

MRX-SMX 125

Electric system



1. ELECTRIC SYSTEM

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1.1 CAUTIONS

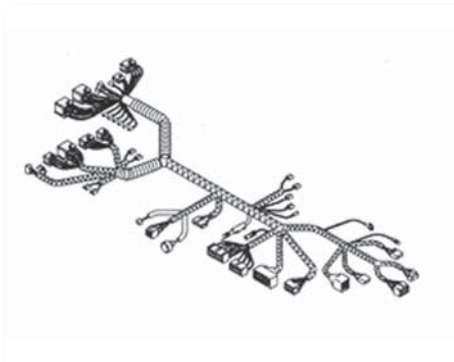
- There are some Important cautions before beginning to inspect or repair the electric system.
- Pay particular attention to the polarity of the battery.
- Always check the condition of the battery before beginning any repair.
- Charge the battery out of the vehicle to avoid possible acid leaks or failures in contact with the battery charger which could damage some electronic component.
- Do not use the battery either other connections with the engine running since you could damage some electronic components.
- Do not use different lamps to the specified ones either in the lights nor in the dashboard.
- Do not weld either operate with machines which can produce electric sparks if CDI is not disconnected otherwise it could be damaged.
- Before taking measures of electric element make sure that the part is not hot.
- All the electric connections should be clean and well tight.

1.2 GENERAL WIRING HARNES

- Check visually that the wiring is not worn and the connectors and terminals not much tight or dirty.
If so, they should be replaced.
- In the event of any fault is observed visually, the continuation with the tester should be checked between wires of the same colour and section.

To be able to check this, the installation should be disconnected.

- The wires of the same colour and section should have continuation among them.





I.3 BATTERY

- To be able to check the battery it is advisable to take it out of the vehicle.
- When disassembling, unplug the first negative terminal to avoid possible short-circuits.
- The condition of the hermetic batteries can be controlled measuring the voltage in the terminal with a digital tester which can measure even tenth of volt.
- In case that the voltage is below the specified one, the battery should be recharged.

The standard voltage in the terminals of the battery should be 12.5V or more.

I.4 METHOD OF RECHARGE

To recharge hermetic batteries it is necessary a battery charger with a stabilized outlet special for this type of batteries.

These batteries are sealed, do not add fluids either open the caps, since the characteristics will be altered, damaging the battery.

Charges up 1/10 of its capacity should not take place.

I.5 SYSTEM TO DETERMINE TIME OF RECHARGE

To determine the necessary time to load the battery, the voltage in terminals should be measured with the tester.

Next, observing in the chart the axis of voltage and draw a vertical line till crossing the slope of charge and the horizontal line till the axis of time in hours.

Example:

Observing the chart.

If the measure in terminals is 12V, draw a vertical line up from the 12V till crossing the slope and a horizontal line until 8h approx.

The time to charge this battery would be of 8 hours approx.

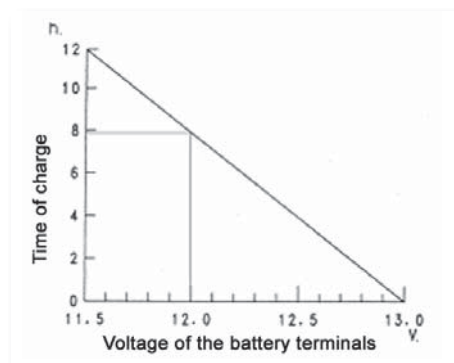


Chart of time to charge in function of the voltage in terminals.



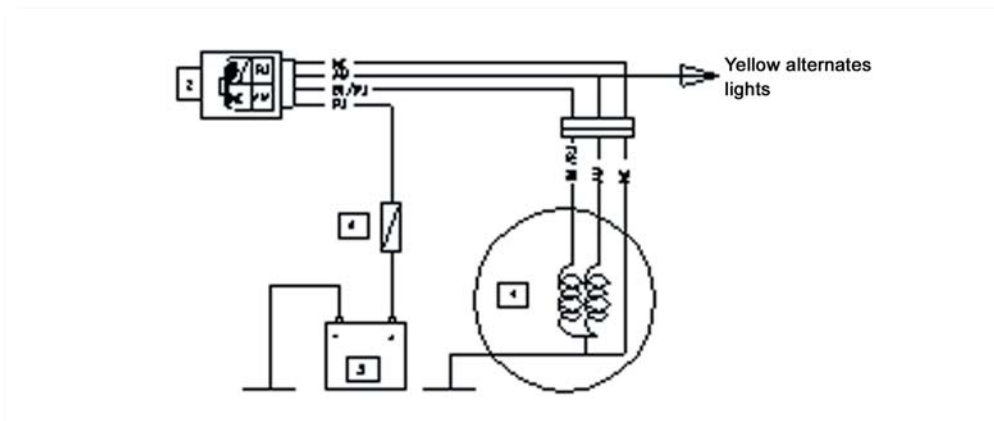
1.6 HOW TO DETERMINE BATTERY CONDITIONS

- To be able to determine if the battery is good, first it should be charged according to the aforementioned standard method.
- Next, leave the battery at rest during 1 hour and take the measurements according to this chart.

VOLTAGE IN TERMINALS	BATTERY CONDITION
12,5 V or more	Good battery
Between 12V and 12,5V	Standard recharge
Less 12V	Change the battery

1.7 RECHARGE SYSTEM AND LIGHTS

- Diagram of the charge circuit and lights supply.



- 1° Alternator
- 2° Regulator AC-DC
- 3° Battery
- 4° Fuse

1.8 FAILURE LOCATION

To control if the charge and outlet system work correctly, check the voltage with the tester.

**Outlet data of the regulator:**

- The battery voltage (red cable) should be between 13.8V to 14.8 with the vehicle running at 4000 R.P.M. (tester in direct current).
- The voltage of alternating (yellow cable) should be between 13.8V to 14.5V. at 4000 R.P.M. (tester in alternating position).

If the previous parameters are not fulfil, check the alternator.

Check of the alternator:

It should be made with the 4 ways connector of the unplugged magnetic flywheel and with the engine in cold.

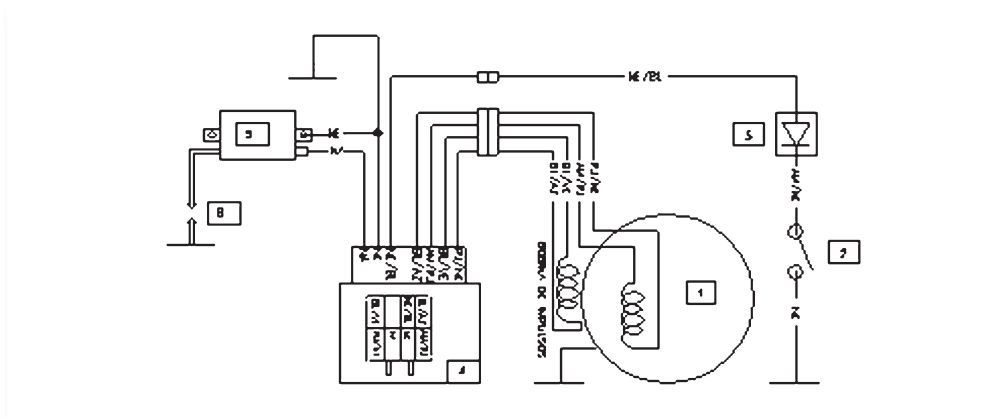
TESTER SCALE	TESTER CONNECTIONS		READING
$\Omega \times 1$	Red clip +	Black clip -	
	White/red cable	Black cable	0,4 Ω
	Yellow cable	Black cable	0,35 Ω

In the event of getting the values of the chart correctly, the regulator should be replaced.



I.9 IGNITION SYSTEM 2002

- Ignition diagram



- 1° Magnetic flywheel
- 2° Ignition Key
- 3° Control diode
- 4° CDI unit
- 5° High tension coil
- 6° Spark plug

If the vehicle doesn't sparkle or the ignition is misfired, the following checking should be carried out:



Firstly, the black / white wire should be disconnected or connected directly to earth to neutralize the stopping system of the vehicle.

If the problem persists, check each component of the ignition system.

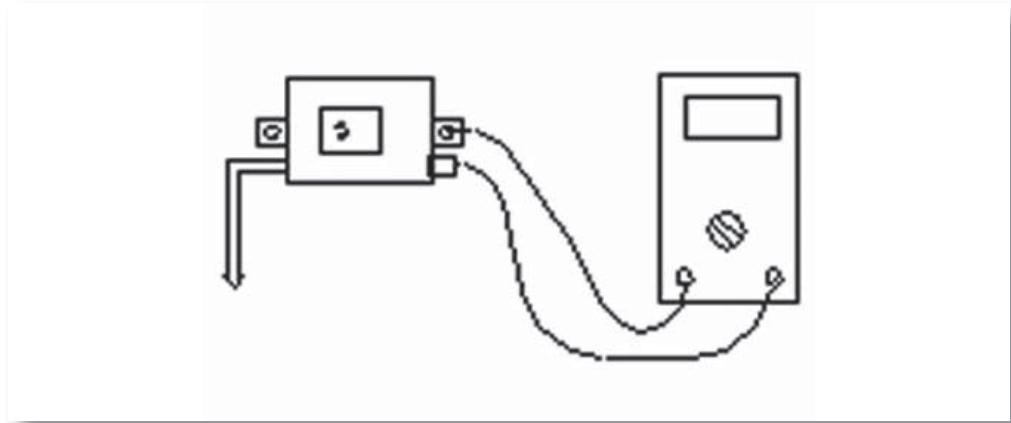
Before beginning checking the components, verify that the connections are clean and well connected and the wiring is in good conditions.

The resistance control of the components must take place when the engine is cold.



CHECKING OF THE HIGH TENSION COIL:

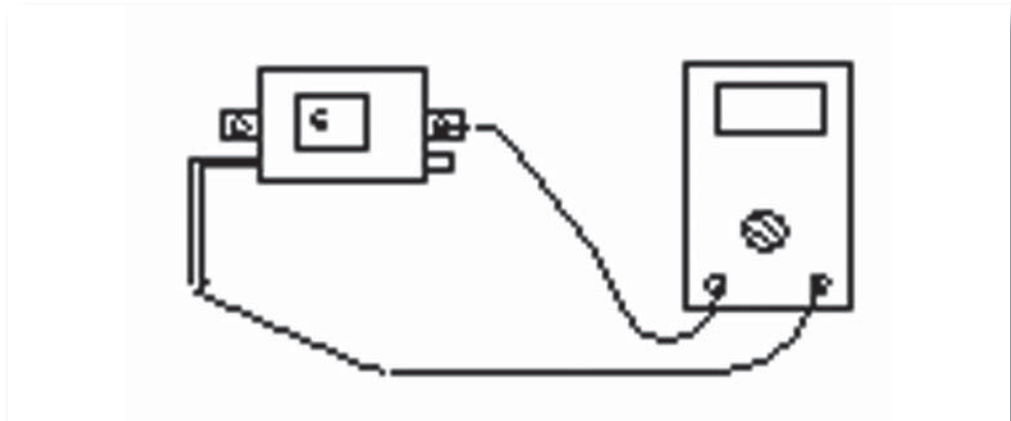
Before beginning the verifications assure that the ground of the high tension coil is correct, and its fixing is free of rust and clean.



Resistance of the primary winding

Measure the resistance between the terminal and ground.

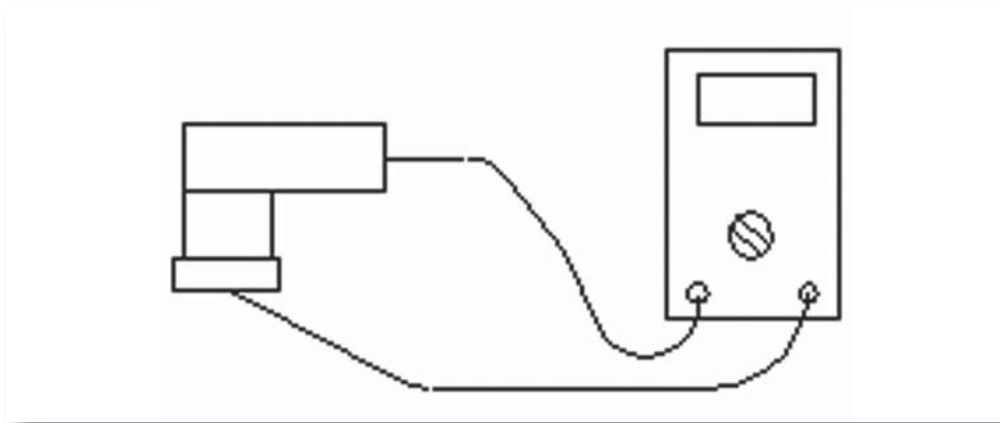
$0.3\Omega \quad \pm 10\% \quad 20^\circ \text{C}$



Resistance of the secondary winding

Measure the resistance between the high wire and ground

$3.16\text{K}\Omega \quad \pm 10\% \quad 20^\circ \text{C}$



CHECKING OF THE ANTIPARASITIC PIPE

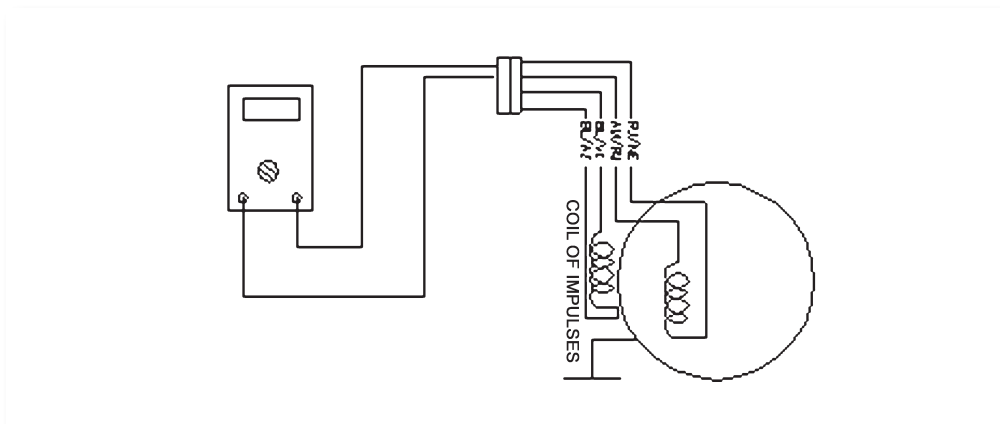
Take the spark plug pipe apart rotating it anticlockwise.

Check that the copper wire sticks out the HT wire.

Resistance: 5KΩ +/- 20% 20°C

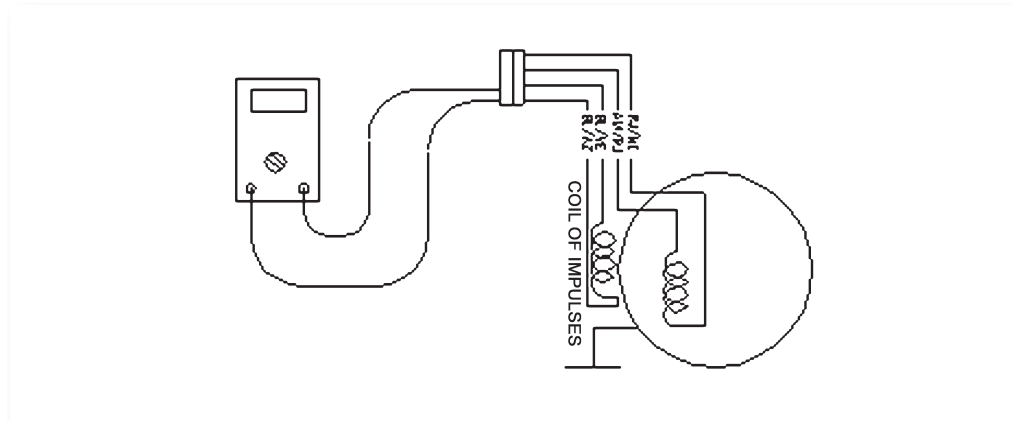
If the values of the coil and the spark plug pipe are correct then check the magnetic flywheel.

I.10 MAGNETIC FLYWHEEL CHECKING



Connect the tester between the wires:
red / black and yellow / red

Resistance: 860Ω +/-20% 20° C.



Resistance of the coil sensor of impulses

Connect the tester between the wires:

white / green and white / blue

Resistance: $310\Omega \pm 20\%$ 20°C .

If all the devices give the correct values and the problem persists, CDI should be replaced.

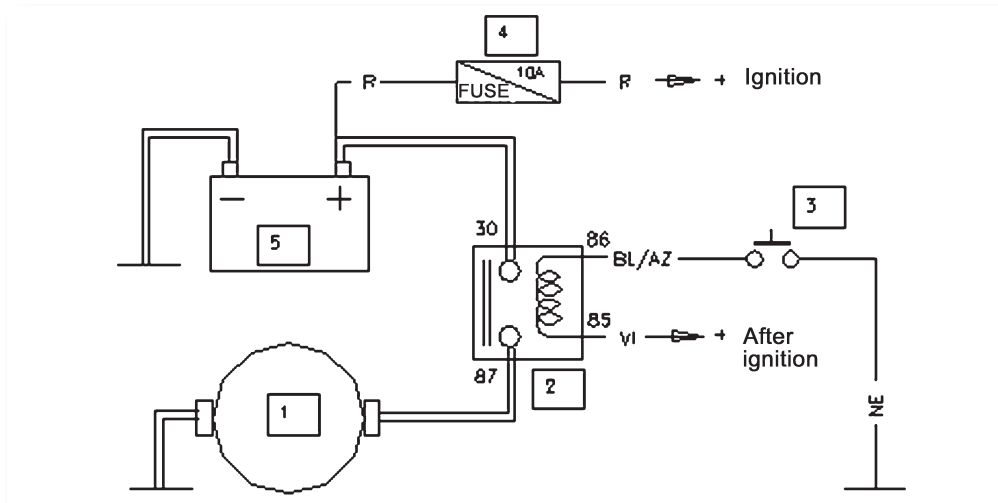
Important cautions:

Do not connect either disconnect wires or connections with the engine running.

- Do not electric weld either spark off with CDI connected.
- Before replacing CDI check that the connections and the wiring are in good conditions.



I.II START SYSTEM DIAGRAM



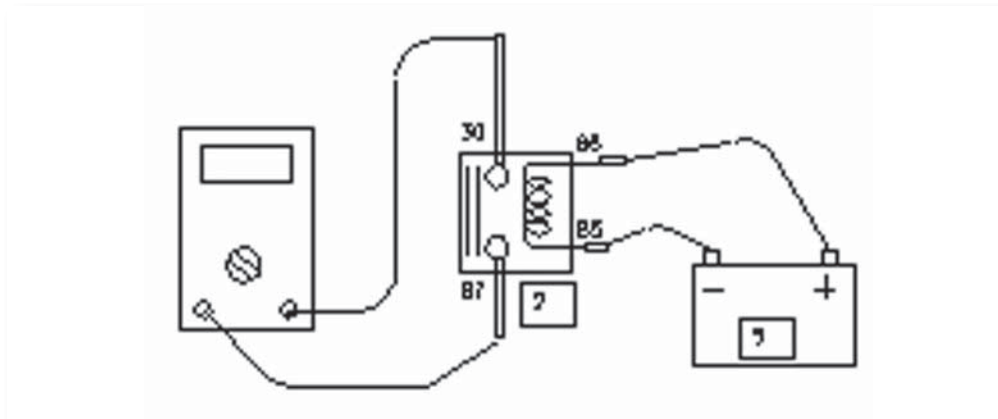
- 1° Starter
- 2° Start relay
- 3° Start switch
- 4° Fuse 10 A
- 5° Battery

ELECTRIC START SYSTEM CHECKING

Check with the tester the continuation of the 10 A fuse. If the fuse is correct check the battery according to the section about it.

Minimum voltage of the battery 12.5 V.+

Checking of the start relay



With the terminals 85 and 86 of the connected relay to a battery, check the continuation between the terminals 30 and 87.

The tester should read 0 Ω

When disconnecting the battery, it should read infinite.

The tester should read ∞(infinite).



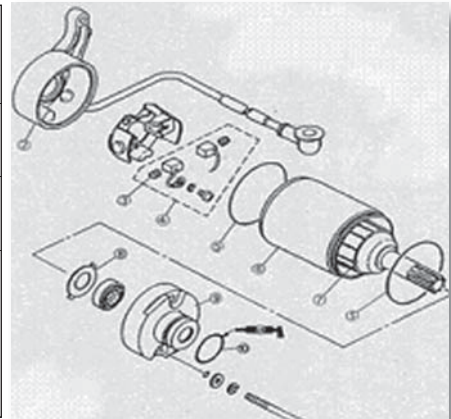
I.12 ELECTRIC START SYSTEM

Checking of the starter

Connect the engine to a charged battery and check it turns vigorously.

In case that it doesn't rotate correctly you should disassemble the engine and make the following verifications:

A	Correct operation limit of dynamo brushes 3.5mm.
B	Wear limit of the brush collector 21mm.
C	Depth of the collector insulation 1.5mm.
D	Resistance of the rotor coils 0.017Ω - 0.021Ω 20°C. IMPORTANT! Check the insulation between the sheets of the collector and the ground.



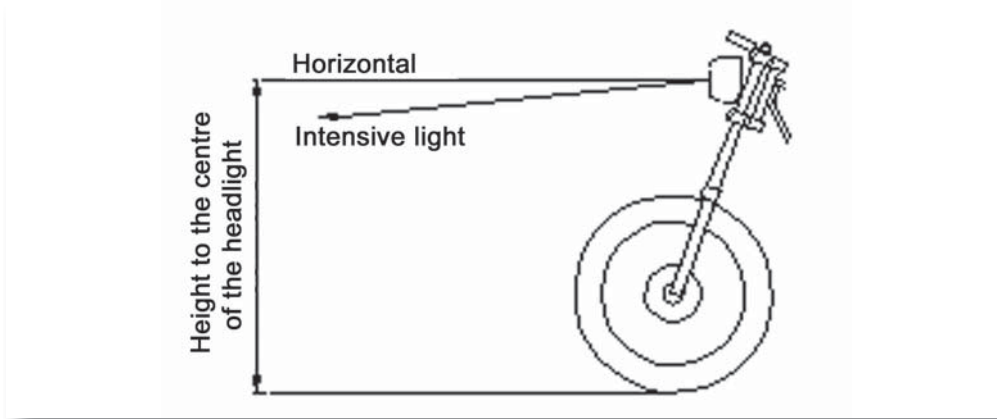
If the engine has the suitable values, the following operations must be carried out:

- Polish the surface of the collector and revise the depth of the insulation.
- Reduce the insulation between the sheets of the collector with a saw till reaching 1.5mm.
- Check the pressure of the springs of the brushes.
- Check that the plate of brushes is not connected to earth.
- See the bearings set and that the armature doesn't graze the stator.
- Do not grease excessively since in rotation the brush collector would dirty.



1.13 LIGHTING SYSTEM

Adjustment of the beam light height of the headlight

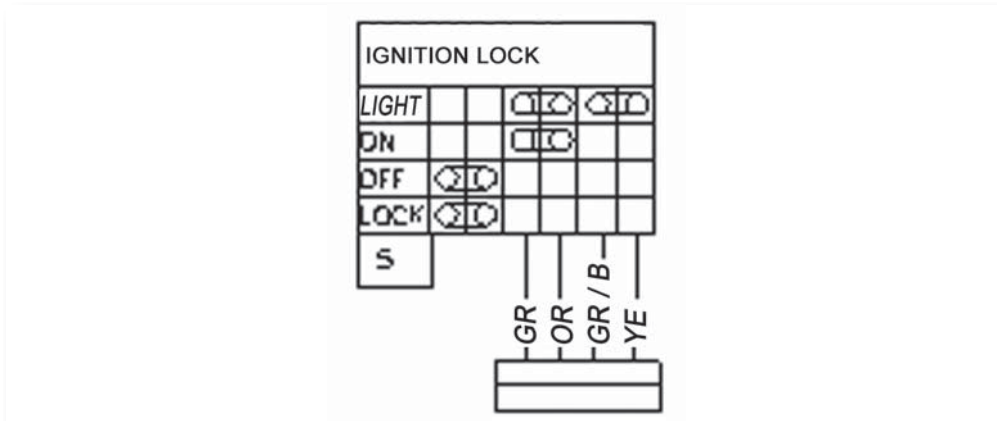


With the driver seated on the vehicle, the headlight should be adjusted so the intensive beam of light is underneath the horizontal of the headlight.

In the event of changing a lamp do not handle the internal part of the headlight and take the new lamp with a clean cloth.

Checking of the switches:

Control of the ignition lock.



With the tester check the continuation among the cables of the ignition lock.

In the ON position, continuation between wires

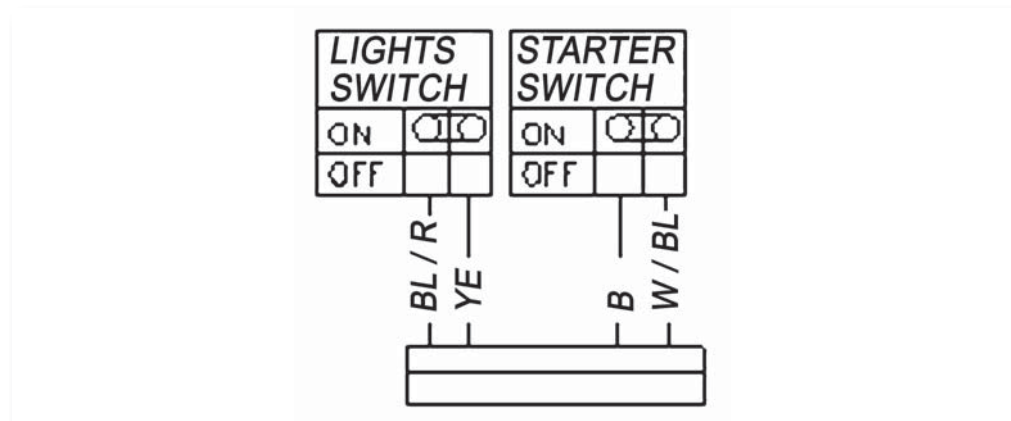
Colour: GR and OR

In the LIGHT position, continuation among wires

Color: GR and OR GR/ B and YE



Control of the right-hand drive, lights switch and starter switch.

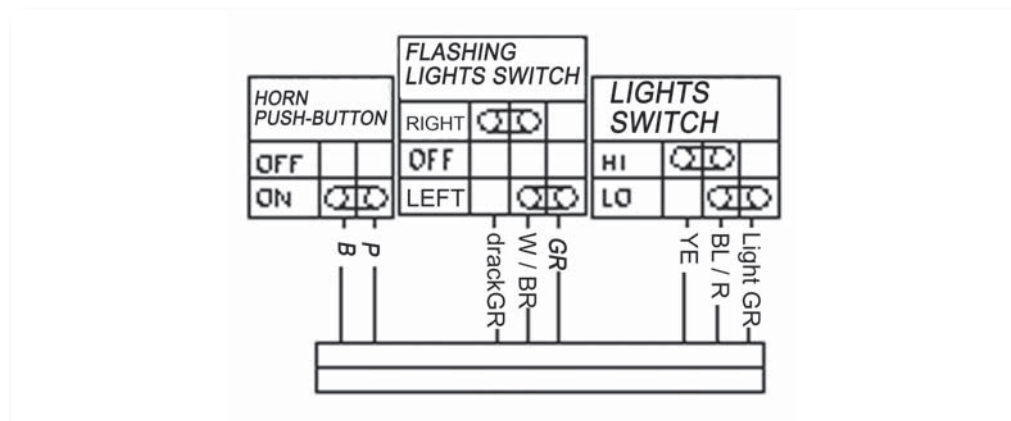


Check the continuation among the cables of the connector.

In the ON position of the lights switch check the continuation among the wires
Colour: BL/R and YE

In the ON position of the starter switch, check the continuation among the cables
Colour: B and W/BL

Control of the right-hand drive: Lights switch, flashing lights switch and horn push-button.



Check the continuation among the cables of the switch.

Horn push-button

In the ON position. Continuation between the wires **Colour: P/B**

Flashing lights switch

In the RIGHT position. Continuation among wires **Colour: Dark GR and W/BR**

In the LEFT position. Continuation among the wires **Colour: W/BR and BR**

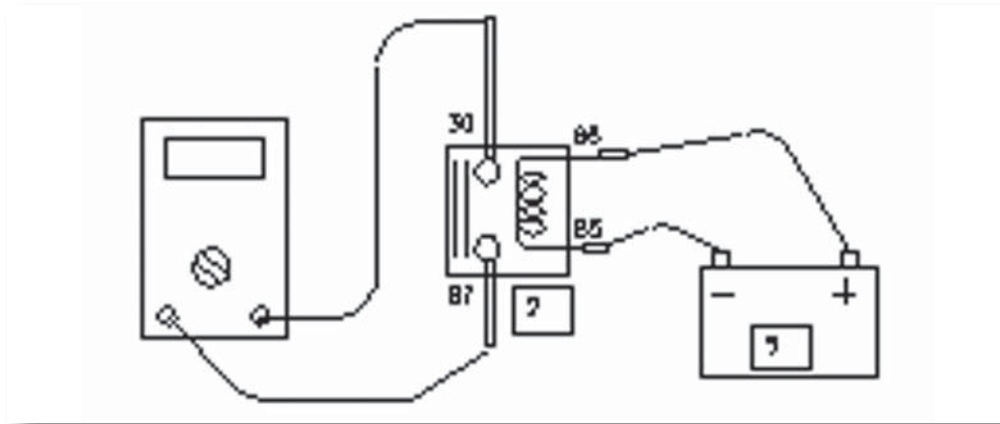
Lights switch

In the Hi position. Continuation among the wires **Color: YE y BL /R**

In the HIM position. Continuation among the wires **Colour: BL/R Light GR**



Checking of the ignition relay



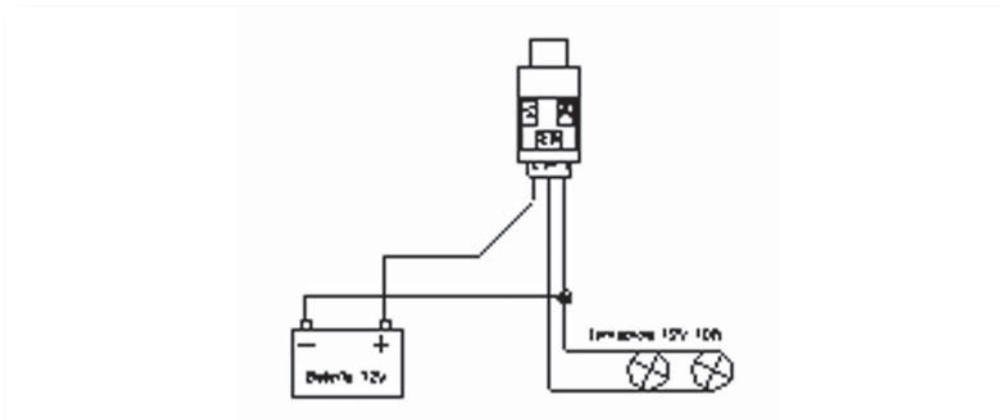
With the relay terminals 85 and 86 connected to a battery check the continuation between the terminals 30 and 87.

