FIREGROUND HANDHELD RADIOS PROCEDURES

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Akron, Ohio Fire Department
CERTIFICATION STATEMENT

I HEREBY CERTIFY THAT THIS PAPER CONSTITUTES MY OWN PRODUCT, THAT WHERE THE LANGUAGE OF OTHERS IS SET FORTH, QUOTATION MARKS SO INDICATE, AND THAT APPROPRIATE CREDIT IS GIVEN WHERE I HAVE USED THE LANGUAGE, IDEAS, EXPRESSIONS, OR WRITINGS OF ANOTHER.

SIGNED: [Signature]

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Abstract

The Akron Fire Department (AFD) was in a radio transition from officers and apparatus drivers only to everyone having a handheld radio on the fire ground. The department received a grant to purchase additional radios. On December 13, 2010 the department installed the additional radios. This topic was chosen to assist with this radios transition.

At the time this research was selected, the problem was that the department officers and the apparatus drivers were the only personnel that carried radios on the fire ground.

The purpose of this research was to examine how to improve and make a smooth transition to everyone having a radio. Even with the installation of the new radios the department is still in a transition period.

The descriptive method was used to analyze the problem, purpose and the research questions. The questions that were researched were: A. What are the national standards that govern fireground communications? B. What are some of the issues with everyone having a fireground handheld radio? C. What type of guidelines and/or procedures need to be added to assist the incident commander with the monitoring of additional fireground communications? D. What are other fire departments’ radio guidelines and training procedures?

Internet articles, other Applied Research Papers and a 26 questions survey were used to examine this research. Microsoft Excel was used to analyze the firefighters’ survey data.

New results were not changing channels during a Mayday, location of the IC, the IC using headset and the assigning of a dispatcher to help monitor fireground channels.

The underlying concerns from the survey and the main recommendation from this research was that fireground SOPs and SOGs need to be changed to address this radio transition. Department
wide training will be required to ensure that the new policies are consistent throughout the department.
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INTRODUCTION

Handheld radios have been used by fire departments to ensure quick and effected communications. Handheld radios have been used by fire departments to pass important communication. All Akron Fire Department’s firefighters who work in administrative departments have been issued their own personal handheld radios. During storms, administration department members are called in order to assist online fire personnel with wires down calls, to expand manpower coverage, and they are able to communicate with online staff with their handheld radio. On the Akron Fire Department only fire officers and apparatus drivers are able to use handheld radios on the fire ground. This is a requirement of the NFPA 1201 that states that chiefs and line officers shall have radios assigned to them while they are on duty” (Wojcik, 2010). Due to the advancement in cell phone coverage most administration department’s non-emergency communication could be handled by their department issued cell phones.

Fireground communications have to be translated clearly and quickly. One of the most used successful verbal communication forms to date, other than person to person, is with handheld radios.

The problem is that, Akron Fire Department’s officers and the apparatus drivers are the only personnel that carry radios on the fire ground. In case of fireground emergencies, the affected firefighters may not be able to radio for help, and the delay in radio communication time
The purpose of this research is to examine how to improve and make a smooth transition from officers/driver only radio system to everyone on the fireground having a handheld radio. This research paper will examine some of the possible issues and concerns with making this transition.

The descriptive method will be used to analyze the research problem, purpose and the research questions. The four research questions that will be used to understand this problem are: A. What are the national and/or state standards that govern fireground communications? B. What are some of the issues with everyone having a fireground handheld radio? C. What type of guidelines and/or procedures need to be added to assist the incident commander with monitoring the additional fireground communications? D. What are other fire departments’ radio guidelines and training procedures?

The Akron Fire Department has shown a commitment to improving fireground safety. The department has been awarded a grant to purchase the additional handheld radios to ensure every firefighter on the fireground has a handheld radio and has worked on the radio background sounds issue with Motorola. The transition date has not been established. This research paper
will examine possible issues that may arise during the transition. The ultimate goal of this research paper is to create a safe and smooth transition from the current fireground radio system to the new radio system.

BACKGROUND & SIGNIFICANCE

The Akron Fire Department started as a volunteer department. The department was organized December 11, 1839, as the North Akron Fire Company, with thirty-two members. Two years after formation, the “first public calamity which befell Akron was the destruction by fire of the First Methodist Episcopal Church early on the morning of March 17, 1841”. (Grismer, 1950, pp. 145 - 146)

The Akron Fire Department was one of the first fully motorized fire departments in the U.S. The city of Akron is located in northeast Ohio and covers an area of 50 square miles and based on the 2000 census report the population was 217,000 residents. The City of Akron is an industrial and service-based community. Based on the 2008 Fire Department Annual Report, staffing “is 380 (authorized 400) uniformed personnel and a support staff of 28. The department has 13 fire stations, each manned by four firefighter/medics that respond to either medical or fire calls”. (Akron Fire Department, 2010, p. 1)

Currently the Akron Fire Department’s handheld radios are the XTS 5000 model. The department has been using these radios since 1995.

“We have a five-site 800 MHz Motorola Smart Zone system used by many public safety and public service entities here in our county. Once it was exclusively used by Akron Fire and Police, but it is so much more than that today,” Deputy Chief Ross explains. Akron Fire has 318 radios assigned; all portables are XTS 5000 models. Most portables are ruggedized. Audio intelligibility issues “Since transitioning to 800 MHz service in 1995, the department has utilized digital talk groups almost exclusively, having little analog experience,” states Chief Ross. (2009, p. 2)
In the Executive Leadership Program, we took a field trip to Gettysburg. As we examined The Battle of Gettysburg, a common underlying factor was the effect of communication. When information flowed in a timely fashion, the battle plans had a better chance of being successful. However, when there was a delay in the flow of communication the battles were lost and the fatalities were high. During the Battle at Gettysburg life changing decisions were based on the speed of information. On the fireground life changing decisions are also made based on current information. “Giving a firefighter a portable radio is an investment in saving lives. But you must also provide proper training, policies for radio operations, and equipment maintenance. Personnel must know all the intricacies of the portable radio in addition to being able to operate it, maintain it, and ensure that it is ready for use at all times.” (Wojcik, 2010)

With an increase in handheld radios there will be an increase in the flow of information. However, if this increase in information is not received in an understandable manner it can create an adverse effect on fireground operations.

One of the goals of this research is to reduce the number of firefighter fatalities. This is the third goal of the U. S. Fire Administration (USFA). The USFA third goal is to reduce the number of firefighter deaths by 25 percent over 5 years. “In fact, according to the National Institute for Occupational Safety and Health's Fire Fighter Fatality Investigation and Prevention Program*, lack of effective communications is one of the leading causes of non-cardiac line of duty deaths among firefighters” (National Institute for Occupational Safety and Health's Fire Fighter Fatality Investigation and Prevention Program, 2010).

On the Akron Fire Department only officers and apparatus drivers have a handheld radio on the fireground. Recently the fire department received a grant to purchase additional radios, so all firefighters will have a radio on the fire ground. This topic was chosen to examine how to create a smooth transition from the current procedures that have been in place for over 20 years.
This research paper will examine the transition from only officers and drivers having radios to everyone having a fireground radio.

