

C: CLEAN, R: REPLACE, A: ADJUST, L: LUBRICATE

- (1) Check and clean and adjust or replace, if necessary, before every journey.
- (2) Check and clean, adjust or replace if necessary every 621 mi (1,000 km).
- (3) Replace at whichever of the following occurs first: 25.000 mi (40,000 Km) or 4 years.

SCHEDULED MAINTENANCE TABLE USA

mi x 1.000 (km x 1.000)	0.6 (1)	6.2 (10)	12.4 (20)	18.6 (30)	24.9 (40)
Rear shock absorber (bearings - linkage mechanisms)			I		I
Motorcycle set up	I	I	I	I	I
Spark plug			R		R
Drive chain (2)	I - L	I - L	I - L	I - L	I - L
Clutch cable	L	L	L	L	L
Front sprocket - rear sprocket - Chain slider		I	I	I	I
Steering bearings and steering play	I	I	I	I	I
Wheel bearings - Wheels	I	I	I	I	I
Diagnosis by tool	I	I	I	I	I
Brake discs - Brake pads wear (1)	I	I	I	I	I
Air filter		I	R	I	R
Engine oil filter	R	R	R	R	R
Raked			I		I
Vehicle general operation	I	I	I	I	I
Valve clearance			A		A
Cooling system		I	I	I	I
Brake systems	I	I	I	I	I
Safety switches (stand, stop, clutch, extra negative stroke, gas control)	I	I	I	I	I
Brake Fluid	I	I	I	I	I
Coolant	I	I	I	I	I
Fork oil (3)					R
Engine oil	R	R	R	R	R
Headlight aiming		I	I	I	I
Fork oil seals		I		I	
Tyres - pressure / wear (1)	I	I	I	I	I
Nut/bolt tightness	I	I	I	I	I
Labour time (minutes)	90	110	190	110	280

NOTE

AT EACH SCHEDULED MAINTENANCE MUST BE VERIFIED WITH THE DIAGNOSTIC TOOL IF THERE ARE ERRORS AND THE IF THE PARAMETERS ARE CORRECT. ENSURE THAT THE VEHICLE CALIBRATION IS UP TO DATE AFTER UPDATING THE DIAGNOSTIC TOOL.

SCHEDULED MAINTENANCE TABLE ONLY FOR THE ASIA/PACIFIC MARKET

I: CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY

C: CLEAN, R: REPLACE, A: ADJUST, L: LUBRICATE

- (1) Check and clean and adjust or replace, if necessary, before every journey.
- (2) Check and clean, adjust or replace if necessary every 1,000 km (621.37 mi).
- (3) Replace at whichever of the following occurs first: 40,000 km (24,854.85 mi) or 4 years.

SCHEDULED MAINTENANCE TABLE

Km x 1.000 or (months) maximum	1 (1)	10 (10)	20 (20)	30 (30)	40 (40)
Rear shock absorber (bearings - linkage mechanisms)			I		I
Motorcycle set up	I	I	I	I	I
Spark plug			R		R
Drive chain (2)	I - L	I - L	I - L	I - L	I - L
Clutch cable	L	L	L	L	L
Front sprocket - rear sprocket - Chain slider		I	I	I	I

Km x 1.000 or (months) maximum	1 (1)	10 (10)	20 (20)	30 (30)	40 (40)
Steering bearings and steering play	I	I	I	I	I
Wheel bearings - Wheels	I	I	I	I	I
Diagnosis by tool	I	I	I	I	I
Brake discs - Brake pads wear (1)	I	I	I	I	I
Air filter		I	R	I	R
Engine oil filter	R	R	R	R	R
Raked			I		I
Vehicle general operation	I	I	I	I	I
Valve clearance			A		A
Cooling system		I	I	I	I
Brake systems	I	I	I	I	I
Safety switches (stand, stop, clutch, extra negative stroke, gas control)	I	I	I	I	I
Brake Fluid	I	I	I	I	I
Coolant	I	I	I	I	I
Fork oil (3)					R
Engine oil	R	R	R	R	R
Headlight aiming		I	I	I	I
Fork oil seals		I		I	
Tyres - pressure / wear (1)	I	I	I	I	I
Nut/bolt tightness	I	I	I	I	I
Labour time (minutes)	90	110	190	110	280

NOTE

AT EACH SCHEDULED MAINTENANCE MUST BE VERIFIED WITH THE DIAGNOSTIC TOOL IF THERE ARE ERRORS AND THE IF THE PARAMETERS ARE CORRECT. ENSURE THAT THE VEHICLE CALIBRATION IS UP TO DATE AFTER UPDATING THE DIAGNOSTIC TOOL.

Recommended products

Piaggio Group recommends the use of products from its Castrol official partner for the scheduled maintenance of its vehicles.

Only use lubricants and fluids which meet or exceed the performance characteristics specified.

This also applies when topping up only.



TABLE OF RECOMMENDED PRODUCTS

Product	Description	Specifications
Engine oil 10W -50	Synthetic-based lubricant for high performance four-stroke engines.	SAE 10W 50; API SL; JASO MA2
Lithium-based grease	Lithium-calcium soap based grease	colour - black, contains EP (Extreme Pressure) additives, excellent water-repellent properties
Anti-freeze liquid, ready to use, colour red	Ethylene glycol antifreeze liquid with organic inhibition additives. Red, ready to use.	ASTM D 3306 - ASTM D 4656 - ASTM D 4985 - CUNA NC 956-16
DOT 4 brake fluid	Synthetic brake fluid.	SAE J 1703; FMVSS 116; ISO 4925; CUNA NC 956 DOT4
Fork oil 7.5W	Fork oil.	SAE 7.5W

Spark plug

To remove the spark plugs, the fuel tank and the complete filter box must first be removed. Then proceed as described:

- After releasing the coil connectors from the supports, disconnect them.



