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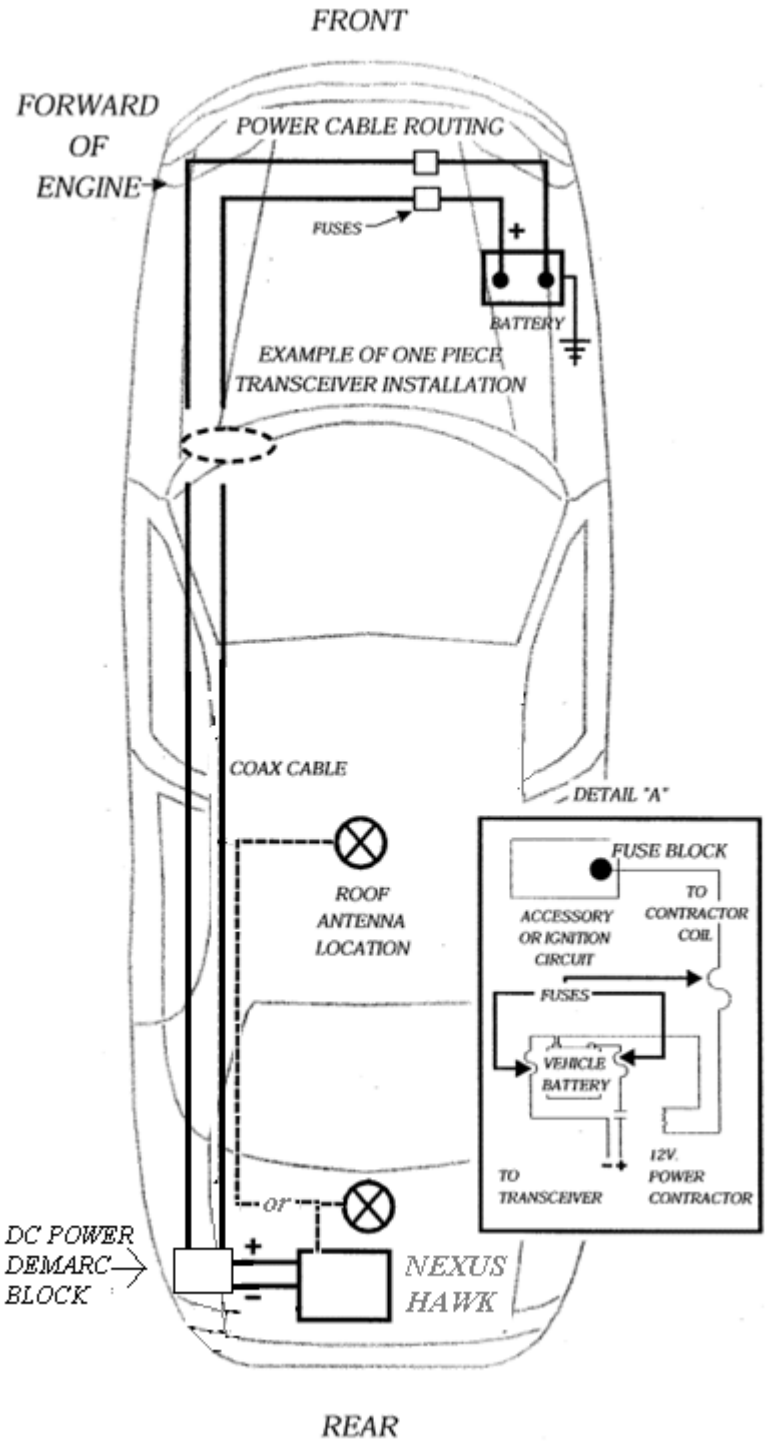
Nexus Hawk™

Vehicle Installation Guideline

The way in which certain radio transmitting devices are installed may adversely affect both their normal function as well as 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 Nexus iSR. The following are general guidelines for installing a Nexus Hawk into vehicles. These guidelines are intended to supplement good engineering practices and guidelines that authorized installers (as "vendors of knowledge") may already have or that vehicle manufacturers have communicated.



Detail "A" shows alternate, ignition-switch control of supplied power.

Locate the Nexus Hawk in such a way as to assure that it will not move and will introduce no trip, vision or rider-access hazard during vehicle operation.

