

Chang Jiang 750 OHV engine repair

This applies specifically to the CJ750F1 and CJ750F1a OHV engines, the latter having different oil pump gearing, a take-off point for a tachometer, and an output for an oil pressure gauge. Some of the information is probably applicable to SV engines as well. Tolerances, torques etc. are sourced to the original CJ manuals when possible, or to the Ural 650 repair manual, as its design is similar to the CJ's.

Recommended parts and tools

- A gasket kit
- New copper head gaskets
- A seal kit
- A flywheel bolt and a set of 6 clutch plate screws; they can be reused but it's better to replace them
- The CJ mechanic's tool kit, as it has a clutch alignment tool, as well as various puller accessories designed specifically for the CJ
- An impact screwdriver (hand or air)
- Penetrating oil
- Safety wire (twisting together two lengths of stranded picture-hanging wire is fine)
- A torque wrench
- A 36 mm socket
- A stand to hold the engine; easy to make with some 2x4s and threaded rod

Preparation

Start by removing everything attached to the engine (carburetors, crankcase vent hose, gearbox, spark coil, etc.) then mount the engine on a stand and drain the oil.

Oil pump

Remove the oil pump drive gear cover and lift out the gear and the oil pump drive shaft. Remove the oil pan. Cut the safety wire holding the oil pump filter in place. Unscrew the two bolts holding the oil pump in place (not the two with holes for the safety wire).

When reinstalling the oil pump, make sure the gasket does not block the oil duct.

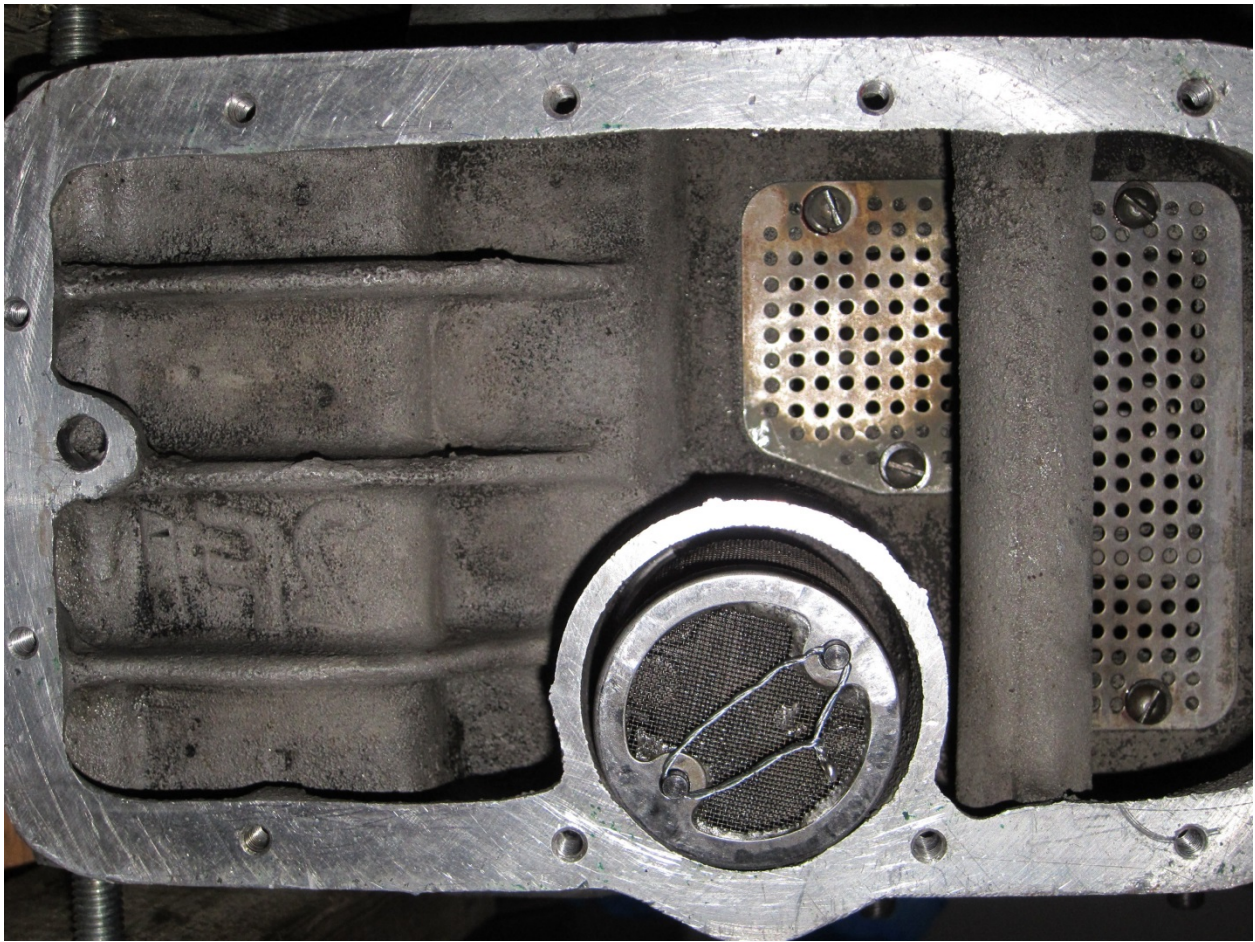


Figure 1 – Oil pan cover removed showing the oil pump filter safety wired in place.

Clutch

Use an impact screwdriver to loosen the six bevel-headed screws. Remove two screws in opposing positions, and replace them with a long fully-threaded M6-1 bolts and nuts. Screw the nuts up against the clutch plates, and then remove the 4 remaining bevel-headed screws. Then back off the two nuts to release the clutch springs' tension.

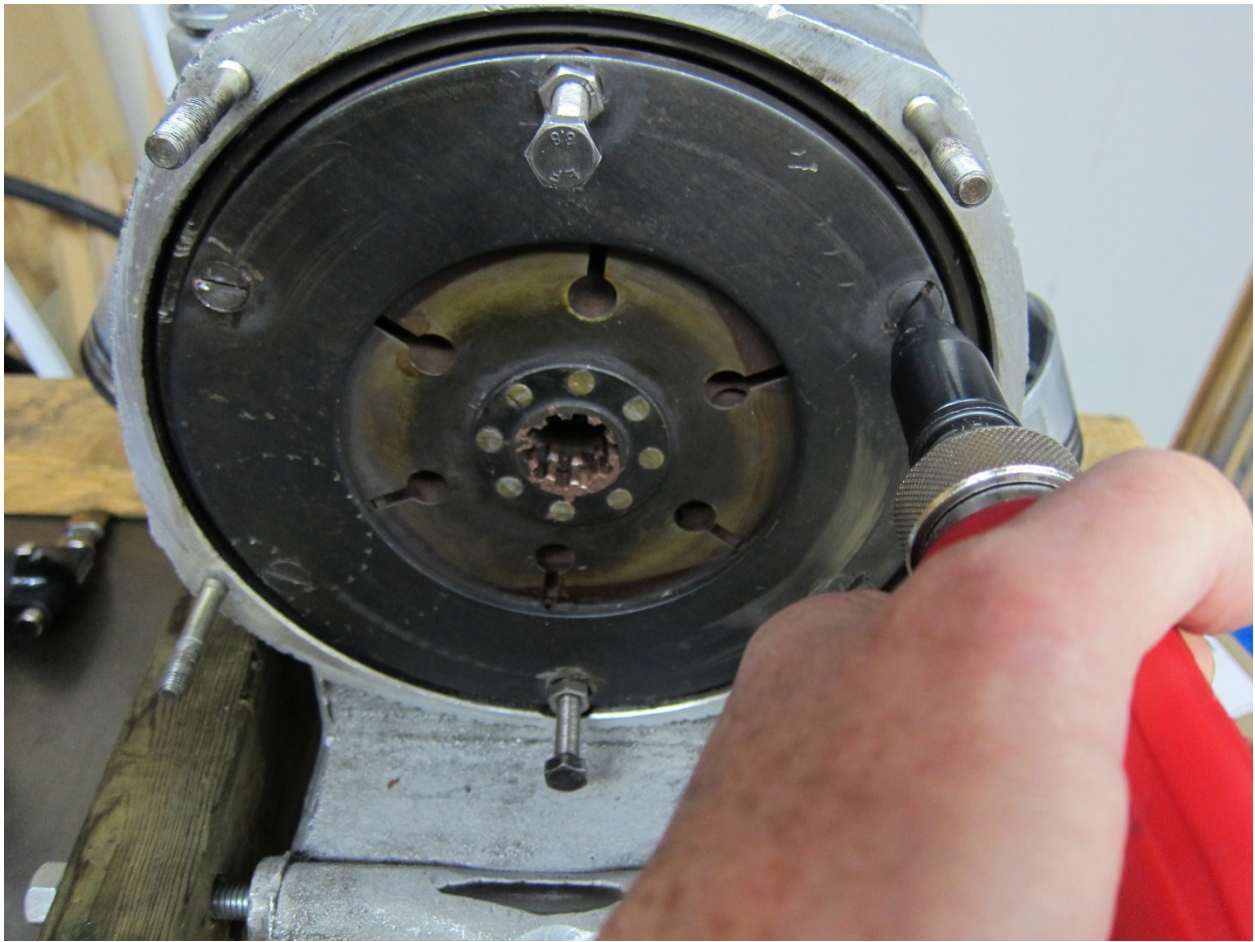


Figure 2 – Using an impact screwdriver to remove the screws, with the spring tension taken up by two M6-1 bolts

More information can be found here: <http://www.changjiangunlimited.com/tb2090.htm>

Remove the clutch plates. Assume the friction plate pads contain asbestos, so don't use compressed air to clean them.

