

# **Installation of the Smitty 5-speed Toyota Kit**

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**NOTE: Use this along with the detailed photos at:**

<http://webpages.charter.net/bighealey/smitty/smitty2.htm>

which show Tracy Drummond's installation

**These are notes on the installation of the Smitty 5-speed Toyota kit on my 59 BN6 with 29D engine and 10" coil spring clutch. Some suppliers in the Los Angeles area are included for convenience. These notes are being posted so they'll be in the archive for future use.**

I had posted questions and received much useful off-list information regarding this conversion. Thanks to Robert Barback, Dean Caccavo and Jim LeBlanc as well as several others. Vive La Liste!

***Robert Barback's notes on his BT7 installation follow mine.***

## **Smitty Kit:**

The Smitty kit is a well-made and engineered product for a reasonable price. None of the following comments are intended to disparage this product or Smitty, but rather to get more information out there for future use. Posters in this list have said they'd put one of the kits on in a weekend. Mine was more of a fiddle and Smitty cautions that these cars tend to be different and each install is a process. Smitty 805-495-1488.

Smitty's manual is comprehensive and is said to be available ahead of time if you are interested in purchasing the kit (I haven't verified that). The manual supplies all the needed Toyota part numbers with plenty of drawings.

## **Retaining Engine Position for easy reinstallation:**

With the transmission removed the engine mounts are not too far off from the balance point of the engine. Therefore it is possible to hold the engine in the proper position with a carefully measured block of wood between the valve cover and the firewall. The pressure from the engine tilting is not enough to cause any significant flex in the firewall. Be careful!

I bought the \$69 Transmission Jack from Harbor Freight and used it in combo with my floor jack and an overhead cable hoist ("comealong"). I used the floor jack to move the engine up and down with a 2x4 under the back of the pan (non-concours pan--lotsa dings). I used the comealong hanging from the garage rafters to lift the tail end of the Healey and Toyota transmissions up via a fan belt looped under the back of each trans. Having the two jacks was more important than the comealong. The transmission jack accurately holds and supports the trans and allows it to roll forward and backward. Many people say this is fairly easy to do with just a floor jack.

**Transmission:**

The Toyota transmissions come with the shift tower in 3 positions--front, middle and back. Mine is the front tower and I surely wouldn't want the shift lever any further back than that, although Smitty says you can use all 3--he also says front is best. The others require bending the shift lever forward then up. Center-shifters are different.

I got my transmission from Foreign Auto Salvage in North Hollywood CA for \$300. Upon disassembly, found chipped gears and at least 2 tablespoons of coarse metal chips in the inside. Foreign Auto instantly replaced it with no hassle. The second trans appears to be from a Toyota Sedan, because it came with a long, chrome shift lever with a fake leather ball on the end. The trucks tend to have black shift levers. I took it apart and it was perfect on the inside. Put a gasket set in it. Smitty's manual doesn't mention this, but the gasket set comes with front & rear seals included, which I'd purchased separately.

In the junkyard you may want to check out the 5th gear ratio by putting a mark on the input shaft and seeing how far the output turns. I didn't do this until I had the trans installed in the car--unfortunately it seems mine has an 18% overdrive--most are supposed to be 22%. Oh well.

Suggest retorquing the main case bolts till they feel snug. Mine felt like they might be starting to strip at 40 lb-ft and the Chilton Toyota Truck manual says to use 53. Likewise the front nose cover said 27 and 19 or 20 feels more like it. Most guys ignore or don't know these figures and just torque till they feel snug.

Toyota uses a splined yoke which slides in and out of the rear of the trans--this instead of the splined 2-piece shaft from the Healey. Smitty says to get the yoke from the junk yard. I did this, but the one I got had a non-removable u-joint in it. Which brings me to the driveshaft fabrication.

**Driveshaft:**

The going rate for these driveshafts seems to be about \$200. Mine was fabricated by Driveshaft Specialist in Irwindale CA (626) 334-2418. He quoted me \$135 to fab it cannibalizing the flange off my Healey shaft. He actually built it fresh in 2 days using an aftermarket Toyota sliding yoke for \$115 total, leaving my Healey shaft intact. Wow! He told me that since Toyota makes (or made) some of their trucks in the US, US-made yokes are available at large savings over the original part. Smitty's manual describes how to measure for the driveshaft needed.

