Triumph 5-Speed Conversion

Installation Instructions

For:

1952-1967, TR2-TR4A	**Part # 440-115**
1968-1972 TR250-TR6	**Part # 440-134**
1973-1976 TR6	**Part # 440-135**

GENERAL INFORMATION

The HVDA transmission conversion kits allow you to fit all TR-2 through TR-6 series engines with Toyota 1982-1985 Celica, 1982-1986 Supra or 1984-1996 pickup trucks, or 1992-1997 Lexus SC300 5-speed manual transmissions.

These instructions tell you how to:

A. Select a Toyota Transmission

B. Select the correct kit for your conversion

C. Gather the tools and supplies you'll need

D. Remove your Triumph Transmission, Clutch and Driveshaft

E. Convert the Toyota Transmission

F. Install the Clutch Conversion

G. Install the Throw Out Bearing

H. Converted Transmission Installation

I. Driveshaft Modification

J. Final Assembly

Caution: These instructions are provided to you only as an aid for your modification. You make these modifications at your own risk.

Use prudence and caution at all times. We cannot assume responsibility for any injuries or damages that might result from the accomplishment of these procedures.

BEFORE YOU BEGIN

- Read and understand these instructions entirely before you disassemble or begin any work on your car. It's cheaper to bring a running car and complete boxed kit to a mechanic than it is to bring a dissembled car on a tow truck. The conversion is straightforward, and can be done by an experienced mechanic.
- A transmission is not provided in this kit, you must provide your own. See the "selecting a transmission" section of these instructions for more information and helpful sourcing information.
- If you have weak engine mounts, they need to be replaced.
- This kit does not include a pressure plate. Moss part 593-010 TR6 pressure plate has been tested and known to work well with this conversion. All cars (TR2-TR6) require the TR6 pressure plate. The older coil spring style pressure plates are not compatible with HVDA kits.
- If you have a TR2 – TR4 flywheel, you will need to bring it and the TR6 pressure plate to a machine shop. The machinist needs to put threaded holes in the flywheel so that it can accept the TR6 pressure plate. The TR2-4 pressure plates are not compatible with this kit.
- We recommend having the pressure plate and flywheel balanced together as an assembly by a machine shop for all cars.
- Some 4 cylinder cars will require drive shaft shortening or lengthening. A drive line shop can do these procedures and balance the assembly.

A. SELECTING A TOYOTA TRANSMISSION

The transmission this kit was designed around is what Toyota calls the “W58”. These W58 transmissions came in many Toyota cars and trucks in the US and all over the world.

Possible sources for W58 transmissions:

- Local wrecking yard
- Craigslist
- eBay
- Jim Cox (502) 376-9149 or jacox1@aol.com

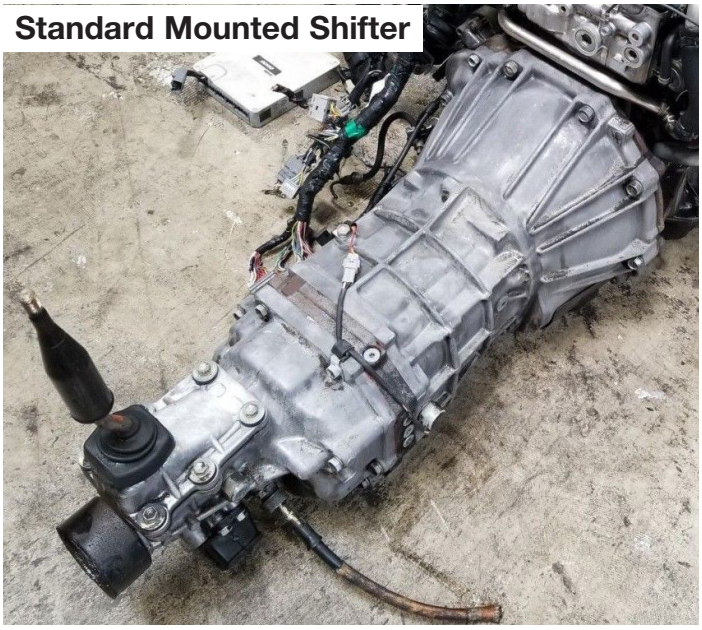
The main things you need to look for when choosing your W58 transmission are listed below.

Some w58 transmissions have a remote mounted shifter which hangs off the rear of the transmission (such as on the Lexus SC300). For these transmissions you will need to replace a part that Toyota calls the “shift lever housing”. The correct shift lever housing is Toyota part # 33502-14100 (this part comes stock on the Celica/Supra and Pickup). These shift lever housings are becoming increasingly hard to find as new old stock is drying up. As an alternative, Moss has developed a shift lever housing (part# 440-440) which will allow the use of transmission which came with the remote shifter. **Note:** you must remove the tail housing from the transmission to install either shift lever housing. This can be a little tricky to do. Refer to the shift lever housing instructions for more information. See the figures below to identify the remote mounted shifter and the shift lever housings. None of the HVDA 5 speed conversions come with a shift lever housing. You will need to purchase it separately.

Since there are variations in the transmissions that must be accommodated by the kits, it’s recommended that you get the transmission in advance. Once you have the transmission, and have verified that it is good, you can order the small adapter block and or plug as needed (see next page for more info), along with the 5speed conversion kit. This will minimize down time.

Remote Mounted Shifter

Standard Mounted Shifter



Several models of Toyota manual transmissions can be used for the conversion. For the most straight forward and closest to stock gearing; **look for a transmission from a 1982 through 1985 Celica, or 1982 through 1986 Supra (the latter being harder to find).**

For the next most straight forward; **1984 through 1996 Toyota pickup truck (non-turbo and not 4WD).** The gearing on these is significantly different than a stock TR6 making the first 3 gears shorter than stock. *See the chart below.*

Table 1. Gear Ratios

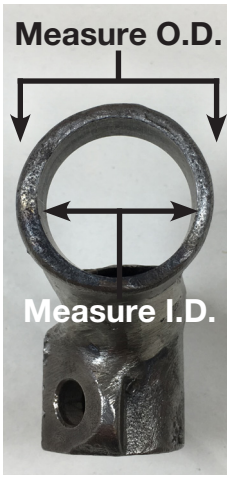
GEAR	TRIUMPH TR2-6	1982-1985 CELICA			1984-1996 PICKUP TRUCK	
First	3.140:1	3.285:1	3.166:1	3.285:1	3.950:1	3.830:1
Second	2.001:1	2.041:1	1.904:1	1.984:1	2.140:1	2.060:1
Third	1.333:1	1.322:1	1.310:1	1.275:1	1.380:1	1.430:1
Fourth	1.000:1	1.028:1	0.969:1	1.000:1	1.000:1	1.000:1
Fifth	---	0.820:1	0.815:1	0.783:1	0.810:1	0.840:1
Reverse	4.280:1	3.153:1	3.250:1	3.786:1	4.368:1	4.368:1

Gear ratios vary slightly from one model of transmission to another. If you can identify the exact model number, the **Table 1** compares the gear ratios of the typical Triumph four-speed transmission with your model Toyota 5 speed transmission. See the chart below for some of the more popular transmission's gear ratios.

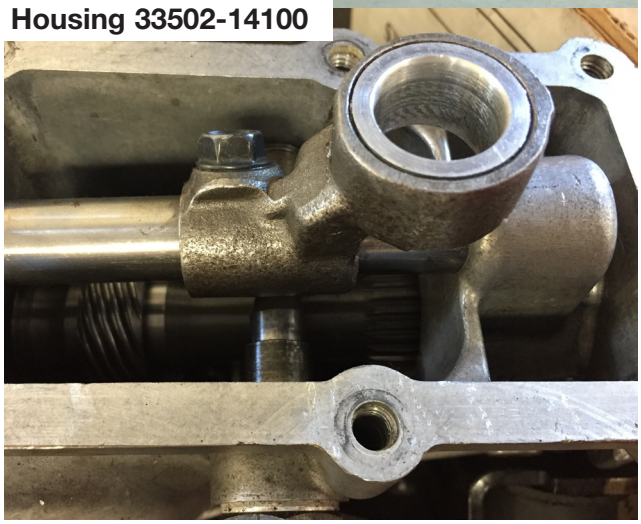
IMPORTANT: Please identify which shift lever housing your Toyota w58 transmission has before ordering your kit and order any required shift lever housing adapters, if needed. Optionally, you may choose to order the Moss 440-440 Universal Adapter as an option. See below.

Identify which shift lever housing you have. There is a larger and a smaller outside diameter shifter lever housing. The adapter block must fit over this housing. See the figures below to identify which adapter block you need.

Just as with the outside of the shift lever housings, there is a lager and smaller inside diameter. Again see the figures below to identify the parts you need.



Toyota Shift Lever Housing 33502-14100



All HVDA kits come standard with parts that fit the "large adapter block" part # 440-385 and "large adapter plug" part # 440-384 because they are the most common. If your transmission has the smaller shift lever housing, Moss does stock the "small adapter block" part # 440-388 and "small adapter plug" part # 440-383 which must be purchased separately if needed.

Make sure to measure both the outside and inside of your shifter housing. In rare instances, the 440-385 top and 440-383 plug may need to be used together for correct fit.

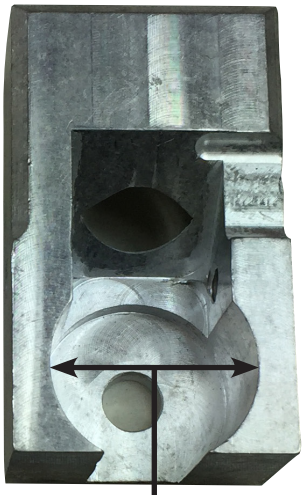
Large
Part # 440-385

I.D. = 1.36"

O.D. = 1.05"

Part # 440-384

Small
Part # 440-388

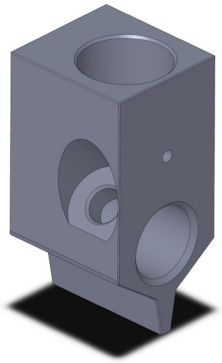


I.D. = 1.09"

O.D. = .772"

Part # 440-383

OPTIONAL: As an alternative, you can just replace whatever shift lever housing you have with the Moss shift lever housing part # 440-440. Using the Moss shift lever housing eliminates the need for either adapter block or plug at the expense of taking the tail section off the transmission to replace the Toyota shift lever housing. See the instructions for 440-440 to decide if this is right for you.