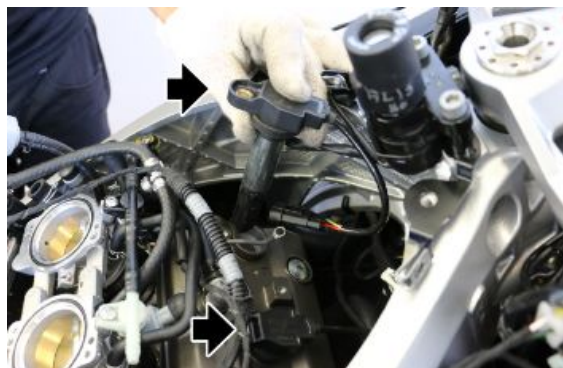
- Disconnect the corrugated pipe from the cable glands and unscrew the screw that secures the earth cable and the canister support to the head cover.



- Remove the canister complete with support.



- After removing the screws holding the coils, disconnect them from the spark plugs and remove them.



- Using a special spark plug wrench, unscrew and remove them.



- Check the efficiency and check the electrode gap. If they are not within the parameters, replace them.

Engine oil

Check

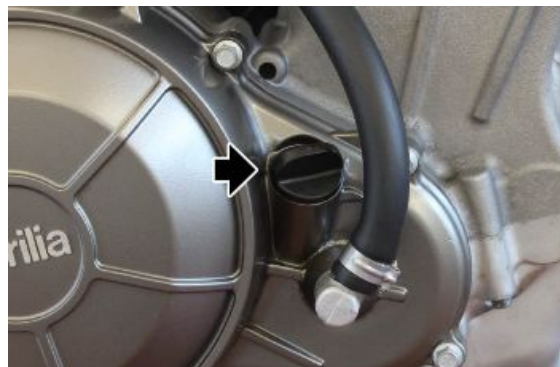


THE OIL LEVEL MUST BE CHECKED WHEN THE ENGINE IS WARM.

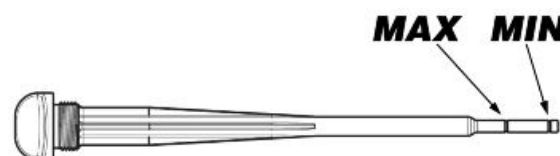
CAUTION

DO NOT LET THE ENGINE IDLE WITH THE VEHICLE AT A STANDSTILL TO WARM UP THE ENGINE AND OBTAIN THE OPERATING TEMPERATURE OF ENGINE OIL. PREFERABLY CHECK THE OIL AFTER A JOURNEY OF AFTER TRAVELLING APPROXIMATELY 15 Km (10 miles) IN EXTRA-URBAN CONDITIONS (ENOUGH TO WARM UP THE ENGINE OIL TO OPERATING TEMPERATURE).

- Shut off the engine and wait a few seconds
- Keep the vehicle upright with both wheels on the earth
- Ensure that you are on a flat surface
- Unscrew the engine oil level dipstick (1)



- Clean the engine oil level dipstick (1) and put it back in without screwing it in
- Remove it again and check the engine oil level
- The level is correct if it reaches the "MAX" level approximately. Otherwise top off the engine oil



CAUTION

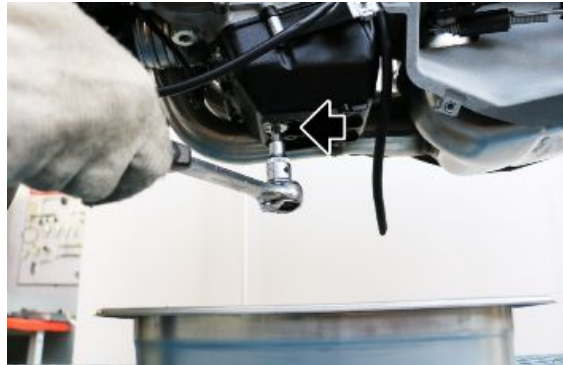
THE OIL LEVEL MUST NEVER DROP BELOW THE MINIMUM MARKING OR EXCEED THE MAXIMUM MARKING; AN OIL LEVEL NOT WITHIN THE MINIMUM AND MAXIMUM MARKINGS MAY CAUSE SEVERE ENGINE DAMAGE

Replacement

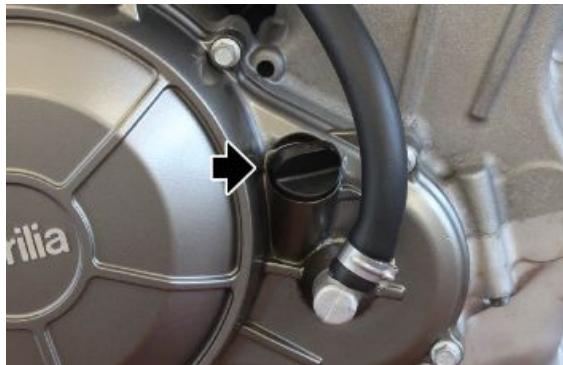
NOTE

HOT OIL IS MORE FLUID AND WILL DRAIN OUT MORE EASILY AND COMPLETELY.

- Place a container with suitable capacity under the drainage plug.
- Unscrew and remove the drainage plug.



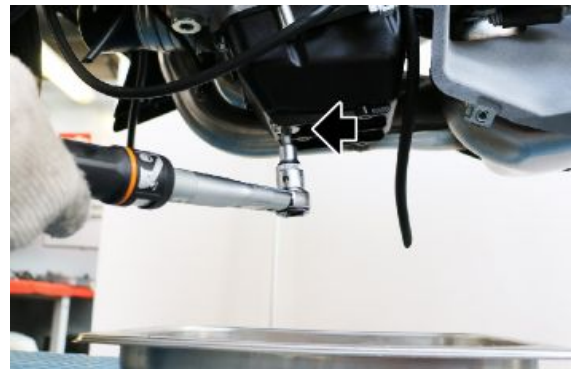
- Unscrew and remove the filler cap.



