The Definitive Two-Way Radio Accessory Guide
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Batteries

Batteries are your lifeline when out on the force. You know the feeling of looking at your radio and it’s not powering on. Having a battery that you can count on in emergency situations is critical for a successful operation. Each two-way radio has a rechargeable battery included and charging times differ from the manufacturer and the type of radio.

In this section, we will review everything you should (and NEED to) know when it comes to two-way radio batteries.

1. Battery Types
2. Batteries for Different Environments
3. Battery Care
4. Battery Life
Battery Types

- Nickel Cadmium (Ni-Cd)
- Nickel Metal Hydride (Ni-MH)
- Lithium-Ion
- Lithium-Ion Polymer (Li-Po)

Choosing the correct battery type is important and differ among your communication needs.

**Nickel Cadmium**

This type of battery performs best in extreme hot and cold temperatures. You don’t need to worry about leaving the battery for a long period of time because these types of batteries have a great shelf life. What that means is you can leave the battery sitting for a while and it will still perform at peak potential.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very durable, can be dropped</td>
<td>Low energy density compared to newer systems.</td>
</tr>
<tr>
<td>Over 1000 charge and discharge cycles</td>
<td>Not environmentally friendly. Contains toxic metals and is limited in some countries.</td>
</tr>
<tr>
<td>Available in different sizes</td>
<td>Needs to be recharged after stored for a long period.</td>
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## Battery Types

### Nickel Metal Hydride

These batteries are the next step up from nickel cadmium with 30% to 40% more capacity. Below are advantages and disadvantages of this type of battery.

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<td>Single storage and transport</td>
<td>20% more expensive than Ni-Cd because they are designed for high draw</td>
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<tr>
<td>Environmentally friendly, only contains mild toxins</td>
<td>Limited service life, only 200-300 cycles before the performance begins to deteriorate</td>
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<td>High maintenance, these batteries do require a full discharge to prevent crystalline formation</td>
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### Lithium Ion Batteries

These batteries are lighter and provide a higher capacity for a longer run time. The advantages and disadvantages are found below.

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<td>High energy density with potential for higher capacities.</td>
<td>Requires circuit protection. Circuit protection limits the voltage and current.</td>
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<td>Relatively low self-discharge</td>
<td>Subject to aging even if not being used. Place in a cool place at 40% charge to reduce these aging effects</td>
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<tr>
<td>Low maintenance. No periodic discharge needed because it has no memory effect.</td>
<td>Expensive to manufacture. Greater than 40% in cost to manufacture compared to Ni-Cd.</td>
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Battery Types

Lithium-Ion Polymer (Li-Po)

This type of battery has the highest capacity with no memory effect. They are typically used by law enforcement personnel because the batteries produce extended talk times which is ideal for stakeouts or undercover investigations. Many other personnel who use lithium ion batteries are people who require long battery life like casino security, military and investigative task force.

This type of battery has now been popular in powering drones and are found in mostly all of today's cell phones. They deliver high power and discharge quickly for a short period of time.

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<td>Flexible form factor. Manufacturers are not bound by standard cell formats allowing it to be produced economically.</td>
<td>Lower energy density and decreased cycle count</td>
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<tr>
<td>Light weight design</td>
<td>Expensive to manufacture once this battery becomes mass produced. The battery reduces control circuit, so it offsets higher manufacturing costs.</td>
</tr>
<tr>
<td>Improved safety. More resistant to overcharge so its less likely for electrolyte leakage.</td>
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Battery for Different Environments

Firefighters risk their lives every day running into burning houses and rescuing members of their community. The last thing on their mind is their radio batteries. Firefighters are exposed to environments where there is flammable gas and dust so it's required they use equipment that is intrinsically safe.

Intrinsically safe batteries are specifically designed to not allow for generation of heat or spark. This eliminates the risk of the batteries causing an explosion or igniting flame.

Although intrinsically safe batteries are critical for fire fighters, they are not the only ones who use intrinsically safe products. You will often see miners and oil refinery workers using intrinsically safe products.

Battery Care

• Caring for your battery is important to get the longest life and best performance from it.
• Charge the battery to full capacity, wait till 100% charged before using again.
• Use the battery soon after charge and use as much of the capacity as possible.
• Several discharges and charges are recommended to bring a new battery up to rated capacity.
• Store and charge batteries at room temperature (65°F to 75°F)
• Reduced capacity or “memory effect” may result from repeated identical shallow discharge/full recharge cycles. If such a condition is suspected, run the battery until the instrument loses all power, then fully recharge and discharge again. Repeat this cycle 3-4 times. Full usable capacity then becomes available.
Remote Speaker Microphone

Speaker Microphones can also be known as shoulder mounted microphone, lapel microphones and remote speaker microphones. These accessories improve and enhance critical radio communication. These microphones attach to the side of the radio allowing you to listen and respond without having to pick the radio up.