Check the pressure plates for distortion. Check the friction plates for loose rivets or damaged splines. Replace them if they're damaged or excessively worn – when new they're around 6.5 mm thick. Check the guide posts on the flywheel and the matching holes in the pressure plates for excessive wear.

Clutch springs come in 3 ranges designated by colour: yellow, white and green, corresponding to the force to compress them to a length of 21 mm. If the force required to compress each spring to 21 mm in length is less than 20 – 23 kg, replace all 6 springs with ones of the same grade. ¹

When reassembling, use the CJ clutch alignment tool to insure the clutch plates are centred. Note that the rivet side of the friction plates faces outwards. The clutch springs will not stay in place without help. Either tip the engine forward, wrap the bottom of the springs with a strip of newspaper or wrapping foam to hold them in place, or hold them in place with a drop of cyanoacrylate (Super) glue. Lubricate the splines with a very small amount of anti-seize or heavy grease. Tighten the 6 bevel-headed screws with an impact hammer, and punch them so they won't come undone.

¹ Reference 2, page 285

Flywheel

Take a punch and flatten the safety washer under the flywheel bolt. Prevent the flywheel from turning (see Figure 4) and use a 36 mm socket wrench to loosen, but not remove, the bolt. Apply some penetrating oil, and then use the puller from the tool kit to remove the flywheel. Heating will help loosen the bond.

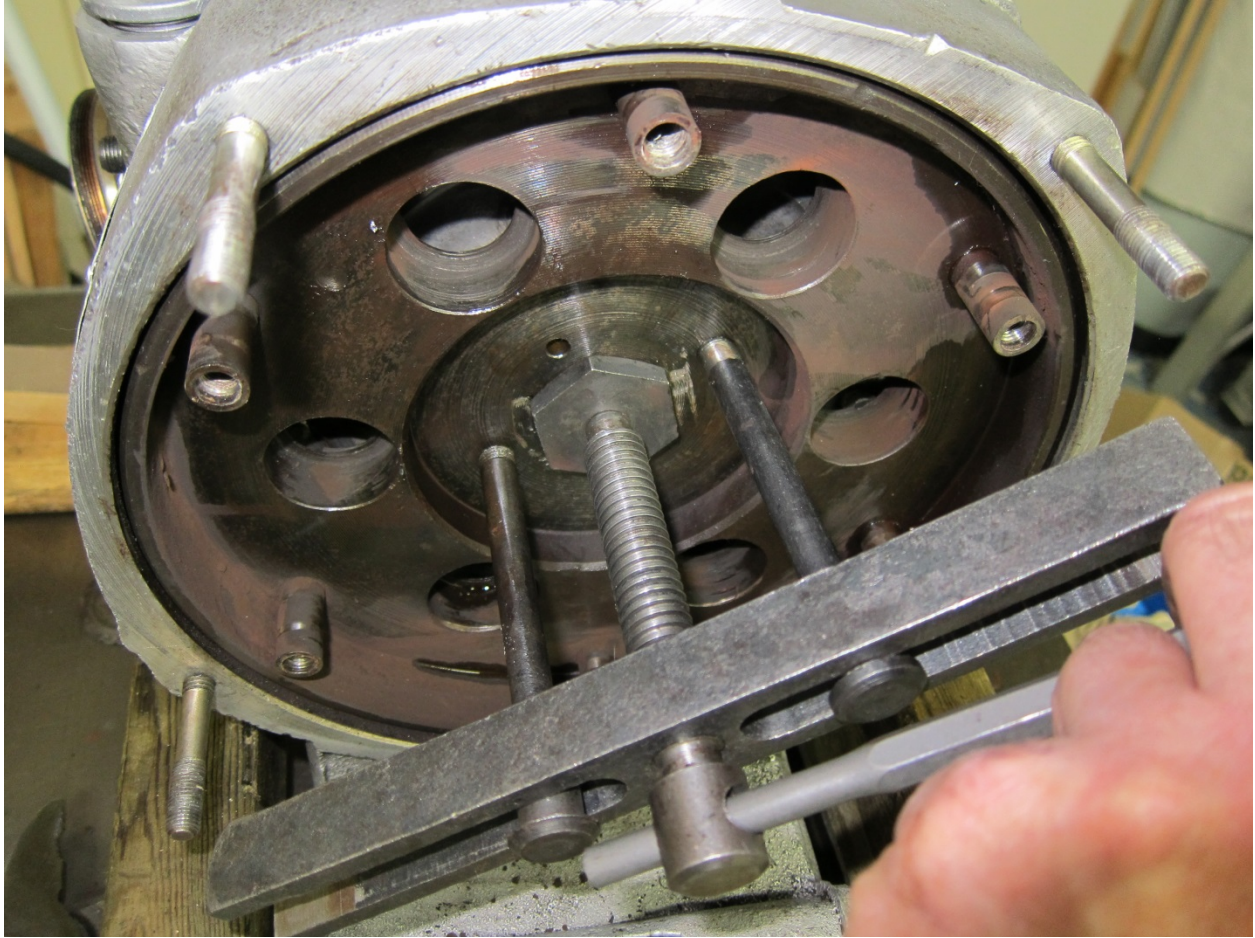


Figure 3 - Pulling the flywheel

While the flywheel is off, fill in the timing markings and numbers around the rim with white paint – it will make them much more visible when adjusting the ignition timing.

When reassembling, lubricate the part of the flywheel that contacts the oil seal.

Since the flywheel bolt is critical, use a new bolt when reinstalling the flywheel, if possible. ²

Specification:

Flywheel 36 mm bolt torque = 186 ± 10 N-m ³

² Reference 3, page 105

³ Reference 1, page 297

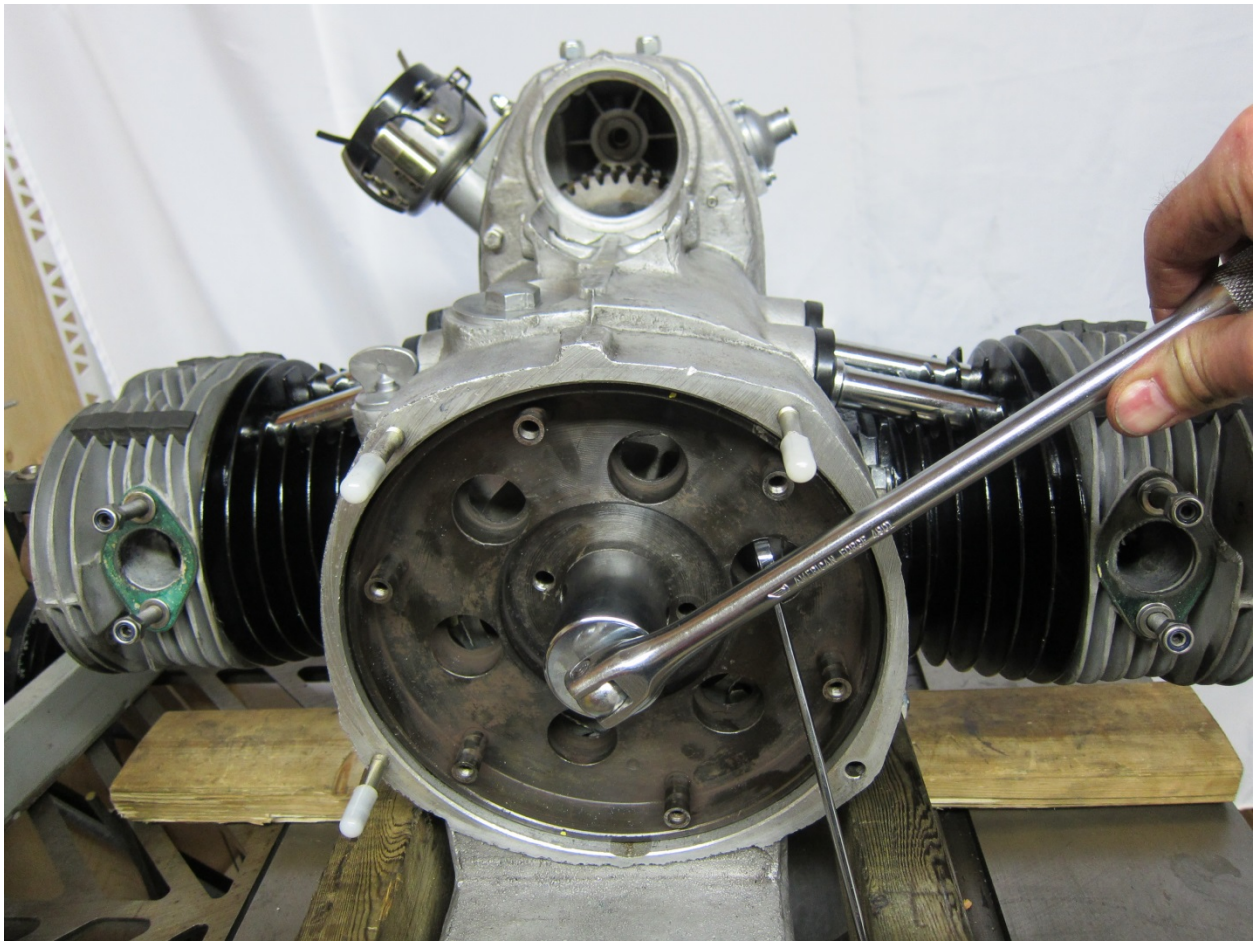


Figure 4 - Use an open end wrench to prevent the flywheel from turning when loosening and tightening the bolt

Rear crankshaft bearing

Cut the safety wire and remove the 9 bolts holding the bearing carrier plate.

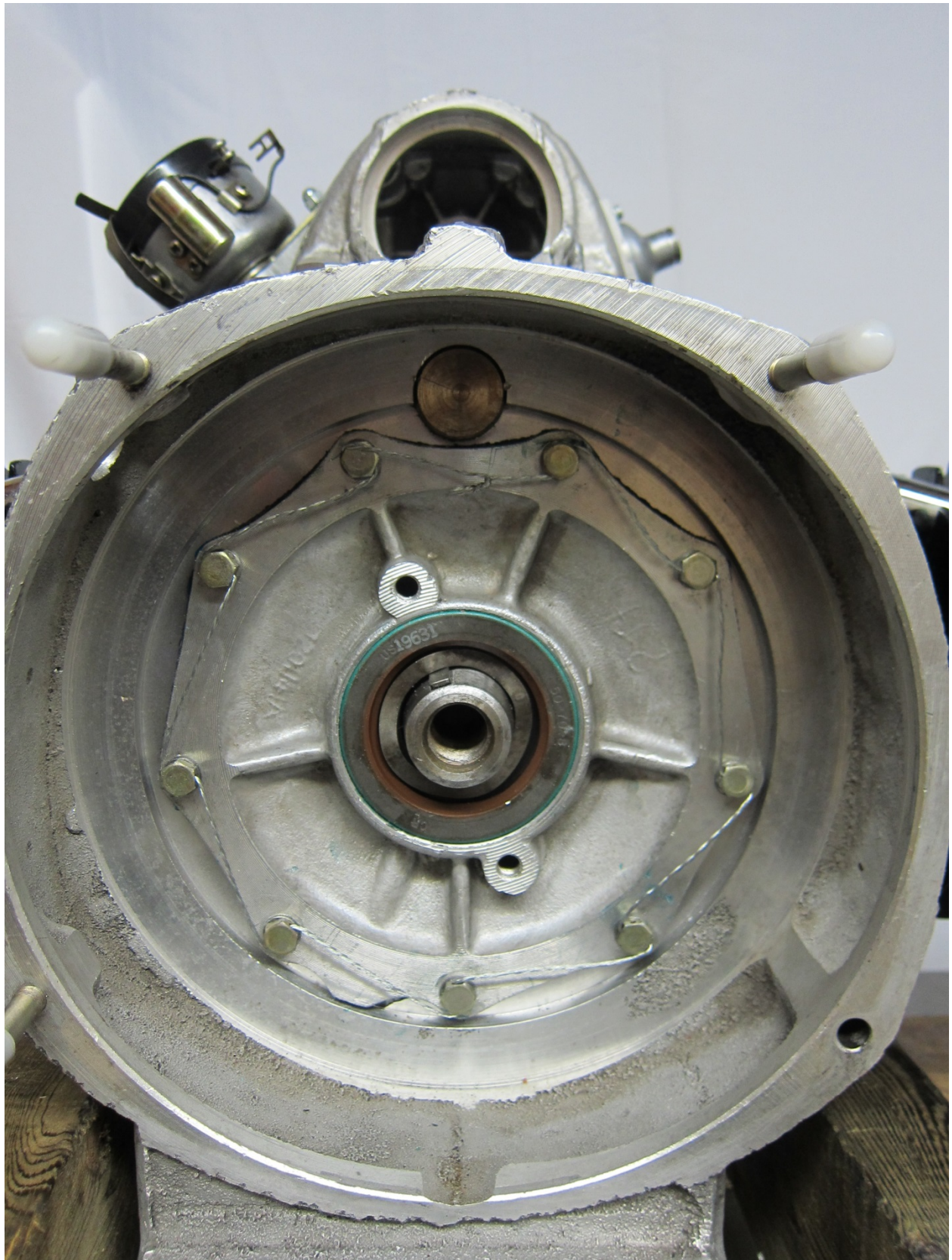


Figure 5 - Rear crankshaft bearing plate showing safety wire

Use the tool from the kit to pull the bearing carrier plate.



Figure 6 - Pull the bearing plate using the puller from the tool kit

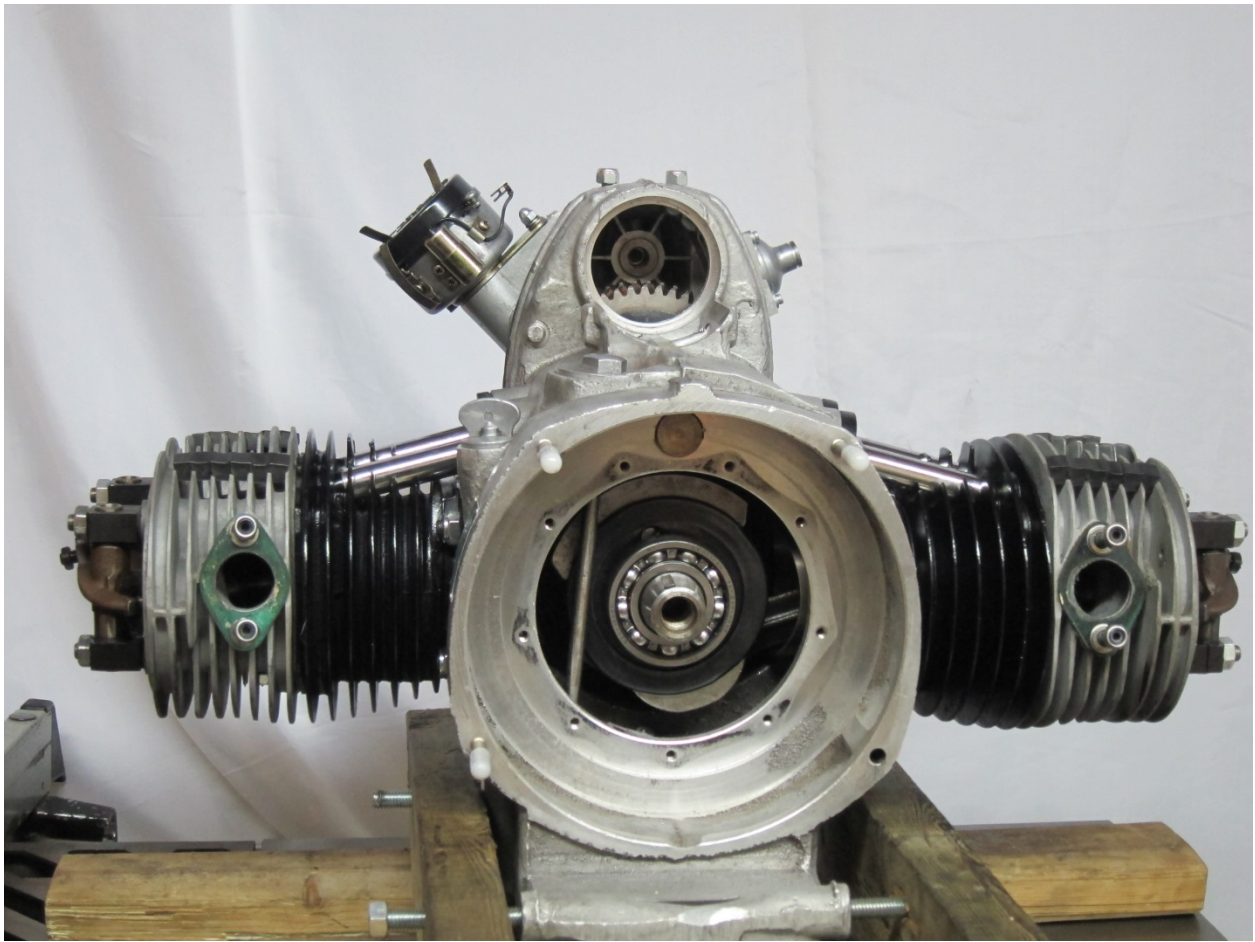


Figure 7 - Showing the rear crankshaft bearing and oil slinger

Before disassembly, note the position and orientation of the various parts: spring washer, oil guard, bearing, oil slinger.