The tester should read 0Ω

When disconnecting the battery it should read infinite.

The tester should read ∞ (infinite)

Checking the flashing lights relay



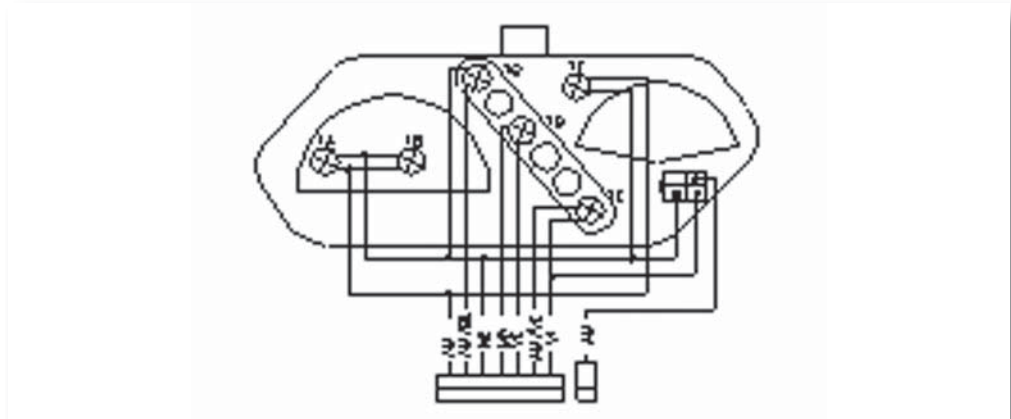
Connect the flashing lights relay according to the sketch to check if it sparkles, the lamps can be replaced by one of 12V and 21W.



I.14 INSTRUMENT CONTROL

When a lamp of the dashboard is replaced make sure that it is of the same voltage and power.

Checking of the tachometer.



To check the tachometer verify the inlet wires without disconnecting the dashboard of the vehicle.

1° With the tester or a testing lamp check if the voltage comes up to the black and violet wires (tachometer switch) when ignition takes place.

2° With the engine running, check if the voltage comes up to the black and yellow wires.

If the two sections are fulfilled, the dashboard should be replaced.

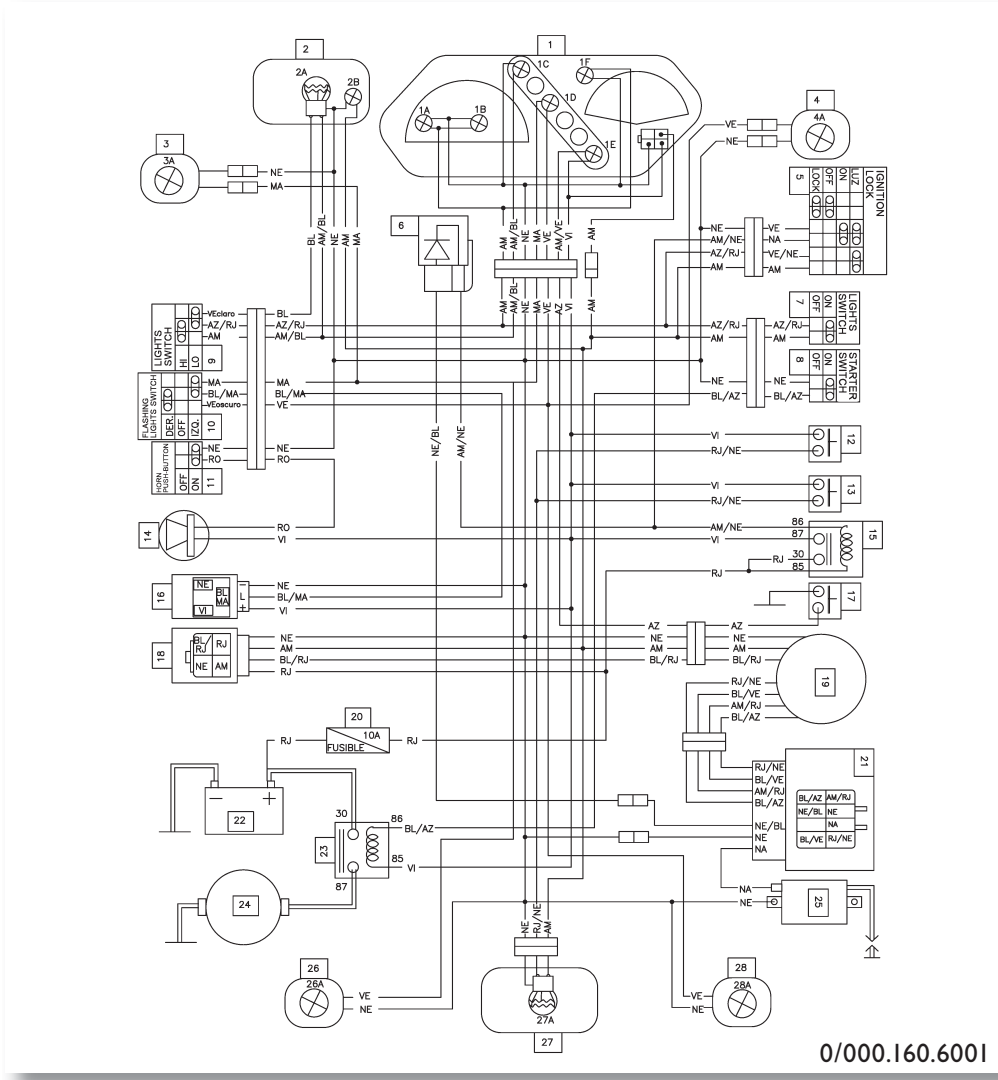
Neuter sensor

To check this sensor, the continuation between the terminal and the ground should be controlled.

With the neuter in the On position, it should read	0Ω
When start the tester reads	∞ (infinite)



I.15 ELECTRIC DIAGRAM 2002



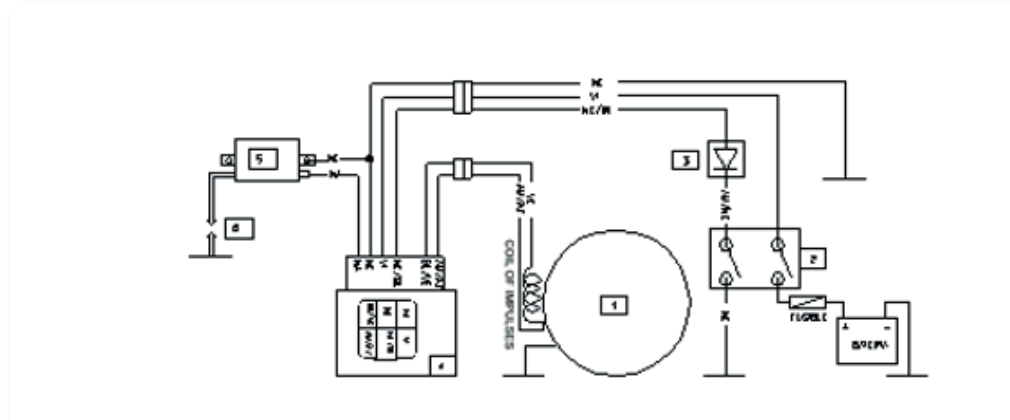
NOMENCLATURE OF THE COMPONENTS	
1	INSTRUMENT PANEL
1A	LIGHTING LAMP C/km 12V 1,2W
1B	RESERVE TANK CONTROL LAMP 12V 1,2W
1C	FLASHING LIGHTS CONTROL LAMP 12V 1,2W
1D	INTENSIVE CONTROL LAMP 12V 1,2W
1E	NEUTER CONTROL LAMP 12V 1,2W
1F	LAMP 12V 1,2W
2	HEAD LIGHT
2A	MAIN LAMP 12V 55/60W
2B	POSITION LAMP 12V 5W
3	HEAD LEFT FLASHING LIGHT
3A	FLASHING LAMP 12V 10W
4	HEAD RIGHT FLASHING LIGHT
4A	FLASHING LAMP 12V 10W
5	IGNITION LOCK
6	DIODE OF ENGINE STOPPAGE
7	LIGHTS SWITCH
8	STARTER PUSH-BUTTON
9	INTENSIVE AND DIPPED HEADLIGHTS SWITCH
10	FLASHING LIGHT SWITCH
11	HORN PUSH-BUTTON
12	FRONTAL BRAKE LIGHTS
13	REAR BRAKE LIGHTS
14	HORN DC 12V
15	IGNITION RELAY
16	CENTRAL FLASHING LIGHT 12V 2X10W
17	NEUTER SWITCH
18	VOLTAGE REGULATOR AC-DC 12V
19	MAGNETIC FLYWHEEL
20	FUSE 10 A
21	CDI CENTRAL IGNITION
22	BATTERY 12 V
23	ELECTRIC IGNITION RELAY 12V 70A
24	STARTER
25	H.T. COIL
26	REAR RIGHT FLASHING LIGHT
26A	FLASHING LAMP 12V 10W
27	TAIL LIGHT WITH LEDS
28	REAR LEFT FLASHING LIGHT
28A	FLASHING LAMP 12V 10W

COLOURS CODE	
YE	YELLOW
R	RED
B	BLACK
GR	GREEN
BR	BROWN
P	PINK
W	WHITE
VI	VIOLET
BL	BLUE
OR	ORANGE



I.16 IGNITION SYSTEM 2005

- Ignition diagram



- 1° Magnetic flywheel
- 2° Ignition Key
- 3° Control diode
- 4° CDI unit
- 5° High tension coil
- 6° Spark plug

I.17 FAILURE LOCATION

If the vehicle doesn't sparkle or the ignition is misfired, the following checking should be carried out:



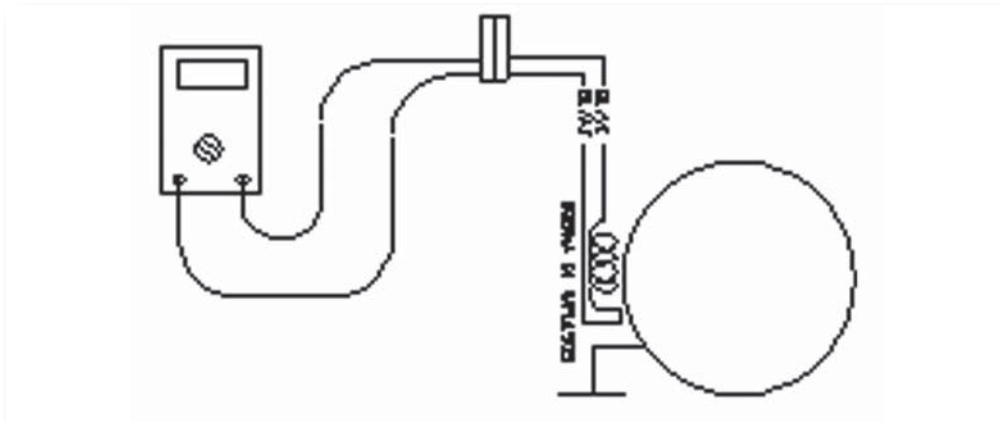
Firstly, the black / white wire should be disconnected or connected directly to earth to neutralize the stopping system of the vehicle.

If the problem persists, check each component of the ignition system.

Before beginning checking the components, verify that the connections are clean and well connected and the wiring is in good conditions.

The resistance control of the components must take place when the engine is cold.

I.18 SENSOR CHECKING (PICK UP)

**Resistance of the coil sensor of impulses**

Connect the tester between the wires:

white / green and white / blue

Resistance: $290\Omega \pm 20\%$ 20°C

If all the devices give the correct values and the problem persists, check that the black and violet wires of the CDI switch come up to 12 V when ignition is in the ON position.

In case all the values are fulfilled, CDI should be replaced.

Important cautions:

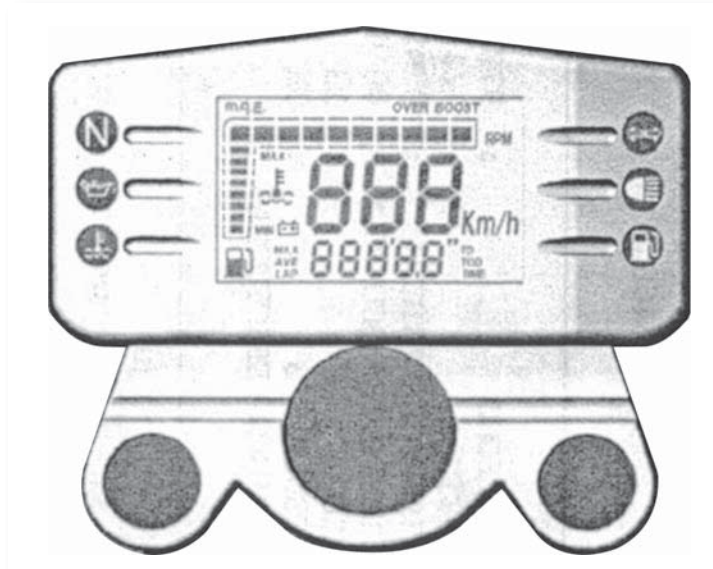
- Do not connect either disconnect wires or connections with the engine running.
- Do not electric weld either spark off with CDI connected.
- Before replacing CDI check that the connections and the wiring are in good conditions.





1.19 DASHBOARD PROGRAMMING

DASHBOARD



The insertion of Values in the Display is carried out through the button "Trip" placed in the left side of the Handlebar.

In the Model MRX and MRX PRO the insertion of values will be carried out with the engine running.

In the Model SMX and SMX PRO the Battery is connected and loaded, so it can be carried out with the key in the ignition position and also with the engine running.

INSERTION OF THE VALUES OF CALCULATION IN THE ODOMETER MEMORY

- Development of the wheel that sets the signal sensor.
- Pulses of the signal sensor.
- Pulses of Revolutions.

Put the key in the ignition position and start the engine.

- Wait some seconds till the INITIAL screen appears on the DISPLAY.
- Press the button "TRIP" for 6 seconds and the Screen will show the digits to insert the value of the development of the wheel, (the flickering digits are the selected ones) following the sequence of pressing the button, we will choose the number and keeping the button pressed for 3 seconds we will pass to the next digit, and so forth until set the value.



- Pressing the button “TRIP” for 3 seconds, we will pass to the next screen of the Display where the word “PULSE” will appear, following the sequence pressing the button “TRIP”, we will insert the value corresponding to the pulses of the sensor of the wheel.
- Going on pressing the button “TRIP”, the option “MILES”, (mph) and kilometres hour (km / h) will be displayed and with the button “TRIP” we will choose km/h.
- Keeping it pressed for 3 seconds, the word “PULSE” will appear on the screen and above it in the right part of the screen RPM will be displayed, then we will insert the value corresponding to the RPM, picking the fixed value pressing the button “TRIP”.

Keeping the button “TRIP” pressed for 3 seconds more, we will turn back to the INITIAL screen.

The return to the initial screen becomes effective Automatically after 6 seconds without operating the button “TRIP.”

TO CHECK IF THE INPUT DATA IS THE RIGHT ONE, WE SHOULD TURN ON THE IGNITION, START THE ENGINE AND IN TWO SECONDS THE ENTERED DATA WILL BE DISPLAYED ON THE SCREEN DURING TWO SECONDS, VERIFYING THAT IT IS CORRECT, IMMEDIATELY AFTER THE INITIAL SCREEN WILL APPEAR.

The dashboard is ready to be used giving the right information.

MAE DASHBOARD

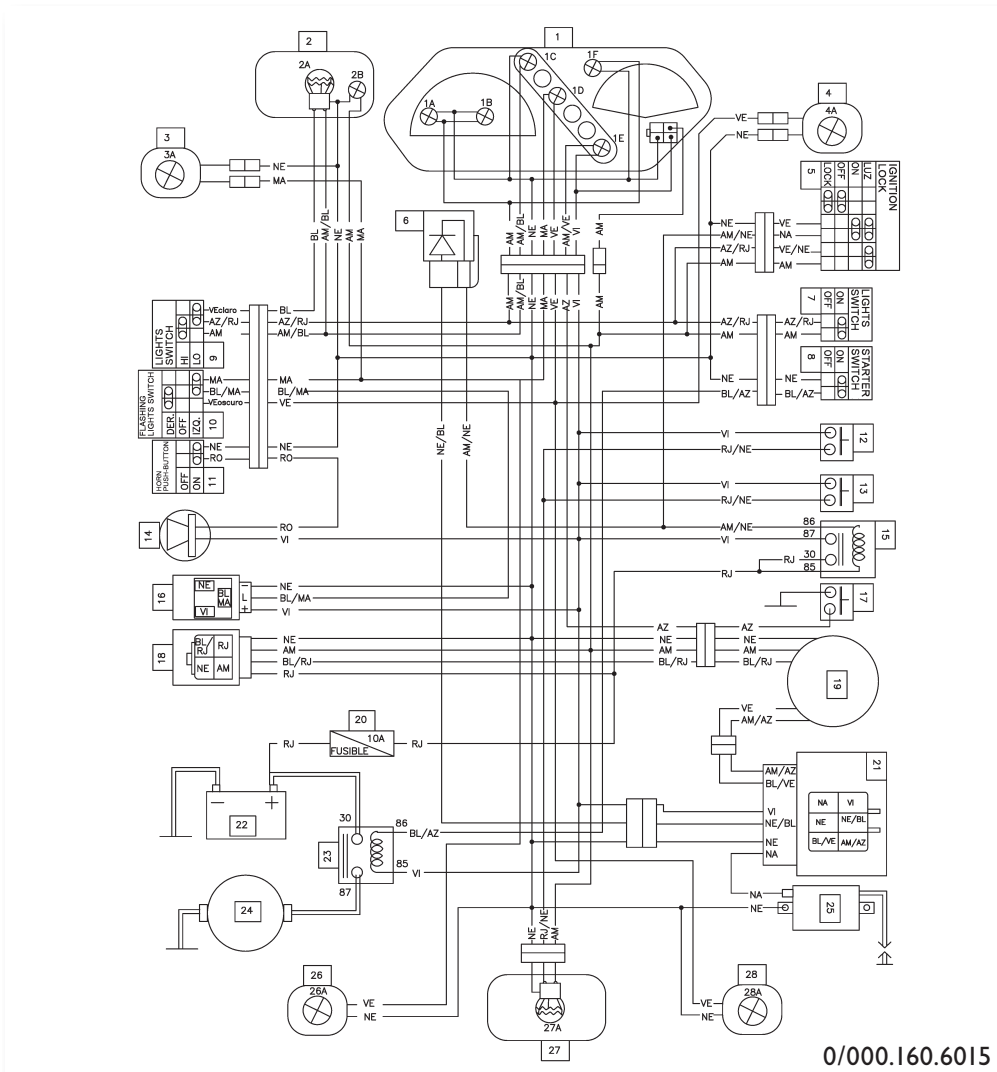
SET OF VALUES

VALUES TO BE INSERTED IN THE DISPLAY CONFIGURATION

	MRX 125cc.	SMX 125cc.
Rear Tyre	120/80-18	130/70-17
Development of the wheel	1980	1970
Pulses of the Sensor (screws)	3	3
Pulses of RPM	6	6



I.20 ELECTRIC DIAGRAM 2005



0/000.160.6015

NOMENCLATURE OF THE COMPONENTS	
1	INSTRUMENT PANEL 1A LIGHTING LAMP C/km 12V 1,2W 1B RESERVE TANK CONTROL LAMP 12V 1,2W 1C FLASHING LIGHTS CONTROL LAMP 12V1 1,2W 1D INTENSIVE CONTROL LAMP 12V1 1,2W 1E NEUTER CONTROL LAMP 12V1 1,2W 1F LAMP 12V 1,2W
2	HEAD LIGHT 2A MAIN LAMP 12V 55/60W 2B POSITION LAMP 12V 5W
3	HEAD LEFT FLASHING LIGHT 3A FLASHING LAMP 12V 10W
4	HEAD RIGHT FLASHING LIGHT 4A FLASHING LAMP 12V 10W
5	IGNITION LOCK
6	DIODE OF ENGINE STOPPAGE
7	LIGHTS SWITCH
8	STARTER PUSH-BUTTON
9	INTENSIVE AND DIPPED HEADLIGHTS SWITCH
10	FLASHING LIGHT SWITCH
11	HORN PUSH-BUTTON
12	FRONTAL BRAKE LIGHTS
13	REAR BRAKE LIGHTS
14	HORN DC 12V
15	IGNITION RELAY
16	CENTRAL FLASHING LIGHT 12V 2X10W
17	NEUTER SWITCH
18	VOLTAGE REGULATOR AC-DC 12V
19	MAGNETIC FLYWHEEL
20	FUSE 10 A
21	CDI CENTRAL IGNITION
22	BATTERY 12 V
23	ELECTRIC IGNITION RELAY 12V 70A
24	STARTER
25	H.T. COIL
26	REAR RIGHT FLASHING LIGHT 26A FLASHING LAMP 12V 10W
27	TAIL LIGHT WITH LEDS
28	REAR LEFT FLASHING LIGHT 28A FLASHING LAMP 12V 10W

COLOURS CODE	
YE YELLOW	R RED
B BLACK	GR GREEN
BR BROWN	P PINK
W WHITE	VI VIOLET
BL BLUE	OR ORANGE

MRX-SMX 125

Engine workshop manual



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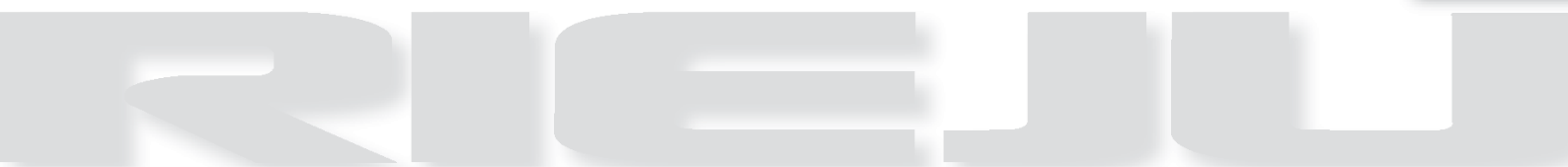
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Introduction



I.1 ENQUIRY NOTES

The intervention in control, maintenance, repairs, replacement parts, etc. in the whole range of our motor vehicle, means not only the competence and experience of the responsible technicians in this task, in the modern technologies, but also the knowledge of the quick and rational procedures, of the technical characteristics, of the calibrated values, of the torque, that only manufacturer is in a condition to lay down for certain.

The present series of WORKSHOP GUIDES for two-stroke engine, provide the main information for the technicians of the sector (Authorized Dealer, etc...) to operate harmoniously on the modern concepts of "good technique" and "safety at work".

The aim of these guides, is about the standard technical interventions in the whole range of engine (two-stroke engine) for RIEJU motor vehicles in the production phase at the spreading time of these manuals. This information refers to the "ENGINES" of the motor vehicles. Some information has been deliberately omitted, since (according to us) it is an essential part of the basic technical knowledge.

Another possible information, can be deduced from the SPARE PARTS CATALOGUES (of each particular model).

Before reading the motor vehicle manual you are interested in, it is important that you examine the first general pages, where you will find the basic information for a good item enquiry and the general nature technical concepts.

REMARK:

The manual provides you with the essential information for the standard intervention procedures. This information is supplied by the engine manufacturers, so therefore, this frees us to be responsible for any eventual error, omissions, etc.

The RIEJU company reserves the right to contribute modifications at any time, without any previous notice.

For any request or further information please call to Rieju Technical Assistance Service.

I.2 UPDATING GUIDE

- **The updating** will be send (in a reasonable period). Each new CD-ROM will replace the one you have already got.
- **The index** will be updated in case modifications and changes of the pages inside no longer guarantee a rational enquiry of the manual.
- **IMPORTANT!** The series of Workshop Guides has to be considered as a **work tool**, strictly speaking, and it can remain in "value" through time, only if it is constantly updating.



1.3 WRITING SIMBOLOGY



ATTENTION! Some caution advice and information as regards to the safety of the motorcyclist (vehicle user) and the safeguard of the whole vehicle.



ATTENTION! Descriptions relating to some dangerous interventions for the maintenance engineer, the repair technician, the workshop staff or strangers, for the atmosphere, for the vehicle and for the equipments.



FIRE RISK
Operations which could cause fire.



DANGER OF EXPLOSION
Operations which could cause explosion.



TOXIC
Evident danger of poisoning or inflammation of the first respiratory track.



MECHANICAL MAINTENANCE
Operations to be performed only by an expert mechanic.



ELECTRICAL MAINTENANCE
Operations be performed only by an expert electrical / electronic technician.



NO!
Operations which must be avoided.



ENGINE WOKSHOP GUIDE
Information derived from this documentation.



SPARE PARTS CATALOGUES
Information derived from this documentation.

F	Figure
Pr Tr	Torque
P	Page
Ap	Sub-section
S	Section
Es	Diagram
T	Table
Tr	Bolt

Remark:

*Illustrations frequently shown fixing or regulator screws, specified with the letter **Tr**. The **number** besides this letter indicates the quantity of identical **Tr** existing in the group or object component of the description and its corresponding illustration. The letter **without number**, indicates **quantity 1**. In case of different screws shown in the same figure, a **number** and a **small letter** will follow the letter **Tr** (example: (Tr4a)).*

*The re-assembly of groups and components is usually carried out in **opposite way** to the disassembly interventions (excepting specified description).*

I.4 OPERATIVE SIMBOLOGY

L) Loctite



O) Lubrication (oil)



G) Greasing (grease)



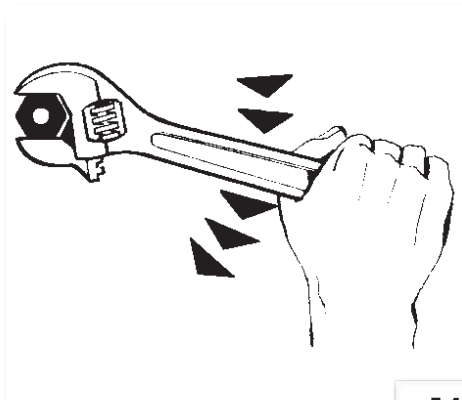


I.5 WORK GENERAL RULES

• **The following advice, recommendations, and warnings,** guarantee rational interventions in the maximum operative safety, ruling out considerably the probabilities of accidents, all kind of damage and time-out. Therefore, we advise you to observe them scrupulously.

ADVICE:

- Always use high quality equipments.
- For raising the motor vehicle, use manufactured equipment on purpose and subject the European regulations.
- During the operations, tools must be within arm's reach, as far as possible, according to a predetermined sequence, and anyway, never on the vehicle or in a hiding or inaccessible place.
- Keep your workplace duly clean and tidy.
- To tighten bolts and nuts, begin with those of **bigger diameter** or the interior ones, proceeding in "**cross**" in one go and so on.
- The most proper use of the spanner (the fork one), is **in one go** never pushing.
- The rolling monkey wrench (F-1) have to be used in emergency conditions, this is to say, when the suitable size tool is not available. During the effort, the mobile clamp tend to open and this could damage the bolt as well as lead to obtain a torsion moment of an unreliable tightness. Anyway, use tools like the illustration (figure I).
- Excluding some exceptional assistance cases, prepare a **record card** for the Customers, where all the interventions done and notes for possible controls in future will be entered.

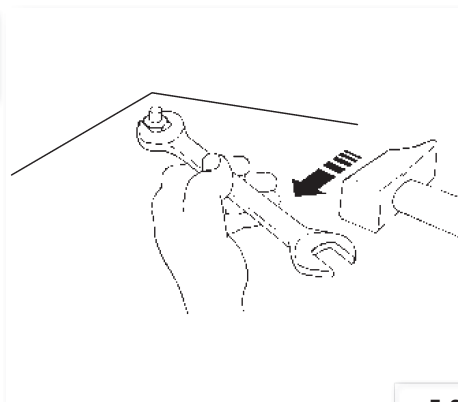


F-1

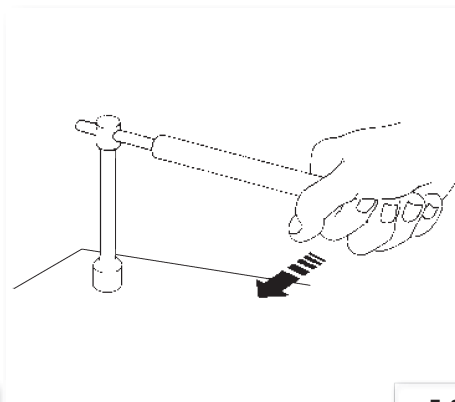


1.6 RECOMMENDATIONS

- **Before beginning** any intervention in the motor vehicle, wait till all and each one of the components of the same vehicle are **completely cool down**.
- If the operations need two technicians work, it is necessary that they previously come to an agreement on tasks and synergies.
- Always check the correct assembly of each component, before assemble another one.
- Lubricate the need spare parts, before re-assembly.
- The linings, the watertight and elastic rings and the pins must be replaced when disassembly takes place.
- The torque values indicated in the manuals, refer to the “**final tight**”, and they have to be progressively reached, in consecutive goes.
- The loosen and tighten operations of the parts in aluminium alloy (sump) must be carried out when the **motor cools down**.
- Always use screwdrivers of suitable size for the bolts in use.
- **Never work in awkward conditions neither in an unstable situation of the motor vehicle.**
- **Never use a lining or an elastic ring again.**
- **Never unscrew or screw down bolts and nuts with clips since, besides it does not exert enough blockade force, the bolt cap or the nut hexagon can be damaged.**
- **Do not hit with the hammer (or another tool) on the spanner to loosen or tighten bolts and nuts (F-2).**
- **Do not use the extension bar for the spanner (F-3).**



F-2



F-3



Never use, under no circumstances, free flames.



Never leave open and not suitable containers with fuel, blocking the pass, near to heat sources, etc.