Moss Shift Lever Housing Part # 440-440

Before you buy your transmission, do the following:

1. Check the hole pattern at the interface of the bell housing to the transmission. It should be identical to the one shown. *See the view of the transmission to bell housing bolt pattern below.*

2. Inspect the transmission for wear as follows:

   (a) Look for wear in the input shaft. **Reject any transmission that has noticeable play in the input shaft.**

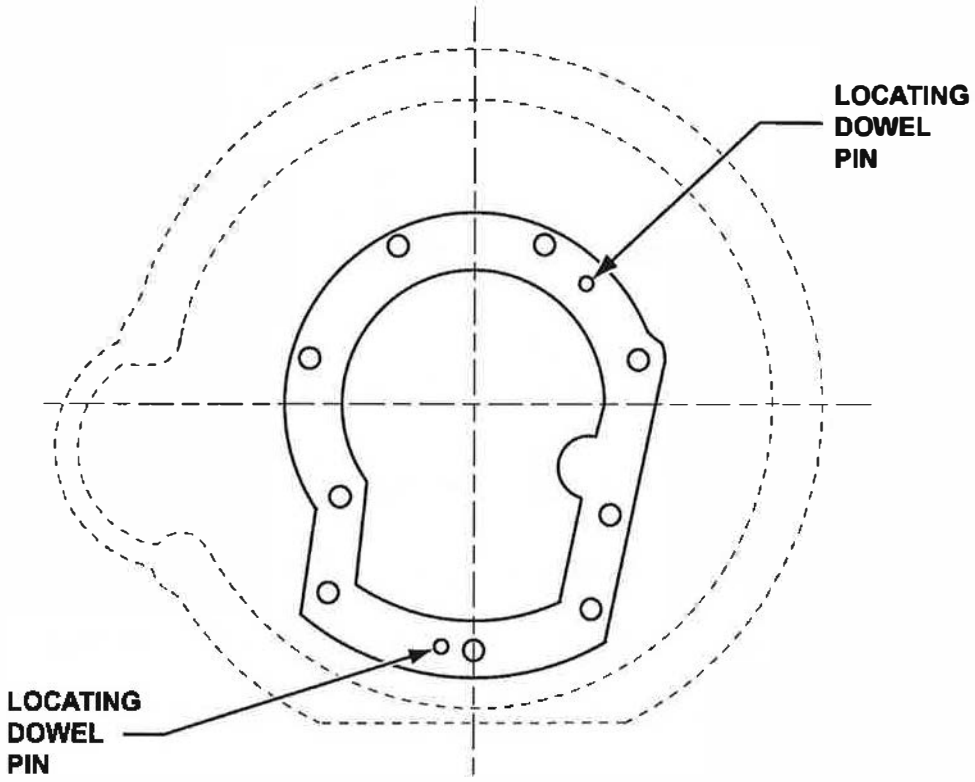
   (b) Put the transmission in neutral and turn the shaft. **The shaft should turn lightly and smoothly in neutral.**

   (c) Turn the input shaft in each gear. The output shaft should slip through your fingers. Again, **the shaft should turn smoothly and noiselessly in each gear.**

   (d) Finally, remove the shift tower and inspect the bushing inside the gear selector dog for wear or damage. **Major damage or wear on this bushing indicates abuse and high mileage.**

NOTE: Make sure the steel bushing inside the dog is present. If not, it must be replaced (Toyota dealer part).

3. **Calculate the gear ratios by putting the transmission each gear, spinning the input shaft and counting the revolutions of the output shaft. You may think you have a Celica or Supra box and find out it is a truck box with shorter 1st and 2nd gears. It's better to find out now.**



VIEW OF BELL HOUSING LOOKING FROM FRONT

Figure 1. Transmission Bell Housing Hole Pattern

B. SELECTING YOUR HVDA CONVERSION KIT

We urge you to identify the pilot bushing and rear transmission mount bracket on your car before ordering a kit. This will ensure you get the correct set of part to fit your car. We don't know the exact chassis number for the switch over of the pilot bushing. Also some cars can have parts from a different year vehicle.

Near the end of these instructions you will find a bill of materials and two diagrams. Please have a look at the diagram to identify the style of transmission mount bracket required for your car. The change over for the rear transmission bracket is somewhere in the early TR6 model years. It is best for you to identify which style you need before ordering your kit.

4 cylinder TR's, TR250 and early TR6 engines will use a long 1" pilot bushing that fits in the end of the crankshaft and into the flywheel. Later TR6 have a smaller hole in the crankshaft and will use a shorter ½" bushing that fits only into the flywheel. This is the bronze bushing which supports the transmissions input shaft. It is helpful to know which crankshaft/flywheel combo you have. You can order a bushing separately but it can delay the installation process if your car has a crankshaft or flywheel from a different year.

440-115 should be ordered for 1952 -1967 TR2 throughTR4A.

This kit includes only the long 1" pilot bushing for early crankshafts. This kit includes steel transmission mount brackets suitable for TR2 through early TR6.

440-134 should be ordered for 1968 -1972 TR250 through early TR6.

This kit includes both long 1" and short ½" pilot bushings to cover both crankshafts. This kit includes steel transmission mount brackets suitable for TR2 through early TR6.

440-135 should be ordered for 1973-1976 TR6.

This kit includes only the short ½" pilot bushing for TR6 flywheel. This kit includes the cast aluminum rear transmission mount bracket suitable for late TR6.

When you call to order your kit, please specify:

Year of your car: _____

Style of transmission mount:

- ☐ Aluminum Casting
- ☐ Steel Brackets

Pilot bushing:

- ☐ 1"
- ☐ ½"

Do you need:

- ☐ A Moss shift lever housing part # 440-440
- ☐ A small adapter block part # 440-388
- ☐ A small adapter plug part # 440-383

C. REQUIRED TOOLS

- Shop manual for your Triumph
- Jack and 4 jack stands
- Oil drain pan
- 6" combination square
- SAE and Metric wrenches and sockets
- Set of metric Allen wrenches
- 3/16" Allen Wrench
- Torque wrench
- 24" metal straight edge
- Machinist's ruler (1/100th in)
- Machinist's calipers
- Utility knife
- Soft hammer - copper, lead or plastic
- Flashlight and/or drop light
- Small file
- Small mechanic's magnet

Required and suggested materials/supplies:

- Cyanoacrylate adhesive gel (commonly known as super glue)
- High temperature gear grease
- Parts cleaning solvent
- Brake parts cleaner
- Dot 4 hydraulic brake fluid
- De-natured alcohol—CAUTION READ MSDS and use proper safety equipment
- Maximum strength thread locker (red)
- Medium strength thread locker (blue)

Caution: Do not use common 90w hypoid gear oil or synthetic oil in the Toyota transmission. Use only the Toyota approved gear oil listed below; otherwise you will have trouble shifting.

- Suggested gear oils (one of the following):
  (a) Redline gear oil, mt-90
  (b) Royal Purple Synchromax, 75-90w.
  (c) Kendall gear oil, 75w or equivalent
  (d) Or check with your Toyota dealer
- Transmission front oil seal, (Napa part # 11615) (Carquest/National # 1981)
- Transmission rear oil seal, (Napa part # 14753) (Carquest/National # 223840)
- Hand cleaner
- Clean shop cloths

SAFETY PRECAUTIONS

Use good shop practices and common sense when doing these procedures. Don't take any chances that might risk someone's safety. Follow all manufacturer's warnings, cautions and recommendations when doing the conversion. Read the MSDA on all products before using them.

Warnings: Support the car with jack stands. DO NOT work under the car when it is only supported by jacks, cinder blocks, stacks of wood, or any other object that might tip over or collapse.

Disconnect the battery cables before working on the car. Keep a certified fire extinguisher nearby in case of fire.

D. TRANSMISSION AND CLUTCH REMOVAL

Follow the procedures specified in your Triumph shop manual(s) to do the following:

1. Disconnect the battery.
2. Put the car up on four jack stands.
3. Remove the seats, the center console, as applicable, the carpeting, the transmission cover and the shift lever boot.
4. Drain the oil out of the transmission.
5. Bleed all of the fluid from the clutch master cylinder and slave cylinder.
6. Remove the clutch slave cylinder, connecting hose and mounting bracket.
7. Disconnect and remove the starter motor.
8. Support the engine from below.
9. Support the transmission from below with the floor jack.
10. Remove the transmission and rubber mounts, the driveshaft, the pressure plate, the pilot bushing, and the clutch disc.
11. Remove the flywheel from the engine. Remove the transmission cross member from the chassis. **Late TR6's only,** also keep the cross member for re-use.

E. BELL HOUSING CONVERSION

From this point on, a number in brackets (XX) corresponds to a part in the bill of materials and exploded diagram the end of these instructions. Refer to the exploded BOM diagram for a visual refer.

12. Remove the Toyota bell housing with the throw out bearing, carrier, fork, and lever by removing the ten attaching bolts and lock washers. Save the bolts, lock washers and two locating dowel pins for re-use.

> **Caution: Both locating dowel pins must be installed for proper clutch operation.**

13. Inspect the input shaft for burrs or other damage. Clean it with solvent and lightly grease it with high-temperature gear grease.

> **Caution: Don't allow grease or oil to get on the new clutch disc, flywheel or pressure plate.**

14. Try the new clutch disc (400) on the spline. It should move back and forth freely. If not, clean the splines again and check for burrs or other damage. Remove the clutch disc.

15. Install the new HVDA bell housing (10) on the Toyota transmission with the existing locating dowel pins (Figure 1), the nine bolts and nine lock washers (20).

Fitting nylon ball to gear shifter

HVDA recommends securing the nylon ball to the donor Triumph gear shifter using the supplied cyanoacrylate adhesive. Many Triumph gearshift-lever ends have become worn with use, and although the degree varies we recommend securing the nylon ball in place with an industrial grade cyanoacrylate adhesive gel supplied with your kit. **Your HVDA kit is supplied with a ½-gram tube of cyanoacrylate adhesive gel.**

NOTE: Be careful when handling the adhesive! Cyanoacrylate adhesives will bond your skin together instantly! In the event that you have a mishap, acetone or nail polish remover will dissolve the adhesive.

16. Remove the shifter from the Triumph transmission. Remove the anti-rattle plunger (170) and spring (180) from the Triumph gear shift lever if it is present. (It is not uncommon for this item to be missing). If there is one in there, do not put it back in.

17. Prepare the shifter by cleaning the end, including the plunger hole with solvent such as denatured alcohol] or acetone. Clean the inside of the nylon ball in the same fashion and dry both items thoroughly. The shifter must be absolutely oil free in order for the adhesive to keep the ball in place. Tip: Use coffee filters to wipe the parts clean. Continue to clean the parts until the coffee filters are still white after wiping the parts. Any contaminates will show on the white filter.

