Radio Amateur's – Getting back to Civil Defense:

A Plan Just for You and Your Neighbor's During Disaster's



By George R. Bradford

KF5QEZ

Table of Content

Credits

Acknowledgement

Introduction: 5

Part 1 **Becoming an Immediate Responder** 7

Chapter 1: Fighting Fires for the Immediate Responder 8

Chapter 2: Controlling Damaged Utilities to Prevent New Problems 17

Chapter 3: First Aid and Transporting the Injured 25

Chapter 4: Neighbor's Helping Family and Neighbor's 40

Part 2 **Neighborhood Amateur Messaging service** 42

Chapter 5: Developing the NAM 43
Managing the Message 46
First Contact – the Worksheet 47
Computer Message Tracking 49
Portable Station Safety 51
Combining Power Options when the Electric Grid is Un-reliable 52

Chapter 6 A Simple and Quick Antenna 53

Chapter 7 Messages – Beyond the Neighborhood 55

Chapter 8 Staying Operational Following an EMP 57

Appendix A Glossary 59

Summary 62

Credits to past work
Much of the work in Part One of this paper, are partial excerpts from my original work: *Self-Reliance during Natural Disasters and Civil Unrest – How to Handle Fires, Search and Rescue and other Emergency Response Situations on your own.*

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Cover photo by Greg Henshall // FEMA. The center of Greensburg, KS 12 days after a F-5 tornado with 200 MPH winds on May 16, 2007. The author visited this quite town one month prior to this storm. The loss felt almost personal.

Acknowledgement

For those of you who have meet my wife Peggy, you will probably recognize her in several of the pictures throughout Part 1 of this paper. She has endured: research, proof reading, staging for photos, and more proof reading for both of the editions of the books credited on the prior page.

She has provided an endless level of support for a project as I re-focused this work toward the Amateur Radio community. This project has been on-going since 2007 and without her standing by me, it never would have happened.

Love always. 73

INTRODUCTION

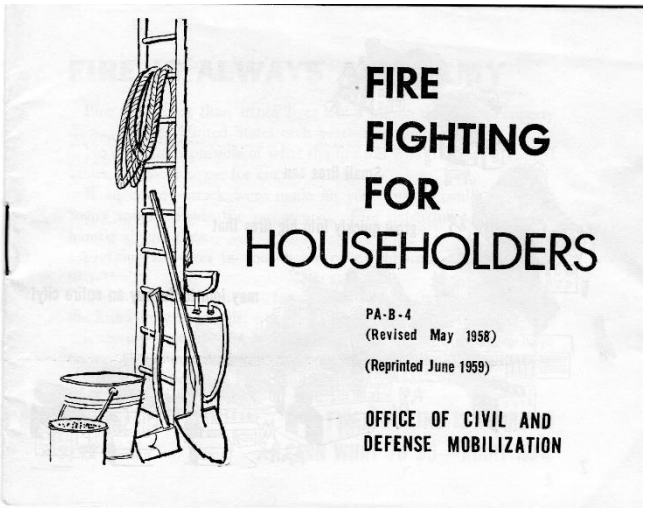
You may have noticed the narrow focus of the title. It addresses the group of radio operators serving a small group of family and friends. Why would I focus on this part of the community? Because there are hundreds of books, manuals, best practices, and task books about every part of emergency communication but none of them cover a *timely* support for the citizens themselves. This paper is how we can support each other within our own neighborhood community. It's about the radio operators who can't jump up in the middle of the night and deploy on long road-trips in the dark. It's for the operators who are past their time for putting up a tent or worse yet just sleeping on the ground. But if we narrow the focus to our own neighborhood, we then expose a massive number of underutilized amateur radio operators who can become an *example* for all their neighbors and fill a need not addressed by most government plans. This paper will give these operators a plan that they can form into a personal program just for you and your neighbors. The best part is that they can do this without ever leaving their undamaged homes.

The Immediate Responder

But before we address amateur emergency communications, we need to stress that *every* citizen, including HAMs, should possess basic fundamental skills to handle early-stage emergencies resulting from a disaster. You and your neighbors will always be the first to arrive on any emergency impacting your own neighborhood, therefore, you will be in the best position to take the most effective initial emergency action. This does not mean you are a professional first responder; more significantly, you are an *Immediate Responder*[1]**,** fully prepared to prevent small problems from becoming catastrophic.

As radio operators that go by the moto "when all else fails," we must be a *visible* example of not only emergency communications but also in sizing-up and handing *initial* action to naturalize hazardous situations before they get out of hand. Often these little emergencies must be taken care of in order to secure a safe environment to conduct portable/emergency communications.

Case in point: this is nothing new. The concept of civilians handling emergencies is not new. All through World War II, groups of organized citizens put out fires and rescued people from rubble after bombing raids. Posters proclaimed that civil defense was every citizen's responsibility. During the 1950s, the *Office of Civil Defense* stockpiled medical supplies in civilian shelters and printed numerous pamphlets that encouraged every citizen to learn



[1] I believe this term was used once in some junk mail. I don't remember how long ago or from whom but I have done my best to keep it alive. It is completely self-explanatory!

how to care for themselves. The government didn't want to do everything for you in those days. It's time for the people to get back into a Civil Defense frame of mind.

In more recent times, civilian volunteers routinely operate as part of government emergency plans. The National Weather Service has its successful SKYWARN program, where volunteer weather spotters (many of them amateur radio operators) confirm with visual ground-truth reports confirming events indicated on radar. In the past, communities have utilized all-volunteer debris handler corps to assist property owners move debris into piles for mechanized removal. Mountainous counties have Ski Patrol and Search and Rescue volunteers conducting very professional and dangerous jobs in wilderness terrain. Jeep clubs throughout the mid-west help people who can't safely traverse roads rendered unsafe during ice storms.

But the ultimate story of recent years comes from the Boy Scouts of America! June 2008 in Little Sioux, Iowa. A group of scouts were at camp when their location took a direct hit from an EF3 tornado that suddenly appeared out of the night. One of the scouts realized what was happening when he saw the funnel in the lightning flashes and activated an on-site siren, which gave the rest of the scouts enough time to seek cover. After the storm passed, these scouts started triage, treating more than 48 injured and confirmed four dead. They displayed proficiency with small tools while freeing some of the injured who were lightly pinned in the rubble. I have the highest admiration for this group of 13 to 18-year-olds and I dedicate this paper to these young Immediate Responders. They trained, practiced, and stepped up during a time of peril.

The precedent for civilians conducting initial emergency operations following a disaster has long been established. I would hope that besides our obvious communication skills, that we as emergency radio operators, would become highly visible examples of such immediate action skills for the rest of our neighbors. If we are prepared to handle the small problems, the professionals can be freed up to handle the more complicated ones. The chapters in Part 1 of this paper will give you the necessary information to safely conduct Immediate Responder tasks; something most other communication books have not addressed. Much of the content and photos in Part One have been resurrected from my book *Self-Reliance during Disasters and Civil Unrest,2007.* The book is now out of print but the basic skillsets are still valid for anyone who may have to someday answer the call.

Why is this paper better?

Emergency response will never be just about radios. Even at the neighborhood level, the work is complicated and will require quick, calm and decisive action from the collective effort of your entire neighborhood in order to minimize impact. This paper is divided into two parts; Part 1 consisting of Chapters 1 through 4, will address in layman terms, the initial action for the Immediate Responder; something you won't find in many books without spending weeks in a classroom. Part 2 provide a detailed discussion of the Neighborhood Amateur Messaging service which can provide the emotional support your neighbors family needs; a message from home.

Part 1 Becoming an Immediate Responder

Professional emergency services are staffed and funded to handle every day emergency response. A single catastrophic event produces hundreds of single emergencies all at once. There is no way that routine emergency forces can handle all these events within the response time you are accustomed to. You will likely have to wait for help. You may not even be able to report your troubles or needs by conventual cell phone means.

Everything in Part 1 is a basic and simple processes for mitigating early-stage emergency. You will only need tools commonly found in most garages, a fire extinguisher and some first aid supplies. No formal certification or justification by the government is required. Read the labels and any manufactures instructions that comes with your emergency supplies and then apply the tips from within these pages.

I would caution you to stay focused. You must stay calm so you make prudent and rational decisions that are based on your individual ability. These abilities will be different for all of us as individuals but the collective of neighbors working together may produce greater results. I have included references and even specific website links to help you further your knowledge of these subjects. Websites are constantly changing. If any of the links I have included do not work, simply do a key word search on your preferred web browser.

Chapter 1 through 4 addresses the types of emergencies that need to be handles in the early stages to avoid catastrophe. If you handle these problems early, your situation will likely improve. This will be your goal; *let your actions stabilize and improve the emergency. Keep it in check until professional help can get to your neighborhood*. Young and old; we can do this, because we are all *Immediate Responder*.

Chapter 1 Fire Fighting for the Immediate Responder

In the aftermath of any disaster, fire has the single most potential for escalation. Fires start when structures and equipment are torn apart by heavy winds, earthquakes, falling trees, or mud- and rockslides. Most fires start out small and, if detected early, can be extinguished by anyone with minimal equipment. Homeowners in England, many of them women, fought fires caused by incendiary bombs during World War II. In some cases, every home on a street had some level of fire induced by the air raids. NASCAR has been fighting race track fire with hand held extinguishers for years.

The procedures they used decades ago are just as applicable for you today. To put out a fire, you must cool or remove the source of heat that is causing the burning process, exclude the supply of air that the fire needs to burn, remove any new fuel the fire will need to continue burning, or interrupt the chemical reaction taking place within the flaming zone of the fire. This chapter will provide you with the basic knowledge to implement these basic steps, make decisions regarding the volume of fire you can handle safely, and take appropriate action to prevent incipient (early) stage fires from becoming catastrophic.

TYPES OF FIRES AND BASIC ACTIONS TO TAKE

The basis for all firefighting decisions is an understanding of the various types of fires and the characteristics of the different type of extinguishing agents.

Class A fires involve ordinary combustibles such as wood, paper, vegetation, and some plastic—basically, anything that leaves an ash (**Fig 1.1**). Fires in ordinary combustibles have a tendency to burn deep into the material and are subject to smoldering and reignition. These fires can be extinguished by cooling (i.e., removing heat) with water, smothering (i.e., excluding air) with sand or dirt, or controlling with the appropriate size Class A-rated extinguisher.



Figure 1.1 A small Class A trash fire.

Class B fires involve flammable liquids or gases such as gasoline, propane, or petroleum-based greases or paints (**Fig 1.2**). Typically, these fires need to be either smothered or deprived of a continuous source of fuel by closing a valve. These fires are capable of flowing and can be pushed around or increased in intensity when sprayed with water. They are also subject to reignition if the extinguishing agent's integrity is broken or blown away by the wind.

Vapors from flammable liquid that accumulate in a confined area could explode if they find another source of heat such as a pilot light or hot metal within the burned area. (I'll talk about controlling utilities to prevent new fires in chapter 2). To limit vapor buildup, make sure plenty of air is flowing through any

confined area that was on fire. The same principle applies if the fire is outside the building; close any doors or windows to prevent vapors from entering the building.



Figure 1.2 A Class B flammable liquid fire.

Class C fires involve energized electrical equipment such as power distribution panels, electric motors, or computers. The primary danger is the risk of electrocution. Once the power is turned off, these fires can be handled as Class A or B fires. If fighting this type of fire while the current is still flowing, you must use a Class C-rated extinguishing agent, never water.

Class D fires involve the burning of combustible metals such as magnesium or aluminum. Most people will never see a Class D fire, with the possible exception of a well-involved vehicle fire where the magnesium wheels or aluminum engine block is burning. If you have a specialized extinguisher designed to put out Class D fire, go ahead and use it. If not, and if the fire is on a flat surface, you can cover the burning material with a deep layer of *dry* sand. Otherwise, the best you can do is direct some water on the surrounding combustibles so they don't catch fire while the metal burns itself out. You should know that if you allow the water to hit the burning metal, there will be a violent reaction that will result in molten metal being scattered around the area. You must either keep something solid between you and the fire, wear heavy clothes to protect you from burns, or leave this fire alone.

Class K fires involve combustible cooking media such as vegetable or animal oils and fats. They are often referred to as grease fires and are almost always inside a deep fat fryer, in a roasting pan within an oven, or in a skillet on a range top. These fires will pop and spatter burning grease with the slightest agitation, so the last thing you want to do is pick up the pan and run out the front door with it. The first step is always to turn the heat off under the burning appliance. Next, place a lid over the appliance to exclude air from the burning zone. Deep fat fryers have lids specially designed to fit tightly over the fat tank. As with Class B fires, do not allow any water to get into the burning grease; it will cause the grease to froth, splatter, and possibly boil over the tank and onto the floor. We'll talk about special extinguishing agents for these types of fire later in this chapter.

EXTINGUISHING AGENTS AND DELIVERY SYSTEMS



Figure 1.3 A 2.5-gallon water extinguisher is easily identified by its shape.



Figure 1.4 Label shows how to use extinguisher and what type of fires to use it on.

Of the two types of extinguishing agents commonly used against Class A fires, water is the most effective. It cools the burning material below its ignition temperature (i.e., the temperature at which various materials catch fire) and soaks into the char to cool deep-seated residual heat. Water is readily available, easy to apply, and cheap. However, water does conduct electricity, so be careful where you point those streams. Pressurized water extinguishers are easily identified by their tank-like shape (**Fig 1.3)**, and they will have a blue symbol with an "A" or a picture of a burning trash can on the label (**Fig 1.4)**.

Dry chemical extinguishers deploy the most common general-purpose extinguishing agent available today, and they are easily identified by their familiar cylindrical shape (**Fig. 1.5**). Dry chemical was originally designed for and is still the most effective extinguishing agent for fighting flammable liquid fires. Today's dry chemicals are capable of extinguishing Class A-, B-, or C-rated fires and will have a blue symbol with an "ABC" on the label (**Figure 1.5**).

Even though dry chemical agents can be used against any of the three most common types of fires, it has its limitations. Some extinguishers containing this chemical only carry a BC rating because they are too small to be effective on Class A fires. Also, dry chemical does not cool the burning material like water does, so you need to watch for reignition. Should the fire reignite, hit it again and then find some water to cool the smoldering material, as long as there is no energized electrical equipment involved.

I can hear some of you saying, if this stuff doesn't cool the burning material and it obviously isn't removing the fuel, it must smother the fire. Well, not exactly. As the cloud of dry chemical envelops the fire, it interferes with the chemical reaction occurring within the flames and causes the burning process to stop.

If your extinguisher is old enough, it may be loaded with a chemical called sodium bicarbonate—yes, common baking soda. Before the development of modern general-purpose dry chemical, sodium bicarbonate was state of the art. Now, there is good news and bad news about sodium bicarbonate



Figure 1.5 the shape of the cylinder makes the dry chemical extinguisher easy to recognize. Instructions for use and type of fire to use it on are printed on the label.

extinguishers. The bad news: sodium bicarbonate is not effective enough on Class A fires to carry an A rating, so the label will be marked with a blue "BC" (**Figure 1.6**). This will not be a problem if you are only dealing with liquids on fire, but many Class B fires also involve ordinary combustibles. If you are confronted with multiple classes of burning material, then a BC rated extinguisher will only be limitedly effective. The good news is that, for use in kitchens, an extinguishing agent made of baking soda will not present nearly the hassle of a phosphate-based chemical when it's time to clean up.

A relatively new development for use on commercial kitchen fires is a product called K-Guard by Ansul. It is a specially formulated wet chemical agent that can be cleaned up with soap and water, as opposed to the laborious process of cleaning up general-purpose dry chemical. This agent is specifically designed for cooking grease fires (Class K) and extinguishes the fire by forming an airtight film over the burning material. Because it is a wet agent, K-Guard also incorporates a cooling factor that helps prevent reignition, which has always been a problem with dry chemical extinguishing agents. This agent is a liquid that only carries an AK rating, so don't use it on an energized electrical fire (Class C), flammable liquids (Class B), or combustible metal (Class D) fires.

