

# <THESE INSTRUCTIONS MUST BE GIVEN TO THE END USER>



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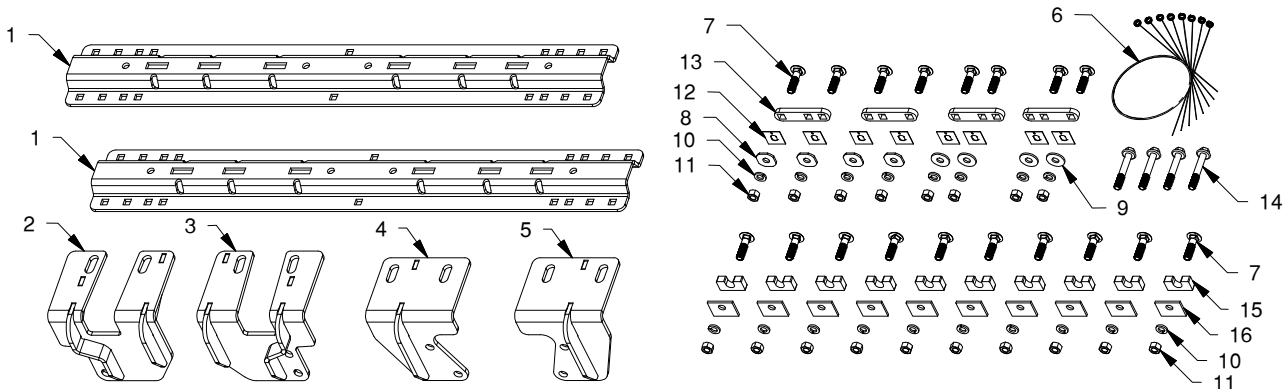
## Custom 5th Wheel Hitch Mounting Rail Installation Instructions

# MODEL 2505

2020-2023 CHEVROLET & GMC 2500 & 3500 Trucks.  
 Excludes Trucks with CarbonPro beds.

See Limited Lifetime Warranty at  
[bwtrailerhitches.com/warranty](http://bwtrailerhitches.com/warranty)

NOTE: All diagrams and figures shown are specific to installation on a short bed truck.



Patriot Rail Box (RVR3210)		
ITEM	DESCRIPTION	QTY
1	Mounting Rail	2

Bracket Set Box (RVR2505)		
ITEM	DESCRIPTION	QTY
2	Driver Side Front Side Plate	1
3	Passenger Side Front Side Plate	1
4	Driver Side Rear Side Plate	1
5	Passenger Side Rear Side Plate	1
6	Fish Wire	8

Bracket Set Bolt Bag #1		
ITEM	DESCRIPTION	QTY
7	1/2" X 1-1/2" Carriage Bolt	18
8	Frame Spacer	4
9	1/2" Flat Washer	4
10	1/2" Lock Washer	18
11	1/2" Finish Nut	18
12	Bolt Retainer	8
13	Locking Strap	4
14	12mm X 80mm Flange Head Bolt	4

Bracket Set Bolt Bag #2		
ITEM	DESCRIPTION	QTY
15	U-Shaped Spacer	10
16	Offset Rectangle Washer	10

## **⚠ WARNING** Failure to comply with the safety information in these instructions could result in serious injury or death.

