



Best management practices for mobile 2-way radio use on resource roads in BC, installation and maintenance

April 2014

By:

Craig Evans, RFT, Silvicultural Operations
Allan Bradley, RPF, PEng, Resource Roads

Report prepared for the BC Ministry of Forests, Lands and Natural Resource Operations under the BC radio communications protocol initiative

INTRODUCTION

BC has thousands of kilometres of forest service roads that are used by forestry and other resource industries, commercial transportation, and the general public. Many vehicles on these roads utilize VHF mobile 2-way radio communications to help anticipate when they will encounter other road users and, thereby, avoid collisions. Radio users of resource roads have a range of ability, confidence and training with radio communications. The intent of this document is to recommend best practices for mobile 2-way radio communications on radio-assisted resource roads in BC; and to highlight important considerations for radio installation and maintenance. These best practices will instruct the reader how to communicate using the new resource road radio communications protocol and how to avoid the most common errors in radio use, installation and maintenance. This document was prepared on behalf of the BC Ministry of Forests, Lands and Natural Resource Operations (FLNRO).

A New Resource Road Radio Communications Protocol for BC

In British Columbia, a new radio communications protocol is being implemented on Forest Service Roads (FSR). The protocol consists of a set of dedicated VHF radio channels, standardized call procedures and new signage. The new resource road radio communications protocols are gradually being implemented throughout the province. If in doubt, check with those responsible for the road that you will be using and follow the communications protocol that they specify.

BEST MANAGEMENT PRACTICES FOR RADIO CALLING

Owner's Manual

Read the owner's manual and know how to use and maintain your two-way radio.

Calling Procedures

The new resource road radio calling procedures are being adopted on Forest Service Roads around the Province. If radio calling procedures are posted on the road being travelled, the posted procedures shall be followed. In the absence of posted procedures, follow the new resource road calling procedures which specify calling road name, location and direction of travel. Travel in the direction of increasing kilometers is called as the 'Up' direction and travel in the direction of decreasing kilometers is called as the 'Down' direction.

The default call order (unless otherwise posted) for all resource roads is:

1. Road name
2. Location (call at every other Km mark starting with 0 Km (i.e., every 2 kilometres))
3. Direction of travel ('Up' or 'Down')
4. Number of vehicles if convoy calling ¹
5. Vehicle type (optional)

Part of the communications protocol includes new road signage. Some areas now utilize standardized sign formats developed by FLNRO (http://www.for.gov.bc.ca/hth/engineering/sign_standards.htm). 'Km' signs have several format options, and may be simpler and smaller than the example sign shown to the right. The radio calling order is accounted for when signs of this type are read from top to bottom.



¹ A convoy is a series of two or more vehicles with the trailing vehicle(s) usually positioned no more than 1 km behind the lead vehicle. If a vehicle is more than 1 km behind the lead vehicle, it is responsible for calling its own position. Convoy rules may be changed by the road safety committee, so review the local procedures for driving on resource roads.



Active FSRs in British Columbia have or will have calling procedures posted on a road information sign at the start of the road. Road Safety Committees have been given the flexibility to modify the calling rules which may differ from the default listed above. Read the signs carefully before proceeding and call your kilometers in accordance with these procedures.

Be sure to call your location at all 'must call' signs and use extra caution in these areas.



Radio Test

A radio test should be performed before entering a radio-assisted resource road. This test confirms that others on the road can clearly hear your radio and that you can clearly hear them. The radio test procedure is:

1. Switch your radio to the specified road frequency posted at the entrance to the road.
2. Call to ask if anyone can hear your transmission, e.g., '**Can anybody hear this radio?**' and wait for a response. If you can hear radio traffic but receive no response to your radio test, this may indicate there is a problem with your radio or antenna.
3. If you suspect your radio is not working, drive with extra caution and follow another radio-equipped vehicle until you can get your radio checked.²



Microphone Usage

Garbled and cut off radio calls can occur without drivers realizing that their calls are not being understood. The following are three simple but effective ways to ensure others will be able to understand your radio calls:

² Travel on resource roads is inherently dangerous. Use of radios to communicate vehicle locations is a way to reduce the risk associated with travel; however, travel on these roads does not require radio use.

