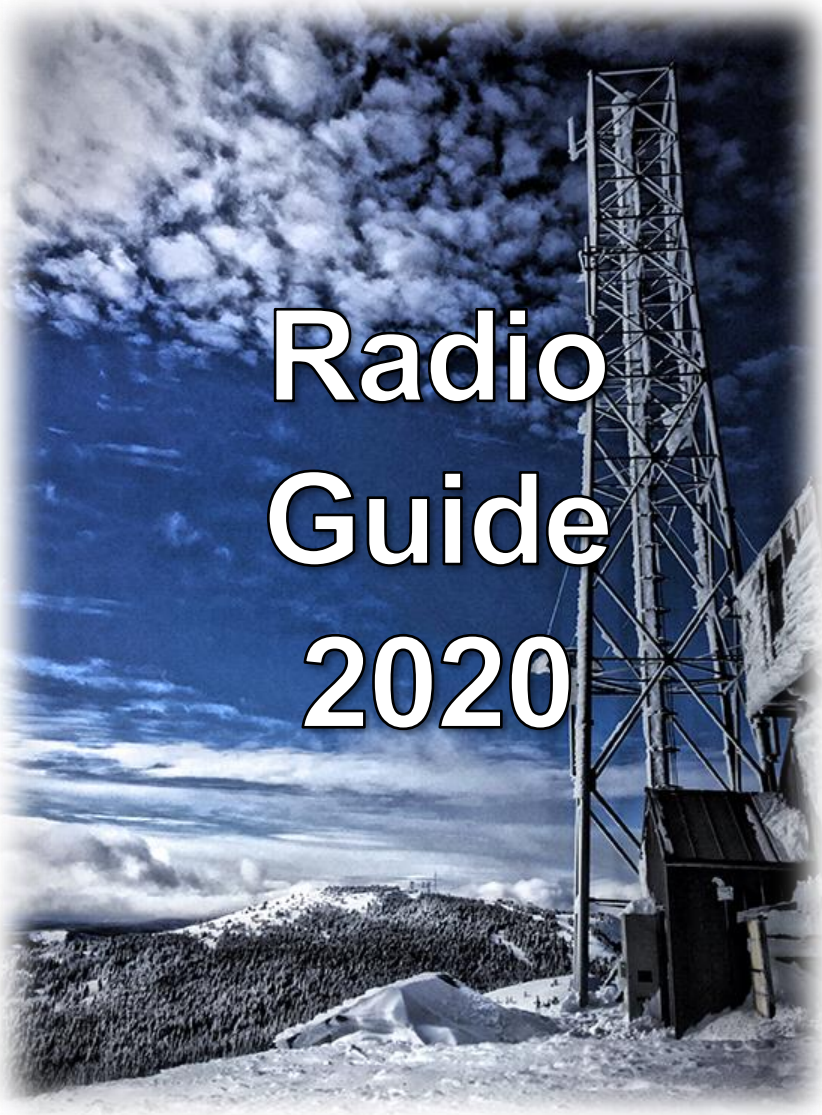
WASHINGTON STATE DEPT OF
NATURAL RESOURCES



Radio Guide 2020

Updated March 3, 2020

THE RADIO AGREEMENT

DNR operates a statewide two-way radio system. The Federal Communications Commission (FCC) permits us to share the use of our radio system with other public safety organizations, if those organizations would otherwise be eligible for licenses in the same frequency band. Most fire, emergency medical services and law enforcement organizations are eligible. We encourage our public safety cooperators to take advantage of that system when communicating with DNR during an incident response.

To obtain current system information and apply for a frequency sharing agreement, please send us an email with the following information:

- Organization name
- Email address
- Street address
- Phone number
- Brief description of your organization

Please include the subject line 'Radio Agreement Form Submission.' In return, we will email you a Cooperators Frequency Guide and System Sharing Agreement. Annual and emergency updates will be emailed to your organization.

Our email: radio@dnr.wa.gov

Our phone: 360-902-1480

http://www.dnr.wa.gov/radio

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2. DNR RADIO SERVICES

The DNR Radio Operations program, within the Engineering & General services Division, supports radio communications technology for the agency.

The program is based at the Tumwater Compound. Local support is provided by radio technicians at Colville, Ellensburg, Chehalis, Sedro Wooley, and Forks.

Radio services are also provided to the Washington State Parks Commission and to the Washington Department of Fish & Wildlife.

During Fire Season, program personnel are routinely dispatched in support of wildfire and other incidents.

RADIO REPAIRS

The Radio Operations Program strives to address all radio repairs in a timely and cost-effective manner. These services can be accessed by contacting the program office in Tumwater and by contacting the local technicians.

After hours call-out for emergency repairs must be authorized by program management. The most recent version of the Radio Call List is on SharePoint.

- **SharePoint — Engineering & General Services > Team Sites > Radio Operations**

USER TRAINING

User training and information is available from the Radio Operations Program. These services can be accessed by contacting the program office in Tumwater, by contacting the local technicians, and by accessing resources posted on SharePoint.

- **SharePoint — Engineering & General Services > Team Sites > Radio Operations > Radio User Information**

REPORTING OF RADIO SYSTEM PERFORMANCE

The Radio Operations program maintains the DNR statewide radio system with the goal that each DNR radio user would be able to communicate effectively wherever their work requires them to travel. Because the DNR work area is so vast and involves challenging terrain, coverage gaps remain.

While the radio system performance can be analyzed with computer models, the most meaningful data comes from DNR employees reporting their experience in the field.

Field reporting of radio system performance provides invaluable information for planning radio system adjustments to improve employee safety. Please use the outline below to record your experience and identify areas where improvement is needed.

Field Report Message

Please provide the following information to identify radio system performance issues. Send the report by email to <radio@dnr.wa.gov> or ask your dispatcher to submit the report

- **Reporting Unit** — field unit name / number
- **Date / Time** — indicate when the observation occurred
- **User Location** — indicate where the observation was made. Identify the location by latitude / longitude or section / range / township and road location.
- **Radio Channel / Repeater Name** — indicate which radio channel was being used.
- **Message Quality** —use the following rating scale to describe radio system performance:
  - **0** = message **not received**
  - **1** = message **unusable**, heard but not understood
  - **2** = message **usable** with great effort; repetition often required
  - **3** = message **usable** with slight effort; some repetition required
  - **4** = message easily **understood**; little noise or distortion present
  - **5** = message is **perfect**; no noise or distortion
- **Talk-Out / Talk-In** — indicate which the report relates to:
  - How well the dispatcher is heard by the field unit (Talk-Out)
  - How well the field unit is heard by the dispatcher (Talk-In)
  - Or communications in both directions.
- **Portable or Mobile** — indicate the type of radio being used.

3. YOU ARE A RADIO OPERATOR

In the United States, the Federal Communications Commission (FCC) regulates the use of radio devices — that includes everything from television and cell phones to garage door openers and two-way radios. The FCC rules define technical standards and operating procedures; many of those rules relate to international treaties. Every DNR employee that uses our radio does so in keeping with the FCC rules.

You are a ***Radio Operator*** every time you send or receive a message with a radio. Whether using a portable radio, a mobile radio, or a dispatch console, **you are Operating a Radio Station**. Realize that everyone is listening: your coworkers, your boss, other agencies, the news media, and the public. Every day thousands of Radio Operators perform their duty in accord with well-established international standards; they make work more efficient and frequently save lives. As a radio operator, your professionalism and skill are on display every day.

This manual is your guide to the DNR radio system and the use of DNR radios. The information in this manual will enable you to effectively communicate with your coworkers and coordinate assistance in an emergency.

NO PRIVACY

Always keep in mind that every message you send by radio is open to the public. Without using sophisticated encryption, there is no expectation of privacy.

- Always keep messages short and directly related to DNR business.
- Never discuss personnel or payroll issues, complaints, criticism, or disciplinary issues.
  - It is better to say, "*See me when you get back to the office*."
- Never discuss the medical information of an individual. The federal HIPAA rules place significant limits on the disclosure of private medical information.
  - Do NOT say: *"[Name] has a leg wound."* Instead say: "*A male subject has a leg wound."*

Golden Rule: Always consider how the message you are about to send will play on the evening news.

SHARED RADIO SYSTEM

The DNR statewide radio system is shared with other agencies. Radio equipment and infrastructure is costly technology that requires ongoing maintenance and repair. Sharing the radio system is an efficient use of public funds.

That the radio system is shared means that DNR employees will hear other radio users from time to time. Provided all radio users adhere to the radio rules and follow established procedures, sharing will have minimal impact on DNR daily operations and emergency response responsibilities.

4. Radio Rules

DNR radio use is governed by the Code of Federal Regulations, Title 47, specifically Part 90, known as the FCC Rules. Those rules are based on the Communications Act of 1934 and on international treaties.

Your duty as a Radio Operator is to understand and follow the FCC rules that relate to how radios are used. Proper radio operation is not difficult; the rules define an expected level of professionalism and common courtesy.

DNR Business Only

As a condition of FCC frequency licensing, DNR is required to

> *Exercise direction and control to ensure that radios are used only for the permitted purpose, only in a permissible manner, and only by persons with authority to use and operate the equipment."* [§90.403 (a)]

As a DNR employee:

- You are authorized to operate radio equipment.
- You must only use the radio for DNR business.
- You must only use the radio according to FCC rules and DNR procedures.

Frequency Licenses

The FCC assigns radio frequencies on a shared basis. While DNR is licensed to operate on certain radio frequencies that authority is not exclusive — DNR does not own the frequency — and other users are often licensed to use the same frequency in different locations.

DNR radios are programmed with a large number of frequencies (channels). Specific frequencies are authorized for use within specific service areas. Transmitting on a frequency outside the licensed service area is a violation and may interfere with another radio user.

Procedure Rules

All Radio Operators follow procedures that are defined in FCC rules.

- Keep radio messages as short as possible. [§90.403 (c)]
- Emergency communications has priority. [§90.403 (d)]
- Listen for other users before transmitting. [§90.403 (e)]
- Identify yourself and the radio station you are using. [§90.425 (a)]

Call Signs

FCC rules require that all Radio Operators regularly identify the radio station they are operating [§90.425 (a)]. Among other reasons, this is the most effective way to identify and thereby coordinate the resolution of any radio interference issues.

DNR has a large number of call signs; fortunately, the FCC rules allow the use of a single call sign for large radio systems like DNR.

All DNR radio stations – repeaters, mobile radios, and portable radios – are identified with a single call sign: K E 9 6 6 9 .

For consistency, the following guidelines will apply:

1. If a Dispatcher is involved in the message exchange, whether the call was initiated by a field unit or by the dispatcher, the dispatcher is responsible for announcing the call sign.
2. If a Dispatcher is not involved in the message exchange, the last unit to transmit will end their message by announcing the call sign.
3. The call sign may be omitted during periods of continuous radio messages, but must be announced at least once every 30 minutes. (If you don't recall hearing the call sign for a while, send it at the end of the next call.

PROGRAMMING OF RADIOS

FCC rules authorize DNR to only program radio frequencies according to the licenses authorized by the Commission.