- ⚠** Read all installation and operating instructions along with all labels before using this product.
- ⚠** Adding components to the chassis of any vehicle can be hazardous. There is potential for damage to vehicle, injury from tool usage and many other hazards. This installation must be completed by someone who is aware of the hazards involved. This person must be knowledgeable of proper safety procedures for a vehicle installation of this nature, and for usage of the equipment required to perform the installation.
- ⚠** Without proper knowledge, towing can be a dangerous activity. Understand all the risks involved with towing before proceeding. For information on towing safety, see **"The Trailer Handbook: A guide to Understanding Trailer and Towing Safety"** from the *National Association of Trailer Manufacturers*, [www.NATM.com](http://www.NATM.com) and your trailer manufacturer's owner's manual.
- ⚠** Do not exceed tow or tongue rating of coupler, tow or tongue rating of hitch, or tow or weight ratings of truck or trailer. See vehicle and trailer manufacturer information for ratings. Exceeding these ratings may cause damage to towing components or loss of attachment between the trailer and truck.
- ⚠** Additional caution must be used when towing a wedge car trailer. Towing stability greatly depends on keeping the center of gravity as low as possible. Load heavy cars over the axles. Never tow with a single car on the front of the trailer. When towing a wedge car trailer, never exceed speeds that are reasonable for the roadway conditions (e.g. turns, going around a curve, etc.). Failure to account for proper trailer center of gravity and speeds that are reasonable for the roadway conditions may cause damage to the truck, trailer, towing components, and loss of attachment between the truck and trailer.
- ⚠** Do not modify this product in any manner. Doing so could alter its integrity and lead to a loss of attachment between the trailer and the tow vehicle.
- ⚠** A visual inspection of the hitch should be performed before each time you tow. Regularly check that all pinned connections are secure, and that all bolted connections are at the correct torque specification. Check for cracks or damage to the hitch. Do not tow with the hitch if cracks or damage outside of normal wear is found. Towing with a hitch that has cracks or damage could result in damage to the tow vehicle, trailer, towing components or loss of attachment between the tow vehicle and trailer.

# PREPARING TO INSTALL

**NOTICE:** Some steps of this Patriot rail kit assembly will require two people.

**NOTICE:** It may be necessary to remove the spare tire and/or heat shield before installation.

**NOTICE:** If truck is equipped with a removable bed liner or mat, it should be removed or it must be cut to allow the mounting rails to connect directly with the bed. It is acceptable to install the mounting rails over a spray in bed liner.

**NOTE:** Remove all parts from the packaging and familiarize yourself with all the parts and tools required. Use the parts list on the front page to verify that all parts and hardware are present.

**! WARNING:** Do not install side plates over wiring or brake lines. Always place the hitch components directly against the frame of the truck. Failure to move such components can lead to property damage or serious injury.

Installation of the mounting rails requires several common tools and a few specialized tools. Below is a listing of equipment used during a typical installation.

- Impact wrench or ratchet with a 3/4" socket
- 3/4" box end wrench
- Drill and 1/8", 9/16" Drill bits
- Patriot 5th wheel or Slider Base
- Hammer
- Flashlight
- Tape Measure
- Eye Protection
- If overload brackets are present on truck a 18mm box and wrench or ratchet will be needed.
- Ear Protection
- Torque Wrench
- Center Punch Tool

## DRILL REAR MOUNTING HOLES

- 1. Layout the rear mounting rail.** Place a mounting rail onto the bed of the truck. Hook a tape measure over the rear edge of the bed (not on any part of the tailgate), measure the location for the mounting rail as shown in Figure A1. Next, center the mounting rail in the bed by measuring the distance on either side from the edge of the rail to the sides of the bed. The rail will be centered when both measurements on either side of the rail are the same.

**IMPORTANT:** If your truck has a spray-in bed liner you will need to take this into account when you are measuring, and add the thickness of the applied liner that has been sprayed over the end of the bed.

**IMPORTANT:** The mounting rail is designed to install only at the described location. Failure to place the mounting rail precisely may result in added difficulty during installation and/or property damage.