LITERATURE REVIEW

This literature review will examine how to effectively make a smooth transition from the Akron Fire Department’s current fireground radio system. This research will look at national guidelines, other research papers, internet articles and surveys completed by Akron’s Firefighters. Four research questions will be used to organize the research information. The four questions that will be used are: What are the national standards that govern fireground communications? What are some of the issues with everyone having a fireground handheld radio? What type of guidelines and or procedures need to be added to assist the incident commander with monitoring the additional fireground communications? What are other fire departments’ ground radio guidelines and training procedures? Some of the national standards that govern fireground communications are National Fire Protection Association (NFPA), Occupational Safety & Health Administration (OSHA), Federal Emergency Management Agency FEMA and National Institute for Occupational Safety and Health's (NIOSH).

“An effective communications system requires proper planning at the front end in order to prevent problems later, and there is no one better to participate in the process than fire fighters”. (Schaitberger, 2008)

If the number of radios on the fireground increases, there is an increased potential for radio traffic. This would have to be managed with strict radio discipline SOGs and practices. Another management tool would be to allow these fireground radios to only be programmed with fireground channels although several reports, NFPA and NIOSH statements seem to indicate that
there is a high life safety value to allowing firefighters in the IDLH access to a “repeated” channel in the event of a mayday situation. (Wojcik, 2010)

Even with the possible increase in radio traffic, the additional radios would still improve fireground safety. The reference also stated that if all fireground personnel were able to monitor and communicate on dispatch and the fireground channels, it would be safer than if firefighters only have the fireground channel. Being able to monitor dispatch and the fireground would increase fireground awareness and communication flow.

NFPA 1001 NFPA Fire Fighter I Task Book - Edition 2008 6 (B) Requisite Skills: The ability to operate fire station telephone and intercom equipment. 5.2.3 Transmit and receive messages via the fire department radio, given a fire department radio and operating procedures, so that the information is accurate, complete, clear, and relayed within the time established by the AHJ. (A) Requisite Knowledge: Departmental radio procedures and etiquette for routine traffic, emergency traffic, and emergency evacuation signals. (B) Requisite Skills: The ability to operate radio equipment and differentiate between routine and emergency traffic. (State of Oregon Department of Public Safety Standards and Training, 2008)

Fire departments must provide a standard communication method to give priority to the transmission of emergency messages and notification of imminent hazards. All routine traffic has to stay off the radio channels until the emergency message ends with all clear. Then routine traffic can resume. All fire personnel should be taught radio etiquette. NFPA 1001 already requires that all firefighters have the ability to operate radio equipment and discriminate between routine and emergency traffic. With more radios on the fireground, knowing when to talk and understanding the difference between routine and emergency traffic will assist in reducing the possibility of radio traffic overload.
NFPA 1201 also specifically states that chiefs and line officers shall have radios assigned to them while they are on duty. The Akron Fire Department currently meets this requirement.

Once firefighters initiate an interior attack on a structure fire, OSHA considers the interior environment to be IDLH (immediately dangerous to life and health). Any structure fire beyond the incipient stage is considered to be an IDLH atmosphere by OSHA. All personnel engaged in interior structural suppression operations beyond the incipient stage must use SCBA’s, work in teams of two or more, and maintain voice or visual contact with one another at all times. Although portable radios can be used for fireground communications, radio contact is not acceptable to replace visual or voice contact between team members due to the potential of mechanical or reception failure.

(Mittendorf, 2009)

This regulation doesn’t require that one of the firefighters be an officer or that one of the two firefighters have a radio. This rule also states that “portable radios can be used for fireground communications, radio contact is not acceptable to replace visual or voice contact”. (Mittendorf, 2009) The two-in and two out rule applies once firefighters begin the interior attack on an interior structural fire. If the atmosphere is assumed to be Immediately Dangerous to Life or Health Concentrations (IDLH) then paragraph (g)(4) applies. (Respiratory Protection, 1998)

It is common practice in most services that at least one member of each interior team have a radio set to the fireground channel. **** at least one responder on each crew or company shall be equipped with a portable radio, and each responder on the crew or company shall be equipped with either a portable radio or another means of electronic communication.” (Wojcik, 2010)
The key point here is that this is a common practice, not a regulated practice. However, when this practice is not used, it can create an unsafe environment for firefighters.

OSHA uses the definition for "interior structural firefighting" contained in 29 CFR 1910.155, which applies to all situations covered by Subpart L Fire Protection. The definition is as follows: “Interior structural firefighting means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage”. (United State Department of Labor, 1998)

Per the two-in and two out rule the standby rescuer must be able to stay in communication with the inside employee(s), but the person being rescued may not have a radio or telephone. The fire victim that does not have a radio will not be able to stay in communication with the rescue personnel.

Paragraphs (d) and (g) of the final standard require employers whose employees are exposed to an IDLH atmosphere to provide them with the most protective and reliable respiratory protection, i.e., a full facepiece pressure demand SCBA certified by NIOSH for a minimum of a 30-minute service life, or a combination full facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply, and to implement specific rescue precautions and communication procedures. (National Institute for Occupational Safety and Health's Fire Fighter Fatality Investigation and Prevention Program, 2010)

This section of the rule clearly explains the type of respirator, but ends with a general statement about communication procedures.

NIOSH investigative has shown that one of the main contributing factors to firefighter line of duty death (LODD), is when a firefighter becomes separated from his or her team. Obviously if a team gets cut off from one another, having only one radio can delay (or
prohibit) the issuance of a mayday. Assuming that the firefighter with radio can issue a mayday, he or she may not know the location of other missing firefighters or the firefighter with the radio could become incapacitated. It is conceivable that the only firefighter with a radio may not even be aware that a member of his team is in a mayday situation. Having only one radio also means that if an evacuation order is given, other firefighters may be 100 percent dependent upon the radio carrier to hear and relay the message. (Wojcik, 2010)

On the fireground if a firefighter loses contact with their members and don’t have a way to communicate, this situation can lead to their death. Case in point “a team of two firefighters was operating inside a structural fire. Rapidly deteriorating conditions occurred in which there was dense smoke. Confusion ensued and the team lost contact, resulting in one firefighter death. (Incident number 2; OSHA Investigations of Firefighter Fatalities; 10/1/91-3/17/97; IMIS) (Smith, 1996)”.

In this case they followed the two–in rule, but one of the members became lost. The two-in rule without a proper way to communicate with rescuers can still be deadly for firefighters.

There were requests that OSHA make clear the information about voice communication, visual contact and when hand signals may be used. OSHA responded that visual, voice, or signal line communication must be maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere. However, this clarification does not require that every firefighter be issue a handheld radio on the fireground. This section added that signal line communication must be maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

“NFPA 1500 has other relevant criteria found in requirements 6-4.3 and 6-4.4. In 6-4.3 the standard requires members operating inside hazardous areas during emergency incidents to operate in teams of two or more. Team members operating within hazardous areas shall be in
communication with each other through visual, audible, physical, safety guide rope, electronic means or other means to coordinate their activities” (United State Department of Labor, 1995).

This standard requires that members operating inside hazardous areas shall be in communication with each other through visual, audible, physical, safety guide rope, electronic or other means to coordinate their activities. This standard gives more detail about how to communicate with each other. But it doesn’t require that each member have a handheld radio. It states that the members must be able to communicate inside hazardous areas.