Who uses speaker mics?

Remote speaker mics are normally used by firefighters, police, security personnel, construction, and military. They prefer the speaker mics because they don't need to pick up the radio to hear or respond back. The convenience saves them time during uncertain and desperate times where fast action is required.

What are the features?

• Heavy Duty
• 3.5mm accessory jack
• Background noise cancelling
• Emergency button
• Kevlar reinforced cable
• Waterproof versions available
• Hi/Lo volume switch
• PTT (Push to Talk)
• 360-degree rotating spring clip
Remote Speaker Microphone

- Emergency Button
- Heavy Duty Clip (found on back of mic)
- Push to Talk
- High Low Volume Switch
- 2.5 mm, 3.5mm or 3.5mm threaded audio jack
- Knowles Audio Quality
- Kevlar Reinforced Cable
- Radio Adapter
Remote Speaker Microphone

**Speaker Microphone Positioning**

When using a microphone, special positioning is required to ensure safety and effective communication in times of need. Several problems may arise if your mic is not placed correctly on the person. Below are some ways that people wear speaker microphones.

1. **Wearing on shoulder:** Clipped to your shirt or vest. This is recommended for most law enforcement.

2. **Over the shoulder:** This position ensures the cable is tight and the speaker mic close to your head for easy access.

3. **On chest:** This is a popular position because it is placed close to your head and resting on your center of your chest.

**Watch below as Vice President of Waveband Communications, Nick Hohman, tests the waterproof ability of speaker mics by submerging one in water for 10 minutes!**
Charger

The right charger will help keep your two-way radio battery functioning properly. Many of the chargers have specialized micro-processors and algorithms that can read the chemistry of the batteries. (Ni-Cd, Ni-Mh or Li-Ion) These specialties in the chargers allow for precise, maximum-capacity conditioning charge every time.

Chargers have replacement pods that allow for changing of hundreds of different radio models and batteries. The pods are replaceable which allows the charger to still be used when charging future radios. Most changers can charge the battery with or without the radio attached.

Types of Chargers

In-vehicle chargers

If your job constantly has you on the road and still needing to communicate, in vehicle chargers are available. These chargers have vehicle power adapters that plug into the cigarette outlet in the car. Metal mounting brackets and tie-down straps are included to keep the charger in place in the car. These chargers come in handy with police or other personnel on long shifts that need the radio for long periods of time.
Charger

6 Bank Charger

This slim fit design charges 6 batteries at a time. Replaceable pods allow for different radio batteries and long-lasting charger.

Single Bank Charger

This single bank charger charges one battery at a time and is the perfect size to sit on a desk.
Analyzers and Conditioners

Analyzers will charge, condition, and analyze your radio batteries. Analyzing batteries will tell users how much life the battery has left and if the battery should be replaced. The video below will give you more detail on analyzers and the specifications.

Charge Time

The charge time for batteries is about 2-4 hours depending on battery capacity. A fast charge time is important because many people always rely on communication so waiting a long time for a battery to charge is not ideal.
Charger

Charger LED Indicator

Some chargers are designed to show LED indication of the charging status and fault conditions. Found in the chart below, charging status is indicated by green, red and orange colors while the fault conditions is a flashing red indicating a problem with the battery.

**Solid Orange:** Performing battery diagnostics

**Solid Red:** Battery charging, Less than 80%

**Flashing Green:** Battery charging, more than 80%

**Solid Green:** Battery fully charged.

If you find a flashing red LED status on your charger, three things could be happening.

**Flashing Red 1 Time:** Charge is complete but battery was under charged.

**Flashing Red 2 Times:** Battery contact is open and you need to check battery compatibility

**Flashing Red 3 Times:** Over current conditions cause by a short circuit from the battery

It is important for the battery that you solve these issues to save the life and capabilities for your radio.
Charger

How do I know which radio is compatible with my chargers?

Since every radio requires various accessories to be of compatible make for it to work properly, finding the correct accessory can be complicated. We have made a comprehensive charger guide that helps you find the right charger for your radio.

Check Out the Compatibility Guide Here
Portable Radio Adapters

Quick disconnect adapters are used widely by law enforcement agencies around the world. These adapters allow you to quickly and easily connect and disconnect from your two-way radio. These adapters are ideal for uniforms where they quickly detach from the radio, so you do not need to take off the uniform to remove accessories. Many accessories go inside the clothing for a discrete look, so adapters help remove yourself and accessories from the radio without need to undress. The adapters are quick disconnect meaning its easily able to detach itself from the radio. Our radio adapters include 6 pin and 12 pin silver hirose and a 3.5 mm threaded side mounted audio jack adapter.

