

REPAIRMANUAL2007

450 / 505 SX-F

450 SXS-F

REPARATURANLEITUNG

MANUALE DI RIPARAZIONE

MANUEL DE RÉPARATION

MANUAL DE REPARACIÓN



ART.NR.: 3.206.029-E

KTM

REPAIRMANUAL2007
450 / 505 SX-F
450 SXS-F



KTM Group Partner



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EXPLANATION - UPDATING

3.206.029-E **Repair Manual 450/505 SX-F**
Basic version Model year 2007

10/2006

INTRODUCTION

This repair manual offers extensive 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 procedures common in workshops 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 professionally trained mechanics.

Read through the repair manual before beginning with any 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 THE DAMAGE OF MOTORCYCLE COMPONENTS OR
RENDER MOTORCYCLES UNFIT FOR RIDING!**

“NOTE” POINTS OUT USEFUL TIPS.

Use only **ORIGINAL KTM SPARE PARTS**.

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



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
5230 Mattighofen, Austria

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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 manuals – 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:

- Enter the complete item no. for the repair manual in column 1 (e.g.: **3.206.029-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.: **5-7C**) 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

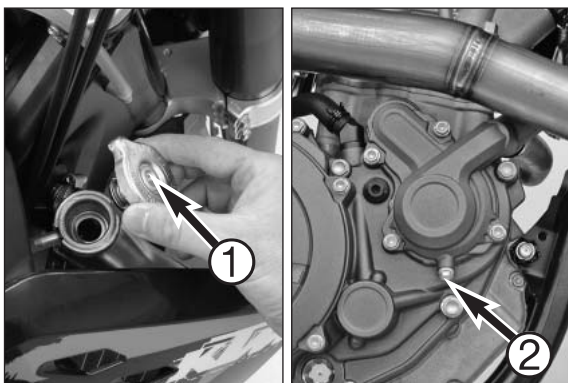
Company/work shop

GENERAL INFORMATION

2

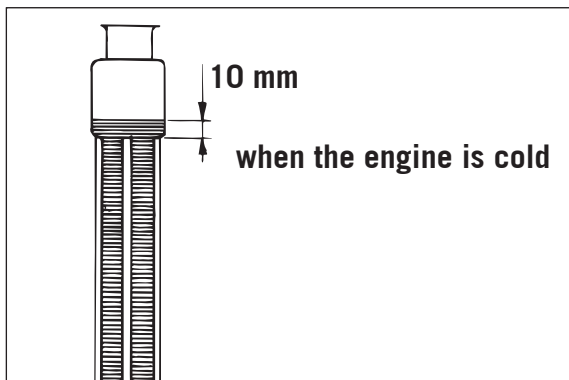
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Changing the cooling liquid

- Remove the radiator cap ① when the engine is cold.
- Remove the drain plug ② on the water pump cover and allow the cooling liquid to drain into a suitable pan.
- Remount the drain plug ② and tighten to 10 Nm.
- Fill the cooling system with cooling liquid in a ratio of 50% antifreeze and 50% distilled water (freeze protection down to at least -25°C) to 10 mm over the radiator fins.
- Mount the radiator cap ①.
- Go for a short ride and check the cooling liquid level again.



Checking the cooling liquid level

- When the engine is cold, the cooling liquid should be approx. 10 mm over the radiator fins (see illustration).

Engine oil

Automobile engine oil used to be used for four-stroke motorcycles before there were separate motorcycle specifications. Different technical developments made it necessary to have a separate specification for four-stroke motorcycles - the JASO T903 MA standard. Whereas car engines require long changing intervals, motorcycle engines require a higher power output at higher speeds. Most motorcycle engines also use the same oil to lubricate the transmission and the clutch. The JASO MA standard responds to these special requirements.

Only use fully synthetic engine oils that meet the JASO MA quality requirements (see information on the can).

KTM recommends Motorex Power Synt 4T in the 10W/50 viscosity (for temperatures over 5°C, 41°F) or 5W/40 (for temperatures under 5°C, 41°F).

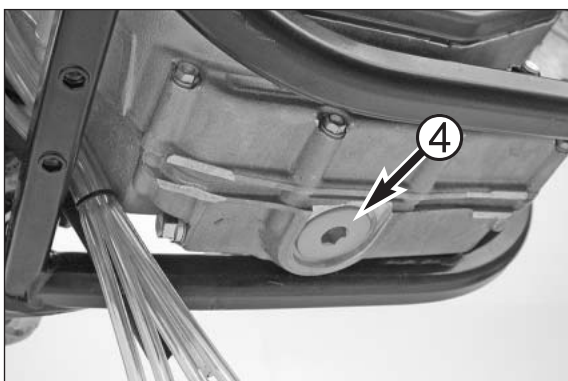
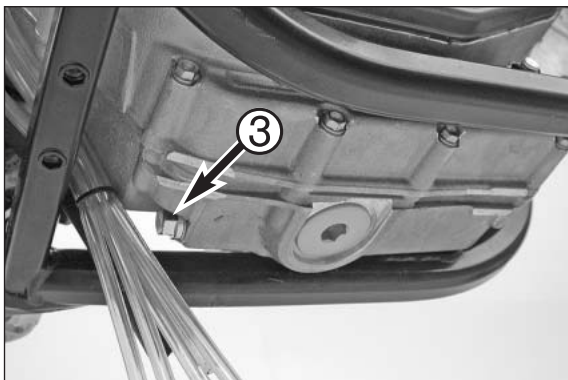
Changing the engine oil

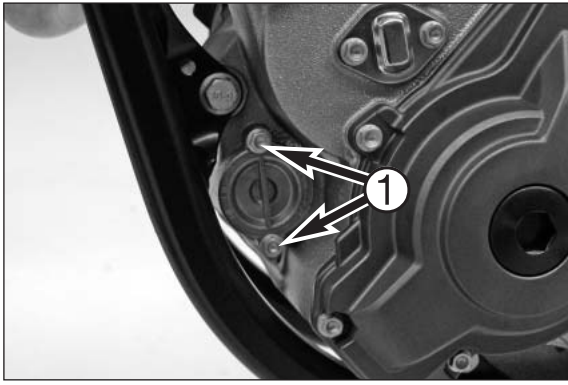
▲ **CAUTION** ▲

AN ENGINE AT OPERATING TEMPERATURE AND THE ENGINE OIL IT CONTAINS ARE VERY HOT – DO NOT BURN OR SCALD YOURSELF.

NOTE: When changing the engine oil, it is necessary to clean the oil screen and to replace the oil filter. Engine oil has been changed with the engine at an operating temperature..

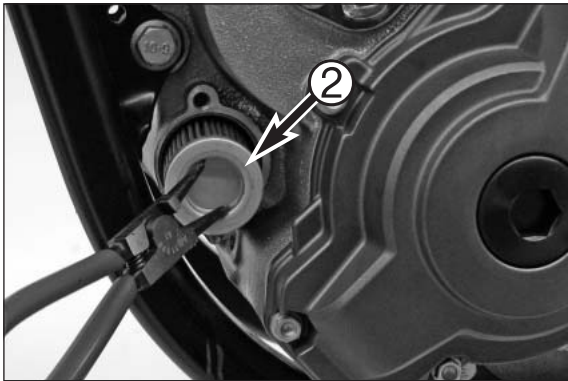
- Place the motorcycle on a level surface.
- Remove the oil drain plug ③ and allow the engine oil to drain into a pan.
- Relieve the plug ④ by tapping gently a few times with a hammer.
- Remove the plug with the oil screen.
- Allow the engine oil to drain completely and clean the sealing areas.
- Thoroughly clean all parts.
- Check the O-rings for damage and replace if necessary.
- Mount the oil drain plug with a new seal ring and tighten to 20 Nm.
- Mount the plug with the oil screen and tighten to 30 Nm.



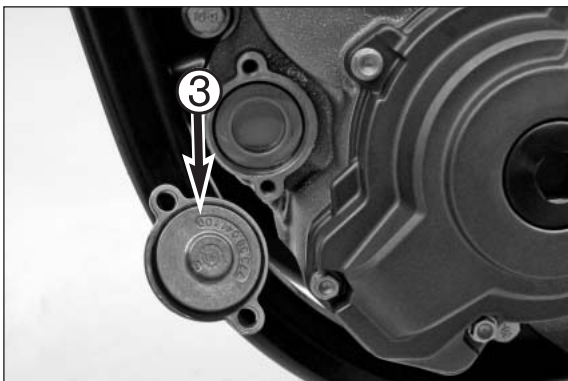


Changing the oil filter

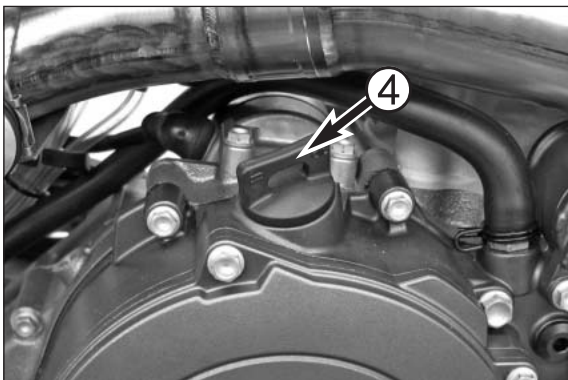
- Place a pan under the engine to drain the oil. Remove the 2 screws **1** and take off the oil filter cover and O-ring.



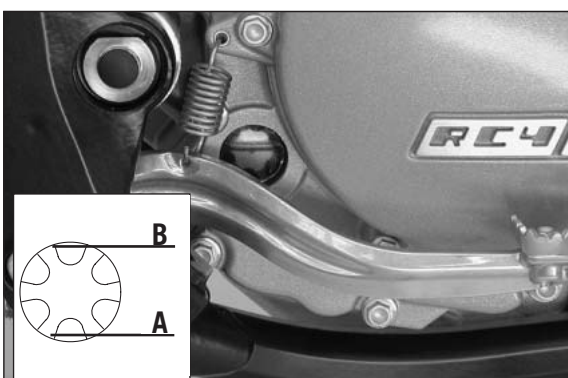
- Pull the oil filter insert **2** out of the housing with circlip pliers 510.12.011.000.
- Clean the oil filter cover, the sealing area on the O-ring and the engine case. Check the O-ring in the oil filter cover for damage and replace if necessary.



- Lay the motorcycle down on its side and fill the oil filter housing approx. 1/3 full with engine oil; insert the oil filter in the housing.
- Grease the O-ring in the oil filter cover and mount the cover **3**. Mount the screws and tighten to 10 Nm.



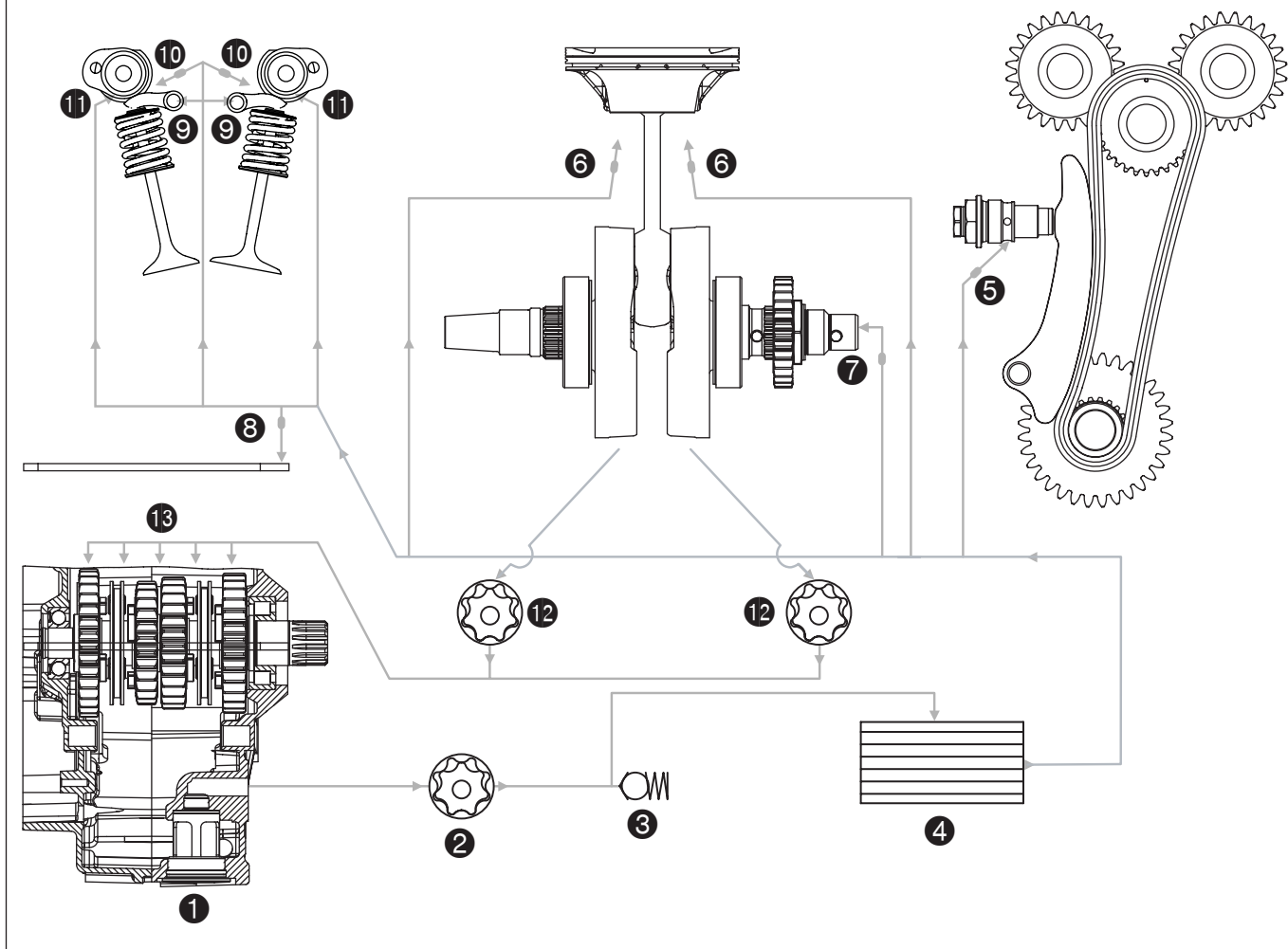
- Stand the motorcycle up again.
- Remove the oil filler screw **4** in the clutch cover and add approx. 1.3 liters of fully synthetic engine oil (Motorex Power Synt 4T 10W/50 for temperatures over 5°C or 5W/40 for temperatures under 5°C).
- Start the engine and check all screw connections and the oil filter cover for leaks.
- Finally, check the engine oil level and correct if necessary.



Checking the engine oil level

- You can check the engine oil level with the engine cold or warm. Stand the motorcycle upright on a level surface (not on the side stand).
- The oil should be visible at the lower edge **A** of the inspection window if the engine is cold.
- If the engine is warm, the engine oil should reach the upper edge **B** of the inspection window.
- Correct the engine oil level if necessary.
- Check the engine for leaks.

Engine oil circuit



Engine oil circuit

- ❶ oil screen
- ❷ Pressure oil pump
- ❸ Bypass valve
- ❹ Oil filter insert
- ❺ Throttle to meter the oil for the timing chain tensioner
- ❻ Oil spraying nozzle for piston
- ❼ Jet to meter the oil to the lower conrod bearing
- ❽ Throttle to meter the oil to the clutch pushrod
- ❾ Oil duct for the cam lever support
- ❿ Oil spraying nozzle for the camshaft
- ⓫ Oil duct for the camshaft support
- ⓬ Suction pump for the crankcase
- ⓭ Oil duct for transmission lubrication



Checking the oil pressure

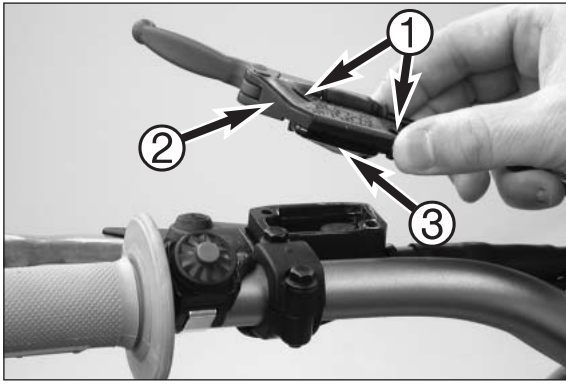
- Remove the plug for the oil duct from the cylinder head.
- Screw on oil pressure adapter 773.29.006.000 and tighten.
- Connect EFI pressure gauge 610.29.094.000 without the T-piece to the oil pressure adapter; tighten the banjo bolt.

! CAUTION !

- CHECK THE ENGINE OIL LEVEL AND CORRECT IF NECESSARY.
- MAKE SURE THE OIL FILTER IS IN A GOOD CONDITION.
- Allow the engine to warm up and measure the oil pressure with the engine at operating temperature (engine oil temperature approx. 100°C):

min. 1.0 bar at 1600 rpm

- Remove the special tools, screw the plug on with a new O-ring and tighten to 10 Nm.



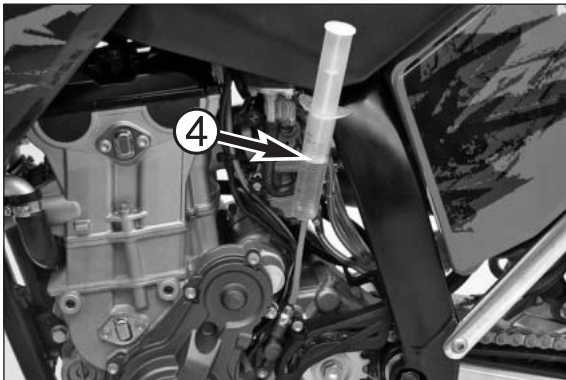
Checking the oil level of the hydraulic clutch

! CAUTION !

ONLY FILL SAE 10 BIODEGRADABLE HYDRAULIC OIL (E.G. MOTOREX HYDRAULIC FLUID 75) INTO THE MASTER CYLINDER. DO NOT ADD BRAKE FLUID.

NOTE: remove the cover to check the oil level in the master cylinder of the clutch.

- Move the master cylinder into a horizontal position.
- Remove the screws ① and the cover ② together with the rubber boot ③.
- The oil level should be 4 mm under the upper edge with the master cylinder in a horizontal position. If necessary, add SAE 10 biodegradable hydraulic oil (e.g. Motorex Hydraulic Fluid 75).
- Remount the rubber boot, cover and screws.

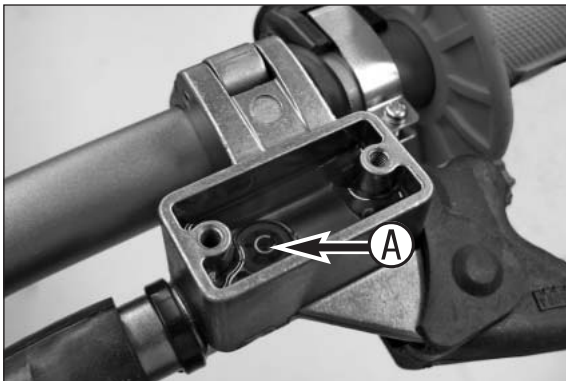


Bleeding of the hydraulic clutch

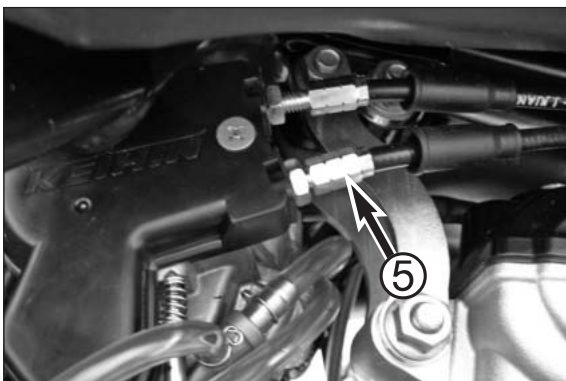
! CAUTION !

ONLY FILL SAE 10 BIODEGRADABLE HYDRAULIC OIL (E.G. MOTOREX HYDRAULIC FLUID 75) INTO THE MASTER CYLINDER. DO NOT ADD BRAKE FLUID.

- Move the master cylinder into a horizontal position.
- Remove the screws ① and the cover ② together with the rubber boot ③.
- Remove the bleeder screw on the slave cylinder of the clutch and mount the bleeding syringe ④ filled with SAE 10 biodegradable hydraulic oil (e.g. Motorex Hydraulic Fluid 75).

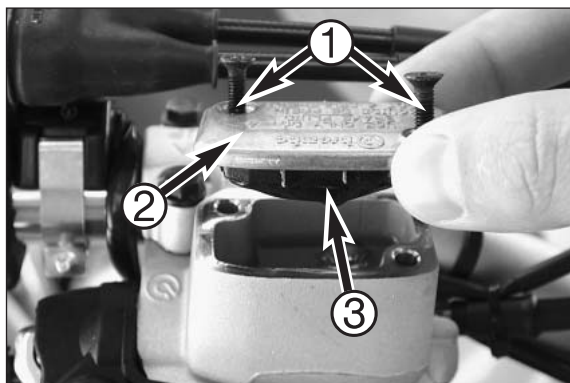


- Press the SAE 10 biodegradable hydraulic oil into the system until oil starts to run out of the hole A in the master cylinder without bubbles. Make sure the oil does not overflow.
- After bleeding the clutch, remove the bleeding syringe and mount the bleeder screw.
- Add SAE 10 biodegradable hydraulic oil (e.g. Motorex Hydraulic Fluid 75) up to 4 mm under the upper edge.
- Remount the rubber boot, cover and screws.



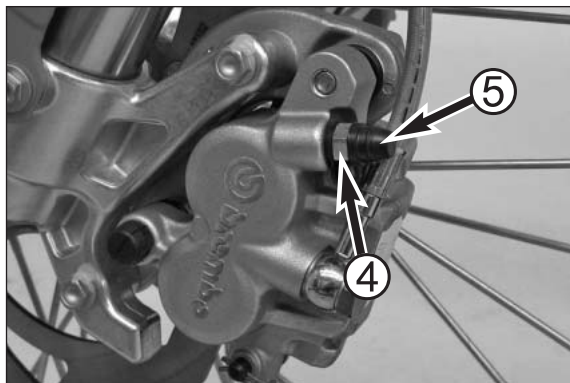
Adjusting the throttle cables

- Push back the dust boots.
- Set 3-5 mm free travel at the throttle grip with the adjusting screw ⑤. The idling speed should not change with the engine running if the handlebar is turned all the way to the left or right.
- Slip on the dust boots.
- Check the throttle grip for smooth operation.

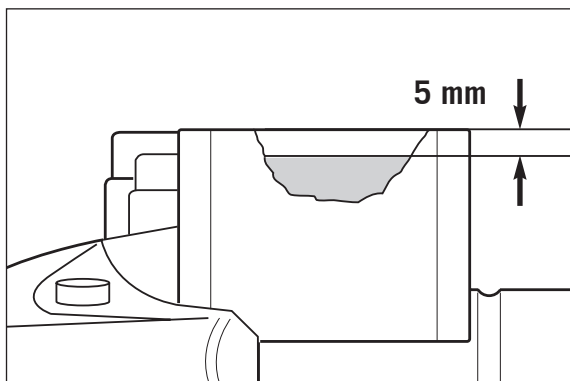


Changing the front brake fluid

- Move the hand brake cylinder into a horizontal position.
- Remove the screws ❶ and the cover ❷ together with the rubber boot ❸.
- Use a syringe to extract the used brake fluid and add fresh DOT 5.1 brake fluid (Motorex Brake Fluid DOT 5.1).



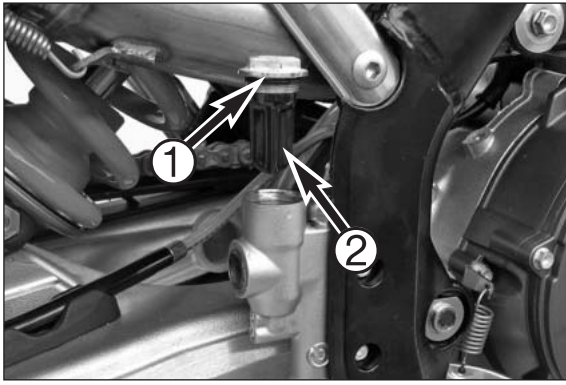
- Use a commercial extractor (shop equipment) to extract the used brake fluid out of the system through the bleeder screw ❹ on the brake caliper. Make sure the brake fluid reservoir is always filled with enough fresh brake fluid.
- Tighten the bleeder screw ❹ and attach the dust cap ❺ again.



- Add DOT 5.1 brake fluid (Motorex Brake Fluid DOT 5.1) up to 5 mm under the top edge of the reservoir. Remount the rubber boot, cover and screws.
- Wash off any overflowing or spilled brake fluid with water.
- Actuate the hand brake lever until you feel the point of pressure.

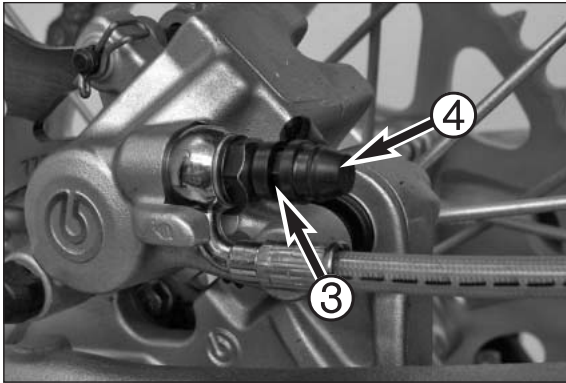
! CAUTION !

- NEVER USE DOT 5 BRAKE FLUID. IT IS BASED ON SILICONE OIL AND DYED PURPLE. GASKETS AND BRAKE HOSES WILL BE DAMAGED IF DOT 5 BRAKE FLUID IS USED.
- BRAKE FLUID CAN CAUSE SKIN IRRITATIONS. AVOID CONTACT WITH THE SKIN OR EYES. IF BRAKE FLUID SPLASHES INTO YOUR EYES, RINSE THOROUGHLY WITH WATER AND CONSULT A DOCTOR.
- MAKE SURE NO BRAKE FLUID COMES INTO CONTACT WITH PAINTED PARTS AS BRAKE FLUID WILL CORRODE THE PAINTWORK!
- ONLY USE CLEAN, NEW BRAKE FLUID FROM TIGHTLY SEALED CONTAINERS.



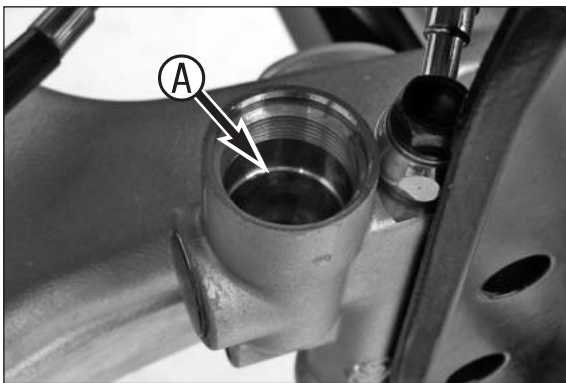
Changing the rear brake fluid

- Move the vehicle into a vertical position.
- Disassemble the screw cap ① together with the rubber boot ② from the brake fluid reservoir.
- Use a syringe to extract the used brake fluid and fill with fresh DOT 5.1 brake fluid (Motorex Brake Fluid DOT 5.1).



- Use a commercial extractor (shop equipment) to extract the used brake fluid out of the system through the bleeder screw ③ on the brake caliper. Make sure the brake fluid reservoir is always filled with enough fresh brake fluid.

- Tighten the bleeder screw ③ and attach the dust cap ④ again.



- Fill with DOT5.1 brake fluid (Motorex Brake Fluid DOT 5.1) up to the mark A on the inside of the reservoir.
- Check the O-ring of the screw cap for damage, exchange it if necessary and remount the screw cap again.
- Wash off any overflowing or spilled brake fluid with water.
- Press the foot brake pedal until you feel the point of pressure.

!

CAUTION

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- NEVER USE DOT 5 BRAKE FLUID. IT IS BASED ON SILICONE OIL AND DYED PURPLE. GASKETS AND BRAKE HOSES WILL BE DAMAGED IF DOT 5 BRAKE FLUID IS USED.
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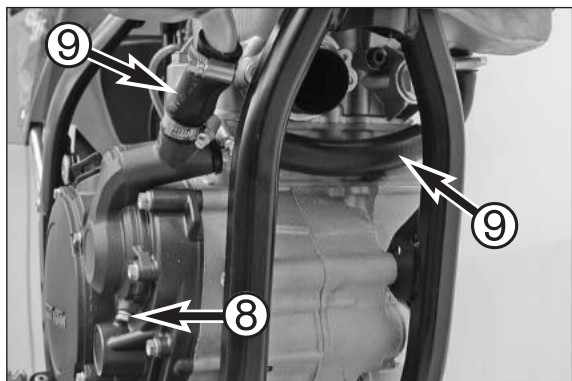
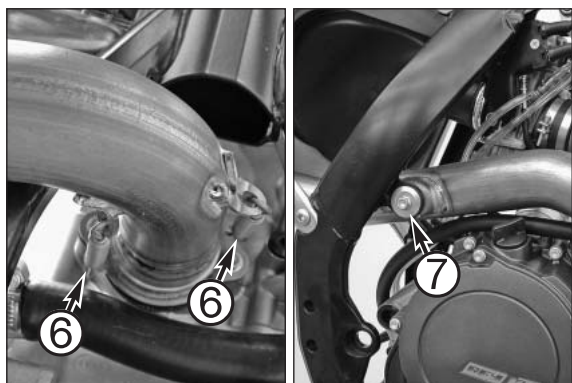
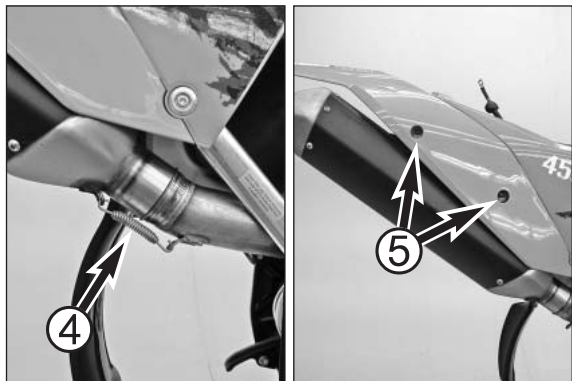
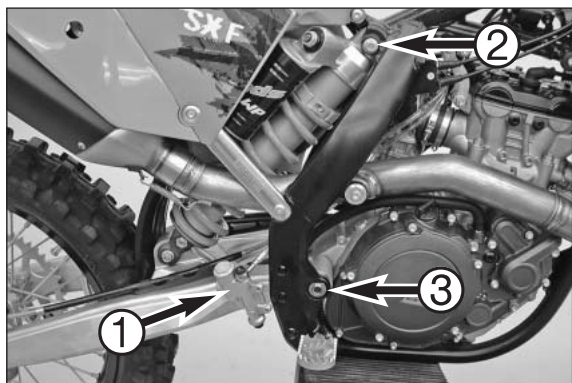
SPECIAL TOOLS - ENGINE

ITEM	PART NO.	DESCRIPTION
1	560.12.001.000	Universal engine work stand
2	773.29.002.000	Retaining arm, complete
3	600.29.012.000	Plastigauge measuring strips
5	510.12.011.000	Circlip pliers, inverted
6	590.29.033.000	Double jaw puller
7	600.29.015.000	Piston ring compressor
8	6899785	Loctite 243 blue
9	151.12.017.000	Bearing puller
10	151.12.018.000	Insert 12-16mm
10	151.12.018.100	Insert 18-23mm
10	151.12.018.200	Insert 5-7mm
10	773.29.020.000	Insert 8-12mm
11	590.29.026.006	Limit plug gauge for valve guide
12	585.29.005.000	Mounting sleeve
13	590.29.041.000	Feeler gauge set
14	773.29.060.000	Insert for valve spring mounter
15	590.29.019.000	Valve spring mounter
16	584.29.037.037	Mounting tool for inner bearing ring
17	590.31.017.200	Mixture control screw
18	580.12.009.000	Magneto extractor
19	309098	Three-Bond silicone sealant
20	510.12.012.000	Holding wrench for engine sprocket
21	773.29.072.000	Spark plug wrench
26	503.29.050.000	Bleeding syringe
27	584.29.059.000	Loctite 648 green
28	773.29.003.000	Clutch holder
31	750.29.090.000	Protection cover for crankshaft
32	773.29.012.100	Mounting pin AGW-ZR-KS
33	600.29.010.000	Graduated disk, 360 degrees
34	773.29.034.000	Wrench for mixture regulating screw
35	773.29.081.000	Special wrench for screw neck
37	773.29.050.000	Adjusting bearing bridge
38	773.29.051.000	Unlatcher for timing chain tensioner
39	773.29.010.000	Engine locking screw
40	773.29.021.000	Special 36mm socket
41	773.29.030.000	Mounting tool for piston pin retainer 450
41	776.29.030.000	Mounting tool for piston pin retainer 505
42	773.29.006.000	Oil pressure adapter
43	610.29.094.000	EFI pressure gauge

DISMOUNTING AND MOUNTING THE ENGINE 3

INDEX

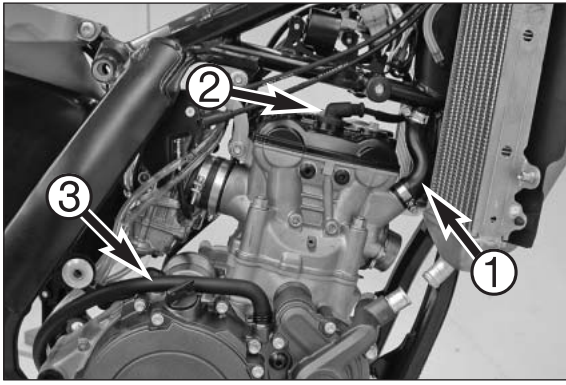
DISMOUNTING THE ENGINE	3-2
MOUNTING THE ENGINE	3-5



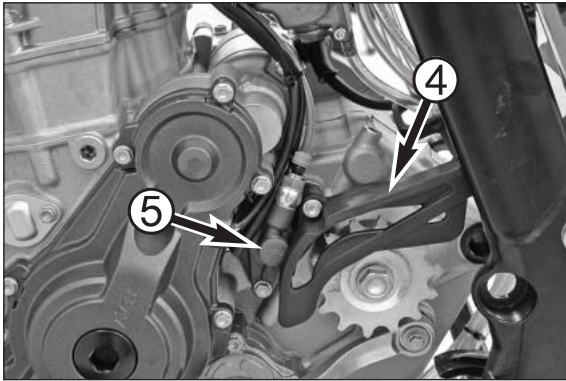
Dismounting the engine

- Thoroughly clean the motorcycle and jack it up on a suitable assembly stand. Make sure it cannot tip over.
- Remove the seat and tank with the spoiler.
- Disconnect the battery.
- Open the chain and remove.
- Dismount the foot brake cylinder ① and turn towards the back; you do not need to loosen the line to the rear wheel brake.
- Remove the foot brake lever and detach the return spring on the foot brake lever.
- Remove the upper shock absorber screw ②.
- Loosen the nut on the swing arm pivot ③, knock out the swing arm pivot with a suitable driver and completely remove the swing arm, shock absorber and rear wheel from the motorcycle.
- Detach the exhaust spring ④ between the header pipe and silencer with a suitable tool.
- Remove both fixing screws ⑤ on the silencer and remove the silencer.
- Detach the exhaust springs ⑥ on the cylinder head with a suitable tool.
- Remove the fixing screw ⑦ on the header pipe together with the washer and rubber sleeve.
- Pull the header pipe forward and remove from the motorcycle.

- Open the drain plug on the water pump ⑧ and allow the cooling liquid to drain into a suitable container.
- Loosen the hose clamp and remove both radiator hoses ⑨.

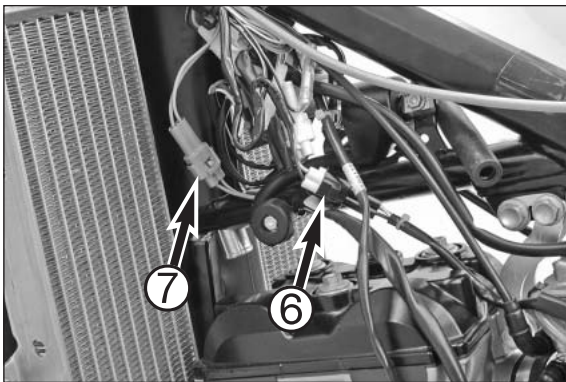


- Loosen the hose clamp and remove the coolant hose ①.
- Disconnect the spark plug connector ②.
- Remove the vent hose ③.

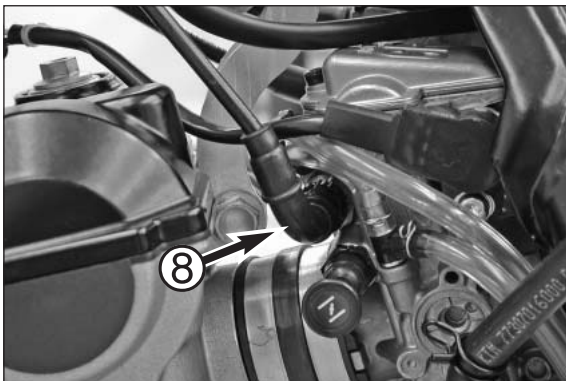


- Unscrew the chain guard ④ from the clutch slave cylinder and from the frame and remove.
- Cut off the cable tie, unscrew the clutch slave cylinder ⑤ and tilt aside.

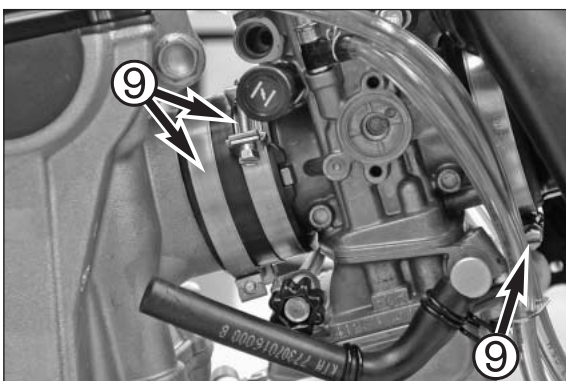
NOTE: do not actuate the clutch lever as long as the clutch slave cylinder is dismounted.



- Disconnect the socket connectors from the throttle position sensor ⑥, pulse generator ⑦ and generator.



- Unscrew the hot start actuator ⑧ from the carburetor.



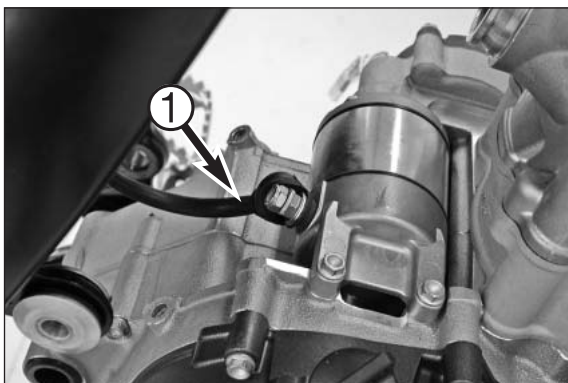
- Loosen the carburetor clamps ⑨.



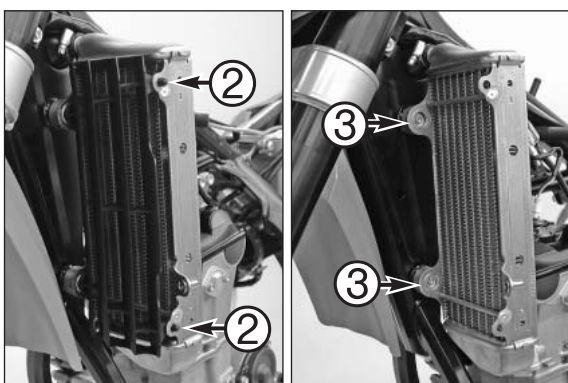
- Push the carburetor back and remove the rubber sleeve from the cylinder head.
- Dismount the carburetor towards the right and let it hang down.

! **CAUTION** !

DO NOT PLACE THE CARBURETOR IN THE AIR FILTER BOX SINCE THE AIR FILTER WILL ABSORB ANY LEAKING FUEL.

