REPAIRMANUAL2007

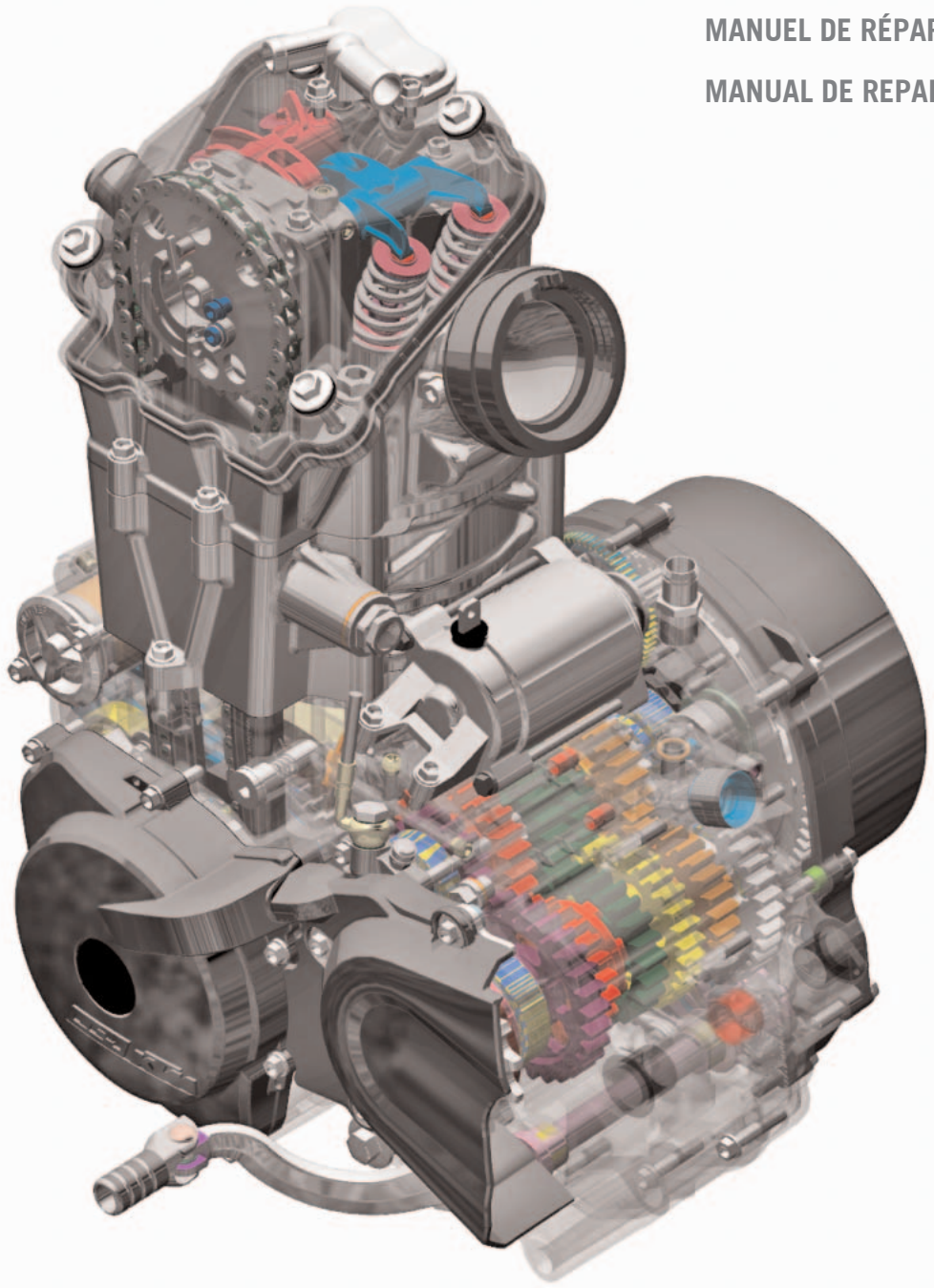
690 LC4

REPARATURANLEITUNG

MANUALE DI RIPARAZIONE

MANUEL DE RÉPARATION

MANUAL DE REPARACIÓN



ART.NR.: 3.206.045-E

REPAIRMANUAL2007

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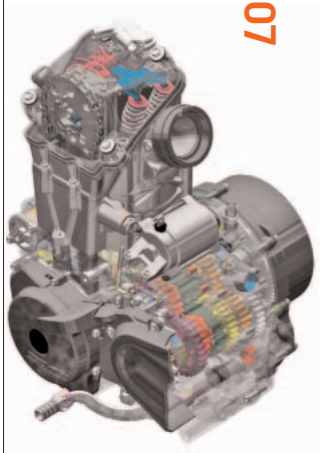


KTM Group Partner

EXPLANATION - UPDATING

3.206.045-E Repair Manual 690 LC4

Basicversion Modelyear 2007

1/2007

Edition: 01/2007

INTRODUCTION

This repair manual offers extensiv repair-instructions and is an up-to-date version that describes the latest models of the series. However, the right to modifications in the interest of technical improvement is reserved without updating the current issue of this manual.

A description of general working modes common in work shops has not been included. Safety rules common in the work shop have also not been listed. We take it for granted that the repairs are made by qualified profesionally trained mechanics.

Read through the repair manual before beginning with the repair work.

⚠ WARNING ⚠

STRICT COMPLIANCE WITH THESE INSTRUCTIONS IS ESSENTIAL TO AVOID DANGER TO LIFE AND LIMB.

! CAUTION !

NON-COMPLIANCE WITH THESE INSTRUCTIONS CAN LEAD TO DAMAGE OF MOTORCYCLE COMPONENTS OR RENDER MOTORCYCLES UNFIT FOR TRAFFIC !

„NOTE" POINTS OUT USEFUL TIPS.

Use only **ORIGINAL KTM SPARE PARTS** when replacing parts.

The KTM high performance engine is only able to meet user expectations if the maintenance work is performed regularly and professionally.

TÜV MANAGEMENT SERVICE ISO 9001
REG.NO. 12 100 6061

In accordance with the international quality management ISO 9001 standard, KTM uses quality assurance processes that lead to the highest possible product quality.

KTM Sportmotorcycle AG reserves the right to modify any equipment, technical specifications, colors, materials, services offered and rendered, and the like so as to adapt them to local conditions without previous announcement and without giving reasons, or to cancel any of the above items without substituting them with others. It shall be acceptable to stop manufacturing a certain model without previous announcement. In the event of such modifications, please ask your local KTM dealer for information.

KTM Sportmotorcycle AG
5230 Mattighofen, Austria

REPLY FAX FOR REPAIR MANUALS

We have made every effort to make our repair manuals as accurate as possible but it is always possible for a mistake or two to creep in.

To keep improving the quality of our repair manuals, we request mechanics and shop foremen to assist us as follows:

If you find any errors or inaccuracies in one of our repair manual – whether these are technical errors, incorrect or unclear repair procedures, tool problems, missing technical data or torques, inaccurate or incorrect translations or wording, etc. – please enter the error(s) in the table below and fax the completed form to us at 0043/7742/6000/5349.

NOTE to table:
- Enter the complete item no. for the repair manual in column 1 (**e.g.: 3.206.045-E**).
  You will find the number on the cover page or in the left margin on each right page of the manual.
- Enter the corresponding page number in the repair manual (**e.g.: 5-7**) in column 2.
- Enter the current text (inaccurate or incomplete) in column 3 by quoting or describing the respective passage of the text. If your text deviates from the text contained in the repair manual, please write your text in German or English if possible.
- Enter the correct text in column 4.

Your corrections will be reviewed and incorporated in the next issue of our repair manual.

Item no. of repair manual	Page	Current text	Correct text

Additional suggestions, requests or comments on our Repair Manuals (in German or English):

Name mechanic/shop foreman **Company/work shop**

GENERAL INFORMATION 2

INDEX

Art.-No. 3.206.045-E

SPECIALTOOLS – CHASSIS

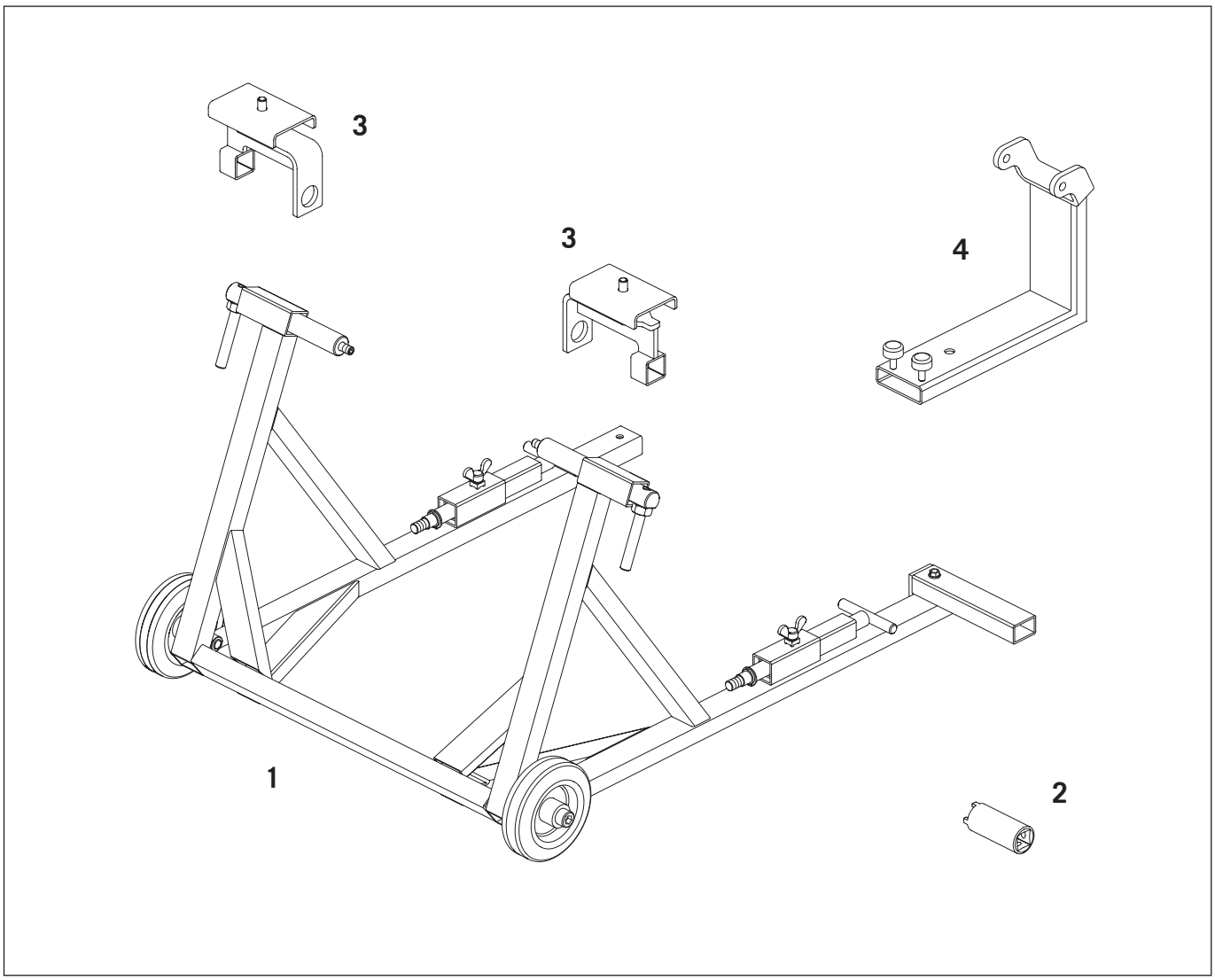
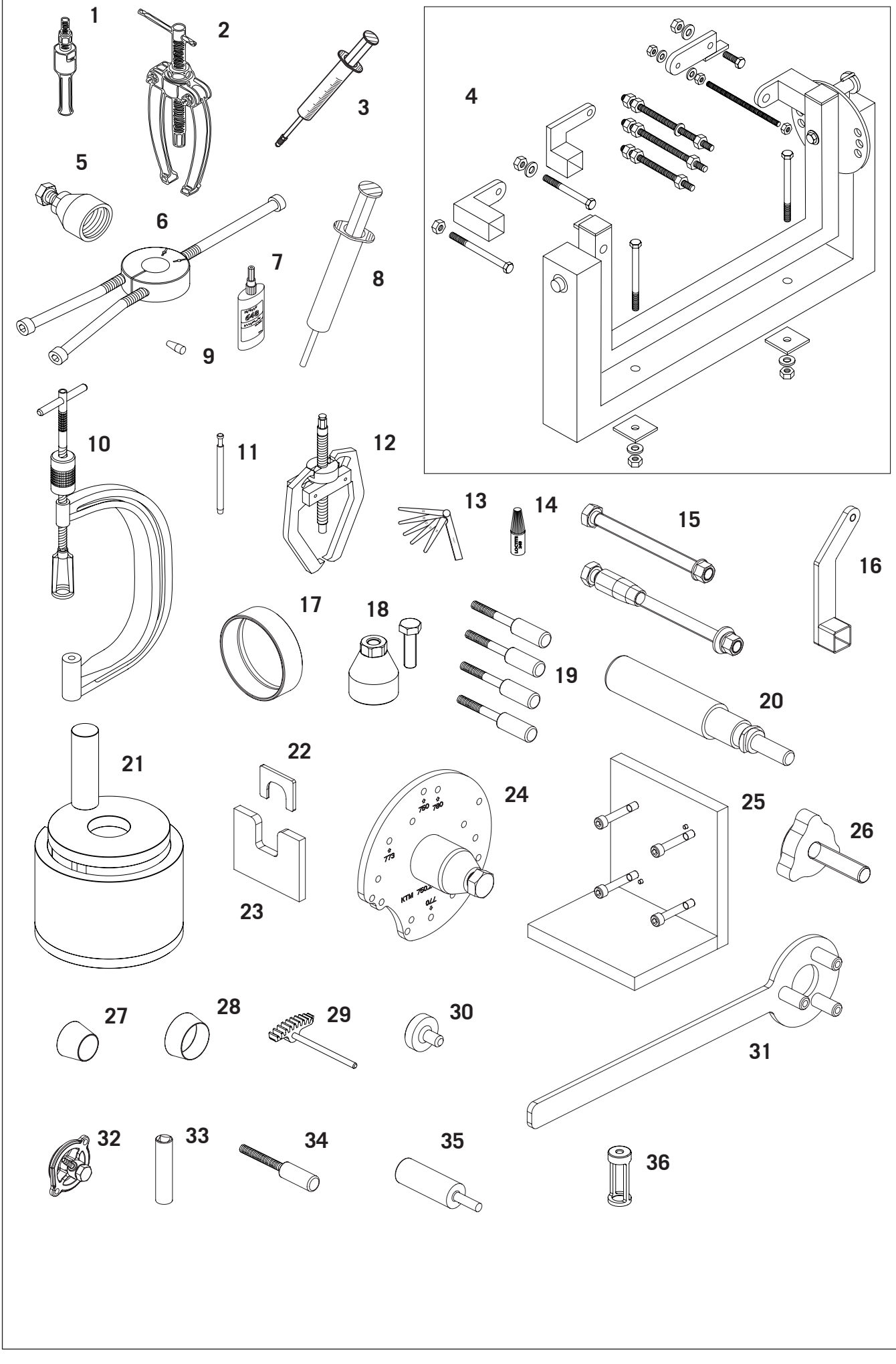


FIG	PART NO	DESCRIPTION
1	625.29.055.000	Assembly stand
2	750.29.034.000	Adjusting nut for swingarm bearing
3	750.29.036.000	Assembly stand attachment
4	750.29.055.000	Floor jack attachment

SPECIAL TOOLS – ENGINE

FIG	PART NO	DESCRIPTION
1	151.12.017.000	Gear puller
2	151.12.018.100	Internal gear puller 18-23 mm
3	503.29.050.000	Bleeding syringe for hydraulic clutch
4	560.12.001.000	Universal-engine work stand
5	584.29.009.000	Magneto extractor
6	584.29.037.043	Mounting tool for inner rings of crankshaft bearings
7	584.29.059.000	Loctite 648 24 ml
8	584.29.059.200	Loctite 5910 50 ml
9	585.29.005.000	Protection sleeve for shaft seal ring of water pump
10	590.29.019.000	Valve spring mounter
11	590.29.026.006	Limit plug gauge
12	590.29.033.000	Gear puller
13	590.29.041.000	Feeler gauge for valve clearance
14	6 899 785	Loctite 243 10 ml
15	750.12.001.060	Engine holder for engine work stand
16	750.12.001.070	Engine holder for engine work stand
17	750.29.015.102	Piston ring mounting tool
18	750.29.021.000	Puller for primary gear
19	750.29.033.000	Mounting screws for Anti hopping clutch
20	750.29.035.000	Mounting tool for piston pin retainer
21	750.29.047.000	Crankshaft press tool - optional
22	750.29.047.050	Crankshaft press-out disk upper part - optional
23	750.29.047.051	Crankshaft press-out disk lower part - optional
24	750.29.048.000	Housing separating tool
25	750.29.050.000	Mounting plate for cylinder head
26	750.29.051.000	Press-out drift for camshaft bearings
27	750.29.080.000	Protection sleeve for crankshaft seal ring flywheel side
28	750.29.080.050	Protection sleeve for crankshaft seal ring clutch side
29	750.29.081.000	Gear segment
30	750.29.090.000	Protction cap for crankshaft
31	750.29.091.000	Holding wrench for flywheel
32	750.29.094.000	Oil pressure adapter
33	750.29.172.000	Spark plug wrench
34	773.29.010.000	Crankshaft locking bolt
35	773.29.051.000	Unlatcher for timing chain tensioner
36	773.29.060.000	Insert for valve spring mounter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34
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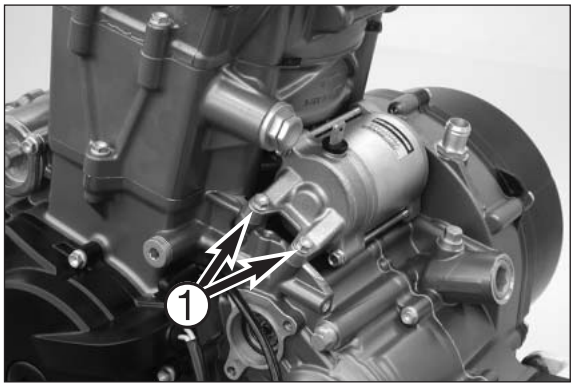
36

DISASSEMBLING THE ENGINE 4

INDEX

Art.-No. 3.206.045-E

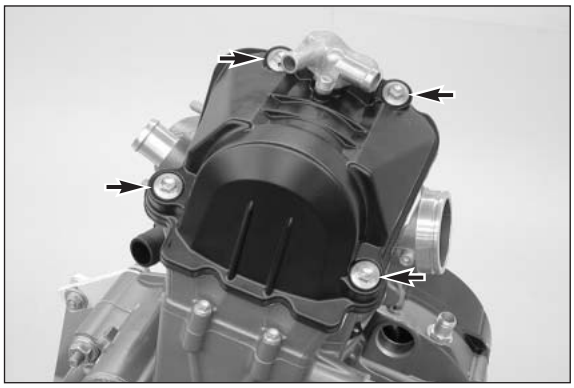


Preparatory work

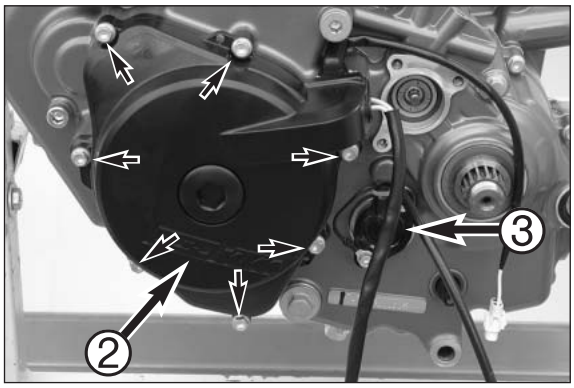
– Thoroughly clean the outside of the engine.
– Drain the engine oil.
– Clamp the engine in the engine work stand 560.12.001.000 with holders 750.12.001.060 and 750.12.001.070.

Left side of the engine

– Remove both screws ❶ on the starter engine and dismount the starter engine.

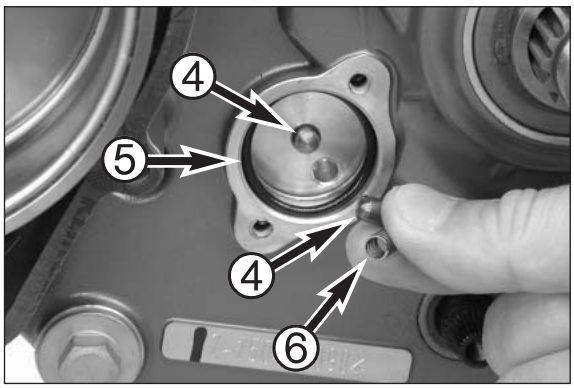


– Remove the valve cover screws and lift off the valve cover.

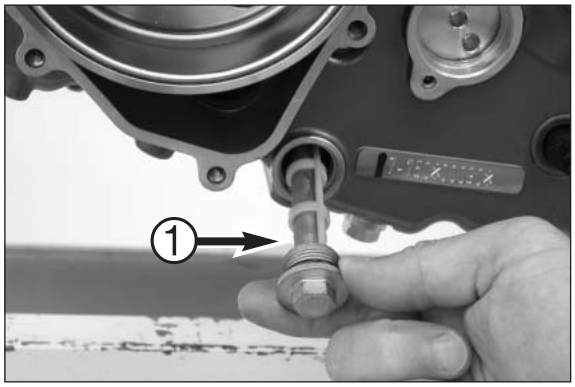


– Remove the screws on the generator cover ❷ and lift off the generator cover. Pull out the centering sleeves, remove and discard the gasket.

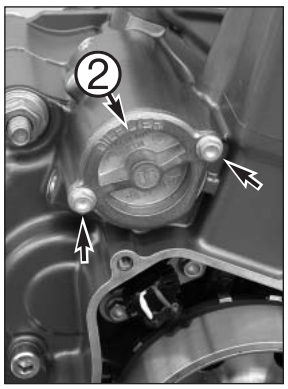
– Remove the gear sensor ❸.

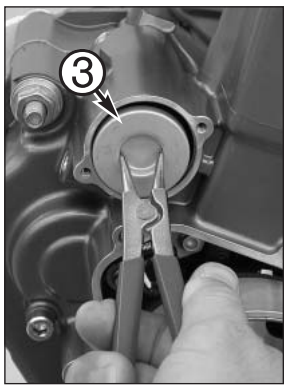


– Remove both contact bolts ❹ and the O-ring ❺.
– Take both contact springs ❻ out of the bores.



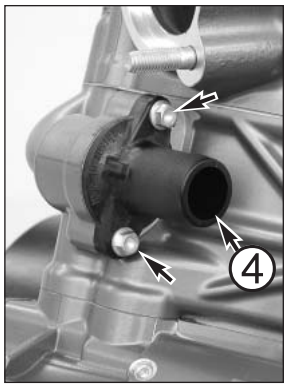
– Loosen the plug (A/F 13 mm) and pull out together with the oil screen ❶.
– Pull the oil screen out of the plug, remove and discard all of the O-rings.





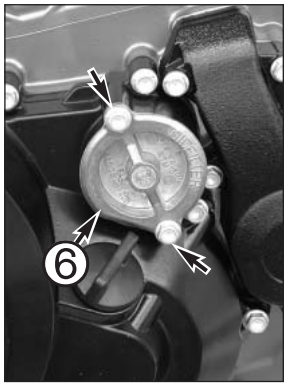
– Remove the screws and oil filter cover ❷, discard the O-ring.

– Pull out the oil filter ❸ with circlip pliers and discard.



– Remove the screws and take off the thermostat connection ❹, being careful not to lose the collar bushings.

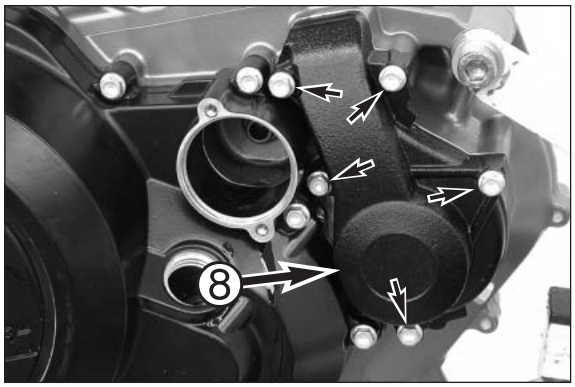
– Pull out the thermostat ❺, discard the gasket.



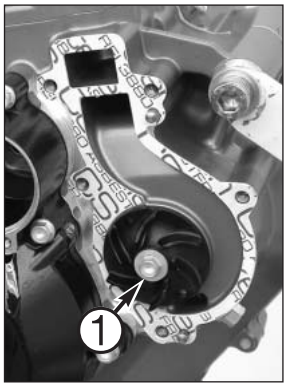
Right side of the engine

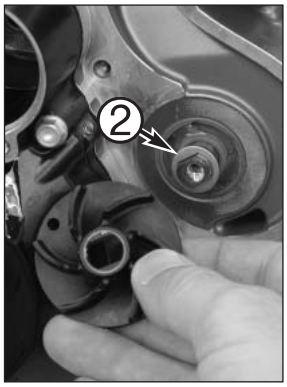
– Unscrew the oil filling plug and remove.
– Remove the screws and take off the oil filter cover ❻, discard the O-ring.

– Pull out the oil filter ❼ with circlip pliers and discard.



– Remove the screws and take off the water pump cover ❽.



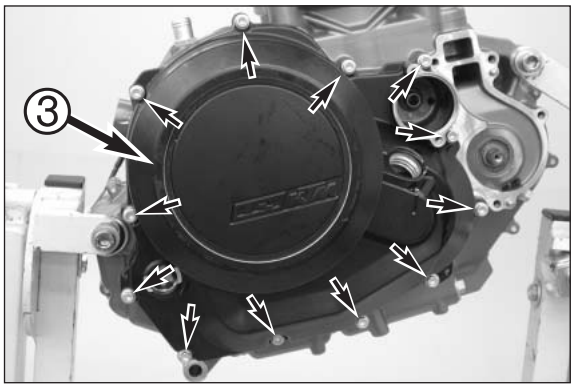


– Remove the gasket and discard.

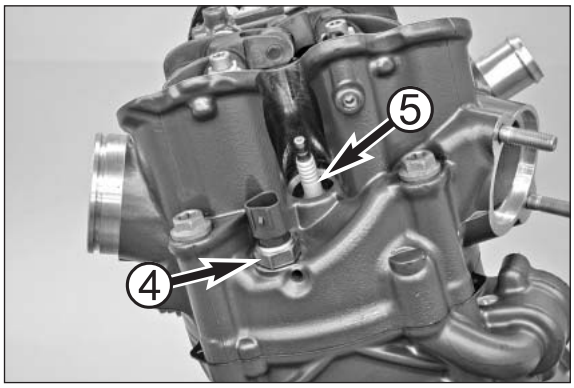
– Loosen the screw on the water pump wheel ❶ and remove.

– Remove the water pump wheel.

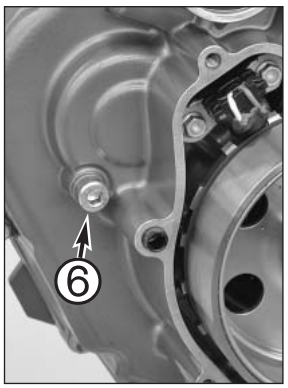
– Take the washer ❷ off the water pump shaft.

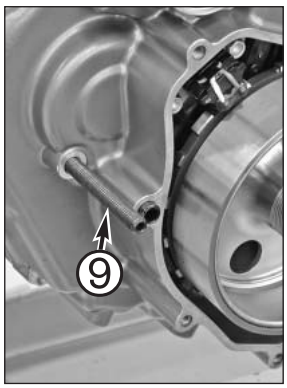


– Remove the screws and take off the clutch cover ❸, discard the gasket and pull out the centering sleeves.



– Unscrew the temperature sensor ❹ (A/F 19 mm) and spark plug ❺ (750.29.172.000).

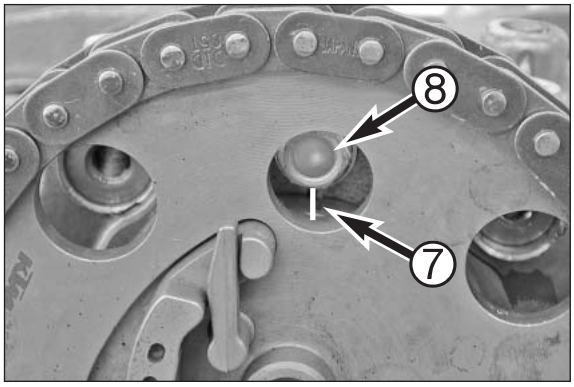




Moving the engine to TDC

– Remove the plug ❻.

– Turn the crankshaft in a counterclockwise direction until the mark on the camshaft ❼ is in alignment with the mark on the camshaft retaining bracket.

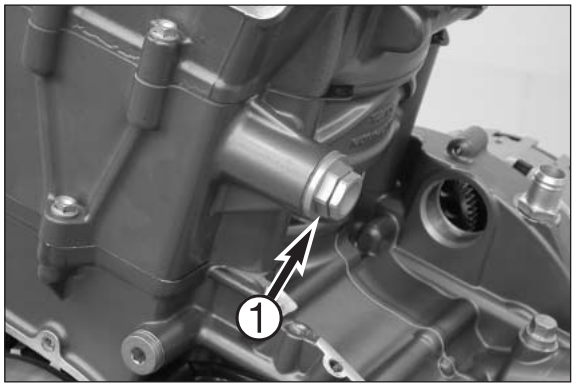


NOTE: the mark on the camshaft retaining bracket is in the middle of the screw ❽.

– Screw on the engine locking screw 773.29.010.000, make sure the engine is locked.

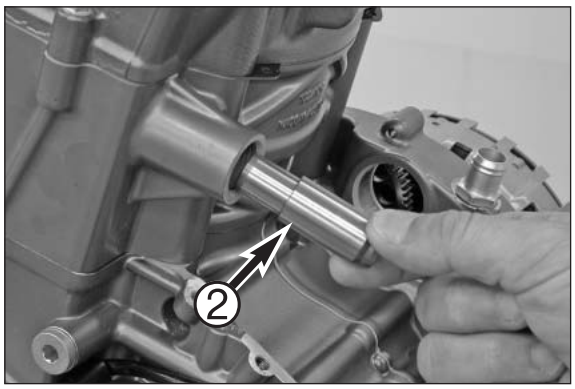
! CAUTION !

DO NOT USE THE LOCKING SCREW TO HOLD THE CRANKSHAFT WHEN YOU UNSCREW OR TIGHTEN THE NUTS ON THE FLYWHEEL OR PRIMARY PINION SINCE ENGINE PARTS WILL BE DAMAGED.

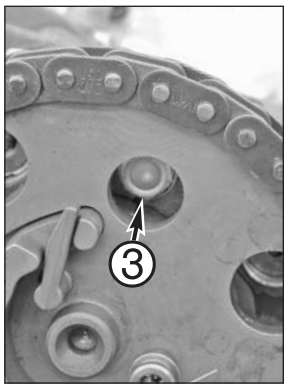


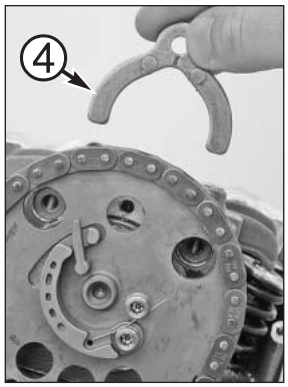
Removing the cylinder head and piston

– Unscrew the plug ❶ (A/F 19 mm) on the chain tensioner, remove and discard the gasket.