Those of you who work in the restaurant business have probably seen these extinguishers. They look like the short, pressurized water extinguisher shown in figure 1.3. Make sure you read the labels on the extinguishers in your workplace so you will be sure of the type of agent each one employs and the range of that agent. I recently saw a small domestic kitchen extinguisher that was charged with K-Guard, and I think this agent would be a good addition to your home firefighting arsenal. But don't get rid of that dry chemical extinguisher; you still need something with a BC rating.



Figure 1.6 Sodium bicarbonate extinguishers do not carry an A rating.

A couple of less commonly known extinguishing agents are carbon dioxide (CO_2) and Halon 1211. CO_2 is an inert, heavier-than-air gas that displaces air from the burning zone and smothers the fire. The gas is stored in a very heavy steel cylinder under about 900 pounds of pressure. When CO_2 is released from the extinguisher, it expands dramatically and becomes very cold (hundreds of degrees below zero). You must keep your hands on the designated handle in order to avoid frost burns (**Fig. 1.7**), and you will have to get a little closer to the fire because these extinguishers don't have the range that dry chemical models have. CO_2 is another agent that only carries a BC rating (**Fig. 1.8**). The gas is also subject to dissipation. Once the gas blows away, the residual heat may cause the fire to reignite.

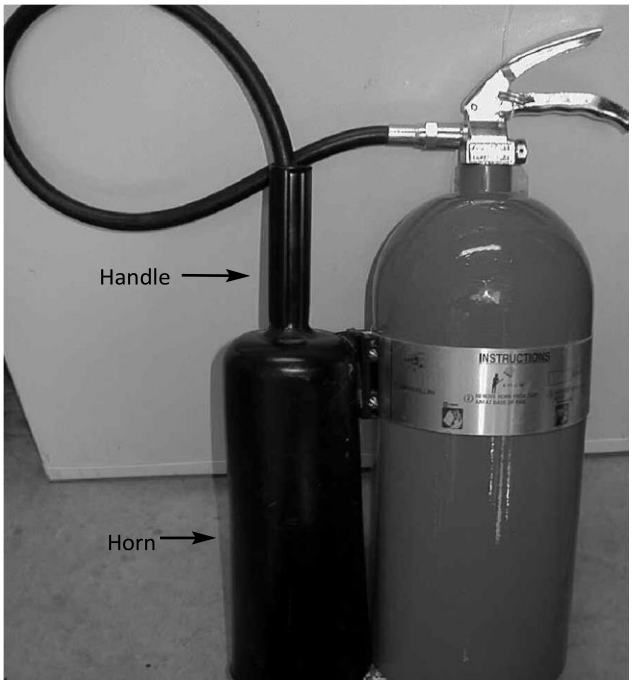


Figure 1.7 Keep your hands on the handle, not the horn, of a CO2 extinguisher.

There are two reasons why I really like CO_2. The first is convenience. Because it is a gas, it just goes away with a little airflow. There is no mess to clean up. Anyone who has ever discharged a dry chemical extinguisher will be able to see the advantage in that, especially if your fire involved electrical equipment. Secondly, CO_2 is heavier than air, meaning it will seek and pool in low places. For this reason, it is my favorite tool for engine or bilge fires on boats; you just fill the void with carbon dioxide and wait for everything to cool off. Remember, however, that CO_2 will dissipate all the oxygen from a confined space, so never use it in tight places that people have to occupy. You guys need oxygen to survive, just like the fire does.



Figure 1.8 Read the label of your extinguisher to determine the range of the extinguishing agent. Notice the pictures that show which classes of fire this agent can be used on.

The second gaseous nonconducting extinguishing agent is commonly known as Halon. The old Halon 1211 has recently been replaced by DuPont FE-36. It's pretty expensive, but if you have a lot of delicate electronic equipment such as computer servers and routers, it is the better choice because it doesn't condense moisture on the equipment. Unlike Halon, DuPont FE-36 carries a full ABC rating.

WHAT DO THE RATINGS MEAN?

Some of you may have noticed numbers assigned to the agent classification on dry chemical extinguisher labels—for example, 1A5BC, 2A10BC, or 3A40BC—and the fact that the bigger the rating numbers, the larger the extinguisher. The number in front of the A represents the ability to extinguish several cubic feet of thin wood and excelsior. 2A means it can extinguish two times the burning material, and so on. The number in front of the B *roughly* equates to the square footage of burning liquid fuel that can be extinguished by an experienced operator. It refers to burning fuel only; if a lot of hot metal or cans and drums are within the burn area, the square footage in actuality will be less than the rating figure. There will never be a number in front of the C, D or K rating. These letters simply imply that the agent is safe to use on energized electrical components, exotic metals, or grease fires.

HOW MANY EXTINGUISHERS SHOULD I HAVE?

I have often been asked, "How many extinguishers should I buy?" My personal preference is to have two multipurpose ABC extinguishers of small to mid-size, one in the house and one in the garage. I like mid-sized extinguishers because anyone can handle them, and sometimes two extinguishers work better than one, as I will talk about in the next section. In addition, I have one special-purpose model, usually a CO_2 bottle, which I can use for simple fires that can be easily extinguished without having to deal with the mess. I have a 2.5-gallon water extinguisher for cooling combustible fires, and finally I keep one 3A40BC extinguisher in each vehicle. This may seem excessive to some people, but remember the premise of this book: you are responsible for your own safety during the first seven or more days following a disaster, so you are going to need to have the right tools on hand.

EXTINGUISHER DEPLOYMENT BASICS

The methodology for using fire extinguishers is very simple. Just remember the acronym *PASS*, for Pull, Aim, Squeeze, and Sweep.

First, ***pull*** the pin. Some pins are held in place by a plastic keeper that is easy to override, while others are kept in place by a wire tie (**Fig 1.9**). If you have trouble pulling through the wire, just twist it until it breaks, then pull the pin all the way out.

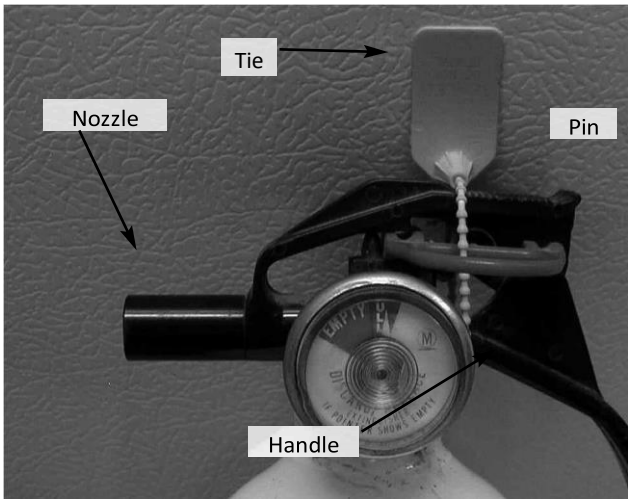


Figure 9 Extinguisher component names

Next, ***aim*** the nozzle at the base of the fire (**Fig. 1.10**). You have to hit the stuff that is on fire in order to put it out. Whether it is a liquid or solid, it will usually be on the ground. The flames shooting into the air are just burning gases and will stop as soon as you hit the burning material with extinguishing agent. Directing your extinguisher into the air at the flames will not affect the burning material on the ground. The nozzle on smaller extinguishers, such as the one shown in figure 1.9, is embedded in the head. Just point the extinguisher at the fire. If your extinguisher

has a rubber hose, you will have to hold the cylinder in one hand and aim the nozzle on the end of the hose with your other hand.

Another important step in the aiming process is keeping the wind to your back. The heat, smoke, and dry powder will all hit you if you face into the wind. Next, adjust your distance. Every extinguisher has a different effective range. The only way to know this range for sure is to read the label. If you get too close, the blast from the pressurized agent might scatter the burning material or liquid and make the fire bigger. If you are too far back, the agent might not effectively cover the fire and the fire won't go out. Read the label on your extinguisher *before* a fire starts. I have noticed that most people don't get very much information from a label when the flames in front of them are getting bigger.



Figure 1.10 Good approach: she has put the wind at her back, established the proper distance, and is aiming at the base of the fire.



Figure 1.11 Keep the cylinder vertical. Very important!

Now, slide your fingers under the handle, place your thumb on the top lever, and ***squeeze*** the top lever. You must keep the extinguisher in an upright position. If you hold it horizontally, it will discharge the gas with very little of the powder, rendering the extinguisher virtually useless (**Fig.1.11**). Finally, ***sweep*** from side to side (**Fig. 1.12**). Start by aiming low and just in front of the fire, all the time sweeping from side to side. Don't overdo it; just sweep enough to cover the material that is on fire. Then work toward the rear of the area that is on fire. If a wall is also on fire, spray up the wall from bottom to top.



Figure 1.12 Nice job!

ADDITIONAL EXTINGUISHER TIPS

Some water and carbon dioxide extinguishers are very heavy. If you are having trouble carrying the extinguisher, just drag it or if you have the time and presence of mind, transport it to the fire in a wheelbarrow or moving dolly that is stored near the heavy extinguisher. When you get to the fire, position it on the ground while holding it upright. Proceed with PASS.

It's always a good idea to have a plan B ready to deploy when you are fighting fires. When fighting fires with extinguishers, plan B is a second extinguisher manned and ready to assist. If you think one extinguisher is rated and capable of putting out the fire, then get started, but have the person with the second extinguisher stay behind you. He or she will watch for flare-ups and be prepared to move up and take over if your bottle doesn't finish the job. If you don't think your extinguisher is large enough to handle the fire, then divide the fire down the middle and deploy one person on each half. Approach side by-side and work in unison toward the rear of the fire. This method is very effective when tanks or drums are in the middle of burning liquids. Alone, you could conceivably end up chasing a fire around any object that obstructs the agent from hitting the burning liquid. With a tandem attack, you are always working the fire from two directions.

Dry chemical is not toxic, but it is very irritating to breathe. If you are outside, keep the wind to your back when deploying a dry chem extinguisher. If you are indoors, put on a dust mask after the fire is out. This powder is very fine and some will get through the mask, but it should help enough to let you work in the area comfortably. Any dry chem agent that gets on your skin should be washed off with soap and water. If it gets in your eyes, flush with plenty of plain water. It is also a terrible mess to clean up. This stuff is fine enough to go right through a shop vacuum unless it is fitted with a HEPA (high-efficiency particulate air) filter. A HEPA filter will do a pretty good job of cleaning up this powder but will not last very long before becoming plugged. If you don't have a shop vac with a HEPA filter, the only way to clean up dry powder is with wet towels and hoses. Needless to say, do not attempt to clean dry chemical from an oven using self-cleaning function.

Extinguisher Maintenance

In order for equipment to be reliable during an emergency, you must check it regularly for serviceability. Manufacturers recommend a monthly inspection to make sure the pressure registering on the gauge is in the green, the hanger is secure and the pin is in place, and the nozzle is clean and free of obstructions. If your extinguisher does not have a round pressure gauge, there will be a button on the head to check pressure. CO_2 bottles don't have pressure gauges at all—you must weight them. The empty and full weight is stamped on the side of the head (**Fig. 1.13**). Don't forget to check them often. These routine maintenance checks will also help you stay familiar with their labels, ratings, and operation.



Figure 1.13 Full and Empty weight stamped on head of Carbon Dioxide extinguisher.

There you have it…
We have gone over a tremendous amount of material, but this is one of the most important chapters. If you are going to get in trouble, it will probably be after making a bad decision about your capability or due to the limitations of your equipment. You must internalize a decision process and periodically review this chapter to be able to apply this information in the heat of an emergency. If you retain this information, you can safely and confidently handle small, early-stage fires, before they destroy your possessions or endanger your life or the lives of your family.

There is a very good free video on the internet. Short, complete and a good visual augmentation to this chapter. Go to: https://www.youtube.com/watch?v=ONUIEMSbrog

Chapter 2: Utilities

Most disasters have a dramatic impact on infrastructure and utility service. Buildings can be broken up by high winds from tornadoes or hurricanes or by blown-down trees. Underground utilities can be damaged by earthquakes or landslides. Every homeowner and employee should be familiar with the utility controls at their own property and workplace and be responsible for knowing how and when to shut them off. Prompt utility control is more than a convenience; it can make the difference between a minor short or leak and a major fire or explosion. You don't need a college degree to perform utility control, but you must understand a few basic facts about the systems. The final decision whether to act or not is yours, but before you can act, you need to know what to do.

UNDERSTANDING AND CONTROLLING YOUR GAS UTILITIES

There are two types of fuel gases commonly used for heating and cooking: propane and natural gas. Propane is a pressurized gas stored in a liquid state in heavy steel tanks, and natural gas is composed primarily of methane. Propane tanks typically service only one customer, while natural gas is distributed to several customers by a grid of underground pipes.

Propane has a very distinctive smell. If you have ever been present when they filled your tank, or your barbeque bottles for that matter, you will recognize the smell. Natural gas has little smell of its own, so the manufacturers inject an odorant into the gas so you can smell it if a leak occurs. Since propane is heavier than air, it will pool and collect in low spots and be a little harder to purge from a building. On the other hand, natural gas is close to the same weight as air and usually can be ventilated from a building by opening windows. Obviously, both of these gases are very flammable and fully capable of exploding if the right amount of air-to-gas mix finds a source of ignition such as a pilot light or the flip of an electric switch.

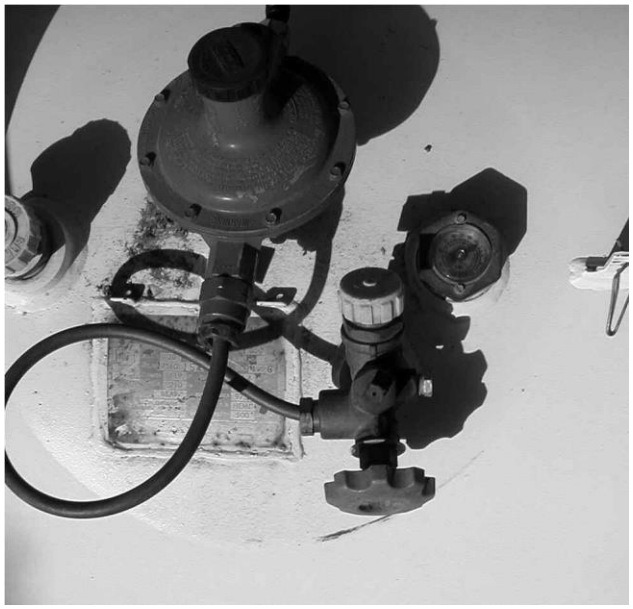


Figure 2.1 The round wheel is the main propane shut-off valve



Figure 2.2 Secondary shut-off valve on side of building.

The main shutoff valve will stop the flow of gas from the tank to the entire system (**Fig.2.1**). These valves operate like a water faucet. Close them by rotating in a clockwise direction and open them by rotating counterclockwise. Some gas systems may have a secondary shutoff

valve on the side of the building (**Fig. 2.2**). These valves are closed by turning the lever one quarter turn, or 90 degrees. If you have a propane system, go out and locate your shutoff valves, mark them, and show everyone the locations so they will know what to do if you tell them to "shut off the gas." If you suspect that your shutoff valves are corroded and not serviceable, try closing them partway. If they won't move, call your gas supplier and request service for the valve.

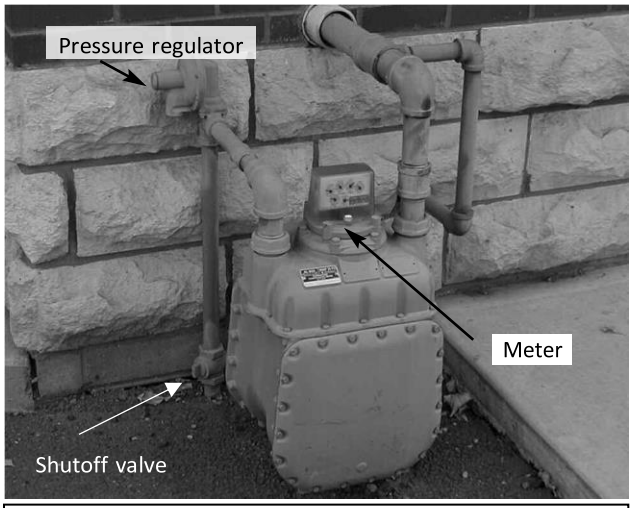


Figure 2.3 Typical natural gas meter

If you don't have a large tank on your property, you will have a gas meter and regulator like the one in (**Fig 2.3**). This means you have a natural gas system. A natural gas system works just like a propane system, but the components look different. The meter is the rectangular box with the gauges that the utility company reads every month. Gas is piped through a shutoff valve and then into a saucer shaped pressure regulator, which is connected to the meter. The shutoff valve is also a quarter-turn valve, but you will need a wrench to turn it. When the blade is in line with the pipe, the valve is open. When the blade is across the line of the pipe, the valve is closed (**Fig. 2.4**).