- Drain the oil into the container; allow several minutes for oil to drain out completely.
- Check and, if necessary, replace the drainage plug sealing washers.
- Remove the oil filter.
- Spread a thin layer of oil on the sealing ring of the new engine oil filter.
- Insert and screw the new engine oil filter in the seat, filling the filter to 1/3 of its capacity with engine oil before fitting.



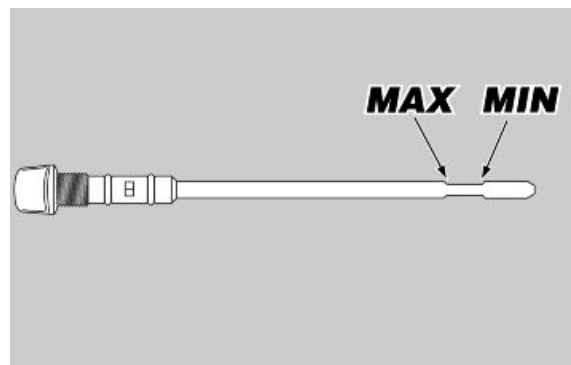
- Screw and tighten the drainage plug.
- Add 2300 cc (140.35 cu in) of new engine oil of the specified type.
- Screw on the filler cap.



- Warm up the engine up by running it for a few minutes, then switch it off. After thirty seconds, check the level with a oil level dipstick. Top up if necessary.

CAUTION

THE OIL LEVEL MUST NEVER DROP BELOW THE MINIMUM MARKING OR EXCEED THE MAXIMUM MARKING; AN OIL LEVEL NOT WITHIN THE MINIMUM AND MAXIMUM MARKINGS MAY CAUSE SEVERE ENGINE DAMAGE



Engine oil filter

Replace the engine oil filter each time you change the engine oil.

- Drain the engine oil completely.
- Unscrew and remove the engine oil filter from its seat.

NOTE

NEVER REUSE AN OLD FILTER.



- Spread a thin layer of oil on the sealing ring of the new engine oil filter.
- Insert and screw the new engine oil filter in the seat, filling the filter to 1/3 of its capacity with engine oil before fitting.

See also

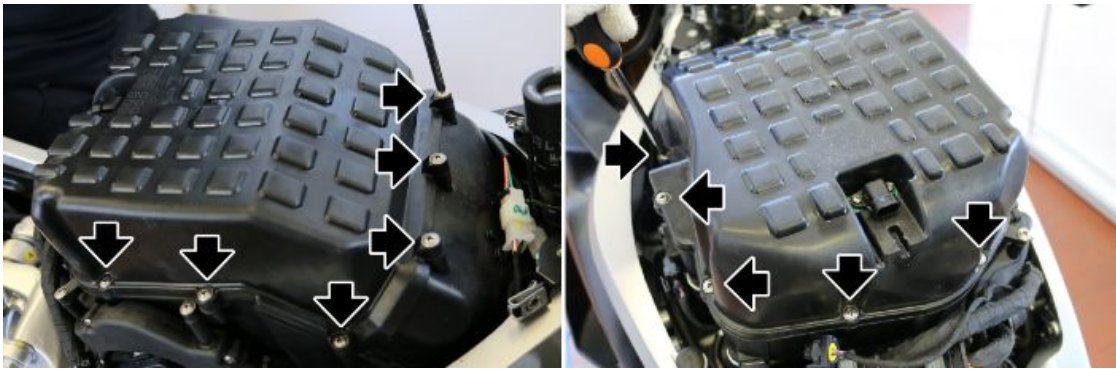
[Replacement](#)

Air filter

- Remove the fuel tank.
- Disconnect the intake air temperature sensor connector.



- Remove the eleven filter box lid fastening screws.



- Remove the filter box cover.



- Remove the filter retainer..



- Remove the filter.



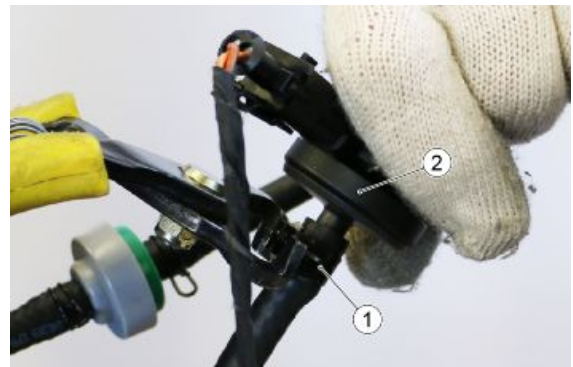
Throttle body

Throttle body removal

To remove the throttle body, the fuel tank and the complete filter box must first be removed.

Then proceed as described:

- Having removed the canister, using pliers remove the metal clamp (1) and disconnect the vacuum valve (2).



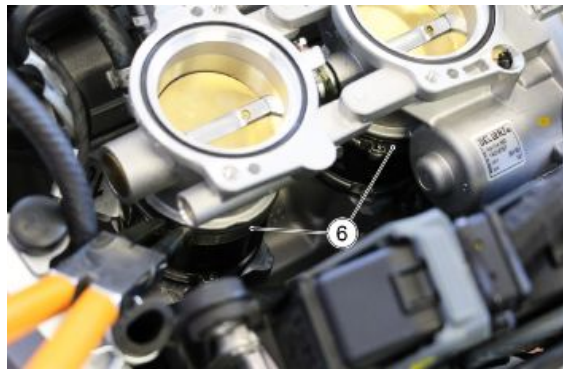
- Disconnect the two vacuum pipes (3) from the air pressure sensor (4).



- Disconnect the injector connectors (5).