18. Apply a drop or two of the adhesive inside the nylon ball. Push the nylon ball (190) firmly onto the shifter (200). Be certain that the ball is on straight and fully seated on the shifter. Reposition the ball if necessary before the adhesive sets up. Wipe off any excess with a paper towel. In the event that the ball is not positioned correctly, and the adhesive has already started to set, you can only remove the ball by soaking the components in acetone for a few minutes. This is a tight fit even without the adhesive, so some effort is required to remove the ball from the assembly.

19. After you are satisfied that the ball and shifter are in good alignment allow the glue to cure for a few minutes. Then with the remainder of the tube of glue run a filling bead around the top of the ball where the shifter exits. This will seal out oil and provide a firm and permanent seal for the shifter ball. Set the shifter aside, in a vertical position, and allow the adhesive to cure for twenty-four hours.

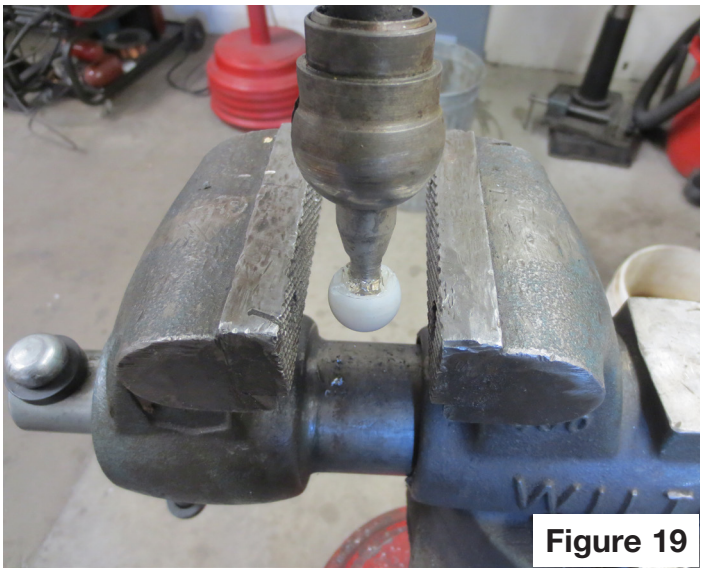


Figure 19

SHIFT LEVER HOUSING CONVERSION

20. Place the Toyota transmission in neutral. Remove the shift lever, housing, baffle (120) and inner washers (130) from the Toyota transmission by removing the six attaching bolts (150) and lock washers (160). Save the baffle and inner washers for re-use.

21. Use a sharp knife to modify the gasket (120) as shown in Figure 21.

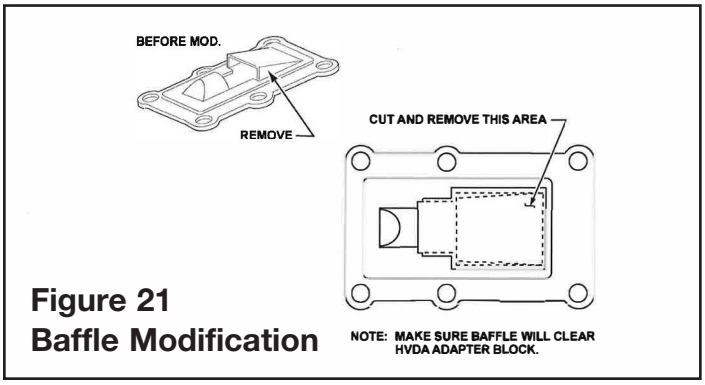


Figure 21
Baffle Modification

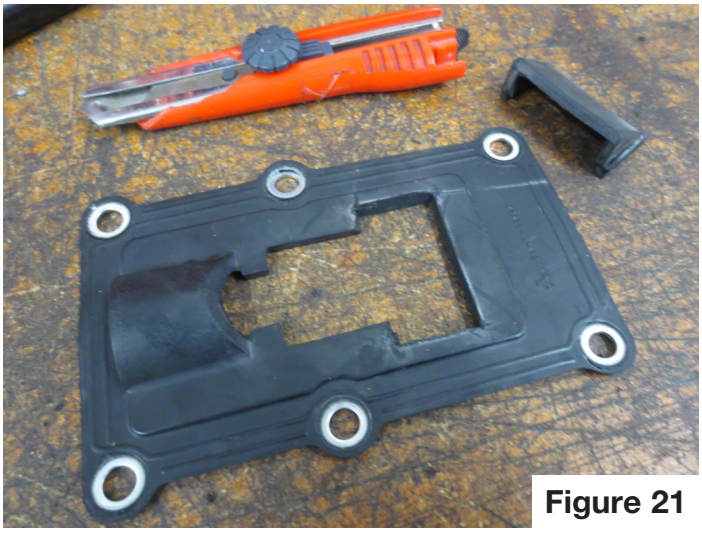


Figure 21

22. Apply medium strength Loctite (blue) to the 5/16-18 cap screw (100). Support the adapter plug (70) under the dog in the shifter mechanism (80) with your finger. Place the shift converter block (90) over the dog and bolt the adapter plug to the shift converter block with the 5/16-18 cap screw. See figure 23.

    NOTE: If you drop the adapter plug or a setscrew in the transmission, don't worry. You can use a small mechanic's magnet to retrieve it.

23. Apply medium strength Loctite (blue) to the setscrews (110). Install the setscrews in each side of the shift converter block (90). Adjust them so that the converter block will be centered in the assembly.

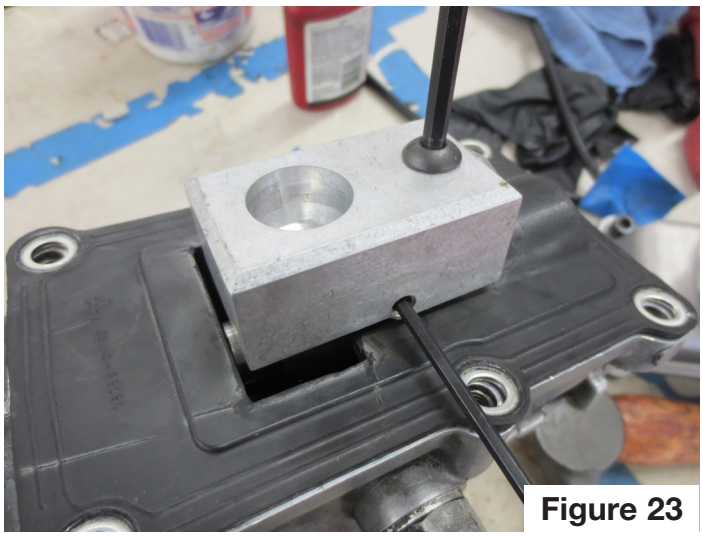


Figure 23

24. Place the modified baffle (120) on the mating surface of the transmission case. Install the six sealing washers (130) in the corresponding holes in the baffle.

25. Install the new cover (140) over the adapter mechanism with the six socket head cap screws (150) and lock washers (160).

26. Assemble the Triumph shift lever cap (230), spring plate (220), shift lever (200), and spring (210) for installation. Lubricate the shifter pivot ball, cup, and cover plate with a light layer of lithium grease.

27. Insert the shift lever assembly in the housing (140), making sure that the nylon ball (190) is fully engaged with the socket in the adapter block (90). Insert the¼ X 3-inch bolt (240) through the assembly and install the lock washer (260) and locking nut (250). At the back of the cap, install the ¼ X 0.5-inch bolt (270) and lock washer (280).

NOTE: On later models, bolt (240) washer (260) and locking nut (250) are replaced by two ¼ x 1"step bolts, which should be removed from the Triumph transmission and threaded into the shift adapter housing.

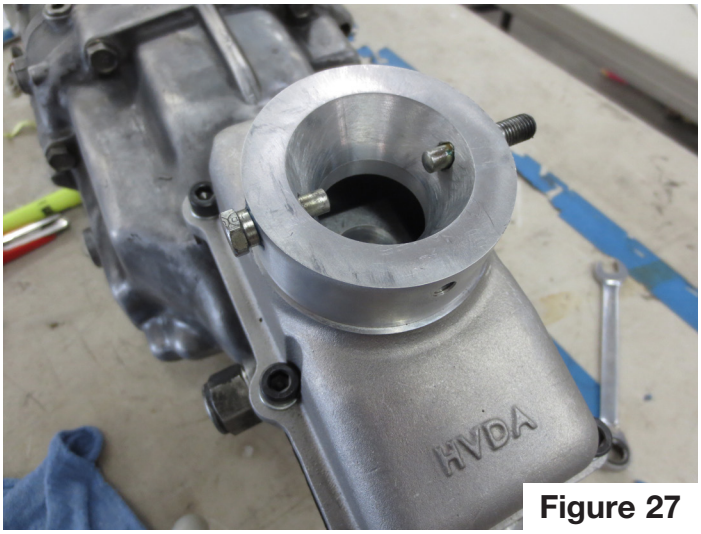


Figure 27

28. Check that the shift lever is properly engaged. The transmission should shift freely through the six gears.

29. If necessary, file about 3/32 in. out of the shift lever cap (230) in the 3rd and 5th gear position (See Figure 29) to ensure adequate clearance for the shift lever.

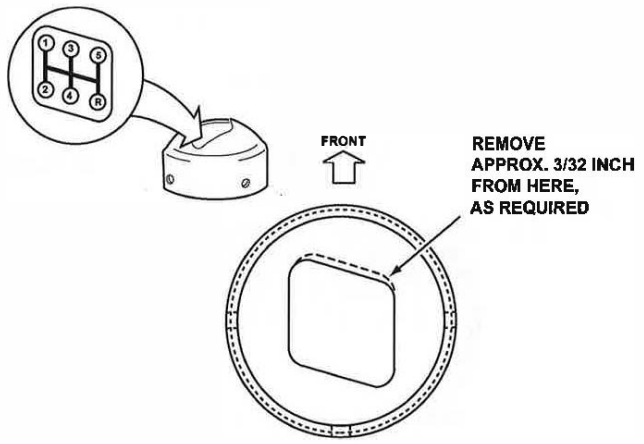


Figure 29
Shift Lever Cap Modification

OUTPUT FLANGE CONVERSION

30. Inspect front and rear oil seals. If they are old or if there is any doubt about their condition replace them now.

31. Install the HVDA output flange (60) over the splines in the transmission.

F. CLUTCH INSTALLATION

32. **Four-cylinder TR engines only:** Take the flywheel and a TR6 pressure plate to a machine shop. Have the flywheel reground if necessary. Have the machinist drill and tap the holes necessary to mount the TR6 pressure plate on the flywheel, and then balance the assembly. When you get it back, note the balancing marks the machinist made on both parts.

