The Little Green Radio Book

Everything you need to know to buy, operate and care for 2 way radios

2 Way Radio Express Press
4085 Tamiami Trial North Suite B101
Naples Florida 34103
www.2wayRadioExpress.com

To order this title, please call 1-800-557-3083

Contents

Introduction	*3*
Hand Held, Mobile and Desktop	*4*
Radio Waves and Frequency	*5*
Don't Be Fooled	*6*
Multiple Channels	*7*
Scanning	*7*
Programming	*8*
Batteries	*9*
Emergency Battery Charging	*11*
Antennas	*11*
Passive Antenna	*12*
Repeater	*13*
Trunking	*13*
Radio Over Internet Protocol	*14*
Licensing	*15*
Accessories	*15*
Military Specifications, IP and Intrinsically Safe	*17*
Radio Manufacturers and Brands	*18*
Comparing radios to cell phone.... Try this on a cell phone	*18*

Introduction

This little booklet describes everything you need to know to buy, operate and care for land mobile two way radios.

Radios are an invention of the early twentieth century. Hand held radios like we use today didn't appear until the early 1960s with the introduction of the Motorola HT200. The Motorola HT200 hand held radio weighed in at a hefty 2 pounds and 1 ounce. (By comparison many of todays full powered, full featured radios weigh less than 10 ounces.)

Despite the size and weight hand held two way radios were an immediate hit. They saved steps, made it easy to communicate, made the workplace safer and increased productivity.

These benefits are still available today to every business that uses two way radios. The cost for two way radios is so little most schools, municipalities and businesses that use radios do not account for the cost separately but instead lump it into their other telephone and communication expenses.

I hope you use the following information to become more efficient, increase your productivity and make your workplace safer.

Hand Held, Mobile and Desktop

Some people call them “walkie talkies” or “handy talkies” or “hand held radios” or “base station radios” or “mobile radios.” These are all essentially the same in how they operate and in the commercial world are called “land mobile radios.”

Land mobile radios come in three styles: the hand held style, the mobile style and the base station style.

Hand held radios are radios that you can hold in your hand and operate as you move about. Today these radios are usually between 9 and 16 ounces in weight and are typically between 4 and 8 inches tall (not counting the length of the antenna).

Hand held radios are regulated (by the Federal Communications Commission) to no more than 5 watts of power.

Mobile and Base station radios are usually more powerful than hand held radios and may have as much as 100 watts of power.

Mobile and base station radios are essentially the same except for how they are mounted and used. A mobile radio is mounted in a vehicle and uses the battery of the vehicle as a power supply. Additionally the mobile radio has a separate antenna that is mounted on the roof, fender or someplace else on the vehicle.

The same mobile radio becomes a base station radio when it is operated from a desk or counter and connected to regular house current as a power source. The base station typically uses an exterior antenna that is mounted on the roof of the building.

Hand held, mobile and base station radios are two way radios because they receive radio signals and also send radio signals.

Hand held, mobile and base station radios are completely compatible and operate seamlessly with each other.

Radio Waves and Frequency

The AM/FM radio in your car or at home is a one way radio. These radios can only receive a signal. You can listen to your AM/FM radio but you can't talk back to the radio station. Two-way radios let you listen and talk.

Radio waves are created by some vibrating or "oscillating" mechanism inside a radio. Years ago radios used crystals as oscillating mechanisms. An oscillating mechanism is basically an electrical switch that turns on and turns off at a specific rate. The rate at which the switch turns on and off is its "frequency." When a switch is turned on and turned off at a very rapid rate electro magnetic fields are created that we call radio waves. The specific frequency at which the switch is turned on and turned off creates a radio wave of a specific size.

Each channel on a radio (this could be a popular radio station or a land mobile two way radio) is broadcast on a specific frequency. A popular radio station is known by its frequency; Talk 790 AM or Sunny 95.5 FM. 790 and 95.5 are these stations' frequencies (measured in kilo hertz - thousands of cycles per second - for AM radio or mega hertz - millions of cycles per second - for FM radio). Likewise, every two way radio broadcast on a specific frequency. Two-way radios broadcast in the VHF range (very high frequency) or the UHF range (ultra high frequency). The difference between VHF and UHF is like the difference between AM and FM for public radio stations. (In more specific terms the difference between AM and FM relates to amplitude rather than just frequency.)

Both VHF and UHF radio frequencies are measured in million of cycles per second (MHz). There are certain properties that are associated with VHF and UHF frequencies.

