

## **Portable FR 300 Repeater Setup and Use.**

(Revised 07/23/2007)

- 1. Handle Carefully - this is Fragile Equipment.**
- 2. Do not alter any settings on this equipment – set only the one power switch to the “ON” position when instructed.**
- 3. Do not pack loose components inside the radio box when returning the equipment – they will destroy the radio modules and cost you a lot of money in repairs!!!**
- 4. Do not allow the battery clamps on the power leads to short together at any time during installation.**

These instructions refer to the new FR300 repeater design which has been equipped with a new R/T module that has up to 10 watt transmit power instead of the 5.0 watts provided by earlier versions.

The frequencies quoted in these instructions are those used on repeaters manufactured for use by Falcon Research. Units manufactured for other clients may use different frequencies.

For logistics and support reasons control tones are not usually incorporated into the repeater programming unless specifically requested.

### **Privacy and Use:-**

It is very important for users to understand that there is no such thing as exclusive use frequencies for the average user. Any conversations made using the portable radios and // or the repeater are able to be overheard by anyone else using a standard FM portable radio tuned to the right frequencies. The ONLY effective way around this issue is to use encryption or scrambling – something that Industry Canada tries to discourage but which is available if absolutely required. It is also important to minimize possible interference with other users on adjacent repeaters. Please use the repeater talk around channel whenever possible. Should adjacent repeater interference become a significant problem we do have other frequencies available.

### **Site Considerations :-**

Choose a repeater site that has a good line of sight from the repeater to each of the mobile parties and / or base station. Check the signal path between this site and each of the mobile parties and / or base station using standard VHF-FM portable radios operating at 5 watts Tx power. Where multiple linked repeaters are being installed it will also be necessary at the same time to confirm the signal path between the first stage and second stage repeater locations. This path is essential for the operation of portables at the second site. A signal transmitted from the first repeater site must be received with good strength and clarity at the site of the second repeater. There should be no background hiss when receiving an audio signal. Confirm that the second stage repeater location can access and be accessed by all portables that will be operating through it. Note that second stage of a multiple repeater system will consist of two repeater modules. If possible allow 50 to 100 yards of physical separation between the two second stage modules.

Locate the solar panel so that the face is exposed sunlight for as long as possible during the day. It may be necessary to wedge the panel between rocks so that wind does not blow it down or build from local materials a mounting frame to which you will fasten the Solar Panel supports with screws. Metal pegs may be provided for staking the panel to the ground where soil types permit. If not mounted on the optional solar panel, set the box down with the lid uppermost on a raised surface (rocks or logs) to keep it out of any ground water and cover it with a tarp or heavy plastic bag to protect it from the weather. If the R/T box is mounted on the solar panel support assembly, wrap one of the supplied plastic bags over the box and secure it with the supplied electrical tape.

If chattering or cycling of the repeater is experienced when relaying weak signals it may be necessary to move the antenna from the top of the Solar Panel. In this case mount the antenna on a post as far away and above the repeater as possible and install a ground plane. Also check the voltage of the 12 VDC battery, the solar panel may not be charging it properly.

It is strongly suggested that you set the equipment up in camp before field installation so that any problems can be sorted out more easily and field personnel can try out the channels on the radios to get a better understanding of how it all works. Leave the system operational for an hour or two before moving it out into the field to ensure that it is electrically stable. When setting up and testing multiple repeater systems allow a hundred yards between units to avoid over driving the receivers due to transmitters in too close proximity.

The antenna is a ½ wave whip which when mounted on the solar panel does not require any further ground plane. Each antenna is matched to the repeater with which it is packed – do not use an antenna with another repeater box!

**Do not alter the settings of any of the internal equipment in the repeater box other than to switch on the single control switch as instructed below.**

**Installation: -**

Customer to supply: -

- A. A 12 volt battery (automotive lead-acid type is fine). Use a new battery – many problems have been traced to old batteries from camp equipment that do not hold a charge any longer!
- B. A post to mount the antenna if the Solar Panel option is not supplied.

The repeater consists of two boxes if the Solar panel option is ordered; otherwise there is only one box that contains the radio equipment. Disregard references to the Solar panel if it is not part of your installation. Retain all packing materials (particularly the Solar Panel box) for use when returning the system. Leave the tools and instructions with the repeater for use by the person that removes the system.

