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How to: 02M/02Q LSD Install

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03-02-11, 11:11 PM

Whitbread

[Vendor w/Business number](#)



Join Date: Jan 2007
Location: Johannesburg, MI
TDI(s): [Several](#)

How to: 02M/02Q LSD Install

Well I'm finally installing MY lsd and figured I'd post up a good how to since there aren't really any out there 😊.

This is an FMH 02M, however it is apparently darn near the last 02M made as it's basically an 02Q on the inside 🤔. I've done tons of 02M lsd and this is the first one I've seen like this. The last one I did was even an FMH, but it was still the "old" style 02M.

Onto the pics;

The patient



Remove speed sensor and all bolts you can find. The first clues that this was something different was that the case bolts are aluminum and the cap that most 02m's don't have.



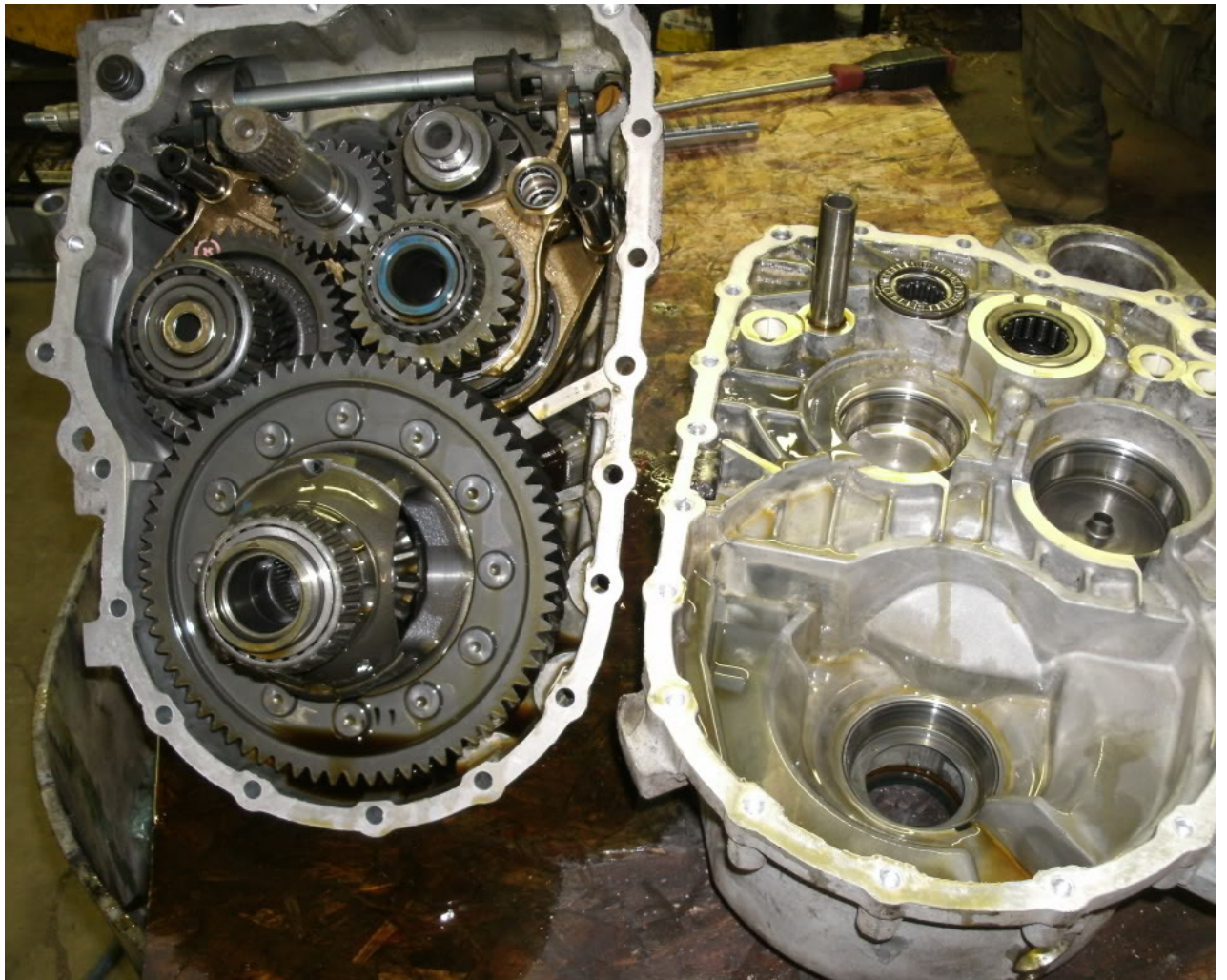
Next, remove the shift tower by pulling straight out and then put the trans bellhousing side down. Use a very small screwdriver to remove the covers the rear input shaft bearing. Notice the snap ring on the **outside** of the bearing, remove it. If you have an old style 02M, this step does to you.



