Curriculum for the NET net.docx

Friday, June 23, 2017

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1. NET ARO program overview of requirements
    a. Early (circa 2012) problems that highlighted the need for NET ARO training
        i. Unfamiliarity with radio nets (resource net, directed nets, etc)
        ii. Unfamiliarity with equipment (fire station Go-Kits, Anderson powerpoles)

iii. Poor operating knowledge (ITU phonetics, message handling, protocol)

b. Walk through NET ARO requirements

c. Resources

i. PBEM web site pages (google "Portland NET Amateur Radio")

1. PBEM→ Amateur Radio→NET AROs Standards and Training
2. Link to the ARO Task List

ii. PortlandPrepares.org → Top menu →Net Resources→Radio

iii. RTLs

iv. Information on programming and using our inexpensive radios: Milkor and Chinese radio Project site

2. How do I use my radio? What can I do with it?

a. How do I use my radio? How do I program it?

i. Read the manual

ii. Watch YouTube

iii. Make or buy a cheat sheet

iv. Find your RTL: PBEM→ Amateur Radio→NET AROs Standards and Training

v. Local businesses: HRO

vi. Web sites: ARRL, QRZ, Repeaterbook.com

vii. Radio clubs, ARES meetings, ARRL Field Day

b. What can I do with it?

i. Listen to and participate in nets

1. ARRG listings (http://www.arrg.org/links.htm)
2. WORC website (http://www.worc.info/nets.htm)
3. Northwest Oregon Traffic and Training net (NTTN) traffic net (http://nttnweb.us/wp/) and other-nets-to-check-into

ii. Echolink and IRLP (internet)

iii. Digital modes

1. MMSSTV, FLDGI, RME Express, EasyPal

iv. Get involved with other NET AROs and hams through PortlandPrepares.org web site

v. Stay tuned

3. Beginner's errors

a. Not turning up the volume (open the squelch to check)

b. Not turning down the squelch (tighten it just a little after finding the break)

c. Yaesu WiRES feature turned on

d. Offset and tone, of course

e. Bad batteries

f. Not holding the antenna vertical

g. Replacing the rubber duck antenna

i. Recommend mag-mount, 5/8-λ, on cookie sheet

h. Being in a "hole"

i. Figuring out how long to hold down a button to retrieve a particular function

j. Is the deviation set too narrow?

k. Optionally, discuss trouble-shooting in module 21, below

4. What is a NET ARO to do when the balloon goes up?

a. Your Op Plan
b. PBEM and McARES frequencies and nets
c. Simplex for NET ARO
    i. Importance of mapping
    ii. Relays and relaying

5. Repeater use and net etiquette
    a. Private property: ARRG and WORC
    b. Tones, permissions, offsets
    c. Repeaterbook.com
    d. Directed (closed) vs non-directed (open, or rag-chew)
    e. Speak slowly, especially your call sign, especially if you are new
    f. Use standard ITU phonetics – don't be cute
    g. Key up before and hold key after your talk
    h. Break into a conversation with your call sign only
    i. Use your call sign after finishing your business
    j. Listen, listen, listen – Get an idea of the format of the net
    k. Keep it short – don't take control over from net control
    l. Don't worry about begin left behind – unless it is a very long check-in, the net control loves as many contacts as possible and will give you multiple opportunities to check in
    m. Doubles – how net control will handle them
    n. In the event of a disaster, repeaters are likely to be reserved for life safety and emergency communications – The repeater owners (W7PM) will ask that NET tactical operations move to simplex
    o. How to Participate in Ham Radio Nets.docx

6. What are some of the nets out there? How do I find them?
    a. ARRG website (http://www.arrg.org/links.htm) ← most complete and current
    b. WORC website (http://www.worc.info/nets.htm)
    c. NTTN (http://nttnweb.us/wp/) and other-nets-to-check-into
    d. McARES net
    e. ARES D-1 net
    f. Club nets
        i. PARC
        ii. Clark Co
        iii. Hoodview
    g. Special purpose nets: Hospital Emergency Amateur Radio Team (HEART) net, Skywarn net, YL net (WORC), astronomy net, SSTV, digital modes
        i. **HEART** *Kathleen Resburg*, KE7AJH (145.230 - Repeater, 145.390 - (100), ARRG system - Second Thursday @ 7:30 PM, 503-220-8262 x56715 w, (503) 690-7745 h)
        ii. **Skywarn** Debbie Fox, W0DSF, 8:05 PM Wednesdays, on the ARRG system (http://nworegonskywarn.info)
        iii. **Clackamas County FD-1 net,** 8:00 PM Thursday, on the WORC system