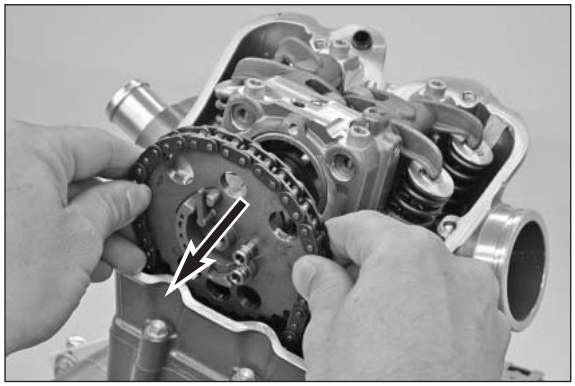
– Pull out the chain tensioner ❷.



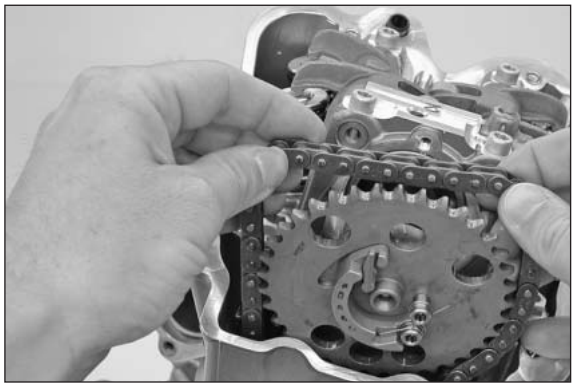


– Remove the screw ❸ on the camshaft retaining brackets.

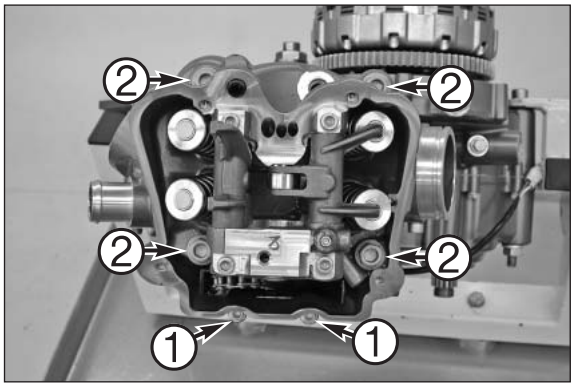
– Remove the camshaft retaining bracket ❹.



– Carefully pull the camshaft forward and let it hang down.



– Remove the timing chain from the camshaft. Now you can remove the camshaft.

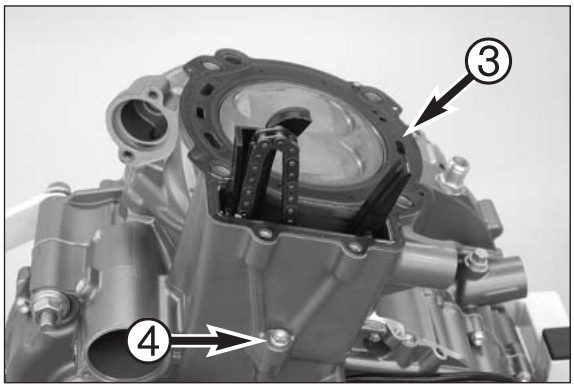


– Remove the two screws ❶.

– Loosen the cylinder head screws ❷ (A/F 14 mm or AH 8 mm) in a crosswise direction and remove.

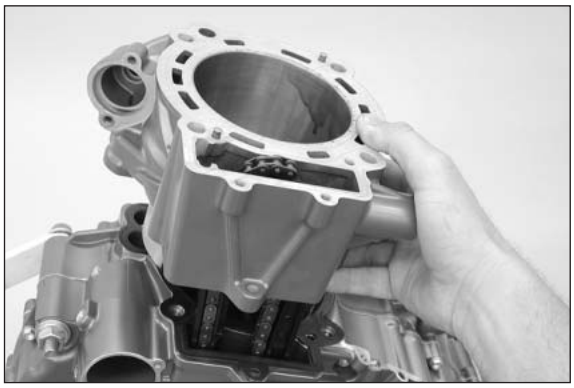
NOTE: always replace the cylinder head screws.

– Lift off the cylinder head.

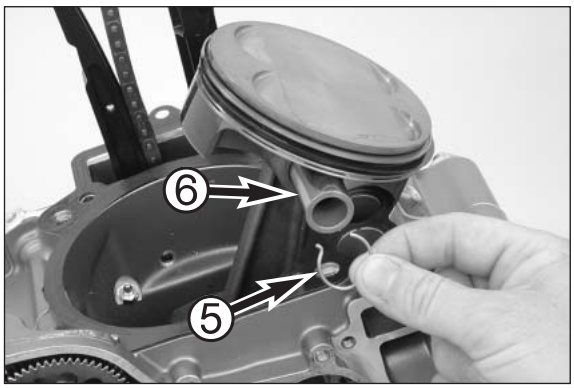


– Remove the cylinder head gasket ❸ and discard.

– Remove the screw ❹.



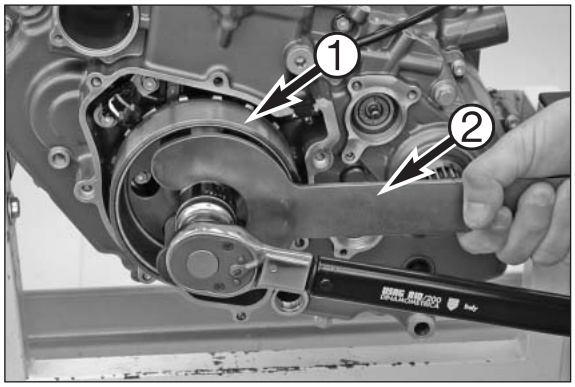
– Carefully pull the cylinder up, hold the piston and remove the cylinder.



– Remove the piston bolt lock ❺ with a suitable tool and slide the piston bolt ❻ out of the piston, holding on to the piston.

NOTE:
– Push the piston bolt out with your finger, do not use a tool.
– If you plan to use the piston again, it is advisable to remove the lock ring on the clutch end.

– Lift off the cylinder base gasket and discard.



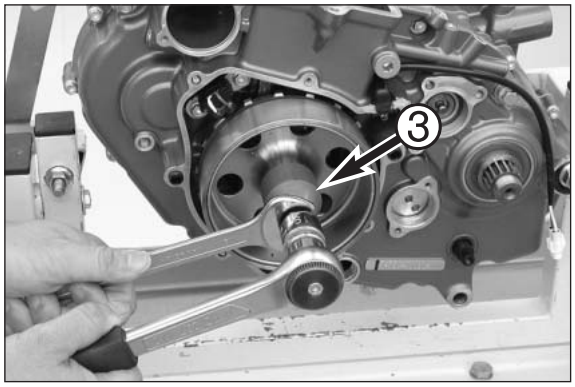
Removing the rotor

– Hold the rotor ❶ with special tool 750.29.091.000 ❷ as shown in the photo.

– Unscrew the nut (A/F 27) on the rotor.

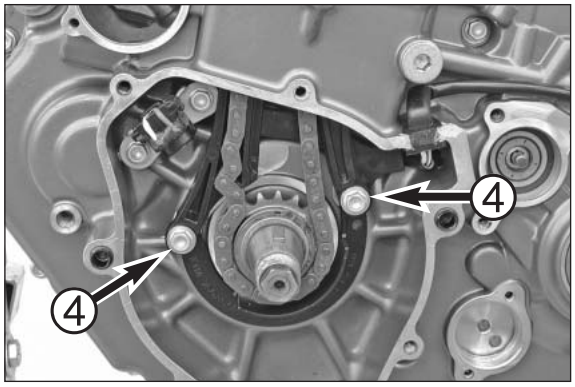
NOTE: make sure the crankshaft is not locked with the locking screw.

– Remove the nut and lock washer.



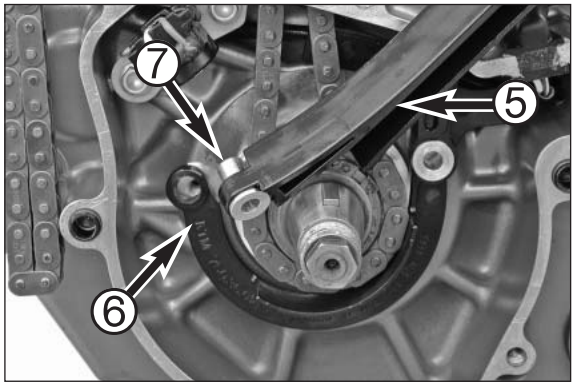
– Screw special tool 584.29.009.000 ❸ onto the rotor.
– While holding the special tool, turn in the screw; this will pull the rotor off the crankshaft.

– Remove the rotor and unscrew the special tool.



Removing the timing chain and timing chain pinion

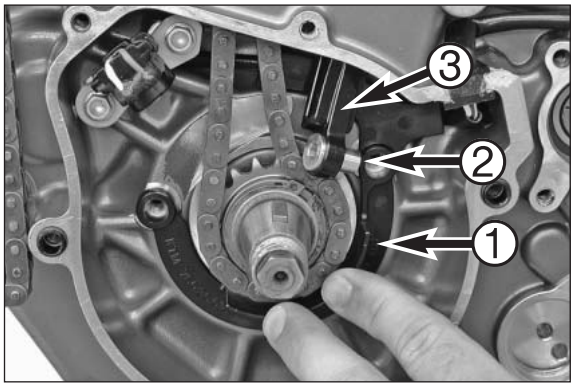
– Remove the screws ❹ on the timing chain guides.



– Lift the guide rail ❺ out of the clip ❻.

NOTE: the sleeve ❼ is inserted through the guide rail and clip.

– Lift off the guide rail.

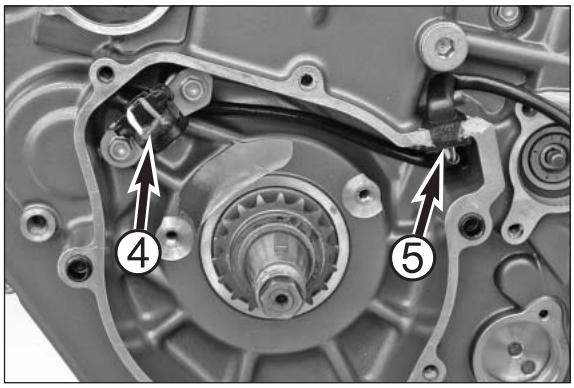


– Hold the clip ❶ while you pull out the sleeve ❷ from the tensioning rail ❸.

– Lift off the tensioning rail.

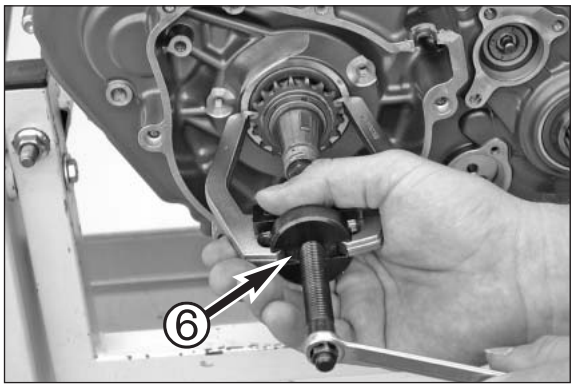
– Remove the timing chain from the timing chain pinion and thread it through to remove.

NOTE: if you plan to mount the timing chain again, mark the direction of travel.



– Remove the screws on the pulse generator 4 and remove the pulse generator.

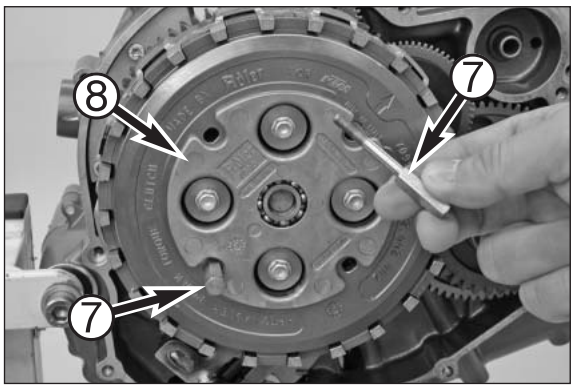
– Pull the cable guide ❺ out of the opening.



– Remove the lock ring from the crankshaft with suitable pliers.

– Use puller 590.29.033.000 ❻ to pull the engine sprocket off the crankshaft.

Removing the clutch and primary pinion

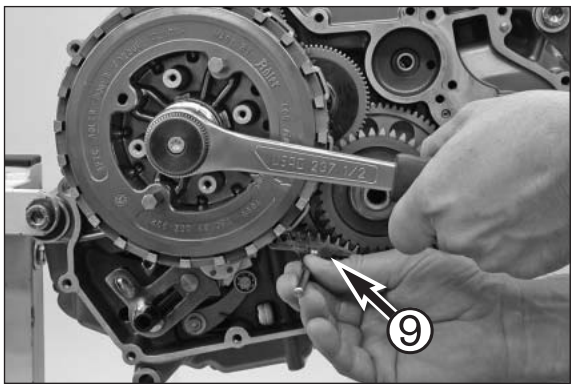


– Clamp the anti-hopping clutch with special tool 750.29.033.000 ❼.

NOTE: only tighten special tool 750.29.033.000 by hand; do not use a tool to tighten.

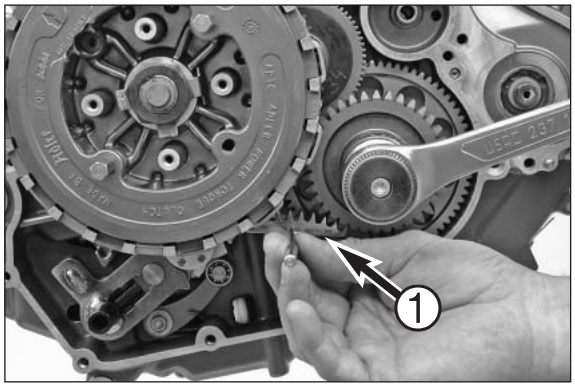
– Loosen the clutch screws in stages in a crosswise direction and remove together with the washers and springs.

– Remove the pressure cap ❽.



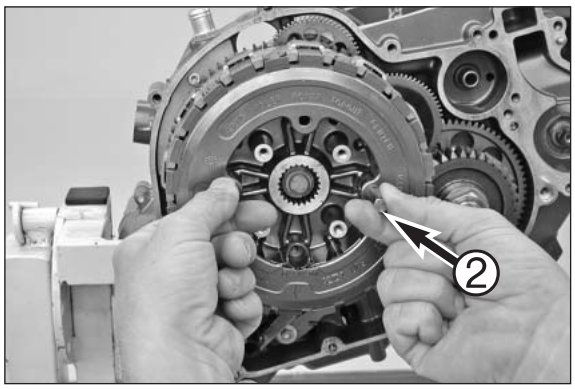
– Bend up the lock washer on the nut.

– Hold the outer clutch hub with special tool 750.29.081.000 ❾ while you unscrew the nut (A/F 30 mm).



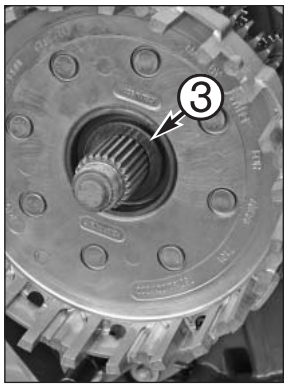
– Hold the primary pinion with special tool 750.29.081.000 ❶ while you unscrew and remove the nut (A/F 27 mm).

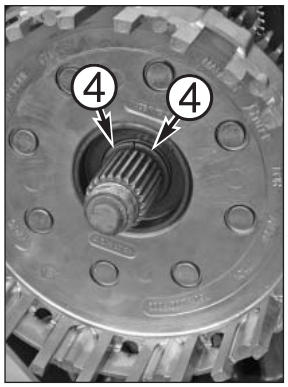
NOTE: LH thread!



– Pull the anti-hopping clutch disks out of the outer clutch hub with special tool 750.29.033.000 ❷.

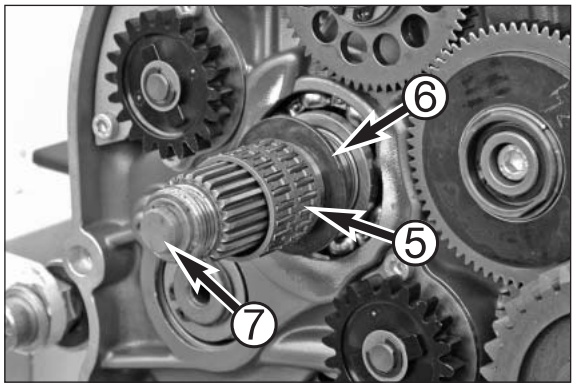
NOTE: the stepped disk mounted underneath usually sticks to the clutch hub.





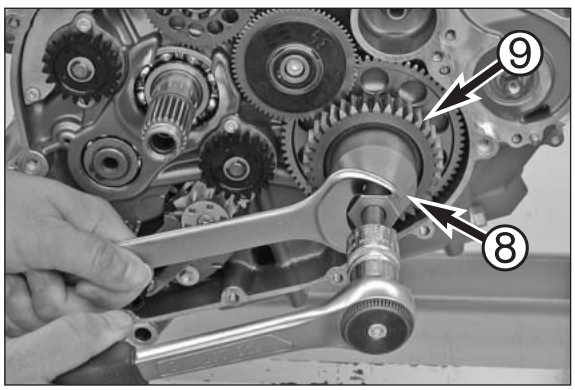
– Remove the stepped disk ❸.

– Take the half disks ❹ out of the groove.

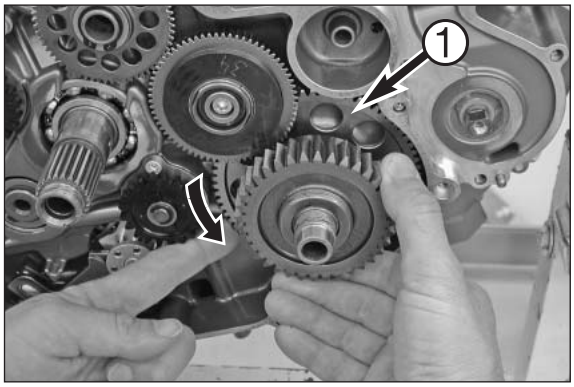


– Remove the outer clutch hub, needle bearing ❺ and the washer ❻ mounted underneath.

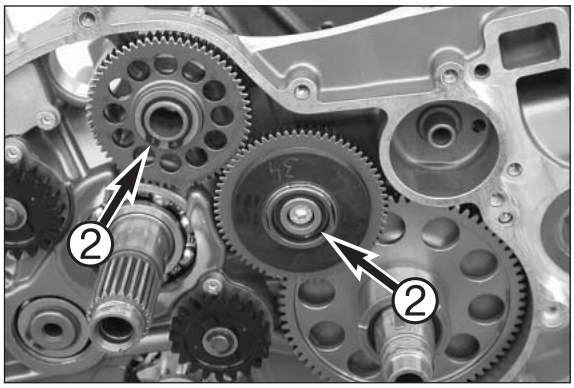
– Remove the pressure piece ❼ and the pushrod.



– Mount special tool 750.29.021.000 ❽ on the primary pinion ❾ and hold (A/F 24 mm) while you turn in the screw (A/F 19 mm); this will pull the primary pinion off the crankshaft.



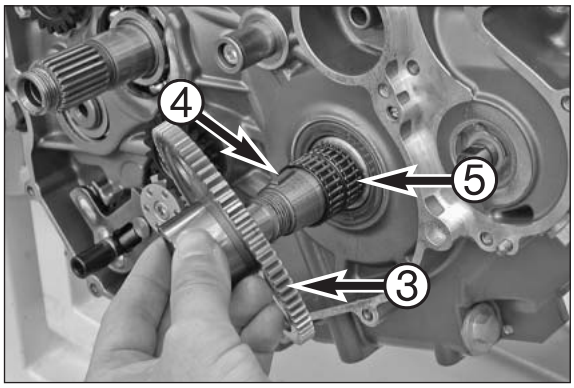
– Turn the freewheel gear ❶ in a counterclockwise direction and remove the primary pinion.



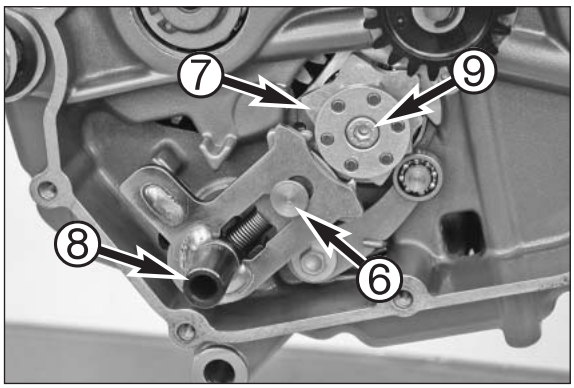
Removing the starter drive

– Remove the lock rings ❷ with the washers mounted underneath.

– Pull off both starter drive idler gears; remove the needle bearings.



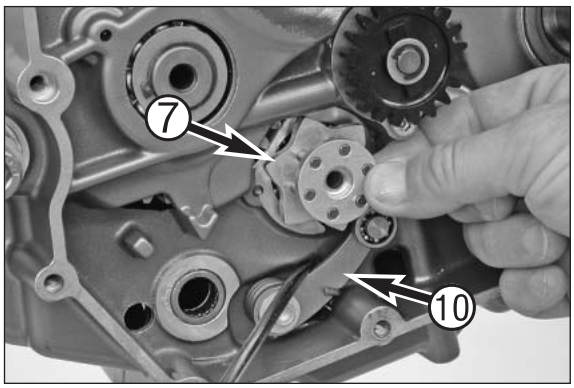
– Take the freewheel gear ❸ off the crankshaft and remove the woodruff key ❹.
– Remove both needle bearings ❺.



Disassembling the shift mechanism

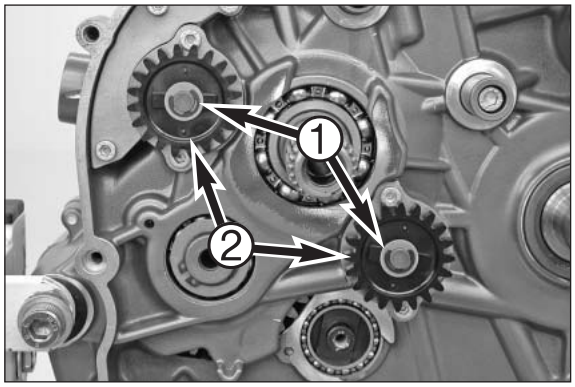
– Push the shift rail ❻ away from the shift lock ❼ and pull out the shift shaft ❽ together with the washer mounted underneath.

– Remove the screw ❾ (AH 5 mm) on the shift lock.



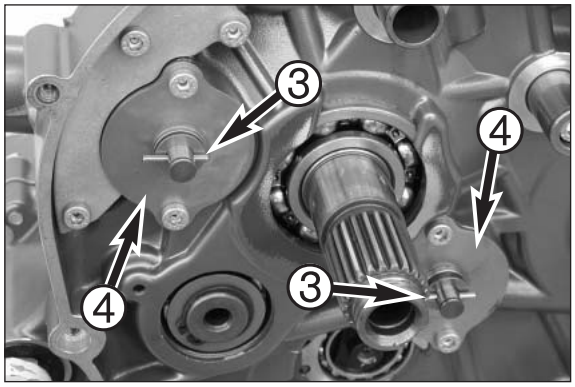
– Press the locking lever ❿ down to relieve the shift lock ❼, remove the shift lock.

– Loosen the screw and remove the locking lever together with the washer and spring.



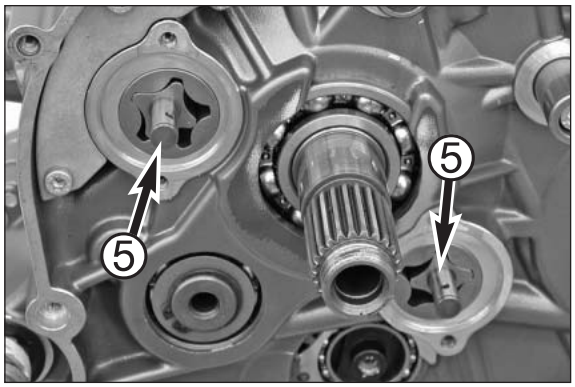
Removing the oil pumps

– Remove the lock rings ❶ on both oil pump shafts.
– Pull off the spacing washers and oil pump gears ❷.

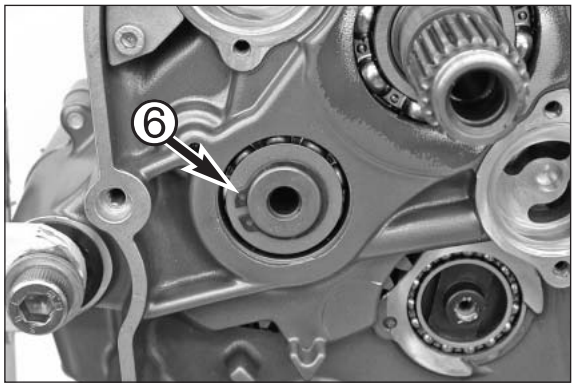


– Pull the needle rollers ❸ out of the pump shafts and remove the spacing washers mounted underneath.

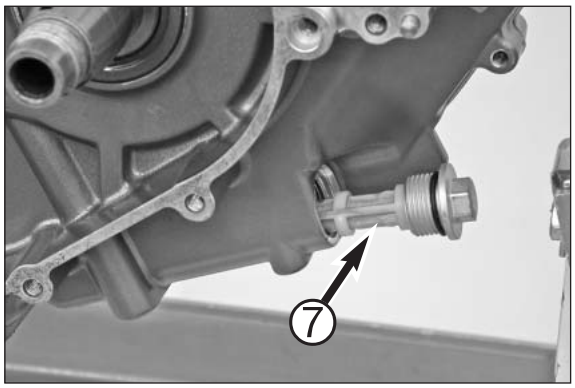
– Remove both oil pump covers ❹.



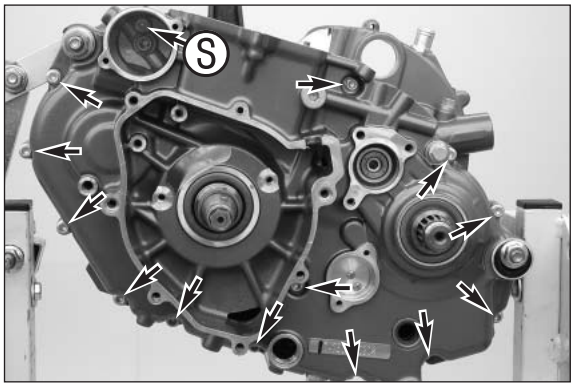
– Pull out both oil pump shafts ❺ with the inner rotors; take the outer rotors out of the engine case.



– Take the lock ring ❻ and washer off the countershaft.



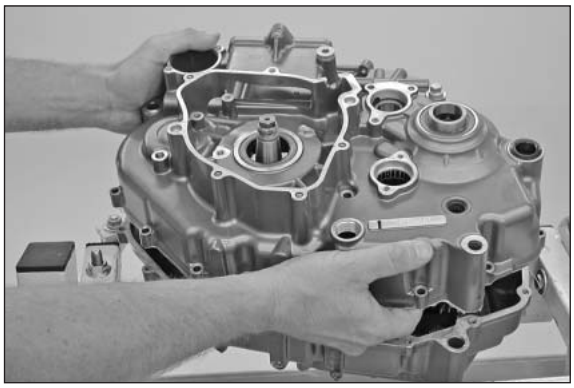
– Loosen the plug (A/F 13 mm) and pull it out together with the oil screen ❼.
– Pull the oil screen out of the plug; remove all O-rings and discard.



Separating the case halves, removing the crankshaft and transmission shafts

– Remove all engine case screws (M6) including the screw ❽ (with copper washer) in the oil filter housing.

– Lay the engine on its side.



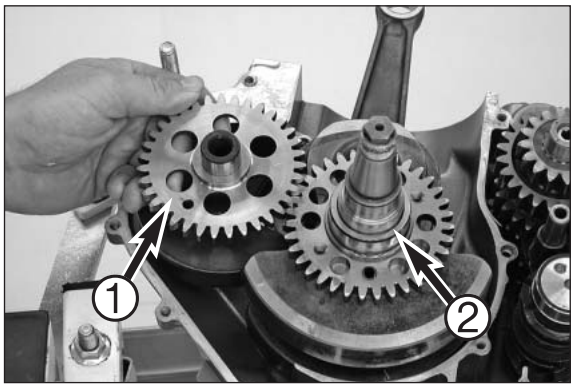
– Lift off the left case half with special tool 750.29.048.000, tapping lightly on the shafts with a plastic hammer if necessary.

! CAUTION !

DO NOT PRY THE CASE HALVES APART WITH A SCREWDRIVER OR SIMILAR TOOL SINCE THIS WILL DAMAGE THE SEALING AREAS.

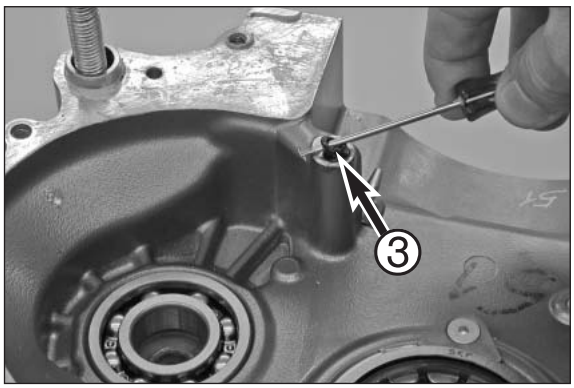
– Pull the bushing and O-ring for the countershaft out of the shaft seal ring in the countershaft and discard the O-ring.

NOTE: the main shaft and the balancer shaft have a stop disk that usually sticks to the bearing; be careful not to lose them.

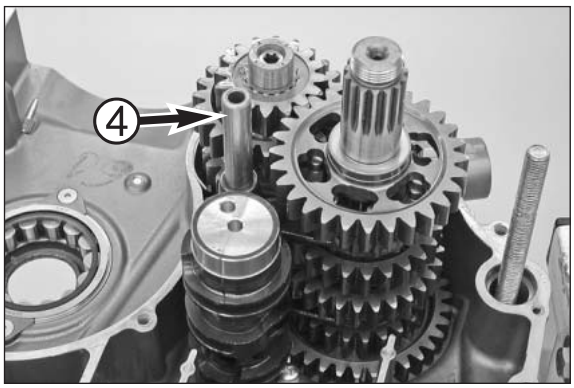


– Lift the balancer shaft ❶ out of the bearing.