NFPA Standard Number 1500 also covers dispatch responsibilities. The 1992 Edition, entitled "Standard on Fire Department Occupational Safety and Health Program," stated in Chapter 6-1.6 that "The fire department shall establish and ensure the maintenance of a fire dispatch and incident communication system that meets the requirements of Section 3-6 of NFPA 1561. "Standard for Fire Department Incident Management System" (NFPA 1500, 1992, p. 20).

The fireground safety officer, when appointed by the incident commander (IC), will assist the IC monitor fireground radio transmissions and stay alert to transmission barriers that could result in missed, unclear, or incomplete communication.

What are some of the issues with everyone having a fireground handheld radio?

Some of the issues with additional fireground radios are background noise, possible radio traffic overload, radios being too close to other radios causing echo noise sounds, radios becoming entangled or not assessable, radio not on the correct channel.

“When the high ambient background noise interference issue came into the spotlight, we wanted to know if there was an impact on analog and digital communications. We asked Motorola if we could test its Noise Shield software to see if the benefits would warrant upgrading our units.” - Rob Ross, Deputy Chief, Akron Fire Department (Ross, 2009)
Fireground background noise is an uncontrollable fireground condition. However, the incident commander is still required to monitor, hear and respond to radio traffic. It is also important that the incident commander be able to hear all radio transmissions, especially from those operating on scene. Some ways to accomplish this are through the use of radio communication headset and the IC staying in their command vehicle. This will enable the incident commander to be in the best position possible to hear critical radio transmissions and monitor more than one channel.

The Baton Rouge Fire Department “Communications is a vital part of firefighting. We experiment almost daily to develop better ways of using microphones of all kinds and headsets,” said Ed Smith, chief of the Department's Special Services Division. For comfort, hearing protection and an improved ability to hear from an earphone when noise is loud, a double-ear headset with gel- or water-filled ear cups that mold to the ear work well, said Carolyn Servidio, president of Radio Mate, a headset manufacturer in Concord, Calif. (Bishop, 02)

The national recommendation is to move the IC inside a command vehicle. The pluses are that the IC has less background noises and can listen to more than one radio and the IC is not standing by the vehicle exhaust pipe.

NFAP 1561 A.5.1.3 In order to effectively command an incident, it is recognized that the incident commander needs to be in the most advantageous position possible. The best position is being seated inside a vehicle. This can be accomplished utilizing his or her staff vehicle, a designated command vehicle, or fire apparatus. An acceptable alternative is utilizing the rear area of a sport utility vehicle or van-style vehicle. This method will provide the incident commander with an area that is quiet and free of distractions from which to command an incident. It is also vital for the incident commander to be able to hear all radio transmissions, especially from those operating on scene. The best way to
accomplish this is through the use of a radio communication headset. This will enable the incident commander to be in the best position possible to hear critical radio transmissions. (National Fire Protection Association , 2002)

In Akron this would assist the IC in monitoring three fireground radio channels. The three radio channels that Akron Fire Department uses are Dispatch, Fireground and Talkaround. When there is a safety officer, the safety officer monitors the talkaround channel. The talkaround channel is an emergency back-up channel that is used when a firefighter can’t use the fireground channel.

Another consideration here is the National Institute of Safety and Technology report issued in August of 2006 entitled “Testing of Portable Radios in a Fire Fighting Environment.” This report stated that while most radios will withstand normal firefighting conditions while encased in a radio pocket, the lapel mic and associated cord will fail much sooner. Radio components and lapel mics were shown to fail in extended temperature conditions of 320 degrees Fahrenheit or less. In a mayday situation, it is conceivable that radios will fail while firefighters are still surviving in the IDLH environment. If there is only one radio with the crew, the chances of total radio failure during a mayday situation may be significant. If the firefighter with the radio is the one who “goes down” in the IDLH environment, these chances increase. (Wojcik, 2010)

“Obviously, the use of a lapel microphone with a radio strap is strongly recommended. In addition, when the radio strap is worn under the turnout coat, it’s less of an entanglement hazard. This setup, when practiced, requires minimal effort to hear and transmit messages”. (McCormack, 2009)
“On March 30, 2010, a 28-year-old male career fire fighter/paramedic (victim) died and a 21-year-old female part-time fire fighter/paramedic was injured when caught in an apparent flashover while operating a hoseline within a residence. During this incident, the victim did have a radio, but it was positioned in the back pocket of his station pants. Thus, when he donned his bunker pants, his radio became inaccessible during the incident”. (NIOSH, 2010)

Having a radio does not in itself guarantee firefighter safety. If the radio is not accessible or able to be heard it can become a hazard. What are ways firefighters carry their radios?

“Powered helmets were rated best for breathing ease, communication ease, skin comfort and in-mask temperature and humidity, while disposables were rated best for weight and convenience." (National Institute for Occupational Safety and Health's Fire Fighter Fatality Investigation and Prevention Program, 2010)

"Using a Mic Keeper firefighters not only ensure their radio will always be where they expect it, but it also can help a firefighter meet the IAFC recommendations for maintaining a proper speaking distance," says John Salentine, Vice President and co-founder of Hammerhead Industries, which manufactures the full range of Gear Keeper products including the Mic Keeper. "The device has been used by firefighters for years for comfort and convenience. It keeps the mic close to the body which prevents it from becoming entangled or damaged if they have to crawl on the ground or squeeze through tight spaces. "It can also help avoid major problems caused by an untethered mic dangling on the ground or a melted mic cord that was wrapped around the neck over the reflective material on turnout coats," he added. IAFC says that firefighters should "ensure that the microphone is placed one to two inches from the mouth or SCBA voice port with the microphone positioned directly in front of the audio source." (National Institute for Occupational Safety and Health's Fire Fighter Fatality Investigation and Prevention Program, 2010) pg. #1
It is imperative that the IC command and control radio communications to ensure firefighter safety within the fire structure. However, firefighters within a structure are unable to see all areas affected by fire and whether the structure is maintaining its stability. Having radio communications can enhance firefighter safety and health by providing fire fighters a means to also monitor the changing fire conditions and communicate with other crew members or with the IC. If firefighters find themselves in need of assistance, they will have the ability to notify other firefighters or the IC.

What types of guidelines and or procedures need to be added to assist the incident commander with monitoring the additional fireground communications?

With the increase of radio traffic on the fireground, adjustments have to be made to how fireground communication will be handled. SOP and SOG have to establish proper radio traffic.

NFPA 1561 states that “communication systems should follow a standardized method of transmitting emergency messages and notifications of imminent hazards to all levels of the command structure at emergency scenes.

If the number of radios on the fireground increases, there is an increased potential for radio traffic. This would have to be managed with strict radio discipline SOGs and practices. Another management tool would be to allow these fireground radios to only be programmed with fireground channels although several reports, NFPA and NIOSH statements seem to indicate that there is a high life safety value to allowing firefighters in the IDLH access to a “repeated” channel in the event of a mayday situation. (Wojcik, 2010)

The United States Fire Administration in 2008 developed a Voice Radio Communications Guide for the Fire Service and another radio guideline is the Radio Communication for the Fire Services. Fire Departments may want to consider
incorporating these types of guidelines into their fireground communication radio procedures. Below are a few recommendations from the guide that will help strengthen fireground communications.

- **Organization** — Before speaking, think about what information is being communicated and put the information in a standardized reporting template. For instance, a standard situational report might contain Unit ID, location, conditions, actions and needs. This method forces the user to fill in the blanks, answer all the necessary questions, and filter out unneeded information.

