

## **Newcomers and Elmers Net 9-29-13**

### **QRP – Low Power Operation AK3Q**

QRP is ham-speak for low power transmissions, coming from the days of code where QRP meant “reduce power.”

QRP is considered working with 5 watts or less, sometimes much less, down into the milliwatt range.

Some folks get bitten by the QRP bug and won't work anything else I am not to that point yet, but I do like low power for several reasons:

1. More challenging (if you think 100 watts is challenging . . . !

2. More discipline is required to put out a good signal within that 5 watt limitation.

-- There is no room for inefficiency, line-loss, or poor antenna design.

-- As the wattage goes down the efficiency must go up dramatically, and this has a real appeal to me.

-- If one learns to be efficient in limited conditions, one will be more likely to carry that efficiency to every area of the hobby regardless of the power and resources available

3. Working low power allows for radios, power supplies and antennas to be much smaller and much more portable, opening up all kinds of DX possibilities.

-- Many of us do not live in ideal DX conditions, but great locations may be fairly close to where we live.

-- I personally do not want to lug heavy batteries or electric generators around town looking for a spot from which to work the world. Once in a great while, maybe

-- more often than not if it isn't quick and easy I am likely to pass up an opportunity to take my radio on the road.

-- QRP rigs and power supplies can be very small indeed, and the antennas can be simple and light as well.

-- Virtually any wire will work for QRP, and since working portable usually means working out in the open, even the feedline can be lightweight and easily transportable.

I emphasize portability not to discount working QRP from home, but because just like working low power forces one to be more efficient, so does going portable.

-- one is more likely to have the attitude of "Oh, I don't have to worry about the antenna—I already know that works fine."

Part of the goal here is to develop a heightened sense of peak efficiency which can then translate into *QRO*, or increased power operation.

-- Lessons learned in the field can be brought back home to tweak or even substantially upgrade your base station, whether it operates at 100 watts or 1500 watts.

-- Learning to think in terms of peak efficiency will pay a lot of dividends down the road.

Naturally having low power capability also prepares you for emergency work as we have discussed previously, so there really are a number of benefits to working QRP.

### **Equipment Needs for QRP**

Low power usage, meaning 5 watts or less, places a minimal load on a power supply, and this is great news for portability.

-- I have several power supply options which I keep available for powering my 5 watt HTs, and these can be used to power a QRP station as well

-- Dry cells, gel cells, car batteries, portable jump-start batteries, even lantern batteries may be used as long as the power output matches the needs of the QRP radio.

-- QRP contacts tend to be fairly quick, especially when working DX, and so a reasonable power source can last a long time, easily throughout the day or over a weekend camping trip.

-- The radio itself can be something homemade (particularly for Morse code work), or it can be a commercial radio made for QRP or capable of reducing power to QRP levels

-- Keep in mind when using a full-power radio in QRP mode the power drain may still be significant even when not under load. Always check

the idle power requirements of your rig before setting off on an adventure to make sure you have adequate power on hand for your needs.

-- Other than a radio's power requirements most everything else is optional, such as an inboard/outboard tuner, pre-amps, or DSP filtering and the like.

-- Using the "keep it simple" principle I would recommend keeping everything to a minimum to allow you to focus on putting out the cleanest, most efficient signal possible

-- the idea is to get right down to the most basic level of low power signals reaching out as far as possible. Everything else is secondary.

## **Supports**

Trees are an obvious choice for supporting an antenna in a portable situation, and the easiest way to do this is to bring along some means of casting a wire, rope, or string into or over a tree

-- Since low-power setups do not require heavy wire or even coax, some method of casting a weighted string or wire into the air helps make antenna setup a quick one.

-- Slingshots, fishing gear, and even rubber balls can be used to lob one end of a dipole into a tree. There are a number of commercial and homebrew launchers online

-- You can launch each end over a tree limb, or use a launcher to hoist the middle feedpoint of a dipole and then stretch out the ends as needed

-- As an alternative, the center can be raised to the desired height first using a mast and then elevate the ends of the dipole as appropriate to the surroundings.

## **Antennas**

QRP antennas require the highest efficiency of any form of amateur radio simply because every milliwatt counts.

-- When designing the antenna for QRP work not only must the antenna be a match to the radio, but the feedline must introduce no appreciable loss to the signal

-- also the physical surroundings have to help (or at least not hurt) the RF signal coming from the antenna. There just isn't much wiggle room when power is this low!

