



# THE PRINTED CIRCUIT

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By: **The Southwest Iowa Amateur Radio Club**  
a monthly newsletter all things ham radio



Greetings everyone! Well, I may have put my foot in my mouth by volunteering for this gig, but hey, it gives me something to do.

First off, I'm Rick Rodgers, KD0WDP. I hold a Technician ticket, hoping to upgrade to General soon. I have been involved in ham radio off and on since I was 14 so this makes 41 years. I love being a ham, making contacts, and working events. I've worked with the Lincoln club on several events over the last 5 years and have enjoyed all of them.

The best thing about ham radio is making new friends. You become family with your fellow hams and when they are in need, you are there for them, likewise when you are in need, they are there for you. Its the friendship, the sharing, the teaching, the learning, and getting a new ham their very first contact. This is what its all about. Not to say that we don't play an important role. We do very much. In times of emergencies such as a disaster, it can fall to us to maintain communications.

Each of us has a special skill set that we possess that can be utilized in time of need.

First order of business. The 146.820 repeater. I know it has had issues since the installation of the new equipment, however, it was said from the beginning that it would take time to complete and everyone needed to be patient. I believe they are at phase 4 of 6. They are working on everything when they have time and can coordinate getting the people, equipment, and access to what they need. One thing I want to stress is this, Paul and John are doing this on their own time and not getting paid for it. The people who keep complaining really need to take this into count. Its not fair or right to complain about something that was explained already that it would take time and would not be 100% until completed. Just think, when it is complete it will be an awesome repeater!!!

In the United States, the Federal Emergency Management Agency (FEMA) provides support to State and local governments in fulfillment of their responsibilities for preparedness, response, recovery and mitigation of disasters. One method FEMA has used to support State and local emergency communication functions was to sign and implement a Memorandum of Understanding with the American Radio Relay League (ARRL) for amateur radio operators to provide electronic communications for State and local governments in disasters.

As of 2018, The Federal Communications Commission (FCC) has licensed 750,000 amateur radio operators in the United States. The national organization of amateur radio operators called the American Radio Relay League (ARRL) was formed in 1914. More than 80,000 of these amateurs have registered their availability for emergency communications in disasters in the ARRL's Amateur Radio Emergency Service (ARES).

Amateur radio operators have been providing communications in natural disasters such as floods, hurricanes, tornadoes, wildfires, blizzards, and earthquakes since 1910. Since amateur radio operation was prohibited during the years of both World Wars I and II, FEMA has sponsored a new branch of the amateur service called Radio Amateur Civil Emergency Service (RACES). RACES operators are authorized to operate if the President invokes his War Emergency Powers while all other amateur operation would be silenced.

Some amateur radio operators in the United States communicate by sending Morse code signals, others prefer to use microphones. Some use computer-to-computer communications, while still others set up amateur television stations so that they can see the person they are talking to.

The role of amateur radio in providing emergency electronic communications for disaster management will be examined and future contributions will be explored.

The national organization of amateur radio operators, the American Radio Relay League (ARRL) (<http://www.arrl.org/>) was formed in 1914. Individuals and clubs have been involved in providing communications during disasters from the earliest days of amateur radio. Radio amateurs at the University of Michigan and Ohio State in 1913 provided emergency

communications for a Midwest area isolated by a severe windstorm. In 1935, the ARRL reorganized and formalized this type of activity by establishing its "Amateur Radio Emergency Service" and appointing amateurs all over the United States to be Emergency Coordinators. In 1949, the ARRL created its "National Traffic System". The ARRL's monthly magazine is called "QST", (Ford, 1994)

The Federal Emergency Management Agency (FEMA) (<http://www.fema.gov/>) and the American Radio Relay League signed a Memorandum of Understanding on August 3, 1984. According to this memorandum;

***"The purpose of this document is to state the terms of a mutual agreement between the Federal Emergency Management Agency (FEMA) and the American Radio Relay League (ARRL), that will serve as a framework within which volunteer personnel of the ARRL may coordinate their services, facilities, and equipment with FEMA in support of nationwide State and local emergency communications functions. It is intended, through joint coordination and exercise of the resources of ARRL, FEMA, and Federal, State and local governments, to enhance the nationwide posture of emergency communications readiness for any conceivable emergency."***

During the cold war era, civil defense planners in the Defense Department requested the Federal Communications Commission to establish a "Radio Amateur Civil Emergency Service" so that there could be special amateur radio communications during a war when normal amateur communications would be prohibited as happened throughout the war years of World Wars I and II, (FEMA, 1991).