**Clutch:**

Likewise, another lister emailed me who had had a custom clutch disc made by a clutch specialist. I did not do this, as I'd already special-ordered a remanufactured disc from Toyota for \$73 and could not return it. He said you can have a custom disc made for half this, though I didn't check. I've had a recommendation of Valley Clutch Co also in

Irwindale CA at (626)962-8787. This fellow said his Toyota disc was the same thickness as the minimum thickness specified for the Healey clutch. I was not able to find a spec for disc thickness for the Healey either in Haynes or in the Official manual. My Healey disc appeared to be nearly new and the Toyota disc was maybe 20 thousandths thicker. I did not experience any interference or rivet problems with my BN6 clutch, as Robert did with his BT7.

### **Thicker clutch disc would give more clearance:**

It occurs to me that if the assembled clutch cover is too thick from the engine to the T/O plate and the T/O bearing is riding on the clutch all the time, then you could have a thicker clutch disc fabricated which would move the levers and clutch T/O plate down toward the flywheel, giving clearance in front of the T/O bearing. I would seek guidance from the clutch fabricator on this issue before going ahead with it. It also occurs you could make a telescoping adjustable slave pushrod out of a piece of steel tubing, jam nuts and a 1/4-20 screw.

### **Rebuilding the clutch slave cylinder:**

My clutch slave cylinder needed an overhaul. One lister suggested leaving the cylinder hanging under the car and letting it bleed by gravity into a pan. I used a turkey baster to remove all the old brake fluid from the reservoir and filled it up again with new Castrol LMA. I allowed about 1/2 the reservoir to drain out through the bleed screw and all the bubbles were gone.

### **Slave Cylinder and clutch pushrod:**

Two emailers said they'd had to use a different Toyota T/O bearing because the original was not extending far enough forward to fully depress the clutch. Rather than do this I shimmed the ball stud with approximately 3/16" of washers. Moving the ball stud forward moves the lever rest position near the front of the opening which is most desirable for guaranteeing the clutch will disengage. The slave cylinder can then operate it with maximum travel. Adjusting the length of the pushrod may be necessary in order to properly bottom the slave piston. I used a 16d nail as a practice pushrod to experiment with lengths. In my case the Smitty-supplied pushrod worked fine.

### **First test of clutch disengagement:**

Jim LeBlanc suggested cranking the engine with the starter motor and pushing on the clutch pedal while feeling with a finger to see if the tailshaft stops rotating.

At this point if it's not disengaging properly, you might need to experiment with a longer pushrod. Push the pushrod all the way into the slave cylinder until it bottoms out to see if a significant gap appears between the pushrod and the clutch lever. If you've got a lot of space there--like 1/2" instead of 1/8"--make an equivalently longer temporary pushrod out of a heavy nail and try it out. Pushrods come in and out of the slave cyl in just a moment.

**A Note:** After removing the seats, removing the transmission tunnel covers was easy. This is the only way I can see to get to the upper bolt on the clutch slave cylinder. Getting the seats and tunnel covers out of there is about 1/2 hr's work and well worth it. (Reinstalling the seats takes a lot longer if you don't jack the car up on stands.)

Keep track of which holes the dowel bolts come out of in the engine flange. They are the ones with the little groove between the threads and the plain shank.

### **Toyota pilot bearing:**

Toyota uses a ball pilot bearing which is a very accurate fit on the end of the pilot shaft. I had to sand my pilot shaft down slightly with wet/dry paper to get the bearing to be other than a force fit. You need a sliding fit for installation of the trans in the car.

### **Pilot Tool adjustment:**

I believe it is necessary, or desirable at least, to tighten up the accuracy of the supplied plastic pilot tool to make sure the nose of the first-motion shaft will slide into the Toyota pilot bearing during installation of the trans. I wrapped the pilot tool with enough electrical tape so it was a perfect fit on both the pilot bearing and the clutch disc splines. 1 layer of tape around the contour of the splines did the trick. Smitty supplies an aluminum ring which holds the Toyota pilot bearing into the Healey flywheel. I used a vise to press the bearing into the ring, and a large 1-5/16 socket as a tool to hammer this into the recess in the flywheel. This was easy if you're careful. Your lead hammer makes a dandy driver for this.

### **Toyota Trans install:**

The shop manuals warn against tilting the engine into the radiator. Mine has the 6-bladed fan about 1/2" back from the radiator and during this process it never came close to the radiator. If you have the block between the valve cover and the firewall, minor or no jacking of the engine should be necessary in order to get the Toyota trans in place. Position your trans jack or floor jack in the middle of the hole and place the Toyota trans on top of it. Lower enough to get the bell housing through the opening, then raise it back up to where the bolt holes align. Observe parallelism between the bell housing and engine flange. I believe the limiting factor here is the alignment of the Toyota pilot shaft with the pilot bearing--I believe this is at least as accurate as anything to do with the dowel bolts.

