

86-95 Suzuki Samurai Transmission

SKU# STM-RT

Revised 4-10-17

Installation Instructions



CAUTION: Safety glasses should be worn at all times when working with vehicles and related tools and equipment.

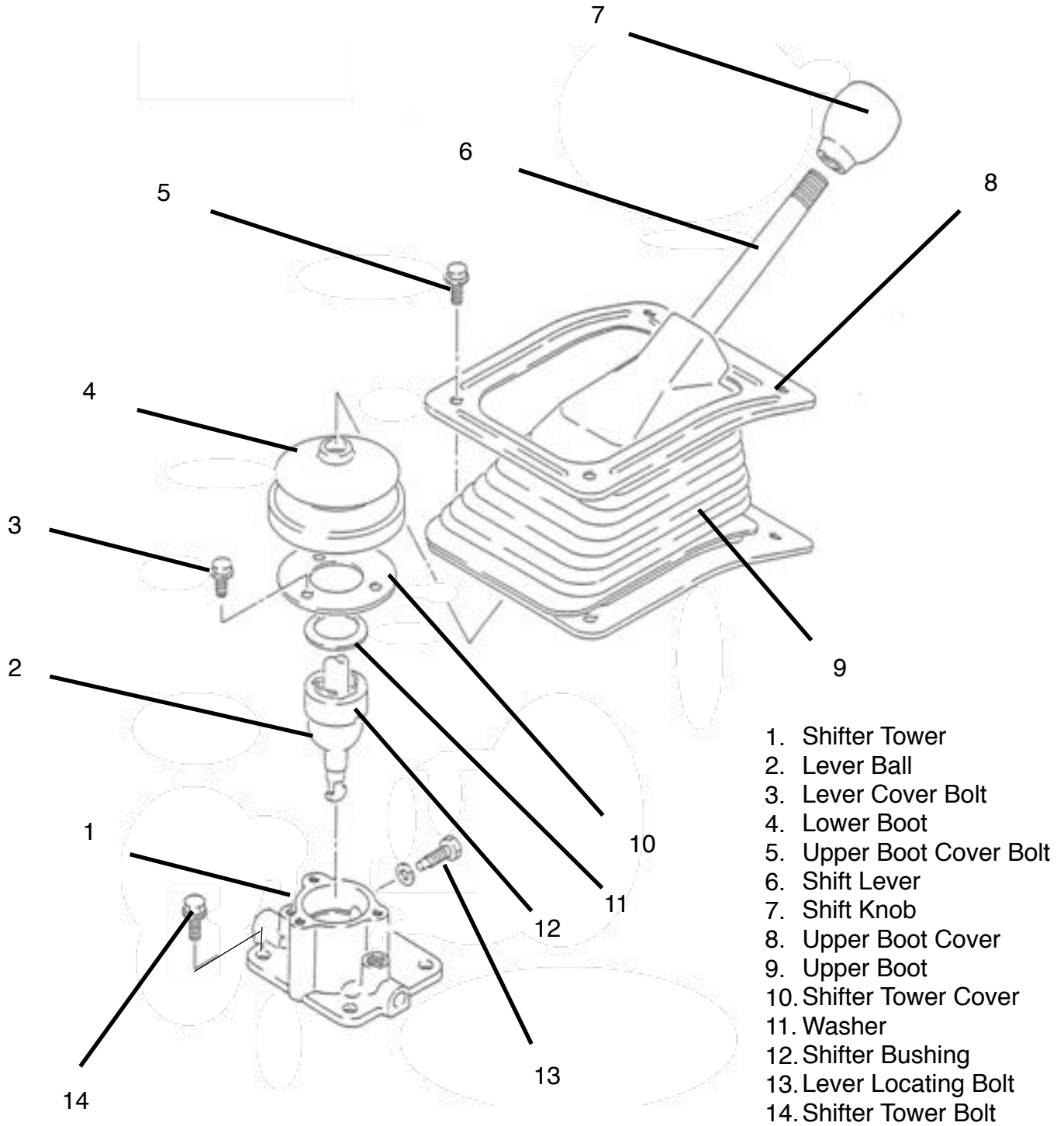


FOR ADDITIONAL COPIES OF THESE AND OTHER INSTRUCTIONS GO TO:
www.lowrangeoffroad.com and click on the "TECH" tab.

Suggested Tools:

- 3/8 Drive Sockets: 10, 12, 14 & 17 mm
- 3/8 Drive Universal Socket: 14 mm
- 3/8 Ratchet
- Twin Post Lift (or Floor Jack and 4 Jack Stands)
- Under Hoist Jack Stand
- Transmission Jack, High Lift (Optional)
- 3/8 Extensions: 2-12"
- Combination End Wrenches: 10, 12, 14 & 17
- Second Combination Wrenches: 12, 14, & 17
- Brake Cleaner
- 80W90 Gear Oil (A few drops)
- Brake Lubricant (Permatex Ceramic Extreme Brake Parts Lubricant Recommended)
- Gasket Sealer (Permatex Ultra Gray Gasket Maker Recommended)
- Wheel Bearing Grease
- Gasket Scraper

Shifter Parts



Removing the Shifter



Step 1

Place the shifter in neutral.



Step 2

Remove the transmission upper boot by removing the (4) bolts using a 10 mm socket.



Step 3

Slide the transmission interior boot up the shifter.



Step 4

Slide the lower transmission boot up the shifter.



Step 5

Remove the (3) shifter tower cover bolts using a 10 mm socket.



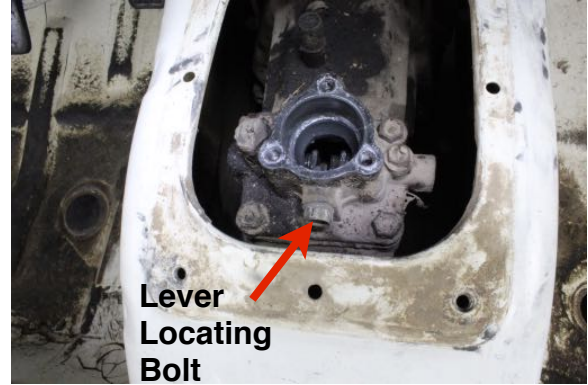
Step 6

Slide the lever case cover upward.