Except for frequencies used in accordance with §90.417, ***no person shall program into a transmitter frequencies for which the licensee using the transmitter is not authorized.*** [§90.427 (b)]

Shared Use of Radio Systems

One exception to this limitation is the sharing of radio systems, as authorized under §90.179. That section requires a written agreement before other agencies may program DNR radio frequencies and before DNR may program frequencies licensed to another agency. Please see page 2 for information on Radio Agreements.

DNR maintains agreements with federal, state, and local agencies that provide for the shared use of radio systems. Information about channels authorized for shared use is included in the annual radio channel information documents, from the local Radio Technicians, and from Region and District managers.

Emergency Communications

The other exception provides for a message to be sent by any means during serious emergencies.

> *Any station licensed under this part may communicate with any other station without restriction as to type, service, or license when the communications involved relate directly to the imminent safety-of-life or property.* [§90.417 (a)]

This broad exception allows any means necessary to communicate when there is immediate danger. It does require that the exceptional use must cease promptly when the imminent danger ends.

5. TALKING ON THE RADIO

Talking on the radio is different than speaking with someone by telephone or face-to-face. Differences in audio quality and noise can make understanding difficult. Thus, how you speak will improve how well someone else understands your message. Using well-established radio procedures ensures that your message has the best chance of being understood by the receiving radio station.

RADIO PROCEDURES

Radio operators worldwide follow international procedures that define the process of communicating on the radio. Practicing proper radio procedures will mark you as a professional radio operator.

When making a telephone call you (1) dial a number, (2) wait for the other party to answer, (3) then information is exchanged, and finally (4) you hang-up to end the call. Radio procedures follow a similar pattern.

DNR uses the following radio procedure, which follows the international standard. In which most calls have three parts:

- **Establish the Call** — the calling station initiates the call.

1- Station Called	*2-Station Calling*	*3-Radio Channel*
"Engine 12"	**"This is Engine 24"**	**"On Capitol"**

- **Respond to the Call** — the station being called confirms contact.

1-Station Called	*2-Station Calling*	*3-Acknowledge*
"Engine 24"	**"This is Engine 12"**	**"Go Ahead"**

- **Exchange Information** — one or more short messages are exchanged.
  - Formally, Station ID is included.
  - Informally, the sequence may be abbreviated, only sending the message part.

1-Station Called	*2-Message*	*3-End*
"Engine 24"	**"Meet me at XYZ"**	**"Over"**

- **End the Call** — this tells other radio uses that the call is complete and the channel is available for use.

1-Station ID	*2-End Contact*	*3-Call Sign*
"Engine 24"	**"Clear"**	**"KE9669"**

PLAIN LANGUAGE

Speaking in plain language is the best way to communicate clearly.

Radio codes were invented to shorten messages and reduce the time and effort required for sending and receiving.

Unfortunately, codes and jargon can create confusion; codes have different meanings for different users and agencies. Therefore, plain language is the nationally accepted standard for radio communications.

It should go without comment: Profanity has no place in professional radio use.

SPEAK TO BE UNDERSTOOD

As a Radio Operator, how you speak can significantly improve how well the receiving station understands the message.

- **Think before Talking** — formulating the message in your mind as you reach for the microphone helps ensure a smooth and clear delivery.
- **Listen before PTT** — if you start talking while someone else is sending a message neither message will be understood.
- **PTT and Then Inhale** — begin to inhale as you press the push-to-talk (PTT) button; this fraction of a second gives the radio system time to activate.
- **Speak Slowly** — using an even pace, slower than you would in face-to-face conversation, improves clarity and allows the other operator to make notes.
- **Enunciate Clearly** — pronounce each syllable clearly and distinctly.
- **Avoid Contractions** — saying, “I am going,” is easier to understand on the radio than, “I’m going.”
- **Use Standard Words** — even when there is interference, standard words are more readily recognized by the listener.

RADIO WORDS

Certain words and phrases are international standards for radio communications and have very definite meanings. They are used to improve understanding.

For example, the choice of phonetic words for the alphabet was made after thousands of comprehension tests involving 31 nationalities. The choice was based on the likelihood of a code word being understood in the context of other words and the presence of background noise.

Law enforcement units use a different phonetic alphabet (Adam, Boy, Charles, David, etc.). In practice, even if you misspeak, using phonetic spelling helps get the message across.

The following words and phrases are used in radio communications for clarity and to keep messages short.

- ***Affirmative*** — Yes
- ***Break*** — Signals a pause during a long transmission to open the channel for other transmissions, especially emergency traffic, to get through.
- ***Break-Break*** — Signals to all listeners on the frequency, the message to follow is priority. Almost always reserved for emergency traffic.
- ***Clear*** — I have finished talking to you and do not expect a reply.
- ***Come in*** — You may begin speaking now
- ***Copy*** — I heard what you just said; ok; all right. (See: Rodger)
- ***Disregard*** — cancel the message I was sending
- ***Go ahead*** — Send your transmission.
- ***Mayday*** — International signal of life-threatening emergency.[1] (*The call is always given three times in a row — "Mayday Mayday Mayday" — to prevent its being mistaken for some similar-sounding phrase under noisy conditions.)*
    - DNR users should rely on "plain language" and would make the following call: "*Disptach this is Engine 12, I have an Emergency."*
    - NOTE: **Making a false distress call is a Federal Felony.**
- ***Negative*** — No. (It is longer and more easily understood in a noisy message.)
- ***Ready to Copy?*** — Write down (i.e. "Are you prepared to copy".)
    - "Go Ahead," is the response when ready to write.
    - "Standby" is the response if not ready to write.
- ***Repeat*** — resend your last message; i.e. the message was not understood or received clearly.
- ***Standby*** — pause for the next transmission.
    - I can't respond right now, please wait and I'll get back to you.
    - I do not have the answer or information at hand, I will attempt to get the answer or information requested shortly.

[1] Mayday is from the French "m'aider", a shortened version of "venez m'aider," which means "come and help me".

FYI: "SOS" is the international emergency signal for mose code. Contrary to myth, it is not an acronym. Rather, it is the shortest code message (9 bits) and is easly remembered.

Phonetic Alphabet

The 26 phonetic words in the International Radio Spelling Alphabet are:

Alfa	**Bravo**	**Charlie**	**Delta**	**Echo**	**Foxtrot**
Golf	**Hotel**	**India**	**Juliet**	**Kilo**	**Lima**
Mike	**November**	**Oscar**	**Papa**	**Quebec**	**Romeo**
Sierra	**Tango**	**Uniform**	**Victor**	**Whiskey**	**X-ray**
Yankee	**Zulu**				

Numbers

Numbers can be difficult to hear and understand on the radio. It is important to speak numbers slowly and to over-emphasize the syllables.

For example: *"Thu-ree, Six, Ze-ro"* is the area code for Olympia.

Remember, "zero" is a number"; "O" (oh) is a letter.

6. Using Radio Equipment

As a Radio Operator you are responsible for the care and proper use of radio equipment. Your life and the lives of your coworkers may depend on that equipment functioning properly in a crisis. Your professionalism is on display in the handling and use of radio equipment.

Speak Directly Into The Microphone

Speaking close to the microphone greatly increases the audio quality. The sound level increases **four times** when you cut the distance in **half**.

The Antenna Must Be Vertical

DNR radios antennas are vertically polarized. Holding the antenna horizontally reduces the received signal by **half**.

SPEAKER MICROPHONES

Speaker Microphones are an accessory that allows the Radio Operator to receive and transmit without removing the portable radio from its carry case. This is convenient, particularly when moving around obstacles and working with both hands.

However, the effectiveness of the radio antenna is affected by being carried against the body. The body acts as a shield to radio signals, absorbing more than 75% of the transmit energy[2].

In many situations this loss of transmit energy will not hinder communications. The signal loss will be significant for locations where coverage is marginal.

If you experience difficulty communicating, getting the radio out of the carry case and into your hand will provide a very noticeable improvement in communications.

HANG UP THE MICROPHONE

Unintentional transmissions will tie up a radio system and prevent other users from communicating. While frustrating and annoying during routine operations, jamming the radio system in this way can be life-threatening in an emergency.

Radio operators neglecting to return the microphone to its proper hanger is the leading cause of unintended transmit that jam radio systems.

A radio microphone left on the truck seat can easily be squeezed by other stuff, which presses the push-to-talk switch. This unintentional transmission has two avoidable consequences:

1. Unintended transmit allows everyone to listen to the conversation taking place in the truck. It may be regrettable that others overhear a conversation that was not intended for broadcast.
2. Far more important, unintended transmit may jeopardize the lives of other DNR employees or jeopardize public safety by preventing use of the radio system when needed.

Unfortunately, because their radio is transmitting rather than receiving, the Radio Operator responsible for the jamming is the only one who cannot hear the interference. Therefore, it is a big deal that you hang up the microphone.

[2] While impacting radio communications, this energy absorption is NOT a health risk because the transmit energy level of a portable radio is far below the risk level.

CARE FOR YOUR RADIO EQUIPMENT

The use of two-way radio equipment helps make work efficient and safer for DNR employees and for the public. The replacement value of a mobile radio is between $2500 and $3000. The replacement value of a portable radio is between $1200 and $2000. Radio equipment is a significant investment of public funds that you, as a Radio Operator, are responsible to safeguard.

- **Keep your radio equipment safe.** Avoid setting your equipment where it could fall or be damaged. Carrying cases, chest packs, and other protective holders are recommended for portable radios.

  DO NOT USE A PORTABLE RADIO ANTENNA AS A HANDLE

- **Keep your radio equipment clean.** While it is true that hard-work and dirt go together, protecting your equipment and periodic cleaning will extend its life. Gentle brushing and wiping with a damp cloth is usually sufficient.
- **Keep your radio equipment secure.** Because of its value, radio equipment can be attractive to thieves. Be aware of your surroundings and the location of your equipment to avoid creating an opportunity for theft.

RADIO BATTERIES

Portable radios are completely dependent on batteries; a bad battery will render a good radio useless.

Rechargeable Battery Packs

Lithium-ion battery packs provide greater energy capacity with smaller size and weight than the nickel-cadmium batteries that were used in the past. However, because of the their unique chemistry, lithium-ion batteries should never be placed in a charger designed for nickel-cadmium batteries.

Lithium-ion battery packs should be recharged regularly. This is better for the battery than draining it completely. “Battery memory” is no longer an issue. If you do drain the battery completely, place it in the charger for the full charge-cycle.

Rechargeable battery packs have a limited number of charge-discharge cycles. Rechargeable batteries must be disposed of properly. Your local Radio Technician will help determine when your battery should be replaced and will help you with the proper recycling of rechargeable batteries.

Refillable Battery Packs

Also referred to as clam-shell batteries, refillable battery packs use disposable AA batteries. These are used extensively during fire operations.

Alkaline AA batteries have a long shelf life, so carrying a clam-shell is a good backup for a rechargeable battery pack. Carrying extra AA batteries in your pack is a prudent precaution.