The VHF radio band for commercial radios is between 130 - 14 MHz. The biggest advantage to using VHF radios is distance. VHF radios with comparable power and antenna size tend to travel further and provide more coverage in terms of distance than UHF radios.

The UHF radio band commercial radios is between 400 - 512 MHz. The biggest advantage to use UHF is penetration. UHF radios with comparable power and antenna size tend to reach further inside building, through solid obstacles and heavy forests than VHF radios.

UHF radios are usually the best choice because the signal that is produced has better ability to travel around and through objects like trees and buildings. People use VHF radios when they are going to be used in an airplane or on a boat or outside where there is little between sender and the receiver. Under these conditions VHF travels further than UHF.

Each specific frequency produces a radio wave of a specific length. Lower frequencies produce longer radio waves. For example, a VHF radio frequency of 150.00 MHz will produce a radio wave about 15 long. A UHF radio frequency of 450.00 MHz will produce a radio wave about 2 feet long. Visualize trying to push a 15 foot long pole into an area with many obstructions. Now visualize pushing a 2 foot long pole into the same area. Can you see why VHF waves tend not to penetrate?

The second factor in broadcasting is the power of the signal measured in “watts.” A commercial radio station might broadcast at 5000, 10,000 or 50,000 watts. The more wattage or power the further the signal will travel. Hand held two-way radios usually broadcast at 1 - 5 watts. Mobile radios, the kind you might find in a fleet of delivery trucks, broadcast at 5 -100 watts.

Some radio manufacturers rate the wattage on their radios in “peak wattage.” Peak wattage is the maximum wattage the radio can attain but not necessarily the radio’s actual operating wattage. A radio that operates at a constant 1 watt can out perform a radio that boasts a 5 watt peak power.

Special measuring equipment is needed to learn if a radio’s specifications are based on peak or constant power. A reputable radio manufacturer or dealer can give you this information.

The third factor in broadcasting is those things that might block a radio signal. If a radio signal is blocked by buildings, walls, trees or mountains the signal will not reach the receiving radio. To solve this problem commercial radio stations broadcast from towers. This way the signal is beamed out and down to people wanting to listen to the station. It doesn’t take much power if a receiving radio doesn’t have anything between it and the sending radio tower or antenna. For example the radios that the astronauts used on the moon to talk to earth were able to successfully communicate with less than 1 watt because there is nothing between the moon and earth to block the signal.

We are not on the moon and we can expect much less coverage from our two way radios. A general rule is to expect a 1 watt radio on flat land to provide about 1 mile of coverage. Doubling the power increases the range by about a third. A 2 watt radio on flat land provides about 1.3 miles of coverage. You can improve range by increasing antenna height. The higher the antenna the further you can talk. For example, a one watt radio might talk 10 miles to an unobstructed mountain top.

Don’t Be Fooled

You may have seen radios at a discount store or the local sporting goods store advertising radios with talk distances of 10 miles or 12 miles or 18 miles. This is purely bogus. If bogus sounds too harsh to you, just ask the seller to demonstrate the advertised coverage. He will not be able to do it.

Multiple Channels

Two-way radios can have multiple channels just like an AM or FM radio can be tuned to different stations. Most commercial grade two-way radios have between 4 and 16 channels. (Radio that are used by the police or fire department for safety may have as many as 256 different channels.) Each channel is operated on a different frequency so people listening or talking on channel 1 won't hear people talking on channel 2 or one of the other channels.

This is particularly important to radio users that want a group of people to be able to talk to each other without interfering with other groups. For example, in a hotel the housekeeping staff can use one channel, the maintenance staff can use another channel and the banquet staff can use a third channel without everyone hearing everything that is being transmitted. Talk groups can be divided by department, work category, location or anything that helps people communicate better.

Scanning

A scanning radio automatically locks onto an active frequency or radio signal. Once that frequency goes silent the radio continues scanning until it finds the next active frequency. The traditional use of scanning was to monitor police, fire and other emergency services that use several different frequencies but only with sporadic use each.

Most modern automobile AM/FM radios have a scan feature. The user pushes a single button and the radio will scan for the next channel. Once the next channel is found the scanning stops for 10 seconds and then continues to the next channel. The user turns off scanning as soon as a good station is found.

