WPC rod bearing & ARP rod bolts DIY & advice

08-02-2014, 11:34 PM #1

Rennwerks
Enlisted Member

10 REP 48 POSTS

Drives: '09 ESS M3 DCT
Join Date: Mar 2013
Location: Pittsburgh, PA

iTrader: (0)

WPC rod bearing & ARP rod bolts DIY & advice

Just finished changing the rod bearings in my '09 M3 with the WPC coated bearing set and ARP rod bolts. Did it preventatively. Car had no noise or signs of bad bearings, just gets tracked a lot and is S/C'd. Blackstone reports always came back raving about the high quality of the samples sent in. I have been seeing enough horror stories lately that I decided since I plan on keeping the car for awhile I should just bite the bullet and do it. 15hrs total from first to last bolt and test driving.

I want to share some insight and wisdom to tearing in to it yourself. Just a crude write up as a basic guide of what has to happen and things I wish I knew before starting.

Some info on the car: '09 E92 M3. 61k ESS SC since ~20k. Tracked fairly often. Used in the One Lap of America this year and will be next year. Always changed the oil with Liqui-Moly GT1 10w60 and

Mahle filters. Every 5k or three track weekends. Also took the car on a 12k road trip around the country this year. Never beat on when cold and warmed up before hitting the track.

To be fair, I am a technician by trade and own a shop with a few lifts, and I don't think I would tackle this one on the ground with jackstands. Laying on your back getting dripped on for an hour while you swapped the bearings wouldn't be very fun at all. Also getting the subframe down and clear would be a PITA without being able to lift the car off of it and slide it out of the way.

Started by disconnecting battery, pulling all undertray shields, draining all fluids, and tearing everything down up top.

I removed the intake plenum, supercharger & mounting bracket, ignition coils, plugs, coolant hoses on the front of the engine, radiator fan, radiator (just to make more room, not absolutely necessary), both belts, oil cooler lines, AC belt tensioner, AC belt idler pulley, disconnect power steering lines at plastic cooler connectors, and power steering reservoir & pump as an assembly left attached to rack and subframe. Support the engine with a transverse engine hoist

Removed strut upper mount bolts with plans to drop the subframe out as a complete assembly with struts still attached. Worked pretty well.

From underneath I removed the oil cooler line connections from oil cooler, ABS sensor wires, xenon level sensor connector, calipers from hubs, both engine mount to subframe bolts, and the steering

shaft to rack bolt.

From there I lowered the subframe on to four jackstands, removed the subframe bolts, removed the strut mount nuts, and lifted the car off of the subframe.

Removing the oil pan is a lot of T30 torx of various lengths. You will need a T-handle or long necked T30 as about 10 of the bolts are recessed in holes only about 7mm wide but about 4 inches deep. There are also four bell housing E12 external torques that need to come out. The lower AC belt tensioner bracket comes off too.

Once the pan is down there are around 6 bolts in total needed to remove the pump pickup tubes and get to the rod caps

Changed the bearings one at a time starting at one and making my way back to eight as I rotated the engine. The rods came right off the crank and tapping the upper bearings around lightly and removing them was pretty easy. New bearings are marked blue and red. Blue on top, red on bottom. Make sure to line up the rod caps with the correct orientation of the bearing notch as they are cracked rods and the caps only fit one way. The ARP rod bolts come with lube and Bimmerworld spec'd them at 40ftlbs. Would have been nice to have a stretch gauge but torque works fine.

New oil pan gasket and time to put the subframe back up. Easiest way was bolting the strut mounts up in to the car and allowing the subframe to hang by the struts while I lined everything up and used pole jacks to support it as I needed.

The rest was reverse of removal. Order of operations really matters when putting the front of the engine back together. The p/s pump has to go on first and the alternator belt can't slip up above the water pump pulley with the idler for the AC belt installed. Also oil cooler lines have to go on after the AC belt is reattached.

