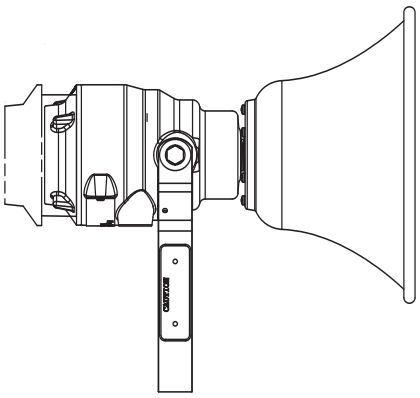

INCREASING THE INTELLIGIBILITY OF INDUSTRIAL PUBLIC ADDRESS:

A CLEAR PATH TO A NEW GENERATION OF SELECTONE® SPEAKER AMPLIFIERS

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The Purpose of This White Paper

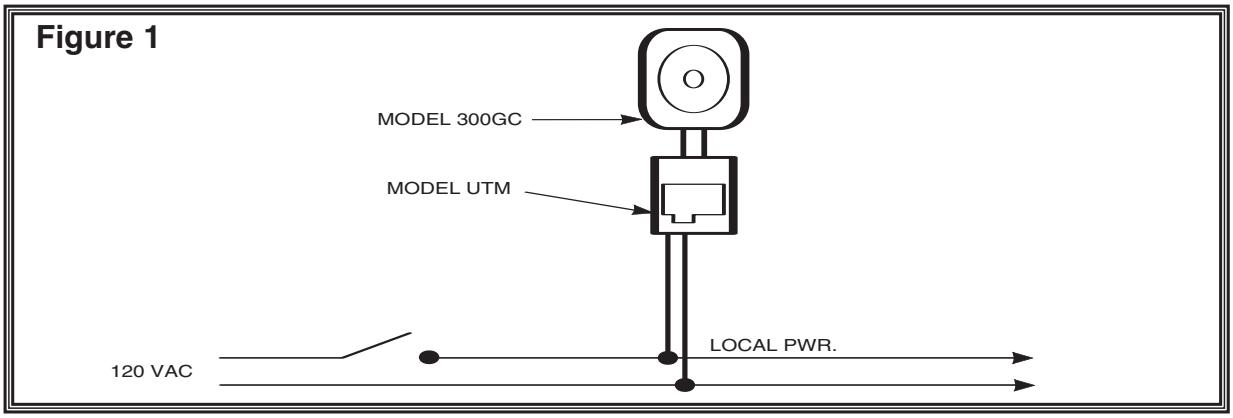
To introduce the Next Generation SelecTone® Speaker/Amplifiers with Class -T® Technology. This product will provide our customers with the same SelecTone flexibility with an all new design that incorporates increased protection and crystal-clear clarity.

A CLEAR Path to a New Generation of SelecTone Speaker Amplifiers

Today's Selectone speaker amplifiers contain two basic components: a speaker and an amplifier assembly. The Speaker portion consists of a low-impedance re-entrant horn utilizing a compression driver or a voice coil and diaphragm assembly to replicate sound. This Federal Signal speaker, in all cases, is connected directly to a control box that houses our amplifier assembly. In a stand-alone configuration, this amplifier assembly requires a tone card to produce a sound, like the UTM (Universal Tone Module) or TM33 (Custom Tone Module). In a system configuration, the amplifier requires a connector kit, like the 300CK, 300CKS, AM25CK or AM70CK and an audio generation source to produce a sound. Please note Figures 1and 2:

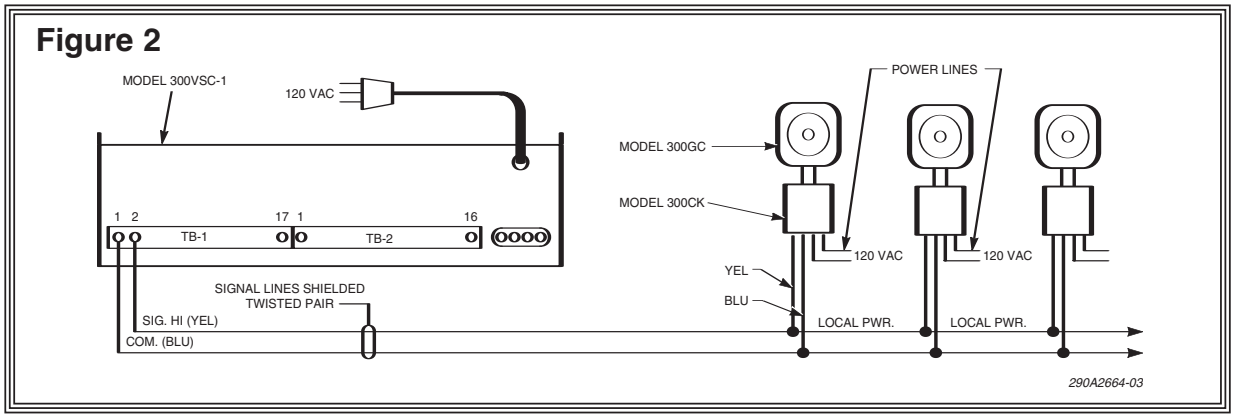
Typical Stand-Alone Configuration

Figure 1



Typical System Configuration

Figure 2



In both configurations, the amplified audio produced from this product is replicated from the signal that it has received. In a stand-alone application, audio output is finite. The tone never changes once a selection is made on the UTM or a tone/voice is recorded on the TM33. In a system configuration the audio may be coming from various sources, each having its own frequency range and amplitude. It could be constantly changing.

For example, a tone followed by a pre-recorded message may have a frequency range of 400 to 1000 Hz, while the public address message that follows that instruction could have a frequency range of 200 to 2000 Hz or greater. This wide variance in pitch causes the amplifier to work diligently and give off heat. This heat can sometimes be a measurement of how efficient an amplifier is.

We can define an amplifier's efficiency for our purposes:

The efficiency of an amplifier is a measurement of the amount of power an amplifier makes that is not lost to heat.

For example, a given amplifier is known to be 60% efficient. In simple terms, this means that 60% of an amplifier's output power is applied to the speaker system, and 40% of the amplifier's output is given off in the form of heat.

In addition to amplifier efficiency, amplifier fidelity must also be considered. Fidelity may be defined as how clearly the amplifier and speaker combination accurately reproduces a given input signal throughout the listening range. In the case of an automobile sound system of marginal audio quality, low to mid volume listening is acceptable. But when the volume is increased to the maximum, fidelity is significantly decreased and the ability to understand the words becomes unclear or un-intelligible.

In the case of an evacuation system, ambient noise will almost always compete with an alarm tone or signal. Therefore, our speaker amplifiers must be intelligible throughout their amplitude range, but most importantly at maximum volume. To achieve this, the proper amplifier "class" design must be selected to minimize distortion and maximize fidelity.

The circuit design behind our speaker amplifiers was considered a Class-A-B amplifier. This Class A-B amplifier was a transistorized design producing an analog audio output signal of very good linearity, with moderate efficiency. That means, while the audio output had good fidelity throughout the adjustment of the gain potentiometer, a percentage of the usable output of the amplifier was lost to heat as the amplifier makes power.

Additional features built into all of our SelecTone Speaker/Amplifiers:

High Efficiency/High Fidelity – The amplifier will run cooler while providing the same output and increased clarity through digitally processed audio.

Built in mute control – In Stand-alone configuration, when the product is energized, sometimes a "popping" sound can be heard. This has been eliminated through the use of a Mute circuit inherent to the amplifier.

Over-Current protection – In the event that the amplifier becomes short-circuited, it will automatically shut down to prevent damage to the circuit.

Fuse protection – Both the audio input and power input circuits are fuse protected preventing damaged amplifier cards. This was never the case with prior models.

UL1480 Approved – Meets UL's new specification for increased audible intelligibility.

Terminal blocks for field power supply connections – Eliminates "flying leads" requiring twisted wire connections.

Backward and forward compatibility – Can be used in existing SelecTone systems.

Adjustable gain down to 0dB– Any model can be fine tuned to suit a quieter environment.

In an effort to modernize our speaker amplifier design and meet the new UL1480 Intelligibility Specification, we have introduced a new Digital amplifier design, the Class - T. The Class - T Amplifier utilizes a digital signal processor that provides a very high efficiency while maintaining and improving upon the linearity of the Class A-B Amplifier design throughout the frequency range. This means high quality audio with the same dB output in a smaller package.

The benefits from this new technology are all 15 and 30 Watt speaker amplifiers incorporate this design, beginning with our Explosion-proof models (300X, 302X, 304X, 314X).

The new design is backward and forward compatible with existing systems, utilizing the same selection of connector kits and tone modules. Connector kits and TM33's compatible with the new Class - T design and prior Class A-B design will have to be purchased at time of order entry. Connector Kits and TM33 Custom Tone modules manufactured prior to April, 2005 will not work with Class-T SelecTone product. A detailed reminder appears in the connector card slot of each speaker/ amplifier product containing the new Class - T design.

Class - T® is a registered trademark of Tripath Technology, Inc.

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