7. Radio Basics & Terminology

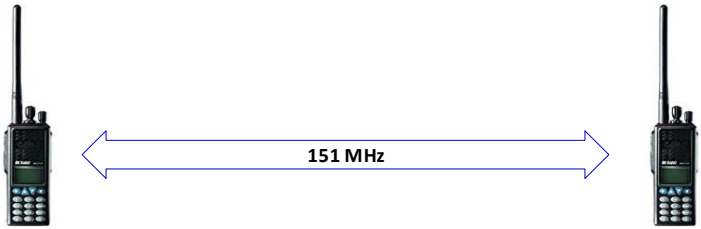
A two-way radio, a cell phone, a television, or a garage door opener are all radios that do the same thing. Various devices differ only in the type of information they send and receive and how they convey the information.

Simplex Operations (Direct)

The most basic configuration of radios is when all radios transmit and receive on the same frequency. It's called simplex because it uses a single frequency and communicates in one direction at a time.

The advantage of simplex operations is that it does not rely on additional devices. Simplex works well for unit-to-unit communications over short to moderate distances.

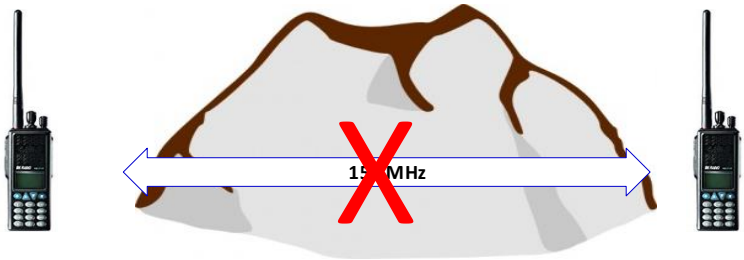
DNR Common is a standard simplex channel in all DNR radios. Information about this and other simplex channels is provided in chapter 0 of this booklet.



This illustration shows two units communicating with each other on a simplex channel. Both radios send and receive on the same frequency.

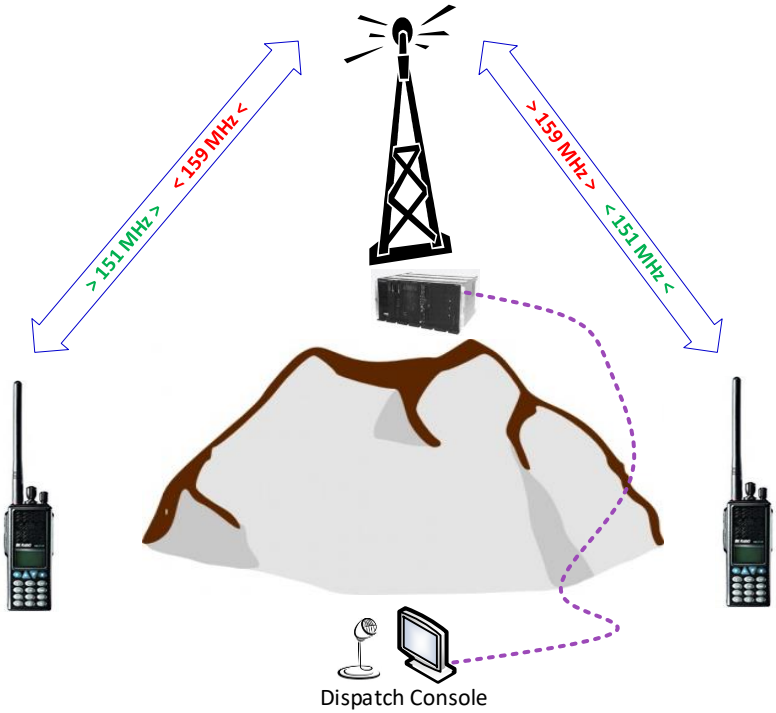
Simplex channels are appropriate for line-of-sight operations. In some situations a simplex channel may communicate for many miles, or even more than 100 miles; in other situations the range of simplex channel could be less than a mile.

The limitation of simplex operation, as illustrated below, is that terrain can block communications between two user radios. While radio will penetrate forest cover and bend around some obstructions, significant terrain cannot be overcome with simplex radio channels.



REPEATER OPERATION (RADIO RELAY)

A radio that receives on one frequency and simultaneously retransmits on another frequency is a radio repeater. This is called duplex operations because it is sending and receiving at the same time.



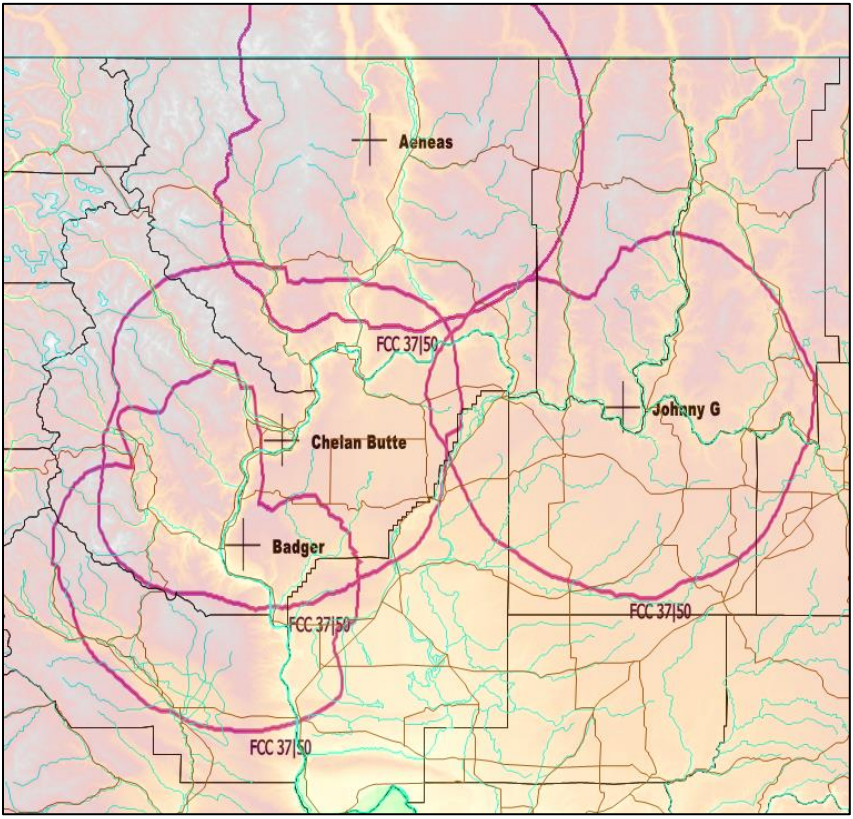
This illustration shows the advantage of the repeater in overcoming a terrain obstacle. All radios that can communicate with the repeater can communicate with each other. A repeater provides communications where a simplex channel would be blocked by terrain.

However, every repeater has a limited coverage area no matter where it is installed. A communications satellite is a radio repeater with a very high location. The coverage area for a satellite can be almost half the planet, but not the other half. No matter where it is installed, the coverage area of a radio repeater is limited by terrain.

MULTIPLE SITE RADIO NETWORK

To communicate beyond the range of a radio repeater requires linking or “patching” multiple repeaters so messages received by one repeater are retransmitted by other repeaters. Patching may be configured manually by a

dispatcher or automatically by the radio system; automatic linking is a feature of advanced radio systems. (That is how your cell phone works.)



As an illustration of the need for multiple radio sites, this map shows the service contours of four radio sites. (This is a computer model that predicts radio performance.)

The DNR statewide radio system is a network of radio repeaters that are connected to dispatch centers that support each region and to the Emergency Operation Centers (EOC) in Olympia and the backup EOC in Tumwater.

As the DNR statewide radio system does not use automatic patching, as a Radio Operator you will need to change radio channels depending on location to access the appropriate radio repeater.

Specific information on how to access the channels in the radios used by DNR is provided in chapters 8, 9, and 10 of this booklet

Information on selecting the correct radio channel for a given location is included in the annual radio channel information documents, which is available on

SharePoint, from the Radio Operations program, and from your local Radio Technicians.

SQUELCH SETTINGS

All radios rely on sensitive receivers. When not receiving a transmission, the receivers pick up the background radio frequency noise. It would be very annoying if this noise were constantly playing from the radio speaker. The "squelch circuit" solves this problem by muting the receive audio when no signal is present. When the level of background noise rises above a set value, the audio is muted and the background noise is not heard on the radio speaker.

An improperly adjusted squelch setting can hinder communications. Squelch settings should be adjusted just high enough that background noise is muted but no higher. **Adjusting the squelch setting too high can block weak radio signals resulting in important messages being missed.**

TONE OR DIGITAL CODED SQUELCH

Abbreviated as **Tone Squelch** or **Digital Squelch**, this feature mutes unwanted signals and interference.

- The tone or digital code is added by the transmitter and is decoded by the receiver.
- The receiver un-mutes when the proper code is received; signals without the proper code remain muted.
- The tone or digital code signal is not heard on the radio speaker.

Different vendors have different trade names for coded squelch. You may hear these names or abbreviations in discussions of radio equipment.

- Motorola calls it "Private Line" or "Digital Private Line" (**PL** or **DPL**)
- BK Technologies calls it "Code Guard" (**CG**)

You may hear a channel referred to as being "**toned**", which means tone coded squelch or digitally coded squelch has been implemented.

Monitor Function

FCC rules require monitoring the radio channel before transmitting. To meet this mandate requires disabling tone coded and digitally coded squelch because coded squelch mutes some signals.

Disabling coded squelch is commonly referred to as "**Monitor**" mode. All radios provide a Monitor Function.

- Mobile radios typically enter Monitor mode when the microphone is removed from the hanger. *(This is another good reason to return the microphone to the hanger when it is not being used.)*
- Portable radios will typically have a button to press to enter Monitor mode or the squelch knob will be rotated to disable coded squelch.

Specific information on how to access the monitor mode in the radios used by DNR is provided in chapters 8, 9, and 10 of this booklet.

SCANNING MULTIPLE CHANNELS

The ability to receive multiple channels is very helpful in maintaining awareness of activity in your work area and to ensure you do not miss important messages. Here's a quick summary of scanning; specific information for each type of radio is provided in Chapters 8, 9, and 10 below.

Scan List

The first step in scanning is to configure which channels the radio will scan, called the scan list. While the procedure varies between radios, all radios provide a means to review the channels in the scan list as well as adding and deleting channels from the list.

NOTE: Maintaining a large scan list will decrease portable radio battery life because of the constant activity in the radio. Also, having a large scan list takes the radio longer to cycle between the channels, which raises the odds of missing a message.

Scan no more than four channels to avoid missing important information.

Scan

The radio checks for signals on channels in the preset scan list, as well as the channel selected by the channel selector knob. When a signal is detected on any of the scanned channels, scanning stops and the message is received. When the signal ends, the radio resumes scanning.

Priority Scan

Priority Scan is a useful variation of Scan. Like regular scan, the receiver will stop on any active channel in the scan list. However, it will continue to check the priority channel for activity. When receiving a scanned channel, the radio will switch to the priority channel if a message is received on that channel.

Nuisance Channel Delete

It can be quite annoying when a channel in the scan list receives a high number of irrelevant messages or becomes a source of interference. Channels can be temporarily removed from the scan list using "Nuisance Channel Delete," which is typically programmed as a button on DNR radios. This does not permanently alter the scan list. The scan list is reset either by selecting a function or when the radio is turned off and then reactivated.