Things I wish I knew or would have done while I was in there:

New seals for the oil pump pickup tubes and the oil cooler lines would have been nice. Also it was a

perfect opportunity to upgrade the lower engine mounts. Good time to change your idler pulleys and belts while you have it all torn down. Plugs were done not too long ago so skipped it, but thinking maybe it would have been worth it to throw a set of coils in. Easy enough to do later.

Good luck if you decide to go at it. My upper bearings showed wear on all cylinders. I view it as necessary preventative maintenance if you're planning on keeping the car for awhile.






Appreciate 1 QUOTE

08-03-2014, 03:14 AM #2

schlichtm3
Driver

5 REP 48 POSTS

Drives: M3 Coupe 2011
Join Date: Apr 2014
Location: Germany

iTrader: (0)

thanks for write up!!

Appreciate 0 QUOTE

08-03-2014, 09:20 AM #3

Brian0473
Lieutenant

15 REP
463 POSTS

Drives: 2010 SSII DCT Coupe
Join Date: Sep 2013
Location: San Antonio, TX

iTrader: (**8**)

So these were the factory original units in there?

_____
No toys right now...

My old M3:

Appreciate 0 QUOTE

08-03-2014, 12:02 PM #**4**

Rennwerks
Enlisted Member

10 REP
48 POSTS

Drives: '09 ESS M3 DCT
Join Date: Mar 2013
Location: Pittsburgh, PA

iTrader: (**0**)

Yes, they were the original bearings

Appreciate 0 QUOTE

08-03-2014, 12:50 PM #**5**

OneSickM
Lieutenant

26 REP
463 POSTS

Drives: M3
Join Date: Jul 2014
Location: ---

iTrader: (**1**)

Why is one side has more wear than the other?

Appreciate 0 QUOTE

08-03-2014, 09:33 PM #6

4corners
Major

94 REP 1,048 POSTS

Drives: 2008 Jet Black M3 Coupe
Join Date: Feb 2011
Location: Yucca Valley, CA - Kelowna, BC

iTrader: (0)

Garage List
2008 BMW M3 [0.00]
2007 Ford E350 4x4 [2.75]

Quote:

> Originally Posted by **OneSickM**
> *Why is one side has more wear than the other?*

The bearing on the top is subjected to forces from combustion which causes the upper bearing to wear more. So goes the theory. There is also some opinion that detonation can add to this condition.

Appreciate 0 QUOTE

08-04-2014, 03:06 AM #7

SenorFunkyPants
Brigadier General

187 REP 3,227 POSTS

Drives: E92 DCT M3
Join Date: Mar 2009
Location: UK

iTrader: (0)

Considering the 40k miles Supercharged the bearings are in pretty good shape I would have thought.

Appreciate 0 QUOTE

08-04-2014, 07:59 AM #8

Randy Forbes
New Member

5 REP 11 POSTS

Wow, a lot more work, as regards gaining access to *the meat* of the job, than compared to the Z3/M, Z4/M & E-46 M3 (all w/S-54 I6 engine).

Drives: M Rdstrs (2), X5 35i, 100/6
Join Date: Dec 2007
Location: SW Florida!

iTrader: (**0**)

Up until just recently__2nd quarter of this year__I could buy the S-54 rod bearings as the "E-46 bearing recall kit" (NLA) for much less than buying the individual shells, then I would coat them myself (Techline TLML). The shells are still available, but only as individually ordered pieces now, at more than double the kit's cost.

I'm guessing that there was never a recall on the S-65 engine, so the OE (BMW) bearings are only available priced individually, if I was to again, do my own coating process?

_____
1957 Austin-Healey 100/6 2-seater
99 M Coupe w/EuroSport Twinscrew S/C
99 M Rdstr & 01 M Rdstr Performance Center Delivery
2011 X5 35i Wife's daily urban assault vehicle
Sports Cars Plus, LLC www.spcarsplus.com/gallery3

Appreciate 0 QUOTE

08-04-2014, 08:39 AM #**9**

pbonsalb

Brigadier General

215 REP 3,414 POSTS

Drives: 08 E90 M3, 99 E36 M3 Turbo
Join Date: Feb 2011
Location: Concord, NH

iTrader: (**3**)

There is some theory that the wear is premature due to less than adequate clearance. I know coatings are thin, but any coating reduces clearance. I'd make your decision first on whether the clearance is adequate. Other theory say original factory spec 10W60 oil is too thick.