Step 7

Remove the shifter lever by lifting straight up.



Step 8

Remove the shifter case by removing the (4) bolts using a 12 mm socket.

Note: If the lever locating bolt is broken or damaged it must be replaced. A replacement [bolt](#) can be purchased through our web site.

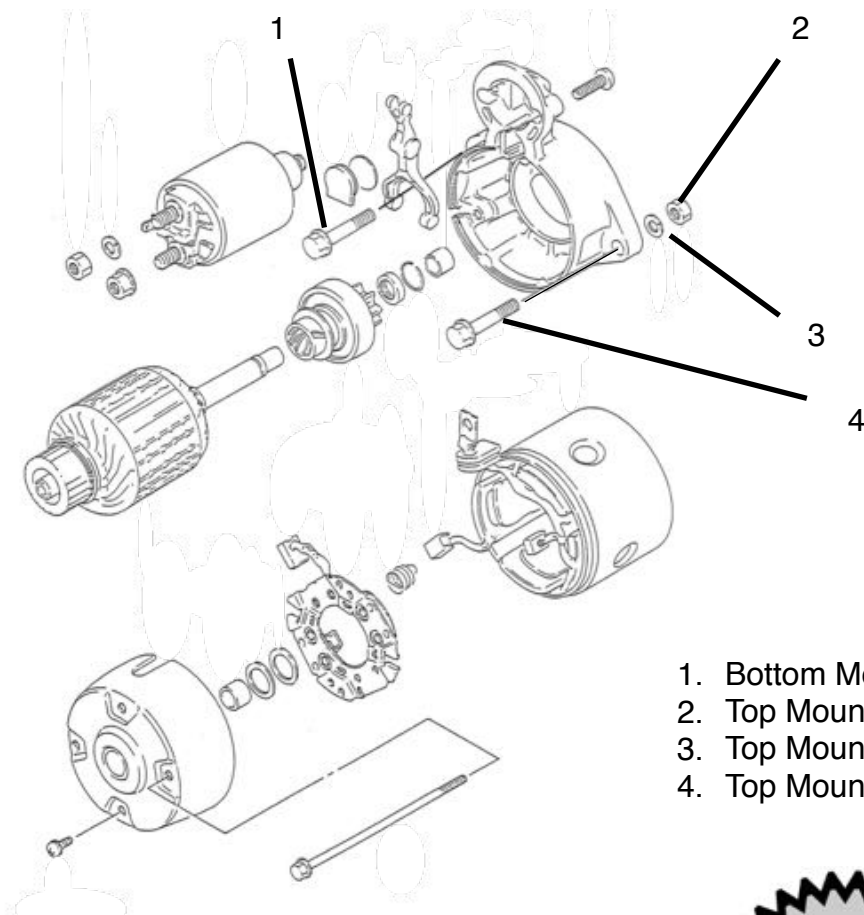




Step 9

Place a rag in the shifter opening to prevent debris from falling inside the transmission.

Starter Motor Parts Identification



1. Bottom Mounting Bolt
2. Top Mounting Nut
3. Top Mounting Lock Washer
4. Top Mounting Bolt

Disconnecting the Starter



Step 10

Disconnect the negative battery cable.

Step 11

Remove the bottom mounting bolt using a 12 mm socket.

Note: The battery ground cable is also secured by this bolt.



Step 12

Remove the top mounting bolt by holding the nut with a 12 mm box end wrench and removing the bolt with a 12 mm socket.

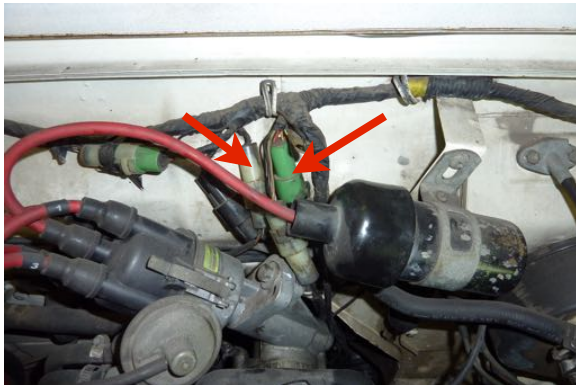
Note: We found it easier to use a 12 inch extension between the ratchet and the socket.

Step 13

Simply slide the starter forward and let it rest on the clutch cable bracket.



Disconnecting the 5th Gear Switch and Reverse Light Connectors



Step 14

The two connectors shown by arrows need to be disconnected. These are the reverse light and 5th gear indicator wires that go to the transmission.

Step 15

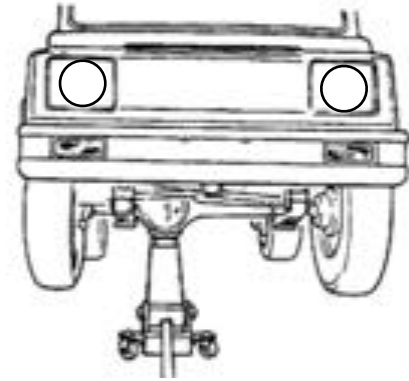
This is done by lifting up on the tab and pulling the connector halves apart.



Step 16

After disconnecting these two connectors let the wires drop down so they can be removed with the transmission.

Lifting the Vehicle



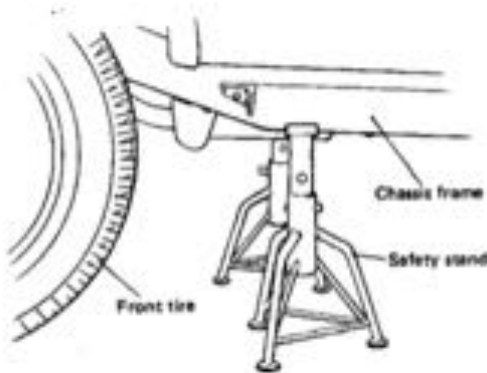
Step 17

Lift and support the vehicle on a twin post lift.