7. How to run a directed net
    a. Use a worksheet of call signs

b. Have a preamble IN LARGE TYPE
c. For more involved situations, you need a scribe!
d. Think of the exchange like the passing of the talking stick, only blindfolded
e. Make your terms and usage regular and predictable (e.g. of non-regular terms: decimal, point, dot, period, Romeo, full stop)
f. Ask the receiving station to contact the transmitting station
g. Don't talk until you have the recipient's attention
h. Use "over," use your call sign, or ask question for response. Just letting up on the key does not tell the NC or others that you have finished your transmission.
i. I'll let this drop
j. Handling doubles
    i. Stop the exchange
    ii. Announce the call signs you have heard from
    iii. Try to identify as least one call sign or part of a call sign and contact that person
    iv. Be as clear as possible as to whom you are talking
    v. As for others, using whatever identification you have
    vi. Cycle back to two until there are no stations identifying themselves as not-yet recognized

8. The Comms section of your **Neighborhood Emergency Team Operating Plan**
    a. ***Neighborhood Emergency Team (NET) Guidelines***, Appendix A, indicates that every team will develop an Operating Plan, addressing
        i. How will NET members communicate with each other immediately following a disaster?
        ii. Where is the NET Staging Area that members will deploy to? If the Staging Area is not accessible, is there a backup Staging Area and where is that?
        iii. Is there a Basic Earthquake Emergency Communication Node (BEECN) in the neighborhood?
        iv. Who will act as the Incident Team Leader at the NET Staging Area and begin delegating tasks? Who is next in line to act as Incident Team Leader if that person is not available?
        v. How will the NET intake and manage Spontaneous Unaffiliated Volunteers (SUVs)?
        vi. Are there locations in the neighborhood that pose particular problems or hazards in the event of an emergency, and what is the most appropriate way for the NET to manage or work around these hazards?
        vii. How will the NET Amateur Radio Operator (ARO) communicate with the Portland Bureau of Emergency Management's Emergency Coordination Center (ECC)?

    b. Where will the ARO Deploy?
        i. Staging Area?
        ii. Home?
        iii. Fire Station?

iv. BEECN?
v. Somewhere else, like a served agency?

c. If appropriate, how will the ARO remain in contact with the TL?
d. If multiple AROs, who is primary, and what is the protocol to replace the primary ARO? What jobs will supporting AROs have?
e. FRS/GMRS channels and PL tones (best practice is not to use PL tones)
f. Radio go-kits for ARO and FRS users – they're not that different
g. Propagation maps
h. Dealing with teams bridging multiple neighborhoods
i. Agreements and coordination with adjacent neighborhoods
j. ARO Requirements not already addressed by the NET ARO training
    i. Practice
    ii. Participation in particular nets
    iii. Membership in ARES
k. Member requirements for non-AROs: checking in with FRS, understanding ITU phonetics, tactical message handling, knowing when not to speak

9. Major types of emergency nets (Tactical, Resource, Command)
    a. Similarities
        i. All directed nets
        ii. Brevity and efficiency are of utmost importance
        iii. Understand the protocol before you need to use these for emergency communication – listen, listen, listen

    b. Tactical – The Tactical Net is the front line net employed during an incident, usually used by a single government agency to coordinate with Amateur Radio operations within their jurisdiction. There may be several tactical nets in operation for a single incident depending on the volume of traffic and number of agencies involved. Communications include traffic handling and resource recruiting.

    c. Resource – For larger-scale incidents, a Resource Net is used to recruit operators and equipment in support of operations on the Tactical Nets. As an incident requires more operators or equipment, the Resource Net evolves as a check-in place for volunteers to register and receive assignments.

    d. Command Net – As the size of an incident increases and more jurisdictions become involved in the incident, a Command Net may become necessary. This net allows the incident managers to communicate with each other to resolve inter- or intra-agency problems, particularly between cities or within larger jurisdictional areas. It is conceivable that this net could become cluttered with a high volume of traffic. It may also be necessary to create multiple command nets to promote efficiency.

    e. Open and Closed Nets – A net may operate as an open or "free form" net, or as a closed net where a net control station (NCS) is used to control the flow of transmissions on the channel. Typically, when the amount of traffic is low or sporadic, a net control isn't required and an open net is used. Stations merely

listen before they transmit. When a net is declared a "closed" net, then all transmissions must be directed by the NCS.