I went with WPC treatment, which either leaves clearance or may minutely improve it. Cost was $64 for me but a shop might get a lower rate. Quantity certainly would. Plus shipping both ways -- about $25-$30 total.

Best price I found on bearings was through FCP Groton at about $26 for the upper and $17 for the lower (or maybe vice versa) with free shipping. Bolts were around $6 each, since I used stock. ARPs are easier to install but around $300 for all 16. No known problems with stock bolts. Again, you can probably do better on these costs with your dealer connections. ECS Tuning was in the same price range.

Appreciate 0 QUOTE

01-01-2015, 04:30 PM #10

Flea7
Major

43 REP 1,202 POSTS

Drives: E92 M3 6MT/F48 X1/F430
Join Date: Oct 2007
Location: Mill Creek WA

iTrader: (5)

Garage List
2016 Lexus CT200H [0.00]
2016 X1 [0.00]
2005 Ferrari F430 [0.00]
2008 E92 M3 [0.00]

What happened to the pics??

Appreciate 0 QUOTE

01-04-2015, 04:55 AM #11

e92zero
Captain

42 REP 786 POSTS

Drives: 2011 E92 BW
Join Date: May 2010
Location: somewhere in US

iTrader: (0)

This is the DIY that I more or less used as a guideline so I figure I will add to it here. I want to thank Rennerks for the DIY as I would not have attempted this without it. Thanks.

I am a self-taught mechanic so not everything will be proper or by the book. Please use common sense and I am not responsible for any damage you done to yourself or your car if you follow my steps.

Here were my steps as I did mine with jacks and jack stands. I did things a certain way to avoid spilling fluid as much as possible. I also changed the ps reservoir, belt tensioner pulleys, oil cooler, and the engine mounts at the same time so I will include them here. If you are not replacing these, you can skip those steps.

1) since there are no real electrical system involved, I didn't disconnect the battery. Probably a big no no to some.
2) get the front end of the car on jack stand as high as you can, you will need all the clearance you need.

3) drain the oil. In the mean time, remove all under tray covers, wheels, inner wheel liners, tray covers on the rear of the subframe. Unclip the hoses on the bottom of the radiator fan.
4) remove the brake caliper and the upper sway bar mount to the suspension body. Hang the caliper to something in the wheel well not tied to the suspension. (I didn't remove the upper sway bar mount here but it will probably make your life much easier later).
5) unplug speed sensors, brake wear sensors. On the driver side, unplug level sensor wire, remove the nut that mount the level sensor to the lower suspension arm. There is also one more wire connected to something attached to the subframe. I have no idea what this is but unplug this as well.
6) turn the steering wheel a little to the right (passenger side), you will see a torx nut in the driver side wheel well for the steering shaft, remove this. (thread lock)
7) plug the oil drain plugs back in (optional) and remove the re-enforcement plate.
8) remove transmission cover, remove the wire bracket, unplug oil level sensor. remove the lowest 4 E12 external hex that mount the transmission to the oil pan.
9) remove front bumper.
10) detach oil cooler lines at oil cooler. More oil will come out so have something ready to catch it. Can remove oil cooler here if you are changing oil cooler.
11) remove intake airbox assemblies.
12) remove fan.
13) loosen up the 3 bolts on the power steering pulley. If you are replacing the tensioning pulley on the alternator side, you will need to loosen up the water pump pulley bolts also. 4 of them.
14) remove all belts. You will need to remove the big deflection pulley that's infront of the water pump to get the ps belt off.
15) remove the tensioning pulley for the power steering belt. Should only be 2 bolts.
16) remove the power steering pulley (3 bolts) and then remove the 3 bolts that mount the power steering pump to the engine.
17) if you are replacing the tensioning pulley on the alternator side, remove the water pump pulley and remove that tensioner. Should only be 2 bolts.
18) remove the 2 bolts that mount the power steering lines to the engine. One for each line. Unclip all plastic clips to the ps lines. At this point the entire ps pump should be lose.