Inspect the oil seal and bearing, and replace if necessary. Remove and replace the oil slinger, or clean it using a dental explorer and solvent, as the material to be removed will be densely packed.

If required, the rear bearing can be pulled and replaced without removing the crankshaft.

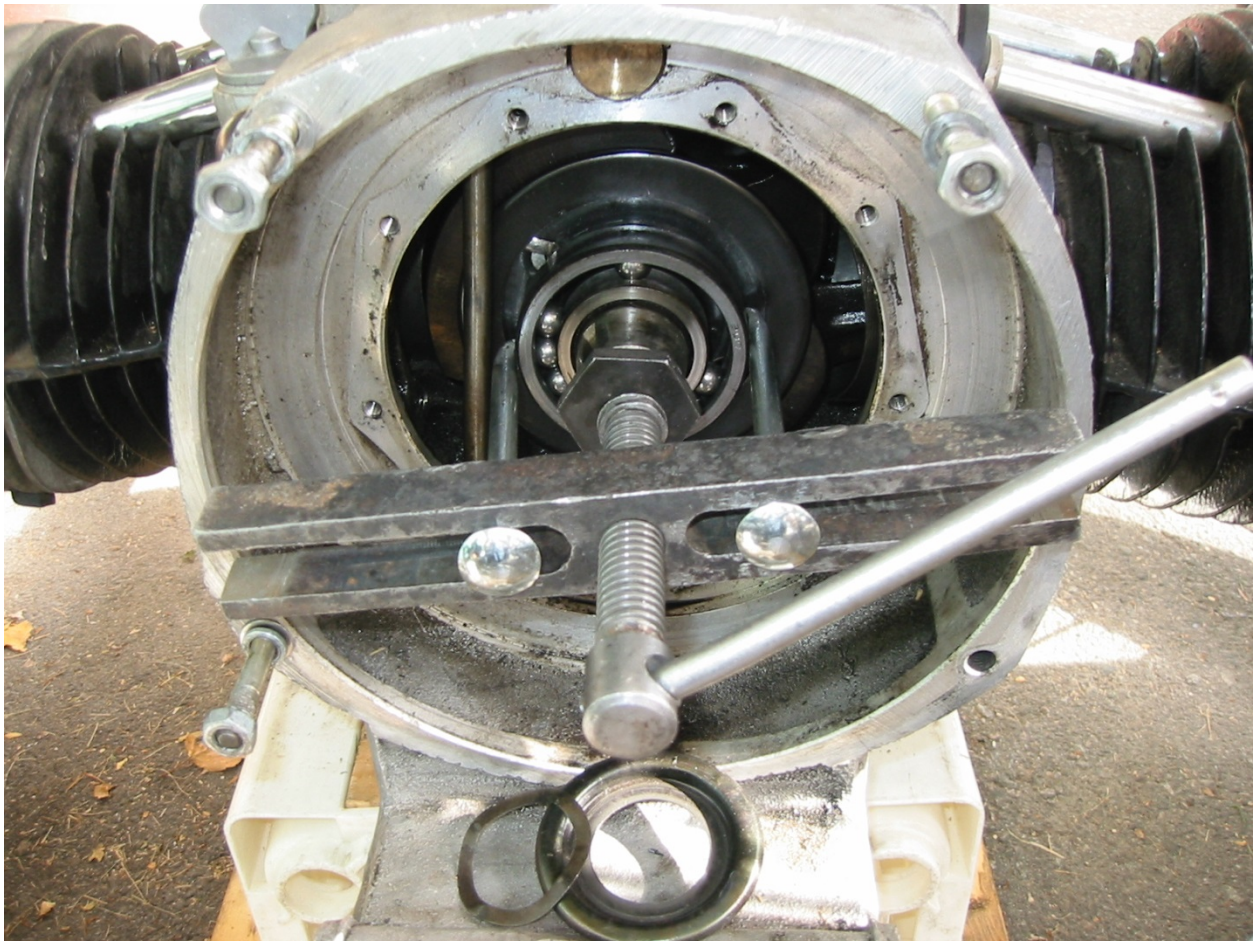


Figure 8 - Removing a damaged rear bearing

Valves and cylinder head

Remove the valve covers.

Undo the rocker arm support nuts, and then remove the rocker arm assembly, push rods and tappets. Undo the nut behind the spark plug, as well as the one on the underside of the cylinder head. Pull off the cylinder head.

Check if the valves seal properly by pouring solvent in the intake and exhaust ports to see if any leaks through the valves.

Compress the valve springs and remove the keepers. A modified C-clamp will work.

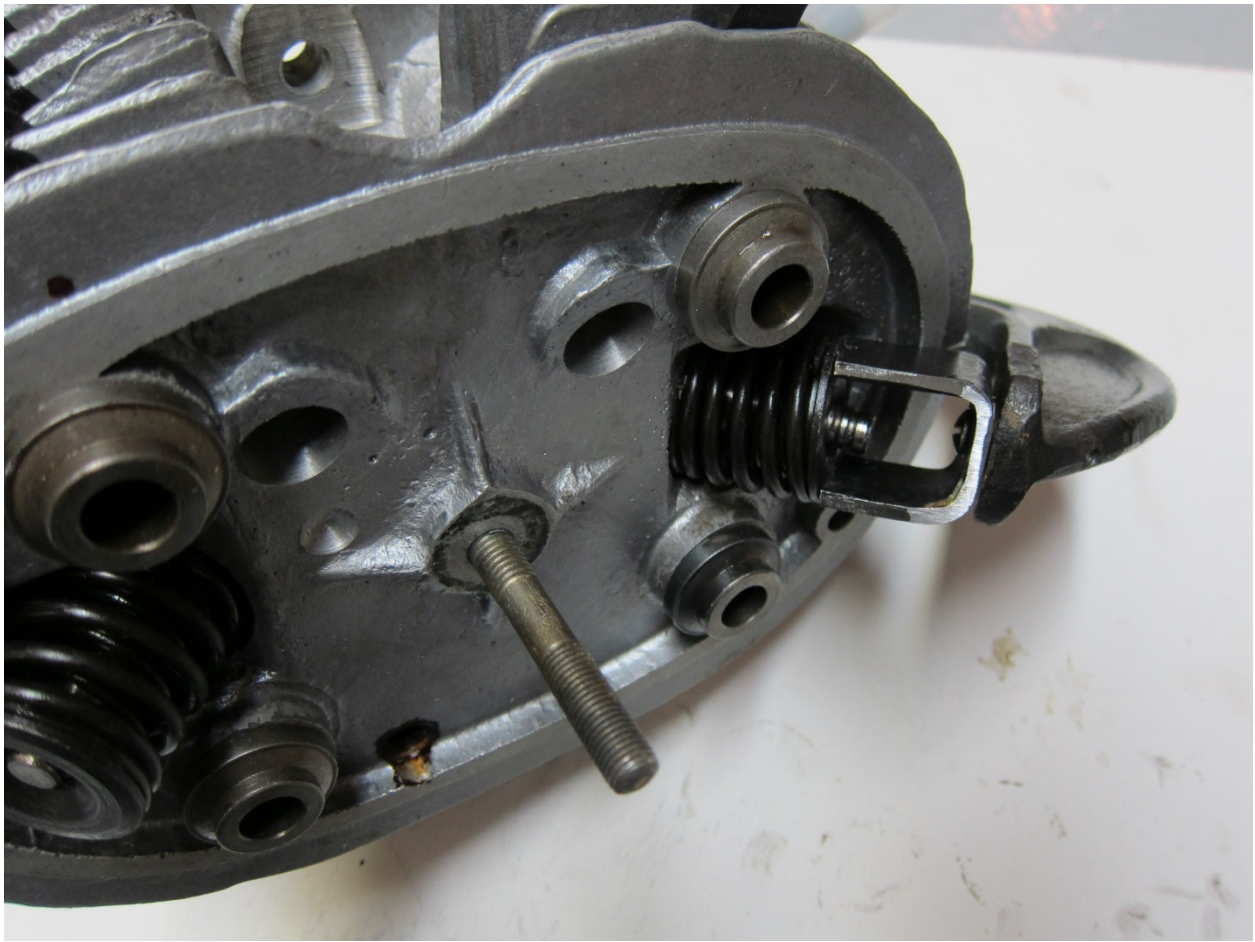


Figure 9 - Improvised valve spring compressor made with a C-clamp

Inspect the condition of the valve head seating chamfer, and make sure the valve contact area is concentric. Check for excessive play between the valve stem and the valve guide. Make sure the valve guides are well seated, and can't be pushed out with moderate pressure. Make sure there are no broken valve keepers (see Figure 10).

