

AN INTRODUCTION TO PREPAREDNESS COMMUNICATIONS

David Pruett / KF7ETX
AMP-3, LLC • PORTLAND, OREGON

www.amp-3.net

REVISED: OCT 2016



WHY NOT JUST A CELL PHONE?

- Cell phone communications are not reliable during a disaster and should not be counted on during a time of need
- Cell phones rely on an infrastructure that can get overwhelmed and shut down during high use such as during a disaster
- Personal radios and HAM radio do not rely on infrastructure and can provide reliable communications

COMMS PLAN

- A communications plan is a pre-established plan for a group / family to *maintain communications* and *obtain critical information* during a time of need
- A good communications plan allows for
- *local - regional - national communication*

NON-HAM RADIO OPTIONS

- Scanner with trunking capability
- Shortwave Radio with SSB capability
- FRS (Family Radio Service)
- GMRS (General Mobile Radio Service)
- eXRS (Extreme Radio Service)
- FHSS (Frequency Hopping Spread Spectrum)
- MURS (Multi-Use Radio Service)
- CB (Citizens Band)

SCANNERS

- Scanner allows monitoring / scanning of local communications, public safety agencies, air traffic, and HAM radio
- Trunking 800 MHz System
- OPTIONS: Handheld / Mobile / Base Station
- Consider an external *DISCONE ANTENNA* for optimal base operations

SHORTWAVE (SW) RADIO

- Shortwave Radio with SSB capability
- Important Features To Consider
 - AM / FM to monitor local stations
 - Air Band & Weather Band

- **Must have SSB**
- **External Antenna Jack**
- **External Power Jack**

DIY SW LONGWIRE ANTENNA

- **USNERDOC YouTube Video Series:**
DIY Long Wire Antenna Project
- <http://youtu.be/qE3WrYFoZCc>

FRS / GMRS / MURS / FHSS

- **FRS (Family Radio Service)**
- **GMRS (General Mobile Radio Service)**
- **Hybrid Radios (FRS/GMRS)**
- **MURS (Multi-Use Radio Service)**
- **Multiband Radios (HAM / FRS / GMRS / MURS)**
- **Frequency Hopping Spread Spectrum (FHSS) Technology**

FRS (Family Radio Service) • UHF

- **Short range personal communications**
- **Personal radio service utilizing 14 CHANNELS around 462 and 467 MHz in the Ultra High Frequency (UHF) band**
- **FRS does not suffer the interference effects found on CB (Citizen's Band) at 27 MHz**
- **FCC has limited maximum power on an FRS channel to 0.5 watts which is a maximum range of around 2 miles, often much less!**

GMRS (General Mobile Radio Service)

- **Short range line of sight communications**
- **15 GMRS channels available**
- **Requires FCC license**
- **No test required**
- **License extends privileges to immediate family**
- **Higher power limits compared to FRS**
- **Can use removable antennas**
- **Repeaters can be used to extend range**
- **GMRS RADIO - GMRS Repeater Comptible**
2 watt / 5 watt Selectable Power Settings
UHF/VHF Scanner

<http://www.amp-3.net/shop-amature-radio/btech-gmrs-v1-gmrs-two-way-radio>



FRS/GMRS Hybrid Radios

- **Both FRS & GMRS in one radio**
- **7 channels assigned by the FCC to FRS and GMRS overlap (Channels 1-7)**
- **On this type of radio, transmitting on shared FRS/GMRS channels 1-7 requires a license if using more than ½-watt**
- **Channels 8-14 are license-free FRS**
- **Channels 15-22 are GMRS and require a license**

MURS (Multi-Use Radio Service)

- **Short range communications**
- **Unlicensed VHF two-way radio service**
- **5 Channels**
- **Power output limited to 2 watts**
- **Repeaters can be used to extend range**
- **Dakota Alert Series Utilizes MURS**
- **Radio-to-Radio Communications**
- **Zone Security Monitoring**

BASIC COMMS KIT

- **Scanner with trunking capability**
- **Shortwave radio with single sideband capability (SSB) and long wire antenna**
- **Set of GMRS radios (or FRS/GMRS)**
- **HAM dual band handheld radio (2m / 70cm)**
- **Support gear to keep radios powered**
- **This basic kit can be expanded as interest and resources allow**

What is a hand held and what does dual band mean?