On mine, I also had to remove this guy to get the tower out



Now, use a rubber mallet to break the adhesive bond between the halves and lift the top of the case off. All the gears will be stacked nicely for you. (I pulled the bellhousing side off first because I wanted to make sure I removed the shift tower correctly since I've never done a "new" one before.) I couldn't be happier to see how clean this transmission is on the inside. There can't be more than 20K on it tops.



Here's all the gears



Here's the forks with offending rivets that must be removed. Notice the cushions on the end of the shift rails, old style 02M's don't have those



02 Jetta TDI

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Last edited by Whitbread; 03-02-11 at 11:15 PM.



03-02-11, 11:12 PM

[Whitbread](#)

[Vendor w/Business number](#)



Join Date: Jan 2007

Location: Johannesburg, MI

TDI(s): [Several](#)



Here's some interesting bits I noticed on this particular trans:

Input shaft is supported by one straight roller bearing and one giant ball bearing. Normally, it's a tapered roller bearing at each end of the shaft on older 02m's. Now, I question whether this is a change made to increase strength, or a change because this is somehow cheaper than tapered roller bearings. It seems surprising to me that they deemed that the axial thrust loads generated by the helical gears could be handled by straight bearings with no thrust bearings. Any of the engineers/experts have a comment here?



Another oddity is the shift rail bushings this trans has. In old style 02m's they use little ball bearings in plastic cages. This trans just has bush. Seems to me like a cost cutting design change.



The drive flanges also have little plastic dust shields of sorts on them. I'll snap pics of them tomorrow.

That's all for tonight, going to hot tank the cases tomorrow morning and get back at it. Hopefully the differential bearings show up tomorrow Parts and I can put it all back together. (Are they going to show up tomorrow Peter? 🤔)

Okey dokey, here's the next round of pics:

Rivets drilled out. I like to use a 17/32" bit on a drill press with some wd-40 or other cutting lubricant.



The weapon of choice for driving rivets out



All out



Use a dead blow mallet to gently knock ring gear off differential. Notice the groove cut in the face of the ring gear that contacts the flange of differential. Make sure you reinstall it in the same orientation.



Press the studs in your shiny expensive diff you'll never see again



Heat the ring gear in an oven, top of wood stove, propane torch, etc to approx 200F. This will make it drop on the diff much easier. Be sure to studs and nuts with ARP lube and use 2 nuts 180° apart to draw the ring gear down gently. Once you feel it bottom out, torque all nuts to 40 Then torque them all to 70 ft/lbs. This will make sure all the studs are fully seated in the differential flange. You'll probably have a couple that feel turn more than others, that's the stud being drawn into the diff fully. Then, break all nuts loose, and torque to 45 ft/lbs for the final tq.



Now, take your bearings and toss them in the oven at 400F for 20 mins or so. Might want to make sure the better half is out of the house wh

this....



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Last edited by Whitbread; 03-09-11 at 11:12 PM.



03-02-11, 11:14 PM

[Whitbread](#)

[Vendor w/Business number](#)



Join Date: Jan 2007

Location: Johannesburg, MI

TDI(s): [Several](#)

Toss the diff in the freezer for a half hour or so



If you did it right, the bearings will drop right on, no pressing needed.



Using this [method](#), I changed the differential bearing races in the case



When doing the race that has the shim behind it, take a die grinder or rat tail file and put 2 small notches 180° apart. This makes driving the race out after checking preload 100X easier. After notching, install the race with NO shim, measure the free play, drive the race back out, and install the correct shim and the bearing race again.