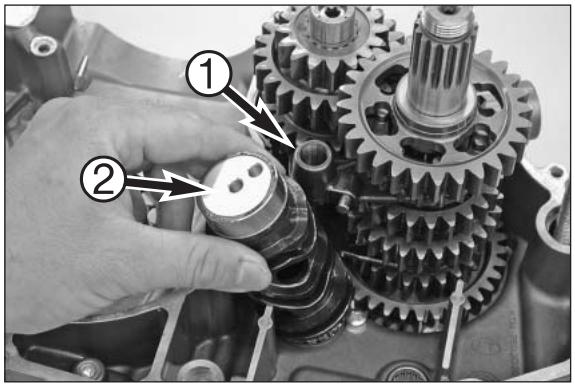
– Lift the crankshaft ❷ out of the bearing.



– Remove the O-ring ❸.



– Pull out the shift rail ❹.



– Tilt the shift forks ❶ to the side and pull out the shift drum ❷.

– Remove the upper and lower shift fork; the middle shift fork will be removed from the engine case together with the transmission shafts.

– Stand the engine case up again; grasp both transmission shafts and the middle shift fork with one hand and pull them out of the bearing seats; make sure the engine case cannot fall off the work stand.

SERVICING INDIVIDUAL COMPONENTS 5

INDEX

Art.-No. 3.206.045-E

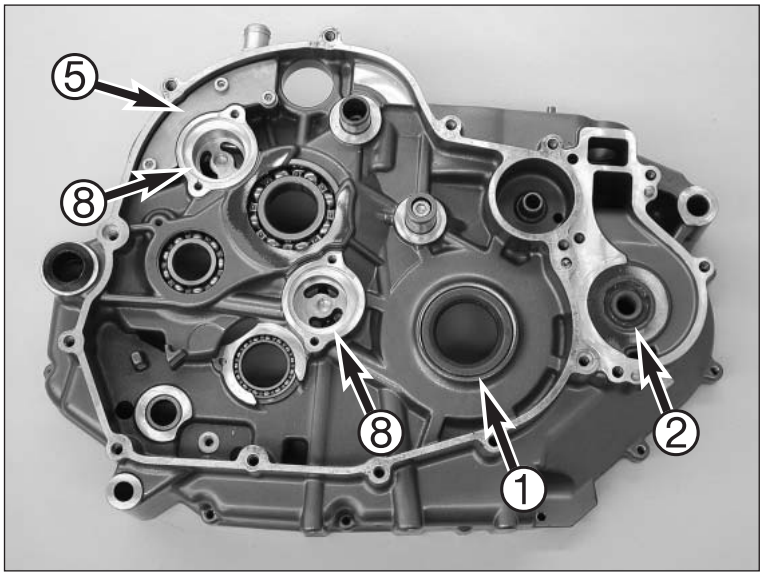
IMPORTANT NOTE TO WORKING ON THE ENGINE CASE

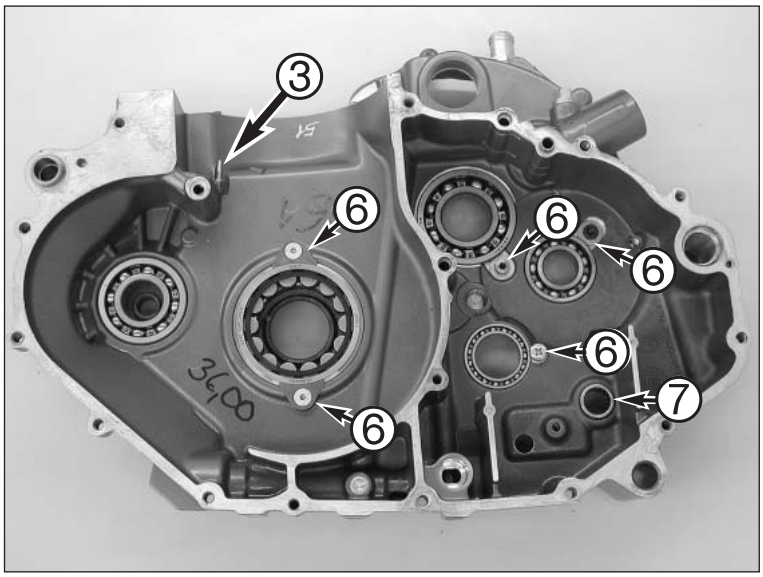
Read this section before you start to work on the engine case. Plan the precise order of assembly so that you can insert the bearings the first time the case halves are heated.

To press or tap out the bearings, remove the dowels and place the engine case half on a large, level surface. Make sure the entire sealing area of the engine case half rests on the surface to avoid damage (a wooden panel makes a good base).

If possible, bearings or shaft seal rings should not be hammered or tapped in at all. If you do not have a pressing tool, carefully tap them in with a suitable drift. Cold bearings usually fall into the bearing seats automatically at an engine case temperature of approximately 150° C.

If the bearings do not fit tightly in their mounts when the case half has cooled down, they may turn in the engine case when they warm up. In this case the engine case must be replaced.





Right case half

– Pry the shaft seal rings out of the crankshaft ❶ and the water pump shaft ❷ without damaging the case.

– Remove the spraying nozzle ❸ and the oil jet ❹.

– Remove the plate ❺ on the engine ventilation.

– Thoroughly clean the case, removing any residual sealant. Blow compressed air through all oil bores.
– Remove all bearing retainers ❻.

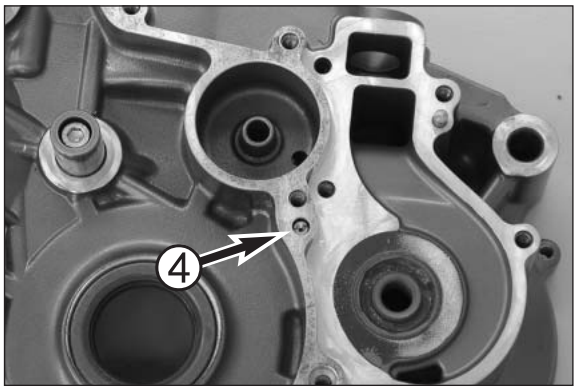
– Pull the dowels out of the case.

– Heat the case in the oven to approx. 150° C and tap on a level wooden board, causing the bearings to drop out of the bearing seats. Any bearings that remain in the case must be pressed out with a suitable press/drift tool.

– Push new bearings into the bearing seats while the engine case is still hot. Press all the way in from the inside to the outside, using a suitable press/drift tool if necessary.

NOTE:
– Press the shift shaft bearing ❼ in from the outside to the inside until it sits flush.
– To avoid damage, make sure the case lies flat when pressing in the bearings.
– Always press in bearings on the outer ring or the bearings will be damaged in the process.
– Check the bearings for a tight fit when the case has cooled.

– Mount all bearing retainers, lock screws with Loctite 648 and tighten to 5 Nm.



– Press in a new crankshaft seal ring ❶ with the open side towards the inside until it sits flush.

– Press in a new water pump shaft seal ring ❷ with the open side towards the outside until it sits flush.

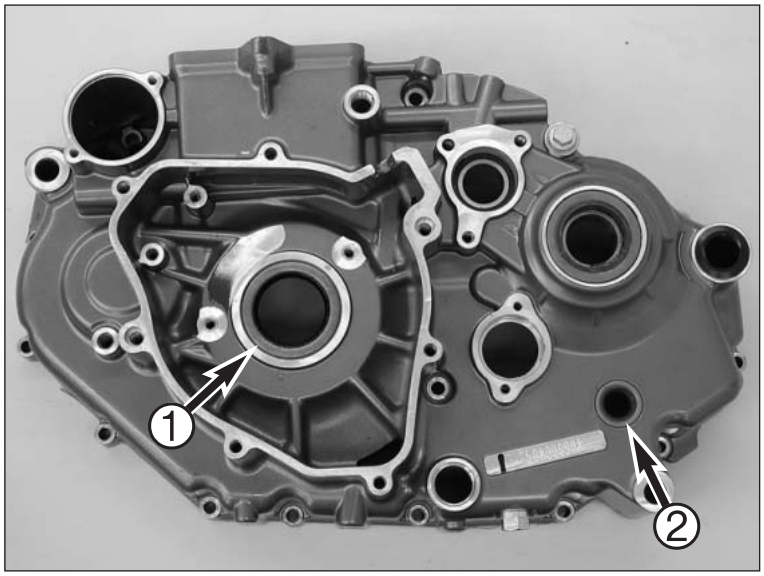
– Inspect the oil pump housing ❽ for score marks or seizing marks.

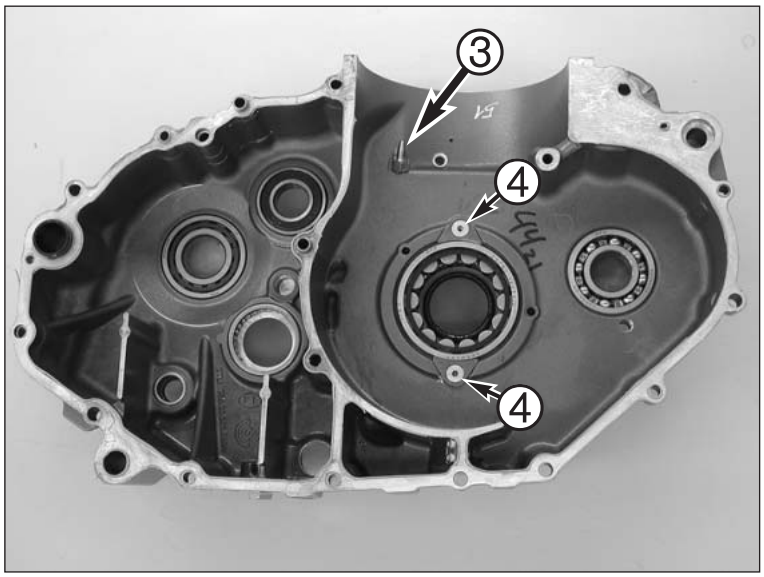
– Apply Loctite 648 to the spraying nozzle 50 ❸ and tighten to 6 Nm.

– Apply Loctite 648 to the oil jet 125 ❹ and tighten to 2 Nm.

– Mount the plate ❺ on the engine vent, lock the screws (AH M5x12) with Loctite 243 and tighten to 3 Nm.

– Mount the dowels again.





Left case half

– Pry the shaft seal rings out of the crankshaft ❶ and the shift shaft ❷ without damaging the case.

– Remove the spraying nozzle ❸.

– Thoroughly clean the case, removing any residual sealant. Blow compressed air through all oil bores.
– Remove all bearing retainers ❹.

– Remove the plug ❺ and take the pressure spring ❻ and bypass valve ❼ out of the hole.

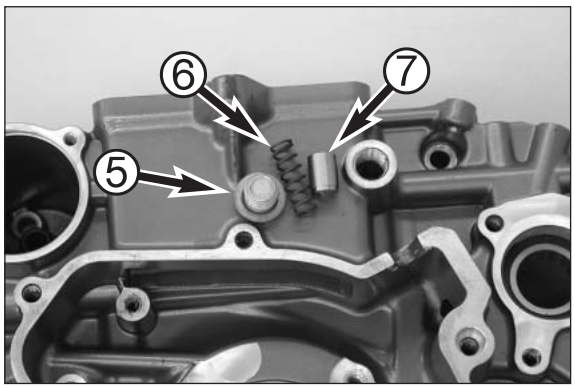
– Pull the dowels out of the case.

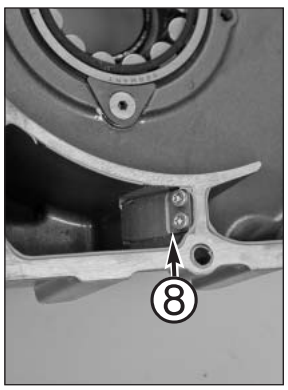
– Unscrew the diaphragm support plate ❽ (TX 10) and remove together with the diaphragm.

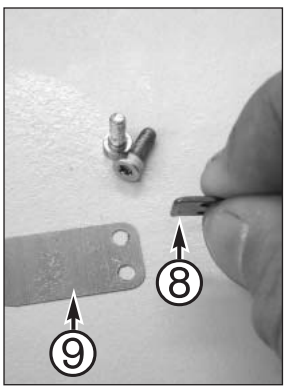
– Heat the case in the oven to approx. 150° C and tap on a level wooden board, causing the bearings to drop out of the bearing seats. Any bearings that remain in the case must be pressed out with a suitable press/drift tool.

– Push new bearings into the bearing seats while the engine case is still hot. Press all the way in from the inside to the outside, using a suitable press/drift tool if necessary.

NOTE:
– To avoid damage, make sure the case lies flat when pressing in the bearings.
– Always press in bearings on the outer ring or the bearings will be damaged in the process.
– Check the bearings for a tight fit when the case has cooled.







– Mount all bearing retainers, lock screws with Loctite 648 and tighten to 5 Nm.

– Press in a new shaft seal ring for the crankshaft ❶ and the shift shaft ❷ with the open side towards the inside until it sits flush.

– Remove the bypass valve, inspect for score marks or seizing marks, measure the length of the pressure spring.

Minimum length of the pressure spring: 25 mm

– Oil the bypass valve and mount with the spring, screw in the plug with a new seal ring and tighten to 20 Nm.

– Apply Loctite 648 to the thread of the spraying nozzle 50 ❸ and tighten to 6 Nm.

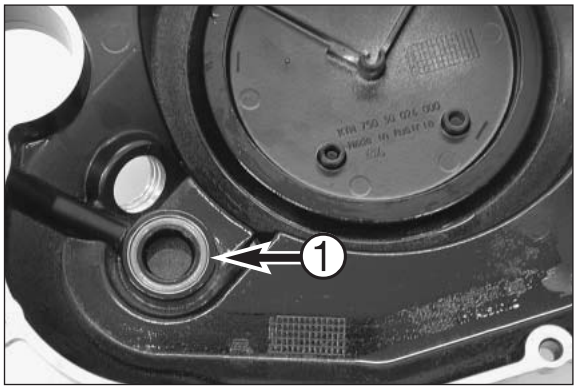
– Mount the dowels again.

– Mount the diaphragm support plate ❽ and the diaphragm ❾ again. Use some Loctite 243 on the threads of the screws (M3x8) and tighten.

NOTE: the diaphragm support plate is curved and must point away from the diaphragm.

! CAUTION !

– An incorrectly mounted diaphragm support plate will lead to poor performance and excessive oil consumption or leaks.
– Make sure no Loctite 243 drips between the diaphragm and the diaphragm support plate otherwise its function will be impaired.

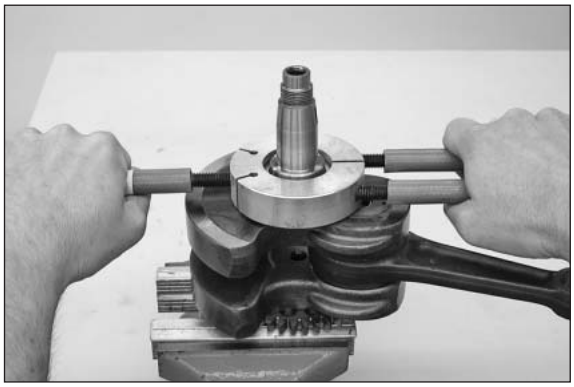


Clutch cover

– Pry the shaft seal ring out of the crankshaft ❶, press a new shaft seal ring all the way in with the open side on the inside.

NOTE: support the clutch cover when pressing in the shaft seal ring.

– Blow compressed air through the oil duct and make sure it is not clogged.



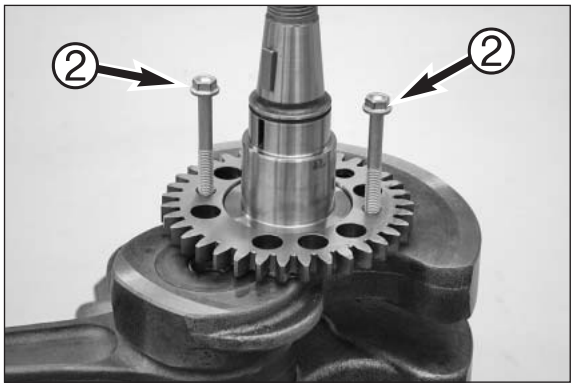
Crankshaft bearing

– Clamp the crankshaft in a vise, using protective jaws.
– Heat special tool 584.29.037.043 on a hotplate to approx. 150° C and immediately slide it onto the inner ring. Squeeze the special tool together tightly to obtain a good heat transfer and pull the inner ring off the crankshaft.

– To mount the new inner ring, reheat the special tool to approx. 150°C, clamp the inner ring and immediately slide it onto the crankshaft journal.
– Make sure the new inner ring sits flush.
– Measure the axial clearance of the crankshaft after the inner rings are replaced.

! CAUTION !

NEVER LOCK THE CRANKSHAFT IN A VISE TOGETHER WITH THE CRANKPIN TO TRY TO EXTRACT THE INNER BEARING RING. THIS WILL ONLY COMPRESS THE CRANKSHAFT WEBS AND MAKE THE CRANKSHAFT UNUSABLE.



Drive wheel on the balancer shaft

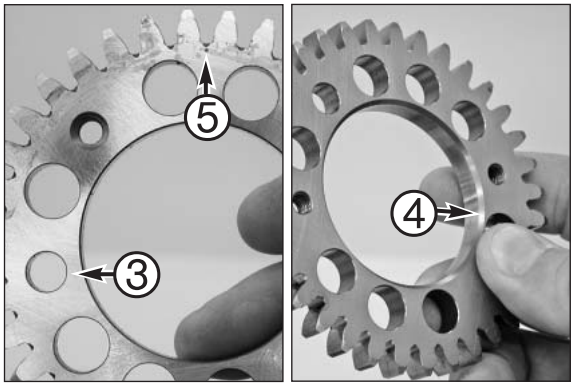
NOTE: remove the inner ring from the roller bearing before you remove the balancer shaft drive wheel from the crankshaft.

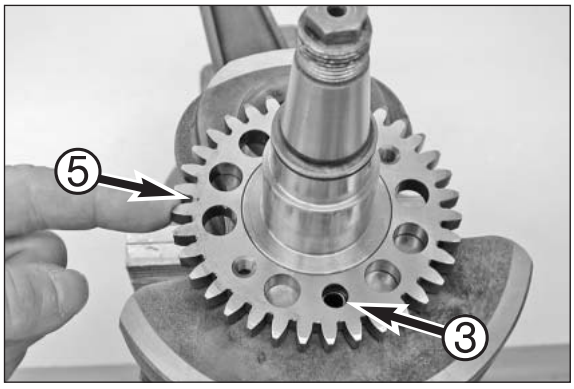
– Insert the 2 M6 screws ❷ in the threaded holes.
– Tighten the two screws evenly and pull the drive wheel from the crankshaft.

– To mount the drive wheel, heat it to approx. 100° C.

– Mount the drive wheel on the crankshaft; the dowel on the crankshaft must slide into the hole ❸.

NOTE: the side of the drive wheel with the punch mark ❺ must face you after mounting, the side with the chamfer ❹ faces the crankshaft web.





– After mounting, check the position of the dowel and the punch mark: the dowel should slide into the hole ❸, the mark ❺ should be visible.

! CAUTION !

MAKE SURE THE DOWEL DOES NOT PROTRUDE ON THE OTHER SIDE OF THE CRANKSHAFT WEB.

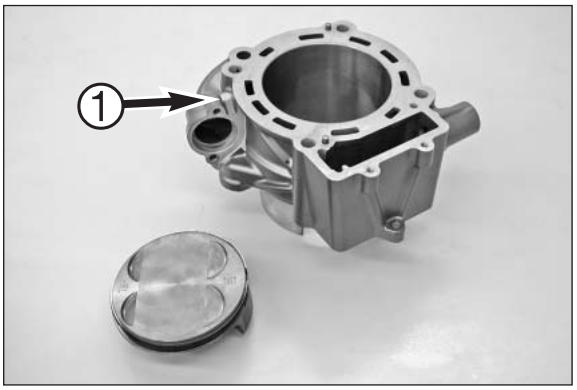
Measuring the axial clearance of the crankshaft

– Insert the crankshaft and both transmission shafts in the right case half. Mount the left case half.
– Mount and tighten the case screws.
– Mount the dial gauge support on the engine case and measure the axial clearance of the crankshaft.

Axial clearance of the crankshaft: 0.15 - 0.25 mm

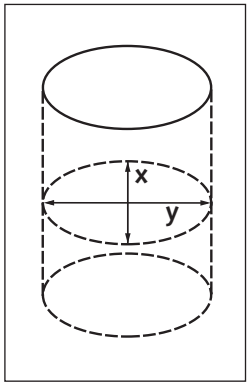
– If the measured value does not correspond to the set-point value, correct the axial clearance.
– Remove the crankshaft and pull the inner ring off the crankshaft on the ignition side using special tool 584.29.037.043. Now either add or remove compensating washers.

NOTE: If the axial clearance is too large, add compensating washers; if it is too small, remove some of the washers. Compensating washers may only be added on the ignition side.



Cylinder - Nikasil coating

Nikasil is a trademarked cylinder coating process developed by the Mahle piston manufacturer. The name is derived from the two materials used in the process - a nickel layer in which the exceptionally hard silicon carbide is embedded. The main advantages of the Nikasil coating are its outstanding heat dissipation, the improved power output, low wear and the low weight of the cylinder.

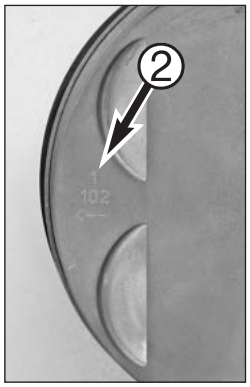


Measuring the piston and cylinder, establishing the mounting clearance of the piston

– To establish the wear to the cylinder, use a micrometer to measure the cylinder in the middle of the bearing surface.
– Measure the diameter of the cylinder in the X and the Y axis to detect any ovality.

Cylinder diameter	size I: 102.000 - 102.012 mm
	size II: 102.013 - 102.025 mm
	wear limit: max. 102.04 mm

NOTE: the cylinder size ❶ is marked on the side of the cylinder, the piston size ❷ on the piston head.



– The piston is measured at the piston skirt across the piston pin, as illustrated.

Piston diameter	size I: 101.955 - 101.965 mm
	size II: 101.966 - 101.975 mm

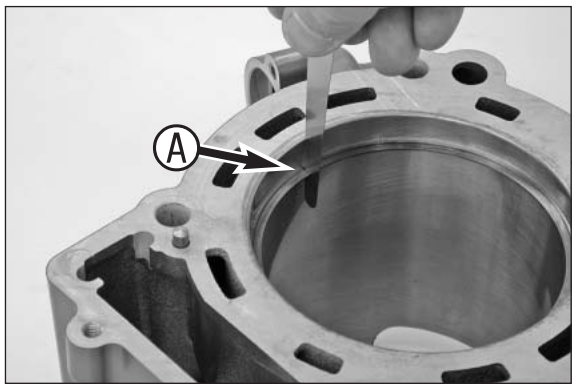
– The piston mounting clearance is the difference between the smallest cylinder diameter and the piston diameter.

Piston mounting clearance min. 0.03 mm - max. 0.10 mm

Piston

– Replace the piston if oil consumption is high or the piston skirt is excessively grooved.
– If the piston is to be remounted:

1. Check the piston bearing surface for damage
2. Piston ring grooves: the piston rings must move freely in the groove. You can use old piston rings or sandpaper (400 grit) to clean the piston ring grooves.
3. Check the piston rings for damage and end gap.
   Mount the oil scraper ring with the "TOP" mark facing up.
   Mount the rectangular ring with the "O" mark facing up.
4. Replace piston pins that are badly discolored or have visible running marks. Place the piston pin in the conrod and check for clearance.

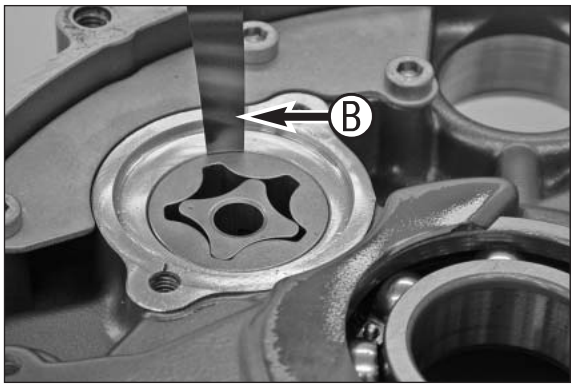


Checking the piston ring end gap

– Insert the piston ring in the cylinder and align with the piston (approx. 10 mm under the upper edge of the cylinder).
– Use a feeler gauge Ⓐ to measure the end gap.

Compression ring : max. 0.80 mm
Oil scraper ring : max. 1.00 mm

If the end gap is larger than indicated above, check the cylinder for wear. If the cylinder wear is within the tolerance limits, replace the piston ring.

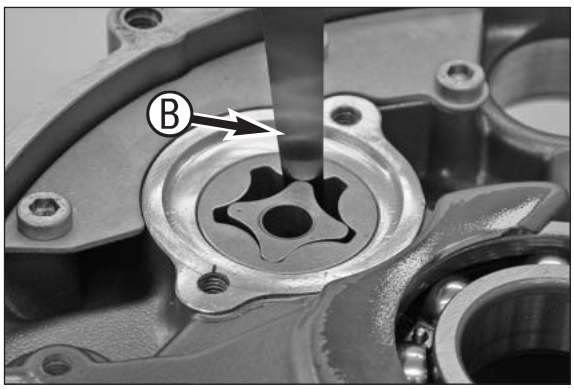


Checking the oil pumps for wear

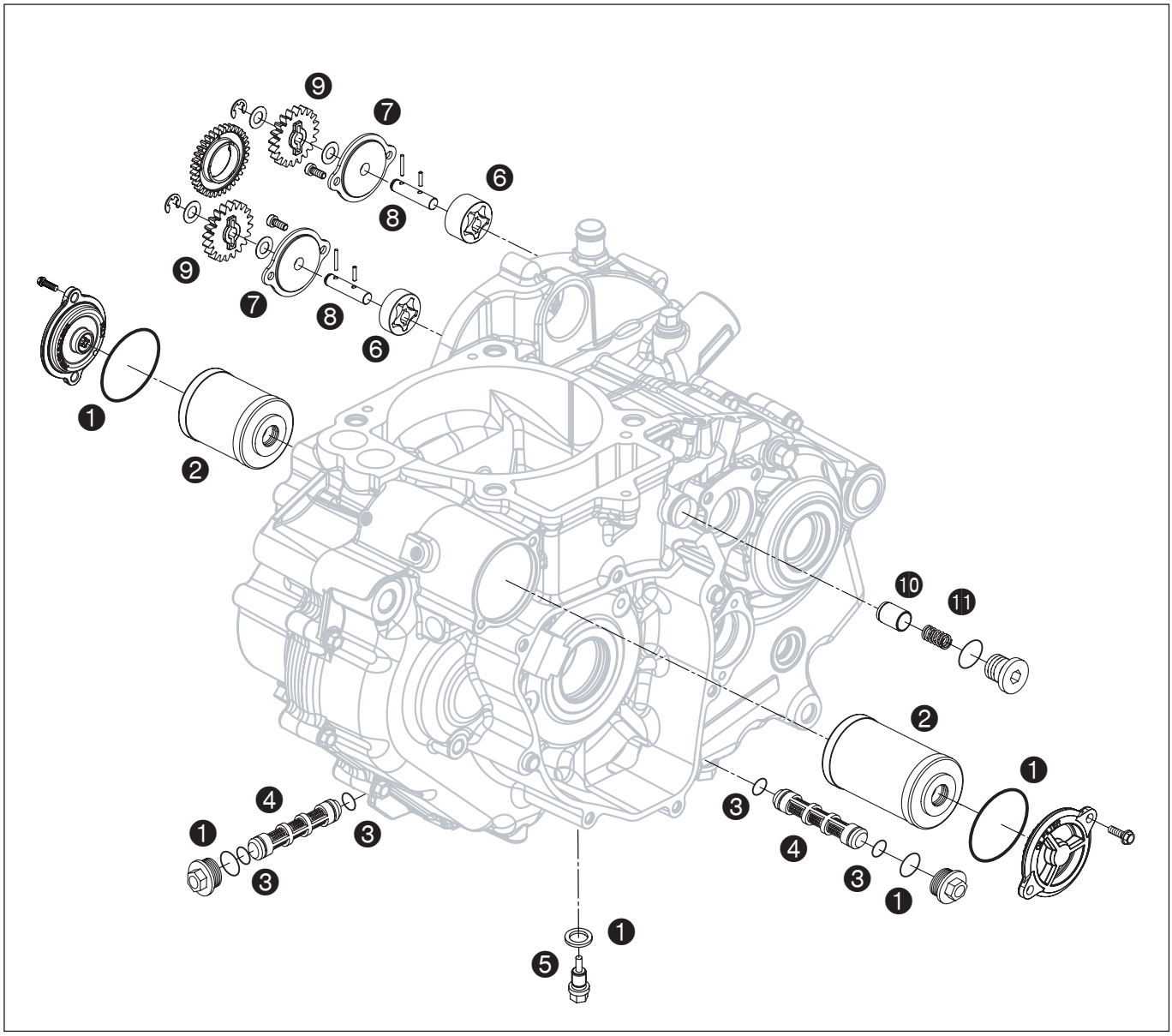
– Position the inner and outer rotors in the engine case with the marks facing the case (not visible).

– Use a feeler gauge Ⓑ to measure the wear:

Outer rotor - oil pump housing: max. 0.20 mm



Outer rotor - inner rotor: max. 0.20 mm



Lubrication system

– Replace the O-rings and sealing washer ❶ each time you change the oil filter.

– Change the oil filter ❷ each with each oil change.

– Inspect the O-rings ❸ for brittleness and replace if necessary; replace these O-rings when you repair the engine.

– Clean the oil screen ❹ with compressed air and petroleum; replace if damaged.

– Thoroughly clean the magnet on the oil plug ❺ each time you change the oil filter.

– Inspect the oil pump rotors ❻ (see "Checking the oil pumps for wear"). Thoroughly clean the oil pump rotors before remounting.

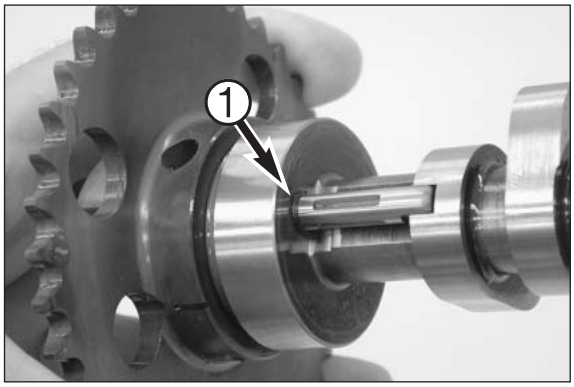
– Check the oil pump covers ❼ for seizing marks on the inside and replace if necessary.

– Lay the oil pump shaft ❽ on a level surface and check for runout.

– Check the teeth on the oil pump gears ❾ for wear. The recesses for the needle rollers should not be worn-out.

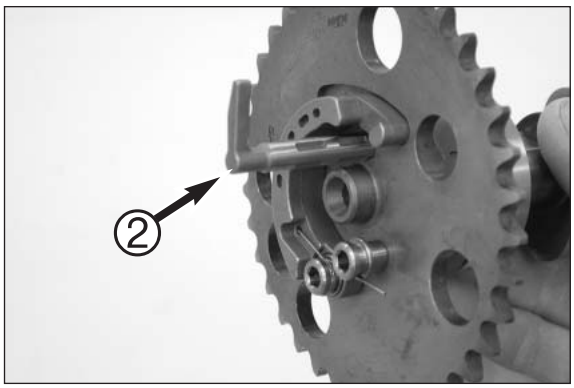
– Check the pressure control piston ❿ for wear and score marks.