8. DNR RADIO CHANNELS

As stated above, the DNR radio system is a series of repeaters that are connected to the dispatch centers. It is your responsibility as a Radio Operator to select the correct radio channel in order to access the correct repeater.

Whether operating in the field or serving as a dispatcher you need to:

- Understand the location and coverage area of DNR radio repeaters.
- Understand the function and use of DNR radio channels.
- Understand the organization of DNR radio channels and how to access those channels in the various models of radios used by DNR.

Your local Radio Technician can provide additional and specific information to assist you in this responsibility.

ANNUAL RADIO UPDATES

Each year in preparation for Fire Season the Radio Operations program publishes radio channel information.

Annual Channel Information

- Statewide Channel card and booklet.
- Regional Channel cards and booklets.

If your radio or vehicle does not have a sticker showing the radio has programming for the current year, contact your local Radio Technician to update your radio.

Annual Programming Sticker

Mobile radios that have received their annual reprogramming will have a sticker with the 2 digits of the year.

CHANNEL ORGANIZATION

A combination of transmit and receive frequencies, along with other configuration settings, are referred to as a **channel**.

Channels are assigned a **channel name**, which can be abbreviated depending on the number of characters available on the radio display.

- Some DNR radios use 8 characters displays.
- Other radios use 16 characters displays.
- A small number of radios have no display, in which case a label will be attached to the radio showing what channels are programmed.

Channels are usually organized in sets of 16, the number of settings available on a typical channel knob. The sets are known either as **Groups** or as **Zones**.

Instructions for accessing the Channels and Groups/Zones in each model of radio are provided in the model specific sections that follow in this booklet.

KNG Series Radios

The KNG-M150 mobile radio can contain up to 5000 channels while the KNG-P150s portable radio can contain up to 512 channels. The channels are organized in zones of 16 channels each, based on the number of stops on the portable radio channel knob.

KNG mobile radios are programmed with a single statewide channel plan, with the zones organized by region.

Command Zones

KNG radios also provide "Custom" zones that can be configured by the radio user. Known as "**Command Zones**," these groups allow a radio user to select channels from any zone in the radio to fit their specific need; this is like creating a favorites list. (See Chapter 10 for instruction on this feature.)

16-Channel Radios

There are a limited number of portable radios that support only 16 channels. These radios are deployed as a cost-effective option for specific uses.

These radios should not be transferred from their assigned location or taken to a fire as they do not meet the rigorous requirements for DNR FIRE operations.

TYPES OF RADIO CHANNELS

Every DNR radio will be programmed with different types of radio channels. Each type of radio channel has a specific function, specific operating characteristics, and in many cases specific licensing limitations that must be followed.

It is important to recognize the distinction between radio channels available for routine in daily operations and channels that are designated for emergency operations, incident response, and interagency coordination.

Your local Radio Technician is available to help you in choosing the right radio channel for your work area and situation.

Repeater Channels

The DNR statewide radio system has a large number of radio repeaters. These radios are licensed for a specific service area.

There are two types of repeater channels:

AREA Repeater Channels

The primary day-to-day channels for DNR business are referred to as the "Area Repeaters." Area repeaters are installed to provide radio coverage areas where DNR has land management and firefighting responsibility.

These channels use different frequency sets, which allow neighboring repeaters to be used at the same time without interference.

All DNR radios will be programmed with Area Repeaters for other regions. These channels are provided in the event a radio user needs to travel to other parts of the state. Thus, these are referred to as **Guest Groups**.

Area repeaters are used during initial-attack fire operations. Additional repeaters may be established for extended operations, which makes the Area Repeater available for continued routine operations.

STATE Repeater Channels

The State Repeaters are deployed as a second channel at many radio sites and are deployed in areas where DNR has limited daily operations. The "State Repeaters" are shared with the Washington Department of Fish & Wildlife and the State Parks Commission.

These repeaters generally use a single frequency set, which limits capacity as the use of neighboring repeaters would interfere with each other. Coded squelch controls access to each repeater. With coded squelch disabled (monitor mode), you may hear multiple State Repeaters from a given location.

State Repeaters may be used during fire operations. There is a procedure for notifying other Fish & Wildlife and State Parks users that must be followed before using a State Repeater for fire operations.

DNR Simplex Channels

As described above, simplex channels are appropriate for short range unit-to-unit communications. These channels are licensed for statewide operation.

DNR simplex channels include:

DNR Common

As the name implies, this is the statewide common simplex channel used by all DNR radio operators as a unit-to unit working channel.

In most cases this is programmed as Channel #1 in each radio group/zone. This allows a Radio Operator to select DNR Common without looking by rotating rotate the channel knob all away counterclockwise..

DNR TAC 1 & TAC 2

These two channels are statewide unit-to unit tactical channels. They are used heavily for initial-attack fire operations. They are also used when it is desirable to move from DNR Common due to communications volume.

Air-to-Ground Channels

DNR- Air/Ground and NIFC Air/Ground channels (DNR A/G-1, etc.) are used for tactical coordination with aircraft. Coordinating helicopter water drops or landing zone operations are typical examples.

Air Guard

The National Air Guard frequency is used for emergency aviation communications. It is authorized for emergency air-to-air initial communications, emergency ground-to-air communications, and initial call, recall, and redirection of aircraft when no other frequency is available.

Interoperability Channels

National and Statewide channels are designated for interagency communications to facilitate joint operations. These channels should only be used for their specified purpose. Region, District, and Incident leaders will specify when and how these channels will be used.

National Interoperability Channels

The FCC has designated a set of standard interoperability channels in each of the frequency bands utilized for public safety (Low-band, VHF, UHF, 700 MHz, and 800 MHz). Each set of channels has a “Calling” channel and several “Tactical” channels. These channels are intended to support interagency communications during critical incidents.

The VHF channels are: VCALL10, VTAC11, VTAC12, VTAC13, and VTAC14.

OSCCR

Washington State agencies have coordinated a statewide interoperability channel. OSCCR, which stands for On Scene Command and Coordination Radio, is used for interagency incident response.

Red Net — WA & OR

Red Net is a statewide interagency channel available to coordinate operation between fire agencies.

There is a Red Net channel for Washington and a Red Net channel for Oregon.

LERN

The Law Enforcement Radio Network is a statewide interagency channel available to coordinate operations between police agencies.

Mutual Aid Channels

DNR Radios have a large number of channels that are licensed to other agencies and authorized to DNR under the terms of mutual aid agreements. There are procedures and call signs that are to be used with mutual aid channels. Your Region and District managers will provide specific instructions on the use of mutual aid channels.

Weather Channels

The National Weather Service provides a continuous broadcast of weather information using radio transmitters located throughout the state. There are six weather channels; selecting between them will locate a broadcast for your area.

CB Radio Channels

Many DNR vehicles are equipped with CB radios as an aid to safety. These radios support communications with log trucks and other equipment drivers that operate on forest roads. As you travel on forest roads, look for signs indicating which channel is being used for that area. A loaded truck coming downhill has the right-of-way; they should announce their presence to allow you an opportunity to safely pull over.

9. KNG Portable Radios

The BK Technologies KNG-P150s is a direct descendant of the GPH/DPH that is familiar to most DNR employees. Improvements include: increased channel capacity *(32 zones of 16 channels each, up from 15/25 zones),* decreased size and weight, greater resistance to water and dust damage and increased transmit power.

The P150s controls have been configured to be similar to the GPH/DPH for easier adoption. This configuration may not match those used by other agencies.

As with the GPH/DPH series, the battery may either be a **rechargeable** (**black**) or a **clamshell** Radio Controls (**orange**). The KNG clamshell holds **8 AA** size alkaline cells.

KNG Controls

Hard Controls

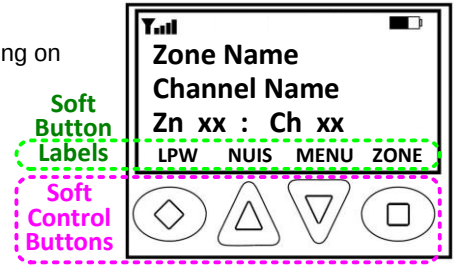
Hard controls have fixed functions. WA DNR radios have the following Hard Controls:

- On / Off Volume Knob
- Push To Talk Button
- Squelch Adjust Button
- Channel Scan Toggle Switch
- Control Lock Collar Switch
- Channel Selector Knob
- Monitor Button
- Priority Scan Toggle Switch
- Backlight Button (Orange)
- Numeric Keypad

Soft Controls

Soft controls change function depending on the mode of operation or the menu selected.

The labels above each soft button will change to indicate the function of the button in a given mode.



Channel Display Screen

The display screen provides channel information in two forms: the text name of the zone + channel, and the zone + channel number. The zone + channel numbers will aid you in navigating the large number of available channels.

Indicators

	Receive Signal Level
	Battery Level (present only with rechargeable battery)
RXA or **RXD**	Receiving Signal - A = analog, D = digital (not typically used)
TXA or **TXD**	Transmitting - A = analog, D = digital (not typically used)

LP	Present while transmitting in Low Power Mode
SCN	Scanning *(blinks when in a scan mode or priority scan mode)*
P1	Will appear when Priority Scan is Enabled

MENU NAVIGATION

Many configuration options are available through a menu system. Soft button labels will change depending on the menu function selected. Shortcut buttons have been configured to provide quick access to common functions.

Note: most keys respond to a momentary press but ignore being held.

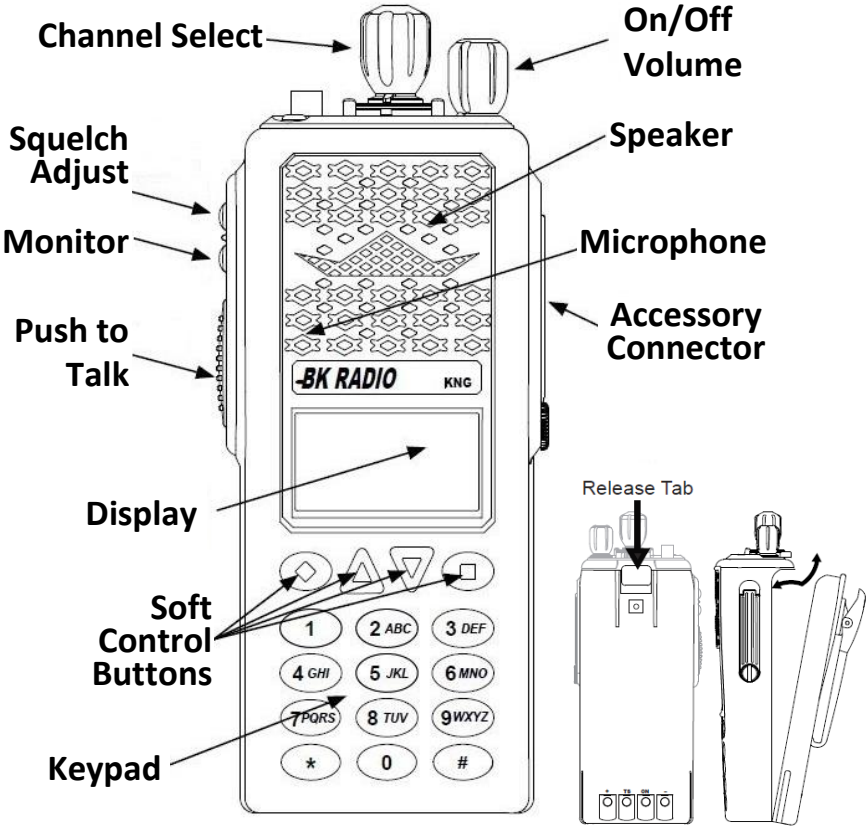
LPW or **LPW**	**LPW** = High Power, **LPW** = Low Power (see details below)
NUIS	Nuisance Channel Delete (see details below)
MENU	Opens Menu of Configuration Options (see details below)
ZONE	Enters Zone Selection Menu (see details below)
ESC	Escape returns to Next Higher Menu Level
↑	Navigate UP Through Menu Choices
↓	Navigate DOWN Through Menu Choices
ENT	ENTER – Accepts Currently Selected Option
+/-	Toggles Currently Selected Option
CLR	Clear the Current Entry (see “keypad programming” below)

