

UHF Radios - a convenient means of

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Those who regularly attend club social runs will know the benefits of having a UHF radio in their car.

For those new to the Club, the purchase and fitment of a UHF radio will certainly provide a new dimension to the social runs and allow you to chat to others and listen to directions from the run leaders.

This short article is intended to provide some guidance on the UHF radios that seem most appropriate for our Club trip use, and is based on my experiences to date. These are purely my views on the subject.

There are two main categories of radios, being hand-held and car-mounted.

Hand-held Radios

There are now quite a few brands on the market for hand-held UHF radios, but the two major brands still appear to be *Uniden* and *GME*.

From my experience with both brands, these are well designed, compact and work very well. I would suggest that any model chosen though has a 5 Watt transmission capability, which is the legal limit on transmission power for citizen band UHF radios. There are a few models that have either a half Watt or 1 Watt limit. The higher the power limit, the better the transmission range in general terms.

The hand-held radios in this category typically come complete with two batteries, a mains charger unit, a speaker microphone and a short flexible rubber antenna.



Most people appear to either use them as a stand-alone hand-held radio without the speaker microphone, or clip the radio to the wind deflector between the seats and use the speaker microphone. The latter is a very popular method amongst members.

Katrina and I have tried both methods but we tended to sit the radio unit in a stubby holder and place it in the cup holder between the seats in our ND model, and use the speaker microphone to talk and listen to the conversation, allowing easy access to the radio controls.

One of the limitations of these units that we experienced was the relatively small speaker in the microphone unit. We often had trouble hearing the convoy conversations clearly.

As for transmission and reception of the radio signal, we found that the height of the antenna and the gain of antenna were

very important. The standard antennas often have a gain of 1dBi (unity) and by design the height is limited to where you place the radio. I tried to improve the radio reception by using a different antenna with a higher gain. To connect these "external" antennas to the hand-held radio, I used an adaptor such as shown below. These are available from numerous radio retailers and online stores.



The use of a larger, higher gain (typically around 2-3 dBi) antenna certainly improved the radio reception. I also believe it improved the radio transmission as well, based on feedback from the rest of the convoy over numerous trips.

This approach provides a reasonable, low-cost approach to improving the usability of the radios on trips. One does need to be conscious of the extra stress placed on the antenna connection at the radio and be careful handling the radio unit.

Car-mount Radios

Over the last couple of years we have tried a couple of different approaches to the radios, as I am keen on improving reception and transmission quality and usability for Katrina and I in the car. I am aiming for a solution that provides good usability, good reception and transmission quality and good reception volume in the car, especially with the roof down and combating the wind noise we all experience.

I currently run a car-mounted radio, as it provides the ability to have a larger dedicated microphone unit and a separate external speaker unit.



With a car-mount radio one needs to have an externally-mounted antenna. This provided the next challenge, given that MX-5s are not that easy to mount an antenna on, and I certainly



didn't want to drill holes anywhere. I know the earlier NA/NB models can have an antenna bracket mounted to the rear chrome-plated hard-top roof mounting plates and a few cars in the Club have these fitted.

With our ND model, the external mounting options are very limited. I didn't want to use a traditional Z-bracket for the front guard mount, as typically used for many cars and 4WDs. The ND doesn't have suitable front guard mounting bolts anyway and I found it would be difficult to also run the antenna coaxial cable through the engine bay firewall into the cabin space.

One option I considered was to mount an antenna near or on the air deflector between the seat headrests, but the antenna could not be too long as it would foul the roof operation and cabling the antenna would be difficult to easily conceal.

I settled on a glass-mount antenna which uses capacitive coupling to transmit the radio signal through the windscreen glass from an internal glass mount unit to the external glass mount antenna. The picture at right shows a typical glass-mount antenna unit. There are a couple of brands on the market. There are also stick-on internal glass-mount antennas, which look promising.

This type of glass-mount antenna provides a typical gain of around 2.1 dBi. The antenna is reasonably compact and easy to



mount. I have enhanced mine to eliminate wind noise – an article topic for another day. I then ran the antenna coaxial cable down behind the A-pillar rubber seal (easy to conceal) and under the passenger dash and behind the foot well carpet to the radio.

In my ND model, I found it was convenient to simply mount the radio unit under the passenger seat and power it from the 12VDC socket,

which is located under the passenger dash area. The microphone unit (which incorporates the radio controls in my model) is then clipped into a stick-on mount on the passenger side of the console. An external speaker is then located on the driver side of the console near the seat base.

Our experience to date has been very good with this configuration. We have good clear reception and feedback has shown that the convoy can hear Katrina and I quite clearly, even towards the rear of most convoys when we are up the front.

40 Channel vs 80 Channel radios

UHF radios in the market place can be either 40-channel or 80-channel units. Back in 2011, the ACMA (Australian Communications and Media Authority) changed the rules governing the Citizen Band (CB) UHF radio channels. Prior to 2011, UHF CB radios were 40-channel units. From 2011 onwards the rules changed and the CB UHF radio frequency spectrum was changed to incorporate 80 channels covering the same frequency range. Hence new radios manufactured since 2011 are 80-channel units. The original AMCA rule change actually outlawed the use of the older 40-channel units from June 2017. There was some public backlash to this decision, and in February 2017, the ACMA reversed its decision to make the use of 40-channel radios illegal after June 2017.

So for now, we can still use 40 channel UHF radios as well as the newer 80 channel units, however all new radios are 80 channel units.

So what's the difference?

In simple terms, the UHF radio channels are spread over a frequency range of 476.425 to 477.4125 MHz. With 40-channel radios, the range is 476.425 to 477.400 MHz and each of the 40 channels has a frequency bandwidth of 0.025 MHz (25 kHz) between channels. For the 80-channel radios, the same overall frequency range is still used (476.425 to 477.4125 MHz), but each channel now has a frequency bandwidth of 0.0125 MHz (12.5 kHz) between channels and channels 41 to 80 are interlaced between channels 1 to 40. This means channel 41 is not logically placed after channel 40, but now sits *halfway between channel 1 and channel 2 in frequency*. Channel 42 sits halfway between channels 2 and 3, etc ... Importantly, channels 1 to 40 are the same frequency for both 40- and 80-channel radios.

The impact of this interlacing of the additional 40 channels is that the newer 80-channel units have half the frequency bandwidth per channel compared to the older 40-channel units. When one uses an 80-channel unit to communicate with other 80-channel units, there are no issues and reception appears normal. When one uses a 40-channel unit to transmit to others who use 40-channel units, again all is good and there are no perceived issues.

However, if a 40-channel unit transmits to 80-channel units, the volume is perceived as being louder and may come across slightly

distorted, although newer 80-channel radios often have technology to handle the wider bandwidth of older 40-channel units and minimise any distortion. Conversely, when 80-channel units transmit to older 40-channel units, the transmission volume can be perceived as being quieter and hard to hear.

My own experience has shown that when we use our hand-held radio (80 channel), a lot of cars in the convoy who have a range of new and older radios find it difficult to hear us even though we can hear them quite well. Our current radio is now a car-mount 40-channel unit (transferred from our older 4WD) and we now have good reception and appear to have good transmission to others, regardless of their radio types. **Since we typically use channel 24 for our convoys, 40-channel units still work fine.**

In summary, it would be nice to have a 40-channel radio to transmit on with an 80-channel radio to listen on, but this is obviously not feasible. As the older 40-channel units eventually phase out over the coming years and people update their radios, this mis-match of reception quality will also fade.

We hope this information provides some useful guidance for those interested in acquiring a UHF radio for club trips, which I certainly encourage. ●