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Hello — Snowys Camping Show to loyal Snowys fans — do you read me?!

From marine to mountaineering, tune in to this episode of the Snowys Camping Show as Ben and Lauren lead an extensive discussion on UHF radios with Tony from GME.
Covering a vast range of talking points stretching further than the Hay Plains – know how to best mount in the mountains, choose your channels, and select the best gain for the best range.

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Mentioned in this Episode

Products
UHF and UHF CB radios
Personal Locator Beacons (PLBs)
Antennas
‘Plug ‘n Play’ radio kit

UHF CB 5-Watt Handheld radio
Antenna mounting bracket
2.1dBi antenna
6.6dBi antenna
Antenna whip

Introducing Tony from GME

With almost twenty years of experience in consumer electronics, Tony is a passionate employee of GME with a genuine curiosity in their products and associated markets. His ever-present interest in 4WD-ing, camping, fishing, and electronics had him naturally progressing into the GME space. Now with six years at the company under his belt and a boss four-wheel-drive, he has all the gear – and a fair idea!

What does GME stand for?

With sixty-two years of trading under parent company Standard Communications, Greenwich Marine Electronics (GME) manufactures a distinctive range of consumer electronics. A well-recognised brand with a long, proud history, GME has no intention to keep its meaning a secret. Nonetheless, the link to marine electronics can confuse those who aren't aware of their past purpose. The company produced marine radios before Ultra-High Frequency (UHF), soon catering to different markets as the business evolved.

GME History

It began in a backyard shed.
GME was founded by Edward "Ted" Dunn in 1959, initially specialising in TV tuners and other facets of television service. From there, Dunn began to identify the more niche markets, before working to source and develop products to suit. The UHF category interested him, and by the 1980s relevant products became necessary within the farming community. Communication was required back to the homestead, though the absence of mobile phones and limitations of AM radios meant fewer alternatives to do so. As UHF radios gained traction, Dunn seized the opportunity to develop products that met these demands.
Where AM radios can refer to 27 MHz ("megahertz") and Single Side Band (SSB) radios, Tony clarifies that the many types of two-way communication are simply distinguished by their different frequencies and waves forms. Before UHF radios, GME was producing 27 MHz marine radios.

GME Radio Products, Services, and Systems

If GME wasn't already an enigma – the company deal in more than just radios. That said, every product offered is in some way associated with radio frequency (RF) and radio communications. Products cover UHF and UHF Citizen Band (CB) radios, commercial radios requiring operating licenses and private frequencies, emergency and Personal Locator

Beacons (PLBs), marine communications or Very-High Frequency (VHF) radios, and all associated antennas.
Additionally, GME offers Kingray TV signal distribution systems like those manufactured during the initial stages of the company.

Every GME product is in some way associated with radio frequency (RF) and radio communications. Credit: GME

Australian Manufacturing

As the only Australian manufacturer of UHF CB radios and emergency beacons, supporting Australian companies is a highly valued notion at GME. Given some materials need to be sourced from overseas, Ben and Lauren ask Tony how people can view the extent to which GME products are Australian-made.
Firstly, the main priority of GME is to continue to manufacture in Australia. While labour costs are higher here than overseas, and some components are received from all over the world, GME remain committed to Australian production. Tony states that the simplest way to describe the extent to which GME products are Australian is on a revenue basis. Of their yearly revenue, 80% comes from Australian-manufactured products created in their factory in Sydney, New South Wales.
Limitations to 100% Australian-made products remain, where the mission is always to achieve a happy-medium percentage of quality against cost.

Upgrading From a 40-Channel Radio

Roughly ten years ago, 80-channel radios were introduced as the suggested transition from 40-channel types. As Ben owns the latter, he turns to Tony for his advice on whether upgrading is necessary, and what the limitations are if he does not.
While a 40-channel radio is still adequate, refusing to shift to an 80-channel model simply denies someone 50% of the full picture.
For example, if a group using 80-channel radios need to communicate, those with 40-channel types may not be able to hear them if their radio falls short of access to the channel in use.
The Australian Communications and Media Authority (ACMA), who mandate and manage the spectrum, originally opted to make 40-channel radios illegal. The intention behind this proposal was to encourage the market to upgrade to the 80-channel product. However, the feedback they received suggested they shouldn't – and given the 40-channel radios showed no sign of functional failure, the ACMA adjusted their approach.
For simply communicating with a friend via an agreed channel, a 40-channel radio is sufficient. However, monitoring highway danger and safety channels when on-road travelling is best done using an 80-channel model to ensure you are not operating with 40 fewer. While the decision is now in the hands of the 40-channel community as to whether they upgrade, it remains highly recommended that they do to experience the full advantages of a more extensive channel range.
The benefits of UHF radios extend beyond their channels. As technology has advanced, there are more features of updated models to take advantage of that aren't factored into the earlier types. A newer style of radio that Ben has recently started to enjoy allows the user to simply 'plug 'n play', without the need for a complicated installation process (these will be elaborated on later in the podcast). That said, UHF radios in general last a long time, leading many to prefer using their existing model until there's a more steadfast reason to transition.

