



FORD MOTOR COMPANY

Mobile Radio Installation Guidelines



SPECIAL NOTE:

The information contained in this guide has been prepared for use by persons installing two-way radio equipment (transmitters and receivers) in vehicles. It has been prepared in accordance with current engineering principles and generally accepted practices, using the best information available at the time of publication. These guidelines are intended to supplement, but not to be used in place of, detailed instructions for such installations which are the sole responsibility of the manufacturer of the land mobile radio. Since it is not possible to cover all possible installations of two-way radio equipment, Ford Motor Company cannot be held responsible for incidental or consequential damages arising from the use of the information contained herein. Certain land mobile radios or the way in which they are installed may affect the vehicle operations such as the performance of the engine and driver information, entertainment and electrical charging systems. Expenses incurred to protect the vehicle systems from any adverse effect of any such installation are not the responsibility of Ford Motor Company.



GENERAL INFORMATION

Ford Motor Company vehicles are designed and tested for safe operation with properly installed and properly used land mobile/amateur radio communication equipment with up to 100 Watt transmitter power.

Special design considerations are incorporated into all Ford vehicle electronic systems to provide immunity to radio frequency signals. To maintain compatibility with vehicle electronic systems, mobile two-way radio and telephone equipment must be installed properly by trained personnel, observing these general guidelines:

- Power connections should be made directly to the battery and fused as close to the battery as possible. Avoid using cigar lighter or “Power Point” receptacles as power sources for radio communication equipment.
- Antennas for two-way radios should be mounted on the roof or the rear area of the vehicle. Care should be used in mounting antennas with magnet bases, since magnets may affect the accuracy or operation of the compass on vehicles, if so equipped.
- The antenna cable should be high quality, fully shielded coaxial cable, and kept as short as practical. Avoid routing the antenna cable in parallel with vehicle wiring over long distances.
- Carefully match the antenna and cable to the radio to achieve a low Standing Wave Ratio (SWR) and to avoid RF currents on the antenna cable shield.

All installations should be checked for possible interference between the communications equipment and vehicle electronics. Mobile radio equipment with greater than 100 Watts output may require special precautionary measures beyond those outlined in this document.

This pamphlet is provided as a supplement to the radio manufacturer’s installation instructions for installing communication equipment in Ford vehicles. Listed on page 4 are some additional sources of information.

Radio transmitters are regulated by the Federal Communications Commission (FCC) in the United States. Compliance with FCC regulations is the responsibility of the manufacturer and/or user of transmitter equipment and not Ford Motor Company.

INSTALLATION GUIDELINES

1. *Transceiver Location*

- a. A transceiver location should be selected that provides a solid mounting point which does not interfere with the vehicle operator controls and provides adequate ventilation.

NOTE: Do not mount any transceiver, microphones, speakers, or any other item in the deployment path of the airbag system.

- b. Before using screws to mount the transceiver equipment, be sure to check for vehicle wiring under the carpet or behind the instrument panel which could be pinched, cut, or otherwise damaged.



2. Radio Wiring and Routing

- a. Transceiver power connections should be made directly to the battery and appropriately fused as close to the battery as possible. A weatherproof fuse holder is recommended. Twist the positive and negative power leads together to enhance noise immunity.
- b. Use caution when routing wires between the passenger and engine compartments to avoid chafing or pinching of wires. Use grommets over any exposed sharp edges and strain reliefs to keep wires in place. Seal all holes to prevent moisture intrusion.
- c. Route and secure all underhood wiring away from mechanical hazards such as exhaust manifolds and moving parts (steering shaft, throttle linkage, fans, etc.).
- d. Maintain as great a distance as possible between mobile radio power leads and the vehicle's electronic modules and wiring. Avoid running power leads in parallel with vehicle wiring over long distances.

3. Antenna Location and Installation

- a. Permanently installed antennas are preferable over magnetic, glass, or body lip mounts for anything other than for low power or temporary installations. Most of these alternate antennas can reflect significant power back at the feedpoint; this reflected power could then radiate from the feedline inside the passenger compartment and be picked up by the vehicle wiring. However, a magnetic-mount antenna is a good tool for checking the proposed fixed antenna location for unwanted effects on the vehicle since antenna location is a major factor in these effects.
- b. Glass mounted antennas should be kept as high as possible in the center of the rear window or windshield. Some vehicles use glass that contains a thin metallic coating for defrosting or to control solar gain; glass mount antennas may NOT function properly when mounted on this type of glass. (Ford Privacy Glass contains such a coating.) Also, refer to the antenna manufacturer's recommendations.

NOTE: *On some Ford vehicles, the rear window contains the entertainment radio antennas (AM and FM). Avoid using the rear window to mount mobile radio antennas in these vehicles.*

- c. If a magnetic mount antenna is used, take care to locate the magnetic base in a location which avoids interference to the vehicle's compass mechanism, if so equipped. Also, some Ford vehicles use non-metallic body panels (decklids, etc.). If metallic backing panels are used, do not block the reception paths for factory installed antennas, such as Global Position Satellite (GPS) transceivers, if so equipped.
- d. **Antenna Tuning:** It is important that the antenna be tuned properly and reflected power be kept to less than 10% (VSWR less than 2:1).

NOTE: *Your installation should be checked periodically for proper SWR and any signs of damage or deterioration to maintain proper operation with your vehicle.*



4. Antenna Cable Routing

- a. Always use a high quality, one piece coaxial cable (at least 95% shield coverage). Connector quality and termination techniques are just as important. The ARRL handbook provides excellent guidelines for terminating coaxial cables.
- b. The antenna cable should be treated in the same way as the control and power cables. Avoid sharp edges and pinches and keep the cable as short as possible. Also, avoid routing the antenna cable in parallel with vehicle wiring over long distances. If it is necessary to cross over wiring, cross at right angles. (In some cases, additional shielding between the antenna cable and the vehicle wiring may be helpful.)

ADDITIONAL INFORMATION

1. Troubleshooting

- a. Should vehicle-radio interaction develop following installation, the source of the problem should be identified prior to further operation of the vehicle. Most interaction problems can be eliminated by following these installation guidelines.
- b. Possible causes of vehicle-radio interaction include:
 - Antenna location (move antenna to another position)
 - Antenna feed line routing (locate as far as possible from vehicle electronics and wiring)
 - Inadequate shielding or loose/corroded connectors associated with the antenna feed line
 - Mismatched antenna or high SWR
 - Power feeds not connected directly to the vehicle battery
 - Power feed routing (locate as far as possible from vehicle electronics and wiring)
- c. If any vehicle-radio interaction problems exist after following these guidelines, contact your radio equipment manufacturer for additional assistance.

2. Additional Sources of Information

- *Radio Frequency Interference: How to Find It and Fix It*
ISBN: 0-87259-375-4
The American Radio Relay League, Inc.
Newington, Connecticut 06111-1494
Phone 203-666-1541 / Fax 203-665-7531
- *Giving Two-Way Radio Its Voice* (booklet)
Champion Spark Plug Company
Automotive Technical Services Dept.
P.O. Box 910, Toledo, Ohio 43661

3. Internet News Groups

- rec.radio.amateur.equipment
- rec.radio.amateur.misc