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REPARATURANLEITUNG

REPAIR MANUAL

2004 - 2005

MANUEL DE REPARATION

HUSABERG
4 STROKE FORCE

PREFACE

This manual contains detailed instructions on repairing the engine. It was prepared according to the state of the art for this model series. We reserve the right to make modifications based on technical progress without making the respective corrections in this repair manual.

This manual does not contain a description of general shop or working methods. It does not include safety rules generally observed in workshops and is based on the assumption that the work is performed by a mechanic who has completed his vocational training.

Please read the entire manual before starting to work.



WARNING: failing to observe these instructions can be dangerous to life and limb.



CAUTION: failing to observe these instructions may damage the motorcycle/engine components or impair the motorcycle's traffic safety.



NOTE: provides useful information.

Only use **ORIGINAL HUSABERG SPARE PARTS** if parts need to be replaced.

The engine will only continue to operate safely if the prescribed service work is performed regularly and professionally.



Subject to changes in construction and design.

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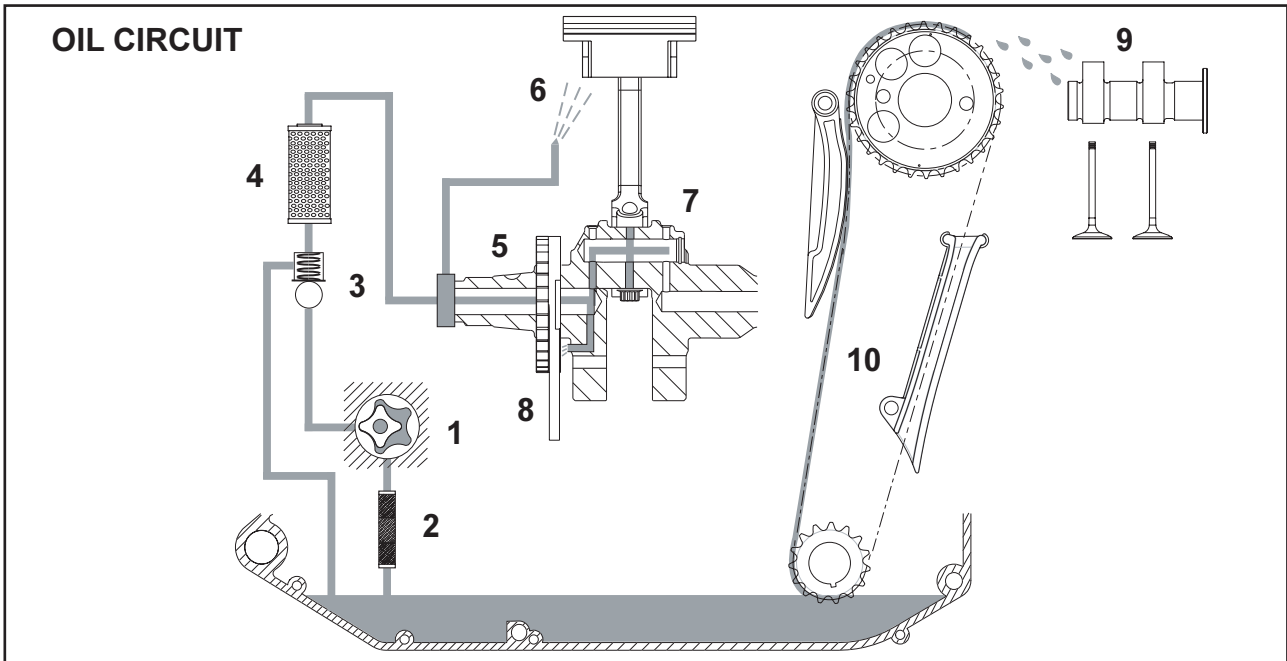
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GENERAL INFORMATION



DESCRIPTION:

The oil pump (1) draws the engine oil from the oil sump through the oil screen (2) and pumps it past the pressure relief valve (3) to the oil filter (4). It continues to the crankshaft (5), partly branching off through a hole to lubricate and cool the piston (6) and the piston pin bearing. Once through the crankshaft, the engine oil is pumped to the conrod bearing (7) and branches off again to the bearings in the balance weight (8).

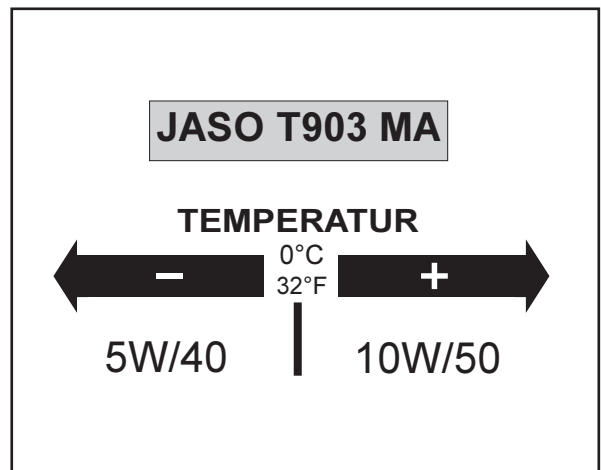
The camshaft (9) is lubricated by the engine oil which is transported to the cylinder head by the timing chain (10). On the downward movement of the piston, engine oil is pressed from the crankcase through the diaphragm valve (not depicted) to the transmission and shift mechanism.

ENGINE OIL

Only use fully synthetic brand-name engine oils (e.g.: Motorex Power Synt. 4T) that meet or exceed the Jaso T903 MA quality requirements (information on the can).



CAUTION: not enough engine oil or low-quality oil will lead to premature engine wear.



CHECKING THE ENGINE OIL LEVEL



NOTE: the engine oil level can be checked when the engine is cold or warm.

– Place the motorcycle on a level surface (not on the side stand).

If the engine is cold, the engine oil should be visible at the lower edge (A) of the inspection glass.

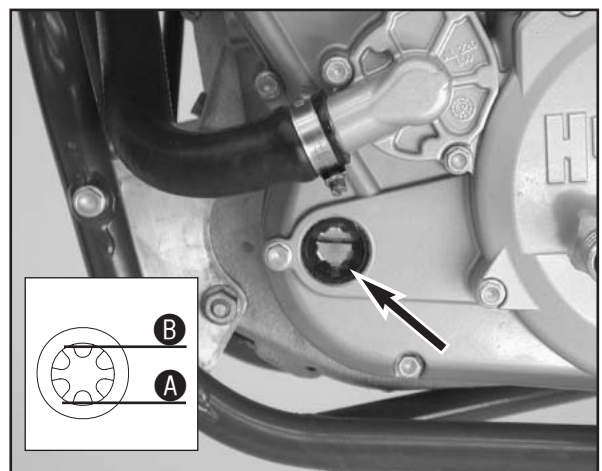
If the engine is warm, the engine oil should reach the upper edge (B) of the inspection glass.

Add engine oil if necessary.



CAUTION: not enough engine oil or low-quality oil will lead to premature engine wear.

– Check the engine for leakage.



GENERAL INFORMATION

CHANGING THE ENGINE OIL



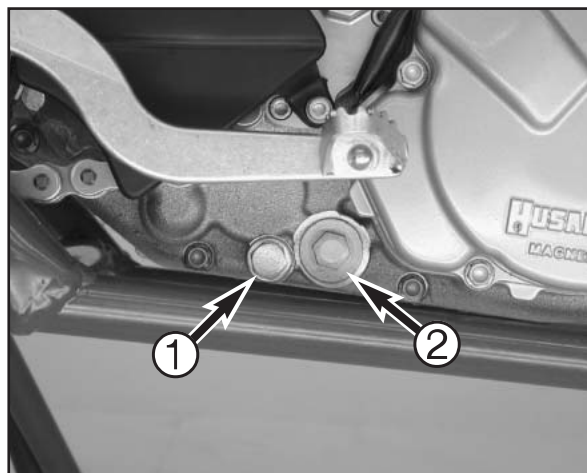
NOTE: Replace the oil screen and the oil filter when you change the engine oil.

Change the engine oil when the engine is at operating temperature.



WARNING: the engine oil will be very hot when the engine is at operating temperature – be careful not to burn yourself.

- Place the motorcycle on a level surface, remove the plug (1) and allow the oil to drain into a suitable vessel.
- Thoroughly clean the plug (with the magnet).
- After the oil is completely drained, clean the sealing area, mount the plug with a new seal ring and tighten to 20 Nm.

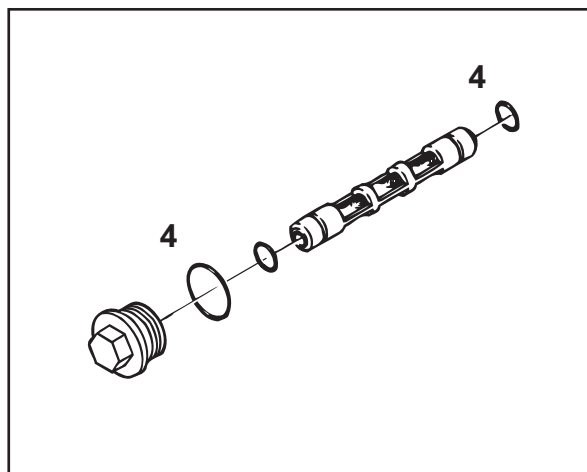
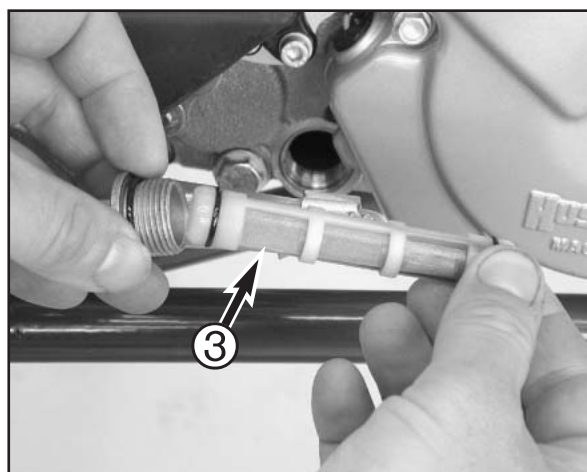


CLEANING THE OIL SCREEN



NOTE: the oil screen (3) is located in the plug with the hexagon drive (2) next to the oil drain plug on the right side of the engine.

- Dismount the plug with the oil screen, thoroughly clean the parts and blow clean with compressed air.
- Check the O-rings (4) for damage and replace if necessary.
- Insert the oil screen in the plug, mount and tighten the plug to 15 Nm.



GENERAL INFORMATION

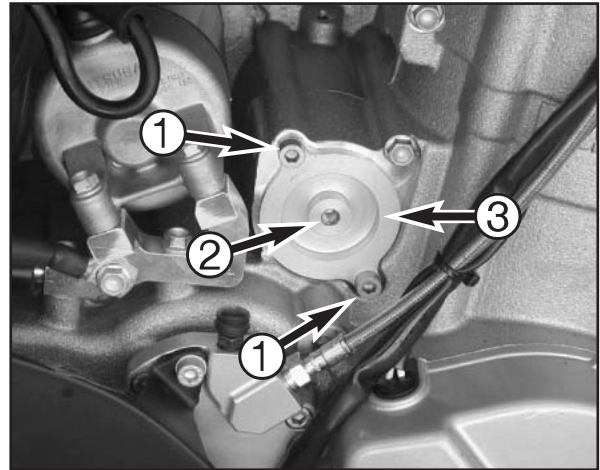
CHANGING THE OIL FILTER

- Place a suitable vessel under the engine to allow the oil to drain.
- Remove both bolts (1) and screw an M6 bolt in the center hole (2) of the oil filter cover.

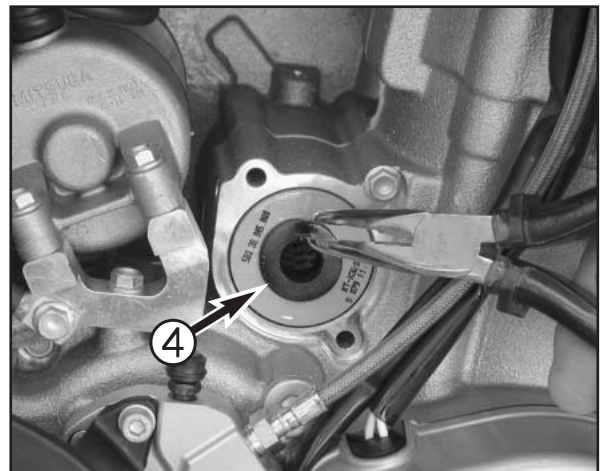


NOTE: only tighten the bolt by hand, otherwise you will damage the oil filter cover.

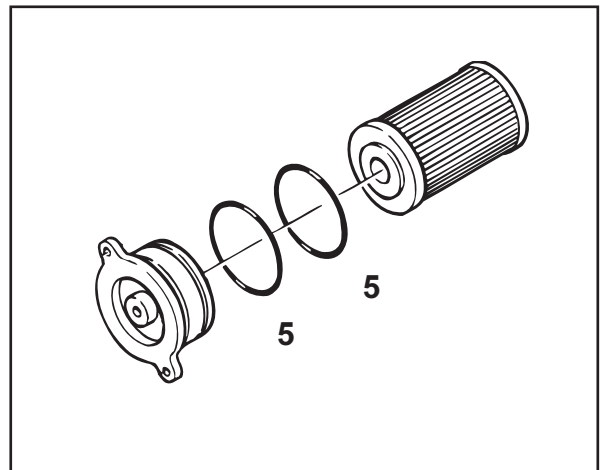
- Pull the oil filter cover (3) out of the hole with the bolt M6 and remove the bolt.



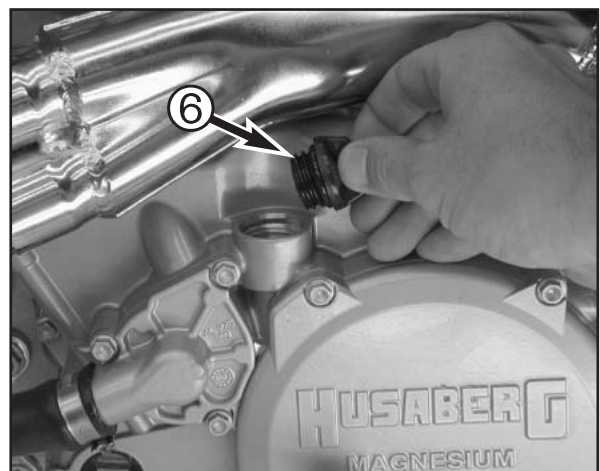
- Use pliers to pull the oil filter element (4) from the housing.
- Clean the oil filter cover, the sealing areas on the O-rings and the engine case. Check the O-rings (5) in the oil filter cover for damage and replace if necessary.



- Lay the motorcycle down and fill the oil filter housing approx. half-full with engine oil. Insert the oil filter in the housing.
- Grease the O-rings in the oil filter cover and mount the cover. Mount the bolts and tighten to 6 Nm.
- Place the motorcycle in an upright position again.



- Unscrew the oil filler plug (6) and add 1 liter of fully synthetic engine oil (e.g.: Motorex Power Synt. 4T).
- Start the engine and check all of the plugs and the oil filter cover for leakage.
- Finally, check the engine oil level and correct if necessary.



GENERAL INFORMATION

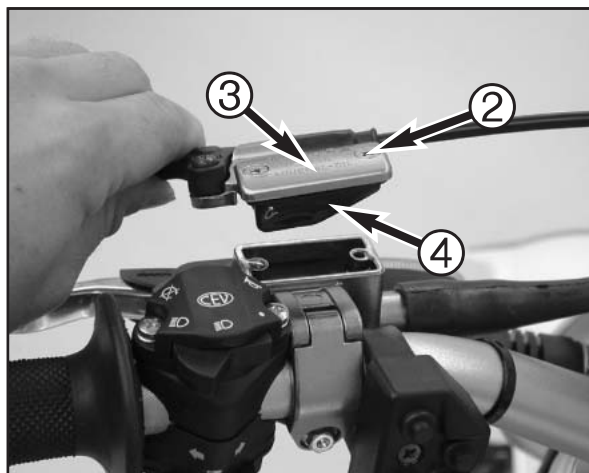
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CHECKING THE OIL LEVEL OF THE HYDRAULIC CLUTCH

To check the oil level in the master cylinder of the clutch remove the cover. For this purpose, remove screws (2) and cover (3) together with the rubber boot (4). The oil level in the horizontal-standing master cylinder should be 4 mm below the upper edge. If necessary, fill up with biodegradable hydraulic oil SAE 10 (e.g. Motorex Kupplungs-Fluid 75). Biodegradable hydraulic oil is available from your Husaberg dealer (50ml).



CAUTION: Husaberg uses biodegradable hydraulic oil for the hydraulic clutch control. Never mix biodegradable hydraulic oils with mineral oils. Never refill with mineral hydraulic oil or brake fluid.

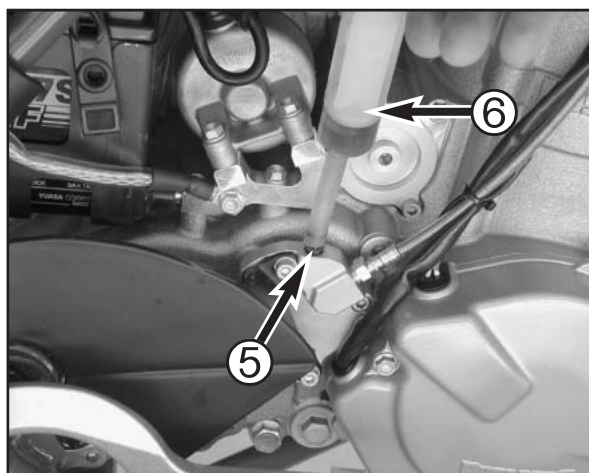


BLEEDING OF THE HYDRAULIC CLUTCH

To bleed, the cover of the master cylinder of the clutch needs to be removed. For this purpose, remove screws (2) and take off cover (3) together with rubber bellows (4). At the slave cylinder of the clutch, remove the bleeder nipple (5). In its place, mount the bleeder syringe (6) which is filled with SAE 10 hydraulic oil. Refill oil until oil is discharged from the bore (7) of the master cylinder in a bubble-free state. Make sure that the oil does not overflow. The bleeder syringe can be purchased from your Husaberg dealer. Having completed the bleeding procedure, you have to verify that the oil level in the master cylinder is correct. If necessary, fill up with biodegradable hydraulic oil SAE 10 (e.g. Motorex Kupplungs-Fluid 75). Biodegradable hydraulic oil is available from your Husaberg dealer (50ml).



CAUTION: Husaberg uses biodegradable hydraulic oil for the hydraulic clutch control. Never mix biodegradable hydraulic oils with mineral oils. Never refill with mineral hydraulic oil or brake fluid.



GENERAL INFORMATION

CLEANING

Clean the motorcycle regularly to retain the beauty of the plastic parts.

Use warm water with a commercial detergent and a sponge. Coarse dirt can be removed with a soft water jet.



CAUTION: never clean the motorcycle with a power washer or a high pressure jet. This will cause the water to reach the electric components, socket connectors, cables, bearings, carburetor, etc. and will cause these parts to malfunction or break.

- Only use commercial detergents to clean the engine. Use a brush to clean any heavily soiled areas.
- Before you start cleaning, close the exhaust pipe to prevent water from penetrating.
- After cleaning the motorcycle thoroughly with a soft water jet, dry with compressed air and a soft cloth. Drain the float chamber in the carburetor. Take a short ride until the engine reaches the operating temperature, applying the brakes while driving. The heat will cause the water to evaporate from the inaccessible engine and brake areas.
- Slide back the protection covers on the handlebar instruments to allow water that has penetrated to evaporate.
- After the motorcycle has cooled down, oil or grease all of the sliding and bearing points. Treat the chain with chain spray. Oil the fuel tap.
- To prevent defects in the electric system, apply contact spray to the emergency stop switch, the short-circuit button, the light switch and the socket connector.

PRESERVATION FOR WINTER OPERATION

If the motorcycle is used during the winter where roads will be spread with salt, precautions must be taken to protect the motorcycle against the aggressive road salt.

- Clean the motorcycle thoroughly and allow to dry after each ride.
- Treat the engine, carburetor, swing arm and all other bare or galvanized parts (except the brake disks) with a wax-based anti-corrosion agent.



WARNING: do not allow any anti-corrosion agent to get on the brake disks since this will significantly reduce the braking effect.



CAUTION: clean the motorcycle with cold water and dry thoroughly after driving on salted roads.

STORAGE

If your motorcycle is to be immobilized for a longer period of time, proceed as follows:

- Clean the motorcycle thoroughly.
- Change the engine oil, the short and the long oil filter (old engine oil contains aggressive impurities).
- Check the quantity of antifreeze and coolant.
- Allow the engine to warm up, close the fuel tap and wait until the engine stalls. Open the drain plug on the float chamber to allow any remaining fuel to drain.
- Remove the spark plug and fill approx. 5 cm³ of engine oil into the cylinder through the spark plug hole. Actuate the kickstarter 10 times to distribute the engine oil over the cylinder wall and mount the spark plug again.
- Set the piston in the compression position to close the valves.
- Drain the fuel from the tank into a suitable vessel.
- Check the tire air pressure.
- Oil the bearing points on the control levers, footrests, chain, etc.
- Dismount and charge the battery.
- The storage site should be dry and not have any extreme fluctuations in the temperature.
- Cover the motorcycle with a permeable cover or blanket. Do not use impermeable material since it will not allow any moisture to escape and cause corrosion.



CAUTION: Do not briefly run the engine of an immobilized motorcycle since the engine will not become warm enough and any vapor produced during the combustion process will condense and cause corrosion.

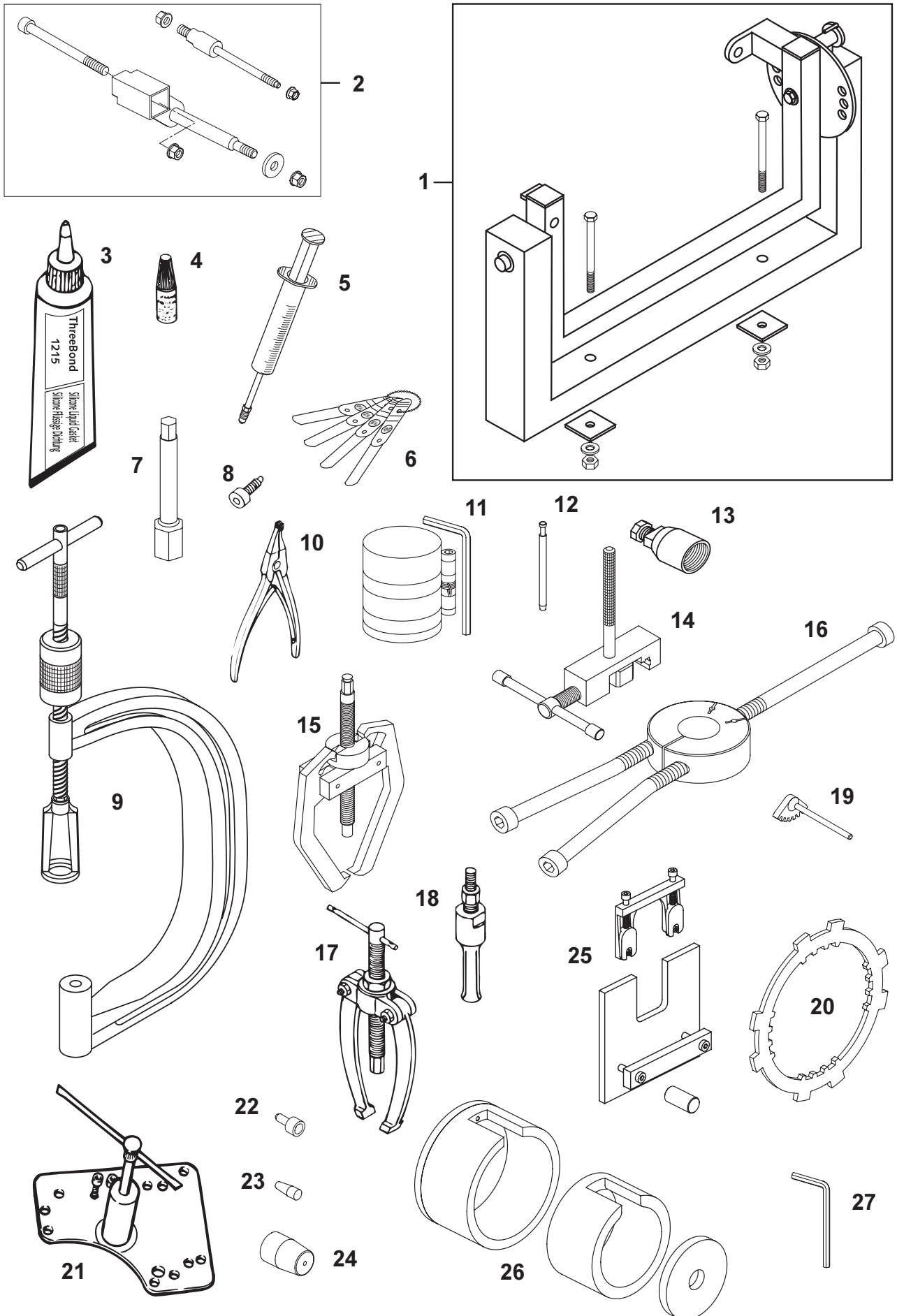
STARTING UP AFTER IMMOBILIZATION

- Connect the charged battery (check for correct polarity).
- Fill fresh fuel into the tank.
- Inspect the motorcycle as you would before each start-up (see Driving Instructions)
- Go on a short, cautious test ride

GENERAL INFORMATION

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SPECIAL TOOLS - ENGINE



GENERAL INFORMATION

SPECIAL TOOLS - ENGINE

A
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FIG	PART NUMBER	DESCRIPTION
1	560.12.001.000	Universal engine work stand
2	800.29.002.000	Engine holder for universal engine work stand
3	309098	Silicone three bond sealing compound
5	503.29.050.000	Bleeder syringe for hydraulic clutch
6	590.29.041.000	Feeler gauge for valve clearance
7	590.29.072.000	16 mm spark plug wrench
8	580.30.080.000	Locking bolt
9	590.29.019.000	Valve lifter
10	510.12.011.000	Circlip pliers inverted
11	600.29.015.000	Piston ring clamp
12	590.29.026.006	6 mm limit plug gauge for valve guide
13	580.12.009.000	Rotor extractor
14	800.29.030.000	Timing chain riveting tool
15	590.29.033.000	Extractor for timing gear and camshaft bearing
16	584.29.037.037	Mounting tool for bearing inner rings on crankshaft
17	151.12.017.000	Bearing extractor
18	151.12.018.000	12-16 mm insert for bearing extractor
19	800.29.004.000	Gear segment
20	800.29.003.000	Clutch holder
21	800.29.020.000	Housing separating tool
22	800.29.031.000	Protection cover for crankshaft
23	590.29.005.010	Mounting sleeve for the shaft seal ring on the water pump
24	800.29.005.000	Mounting sleeve for the left shaft seal ring on the the crankshaft
	800.29.105.000	Mounting sleeve for the right shaft seal ring on the crankshaft
	800.29.205.000	Mounting sleeve for the shaft seal ring on the kickstarter shaft
25	800.29.035.000	Pressing tool for conrod bearing (out)
26	800.29.036.000	Pressing tool for conrod bearing (in)
27	800.29.052.000	Safety TORX TX20 for the carburetor potentiometer
	584.29.042.000	Peak voltage adapter

DISMOUNTING AND MOUNTING THE ENGINE

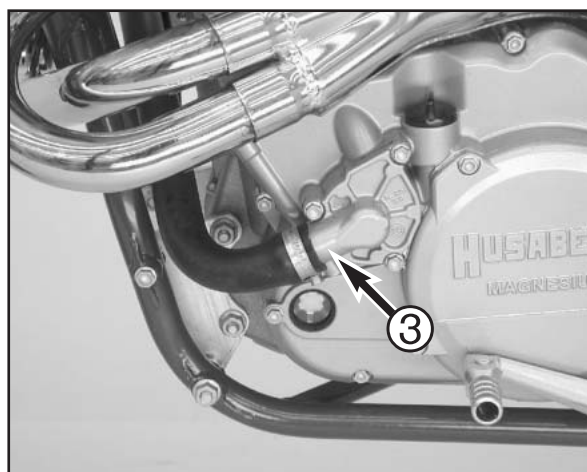
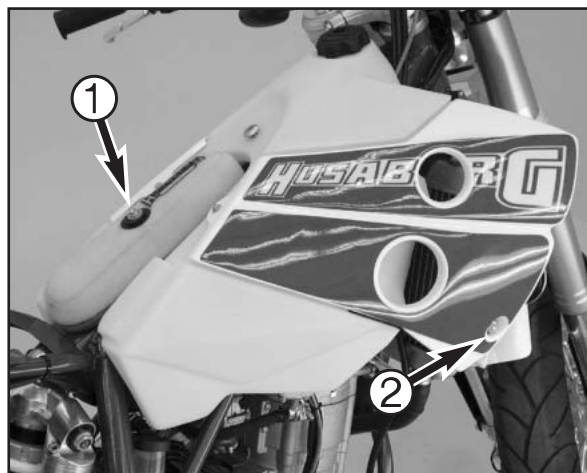
DISMOUNTING THE ENGINE

- Thoroughly clean the motorcycle and jack up on a sturdy work stand.
- Remove the seat.
- Unscrew the air filter (1).
- Close both fuel taps and disconnect the fuel hoses
- Unscrew both lateral bolts (2) on the spoiler.



NOTE: Hold the retaining sleeve on the radiator shield with pliers if it turns at the same time.

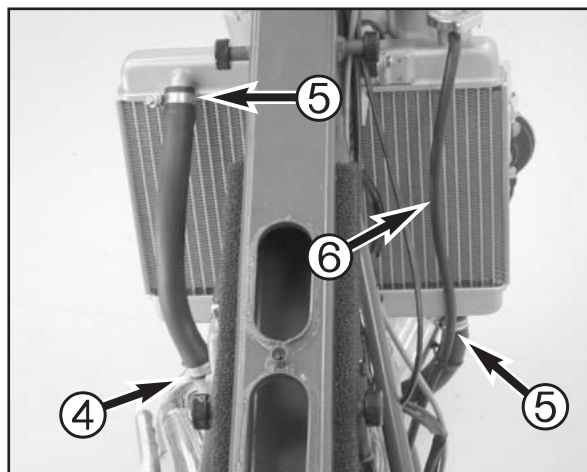
- Remove the tank with the spoilers.
 - Disconnect the ground and positive cable.
-
- Loosen the hose clamp connecting the water pump (3), remove the hose and drain the cooling liquid in a suitable vessel.



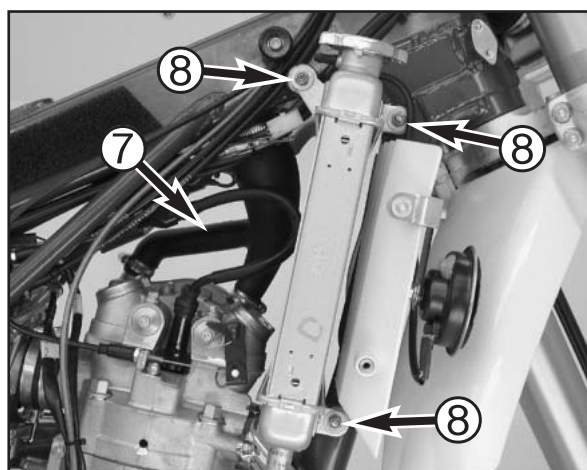
- Loosen the hose clamps on the cylinder head (4) and the radiator (5) and dismount both radiator hoses together with the overflow hose (6).



NOTE: A thermostat is installed in the FE and FS-E models starting in 2005 (see "Mounting the Engine"). The thermostat and the T-fitting do not need to be disconnected from the hoses.



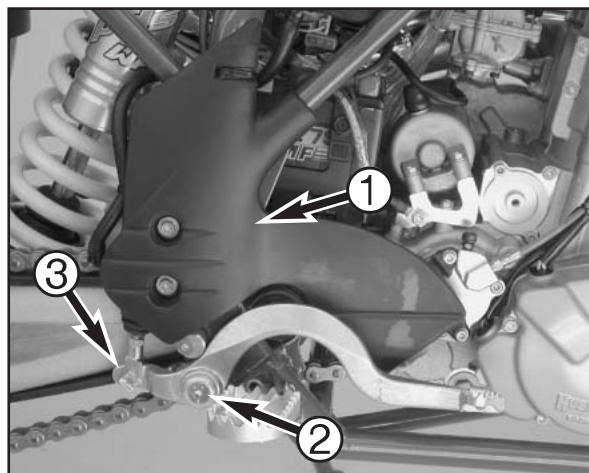
- Dismount the engine vent hose (7).
- Remove the three nuts (8) from the radiator mounting and pull the radiator out of the right side of the frame.



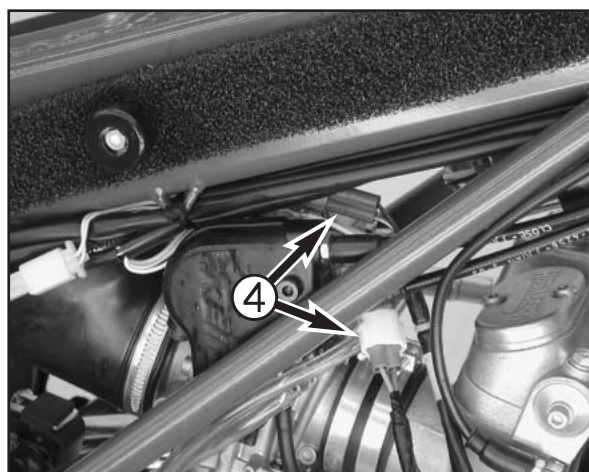
DISMOUNTING AND MOUNTING THE ENGINE

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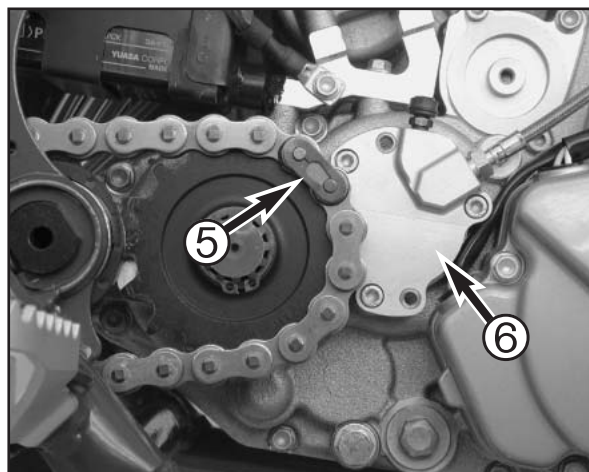
- Dismount the right frame protector (1).
- Unscrew the bearing bolt (2) on the foot brake lever and tilt the foot brake lever aside.
- Remove the retaining clip from the push rod holder (3), pull out the bolt and the foot brake lever



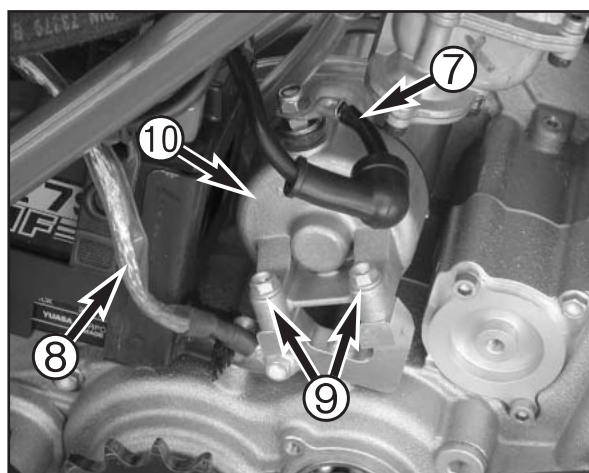
- Disconnect the generator and pickup connector (4) and remove the cable clips from the clutch line.



- Open the chain joint (5), separate the chain and remove.
- Unscrew the clutch slave cylinder (6) and let it hang to the side.

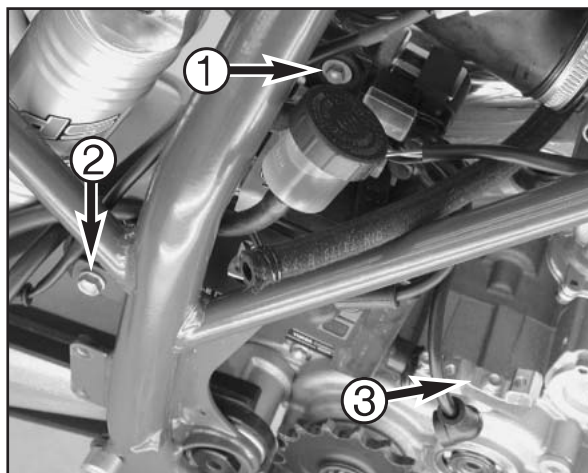


- Dismount the positive starter cable (7) from the starter engine.
- Unscrew the engine ground connection (8).
- Remove both bolts (9) and pull the starter engine (10) out of the engine case.



DISMOUNTING AND MOUNTING THE ENGINE

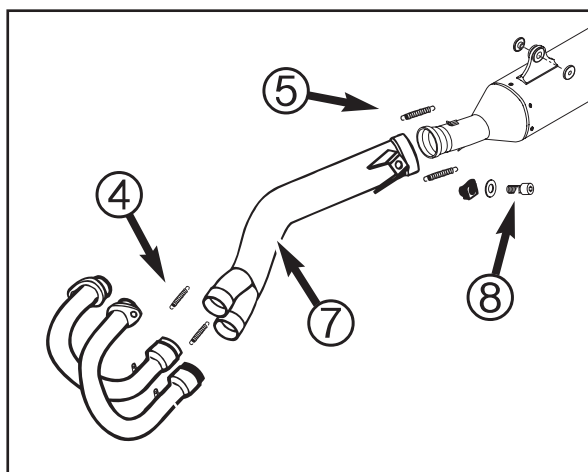
- Remove the retaining bolt from the starter relay (1), disconnect the connectors from the starter relay and lift out the starter relay.
- Unscrew the nut on the chain roller bolt (2).
- Dismount the starter holding bridge (3) and lift the battery out of the frame together with the battery case.



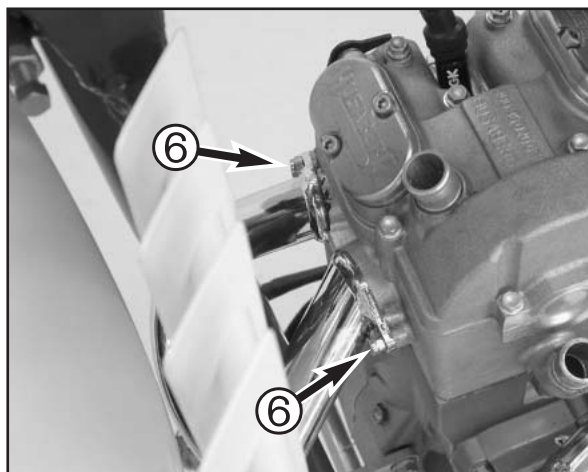
- Use a suitable tool (hooked handle) to detach the front (4) and rear (5) exhaust springs.



NOTE: Only 1 rear exhaust spring (5) is installed starting with the 2005 model year.



- Remove the exhaust nuts (6) from the cylinder head and pull both exhaust pipes out of the intermediate exhaust pipe (7) one at a time.
- Unscrew the bolt (8) and remove the intermediate exhaust pipe.



- Loosen the clamps on the carburetor connection boots and remove the rear carburetor connection boot (9).
- Pull the carburetor out of the front connection boot and attach to the frame.



NOTE: leave the carburetor in the frame if it does not need to be serviced.

Move the carburetor vent hoses towards the rear.

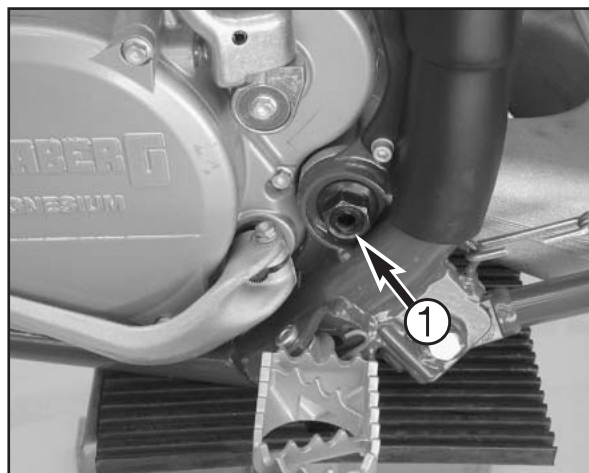
- Disconnect the spark plug connector and separate the decompression cable from the cylinder head.



DISMOUNTING AND MOUNTING THE ENGINE

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- Remove the nut from the swing arm pivot (1) and knock out the swing arm pivot with a suitable pipe.
- Pull the swing arm towards the back and let it rest against the frame.

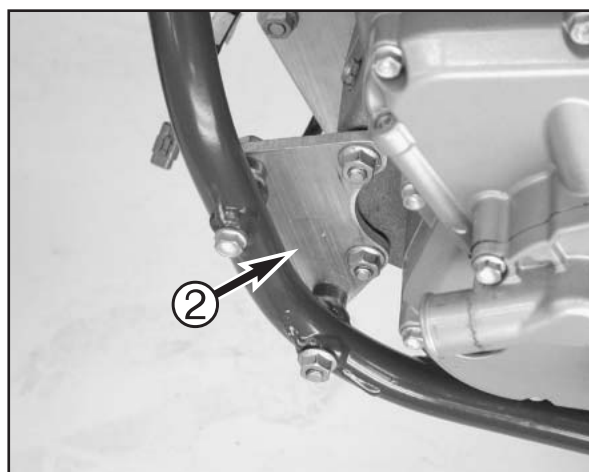


- Unscrew the engine mounting plates (2) and remove the bolts.



NOTE: hold the engine to prevent it from tilting out of the frame.

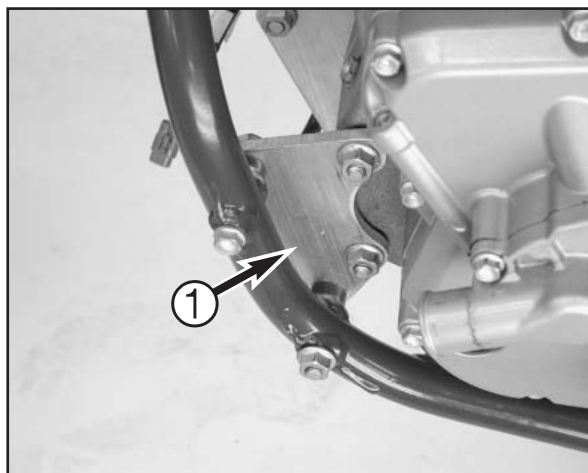
- Lift the engine and lift out of the frame towards the left.



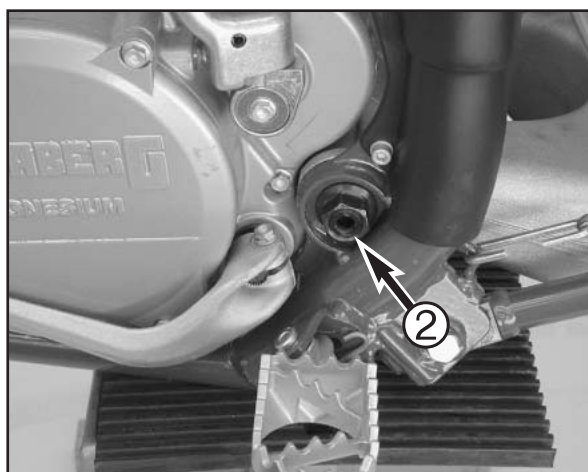
DISMOUNTING AND MOUNTING THE ENGINE

MOUNTING THE ENGINE

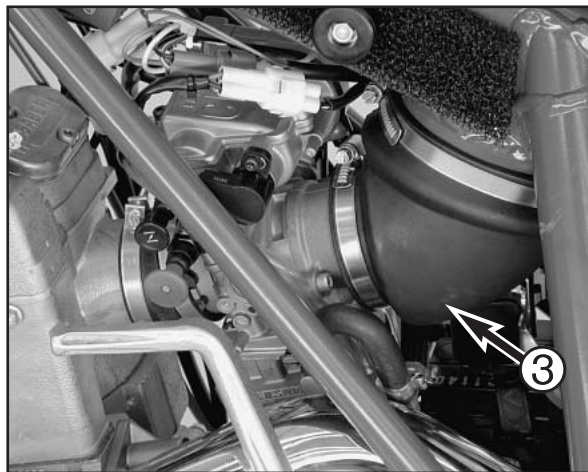
- Lift the engine into the frame, position the engine mounting plates (1), insert the bolts and screw on the nuts but do not tighten yet.



- Position the swing arm and push in the swing arm pivot (2) from the right until it touches the engine.
- Lift the engine until the swing arm pivot can be pushed through the engine case, gently tapping with a plastic hammer if necessary.
- Screw the nut on the swing arm pivot and tighten to 100 Nm.
- Tighten the nuts on the engine mounting plates to 25 Nm.



- Insert the carburetor in the front carburetor connection boot and tighten the clamps.
- Mount the rear carburetor connection boot (3) and tighten the clamps

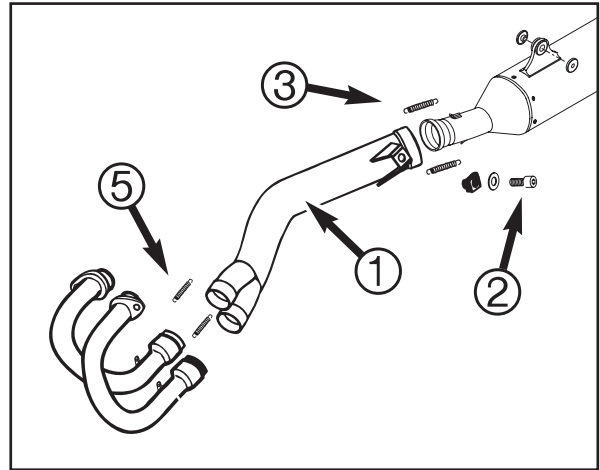


DISMOUNTING AND MOUNTING THE ENGINE

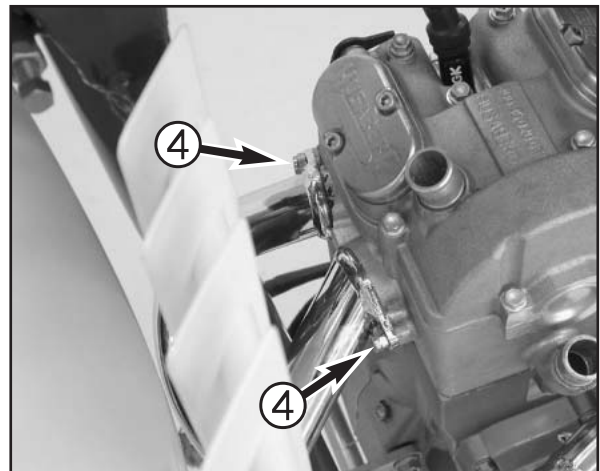
- Mount the intermediate exhaust pipe (1) and tighten the bolt (2).
- Use a suitable tool (hooked handle) to mount the rear exhaust springs (3).



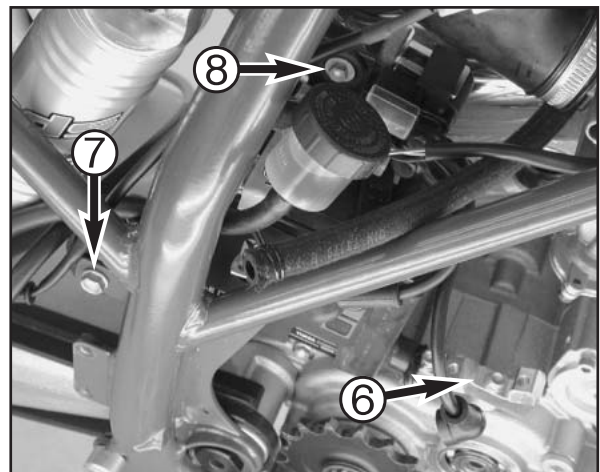
NOTE: Only 1 rear exhaust spring (3) is installed starting with the 2005 model year.