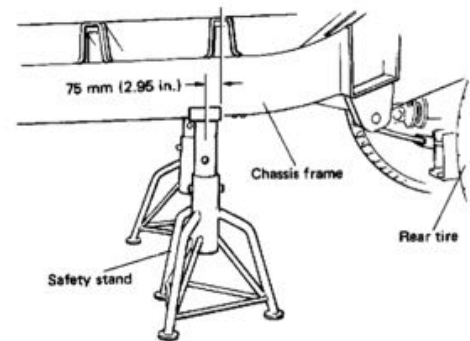
Note: We used a twin post lift, but this job could be done with a floor jack and (4) safety stands.

Tech Tip

Proper positioning of floor jack.



Front



Rear

Tech Tip

Proper positioning of safety stands.

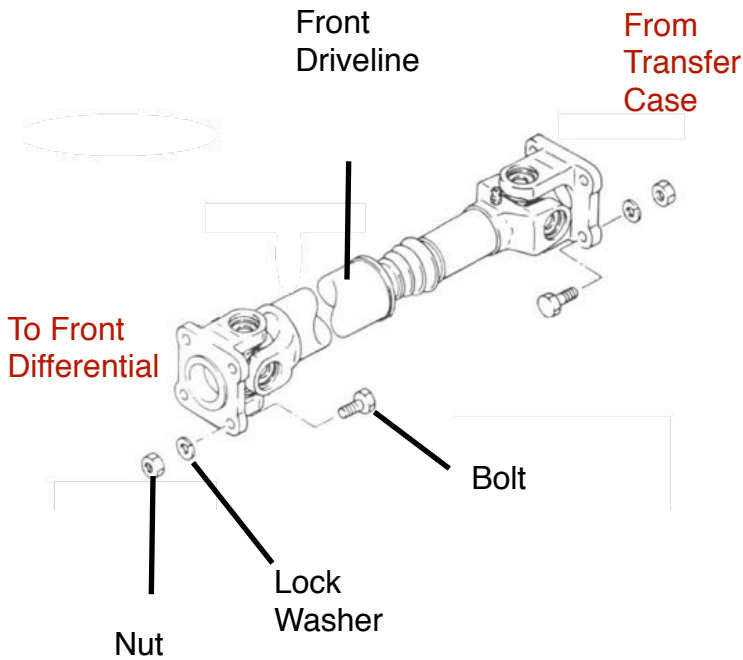


Figure A



Step 18

Disconnect front driveline from the front differential by removing the (4) bolts using two 12 mm box end wrenches. (See **Figure A**) Leave the driveline connected at the transfer case and tie the disconnected end back out of the way.

Note: A bungee cord works well for this.



Step 19

Remove the driver side cross brace bolt using a 14 mm socket.



Step 20

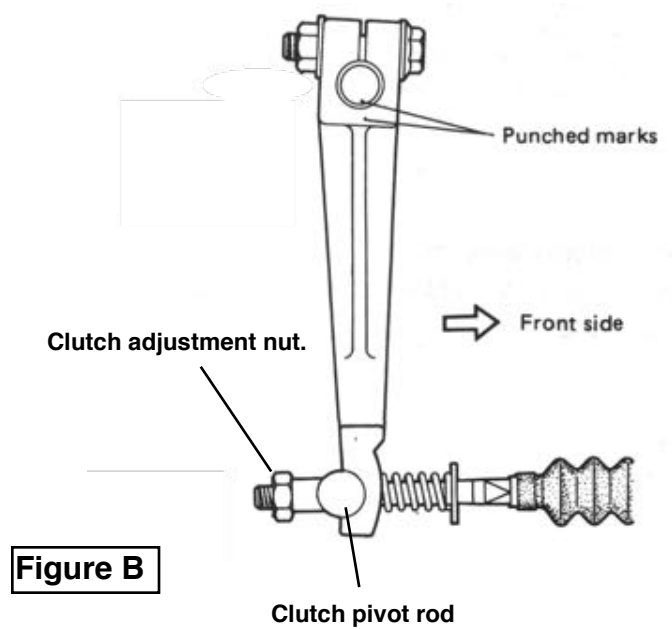
Remove the passenger side cross brace bolt using a 14 mm box end wrench.





Step 21

Remove the cross brace and set it aside.



Step 22

Disconnect the clutch release cable by holding the cable with a 10 mm open end wrench and removing the clutch adjustment nut with a 14 mm box end wrench. (See Figure B)



Step 23

Set the clutch adjustment nut and pivot rod aside. (See Figure B)

Note: Be careful not to lose the small washer that is on the cable.



Step 24

Remove the input driveline by removing the (4) bolts using (2) 12 mm box end wrenches.



Step 25

Once the driveline is disconnected from the transfer case, let it drop down and pull it out of the transmission. The transmission end of the drive shaft has a slip yoke (**See Figure C**) that allows it to be removed with little effort.

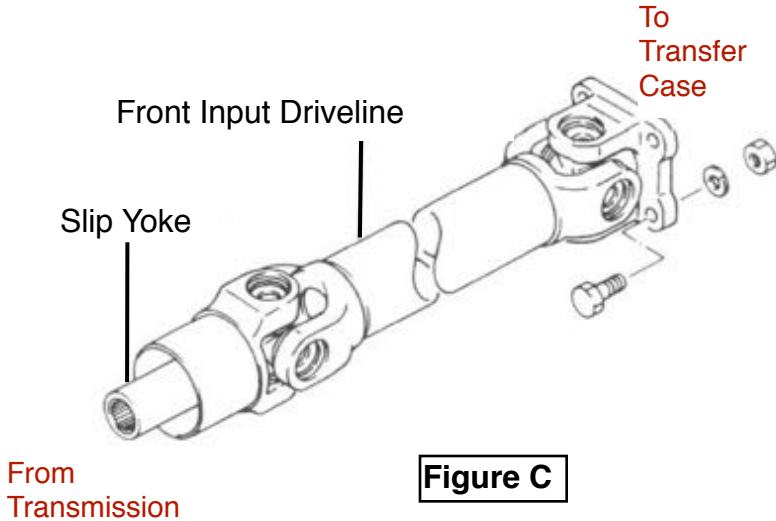


Figure C

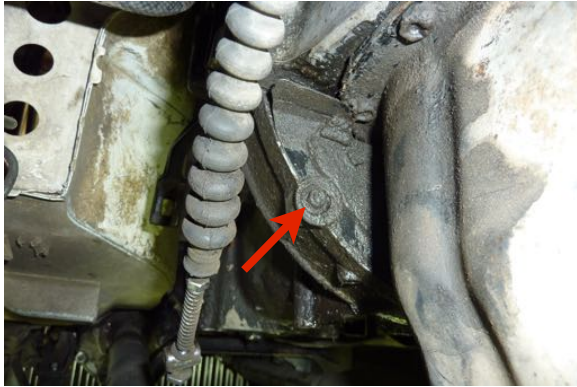


Step 26 Continued

This picture shows the driveline being removed.