Care should be exercised to assure that the foundation to which the Nexus Hawk is attached is secure enough to keep the Nexus Hawk from becoming a projectile if the vehicle is involved in an accident.

Care should be exercised to assure that the mounting location does not interfere with the deployment path of a Supplemental Inflatable Restraint or "Air Bag" or any vehicle

controls. The most favorable locations include: Trunk – fastened to a trunk wall, Trunk – fastened to a mounting shelf, Passenger seat – fastened to floor, Wire cage – mounted on cargo side.

Wiring Harness Specification

Wire Harness Length	Minimum Recommended AWG	Voltage drop at 5 A and maximum length	Voltage Delivered with 12V supplied	Voltage Delivered with 13.8V supplied
Up to 10 feet	16	0.416 Volts	**11.5**84 Volts	13.384 Volts
10 to 25 feet	12	0.408 Volts	**11.5**92 Volts	13.392 Volts
Over 25 feet	Not recommended			

Where ignition switch control is desired and no SEO wiring exists, a 12 Volt power contactor must be installed in the power line's positive lead. The contactor should be located near a proper 12 Volt feed. The coil of the contactor should be connected through an appropriate in-line fuse to an available accessory circuit or ignition circuit not powered during cranking. The contactor coil must return to a proper negative point. Detail "A" illustrates direct connection to the vehicle battery.

Any negative lead must return to a proper negative connection point (see Power Demarcation Block). It is preferable that the positive lead be connected directly to a proper positive feed (see Power Demarcation Block). If ignition switch control is desired, the power line's positive lead may be connected through an appropriate in-line fuse to an available accessory circuit or ignition circuit not powered during cranking. It is recommended that positive and negative leads be appropriately fused separately from the transceiver positive and negative leads.

The power leads should be brought through a grommeted hole in the front bulkhead that must be provided by the installer. For trunk-mounting, the cables should continue on along the driver's side door sills, under the rear seat, and into the trunk through the rear bulkhead. All attempts should be made to maintain as great a distance as possible between radio power leads and vehicle electronic modules and wiring.

If the battery is located on the passenger side, radio power leads should cross the vehicle in front of the engine.

These instructions do NOT supersede vehicle manufacturer instructions and guidelines.

Fusing Requirements

Both positive (+) and negative (-) lines must be fused with identical methods and fuse values. Fuse value is NOT TO EXCEED 7.5A, and is nominally 5A. Do NOT use slow-blow varieties.

Power Demarcation Block

DC power for the Nexus Hawk must terminate to a (preferably weather resistant), damage resistant, covered and insulated terminal block that is fastened to sturdy foundation or frame. The Nexus Hawk (and associated accessories, such as power amplifier, etc.) will receive their power from the terminal block.

Optional/Additional Power-management Devices

Power-off Timers, Voltage Regulators and similar devices must be mounted <u>after</u> the Power Demarcation Block, secured to a mounting deck and protected from damage. Examples of approved Power-off Timers are manufactured by *Lind Electronics* and *ChargeGuard, Inc*.

Maximum Power Budget

Device	Current
Nexus Hawk 2-slot, with WiFi and GPS	1700 ma
Each populated PCMCIA Slot	1000 ma under full use, 400 ma in stand by
Cellular Power Amplifier[1]	1500 ma

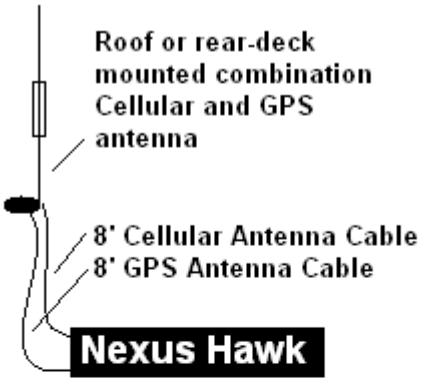
Antenna[2], Coax and Amplifier Installation