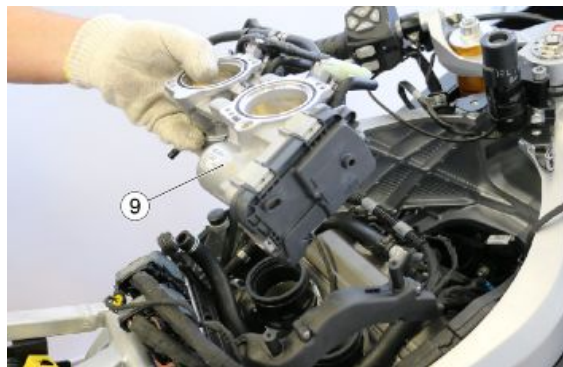
- Release the metal clamps (6) which hold the throttle body to the manifolds.



- After having removed the throttle body from the manifolds and unhooked the safety hook of the connector (7), disconnect it.



- Disconnect the fuel hose from the fitting (8).



Air filter housing

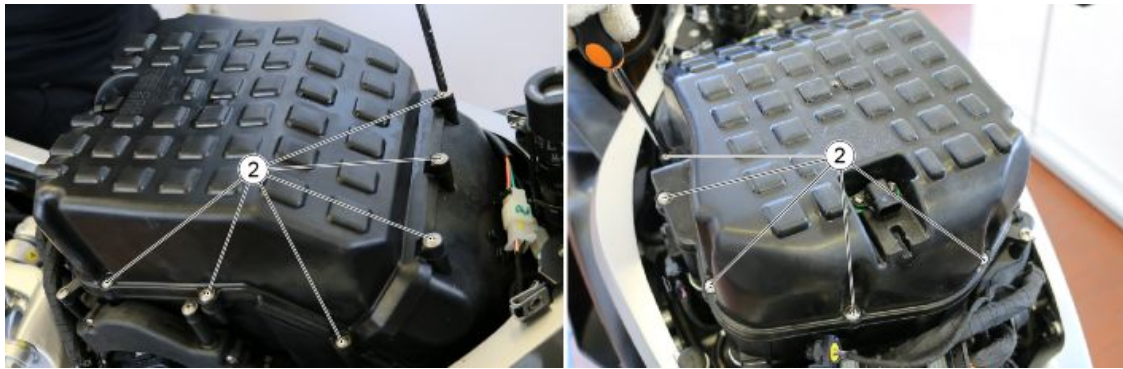
Air filter housing removal

To remove the filter housing, firstly remove the fuel tank and then proceed as described:

- Disconnect the intake air temperature sensor connector (1).



- Remove the eleven fixing screws (2) of the filter box cover.



- Remove the filter box cover (3).



- Remove the filter retainer (4).



- Remove the filter (5).



- If it needs cleaning, remove the blow-by filter (6).



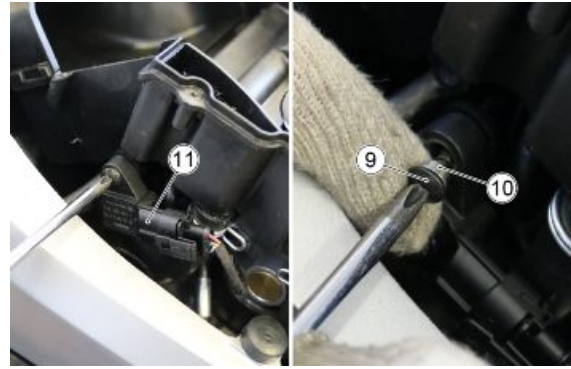
- Remove the two screws (7) securing the filter box to the cable support of the main wiring harness.



- Remove the two fixing screws (8) of the ECU support to the filter housing.



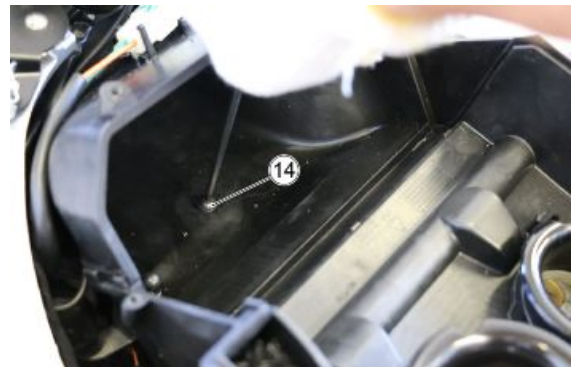
- Remove the fixing screw (9) and relative bush (10) of the sensor (11).



- After removing the two springs (12) from the breather pipes (13), disconnect them.



- Remove the central screw (14) inside the filter box which is fixed on the canister support below.



- Remove the 4 screws (15) securing the intake duct.



- Remove the 2 intake ducts (16).



- Disconnect the two connectors (17) of the ignition switch assembly from the filter box.



- Disconnect the vacuum valve (18) from the support.



- Remove the complete filter box (19).



- If necessary, it is possible to separate the upper duct from the filter box base.

Checking the ignition timing

To proceed with the engine timing check, it is necessary to first remove the fuel tank, the side fairings, the complete filter housing, the throttle body, the canister, the ignition switch assembly and clutch housing.

Then proceed as described:

COMPONENTS DISASSEMBLY

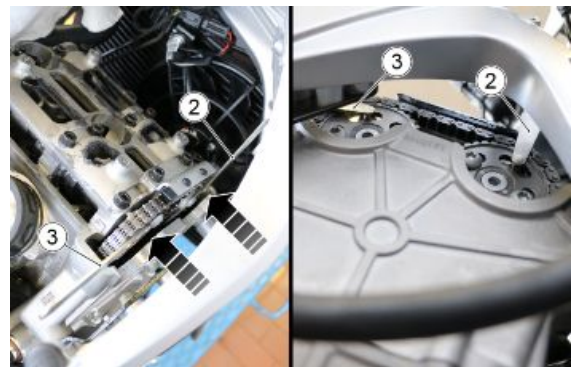
- Working from the left side of the motorcycle, having removed the inspection cap, rotate the engine anticlockwise until the top dead centre of cylinder 1 is reached.
- Rotate a further +20° to intercept the hole in the crankcase on the right side of the vehicle near the crankshaft timing gear.
- Insert the first centring pin (1).