33. **Six-cylinder engines:** No flywheel machining is necessary to accept the TR6 pressure plate but (as with any clutch replacement) it is highly recommended to have your flywheel resurfaced, and the pressure plate balanced as an assembly with the flywheel.

34. The pilot bushing should be a tight fit in the flywheel/ crankshaft and not be allowed to spin. If the bushing drops in and spins freely in the flywheel, create some roughness on the outside surface of the bronze bushing by lightly punching the outside all the way around with a punch or **gently** clamping it in a vice all the way around to create dimples as shown. Then apply some blue Loctite to the outside of the bushing and gently tap into place with a soft faced hammer.

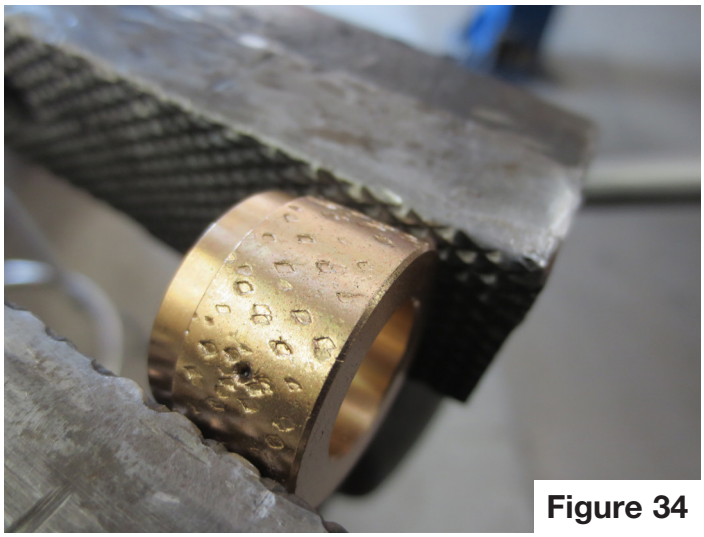


Figure 34

35. **TR2-earlyTR6:** Install the new 1" pilot bushing (390), stepped shoulder facing out, in the crankshaft. **Later TR6:** with the shorter 1/2" pilot bushing will be installed in the flywheel. Take note of the stepped shoulder in the flywheel. Apply a small amount of grease to the inside of the bushing to aid in installation and lubrication at initial startup.

36. Install the flywheel on the engine. Torque the bolts as specified in the Triumph shop manual.

Caution: Don't allow grease or oil to get on the new clutch disc, flywheel, or pressure plate. Clean all parts with alcohol and a clean rag before final installation.

37. Install the clutch disc (400) using the provided alignment tool. The clutch disc should have "flywheel side" labeled on it on the side with the recessed center section. Install the pressure plate on the flywheel. Tighten the bolts just finger-tight.

38. Use the alignment tool to hold the clutch disc centered in the assembly as you torque the bolts as specified in the Triumph shop manual, going diagonally across the pressure plate from one bolt to another. Tighten evenly in a star pattern in small increments until reaching the specified torque in the shop manual. Remove the alignment tool.

G. HYDRAULIC THROWOUT BEARING

NOTE: Please read the manufacturer's instructions included with the Quarter Master hydraulic throw out bearing, part #721100, assembly for more details. If you keep your car stored (not driven) for long periods of time, it is recommended by the manufacturer that you pump the clutch pedal several times every 3 to 4 weeks. This will lubricate the 0-rings and help to prevent them from drying out and leaking.

In this section, you will set the proper clearance (0.180-0.250") between the hydraulic throwout bearing and pressure plate fingers. This clearance is extremely critical for proper operation of the clutch. The hydraulic throw out bearing is self-adjusting, but requires this clearance to compensate for wear of the clutch disc over time. Take your time, make accurate measurements, and double check your math on each step. **There is no external adjustment for the throw out bearing clearance. If a mistake is made, you will have to remove the transmission to correct it.**

Caution: Make sure the pressure plate mounting bolts are properly torqued before making measurements.

39. Remove the M8x1.25 bolt and washer (20) from the cover of the input shaft retainer at about the 7 o'clock position. Use it to install the anti-spin bracket (part of 360) on the bell housing.

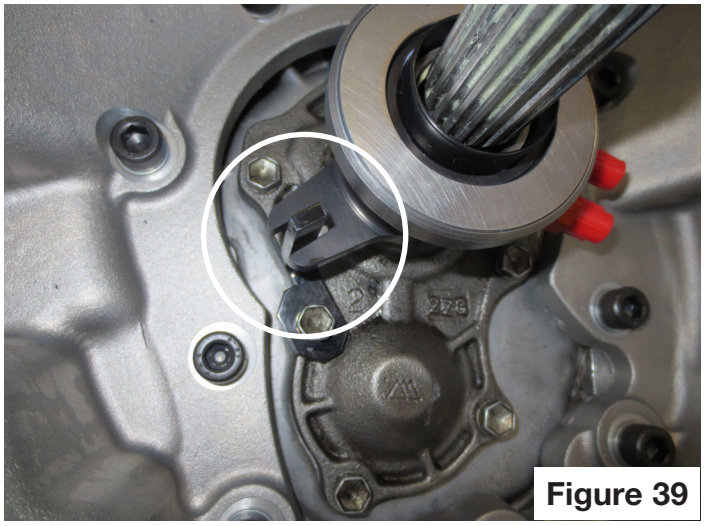


Figure 39

40. 10 shims are provided for adjustment of the throw out bearing. Place 7 shims over the transmission snout with the concave end towards the transmission. This is a good starting point for adjustment. Most of the installations we've tested have used 7 shims. Your results may vary based on your individual engine, transmission, wear on your flywheel, etc.

41. Lightly lubricate the inside of the throw out bearing and snout of the transmission with a very small amount of brake fluid. **Do not use grease as it is not compatible with the seals in the throwout bearing.** Temporarily place the throw out bearing (360) over the clutch shaft so that the locking fork fits over the anti-spin bracket. Remove the caps from the hydraulic fittings and press down to ensure that the hydraulic throw out bearing assembly is fully collapsed and seated on the shim stack.

    NOTE: Be certain that your caliper is properly zeroed and reading accurately. Make all measurements in 1/1000ths of an inch (0.001 in.). On the following page there is a thowout bearing work sheet which may help you calculate the proper bearing to finger clearance.

42. File off the heads of the the two provided 5/16 UNC x 4.5" bolts to make them perfectly flat. Install the bolts in the bellhousing interface across from one another with a nut on each side of the plate. Ensure that both bolts are the exact same distance away from the bellhousing mating surface. Figure 42. Record this measurement in “Line 1” of the “Throwout Bearing to Clutch Finger Worksheet” on the page 14.

43. Measure the thickness of your straight edge and record it on “Line 2” of the following page.

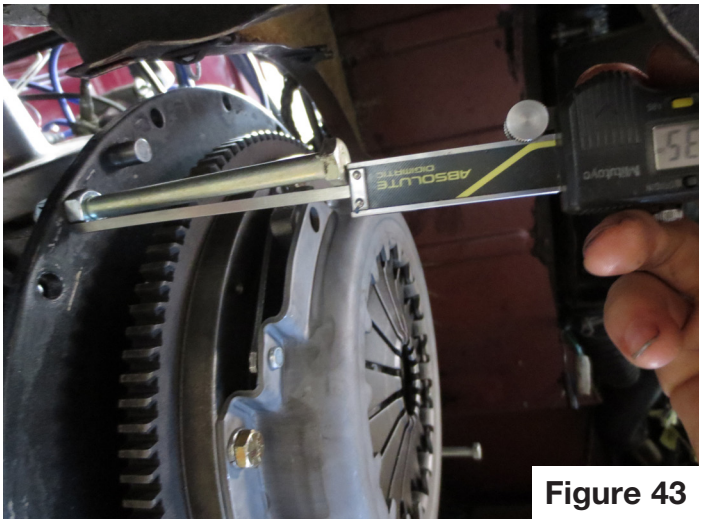


Figure 43

44. Use the straightedge and a 6" combination square as shown to measure the distance from the bell housing mating surface to the high point of the pressure plate fingers. Be sure you are holding the straight edge perfectly flat against the bolt heads, and measuring to the highest point on the pressure plate fingers. Make several measurements on different clutch fingers as they are not all the same height. Use the measurement from the tallest finger (closest to the throwout bearing) and write it in “Line 3” in the table on page 14.

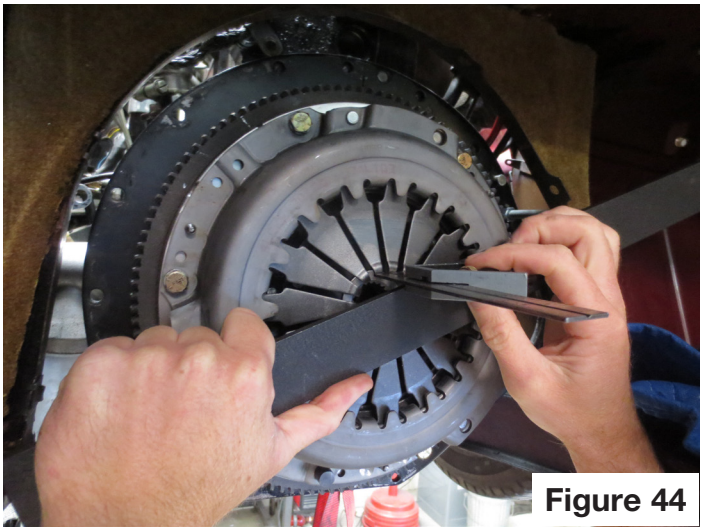


Figure 44

Caution: Make sure the throwout bearing and shims are firmly up against the front of the transmission before making measurements.

45. Use the straightedge and 6" combination square as shown in Figure 45 to measure the distance from the surface of the throw out bearing to the face of the bell housing. Write the measurement down on line 6 of the table on page 14. The difference between measurement A and B will give you the clearance. If clearance is between 0.180-0.250", no further adjustment is required.

