

KEY CONSIDERATIONS FOR PURCHASING FIRE APPARATUS COMMUNICATIONS EQUIPMENT



Brought to you by Setcom Corporation - A leading manufacturer of headsets, intercom systems and single person systems for structural fire and ARFF vehicles.

EXECUTIVE SUMMARY

Fire apparatus communications equipment is essential in providing solutions to issues public safety professionals face in their challenging work environment. The three major concerns are:

1. Hearing Protection
2. Ability to Communicate
3. Department Issues

Major Concerns

Hearing loss is rapidly becoming one of the most common and overlooked occupation-related impairments, and noises emitted by emergency vehicles, engines, sirens and pumps are at such a volume to pose significant threats to firefighters' hearing over time. The two main hearing loss disorders are noise-induced hearing loss (NIHL) and tinnitus.

Since there is no cure for hearing loss, it is extremely important for personnel and departments to take every measure possible to prevent it. Intercom systems and headsets greatly reduce noise exposure and interference, increasing safety and efficiency.

EXECUTIVE SUMMARY

Understanding the fire scene can be very challenging without the use of an intercom system. Headsets ensure that crew members seated in different positions can coordinate their approach without distraction before arrival on the fire ground so that precious time isn't wasted at the scene, and the driver and tiller operator can safely maneuver the vehicle to reduce accidents and prevent confusion during dangerous operations.

Both fire personnel and department leaders are responsible for their health and safety, and neglect will not go without consequences. Departments should make sure that they are complying with the standards presented by the National Fire Protection Association (NFPA) and the Occupational Health and Safety Administration (OSHA). Personnel should be educated on the importance of preventing hearing loss, provided with the necessary safety equipment and given regular hearing tests.

Purchasing Considerations

There are many factors to consider when selecting an intercom system. One must consider application/usage, system configuration, features, installation, comfort, durability and support offered by the manufacturer. One must also decide whether to use a wired or wireless system. While wireless systems are generally preferred, many departments are still using wired systems because they are not yet ready to make the transition or the higher initial investment. While there are some concerns to consider – cost, battery life, reliability – there are also many benefits of going wireless. Wireless technology greatly increases safety and flexibility, enhances communication and reduces costs, since installation and maintenance are less complicated than with a wired system.

Departments looking to purchase new equipment that may or may not be within budget range should also consider applying for grants. Resources are available at www.SetcomCorp.com/Grants.html.

Setcom Corporation

Setcom is a leading manufacturer of communications equipment for firefighters, rescue personnel, police motorcycle officers and industrial users. Setcom's products are easy to install and use, offered at competitive prices and backed by unmatched service and support.

Setcom's Liberator™ Wireless Headset is the latest in fire apparatus intercom systems, with state-of-the-art features, compatibility with existing Setcom systems and compatibility with all other major fire apparatus intercom system vendors. Read on for more details or visit www.SetcomCorp.com.

The decision to install an intercom system will increase safety and ensure that department issues are less likely to occur. At Setcom, our first priority is to educate public safety professionals on the importance of using an intercom system and the options that are available to meet their needs. Please contact us for more information on fire apparatus communication systems and to find out how a system can be customized to meet your goals.

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INTRODUCTION

Advances in technology are constantly changing the ways in which public safety professionals communicate and providing solutions to issues they face on a daily basis.

The purpose of this white paper is to provide information on the importance of using intercom systems and headsets to increase safety, make communication more effective, avoid department issues and boost productivity during emergency vehicle operations.

If you are reading this, you are probably already interested in purchasing an intercom system. Setcom will provide you with helpful tips for selecting a system based on your unique needs and guide you through the various features available in today's market.

You will also discover the difference between wired and wireless systems so that you can determine which is more appropriate for your department, find out what questions you need to ask the dealer or manufacturer, and learn what to expect with your new equipment.

CONCERN #1: HEARING PROTECTION

Hearing Loss Overview

People of all ages experience gradual hearing loss over time. Some cases can be attributed to the body's aging process, viruses, bacteria and other conditions, and some are a result of exposure to noise. It is very likely that many of us who have not yet been treated for hearing loss are already experiencing mild symptoms or are completely unaware of the hearing loss that is taking place as we go about our daily activities.

The noises emitted by emergency vehicles, engines, sirens, pumps and other devices are at such a volume to pose significant threats to firefighters' hearing over the course of a career in public safety.

In many cases, hearing loss is permanent and can have a great effect on the lives of those who experience it. There is no better time than the present to begin taking precautions to protect your hearing and prevent the worsening of symptoms or the onset of disorders later in life.

NIHL and Tinnitus

Noise-induced hearing loss and tinnitus are the two main hearing loss disorders experienced by firefighters and other public safety personnel. These individuals are frequently exposed to loud noises over the course of their careers in addition to the everyday sounds that people who are not involved in the public safety industry are exposed to.