f. Simplex net (vs Repeater net – Half Duplex) – Stations that are in contact with net control listen for stations that net control does not recognize. I'll call these Relay stations. When net control calls for more check-ins a Relay station will indicate that they hear a station that has not been able to check in and net control will pass control of the net briefly to the Relay station to complete the transaction.

g. Repeater nets – ***Reverse*** – useful when net control is having difficulty hearing a station – you can hear them directly; ***Hearing them but*** noting they are **not breaking the repeater** and net control ignoring them – indicates operator is on simplex, i.e., offset is not set properly – relay possible

   Note there is another possible situation where Reverse can be helpful: party has offset set correctly but tone may be wrong or transmit power may not be sufficient to break the repeater – but in this case it is ***unlikely you will know about*** their situation if you are only a net participant. This is probably more helpful if you are helping a friend program their radio.

h. Described further in the ARRL ***ARES Field Manual*** and the book ***The ARRL Operating Manual for Amateur Radio Operators***

10. Basic features of a first emergency radio – HTs
    a. Low cost
    b. Handheld, 5 watts
    c. Standard manufacturer – Find out what others use (Add other models from the other documentation!!)
        i. iCom (ICT70A -$200)
        ii. Yeasu – FT60R $170, VX-6R $242, FT-2DR $400 APRES+Digital (* Built-in GPS Integral GPS receiver and antenna (located on top of the radio) provides location, time, and direction and APRS® information. * 1200/9600bps APRS® Data Communication The built-in worldwide standard AX.25 Data TNC Modem permits uncomplicated APRS® (Automatic Packet Reporting System) operation.)
        iii. Kenwood (TH-F6 - $330)
        iv. Baofeng (UV-5R $26, BF-F8HP $63 (7-8W, bigger battery)
            1. If you go this direction, ***be sure to get the programming cable*** for the Baofeng, because of the issues with manual programming
            2. Look at www.Miklor.com for information on Chinese
            3. See https://baofengtech.com/compare
        v. Wouxen $105
    d. Easy controls – Yaesu FT60R
    e. 2 meter/70 cm – Most nets use the 2 meters, but 70 cm are better in buildings
    f. CTCSS encode and offset enabled for repeaters (all do this)
    g. Rechargable, Li-Ion batteries – An extra rechargeable battery pack
    h. Battery cases that take standard AA or AAA alkaline batteries

i. AAA or AA cell adapter ("clam shell")
ii. A "battery eliminator," which ties a HT to a SLA battery via an auto cigarette lighter (thanks to KF7VXM Pat)
iii. Start working with Anderson Powerpole adapters to marry all this up

i. A good antenna
    i. Replace the rubber duck
    ii. ¼-λ antenna with mag mount
    iii. Role-up J-pole
j. Computer-programmable
    i. Esp the Baofeng
    ii. Chirp software is free
    iii. Cables are separate but usually run $6-$9
k. Easy programming in the field
l. Good headphones/microphone
    i. I prefer the Acoustic Tube earpiece headset with PTT and Microphone ($8-$14)
m. Adapters to PL-259 noting male to male (Yeasu) and female to male (Baofeng)
    i. Some feel the type with cables joining ends of adapters place less stress on the internals of the radio
n. Waterproof or water resistant
o. Unnecessary features: YaesuWiRes feature, DCS encoding and decoding, CTCSS decoding, ability to receive outside the amateur frequencies (wx, marine, air, etc.)
p. A second radio? Mobile/ mag-mount antenna. Better still, a second HT – If one fails, you have the other.
q. Kevin W0KCF like the Jump Starter AGA M/N A5 2 pound ($140 from Amazon)