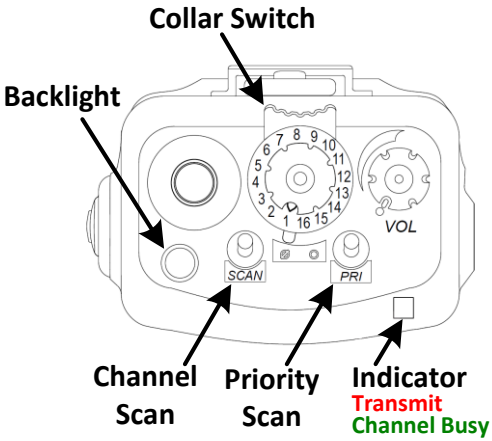
ON/OFF/VOLUME

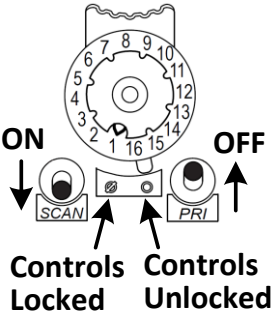
1. Rotate the **Volume** knob to turn the radio **on** or **off**.
2. Press the **Monitor** button to open the squelch.
3. Rotate the **Volume** knob to the desired setting.
4. Press the **Monitor** button again to silence the radio.

RADIO STATUS & SW VERSION SCREENS

This option in the main menu may be ignored unless a technician asks you for this information when reporting a radio problem.


Channel Select
On/Off
Volume
Squelch
Adjust
Speaker
Monitor
Microphone
Push to
Talk
Accessory
Connector
BK RADIO
KNG
Display
Release Tab
Soft
Control
Buttons
Keypad


Collar Switch
Backlight
VOL
SCAN
PRI
Channel
Scan
Priority
Scan
Indicator
Transmit
Channel Busy


ON
OFF
SCAN
PRI
Controls
Locked
Controls
Unlocked

DISPLAY CONTRAST ADJUSTMENT

Display screen contrast may be adjusted as follows:

1. Press the **MENU** soft-key.
2. Use the ↑ ↓ buttons to navigate to **Contrast Adj.**, then press **ENT**.
3. A slider control will appear on the screen. Use the ↑ ↓ buttons to move the slider left or right. Adjust for desired level.
4. Press **ENT** to save the setting.
5. Press **ESC** to returned to the main menu and to exit.

DISPLAY BACKLIGHT

The Display and main keypad have a backlight which helps the user while using the radio in the dark.

The backlight will come on for a duration of 3 seconds any time the display changes (button press, channel change, etc.)

Pressing the Orange button will activate the backlight. Be sure to press it again and turn off the backlight to extend battery life.

MONITOR BUTTON

Pressing the Monitor button disables the squelch allowing background noise to be heard on the radio speaker. In some circumstances this may allow you to receive a very weak signal.

KEYPAD LOCK

Rotating the Collar switch activates the Keypad Lock switch, this prevents all buttons from being accidentally activated. This does not inhibit the Push-to-Talk, Volume, or Channel controls.

While the Keypad Lock switch is activated, “Keys Locked” displays if a button is pressed.

SQUELCH SETTINGS

Squelch silences the receiver when it is not receiving. The squelch threshold may either be a preset value or user selectable. The preset value should be used unless you find yourself in an area where high radio noise is needlessly opening the squelch.

Squelch may be adjusted as follows:

1. Press the **Squelch Adjust Button** to enter the menu.
2. To use the “Preset” level, navigate to **Preset** and press the **ENT** key. That will save the setting and exit to the main menu.

3. To adjust the threshold level, navigate to **User Set** and press the **ENT** key. A slider control should appear on the screen.
4. Use the ↑ ↓ buttons to move the slider left or right. Moving the adjustment to the left lowers the squelch threshold, allowing weaker signals to open the squelch. Moving the adjustment to the right raises the squelch threshold, only allowing stronger signals to open the squelch.
5. Press **ENT** to save the setting and exit the menu.

TRANSMIT POWER

Transmit power may be selected. Low Power is 2 Watts; High Power is 6 Watts.

1. Press **ESC** to return to the Initial Display Screen if not already there.
2. Press the **LPW** soft key to switch between **LPW** (High) or **LPW** (Low).

Use Low Power whenever possible to extend battery life. Use High Power only when extended range is required.

ZONE SELECTION

Channels are arranged in up to 32 Zones of 16 channels each. Not all zones are in use. Empty zones are those that do not have text labels and may be ignored.

Note: The KNG series radios use the term “Zone” in place of the term “Group” that was used in the GPH/DPH series radios.

1. Press the **ZONE** soft key; “Select Zone” should appear on the screen.
2. Enter the desired zone number on the keypad –**OR**– use the ↑ ↓ buttons to select the desired zone. Choose the desired zone then hit **ENT**.
3. Press the **ENT** button to save the selection and exit the menu.

CHANNEL SELECTION

Rotate the **Channel Select** knob to change to the desired channel. Observe the selection on the channel knob or on the display.

The channel switch has 16 positions with stops at position #1 and position #16.

SCAN OPTIONS

Channel Scan

The radio can scan through a “Scan List” of up to 16 channels. Scanned channels must all be in the same zone.

Scan speed slows as more channels are added to the list. A large scan list increases the odds of missing an important message; therefore, a limit of 4 channels in a Scan List is recommended.

NOTE: When radios are reprogrammed the scan list may be cleared and you will have to re-create the list.

NOTE: Regardless of which channel the radio stops on during scan, it will always transmit on the channel currently selected by the Channel Select knob.

Priority Scan

Priority Scan helps avoid missing messages on the primary channel. When enabled, Priority Scan checks the priority channel for messages while receiving on any other channel. The radio will switch to the priority channel even if receiving on another channel. It is normal to hear a slight clicking when receiving on a non-priority channel as the radio is briefly checking the priority channel.

You can set up to 2 priority channels. Priority 1 traffic will always take precedent over other scanned channels, including Priority 2 traffic.

Priority channels can be configured on a per zone basis or on a global basis. Per zone allows you to set different priority channels for each zone, while global allows you to set priority channels that are radio wide.

Program the Scan List

1. Select the Zone that contains the desired channels.
2. Press the **MENU** soft key.
3. Select "**Scan List,**" then press **ENT.**
4. Scroll through the channels using the 🡅 🡇 buttons
5. Press the **+/-** button to select or deselect each channel. Channels marked with the **+** to the left of the channel name are in the scan list.
6. When finished, press the **ESC** to exit.

You may verify that channels are included in the scan list:

1. Turn off scan by moving the **SCAN** and **PRI** toggle switches away from you. The the **SCN** indicator will no longer blink.
2. Rotate the channel selector and observe that the **SCN** indicator is on for channels in the scan list and off for channels not in the scan list.

Program the Priority Channel

1. Press the **MENU** soft key.
2. Scroll down to **Pri. Channels** and press **ENT.**
3. Select which priority channel you would like to program, either **Priority 1** or **Priority 2**.
4. Select either **Use Global** or **Use Per Zone** based on if you would like the priority channel to function across all zones of the radio, or strictly the zone that the radio is currently on.
5. If **Use Global** is selected, select **Pri 1 Zone** and scroll down to choose the zone that the desired channel is in. Then select **Pri 1 Chan** and scroll down to choose the desired channel.
6. If **Use Per Zone** is selected, scroll down to choose the desired channel.

Enabling Channel Scan Mode

1. Slide the **SCAN** toggle switch toward you.
2. The **SCN** symbol will be blinking.

Enabling Priority Scan Mode

1. Slide the **SCAN** toggle switch AND the **PRI** toggle switch toward you.
2. The **P1** symbol will be on and the **SCN** symbol will be blinking.

CAUTION: Although the **SCN** symbol will be flashing when Priority Scan is enabled, the radio will not actually be scanning unless the **SCAN** toggle switch is also turned on.

Nuisance Channel Delete

A channel can be temporarily removed from the scan list. This may be desirable when the channel has excessive or irrelevant traffic. Multiple channels may be removed if desired.

1. Press the **NUIS** soft key while the nuisance channel is being received.
2. The radio will respond with 3 short beeps to indicate temporary removal from the scan list.

To restore the channel(s) to the scan list, toggle the **Scan** switch off then back on. The scan list will also be restored when the radio is turned off and back on.

COPY CHANNEL (CUSTOM ZONE)

Command Zones are similar to a Favorites Menu on a computer. Any channel in the radio can be copied to a Command Zone or Cloning Zone for convenience. As with any other zone, channels in a Command Zone can be entered into a Scan List.

Adding a Channel to a Command Zone

Make sure the radio is currently on the channel you want to add to the custom zone.

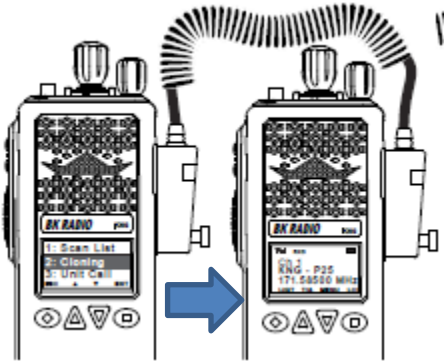
1. Press the **Menu** button
2. Scroll down to **Copy Channel** and press **ENT**
3. Select the Command Zone you would like to copy the channel into by scrolling up or down with the **Arrow** keys
4. Select which channel position with in the Command Zone you would like the copied channel to reside (1-2-3-4 ect) by scrolling up or down with the **Arrow** keys (note if you want to overwrite an existing channel in a Command Zone you ***do not*** need to remove it first) press **ENT**
5. The radio with ask you to confirm the **Channel** and **Zone** location press **ENT** if correct **OR** press **ESC** if chosen in error.

CLONING

KNG P150S radios allow for three cloning options:

- **Active Zone** - Copies the information in the Source radio's active zone to the Target radio's active zone. ***This is the method to use.***
- **"Zone-to-Zone" & "Entire Radio"** ***These should not be used.***

KNG P150S to KNG P150S Cloning



Connect the KAA0701 (or KAA0700) Cloning Cable to the side connector of the Source and Target radios and power up both radios. It doesn't matter which end is which. Use the thumb screws to secure the connectors. Avoid pulling or twisting the cable at the connectors; it will help them last.