Specific tooling

020851Y Camshaft timing setting pin

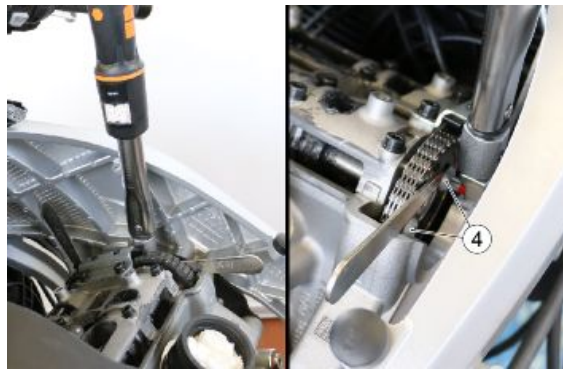
- Insert the second pin (2) through the holes in the timing gear of the exhaust camshaft.
- Insert the third pin (3) through the holes in the timing gear of the intake camshaft.
- In this way block the rotation of the engine.



Specific tooling

021043Y Camshaft timing pin (2 pieces)

- Using the special tools and a T40 torx insert, loosen the two fixing screws (4) of the intake camshaft timing gear.



Specific tooling

669N/5 (BETA) Ratchet torque wrench, rectangular attachment

736/10.10-1 (STAHLWILLE) Insert holder for torque wrench with rectangular attachment

- Complete the removal by working from the outside using a ball end torx wrench.



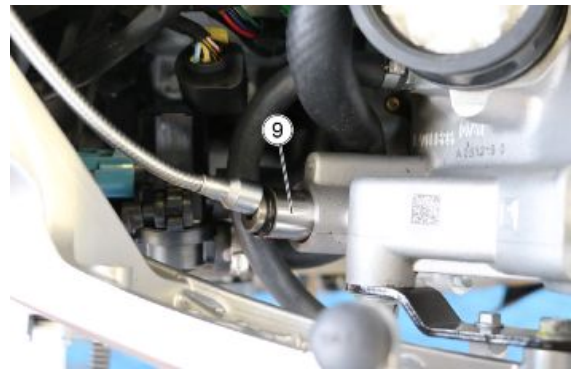
- Working on the chain tensioner, remove the plug (5) complete with copper washer (6).



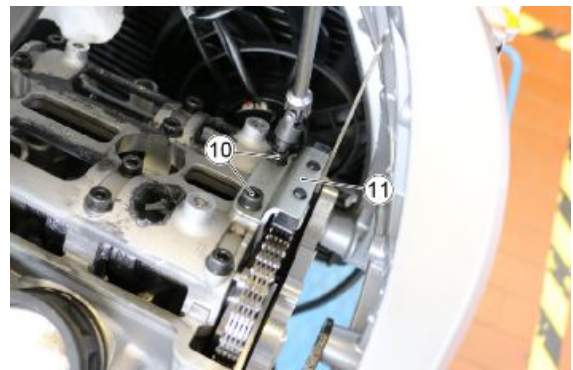
- Unscrew and remove the special screw (7) complete with metal washer (8).



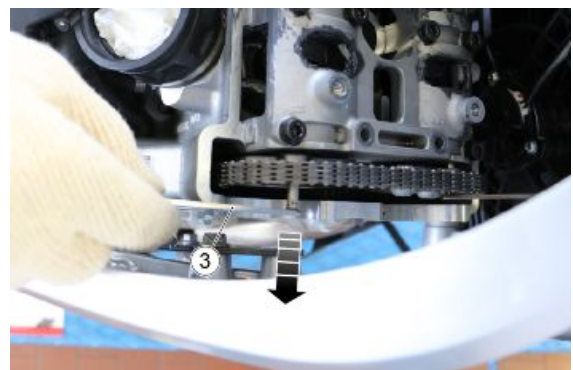
- Using a magnet, extract the chain tensioner (9).



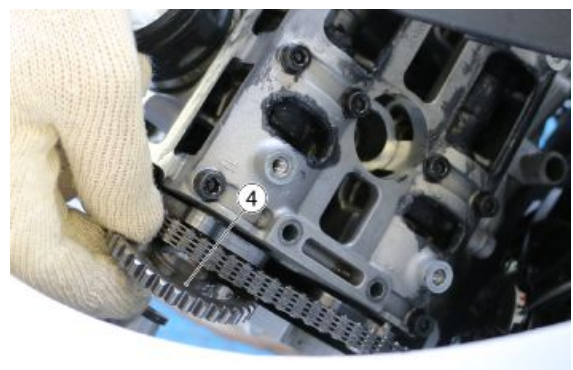
- Unscrew and remove the two screws (10) and the plate (11) complete with slider.



- Remove the third pin (3).



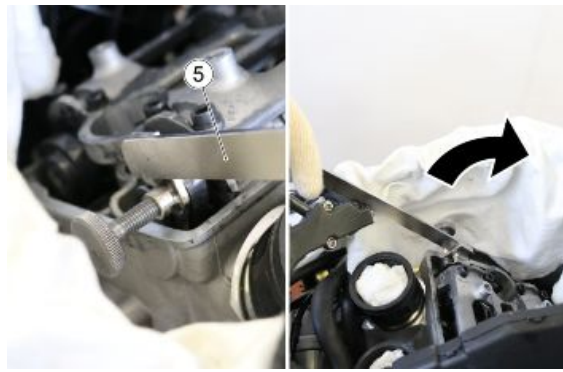
- Remove the timing gear (4) from the intake camshaft by sliding it off the chain.