– Check the length of the spring ⓫ for the pressure control piston (see page 5-3).

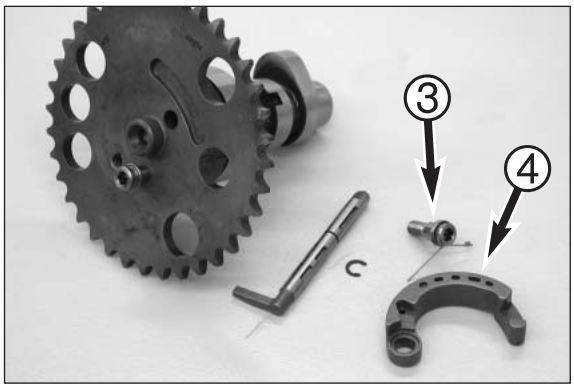


Automatic decompressor

– Remove the lock ring ❶ from the automatic decompressor shaft and discard.

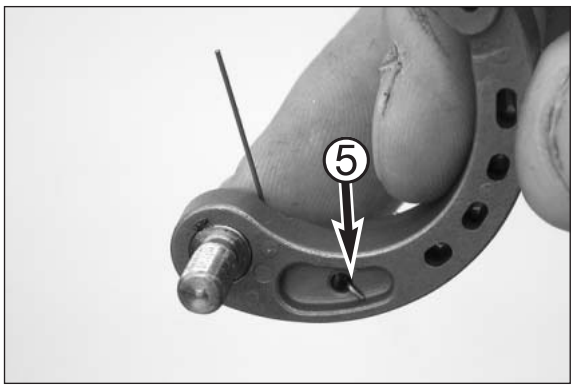


– Pull the automatic decompressor shaft ❷ out of the camshaft.



– Disconnect the automatic decompressor spring, loosen the screw ❸ and remove it together with the automatic decompressor spring and the automatic decompressor weight ❹.

– Check all parts for damage or wear.
– To remount, attach the spring first and then insert the screw through the automatic decompressor weight.

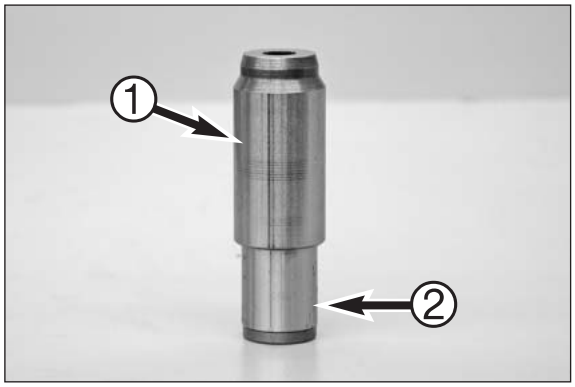


NOTE: make sure the shank of the spring ❺ reaches all the way through the automatic decompressor weight.

– Mount the automatic decompressor weight, lock the screw with Loctite 243 and tighten to 3-4 Nm. Attach the spring again.

– Mount the automatic decompressor shaft in the camshaft and insert the new lock ring in the groove.

– Perform a functional check; the spring should turn the automatic decompressor shaft all the way back. If not, increase the preload or replace.

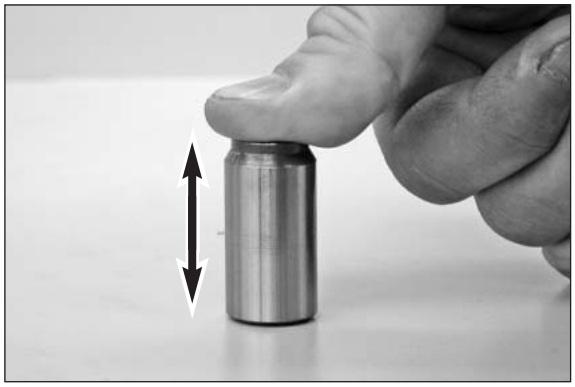


Timing chain tensioner

! CAUTION !

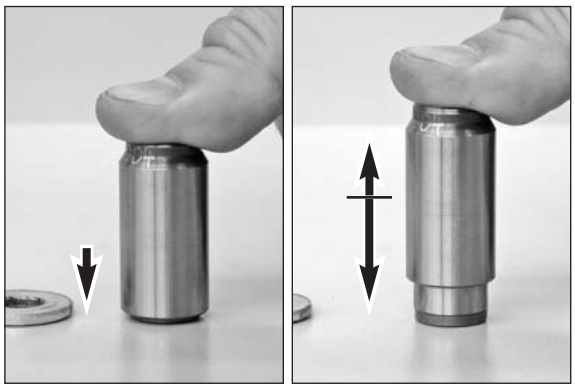
IF YOU DO NOT FOLLOW THESE INSTRUCTIONS, THE TIMING CHAIN WILL NOT BE TENSIONED CORRECTLY AND WILL SKIP, RESULTING IN ENGINE DAMAGE.

NOTE:
- The timing chain tensioner ❶ operates with spring force and with oil pressure. A stop system is used to ensure the right timing chain tension in the engine starting phase, even if the oil pressure is insufficient. The stop system prevents the piston ❷ on the timing chain tensioner from being retracted.
- In a dismounted state, the piston on the timing chain tensioner extends completely.

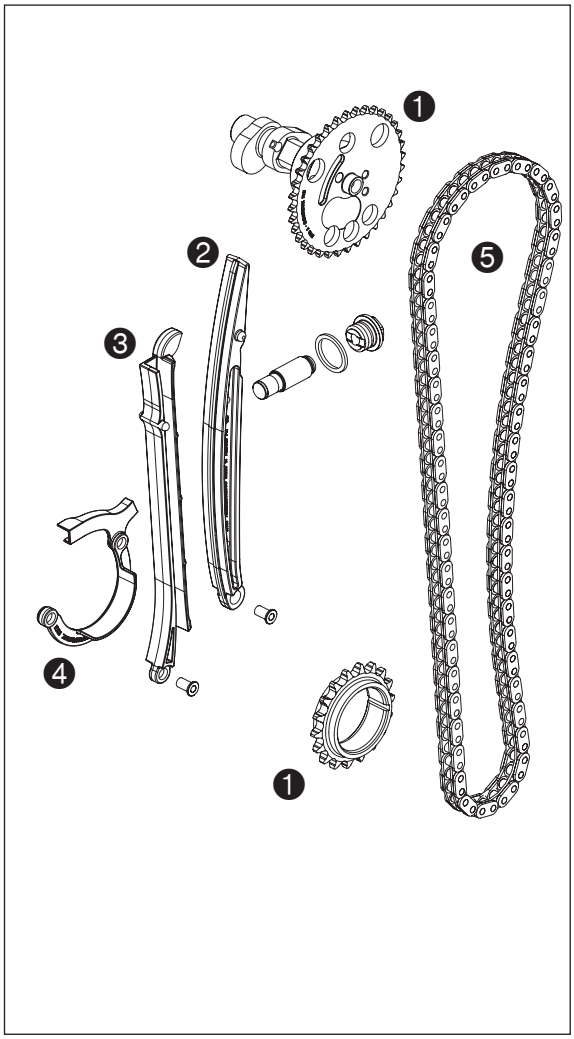


- Fully depress the spring tensioner. This will require some effort since the oil must be squeezed out. If the timing chain tensioner is released it will extend completely again; it may not be mounted in this state, since the locking mechanism will not function.
- Press down on the timing chain tensioner to ensure smooth operation.

- **To prepare the timing chain tensioner for installation, place 2 spacing washers or similar implements with a thickness of 2 - 2.5 mm next to the piston of the timing chain tensioner. This will ensure that the piston cannot be completely retracted when the piston is pressed down. If you release the piston, the stop system will lock, the piston will protrude approx. 3 mm and stay in this position - this position is required for refitting!**



- If you press the timing chain tensioner again and it extends no more than half way (preventing it from extending completely), the stop system will lock and the timing chain tensioner can no longer be pressed together - this position is necessary to ensure that the timing chain is adequately tensioned, even if the oil pressure is low.



Timing train

Thoroughly clean all parts and check for wear.

– Check the toothing of the sprockets ❶ for chips and wear.

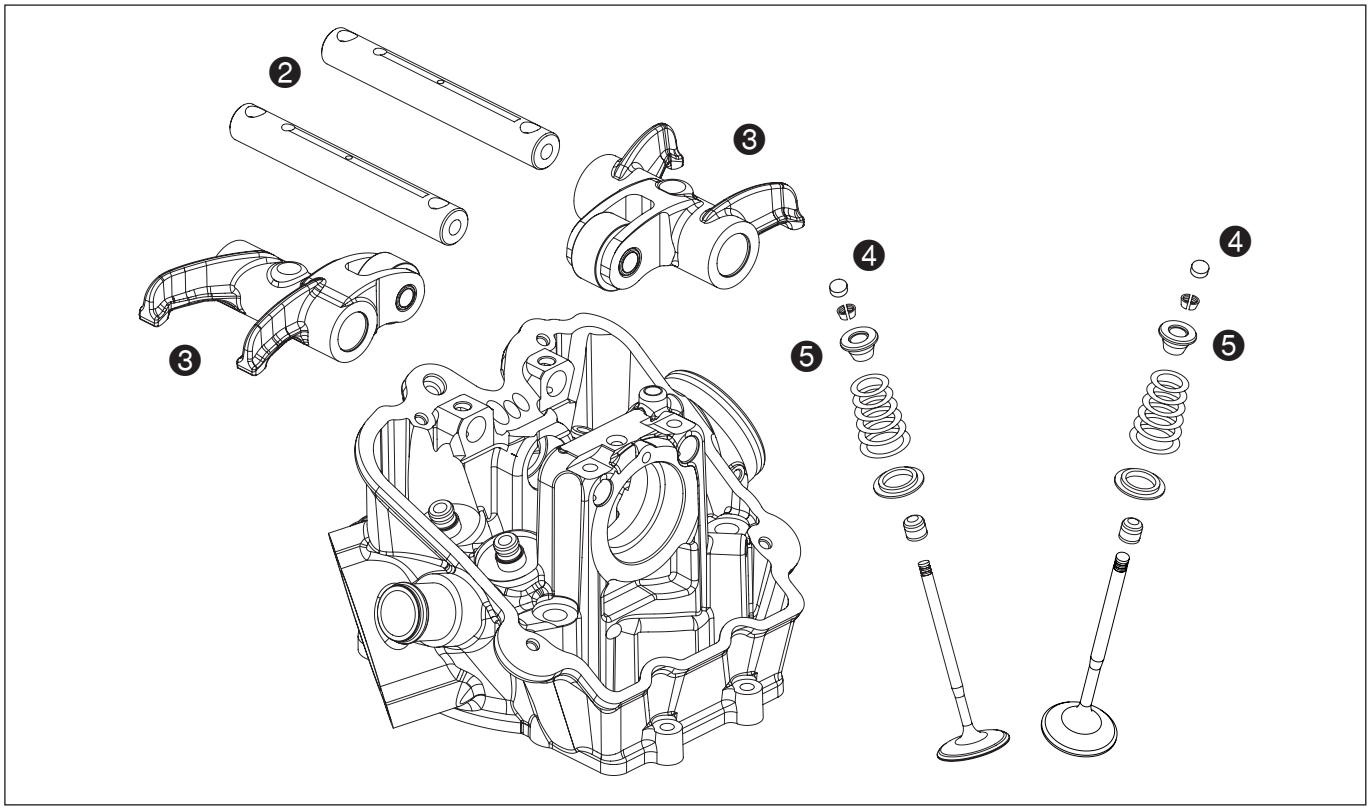
– Check the timing chain tensioning rail ❷ for seizing marks and damage.

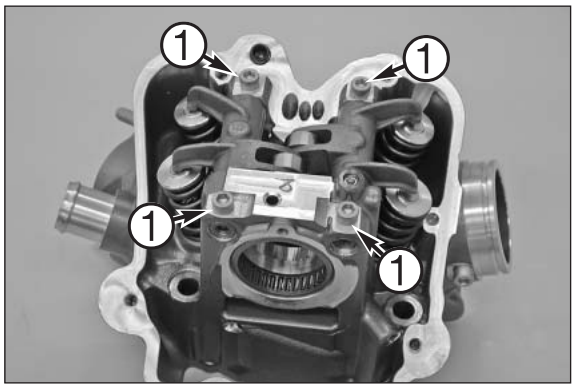
– Check the timing chain guide ❸ for seizing marks and damage.

– Check the timing chain clip ❹ for seizing marks and damage.

– Check the timing chain ❺ for damage and wear; make sure the chain links operate smoothly.

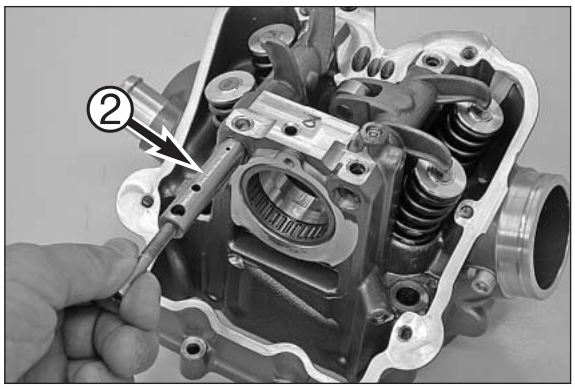
NOTE: The smooth operation of the chain links can easily be checked by simply letting the timing chain hang down - the chain links should align in a row. Replace the timing chain if the chain links do not align in a row - they are no longer free-moving.





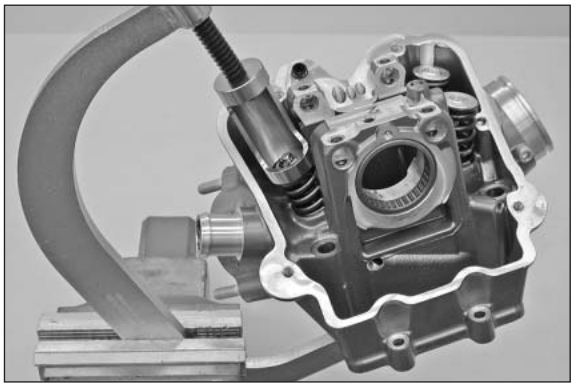
Cylinder head

– Remove all 4 screws ❶ from the rocker arm shafts ❷.

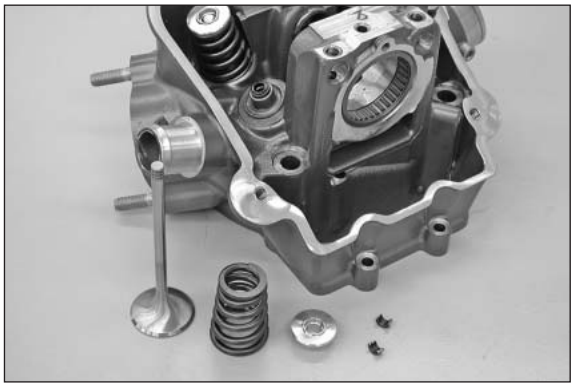


– Insert an M6 screw in the rocker arm shafts and pull them out of the cylinder head; remove the rocker arms ❸.

– Remove the shims ❹ from the valve spring retainers ❺ and lay them aside in their mounting position.

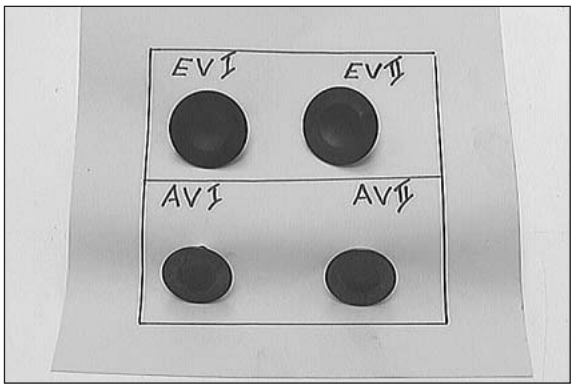


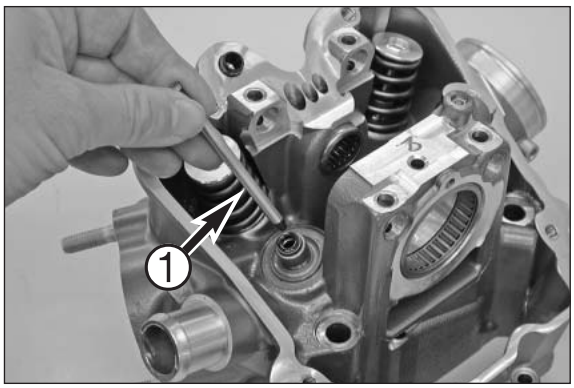
– Remove the valve keys with special tool 590.29.019.000 and 773.29.060.000 and relieve the valve springs.



– Remove the special tool; remove the spring retainers and valve springs.
– Pull the valve out of the bottom of the valve guide, pry off the valve stem gasket and remove the lower valve spring retainer.

NOTE: if you are mounting the used valves again, they must be remounted in the same valve guide as before. For this purpose, place the valves in a box, marking the position they were mounted in the cylinder head (see photo).





– Check the valve guides with the limit plug gauge 590.29.026.006 ❶ (Ø 6.05 mm). If you can easily slide the limit plug gauge into the valve guide, have it replaced and reamed at a special machining shop.

– Check the sealing area of the spark plug thread the valve seats for damage or cracks. Use a straight edge and a feeler gauge to check the warpage of the sealing area towards the cylinder. Warpage: max. 0.10 mm.

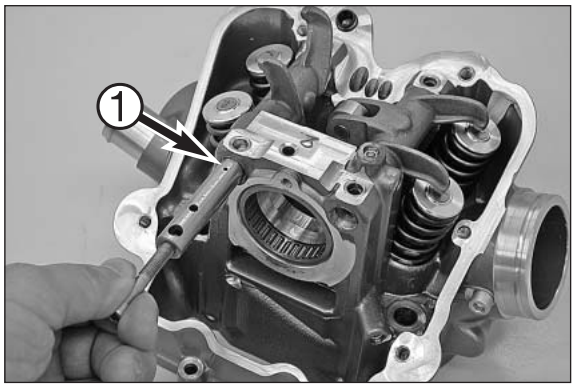
– Valve seats should not be impacted. Sealing seat width: inlet max. 1.60 mm; outlet max. 2.00 mm. If necessary, grind the valves.

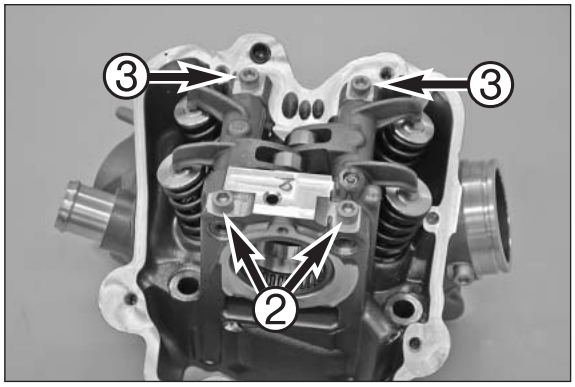
– Check the valve disk for wear and runout. Max. runout at the valve disk: 0.05 mm. The valve seat may not be impacted. The sealing area should be in the center of the valve seat. The valve stem is hard-chromium-plated, the valve guide is usually subjected to wear.

– Check whether the valve springs are broken or worn (visual check). Also measure the length with a sliding caliper.

Minimum length 42.3 mm

NOTE: replace the spring if it is shorter.





– If you remove the valves, always replace the valve stem gaskets.

– Measure the thickness of the valve spring retainers. Minimum thickness: 2.4 mm.

– Position the valve spring retainers in the cylinder head.

– Mount the valve stem gaskets on the valve guides and lubricate.

– Generously lubricate the valves on the stem and insert in the valve guides.

NOTE: make sure you mount the valves in the right position.

– Position the valve springs, place the valve spring retainers in the valve springs.

NOTE: the end of the valve spring with the larger diameter must be mounted facing down.

– Preload the valve springs with the special tool and mount the valve keys.

NOTE: make sure the valve keys are in the right position when mounted. Attach the valve keys to the valve with a little grease.

– Finally, tap the valve spring retainers a few times with a plastic hammer.

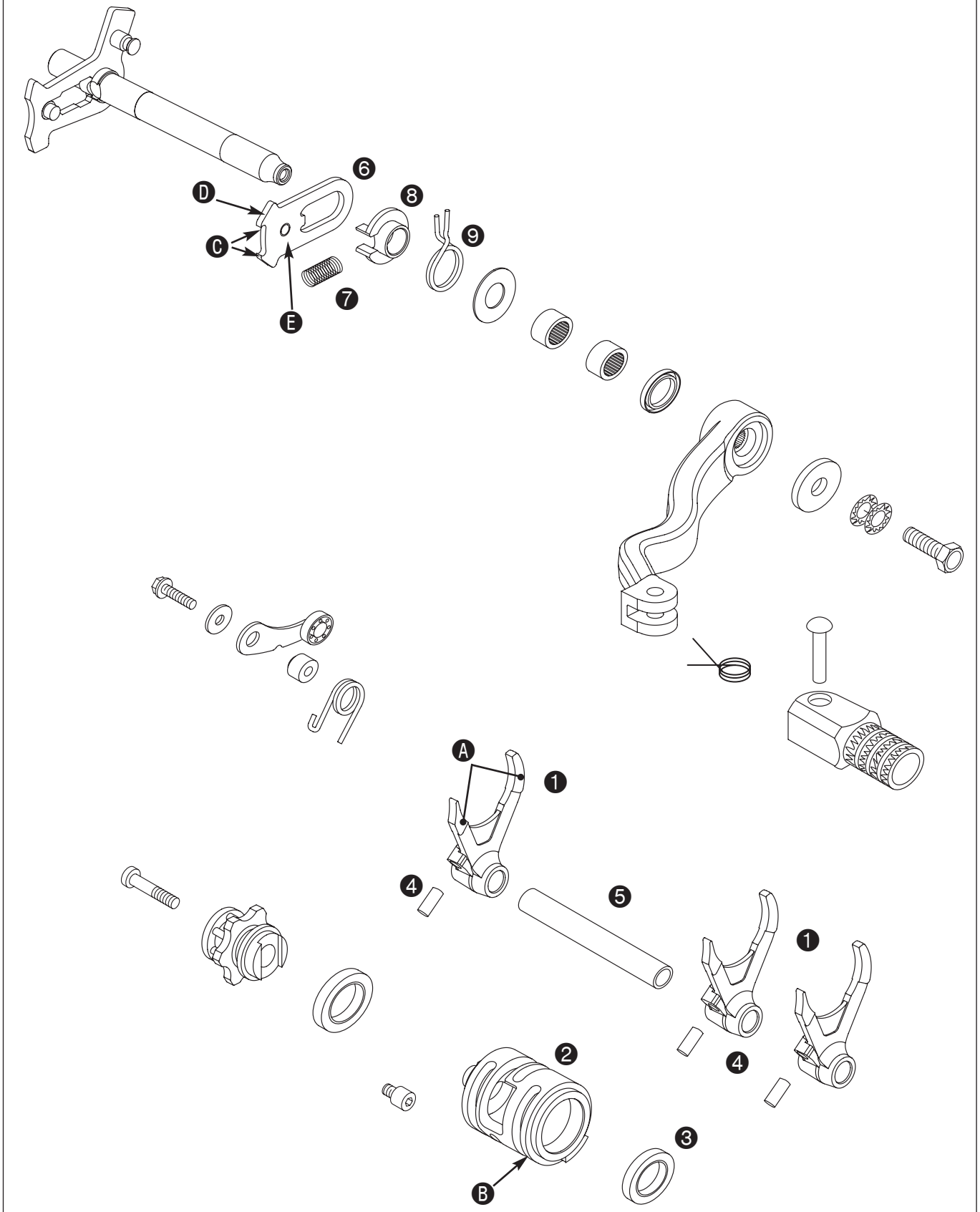
– Mount the shims in their original position.
– Position the rocker arms and slide in the rocker arm shafts.

NOTE: the threaded holes must be on the chain tunnel side.

! CAUTION !

WHEN YOU MOUNT THE ROCKER ARM SHAFTS, MAKE SURE THE SMALL HOLES ❶ FACE UP.

– Mount the M6x40 screws ❷ on the rocker arm shafts, mount the M6x30 screws ❸ and tighten to 12 Nm.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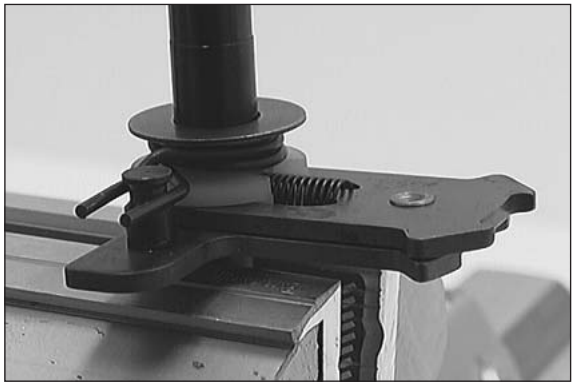
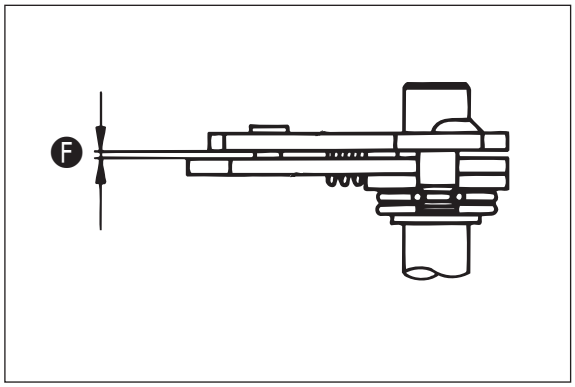




Shift mechanism

– Check the shift forks ❶ on the leaf Ⓐ for wear. The forks have a thickness of 4.85 to 4.95 mm when new, the wear limit is 4.6 mm.

– Check the shift grooves Ⓑ on the shift drum ❷ for wear.
– Check the fit of the shift drum in the grooved ball bearing ❸.

– Check the grooved ball bearing ❸ for smooth operation.

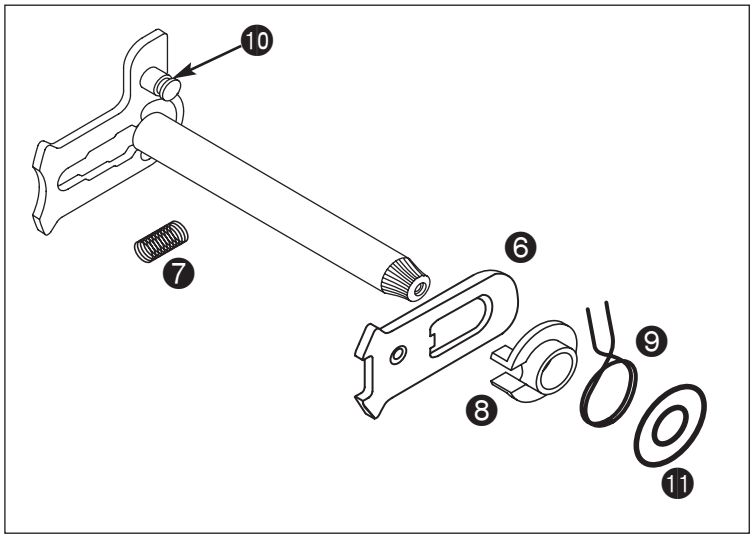
– Check the shaft rollers ❹ for pressure points and cracks.

– Check the shift rails ❺ for runout on an even surface. Check the shift rails for score marks and seizing marks. The shift forks must operate smoothly on the shift rails.

– Check the shift rail ❻ at the contact areas Ⓒ for wear. Check the return surface Ⓓ on the shift rail for wear (replace in case of severe indentation).

– Check the guide bolt Ⓔ for a tight fit and wear.

– Pre-mount the shift shaft and check the clearance Ⓕ between the shift rail ❻ and the shift quadrant. The clearance must lie between 0.40 - 0.80 mm.



Pre-mounting the shift shaft

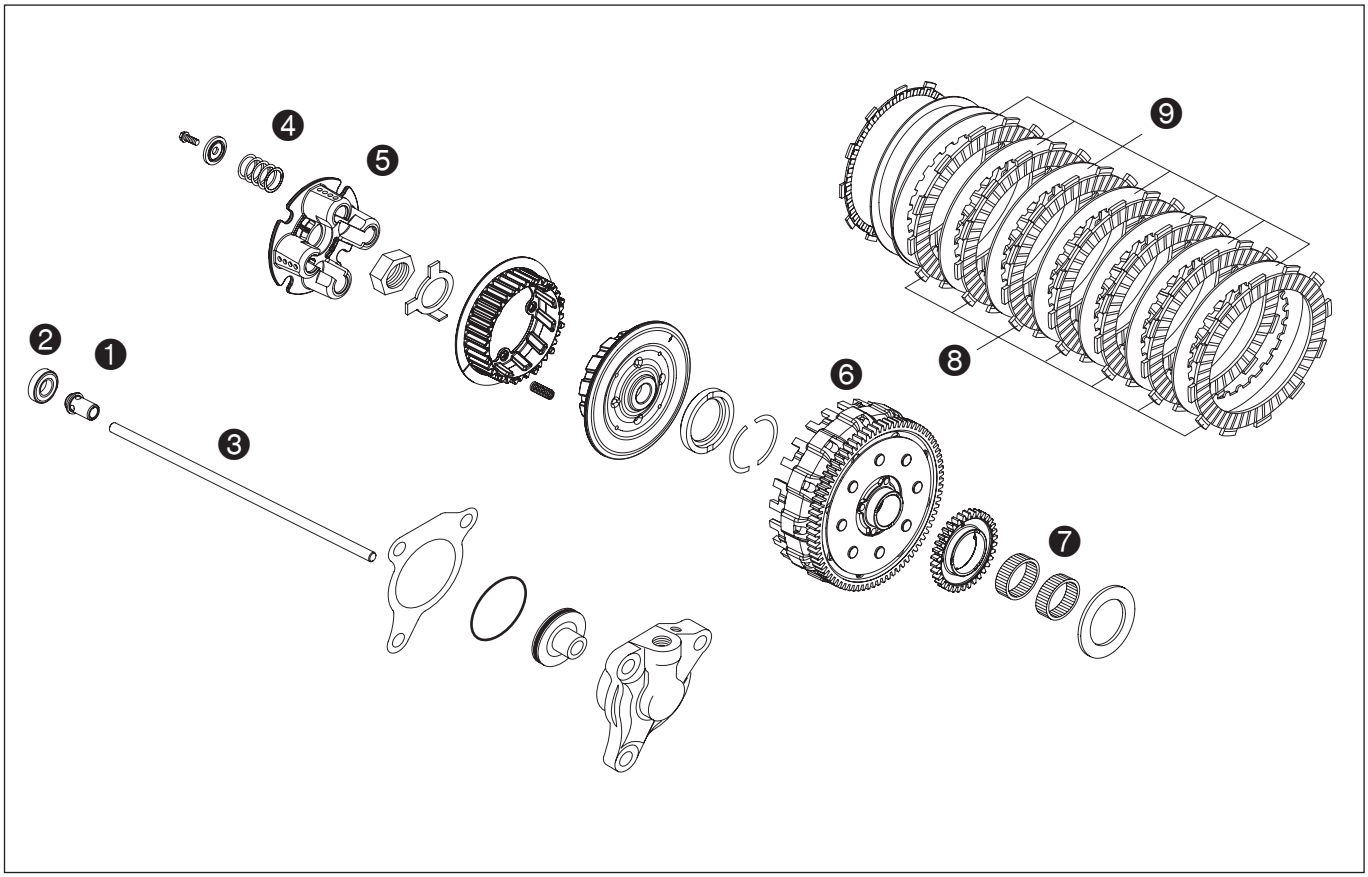
– Clamp the short end of the shift shaft in a vise (use protective jaws).