- **Discipline** — Often, ICs are overwhelmed by excess information on the radio. Radio discipline on the fireground will help to determine if information needs to be transmitted on the radio. If face-to-face communications are possible between members of a crew, and the IC does not need the information, don’t get on the radio.

- **Voice level** — When speaking into a microphone, use a loud, clear, and controlled voice. When users are excited, the speech often is louder and faster. These transmissions often are unintelligible and require the IC to ask for a rebroadcast of the information, resulting in more radio traffic on the channel. (Hutchins, 2010)

It is important that IC learn how to manage the human factors. Radio communication needs to be complete, necessary, and in a controlled, clear voice. Once firefighters learn how to control the human factors, and use a standard format for radio communications it will help to reduce the amount of repeat transmissions on the fireground and also reducing the amount of fireground radio traffic overload.
The SOPs and training should emphasize the need for dispatchers to take a proactive role in managing radio communications. Passive monitoring of the radio channel is not enough to prevent congestion and overloading. Developing procedures and training on multi-company response will not only make communications more effective, it helps to get everyone on the same channel. (Hutchins, 2010)

The fire department standard operating procedures need to provide and define what is clear text radio emergency traffic. Emergency traffic needs to be cleared by the person who gives the emergency traffic and all routine traffic has to wait until the emergency traffic has cleared.

In 1996, J. Curtis Varnoe published an applied research project for his Executive Fire Officer program on the subject of “Fireground Radio Communications and Firefighter Safety.” In his final presentation, he concluded that in several cases where communications problems were cited as a contributing factor in line of duty deaths, there were civilians with scanners who heard calls for help that were missed by those on the fireground. One could summarize that an increase in the number of radios not only increases the number of firefighters who can call for help, but also increases the number of people on the fireground who could HEAR a call for help. (Hutchins, 2010)

It is important that departments instruct everyone on the fireground be require to monitor and carry their radio where it is easy to hear and use the microphone when they need to provide fireground information.

D. What are other similar size fire departments radio guidelines and training procedures?

The Ohio MARCS is a guideline on how to use the XTS 5000 Portable Radio. This
guide lists the functions and features of the XTS 5000. Pages 1 through 7 are shown in Appendix D.

This system helps when riding in the fire truck and also helps reduce fireground noises. Their headset system is interchangeable between the fire apparatus and the firefighter helmet. What we have found works best for us is to have the IC sit in the officer's seat of the first in unit (truck, engine, or rescue). Usually this seat gives almost the same view as he would have from the street (maybe a bit better in inclement weather and due to height). This also affords him access to truck radios and the tech available there along with room for boards, maps and whatever he may need to spread out. All these things are in the cab of all our units anyway so why not use them? The IC is in a good position to observe the sights and sounds of the incident. What we do not do is isolate him completely though. He is still available to face to face with while still keeping him clear of most unnecessary distractions. (Martinez, 2010)

Below is an example of Boone County Fire’s standard terminology to reduce radio traffic.

Table 1: Standard Unit Status Terminology

<table>
<thead>
<tr>
<th>Standard unit status terminology will be used as follows:</th>
</tr>
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<tbody>
<tr>
<td>“Responding” = Unit is en route to incident.</td>
</tr>
<tr>
<td>“On the scene” = Unit has arrived on scene.</td>
</tr>
<tr>
<td>“In service” = Unit is available for a call. *</td>
</tr>
<tr>
<td>“Complete” = Last assignment is completed. *</td>
</tr>
<tr>
<td>“Returning” = Unit is returning to quarters. *</td>
</tr>
<tr>
<td>“Out of service” = Unit is unavailable for a call.</td>
</tr>
</tbody>
</table>

(Boone County Fire, 2004, p. 6)

Below is a section of the Burlington County Department of Public Safety Radio Manual that show how this department handles misuse of their radio policies.
3.12 Individual Incident or User Problems  Any misuse of radios or related equipment and/or Federal Communications violations shall be dealt with by the Department Chief or Captain or the Chief of Public Safety Telecommunications. That officer shall be responsible to see that all users in that supervisors department comply with all techniques, procedures, and FCC regulations. All violations shall be brought to the attention of the users supervisor at the time the incident occurs so that the supervisor can take necessary corrective action to prevent additional violations. Violations shall be dealt with as listed below for 1st, 2nd, and 3rd offenses and all shall be documented in writing.

1. A phone call to officer in charge of the user causing the issue. Failure to rectify any violation or complaint will result in step wise progression to the next level of supervision until such time as an agreement has been secured.

2. Memorandum to radio representative or officer in charge of station with a mandatory reply of the type of action to be taken. A copy of same will be issued to the Radio Committee.


Central and Field Services shall follow this complaint procedure. All complaints must be written in order to obtain a written answer and must be made by the highest rank either Chief or Captain. (Burlington County Department of Public Safety, 2007)

Each radio will be clearly marked with a two digit identifier. The first number represents the apparatus and second is the individual or crew. For example, “portable 41” is the officer in charge of 194’s crew. Portable 42 would be another firefighter who responded on 194. This complements the accountability system and is beneficial when determining who is assigned to specific assignments at the fireground. (Hoham, 2010)
This Literature Review examined internet articles, other research papers and national agencies to help develop information on transitioning from the Akron Fire Department’s current radio system to everyone on the fireground with their own handheld radio. The literature review articles reviewed standards, handheld radios issues and other department’s radio procedures that effect fireground operations. The review found that items like microphone-keepers, headsets, location of IC and the use of other people, including dispatcher, would help with this transition period.

PROCEDURES

The transition from officers and apparatus drivers only to everyone on the fireground having handheld radio is a current issue on the Akron Fire Department. The department was awarded grant funds and had already purchased the handheld units. Currently, the department has 318 handheld radios. These units have not been issued and are being programmed to be issued in the near future. This researcher decided that this topic is relevant to a current issue within the AFD. This research topic also connects to the content in the Executive Leadership course and addresses at least one of the USFA operational objectives. After researching current AFD’s SOPs and SOGs this researcher found that the department had many written radio related policies and procedures, but does not have a specific fireground communication policy. This researcher decided that this ARP would be a tool to assist the department with the handheld radio transition and help establish a specific fireground communication SOG and training procedures. This researcher developed four questions that were used to research this topic. The questions are: (a) What are the national standards that govern fireground communications? (b) What are some of the issues with everyone having a fireground handheld radio? (c) What type of guidelines and/or procedures need to be added to assist the incident commander with monitoring the additional fireground communications? (d) What are other fire departments’ fireground radio guidelines and training procedures?
The descriptive research method was used to examine this topic. This research started with an examination of other Applied Research papers at the National Fire Academy. The Internet Search Engines were used to review related topics on fireground communication and handheld radio procedures. This researcher met with other AFD personnel to help with the formation of an anonymous 26 questions survey. Before completing this survey, each firefighter was told that this survey was for the National Fire Academy’s Executive Fire Officer Program, and should take between 10 and 15 minutes to complete. Once the researcher completed the development of the survey questions, the researcher waited as AFD’s firefighters at different fire stations completed the survey. There were 62 surveys partially completed and collected. 96% of the survey questions were completed. This researcher only used surveys where all 26 questions were completed. Once the surveys were completed the researcher spent time at each fire station answering related questions about fireground communication and AFD’s handheld radio transition and noted other related firefighter's concerns about this radio transition period. A blank survey can be found in Appendix A.