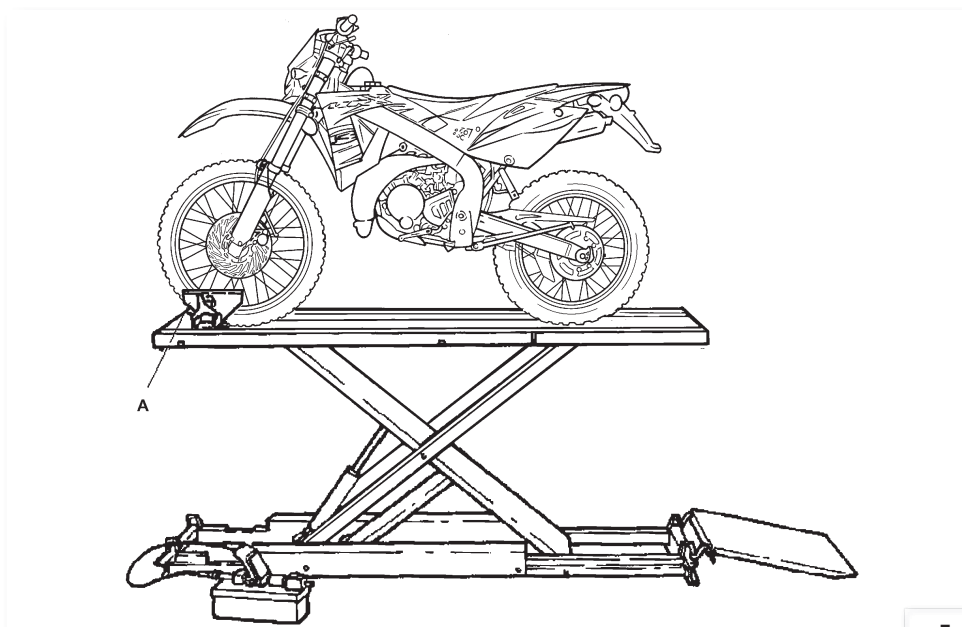
Never suck in or blow in the fuel pipe.

Never carry out welds in the presence of fuel. Remove the tank although it is totally empty and disconnected the negative (-) lead of the battery.

Never leave the motor running in closed premises or without air vent.



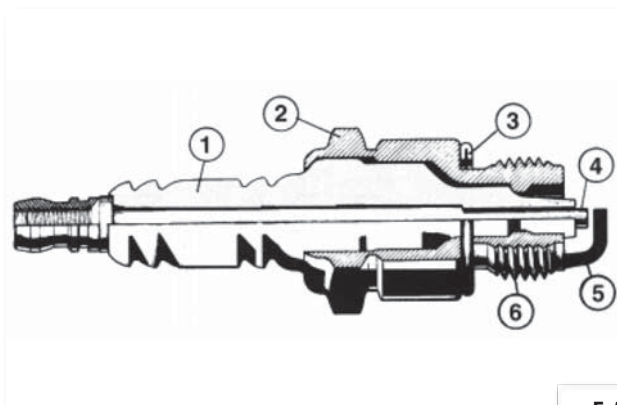
Before each intervention, make sure of the motor vehicle is perfectly steady. The front wheel should be anchored, preferably, to the integrated tool (A/F-4) in the running board .



F-4



I.7 SPARK PLUGS

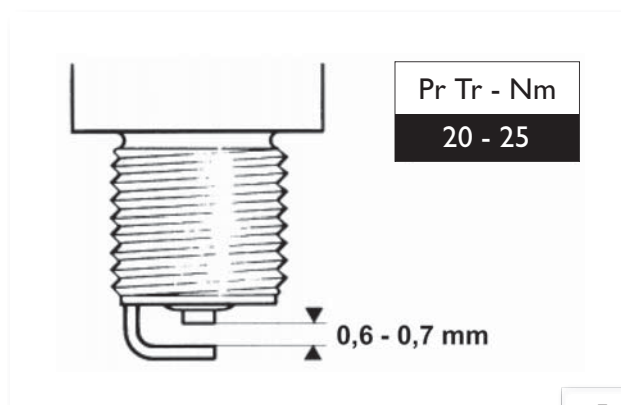


1. Insulator
2. Body
3. Lining
4. Electrode
5. Earth electrode
6. Thread

F-5

SPARK PLUGS CONTROL AT 1.000 Km

- Do not touch the spark plug if the **motor is hot**.
- The color tip and the insulator coloration (around the central electrode) provide with useful information about the **thermic degree** of the spark plug, the **carburation**, the **lubrication** and the overall condition of the engine.
- A **light brown** (insulator) coloration indicates the correct general operation.
- Black sooty tips, dry (to the touch), opaque, indicate that the operation temperature is too low (spark plug thermic degree is too high), too rich carburation or faulty ignition.
- Off-white insulator indicates: a mixture too weak or spark plug thermic degree too low (spark plug too hot).
- Verify the distance between the electrodes (F.6) (although the spark plug is new) using a calibrated calibre of thickness, and eventually, register it working only on the earth electrode.



F-6

I.8 SPARK PLUG MAINTENANCE



- The spark plug maintenance consists in removing it periodically from the motor to check (visually) the conditions and the distance between the electrodes.
- Proceed to clean the electrodes and the insulator carefully, using a wire brush.
- Eliminate possible waste with a strong jet of compressed air.
- Lubricate the thread of the spark plug with motor oil or grease, that conducts electricity, then screw it by hand until the bottom.
Then press it moderately with the respective spanner (see torque in F.6).



It is necessary to replace all spark plug with fissures in the insulator or corroded electrodes.

I.9 SPARK PLUG REPLACEMENT AT 5000 Km

- At the foreseen kilometres, replace always the spark plug with a new one, choosing one of those that the Company RIEJU, S.A. recommends.
- When the discharged spark plug is being eliminated, inspect always its general look (as previously stated) to check the good state of the engine.

I.10 MOTOR REMOVAL

- To remove the motor from the frame, look up in the Workshop Guide, in “Cyclist” section, where you will find all the steps to follow.

I.11 MOTOR DISASSEMBLY

The manufacturer is exempt from any responsibility caused by damages of any nature in a disassembly and a new assembly of the engine and each of its parts, owing to the use of unsuitable tools for this kind of interventions.



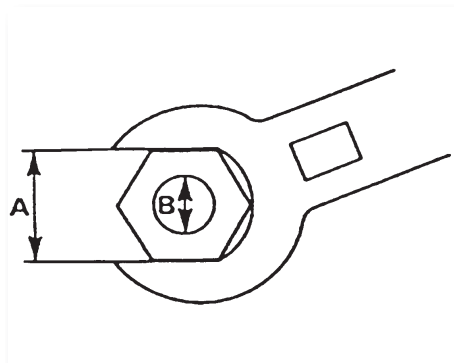
Exclusively use ORIGINAL RIEJU SPARE PARTS.





2.1 TORQUE GENERAL SPECIFICATIONS

- The following table specifies the fixed torques with ISO standard thread. The torque specifications for components or special units are indicated in the chapters of this guide referring to ISO. To avoid strains, screw the units gradually and cross them in one or alternative goes, to obtain the specified torque..



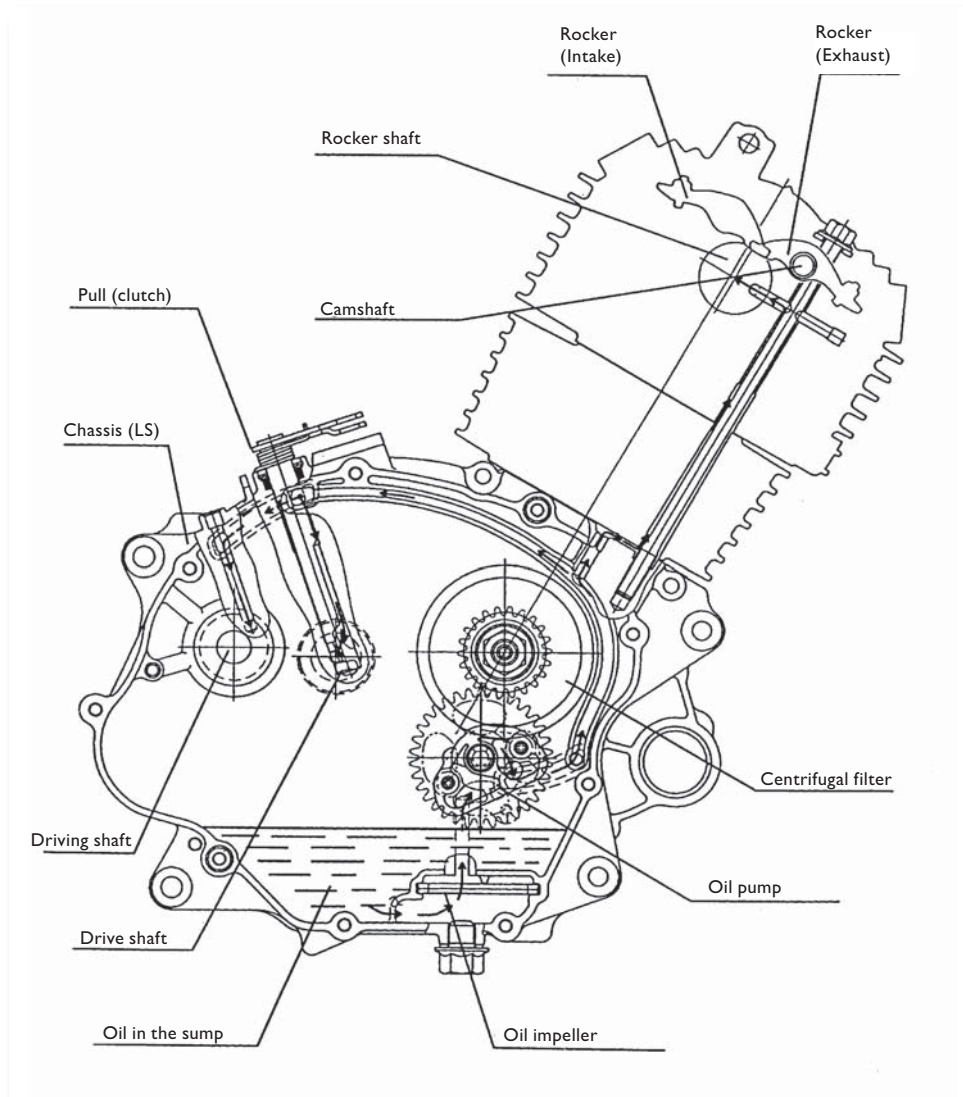
A= Distances among the planes.

B= External Diameter of the thread.

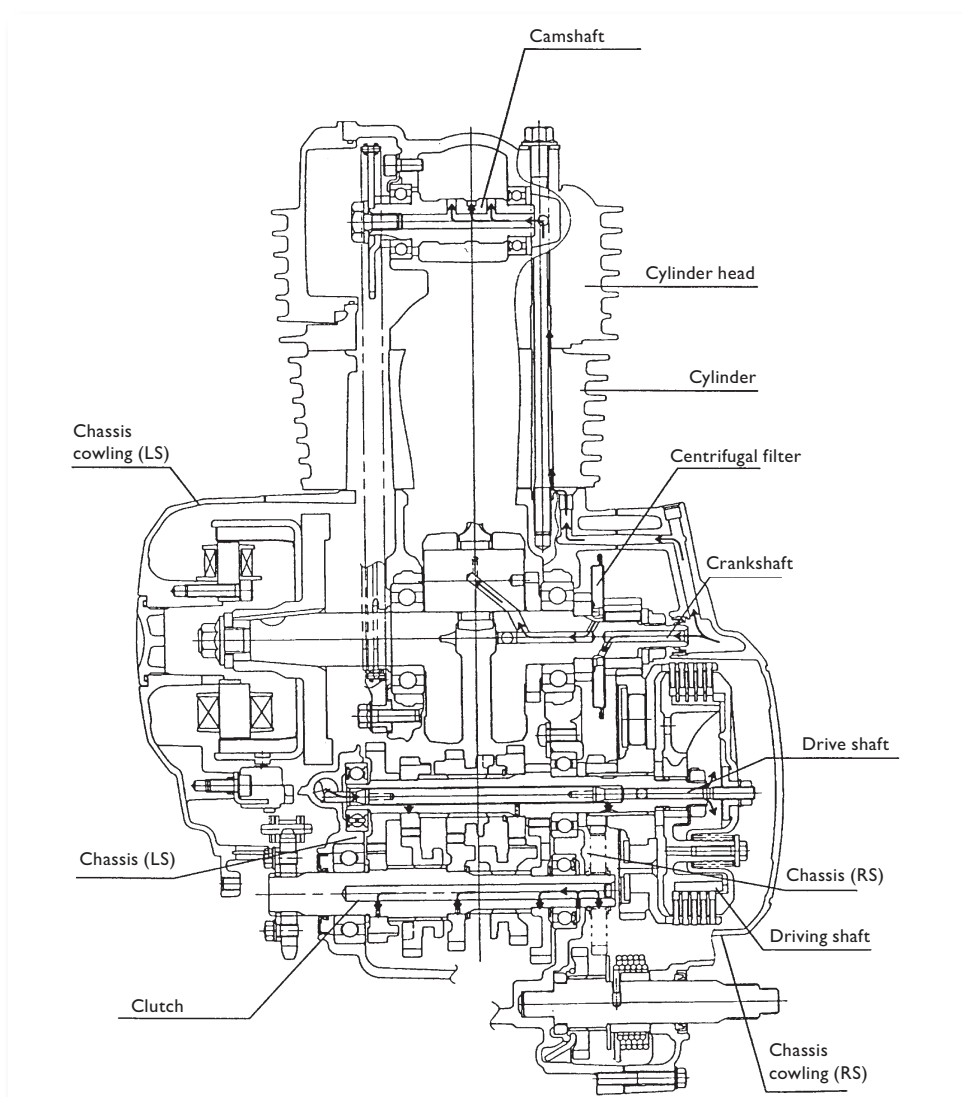
A (Nut)	B (Nut)	Torque general specifications		
		N.m	Kgf.m	ft.lb
10mm	6mm	6	0,6	4,3
12mm	8mm	15	1,5	11
14mm	10mm	30	3,0	22
17mm	12mm	55	5,5	40
19mm	14mm	85	8,5	61
22mm	16mm	130	13,0	94



2.2 LUBRICATION DIAGRAM



Don't damage the chassis surface, otherwise there will be oil leaks.



For a better performance, use always oil and "amalibe".

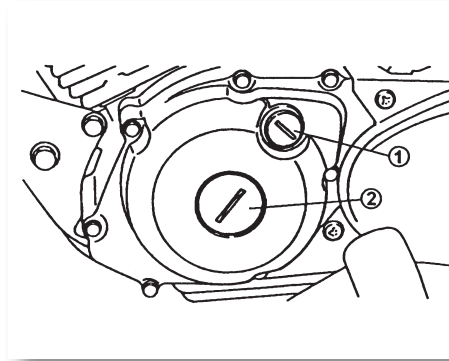
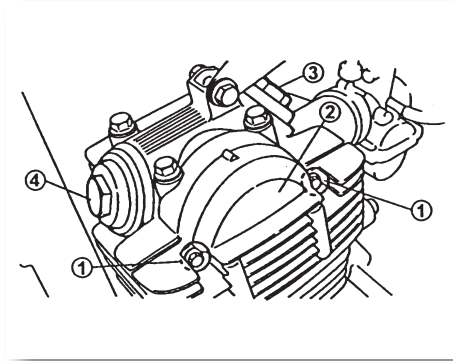


2.3 VALVES SET ADJUSTMENT

Remark:

The valves set should be adjust when the motor is cool down and at room temperature.

When adjusting or measuring the valves set, the piston should be in the top dead centre (TDC) at the compression moment.

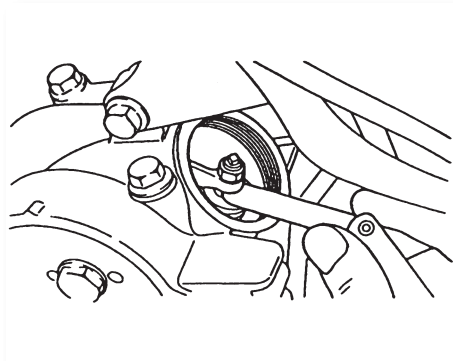


1) REMOVE:

- Spark plug
- Screws (1).
- Lateral cover of the cylinder head (2).
- Valves lining (intake) (3).
- Valves lining (exhaust) (4).

2) REMOVE:

- Top of the point control (with the gasket) (1).
- Central cap (with the gasket) (2)



3) MEASURE:

- Set of valves.

Unspecified => **Adjustment**



Set of valves (cold):

Intake:

0,08 ~ 0,12 mm

Exhaust:

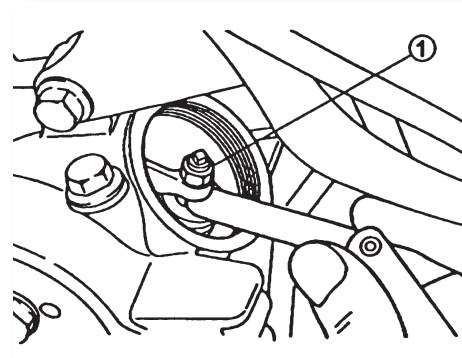
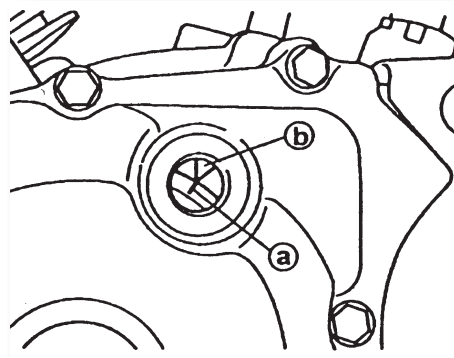
0,10 ~ 0,14 mm

**Steps for measuring:**

- Rotate the crankshaft anticlockwise aligning the mark (a) of the rotor with the stationary point (b) of the chassis cover (1), with the piston in the top dead centre (TDC), and when the mark of the control gear is aligned with the mark of the cylinder head.

- Measure the set of valves with a calibre of thickness.

Unspecified => **Set adjustment**

**4) ADJUST:**

- Set of valves.

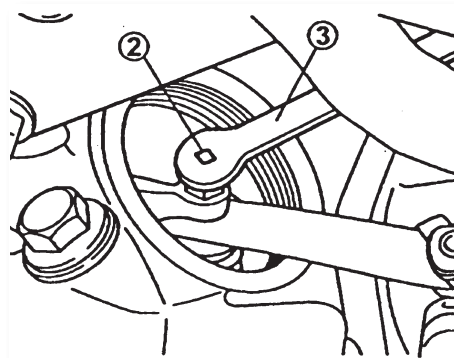
Steps for measuring:

- Loosen the locknut (1).

- Rotate the adjuster (2) towards the inside or outside with the fixed adjustable spanner (3) to obtain the specified play.

Turn towards the inside: Play diminishes

Turn towards the outside: Play increases



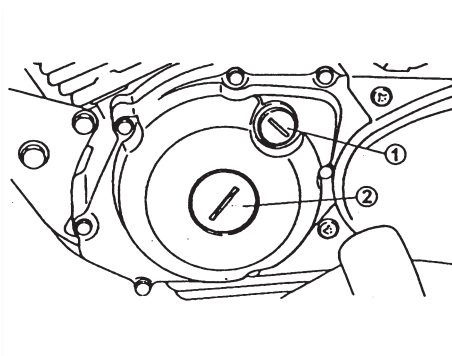
- Install the adjuster to impede it turns and tighten the locknut.



Locknut:

0,8Kgf.m (0,8N.m).

- Measure the set of valves.
- If the play is incorrect, repeat the aforementioned steps until the correct play is achieved.



5) INSTALL:

- Top of the point control (with the gasket) (1).
- Central cap (with the gasket) (2).

SPARK PLUG CONTROL

1) REMOVE:

- Spark plug connector.
- Spark plug.



Before removing the spark plug, blow on the area with compressed air to eliminate any piece of dirt, in order to avoid it falls inside the engine.

2) CHECK:

- Spark plug Type.



Incorrect => **Replace.**

Standard spark plug:

CR7HSA (NGK) / U22 FSR-U (DENSO)

**3) CHECK:**

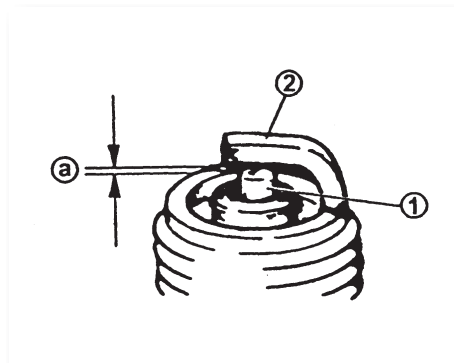
- Electrodes (1).

Damages/Wear => **Replacement.**

- Insulator (2).

Standard colour => **Replacement.**

The standard colour is light brown.

**4) CLEAN:**

- Spark plug.

(Clean the spark plug with a spark plug cleansing or a wire brush).

5) MEASURE:

- Play between the electrodes (a)
(with a calibre of thickness).

Unspecified => **Adjustment to play.**



Play between the electrodes:

0,7 mm

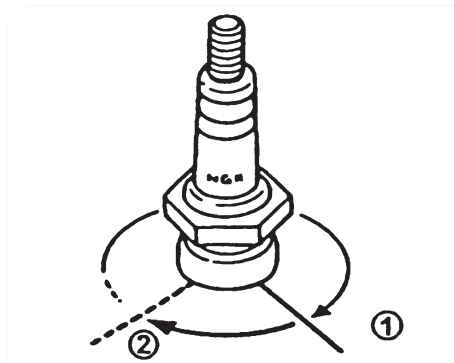
6) INSTALL:

- Spark plug.



Spark plug:

1,25 Kgf.m (12,5 N.m)





Remark:

- Before installing the spark plug, clean the surface of its seating and its gasket.
- In case you do not have a torque gauge, a good evaluation for the correct torque is to tighten (1) the spark plug by hand and then tighten from 1/4 to 1/2 turn to (2).
- Use always a new gasket.

2.4 IGNITION POINT CONTROL

Remark:

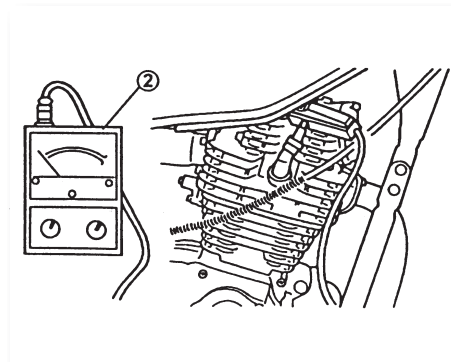
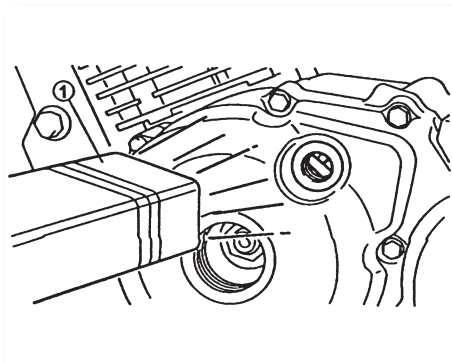
- Before controlling the ignition point, check all the electric connections linked into the ignition system. Make sure that the connections are tightly and without rusty and also the earth connections must be very tight.

1) REMOVE:

- Top of the point control

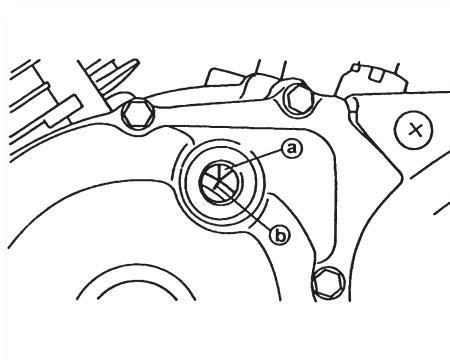
2) INSTALL:

- Stroboscope lamp (1).
- Inductive Tachometer (2) (in the spark plug cable).



**3) CHECK:**

- Ignition Point.

**Steps for checking:**

- Get the engine started and let it warming up for some minutes. Leave it working in the specified rotation.

**Idling speed:**

1.300 - 1.400 rpm

- Check visually if the stationary point (a) is inside the band (b) in the magneto flywheel.

Outside the band => **Check the ignition system.**

Remark:

- *The ignition point is not adjustable.*

4) INSTALL:

- Top of the point control (with the gasket).

2.5 COMPRESSION PRESSURE ADJUSTMENT**Remark:**

- *Insufficient compression pressure results in loss of power.*

1)CHECK:

- Set of valves

Unspecified => **Adjust.**

See section "**VALVES SET ADJUSTMENT**".

- 2) Get the engine started and let it warming up for some minutes.

- 3) Pull the engine up.

4) REMOVE

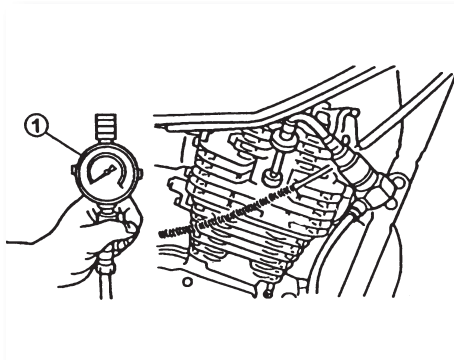
- Spark plug.



Before removing the spark plug, blow on the area with compressed air to eliminate any piece of dirt, in order to avoid it falls inside the engine.

5) INSTALL:

- Compressor gauge (I).



6) MEASURE:

- Compression Pressure

If it exceeds the permitted maximum pressure => **the cylinder head, the valves surface and the piston head in relation to carbon.**

If it is under the minimum pressure => **Inject some drops of oil into the cylinder and measure again.**

Follow the table below:

COMPRESSION PRESSURE (With oil injected into the cylinder)	
Higher measure than without oil	Worn or damaged piston
The same measure as without oil	Possible defect in rings, valves, cylinder head gasket or piston => REPAIR

Compression pressure (at the sea level):

Standard:

1.200 KPa (12 Kg/cm²)

Minimum:

1.040 KPa (10.4 Kg/cm²)



**Steps for measuring:**

- Get the engine started with the throttle totally opened, until the compression reading becomes stabilized.



Before getting the engine up, connect the cable from the spark plug to earth to avoid sparks.

**7) INSTALL:**

- Spark plug.

2.6 CHECKING OF THE MOTOR OIL LEVEL

- 1) Place the motorcycle in a flat surface.

Remark:

- Make sure that the motorcycle is in vertical line when checking the oil level.

- 2) Get the engine started and let it warming up for some minutes.

- 3) Pull the engine up.

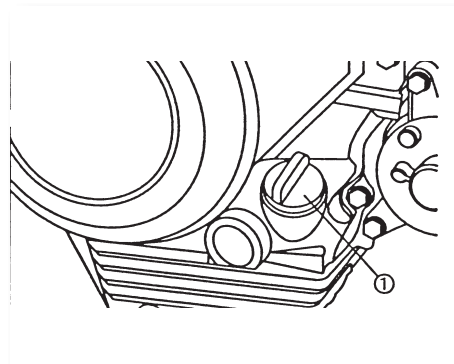
- 4) Move the oil level dipstick (1). Clean it with a cloth and place it in the orifice of oil supply without threading it. Immediately, move it again.

5) CHECK:

- Level of motor oil.

The level of oil should be between the maximum (1) and minimum (2) marks.

Oil underneath the minimum level => **Add oil up to the appropriate level.**

**2.7 RECOMMENDED MOTOR OIL****Recommended motor oil:**

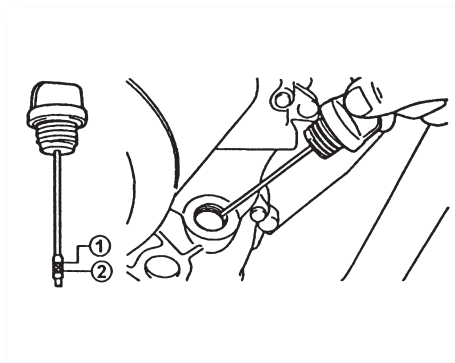
YAMALUBE 4 or similar.

6) Get the engine started and let it warming up for some minutes.

7) Pull the engine up.

Remark:

Wait some minutes till the oil goes down, before checking the oil level.



2.8 MOTOR OIL CHANGE

1) Get the engine started and let it warming up for some minutes.

2) Pull the engine up and place a tray under the motor.

3) REMOVE:

- Oil level dipstick.
- Drainage cap (I).
- Gasket.

Drain the oil in the sump.

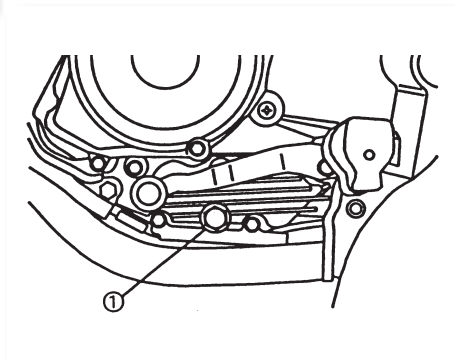
4) INSTALL:

- Drainage cap (I).
- Oil level dipstick.



Drainage cap:

2,0 Kgf.m (20 N.m)



**5) SUPPLY:**

- Oil in the sump.



Quantity of oil:
1,0 L

6) CHECK:

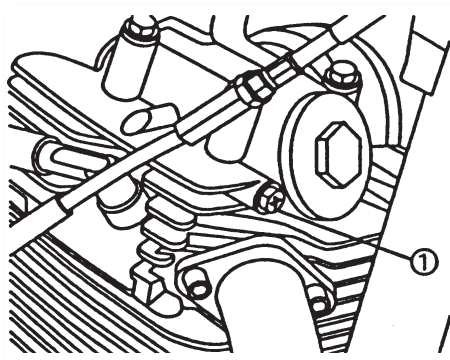
- Level of motor oil.

See section “CHECKING THE LEVEL OF MOTOR OIL” “OIL FLOW CHECKING”.

2.9 OIL FLOW CHECKING**1) REMOVE:**

- Control screw of the oil flow (1).

- 2) Get the engine started and keep it in the idling speed till the oil drips from the drain orifice.



Oil flows => **Oil pressure is good.**

Oil doesn't flow => **Oil pressure isn't not good.**



If oil doesn't come out after some seconds, Pull the engine up immediately and Check the oil pump section.

3) TIGHTEN:

- Control screw of the oil flow.



Screw of the oil flow:
0,7 Kgf.m (7N.m)



2.10 EXHAUST SYSTEM CHECKING

1) CHECK:

- Screws (1) (exhaust pipe).

Loose / damages => **Tighten / replace.**

- Gasket (exhaust pipe).