1. Key the handheld microphone and hold for two seconds in advance of speaking to ensure that the microphone has engaged. Keying a microphone too late will result in what sounds like a cut-off call to others receiving your transmission. Important information may be missed.
2. Talk slowly and clearly, and hold the microphone about 10 cm (4") from your mouth when speaking. Holding the microphone too close to the mouth may garble transmissions.
3. Release the microphone after you have finished making your call being conscious of avoiding release of the microphone prior to talking.
4. When traveling on a radio-assisted resource road, turn down the volume of the FM radio and other entertainment systems. Loud music may drown out the intended message when transmitting.



Programming your radio

Recommended practice is to have mobile radio equipment installed and programmed at radio shops by a qualified radio technician. This will avoid installation and programming errors as well as confirm that radios are operating properly.

When having radios programmed, obtain the full standard bank of RR and LD channels.

Other Recommended Practices:

- Be aware that most resource roads are radio assisted but not radio controlled; do not assume all vehicles are using a radio.
- Use the resource road radio channels only for the purpose of communicating about travel (location and direction) on a resource road.
- Avoid unnecessary chatter on the road channel. Other users may be trying to make calls at important points along the road. Longer conversations of an important nature should be conducted on a LAD or LD channel; 5 LD channels are included with the standard set of RR channels.
- Do not scan the road channels; stay tuned to the RR channel for the road that you are on at all times. Incoming calls from the road you are on can be cut off or missed altogether if you are scanning or talking on other road channels. Some industrial operations require simultaneous

monitoring of additional channels, in which case, a second radio scanning these channels could be used.

- Call when entering or leaving a road and when stopping and starting along the road, i.e., '**stopped and in the clear at 10 Km**'. Call again when you re-join traffic.
- Keep your calls brief and to the point.
- Pull over to use the radio for extended conversations.
- Do not interrupt others making radio calls.
- Call the location of any vehicles that you suspect have no radio regardless of their direction of travel.
- Profane or obscene language is strictly prohibited and is considered an offence under Federal radio law.
- Drive at a safe speed for the road conditions and expect traffic.
- Beware of industrial, commercial and recreational traffic.
- Yield to industrial traffic and utilize turnouts.
- Stay alert and obey traffic signs.
- Use seatbelts and drive with headlights on.



BEST MANAGEMENT PRACTICE FOR MOBILE 2-WAY RADIO INSTALLATION AND MAINTENANCE

This guide on radio installation and maintenance addresses the needs of those who will be installing mobile 2-way radios in their vehicles, and those with vehicles already equipped with two-way radio equipment. Conforming to the practices described here will improve mobile radio communications and road user safety on radio-assisted resource roads.

Owner's manual

Read the owner's manual and learn how to install and maintain your two-way radio.

Upgrading your radio

Radios that are near the end of their service lives should be replaced. A mobile radio exposed to severe service (shaking, vibration and exposure to dust) will need replacement sooner than one that is

not. A heavily used radio should be replaced after 10 years. Radio suppliers may not be able to procure replacement radio parts for older radios and, in such cases, must rely on used parts scavenged from discarded radios. Another benefit to replacing older radio models is that new models have more storage capacity for radio frequencies and are capable of narrowband communications.

Future radio requirements on BC resource roads (and elsewhere) will be for narrowband communications. Radios manufactured after 1997 have this capability but older radios may only communicate with wideband transmissions. Wideband transmissions sound overly loud when received by narrowband radios and narrowband calls received by these radios may sound too quiet. Wideband radios should be replaced with newer, narrowband capable radios.