Fortunately by the very nature of portable QRP work you can select an area which allows your antenna to reach its maximum potential

-- Avoid metal structures of any kind, both to keep down interference and to avoid needing coax as an insulator.

-- Select an area where ground will either help, or at the very least, not hurt your signal

Try to get the antenna up as high as possible to fit the band you're trying to work

-- the height should be at least  $1/2\lambda$  or more whenever possible, and if a full wavelength is possible all the better.

-- Getting out away from the city as much as possible will reduce much of the electrical clutter which can plague QRP work

-- the cleaner the environment from which your signal can originate the better chances it has of being heard

-- And of course, the higher up in elevation you can get usually the better—just be aware of what is around you in terms of possible interference, particularly in the directions you want to work.

TV feedline works great as a transmission line especially for HF bands, -- this can be fed into a 1:1 balun to convert it to coax for the last few feet to your rig if needed.

-- I recommend working with single-band antennas in QRP work to maximize efficiency.

-- By cutting a dipole for the exact band you wish to work you avoid needing a tuner, and the antenna can be cut to give you the best match possible for your particular setup

-- Once this is established it can be used again and again under most circumstances.

-- Again, your goal here is simplicity and efficiency, so a mono-band dipole will give you the most efficient omni-directional antenna which is easy to set up and easy to store.

A good VSWR meter is beneficial—borrow one or plan one into your budget

The same thing goes for a power or watt meter—you will need to be able to measure small changes in power levels in order to make the necessary adjustments to your antenna or feedline

-- VSWR and watt meters are not “one size fits all” when it comes to accuracy, so do a bit of research or talk to more experienced QRP’ers to find out what they recommend.

If you are using twin-lead wire for your feedline you can usually get away with measuring power right out of the receiver (but after a tuner if using one) since the feedline loss will be all but non-existent.

-- If you are forced to use coax for your feedline then you will want to measure power as close to the antenna as possible to evaluate the efficiency of the coax

-- Use the best coax you can and the shortest run possible to minimize feedline loss.

-- Fortunately at HF frequencies the loss is usually minimal, but in QRP work it all matters!

### **Directional Antennas for QRP**

Don’t neglect a good directional antenna for your QRP outings—a quality Yagi for 10 or 20 meters can be quite portable with the right setup

-- this gives you an advantage in gain as the signal is focused in one direction

-- An antenna with good gain can make 5 watts perform like 100, making the world a much smaller place!

Plan on having a good support system for the antenna, and a bit of scouting work before you set out on your adventure can be quite beneficial.

-- There may be locations to which you can attach a telescoping pole to add support for the antenna, as well as having room to attach a few light guy wires as needed.

- While "portable" means being able to move things around easily and with a minimum of gear, don't neglect taking enough precautions to make sure your antenna can stay in place while you operate.
- You don't want to have your day ruined by having your antenna in pieces because a little gust of wind took it down!

## **NVIS**

At the opposite end of the spectrum, you may wish to work a lower band like 40 or 80 meters using an NVIS antenna focusing on close-in contacts.

- The issues are the same in terms of efficiency and simplicity, and you have added another factor in to the mix, and that is the issue of take-off angles
- When working DX we strive for fairly low takeoff angles in order to increase our distance by raising the height;
- with NVIS antennas we strive for extremely high or *near-vertical*, takeoff angles to blanket the surrounding area by keeping the antenna closer to ground
- This makes them perfect for portable operation as you don't have to worry about getting the wire up into trees.

Working close in on low power is an extremely good skill to learn because in the event of an emergency you may be able to provide much needed outside contact for your community

- VHF/UHF work may be difficult in a real disaster situation, particularly if all the repeaters are down.
- Being line-of-sight signals, VHF and above just doesn't have a lot of distance potential, so HF close-in work is vital.
- Having an NVIS setup ready to go at a moment's notice, especially one able to work which requires very low power, could keep you in touch with the world for an extended period of time when you need it most.
- And, experience with close-range, low-power operations can be a real life-saver, literally!

I really encourage you to start only focused on one band at a time and leave the multi-band antennas for QRO work, at least until you gain some real QRP experience.

A tuner can be used as a backup if needed, but again efficiency should rule out the need for a tuner as you gain experience.

Wire antennas are easy to transport as they may be rolled up onto cylinders of almost any type, or you can use fishing reels or laundry reels as a good alternative.

-- Use thin twin-lead feedline for low loss, and just get out there and have some fun.

-- QRP operation will hone your skills to be sure, but it will also provide a great sense of accomplishment to boot as you work the world at 5 watts or less!