Leak of exhaust fumes => **Tighten / replace.**

Screw:

0,7 Kgf.m (7N.m)

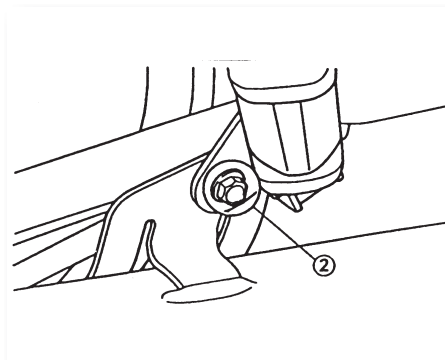
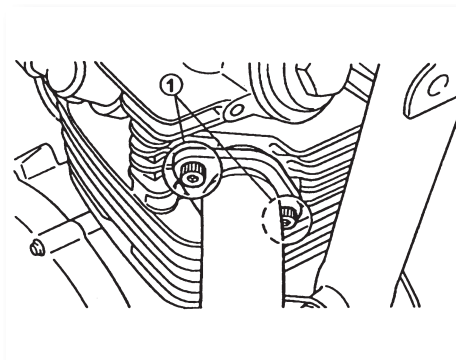
2) CHECK:

- Screws (2).

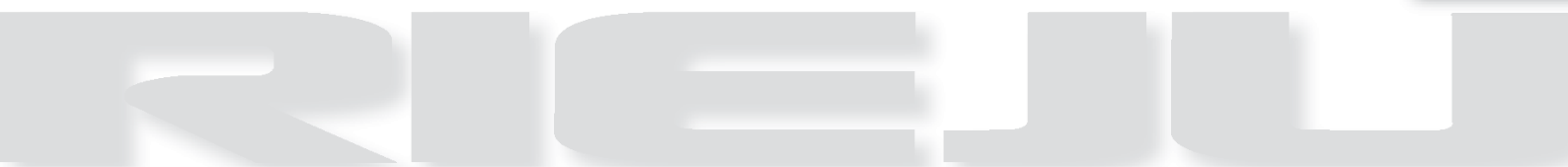
Loose / damages => **Tighten / replace.**

Screw:

1,5 Kgf.m (15N.m)



Engine RIEJU





3.1 MOTOR DISASSEMBLY

CYLINDER HEAD, CYLINDER AND PISTON

REMARK:

With the assembled motor in the frame, the cylinder head, camshaft and cylinder can be checked, replace the following parts:

- Seat
- Side cowling
- Fuel tank
- Exhaust pipe
- Carburettor
- Clutch cable
- Spark plug Cable
- Securing base of the engine

1) REMOVE:

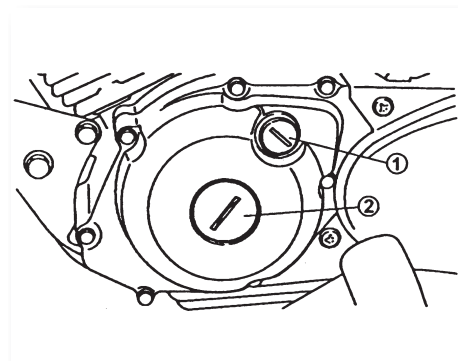
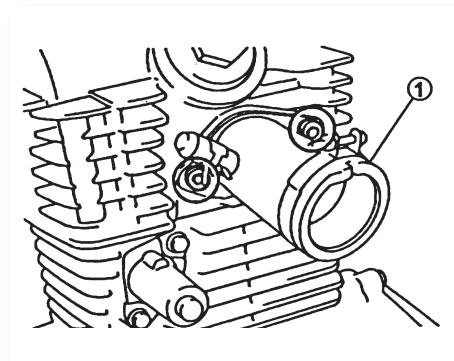
- Spark plug.
- Inlet manifold (1).

2) REMOVE:

- Top of the point control (with the gasket) (1).
- Central cap (with the gasket).

3) REMOVE:

- Valves lining (with the gasket).
- Side covers of the cylinder head (with the gasket).





4) ALIGN:

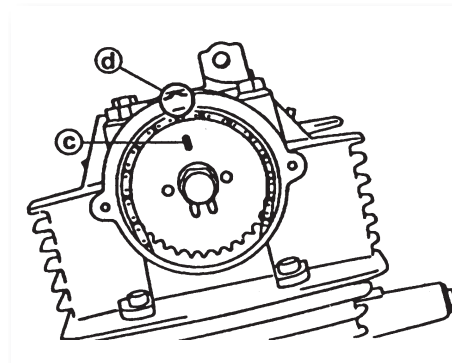
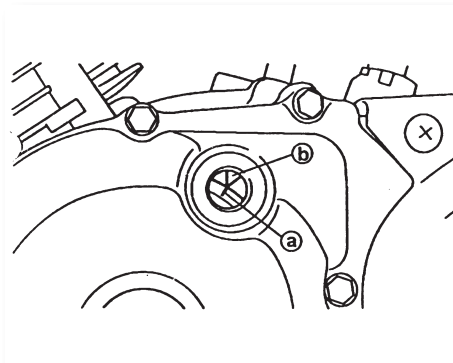
- Magneto mark (a) (with the stationery point (b) of the chassis cowling).

Remark:

Rotate the crankshaft anticlockwise with a spanner.

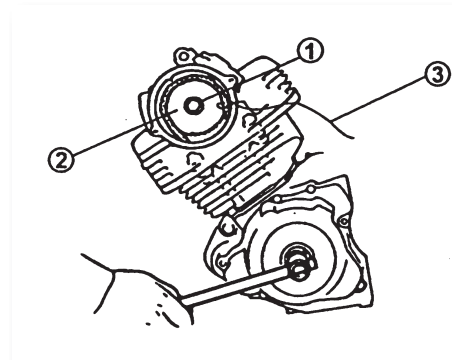
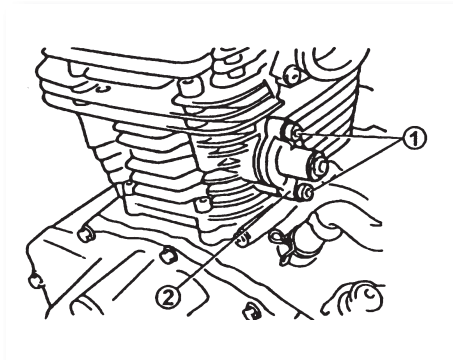
Steps for alignment with TDC:

- Rotate the crankshaft anticlockwise aligning the mark (a) with the top dead centre (TDC) (b).
- Align the mark I (c) of the control gear with the stationary point (d) of the cylinder head. So, the piston will remain in top dead centre (TDC).



Remark:

- Check if the piston is in the TDC of the compression time.
- If it is not, rotate the crankshaft anticlockwise completely once again.



5) REMOVE:

- Screw (adjuster of the timing chain) (1).
- Adjuster unit of the timing chain (2).

6) REMOVE:

- Screw (control gear) (1).
- Particular washer (control gear) (2).

**7) REMOVE:**

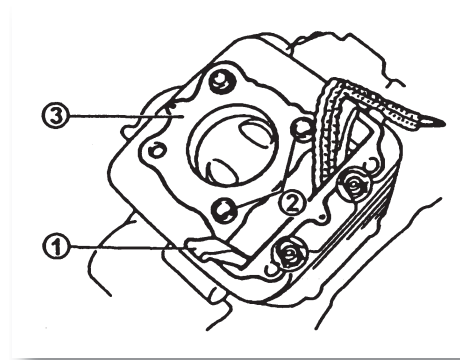
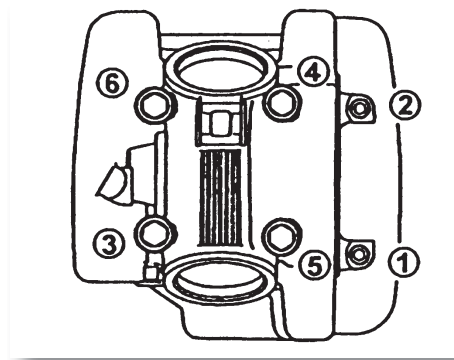
- Screws (cylinder head).
- Cylinder head.

Remark:

- Loosen each one of the screws 1/4 turn and remove them when they are completely loose.
- Loosen the screws, beginning with the smaller number.
- The stamped numbers on the cylinder head indicated the torque sequence.

8) REMOVE:

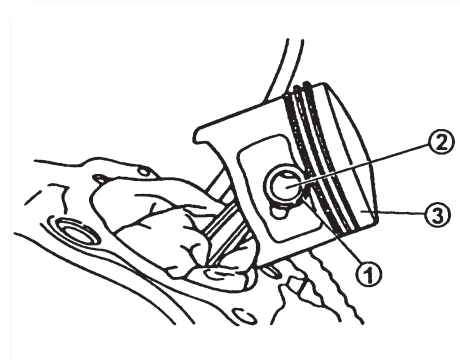
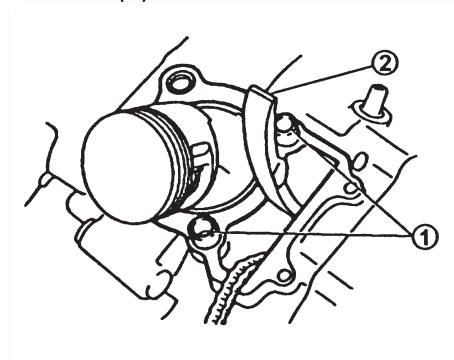
- Guide of the timing chain (exhaust) (1).
- Tangs guide (2).
- Gasket (cylinder head) (3).
- Screws (cylinder head).
- Clutch cable hold.
- Cylinder.

**9) REMOVE:**

- Tangs guide (1).
- Gasket (cylinder) (2).

10) REMOVE:

- Clamp rings of the bolt (1).
- Bolt (2).
- Piston (3).





Remark:

• Before removing the clamp rings of the bolt, cover the cylinder with a clean cloth to avoid that something falls inside the engine.

• Before removing the bolt, take the slot flanges out of the clamp rings and the orifice rim. Once the flanges are removed, it there are still difficulties for getting the bolt out, use the corresponding tool.

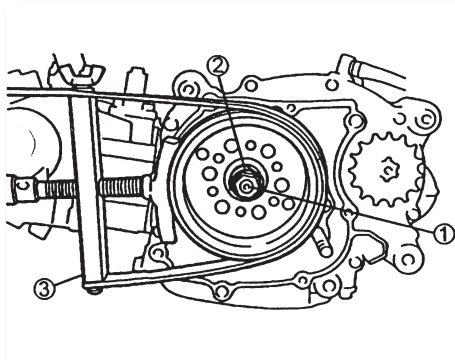
3.2 MAGNETO FLYWHEEL

Remark:

The magneto flywheel can be removed while the engine is assembled in the frame, releasing the change pedal.

1) EXTRAER:

- Chassis cowling (LS).
- Drive of the neuter switch.
- Nut (magneto) (1).
- Flat Washer(2).



Remark:

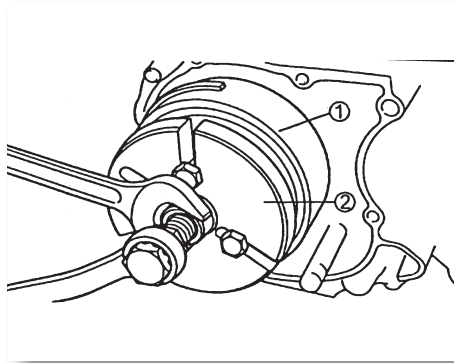
Loosen the nut of the magneto while hold the magneto with the rotor support (magneto) (3).

**2) REMOVE:**

- Magneto flywheel (1).
- Cotter.

Remark:

- Remove the flywheel magneto with the rotor extractor (2).
- Centre the rotor extractor of the magneto flywheel. Make sure that the play between the extractor and the flywheel is the same in all the points, after installing the securing screws. If it is necessary, loosen one of the screws lightly in order to tighten the extractor position.



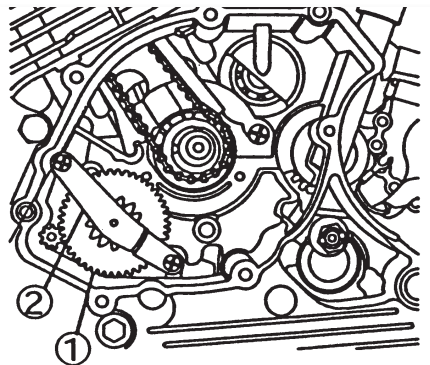
Cover the point of the crankshaft with the spanner to avoid damages.

3) REMOVE:

- Start gear.
- Washer.

4) REMOVE:

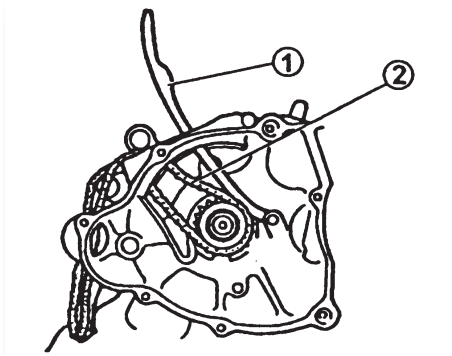
- Plate (2).
- Start gear (1).





5) REMOVE:

- Guides of the timing chain (1).
- Timing chain (2).



3.3 CLUTCH

Remark:

The clutch unit can be removed with the assembled motor in the frame. To be able to do it take the following parts out:

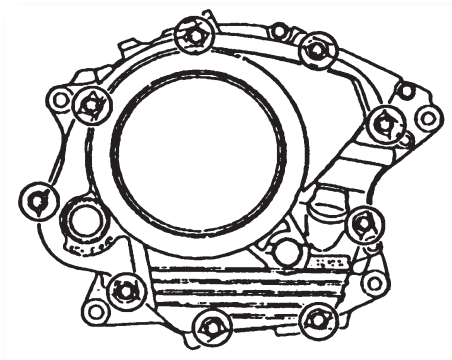
- Exhaust
- Foot rest
- Brakes pedal
- Start Pedal

1) REMOVE:

- Chassis cowlings (RS).

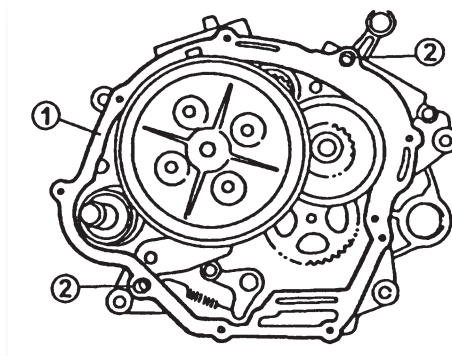
Remark:

Loosen screws diagonally.



**2) REMOVE:**

- Gasket (1).
- Tangs guide (2).

**3) EXTRAER:**

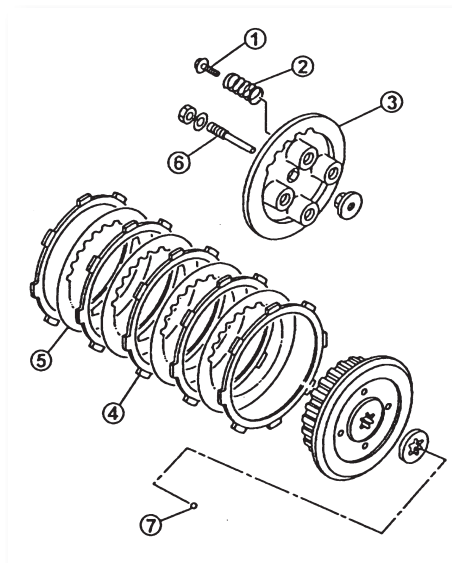
- Screws of the pressure plate (1).
- Clutch springs (2).
- Pressure plate (3).
- Friction plates (4).
- Separators (5)

Remark:

Loosen the screws of the pressure plate diagonally.

4) REMOVE:

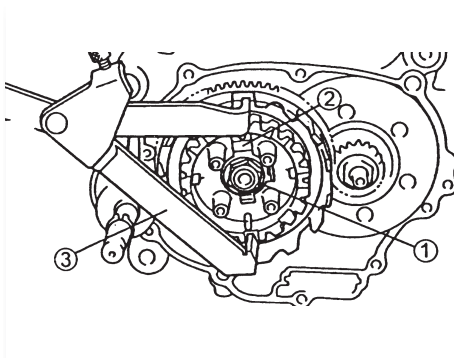
- Operation rod N° 6.
- Ball (7).





5) LOOSE:

- Nut (clutch drum) (1).

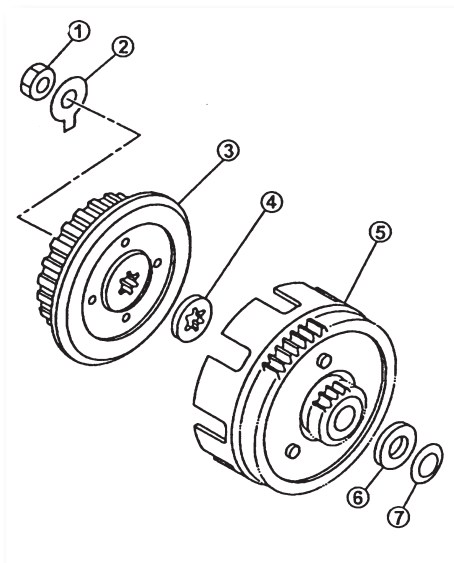


Remark:

- Smooth the rim of the clamp rings (2).
- Loosen the nut (1) from the clutch drum while the drum is hold with the universal clutch support (3).

6) REMOVE:

- Nut of the clutch drum (1).
- Clamp rings (2).
- Clutch drum (3).
- Pressure Washer (4).
- Clutch hood (5).
- Space washer (6).
- Washer (7).



**7) LOOSE:**

- Nut (1).

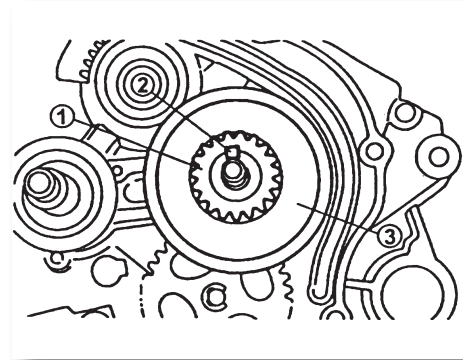
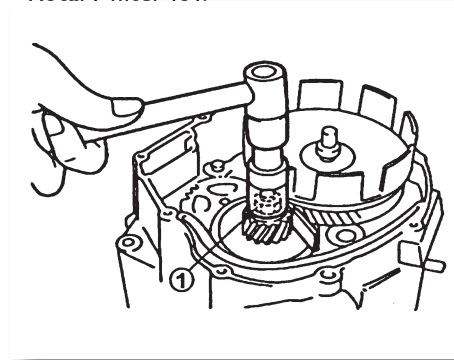
Remark:

• Place a folded aluminium sheet between the teeth of the primary gear and those of the hood.

• Take care not to damage the gear teeth.

8) REMOVE:

- Nut.
- Particular washer.
- Primary gear (1).
- Cotter (2).
- Rotary filter (3).

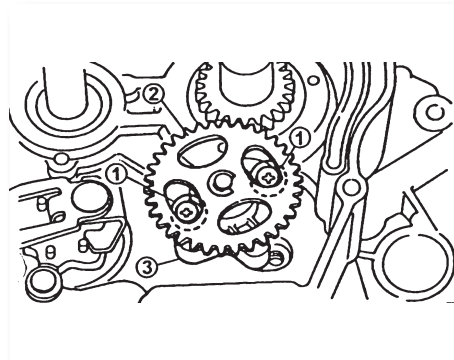
**3.4 OIL PUMP****Remark:**

• The oil pump can be removed with the assembled engine in the frame. To be able to do it take the following parts out:

- Clutch
- Rotary filter

1) REMOVE:

- Screw with washer (oil pump) (1).
- Oil pump unit (2).
- Oil impeller.





3.5 START PEDAL SHAFT

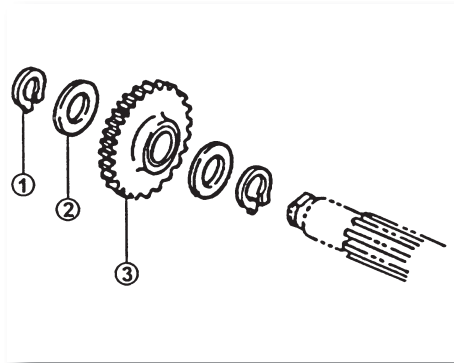
Remark:

• The start pedal can be removed with the assembled motor in the frame. To be able to do it, take the following parts out:

- Exhaust.
- Foot rest
- Brakes pedal
- Change pedal.
- Clutch.

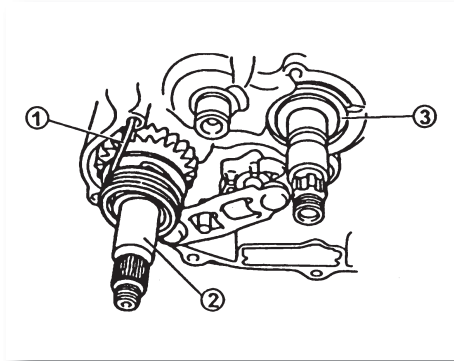
1) REMOVE:

- Clamp ring (1).
- Particular washer (2).
- Star system gear (3).
- Particular washer.
- Clamp ring.



2) EXTRAER:

- Torque spring (1).
- Star shaft unit (2).
- Particular washer (3).
- Clamp ring.

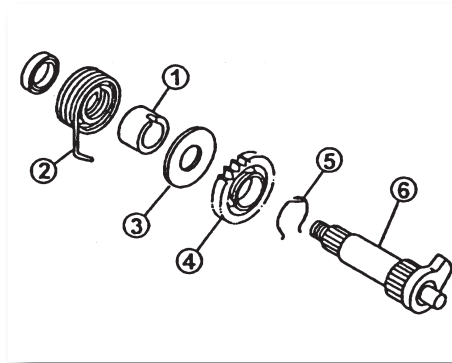




3.6 DISASSEMBLY OF THE START SYSTEM SHAFT WITH PEDAL

1) REMOVE:

- Space washer (1).
- Torque spring (2).
- Washer (3).
- Start system gear (4).
- Clamp ring (5).
- Start system shaft (6).



3.7 CHANGE SHAFT

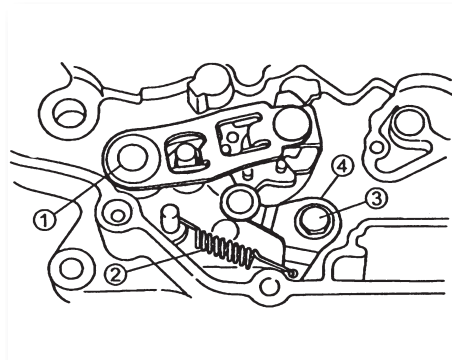
Remark:

• The change shaft can be removed with the assembled motor in the frame. To be able to do it take the following parts out:

- Exhaust.
- Foot rest.
- Change pedal.
- Clutch.
- Start system with pedal unit

1) REMOVE:

- Change shaft (1).
- Torque spring (2).
- Screw (constrained rod) (3).
- Constrained rod (4).

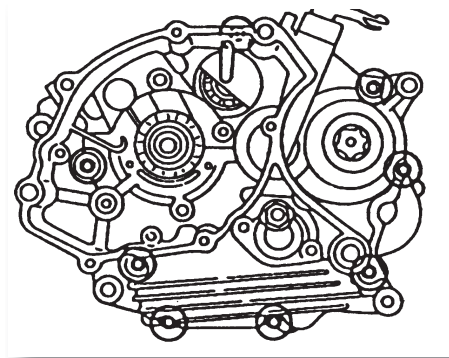
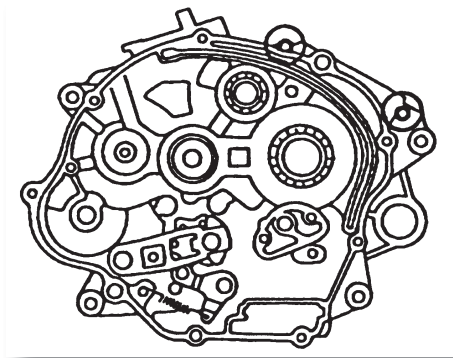




3.8 CHASSIS

1) REMOVE:

- Screws (chassis).
- Battery cable supports.



Remark:

- Loosen the screws diagonally.
- Loosen each one of the screws 1/4 turn and remove them when they are completely loose.

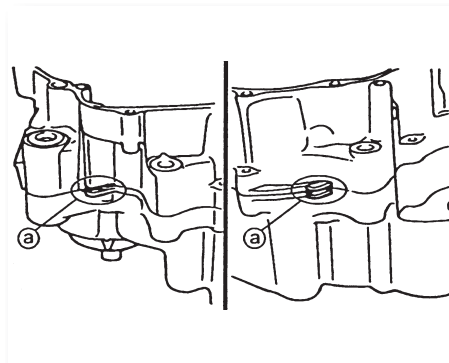
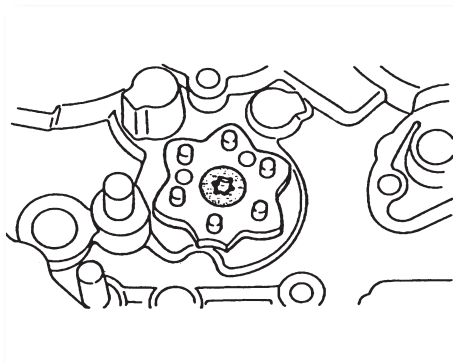
2) REMOVE:

- Screw of the change selector ring.

Use an Alien spanner of 4 mm.

3) REMOVE:

- Chassis (LD).



Remark:

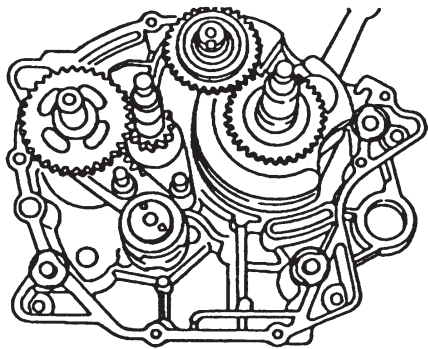
- Place the motor with the chassis (LS) downwards and then put a screwdriver in the division slots (a) of the chassis.



- Use the screwdriver only in the indicated points.
- The chassis (LS) should remain downwards.
- Separate the chassis after checking if the change selector ring and the clamp ring shaft have been removed.
- Do not damage the contact surfaces of the chassis.

3) REMOVE:

- Tangs guide.



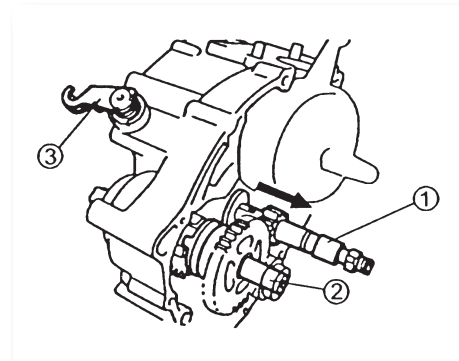
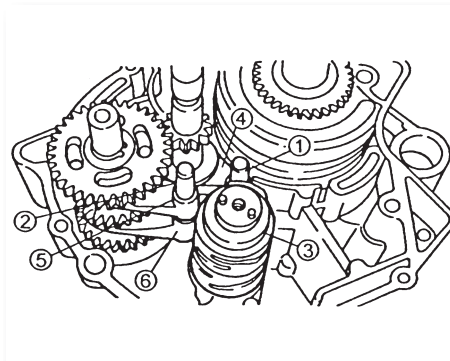
3.9 ROCKER ARM, TRANSMISSION AND CHANGE SELECTOR

1) REMOVE:

- Guide bar of the change fork (1) (short).
- Guide bar of the change fork (2) (long).
- Change selector (3).
- Change fork (1) (4).
- Change fork (2) (5).
- Change fork (3) (6).

2) REMOVE:

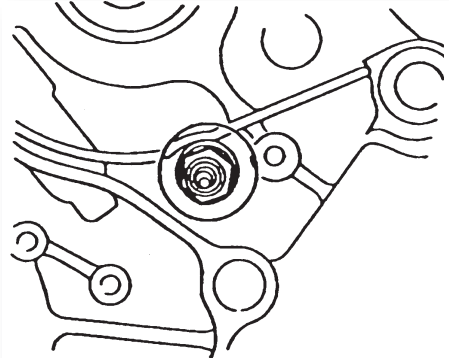
- Drive shaft unit (1).
- Operation rod (n°2).
- Driven shaft unit (2).
- Washer.
- Operation lever unit (3).





3) REMOVE:

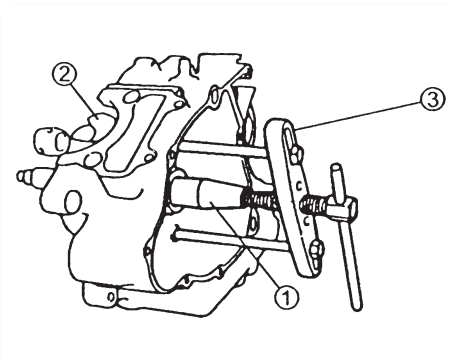
- Neuter switch.



3.10 CRANKSHAFT

1) REMOVE:

- Crankshaft (1) with the rocker arm shaft. (2).



Remark:

- Remove the crankshaft with the crankshaft extractor (1).

• Tighten the screws of the crankshaft extractor till the end, but make sure that the body of the tool is in parallel with the chassis. If it is necessary, loosen one of the screws to adjust the position of the crankshaft extractor.



3.II ROCKERS, CAMSHAFT AND VALVES

1) LOOSEN:

- Locknut of the valve adjusters.
- Valve adjusters.

2) REMOVE:

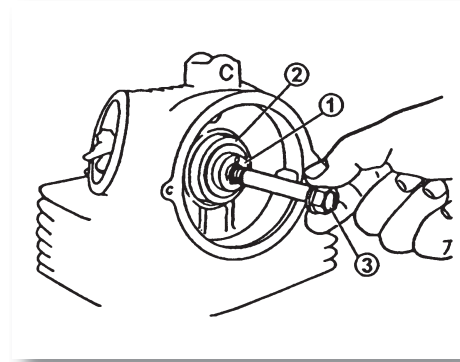
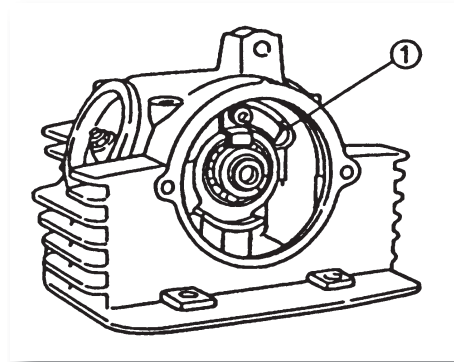
- Clamp plate (1).

