



## **FULL METAL FABWORKS**

### **Apex JKGen 2 Tire Carrier installation instructions for 2007-2018 Jeep JKs and 2018+ Jeep JLs**

Please read these instructions in their entirety before proceeding with installation. If you are not confident in your ability to perform this installation, or lack the necessary tools, please consult the help of a professional.

#### **What Is Included:**

Before beginning the installation, please make sure that all parts and hardware are included in your package and that no damage has been done to the product during shipping. If you are missing parts or the product is damaged please give us a call at (909)-505-7115 and we will make sure that any problems are taken care of.

- (1) Apex Rear Bumper with Tire Carrier Spindle
- (1) Tire Carrier Arm with HD Spindle Housing, UHMW Cradle mount, and Tie-Rod Mount
- (1) Solution Plate mounting system
- (1) Height Adjustable Carrier Mount Plate
- (1) Depth Adjustable Carrier Mount Plate Adaptor
- (1) Wheel Mount
- (1) License Plate Mount
- (1) License Plate Adapter mount
- (1) Billet Threaded Spindle Housing Cap
- (1) 1" Flat Washer
- (1) 1"-14 GrC Nylock Locking Nut
- (2) Tapered Roller Bearings with Race – Timken SET5
- (1) Grease Seal – Timken #5121
- (1) Tie Rod/Turnbuckle assembly consisting of: (1) 3/8-24 LH/RH x 3" Tie-Rod, (1) 3/8-

24 LH Spherical Rod End, (1) 3/8-24 RH Spherical Rod End, (1) 3/8-24 LH Hex Jam Nut, (1) 3/8-24 RH Hex Jam Nut, and (4) misalignment spacers

- (2) 3/8-24 x 2.25" Gr8 Hex Head Cap Screws
- (8) 3/8 SAE H/T Flat Washers
- (8) 1/2-20 x 1-1/4" Gr8 Hex Head Cap Screws
- (16) 1/2 SAE H/T Flat Washers
- (8) 1/2-20 GrC Stover Lock Nuts
- (3) M-12-1.50 Press-in Wheel Studs
- (3) 3/4 Hex Conical 12mmx1.5 RH Open End Bulge Acorn Lug Nuts
- (6) 1/4-20-1/2" SS Button Head Cap Screws
- (6) 1/4 SS Flat Washers
- (9) 1/4-20 Nylock Nuts
- (3) 1/4-20x1-3/4" Gt8 Hex Head Cap Screws
- (1) UHMW Cradle Block
- (2) 3/8-16x1" GR8 Hex Head Cap Screws
- (2) 3/8-16 Gr8 Nylock Nuts
- (1) 5/16-24x3/4" Gr8 Hex Head Cap Screw
- (1) 5/16-24 Gry Nylock Nut

Figure 1:



**Tools Needed:**

- Safety glasses
- 1/2" or 3/8" drive ratchet
- 13 mm socket
- 16 mm socket
- 7/16" socket
- 9/16" socket

- 3/4" socket
- 1-7/16" socket ( for spindle nut)
- Measuring Tape
- 5/32" allen key
- 7/16" open ended wrench
- 9/16" open ended wrench
- 3/4" open ended wrench
- seal/bearing driver kit or a large socket/ hub tool for pressing in bearing races and seal into the spindle housing
- shop press

**Tools that are helpful but not necessary:**

- creeper
- air ratchet/electric impact
- various length extensions for your ratchet

Figure 2:



After verifying all parts, tools, and skills are accounted for and reading these instructions, you are ready to start the installation.

**Installation Procedure:**

- 1) Begin by parking your vehicle on a level surface and setting the parking brake.
- 2.) Disconnect the battery