Onto the forks. The enemy



Drive the roll pin out, drill the hole out to .260"-.270", and then tap it M8x1.25. Since you can't weld this bolt, use red loctite. Snap On tap set is one of the best inventions since sliced bread.



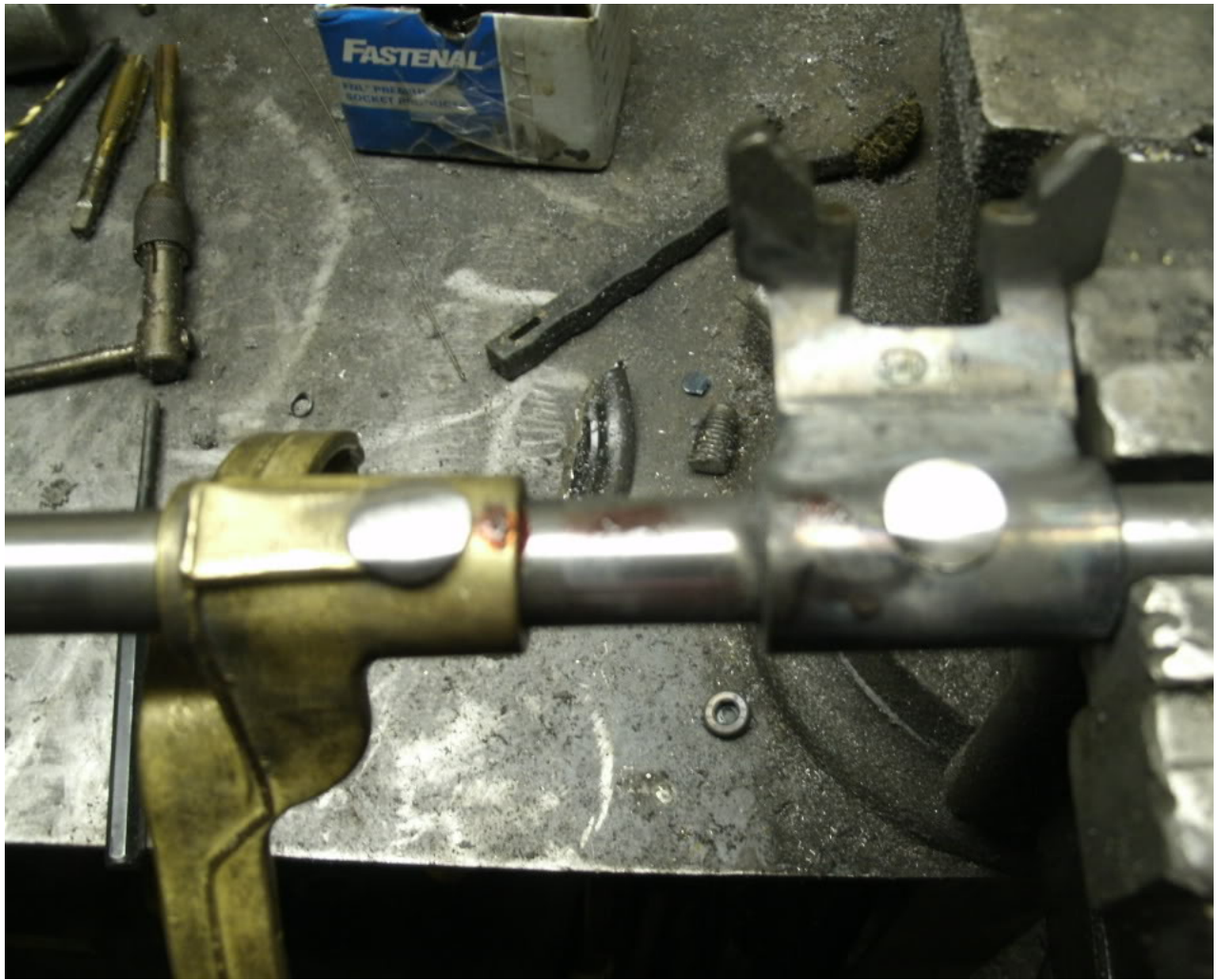
Before removing this roll pin, put 2 tack welds holding the shaft to the collar. If you don't tack it, the collar likes to rotate on the shaft during drilling/tapping. Don't ask me how I know....



