Sound insulation

- Metal ducting for the heating and air conditioning system will carry all kinds of noise through the house. Insulating the ducting with sheets of heat-safe materials will cut way down on the "echo chamber" effect.
- Bare floors and stairs transmit much more noise and vibration then carpeted areas. Wall-to-wall (preferably with floor padding) is the better insulator, but area rugs are better than nothing.
- Acoustic ceiling tile is very effective, both at reducing the overall noise level of a room and in reducing noise from the room above. If you're in a college dorm (or want to feel like you are) thumbtack a tapestry up on the ceiling to cut down on the industrial feel.
- Outside noise can be reduced by replacing blinds with heavy drapes or curtains. Lined curtains are even better.
- When a television or stereo speaker is backed against an interior wall, it transmits sound and vibration much more than if it's backed against an exterior wall. Try hard not to place these items against a wall that you share with your neighbor.
- Speakers that sit right on the floor will be audible to anyone in the room underneath. Place your speakers on stands or shelves, and put some foam rubber under the speakers. If the look doesn't appeal to you, buy some speaker stands.

Ceiling Plenum Insulation

A common sound insulation problem is the combination of a suspended acoustical ceiling with partitions that terminate at the suspended ceiling level. With such a system, sound may be transmitted up through the suspended ceiling into the plenum space, through the plenum above the partition and down on the other side. It should be noted that the ceiling areas do not affect the process in a simple way; transmission is greatest through regions nearest the partition and becomes progressively less with distance from the partition.

In the U.S.A. the Acoustical Materials Association has developed an index suitable for rank-ordering ceiling structures, but the "attenuation factors" so obtained are not directly applicable to design. It is found, however, that for most acoustical ceilings the attenuation factor at 350 cycles/sec is numerically equivalent (approximately) to the Sound Transmission Class of the system. Where AMA attenuation factors are available, appropriate STC values may be thus deduced for use with Formulas (1) to (3) (using the plenum area over the partition as the transmission area S). If ordinary transmission loss measurements are available a conservative STC value for the system will be double the STC of one ceiling. This neglects the effect of absorption in the plenum space itself, which results in additional attenuation.

The STC requirement thus deduced for the partition and ceiling systems independently does not quite suffice when the two systems are combined; the total transmitted power would then be twice the permissible maximum. Each system must be at least as good as the calculated value, and one or both must be somewhat better. Quantitatively, the sum of the two requirements should be about 6 db better than the sum of values obtained by the independent calculations.

If adequate design information is lacking another approach is to require that the contractor or supplier construct a sample pair of rooms, where the actual performance can be determined. Such a step is very useful in any case, because it ensures that the performances of the individual components are not invalidated by an assembly problem. Another wall may be added that spans from the ceiling of the room to the floor above to block the noise from the plenum space.

Doors

Doors constitute a serious weakness in a good wall. Insulation ratings for solid-core doors vary from about STC-15 for a swinging door with clearance all around to STC-27 for the same door completely sealed by gaskets or weather stripping all around. A more typical installation, with stops on three sides but no gaskets, is about STC-20. The requirement for a door alone (in a perfect wall) may be determined by applying the appropriate formula as before, making S equal to the door area. The result for the combined wall and door should be adjusted as for wall and ceiling. Other weaknesses in a partition, such as holes or cracks, may also be studied in the same way.