3) REMOVE:

- Camshaft (1).
- Space washer (2).

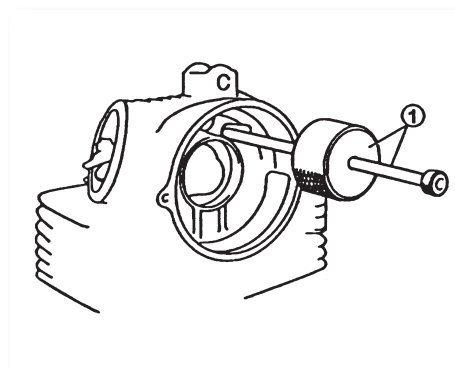
4) REMOVE:

- Rockers shafts.
- Rockers (intake and exhaust).



Remark:

- Install the special tool (1) in the rocker shaft to take it out.



Remark:

- Before removing the internal parts (valves, springs, valve seating, etc) of the cylinder head, check the valves are closed.



5) CHECK:

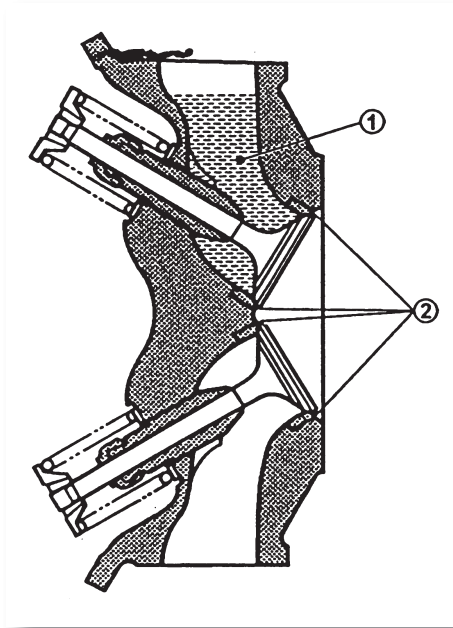
- Valve closing.

Leaks in the valve seating => **Check the valve , valve seating and width of the valve seating.**

See section: **“CHECK AND REPAIR – VALVE SEATING”**.

Steps for checking:

- Fill up the intake chamber and then the exhaust chamber with petrol (1).
- Check the closing of both valves. The valve seating (2) cannot have any leak.

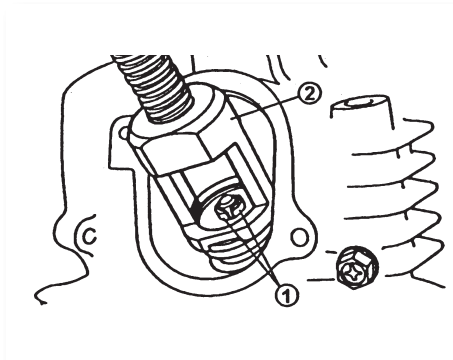


6) REMOVE:

- Valve clasp (1).

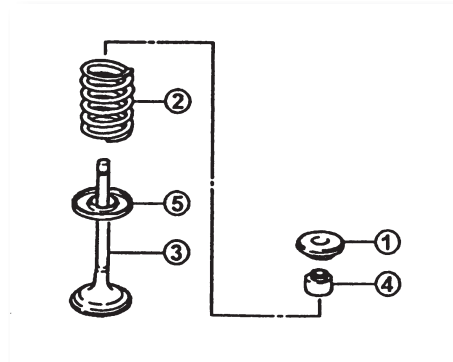
Remark:

- Install the valve spring compressor (2) between the seating of the clasp and the cylinder head, to loosen the valve clasp.



**7) REMOVE:**

- Clasp seating (1).
- Spring (2).
- Valve (3).
- Constraint ring (4).
- Spring seating (5).

**Remark:**

- Identify the position of each piece carefully, so that they can be reinstalled in their original positions.

3.12 CYLINDER HEAD CHECK AND REPAIR**1) ELIMINATE:**

- Carbon sediment (of the compression chamber).
- Use a rounded spatula.

Remark:

- Do not use an instrument with sharp edges to avoid damages and scratches.
- In the thread of the spark plug.
- In the valve seating.



2) CHECK:

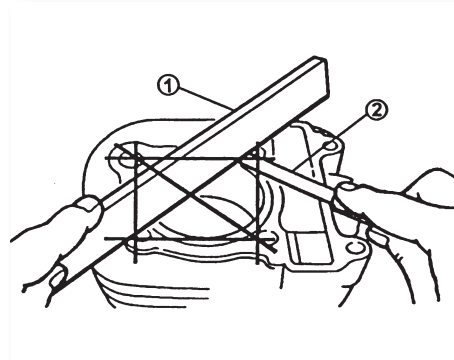
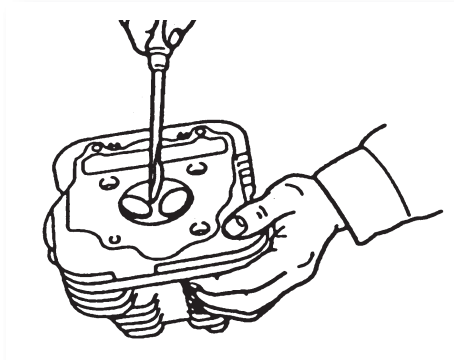
- Cylinder head.

Scratches / damages => **Replace.**

3) MEASURE:

- Strain.

Unspecified => **Rectify.**



Strain of the cylinder head:

Below 0,03 mm

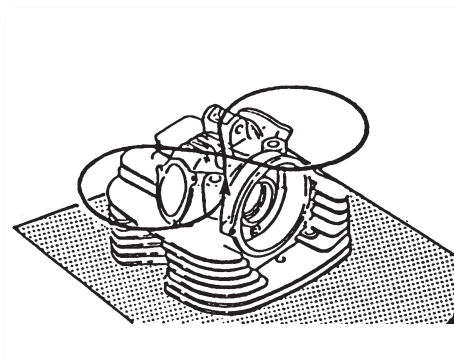
Steps for measuring the strain and correction:

- Place a rule (1) and a calibre of thickness (2) on the surface of the cylinder head as it is illustrated above.

- Measure the strain.

- If the strain is unspecified, correct the cylinder head.

- Put a sandpaper of 400 ~ 600 on a flat surface and correct the cylinder head surface with 8-shaped movements.



Remark:

- Rotate the cylinder head several times to avoid excessive removal of material only in one side.



3.13 VALVE SEATING

1) ELIMINATE:

- Carbon sediment..
(in the face and in the valve seating).

2) CHECK:

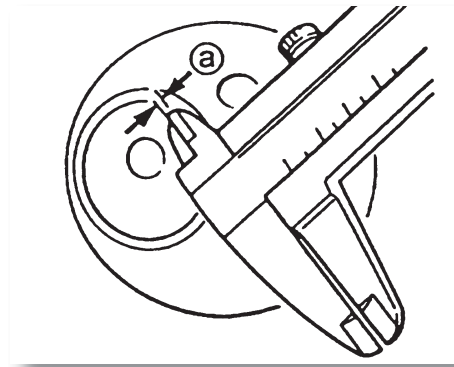
- Valve seating.

Groove / Wear => **Polish the valve with emery.**

3) MEASURE:

- Width of the valve seating (a).

Unspecified => **Polish the valve with emery.**



Width of the valve seating:

Inlet:

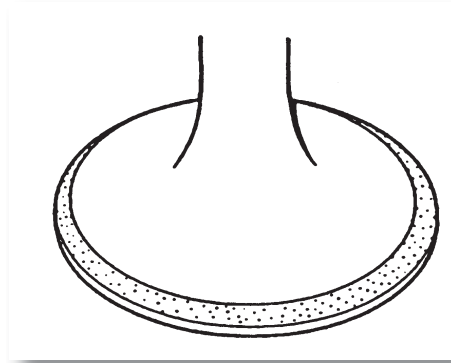
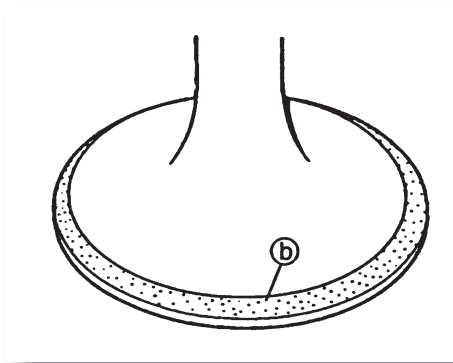
0,9 -1,1 mm
< Limit: 1,6 mm >

Exhaust:

0,9 -1,1 mm
< Limit: 1,6 mm >

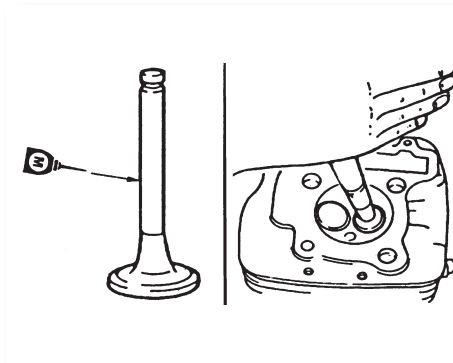
Steps for measuring:

- Apply blue ink of mechanics (Dykem) (b) in the face of the valve.
- Install the valve in the cylinder head.
- Press the valve against the guide and against its seating to make a visible mark.
- Measure the width of the valve seating.
- Where there was a contact between the seating and the front of the valve, the ink will be removed.
- If the seating width of the valve is big, small or it is not centred, it has to be redone.



4) POLISH WITH EMERY:

- Front of the valve.
- Valve seating.



Remark:

- After correcting the valve seating or replacing the valve and its guide, the seating and the front should be polished with emery.

Steps for fixing the valves:

- Apply an abrasive thickness paste on the front of the valve.



Not to allow to enter the paste in the space between the rod and the valve guide.

- Apply oil with disulphide molybdenum in the valve rod.
- Install the valve in the cylinder head.
- Rotate the valve until its front and its seating are uniformly polished, at once eliminate the whole paste.

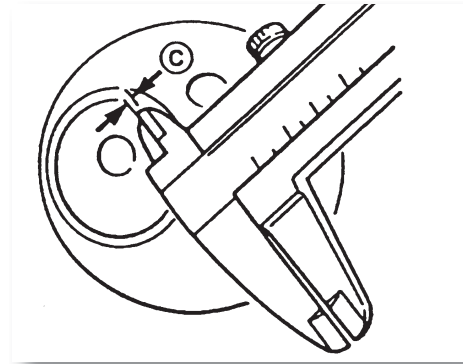
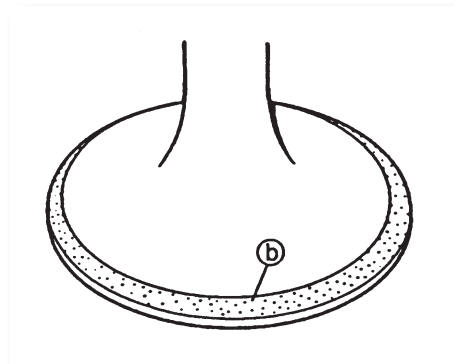
Remark:

- To obtain the best results in fixing the valves, flap smoothly in the valve seating while you turn it forwards and backwards by hand.
- Apply an abrasive thin paste on the front of the valve and repeat the steps aforementioned.

**Remark:**

• Make sure that the front and the seating are completely free from the abrasive paste after each fixing of valves.

- Apply blue ink of mechanics (Dykem) on the front of the valve (b).
- Install the valve in the cylinder head.
- Press the valve through the valve guide and against its seating to get a good contact.
- Measure the width of the valve fixing (c) again. If it is unspecified, correct and polish the valve seating with emery.

**3.14 VALVES AND VALVE SPRINGS****1) MEASURE:**

- Free length(a) of the spring.
- Unspecified = > Replace.*



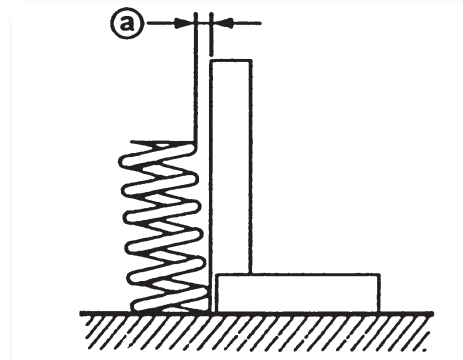
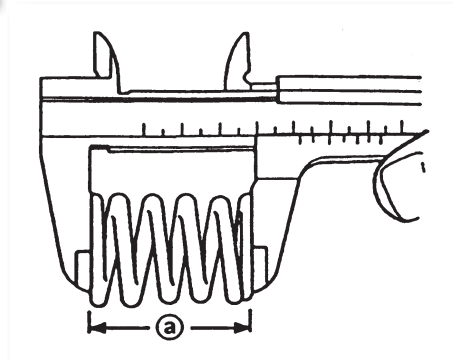
Free length of the valve spring:
39,62 mm < Limit: 38,0 mm >

2) MEASURE:

- Inclination of the spring (a).
- Unspecified = > Replace.*



Inclination limit of the spring:
1,7mm





3) MEASURE:

- Contact front of the spring.
- Wear / damages / scratches => **Replace.**

4) MEASURE:

- Internal Diameter of the valve guide.
- Unspecified => **Replace.**



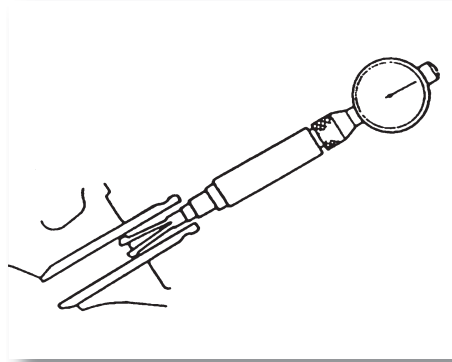
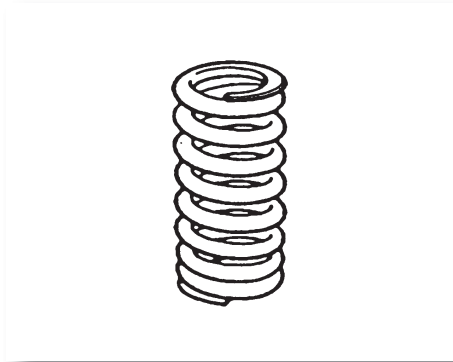
Internal diameter of the valve guide:

Inlet:

5,000 - 5,012 mm
< Limit: 5,042 mm >

Exhaust:

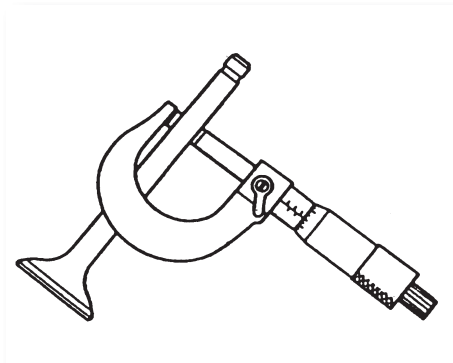
5,000 - 5,012 mm
< Limit: 5,042 mm >



5) MEASURE:

Rod-guide set:

Internal diameter of the guide.
Diameter of the rod valve.



Limit of rod-guide set:

Inlet:

0,010 ~ 0,037 mm
< Limit: 0,08 mm >

Exhaust:

0.025 ~ 0,052 mm
< Limit: 0,10 mm >

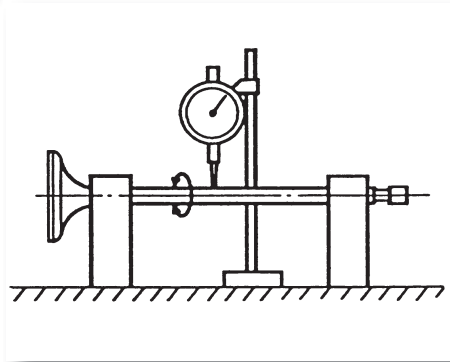
Unspecified => **Replace the valve guide.**

**6) MEASURE:**

- Warping (valve rod).
- Unspecified => **Replace.**

**Warping limit:**

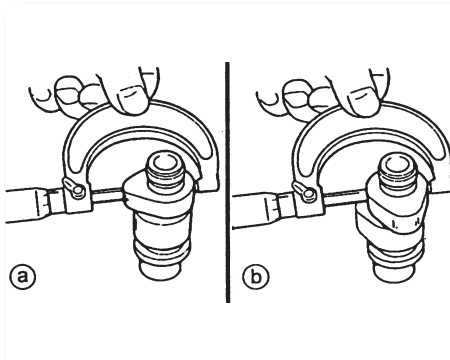
0,01 mm

**3.15 CAMSHAFT CHECKING****1) CHECK:**

- Cam salient.
- Groove / scratches / blue coloration => **Replace.**

2) MEASURE:

- Cam measurements (a) and (b).
- Unspecified => **Replace.**

**Cam measurements:****Inlet:**

(a) 25,881 ~ 25,981 mm

< Limit: 25,851 mm >

(b) 21,195 - 21,295 mm

< Limit: 21,165 mm >

Exhaust:

(a) 25,841 - 25,941 mm

< Limit: 25,811 mm >

(b) 21,05 - 21,15 mm

< Limit: 21,02 mm >



3) CHECK:

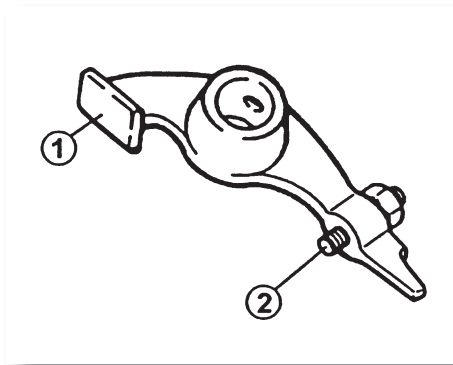
- Oil leak in the camshaft.
- Obstruction => **Compressed air blowing.**

3.16 ROCKERS AND THEIR SHAFTS CHECKING

1) CHECK:

- Cam contact surface (1).
- Adjuster surface (2).

Wear / grooves / scratches / blue coloration => **Replace.**



Steps for checking:

- Check if the two contact areas of the rockers have signs of abnormal wear.

- Orifice of the rocker shaft.

- Cam contact surface.

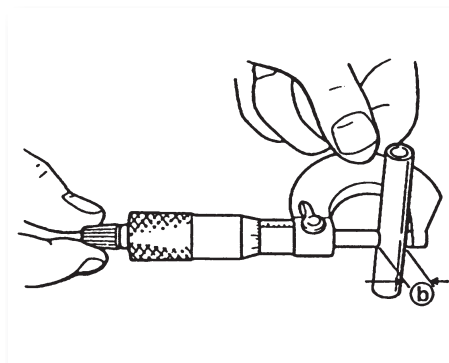
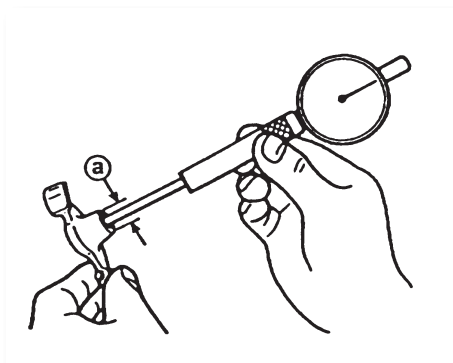
Excessive wear => **Replace.**

- Check the surface conditions of the rockers shaft.

Grooves / scratches / blue coloration => **Replace or check the lubrication system.**

- Measure the internal diameter of the rockers orifice.

Unspecified => **Replace.**



**Internal diameter (rocker) :**

10,000 ~ 10,015 mm
< Limit: 10,03 mm >

• Measure the external diameter (b) of the rockers.
Unspecified => **Replace.**

**External diameter (rocker shaft):**

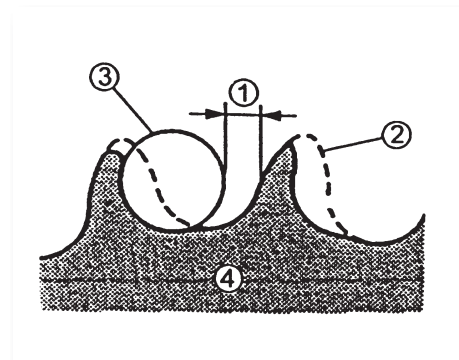
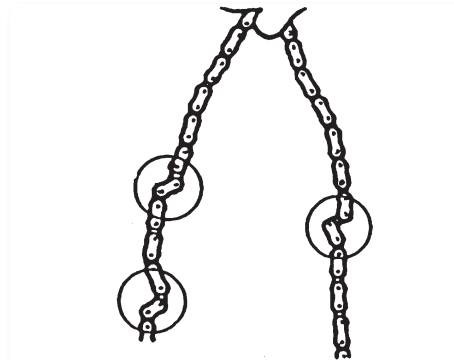
9,981 ~ 9,991 mm
< Limit: 9.95 mm >

3.17 CAMSHAFT CHECKING**1) CHECK:**

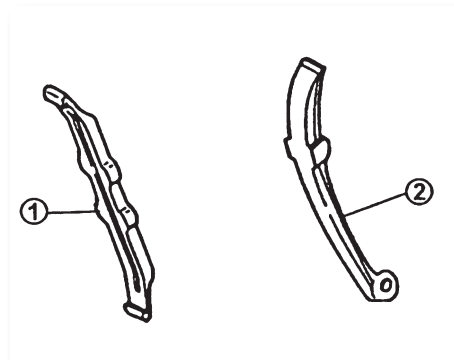
• Timing Chain.
Rigidity / damages => **Replace the chain and the gear.**

2) CHECK:

• Control gear.
Damages / wear => **Replace the gear and the timing chain.**
• 1/4 tooth (1).
• Correct (2)
• Roller (3).
• Gear (4).

**3) CHECK:**

• Timing chain guides (exhaust) (1).
• Timing chain guides (intake) (2).
Damages / wear => **Replace.**





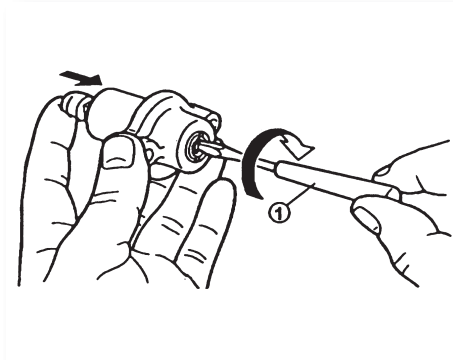
3.18 TIMING CHAIN STRUT

1) CHECK:

- Ratchet brace operation.
- Irregular operation => **Replace.**

Steps for checking:

- While the adjuster rod is lightly pressed by hand, use a screwdriver to turn totally the adjuster rod clockwise.
- When get the screwdriver out, press lightly by hand, and make sure that the adjuster rod moves forwards smoothly.
- On the contrary, replace the adjuster chain unit.



3.19 CYLINDER AND PISTON

1) CHECK:

- Cylinder and piston walls.
- Vertical scratches => **Rectify or replace the cylinder and the piston.**

2) MEASURE:

- Cylinder-piston play.

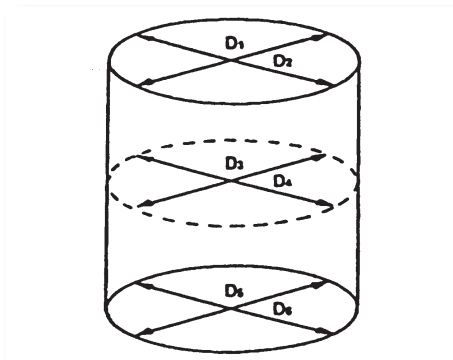
Steps for measuring:

1st Step:

- Measure the "C" diameter of the cylinder.

Remark:

- Measure the "C" diameter of the cylinder in a cross-shape and right-angled to the the crankshaft. Then, calculate the average of the measurements.





"c" Diameter of the cylinder	54,000 ~ 54,018mm
"T" conical limit	0,05mm
Ovalidad "R"	0,01mm

"C" = maximum D
"T" = (maximum D ₁ or D ₂) - (maximum D ₅ or D ₆)
"R" = (maximum D ₁ , or D ₃ or D ₅) - (maximum D ₂ , or D ₄ or D ₆)

- If it is unspecified, rectify or replace the cylinder and replace the piston and the rings altogether.

2nd Step:

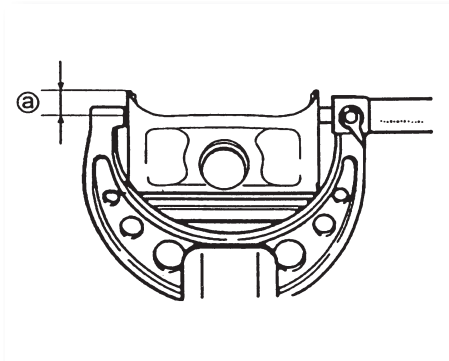
- Measure the "brim" of the "P" piston with a micrometer.

(a) 4,5 mm from "brim" of the piston.

	"P" Piston diameter
Standard	53,977 ~ 53,996mm

Over measure	I°
	II°

- It is unspecified, replace the piston and the rings altogether.



3rd Step:

- Calculate the cylinder – piston play, using the following formula:

Cylinder – piston set:

Diameter of the "C" cylinder.

Diameter of the "P" piston brim.



Set (cylinder - piston):

0,020 - 0,028 mm

< Limit >: 0,15 mm

- If it is unspecified, rectify or replace the cylinder, the piston and its rings altogether.



3.20 RINGS CHECKING

1) MEASURE:

- Lateral play.

Unspecified = > **Replace the piston and its rings altogether.**

Remark:

- *Eliminate the carbon sediments from the grooves of the piston rings before measuring the lateral play.*



Lateral play (rings of the piston):

Top ring - Limit

0.03 ~ 0,07 <0,12 mm>

Secondary ring (scraper):

< Limit >

0.02 - 0,06 <0,1 2 mm >

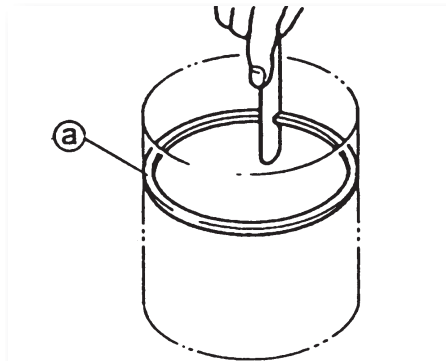
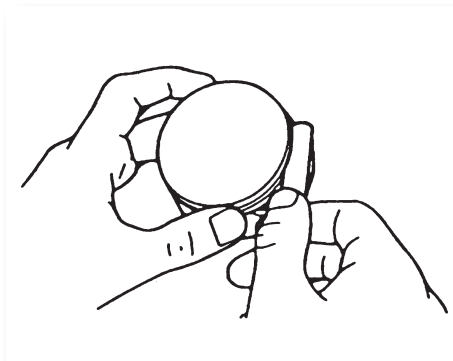
2) PLACE:

- Piston rings (in the cylinder).

Remark:

- *Push the ring with the piston top, in order that it is in parallel with the cylinder base.*

(a) 5 mm



3) MEASURE:

- Play among tips

Unspecified = > Replace.

Remark:

- *You cannot measure the play among tips in the extension ring of the oil ring. If the oil ring has a excessive play, replace the three rings.*



Play among tips:

Top ring - Limit:

0,15 - 0,30 mm <0,40 mm>

Secondary ring (scraper) - Limit:

0,30 ~ 0,45 mm <0,55 mm>

Oil ring:

0,2 ~ 0,7 mm



3.21 BOLT CHECKING

1) CHECK:

- Bolt.

Blue coloration / grooves => Replace and immediately control the lubrication system.

2) MEASURE:

- Play piston - bolt.

Steps for measuring:

- Measure the external diameter of the bolt (a).
- Unspecified => Replace the bolt.



External diameter (bolt):

14,991 - 15,000 mm
< Limit: 14,975 mm >

- Measure the diameter of the bolt place in the piston (b).
- Calculate the piston – bolt play, using the following formula:

Piston – bolt play:

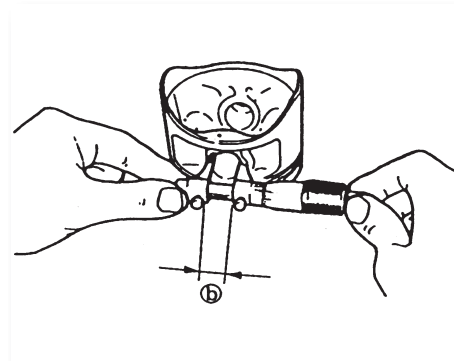
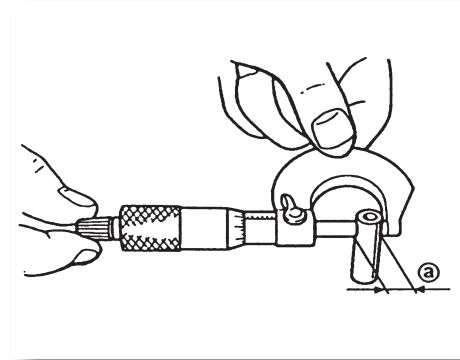
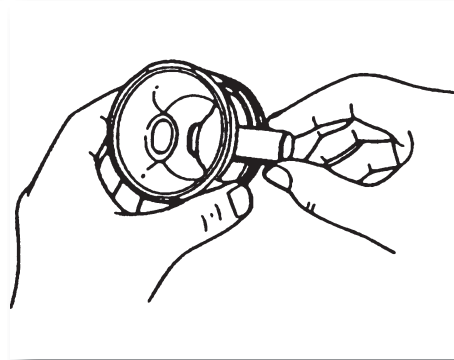
Internal diameter (bolt place) (b).
External diameter (bolt) (a).

- If it is unspecified, replace the piston.



Play (piston - bolt):

0,009 - 0,013 mm





3.22 CRANKSHAFT

1) MEASURE:

- Non-alignment crankshaft.

Unspecified => **Replace the crankshaft and/or ball bearings.**

Remark:

- *Measure the non-alignment crankshaft Rotate the crankshaft unit slowly.*



Non-alignment limit:

0.03 mm

2) MEASURE:

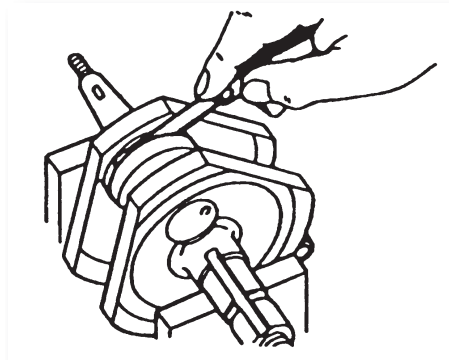
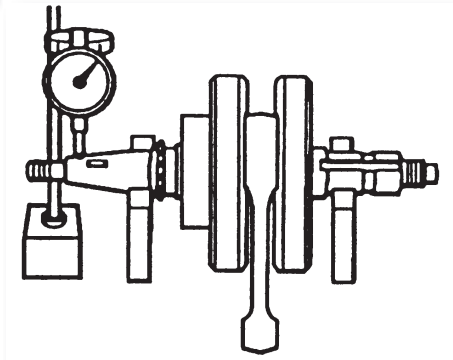
- Lateral play of the connecting rod.

