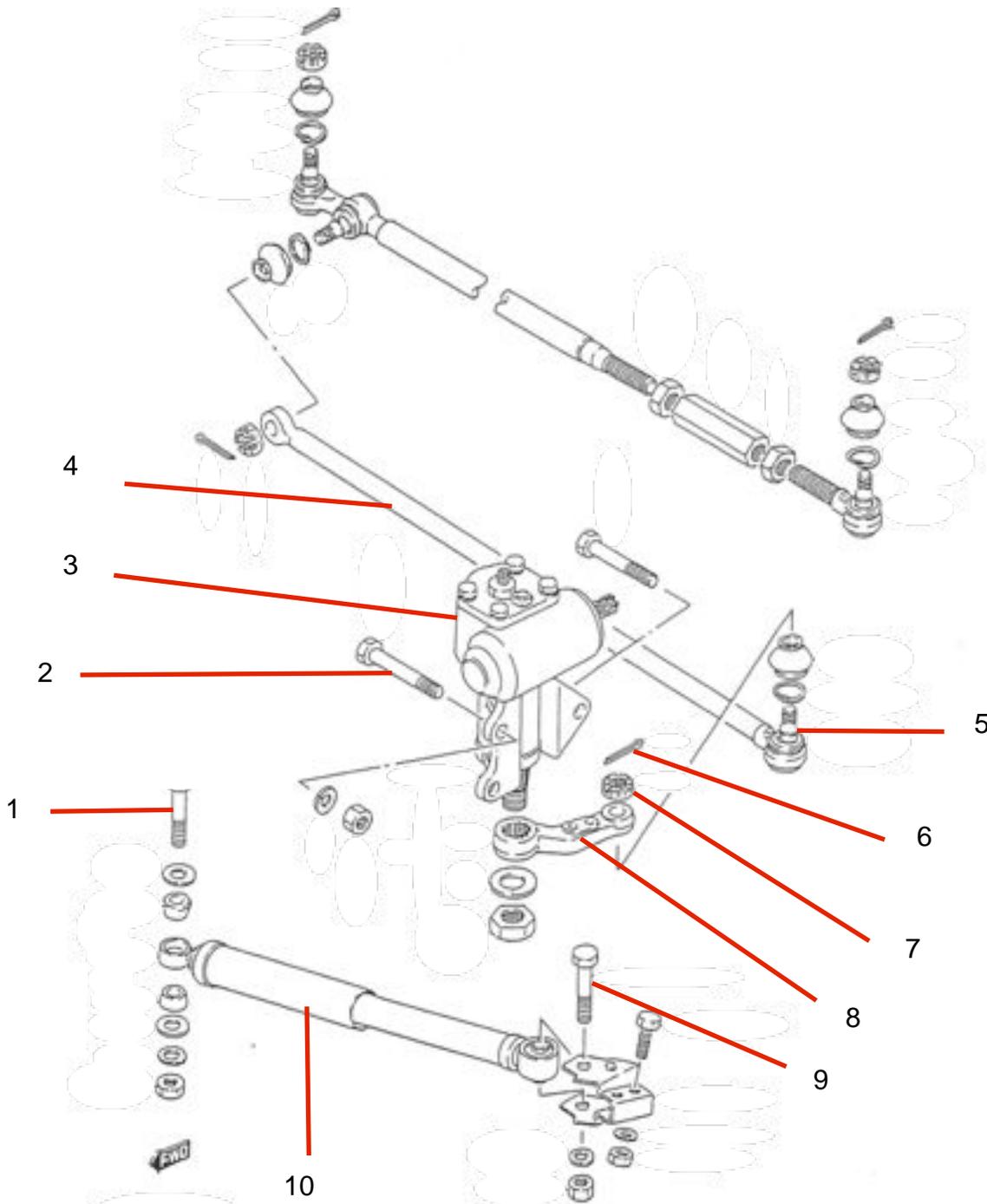


Steering System Parts



- 1. Steering Damper-to-Frame Stud, Washer and Nut
- 2. Steering Gear Bolt, Washer and Nut
- 3. Steering Gear
- 4. Drag Link
- 5. Drag Link Tapered Stud

- 6. Cotter Pin
- 7. Castle Nut
- 8. Pitman Arm
- 9. Damper-to-Pitman Bolt, Washer, & Nut.
- 10. Steering Damper





Step 1

Turn the steering wheel as if making a left hand turn.



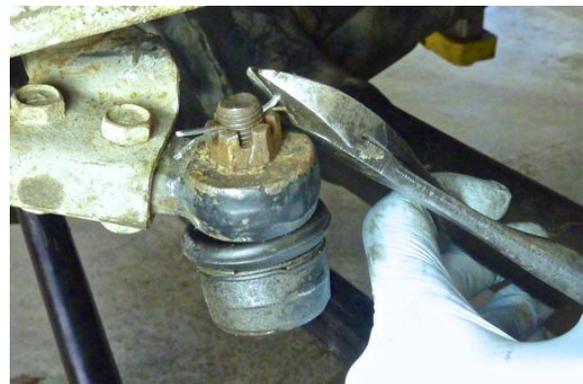
Step 1 Continued

The pitman arm should be visible behind the drivers side front wheel.



Step 2

Straighten the legs on the cotter pin using diagonal cutting pliers (or dikes).



Step 3

Remove the cotter pin using dikes as shown.