19) suck out all the fluid in the ps reservoir and remove it from the bracket. You should be able to fish it around the coolant lines so the ps reservoir is in the open space where the fan was.
20) mount the traverse engine support
21) use a jack and wood to support the subframe.
22) loosen the bolts that mount the subframe. Remember which bolts go where as they are all different length. The 2 rear most are smaller. Remember which one goes to which side. This will come in handy when aligning back the subframe. See note below.
23) remove the lower engine mount bolts to the subframe
24) very slowly start lowering the jack. Check everywhere to make sure nothing is being pull, no line is being stretched. You should see engine being supported by the traverse engine brace and the engine mounts separating from the subframe.
25) continue to lower the jack until the subframe is lowered all the way and is only being attached by the suspensions
26) place some milk crates or something sturdy below the subframe, an inch or 2 below it should be fine
27) move the jack to one side and support the suspension arm. Don't do it on the brake disc as it will spin. Remove the 3 nuts on top at the suspension tower. (thread lock) If you have EDC, you will also need to remove it.
28) very slowly start lowering the jack. The suspension body with the spring will want to fall over, make sure you hold it while the whole side is being lowered. The entire suspension arm and the subframe on this side will start to drop and settled on the milk crate or whatever you put below it to support it.
29) if you are doing this on the driver side, you will want to mark the steering shaft and the rack as it separates. I think this only goes back in one way but you want to be sure. Make sure no one will jump in your car and turn your steering wheel after this point.
30) goto the other side and repeat step 27 to 29. Now your entire subframe and suspension should be separated.
31) if you have removed the upper sway bar mount, you should be able to fish the brake line out of the entire structure and leave the caliper hanging in the wheel well. (Again, I didn't do this and just left my caliper handing on the springs)

32) pull/fish the power steering reservoir out from the front and cut the metal clips and unplug the lines. I used stainless steel hose clamps to remount them for future scenario where I might replace the reservoir again. More ps fluid will come out so have something under it to catch. Plug the lines back up with something to avoid more fluid draining all over.
33) detach the 2 ps lines at the cooler connector. (I didn't do this step but again, it will probably make your life much easier later)
34) your entire subframe should be completely separated if you did all the steps above. If so, slide the entire structure using the milk crate from under your car out the front. I was only able to slide it out most of the way because I didn't detach the ps lines at the cooler, nor did i remove the sway bar mount to let the brake caliper come out.
35) on the driver side, there is a bracket for the oil cooler lines attached to the oil pan. Remove the 2 hex bolts that hold this bracket in place. One in front, one on the side.
36) remove the bracket for the ps side tensioning pulley in front. Should be 3 torx bolts.
37) if you are replacing the engine mounts, remove them from engine bracket. Might have to lower the engine a bit with the traverse engine support brace.
38) now your oil pan should be free to be removed. Remove the 30 torx bolts. Note down each locations as they are of different length. The pan will fall off as soon as you remove the bolts so hold it in place so it won't drop on your face. More oil will pour/drip out also.
39) at this point, I took a break to let the oil continue to drip out so it won't be dripping like crazy on my face while working on it later.
40) remove the 2 bolts that hold the oil tubes to the pump.
41) remove the 3 bolts (1 torx, 2 hex) that mount the tubes to the engine block and the bracket. (thread locked bolts) The oil tubes should come off now.
42) remove the 4 torx bolts that mount the above bracket to the engine block. (thread locked bolts)
43) use feeder gauge to check side clearance on the connecting rods on each journal. Should be simply using something plastic that won't chip, and won't scratch/mark the connecting rod to pry each pair apart and check with feeder gauge. SenorFunkyPants suggest that it should be 10 thousandths. I didn't do this step to get an exact measurement but I did shift the rods apart back and forth and there were decent