- **Handheld - small, lightweight portable transceiver small enough to be carried easily; also called HT for Handie-Talkie**
- **Dual Band - HT that can operate on two different Amateur Radio bands, typically the 2m / 70cm bands (VHF / UHF)**

COMMS GO-BAG

- **Carry Bag**
- **Handheld Scanner**
- **Radio (Dual Band HT)**
- **Charger with AC & DC capability**
- **Antenna**
 - **Upgraded high-gain antenna**
 - **Save original rubber duck as a back-up antenna**
 - **Roll-up J-Pole antenna**
 - **Mag mount antenna**
 - **Coax pigtail and adapter**
- **Power Capability**
 - **Extra battery**
 - **Extended battery**

- **AA battery clam shell**
- **Support Items**
 - **COMMS Plan Notebook**
 - **Notebook / Pencil / Pen / Marker**
 - **Map Set**
- **Extras**
 - **USB Drive (COMMS Plan / Freq List / PDF Manuals)**
 - **Reading glasses**
 - **Headlamp & Flashlight**
 - **Small Illuminated Digital Clock**
 - **Small Compass**
- **Optional Radio Specific Extras**
 - **Programing Cables**
 - **Speaker / Mic**
 - **Earphones**
 - **Ear Tube Speaker / Mic**
- **Insert Photo Example of COMMS GO-BAG**

HAM RADIO

What is HAM radio?

- **HAM radio (aka Amateur Radio) is a hobby enjoyed by hundreds of thousands of Americans and millions around the world who enjoy radio communication and experimentation**
- **Astronauts sent to the International Space Station (ISS) are also licensed HAMS who operate the amateur radio station (NA1SS) on board the ISS to communicate with school groups all over the world**
- **You never know who you'll run into on HAM radio - young and old, teachers and students, engineers and scientists, doctors and nurses, mechanics and technicians, kings and entertainers**

Why HAM Radio?

- Communications is ***THE MOST NEGLECTED PREPAREDNESS SKILL***
- HAM radio will allow you, your family, and your friends to ***communicate effectively*** during a disaster or difficult times
- HAM radio ***requires no infrastructure***
- HAM radio is ***portable***
- HAM radio ***works when cell towers are down***

HAM Radio License Process

- Three license classes: Technician, General & Extra
- ***Technician class license is the entry-level license***
- The higher the class of license, the more frequencies / privileges are available
- US licenses valid for 10 years before renewal
- Inexpensive and easy to obtain with minimal study

HAM Radio License Process

- **Cost For Getting a License & Getting On The Air**
 - Total cost for basic study materials and VEC exam fee is usually less than \$40
 - Once licensed, most new hams find it best to start with simple equipment and grow over time
 - Handheld VHF/UHF transceivers can be purchased for as little as \$100 new, and

- excellent used equipment is often available at lower prices at HAM swap meets
- All things considered, the cost to get the first license, radio, and get on the air should be less than \$200!