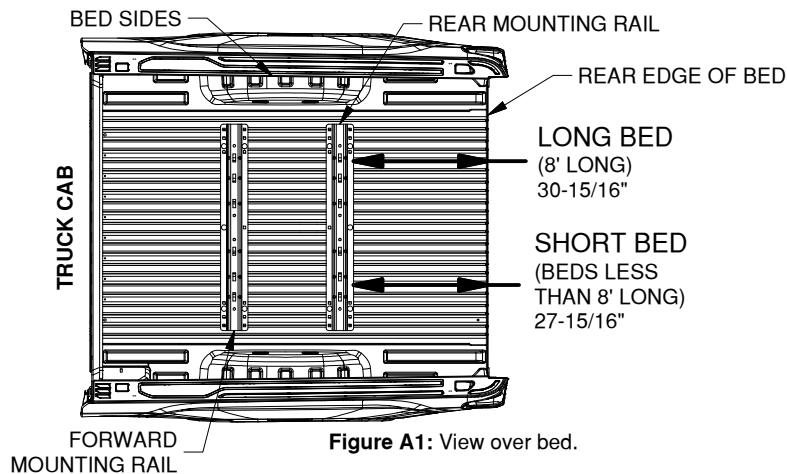


Figure A1: View over bed.

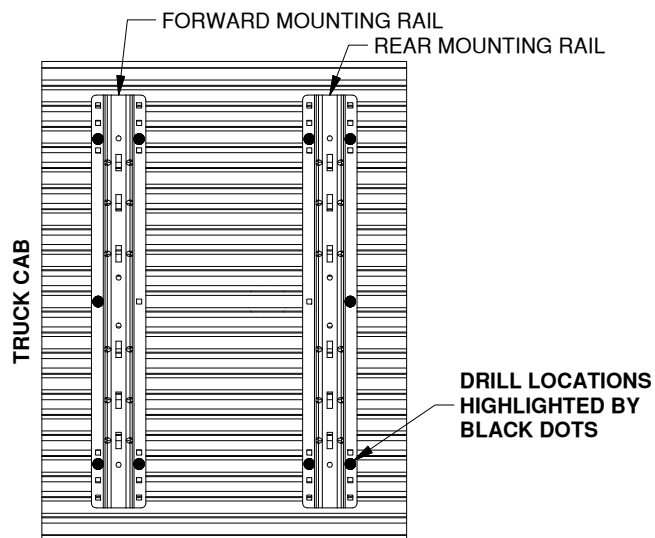


Figure A2: Detail view over bed, showing drill locations for the forward and rear bed rails.

- 2. Mark the hole locations.** While carefully ensuring the mounting rail does not move, use a center punch tool to mark the five drill locations on the rear rail that match your truck's suspension style, shown in Figure A2. (Forward rails will install on a later step.) It is critical that the five drill locations be marked exactly in the center of the square hole in the rail. Once all five rear rail locations are clearly marked, move the bed rail out of the way and drill each location with an 1/8" drill.

**! WARNING:** Truck components such as the fuel tank, air tanks, tubing, and wiring may be directly below the area of the bed which needs to be drilled. Always carefully examine the area under the truck where modification will occur. Make certain that no truck components are damaged during drilling. Damage to these components, such as the fuel tank, may result in property damage, serious injury or death.

# INSTALL REAR SIDE PLATES

1. **Un-attach the wheel well liners.** Check for the presence of flexible wheel well liners in the truck wheel wells. If present, three T-15 Torx screws will need to be removed so that the liners can be folded up and allow access to the frame, see Figure B1. Retain screws for later re-installation.

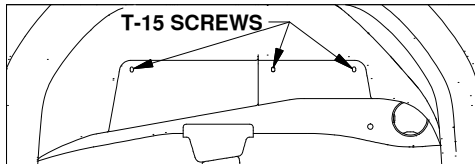


Figure B1: View looking into driver side wheel well.

2. **Check for overload brackets.** Look under the truck and see if there are overload brackets attached to the frame over the leaf suspension, as shown in Figure B2. If your truck does not have overload brackets you may skip to step 4. If your truck does have overload brackets continue to step 3.

3. **Remove overload bracket hardware.** Remove the 16mm bolts indicated in Figure B2. The bolts attaching the rear overload bracket are attached with nuts inside the frame, these will need to be removed as well. The overload brackets do not need to be completely removed.