Removing the Flywheel Inspection Cover.



Step 27

Remove the passenger side fly wheel inspection cover bolt.



Step 28

Remove the driver side flywheel inspection cover bolt using a 10 mm socket.



Step 29

Remove the inspection cover and set it aside.

Removing Transmission Mount



Step 30

Place an under hoist jack stand (or transmission jack) under the transmission and lift slightly.

Note: This will take the weight off the rear transmission mount, making the mount easier to remove.

Step 31

Remove the (6) transmission support bolts using 12 mm socket.



Step 32

Lift up on the transmission using the under hoist jack stand and remove the transmission support.

Step 33

Using a transmission jack (or strong assistant if a transmission jack is not available) lift up on the transmission and move the under hoist jack stand from the transmission to the engine oil pan. This will support the engine while the transmission is being removed.

Disconnecting the Transmission from the Engine.



Step 34

Remove the lower passenger side transmission-to-engine nut using 14 mm socket.



Step 35

Remove the lower driver side transmission-to-engine nut using 14 mm socket.



Step 36

Remove the upper driver side transmission-to-engine bolt using a 14 mm socket.

Note: It may be necessary to use two 12" extensions and a universal socket to access these top two transmission bolts.



Step 37

Remove the upper passenger side transmission-to-engine bolt using a 14 mm socket.



Tech Tip

The transmission weighs about 70 lbs. We recommend using a transmission jack to remove this transmission. However, our transmission jack was being used on another job so we did these instructions by removing and replacing the transmission by hand.



Step 38

Work the transmission rearward. This will take a fair amount of effort. It is very important to disconnect the transmission by moving it STRAIGHT rearward. Once the transmission begins to separate from the engine it must be supported until it is completely disconnected from the engine. DO NOT let the transmission hang unsupported at any point during removal. Once it is completely disconnected from the engine, allow the front of the transmission to drop downward. You will then be able to lower the transmission to the floor.



Step 38 Continued

The transmission on the floor.

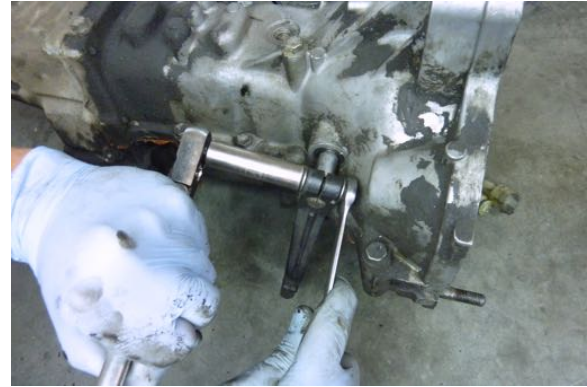
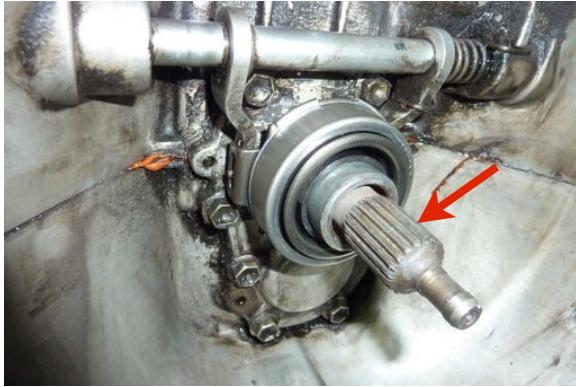


Step 39

Clean the bell housing area with brake clean and a rag.



Component Inspection



Step 40

Inspect the transmission splines for wear or damage.

Step 41

Remove the clutch release lever by holding the bolt with a 12 mm box end wrench and loosening the nut using 12 mm socket.



Step 42

Remove the clutch release lever.

Step 43

Rotate the release shaft toward you and remove the clutch release bearing.

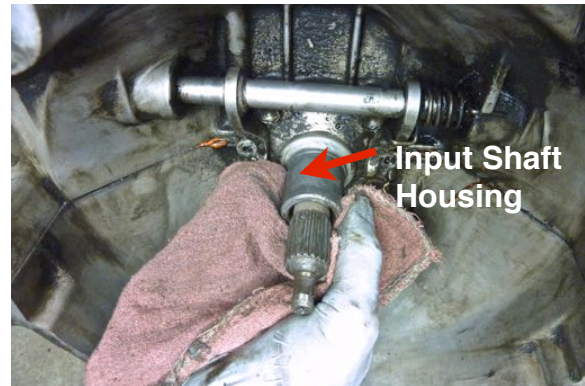




Tech Tip

Inspect the release bearing for signs of wear. The bearing should be replaced if it sticks, rattles or makes abnormal noise when spun and turned by hand.

Click [HERE](#) to see a replacement part.



Step 44

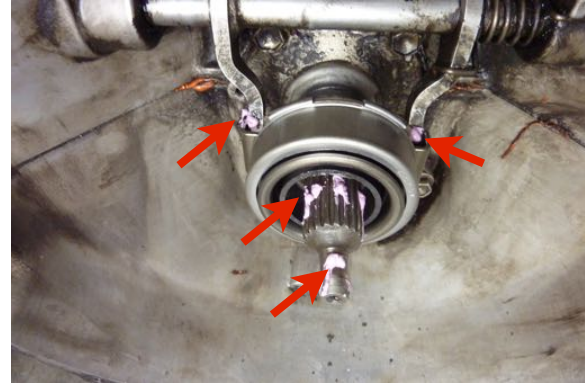
Clean the input shaft housing and inspect for wear. The housing should be replaced if it has grooves, cracks or any uneven surfaces.

Click [HERE](#) to see a replacement part.