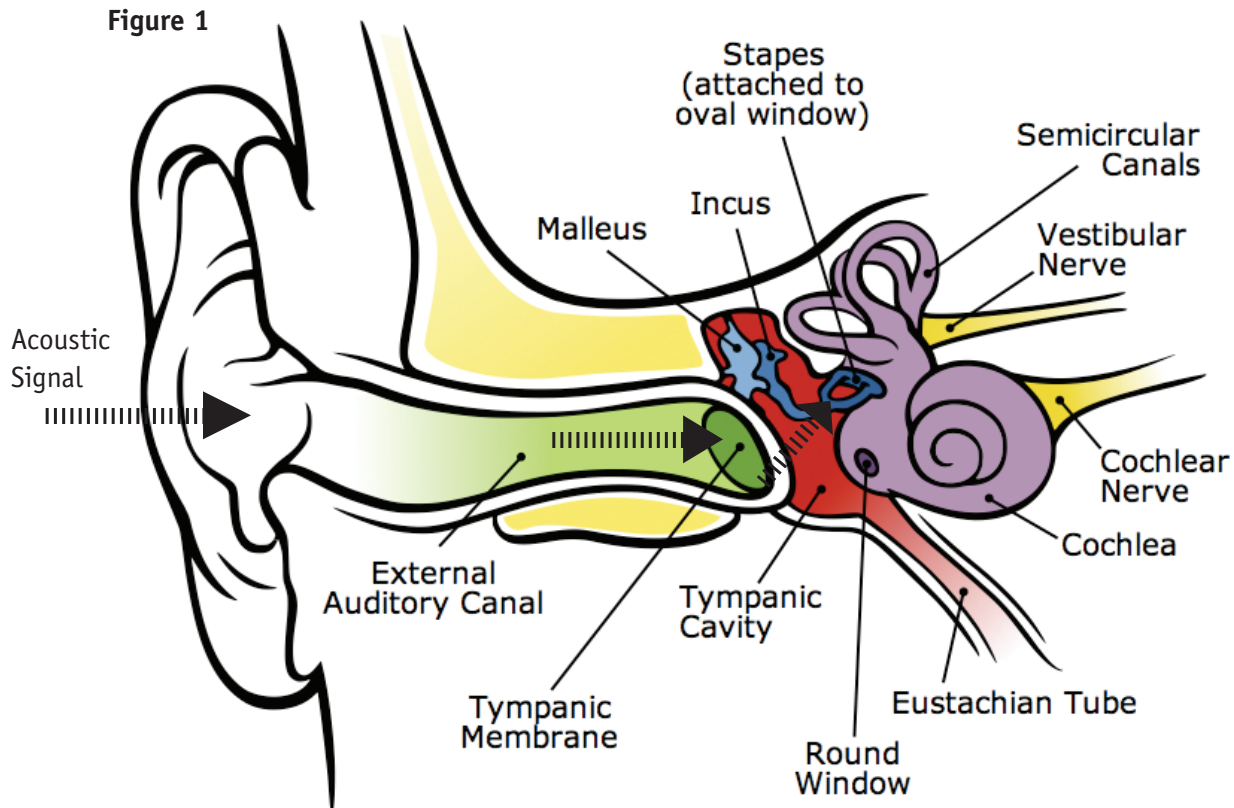
Noise-induced Hearing Loss

Noise-induced hearing loss (NIHL) is one of the most common occupation-related impairments, and also one of the most commonly overlooked conditions. Defined as "an increasingly prevalent disorder that results from exposure to high-intensity sound," NIHL is a result of the ear's hair cells and supporting structures being over stimulated by intense sound traveling into and through the auditory system. There are two types of NIHL: NIHL caused by acoustic trauma and gradually developing NIHL (Wikipedia).

"NIHL occurs when too much sound intensity is transmitted into and through the auditory system. An acoustic signal from an energy source, such as a radio, enters into the **external auditory canal**, and is funneled through to the **tympanic membrane**. The **tympanic membrane** acts as an elastic diaphragm and drives the ossicular chain of the middle ear system into motion. Then the middle ear ossicles transfer mechanical energy to the **cochlea** by way of the **stapes** footplate hammering against the oval window of the **cochlea**. This hammering causes the fluid within the **cochlea** (perilymph and endolymph) to push against the stereocilia of the hair cells, which then transmit a signal to the central auditory system within the brain. When the ear is exposed to excessive sound levels or loud sounds over time, the overstimulation of the hair cells leads to heavy production of reactive oxygen species, leading to oxidative cell death" (Wikipedia).

CONCERN #1: HEARING PROTECTION

Figure 1 illustrates the path noise travels through the auditory system as described above.



Source: Wikimedia Commons - Anatomy of the Human Ear

Tinnitus

Tinnitus is “the perception of sound within the human ear in the absence of corresponding external sound.” According to the American Tinnitus Association, tinnitus can be described as “chronic ringing, hissing or other noise in the ears and/or head” (Winston). Tinnitus is caused by noise exposure, head and neck trauma, wax build-up, jaw misalignment and cardiovascular disease, among other disorders, and worsened by prolonged exposure to intermittent loud noises (Winston).

There are two forms of tinnitus: objective and subjective. Sound in the ear caused by objective tinnitus can be measured, whereas with subjective tinnitus is not measurable and only the person who has it can hear the sound. While tinnitus can be masked by certain types of hearing aids, there is no cure.

CONCERN #1: HEARING PROTECTION

A Firefighter's Battle with Tinnitus

In April 2008, *Tinnitus Today*, the official magazine of the American Tinnitus Association, published a personal account of one firefighter's experience with tinnitus. Here is an excerpt from his story:

"I have been a firefighter for 33 years. I usually write about wildland and wildland/urban interface firefighting. Writing about tinnitus is quite different for me. I am no authority on the subject. But I do suffer from chronic, severe tinnitus and noise-induced hearing loss caused by exposure to loud sirens, air horns, diesel motors and other loud noises germane to the fire service. I began noticing a low level of tinnitus around 1980. In 2000, the level spiked dramatically, spiraling me down into a pit of depression. I could not sleep or eat; I stayed in bed with sweats and shaking spells; I lost strength and considerable weight. My wife held me in her arms, trying to comfort me, and still I thought I was going to die. An empathetic doctor prescribed drugs for my depression, but they made my tinnitus worse. Then a clinician in Connecticut helped save me. Thanks to Tinnitus Retraining Therapy (TRT), excellent counseling, support from my family and some prayer, I now consider myself a most fortunate 'tinnitus survivor'."

Compliance with NFPA and OSHA Standards

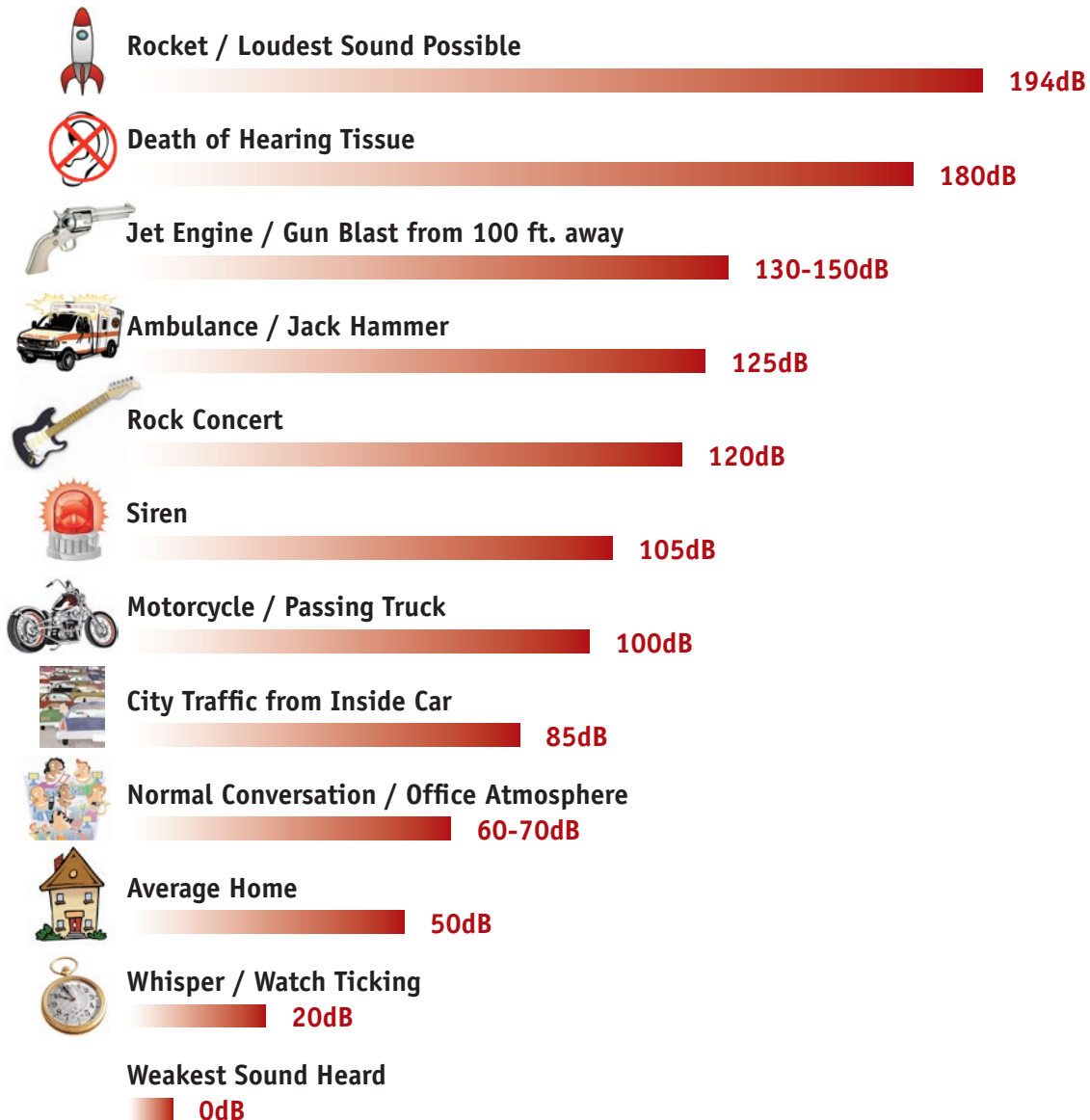
According to the National Fire Protection Association, hearing protection shall be provided and used by all members on a fire apparatus when subject to noise levels above 90 decibels (A-5.11.1). The NFPA also states that the use of personal protective equipment to limit noise exposure should be considered as an interim approach until the noise levels produced by vehicles, warning devices and radios can be reduced (A-5-11.1). Protective earmuffs or noise reduction headsets are recommended for firefighters due to the difficulties of proper fit and insertion of earplugs. See **Appendix A** for the complete text from the NFPA 1500 Standard on Fire Department Occupational Safety and Health Program.