On the Destination radio:

1. Switch to the Zone that is to receive the clone.

On the Source radio:

2. Switch to the Zone that is to be sent.
3. Press the **MENU** soft key.
4. Select "**Cloning**" and press **ENT**
5. Select "**Active Zone**" and press **ENT**.
6. When prompted with **'Clone UCG/PL?'** select **NO**.

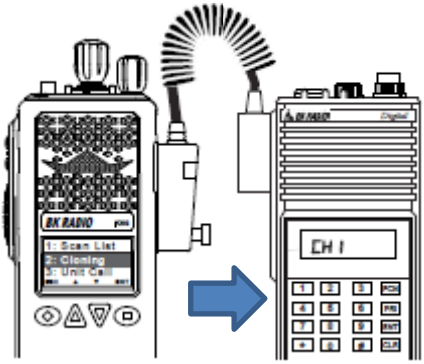
A message "**Active Zone Successfully Cloned**" indicates success.

Error Messages

► The message "**Clone Failed: Target Zone Locked**" indicates that the destination zone is programmed to not accept clones. You must change to a different zone.

► The message "**Clone Failed: "No Device Found**" indicates a cabling problem or a problem with the destination radio.

KNG P150S to Legacy GPH or DPH



Caution > Pre April 2001 version GPH radios are not compatible as they have a different computer inside. They cannot be cloned from the P150S but can be cloned from other GPH and DPH radios.

To identify these radios, press and hold the "**1**" key. If an 8 character code appears on the display, it is likely compatible.

In addition, the P150S supports a wider range of frequencies than most GPH and DPH radios. Although it may appear that the clone was successful, frequencies below 148 MHz may not actually work.

Connect the KAA0701 Cloning Cable to the side connector of the Source and Target radios and power up both radios. Use the thumb screws to secure the connectors. Avoid over-tightening, pulling, or twisting the cable or connectors; it will help them last.

On the Destination radio:

1. Switch to the Group that is to receive the clone (Key in #xx, where xx = the group number). Typically DNR uses Group 13 for cloning on these radios.

On the Source radio:

2. Switch to the Zone that is to be sent.
3. Momentarily hit the **MENU** soft key.
4. Select "**Cloning**" and hit **ENT**
5. Select "**Active Zone**" and hit **ENT**.

A message "**Active Zone Successfully Cloned**" indicates success.

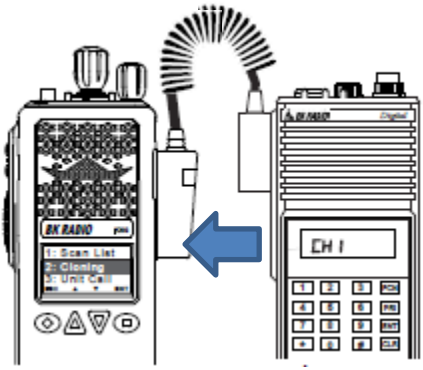
Error Messages

► The message "**Clone Failed: Target Zone Locked**" indicates that the destination zone is programmed to not accept clones. You must change to a different zone.

► The message "**Clone Failed: No Device Found**" indicates a cabling problem or problem with the destination radio.

► The message "**Clone Failed**" with no reason given, generally means that the destination radio is incompatible.

Legacy GPH or DPH to KNG P150s Instructions



DPH and most GPH radios including Pre April 2001 version GPH radios can clone to the P150S.

Connect the KAA0701 Cloning Cable to the side connector of the Source and Target radios and power up both radios. Use the thumb screws to secure the connectors.

Avoid over-tightening, pulling, or twisting the cable or connectors; it will help them last.

On the Destination radio (P150S):

1. Switch to the Zone that is to receive the clone. There are multiple “Cloning Zones” programmed into the P150s radio capable of receiving a clone.

On the Source radio (DPH / GPH):

2. Switch to the Group that is to be cloned from (Source) (Key in #xx, where xx = the group number).
3. Press and hold the little red button on the GPH / DPH cloning connector then press and hold the **[FCN]** key until the display shows “--- ID”
4. Key in the password “000000” followed by the**[ENT]** key. The display should show “CH 00”
5. Press the [*] key to enter program mode. “PROG” should be flashing on the display.
6. Press the **[FCN]** key to start the clone. The source radio will display “CLONE” while data is being transferred. The destination radio will display “Lgcy Cloning” while data is being transferred.

After a successful clone, the source radio returns to the flashing “**PROG**” and is ready to clone another radio. The destination radio will display the new channel name and be ready to use.

Error Messages

If the source radio begins flashing “**FAIL**” and beeping, the clone did not work.

Press the **[CLR]** button and check connections and that the destination radio is powered up. It is possible that the destination Zone that you selected is configured to reject a clone. Try a different Zone on the destination radio. Return to step #3 to try again.

PROGRAMMING OF RADIOS

FCC rules authorize DNR to only program radio frequencies according to the licenses authorized by the Commission.

> *Except for frequencies used in accordance with §90.417,* ***no person shall program into a transmitter frequencies for which the licensee using the transmitter is not authorized.*** [§90.427 (b)]

Shared Use of Radio Systems

One exception to this limitation is the sharing of radio systems, as authorized under §90.179. That section requires a written agreement before other agencies may program DNR radio frequencies and before DNR may program frequencies licensed to another agency.

DNR maintains agreements with federal, state, and local agencies that provide for the shared use of radio systems. Information about channels authorized for shared use is included in the annual radio channel information documents, from the local Radio Technicians, and from Region and District managers

KEYPAD PROGRAMMING (HAND PROGRAMMING)

The user can optionally make changes to certain configuration parameters via the keypad. For example: Removing the requirement for a receive tone on DNR Common or creating a custom zone. It also enables the user to view information such as frequencies or tones.

There are several parameters that if changed will produce undesirable results. It is important that you limit changes to only the parameters described below.

Note that changes will be lost whenever a technician re-programs the radio or the zone is cloned over.

Entering Programming Mode:

1. Press the **MENU** soft key.
2. Select "**Keypad Prog**" and press **ENT.** "Keypad Prog" will be displayed.
3. Press **ENT** again to begin.
4. Enter password: 000000 and press **ENT.**
5. Select **Channels**, **Zone Params**, or **Global Params** followed by **ENT**, and follow the corresponding directions below.

Channel Information:

1. Select the desired **Zone** and press **ENT**.
2. Select the desired **Channel** and press **ENT**.
3. Select the desired parameter and press **ENT** to view the present setting. **CLR** will clear the old value and allow you to enter changes. If no changes are desired hit **ESC**.

4. **Chan Label** - Use the phone style keypad to toggle through characters. **"0"** toggles between 0 and a blank space. "*****" or "**#**" toggles through various symbols. Hit **ENT** when done.

5. **RX Freq** - Key in the frequency and hit **ENT**. Prior to that, you can abort changes by hitting **ESC**.

6. **RX Mode** – Normally choose **Analog.**

7. **RX Guard** – Enter a tone as 4 digits. 000.0 means no tone required. Use # followed by 3 digits to enter DCS code. State repeaters use DCS codes. For example D261 is entered as #261.

8. **TX Freq** - Key in the frequency and hit **ENT**.

9. **TX Mode** - Normally choose **Analog.**

10. **Bandwidth** – Normally 12.5 kHz (Narrowband)

11. **TX Guard** - Enter a tone as 4 digits. 000.0 means no tone required. Use # followed by 3 digits to enter DCS code. State repeaters use DCS codes. For example D261 is entered as #261.

Zone Parameters:

1. Select the desired Zone and hit **ENT**.

2. **Zone Label** - Use the phone style keypad to toggle through characters. **"0"** toggles between 0 and a blank space. "*****" or "**#**" toggles through various symbols. Hit **ENT** when done.

Global Parameters:

Caution: These parameters affect all zones and should not be changed.

1. **Bklight Dur** – This controls how long the backlight stays on. Normal is 2-3 Sec. Do not use "Always On" or battery life will be very poor.

10. KNG MOBILE RADIOS

The KNG mobile radios from BK Technologies offers DNR radio users improved features and increased channel capacity.

The KNG mobile and portable radios share many features and are operated by similar controls and menues.

RADIO CONTROLS

There are three types of controls on the KNG mobile radios.

Hard Controls

These controls have a fixed purpose, such as the volume control, the push-to-talk switch, or the channel knob.

Programmable Controls

These controls are configured as part of radio programming; there are several functions that can be assigned to a given button. Buttons may be configured to control the scan function, activate a menu, or any number of options.

Soft Controls

These change function depending on the operation or menu selection being chosen by the user and have an associated display to identify the function. For example, a “Channel Add” button will become the “Channel Delete” button depending on the channel selected.

MENU NAVIGATION

KNG mobile radios are menu-driven. All user selectable functions can be accessed through the menu system.

For convenience, frequently used functions may be assigned to a programmable button. As such, there may be more than one method for accessing a given function.

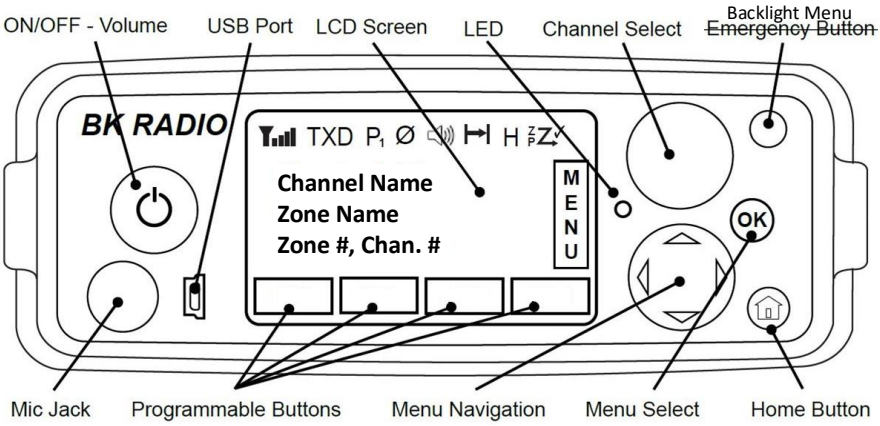
For example: the touchscreen controls, the navigation control on the control head, and the navigation control on the keypad microphone will each accomplish the same functions.

