



## SPLINE LOCK Crank hub solution install guide



**Thank you for your purchase of the VTT SPLINE LOCK Crank Hub Solution upgrade! First thing to do when you open your box is to make sure all parts are in their respective bags and nothing has been left out or lost during shipping. Here is a breakdown of what you should have.**

- 1 VTT Spline Lock Hub
- 1 OEM Oil Sprocket (optional)
- 1 OEM Oil Sprocket retainer (optional)
  - 1 OEM Crank Bolt (optional)
- 1 VTT Crank Bolt Capture (optional)
- 6-8 CBC Bolts/washers (optional)



**Once all parts are accounted for you can proceed with the Crank Hub Installation. We suggest this only be done by a qualified technician failure to properly install your Crank hub solution CAN lead to engine damage. If something was missing for your upgrade, please contact us immediately so we can remedy this.**

**READ THE ENTIRE GUIDE BEFORE BEGINNING INSTALLATION!**



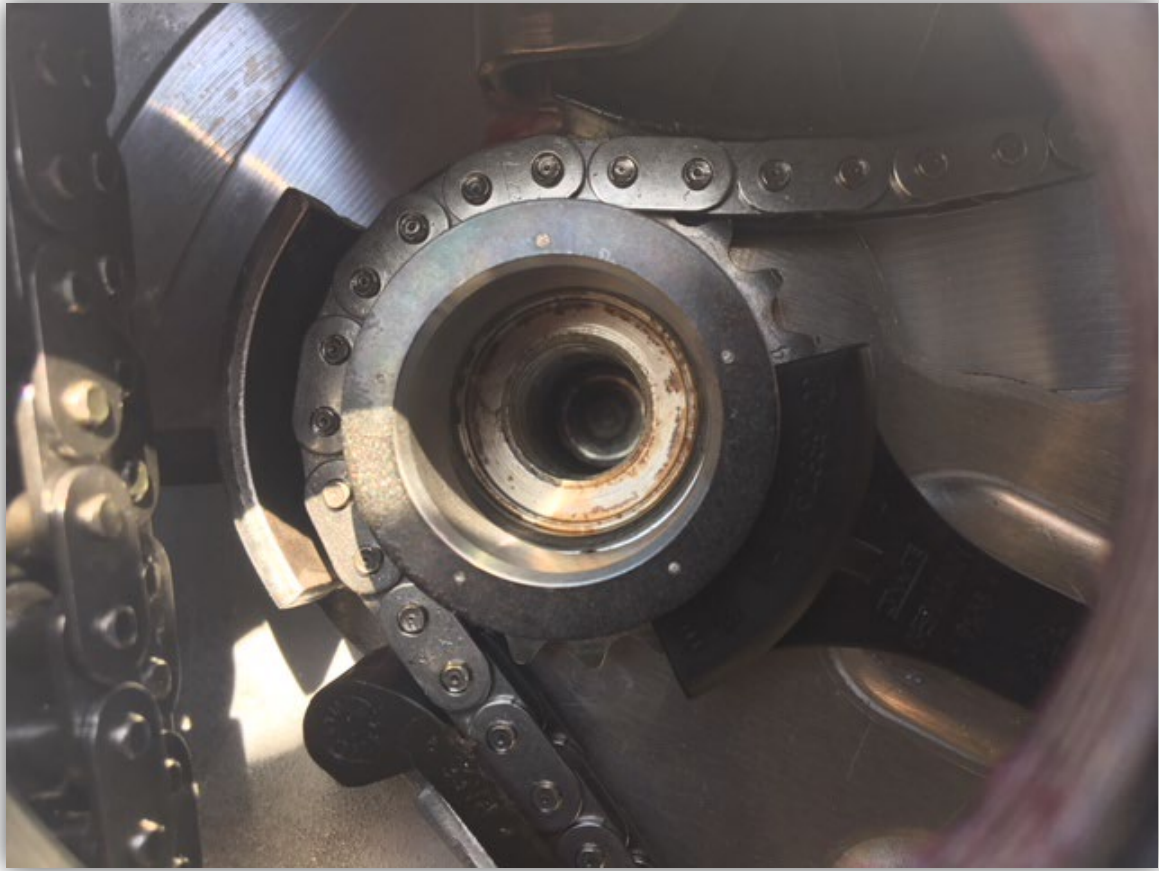
**ANY QUESTIONS, OR FITMENT PROBLEMS, PLEASE EMAIL [SALES@VARGASTURBO.COM](mailto:SALES@VARGASTURBO.COM) BEFORE TRYING TO FORCE OR MODIFY ANYTHING. THIS UPGRADE IS PLUG AND PLAY IF THESE INSTRUCTIONS ARE FOLLOWED, ANY ISSUES NEED TO BE ADDRESSED TO AVOID PROBLEMS**