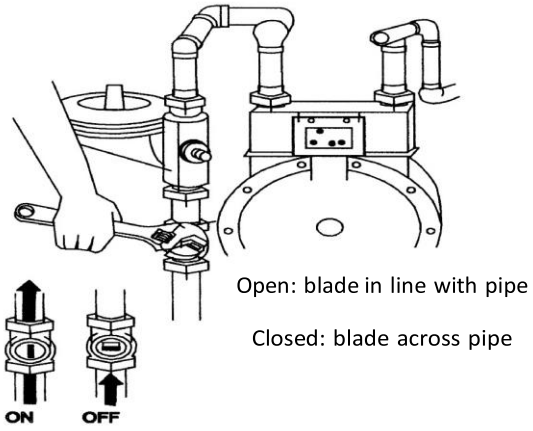




Figure 2.4 Most gas valves have a blade to indicate whether it is open or closed.

Some hardware stores sell utility shutoff wrenches that can be stored next to your meter so you don't have to go looking for a wrench while the gas continues to leak. A 12-inch adjustable wrench will work just as well. Most natural gas meters/shutoffs are located on the side of the building that they serve, but some are closer to the street within a steel post barrier (**Fig. 2.5**). If they're not in either of these locations, look around in the basement or garage.

Gas Service for Multi-unit Dwellings

Apartment houses and condominiums often have one gas meter for each unit and a separate meter for each utility/laundry room. Walk around the building and look for a bank of gas meters like the ones shown in (**Fig 2.6**). They may all be connected to one large meter or pipe. If you don't see any meters on the outside perimeter of the building, try looking in the basement, laundry room, or any open-air underground parking area. Each individual meter will be marked (at least it should be) with the unit number that it serves. Now, go find your meter. If you can't find it, wait until the meter reader makes his rounds and watch where he goes or simply ask him where it is.



Figure 2.5 Shut-off around the back of the building

Appliance Shutoff Valves

All individual gas appliances—including clothes dryers, stoves, furnaces, fireplaces, water heaters, and barbeques—have their own shutoff valves (**Fig 2.7**). The concept is simply to create redundancy in the ability to stop the flow of gas and maintain the option of not disrupting the entire system when only one appliance needs to be shut off. I'll talk more about this in a minute. Look around your home and locate and mark all the gas appliance shut-offs. Make sure everyone in your family knows their location and function. Check and make sure these valves operate freely. If they are frozen in one position, have them serviced.

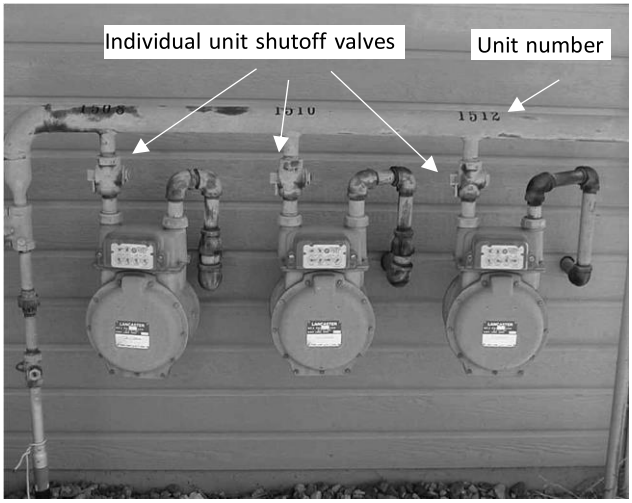


Figure 2.6 Meter's for three apartments

Safely Detecting and Controlling Leaks

Any time a building is subjected to heavy shaking, wind damage, or falling objects, its gas system should be inspected for leaks. You may not hear a minor leak, but you will smell it. The most common technique for locating a leak is to spray or brush a liquid solution onto the joints of damaged pipes and look for bubbles caused by the pressure of the leaking gas. You can also use a cup of water with a little liquid soap and a paintbrush.

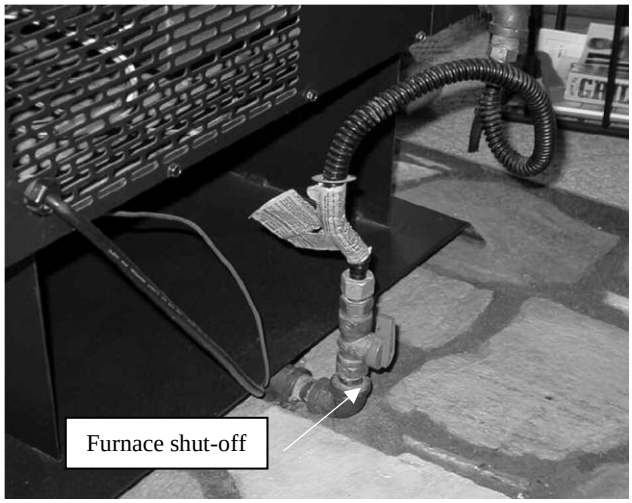


Figure 2.7 Inside appliance shut-off

When dealing with potential gas leaks, keep these five rules in mind:

RULE 1: Don't forget you are looking for a flammable gas. You need to shut off any source of

ignition that can cause a fire or explosion and evacuate any occupants from the building *before* you search for the leak. Keep in mind that all flashlights are not explosion proof. If they don't have O-rings protecting all the threaded parts, it is possible for the explosive gas to enter the flashlight and be ignited by an internal spark. Obviously, if you are contemplating lighting your way with candles or Coleman lanterns, you have not fully understood rule number one.

RULE 2: Your nose will quickly become accustomed to the smell of the gas, and then you won't smell it anymore. When you think the gas has been cleared from the building, have someone who has not been exposed to it check for noticeable odors.

RULE 3: If you can smell it, there is a leak, but it may not necessarily be coming from your property. Natural gas meters are often installed in close proximity to one another. If you smell gas but can't find the leak on your property, check the gauges on the meters that are closest to your property. One of the dials measures very small amounts of gas flow and will be spinning more than the same dial on someone else's meter. This is likely to be the leaking system and needs to be shut off. Tie a piece of flagging ribbon to the shutoff and mark the time/date with a Sharpie.

RULE 4: For those of you who have propane service, keep in mind that this gas is heavier than air and capable of drifting along the ground for a considerable distance. You might have to expand your search area to find this leak. If a tank has been knocked off its pedestal, the leak may be in a liquid state. Propane escaping the confines of its tank drops to a temperature of well below zero. Do not let this escaping liquid get on your skin; it will result in instant frost burn.

RULE 5: If gas has accumulated inside a building, you must open doors and windows to let the gas dissipate. Use any wind to your advantage by opening windows that are lined up with the direction the air is coming from. Do not use electric fans to move explosive gas atmospheres. Key word, *electric!* Once again, make sure you secure any sources of ignition such as pilot lights, electric motors that start automatically, or thermostats that might activate igniters as the room gets colder from the windows being open. Once you think the building has been purged of gas, have someone who has been outside walk through and see if they can smell anything. If they give it the OK, you may reoccupy the building, but don't turn the gas back on until the system has been repaired and inspected.

UNDERGROUND PIPE LEAKS

If you smell gas and have ruled out damage to your or a neighboring building's system, the leaking gas must be coming from a damaged underground pipe. You may not be able to detect a minor leak from this source, but a major leak will vibrate the ground, make a high-pitched noise from the leak location, and kick dust and small rocks into the air.

In either case, you have an emergency that needs to be handled by fire and utility personnel. High-pressure underground leaks can travel along the pipeline and come up under buildings. These leaks generate considerable static electricity, which could possibly ignite the gas without warning. Entire buildings have been reduced to rubble by these explosions. It takes special clamps to crimp the piping and a real mellow dude to dig the hole. If you suspect an underground leak, it's time to call 9-1-1.
Your job in this situation is to evacuate all people from all buildings supplied by the leaking pipe. Shut off nearby sources of ignition and stop vehicular traffic from driving through the gas cloud.

UNDERSTANDING AND CONTROLLING YOUR ELECTRICAL SERVICE

Electricity is just as dangerous as gas; hence most people have a rule that goes something like, “don’t mess with tricity.” If you don’t work in this field, that’s not a bad rule. However, I am not talking about repairing electrical systems. I am talking about isolating damaged systems so they don’t cause injury or a fire. Here are some basic guidelines so you can control your damaged electrical system.

Your Electrical System Controls

You must be able to recognize the control points on your electrical system. Most modern systems consist of one or more panels of resettable circuit breakers that are designed to interrupt the flow of electricity automatically should an overload develop.

Like your gas system, electrical panels have one main circuit breaker that controls the entire system and small individual (sometimes called local) circuit breakers that control only one small part of the system (**Fig 2.8**). They operate like a light switch. Move the breaker handle to one of two positions that are marked “on” or “off.” Their installation is standardized across the country by the National Electrical Code, and their use is similar whether you are at work or home.



Figure 2.8 A typical electrical service (breaker) panel. The widest breaker on the bottom is marked “main” and will shut off all the remaining local beakers.

Multiple Service Panels

Some larger buildings require more complicated electrical distribution systems. The existence of multiple levels, outbuildings, heavy equipment, or remodeling may lead to the use of subpanels in addition to the main service panel. Your main panel is also known as your service entrance because it is where the wires come into the building. It will have the meter that the utility company reads every month and a main circuit breaker.

If the main service panel has several local breakers in it, it may be your only panel. But if there are only one or two local breakers, they likely feed separate subpanels somewhere in the building (**Fig 2.9**). Sometimes subpanels are labeled A, B, C, etc. Look behind doors and in closets for their presence. Multiple electrical panels really don’t change anything other than giving you one more point from which you can control your system with the quickest access and least disruption.

Loss of Power

Loss of power can be attributed to a region-wide loss of service or an individual problem within your building. The first determination to make is whether the loss is in one part of the building or the entire



Figure 2.9 If your main service panel only has a couple of breakers, you likely have subpanels within your building/s.

building. If it is the entire building, walk outside and see if the neighbors have power. If they don't, the problem is at the utility supply. You should turn off any heavy-demand appliances (dryers, heaters, and anything with an electric motor) or sensitive electronic equipment so they don't become damaged by low or high-voltages spikes when the power comes back on.

Exposed or Damaged Wiring

The next step is to walk through all the rooms in your building and look for damaged walls that have exposed or broken wiring. If a wall has moved enough to see the wires, that circuit needs to be shut off. Turn that breaker off even if there is a regional power failure. You don't want that circuit energized when the power comes back on. If the entire building is busted up, shut off the main breaker and pitch a tent until you can sort out the extent of the damage.

Smoke

It's often difficult to find the source when you smell smoke. Sometimes there will be visible smoke to help you decide which breaker needs to be shut off. If there is no visible smoke, listen for crackling or popping sounds. Look for a dark discoloration or a blistering of the paint on the walls. Gain access to the attic and look up there. If the smell still persists and you can't find the source, you have no choice but to turn off the main breaker and get some help.

Tripped Breakers

The last situation you may run into while conducting a post-disaster damage assessment of your electrical system is a loss of power to only part of your building. Go back to the breaker panel and see if any of the breakers have tripped. A tripped breaker means it has responded to an overload or short and turned itself off. You'll have to look carefully, because the handle on the breaker will barely move out of position. I usually run my finger down the row of breakers in order to feel any displacement.

If the tripped breaker corresponds with the part of the building that is without power, go back and see if you can find the cause. Let's say you find a wall lamp that has fallen and pulled the cord loose, causing a short. Unplug the lamp and go back to the breaker panel. Turn the breaker handle all the way off, and then turn it on again (the standard method to reset any tripped breaker). If it stays on, you have resolved the problem. However, if the breaker trips again, leave it off. There is something wrong within the system that needs an electrician to troubleshoot and repair.

Portable Generators

Smaller, portable generators also have a practical application during power failures. People with electric water wells can maintain the use of their water service, and a few lights and a radio can make the night hours much more pleasant. Food in refrigerators or freezers can be saved not only at your home but, if you play it right, at your neighbor's as well. This goes back to the importance of communities banding together in times of crisis. Think about it: you put the generator in the back of a vehicle with a couple

heavy-duty extension cords and go door-to-door powering up everyone's refrigeration equipment to maintain just enough cooling temperature to offset food spoilage. In return, everyone gets together and shares salvaged food in a neighborhood potluck meal. By collectively sharing equipment and food, everyone stays connected, cooperative, and better nourished while waiting for services to return to normal.

For the reasons above, read your generators' owner manual. We will discuss portable operation generator safety in Part 2.

Dealing with Downed Power Lines

I once watched a downed high-voltage power line laying in a gutter melt the concrete into a puddle of molten black goo that eventually cooled into a glass-like substance. I kept that glass object on my desk for several years to remind myself that just because downed power lines are supposed to shut themselves off doesn't mean they always do. Sometimes the electrical system will try to turn itself back on in the presence of a short. The point is that any power line you see lying on the ground is potentially very dangerous.

Any time you are walking around a disaster area, be very aware of downed power lines on the street or tangled within the debris. However, if you need to move around an area where power lines are in contact with the ground, use the information presented on the free brochure to guide you through the decision process. The brochure is produced by www.edfi.org and reproduced in its entirety on the next page. It establishes guidelines for your action when faced with the three primary hazards around high voltage power lines: distance to stay away from downed power lines, how to act if your vehicle comes in contact with power lines, and how to exit the vehicle if impending danger ensues.

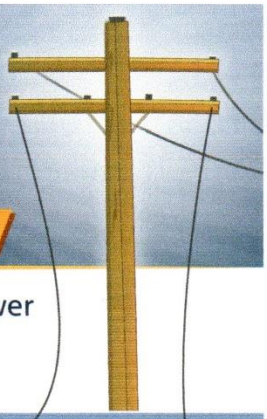
The first situation talks to how far dangerous currents can travel through the ground and cause a life-threatening shock. Add to this guideline the fact that moisture in the ground can extend the distance a shock can affect you. Secondly, energized power line can arc and jump around possibly bringing the wire dangerously closer to you.

In the old days, we were taught to use a dry rope or wooden pole to remove wires that were draped on vehicles or a person lying on the ground. The materials of those days versus the materials of today are two different beasts. Since your tools, equipment, and protective clothing might contain electrically conductive contaminates or impurities, I cannot recommend this old practice. This is a job for the electric company, which has tools designed and routinely tested for safe handling of energized power line.

Finally, if you ever become stuck in a vehicle that is in contact with a high-voltage line, stay in the car, do not touch the metal part of the body, and call 9-1-1 for rescue. If you feel you must leave the vehicle because of impending danger (such as if it is on fire), jump clear of the car and lines without touching the vehicle *and* the ground at the *same* time. Land with your feet together and shuffle at least 35 feet to safety. Keep both feet on the ground; don't pick up one foot like you would if running. The idea is to prevent the electricity from entering one foot, then having to go through your body to exit the other foot when it hits the ground.

Summarizing: A lot of this information can be obtained by taking a CERT course but few of us have the long hours for classroom instruction. If the classroom is not for you, you can build on this *immediate responder* level of information with a simple internet search. Type in "how to shut-off my gas or electricity."

ALWAYS ASSUME ALL DOWNED LINES ARE LIVE



Downed power lines can be ***deadly***. Always assume a downed power line is ***live*** and avoid approaching them or anything near them.

Use Precaution



Downed power lines can energize the ground up to **35 feet away**. Even more in wet conditions.



If you see a downed power line, **call 911**.



Never drive over downed power lines or anything in contact with them.



Never try to move a downed power line.

If a vehicle contacts a **power line** or **utility pole**...