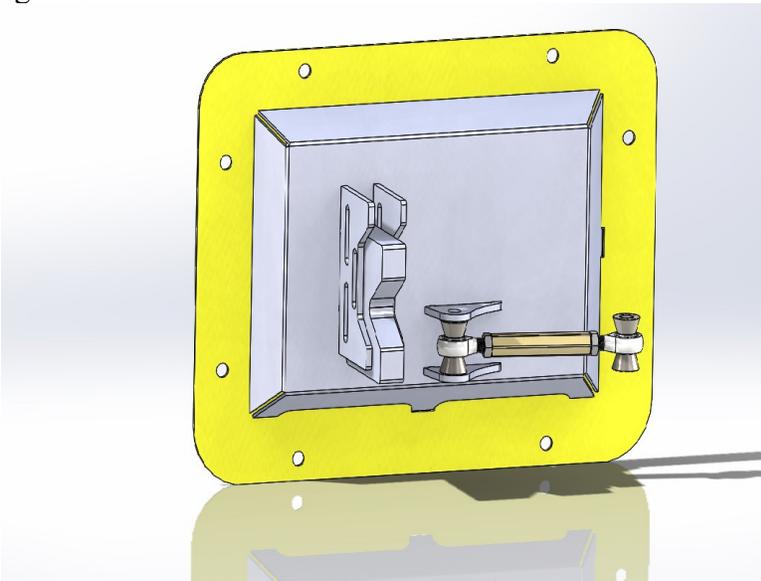
3.) Installation instructions covers the setup of the tire carrier itself and assumes the Full Metal Fabworks Rear Bumper has already been installed, if you have not installed your rear bumper yet please refer to instructions for the rear bumper installation.

4.) Now that the bumper has been test fitted, it is time to start the installation of the tire carrier components.

5.) Begin by loosely installing the UHMW Cradle into the cradle mount on the Solution Plate Mounting System using the supplied (3) 1/4"x1-3/4" bolts,(6) 1/4" SS flat washers, and 1/4-20 Nylock Nuts Leave this piece finger tight for now, as its height will be adjusted later with the tire in place. Also Install the Tie Rod Assembly to the plate as shown in Figure 3. This Tie Rod/Turnbuckle has left and right hand threads to adjust the length which will be done at a later step. Leave the jam nuts loose for now.

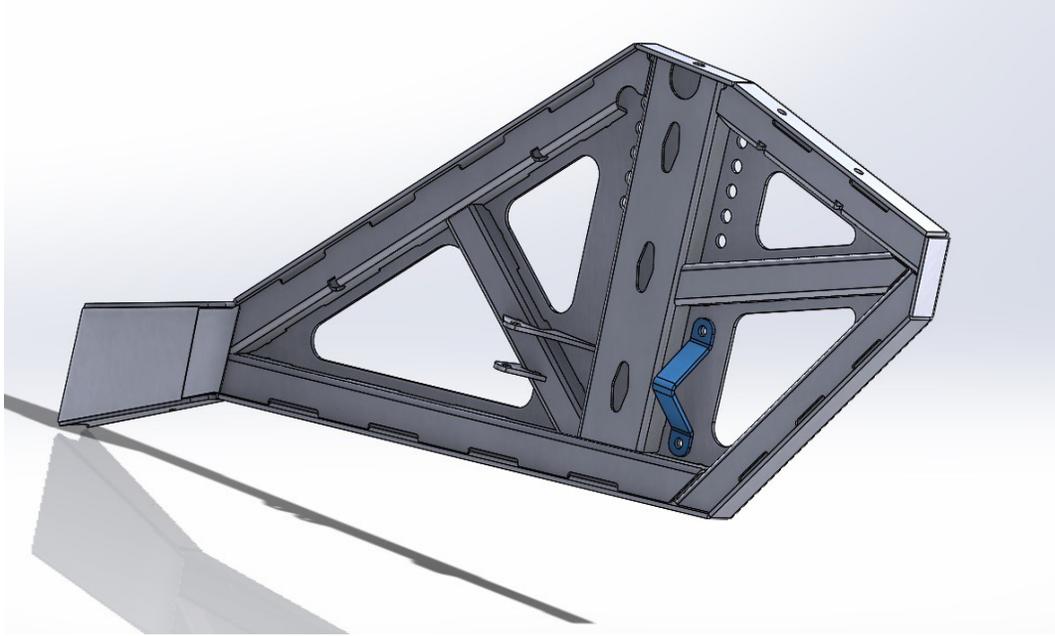
6.) Install the Solution Plate mounting system to the tailgate, using the OEM hardware and your 13mm socket, with the vent holes facing down:

Figure 3:



7.) Install the male UHMW Cradle on the tire carrier arm using (2) 3/8-16x1.25" GR8 Hex Head Cap Screws,(4) 3/8 Gr8 Washers and (2) 3/8-16 Gr8 Nylock Nuts as shown below in Figure 4:

Figure 4:



8.) Check to see if bearing races are already installed in the spindle housing on the tire carrier arm. If we have already installed the races you can move onto step 9. If the races are still in the bearing box and not installed in the spindle, use your shop press and carefully press a bearing race into the top and bottom of the spindle housing so that the tapered bearing for the top of the housing will point down (narrow end of the cone facing downward) and the tapered bearing for the bottom will face up. Take care with this step not to mar the machined surfaces inside the spindle housing.