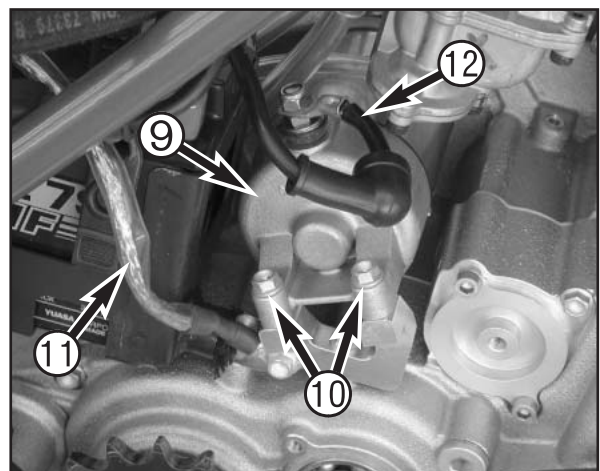
- Apply copper paste to the front exhaust pipe at the connections to the cylinder head and mount.
- Screw on the exhaust nuts (4).
- Mount the front exhaust springs (5).



- Place the battery and battery case in the frame.
- Screw on the starter holding bridge (6).
- Mount the battery case and tighten the nut on the chain roller bolt (7).
- Mount the starter relay and fix with the bolt (8), attach the connector.

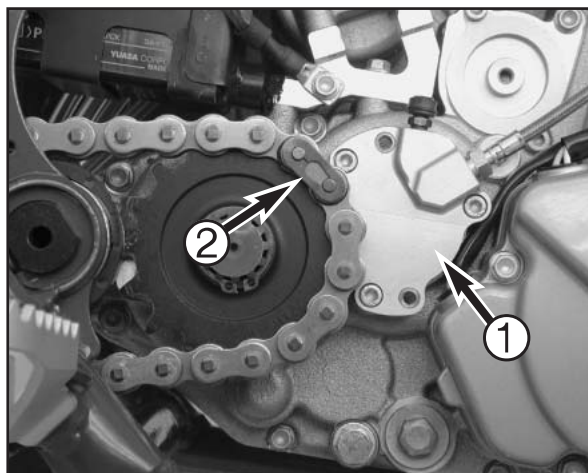


- Grease the O-ring on the starter engine and mount the starter engine (9), tighten the bolts (10) to 10 Nm.
- Screw on the engine ground connection (11) and the positive starter cable (12).

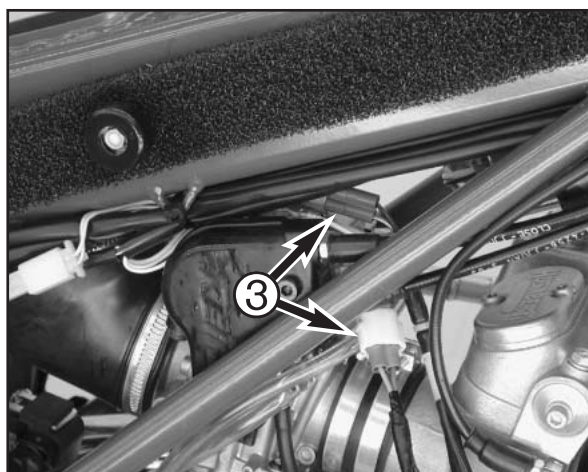


DISMOUNTING AND MOUNTING THE ENGINE

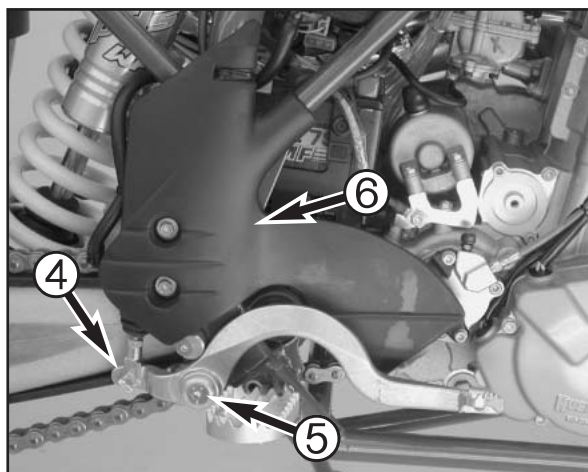
- Mount the clutch slave cylinder (1) and tighten the bolts to 6 Nm.
- Position the chain and mount the chain joint (2).



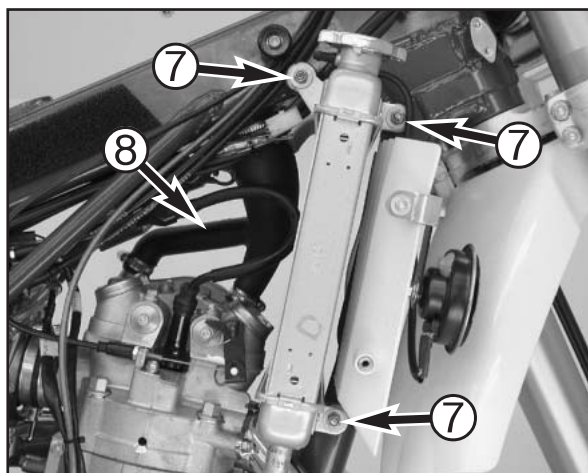
- Connect the generator and pickup connector (3) and fasten the wiring harness to the clutch line with cable clips.



- Mount the bolt for the push rod holder (4) and secure with the retaining clip.
- Position the foot brake lever, secure the bearing bolt (5) with Loctite 243 and tighten the bearing bolt to 10 Nm.
- Screw on the frame protector (6) and secure with cable clips.



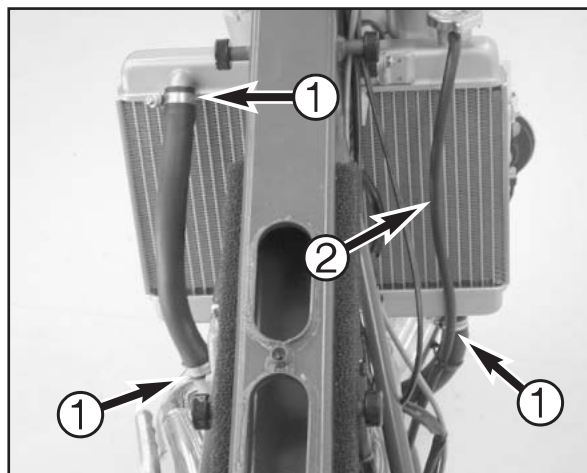
- Slide the radiator into the frame from the right and screw on with the 3 nuts (7).
- Mount the engine vent hose (8) and tighten the hose clamps.



DISMOUNTING AND MOUNTING THE ENGINE

FC

- Mount both radiator hoses and tighten the hose clamps (1).
- Connect the overflow hose (2) and attach to the frame with cable clips.



FE/FS MODELS FROM 2005

- Mount the radiator hoses with the thermostat and T-fitting as illustrated. Tighten the 10 hose clamps or press together with the pliers 600.29.057.000.

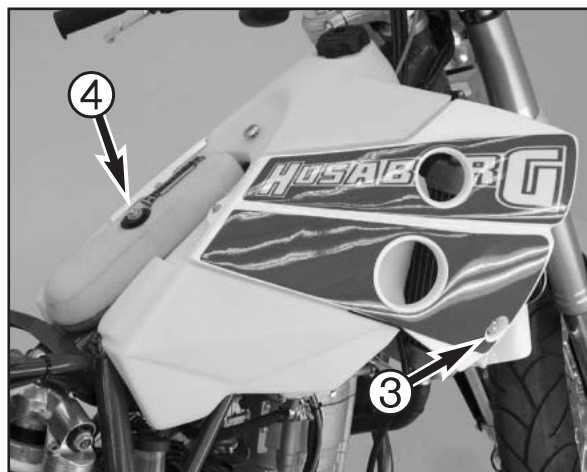


CAUTION: make sure you mount the thermostat in the right direction (screw heads facing up).

- Mount the overflow hose (2) and attach to the frame with cable clips.



- Connect the battery cables.
- Mount the tank and tighten the two bolts (3) on the side of the spoiler.
- Connect both fuel hoses and open the fuel taps.
- Mount the air filter (4) and screw tight.
- Mount the seat.
- Lift the motorcycle off the engine work stand.
- Bleed the cooling system.
- Check the engine oil level.
- Check the oil level and cooling liquid level again after a short, cautious test ride.

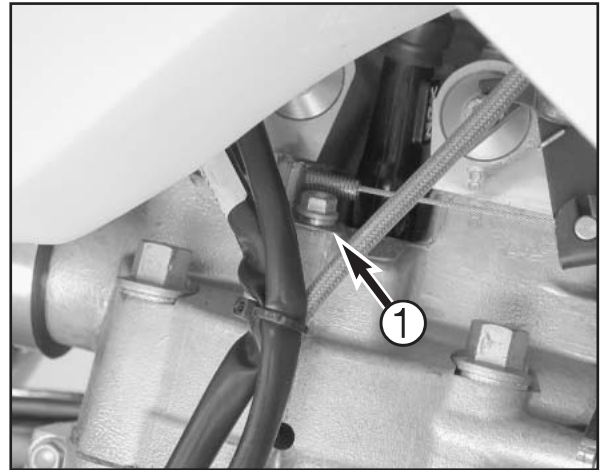


DISMOUNTING AND MOUNTING THE ENGINE

BLEEDING THE COOLING SYSTEM


- Add cooling liquid until it reaches approx. 10 mm over the radiator fins.
- Open the bleeder bolt (1) on the cylinder head until cooling liquid escapes without bubbles, tighten the bleeder bolt again to 6 Nm.

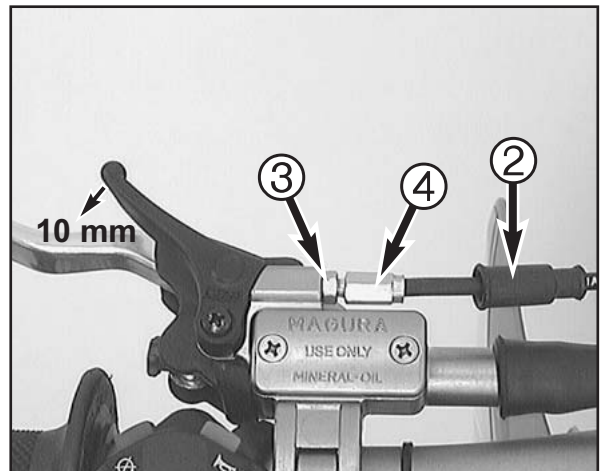
Check the cooling liquid level again after another short ride and correct if necessary.




CHECKING THE ADJUSTMENT OF THE HAND DECOMPRESSION CABLE

- Start the engine and slowly pull the hand decompression lever at idling speed until you feel the thumping of the rocker arm on the lever. The free travel until you feel the thumping should be approx. 10 mm measured at the outer end of the lever. Correct the free travel if necessary.
- To adjust, push back the protection cover (2), loosen the counternut (3) and adjust the adjustment screw (4) as required. Tighten the counternut and slide the protection cover into place.

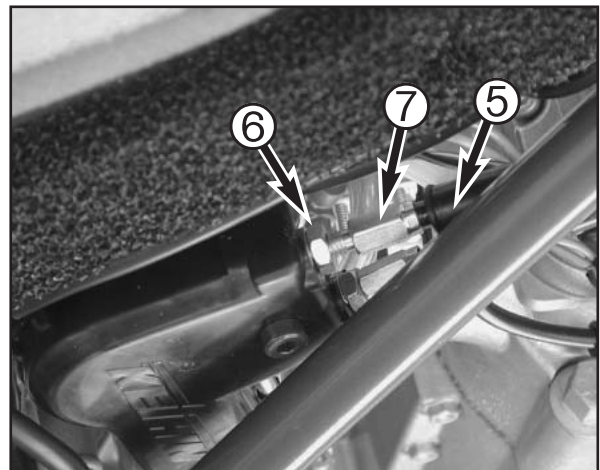
 **CAUTION:** no free travel in the decompression lever will lead to engine damage.



ADJUSTING THE THROTTLE CABLES

 **NOTE:** The throttle grip should always have 3-5 mm free travel. In addition, the idling speed should not change with the engine running if the handlebar is turned all the way to the left or right.

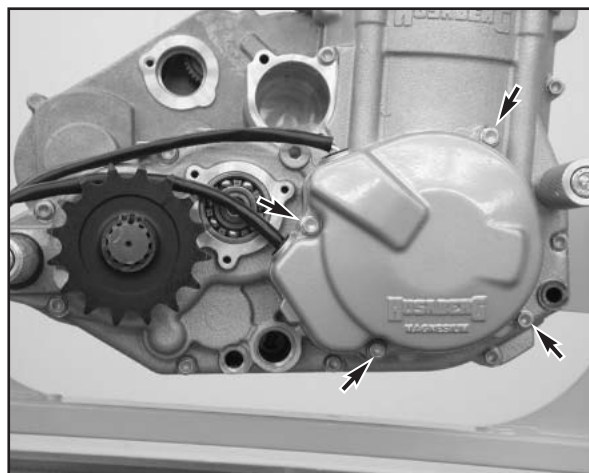
- To adjust the throttle cables, remove the seat and tank with the spoilers. Push back the protection cover (5), loosen the counternut (6) and adjust the adjusting screw (7) as required. Turning the adjusting crew in a counterclockwise direction will reduce the free travel, turning it in a clockwise direction will increase the free travel.
- Tighten the counternut and check the throttle grip for smooth operation.
- Mount the tank and the seat.



DISASSEMBLING THE ENGINE

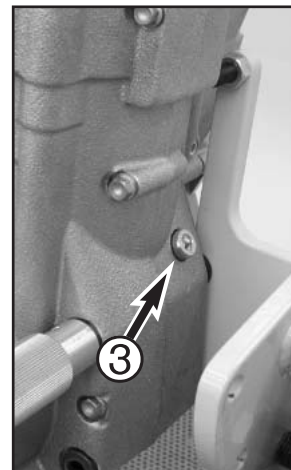
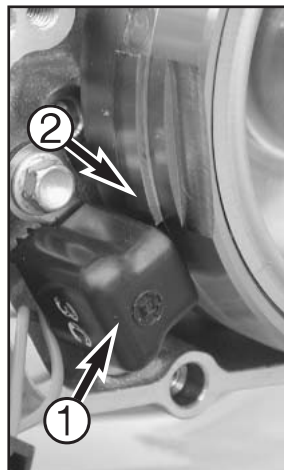
- Thoroughly clean the outside of the engine and clamp on a universal engine work stand.
- Drain the engine oil, remove the oil filter and the oil screen (see Chapter A).
- Remove the kickstarter and the shift lever.

- Remove the circlip from the engine sprocket with suitable pliers, pull the engine sprocket off the shaft.
- Remove the 4 bolts from the generator cover and remove the generator cover.
- Pull both dowels from the housing and discard the gasket.
- Unscrew the spark plug with the spark plug wrench 590.29.072.000.



LOCKING THE ENGINE

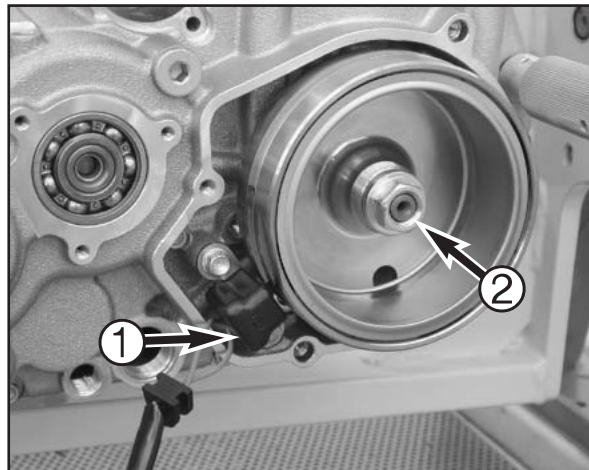
- Turn the crankshaft in a counterclockwise direction until the pickup sensor (1) is aligned with the edge of the shim (2) welded onto the rotor.
- Remove the plug and the copper gasket and screw in the locking bolt (3) 580.30.080.000 by hand, turning the crankshaft back and forth to allow the locking bolt to engage in the recess in the crankshaft.



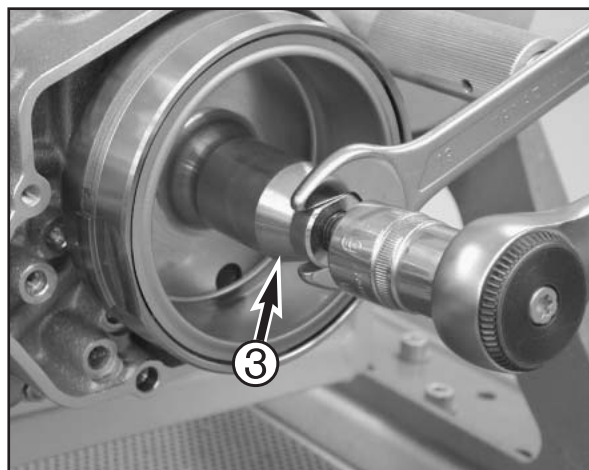
DISASSEMBLING THE ENGINE

REMOVING THE ROTOR

- Remove the pickup sensor (1).
- Loosen the rotor nut (2) (17 mm – LH thread!) and remove together with the corrugated washer.

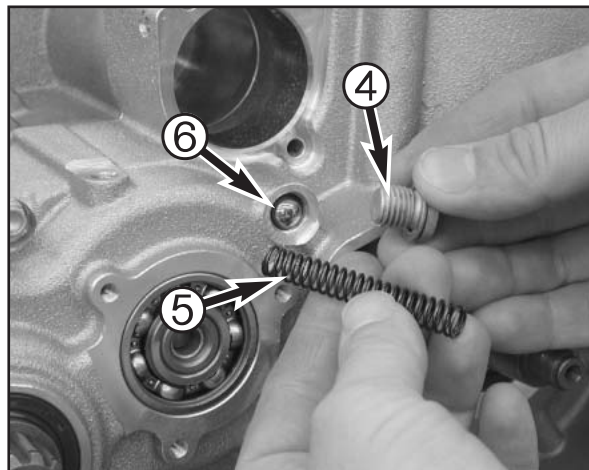


- Screw the extractor 580.12.009.000 (3) to the rotor, hold the extractor while you screw in the extractor bolt until the rotor is released from the crankshaft. Remove the rotor, unscrew the extractor from the rotor.

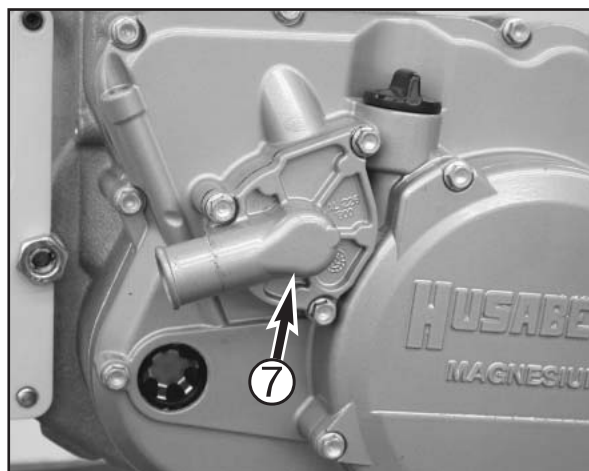


DISMOUNTING THE PRESSURE RELIEF VALVE

- Unscrew the plug (4) on the pressure relief valve together with the copper washer, pull the spring (5) out of the hole and remove the ball (6) from the engine case with a magnet or by tilting the engine.

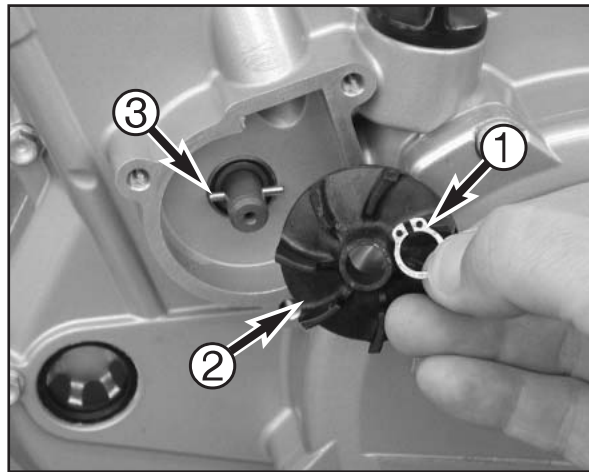


- Remove the water pump cover (7), discard the gasket.



DISASSEMBLING THE ENGINE

- Remove the circlip (1) from the water pump shaft.
- Carefully pull out the water pump wheel (2) with pliers and remove the pin (3) from the shaft.

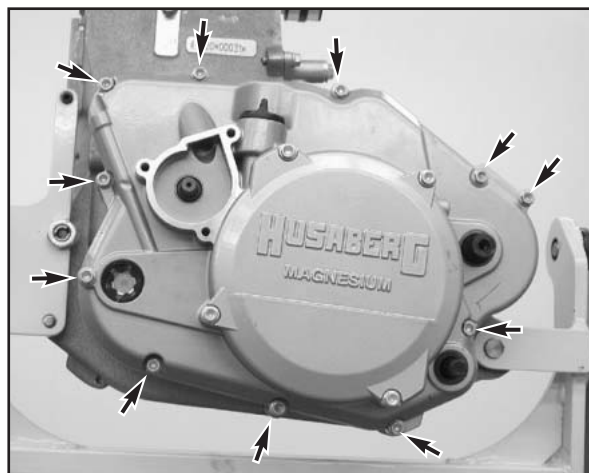


- Remove all of the bolts in the clutch cover and remove the clutch cover.



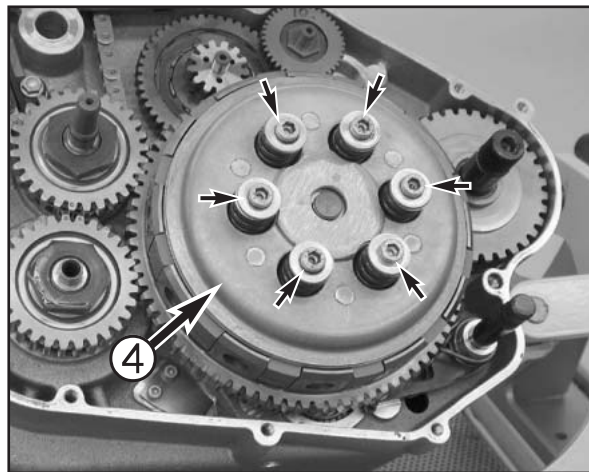
NOTE: the outer cover does not need to be removed separately.

- Discard the gasket and the O-ring in the water duct, pull the dowels out of the housing.

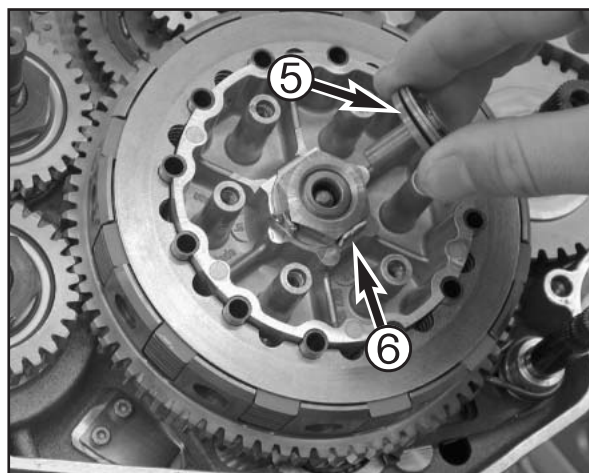


REMOVING THE CLUTCH

- Loosen the clutch bolts crosswise to prevent the clutch disks from jamming. Remove the pressure cap (4) together with the bolts, spring retainer and clutch springs.



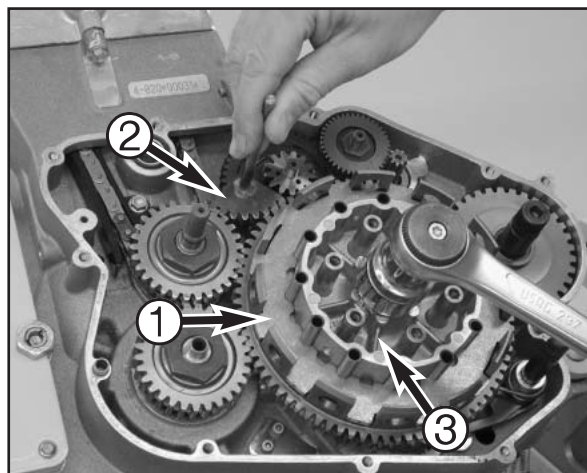
- Remove the pressure piece (5) and the push rod.
- Remove all of the clutch disks from the outer clutch hub together.
- Remove the clutch sleeves from the inner clutch hub.
- Bend up the lock washer (6) for the clutch nut.



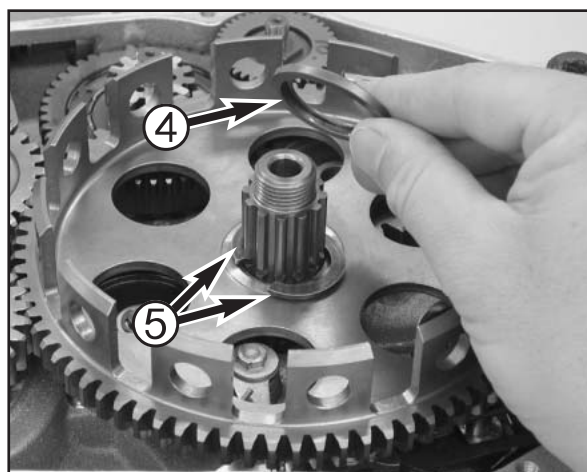
DISASSEMBLING THE ENGINE

REMOVING THE INNER CLUTCH HUB

- Unscrew the locking bolt.
- Insert the clutch holder (1) 800.29.003.000 in the outer clutch hub with at least 6 clutch sleeves, lock the outer clutch hub with the gear wheel segment (2) (800.29.004.000) as shown in the photo and loosen the nut (27 mm).
- Remove the clutch holder, the nut and lock washer and the inner clutch hub (3).

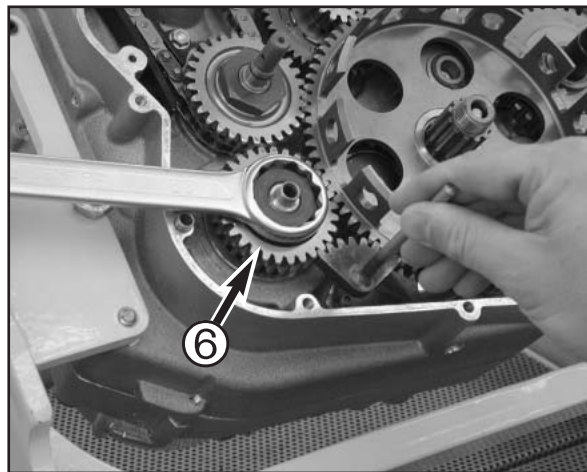


- Remove the stepped disk (4) and both half disks (5).

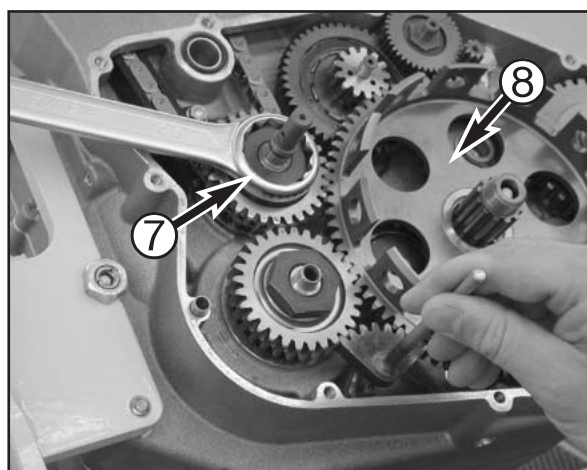


REMOVING THE PRIMARY PINION AND IDLER SHAFT GEAR

- Lock the primary pinion (6) with the special tool 800.29.004.000 (gear segment) as shown in the photo and unscrew the nut (30 mm) on the primary pinion.

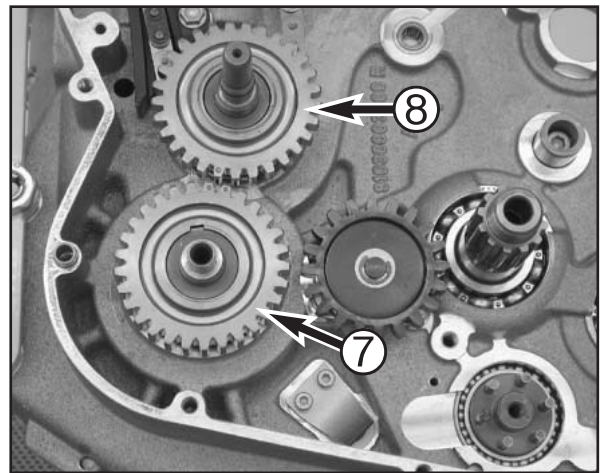
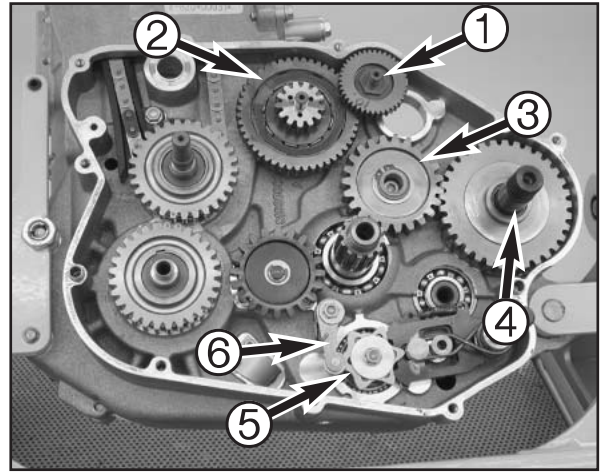


- Lock the idler shaft (7) with the special tool 800.29.004.000 (gear segment) as shown in the photo and unscrew the nut (30 mm) on the idler shaft.
- Remove the outer clutch hub (8) with the two needle bearings and the washer located below.



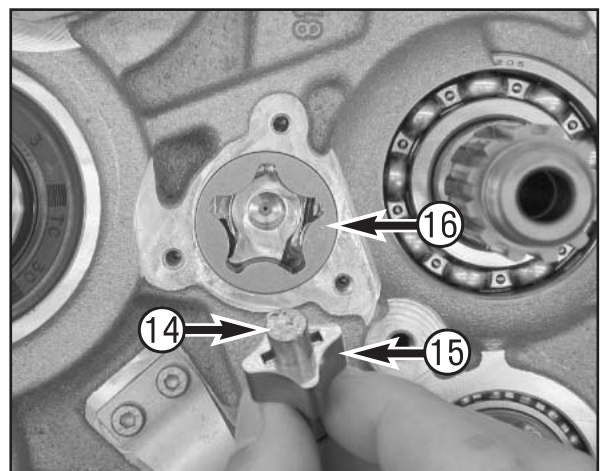
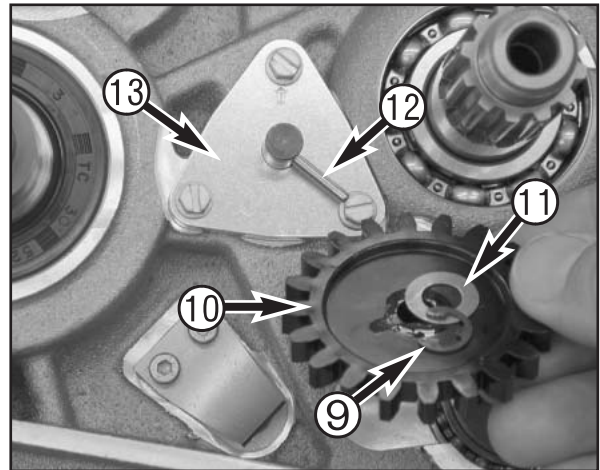
DISASSEMBLING THE ENGINE

- Pull the idler (1) and the freewheel (2) from the engine case (only applies to starter models).
- Remove the circlip on the kickstarter idler gear (3) and pull the kickstarter idler gear with the upper and lower disk and the needle bearing off of the bearing bolt.
- Forcefully pull the kickstarter shaft (4) out of the housing and dismount together with the gear wheel, the bearing and the spring.
- Loosen the bolts on the shift locating drum (5) and on the shift lock (6).
- Dismount the shift locating drum with the upper and lower disk as well as the bolt.
- Relieve the shift lock spring and dismount the shift locking lever together with the bolt, sleeve and spring.
- Dismount the shift shaft.
- Remove the primary pinion (7) and the gear on the idler shaft (8), pry both woodruff keys out of the shaft grooves.



REMOVING THE OIL PUMP

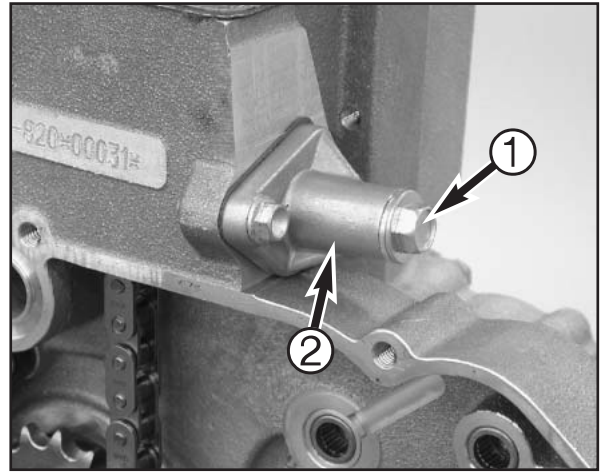
- Pry the circlip (9) on the oil pump gear (10) from the shaft, removing the washer (11), oil pump gear and pin (12).
 - Loosen the three screws and remove the oil pump cover (13).
-
- Dismount the oil pump shaft (14) together with the inner rotor (15), pin and outer rotor (16).



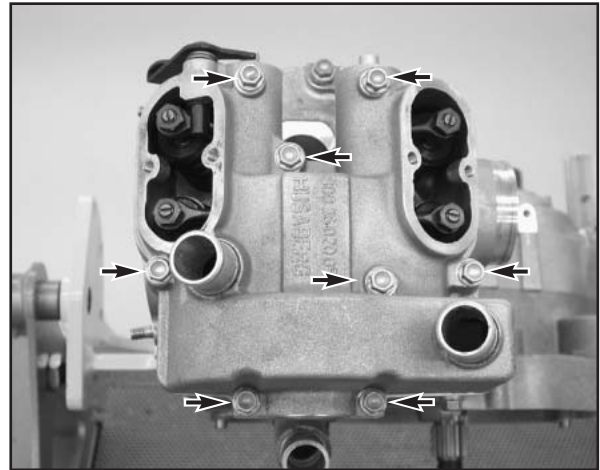
DISASSEMBLING THE ENGINE

REMOVING THE CHAIN TENSIONER

- Remove the bolt (1) together with the seal ring and chain tensioning spring.
- Unscrew the chain tensioner (2).



- Remove both valve covers, discarding the gaskets.
- Loosen the bolts on the cylinder head top section, carefully tap on the side with a plastic hammer and remove the cylinder head top section.



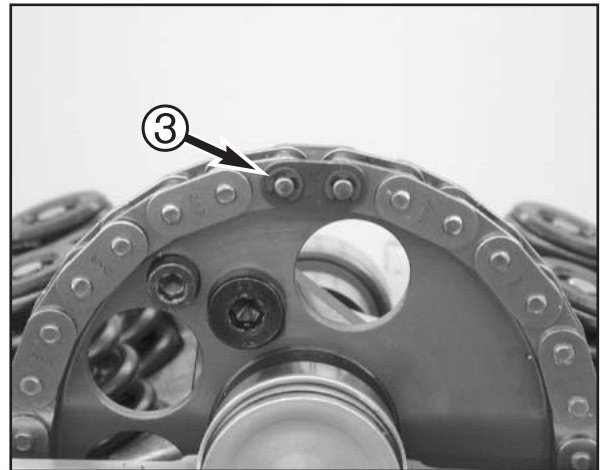
SEPARATING THE TIMING CHAIN

- Turn the camshaft until the chain joint (3) is on top and can be easily opened.
- Remove the chain joint retainer, pull off the chain shims and remove the chain joint.
- Pull the chain out of the chain tunnel.



NOTE: there are 2 types of chain joint retainers, each has a different shape.

If the timing chain does not have a chain joint, use timing chain separating tool 800.29.030.000 to open the chain.



- Apply the timing chain separating tool and turn the spindle to open the timing chain.



NOTE: the timing chain can be separated at any point. The pressed open chain link must be replaced and can be replaced by a chain link with a chain joint.

- Remove the camshaft and cap from the cylinder head.



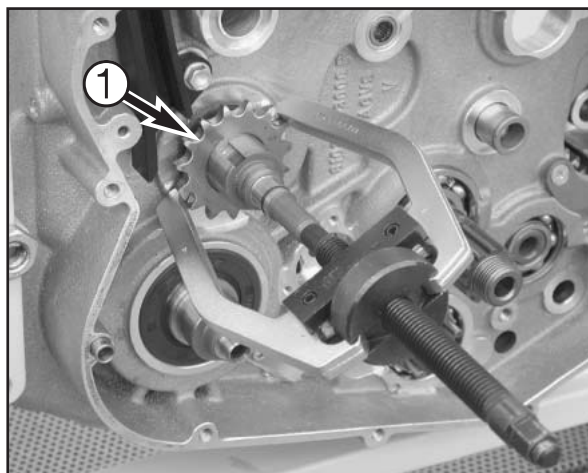
DISASSEMBLING THE ENGINE

- Pull the rear sprocket (1) off of the idler shaft with the extractor 590.29.033.000.



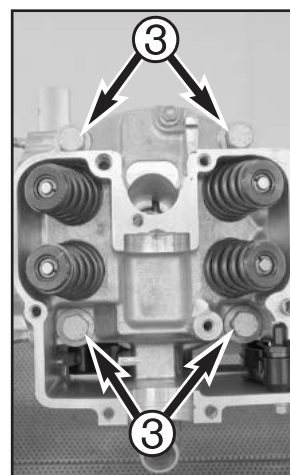
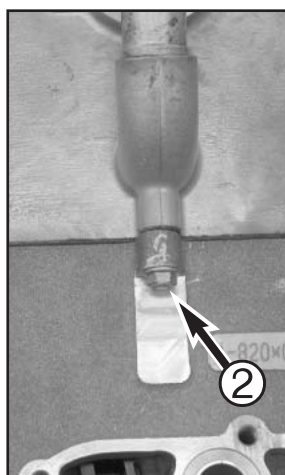
CAUTION: Hold the extractor and do not let it touch the chain guide.

- Pry the woodruff key from the shaft.



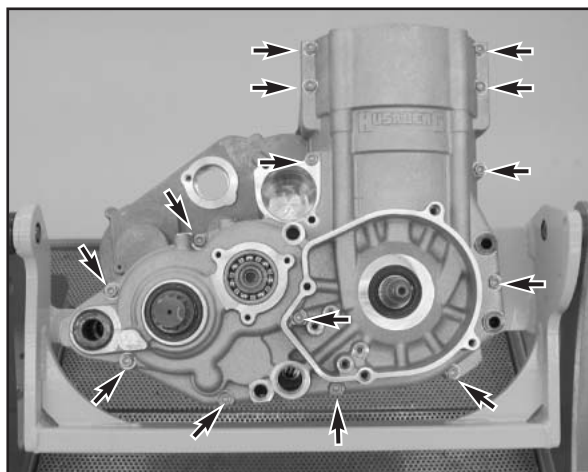
REMOVING THE CYLINDER HEAD

- Remove the bolt on the left side (2).
- Loosen the 4 cylinder head bolts (3) crosswise and remove together with the washers.
- Lift off the cylinder head with the sleeves and gasket, discarding the gasket.



SEPARATING THE HOUSING HALVES

- Remove all of the housing bolts from the right housing half.

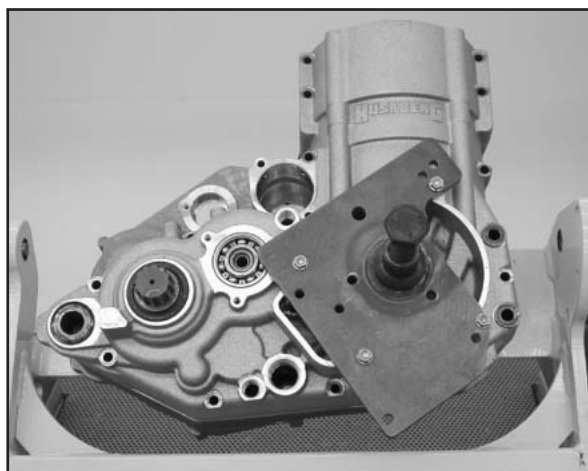


- Screw the special tool 800.29.020.000 onto the right housing half and separate the two housing halves by turning in the spindle. Gently tap on the side of the housing with a plastic hammer to prevent the housing halves from being distorted.



NOTE: do not use a screwdriver or similar tool to pry the housing halves apart since this will damage the sealing areas.

- Remove the dowels.



DISASSEMBLING THE ENGINE

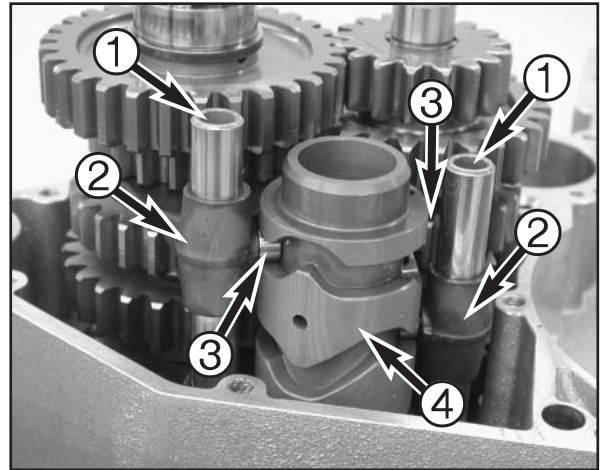
REMOVING THE CRANKSHAFT

- Lift the crankshaft out of the housing together with the conrod, piston and cylinder liner, tapping gently on the rear crankshaft with a plastic hammer if necessary.



REMOVING THE TRANSMISSION

- Pull both shift rails (1) out of the housing.
- Tilt the shift forks (2) aside, the shift rolls (3) usually remain in the shift drum (4) and should be removed with a magnet.

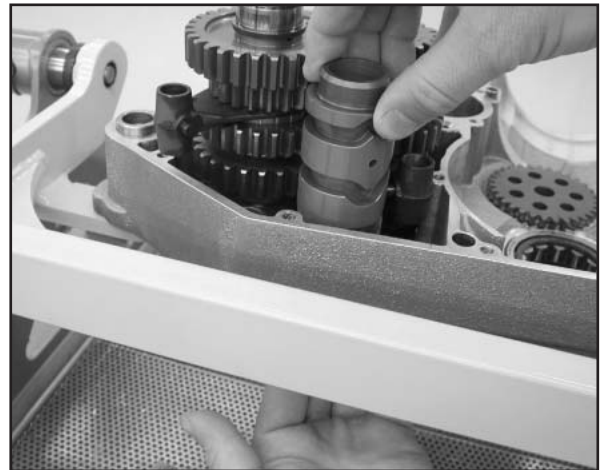


- Press the shift drum up from below while turning it until it can be removed from the housing.

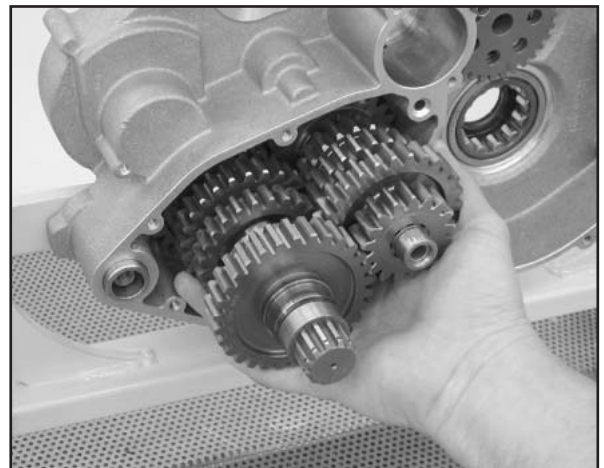


NOTE: if you do not turn the shift drum, the circlip will get caught on the first gear idler.

- Remove the shift forks from the shift grooves.



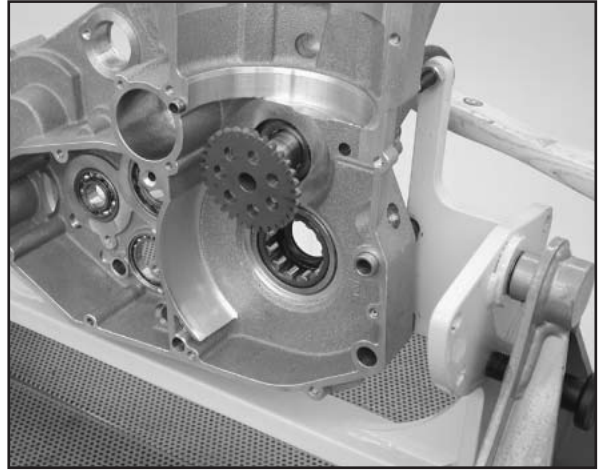
- Set the engine case in an upright position (installation position) and simultaneously pull out both transmission shafts, gently tapping on the back of the main shaft with a plastic hammer if necessary.



DISASSEMBLING THE ENGINE

REMOVING THE IDLER SHAFT

- Knock the idler shaft out of the bearing seat from behind with a plastic hammer.



SERVICING THE INDIVIDUAL PARTS

IMPORTANT INFORMATION ON WORKING WITH THE ENGINE CASE

Generally, all gaskets, O-rings, crankshaft bearings and the transmission shaft bearings should be replaced when repairing the engine. In addition, all of the parts need to be cleaned thoroughly, removing any residual sealant from the sealing areas.

Any bearings removed with an extractor need to be replaced.

Read the following section before you start to work. Establish the assembly order to allow you to insert the bearings after heating the engine case halves only once.

To press or knock out the bearings, place the respective housing half on a flat surface (first remove the dowels), placing the housing half on the sealing area to prevent it from being damaged. A wooden panel makes a good base.

If possible, do not drive in any bearings or shaft seal rings; if you do not have a pressing tool, only drive them in with a suitable mandrel, using the utmost care. The cold bearings will automatically drop into the bearing seats at an engine housing temperature of approx. 150° C. If necessary, tap the housing half on an even wooden surface, if any bearings stay in their seats, press out with a suitable mandrel.

Always press or drive in new bearings at the outer ring of the bearing, otherwise the bearings or their running surfaces will be damaged.

After the housing half has cooled down, check the bearings for a tight fit; if they are not firmly seated after cooling down they may turn in the engine case when they warm up. If this happens, the engine case must be replaced.

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LEFT HOUSING HALF

- Remove the shaft seal ring (1) from the crankshaft.
- Dismount the chain guide (2).
- Dismount the diaphragm valve (3)
- Remove the circlip (4) from the idler shaft bearing.
- Remove the retaining bolt (5) on the shift drum bearing.
- Heat the housing half in the oven to approx. 150° C; the bearings will fall out of the bearing seats automatically at a housing temperature of approx. 150° C.

Roller bearing for the crankshaft (6)

Press in a new roller bearing from the inside up to the stop with a suitable mandrel.

Grooved ball bearing for the main shaft (7)

Press in a new grooved ball bearing from the inside up to the stop.

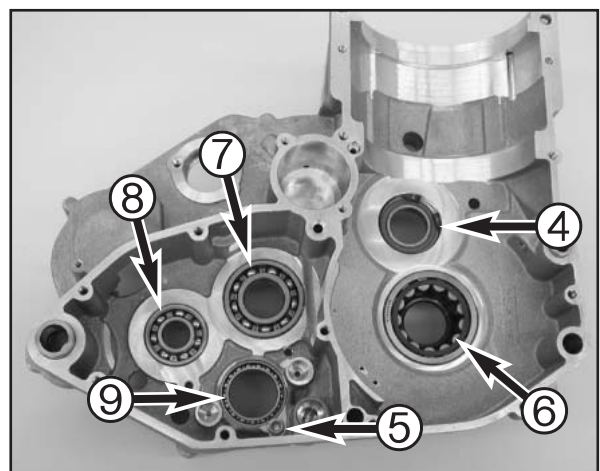
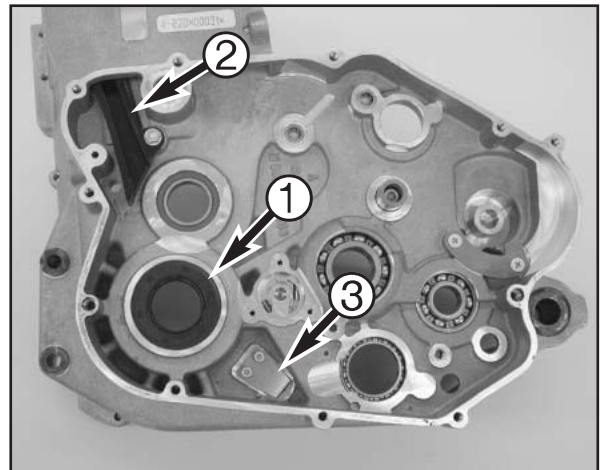
Grooved ball bearing for the countershaft (8)

Press in a new grooved ball bearing from the inside up to the stop.