Why do I need a UHF radio?

The answer is simple: a UHF radio allows communication without the infrastructure. Beyond metro centres, patchy mobile reception calls for efficient and effective comms achieved through UHF radios.
By extension, UHF radios are a safety precaution in allowing communication in the case of emergencies. Solely relying on a mobile phone in these circumstances is an issue, as only 40% of Australia's landmass is covered for mobile phones. Considering this, one doesn't need to travel too far out of a city to ultimately lose mobile coverage.

Limitations of a UHF radio

As with all two-way comms, UHF radios are effective by line of sight – that is, the straight, unobstructed path between a transmitting antenna and a receiving antenna. For example, it is not possible to contact someone in Darwin from Adelaide, as both communicators are required to be within the range of their radios.
The effectiveness of the transmitting and receiving of comms depends on a vast number of factors. These include the transmission power, the size of an aerial, and the geographic

nature of the area. For example, while travelling through a mountainous area will drop the maximum potential transmission range, doing so through the Hay Plains will achieve far more distance out of the radio.

At any one time, there are close to three million UHF radios in commission across Australia. Considering this, it is highly likely to be successful in connecting with another traveller or making a call via one of the dedicated emergency channels. That said, UHF radios are not the be-all-end-all of comms, where emergency beacons provide an added level of safety and insurance if emergency situations become more dire.

While UHF radios and emergency beacons are not direct alternatives to satellite phones, they are nonetheless complementary. A satellite phone is a powerful device that works anywhere on the planet, though the purchase price is substantially higher. What's more, owners will be paying for ongoing subscriptions whether their device is in use or not, while a UHF radio is free to utilise after purchasing. With an open communication platform, UHF radios allows for anyone tuned into the same channel as others to hear and respond – a key difference to satellite phones, which instead require one to call a specific user.

Ultimately – the more solitary one travels the more necessary multiple safety devices are. More avid, remote travellers carry a satellite phone, UHF radio, and an emergency beacon together.

What is UHF CB?

So what's the difference between UHF and UHF CB radios? The latter refers to Citizen Band, which can be accessed by anyone. On the other hand, UHF and VHF commercial radios operate via the same frequencies but offer licensed channels that aren't open to the public. These individually licensed frequencies allow users to have private conversations without interference from others.

As the conversation around UHF versus UHF CB becomes a little complicated, Tony clarifies that the distinction is ultimately related to frequency. UHF, as mentioned, refers to Ultra High Frequency – and within this is Citizen Band and Commercial range. Both operating on the same frequency, they simply offer different channels. A UHF CB radio hosts 80 channels tuned within the Citizen Band, where any frequencies operating beyond this are for commercial use and require a license. While UHF or commercial radios reach Citizen Band channels, there are UHF CB radios that allow users to hear commercial channels but not transmit via them.

Commercial Channels and Encrypted Digital Radio

Ultimately, there is a difference between UHF and UHF CB radios. While it's expected for police and other emergency services to use commercial channels as opposed to those that are publicly accessible – in many cases, they use a different technology altogether: encrypted digital radio.

Unlike some concepts, radio isn't radio. There are many radio-based products, and each function differently depending on the requirements. Gone are the days when it was possible to sit in our living rooms and listen to the whereabouts of the police. Now, such sensitive content is protected, where all communication – especially in metro areas around Australia –

is encrypted.

Can I use UHF CB radio on a boat?

A marine radio operates via VHF channels. In a practical sense, a VHF radio can work on land where a UHF CB can on water – however, this contradicts the purpose of each radio's respective design.
A VHF is designed for use in marine environments, and it's recommended that one purchases a radio based on what they will more likely use it for. In Australia, GME as a manufacturer are not permitted to offer products that transmit more than five watts of power via a UHF radio. Transmission of VHF marine radios reaches 25 watts, providing a greater range.
Considering this, there are specific benefits to different products that are designed according to these standards. For example, a 4WD-er with a VHF can talk to every boat on the harbour – but none of the other 4WD-ers on the road!