### **Throttle linkage interference:**

If you have to jack the engine, be careful of the throttle linkage from the firewall to the manifold--on my BN6 this seemed to be more of a factor than hitting the radiator with the fan.

### **Trans tunnel & shift lever:**

With the forward shift tower, the shift lever is approximately 3" in front of the ash tray. Having driven the car this way, I would strongly advocate using the forward shift tower, even if it means converting the trans (easy-Smitty shows which parts are necessary). I

used the Toyota stub shift lever and it's only about 6" tall so rechroming it will be unnecessary as the leather shift boot goes all the way up to the ball.

### **Shift ball:**

Threaded Black balls are available at bigger hardware stores. A gunsmith friend suggested having a trophy engraver engrave the 5-speed shift pattern on the ball, then fill it with white paint. I didn't explore this yet.

### **Robert Barback's Notes: Smitty Transmission Info For BJ8 Revised For BT7**

Transmission Model W55 5 Speed 89-91

Speedometer teeth 26- 31 teeth use the Toyota gearing and recalibrate speedometer

Drive shaft Napa

Install either the Dennis Welch AH 950 or the Moss rear seal kit on the your engine if you have not one already It is not really hard and they do work. Although the oil is leaking from the rear of the cam and not the only crank when you replace the gasket or perma-tex the plate you will stop the leak coming from the cam which is about 60% of the oil you see on the ground.

We had a Clutch 9 3/8 inches made by local clutch shop , (same size as Toyota clutch disc) watch Toyota clutches because rivets poke out the wrong way and will hit flywheel if inside cut out on flywheel is less than 5 3/4 inches. Early BT7 had 5 1/4 inch cut outs and the rivets hit causing the clutch to rub on flywheel.

By going to the local builder we got a clutch for about 50% of what Toyota wanted for a Clutch disc even with a discount. We found this out after buying the Toyota disc. We decided to build the clutch with the rivets clearing the flywheel because we did not want to cut on the flywheel in case we wanted to go back original , however trimming the flywheel will not affect going back original Because the Healey disc misses this area by about a 1/4 inch however I was not sure of the spacing when I made the decision. So I went conservative. A 9 3/4 inch disc will fit if you can get one , we could not find one....

Since the Late BJ7 's and the BJ8 have a different flywheel cut out and bolt pattern the Pressure plate is different, (they do not interchange) it makes the release on the clutch disc different , we had to have the spring tension on the springs in the pressure plate changed the changed springs to a stronger type with out the change the clutch will slip in higher gears as the car warns up this is because the clutch disc is not being held with enough pressure. We used a pressure plate with less than 2000 miles on it from new , it worked ok with the original Healey disc( new) however it slipped with the Toyota disc. We measured a worn Healey disc ( it was slipping ) with the new clutch disc from Toyota the Toyota disc was only .006 thicker.

If the W55 Transmission is used the Ash tray can remain, the hole is cut in the transmission cover front of the ash tray. I have not checked on the center shift Healey where the shifter comes through. On the W 55 transmission, the shifter is the most forward of all the Truck transmissions. So you don't have to remove the ash tray.

Replace the bolts Smitty gives you that holds the rear mount on with Allen head cap bolts otherwise it is a pain to get the wrench in between the frame and the mount. remember they are metric bolts.

Bring the measurements to your local NAPA Store they make a real nice drive shaft and can supply all the needed parts. It really makes the car ride much smoother it is surprising how much imbalance the old drive shafts had in them even if you took care of them.

Use the speedometer gear already in the Toyota transmission, and recalibrate the speedometer , otherwise you may have problems with the nylon drive gear not meshing with the steel drive gear in the transmission. They work for a while but fail after a few hundred miles and the transmission must be removed and disassembled to replace the clip. There is no way of telling because the teeth are so close to matching everything works until they wear and it fails. MOMA does a great job on the speedometers about \$ 100 for cleaning and recalibrate.

The slave cylinder is moved on the Toyota transmission from the Healey transmission , you lose the clearance between the transmission and the chassis , you can't bleed the hydraulic lines with the transmission cover in place. We had to add an extension line on to the bleeder and run it into the engine compartment to be able to bleed the air out.

NAPA has the 20 in brake lines in stock however you must change to 2 long fittings and not the 1 long and one short as the replacement line comes with. 3/16 couplers fit the line and the bleeder.

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**Bell Housing - wrench interference:**

Before installation, verify there's enough room for your socket wrench to clear the bolt heads on the Smitty bell housing. I used a deep 9/16 3/8-drive Craftsman because of its thin walls, but had to relieve a couple of places around the bolt heads.