Grooved ball bearing for the shift drum (9)

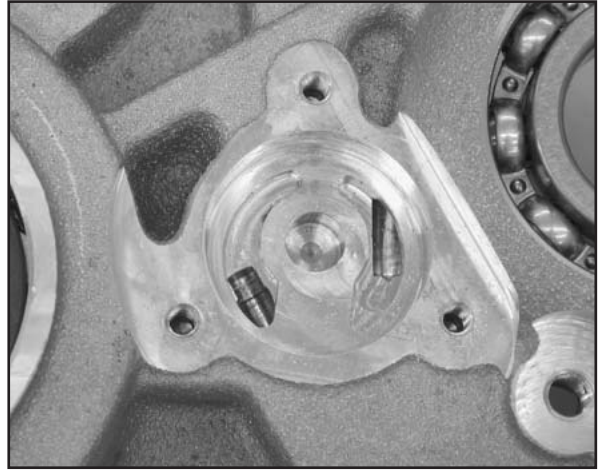
Press in a new grooved ball bearing from the inside up to the stop.

The needle bearings in the starter idler and freewheel usually do not need to be replaced since they do not wear easily.



SERVICING THE INDIVIDUAL PARTS

- Check the oil pump housing for scores and seizing marks.
- Blow compressed air through all oil ducts and make sure they are not clogged.

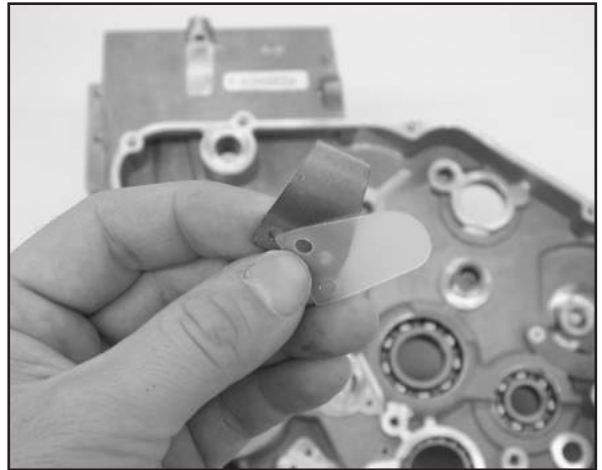


- Check the diaphragm valve for damage, replace the diaphragm if necessary.
- Remount the diaphragm valve, apply Loctite 243 to the M4x6 screws and tighten to 1.5 Nm.
- Press the shaft seal ring onto the crankshaft with a suitable mandrel until flush.
- Mount the chain guide, apply Loctite 243 to the bolt and tighten to 6 Nm.



CAUTION: make sure the collar on the bolt is free of screw locking varnish, otherwise the chain guide will be blocked and may break.

- Mount the circlip on the idler shaft bearing.
- Apply Loctite 243 to the retaining bolt for the shift drum bearing (M6x8) and tighten to 10 Nm.



RIGHT HOUSING HALF

- Remove the shaft seal rings from the crankshaft (1) and the countershaft (2).
- Heat the housing half in an oven to approx. 150° C, the bearings will fall out of the bearing seats automatically at a housing temperature of approx. 150° C.

Roller bearing for the crankshaft (3)

Press in a new roller bearing from the inside up to the stop with a suitable mandrel.

Grooved ball bearing for the main shaft (4)

Press in a new grooved ball bearing from the inside until it fits flush with the housing.

Roller bearing for the countershaft (5)

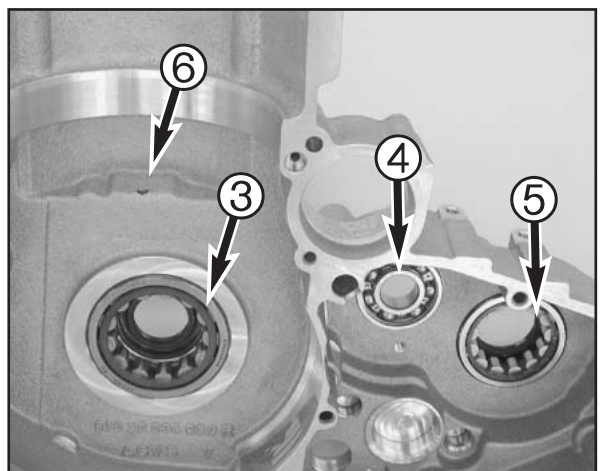
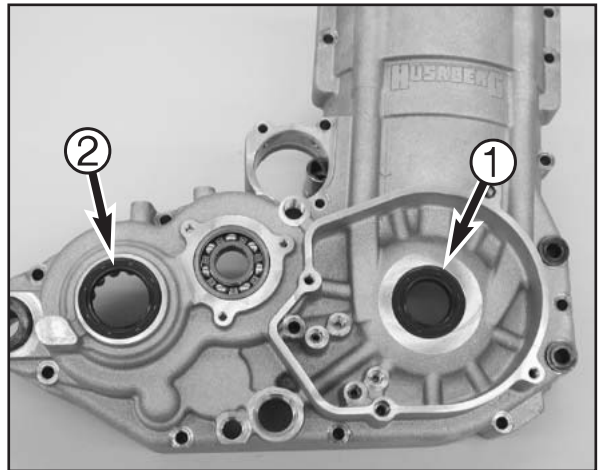
Press in a new roller bearing from the inside to the stop.

- Blow compressed air through the oil hole (6) and make sure it is not clogged.



NOTE: engine oil is injected through this hole to cool and lubricate the pistons and piston pin bearings.

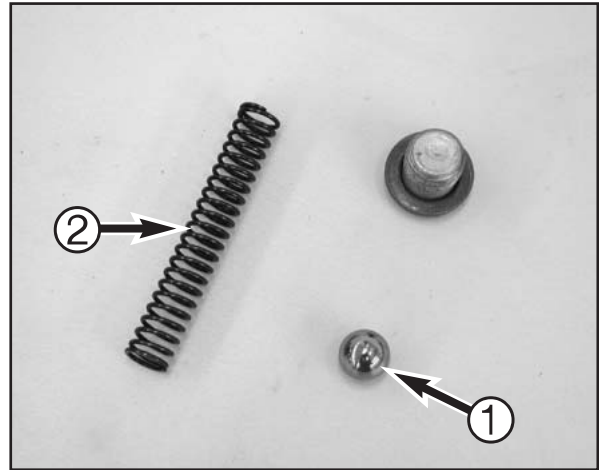
- Press the shaft seal rings onto the crankshaft and the countershaft with a suitable mandrel until flush.



SERVICING THE INDIVIDUAL PARTS

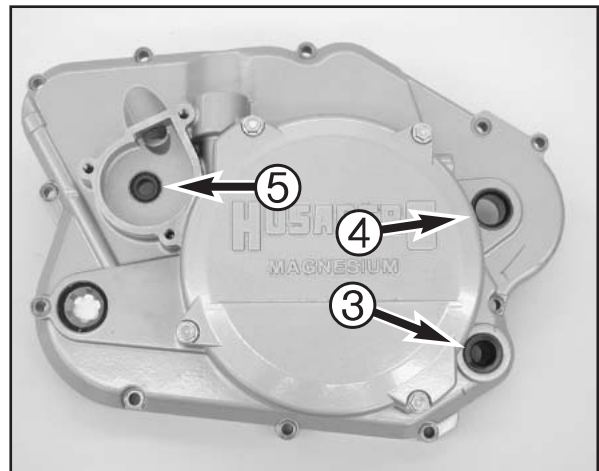
PRESSURE RELIEF VALVE

- Check the valve ball (1) and the pressure spring (2) for damage.

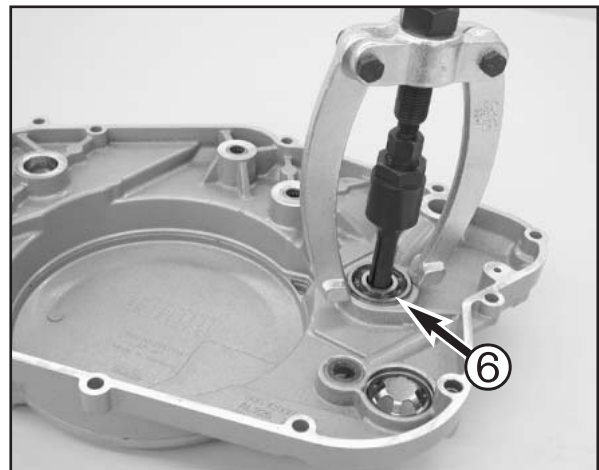


CLUTCH COVER

- Pry the shaft seal ring for the shift shaft (3), the kickstarter shaft (4) and the water pump shaft (5) out of the clutch cover.
- Press in new shaft seal rings with a suitable mandrel until flush, making sure the open side of the seal ring for the water pump faces towards the outside.



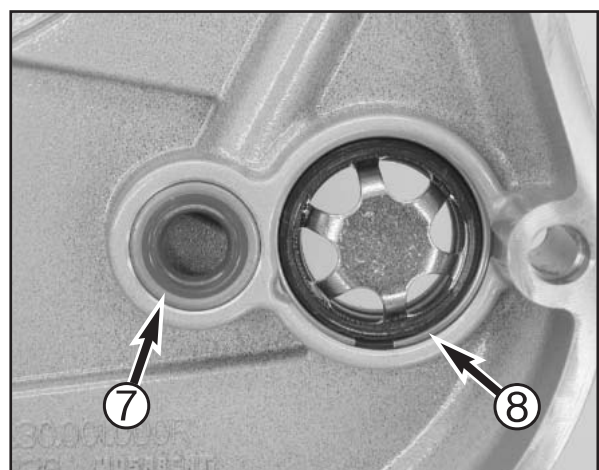
- Pull the grooved ball bearing for the water pump (6) out of the clutch cover with extractor 151.12.017.000 and insert 151.12.018.000.
- Place a wooden panel under the water pump bearing and press the new bearing in up to the stop with a suitable mandrel, being careful to press on the outer ring only.



- Remove the shaft seal ring for the crankshaft (7) and press in a new seal ring until flush (press all the way in to the stop for 650 starting with the 2005 model).
- Blow compressed air through the oil duct and make sure it is not clogged.

- Pry out the ring lock (8) for the oil level viewer out of the clutch cover.
- Clean the hold and press in a new oil level viewer.
- Mount the ring lock.

The needle bearings in the starter idler and freewheel usually do not need to be replaced since they do not wear easily.



SERVICING THE INDIVIDUAL PARTS

CRANKSHAFT

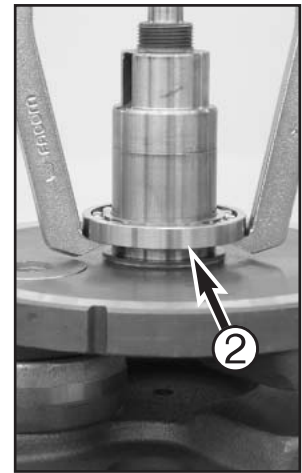
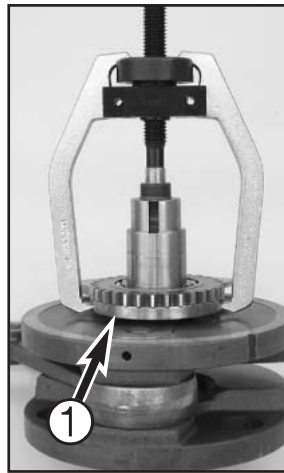
- Pull the cylinder liner off of the piston, lift the piston pin retainer out of the groove and push the piston pin out of the piston.
- Clamp the crankshaft into the vise – use protective jaws.
- Heat the special tool 584.29.037.037 to approx. 150° C on a hotplate and immediately push on the inner ring of the crankshaft bearing. Firmly press the tool together to obtain a good heat transfer and pull the inner ring off of the crankshaft with the special tool.



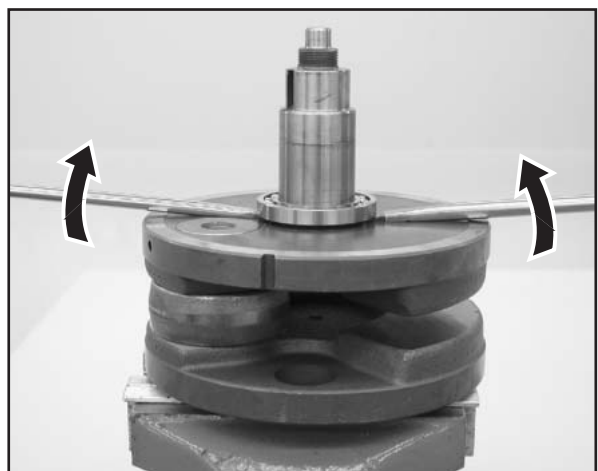
- Remove the spacing washers from the crankshaft.



- Pull the balance weight (1) off of the crankshaft with the extractor 590.29.033.000 (use protection cover 800.29.031.000).



- Carefully press the inner bearing (2) upwards with 2 screwdrivers and pull off of the crankshaft using extractor 590.29.033.000.



SERVICING THE INDIVIDUAL PARTS

- Press the outer ball bearing out of the balance weight (on the side with the tothing).



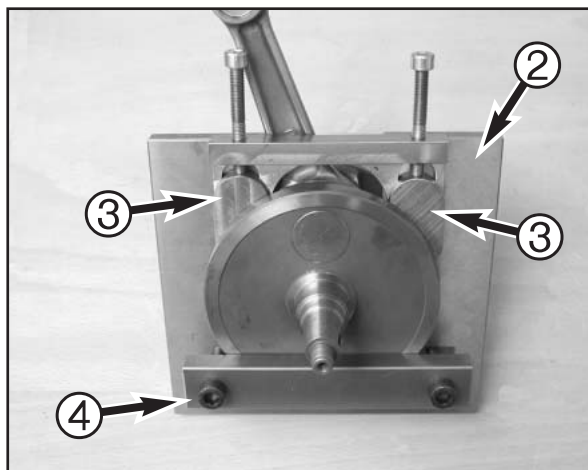
NOTE: the ball bearing cannot be pressed out through the bottom since it will be blocked by the ring (1).



D
5

PRESS OUT THE CRANK PIN

- Place the crankshaft and a crankshaft web in the press out tool 800.29.035.000 (2) as shown in the photo, being careful not to jam the conrod.
- Move the wedges (3) until the crankshaft lies flat.
- Tighten the screws on the clamping bracket (4).

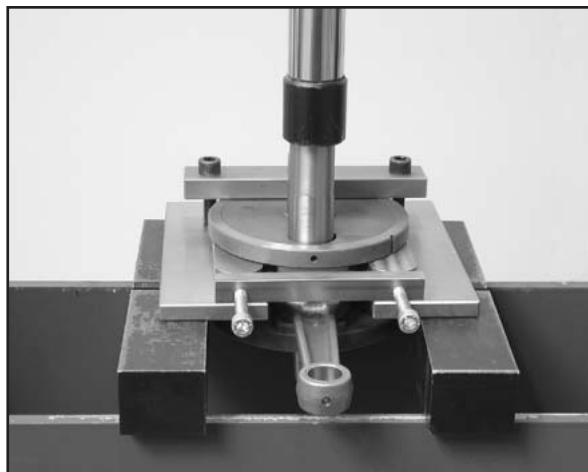


- Use a hydraulic press to press the crankpin through with the pressing pin.

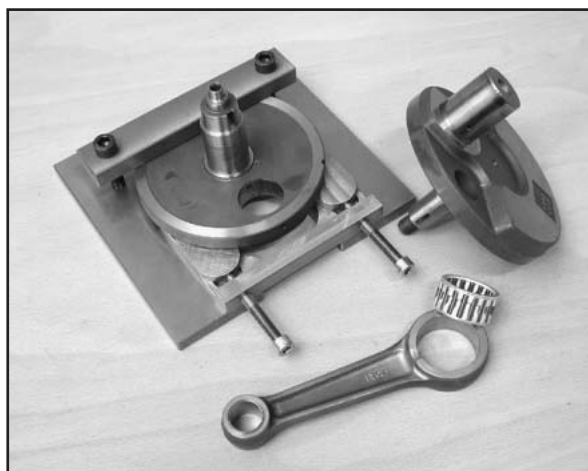


CAUTION: hold the lower part of the crankshaft to keep it from falling down.

- Press the crankpin out of the second crankshaft web in the same manner.



- Check the crankpin parts, replace any damaged or worn parts and clean the crankshaft webs.



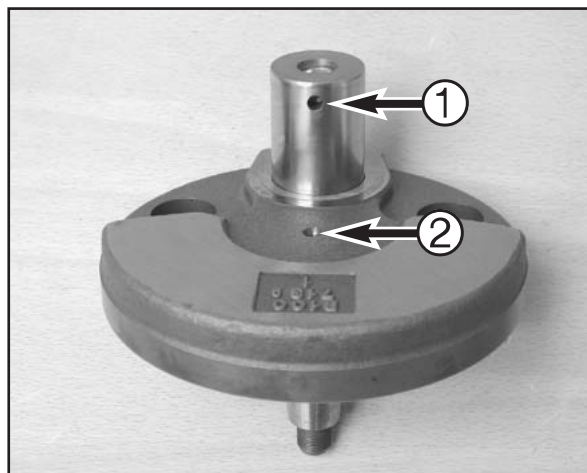
SERVICING THE INDIVIDUAL PARTS

PRESS IN THE CRANK PIN

- Press in the crankpin until flush. The lubrication bore (1) must point to the exact center (2) of the crankshaft web, as shown in the photo.



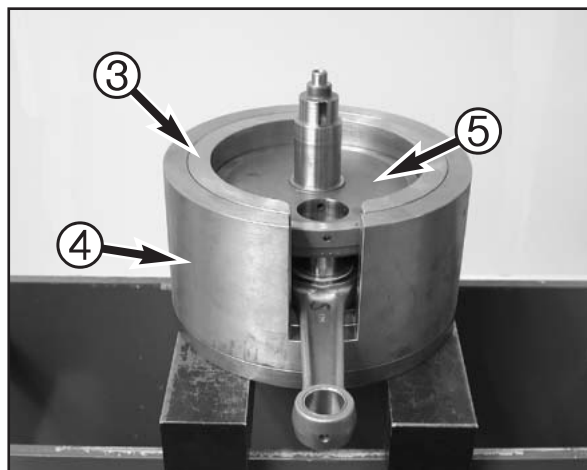
CAUTION: if the lubrication bore is incorrectly aligned the conrod bearing will not be supplied with lubricating oil and which will lead to engine damage.



- Slide the conrod bearing and the conrod on the crankpin.
- Insert a suitable centering sleeve (3) in the outer part (4) of the pressing tool 800.29.036.000 and mount the crankshaft web with the conrod (see photo).



NOTE: Several centering sleeves belong to the conrod bearing pressing tool 800.29.036.000, since the outer diameter of the crankshaft webs can vary depending on the engine displacement.



- Slide the second crankshaft web (5) in the centering sleeve with the pressing plate (6) on 800.29.036.000 and press on the crankshaft web.



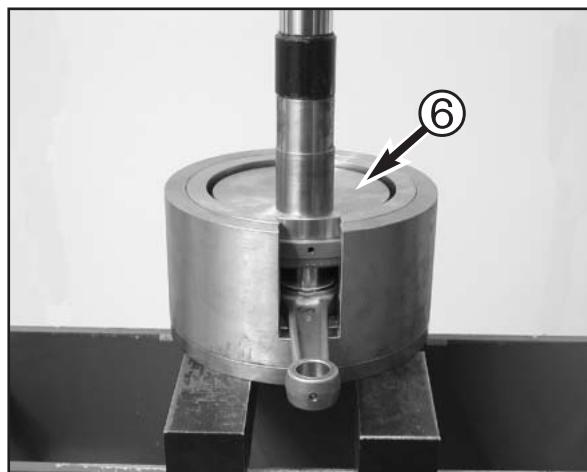
CAUTION: the pressing plate must be positioned in the center of the crankshaft web.

To make sure the crankshaft web does not cant, press onto the crankpin from above.

- Remove the crankshaft from the pressing tool and check the conrod bearing for smooth operation.



NOTE: after it is pressed in, check the crankshaft for runout and measure the outer dimension of the crankshaft webs (see page D7).



SERVICING THE INDIVIDUAL PARTS

CHECKING THE CRANKSHAFT FOR LATERAL RUNOUT

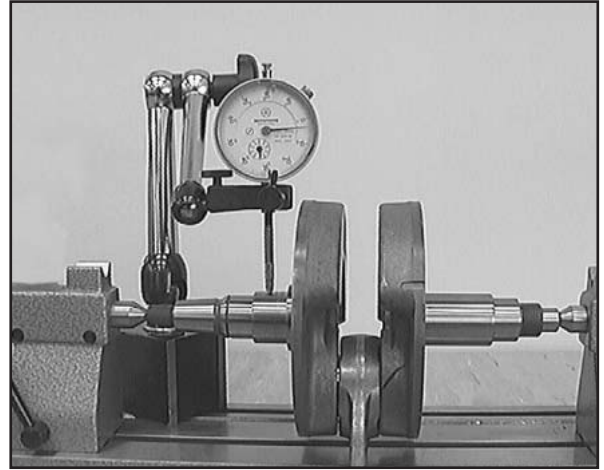
- Place the crankshaft on a roller stand or similar support and use a dial gauge to check the crankshaft for lateral runout.

Lateral runout: max. 0.12 mm

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

Radial clearance: max. 0.05 mm

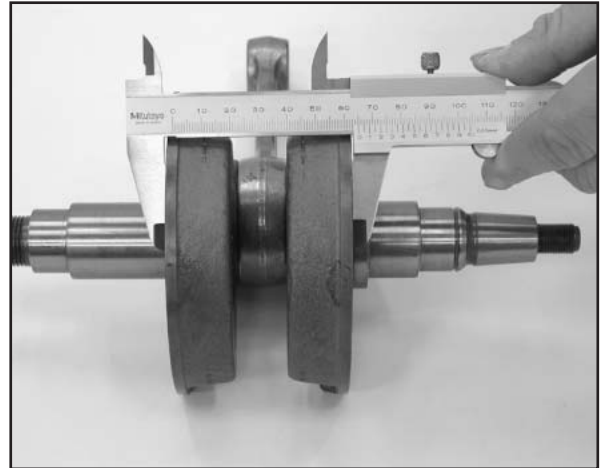
Axial clearance: max. 1.00 mm



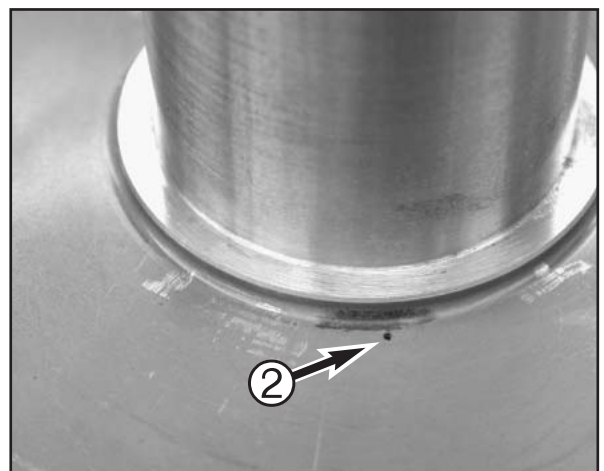
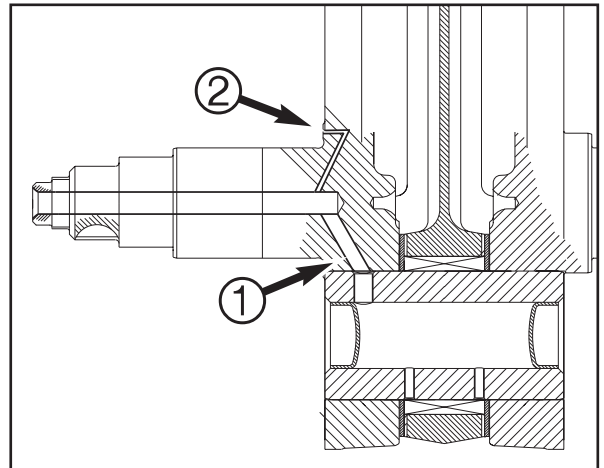
OUTER DIMENSION OF THE CRANKSHAFT WEB

- Measure the outer dimension of the crankshaft web using a sliding gauge as shown.

Outer dimension of crankshaft web = 60 mm \pm 0.05 mm
for 650 starting with the 2005 model = 61.2 mm \pm 0.05 mm



- Clean the crankshaft thoroughly, blow compressed air through the oil holes to the crank pin (1) and to the ball bearing in the balance weight (2) and make sure they are not clogged.



SERVICING THE INDIVIDUAL PARTS

- Press the inner ball bearing (1) on the balance weight (2) onto the crankshaft with a suitable pipe
- Only press on the inner ring. Press on the balance weight with the outer ball bearing (3) – only press on the inner ring.
- Slide the spacing washer (4) (0.2 mm) onto the crankshaft.
- Heat the special tool 584.29.037.037 with the new bearing inner ring (5) on a hotplate to approx. 150° C and immediately slide onto the crankshaft (see page D4).
- Strike on the inner ring with a suitable pipe and allow to cool.



CAUTION: never clamp the crankshaft with the crankshaft journal and strike on the inner ring since this will press the crankshaft webs together and the crankshaft can no longer be used.

- Turn the crankshaft over and slide both spacing washers (6) (0.1 and 0.15 mm) onto the crankshaft.
- Mount a new inner ring of the other crankshaft bearing (7) as described above.
- Measure the axial clearance of the crankshaft after you replace the inner rings.

BALANCING THE AXIAL CLEARANCE OF THE CRANKSHAFT

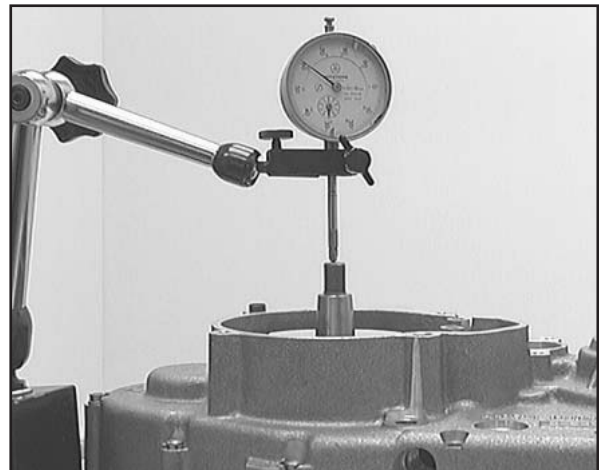
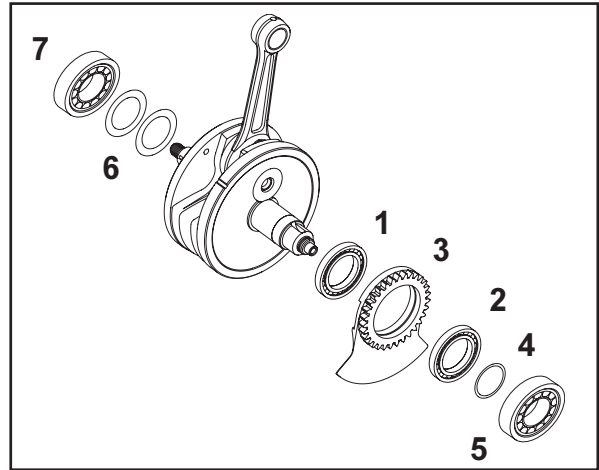
- Place the crankshaft in the left housing half and mount the right housing half.
- Mount the housing bolts around the crankcase and tighten.
- Mount the dial gauge support on the engine case and measure the axial clearance of the crankshaft.

Axial clearance	450:	0.25 - 0.35 mm
Axial clearance	501,550:	0.45 - 0.55 mm
Axial clearance	650:	0.55 - 0.65 mm

- Correct the axial clearance if the measured value does not correspond to the setpoint value.
- To correct, remove the crankshaft and the inner ring of the crankshaft bearing (7) and pull off of the crankshaft with the special tool 584.29.037.037 on the ignition side. Add or remove compensating disks and remount the inner ring (see above).



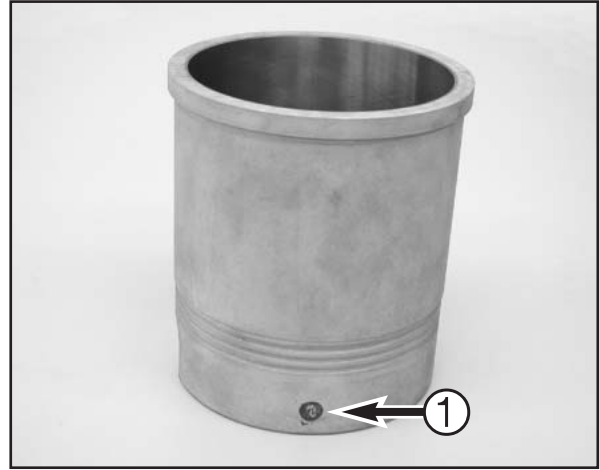
NOTE: Add compensating disks if the axial clearance is too large. Remove compensating disks if the axial clearance is too small. Only add compensating disks on the ignition side.



SERVICING THE INDIVIDUAL PARTS

NIKASIL CYLINDER COATING

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/cylinder liner. It is inexpensive to repair (replace) a worn coating if the cylinder barrel is not damaged.



MEASURING THE PISTON AND CYLINDER LINER, ESTABLISHING THE MOUNTING CLEARANCE OF THE PISTON

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

Diameter 450, 550, 650

Cylinder liner size I: 100.000 - 100.012 mm

Cylinder liner size II: 100.013 - 100.025 mm

Diameter 501

Cylinder liner size I: 95.000 - 95.012 mm

Cylinder liner size II: 95.013 - 95.025 mm



NOTE: mark the cylinder liner size (1) on the side of the cylinder liner, the piston size (2) on the piston head.

If measured diameter of a size I cylinder liner falls within the size II tolerance zone, order a new size II piston.

- The piston is measured at the piston skirt across the piston pin as shown in the drawing.
- The piston mounting clearance is the difference between the smallest cylinder liner diameter and the piston diameter.

Piston mounting clearance 450, 550, 650 uncoated

0.072 - 0.097 mm

Wear limit: 0.12 mm

Piston mounting clearance 450, 550, 650 coated

0.042 - 0.087 mm

Wear limit: 0.12 mm



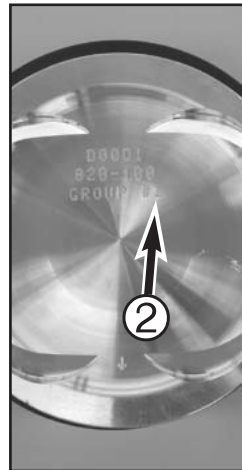
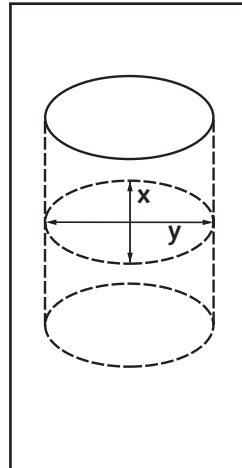
NOTE: Uncoated pistons have light-colored metal, coated pistons are dark-colored with black coating.

Piston mounting clearance 501

Piston size I: 0.040 - 0.080 mm

Piston size II: 0.044 - 0.085 mm

Wear limit: 0.12 mm



SERVICING THE INDIVIDUAL PARTS

CHECKING THE PISTON

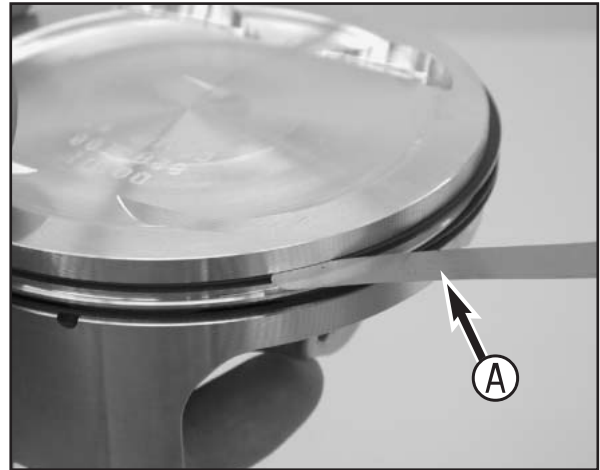
- Replace the piston if oil consumption is high or the piston skirt is excessively grooved.
- If the piston is to be remounted:

1. Check the piston bearing surface for damage
2. Piston ring grooves: use a feeler gauge (A) to measure the piston ring clearance in the piston ring groove.

Wear limit: 0.15 mm

The piston rings must move freely in the groove. Use old piston rings or sandpaper (400 grit) to clean the piston ring grooves.

3. Check the piston rings for damage and end gap.
Mount the oil scraper ring with the "O" mark facing up.
Mount the rectangular ring with the "O" mark facing up.
4. Replace piston pins that are badly discolored or have visible running marks. Place the piston pin in the conrod and check for clearance.



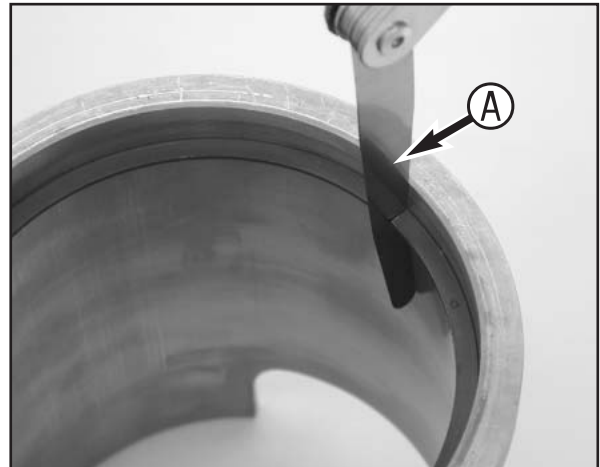
CHECKING THE PISTON RING END GAP

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

Compression ring : max. 0.80 mm

Oil scraper ring : max. 1.00 mm

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

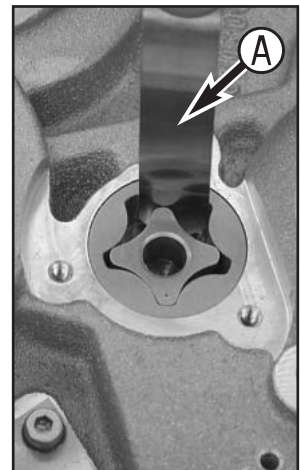
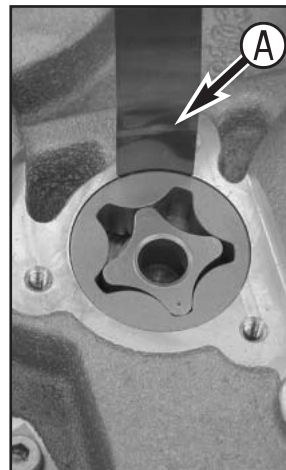


CHECKING THE OIL PUMP FOR WEAR

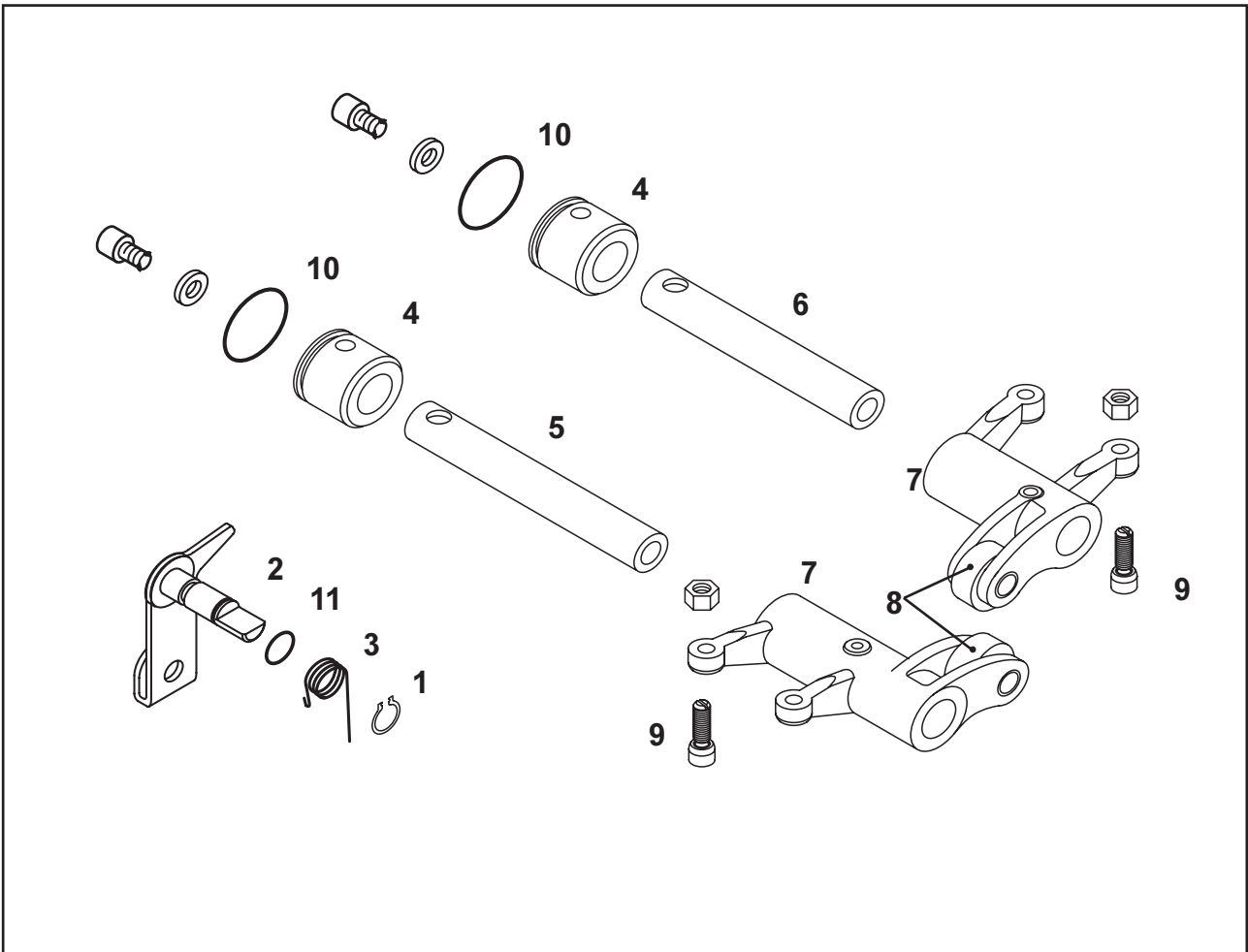
- Insert the inner rotor in the engine case with the mark facing towards the outside and the outer rotor with the mark facing towards the inside.
- Use a feeler gauge (A) to measure the wear:

Outer rotor - oil pump housing: max. 0.20 mm

Outer rotor - inner rotor: max. 0.20 mm



SERVICING THE INDIVIDUAL PARTS



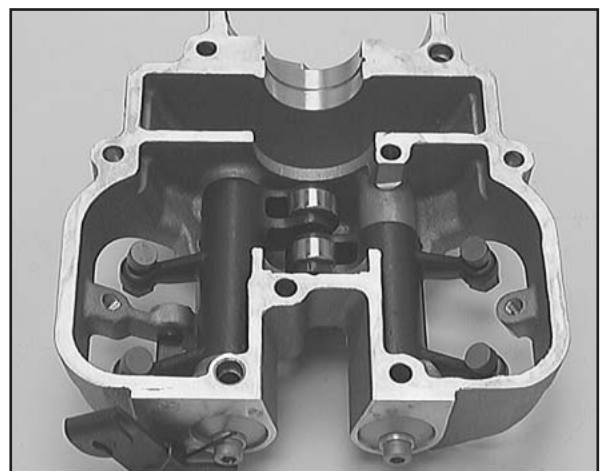
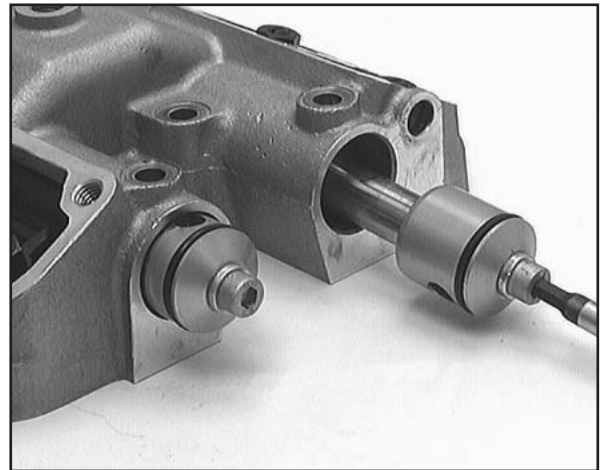
CYLINDER HEAD TOP SECTION

- Remove the circlip (1) and the decompression shaft (2) out of the bore together with the spring (3).
- Pull the 2 end pieces (4) out of the cylinder head top section together with the rocker arm shafts (5) + (6). Remove the rocker arms (7).
- Clean all parts and check for wear.
- Check the rocker arm shafts (5) + (6) for score marks and smooth operation in the rocker arms (7).
- Check the rocker arm rollers (8) for smooth operation, replace the rocker arm roller if there is any radial clearance.
- The seating surfaces of the adjusting screws (9) must fit flush.
- Check the decompression shaft (2) for smooth operation and clearance in the bearing bore. Replace the O-ring (11).
- Replace the O-rings (10).
- Thoroughly oil all parts before reassembling.
- Position the rocker arms in the cylinder head top section and mount the rocker arm shafts.



NOTE: mount the shorter rocker arm shaft (6) in the rear.

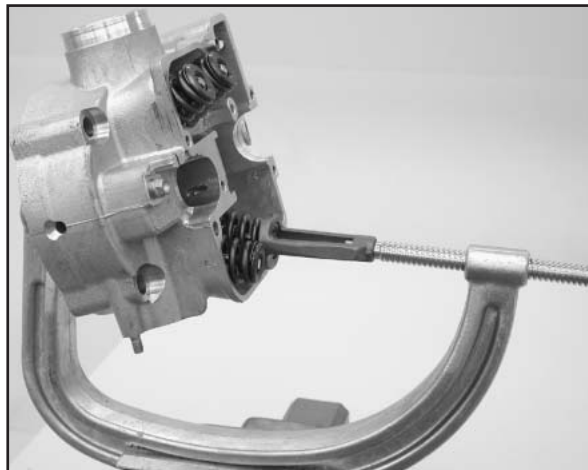
- Mount the end pieces (4) and turn so that you can mount the bolts for the cylinder head top section.
- Mount the decompression shaft (2) and pretension the spring.



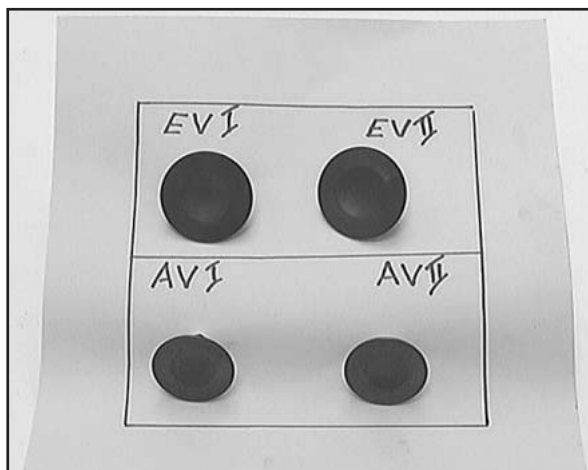
SERVICING THE INDIVIDUAL PARTS

CYLINDER HEAD

- Remove the chain tensioning rail.
- Remove the 4 valves with the special tool 590.29.019.000.



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



- Remove the valve spring retainer (1) and the valve springs (2) from the cylinder head.
- Remove the spring retainer (3) and pull the valve shaft seals (4) off of the valve guides.

Sealing area

Check the spark plug thread and the valve seats for damage or cracks. Use a straight edge and a feeler gauge to measure the sealing area to the cylinder for distortion. Max. distortion 0.10 mm.

Valve seats

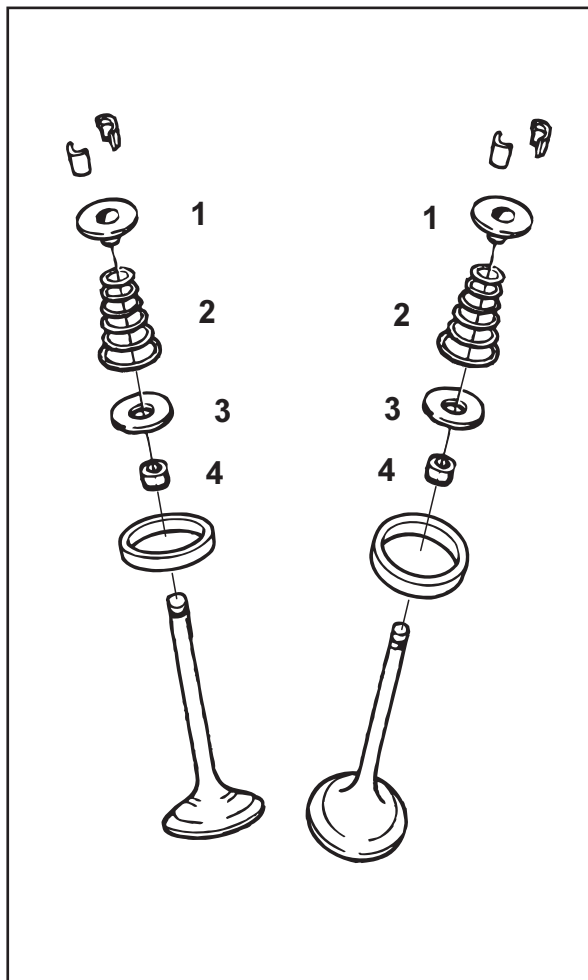
The valve seats may not be impacted. Width of sealing seat: intake max. 1.50 mm; outlet max. 2.00 mm. Reseat the valves if necessary.

Valves

Check the valve disk for wear and runout. The valve disk runout should not exceed 0.05 mm. The valve seat may not be impacted. The sealing area should be in the middle of the valve seat. The valve shaft is hard-chrome-plated. Wear usually occurs at the valve guide.



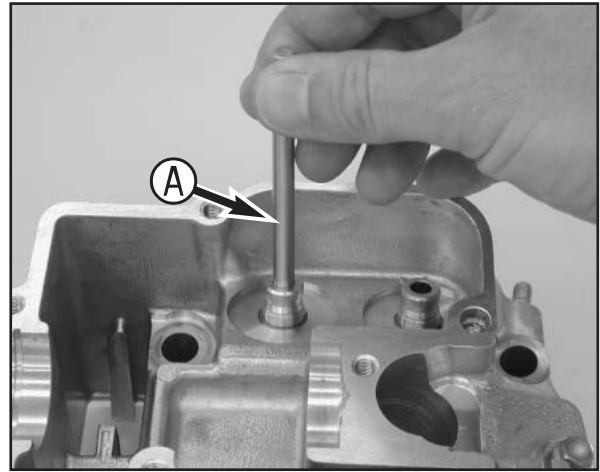
NOTE: 2 cylindrical, intertwined springs are installed in the 450 FC/FS-C starting with the 2005 model.



SERVICING THE INDIVIDUAL PARTS

Valve guides

Use the limit plug gauge 590.29.026.006 (A) (\varnothing 6.05 mm) to check the valve guides. If the limit plug gauge can easily be pushed into the valve guide, the valve guide needs to be replaced at a special workshop.