Two-way radios that have more than one channel can also be equipped with a scanning feature. However land mobile radios only scan the frequencies that have been programmed in the radio. For example, a hotel is using 8 channel radios. They have assigned the channels:

1. General use - All call
2. Housekeeping
3. Maintenance
4. Banquet and catering
5. Bell hops
6. Parking
7. Front Desk
8. Manager

In our example the radios are programmed for each department. The housekeeping staff's radios are programmed to scan channel 2 and channel 1. These folks leave their radios on channel 2 all day and communicate with each other by only using the push to talk button on their radios. If they want to talk to the front desk they would turn their radio to channel 7. If they want to talk to someone in maintenance they would turn to channel 3. If there is a call on channel 1 their radios will pick up the signal because they are scanning channel 2 and channel 1.

The maintenance department's radios are programmed to scan channel 3 and channel 1. They can turn to another channel to reach another department and other departments can reach maintenance by turning to channel 3.

If there is an emergency or a message everyone needs to hear anyone can turn their radio to channel 1 and broadcast a message to all radios (because all radios are scanning channel 1).

Programming

Some years ago radios used crystals to determine the frequency on each channel. Each channel had two crystals. One crystal determined the transmit frequency and one crystal determined the receive frequency. Crystals were cut to a specific size to create a specific frequency. Using crystals radio frequencies were separated by 0.025 MHz. For example, frequency spacing between channels would be 450.000 - 450.025 - 450.050 - 450.075 - 450.100. This 0.025 MHz spacing is referred to as "wide band."

Today radios use a device in the radio called a "voltage controlled oscillator" to control specific transmit and receive frequencies. The voltage controlled oscillator is accessed through the audio port on the side of the radio and a programming cable that goes from a computer to the radio. The use of a voltage controlled oscillator is much more precise than crystals. This greater precision allows for radios to be programmed with frequency spacing of only 0.0125 MHz. For example, frequency spacing can be 450.000 - 450.0125 - 450.0250 - 450.0357 - 450.050 - 450.0675 - 450.0750 - 450.0875 - 450.100. The 0.0125 spacing is referred to as "narrow band." Narrow band allows for twice as many frequencies to be available.

Most recently manufacturers are able to build radios with only 0.00625 spacing, allowing for more band width and even greater availability of radio frequencies.

In addition to more precise frequency choices modern computer programmed radios allow for "interference elimination codes." Interference elimination codes are also known as "private line codes" "PL codes" or most accurately "squelch codes." Instead of only needing to be receiving on the same frequency as others in your group, radios using elimination codes require all radios to have the same channel/privacy code to communicate. In order for a radio to open up and receive a broadcast, it must first hear

the elimination code and then the channels frequency. (The tone actually cannot be heard, it is sub-audible.) Effectively this eliminates hearing other radios that are nearby broadcasting on the same frequencies.

Keep in mind by using elimination codes you will not hear other radios on your frequency however others using your frequency but not using an elimination code may still hear you.

Elimination codes are particularly useful with FRS (Family Radio Service) GMRS (General Mobile Radio Service) and MURS (Multiple User Radio Service) frequencies.

FRS frequencies are 7 specific frequencies that were set aside by the Federal Communications Commission for non commercial use and do not require a license to operate. Radios that use the FRS frequencies are limited to 0.5 watts of power. There are VHF and UHF FRS frequencies available.

GMRS frequencies are 15 specific frequencies that were set aside by the Federal Communications Commission for non commercial use. Radios that use GMRS frequencies typically use 1 - 5 watts of power. The FCC offers a 5 year license for using these frequencies. The license application is a short form and cost $85. You can apply for this license online at www.fcc.gov.

MURS frequencies are 5 specific VHF only frequencies that were set aside by the FCC for personal or business use and do not require a license.

Several radio manufacturers offer radios that are pre or partially programmed to use the FRS, GMRS and MURS frequencies.

Batteries

There are three primary battery chemistries used in two way radios: Nickel Cadmium (NiCad), nickel metal hydride (NiMH) and lithium ion (Li-Ion). Nickel cadmium is the oldest chemistry and in some ways still offers advantages over the newer chemistries. The capacity of each of these types of batteries is measured in milliamps (mAh).

Nickel cadmium out performs other battery chemistries in both high and low temperature extremes. These batteries are also more resistant to overcharging problems and have a longer life expectancy. Generally nickel cadmium batteries cost less per mAh than other battery chemistries. However nickel cadmium batteries are larger and heavier than other types and tend to develop “memory burn.” Memory burn occurs when a battery is re-charged before it is completely discharged. The battery remembers this smaller partial charge and adjusts to accept this amount as a full charge. Memory burn can be reduced or eliminated by regularly discharging the battery to full exhaustion. It is not unusual to see nickel cadmium batteries last for 2, 3, 4 or even more years.