Step 4

LOOSEN the castle nut (4 or 5 turns) using a 17 mm box end wrench.



Step 5

Dislodge the pitman arm from the drag link by striking it sharply with a ball peen hammer.

Note: This may take several blows. Don't be shy. Hit it hard!



Step 6

Once the drag link becomes dislodged, remove the castle nut, disconnect the drag link and lay it out of the way.



Step 7

Disconnect the steering damper from the pitman arm by holding the bolt with a 17 mm box end wrench and turning the nut with a 17 mm socket.



Step 8

Disconnect the other end of the steering damper by removing the damper-to-frame nut and washer.



Step 9

Remove the steering damper.

Note: The steering damper will NOT be used with the sidekick steering system being installed.

Removing the cooling system Components



Step 10

Disconnect the coolant overflow hose from the radiator.



Step 11

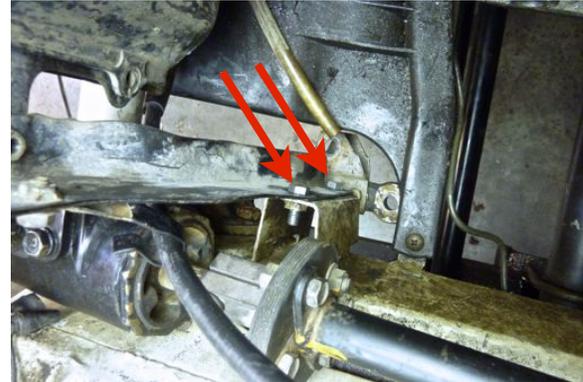
Remove the coolant overflow bottle by lifting it upward.





Step 12

Remove the two driver side radiator bracket bolts using a 10 mm socket.



Step 13

Remove the (2) driver side radiator support-to-frame bolts using a 12 mm socket.



Step 14

Disconnect the clutch cable from the radiator bracket and remove the bracket.



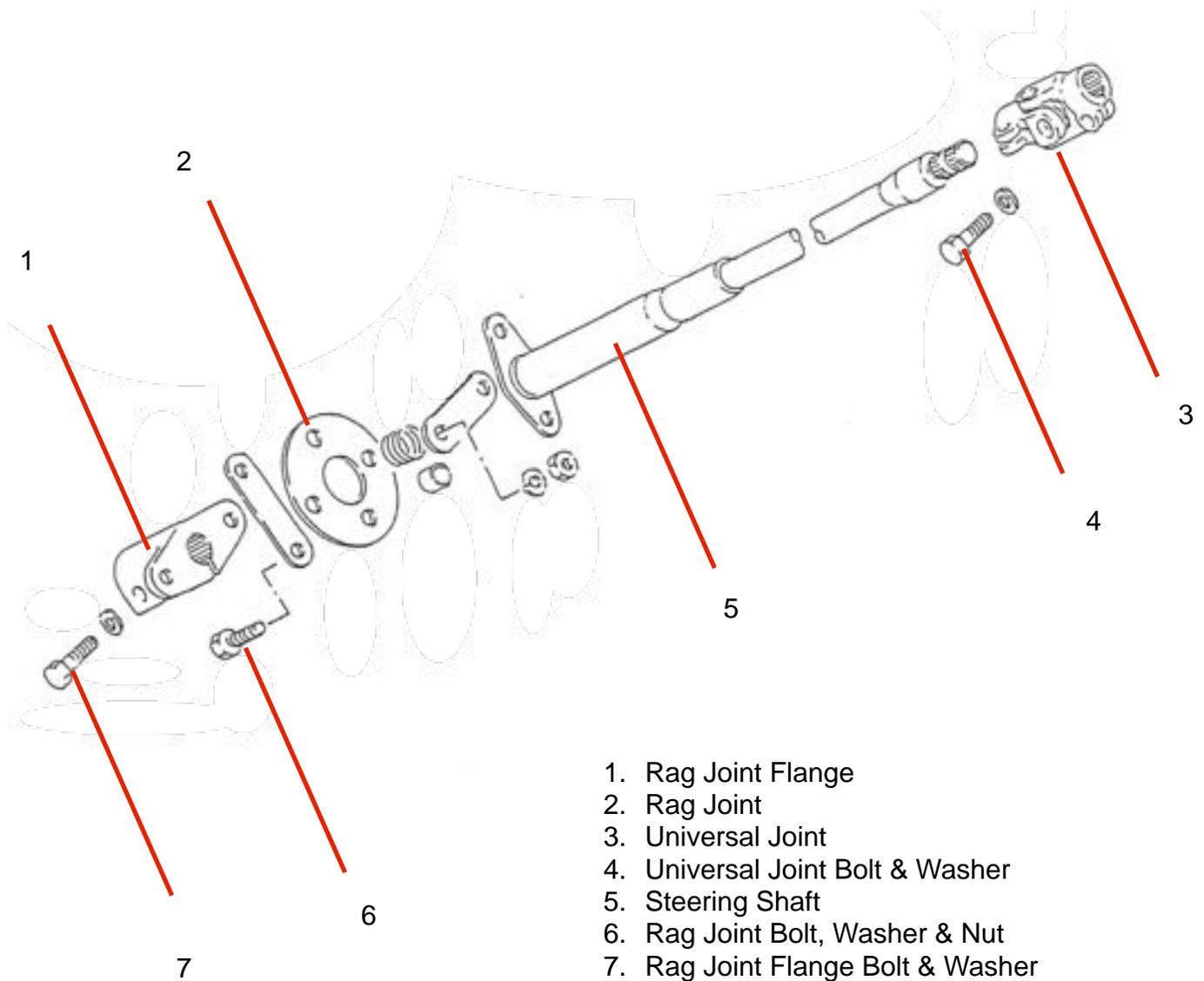
Step 15

Remove the (2) passenger side radiator bracket-to-frame bolts using a 12 mm socket.