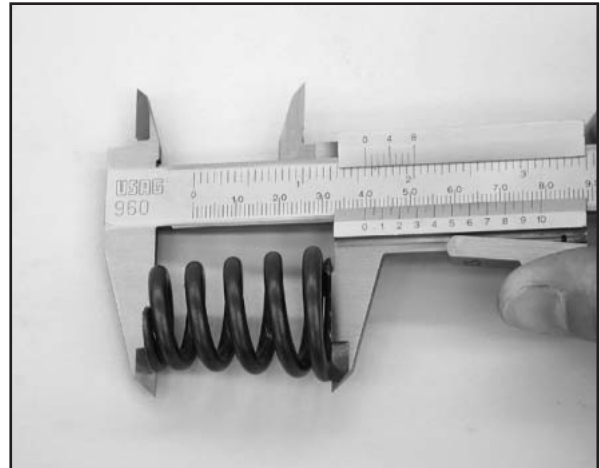


Valve springs

Check the valve springs for fractures or other wear (visual check). Measure the spring length with a sliding gauge. The minimum length may not be less than 38.30 mm (450 FC/FC-S until 2004). Replace the spring if it is shorter.



NOTE: 2 cylindrical, intertwined springs are installed in the 450 FC/FS-C starting with the 2005 model.



Minimum length of valve springs

450 FC/FS-C from 2005

Inner spring	30.20mm
Outer spring	32.40mm

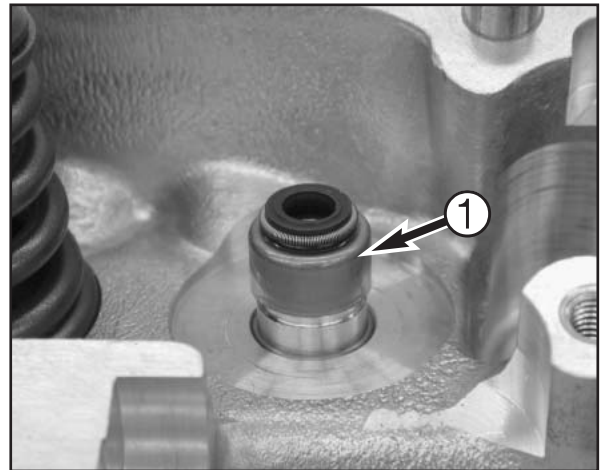
Other models

Conical spring	38.30mm
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Valve shaft seals

Always replace the valve shaft seals (1) if the valves are dismantled.

- Mount the valve shaft seals on the valve guides and oil.
- Place the 4 spring washers in the cylinder head.
- Oil the valves at the shaft and insert in the valve guides in their original position.
- Mount the valve springs with the larger diameter facing down, place the valve spring retainers in the valve springs.

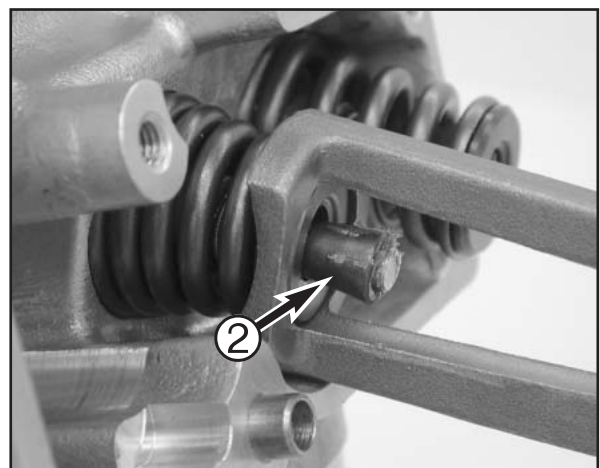


- Pretension the valve springs with the special tool and mount the valve key (2).



NOTE: make sure the valve keys are seated properly when mounted. Use a little grease to position them on the valve.

- Tap on the valve spring retainers a few times with a plastic hammer.
- Mount the chain tensioning rail, secure the bolt M5x16 with Loctite 243 and tighten to 6 Nm.



SERVICING THE INDIVIDUAL PARTS

CAMSHAFT

- Use the extractor 590.29.033.000 to pull both grooved ball bearings (1) off of the camshaft (see illustration).



CAUTION: never clamp the camshaft in a vise on the cams.

- Detach the spring (2) on the automatic decompression shaft (3) while pulling the automatic decompression shaft out of the camshaft.
- Loosen the 2 bolts M8x10 (4) and remove the camshaft gear (5).

- Clean all of the parts, check and replace if necessary.
- Check the bearing seats in the camshaft and the cams for wear.

- Replace both grooved ball bearings (1).

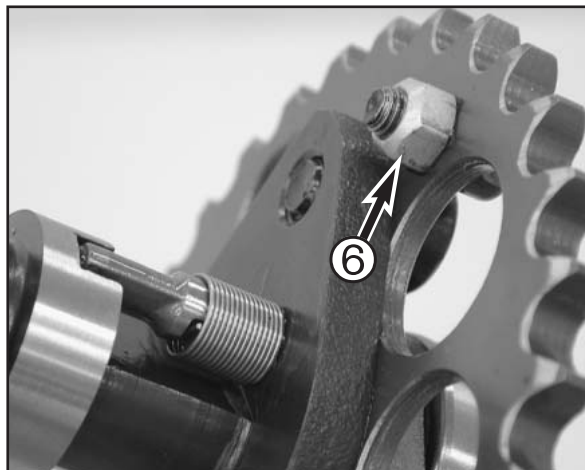
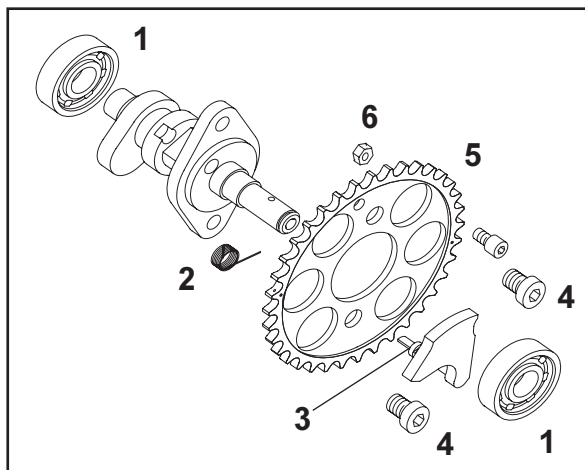
- Check the position of the automatic decompression shaft (3) for clearance and contact surface to the rocker arm for wear.

- Check the tothing on the camshaft gear (5) for wear.

- Check whether the bolt (6) on the automatic decompression retainer has a tightening torque of 8 Nm.



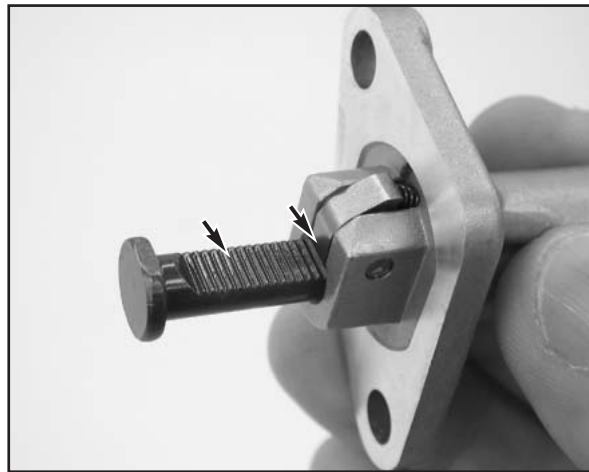
NOTE: if you can turn the bolt, it needs to be removed, cleaned, secured with Loctite 2701 and tightened to 8 Nm.



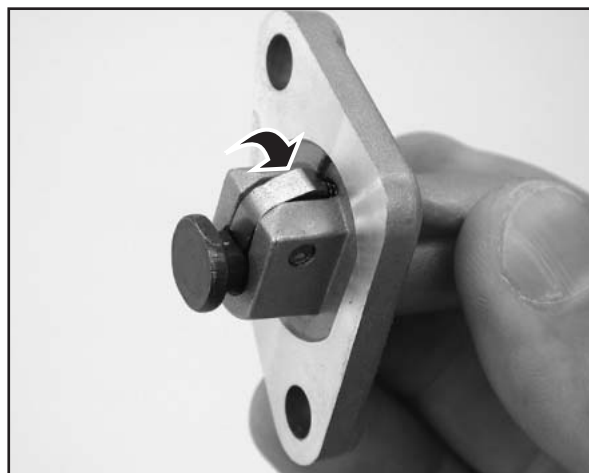
SERVICING THE INDIVIDUAL PARTS

TIMING CHAIN TENSIONER

- Pull the pressure bolt all the way out of the timing chain tensioner and check for smooth operation.
- Check the tothing on the pressure bolt and the ratchet for wear.



- To mount, press the ratchet in the direction shown by the arrow to keep the pressure bolt from locking and push the pressure bolt all the way into the tensioner housing.



TIMING TRAIN

Thoroughly clean all parts and check for wear.

Timing gear (1)

Check the tothing for breakout and wear

Tensioning rail (2)

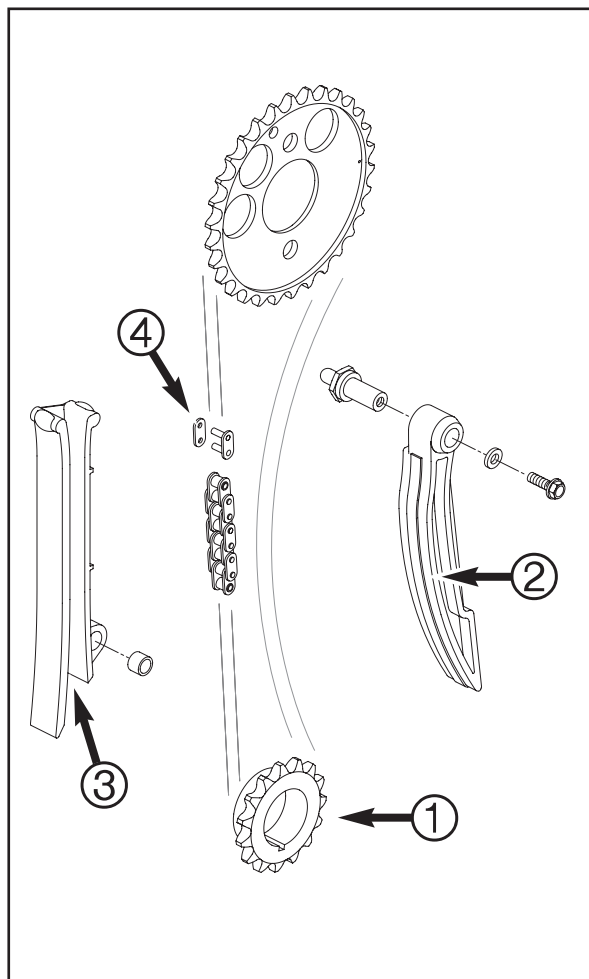
Check for seizing marks at the contact surface.

Timing chain guide (3)

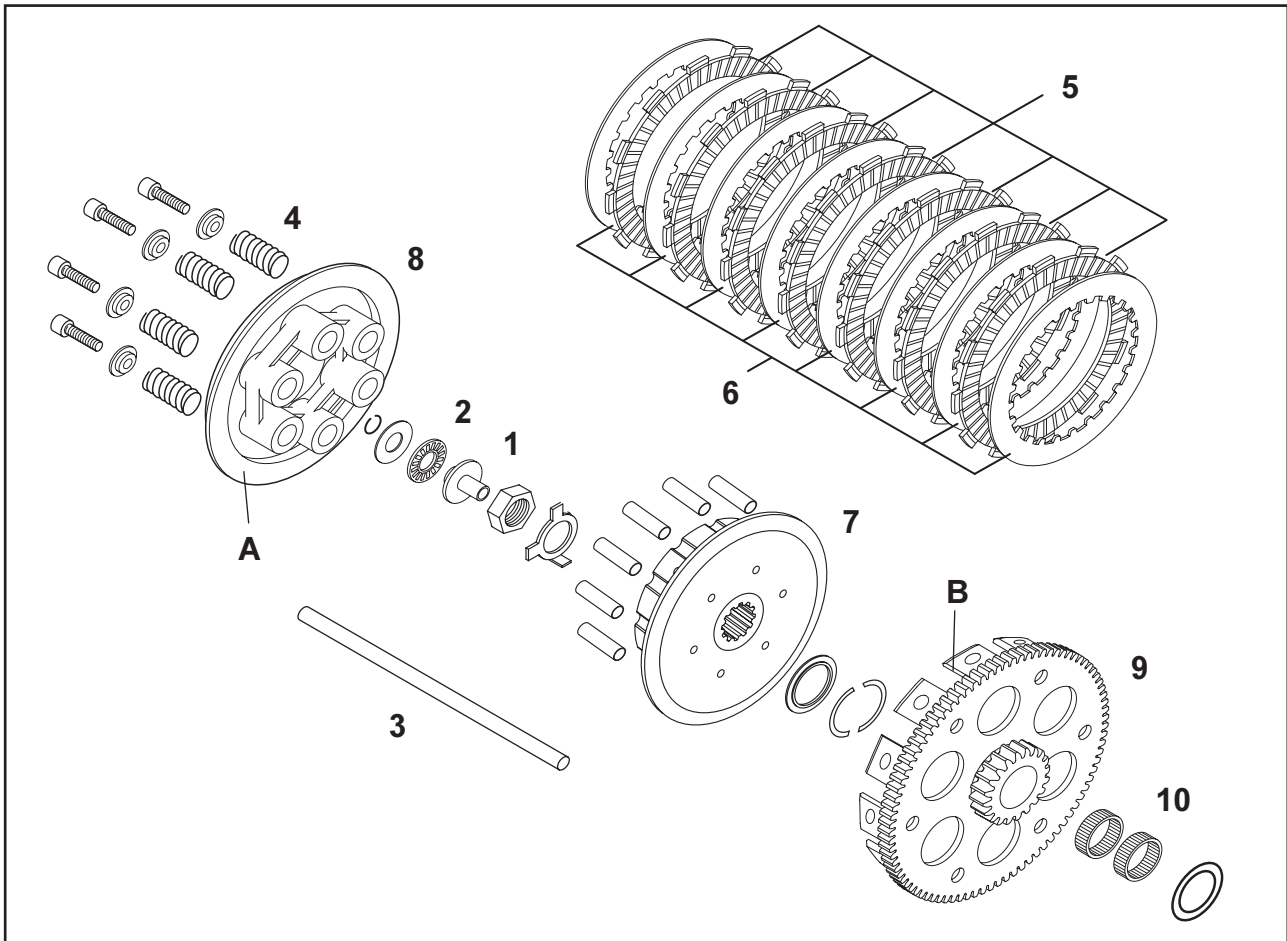
Check for seizing marks at the contact surface.

Chain link (4)

Replace the open chain link on the timing chain after it was separated.



SERVICING THE INDIVIDUAL PARTS



CHECKING THE CLUTCH FOR WEAR

Pressure piece (1)

Check for seizing marks and smooth operation.

Axial needle bearing (2)

Check for damage.

Push rod (3)

Place on a flat surface and check for eccentricity.

Clutch springs (4)

Minimum length 41.5 mm (new 43 mm), replace all 6 springs if necessary.

7 lining disks (5)

Minimum thickness 1.9 mm (new 2.0 mm). The lining disks must be flat.

8 clutch disks 1.0 mm (6)

The clutch disks must be flat. Check for mechanical damage. Replace the clutch disks if localized points are broken off.

Inner clutch hub (7)

Check for seizing marks or damage.

Pressure cap (8)

Check the seating surface (A) of the steel disk for damage.

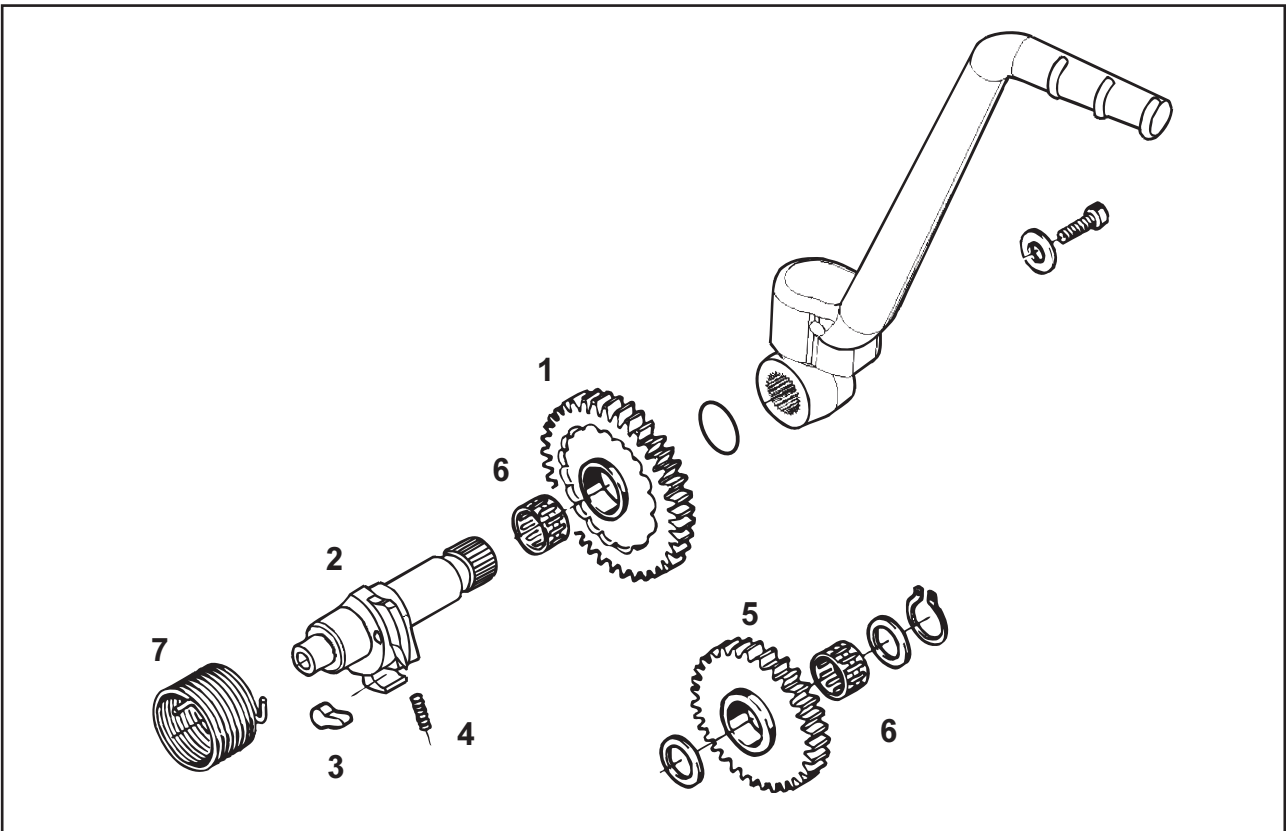
Outer clutch hub (9)

Check the thrust faces (B) of the lining disks and the outer clutch hub for wear. Replace the lining disks and the outer clutch hub if the depressions are deeper than 0.5 mm.

Needle bearing (10)

Check for seizing marks or damage.

SERVICING THE INDIVIDUAL PARTS

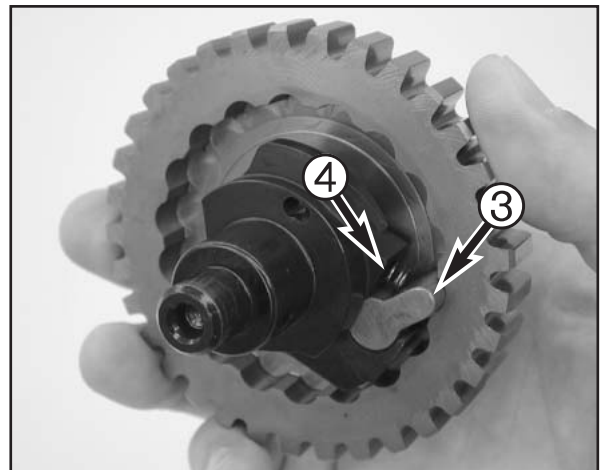


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CHECKING THE KICKSTARTER FOR WEAR

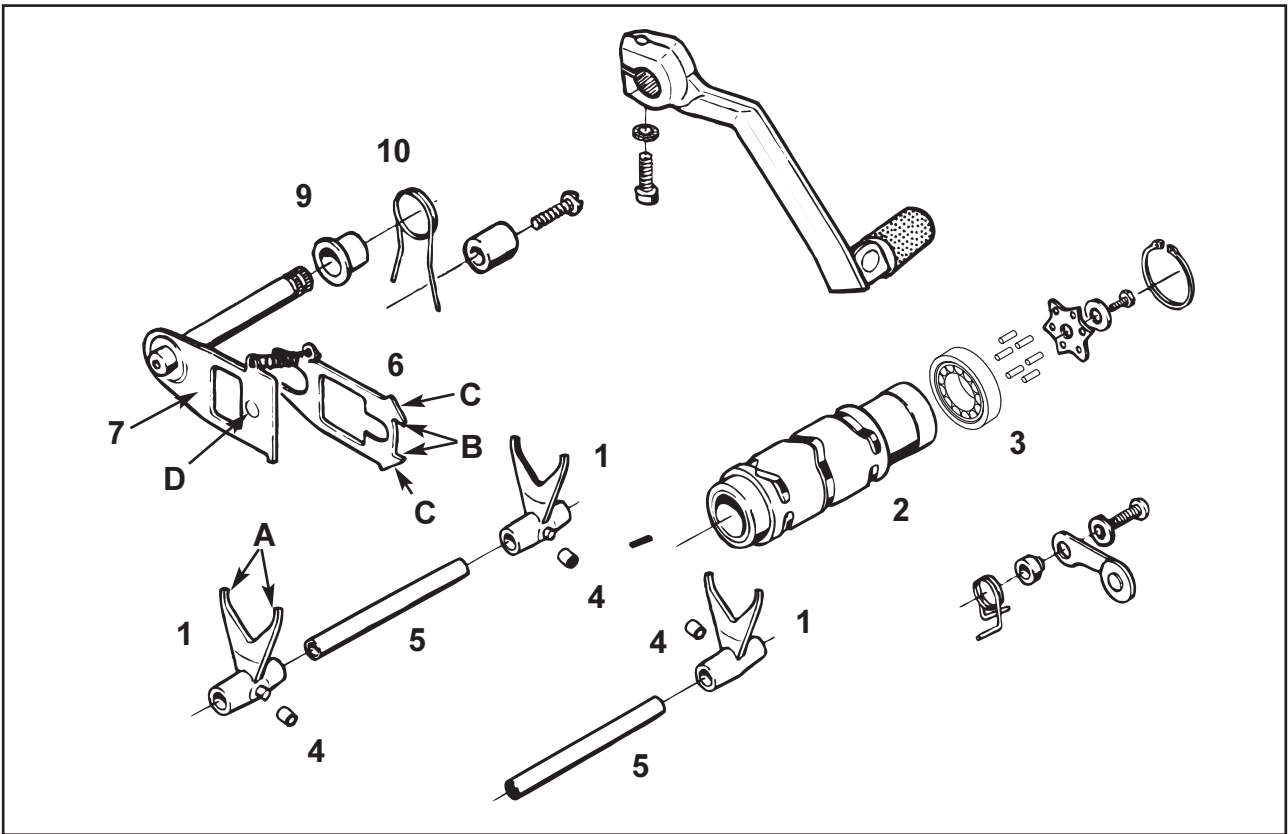
Remove all parts from the kickstarter shaft, clean and perform the following visual test:

- Check the tothing and the driver running surface on the kickstarter wheel (1) for wear.
 - Check the kickstarter shaft (2) for wear or damage.
 - Check the inner clutch hub (3) and the driver spring (4) for wear or damage.
 - Check the tothing on the kickstarter idler (5) for wear.
 - Check the clearance of both needle bearings (6).
 - Check the kickstarter spring (7) for damage.
-
- Insert the driver spring in the kickstarter shaft, slide the inner clutch hub into the recess.
 - Slide the kickstarter wheel together with the needle bearing onto the kickstarter shaft and make sure the inner clutch hub engages.



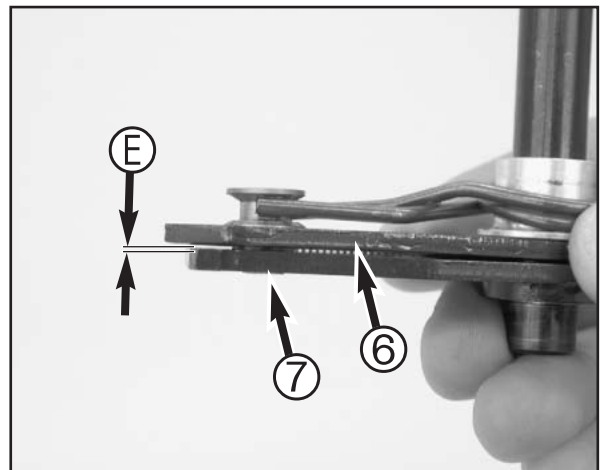
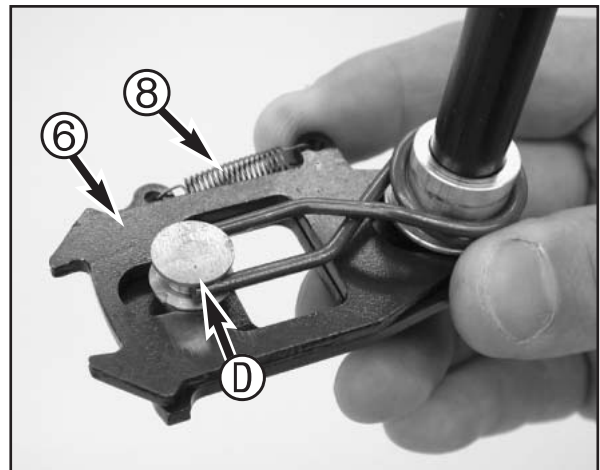
SERVICING THE INDIVIDUAL PARTS

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SHIFT MECHANISM

- Disassemble the shift shaft and clean the individual parts.
- Check the shift forks (1) at the blade (A) for wear. They are 3.9 mm thick when new; the wear limit is 3.6 mm.
- Check the shift grooves on the shift drum (2) for wear.
- Check whether the shift drum is properly seated in the grooved ball bearing (3).
- Check the grooved ball bearing (3) for smooth operation.
- Check the shift rollers (4) for pressure marks or cracks.
- Check the shift rails (5) for runout on a flat surface. Also check for scores or seizing marks. Make sure the shift forks run smoothly on the shift rails.
- Check the shift rail (6) for wear at the points of contact (B).
- Check the return surface (C) on the shift rail for wear (replace if excessively grooved)
- Check the guide bolt (D) for a tight fit and wear.
- Mount the shift rail (6) on the shift quadrant (7) and attach the spring (8).
- Slide the bushing (9) and the return spring (10) with the offset facing the shift quadrant, attach the return spring to the guide bolt.
- Check the clearance (E) between the shift rail (6) and shift quadrant (7). It should lie between 0.40 and 0.80 mm.



SERVICING THE INDIVIDUAL PARTS

GENERAL INFORMATION ON WORKING WITH THE TRANSMISSION

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



NOTE: if the 2nd fixed gear cannot be removed from the main shaft, use the extractor 590.29.033.000 to pull it off together with the 6th idler gear.

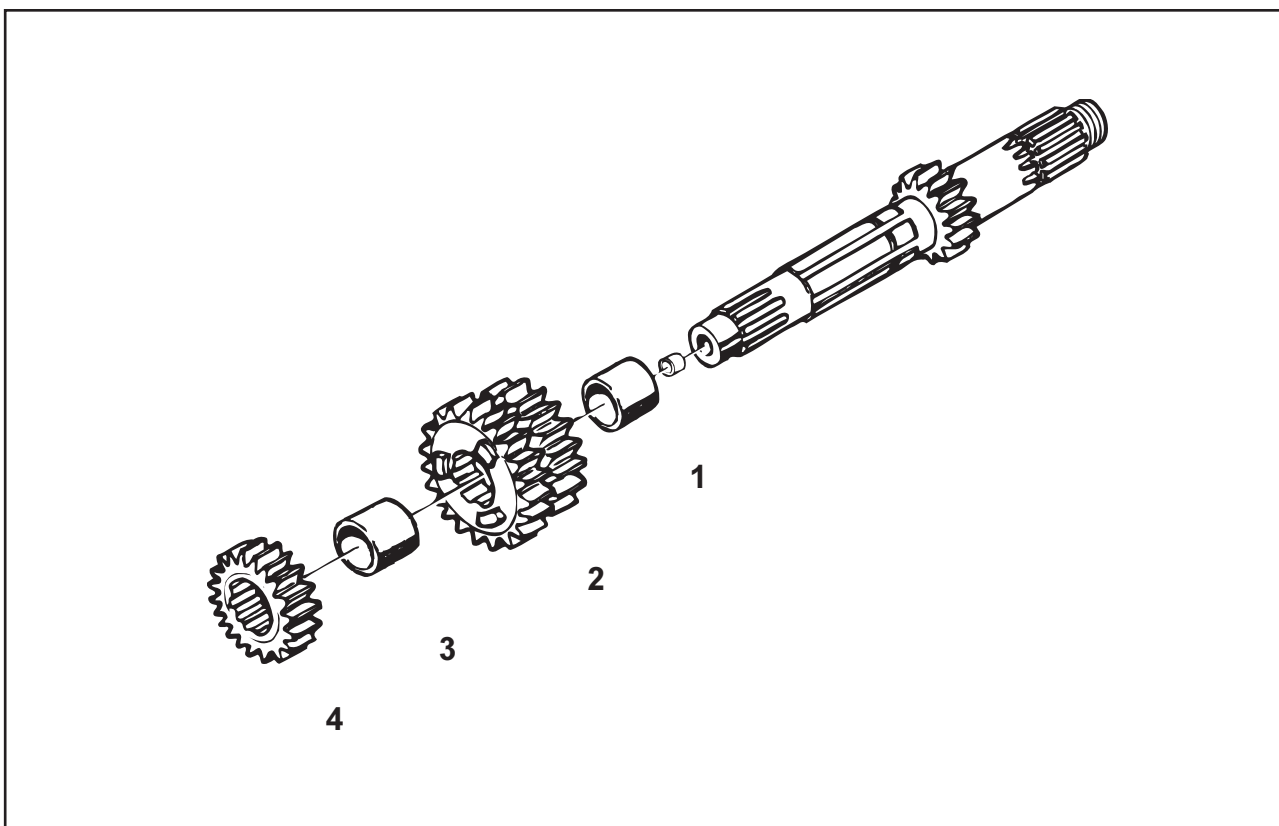
Check the following parts for wear or seizing marks:

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

Carefully clean all parts and replace any damaged parts.

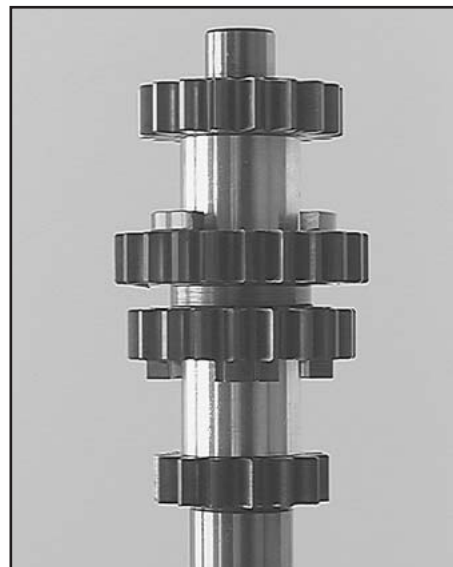
Always mount new circlips when you repair the transmission.

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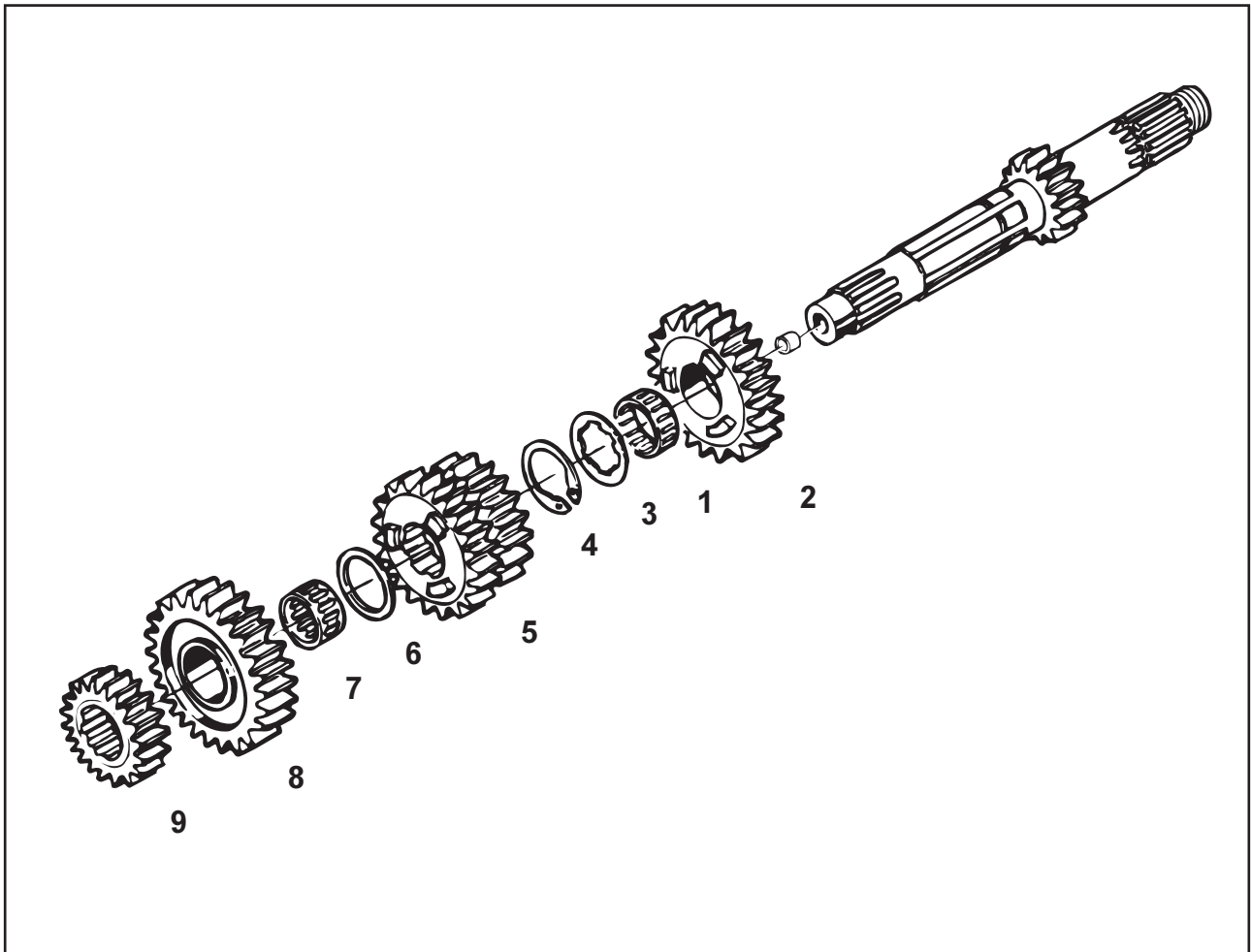
ASSEMBLING THE MAIN SHAFT (4-SPEED)

- Clamp the main shaft in a vise with the thread facing down (use protective jaws).
- Carefully oil all parts before assembling.
- Mount the distance bushing (1) and the 3rd/4th gear sliding wheel (2) with the small gear wheel facing down.
- Slip on the distance bushing (3) and the 2nd fixed gear (4) with the inscription facing up, tap with a rubber hammer to the stop if necessary.
- Finally, check all gears for smooth operation.



SERVICING THE INDIVIDUAL PARTS

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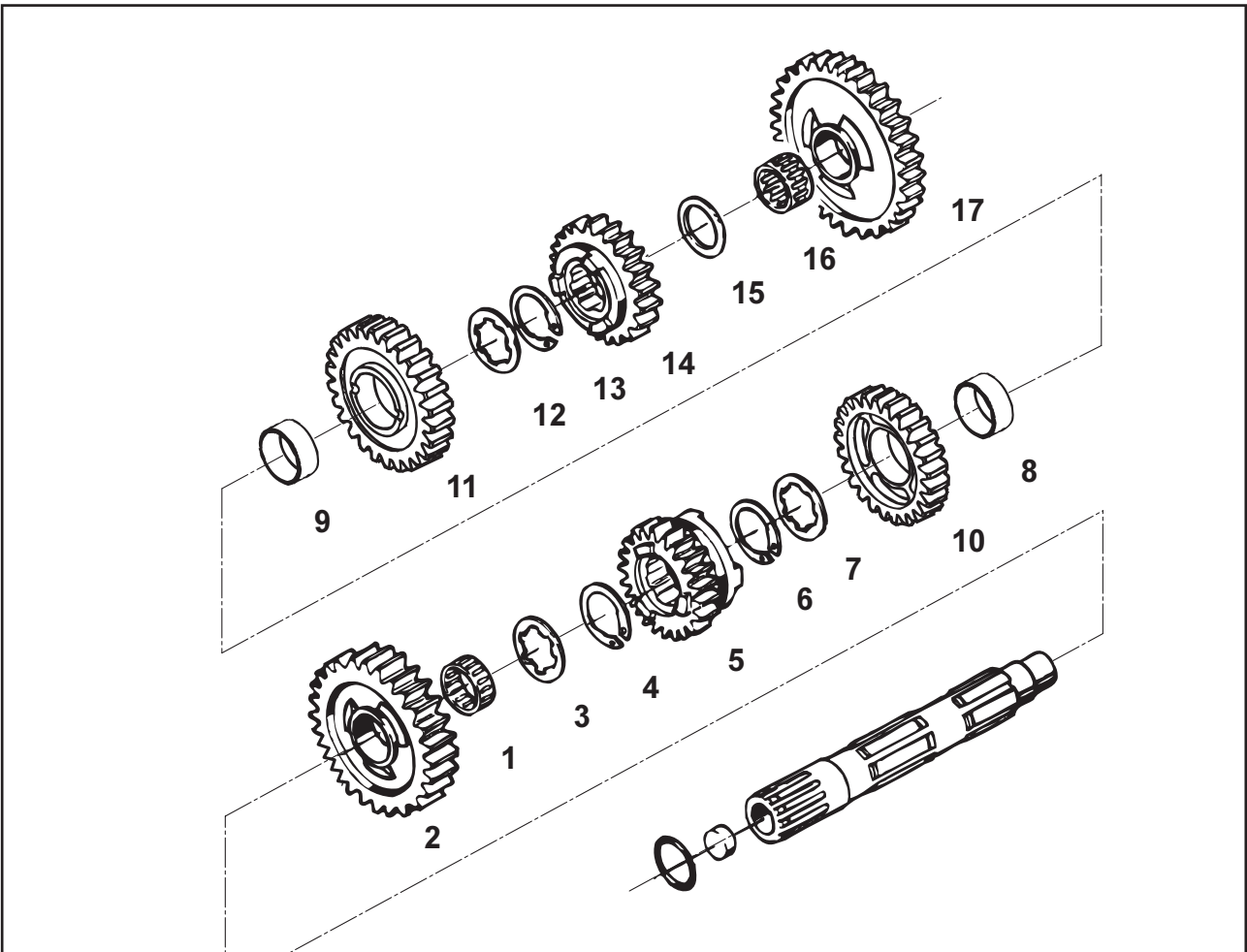


ASSEMBLING THE MAIN SHAFT (6-SPEED)

- Clamp the main shaft in a vise with the thread facing down (use protective jaws).
- Carefully oil all parts before assembling.
- Mount the needle bearing (1), slip on the 5-speed idler (2) with the shift dogs facing up.
- Mount the stop disk (3) (25.2x30x1 mm) and circlip (4) with the sharp edge facing up.
- Slip on the 3rd/4th gear sliding wheel (5) with the small gear facing down and mount the stop disk (6) (21x28x1 mm).
- Slip on the needle bearing (7) aufstecken and the six-speed idler (8) with the shift dogs facing down.
- Slip on the 2-speed fixed gear (9) with the inscription facing up, tap with a rubber hammer to the stop if necessary.
- Finally, check all gears for smooth operation.



SERVICING THE INDIVIDUAL PARTS



ASSEMBLING THE COUNTERSHAFT (4-SPEED/6-SPEED)

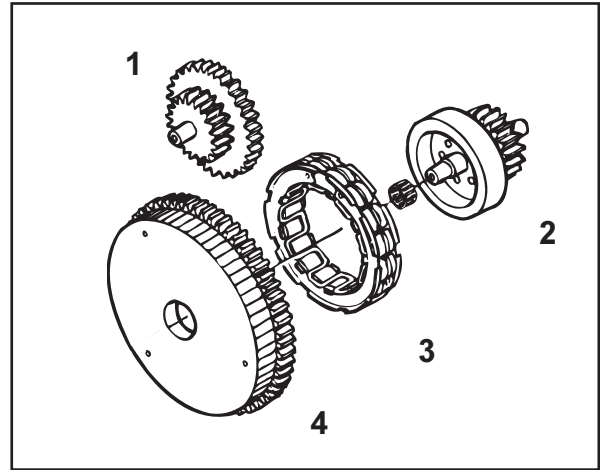
- Clamp the countershaft in a vise with the toothing for the Ritzel facing down (use protective jaws).
- Carefully oil all parts before assembling.
- Mount the needle bearing (1) and the 2nd gear idler (2) on the countershaft with the recess for the shift dogs facing up.
- Mount the stop disk (3) (25.2x32x1 mm) and the circlip (4) with the sharp edge facing up.
- Mount the 6th sliding wheel (5) with the shift groove facing up.
- Mount the circlip (6) and the stop disk (7) (25.2x32x1 mm).
- Mount the 2 transmission gear bushings (8+9) and the 4th gear idler (10) with the recess for the shift dogs facing down.
- Mount the 3rd gear idler (11) with the recess for the shift dogs facing down.
- Mount the stop disk (12) (25.2x32x1 mm) and the circlip (13).
- Slip on the 5-speed sliding wheel (14) with shift groove facing down and the stop disk (15) (21x28x1 mm).
- Mount the needle bearing (16) and 1st gear idler (17) with the recess facing down.
- Finally, check all gears for smooth operation.



SERVICING THE INDIVIDUAL PARTS

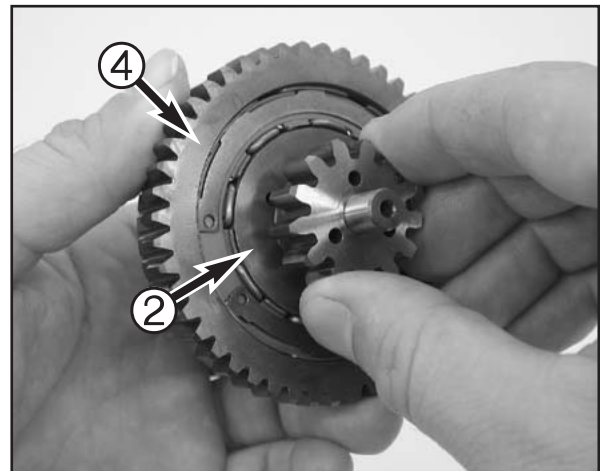
STARTER DRIVE

- Check the tothing and the pivot point on the starter idler (1) for wear. Also check the bearing bolt for running marks.
- Check the tothing and pivot point on the freewheel gear (2) for wear. Also check the bearing bolt on the freewheel gear for running marks.
- Remove the freewheel gear from the freewheel and check the points of contact for pressure marks.
- Dismount the freewheel (3) from the freewheel gear (see below), check the freewheel segments for wear.
- Check the freewheel gear tothing (4) and points of contact to the freewheel for wear and pressure marks.
- Replace the O-ring on the starter flange.



CHECKING THE FREEWHEEL

- Insert the freewheel gear (2) in the freewheel (4).
- You should be able to move the freewheel gear in a counterclockwise direction.
- The freewheel gear must lock in a clockwise direction.

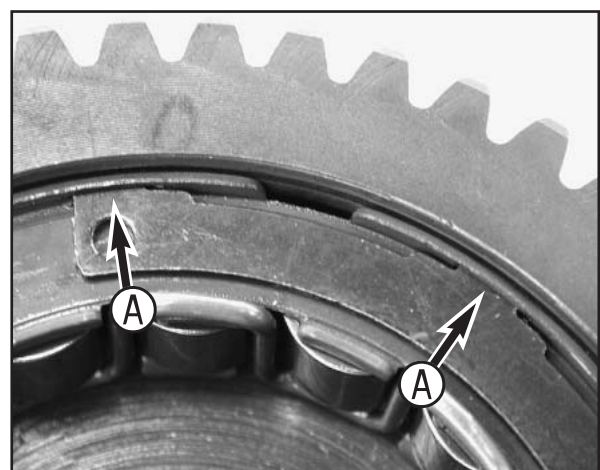
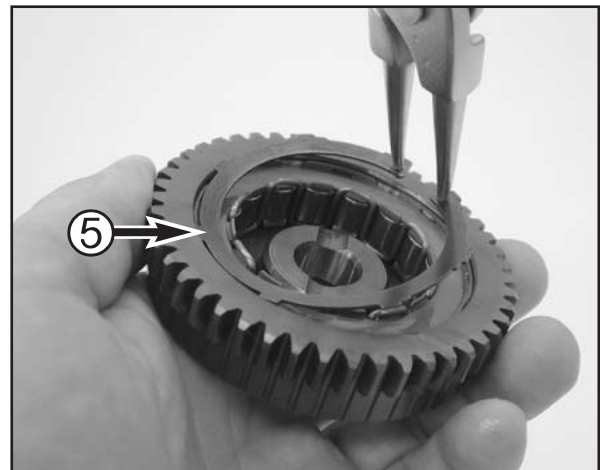


REPLACING THE FREEWHEEL HUB

- Press the spacer ring (5) together with circlip pliers and remove.
- Lift the freewheel out of the freewheel gear.
- Oil the freewheel (3) and insert in the freewheel gear (4).
- Use circlip pliers to insert the spacer ring in the groove and check for a good fit. Carefully tap on the mounted spacer ring with a punch.



NOTE: the tabs (A) on the spacer ring must engage in the recesses in the freewheel gear.



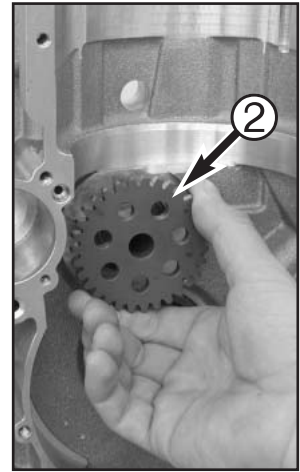
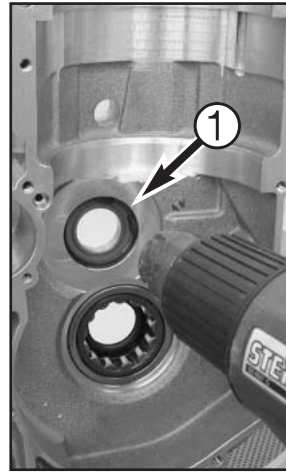
ASSEMBLING THE ENGINE

MOUNTING THE IDLER SHAFT

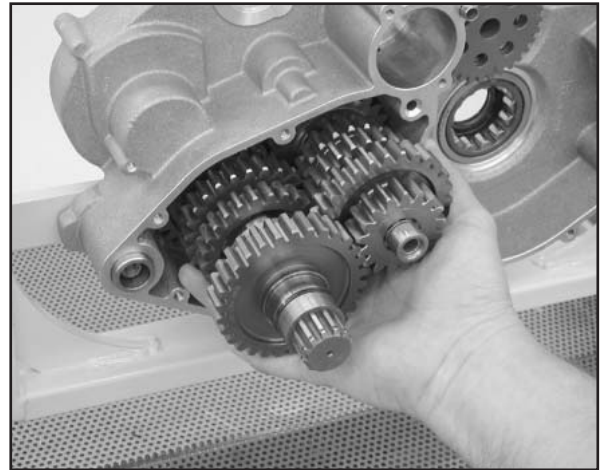
- Clamp the left housing half in the universal engine work stand.
- Briefly heat the bearing (1) of the idler shaft (2) with a hot-air blower and mount the idler shaft, carefully tapping with a plastic hammer to the stop if necessary.



CAUTION: do not heat the bearing too long or you will damage the bearing sealing.



- Connect both transmission shafts and insert in the bearings.

