



# PETROWORKS

## OFF-ROAD PRODUCTS, INC.

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## Installation Instructions for Petroworks Spring-Over-Axle Kit

Congratulations! You have purchased the most effective modification you can make to your Suzuki Samurai. These installation instructions are written strictly for the installation of the Spring-Over kit, but if you are performing other repairs or modifications at the same time, do not hesitate to call on us if questions arise. Petroworks strongly recommends use of the Suzuki factory service manual while installing this kit. Other commercially available repair manuals simply do not contain as much information as the factory manual, and in some cases can cause you to perform unnecessary work. So, in order to spare yourself any needless grief please read these instructions carefully prior to beginning work. In addition, Petroworks recommends that all welding be done by a certified welder.

This kit can be installed by anyone with a moderate level of skill, but does require welding and a few tools that may not reside in your collection (try renting them). Also, the portion of the exhaust pipe aft of the muffler (tailpipe) requires modification in order for the kit's long-travel Rancho RS-9000 shock absorbers to function properly.

### **The following tools are required:**

1. Pitman Arm Puller and a 30mm socket (for removal of the Pitman Arm)
2. Steering wheel Puller (to remove and re-center the steering wheel after installation of the kit.
3. Tie Rod End remover ( to help remove steering drag link). (A hammer and pickle fork may be substituted for the Tie Rod End remover, but will almost certainly damage the dust boot on the drag link.)

### **The following tools are not required, but can be *very helpful*:**

1. 10mm tubing wrench (for removing and reinstalling the brake lines).
2. 1/2" drive impact wrench (to help remove the Pitman Arm).
3. Handheld grinder (to modify the right front spring saddle and remove front axle U-bolt guide pads).
4. Four small tapered rubber plugs (to plug brake lines).
5. Hydraulic floor jack (to lift vehicle and axles).

## Your kit includes the following components:

| <u>Quantity</u> | <u>Component</u>                       | <u>Petroworks Part Number</u> |
|-----------------|--|-------------------------------|
| (4)             | Spring Saddle Pads                     | AXL-5550                      |
| (1)             | 3" Drop Pitman Arm                     | PWP-5150                      |
| (2)             | Front Shock Mount Brackets             | AXL-5100                      |
| (2)             | Rear Shock Mount Brackets              | AXL-5200                      |
| (2)             | Front Brake Lines                      | AXL-4500                      |
| (2)             | Rear Brake Lines                       | AXL-4550                      |
| (2)             | Rear Bump Stops                        | PWP-5650                      |
| (2)             | Front Bump Stop Brackets               | PWP-5500                      |
| (2)             | Rear Bump Stop Brackets                | PWP-5600                      |
| (1)             | 3/4" Driveshaft Extension (pre 88 1/2) | PWP-5111                      |
|                 | (post 88 1/2)                          | PWP-5112                      |
| (1)             | 1" Driveshaft Extension (per 88 1/2)   | PWP-5113                      |
|                 | (post 88 1/2)                          | PWP-5114                      |
| (1)             | Rear Upper Shock Absorber Mount        | .....                         |

### **\*\*\*WARNING\*\*\***

**If you do not have the use of an impact wrench, it is possible to knock the vehicle from it's supports during step four of this procedure. If you do not have an impact wrench, Petroworks strongly recommends that the Pitman Arm nut be broken loose before lifting and supporting the vehicle.**

## **DISASSEMBLY**

1. Begin by selecting a firm, level work area where the vehicle can remain undisturbed. Lift and securely support the vehicle from the frame so that the axles and wheels are suspended.
2. Remove the wheels and set them aside. Remove the front brake lines (plug ends). Remove the front shock absorbers and anti-sway bar.

3. Remove the nut attaching the steering drag link to the pitman arm and separate the drag link from the pitman arm. Wire or zip-tie the drag link to the tie rod.
4. Disconnect the steering damper and remove the steering damper bracket from the pitman arm. Attach the bracket to the new pitman arm. Using the 30mm socket and the pitman arm puller, remove the old pitman arm from the steering box sector shaft.
5. Remove the front driveshaft. Remove the front axle u-bolts and springplates. Position a floor jack under the front differential. With an assistant, remove the front shackles and lower the front springs away from the axle housing. Remove the front axle assembly and set aside. Once the axle is removed, reinstall the front shackles, torquing the nuts to **22-39.5 ft-lbs**. Remove the spring center bolt from each spring and reinstall so the head of the bolt points downwards. Torque the nuts to **7.5-11.5 ft- lbs (90-138 in-lbs)**.
6. Remove the rear shock absorbers. Remove the rear driveshaft. Disconnect the parking brake cables from the brake backing plates and the rear axle. With a can of Brake parts cleaner handy and shop rags strategically placed to protect against dripping brake fluid, disconnect the rear brake hoses at the rear axle. Unclip and plug the brake lines and hoses. Immediately remove any spilled brake fluid from painted surfaces.
7. Remove the rear axle u-bolts and springplates. Position a Floor jack under the rear differential. With an assistant, remove the rear shackles and lower the rear springs away from the axle housing. Remove the rear axle assembly and set aside. Once the axle is removed, reinstall the rear shackles, torquing the nuts to **22-39.5 ft-lbs**. Remove the spring center bolt from each spring and reinstall so the head of the bolt points downwards. Torque the nuts to **7.5-11.5 ft-lbs (90-138 in-lbs)**.