Step 45

Install the release bearing. If it is new it comes pre-lubed in the area indicated by the arrow. If you are reinstalling the original release bearing, apply some grease in the area indicated by the arrow.



Step 46

Apply grease in the areas shown by the arrows.

Tech Tip

We recommend using Permatex Ceramic Extreme Brake Parts Lubricant or equivalent. Click [HERE](#) to see what is available from Low Range Off-Road.





Step 47

Reinstall the clutch release lever.

Note: Be sure to align the punch marks on the shaft with the punch marks on the lever. (See Figure D)

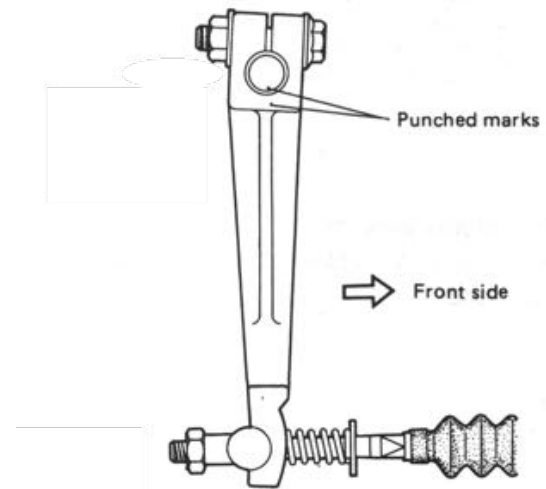


Figure D



Step 48

Tighten the pinch bolt and nut to 7.5 to 11.5 ft. lbs.



Tech Tip

If it has been a while since your clutch and associated parts have been replaced this may be a good time to do it. Click [HERE](#) to see our Complete Clutch Kits. We also supply **FREE** full color instruction showing how to install these clutch kits.



Step 49

Check the pilot bearing. If it sticks, rattles or makes abnormal noises it should be replaced.

Click [HERE](#) to purchase a pilot bearing through Low Range Off-Road.

Tech Tip

Other things to consider replacing while the transmission is out:

1. Transmission Rebuild
2. Complete Clutch Kits
3. Complete Pedal Rebuild Kit
4. Clutch Cable
5. Transmission Mount
6. Shifter Bushings and Related Parts
7. Transmission Shifter Boots (2)
8. Transmission Shifter Knob
9. Transmission Rear Seal
10. Transmission Front Input Housing
11. 5th gear switch
12. Engine Rear Main Seal
13. Flywheel
14. Starter Motor

Reinstalling the Transmission.



Step 50

Be sure the guide sleeve is clean and positioned properly.



Step 51

Insure the starter adapter plate is positioned properly.



Step 52

Samurai transmissions weight about 70 lbs. We recommend using a transmission jack to reinstall the transmission. Be sure to secure the transmission with a safety chain. A transmission jack was not available when we did this job so we did it by hand.



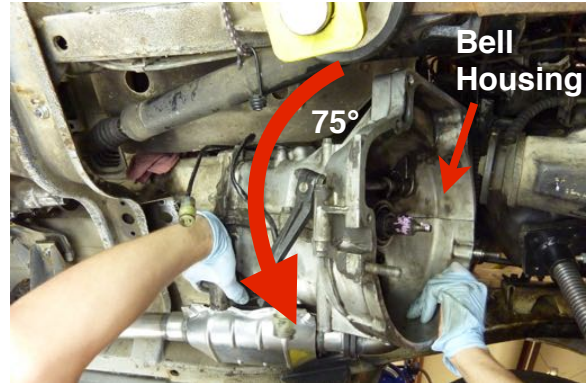
Step 53

Raise the back of the engine with the under hoist jack stand.



Step 54

Begin positioning the transmission by lifting the back of the transmission above the transmission mount.



Step 55

Then position the front of the transmission bell housing around the clutch cover and flywheel. (See **Figure E on the next page**)

Note: It may be necessary to rotate the transmission about 75° clockwise (as viewed from the rear of the transmission) to get it to fit into place.



Step 56

Once the front of the transmission is positioned as shown (about 3 inches away from the engine), move the under hoist jack stand from the engine oil pan to the middle of the transmission. Now that the under hoist jack stand is supporting most of the transmission weight, raise (or lower) the transmission to approximately the correct height. The correct height can be determined by aligning the transmission mounting studs with the engine. See next photograph.



Step 56 Continued

This shows the passenger side transmission mounting stud aligned with the hole in the engine block.