Note: It is not necessary to remove the radiator. It simply allows the radiator to be moved toward the passenger side giving more room for the steering gear to be removed and replaced.



Steering Shaft Parts





Step 16

Remove the universal joint bolt and washer using a 12 mm socket.



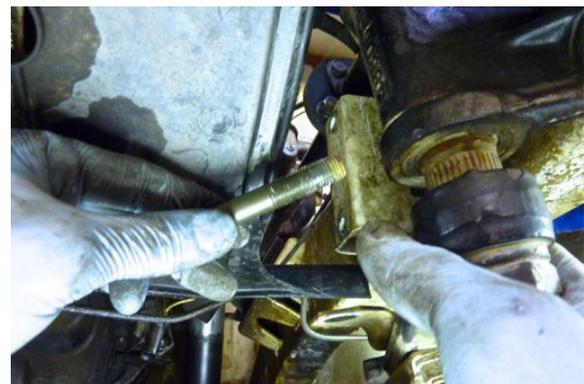
Step 17

Remove the rag joint bolt using a 12 mm socket.



Step 18

While holding the rear steering gear bolt with 19 mm box end wrench, remove the nut using a 19 mm socket.



Step 19

Remove the rear steering gear bolt.



Step 20

Repeat **Steps 19 and 20** on the other 2 steering gear bolts and nut.



Step 21

Move the steering gear forward and disconnect the rag joint flange from the steering gear.



Step 22

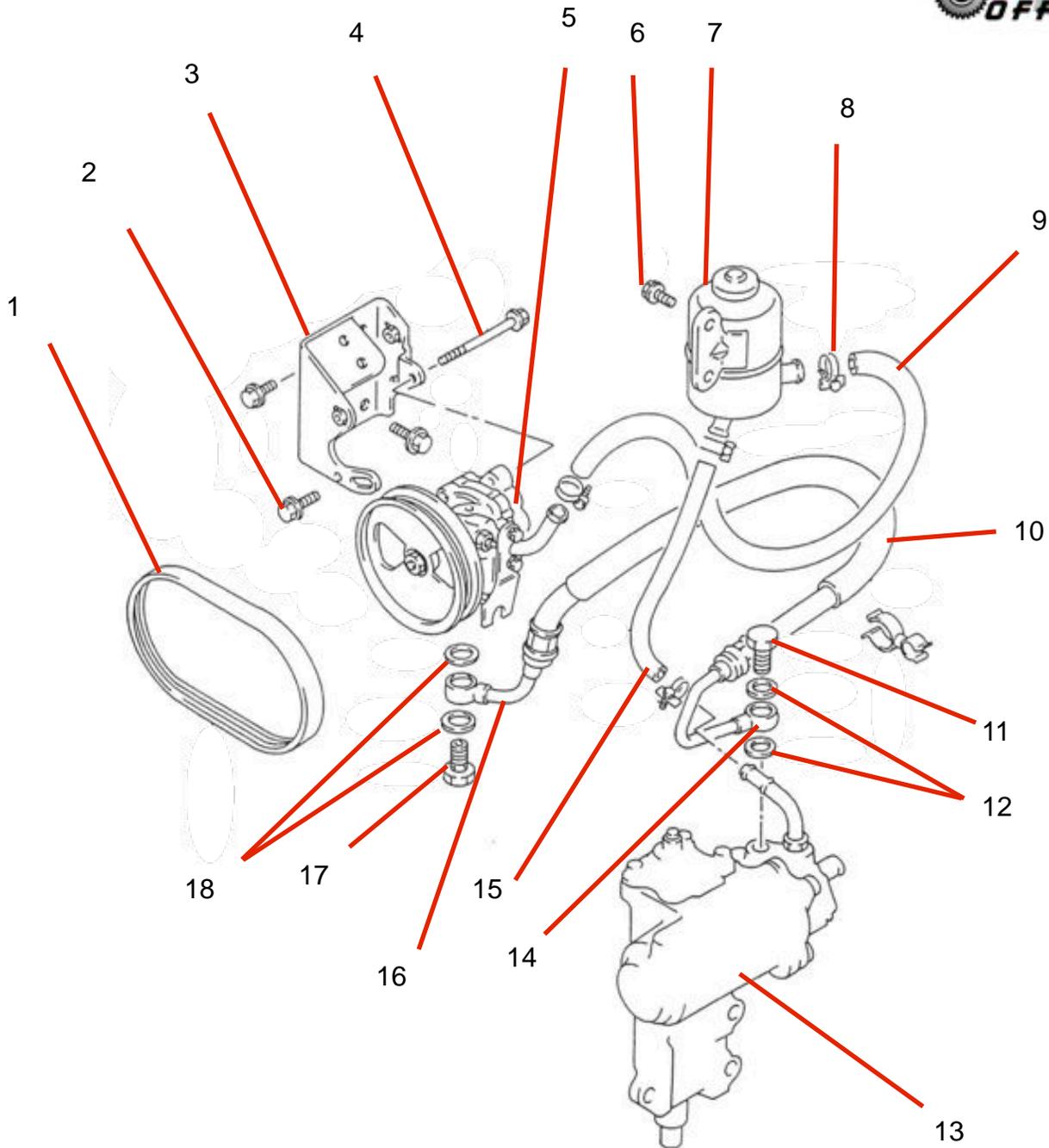
Disconnect the steering shaft from the universal Joint and set the shaft aside.