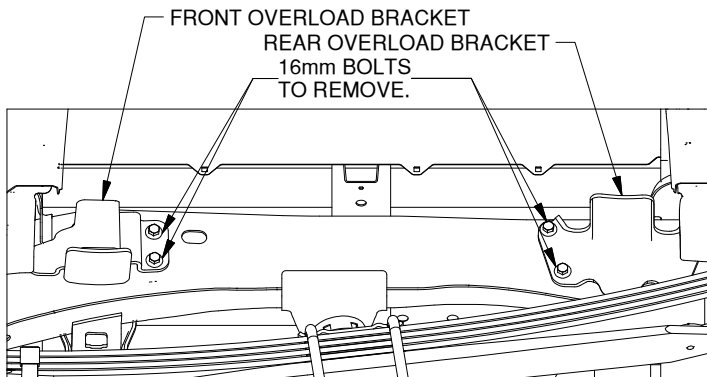


Figure B2: View looking into driver side wheel well.

4. **Prepare for hardware installation.** Start by locating four 1/2" x 2" carriage bolts, two locking straps, four bolt retainers, and four fish wires. Identify the two hole locations on the outside of the frame where the bolts will install, as shown in Figure B3. Each of these two holes have a larger clearance hole on the inside of the frame.

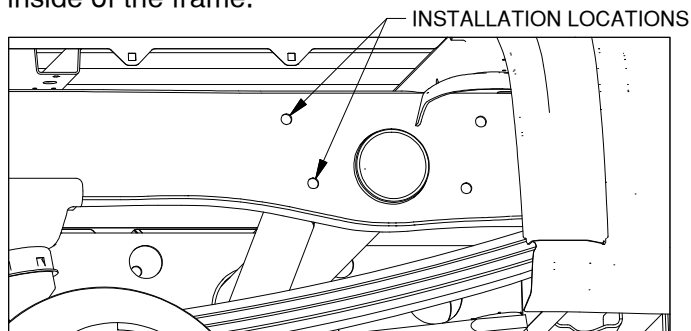


Figure B3: View looking into driver side wheel well.

5. **Install mounting hardware.** Attach a 1/2" x 2" carriage bolt to the end of one of the fish wires. Next, pass the fish wire onto one of the holes on either end of the locking strap. Insert the straight end of the fish wire into the large clearance hole in the inside of the frame nearest to the bed (top hole), see Figure B4. Pass fish wire through the frame and out the smaller hole on the outside of the frame where the carriage bolt will install. Push the locking strap into the frame. Pull the fish wire until the threads of the carriage bolt are through the hole. Maneuver the bolt until the square shank of the bolt is inside the square hole in the locking strap inside the frame. Carefully remove the fish wire while holding onto the bolt so that it does not fall back into the inside of the frame. Install a bolt retainer onto the carriage bolt and tighten until the retainer is snug against the frame. Attach another carriage bolt onto a fish wire. Twist the top carriage bolt to turn the locking strap so that the bottom hole of the strap is in line with the lower hole in the frame. Pass the straight end of the fish wire through the lower clearance hole on the inside of the frame and guide the end through the locking strap hole and lower hole in the frame, see Figure B5. Pull the fish wire until the carriage bolt has passed out of the frame. Remove the fish wire and attach a bolt retainer so it is snug against the frame, see Figure B6. Repeat this step on the other side of the truck.

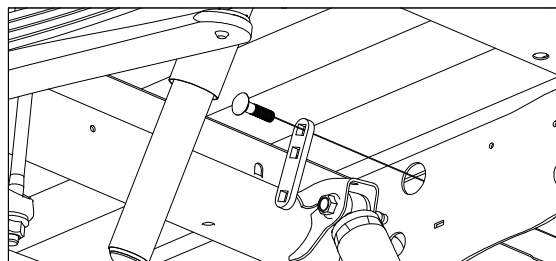


Figure B4: View looking under bed looking up at driver side of frame.