11. What does a radio Go-Kit look like?
    a. Another radio
    b. What you might expect: extra batteries
    c. Lots of adapters (like SMA to PL259), noting male to male (Yeasu) and female to male (Baofeng)
    d. Headphones with special splitters to accommodate a scribe
    e. A field binder with key frequencies, etc. (Multnomah County, PBEM, weather, GMRS/FRS, etc.), lots of blank standard ICS and PBEM NET forms, pencils, etc.
    f. Consider bringing a folding chair, canopy, table, your own extension chord, food, water, etc.
    g. Cheat sheets or manuals for all your radios
    h. Charger for your radio (who knows, you might get luck - or use your go-kit for SETs)
12. Battery basics
    a. Types
        i. Alkaline
        ii. Li-Po
        iii. Ni-MH
        iv. Lead acid
            1. Technology

a. SLA
b. Gelpac (older technology)
c. AGM (Absorption Glass Mat)

b. Duty
   i. Deep cycle vs alarm or security battery
c. Peukert Constant (see Wikipedia/Peukert's_law)
   i. This tells us how much energy you will actually be able to draw from a battery with a given Ahr rating
   ii. The Ahr rating is at a specified current draw ***and temperature***, and it will be different for alternative currents and temperature according to

$$t = H\left(\frac{C}{IH}\right)^k$$

where:

H is the rated discharge time (in hours),
C is the rated capacity at that discharge rate (in ampere hours),
I is the actual discharge current (in amperes),
k is the Peukert constant (dimensionless),
t is the actual time to discharge the battery (in hours).

   iii. If a battery has a 20 Ah capacity at 5 Amperes and a Peukert constant of 1.2, the available energy is 8.7 Ah
   iv. Temperature is also a consideration. If a Li battery heats up with discharge, the rating is diminished
d. Recharging and maintenance
   i. Corresponding to the Peukert law, there is a Maximum Power Point, which indicates the best voltage (or current) for charging a battery at the highest rate.
   ii. Inexpensive chargers will permit a battery to overcharge and heat up, diminishing their useful life

13. GMRS/FRS/MURS in NETs
   a. Section 900 outlines the requirements according to a simple model
      i. Intra-team (FRS – Part 95)
      ii. Inter-team (GMRS – Part 95/Amateur UHF – Part 97)
         1. We now have UHF frequencies (431.2, 431.3, etc.) that we have reserved with the Oregon Region Relay Council. They correspond to the NET's FRS channel
      iii. ECC (2m/ Amateur UHF – Part 97)
      iv. BEECN (UHF commercial, Mobile Land-Based – Part 90)
   b. Comparison of modes
      i. Fundamentals (see FRS-GMRS-MURS Comparison K7TY 160522.pdf
   c. FRS
      i. Channel allocation
      ii. Basics of radio (see below)
      iii. Privacy codes and "FM capture", and the significance to Ops Plans
      iv. Exercises for NETs: we can learn ALL of the ARO skills with this technology

1. Tactical message handling
    a. Proper pacing
    b. Phonetics
    c. Using phonetics with the Proword, “I spell”
    d. Using the Proword, “Fills”
2. Push-pause-pause-release
3. Tactical call signs
4. Correct call sequence
5. Repeating it back
6. Knowing how and where to hold a radio (polarization, over-modulation)

d. GMRS
    i. Frequencies and power
    ii. GMRS radio with removable antenna: the Midland MXT-1000
        1. See Midland MXT100 Review-30Nov2015b.pdf
        2. See 151201 Beaston Gmail - Midland MXT100 review.pdf
    iii. Licenses
    iv. What you can and cannot do :What is legal, and what is not legal for our Chinese radios (What is legal, and what is NOT legal for our Chinese radios..pdf)
e. MURS
    i. Frequencies (2m, 5 channels, and power-2W)
    ii. Discounted because of limited channels and existing use by Walmart, construction firms, security, etc.
f. BEECN - Private Land Mobile Radio Services (Part 90)
    i. The FT-4001 is a 4W radio, but PBEM’s license is for 50W
    ii. Baofengs are type certified, but you still need an operating license
    iii. PBEM frequencies are in the area of 451 and 462 MHz and the number of users are limited
g. The basics of the FCC rules
    i. Knowing the difference between Parts 90, 95, and 97
    ii. Knowing 95A (GMRS), 95B (FRS), and 95J (MURS)
    iii. Knowing 90 is BEECN commercial
    iv. Basic limitations and privileges of each
h. How to determine which type certification applies
    i. Use the FCC ID in your radio
    ii. Google OETCF to find the FCC’s Office of Equipment and Technology Equipment Authorization section and database

14. The PBEM BEECN program and radio use
    a. Nature of the ICOM radio
        i. See IC-F3001 _ F4001 Series VHF and UHF Transceivers - Features - Icom America.pdf
    b. Operating expectations of radio operators
    c. Current integration with the NET program
        i. New program under the leadership of Ernie KI7EFT