HAM Radio License Process

- Amateur radio license testing is conducted under the supervision of Volunteer Examiner Coordinators (VEC's)
- Volunteer Examiners (VE's) are amateurs holding General or Extra Class licenses who are approved by a VEC to prepare and administer amateur license examinations to applicants
- Examinations are given by teams of three qualified VEs who volunteer their time to help the amateur service grow
- There is a small examination charge (currently \$14.00)
- VEs construct written examinations from question pools that have been made public
- VEC's Question Pool Committee (QPC) develop and revise all of the question pools set cycle period

Where To Get Help and Testing Information

- Start with a local HAM club
- Do a Google search for clubs your area
- Local HAM acting as a mentor is an "Elmer"

- For more information go to:
<http://www.arrl.org/getting-licensed>

- ARRL-VEC Information
<http://www.arrl.org/volunteer-examiners>
- W5YI-VEC Information
http://www.w5yi.org/exam_locations_ama.php

TIP Study for the General Exam at the same time you are studying for the Technician Exam. If you pass the Technician Exam, you will be invited to take the General Exam at no additional charge. If you pass the General Exam, you will be invited to take the Extra Exam . . . *who knows what will happen!*

TECHNICIAN LICENSE

- Pass 35 question test
- License gives access to all Amateur Radio frequencies above 30 megahertz including the very popular 2-meter band
- Ability to communicate locally and most often within North America
- Limited privileges on HF ("short wave") bands used for international communications

GENERAL LICENSE

- Pass 35 question test and pass Technician exam
- Grants some operating privileges on all Amateur Radio bands and all operating modes
- Opens the door to world-wide communications

EXTRA LICENSE

- Pass 50 question test and pass Technician and General exams
- Grants operating privileges on all Amateur Radio bands and all operating modes

Study Resources - BOOKS

BOOKS

- **ARRL**

<http://www.arrl.org/shop/What-s-New/>

- **Gordon West**

http://www.gordonwestradioschool.com/main/page_w5yi_training_resources.html

- **HAM Radio School**

<http://www.hamradioschool.com/general-license-course-book/>

<http://www.hamradioschool.com/general-license-course-book/>

Study Resources - WEB

- **ARRL**

<http://www.arrl.org/home>

- **eHAM.net**

<http://www.eham.net/exams/>

- **HAM Radio School**

<http://www.hamradioschool.com/>

- **Gordon West Radio School**
<http://www.gordonwestradioschool.com/>
- **W5YI - VEC**
<http://www.w5yi.org/>

Study Resources - APPS - iOS (Apple iPhone / iPad)

- **Five By Five**
<http://www.fccexam.com/>
- **Exam Prep**
<http://www.patrickjmaloneyllc.com/>
- **HAM Radio School - Technician**
<http://www.hamradioschool.com/>

Some Common HAM Terms

- **73** - Best Regards
- **ELMER** - mentor; an experienced operator who tutors newer operators
- **SIMPLEX** - mode in which a radio transmits and receives on the same frequency
- **DUPLEX** - mode in which radio transmits on one frequency and receives on another
- **NET** - group of stations that meet on a specified frequency at a certain time, organized and directed by a net control station, who calls the net to order, recognizes stations entering and leaving the net, and authorizes stations to transmit
- **QSO** - two-way conversation
- **QSL** - to acknowledge receipt, also term for sending cards by mail to confirm a two-way contact with a

station

- **QRP** - low power operation, usually 5 watts output or 10 watts input power
- **CW** - Continuous Wave, in common usage refers to Morse code
- **UTC** - Coordinated Universal Time , the time (expressed in 24-hour format) at the 0-degree Meridian, which passes through Greenwich, England

SIMPLEX OPERATION (Radio-to-Radio)

National 2 meter Calling Frequency 146.52

Repeater Terms

- **REPEATER** - Remote radio that listens on one frequency and transmits on another
- **OFFSET** - In order to listen and transmit at the same time, repeaters use two different frequencies
 - 2-meter ham band frequencies are 600 kHz apart
 - If the output is below 147 MHz, then the input is 600 kHz lower referred to as a negative offset
 - If the output is above 147 MHz, then the input is 600 kHz above referred to as a positive offset.
- **PL TONE** - low frequency audio tones used to alert or control receiving stations

Fun With HAM Radio

Having fun with HAM radio is the best way to learn new skills & sharpen basic preparedness communication skills

- Satellites
- International Space Station (ISS)
- ARRL Field Day

- QSL Cards
- Home Brew an Antenna
- Inspire Someone to Become a HAM

Get Involved & Practice

Radio nets

- What is a “net”?
- Participate in a regular local “net”
- Start your own net with family & friends
- Practice with your gear!