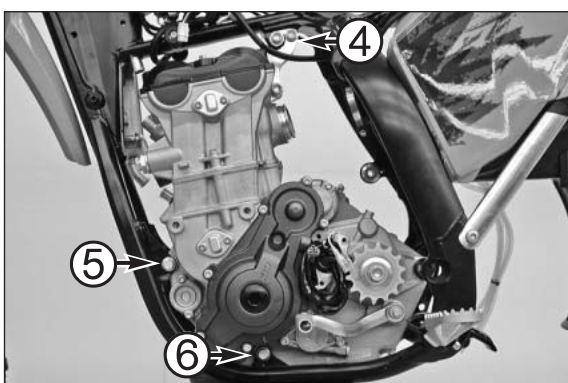


- Unscrew the nut and remove the electric connection ① from the starter engine.



- Press the fixing tabs ② towards the inside and remove the left radiator shield.
- Loosen the hose connection on the left radiator and both radiator fixing screws ③ and remove the left radiator.

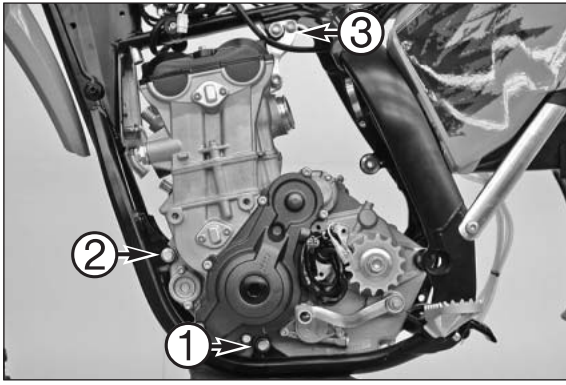
NOTE: the left radiator does not have to be dismantled if someone helps you lift out the engine to prevent the radiator and lower radiator connection from being damaged.



- Dismount the upper engine brace ④.
- Remove the front ⑤ and lower ⑥ engine fixing screws and lift the engine out of the frame towards the left.

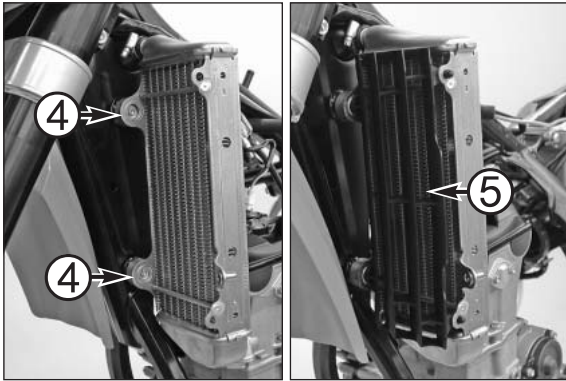
! **CAUTION** !

MAKE SURE THE MOTORCYCLE CANNOT TIP OVER.

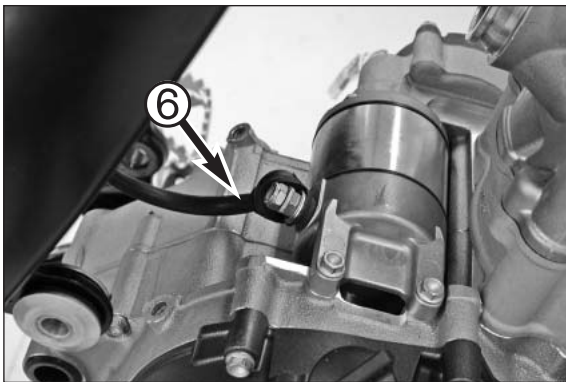


Mounting the engine

- Lift the engine into the frame from the left, position and screw in the lower **1** and the front **2** engine fixing screws (M10x123) but do not tighten them yet.
- Mount the upper engine brace **3** (all screws are M8x42), do not tighten yet.



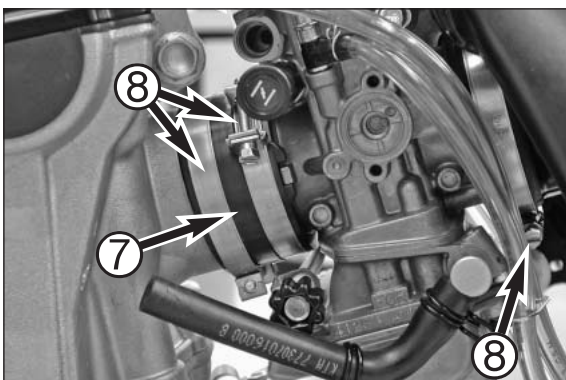
- Mount the left radiator and tighten the radiator screws **4** to 10 Nm.
- Mount the radiator shield **5** and the hose and tighten the hose clamps.



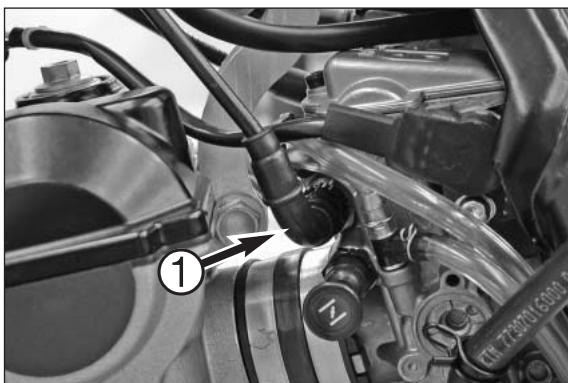
- Attach the electric connection **6** to the starter engine and tighten the nut.



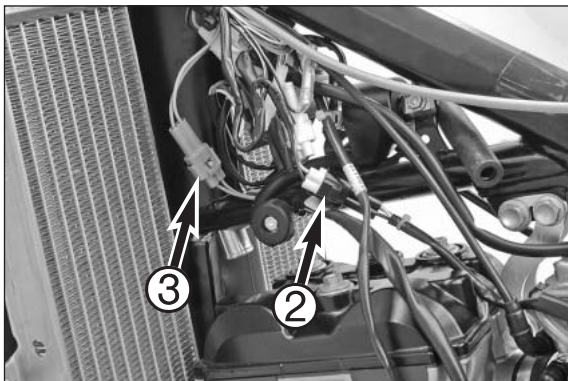
- Position the carburetor and insert in the air filter boot.
- Push the carburetor back and place the rubber sleeve **7** on the cylinder head, slide the carburetor into the rubber sleeve.



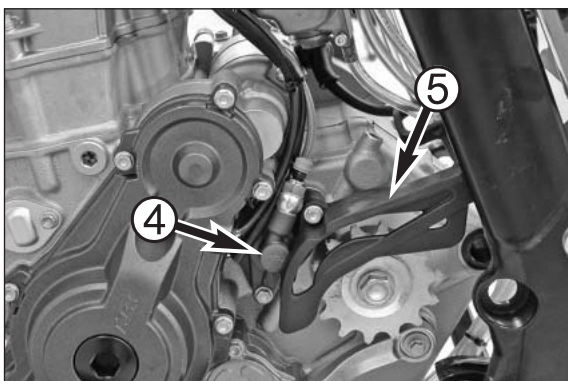
- Tighten the clamps **8**.



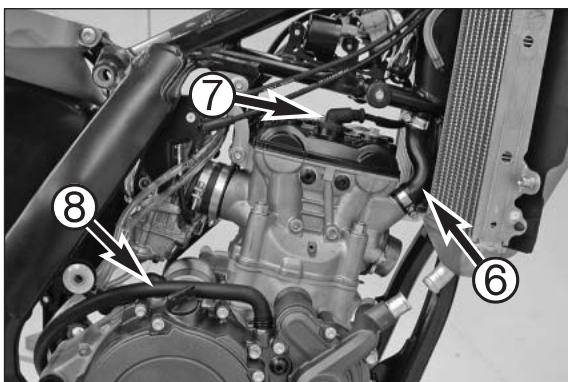
- Screw the hot start actuator **1** in the carburetor.



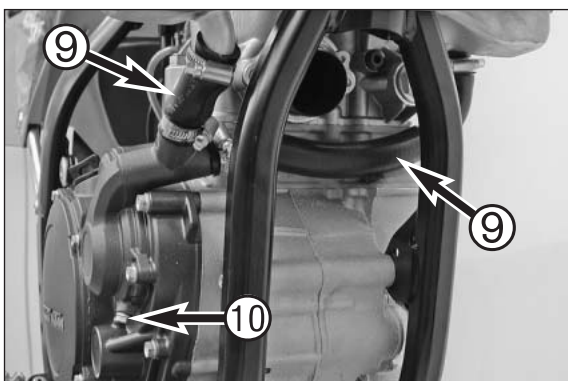
- Connect the socket connectors on the throttle position sensor **2**, pulse generator **3** and generator. Fasten the wiring harnesses with cable ties.



- Mount the clutch slave cylinder **4**, screw in both of the front screws (M6x25) and tighten to 10 Nm.
- Mount the chain guard **5**, tighten the front screw (M6x35) to 10 Nm, apply Loctite 243 to the rear screw (M8x30) and tighten to 25 Nm.



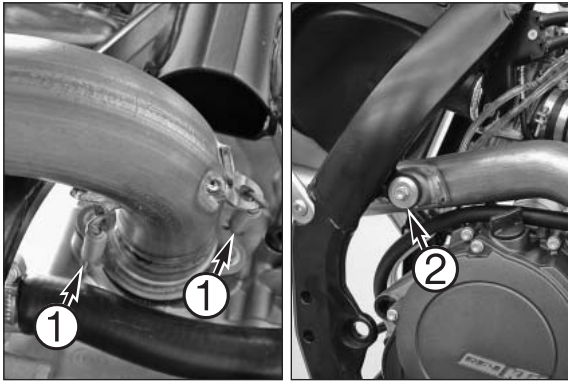
- Mount the coolant hose **6** and tighten the hose clamps.
- Mount the spark plug connector **7**.
- Mount the vent hose **8**.



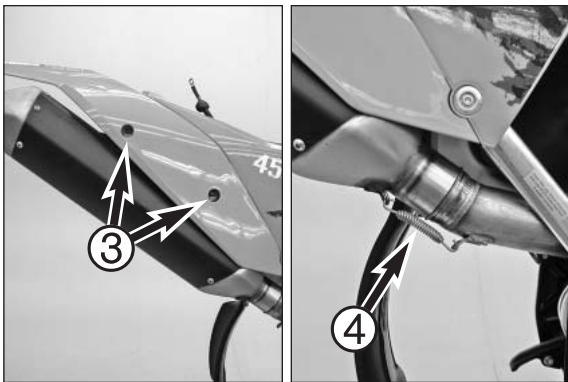
- Mount the coolant hoses **9** and tighten the hose clamps.
- Mount the drain plug **10** with a new sealing washer and tighten.



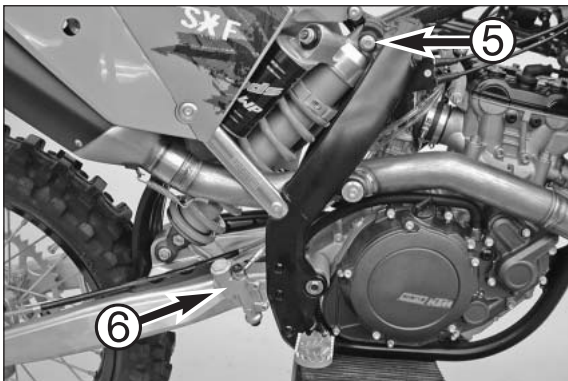
- Position the header pipe from the front of the motorcycle.



- Attach the exhaust springs ① to the cylinder head with a suitable tool.
- Mount the fixing screw (M6x25) ② for the header pipe with a washer and rubber sleeve and tighten to 10 Nm.



- Mount the silencer on the vehicle and tighten the screws (M6x30) ③ to 10 Nm
- Attach the exhaust spring ④ between the header pipe and the silencer with a suitable tool.



- Position the swing arm and shock absorber on the motorcycle, insert the swing arm pivot and tighten to 100 Nm.
- Lock the upper shock absorber screw ⑤ with Loctite 243 and tighten to 70 Nm.
- Tighten the screws on the engine fastening and engine brace: M10 to 60 Nm, M8 to 33 Nm.
- Mount the foot brake lever and attach the return spring to the foot brake lever, apply Loctite 243 to the screw (M10x40) and tighten to 45 Nm.
- Mount the foot brake cylinder ⑥, apply Loctite 243 to the screws (M6x12) and tighten to 10 Nm.
- Position the chain and mount (make sure the closed side of the guide points in the running direction).
- Connect the battery.
- Mount the tank with the spoiler and seat.
- Add cooling liquid.
- Take the motorcycle off the assembly stand.
- Check the engine oil level.

DISASSEMBLING THE ENGINE

4

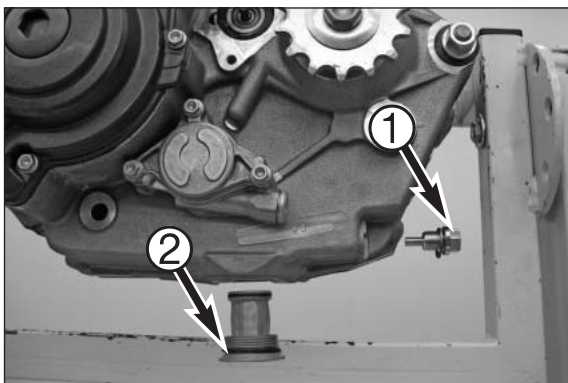
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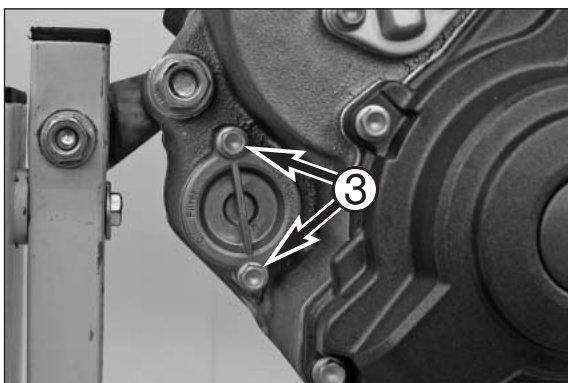
Preparation

- Thoroughly clean the outside of the engine and clamp in the universal work stand 560.12.001.000 with the engine holders 773.29.002.000.
- Remove the shift lever.



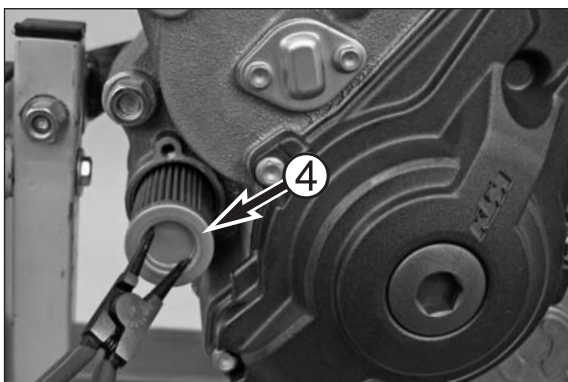
Draining the engine oil

- Remove the oil drain plug ① together with the seal ring.
- Tap lightly with a hammer to relieve the plug ②.
- Remove the plug together with the oil screen.
- Completely drain the engine oil.

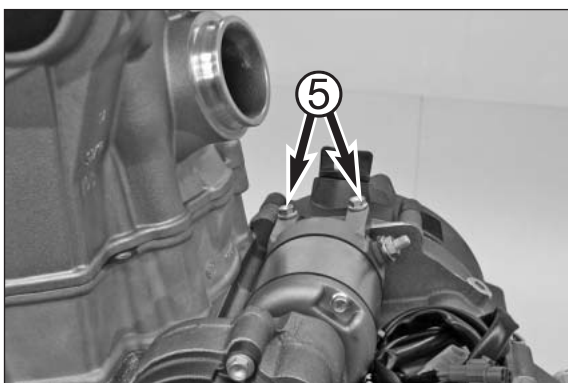


Removing the oil filter

- Remove both screws ③ and take off the oil filter cover together with the O-ring.

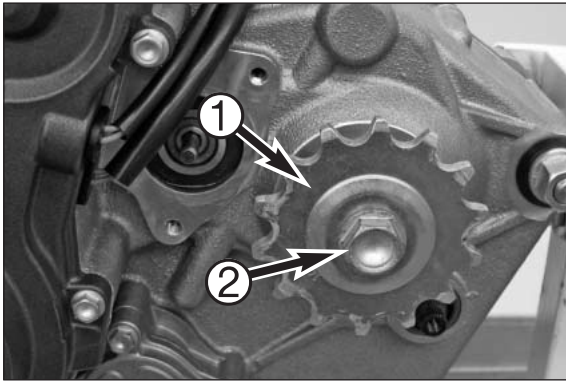


- Pull the oil filter insert ④ out of the housing with the circlip pliers 510.12.011.000.



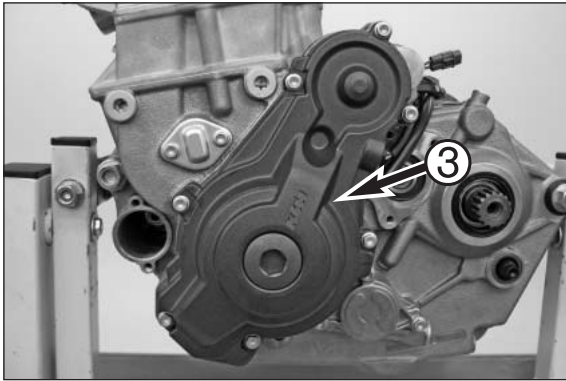
Removing the starter

- Remove both screws ⑤ and take out the starter together with the O-ring.



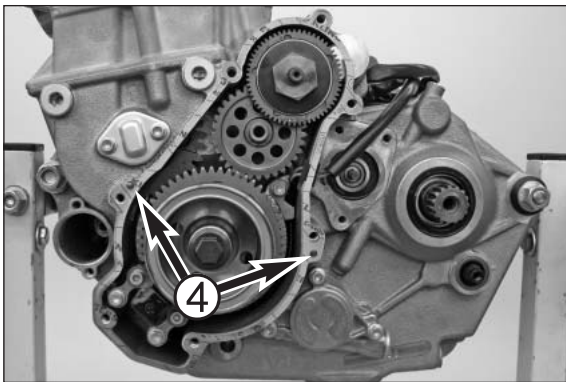
Removing the sprocket

- Use holding wrench 510.12.012.000 to hold the sprocket ① while you remove the screw ② with the spring washer.
- Remove the sprocket, distance bushing and O-ring.

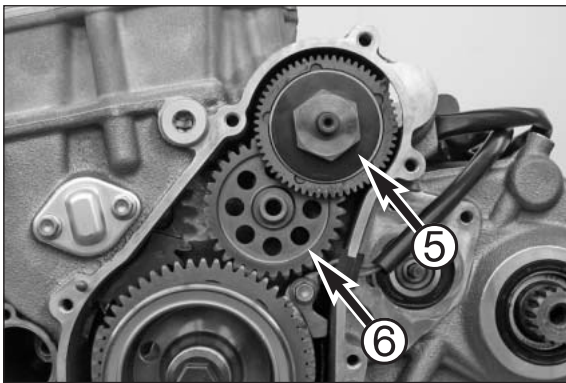


Removing the ignition cover

- Remove the 7 screws on the ignition cover and take off the ignition cover ③.

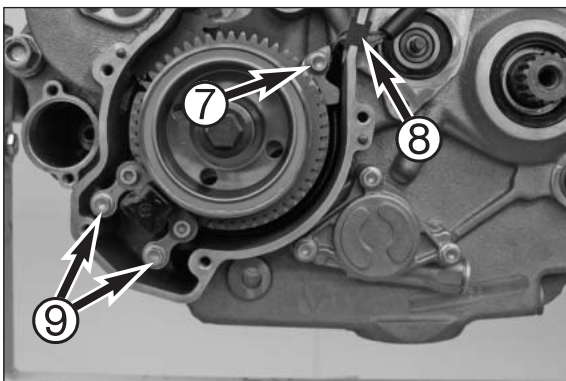


- Remove the ignition cover gasket.
- Do not lose the needle rollers ④.



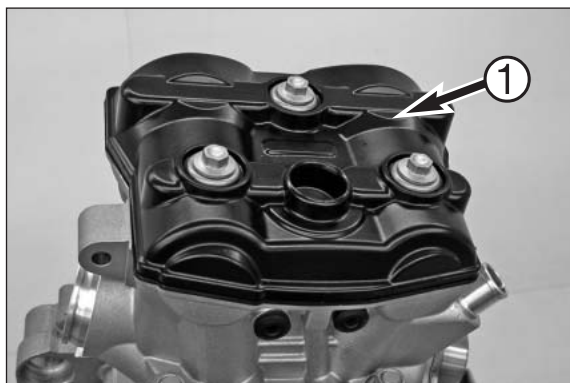
Removing the starter drive

- Remove the torque limiter ⑤.
- Remove the starter idler gear ⑥.



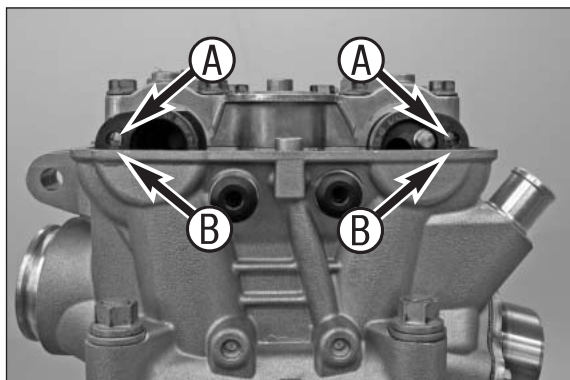
Removing the pulse generator

- Remove the screw ⑦ and take off the retaining bracket.
- Pull the cable support sleeve ⑧ out of the engine case and unthread the cable.
- Remove both screws ⑨.
- Remove the pulse generator including the holder.

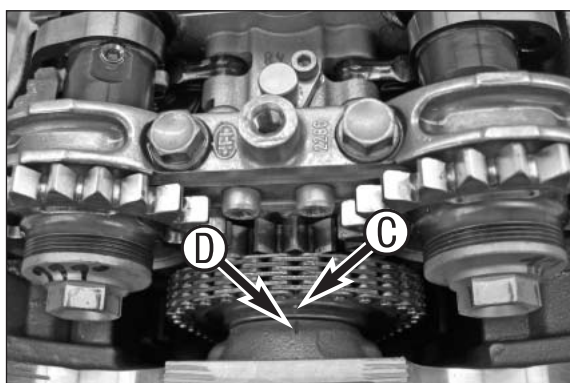


Moving the engine to ignition TDC

- Remove the 3 screws on the valve covers together with the rubber seal.
- Remove the valve cover ❶ together with both gaskets.
- Remove the spark plug.

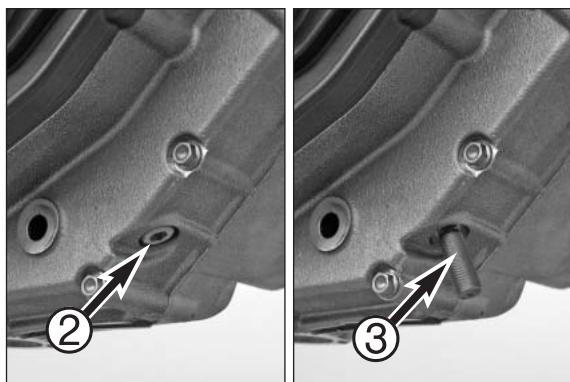


- Move the crankshaft to ignition TDC. Both cams point towards the outside in this position.
- The bores ❶ in the camshafts are flush with the valve cover above the sealing area ❷.

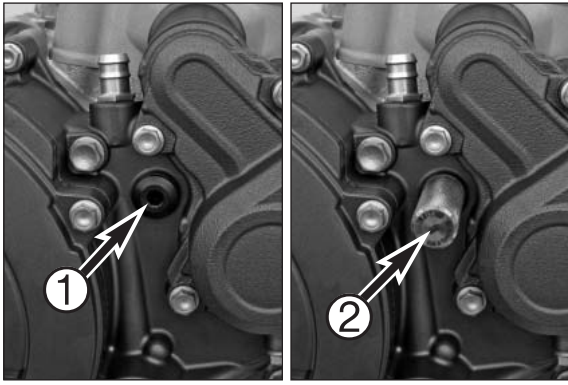


- Check whether the ❸ and ❹ marks were made. If the marks were made, they should be in alignment with each other in the ignition TDC position (they only show once every 6 crankshaft revolutions).

NOTE: the marks make it easier to mount the camshafts.



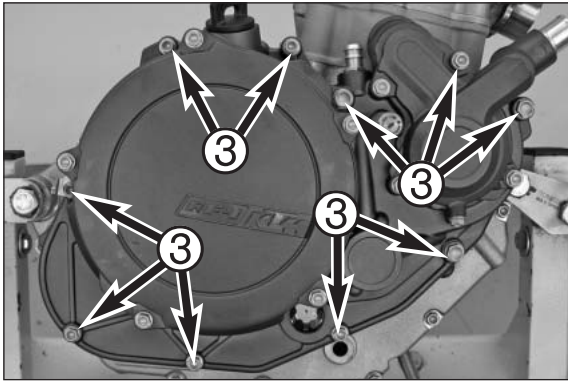
- Remove the screw ❷ including the copper washer.
- Insert the engine locking screw ❸ 773.29.010.000.
- If not already made, make marks ❸ and ❹.



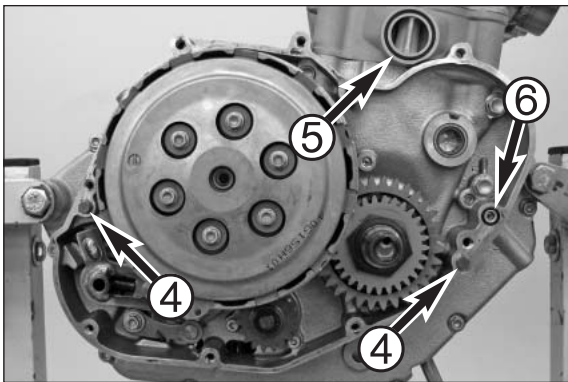
Removing the clutch cover

- Remove the plug ① including the O-ring.
- Insert the mounting pin ② 773.29.012.100.

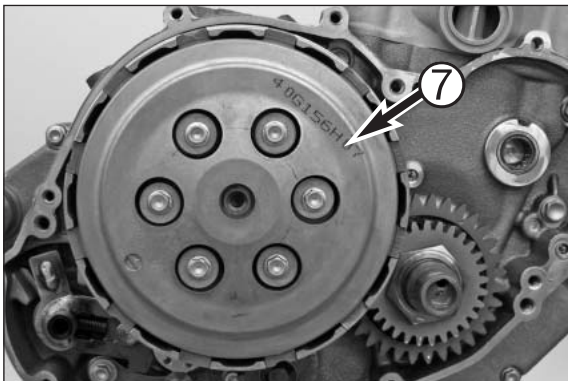
NOTE: you do not need to remove the water pump cover to remove the clutch cover.



- Remove the screws ③ and completely take off the clutch cover.

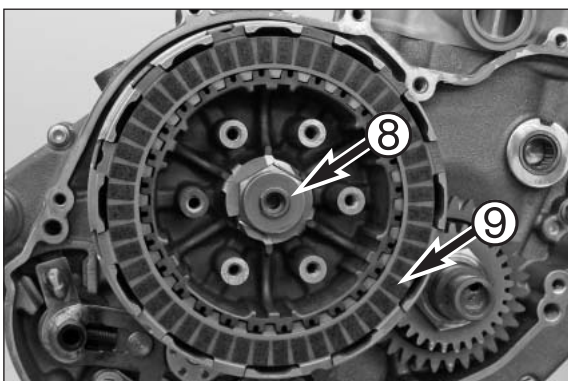


- Pull the rollers ④ out of the engine case.
- Remove the quad ring ⑤ and O-ring ⑥.

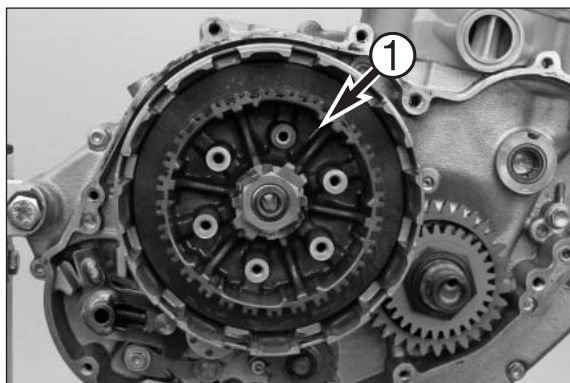


Removing the clutch

- Loosen the screws on the pressure cap in a crosswise direction and remove together with the washers and springs.
- Remove the pressure cap ⑦.

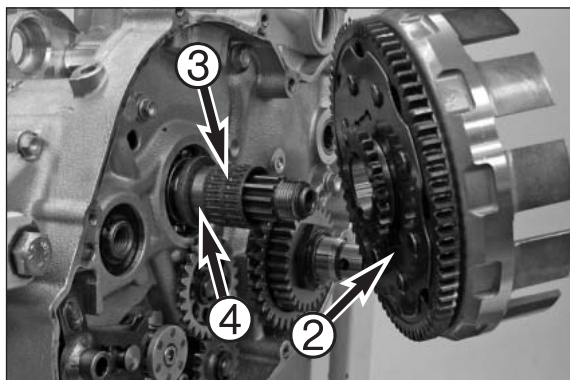


- Take out the pressure piece ⑧ and pull out the pushrod.
- Take the clutch disk package ⑨ out of the outer clutch hub.

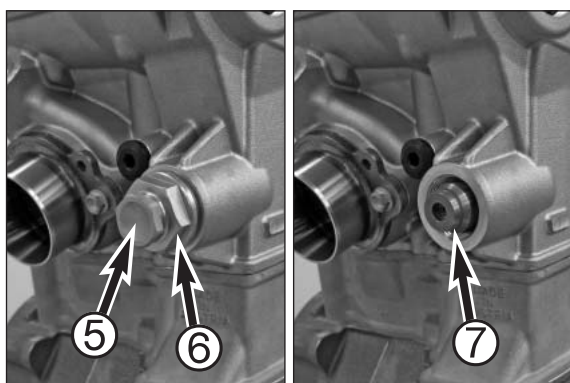


- Bend up the lock washer on the drive nut.
- Hold the driver **1** with the clutch holder 773.29.003.000 while you remove the drive nut together with the lock washer.
- Remove the driver together with the stop disk mounted underneath.

NOTE: the stop disk usually sticks to the driver.

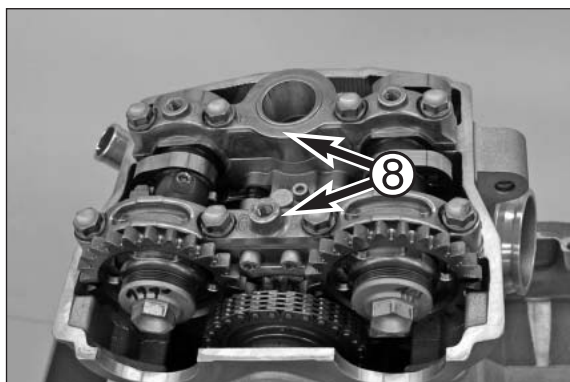


- Remove the outer clutch hub **2**, needle bearing **3** and collar sleeve **4**.



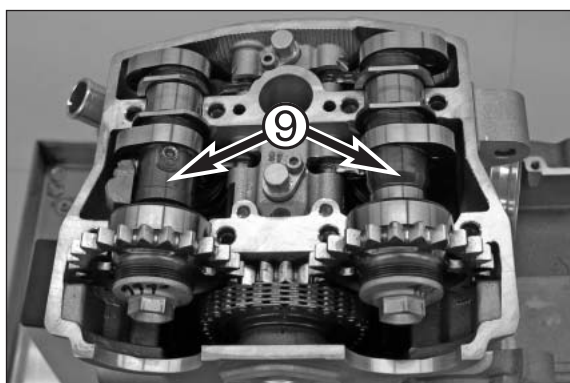
Removing the timing chain tensioner

- Remove the release screw **5** together with the O-ring.
- Remove the plug **6** together with the seal ring.
- Pull out the timing chain tensioner **7**.



Removing the camshafts

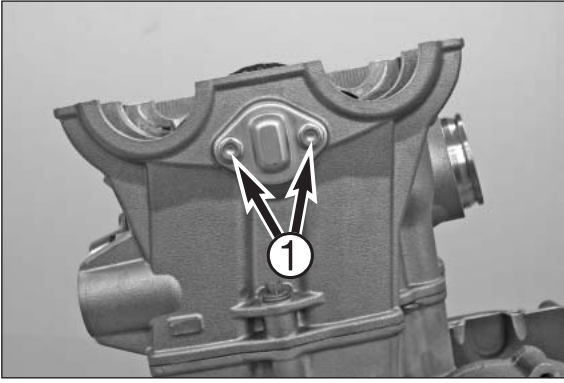
- Remove the screws on the camshaft bearing bridges **8**.
- Remove the camshaft bearing bridges.
- Do not lose the needle rollers and O-ring.



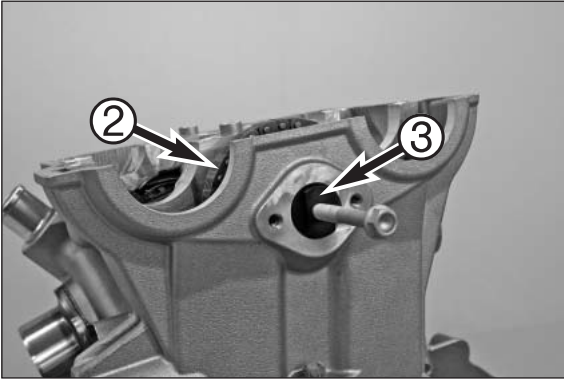
- Completely remove the camshafts **9**.

Removing the cylinder head

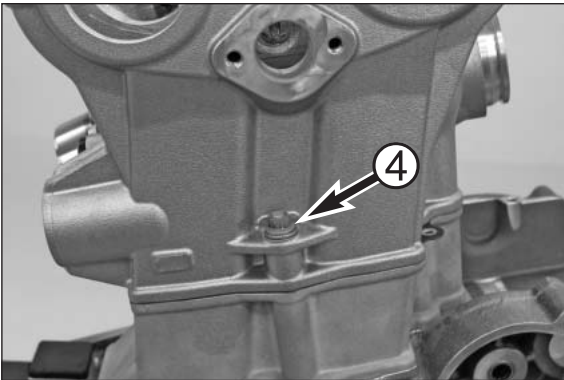
- Remove the screws **1** and take off the retaining bracket.



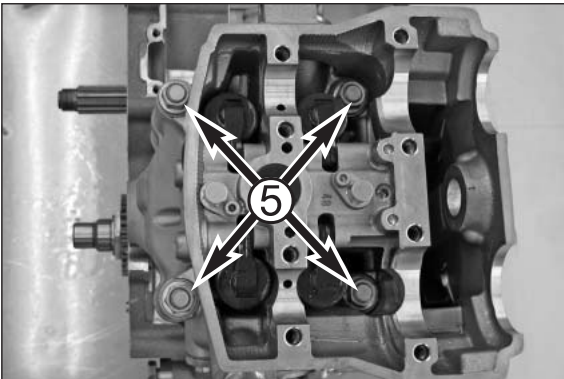
- Grasp the double gear **2** and use a screw to pull the axle for the double gear **3** out of the cylinder head.
- Remove the timing chain from the double gear.
- Remove the double gear with both needle bearings and allow the timing chain to drop into the timing chain compartment.
- Remove the screw from the double gear axle.



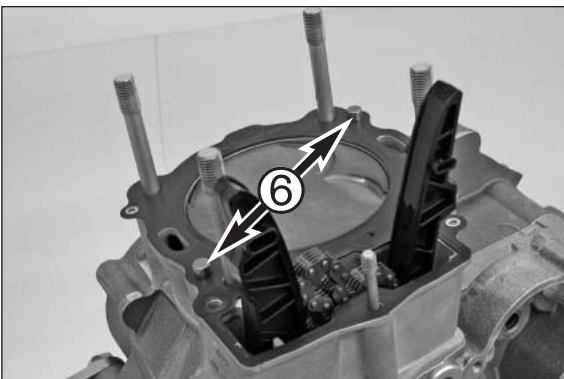
- Remove the nut **4** including the shim.

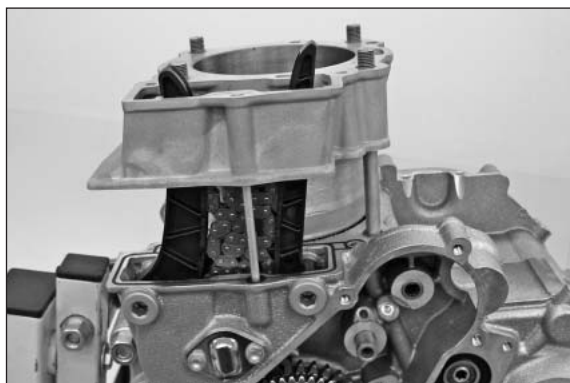


- Remove the nuts **5** including the shim.
- Remove the cylinder head.



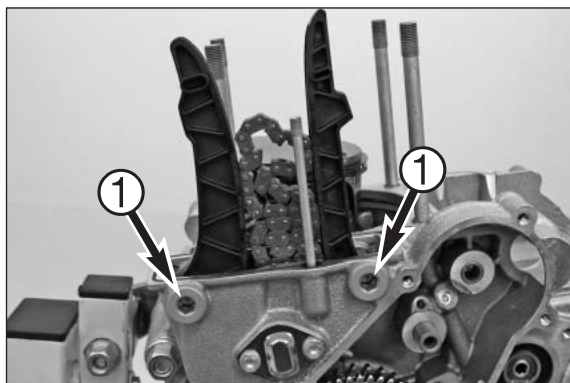
- Remove the cylinder head gasket.
- Pull the rollers **6** out of the cylinder.



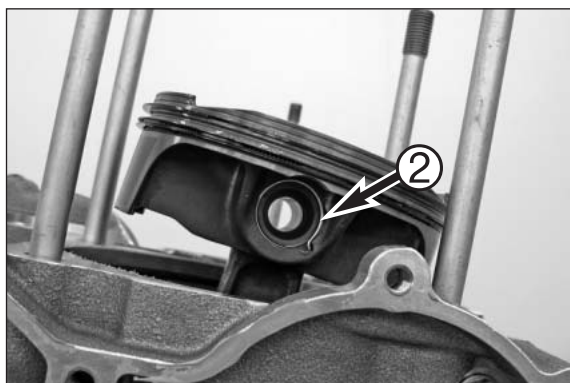


Removing the cylinder / piston

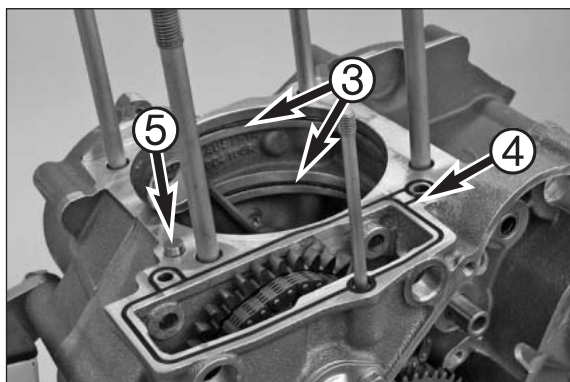
- Remove the cylinder.



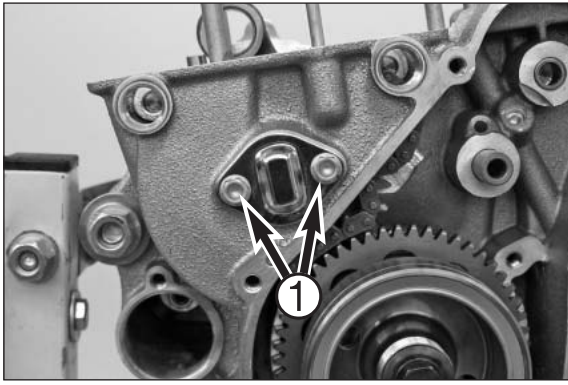
- Remove the axles **1** including the O-ring.
- Take out the tensioning rail and guide rail.



- Remove the lock ring **2**.
- Gently push the piston bolt out of the piston and remove the piston.