Nickel Metal Hydride batteries are similar to nickel cadmium except they tend not to develop “memory burn.” Nickel metal hydride batteries are somewhat lighter weight, more compact and cost only slightly more than nickel cadmium batteries. These batteries are less tolerant of overcharging and have a shorter life expectancy. Typically a nickel metal hydride battery has a life expectancy of 1 - 2 years.

Lithium Ion batteries are the lightest weight, most compact, do not develop any memory burn and cost the most per mAh. Lithium ion batteries have a specific number of charges they are capable of receiving. (The amount might be 500, 750 or 1000 charging cycles depending on the manufacturer and design.) Once the battery has experienced the specific charging cycles it will not accept a charge. Lithium ion batteries also require a more advanced charger that is typically able to recharge the battery in a couple of hours rather than the traditional overnight charger.

The industry standard for measuring a battery’s duty cycle is “5 - 5 - 90.” This supposes you talk 5% of the time, listen 5% of the time and you are on stand by for 90% of the time. The duty cycle considers the capacity of the battery and the consumption rate of the radio.

Feature	Nickel Cadmium	Nickel Metal Hydride	Lithium Ion
Size/Weight	Good	Better	Best
Extreme Temperature	Best	Better	Good
Memory Burn	Good	Better	Best
Deep Discharge Ability	Best	Better	Good
Overcharge Tolerance	Best	Better	Good
Charge Cycle Life	Best	Better	Good
Capacity	Good	Better	Best
Initial Price	Best	Better	Good

Emergency Battery Charging

Natural and man made disasters and emergencies can result in power outages that can last for a few hours or even days.

- Even if you do not use two-way radios as part of your regular day to day operation keep your radio batteries charged and conduct a radio check once a week. The weekly radio check will reinforce how to use the radios and instill good radio habits. A weekly radio check will reveal if there are any equipment or personnel issues. During an emergency having to train personnel will consume rather than conserve battery power.

- Have spare two way radio battery equipment available and handy. Many commercial two way radio chargers have a slot for an additional battery. By keeping two batteries charged you effectively double the useful life of radios in an emergency. Additionally some commercial two way radios can be equipped with standard size alkaline batteries. These alkaline batteries have a long shelf life and can come in handy if the power outage is lengthy.

- If you have an uninterruptible power supply (UPS) battery backup for your computer it can be a source of power for re-charging two way radio batteries. Just plug your charger into the UPS and you'll have enough power to re-charge your radio battery to last at least a full day, and maybe even more. Make sure to shut down your computer at the first sign of a power outage. It increases the UPS power that is available for charging radio batteries.

- If it's safe to go outside, you can recharge your two way radio batteries in your car or truck by using a charger that plugs into your vehicle's cigarette lighter. If the power outage last a short while, this can provide enough juice to keep things going during the crisis. If it looks like the power is going to be out for several days then keep in mind that this is also impacting your vehicle's gas and battery.

- You can use your two-way radio during a power outage if you have a solar rechargeable battery pack. Solar power is becoming increasingly popular as source of alternative energy. It doesn't even have to be a bright sunny day for it to work effectively. Solar battery recharging kits can provide recharging service for your two way radios. You'll find a solar kit with a quick Internet search or call your two way radio dealer.

Antennas

An antenna is designed to send and receive radio signals. When the antenna is receiving it converts electromagnetic waves into radio frequency electrical currents. When the antenna is sending it converts radio frequency electrical currents into electromagnetic radio waves.

As mentioned earlier, every specific frequency produces a specific length radio wave. Lower frequencies produce longer radio waves. For example, a radio frequency of 150.00 MHz will produce a radio wave about 15 feet long. A radio frequency of 450.00 MHz will produce a radio wave about 2 feet long. Antennas of these size would be totally inappropriate for a hand held radio.

Fortunately radio manufacturers have learned two important lessons. First, radios perform well as long as the antenna size is relatively close to the size of the wave length. This means that a fifteen foot long antenna will provide good transmission and reception for a range of radio waves from 7 to 30 feet in length. Secondly, antennas can be fractional sizes of the wave length and still perform well. For example, the average size UHF radio wave is approximately 2 feet. However a one-foot or half-foot or quarter-foot antenna will also work well.