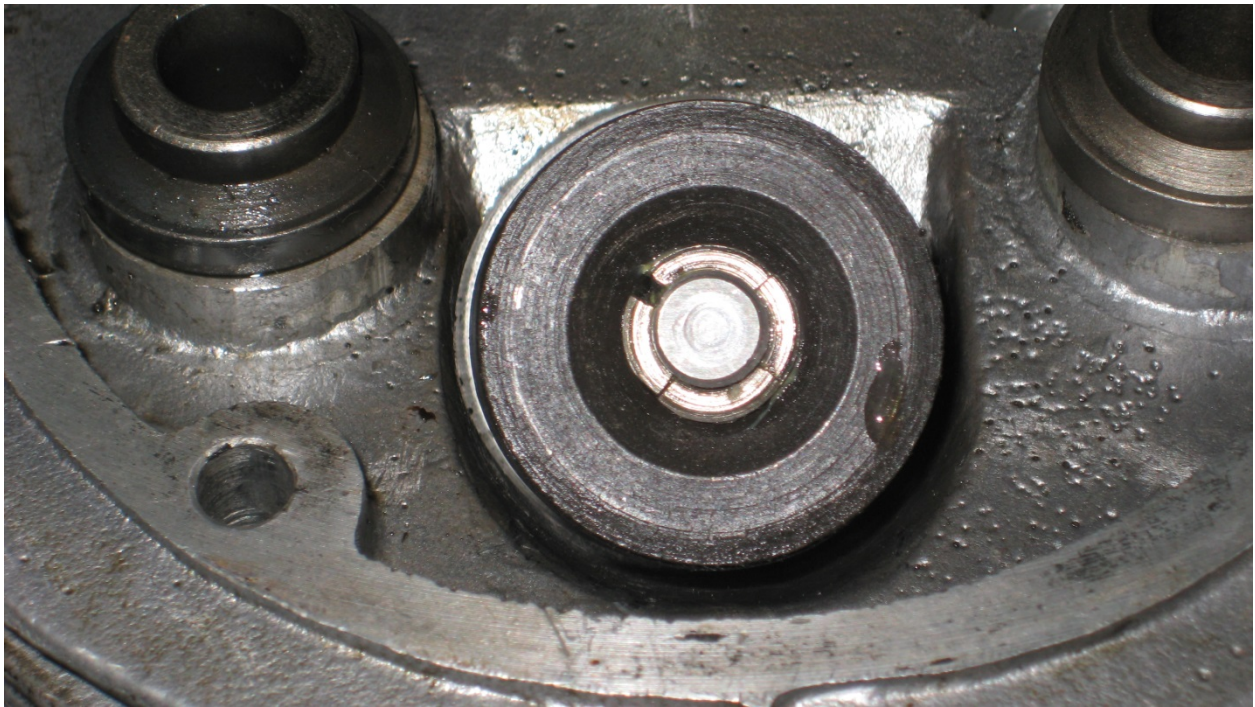


Figure 10 - Showing a broken valve keeper

Unless you have experience, fitting new valve guides and cutting new valve seats is probably best left to professionals.

Either replace the copper head gaskets or if reusing the old ones, anneal them first. When reinstalling the cylinder head and torqueing the head bolts, make sure the engine is at TDC and that there is clearance between the rocker arms and valves, otherwise the valve stems or push rods could be bent.

Adjust the valve clearance, and lubricate the rocker shafts through the top hole before replacing the valve cover. ⁴

Specifications:

Intake and exhaust valve clearance 0.1 mm (cold) ⁵

Intake valve stem to valve guide clearance = 0.035 – 0.072 mm

Exhaust valve stem to valve guide clearance = 0.05 – 0.087 mm ⁶

Rocker arm support / cylinder head nut torque = 40 ⁺¹⁰/₋₅ N-m ⁷

Copper head gasket thickness = 0.5 mm

Cylinders

Remove the four nuts on the base of each cylinder, and pull off the cylinders.

Clean and check the condition of the cylinder walls. If deeply scored or out of tolerance, consider replacing them or have them re-bored and install oversize pistons. Six steps of oversize pistons are available, in 0.25 mm increments.

⁴ Reference 3, page 92

⁵ Reference 1, pages 7, 57, 295

⁶ Reference 1, page 49

⁷ Reference 1, page 297

Before replacing the cylinder, lubricate the cylinder face with oil. Take care not to pinch the O-ring where the cylinder enters the crankcase. Hold the O-ring in place with grease, and oil the cylinder skirt. It's important that the O-rings not be pinched or torn, as they are an integral part of the lubrication system.

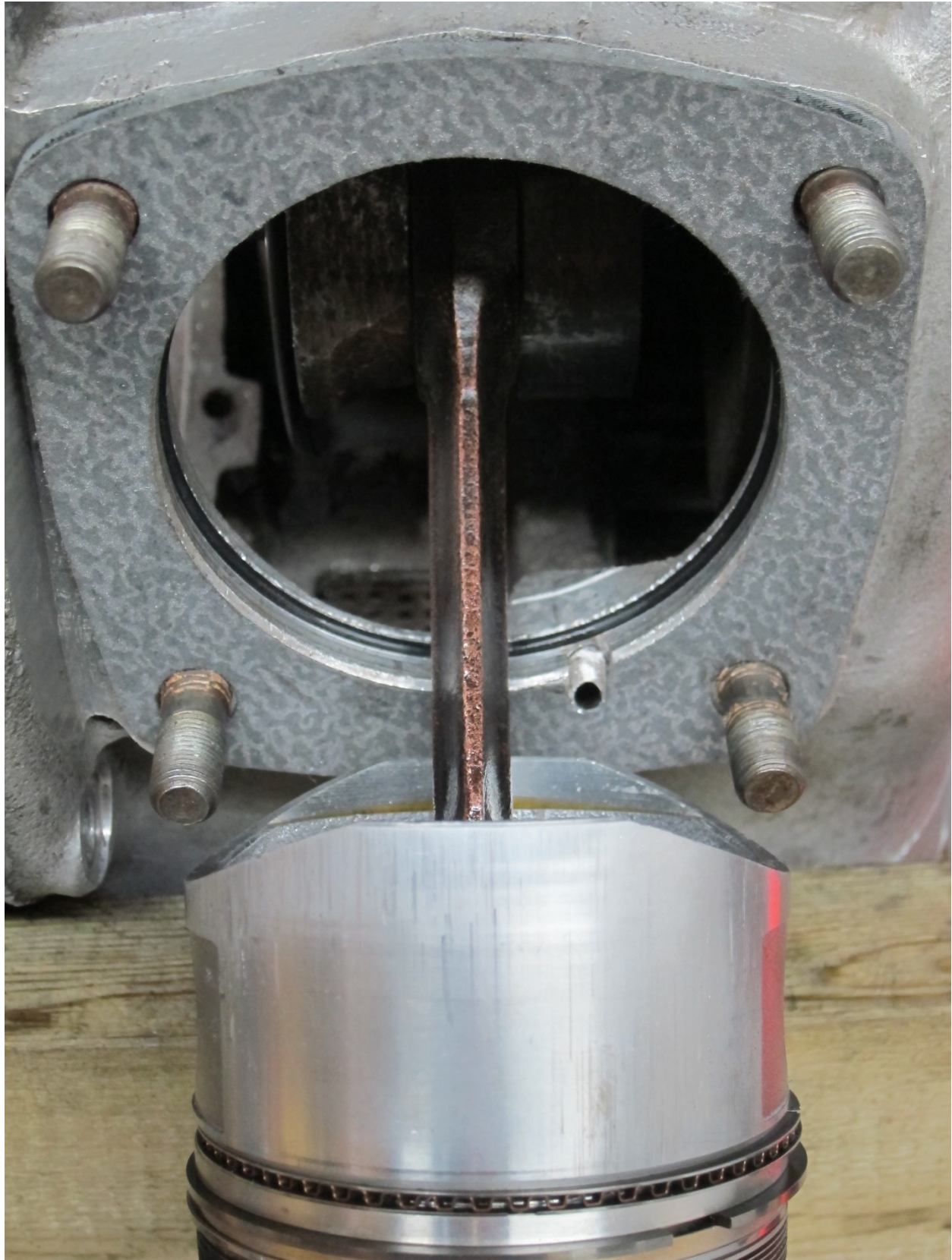


Figure 11 – Showing cylinder skirt O-ring seal

Cylinder bore specifications:

Maximum taper = 0.1 mm

Maximum out of round = 0.05 mm

Maximum cylinder diameter = 78.1 mm ⁸

Pistons

Remove the circlips and push out the wrist pin.