In addition, the Occupational Health and Safety Administration (OSHA) determined that prolonged exposure to sound levels above 85dB can cause permanent hearing loss. Firefighters are routinely exposed to sounds as loud as 120dB while working alongside running apparatus and sirens. See **Appendix B** for OSHA Section 5(a)(1) and 5(a)(2) standards.

CONCERN #1: HEARING PROTECTION

How loud are everyday noises?

Figure 2



Compiled from:

-Galen Carol Audio (<http://www.gcaudio.com/resources/howtos/loudness.html>)
-Dangerous Decibels® (<http://www.dangerousdecibels.org/hearingloss.cfm>)

CONCERN #1: HEARING PROTECTION

Case Studies

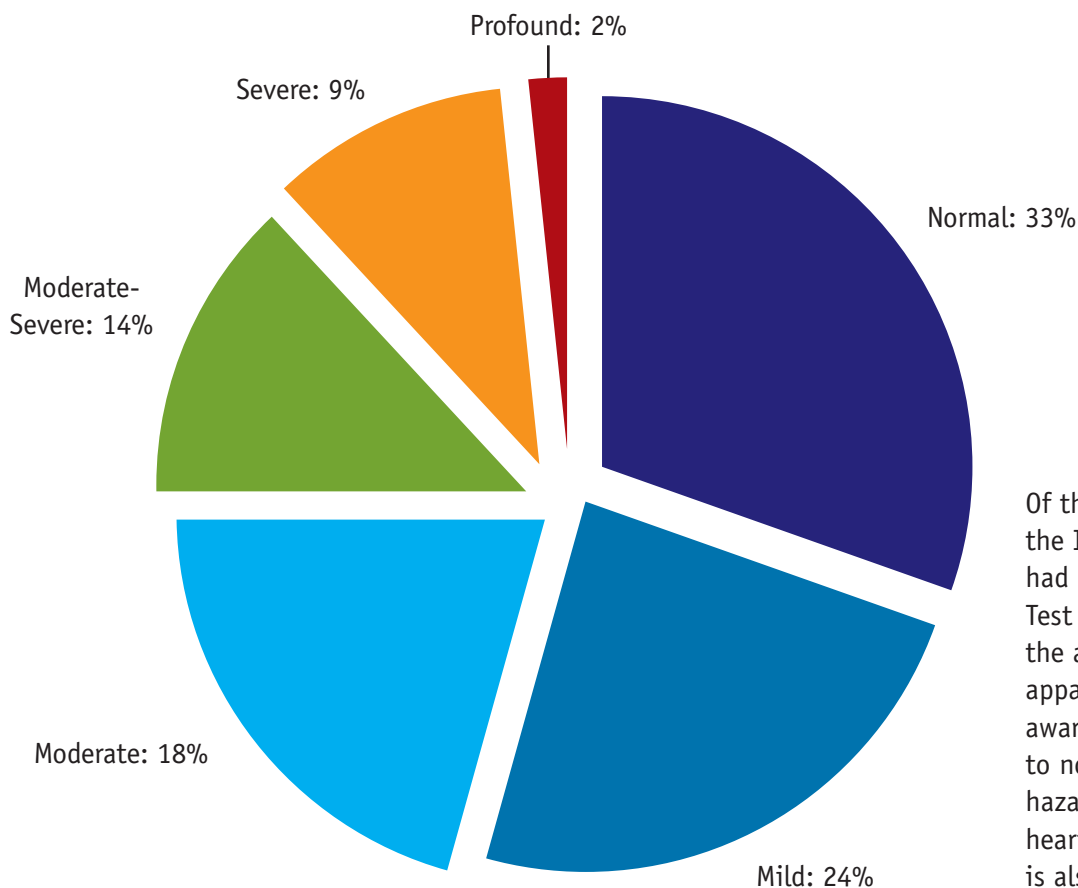
Superior hearing is a necessity for firefighters, as it is crucial for them to be able to hear a cries for help, alarm signals from other firefighters in danger and tactical commands transmitted on their radios.

The blaring sirens on a fire truck are just one example of the type of noise firefighters are exposed to en route and at the scene of a fire. Other types include fire apparatus engines, hand-powered tools, water pumps, air horns and general noise on the fire ground (IAFF 2).

There are numerous examples of occupation-related hearing loss, especially in the public safety sector.

The National Institute for Occupational Safety & Health conducted a hearing test at the 1998 IAFC Convention with 458 firefighters. As illustrated in Figure 3, test results indicated that two out of three test subjects had measurable hearing loss and one out of four had moderate-severe to profound hearing loss (IAFF 1).

Figure 3: IAFF BIENNIAL CONVENTION HEARING TEST RESULTS



Of the 458 fire fighters tested at the IAFF convention two-thirds had measurable hearing loss. Test results indicate that despite the availability of quieter apparatus and increased awareness, fire fighter's exposure to noise is still a significant hazard. While noise induced hearing loss is irreversible; it is also a preventable condition.