9.) Using a bearing packer, or wearing nitrile/latex gloves, pack the bearings with a quality wheel bearing grease as shown in figure 5. Set one bearing aside as it will be used for the top of the tire carrier arm. Now is a good time to use any left-over grease to apply a light “rust-inhibiting” coat to the machined surfaces of the inside of the spindle housing and the spindle itself; be sure to avoid the threads on the spindle. With the arm turned upside down, insert the remaining bearing into the bottom of the spindle housing (the narrow cone end of the bearing will face the top of the tire carrier), a little extra grease will help hold the bearing in place for the following step.



Figure 5:

10.) Use a seal driver tool to install the grease seal into the bottom of the spindle housing, there is a seat for the seal machined into the spindle housing. If you do not have a bearing seal driver, a large socket, hub tool, or a block of wood and a small mallet can carefully be used to install the seal. Ensure that the seal goes in square and fully seats.

11.) With the help of a friend install the tire carrier arm onto the bumper as shown in figure 6. The tolerances between the ID of the bearing and the Spindle OD are tight but having a friend help hold the arm perpendicular to the spindle will help guide the bearing down the shaft. Be careful not to damage the grease seal when installing the arm. Once the arm is in place install the pre-packed bearing (narrow end of the cone facing down for the upper), then the 1" flat washer, and finally the 1"-14 GrC nylock nut. Using a 1-7/16" socket, tighten the nut enough so that the arm swings freely while the bearings are seated and there is no up and down play in the arm. Due to the nature of the parts and its intended use this nut may have to be tightened several times before it fully seats.

Figure 6:



11.) Using a tape measure, or by holding the wheel mount flush with the back of your spare's wheel, determine which holes correspond with your wheel pattern. The mount is designed to accept the 3 most common sizes found on JKs (5x5 or stock, 5.5, and 8x6.5) unless specially ordered. Once you have determined your wheel pattern, use your shop press or a hammer and punch to drive the 3 provided M12x1.5 wheel studs into the wheel mount. Make sure that the studs are facing the same direction as the license plate mount

12.) Using (8) of the provided 1/2-20 x 1-1/4" Gr8 Hex Head Cap Screws install the Height/Depth Adjustable Carrier Mounts, leaving the depth mount loose for adjustment in and out depending on tire/wheel width. The orientation of the wheel mount is shown below in Figure 7.

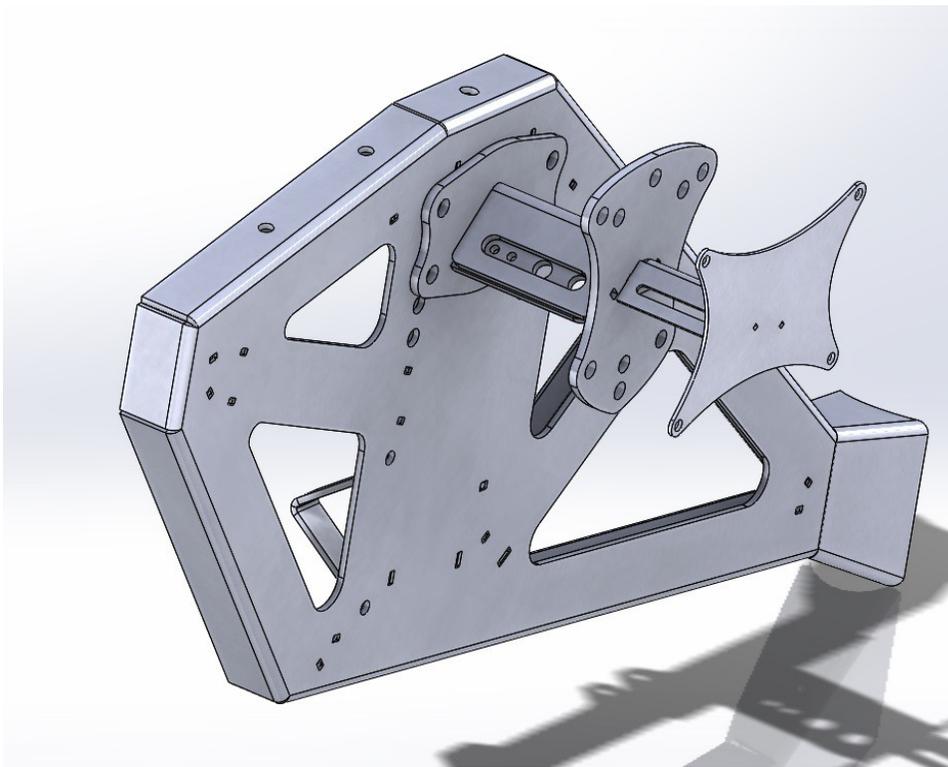


Figure 7:

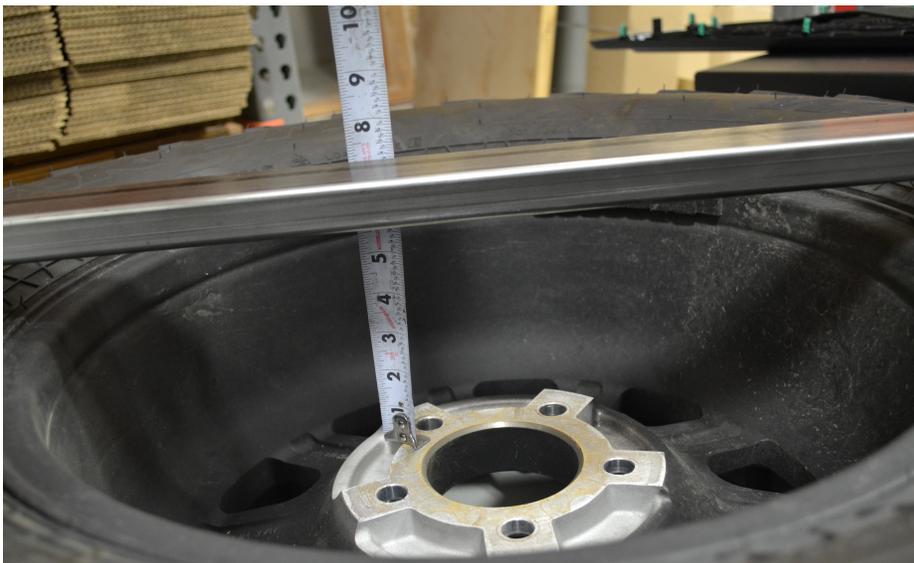
The final depth will depend on wheel backspacing as well as tire width. **Note: It is best practice that, when possible (some wheel/tire combos may not allow it), the depth is adjusted so that the tire is touching or pre-loaded against the tire carrier arm when the lug nuts are tight as shown in figure 8:**

Figure 8:



13.) To determine the appropriate depth adjustment lay your tire and wheel on the ground face down. Use a straight edge to measure the depth from the wheel mounting surface to the face of the tire that will contact the tire carrier as shown in Figure 9 our example is 6". After finding this measurement subtract 1/4" (5-3/4" for our example) if possible and set the depth adjustment based on this number as shown in figure 10.

Figure 9:



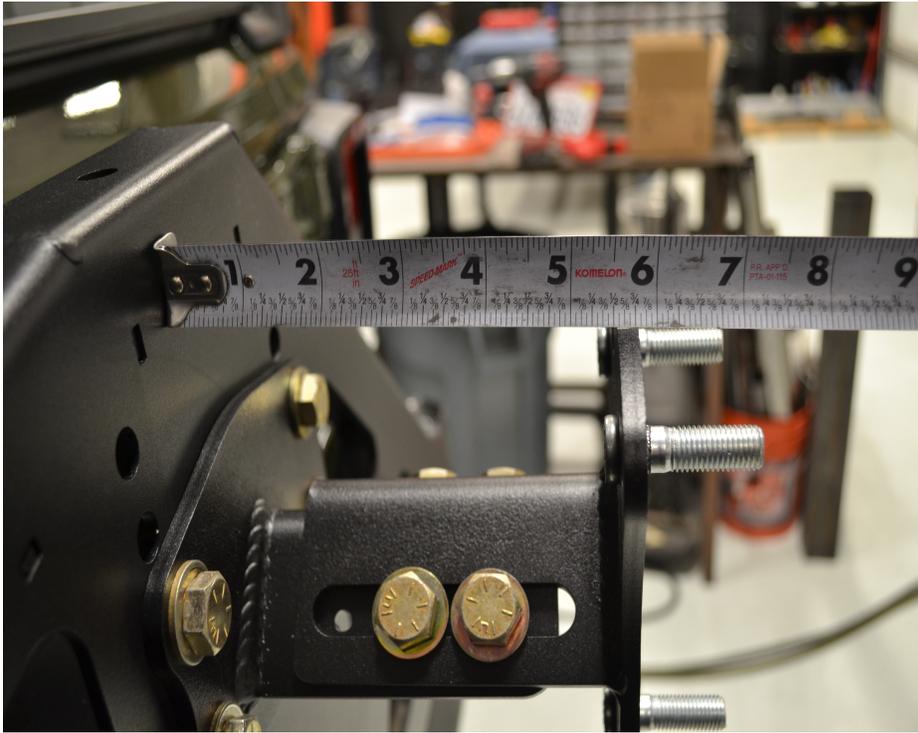
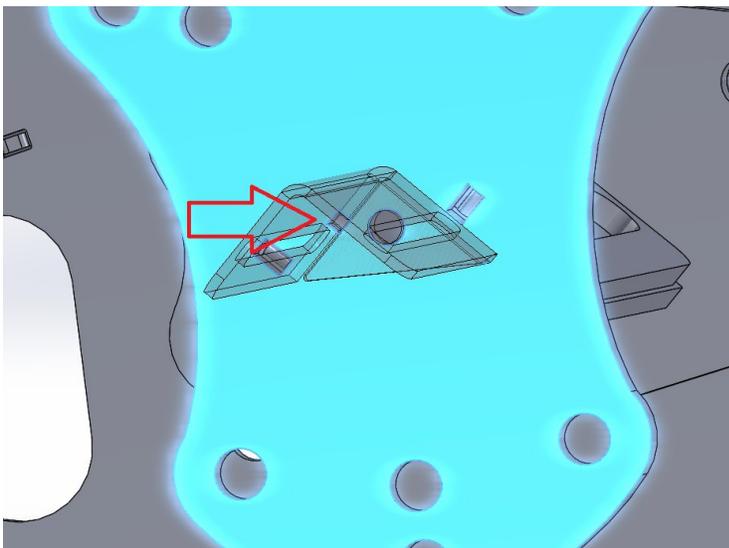


Figure 10:

14.) Using the (1) 5/16-24x3/4" Gr8 Hex Head Cap Screw and 5/16-24 nylock nut install the license plate adapter onto the Wheel Mount you installed in the previous step. The License Plate mount will install onto this bracket after the wheel and tire is installed. Notice the license plate adapter has a male "tang" that will correspond with a hole in the wheel mount to prevent it from rotating while tightening. See red arrow in Figure 11

Figure 11:



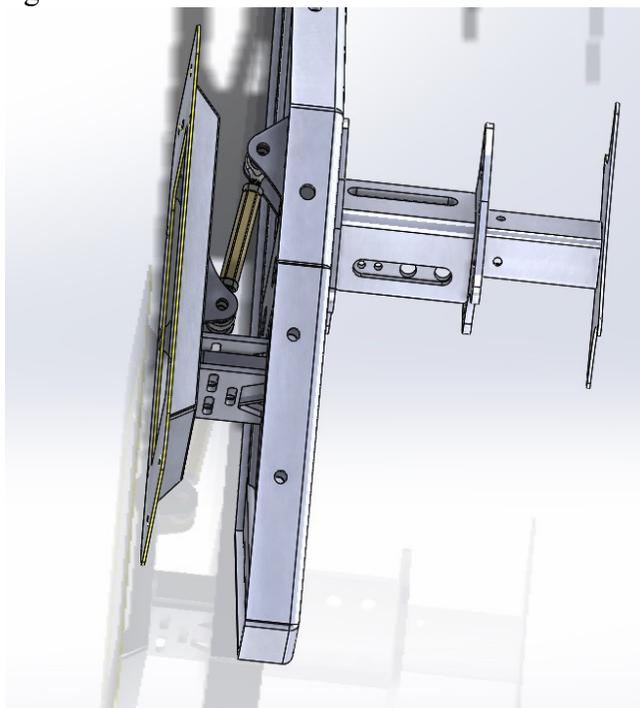
15.) With the help of a friend, and being careful not to damage the license plate adapter installed in the previous step, mount the tire and wheel onto the wheel mount using the (3) 3/4 Hex Conical 12mmx1.5 RH Open End Bulge Acorn Lug Nuts. Adjust the height of the Wheel Mount up or down depending on your tire size, desired departure angle/ground clearance, and required visibility through your rear window.