Because the actual antenna may be coiled around an antenna mast it is difficult to see the antenna's true length without taking the antenna apart.

Many radio users are choosing "stubby antennas" (antennas that are just a couple of inches in length). Stubby antennas are more convenient and comfortable to use because a shorter antenna does not get in the way (much the way short tailed cats seem to have a less accident prone life style).

A stubby antenna is really a full size antenna where the active antenna is spiral coiled around the mast to create a shorter profile. These antennas provide equal performance in all but the most extreme circumstances.

Antenna performance is a critical factor in distance and coverage of radio signals.

Passive Antenna

A passive antenna is a coaxial cable with an antenna on both ends. Think about 2 antennas that are connected by a cable. The purpose of a passive antenna is to provide a path way for radio signals. For example, a hospital has an X-ray room that is equipped with lead lined wall. Radio signals have difficulty in penetrating these walls. One end of a passive antenna (the first antenna) is placed outside the room where radio signals can reach it. The other end of the passive antenna (the second antenna) is placed inside the room. These antennas and cable provide a path way so radio users can communicate inside and outside the room.

If a radio user can receive and send signals outside a building but not from inside: a passive antenna maybe the solution.

Passive antennas are an inexpensive way of overcoming penetration issues.

Repeater

A repeater is an electronic device used to increase the distance and quality of radio broadcasts. A repeater works by receiving a radio signal on one frequency and re-broadcasting that signal on another radio frequency.

A specific channel on a commercial grade two way radio can be programmed to transmit on one frequency and receive on a different frequency. For example, channel 1 can be programmed to transmit on 450.00 MHz. The same radio can be programmed for channel 1 to receive on 455.00 MHz. When this radio is receiving on channel 1 it is receiving at 455.00 MHz. When this radio is broadcasting on channel 1 it is transmitting at 450.00 MHz.

The repeater picks up the radio's transmission at 450.00 and simultaneously rebroadcasts the signal at 455.00 MHz. Other radio users in the area hear the broadcast on 455.00 MH and respond on 450.00 MHz.

Repeaters work well in extending radio range. Suppose you and your partner are too far apart to receive each other's radio signal. Now suppose there is a repeater located between you and your partner to boost the signal. Presto you're communicating.

Repeaters work well at changing "the line of sight." Suppose you and your partner are standing on either side of a mountain. Your radio signal cannot penetrate the mountain and you're not able to communicate. Now suppose there is a repeater on the top of the mountain. Your radio can "see" the repeater's antenna and your partner's radio can "see" the repeater antenna. Presto you're communicating.

Repeaters come in sizes ranging from just a couple of watts to over 100 watts. Just like radios, the repeater's antenna is critical to the performance.

Trunking

A repeater is a single channel device. Repeaters can only receive on one frequency and send on one frequency. Consequently a single repeater can serve a limited amount of radio users. Typically a single repeater can serve about 75 radio users. If more than 75 people are using a repeater the channel becomes overloaded and users can't get a turn sending their message.

Sometimes a second repeater can be added. The radio users are divided by the work they do, their department or the area they are working in. Some workers use a channel on one repeater and other workers use the other repeater. By doing this the 2 repeater serve about 150 radio users in total. A third repeater could serve another 225 radio users.

A trunking system links 2 or more repeaters and allocates a radio signal to whichever repeater is not in use. This resource allocation increases the amount of radio users the system can serve. For example, while three repeaters can effectively serve 225 radio users, a three repeater trunking system might serve as many as 1000 radio users.

While all commercial grade radios can be programmed to use a repeater only special (trunking capable) radios can be programmed to use a trunking system. (Radios that can be programmed to use a repeater but not a trunking system are called conventional radios. Only “trunking radios” can be programmed to operate on a trunking system.

The most popular trunking protocols are LTR and Passport. A radio has to be specifically enabled to use LTR to use an LTR trunking system. A radio has to be specifically Passport enabled to use the Passport trunking system. Police, fire and other public safety departments are the typical users of trunking systems.

Repeaters and trunking systems can be equipped with a telephone interconnect. A telephone interconnect allows regular analog telephone calls to be sent through the repeater. This telephone interconnect option is particularly useful in areas where cell phone coverage is poor. Another application for the telephone interconnect is for transferring a telephone call to a radio when the person receiving a call is out of their office, out on campus in the plant or otherwise away from a phone.