Unspecified => **Replace the connecting rod ball bearing, the crankshaft elbow and/or the connecting rod.**



Lateral play of the connecting rod:

0,15 - 0.45 mm



3) MEASURE:

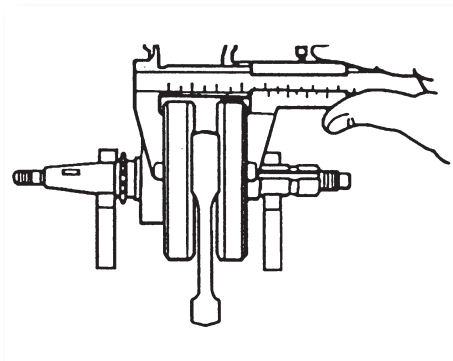
- Width of the crankshaft

Unspecified => **Replace the crankshaft.**



Width of the crankshaft:

46,95 - 47,00 mm



**4) CHECK:**

- Crankshaft gear (1).

Damages / wear => **Replace the crankshaft.**

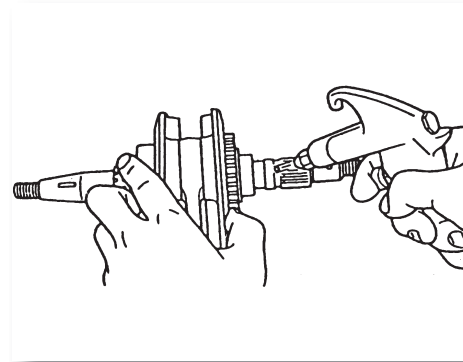
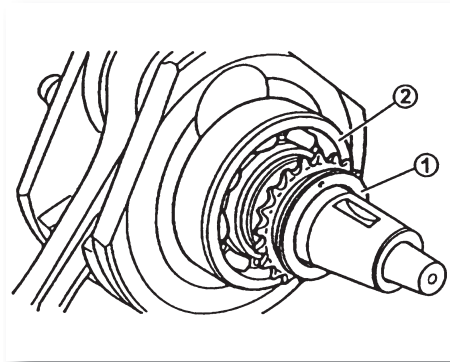
- Ball bearing (2).

Wear / fissures / damages => **Replace the crankshaft.**

5) CONTROL:

- Oil leak in the crankshaft.

Obstruction => **Compressed air blowing.**

**3.23 ROCKER ARM CHECKING****1) CHECK:**

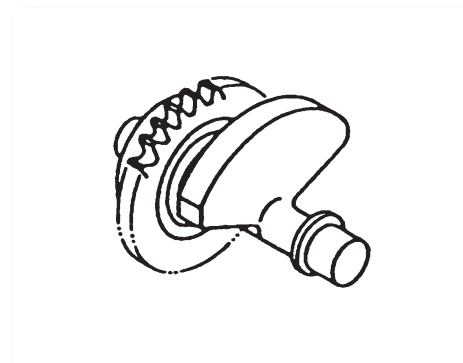
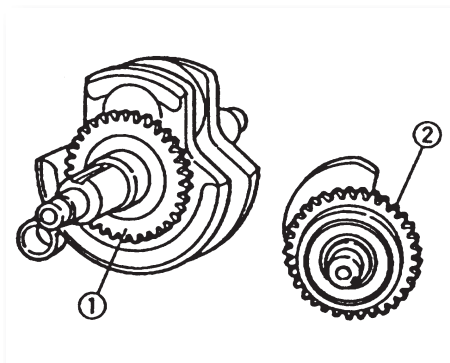
- Teeth of the rocker arm drive gear (1).
- Teeth of the rocker arm driven gear (2).

Wear / damages => **Replace the unit.**

2) CHECK:

- Rocker arm shaft.

Wear / crack / damages => **Replace.**





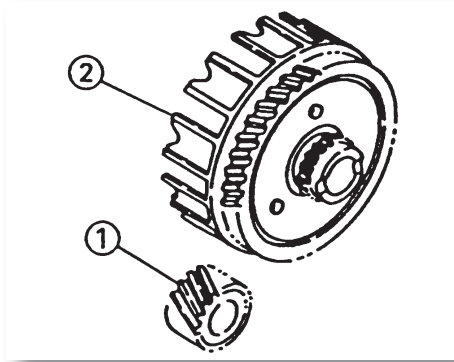
3.24 CLUTCH HOOD CHECKING

1) CHECK:

- Teeth of the primary gear (1).
- Teeth of the hood gear (2).

Wear / damages => **Replace both gears.**

Excessive noise during the operation => **Replace both gears.**



3.25 CLUTCH CHECKING

1) CHECK:

- Friction plates.

Wear / damages => **Replace the friction plates unit.**

2) MEASURE:

- Thickness of the friction plates.

Unspecified => **Replace the friction plates unit.**

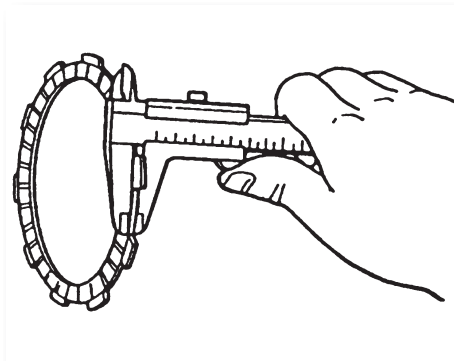
Measure in 4 different positions.



Thickness (friction plates):

3,0 mm

< Limit: 2,8 mm >



**3) CHECK:**

- Separators.

Damages => **Replace the separators unit.**

4) MEASURE:

- Separators strain.

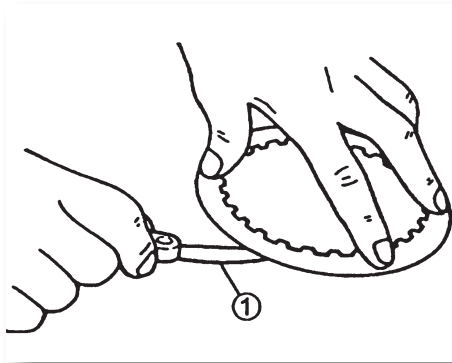
Unspecified => **Replace the separators unit.**

Take the measurements on a plane table with the help of a thickness calibre (1).

**Strain limit**

(separators):

Lower than 0,05 mm

**5) CHECK:**

- Clutch springs.

Damages => **Replace the springs units.**

6) MEASURE:

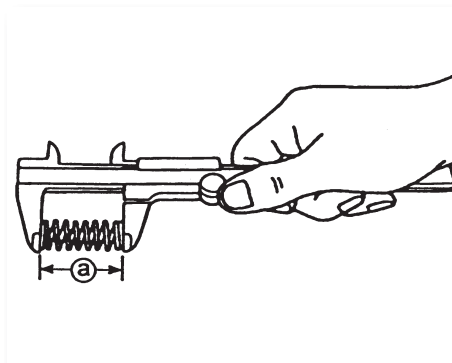
- Free length (springs) (a).

Unspecified => **Replace the springs unit.**

**Free length (springs):**

33.0 mm

< Limit: 31,0 mm >





7) CHECK:

- Nails (of the hood) (1).

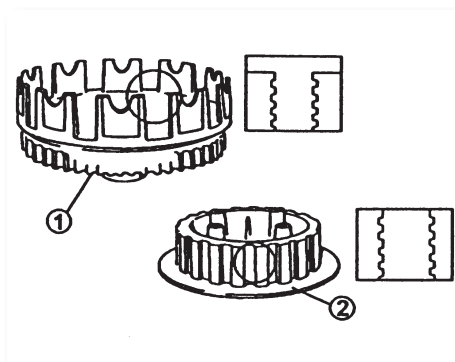
Rims / wear / damages => **Eliminate the rims or replace the hood.**

- Grooves in the clutch drum (2).

Rims / wear / damages => **Replace the clutch drum.**

Remarks:

- Rims in the nails of the hood and in the grooves of the clutch drum results in an irregular operation.

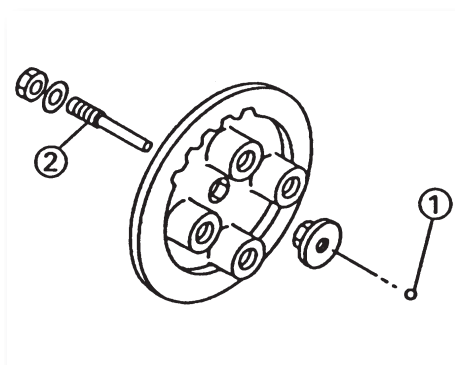


3.26 ROD OPERATION CHECKING

1) CHECK:

- Ball bearing (1).
- Rod operation (2).

Wear / cracks / damages => **Replace.**





3.27 FORKS AND CHANGE SELECTOR CHECKING

1) CHECK:

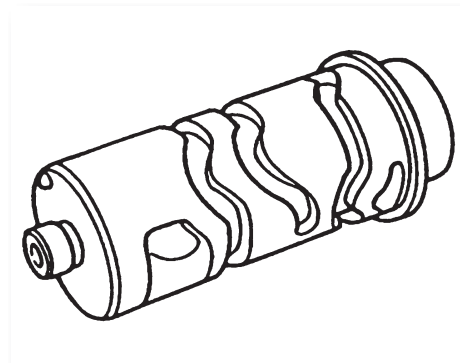
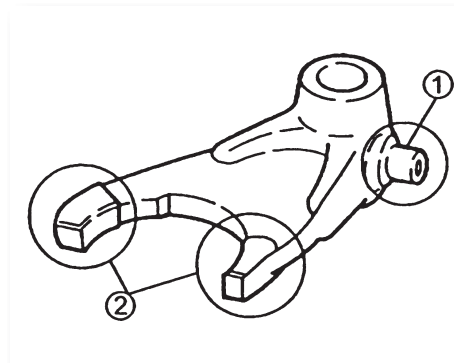
- Fork extension (1).
- Extremities of the change forks (2).

Scratches / warping / wear / damages => **Replace.**

2) CHECK:

- Grooves in the change selector.
- Wear / damages / scratches => **Replace.**
- Extension of the change selector.

Wear / damages => **Replace.**



CHECK:

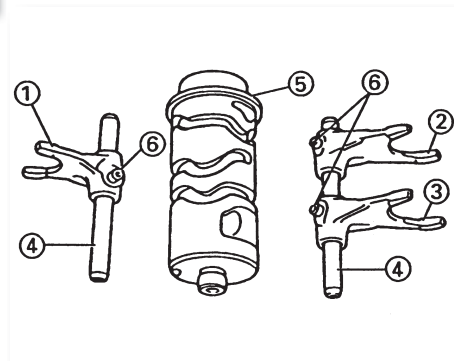
- Change fork 1 in the right centre (1).
- Change fork 2 in the top left (2).
- Change fork 3 in the bottom left (3).
- Guide bar (4).
- Change selector (5).
- Tang guide (6).

Roll the guide bar on a flat surface.

Warping => **Replace.**



Do not try to straighten up a warping guide bar.





4) CHECK:

- Movement of the change forks (in the guide bar).

Irregular movement => **Replace the fork and the bar.**

Remark:

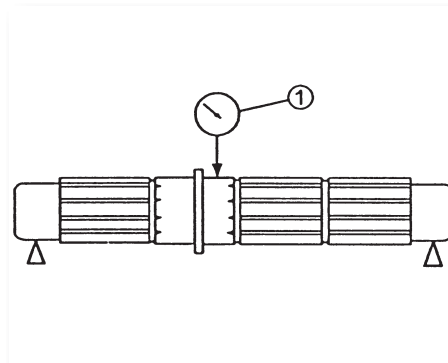
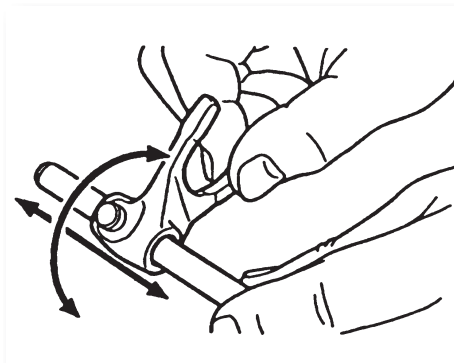
- If the change fork and the transmission gear are damaged, replace the gears which are side by side of the unit.

5) MEASURE:

- Warping of the Shafts (driver and driven one).

Use a tip support and a clock to compare (1).

Unspecified => **Replace the warped shaft.**



6) CHECK:

- Teeth of the gears.

Blue coloration / grooves / wear => **Replace.**

- Nails of the gears.

Rounded brim / cracks / missing parts => **Replace.**

7) CHECK:

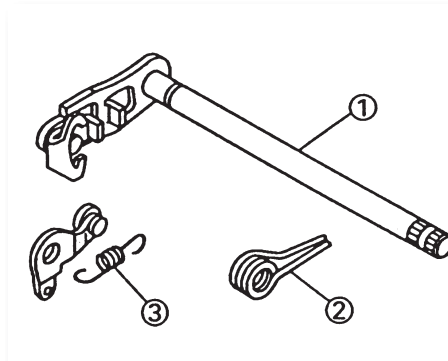
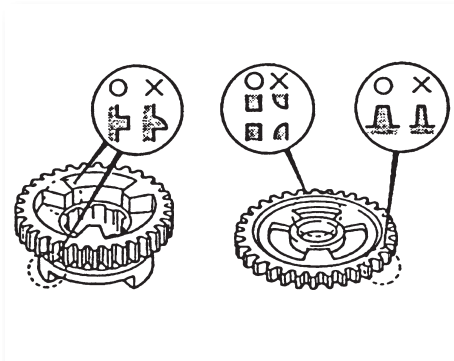
- Change shaft (1).

Damages / warping / wear => **Replace.**

- Spring of return (change shaft) (2).

- Spring of return (constrained rod) (3).

- Wear / damages => **Replace.**





3.28 START SYSTEM WITH PEDAL CHECKING

1) 3.28 START SYSTEM WITH PEDAL CHECKING

- Teeth of the gear (start gear) (1).
- Teeth of the gear (ratchet brace) (2).

Damages / wear => **Replace.**

2) MEASURE:

- Friction force of the ring of the start gear (torque spring) (1).

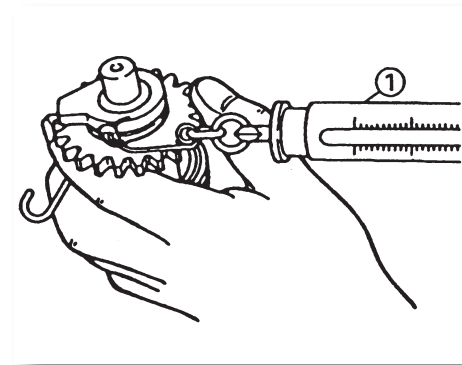
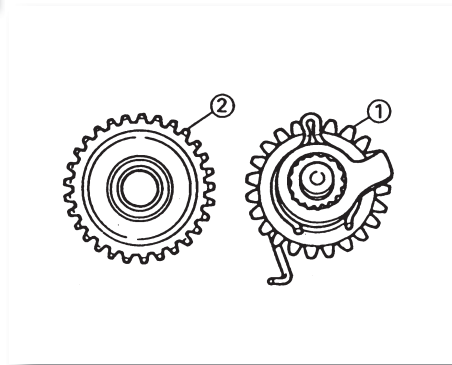
Unspecified => **Replace.**

Use a dynamometer.



Friction force of the ring of the start system:

0,8 - 1,2 Kgf



3.29 OIL PUMP CHECKING

1) MEASURE:

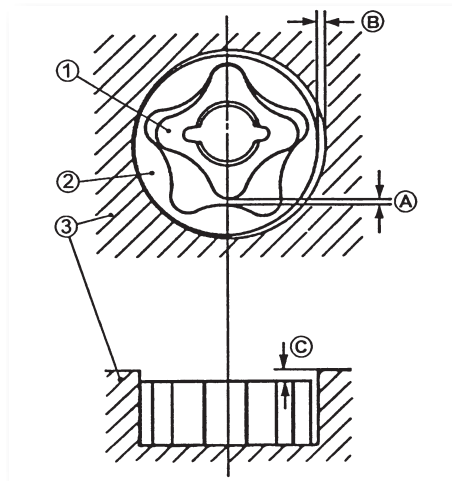
- Play among tips (TO).
(between internal rotor (1) and external rotor (2)).

- Lateral play (B).
(between external rotor (2) and the pump casing (3)).

Unspecified => **Replace the oil pump unit.**

- Play between the casing and the rotor (C).
(between the pump casing (3) and the rotors (1) and (2)).

Unspecified => **Replace the pump oil unit.**





Play among tips (A):

0,15 mm <Limit: 0,20 mm>

Lateral play (B):

0,06 ~ 0,10 mm <Limit: 0,15 mm>

Play between the casing and the rotor (C):

0,06 ~ 0,10 mm <Limit: 0,15 mm>

2) CHECK:

- Rotary filter.

Cracks / damages => **Replace.**

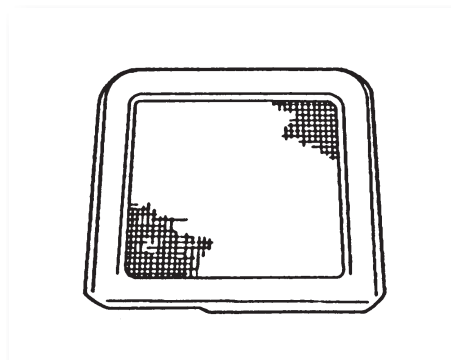
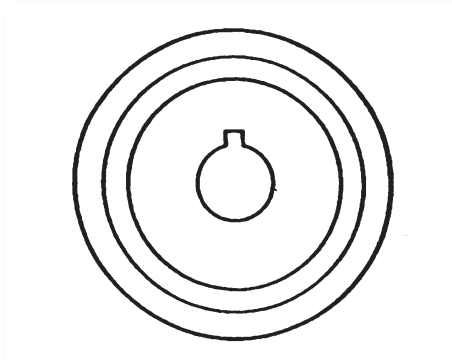
Contamination => **Clean.**

3) CHECK:

- Oil impeller.

Cracks / damages => **Replace.**

Contamination => **Clean.**



3.30 OIL LEAKS CHECKING (COVER OF THE CASSING IN THE RIGHT SIDE)

1) CHECK:

- Oil leak.

Obstruction => **Blow with compressed air.**





3.31 CHASSIS

- 1) Wash the chassis properly with kerosene.
- 2) Clean the surfaces which bear the gaskets and the surfaces in contact with the chassis properly.

1) CHECK:

- Chassis.

Cracks / damages => **Replace.**

- Oil leaks.

Obstruction => **Blow the leaks with compressed air.**

3.32 CLAMP RINGS AND WASHERS

1) CHECK:

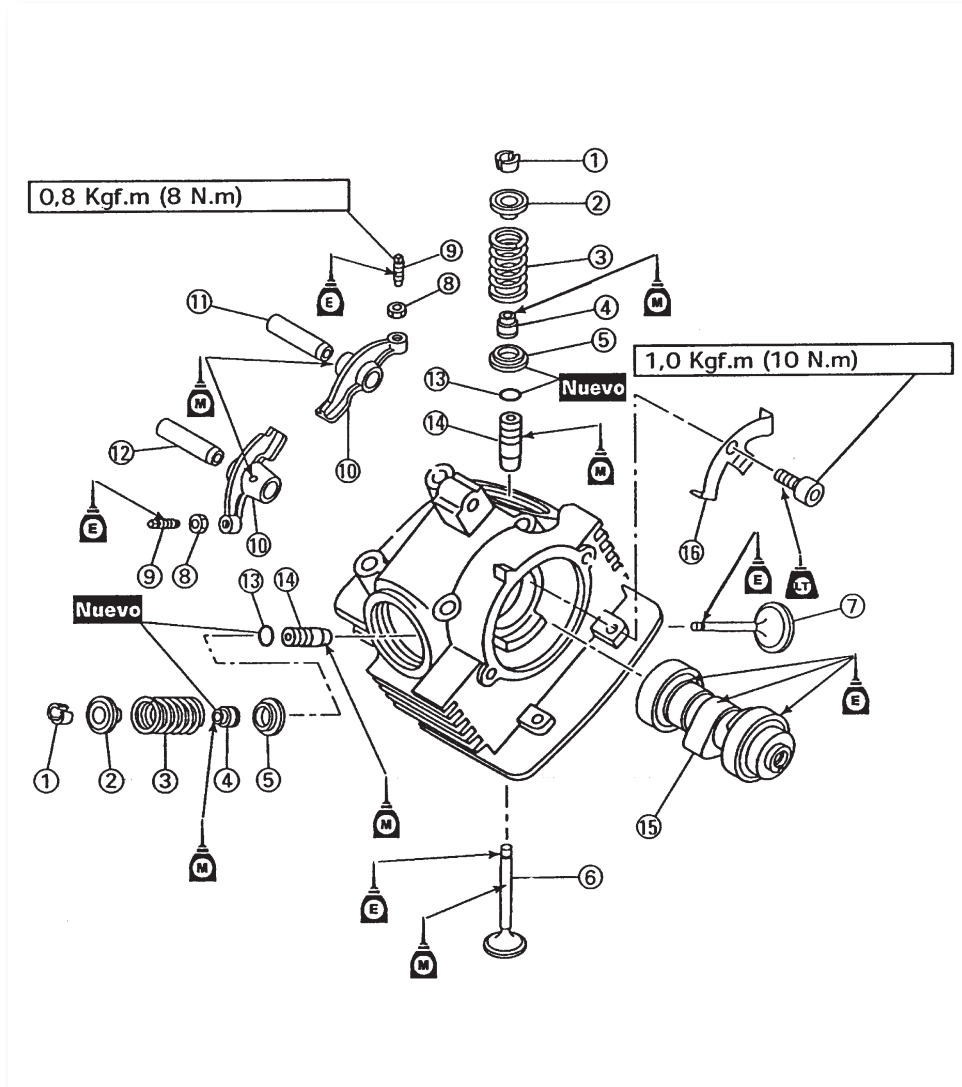
- Clamp rings.
- Washers.

Damages / loose / deformed => **Replace.**



3.33 MOTOR ASSEMBLY AND ADJUSTMENTS

1) VALVES, ROCKERS AND CAMSHAFT



- 1) Clamp valves
- 2) Clamp seating
- 3) Spring
- 4) Constrained ring
- 5) Spring seating
- 6) Valve (inlet)
- 7) Valve (exhaust)
- 8) Locknut
- 9) Adjuster
- 10) Rocker
- 11) Rocker shaft (intake)
- 12) Rocker shaft (exhaust)
- 13) Clamp ring
- 14) Valve guide
- 15) Camshaft
- 16) Clamp plate CD



To assemble the motor, replace the following parts with other new ones:

- Particular ring.
- Gaskets.
- Constrained rings.
- Copper washers.
- Clamp washers.
- Clamp rings.

3.34 VALVES AND VALVE SPRINGS CHECKING

1) ELIMINATE THE RIMS:

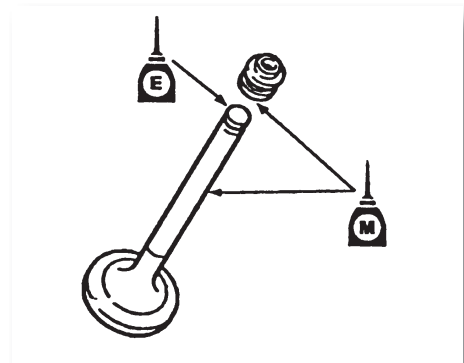
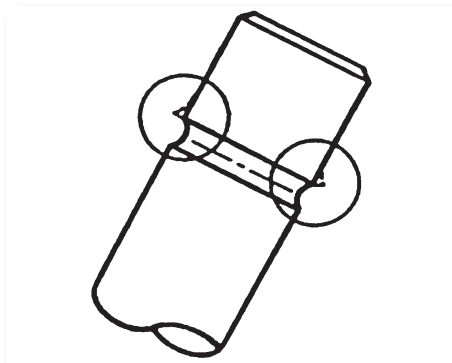
- From the extremity of the valve rod.
- Use an emery stone to eliminate the rims.

2) APPLY:

- Oil of disulphide molybdenum.
- (In the valve rod and in the constrained ring).



Oil of disulphide molybdenum.



3) INSTALL:

- Spring seating (1).
- New constrained ring (2).
- Valve (3) (In the cylinder head).
- Valve (4) Spring.
- Clamp seating (5).

Remark:

Install the valve springs with the biggest passage upwards (a).

- (b) smaller passage

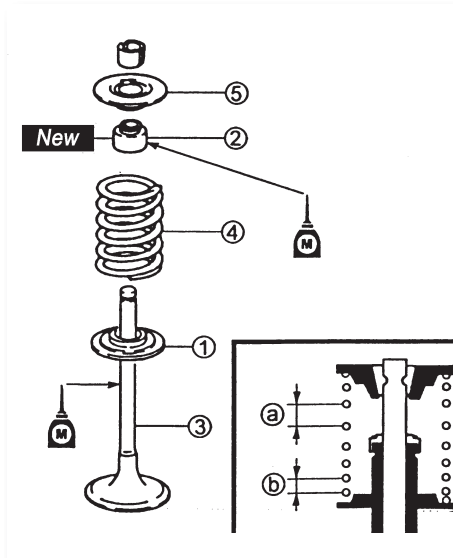


Inlet:

Mark "IN"

Exhaust:

Mark "EX"



4) INSTALL:

- Valve clamp (1).

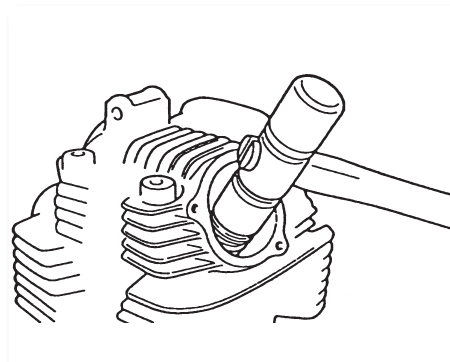
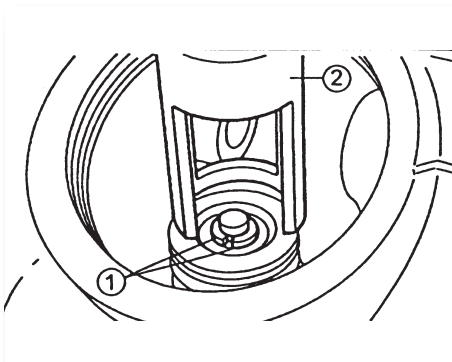
Remark:

Install the valve clamp while the spring valve is compressed with the compressor of the valve spring (2).

- 5) Fix the clamp valves in the rod, pound lightly with a rubber hammer.



Do not hit, because valve can be damaged.





3.35 ROCKERS AND CAMSHAFT INSTALLATION

1) LUBRICATE:

- Camshaft (1).



Camshaft:

Oil of disulphide molybdenum.

Ball bearing of the camshaft:

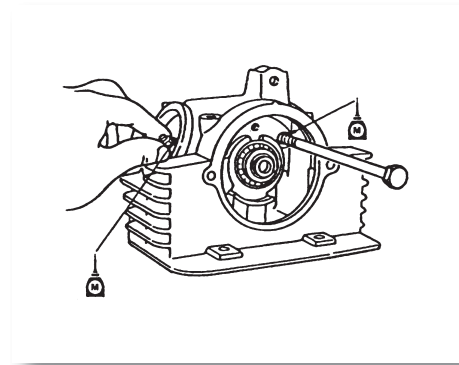
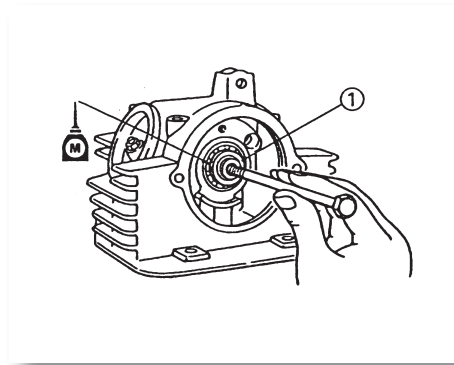
Motor oil.

2) APPLY:

- Oil of disulphide molybdenum (in the rocker and its shaft).



Oil of disulphide molybdenum.

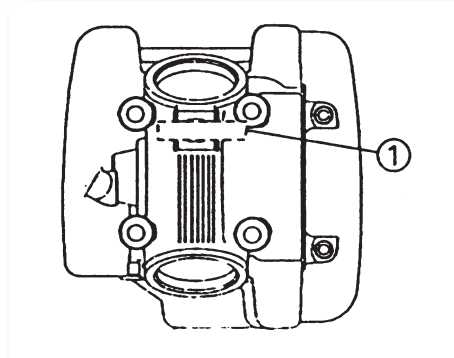


3) INSTALL:

- Rocker.
- Rocker shaft (1).

Remark:

Install completely the shaft of the rocker (exhaust).

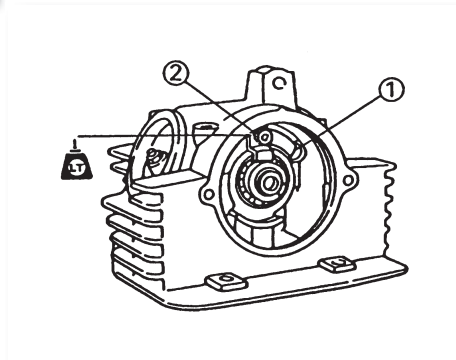


4) INSTALL:

- Clamp plate (1).
- Screw (2).