## **INSTALL GUIDE**

- 1. Following factory procedures remove under trays, radiator fan, and serpentine belt, valve cover, vibration damper, oil pan, and any other parts that may be required to access the crank hub, and timing components of the vehicle. THIS IS NOT A GUIDE ON HOW TO TIME YOUR BMW VEHICLE. THIS IS A GUIDE TO WALK YOU THROUGH THE SPECIFICS OF INSTALLING THE VTT SPLINE LOCK HUB. SPECIAL TOOLS ARE REQUIRED TO DO THIS JOB, AS IS INTIMATE KNOWLEDGE OF BMW CAM TO CRANK TIMING SYSTEM. IF YOU ARE EVEN REMOTELY CONCERNED YOU MAY NOT BE ABLE TO INSTALL THIS CORRECTLY, DO NOT ATTEMPT, AND HAVE A QUALIFIED SHOP PERFORM THE INSTALL. WE SUGGEST REMOVING THE OIL PAN TO DO THE JOB, IT IS POSSIBLE TO DO WITH THE PAN INSTALLED, BUT IT IS VERY DIFFICULT, AND NOT RECOMMENDED**
- 2. Once You have access to the timing components of the vehicle, and the hub is accessible. Find TDC on the vehicle, and lock the cams in place with the timing tools. (if your hub has slipped be sure you have no engine damage, and be very careful turning the motor over as you may bend the valves if the crank is turning, but the cams are not.**
- 3. Once TDC is found, and the cams are locked into place, install your crank locking tool, BMW makes a few different types. If the motor is on the engine stand, you can make a tool to lock the rear of the crank against the stand, and spin the bolt out with an impact. On reinstallation you can TQ the bolt but will have to wait until the engine is in the car to stretch or you must secure the stand from moving, as the force required for stretching the bolt will turn the stand over. DO NOT ATTEMPT to remove the crank bolt without locking the crank in place with a proper tool, engine damage can occur...**
- 4. Once the crank, and cams are locked, remove the chain tensioner to relieve the tension on the timing chain. Once all that is done proceed to remove the crank bolt, hub, and timing sprocket from the front of the engine. If changing the oil sprocket, and retainer (recommended) you can use a screwdriver to remove the retainer and squeeze the sprocket out. You may have to relieve tension on the oil pump chain to do this. (S55 ONLY: WARNING on removal of the oil sprocket the oil chain tensioner piston CAN come out of the bore, if this happens it is very very hard to get back in without damaging it, as the spring is strong, we suggest having a new tensioner on hand during the install, in case this happens. You will also need to remove the cover in front of the tensioner to get to the bolts, this cover is not reusable. Part numbers for tensioner, and cover are at the end of the guide)**
- 5. Once you have all stock crank components removed, you can prepare for install. Using brake clean and a rag or paper towels remove the oil, etc. from the crank snub and check for any burrs or damage if your hub has previously spun. Your crank has to be in good shape to accept the spline lock hub.**
- 6. If you are going to change your front crank seal now is the time to do it, if not continue to the next step.**
- 7. Install the new Oil Sprocket, and sprocket retainer (gear side goes towards the engine) (S55: This is when you may need to install the new oil tensioner if replacing) Once that is done the front of your engine will look similar to this. (Fig 1)**