I used a grade 12.9 M8 cap screw 25mm long to replace the roll pin. Grind the end flush and run around with a tig to make sure it never com



Grind the socket heads down to clear the trans case



Ahhhh, the 1-2 fork that has given so many people grief. Grind the rivet head off and punch the rivet out



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Last edited by Whitbread; 03-09-11 at 11:27 PM.



03-02-11, 11:14 PM

[Whitbread](#)

[Vendor w/Business number](#)



Join Date: Jan 2007

Location: Johannesburg, MI

TDI(s): [Several](#)

Drill and tap this piece with the same tools used earlier. Drill the brass fork out to 5/16" so bolt can pass through it.



I used an M8x16mm cap screw here. Grind excess down and weld again. You don't have to grind the socket head on this one though.

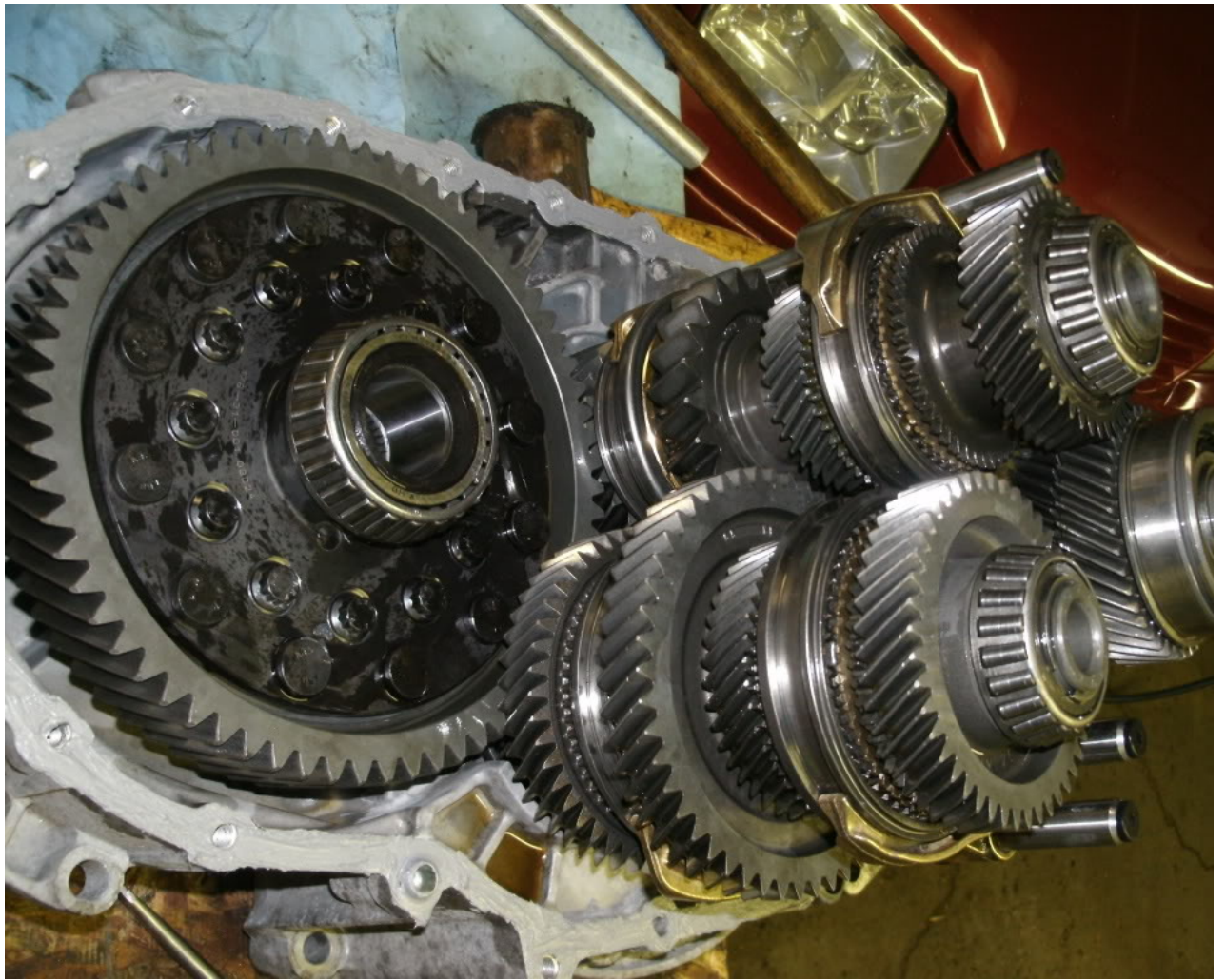


For your remaining fork, follow the same steps as above. On this one you do have to grind the socket head down.