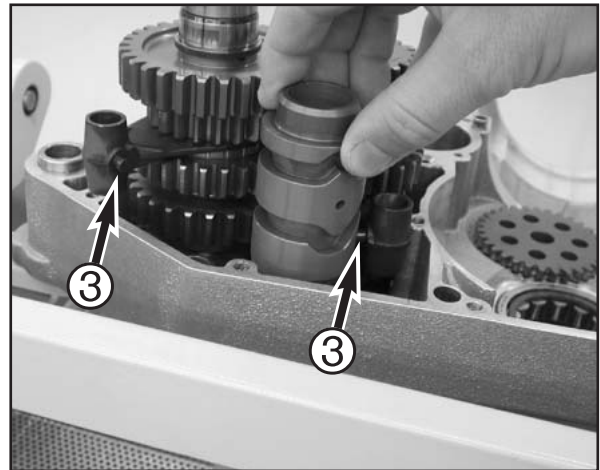


- Move the engine case into a horizontal position and insert the the shift forks in the shift grooves, the driving pin (3) of the shift forks must be aligned.

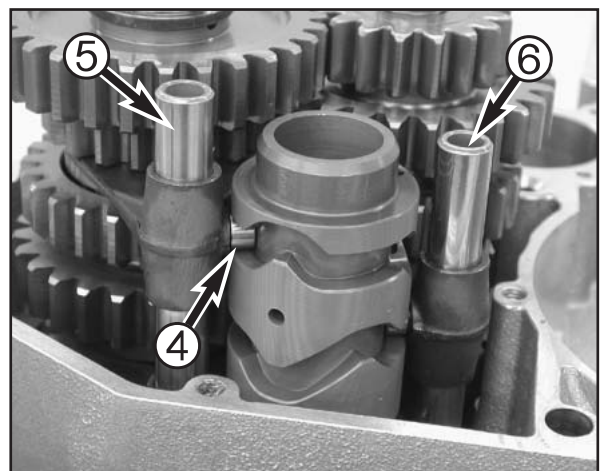


NOTE: all three shift forks are identical.

- Turn the shift drum until it can be pushed into the bearing seat with the circlip past the 1st idler gear.



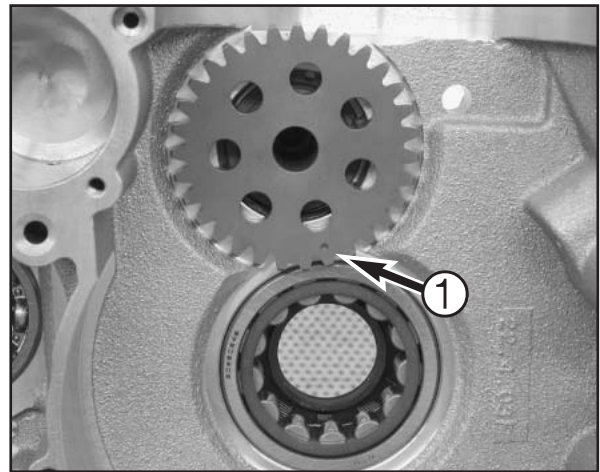
- Mount the shift rolls (4) on the driving pin, fix with a little grease if necessary.
- Attach the shift forks to the shift drum and mount the shift rails (5) and (6), the longer shift rail (5) is used for the countershaft shift forks.



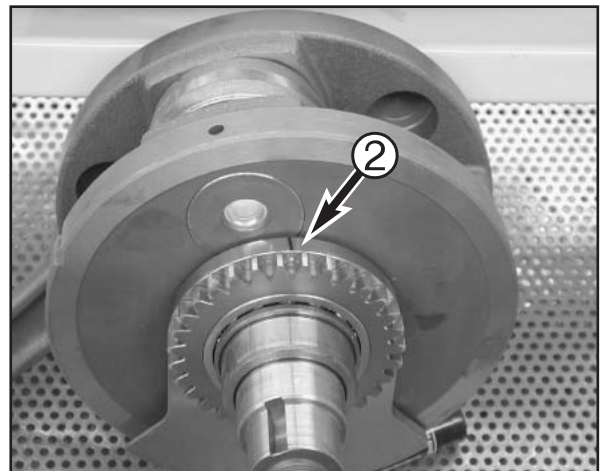
ASSEMBLING THE ENGINE

MOUNTING THE CRANKSHAFT

- Turn the mark on the idler shaft gear (1) towards the bottom as shown in the photo.



- The tothing on the balance weight has a punch mark (2) between 2 teeth directly opposite the compensating mass. Use a felt-tip pen to draw the mark on the outer side of the balance weight (see photo).

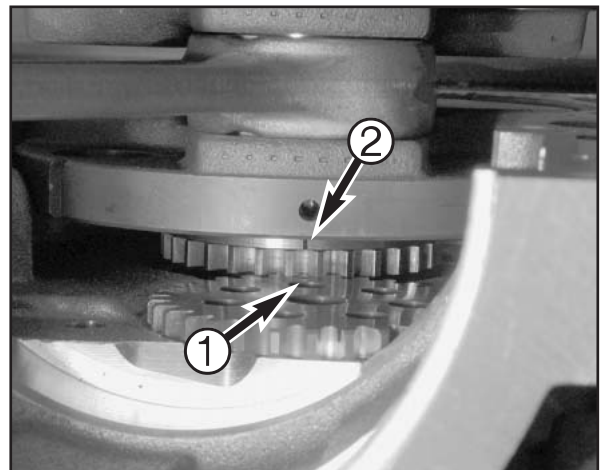


- Screw the mounting sleeve 800.29.005.000 on the left end of the crankshaft.
- Position the crankshaft in the engine case, making sure both marks are aligned.



NOTE: to make sure the marks are aligned, gradually push the crankshaft into the bearing seat, checking the position of the marks. It will not be possible to check their position after the crankshaft is mounted.

- Unscrew the mounting sleeve 800.29.005.000.



ASSEMBLING THE ENGINE

- Mount new O-rings on the cylinder liner and lubricate with a little oil.
- Position the well-lubricated piston on the cylinder liner and clamp the piston rings together with the piston ring clamp 600.29.015.000 (1).



- Tap on the top of the piston ring clamp with a hammer to make it fit flush with the cylinder liner.
- Carefully tap the piston into the cylinder liner with the hammer handle, making sure the piston rings do not get caught.



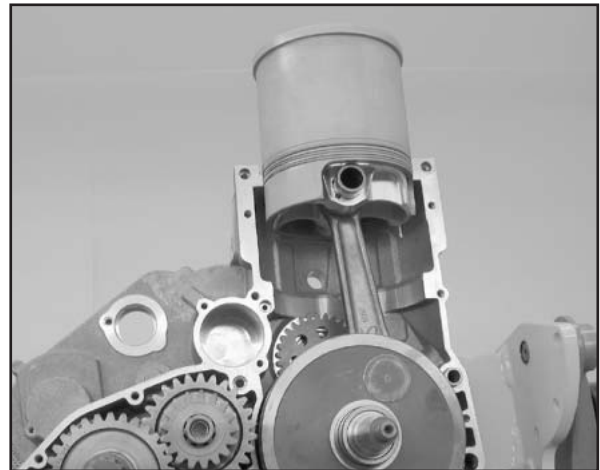
CAUTION: if the piston ring clamp presses the piston rings together properly and flush around the entire cylinder, you will be able to push the piston into the cylinder by tapping lightly with the hammer handle. Excessive force usually damages the piston rings.



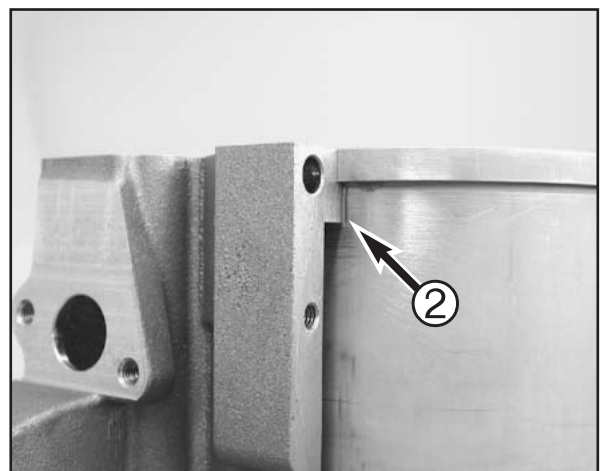
- Insert the cylinder liner and piston in the engine case, insert the piston pin and mount a new piston pin retainer.



NOTE: the arrow mark on the piston must point to the exhaust side.



- Turn the cylinder liner until the mark (2) is aligned with the engine case, i.e. the recess in the cylinder liner is positioned at the idler shaft.

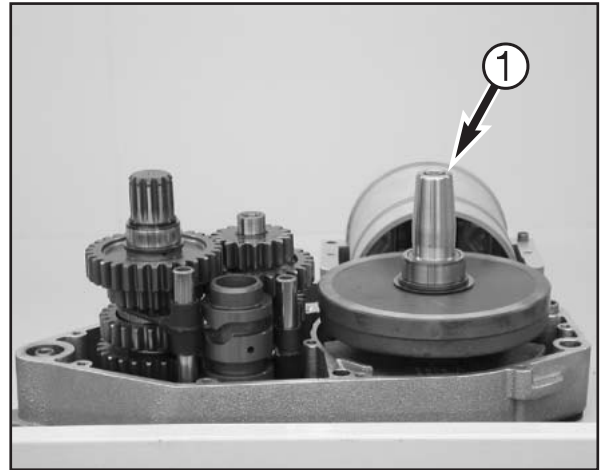


ASSEMBLING THE ENGINE

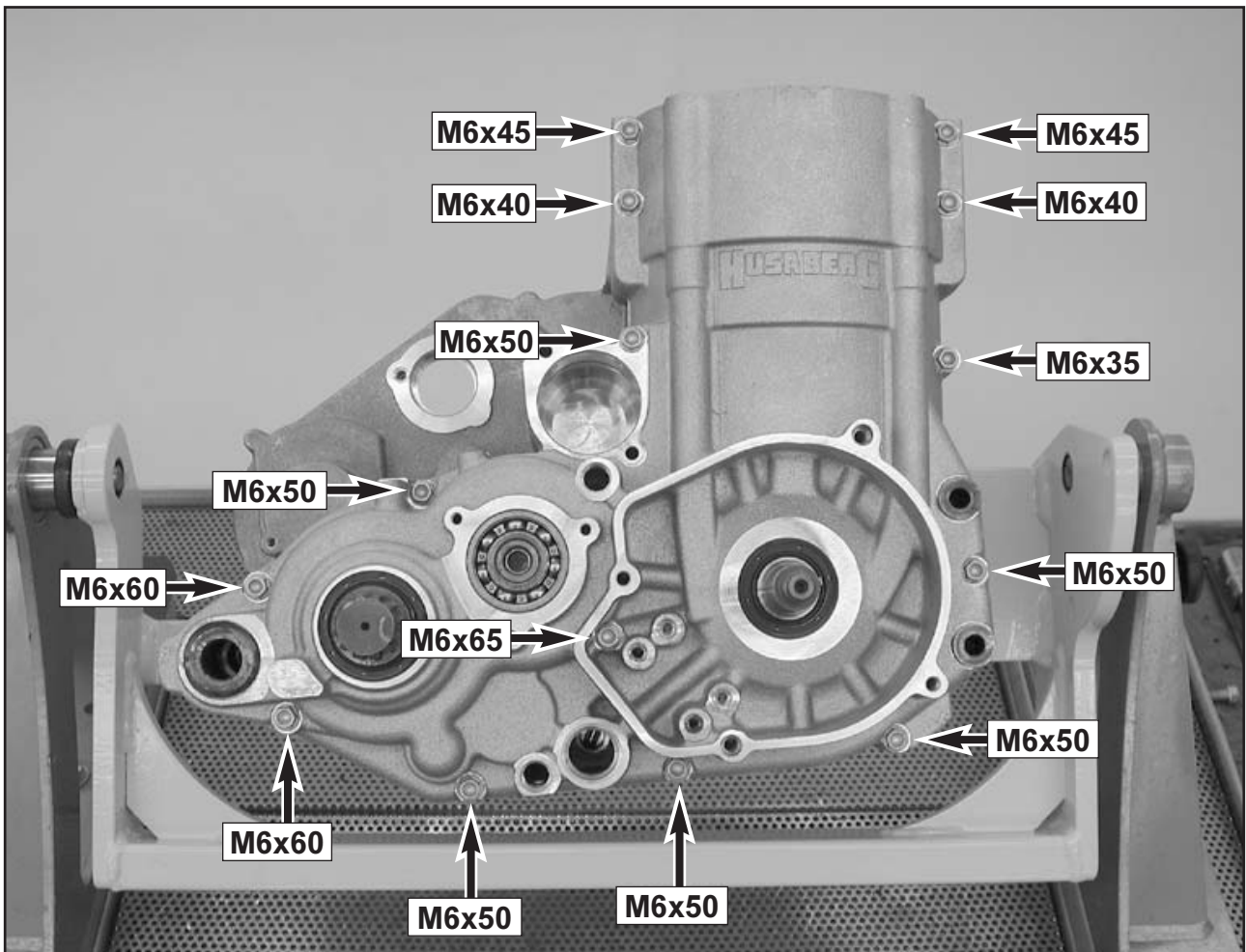
- Degrease the sealing areas on both engine case halves and apply a thin coat of silicone gasket sealant 309098 to the sealing area on the left housing half; mount the dowels
- Place protective sleeve 800.29.105.000 on the crankshaft (1) mount the right engine housing half.



CAUTION: do not try to draw the two housing halves together with the housing bolts. If necessary, carefully tap on the housing near the bearings with a plastic hammer.



E
4



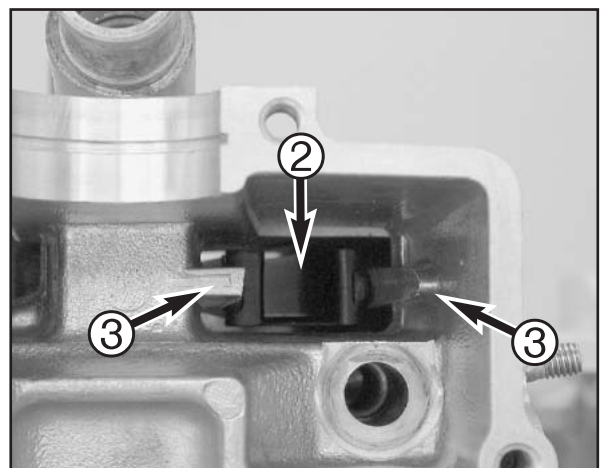
- Remove the protective sleeve.
- Mount the bolts (see above photo for bolt lengths) and tighten slightly.
- Tap the cylinder liner down and tighten the bolts from the inside to the outside to 10 Nm.
- After tightening, check all shafts for smooth operation and lock the crankshaft in the TDC position.

MOUNTING THE CYLINDER HEAD

- Put a new cylinder base gasket in place and mount the cylinder head (do not forget the sleeves).



CAUTION: run the chain guide rail (2) between the two locating tabs (3).

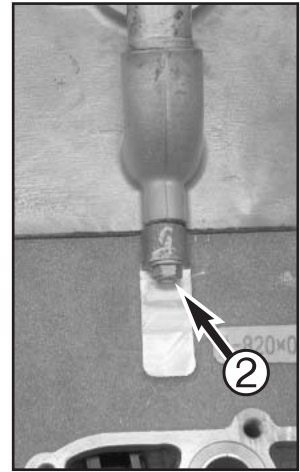
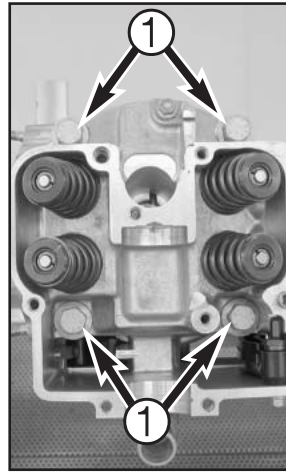


ASSEMBLING THE ENGINE

- Screw on the oiled cylinder head bolts (1) with the washers.
- Tighten the cylinder head bolts crosswise until you feel a slight resistance.
- Tighten the cylinder head bolts crosswise to 40 Nm.
- Tighten the cylinder head bolts crosswise to 50 Nm.
- Secure the lateral cylinder head bolt (2) with Loctite 243 and tighten to 10 Nm.



CAUTION: do not tighten the lateral cylinder head bolt any tighter since you may damage the feeder on the engine case.

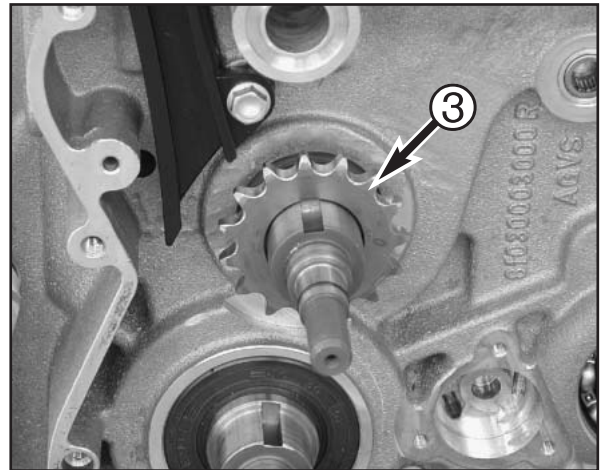


MOUNTING THE TIMING CHAIN

- Mount the woodruff key for the rear sprocket (3) in the idler shaft groove.
- Heat the rear sprocket on the idler shaft on a hotplate to approx. 100° C and immediately slide on the idler shaft with the collar on the inside.



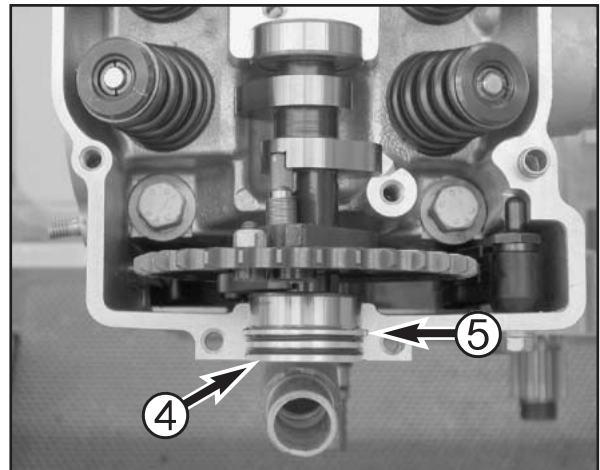
CAUTION: do not mount the rear sprocket in a cold condition since you may damage the idler shaft ball bearing or cause the idler shaft to be pressed towards the inside.



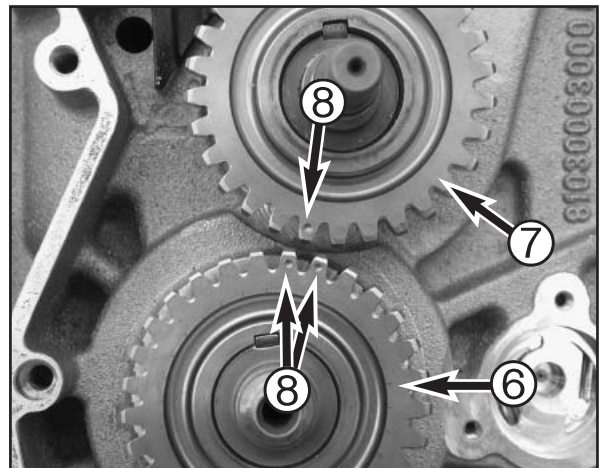
- Mount the camshaft with the cap (4) in the cylinder head, insert new, oiled O-rings in the cap.



NOTE: the collar (5) of the cap must engage in the cylinder head groove.

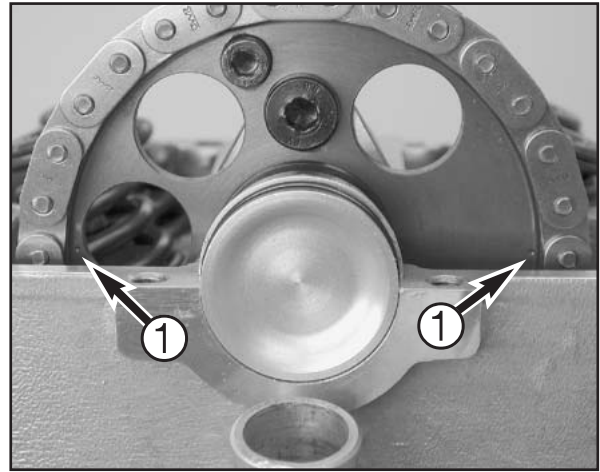
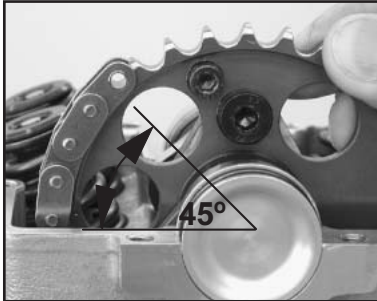


- Lock the crankshaft with the locking bolt 580.30.080.000.
- Place the woodruff keys in the shaft grooves of the idler shaft and crankshaft.
- Mount the primary pinion (6) and idler shaft gear (7), turn the idler shaft until the marks (8) on the two gears are aligned.



ASSEMBLING THE ENGINE

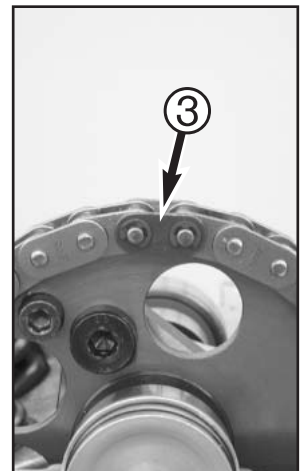
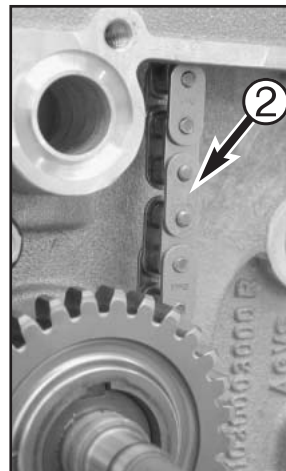
- Turn the camshaft gear until the marks (1) are aligned with the edge of the cylinder head.
- Allow the chain to fall into the chain compartment on the guide side; insert the end of the chain at approx. 45° (see photo).
- Continue to turn the camshaft gear in a clockwise direction one complete rotation until the marks are aligned again. The end of the chain will be just in front of the rear sprocket on the idler shaft in this position.



- Run the 2nd end of the chain around the rear sprocket on the idler shaft and check the marks again.
- Mount the chain link (2) to close the chain and continue turning the chain until the chain joint (3) can be easily mounted and secured.

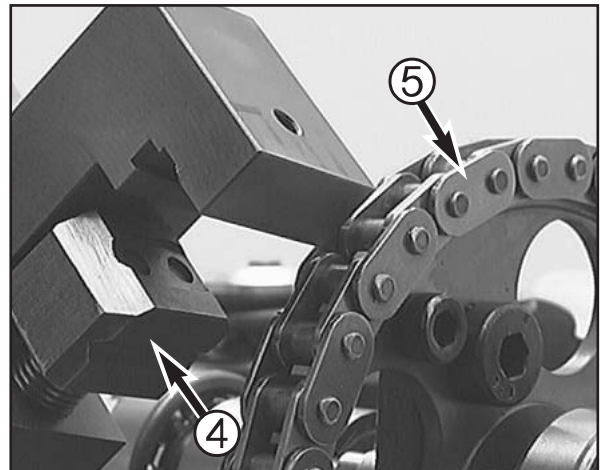


CAUTION: when you are finished, align the rear sprockets with the marks again, making sure that the cams on the camshaft point down (towards the cylinder head).



Proceed as follows to lock the timing chain:

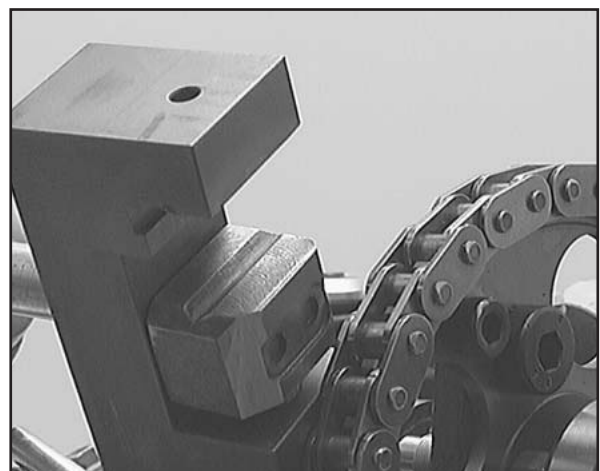
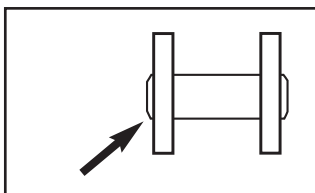
- Mount a new chain link.
- Apply the insert (4) of the special tool 800.29.030.000 as shown in the photo and lock the chain link (5) by tightening the tool spindle.



- Turn the special tool insert and rivet the link.



NOTE: rivet the link so tightly until the ends of the link have a trapezoidal cross section (see drawing)

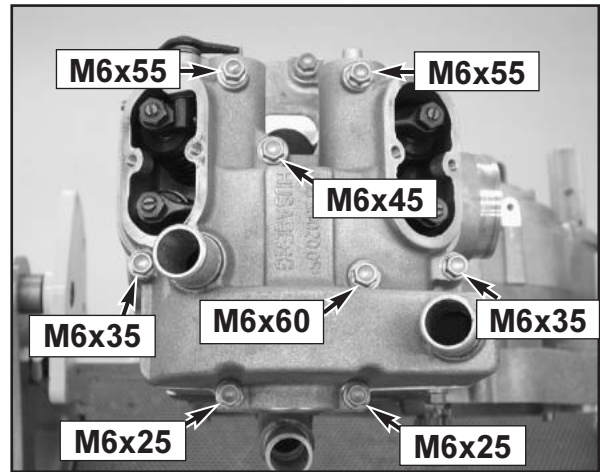


ASSEMBLING THE ENGINE

- Degrease the sealing area on the cylinder head and the cylinder head top section and apply a thin layer of silicone gasket sealant 309098 to the sealing area of the cylinder head.
- Mount the dowels and the cylinder head top section.
- Mount the bolts and tighten to 10 Nm (see photo for bolt lengths).



NOTE: mount the M6x55 and M6x60 bolts with new copper sealing washers.



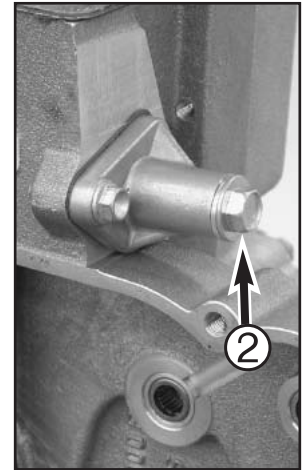
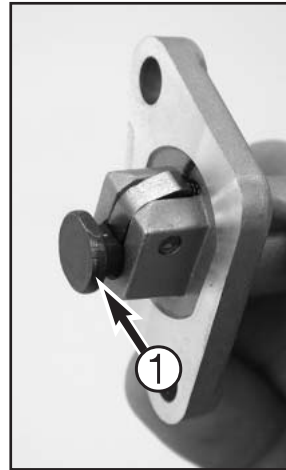
MOUNTING THE TIMING CHAIN TENSIONER

- Mount the timing chain tensioner with a new gasket but without the spring and plug.



CAUTION: make sure that the pressure bolt is completely retracted (see photo), otherwise the timing chain will be overtensioned.

- Mount the 2 bolts (M6x20) and tighten to 10 Nm.
- Use a screwdriver to press in the pressure bolt until you feel a slight resistance. Then press in one notch further.
- Mount the pressure spring and plug with a new seal ring and tighten to 10 Nm.



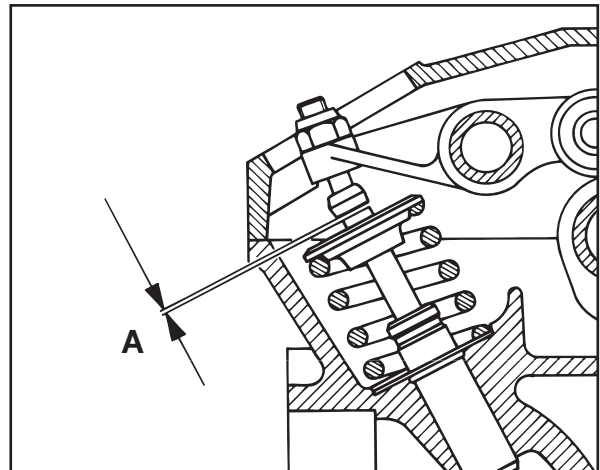
ADJUSTING THE VALVE CLEARANCE

- The valve clearance (A) is measured between the valve shaft and the adjusting screw when the engine is cold.

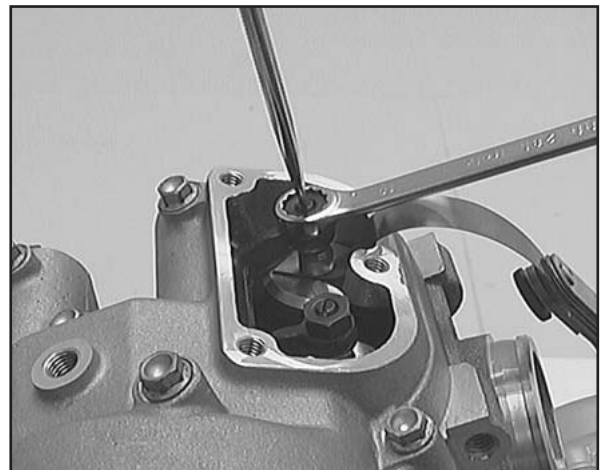
Valve clearance: 0.12 mm



CAUTION: if the piston is not in the top ignition dead center position, the valves will be actuated by the rocker arms and the valve clearance cannot be correctly adjusted. In this case, turn the engine one revolution further and lock again.



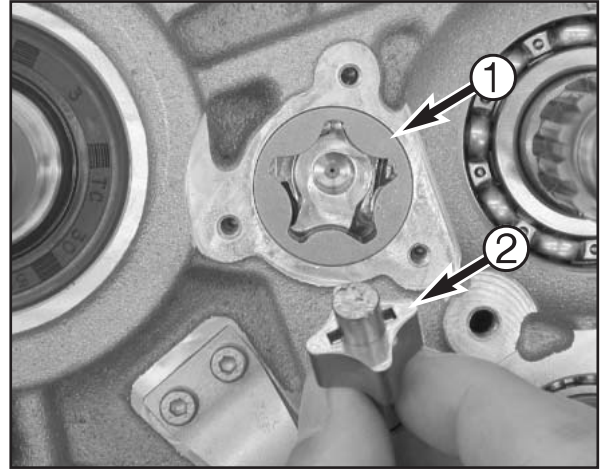
- After adjusting, check the valve clearance again and tighten the counter nuts to 11 Nm.
- Mount the 2 valve covers with new gaskets and bolts (AH M5x15 bolt). Tighten the bolts to 6 Nm.



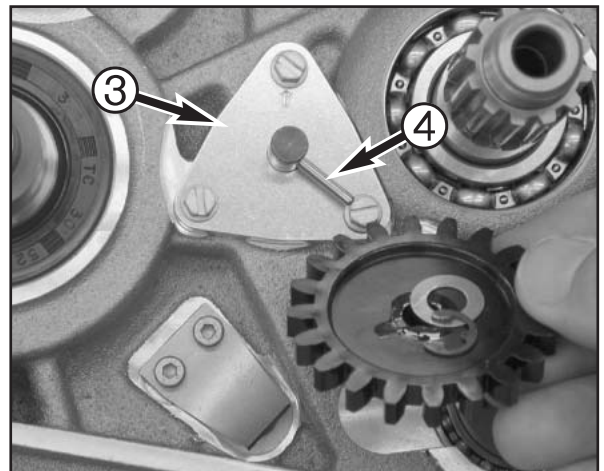
ASSEMBLING THE ENGINE

MOUNTING THE OIL PUMP

- Oil the outer rotor (1) and insert in the engine case with the mark towards the inside (the mark should no longer be visible once mounted).
- Insert the pin in the oil pump shaft and slide on the inner rotor (2).
- Mount the shaft with the inner rotor, the mark on the inner rotor pointing towards the outside (the mark should still be visible once mounted).



- Attach the oil pump cover with the arrow pointing up, secure the screws (M4x12) with Loctite 243 and tighten to 5 Nm.
- Insert the pin in the oil pump shaft, attach the oil pump gear, slip on the washer and mount the circlip in the groove of the oil pump shaft.
- Check the oil pump for smooth operation.



MOUNTING THE SHIFT MECHANISM

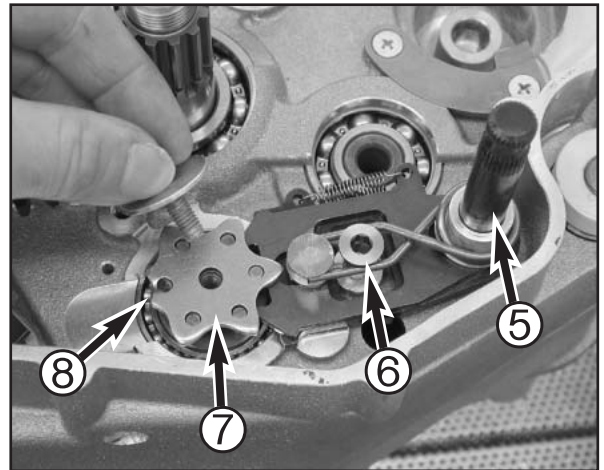
- Mount the shift shaft (5), secure the bolt (6) with Loctite 243 and tighten to 10 Nm.

- Place the (smaller) washer on the shift drum and mount the shift lock (7) on the shift drum.

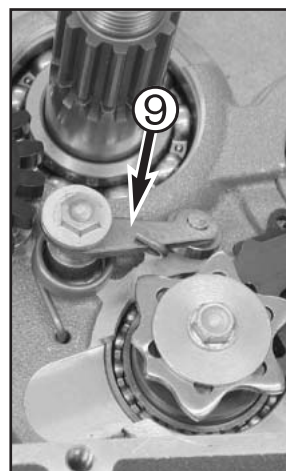


NOTE: The shift drum pin with the colored marks must engage in the hole next to the flat part (8).

- Apply Loctite 243 to the thread of the M6x20 bolt and screw into the shift drum together with the larger washer. Tighten to a torque of 10 Nm.



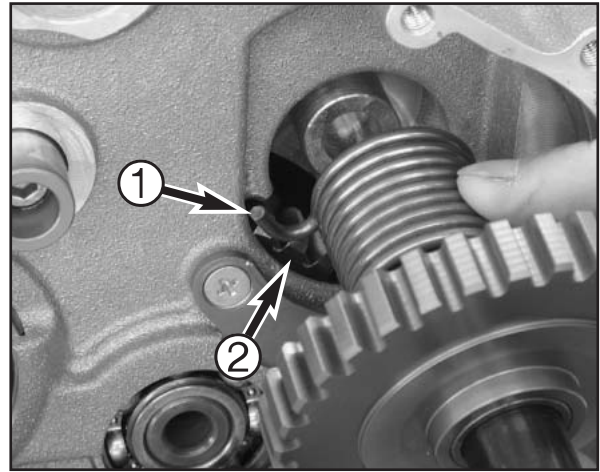
- Insert the bolt (M6x25) through the locking lever (9), position the sleeve with the collar facing up and attach the spring.
- Secure the bolt with Loctite 243 and insert the spring in the hole in the engine case. Tighten the bolt several turns.
- Swing the locking lever against the spring force and allow to rest against the shift lock.
- Mount the locking lever on the sleeve and tighten the bolt to 10 Nm.



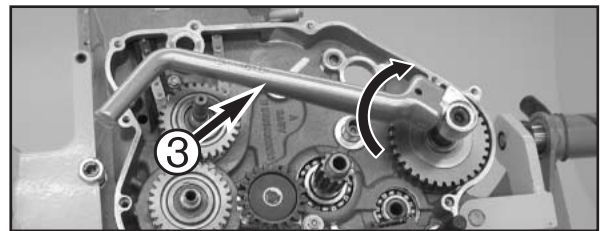
ASSEMBLING THE ENGINE

MOUNTING THE KICKSTARTER SHAFT

- Attach the kickstarter spring (1) behind the transmission gear (2) in the engine case and push the kickstarter shaft into the bearing seat.



- Slide the kickstarter (3) on the kickstarter shaft as shown in the photo.



- Turn the kickstarter shaft with the kickstarter half a turn in a clockwise direction (to pretension the spring), slide the kickstarter shaft into the housing all the way to the stop and relieve the kickstarter.

Check the kickstarter pinion (4) for proper functioning: if the kickstarter is not actuated, the kickstarter pinion can be cranked without resistance.

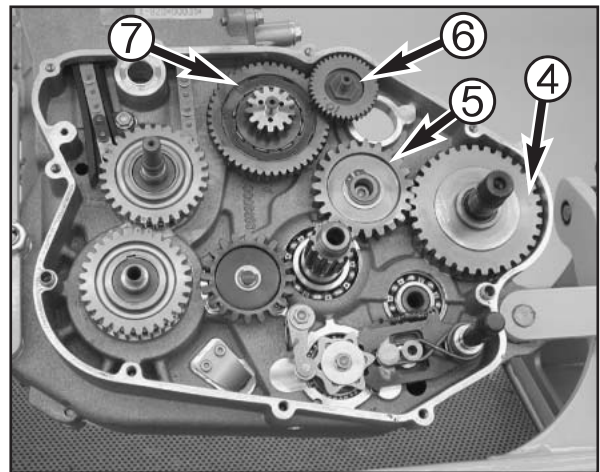
The driver will not engage until the kickstarter is turned in a clockwise direction; the kickstarter pinion will lock when turned in a counterclockwise direction.



- Remove the kickstarter.

- Slide the kickstarter idler (5) with the needle bearing, the upper and the lower washer on the bearing bolt and mount the circlip.

- Mount the starter idler (6) and the freewheel (7) together with the freewheel needle bearing.

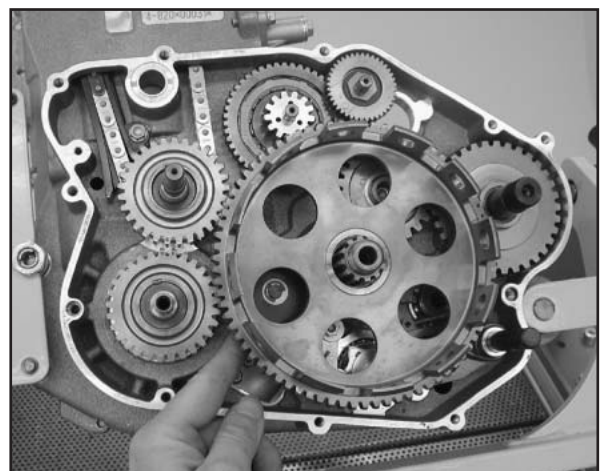


MOUNTING THE CLUTCH

- Slide the washer on the transmission main shaft, mount the two needle bearings and slide on the outer clutch hub.

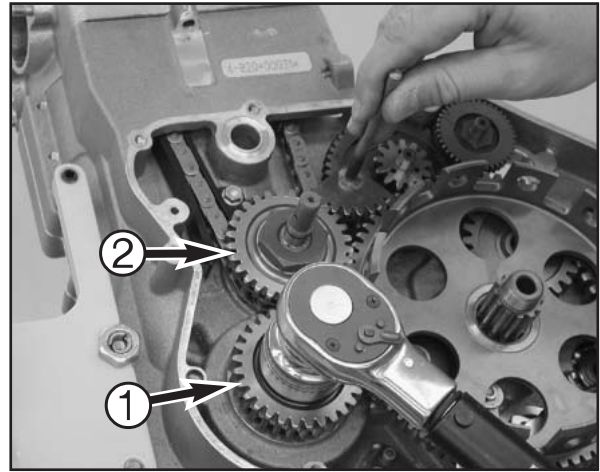


NOTE: since the outer clutch hub must engage in the primary pinion, the gear on the idler shaft, the freewheel, the kickstarter idler and the oil pump gear, you may need to turn some of the gears back and forth to get them to engage more easily.

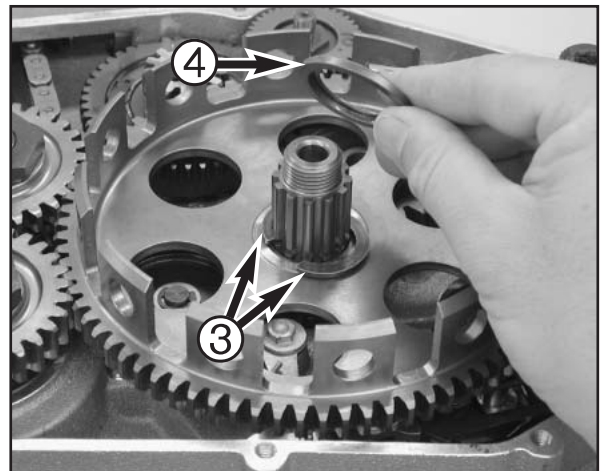


ASSEMBLING THE ENGINE

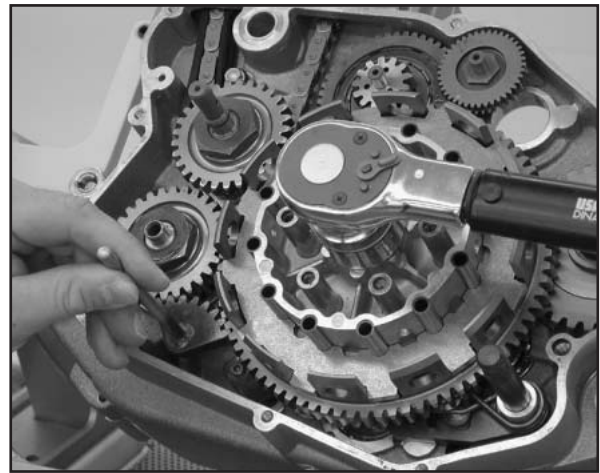
- Make sure the marks on the primary pinion and the idler shaft gear are aligned and loosen the crankshaft locking bolt 580.30.080.000.
- Lock the primary pinion (1) with the special tool 800.29.004.000 (gear segment) as shown in the photo, apply Loctite 2701 to the thread of the nut M16x1 (30 mm) and tighten to 110 Nm.
- Lock the idler shaft (2) with the special tool 800.29.004.000 (gear segment) as shown in the photo, apply Loctite 2701 to the thread of the nut M16x1 (30 mm) and tighten to 110 Nm.



- Place both semiwashers (3) in the groove of the transmission main shaft and secure with the stepped disk (4).



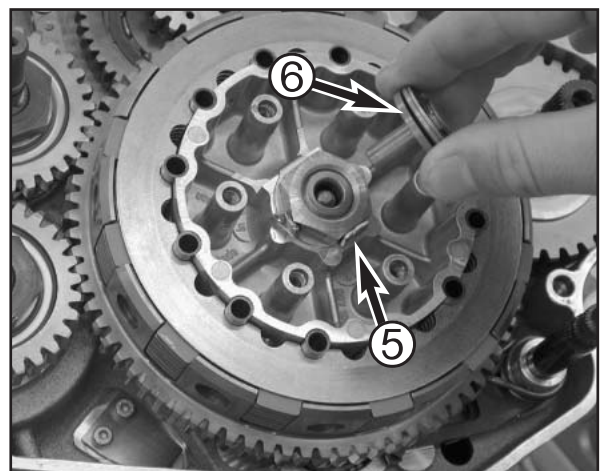
- Slip on the driver and lock washer, apply Loctite 243 to the nut (27 mm) and screw on.
- Insert the clutch holder 800.29.003.000 with into the outer clutch hub with at least 6 clutch sleeves, lock the outer clutch hub with the gear wheel segment (800.29.004.000) as shown in the photo and tighten the nut to 120 Nm.



- Remove the clutch holder and bend up the the lock washer (5) of the nut.
- Insert all of the clutch sleeves, fix with some grease if necessary.
- Starting with one of the clutch disks, alternately insert 8 steel and 7 lining disks in the outer clutch hub, ending with a clutch disk on top.
- Mount the push rod and the pressure piece (6).

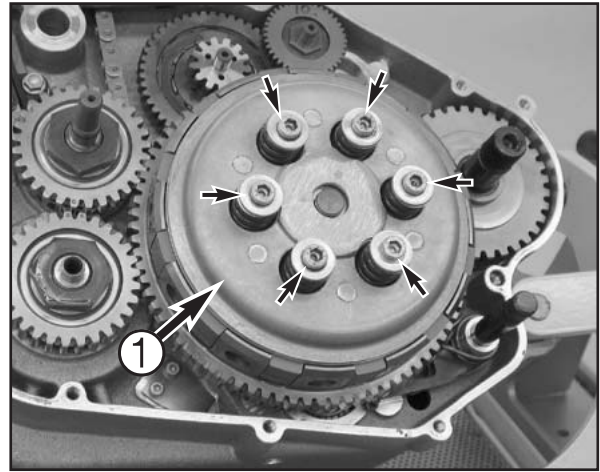


NOTE: insert the thinner end of the push rod into the pressure piece.



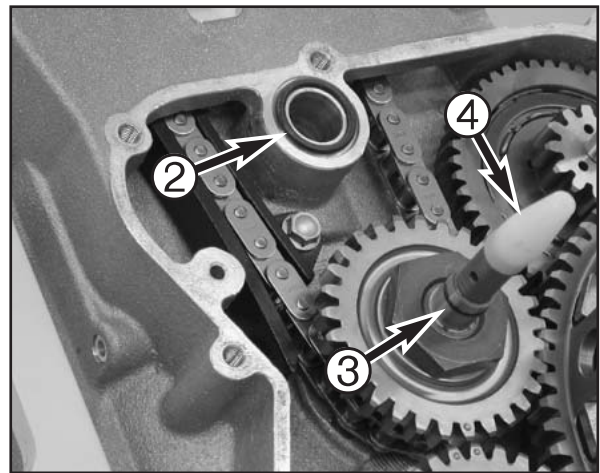
ASSEMBLING THE ENGINE


- Mount the pressure cap (1) with the collar bolts, clutch springs and spring retainers.
- Secure the collar bolts with Loctite 243 and tighten in several stages crosswise to 8 Nm.




MOUNTING THE CLUTCH COVER

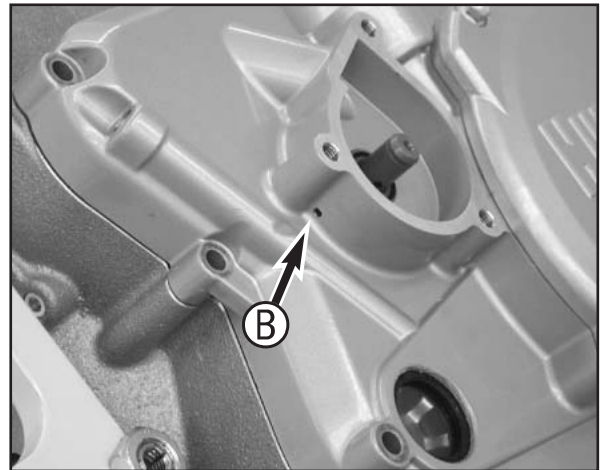
- Insert a new O-ring in the groove around the water duct (2).
- Mount a new O-ring on the water pump shaft (3) and grease thoroughly.
- Place protective sleeves (590.29.005.010 (4) and 800.29.205.000) over the water pump shaft and kickstarter shaft.
- Cover the teething of the shift shaft with isolation tape.
- Mount the dowels and a new clutch cover gasket.
- Carefully mount the clutch cover, tapping lightly with a plastic hammer if necessary.



 **CAUTION: do not draw the clutch housing to the engine case with the bolts since it could cant and break**

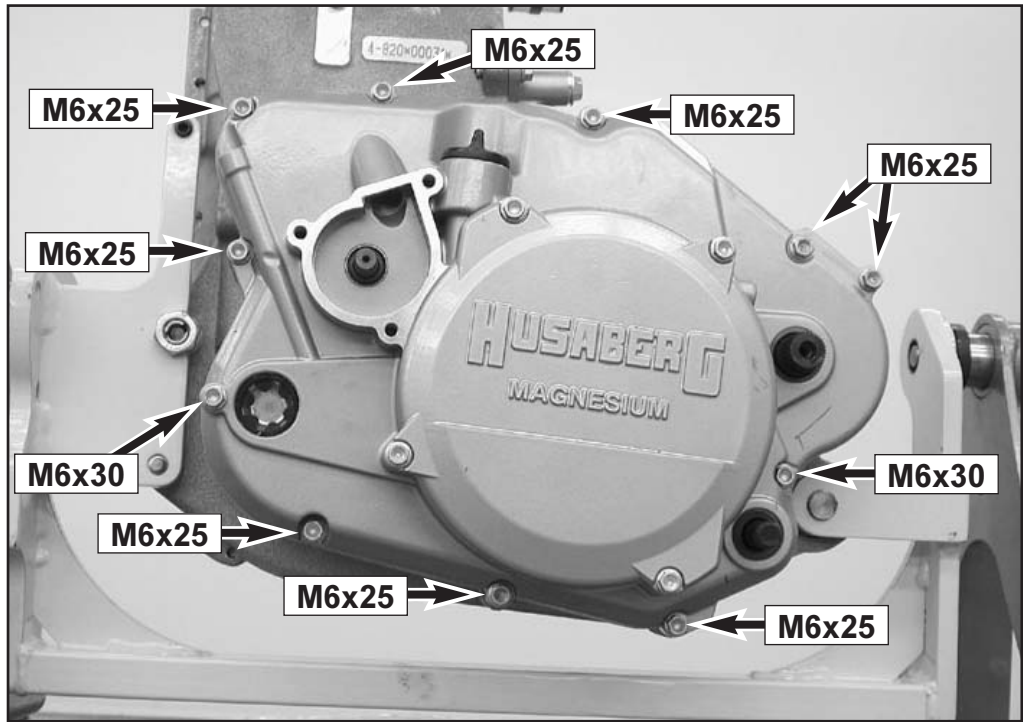
- Remove the protection sleeves and the isolation tape.

