



How To Design A Basic Commercial Sound System

Commercial Sound System Basics

Commercial sound systems are also referred to as 70-Volt Distributed Sound Systems. In a 70-Volt Distributed Sound System, a transformer is included with each speaker. This changes the system from low impedance (4 or 8 ohm) to high impedance and allows connection of a greater number of speakers in parallel to the amplifier. A commercial grade amplifier provides a higher voltage (up to 70 Volts) than a home stereo amplifier, in order to compensate for the high speaker impedance.

Transformers on the speakers have what the industry calls “Wattage Taps”. On most speakers there are multiple wattage taps, with ratings such as 1, 2, 4, 8 & 16 watts. The wattage taps provide the ability to designate how much power the speaker will draw in a system - the higher the wattage tap, the louder the speaker will play. This allows the designer to compensate for different ceiling heights as well as louder areas within a business. In a 70-volt system, you can add as many speakers as you desire as long as the total power requirement of all the transformers added together does not exceed 80% of the power output of the distribution amplifier.

Commercial Sound System Components

- Speakers: standard speakers and their applications.
 - Flush mount speakers are for drop tile and sheetrock ceilings. In sheetrock ceilings, the speakers must be installed during construction or there will need to be adequate access above the ceiling to install the speaker cabling post construction.
 - Surface mount speakers are typically utilized for open beam ceilings, hard ceilings or outdoor applications.
 - Pendant mount speakers are for open beam ceilings
 - Satellite/subwoofer systems usually include 4 satellite speakers and a subwoofer. These systems come in flush, surface and/or pendant mount.
- Mixer Amplifiers are available in various power ratings, with the most common being 15, 30, 60, 120, 160, 260 or 360 watts. All mixer amplifiers have multiple inputs that allow connection of music, paging and signaling sources (such as door chimes or fire alarms). Some mixer amplifiers have other features such as automatic muting of the music when a page is made, room combining capability and auto level controls. When selecting an amplifier, it is important to note the power required by all speakers, in addition to inputs for music, microphones and/or paging.



- Volume Controls can be added to a specific speaker or to a group of speakers to allow adjustment of those speakers without affecting the rest. Volume controls are rated in wattage and typically come in 10, 50, 100 & 200-watt ratings. A volume control must be rated higher than the actual wattage draw of all the speakers it is controlling.

Commercial Sound System Design

The below information is used to calculate the quantity of speakers for a very basic sound system in businesses with ceilings 14' or lower.

1. Determine the speaker spacing: _____
 - A. As a general rule, multiply the ceiling height times 1, 1.5 or 2, depending on the coverage needs and desires:
 - i. Ceiling height X 2 – This speaker spacing provides good coverage and is typically used in budget applications for low volume background music or paging applications.
 - ii. Ceiling height X 1.5 – This speaker spacing provides better coverage and is typically used for background music with average coverage.
 - iii. Ceiling height X 1 – This speaker spacing provides excellent coverage and is typically used for background/foreground music in high noise situations, lower ceilings under 9' and when the sound is an important part of the business environment.
2. Determine the speaker coverage: _____
 - A. Square the above speaker spacing number to obtain the square footage each speaker will cover. If the speaker spacing as determined above is 1.5, and the ceiling height is 10', the calculation would follow as $1.5 \times 10' = 15^2 = 225$ square feet.
3. Determine the number of speakers you need: _____
 - A. To calculate the number of speakers, divide the above speaker coverage number by the total square footage.
 - B. Always round up to the nearest whole number.

Example: 2000 sq ft divided by 225 is 8.88 speakers. Round this up to 9 speakers.



4. Select the appropriate speaker type: _____

5. Determine the speaker wattage taps: _____

A. For basic background music, speakers should be tapped around 2 watts.

B. For Foreground music, tap the speakers at 4 to 8 watts

C. Outdoor applications, tap the speakers at 8 watts.

6. Calculating the size of the 70V commercial amplifier: _____

A. Add up all the speaker wattage taps in the system, and then add 20%.

$$\text{_____} \div \text{_____} = \text{_____} \times \text{_____} = \text{_____} \times 20\% = \text{_____}$$

Square footage ÷ Speaker Coverage = Qty of Speakers X Wattage Tap = Total spkr. Wattage X 20% = amp size

For more information contact us.