15. Antennas for beginners
    a. Polarity is vertical
    b. Quarter-wave
        i. rubber duck
        ii. 1/4-λ
    c. Half-wave and variations
        i. ½-λ, vertical and horizontal
            1. Recommended for bikes (Pulse/Larsen Antenna is a good source)
        ii. 5/8-λ
            1. Mine is a BROWNING BR-180 Amateur Dual-Band Mobile Antenna
        iii. J-poles
            1. Ed Fong J-Pole
                a. Commercial is DBJ-1 ($38)
                b. QST Magazine, Feb 2003 "The DBJ-1: A VHF-UHF Dual-Band J-Pole" Edison Fong WB6IQN
                c. Can think of this as a 1/2½-λ with a hairpin match, driving the end rather than the middle of the dipole
                d. Edsantennas.weebly.com
            2. Designs like Multnomah County ARES
                a. **https://tinyurl.com/mcaresjpole**
    d. Colinears – phased vertical antenna
        i. Diamond X50A 7.2dB 5x
        ii. Diamond X700HNA 13 dB 20x
    e. Yagis
        i. Mine is Cushcraft A27010S 10dB
    f. Concepts?
        i. Impedance/Reflection
        ii. Losses
        iii. Cross-section/effective area
16. Getting started with ***solar power***
    a. Why we need to think about solar power
    b. This is not my area, so I will defer to others with more experience. I would also point you to some Youtube videos I have found
        i. http://solarpoweredhamradio.com/2014/03/04/video-primer-for-solar-powered-ham-radio/ with Dave, K7RPM (One hour and three minutes)
        ii.
    c. Definitions
        i. Charge Controllers
            1. Simple 1 or 2 stage controls – basically relays and resistors
            2. 3-stage and/or Pulse Width Modulation (PWM)
                a. Generates a lot of RF noise
            3. Maximum power point tracking (MPPT)
                a. The charge controller regulates this 16 to 20 volts output of the panel down to what the battery needs at the time.

4. Some charge controllers have a pair of "sense" terminals – detecting the voltage at the battery and compensating charging voltage
5. Some controllers also have a "LOAD", or LVD output, which can be used for smaller loads, such as small appliances and lights.

ii. Power gates
1. "Power Gate" is the fifth single by Japanese singer and voice actress Nana Mizuki.

iii. Inverters
1. Pure sine wave vs approximations
2. The harmonics

d. Some systems to consider
i. Harbor freight – cheap but low value for your dollar
ii. Goal Zero: http://www.goalzero.com/
1. goal-zero-yeti-400-portable-power-station ($460)
2. Goal-zero-yeti-150-portable-power-station ($230)
iii. Renology
iv. Samlex Panels are adopted by the McARES trailer (KF7ZWX) [– But what about Xantrex? Is that what I heard?]
v. Battery Tender has 15 Watt Panels (KF7ZWX), but I have not found them

e. Other resources
i. Solar power supply calculator
1. https://www.renogy.com/calculators#solar-size

f. Issues and controversy
i. PWM are not noisy but MPPT are
1. My reference is https://www.solar-electric.com/solar-charge-controller-basics.html/

17. Digital radio
a. Issues with your virus software, router, and firewall
b. RMS Express
Download from https://www.winlink.org/WinlinkExpress
c. Slow-Scan Television (SSTV)
Download from http://hamsoft.ca/pages/mmsstv.php
d. Apps for your phone
i. DroidSSTV
ii. OpenCamera
1. Features GPS coordinates, direction, time, Amateur call stamp
iii. RepeaterBook
iv. APRSDroid
v. Echolink
vi. Ham Band (***US Amateur Radio Band Plan***, by Kimbrel)
vii. ***Ham Radio Tools*** (Talixa Software & Services)
viii. Other emergency response
1. FEMA
2. ERG 2016

e. EasyPal
    i. Digital version of SSTV
    ii. Non-standard
    iii. Better quality
    iv. Download from http://www.g0hwc.com/easypal_setup_help.html
    v.
f. FLDigi
    i. Download (Mac, Unix, Windows)
        1. http://www.w1hkj.com/
    ii. FT63, PSK, FSK, Olivia
    iii. Used FM, SSB, and HF
    iv. Yahoo Groups
        1. paNBEMS
        2. NBEMSam
    v. Ancillary