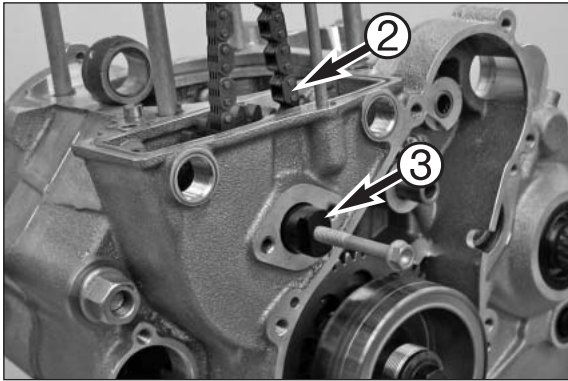


- Remove the O-rings **3** and gasket **4**.
- Do not lose the roller **5**.



Removing the timing chain

- Remove the screws ① and take off the retaining bracket.

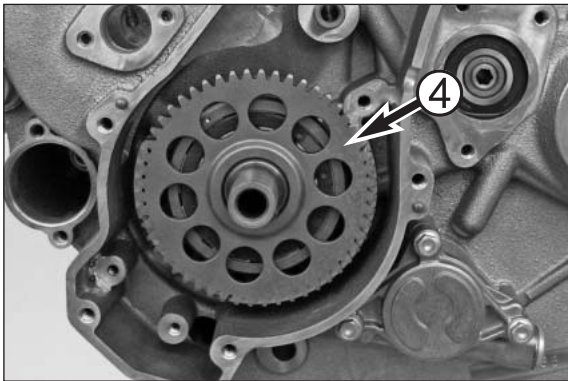


- Grasp the timing chain ② while you pull the axle for the balancer gear ③ out of the engine case with a screw.
- Simultaneously remove the timing chain, balancer gear, stop disk and both needle bearings.
- Remove the screw from the balancer gear axle.



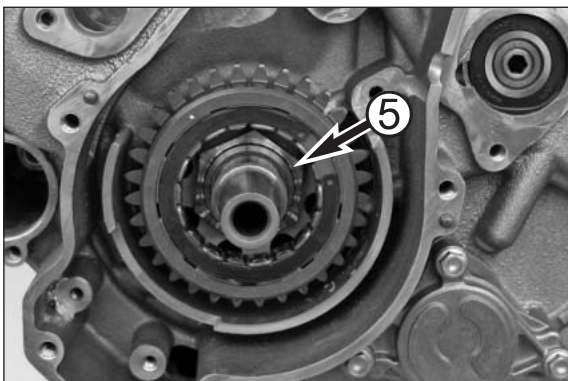
Removing the rotor

- Remove the rotor screw.
- Mount the protection cover 750.29.090.000 on the crankshaft.
- Use the puller 580.12.009.000 to pull off the rotor.
- Remove the special tools.
- Do not lose the woodruff key.

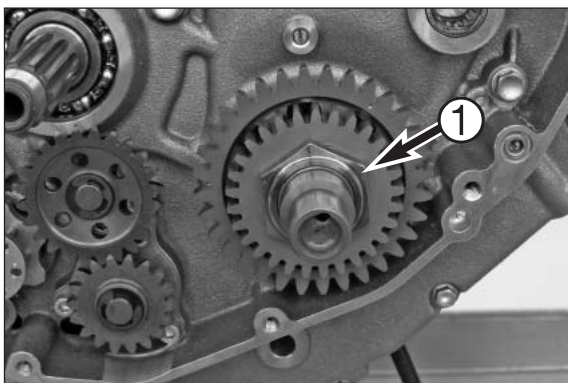


Removing the freewheel hub

- Remove the starter gear ④ together with the needle bearing.

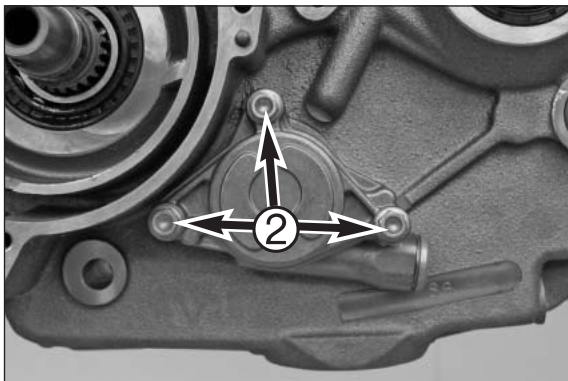


- Remove the nut ⑤ with special socket wrench 773.29.021.000.
- Completely remove the freewheel hub.



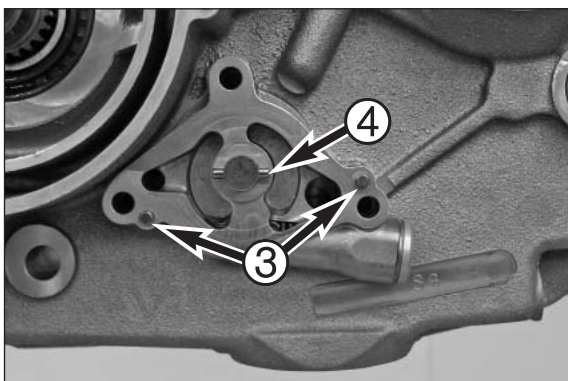
Removing the primary gear

- Remove the nut ① with special socket wrench 773.29.021.000.
- Remove the primary gear.
- Remove the engine locking screw 773.29.010.000.

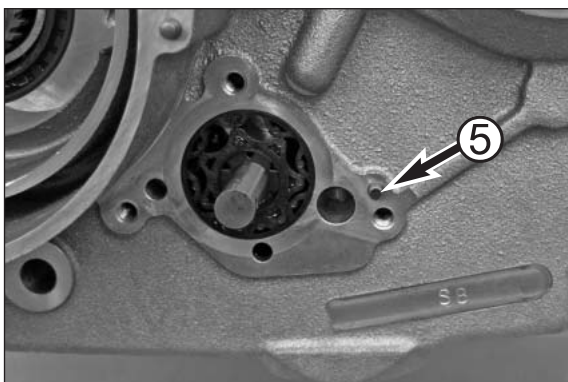


Removing the oil pumps

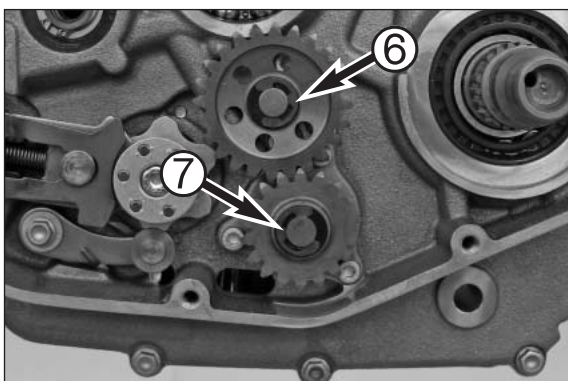
- Remove the screws ②.
- Remove the oil pump cover together with the gasket and oil pressure pump.



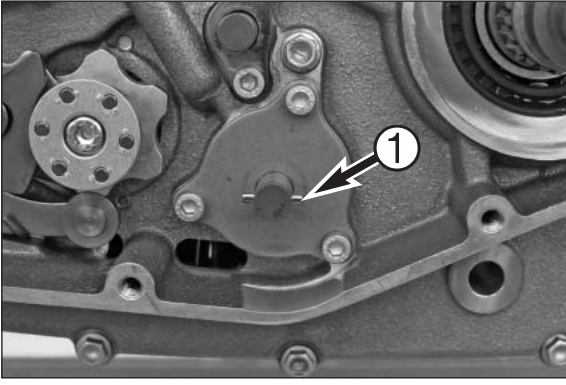
- Do not lose the needle rollers ③.
- Remove the needle roller ④.
- Remove the oil pump housing together with the gasket.



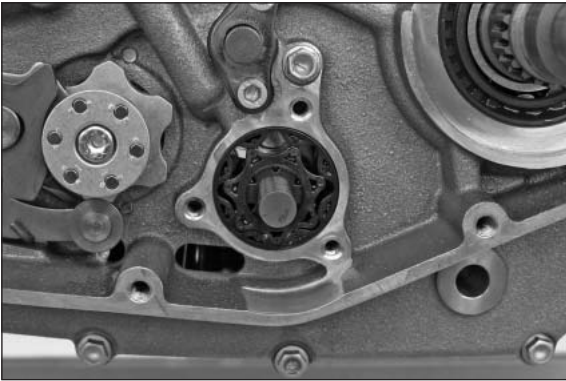
- Remove the needle roller ⑤.
- Remove the suction oil pump.
- Remove the needle roller for the suction oil pump drive from the oil pump shaft.



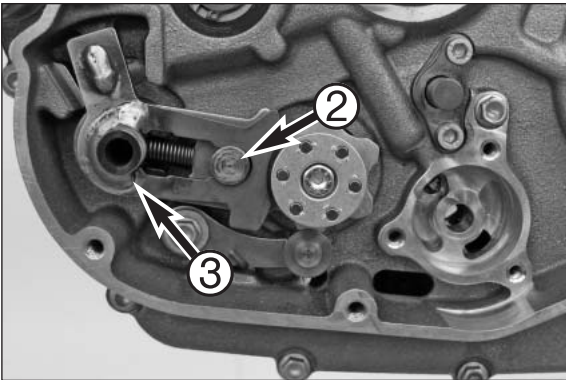
- Remove the lock washer ⑥, shim, oil pump idler gear and needle bearing.
- Remove the lock washer ⑦, shim and oil pump gear.



- Remove the needle roller ①.
- Remove the screws on the oil pump cover and take off the oil pump cover.

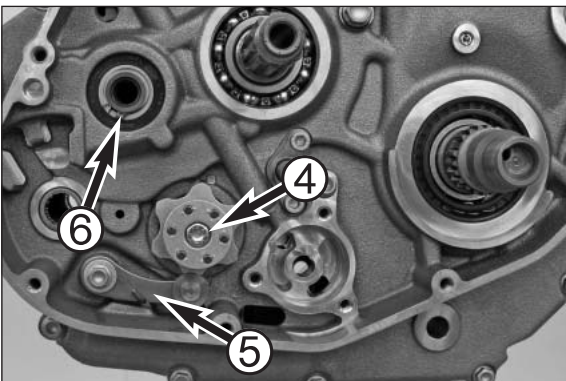


- Remove the suction oil pump together with the oil pump shaft and needle roller.



Removing the shift mechanism

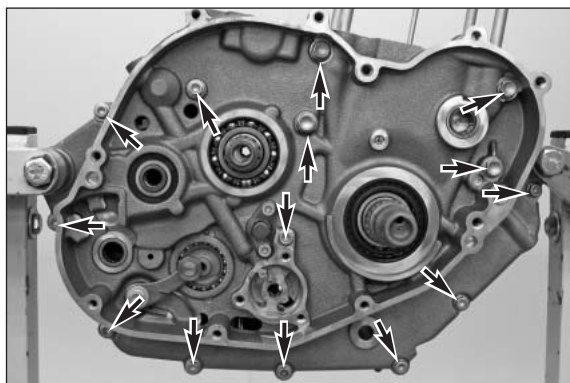
- Push back the shift rail ② and remove the shift shaft ③ together with the stop disk.



- Remove the screw ④.
- Press back the locking lever ⑤ and remove the shift lock; release the locking lever again.

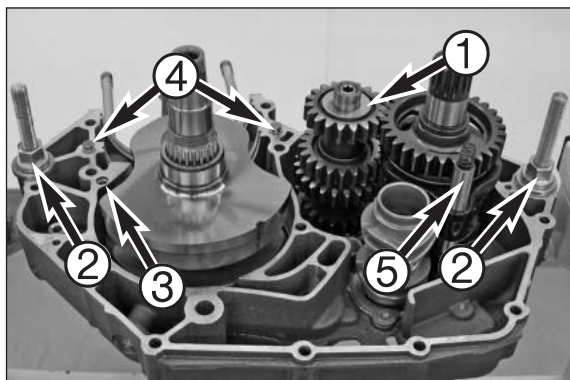
NOTE: the locking lever ⑤ does not need to be removed when the engine is dismantled.

- Remove the lock ring ⑥.



Separating the engine case halves

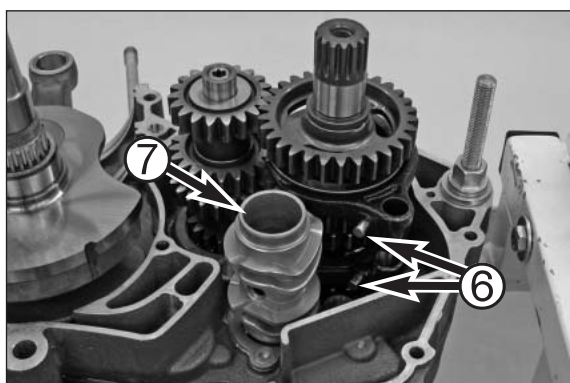
- Remove all screws from the housing.
- Remove both nuts on the engine holder in the universal engine work stand.



! CAUTION !

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

- Remove the left case half, tapping with a plastic hammer if necessary.
- Do not lose the stop disk **1**.
- Remove the dowels and fasten the engine case half to the universal engine work stand with shims and nuts **2**.
- Do not lose the dowel in the oil duct **3**.
- Remove the rollers **4**.
- Remove the shift rail **5** together with the springs.



- Turn the shift forks to the side.
- Do not lose the rollers **6**.
- Remove the shift drum **7**.
- Mark the position of the shift forks and remove them.



- Simultaneously remove both transmission shafts from the engine case half.



- Remove the crankshaft.
- Unfasten the engine case half.
- Remove the engine case half from the universal engine work stand.
- Clean all parts and check for wear, replacing any worn parts.

NOTE: we recommend that all seals, shaft seal rings, O-rings and bearings be replaced during a complete engine overhaul.

SERVICING INDIVIDUAL COMPONENTS

5

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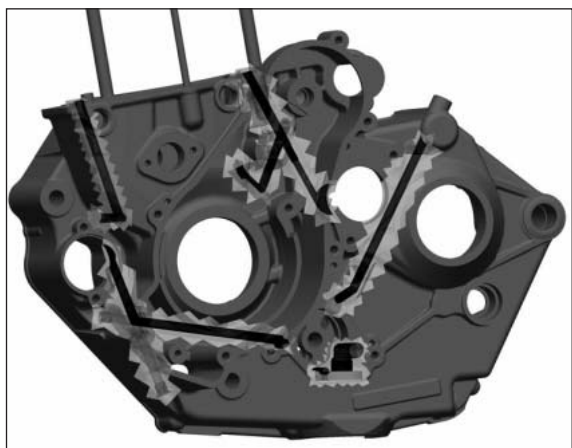
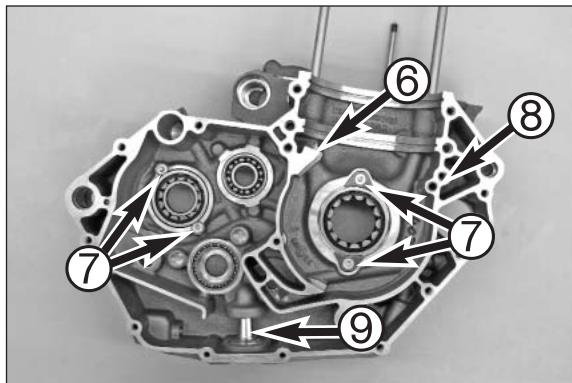
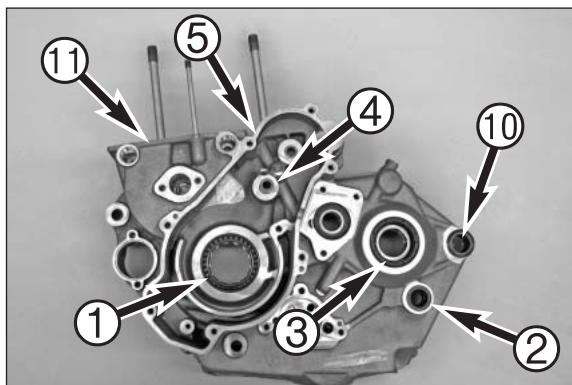
IMPORTANT NOTE REGARDS WORKING ON ENGINE HOUSING

Read through the following section before commencing work. Then determine the assembly sequence so that the engine housing halves only need to be heated up once before replacing the bearings.

Having first removed the dowels, needle roller and rollers, in order to expel the bearings or remove them with light mallet blows, the housing halves must be placed on a suitably large plane surface, supporting the whole of the sealing surface without damaging it. A wooden panel is best used as a base.

Bearings or shaft seal rings should not be hammered into their seats. If no suitable press is available, use a suitable mandrel and hammer them in with great care. Cold bearings will practically drop into their seats at an engine housing temperature of approx. 150°C.

After cooling, should the bearings fail to lock in the bore, they are bound to rotate after warming. In that event the housing must be replaced.



Left engine case half

- Pry out the shaft seal ring on the crankshaft **1**, the shift shaft **2** and the countershaft **3** without damaging the case.
- Remove the bearing bolt **4**.
- Remove the throttle **5** in the oil duct.
- Remove the oil jet **6**.
- Remove the screws **7** on the bearing retainer (and the retaining brackets on the crankshaft bearing).
- Remove the dowel **8**.
- Remove the oil intake snorkel **9**.
- Thoroughly clean the case, removing any residual sealant.

NOTE: only remove the studs, case bushing **10** and roller **11** if you are replacing the engine case.

- Clean all oil ducts and check whether they are clogged.
- Inspect the engine case half and add-on parts for damage and wear. Check the oil pump housing for score marks or seizing marks.
- Heat the engine case half in an oven to approx. 150°C and tap on a level wooden surface, causing the bearings to fall out of the bearing seats. Any bearings that remain in the case must be pressed out with a suitable press/drift tool or with bearing puller 151.12.017.000 and a suitable bit.
- Push new bearings in the bearing seats of the hot engine case, pressing all the way in until flush with a suitable press/drift tool if necessary.

- Mount the bearing bolt **4**.

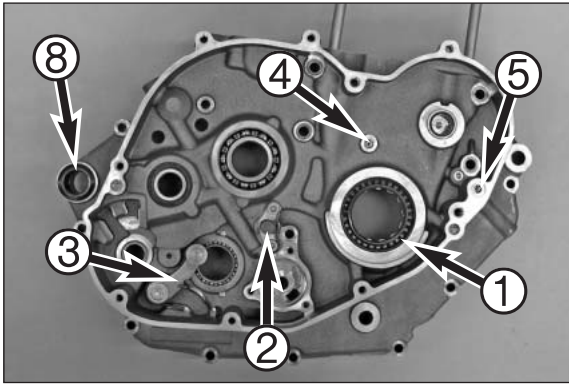
NOTE:

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.

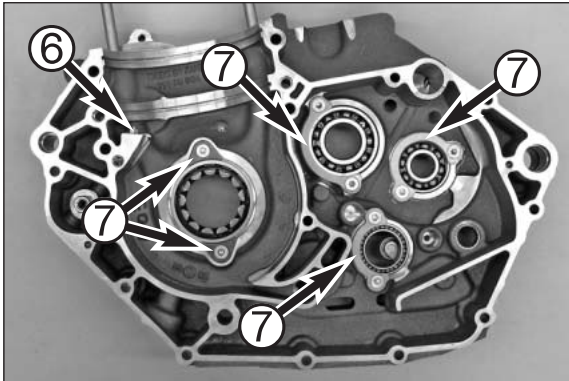
Check the bearings for a tight fit when the case has cooled.

- Press in a new shaft seal ring for the crankshaft **1** with the open side on the outside until flush.
- Press in a new shaft seal ring for the shift shaft **2** with the open side on the inside until flush.
- Press in a new shaft seal ring for the countershaft **3** with the open side on the inside until flush.
- Degrease the thread on the throttle **5** in the oil duct, apply Loctite 243 and tighten to 6 Nm.
- Degrease the thread on the jet **6**, apply Loctite 243 and tighten to 4 Nm.
- Degrease the thread on the screw **7** and apply Loctite 243. Mount the retaining brackets and tighten the screws on the bearing retainer to 6 Nm.
- Mount the dowel **8**.
- Degrease the thread on the oil intake snorkel **9**, apply Loctite 243 and tighten to 15 Nm.
- Make sure the oil ducts are not clogged.
- Check the studs, case bushing **10** and roller **11** for a tight fit.



Right engine case half

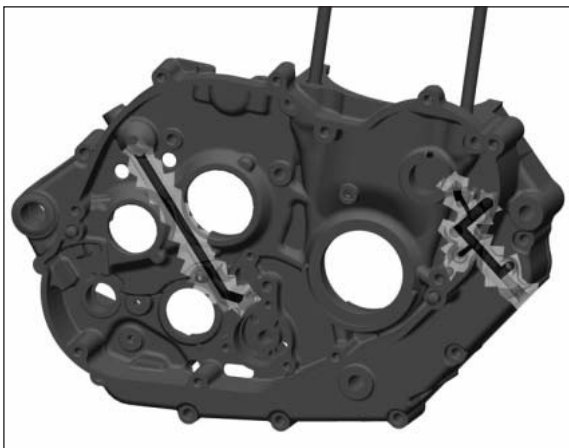
- Pry out the shaft seal ring on the crankshaft **1** without damaging the case.
- Remove the screws from the bearing bolt and take off the bearing bolt **2** together with the lock washer.
- Remove the screw and washer from the locking lever and take off the locking lever **3** together with the sleeve and locking lever spring.
- Remove the jet for the crankcase ventilation **4**.
- Remove the oil metering jet for the lower conrod bearing **5**.
- Remove the jet **6**.



- Remove the screws on the bearing retainer and the retaining brackets **7**.
- Thoroughly clean the case, removing any residual sealant.

NOTE: only remove the studs and case bushing **8** if you are replacing the engine case.

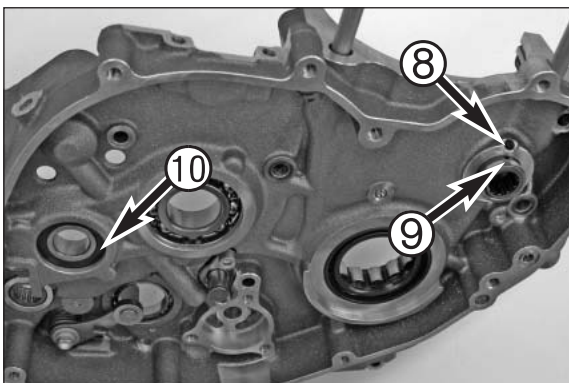
- Clean all oil ducts and check whether they are clogged.
- Inspect the engine case half and add-on parts for damage and wear. Check the oil pump housing for score marks or seizing marks.
- Heat the engine case half in an oven to approx. 150°C and tap on a level wooden surface, causing the bearings to fall out of the bearing seats. Any bearings that remain in the case must be pressed out with a suitable press/drift tool or with bearing puller 151.12.017.000 and a suitable bit.
- Push new bearings in the bearing seats of the hot engine case, pressing all the way in until flush with a suitable press/drift tool if necessary.



NOTE:

The bore in bearing **9** and the bore **8** in the engine case must be aligned. Press in the sealing on the bearing **10** towards the outside. When pressing it in, make sure the case lies flat to avoid damage. Always press in the 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.

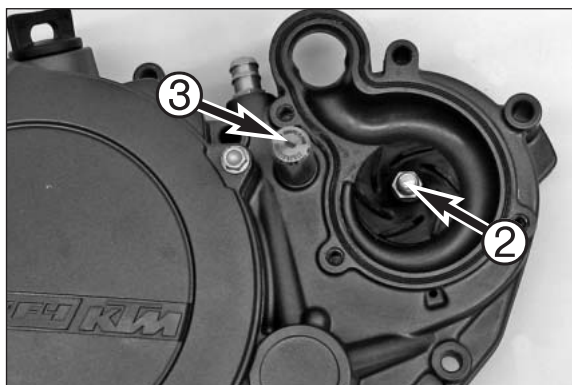
- Press in a new shaft seal ring for the crankshaft **1** with the open side on the outside until flush.
- Degrease the thread on the screws for the bearing bolt and apply Loctite 243. Mount the bearing bolt **2** and lock washer and tighten the screws to 6 Nm.
- Degrease the thread on the screw for the locking lever and apply Loctite 243. Screw on the locking lever **3**, washer, sleeve and spring and tighten to 6 Nm.
- Degrease the thread on the jet for the crankcase ventilation **4**, apply Loctite 243 and tighten.
- Degrease the thread on the oil metering jet for the lower conrod bearing **5**, apply Loctite 243 and tighten.
- Degrease the thread on the jet **6**, apply Loctite 243 and tighten to 4 Nm.
- Degrease the thread on the bearing retainer and apply Loctite 243. Mount the retaining brackets **7** and tighten the screws on the bearing retainer to 6 Nm.
- Make sure the oil ducts are not clogged.
- Check the studs and case bushing **8** for a tight fit.





Water pump

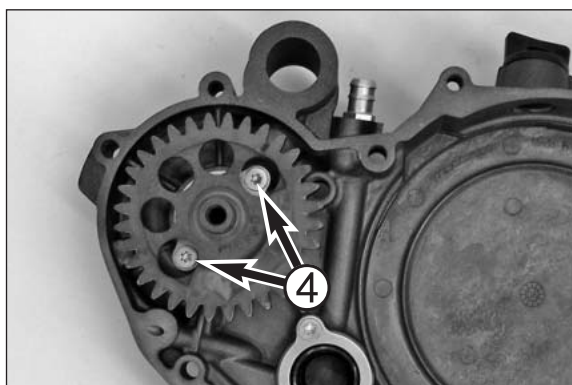
- Remove the screws **1**.
- Remove the water pump cover and the seal ring.



- Remove the cap nut **2** and take off the water pump wheel.

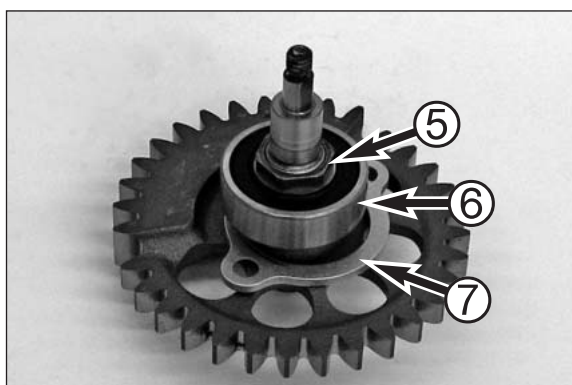
Assemble in the reverse order, paying attention to the following items:

- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- Degrease the thread on the cap nut, apply Loctite 243 and tighten to 6 Nm.

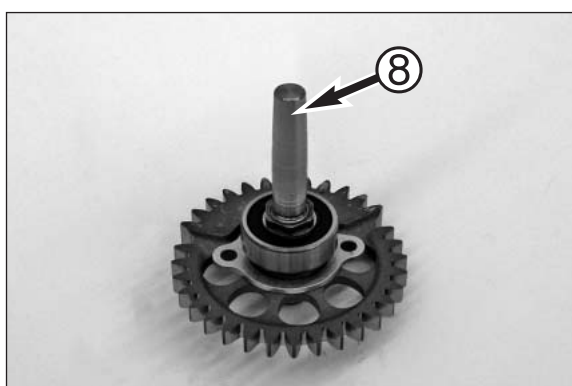


Balancer gear

- Remove the mounting pin **3** 773.29.012.100.
- Remove the screws **4**.
- Press out the balancer gear.

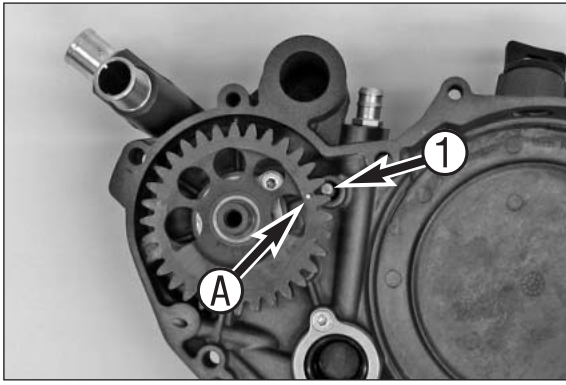


- Remove the nut **5**.
- Pull off the bearing **6** with puller 590.29.033.000.
- Remove the retaining bracket **7**.

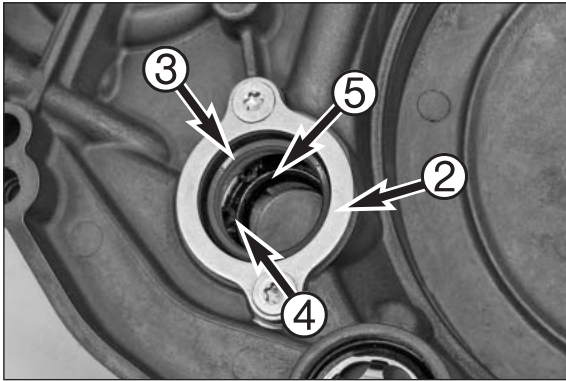


Assemble in the reverse order, paying attention to the following items:

- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- Press on a bearing **6** with a suitable sleeve for the inner bearing ring.
- Degrease the thread on the nut **5**, apply Loctite 243 and tighten to 20 Nm.
- Use mounting sleeve 585.29.005.000 to press into the clutch cover **8**.

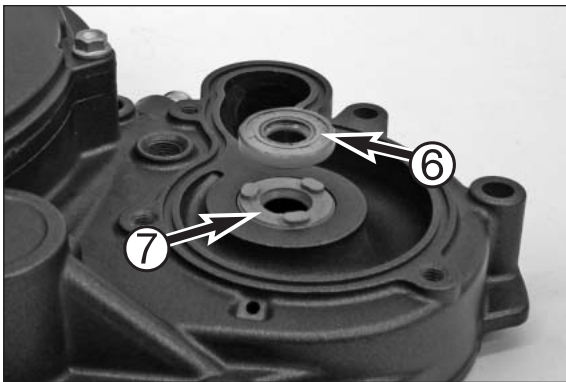


- Degrease the thread on the screws for the retaining bracket, apply Loctite 243 and tighten to 6 Nm.
- Align the mark **A** on the balancer gear with the mounting pin **1**.

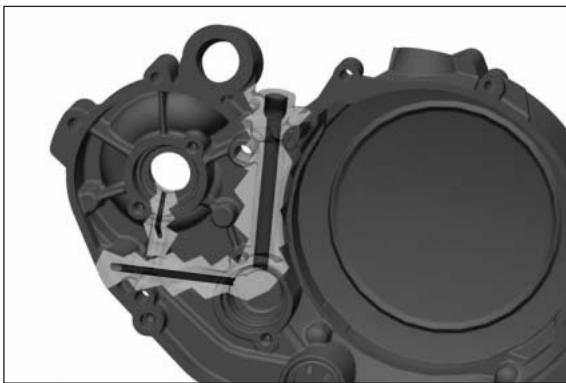


Clutch cover

- Remove the screws on the bearing retainer and the retaining bracket **2**.
- Pry out the shaft seal rings **3**.
- Remove the lock ring **4**.
- Pry out the shaft seal rings **5**.

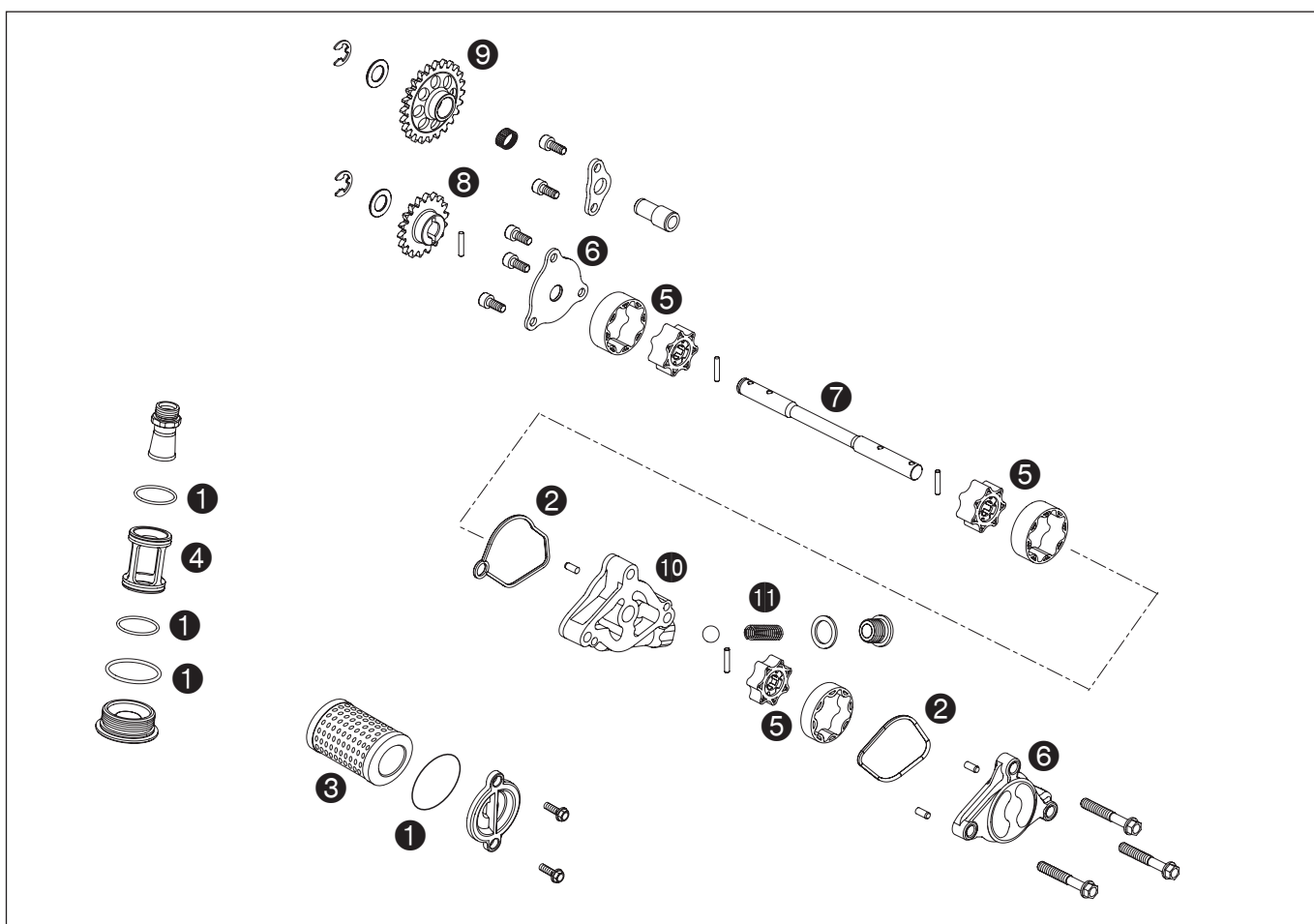


- Pry out the water pump shaft seal rings **6** and **7**.



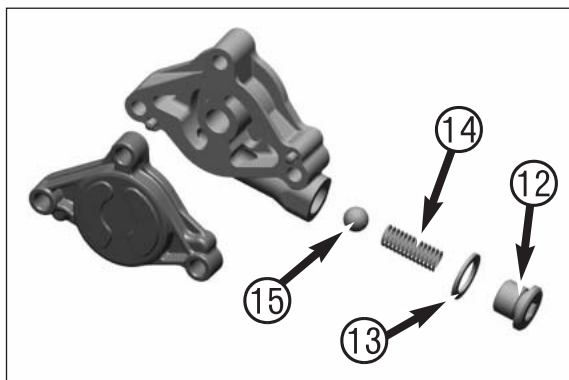
Assemble in the reverse order, paying attention to the following items:

- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- The shaft seal ring **7** has 3 spacer tabs.
- Press in new shaft seal rings (**7** and **6**) with the open side on the inside one by one. Pay attention to the distance between the two shaft seal rings.
- Press in the shaft seal ring **5** with the open side on the outside and shaft seal ring **3** with the open side on the inside (towards the retaining bracket **2**).
- Degrease the thread on the screws for the bearing retainer and apply Loctite 243. Mount the retaining brackets **2** and tighten the screws on the bearing retainer to 6 Nm.
- Clean all ducts and make sure they are not clogged.



Lubrication system

- Check the O-rings ① and gaskets ② for damage and replace if necessary.
- Replace the oil filter ③ every time you change the engine oil.
- Clean the oil screen ④ and replace if damaged.
- Check the inner and outer rotor on the oil pump ⑤ for damage and deposits. If they will be used again, do not replace the inner and outer rotors with each other.
- Check the oil pump covers ⑥ for seizing marks on the inside and replace if necessary.
- Lay the oil pump shaft ⑦ on a level surface and check for runout.
- Check the oil pump gear ⑧ and oil pump idler gear ⑨ for damage and wear.
- Check the oil pump housing ⑩ and bypass valve ⑪ for damage and wear.



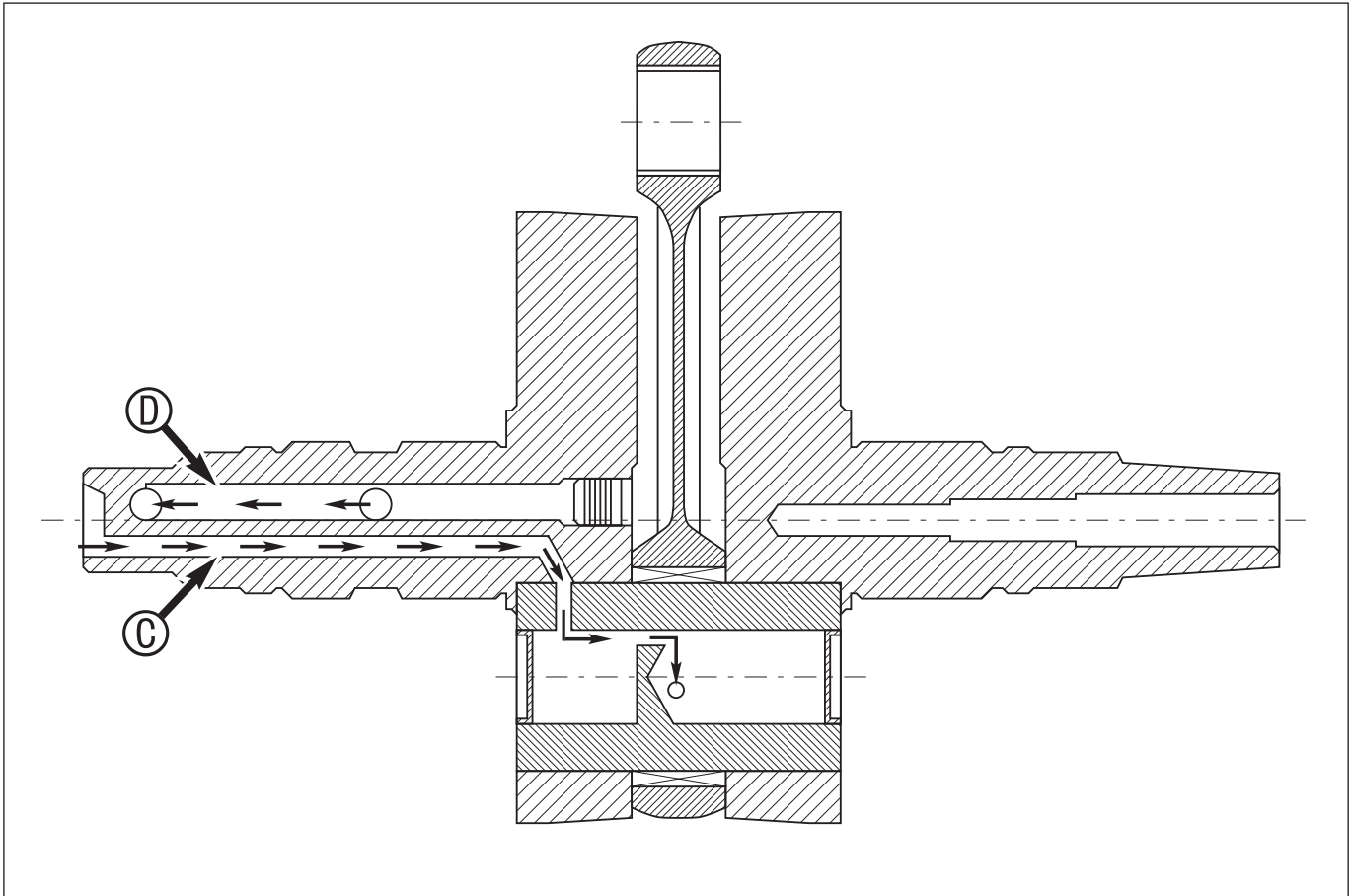
- Remove the plug ⑫ together with the seal ring ⑬.
- Remove the spring ⑭ and the ball ⑮.

Assemble in the reverse order, paying attention to the following items:

- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.