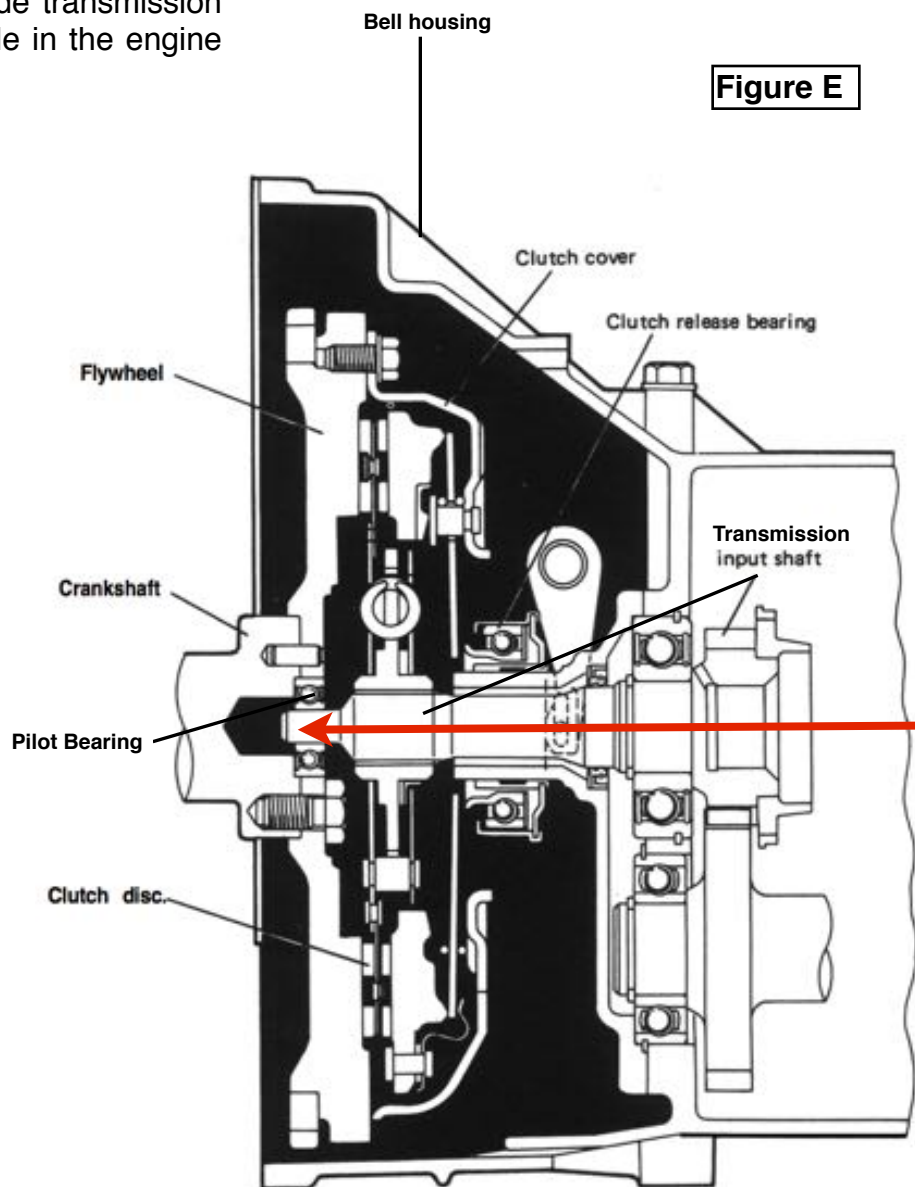


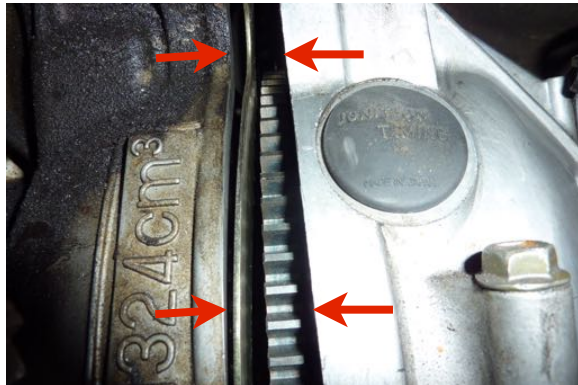
Step 56 Continued

This shows the driver side transmission stud aligned with the hole in the engine block.

Tech Tip

The objective for the next few steps is aligning the transmission input shaft with the clutch release bearing, the clutch disc and the pilot bearing. This aligning of components is rather difficult because it cannot be seen. The only way to accomplish this objective is to align the transmission with the engine by observing the studs, locating pins and bolt holes, and then bringing these components together evenly or at the same rate, all the way around the bell housing.





Step 57

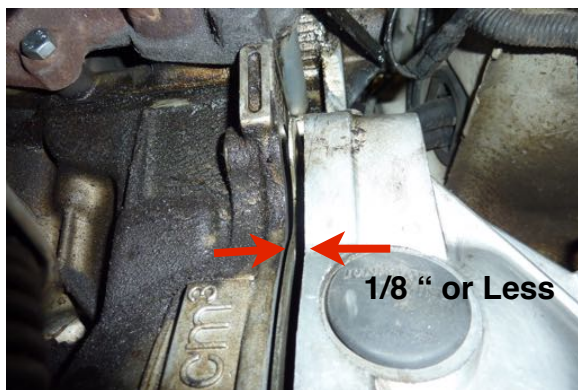
Once the mounting studs are aligned properly, raise or lower the back of the transmission so that the transmission matches up with the engine with equal spacing all the way around the bell housing. In other words the transmission and the engine have to be moved together with equal spacing.



Step 58

Now that the transmission and engine are coming together evenly, you will need to wiggle the transmission side-to-side; and push, at the same time.

Note: NEVER force the engine and transmission together using the bolts or nuts. This could damage internal parts resulting in expensive and time consuming repairs.



Step 59

Once the transmission is together, with an 1/8 inch gap or less, all the way around the bell housing. . . .



Step 60

. . . install the driver side nut, but leave it loose for now.





Step 61

Then install the passenger side nut, and leave it loose as well.



Tech Tip

The top two transmission mounting bolts are different lengths. The Long bolt installs on the passenger side and the shorter bolt installs on the driver side.



Step 62

Install the longer bolt on the passenger side. Leave it loose for now.



Step 63

Install the shorter bolt on the driver side. Then snug all four fasteners (2 nuts and 2 bolts) in a increasingly tighter criss-cross pattern until you reach 16–25 ft. lbs.

CAUTION: The transmission and engine should draw together easily. If it does not go together easily, loosen off on all 4 fasteners. Then wiggle and push by hand until the transmission and engine go together. Then retighten the bolts to proper torque.

Installing the Transmission Mount



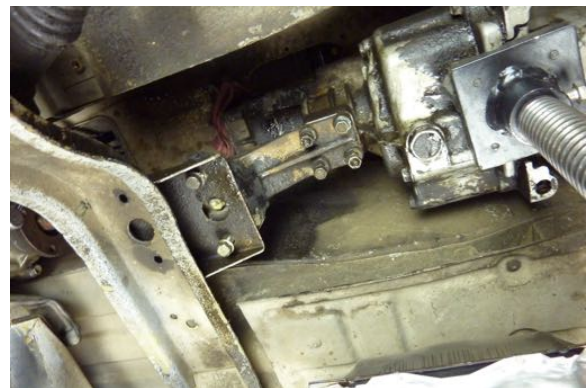
Step 64

Inspect the transmission mount for signs of cracking or separation. Replace if needed.

Note: Click [HERE](#) to get more information about transmission mounts.

Step 65

Using the under hoist jack stand lift up on the transmission as high as necessary to install the rear transmission mount.