COMMS Plan

- Develop a personal / family COMMS Plan
- SOI (Signal Operations Instruction) ***AmRRON.com***

The Courteous HAM

- No one “owns” a frequency
- All operators must cooperate in selecting transmitting channels and in making the most effective use of the amateur service frequencies
- It’s good practice and plain common sense for any operator, regardless of mode, to check to see if the frequency is in use prior to engaging operating
- If you are there first, other operators should make an effort to protect you from interference to the extent possible, given that 100% interference-free operation is an unrealistic expectation in today’s congested bands

The Amateur's Code **by Paul M. Segal / W9EEA (1928)**

The Radio Amateur is:

CONSIDERATE - never knowingly operating in such a way as to lessen the pleasure of others.

LOYAL - offering loyalty, encouragement and support to other amateurs, local clubs and the American Radio Relay League, through which Amateur Radio in the United States is represented nationally and internationally.

PROGRESSIVE - with knowledge abreast of science, a well built and efficient station, and operation beyond reproach.

FRIENDLY - with slow and patient operation when requested, friendly advice and counsel to the beginner, kindly assistance, co-operation and consideration for the interests of others. These are the hallmarks of the amateur spirit.

BALANCED - Radio is an avocation, never interfering with duties owed to family, job, school or community.

PATRIOTIC - with station and skill always ready for service to country and community.

US Amateur Radio Bands

US AMATEUR POWER LIMITS

FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

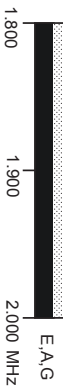
Effective Date
March 5, 2012

Published by:
ARRL AMATEUR RADIO®
www.arrl.org
225 Main Street, Newington, CT USA 06111-1494

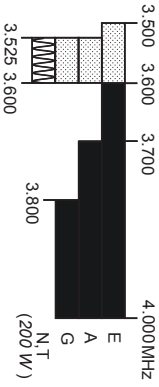


160 Meters (1.8 MHz)

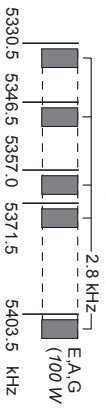
Avoid interference to radiolocation operations from 1,900 to 2,000 MHz



80 Meters (3.5 MHz)

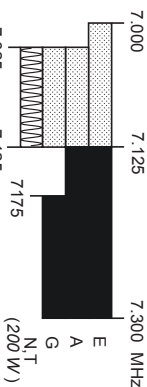


60 Meters (5.3 MHz)



General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated output of 100 W PEP. Permitted operating modes include upper sideband, voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR II as defined by the FCC Report and Order of November 18, 2011. USB is limited to 2.8 kHz centered on 5332, 5348, 5358.5, 5373 and 5405 kHz. CW and digital emissions must be centered 1.5 kHz above the channel frequencies indicated above. Only one signal at a time is permitted on any channel.

40 Meters (7 MHz)



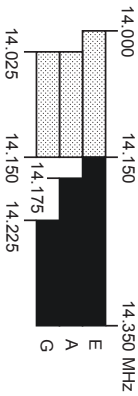
Phone and image modes are permitted between 7,075 and 7,100 MHz for FCC licensed stations in ITU Regions 1 and 3 and by FCC licensed stations in ITU Region 2 West of 130 degrees West longitude or South of 20 degrees North latitude. See Sections 97.305(c) and 97.307(f)(11).
Novice and Technician licensees outside ITU Region 2 may use CW only between 7,025 and 7,075 MHz and between 7,100 and 7,125 MHz. 7,200 to 7,300 MHz is not available outside ITU Region 2. See Section 97.301(e). These exemptions do not apply to stations in the continental US.