STAY AWAY AND CALL 911



Consider **all lines** to be live and dangerous.

Stay in place or inside your vehicle unless you see **fire or smoke**.

35 ft

Warn others to stay at least **35 feet away**.

Tell others not to approach vehicle, downed lines, or anything that may be in contact with downed lines.

911

Call **911**.

In the Event of Fire or Smoke

Do not touch the ground and vehicle at the **same time**.



Jump from the vehicle with your **feet together**.



Shuffle away, avoid lifting your feet.



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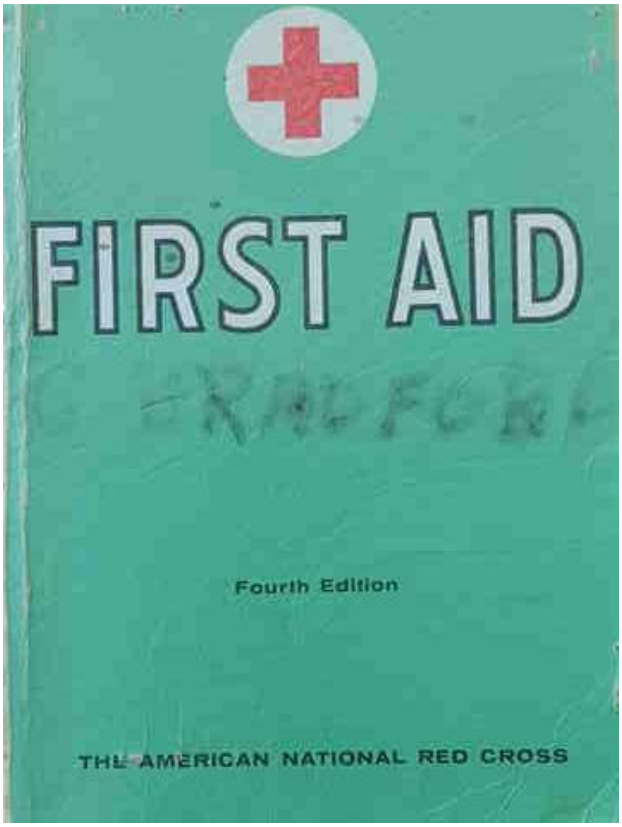
Chapter 3: First-aid and Transporting the Injured

This chapter is not intended to be a certified first aid course nor will it replace in-person first aid training. I endorse any training you have the time or money to pursue, but I also recognize that many people will not be able to take advantage of these programs. This chapter is for these people, offering the age-old concepts of *immediate first aid*.[2] It addresses the most *life-threatening* injuries that can occur following a disaster and guides you to stabilizing their condition with simple lay-person skills – buying the victim time until the they can be turned over to a professional paramedic, emergency medical technician (EMT), or doctor. I will also review methods you can use to safely transport the injured without further hurting them or yourself.



We will focus on the simplest first aid skills that will have the *most* impact. They are: (1) organize and conduct a triage when there are multiple victims (2) stop bleeding, (3) reduce shock-inducing pain by splinting broken bones or caring for burns and (4) move the injured in a fashion that reduces the likelihood of complicating back or neck injuries. When you are finished reading this chapter, you will be able to safely stabilize and if necessary, move the injured victims to safety. Further, you will be able to conduct each step using only materials found around the disaster site and a few modest first aid supplies.

If your goal is to be able to manage most *medical* emergencies not just trauma, I strongly recommend that you purchase a copy of *Emergency First Aid Fundamentals* by Michael Martin[3]. This book is very easy to read, medical terms are defined and explained as to their relevance. The old focus of the Good Samaritan and the early Boy Scouts of America have not been lost with his work. This book is written for us - the civilian Immediate Responders!

Where do you Start?

Before we get into the treatment of *specific* injuries, I want to talk about prioritizing your action when *multiple* neighbors are injured. The process is called *triage*. A focused sorting process to quickly identify which victims have life threatening injuries that need to be treated first from those whose injuries can wait without endangering their chance of survival. The process has been around since World War 1 and

[2] "First Aid is defined as the immediate and temporary care given a victim … until the services of a physician can be obtained." First Aid, ARC 1957. First edition was in 1933. This is not a new concept and it is still valid today.

[3] Second edition 2022, available through USCCA.org Emergency First Aid Fundamentals - USCCA Store (usconcealedcarry.com) by Michael Martin. The First Ed. is on Amazon but I recommend the 2nd Edition.

today is referred to by the acronym START – Simple Triage And Rapid Treatment. The beauty of this concept is that you don't need to be a doctor to triage a disaster scene. Simple observations are made for each victim, immediate life threating actions are initiated, the victim is then tagged and you move on to the next victim. It sounds complicated but taken one step at a time and with a simple organizational kit, any Immediate Responder can do this. Remember, critical lifesaving must be done within the first hour. Time starts when the event happens, not when EMS arrives. Immediate Responders not only live there but are there when the event happens. Who better to take effective initial action!

HOW TO CONDUCT TRIAGE

One of the most concise and to-the-point instruction booklets I have read is available at start.pdf (cert-la.com) This is a well-organized fire department training booklet. Reading through it will not only clarify the process of conducting triage, it will help you get an idea of how the professional emergency response will conduct their part of the operation. Read it *now* before you continue.

If your goal is to be the civilian triage specialist for you Neighborhood Amateur Messaging service (NAM), I would recommend the purchase of a ribbon dispensing pouch from Disaster Management Systems. Compact 4-Bay Triage Ribbon Dispenser (triagetags.com) This pouch-system consist of a dispenser of four different colored rolls of flagging ribbon. The colors consistent with the coding in the START system. You tear off a strip of ribbon that corresponds to the victim's condition and tie it to their arm. Use the attached grease pencil to record a hash mark on the pre-printed victim tally card. This tallied number will help you keep track of how many victims you have identified so EMS will know how much help to send you. Remember, we are conducting just the triage that will give the victim the best chance of survival while awaiting arrival of EMS. The professional emergency responders will take care of moving the victims, treating their injuries and arranging transportation to the hospital.

HOW TO FIND THE VICTIMS AFTER YOU MOVE TO THE NEXT PERSON

Unlike a single-site event, a disaster affecting a neighborhood could leave victims distributed over several blocks. When the professional EMS crews arrive, they will assign crews to package the victims you have tagged and carry them to a *treatment area*. The flagging ribbon will identify which victims need first treatment but they are going to be really hard to find these widely spaced victims, especially if it is dark. If you add a bunch of chemical light sticks (3 color pack) Triage Light Stick Combo (3 pack) (rescue-essentials.com) with a pre-attached lanyard to your triage kit, you can easily place one on a mail box or door handle to mark the location that will be visible from the street. Don't forget a headlamp for yourself.

WILL EMS TRUST YOUR JUDGEMENT?

This is a tough one. Typically, government services don't trust or like to deal with any organization that doesn't have a pocket full of certificates. You are going to have to solve this problem yourself. Get to know your fire, EMS and emergency manager. Explain the value and limitations of the Immediate Responder, especially if they don't have time to take a long CERT class. This would be a good time to inject the discussion of your Amateur Radio capability. I can't imagine any emergency manager that would not embrace free help during a disaster. Good luck

STEPS TO CONTROL BLEEDING

The first order of business will be to check for and control any free-flow bleeding. Most of the time this can be accomplished by placing a dry *dressing* over the wound and applying firm pressure for a minute or two. A dressing can be any clean (preferably sterile), absorbent material that is used to cover the wound and prevent contamination that could lead to infection. The most universal dressing is a multi-layered piece of gauze referred to as a 4 by 4 (the name referencing its size of 4 x 4 inches), these dressings come in many sizes and can be purchased in any drugstore (**Fig 3.1**). Keep lots of four-by-fours in your first aid kit. It's also a good idea to keep a pair of surgical rubber gloves in your kit to protect you against direct contact with other people's blood. Spend a few extra dollars and get the stronger, latex-free gloves to avoid complications due to latex allergies.

A *bandage* is used to hold a dressing in place and maintain even pressure over the wound. There are four basic types of bandages that can be easily applied with a little practice. Each has advantages and disadvantages. Kling (a brand name) is the easiest to work with because it adheres to itself and forms to the different contours of the body as you wrap. Apply Kling with a figure-eight wrap when you are bandaging tapered parts of the body. It is available in the first aid section of any supermarket or drugstore.



Figure 3.1 The old style of military battle dressings (left) usually have a foil liner to keep them dry. The new styles (right) are called bandage/compresses.

Roller gauze bandage is a single layer of gauze that is cut narrow in width and usually packaged in 5- to 10-yard rolls. Roller gauze does not adhere to itself like Kling, so you need to keep your figure eight wraps snug and evenly spaced. You finish a roller gauze bandage by having a second person split the bandage down the middle (long axis) for about a foot. Take the two legs and tie them with an overhand knot to prevent the slit from future tearing, then bring the two free ends (one on each side of the extremity) over the dressing and secure with a square knot.

Battle dressings come in various sizes and incorporate both the dressing and bandage in one package. You simply unfold the dressing and place it over the wound, then wrap the pre-attached bandage ties around the dressing and tie it off with a square knot **(figs 3.2–3.5).** The ties are very long, which gives the battle dressing enough versatility to be applied to just about any part of the body. The ties should be wrapped tight enough to stop the bleeding and keep the bandage in place, but not so tight as to stop the flow of blood to the rest of the limb; don't make a tourniquet out of it. If their length becomes cumbersome, cut them to a convenient length.



Figure 3.2 Pull dressing wide open. (U.S. Army illustration)



Figure 3.3 Place dressing directly over wound. Make sure the entire wound is covered. (U.S. Army illustration)

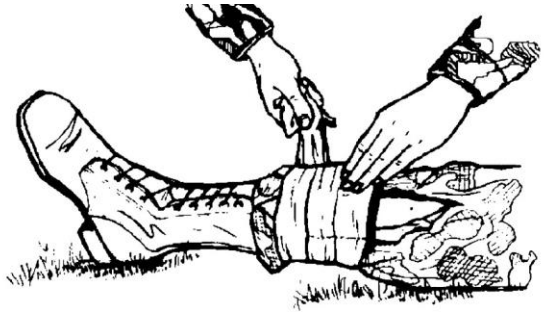


Figure 3.4 Wrap one tie around the dressing then the other tie in the opposite direction until even pressure is applied over the entire wound. (U.S. Army illustration)

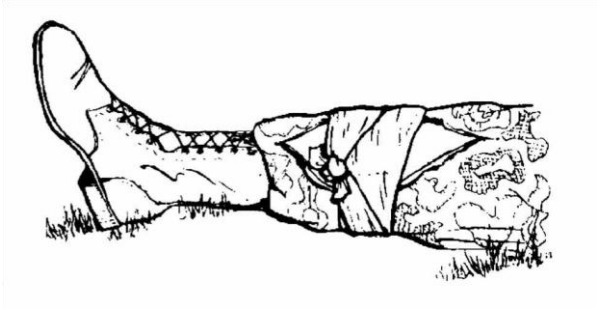


Figure 3.5 Finish the wraps with a square knot (U.S. Army illustration)

Somebody finally designed a better battle dressing. It was originally called the *Israeli bandage* and is carried by military and law enforcements worldwide. It incorporates a sterile, non-adhesive dressing with a special clip and elasticized wrap that can be applied with one hand should you need to treat yourself **(figs 3.6–3.7).** The long elastic strap makes this bandage usable on any part of the body. It can be used as a pressure bandage, a torniquet and even to immobilize broken bones. This bandage system should be in every first aid kit. Do a keyword search on your favorite search engine to locate a vendor that sells medical or sporting supplies. This site has good videos on their use www.liveactionsafety.com



Figure 3.6 Place this tension clip just passed the dressing and then reverse the wrapping direction for mor pressure. Watch the video above.



Figure 3.7 Finish the wraps buy inserting this clip under a few prior wraps to hold the end tight.

What if the bleeding doesn't stop?
If the first dressing becomes saturated with blood, do not remove it. Place another dressing over the first and try elevating the extremity above the level of the heart. Maintain pressure. Be sure to splint any broken bones before elevating an extremity. We'll talk more about splinting later.

If maintaining direct pressure while elevating the injury still does not stop the bleeding, you need to consider a new approach. There is a product called *Quik Clot* www.quikclot.com that is used by emergency first responders and military personnel to stop massive bleeding and promote coagulation. If conventional methods fail to stop the bleeding, these packets can be packed into the wound and covered with a pressure bandage. There is a specific protocol for using Quik Clot that is covered in a short downloadable *instruction sheet* (resource tab) from their website. These products have tremendous potential for saving lives when the emergency medical system is overloaded or completely out of business.

TREATING SHOCK

One of biggest immediate threats to an injured victim of trauma or psychological stress is that they can go into shock if medical care is delayed. A victim who has gone into shock has experienced a collapse of their cardiovascular system, which can result in an inadequate supply of blood to the body's tissues. There are three basic causes: damage to the heart, loss of blood volume, or dilation of the blood vessels. When the normal blood flow within the body is upset, death can result. Early recognition and proper first aid is necessary to save the casualty's life.

Events that may cause shock

- Blood loss in excess of 1 pint (if you don't know what a pint of liquid looks like on the floor, fill a measuring cup of water and pour it on the ground. Blood will cover a little less of an area.)
- Reaction to their own wounds or other traumatic sights
- Burns
- Crushing injuries
- Head injuries
- Insect or snake bites

Signs of the on-set of shock

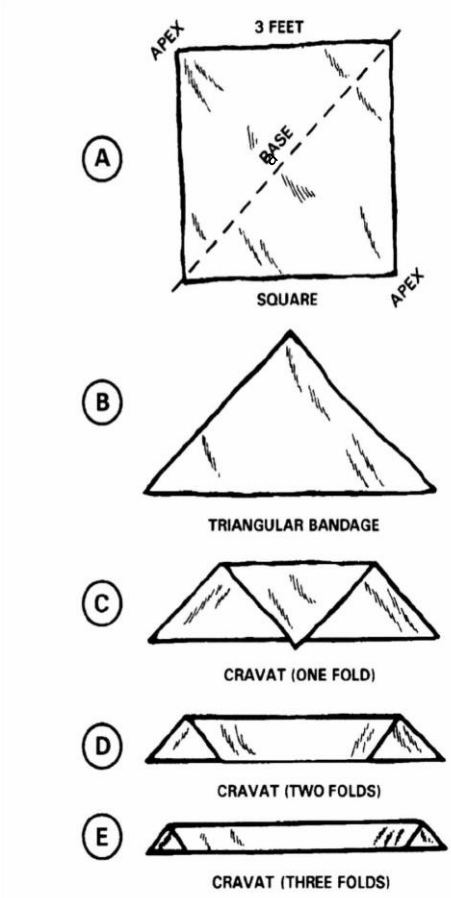
- Sweaty but cool (referred to as clammy) skin
- Weak and rapid pulse
- Paleness of skin (individuals may have a grayish look to their skin)
- Restlessness and/or nervousness
- Thirst
- Nausea or vomiting

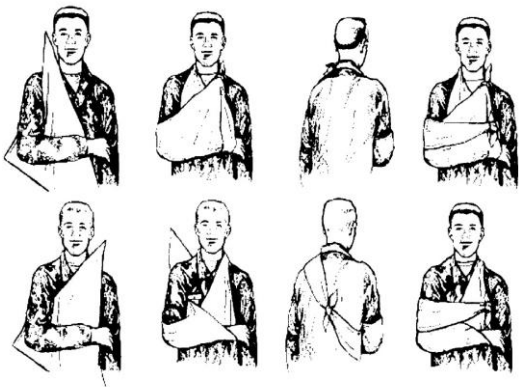
The first aid treatment for shock is identical to the procedures for preventing shock. When caring for a victim of major injuries, assume that shock is present or will occur shortly. Don't wait until the actual symptoms are noticeable.