They are available for all major radio models and latch on to the side of the radio. Law enforcement are not the only ones using these adapters. Security companies, casinos and retailers also commonly use these adapters.
Headsets

The Center of Disease Control has declared noise-induced hearing loss is the most common workplace injury, leaving 22 million workers exposed to hazardous sound levels. Wearing the correct noise reducing accessories will help protect you from sound levels not just at work but in various activities too.

Industries that should wear protective headsets are anyone involved in military, construction, manufacturing, and airport traffic control. That is just a short list who should be aware of their hearing while on site. If you are anywhere that you need to raise your voice to speak to someone, you may want to wear some sort of hearing protector.

Headsets limit the exposure of decibel noise to your ears. An airplane at bay has a decibel level of 140, next to a jet takeoff at 150 and a firearm at 160 decibel. There are a wide variety of headsets that protect your hearing and allow you to communicate effectively back and forth.

Types of Headsets

Duel Muff Noise Canceling

These headsets are ideal for airport professionals around loud aircraft’s or firefighters who are around loud engines and inside buildings where hearing is limited. This behind the head headset is noise canceling to protect your ears from any increase in noise levels. This also comes with a boom microphone attachment that allows you to communicate with others while wearing the headset. The in-line PTT gives you the ability to talk to others without the need to take the headset off. Our headsets are given a 24DB noise canceling rating.

Behind the Head Headset

Behind the head headsets are ideal for motorcycle police, beach police, and tactical professionals.
Carrying cases and holsters allow the two-way radio to sit comfortable and safely on your side. They are widely used and depended on by fire fighters, police and military. Cases add an extra benefit that not only protects your radio from damage but safely holds the radio, so you do not need to hold it or worry about losing it in high intensity situations.

Cases come in a wide variety of styles

The most popular case styles are,

- Belt Loop
- Swivel
- Clip
- Carrying Strap
- D Ring

A belt loop is exactly how it sounds. The belt will go though the loop found on the back of the case.

A swivel case rotates 180 degrees. This case gives you range in motion so you can move the radio when needed.

The clip, located on the back of the case, can fasten onto things like a belt, uniform and more. A strap connects to a radio holster and suspends across the body.

Lastly, cases can come with D rings found at the top that can clip onto the strap.
Cases

Cases are usually available in two types of materials

- Leather
- Nylon

Leather cases are most popular and can be made with genuine cowhide leather right here in the United States. Leather is more durable than nylon so if dependability and durability is important to you, I would choose the leather case.
Surveillance Kits and Receive Only Earpieces

Surveillance kits provide clear and private receiving conversations. Surveillance Kits are used by hundreds of federal law enforcement professionals, casinos, security, and secret service nationwide. These earpieces are helpful for needing to be discrete with communication because your audio isn't broadcasted for all to hear like the remote speaker mic.

**Types of Surveillance Kits**

- **1 Wire**
  - Microphone and PTT button on a single wire

- **2 Wire**
  - These have one wire that holds the microphone and PTT and one wire that has the earpiece and clip.

- **3 Wire**
  - One wire has earpiece with clip, the second wire holds the microphone and the third wire has a PTT that is put down the sleeve of a uniform.

**Features of a surveillance Kit**

- Knowles microphone
- Kevlar reinforced cables with braided fiber cord.
- Medical grade coiled acoustical tubes
- Hirose connectors with quick disconnect option (when needed)
- Clear acoustics
Surveillance Kits and Receive Only Earpieces

- Kevlar Reinforced Cable
- Quick Disconnect Adapter
- Knowles Microphone
- Quick Disconnect Clear Acoustic Tube
- Replaceable Ear Tips
Surveillance Kits and Receive Only Earpieces

Receive Only Earpiece

Receive-Only Earpieces can also be known as Listen-Only Earpiece. This earpiece mutes the speaker mic or radio and only allows users to hear radio communication through the coiled acoustic tube. This is still a discrete communication device, but you do not have a PTT adapter on the earpiece. This is ideal for people who do not need to communicate back to others. The cable plugs right into the radio accessory port on the radio.
Surveillance Kits and Receive Only Earpieces

How to Clean the Acoustic Tube

1. Remove the acoustic tube from the clothing clip assembly by rotating the twist connector. Inspect the tube for any blockages or foreign matter inside of the tube.

2. Disconnect the earbud, twist connector and PVC elbow from the acoustic tube. Inspect all of these parts for blockages.