 **CAUTION: if the O-ring on the water pump shaft is damaged when mounting the clutch cover, it will cause engine oil to leak out of the hole (B).**



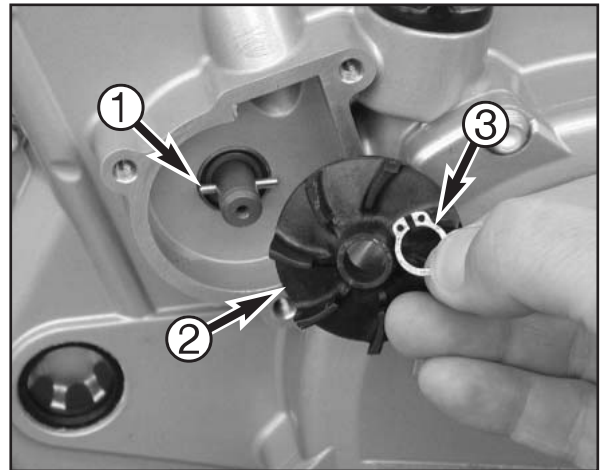
ASSEMBLING THE ENGINE

E
12

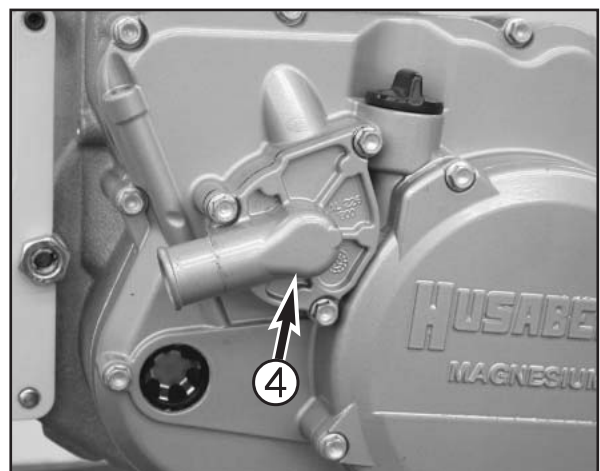


- Screw in the bolts (see photo for bolt lengths).
- Tightening torque: 10 Nm.

- Insert the pin (1) in the water pump shaft, slip on the water pump wheel (2) and mount the circlip (3).



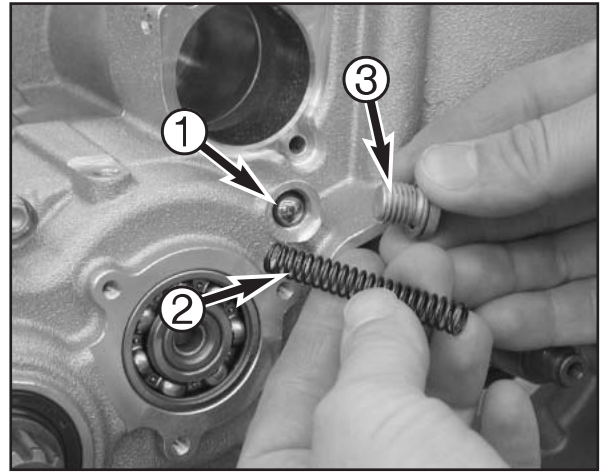
- Mount the water pump cover (4) with a new gasket, tighten the M6x15 bolts to 10 Nm.



ASSEMBLING THE ENGINE

MOUNTING THE PRESSURE RELIEF VALVE

- Slide the ball (1) and spring (2) in the hole, screw in the plug (3) with a new seal ring and tighten to 20 Nm.



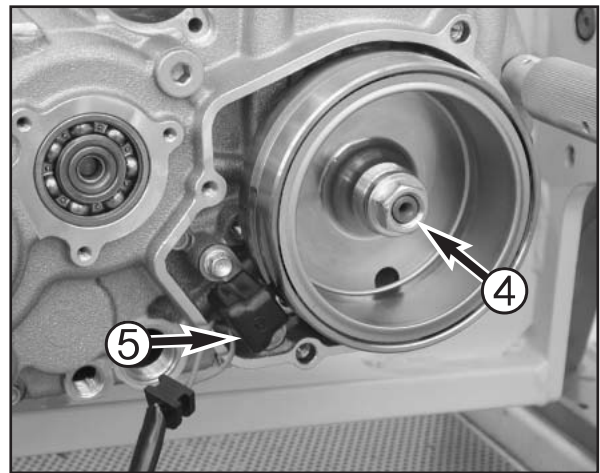
MOUNTING THE ROTOR AND THE PICK UP

- Mount the ignition rotor and the nut (4) with corrugated washer; make sure that the woodruff key is mounted.

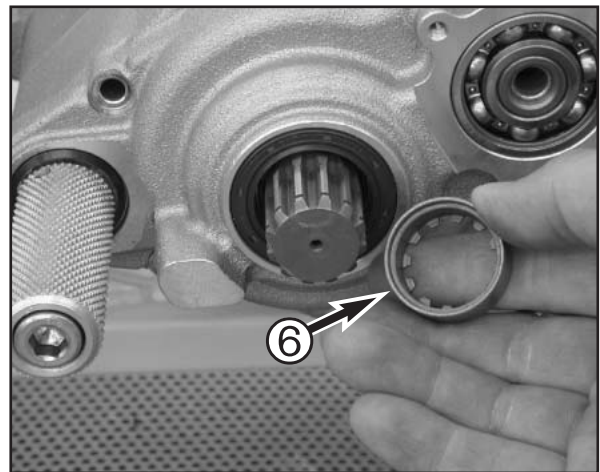


NOTE: LH thread!

- Lock the crankshaft (tighten the locking bolt 580.30.080.000) and the nut (17 mm) to 60 Nm).
- Remove the locking bolt again and screw in the M8x15 plug.
- Mount the pulse generator (5) with the M5x16 bolts, secure the bolts with Loctite 243 and tighten to 6 Nm.

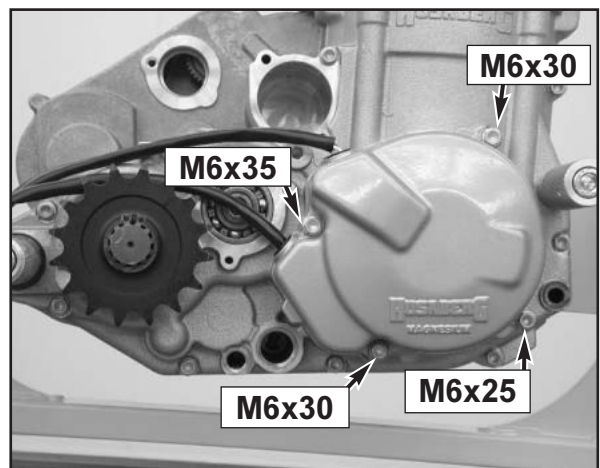


- Oil the distance bushing (6) and slide onto the countershaft with the recess for the O-ring towards the inside.



- Mount the generator cover with dowels and a new gasket (see photo for bolt lengths) and tighten to 10 Nm.
- Slip the engine sprocket on the shaft and mount the circlip.
- Use the spark plug wrench 590.29.072.000 to screw in the spark plug and tighten to 20 Nm.

To mount the oil filter and the oil screen and add engine oil: see Chapter A



ELECTRIC SYSTEM

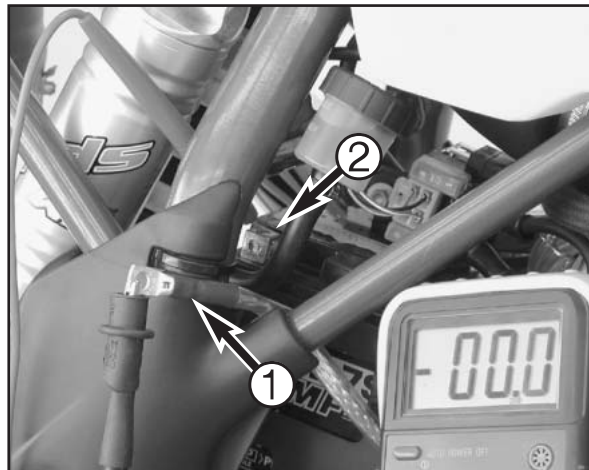
CHECKING FOR LOSS OF CURRENT

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

- Switch off the ignition and disconnect the ground cable (1) from the battery.
- Clamp an ammeter between the ground cable and the negative pole (2) of the battery.

Setpoint value: max. 2 mA

- If the value is lower than the setpoint value, look for power consumers.
For example:
 - Defective voltage regulator-rectifier
 - Creepage current in the socket connectors

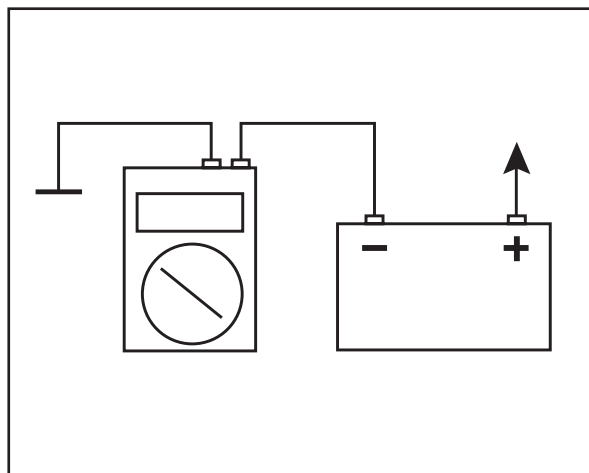


DISMOUNTING/MOUNTING THE BATTERY

- see pages B2 and B6.



CAUTION: when you dismantle the battery, disconnect the negative pole and then the positive pole. When you mount the battery, connect the positive pole and then the negative pole to the battery.



CHARGING THE BATTERY

- Check the charging level before you charge the battery. To check the charging level, use a voltmeter to measure the voltage between the battery poles (off load voltage). Tolerance of the measuring device max. 1 %.
- For the measurement to be accurate, the battery should not have been charged or discharged for at least 30 minutes.
- If you cannot determine the charging level, do not load the battery for more than 10 hours with 0.5 amperes and a maximum of 14.4 volts.



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.

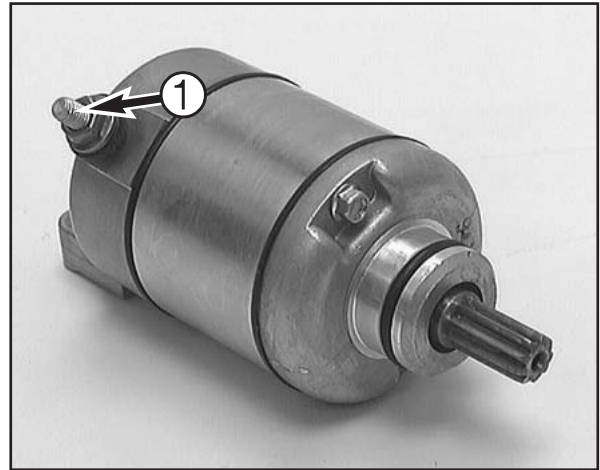
Avoid quick charges if possible.

Off load voltage Volt	Charging level %	Charging time at 0.5 A	Charging voltage
>12.7	100	—	Max. 14.4 V
~12.5	75	4 h	
~12.2	50	7 h	
~12.0	25	11 h	
~11.8	0	14 h	
<11.5	0	20 h	

ELECTRIC SYSTEM

CHECKING THE STARTER ENGINE

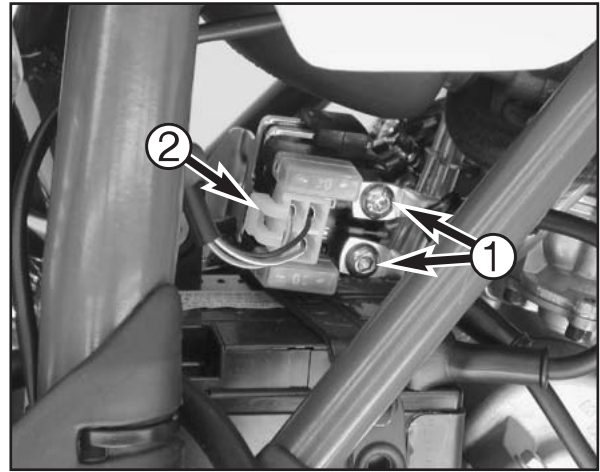
- Disconnect the negative pole from the battery and dismount the starter.
- Connect the negative pole of a 12-V battery to the starter engine housing and the briefly connect the positive pole of the battery to the starter connector (1) (use thick cables).
- The starter engine should turn when the circuit is closed.
- If not, the starter needs to be replaced.



ELECTRIC SYSTEM

CHECKING THE STARTER RELAY

- Unscrew the brake fluid reservoir for the foot brake and let it hang down on the side.
- Unscrew the negative pole from the battery and the two cables (1) from the starter relay.
- Pull the connector (2) from the starter relay and remove the starter relay from the support.



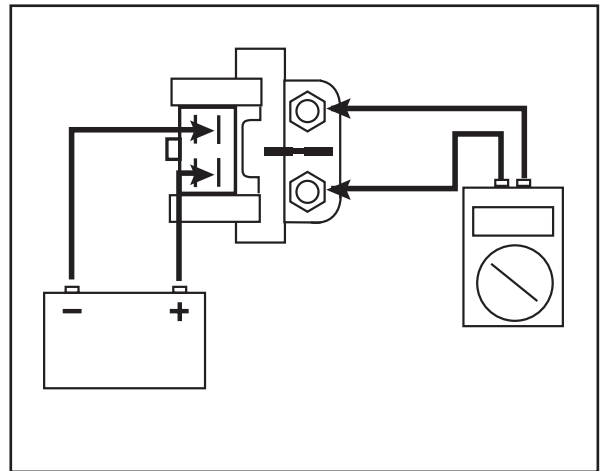
- Connect the starter relay to a 12-V battery as shown in the drawing.
- Use an ohmmeter to check the continuity between the screw connections.

Reading: 0Ω OK
Reading: $\infty \Omega$ defective



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

- The starter relay is mounted in the reverse order.



F
3

MAIN FUSE



NOTE: the main fuse (3) 10 A is located in the starter relay. It supplies the following power consumers:

- Starter system
- Horn
- Turn signal
- Multifunctional digital speedometer

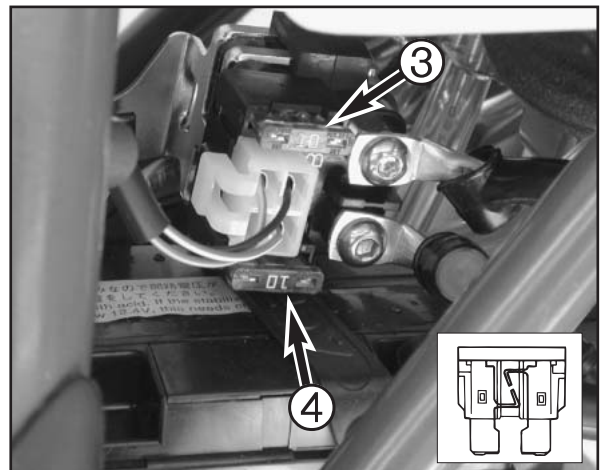
The fuse (4) is a spare fuse.

- Pull out the fuse and replace with a new fuse. Mount the cover again.



CAUTION: never use a stronger fuse or a repaired fuse. Improper use can destroy the entire electric system.

- If you use the spare fuse on the road, be sure to replace it at the next opportunity.



ELECTRIC SYSTEM

CHECKING THE VOLTAGE REGULATOR

A defective voltage regulator (1) can have the following effect:

- No voltage in the circuit In this case, disconnect the voltage regulator with the engine at idle speed. If the consumers run, the voltage regulator is defective. If there is still no voltage, the error must be in the switch, the wiring harness or in the ignition system.
- Excessive voltage in the circuit
Bulbs burn out. In this case the voltage regulator needs to be replaced.

DYNAMIC GENERATOR VALUES - KOKUSAN 4K-3B

Measuring conditions:

- All plugs and the ground connection are in a non-corroding condition, plugs are tightly connected
- The battery is in a startable condition, not fully charged (start several times if the battery is fully charged)
- Start the engine; the measurement must be taken right after starting

Controller output – measure the voltage with the measuring tips of the peak voltage adapter directly on the poles of the vehicle battery:

- Unstressed (no electric consumer switched on), engine running at idle speed (1400 +/- 50 rpm)
Multimeter reading: 13 volts +/- 0.5 volt
- Stressed (light switched on, horn and brake actuated), engine running at idle speed
Multimeter reading: 13 volts +/- 0.5 volt
- Stressed (light switched on, horn and brake actuated), engine running at increasing speed (- 8000 rpm)
Multimeter reading: 13 volts +/- 0.5 volt



NOTE: the black measuring tip on the peak voltage adapter should be applied to the ground (negative pole).

Check the charge current – remove the main fuse, apply the multimeter measuring tips (without the peak voltage adapter) to both plugs on the fuse carrier (2) and measure the current (set the multimeter DCA to 10 amperes):

- Unstressed (no electric consumer switched on), engine running at idle speed
Multimeter reading: 1.5 amperes +/- 0.2 ampere
- Stressed (horn actuated), engine running at idle speed
Multimeter reading: -1.0 ampere +/- 0.2 ampere
- Stressed (horn actuated), engine running at increasing speed
Multimeter reading: 0.8 ampere +/- 0.2 ampere



ELECTRIC SYSTEM

TROUBLESHOOTING IN THE IGNITION SYSTEM

Before checking the ignition, make sure:

- The emergency OFF switch is in the ON position
- The battery is charged
- The main fuse is OK

Check whether there is an ignition spark upon starting:

- 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 the battery is nearly run down, turn off the light and use the kickstarter.

- 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 at the electrode 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 following parts:

- Emergency OFF switch
- Cable tree parts belonging to the emergency OFF switch.

If the ignition is being supplied with voltage but no spark is visible, check:

- The ground connection from the CDI unit and ignition coil
- The cable from the CDI unit to the ignition coil
- The pulse generator
- The stator
- The ignition coil
- The short-circuit button



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

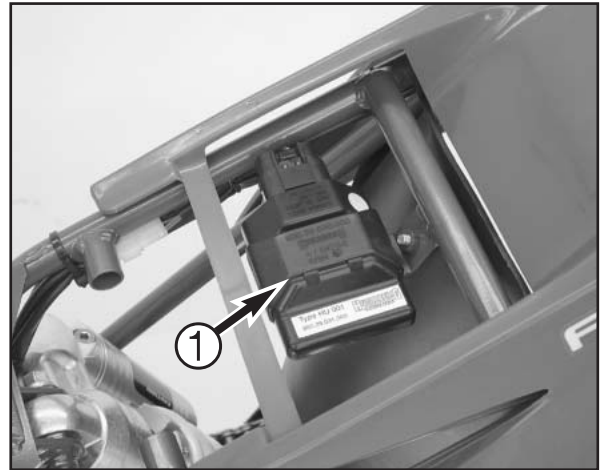
ELECTRIC SYSTEM

CDI UNIT

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



CAUTION: never test the CDI unit with a conventional measuring device. Highly sensitive electronic components could be destroyed.



CHECKING THE IGNITION COIL

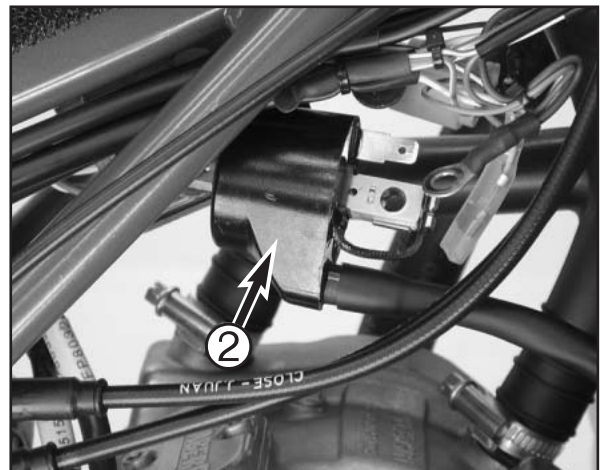
- Disconnect the ignition coil and remove the spark plug connector.
- Use an ohmmeter to take the following measurements:



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

Measurement	Cable colors	Resistance
Primary coil	blue/white-ground	$0.30 \Omega \pm 0.05 \Omega$
Secondary coil	blue/white ignition wire	$6.30 \text{ k}\Omega \pm 1.26 \text{ k}\Omega$

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



ELECTRIC SYSTEM

IGNITION SYSTEM

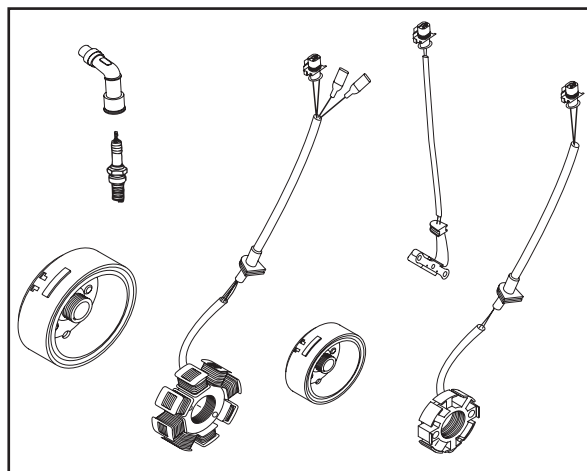
General information

The measurements described below will only detect serious defects.

Short circuits in the coil that lead to a weak ignition spark or poor generator capacity can only be established on an ignition test stand.

In case of a defect, check the cable and the plug and socket connections in the ignition system first.

Always pay attention to the right measuring range for the digital multimeter when measuring



Ignition	Measurement	Cable colors	Resistance
4K-3A	Pulse generator coil	red – green	100 Ω ± 20 Ω
	Stator	black/red – red/white	26 Ω ± 5.2 Ω
4K-3B	Pulse generator coil	red – green	100 Ω ± 20 Ω
	Stator	black/red – red/white	15 Ω ± 3 Ω
	Charging coil	ground – yellow	0.65 Ω ± 0.15 Ω
		white – yellow	0.16 Ω ± 0.03 Ω

CHECKING THE STATOR AND PULSE GENERATOR

Use an ohmmeter to perform the following measurements:

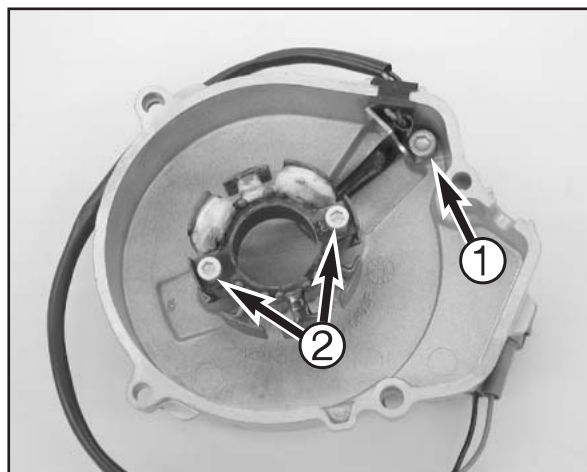


NOTE: the measurements must be performed at a temperature of 20° C, otherwise the readings will deviate significantly.

Replace the stator if one of the measured values deviates significantly from the setpoint value.

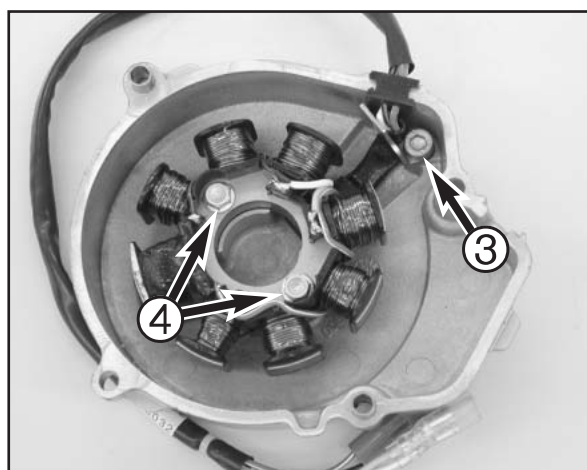
REPLACING THE STATOR IN THE FC MODELS (4K-3A)

- Remove bolt (1) and the retaining bracket.
- Remove the 2 bolts (2) and take the stator out of the ignition cover.
- Place a new stator in the ignition cover.
- Degrease the thread of all 3 bolts and apply Loctite 243.
- Mount the bolts and tighten to 6 Nm.
- Run the wiring harness stress free and fix with the retaining bracket. Don't forget the cable socket.



REPLACING THE STATOR IN THE FE AND FS MODELS (4K-3B)

- Remove the bolt (3) and the retaining bracket.
- Remove the 2 bolts (4) and take the stator out of the ignition cover.
- Place a new stator in the ignition cover. Degrease the thread of all 3 bolts and apply Loctite 243.
- Mount the bolts and tighten to 8 Nm.
- Run the wiring harness stress free and fix with the retaining bracket.



ELECTRIC SYSTEM

STATIC IGNITION VALUES - KOKUSAN 4K-3A, B

Measuring conditions:

- Cold engine
- Seat and tank removed
- All plugs and the ground connections are in a non-corroding condition, plugs are tightly connected
- Battery charged (if installed) and the light switch turned off
- Gap between the rotor and the pulse generator is set to 0.75 mm
- Decompression lever is pulled
- Depress the kickstarter forcefully at least 5 times for each measurement

Check the pulse generator for an output signal – bipolar plug (1) with green and red cable colors (also see circuit diagram on opposite page):

- Apply the red measuring tip of the peak voltage adapter to the green cable and the black measuring tip to the red cable, disconnect plug (1) to disconnect the CDI unit (2).

Multimeter reading: 6 volts +/- 0.5 volt

- Same measurement with CDI unit connected
Multimeter reading: 4 volts +/- 0.5 volt

Check the generator charging coil for the ignition capacitor charge for output voltage – bipolar plug (3) with black/red and red/white cable colors (also see circuit diagram on opposite page).

- Apply the red measuring tip of the peak voltage adapter to the black/red cable and the black measuring tip to the red/white cable; disconnect plug (3) to disconnect the CDI unit (2).

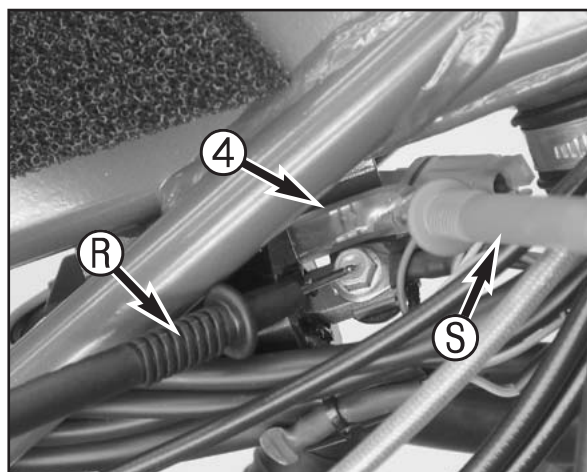
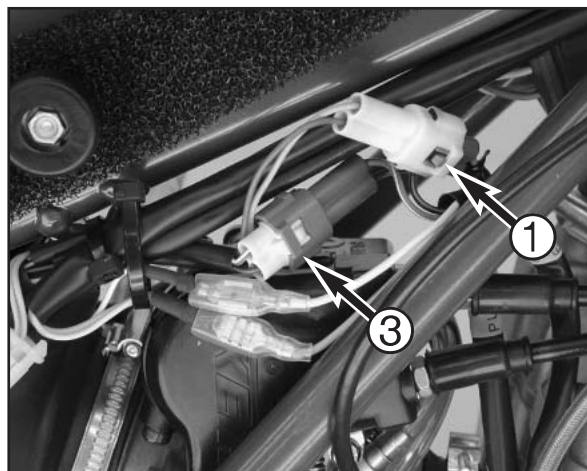
Multimeter reading: 35 volts +/- 5 volts

- Same measurement with CDI unit connected.
Multimeter reading: 210 volts +/- 10 volts

Check the primary voltage output (4) for ignition coil control (also see circuit diagram on opposite page) for output voltage (blue/white cable).

- Apply the red measuring tip (R) of the peak voltage adapter to the black/white cable (ground) and the black measuring tip (S) to the blue/white cable, CDI unit (2) and ignition coil (5) connected.

Multimeter reading: 200 volts +/- 10 volts



ELECTRIC SYSTEM

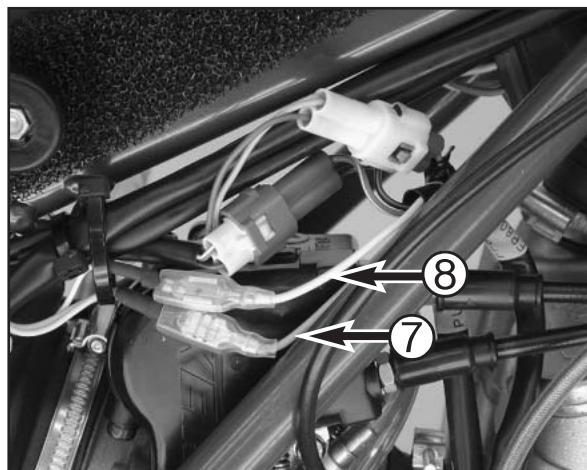
STATIC GENERATOR VALUES - KOKUSAN 4K-3B

Measuring conditions:

- Cold engine
- Seat and tank removed
- All plugs and the ground connections are in a non-corroding condition, plugs are tightly connected
- Battery charged (if installed) and the light switch turned off
- Decompression lever is pulled
- Depress the kickstarter forcefully at least 5 times for each measurement

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

- Between yellow and brown (ground), plug (7) disconnected
Multimeter reading: 12 volts +/- 1 volt
- Same measurement with plug (7) connected
Multimeter reading: 12 volts +/- 1 volt
- Between white and brown (ground), plug (8) disconnected
Multimeter reading: 19 volts +/- 1 volt
- Same measurement with plug (8) connected
Multimeter reading: 15 volts +/- 1 volt



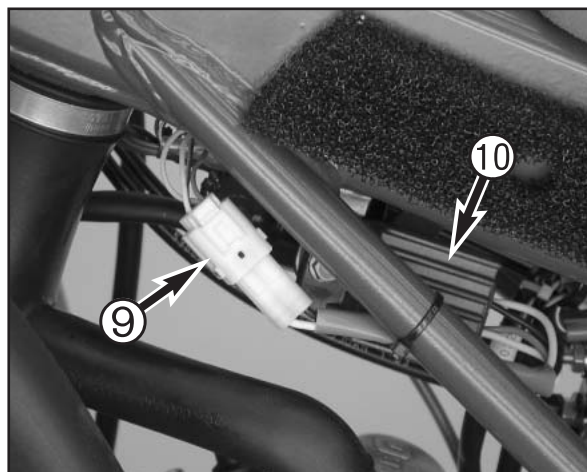
NOTE: apply the black measuring tip on the peak voltage adapter to the ground.

Check the regulator output voltage (9) (also see circuit diagram on opposite page) with the cable color yellow/red, controller (10) connected, fuse (11) removed:

- Between yellow/red and brown (ground)
Multimeter reading: 14 volts +/- 1 volt



NOTE: apply the black measuring tip on the peak voltage adapter to the brown (ground) cable.



ELECTRIC SYSTEM

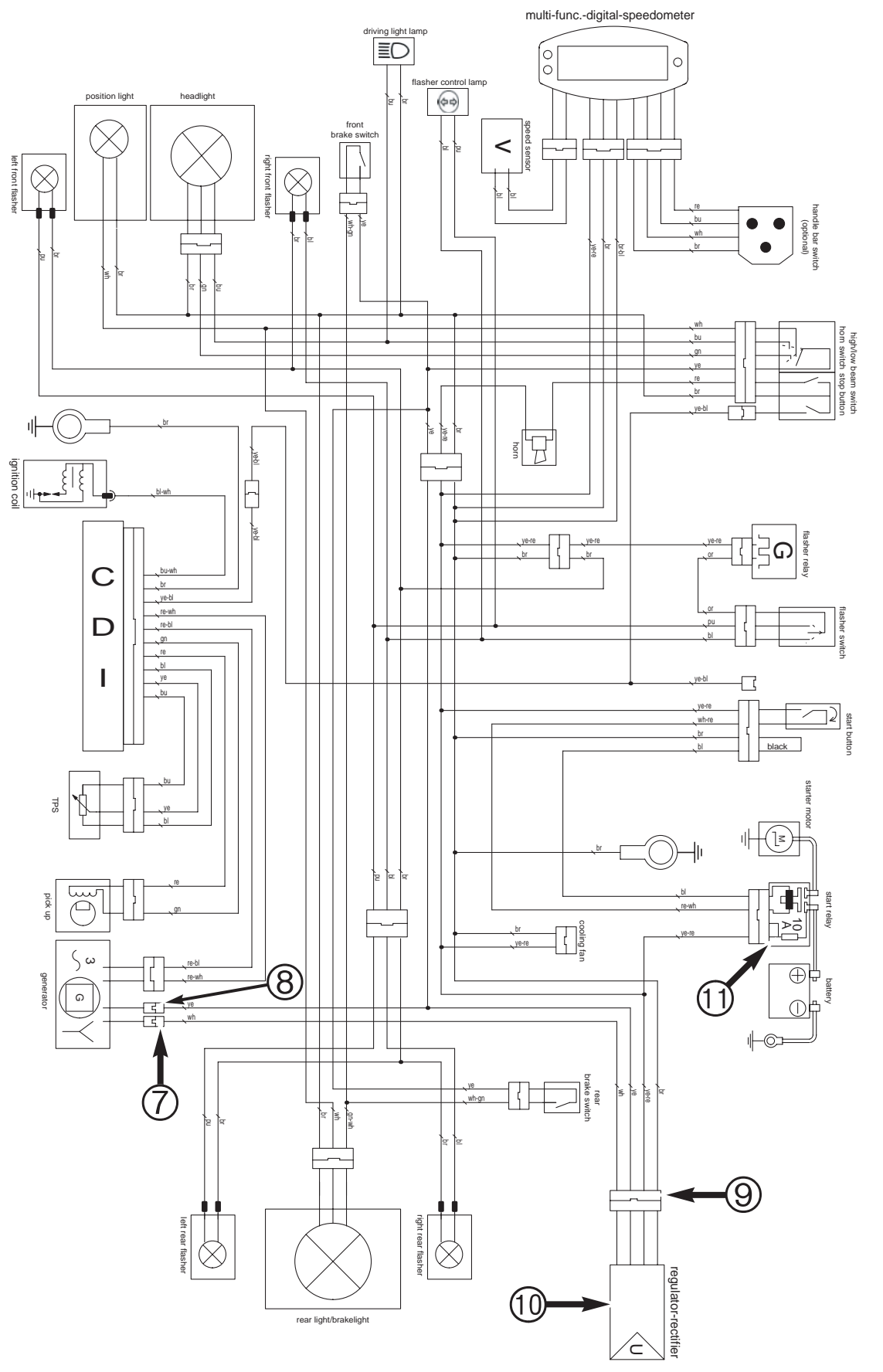


Husaberg FE/FS 2005

wiring diagram

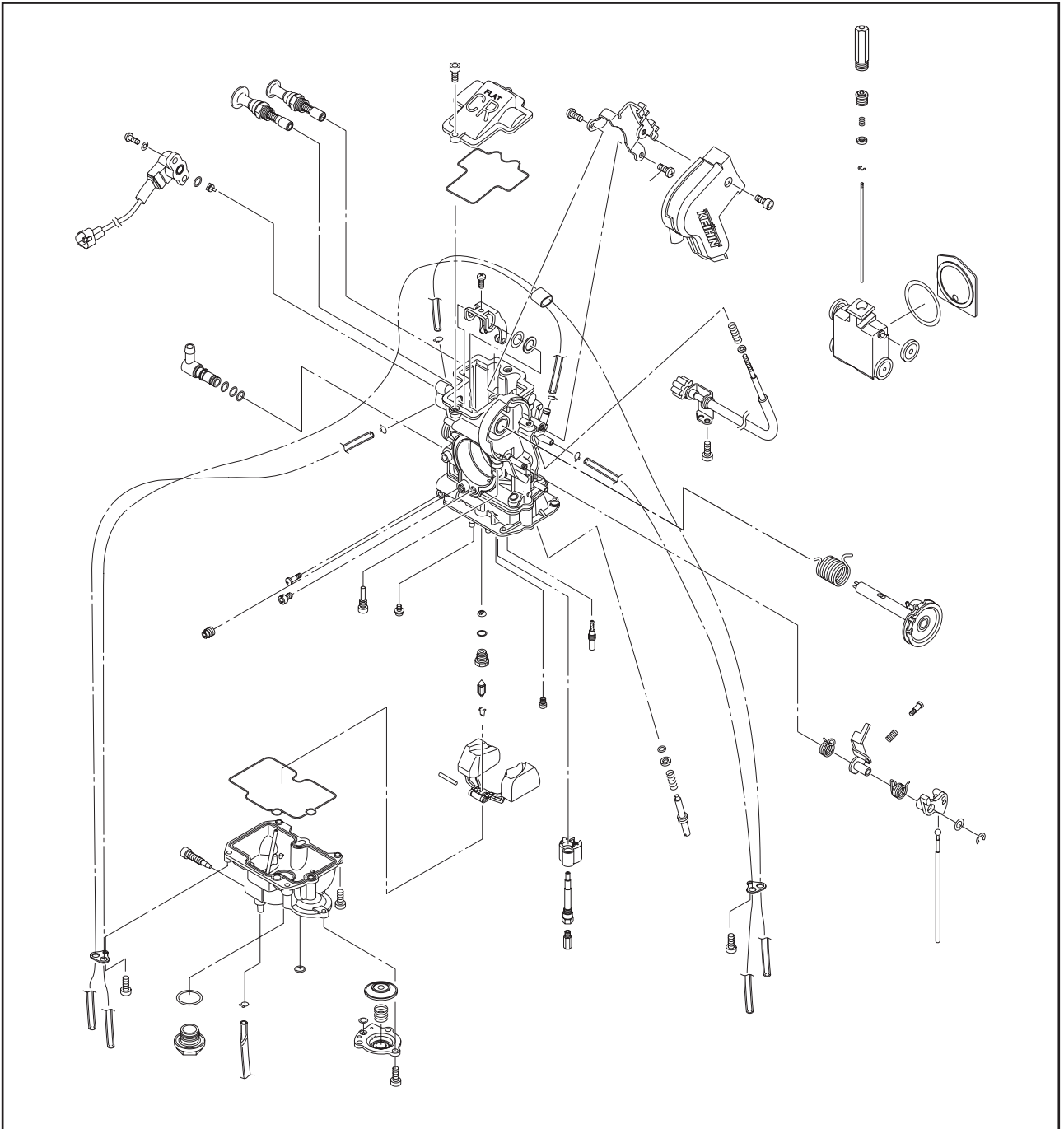
main harness - 800.11.075.500

11.03.2004



FUEL SYSTEM

KEIHIN FCR-MX 39/41 CARBURETOR



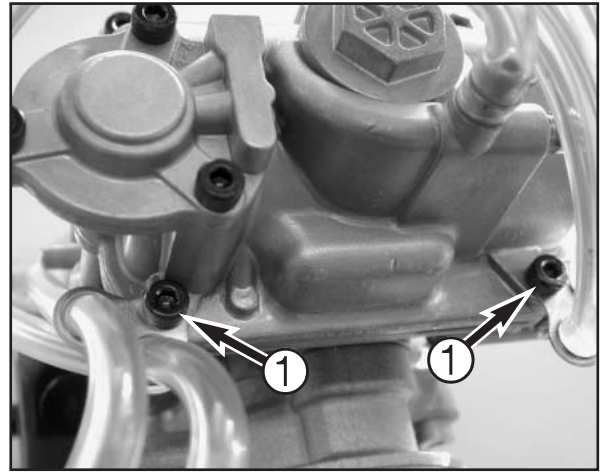
FUEL SYSTEM

DISASSEMBLING THE KEIHIN FCR-MX 39/41 CARBURETOR

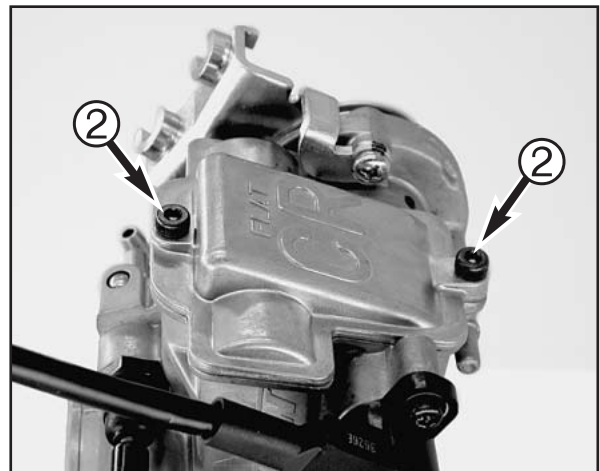


NOTE: Before you start to disassemble the carburetor, make sure your workplace is clean and offers enough room to spread out the individual carburetor parts.

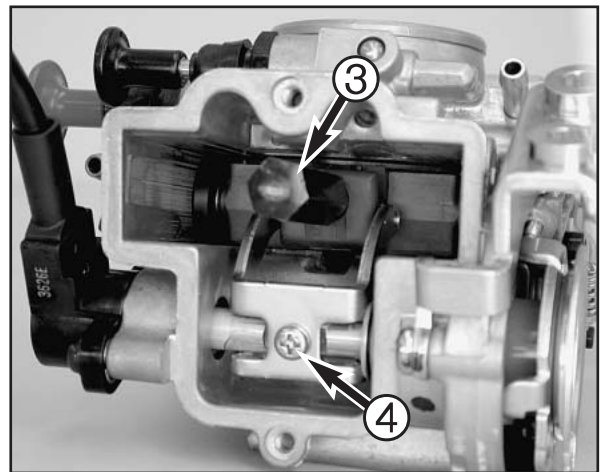
- Dismount the carburetor and remove any accumulated dirt.
- Loosen the 2 screws (1) and disconnect all of the vent hoses from the carburetor.



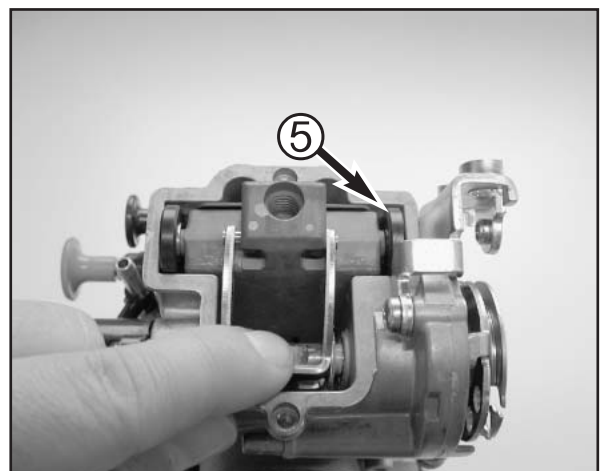
- Remove the 2 screws (2) and lift the slide cover and gasket from the carburetor.



- Remove the screw (3) and pull the jet needle from the throttle slide.
- Remove screw (4).



- Lift the throttle slide arm and take the throttle slide including the roller (5) and slide shim out of the carburetor.



FUEL SYSTEM

- Turn the carburetor around, remove the 3 screws and remove the cover on the accelerator pump.

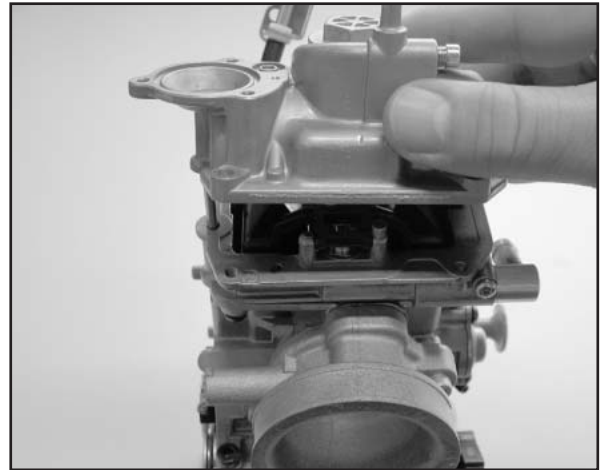


NOTE: When dismantling the cover, pay special attention to the spring and seal rings since they are easily lost.

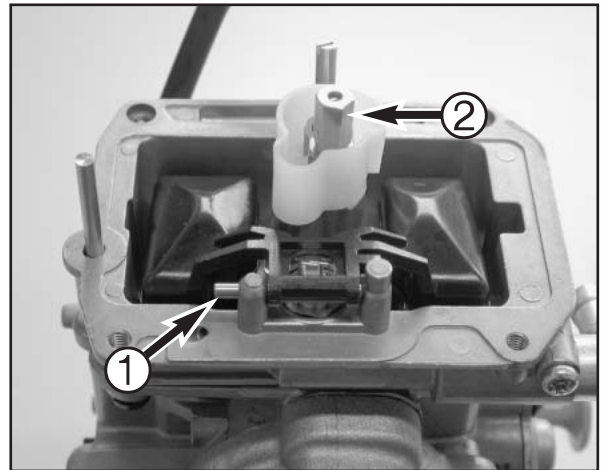
- Take the 2 seal rings, spring and membrane out of the pump housing.



- Remove the screws from the float chamber and lift off the float chamber.



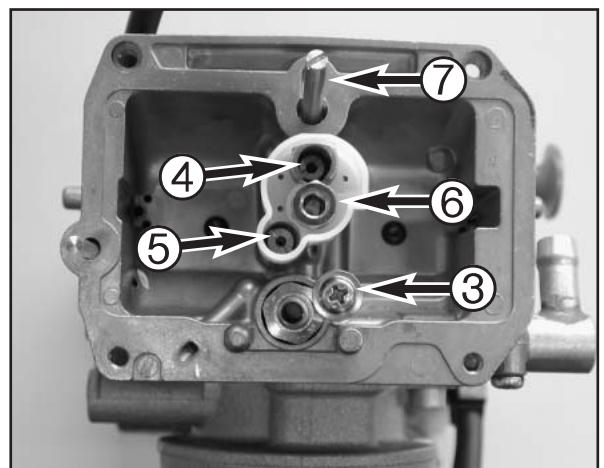
- Pull out the float hinge pin (1) and remove the float together with the float needle valve.
- Remove the main jet (2).



- Remove the screw (3) and carefully pull the float needle valve seat out of the carburetor with pliers.
- Unscrew the idling jet (4), starting jet (5) and needle jet (6).
- Screw in the mixture control screw (7) up to the stop, counting and writing 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 hole. You can remove these parts with compressed air.