If installing new rings, place each ring in the cylinder and measure its gap before fitting them to the piston. Adjust if required.

Before installing the cylinder, rotate the piston rings so their gaps are not lined up. The gaps should be 120 degrees apart from one to the next.

Specifications:

Ring gap = 0.10 – 0.30 mm ⁹

Replace the wrist pin bushing if play >0.07 mm ¹⁰

Front end and alternator

Remove the cover plate.

Remove the 3 alternator stator bolts. Make sure the innermost carbon brush so it doesn't catch on the copper slip rings when pulling off the stator.

Remove the long hex-head rotor bolt. Remove the rotor using the special tool: screw in the setscrew until it clears the rotor and engages in the rotor shaft. Screw in a couple of turns more, and then tighten the hex bolt against it. This will break the taper bond between the rotor and its shaft.

More information can be found here: <http://www.changjiangunlimited.com/tb2094.htm>

⁸ Reference 1, page 280

⁹ Reference 1, page 38

¹⁰ Reference 2, page 271



Figure 12 – Bolts used to remove the alternator rotor from its shaft

Remove the 9 M6 cap screws on the front, and the single M6 bolt from behind. Pull off the timing gear cover.

Camshaft, tappets and push rods

Remove the oil pump drive gear cover and lift out the gear. Remove the starter motor. Undo the two bevel-head screws (at 5 and 11 o'clock) that secure the camshaft gear retaining plate. To be able to remove the camshaft, the tappets must be pushed away from the camshaft. This can be done with the cylinders in place, but the valve gap adjustment screws will have to be completely backed off.

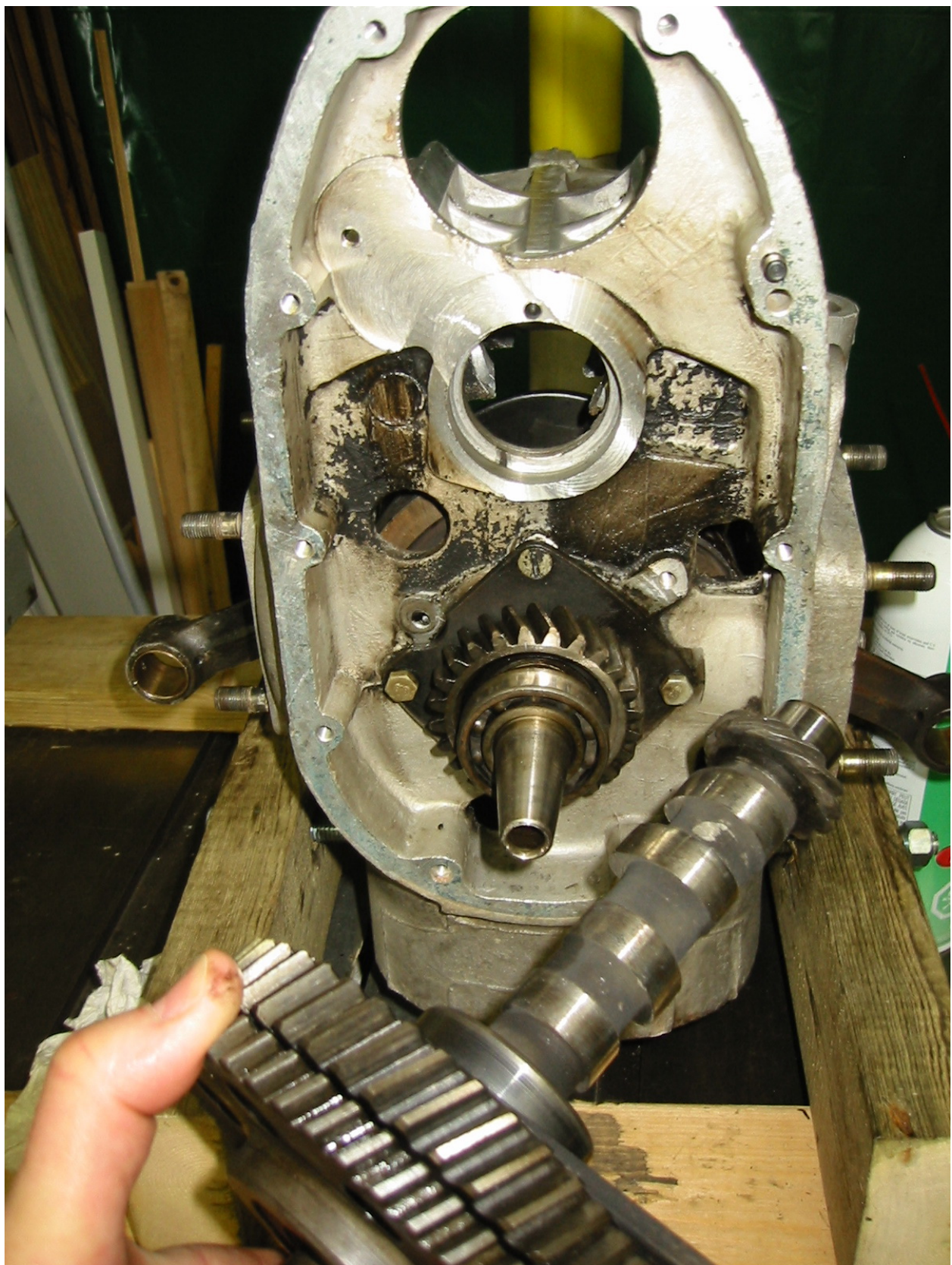


Figure 13 - Removing the camshaft

Check the condition of the camshaft, tappets and bearing. The photo shows a tappet that came apart, damaging the right cylinder's exhaust valve cam lobe. Roll the push rods on a flat surface to insure they are not bent. Replace if worn or bent.



Figure 14 - Broken tappet and damaged cam lobe

Before reinstalling the camshaft, lubricate the rear bronze sleeve bearing. When meshing the gears, make sure the timing marks line up. The upper timing mark is hard to see once the starter gear is in place, so it helps if you highlight the alignment marks and adjacent teeth with a marker.

Lubricate the tappets with motor oil, and reinstall them in their same positions.

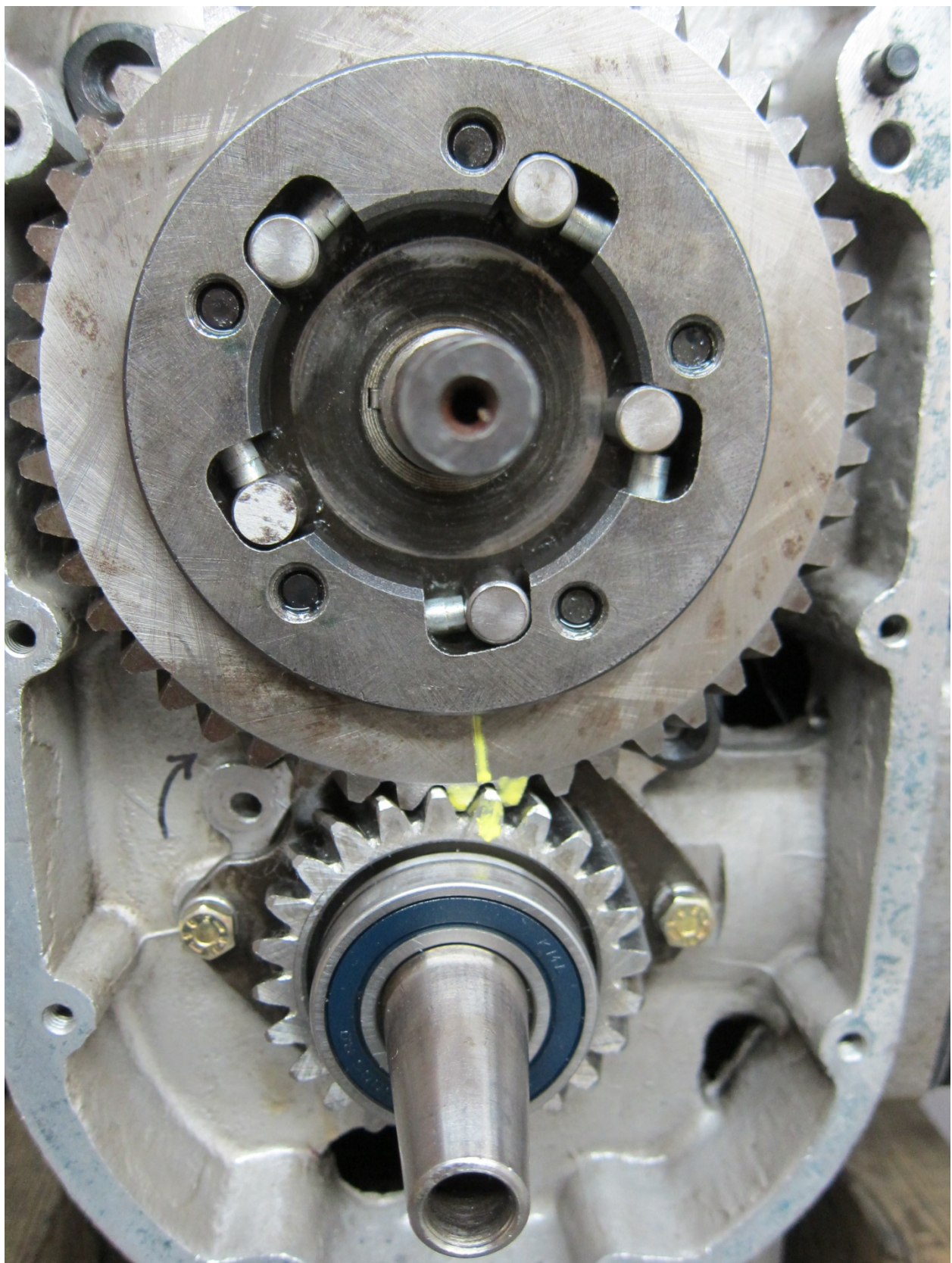


Figure 15 - Timing marks highlighted with paint (starter gear removed)