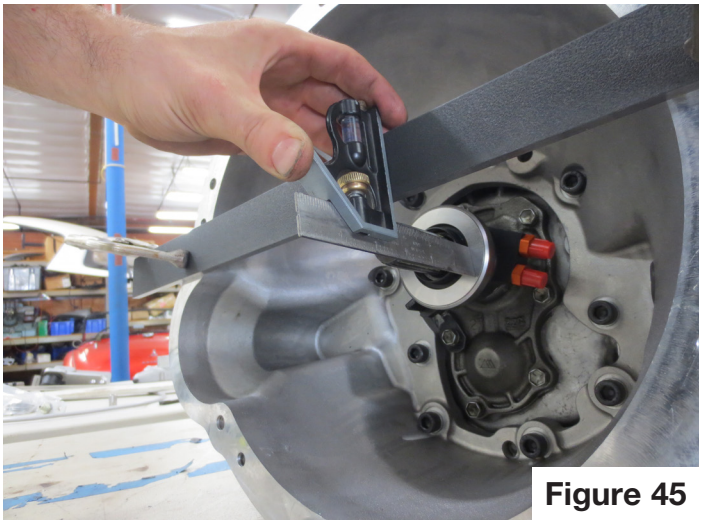


Figure 45

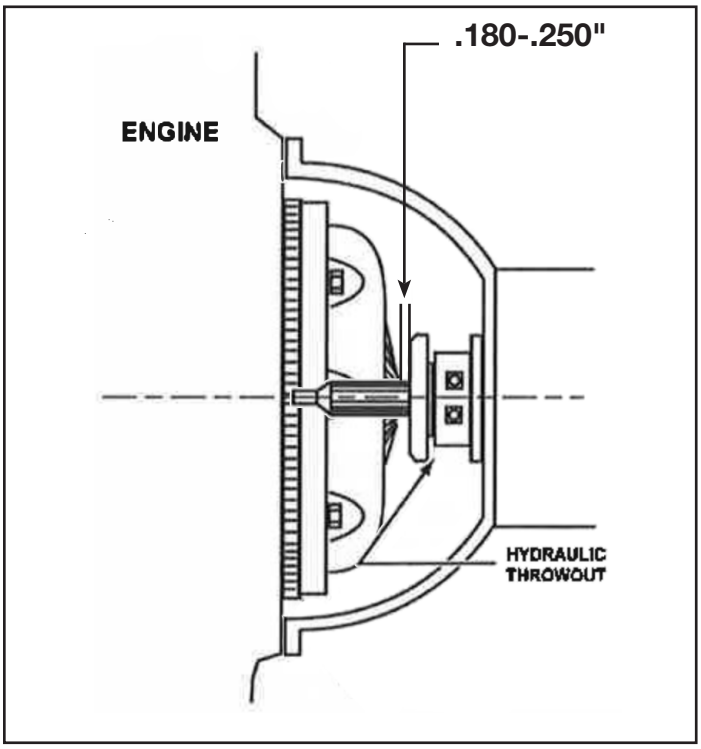


Figure 45. Transmission Installed

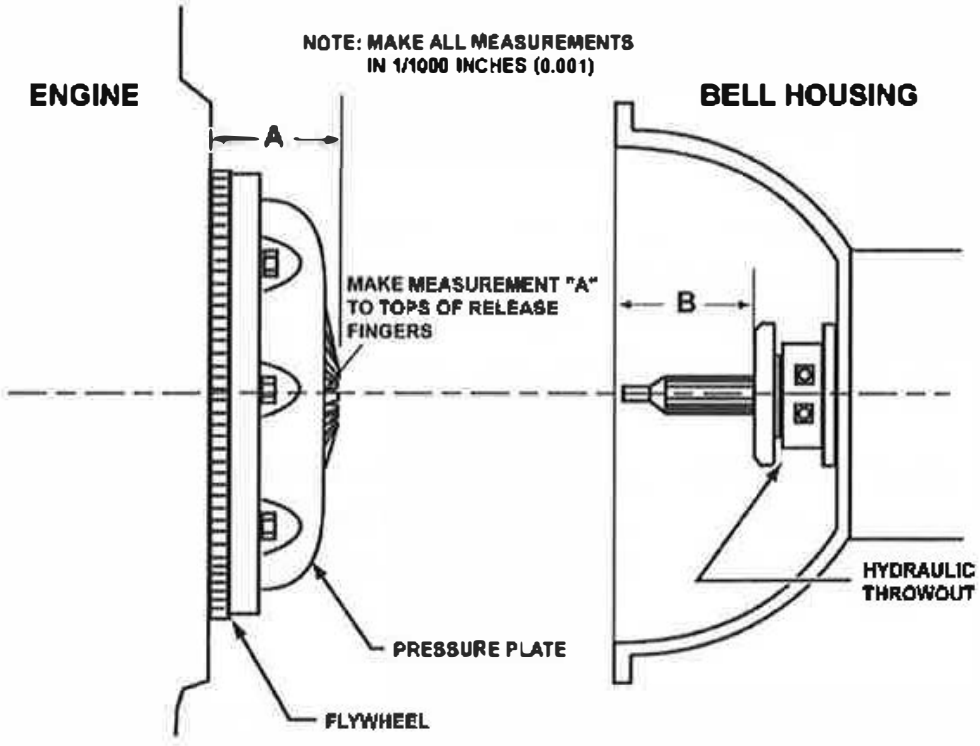


Figure 45

Throwout Bearing to Clutch Finger Worksheet			
		First Measurement	**Double Check**
Line 1	Bolt head to bell housing surface		
Line 2	Straight edge thickness		
Line 3	Straight edge to pressure plate fingers		
Line 4	Add lines 1 & 2		
Line 5	Subtract line 3 from line 4 *This is measurement A in the diagram*		
Line 6	Straight edge throwout bearing face		
Line 7	Subtract line 2 from line 6 *This is Measurement B in the diagram*		
Line 8	Subtract line 5 from line 7 (Measurement A from B) *This is the throw out beairng to Clutch finger clearance*		

- Line 8 must be in-between .180" and .250" for proper throwout bearing to clutch finger clearance.
- If line 8 is less than .180", you must remove a shim or shims.
- If line 8 is more than .250", you must add a shim or shims.
- One shim is about .090" of throwout bearing movement.
- After each addition or subtraction of a shim, measure and calculate lines 1 through 8 again.
- We have provided an extra column on the work sheet for double checking the measurements. Do not move on in the installation process until you are sure the bearing to finger clearance is as specified.

46. Run the hydraulic hoses (330 and 340) through the rubber grommet (345) and install the grommet in the bell housing.

47. Firmly tighten the hydraulic hoses (330, 340) to the throw out bearing. The shorter bleeder hose should be on top of the throw out bearing and the long feeder hose on the bottom.

Caution: To prevent costly leakage, make sure the hoses are properly tightened on the hydraulic throw out bearing hose fittings before installing the transmission. Use care and do not damage by over tightening!

H. TRANSMISSION INSTALLATION

48. Use a soft hammer to tap the small steel bushing (310) onto the end of the transmission input shaft.

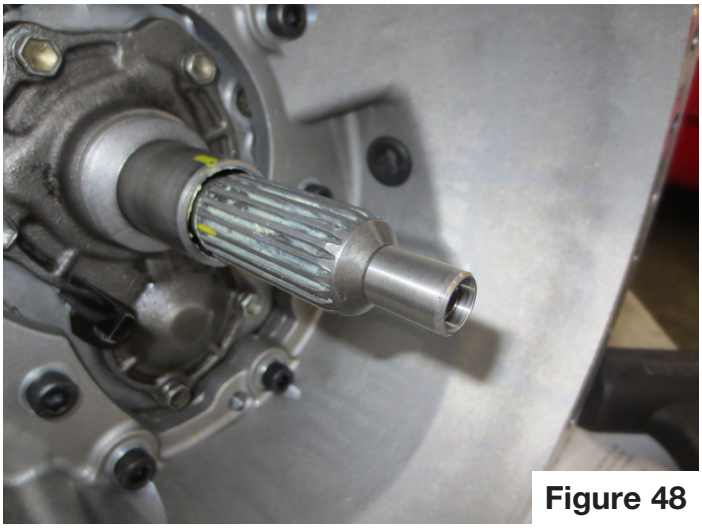


Figure 48

49. **Six-cylinder TR's only:** Check to make sure that the two locator dowels are still in place on the rear engine plate. If any locator dowels are missing, replace them. We recommend that you use maximum strength Loctite (red) to secure them in place.

Caution: Both locating dowel pins must be installed for proper clutch operation.

50. Use an existing bolt and washer (40) to install the bleeder hose bracket (30) on the bell housing at the second hole from the bottom, as shown. Attach the bleeder hose (340) to the bracket (30) with the clip (370). Make sure the bleeder nipple (350) is snug in the hose fitting (340). Attach the bell housing (10) to the engine with the twelve attaching bolts and lock washers. Leave the floor jack under the transmission.

51. **Late TR6's ('73 & on) only:** Attach the two rubber mounts (440) to the rear mounting bracket (410). Bolt the rear mounting bracket (410) to the transmission with the four M10 bolts (430) and the lock washers (420). Maneuver the cross member into position and insert the studs on the rubber mounts (440) into the corresponding holes in the cross member. Install the attaching nuts (450) flat washers (455) and lock washers (460) on the rubber mounts (440). Attach the Triumph cross member to the frame with the four bolts and lock washers. Apply medium strength Loctite (blue) to the M10 (430) bolts. Tighten them to 32-38 ft-lbs. While holding the steel shoulder of the rubber shock mount with a pair of pliers, tighten the upper and lower attaching nuts (450) on the rubber mounts (440), Tighten the four attaching bolts on the cross member.

52. **TR2 through early TR-6's (up to '72):** See the Exploded BOM, View A. Before installation of the transmission install the LH and RH transmission mounting bracket (540 and 550) on the transmission with the four M10 bolts (435) and lock washers (420). Apply medium strength Loctite (blue) and torque the bolts to 32 to 38 ft-lbs. Remove the gearbox mounting adaptor and bracket from the vehicle. Install the two rubber transmission mounts (440) on the LH and RH mounting brackets (560, 570) with the attaching nuts, (450) flat washers (455) and lock washers (460), and tighten them.

53. Install the transmission in the car by handling the transmission by the rubber mounts. Install the LH and RH bracket weldments (560, 570) on the chassis with the attaching bolts and washers. Ensure that the rear slot engages the stud on the rubber mount (440) and install the attaching nut (450) flat washer (455) and lock washer (460). Line up the transmission between the frame and tighten all the mounting bolts. Tighten the 3/8-24 x 1 ¼ bolts, nuts, lock washers and flat washers on the LH and RH bracket weldments (560, 570) to the frame.