8. With the oil sprocket installed you are ready to install the SPLINE LOCK hub. If you have the engine on the stand, oil pan is off, and vanos solenoids are not on yet MAKE SURE you have the chain open so it goes around the hub when installed. Failure to do this will require removal of hub after it is installed (which requires a puller). If the motor is in the car it is possible to get the chain on the timing sprocket without removing the vanos solenoids, but it is difficult. The easiest way to do this is to remove the two one-time use bolts, and remove the vanos solenoids, this will allow the chain to drop down. Allowing easy installation of the hub, then line up the chain with the sprocket, and pulling it back up to reinstall the vanos solenoids. If this method is used, you must replace the two bolts, and follow factory procedure for those bolts which is 20NM, and 180 degrees of stretch. Whichever way you are doing this follow these steps.
9. Using white grease something similar lubricate the lip of the seal so it will slide easily when the hub is inserted. Now you can slip your hub through the hole, through the oil sprocket, and against the nose of the crank. The crank has a very aggressive taper, and the sprocket should center itself once you begin to press it in. BUT, it can go in cocked if you do not take care to make sure its flat once you have the press in bolt snugged in by hand (Fig 2-8)
10. With the hub FLAT against the crank insert your old crank bolt through the hub, and thread it into the crank by hand. (Fig 9)
11. Making sure you have locked the crank as it will TAKE QUITE A BIT OF FORCE TO PRESS THE HUB INTO THE CRANK, use a ½" drive 22MM socket (7/8" will work in a pinch) ½" ratchet tighten the old bolt until it stops, as you do this you are pressing the splines into the crank. (Fig 10-12) Once this is done ensure the hub is pressed all the way in. Remove the old bolt, insert your new Crank bolt, take your ½" torque wrench and put 75 Ft/Lbs. of Tq on the bolt. We will stretch it later. (Fig 13)
12. Once the bolt is tight, you must time the motor, and check timing. To do this if the vanos sprockets were removed, reinstall, and using the timing tools line up the vanos pins into the plates, and ensure you crank has not moved from TDC. Once this is done insert two new vanos bolts, and only hand tighten them. Now using the tensioner tool, insert it into the tensioner hole, and put 3NM of torque on it (be very careful here, if you put too much tq on this tool, you will break the chain guides). Once this is done, you have verified TDC is still held, the cams are still locked with the tools, and vanos plates lined up with the pins. Tighten the vanos bolts to 20NM, then 180 degrees of stretch.
13. Verify the crank bolt is tight, and the vanos sprockets are tight, remove all timing tools (EXCEPT CHAIN TENSIONER TOOL), and spin the motor until it comes back up to TDC. At this time reinstall all the timing tools to verify timing is held. If timing is as it should remove the tensioner tool, and reinstall the factory tensioner, remove the cam tools, and vanos tool, leave the crank tool in place as the crank bolt still needs to be stretched. If timing is not correct, you will need to remove the vanos bolts again, throw them away, and retime using new bolts
14. Using the proper crank or flywheel holding tool, recheck the bolt tq is at 75 ft/lbs. Once verified, using a very long breaker bar, put 360 degrees of stretch for N54, and 270 degrees for N55/S55. Make sure to mark the bolt to the hub so you can track the degrees stretched. Also, keep in mind for the Crank bolt capture, mark one of the bolt holes, and line the bolt head up properly so the capture will fit easily.
15. Once the bolt is stretched, you can proceed to assemble the engine in reverse of how it was taken apart, making sure to replace all one time use bolts such as oil pan, and install the crank bolt capture onto the damper using the provided bolts, and washers. Tq spec on those is 40 ft/lbs
16. This concludes the Install of the VTT SPLINE LOCK Crank hub, go enjoy the security of knowing your crank hub is secured, and not going to slip on you!