Repeaters and trunking systems can improve radio signals inside a facility or extend the effective range for using radios to across town, throughout the county or even across the state.

Radio Over Internet Protocol

Radio Over Internet Protocol (ROIP) connects any two or more sites using two way radios. Distance is not a factor with ROIP. The ROIP system has 8 parts starting with a hand held or mobile radio. The hand held radio sends a message to a base station. The base station is connected to an internet adaptor device. The internet adaptor device converts a radio wave into a signal that can be transmitted over the internet. The internet adaptor device is connected to a computer (laptop, note book or desktop all work with this system) by way of a cable and USB plug. The signal is sent over the internet to one or more receiving station.

The receiving station is similarly equipped with a computer, internet adapter device, and a base station that can broadcast to hand held or mobile radios in the receiving area.

Because radio signals are converted to internet protocol the ROIP system can include VHF, UHF 800 MHz or any combination of signals and achieve seamless

communications. The sending and/or receiving computer can be stationary or operated using an air card.

The ROIP system is an affordable solution for universities or hospitals with multiple campuses or any organization that needs to communicate between distant locations.

Licensing

The Federal Communications Commission (FCC) governs private and public radio communications. The FCC requires all radios be licensed with a few exceptions. The noteworthy exceptions are Family Radio Service (FRS) radios and Multiple User Radio Service (MURS). Another exception to the rules of licensing is the General Mobile Radio Service (GMRS which can be licensed with a short form and nominal fee of $80 for 5 years of licensing.

All the exceptions come with limitations. For example, FRS radios can broadcast at a maximum of one half watt and can be used for personal and family use only. Commercial use of these radios is not allowed.

The FCC licenses the radio user not the radio itself. For example, the FCC will issue a license to the Jones Company to use a specific frequency or group of frequencies to be used in a specific geographic area. The Jones Company may be using 2 radios or 200 radios and the license would be the same.

A typical FCC license is for the use of 5 frequencies for 10 years. You can learn more about FCC licensing and download forms at www.fcc.gov. Unfortunately applying for a license is confusing and time consuming. Organizations like Enterprise Wireless Alliance (www.enterprisewireless.org) can help you get licensed for a few hundred dollars including 10 years of FCC fees.

Accessories

The most popular accessories for two way radios are audio accessories, protective cases and special charging units.

Audio Accessories

Speaker mics come in several different styles and sizes but in general plug into the radio's audio port (typically located on the top or side of the radio) and clip to the user's collar, shirt pocket or on their shoulder epaulet.

Generally this type of speaker mic is called a "shoulder style speaker mic." Speaker mics allow the user to send messages without taking the radio off their belt. Additionally speaker mics place the sound closer to the user's ear in a noisy environment.

Some radios are equipped with a voice activation feature (VOX). When voice activation is turned on the radio becomes sensitive to sound and opens or broadcasts without the need for any one to push the “push to talk” button. Speaker mic and earpieces are available that include the voice activation feature.

“Loudness” is a subjective term that describes your ear’s perception of a sound. On the other hand, “Volume” is an objective term that describes the amount of air that is being effected by sound. For example, if someone snapped their fingers close to your ear it would seem loud. However you would not be able to hear this sound in the next room.

Volume is demonstrated in a movie theater when one of the actors whispers. The whisper fills the entire theater (it moves a large volume of air). Here we have lots of volume but very little loudness.

Earpieces fit around the ear like eyeglasses fit around your ear and have a small microphone that clips to your collar. Some earpieces actually fit in the ear canal. Both of these accessories provide loudness (while a shoulder style speaker mic produces volume).

One of the considerations in choosing an earpiece or speaker mic is to determine if you are trying to overcome loudness or volume.

An additional advantage to the ear piece is privacy. By wearing an earpiece others in the immediate area will not be able to hear what is being broadcast on the radio. This is particularly useful in hospitals, schools and for tour guides.

Protective Cases

Protective cases come in nylon, plastic and leather and are a great way to protect your radio. The swivel on most holsters and cases make it easy to remove the radio from your belt. When you use a case and a speaker mic the chances of dropping the radio are greatly reduced. Additionally some cases completely enclose the radio. This protect the radio against extreme conditions where there is substantial risk from moisture or airborne dust and dirt. In these circumstances the less costly speaker mic is sacrificed to protect the radio.

