A tutorial on “Dragon Radios”

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It was more than ten years ago that organizers of the Tail of the Dragon event realized that there was a need to be able to talk car-to-car while on our runs. Even organizing our event while at Fontana Dam was made easier with two-way radios. The radios used are FRS handheld radios you can buy locally, but there are issues with many radio models on the market; it was not long before we started having issues that almost made use of radio more irritating than helpful. This paper is an attempt to use what we have learned over the years to make future meets (The Dragon, CAA, Ozarks, etc.) run more smoothly – at least from a “two-way radio” perspective.

First, the basics. There are three ‘radio services’ that we are concerned with when talking about the radios we use.

- CB Radio – CB is known to almost all of us and is not really adequate for our use. CBs require large antennas, and they are subject to all sorts of noise and interference. Also, given they operate on what is essentially “short wave”, you can sometimes talk to others over 1,000 miles away. While this can be fun for a radio enthusiast, it simply does not serve the purpose for most of us.

- FRS (Family Radio Service) – The FCC came up with this license-free service as an answer to the average individual’s need to communicate over short distances when it became apparent that the old “CB” radio service was not filling the need.

- GMRS (General Mobile Radio Service) – This is an odd part of the FCC’s rules. It is essentially a ‘real’ radio service for individuals who are willing to spend considerable money in order to have a radio system that covers as much as one or two counties. The license required is not very costly and is easy to obtain by filling out the form and paying a fee. Several of us are already licensed. I mention GMRS because channels 1 to 7 and 15 to 22 are common between the two services.

You need not know much more than the above, but knowing the above may make the rest of this paper more understandable.

Myths and Truths about FRS Radios

There are a lot of myths and misunderstandings about FRS radios. Let us clear up two of them.

1. *"Always use a channel between 1 and 7 because they are higher power."* This started due to the fact that early FRS radios had only channels 1 to 14 and 1 thru 7 are shared with the GMRS service, which authorizes 5 watts of power on these channels. FRS radios are not capable of 5 watts of power, so this myth is essentially untrue.

   Speaking of power levels, rules have recently changed.

   a. Initially, FRS radios were limited to ½ watt. In 2017, the FCC changed the rules, the rules now are:
      Channels 1-7: FRS – 2 watts, GMRS 5 watts (FRS went from ½ to 2 watts)
      Channels 8-14: FRS and GMRS 1/2 watt (same as always)
      Channels 15-22: FRS – 2 watts, GMRS 50 watts (FRS went from ½ to 2 watts)
   b. VERY FEW FRS radios run 2 watts due mostly to the fact that few buyers will pay for a two watt radio and the fact that no AAA or AA battery is going to last long at that power level.

2. *"We can't use certain channels without a license*." Linked to myth 1 above, this is not true. Your FRS radio is legal on channels 1 – 22. There was a Notice of Proposed Rulemaking a few years ago which proposed to eliminate FRS from some channels, but the FCC eventually rejected the NPRM. Unfortunately, many user manuals were amended when manufacturers assumed the FCC was going to modify the law. Any reference to this in a user manual is a mistake. All radios are built overseas, mostly in China, and most manufacturers don't' keep up with what the FCC is doing.

What we all can do to make things work smoothly

Now, after over ten years of attending both Dragon and other meets, I have observed the pitfalls we face and have some thoughts on how to make our radio communications easier and more effective.

One of the struggles of every meet I've attended is that I get many people running up to me to ask for help in programming their radio. This seldom works well, as there are far too many models out there for me to keep up with and given that these requests tend to come as we are lining up, there is often no time to remedy their programming situation without holding everyone else up. I WISH manufacturers would copy one another's operational design, so that the radios all programmed the same, but this is not the case at all.

Given the above challenge, I propose that you buy ONLY what I tell you to buy. I have done a lot of homework and have come up with a simple answer – if you are going to buy a FRS (family radio service) product, there is one radio to buy, ignore all others. But first, a few words on the radios you should ignore and why you should ignore them.

Radios to avoid

There are some **REALLY bad** products out there. I can sum up the situation in two major points:

1) Avoid any radio made by "BaoFeng". While there are numerous Chinese-made junk radio brands, BaoFeng has to be the worst excuse for a radio on planet earth.
2) Avoid any radio on eBay of a brand or model number you cannot find at Walmart, BassPro or Amazon.

   THE POINT: *There are a lot of radios being illegally imported and showing up on eBay. These radios claim to be "FRS" radios, but are intended for markets overseas. They are illegal here and while you can operate them with little fear that the FCC will ever find out, OR that you will interfere with anyone (their range and power levels are so poor, they are not really a threat), fact is you will be on channels we don't use or have access to. For these reasons, they are a waste of money on a Dragon weekend*.