Ahhh, the 02M in it's assembled glory





When dropping my top case half on, I had to warm the case around the rear input shaft bearing to get it to slip in place. Once it's in all the w

snap ring in and tap the seal cover on.



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Last edited by Whitbread; 03-09-11 at 11:35 PM.



03-03-11, 08:26 AM

The Shootist

Veteran Member

Join Date: Aug 2006

Location: Hixson, TN

TDI(s): [2002 New Beetle GLS](#)
[TDI](#)



Ball Bearings

All the Honda trannies I have pulled apart use straight bearings. Ball bearings have a fair tolerance to axial loading as is.

Tapered bearings can be tricky to set because the aluminum case, and the steel shafts expand at different rates. Straight bearings end of the shaft float axially making shims obsolete. 😊

2002 NB known as "Stitch" (small, round, blue, kinda cute...may bite if agitated). PP520s, RC3, EGR delete, turbo back 2.25" open cat delete, Koni struts & springs Neuspeed bars, slotted rotors, 245-45-17 Sumitomo's. Things to do: H2O intercooler, VNT-2256, bigger IP.



03-03-11, 10:54 AM

TDIinTexas

Vendor



Join Date: Jul 2007

Location: Fort Worth, Texas

TDI(s): [2002 Jetta TDI](#), [2010](#)

[JSW TDI](#)



Over on Vortex they suggest removing the rubber cushions on the ends of the rods. Any ideas on the thinking behind this?

David

His: 02 Jetta TDI, GTB2260VKLR, [Fun stuff to come...](#)



03-04-11, 11:12 AM

Whitbread

[Vendor](#)
[w/Business number](#)



Join Date: Jan 2007
Location: Johannesburg, MI
TDI(s): [Several](#)



Quote:

Originally Posted by **The Shootist**

All the Honda trannies I have pulled apart use straight bearings. Ball bearings have a fair tolerance to axial loading as is.

Tapered bearings can be tricky to set because the aluminum case, and the steel shafts expand at different rates. Straight bearings let one end of the shaft float axially making shims obsolete.

Ah, I've never been in a honda trans before. I guess I'm just so used to working 02J's/02M's and old school heavy duty stuff where everything is on tapered roller bearings. My car should be a good test if it's weaker or not haha.

Quote:

Originally Posted by **TDIinTexas**

Over on Vortex they suggest removing the rubber cushions on the ends of the rods. Any ideas on the thinking behind this?

David

I've seen that mentioned too. I'm not sure why either. Only thing I can think of is to extend the travel of the shift shaft to make sure it doesn't miss a shift.

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03-09-11, 11:33 PM

Whitbread

[Vendor](#)
[w/Business number](#)



Join Date: Jan 2007
Location: Johannesburg, MI
TDI(s): [Several](#)



Install finished, pics added

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03-10-11, 02:40 AM

diesel-dave

Veteran Member



Join Date: Aug 2007
Location: earth
TDI(s): [2003 wagon TDI](#),
[2003 wagon Tdi](#), [2013 Q7 Tdi](#)



the freeze/heat method for installing the bearings is the way to go. i have seen blogs where the guys are damaging these on a regular basis.