The first step is to check the victim for any broken bones or back injuries. Splint, if necessary, then place the person on her back, preferably, on an improvised backboard or stretcher and elevate the feet about 6 to 8 inches above the heart by placing a solid object under the lower end of the board. They will not slide off the board at that height. If the victim has a chest or head wound, keep her flat on her back or whichever position of comfort that she dictates. If she is having difficulty breathing, elevate the head and chest slightly. Victims with abdominal wounds will probably find the most comfort by lying on their back with something soft propped under their knees. Loosen any constrictive clothing around the wrists or neck and remove any jewelry from swollen extremities. You must maintain a normal body temperature by adding blankets to cold victims or fanning and misting an overheated victim. Don't add heat; just maintain the normal temperature. Remember that a sign of shock is cool and sweaty skin, but if they are warm and sweaty, they might be overheated. Do not give them anything to drink even though they may complain of being thirsty. Giving liquids by mouth to a person who is in shock may lead to vomiting. Under no circumstances should you let them have coffee, alcohol, or smokes. Reassure and calm the victim, make every effort to control the pain, and allow her to rest while trying to get access to medical aid.

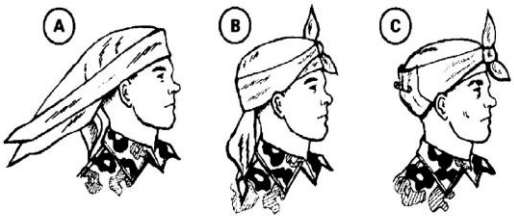
CRAVATS:

Cravats are improvised bandages made by folding triangular-shaped cloth into long, narrow ties (**Illustration A -E**) You can start with a precut triangular bandage available in most first aid kits, or fold a standard 24- to 36-inch dish cloth into a triangle. Finish the cravat by folding the triangle on its long axis until it is 3 or 4 inches wide. The number of ways that a cravat can be used in bandaging and splinting is endless, and they can be cut from just about any reasonably clean material you find at a

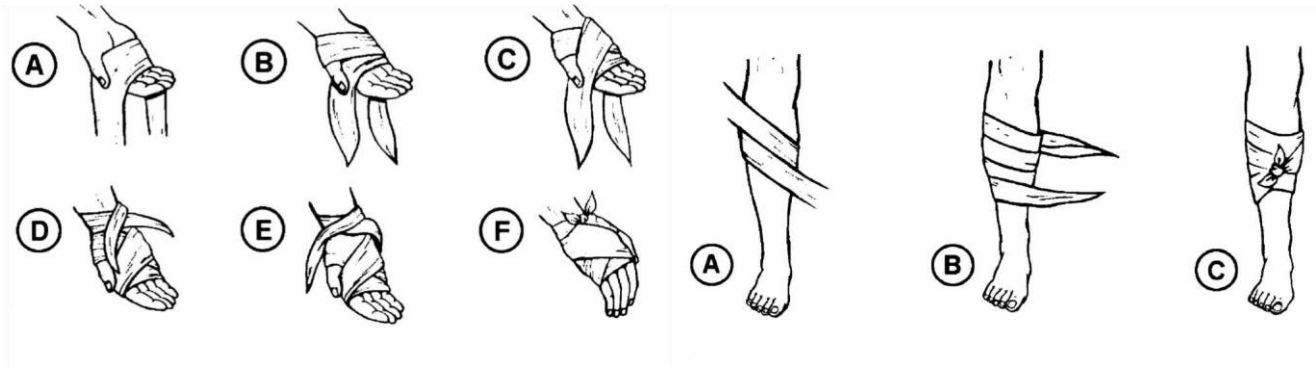




One of the most common uses of a triangular bandage is to make a sling to support an injured arm. (U.S. Army illustration)



Using a cravat to dress a head wound. (U.S.



disaster site. If you need a longer bandage to go around the chest or back, simply tie two or more cravats together. Many uses for a cravat are shown in the illustrations above.

TREATING BURNS

Burns can be very painful: cause the body to lose fluids, and are very prone to becoming infected. Any of these issues can lead to the victim going into shock. Make sure the person has been removed from the source of the burn before starting first aid treatment. Not all burns are caused by fire. If the cause is chemical, cut away any contaminated clothing and flush the site for 15 minutes. If the cause is electrical, make sure the electricity is off before touching the victim.

After that, there are two basic concerns when evaluating a burn victim: how much of the body is burned, and the degree (or depth) of the burn. When you are estimating the percentage of the body that is burned, don't forget to include both the front and back of the body. The depth of burn is divided into three degrees: first degree is a reddening of the skin (like sunburn), second degree has occurred when you see blisters, and third degree is a depth of burn that is visibly deeper into the sublayers of skin. Third-degree burn may have some blackening within the site and is often surrounded by second- or first-degree burns.

Anytime a person has been burned over 10 percent of his body with second- or third-degree burns, you need to get him to a hospital as soon as possible. The danger of shock, respiratory distress (if the head is involved, look for burned nasal hair), and serious infection are grave. The needed care is way beyond what can be provided in the field. If you don't know the location of a hospital that is operational or a field hospital, assign someone (a team of two is safer) to venture out and find one. If the roadways are in bad shape, regular vehicles might not be of any use. Try to find someone with a bicycle, dirt bike, or all-terrain vehicle (ATV) to do your recon. These vehicles are much more maneuverable and should be able to get around obstacles that a standard-sized vehicle may not.

First aid objectives

- Cool the burn
- Treat shock
- Relieve pain
- Prevent contamination and infection

The purpose of cooling a burn is to draw the heat from the deep layer of tissue. Without this treatment, a first-degree burn can extend into a second-degree burn, a second to a third, and a third can increase in area. The best method is to flush the burned area with clean, *cool* water. If running water is not available, place a plastic bag with water and some ice or snow over the site. A clean cotton sheet that has been soaked in water is also a good cooling agent. Keep the cool application on the burn for 10 to 15 minutes

or until the victim says it hurts. Keep in mind that it is going to hurt eventually, and everybody has a different threshold for pain. You have to draw the heat that is deep within the burn, but don't make the person uncomfortable in the process. If the victim shows any sign of going into shock, implement the treatment outlined in the section above.

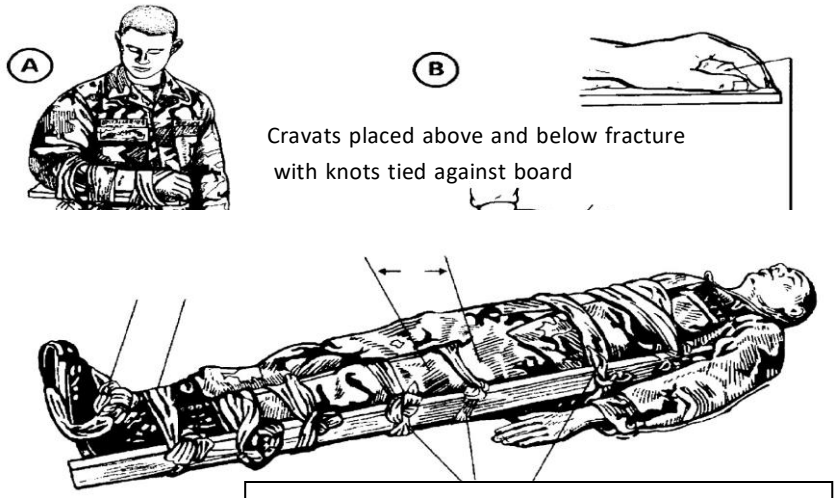
Relieving pain is one of the primary methods for reducing the onset of shock. The best way is to exclude air from the burn by applying four to six layers of clean, dry dressings. These dressings are applied dry because a wet dressing tends to stick more to the wound, which will present problems when it is time to change it. The days of putting butter or lard on a burn are long gone; use dry dressings. Laying the victim in whichever position he finds most comfortable is another way to reduce pain. Place something under the knees when you are dealing with burns to the abdomen, elevate extremities that are burned, and let them lie on their side or stomach for burns on the back.

The best way to prevent contamination and infection is to remove all contaminated clothing from the wound (cut around any that sticks) and cover the site with sterile dressings to keep it clean. If the burns are over a large part of the body, use clean dry sheets. Large wet sheets may cause Hypothermia; your victim already have enough problems. No matter which method you choose, either get the victim to a hospital or change the dressing and clean the wound daily, as described above.

I have used a gel called *Burn Free* that did a better than average job of relieving the pain and dramatically reduced the healing time of a second degree burn on my forearm. They have a full product line, from individual gel packets and sterile wound dressings to full body dressings. This gel addresses all the critical parameters for burn treatment (cooling, relieving pain, and preventing infection) in one product that is easy to store in your first aid kit. www.burnfree.com Their website also has good burn treatment information. Key word search for *Burn Free Pain Relieving Gel*.

TREATING BROKEN BONES

Broken bones are not always life threatening but they are very painful and pain can contribute to shock, which can be life threatening. So, if you see deformities or the victim complains of considerable pain at a specific point, splint that part of the body. The concept of splinting is simple: splint the extremities in the position they lie (whenever possible) and immobilize the joints above and below the break. (**Fig 3.8)**



(Fig 3.9) Splinting lower extremities can be more difficult. A full body immobilization may become necessary if lower extremities and/or pelvis are fractured in multiple locations leaving no joints to splint to.

The splint itself, can be a piece of wood, a rolled-up magazine, or some wire netting but the most versatile splinting material is cardboard. You can cut it to any length and form it into almost any shape. Pad the splint with a towel and tape it in several locations to give it stability.

Splinting lower extremities, the hip and/or pelvis will be more difficult and should be

considered a very serious injury. These injuries can cause and hide a tremendous amount of blood lose. This victim needs top priority for transportation to a trauma facility. Ambulances carry *long-boards* with multiple carrying and tiedown points. This is the best method for immobilizing lower extremity as well as cervical injuries. If pre-made long-boards are not available, you can splint these injuries with expedient material and cravats found at the scene. **Fig. 3.9**



Fig. 3.10 Expediate splint of the ankle

One of the more difficult splinting jobs you will have to deal with is the crushing of feet or knees. The best expedient item I have found is a pillow. Shape the pillow around the deformities and secure with two or three ace bandages. (**Fig 3.10)**

Don't secure the splint so tight that the victim loses circulation in the effected extremity. Continually check for circulation by pressing on any finger or toe nail until it turns white (called blanching) then release the pressure and watch for the color to come back to pink. It should happen within two seconds. If the Pink does not return, they have a circulation problem. Loosen the splint and get the victim to medical care ASAP.

BREAKS TO THE FEMUR

The thigh connects the hip to the knee with a very large bone called the femur. It is surrounded by major arteries and a very large muscle group. If this bone is broken, the muscles contract and can cause the jagged ends of the bones to tear tissue and possibly arteries. At the very least, it is very painful. The most effective treatment we can do in the field is to apply traction at the ankle. With the victim on his back, position yourself at his feet kneel down and take the effected foot in both hands Slowly increase the pulling traction. The victim's pain will be dramatically reduced when you have applied enough traction. Maintain that pressure until professional help arrives.

The treatment is just that simple but the criteria for traction is much more involved. Let's start with when *not* to use traction to treat a femur break:

- Whenever the lower leg, knee or ankle is also broken.
- When the femur break is close to the pelvis or knee. If not sure as to whether the pelvis is also affected; with your hands press on both sides – if the pressure is painful (or even just tender) don't apply traction. You'll end up with the treatment for the femur injury complicating the pelvis injury.
- If the femur break has broken through the shin.
- If *any* of these are present, immobilize the victim as shown in **Fig 3.9** and get him to a hospital.

WHEN EMS IS NOT AVAILABLE – HOW TO MAINTAIN TRACTION

If the victim has to be moved any appreciable distance, or if EMS if not readily available, I would apply an expedient traction splint to stabilize the spasmodic leg muscles and make the victim more comfortable while you move him to more advanced medical service. Try this a few times before depending on traction as a field procedure. The pictures on the next few pages should help clarify the key points.



Fig 3.11 Start a lock hitch by pulling a loop through the notch on an expedient splint.

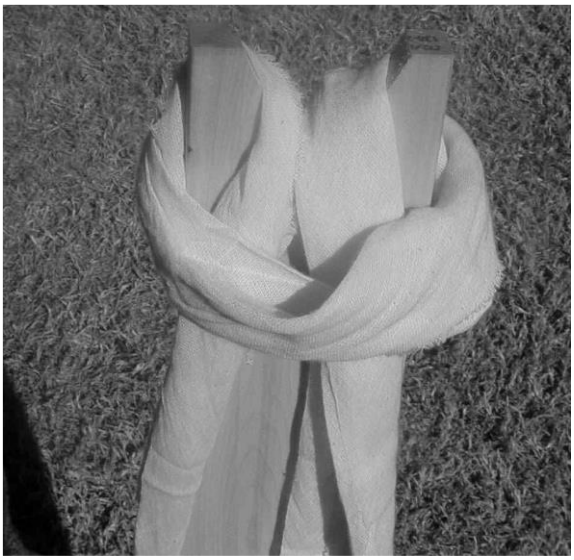


Fig 3.12 Finish the lock hitch by folding the loop back over the splint and pulling the tails of the cravat snug.



Fig 3.13 Good placement: the end of the splint is just above the hip and the knot of the cravat is on top of the thigh.



Fig 3.14 Form a cravat into a foot harness by folding it into a large overhand loop.



Fig 3.15 Notice the loop is made up of three wraps. Place one wrap *behind* the heel, one *under* the heel, and one on *top* of the foot.

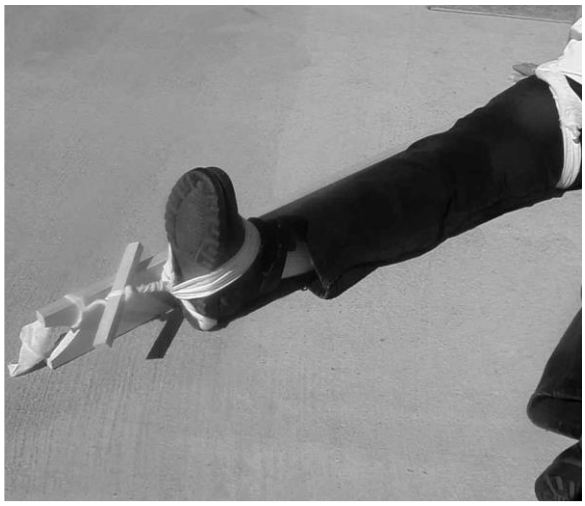


Fig 3.16 Tension the foot harness by twisting a stick between the tails of the cravat and secure the stick on-top of the splint.

CARRYING AND TRANSPORTING THE INJURED

Once you have administered immediate first aid, it's time to transport the victim to a place of safety or a medical aid station. Sometimes injured victims are relatively uninjured and simply need a ride or escort to the station. However, if your victim is seriously injured or unconscious, you will need to take some precautions so you don't complicate any existing injury during the process of moving.

It's decision time again. If you are not comfortable with your ability to move the seriously injured victim safely, it might be prudent to leave him in a position of comfort and wait for help to arrive. On the other hand, if the person is lying in a place that is potentially life threatening (e.g., threat from impending fire, further collapse, damaged utilities, inclement weather, etc.), you have no choice but to move him to safety regardless of whether or not you may complicate his injuries. If your decision is to move the victim, the medical issues you need to consider are:

- Can you keep the victim's head, neck, and back as straight as possible?
- Did you recognize and splint any broken bones before moving the victim?
- Can you move the victim without compromising his airway?

This may sound complicated, but if you implement the steps below, you can complete the transport with minimal risk to the victim. However, moving an unconscious victim presents several problems for the rescuers. To start with, most people are not strong enough to pick up a victim and throw him over his shoulder. This is why you often see news footage of untrained civilians, each with an arm or leg in hand, running through the street with the injured person's head bouncing on the ground. After considerable research, I have come to the conclusion that there are very few acceptable handles on the human body. This is particularly noticeable to the single rescuer and pretty much rules out any plan for carrying an adult or large child.

Your best options are to slide or drag the victim. Sliding is okay if you only have to move the victim a short distance. Stabilize the head with a towel or jacket, and then grab a handful of the person's shirt with one hand and his belt with the other. Lift just enough to take the victim's weight off the floor and slide a foot or two. Reposition yourself and keep doing the slide until you get where you are going. If time is the most important factor in this leg of the rescue, this maneuver is acceptable but does only a fair job of protecting the victim from further neck or back injury. Another downside to sliding is that you have to bend over the person while lifting, a position that leaves you prone to injuring your own back.