– Mount the shift rail ❻ with the guide bolt facing down and attach the guide bolt to the shift quadrant.

– Mount the pressure spring ❼.

– Slide on the spring guide ❽, slide the return spring ❾ over the spring guide with the angled end up and lift the angled end over the dolly bolt ❿ (see illustration).

– Mount the stop disk ⓫.



Clutch

– Check the pressure piece ❶ for seizing marks and smooth operation.

– Check the axial bearing 2 for damage.

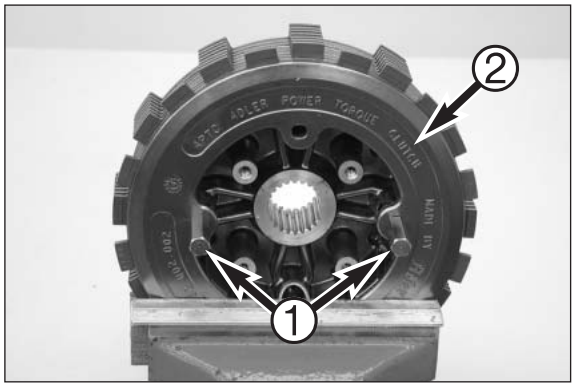
– Lay the pushrod ❸ on a level surface and check for runout.
– Check the length of the clutch springs ❹. Minimum length 31.5 mm (33.5 mm new), replace all 4 springs if necessary.

– Check the pressure cap sealing area ❺ for damage.

– Check the contact face ❻ of the outer clutch hub for wear. If the indents are bigger than 0.5 mm, replace the lining disks and the outer clutch hub.

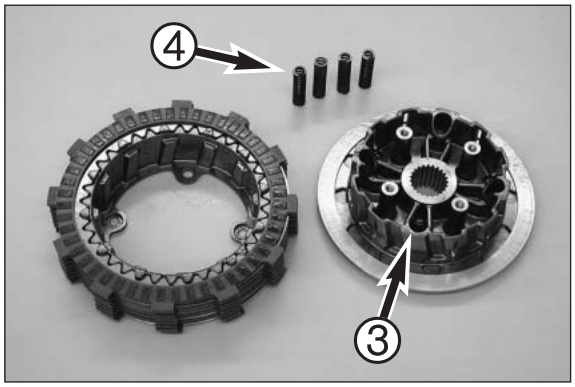
– Check the needle bearing ❼ for seizing marks and damage.

– Inspect the lining disks ❽ and clutch disks ❾ (see next page).



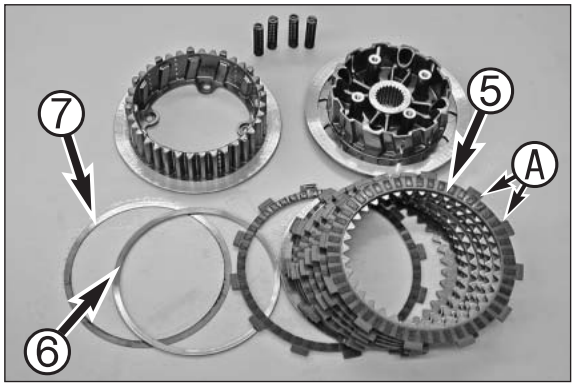
Checking the clutch

– Clamp the clutch in a vise (use protective jaws), gradually loosen special tool 750.29.033.000 ❶ and remove.



– Remove the clutch from the vise and place it on a clean workbench with the outer hub ❷ face down.

– Remove the inner hub ❸ and clutch springs ❹ from the outer hub.



– Remove the clutch disks ❺ from the outer hub.

– Remove the spring ring ❻ and supporting ring ❼.

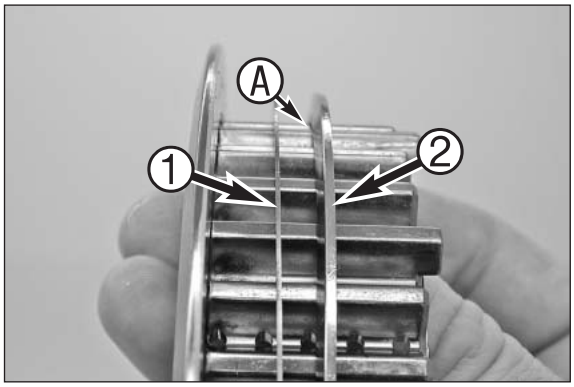
– Thoroughly clean all parts.

– Check both hubs for seizing marks and damage.

– Check the contact area Ⓐ on the lining disks for wear. If the indents are larger than 0.5 mm, replace the lining disks and the outer clutch hub.

– Check the thickness of the lining disks; minimum thickness: 2.5 mm. The lining disks must be flat.

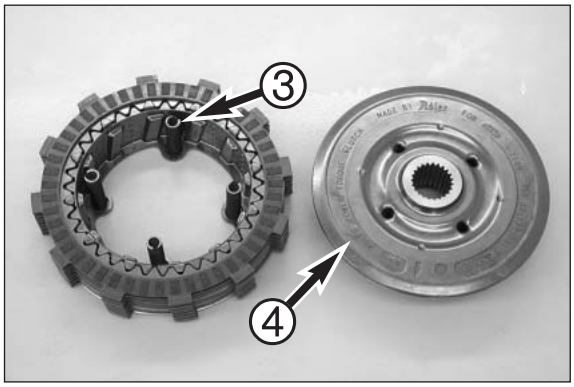
– Clutch disks must be flat. Check for mechanical damage. Replace the clutch disks if you detect any roughness or chipped material.



– Generously lubricate the clutch disks.

– Slide the supporting ring ❶ and the spring ring ❷ on the outer hub.

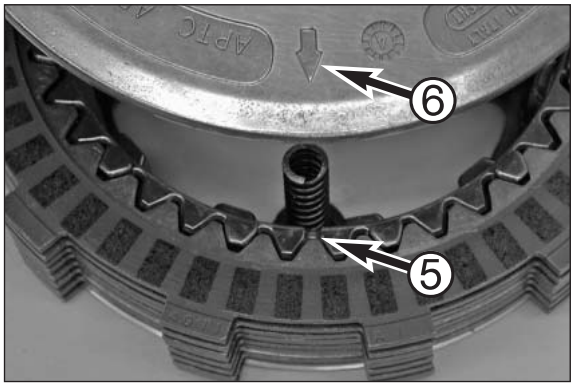
NOTE: mount the spring ring with the inner edge Ⓐ resting on the supporting ring.



– Alternately slip on 8 lining disks and 7 steel disks, finishing with a lining disk on top.

NOTE: the outer lining disk has a larger inner diameter since it must be positioned over the spring ring and supporting ring. Mount this lining disk first.

– Position the clutch springs ❸.



– Slide on the inner hub ❹, matching the marks.

NOTE: the outer hub has a notch ❺ at the clutch spring, the arrow ❻ on the inner hub must point to the notch.

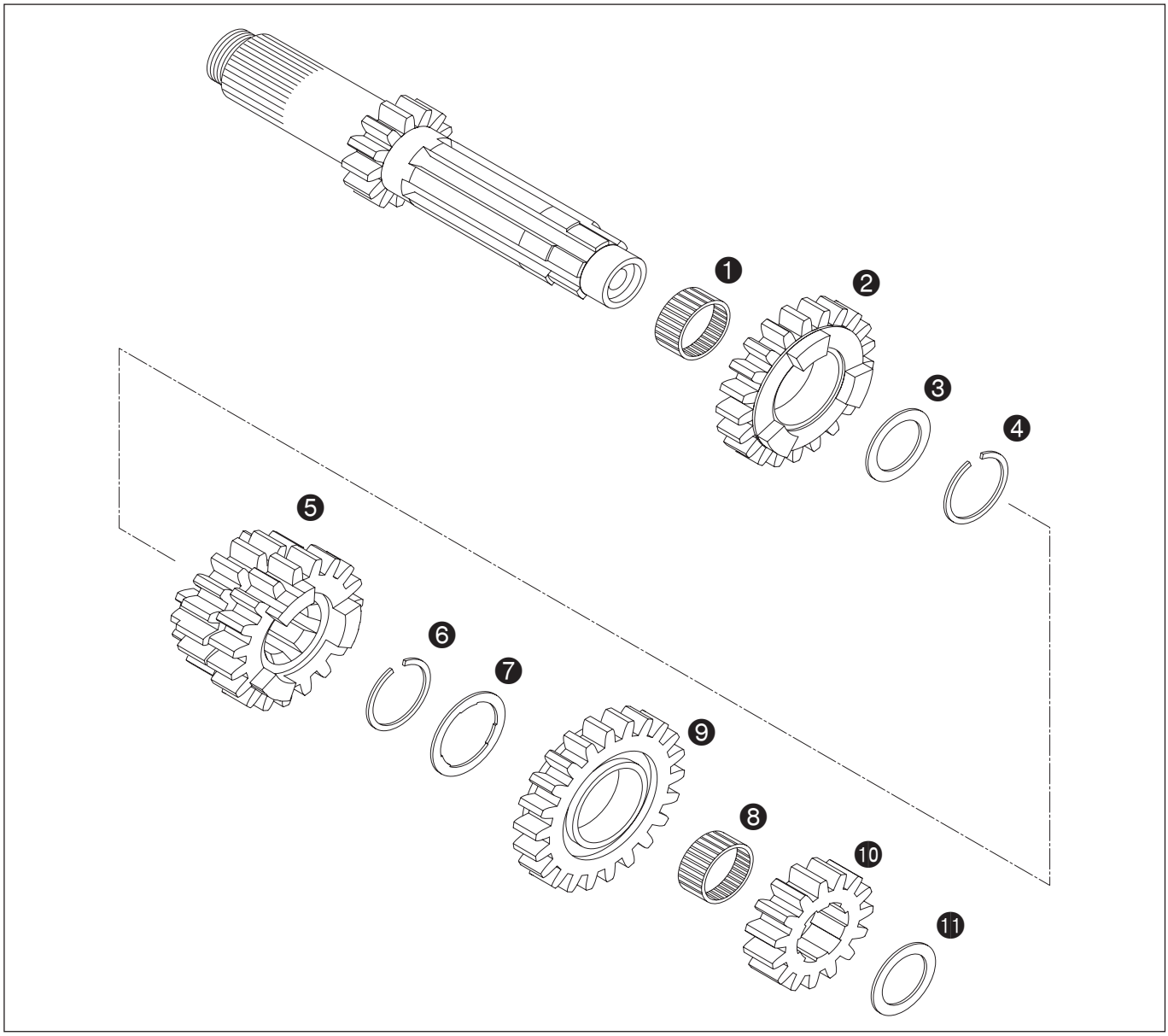
– Tightly press the two hubs together and have a helper screw on special tool 750.29.033.000.

! CAUTION !

DO NOT TIGHTEN WITH A TOOL.

NOTE: tighten special tool 750.29.033.000 just enough to allow the clutch disks to be turned since they must be aligned when mounted in the outer clutch hub.

– Align the lining disks with the outer clutch hub, turning the upper disk one space.



General information on servicing the transmission

Clamp the main shaft or countershaft in a vise (use protective jaws). Remove the gears and check the following parts for wear or seizing marks:

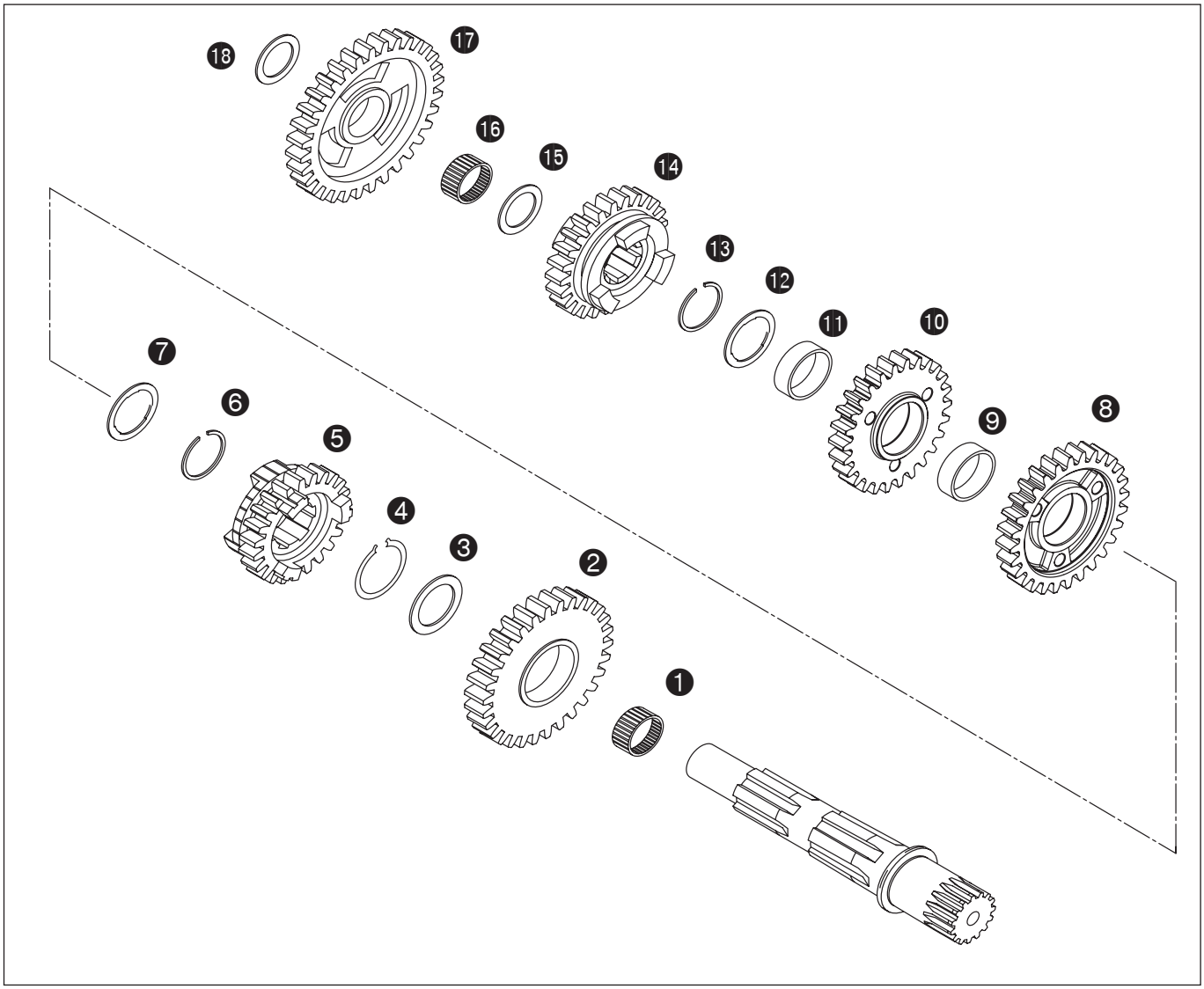
- Bearings
- Pivot points on the main shaft and countershaft and pivot points on the idler gears
- Gear dogs
- Tooth faces on all gears
- Tooth profiles on the main shaft and countershaft and the corresponding gears
- Check all sliding gears for smooth operation in the profile

Carefully clean all parts and replace any damaged parts.
Always mount new circlips when repairing the transmission.

Assembling the main shaft

- Clamp the main shaft in a vise with the toothed end facing down (use protective jaws).
- Carefully lubricate all parts prior to mounting.
- Mount the split needle bearing ❶, mount the 5-speed idler gear ❷ with the shift dogs facing up.
- Mount the stop disk ❸ (20x32x1mm) and the circlip ❹.
- Mount the 3rd/4th gear sliding gear ❺ with the small gear facing down; mount the shaft ring ❻.
- Mount the stop disk ❼ and split needle bearing ❽.
- Mount the 6th gear idler gear ❾ with shift dogs facing down.
- Mount the 2nd gear fixed gear ❿ with the collar facing down; mount the stop disk ⓫ (20x32x1mm).
- Finally, check all gears for smooth operation.

NOTE: ❸ and ⓫ are identical.



Art.-No. 3.206.045-E

General information on servicing the transmission

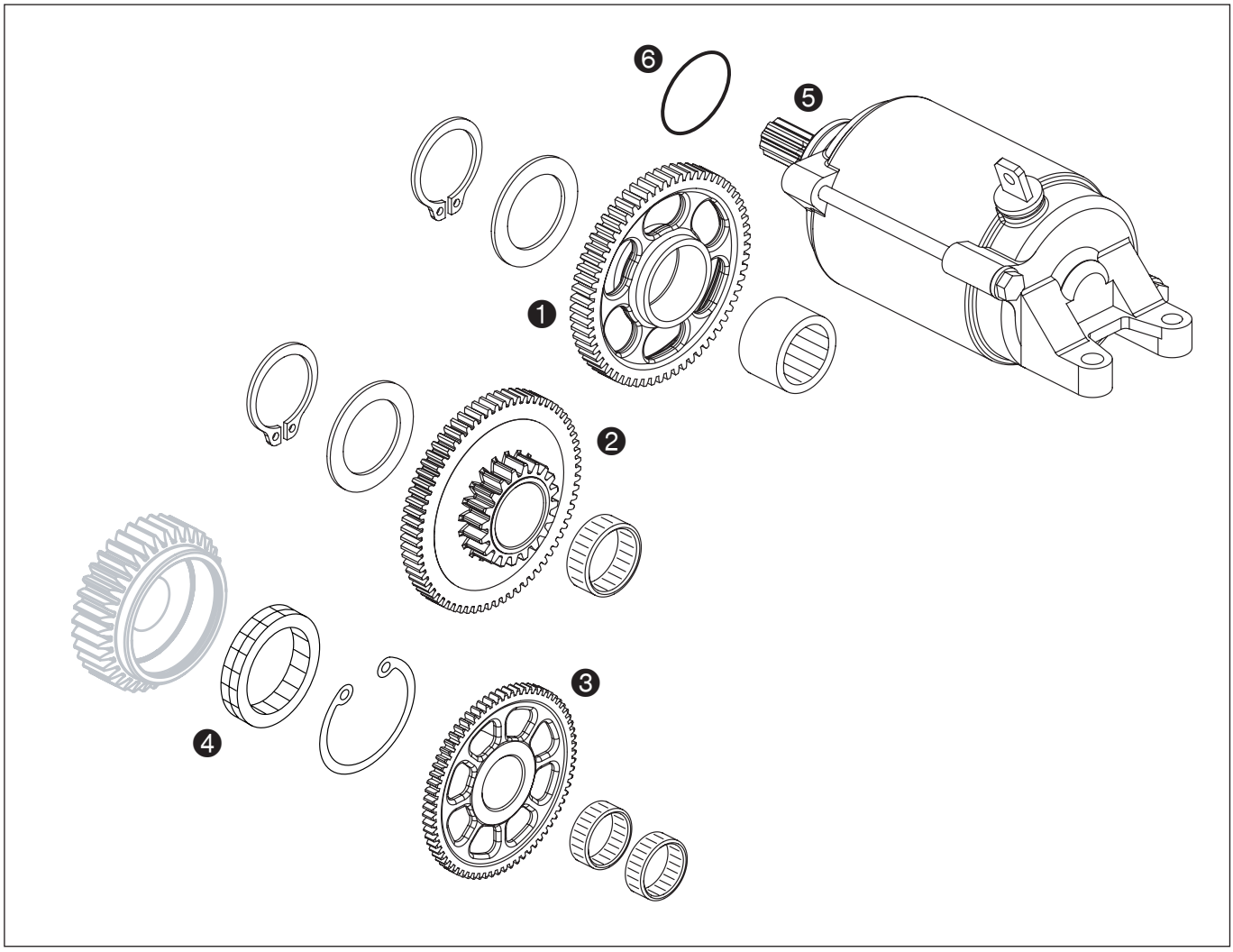
Clamp the main shaft or countershaft in a vise (use protective jaws).
Remove the gears and check the following parts for wear or seizing marks:
- Bearings
- Pivot points on the main shaft and countershaft and pivot points on the idler gears
- Gear dogs
- Tooth faces on all gears
- Tooth profiles on the main shaft and countershaft and the corresponding gears
- Check all sliding gears for smooth operation in the profile

Carefully clean all parts and replace any damaged parts.
Always mount new circlips when repairing the transmission.

Assembling the countershaft

- Clamp the countershaft in a vise with the toothed end facing down (use protective jaws).
- Carefully lubricate all parts prior to mounting.
- Mount the split needle bearing ❶ and 2nd gear idler gear ❷ on the countershaft with the protruding collar facing down.
- Mount the thrust washer ❸ and the lock ring ❹.
- Mount the 6th gear sliding gear ❺ with the shift groove facing up.
- Mount the lock ring ❻ and the stop disk ❼.
- Mount the 2 split needle bearings ❾ + ⓫ and the 4th gear idler gear ❽ with the collar facing up.
- Mount the 3rd gear idler gear ❿ with the collar facing down.
- Mount the stop disk ⓬ and lock ring ⓭.
- Mount the 5-speed sliding gear ⓮ with the shift groove facing down; mount the stop disk ⓯ (22x31.7x1mm).
- Mount the needle bearing ⓰, 1st gear idler gear ⓱ with the recess facing down; mount the stop disk ⓲ (20x32x1mm).

NOTE:
- ❸, ❼ and ⓬ are identical.
- ❾ and ⓫ are identical.



Starter drive

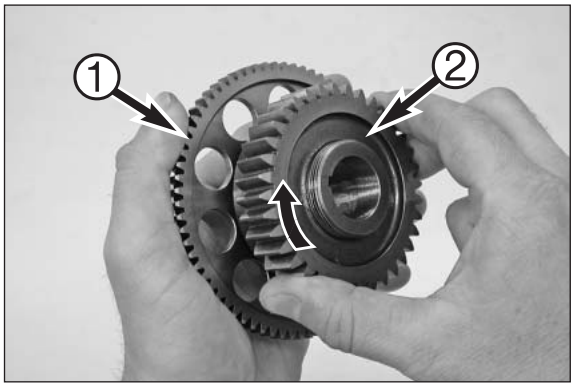
Idler gear ❶
Check the toothing and bearing position of the starter idler gear for damage and wear. Also check the idler gear bearing bolt for running marks.

Idler gear ❷ with torque limiter
Check the toothing and bearing position of the idler gear for wear. Also check the idler gear bearing bolt for running marks. Mount the idler gear with the needle cage on the bearing bolt and check the clearance.

Freewheel gear ❸
Check the toothing and bearing position for wear.

Freewheel ❹
Disassemble the freewheel (see next page) and check for damage and wear.

Starter engine ❺
Check the toothing for wear; replace the O-ring ❻ on the flange.

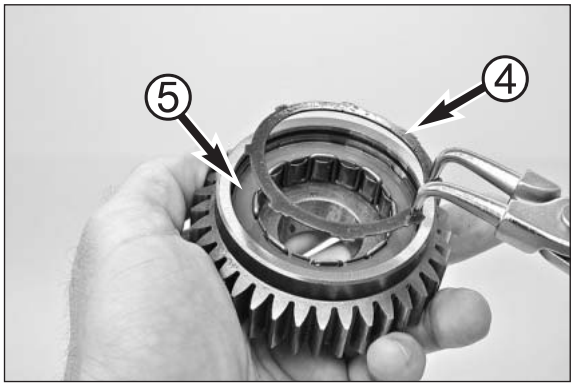


Checking the freewheel

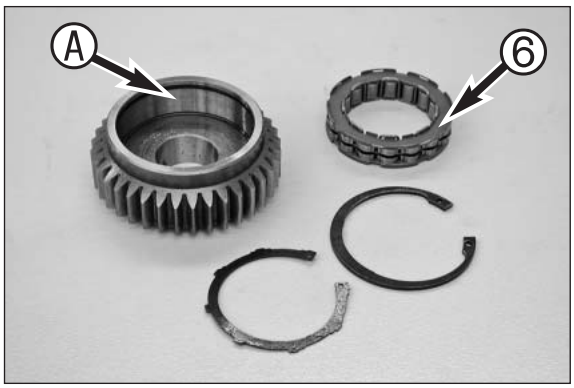
– Insert the freewheel gear ❶ in the primary pinion ❷, evenly turning the primary pinion in a clockwise direction (see photo).
– You should be able to turn the freewheel gear in a clockwise direction.
– The freewheel gear should block in a counterclockwise direction.

Replacing the freewheel

– Remove the lock ring ❸ from the groove with suitable pliers.



– Squeeze the spreader ring ❹ together with suitable pliers and remove.
– Lift the freewheel ❺ out of the primary pinion.

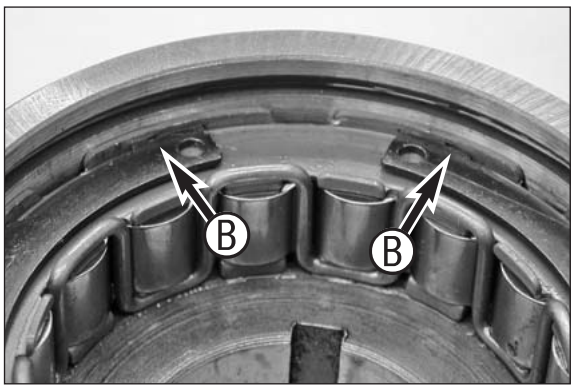


– Check the contact area Ⓐ for pressure marks; thoroughly clean the primary pinion.

– Thoroughly clean the freewheel ❻ with petroleum and compressed air. Check the freewheel segments for wear. Next, generously lubricate the freewheel.

NOTE: if you detect any damage that requires the parts to be replaced, replace both as a set.

– Insert the freewheel in the primary pinion.



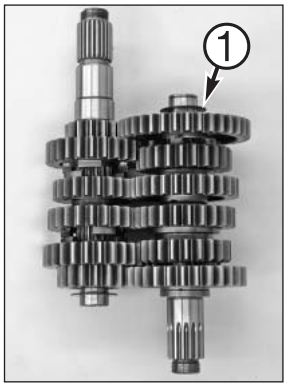
– Mount the spreader ring; make sure all of the tabs on the spreader ring slide into the freewheel grooves. If necessary, use a screwdriver to press them in.

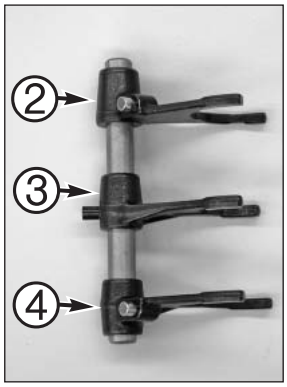
– Insert the lock ring ❸ in the groove with suitable pliers and make sure it is fully seated. It is recommended to carefully tap on the mounted spreader ring with a drift punch.

ASSEMBLING THE ENGINE 6

INDEX

Art.-No. 3.206.045-E





Mounting the transmission shafts, assembling the engine case

– Mount the stop disk ❶ and assemble both transmission shafts.

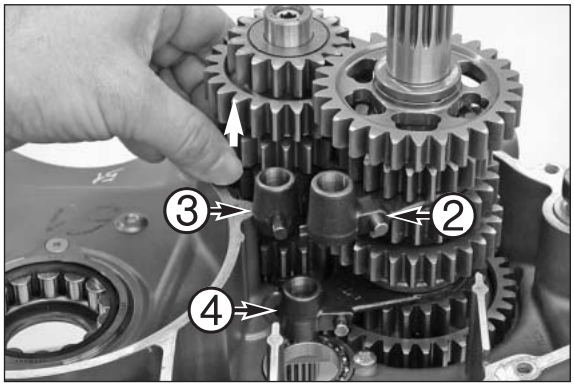
NOTE: the countershaft has a stop disk on the bearing side, the main shaft does not.

– Mount the engine case in the work stand and move into a vertical position.

– Thoroughly oil all bearings.

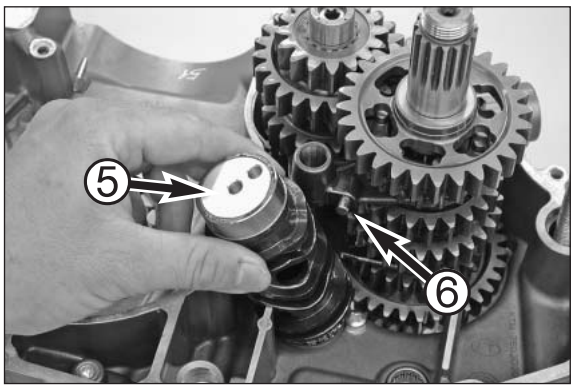
– Grasp both transmission shafts with one hand and insert in the bearing seats.

– Move the engine case into a horizontal position.

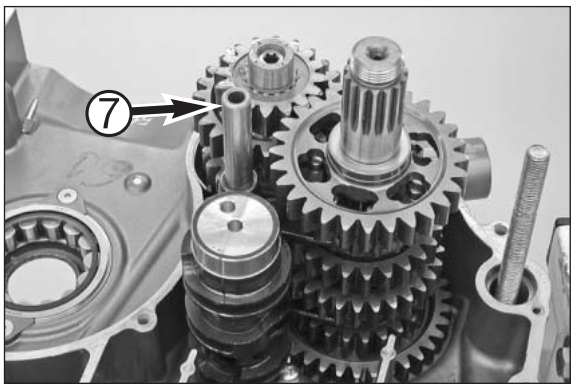


– Mount the shift forks.

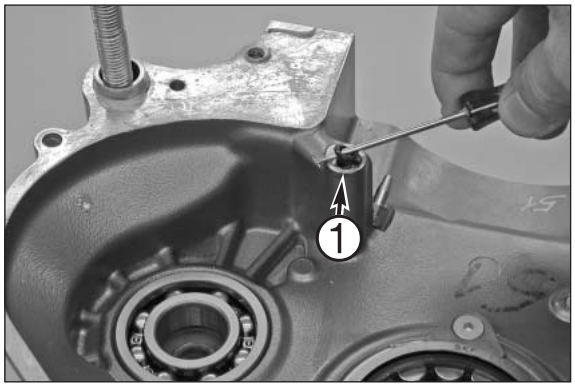
NOTE:
– Upper shift fork ❷, middle shift fork ❸, lower shift fork ❹ (see photo at the top).
– Lift the sliding gear for 3/4 gear to mount the middle shift fork.



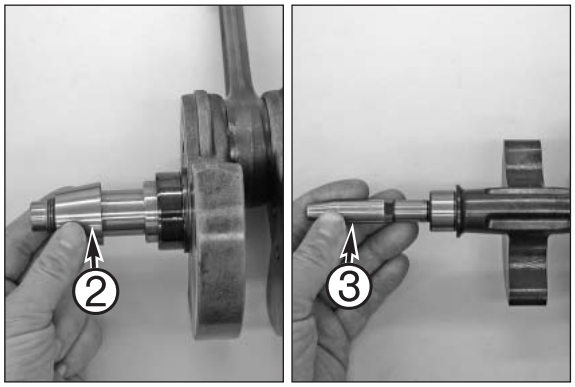
– Mount the shift drum ❺ and allow the needle rollers ❻ to engage in the shift forks.



– Align the shift forks and mount the shift rail ❼.