Microsoft Excel was used to log, sort and create the survey related charts. The researcher created the survey questions after discussing this topic with other firefighters and based the questions on researched information. Charts and graphs were created based on the 26 survey questions. Each question was sorted and totaled by answer type and then converted into a percent based on the question information. The survey total data break down can be found in Appendix B. The total survey numbers count and percentages are located in Appendix C. Survey charts were used in the findings and discussion section of this research paper.

Limitations this researcher encountered were the survey participants comprehension of some of the survey questions and the current department fireground SOPs and SOGs. 75% of the firefighters were not officers and most of them never carry a radio on the fire ground. They did not have personal experience on some of the issues with carrying and operating a radio on the fire ground. Another limitation was the cost that was charged for some needed research information. Some of these charges forced the researcher to spend more time trying to find related research information in a different no cost location.
The problem is fireground communication has to be taught before firefighters arrive on the fire ground. As noted in NFPA 1001 Fire Fighter I Task Book, one of the first skills that new firefighters need to learn is proper radio communication and “discriminate between routine and emergency traffic”. (State of Oregon Department of Public Safety Standards and Training, 2008)

The national guidelines show when radios are required. NFPA 1201”states specifically that chiefs and line officers shall have radios assigned to them while they are on duty” (Wojcik, 2010). OSHA states that all personnel engaged in interior structural suppression operations beyond the incipient stage must use SCBA’s, work in teams of two or more, and maintain voice or visual contact with one another at all times. Although portable radios can be used for fireground communications, radio contact is not acceptable to replace visual or voice contact between team members due to the potential of mechanical or reception failure. (Mittendorf, 2009)

A common practice is that at least one person on the interior team should have a radio. Per NFPA the outside person on the RIT team should be able to communicate with the inside personnel. Radio traffic and background noise can cause important communication to be missed. The Akron Fire Department works directly with Motorola to help create Noise Shield software to help reduce back ground noises. Three other solutions to help reduce back ground noises are for the commander to work inside of their vehicles, wearing of headsets and use other personal to help monitor radio channels. The IC should consider assigning a safety officer and assigning a dispatcher to monitor the fireground. Talkaroud helps reduce the chance of important information being missed or dropped. “The SOPs and training should emphasize the need for dispatchers to take a proactive role in managing radio communications. Passive
monitoring of the radio channel is not enough to prevent congestion and overloading”. (Hutchins, 2010)

This research also shows that using a Mic-Keepers would help to reduce the attached radio cords from becoming tangled and help the wearer to know where their microphone is located. Wearing the radio on the inside of the coat also helps to reduce radio cords from becoming tangled. When asked that question on the survey only 5% felt the radio should be inside the coat.

A survey was created and 62 Akron Fire Department firefighters took this survey. There were 26 questions that were designed to get firefighter opinions about adding additional radios on the fire ground. Below is a chart that shows the years on the job of the different firefighters that took the survey.

TABLE 2: How Long Have You Been On the Job

The next chart shows the rank breakdown:
TABLE 3: Rank Survey Breakdown

Two multiple choice questions that were asked were how should you carry the radio? 71% said that the radio should be carried inside an added on radio pocket and 16 said a radio strap should be used to carry the radio.

TABLE 4: How Should the Radio Be Carry?

When asked where or how the radio microphone should be carried 48% felt that it should be attached to the helmet or facepiece and 35% felt to the lapel with 17% answering that there should be no additional attachment added to the handheld radio.
TABLE 5: Where to Carry Microphone

- Some interesting findings from the survey were 77% felt that all fireground personnel should have a radio. 81% felt a radio would make their job safer. Most felt that the radio would not get in their way and 83% felt they would be able to hear the radio on the fire ground. When asked if all firefighters should be able to talk indirectly with the IC the answers were split at 46% saying yes and 55% saying no. When asked if companies’ members should relay information first to their officers, 89% said yes and 75% felt that the relaying of information would not cause an unsafe delay in information transfer. 75% felt that the radios should be assigned to the apparatus seat. However 68% felt the firefighters would take better care of the radios if they were personally assigned to each member. 71% felt that the current SOPs need to be changed and 78% felt that the current or new SOPs should be issued to each member at the time the radios are placed into service. 86% felt that the fire communication training should be done at Training School before the radios are placed into service. However, 78% felt that if the current or new SOPs were issued when radios were placed in service the training could be done within the battalion district. When asked if the channel should be changed during a mayday, 57% said yes and 43% said no. The current policy is that the channel be changed during a Mayday. Members were split when asked if an increase in radio traffic would cause important information to be dropped. 49% said yes and 51% said no.
Most of the findings from the research articles and the survey were in line with each other. New items found in the research articles were the handling of Mayday channels, location of the IC on the fire ground, the IC using headset and the assigning of a dispatcher to help monitor fireground channels. Most Akron Firefighters felt that having a radio would help make the fireground safer. One of the underlying concerns from the survey was that SOPs and training should be done before placing the radios into service. The entire survey with the numbers and percentage breakdown is located in Appendix C.

**DISCUSSION/IMPLICATIONS**

The problem was when this research was started only officers and the apparatus drivers had radios on the fire ground. On December 13, 2010 the department installed the extra radios in the fire apparatus. These fireground radios were assigned to the seat where the firefighters are working when on duty. Appendix D shows the radio guidelines that were issued when the radios where installed.

The purpose of this research was to examine how to improve and make a smooth transition from officers/driver only radio system to everyone on the fireground having a handheld radio. This research paper examined some of the possible issues and concerns with making this transition. Even with the installation of these radios there are still issues that need to be addressed. The radio transition period has just started and finding in this research paper will still help with some of the transition issues. One of the first questions that came up after the radio installation was how the new radios should be identified. In the Literature Review the Hamilton Fire Department used the first number to represent the apparatus and the second number to represent the individual or seat assignment. This system lined up with this the department’s accountability system. In Akron this system would also work with apparatus assignment and our accountability system. Case in point,
Engine #3 would use E3 for unit and 1 for officer, 2 for driver, 3 for seat behind the driver and 4 for the seat behind the officer. For example, E31 would be the officer and E32 would be the driver. The number 1 would always equal the officer, and 2 would always equal the driver, 3 would always represent the seat behind the driver and 4 would always represent the seat behind the officer. The only difference would be the apparatus type E for engine, L for ladder and H for Haz-mat Rescue. If someone is missing you would be able to tell the unit and their position on the unit by the radio identification.

Most Akron firefighters go through Paramedic school within their first three years on the job. Once they complete their training they are assigned to a med unit where they develop radios skills. However, using a radio in fire gear is a totally different skill. With the issuing of the radios our current SOPs and SOGs need to be reviewed and adjusted. The department needs to consider creating a fireground communication SOP and SOG where all fireground communication information can be found. The department should use manuals like the U. S Administration Voice Radio Communication Guide for the Fire Service date October 2008 as a guideline when developing their guidelines. With the increase in radios and radio traffic it is important that members know when to talk on the radio, what is considered an emergency and how to clear emergency traffic. Currently when a run is dispatched units have to wait to respond. There will be a wait if more than one person is trying to talk on the radio at the same time. It will be more important that radios are only used for important information.

It is also important to remember that radio communication is just another communication tool. It does not replace face to face or other forms of communications. The department needs to have some type of penalty in place to ensure proper fireground radio procedures.