CONCERN #1: HEARING PROTECTION

In 1985, a study was conducted to determine if the Columbia Fire Department in Missouri needed a hearing conservation program. Twenty-two percent (20 of the 89 firefighters) showed evidence of moderate hearing loss and 14 percent (12 firefighters) had severe hearing loss consistent with noise-induced hearing loss (See **Figure 4**).

Figure 4: Hearing Loss of Columbia, MO, firefighters as shown by frequency of distribution of thresholds from audiograms.

Threshold ¹	Number ²	Percent
Normal (less than 20db)	27	30
Mild Loss (20 to 39db)	30	34
Moderate Loss (40 to 59 db)	20	22
Severe Loss (greater than 59 db)	12	14
Total	89	100.0

¹ Highest threshold from either ear at 3,000, 4,000 or 6,000 Hz.

² 5 of the total of 94 firefighters were not tested due to scheduling problems.

Hearing Loss in the Military

Noise-induced hearing loss isn't just an issue for the fire industry, either. There are many other occupations with noisy environments that are also at high risk for noise-induced hearing loss. Take, for example, the United States Air Force. In January 2010, *Hearing Health Magazine*, published by the Deafness Research Foundation, reported hearing loss as the number one diagnosis for U.S. soldiers in Afghanistan (Hood 1).

When military personnel prepare for a mission, hearing protection often gets put on the backburner when it should be given as much importance as equipment such as eye protection and body armor. According to *Hearing Health's* article, more than 50 percent of walk-in clinic patients at Bagram Air Field came in for hearing-related issues (Hood 1).

Prevention is the Only Cure

It is important to keep in mind that hearing loss is cumulative and irreversible. There is no cure for permanent hearing loss that results from excessive exposure to noise. Prevention is the only way to reduce its impact (Ewigman 53).

The use of an intercom system and associated headsets in a fire apparatus can assist in preventing hearing loss and many other adverse health effects without having a significant effect on the jobs of firefighters. Hearing protection devices, particularly headsets, often reduce noise exposure by 20 to 30 decibels and are relatively inexpensive compared to the cost of hearing loss (Ewigman 57).

CONCERN #2: ABILITY TO COMMUNICATE

Understanding the Fire Scene

In the emergency response industry, every second counts, and in numerous incident reports that involve a firefighter's injury, poor communication is part of the cause. Without an intercom system, firefighters often cannot communicate clearly and coordinate their approach before arrival at the fire ground (LeBlanc 1).

There are many factors that affect communication effectiveness – individual communication styles, environment, and interference to name a few – and fire personnel are usually trained to communicate in a way that prevents confusion and promotes productivity. Even with this training, without headsets, firefighters are sometimes forced to yell at each other, read lips, turn up the volume on the cabin speakers and even turn off the sirens to hear the dispatcher (LeBlanc 1).

Eliminating Poor Communication

Using an intercom system increases the probability that things will go smoothly at the fire ground by eliminating confusion and allowing fire personnel to carry out their job functions without straining to hear important details and commands. Crew members seated in different positions on the fire apparatus can communicate freely without disruption, the driver and tiller operator can safely maneuver the vehicle to reduce accidents, and dangerous aerial operations are simplified when the platform and turntable operators can discuss plans at normal voice levels.

Issues with communication are greatly minimized when firefighters are using intercom systems, which eliminate noise interference from the vehicle, equipment and sirens, allowing them to focus on responding to emergencies more quickly and effectively.

CONCERN #3: DEPARTMENT ISSUES

Consequences for Neglect

The value proposition for intercom systems is easy to understand when the cost of hearing loss and related consequences are taken into consideration. Hearing loss is not just a problem for fire personnel, but also for the departments who choose to dismiss the need for protective equipment.

In many cases, the department is held responsible for failure to comply with safety standards and can be faced with expensive worker's compensation claims and lawsuits.

Preventative Measures

Departments can take these steps to create awareness and stop incidents from occurring:

Educate members about hearing loss – Discuss the issue openly and provide resources that will ensure personnel are aware and motivated to protect themselves. Use resources from the National Institute for Occupational Safety (NIOSH) and the Occupational Safety & Health Administration (OSHA).

Provide hearing protection equipment – Use an intercom system to increase the effectiveness of communication. While some might argue that headsets are more expensive and can be uncomfortable, they have more advantages than ear plugs and canal caps because they are easier to remove, they provide more protection and they adjust to fit most people's heads.

Consider the noise level of equipment before purchasing – Make it your responsibility to investigate noise levels before making a purchase that can potentially cause hearing damage. When the proper communications equipment is selected and put to use, everyone wins. Communication is improved, operations can be carried out quickly and efficiently, hearing loss is prevented, lawsuits are avoided and each individual can perform without unnecessary interference added to an already intense situation.

Adopt a hearing conservation program – Identify equipment that is potentially hazardous, reduce noise production where possible, conduct annual hearing tests and help personnel identify symptoms of hearing loss so that it can be prevented (IAFF 3). Possible symptoms include but are not limited to ringing ears, headaches and the frequent need to raise your voice or shout to communicate with crew members (IAFF 3).

PURCHASING CONSIDERATIONS

Quality headset intercom systems are critical to the performance and safety of firefighters who depend on timely communication under noisy and dangerous conditions. Prices vary, but it is important to choose a high-quality, dependable system based on your unique application and the needs of each crew position.

Selecting the right system can be challenging with all of the options available today. With the help of a knowledgeable manufacturer such as Setcom, addressing proper equipment selection and crewmember requirements ensures optimum performance and smooth operation that you can count on.

Factors to Consider When Selecting an Intercom System

Application / Usage

- Fire apparatus require communication systems that are durable and dependable.
- A mobile command center necessitates greater radio controls, lightweight headsets and communication flexibility.

Applications:

- Pump-panel
- Tillers
- Tailboard
- Ladder
- Aerial platform or basket
- Incident scene / fire ground
- Brush truck / Wildland fire apparatus

System Configuration / Vehicle Requirements

- Headset selection is based on vehicle and crew position requirements. Most systems can accommodate up to 12 members.
- Headsets should have the capability to be used with portable radios off of the truck to provide clear communications while on the fire ground.

Crew Members:

- **Driver** – Communicates with dispatch/crew
- **Officer** – Communicates with dispatch/crew
- **Multiple jump seat positions** – Typically operate on intercom and do not require radio-interface capability
- **Pump Panel** – Headset intercom system
- **Bucket Operator** – Headset intercom system
- **Turntable Operator** – Headset intercom system

Features

- Due to the high level of ambient noise on emergency scenes, headsets should be equipped with noise cancelling microphones and noise cancelling headphones to eliminate noise from equipment.
- Headsets should carry a noise reduction rating that meets NFPA 1500 (See **Appendix A**).