What UHF CB radios are available for 4WD tourer campers?

Many!
A UHF CB radio is available in both a handheld (portable) design, and a fixed-mount (mobile) model requiring installation in a vehicle. Within both categories, there are variations to power transmission, standard features, waterproof radios, GPS capabilities, and Bluetooth – and this is where customers require detailed consideration in the interest of aligning the product to their specific uses.
Tony recommends a handheld radio at a minimum – the closest to a one-size-fits-all model – for infrequent users who would like communication abilities outside metro areas. Handheld models are convenient, useful both within and outside a vehicle, practical at the campsite, capable of monitoring traffic, and are without the investment of a fixed mount and antenna. That said, there are limitations around range, given their smaller antenna. Furthermore, the battery-power feature has it demanding constant charging, as opposed to what would otherwise be required of a fixed mount model via the 12-volt system in a vehicle.

Considerations when Mounting Antennas

When we consider the range of a five-watt handheld radio versus that of a five-watt fixed mount model, we turn to their antennas. By default, the taller the antenna the further a radio can transmit.
Other determining factors include where on the vehicle the antenna is mounted. Mounting to the back of a vehicle can drop the available range the antenna can transmit on. The less an antenna is obstructed, the more effective a radio's transmission. Considering this, recommended locations to mount an antenna include in front of the bull bar, or on top of the roof.
While some may want to consider surrounding the antenna with a flat plain, this isn't so much a consideration anymore as it was when antennas were ground-dependent. Nowadays,

most antennas are ground-independent, eliminating the necessity for a ground plain and instead dictated by the extent to which the antenna is obstructed. For example, vertically mounting an antenna against the flat, back wall of a Jeep will have your radio struggling to transmit a signal through the body of the car. On the other hand, surrounding the antenna with an unobstructed, clear range allows a more effective transmission. Drivers who otherwise find aerials on the bull bar distracting should consider how significant adequate reception is for their journeys.

How accurate is the advertised range of each radio?

While some brands state the wattage range of a radio, GME do not. Tony confirms that the most common questions asked refer to the extent of the range expected from a handheld radio. Essentially, there are too many variables – but geographic positioning is an aspect that impacts range to a greater extent.

As mentioned earlier, radios are effective by line of sight. For example, it is more likely for a user to achieve sufficient transmission from their radio atop a mountain than it is low within the valleys. With this in mind, some brands claiming 17 kilometres of range is misleading. A customer is likely to be disappointed when their radio “doesn’t work”, despite many factors likely contributing to their inadequate transmission – and this is why GME choose not to make a claim. Broadly speaking, a five-watt handheld radio could offer up to ten kilometres of range in ideal conditions, while a fixed-mount model of the same wattage could extend to 25 kilometres or more.

Nonetheless, range is variable-dependent – and if anything, a company ought to state the transmission power. A customer is likely to choose a one-watt handheld radio over a five-watt handheld because of the difference in price and specific requirements of the radio. For instance, travelling in a convoy within only 500m of other vehicles would likely only demand a one-watt radio, where the need for transmitting beyond ten kilometres is unnecessary. A lower watt radio is also useful for keeping in touch with children and family members within a camping ground.

Essentially, a user’s choice of radio-based on transmission power is dependent on its specific use, where any remote, solo travellers require maximum transmission power and a high-performance aerial for optimum transmission from their radio.

How do antennas actually work?

Following the frequent mention of antennas, Ben and Lauren are curious as to whether there is a visual representation of how they transmit radio waves. It is, for lack of a better word, technical!

Radio waves are transmitted via a ‘radiation pattern’. Essentially, this pattern describes how a signal is released from the radio into the antenna and communicated out. This is called a ‘gain’ rating, denoted by a decibel isotropic (dBi) number.

Antennas are available in specific gain ratings, including 2.1dBi, 6.6dBi, and 8.1dBi. The length of an antenna correlates to its gain measurement, where a shorter antenna will have a lower gain rating and an 8.1dBi antenna measures two metres long.

Tony clarifies that a higher gain does not necessarily equate to a better-performing antenna.