Clutch Hydraulics

Caution: You must use a properly-adjusted stop bolt under the pedal to keep the throwout bearing from extending too far. If it does extend too far, the internal o-rings will bypass the brake fluid, causing the unit to leak. It is better to start out with the adjustment bolt a little too far out (shortening the overall stroke) and adjust from there as needed.

54. **TR250-TR6:** Install the provided clutch pedal stop bracket (380, 381, 382) underneath the dash. Remove the two lower nuts retaining the brake master cylinder or (booster if equipped) and use the factory nuts to install the bracket. Thread a nut onto the 5/16" bolt and then thread it into the bracket a few turns. Use the nut to lock the adjustment in place.

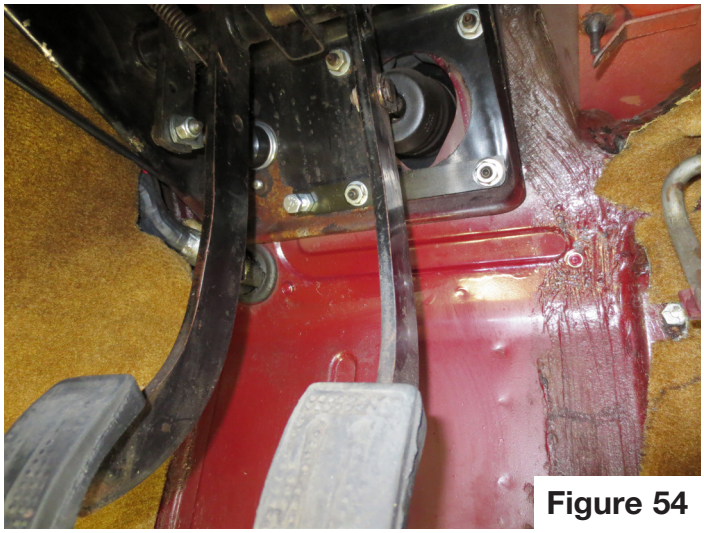


Figure 54

55. **TR2-4A:** Drill a 5/16" hole in the firewall and install the 5/16 x 2" bolt with a nut on each side to lock it in place.

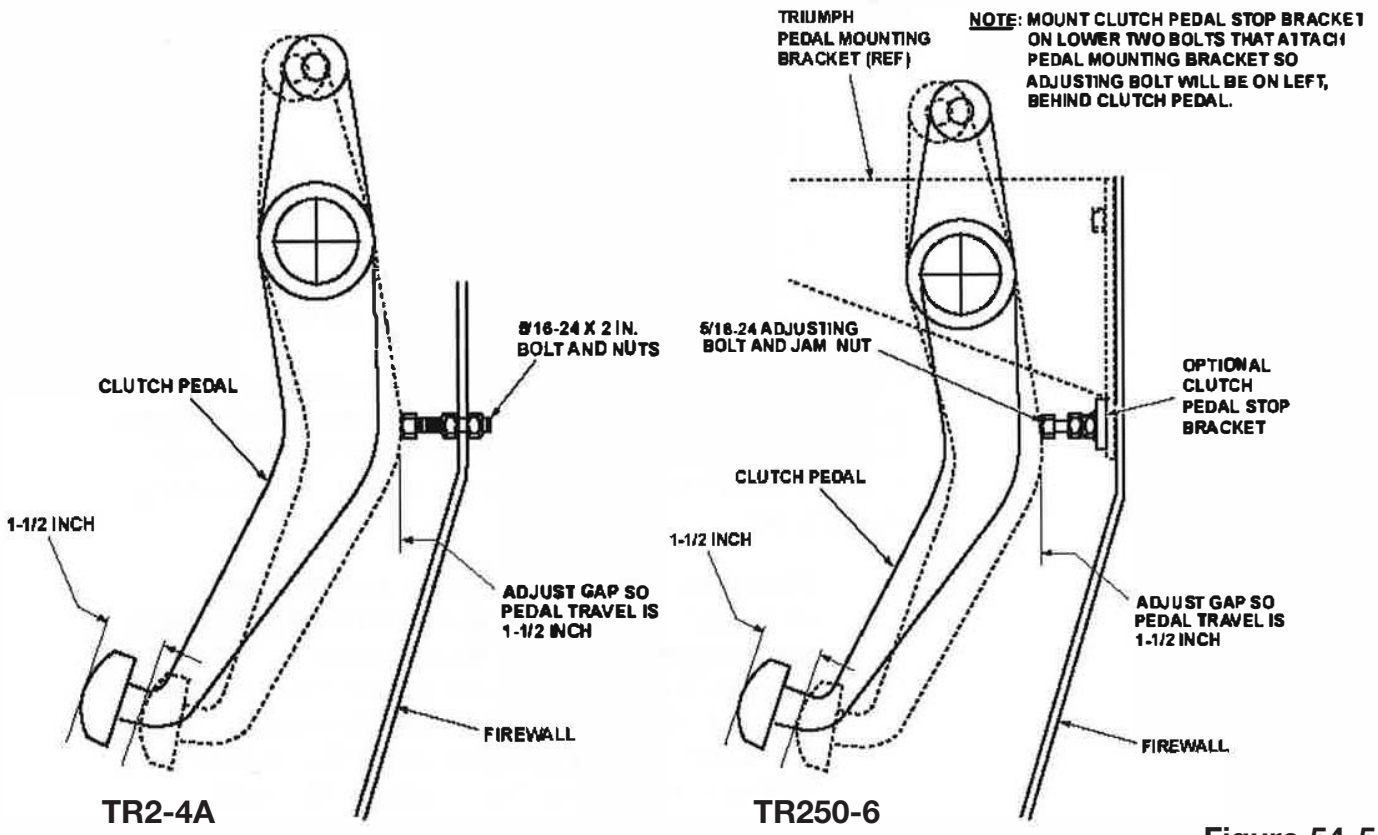


Figure 54-55

56. Connect the flexible inlet hose to the clutch master cylinder output pipe with the appropriate male-male adapter fitting.

> **Caution: Use only dot 3 or 4 brake fluid in the hydraulic throwout assembly. Do not use silicone (dot 5) or petroleum based fluids. If those fluids were in use before the conversion, they must be throughly flushed out of the system before being connected.**

57. Fill the reservoir with brake fluid and bleed the system just like bleeding brakes. We have found that simply opening the bleeder (350) and allowing the system to gravity bleed will work in most cases. Refill the clutch master reservoir.

58. Slowly depress and release the clutch pedal several times. The first few applications may feel very soft as the hydraulic throw out self-adjusts to the correct position. Bleed again if necessary. After you achieve a firm clutch pedal, top off the clutch master cylinder reservoir.

59. You can test the operation of the clutch by shifting the transmission into gear and turning the output flange by hand as you press and release the clutch. The output shaft should easily turn by hand when the clutch is depressed.

I. Driveshaft Modification

Unlike the stock Triumph design, this conversion utilizes a slip yoke output shaft and flange to allow movement of the drive shaft during suspension compression and extension. You will be locking your driveshaft at maximum extension, effectively turning it into a solid shaft with no compression. The slip yoke will now provide the necessary driveshaft movement.

60. Clean the threads and apply blue Loctite to the dust collar on the driveshaft. Tighten the dust collar with channel locks.

61. With the driveshaft already installed on the rear differential end, extend the driveshaft to its maximum extension. Install the locking collar around the driveshaft, up against the dust collar as shown. Apply blue Loctite to the screws and tighten with a 3/16" Allen wrench. Using the existing bolts and new lock nuts, bolt the driveshaft flange to the transmission output flange and note the position of the output flange with the driveshaft now locked at maximum extension.

