

## FIX-N-FAX #150

### CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION

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#### **Management Guidelines for RFI (Radio Frequency Interference)**

The following information is published as a guide for Radio Frequency Interference Management, due to the increased use of electronic technology both in the vehicle systems and with auxiliary equipment that is installed on or about the vehicle.

#### **Troubleshooting guidelines:**

The following are general guidelines that should be followed when installing a radio telephone or land mobile radio in a vehicle. These guidelines are intended to supplement, but not to be used in place of, detailed instructions for such installation which are the sole responsibility of the manufacturer of the involved radio telephone or land mobile radio.

**NOTE:** If problems persist after conformance to these guidelines have been assured, then the manufacturer of the vehicle and the manufacturer of the radio equipment should be contacted for additional information regarding installation or operation of the device.

#### **General Guidelines:**

##### 1. Transmitter Location

- a) The transceiver for remote radios should be located away from other electronic devices and as near to the vehicle body side as possible.
- b) One piece transceivers should be mounted under the dash where they will not interfere with vehicle controls or passenger movement.

##### 2. Antenna Installation

- a) Each vehicle model and body style reacts differently to radio frequency energy. When dealing with an unfamiliar vehicle, it is suggested to consider air bag location; also that a magnetic mount be used to check the proposed antenna location for unwanted effects. Antenna location is a major factor in these effects.

### 3. Antenna Cable Routing

- a) High quality coax (at least 95% shield coverage) should always be used and located away from all electronic modules.
- b) Cable routing should be done to maintain as great a distance as possible between any vehicle wiring and the feed line.

### 4. Antenna Tuning

- a) It is important that the antenna be tuned properly and reflected power be kept to less than 4% (VSWR less than 2:1).

### 5. Radio Wiring and Connection Locations

- a) Both transceiver power lead connections should be made directly to the battery. For one-piece transceivers where ignition control is desired, a 12-volt power contactor should be located at the vehicle battery with the coil of the contactor driven through an appropriate in-line fuse from an available ignition circuit not powered during cranking. The contactor coil must return to battery negative.
- b) Any negative lead from a handset or control unit must return to battery negative. It is preferable that the positive lead for a handset or control unit be connected directly to the battery. It is recommended that the handset or control unit positive and negative leads be appropriately fused separately from the transceiver positive and negative leads.

### 6. Wire Routing

- a) The power and ground connections should be routed through the vehicle as far as possible from any electronic modules.

### 7. Troubleshooting

- a) Possible causes of unwanted vehicle-radio interaction include:
  - 1) Power leads connected to points other than the battery,
  - 2) Antenna location,
  - 3) Transceiver wiring located too close to vehicle electronics,
  - 4) Poor shielding or poor connections on antenna feedline.

This information was supplied by:

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