Options:

- Noise Cancelling Microphones
- Noise Cancelling Headphones
- Water resistant enclosures for components that are subjected to the elements
- Push-to-Talk Button (PTT)
- Volume Controls

PURCHASING CONSIDERATIONS

Factors to Consider When Selecting an Intercom System (continued)

Installation

- Plug and play capabilities with a minimal number of components make for easy installation, saving you time and money. This feature also enables you to add to the system or readily replace worn-out parts.

Comfort / Headset Style

- Comfort is extremely important because of extended periods of use. Headsets are offered in a variety of styles to fit your head and ears comfortably.
- Make sure the ear cups fit and provide sufficient interior room.
- Headbands should be wide enough to support behind-the-head styles.

Durability / Support

- Headset intercom systems must hold up to the demanding fire/rescue service environments.
- Before making a purchase, do your homework to find out the support and repair options offered by the manufacture and what the total lifetime cost of ownership will be.

Before You Buy:

- Determine whether you will be installing the equipment at the time that the truck is being manufactured, or after it has been in service.
- Ask your manufacturer/dealer who is locally certified to install the equipment.
- Get an estimate for equipment installation.

Styles Choices:

- Traditional single
- Slotted Dome
- Behind-the-Head
- Over the ear
- Boom microphones

Verify that the manufacturer stands behind its products and provides prompt and efficient customer service with dedicated technical support, warranties on system components and workmanship, and replacement components for low-cost maintenance.

Call reference accounts to find out how the equipment lasts in the field.

SYSTEM COMPONENTS AND FEATURES

System components include noise-attenuating headsets, a master station controller, and one or more remote headset stations and radio-interface modules. Headsets and radio adapters are compatible with most two-way radio models. Below is an explanation of some of the most common components and their features.

Master Intercom Station – Each headset is connected to an intercom system providing “hands free” communication. Systems have been designed to allow a single user to receive and transmit communications from as many as three different mobile radios. This technology provides interoperability where communications from fire, police and rescue personnel can be coordinated from a single point of contact.

Noise Reducing Headsets - Headsets reduce noise levels to protect hearing and to ensure clear communication with all personnel. Headsets can include single or dual-speakers and waterproof noise-canceling microphones with volume controls and a variety of push-to-talk control options.

Remote Headset Stations – Jump seat extension station and pump panel/tailboard station components enable you to configure a communication system suitable for most fire apparatus. Some are weather-proof if they are mounted externally on the vehicle.

Radio Interface Modules – The intercom system needs to interface to your radios and enable communications (both transmit and receive) to be heard through each headset. Radio transmitting can be done from two or more positions. The crews’ intercommunication should not be transmitted over the radio. To transmit over the radio, there should be a radio push-to-talk switch that can be activated, and only that person’s voice will be heard over the airways.

Cables and Connectors – Cabling and connectors should be designed for durability and to prevent radio frequency and electromagnetic interference. Waterproof is another key feature for cords and connectors. Connectors that are assembled by the intercom manufacturer make for easier and more economical installations.

WIRED VS. WIRELESS

The latest in fire communications, wireless headsets are generally liked by public safety professionals, although many still continue to purchase the traditional wired headsets (Scott, 28).

The main reasons departments continue to purchase wired systems are:

1. They aren't ready to make the transition to wireless.
2. They have had poor experiences with wireless products in the past (such products may or may not have been fire wireless headsets).
3. Wireless headsets require a higher initial investment.
4. Wireless headsets require routine charging.

When the benefits of going wireless are examined, however, the features often outweigh the concerns, which are related to cost, battery life and overall reliability of this technology.

Major Concerns

Cost

Concern: Wireless systems cost more than wired systems.

Question: How can I justify paying more for the equipment?

Answer: The initial investment may be more expensive than going with a wired system, but the benefits go a lot further.

Wireless headsets improve safety and flexibility, enhance communication, and are more cost effective when it comes to installation and repairs.

Wireless systems are also less expensive to install.

Battery Life

Concern: Wireless systems require batteries, unlike wired systems.

Question: How often will I need to charge and how long will the charge last?

Answer: Wireless headsets are typically powered by lithium ion batteries and charges last up to 30 hours.

Charge regularly to avoid any issues, and consider purchasing extra systems to have on hand just in case.

Reliability

Concern: Wireless technology is fairly new and there is a higher probability for failure than with traditional wired systems.

Question: What issues can I expect with a wireless system and why should I transition from wired?

Answer: Wireless technology gets a bad reputation for being less reliable, but most negative views stem from poor past experiences with products other than headsets. With proper installation and regular charging, you should not encounter any major issues with your wireless products. If troubleshooting is needed, the process is less complicated than with a wired system since wireless devices require fewer components.

WIRED VS. WIRELESS

Wireless headsets allow firefighters to be connected to the in-cab intercom system or within range of the base station, with the ability to hear everything that is going on before they arrive on the scene. Outside of the cab, firefighters can move around the truck, tending to tools and equipment or assisting with the maneuvering without being tethered to the console.

With a wireless system in place, pump panel operators no longer have to exit the vehicle to plug their headset into the headset jack at the panel. This is extremely beneficial, because it eliminates the need for a headset jack at the pump panel and gives the operator complete freedom from the hassle of connecting to a separate system or going without a communications system.

Wireless headsets also do not need connector rings in aerial vehicles in order to function. This leaves extra collector rings available for other important electronic devices.

Why should my department go wireless?

Wireless Applications

- Pump-panel
- Tillers
- Tailboard
- Ladder
- Aerial platform or basket
- Incident scene / fire ground
- Brush truck / Wildland fire apparatus

Wireless Benefits

Safety	Wireless headsets increase safety by allowing the user to be mobile while remaining connected to the master station. The elimination of wires gives you the freedom to move to different positions quickly since you are not tethered to the intercom system.
Enhanced Communication	Communication is improved between crew members and dispatch when there is no need for external stations. Also, with a wireless system, personnel can easily monitor multiple channels.
Reduced Costs	The installation of a wireless system is much less complicated than a wired system, saving time and money. Troubleshooting, if needed, is more cost effective because wireless devices require fewer components (and therefore have fewer points of failure) and eliminate cables that can be crimped or pinched during installation.

GRANTS / FUNDING

Purchasing new fire apparatus communications equipment can be expensive and sometimes it just isn't in the budget, but that doesn't mean you shouldn't be able to provide your department with communications equipment that is critical to their safety and job performance.

There are a variety of grants and funding programs available to assist you in obtaining equipment without breaking the budget. Here are just a few provided by the Federal Emergency Management Agency (FEMA):

Assistance to Firefighters Grants (AFG)

The primary goal of the Assistance to Firefighters Grants (AFG) is to meet the firefighting and emergency response needs of fire departments and nonaffiliated emergency medical service organizations. Since 2001, AFG has helped firefighters and other first responders to obtain critically needed equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. For more information, visit <http://www.fema.gov/firegrants/>.