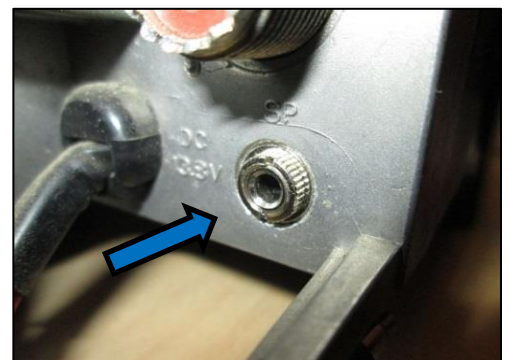
Radio location

A poorly located radio can hinder the safe operation of a vehicle and make it hard to use, see or hear. Also, a poorly located radio can interfere with other vehicle functions and equipment. Radio location should provide the driver with easy access to the controls, and with a clear view of the radio's numerical display under all lighting conditions. Keeping the numerical display clean will improve its readability.

Install the two-way radio where it will not interfere with any other vehicle functions or equipment. Select a solid mounting point so that the radio bracket will remain securely attached even under rough road service. Ensure that the screws used to attach the radio mounting bracket do not interfere with existing vehicle wiring—careless installation may result in an electrical short and impact other vehicle electrical systems. Clip the microphone in an easy-to-access location.



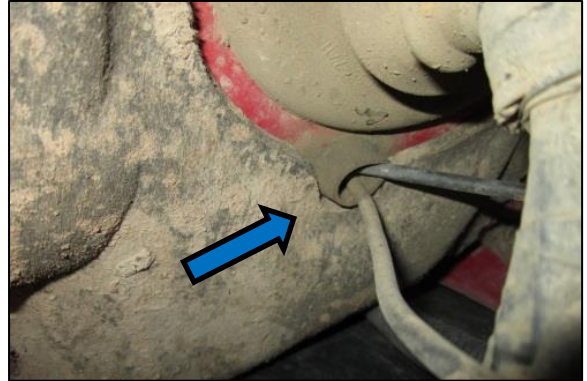
Ambient vehicle and road noise can make it hard to hear your radio. Install an external speaker so that transmissions can be heard clearly with as little interference as possible. Most radios have an external speaker plug-in for this purpose.



Wiring

Some radio performance issues arise from inadequate ground or power connections, gauge of wire used, or inadequate fuses.

If a power or antenna wire is fed through a hole to access the engine compartment, a rubber grommet should be installed in the hole to prevent the wire insulation from chafing on the sharp metal edge—which could cause an electrical short or decreased antenna performance.



Locate a good vehicle ground point for radio power connections. Connect the negative (-) lead to a central grounding point close to the battery. Do not connect the radio ground wire directly to the negative (-) battery post. If a central grounding point is unavailable, a vehicle frame grounding point provides the next best low resistance ground. Use a ring lug crimped to the stripped wire end and a self-tapping screw or existing bolt to connect the ground wire.

If the radio is to be powered regardless of whether the ignition switch is on or off, wire the positive (+) lead directly to the positive (+) battery terminal of the vehicle, with an inline fuse positioned as close to the battery as possible. Refer to the owner's manual for the suggested fuse rating. Do not use cigarette lighter connections for permanent power because a lighter plug can easily come loose and power off the radio unbeknownst to the driver. If the radio is to be powered only when the ignition switch is on, wire the positive lead to the AM/FM radio circuit or a 12V power point circuit. Although connecting a radio to power isn't too difficult, those unfamiliar with electrical systems and fuse boxes should have this done by a professional.

If a power lead has been cut off or is not provided with the radio, use a gauge appropriate for the amperage and length needed (typically this is 12 – 16 gauge wire). Use appropriate tools, materials and procedures when splicing on a new power lead connections. Poorly made connections can degrade radio performance and cause radio damage. If the radio is purchased new, appropriate power lead wire will be provided.

Antenna Location

Improperly located radio antennas or antenna cables, or inadequate antenna type, will reduce a radio's ability to receive and transmit signals.