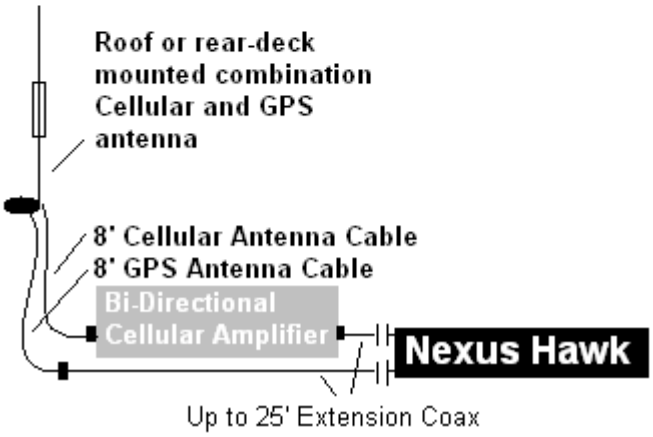
For best performance, the antenna should be a permanent-mount (hole drilling is required) type located in the center of a metallic roof or center of a metallic rear deck lid. Alternately…

If a magnet-mount antenna is used, it must include a jumper braid or wire from its ground plane to the vehicle body (using a convenient lug and spade connector). "Mag mount" antennas are **<u>not</u>** recommended, due to their generally poor performance.

If the installation requires a cable length that is greater than 8', a bi-directional cellular amplifier is required. See the illustration to the right for proper placement.

Always run antenna cables away from the Engine Control Module and other electronic modules. Care should be taken to maintain as great a distance as possible between any vehicle wiring and the antenna cables.





[1] See Appendix A for a discussion of cellular power amplifier topics
[2] See Appendix B for a discussion of cellular antenna topics

Appendix A – Cellular Power Amplifier Topics

Due to their design limitations, data cards are typically low power devices, with moderate receive sensitivity. While this is ideal for an urban location with nearby cellular towers, the data card's performance can be poor in structure-dense (blocking) urban and service-poor rural environments.

External amplifiers can amplify both the output of the data card (allowing it to be received more strongly at the cellular tower) as well as its receive sensitivity (allowing the signal from the cellular tower to be better received by the data card). The two ratings to pay attention to are: RF Output (in "watts" or "dBm") and Receive Amplification (in dB). As a general rule, "the more, the better."

Even in urban environments, amplifiers can be used to effectively minimize inevitable "dead spots" as well. Ideally, amplifiers should be placed as close to the antenna as possible, to maximize their benefit.

Appendix B – Cellular Antenna Topics

Antennas and antenna feed lines are the most critical components to pay attention to, in order to maximize the effectiveness of an installation.

Feed lines should be kept as short as possible and routed in such a way as to avoid sharp bends, constant flexing, pinching and small-diameter coiling. Unless otherwise directed, feedline connectors should be finger tightened, then tool-tightened an additional 1/8 of a turn. The connector should be further secured by the application of two-layers of standard vinyl electrical tape.

It is important to know that the function of an antenna is "bi-directional" in nature. It affects both the transmission and reception ability of the data card, equally. The performance of an antenna is measured in units of dBi. Similar to the amplifier (above), "the more, the better."

However, there is a trade-off. Antennas provide "gain" by compressing their patterns in the vertical plane. A high-gain mobile antenna (one exhibiting a gain of >7 dBi) will focus its signals on the horizon at the expense of those at higher angles. Therefore, high gain antennas may actually perform more poorly in urban environments, where the data towers are "higher" (on tops of buildings).

Subtle differences in antenna gain (less than 4dBi) will have little noticeable effect on the real-world performance of your data card. It is suggested that the best antennas for the mobile environment will exhibit 5- to 8-dBi of gain. This represents a compromise between performance (gain) and pattern (where the antenna focuses that performance).

Antenna mounting location and method will impact performance significantly as well. Ungrounded (floating) magnet-mount antennas perform poorly, despite manufacturer claims – unless one attaches a ground-strap from the antenna's base to the vehicle body. Through-glass mounts are effective antennas only if their installation instructions are fully followed without modification. Trunk-lip mounts perform quite well as long as the set-screws that attach the mount to the vehicle body pierce body paint and primer. Through-hole mounts (require drilling, paint removal and weather sealing) perform the best since the antenna uses the metal of the auto body most effectively.

Lastly, "the higher, the better" is the rule when it comes to mounting the antenna. Roof mounts will provide the best experience. When co-locating multiple antennas, they should be separated by the distance of the longer antenna to minimize interaction