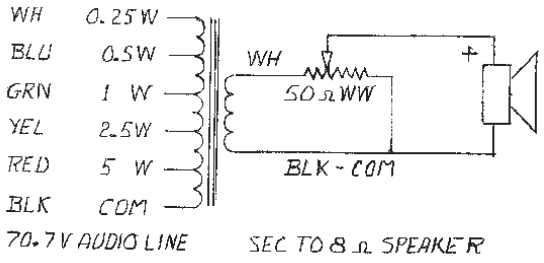
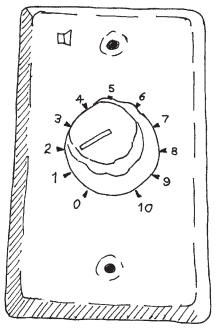
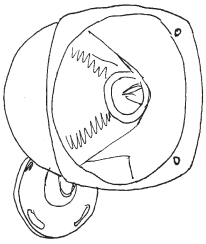
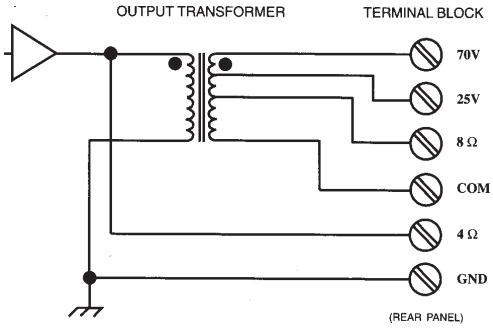
70 VOLTS

THE INS AND OUTS OF THE 70 VOLT PA SYSTEM









USEFUL INFORMATION FOR THE SEASONED PROFESSIONAL AND THE WET BEHIND THE EARS NOVICE ON INSTALLING AND TROUBLESHOOTING YOUR 70 VOLT PA SYSTEM AND SPEAKERS

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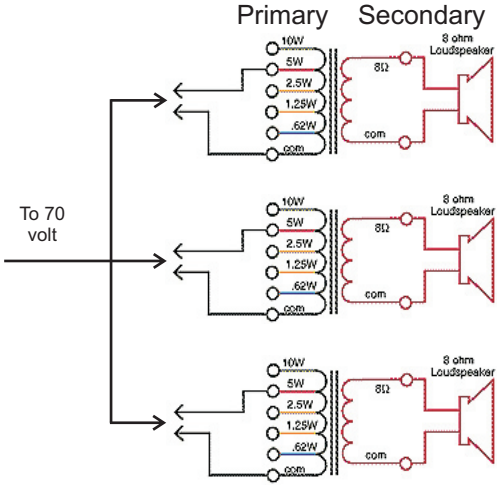
70 Volts

The Ins and Outs of the 70 Volt PA System



These 8 Ohm Loudspeakers with 70 Volt matching transformer (Fourjay ST5-CR8) are daisy chained using 18ga stranded twisted pair. Choose the 1 watt tap on the matching transformer for most applications.

What is a 70-volt paging system?

A typical 70-volt paging system has a centralized amplifier that handles voice enhancement and music reproduction and eases future system expansion. The system's speakers are connected to and powered by the centralized amplifier. Depending on the telephone system and amplifier used, an interface device may be needed to connect the paging system to the telephone system.

Why should you use 70-volt system?

A commercial sound system can power several speakers, easily handling extremely long wire runs between the speakers and amplifier.

However, with long wire runs, you must decrease the current to avoid generating, and subsequently wasting, too much power in the form of heat.

Keep in mind, the power provided to a speaker, or other equipment load, is equal to the voltage multiplied by the current: P = V x I (power) (voltage) (current)

To reduce the amount of power and heat wasted, you can increase the voltage and decrease the current.*Note that decreasing the current by a factor of two decreases the power loss in the wire by a factor of four.*

70-volt systems are ideal for long wire runs because they are designed to use higher voltage and lower current, thereby minimizing the electrical energy wasted and heat produced.

Also, the centralized amplifiers limit the maximum output voltage supplied to the speakers regardless of the amplifier's power capacity. Because of this limitation, speakers are designed only to consume a specific amount of power from the amplifier and won't blow out when used with an amplifier that is too powerful. And, since you will know the speaker's power consumption, you can determine the necessary amplifier power by calculating the total power drawn by all the speakers.

The Anatomy of a 70-volt Speaker: Step-down transformers and power taps.

70-volt paging speakers have a step-down transformer, which converts the high-voltage/low-current amplifier signal of the central paging amplifier to the low-voltage/high-current signal the speakers use.

A step-down transformer has several connections, called taps or power taps, which are used to set the maximum power the speaker will draw from the amplifier.

The particular power taps connected determine both the required amplifier power and the speaker volume. The more power a speaker consumes, the louder the sound produced. By tapping speakers for lower power in quiet areas and for higher power in noisier areas, the paging system sound level can be controlled and balanced.