**\*\*\*WARNING\*\*\***

**PETROWORKS PRODUCTS STRONGLY RECOMMENDS ALL WELDING BE DONE BY A CERTIFIED WELDER.**

## **WELDING**

The following parts will require welding as per the diagrams provided:  
**Spring Saddles, Front and Rear Bump Stop Brackets, Shock Absorber Mounts.**

8. Before the front spring saddles can be installed, the existing u-bolt guide pads must be removed from the front axle. Also, due to the proximity of the right front spring saddle to the differential housing, this saddle will require minor grinding to match the contour of the axle housing. The new saddles must be welded parallel to the existing spring saddles. Refer to the diagram below for proper positioning of the front spring saddles.



9. Weld the front shock absorber mounts to the existing spring pads as shown below



10. Weld the rear spring pads to the rear axle as shown below. (it is permissible to attach the rear spring pads at a maximum deviation from the existing pads of two degrees from parallel. This is to minimize rear differential pinion angle)

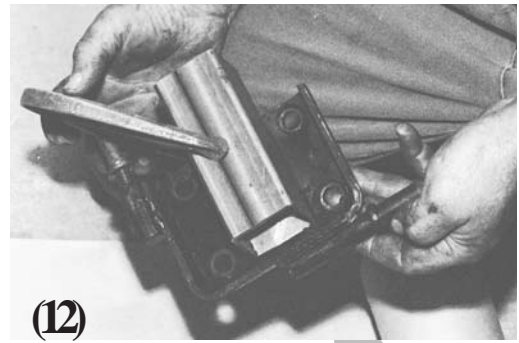


11. Weld the rear absorber mounts to the rear axles as shown. There should be a space between the spring saddle pad and the shock mount of 1 1/4". The pin on the shock mount should be tilted up about 5-10 degrees.

*Note: You may want to wait until you have finished installing the rear axle housing into the truck and then install the rear shocks onto the mounts. Tack weld the lower mounts to the axle housing. Remove the shocks and finish welding the shock mounts. This method will insure that the shock mounts are lined up correctly.*



12. Weld the front bump stop brackets to the front spring plates as shown on the right. The hole in the bump stop should be centered over the hole in the u-bolt plate. (*Note: For a neater installation, the old shock absorber mounts may be removed from the spring plates.*)



(12)



(13)

13. Weld the rear bump stop brackets the rear spring plates as shown on the left. *Be sure to center the bump stop mount carefully between the holes in the spring plate, this will make it much easier to get a socket on the nuts.* (*Note: For a neater installation, the old shock absorber mounts may be removed from the spring plates.*)

## REASSEMBLY

14. Taking appropriate precautions against dripping brake fluid, remove the rear brake hoses where they attach to the frame bracket. Install the new hoses in accordance with the manufacturers instructions, ensuring the e-ring clips properly engage the grooves on the ends of the hoses and the hoses will not be twisted when moving through their normal range of motion. Torque the rear brake hose flare nuts to **10.5-13 ft-lbs (126-156 in-lbs)**.

15. With an assistant, place the front axle on a floor jack, and position under the front springs. Lift the front axle into place and install the u-bolts and spring plates. Torque the u-bolt nuts to **43.5-57.5 ft-lbs**. Reinstall the front driveshaft. Torque the driveshaft flange nuts to **17-21.5 ft-lbs**.

16. Taking appropriate precautions against dripping brake fluid, remove the old front brake hoses and replace with the new hoses. Install the new hoses in accordance with the manufacturers instructions, ensuring the e-ring clips properly engage the grooves on the ends of the hoses and the hoses will not be twisted when moving through their normal range of motion. Do not reuse the old crush washers or banjo bolt. Torque the front brake banjo bolts to **14.5-18 ft-lbs**. Torque the front brake hose flare nuts to **10.5-13 ft-lbs (126-156 in-lbs)**.

17. Install the new pitman arm on the steering box sector shaft, aligning the two matchmarks.
18. Install the steering drag link into the pitman arm. Torque the nut to **22-50.5 ft-lbs.** Reinstall the steering damper. Reinstall the anti-sway bar.
19. Install the front shock absorbers. Torque the upper mount nut to **16-25 ft-lbs.** Torque the lower mount nut to **22.5-39.5 ft-lbs.** Install the front wheels, torquing the lug nuts to **36.5-57.5 ft-lbs.**
20. With an assistant, place the rear axle on a floor jack and position under the rear springs. Lift the rear axle into place and install the u-bolts and spring plates. Torque the u-bolt nuts to **43.5-57.5 ft-lbs.** reinstall the rear driveshaft. Torque the driveshaft flange nuts to **17-21.5 ft-lbs.**
21. Connect the rear brake hoses to the brake lines at the rear axle torque the rear brake hose flare nuts to **10.513 ft-lbs.** (*Note: on '86 and '87 models, the brake hose mounting tab welded to the rear axle must be bent upwards to clear the right rear shock protective boot. If the shock boot will not be used, the mounting tab will not need to be bent.*)
22. Install upper rear shock mount bar using the washers and nuts that were used to mount the old shocks.
23. Reattach the parking brake cable to the rear axle housing. Torque the mounting hardware to **3-5 ft-lbs (36-60 in-lbs).** Install the rear shock absorbers, torquing the mounting nuts to **22.5-39.5 ft-lbs.** Install the rear wheels, torquing the lug nuts to **36.5-57.5 ft-lbs.**
24. Flush, Fill, and Bleed the braking system prior to operating the vehicle, in accordance, with the service manual.
25. Ensure the front wheels are pointed straight. Remove and re-center the steering wheel. Be sure to reattach firmly.

**\*\*\*WARNING\*\*\***

**AFTER THE FIRST 100 MILES OF OPERATION, ALL FASTENERS MUST BE RE-TORQUED TO THE SPECIFICATIONS LISTED IN THESE INSTRUCTIONS OR THE FACTORY SERVICE MANUAL.**

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