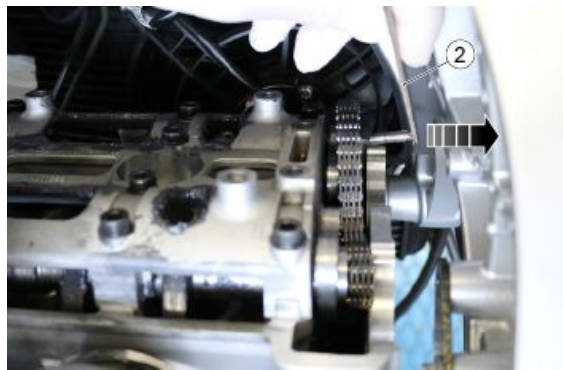
- Position the specific tool (5) on the external cam of the intake shaft as shown and rotate the intake camshaft forward to free the valves.

Specific tooling

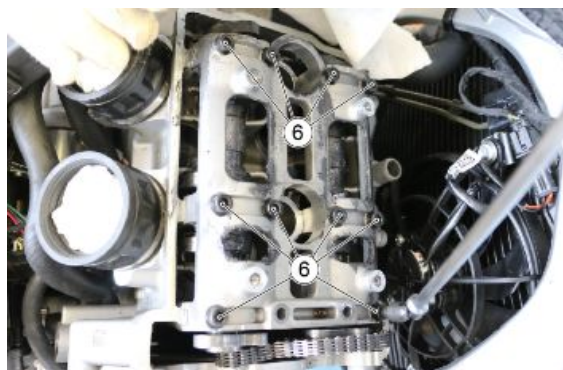
021044Y Intake camshaft disarming lever



- Remove the second pin (2).



- Completely unscrew the ten fixing screws (6) of the cam tower.



- Remove the cam tower (7) complete with screws.



- Depending on which valve needs adjustment, remove the intake camshaft (8) or the exhaust camshaft.



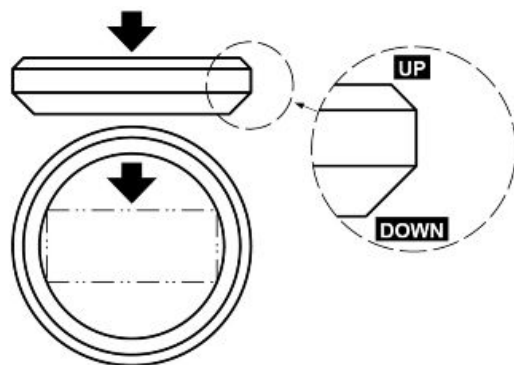
- Remove the bucket tappet (9) of the valve requiring adjustment.



- Remove the calibrated pad (10) and replace it with the one needed to obtain the correct valve clearance.

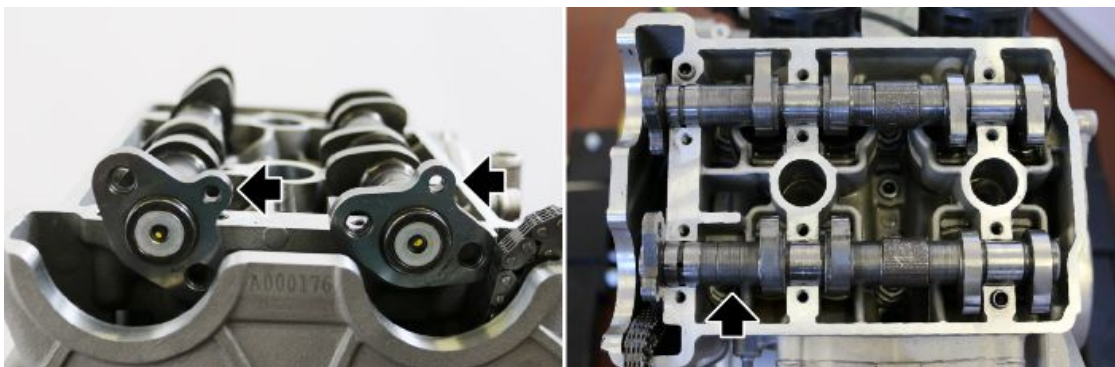
**CAUTION**

THE CALIBRATED PAD MUST BE FITTED UPWARD, OBSERVING THE ENGRAVING OF THE SHIM.

**COMPONENTS INSTALLATION**

- After lubricating the bucket tappets, the rotation seats of the camshafts and the shafts themselves, position them on the head. The exhaust camshaft has two grooves in the indicated point. (lubricate with MOLYKOTE G-RAPID PLUS).

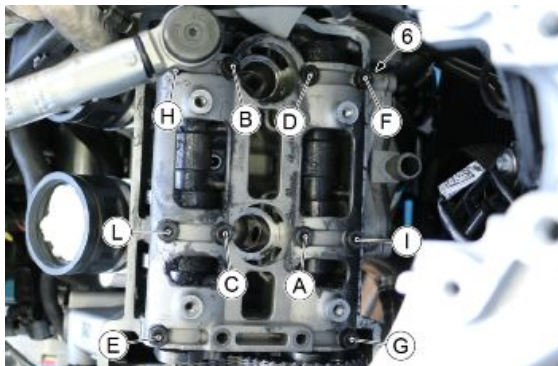
- The correct positioning is determined by the holes, for the insertion of the pins, facing upwards.



- Position the cam tower (7) with the fixing screws, with the exception of the two that will subsequently fix the upper slider.



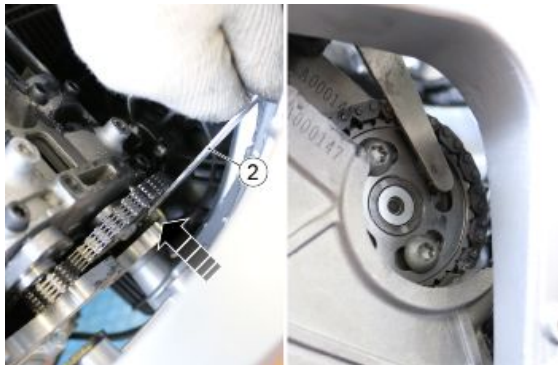
- Tighten the ten fixing screws (6) of the cam tower to the prescribed torque following the indicated sequence.