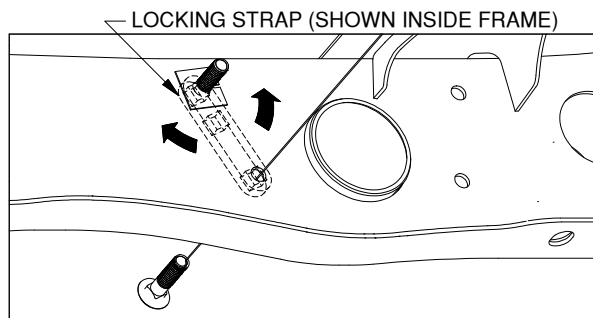


Figure B5: View looking into driver side wheel well.

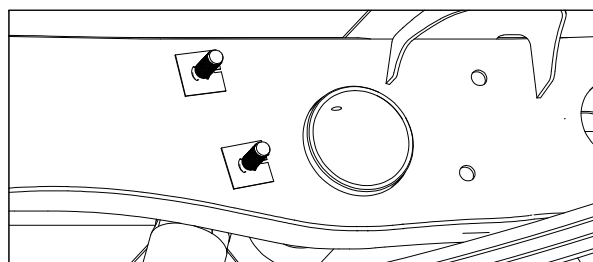


Figure B6: View looking into driver side wheel well.

- 6. Install the rear side plates.** Locate the two rear side plates, four 1/2" lock washers, four 1/2" finish nuts, and four frame spacers. If your truck does not have overload brackets install a frame spacer onto each of the carriage bolts, if it does you may discard the frame spacers. Pass the top flange of the rear side plates over the frame and then pass the holes in the side plates over the carriage bolts. Secure the side plates with a 1/2" lock washer and nut, see Figure B7. Hand tighten hardware only at this time.

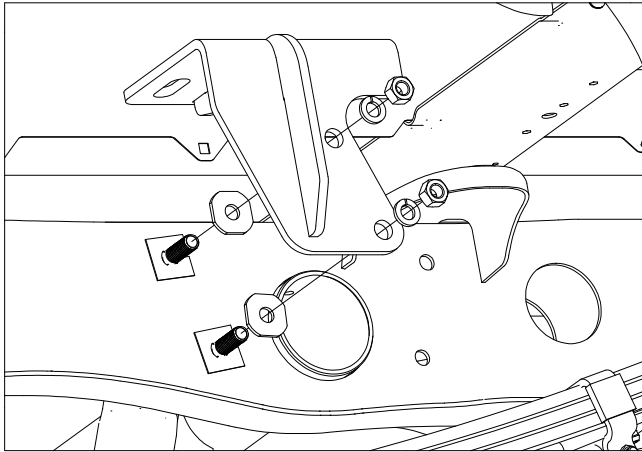


Figure B7: View looking into driver side wheel well.

## DRILL REAR MOUNTING RAIL HOLE LOCATIONS

- 1. Check the hole locations.** Push side plates against the bottom of the bed. Hand tighten hardware so that the side plate is held in position. Look up through the oval slots in the side plate flanges and find the previously drilled 1/8" holes. The 1/8" pilot holes need to be aligned front to back in the center of the slots in the side plate flanges, see Figure C1. If the 1/8" holes are not centered within the slots, drill new pilot holes which are better centered in the slots.

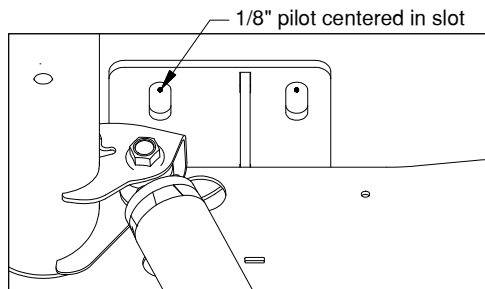


Figure C1: View looking up over the driver side frame.

- 2. Enlarge the holes.** On top of the bed, using the 1/8" holes as pilots, drill out each of the 5 holes with a 9/16" bit.