Minimum length of spring ⑭: 36.0 mm
 Thickness of seal ring ⑬: 1.5 ± 0.2 mm
 Tightening torque for plug ⑫: 18 Nm

NOTE: the bypass valve opening pressure is reduced if the length of the spring is less than 36.0 mm or if the seal ring is thicker than 1.5 ± 0.2 mm. This will reduce the oil pressure and lead to excessive wear.

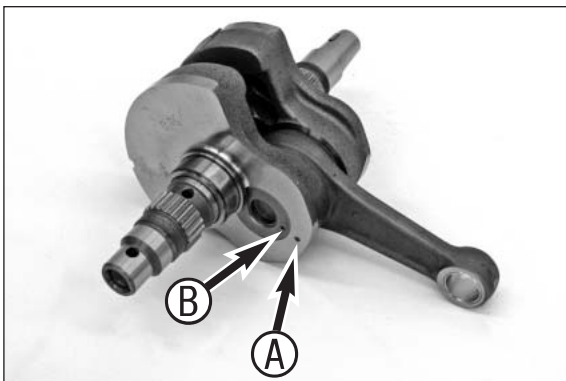


Crankshaft

CAUTION

NEVER CLAMP 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.

- Clamp the crankshaft in a vise using protective jaws.
- Heat mounting tool 584.29.037.037 to approx. 150°C on a hotplate and immediately slide it onto the inner ring. Tightly press the special tool together to obtain a good heat transfer and pull the inner ring off the crankshaft.
- To mount the new inner ring, reheat the mounting tool to approx. 150°C, clamp the new inner ring and immediately slide it onto the crankshaft journal.
- Make sure the new inner ring is seated flush.
- Measure the axial clearance of the crankshaft after the inner rings are replaced.



CAUTION

IF THE CRANKPIN IS INSERTED IN THE WRONG POSITION, THE CONROD BEARING WILL NOT BE LUBRICATED WITH ENGINE OIL AND CAUSE THE BEARING TO BE DAMAGED.

- If you are replacing the conrod bearing, make sure the crankpin is correctly positioned. The bores in the crankshaft web and crankpin must be perfectly aligned. Mark **A** must be lined up with mark **B**.
- Make sure the oil duct **C** and the ventilation duct **D** are not clogged.



- If you will continue to use the crankshaft, check the crankshaft journal for runout. Place the crankshaft on a roller stand or similar stand and measure the crankshaft journal runout with a gauge.

Crankshaft journal runout: max. 0.15 mm

- Check the radial and axial clearance at the conrod bearing.

Radial clearance: max. 0.03 mm

Axial clearance: max. 0.80 mm



- Measure the outer dimension of the crankshaft webs.

Outer dimension of crankshaft webs = 64.0 mm \pm 0.05 mm



Axial clearance of the crankshaft

- Insert the crankshaft in the right engine case half and mount the left engine case half.
- Mount and tighten the screws at the crankcase.
- Mount the dial gauge support on the engine case and measure the axial clearance of the crankshaft.

Axial clearance: 0.25 - 0.35 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 with the mounting tool. Now either add or remove compensating washers on each side.

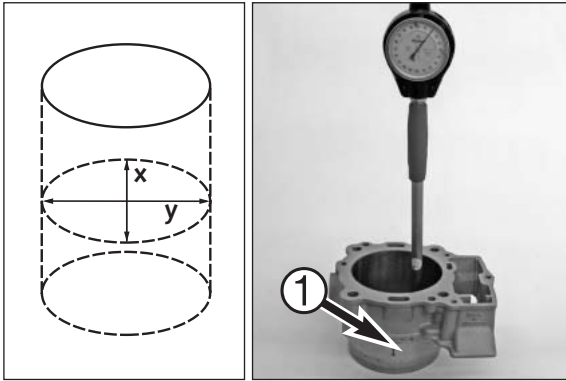
NOTE: If the axial clearance is too large, add compensating washers; if it is too small, remove some of the washers. Make sure the crankshaft is centered.



Piston / Cylinder

NIKASIL COATING ON CYLINDER:

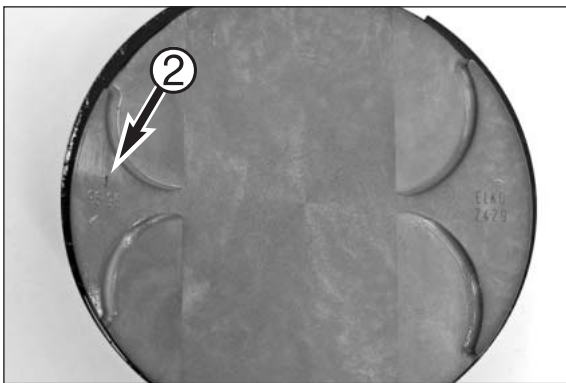
Nikasil is the brand name for a cylinder coating process developed by the Mahle piston company. The name is derived from the two materials used in the process - one layer of nickel in which the exceptionally hard silicon carbide is embedded. The major advantages of the Nikasil coating include its outstanding heat dissipation and the improved power output, the insignificant wear and low weight of the cylinder. It is inexpensive to repair (replace) a worn coating if the cylinder barrel is not damaged.



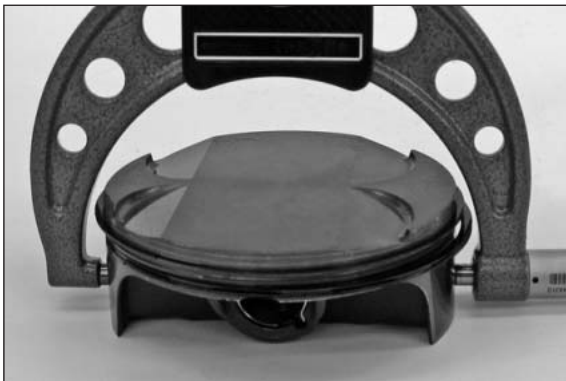
- To establish the wear to the cylinder, use a micrometer to measure the cylinder in the middle of the bearing surface.
- Measure the diameter of the cylinder in the X and the Y-axis to detect any ovality.

Cylinder diameter

450 SX-F / 450 SXS-F	505 SX-F
size I: 97.000 - 97.012 mm	size I: 100.000 - 100.012 mm
size II: 97.012 - 97.025 mm	size II: 100.012 - 100.025 mm



NOTE: The cylinder size ① is marked on the cylinder collar, the piston size ② on the piston head.



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

Piston diameter

450 SX-F / 450 SXS-F	505 SX-F
size I: 96.960 - 96.970 mm	size I: 99.960 - 99.970 mm
size II: 96.971 - 96.980 mm	size II: 99.971 - 99.980 mm

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

Piston mounting clearance

size I: 0.030 - 0.052 mm
size II: 0.032 - 0.054 mm
Wear limit: 0.070 mm



If the piston is to be remounted:

- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- Piston ring grooves: the piston rings must move freely in the groove.
- Measure the piston end gap.
- Mark the installed position of the oil scraper ring.
- Mount the compression ring with the "TOP" mark facing up.
- Replace piston pins that are badly discolored or have visible running marks. Place the piston pin in the conrod and check for clearance.
- Mount the piston pin retainer on the timing chain shaft side.



- Insert the piston ring in the cylinder and align with the piston (approx. 10 mm under the upper edge of the cylinder).
- Measure the end gap with a feeler gauge.

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

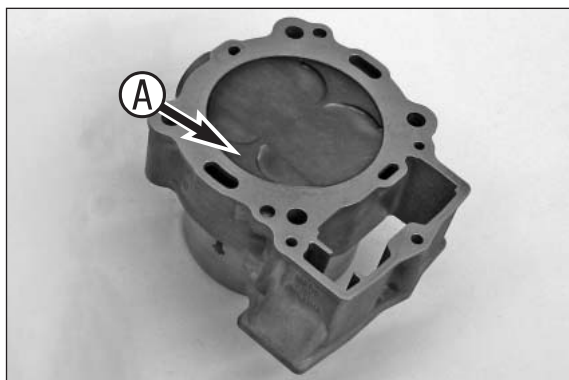
If the end gap is larger than indicated above, check the cylinder for wear. If the cylinder wear is within the tolerance limits, replace the piston ring.



! **CAUTION** **!**

IF THE PISTON RING COMPRESSOR PRESSES THE PISTON RINGS TOGETHER PROPERLY AND FLUSH AROUND THE ENTIRE CYLINDER, YOU WILL BE ABLE TO PUSH THE PISTON INTO THE CYLINDER BY TAPPING LIGHTLY WITH THE HAMMER HANDLE. EXCESSIVE FORCE USUALLY DAMAGES THE PISTON RINGS.

- Make sure the piston ring joints do not align with each other.
- Place piston ring compressor 600.29.015.000 on the oiled piston and compress the piston rings.
- Push the piston approx. 15 mm out of the piston ring compressor and into the cylinder. The piston ring compressor must fit flush against the cylinder.
- Carefully tap into the cylinder with a hammer handle, making sure the piston rings do not get caught.



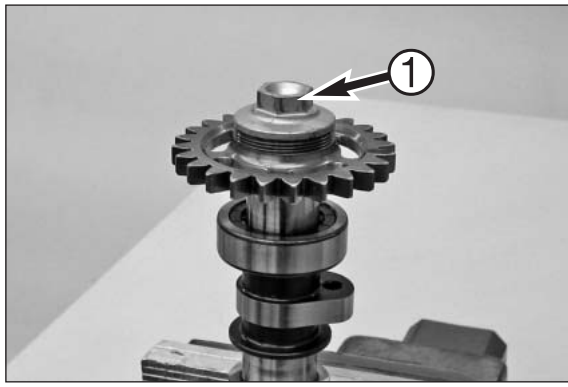
- Align the piston in the cylinder.

NOTE: arrow A on the piston head points to the exhaust side.



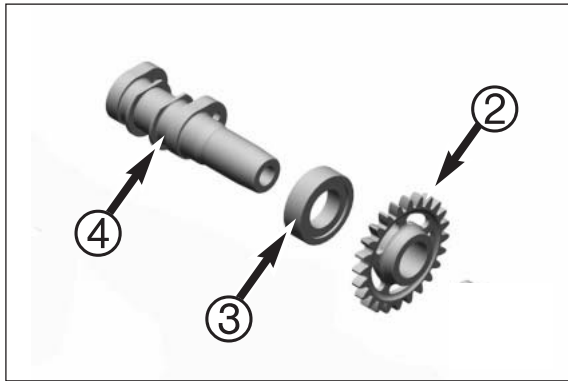
- Carefully push the piston with the piston skirt out of the cylinder until you can insert the piston pin.
- Insert the oiled piston pin on the coolant connection side.

NOTE: only push the piston pin in far enough to still be able to insert the conrod.



Camshafts

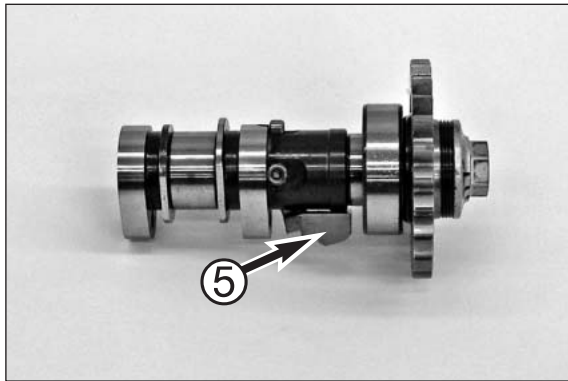
- Wrap some masking tape around the outer cam on the camshaft to protect it from being damaged in the vise.
- Clamp the camshaft in a vise with aluminum protective jaws. Position the outer cam so that the camshaft will not rotate.
- Remove the screw ①.



- Press the camshaft gear ② off the camshaft ④.
- Remove the roller bearing ③.

Assemble in the reverse order, paying attention to the following items:

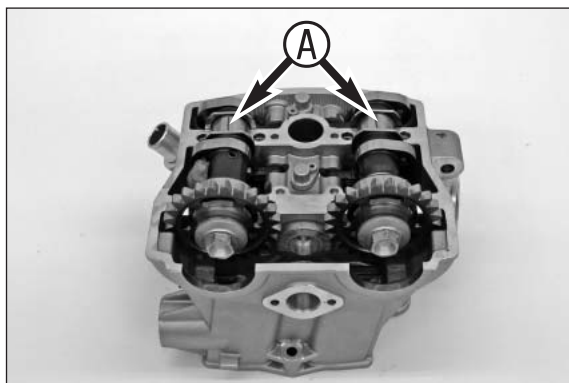
- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- Oil the roller bearing ③.
- Degrease the cone on the camshaft ④ and the camshaft gear ②.
- Oil the thread and contact mounting face of the screw ①.
- Lightly tighten the screw ① so the camshaft and camshaft gear can still be turned. They will be adjusted and the screw tightened when they are mounted in the cylinder head.



Automatic decompression

Check:

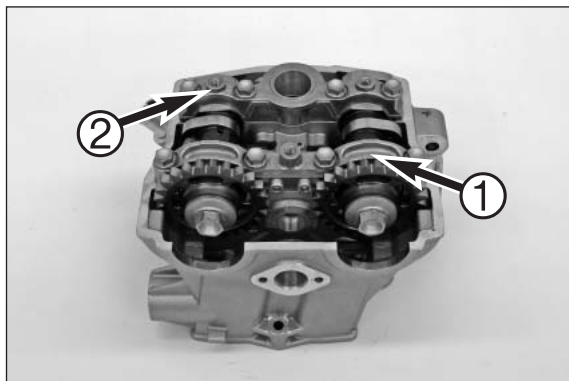
- Push the camshaft bearing lager towards the camshaft gear and hold.
- Pull the lever ⑤ away from the camshaft and release.
- The lever ⑤ should automatically move back to the initial position.
- Replace the exhaust camshaft if damaged or worn.



Radial clearance of the camshaft bearings

- Insert the camshafts in the cylinder head without actuating the valves.
- Position the plastigauge measuring strip 600.29.012.000 on the camshaft at the bearing positions **A**.

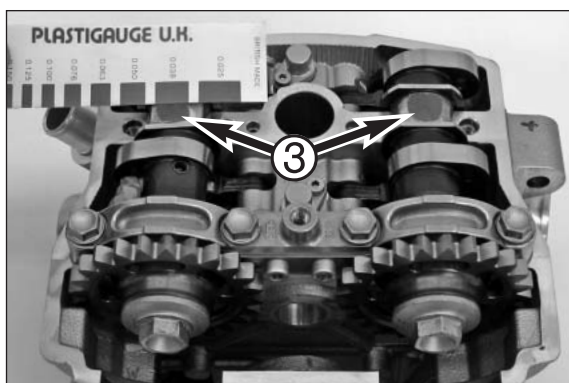
Note: follow the instructions provided by the plastigauge measuring strip manufacturer.



- Mount the camshaft bearing bridge **1** + **2** together with the needle rollers and O-ring.
- Tighten the oiled camshaft bearing screws from the inside to the outside to 14 Nm.

Note: do not turn the camshafts while you measure.

- Remove the screws from the camshaft bearing bridge **2**.
- Remove the camshaft bearing bridge.
- Do not lose the needle roller and O-rings.



- The width of the plastigauge measuring strips **3** indicates the bearing clearance. Compare this width with the information on the measuring strip.

Radial clearance of the camshaft friction bearing: 0.029 mm - 0.053 mm
Wear limit: 0.055 mm

- Remove the screws on the camshaft bearing bridge **1**.
- Remove the camshaft bearing bridge.
- Do not lose the needle roller.
- Remove the camshafts.
- Clean all parts.



Camshaft bearing bridges

- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.

Note: camshaft bearing bridges are only available together with the cylinder head.

Cylinder head

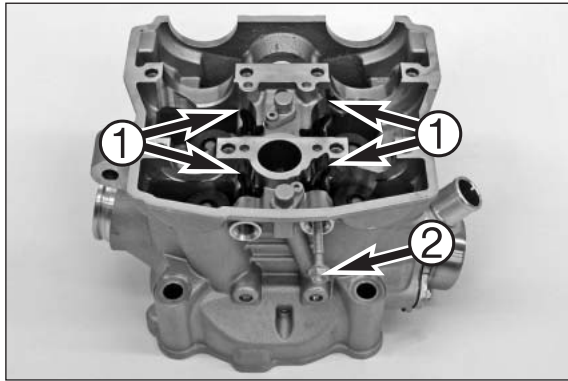
- Fold up the cam lever.
- Remove the shims (valve adjustment shims) from the spring retainer and mark the installed position.

Note: if you mark the installed position you will only need to check the valve clearance when they are remounted.

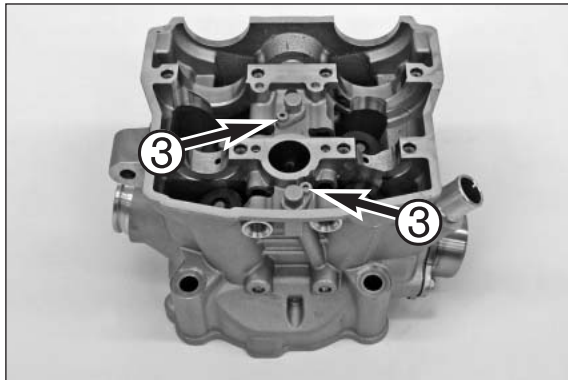


- Remove the plugs on the cam lever shaft together with the O-ring.
- Hold the cam lever ① while you pull the cam lever shaft out of the cylinder head with a screw ②.
- Remove the cam lever.

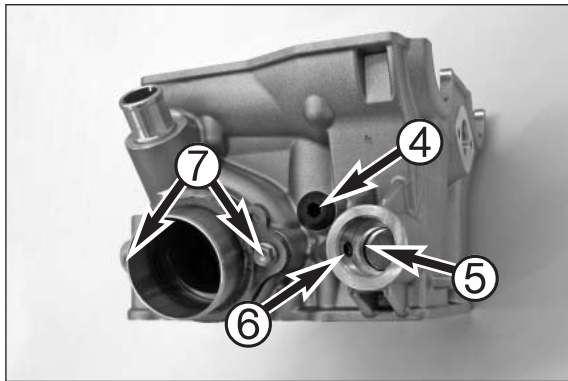
Note: if you will continue to use the cam lever, make a mental note of the installed position.



- Remove the screws ③.
- Remove the oil jets together with the O-ring.



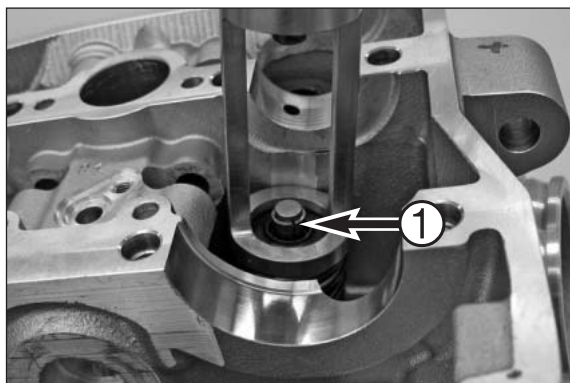
- Remove the plug ④ together with the O-ring.
- Remove the O-ring ⑤.
- Remove the throttle ⑥.
- Remove the screws ⑦ and take off the exhaust flange including the gasket.



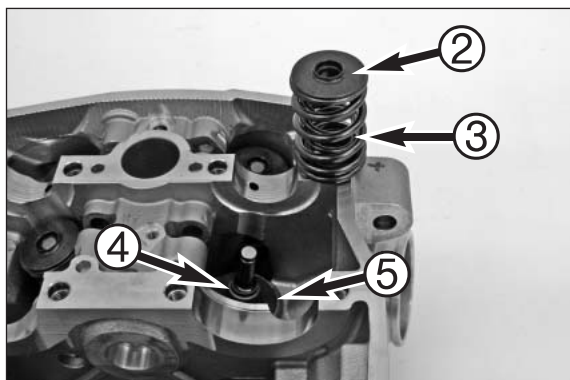
- Clamp the valve lifter 590.29.019.000 and bit 773.29.060.000 in the vise.
- Clamp the cylinder head together with the valve to be removed.

Note: if you will continue to use the valves, make a mental note of the installed position.





- Pretension the valve springs and remove both valve keys ①.



- Remove the valve spring retainer ② and valve springs ③.
- Remove the valve.
- Remove the valve stem gasket ④ and spring washer ⑤.

Note: proceed in the same way for the remaining valves.



Check:

- Clean all oil ducts and make sure they are not clogged.
- Make sure the drain bore in the spark plug shaft is not clogged.
- Check the sealing area on the spark plug thread and the valve seats for damage or cracks.
- Check the valve guides with limit plug gauge 590.29.026.006. Replace if you can easily slide the limit plug gauge into the valve guide.
- Make sure the valve seats are not impacted. Check the sealing seat width.

Inlet/Outlet: max. 1.50 mm

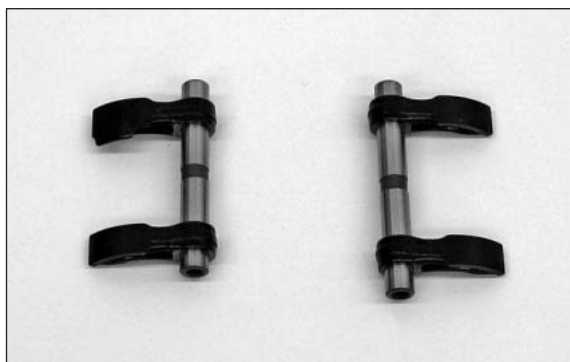
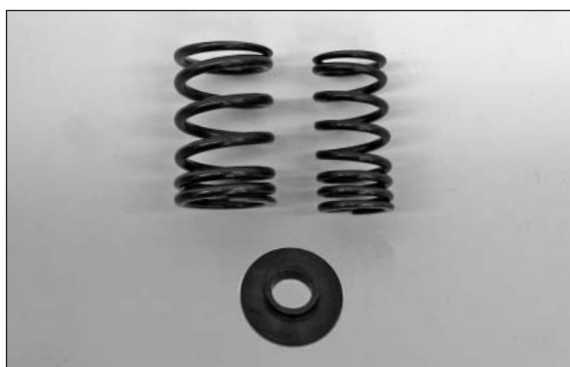
- Use a straight edge and feeler gauge to look for warpage of the sealing area along the cylinder.

Max. warpage: 0.1mm

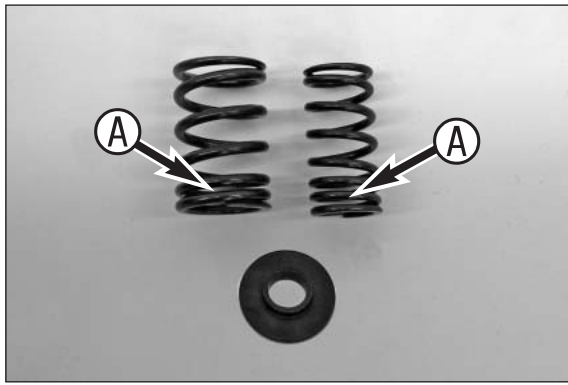
- Measure the thickness of the valve spring shim.
Min. thickness: 1.4 mm
- Check the valve disk for wear and runout. The valve seat may not be impacted. The sealing area should be in the center of the valve seat.
- Check the valve springs for fractures and wear.

Minimum length of outer spring: 40.0 mm

Minimum length of inner spring: 39.0 mm



- Check the cam lever and cam lever shafts for damage and wear.
- The cam lever should turn easily on the cam lever shaft. Clean the oil ducts and make sure they are not clogged.
- Check all O-rings for damage and replace if necessary.



Assemble in the reverse order, paying attention to the following items:

- Replace any damaged or worn parts.
- If the valves were removed, replace the valve stem gaskets. These must be oiled before they are mounted.
- Oil the valve stems and insert the valves in the guides as marked when they were removed.
- Mount the valve springs with the larger number of coils **A** facing towards the valve spring shim.



- Degrease the thread on the screws for the exhaust flange, apply Loctite 243 and tighten to 10 Nm.
- Degrease the thread on the throttle for the oil supply to the timing chain tensioner, apply Loctite 243 and tighten to 6 Nm. Make sure the throttle is not clogged.
- Degrease the thread on the screw for the oil jet, apply Loctite 243 and tighten to 4 Nm. Make sure the oil jet is not clogged.
- Oil the cam lever and mount in the position you marked when it was removed.
- Mount the shims with the labeled side facing the valve. Mount in the same position they were in before they were removed.



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:

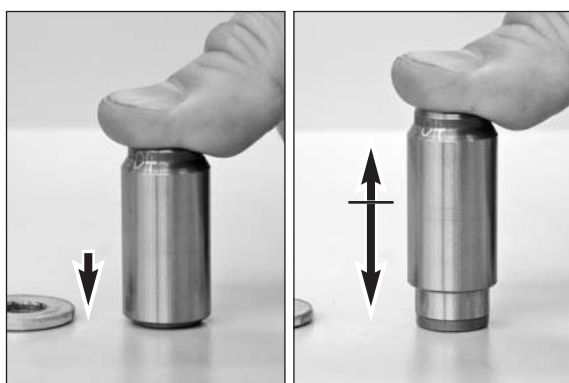
- The timing chain tensioner ① operates with spring force and with oil pressure. A stop system is used to ensure the right timing chain tension in the engine starting phase, even if the oil pressure is insufficient. The stop system prevents the piston ② on the timing chain tensioner from being retracted.
- In a dismantled state, the piston on the timing chain tensioner extends completely.



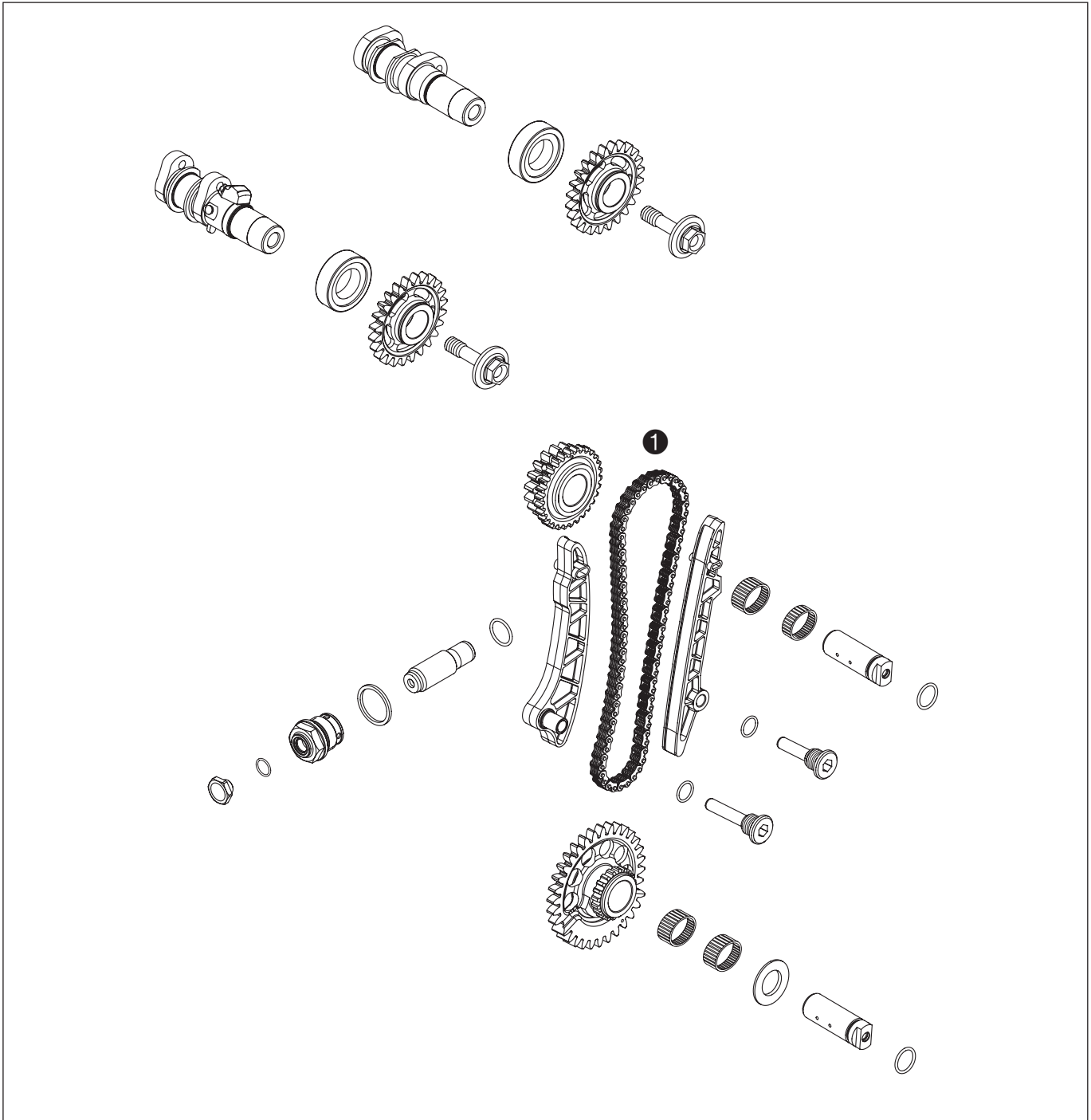
- Fully depress the spring tensioner. This will require some effort since the oil must be squeezed out. If the timing chain tensioner is released it will extend completely again; it may not be mounted in this state, since the locking mechanism will not function.
- Press down on the timing chain tensioner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



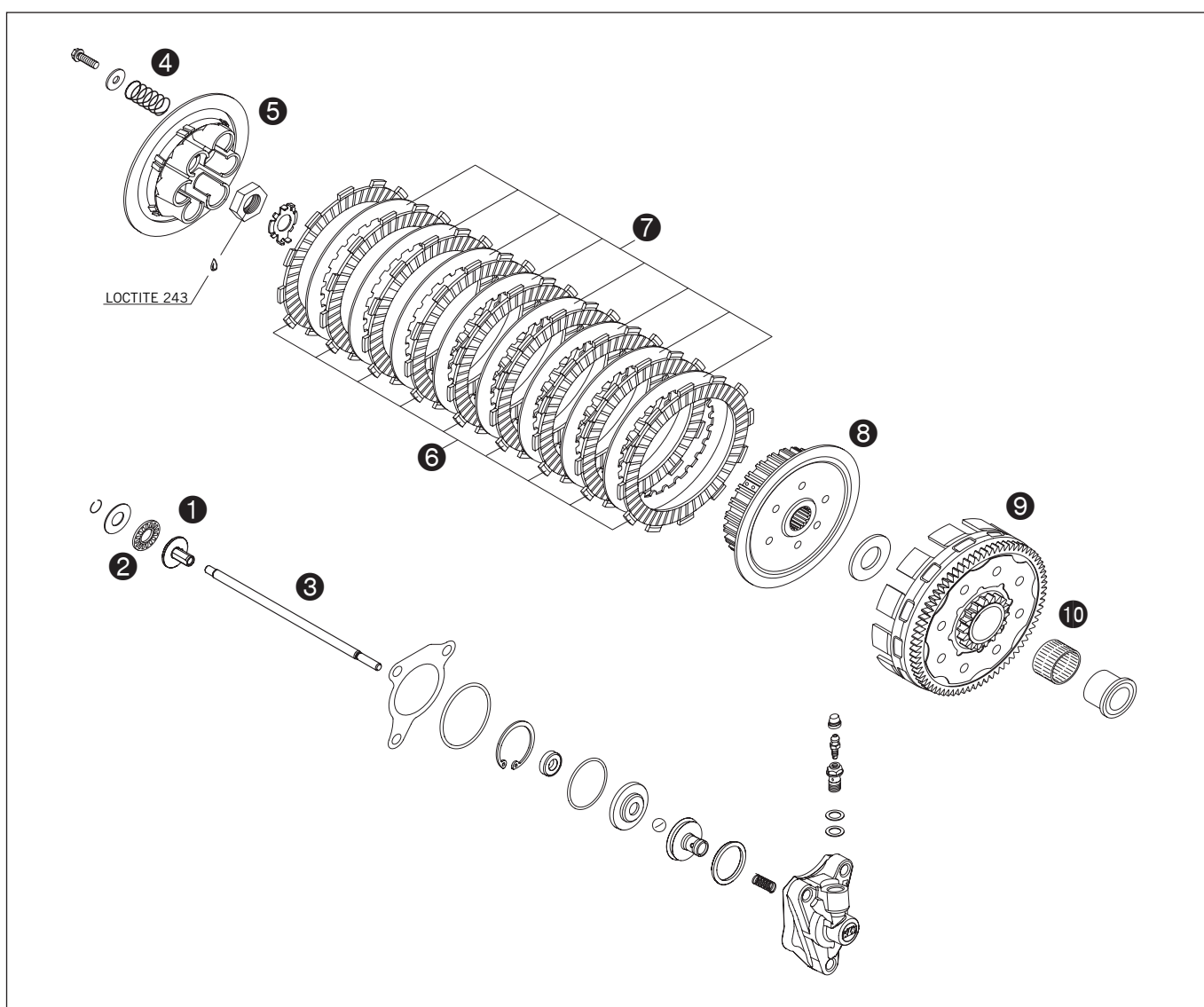
- If you press the timing chain tensioner again and it extends no more than half way (preventing it from extending completely), the stop system will lock and the timing chain tensioner can no longer be pressed together - this position is necessary to ensure that the timing chain is adequately tensioned,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



Timing train

- Check O-rings for damage and replace if necessary.
- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- Also check the timing chain **1** for smooth operation of the chain links.

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.

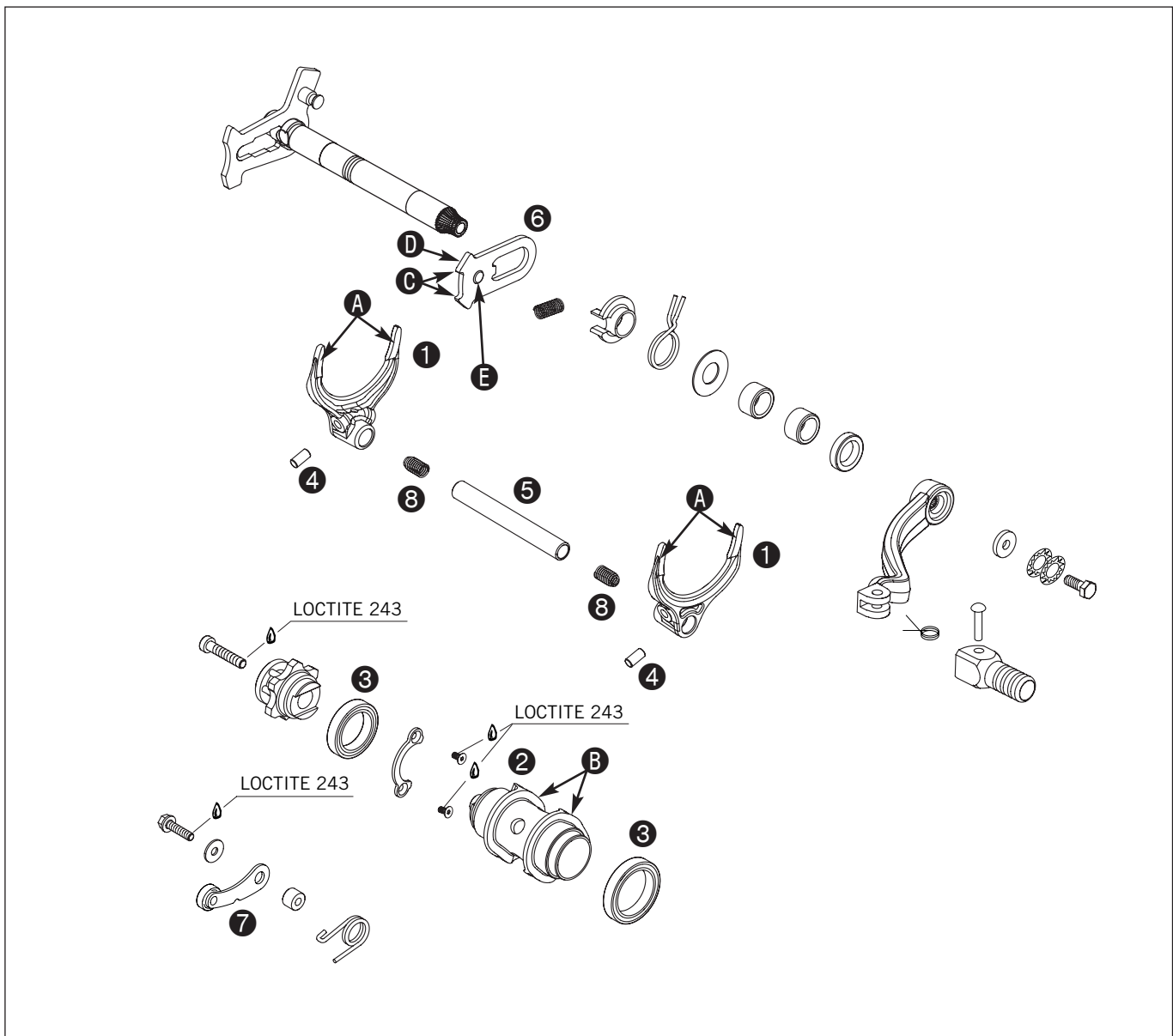


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Clutch

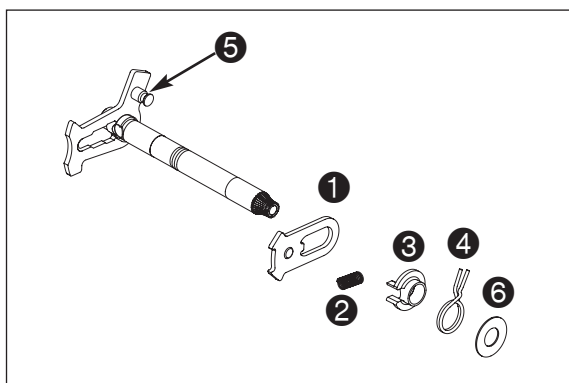
- Check the pressure piece ❶ for damage and smooth operation.
- Check the axial bearing ❷ for damage and wear.
- Lay the pushrod ❸ on a level surface and check for runout.
- Check the length of the clutch springs ❹. Minimum length 39.0 mm (40.0 mm new), replace all 6 springs if necessary.
- Check the pressure cap sealing area ❺ for damage and wear.
- Check the thickness of the lining disks (9 pieces) ❻. Minimum thickness 2.6 mm (2.7 mm new). The lining disks must be flat.
- Check the clutch disks (8 pieces) ❼ for mechanical damage and warpage. Replace the clutch disks if you detect any roughness or chipped material.
- Check the driver ❽ for damage and wear.
- Check the thrust face ❾ of the outer clutch hubs and the lining disks for damage and wear. If the recesses are bigger than 0.5 mm, replace the lining disks and the outer clutch hub.
- Check the needle bearing ❿ for damage and smooth operation.
- Replace any damaged or worn parts.