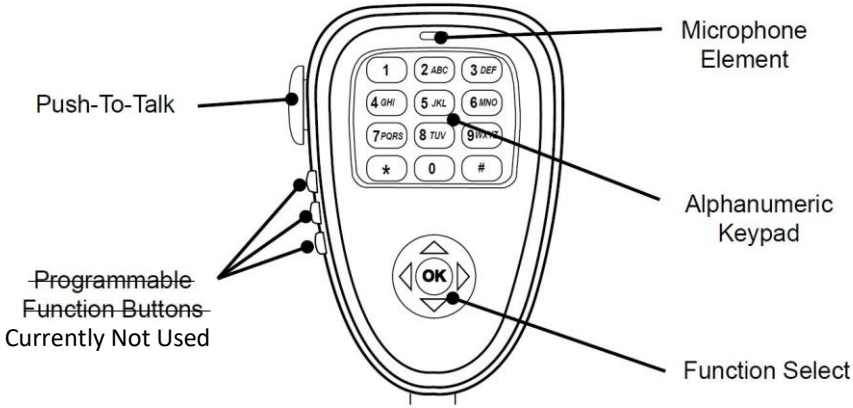
ON/OFF/VOLUME

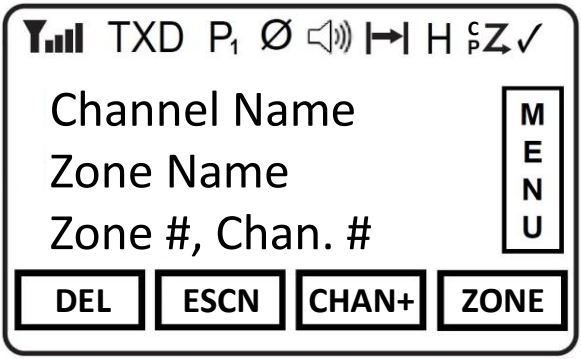
1. **Press** the Volume knob to turn on/off
2. **Rotate** the Volume knob to the desired setting.

It may be helpful to open the squelch to provide sound when setting the volume.

KNG Mobile Radio Controls







INDICATORS

– Receive Level		– Simplex Channel	
– Transmit Power	**H** or **L**	– Monitor Mode	
– Priority 1 Channel	**P1**	– Channel In Scan List	✓
– Channel Scan On	C	– Priority 2 Channel	**P2**
– Priority Scan On	P		

SQUELCH SETTINGS

Squelch should be set just at the threshold (minimum value) when noise is muted.

1. Select **MENU**, then select **Squelch Adjust.**
2. Adjust the **+/-** button until noise is heard. (“open” squelch.)
3. Adjust the **+/-** button until noise stops. (“closed” squelch.)
4. Press the **ENTER** button to set the level.

TRANSMIT POWER

Transmit power is controlled by the programming for each channel. It is not user adjustable.

ZONE SELECT

1. Select **ZONE.**
2. Scroll the list of available zones using the **UP** or **DOWN** buttons
   – OR –
   Enter the desired zone using the **number keys** on the keypad.
3. Press OK to confirm the selection.

HOME BUTTON

The Home button will return the radio to the designated channel and zone from any other channel and zone in the radio.

The Home button can also be used to exit any Menu mode and return to normal radio operation.

Returning to the Home Channel

1. **Press** the **HOME** button momentarily to return to the home channel or to exit a menu mode.

Programming the Home Button

The Home button can be any channel or zone in the radio selected by the user.

1. **Press and Hold** the **HOME** button to set the home channel.
2. A beep sound will confirm the selection.

To fit a given user's circumstances, the Home button could be reprogrammed any number of times during the day.

CHANNEL SELECT

Radio Channels can be selected using the channel knob or the keypad.

Channel Select Switch

1. Rotate the **Channel Select** knob to change to the desired channel.

NOTE: The channel select switch on the portable radio has 16 positions and stops at position #1 and position #16.

NOTE: The channel select switch on the mobile radio has no stops and will sequence from the last channel back to the first channel as the knob is turned.

NOTE: Pressing any of the **number keys** on the keypad microphone will also activate the **Channel Select** menu.

COMMAND (CUSTOM) ZONE

Command Zones are similar to a Favorites Menu on a computer. Any channel in the radio can be copied to a Command Zone for convenience. As with any other zone, channels in a Command Zone can be entered into a Scan List.

Note: the name of the Command Zone is "Custom" with the program version number following, such as "*Custom 2017a."* If the date is not current, see your local radio tech to get the update.

Adding a Channel to a Command Zone

1. Select the **Channel** and **Zone** of the desired channel.
2. Press the **CHAN+** button.
3. Scroll the list of available Command Zones using the **UP** or **DOWN** buttons.
4. Enter the **Channel Number** within the Command Zone using the **number keys** on the keypad.
5. Press **OK** to confirm the selection.

Deleting a Channel from a Command Zone

1. Select the **Zone** and then the **Channel** to be deleted.
2. Press the **CHAN–** button to delete the selected channel. (This was the CHAN+ button)
3. Press **OK** to confirm the selection.

NOTE: The CHAN+ button becomes the CHAN– button.

SCAN OPTIONS

The KNG series radios, both mobile radio and portable radio, support an array of scanning functions; the basic scanning functions are enabled for DNR radios.

Program the Scan List

The first step in using Scan is to create a list of channels to be scanned. Limiting the scan list to no more than 4 channels is recommended.

NOTE: When radios are reprogrammed the scan list may be cleared and you will have to reset the list.

NOTE: Regardless of which channel the radio stops on during scan, it will always transmit on the channel currently selected by the Channel Select knob.

1. Select **MENU**, then choose **Channel Scan List**.
2. Scroll through the scan list to **review**, **add**, and **delete** channels.

   Note that the Scan List symbol will appear on the display for that channel.

3. Press **ESC** or **HOME** to exit the menu.

Channel Scan

1. Press the **ESCN** button on the touchscreen.
2. The Channel Scan symbol will appear on the display.

Priority Scan

Priority Scan helps avoid missing messages on the primary channel. When enabled, Priority Scan checks the priority channel for messages while receiving on any other channel. The radio will switch to the priority channel even if receiving on another channel. It is normal to hear a slight clicking when receiving on a non-priority channel as the radio is briefly checking the priority channel.

There are 2 categories of priority channels in the KNG mobile radios, system priority channels and zone priority channels. System priority channels are radio wide. No matter which zone you are in, the system priority channels will become active if there is radio traffic on them. Zone priority channels are zone specific. The channels you chose for zone priority channels will only apply when you are in that zone.

Select **MENU**, then choose **Priority Channels**.

1. Select which priority channel category you would like to program.
2. There are three choices: **OFF** (no priority), **USE MAIN** designates that the priority channel will follow the channel select or **SELECT** to designate a priority channel to scan.
3. Press **ESC** or **HOME** to exit the menu.
4. Press **ESCN** button on touch-screen to activate scan.

5. The Priority Scan symbol will appear on the display when priority scan is active.

Nuisance Channel Delete

A channel can be temporarily removed from the scan list. This may be desirable when the channel has excessive or irrelevant traffic. Multiple channels may be removed if desired.

1. Press the **DEL** button while the nuisance channel is being received.
2. To restore the programmed scan list, turn off **Scan** or cycle **radio power**.

KNG M150 CLONING

To Clone a KNG radio, it must be put in “Destination Clone Mode.” The KNG radio can only receive “Active Zone” or “Picklist” clone information.

Cloning Clone Active Zone Clone Picklists Enter Dest Clone	**On the KNG Target Radio:** • Select the Menu button. • Use the Up/Down buttons to select “Cloning” • Press the [ENT] button • Select “Enter Dest Clone”
Destination Clone Mode Waiting……	When the KNG Target radio is in “Destination Clone Mode”, the Source radio can initiate the cloning of the “Active Zone” or “Picklist”
Destination Clone Start	When cloning has started, the KNG Target radio will display “Destination Clone Start”
Powering Off	After a successful information transfer, “Power Off” is displayed and the radio will restart.
Zone to Zone Unsupported	The only cloning functions supported by the KNG Target radio are “Active Zone” and “Picklists”. All other functions are unsupported

11. DNR Region Frequencies

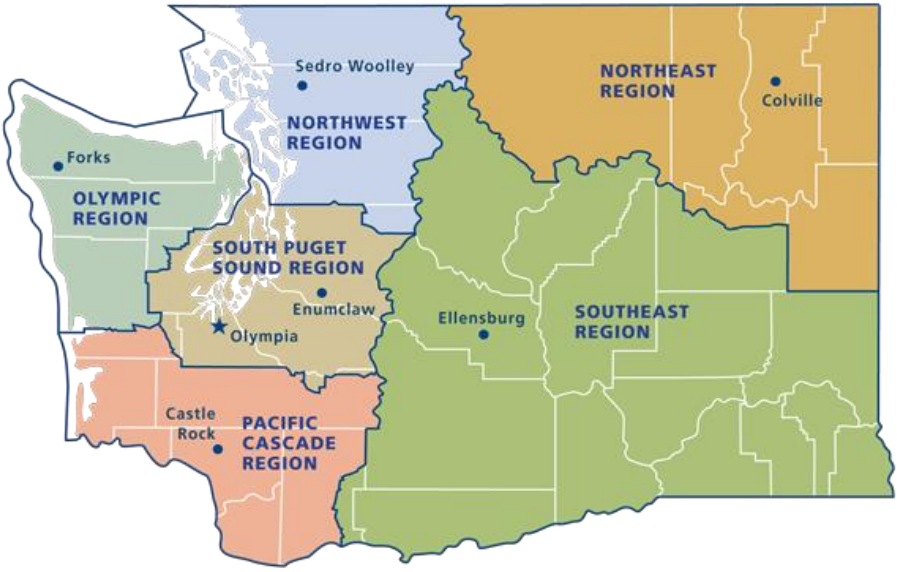
DNR Radio Operations Program

Radio Operations is the technical support program for the DNR statewide radio system. The program is headquartered at the Tumwater Compound. Technical staff are assigned to support each region and located accordingly.

Radio Operations	**360-902-1480**	**815 88th Ave SE Tumwater, WA 98501**

DNR Statewide Coordination

Wildfire Division	**360-902-1300**	**1111 Washington St SE Olympia, WA 98504**



DNR Northeast Region

Region Office	**509-684-7474**	**225 S Silke Road Colville, WA**
Dispatch Center	**Northeast Interagency Communications Center**	
Dispatch Phone	**509-685-6900**	
Call Sign	***"Northeast Dispatch"***	

Channel Name	User RX	Tone	User TX	Tone	Notes
DNR Common	**151.4150**	**103.5**	**151.4150**	**103.5**	**Statewide unit-to-unit**
DNR A/G 1	**159.2700**	**103.5**	**159.2700**	**103.5**	**Statewide unit-to-unit**
DNR A/G 2	**151.2875**	**103.5**	**151.2875**	**103.5**	**Statewide unit-to-unit**
DNR TAC 1	**151.3100**	**103.5**	**151.3100**	**103.5**	**Statewide unit-to-unit**
DNR TAC 2	**151.3400**	**103.5**	**151.3400**	**103.5**	**Statewide unit-to-unit**
Brewster	**159.4350**	**123.0**	**151.2425**	**123.0**	**5 mi WSW of Pateros**
Cheney	**159.3675**	**156.7**	**151.4675**	**156.7**	**16 mi SE of Spokane**
Chewelah	**159.4500**	**156.7**	**151.4600**	**156.7**	**15 mi SW of Chewelah**
Colville	**159.4350**	**156.7**	**151.1600**	**156.7**	**5 mi W of Northport**
Deer Park	**159.4050**	**156.7**	**151.2500**	**156.7**	**7 mi east of Chewelah**
Lincoln	**159.2400**	**156.7**	**151.2650**	**156.7**	**14 mi NNW of Davenport**
Okanogan	**159.3150**	**156.7**	**151.3025**	**118.8**	**15 mi W of Okanogan**
Republic	**159.3600**	**118.8**	**151.2350**	**118.8**	**13 mi WNW of Republic**
Tonasket	**159.3675**	**118.8**	**151.2575**	**156.7**	**9 mi WNW ofTonasket**
Twisp	**159.3450**	**156.7**	**151.3850**	**118.8**	**9 mi ENE of Twisp**