Fire Prevention and Safety Grants (FP&S).

The Fire Prevention and Safety Grants (FP&S) are part of the Assistance to Firefighters Grants (AFG), and are under the purview of the Grant Programs Directorate in the Federal Emergency Management Agency. FP&S Grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death. In 2005, Congress reauthorized funding for FP&S and expanded the eligible uses of funds to include Firefighter Safety Research and Development. For more information, visit <http://www.fema.gov/firegrants/>.

For more resources, please visit Setcom's Grants/Funding page at www.SetcomCorp.com/Grants.html.

ABOUT SETCOM CORPORATION

Founded in 1970, Setcom Corporation is a leading manufacturer of communications equipment for firefighters, rescue personnel, police motorcycle officers and industrial users. Firefighters and police officers have relied on Setcom's communications equipment for over forty years. A pioneer in its markets, Setcom is still a leader because it works with users to develop the kind of innovative, tailor-made products that public safety professionals in all fifty states, most major U.S. cities and more than twenty countries worldwide rely on.

Over one thousand structural fire departments and over 80% of major United States airport fire departments use Setcom products. Setcom's products include fire truck intercom systems, airport rescue apparatus intercoms, police motorcycle helmet kits, industrial and rugged headsets, and mobile and portable radio headset interfaces. For more information, visit www.SetcomCorp.com.

Why choose Setcom?

Setcom's products are:

Easy to install and use – Setcom intercoms are relatively easy to install and can be added at the time the truck is being manufactured or after the truck has been in service at the OEM. The average Setcom installation takes about three to four hours, compared to a day or more for similar systems. Much of this comes from the fact that Setcom systems are plug and play, and they have the fewest installed components of any leading system. They also work with all widely used fire and police two-way radios, so compatibility is rarely an issue.

Offered at competitive prices – Many fire departments are under budget constraints and cannot afford to purchase extremely expensive devices. Fortunately, Setcom intercom systems are priced to be competitive with other comparable systems and they are manufactured with repairable components which allow them to have the lowest lifetime cost of ownership in the industry.

Backed by unmatched service and support - Setcom tests every system 100% before they are shipped, offers 55 hours of live technical support and a 48-hour turnaround time for warranty repairs. All system component and workmanship is backed by a two-year warranty.

SETCOM'S LIBERATOR™ WIRELESS HEADSET



Setcom Corporation brings you the next generation of headsets for fire apparatus intercom systems. Beyond its state-of-the-art features, Setcom's wireless headset is the most functional and durable headset available.

Features:

- Up to 1200 feet of range (line of sight). Typical range 300 feet.
- Advanced Motion Sensor Technology: "Instant On". No need to turn the headset on and off. The Headset shuts down after 15 minutes of inactivity and will automatically turn back on when the firefighter grabs the headset.

- Aerial Advantage™ Antenna is designed to

optimize the wireless connection between the cab of the apparatus and an aerial platform or ladder tip. It has been engineered to increase the wireless range on the vertical axis versus the lateral orientation of standard wireless systems designed for emergency vehicle use.

- Up to 30 hours of continuous talk time allows for more uses with fewer charges
- Encrypted (128-bit) wireless link for maximum security
- Elimination of some cables reduce intercom installation time and cost
- Easy to upgrade for both Setcom and Non-Setcom Intercoms as system is backward compatible and installs within minutes and with all major fire apparatus intercom systems from other vendors
- Ability to integrate portable radio into the headset allowing the firefighter to simultaneously communicate over 2 radio channels. (Fire ground and Dispatch)
- Premium dual-speaker headset with noise reduction rating of 24dB
- Heavy-duty and durable design to extend life in a demanding environment
- Available in Behind-the-Head Style
- Will work while charging off of vehicles power.

Wireless Applications and Uses – Pump panel, Tailboard, Ladder, Aerial platform or basket, Incident scene / fire ground, brush truck / wildland fire apparatus

Benefits of Pairing with Existing Setcom Intercom Systems – Backward compatible with existing Setcom 900 and 1300 systems; installs within minutes on Setcom 900 and 1300 ARFF systems.

Backward Compatible with All Other Major Fire Apparatus Intercom System Vendors

WIRED HEADSETS FROM SETCOM

Setcom offers a variety of headsets for high, medium and low-noise environments.

Setcom's headsets feature:

- Outstanding quality and durability
- Compatibility with the full range of Setcom intercom systems
- Wireless and wired options available
- Refurbishment program which dramatically extends useable life, even in the most demanding environments
- Variety of volume control and push-to-talk options:
 - When used with a Setcom intercom system, the volume control(s) and push-to-talk button(s) are typically either located in the headset or integrated into the intercom system's master or remote stations.
 - For single headset applications, volume control and push-to-talk button are offered in a number of designs, including in the headset and in-line.



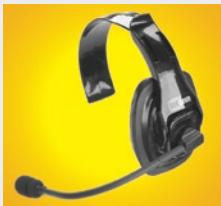
CSB Series Headsets

- Premium dual-speaker headset with a noise reduction rating of 24db
- Cut-away ear cups allow headset to be worn under most helmets
- Waterproof, flexible-boom microphone provides excellent noise cancellation, a superior signal-to-noise ratio and clear voice transmission
- The standard for most System 900 and 922 applications



8B Series Headsets

- Premium dual-speaker headset with a noise reduction rating of 24db
- Over-the-head headband and innovative noise insulation contribute to a lightweight headset that is more comfortable than most high-noise headsets
- Microphone swivels 270 degrees allowing headset to be worn right or left dress (except with Setcom's System 1310)
- Waterproof, flexible-boom microphone provides excellent noise cancellation, a superior signal-to-noise ratio and clear voice transmission
- The standard for most System 1310 applications as well as other extended-use applications in high-noise environments



5B Series Headsets

- Rugged, lightweight single-speaker headset for low-noise environments
- Extremely comfortable for extended-use applications such as dispatch or command centers as well as EMS patient care
- Swivel boom allows headset to be worn right or left dress
- Waterproof, flexible-boom microphone provides excellent noise cancellation, a superior signal-to-noise ratio and clear voice transmission

INTERCOM SYSTEMS FROM SETCOM

Setcom makes an intercom system for nearly every emergency vehicle, all backed by quality and service that you can rely on.

Wireless headsets available for Intercom systems below. See [Liberator Wireless headset](#) information on page 20.

