



**MOBILE RADIO INSTALLATION**

**GUIDE TO INSTALLING  
MOBILE RADIO TRANS-  
CEIVERS IN VEHICLES**

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**Icom Inc.**

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## ■ PREPARATION

Check if there are installation instructions available for your car.	Vehicle manufacturer or agent.
Check that radio is suitable and approved for mobile installation.	Radio manufacturer or agent.
Read the installation instructions for the radio.	

## ■ POSITION

Checklist of points to decide before starting:

- i) Is there a suitable position to mount the radio?
- ii) Will you use a fist mic or a “hands-free” installation?
- iii) Can you route all cables so that they will not interfere with any controls of the vehicle? Fist mic cables are especially important here.
- iv) Make sure that it is possible to securely mount the radio.
- v) Will the position of the radio be quite safe for you and your passengers?
- vi) Will the position of the radio obstruct any safety device of the vehicle?
- vii) Don't forget that transceivers can become quite hot in transmit mode, the ventilation should not be obstructed.
- viii) Don't mount the transceiver, antenna or accessories where they can obstruct the driver's view.

## ■ VEHICLE

Some vehicles require special attention.

These notes are written for petrol/diesel engined cars, vans etc. with 12 volt battery supplies.

Other types of vehicles may be subject to special regulations. If in doubt, please contact either the vehicle or radio distributor for further information.

Be sure that the installation can be made safely, such as no petrol leaks etc.

Modern vehicles are using more and more non-metallic materials in their construction. Some panels (interior and exterior) may be made from plastic or reinforced resin etc. Such panels do not have the same shielding properties as metal and this may cause unexpected effect with RF such as VSWR, RF immunity. A qualified radio installation engineer should be able to give you advice on suitable products that can be used to “screen” such non-metallic panels if required.

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## ■ ANTENNA

Many types and sizes of antennas are available, whatever you choose you need to consider some basic points :

Reduce any RF interference to the vehicle electronic circuits.	Position the antenna away from any sensitive circuits.
If the transceiver is a “high power” type, reduce RF risk to pedestrians etc.	Position the antenna where pedestrians will not easily touch it or stand too close.
Avoid mounting the antenna where it could be dangerous for pedestrian or other road users.	Position the antenna away from the edges of the vehicle, as high as possible. Avoid having the antenna end at “eye level.”

Don't forget that the antenna must also be securely mounted vehicle and should be a sensible size.

If you choose a magnetic mount type, be sure that it is rated for the antenna type.

Large HF antennae, especially bumper mount types will require special consideration because of the safety critical aspect of this part of the vehicle. Such large antenna may also be subject to vehicle construction regulations. Please seek advice from a qualified vehicle engineer and a qualified mobile radio installer.

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## ■ CABLING

Mobile transceivers generally need a direct connection to the vehicle battery.

You need to check where you can route the DC supply cable and RF coaxial cables.

If there are no specific instructions for your vehicle and/or radio then the following points should be adhered to :

- i) Keep the radio cables away from fuel or gas pipes.
- ii) Keep the radio cables away from any part that will become hot.
- iii) Keep the radio cables clear of moving parts (steering, suspension, throttle control, etc.)
- iv) Route the cables where they can be securely held in position.
- v) Check if you need to drill some holes for passing radio cables.
- vi) Only attach cables to non-moving parts of the vehicle.

## ■ INSTALLATION

Start the installation with any mechanical work that is required for fitting the radio mount, cables, etc.

Before drilling any hole in a vehicle check exactly what is behind the panel that you are drilling.

When drilling a hole always use a drill with a “stop” so that it is impossible for the drill to go too far.

Take extra care to avoid petrol tanks and pipes, brake lines, other wiring, etc.

If you have to drill any hole to pass a cable then the hole must be sealed with a rubber grommet and when the cable has been passed through you should re-seal the cable and grommet with a suitable sealant.

If you drill holes for mounting screws, be sure to check that the screw is a suitable type and length.

Locking type screws, nuts or washers are preferred.

Pay attention to cables inside the passenger compartment. They should be secured or routed under carpets etc. There should be no possibility that they could move and interfere with any control or pedal.

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## ■ BATTERY CONNECTION

Mobile transceivers are usually intended for direct connection to the battery.

Before disconnecting the battery you need to be aware of some possible problems:

- i) Is the vehicle fitted with an alarm that may not operate after re-connection?
- ii) Is the vehicle fitted with any electronic circuit that may malfunction after re-connection? (engine management, traction control, braking control, etc.)
- iii) If in doubt do not disconnect the battery. Take the vehicle to an authorised service agent and ask them to connect the transceiver power cables for you.

If the DC cables are not long enough they should only be extended using an equivalent size and type of cable and any join must be capable of handling the specified current and be well insulated.

Always try and route cables so that the total length is as short as possible.

Connections should be made to the battery terminal connectors and nowhere else in the vehicle wiring room.

If the vehicle uses a different battery voltage (24 volts, etc.) then a DC-DC convertor must be used. Never try and connect to an intermediate point on the battery, etc., that appears to measure 12 volts.

## ■ TESTING

Switch on transceiver and check that it functions OK.

Check the antenna matching with a VSWR meter, if possible, adjust the antenna for a minimum value. (Don't forget that doors etc may have an effect on the measured value!)

Switch on ignition (but not engine) and check that all instruments, warning lights etc are displaying "normal" reading. Now transmit and verify that nothing changes and that no instrument is disturbed.

If the transceiver is multi-mode, then repeat the test with all AM/SSB and FM modes.

If the transceiver is multi-band, then repeat the test in all operating bands.

In each case use the maximum RF power.

If there is ANY disturbance of the vehicle instrumentation then stop and identify the source of the problem before continuing.

If the above tests have been completed without problem you can proceed to the STATIC operational checks.

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## ■ STATIC OPERATIONAL CHECKS

Start the engine of the vehicle and repeat ALL the tests described in 'TESTING'.

Check that there is no disturbance of the engine control or engine speed.

With the help of an assistant, switch on the vehicle lights, indicators, etc. while transmitting. Check that no unintended flashing or indication occurs.

Stop the engine. If the above checks have been completed without problem you can proceed to the mobile operational checks.

## ■ MOBILE OPERATIONAL CHECKS

**DO NOT PERFORM THESE CHECKS IN CITY TRAFFIC!**

Find a quiet road, start the vehicle and while moving slowly operate the transmitter. Check that brakes, etc. all operate as normal. Repeat using bands, modes, etc. as applicable to your transceiver.

If all is OK, then increase to normal driving speed and repeat the tests. If there is any unexpected reaction from the vehicle (accelerator, transmission, steering or other in-car electronic device) then stop immediately and seek assistance from a qualified installation engineer before operating the transceiver.

If all is OK, perform a final braking test at normal speed while transmitting.

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Finally stop the vehicle, switch OFF the transceiver and re-check your installation :

- Nothing has come loose?
- No equipment or cable was inconveniently placed for your driving or your passenger's safety?
- Vehicle alarm/immobiliser functions correctly?
- All vehicle instruments read normally?

## **WARNING !**

If the vehicle and transceiver installation does not pass every check without problem you should seek expert assistance.

**Count on us!**

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