Vehicle Antenna Mounting
&
My SUV Roof-rail Bracket Solution

by N6JSX          06/2012

A major draw back in doing mobile Amateur Radio is how to mount HAM vehicle antennas (especially HF antennas that require solid chassis-frame grounding). With the new trend of aerodynamic bumpers for improved MPG efficiency, antenna mounting has become a real struggle. Now one of my top vehicle buying concerns is ‘how I can mount my antennas’? What will it take to create a mount? How can a mount be attached?

In the past I created dog-ears off the trailer hitch assembly for all my antennas.

When I became an Extra I was determined to go all-band mobile HF with a screwdriver antenna.

Screwdriver spare tire mounting worked great but required a custom made bracket. This bracket with chroming, lug-nut machining, and more - cost me nearly $200.
Most of today’s SUV’s no longer have the rear swing door (allowing a spare tire mount) they have gone to hatches. I just upgraded to a 2011 Pathfinder that has the rear hatch and hitch. The flip-up hatch has an arc of nearly three feet past the rear bumper making a trailer hitch extension a large contraption (possibly requiring a clearance light), plus I have serious concerns about an inconsistent and ever changing HF ground even when using a grounding strap. Worse the trailer hitch has now been integrated into the rear bumper frame and covered with a plastic aerodynamic bumper shroud. Dog-ears off the trailer hitch are only possible by cutting serious holes into the plastic bumper. This makes adding a HF screwdriver bracket a serious design challenge that I’m working on and will be covered in my sequel article.

My more immediate concern is getting the VHF/UHF ‘J’ antenna mounted on the Pathfinder without drilling holes into the roof or roof-rails. I’ve not found any viable brackets for roof rail mounting due to the shape/size of the Pathfinder type roof-rail (see diagram).

**This will require I design and build my own SUV roof-rail bracket mount.** Learning from experience I placed a design requirement to this bracket to accommodate an easy method of dropping the antennas onto the SUV roof without need of tools. My old SUV “J” was rigidly mounted to the roof-rail creating clearance difficulties at service garages, prohibited my use of parking structures and drive-thru car washes. This bracket will solve those problems and still be sturdy, durable, and robust.

![Pathfinder roof-rail dimensions](image)

Pathfinder roof-rail dimensions – cross section view.
Here is my first fit check of the bracket, made from aluminum 2.5" x ½" flat bar. The reason for the hinge placement is to insure when lowering the antenna assembly (a future addition) M2 2m loop will clear the roof-rail. Fit check also uncovered the 4" bolts need to be cut down to 3.75" allowing adequate roof top clearance and the use of Stainless-Steel Ny-lock nuts.

Here is an abbreviated drawing of the roof-rail bracket.
The bottom of the roof-rail is 2.25" wide, I added 1.5" to the bottom bracket dimension to insure the bolts (four 4"x¼"-20 hex-head) would clear the rail and the bolt heads/nuts will have plenty of bar material to apply adequate clamping pressure. I placed both pieces on top one another (as they will be mounted) then drilled the same bolt pattern through both pieces at the same time, insuring identical bolt alignments.

With the thickness of the aluminum being ½" it allows for plenty of ¼"-20 tapped threads in the bottom bracket. The top bar bracket four holes are oversized allowing the bolts unobstructed passage.

Since grounding is not required for J operations; I placed sticky foam on the bar-to-rail surfaces.

A marine stainless-steel 5.25"x1.5" hinge (eBay) was used to accommodate the drop-down requirement.

Drilled the hinge ¼"-20 bolt holes and tapped. I positioned the hinge so the actual hinge is off the edge of the top bar bracket. Two stainless-steel (SS) bolts are used to hold the hinge in place. To insure the bolts do not loosening, due to vibration, two SS Ny-lock nuts are used to lock the bolts to the bar. Before mounting the hinge a hole was drilled into the opposite hinge side center for a 3/8"-28 bolt (this is the common thread/bolt for antenna hardware). The bolt heads create a near perfect equidistant parallel to the hinge plates compensating for the thickness of the hinge joint, this allows the antenna to remain perpendicular to the vehicle roof.
The third hinge hole at the top of each hinge plate has a ¼"-20 thumb-bolt. This thumb-bolt holds the antenna from flopping forward when you hit the brakes. Remove the thumb-bolt to tip the antenna forward and down onto the roof. I've now found that SS does not mean 'no rust', the hinge plate bottoms will rust and need preservative!

And finally my finished bracket mounted to my Pathfinder roof-rail and my new 2m/440 CB-J.
This new bracket should insure my antennas will endure most any abuse.

Writer BIO: Dale Kubichek, BS/MS-EET, GROL/RADAR, N6JSX - Amateur Extra; first licensed in 1972. Served 10yrs USN, Vietnam Vet, FTG1 Gun/Missile systems & electronics instructor. Electronics Test/MFG/QA Engineer & Program Manager, in; aerospace - Hughes, Northrop, Rockwell, HawkerBeechcraft; commercial - Magellan, Mitsubishi, Emerson-Copeland; heavy construction - TEREX, Manitowoc Cranes, Navistar, Magnetek; communications – Hughes, STM, RockwellCollins. Currently, a USAF SPO Sr. Engineer on UAV SIMs. Interests are in designing/testing antennas, RDF hunting/training, SAT OPs; published numerous articles in 73 Magazine, eHAM.net, WI Badger Smoke Signals, HamUniverse.com.
Owner of: 
http://groups.yahoo.com/group/HAM-SATs ,
http://groups.yahoo.com/group/RDF-USA , and many more.