If you don't have the strength to hold onto the victims' cloths, or the victim is in a confined space that leaves you little room to grasp him, you will have to rig some form of handle. A short piece of rope tied into a loop and routed under the victims' arms and out between the shoulder blades will give a handle that will make it much easier to drag her. (**Fig 3.17)** It will also provide a cradle to support the head. The only thing that might go wrong is that the victims' arms can pull up, allowing the rope to pull over her head. If this happens, tie both hands together and secure them to the belt.



Fig. 3.17

Once you have the victim in an open area, the blanket drag is a better way to move the victim. Roll her onto her side, keeping the head straight (by a second person), then rollup half the width of the blanket under the victims back. Roll her onto the flat part of the blanket. Next, reach under the victim and unroll the part of the of the blanket against her back. Roll the corners of the blanket diagonally to form a cradle under her head and flip the rest of the blanket over her body. Using the diagonal rolls as a hand hold. Lift the head and shoulders slightly and start pulling. (**Fig 3.18)** Blanket slides are OK for short distance moves but if you have to move the victim over objects or down stairs, you will need to lift her. Depending on the strength of the rescuers and the weight of the victim, you will need at least two rescuers. The first person will support the head and shoulders and call the lift command. The second and/or third person will support the hips and legs. (**Fig 3.19)** Both rescuers line up on the same side of the victim and slide their hands midway under the victim. On the command, they lift simultaneously, first to one knee and then all the way up. The best position for the victim is carried flat but when you have to pass through tight corners or doorways, you will have to roll the victim toward you for better control. When going down stairs, position the victims' feet first to reduce her anxiety.



Figure 3.18



MOVING THE VICTIM LONG DISTANCE

It takes a lot of strength to carry a human body any appreciable distance. Having a manufactured stretcher with built-in handles helps ease the fatigue, but you probably will not have access to a stretcher. You could pull a door out of the rubble and cut it in half on the long axis with a chain saw to construct an improvised litter. This will provide a rigid and secure backboard to lay the victim on, but you still will not have any handles.

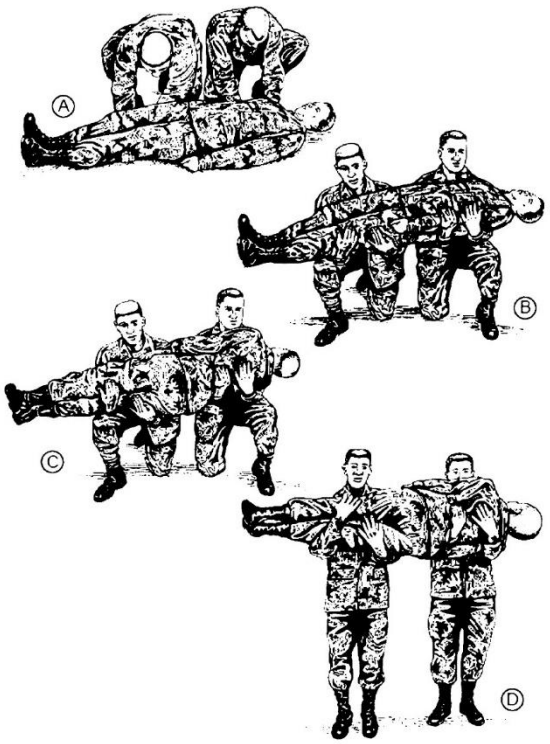


Figure 3.19 If the victim is too heavy for two rescuers to carry, use three. The rescuer at the head end of this victim should be cradling the head. (U.S. Army illustration)

What if we take that door panel and strap it to a wheelbarrow with ratchet tie-downs? The backboard can be positioned either perpendicular or parallel to the wheel, depending on the width of the obstructions you have to drive through. You can have one rescuer on each handle of the wheelbarrow, or have a single rescuer wheel while the second rests and clears debris from the path. If you are using a rescuer on each handle, make sure they are roughly the same height and that they talk to each other during the maneuver. It's really easy to tip a wheelbarrow when each handle is doing something different. It is also conceivable that you will have to tie a rope to the frame of the wheelbarrow so additional helpers can assist the haul by pulling on the rope during ascents up steep terrain. Likewise, they may have to belay your descent to prevent losing control of the victim's ride. Keep the victim's head uphill no matter which direction you are going.



Fig 3.20 Expedient knot placement. Manufactured long-boards have notches to make this much easier.

While I am on the subject of carrying people on improvised litters, we need to talk about the method of tying the victim to the board. You will need 30 feet of rope to lash an adult to a litter. **(Fig 3.20)** Start by tying one end to the wheelbarrow handle with a clove hitch. Now work down one side of the litter and over the victim to form three half hitches: one just under the arms, one at the hips, and one above the knees. Next, make a half hitch that brings the feet together and then wrap the tail of the rope under both feet and around to the opposite side of the victim. Finish the second side of the lashing by taking one turn with the remaining rope around each of the half hitches until you get back to the second handle of the wheelbarrow. Tie off with another clove hitch.

Every time you wrap the rope around the victim to form another half hitch, pull it snug and ask the person if it is too tight. Remember, he is injured, and some parts of his body are going to be sore. Use padding if you need to protect the injuries, but don't let soreness dictate a lashing job that is so loose that he will fall off the litter while being moved.

The wheelbarrow transport is pretty good for moving victims through irregular terrain, but wheelbarrows are prone to tipping and troublesome when they need to be lifted over unmovable obstructions. The ride can be pretty rough for the victim. Take it slow; it's more important for the victim to arrive in good condition than to arrive quickly.

If you have to make a long trip over open roadway or terrain, you will want to transfer the victim to the back of a station wagon, SUV, or bed of a pickup truck. Keep in mind that the back doors on a car won't open wide enough to manage a victim on a backboard.



As I stated at the beginning of this chapter, I encourage everyone to take advantage of any first aid training you can participate in. But for those who can't participate, the non-technical skills in this chapter, and very well explained in *Emergency First Aid Fundamentals*, can stabilize victims with life threatening injuries until professional help can be summoned.

Chapter 4 Neighbors Helping Family and Neighbors

Step One - First things first…

Now that all Immediate Action has been taken care of, the next critical goal will always be to get your family back together. They may be isolated because of damaged roadways, road blocks that prevent family from getting home, downed trees, flooded rivers, etc. Before radio operators can deploy to their amateur communication commitments, they must make sure that all of your family is safe and back together. This will require a pre-planned *Family Re-Unification Strategy*.

The Family Re-Unification Strategy

1. Pre-designate a meeting place with an alternate. If nothing else, any place where you know the people by first name. All family members must make every effort to get to these pre-designated locations. Consider designating a neighborhood safe-home where underage kids can safely wait until their parents get home.
2. Write these locations down in a small address book. Don't count on your phone; pretend it is lost or damaged. Family members will start looking for you at these pre-designated locations.
3. Go ahead and try to use your cell phone but don't call; send a *text messages* A text may go through when a voice call will not. Under no circumstances, try to send photos or videos over an already over-worked cellular system.
4. Make a point of carrying a small – inexpensive Family Radio Service (FRS) walkie-talkie. Example; the kids are out riding their bikes but you are not sure where. Cell service is out but two-way radios will still work.
5. Leave messages at any place you have been and the destination you are trying to get to.
6. Make every effort to move before nightfall; it will be different in the dark!
7. If you can't drive to a meeting place and you have the physical ability, walk to your meeting place. You might be surprised how far you can get on foot.

Step two - How are the neighbors doing?

Once your family has been accounted for, implement a collective of *Neighbors Helping Neighbors* (NHN). This is where getting to know your neighbors will pay-off. It can become its own reward. Identify which resources they can offer to the neighborhood recovery effort. This is not a government assistance program. The program is all yours. There are no formal organizations to join or qualify for; just get to know your neighbors and agree to be available to help each other.

Offer to help your neighbors obtain their amateur radio license if they show an interest. If they are not interested, an inexpensive FRS or GMRS walkie-talkie is a good tool for short range coordination. If you are new to radio communications and are not familiar with radios terms, refer to ***Appendix A*** for an expanded definition.

While looking over this list of NHN task, don't forget we are not rescue personnel. We are just neighbors helping neighbors. Make sure your actions are prudent and within your own capability. Divide this task into the following sub-groups:

Make the neighborhood safe – Locate and treat the injured. If the damage is catastrophic or many people are visibly injured, initiate a triage of your neighborhood as defined in Chapter 3. While the triage is being conducted, other neighbors can put out all small fires and secure or isolate your homes damaged utilities. Run flagging tape around damaged walls, tape broken windows and make sure your radio station is operational. Confine your actions to the task covered in Part 1 of this paper.

Helping the young – The very young will need shelter to protect them from the elements. Set up a temporary nursery in a neighbor's home that is not damage. Likewise, they will need food, water and care for minor injuries. Teenagers can be put to work but they will need guidance. Choose the neighbor who is to watch over the kids carefully; not everyone has a nurse or coach mentality.

Helping the elderly – The elderly may have passed their prime, but I'll bet they have been through something similar and may have some useful ideas. Move the invalids slowly and gently; they break easily. Make sure they are protected from the heat and cold. Stop by every elderly person's home in the neighborhood as often as conditions dictate. If travel is difficult between neighbors, set a time each day for all your neighbors to check-in on their FRS/GMRS radios. If they don't check-in, send someone to do a welfare check.

Able-bodied resources – Most of the people in your neighborhood will have at least one expertise that might be helpful during a disaster. While getting to know your neighbors, ask what tools and expertise they can provide while waiting for the government to respond. I expect you will find contractors, electricians, paramedics, etc. Make a list of personnel and resources.

Information sharing – You must make every effort to manage rumor. Anyone with an operational radio will hear plenty of informational reports, most will not have been confirmed. Be cautious about passing on reports from un-official sources unless you or the trusted source has personally witnessed the situations. Properly vetted, the situational information you hear on your radio may help alleviate some of the helpless feeling and pointless wandering around, often seen by victims of a disaster that have no idea what is happening. Just be cautious and confirm situational information. In **Chapter 7 & 8**, we will even discuss how to form an informational net following a EMP attack.

This takes care of the situations needing immediate action. Congratulations, you are an Immediate Responder and a valuable asset to your neighborhood. In Part 2, we will get to the work of forming a *Neighborhood Amateur Messaging* service.

Part 2 **The Neighborhood Amateur Messaging service**

The following is an excerpt of a true story of a more recent time. It's told by a radio amateur who successfully used his version of what this paper has called the Neighborhood Amateur Messaging service. When his home was impacted by Hurricane Ida [Aug. 2021] he was without communication services and thankfully uninjured. The key to his story is how the emotional stress was relieved by using this system that allows us to make a simple phone call on the victims' behalf. The most important part is that it was carried out during the <u>early</u> stages of the disaster.

When I ask him for permission to use his story, he replied: "if it helps even one other person that would be great!" Thank you for sharing your experience; we all can benefit from your story. His story follows:

I would like to thank each of you for helping to relay my traffic to my brother after hurricane Ida blew through Louisiana. I'm sure that each of you handled lots of traffic in the days after Ida so you likely don't remember me and the details. Some of the details are a little foggy to me as well.

My older brother evacuated to Memphis and I had no way other than ham radio to contact him. The three of you worked together to get his number and place a call for me. I'm not quite sure who it was that actually talked to him. If you have logs, it was the morning of August 30 [2021] around 15:30 UTC.

I was able to let him know that my family was safe and that his other brother, sister and mother were all safe as well. I was also able to ask him to bring specific supplies back with him that we needed. Without you guys and the 7290 Traffic Net [an independent traffic net], it would have been harder and taken a lot more time to get a message to him. I am truly grateful that I had you all available to pass the traffic.



On a side note, I thought you would like to see what I had to work with when contacting the net that day. I was running an IC-746PRO with an MFJ-2289 Big Ears Dipole antenna mounted to a homebrew drive on mount. A picture of the antenna and mount is attached. I was powering it with a battery and only running about 80 watts output. This is a setup that I use sometimes when activating a park as part of the Parks-On-The Air program. Heading out to parks and getting on the air definitely helped me hone my skills when it comes to operating under less-than-ideal conditions.
Again, thank you all for being there and doing what you do. Please also extend my thanks to all of those that regularly check in and act as net control. Without each of them, the net wouldn't be what it is.

Chapter 5 **Neighborhood Amateur Messaging (NAM) service**

Now that your family and neighbors are safe and secure, we can switch our focus to communications. Some of you will deploy to your various ARES commitments; thank you for helping your local government. However, this discussion is focused on the neighborhood and the many amateur radio operators who are neither willing or can't afford to go through the qualification process to assist the government; maybe they just are unable to travel to distant field assignments. These operators are experienced message handlers and can still offer a great service to their neighbors *without ever leaving their home*.

Any amateur radio operator who has maintained backup radio equipment and emergency power, has the opportunity to provide an invaluable service to his neighbors by relaying radio messages to families living outside the affected area. We need to do a better job of fully utilizing the many operators who are too old for travel, sleeping on the ground or who have no desire to get qualified to work in an EOC, a hospital or Red Cross shelter. For the purpose of this paper, we will refer to this level of service as a ***Neighborhood Amateur Messaging service*****.** Simply stated, any HAM radio operators who uses their HF (long range) radios to pass messages outside the impacted area to another HAM who will make a phone call for your affected neighbors. Its fast and doesn't put an additional burden on the National Traffic System (NTS) which normally will have *suspended* Routine and Welfare traffic anyway. This NAM service fills the gap in options available to the public while NTS is rolling out and prioritizing their efforts for assisting the government. Once NTS accepts welfare messages again, the NAM operator can route any remaining traffic into their local traffic net.

During the 2017 Hurricane season, Gulf communities and islands were hit hard leaving them without electrical power or any form of communications. While the government was getting organized, a very small group of amateur radio operators placed their radios on emergency power and were able to relay an unofficial count of some 7,000 welfare messages [4] to the continental US. Amateur Radio operators in the affected area collected messages from the victims of the disaster and relayed each one to any amateur in an un-affected part of the country who had a ***national phone calling plan*** or operational e-mail. That operator would then make the phone call to the victims' relatives and relay the message. Despite the lack of government participation, these HAMs proved that a simple system could be quick and effective at responding to the needs of the people directly impacted by the disaster.

Ideally, any NAM service operator should strive to maintain contact with a few other HAM's who are at least 300 to 400 miles away to minimize impact from long band conditions. These operators will be the predesignated relay contacts who are willing to receive your messages on frequencies not being used by the government. The good news is that the NAM service has already worked under actual disaster conditions and there is no good reason you can't incorporate it into your neighborhood strategy.

[4] QNI Newsletter 2018-4 Pg 22 https://qninewsletterdotnet.files.wordpress.com/2018/03/qni-2018-4.pdf

Another plus that few have acknowledged, is that your neighbors will not have to travel through a disaster area and stand in long lines in order to send a message to their friends and relatives. That is the beauty of the NAM service; it is conducted ***within*** your own neighborhood.

Considerations when organizing your neighborhood NAM service

1. The first step in setting up your NAM is to sit down with your neighbors and explain what you can do for them if normal communications fail. This is a no-power, no-internet, and no-cell service strategy regardless of the cause. Independent small groups are much easier to manage and require no association or government oversight. Each neighborhood will establish their own procedure for activation, collecting and distributing Reliable Outbound Welfare messages to pre-designated operators who will deliver the message.
2. The most important factor of the NAM concept will fall on your neighbors. They must have reliable contact information. This will be referred to as ***Reliable Outbound Welfare*** or ROW. Your neighbors have already written down their family meeting places in a note book during the Family Re-unification Strategy. Just add the names and current phone numbers and/or email of immediate family or friends. Have them pre-brief their family that a message handler, who they will not know, will be using your name. They will ID themselves as an Amateur Radio Operator and it's OK to talk to them. Remember, write the contact information down, assume your phone is dead, lost or damaged.
3. Instruct family to list contacts in both the east and west half of the country. Long distant circuits to one or the other may be overloaded but phone contact may be possible in the opposite side of the country. Instruct the recipient to pass the word to the whole family so your effective neighbor won't have to send multiple messages.
4. Any radio operator who intends to offer NAM service within their neighborhood should check-in with a traffic network and become trained and practiced at message handling. Disaster response requires consistent communication skills, a standardized procedure and message format.
5. Some NAM operators may not feel comfortable allowing strangers into their home. If this is a problem for you, set up your NAM in: your front yard, garage, a park, store parking lot, or school yard. Get permission before the emergency. If you decide to setup outside, it will be a good idea to provide a canopy to protect you from sun, wind and rain.
6. So, when should you power up and monitor your neighborhood radios? This is called ***activating*** the NAM service. The simplest guideline I can think of is to base your decision to active on the loss of internet, cellular service, and electricity for more than 12 hours and/or within an area of newsworthy property damage. You won't have to tell your neighbors; they have lost their service also. Just turn on the radios and talk to each other. Remember, these are battery operated devices. Don't leave them turned on all the time unless they are rechargeable and the charger has power.
7. Recognize that fatigue causes mistakes. Prevent fatigue by posting one or two-hour schedule for receiving messages from your neighbors and then get some rest in between. This could be covered when you meet with your neighbors.