	System	Application	Description
	900	Engines and Other Apparatus	Setcom's most popular and versatile intercom, the System 900 was developed specifically for fire fighters. Its simplicity of design cuts costs, not corners. Its quality is second to none. Its plug and play components ensure easy installation.
	900E	Engines, Rescues and Other Apparatus	The System 900E has all of the features of the System 900, with one added benefit. It allows two additional crew members, for a total of four, to transmit over the radio.
	920	Aerials	With its weatherproof enclosure, the System 920 provides intercom and radio access to firefighters at the turntable and in the basket of an aerial. The system uses only three or four aerial collector ring conductors.
	922	Engines, Rescue Boats and Open-Air Vehicles	Setcom's System 900 fitted in weatherproof boxes, with gasketed lids for the headset jacks. Ideal for rescue boats and other outdoor applications.
	922E	Engines, Rescue Boats and Open-Air Vehicles	Setcom's System 900E fitted in weatherproof boxes, with gasketed lids for the headset jacks. Ideal for rescue boats and other outdoor applications.
	1310	ARFF Apparatus	With its unique split audio feature, the System 1310 is the standard for ARFF Apparatus. It allows ARFF professionals to hear the intercom and fire dispatch radio in one ear and the tower radio in the other.
	1600	ARFF Apparatus and Command Vehicles	A four-person, six radio intercom, the System 1600 is ideal for Command Vehicles. It allows crew members to select, monitor and transmit over all six radios.