## INSTALL REAR MOUNTING RAIL

**NOTICE:** Due to the corrugation of the truck bed, U-shaped spacers are provided to function as space fillers between the mounting rails and the kit attachment hardware. Always place a U-shaped spacer in the gap either above the bed (between the mounting rail and the bed) or below the bed (between the bed and the side plates). Failure to use U-shaped spacers will result in property damage when hardware is tightened.

- 1. The rear mounting rail.** Re-position the rear mounting rail over the drilled 9/16" holes in the bed. Install five 1/2" x 2" carriage bolts through the five drilled positions, as shown in Figure D1. Under the bed place a U-shaped spacer between the side plate flanges and the bed around each of the five carriage bolts, see Figure D2. Secure each of the five carriage bolts with an offset rectangle washer, lock washer and nut. Hand tighten hardware only at this time.

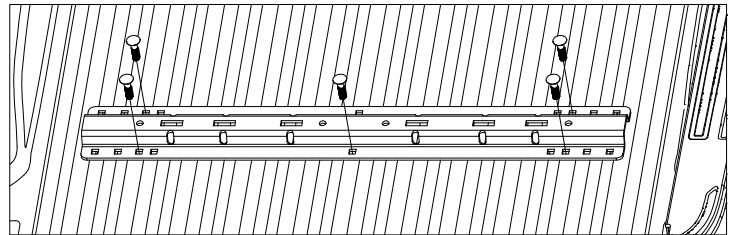


Figure D1: View looking into the back of the truck.

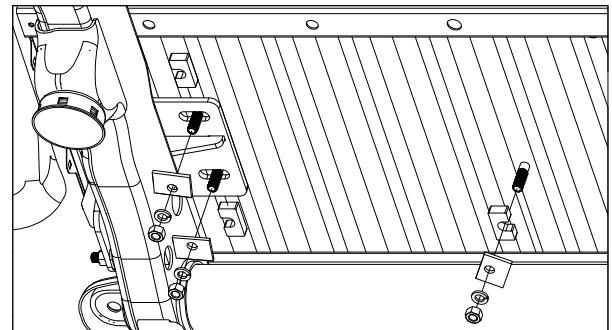


Figure D2: View looking under bed at passenger side plate.

# DRILL THE FORWARD MOUNTING RAIL HOLE LOCATIONS

1. **Position the forward mounting rail.** For this step the base which will be used in the mounting rails is required. Place a mounting rail into the truck bed in front of the rear mounting rail. Place the base over the rail attachment points and carefully lower it until the pin tabs pass through the attachment points on the rear mounting rail. Attach the forward mounting rail to the forward mounting points on the base. The base should rest flat against the top of the rails, see Figure E1. With the base still attached ensure that the forward rail is centered in the truck bed.

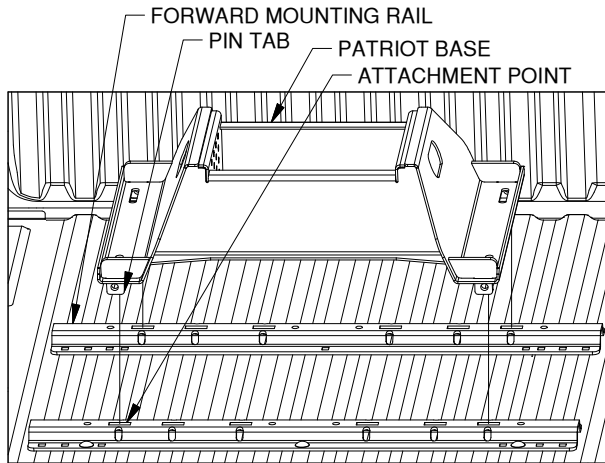


Figure E1: View looking into truck bed .

**IMPORTANT:** Before drilling forward mounting holes pull the RV base towards the rear of the truck and push the forward rail towards the cab of the truck to correctly space the mounting rails, see Figure E2.