Fixed antennas are recommended over magnetic mount antennas for permanent-type installations. For temporary installations, a magnetic mount can be used but ensure that the antenna cable is not pinched in the vehicle door and window when they are opened and closed. Monitor for and replace damaged antenna cables that have exposed wires because damaged cables can greatly reduce antenna performance and shorten radio life.



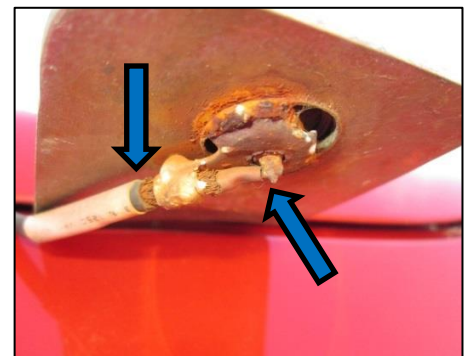
In general, the best reception and transmission is obtained with a high gain (3 db), 5/8 whip, antenna that is positioned on the roof of the vehicle. Ask your radio shop to recommend the best antenna and mounting arrangement for your vehicle. Fender mounting the antenna is common with pick-up installations, however, and may be the best arrangement if these pick-ups are driven into areas with low overhead clearance. A mirror mount or roof mount is the most common arrangement for commercial vehicles.



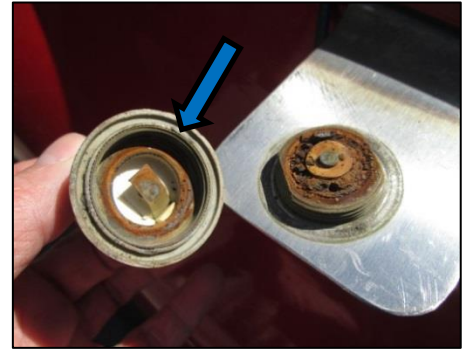
Radio Maintenance

Regularly inspect the radio and its components for damage or wear. Most radio performance issues and premature failure of radio components are due to antenna malfunction. Maintenance of the antenna, therefore, is of critical concern.

Ensure that the radio antenna connections are sound. Soldered connections under the fender mounting plate and the adjacent wires within the antenna cable can corrode from exposure to water and road salt, and this degrades antenna performance. Make sure these vital components are protected.



Ensure that the antenna is screwed properly to the base and is sealed from moisture by a rubber O-ring (arrow points to where an O-ring is missing). If the O-ring is missing or this connection loose, the antenna-to-base contact may become corroded.



Ensure that the antenna connector at the back of the radio is tight, and that the cable is not kinked at this connection.



A severely bent antenna will reduce the effective range of communication, and should be replaced. An annual check-up by your local radio supplier is recommended to measure radio output and antenna reflected power. If reflected antenna power is high, such as caused by a malfunctioning antenna, antenna wire or antenna coil, this will degrade radio performance and could damage other radio components. The radio supplier can test your system to ensure that both the radio output and the antenna reflected power are within specifications. Malfunctions can be complex so have testing done on the assembled radio system as it is in the vehicle rather than removing pieces for testing. During this testing, the radio supplier also can ensure your antenna is tuned correctly.

Annual visits to your local radio shop are recommended to measure radio output and antenna reflected power. If reflected antenna power is high, such as caused by a malfunctioning antenna or antenna coil, this will degrade radio performance and may damage other radio components. A test of radio output will detect damaged radio components that are influencing radio performance. A visual inspection cannot detect these issues. The radio shop can also ensure your antenna is tuned correctly. Have the whole system tested in the vehicle not just pieces.



Head Office

Pointe-Claire

570 Saint-Jean Blvd
Pointe-Claire, QC
Canada H9R 3J9
T 514 630-4100

Vancouver

2665 East Mall
Vancouver, BC
Canada V6T 1Z4
T 604 224-3221

Québec

319 Franquet
Québec, QC
Canada G1P 4R4
T 418 659-2647



OUR NAME IS INNOVATION