TWO-WAY RADIO CONSIDERATIONS FOR 4X4 DRIVERS:

As a 4x4 owner participating in either local "get-togethers" with others in your area, or even on a weekend trail with a group of friends, one of the more enjoyable accessories is a two-way radio, enabling you to remain in contact with others within your group. This has many advantages: one is warned of any possible road or track dangers well in advance thus enabling you to take the appropriate action in time, or being told of where to find game in a game-drive, or simply to keep in contact with your friends when driving in convoy, thus helping to pass time and staving off boredom when driving along long tarred roads to reach your destination. Of course, it can be regarded as a life-saving tool as well during accidents or breakdowns. There is a lot of confusion over the type of radio to choose, so let's consider the facts.

LICENSING:

For normal 4x4 use, one is able to join a Club that is affiliated to ORRA (Off Road Radio Association). ORRA has been tasked by the AAWDC (Association of All-Wheel Drive Clubs) to provide country-wide radio licenses to its member Clubs and therefore directly to the members of those Clubs. By working through ORRA, the radio user is able to obtain a radio license essentially in a matter of days, instead of applying directly to ICASA for a private frequency which is a lengthy and expensive process. In this latter case, you will only be granted a radio license for use within your own immediate geographical area, usually limited to no more than 50km radius of your place of residence. Obtaining your license through ORRA permits you to use the various frequencies issued by ORRA anywhere within the borders of RSA.

WHAT TYPEOF RADIO: 29MHz AM or VHF/ FM?

Currently, there are two main modes of radio communications available to members of ORRA. The first one comprises the older 29MHz AM type radio, while the newer technology VHF/FM radio is an alternative choice. In days gone by, 29MHz radios were freely available and their pricing was extremely competitive, therefore they were widely used for short-distance communications. As the years passed by however, many Manufacturers of these radios dropped the 29MHz AM models which were uneconomical to manufacture in the relatively small quantities that were sold worldwide and concentrated more on the VHF/FM radios that were selling in considerable quantities world-wide. Following below, a brief description of the two modes of radios.

29MHz AM RADIOS:

The virtues of 29MHz AM radios are many – they are relatively cheap and many Clubs and 4x4 drivers make use of them. They are priced at around R1100 – R1800 excluding antenna & installation. Their **reliable** operating range is anything from about three to five kilometers or thereabouts, but this varies greatly with weather conditions and time of day, as well as area of operation and motor vehicle suppression. AM radios are susceptible to engine and atmospheric disturbances, resulting in a crackling sound when such disturbances are present. Adjusting the radio's squelch control can help eliminate these disturbances but this also has the effect of reducing operating range. The radios are fairly low-power units operating at around 4 – 5 Watts RF.

Antenna location is critical with a 29MHz AM radio and a permanent mount is to be preferred over a magnetic mount. Ideally the antenna should be mounted in the middle of a large expanse of metal, such as the roof of a double-cab. This might not always be convenient, and mounting the antenna elsewhere could result in directional RF radiation. A good compromise would be obtained by mounting the antenna as high as practicable on either the "B" or "C" pillar of a vehicle, ensuring that the steel whip and spring does not come into contact with any other metal work.

Below are examples of typical 29MHz AM radios available.

Dragon KR-80 AM Radio

GX300 29MHz Radio.

VHF/FM RADIOS:
This type of radio has been professionally in use for many years world-wide and is supported by all Manufacturers of two-way radios. These radios are typically high-powered but in South Africa the power limit is restricted to 25W for Commercial use. This is, however, completely adequate for good radio communications between two or more users.

For our ORRA purposes the radios operate on VHF, which is a range of frequencies within the 146 - 174MHz band. VHF radios offer excellent communication range, anywhere from about 15 - 30Km between mobile units but dependent upon surrounding terrain. They are powered at 25 watt RF output and are immune to interference caused by atmospheric or electrical conditions. All VHF radios require an appropriate ICASA license, or, in our case, an ORRA license.

The same rules for AM antennas apply to the FM antennas as well. However, there are two common types available:

* Quarter Wave Antenna, which should once more be mounted in a central position on a metal surface or on the B or C pillars of a vehicle. The antenna whip is only some 400mm or so in length. This is the currently preferred antenna for ORRA purposes because of the fairly wide spread in the current ORRA frequencies. Quarter-wave antennas are a good choice in hilly terrain.

* 5/8 Antenna, normally, suitable for B or C pillar mounting but can work on a bull bar. This type of antenna will produce good results when used either for a single frequency or a group of frequencies clustered in close proximity to one another. Not suitable for frequencies that are spread far apart from one another.

Pictured below are some typical multi-channel VHF/FM Radios. As ORRA has revised their channel list, we will no longer consider any radio below 8-channel capacity.

KENWOOD TK7100 64-Channel VHF Radio

KIRISUN PT8100 VHF 256-Channel Mobile Radio

VERTEX VX220012 8-Channel VHF Radio

The radios depicted above are all Alpha-Numeric Display models with LCD screens. This is highly advantageous because instead of the customary "Ch 1" being displayed, the radio can br programmed to display "ORRA 1" ORRA 2+T" etc, which certainly makes things a lot easier if you have to select an individual channel from a bank of, say, eight channels.