Repair manual KTM 450/505 SX-F

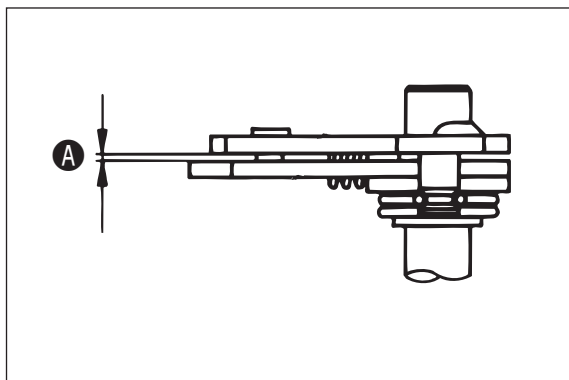


Shift mechanism

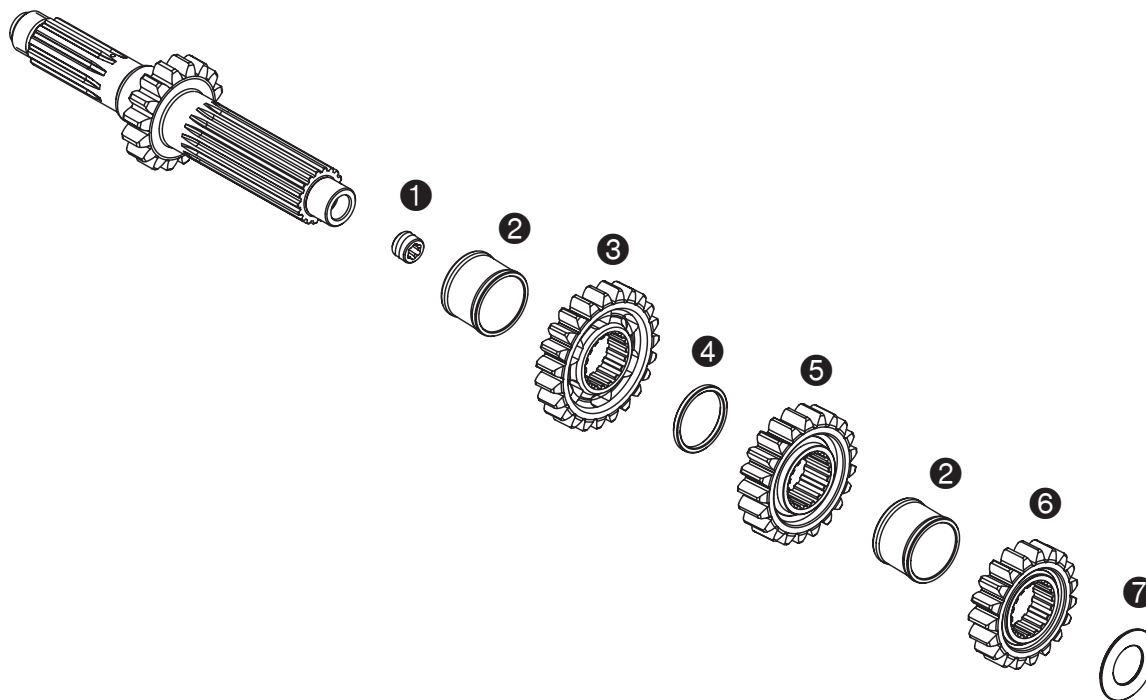
- Check the shift forks **1** at the blade **A** for damage and wear. New shift forks are 3.90 to 3.95 mm thick; the wear limit is 3.70 mm.
- Check the shift grooves **B** in the shift drum **2** for damage and wear.
- Check whether the shift drum is correctly seated in the grooved ball bearing **3**.
- Check the grooved ball bearing **3** for smooth operation.
- Check the shift rollers **4** for damage and wear.
- Lay the shift rail **5** on a level surface and check for runout. Check the shift rail for damage and wear. Check the smooth operation of the shift forks on the shift rail.
- Check the shift rail **6** for wear at the points of contact **C**. Check the return area **D** on the shift rail for wear (replace if strongly indented).
- Check the guide bolt **E** for a tight fit and wear.
- Check the roller on the locking lever **7** for smooth operation.
- Check the springs **8** in the shift rail for a tight fit. If this is not the case, slightly bend up the springs on the conical end and attach this end to the shift rail.
- Replace any damaged or worn parts.



- Clamp the short end of the shift shaft in a vise (use protective jaws).
- Mount the shift rail ① with guide bolt facing down and attach the guide bolt to the shift quadrant.
- Mount the pressure spring ②.
- Mount the spring guide ③.
- Slide the twisted end of the return spring ④ over the spring guide and lift the twisted end over the dolly bolt ⑤.
- Mount the stop disk ⑥.



- Check the clearance A between the shift rail ① and the shift quadrant. The clearance must be between 0.40 and 0.80 mm.



General information on servicing the transmission

Clamp the main shaft or countershaft in the vise (use protective jaws).

If continuing to use the shift ring and fixed gears, mark the installed position.

Remove the gears and check the following parts for damage and wear:

- Bearings
- Main shaft and countershaft bearing positions and idler shaft bearing positions
- Shift dogs on the gears
- Tooth faces on all gears
- Tooth profiles on the main shaft and countershaft as well as the corresponding gear wheels
- Check the shift rings for smooth operation in profile
- Insert the pushrod for clutch control in the main shaft and check for clearance and wear at the guide bushing ❶.

Carefully clean all parts and replace if damaged.

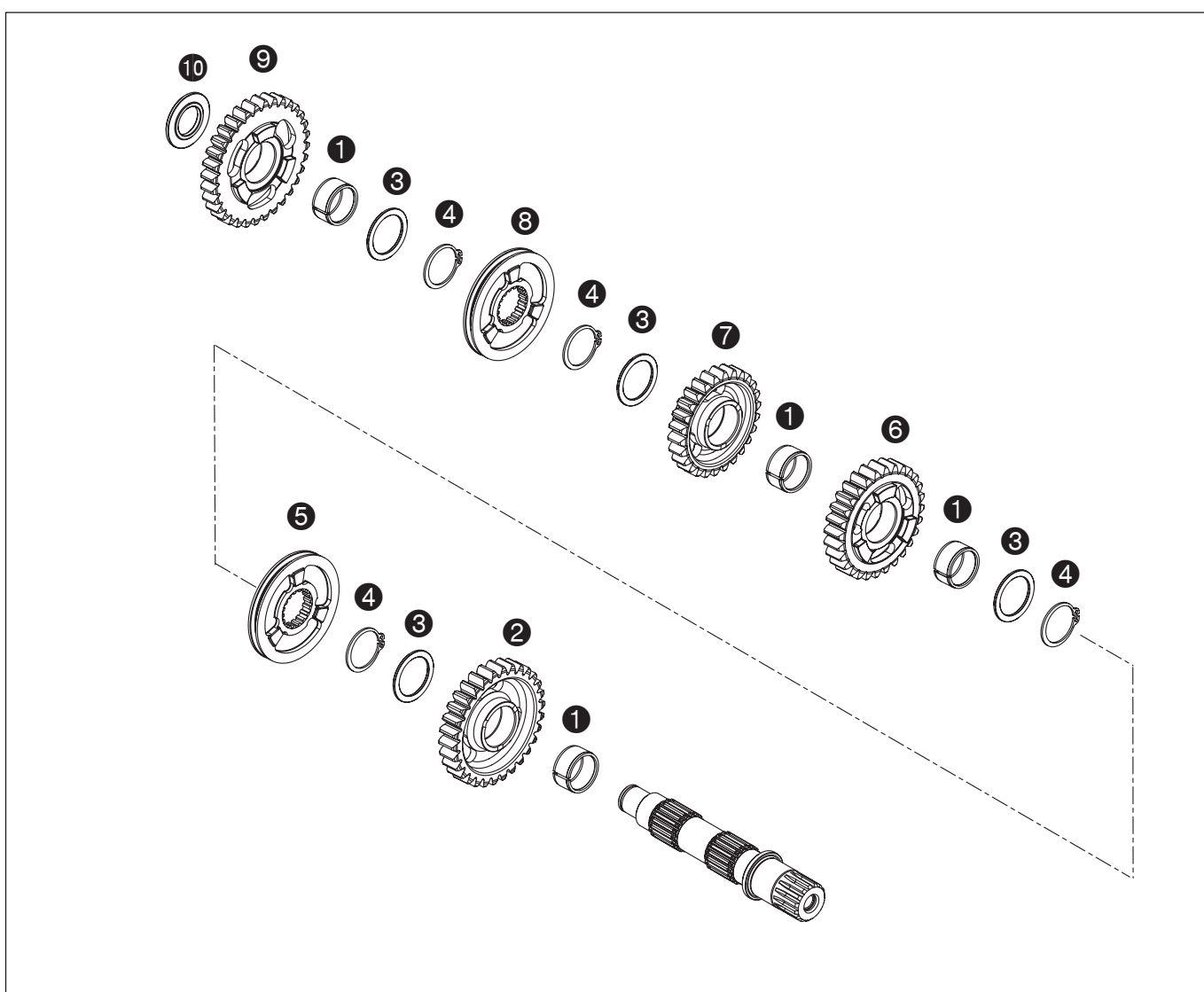
Always use new lock rings when you repair the transmission.

Do not overstretch the lock rings when mounting.

Main shaft

- Clamp the main shaft in a vise with the toothed end facing down (use protective jaws).
- Carefully oil all parts before mounting.
- Mount the distance sleeve ❷.
- Mount the 4th gear fixed gear ❸ to match the installed position mark.
- Mount the distance ring ❹ (25x29x2.4mm).
- Mount the 3rd gear fixed gear ❺ to match the installed position mark.
- Mount the distance sleeve ❷.
- Mount the 2nd gear fixed gear ❻ to match the installed position mark.
- Mount the stop disk ❼ (31x17x1mm).





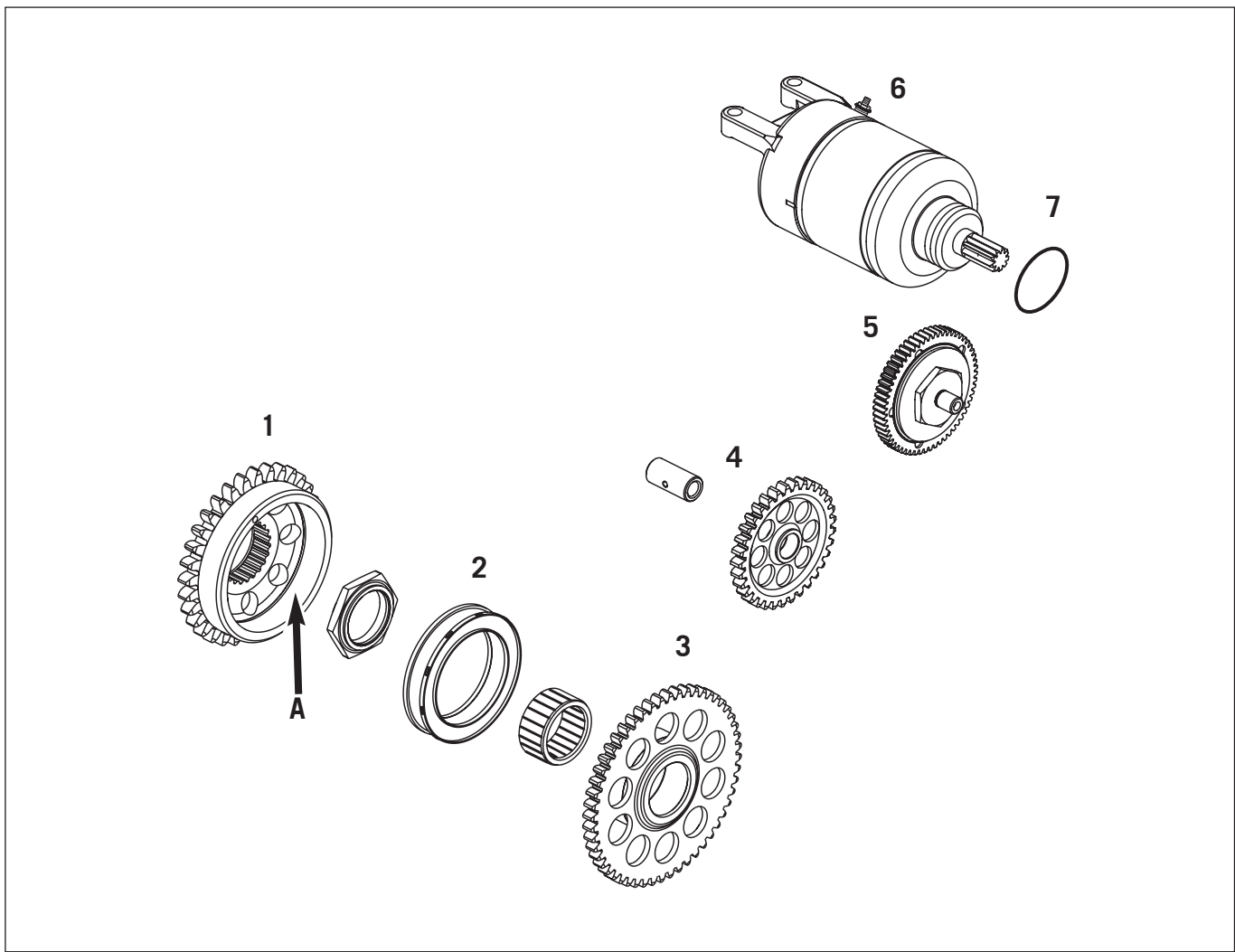
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Countershaft

- Clamp the countershaft in a vise with the toothed end facing down (use protective jaws).
- Carefully oil all parts before mounting.
- Mount the split needle bearing ①.
- Mount the 2nd gear idler gear ② with the shift dogs facing up.
- Mount the stop disk ③ (33x25x1.5mm).
- Mount the lock ring ④.
- Mount the shift ring ⑤ to match the installed position mark.
- Mount the lock ring ④.
- Mount the stop disk ③ (33x25x1.5mm).
- Mount the split needle bearing ①.
- Mount the 3rd gear idler gear ⑥ with the shift dogs facing down.
- Mount the split needle bearing ①.
- Mount the 4th gear idler gear ⑦ with the shift dogs facing up.
- Mount the stop disk ③ (33x25x1.5mm).
- Mount the lock ring ④.
- Mount the shift ring ⑥ to match the installed position mark.
- Mount the lock ring ④.
- Mount the stop disk ③ (33x25x1.5mm).
- Mount the split needle bearing ①.
- Mount the 1st gear idler gear ⑨ with the shift dogs facing down.
- Mount the stop disk ⑩ (32x17x2.7mm).
- Finally, check all of the gear wheels for smooth operation.

Repair manual KTM 450/505 SX-F





Starter drive

Freewheel hub ❶

Take the freewheel out of the freewheel hub. Check the freewheel hub for damage and wear. Check the contact area **A** for pressure marks. Thoroughly clean the freewheel hub.

Freewheel ❷

Thoroughly clean the freewheel. Check the freewheel segments for damage and wear. Oil the freewheel.

Starter gear ❸

Check the starter gear for damage and wear. Mount the starter gear including needle bearing on the crankshaft and check for clearance. Replace the needle bearing if necessary. Check the contact area facing the freewheel for pressure marks.

Starter idler gear ❹

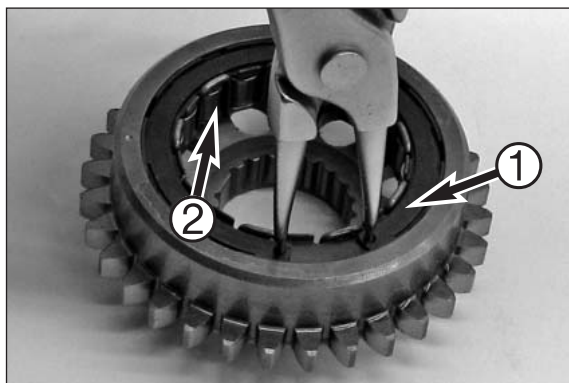
Check the toothings and bearing position of the starter idler gear for damage and wear. Check the bearing bolt for damage and wear.

Torque limiter ❺

Check the toothings and bearing positions of the torque limiter for damage and wear.

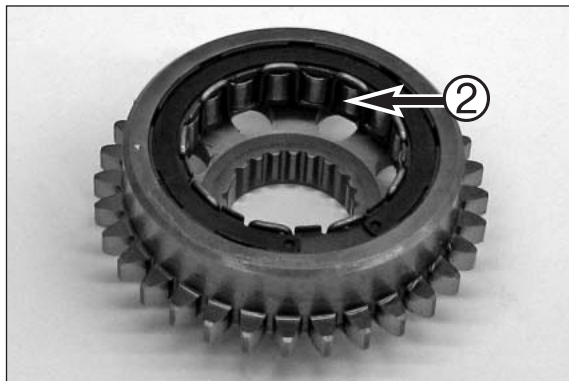
Starter ❻

Replace the O-ring **❼** on the flange.



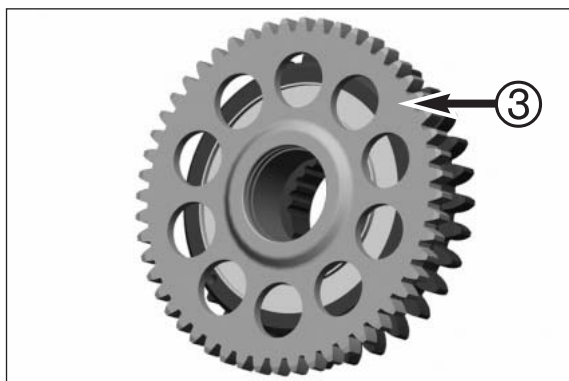
Freewheel hub

- Lightly compress the spreader ring ① with circlip pliers and remove together with the freewheel ②.

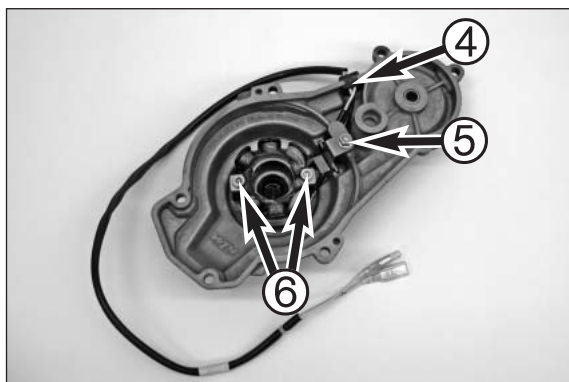


Assemble in the reverse order, paying attention to the following items:

- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- Oil the freewheel ②.



- Insert the starter gear ③ in the oiled freewheel.
- The starter gear should turn in a clockwise direction and lock in a counterclockwise direction.



Ignition cover / stator

- Pull the cable support sleeve ④ out of the ignition cover.
- Remove the screw ⑤ and take off the retaining bracket.
- Remove the screws ⑥ and take off the stator.



- Pull out the bearing ⑦ with bearing puller 151.12.017.000 and a suitable bit.

Assemble in the reverse order, paying attention to the following items:

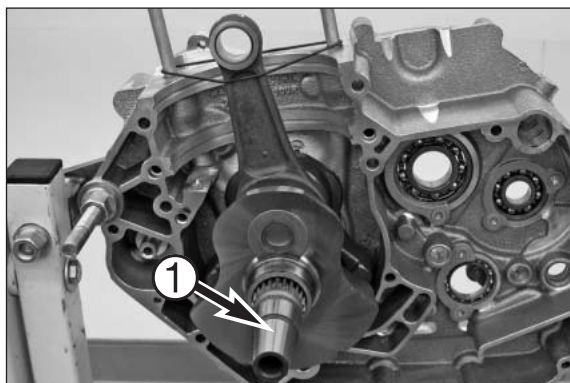
- Inspect the parts for damage or wear.
- Replace any damaged or worn parts.
- Degrease the thread on the screws, apply Loctite 243 and tighten to 6 Nm.
- Press in a new bearing with a suitable press/drift tool until flush.

ASSEMBLING THE ENGINE

6

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Assembling the engine case halves

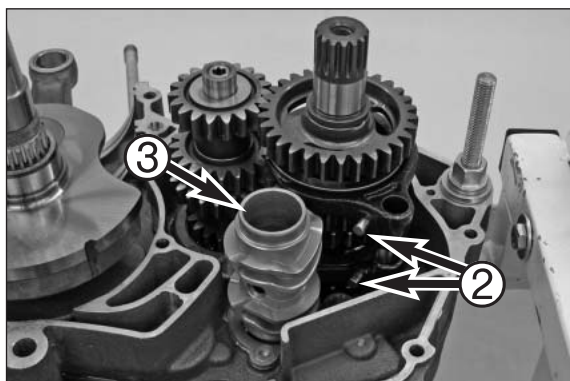
- Fasten the right engine case half to the universal engine work stand.
- Oil all bearing positions.
- Mount the crankshaft.

NOTE: the cone ① for the rotor must point towards the left engine case half.

- Hold the conrod in place with an O-ring.



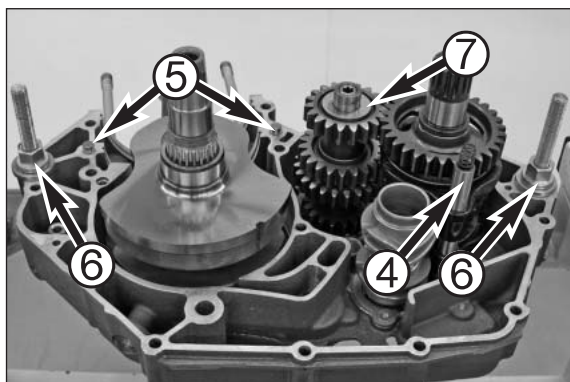
- Simultaneously position the pre-assembled transmission shafts in the engine case half.



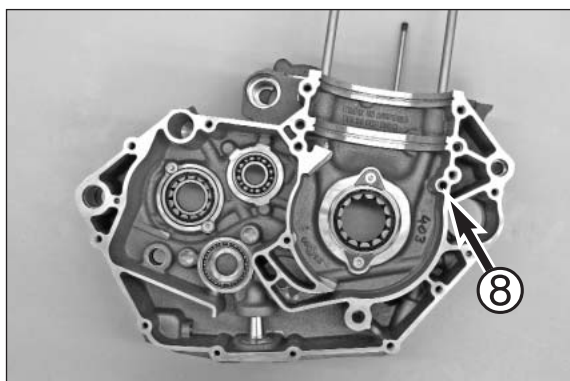
- Insert the oiled shift forks with rollers ② in the shift rings.

NOTE: if continuing to use the shift forks, match the installed position marks.

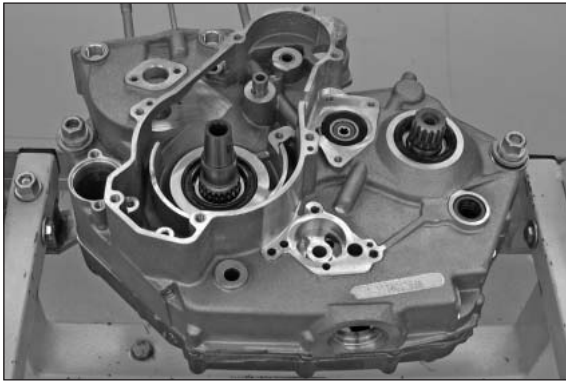
- Mount the shift drum ③.
- Insert the shift forks and rollers in the shift grooves in the shift drum.



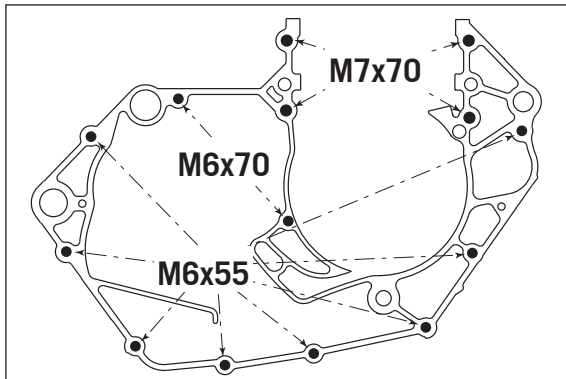
- Insert the pre-assembled shift rail ④ and springs.
- Insert the rollers ⑤.
- Remove the screw cap ⑥ and insert the dowels.
- Make sure the stop disk ⑦ is in place.
- Oil all bearing positions and movable parts.
- Degrease the sealing area.



- Make sure the dowel ⑧ in the left engine case half is in place.
- Oil all bearing positions.
- Degrease the sealing area and apply a thin coat of Three-Bond silicone sealant.



- Mount the left engine case half, tapping lightly with a plastic hammer if necessary.
- Fasten the engine to the universal engine work stand.



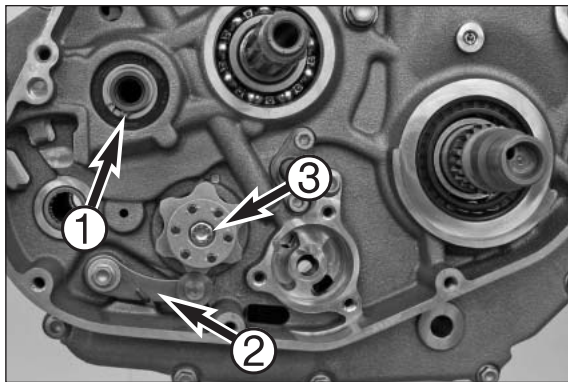
- Insert the oiled case screws and tighten.

Tightening torques

M6: 10Nm

M7: 14Nm

- Check the shafts for smooth operation.
- Check the axial clearance of the crankshaft.

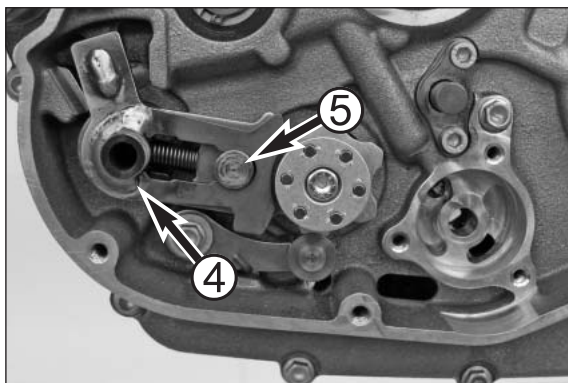


Mounting the shift mechanism

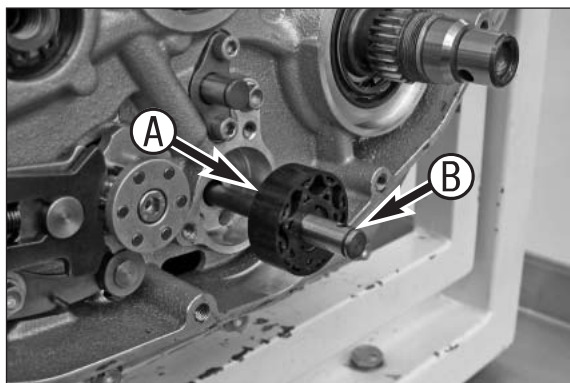
- Insert the lock ring **1**.
- Push the locking lever **2** back and mount the shift lock; release the locking lever again.

NOTE: The shift lock is not symmetrical.

- Degrease the thread on the screw **3**, apply Loctite 243 and tighten to 10 Nm.
- Turn the main shaft and shift through the gears by turning the shift lock.



- Mount the pre-assembled shift shaft **4** together with the stop disk.
- Push back the shift rail **5** and slide the shift shaft all the way in.
- Allow the shift rail to engage in the shift lock.
- Make sure the return spring is correctly seated.

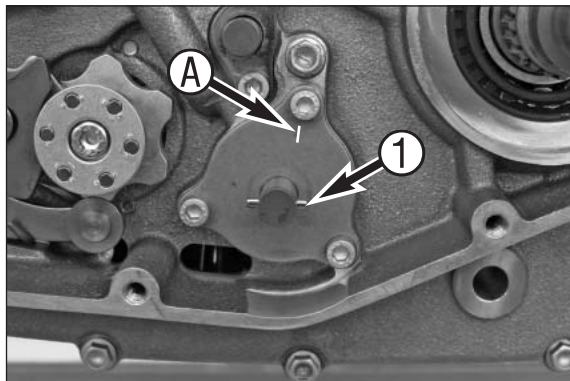


Mounting the oil pump

- Mount the suction oil pump with the oil pump shaft and oiled needle roller.

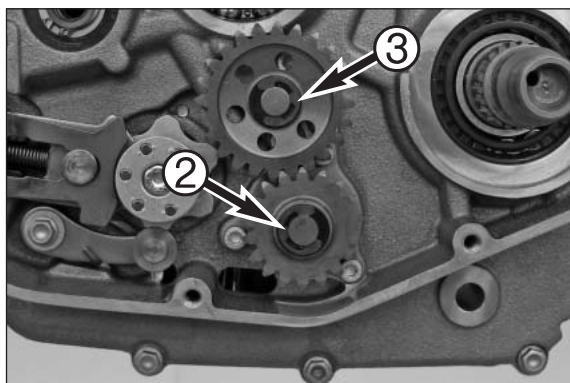
NOTE:

- The rounded side **A** of the suction oil pump should face the engine case.
- The groove **B** in the oil pump shaft should face the right side of the engine.

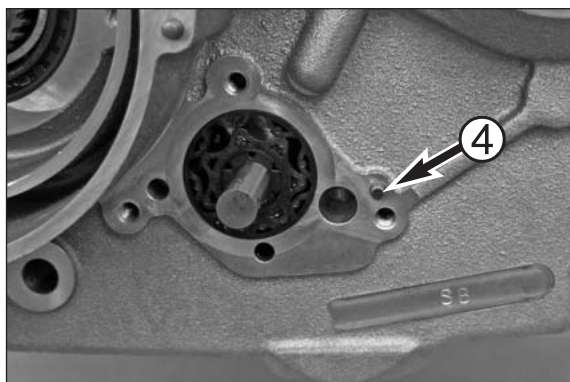


- Degrease the thread on the oil pump cover screws and apply Loctite 243. Screw on the oil pump cover with mark **A** facing up and tighten to 6 Nm.

- Insert the needle roller **1**.



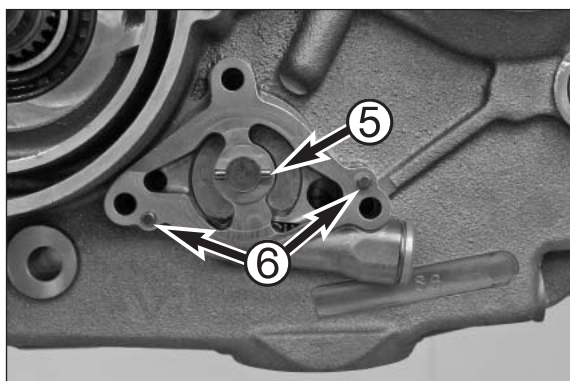
- Mount the oil pump gear and shim. Mount the lock washer **2**.
- Mount the oiled needle bearing, oil pump idler gear and shim. Mount the lock washer **3**.



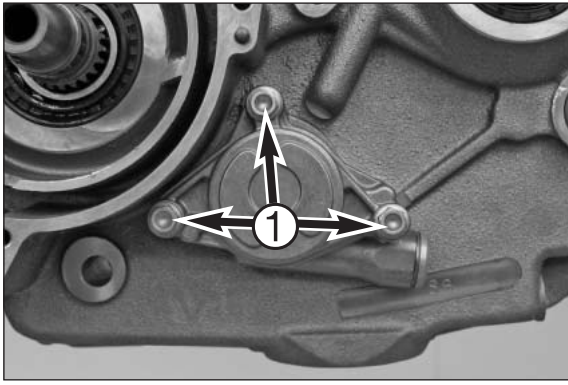
- Insert the needle roller for the suction oil pump drive in the oil pump shaft.
- Mount the oiled suction oil pump.

NOTE: the rounded side of the suction oil pump should face the engine case.

- Insert the needle roller **4**.



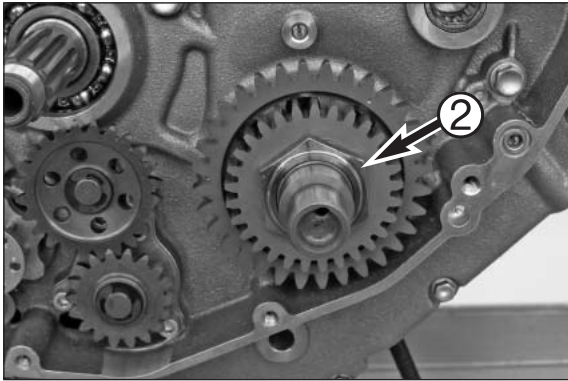
- Mount the pre-assembled oil pump housing including the gasket.
- Insert the needle roller **5**.
- Make sure the needle rollers **6** are in place.



- Mount the oiled oil pressure pump.

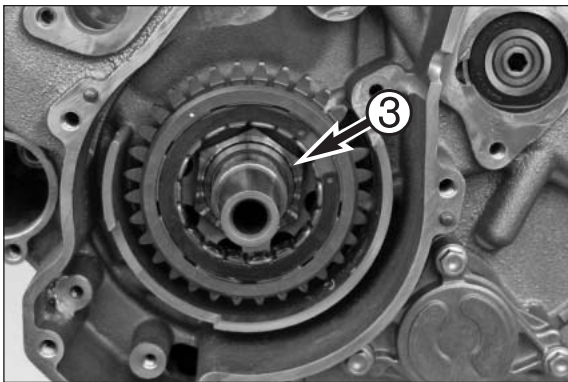
NOTE: the rounded side of the oil pressure pump should face the oil pump cover.

- Degrease the thread on the screws ❶ and apply Loctite 243. Screw on the oil pump cover including the gasket and tighten to 10 Nm.



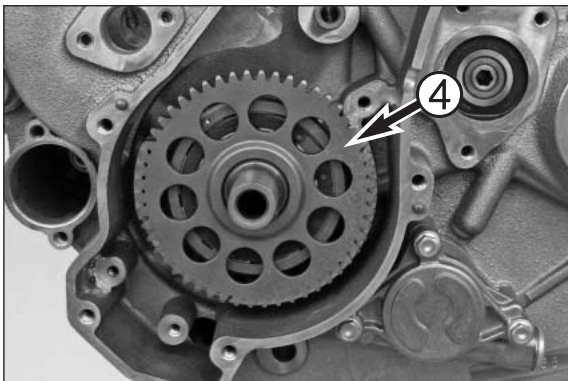
Mounting the primary gear

- Move the crankshaft into the TDC position and insert the engine locking screw.
- Mount the primary gear and tighten the nut ❷ to 60 Nm.



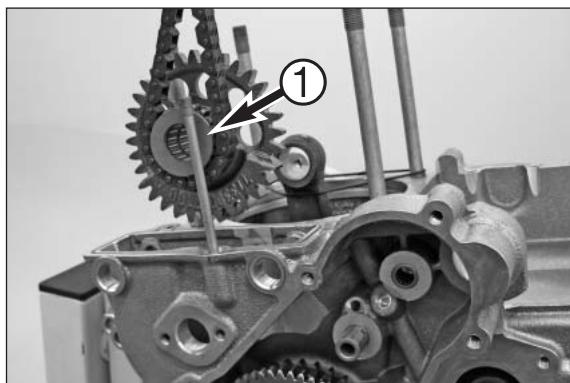
Mounting the freewheel hub

- Mount the entire freewheel hub and tighten the nut ❸ to 60 Nm.



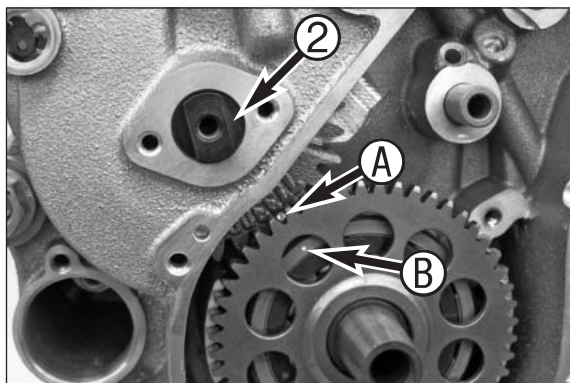
- Oil the freewheel and needle bearing.
- Mount the needle bearing and starter gear ❹.

NOTE: the starter gear should turn in a clockwise direction and lock in a counterclockwise direction.

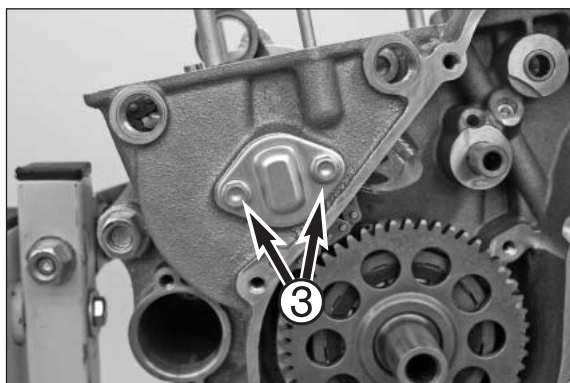


Mounting the timing chain

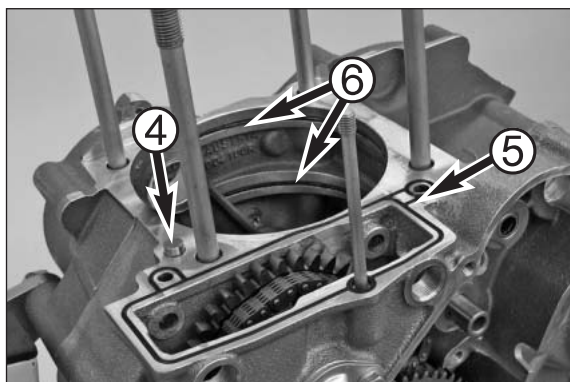
- Place the timing chain on the balancer gear.
- Insert both oiled needle bearings in the balancer gear and mount the stop disk ① with the collar facing the balancer gear.
- Simultaneously insert all parts in the timing chain compartment.



- Align mark A on the balancer gear with mark B on the freewheel hub. Mount the axle balancer gear ② with the O-ring.

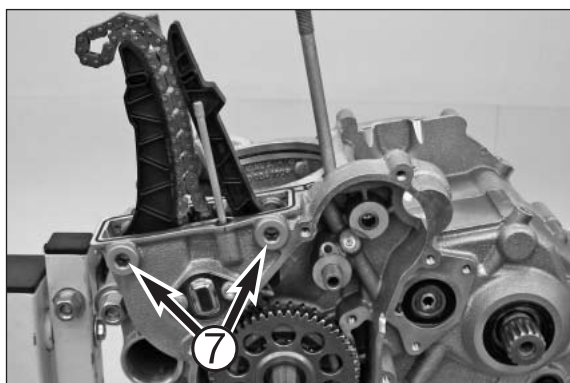


- Align the axle balancer gear for the retaining bracket.
- Degrease the thread on the screws ③ and apply Loctite 243. Screw on the retaining bracket and tighten to 6 Nm.

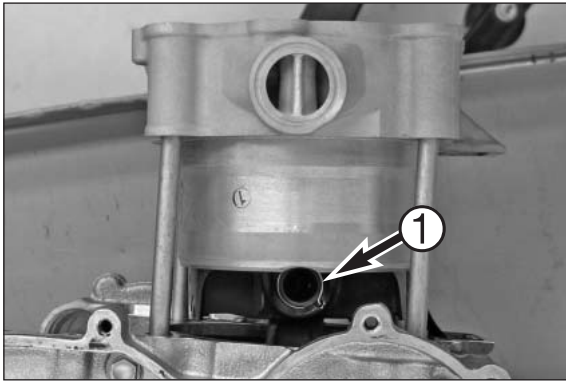


Mounting the piston / cylinder

- Remove the O-ring for the conrod attachment.
- Make sure the roller ④ is in place.
- Mount the gasket ⑤.
- Mount the O-rings ⑥ with grease.



- Mount the tensioning rail and guide rail.
- Mount the axles ⑦ with the O-ring and tighten to 15 Nm.



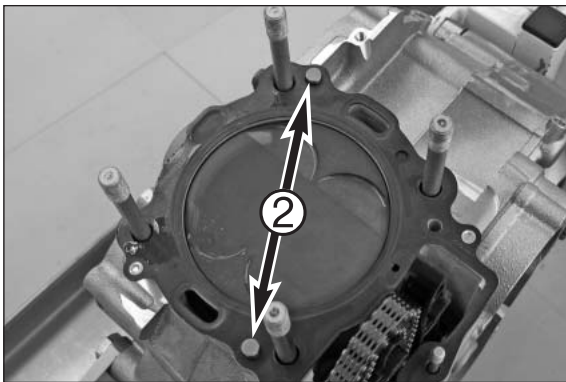
- Lightly grease the outside surface of the cylinder.
- Attach a cable tie to the timing chain and pull it through the timing chain compartment.
- Mount the pre-assembled cylinder/piston unit and align the conrod with the piston.
- Gently slide in the oiled piston bolt.
- Insert the lock ring ① with the mounting tool for the piston bolt lock 773.29.030.000 or 776.29.030.000.

NOTE:

- Do not damage the tensioning rail and guide rail when you mount the cylinder.
- Cover the crankcase when you insert the lock rings.
- The open side of the lock ring should point towards the crankcase.

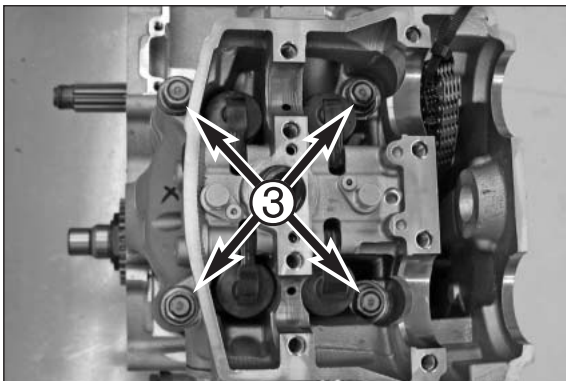


- Slide the cylinder onto the engine case.



Mounting the cylinder head

- Insert the rollers ②.
- Mount a new cylinder head gasket.