***"The purpose of this Emergency Support Function (ESF) is to assure the provision of Federal telecommunications support to Federal, State, and local response efforts following a Presidentially declared emergency, major disaster, extraordinary situation and other emergencies under the Federal Response Plan. This ESF supplements the provisions of the National Plan for Telecommunications Support in Non-Wartime Emergencies, Hereafter referred to as the National Telecommunications Support Plan (NTSP)."***

***"Amateur Radio networks /systems may provide daily and emergency public service communications during emergencies and major disasters. The American Radio Relay League (ARRL) sponsors the combined facilities of the Amateur Radio Emergency Services (ARES) and the National Traffic System (NTS), and recognizes the Radio Amateur Civil Emergency Services (RACES) and the Military Affiliate Radio System (MARS). Other licensed amateur activities and Personal Service Radio (PSR) groups also provide public communications during emergencies and major disasters. Members of the Radio Emergency Associated Communication Team (REACT) perform similar services utilizing Citizen Band radio equipment."***

***"The purpose of this Emergency Support Function (ESF) is to coordinate efforts to provide sheltering, feeding, and emergency first aid following a catastrophic earthquake, significant natural disaster or other event requiring Federal response assistance; to operate a Disaster Welfare Information (DWI) System to collect, receive, and report information about the status of victims and assist with family reunification within the disaster areas; and to coordinate bulk distribution of emergency relief supplies to disaster victims following a disaster."***

The Salvation Army has for many years provided emergency services to individuals and groups in time of disaster. The U.S. Congress officially recognized the capabilities of the Salvation Army when it enacted the Disaster Relief Act of 1970, amended by the Disaster Relief Act of 1974, Public Law 93-288. The American Radio Relay League and the Salvation Army have signed a Statement of Understanding with respect to Disaster Services.

The American Radio Relay League signed a Memorandum of Understanding with the National Weather Service (NWS) on January 19, 1988. Radio amateurs provide emergency communications support to the National Weather Service on an as-needed basis in weather emergencies such as hurricanes, snow and heavy rain storms, and other severe weather situations,

(Hensley, 1990). The National Weather Service has a special tornado spotter service called SKYWARN. The NWS recruits volunteers, trains them in proper weather spotting procedures, and accepts the volunteers' reports during tornado watches and episodes of severe weather. Radio amateurs have assisted the NWS as communicators and spotters since the inception of the SKYWARN program, (Barton, 1991).

In order to examine the role of amateur radio in providing electronic communication for disaster management, we must first look at the way Federal, State and local government authorities handle disasters. The former civil defense organization in Washington is now called the Federal Emergency Management Agency. James Lee Witt, the emergency management director for the state of Arkansas when Clinton was governor, was appointed by President Clinton to be director of FEMA in mid 1993. In October 1993, Mr. Witt reorganized FEMA to de-emphasize civil defense and to give more emphasis to preparedness for the threats of natural disasters, such as hurricanes, floods, earthquakes, tornadoes, etc. The new FEMA has four directorates: mitigation; preparedness, training, and exercises; response and recovery; and operations support.

The United States seems to have suffered an unusually large number of different types of disasters in the past. Hurricanes, Tornadoes, Earthquakes, Wildfires, Floods, Blizzards, pandemics are all catastrophic disasters. In order to examine the role of amateur radio in support of disaster management, we will briefly review some of these large scale disasters.

Many cities, counties, and states are taking actions to invite amateur radio operators to volunteer their communication services in normal times in order to prepare for disasters. One of these cities is Martinez, California where the Chief of Police is also the Disaster Preparedness Director, (Boyd, 1991). The City Council decided to get a 30-foot motor coach and equip it as a mobile-command vehicle, called Control II. It is equipped with amateur TV, HF, VHF, SSB, and packet.

A county in Missouri has a highly active organization of ARES and RACES amateurs, (Schuchardt, 1992). The amateurs are organized much like a volunteer fire service association. They provide a mobile command post for communications support for floods, blizzards, search and rescue, hazardous chemical accidents and tornado spotting for the National Weather Service.

In order for amateur radio operators to be able to contribute their help in emergencies, the local public officials should be aware of amateur radio capabilities and limitations. A survey of mayors, city managers, and city council members attending an annual Michigan Municipal League convention disclosed that 80% had never had contact with their local ham radio group, (Turner, 1990). This indicates that amateurs should take appropriate action to educate their local authorities before some disaster occurs.

The amateur radio community has been studying disasters to investigate how they can provide emergency communications to organizations which are not as well prepared as are modern police, fire, and emergency medical units, (Boyd, 1995). Public works departments in cities and counties are key responders in large scale disasters. For example, they are becoming more involved in massive mutual aid assistance projects for debris removal and demolition of damaged structures. Many public works organizations have rather basic communications gear only usable within their home jurisdiction. This may cause problems when they are asked to respond to a different jurisdiction to furnish mutual aid. Assisting in this type of situation is an appropriate activity for amateur radio. Similarly, utility companies such as water, power, and sanitation agencies may need emergency communications assistance from amateur radio.

Both private and public transportation providers used to transport injured to medical treatment centers or evacuees to shelters may have only the most basic radio equipment. Many school busses have no radios. Amateur radio can provide two-way radio communications essential for prompt efficient assignments and coordination of transportation resources.