16.) Once the desired height and depth of the Wheel Mount have been established you can now fully tighten all (8) 1/2-20 x 1-1/4" Gr8 Hex Head Cap Screws.

17.) With the tire mounted on the arm you can now set the height of the UHMW cradle block. To do so, press the tire carrier arm into the cradle with the tailgate closed. While holding the arm against the UHMW cradle block tighten (1) of the (4) 1/4-20x1-3/4" SS Hex Head Cap Screws so that the cradle is held in place. Swing the tire away from the cradle to access it and then tighten the remaining (3) 1/4-20x1-3/4" Gr8 Hex Head Cap Screws.

18.) If the 3/8-24 LH/RH x 3" Tie-Rod/Turnbuckle has not been pre-assembled on the Solution Plate mounting assembly as shown in figure 3, do so at this time. Take note that one side is Right Hand threaded and the other is Left Hand threaded; this allows you to adjust distance between the tailgate and the tire carrier arm. With the 3/8-24 jam nuts left loose, install the Tie-Rod assembly with the Left Hand threaded end into the two tabs on the Solution Plate mounting system and then into the Tie-Rod mount on the tire carrier arm using the supplied (2) 3/8-16x1.25" GR8 Hex Head Cap Screws, (4) 3/8 Gr8 Washers and (2) 3/8-16 Gr8 Nylock Nuts in the orientation shown in Figure 12.

Figure 12



19.) Using a 9/16" open ended wrench adjust the length of the Tie-Rod Assembly (clockwise to shorten, and draw the arm closer to the tailgate, and vice-versa) until the cradle is just touching the UHMW cradle block when the tailgate is around 1/2" from being closed as shown in Figure 13: Doing so will cause the cradle to compress the UHMW cradle block when the tail-gate is closed, locking the arm into place and preventing the arm from moving up and down while driving. Once the desired Tie-Rod Assembly length is set you can now tighten the jam nuts to lock in the Tie-Rod Assembly length.

Figure 13:



20.) Check the operation of the Tire Carrier as a whole. Once you are completely satisfied with the assembly you can now remove and disassemble it to receive the coating of your choice.

21.) After the coating of your choice has been applied to the bumper and tire carrier assembly, install your Rigid Industries reverse light if you purchased one with the bumper. Note: for All current generation and future bumpers, we have enlarged the opening for the light and it nows installs from the outside. How the light is wired is left up to the customer and should be completed by a competent mechanic/electrician. You can now re-install the assembly for the final time.

22.) Install the Spindle Housing cap onto the HD Spindle Housing. Using a 2-1/2" open ended wrench, socket and ratchet wrench, or large adjustable wrench, tighten the cap so that the logo is in the desired location.

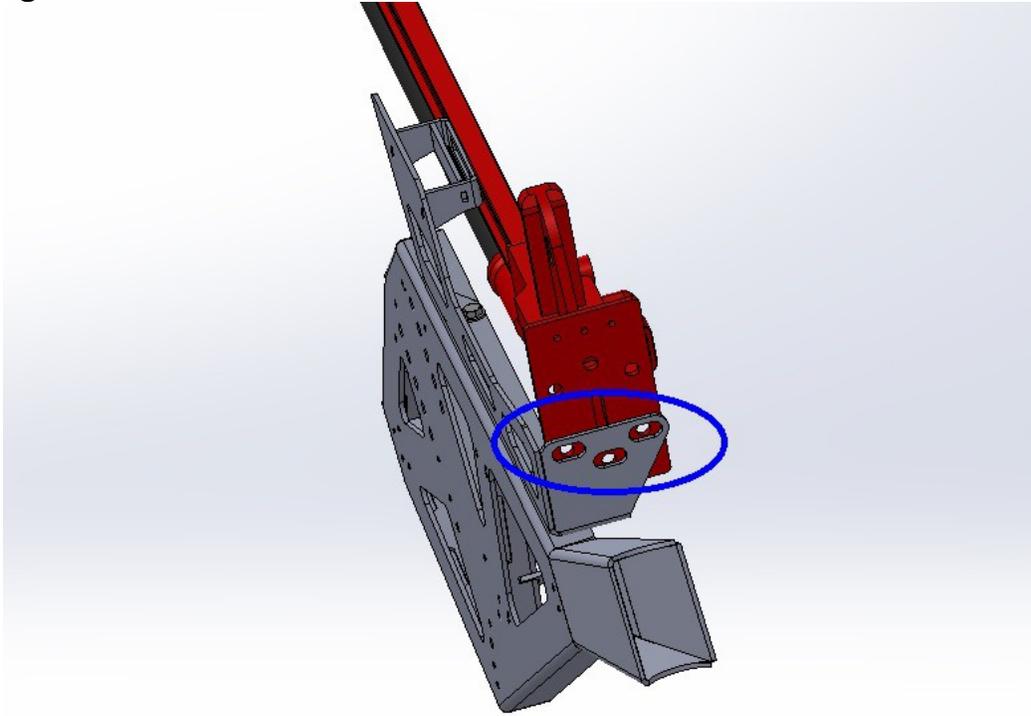
23.) Mount your license plate to the provided License Plate Mount using (4) of the 1/4-20-1/2" SS Button Head Cap Screws. Using the remaining (2) 1/4-20-1/2" SS Button Head Cap Screws mount the License plate mount to the license plate adapter and adjust the depth.