PORTABLE RADIOS ("HANDHELDS"):
29MHz hand-held portable radios are not being discussed here as they have shortcomings due to their low-frequency operation coupled to a cumbersome antenna. They have a very limited operating range and are also no longer readily available.

i) UHF LICENCE-FREE PORTABLE RADIOS:

The cheapest portable radios are the so-called "License Free" hand-held radios, which have very limited RF output stages, usually somewhere between 50mW & 500mW. Dump the 50mW, they are worthless. The 500mW radios offer an operating range of anywhere between 1 – 3Km, depending upon terrain, irrespective of what their Manufacturers might like to claim on the packaging. Line of sight provides the best range. The Stealth ST-200 radio pictured here is supplied is powered by a Lithium-Ion battery pack and is supplied complete with a battery charger. Useful for short-range communication, but with range restrictions of around 1 kilometer maximum when used between two vehicles on an open road. This range can be increased significantly however by means of an external magnetic antenna placed on both vehicles.

This radio operates on various fixed frequencies in the UHF band so therefore is not suitable for the programming of the VHF ORRA frequencies.

ii) VHF PORTABLE RADIOS:
These are the most popular of all types of radios and are used extensively throughout the country by Industries, Mines, Municipalities etc, so they are certainly rugged enough for the average 4x4 driver! Again, for our purposes, we will not consider portable radios of fewer than 16 channels, which has more or less become the Industry norm in any case. They all have similar ratings of 5 watts RF and 16 channel capabilities. While portables with many more channels are available, these are not required for our purposes.

Battery life on most portables is rated for a minimum period of eight hours usage during which the radio transmits for 5% of that time, receives for 5% and is on 'idle' for the remaining 90%.

Some examples of Popular VHF Portable Radios

HF/SSB RADIO:
These radios are used for times when one requires cross-country communications and are not applicable to the ORRA frequencies. However, it is interesting to note what they are capable of. They are typically high-power radios operating on low RF frequencies, usually between 1.8 ~ 30MHz, at RF levels of about 100W. They offer greatly extended operation, but they do have pitfalls. The operating range varies with a local ground-wave signal providing about 30Km radius, but this is in general not too reliable and nor is the radio designed for ground-wave communications. HF comes into its own with the reflected Sky-wave signal, a signal that is reflected off the Earth's Ionosphere, which is constantly varying in height from above the Earth's surface. The RF path can be compared to a tennis ball bouncing up and down as it is thrown hard into the ground.

The distances obtained by HF are virtually anything from 300Km upwards but the operating frequency (and therefore operating range) is very much influenced by the height of the Ionosphere at the time of transmission and therefore these radios are generally allowed to operate on three or four frequencies to allow for the changing conditions. Weather conditions play a major part in obtaining clear reception, as the system is essentially an AM one. Atmospherics and Lightning would cause difficult reception, as would electrical impulses.

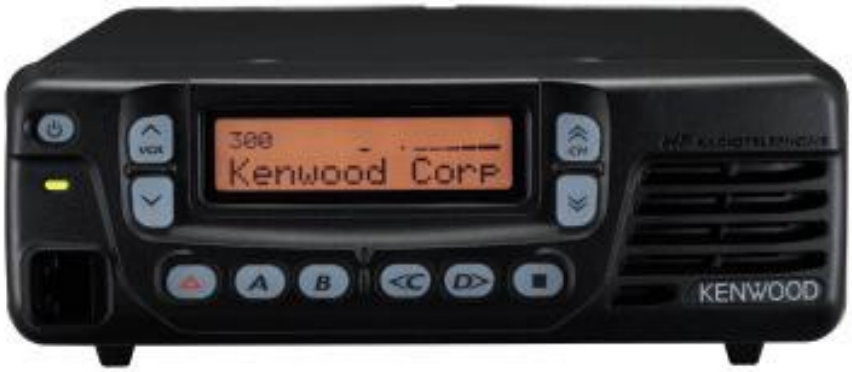
Because of the need for various operating frequencies, you will have to consider using an "Automatic Antenna Tuner". Each operating frequency requires the antenna to be a certain fixed length to provide for maximum signal transfer and also to prevent damage to the radio. This is done

either by the use of an Automatic Antenna Tuner, or you could carry four stainless steel whips & HF Coils and change them as you change frequency – not too practical!

HF/SSB licenses, although obtainable, are fairly restricted due to the limited number of available frequencies. This is not a bad thing in itself, as it is comforting to know that there might be other users on the same frequency should you be stranded in a remote area and in need of assistance. You are allowed to use HF across borders, provided you have the necessary Radio Communications Licence from both Countries' Regulatory Authorities.

Successful HF radio operation requires a learning curve, but for those traveling long distances where there is no other means of communication, it is a blessing.

KENWOOD TK90 HF/SSB Radio



ORRA LICENCING PROCEDURE:

Licensing your radios through ORRA is quick and easy! As long as you are a member of a Club that in turn is one of the AAWDC member Clubs, you may apply to ORRA for a VHF or 29MHz license.

Download the form from the ORRA website http://www.aawdc.org.za/fg_orra.asp and fill in the appropriate details. Approach your Club's Radio Officer and request a letter from him/her confirming your membership of that Club. Pay in the required amount as per the ORRA application Form and submit all three documents to ORRA at the address listed on the Application Form.

Congratulations! You will shortly be joining the thousands of people who have found out the benefits of two-way radio!

- *More details upon current two-way radios may be obtained by sending an email to repcom@lantic.net and requesting a copy of the 4x4 price list, which is updated on a regular basis.*