces

TEST # 3: Control Reverberation Within Spaces

TEST # 4: Control Mechanical Systems' Noise

TEST # 5: Control Impact-Generated Sound Transmission