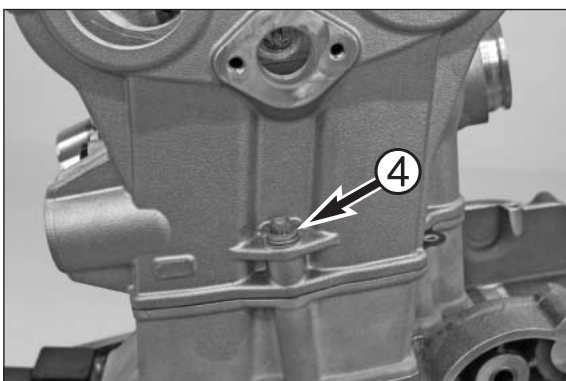


- Pull the timing chain through the timing chain compartment with the cable tie and mount the pre-assembled cylinder head without damaging the tensioning rail and guide rail.
- Screw on the cylinder head with oiled washers and nuts ③:

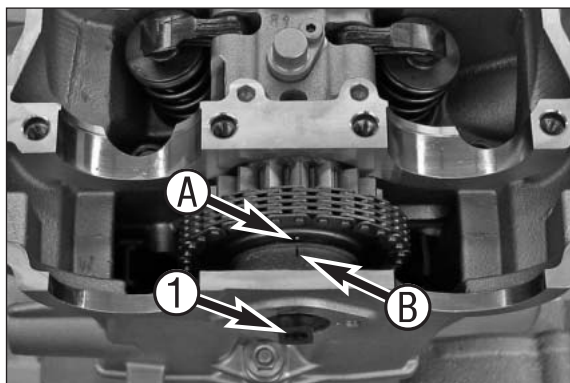
1st step in a crosswise direction: 10 Nm

2nd step in a crosswise direction: 30 Nm

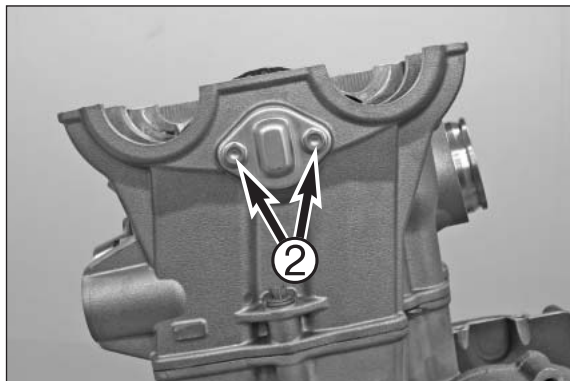
3rd step in a crosswise direction: 50° rotational angle



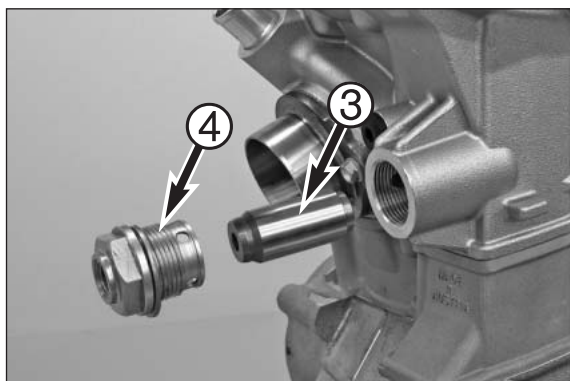
- Screw on the oiled washer and nut ④ and tighten to 10 Nm.



- Insert both oiled needle bearings in the double gear.
- Remove the cable tie and place the timing chain on the double gear.
- Align the mark **A** on the double gear with the mark **B** on the cylinder head. Mount the axle double gear **1** with the O-ring.

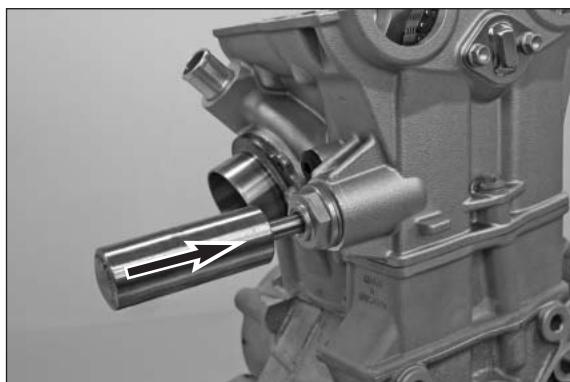


- Align the axle double gear for the retaining bracket.
- Degrease the thread on the screws **2** and apply Loctite 243. Screw on the retaining bracket and tighten to 6 Nm.

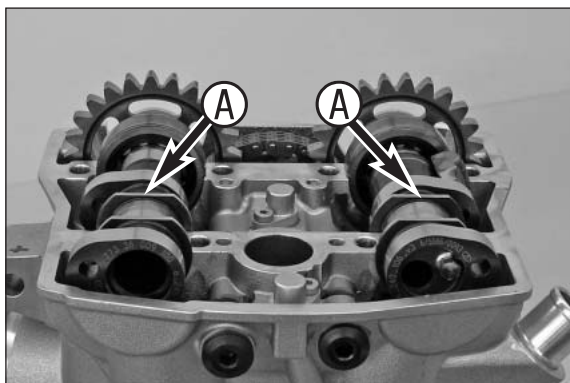


Mounting the timing chain tensioner

- Oil the O-ring in the timing chain tensioner guide.
- Place the timing chain tensioner **3** in the mounting position and insert.
- Insert the plug **4** with the seal ring and tighten to 25 Nm.



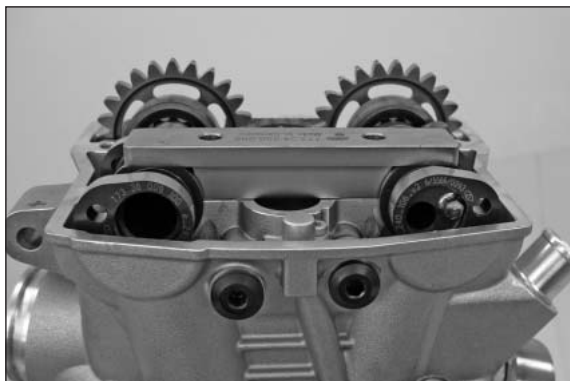
- Press on the timing chain tensioner (see arrow) with unclatcher 773.29.051.000 to trigger the unclatching process.
- Look into the timing chain compartment to make sure the timing chain tensioner has extended.
- Insert the unclatching screw with the O-ring and tighten to 10 Nm.



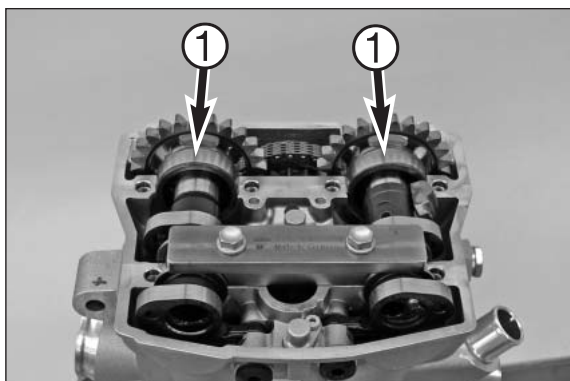
Mounting the camshafts

NOTE: see Chapter 5 for camshaft reassembly / radial clearance of the camshaft bearing.

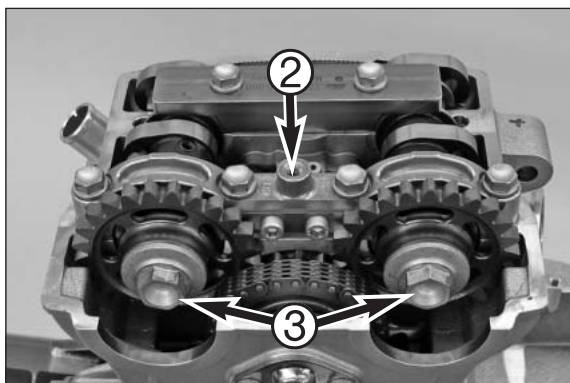
- Place the pre-assembled camshafts in the oiled bearing positions and align with the flat sides **A** facing up.



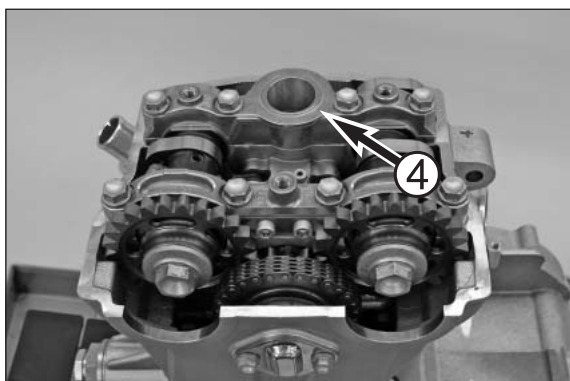
NOTE: if the camshaft gears were not pressed off the camshafts, check the adjusting bearing bridge 773.29.050.000. Its entire surface must rest against the cylinder head and the flat sides against the camshaft. If not, press off the camshaft gears and readjust.



- Screw on the adjusting bearing bridge 773.29.050.000 and tighten to 14 Nm.
- Slide the roller bearings **1** all the way into the bearing seat.



- Mount the camshaft bearing bridge **2** and needle rollers.
- Tighten the oiled camshaft bearing screws from the inside to the outside to 14 Nm.
- Tighten the **3** to 50 Nm.

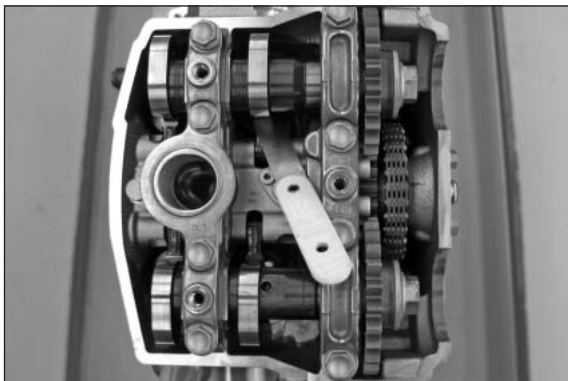


- Remove the adjusting bearing bridge.
- Oil the camshafts.
- Mount the camshaft bearing bridge **4** with the needle rollers and O-ring.
- Tighten the oiled camshaft bearing screws from the inside to the outside to 14 Nm.
- Check the axial clearance at both camshafts.



Checking the valve clearance

- Remove the engine locking screw.
- Switch on the engine several times.
- Move the engine to the ignition TDC position (see Chapter 4) and insert the engine locking screw.



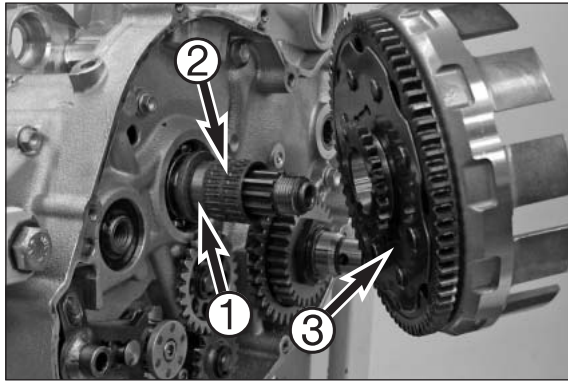
- Check the valve clearance with feeler gauge 590.29.041.000:

Intake valves: 0.10 - 0.15 mm
Exhaust valves: 0.15 - 0.20 mm

- Write down any deviations from the stipulated valve clearance. Remove the camshafts and measure the thickness of the mounted shims. If the measured valve clearance is too small, mount thinner shims. If the valve clearance is too large, mount thicker shims. Shims are available in thicknesses of 1.72 to 2.60 mm in 0.04 increments.
- When mounted, check the valve clearance again and correct if necessary.



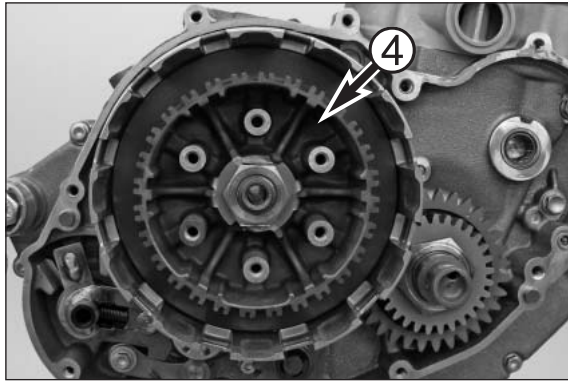
- Insert the spark plug and tighten to 10 - 12 Nm.
- Mount both gaskets and the valve cover.
- Insert the valve cover screws together with the rubber seal and tighten to 8 Nm.



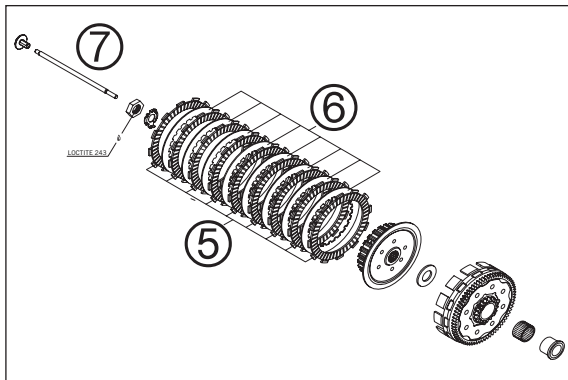
Mounting the clutch

- Mount the collar sleeve **1**, oiled needle bearing **2** and outer clutch hub **3**.

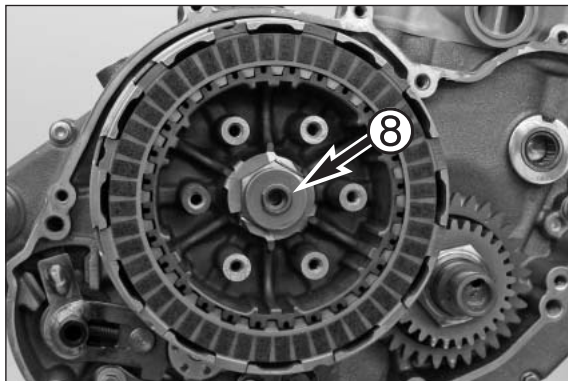
NOTE: make sure the tothing engages in the oil pump idler gear.



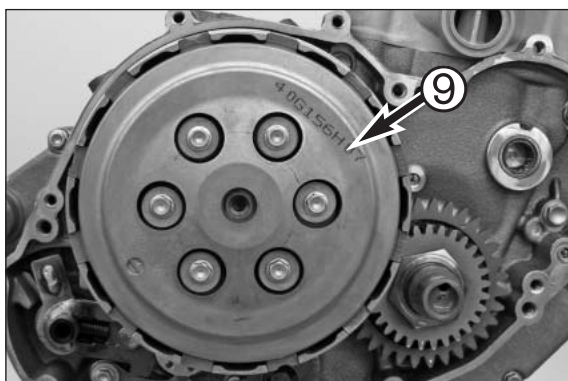
- Mount the stop disk and driver **4**.
- Degrease the thread on the main shaft and apply Loctite 243.
- Mount a new lock washer and screw on the drive nut.
- Hold the driver with clutch holder 773.29.003.000 while you tighten the drive nut to 80 Nm.
- Lock the drive nut with the lock washer.



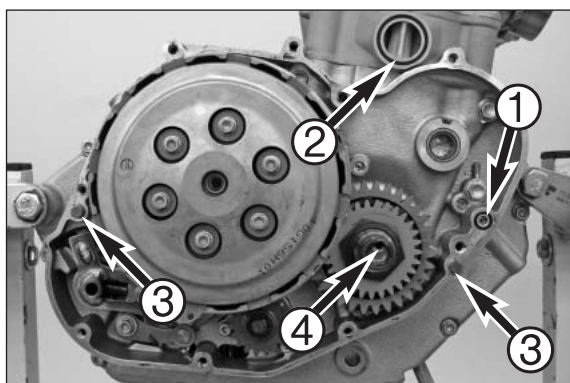
- Thoroughly oil all lining disks.
- Starting with a lining disk **5** insert all 9 lining disks and all 8 clutch disks **6** in the outer clutch hub, ending with a lining disk on top.



- Insert the oiled pushrod **7** with the shorter stepping facing the clutch .
- Insert the pressure piece **8**.



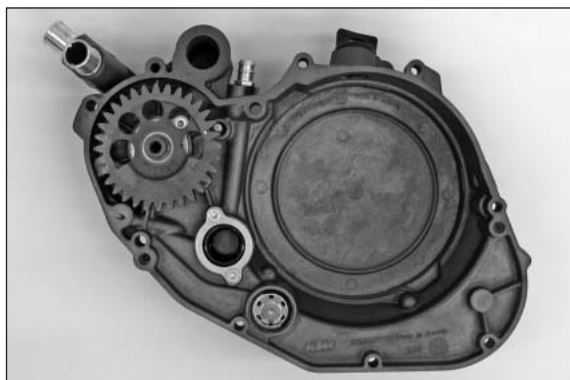
- Mount the pressure cap **9**.
- Tighten the screws on the pressure cap with washers and springs in stages in a crosswise direction to 10 Nm.



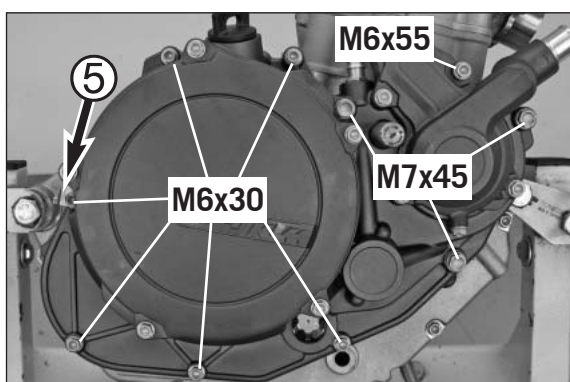
Mounting the clutch cover

- Insert the O-ring ① and the quad ring ②.
- Insert the rollers ③.
- Oil all bearing positions.
- Pour approx. 30 ml of engine oil into the oil duct ④ to the conrod bearing.
- Degrease the sealing area and apply a thin coat of Three-Bond silicone sealant.

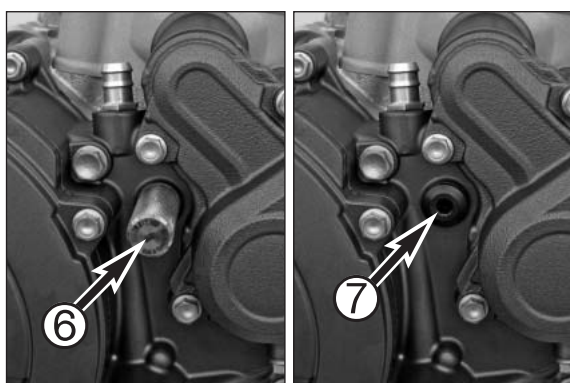
NOTE: make sure there is no silicone sealant in the O-ring ①.



- Degrease the sealing area on the clutch cover.
- Mount the pre-assembled clutch cover pinned off with mounting pin 773.29.012.100.



- Position the spring retaining bracket ⑤.
- Insert the clutch cover screws and tighten to 10 Nm.

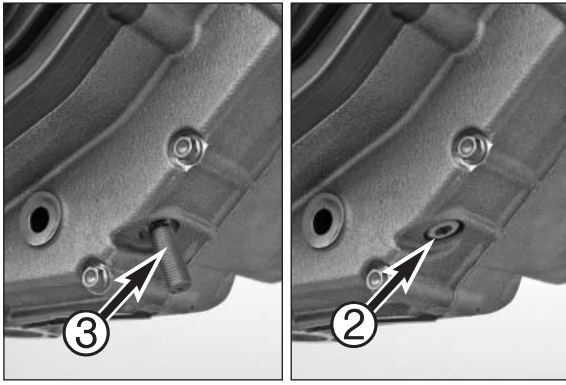


- Remove the mounting pin ⑥.
- Insert the plug ⑦ together with the O-ring.

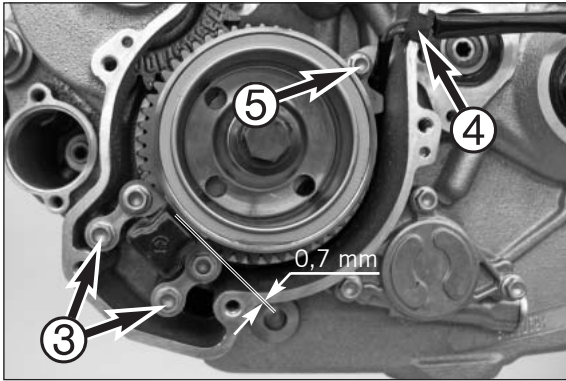


Mounting the rotor

- Make sure the woodruff key is in place.
- Degrease the cone and mount the rotor.
- Insert the oiled rotor screw and tighten to 80 Nm.

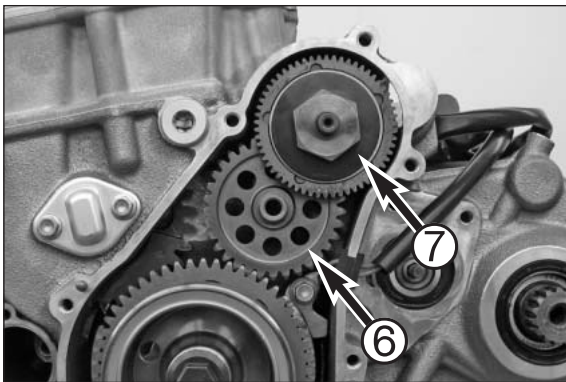


- Remove the engine locking screw ❶.
- Insert the screw ❷ with the copper washer and tighten to 20 Nm.



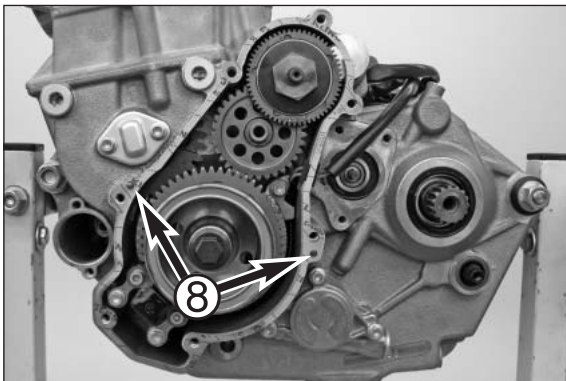
Mounting the pulse generator

- Degrease the thread on the screws ❸ and apply Loctite 243.
- Screw on the pre-assembled pulse generator and holder by hand. Do not tighten the screws yet.
- Turn the crankshaft until the contact piece on the rotor aligns with the pulse generator.
- Adjust the distance between the rotor contact piece and the pulse generator to 0.7 mm and tighten the screws to 6 Nm.
- Thread in the pulse generator cable and press the cable support sleeve ❹ into the engine case.
- Degrease the thread on the screw ❺ and apply Loctite 243. Screw on the retaining bracket and tighten to 10 Nm.



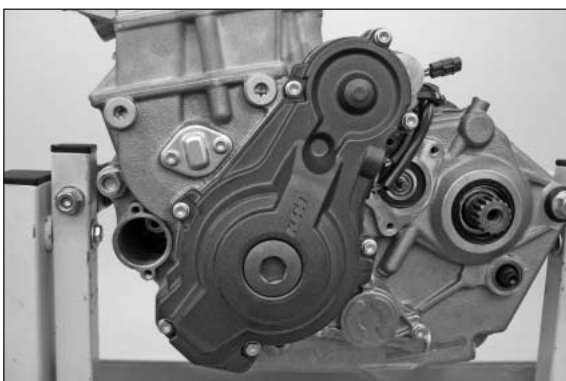
Mounting the starter drive

- Oil all of the bearings.
- Mount the starter idler gear ❹.
- Insert the torque limiter ❺.

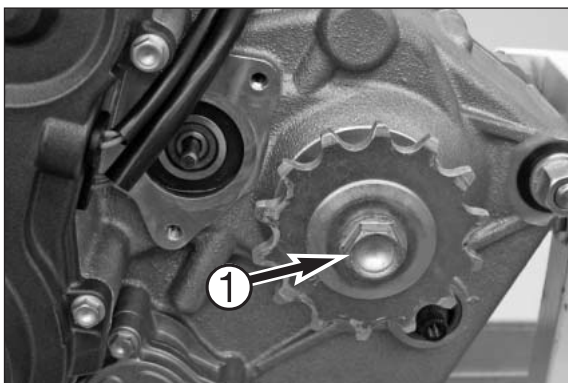


Mounting the ignition cover

- Make sure the needle rollers ❸ are in place.
- Degrease the sealing area mount a new ignition cover gasket.



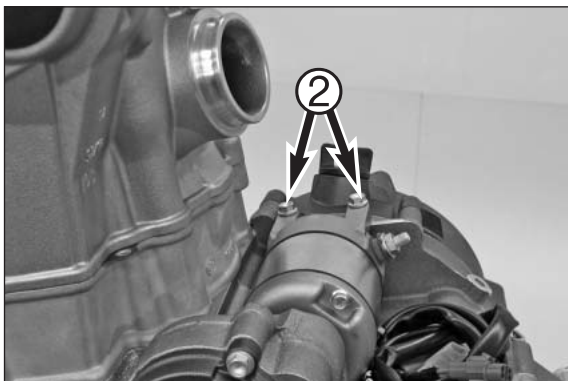
- Degrease the sealing area on the ignition cover.
- Mount the pre-assembled ignition cover.
- Insert the ignition cover screws and tighten to 10 Nm.



Mounting the sprocket

- Mount the O-ring, oiled distance bushing with the recess for the O-ring on the inside.
- Mount the sprocket with the collar on the inside.
- Degrease the thread on the screw ①, apply Loctite 243 and mount the spring washer. Screw on the rear sprocket and tighten to 60 Nm.

NOTE: Use holding wrench 510.12.012.000 to hold the sprocket.



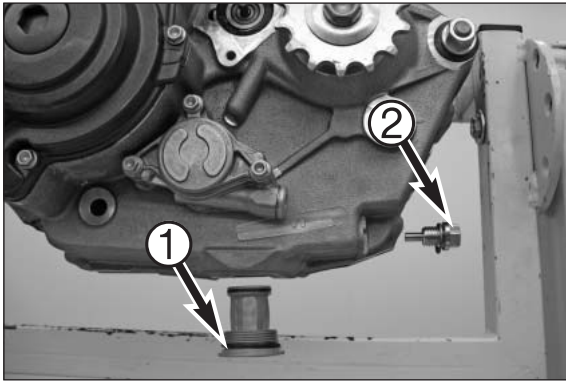
Mounting the starter

- Mount the starter with the O-ring.
- Insert both screws ② and tighten to 10 Nm.



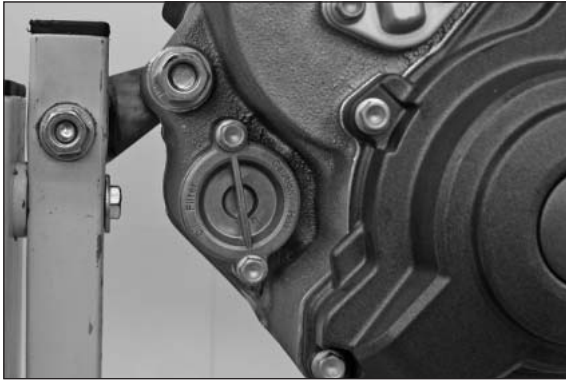
Mounting the shift lever

- Mount the shift lever.
- Degrease the thread on the screw and apply Loctite 243. Slip nordlock washers and the steel washer onto the screw. Screw on the shift lever and tighten to 10 Nm.

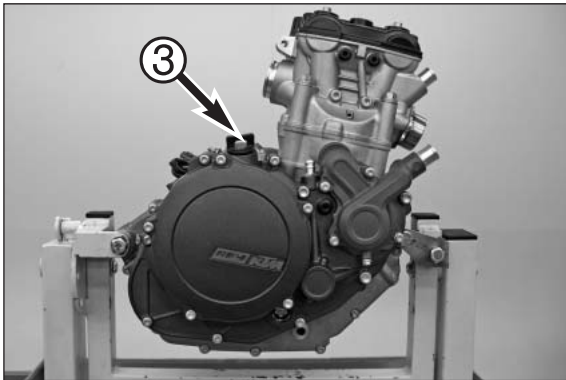


Filling the engine with engine oil

- Insert the oiled plug ❶ together with the oil screen and tighten to 30 Nm.
- Insert the oil drain plug ❷ together with a new seal ring and tighten to 20 Nm.



- Pour engine oil into the oil filter housing (approx. 1/3 full) and into the oil filter insert.
- Mount the oil filter insert.
- Mount the oil filter cover together with the greased O-ring, screw on and tighten to 10 Nm.



- Remove the oil filling screw 3 and add approx. 1.3 liters of fully-synthetic engine oil (Motorex Power Synt 4T 10W/50 for temperatures over 5°C or 5W/40 for temperatures under 5°C).
- Take the engine off the universal engine work stand.

ELECTRICAL

7

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Ignition system troubleshooting

Before beginning the testing procedures on the ignition system, make sure:

- the short circuit button is not actuated
- the battery is fully charged
- the main fuse is working

Check whether there is an ignition spark upon starting, proceeding as follows:

- Pull off the spark plug connector.
- Disconnect the spark plug connector from the ignition wire.
- Hold the loose end of the ignition wire approx. 5 mm from the ground.
- A strong spark should be visible when the starter is actuated.
- If a spark is visible, mount the spark plug connector again.
- Unscrew the spark plug and insert in the spark plug connector.
- Hold the spark plug against the ground. A strong spark should be visible when the starter is actuated. If not, the spark plug connector or spark plug is defective.
- If no spark is visible during the first test, check:
 - The short circuit button with the cable tree
 - The ground connection from the CDI unit and ignition coil
 - The cable from the CDI unit to the ignition coil
 - The ignition coil
 - The pickup
 - The stator

NOTE: the CDI unit cannot be tested with simple devices. It can only be tested on an ignition test bench.

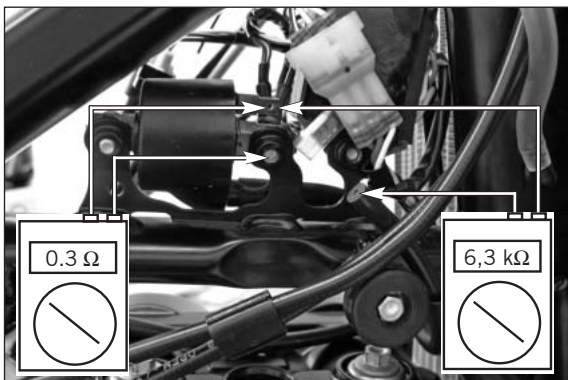


CDI unit

Check the cables and socket connections to the CDI unit.
The CDI unit can only be tested on an ignition test bench.

! CAUTION !

NEVER TEST THE CDI UNIT WITH A CONVENTIONAL MEASURING DEVICE. HIGHLY SENSITIVE ELECTRONIC COMPONENTS COULD BE DESTROYED.



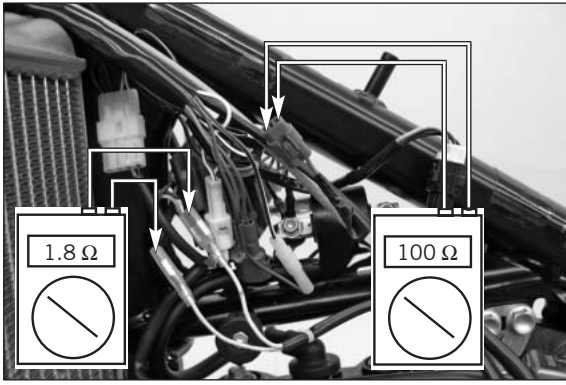
Checking the ignition coil

- Disconnect the ignition coil and remove the spark plug connector.
- Use an ohmmeter to take the following measurements:

NOTE: the following measurements only correspond to the setpoint values at a coil temperature of 20° C.

Replace the ignition coil if the measured values deviate significantly from the setpoint value.

Primary coil setpoint value: $0.30 \Omega \pm 0.05 \Omega$
Secondary coil setpoint: $6.30 \text{ k}\Omega \pm 1.25 \text{ k}\Omega$



Checking the pickup and stator

Use an ohmmeter to take the following measurements (plug connectors disconnected):

Pickup coil red - green setpoint value: $100 \Omega \pm 20 \Omega$

Pickup coil red - ground setpoint value: $\infty \Omega$

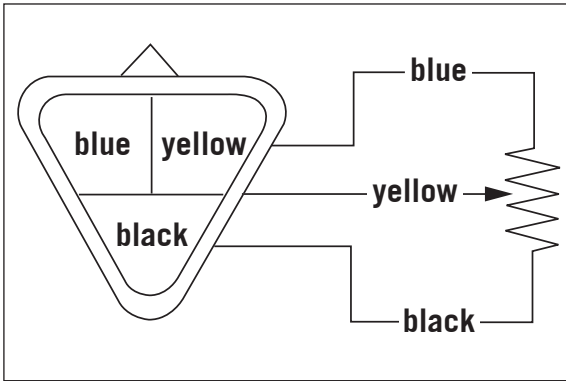
Stator coil yellow - yellow setpoint value: $1.8 \Omega \pm 0.3 \Omega$

Stator coil yellow - ground setpoint value: $\infty \Omega$

NOTE: the measurements must be performed at a temperature of 20°C, otherwise the readings will deviate significantly.

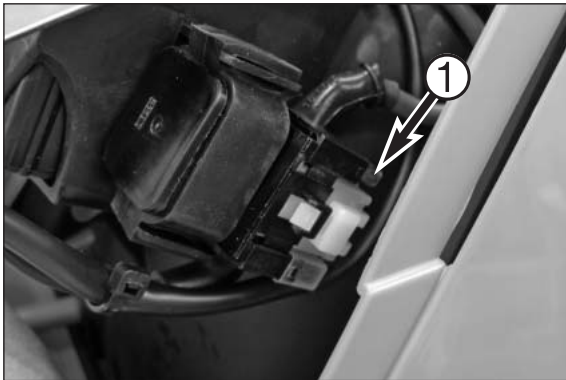
Checking the throttle sensor

- See Chapter 8 "FUEL SYSTEM"



Main fuse

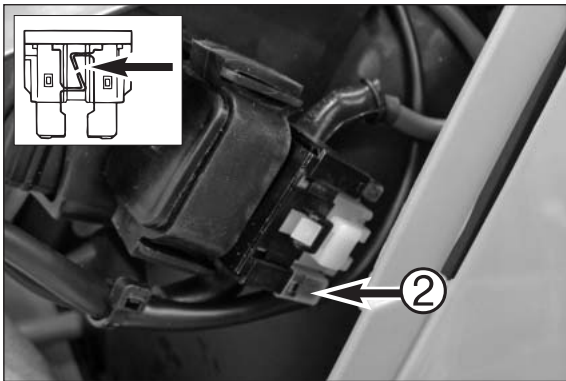
- The main fuse (10 amperes) is located under the filter box cover in the starter engine relay.
- The main fuse ❶ is visible after you remove the filter box cover and protection cover.



! CAUTION !

NEVER USE A STRONGER FUSE OR A REPAIRED FUSE. IMPROPER USE CAN DESTROY THE ENTIRE ELECTRIC SYSTEM

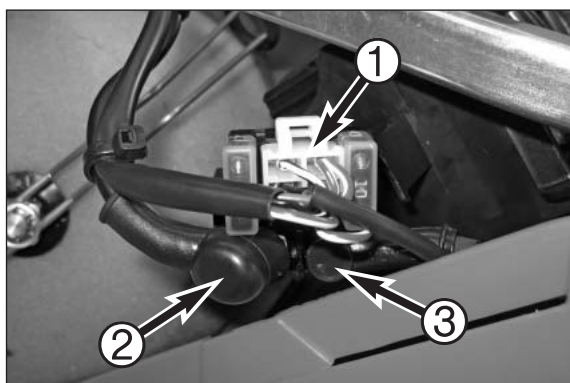
- The spare fuse is located under the protection cover ❷.



Checking the starter

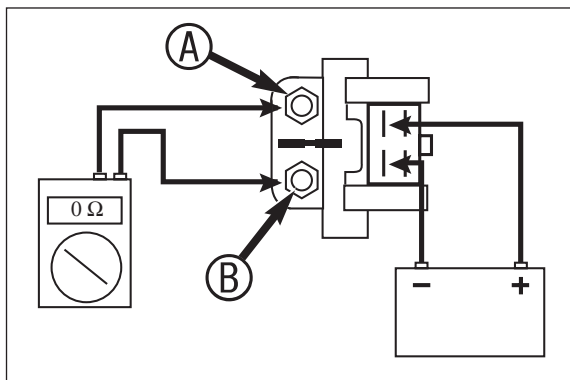
- Disconnect the negative terminal from the battery and remove the starter.
- Connect the negative terminal from a 12V battery to the starter case and briefly connect the positive terminal from the battery to connector ❸ on the starter (use thick cables).
- The starter should start to turn when the electric circuit is closed.
- If not, replace the starter.





Checking the start relay

- Remove the seat and the filter box cover.
- Disconnect the negative terminal from the battery.
- Remove the starter relay from the support.
- Pull the connector ① from the starter relay.
- Disconnect cables ② and ③ from the starter relay and remove the starter relay.



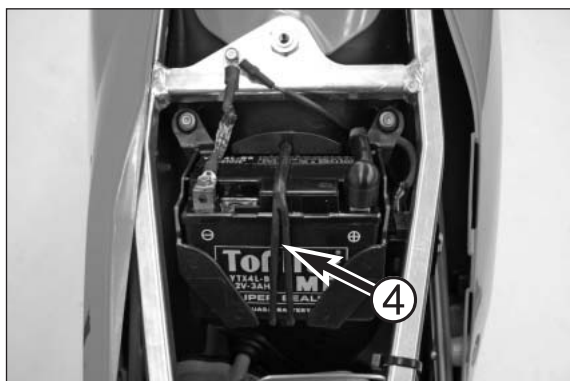
- Connect the starter relay to a 12 V battery as illustrated.
- Use an ohmmeter to check the continuity between terminals A and B.

Setpoint value: 0 Ω OK
Setpoint value: ∞ Ω defective

NOTE: you should hear a click when you switch the starter relay.

The starter relay is mounted in the reverse order, paying attention to the following points:

- Replace any damaged or defective parts.



Dismounting and mounting the battery

- Remove the seat.
- First disconnect the negative terminal, then the positive terminal from the battery.
- Remove the filter box cover, detach the rubber strap ④ and remove the battery.

The battery is mounted in the reverse order, paying attention to the following points:

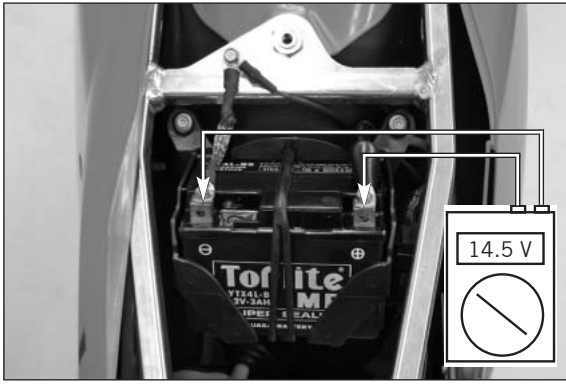
- Replace any damaged or defective parts.
- Connect the positive terminal then the negative terminal to the battery.



Charging the battery

CAUTION

- Do NOT REMOVE THE LOCKING STRIPS.
- To LOAD, CONNECT THE BATTERY TO THE BATTERY CHARGER BEFORE YOU SWITCH ON THE BATTERY CHARGER.
- IF YOU ARE CHARGING THE BATTERY IN A CLOSED ROOM, MAKE SURE IT IS WELL VENTILATED. THE BATTERY PRODUCES EXPLOSIVE GASSES WHILE CHARGING.
- IF THE BATTERY IS CHARGED TOO LONG OR AT AN EXCESSIVE VOLTAGE, ACID WILL LEAK THROUGH THE SAFETY VALVES AND THE BATTERY WILL LOSE CAPACITY.
- QUICK CHARGES WITH HIGH VOLTAGE WILL IMPAIR THE SERVICE LIFE OF YOUR BATTERY.
- Connect KTM battery charger no. 584.29.074.000. The battery charger can also be used to test the offload voltage, the battery's startability and the generator capacity. This battery charger cannot be overcharged.
- If it is not used for longer periods of time, recharge the battery every 3 months.