DNR NORTHWEST REGION

Region Office	**360-856-3500**	**919 N Township Sedro Woolley, WA 98284**
Dispatch Center	**Northwest Region Headquarters**	
Dispatch Phone	**360-854-2825**	
Call Sign	***"Northwest"***	

Channel Name	User RX	RX	User TX	RX	Notes
DNR Common	**151.4150**	**103.5**	**151.4150**	**103.5**	**Statewide unit-to-unit**
DNR A/G 1	**159.2700**	**103.5**	**159.2700**	**103.5**	**Statewide unit-to-unit**
DNR A/G 2	**151.2875**	**103.5**	**151.2875**	**103.5**	**Statewide unit-to-unit**
DNR TAC 1	**151.3100**	**103.5**	**151.3100**	**103.5**	**Statewide unit-to-unit**
DNR TAC 2	**151.3400**	**103.5**	**151.3400**	**103.5**	**Statewide unit-to-unit**
Arlington	**159.3300**	**156.7**	**151.2500**	**192.8**	**9 mi NNE of Arlington**
Lyman	**159.3750**	**141.3**	**151.3700**	**141.3**	**6 mi NE of Sedro-Woolley**
Orcas	**159.2400**	**114.8**	**151.2350**	**114.8**	**E side of Orcas Island**
Sauk	**159.2850**	**141.3**	**151.3850**	**141.3**	**5 mi S of Concrete**
Snohomish	**159.4350**	**141.3**	**151.1900**	**141.3**	**20 mi W of Port Townsend**
Stevens	**159.3600**	**141.3**	**151.3775**	**141.3**	**2 mi S of Skykomish**
Sultan	**159.2475**	**141.3**	**151.1825**	**141.3**	**8 mi NE of Sultan**
Sumas	**159.3150**	**141.3**	**151.3250**	**141.3**	**12 mi NE of Bellingham**

DNR OLYMPIC REGION

Region Office	**360-374-2800**	**411 Tillicum Lane Forks, WA 98331**
Dispatch Center	**Olympic Region Headquarters**	
Dispatch Phone	**360-374-2811**	
Call Sign	***"Olympic"***	

Channel Name	User RX	Tone	User TX	Tone	Notes
DNR Common	**151.4150**	**103.5**	**151.4150**	**103.5**	**Statewide unit-to-unit**
DNR A/G 1	**159.2700**	**103.5**	**159.2700**	**103.5**	**Statewide unit-to-unit**
DNR A/G 2	**151.2875**	**103.5**	**151.2875**	**103.5**	**Statewide unit-to-unit**
DNR TAC 1	**151.3100**	**103.5**	**151.3100**	**103.5**	**Statewide unit-to-unit**
DNR TAC 2	**151.3400**	**103.5**	**151.3400**	**103.5**	**Statewide unit-to-unit**
Canal	**159.3450**	**103.5**	**151.1600**	**103.5**	**11 mi SSE of Brinnon**
Discovery	**159.4050**	**103.5**	**151.2200**	**206.5**	**10 mi SW Port Townsend**
Hoh	**159.2025**	**D365**	**151.2125**	**D131**	**17 mi SE of Forks**
Ozette	**159.2550**	**192.8**	**151.2050**	**167.9**	**13 mi NNE of Forks**
Quinault	**159.4575**	**127.3**	**151.3625**	**186.2**	**29 mi NNW Aberdeen**
Straits	**159.3000**	**173.8**	**151.2650**	**173.8**	**11 mi W of Port Angeles**
Wishkah	**155.7600**	**114.8**	**151.1300**	**82.5**	**24 mi N of Montesano**

DNR Pacific Cascade Region

Region Office	**360-577-2025**	**601 Bond Road Castle Rock, WA**
Dispatch Center	**Pacific Cascade Region Headquarters**	
Dispatch Phone	**360-274-2089**	
Call Sign	***"Cascade"***	

1.

Channel Name	User RX	Tone	User TX	Tone	Notes
DNR Common	**151.4150**	**103.5**	**151.4150**	**103.5**	**Statewide unit-to-unit**
DNR A/G 1	**159.2700**	**103.5**	**159.2700**	**103.5**	**Statewide unit-to-unit**
DNR A/G 2	**151.2875**	**103.5**	**151.2875**	**103.5**	**Statewide unit-to-unit**
DNR TAC 1	**151.3100**	**103.5**	**151.3100**	**103.5**	**Statewide unit-to-unit**
DNR TAC 2	**151.3400**	**103.5**	**151.3400**	**103.5**	**Statewide unit-to-unit**
Abernathy	**151.4750**	**173.8**	**159.1950**	**162.2**	**9 mi NW of Castle Rock**
Baw Faw	**159.3825**	**136.5**	**151.4000**	**136.5**	**13 mi W of Winlock**
Burley	**159.2175**	**173.8**	**151.1450**	**173.8**	**9 mi SSE of Randle**
Capitol	**159.2250**	**136.5**	**151.4300**	**173.8**	**12 mi SW of Olympia**
Defiance	**159.4500**	**136.5**	**151.3250**	**136.5**	**10 mi WSW of Hood River**
Hopkins	**159.1875**	**136.5**	**151.1675**	**136.5**	**4 mi W of Morton**
Kalama	**159.2475**	**136.5**	**151.1975**	**136.5**	**3 mi ENE of Kalama**
Larch	**159.4275**	**136.5**	**151.3850**	**136.5**	**11 mi SW of Battle Ground**
Mitchell	**159.2025**	**136.5**	**151.2125**	**136.5**	**5 mi E of Cougar**
Naselle	**159.1275**	**186.2**	**151.3775**	**186.2**	**4 mi N of Naselle**
Nicolai	**159.3300**	**136.5**	**151.2500**	**136.5**	**5 mi SSW of Westport**
Signal Peak	**159.3000**	**162.2**	**151.2350**	**136.5**	**7 mi SE of Toutle**

DNR SOUTHEAST REGION

Region Office	**509-925-8510**	**713 Bowers Road Ellensburg, WA 98926**
Dispatch Center	**Central Washington Interagency Communications Center**	**3796 Airport Way East Wenatchee, WA**
Dispatch Phone	**509-884-3473**	
Call Sign	***"Wenatchee"***	

Channel Name	User RX	Tone	User TX	Tone	Notes
DNR Common	151.4150	103.5	151.4150	103.5	Statewide unit-to-unit
DNR A/G 1	159.2700	103.5	159.2700	103.5	Statewide unit-to-unit
DNR A/G 2	151.2875	103.5	151.2875	103.5	Statewide unit-to-unit
DNR TAC 1	151.3100	103.5	151.3100	103.5	Statewide unit-to-unit
DNR TAC 2	151.3400	103.5	151.3400	103.5	Statewide unit-to-unit
Badger	159.4425	127.3	151.2125	127.3	4 mi NE of Wenatchee
Brewster	159.4350	123.0	151.2425	123.0	10 mi SSW of Brewster
Chelan	159.2250	156.7	151.4750	156.7	2 mi S of Chelan
Cleman	159.3450	114.8	151.4675	114.8	20 mi NW of Yakima
SE Defiance	159.3750	127.3	151.3700	127.3	10 mi WSW of Hood River
Grayback	159.3000	103.5	151.2575	103.5	15 mi NW of Goldendale
Juniper	159.3525	114.8	151.2500	114.8	7 mi SE of Goldendale
Naneum	159.3225	D023	151.3625	D023	17 mi N of Ellensburg
Peoh	159.3675	141.3	151.4450	141.3	3 mi S of Cle Elum
Sedge	159.2550	107.2	151.1825	107.2	22 mi SW of Yakima

DNR SOUTHEAST REGION – *SNAKE RIVER AREA*

Region Office	**509-925-8510**	**713 Bowers Road Ellensburg, WA 98926**
Dispatch Center	**Blue Mountain Interagency Dispatch Center**	**59973 Downs Rd. LaGrande, OR 98750**
Dispatch Phone	**541-963-7171**	
Call Sign	***"LaGrande"***	

Channel Name	User RX	Tone	User TX	Tone	Notes
DNR Common	**151.4150**	**103.5**	**151.4150**	**103.5**	**Statewide unit-to-unit**
DNR A/G 1	**159.2700**	**103.5**	**159.2700**	**103.5**	**Statewide unit-to-unit**
DNR A/G 2	**151.2875**	**103.5**	**151.2875**	**103.5**	**Statewide unit-to-unit**
DNR TAC 1	**151.3100**	**103.5**	**151.3100**	**103.5**	**Statewide unit-to-unit**
DNR TAC 2	**151.3400**	**103.5**	**151.3400**	**103.5**	**Statewide unit-to-unit**
State Asotin	**159.4200**	**D365**	**151.2950**	**D365**	**5 mi WSW of Anatone**
State Dayton	**159.4200**	**D223**	**151.2950**	**D223**	**5 mi ESE of Dayton**
State Pasco	**159.4200**	**D271**	**151.2950**	**D271**	**10 mi SSW of Pasco**
State Lyons Ferry	**159.4200**	**D226**	**151.2950**	**D226**	**7 mi SW of Washtucna**

DNR South Puget Region

Region Office	**360-825-1631**	**950 Farman Ave N Enumclaw, WA 98022**
Dispatch Center	**South Puget Sound Region Headquarters**	
Dispatch Phone	**360-802-7080**	
Call Sign	***"South Puget"***	

Channel Name	User RX	Tone	User TX	Tone	Notes
DNR Common	**151.4150**	**103.5**	**151.4150**	**103.5**	**Statewide unit-to-unit**
DNR A/G 1	**159.2700**	**103.5**	**159.2700**	**103.5**	**Statewide unit-to-unit**
DNR A/G 2	**151.2875**	**103.5**	**151.2875**	**103.5**	**Statewide unit-to-unit**
DNR TAC 1	**151.3100**	**103.5**	**151.3100**	**103.5**	**Statewide unit-to-unit**
DNR TAC 2	**151.3400**	**103.5**	**151.3400**	**103.5**	**Statewide unit-to-unit**
Belfair	**159.2550**	**114.8**	**151.2050**	**114.8**	**5 mi WSW of Bremerton**
Capitol	**159.2250**	**136.5**	**151.4300**	**173.8**	**12 mi SW of Olympia**
Carbon	**159.3600**	**D072**	**151.3700**	**D065**	**9 mi SW of Enumclaw**
Eatonville	**159.3075**	**114.8**	**151.2275**	**114.8**	**11 mi ESE of Eatonville**
Enumclaw	**159.4575**	**141.3**	**151.2575**	**141.3**	**8 mi East of Enumclaw**
North Bend	**159.2925**	**114.8**	**151.3925**	**114.8**	**2 mi SE of North Bend**
Shelton	**159.3150**	**127.3**	**151.1750**	**127.3**	**12 mi NW of Shelton**

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Washington Department of Natural Resources

Engineering & General Services Division

Radio Operations Program

360-902-1480

radio@dnr.wa.gov

Version – 11

3 March, 2020