Most firefighters felt that there needed to be some type of format or battalion level training. 78% of the member surveys felt that the department’s current or new SOPs or SOGs
should be issued at the time the radios were installed. 95% said that they were familiar with the radio procedure, but 86% felt they still needed more training on fireground communication and radio related issues.

Departments that have fireground communication Sops and SOGs seem to have fewer issues. Having more radios on the fireground will increase fireground awareness and increase the flow of important information. It will help the IC with fireground accountability and activities. However, the IC also must enforce the department’s radio policy to ensure everyone’s safety.

RECOMMENDATIONS

Since the extra radios have been installed these recommendations will have to deal with post installation. It will be important that new radio procedures be department wide and not stations, battalions or shifts wide. “An effective communications system requires proper planning at the front end in order to prevent problems later, and there is no one better to participate in the process than fire fighters”. (Schaitberger, 2008)

This researcher’s first recommendation is that the department create fireground communication policies. The department should incorporation information from some of the national standards and guidelines like the Voice Radio Communication Guide for the Fire Service and Radio Communication for the Fire Services. These types of guidelines lay out national standards that will assist with the development of new fireground guidelines. Theses new guidelines should be issued to every member. Training school should create a Fireground Communication Power Point Presentation that highlights the key points and each member should be required to attend this training. This will help to make these new guidelines department wide procedures.

The second recommendation is that the department look into priorities radio override settings based on rank. The IC commander should be able to communicate over routine traffic.
Other officers should have a priority setting between the IC and other firefighters. This would ensure that important information is not blocked by routine traffic.

The third recommendation is that the department look into headsets that would allow the IC to monitor the three require fireground radio channels.

Forth recommendation is that the department establish policies when the IC should consider moving into a less noisy environment like the inside of their SUV or in the first in fire unit that is usually parked in front of the fireground, and is a little more elevated than their SUV and away from the vehicle rear exhaust pipe.

Fifth recommendation is that there be field training that simulates the fireground environment. This will help firefighters with microphone placement and help them learn how to deal with the fireground sounds.

Sixth recommendation would be for the department to purchase, or let firefighters purchase with their annual clothing allowance, items like microphone keeper, lapel mic cable or radio holders to carry the radios.

Seventh recommendation is that each member be required to participate in the battalion morning radio test. This would ensure that all radios are charged and ready to be used.

The eighth recommendation is that the department give the firefighters more options than the current mask microphone attachment option.

The final recommendation is that the department consider writing another grant to get more radios so every member can be assigned their own radio and battery charger. This will help firefighters reporting to work, with current job related activities and assist with member call up and assignments.

Having more radios on the fireground should be a positive event. “Giving a firefighter a portable radio is an investment in saving lives. But you must also provide proper training, policies for radio operations, and equipment maintenance. Personnel must know all the
intricacies of the portable radio in addition to being able to operate it, maintain it, and ensure that it is ready for use at all times.” (Wojcik, 2010)
REFERENCES LIST


Pitfalls to Increasing the number of radios on the fireground. (n.d.). Retrieved 11 14, 2010, from Carolina Fire Journal:


Response to IDLH or Potential IDLH Atmospheres:


The Use of Radios in the IDLH Environment:
Appendix A:

Questions for AFD Radios Transition:

1. How long have you been on the fire department?
   a. 1 to 5 years
   b. 5 to 10 years
   c. 10 to 15 years
   d. 15 to 20 years
   e. 20 to 25 years
   f. 25 to 30 years
   g. Over 30 years

2. Is it a good idea to issue a radio to all fire ground personal?
   a. Yes
   b. No

3. Would a radio help make your job safer on the fireground?
   a. Yes
   b. No
   c. If yes explain______________________________________________

4. How should you carry the radio on the fire ground?
   a. Radio pocket
   b. Radio strap
   c. Inside your coat
   d. Outside your coat

5. Would a radio get in your way on the fireground?
   a. Yes
   b. No
   c. If yes explain______________________________________________

6. Do you feel that you would be able to hear an understand radio communication during firefighting activities on the fireground?
   a. Yes
   b. No

7. What type of microphone set up would you prefer
a. No attached microphone  
b. Helmet attached microphone  
c. Lapel microphone

8. Should all firefighters be able to talk directly with the incident commander on the fireground?  
a. Yes  
b. No

9. Should company have a company talk group, where each company member can talk to each other and only that company would hear that channel?  
a. Yes  
b. No  
c. If yes explain______________________________________________

10. Should company’s members relay information to their officer, who would then relay important, needed information to the IC?  
a. Yes  
b. NO  
c. If yes explain______________________________________________

11. Would question #10 cause an unsafe delay in information transfer to the IC?  
a. Yes  
b. No  
c. If yes explain______________________________________________

12. Do you feel that the IC will be able to effectively monitor the increase in radio communication?  
a. Yes  
b. NO

13. Should there be a dispatcher or dispatch Lt. that monitor all fire ground radio communication and relay drop information to the IC?  
a. Yes  
b. No

14. Should the radio be assigned to the Apparatus Seat or to all personnel?  
a. Apparatus Seat  
b. Personal Assigned

15. Do you feel that firefighters would take better care of a personally assigned radio?  
a. Yes
b. No

16. Has there even been a time in your personal career on the fire department that you were in a situation that an assigned personal handheld radio would have made a different?
   a. Yes
   b. No
   c. If yes explain

17. Do you know and understand the current Akron Fire Department’s fire ground communication SOP?
   a. Yes
   b. No

18. Should the current fire ground communication SOP be changed to handle the additional radio communication on the fireground?
   a. Yes
   b. No

19. Should all personnel be trained at the training school on fire communication before the radios are issues?
   a. Yes
   b. No

20. If the current or new SOP was issue to each member at the time the radios are place in service, would battalion level training be sufficient?
   a. Yes
   b. No

21. Would the issuing of additional radios would cause more or less fire ground communication issues?
   a. More
   b. less
   c. If yes explain

22. Should the radio channel be change during a mayday?
   a. Yes
   b. No
   c. Explain
23. How hard would it be to change the channels when wearing gear?
   a. Not hard
   b. Hard

24. Do you feel that increase radio communication could cause important information to be dropped?
   a. Yes
   b. No
   c. 

25. Would you be able to switch channel when actively involved in fire ground firefighting activities?
   a. Yes
   b. No
   c. Explain______________________________________________