30 Meters (10.1 MHz)

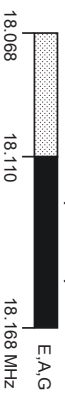
Avoid interference to fixed services outside the US.



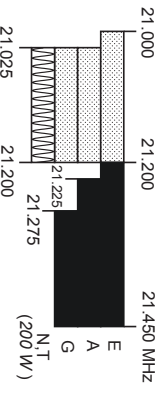
20 Meters (14 MHz)



17 Meters (18 MHz)



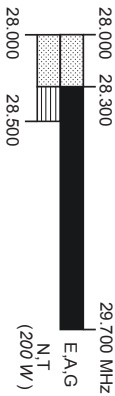
15 Meters (21 MHz)



12 Meters (24 MHz)



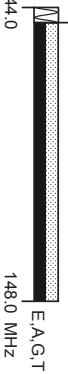
10 Meters (28 MHz)



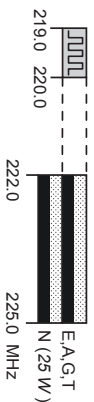
6 Meters (50 MHz)



2 Meters (144 MHz)



1.25 Meters (222 MHz)



*Geographical and power restrictions may apply to all bands above 420 MHz. See The ARRL Operating Manual for information about your area.

70 cm (420 MHz)



33 cm (902 MHz)



23 cm (1240 MHz)



All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz *	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

* No pulse emissions

KEY

Note: CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219.220 MHz. Test transmissions are authorized above 5.1 MHz, except for 219.220 MHz

- = RTTY and data
- = phone and image
- = CW only
- = SSB phone
- = USB phone, CW, RTTY, and data.
- = Fixed digital message forwarding systems only

- E** = Amateur Extra
- A** = Advanced
- G** = General
- T** = Technician
- N** = Novice

See ARRLWeb at www.arrl.org for detailed band plans.

ARRL We're At Your Service

ARRL Headquarters:
860-594-0200 (Fax 860-594-0259)
email: hq@arrl.org

Publication Orders:
www.arrl.org/shop
Toll-Free 1-888-277-5289 (860-594-0355)
email: orders@arrl.org

Membership/Circulation Desk:
www.arrl.org/membership
Toll-Free 1-888-277-5289 (860-594-0339)
email: membership@arrl.org

Getting Started in Amateur Radio:
Toll-Free 1-800-326-5942 (860-594-0355)
email: newham@arrl.org

Exams: 860-594-0300 email: ver@arrl.org
Copyright © ARRL 2012 rev. 4/12/2012

COMM PLAN POCKET CARD

IMMEDIATE ACTION PLAN following an emergency, disaster or specified event make contact with a **BRIEF SITREP**

SITREP (Situation Report)

LOCATION

CONDITION: SAFE / UNSAFE / INJURIES

WHO IS WITH YOU

WHAT IS YOUR PLAN

WHERE YOU PLAN TO GO

WHEN: NEXT CONTACT / SCHEDULE

RECOMMENDATIONS

CALL / TEXT LOCAL & DISTANT *points of contact* to activate your family comm plan

Charge phone & radio immediately and whenever power is available

Conserve power by turning off phone & radio except for scheduled comms

Turn off unnecessary device functions

Text messages will often get thru busy cell towers
Always send confirmation with the simple return message "COPY"

Contact Schedule

0600 – 0900 – 1200 – 1500 – 1800 – 2100 – 2400

AMP-3, LLC • amp-3.net • amp3@reagan.com

PHONE POINTS OF CONTACT

1.

2.

3.

4.

LOCAL
|
DISTANT

FRS / GMRS

CHANNEL #1

CHANNEL #2

HAM RADIO

SIMPLEX
CHANNEL #1

SIMPLEX
CHANNEL #2

REPEATER #1

FREQ
OFFSET
TONE

REPEATER #2

FREQ
OFFSET
TONE