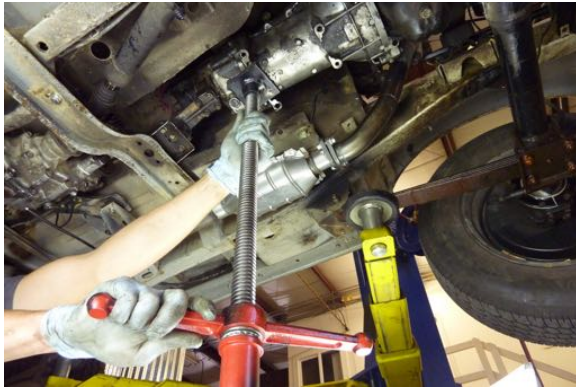
Step 66

Position the transmission mount and align the bolt holes as shown.

Note: It may be necessary to raise or lower the transmission to align the holes.

Step 67

Start all (6) bolts. Once all 6 bolts are installed torque them to 7.5–11.5 ft. lbs



Step 68

Remove the under hoist jack stand.



Step 69

Position the inspection cover and align the bolt holes.



Step 70

Install the driver side bolt but leave it loose for now.



Step 71

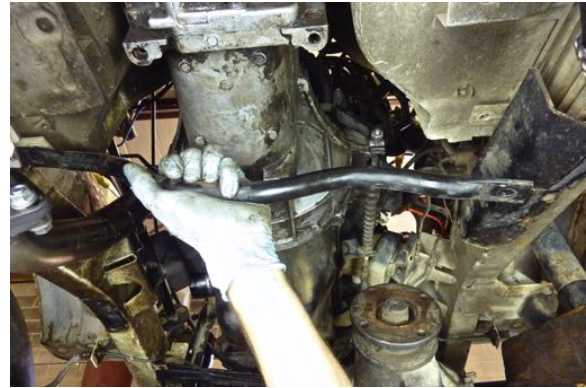
Install the passenger side bolt and torque to 3–5 ft. lbs. Then torque the drivers side bolt to the same spec.





Step 72

Connect the clutch release cable and install the clutch adjustment nut. Tighten the nut until there is about 3 threads (or 3/16") showing on the cable.



Step 73

Position the cross bar and install the (2) bolts. Torque both bolts to 13.5–20 ft. lbs.



Step 74

Position the transfer case-to-front differential drive line and install the (4) bolts, lock washers and nuts.



Step 75

Gradually tighten them in a criss-cross pattern until 17–21.5 ft. lbs. is reached.

Note: You may have to estimate this torque because you will not be able to fit a torque wrench on these nuts.



Step 76

Apply some 80W90 gear oil to the slip yoke to lubricate the transmission seal.



Tech Tip

Install the slip yoke into the transmission.

Note: It may be necessary to rotate the drive line a little, to align the splines.



Step 77

Position the rear of the drive line with the transfer case and install the bolts, lock washers and nuts. Gradually tighten them in a criss-cross pattern until 17–21.5 ft. lbs. is reached.



Step 78

Pass the electrical connectors between the engine and the firewall so they can be reconnected.

Caution: Be sure they are clear of the exhaust pipe and manifold.





Step 79

Lower the vehicle to the floor.



Step 80

Reconnect both electrical connectors. Be sure they snap and lock together.



Step 81

Insure that both wires are clipped on the top of the transmission as shown.



Installing the Starter



Step 82

Reposition the starter and install the upper bolt and nut. Leave them loose for now.

Step 83

Position the battery ground cable, install the lower bolt and torque to 7.5–11.5 ft. lbs.



Step 84

While holding the upper starter bolt with a box end wrench, torque the nut to 7.5–11.5 ft. lbs.



Installing the Shifter



Step 85

Clean any remaining gasket, gasket sealer or debris from the shifter tower using a putty knife.

Caution: Do not gouge the aluminum.



Step 86

Remove the rag from the shifter area.

Caution: Do not let any debris fall inside the transmission.



Step 87

Clean the top of the transmission with a putty knife.

Caution: Do not let debris fall down inside the transmission.



Step 88

Wipe a thin layer of a good quality gasket sealer on the shifter tower.

Note: We recommend Permatex Ultra Gray Gasket Maker. Click [HERE](#) to see what is available through Low Range.





Step 89

Position the shifter tower on the transmission.



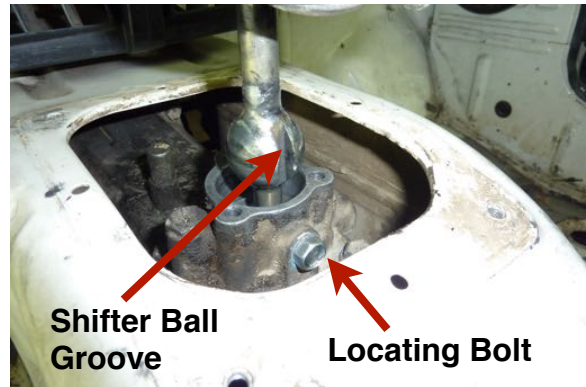
Step 90

Install the (4) bolts and torque to 13.5 to 20 ft. lbs.



Step 91

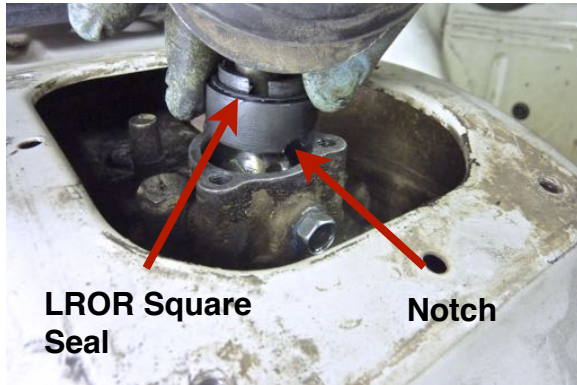
Wipe the shifter lever clean, apply a small amount of bearing grease on the shifter ball and install it in the transmission.



Tech Tip

Insure that the groove in the shifter ball aligns with the locating bolt.





Step 92

Slide the shifter bushing into place as shown.

Note: Be sure the notch is aligned with the location bolt.

Note: Be sure the washer (or LROR square seal if installed) is in place.



Step 93

Position the shifter tower cover and align the bolt holes.



Step 94

Install the (3) bolts and torque 3-5 ft. lbs.



Step 95

Slide the lower boot into place.