There are a lot of good quality FRS radios made by Cobra, Midland and Uniden – but don't buy any of them because they suffer from some issues that really mess up our weekends. What do I mean? Simple: such radios are very feature rich and these features make using them so complicated, that the radio becomes ineffective. These features include:

- VOX (voice operated transmit)
- Full feature channel scan
- Complicated privacy code programming
- Various 'alert' modes and other calling features

EVERY meet I have been to, without fail, we always end up with someone not able to transmit to us because they have accidently entered "Alert" mode. When they transmit, all we get is a warble tone. Often, a "subcode" gets triggered by accident, so we can still hear you, but you can't hear us because we are not running the sub-code that you have accidently triggered.

So, if you know how to program and operate the radio, fine, bring it and use it. If you are someone who says "*I just want it to work, I don't care about all this complicated nonsense...*" then keep reading.

Radios I endorse

Manufacturers tend to change their lineup so fast; it is not always possible to keep up. Based on what I have found in my research, (combined with personal experience) the only commonly available radios I would endorse are Motorola Talkabout T100 series. These are super basic and help us avoid the downfalls of most other radios on the market. These are very easy to operate and feature no 'privacy codes', 'alert modes', 'alert tones' or other such "features" that ultimately mean the radio is easily rendered useless because you hit a button and put the radio in a mode you did not intend.

The choices, as of the date this document was produced:

- T100, which includes two neon blue radios, two belt clips and one user guide.
- T100TP, which includes three neon blue radios, three belt clips and one user guide.
  T107, which includes two bright pink radios, two belt clips and one user guide.

Again, these are CHEAP radios, they will get the job done, although in a convertible with the top down, they will not be as loud as you want them to be; most FRS radios will offer no better performance, even the more expensive ones, so why bother with anything other than a T100?

Uses three AAA batteries. Bring a box of spares or buy two sets of rechargeable AAAs and a charger.

What I hate about FRS Radios

For all the good these radios do us, there are some things that bother me and will probably bother you as well.

Poor Receive Volume

None of the little handheld radios are very loud. If you are running with us in a Roadster with the top down, you are not going to have an easy time hearing what is being said. Having a passenger as a radio operator helps a lot, as your driving can become very distracted when trying to hear using an FRS radio.

Batteries Are Often An Issue

On the one hand, the use of AA and AAA batteries is convenient, as you can buy spares anywhere, you never know the age or quality of the battery you buy. If your radio came with rechargeable batteries (or you bought some quality rechargeables and a charger), you are probably going to be fine.

Poor Audio Quality

On both transmit and receive, no $30 radio is going to perform and sound like (or be as loud as) your car radio. In fact, it won't even be close – but the FRS radio should be louder than, say, most phones in speaker-phone mode.

Poor Range

No ½ watt radio (and keep in mind many FRS radios don't even run ½ watt) with an antenna inside the car is going to talk very far. If we can keep within a few hundred feet of one another, we should be fine, but any hill or structure in the way and you are DONE.

The Kenwood Option

Kenwood does not make FRS or GMRS products, but they DO make expensive, commercial radios capable of serving in GMRS (and, to some extent, FRS) service. These radio overcome every one of the above objections. Kenwood makes mobile and hand-held radios that cost between $250 and $1200 each. All products are either 2 or 5 watt (hand-held) and 10 to 50 watt (mobile); all products are loud enough to be heard with the top down, as well. I can often source used radios at very low ($60 to $120 each) prices and continue to provide as many as I can find. I will announce availability on the Crossfire Forum and various Facebook pages when I have stock.

Should you wish to buy your own (on eBay or other sites) following are a list of suitable models. All will need programming and I can do that for you are any Crossfire event, as I always carry my programming equipment with me. If you can't source one of these, I stress

that I recommend the Motorola T100 family of inexpensive radios. Also, I usually arrive to an event with several loaners for those without suitable radios.

Kenwood Mobile Radios:
NX800, NX820, NX38x0, TK880, TK8360, TK81xx and quite a few others. *An 'x' means that number can be any number, also, an "H", "K" or "K2" at the end of the model number is fine as well. Kenwood mobiles do not come with an antenna, you want a TRAM 11185 and I usually order from Ham Radio Outlet online.*

Kenwood Hand Held Radios:
NX300, NX320, TK390, TK3180, TK340, TK3312, TK3402 and a lot of others. *Remember, all Kenwood products are high-tier commercial radios. You will need a battery and battery charger as you can't use AA or AAA batteries with these. Batteries cost $35-90 each new and chargers cost $30 to $120 new – do not overpay for used products.*

What about the Midland MXT105?

Some time ago, I bought a Midland MXT105. This is an impressive and rather easy to use 5 watt mobile radio from Midland. It is a GMRS radio and runs 5 watts on all channels other than channels 8 to 14. With an external speaker, it is very loud and is suitable for use at highway speeds with the top down.

Unfortunately, in the past year, it seems like the failure rate of the MXT105 is almost 30%. Some of the time, the radio has issues right out of the box. For this reason, I no longer recommend it. I hope that Midland eventually gets their act together again, as Midland has a history that looks better than this.

Conclusion

I hope this paper has helped. I left many details out that I thought would be boring. **For most reading this, I'd again just tell you to go buy a pair of Motorola T100s and make sure you get extra batteries.**