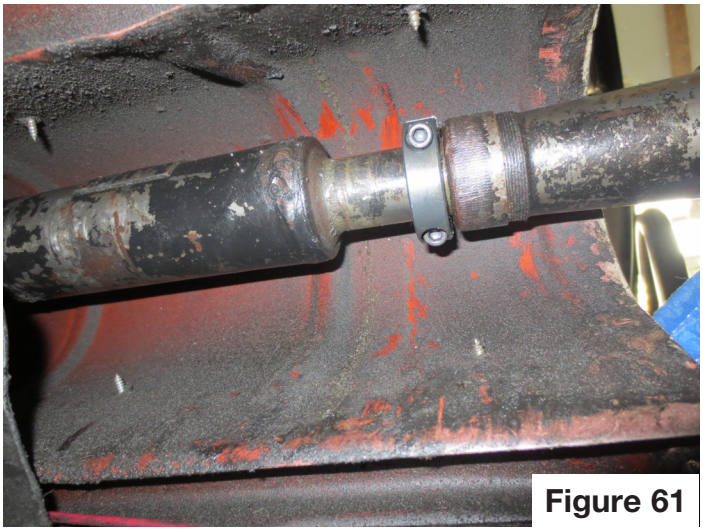


Figure 61

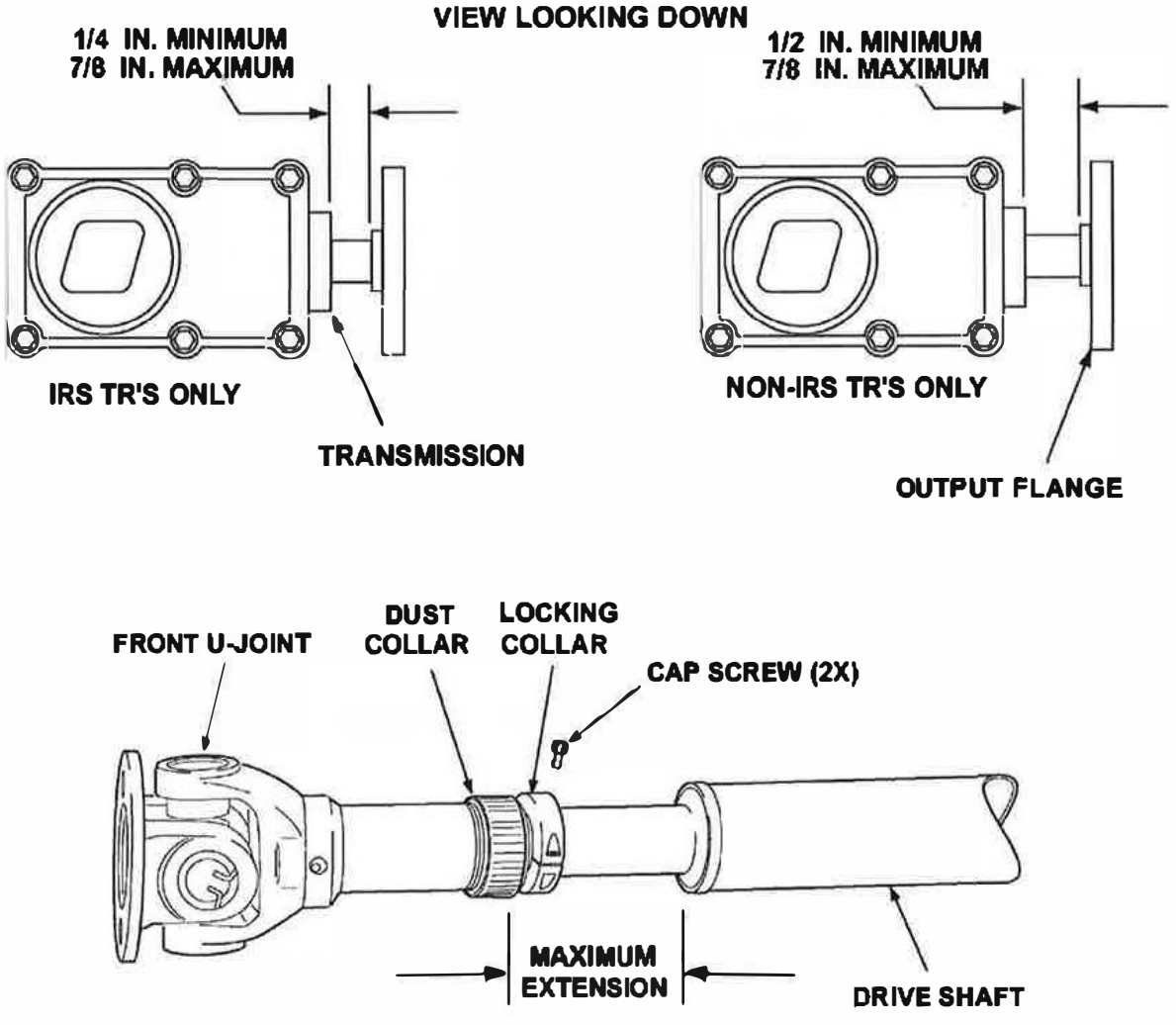


Figure 61

62. **On IRS model TR's:** Ensure that there is not less than 1/4 in. and not more than 7/8 in. between the shoulder on the output flange and the transmission oil seal. (This position will be virtually fixed in operation since there is no movement of the rear axle during suspension travel).

63. **On non-IRS TR's:** Ensure that there is not less than 1/2 in. and not more than 7/8 in. clearance between the shoulder on the output flange and the transmission oil seal. (This will allow some driveshaft compression/extension during suspension travel of the rear axle).

64. **On four-cylinder model TR's:** Remove the jack stands and lower the car to the ground. Ensure that the output flange does not bottom out in the transmission when lowering the vehicle to the ground, which could cause damage to the transmission. Ensure that there is not less than 1/2 in. and not more than 7/8 in. clearance between the shoulder on the output flange and the transmission oil seal. **If the output shaft is not in the correct position, it must be shortened or lengthened to fit.**

65. Take the driveshaft assembly to a driveshaft repair shop to have it shortened and and balanced if necessary

J. Final Assembly

66. Fill the transmission with the approved gear oil until in runs out of the filler hole on the left side of the transmission. It is easiest to remove the shift adapter housing and rubber baffle, and then pour the gear oil in from the top until if flows from the fill plug. There is no need to fill the rearmost cavity with gear oil. Most transmissions will hold about 3.0 US qts.

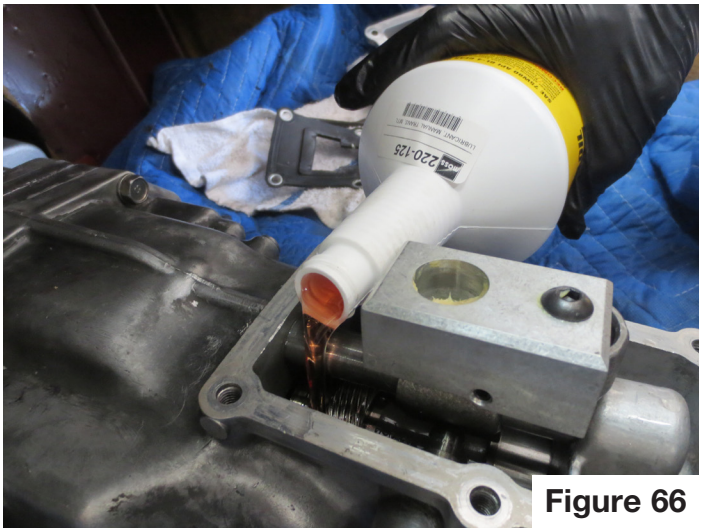


Figure 66

67. Reinstall the starter motor and electrical connections.

68. If your car is equipped with backup lights, you will need to wire them into the switch on the Toyota transmission. The Toyota switch operates the same as the triumph switch and can be tested for function with a multimeter. It should normally read open. When shifted into reverse, it should close.

69. Grease the universal joints as necessary.

70. Reinstall and adjust header pipes, exhaust etc. so that there will be adequate clearance between the transmission and other parts.

71. Route the speedometer cable underneath the transmission. Mount the speedometer cable bracket (470) on the side of the transmission with the short M10 bolt (490) and lock washer (480) as shown.

72. Install the speedometer cable (500) on the transmission and hook it up to the speedometer. Attach the cable to the bracket (470) with the clamp (510), the bolt (520) and the nut (530). Make sure the cable is clear of the exhaust. Use zipties or another method of securing the cable away from the exhaust if necessary.

    NOTE: See Appendix B for a suggested method of recalibrating your speedometer. Be certain that the cable which comes out of the transmission is not too tight. If it is, I recommend installing a right angle head from Toyota, see appendix A for sources.

73. Remove the jack stands and lower the car to the ground.

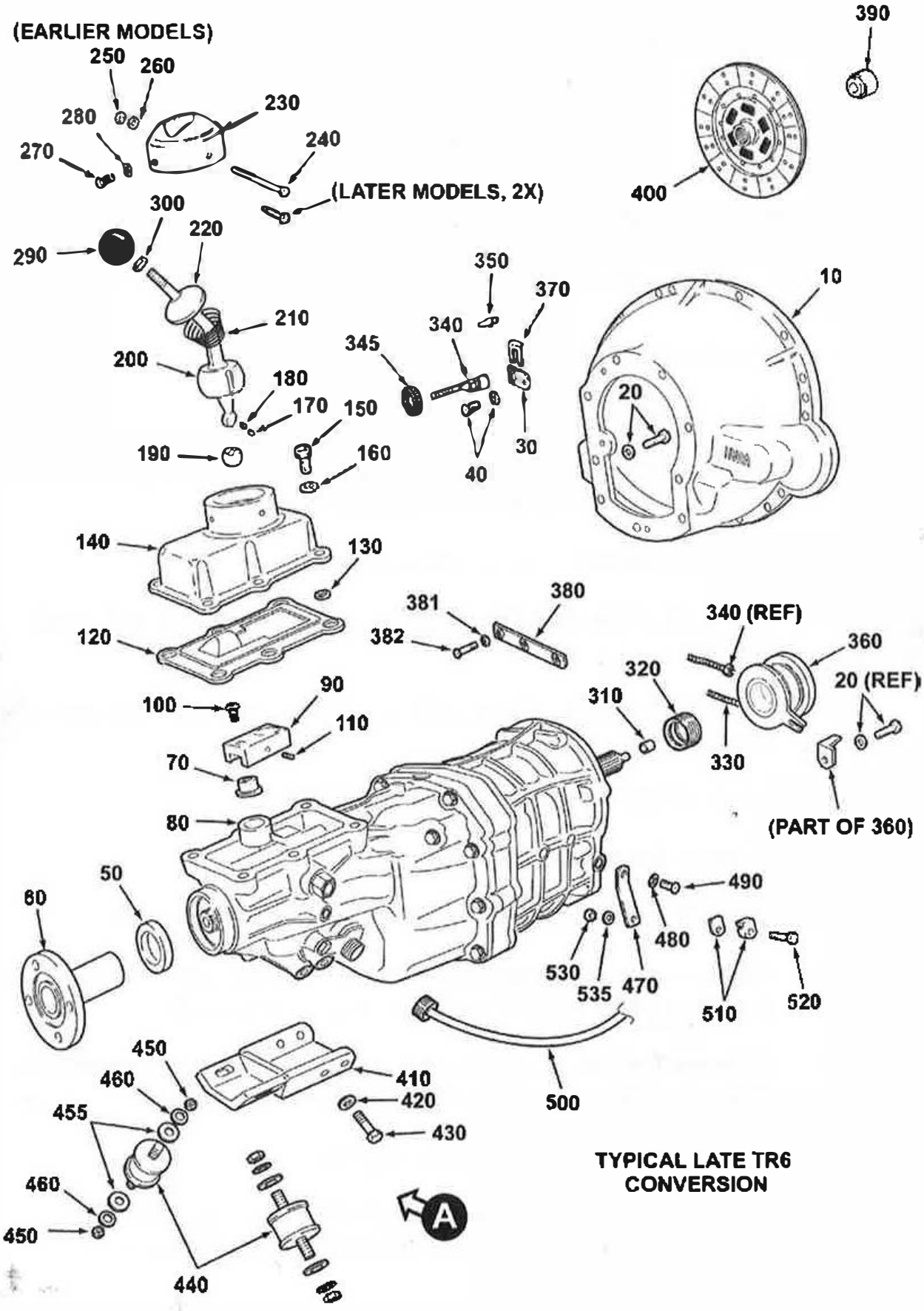
74. Attach the battery cables. Start the car and look for any leaks under the transmission. Test the clutch for proper engagement and operation.

75. Re-install the transmission tunnel housing, rubber shifter lever booth, carpets, center console (as applicable), and the seats.

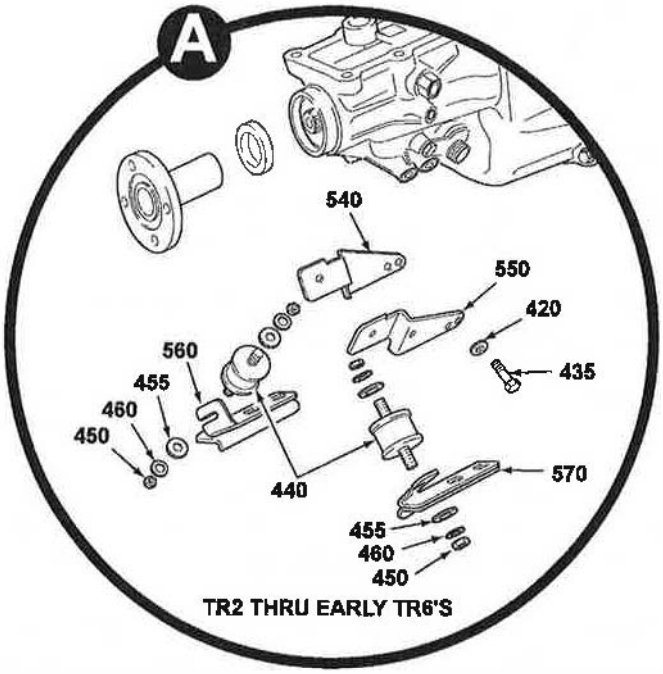
76. Road test the car. TAKE IT EASY until you are certain that everything is working okay.