24.) If you have purchased the optional hi-lift jack mount, fasten the mount to the tire carrier arm in the orientation shown in figure 14 (carriage bolt will be facing the tailgate) using (2) 3/8-16x2.5" Gr8 Hex Head Cap Screws, (4) 3/8 Gr8 Flat Washers, and (2) Gr8 nylock nuts. To attach the hi-lift itself, align the base of the hi-lift with the base of the mount and use the adjustable carriage bolt at the top of the mount to align with one of the holes in the hi-lift. Use (2) 1/2-13x1" Gr8 bolts and (2) 1/2x13 wing nuts to attach the base, and (1) 1/2x13 wing nut to attach the top to the adjustable carriage bolt. **Two important notes: 1:) slowly close tail gate to check clearances, the mount does have in and out depth adjustment so ensure the hi-lift and mount clears the tailgate throughout travel before just slamming it shut 2:) There are several manufacturers of hi-lift style jacks, depending on the quality of the casting, it may be necessary to drill out 2 of the mounting holes in the base to 1/2". See figure 15 with the holes in question circled in blue.**

Figure 14:



Figure 15:



25.) Re-connect the battery power to the vehicle. Congratulations you have completed installation of you Apex Rear Bumper and Tire Carrier.



**Hold Harmless Agreement:**

*In purchasing a Full Metal Fabworks LLC product I release, waive, discharge and covenant not to sue Full Metal Fabworks LLC officers, servants, agents, or employees (hereinafter referred to as Releasees) from any and all liability, claims, demands, actions and causes of action whatsoever arising out of or related to any loss, damage, or injury, including death, that may be sustained by me (or anyone else), any property belonging to me (or anyone else), whether caused by the negligence of the releasees or otherwise, while working on, using or any activity related to this product.*

*I am fully aware of risks and hazards connected with the use of a this product and I elect to voluntarily engage in such use of this product knowing that the use may be hazardous to me and my property. I voluntarily assume full responsibility for any risks of loss, property damage or personal injury, including death, that may be sustained by me (or anyone else), or any loss or damage to property owned by me (or anyone else), as a result of using this product, whether caused by the negligence of releasees or otherwise.*

*I further agree to indemnify and hold harmless the releasees from any loss, liability, damage or costs, including court cost and attorney fees, that they may incur due to my use of a this product, whether caused by negligence of releasees or otherwise.*

*It is my express intent that this Release and Hold Harmless Agreement shall bind the members of my family and spouse, if I am alive, and my heirs assigns and personal representative, if I am deceased, and shall be deemed as a release, waiver, discharge, and covenant not to sue the above named releasees. I further agree that this Waiver of Liability and Hold Harmless Agreement shall be construed in accordance with the laws of the State of California.*

*By accepting this product, I acknowledge and represent that I have read the above Waiver and Liability and Hold Harmless Agreement, understand it and accept it voluntarily as my own free act and deed; no oral presentations, statements, or inducements, apart from the foregoing written agreement, have been made; I am at least eighteen (18) years of age and fully competent; and I execute this Release for full, adequate and complete consideration fully intending to be bound by same.*

*If you do not agree with the preceding Hold Harmless Agreement, you may return the product and receive a full refund. Please, contact a representative of Full Metal Fabworks LLC and they will issue a call tag for the product in question. Once the product has been received by Full Metal Fabworks LLC a full refund will be issued.*