1. Locate the Robertson screwdriver. Also locate and remove the antenna whip from the packing box.
2. If the Solar Panel option is supplied proceed to Para. 3 otherwise follow these instructions. Connect the coaxial connector on the end of the antenna cable to the BNC connector (marked “Ant”), located on the outside of the case below one of the hinges and between the strengthening ribs. If the battery power lead is a separate item connect it to the connector on the back of the Radio box. Go to step # 11.
3. If the Solar Panel is supplied the remove the Yellow colored end block from the Solar panel box by removing the securing screws with the supplied Robertson driver and carefully tip out the Solar Panel. Refit the block and screws (they will be needed when returning the equipment). Lay the box down flat and lay the Solar Panel face down on top of the box.
4. Locate the end of the upper or rear support leg that is usually marked “Prise or lift here to open support legs” and prise it apart from the lower support leg. Once the support legs are free to move set the Panel up on end. Face it in a direction that exposes it to the maximum amount of sunlight for your location and latitude. Adjust the vertical inclination by opening or closing the rear support leg. Secure the lower support legs with the pegs or rocks but do not secure the rear support yet.

5. Locate the hanger brackets on the radio box. Lift up the curved ends of the brackets and hook them over the cross-support (marked “Hang radio box here.”) on the rear support leg of the Solar Panel. Note that on the underside (rear edge) of the radio box there may be one or two different polarized connectors and an antenna connector.
6. Fully open the marked connector panel on the rear of the Solar Panel (open the support leg far enough to let the cover past the radio box hanger bracket) and GENTLY pull out the small connector. Pull out sufficient cable to allow the connector to be plugged into the matching socket on the Radio box. Once the connector is secure then reposition the support leg to give the correct inclination for the panel and then **GENTLY** release the spring-loaded cover.
7. Secure the Rear support leg with pegs or some other suitable means e.g. heavy rocks.
8. **Do not** connect to the battery yet.
9. Due to supplier manufacturing changes the various antenna mounting brackets have securing holes that are differently spaced. The solar panel has two sets of mounting holes. Select the set that matches the hole spacing on the supplied “L” bracket. Use the supplied Robertson screwdriver to remove the two or three screws from the marked antenna bracket location on the top edge of the Solar Panel frame and secure the Antenna mounting bracket with the screws. **Do not let the weight of the antenna cable hang unsupported from the “L” bracket.** Do not uncoil the antenna lead unless you wish to mount it some distance away from the Repeater installation. Straighten the antenna whip and screw it onto the antenna mounting bracket. Be careful not to cross thread the antenna base screws.
10. Connect the coaxial connector on the end of the antenna cable to the BNC connector located on the outside of the case below one of the hinges and between the strengthening ribs and rest the bulk of the cable on top of the radio box..
11. If the battery power lead is a separate item connect it to the socket on the rear of the repeater box. Use a DC voltmeter to check that the polarity of the voltage as measured on the battery clamps is correct i.e. red clamp is positive and black clamp is negative. The actual voltage value will depend upon the amount of light falling upon the solar panel but should be over 12 volts DC. It is the polarity that matters. If the polarity is correct connect the battery lead to the battery but **observe the correct polarity.** Momentary incorrect polarity will destroy the repeater and there is no way to repair the damage in the field. Locate the single power switch and set it to the “ON” position. The green power indicator should be on. Please note that on current models the single internal fuse is no longer used. The radio is protected by two 8 or 10 amp inline fuses in the supply cable.
12. Transmitting from a portable radio on the repeater receive frequency i.e. repeater channel, should now activate the repeater and the relayed signal should be heard on another portable radio, also set to the repeater channel.
13. Ensure the Radio box lid is firmly closed and latched and that the equipment is firmly anchored before leaving. Use the supplied plastic bag and tape to wrap around the equipment box to keep out as much rain as possible. Remove and retain all packing materials for later use. Leave the instructions and screwdriver with the repeater for use when disassembling the system.

### **System Use.**

The repeater receives a signal from the mobile radio on 158.205 MHz and retransmits it on 153.305 MHz to the second mobile. There are 2 frequencies involved in this procedure, one is for transmit and the other is for receiving. The mobile radio's Transmit and Receive frequencies are the inverse of the Repeater's. Since all mobile radios have a common Transmit frequency and a separate but common receive frequency it is obvious that the mobile radios cannot communicate directly with each other on the repeater channel unless they go through the repeater. The appropriate channel on your radios is the Field Repeater channel.

Your portable and mobile radios may also be equipped with a repeater "Talk Around" channel. This channel receives and transmits on the same frequency i.e. 153.305MHz. It will receive any messages relayed by the repeater but will not transmit to the repeater. It will also allow field personnel to talk directly from radio to radio where terrain permits. This saves unnecessary use of the repeater batteries but still allows personnel to monitor for messages from the repeater. These messages can normally be identified by the beep tone that ends a repeater relay message. To reply to a call from the repeater it is necessary to switch to the repeater channel.

In case of queries or problems please call Phil Eldridge at 604 576 8235 (office) or 576 9424 (Res) or email at [phillip\\_eldridge@telus.net](mailto:phillip_eldridge@telus.net).