amount of play.
44) start replacing the bearings one at a time. Rotate engine and repeat. I don't have any tool to turn the engine so what I did was put the car in 6th gear, release hand brakes, jack up one rear wheel, rotate that rear wheel to turn the engine. I move it back to neutral, lower the wheel, engage hand brakes before I get back under the car. The last part seems nonsense but I don't feel safe getting under the car with this wheel off the ground. However, if I lower the car with it still in gear, the wheel seem to rotate backward a bit and I didn't want it to spin the engine in reverse direction. Unfortunately, I don't know if you can do the same with DCT transmission.

That should be it. Reverse the order when putting everything back together and good luck.

Things to note:

- if memory serves me right, the sections that I read through in the BMW TIS are the subframe, oil sump, suspension, and brakes section.
- when removing bolts on structure/components, do not remove one all the way out in one shot. Try to loosen them up a bit at a time from outside inward to avoid warping. Reverse when tightening.
- the service manual call for the subframe bolts to be tighten from front to back with the stretch bolts being the last ones.
- note down and take pictures of routing of lines. You will forget how they are routed.
- bearings were put together with Clevite assembly lube and the bolts with ARP lube.
- highly recommend the ARP bolts. It will make your life much easier, especially if you are doing this with your back on the ground. If the other thread regarding rod bolts is true, then there is really no reason not to use them anyway.
- if you are changing the engine mounts, put them on the subframe first but don't tighten them all the way, just enough that the dowel pin is in so it won't spin. It will give you some room to move them a bit to line them up with the engine brackets.
- the bolts that mounts the oil tubes to the engine block and brackets seems to have thread locking compounds on them. I cleaned up the old one and used the blue surface insensitive one back on these bolts. Same thing with the steering knuckle bolt at the bottom near the steering rack that you will have

to remove. I cleaned this one and used new thread locks on it. The suspension tower nuts also seem to have thread lock compounds on them.
- there is not much room to work with the top shells. Shift the top shells back and forth along the same direction as the engine and it will come loosen/off after a few times. This means across the rod and not radially. Make sure the rod and the bearing do not come into contact with the journal at any time. This is the easiest way I found to get the top off. Do not try to use anything to pick them out, you will scratch up something.
- when removing each cap, check for signs of discoloration, rub marks, etc to see if the engine has side clearance or other potentially issues for future planning/reference just for peace of mind. Please refer to the wiki for some of the pictures/information.
- when putting the subframe back together, after I positioned it back up before tightening everything back down, I used the rear 2 most bolts (they are the stretch bolts) to line it back up to the exact location as before. These bolts have washers that have 4 notches in them. And I spin the washers til those 4 notches lined right back up to their old marks and indentations. You will know what I mean when you get there. I think this is the easiest way to make sure the subframe is in the same spot as before. The manual call for these bolts to be tighten up last so don't crank them all the way down, just hand tighten them to more or less lock the subframe back in position and you should be good.
- i pulled fuse #39 (on 2011 model) from the glove compartment to disable the coil and fuel injectors and just crank the engine with the starter to prime the oil pump before starting the engine. It takes a good few turns (like 10-20 seconds) for the engine to build up any oil pressure. I put the fuse back in and the engine starts right up. If you use this method to prime your engine, the check engine light will be on complaining about fuel pump. You can reset this afterward. I just let it be and it went away after a few cycles.