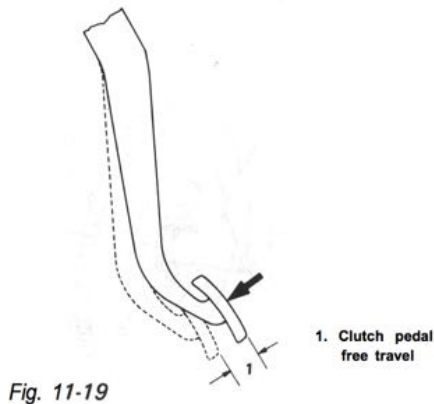
Clutch Pedal Free-Play Adjustment

Caution:

Clutch Pedal Free Play is very important. If clutch pedal free play is too great, you could experience grinding or hard shifting when changing gears. If free play is too little, premature throwout bearing failure could result and in extreme cases the clutch will slip causing the clutch disc itself to wear out extremely fast.

Step 96

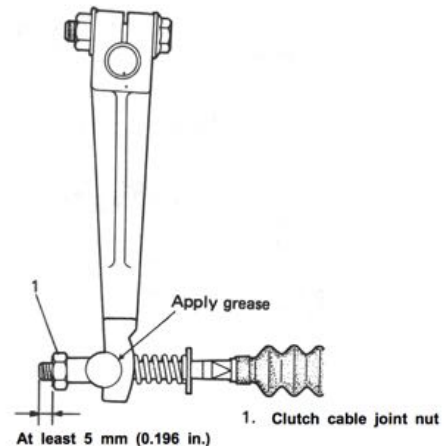
Slide the upper boot into place, install the bolts and torque them 3-5 ft. lbs.



Clutch pedal free travel	20 - 30 mm (0.8 - 1.1 in.)
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Step 97

Depress the clutch pedal with your hand and stop when resistance is felt. Then measure the distance the pedal traveled. This measurement is called "pedal free play". The pedal free play should be within .8 to 1.1 inches (or 20 to 30 mm). If pedal free play is NOT within specification the clutch will require adjustment.

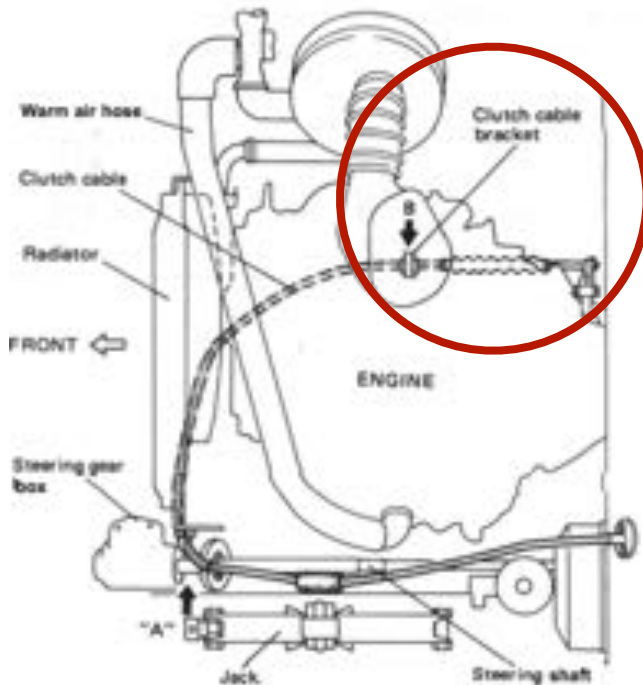


Step 97 Continued

Clutch adjustment is accomplished by turning the clutch cable joint nut. To increase clutch pedal free play, turn the nut **COUNTERCLOCKWISE** using a 14 mm wrench. To decrease clutch pedal free play, turn the nut **CLOCKWISE**.

Note: After adjusting pedal free play, there should be at least 3/16" (or 5 mm) of cable end extending past the nut. If there is, skip to **Step 99**. If not proceed to the next step.

Clutch Cable End Adjustment



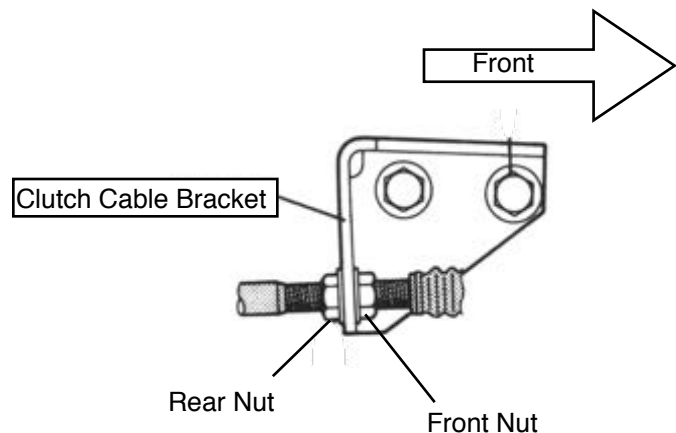
Photograph of Clutch Cable Joint Nut



Photograph of Clutch Cable

Step 98

Locate the clutch cable bracket positioned on the passenger side of the engine below the air cleaner. See illustration above and photograph to the right.



Step 98 Continued

Loosen (turn wrench downward) the front nut using a 17 mm open end wrench. (Some cables have 14 mm nuts). Turn the rear nut an equal amount in the same direction (turn wrench downward) until it becomes tight. Then check and adjust the clutch pedal free play again as explained in **Step 97**. If there is still not enough (3/16" minimum) clutch cable end extending out of the cable joint nut, repeat this step (**Step 98**) until there is.



Step 99

Reconnect the negative battery cable



Congratulations:

You have successfully completed a transmission remove and replace. We sincerely hope these instructions were helpful. If you have suggestions for improvement please email: coleman@lowrangeoffroad.com.



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 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.

Rock crawling and off-road driving are inherently dangerous activities. Some modifications will adversely affect the on-road handling characteristics of your vehicle. All products sold by Low Range Off-Road are sold for off road use only. Any other use or application is the responsibility of the purchaser and/or user. Some modifications and installation of certain aftermarket parts may under certain circumstances void your original dealer warranty. Modification of your vehicle may create dangerous conditions, which could cause roll-overs resulting in serious bodily injury or death. Buyers and users of these products hereby expressly assume all risks associated with any such modifications and use.

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