

SIRN Antenna Selection & Installation

This document is to specifically help West Virginia SIRN Installers, Technicians, Agency Buyers, and End Users, with on-going mobile performance utilizing the WV Statewide Interoperable Radio Network (SIRN).

The selection of an antenna is important, and any selection is a compromise, no one antenna does everything. Selection of the antenna should include:

Performance and coverage needs (ie. Bandwidth)

Mounting options

Cost

Modern vehicles supporting a variety of missions from utilities, law enforcement, military, EMS and Fire have very sophisticated computer modules that operate everything from engine management and gear selection to climate control, safety systems and braking. Strong radio-frequency interference (RFI) introduced into a vehicle's power train or safety systems can cause the driver to lose control of the vehicle. An accident that appeared to be the result of equipment failure or operator error could be the result of RFI, and the evidence vanishes when the culprit transmitter un-keys. Improperly grounded antennas that require a ground plane can radiate on the outside of the coax and introduce RF radiation into areas and devices within vehicles that it was never intended to manage.

Antennas are extremely sensitive to any conductive objects located near them. Consider these factors in choosing your antenna mounting location and final length; other antennas (legacy VHF - UHF, and WiFi, cellular etc.), Light Bars, Individual Light Units, Raised Roofs, ladders, crane booms, Roof-top air conditioners, dump bodies, and surface metal, as it all affects SWR. An antenna analyzer can be used for antenna optimization and fine tuning after the antenna is installed. All antenna installations should be checked for proper forward and reflected power with a high quality watt meter.

Serious consideration should be given to the bandwidth of an antenna. Keep in mind that SIRN sites may be transmitting both on 453 MHz and 460 MHz. In some areas you could add 409 MHz transmitters. Bandwidth consideration should be an antenna capable of at least 50 MHz bandwidth. A very thin wire antenna Laird/Antennex QW450 is rated at 450-470 MHz. It could NOT cover the spectrum from 409-465 MHz which is found in the SIRN system. The heavier antenna rod on an ASPR7495 has a bandwidth of 100 MHz from 406-512 MHz with an SWR of only 1.5:1. The larger the diameter of the antenna rod normally has a wider bandwidth and superior performance.

Antennas and Antenna Mounts age and should be checked annually, antennas and antenna mounts readily corrode when in contact with weather and other metals which are incompatible.

Note: Preventive maintenance should be performed more often if these parts are exposed to winter weather (salt) conditions.

Due to weather related deterioration, you should NOT Re-use Antennas, Feedline and Mounts – Always Replace them on all new vehicle installations.

Available Mobile Antennas

Recommended:

1/2 λ antennas:

Maxrad or PCTEL 1/2 Wave BMWU4002S

Harris 1/2 Wave Antenna AN-225004-001

LAIRD 1/2 wave BB4502NS (black) or B4502NS (silver) Motorola APX™ 8500

EM Wave spring EM-M10003-GPI or flex EMFLX-M10003-GPI

1/4 λ antennas:

LAIRD Mobile 380-520 MHz, 9.9 inch long with spring, Black BB3803WS or silver B3803WS

PCTEL A/S Model ASPR7495 ¼ Wave Mosaic antenna with spring

Motorola HAE6013 new design

EM Wave EMM10001 spring or EMFLX10001 flex

Only for applications requiring VHF/UHF/700/800 MHz in one antenna

Motorola AN000131A01 (Only for applications requiring VHF/UHF/700/800 MHz in one antenna)

PCTEL VHF UHF 700-900 MHz Wide Spectrum Antenna (PCTWLSLMR)

Special Purpose: Shark - Only for disguise applications

Not Recommended:

Laird / Antenex TRA4503, Phantom Antenna (AKA: Salt & Pepper Shaker)