Checking the charging voltage

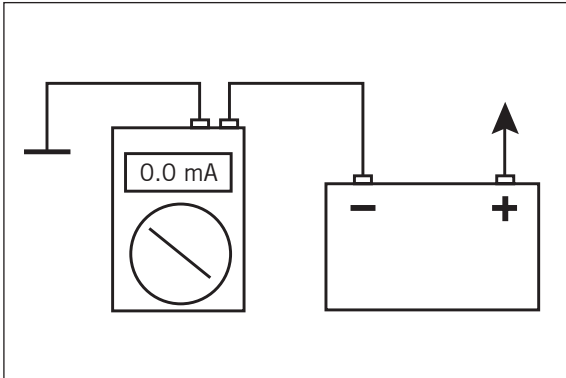
NOTE: : the following figures only apply to fully charged batteries (charging condition at least 90 %).

- Connect a voltmeter to both battery terminals.
- Start the engine.
- Rev the engine up to 5000 rpm and read the voltage.

Setpoint value: 14.0 – 15.0 V

If the measured value deviates significantly from the setpoint value:

- Check the socket connectors from the stator to the voltage regulator and from the voltage regulator to the wiring harness.
- Check the stator.
- Replace the voltage regulator.



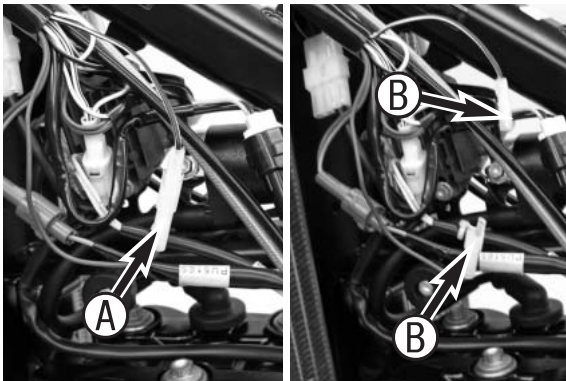
Checking for loss of current

Check for loss of current before you check the voltage regulator.

- Disconnect the ground wire from the battery.
- Connect an ammeter between the ground wire and the negative terminal on the battery.

Setpoint value: max. 0.2 mA

- If this value is higher than specified, look for the power consumers.

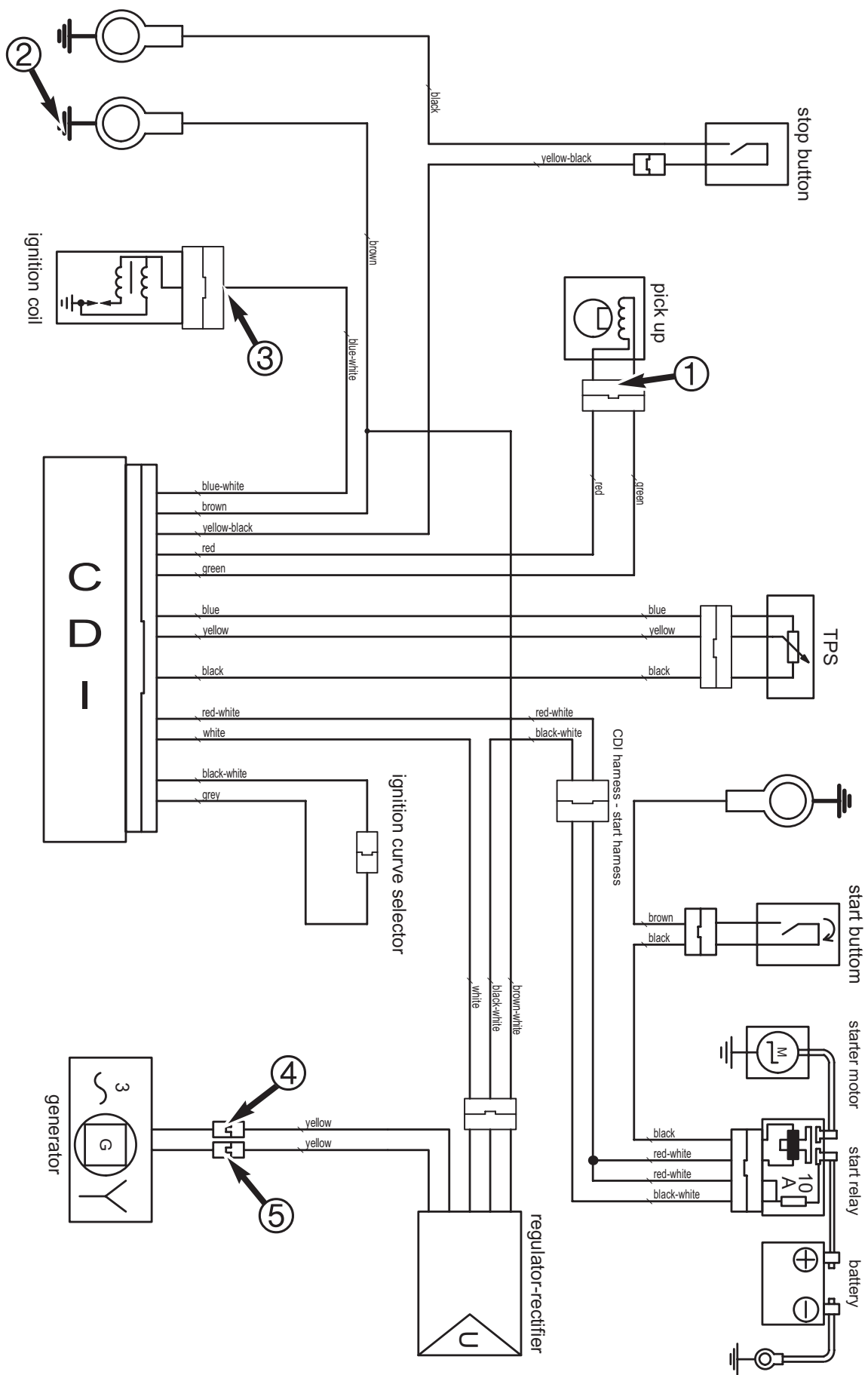


Engine characteristic

- Two ignition curves (performance and soft) are stored in the CDI unit. The performance ignition curve is activated in the condition at delivery.

- Remove the seat and tank to change the ignition curve:

A Performance (higher engine performance)	socket connector connected
B Soft (better driveability)	socket connector disconnected



450/505 SX-F 2007
450 SXS-F 2007

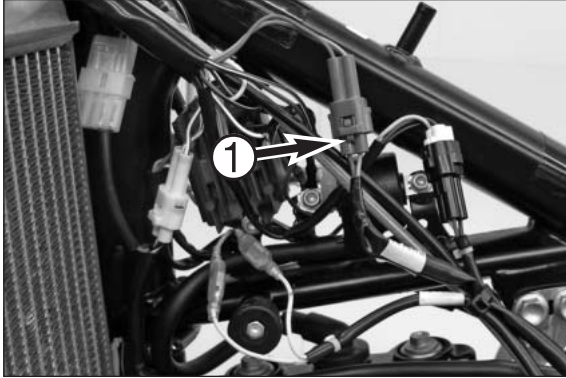
CDI harness - 773.39.032.000
 start harness 773.11.079.000

10.04.2007

Static ignition values

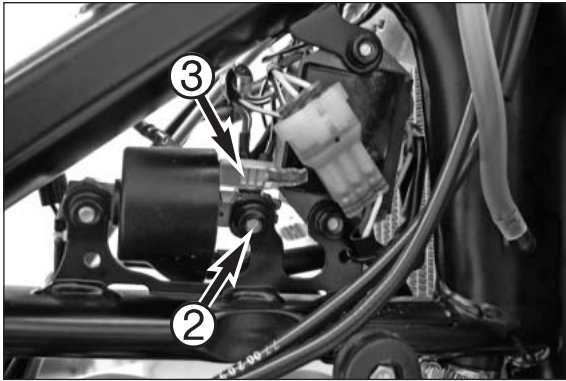
Measuring conditions:

- Cold engine
- Seat and tank removed
- All plugs and the ground connections are in a non-corroding condition, plugs tightly connected
- Battery fully charged
- Gap between the rotor and the pickup: 0.7 mm
- Actuate the starter at least 5 seconds for each measurement
- Peak voltage adapter 584.29.042.000 connected to the multimeter



Check the pickup for an output signal - bipolar plug ❶ with green and red cable colors (also see circuit diagram on page 7-6):

- Apply the red measuring tip on peak voltage adapter 584.29.042.000 to the green cable and the black measuring tip to the red cable.
- Measuring at connector ❶ with CDI unit disconnected.
Setpoint value: 2.4 volts +/- 0.5 volt
- Measuring at connector ❶ with CDI unit connected:
Setpoint value: 1.6 volts +/- 0.5 volt



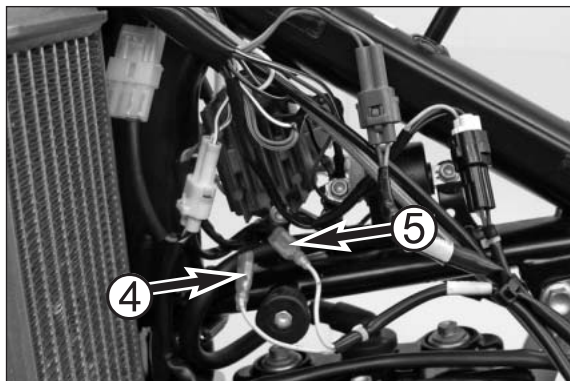
Check the primary voltage for ignition coil control (also see circuit diagram on page 7-6) for voltage (blue/white cable):

- Apply the red measuring tip on the peak voltage adapter to the ground ❷ and the black measuring tip to the blue/white cable ❸, CDI unit and ignition coil connected.
Setpoint value : 200 volts +/- 10 volt

Static generator values

Measuring conditions:

- Cold engine
- Seat and tank removed
- All plugs and the ground connections are in a non-corroding condition, plugs tightly connected
- Battery fully charged
- Actuate the starter at least 5 seconds for each measurement
- Peak voltage adapter 584.29.042.000 connected to the multimeter



Check the generator outlet (also see circuit diagram on page 7-6) for voltage between the following cable colors:

- Between connector ④ yellow cable and connector ⑤ yellow cable, plug disconnected

Setpoint value: 11 volts +/- 1 volt

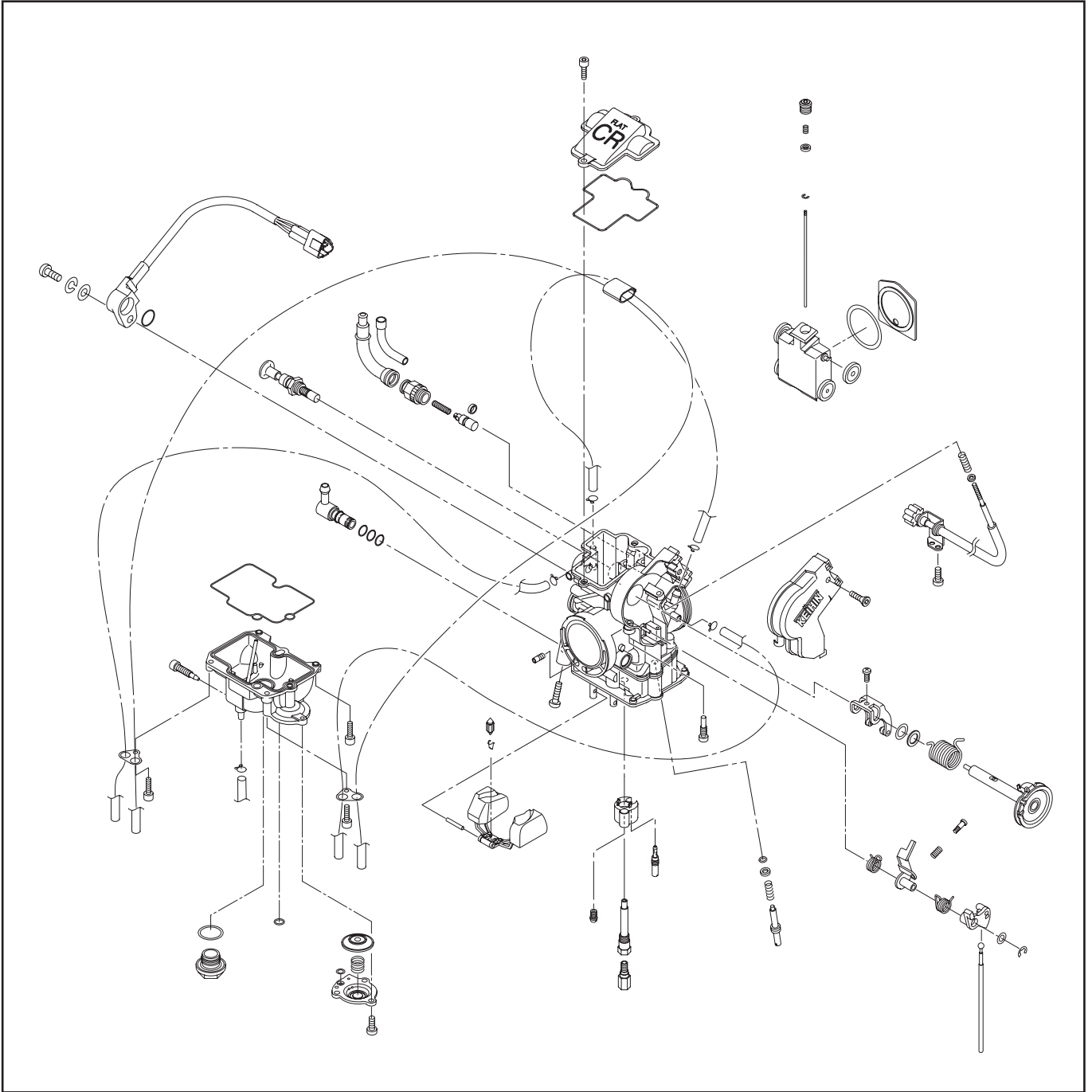
FUEL SYSTEM

8

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CARBURETOR - KEIHIN FCR-MX 4125 G



Art.-Nr. 3.206.029-E

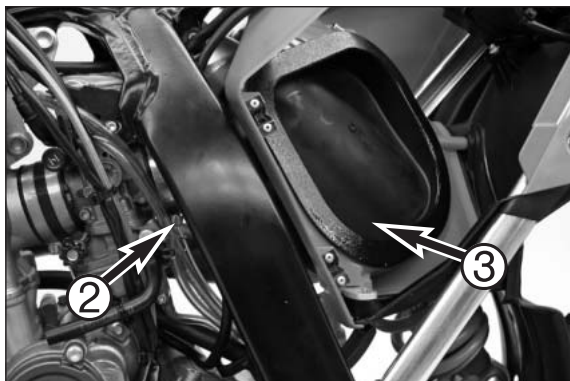
Repair manual KTM 450/505 SX-F



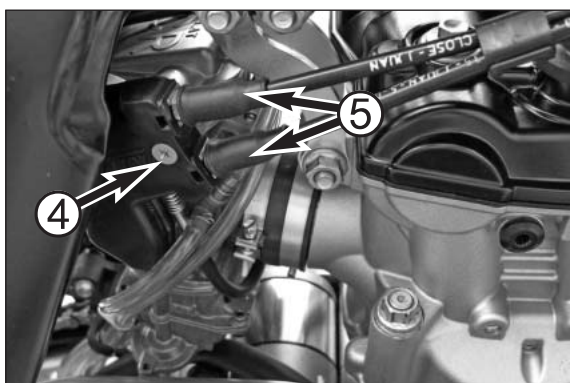
Dismounting and mounting the carburetor

NOTE: clean motorcycle thoroughly.

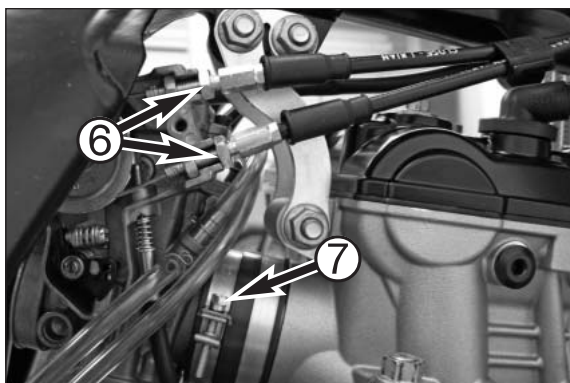
- Remove the seat and tank with spoilers.
- Take off the filter box cover **1** and completely remove the air filter.



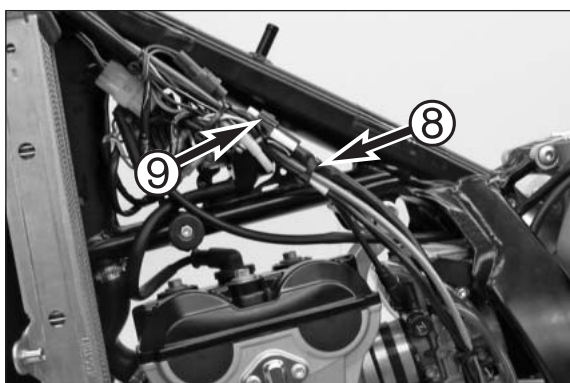
- Loosen the carburetor clamp **2** and remove the carburetor connection boot **3**.



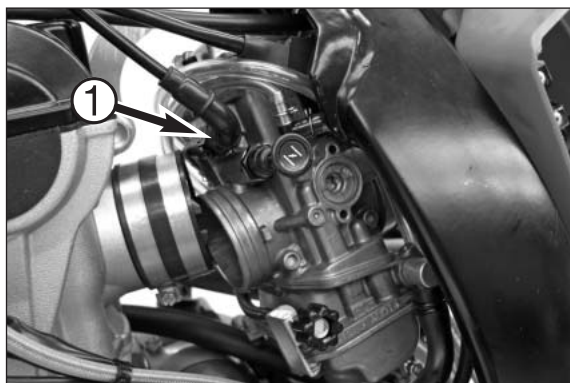
- Remove the screw **4** and take off the carburetor cover.
- Push back the dust boots **5**.



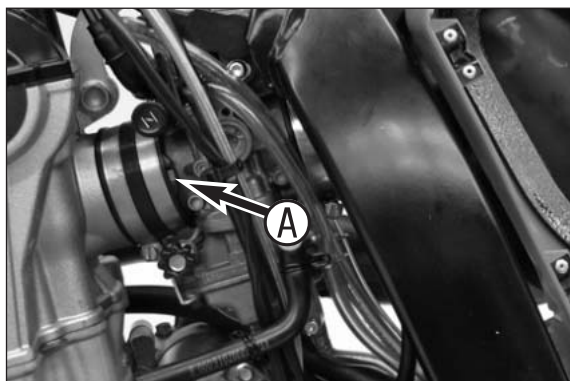
- Loosen the nuts **6** and detach the throttle cable.
- Loosen the carburetor clamp **7**.



- Remove the cable tie **8** and disconnect the throttle sensor plug connector **9**.
- Pull out the vent hose.

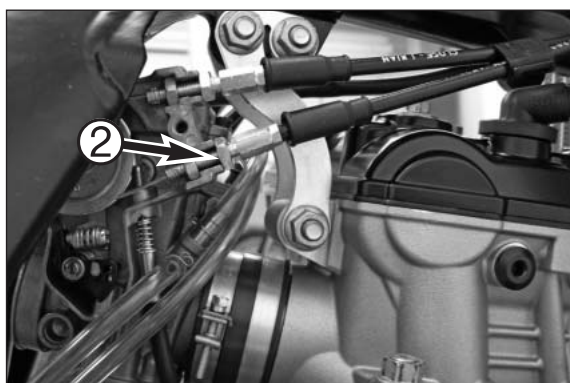


- Pull the carburetor out of the rubber sleeve.
- Unscrew the hot start actuator ❶ from the carburetor.
- Remove the carburetor.



Remount the carburetor in the reverse order, paying attention to the following points:

- Check all parts for damage and wear.
- Replace any damaged or defective parts.
- Align tab ❶ on the carburetor with the recess in the rubber sleeve. The carburetor must be mounted in a vertical position.

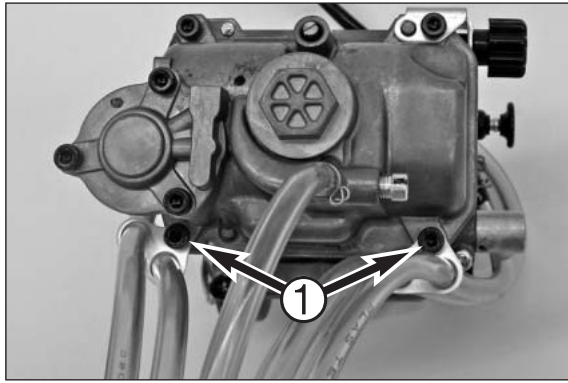


- Set 3-5 mm free travel at the throttle grip with the adjusting screw ❷. The idling speed should not change with the engine running if the handlebar is turned all the way to the left or right.
- Check the throttle grip for smooth operation.
- Check the condition of the air filter and clean or replace if necessary.

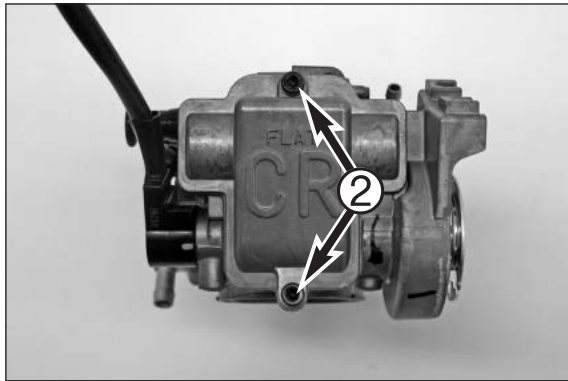
Disassembling the carburetor

NOTE: Before you start to disassemble the carburetor, make sure your workplace is clean and offers enough room to spread out the individual carburetor parts.

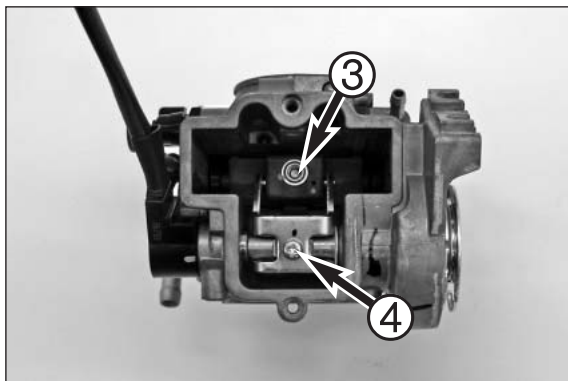
- Dismount the carburetor and remove any coarse dirt.
- Remove the 2 screws ① and disconnect all vent hoses from the carburetor.



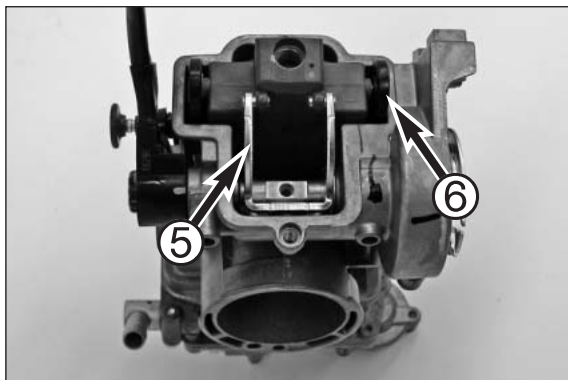
- Remove the 2 screws ② and take the throttle slide cover and gasket off the carburetor.

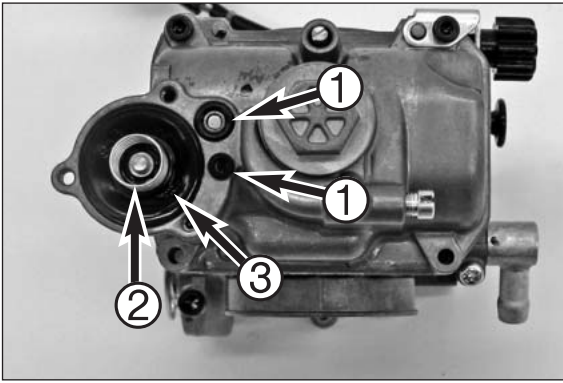


- Remove the screw ③ with spring and washer and pull the jet needle out of the throttle slide.
- Remove the screw ④.

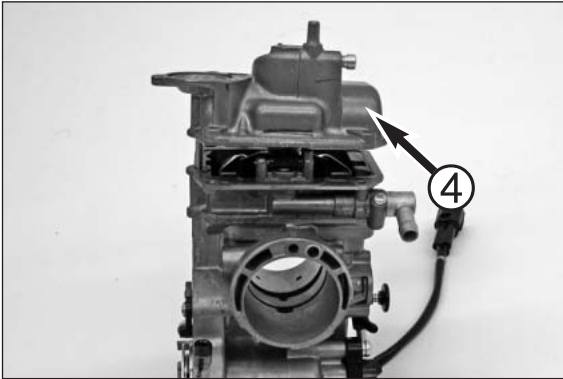


- Lift the throttle slide arm ⑤, remove the throttle slide including the roller ⑥ and the throttle slide plate from the carburetor.

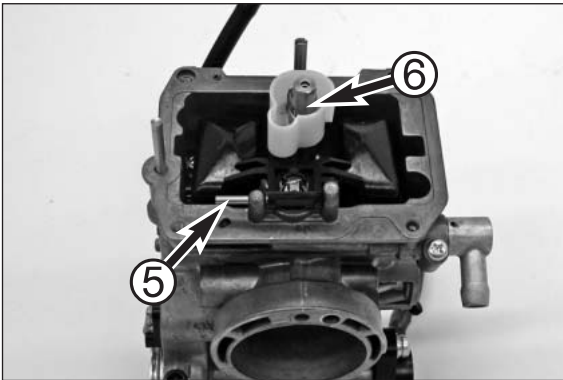




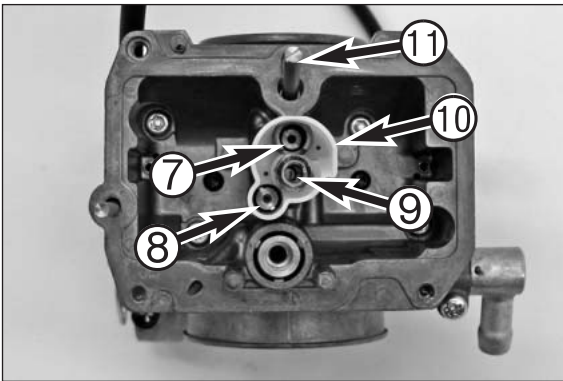
- Remove the 3 screws from the accelerator pump cover and remove the accelerator pump cover.
- Take the 2 seal rings **1**, spring **2** and diaphragm **3** out of the accelerator pump housing.



- Remove the remaining screws on the float chamber and take off the float chamber housing **4**.

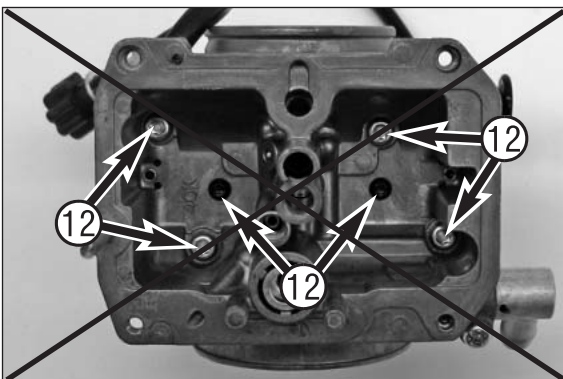


- Pull out the float hinge pin **5** and remove the float together with the float needle valve.
- Remove the main jet **6**.

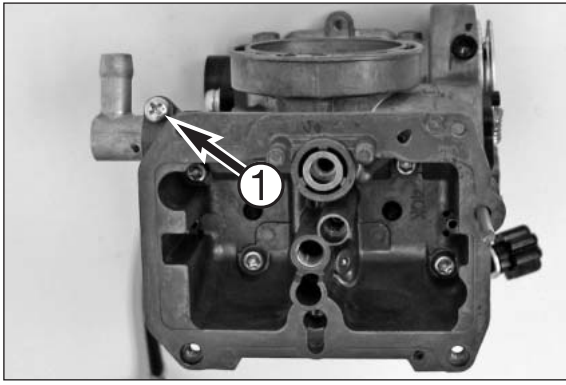


- Remove the idling jet **7**, starting jet **8**, needle jet **9** and damper body **10**.
- Turn the mixture control screw **11** all the way in (count and write down the number of turns).
- Unscrew the mixture control screw and remove together with the spring, washer and O-ring.

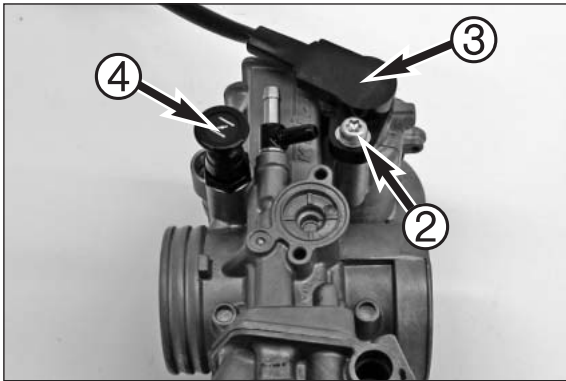
NOTE: The spring, washer and O-ring usually stay in the bore. These parts can be removed with compressed air. The mixture control screw **11** should not be open more than 2 turns. If more than two turns are required (richer mixture), use a larger idling jet.



- Do **not** remove the screws **12**.

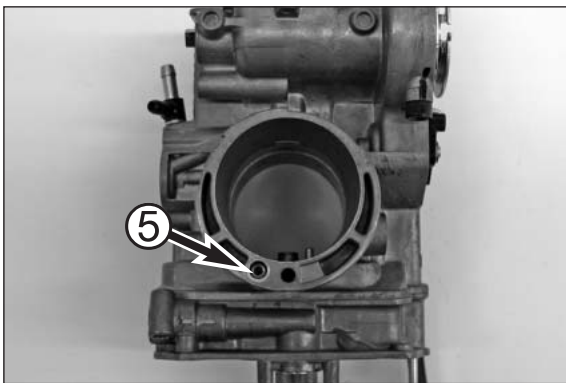


- Remove the screw ① and pull the hose connection out of the carburetor.



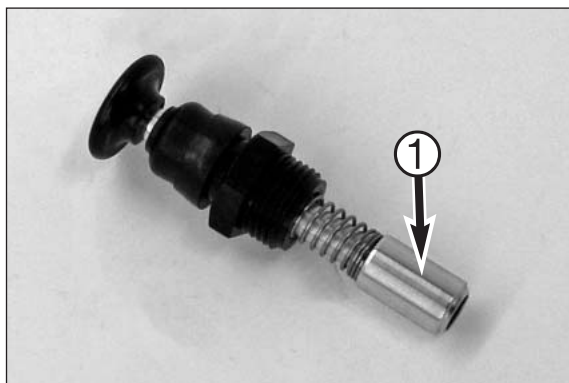
NOTE: only remove the throttle sensor if it is defective. If you loosen the screw ②, you will need to readjust the throttle sensor.

- Remove the screw ② and take off the throttle sensor ③.
- Unscrew the choke slide ④.



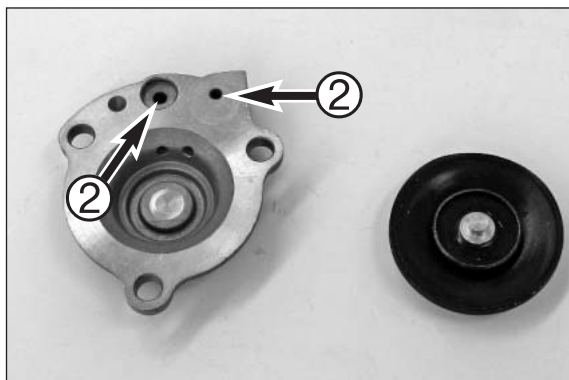
- Unscrew the idle-air jet ⑤.
- Thoroughly clean all jets and the other parts and blow dry with compressed air.
- Clean the carburetor housing and blow compressed air through all the carburetor ducts.
- Check all gaskets for damage and replace if necessary.

NOTE: do not use thinner to clean the carburetor.



Checking the choke slide

The choke slide should operate smoothly.
The choke slide piston ① should not have any deep score marks or deposits.
Check the condition of the rubber boot and the choke lock.



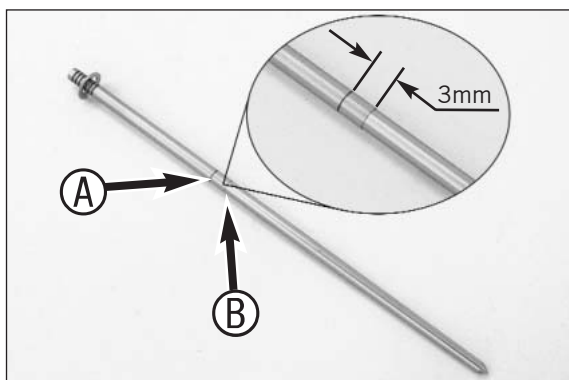
Checking the accelerator pump

Check the membrane for cracks or brittleness.
Check the gaskets for damage.
Make sure the bores ② are not clogged.



Checking the jet needle

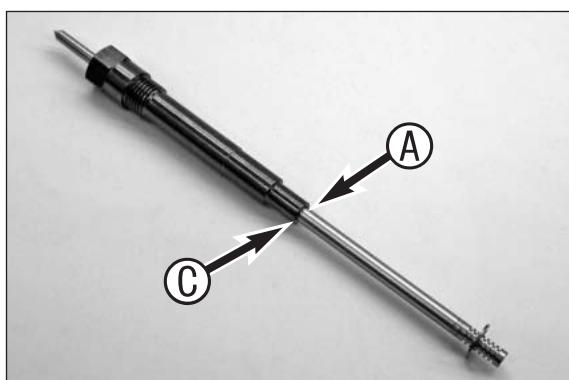
Check whether the jet needle is bent or the coating worn.
Check the needle clip for a tight fit.



Checking the needle jet (after 30 hours of operation)

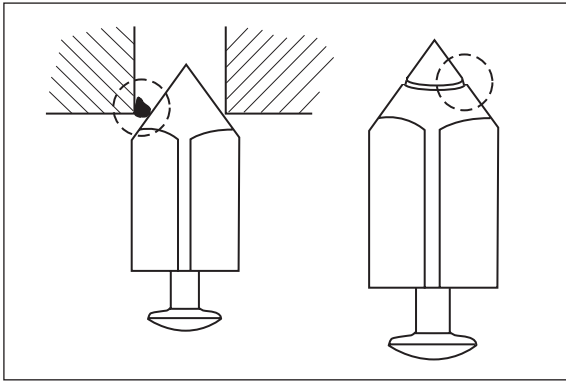
Use a flawless jet needle as a gauge.
Make a mark ① 3 mm above level ② on the jet needle.

NOTE: make sure the mark can be completely removed afterwards.



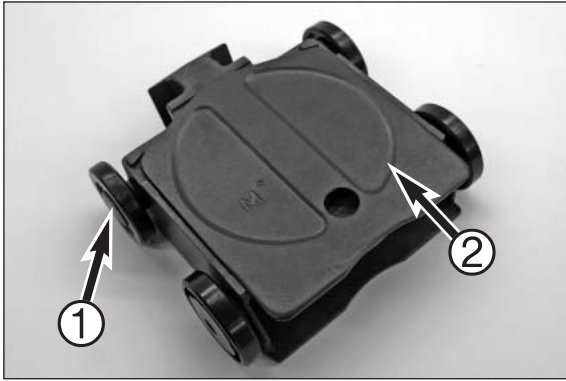
Insert the market jet needle in the needle jet to be tested. **Carefully** push the two parts together. If the mark ① on the jet needle can still be seen on the upper edge ③ of the needle jet, the needle jet can still be used.

If the mark on the jet needle is no longer visible, replace the needle jet.



Checking the float needle valve

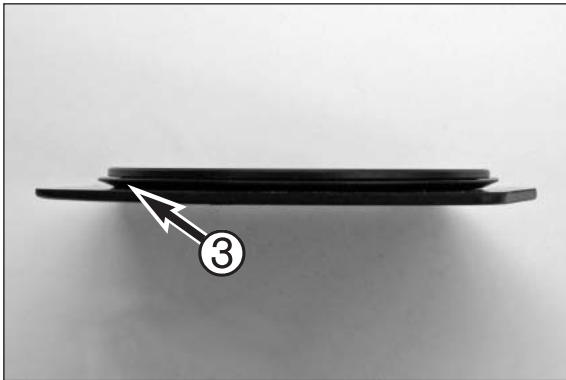
Check the needle valve at the sealing area for indentations. Make sure no dirt has accumulated between the valve seat and float needle.



Checking the throttle slide

The rollers on the throttle slide must turn easily and should not have any flat areas. They should be seated firmly on the throttle slide (except roller 1, which is removable).

Check the condition of the coating on the throttle slide and throttle slide plate 2. Replace if the coating is worn (if the bare aluminum is visible) or damaged.



Check the membrane 3 on the throttle slide plate for cracks or brittleness and make sure it is correctly seated.



Assembling the carburetor

Assemble the carburetor in the reverse order, paying attention to the following points:

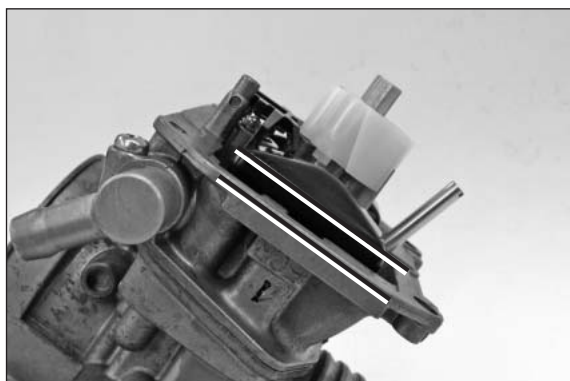
- Lock the screw on the throttle sensor with Loctite 243 but do not tighten yet.
- Lock the screws for the hose connection and the attachment of the throttle slide arm with Loctite 243.

NOTE: it should be possible to turn the hose connection freely when mounted.

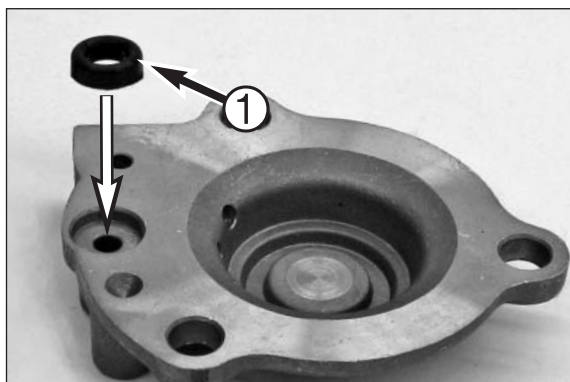


- Unscrew the mixture control screw the number of turns written down during disassembly. See "Technical Specifications" for the basic carburetor setting.

NOTE: the mixture control screw should not be open more than 2 turns. Use a bigger idling jet if more than two turns are necessary (richer mixture).



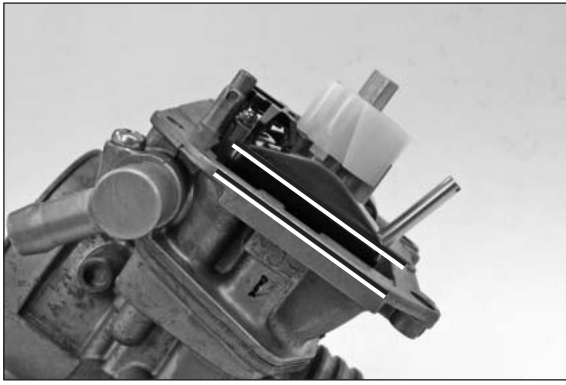
- Check and/or adjust the float height.



- Check and/or adjust the throttle slide opening.
- Check and/or adjust the operation of the accelerator pump.
- Fasten the seal ring ① with the rounded side facing up in the accelerator pump cover.

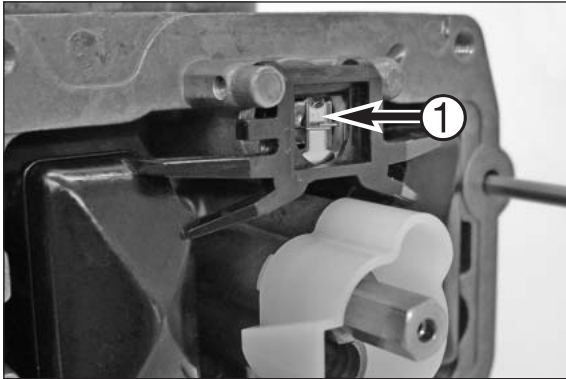
NOTE: mount the accelerator pump membrane with the writing facing the accelerator pump cover.