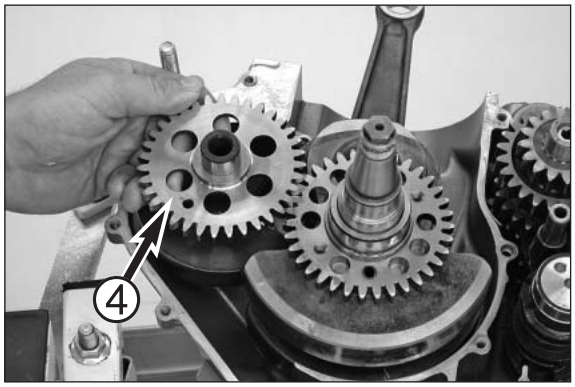


– Grease and mount a new O-ring ❶.



– Slide special tool 750.29.080.000 ❷ onto the generator end of the crankshaft.

– Slide special tool 585.29.005.000 ❸ on the balancer shaft.

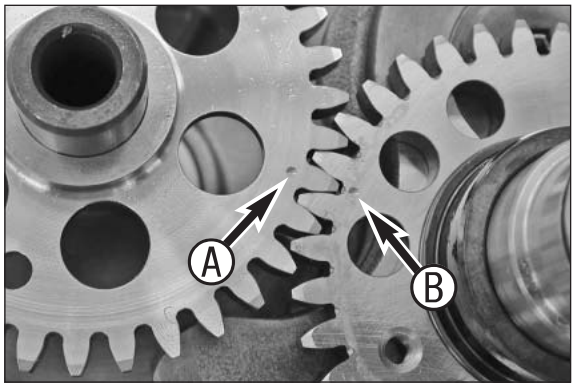


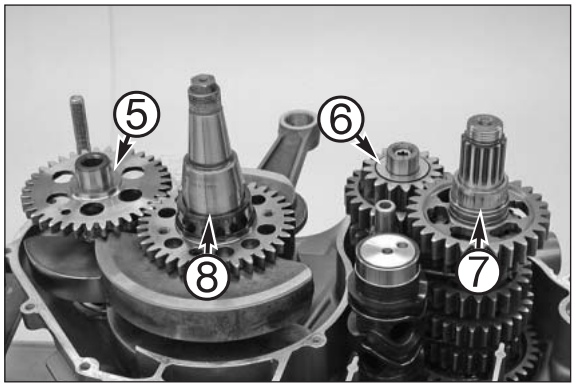
– Insert the crankshaft in the bearing seat and remove 750.29.080.000.

– Liberally lubricate the shaft seal ring for the water pump.

– Insert the balancer shaft ❹ in the bearing seat, making sure the Ⓐ and Ⓑ marks are aligned.

– Remove 585.29.005.000 from the balancer shaft.





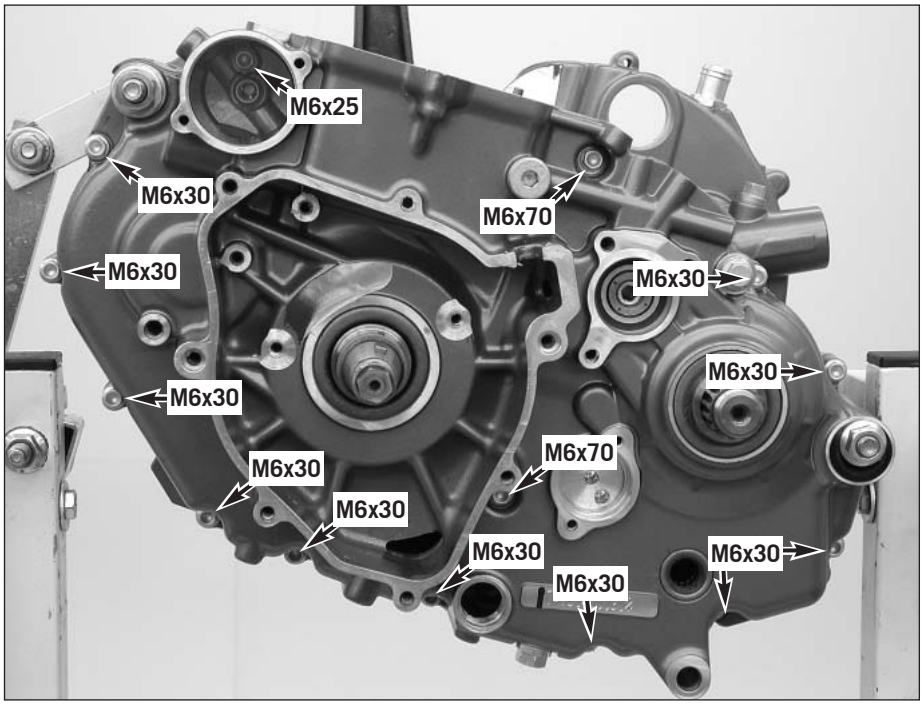
– Mount the stop disks for the balancer shaft ❺ and main shaft ❻, slide the inner bearing ring for the countershaft ❼ and special tool 750.29.080.050 ❽ onto the crankshaft.

– Degrease the sealing area and apply a thin layer of Loctite 5910 (584.29.059.200).
– Mount the left case half, tapping lightly with a plastic hammer if necessary.

! CAUTION !

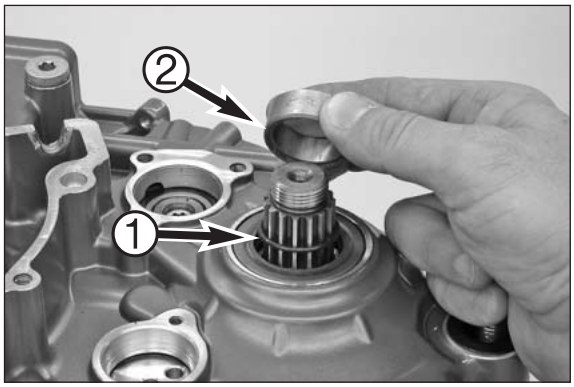
DO NOT PULL THE CASE HALVES TOGETHER WITH THE SCREWS SINCE THIS WILL DAMAGE THE BEARINGS AND CASE.

– Remove 750.29.080.050.

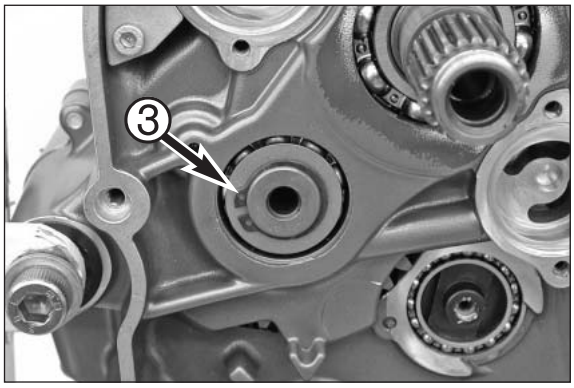


– Mount all engine case screws (see photo for lengths) in a crosswise direction and tighten to 10 Nm.

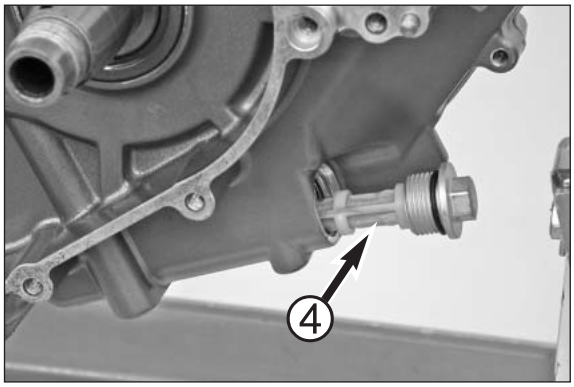
NOTE: mount the M6x25 screw in the oil filter housing with a new copper washer.



– Grease a new O-ring ❶ for the countershaft and insert in the collar ❷ of the bushing; mount the bushing with the collar facing down.



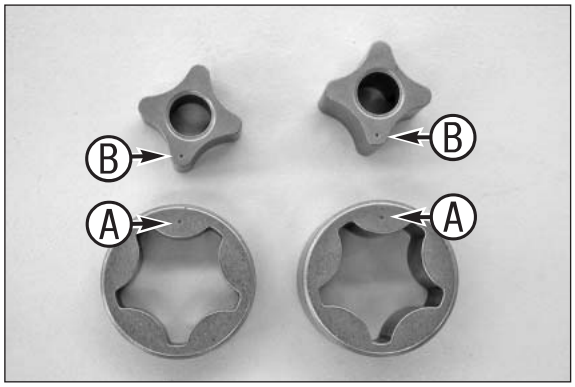
– Mount the lock ring ❸ and washer for the countershaft.



– Mount new O-rings in the oil screen ❹ and plug.

– Insert the oil screen in the plug, screw in the plug (A/F 13 mm) and tighten to 15 Nm.

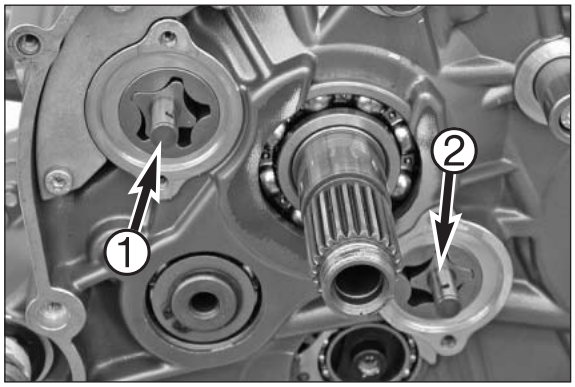
NOTE: the two oil screens and plugs are identical



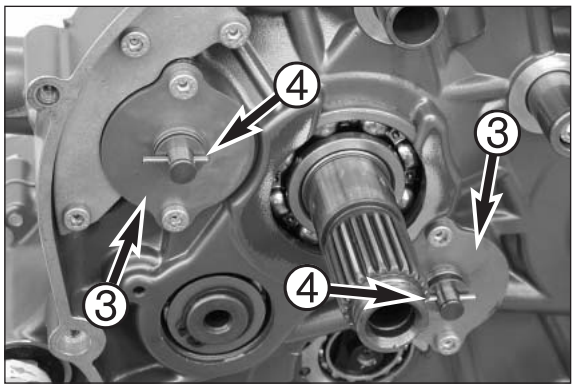
Mounting the oil pumps

NOTE:

– The outer rotors for both oil pumps are marked with an ❹ on the inside that is no longer visible when mounted.
– The inner rotors for both oil pumps are marked with a ❸ on the outside that is still visible when mounted.
– The oil pump cover, oil pump gears, spacing washers, screws and needle rollers are identical for both oil pumps.
– The wider oil pump ❶ is the suction pump, the narrower pump ❷ is the pressure pump.
– Fill the oil ducts with oil and the oil pumps with grease before you mount the oil pump covers.

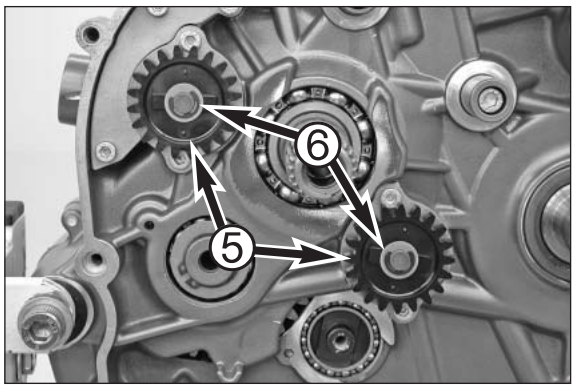


– Mount both oil pumps.



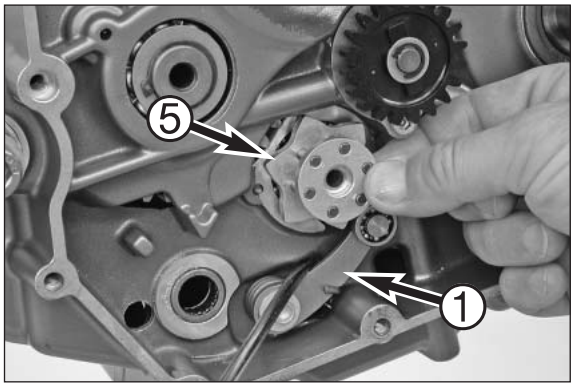
– Mount both oil pump covers ❸, lock the screws (AH M5x12) with Loctite 243 and tighten to 6 Nm.

– Slide on the spacing washers, insert the needle rollers ❹.



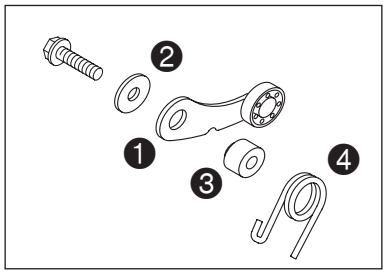
– Mount the oil pump gears ❺, slide on the spacing washers and mount the lock rings ❻.

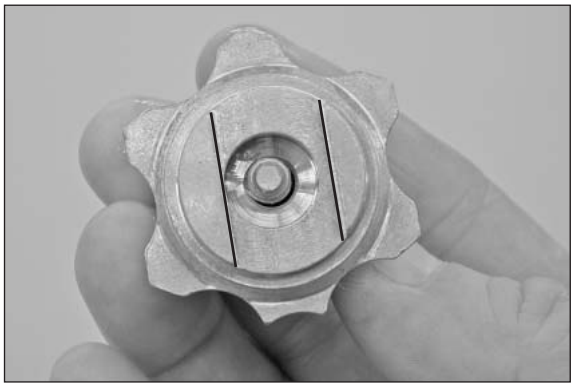
– Check the oil pump gears for smooth operation.



Mounting the shift mechanism

– Mount the locking lever ❶ with washer ❷, sleeve ❸ and spring ❹, lock the screw with Loctite 243 and tighten to 10 Nm.





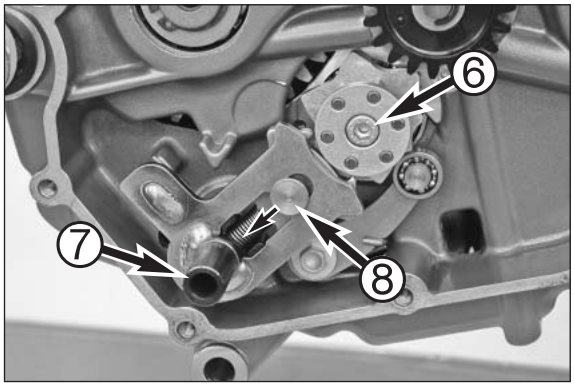
– Press the locking lever away from the shift drum and mount the shift lock ❺.

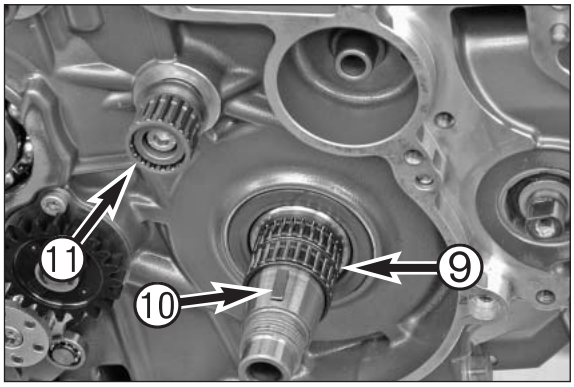
NOTE: the flat areas on the shift lock are not symmetrical.

– Lock the screw ❻ (AH 5 mm) on the shift lock with Loctite 243 and tighten to 10 Nm.

– Mount the pre-assembled shift shaft ❼ in the housing (remember to include the stop disk), push back the shift rail ❽ and allow to engage in the shift lock.

– Mount the shift lever and shift through all gears while you turn the main shaft; remove the shift lever again.



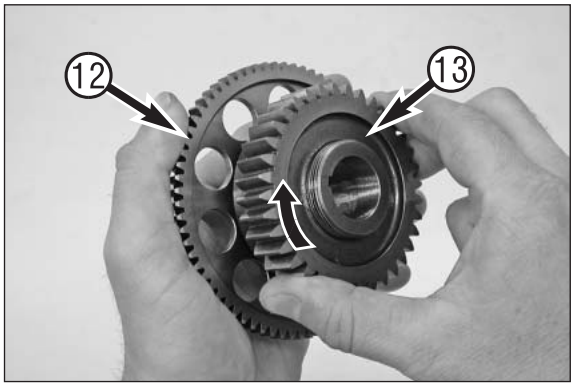


Mounting the starter drive

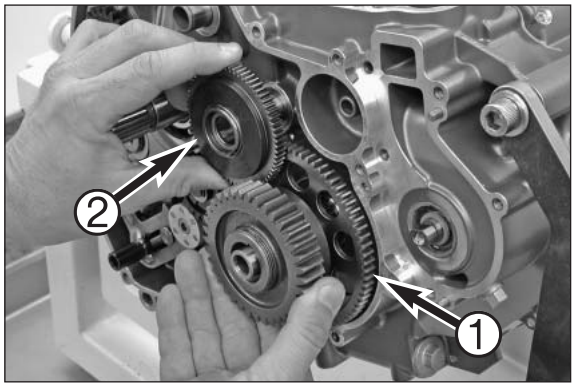
– Slide both needle bearings ❾ onto the crankshaft.

– Mount the shaft key ❿.

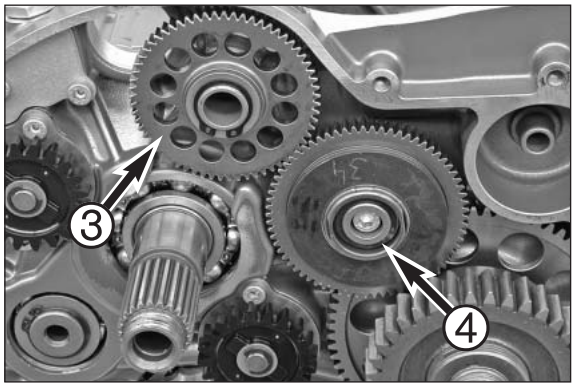
– Mount the needle bearing ⓫ on the starter idler gear bearing bolt.



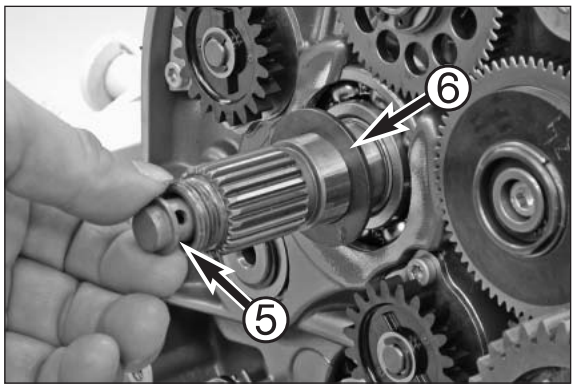
– Mount the freewheel gear ⓬ in the primary pinion ⓭, turning the primary pinion in a clockwise direction (see photo), making sure it does not jam.



– Simultaneously slide the primary pinion and freewheel gear ❶ onto the crankshaft and the starter idler gear ❷ onto the bearing bolt, allowing the starter idler gear to engage in the freewheel toothing.
– Turn the primary pinion until the shaft key engages.



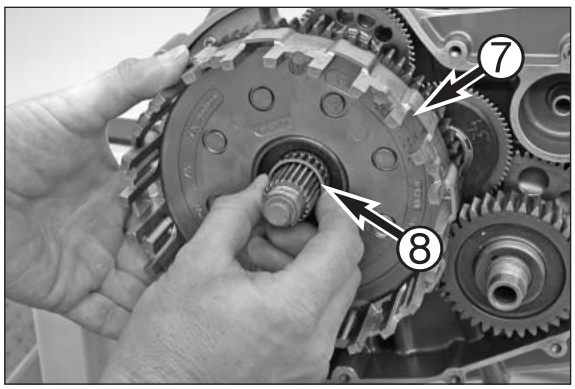
– Slide on the upper starter idler gear ❸ with the lower collar facing the housing, mount the washers and lock rings ❹ on both starter idler gears.



Mounting the clutch and primary pinion

– Insert the pressure piece ❺ and pushrod in the input shaft.

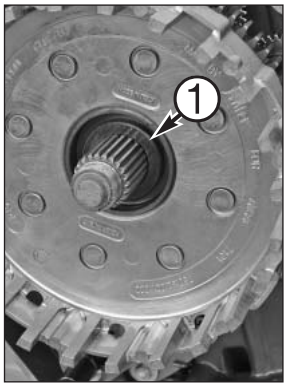
– Slide the washer ❻ onto the input shaft.

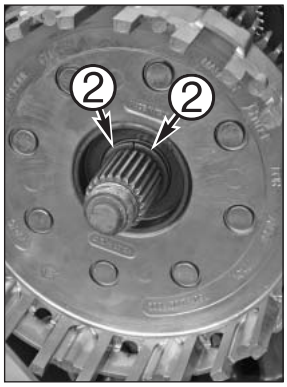


– Slide the outer clutch hub ❼ onto the main shaft.

NOTE: turn the oil pump gears and outer clutch hub back and forth to allow the teeth to engage.

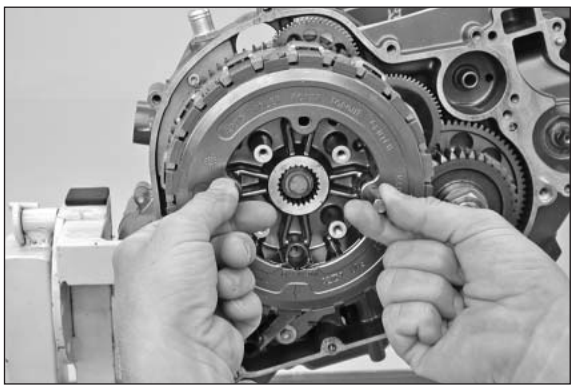
– Insert the needle bearing ❽.





– Place the half disks ❶ in the groove of the input shaft.

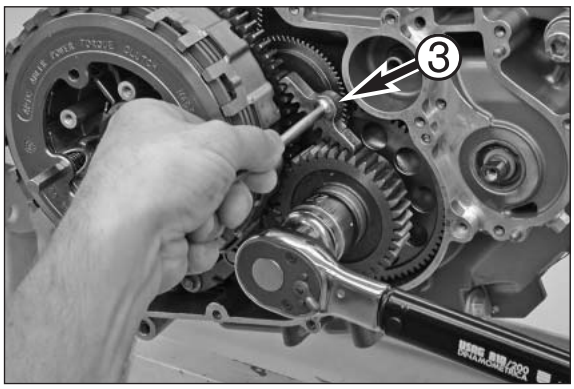
– Slide on the stepped disk ❷.



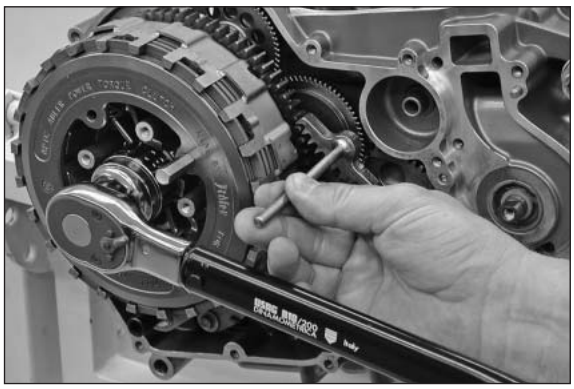
– Slide the clutch disks for the anti-hopping clutch in the outer clutch hub with special tool 750.29.033.000.

– Mount the disk package in the outer clutch hub, turning the transmission shafts to help it engage.

NOTE: make sure the upper clutch disk is offset by one meshing.

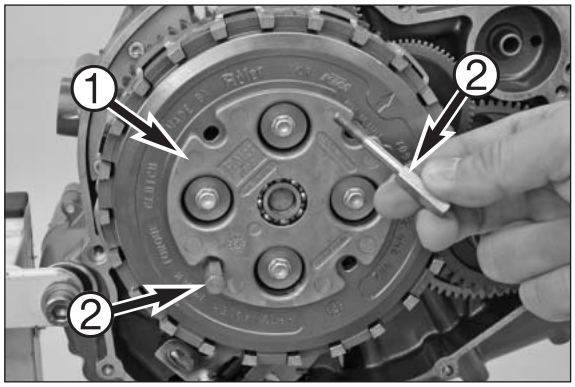


– Hold the primary pinion with special tool 750.29.081.000 ❸ while you apply Loctite 243 to the nut (A/F 27 mm, LH thread), mount and tighten to 100 Nm.



– Mount a new lock washer and screw on the nut.

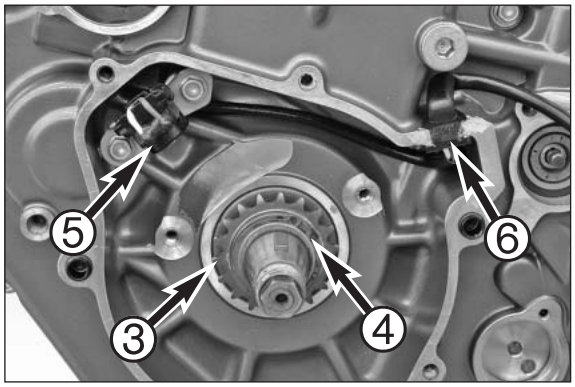
– Hold the outer clutch hub with special tool 750.29.081.000 while you tighten the nut (A/F 30 mm) to 100 Nm; bend down the lock washer.



– Mounting the pressure cap ❶.

– Mount the clutch screws with washers and springs and tighten in stages in a crosswise direction to 6 Nm.

– Remove special tool 750.29.033.000 ❷.



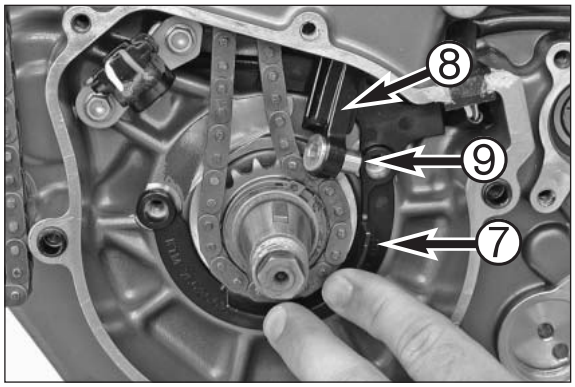
Mounting the timing chain pinion and timing chain

– Mount the shaft key.
– Heat the timing chain pinion ❸ to approx. 150° C and slide onto the crankshaft with the larger chamfer first.

– Mount the lock ring ❹.

– Mount the pulse generator ❺, lock the screws (M6x15) with Loctite 243 and tighten to 10 Nm.

– Apply Loctite 5910 (584.29.059.200) to the cable guide ❻ and press into the opening.



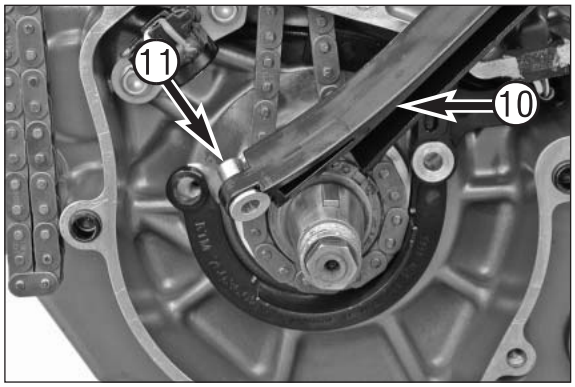
– Thread the timing chain and position it on the timing chain pinion.

NOTE: pay attention to the direction of travel if mounting a used timing chain.

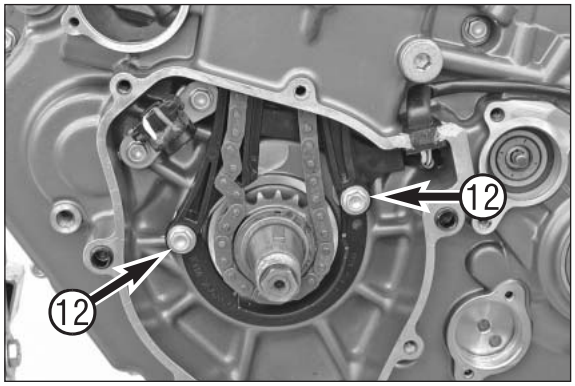
– Position and hold the clip ❼.

NOTE: place the cable for the pulse generator in the clip's cable duct.

– Lower the tensioning rail ❽ into the chain tunnel, tilt slightly as shown in the photo and insert the sleeve ❾ in the clip.



– Lower the guide rail ❿ into the chain tunnel and insert the sleeve ⓫ in the clip.

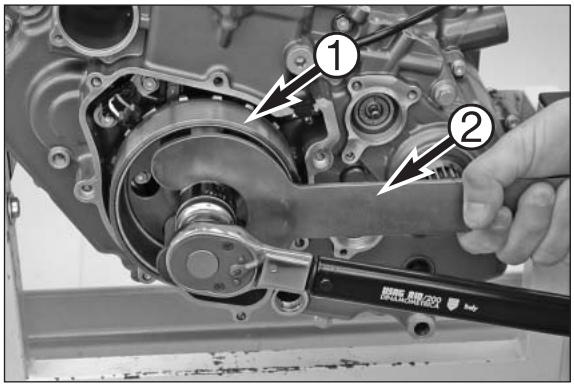


– Apply Loctite 243 to the screws ⓬ (M6x30) for the timing chain guide and tighten to 10 Nm.

! CAUTION !

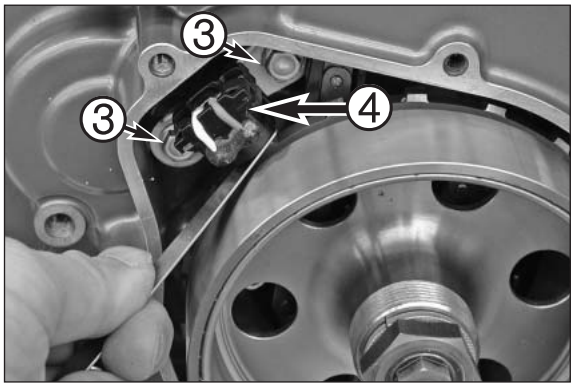
MAKE SURE NO LOCTITE 243 DRIPS BETWEEN THE TIMING CHAIN GUIDES AND THE SLEEVES SINCE IT WILL CAUSE THE TIMING CHAIN GUIDES TO LOCK AND BREAK.

– Make sure both rails operate smoothly.

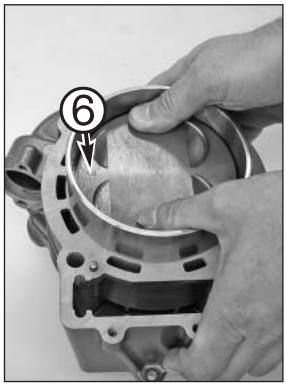


Mounting the rotors

– Slide the rotor ❶ onto the crankshaft, paying attention to the shaft key.
– Mount the lock washer and nut; hold the rotor with special tool 750.29.091.000 ❷ while you tighten the nut (A/F 27 mm) to 100 Nm.



– Check the distance between the pulse generator and the rotor: 0.7 mm; if the distance deviates, loosen both screws ❸, correctly position the sensor ❹ and tighten the screws to 10 Nm.