26. What is your current rank?
   a. Firefighter
   b. Lieutenant
   c. Captain
   d. District Chief
   e. Deputy Chief
   f. Chief
## Appendix B

|       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Test 1| 2 | b | a | a | a | a | a | a | b | b | b | a | a | b | a | a | a | a | a | a | b | b | b | a | a | a | a |
| Test 2| 3 | g | b | b | a | b | a | b | a | a | b | a | a | a | a | a | a | a | b | b | b | a | a | a | a | a | a |
| Test 3| 4 | f | b | b | b | a | b | b | b | a | b | b | a | b | b | a | b | a | a | a | a | a | a | a | a | a | a |
| Test 4| 5 | b | a | a | a | b | a | b | b | a | a | b | a | a | a | a | a | b | a | a | a | a | b | a | a | a | a |
| Test 5| 6 | a | a | a | a | a | a | b | b | a | b | b | a | b | b | a | b | b | a | a | a | a | a | a | a | a | a |
| Test 6| 7 | c | a | a | a | a | a | b | b | b | a | b | b | b | a | b | b | b | a | a | a | a | a | a | a | a | a |
| Test 7| 8 | g | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 8| 9 | b | a | a | a | b | a | b | a | a | b | a | a | b | a | a | b | a | b | b | b | a | b | b | b | b | b |
| Test 9| 10| b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | b | a | a | b | a | b | a | a | a |
| Test 10| 11| c | a | a | b | a | c | a | b | b | c | a | b | a | b | a | b | a | a | a | a | b | a | a | b | a | a |
| Test 11| 12| a | a | a | a | b | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 12| 13| e | b | b | b | b | a | b | b | a | b | b | a | b | b | a | b | b | a | a | a | a | a | a | a | a | a |
| Test 13| 14| a | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 14| 15| c | a | a | a | b | a | c | a | c | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 15| 16| f | a | a | b | b | a | c | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 16| 17| a | a | a | a | b | a | c | b | b | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 17| 18| b | a | a | a | b | a | c | b | a | b | a | a | a | a | a | a | a | b | a | a | b | a | a | a | a | a |
| Test 18| 19| d | a | a | b | b | a | c | b | a | a | a | a | a | a | a | a | a | a | b | a | a | b | a | a | a | a |
| Test 19| 20| b | a | a | b | a | c | b | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 20| 21| c | a | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 21| 22| d | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 22| 23| e | c | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 23| 24| a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 24| 25| c | a | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 25| 26| a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 26| 27| e | c | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 27| 28| d | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 28| 29| c | a | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 29| 30| c | A | a | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 30| 31| c | A | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 31| 32| c | A | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 32| 33| d | A | a | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 33| 34| d | A | a | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 34| 35| d | B | a | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 35| 36| c | A | a | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 36| 37| a | A | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 37| 38| a | A | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| Test 38| 39| a | A | a | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| 40 | C | a | A | a | b | a | c | a | a | a | b | a | b | a | a | a | b | a | b | a | a | b | b | b | b | a | a |
| 41 | f | a | B | b | b | a | b | a | b | a | b | b | a | b | b | b | a | b | b | a | b | b | b | b | a | a | a |
| 42 | b | b | B | c | a | b | a | b | b | b | a | b | b | a | b | a | b | a | b | b | a | b | b | a | b | a | b |
| 43 | b | a | A | a | b | a | c | a | b | a | b | a | b | a | b | a | b | a | b | a | b | a | b | a | a | a | a |
| 44 | b | a | A | a | b | a | a | a | b | a | a | a | b | a | b | a | b | a | a | a | a | a | a | b | a | b | a |
| 45 | c | a | A | a | b | a | b | a | a | a | b | a | a | a | b | a | a | a | b | a | a | a | b | a | b | a | b |
| 46 | g | a | A | a | b | a | a | b | b | a | b | a | a | b | a | b | a | a | a | a | b | a | b | a | a | b | a |
| 47 | f | b | B | c | a | b | c | b | b | a | a | a | b | a | b | b | b | b | a | b | a | b | a | a | a | a | a |
| 48 | g | b | B | a | a | b | c | b | a | a | b | b | a | a | b | a | a | a | b | a | b | a | b | a | a | b | a |
| 49 | g | b | B | a | a | b | c | b | a | a | b | b | a | a | b | a | a | a | b | a | b | a | b | a | a | b | a |
| 50 | c | b | A | a | a | b | b | b | a | a | a | a | a | a | b | a | b | b | a | a | a | a | a | a | a | a | a |
| 51 | g | b | B | d | a | a | b | b | b | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| 52 | d | a | A | a | b | a | a | b | a | a | a | b | a | b | a | a | a | a | b | a | a | a | a | a | b | a | a |
| 53 | c | b | B | d | a | a | a | a | b | b | a | a | b | b | b | a | a | b | a | b | a | a | b | b | a | a | b |
| 54 | c | a | A | a | b | a | c | b | a | a | b | a | a | b | a | b | a | a | a | b | a | a | b | a | b | a | a |
| 55 | d | a | A | a | b | a | a | b | a | a | a | b | a | b | a | a | a | b | a | b | a | a | a | a | b | b | b |
| 56 | g | a | A | a | b | a | b | b | a | a | b | a | a | b | a | b | a | a | a | b | a | a | a | a | a | a | a |
| 57 | c | a | A | d | b | a | a | a | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a | a |
| 58 | e | a | A | a | b | a | a | b | a | a | b | a | a | b | a | a | a | a | a | a | a | a | a | a | a | a | a |
| 59 | a | a | A | a | b | a | c | a | b | a | b | a | b | a | b | a | b | a | b | a | b | a | b | a | a | a | b |
| 60 | a | a | A | a | b | b | b | a | b | a | b | a | b | a | b | a | b | a | b | a | b | a | b | a | a | a | a |
| 61 | f | b | B | a | a | a | b | a | a | a | b | a | b | a | b | a | b | a | b | a | b | a | b | a | a | a | a |
| 62 | g | a | A | a | b | a | b | a | a | a | b | a | a | a | b | a | a | a | b | a | a | a | b | a | a | a | a |
Appendic C:

From: Ross, Robert

Sent: Monday, December 13, 2010 8:32 AM

To: _PDL_Fire

Subject: New radios

To all companies:

Two new handheld radios are being delivered to all front-line fire companies, these new radios are equipped with SCBA interface cables. These radios are to allow all personnel to have radio capabilities when wearing SCBAs. These radios are to be assigned to the "back seat" positions in the engines and ladders. These radios are meant to be used during SCBA operations since they will NOT have the plug-in microphones. The only way these radios will work is when plugged into the SCBA facepiece. Do not remove the interface cables to use the radio in any other manner. These radios have the re-designed interface cable and PTT (push-to-talk) switch that are designed to be more reliable under firefighting conditions.

Officers should immediately review all pertinent radio operations procedures with their personnel so that operational and safety procedures are well known. Officers shall stress proper radio discipline to be maintained at all times. More radios at emergencies have the potential to make operations even more confusing if proper procedures and radio discipline are not observed. Officers shall also ensure all radios assigned to our companies have a good battery and are ready for use at all times. A properly operating and utilized radio may be a lifesaver, a misused or non-operational radio can risk someone's life. Make sure this training is conducted regularly and that all personnel are proficient.
If there any problems with these radios notify your Battalion Commander who can help determine whether it is a "radio" problem or an "interface" problem. Suspected issues with the radio are to be directed to Communications (radio room), issues with the interface cable should be directed to Fire Maintenance and documented with a work order.

If there are other questions or issues with these radios please address it first with your Battalion Commander.
Appendic D:

Ohio MARCS

Using your MARCS Digital Radios

October 2006
Physical Features of the XTS 5000 Portable Radio

- Channel/Mode Select
- Scan On/Off Toggle
- Concentric/Encryption
- Man Down
- On/Off Volume
- Speaker/Mic Page
- Programmable Buttons
- 4 Way Navigation
- Alpha Button
- Display
- Home
- ZONE
- Call
- Keypad

Basic MARCS Radio Training
Basic Operation of the XTS 5000

On/Off
- Turn the On/Off Volume Control knob clockwise. You also control the volume with this knob.
- The LED light on top of the radio flashes when you turn the radio on.
- If the power-up test is successful, you briefly see "SELF-TEST", then your "home" display. if the power-up test is unsuccessful, you see "ERROR XX/YY (XX/YY is an alphanumeric code).
- Turn the On/Off Volume Control knob counterclockwise until it clicks to turn the radio off.