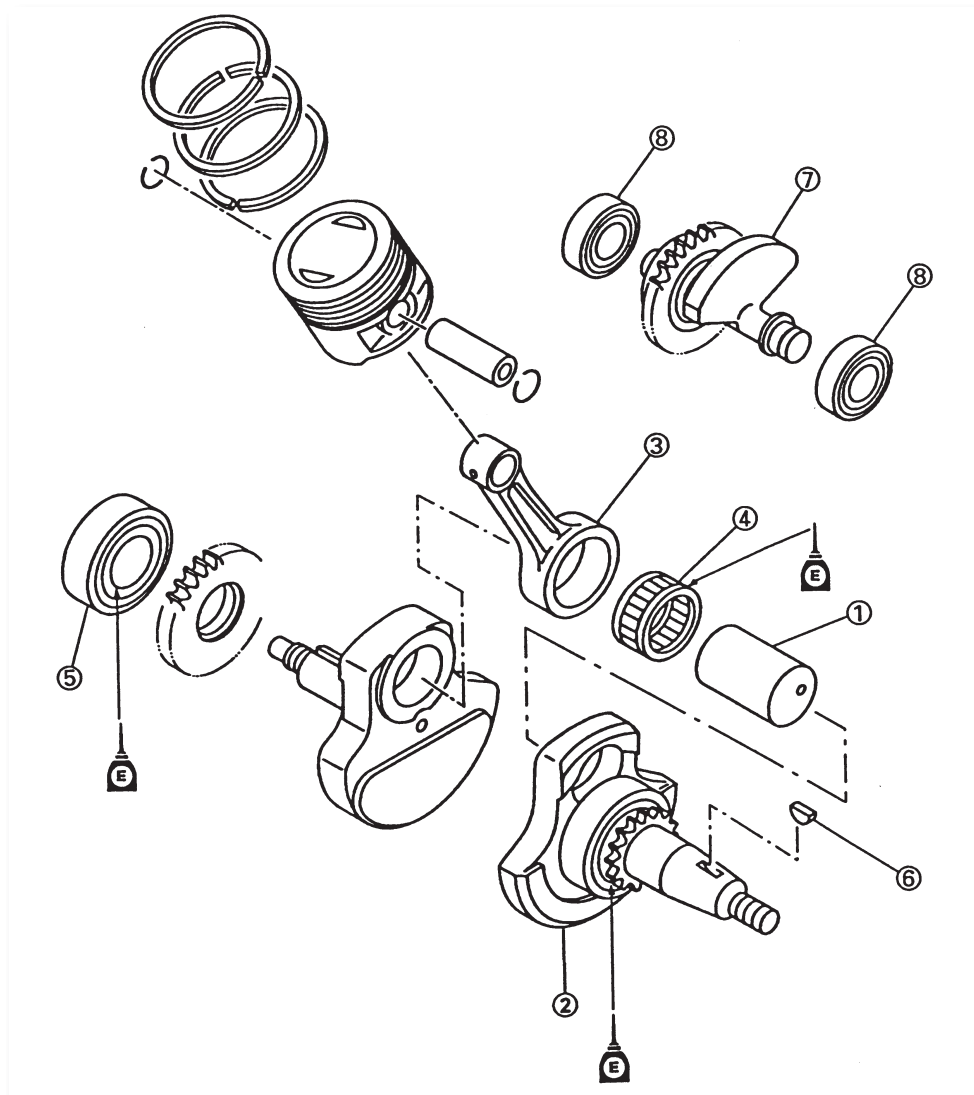


Screw (clamp plate):
1,0 Kgf.m (10 N.m.)





3.36 CRANKSHAFT AND ROCKER ARM SHAFT



- 1) Elbow of the crankshaft
- 2) Crankshaft
- 3) Connecting rod
- 4) Lower ball bearing of the connecting rod
- 5) Ball bearing of the crankshaft
- 6) Cotter
- 7) Rocker arm
- 8) Ball bearing



1) INSTALL:

- Extractor of the crankshaft

2) INSTALL:

- Crankshaft.

Remark:

Hold the connecting rod with one hand while the nut of the special tool turns with the other one. Use the tool until realizing that the crankshaft adjusts in the ball bearing.



To avoid scratches in the crankshaft and to facilitate the installation, apply grease in the rims of the constrained ring and motor oil in the ball bearing.

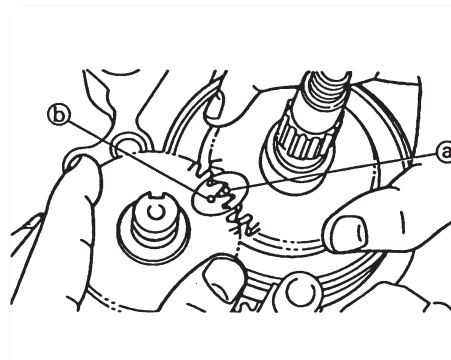
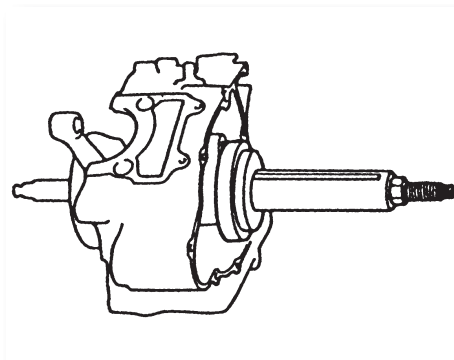
3) INSTALL:

- Rocker arm shaft.

Always use rubber new rings.

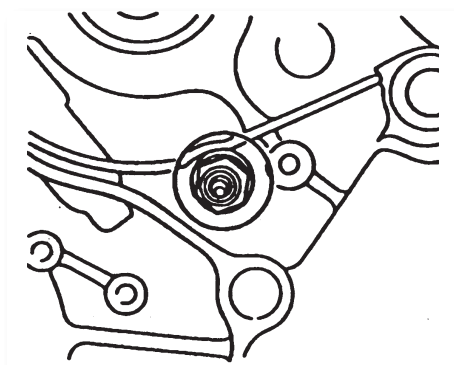
Remark:

When installing the shaft of the rocker arm, align the puncture mark (a) of the crankshaft gear with the puncture mark (b) of the rocker arm gear.



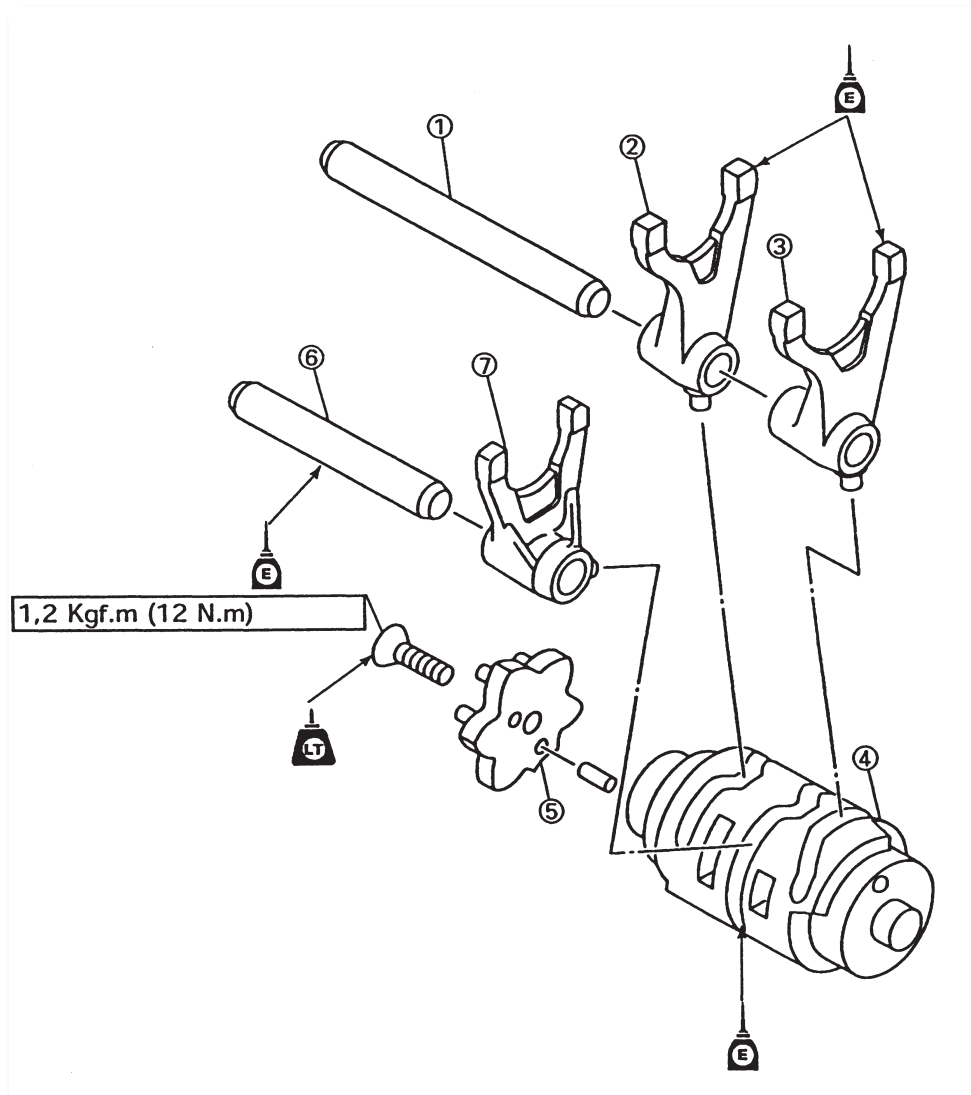
4) INSTALL:

- Neuter Switch.





3.37 CHANGE SELECTOR



- 1) Guide bar (long).
- 2) Change fork n° 3
- 3) Change fork n° 1
- 4) Change selector
- 5) Segment
- 6) Guide bar (short)
- 7) Change fork n° 2

3.38 TRANSMISSION, FORKS AND CHANGE SELECTOR INSTALLATION



1) MEASURE:

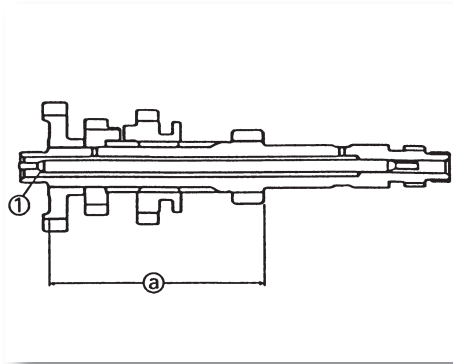
- Length of the drive shaft (a).



Length of the shaft (drive):
82,25 - 83,45 mm

2) INSTALL:

- Operating rod n° 2 (1).
- In the orifice of the drive shaft.

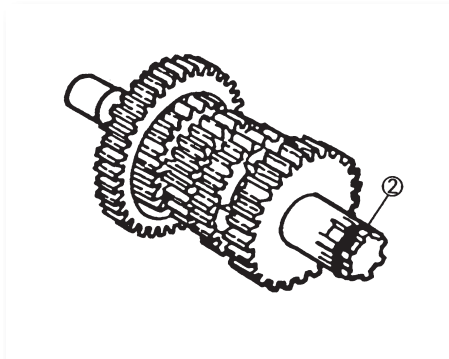
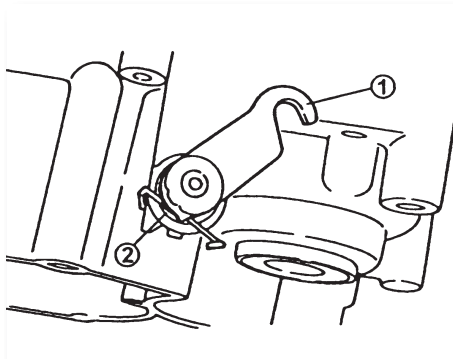


3) INSTALL:

- Shaft of the operation rod (1).
- New gasket (2).

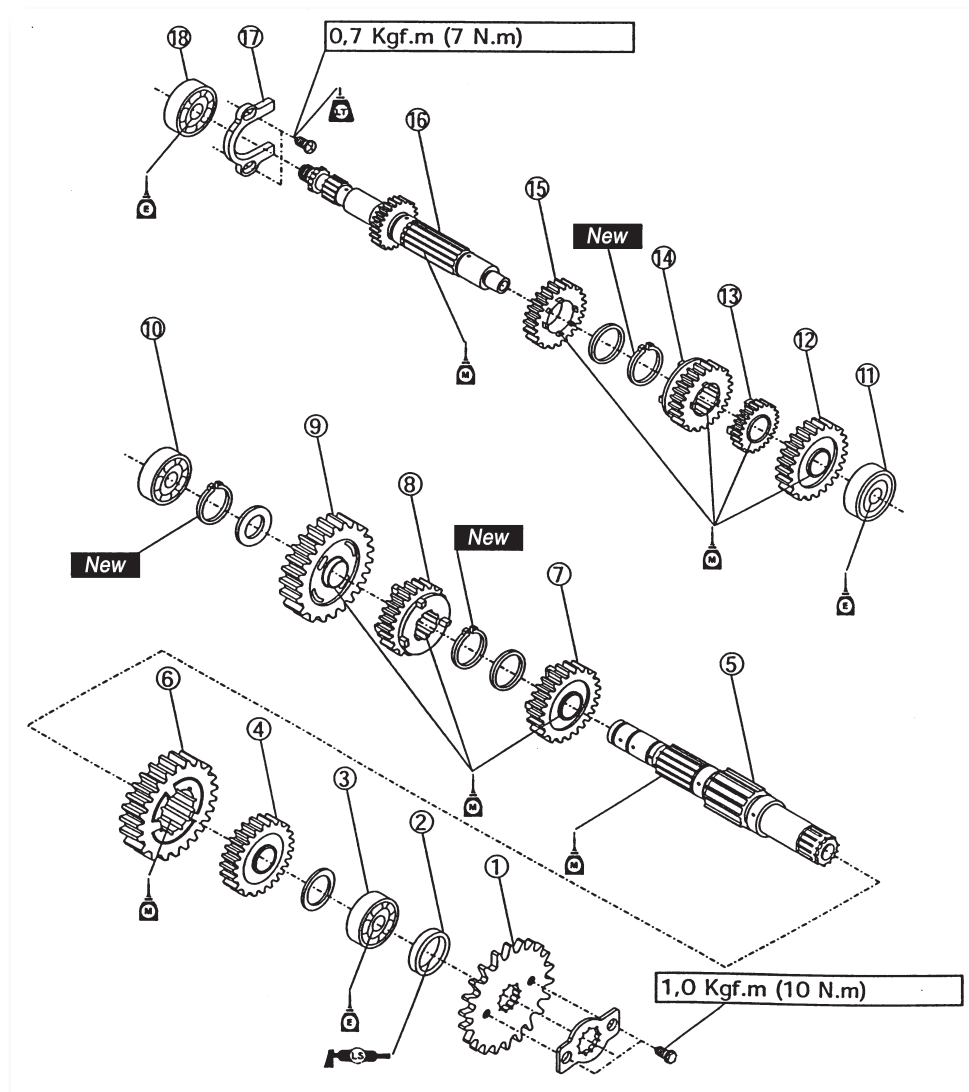
4) INSTALL:

- Special gasket (2).
- In the groove of the drive shaft.





3.39 TRANSMISSION



- | | |
|---------------------------|------------------|
| 1) Pinion | 17) Clamp plate |
| 2) Constrained ring | 18) Ball bearing |
| 3) Ball bearing | |
| 4) Driven gear of the 5th | |
| 5) Drive shaft | |
| 6) Driven gear of the 2nd | |
| 7) Driven gear of the 3rd | |
| 8) Driven gear of the 4th | |
| 9) Driven gear of the 1st | |
| 10) Ball bearing | |
| 11) Ball bearing | |
| 12) Drive gear of the 5th | |
| 13) Drive gear of the 2nd | |
| 14) Drive gear of the 3rd | |
| 15) Drive gear of the 4th | |
| 16) Drive shaft | |



5) INSTALL:

- Bottom left fork of change (L) (1).
- Top left fork of change (R) (2).
- Right central fork of change (C) (3).
- Guide bar 1 (short) (4).
- Guide bar 2 (long) (5).

Remark:

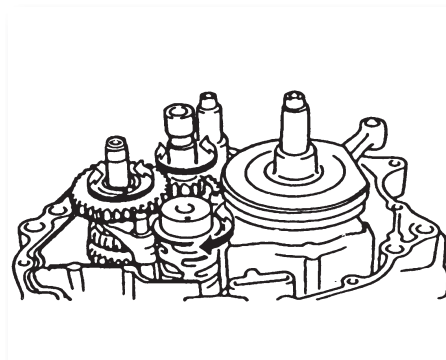
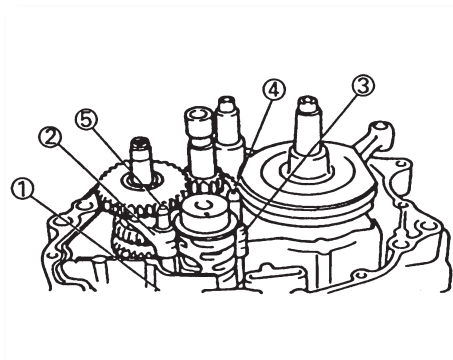
Install the change forks with the stamping mark in the sequence (L, R, C), beginning with the right.

6) CHECK:

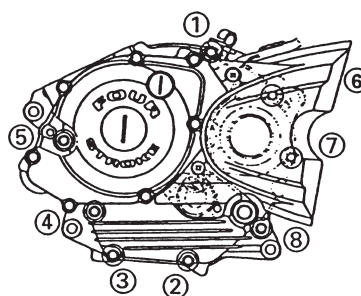
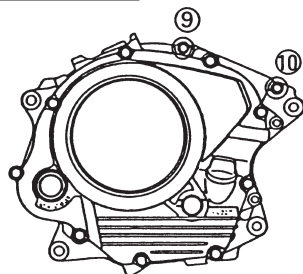
- Operation of the change selector.
- Irregular operation => **Adjust.**

Remark:

Check if the operation of the transmission and the forks is normal, turning the change selector by hand.

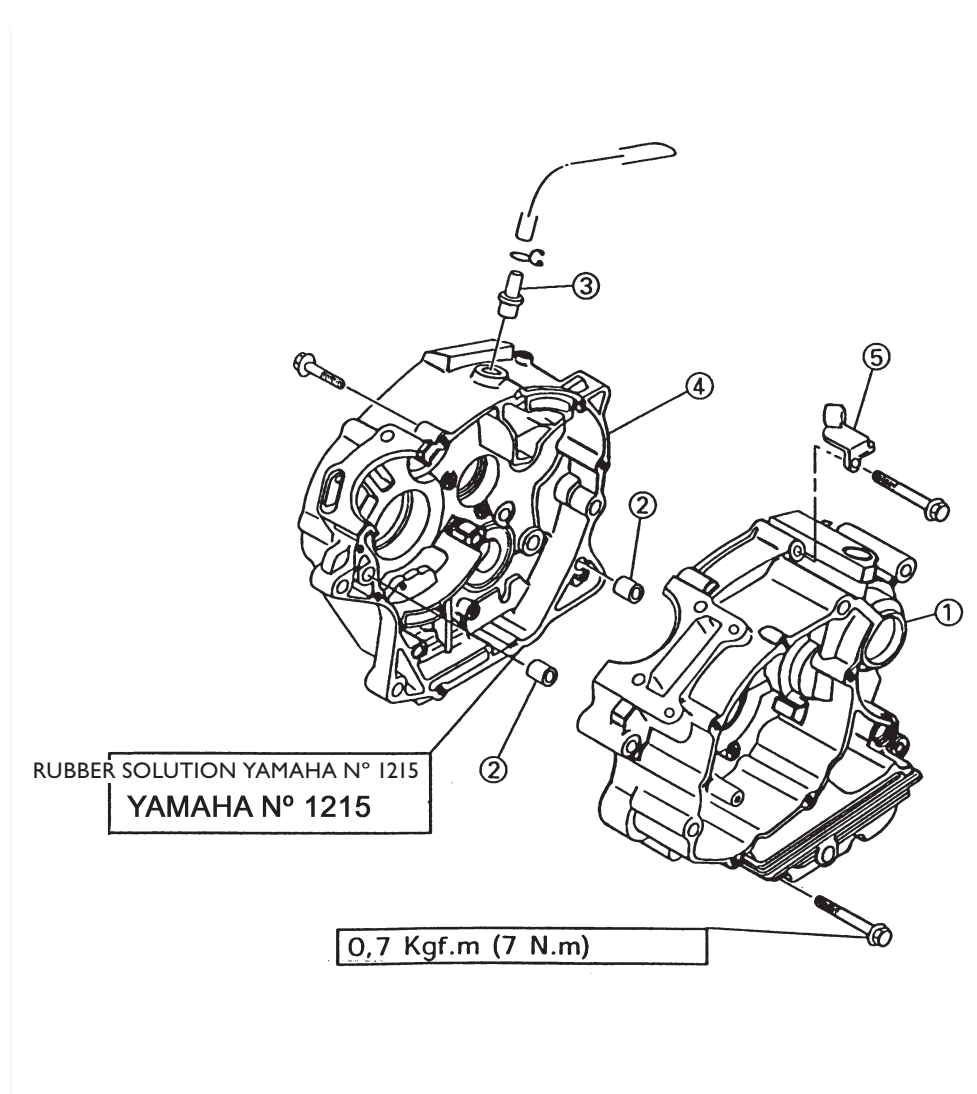


Tighten sequence





2.40 CHASSIS



- 1) Chassis (RS)
- 2) Tang guide
- 3) Hose of the sump vent
- 4) Chassis (LS)
- 5) Securing part



3.41 CHASSIS (RIGHT SIDE))

1) APPLY:

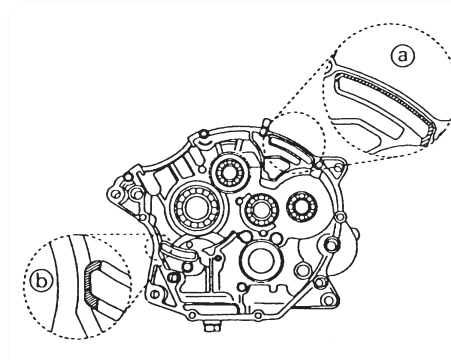
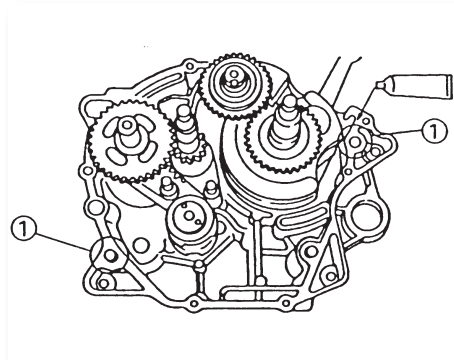
- Rubber solution.
(on the surfaces in contact with the chassis).

Remark:

Not ALLOW that the rubber solution come into contact with the oil leaks (a) and (B) as it is illustrated in the following figure.

2) INSTALL:

- Tang guide (I).



3) INSTALL:

- Chassis (LS).
(in the chassis (RS)).

Remark:

Pound lightly in the chassis with a rubber hammer.

4) PRESS:

- Screws (chassis).



Screws (chassis):

82,25 - 83,45 mm

Remark:

Press the screws in numerical decreasing order (see the numbers in the figure).

**5) APPLY:**

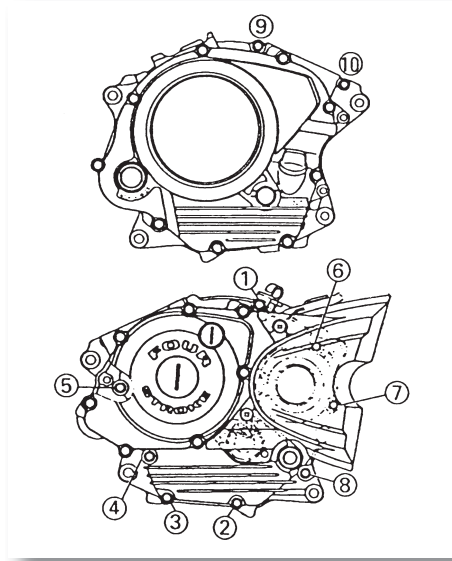
- Oil motor 4T.

(in the elbows of the crankshaft, ball bearings, orifices of oil supply).

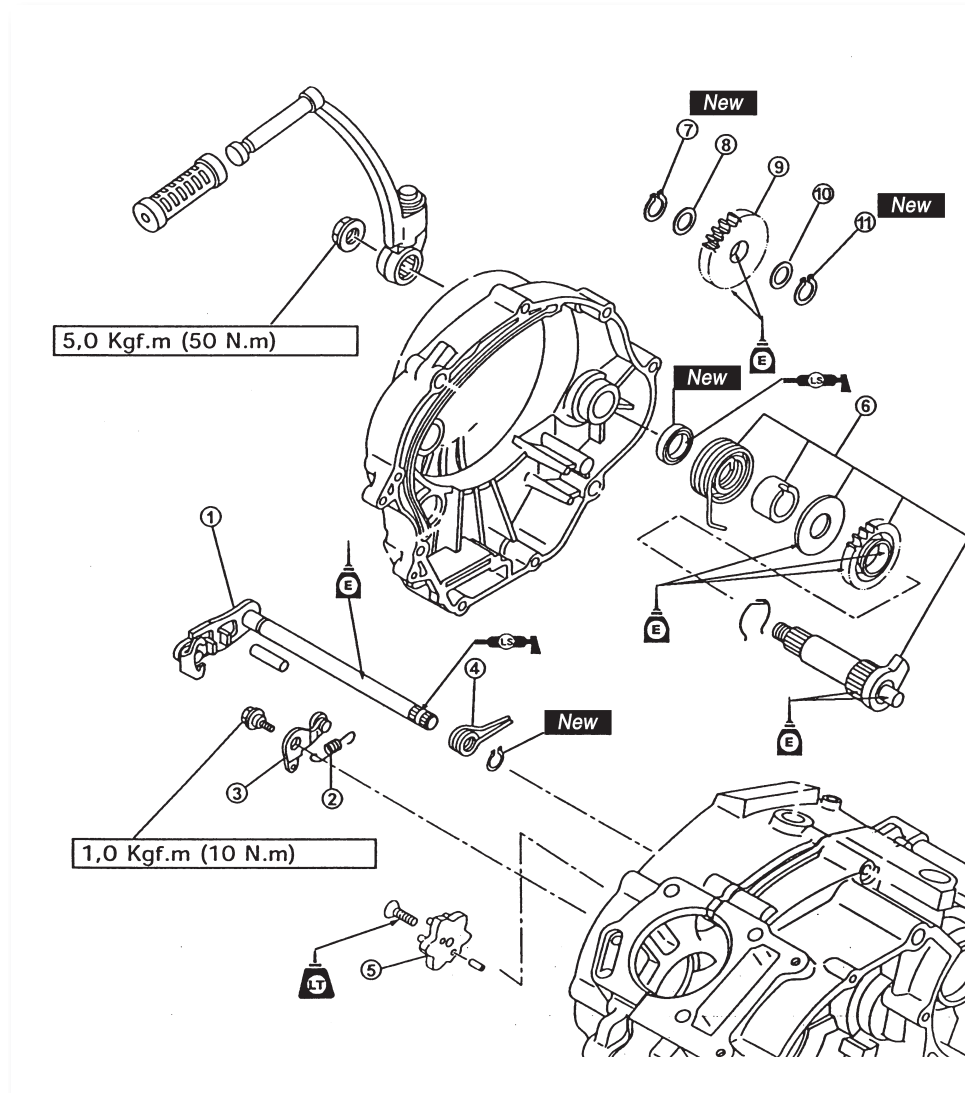
6) CHECK:

- Operation of the crankshaft and the transmission

Irregular operation => **Repair.**



3.42 CHANGE SHAFT AND START SYSTEM WITH PEDAL



- 1) Change shaft
- 2) Torque spring
- 3) Constrained rod
- 4) Return spring
- 5) Segment
- 6) Start system unit
- 7) Clamp ring
- 8) Washer
- 9) Start gear
- 10) Washer
- 11) Clamp ring



3.43 CHANGE SELECTOR SEGMENT AND CHANGE SHAFT

1) INSTALL:

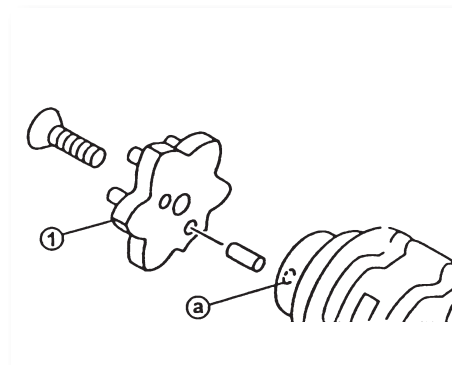
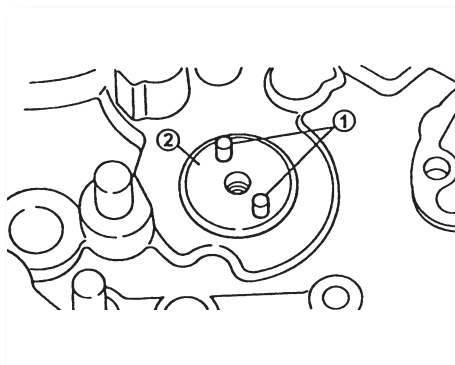
- Tang guide (1).
- (in the supporter (2)).

2) INSTALL:

- Segment (1).
- Using an Allen spanner of 4 mm.

Remark:

Install the tang guide of the segment in the positioning orifice (a) of the change selector and install the segment.



3) INSTALL:

- Rod limiter (1).
- Spring (2).

Remark:

Couple the spring on the rod limiter (1) and in chassis drum.
Couple the rod limiter (1) on the limiter of the change selector.



Screw (Rod limiter):

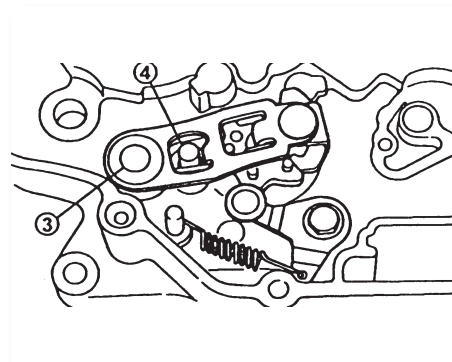
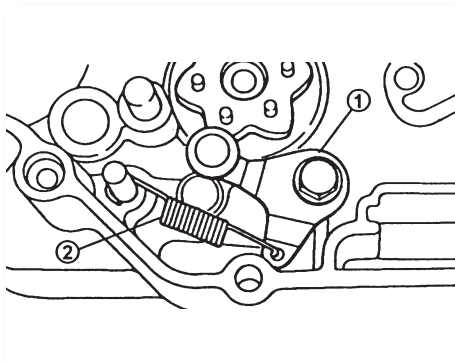
1,0 Kgf.m (10 N.m)

4) INSTALL:

- Change shaft unit (3).

Remark:

Apply grease on the tangs of the constrained rings. Fit the tips of the spring into the limiter (4).