Mounting the piston, cylinder and cylinder head

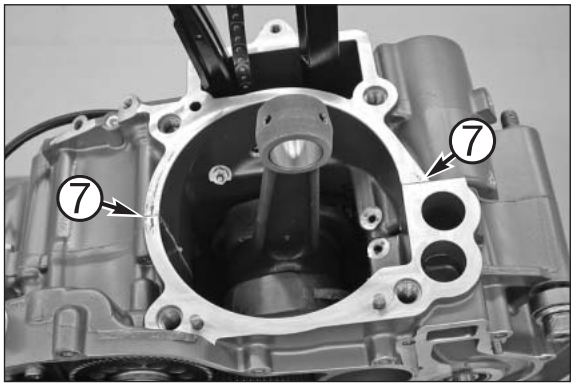
– Liberally oil special tool 750.29.015.102 ❺ and piston (including the piston rings), push the piston into the special tool as far as possible without using force. The piston will protrude a few millimeters on the other side.

! CAUTION !

THE PISTON RINGS SHOULD NOT PROTRUDE FROM THE SPECIAL TOOL.

– Mount the piston and special tool on the liberally oiled cylinder and slide in the piston.

NOTE:
– if the parts are well-oiled, you will be able to push the piston into the cylinder with your finger.
– The arrow ❻ on the piston will point towards the front, i.e. the exhaust end.



– Apply a thin coat of Loctite 5910 (584.29.059.200) on the housing joints ❼.

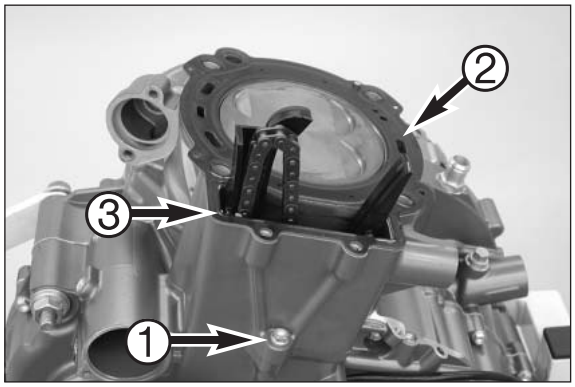
– Mount a new cylinder base gasket.

– Only push the piston out of the bottom of the cylinder far enough to allow the piston bolt to be inserted.

NOTE:
– push the piston bolt into the conrod bearing as gently as possible.
– Cover the engine case with a cloth or paper towel to prevent the piston bolt lock ring from falling in while being mounted.

– Mount the piston bolt lock ring: attach the lock ring (see photo showing the disassembled condition), insert special tool 750.29.035.000 in the piston bolt and press against the piston. Turn the special tool in a counterclockwise direction, causing the lock ring to be pressed into the groove.

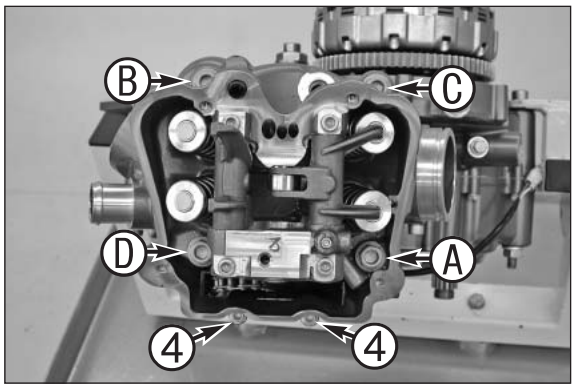
NOTE: make sure the lock ring is correctly positioned in the groove.



– Slide the cylinder onto the engine case, apply Loctite 243 to the screw ❶ (M6x25) and tighten to 10 Nm.

– Mount a new cylinder head gasket ❷ and mount any dowel pins previously removed.

NOTE: make sure the locating tabs ❸ on the timing chain guide engage in the recess in the chain tunnel.



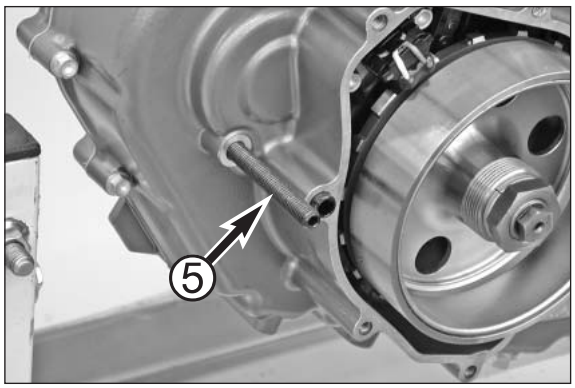
– Mount the cylinder head and the oiled new cylinder head screws.

NOTE: always replace the cylinder head screws.

– Tighten the cylinder head screws (A/F 14 mm or AH 8 mm) in 4 stages in a crosswise direction, starting with the left screw on the intake side (tightening order Ⓐ, Ⓑ, Ⓒ, Ⓓ)

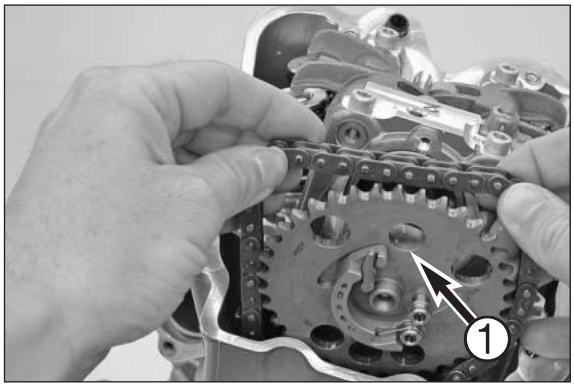
1st stage: 15 Nm, 2nd stage 30 Nm, 3rd stage: 45 Nm, 4th stage 60 Nm

– Apply Loctite 243 to both screws ❹ (M6x30) and tighten to 10 Nm.



Moving the engine to TDC

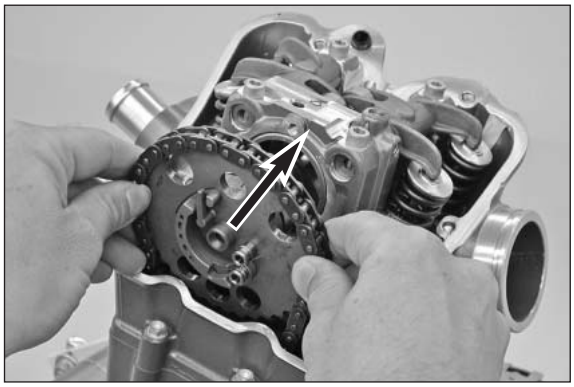
– Move the crankshaft until the piston is in the top dead center position.
– Tighten the engine locking screw 0113 080802 ❺ and make sure the engine is locked.



Mounting the camshaft

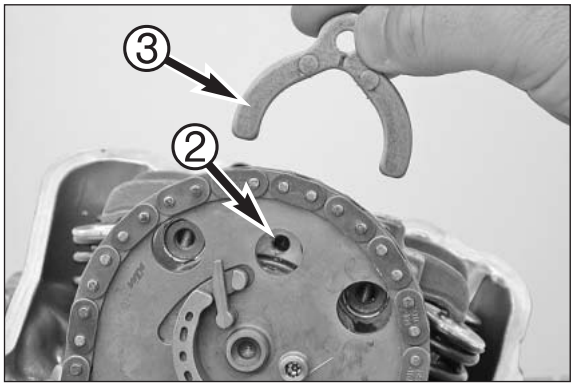
– Pull the timing chain out of the chain tunnel, only push the camshaft into the bearing far enough to be able to place the timing chain over the rear sprocket.

NOTE: the middle hole ❶ of the 3 holes must be in the upper position.



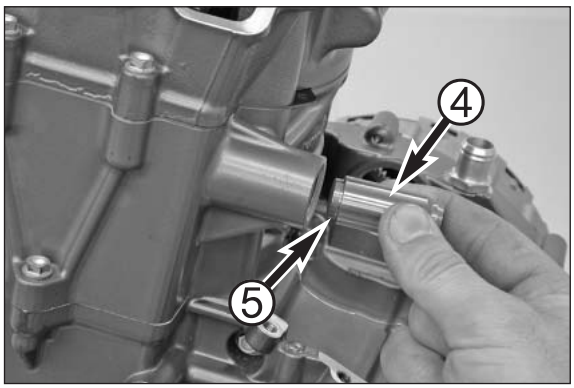
– Push the camshaft into the bearing seats.

NOTE: make sure the rocker arms rest on the valves, otherwise they will block the camshaft.



NOTE: if the timing chain is correctly mounted, the middle hole will be aligned directly over the hole ❷ for the camshaft retaining bracket screw.

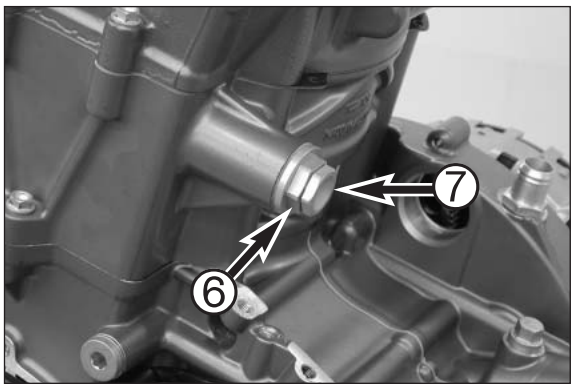
– Mount the camshaft retaining bracket ❸ in the camshaft groove, apply Loctite 243 to the screw (M6x12) and tighten to 10 Nm.



Mounting the chain tensioner

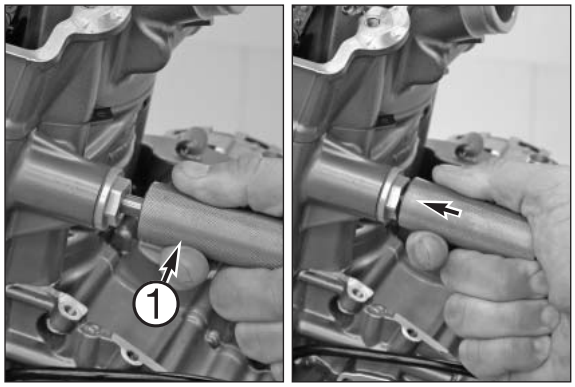
– Compress the chain tensioner ❹ down to the first notch and, holding it in this position, slide it into the hole in the cylinder head.

NOTE:
– Checking and locking the chain tensioner: see Chapter 5.
– The piston ❺ should protrude approx. 3 mm from the chain tensioner.



– Mount the plug ❻ (A/F 19) with a new seal ring and tighten to 25 Nm.

– Hold the plug (A/F 19) while you remove the screw ❼ (A/F 17).



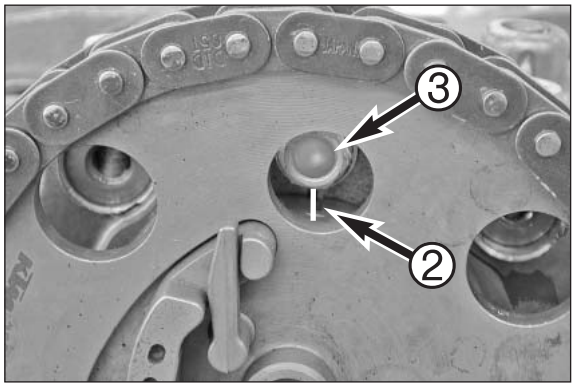
– Use special tool 773.29.051.000 ❶ to press against the piston on the chain tensioner all the way to the stop to release the assembly lock and cause the piston to extend. This puts a physical load on the chain tensioner rail and tensions the timing chain.

– Mount the screw on the chain tensioner again and tighten to 10 Nm.

NOTE: check by pressing against the chain tensioner rail; the chain tensioner should lock, ensuring that the timing chain retains its tension if the engine is started without sufficient oil pressure.

! CAUTION !

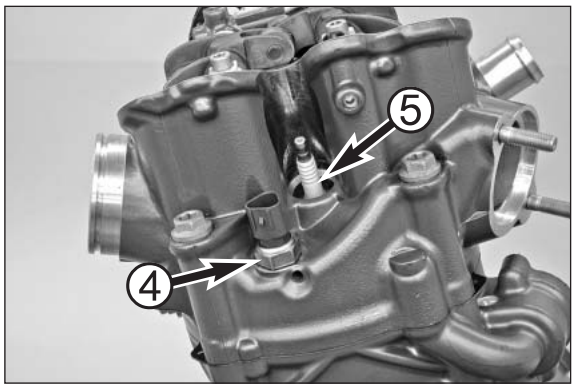
IF THE CHAIN TENSIONER IS NOT LOCKED AS DESCRIBED IN CHAPTER 5 AND RELIEVED AFTER MOUNTING, THE TIMING CHAIN WILL JUMP WHEN THE ENGINE IS STARTED AND RESULT IN ENGINE DAMAGE.



– Unscrew the engine locking screw 773.29.010.000, turn the crankshaft 2 turns in a counterclockwise direction and screw the engine locking screw back in again; make sure the engine is locked.

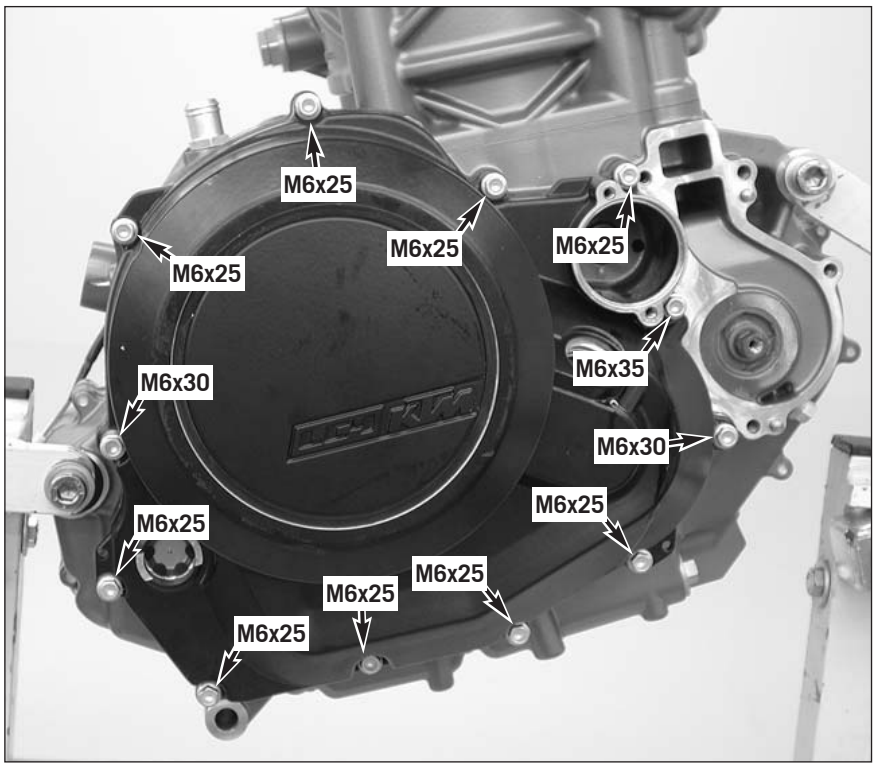
– Check the position of the camshaft gear: the mark on the camshaft ❷ must be in alignment with the mark on the camshaft retaining bracket.

NOTE: the mark on the camshaft retaining bracket points to the center of the screw ❸.



Right side of the engine

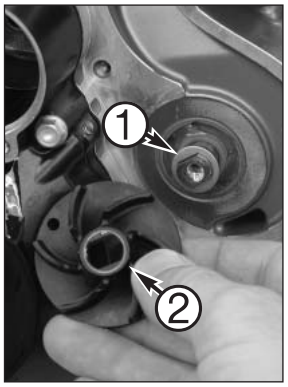
– Screw in the temperature sensor ❹ (A/F 19 mm, tightening torque 12 Nm) and spark plug ❺ (750.29.172.000, tightening torque 17 Nm).

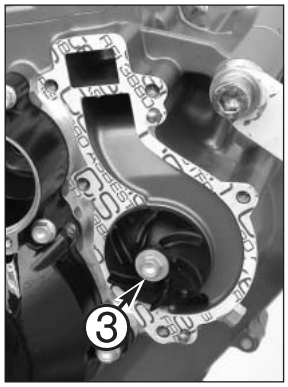


– Mount the centering sleeves and a new clutch cover gasket.

– Mount the clutch cover.

– Mount the screws (see photo for lengths) and tighten to 10 Nm.

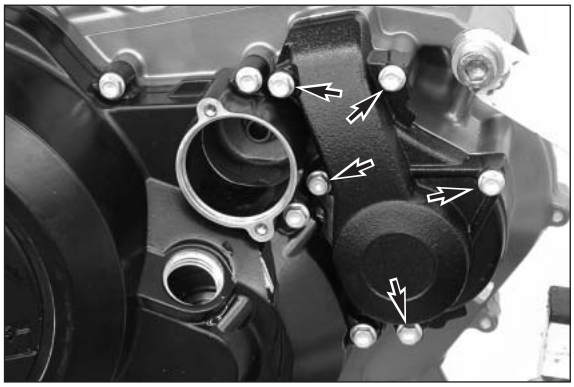




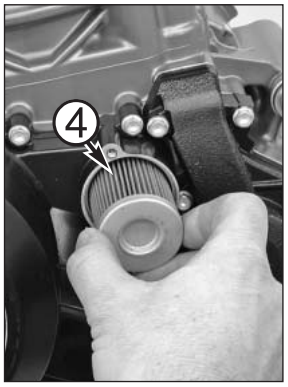
– Slide the washer ❶ onto the water pump shaft.

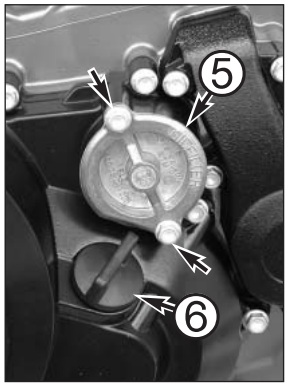
– Slip on the water pump wheel ❷, apply Loctite 243 to the screws (M6x15) ❸ and tighten to 10 Nm.

– Mount a new gasket in the water pump cover.



– Mount the water pump cover, mount the screws (M6x30) and tighten to 10 Nm.



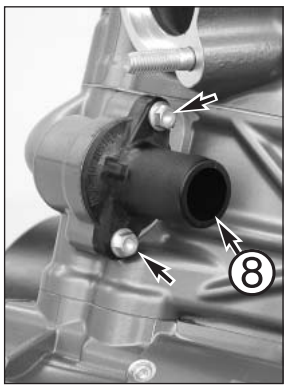


– Lay the engine on its side, fill the oil filter housing half full with engine oil and mount a new oil filter ❹.

– Mount the oil filter cover ❺ with a new O-ring, mount the screws (M5x16) and tighten to 6 Nm.

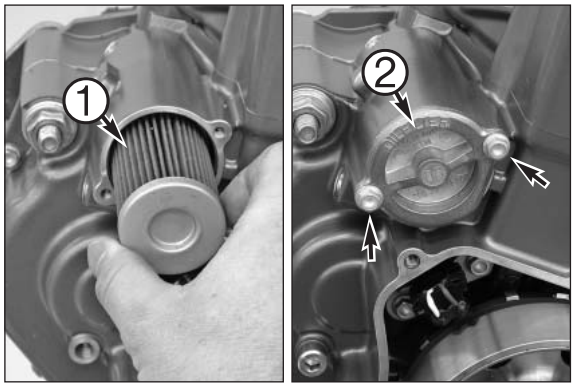
NOTE: both oil filter covers are identical.

– Move the engine back into a vertical position and screw in the oil filling plug ❻.



– Mount a new thermostat ❼ with a new gasket.

– Position the thermostat connection ❽ with collar bushings, apply Loctite 243 to the screws (M6x20) and tighten to 10 Nm.



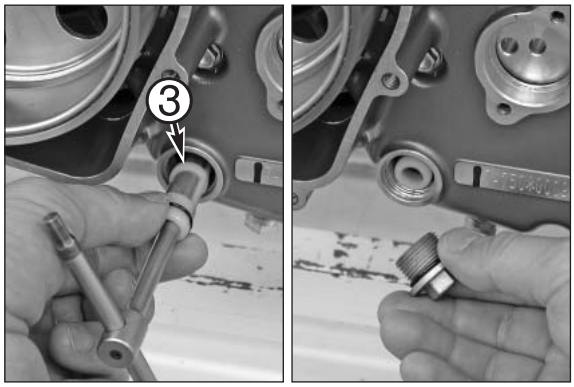
Left side of the engine

– Lay the engine on its side, fill the oil filter housing half full with engine oil and mount a new oil filter ❶.

– Mount the oil filter cover ❷ with a new O-ring, mount the screws (M5x16) and tighten to 6 Nm.

NOTE: both oil filter covers are identical.

– Move the engine back into a vertical position.



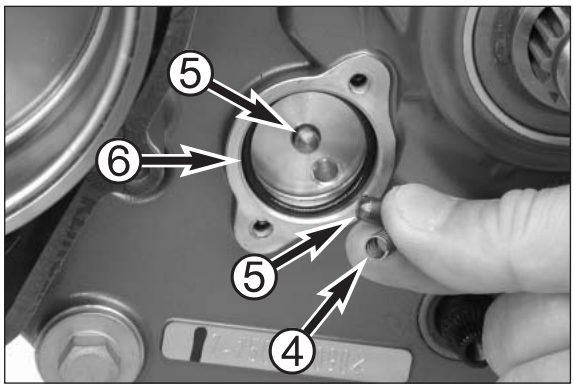
– Mount new O-rings on the oil screen ❸ and plug.

– Slide the oil screen on a pin wrench. Insert the pin wrench through the opening in the bore on the opposite engine case wall and slide the oil screen all the way into the engine case. Pull out the pin wrench, screw in the plug (A/F 13 mm) and tighten to 15 Nm.

! CAUTION !

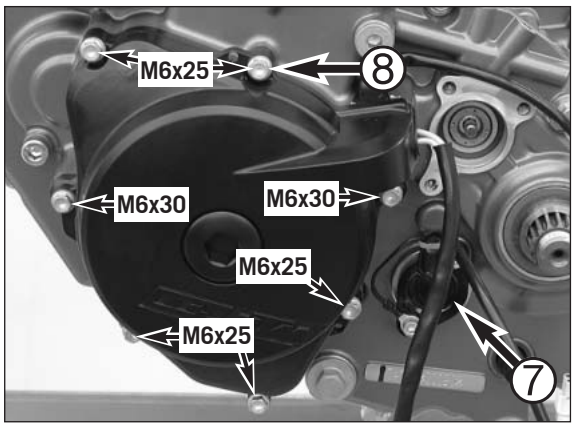
AN INCORRECTLY MOUNTED OIL SCREEN LOSES ITS FILTERING EFFECT AND LEADS TO EXCESSIVE ENGINE WEAR.

NOTE: both oil screens and plugs are identical.



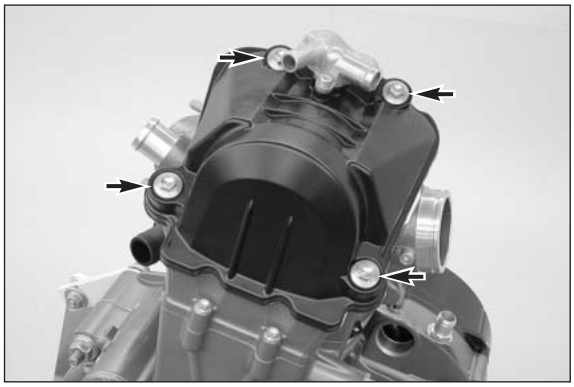
– Insert both contact springs ❹ in the bores.

– Mount both contact bolts ❺ and a new O-ring ❻.



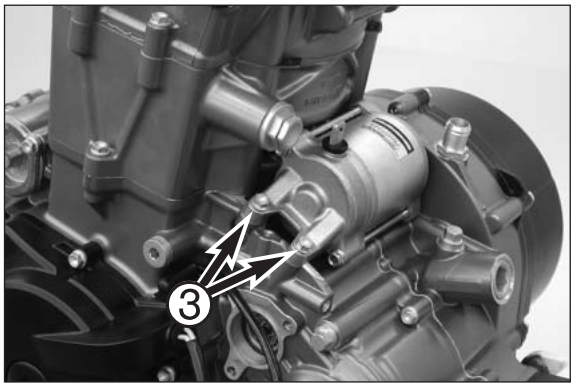
– Mount the gear sensor ❼, apply Loctite 243 to the screws (AH M5x12) and tighten to 5 Nm.

– Mount the centering sleeves, mount a new gasket and mount the generator cover. Tighten the screws (see photo for lengths) to 10 Nm, applying Loctite 243 to the screw ❽.



– Position the valve cover and tighten the screws to 10 Nm.

NOTE: the gasket can usually be used again.



– Mount a new O-ring on the starter engine and grease.

– Slide the starter engine into the bore in the engine case, apply Loctite to both screws ❶ (M6x20) and tighten to 10 Nm.

– Unclamp the engine.

TROUBLE SHOOTING 9

INDEX

Art.-No. 3.206.045-E

TROUBLE	CAUSE	REMEDY
Engine does not start when the starter button is actuated	Operating error	Turn on the ignition, switch the gear to neutral and switch the emergency OFF switch on, do not accelerate while starting the engine
	Discharged battery	Recharge the battery and investigate the causes for discharging
	Blown fuse	Replace fuse 1, 2, 3 or 4 in the fuse box
	Main fuse is blown	Remove the seat, move the tank back and replace the main fuse
	Defect ignition lock or emergency OFF switch	Check ignition lock and emergency OFF switch
	Defect safe-starting system.	Repair safe-starting system
The engine cranks only with pulled clutch lever	A gear is engaged	Shift the transmission to neutral
	A gear is engaged and the side stand is still folded down	Shift the transmission to neutral
	Defect safe-starting system.	Repair safe-starting system
Engine cranks with gear engaged.	Defect safe-starting system.	Repair safe-starting system
Engine cranks but doesn't start.	Operating error	Pay attention to starting off information (see driving instructions)
	Blown fuse for the fuel pump	Replace fuse 4
	Fuel line connection not attached	Connect the fuel line
	The plug and socket connector on the wiring harness is oxidized	Remove the panel and fuel tank, clean the plug and socket connector and spray with contact spray
	Error in the injection system	Error diagnosis with the KTM diagnostics tool, eliminate error
Engine will not reach full power	Air filter/fuel filter heavily soiled	Have the air filter/fuel filter replaced
	Error in the injection system	Error diagnosis with the KTM diagnostics tool, eliminate error
Engine overheats	Insufficient cooling liquid	Refill cooling liquid (see maintenace work), check cooling system for leaks
	Radiator fins are extremely dirty	Clean radiator with water jet
	Foam forms in cooling system	Replace cooling liquid, use antifreezer with brand name
	Radiator hose is kinked or damaged	Run the radiator hose correctly or replace
	Thermostat defective	Check the thermostat (opening temperature 70°C, 158°F) or replace
	Blown fan fuse	Replace fuse 5

TROUBLE	CAUSE	REMEDY
Engine overheats	Defect fan or thermoswitch for fan	Repair system
	Air in the cooling system	Bleed the cooling system
FI lamp is blinking / lights up	Error in the injection system	Error diagnosis with the KTM diagnostics tool, eliminate error
Engine stalls while driving	No fuel	Refuel
	The fuse for the ignition or fuel pump is blown	Replace fuse 1, 2 or 4
High oil consumption	Engine oil level too high	Check engine oil level when the engine is warm; correct if necessary
	Engine oil too thin (viscosity)	Use thicker engine oil; see chapter „Engine oil“
	Kink in engine vent hose	Remove the seat, move the tank back and check engine vent hoses
Headlight and position light fail	Blown fuse	Replace fuse 7
Turn signal, brake light and horn do not function	Sicherung durchgeschmolzen	Replace fuse 6
Time is not displayed or not correctly displayed	Blown fuse, thus no continuous power supply	Replace fuse 2 and set the clock
The battery is discharged	The ignition (power consumer) hasn't been switched off	Recharge the battery according to the relevant instructions
	The battery isn't charged by the generator	Check voltage regulator and generator.
No values are visible in the combined instrument display.	Blown fuse	Replace fuse 1
The speed indication on the combined instrument is not working	Pickup cable is damaged or contacts on the cable connector have oxidized	Check the pickup cable for damage, repair if neccessary

TECHNICAL SPECIFICATIONS 11

INDEX

Art.-No. 3.206.045-E

TECHNICAL SPECIFICATIONS – ENGINE

ENGINE 690 LC4 2007	
Design	Single-cylinder, 4-stroke Otto engine with balancer shaft
Displacement	654 cm^3
Bore / Stroke	102 / 80 mm
Compression ratio	11,8 : 1
Fuel	unleaded fuel with at least RON 95 (USA: Premium PON 91)
Valve timing	4 valves OHC, roller rocker arms
Valve diameter Intake	40 mm
Valve diameter Exhaust	34 mm
Valve clearance, cold Intake	0,07 - 0,13 mm
Valve clearance, cold Exhaust	0,07 - 0,13 mm
Crankcase bearing	Two cylinder roller bearing
Conrod bearing	Needle bearing
Piston pin bearing	Bronze bushing
Piston	Light alloy – forged
Piston rings	1 L-ring, 1 tapered compression piston ring, 1 oil scraper ring
Engine lubrication	Semi-dry sump with 2 Eaton pumps
Engine oil	Motorex Cross Power 4T SAE10W/60
Quantity of engine oil	approx. 2 liters)
Clutch	Straight-toothed spur wheels 36 : 79
Primary drive	36:79
Transmission (claw shifted)	6-speed
1. gear	14 : 35
2. gear	16 : 28
3. gear	21 : 28
4. gear	21 : 23
5. gear	23 : 22
6. gear	23 : 20
Mixture preparation	electronically controlled gasoline injection
Ignition system	breakerless transistorized electronic ignition system with digital ignition advance
Alternator	12V 224W at 5000 rpm
Spark plug	NGK LKAR8AI-9
Electrode distance	0,9 mm
Cooling system	liquid cooled
Cooling liquid	1.2 liter, 50% antifreeze, 50% distilled water, at least –25°C (-13°F)
Starting aid	electric starter

TECHNICAL SPECIFICATIONS – CHASSIS

CHASSIS	690 SUPERMOTO 2007	690 SUPERMOTO PRESTIGE 2007
Rahmen	Chromoly trellis frame, powder-coated	
Fork	WP Suspension – **U**p **S**ide **D**own 4860 ROMA	
Spring travel front	210 mm	
Rear suspension	WP Suspension - 4618 shock absorber - PRO-LEVER relay lever	
Spring travel rear	210 mm	
Front brake	4-piston fixed radial caliper, brake disc Ø 320 mm	
Rear brake	single-piston floating caliper, brake disc Ø 240 mm	
Authorized front tires *	BRIDGESTONE Battlax BT090F 120/70 R17 M/C 58H	METZELER Sportec M3 Front 120/70 ZR17 M/C 58W
Air pressure	Road, driver only.....2.0 bar Road, with passenger / maximum payload .....2.0 bar	
Authorized rear tires *	BRIDGESTONE Battlax BT090R PRO 160/60 R17 M/C 69H	METZELER Sportec M3 160/60 ZR17 M/C 69W
Air pressure	Road, driver only.....2.0 bar Road, with passenger / maximum payload .....2.2 bar	
Fuel tank capacity	13 liters, 2.5 liters Reserve	
Lighting	high beam + low beam .....H4 12V 60/55W (socket P43t) position light front.....12V 5W (socket W2.1x9.5d) Instrument lights + indicator lamp.....LED position light rear.....LED stoplight .....LED licens plate illumination .....12V 5W (socket W2.1x9.5d) flashers .....12V 10W (socket BA15s)	
Battery	maintenance-free battery 12V / 8.6 Ah	
Gear ratio – rear wheel	17:41	
Chain	5/8 x 1/4" X-Ring	
Steering head angle	63,5°	
Wheel base	1472 ± 15 mm	
Seat height, unloaded	880 mm	
Ground clearance, unloaded	245 mm	
Dry weight	154 kg	
Max. axle load front	150 kg	
Max. axle load rear	200 kg	
Max. total load	350 kg	