- Insert the second centring pin (2) on the exhaust camshaft at the point shown.

Specific tooling

021043Y Camshaft timing pin (2 pieces)



- Position the timing gear (4) complete with chain on the intake camshaft.



- Position the specific tool (5) on the external cam of the intake camshaft as shown and rotate the intake camshaft to intercept the insertion point of the third pin (3) on the cam tower.

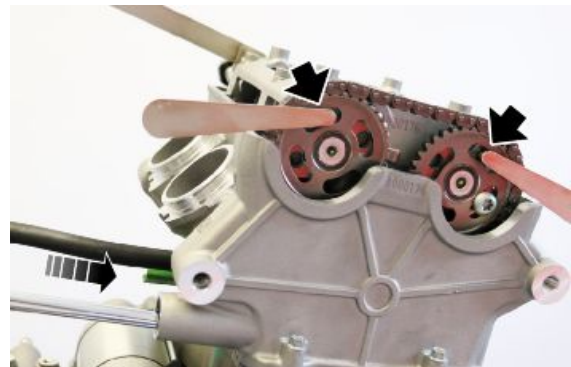


Specific tooling

021044Y Intake camshaft disarming lever

021043Y Camshaft timing pin (2 pieces)

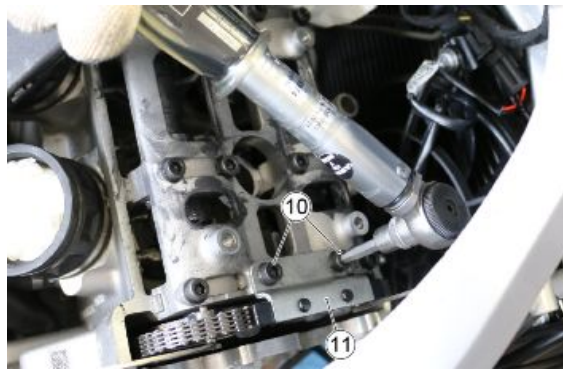
- Using a punch, simulate the tension of the transmission chain and check that the holes of the fixing screws of the timing gears are centred with respect to the slotted holes of the gears themselves.



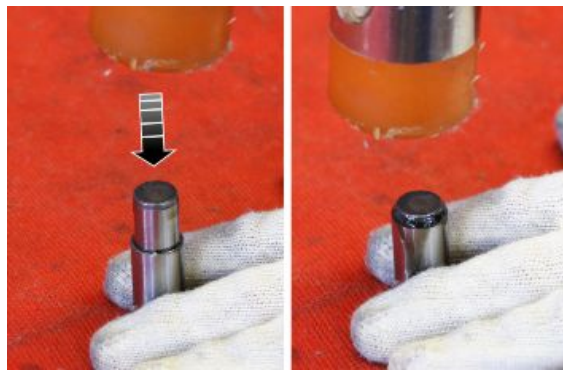
- Insert and hand tighten one screw of the timing gear.



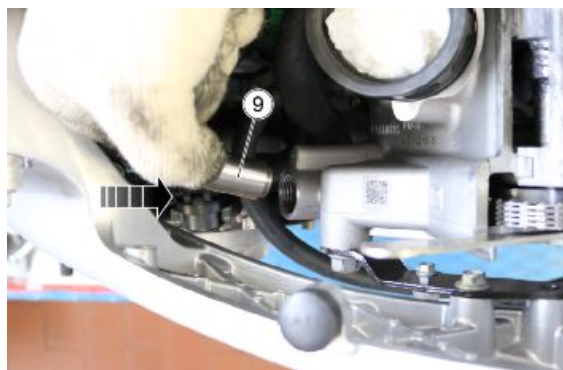
- Position the plate (11) complete with sliding block and relative screws (10).
- Tighten the two screws to the prescribed torque.



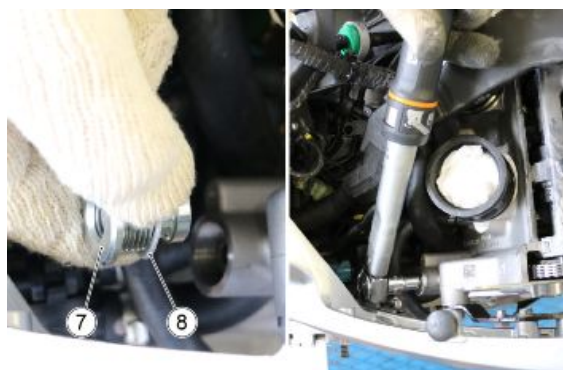
- After verifying the correct operation, use a rubber hammer to arm the chain tensioner.



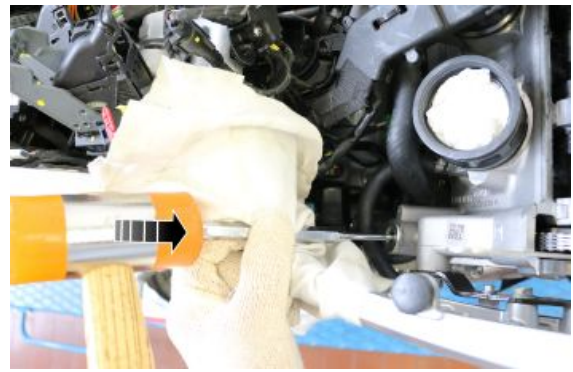
- Insert the chain tensioner (9) complete with a new O-Ring.