Step 23

Lift out the steering gear and set it aside.

Note: It will be necessary to shift the radiator toward the passenger side of the vehicle to free the steering gear.



- 1. Belt
- 2. Adjustment Bolt
- 3. Pump Bracket
- 4. Pump Pivot Bolt
- 5. Pump
- 6. Reservoir Bolt
- 7. Reservoir
- 8. Hose Clamp
- 9. Reservoir-to-Pump Hose
- 10. Pump-to-Gear Hose

- 11. Steering Gear Banjo Bolt
- 12. Copper Washers (2)
- 13. Steering Gear
- 14. Gear Banjo Connector
- 15. Reservoir to Pump Hose (5/8")
- 16. Pump Banjo Connector
- 17. Pump Banjo Bolt
- 18. Copper Washers (2)



Preparing the Sidekick steering components for installation.



Step 24

Lay out all the sidekick steering system components on a work bench.

Step 25

Disconnect the pump banjo bolt using a 22 mm box end wrench.

Note: Lay a cloth under the bolt. Power steering fluid will likely come out when removing this bolt.



Step 26

Save the (2) copper washers. You will need them later.

Step 27

Loosen the hose clamp on the pump-to-reservoir hose as shown using a 10 mm socket (or phillips screwdriver) and disconnect the hose from the pump.





Step 28

Disconnect the electrical connector if equipped.

Note: This electrical wire (and related components) help reduce the risk of engine stall during high power steering pump engine load. A Samurai will not accommodate this feature. So you can do away with this wire.

Important Note: Sidekick power steering systems came equipped with a **CAST IRON** pump up to 1995 and a **CAST ALUMINUM** pump from 1996 and newer. These pumps operate and mount exactly the same, except for the outlet hose fitting. If you have the cast aluminum pump start at **Step 29**. If you have the cast iron pump skip ahead to **Step 40**. (See examples below)



Cast Iron Pump (1995 and older)



Cast Aluminum Pump (1996 and newer)

Aluminum Pump (1996 and Newer) Modification Instructions



Step 29

Mount the pump in a bench vice with the inlet hose connector up as shown.



Step 30

Mark the connector with a felt tipped marker as shown. This mark is to be used as a guide for cutting the bracket.



Step 31

Cut the hose bracket as shown using a hack saw.



Caution:

Be sure not to cut into the pump housing on the bottom side of the bracket.



Step 32

Remove the pump from the vise and place it on a work bench.



Step 33

Rotate the pump pulley so that the adjustment bolt is visible through the largest pulley opening as shown.



Step 34

Remove the adjustment bolt using a 12 mm socket.



Step 35

Remove the pump pivot bolt using a 12 mm socket.



Step 36

Separate the pump from the pump bracket and set the bracket aside. You will not need this bracket.



Step 37

Remove the power steering hose inlet fitting bolt using a 10 mm box end wrench.



Step 38

Rotate the hose fitting approximately 180° (or 1/2 turn)

Note: There is an O-ring here. Be sure it is in good condition and in its proper position. If it is cracked, brittle or distorted in any way it should be replaced.



Step 39

Install the supplied hold down bracket as shown.



After completing **Step 40** skip ahead to **Step 47**.

Step 40

Reinstall the original bolt and tighten to 3 to 5 ft. lbs. Set the pump aside for now.

Cast Iron Pump (1995 and older) Modification Instructions



Step 41

Remove the (2) power steering hose inlet fitting bolts using a 10 mm socket.

Step 42

Remove the inlet fitting.

Note: There is an O-ring here. Keep it safe. It will be needed when reinstalling the inlet hose fitting.

Note: Inspect this O-ring. If it is cracked brittle or deteriorated in any way, it should be replaced.



Step 43

Mark along the bend as a guide for cutting.



Step 44

Clamp the hose fitting in a bench vice and cut long the line with a hacksaw.



Step 45

Install the hose fitting back on the pump exactly 180° (or 1/2 turn) from its original position.

Caution: Be sure the O-ring is properly positioned.



Step 46

Install the original bolts and tighten them 3 to 5 ft. lbs. Set the pump aside for now.





Step 47

Loosen the hose clamp on the pump-to-reservoir hose using a 7 mm socket (or phillips screwdriver) and disconnect the hose. Set the reservoir aside.



Step 48

If there is an electrical wire strapped to the pump-to-reservoir hose, cut the ties and remove the wire. You will not need this wire.

Steering Gear Installation



Step 49

Position the steering gear as shown.

Note: Notice that the pitman arm is directed downward at first. You will also need to shift the radiator as far as it will go toward the passenger side of the vehicle. Be careful not to damage the radiator, fan or fan shroud.



Step 50

Then rotate the pump into this position.





Step 51

Shift the steering gear toward the passenger side of the vehicle and position the supplied pump bracket between the steering gear and the frame.



