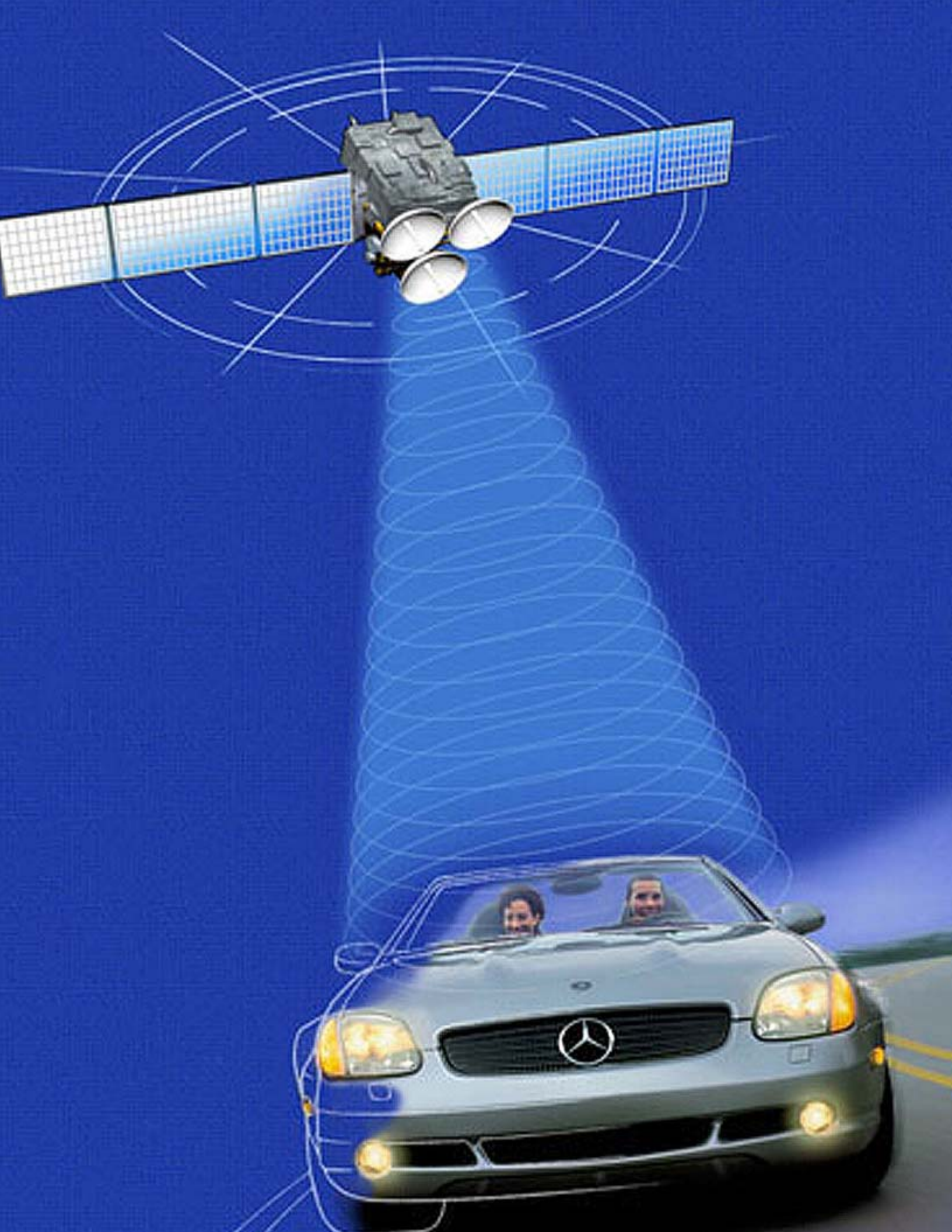

MECP Study Guide Supplement

SATELLITE RADIO INSTALLATION

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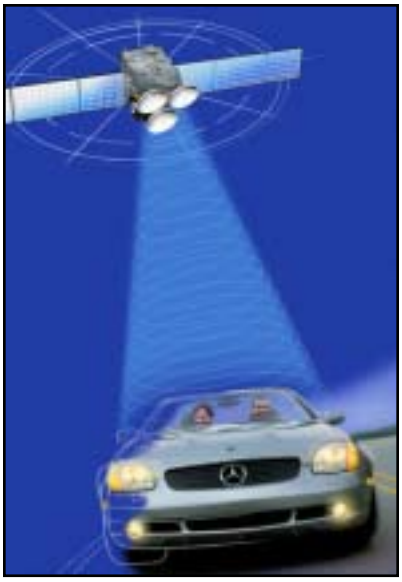

Small obstacles like leaves, branches or rain do not affect the satellite signal.

Introduction to Satellite Radio

Digital satellite radio is the latest advancement in automotive entertainment, offering consumers unprecedented sound quality, programming choice and national coverage. Digital satellite radio works much like the digital broadcast satellite systems that are popular in homes. The digital signal from a satellite radio company is uplinked from a ground-based transmitter to several high-powered satellites that beam the signal back down to earth. Digital satellite radio subscribers can listen to the broadcasts using special receivers and dedicated antennas.