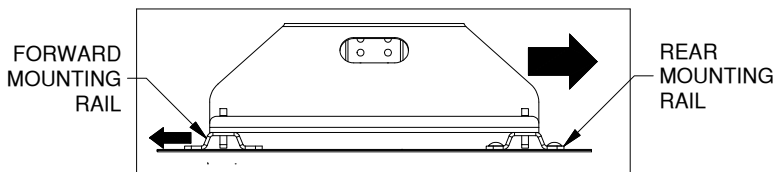


Figure E2: Side view of RV base and mounting rails.

2. **Drill forward mounting pilot holes.** Using the holes in the forward mounting rail, mark the five drill locations. Refer to "DRILL REAR MOUNTING HOLES" section, Step 2, on Page 2. Notice that the hole locations may be slightly different than the rear rail, see Figure A2. It is critical that the five drill locations be marked exactly in the center of the square hole in the forward rail. Drill each of the marked locations with a 1/8" pilot hole.
3. **Enlarge the holes.** Remove the base and move the forward rail out of the way. Use the 1/8" holes as pilots and drill out each hole with a 9/16" bit.

# INSTALL FRONT SIDE PLATES

**NOTE:** If you have overload brackets on your truck skip to step 3b. If your truck does not have overload brackets start with step 1.

1. **Prepare for hardware installation.** Start by locating four 1/2" x 2" carriage bolts, two locking straps, four bolt retainers, and four fish wires. Identify the two hole locations on the outside of the frame where the bolts will install, as shown in Figure F1.

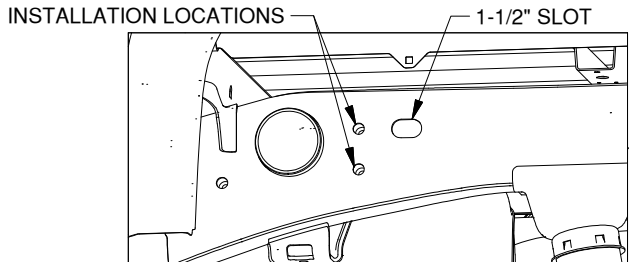


Figure F1: View looking into driver side wheel well.

2. **Fish hardware through the frame.** Attach two 1/2" x 2" carriage bolts to the end of fish wires. Next, pass both fish wires into a locking strap, one wire in the center hole, the other wire in the hole furthest from that hole. Find the 1-1/2" wide slot on the outside of the frame just behind the two installation holes. Insert the straight end of the fish wire which is through the center hole of the locking strap through the large slot on the outside of the frame and out the top installation hole. Insert the other fish wire through the large slot and out the bottom installation hole, see Figure F2. Next, push the locking strap into the frame. Pull the fish wires until the threads of the carriage bolts are through the two holes. Maneuver the bolts until the square shank of the bolts are inside the square hole in the locking strap inside the frame. One at a time, carefully remove the fish wires while holding onto the bolt and install a bolt retainer onto each of the carriage bolts. Tighten until the retainers are snug against the frame, see Figure F3. Repeat these steps on the other side of the truck.

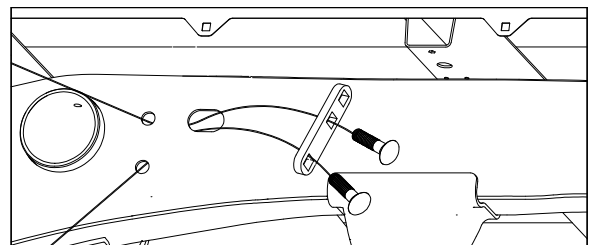


Figure F2: View looking into driver side wheel well.

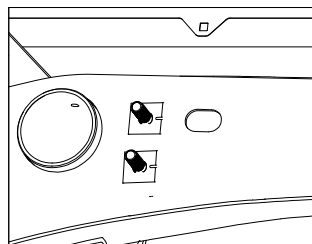


Figure F3

**3a. Install the front side plates (without overload brackets).** Locate the two front side plates, four 1/2" lock washers, four 1/2" finish nuts. Pass the top flange of the rear side plates over the frame and then pass the holes in the side plates over the carriage bolts. Secure the side plates with a 1/2" lock washer and nut, see Figure F4. Hand tighten hardware only at this time.