Torque values I used:
connect rod bolts (ARP2000): 45 ft-lbs
oil pan bolts (30 qt) and all other M6 bolts inside/outside engine: 10 Nm
ps bracket (3 qt) and ps pulley bolts (3 qt) (M8): 19 Nm
steering rack bolt on step 6 (1 qt) (M8): 21 Nm

E12 transmission to oil pan bolts (4 qt) (M10): 38 Nm
engine mount nuts. 1 top, 1 bottom on each side: 56 Nm
the 6 front subframe bolts (M12): 108 Nm
rear 2 most subframe bolts (M10): 56 Nm + 90 degree
re-enforcement plate bolts (7 qt) (M10): 56 Nm + 90 degree
deflection pulley (the one right infront of the water pump pulley): 45 Nm
4 water pump pulley bolts (M6): 10 Nm
pulley tensioning system on both sides. 2 for each side (M8): 19 Nm
suspension tower nuts on both side. 3 for each side (M8): 34 Nm
front brake bracket to hub. 2 for each side (M12): 110 Nm
oil cooler lines nuts (M8): 15 Nm

Last edited by e92zero; 01-07-2015 at 03:53 PM.

Appreciate 2 QUOTE

01-04-2015, 11:06 AM #12

gazosnic
Captain

22 REP 907 POSTS

Drives: bmw m3
Join Date: Feb 2010
Location: chicago

iTrader: (3)

What would a independent shop charge for labor to do this?

Appreciate 0 QUOTE

01-07-2015, 04:37 PM #13

///Mvy
Private First Class

8 REP 152 POSTS

Drives: 08' AW e90M3/6 & 08GT3
Join Date: Dec 2014
Location: Annapolis

Thanks for these write ups!

iTrader: (**0**)

Appreciate 0

QUOTE

04-28-2015, 03:59 AM #**14**

SteveInfante

AEMS SC Prez

109 REP 1,187 POSTS

Drives: 2014 F22 228i 6MT
Join Date: Sep 2010
Location: Columbia, SC

iTrader: (**0**)

Quote:

> Originally Posted by **gazosnic**
> *What would a independent shop charge for labor to do this?*

$2500 ish is the going rate that I've read on the forums. I'm not sure how much the parts are in total and if someone would like to post the amounts for the bearing and bolts that would be stellar.

228i MBM/Terra 6MT, Premium, Cold Weather, lights, tint
http://www.facebook.com/newfinishcolumbia/

Appreciate 0

QUOTE

04-28-2015, 07:26 AM #**15**

pbonsalb

Brigadier General

215 REP 3,414 POSTS

Drives: 08 E90 M3, 99 E36 M3 Turbo
Join Date: Feb 2011
Location: Concord, NH

iTrader: (**3**)

Shops like EAS, Bimmerworld, and others sell WPC treated bearings and stock and ARP bolts. In addition to the bearings and any treatment and bolts, you need a pan gasket, which was about $25, an oil filter and 8-9 quarts of oil, plus some PS fluid if your DIY involves disconnecting the PS. I used stock bolts and bought the bearings and sent them to WPC myself (about $75 with shipping) and spent under $600 for bearings, WPC treatment, stock bolts, pan gasket, filter and Mobil 1. With ARPs, it would have been $800.

A shop that has done a few of these is probably doing it in 8 hours, though I doubt they will admit that since it means they are making about $200 per hour on this job. EAS does not even drop the subframe -- they lower it just enough to pull the pan and leave it hanging. They are disconnecting little

and have the job down to a science. The ARP bolts they use are quick to install compared to stock bolts.

Appreciate 0 QUOTE

04-28-2015, 08:53 PM #16

SteveInfante
AEMS SC Prez

109 REP 1,187 POSTS

Drives: 2014 F22 228i 6MT
Join Date: Sep 2010
Location: Columbia, SC

iTrader: (0)

Thanks for the info. That filled in the blanks a bit. I would be awesome to have pictures of all the stuff under the car and the process for switching out the bearings so we could rinse and repeat for each one once we get everything apart. I'm guessing that I could do this in about the same amout of time you two did once I got everything out of the way. I'm looking at getting an E9X M car and this is one of the first things on the just in case stockpile of parts for when the time comes.

_____

228i MBM/Terra 6MT, Premium, Cold Weather, lights, tint
http://www.facebook.com/newfinishcolumbia/

Appreciate 0 QUOTE

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