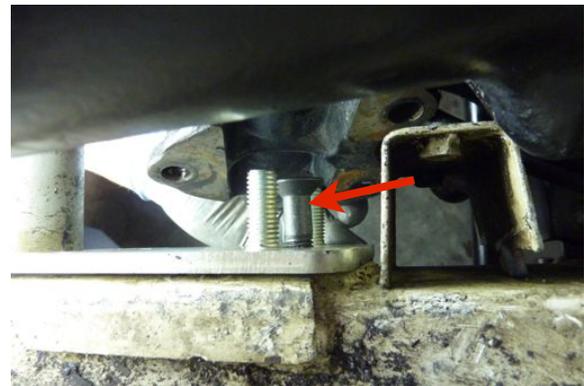
Step 52

Install the supplied tapered head bolt (M12-1.75X60) into the bracket.



Step 52 Continued

The tapered head goes in the hole indicated by the arrow.



Step 52 Continued

This shows the tapered head bolt properly installed.



Step 53

Install the supplied (M12-1.75) nylock nut on the tapered head bolt, but do not tighten it at this point.



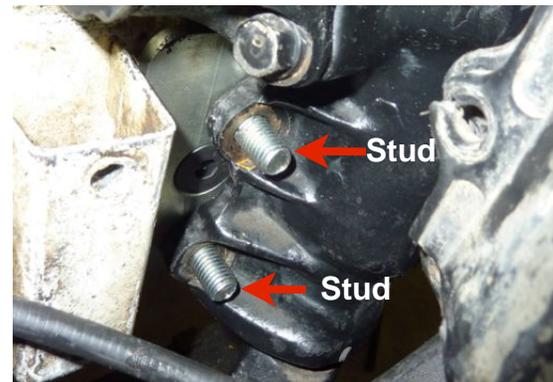
Step 54

Install the supplied (M12-1.75X100) bolt through the bracket and frame as shown. This is the top bolt.



Step 55

Start the supplied (M12-1.75) nylock nut on the bolt. Then tighten both nylock nuts to 60 ft. lbs.



Step 56

Position the steering gear on the studs of the bracket.



Step 57

Install the third steering gear bolt as shown. This is the bottom bolt.



Step 58

Install the nut as shown. Do not tighten yet.



Step 59

Install the (2) M12-1.75 nylock nuts on the bracket studs. Gradually tighten these all three nylock nuts, until you reach 60 ft. lbs.



Rag Joint Eliminator Installation



Step 60

Install the supplied rag joint eliminator on the steering gear shaft.

Note: Be sure the pinch bolt is located on the flat of the sector shaft.



Step 61

Install the rag joint flange bolt. Do not tighten this bolt yet.



Step 62

Temporarily install the steering shaft in the steering universal joint.



Step 63

Notice that the steering shaft is too long. Estimate the amount the steering shaft needs to be shortened.

Note: In our installation we needed to shorten the steering shaft to an overall length of 16 inches.



Step 64

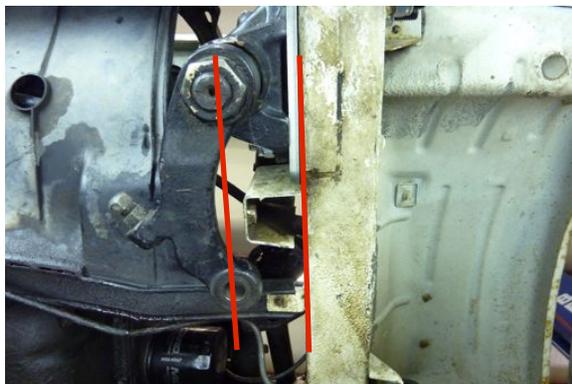
To shorten the steering shaft, place the spline end on a board and hit the rag joint end with a hammer. You have to hit pretty hard to start the collapse, but once it starts, it goes pretty easy. Try not to over collapse (shorten) the shaft. It is easier to collapse than to lengthen. As you get closer to the correct length, test fit the shaft and continue adjusting until it fits properly.



Step 65

Test fit the steering shaft by installing the universal joint on the upper end and positioning the other end on the rag joint eliminator as shown. Once you are sure the shaft is the correct length, remove the steering shaft from the vehicle.

Aligning the Steering Wheel, Shaft and Gear.



Step 66

Position the pitman arm in center steer position by placing the holes parallel with the frame.



Step 67

Place the steering wheel in the center steer (or level) position as shown.





Step 68

Reinstall the steering shaft **WITHOUT** rotating the steering gear or the steering wheel. This is done by estimating the position of the rag joint end of the steering shaft such that the bolt holes align



Step 69

. . . . and installing the universal joint end.



Step 70

Start the rag joint bolts as shown. Do not tighten these bolts yet.



Step 71

Start the universal joint bolt. Do not tighten it yet either.





Step 72

Double check to see that the pitman arm is still parallel with the frame and the steering wheel is still centered. If they are not, repeat **Steps 66 through 71**. If all is still aligned properly, continue to the next step.



Step 73

Tighten the (2) rag joint bolts and the (1) rag joint flange bolt to 13.5 to 20 ft. lbs.



Step 74

Tighten the universal joint bolt to 13.5 to 20 ft. lbs.



Step 75

For added strength and security, install and tighten the nylock nuts on the (2) rag joint bolts. 13.5 to 20 ft. lbs



Power Steering Pump Bracket Installation



Step 76

Position the supplied power steering pump bracket as shown.