Volume
- Turn the On/Off Volume Control knob clockwise until you reach the volume you desire.

Zone Select
- To select a zone, press the "ZONE" button located directly below "ZONE" on the display (the current zone flashes on the display when you do this).
- Press the right side of the 4-way Navigation button to find the zone you want.
- OR use the keypad to enter the zone number (i.e. 1, 2, 10).
- Press the "HOME" button to confirm the displayed zone and channel.
- OR press the "PTT" button to transmit on the displayed zone/channel.

Concentric Switch/Encryption
- Encryption is activated by rotating the concentric button to the left.
- The encryption symbol will flash on the display when you are receiving an encrypted transmission.
- REMEMBER: Encryption is only active on your encrypted talkgroups. Private calls are not encrypted.

Private Call - Initiate
- Press the key below "CALL" on your display to activate the feature.
- The last ID number transmitted or received appears on the display and the "LIST" soft key. Press the "PTT" button to dial the displayed number, or press the button "LIST" to enter the Private Call List.
- OR-enter a new 6 digit ID number to be called via the keypad, and press the "PTT" button to transmit.
- Press and home "HOME" to exit the call.

Private Call - Receive
- When a Private Conversation Call is received, two alert tones will sound and the display will read "CALL RCV".
- Press the key below "CALL" on your display to activate the feature, the last ID number received appears on the display.
Press the "PTT" button to talk; release to listen
Press and hold the "HOME" button to exit the call

Call Alert Page - Initiate
- Press the key below the word "PAGE" on your display to activate the feature (button with 3 dots)
- The last ID number transmitted or received appears on the display and the "LIST" soft key. Press the "PTT" button to dial the displayed number or enter a new 6 digit ID number to be called via the keypad
- Press the "PTT" button to dial the displayed number
- Press and hold "HOME" to exit the feature

Call Alert Page - Receive
- When a Page is received, you will hear for repeating alert tones, the LED flashes green, the call received symbol flashes and "PAGE RECEIVED" is displayed
- Press the "PTT" button. This dials the displayed ID number as a Private Conversation Call
- Press and hold the "HOME" button to clear the alert and return to the main display

Display
- The top and middle buttons on the side of the radio controls the brightness of your display. Page 8 has the most common symbols seen on your MARCS radio.

Home
- Pressing this button brings the radio to the "HOME" talkgroup which is where you will conduct your day to day business
- You must press and hold the "Home" button until the display changes to "YOUR HOME"
- Make sure the Channel/Mode Select dial is in the "1" position

Scan On/Off 3 Position Toggle Switch
- The programmable scan feature allows you to monitor traffic on different channels by scanning a preprogrammed list of channels.
- When you move the 3 position toggle switch to the "B" position, your radio is in scan mode
- The scan icon wilt appear in your display
- Your radio can have several different scan lists. These lists must be preprogrammed by a qualified radio technician.

Scan Select
- This programmable feature allows you to change scan list members and priorities. Scan Select is located in the "C" position of the 3 position toggle switch
- The Scan Select icon will appear in your display
- This feature lets you change scan list members and priorities
To edit the scan list:

1) Toggle the Scan List Programming Switch to the predetermined programming position.
   - On these training radios that is position "C"
   - You will see a small square flash in the upper right corner of the display indicating the programming mode
   - You will also see SEL, DEL, and RCL displayed as possible selections

2) Press the left or right side of the 4-way Navigation button to select the item to be changed.

3) Press the button directly below SEL or DEL or RCL
   - SEL = add the currently displayed item to the scan list
   - DEL = delete the currently displayed item from the scan list
   - RCL = view the next available item
   
   OR

When adding a priority member, press the button directly below SEL additional times. You will see

= this item is in the scan list

= this item is in the scan list as a priority-two member

= (dot flashing) this item is in the scan list as the priority-one member Priority-one members cannot be deleted)

4) Press the left or right side of the 4-way navigation button to select more items to be added or deleted.
   
   OR

Use the keypad to go directly to additional items to be added or deleted

   OR

Use the 16 position select knob to select additional items to be added or deleted

The maximum number of members for a trunking priority monitor scan list is 15

5) Toggle the Scan List Programming switch out of the programming position

Channel/Mode Select

- To select a channel/mode, turn the rotary dial on top of the radio to select specific talkgroups you wish to transmit/receive on.
- From the "HOME" position in these training radios, turn the dial counterclockwise and watch the display change from talkgroup to talkgroup in your home zone.
Transmit and Receive (PTT)

- Turn the radio on and select the desired talkgroup. The selected talkgroup appears in the display.
- Listen for ongoing conversations; if your talkgroup becomes available, proceed with your transmission.
- Press the PTT button to transmit and wait for the talk permit tone. (3 beeps) When speaking, keep the radio 4-6" from your mouth. If you hear a busy signal, (honk) wait for a call back tone, then proceed with your call. Release the "PTT" button to listen.

Important: Remember to wait briefly before beginning your conversation as the system takes a little time to select an open channel and assign it to you.

Man Down

- The orange button located on top of the radio is a programmable "man down" feature.
- When programmed, pressing this button would give a visual alert (on your display) to others in your group you are in distress.
- Audio tones can also be programmed into the radios indicating an emergency.
- To disable, press and hold the orange button down.
- Alerts the "emergency" talkgroup (your radio room, or other designated talkgroup). Other radios will also see the emergency alert. You will only know the ID number of the radio, not the individual’s name.
- Press and hold the "HOME" button to clear the alert and return to the main display.

Basic MARCS Radio Training

6) My ID

- In the event you forget what your 6 digit radio ID number is you can put it up on the XTS 5000 display.
- Press the button directly below "CALL" on the radio display.
- Press the left side of the 4-way Navigation button to find your ID.
- Press "HOME" to return to the home display.

Time and Date

You can program the time and date as you might with other electronic devices. The clock display is enabled by a qualified radio technician.

- The default time setting is a 12-hour clock.
- If a 24 hour clock is selected, AM/PM selection is not available.
- The default setting for the domestic date shows MDY.

To Edit Time and Date

- Press the right arrow button (oval 4 way navigation button) to find "CLCK".
- Press the white button (with blue dots) directly below "CLCK". The current setting is displayed.
• Press the white button (with blue dots) directly below "EDIT". The first item flashes.
• Press the up/down arrow button (oval 4 way navigation button) to change the selected item.

OR

• Press the right arrow key (oval 4 way navigation button) one or more times to move to an item you wish to change.
• Press the up/down arrow button (oval 4 way navigation button) to change the selected item.
• Press the right arrow button (oval 4 way navigation button) one or more times to move to an item in the date field.
• Press the up/down arrow button (oval 4 way navigation button) to change the selected item.
• When you have made all your changes, press the white button (with blue dots) directly below SAVE to save your changes and return to the home display.

Note: If a call arrives while the radio is in the clock-setting menu, the radio exits clock setting, your changes are lost, and the call information is displayed.

When you need to call for HELP!!!

HELPDESK

If the control station fails to operate properly, contact the MARCS Network Operations Center (NOC) at 1-866-646-2727. This center is monitored 24/7 and will assist you in obtaining help with equipment problems.