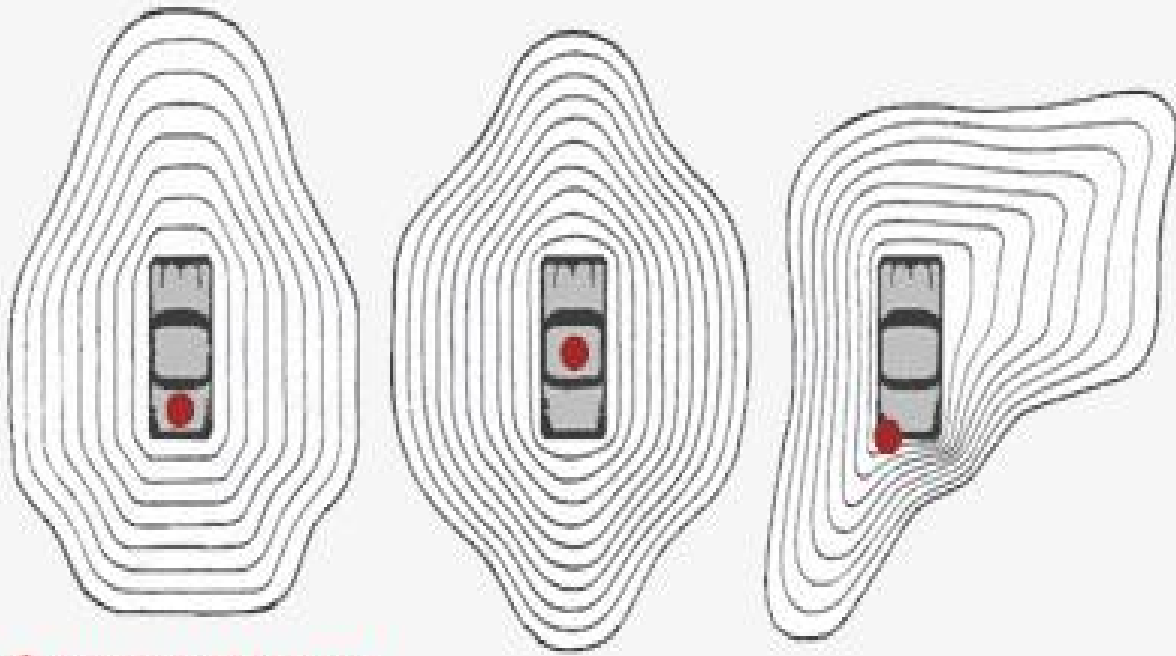
Laird / Antenex BB4505C 5dB Gain 5/8 λ Antenna

Laird / Antenex Model: QW450 ¼ Wave Antenna Unity Gain, 6.0 in Height

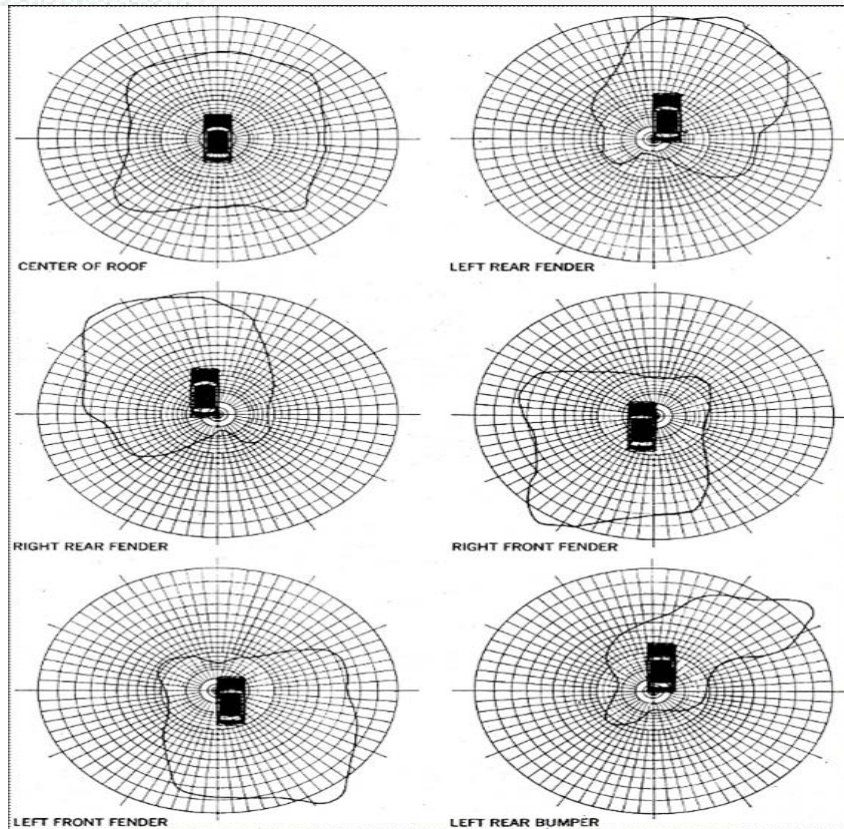
DDRR's (Directional Discontinuity Ring Radiator) / antennas with ray domes (covers)

Manufacturers antennas that are not shown on this list may submit them for testing.

Antennas radiate best in the center of the roof of a vehicle (second choice center of trunk deck).



● Location of Antenna



Center-roof location has an effective ground plane to radiate properly. The conducting surface must be at least a quarter of the wavelength ($\lambda/4$).