77. Enjoy your HVDA 5-speed conversion!

Bill of Materials Exploded Diagram (Sheet 1 of 2) Transmission Conversion



Bill of Materials Exploded Diagram (Sheet 2 of 2) Transmission Conversion



LEGEND FOR FIGURE 4:

10	***BELL HOUSING (1)***
20	TOYOTA HARDWARE (9 EA)
30	***BLEED VALVE BRACKET (1)***
40	TRIUMPH HARDWARE (1 EA)
50	TRANSMISSION OIL SEAL (1)
60	***OUTPUT FLANGE (1)***
70	***ADAPTER PLUG (1)***
80	SHIFT LEVER DOG (REF)
90	***ADAPTER BLOCK (1)***
100	***SOCKET SCREW (1)***
110	***SETSCREW (2)***
120	TOYOTA BAFFLE (MODIFIED) (1) (Dealer part #33143-22020)
130	GASKET WASHERS (6)
140	***ADAPTER COVER (1)***
150	***M8 CAP BOLT, SOCKET HEAD (6)***
160	LOCKWASHER (6)
170	PLUNGER, ANTI-RATTLE (1)
180	SPRING, ANTI-RATTLE (1)
190	***NYLON BALL (1)***
200	TRIUMPH SHIFT LEVER (1)
210	SPRING (1)
220	SPRING RETAINER (1)
230	CAP, GEAR LEVER (1)
240	1/4 X 3 INCH BOLT (1)
250	LOCKNUT (1)
260	WASHER (1)
270	1/4 X 0.5 INCH HEX BOLT (1)
280	WASHER (1)
290	SHIFT LEVER KNOB (1)
300	JAM NUT (1)
310	***INPUT SHAFT BUSHING (1)***
320	***HYDRAULIC THROWOUT ADJUSTING SHIMS (8)***
330	***HYDRAULIC HOSE (INPUT) (1)***
340	***HYDRAULIC HOSE (BLEED) (1)***
345	***GROMMET, RUBBER***
350	***BLEEDER VALVE (1)***
360	***HYDRAULIC THROW OUT BEARING AND BRKT (1)***
370	***BLEEDER HOSE CLIP (1)***
380	***PEDAL STOP BRACKET (1)***
381	***PEDAL STOP ADJUSTING BOLT (1)***
382	***PEDALS STOP JAM NUT (1)***
390	***PILOT BUSHING (1)***
400	***CLUTCH DISC (1)***
410	***MOUNTING BRACKET, LATE TR6 (1)***
420	***M10 LOCKWASHER (4)***
430	***BOLT, M10 X 30 mm LATE TR MODELS (4)***
435	***BOLT, M10 X 25 mm, EARLY TR MODELS (4)***
440	***TRANSMISSION MOUNT (2)***
450	***HEX NUT (4)***
455	***FLAT WASHER (4)***
460	***LOCKWASHER (4)***
470	***SPEEDO CABLE BRACKET (1)***
480	***WASHER (1)***
490	***M10 HEX BOLT (1)***
500	***SPEEDOMETER CABLE (1)***
510	***CLAMP (1)***
520	***HEX BOLT (1)***
530	***HEX NUT (1)***
535	***LOCKWASHER (1)***
540	***LH MOUNTING BRACKET, EARLY TR MODELS (1)***
550	***RH MOUNTING BRACKET, EARLY TR MODELS (1)***
560	***LH BRACKET WELDMENT, EARLY TR MODELS (1)***
570	***RH BRACKET WELDMENT, EARLY TR MODELS (1)***

NOTE: Items shown in ***bold italic*** are supplied with HVDA kits (See Table 3).

Bill of Materials

Ref Item (See Figure)	Moss Part #	Description	Quantity (Moss Kit #)		
			440-115	440-134	440-135
10	440-116	BELL HOUSING, GEARBOX	1	1	1
30	440-381	BRACKET, BLEED VALVE	1	1	1
60	440-382	FLANGE, OUTPUT	1	1	1
70	440-384	PLUG, ADAPTER, LARGE	1	1	1
90	440-385	BLOCK, ADAPTER, LARGE CUTOUT	1	1	1
100	440-389	BHCS, 5/16-18, 7/8, FULL THD	1	1	1
110	440-390	SETSCREW	2	2	2
140	440-408	COVER, ADAPTER, 1/4" BORE	1	–	–
140	440-391	COVER, ADAPTER, 5/16" UNF	–	1	1
150	440-392	BOLT, CAP, SOCKET HEAD, M8	6	6	6
160	051-075	WASHER, LOCK, M8	6	6	6
190	440-393	BALL, NYLON	1	1	1
310	440-394	BUSHING, INPUT SHAFT	1	1	1
330	440-407	ASSY, HOSE, HYDRAULIC, INPUT, SHORT	1	–	–
330	440-406	ASSY, HOSE, HYDRAULIC, INPUT, LONG	–	1	1
340	440-426	ASSEMBLY, BLEEDER HOSE	1	1	1
345	440-400	GROMMET, RUBBER	1	1	1
360	440-402	BEARING, THROW OUT	1	1	1
360	440-403	BRACKET, THROWOUT BRNG LOCATOR	1	1	1
380	440-405	BRACKET, PEDAL STOP	–	1	1
381	052-339	NUT, STANDARD, 5/16 UNF	2	1	1
382	322-540	BOLT, 5/16 UNF X 7/8 IN	–	1	1
382	052-800	BOLT, 5/16 UNF X 2 IN	1	–	–
390	440-410	BUSHING, PILOT, 1 INCH	1	1	–
390	440-409	BUSHING, PILOT, 1/2 INCH	–	1	1
400	440-411	CLUTCH DISC	1	1	1
410	440-412	BRACKET, MOUNTING, LATE TR6	–	–	1
420	051-050	WASHER, LOCK, M10	5	5	5
430	440-414	AHCS, M10 X 25MM	4	4	–
435	440-413	AHCS, M10 X 30MM	–	–	4
440	810-060	MOUNT, TRANSMISSION	4	4	2
450	052-339	NUT, STANDARD, 5/16 UNF	4	4	4
455	051-587	WASHER, LOCK, 5/16 IN	4	4	4
460	051-588	WASHER, FLAT, 5/16 IN., SAE	4	4	4

Bill of Materials (cont'd)

Ref Item (See Figure)	Moss Part #	Description	Quantity (Moss Kit #)		
			440-115	440-134	440-135
470	440-419	BRACKET, SPEEDOMETER CABLE	1	1	1
490	440-421	BOLT, AHCS, M10 X 1.25 X 16	1	1	1
500	440-422	CABLE, SPEEDOMETER	1	1	1
510	051-030	P-CLAMP, 1/2 IN ID	1	1	1
520	322-382	BOLT, 1/4 UNC X 5/8 IN	1	1	1
530	771-690	NUT, 1/4-20 X 17/64 HT, ZINC	1	1	1
535	051-583	WASHER, LOCK, 1/4 IN	1	1	1
540	440-428	BRACKET, MOUNTING, LH, EARLY TR	1	1	–
550	440-429	BRACKET, MOUNTING, RH, EARLY TR	1	1	–
560	440-430	BRACKET, WELDMENT, LH, EARLY TR	1	1	–
570	440-431	BRACKET, WELDMENT, RH, EARLY TR	1	1	–
	440-396	ALIGNMENT TOOL, CLUTCH	1	1	1
	440-438	CLAMP, DRIVESHAFT	1	1	1
	322-175	BOLT, 5/16 UNC X 4.5 IN	2	2	2
	051-446	NUT, STANDARD, 5/16 UNC	4	4	4

APPENDIX A

HVDA Right Angle Head Sources

General Information:

Description: Adapter Assembly, Speedometer Cable

Toyota part number: 8377022120

Prices vary considerably from about $80 to $120 retail. Prices have been going up as demand for stocking these parts has diminished.

APPENDIX B

TRIUMPH SPEEDOMETER CALIBRATION CHECK PROCEDURE

Because there are different gear ratios between the Toyota transmission you choose and the original Triumph model, and since you may very likely have different tire sizes, or even different gears in your differential, you will probably notice that the speedometer and odometer will be as much as 10 percent off.

Below is a method that you can use to determine exactly how much the speedometer is off, and what you can do to correct it.

You will need:

- At least 100 ft of straight, smooth, level pavement with no traffic. (Such as an empty parking lot.)
- A big piece of light colored chalk or a large, light colored crayon.
- A 75 ft or 100 ft tape measure.
- Masking tape.
- A friend to observe the rear tires and signal when to stop

1. Look for a small number printed at the bottom of the face on your Smiths speedometer (Late model TR6's will probably have the number "1120" printed there.) This number indicates the number of turns the speedometer cable is supposed to make in exactly one mile.

2. Mark off exactly 52 feet, 9-1/2 inches on the pavement.

3. Park your car with a rear wheel centered on top of the "start" mark.

4. Disconnect the cable from the speedometer. Put a piece of tape on the end of the cable so that you can easily count the revolutions it makes when the car is moving.

5. Slowly push or drive the car towards the "finish" mark until the rear wheel is centered directly over it. As you move the car, count the revolutions the speedometer cable makes between the "start" and "finish" marks. Record the number of turns, including your best estimate of the last fraction of a turn, if any.

6. Divide the number on the front of the speedometer by 100. This is the number of turns the speedometer cable should have made between the marks if your car was in the original configuration. (For example, suppose your speedometer has "1120" on the front. Since this is 52.80 feet, or 1/1000 of a mile, the cable should have made 11.2 turns between the marks, etc.) The ratio of the specified number calculated from the one on the speedometer face and the actual number of turns the cable makes in the test is the amount of error.

7. Take your speedometer, with the number of actual turns, to a speedometer repair shop and have it recalibrated. They will use your information to simply replace one of the internal gears with one of the proper ratio to match your data. You might want to keep the old gear in case you want to set your speedometer back to the original configuration.