**Fig 1**



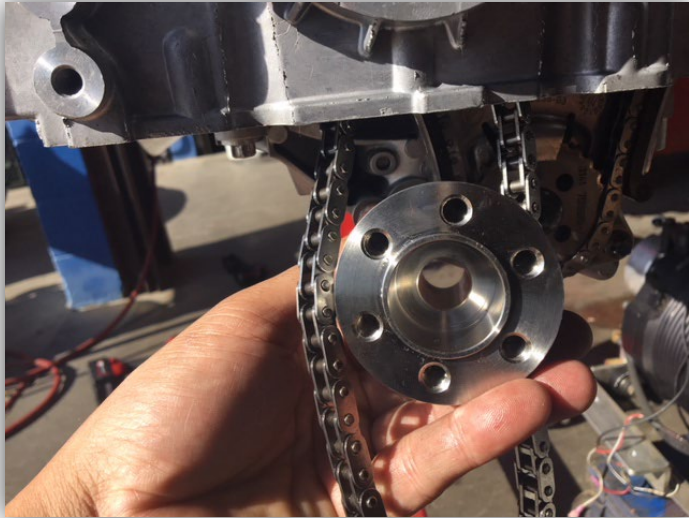
**Fig 2**



**Fig 3**



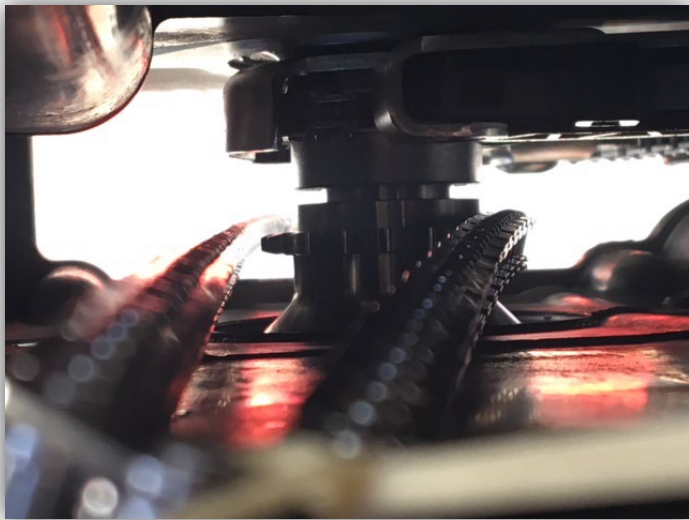
**Fig 4**



**Fig 6**



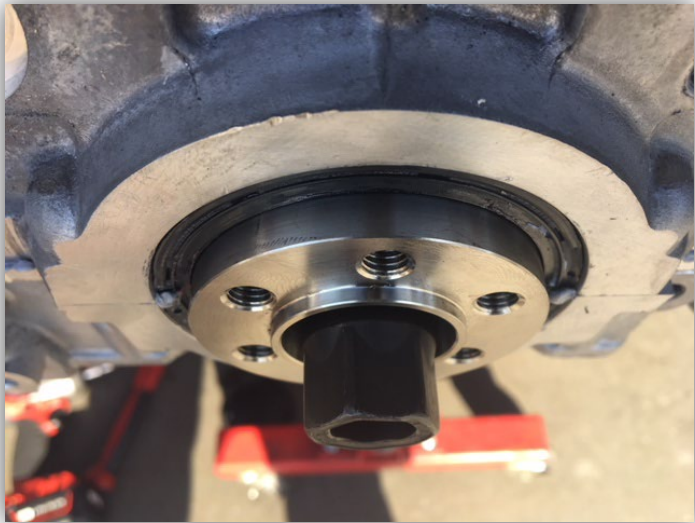
**Fig 7**



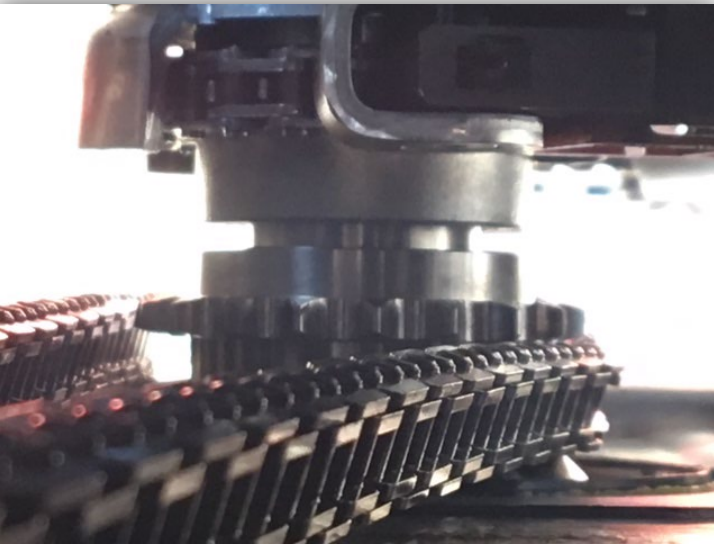
**Fig 8**



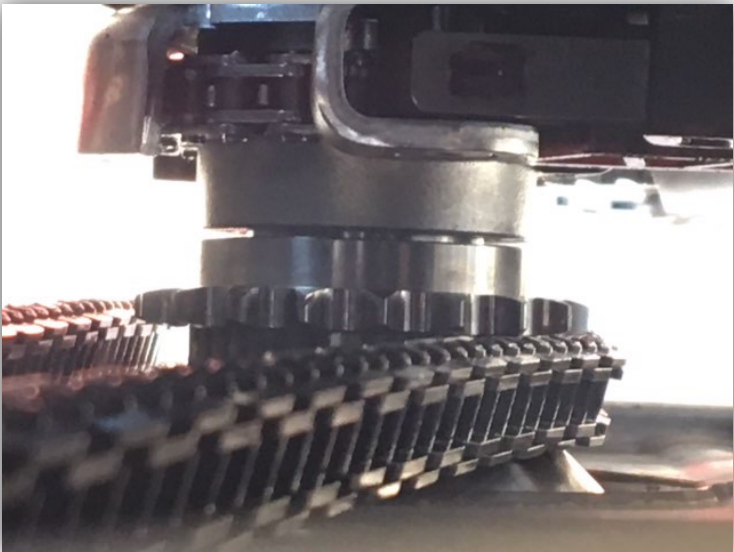
**Fig 9**



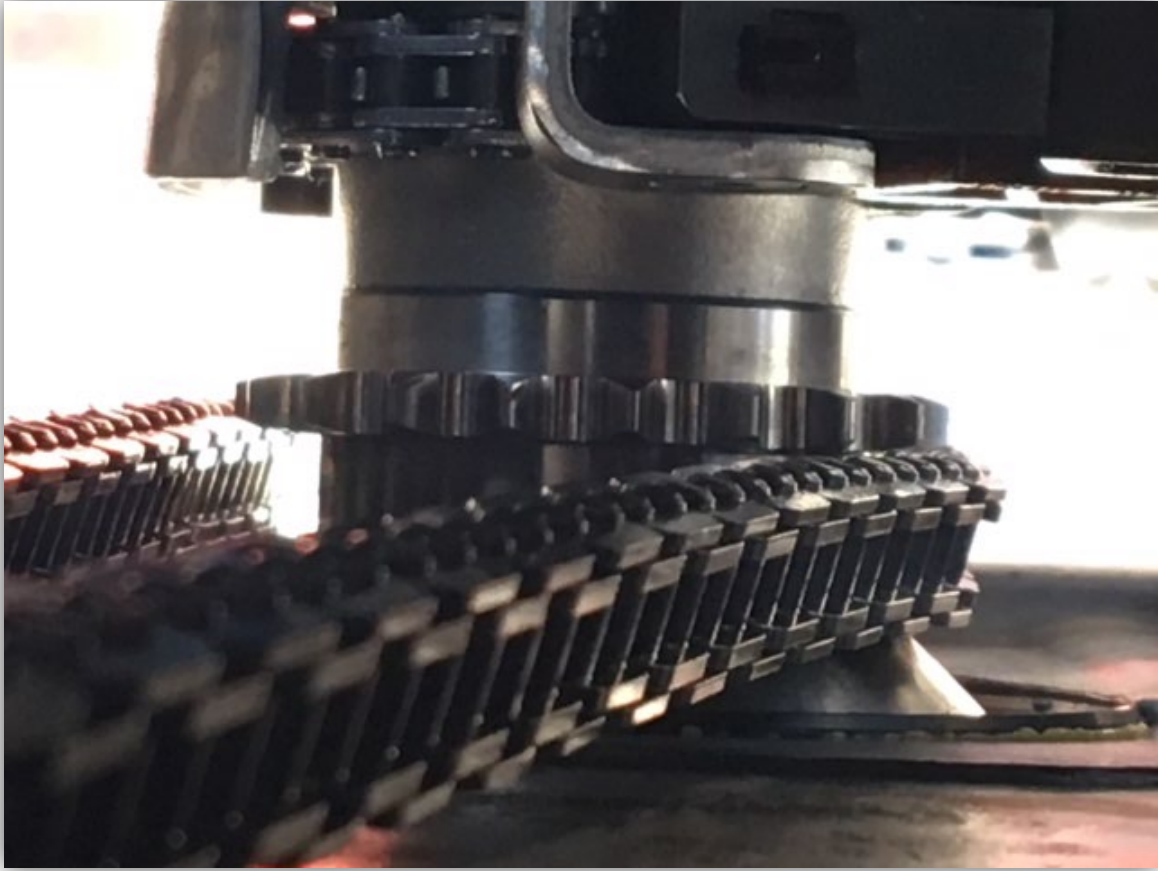
**Fig 10**



**Fig 11**



**Fig 12**



**Fig 13**



## **Part numbers for parts possibly needed for install**

### **N54:**

**OIL PAN GASKET** – 11 13 7 548 031

**OIL PAN BOLTS** – 11 13 2 210 959

**VANOS GEAR BOLTS** – 11 36 7 524 954

**VALVE COVER GASKET** – 11 12 7 565 286

### **N55/S55:**

**OIL PAN GASKET-** 11 13 7 600 482

**OIL PAN BOLTS** – 11 13 2 210 959, 11 13 7 559 537, 11 13 7 582 340

**VANOS GEAR BOLTS** – 11 36 7 524 954

**OIL CHAIN TENSIONER** – 11 41 7 618 943

**OIL CHAIN TENSIONER ACCESS CAP** – 11 11 7 615 131

**VALVE COVER GASKET** – 11 12 7 587 804