2003 Bora Wagon TDI Bosio R520's, colt cam, VNT 17

q loader. no smoke and so on

2001 Beetle TDI GLS Bosio 764 7 hole's, qloader, VNT 15 and so on

2010 JSW wagon DSG loaded

2003 golf auto PP520's



03-10-11, 08:06 AM

Keebler145

Veteran Member



Join Date: Jun 2008
Location: Niles, Ohio
TDI(s): [Jetta MKIV 2000](#),
[2003 Jetta](#) and [MKV 2006 PD DSG](#)
Fuel Economy: ~45



haha guess my next transmission is going off to Matt to have him do the wavetrac install. I don't have an oven I can use that won't melt the oil ;)



424,000 miles and counting, On the frame that is (as of sold date)

Gt2256v 3 in downpipe and vibrant resonator, 3in OMI and FMIC all by Whitbread, Titan 520's, Port & Polished Head courtesy Franko6, RC 6, 11mm IP, PD LiftPump. Rosten 1000 Pistons, Oil Cooler, Fuel Cooler, Diablo W/M Kit, DC III clutch, Built 5 speed with LSD



03-10-11, 01:01 PM

ryanp

[Vendor](#)



Great guide, I've got a super long ratio 02Q with only 100 miles on it for my new project, i need to do the diff install and upgrade the forks on that! the 02Q rarely break compared to the 02M so maybe leave the buffers in?

I read something about measuring the exact width of the old diff compared to the new diff and that dictates the thickness of the shims that sound right?



Join Date: Jun 2008
Location: Barnsley, South Yorkshire, UK
TDI(s): [Arosa BKD 2.0 16v - 510hp, Mk4 Golf 4 Motion 325hp Daily, Caddy 2.0 16v TDI - 300hp, Golf Mk2 Van 1.9 TDI - was 290hp, Mk5 Ibiza 2.0 FR TDI - 250hp, BMW 120d, BMW 330d.....](#)
Fuel Economy: 55+MPG



02M 6 Speed Conversions + Euro Parts - 6 Speed Setups for A4 + A5 platform, PD150 Intakes, TIP kits, Turbo's, Injectors as v anything else!! PM Me! - [Click HERE](#)

Last edited by ryanp; 03-10-11 at 01:04 PM.



03-30-11, 05:18 PM

NOLA_VDubber

Newbie

Join Date: Mar 2011
Location: New orleans, LA
TDI(s): [2005 Jetta GLI](#)



OP, you are my hero! I'm going to be tackling this job for the first time this weekend and had been worried as there are very little there showing the 02M split open.

My questions for you are:

- 1) Once the old shimmed race is removed, are you doing anything special when installing the new one? That is, are you throwing the freezer and heating the case prior to attempting to press it in?
- 2) Anything special when popping it back out after checking preload?
- 3) What value are you using for preload and where did you get your shims?

TIA 😊



03-30-11, 05:55 PM

Whitbread

[Vendor w/Business number](#)



Join Date: Jan 2007
Location: Johannesburg, MI
TDI(s): [Several](#)



Quote:

Originally Posted by **NOLA_VDubber** ➤

OP, you are my hero! I'm going to be tackling this job for the first time this weekend and had been worried as there are very DIY's out there showing the 02M split open.

My questions for you are:

- 1) *Once the old shimmed race is removed, are you doing anything special when installing the new one? That is, are you throw the race in the freezer and heating the case prior to attempting to press it in?*
- 2) *Anything special when popping it back out after checking preload?*
- 3) *What value are you using for preload and where did you get your shims?*

TIA 😊

Thanks 😊. The next time I do an lsd I'll do pics of the shimming process. Forgot to snap them while I had mine apart.

- 1) Nope. Just use a race driver or good (not china freight) round headed punch to carefully drive the race in. You could warm the wanted, I generally don't.
- 2) Nope. Just use a good round punch to carefully knock it out from the backside.
- 3) I shoot for .010-.014" of preload. The math goes something like this; Free play measurement + .002" or .003" for what preload lose because of the case sealant + .010" to .014" = shim thickness.

Here was mine: Original shim was .039". Free play was .024". $.39 - .24 = .015$ ".
.015" - .003" = ~.012" preload with original shim. Since that's in spec, no new shim required.

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03-31-11, 02:49 PM

NOLA_VDubber

Newbie

Join Date: Mar 2011
Location: New orleans, LA
TDI(s): [2005 Jetta GLI](#)



^Thank you so much! I've got a copy of this thread printed out and will be using it thoroughly starting tomorrow!



05-14-11, 05:08 PM

TDIVR6T

Newbie

Join Date: Dec 2009

Location: Toronto

TDI(s): [1996 Passat TDI](#)



Do you know the torque specs for the transmission case? Have been searching for a while now and found one link which said torq 25nm and a 45* turn, is this correct?



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