Currently, there are two companies broadcasting digital satellite radio. While these two companies offer similar services and use similar technologies, the associated hardware is not interchangeable so consumers must buy the receiver for the service to which they intend to subscribe.

Digital satellite radio is related to other radio frequency based services like FM and cellular telephone but many of its characteristics and requirements are unique. While small obstacles like leaves, branches or rain will not interrupt service, the signal from the satellites cannot penetrate large objects like buildings and hillsides. Thus the receiver's antenna must have an unobstructed view (line-of-sight) of at least one orbiting satellite. In urban areas where buildings and terrain are likely to block the signal, a network of ground based (terrestrial) repeaters broadcast the signal on a frequency that can penetrate these obstacles. While the digital satellite radio receivers require a separate antenna to receive these signals, the radio will automatically select the best signal without any intervention from the user. The combination of multiple satellites and local networks of terrestrial repeaters is designed to provide seamless uninterrupted service across the country.

Home, automotive and portable digital satellite radio receivers are available from a variety of manufacturers and vary in cost and complexity. A basic satellite radio system consists of a satellite radio receiver and at least one antenna. Automotive receivers can be added to existing stereos using a dedicated digital cable, an analog connection or using an RF modulator, each with its own benefits and drawbacks.

Basics of Installation

There are countless ways to install satellite radio systems. Accordingly, we do not have the luxury of being able to cover each application. Therefore, we will cover the installation basics of the dedicated receiver, the RF modulated control unit and satellite radio antennas.

- Properly planning the installation (as discussed in Chapter 2 of the MECP Basic Installer Study Guide) is essential.
- Over 80% of all problems that occur with satellite radio systems can be traced back to installation related problems.

■ Both the antenna and receiver box are essential elements of the satellite radio system. Make sure you pay attention to the placement of the antenna and receiver, taking special care to account for the length of the antenna cable. Perform a "dry run" by temporarily mounting the antenna, routing the antenna cable, then locating the receiver module.

■ With today's highly integrated OEM audio systems, do not underestimate the consumer appeal of the RF modulated receiver. Often the customer does not want to replace his or her existing audio system, but does not realize that an RF modulated satellite radio receiver can still provide very high sound quality.

The following are basic guidelines you should follow when installing a satellite radio system:

Antennas

Every satellite radio receiver requires the use of an antenna. There are many different antennas available on the market today, but they can be categorized into few basic types:

- Adhesive, Roof Mount
- Magnetic, Roof Mount
- Adhesive, Glass Mount
- Mast-type, Truck Antennas

Each antenna and receiver has a pair of antenna connectors. One connector is for the satellite signal and the other is for the terrestrial repeater signal. The antenna connectors are typically color-coded, although antenna color connectors vary by manufacturer. Antenna cables range in length from 14 to 21 feet. It is important that you do not cut these cables. Any alteration of the cables will result in signal degradation.

Installing Adhesive/Magnetic Roof Mount antennas

Adhesive and magnetic antennas share many similar installation techniques, the only difference being how they are secured to the vehicle. Adhesive mount antennas are permanently affixed, while magnetic mount antennas can be easily removed. Here are some important points for installation of either type of antenna:

■ Must be installed within 10-degrees of a horizontal plane.

■ Must have a 20-degree clearance of any obstruction on all sides. It is imperative that the Adhesive/Magnetic Roof Mount antenna be placed on the roof of the vehicle for best reception. (If you must place the antenna on a trunk lid (convertibles are the only exception), the antenna must be able to "see" the satellite, having clearance of at least 20-degrees from the roof of the vehicle.)

Margin Notes

The antenna connectors are typically color-coded. Each receiver manufacturer uses a different combination of colors on the antenna connectors.

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■ Must have a suitable ground plane, cannot be mounted on plastic, fiber-glass or any other substance than metal. (Roof mount antennas require approximately 2 square feet of metal underneath them.)

■ Choose the mounting location carefully. Once the adhesive touches the surface of the vehicle it is very difficult to remove without damaging the. antenna or vehicle. Ensure that the surface is clean before mounting the antenna.

■ Route the wires into the vehicle carefully; avoid kinking the antenna cable more than 90-degrees.

Installing Adhesive, Glass Mount antennas

■ Must be installed within 10-degrees of a vertical plane.

■ Must have a 20-degree clearance of any obstruction on all sides from 4" down on the mast.

■ Do not install a glass mount antenna on windows that contain metallic or mirrored finishes.

■ Some glass mount antennas require DC power. Wire these antennas to a switched 12V power supply so they will not drain the vehicle's battery when the vehicle is not running. Fuse the power connection no more than 10" from the power source.

■ Ensure the antenna does not block any part of the vehicle's brake light.

■ Ensure the selected mounting location does not interfere with the driver's visibility during vehicle operation.

■ Ensure the coupler core in the antenna does not cross an existing antenna or defroster lines.

■ Route the wires into the vehicle carefully; avoid kinking the antenna cable more than 90-degrees.