Note: The exhaust heat shield and jack mount was not in place on our Samurai. If you have these components, it should not be necessary to remove them.



Step 77

Start the (3) M10-1.25 X 20 flange bolts. Do not tighten them yet.



Step 78

Install the (2) supplied M8-1.25 X 45 flange bolts with the spacers as shown.



Step 79

Gradually tighten all 5 power steering bracket bolts until the specified torque is achieved.

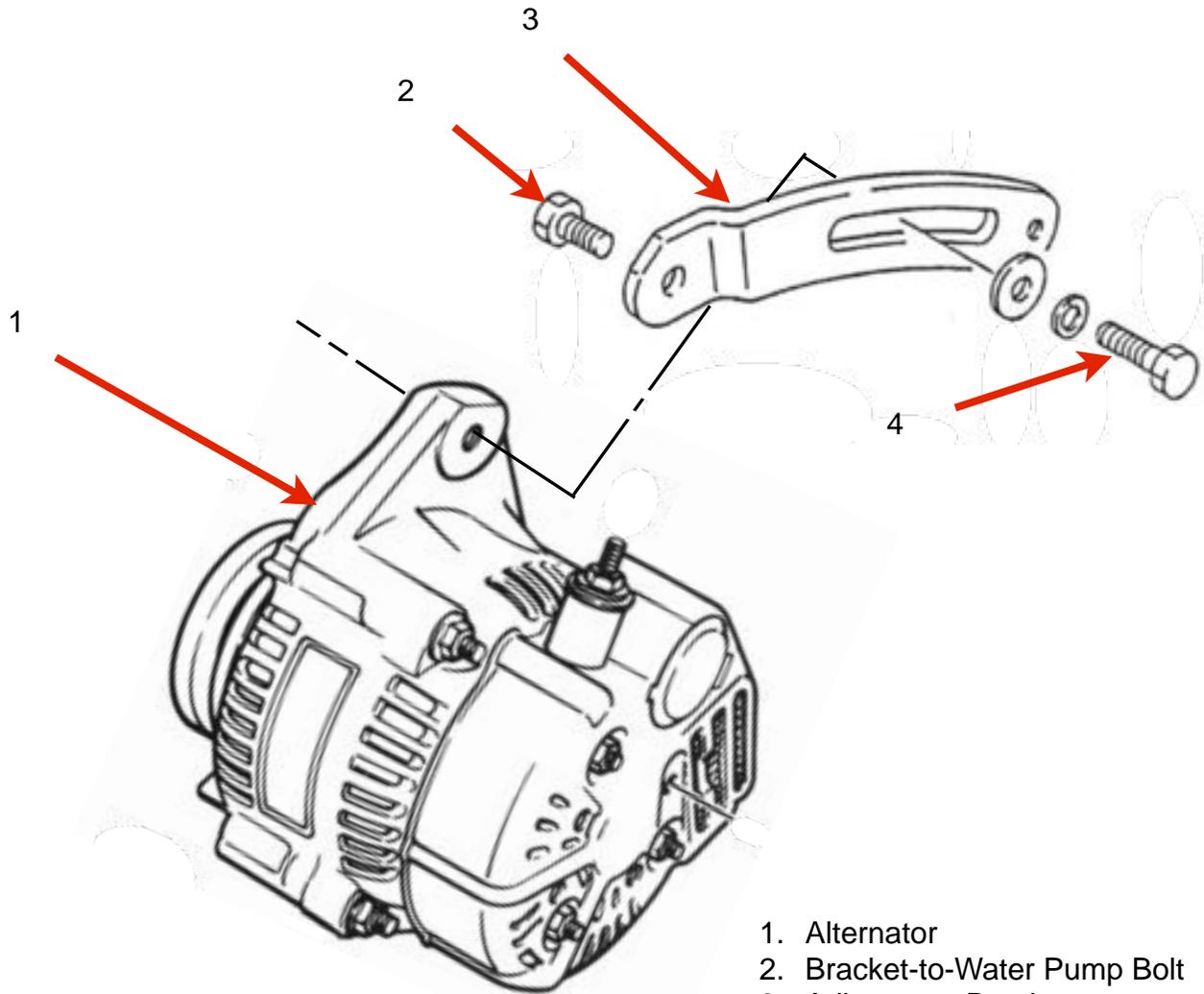
M8 bolts = 15 ft. lbs.

M10 Bolts = 30 ft. lbs.

Caution: Do not over-tighten these bolts. The threads in the soft aluminum engine block are easily stripped.



OEM Alternator Adjustment Bracket Parts



Crankshaft Pulley Installation



Step 80

Loosen (but do not remove) the alternator adjustment bolt using a 12 mm box end wrench or socket.

Note: It may be necessary to loosen the alternator pivot bolt (located on the bottom of the alternator) as well.

Step 81

Loosening the alternator belt by pushing the alternator toward the engine.



Step 82

Remove the belt from the water pump pulley and the crankshaft pulley. It is not necessary to remove the belt completely. Simply lay it out of the way for now.

Step 83

Remove the (4) crankshaft pulley bolts using a 10 mm socket. See figure A

Note: Do not remove the larger bolt.