flamp - Amateur Multicast Protocol - file transfer program
flwrap - file encapsulation / compression
flmsg - Forms manager
flrig - rig control program, cooperates with fldigi
flwkey - modem program for the K1EL Winkeyer series
fllog - can use same data file as fldigi
flnet - voice net controller database / check-in application
kcat - Kachina 505DSP controller for Linux, Windows and OS X
kcts - Kachina 505 test suite for Linux, Windows and OS X
test suite - includes linsim, comptext and comptty

    vi. 1.1. What is Fldigi? From the FLDigi help documentation

Fldigi is a computer program intended for Amateur Radio Digital Modes operation using a PC (Personal Computer). Fldigi operates (as does most similar software) in conjunction with a conventional HF SSB radio transceiver, and uses the PC sound card as the main means of input from the radio, and output to the radio. These are audio-frequency signals. The software also controls the radio by means of another connection, typically a serial port.

Fldigi is multi-mode, which means that it is able to operate many popular digital modes without switching programs, so you only have one program to learn. Fldigi includes all the popular modes, such as DominoEX, MFSK16, PSK31, and RTTY.

Unusually, Fldigi is available for multiple computer operating systems; FreeBSD™; Linux™, OS X™ and Windows™.

1.2. What is a Digital Mode?
Digital Modes are a means of operating Amateur radio from the computer

keyboard. The computer acts as modem (modulator - demodulator), as well as allowing you to type, and see what the other person types. It also controls the transmitter, changes modes as required, and provides various convenient features such as easy tuning of signals and prearranged messages.

Digital modes can offer performance that cannot be achieved using voice (and in some cases even Morse), through reduced bandwidth, improved signal-to-noise performance and reduced transmitter power requirement.

Some modes also offer built-in automatic error correction.

Digital Mode operating procedure is not unlike Morse operation, and many of the same abbreviations are used. Software such as Fldigi makes this very simple as most of the procedural business is set up for you using the Function Keys at the top of the keyboard. These are easy to learn.

Other factors such as available band space, operating speed and convenience, noise level, signal level and available power also affect the choice of mode.

1. Books: To gain a good insight into each mode and its capabilities, you might consider purchasing Digital Modes for All Occasions (ISBN 1-872309-82-8) by Murray Greenman ZL1BPU, published by the RSGB and also available from FUNKAMATEUR and CQ Communications; or the ARRL's HF Digital Handbook (ISBN 0-87259-103-4) by Steve Ford, WB8IMY.]

18. Tactical message handling, with example
    a. Four key attributes
        i. Slow
        ii. "I spell"
        iii. "I fill"
        iv. ITU
    b. Examples of ***Form 8*** messages passed and critique
19. Formal message handling, with example
    a. ICS messages – This should be a brief comment about differences with Tactical Message Handling with ***Form 8*** – Last week's examples
    b. NTS message handling
    c. Examples of messages passed and critique
20. The RTL program
    a. Progress, lessons learned, and challenges
    b. A general discussion conversation with the RTLs
21. Trouble-shooting propagation problems
    a. See beginner's errors
    b. Use of reverse

c. Relays
d. Is the deviation set too narrow?

22. Making nets more inviting
    a. Gender assumptions
    b. Strong foreign accents you have trouble understanding, e.g., Texans
    c. Dealing with individuals who are afraid to talk on the radio
    d. Folks with disabilities
    e. Understanding peacocks

Programming the Baofeng UV-5R+

- Possible problems from the last page of the Nifty Quick Reference
    - Exact VFO frequency
    - Narrow vs Wide deviation
    - PTT-ID
    - AutoLock
    - Squelch tail elimination
    - Delay squelch tail elimination
    - Tone at the end of the TX
- Programming
    - Preliminaries
        - VFO mode, channel A
        - Band to the correct VHF/UHF band
        - Enter frequency with keypad
        - Set power level Menu 2 (menu, up and down, menu)
    - Set receive frequency
        - Be familiar with your channels
        - Menu 25 set deviation (+/-/off)
        - Menu 26 offset (MHz)
        - Menu 13 CTCSS (T-CTC tone/off)
        - Menu 11 Squelch tone for receive off
        - Menu 27 select channel (menu, up and down, menu – look for one without CH-) The last <menu> saves the "receiving memory" – Then EXIT
        - Save the "transmitting memory":
          <* SCAN><MENU><MENU><MENU>
          saves the transmitting memory. <* SCAN> reverses the receive and transmit frequencies, <MENU> takes you back to Menu 27 and your choice for the channel, then <MENU><MENU> enters the transmitting frequency and exits, at which point you will hear "transmitting memory." Then EXIT and you are done.