Charging Units

Most radio manufacturers and aftermarket providers offer multiple unit battery chargers. These charging stations are popularly referred to as “gang chargers.”

Gang chargers are a great way of keeping track of radios by charging them at a central location. The downside of gang chargers is their relatively high cost and if the gang charger becomes faulty the ability to charge all radios has been interrupted.

Chargers are available specifically for conditioning nickel cadmium and nickel metal hydride batteries. The chargers (or sometimes the radio itself) will have a button to press that completely discharges the battery. The process of complete discharge and re-charging is called “conditioning” and can add years of life to your battery.

Military Specifications, IP and Intrinsically Safe

The Defense Logistics Agency is the US Department of Defense’s largest combat support agency. The Defense Logistics Agency provides guidelines and criteria for supplies and materials that are used by all branches of the US Military. These guidelines and criteria as they apply to commercial grade radios are referred to as “Mil Spec Radios.” The guidelines call for radios to be able to withstand shock, vibration, humidity, temperature extremes and a host of other criteria. Passing “Mil Spec” testing is an indication of a superior product.

The European Committee for Electro Technical Standardization offers a method for classifying the degree of protection provided by an enclosure. These methods are designed to numerically rate an electrical product on the level of protection its enclosure provides. By assigning different number codes, the product’s degree of protection can be identified quickly and easily. In the code IP54, for example, IP (intrusion protection) identifies this standard, the 5 describes the level of protection from solid objects, and 4 describes the level of protection from liquids. A radio that meets the IP54 standard can withstand blowing dust and rain.

Intrinsically Safe radios are certified by Factory Mutual Global to not spark. Factory Mutual Global is an industrial property insurance and risk management organization specializing in property protection. Factory Mutual Global establishes the criteria for certification and insures against the loss if there is a mishap.

Intrinsically Safe radios are offered by the major radio manufacturers and are used in areas where there is a risk of explosion, ignition or fire.

Radio Manufacturers and Brands

There are a dozen or so manufacturers of two way radios. The list includes Motorola, Kenwood, ICOM, Tekk International, Ritron, Quantun Electronics, Vertex and others. Additionally there are more than a hundred brands of two way radios that are manufactured and private labeled by other companies.

Some years ago you could shop by company to find the best two way radios. Motorola truly dominated the market place. Motorola radios were durable and full featured. Motorola still enjoys a good reputation for their commercial grade radios. However there are now several leading brands (ICOM, Tekk International, Quantun Electronics, Kenwood and Vertex) that offer comparable and sometimes superior models at a much more competitive price.

Comparing radios to cell phone.... Try this on a cell phone

Sometimes we hear someone say “cell phones might be an alternative to two way radios.” They think they can combine the ability to make and receive phone calls with the walkie talkie feature that is offered by some cell phone companies.

Don’t get trapped. Here are a few things you should know before you commit your company to lengthy and expensive cell phone contracts:

- Two way radios are easier to use. Push a button and start talking.
- The right two way radios will provide better reception in hard to reach areas of your property. Cell phones are prone to dead spots or areas of poor reception and transmission. (Have you ever noticed how people have to go outside the mall or grocery store to make or receive a call on their cell phone?)
- Two way radios equipped with a “telephone interconnect” can make and receive telephone calls through your existing telephone equipment and carrier for no additional monthly charge.
- You can immediately reach everyone with two way radios. Cell phones require a separate number to call each person individually. Having to call everyone individually is completely inappropriate in an emergency.
- Two way radios equipped with “selective calling” let you speak privately with one person at a time or with everyone at once. Two way radios equipped with “selective calling” also have a caller ID display so you know who you are talking to.

- Two way radios (intrinsically safe versions) can be used in highly flammable or explosion areas without fear of sparking.

- The “man down option” available on many two way radios will send a distress signal when a worker remains horizontal for more than 30 seconds. Emergency buttons are also available on several 2 way radio models.

- Two way radios come with a multi year parts and labor warranty. Cell phones usually have warranties of only 90 days.

- After several recent natural disasters, many people have learned that two way radios continue to work in an emergency when cell phones and even land lines become useless.

- Two way radios (properly equipped) are available for use in high noise areas, dusty, dirty or wet environments, when hands free operation is necessary, when security is paramount or covert communications are required.

Two way radios are easy to use, are loaded with options, are effective in all locations and have no monthly fees or service contracts.

Two way radios are simple, affordable and reliable. Two way radios increase safety, improve efficiency and boost productivity.