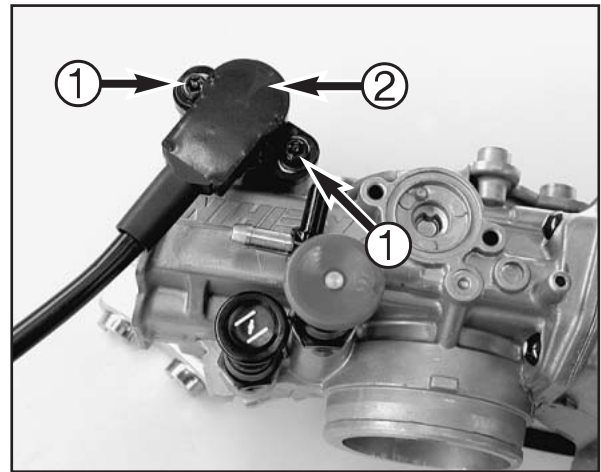


FUEL SYSTEM

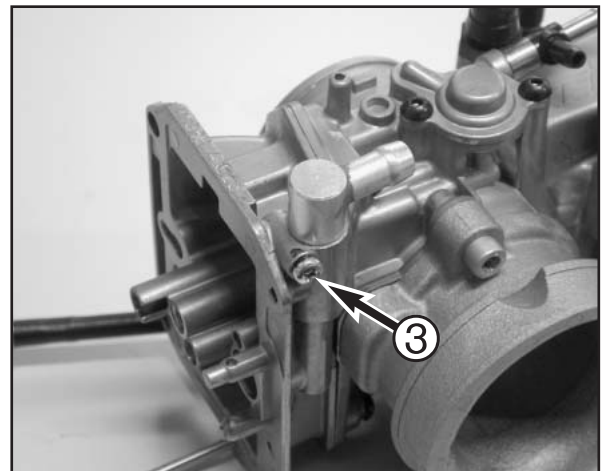
- Remove the screws (1) with special tool 800.29.052.000 and take off the throttle sensor (2).



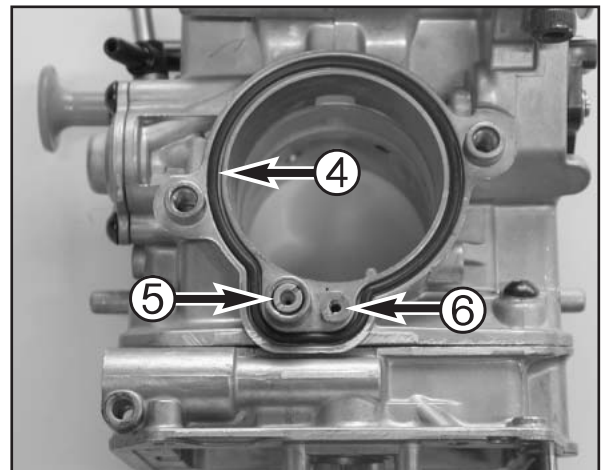
NOTE: Only remove the throttle sensor if it is defective. The throttle sensor must be readjusted if the screws (1) are loosened.



- Remove the screw (3) and pull the connecting piece out of the carburetor.



- Remove the 2 screws and take the intake trumpet and the O-ring (4) off of the carburetor.
- Unscrew the idle-air jet (5) and main air jet (6).
- Thoroughly clean all of the jets and the other parts and blow through with compressed air.
- Clean the carburetor housing and blow compressed air through all of the ducts in the carburetor.
- Check all of the gaskets for damage and replace if necessary.



FUEL SYSTEM

CHECKING THE CHOKE SLIDE AND THE HOT START KNOB

Choke slide:

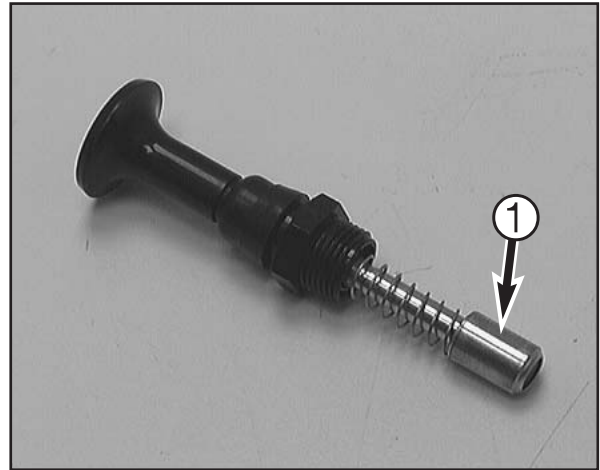
The choke slide must be easily actuated.

The piston (1) on the choke slide may not have any deep scores or deposits.

Hot start knob:

The hot start knob must be easily actuated.

The piston on the hot start knob may not have any deep scores or deposits.

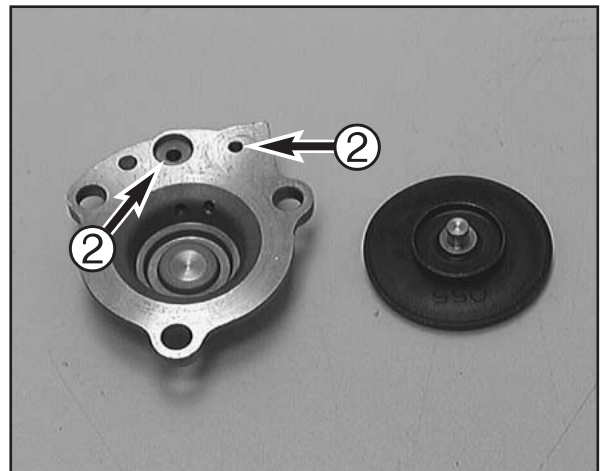


CHECKING THE ACCELERATOR PUMP

Check the diaphragm for crack formation or brittleness.

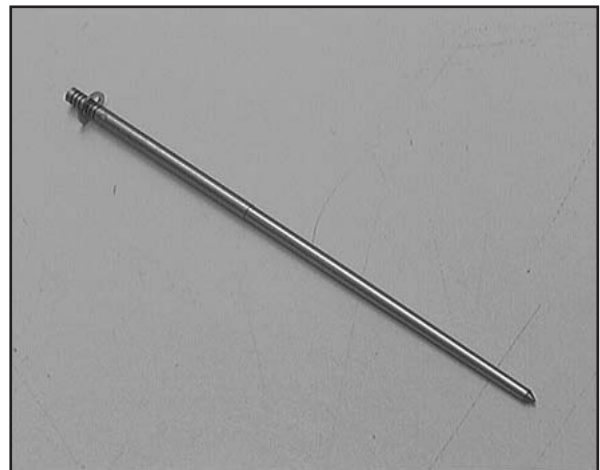
Check the gaskets for damage.

Check the holes (2) for free passage.



CHECKING THE JET NEEDLE

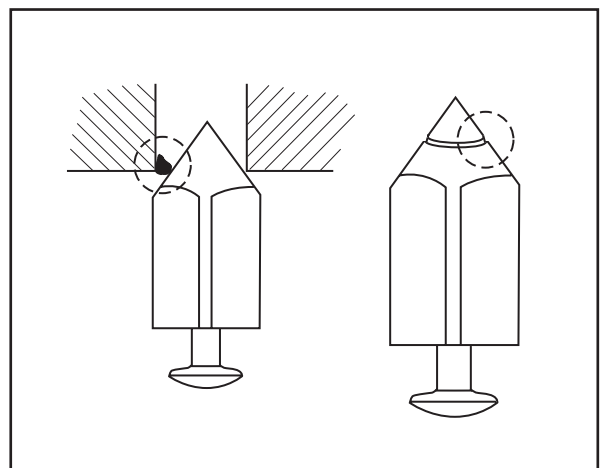
Check the jet needle for deformation and wear.



CHECKING THE FLOAT NEEDLE VALVE

Check the needle valve for indentations around the sealing area.

Make sure no dirt has accumulated between the valve seat and the float needle.

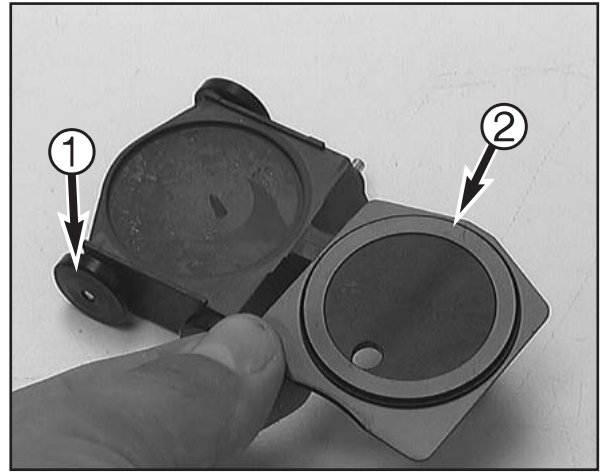


FUEL SYSTEM

CHECKING THE THROTTLE SLIDE

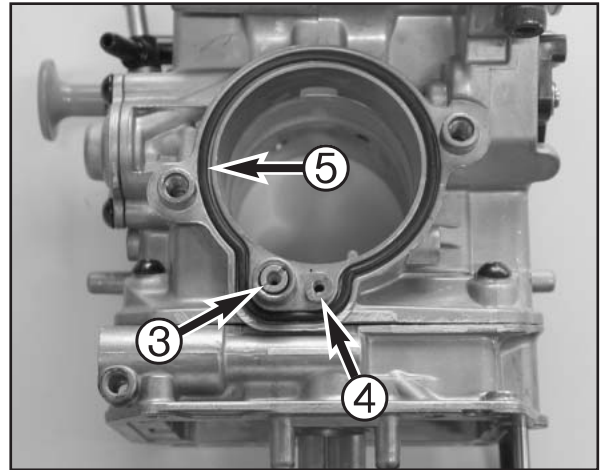
The rollers (1) on the throttle slide should be easy to turn and not have any flat areas.

Check the throttle slide shim (2) for damage.



ASSEMBLING THE KEIHIN FCR-MX 39/41 CARBURETOR

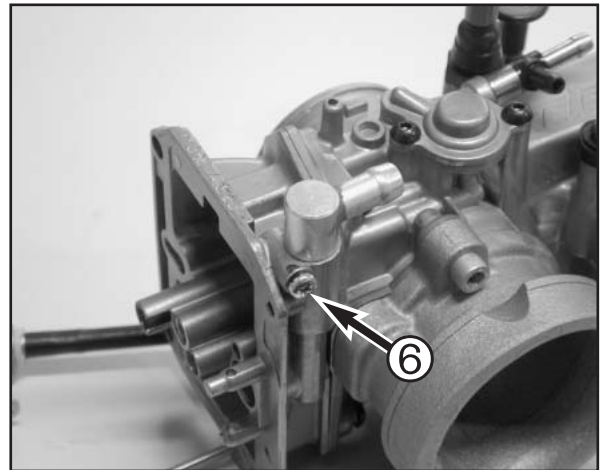
- Mount the idle-air jet (3) and the main air jet (4).
- Place the O-ring (5) in the groove and attach the intake trumpet to the carburetor with the 2 screws.



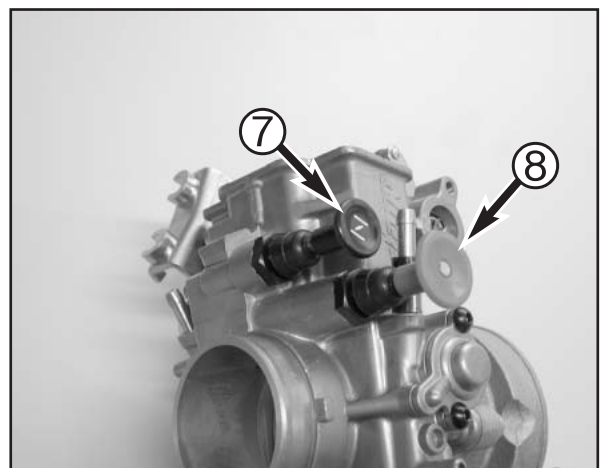
- Insert the fuel connection in the carburetor and fix with the screw (6).



NOTE: The connecting piece should be easy to turn when mounted.



- Mount and actuate the choke slide (7) and the hot start knob (8) several times, checking for smooth operation. Also make sure that the choke and the hot start knob lock properly.



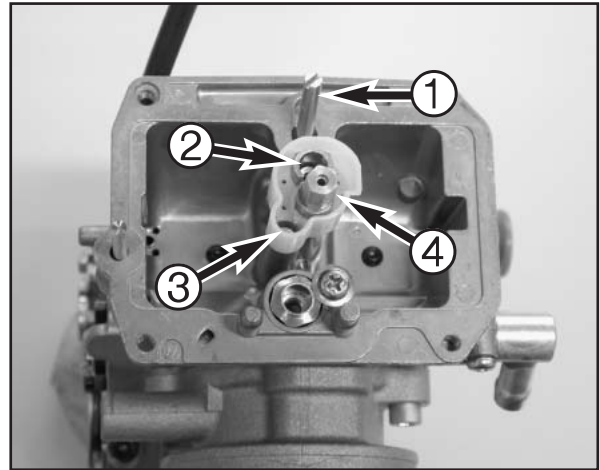
FUEL SYSTEM

- Mount the spring, washer and the O-ring on the mixture control screw (1) and turn the mixture control screw all the way in to the stop.
- Now unscrew the mixture control screw the number of turns written down during disassembly.

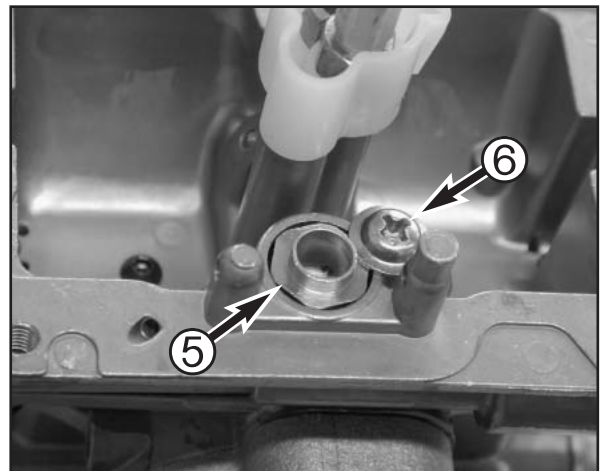


NOTE: Basic carburetor setting: see Technical specifications.

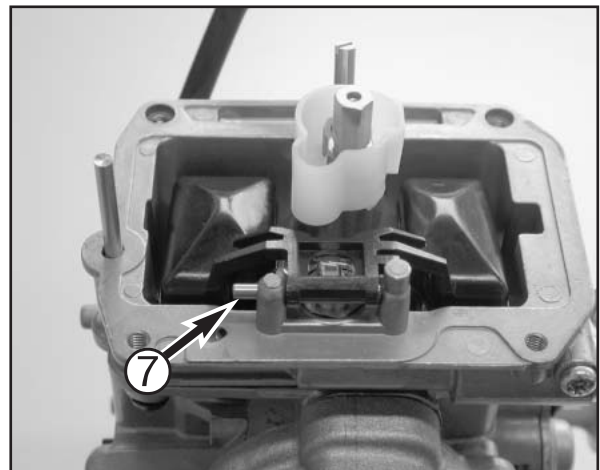
- Mount the idling jet (2), starting jet (3) and needle jet together with the main jet (4).



- Insert the needle valve seat (5) in the hole and fix with the screw (6).



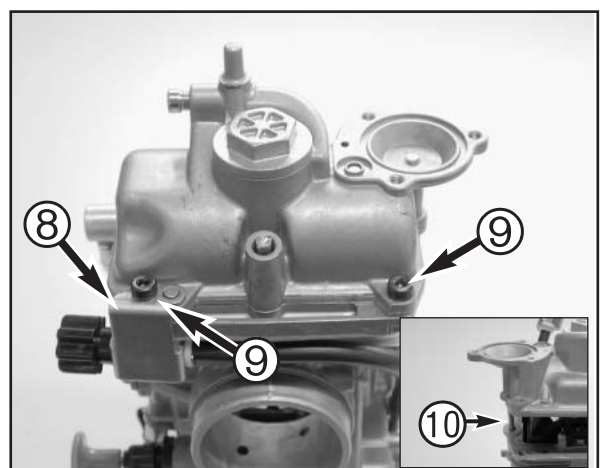
- Position the float and the float needle valve and mount the float hinge pin (7).
- Check the float level (see page G13).



- Mount the float chamber together with the gasket, position the attachment for the adjusting screw (8) and fix the float chamber with the screws (9).

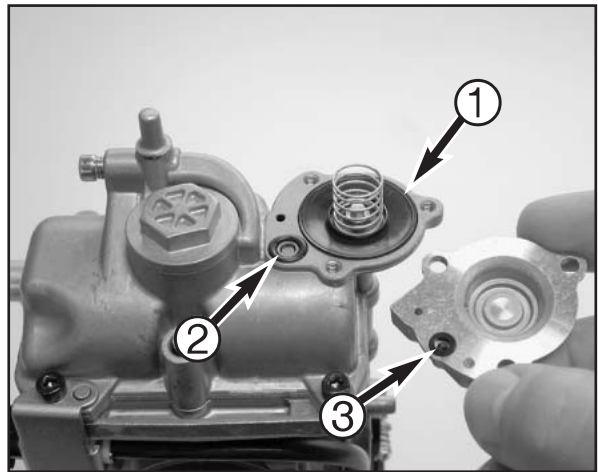


NOTE: When mounting the float chamber, make sure that the push rod (10) on the accelerator pump slides into the hole.

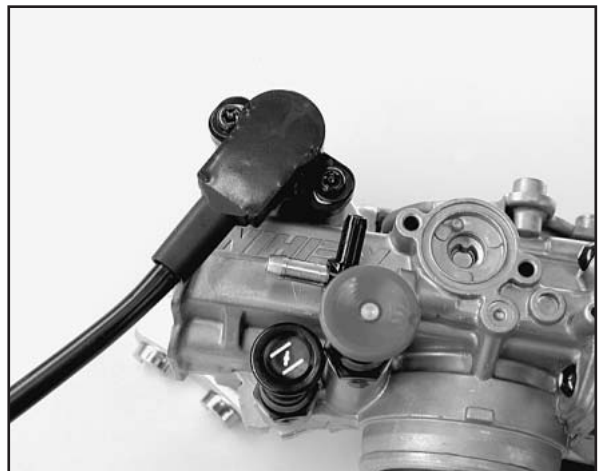


FUEL SYSTEM

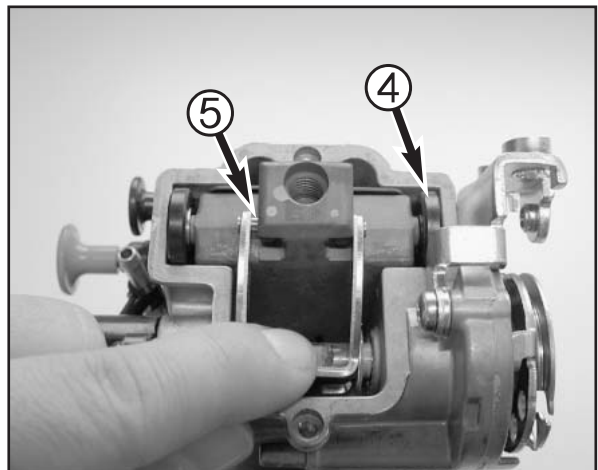
- Place the spring and the diaphragm (1) in the pump housing with the inscription facing up.
- Place the O-ring (2) in the groove. Fix the seal ring (3) in the cover with a little grease and fasten the cover with the 3 screws.



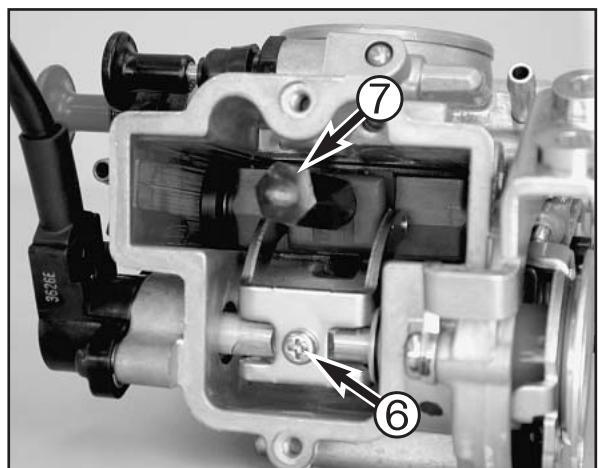
- Mount the throttle sensor so that the flat part of the carburetor engages in the groove in the throttle sensor, tighten the screws with special tool 800.29.052.000.



- Lift up the throttle slide arm and slide the throttle slide, the roller (4) and the slide shim into the carburetor so that the rollers (5) engage in the throttle slide (see photo).
- Check the throttle slide for smooth operation.

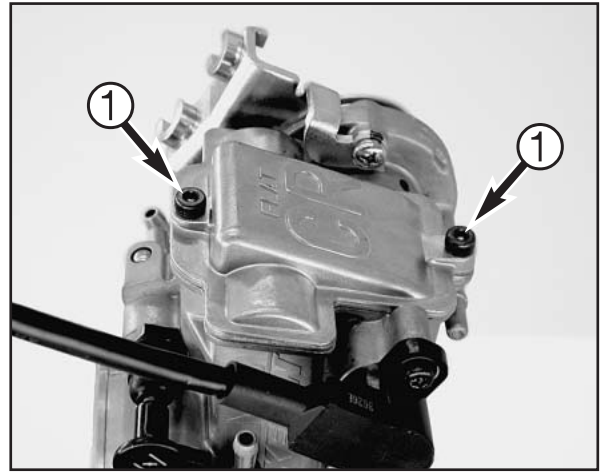


- Apply Loctite 243 to the screw (6) and tighten.
- Mount the jet needle and fix with the screw (7).

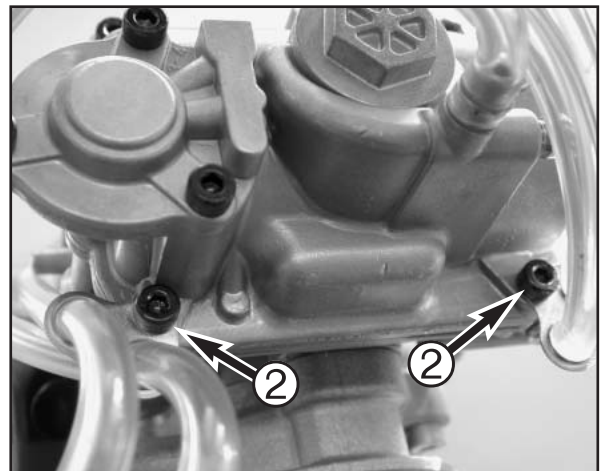


FUEL SYSTEM

- Position the slide cover with the gasket and fasten with the 2 screws (1).



- Attach the vent hoses to the float chamber with the 2 screws (2).



FUEL SYSTEM

ADJUSTING THE POSITION OF THE THROTTLE SENSOR



NOTE: The idle speed must be correctly adjusted before you check the position of the throttle sensor.

- Disconnect the plug and socket connection on the throttle sensor.
- Connect a multimeter (measuring range $\Omega \times 1k$) to the blue (+) and the black (-) cable on the throttle sensor and measure the throttle resistance.
- Multiply this value by 0.15 to obtain the setting for the throttle sensor.

Example:

Throttle sensor resistance (bl/b) = 5 k Ω

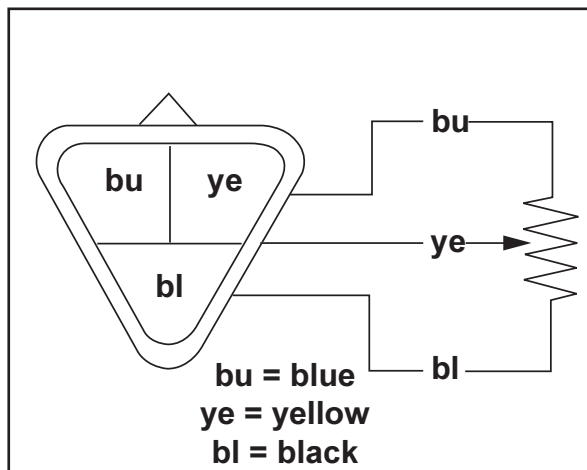
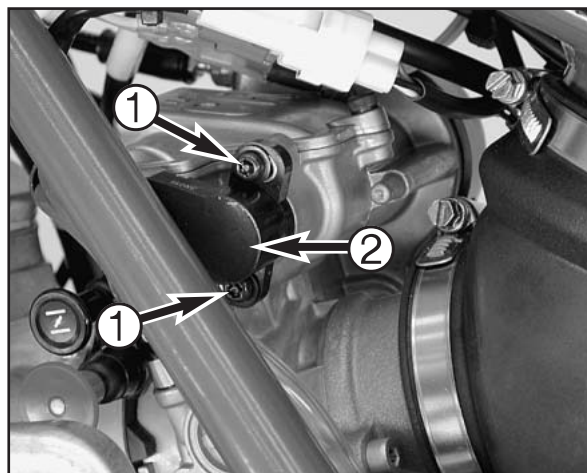
Throttle sensor resistance (y/b) = 5 k $\Omega \times 0.15 =$

750 $\Omega \pm 50 \Omega$

- Connect the multimeter (measuring range $\Omega \times 100$) to the yellow (+) and the black (-) cable on the throttle sensor and measure the throttle sensor resistance with the throttle grip closed.

According to the above example, this value should be 750 $\Omega \pm 50$.

- If the measured value does not correspond to the setpoint value, loosen the 2 screws (1) and turn the throttle sensor (2) until the measuring device displays the setpoint value.
- Fix the throttle sensor in this position by tightening the screws and check the value again.
- Connect the throttle sensor to the cable tree.



FUEL SYSTEM

CHECKING THE THROTTLE SENSOR



NOTE: The following measurement must be performed at a component temperature of approx. 20°C.

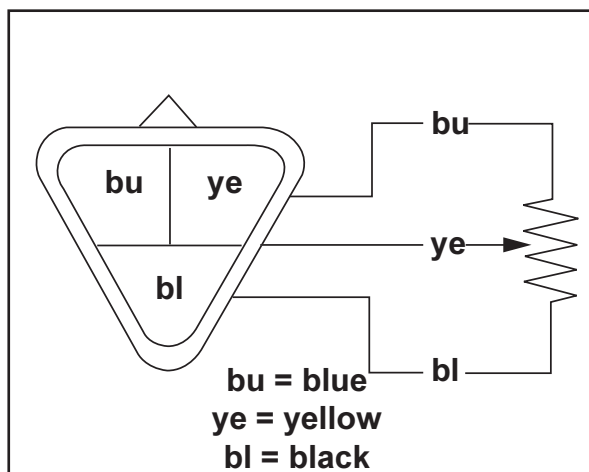
- Disconnect the plug connection on the throttle sensor.
- Connect a multimeter (measuring range . x 1k) to the blue (+) and the black (-) cable on the throttle sensor.

Throttle sensor resistance: 4 - 6 k Ω



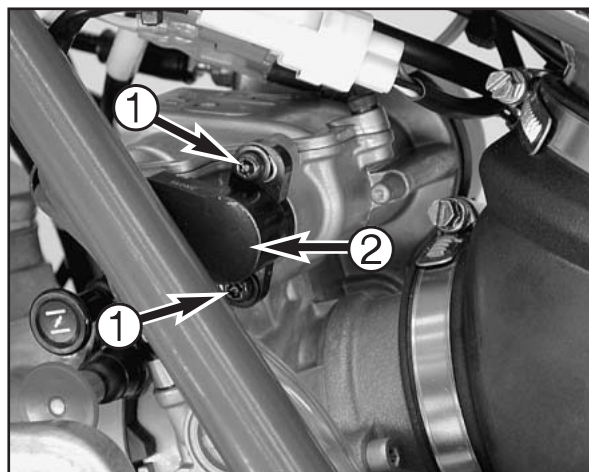
- Now connect the multimeter to the yellow (+) and the black (-) cables on the throttle sensor.
- The resistance should change evenly when the throttle grip is slowly opened.

Throttle sensor resistance: 0 - 5 k Ω \pm 1 k Ω
(when the throttle grip is opened)

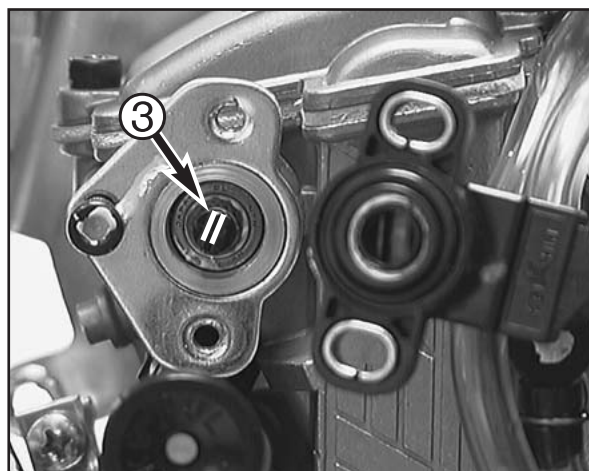


DISMOUNTING AND MOUNTING THE THROTTLE SENSOR

- Disconnect the plug connection on the throttle sensor lösen and remove the screws (1).
- Remove the throttle sensor (2) from the carburetor.



- When you mount the throttle sensor, make sure that the flat area on the driver (3) engages in the groove in the throttle sensor.
- Degrease the thread on the 2 screws and apply Loctite 243.
- Mount the 2 screws but do tighten yet and adjust the position of the throttle sensor.



FUEL SYSTEM

ADJUSTING THE CARBURETOR IDLE

The carburetor idle setting has a strong influence on the engine's starting behavior. In other words, an engine with a correctly adjusted idle will be easier to start than an engine with an incorrectly adjusted idle.

The idle is adjusted via the adjusting knurl (1) and the mixture control screw (2). The basic throttle slide position is adjusted with the adjusting knurl. The mixture control screw is used to adjust the idle mixture which flows through the idle system to the engine. Turning in a clockwise direction will reduce the amount of fuel (lean mixture), turning in a counterclockwise direction will increase the amount of fuel (rich mixture).

To adjust the idle, proceed as follows:

1. Turn the mixture control screw (2) in all the way to the stop and adjust to the basic setting specified by Husaberg (see Technical Specifications - Engine).
2. Run the engine warm
3. Use the adjusting knurl (1) to set a normal idle speed (1400 - 1500/min).
4. Slowly turn the mixture control screw (2) in a clockwise direction until the idle speed starts to drop. Note down the position and slowly turn the mixture control screw in a counterclockwise direction until the idle speed drops again. Set the point between these two positions that has the highest idle speed. If the speed increase is too high, reduce the idle speed to a normal level and repeat as described in section 4. Racing pilots will make the ideal setting approx. 1/4 turn leaner (in a clockwise direction), since the engine becomes hotter while racing.



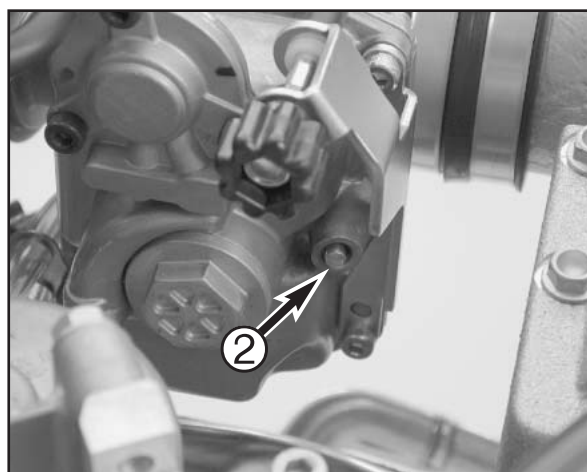
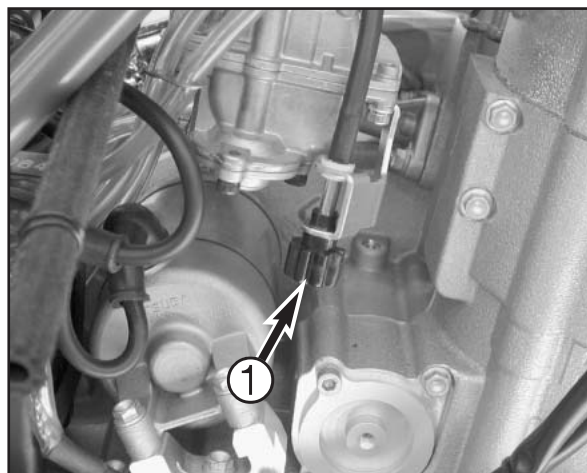
NOTE: if the mode of procedure described above does not achieve satisfactory results, this may be due to the wrong dimensioning of the idling jet. If

a) the mixture control screw is turned in up to the stop without any change in the speed, mount a smaller idling jet.

b) the engine stalls with the mixture control screw 2 turns open, select a larger idling jet.

Repeat the adjustment procedure after replacing the jet.

5. Now set the desired idle speed with the adjusting knurl.
6. Readjust the idle for greater changes in the outdoor temperature or extremely varying altitudes.



FUEL SYSTEM

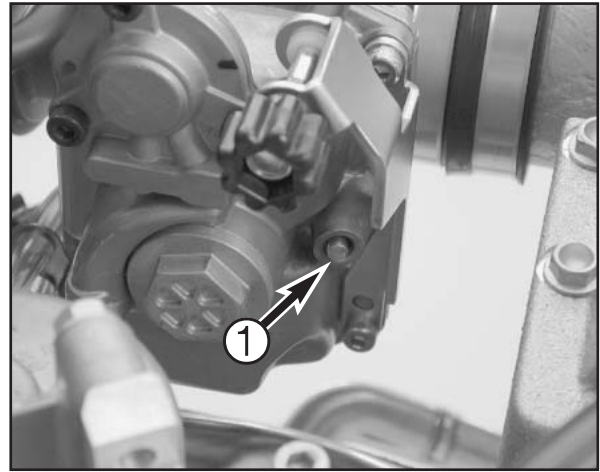
GENERAL INFORMATION ON CARBURETOR WEAR

Engine vibrations make the throttle slide, jet needle and main jet holder subject to increased wear. Wear leads to malfunctioning of the carburetor (e.g. over enrichment). These parts should be replaced after 200 operating hours.

ADJUSTING THE MIXTURE CONTROL SCREW

The mixture control screw (1) is used to adjust the idle mixture.

Turning the mixture control screw in a clockwise direction will reduce the idle mixture, turning it in a counter-clockwise direction will increase the idle mixture.



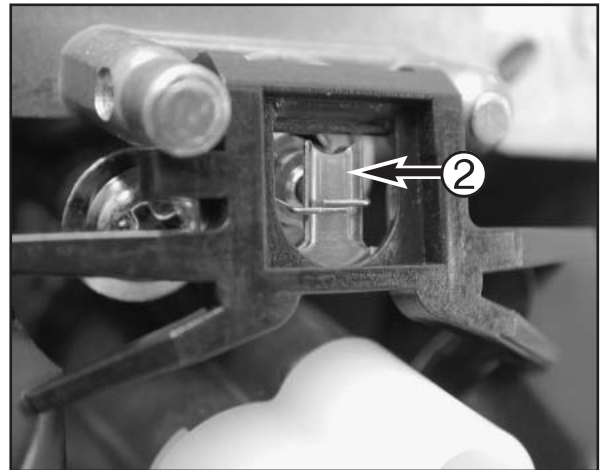
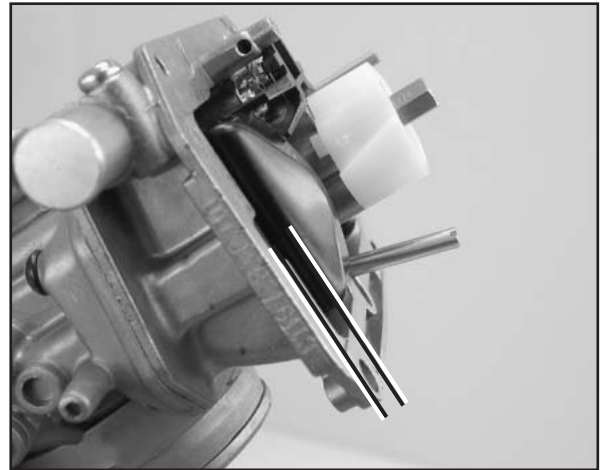
CHECKING THE FLOAT LEVEL (FLOAT HEIGHT)

To check the float level, dismount the carburetor and remove the float chamber. Tilt the carburetor until the float rests against the float needle valve without crushing 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 level does not have the setpoint value, check the float needle valve and replace if necessary.

If the float needle valve is OK you can adjust the float height by bending the float lever (2).

Mount the float chamber and the carburetor and adjust the idle.



TROUBLESHOOTING

ERROR	CAUSE	REMEDY
Engine does not switch on (starter)	<p>Operating error</p> <p>Fuse is blown</p> <p>Battery is dead</p> <p>Low outdoor temperature</p>	<p>Switch on the emergency OFF switch (Australia only)</p> <p>Replace the fuse in the starter relay</p> <p>Charge the battery and determine the cause of discharging</p> <p>Start the engine with the kickstarter</p>
<p>Engine switches on but does not start (starter)</p> <p>Engine does not start (kickstarter)</p>	<p>Operating error</p> <p>Motorcycle was not operated for a longer period of time, old fuel in the float chamber</p> <p>Fuel supply is interrupted</p> <p>Engine is flooded</p> <p>Spark plug is sooted or wet</p> <p>Electrode distance is too large</p> <p>Spark plug connector or spark plug is defective</p> <p>Short-circuit cable in the wiring harness chafed, Emergency OFF switch or short circuit button is defective</p> <p>Socket connector on CDI, pulse generator or ignition coil has oxydized</p> <p>Water in the carburetor or jets clogged</p> <p>Idling jet clogged</p>	<p>Open the fuel tap, refuel, do not actuate the choke, follow start-up instructions (see driving instructions)</p> <p>The highly inflammable constituents in the new fuel volatize if left standing over longer periods of time. If the motorcycle was not used for over 1 week, drain the old fuel from the float chamber. The engine will start immediately after the float chamber is filled with fresh ignitable fuel.</p> <p>Disconnect the fuel hose from the carburetor, place the end in a vessel and open the fuel tap, – if fuel leaks out, clean the carburetor – if no fuel leaks out, check the tank ventilation and clean the fuel tap</p> <p>To "pump" the engine dry, pull the hand decompression lever, open the throttle completely, actuate the kickstarter 5 – 10 times or the starter 2 times for 5 seconds. Then start the engine as described above. If the engine still won't start, unscrew the spark plug and dry.</p> <p>Clean and dry or replace the spark plug</p> <p>Set the electrode distance to 0.6 mm</p> <p>Remove the spark plug, connect the ignition wire, hold the spark plug against the ground (bright side facing the engine) and start. A strong spark should be visible at the spark plug. – if there is no spark, replace the spark plug – if there is still no spark, disconnect the spark plug connector from the ignition wire, hold approx. 5 mm away from the ground and start – if there is a spark, replace the spark plug connector – if there is still no spark, have the ignition system checked</p> <p>Remove the fuel tank, disconnect the cable from the emergency OFF switch or short-circuit button and check the spark. If there is a spark, look for the error in the short circuit</p> <p>Remove the seat, clean the socket connector and treat with contact spray</p> <p>Dismount and clean the carburetor</p> <p>Disassemble the carburetor and clean the jets</p>
Engine has no idle	<p>Adjusting screws on the carburetor are distorted</p> <p>Spark plug is defective</p> <p>Ignition system is defective</p>	<p>Adjust the carburetor</p> <p>Replace the spark plug</p> <p>Check the ignition system</p>

TROUBLESHOOTING

ERROR	CAUSE	REMEDY
Engine won't rev up	Carburetor overflows because the float needle is soiled or worn Loose carburetor jets Electronic ignition advance is defective	Disassemble the carburetor and check for wear Tighten the jets Check the ignition system
Engine does not have enough power	Fuel supply is interrupted or the carburetor soiled Air filter is heavily soiled Exhaust system is not tight, deformed or there is not enough glass-fiber yarn in the silencer Valve clearance is too small Compression loss due since hand decompression lever is inadequately adjusted Electronic ignition advance is defective	Clean and check the fuel system and carburetor Clean or replace the air filter Check the exhaust system for damage, replace the glass fiber yarn in the main silencer Adjust the valve clearance Adjust the hand decompression cable Check the ignition system
Engine stops or backfires in the carburetor	Shortage of fuel Engine draws in unmeasured air	Clean and check the fuel system and carburetor Check the rubber sleeve and carburetor for a tight fit
Engine gets too hot	Not enough cooling liquid in the cooling system Not enough air stream Cooling system not ventilated Radiator fins are heavily soiled Foam has formed in the cooling system Bent radiator hose	Add cooling liquid (see maintenance work), check the cooling system for tightness Continue driving speedily Ventilate the cooling system Clean the radiator fins with a water jet Replace the cooling liquid, use brand-name antifreeze Shorten or replace the radiator hose
High oil consumption	Bent engine ventilation hose Engine oil level is too high Engine oil is too thin	Install the ventilation hose without kinks or replace Check the engine oil level and correct if necessary Use a thicker engine oil, see "Engine oil" chapter (viscosity)
All of the switched on lights are burned out	The voltage regulator is defective	Check the voltage regulator
Horn, turn signal and starter do not work	Fuse in the starter relay is blown	Renew the fuse
Battery is dead	Battery is not being charged by the generator	Check the connections on the voltage regulator

TECHNICAL SPECIFICATIONS - ENGINE 2004

Engine	FC 450/4	FE 450e/6	FS 450e/6	FE 501e/6
Design	Liquid-cooled, 1-cylinder 4-stroke Otto engine with balancer weight			
Displacement	449 cm ³			501 cm ³
Bore/Stroke	100 / 57.2 mm			95 / 70.7 mm
Compression ratio	13:1			11.6:1
Keihin carburetor	FCR-MX 41	FCR-MX 39		
Fuel	unleaded fuel with at least RON 95 (USA = Premium RON 91)			
Timing	4 valves controlled over rocker arm and 1 camshaft, camshaft drive with single chain			
Valve diameter, intake	35 mm			
Valve diameter, exhaust	30 mm			
Valve clearance, intake, cold	0.12 mm			
Valve clearance, exhaust, cold	0.12 mm			
Crankcase bearing	2 roller bearings			
Conrod bearing	needle bearing			
Piston pin bearing	bronze bush			
Piston	Light alloy – forged			
Piston rings	1 compression ring, 1 oil scraper ring			
Engine lubrication	pressure lubrication with trochoid rotor pump			
Engine oil	fully synthetic engine oil (Motorex Power Synt 4T SAE 10W50)			
Quantity of engine oil	1.0 liter			
Primary drive	straight-toothed spur wheels 29:78 Z			
Clutch	multi-disk clutch in oil bath			
Transmission (claw shifted)	4-speed		6-speed	
Gear ratio				
1st gear	14:33		14:33	
2nd gear	17:30		17:30	
3rd gear	19:26		19:26	
4th gear	23:25		23:25	
5th gear	–		24:22	
6th gear	–		27:20	
Ignition system	breakerless transistorized DC-CDI ignition system with digital ignition advance, type KOKUSAN			
Generator	–	12V 150W		
Spark plug	NGK DCPR 8 E			
Electrode distance	0.6 mm			
Cooling system	liquid cooled, permanent circulation of cooling liquid through water pump			
Cooling liquid	1.0 liters, mixing ratio 40% antifreeze, 60% water, at least –25° C			
Starting aid	kickstarter	kickstarter/electric starter		

BASIC CARBURETOR SETTING

	FC 450/4	FE/FS 450e/6 EU/AUS/USA green	FE 501e/6 EU/AUS
Type of carburetor	Keihin FCR-MX 41	Keihin FCR-MX 39	Keihin FCR-MX 39
Carburetor ID number	4125B	3925B	3925BA
Main jet	182	178	178
Jet needle	OBDVR	OBDVT (OBDVR)	OBDVT (OBDVR)
Idling jet	40	38 (40)	38 (42)
Main air jet	200	200	200
Idle air jet	100	100	100
Needle position	6th from top	2nd (6th) from top	3rd from top
Starting jet	85	85	85
Mixture control screw open	1.5	1.5 (2.0)	1.5
Slide	15	15	15
Restriction	–	slide stop	slide stop
Pump diaphragm stop	858 / 2.15 mm	858 / 2.15 mm	858 / 2.15 mm
Hot start knob	diameter 2.5 mm	diameter 2.5 mm	diameter 2.5 mm

TECHNICAL SPECIFICATIONS - ENGINE 2004

Engine	FC 550/4	FE 550e/6	FE 650e/6	FS 650e/6
Design	Liquid-cooled, 1-cylinder 4-stroke Otto engine with balancer weight			
Displacement	550 cm ³		644 cm ³	
Bore/Stroke	100 / 70 mm		100 / 82 mm	
Compression ratio	11.8:1		11.5:1	
Keihin carburetor	FCR-MX 41			
Fuel	unleaded fuel with at least RON 95 (USA = Premium RON 91)			
Timing	4 valves controlled over rocker arm and 1 camshaft, camshaft drive with single chain			
Valve diameter, intake	35 mm			
Valve diameter, exhaust	30 mm			
Valve clearance, intake, cold	0.12 mm			
Valve clearance, exhaust, cold	0.12 mm			
Crankcase bearing	2 roller bearings			
Conrod bearing	needle bearing			
Piston pin bearing	bronze bush			
Piston	Light allow – forged			
Piston rings	1 compression ring, 1 oil scraper ring			
Engine lubrication	pressure lubrication with trochoid rotor pump			
Engine oil	fully synthetic engine oil (Motorex Power Synt 4T SAE 10W50)			
Quantity of engine oil	1.0 liter			
Primary drive	straight-toothed spur wheels 29:78t			
Clutch	multi-disk clutch in oil bath			
Transmission (claw shifted)	4-speed			6-speed
Gear ratio				
1st gear	14:33			14:33
2nd gear	17:30			17:30
3rd gear	19:26			19:26
4th gear	23:25			23:25
5th gear	–			24:22
6th gear	–			27:20
Ignition system	breakerless transistorized DC-CDI ignition system with digital ignition advance, type KOKUSAN			
Generator	–	12V 150W		
Spark plug	NGK DCPR 8 E			
Electrode distance	0.6 mm			
Cooling system	liquid cooled, permanent circulation of cooling liquid through water pump			
Cooling liquid	1.0 liters, mixing ratio 40% antifreeze, 60% water, at least –25° C			
Starting aid	kickstarter	kickstarter/electric starter		

BASIC CARBURETOR SETTING

	FC 550/4	FE/FS 550e/6 EU/AUS/USA green	FE/FS 650e/6 EU/AUS/USA green
Type of carburetor	Keihin FCR-MX 41	Keihin FCR-MX 41	Keihin FCR-MX 41
Carburetor ID number	4125B	4125B	4138C
Main jet	182	182	160
Jet needle	OBDVR	OBDVT (OBDVR)	OBDVT (OBEKR)
Idling jet	40	38 (40)	38 (45)
Main air jet	200	200	200
Idle air jet	100	100	100
Needle position	5th from top	5th from top	2nd (6th) from top
Starting jet	85	85	85
Mixture control screw open	1.5	1.5	0.5 (1.5)
Slide	15	15	15
Restriction	–	slide stop	slide stop
Pump diaphragm stop	858 / 2.15 mm	858 / 2.15 mm	858 / 2.15 mm
Hot start knob	diameter 2.5 mm	diameter 2.5 mm	diameter 2.5 mm

TECHNICAL SPECIFICATIONS - CHASSIS 2004

	FC 450/4, 550/4	FE 450/501/550/650e/6	FS 450e/6, 650e/6
Frame	tubular chrome-molybdenum-steel frame, powder-coated		
Fork	WP Up Side Down 4860 MXMA		
Spring travel, front/rear	295/320 mm		260/287 mm
Rear suspension	WP Progressive Damping System shock absorber, aluminum rear swinging fork		
Front brake	Disk brake, perforated Ø 260 mm brake disk, floating brake caliper		Ø 310 mm
Brake disk front	minimum thickness 2.5 mm		minimum thickness 5.0 mm
Rear brake	Disk brake, perforated Ø 220 mm brake disk, floating brake caliper		
Brake disk rear	minimum thickness 3.5 mm		
Front tire	80/100 - 21"	90/90 - 21"	120/60 - 17"
Air pressure, off road	1.0 bar	1.0 bar	-
Air pressure, on road/alone	-	1.5 bar	1.5 bar
Rear tire	110/100 - 19"	140/80 - 18"	150/60 - 17"
Air pressure, off road	1.0 bar	1.0 bar	-
Air pressure, on road/alone	-	2.0 bar	2.0 bar
Fuel tank capacity	9 liters		
Gear ratio - rear wheel	14:48	450/501 14:48, 550 15:48, 650 15:45	450 15:42, 650 15:40
Chain	X-Ring 520		
Available rear sprockets	38Z, 40Z, 42Z, 45Z, 48Z, 50Z, 52Z		
Lighting	Headlight	HS1 12V 35/35W	
	Parking light	12V 5W (Socket W2, 1x9.5d)	
	Brake light	12V 21/5W (Socket BaY15d)	
	Turn signal	12V 10W (Socket Ba15s)	
	License plate illumination	12V 1.2W (Socket 1x4,6d)	
Battery	maintenance-free battery 12V 7Ah		
Steering head angle	63°		
Wheel base	1490 ± 10 mm		
Seat height, unloaded	930 mm		870 mm
Ground clearance, unloaded	380 mm		320 mm