Using Speakers Without Power Taps

Some speakers allow on-the-fly volume adjustment without using power taps. You simply need to know the ambient noise levels and dimensions of each paging zone you're working with.

Using Low Impedance Speakers

Unlike 70-volt speakers, low impedance speakers, which are typically 4- to 8-ohms, require high current at relatively low voltages and must be located near the amplifier. These speakers don’t have a step-down transformer and can't be used with 70-volt central paging amplifiers. Also, if too many low impedance speakers (sometimes as few as four) are used, the amplifier will quickly overload.

Using 25-Volt Amplifiers

In certain situations, 70-volt speakers with step-down transformers may be used with 25-volt amplifier outputs. The installation and operation of these 25-volt outputs is identical to that of 70-volt outputs.

Amplified Speakers

An amplified speaker has a self-contained amplifier with just enough capacity to power the speaker. These speakers require two wires for the DC power consumed by the internal amplifier and two wires to carry the low-level signal to be amplified. Amplified speakers operate off of 24-volt power supplies. Depending on the number of speakers or distance between speakers, several power supplies may be needed at different locations throughout the paging area. Because this can become inconvenient and expensive, amplified speakers tend to be used in smaller applications. Amplified speakers also require an input controller that conditions the input signals for the system, making them compatible with the amplified speakers.

Why should you use 70-volt centralized paging amplifiers?

Centralized amplifiers are comprehensive yet compact electronic devices. They typically handle several input styles for different music and paging sources, multiple output types, and various tone and level control features. Unlike amplified speakers, centralized amplifiers contain all the necessary circuits—signal conditioning, amplification, power supplies, and heat control—built into one package. This bundled approach allows centralized amplifiers to reliably provide clean, smooth audio power to the speakers and makes it quick and easy to install a basic paging system.

Amplified Output Types

Most paging systems use a step-up output transformer in the amplifier to produce a 70-volt output. Speakers with step-down transformers (rated for 70-volt systems) are connected to this output. There are, however, a number of other common speaker impedances to which an amplifier can be connected. These outputs provide the proper speaker signal levels for different low impedance speaker configurations. A 25-volt output is provided on many amplifiers for situations where the building code requires a

speaker voltage of less than 70 volts. Direct outputs, which are used with low impedance speakers, have an exceptional low frequency (bass) response, providing fuller, better-quality sound. Certain general-purpose amplifiers include this feature, which allows the step-up output transformer to be bypassed for direct connection to the amplifier.

Amplifier Input Types

Auxiliary Input (AUX)

The auxiliary (AUX) input is the most common type used in paging systems. This input connects to most music sources, such as a CD player or tuner, by way of a phono jack (also called an RCA jack) and standard audio cables.

The AUX input has an outer connection, which is directly connected to the equipment's ground, and a center connection, which is the "hot" input. AUX inputs, sometimes referred to as the Hi-Z or high impedance inputs, won't overload the source equipment's output. However, with this type of "unbalanced" input, you must use shielded cable to avoid inducing noise into the system.

Telephone Input (TEL)

Telephone (TEL) inputs work with telephone system page port outputs. These 600-ohm transformer coupled inputs match the impedance of the telephone port, providing the proper interface. TEL inputs electrically isolate the amplifier from the PBX or Key system and provide a balanced input with a great deal of noise immunity.

TEL inputs usually have a ground terminal for the shield connection. However, you should provide higher noise immunity, which allows you to locate the amplifier much farther away from the source equipment than allowed with an unbalanced input.

Microphone Input (MIC)

Traditionally, the microphone (MIC) input was the main announcement source until it became possible to connect paging systems to telephone systems. MIC inputs are still used in public address applications today.

When connected properly, a microphone can be hundreds of feet from the amplifier and still provide clear, quiet audio. To combat the stray noise pickup problem of these sensitive inputs, MIC inputs are balanced and have fairly low input impedance, which keeps down noise and makes its signal level smaller.

The MIC input requires three connections: two for the balanced signal and one for the shield ground. If you reverse the balanced signal leads, the system will still work properly. However, if you miswire the ground connections, the amplifier may become unstable and begin to oscillate. When this occurs, the amplifier may heat up enough to cause its protection circuits to shut down, or it may produce distorted sound.

Try to locate the source equipment near the amplifier to avoid an exceedingly long patch cord run. This cord acts as an antenna, so the longer the run, the more noise picked up.

Consider 70-Volt Systems As A Reliable, Cost-Effective Alternative

For high-quality, home-theater sound systems with multi-zone options, a traditional 8-ohm distributed audio system is the better option. However, 70-volt systems are ideal in commercial settings for background music and paging applications. 70-volt systems are easy to install and use and offer medium-fidelity sound with minimal wiring efforts. These systems also have proven durability and reliability and are an excellent, cost-effective alternative to more expensive 8-ohm systems.