■ Do not "test" a glass mount antenna by holding the outside element directly against the inside coupler. This causes the coupler elements to short-circuit, which permanently damages the antenna. Ensure there is always glass between the outside element and the inside coupler.

Note: All applications of adhesive antenna require press and hold for 60 seconds. Also, in Northern climates, the glass should be allowed to warm to about 70 degrees Fahrenheit before applying. Ensure that the glass is completely clean before mounting the antenna.

Installing Mast-type, Truck Antennas

These antennas are designed for class 5,6,7 and 8 Semi-Tractors. They mount to the mirrors or rear grab bars.

- Must be installed within 10-degrees of a horizontal plane.
- Must have a 20-degree clearance of any obstruction on all sides. Take into account all metal hardware, including exhaust stacks. Fiberglass wind fairings are ok, and will provide minimal signal blockage.
- If the antenna is mounted towards the rear of the cab, run the antenna cable into the rear storage area or behind the driver's seat on day cabs. Use existing access holes if possible and silicone any penetrations into the cab. Connect the antenna cables to the receiver.

Mounting the Dedicated Receiver

On most systems the satellite receiver is a small metal box. These units are designed to be mounted in the trunk, glove box or even under a seat. The installation is similar to that of a CD changer; however, unlike a CD changer, the customer does not need to access the unit to change their music selection.

Find a suitable location to mount the receiver box.

- Avoid any moving parts, places where moisture can arise, locations near extreme heat and vibration or areas that are susceptible to electric interference.
- Locations such as under the front seats, or on a sidewall in the trunk work the best, provided the unit cannot be damaged by water or moisture from passengers shoes, boots, etc.
- The receiver box can be mounted in a vertical or horizontal configuration, but it is best to consult the owner of the vehicle before determining a final location.
- Make sure that the receiver box has adequate ventilation. Mounting the receiver under the rear seat, for example, is not recommended because of insufficient air circulation.

Before finishing mounting the unit, connect all of the wiring temporarily to verify the system works properly.

Before drilling or securing the unit, always visually inspect the surrounding area to ensure you will not drill into gas lines, brake lines, etc.

Margin Notes

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Mounting the RF Modulated control unit
The control unit may be flush mounted in the vehicle, or you may simply use Velcro or another such adhesive.

When flush mounting the control unit:

- Use the supplied mounting bracket whenever possible.
- Before modifying the vehicle, it is best to consult the owner of the vehicle first.
- Inspect the surrounding area for obstacles before drilling or cutting.

When using Velcro or other adhesives:

- Consult with the owner of the vehicle to determine a mounting location.
- Thoroughly clean the surface of the mounting location before adhering the Velcro.

Note: A hanging cord from the control unit may pose a hazard to the driver if it tangles with the shifter, steering wheel, etc. Install the control unit so the cord cannot get in the way of these or other potential hazards in the vehicle.

Troubleshooting

Here are a few scenarios that you may come across when installing satellite radio units.

No system power
Check your connections. More than likely a fuse is blown or you didn't connect power and ground correctly. Reset the unit.

No signal
Does the antenna have a ground plane? A ground plane must be present when using a roof mount antenna.

If you are indoors, pull the vehicle outside to have clear view of the sky.

If this is an active on-glass antenna, verify that the LED is lit indicating that it is powered and working.

Display says "Antenna"
Are the antenna connectors in the right location and fully connected? There are two antennas needed for the satellite radio system to operate properly, one for the terrestrial repeaters and one for the satellite signal. If they either are disconnected or incorrectly connected the receiver will display this message on the screen.

The signal cuts in and out
In most settings signal interruption is rare. However, if you are not near a repeater, then you will probably lose the satellite signal under service station awnings, in tunnels, in parking structures, or even under large overpasses. If the signal is erratic, check the following:

- audio connections – check whether other audio sources such as CD or AM/FM radio exhibit the same interruptions.
- antenna placement – is the antenna placed on the highest part of the vehicle and oriented in the correct direction?
- power connections to the receiver box and the head unit.

Bad AM/FM reception, but good satellite radio reception
This may happen if you install a RF modulated receiver and do not make the antenna connections properly behind the radio. You will also want to ensure the satellite radio receiver is shut off when you are listening to AM/FM, with some products, the signal sent through the RF modulator is stronger than the AM/FM signal, causing the satellite signal to override AM/FM.

Receives the "barker" or "free-to-air" channel, but no other satellite channels are present
The unit probably isn't activated yet. Confirm with your customer to ensure they have activated their new unit.

Every satellite radio receiver has a set of troubleshooting codes that may appear if a problem arises. Refer to the owner's manual of the specific brand receiver to learn more about these codes.

Controls and display works correctly but no audio from satellite channels
This is a common mistake when installing a receiver that connects directly to the head unit. The receiver usually has 2 ports for the interface cable, to allow a CD changer to be daisy-chained to the system. Check the instruction manual to ensure that the interface cable is plugged to the correct port.

A special thanks to Best Buy, Sirius Satellite Radio, and XM Satellite Radio for contributing significantly to this chapter.

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