Specifications:

Camshaft rear bushing free play = 0.08 – 0.119 mm ¹¹

¹¹ Reference 1, page 52

Tappet clearance = 0.01 – 0.041 mm¹²

Timing gear backlash = 0.04 – 0.20 mm¹³

Crankcase vent valve

Remove the valve cover, clean and insure that the valve's diaphragm moves easily and closes completely.

¹² Reference 1, page 52

¹³ Reference 1, page 295

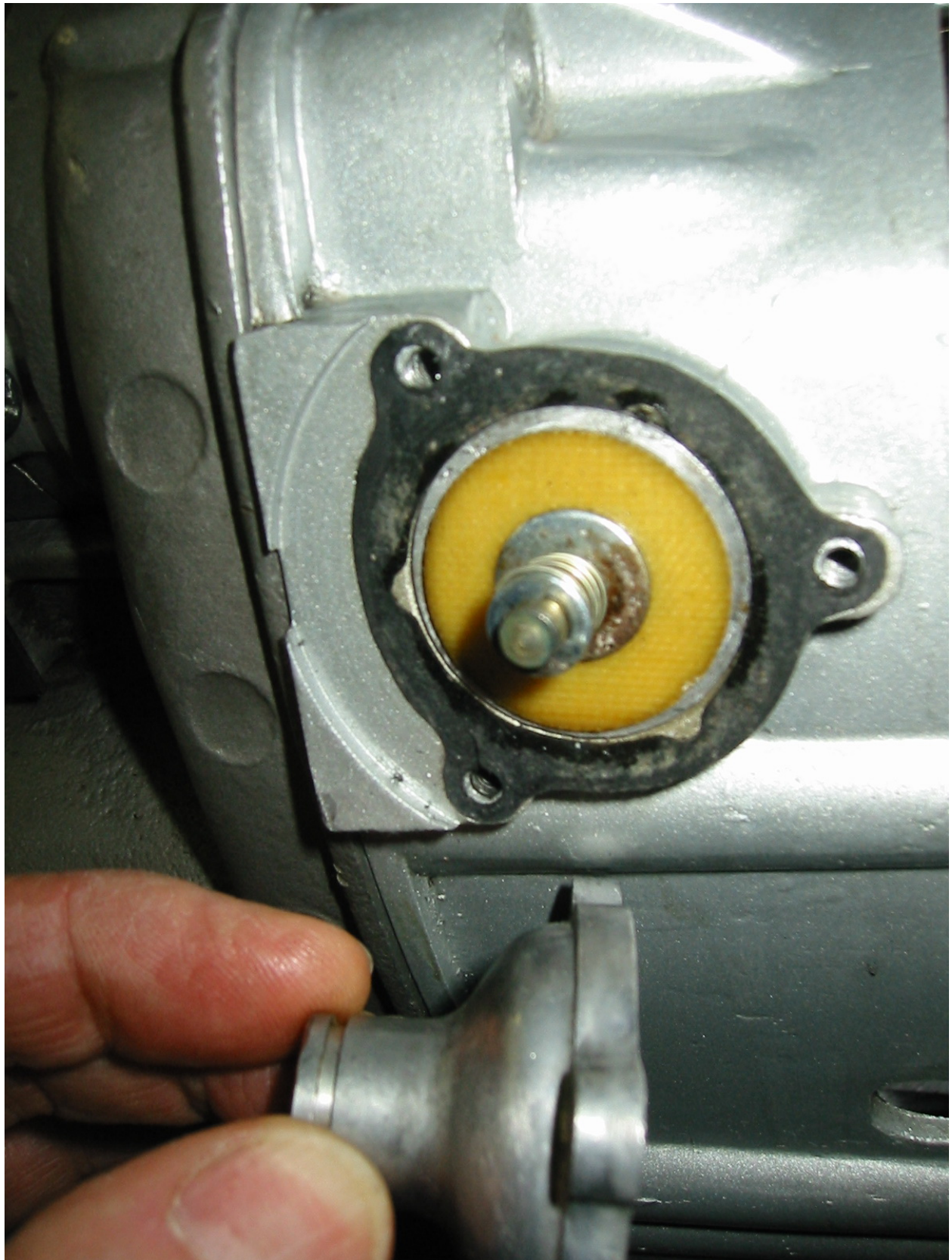


Figure 16 - Crankcase vent valve with cover removed

Starter free-wheel gear

If the electric starter occasionally doesn't engage properly, it's likely that one or more of the rollers in the starter free-wheel clutch are not making contact. The retainer cups holding the outer end of the springs in place can become loose, and are eventually ground up by being pushed into the rotating outer gear.

To inspect the starter gear mechanism the distributor drive gear must be removed from the end of the camshaft. First remove the O-ring, the thick washer, and the circlip. The gear has a tight interference fit on the camshaft, and is quite hard to remove. Use a puller that doesn't contact the edge of the gear's teeth, as they're easy to chip.

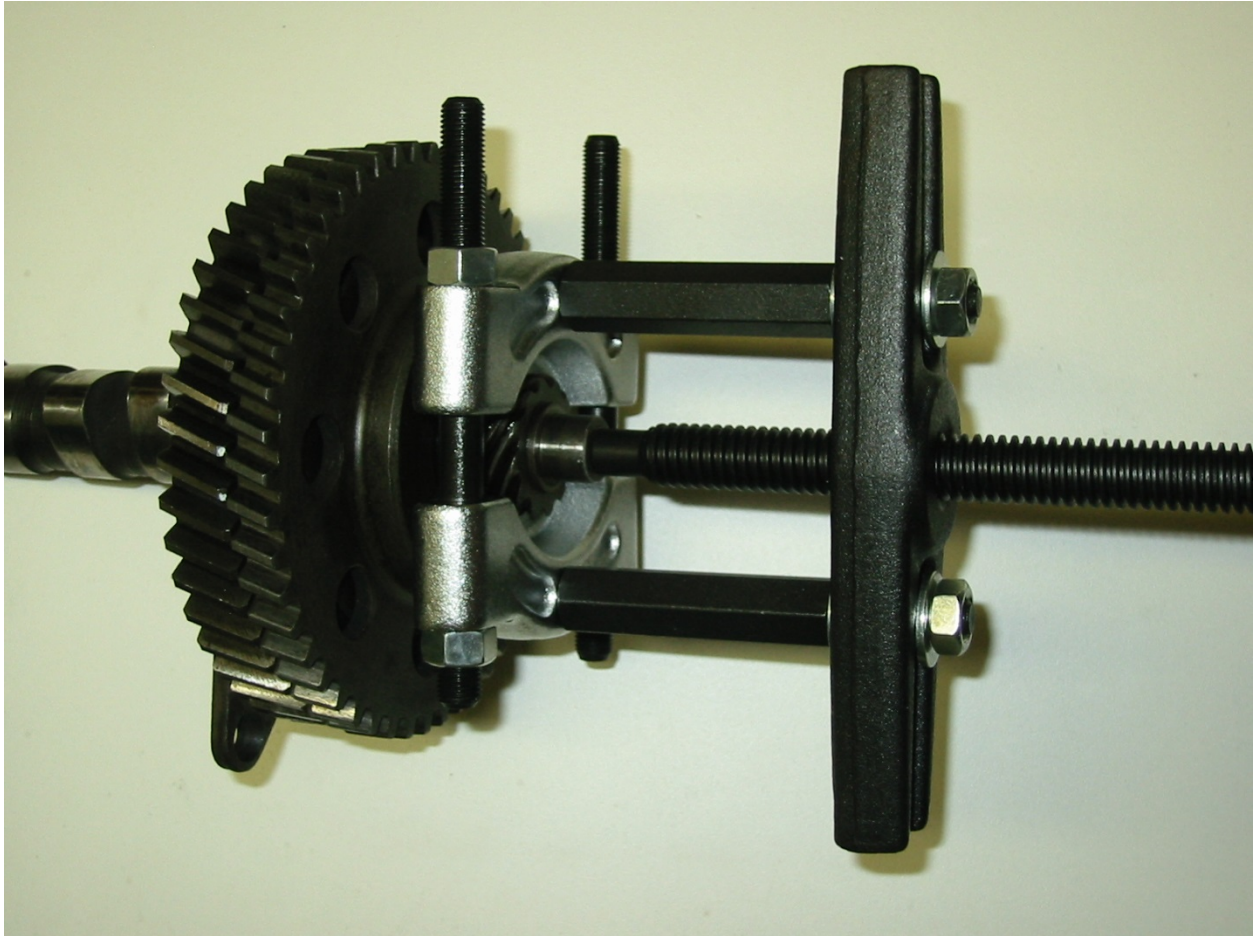


Figure 17 - Pulling the distributor gear from the camshaft

Disassemble the free-wheel clutch and inspect for loose spring retainer cups, deteriorated rubber dampers or other damaged parts.