8. No one can do this job by themselves. Spouses or neighbors, even if not licensed, can be trained to help neighbors fill out message worksheets for hand delivery to the radio operator. In the next section, we will expand the discussion on managing the messages.
9. While we are hitting bullet points, be mindful of safety around portable stations and antenna sights. Refer to page 47 for safe portable station checklist.
10. Most people don't like to think about disaster preparedness; after all, it may never happen. Maintain a practiced framework of NAM radio operators; have a BBQ with your neighbors, make it fun. If your neighbors show an interest, put on a live demonstration of your NAM service in action. Let them compile a demo message and send it to the relatives who may not be familiar with radiograms.
11. Print up a ***pre-event check-list***
    - ✓ Top off gasoline and oil in generators
    - ✓ Charge all batteries
    - ✓ Locate or print ROW worksheets. Keep plenty of note pads around. Don't forget printer paper, cables and power source for your printer. If outside, don't forget some paper weights.
    - ✓ Send group e-mail to pre-defined NAMS relay's that make up your NAM frame work. Let them know you may be activating your NAM and specify the time and frequency for sending messages to them. NOTE: this part is import. Have the NAM personnel framework in place and your neighbors will come when they see you taking messages. As soon as one person leaves a message, word of mouth will take it from there and they will probably come from outside your neighborhood!

NAM service operational guidelines during an emergency

At least two people (one should be female) should be present anytime the public is invited into or outside your home. The radio station itself should be in a separate location away from the public area where messages are collected. The opportunity for mistakes can be reduces by separating the radio operator from the confusion of the message collection site. Consider security and identification of station personnel. A vest with reflective stripping and maybe your club patch should help the public recognize your message handlers. Only you must decide whether you need to openly carry sidearms to protect your family, home and possessions.

Message collection away from your home

The primary focus of this program is to offer a service to your immediate neighbors. However, if you want to expand the service to surrounding neighborhoods, consider displaying a banner at your message collection site: *"Neighborhood Amateur Messaging service – radio messages to home."* Remember, get permission if you intend to operate on private or public land. These auxiliary message collection points can be coordinated by a *Local Gateway* Operator on GMRS or VHF radios, operating mobile or portable with beam antennas to extend range. Regardless of how the messaged are collected, they are then relayed to a stationary *HF Gateway* Operator who will disseminate your messages to operators outside the area impacted by the disaster. Refer to **Chapter 7** for an expanded discussion of offering your messaging service beyond your immediate neighborhood.

Manage the Messages

A very simple system for managing and tracking the NAM messages is a *hybrid paper/computer* system consisting of simple non-technical hand written paper forms for gathering information from neighbors and a standalone computer program (not dependent on the internet) for tracking the messages. If your laptops are not operational, the system can be conducted on paper alone but during a complex net, you will probably find yourself shuffling those forms to a point of frustration. The top box on the worksheet is for optional use of the form without the use of a computer. Remember, your backup computers *and* printers need alternate power and protection from damage. Do you have cables for your battery-operated printer?

Whereas a paper system is cheap, easy to learn and isn't prone to corrupted files, the computer is unquestionably faster at finding specific records. Probably more importantly is the fact that hand written notes are notoriously hard, if not impossible, to interrupt accurately during later viewing.

Most HAM's have received short messages over the air and relayed to another station. It's what we do but managing and tracking several messages can be confusing, especially if you don't apply a basic *practiced* system of receiving and sending the messages. We should also consider that your NAM service may be staffed with non-amateur helpers so, in the name of keeping the task simple, lets divide it into two basic functions. The helpers will use a paper form[5] to interview and gather information from the sending party. These forms are them handed to the radio operator who will review, log into the computer and then pass as ROW to a relay or NTS welfare traffic if they are accepting welfare traffic.

These messages should be brief and follow the guidelines of the worksheet shown in the next section. Make sure your relay operators who are receiving the message are far enough away for reliable contact during long band conditions. Make sure your relay operator knows the coverage of his National or toll-free calling phone plan so he doesn't take messages that he will have to pay for.

The goal is to provide a simple channel for disaster victims to get news to their friends and relatives. The fact that they are sending the message implies that the news is relatively good. However, we are not trained, have no way to confirm, and are not authorized to deliver bad news. Refer that job to the Red Cross and/or law enforcement.

[5] If your assistant is *practiced* with the radiogram and the flmsg software, they could input the initial contact information directly into their own laptop and then save the file on a flash drive, in a pending folder. The radio operator will then review and post the message. Save time and steeps anywhere you can.

FIRST CONTACT - A PAPER WORKSHEET

This is a single-page form designed to be hand filled by the NAM assistant who has been briefed on how to assist the public and obtain all the information needed to successfully pass their message. Remember, this worksheet is used to manage NAM operations to quickly and effectively pass phone messages for your neighbors; regardless of your assistant's background with radio communications. If this message is to be placed on a NTS network, send it in a formal radiogram format.

The individual originating a message must be queried as to how reliable the recipient contact information is and help the sender keep their message content *short and concise*. The standard practice for radiogram drafting is a text of 25 word or less. I am of the opinion that a little leeway is in order. Remember the intent. There could be many people wanting the use the service.

There is a space on the right side of the *sender box* for the originating sender to initial. Their initials acknowledges that the sender has reviewed the verbiage on top of the form and agrees to the content. This form will ultimately be archived in an *incident named* folder. This form is duplicated on the next page and can be printed as a word document and copied as needed.

The worksheet is also a very effective tool for periodic practice to keep your assistants familiar with using the worksheet to gather message information. Ideally, any radio operator and assistants should monitor traffic net and practice writing the messages out on paper.

*Any individual who finds themselves isolated by disaster or communication disruption may fill out this form and submit it to a **Neighborhood Amateur Messaging*** service *radio operator. Your message must contain current contact information. Your message will be passed by a volunteer licensed amateur radio operator free-of-charge. It will be passed the fastest way possible to another operator who will deliver your message in your name. We cannot be accountable if the recipient does not answer their phone, text or e-mail. There can be no guarantee of the timeliness of the delivery. We will always do the best we can for the conditions.*

Reliable Outbound Welfare Worksheet

Radiogram Tracking

Number	Precedence	HX	Station of Origin	Check	Place of Origin	Time Filed	Date

RCVD FM	**NET**	**DT/TM**
SENT TO	**NET**	**DT/TM**
DLVD TO	**DT/TM**	

T0: [Name,address,city,state,Zip]	**Misc contact info:** (If text is OK, add following to message block – "*Reply back with C"*
Phone Nu. (Is text OK?)	**Email**

Sender: [Name,address,city,state,Zip]	**Orig Misc info: (How to contact with reply?)** **Senders Initials:**
Phone Nu.	**Email**

Message [25 words or less] **Reply Message**

9/24/2021

COMPUTER MESSAGE TRACKING

Whereas the first point of contact is recorded with pencil and paper, storing messages and searching for specific information will be more effective if you use a free downloadable form editor called *flmsg.* Every NAM operator should include a laptop as part of his radio station.

Some advantages of using this database:

- Typed messages will be readable by anyone. This probably will not be the case with hand written notes. They will be placed into a modified radiogram format which any practiced message handler will be familiar with.
- The radio operator can place the message forms into a "Pending" folder until the next scheduled radio plan to send messages. All files can be stored on a flash drive in an *incident named*/*neighborhood* folder
- Computer files are easily searchable for quick recovery by message number (typically the last four digits of the recipients' phone number) or by date. This is always going to be more efficient than flipping through stacks of papers. Every program is a little different so make sure you learn how to conduct searches using *wildcards* to find specific records.
- These files are also printable as a radiogram for hand delivery or in a plaintext format for insertion into an email.
- You should also maintain a personal master message-number list (paper or Excel) for your outgoing messages so you will have ready access to the next unused message number. It's an extra step but it will make it quicker to determine how many Routine and Welfare messages you handled for your net-report.
- If a reply to the original message is routed back to the NAM, print it and post it on a bulletin board or pass it to a messenger for hand delivery. Reference the original message number in the Op-note of the reply message. There is room in the, DLVD TO, box on page two of the *computer form* to type in a reply message. Using this process will help keep the original and reply message together and easy to recover.
- Your master message number chart (Excel) can also show a column for listing reply message numbers next to the original message number and a column for show that a message has been finalized.
- Keep a formatted disk in your radio audio recorder at the ready. Slow down, this is not a contest. Detail and accuracy are more important.
- Download flmsg software and manuals free at: www.w1hkj.com

Hints for downloading *flmsg*

Flmsg is component of the NBEMS (Narrow Band Emergency Messaging System) communication package. I use flmsg as a form manager without the full fldigi modem program. So, when you get to w1hkj.com, just download flmsg. Window defender will block the download stating that the program is little-know and is a threat. Click on the *more details* link and tell Windows to download it anyway. Open the files and double click the setup file. For some helpful YouTube video's, Search *k4ref how-to video series – Fldigi/flmsg.* His videos are a little dated

and will tell you that you must download this program from the SourceForge.net web site. No longer true, you can download flmsg directly from W1hkj.com.

Why can't I just use Excel?
Excel is a massive financial spreadsheet which can also be used as a simple flat file database. Flat file means data is processed in rows and columns; it's not relational. The program is relatively simple and it's on most computers. You won't have to buy more software and the data is displayed in a table view which is easy to review with a glance. The *sort* function is effective for arranging specific information within an organized and easily viewable screen. Excel has sheet tabs across the bottom of the screen which can be changed to reflect individual tracking style. This program would be a fast and simple solution for any NAM operator who wants to use a hybrid system to track simple incident information which is not likely to produce multiple similar results.

The Excel *find* function is not as effective. The process involves multiple keystrokes and/or mouse clicks to initiate the find. If multiple files meet the find criteria you will have to click *next* until you happen by the one you are looking for. A quick way to limit the search problem is to search by the last four digits of the phone number. It will be not as likely to return multiple files.

What time is it- really?
The NTS standard is to use Zulu time on radiogram messages. I suspect this would create more confusion than not when operating in a local neighborhood NAM. Consider using 24-hour time with the designator for your local time zone. Example: 1430 CST verse 2030z.

Portable Station Safety

If you have to set up your message collection site and/or radio stion outside of your normal home, you are operating *portable.* Review this list of key-points any time you set up a portable NAM service. If you find items on this list that you are not familiar with, there are several publications in the *www.arrl.org* on-line store that cover emergency power and portable operations.

- Store fuel for generators in metal gasoline cans. Service generators away from public. Keep multi-purpose fire extinguisher on site. If you are not familiar with the extinguisher, search the internet, refer back to Chapter 1.
- First aid kits are important. You must be able to stop bleeding, splint broken bones and treat shock as a minimum. Store an Israeli bandage and some QuikClot in your first air bag. If it has been a while or you never have had any first aid training, refer back to Chapter 3.
- Tent stakes should be marked and sharp ends covered. Put flagging ribbon on low guy wires.
- Setup your portable radio station to meet Maximum Permissible Exposure (MPE) safety clearance for the highest power output you will be using. Formal calculations required if your power levels exceed:
    - Handheld FRS none
    - GMRS and UHF amateur radio >70 watts
    - VHF amateur radio's >50 watts
    - HF amateur radio's >100 watts
- Protect extension cords from tip hazards or walking damage. Make sure the cords are not too long for the load rating.
- Radio, generators and power equipment still need to be grounded.
- Protect all personnel involved from heat, wind, lightning, and cold injuries. Stay hydrated…
- Review **Chapter 6** for an overview of a portable NVIS antenna system on a telescopic mast that is quick and easy to setup and store.

Combining Power Options when the Electric Grid is Unreliable

We all use various different combinations of the: electric power grid, battery, solar, and/or generator power to keep our stations on the air. Not forgetting the need for emergency power in our home, I offer the following suggestions for emergency power utilizations to maximize the potential of each of these sources:

- Batteries, they are quick to deploy but their voltage steadily drops with use. A battery booster is critical for maintaining a constant voltage output. This will extend the length of time the battery is useful.
- Large batteries are slow to recharge. Make sure it's important before you step on the foot switch. Use low-power, NVIS antennas and a radio plan to conserve power.
- I use two deep-cycle batteries and a one solar charger. One battery is being charged and the other is powering the system. Use DC/AC power inverters to top off all laptops and cell phones. Don't forget the inverter in your car.
- Use the generator to provide AC power to the radio station and critical home appliances but not the large battery charger. It's not fuel effective to run the generator as long as it takes to charge a large battery. Refer to the third bullet point above and develop a charging schedule so every time the generator is running, you get maximum wattage for every hour of operation.
- If the *power is on but erratic;* add a backup power management charger/uninterruptible switch. You can operate on AC while you have power but if the AC fails, it will switch to batteries instantly. The new power management switches have a port for solar power to charge your deep cycle batteries while providing power to the load. Check out www.westmountainradio.com for a full line of DC power management products.

Chapter 6 A Simple and Quick Antenna

If your antennas are damaged, you will need a quick and simple replacement antenna system that you can deploy by yourself. Even if your home is un-damaged, the power may be out for an unknown time. This will make it tough to use rotors and full-power amplifiers. You are going to be portable whether you are operating from home or a store parking lot. I therefore, offer for your consideration, a very simple and quickly deployable antenna system.

Since full power into large bulky antenna's is not likely to be in the cards, we should consider deploying a NVIS antenna. Why? Because you will likely need 360-degree propagation without having to rotate the beam. To carry out the NAM's mission, you will need to make contacts within 25 to 400 miles; *reliably*. The quickest way to accomplish this is by deploying a horizontal loaded di-pole at a height of 15 18 feet. I am not going to reinvent or rehash the hundreds of books and papers that have been written on the subject of NVIS. I will show you what has worked well for me.

The goal should be to minimize the number of vertical mast and supports, keep the footprint of each leg as short as possible and above the ground where the public has access. I chose the horizontal loaded dipole on an 18-foot telescopic mast. Its quick and easy setup. This system stores in a very small package for transport and can be easily erected by one person. Refer back to *page 47* for safe portable operations.

This is a loaded di-pole which dramatically reduces the foot print of the antenna legs. The antenna is strong enough to support itself with only one mast. Therefore, there is no need to rig additional supports for the leg wires. Because the NVIS system is most effective in the horizontal orientation, there are no low-hanging wire legs or radiators. **Figure** 1 and 2.



Figure 1 - Transportable in very small package



Figure 2 - Fully Assembled still fits in small yard

With every system there are advantages and disadvantages. The advantages are: quick, easy with a small foot print. There are two disadvantages: The Banana plug connections can get wet in the rain and cause a high SWR. I called the manufacture and asked for a recommendation; they never called back so I just wrapped a thin bed of plumbers puddy to keep the connections dry. **Figure 3** shows the coax connection to the antenna. You might try to cover it with a Ziplock bag in wet weather.



Figure 3 - Banana Plug connectors are not water proof. Note horizontal holes for eye-bolt if you need to mount a FM mobile antenna on the same mast.

The center connection is designed for considerable versatility in antenna orientation. However, this system can only be used for one band at a time. You can deploy a second antenna for V/UHF contacts with a couple of eye-bolts and a dowl rod. A couple of feet of separation and they both work quite well.