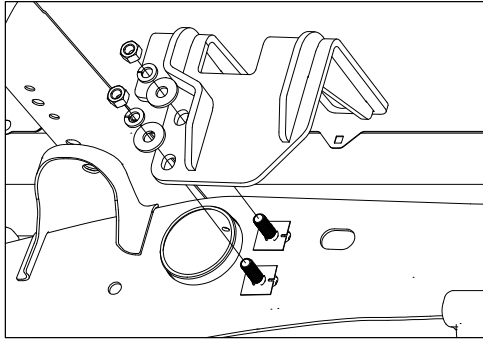


Figure F4: View looking into driver side wheel well.

**3b. Install the front side plates (with overload brackets).** Locate the two front side plates and four 12mm x 80mm flange head bolts. Pass the top flange of the front side plates over the frame and then align the holes in the brackets with the holes in the overload bracket still attached to the frame. Install a 12mm flange head bolt into each hole in the brackets, see Figure F5. Hand tighten hardware only at this time.

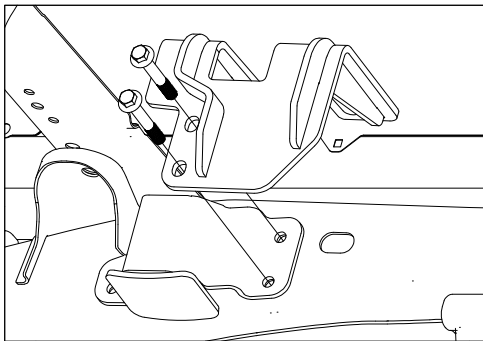


Figure F5: View looking into driver side wheel well.

## INSTALL FORWARD MOUNTING RAIL

**1. Install the forward mounting rail.** Re-position the forward mounting rail over the drilled 9/16" holes in the bed. Install five 1/2" x 2" carriage bolts through the five drilled positions, as shown in figure G1. Under the bed place a U-shaped spacer between the side plate flanges and the bed around each of the five carriage bolts. Secure each of the five carriage bolts with an offset rectangle washer, lock washer, and nut. Hand tighten hardware only at this time.

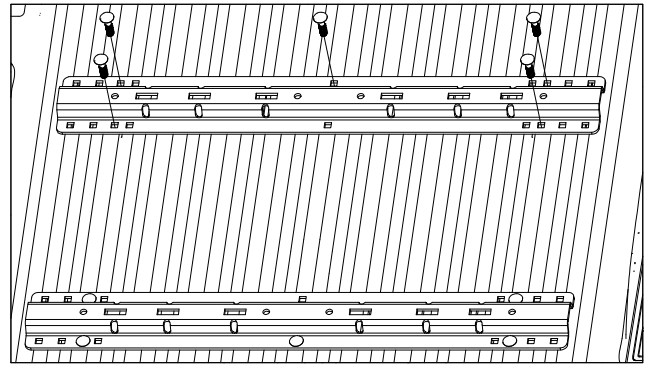


Figure G1: View looking down into bed from rear of truck.

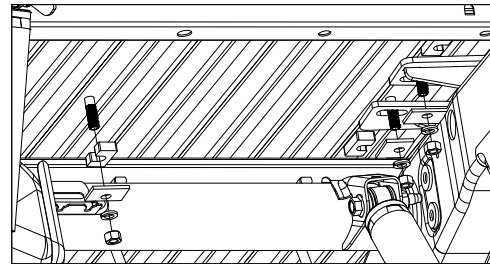


Figure G2: View looking up towards passenger side frame under truck.

**2. Tighten hardware.** Using a torque wrench, first torque all the 1/2" nuts and cap screws in the mounting rails to 80 ft. lbs. Second, torque all the 1/2" nuts in the side plates to 80 ft. lbs. If you have overload brackets tighten the 12mm bolts to 96 ft. lbs.