



## How Fire Station Alerting Systems Affect Firefighter Health and Safety

When fire chiefs and safety officers think of firefighter safety, they don't often consider it in relation to their fire station's alerting system. The stress that firefighters are exposed to, however, begins with the incident dispatch they receive in the fire station.

The US Fire Administration study, "Fire & Emergency Service – Hearing Conservation Program Manual" (FA-118/1992), states the following:

Studies have found noise to be a causative factor in stress-related illnesses, such as hypertension, ulcers, allergies and neurological disorders. Noise has been shown to cause nervousness, fear and psychosomatic illnesses, as well as to disturb sleep.

One theory indicates that noise, like other stressors, triggers a startle response, which induces a widespread change in the body's activities. These changes may include a rise in blood pressure, a rise in pressure inside the head and increased sweating. Normally, these physiological changes are brought about by intense sounds of sudden onset, much as a fire fighter would experience going from a relaxed state in the station to an alarm response.

Studies of firefighters' reaction to the alarm signal indicate that the onset of both physiological and psychological stress induces measurable biological effects. Although the physical activity necessary to get into a truck following an alarm signal should not increase the heart rate to more than around 100 beats per minute, studies have found that heart rates, particularly those of younger fire fighters, increased to as much as 130-150 beats per minute. Several studies have shown increases in pulse rates following an alarm signal from between 47-61 beats per minute."

The soft-start alerting tones used by the Phoenix G2 system minimize the stress on firefighters by increasing the volume of the tone slowly, from off to full volume, over a longer amount of time. In addition, because the system includes many speakers located throughout the fire station, the volume levels for each speaker can be much lower than in other systems. A day/night feature in the Phoenix G2 system lowers the speaker volume during the quieter nighttime hours to further mitigate the "startle response.

The Hearing Conservation Manual also states:

The primary factors that determine if noise can inflict hearing loss are intensity, frequency, exposure pattern and duration ... Noise levels in the frequencies above 1000 Hz are also more damaging than those in the frequencies below 1000 Hz.

US Digital Designs' Phoenix G2 Fire Station Alerting System uses alerting tones at 850 Hz and below to alert firefighters to dispatches. This, along with dramatically reduced volume levels, eliminates hearing damage due to dispatch audio in the station environment.

[NFPA 1500](#), if adopted by the local department, requires a fire department to establish a hearing conservation program that identifies potential sources of harmful noise and seeks to reduce or eliminate them. Implementing the Phoenix G2 system can be a part of that program, as it can reduce the sound levels necessary to alert firefighters to a dispatch.