As the gain rating of an antenna increases, the radiation pattern changes shape. He describes an inflated balloon, which could be viewed as a 2.1dBi radiation pattern (i.e. distributing a broad transmission over a smaller distance). Increasing the gain rating is the equivalent of applying more pressure to the ‘balloon’, consequently elongating it in a horizontal fashion. So, while an 8.1dBi antenna transmits further than an antenna of 2.1dBi, it does so via a flatter radiation pattern.
Ultimately, as mentioned previously, transmission is dependent on geographic conditions. Running an 8.1dBi antenna in hilly terrain results in poor range, as the signal is unable to overcome the obstructions. Therefore, the nature of the terrain determines the performance of the antenna. Many antennas in the GME range have interchangeable whips, allowing users to choose the whip that best complements the current conditions. A whip is the straight, flexible, fibreglass rod, with a spring on the base to prevent breakage along corrugated roads. A smaller, shorter whip with a lower gain rating works better in the hills, like the Victorian high country. On the other hand, the Nullarbor Plain calls for a longer antenna with a higher gain rating.
Most adventurers seek ground-independent antennas, as their design incorporates a feature at the base that eliminates the need for a flat plain. In contrast, a ground-dependent antenna is a product of old technology. Put simply, those who don’t choose a ground-independent design are those who are willing to drill a hole in the centre of their roof! With the evolution of technology over time, ground-independent designs offer greater flexibility in where users can mount their antennas. In the 80s, optimal performance of a UHF radio could be achieved by puncturing a hole through the centre of a vehicle’s roof. The antenna uses the roof as the ground plain to operate effectively.
As well as transmitting and receiving radio signals, 2.1-metre antennas have also been seen to double as flagpoles. While this is not a specified use of the antenna, nor is it noted in GME’s instruction manual – it’s a tempting idea for most campers, fishermen, and 4WD-ers. Owed to the antenna’s exceptionally heavy-duty spring base, a flag attached to the top is unlikely to provoke any physical damage, or – to Tony’s knowledge – affect how the aerial operates.
Lauren enquires whether there is a hybrid model of a fixed-mount and handheld radio available, to which Tony presents more than one option.
Firstly – with GME’s handheld model, users can purchase drop-in chargers to mount in their vehicles, unscrew the antenna from the handheld, and connect a smaller magnetic antenna that can be attached to the vehicle’s roof. This essentially transforms the handheld radio into a pseudo fixed-mount antenna. While this method remains inferior in the absence of larger antennas, repositioning the antenna to the outside of the vehicle automatically improves the range. This further reinforces the effect of limited obstructions – a common theme throughout the discussion. The best possible scenario for an antenna to perform at its optimum is a mounting position that is high, free of obstructions, and outside a vehicle.
Another option for a hybrid is the ‘plug ‘n play’ model.

‘Plug ‘n Play’ Radios

This model is a fixed-mount radio that does not require permanent installation in a vehicle. The device is supplied with a 12V DC cigarette lighter socket which, once plugged in, runs the

small magnetic antenna. With a ‘plug ‘n play’ radio, users can enjoy the benefit of a fixed-mount design – but are nonetheless limited by the antenna.
In the presence of a large fixed-mount radio inside a vehicle, with small, handheld radios in the same vicinity – Lauren asks whether the fixed-mount model works to boost the effectiveness of the handheld devices. As great as that would be, Tony confirms that this is not the case. An antenna needs to be attached directly to a radio to form any kind of relationship or connection.

Interference and Installation Considerations

It is worth noting that if a customer purchases a radio and finds it doesn’t work effectively, the chances are that it has little to do with the radio itself and more so its sensitivity to other radio waves. Products that tend to disrupt a radio’s efficiency are those generating noise, and LED light bars.
Positioning an antenna nearby LED light bars creates an interference heard through the radio. Considering this, when installing an antenna on a vehicle it’s wise to note where the cables run, to prevent bundling up beside those for other devices such as LED light bars. When light bars are removed from the space, problems related to the radio’s effectiveness are too.

How effective are stick-on window aerials?

Are they a last resort, or equally as effective as other models discussed? Again, Tony circles back to considering where the antenna is mounted, its height, and its gain rating.
For example, 2.1dBi and 4.5dBi stick-on antennas will still transmit and receive, though not as effectively as a 1.2-metre antenna mounted on a bull bar. The former are best utilised in a convoy-style scenario.

Thanks for listening, tune in again for next week’s episode!

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Catch you out there!