The second disadvantage is that you will have to lower the antenna to physically change the length of the telescopic whips in order to obtain resonance on the new frequency. This antenna has a pretty narrow bandwidth. The best way to obtain resonance is with an antenna analyzer. You should be able to get a 50 Ohms impedance at a low SWR with the antenna raised at 14 to 18 feet. **Figure 4** Once you tune the whips, measure their length and log it in your notebook for each different frequency that you expect to use. This will make setup faster next time.



Figure 4 - 50ohms and 1.4 SWR

Chapter 7 Messages from Beyond your Neighborhood

This paper that has been focused at the neighborhood but every part of this work can be applied to a wider geographical zone consisting of several individual neighboring NAM's. However, before you take on this venture, consider the number of radio operators needed to staff this workload and how well they are organized and/or willing to work together. Remember that small individual groups are going to be much easier to coordinate and larger groups require dedication to the common goal.

How do we expand the messaging service?

Once your NAM is operational, maintain familiarity with an occasional block party or BBQ. Make it fun but don't forget to demonstrate a portable message service for everyone to watch or participate in. Lead by example and let word of mouth be the seed that germinates into other NAM's. They don't have to operate exactually the way your NAM operates, in fact they most likely will not. That's OK, the NAM service is more about objective than specific procedure.

Ideally, each NAM should have its *own distant HF contacts* to deliver their welfare messages. But what if your neighboring NAM does not have an embedded radio operator with HF capability? You can still coordinate with volunteers from all the neighboring NAM's to staff one central Local Gateway for message collection. It will be easier to list collection site time schedules and manage heavy traffic load if you have extra helpers. The messages would be input onto the ROW worksheet and relayed to a HF Gateway by radio or courier. This is a good way to use HAMs with a technician license so they can get involved with their portable FM radios and antenna's. You don't have to be licensed amateur radio operators to relay ROW messages. Several volunteer organizations such as CERT or REACT, use CB or GMRS radios to coordinate their mission operations. As long as they have reliable contact information and a way to contact the gateway operators, there is no reason they can't piggy-back onto your NAM.

Local and HF Gateways

The term gateway operator refers to a multi-tasking Ham who has an operational station with both VHF/UHF, and/or HF and sometimes a GMRS capability. The idea is for the local gateways to gather messages from their individual neighborhood NAM's on tactical or simplex frequencies. He then checks them for completeness and then during a pre-designated time (called a *radio plan*), relay the messages to the HF gateway who will relay the new messages (called *traffic*) to distant hams who has agreed to make phone calls on your neighbors' behalf.

What if a neighbor is reporting an Emergency?

While we are on the subject of expanding your operation, there is going to be a natural inclination for reporting emergencies. This is beyond the NAM concept as presented in this paper but if your local emergency manager is forward looking enough to take advantage of free resources, it could be a win-win for everybody.

It will be up to your local emergency management to appoint a trained RACES liaison operator to monitor reports from the general public. RACES stands for *Radio Amateur Civil Emergency Service*. They have to complete several federal training programs and task reviews in order to carry the RACES credential. We cannot operate on RACES frequencies but you should get to know your local RACES leaders to establish a standardized procedure for collecting NAM

situation reports. I am going to resurrect a concept that I have used in past papers which should fit well here. The concept is called a *snapshot*; a short-standardized situation reports from radio operators all over any given geographical sector. This is not door-to-door FEMA type damage assessment. It is a compilation of observations made from their own homes and used by emergency managers to determine the overall scope of the *initial* situation.

In order to be useful and easy to transmit, this snapshot report must be given in a standardized format consisting of:

- Brief weather report based on location
- Is the power on; how reliable?
- Communication status, landline, cell and internet
- Number of fires or other *priority*/*reportable* disaster related events (life endangered first)
- Signal report
- Radio plan for ROW

Chapter 8: Staying Operational Following an EMP

Let's form a Special Team of HAMs dedicated to staying technologically knowledgeable and operational following an EMP attack…

In Chapter 4 we addressed the need for situational information as an integral part of emotional support component of the NAM service. Therefore, hardening of our station equipment for EMP attack can be the final step in our Neighborhood Amateur Messaging service. I would like to see this common goal turn into a group of Super-EMP HAM's who can provide a local situational Snapshot as well as NAM messages. A high-altitude EMP attack is not focused on Blast waves and fallout contamination; it is designed to maximize geographic coverage of the pulse. Our home stations will likely be intact and operational if hardening measures have been taken. I am ready, it would be nice to have a group of EMP ready HAMs to talk to.

Now I can hear you say, if all electronics will be destroyed during an EMP event, why are we even talking about this? Simply, there is a very different philosophy about the protection measures of the 1960's Faraday cages vs. what we know today. After 60 years of research and development, there are practical steps that can be taken to keep our stations on the air. As stated, this paper is not a highly technical report on the physics of an EMP event, I'll leave that to the experts on their referenced websites. This chapter is a how-to protect your equipment and make the most of our motto: "when *all* else fails."

I hope to plant some seeds that will identify a group of operators who are willing to implement a minimum level of EMP protection for their primary station and/or backup equipment enabling them to remain operational following an EMP attack.

Steps to Implement

Basic Protection

Store *backup* (not plugged in) HF and FM radio equipment in *nested*[6] EMP bags. Include generator, power supplies, chargers, LED lighting and solar panels. Keep backup computer files on flash drives and stored in EMP bags. Use computer programs that do not need to interact with the internet. Stockpile one month of food, water and fuel. Learn how and be equipped to extinguish EMP caused fires referenced in Part 1 of this paper.

Advanced Protection

To take the protection one step farther, install AC home power suppressor on your home service entrance. A 12 VDC suppressor on the load side of the power supply serving the radio station and an inline suppressor on the incoming station coax. EMP Suppressors are now available to the public that have *less than a nano-second* response which is fast enough to prevent high voltage

[6] *Nested* is a term meaning to double protect your equipment by placing one EMP bag into another one in order to protect against the effects of the *Super* EMP E-1 burst. Key word search for *EMP bags*.

heating that can destroy fine circuitry. Exceeding military specifications, these suppressors can divert all three pulses generated by an EMP attack or CME event and provide continuous protection for routine high voltage spikes or lightning strikes. I would direct you to the *EMP Shield*[7] website. These are the guys that developed and manufacture the EMP Shield suppressor. Their website is heavily referenced and has live phone operators who are happy and capable to answer your questions.

Start by Upgrading to the Best Ground System

Inspect and/or upgrade your station ground to a single point ground using flat copper strapping, pictured below. Remove all excess wire that can act as an antenna for the EMP pulse.

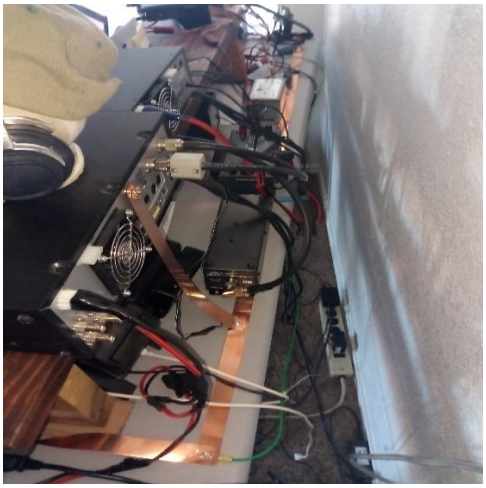




Figure 5 I removed this much excess wire from my station

Long term Emergency Power

We got through the EMP pulses and our equipment is operational but the power is off and may be off for some time. I am not going to rehash the emergency power topic that is so well covered by multiple different publications and sources. You might take a look at the web site that acknowledges a cooperative effort between *EMP Shield and Energy Technology* to develop a solar/ battery backup with EMP protection built in. If you are looking for long term power systems, especially for portable or RV use, this site is worth your time. Inergy Technologies - Power For Life (inergytek.com) The FAQ tab is very thorough. As I recommend these various web sites, I would caution that there are many different *expert* opinions on the internet; most of them conflicting. I put my faith in the one who has a courteous customer service operator who can answer your questions and point you to a reliable reference.

Reference and Additional Reading:

Dr. Peter Pry EMP Task Force, book: North Korea's Capabilities for EMP Attack 6/6/2021
Dr. Peter Pry, Blackout Warfare: Attacking the US Electric Power Grid… 8/23/2021
The Learning tab at the *EMP Shield* website

[7] EMP Shield in Kansas, designed surge suppressors that exceed military specs. The Customer Service is excellent. The site is well referenced and educational. www.empshield.com Review all the tabs.

Appendix A Glossary of Terms and Abbreviation's

Organized and trained ***Citizen Emergency Response Teams*** (CERT) will probably use FRS/GMRS radios to coordinate team activity. This is good for all the same reasons you use them. Remember the use of CTCSS tone to prevent your traffic from interfering with their traffic. All NAM service efforts are focused on family re-unification and welfare messages. If an organized CERT team exist in your neighborhood, they can focus on taking emergency action. Remember that CERT is a government support function first. If emergency messages need to be sent to the 9-1-1 center, they should be relayed through a trained CERT operator to a licensed ***Amateur Radio Emergency Service*** radio operator. Only these operators are authorized to receive and filter messages going to the local Emergency Operations Center.

Use of ***CTCSS codes:*** FRS and GMRS radios usually have provisions for using sub-audible tone squelch (CTCSS) to filter out unwanted chatter from another user on the same channel. Both radios have to be set to the same CTCSS code number for this filter to work.

Electromagnetic Pulse (EMP)[8]

A nuclear EMP is defined as having 3 distinct pulses of voltage/current. The ***E1 pulse*** is caused by the gamma rays released during the nuclear reaction. The Gamma rays interact with the electrons and the nucleus of the atoms that make up the atmosphere, and this interaction results in freeing electrons from their atoms. The free electrons ionize the atmosphere (ionization results in electron flow), which can be seen as the flow of electricity through anything that acts as an antenna. All of the wires that make up our nations' electrical grid make an excellent antenna, which will produce an over-voltage condition throughout the affected area. For an optimally positioned detonation (approximately 300 miles high and over the center of the US), the entire nation will be affected by the E1 pulse. The E1 pulse starts at the time of the detonation of the weapon and continues until 1 microsecond after the detonation.

The E-2 pulse starts at 1 microsecond and continues until approximately 1 second after the detonation. The E-2 pulse is caused by the inelastic scattering (matter bouncing off other matter) of the matter from the nuclear weapon interacting with the matter that makes up the atmosphere continuing to ionize the atmosphere.

The E-3 pulse starts at approximately 1 second after the detonation and can continue for several minutes. The E-3 pulse is caused by the nuclear detonation distorting the earth's geomagnetic structure, and then its reconfiguration. As the magnetic lines are pushed out of configuration and then come back into normal configuration, electricity is generated, and flows through the atmosphere until it contacts an antenna (wires).

[8] Frequently Asked Questions | EMP Shield From this web site. Lots to learn on this page. Written in plane – not overly technical – language.

The antenna that is most affected will be the nation's power grid, but all arrays of wiring (even in your house) will act as large or small antennas and will produce the flow of electricity and over-voltage conditions.

EMS Emergency Medical Service. This is the entire realm of professional Fire, Paramedics and Hospital public servants.

EMT Emergency Medical Technician A certified level of medic. Usually assisting the higher certified Paramedic

Family Service Radios (FRS) are simple and inexpensive walkie-talkies. They can be purchased at most hardware or sporting goods stores. You won't need an F.C.C. license or any special training to use these radios but you will need a supply of Alkaline batteries and/or a solar charger. What these radios gain in simplicity they lose in capability. There range is about ½ mile; possibly as far as 2 miles in unobstructed terrain. They are small and lightweight so you can easily put one in your car, a go-pack or clip onto your kids' belt. These little radios are the most effective communications tool for inter-family or neighborhood (NHN) coordination during an emergency.

Another radio covered under the F.C.C. Citizens Radio Service is the ***General Mobile Radio Service*** (GMRS). These radios are also readily available at Walmart and similar big box stores and only a little more expensive. The transmitter in this group of radios have higher output so they have a longer effective range. The mobile radios can also be fitted with an external antenna which will increase the range even further. They are capable of talking to any of the FRS radios that your kids and neighbors may be using. And with a little greater range, these handheld radios are a good tool for neighborhood coordination by the Local Gateway operator. Like the FRS radios, they are battery operated, so maintain your battery cache.

Because this group of radios has a higher capability, GMRS service does require licensing and adult supervision. There is no special training or test required and the one-page license form can be filled out on-line. The fee for the entire family is $70.00/10 years.

HAM is a term, more of a nick name, that refers to an FCC licensed amateur radio operator.

A ***HF Gateway Station*** is the licensed amateur radio operator who has both GMRS and higher-powered licensed amateur radios. His job is to monitor the various NAM operations on their GMRS radios and pass their collected messages to another relay operator outside the impact area for phone delivery. A gateway station can serve one single NAM or as many NAM's that are operating within the communicating range of their GMRS radios. If these operators have to set up portable stations outside their undamaged homes, they will likely be using NVIS (low to the ground) wire antenna's. Setting up and tuning this type of antenna is covered in detail in **Chapter 7**. They are very effective for using HF radios at close range with other operators.

Local Gateway Station is an individual radio operator that employs a licensed V/UHF or GMRS base station (operates from a home or other stationary location) using an external antenna to boost communication range of handheld FRS radios. The primary function is coordination of NHN and the relaying of ROW messages to a HF Gateway for the routing to a relay station. GMRS radios are inexpensive and require minimal technical radio experience to operate. For this purpose, GMRS serves the greater purpose of simplicity as compared to entry level amateur licensed radio service.

National Traffic System and Neighborhood Amateur Messaging service: NTS is a highly structured network of traffic nets that operate on a specific schedule for the purpose of routing in-bound and out-bound formal radio messages. For the purpose of this paper, NAM service is an informal process of passing messages to any operator who has phone or internet service so he can make a phone call on your behalf.

Neighbor helping Neighbor (NHN) initials used in the discussion of the second course of initial action to take following a disaster impacting your neighborhood.

Reliable Outbound Welfare: ROW is a term used to drive home the necessity of providing current contact information or message addressee in order to expedite delivery.

In radio terms, the word ***simplex*** refers to the radio sending and receiving messages on the same frequency. This very basic transmission combined with the Ultra High Frequency limits radio coverage to straight lines of sight. This makes the FRS or GMRS radio the prefect tools for short range communication because your signal will not go so far as to interfere with other neighborhood activity. There is a way to use GMRS radios trough a repeater which can extend your talk range considerably. However, it is an expensive and technical process and I recommend this approach be reserved for licensed amateur radio operators who have a level of experience to setup and use repeaters and hi-power radios.

SitRep is a common abbreviation for Situation Report.

Snapshot is the term use to identify a specific initial report from radio operators reporting from their own homes. It’s a short, concise and structured report to aid emergency managers with determining overall scope of an emergency. The term snapshot is proceeded by the geographical name of the county or sub-division.

Summing it up

The Internet and Cellular service providers will tell you that they have a fleet of mobile equipment to quickly restore communication service. They have interesting names like: COW (cellular on wheels), GOAT (generator on a trailer), SOW (satellite on wheels). All this is true but just think about the time required to: request these resources, find a technician, travel time, and time required to set up and make it operational. I don't know how many of these assets they have but during Hurricane Harvey in 2017, 364 cellular towers (95%) were damaged. It's during this time before the mobile support trailers arrive that a totally voluntary NAM service can be quickly put in service right in your own neighborhood.

Small groups are always going to be easiest to organize. This paper defines a concept that will enable the amateur community to fully utilize the many amateur radio operators who have not qualified to be a modern-day emergency communicator. These operators are still fully capable of implementing a local NAM service within their own neighborhood. Radio operators do two thing and they do it well; they improvise and deliver messages.

Implement as much or as little of this program as fits your needs and your ability. Review this paper and practice these skills often. Instinctive reactions will only come with practice. And then, the next time you hear someone say "when all else fails," Ask them if their station is EMP hardened.

I hope this paper will help you develop a service that benefits you and your neighbors. 73

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