Hospitals may need amateur radio operators as backup communicators if the telephone system is down and cellular systems down or overloaded. In recent earthquakes and hurricanes, many hospitals have been severely damaged with large scale relocations of patients necessary. Similarly, convalescent centers and retirement homes usually only have the usual telephone service. If many of the residents are non-ambulatory, there may be an urgent requirement for amateur radio emergency communications to support patient relocation and evacuation.

Child care centers may also have tremendous problems if a disaster, such as an earthquake, were to occur when the children are there and the parents are at work. Amateur radio operators should be able to help with emergency communications. Also, many school systems may have basic communications equipment but may not be able to cope with damage to antennas and equipment after a disaster. Amateurs practice for emergencies with battery-operated gear and hastily erected antennas.

In the Midwest, Amateur Radio Operators in a vast amount of Metropolitan areas have taken on the role of certified storm spotters for their county's Emergency Management. This consists of the radio operators taking classes, and exams to be certified by the National Weather Service and Storm Prediction Center.

They are the ones who go out into the storms and watch these storms for tornadic activity, and report it back to the Emergency Operations Center, who then contacts the National Weather Service who then issues the warnings. Hams are their eyes and ears in the field, and the ones on the front line of these storms.

We do all of the above stated things without pay, and not for fame or notoriety, but because it is who we are and what Amateur Radio is all about. We humble ourselves. There is no place in ham radio for egos as it does nobody any good.

As Amateur Radio continues to grow with digital becoming more and more prevalent, and with more people getting their licenses, its a great thing to see the growth and interest.

73's

Rick R. KD0WDP

Ham Radio Outdoors  
SLA/AGM versus Lithium Go Box Batteries  
By Craig B. WONEU

There is always robust discussion between operators regarding performance of Lithium batteries versus SLA (Sealed Lead Acid) and AGM (Absorbent Glass Mat) batteries for ham radio use. Without diving into the engineering details of all battery types, this article will attempt to clarify the key elements to consider when considering batteries and costs for a Ham Radio go-box or solar power supply.

AGM and SLA batteries are both traditional sealed lead acid. In my personal use all examples including Lithium are sealed maintenance free. Below are my findings from my last two battery projects:

Weight and Performance: SLA and AGM batteries in larger Amp Hour versions (20 AH – 15 pounds, 55 AH – 43 pounds) can become extremely heavy. Also SLA/AGM batteries slowly lose voltage as they discharge and fall below 11.5 volts (safe radio voltage) at about 40-50% of their life. Hence when you have a 20 amp hour traditional battery you actually get less than 10 amp hours usable life without risk of damage to your equipment. LifePo lithium batteries on the contrary are light and expensive BUT they will consistently maintain about 12.3 volts down to about 10% of their life. Therefore a 12 AH lithium will perform longer at a safer voltage than a 20 AH SLA. Keep that size versus performance delta in mind when you compare costs.



**Example 1:**

This example is a 55 amp hour AGM in a case with an MFJ voltage booster. The booster maintains a constant 13.8 volts out and will allow you to drain the deep cycle SLA battery down to about 35% remaining charge without having a dangerous undervoltage scenario. This complete package weighs 58 pounds. The cost of this arrangement is approximately \$455.00. (55 Amp hour AGM battery \$130.00, MFJ battery booster and remote \$200.00 (I bought used \$100). Harbor Freight charger \$35.00 and Apache 4800 case \$60. With the booster you get about 65% of the battery life or 35 usable Amp Hours.  $\$455/35 \text{ amp hours} = \$13.00 \text{ per useable Amp Hour}$ .



**Example 2:**

My second example consists of two 20 Amp Hour Lifepo4 Lithium batteries in a much smaller and cheaper case. Weight of this package is 18 pounds. The cost however is similar, and the performance is much better. The lithium battery can maintain 12.3 volts out down to 10% of life WITHOUT need for a voltage booster. This arrangement provides 36 usable amp hours. The cost for this setup was \$460.00 (Two LifePo4 Batteries - \$400.00, Charger \$30.00, Apache 3800 case \$30.00). Amp Hour Cost  $\$455.00/36$  amp hours = \$12.65 per useable Amp Hour.

The bottom line is if you are going to use the full capacity of an SLA battery you need to add the cost of a good voltage booster. The additional equipment increases cost and triples weight. In the end the cost per useable amp hour between the two examples is almost exactly the same. The cost of other components in the pictures are not included as they do not directly apply to the battery comparison.

Good luck and as always do your own research regarding which batteries are best for your needs.

73 W0NEU

So, for now this should be a good start for people to digest and hopefully enjoy. Next month we will be doing a review of the Yaesu FT-818ND and antenna possibilities for it. Also up will be a review of the Anytone AT-D878UV digital/analog handheld. I hope all of you stay safe and healthy.

73s

Rick KD0WDP