Figure 18 - Starter free-wheel clutch showing broken damper parts

Crankshaft

The alternator, front end, clutch, flywheel, rear bearing plate and pistons have to be removed beforehand. Next, pry or use a puller to remove the timing gear and alternator shaft from the crankshaft, and then remove the front bearing retainer plate. Push the crankshaft backwards to get the front of the shaft off the bearing. Do not use excessive force if you plan on reusing the front bearing.

More information on installing the crankshaft can be found here:

<http://www.changjiangunlimited.com/tb2123.htm>

Clean or replace the oil slingers. Check the piston wrist pin bronze bushing for wear. Check the connecting rod big ends for excessive play. This work can be done without removing the crankshaft.

Specifications:

Connecting rod lateral play = 0.045 – 0.140 mm

Connecting rod radial run out <0.05 mm ¹⁴

Engine block

With the engine block stripped, clean everything with solvent and dry out. Blow out the oil galleries with compressed air.

Ignition system

Clean and lubricate the distributor. Inspect the contacts for wear, and dress with a diamond hone if necessary. Set the point gap. If you take the distributor off the engine, it's best to replace it before reassembling the front end, as it's hard to get the distributor in place "blind".

¹⁴ Reference 1, page 39

After the engine is reassembled, set the ignition timing (static) to 6° BTDC. You can fine-tune it later using a timing light. The distributor has a centrifugal mechanism providing an additional spark advance of $30^\circ \pm 6^\circ$ BTDC in addition to the static advance of 6° BTDC. Its action starts at 1100 rpm and reaches maximum advance at 2200 rpm, so be sure the engine speed is at least 2200 rpm if using a timing light.¹⁵

Specifications:

Distributor point gap = 0.35 – 0.45 mm

Static spark advance = 6° BTDC¹⁶

Spark plug gap = 0.6 – 0.8 mm¹⁷

Capacitor = 0.20 – 0.25 μ F; DC resistance > 50 M Ω at 20°C¹⁸

Spark coil resistance = 13.5 k Ω at 20°C (HV winding) and 2.4 Ω at 20°C (LV winding)¹⁹

Starting motor

Remove the starting motor's restraining strap, and then ease out the starter. Use a screwdriver or tire iron to pry it out if necessary. Check the four carbon brushes for wear and replace if necessary. Blow out the accumulation of carbon dust.

Undo the two Philips head screws on the side, and remove the planetary gear unit. Clean out the old grease and re-pack with gear grease. Seal with RTV and reassemble. Replace the O-ring if needed, and apply RTV to the joint.

¹⁵ Reference 1, page 218

¹⁶ Reference 1, pages 121, 122

¹⁷ Reference 1, page 123

¹⁸ Reference 1, page 218

¹⁹ Reference 1, page 220

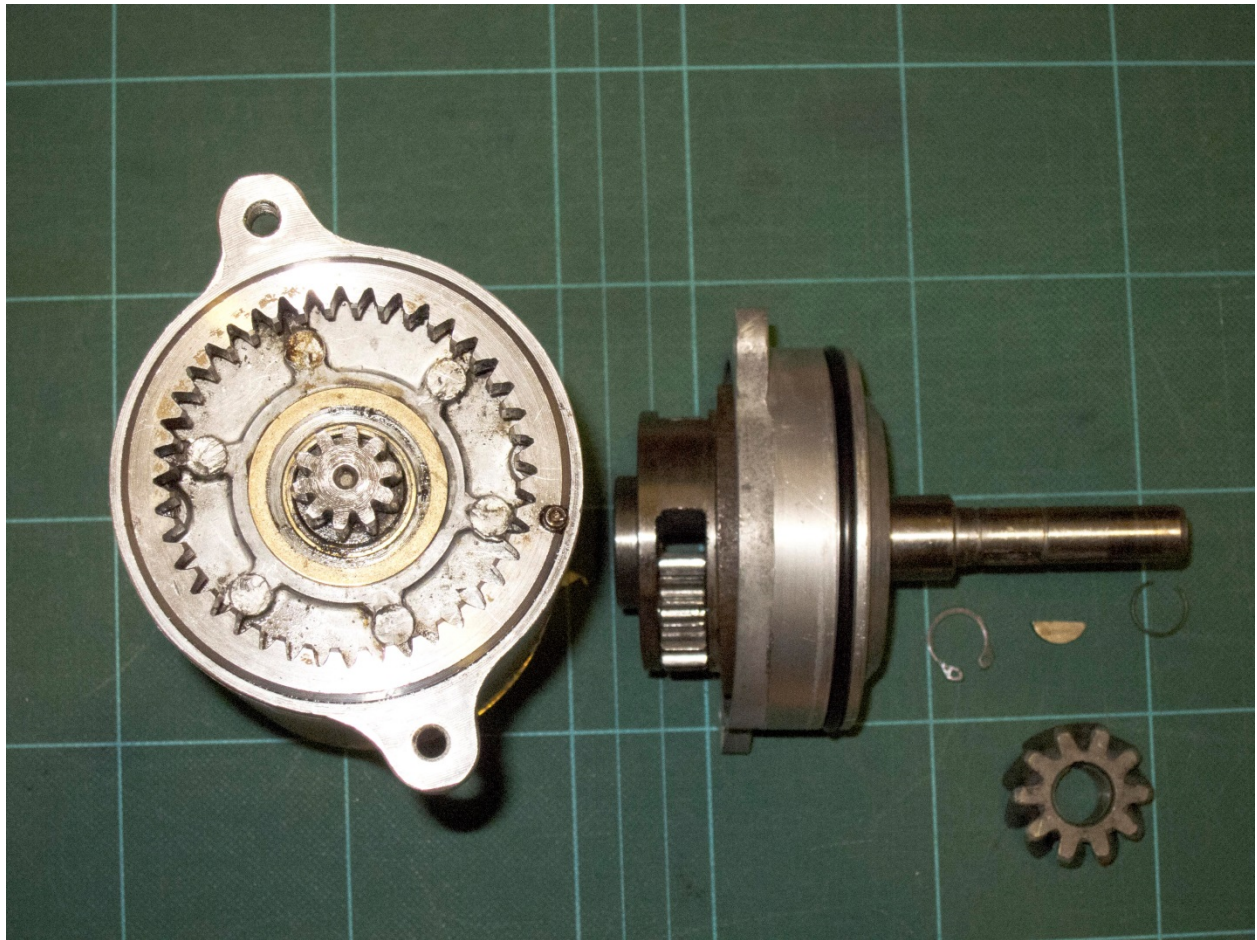


Figure 19 - Starter motor planetary gears

If the starter needs more extensive work, refer to the article here:

<http://www.changjiangunlimited.com/2012/Starter%20motor%20maintenance.pdf>

Bearings

Camshaft	6205	52x25x15 mm	single row deep groove unshielded ball bearing
Crankshaft	6207	72x35x17 mm	single row deep groove unshielded ball bearings (front and rear)
Alternator	6005	47x25x12 mm	single row deep groove unshielded ball bearing

Oil seals and O-rings

Cylinder skirt O-rings	85x90x2.5 mm
Camshaft O-ring	14x21x3.5 mm
Starter motor O-ring	74x80x3 mm
Rear crankshaft seal	50x70x8 mm
Alternator shaft seal	28x47x6 mm

References

Reference 1: Xiang Jiang 750 Sidecar Motorcycle - Use, Maintenance and Repair (湘江 750 边三轮摩托车 构造 • 使用 • 保养 • 维修)

Reference 2: CJ750 Motorcycle Use and Maintenance (长江 750 型摩托车构造使用和维护)

Reference 3: Ural (America) Repair Manual, 2000