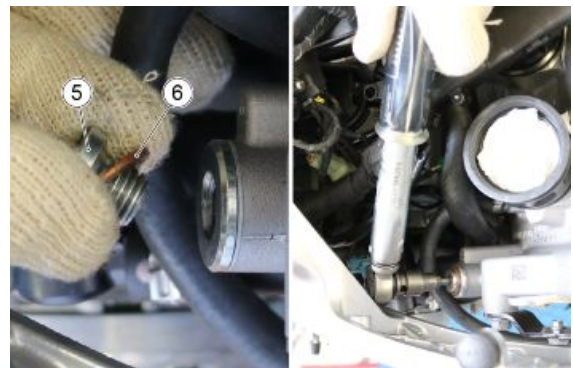
- Insert the special screw (7) complete with a new metal washer (8) and tighten it to the specified torque.



- Disarm the chain tensioner using a punch through the hole in the fitting.



- Insert the plug (5) complete with a new copper washer (6) and tighten it to the prescribed torque.



- Using the special tools and a T40 torx insert, having inserted the missing screw, tighten the two fixing screws (4) of the intake camshaft timing gear to the prescribed torque.



Specific tooling

669N/5 (BETA) Ratchet torque wrench, rectangular attachment

736/10.10-1 (STAHLWILLE) Insert holder for torque wrench with rectangular attachment

- Complete the reassembly procedure by repositioning the valve cover.

Checking the valve clearance

To proceed with the valve clearance check, it is necessary to first remove the fuel tank, the side fairings, the complete filter box, the throttle body and the canister.

Then proceed as described:

- Working from the left side of the motorcycle, having removed the inspec-



tion cap, rotate the engine clockwise until the valve to be measured is freed.

- Using a feeler gauge, measure the distance between the cam of the camshaft and the valve bucket tappet.

Characteristic

Intake valve clearance

0.10 - 0.15 mm (0.0039 - 0.0059 in)

Exhaust valve clearance

0.10 - 0.20 mm (0.0039 - 0.0078 in)

If the valve clearance is not within the tolerance range, proceed with the adjustment, referring to paragraph "timing check"

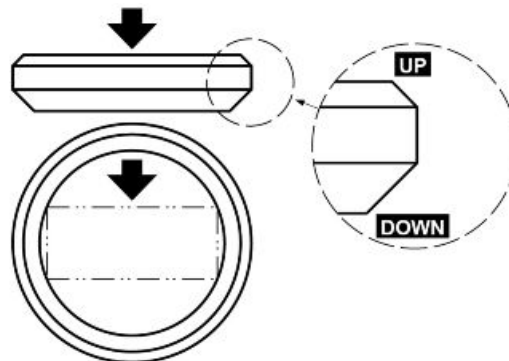
See also

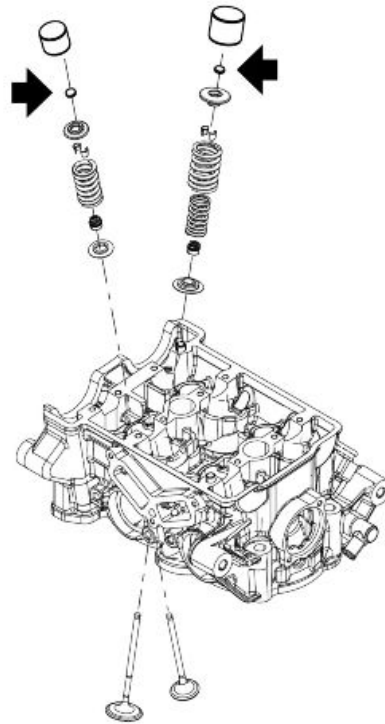
[Checking the ignition timing](#)

Calibrated pad thickness

CAUTION

THE CALIBRATED PAD MUST BE FITTED UPWARD, OBSERVING THE ENGRAVING OF THE SHIM.





Pad thickness for adjusting valve clearance correctly:

- 1.75 mm (0.0689 in)
- 1.77 mm (0.0697 in)
- 1.80 mm (0.0709 in)
- 1.82 mm (0.0716 in)
- 1.85 mm (0.0728 in)
- 1.87 mm (0.0736 in)
- 1.90 mm (0.0748 in)
- 1.92 mm (0.0756 in)
- 1.95 mm (0.0768 in)
- 1.97 mm (0.0775 in)
- 2 mm (0.0787 in)
- 2.02 mm (0.0795 in)
- 2.05 mm (0.0807 in)
- 2.07 mm (0.0815 in)
- 2.1 mm (0.0827 in)
- 2.12 mm (0.0835 in)
- 2.15 mm (0.0846 in)
- 2.17 mm (0.0854 in)
- 2.2 mm (0.0866 in)
- 2.22 mm (0.0874 in)
- 2.25 mm (0.0886 in)

2.27 mm (0.0894 in)
2.3 mm (0.0905 in)
2.32 mm (0.0913 in)
2.35 mm (0.0925 in)
2.37 mm (0.0933 in)
2.4 mm (0.0945 in)
2.42 mm (0.0953 in)
2.45 mm (0.0964 in)
2.47 mm (0.0972 in)
2.50 mm (0.0984 in)
2.52 mm (0.0992 in)
2.55 mm (0.1004 in)
2.57 mm (0.1012 in)
2.6 mm (0.1024 in)
2.62 mm (0.1031 in)
2.65 mm (0.1043 in)
2.67 mm (0.1051 in)
2.7 mm (0.1063 in)
2.72 mm (0.1071 in)
2.75 mm (0.1083 in)
2.77 mm (0.1090 in)
2.8 mm (0.1102 in)
2.82 mm (0.1110 in)
2.85 mm (0.1122 in)
2.87 mm (0.1129 in)
2.9 mm (0.1142 in)
2.92 mm (0.1150 in)
2.95 mm (0.1161 in)
2.97 mm (0.1169 in)
3 mm (0.1181 in)
3.02 mm (0.1189 in)
3.05 mm (0.1201 in)
3.07 mm (0.1209 in)
3.10 mm (0.1220 in)
3.12 mm (0.1228 in)
3.15 mm (0.1240 in)