STANDARD FORK ADJUSTMENT

	FC 450/4, 550/4 WP4860MXMA 14.45Y7.28	FE 450/501/550/650e/6 WP4860MXMA 14.45Y7.29	FS 450e/6, 650e/6 WP4860MXMA 14.45Y7.30
Compression damping	18	19	20
Rebound damping	19	21	15
Spring	4.4 N/mm	4.2 N/mm	4.4 N/mm
Spring preload	5 mm	5 mm	33 mm
Air chamber length	100 mm	110 mm	110 mm
Fork oil	SAE 5	SAE 5	SAE 5

STANDARD SHOCK ABSORBER ADJUSTMENT

	FC 450/4, 550/4 WP 5018 PDS DCC 12.45.Y7.21	FE 450/501/550/650e/6 WP 5018 PDS DCC 12.45.Y7.22	FS 450e/6, 650e/6 WP 5018 PDS DCC 12.45.Y7.23
Compression damping	15 LS (low speed) 2 HS (high speed)	15 LS (low speed) 2 HS (high speed)	10 LS (low speed) 2 HS (high speed)
Rebound damping	22	22	15
Spring	76/95/260	71/90/260	84/250
Spring preload	6 mm	8 mm	5 mm

TECHNICAL DATA - ENGINE 2005

ENGINE	FC 450/4	FE 450E/6	FS 450E/6
Design	1-cylinder 4-stroke engine with balancer shaft, liquid cooled		
Displacement	449 cm ³		
Bore/Stroke	100 / 57.2 mm		
Ratio	13:1		
Carburetor Keihin	FCR-MX 41	FCR-MX 39	FCR-MX 41
Fuel	unleaded fuel with at least RON 95 (USA = Premium RON91)		
Valve timing	4 valves over rocker arm and 1 overhead camshaft, camshaft drive through single chain		
Valve diameter Intake	35 mm		
Valve diameter Exhaust	30 mm		
Valve clearance cold Intake	0.12 mm		
Valve clearance cold Exhaust	0.12 mm		
Crank shadt bearing	2 cylinder roller bearing		
Connecting rod bearing	needle bearing		
Top end bearing	bronze bushing		
Piston	alluminium alloy forged		
Piston rings	1 compression ring, 1 oil scraper ring		
Engine lubrication	pressure circulation lubrication with two rotor pumps		
Engine oil	full synthetic oil (Motorex Power Synt 4T SAE 10W50)		
Quantity of engine oil	1.0 liter		
Primary ratio	straight geared spur wheels 29:78 Z		
Clutch	mult disc clutch in oil bath		
Transmission (clawn shifted)	4-speed	6-speed	
Gear ratio			
1. Gear	14:33	14:33	
2. Gear	17:30	17:30	
3. Gear	19:26	19:26	
4. Gear	23:25	23:25	
5. Gear	–	24:22	
6. Gear	–	27:20	
Ignition system	contactless DC - CDI ignition with digital advanced system, Typ KOKUSAN		
Generator	–	12V 150W	
Spark plug	NGK DCPR 8 E		
Spark plug gap	0.6 mm		
Cooling system	liquid cooled, permanent rotation through mechanically driven water pump		
Cooling liquid	1.3 liter, 40% antifreeze, 60% water, at least –25° C		
Starting equipment	kickstarter	kick - electric starter	

BASIC CARBURETOR SETTING

	FSC/FC 450/4	FE 450E/6 EU/AUS/USA GREEN	FS 450E/6
Type of carburetor	Keihin FCR-MX 41	Keihin FCR-MX 39	Keihin FCR-MX 41
Carburetor ID number	4125B	3925B	4125B
Main jet	182	178	182
Jet needle	OBDVR	OBDVT (OBDVR)	OBDVT (OBDVR)
Idling jet	40	38 (40)	38 (40)
Main air jet	200	200	200
Idle air jet	100	100	100
Needle position	6 th from top	2 nd (6 th) from top	2 nd (6 th) from top
Starting jet	85	85	85
Mixture control screw open	1.5	1.5 (2.0)	1.5 (2.0)
Slide	15	15	15
Restriction	–	slide stop (not USA)	slide stop (not USA)
Pump diaphragm stop	858 / 2.15 mm	858 / 2.15 mm	858 / 2.15 mm
Hot start knob	diameter 2.5 mm	diameter 2.5 mm	diameter 2.5 mm

TECHNICAL DATA - ENGINE 2005

ENGINE	FC 550/4	FE 550E/6	FE 650E/6	FS 650E/6
Design	Liquid-cooled, 1-cylinder 4-stroke Otto engine with balancer weight			
Displacement	550 cm ³		628 cm ³	
Bore/Stroke	100 / 70 mm		100 / 82 mm	
Ratio	11.8:1		11.5:1	
Carburetor Keihin	FCR-MX 41			
Fuel	unleaded fuel with at least RON 95 (USA = Premium RON 91)			
Valve timing	4 valves controlled over rocker arm and 1 camshaft, camshaft drive with single chain			
Valve diameter Intake	35 mm			
Valve diameter Exhaust	30 mm			
Valve clearance cold Intake	0.12 mm			
Valve clearance cold Exhaust	0.12 mm			
Crank shaft bearing	2 roller bearings			
Connecting rod bearing	needle bearing			
Top end bearing	bronze bush			
Piston	Light alloy – forged			
Piston rings	1 compression ring, 1 oil scraper ring			
Engine lubrication	pressure lubrication with trochoid rotor pump			
Engine oil	fully synthetic engine oil (Motorex Power Synt 4T SAE 10W50)			
Quantity of engine oil	1.0 liter			
Primary ratio	straight-toothed spur wheels 29:78t			
Clutch	multi-disk clutch in oil bath			
Transmission (claw shifted)	4-speed		6-speed	
Gear ratio				
1. Gear	14:33		14:33	
2. Gear	17:30		17:30	
3. Gear	19:26		19:26	
4. Gear	23:25		23:25	
5. Gear	–		24:22	
6. Gear	–		27:20	
Ignition system	breakerless transistorized DC-CDI ignition system with digital ignition advance, type KOKUSAN			
Generator	12V 40W		12V 150W	
Spark plug	NGK DCPR 8 E			
Spark plug gap	0.6 mm			
Cooling system	liquid cooled, permanent circulation of cooling liquid through water pump			
Cooling liquid	1.0 liters, mixing ratio 40% antifreeze, 60% water, at least –25° C			
Starting equipment	kickstarter		kickstarter/electric starter	

BASIC CARBURETOR SETTING

	FC 550/4	FE/FS 550E/6 EU/AUS/USA GREEN	FE/FS 650E/6 EU/AUS/USA GREEN
Type of carburetor	Keihin FCR-MX 41	Keihin FCR-MX 41	Keihin FCR-MX 41
Carburetor ID number	4125B	4125B	4138D
Main jet	182	182	160
Jet needle	OBDVR	OBDVT (OBDVR)	OBDVT (OBEKR)
Idling jet	40	38	38 (45)
Main air jet	200	200	200
Idle air jet	100	100	100
Needle position	6 th from top	5 th from top	2 nd from top (4 th)
Starting jet	85	85	85
Mixture control screw open	1.5	1.5	0.5 (2.0)
Slide	15	15	15
Restriction	–	slide stop	slide stop
Pump diaphragm stop	858 / 2.15 mm	858 / 2.15 mm	858 / 2.15 mm
Hot start knob	diameter 2.5 mm	diameter 2.5 mm	diameter 2.5 mm

TECHNICAL DATA - ENGINE

TIGHTENING TORQUES		
HH collar screws on housing, clutch cover, ignition cover	M6	10 Nm
Oil drain plug	M12x1.5	20 Nm
HH plug oil screen	M20x1.5	15 Nm
AH collar screw on oil filter cover	M5	6 Nm
Plug on pressure relief valve	M12x1.5	20 Nm
HH screws on oil pump cover	M4	Loctite 243 + 5 Nm
HH collar screw on cylinder head top section	M6	10 Nm
AH screws on valve cover	M5	6 Nm
HH collar screws on water pump cover	M6	10 Nm
HH screws on cylinder head	M10	50 Nm
HH screw on cylinder head	M6	10 Nm
AH screws on camshaft gear	M8	Loctite 243 + 28 Nm
HH nut on automatic decompression stop	M5	Loctite 2701 + 8 Nm
AH screws on rocker arm shaft silencer cap	M5	Loctite 243 + 6 Nm
Counternut on valve adjusting screw	M6x0.75	11 Nm
HH nut on primary pinion	M16x1	Loctite 2701 + 110 Nm
HH nut on idler shaft gear	M16x1	Loctite 2701 + 110 Nm
HH nut on clutch drive	M18x1.5	Loctite 243 + 120 Nm
HH collar screws on clutch springs	M6	Loctite 243 + 8 Nm
AH screw shift on shift roller lock	M6	Loctite 243 + 10 Nm
HH collar screw on locking lever	M6	Loctite 243 + 10 Nm
HH collar screw on shift roller bearing	M6	Loctite 243 + 10 Nm
HH collar screws on chain tensioner	M6	10 Nm
HH screw chain tensioning rail	M5	Loctite 243 + 6 Nm
HH screw on chain guide rail	M6	Loctite 243 + 6 Nm
HH collar screws on stator FE/FS models	M6	Loctite 243 + 10 Nm
HH collar screws on stator FC models	M5	Loctite 243 + 6 Nm
HH collar screws on pulse generator	M5	Loctite 243 + 6 Nm
HH collar nut on rotor	M12x1	60 Nm
HH collar screw on starter cap, FC models only	M6	10 Nm
HH screw on kickstarter	M6	Loctite 243 + 10 Nm
Phillips screws on kickstarter release plate	M5	Loctite 243 + 6 Nm
HH collar screw on shift lever	M6	10 Nm
Spark plug	M12x1.25	20 Nm
Plug on engine blocking bore	M8	20 Nm
Diaphragm valve	M4	Loctite 243 + 1.5 Nm

TECHNICAL DATA - ENGINE

MOUNTING CLEARANCES, WEAR LIMITS		
Crankshaft	Axial clearance 450	0.25 - 0.35 mm
	Axial clearance 501, 550	0.45 - 0.55 mm
	Axial clearance 650	0.55 - 0.65 mm
	Lateral runout	max 0.12 mm
Conrod bearings	Radial clearance	max. 0.05 mm
	Axial clearance	max. 1.00 mm
Cylinder liner 450, 550, 650	Bore diameter size I	100.000 - 100.012 mm
	Bore diameter size II	100.013 - 100.025 mm
Cylinder liner 501	Bore diameter size I	95.000 - 95.012 mm
	Bore diameter size II	95.013 - 95.025 mm
Piston 450, 550, 650 uncoated	Mounting clearance	0.072 - 0.097 mm
	Wear limit	0.12 mm
Piston 450, 550, 650 coated	Mounting clearance	0.042 - 0.087 mm
	Wear limit	0.12 mm
Piston 501	Mounting clearance size I	0.040 - 0.080 mm
	Mounting clearance size II	0.044 - 0.085 mm
	Wear limit	0.12 mm
Piston ring end gap	Compression ring	max. 0.80 mm
	Oil scraper ring	max. 1.00 mm
	Axial clearance in the ring groove	max. 0.15 mm
Valves	Width of sealing seat, intake	max. 1.50 mm
	Width of sealing seat, exhaust	max. 2.00 mm
	Valve shaft runout	max. 0.05 mm
	Diameter of valve guide	max. 6.2 mm
Valve springs (Conical)	Minimum length	38.30 mm
Valve springs 450 FC/FS-C from modelyear 2005	Minimum length of inner spring	30.20 mm
	Minimum length of outer spring	32.40 mm
Oil pump	Outer rotor housing clearance	max. 0.20 mm
	Outer/inner rotor clearance	max. 0.20 mm
	Axial clearance	0.15 mm
Clutch	Length of clutch springs	min. 41.5 mm (new 43 mm)
	Minimum lining thickness	min. 1.9 mm
Transmission shafts	runout	0.06 mm
Rocker arm	Axial clearance	min. 0.05 - 0.10 mm

TECHNICAL SPECIFICATIONS - CHASSIS 2005

	FC 450/4, 550/4	FE 450/501/550/650E/6	FS 450E/6, 650E/6
Frame	tubular chrome-molybdenum-steel frame, powder-coated		
Fork	WP Up Side Down 4860 MXMA		
Spring travel, front/rear	300/320 mm	295/320 mm	275/288 mm
Rear suspension	WP Progressive Damping System shock absorber, aluminum rear swinging fork		
Front brake	Disk brake, perforated Ø 260 mm brake disk, floating brake caliper		Ø 310 mm radial brake caliper
Brake disk front	minimum thickness 2.5 mm		minimum thickness 5.0 mm
Rear brake	Disk brake, perforated Ø 220 mm brake disk, floating brake caliper		
Brake disk rear	minimum thickness 3.5 mm		
Front tire	80/100 - 21"	90/90 - 21"	120/60 - 17"
Air pressure, off road	1.0 bar	1.0 bar	-
Air pressure, on road/alone	-	1.5 bar	1.5 bar
Rear tire	110/100 - 19"	140/80 - 18"	150/60 - 17"
Air pressure, off road	1.0 bar	1.0 bar	-
Air pressure, on road/alone	-	2.0 bar	2.0 bar
Fuel tank capacity	9 Liter		
Gear ratio - rear wheel	14:48	16:40	16:38
Chain	X-Ring 520		
Available rear sprockets	38Z, 40Z, 42Z, 45Z, 48Z, 50Z, 52Z		
Lighting	Headlight Parking light Brake light Turn signal	HS1 12V 35/35W 12V 5W (Socket W2, 1x9.5d) 12V 21/5W (Socket BaY15d) 12V 10W (Socket Ba15s)	
Battery	maintenance-free battery 12V 7Ah		
Steering head angle	63.5°	63°	63.5°
Wheel base	1481 ± 10 mm	1490 ± 10 mm	1481 ± 10 mm
Seat height, unloaded	930 mm		870 mm
Ground clearance, unloaded	380 mm		320 mm

STANDARD ADJUSTMENT - FORK

	FC 450/4, 550/4 WP4860MA 14.45.7A.01	FE 450/550/650e/6 WP4860MA 14.45.7A.02	FS 450e/6, 650e/6 WP4860PAMA 14.45.7A.03
Compression adjuster	22	18	20
Rebound adjuster	20	20	15
Spring	4.6 N/mm	4.2 N/mm	4.8 N/m
Spring preload	5 mm	5 mm	0 mm
Airchamber lenght	95 mm	110 mm	110 mm
Fork oil	SAE 5	SAE 5	SAE 5

STANDARD ADJUSTMENT – SHOCK ABSORBER

	FC 450/4, 550/4 WP 5018 PDS 12.45.7A.01	FE 450/550/650e/6 WP 5018 PDS 12.45.7A.02	FS 450e/6, 650e/6 WP 5018 PDS 12.45.7A.03
Compression adjuster	15 LS (low speed) 2.5 HS (high speed)	15 LS (low speed) 2 HS (high speed)	15 LS (low speed) 2 HS (high speed)
Rebound adjuster	22	22	15
Spring	80/250	80/250	88/250
Spring preload	5 mm	5 mm	11 mm

TECHNICAL SPECIFICATIONS - CHASSIS

TIGHTENING TORQUES		
Collar bolt on front wheel spindle	M24x1.5	40 Nm
Bolts on front brake caliper	M8	Loctite 243 + 25 Nm
Collar bolts of front brake pads - FS models only	M6	10 Nm
Bolts on brake disks	M6	Loctite 243 + 10 Nm
Clamp bolts on top triple clamp	M8	20 Nm
Clamp bolts on bottom triple clamp	M8	15 Nm
Clamp nut on triple clamp	M22x1	20 Nm
Clamp bolt on fork leg	M8	15 Nm
Collar nut on rear axle passage	M20x1.5	80 Nm
Hexagon nut on swing arm pivot	M16x1.5	100 Nm
Collar bolt on handlebar clamp	M8	20 Nm
AH bolt on handlebar mount	M10	Loctite 243 + 40 Nm
Shock absorber top	M12	60 Nm
Shock absorber bottom	M10	40 Nm
Rear sprocket bolts	M8	Loctite 243 + 35 Nm
Ball joint on push rod	M6	Loctite 243 + 10 Nm
Engine cradle bolts	M8	25 Nm
Side stand	M8	20 Nm
Rim lock	M8	6 Nm
Bolt on adjusting ring, spring preload, shock absorber	M6	8 Nm
Spoke nipple	M4.5 / M5	4 - 6 Nm
Other bolts on chassis	M6	10 Nm
	M8	25 Nm
	M10	45 Nm
Other collar nuts on chassis	M6	15 Nm
	M8	30 Nm
	M10	50 Nm

PERIODIC MAINTENANCE SCHEDULE

FC 450/4, FC 550/4			
A clean motorcycle can be checked more quickly which saves money!		1. service after 2 hours or 15 l fuel	after/every 10 hours or 60 l fuel
ENGINE	Change engine oil and 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	●	●
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		●
	Check headlamp setting		●
	Check function of electric systems (low high beam, brake light, indicator lamps, speedometer illumination, horn, emergency OFF switch or button)	●	●
BRAKES	Check brake fluid level, lining thickness, brake discs	●	●
	Check brake lines for damage and leaks	●	●
	Check function and smooth operation and adjust free travel of handbrake/foot brake lever	●	●
	Check tightness of brake system screws	●	●
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)	●	●
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	●	●
	Check clearance of wheel bearings	●	●

IMPORTANT RECOMMENDED MAINTENANCE WORK THAT CAN BE CARRIED OUT BY EXTRA ORDER	
	at least once a year
Complete maintenance of fork	●
Complete maintenance of shock absorber	●
Clean and grease steering head bearings and gasket elements	●
Clean and adjust carburetor	●
Replace glass fibre yarn filling of the exhaust main silencer	●
Treat electric contacts and switches with contact spray	●
Treat battery connections with contact grease	●
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 Husaberg authorised workshops is not a substitute for care and checks done by the rider.

PERIODIC MAINTENANCE SCHEDULE

FE 450,501,550,650 e/6, FS 450,650 e/6

A clean motorcycle can be checked more quickly which saves money!		1. service after 3 hours or 20 l fuel	after/every 15 hours or 100 l fuel
ENGINE	Change engine oil and 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	●	●
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		●
	Check headlamp setting		●
	Check function of electric systems (low high beam, brake light, indicator lamps, speedometer illumination, horn, emergency OFF switch or button)	●	●
BRAKES	Check brake fluid level, lining thickness, brake discs	●	●
	Check brake lines for damage and leaks	●	●
	Check function and smooth operation and adjust free travel of handbrake/foot brake lever	●	●
	Check tightness of brake system screws	●	●
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)	●	●
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	●	●
	Check clearance of wheel bearings	●	●

IMPORTANT RECOMMENDED MAINTENANCE WORK THAT CAN BE CARRIED OUT BY EXTRA ORDER

	at least once a year
Complete maintenance of fork	●
Complete maintenance of shock absorber	●
Clean and grease steering head bearings and gasket elements	●
Clean and adjust carburetor	●
Replace glass fibre yarn filling of the exhaust main silencer	●
Treat electric contacts and switches with contact spray	●
Treat battery connections with contact grease	●
Change hydraulic clutch fluid	●
Change brake fluid	●

IF MOTORCYCLE IS USED FOR COMPETITION 15 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 Husaberg authorised workshops is not a substitute for care and checks done by the rider.

PERIODIC MAINTENANCE SCHEDULE

IMPORTANT CHECKS AND MAINTENANCE TO BE CARRIED OUT BY THE RIDER			
	Before each start	After every cleaning	For cross-country use
Check oil level	●		
Check brake fluid level	●		
Check brake pads for wear	●		
Check lights for function	●		
Check horn for function	●		
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		●	
Treat ignition and steering locks and light switches with contact spray		●	
Check tightness of screws, nuts and hose clamps regularly			●

RECOMMENDED INSPECTION OF THE HUSABERG - ENGINES USED FOR HOBBY-ENDURO COMPETITIONS BY YOUR HUSABERG WORKSHOP (ADDITIONAL ORDER FOR THE HUSABERG WORKSHOP)							
a 100 liter fuel consumption is equivalent to approx. 15 operating hours	30 hours 200 liter	60 hours 400 liter	90 hours 600 liter	120 hours 800 liter	180 hours 1200 liter	240 hours 1600 liter	270 hours 1800 liter
Check the clutch disks for wear	●	●	●	●	●	●	●
Check the length of the clutch springs		●	●	●	●	●	●
Check the cylinder and piston for wear			●		●		●
Check the groove on the piston pin retainer for wear (visual check)			●		●		●
Check the camshaft for wear (visual check)			●		●		●
Check the camshaft bearings			●		●		●
Check the length of the valve springs			●		●		●
Check the spring cap for wear			●		●		●
Check the eccentricity of the valve disk			●		●		●
Check the valve guides for wear			●		●		●
Check the radial clearance of the rocker arm rollers			●		●		●
Check the elongation of the timing chain			●		●		●
Check the chain tensioner tooting for damage (visual check)		●	●	●	●	●	●
Check the eccentricity of the crankshaft journal		●		●		●	
Replace the conrod bearings		●		●		●	
Check piston pin bearing		●		●		●	
Replace the balancer shaft bearings		●		●		●	
Replace the crankshaft main bearings		●		●		●	
Check the entire transmission including the roller and bearings for wear		●		●		●	

PERIODIC MAINTENANCE SCHEDULE

RECOMMENDED INSPECTION OF THE HUSABERG - ENGINES USED FOR ENDURO COMPETITIONS BY YOUR HUSABERG WORKSHOP (ADDITIONAL ORDER FOR THE HUSABERG WORKSHOP)							
a 100 liter fuel consumption is equivalent to approx. 15 operating hours	15 hours 100 liter	30 hours 200 liter	45 hours 300 liter	60 hours 400 liter	90 hours 600 liter	120 hours 800 liter	135 hours 900 liter
Check the clutch disks for wear	•	•	•	•	•	•	•
Check the length of the clutch springs		•	•	•	•	•	•
Check the cylinder and piston for wear			•		•		•
Check the groove on the piston pin retainer for wear (visual check)			•		•		•
Check the camshaft for wear (visual check)			•		•		•
Check the camshaft bearings			•		•		•
Check the length of the valve springs			•		•		•
Check the spring cap for wear			•		•		•
Check the eccentricity of the valve disk			•		•		•
Check the valve guides for wear			•		•		•
Check the radial clearance of the rocker arm rollers			•		•		•
Check the elongation of the timing chain			•		•		•
Check the chain tensioner tooting for damage (visual check)		•	•	•	•	•	•
Check the eccentricity of the crankshaft journal			•		•		•
Replace the conrod bearings			•		•		•
Check piston pin bearing			•		•		•
Replace the balancer shaft bearings			•		•		•
Replace the crankshaft main bearings			•		•		•
Check the entire transmission including the roller and bearings for wear			•		•		•

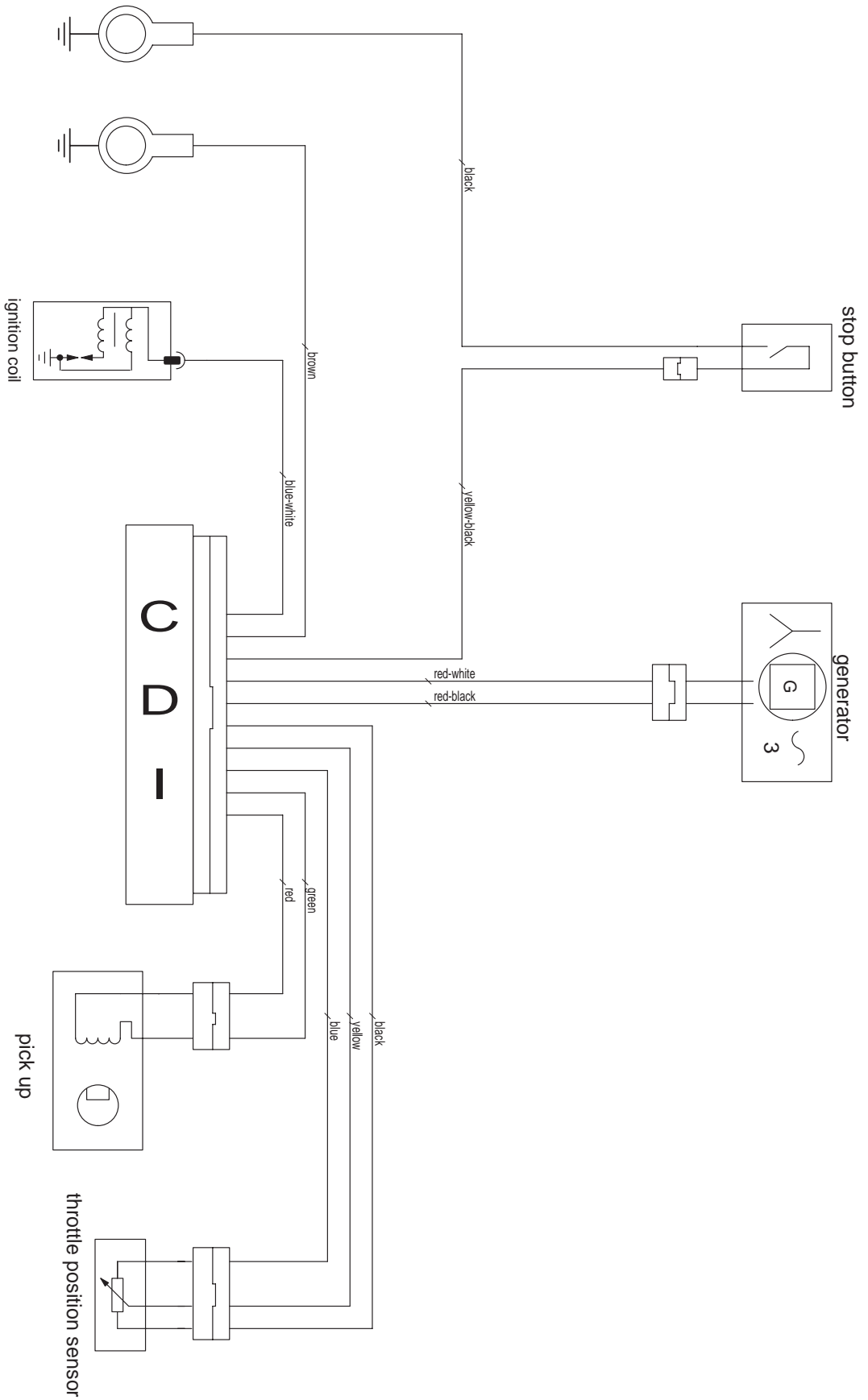
WIRING DIAGRAMS 2004/2005



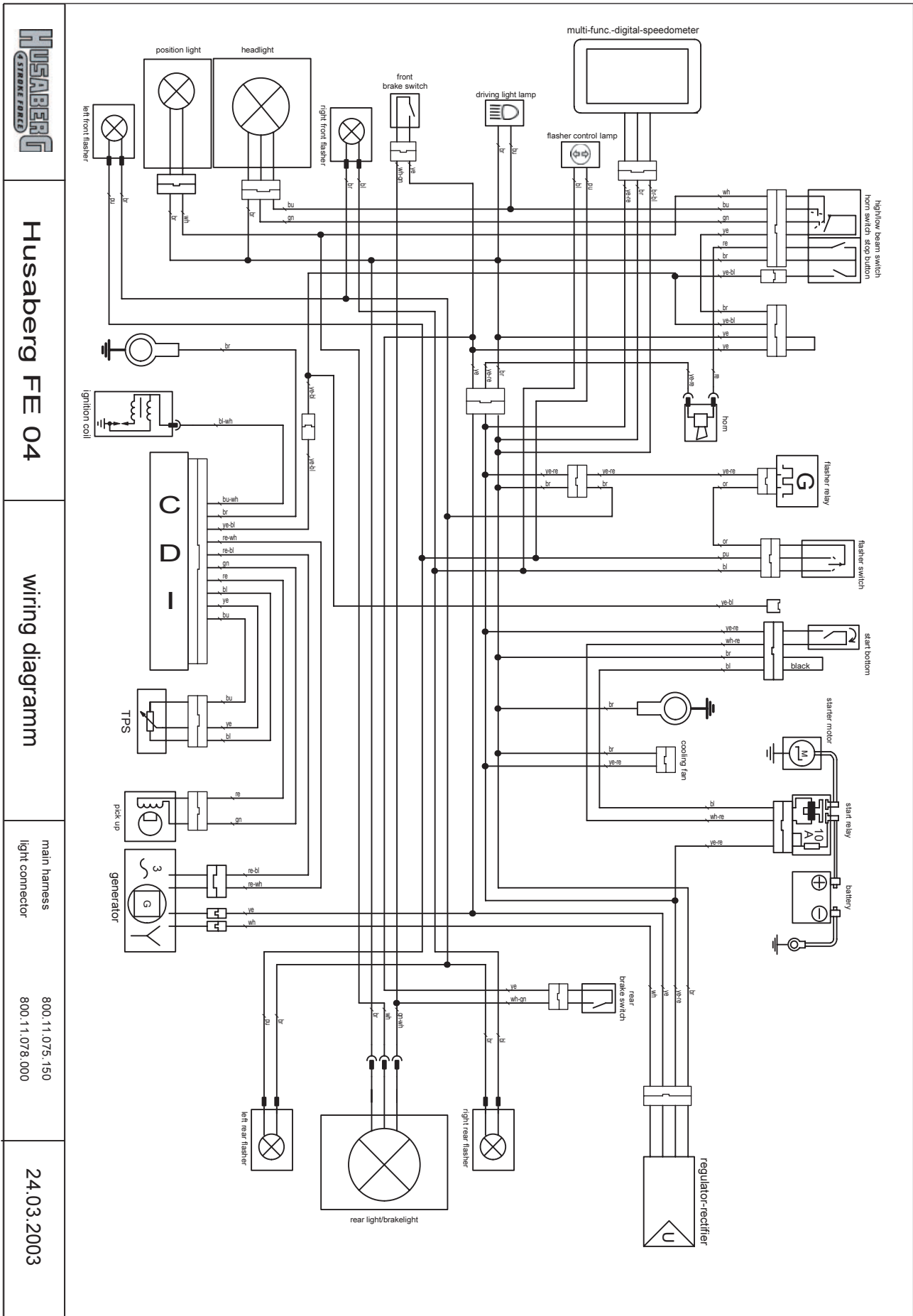
Husaberg FC 04-05

800.11.075.300

10.03.2004



WIRING DIAGRAMS 2004



Husaberg FE 04

wiring diagramm

main harness
light connector


800.11.075.150
800.11.078.000

24.03.2003







WIRING DIAGRAMS 2004

horn switch

cable color	re	br
HORN 	●	●
OFF		



light switch
high/low beam switch

cable color	bu	ye	gn	wh
LIGHT OFF				
P.LIGHT 		●	●	●
LO 		●	●	
HI 	●		●	
P.LIGHT 		●	●	●


brake switch

cable harness	gn-wh	ye
cable switch	bl	bl
pushed	●	●
unpushed		

flasher switch

cable harness	or	pu	bl	gr	br
cable switch	gn-br	bu-re	bu-bl	pi	br-pi
TURN L 	●	●			
TURN R 	●	●			
OFF					

start switch

cable switch	re-wh	ye-re
START 	●	●
unpushed		

WIRING DIAGRAMS 2004



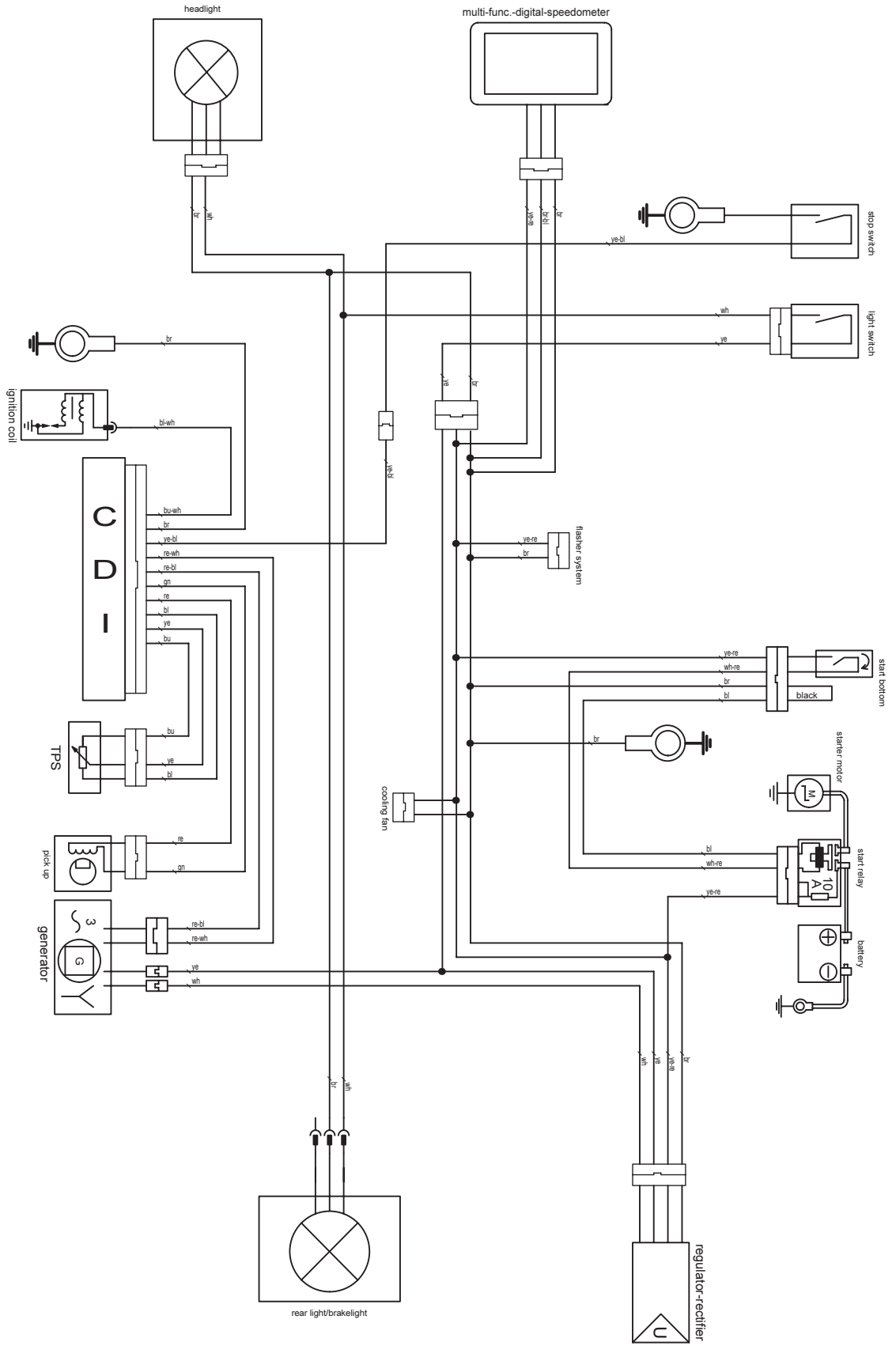
Husaberg FE USA 04

wiring diagramm

main harness



800.11.075.000

24.03.2003



WIRING DIAGRAMS 2004

start switch

cable switch	re- wh	ye- re
START 		
unpushed		

WIRING DIAGRAMS 2004



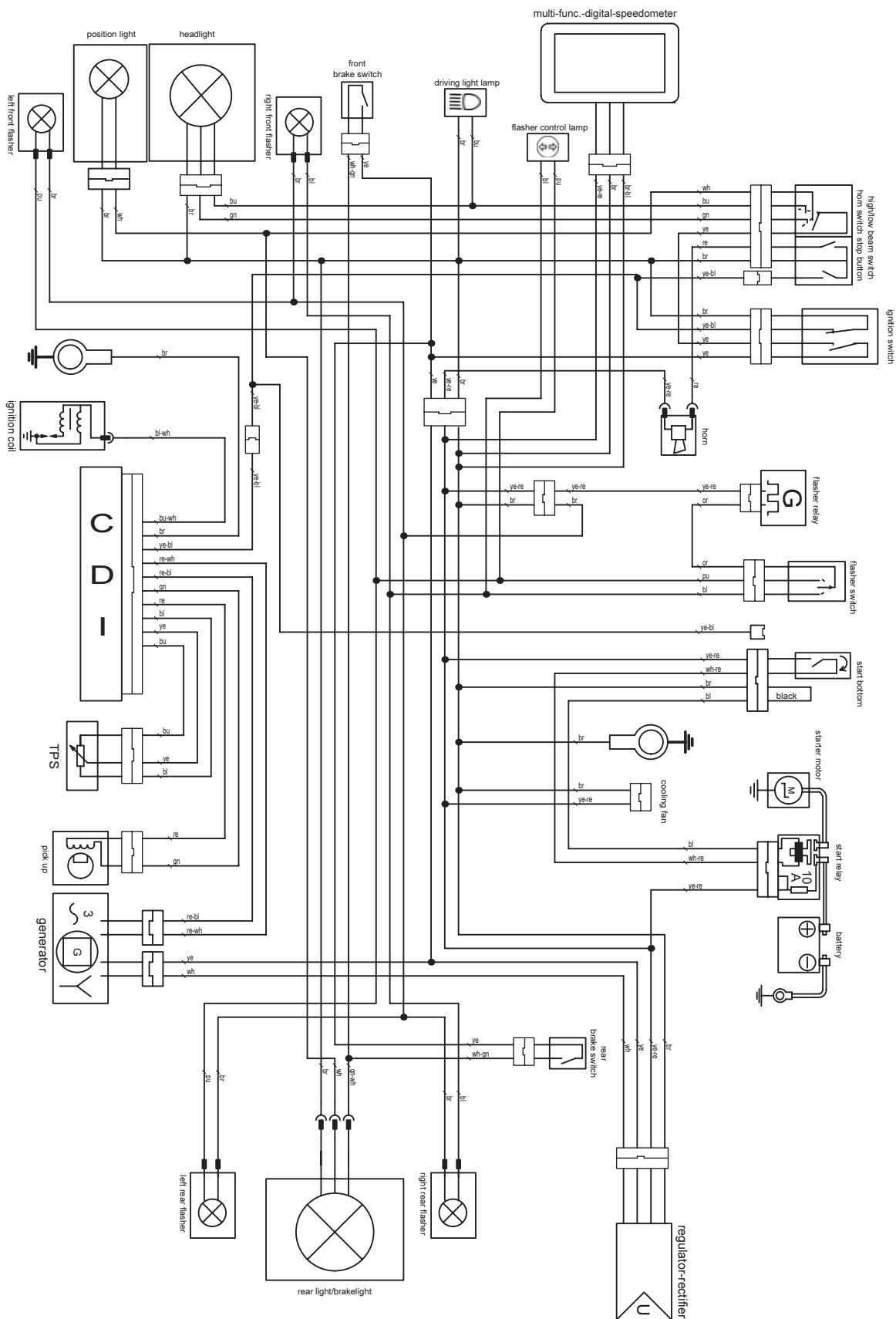
Husaberg FS 04

wiring diagram

main harness
ignition switch harness


800.11.075.150
800.11.077.000

24.03.2003







WIRING DIAGRAMS 2004

horn switch

cable color	re	br
HORN 	●	●
OFF		



light switch
high/low beam switch

cable color	bu	ye	gn	wh
LIGHT OFF				
P.LIGHT- 		●	●	
LO 		●	●	
HI 	●		●	
P.LIGHT- 		●	●	


brake switch

cable harness	gn-wh	ye
cable switch	bl	bl
pushed	●	●
unpushed		


flasher switch

cable harness	or	pu	bl	gr	br
cable switch	gn-br	bu-re	bu-bl	pi	br-pi
TURN L 	●	●			
TURN R 	●	●	●		
OFF					

start switch

cable switch	re-wh	ye-re
START 	●	●
unpushed		

ignition switch

	br	bl-ye	ye	ye
ON 			●	●
OFF	●	●		
LOCKED				

WIRING DIAGRAMS 2005

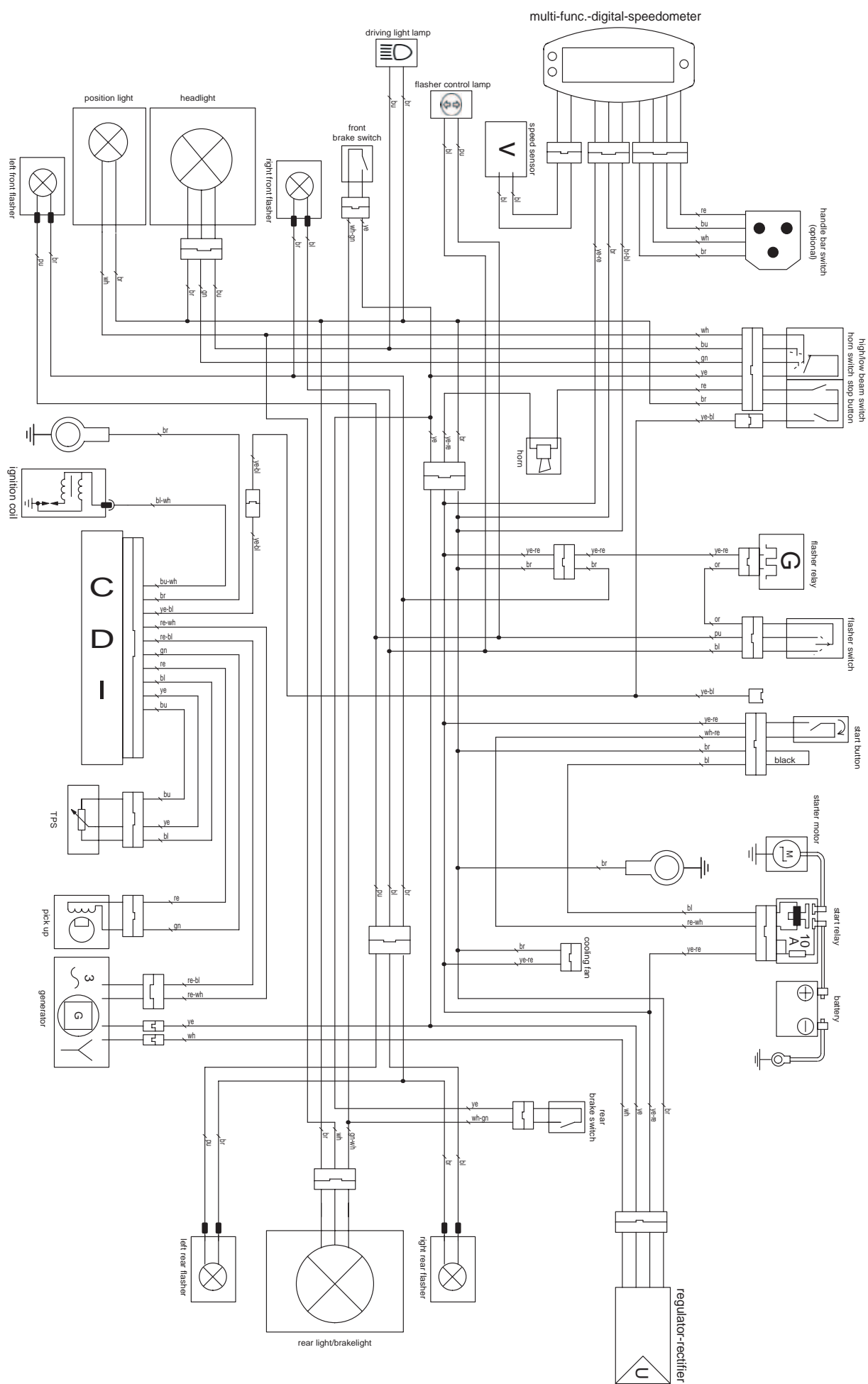


Husaberg FE/FS 2005

wiring diagram


main harness - 800.11.075.500

11.03.2004







WIRING DIAGRAMS 2005

horn switch

cable color	re	br
HORN 	●	●
OFF		



light switch
high/low beam switch

cable color	bu	ye	gn	wh
LIGHT OFF				
P.LIGHT 		●	●	●
LO 		●	●	
HI 	●	●		
P.LIGHT 		●	●	●


brake switch

cable harness	gn-wh	ye
cable switch	bl	bl
pushed	●	●
unpushed		

flasher switch

cable harness	or	pu	bl
TURN L 	●	●	
TURN R 	●	●	●
OFF			

start switch

cable switch	re-wh	ye-re
START 	●	●
unpushed		

kill switch

cable color	ye-bl	br
pushed	●	●
unpushed		

WIRING DIAGRAMS 2005

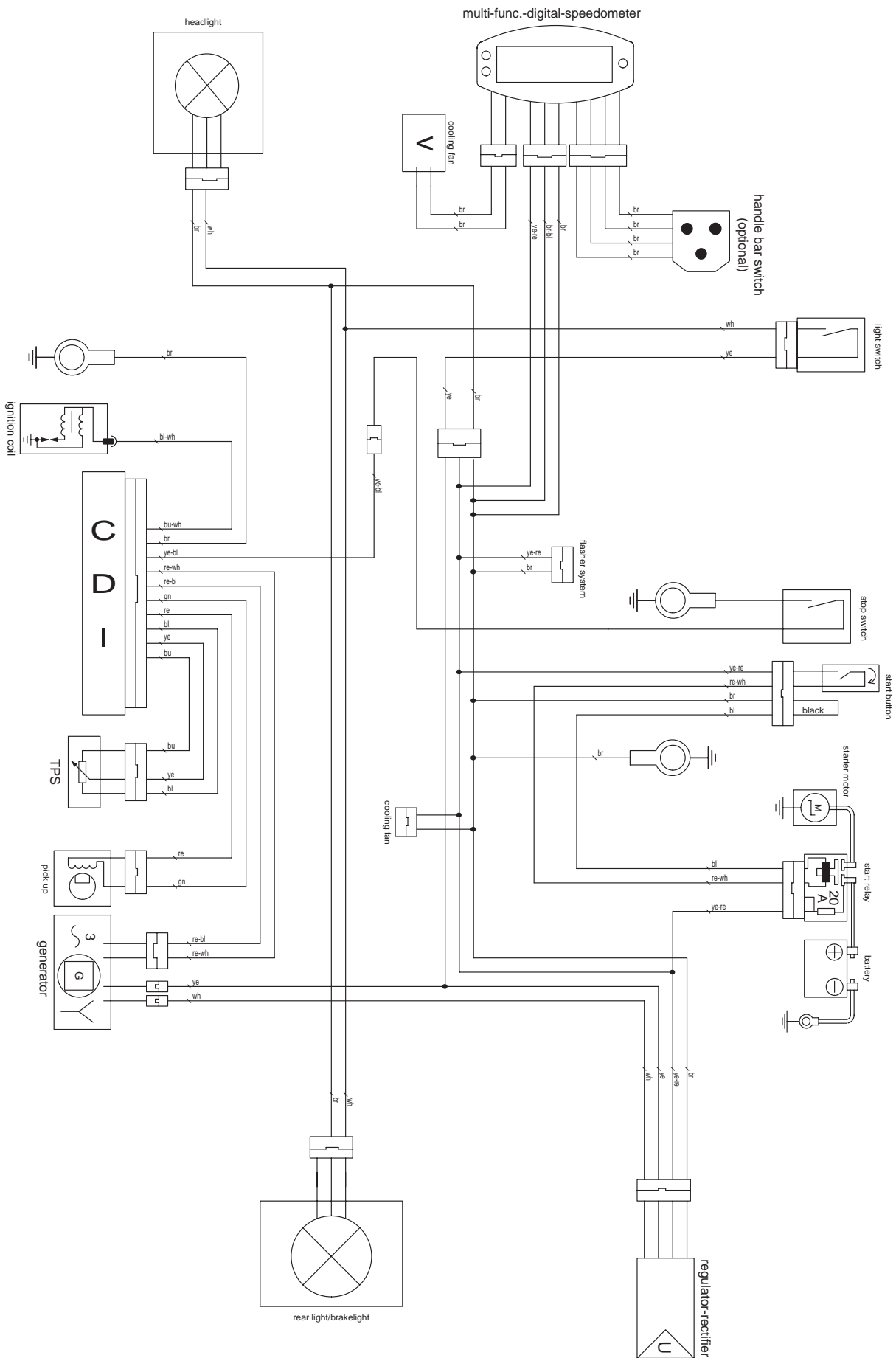


Husaberg FE/FS USA 05

wiring diagram



main harness - 800.11.075.400

15.03.2004



WIRING DIAGRAMS 2005

start switch

cable switch	re- wh	ye- re
START 		
unpushed		

WIRING DIAGRAMS

Cable colours

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