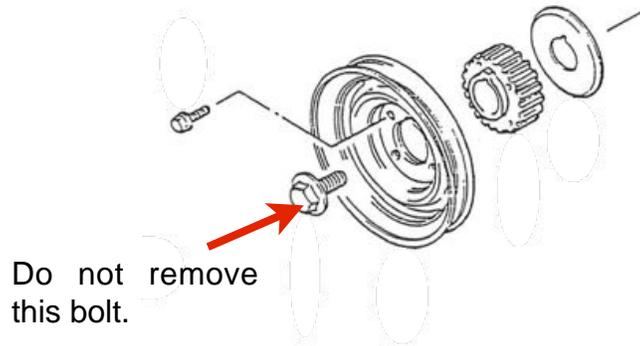


Figure A



Step 84

Remove the crankshaft pulley.

Note: This is not a press fit pulley. It should come off easily.



Step 85

Install the supplied LROR crankshaft pulley, the (4) supplied (M6-1.0 X 23) flange bolts and torque them to 7.5 to 9 ft. lbs.

Note: Insure that the notch in the LROR pulley matches the key in the crankshaft.



Step 86

Reposition the v-belt on the alternator, water pump and crankshaft pulleys. (See Figure B)





Step 87

Tension the V-Belt by prying the alternator away from the engine and tightening the adjustment bolt.

Caution: Do not over-tighten the adjustment bolt. It is easily stripped. Also, if you loosened the alternator pivot bolts earlier, tighten them as well.

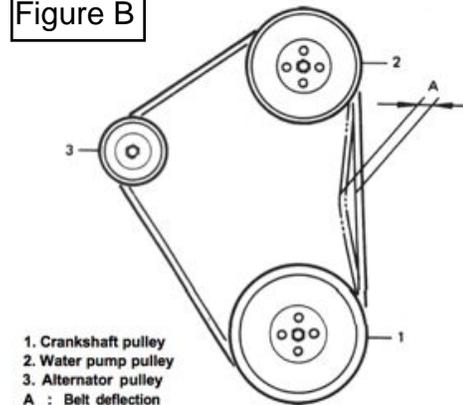


Step 88

Correct tension is checked by pushing on the belt midway between the crankshaft and water pump pulleys. It should deflect about 3/8 inch with moderate pressure. (See Figure B)

Note: Readjust the alternator if the belt is too loose or too tight. Belt squeal on initial start-up is an indication of a loose alternator belt. If a belt is too tight it can damage the alternator bearings.

Figure B



- 1. Crankshaft pulley
- 2. Water pump pulley
- 3. Alternator pulley
- A : Belt deflection

Fig. 10-21

Drive belt deflection (Under 10 kg thumb pressure)	6 – 9 mm (0.24 – 0.35 in)
---	------------------------------

Power Steering Pump Installation



Step 89

Position the power steering pump in the bracket as shown.



Step 90

To make room for the power steering pump pivot bolt, remove the (M10-1.25 X 20) bolt as shown.



Step 91

Install the power steering pivot bolt (M8-1.25 X 100) as shown.



Step 92

Install the (M8-1.25) serrated nut on the pivot bolt through the pump pulley.



Step 93

While holding the pivot bolt with a 12 mm box end wrench, snug the nut with a 12 mm deep socket.



Step 94

Reinstall and torque the (M10-1.25 X 20) bolt that was removed earlier. 30 ft. lbs.



Step 95

Install the supplied pump adjustment bolt (M8-1.25 X 25) but do not tighten it yet.



Step 96

Install the supplied multi-groove belt on the crankshaft and power steering pump pulley.



Step 97

Tension the belt by lifting up on the pump and tightening the adjustment bolt using a 12 mm deep socket. 7.5 to 11.5 ft. lbs.

Note 1: The belt should deflect about 1/4" with moderate thumb pressure to be considered adjusted properly.

Note 2: Do not over-tighten this bolt. It is easily stripped.



Step 98

Tighten the pivot bolt nut. 7.5 to 11.5 ft. lbs.

Removing the Washer fluid Reservoir



Step 99

Remove the front bolt using a 12 mm socket.



Step 100

Remove the rear bolt using a 12 mm socket and set the reservoir aside.



Power Steering Reservoir



Step 101

Loosen the hose clamp and remove the bottom hose.



Step 102

loosen the hose clamp on the other hose and remove it as well.



Step 103

Loosen the outlet hose fitting on the steering gear using a 17 mm box end wrench.



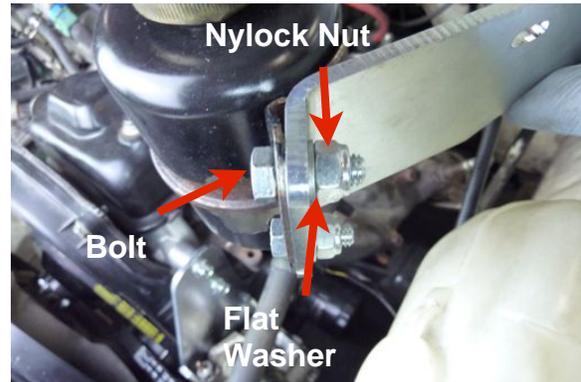
Step 104

Rotate the outlet hose fitting 90° (or 1/4 turn) as shown and retighten the fitting.



Step 105

Mount the reservoir to the bracket as shown. Be sure the curve of the bracket is facing downward.



Step 105 Continued

This shows the location of the fasteners.

Bolts: M8X1.5X25

Nut: M8X1.5

Washer: M8 Flat Washer



Step 106

Connect the the supplied (3/8") reservoir-to-steering gear hose to the bottom of the reservoir using the supplied hose clamp.



