Aluminum Truck Body Hinders Radio Transmitting and Receiving

NARRATIVE
While heading out to check on a repeater site location, this incident’s two Communications Technicians were stopped by the Division Q Supervisor and the Engine Strike Team Leader, who shared their concern about being unable to transmit or receive on their radio from inside their vehicle, a 2015 Ford F-150 truck.

Problem 1: “Faraday Cage” Blocks Radio Signals
The Communications Technicians proceeded to experiment with the radio system. They verified that—due to this vehicle’s aluminum body construction—communications were hampered when trying to use the radio from inside the vehicle. Note to everyone: This aluminum body seems to act as a “Faraday cage” (also known as a “Faraday shield”)—that blocks the transmitting and receiving of the radio signals.

Problem 2: Antenna’s Magnetic-Mount Not Attaching Properly
In addition, due to the vehicle’s aluminum body, the external magnetic-mount antenna would not properly adhere to the cab’s top. The Division Supervisor had therefore fiber-taped this external magnetic-mount to the cab’s top.

However, the Communications Technicians were concerned that the antenna was not magnetically coupled to a ground plane. (A ground plane is the metal surface required below a radio’s antenna that enables the signal that is generated when transmitting to reflect off the surface and travel up into the atmosphere.)

LESSONS – A Solution for Attaching the Magnetic-Mount
For a temporary fix, a combi-tool was mounted in the bed of the truck with the shovel head parallel to the ground and the magnetic-mount was attached to the shovel head. (See Photo 1.)

For a cleaner solution, a 24” x 24” galvanized 26G sheet of steel and gaffer tape was used to mount the antenna to the top of the vehicle to create the necessary ground plane. (See Photo 2.)

Next, testing SWR (Standing Wave Ratio) showed little difference between taping directly to the roof of the vehicle vs using galvanized steel sheets.

Therefore, the recommended solution—to avoid damaging paint on rental vehicles—is to directly tape the magnetic-mount to the center of the roof using gaffer tape.

This RLS was submitted by: Incident Overhead