- Check and/or adjust the position of the throttle sensor.
- Check and/or adjust the idling speed.

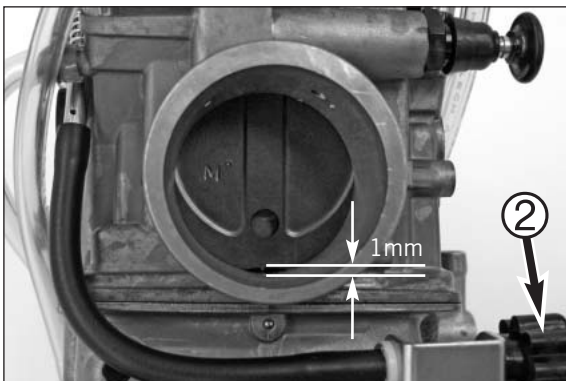


Checking/adjusting the float height

- Tilt the carburetor until the float rests against the float needle valve without compressing it.
- The edge of the float should be parallel to the sealing area of the float chamber in this position (see photo).
- If the float height does not correspond to the setpoint value, check the float needle valve and replace if necessary.



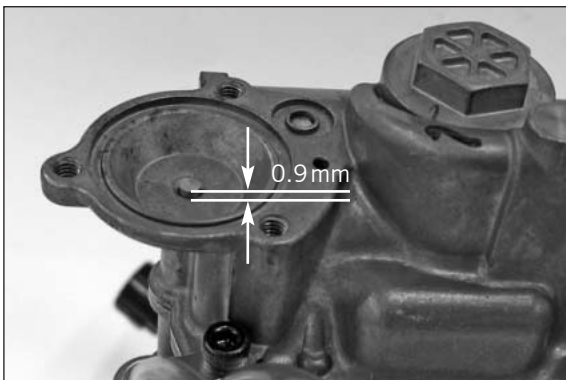
- If the float needle valve is good you can adjust the float height by bending the float tab ①.



Checking/adjusting the throttle slide opening

NOTE: the basic 1 mm throttle slide setting only helps to control the beginning of injection by the accelerator pump and the basic setting of the throttle sensor.

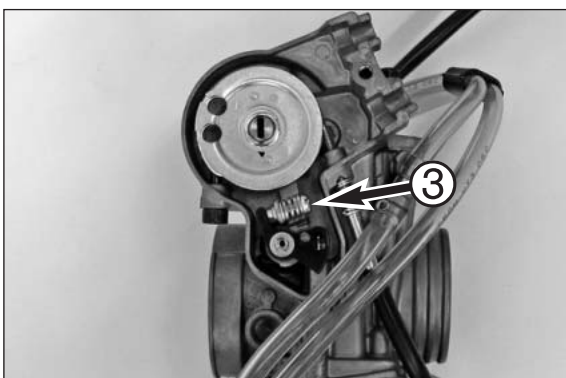
- Use the adjusting screw ② to set the opening of the throttle slide to 1 mm. This test is easily performed with a 1 mm drill bit shaft or wire.



Checking/adjusting the operation of the accelerator pump

NOTE: adjusting the accelerator pump clearance will change the beginning of injection and will not affect the quantity injected or intensity of the accelerator pump.

- A 1mm opening of the throttle slide is a prerequisite for the correct adjustment of the accelerator pump operation.
- The basic setting for the accelerator pump piston rod projection is 0.9 mm.



- The piston rod projection can be corrected by turning the adjusting screw ③.

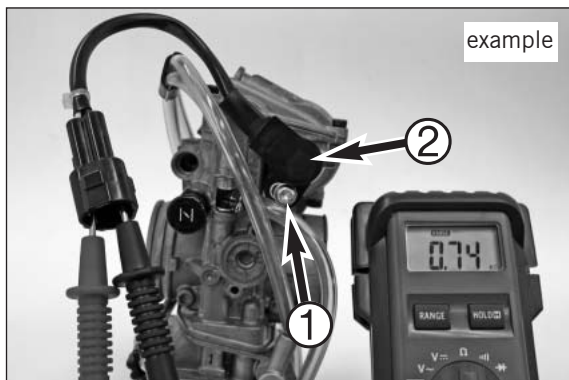
NOTE: check and/or adjust the idling speed.



Adjusting the position of the throttle sensor

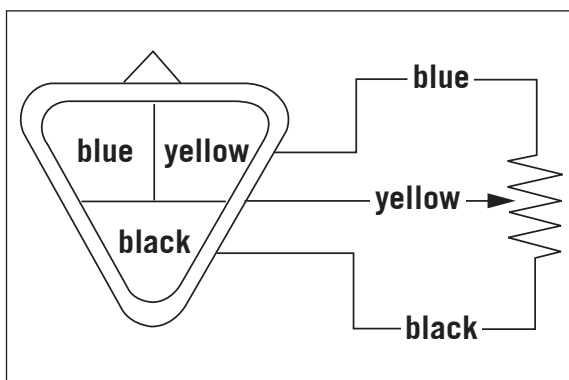
NOTE: the following measurement must be made at a component temperature of approx. 20°C. The carburetor must be dismounted to take this measurement. The throttle slide must be in the starting position (1mm open).

- Connect a multimeter (measuring range kΩ) to the blue (+) and black (-) cables on the throttle sensor and measure the total resistance of the throttle sensor (R_{ges}).
- Multiply the throttle sensor total resistance (R_{ges}) by 0.17 to obtain the variable throttle sensor resistance (R_{var}) for the throttle sensor setting.



R_{ges} (bu/bl) = 4 - 6 kΩ (setpoint value)

R_{var} (ye/bl) (tolerance ± 0.05 kΩ) = $R_{ges} \times 0.17$



- Connect the multimeter (measuring range kΩ) to the yellow (+) and black (-) cables on the throttle sensor and measure the variable throttle sensor resistance (R_{var}).
- If the measured value does not correspond to the calculated setpoint value, loosen the screw ① and adjust the setpoint value by turning the throttle sensor ②.
- Tighten the screw to set the throttle sensor in this position and check by measuring again.

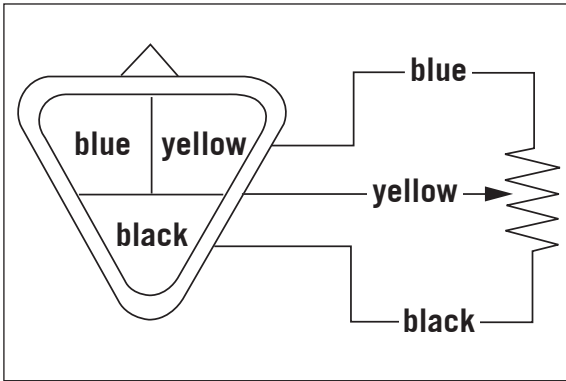


Checking the throttle sensor

NOTE: the following measurement must be made at a component temperature of approx. 20°C. The carburetor must be dismantled to take this measurement. The throttle slide must be in the starting position (1mm open).

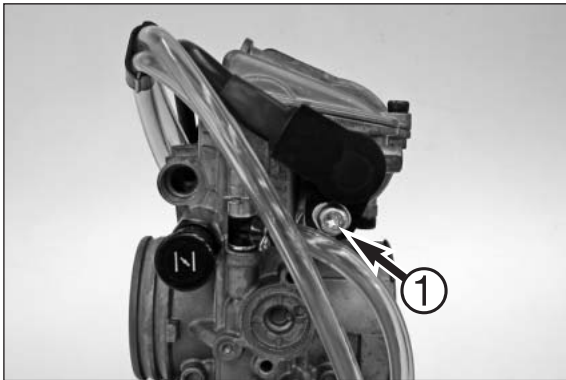
- Connect a multimeter (measuring range $k\Omega$) to the blue (+) and black (-) cables on the throttle sensor and measure the total resistance of the throttle sensor (R_{ges}).

Throttle sensor total resistance (R_{ges}): 4 - 6 $k\Omega$



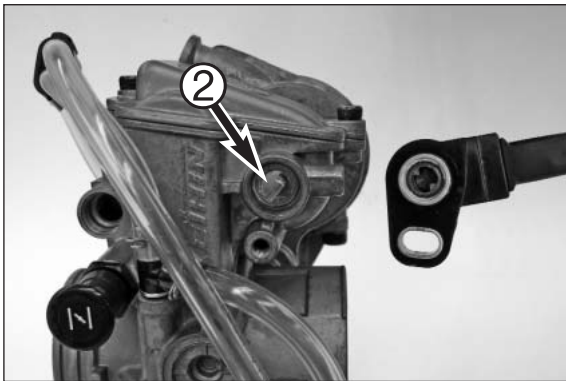
- Connect the multimeter (measuring range $k\Omega$) to the yellow (+) and black (-) cables on the throttle sensor and measure the variable throttle sensor resistance (R_{var}).
- When the throttle slide is opened slowly, the resistance should steadily increase to:

Variable throttle sensor resistance (R_{var}): 3 - 4.5 $k\Omega$
(throttle slide fully open)

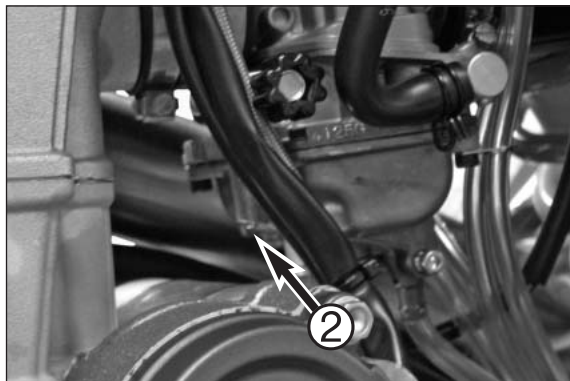
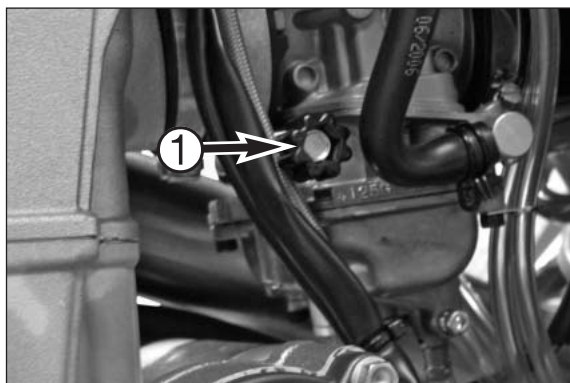


Removing and mounting the throttle sensor

- Disconnect the plug connector from the throttle sensor and remove the screw ①.
- Remove the throttle sensor from the carburetor.



- When you mount the throttle sensor make sure the flat part of the driver ② engages in the recess in the throttle sensor.
- Degrease the screw thread and apply Loctite 243.
- Mount the screw but do not tighten yet. Adjust the position of the throttle sensor.



Adjusting the idle speed

The carburetor idle speed strongly influences the starting performance, a stable idle and engine responsiveness when accelerating. An engine with a correct idle speed will be easier to start than one with an incorrect idle adjustment.

The idle speed is adjusted with the adjusting screw ① and the idle mixture with the mixture control screw ②. The adjusting screw sets the basic position of the throttle slide. Turning in a clockwise direction will decrease the amount of fuel (lean mixture), turning in a counterclockwise direction will increase the amount of fuel (rich mixture).

TO SET THE CORRECT IDLE SPEED, PROCEED AS FOLLOWS:

1. Turn the mixture control screw ② all the way in and adjust to the specified basic setting (see Technical Specifications - Engine).

NOTE: use special tool 773.29.034.000 to adjust the mixture control screw on the vehicle.

2. Warm up the engine (approx. 5 minutes).
3. Adjust the idle speed (1600/min + 50/min) with the adjusting screw ①.
4. Slowly turn the mixture control screw ② in a clockwise direction until the idle speed starts to drop. Mark this position and slowly turn the mixture control screw in a counterclockwise direction until the idle speed starts to drop again. Set the position with the highest idle speed between these two positions. If this results in an increased speed, reduce the idling speed to a normal level and repeat step 4. Extreme sport racers will set this ideal setting approx. 1/4 turn leaner (in a clockwise direction), since the engine will become hotter during competitions.

NOTE: if satisfactory results are not achieved with the above mode of procedure, an incorrectly dimensioned idling jet could be the cause. If:

- a) the mixture control screw is turned all the way in without changing the speed, use a smaller idling jet.
 - b) the engine is still too lean when the mixture control screw 2 is open two turns, use a larger idling jet.
- Readjust every time you replace the jets.

5. Set the desired idling speed with the adjusting screw.
6. The idling speed must be readjusted for larger fluctuations in the outside temperature and at extreme altitudes.

Basic information on carburetor wear

The throttle slide, jet needle and needle are subjected to increased wear due to engine vibrations. This wear will cause the carburetor to malfunction (e.g. to over-enrich). These components should be checked for wear every 50 operating hours.

TROUBLE SHOOTING

9

INDEX

TROUBLE SHOOTING	9-2
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TROUBLE	CAUSE	REMEDY
Engine doesn't crank (E-starter).	Blown fuse	Dismount the filter box cover and replace the fuse in the starter relay.
	Discharged battery	Recharge the battery and investigate the causes for discharging.
	Low outside temperature	Use the 12 V / 4 Ah battery included in the scope of supply.
Engine cranks but doesn't start (E-starter).	Operating error	Open fuel tap, tank fuel, actuate choke. Pay attention to starting information (see driving instructions).
	The motorcycle has been out of operation for a longer period of time. Therefore old fuel has accumulated in the float chamber	The easily inflammable components of the new fuels evaporate during longer periods of standing still. When the motorcycle has been out of operation for more than a week, it is therefore recommended to drain the old fuel from the float chamber. The engine will immediately start when the float chamber is filled with new fuel.
	Fuel supply interrupted	Close fuel tap, loosen fuel hose at carburetor, lead into a basin and open fuel tap <ul style="list-style-type: none"> - if fuel leaks out, the carburetor may need cleaning - if no fuel leaks out, check tank ventilation, i.e. clean fuel tap
	Flooded engine	Clean and dry the spark plug or exchange it, respectively
	Sooty or wet spark plug	Clean and dry the spark plug or exchange it, respectively
	Electrode gap too large	Adjust spark plug electrode gap to 0.6 mm
	Spark plug connector or spark plug faulty	Dismount spark plug, connect ignition cable, hold to ground (blank place on engine) and actuate starter, a strong spark must be produced at the spark plug <ul style="list-style-type: none"> - If no spark is created replace the spark plug. - If the new spark plug doesn't produce a spark either, disconnect the spark plug connector from the ignition cable, hold it a distance of approx. 5 mm from ground and start. - If a spark now occurs, replace spark plug cap - If no spark is produced, control ignition system
	Short circuit cable scored in wiring harness, short circuit button faulty	Dismount the fuel tank, disconnect the black/yellow cable from the cable of the short-circuit button, respectively, and check the ignition spark. If a spark is generated, look for the problem in the short-circuit circuit.
	The plug connection of the CDI-unit, the pulse generator or the ignition coil has oxydized	Remove the seat and the fuel tank. Clean the plug connection and treat it with contact spray
Water in carburetor or jets blocked	Dismount and clean the carburetor	
Engine fails to idle	Clogged idling jet	Disassemble the carburetor and clean the jets
	Incorrect adjustment of adjusting screws on carburetor	Adjust carburetor
	Defective spark plug	Replace the spark plug
	Defective ignition system	Check ignition system

TROUBLE	CAUSE	REMEDY
Engine does not rev up	Carburetor fuel level too high because float needle valve is dirty or worn out Loose carburetor jets Electronic ignition timing faulty	Dismount carburetor and check if worn out Tighten jets Check ignition system
Engine will not reach full power	Fuel supply partially interrupted or carburetor dirty Air filter very dirty Exhaust system is not tight, deformed, or the silencer does not contain enough glassfiber yarn Valve gap too small Electronic ignition timing faulty	Clean and check fuel system as well as carburetor Clean or replace air filter Check if exhaust is damaged, replace glassfiber yarn in exhaust silencer Adjust valve gap Check ignition system
Engine stops or splutters in carburetor	Insufficient fuel Engine takes air out of control	Clean and check fuel system and carburetor Check rubber sleeve and carburetor for tight fit
Engine gets too hot	Insufficient cooling liquid Not enough air stream Cooling system has not been bled Radiators very dirty Foam formation in cooling system Bent cooling hose	Add cooling liquid, check cooling system for leaks Drive on briskly Bleed cooling system Clean radiators with water jet Replace cooling liquid, use antifreeze liquid with brand name Shorten or replace cooling hose
High oil consumption	Hose of engine ventilation is bent Engine oil level too high Motor oil too thin (viscosity)	Dislocate i.e. replace non-buckling ventilation hose Correct engine oil level Use recommended engine oil
The battery is discharged	The battery isn't charged by the generator	Remove seat and fuel tank and check voltage regulator connections; voltage regulator and generator should be checked.

TECHNICAL SPECIFICATIONS

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TECHNICAL SPECIFICATIONS - ENGINE 2007

	450 SX-F / 450 SXS-F	505 SX-F
Design	Liquid-cooled, 1-cylinder, 4-stroke Otto engine	
Displacement	449.3 ccm	477.5 ccm
Bore / Stroke	97 / 60.8 mm	100 / 60.8 mm
Compression ratio	12.5 : 1	
Fuel	Unleaded premium fuel with at least RON 95 (USA = Premium PON 91)	
Valve timing	4 valves controlled via cam lever and 2 camshafts, driven by a pair of spur gears and a tooth-type chain	
Valve diameter intake	40.4 mm	
Valve diameter exhaust	31.7 mm	
Valve clearance, cold, intake	0.10 - 0.15 mm	
Valve clearance, cold, exhaust	0.15 - 0.20 mm	
Crankshaft bearing	2 cylindrical roller bearings	
Conrod bearing	Needle bearing	
Piston pin bearing	Bronze bushing	
Piston	Light alloy - forged	
Piston rings	1 compression ring, 1 oil scraper ring	
Engine lubrication	Pressure circulation lubrication with 3 rotary pumps	
Engine oil	Fully synthetic engine oil (Motorex Power Synt 4T 10W/50) 10W/50 for temperatures over 5°C or 5W/40 for temperatures under 5°C	
Quantity of engine oil	1.3 liters	
Primary drive	29:74	
Transmission (claw shifted)	4-speed	
1 st gear	17:32	
2 nd gear	19:30	
3 rd gear	21:28	
4 th gear	23:26	
Ignition system	Breakerless DC-CDI ignition system with digital ignition timing, type KOKUSAN	
Generator	42 W at 6000 rpm	
Spark plug	NGK CR 9 EKB	
Cooling system	Liquid cooled, permanent circulation of cooling liquid through water pump	
Cooling liquid	1.2 liters, 50% antifreeze, 50% distilled water, at least -25°C	
Starting aid	Electric starter	

BASIC CARBURETOR SETTING			
	450 SX-F	450 SXS-F	505 SX-F
Type of carburetor	Keihin FCR-MX 4125G	Keihin FCR-MX 4125G	Keihin FCR-MX 4125H
Main jet	185	190	185
Jet needle	OBDTP	OBDTR	OBDTP
Idling jet	40	40	42
Idle air jet	100	100	100
Needle position	4 th from top	4 th from top	5 th from top
Starting jet	85	85	85
Mixture control screw, open	1.5	1.5	1.5
Slide	15	15	15
Throttling	-	-	-
Hot start system	2.5 mm	2.5 mm	2.5 mm

TECHNICAL SPECIFICATIONS – CHASSIS 2007

	450 / 505 SX-F	450 SXS-F
Frame	Central tube chrome-molybdenum-steel frame	
Fork	4860 MXMA CC	
Fork offset (caster)	adjustable 18mm/20mm	adjustable 17.5mm/20.5mm
Front/rear suspension travel	300/335 mm	
Rear suspension	WP Progressive Damping System shock absorber, aluminum swing arm	
Front brake	Disk brake with perforated Ø 260 mm brake disk, brake caliper floated	
Rear brake	Disk brake with perforated Ø 220 mm brake disk, brake caliper floated	
Brake disks, Wear limit	2.5 mm front; 3.5 mm rear	2.5 mm front; 3.8 mm rear
Tires, front	80/100 - 21"	
Off-road air pressure	1.0 bar	
Tires, rear	110/90 - 19"	
Off-road air pressure	1.0 bar	
Fuel tank capacity	approx. 8 liters	
Final drive ratio	14:52	
Chain	5/8 x 1/4"	
Battery	maintenance-free battery 12V 3 Ah and 4 Ah	
Steering head angle	63.5°	
Wheel base	1475 ± 10 mm	
Seat height, unloaded	925 mm	
Ground clearance, unloaded	380 mm	
Weight (without fuel)	approx. 104 kg	

STANDARD ADJUSTMENT – FORK

	450 / 505 SX-F WP 4860 MXMA CC 14.18.7C.05	450 SXS-F WP 4860 MXMA CC 14.18.7C.16
Compression adjuster	15	15
Rebound adjuster	21	22
Spring	4.6 N/mm	4.6 N/mm
Oil quantity fork tube without CC	375 ml	380 ml
Oil quantity CC	195 ml	195 ml
Gas pressure	1.2 bar	1.8 bar
Fork oil	SAE 5	SAE 5

STANDARD ADJUSTMENT – SHOCK ABSORBER

	450 / 505 SX-F WP 5018 PDS DCC 12.18.7C.05	450 SXS-F WP 5018 PDS DCC 12.18.7C.12
Compression adjuster	15 LS (low speed) 1 HS (high speed)	12 LS (low speed) 20 HS (high speed)
Rebound adjuster	25	20
Spring	66-250	72-250
Spring preload	7 mm	7 mm
Static sag	33 mm	33 mm
Riding sag	110 mm	107 mm

MOUNTING CLEARANCES, WEAR LIMITS			
Crankshaft		Axial clearance	0.25 - 0.35 mm
		Lateral runout	max: 0.15 mm
		Crankshaft web - outer size	64 mm ± 0.05 mm
Conrod bearings		Radial clearance	max. 0.03 mm
		Axial clearance	max. 0.80 mm
Cylinder	450 SX-F / 450 SXS-F	Bore diameter, size I	97.000 - 97.012 mm
		Bore diameter, size II	97.012 - 97.025 mm
	505 SX-F	Bore diameter, size I	100.000 - 100.012 mm
		Bore diameter, size II	100.012 - 100.025 mm
Piston	450 SX-F / 450 SXS-F	Diameter, size I	96.960 - 96.970 mm
		Diameter, size II	96.971 - 96.980 mm
	505 SX-F	Diameter, size I	99.960 - 99.970 mm
		Diameter, size II	99.971 - 99.980 mm
		Mounting clearance, size I	0.030 - 0.052 mm
		Mounting clearance, size II	0.032 - 0.054 mm
		Wear limit	0.070 mm
Piston ring end gap		Compression ring	max. 0.80 mm
		Oil scraper ring	max. 1.00 mm
Valves		Sealing seat width, intake	max. 1.50 mm
		Sealing seat width, exhaust	max. 1.50 mm
		Spring washer	min. 1.40 mm
Valve springs		Min. length, outer valve springs	40.0 mm (new 40.3 mm)
		Min. length, inner valve springs	39.0 mm (new 39.9 mm)
Bypass valve		Min. spring length	36.0 mm (new 36.36 mm)
		Seal ring thickness	1.5 ± 0.2 mm
Clutch		Clutch spring length	min. 39.0 mm (new 40.0 mm)
		Min. lining disk thickness	min. 2.6 mm (new 2.7 mm)
Camshaft friction bearings		Radial clearance	0.029 - 0.053 mm
		Wear limit	0.055 mm
Shift fork		Min. thickness at blade	3.90 - 3.95 mm
		Wear limit	3.70 mm

TIGHTENING TORQUES - ENGINE		
Oil jet for piston	M4	Loctite 243 + 4 Nm
Oil restrictor jet for crankshaft	M4	Loctite 243
Crankcase air jet	M4	Loctite 243
Oil jet for cam lever / camshaft	M4	Loctite 243 + 6 Nm
Throttle oil supply clutch	M5	Loctite 243 + 6 Nm
Screw on locking lever	M5	Loctite 243 + 6 Nm
Screw on retaining bracket for camshaft bearing	M5	Loctite 243 + 6 Nm
Screw on oil pump cover, right	M5	Loctite 243 + 6 Nm
Screw on bearing bolt for oil pump idler	M5	Loctite 243 + 6 Nm
Screw on retaining bracket for timing train axle	M5	Loctite 243 + 6 Nm
Screw on bearing lock washer	M5	Loctite 243 + 6 Nm
Screw on stator	M5	Loctite 243 + 6 Nm
Screw on retaining bracket for stator cable	M5	Loctite 243 + 6 Nm
Screw on pulse generator / pulse generator adapter	M5	Loctite 243 + 6 Nm
Screw on engine case	M6	oiled 10 Nm
Screw on clutch, ignition and water pump cover	M6	10 Nm
Screw on oil pump cover, left	M6	Loctite 243 + 10 Nm
Screw on clutch spring	M6	10 Nm
Stud for screw cap on cylinder / cylinder head	M6	10 Nm
Screw on clutch slave cylinder	M6	10 Nm
Screw on shift lock	M6	Loctite 243 + 10 Nm
Cap nut on water pump	M6	Loctite 243 + 6 Nm
Screw on valve cover	M6	8 Nm
Nut on cylinder head screw cap	M6	oiled 10 Nm
Throttle oil supply timing-chain tensioner	M6	Loctite 243 + 6 Nm
Screw on oil filter cover	M6	10 Nm
Screw on exhaust flange	M6	Loctite 243 + 10 Nm
Screw on electric starter engine	M6	10 Nm
Screw on retaining bracket for pulse generator cable	M6	Loctite 243 + 10 Nm
Screw on shift lever	M6	Loctite 243 + 10 Nm
Screw on engine case	M7x1	oiled 14 Nm
Screw on clutch cover	M7x1	14 Nm
Screw on camshaft bearing bridge	M7	geölt 14 Nm
Plug for engine locking screw	M8	20 Nm
Screw on camshaft gear	M10x1	oiled 50 Nm
Plug on cam lever shaft	M10x1	10 Nm
Plug on oil duct	M10x1	10 Nm
Plug on timing chain tensioner release	M10x1	10 Nm
Screw on rotor	M10x1	oiled 80 Nm
Stud for screw cap on cylinder / cylinder head	M10x1.25	20 Nm
Nut for cylinder head screw cap	M10x1.25	oiled 10/30 Nm + 50°
Spark plug	M10	10 - 12 Nm
Screw on rear sprocket	M10	Loctite 243 + 60 Nm
Oil drain screw	M12x1.5	20 Nm
Threaded sleeve for engine ventilation	M12x1.5	16 Nm
Nut for balancer gear	M14x1	Loctite 243 + 20 Nm
Oil intake snorkel	M14x1	Loctite 243 + 15 Nm
Axle for tensioning rail/guide rail	M14x1	15 Nm
Plug on bypass valve	M14x1.5	18 Nm
Nut on clutch drive	M18x1.5	Loctite 243 + 80 Nm
Plug on timing chain tensioner	M24x1.5	25 Nm
Nut on primary gear/freewheel hub	M27x1	60 Nm
Plug on oil screen	M32x1.5	oiled 30 Nm

TIGHTENING TORQUES - CHASSIS		
Spoke nipple	M4.5 / M5	5 Nm
Screw on brake disk	M6	Loctite 243 + 14 Nm
Screw on push rod ball joint	M6	10 Nm
Screw on brake caliper, front	M8	Loctite 243 + 25 Nm
Screw on upper triple clamp	M8	17 Nm
Screw on lower triple clamp	M8	12 Nm
Screw on steering stem	M8	Loctite 243 + 17 Nm
Screw on fork stub	M8	15 Nm
Screw on handlebar clamp	M8	20 Nm
Nut for rear sprocket screw cap	M8	Loctite 2701 + 35 Nm
Screw for bracket mounting	M8	Loctite 2701 + 35 Nm
Screw for engine brace	M8	33 Nm
Nut for rim lock	M8	10 Nm
Screw for handlebar mount	M10	Loctite 243 + 40 Nm
Screw for engine mount	M10	60 Nm
Nut for seat mount	M12x1	20 Nm
Screw for shock absorber	M12	Loctite 243 + 70 Nm
Nut for swing arm bolt	M16x1.5	100 Nm
Screw for steering head, top	M20x1.5	10 Nm
Screw for steering head, bottom	M20x1.5	Loctite 243 + 60 Nm
Nut for rear wheel spindle	M20x1.5	80 Nm
Threaded sleeve on frame	M20x1.5	Loctite 243 + 12 Nm
Screw for front wheel spindle	M24x1.5	40 Nm
Other chassis screws	M6	10 Nm
	M8	25 Nm
	M10	45 Nm
Other chassis nuts	M6	15 Nm
	M8	30 Nm
	M10	50 Nm

PERIODIC MAINTENANCE SCHEDULE

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PERIODIC MAINTENANCE SCHEDULE 2007

450/505 SX-F / 450 SXS-F

A CLEAN MOTORCYCLE CAN BE CHECKED MORE QUICKLY WHICH SAVES MONEY!		1st service after 3 hours or 20 l fuel	every 10 hours or 70 l fuel
ENGINE	Change engine oil, oil filter	●	●
	Clean oil screen and drain plug magnet	●	●
	Replace spark plug (after 30 hours)		
	Check and adjust valve clearance	●	●
	Check engine mounting bolts for tightness	●	●
	Clean the spark-plug connector and check for a tight fit	●	●
	Check the screw on the shift lever for a tight fit	●	●
CARBURETOR	Check carburetor connection boot for cracks and leaks		●
	Check idle speed setting	●	●
	Check vent hoses for damage or bends	●	●
ADD-ON PARTS	Check cooling system for leaks, check quantity of antifreeze	●	●
	Check exhaust system for leaks and fitment		●
	Check cables for damage, smooth operation and bends, adjust and lubricate	●	●
	Check fluid level of the clutch master cylinder	●	●
	Clean air filter and filter box		●
	Check electric wires for damage and bends		●
BRAKES	Check brake fluid level, lining thickness, brake disks	●	●
	Check brake lines for damage and leaks	●	●
	Check/function smooth operation and adjust free travel of handbrake/foot brake lever	●	●
	Check the screws and guide bolts on the brake system for a tight fit	●	●
CHASSIS	Check shock absorber and fork for leaks and function	●	●
	Clean fork dust bellows		●
	Bleed fork legs		●
	Check swing arm bearings		●
	Check/adjust steering head bearings	●	●
	Check tightness of chassis screws (triple clamps, fork leg axle passage, swingarm, shock absorber)	●	●
WHEELS	Check spoke tension and rim joint	●	●
	Check tires and air pressure	●	●
	Check chain, chain joint, rear sprockets and chain guides for wear, fit and tension	●	●
	Lubricate chain, clean and grease the adjusting screws on the chain tensioner	●	●
	Check clearance of wheel bearings	●	●

ADDITIONAL SERVICE WORK THAT MUST BE PERFORMED UNDER A SEPARATE ORDER		
	at least once a year	every 2 years
Complete maintenance of fork	●	
Complete maintenance of shock absorber		●
Clean and grease steering head bearings and gasket elements	●	
Clean and adjust carburetor	●	
Treat electric contacts and switches with contact spray	●	
Change hydraulic clutch fluid	●	
Change brake fluid	●	

IF MOTORCYCLE IS USED FOR COMPETITION 10 HOURS SERVICE SHOULD BE CARRIED OUT AFTER EVERY RACE.
Service intervals should never be exceeded by more than 2 hours or 15 liters of fuel.
Maintenance work done by KTM authorised workshops is not a substitute for care and checks done by the rider.



IMPORTANT CHECKS AND MAINTENANCE TO BE CARRIED OUT BY THE RIDER				
	Before each start	After every cleaning	For cross-country use	at least once a year
Check oil level	●			
Check brake fluid level	●			
Check brake pads for wear	●			
Lubricate and adjust cables and nipples		●		
Bleed fork legs regularly			●	
Remove and clean fork dust bellows regularly			●	
Clean and lubricate chain, check tension and adjust if necessary		●	●	
Clean air filter and filter box			●	
Check tires for pressure and wear	●			
Check cooling fluid level	●			
Check fuel lines for leaks	●			
Drain and clean float chamber		●		●
Check all control elements for smooth operation	●			
Check brake performance	●	●		
Treat blank metal parts (with the exception of brake and exhaust system) with wax-based anti corrosion agent		●		
Check tightness of screws, nuts and hose clamps regularly				●

IMPORTANT INSPECTIONS OR MAINTENANCE WORK THAT MUST BE PERFORMED BY THE SPECIALIZED KTM WORKSHOP (SEPARATE ORDER FOR SPECIALIZED KTM WORKSHOP)					
	every 10 hours 70 liter	every 20 hours 140 liter	every 40 hours 270 liter	every 60 hours 400 liter	every 80 hours 540 liter
A 100 liter fuel consumption is equivalent to approx. 15 operating hours					
Check the clutch disks for wear		●	●	●	●
Check the length of the clutch springs		●	●	●	●
Check the clutch drive for indentations		●	●	●	●
Check the outer clutch hub for indentations		●	●	●	●
Check the cylinder for wear and replace the piston			●		●
Check the groove on the piston pin retainer for wear (visual check)			●		●
Check the camshaft for wear (visual check)			●		●
Check the spring cap for wear			●		●
Check the eccentricity of the valve disk			●		●
Check the valve guides for wear			●		●
Replace the valves			●		●
Replace the valve springs			●		●
Check the function of the chain tensioner			●		●
Check the eccentricity of the crankshaft journal			●		●
Replace the conrod bearings			●		●
Check piston pin bearing			●		●
Replace the crankshaft main bearings			●		●
Check the entire transmission including the roller and bearings for wear			●		●
Check the length of the bypass valve spring			●		●
Replace the glass-fiber yarn filling in the silencer	●	●	●	●	●
Replace the sealing cup for the foot brake cylinder		●	●	●	●
Check the throttle slide, jet needle and needle jet (every 50 hours)					

NOTE:

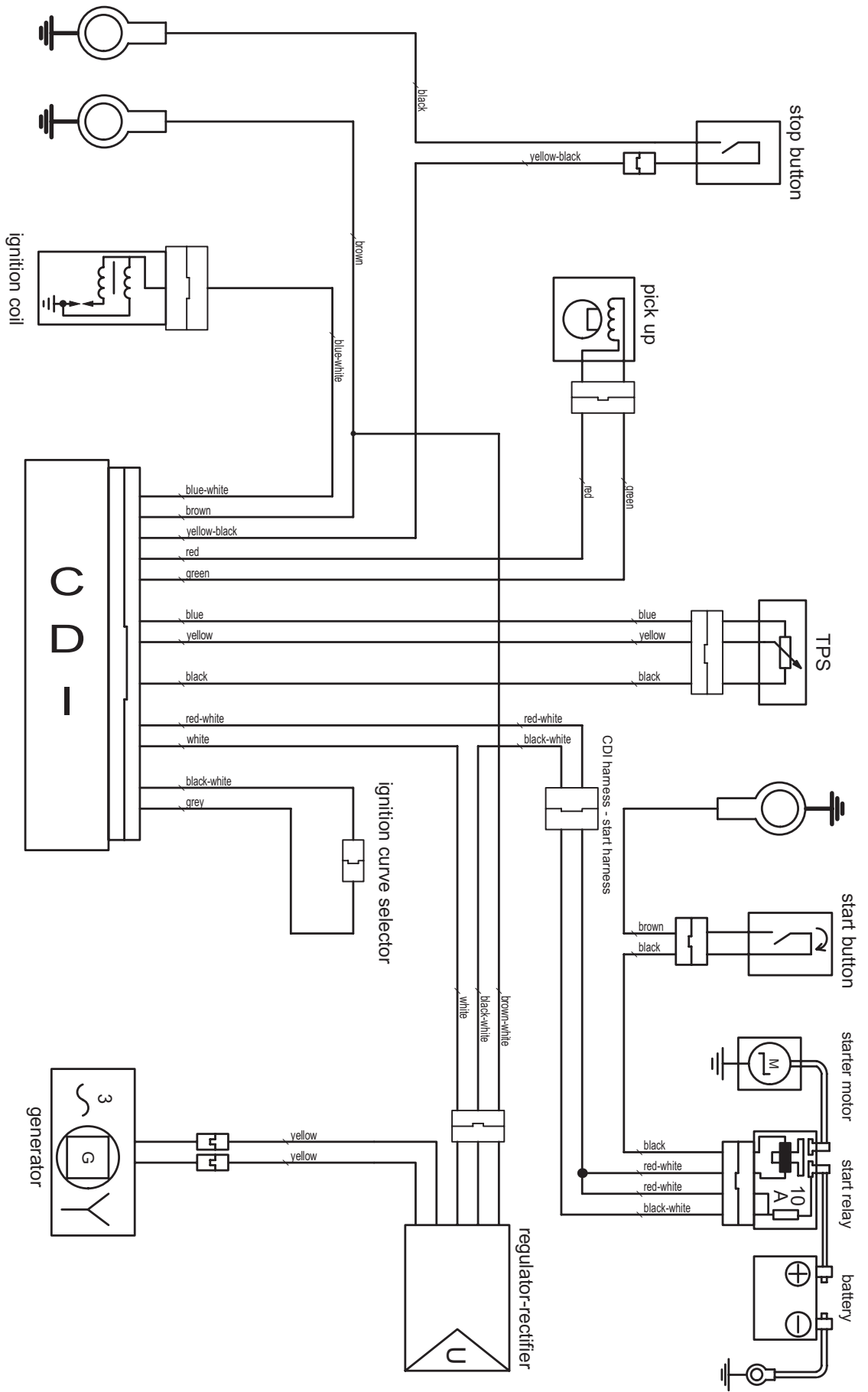
If the inspection establishes that permissible tolerances are exceeded, the respective components must be replaced.

WIRING DIAGRAMS

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450/505 SX-F 2007
450 SXS-F 2007

CDI harness - 773.39.032.000
start harness 773.11.079.000

10.04.2007

ENGLISH	DEUTSCH	ITALIANO	FRANCAIS	ESPANOL
Battery	Batterie	Batteria	Batterie	Batería
Generator	Generator	Generatore	Alternateur	Generador
Ignition coil	Zündspule	Bobina d'accensione	Bobine d'allumage	Bobina de encendido
Pick up	Impulsgeber	Pick up	Capteur d'allumage	Generador de impulsos
Regulator-rectifier	Regelgleichrichter	Regolatore-raddrizzatore	Régulateur/redresseur	Regulador rectificador
Start button	Starttaster	Pulsante d'avviamento	Bouton de démarrage	Botón de arranque
Start relay	Startrelais	Relè d'avviamento	Relais de démarreur	Relé del arranque
Starter motor	Startermotor	Motorino d'avviamento	Démarrreur	Motor de arranque eléctrico
Stop button	Kurzschlussaster	Bottone di massa	Bouton de mise à la masse	Botón de cortocircuito
Throttle position sensor (TPS)	Drosselklappensensor	Potenzionmetro carburatore (sensore TPS)	Captur d'ouverture de carburateur	Potenciómetro del carburador
CDI	CDI	CDI	CDI	CDI
Ignition curve selector	Zündkurvenstecker	Connettore curve d'accensione	Prise de courbe d'allumage	Terminal de la curva de encendido

CABLE COLOURS	KABELFARBEN	CAVO COLORATO	COULEUR DE CABLE	COLOR DE CABLE
bl: black	bl: schwarz	bl: nero	bl: noir	bl: negro
ye: yellow	ye: gelb	ye: giallo	ye: jaune	ye: amarillo
bu: blue	bu: blau	bu: blu	bu: bleu	bu: azul
gn: green	gn: grün	gn: verde	gn: vert	gn: verde
re: red	re: rot	re: rosso	re: rouge	re: rojo
wh: white	wh: weiß	wh: bianco	wh: blanc	wh: blanco
br: brown	br: braun	br: marrone	br: brun	br: marron
or: orange	or: orange	or: arancione	or: orange	or: naranja
pi: pink	pi: rosa	pi: rosa	pi: rose	pi: rosado
gr: grey	gr: grau	gr: grigio	gr: gris	gr: gris
pu: purple	pu: violett	pu: violetto	pu: violet	pu: violeta