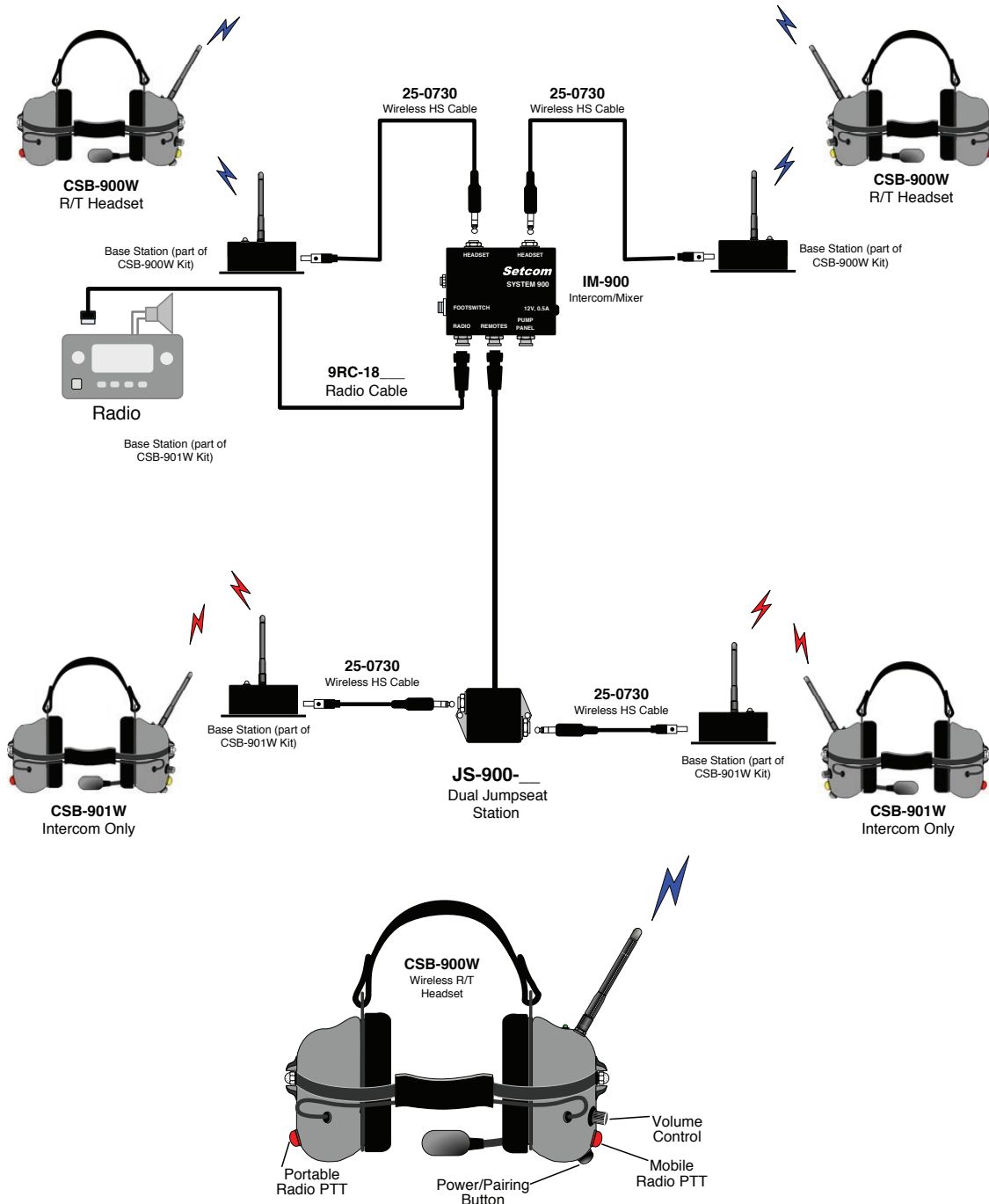
SYSTEM 900 DIAGRAM

4-POSITION WIRELESS SYSTEM

Setcom

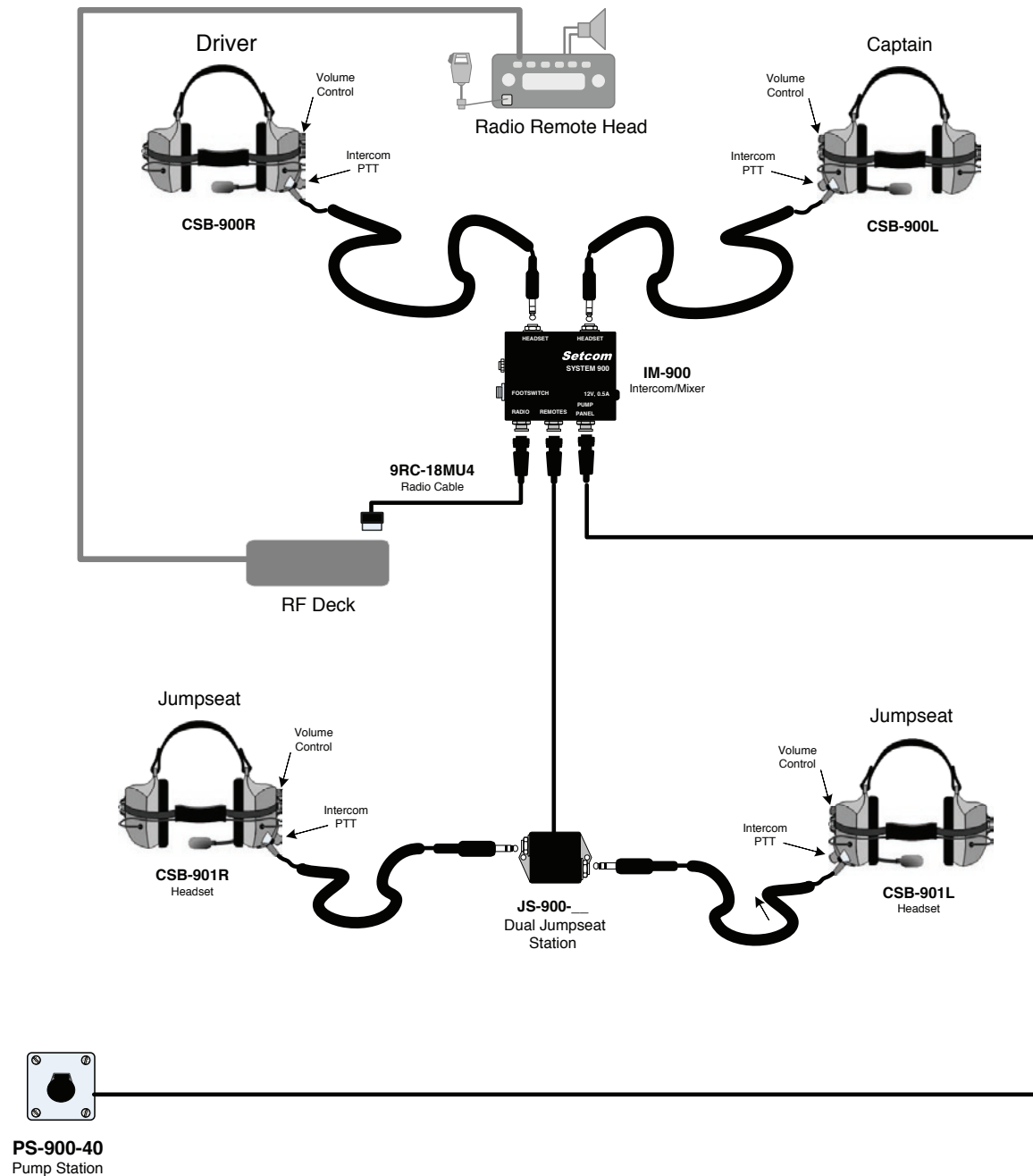
www.setcomcorp.com

System 900 Four-Man/Four Position Wireless System



SYSTEM 900 DIAGRAM

4 PERSON / 5 POSITION WIRED SYSTEM



CONCLUSION

Fire apparatus intercom systems are essential in protecting firefighters' hearing and allowing public safety professionals to communicate clearly and do their jobs efficiently, ultimately saving time and lives.

The decision to put an intercom system in place will increase safety and ensure that department issues, including worker's compensation claims, lawsuits and failure to adhere to health standards, are less likely to occur. Intercom systems also mean that crew members can carry out the operations without interference, confusion and time-consuming communication dilemmas.

At Setcom, our first priority is to educate public safety professionals on the importance of using an intercom system and the options that are available to meet their needs. Please contact us for more information on fire apparatus communication systems and to find out how a system can be customized to meet your goals.

APPENDIX A

NFPA 1500 Standard on Fire Department Occupational Safety and Health Program

7.16 Hearing Protection.

7.16.1* Hearing protection shall be provided for and used by all members operating or riding on fire apparatus when subject to noise in excess of 90 dBA.

7.16.2* Hearing protection shall be provided for and used by all members when exposed to noise in excess of 90 dBA caused by power tools or equipment, other than in situations where the use of such protective equipment would create an additional hazard to the user.

7.16.3* The fire department shall engage in a hearing conservation program to identify and reduce or eliminate potentially harmful sources of noise in the work environment.

APPENDIX B

OSHA Section 5(a)(1) and 5(a)(2)

Often referred to as the General Duty Clause, OSHA Section 5(a)(1) requires employers to “furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees”. Section 5(a)(2) requires employers to “comply with occupational safety and health standards promulgated under this Act”.

OSHA Instruction CPL 2-2.35A Appendix A – Noise Control Guidelines

When comparing the relative degree of attenuation of personal protectors and engineering and/or administrative controls, all of the following factors in addition to the guidelines in the Field Operations Manual and Industrial Hygiene Field Operations Manual must be considered and documented in the case file:

1. Hearing Protection. Personal hearing protection must attenuate the occupational noise received by the employee’s ears to within the levels specified in Table G-16 of 29 CFR 1910.95. For those employees with a standard threshold shift (STS), noise reduction must be sufficient to meet Table G-16a of 29 CFR 1910.95 (85 TWA). Hearing protectors shall be evaluated for the purposes of analyzing the benefits of engineering controls as follows:

a. Use Appendix B of 29 CFR 1910.95 to determine the laboratory-based noise reduction for a given hearing protector. b. Apply a safety factor of 50 percent; i.e., divide the calculated laboratory-based

attenuation by 2. NOTE: This is a general method for taking into consideration OSHA experience and the published scientific literature, which indicate that laboratory-obtained attenuation data for hearing protectors are seldom achieved in the workplace. If a different safety factor seems appropriate in a particular instance, the ARA for Technical Support should be consulted for assistance. This procedure is not applicable, however, for determining compliance with the hearing protector attenuation requirements of the hearing conservation amendment (29 CFR 1910.95(j)). c. The adjusted noise reduction should be sufficient to meet Table G-16 or, as appropriate, Table G-16a. Depending on the specifics of the case, an exception may be appropriate when an employer is in compliance with the hearing conservation amendment and has a history of an effective hearing conservation program.

2. Hearing Loss. Documentation of any hearing loss shall include:

a. The amount of hearing ability lost and date it was recorded. NOTE: If the employer has not done so, apply age correction to audio-grams according to the guidelines in Appendix F of 29 CFR 1910.95. b. Exposure level. c. Frequency and duration of exposure. d. Length of employment. e. Explanation of any follow-up measures taken. f. Any other pertinent information.

APPENDIX B

3. Cost of Controls.

a. **Reasonability.** The estimated costs for engineering controls must be reasonable and include the annualized cost of installing controls and, if available, the annual cost of their maintenance and costs due to any resulting loss of productivity or efficiency. b. **Relative Permanency.** In order to consider the permanency of engineering controls, compare the estimated cost for engineering controls to the estimated annual cost of a hearing conservation program multiplied by the approximate number of years the controls would be effective.

4. Employee Noise Reduction by Controls. An anticipated reduction in employee noise exposures would be considered significant if a 3 to 5 dB decrease is achieved by one or a combination of the following:

- a. Source controls.
- b. Controlling the industrial environment (e.g., barriers, enclosures, etc.).
- c. Administrative controls.

5. Control Options. When evaluating control options for the purposes of this instruction, consider all types of abatement possibilities. For example:

- a. **Partial Use of Controls.** It may be beneficial to implement some of the controls while forgoing more costly ones.
- b. **Substitution.** Abatement plans may include plans for replacing process equipment with quieter equipment that will significantly reduce exposure levels and make interim engineering controls for existing machinery impractical.

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