3. Completely submerge the earbud, twist connector, PVC elbow and acoustic tube in warm (not hot) water for 10-15 minutes. Do not use any soap, detergent, cleanser, or any other type of cleaning chemicals.

4. Reassemble the earphone by inserting the PVC elbow and twist connect respectively into the top and bottom of the acoustic tube. Insert the earbud onto the open end of the PVC elbow.

5. Insert the straw from a can of compressed air into the hole at the end of the earphone and blow any debris or water out of the acoustic tube.

6. Pat the outside of the earphone dry with a clean towel.

7. If the steps above do not solve your issue, then you may need to replace your acoustic tube.
Antennas

When using a two-way radio you are restricted on how far you can go to still be able to communicate. Moving out of this range will cut your conversation off. An antenna can help extend and improve the range you are receiving. This is a good idea if you have employees who are consistently losing signal during the workday.

The range admitting from your two-way radio is dependent on several things. These include,

- The power of your radio: Each model of radio has a different power that can affect range.
- Where you are located: Range can drastically affect if you are inside or outside or if you are obstructed by tall buildings or trees in a forest.
- The frequency of your radio: UHF and VHF frequencies can determine the amount of range that your antenna can produce.
- Antennas design
Antennas

Types of Antennas

Stubby
These are about 3 to 4 inches long. They are meant to be short, so they do not get in the way of daily activity when wearing a radio. A drawback is that you will lose range depending on frequency of radio or antenna.

Whip
These are 7 to 8 inches long. You get better range for your radio because of the size.

Helical Coil
They come in several different lengths and are thicker than your normal antenna. You get good range and coverage.
Antennas

Single Band vs Dual Band UHF/VHF Antennas

Each radio has a desired frequency it operates on so choosing the right UHF and VHF antenna is important for the dependency of your radio. A single band UHF antenna needs to be used with a single band UHF radio while a single band VHF antenna needs to be used with a VHF single band radio. The dual band UHF and VHF antennas operate on two frequencies and can operate one at a time or both at once.

VSR antennas, Volume Surveillance Radar, provides all-weather search capabilities with high power opening and narrow width, enabling it to accurately track targets.

Quarter wave antennas get its name because its an antenna that is one-fourth wavelength of the transmitted frequency. These antennas must be connected to the ground. This antenna is also omni-directional. A half antenna is the shortest length and does not need to be connected into the ground as its already long enough to radiate properly.

ISO 9001 Certification

An ISO 9001 certification is a quality management system used by organizations to meet standards for consistency throughout products and services to meet customer requirements. Its important to have this ISO 9001 certification because it ensures consistent outcomes with each product, less waste for the company, increased efficiency, and minimizes mistakes for better quality products. Our antennas are manufactured with ISO 9001 certification, so you also get the best quality antennas every time you buy.
Ear Inserts/ Tips/ Plugs

Ear inserts, plugs and tips work with any acoustic tube by removing the standard rubber tip and replacing it by pressing the ear mold onto the plastic elbow fitting acoustic tube. Ear inserts can also be known as a semi custom ear mold. These flexible ear inserts are made from flexible and comfortable hypo-allergenic plastic that conforms to the users’ ear. They also allow for the user to hear ambient background noise so you can still be aware of your surroundings.

Features of Ear Inserts

- Custom ear inserts are made in 3 different sizes to fit all types of ears (small, medium, large)
- Available for right or left ear
- Fit securely over an acoustic tube elbow
- Works with surveillance kits, receive only earpieces and acoustic tubes

These ear inserts, tips, and plugs are used widely by public safety, transportation, manufacturing, security, construction and law enforcement.
Ear Plugs

Ear plugs are essential for the safety of our hearing. Did you know hearing loss is the number one cause of injury in the workplace? That’s why wearing ear plugs is important and ensuring a proper fit. You should use ear plugs if you work in manufacturing, construction, military or any place where there is a loud and impulse noise.

3M have manufactured ambient listening earplugs that help protect your hearing and improve auditory environmental awareness. The 3M TEP-100 Peltor Tactical Ambient Listening Earplugs have advanced features designed for law enforcement, military, construction and manufacturing personnel. The TEP-100 is compact, lightweight and rechargeable earplugs with ambient listening.

Some features of these advanced ear plugs are

• Rechargeable with up to 16 hours of operation
• Reduce loud noise
• IP67 water resistant
• Innovative microphone port design helps protect earplug against water
• Compatible with Personal Protective Equipment like hardhats and helmets
• Optional earplug cord that attaches to the ear plugs.
• Comes in Ultra fit Tip, Triple C Communication Tip, and Skull Screw Tip.