* further tire releases are available on the Internet at www.ktm.com

FORK	690 SUPERMOTO	690 SUPERMOTO PRESTIGE
Type	14.18.7C.07 WP Suspension	14.18.7C.08 WP Suspension
Spring	5.2 - 430	5.2 - 430
Air chamber length	100 mm	100 mm
Fork oil	SAE 2.5	SAE 2.5

SHOCK ABSORBER	690 SUPERMOTO	690 SUPERMOTO PRESTIGE
Type	15.18.9C.07 WP Suspension	15.18.7C.08 WP Suspension
Spring	65 - 230	65 - 230
Spring preload	12 mm (0.472 in)	12 mm(0.472 in)

BASIC SETTING FORK WP 4860 ROMA	SUPERMOTO				SUPERMOTO PRESTIGE			
	Driving Comfort	**Basic Setting**	Driving Sport	Maximum Payload	Driving Comfort	**Basic Setting**	Driving Sport	Maximum Payload
Compression adjuster (clicks)	-	**-**	-	-	20	**15**	10	10
Rebound adjuster (clicks)	20	**15**	10	10	20	**15**	10	10

BASIC SETTING SHOCK ABSORBER WP 4618	SUPERMOTO				SUPERMOTO PRESTIGE			
	Driving Comfort	**Basic Setting**	Driving Sport	Maximum Payload	Driving Comfort	**Basic Setting**	Driving Sport	Maximum Payload
Compression adjuster Low Speed (clicks)	-	**-**	-	-	20	**15**	10	10
Compression adjuster High Speed (turns)	-	**-**	-	-	2	**1,5**	1	1
Rebound adjuster (clicks)	20	**15**	10	10	20	**15**	10	10
Spring preload (mm)	12	**12**	12	12	12	**12**	12	12

TIGHTENING TORQUES – ENGINE		
HH screws for ignition cover	M6	Loctite 243 + 10 Nm
Plastic screw in ignition cover	M24x1.5	8 Nm
AH plug for oil bore	M14x1.5	Loctite 243 + 15 Nm
AH plug for oil bore	M10x1	Loctite 243 + 15 Nm
Torx plug for oil bore	self-tapping	Loctite 243 + 9 Nm
Plugs for oil bore in oil cooler	M10x1	15 Nm
Plug for drain bore in water pump	M10x1	15 Nm
Oil jet (piston cooling)	M6x0.75	Loctite 648 + 6 Nm
Oil jet (conrod lubrication)	M4	Loctite 648 + 2 Nm
Threaded sleeve (engine vent)	M16x1.5	Loctite 243 + 25 Nm
AH plug for crankshaft fixation	M8	20 Nm
AH screw to fasten diaphragm plate/diaphragm	M3	Loctite 243
AH screws for oil pump cover	M5	Loctite 243 + 6 Nm
Screws for bearing retainers	M5	Loctite 648 + 5 Nm
HH nut for clutch drive	M20x1.5	Loctite 243 + 100 Nm
HH screws for slave cylinder	M6	Loctite 243 + 10 Nm
HH screw for locking lever	M6	Loctite 243 + 10 Nm
AH screw for shift lock	M6	Loctite 243 + 10 Nm
HH screw for gear sensor	M5	Loctite 243 + 5 Nm
HH nut for primary gear	M20x1.5 LH thread	Loctite 243 + 100 Nm
HH nut for ignition rotor	M18x1.5	100 Nm
AH screws to fasten stator in ignition cover	M6	Loctite 243 + 10 Nm
HH screws for starter	M6	Loctite 243 + 10 Nm
HH screws for cylinder head	M10	oiled, 4 stages: 15/30/45/60 Nm
HH screws for cylinder head / cylinder (timing chain chamber)	M6	Loctite 243 + 10 Nm
AH screws for cylinder head / housing (timing chain chamber)	M6	Loctite 243 + 10 Nm
AH screws for front/rear rocker arm shafts	M6	12 Nm
HH screw for camshaft retaining bracket	M6	Loctite 243 + 10 Nm
Spark plug	M12x1.25	17 Nm
AH screw to fasten vent cover	M5	Loctite 243 + 3 Nm
Stud for exhaust flange	M8	Loctite 243 + 10 Nm
CU nut to fasten exhaust flange	M8	20 Nm
AH screw for decompression bearing bolt	M6	Loctite 243 + 3-4 Nm
HH screw for water pump wheel	M6	Loctite 243 + 10 Nm
HH screw for thermostat case	M6	Loctite 243 + 10 Nm
Temperature sensor on cylinder head	M12x1.5	12 Nm
HH screw for timing chain tensioner (plug)	M20x1.5	25 Nm
HH screw for timing chain tensioner (release screw)	M10x1	10 Nm
HH screw for guide rail	M6	Loctite 243 + 10 Nm
HH screw for tensioning rail	M6	Loctite 243 + 10 Nm
AH plug for oil thermostat	M24x1.5	15 Nm
Oil plug at oil screen	M20x1.5	15 Nm
Oil plug with magnet	M12x1.5	20 Nm
Plug for pressure relief valve	M12x1.5	20 Nm
HH screw for pulse generator	M6	Loctite 243 + 10 Nm
HH rear sprocket nut (A/F 27)	M20x1.5	Loctite 243 + 60 Nm
HH screw for shift lever	M6	Loctite 222 + 10 Nm
Gemi hose clamp (intake)	M4	1.5 Nm
Other engine screws	M5	6 Nm
	M6	10 Nm

TIGHTENING TORQUES – CHASSIS

Screw for side stand switch	M4	Loctite 243 + 2 Nm
Spoke nipple	M4,5/M5	5 Nm
Screw for fuel pump, pressure regulator	M5	4 Nm
Screw for fuel level sensor	M5	3 Nm
Screw for foot brake pedal surface	M5	Loctite 243 + 6 Nm
Screw for plastic clamp brake line fork leg	M5	2 Nm
Screw for heat protector on exhaust	M5	Loctite 243 + 5 Nm
Screw for side cover	M5	2 Nm
Screw for seat lock	M5	Loctite 222 + 3 Nm
Screw for starter cable - starter	M5	3 Nm
Pushrod ball joint foot brake cylinder	M6	Loctite 243 + 10 Nm
Remaining screws for tank	M6	6 Nm
Screw for compensating tank rear wheel brake	M6	5 Nm
Screw for battery rack, control unit holder	M6	3 Nm
Screw for fuel cock	M6	6 Nm
Screw for front/rear brake disk	M6	Loctite 243 + 14 Nm
Screw for foot brake cylinder	M6	Loctite 243 + 10 Nm
Screw for horn	M6	Loctite 243 + 6 Nm
Screw for license plate holder	M6	8 Nm
Screw for lower radiator mount	M6	5 Nm
Screw for magnetic side stand holder	M6	Loctite 243 + 10 Nm
Screw for rectifier regulator	M6	8 Nm
Screw for headlight mask	M6	5 Nm
Screw for side stand bracket	M6	Loctite 243 + 10 Nm
Screw for SAS valve	M6	6 Nm
Nut for rear sprocket screw	M8	Loctite 243 + 35 Nm
Nuts for header - cylinder head	M8	copper paste + 25 Nm evenly, do not bend washer
Screw for silencer exhaust clamp	M8	25 Nm
Screw for header exhaust clamp	M8	copper paste + 25 Nm
Screw for side stand spring bracket	M8	Loctite 243 + 25 Nm
Screw for rear footrest support	M8	25 Nm
Screw for rear footrest bracket	M8	Loctite 243 + 25 Nm
Screw for upper triple clamp	M8	12 Nm
Screw for lower triple clamp	M8	15 Nm
Screw for fork stub	M8	15 Nm
Screw for grip	M8	6 Nm
Screw for steering stem clamping	M8	20 Nm
Screw for header - silencer	M8	copper paste + 25 Nm
Screw for handlebar clamp	M8	20 Nm
Screw for upper subframe	M8	Loctite 243 + 35 Nm
Screw for side stand bracket	M8	Loctite 243 + 25 Nm
Screw for tank bearing	M8	15 Nm
Screw for linkage bracket, front engine holder	M8	Loctite 243 + 25 Nm
Screw for front/rear brake disk	M8x1,25	Loctite 243 + 30 Nm
Engine mount screws	M10	Loctite 243 + 45 Nm
Screw for upper/lower shock absorber	M10	Loctite 243 + 45 Nm
Screw for handlebar mount	M10	20 Nm
Screw for side stand	M10	Loctite 243 + 35 Nm
Screw for front brake caliper	M10x1,25	Loctite 243 + 45 Nm
Screw for lower subframe	M10x1,25	Loctite 243 + 45 Nm
Lambda probe	M12x1,25	24,5 Nm
Nut for frame - connecting lever - rocker arm - swinging fork	M14x1,5	100 Nm
Nut for swing arm pivot	M16x1,5	100 Nm
Nut for engine sprocket	M20x1,5	Loctite 243 + 80 Nm
Screw for steering head	M20x1,5	12 Nm
Adjusting ring for swing arm support	M24x1,5	25 Nm
Screw for front wheel spindle	M24x1,5	40 Nm
Nut for rear wheel spindle	M25x1,5	90 Nm
Remaining chassis screws	M5 M6 M8 M10	4 Nm 10 Nm 25 Nm 45 Nm
Remaining chassis screws	M6 M8 M10	15 Nm 30 Nm 50 Nm

TOLERANCES AND FITTING CLEARANCE

COMPONENT	MEASUREMENT/TEST ..... SETPOINT VALUE	TOLERANCE LIMIT
Valves	Valve clearance (at 20ºC) intake ..... 0.07 mm - 0.13 mm	
	Valve clearance (at 20ºC) exhaust ..... 0.07 mm - 0.13 mm	
	Valve shaft runout	max. 0.05 mm
	Sealing seat width, intake	max. 1.60 mm
	Sealing seat width, exhaust	max. 2.00 mm
	Valve disk runout	max. 0.05 mm
	Valve guide, inner diameter	max. 6.05 mm
	Valve shaft, outer diameter, intake ..... 5.961 mm - 5.975 mm	min. 5.93 mm
	Valve shaft, outer diameter, exhaust ..... 5.946 mm - 5.960 mm	min. 5.93 mm
Valve springs	length, unloaded ..... new 42.85 mm	min. 42.3 mm
	spring washer ..... new 2.5 mm	min. 2.4 mm
Camshafts/cylinder head	Camshaft bearing journal (front)	min. 39.95 mm
	Camshaft bearing journal (rear)	min. 17.96 mm
	Cylinder head distortion	max. 0.15 mm
Cylinder	Size 1 ..... 102.000 mm – 102.012 mm	
	Size 2 ..... 102.013 mm–102.025 mm	max.102.04mm
	Cylinder distortion	max. 0.10 mm
Piston	Size 1 ..... 101.955 mm – 101.965 mm	
	Size 2 ..... 101.966 mm – 101.975 mm	
	Mounting clearance ..... min. 0.03 mm - max. 0.10 mm	
Piston ring	Compression ring gap	max. 0.8 mm
	Oil scraper ring gap	max. 1.0 mm
	Width of piston ring groove - 1st ring (L-ring) ..... 0.91 mm - 0.93 mm	max. 1.0 mm
	Width of piston ring groove - 2nd ring (L-ring) ..... 1.26 mm - 1.28 mm	max. 1.35 mm
	Width of piston ring groove - oil scraper ring ..... 3.01 mm - 3.03 mm	max. 3.1 mm
Crankshaft/conrod	Lateral runout	max. 0.08 mm
	Outer crankshaft web dimensions ..... 71.95 mm - 72.05 mm	
	Axial clearance for crankshaft ..... 0.15 mm - 0.25 mm	
	Bearing clearance for conrod bearing	0.05 mm
Balancer shaft	Axial clearance ..... 0.10 mm - 0.20 mm	
Oil pressure	measured at the right oil filter cover with the engine at service temperature	min. 0.5 bar at 1600 rpm
Oil consumption	.....	max. 0.8 lt /1000 km
Oil pumps	Clearance between inner and outer rotor	max. 0.2 mm
	Clearance between outer rotor and case	max. 0.2 mm
	Axial clearance ..... 0.04 mm - 0.08 mm	
Bypass valve	Length of spring, unloaded	min. 25 mm
Clutch	Thickness of lining disks	min. 2.5 mm
	Thickness of steel disks ..... 1.45 mm - 1.55 mm	min. 1.35 mm
	Length of clutch springs, unloaded ..... neu 33.5 mm	min. 31.5 mm
Thermostat/radiator	Opening temperature of thermostat ..... 68 ºC - 72 ºC	
	Opening stroke of thermostat	min. 6 mm
	Discharge pressure of radiator cap	max. 1.4 bar
	Switch-on temperature of radiator fan switch ..... 102 ºC	
Transmission	Axial clearance of the mainshaft ..... 0.1 mm - 0.4 mm	
	Run out of the mainshaft	max. 0.025 mm
	Clearance between shift fork and groove ..... 0.49 mm - 0.75 mm	
	Width of shift fork groove ..... 5.55 mm - 5.6 mm	
	Thickness of shift fork ..... 4.85 mm - 4.95 mm	

PERIODIC MAINTENANCE SCHEDULE 12

INDEX

Art.-No. 3.206.045-E

PERIODIC MAINTENANCE SCHEDULE

690 SUPERMOTO / 690 SUPERMOTO PRESTIGE 2007 A clean motorcycle can be checked more quickly which saves money!		1st Service after 1000 km (621 miles)	every 5000 km (3107 miles) or once a year	every 10000 km (6214 miles) or every 2 years
ENGINE	Change engine oil, coarse and fine filter	●	●	●
	Clean oil screens and drain plug magnet	●	●	●
	Renew spark plug			●
	Check and adjust valve clearance			●
	Check engine fastening bolts for tight fit	●	●	●
	Check all engine bolts accessible from the outside for tight fit	●	●	●
FUEL INJECTION	Check rubber boots for cracks or leaks	●		●
	Check fault memory with the KTM diagnosis tool	●	●	●
	Perform a status check of neutral, clutch, 2nd/3rd gear and side stand switch using the KTM diagnosis tool	●	●	●
	Make sure the fuel hose, SAS hoses and vent hoses are run correctly and check for damage	●	●	●
	Replace the O-ring on the fuel hose connection and check for leaks	●	●	●
	Check the wiring harness on the throttle body for proper installation and damage	●		●
ADD-ON-PARTS	Check cooling system for leaks and antifreeze protection	●	●	●
	Check radiator fan for proper operation	●	●	●
	Check the exhaust system for leaks and correct suspension and the clamps for a tight fit	●	●	●
	Check actuating cables for damage, smooth operation, and kink-less arrangement, adjust and lubricate	●	●	●
	Check the oil level in the hydraulic clutch reservoir		●	●
	Check air filter, renew if necessary, clean air filter box		●	●
	Check cables for damage and kink-less arrangement	●	●	●
	Check headlamp adjustment	●	●	●
	Check electrical system for function (low/high beams, stop light, turn indicators, headlamp, flasher, tell-tale lamps, speedometer illumination, horn, sidestand switch, clutch switch, emergency-off switch)	●	●	●
	Make sure all bolts and nuts are tight	●	●	●
BRAKES	Check brake fluid level, lining thickness, and brake discs	●	●	●
	Change brake fluid			●
	Check brake lines for damage and leaks	●	●	●
	Check/adjust smooth operation, free travel of handbrake/footbrake levers	●	●	●
	Check bolts of brake system for tight fit	●	●	●
CHASSIS	Check shock absorber and fork for leaks and proper operation	●	●	●
	Clean fork dust sleeves		●	●
	Bleed fork legs	●	●	●
	Check swinging-fork pivot	●	●	●
	Check/adjust steering-head bearing	●	●	●
	Check all chassis bolts for tight fit (fork plates, fork leg, axle nuts/bolts, swinging-fork pivot, reversing lever, shock absorber)	●	●	●
	Lubricate PRO-LEVER relay lever			●
WHEELS	Check rim joint	●	●	●
	Check tire condition and inflation pressure	●	●	●
	Check chain, sprockets and chain guides for wear, force fit and tension	●	●	●
	Check bolts on pinion and chain sprocket for locking devices and a tight fit	●	●	●
	Lubricate chain	●	●	●
	Check wheel bearings and jerk damper for play		●	●

IF MOTORCYCLE IS USED FOR COMPETITION 5000 KM (3107 MILES) SERVICE SHOULD BE CARRIED OUT AFTER EVERY RACE!
Service intervalls should never be exceeded by more than 500 km (311 miles).
Maintenance work performed by an authorized KTM workshop is not a substitute for care and maintenance by the driver!

690 SUPERMOTO / 690 SUPERMOTO PRESTIGE 2007 ADDITIONAL SERVICE WORK TO BE PERFORMED UNDER A SEPARATE ORDER		
	at least once a year	every 10000 km (6214 miles) or every 2 years
Perform complete fork maintenance		●
Perform complete shock absorber maintenance		●
Clean and lubricate steering-head bearing and sealing elements	●	
Treat the electrical contacts and switches with contact spray	●	
Treat battery connections with contact grease	●	
Change coolant fluid		●

690 SUPERMOTO / 690 SUPERMOTO PRESTIGE 2007 VITAL CHECKS AND CARE PROCEDURES TO CONDUCTED BY THE OWNER OR THE MECHANIC			
	before each start	after every cleaning	every 1000 km (621 miles)
Check oil level	●		
Check brake fluid level	●		
Check brake pads for wear	●		
Check lighting system for proper operation	●		
Check horn for proper operation	●		
Lubricate actuating cables and nipples		●	
Bleed fork legs			●
Clean chain			●
Lubricate chain		●	●
Check chain tension	●		
Check tire pressure and wear	●		
Check coolant level	●		
Check fuel lines for leaks	●		
Check all control elements for smooth running	●		
Grease the hand brake lever and clutch lever		●	
Check brake performance	●	●	
Treat exposed metal components (except for the braking and exhaust system) with wax-based anti-corrosion agents		●	
Treat ignition/steering lock and light switch with contact spray		●	

Art.-No. 3.206.045-E

WIRING DIAGRAMS 13

INDEX

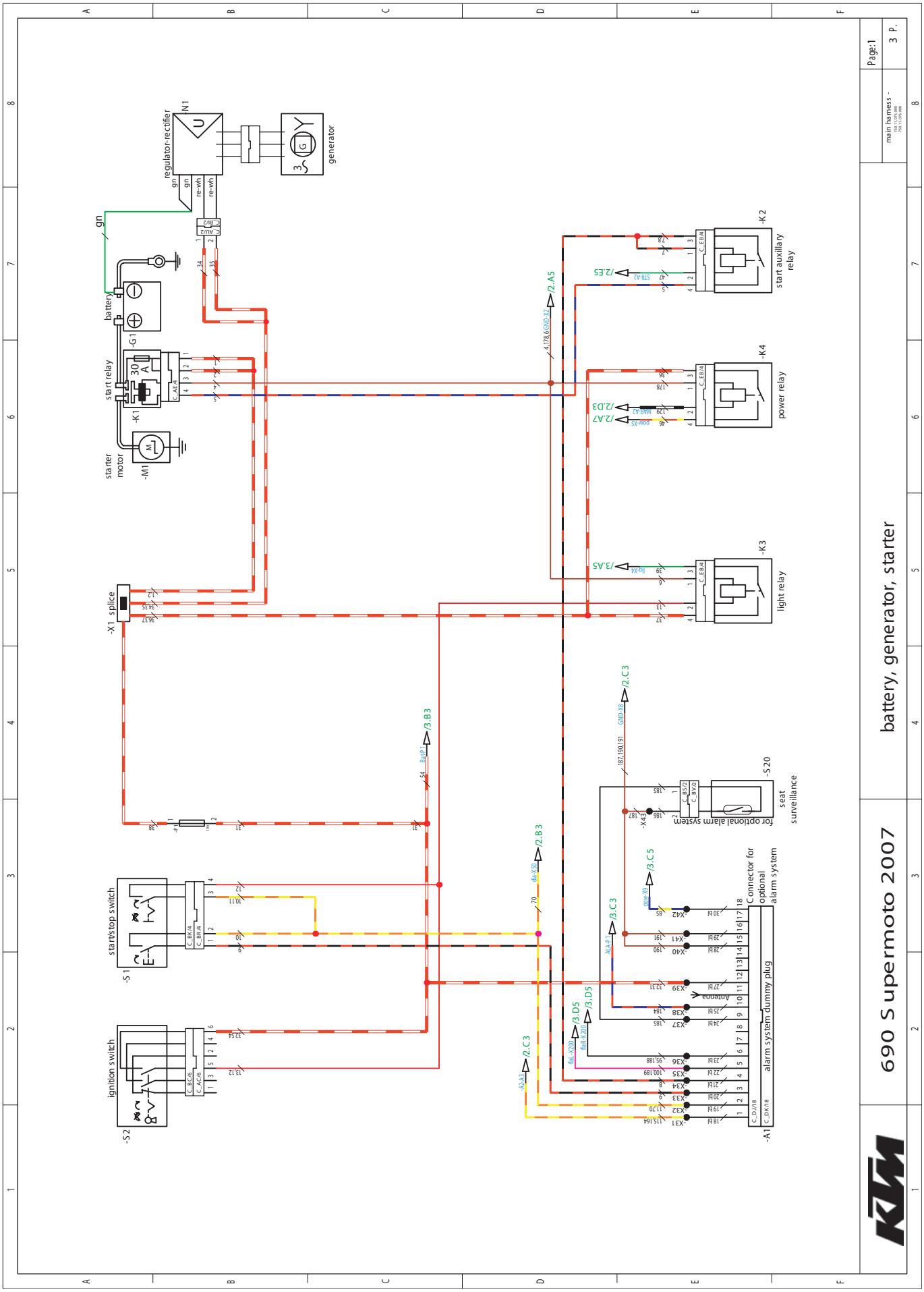
690 LC4 SUPERMOTO

Art.-No. 3.206.045-E

NOTE to the connector designations:
The connector designations are comprised of letters and numbers - e.g.: **C_AA1/20**
–The 1st position **C** stands for connector (connector).
–The 2nd and 3rd positions **AA** stand for the connector type.
–The 4th position numbers the same type of connector if the connector is used for different applications.
–The 5th and 6th positions **20** specify the number of pins in the connector, in this case 20 poles. The 5th position is not required for connectors with less than 10 pins.

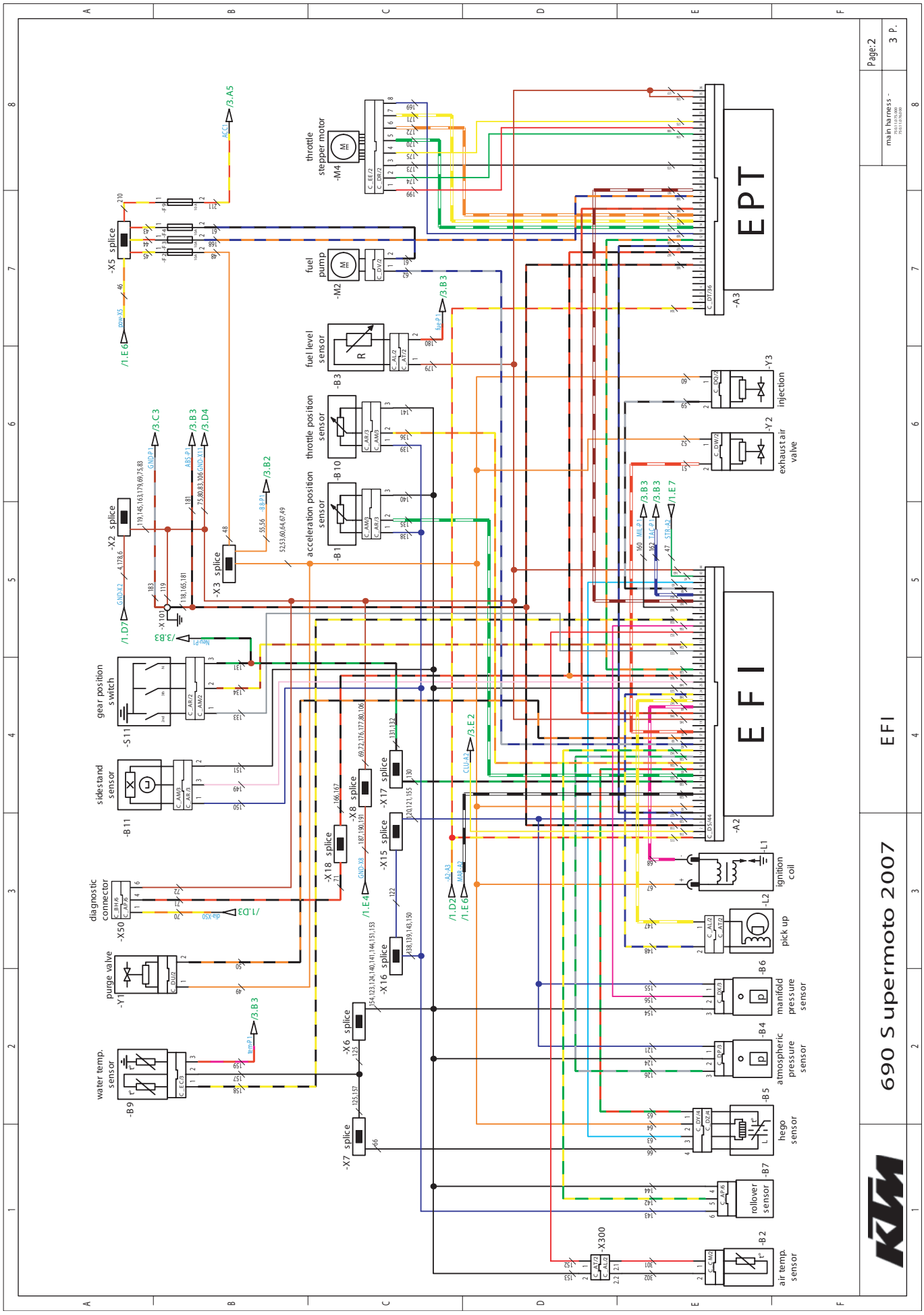
Cable colours

bl: black
ye: yellow
bu: blue
gn: green
re: red
wh: white
br: brown
or: orange
pi: pink
gr: grey
pu: purple



Repair manual KTM 690 LC4

Art.-No. 3.206.045-E


690 S upermoto 2007
EFI
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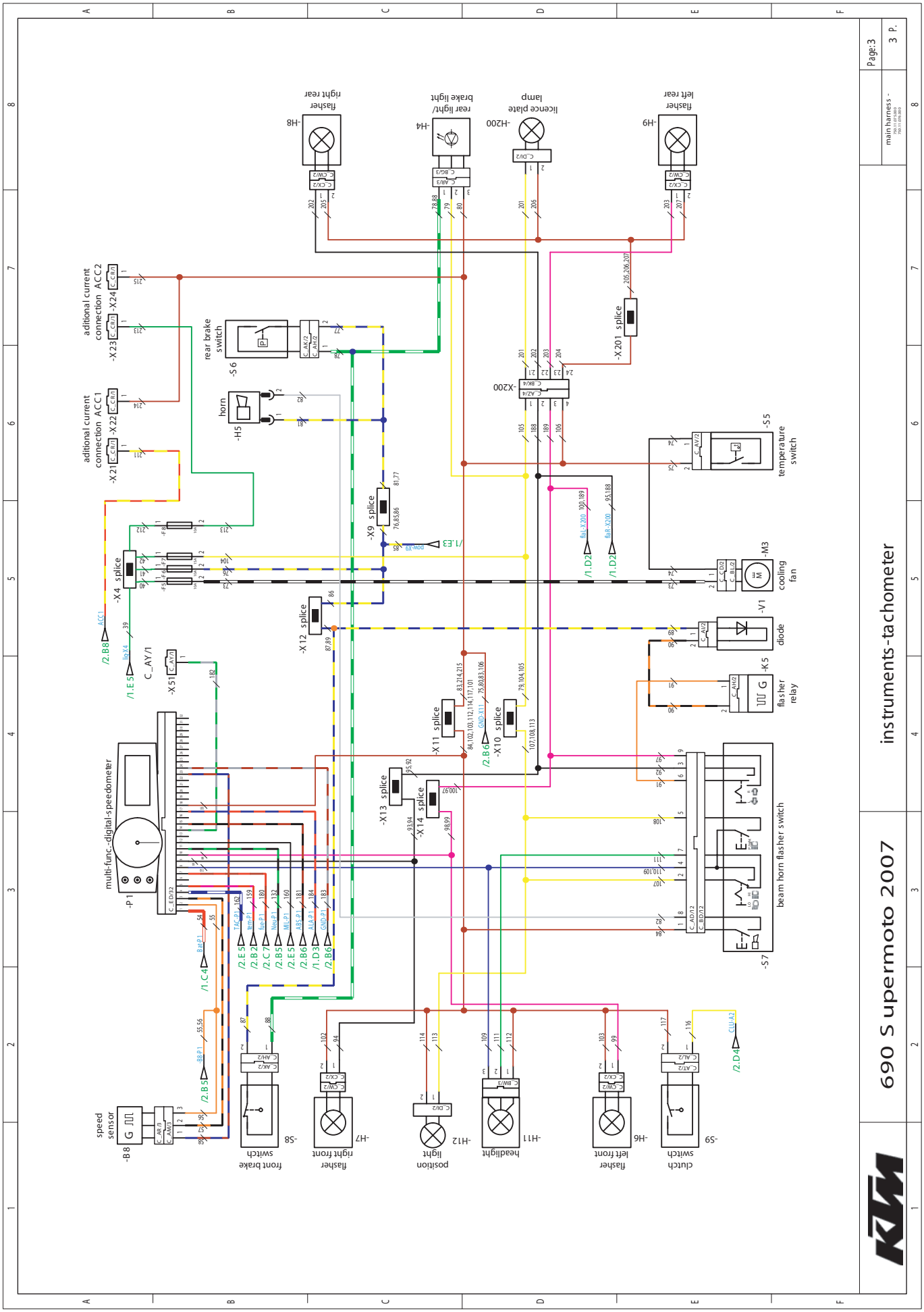
3 P.
main harness -
EPT
E F I
-A3
-A2
-Y3 injection
-Y2 exhaust air valve
-L1 ignition coil
-L2 pick up
-B6 manifold pressure sensor
-B4 atmospheric pressure sensor
-B5 hego sensor
-B7 rollover sensor
-B2 air temp. sensor
-B1 acceleration position sensor
-B10 throttle position sensor
-B3 fuel level sensor
-M2 fuel pump
-M4 throttle stepper motor
-B11 sidestand sensor
-S11 gear position switch
-B9 water temp. sensor
-Y1 purge valve
-X50 diagnostic connector
-X1 splice
-X2 splice
-X3 splice
-X5 splice
-X6 splice
-X7 splice
-X8 splice
-X15 splice
-X16 splice
-X17 splice
-X18 splice
-X300



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Art.-No. 3.206.045-E