Step 107

Feed the other end of the 3/8 hose around the headlight and toward the steering gear.





Step 108

Align the bracket with the holes in the washer fluid reservoir and insert the supplied (M6-1.0 X 16) bolts as shown.



Step 109

Mount the washer and power steering reservoirs and tighten the bolts to 3 to 5 ft. lbs.



Step 110

Connect the 3/8" steering gear-to-reservoir hose to the steering gear and tighten the supplied hose clamp.

Note: This hose may be a bit too long. If it is, cut it to length as needed.



Step 111

Clean the banjo bolt with a cloth. . . .



Step 112

..... and both copper washers.

Note: These copper washers must be free of any nicks, cracks or uneven surfaces in order to seal properly. Replace these washers if needed.



Step 113

Install the banjo bolt and two copper washers on the pump-to-steering gear hose as shown.

Caution: All these parts must be clean and free of any debris in order to seal properly.



Step 114

Install the banjo bolt and hose on the power steering pump.

Note: The banjo connector should be oriented downward as shown. Make sure it does not rub the pump pulley.



Step 115

Tighten the banjo bolt 29 to 43 ft. lbs.





Step 116

Connect the supplied (5/8") pump-to-reservoir hose to the pump and tighten the clamp.



Step 117

Connect the other end of the hose to the reservoir and tighten the clamp.

Note: This hose may be a bit too long as well. Shorten it by cutting if necessary.

Installing the Cooling System Components



Step 118

Install the driver side radiator support bracket and install the (2) upper bolts, but do not tighten them yet.



Step 119

Install the (2) driver side radiator bracket-to-frame bolts, but leave them loose as well.



Step 120

Install the passenger side bracket-to-frame bolts.



Step 121

Tighten all (6) radiator support bracket bolts that were installed in **Steps 118 through 120**.



Step 122

Install the clutch cable back in the bracket.



Step 123

Install the coolant overflow bottle.





Step 124

Reconnect the coolant overflow hose.



Step 125

Reconnect the drag link to the pitman arm.



Step 126

Install the castle nut and torque to 30 ft. lbs.



Step 127

If the nut aligns with the hole in the stud as shown here, install a new cotter pin and bend the legs as shown in the next picture. If the holes do not align, tighten (NEVER LOOSEN) the nut until the holes align.



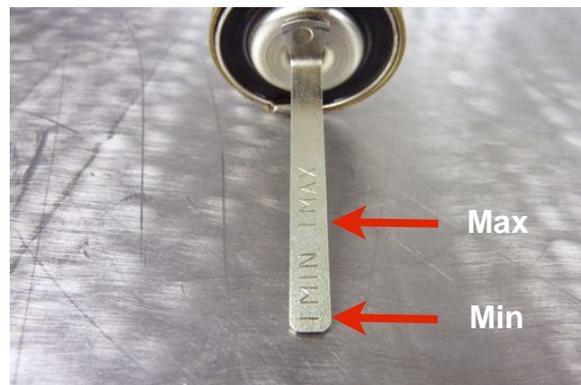


Tech Tip

Cotter pin properly installed.

Refilling and Bleeding the System

Bleeding (purging of air from) the system works best with the front wheels raised off the ground, supported by jack stands. However, bleeding can also be accomplished with the wheels on the ground. It just may take a bit longer.



Step 128

Fill the reservoir to the MIN mark on the dip stick.

Tech Tip

MIN mark on the dipstick.





Step 129

Start the engine, let it run for 5 seconds and turn it off.



Step 130

Add fluid as needed to the reservoir. Repeat **Steps 128 & 129** until the fluid level remains steady in the reservoir.

Caution: Never let the reservoir become empty. If the pump is allowed to run without sufficient fluid it may sustain permanent internal damaged.



Step 131

Start the engine again, and slowly turn the steering wheel from side-to-side several times, without hitting the stops. Return the front wheels to straight ahead position and let the engine idle for a few more minutes.



Step 132

Turn the engine off, recheck the fluid level in the reservoir with the dip stick, and add fluid to the MIN line if needed.

Note: Fluid should be at the MIN line when the fluid is at room temperature. When the fluid reaches operating temperature it should be at the MAX line.





Tech Tip

Steering should operate smooth with no binding and without moaning noise. Moaning is an indication that there is air in the system. If Moaning is still present, remove the reservoir cap, start the engine, turn the steering wheel from right-to-left several more times. Then let the engine idle a few minutes. Turn the engine off and add fluid as needed. This should purge the air from the system.

Tire Wear and Wheel Alignment



CAUTION: Replacing steering parts and components can adversely affect wheel alignment resulting in excessive tire wear, poor handling and unsafe braking. We strongly recommend having this vehicle professionally aligned as soon as possible after completing this installation.



As always, If you experience any difficulty during the installation of this product please contact Low Range Off-Road Technical Support at 801-805-6644 M-F 8am-5pm MST. Thank you for purchasing from Low Range Off-Road.



These instructions are designed as a general installation guide. Installation of many Low Range Off-Road products require specialized skills such as metal fabrication, welding and mechanical trouble shooting. If you have any questions or are unsure about how to proceed, please contact our shop at 801-805-6644 or seek help from a competent fabricator. Using fabrication tools such as welders, torches and grinders can cause serious bodily harm and death. Please operate equipment carefully and observe proper safety procedures.

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