3.44 START SYSTEM WITH PEDAL INSTALLATION

1) INSTALL:

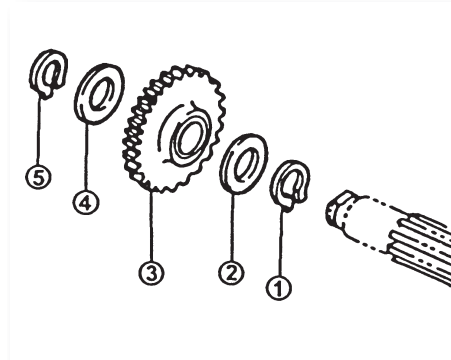
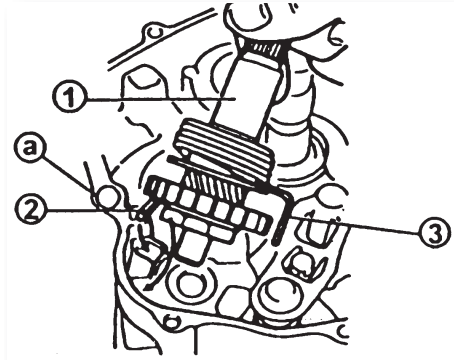
- Unit of the start system shaft (1).
- Clamp ring of the start gear (2).

Remark:

Rotate the torque spring clockwise and couple it into the chassis orifice (a).

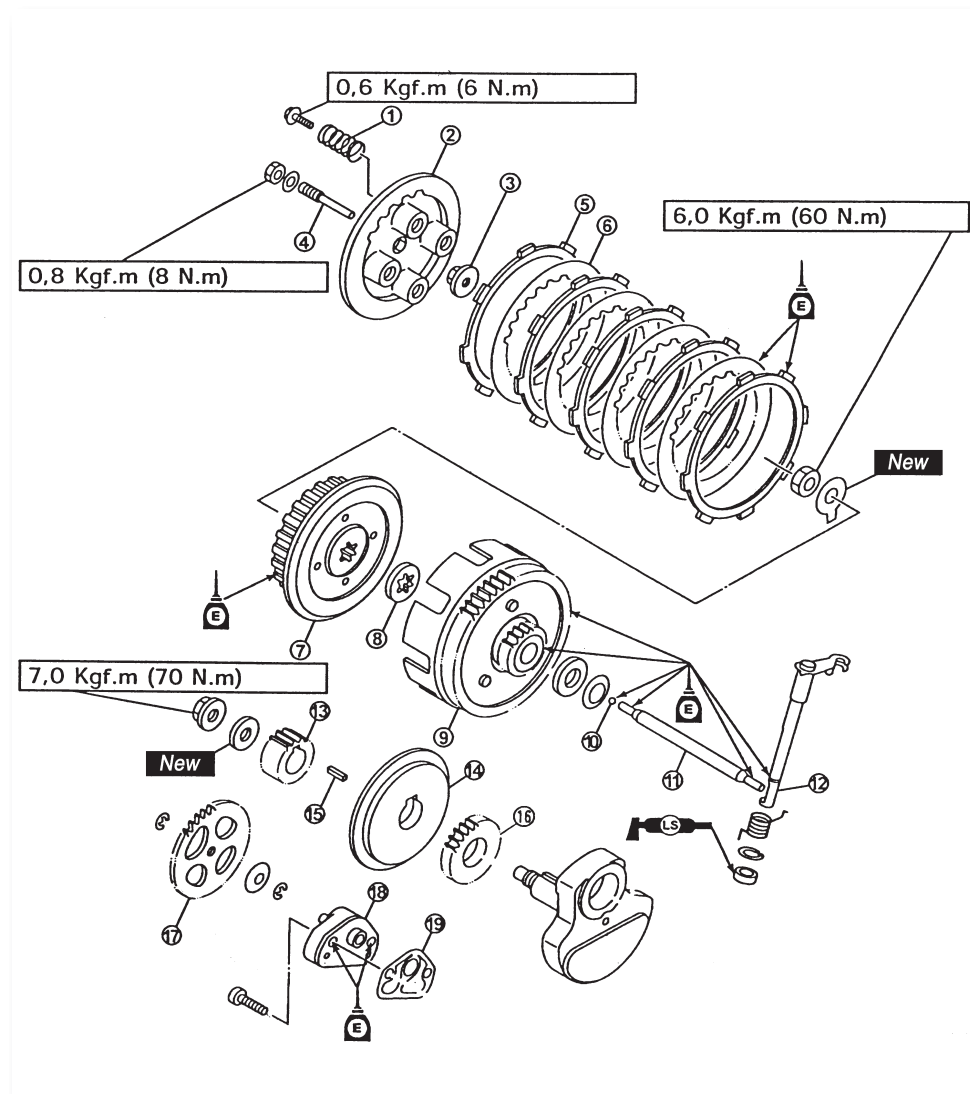
2) INSTALL:

- Clamp ring (1).
- Washer (2).
- Start gear (3).
- Washer (4).
- Clamp ring (5).





3.45 CLUTCH, HOOD AND OIL PUMP



- | | |
|----------------------------------|---------------------------------|
| 1) Clutch spring | 16) Drive gear of the oil pump |
| 2) Pressure plate | 17) Driven gear of the oil pump |
| 3) Operation plate | 18) Oil pump |
| 4) Operation rod I | 19) Gasket |
| 5) Friction plate | |
| 6) Separator | |
| 7) Clutch drum | |
| 8) Pressure washer | |
| 9) Clutch hood | |
| 10) Ball | |
| 11) Operation rod 2 | |
| 12) Shaft of the operation lever | |
| 13) Primary gear | |
| 14) Rotary filter | |
| 15) Cotter | |



3.46 OIL PUMP INSTALLATION

1) LUBRICATE:

- Leak of oil supply (chassis (RS)).
- Oil pump unit.



Recommended Lubricant:

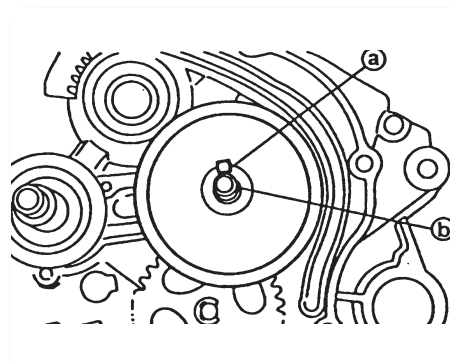
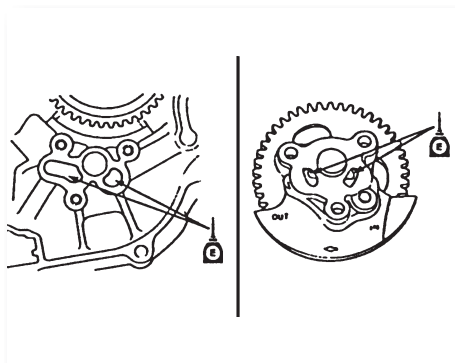
Motor oil.

2) INSTALL:

- Drive gear of the oil pump.
- Cotter.

Remark:

1. Assemble the gear of the oil pump with the pipe towards inside.
2. Assemble the rotary filter with the side of the larger salient towards inside, fitting the fluke in the pipe of the crankshaft.



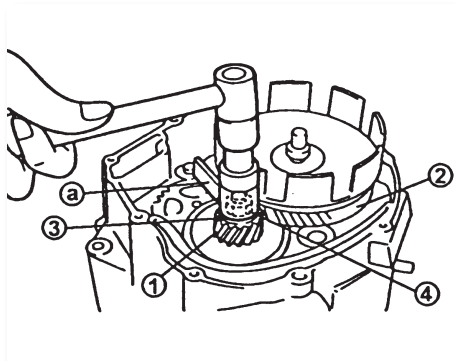
3.47 CLUTCH HOOD INSTALLATION

1) INSTALL:

- Primary gear (1).
- Clutch hood (2).
- Washer (3).
- Nut of the primary gear (4).

Remark:

- Assemble the primary gear with the letter out.
Place a folded aluminium or copper sheet (a) among the teeth of the primary gear (1) and the teeth of the hood gear (2).





3.48 CLUTCH INSTALLATION

1) INSTALL:

- Clutch hood (1).
- Pressure washer (2).
- Clutch drum (3).
- Clamp washer (4).
- Nut of the clutch drum (5).



2) PRESS:

- Nut of the clutch drum.

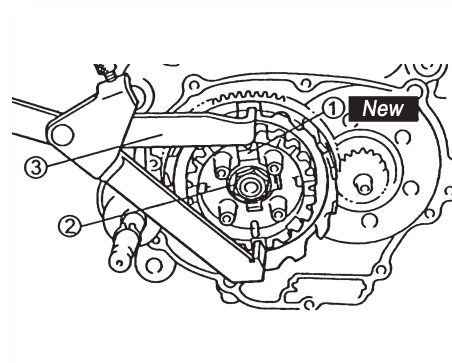
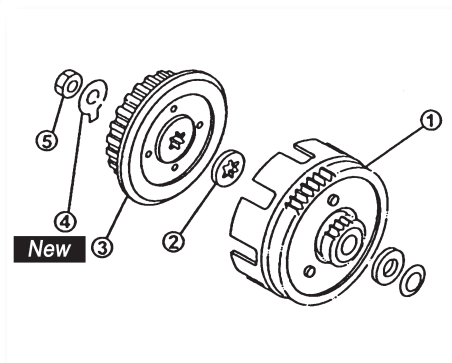
Remark:

Press the nut of the clutch drum (2) while hold the clutch drum with the universal support of the clutch (3).



Nut of the clutch drum:

6,0 Kgf.m (60 N.m)

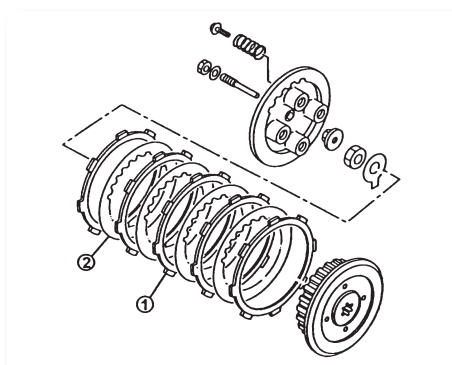


3) BEND:

- Rim of the clamp washer (1).
- (on a top flat side of the nut).

4) INSTALL:

- Friction plate (1).
- Separators (2).





Remark:

• Install the plates and the separators alternately in the clutch drum, beginning and finishing with a friction plate.

• Lubricate all the plates and separators with motor oil before the installation.

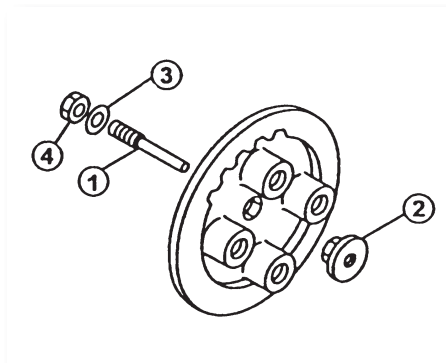
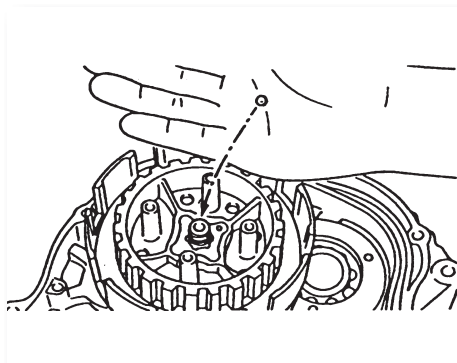
• Make sure that each separator with its 90 dislocated projections is installed with regard to the previous one. Continue with this procedure till all the separators have been installed.

5) INSTALL:

- Ball.

6) INSTALL:

- Operation rod N° 1 (1).
- Operation plate (2).
- Washer (3).
- Nut of the operation rod N° 1 (4).



7) INSTALL:

- Pressure plate (1).
- Compression springs (2).
- Screws (3).

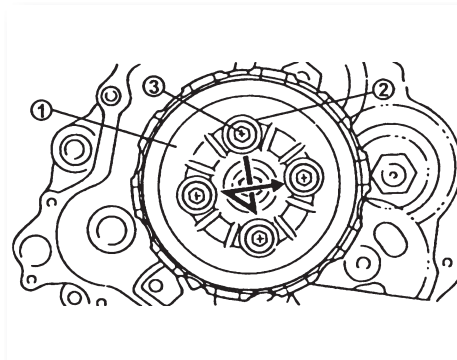


Screws (Clutch spring):

0.6 Kgf.m (6 N.m)

Remark:

Press the screws of the springs gradually and diagonally.



**8) CHECK:**

- Position of the operation lever.

Push the lever unit following the indicator and make sure that the alignment marks are aligned.

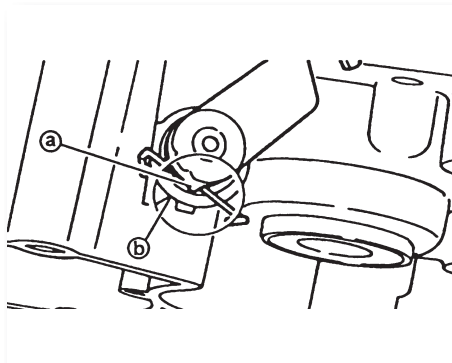
- (a) Marks of the lever.
- (b) Mark of the chassis.

9) ADJUST:

- Position of the operation lever.

Steps for the adjustment:

- Loose the locknut (1).
- Rotate the adjuster (2) clockwise or anticlockwise to align the marks.



- Hold the adjuster to avoid its movement and press the locknut.



Be careful not to press the adjuster (2) excessively since the play between operation rods can be eliminated.

- Press the locknut (1):

**Locknut:**

0.8 Kgf.m (8 N.m)



10) INSTALL:

- Tang guide.
- Gasket of the chassis - New
- Chassis cover (RS).



Screws of the chassis cover:

1,0 Kgf.m (10 N.m)

Remark:

Press the screws in decreasing numerical order (see the numbers in the figure).

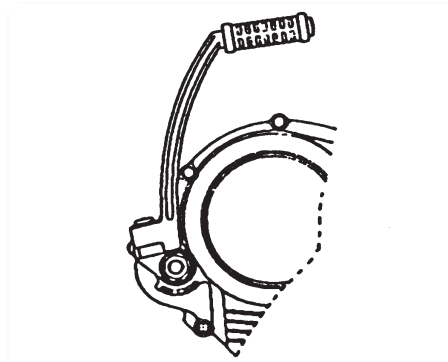
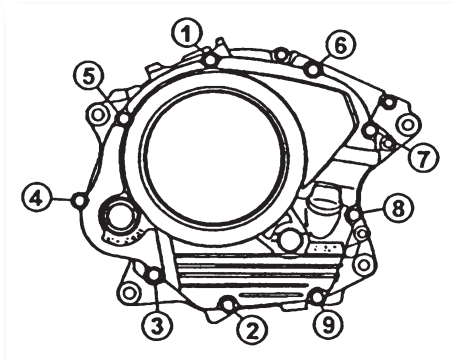
11) INSTALL:

- Start pedal.



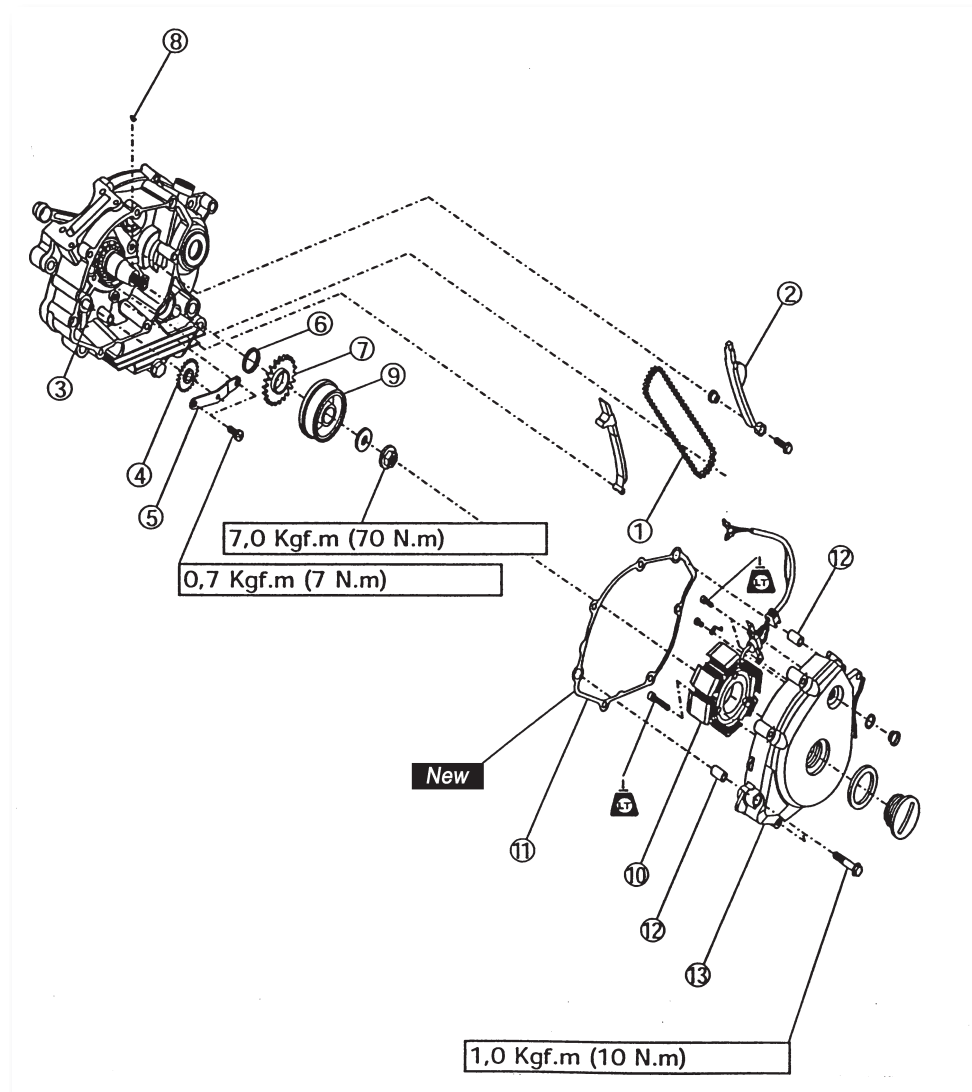
Nut of the start pedal:

5,0 Kgf.m (50 N.m)





3.49 MAGNETO FLYWHEEL



- 1) Timing chain
- 2) Guide of the chain (intake)
- 3) Tang guide
- 4) Start gear 1
- 5) Plate
- 6) Washer
- 7) Start gear 2
- 8) Cotter
- 9) Magneto rotor
- 10) Stator
- 11) Gasket
- 12) Tang guide
- 13) Chassis cowling



3.50 START GEAR CHECKING

1) INSPECT:

- Teeth of the start gear system (a) (b) (c).

Rims / filings / roughness / wear = > **Replace.**

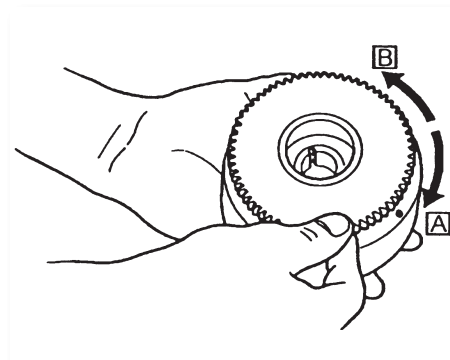
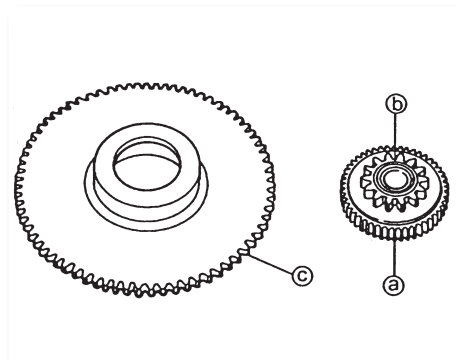
2) CHECK:

- Operation of the start clutch.
- Push the tang guide following the indicator.

Stiff operation = > **Replace.**

Steps for checking:

- Loose the start clutch.
- When rotating the start gear (the big one) clockwise (A), the start clutch and the start gear should be coupled.
- On the contrary, the start clutch is damaged. Replace.
- When rotating the start gear anticlockwise (B), it should turn freely.
- On the contrary, the start clutch is damaged. Replace.



3.51 MAGNETO ROTOR AND STAR GEAR

1) INSTALL:

- Timing chain.
- Guide of the chain.



Screw (guide of the chain):
1.0 Kgf.m (10 N.m)

Remark:

Fasten a wire on the timing chain to avoid this falls inside the chassis.

**2) INSTALL:**

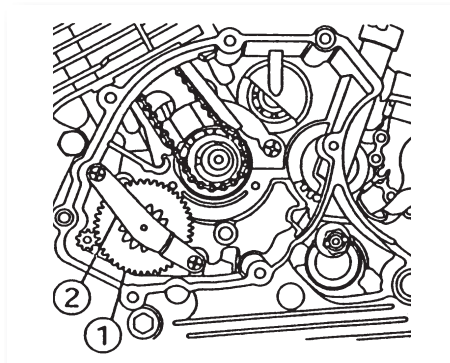
- Start gear (1).
- Plate (2).

**Screw of the plate:**

0,7 Kgf.m (7 N.m)

3) INSTALL:

- Motor Oil 4T.
(in the start gears).

**4) INSTALL:**

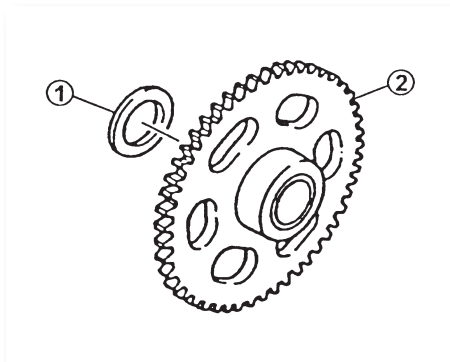
- Washer (1).
- Start gear (2).

5) INSTALL:

- Cotter.
- Magneto rotor.

Remark:

*Install the rotor provisionally, aligning the groove of the cotter with the cotter.
Rotate the start gear clockwise and install the rotor in the start gear.*



6) PRESS:

- Nut (magneto flywheel).

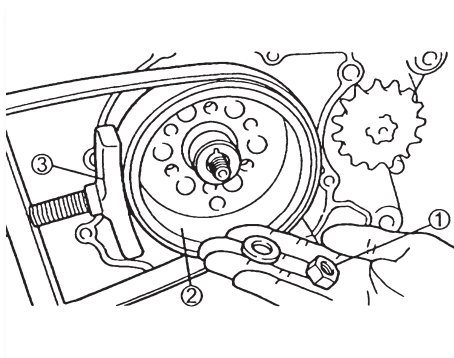


Nut of the magneto flywheel:

7,0 Kgf.m (70 N.m)

Remark:

*Press the nut (1) while holding the steering wheel (2) with the supporter of the rotor (3).
Be careful not to let the supporter of the rotor touches the rotor salient.*



Rotor support:

90890-01701

7) INSTALL:

- Tang guide.
- Gasket of the chassis cover - New.
- Chassis cowling (LS).



Screws of the chassis cover:

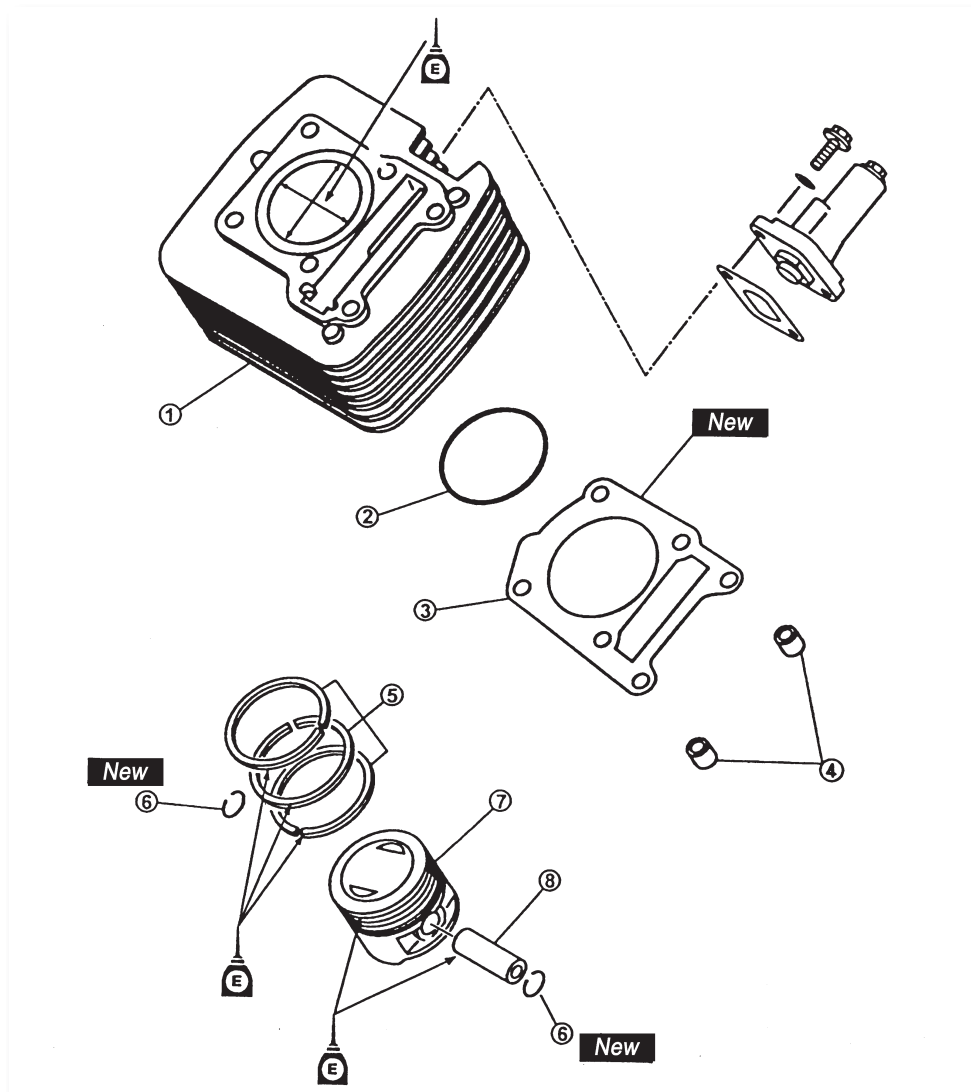
1,0 Kgf.m (10 N.m)

8) CONNECT:

- Drive of the neuter switch.



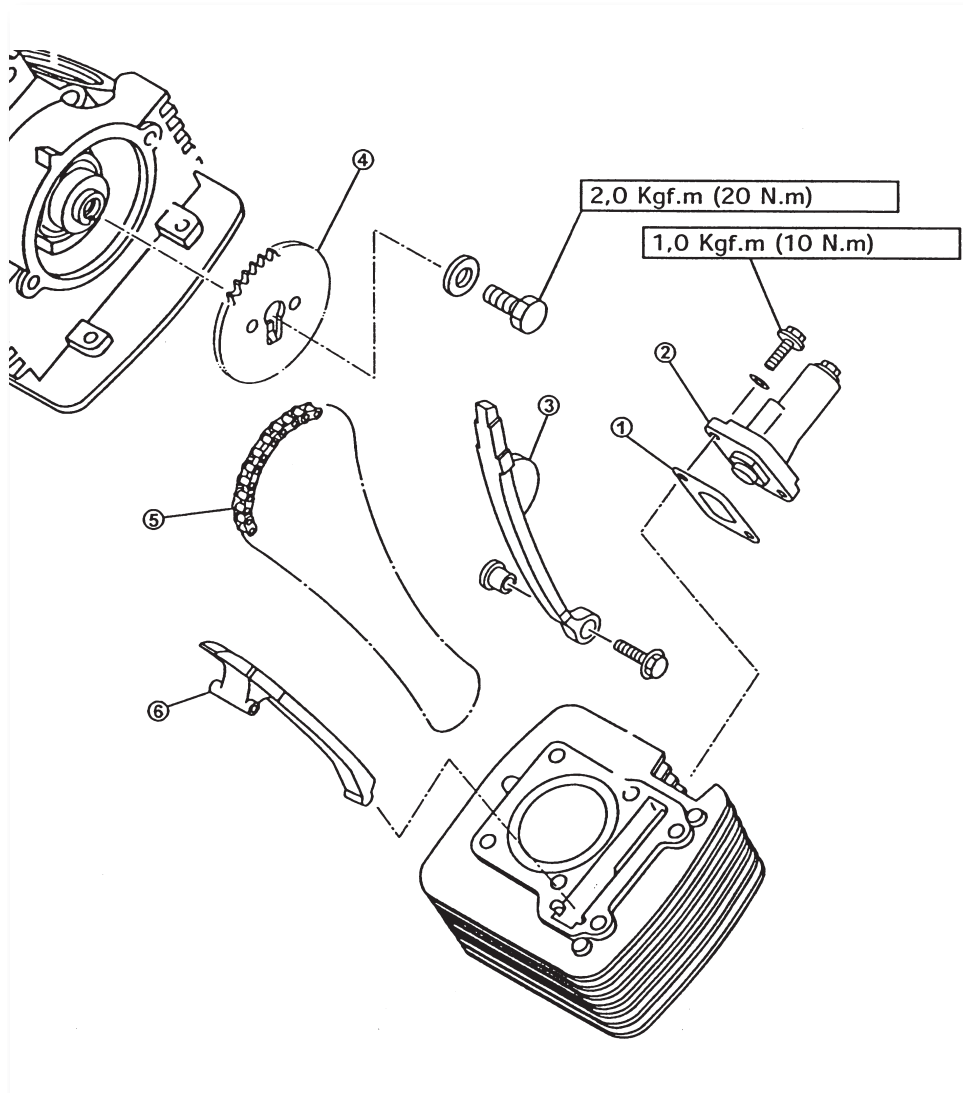
3.52 CYLINDER AND PISTON



- 1) Cylinder
- 2) Special gasket
- 3) Cylinder gasket
- 4) Greed tang
- 5) Group of rings
- 6) Clamp bolt
- 7) Piston
- 8) Bolt



3.53 CONTROL GEAR AND TIMING CHAIN



- 1) Gasket
- 2) Strut unit of the timing chain
- 3) Guide of the timing chain (intake)
- 4) Control gear
- 5) Timing chain
- 6) Guide of the timing chain (exhaust)



3.54 RINGS, PISTON AND CYLINDERS INSTALLATION

1) Install according to the following sequence:

- Expander (oil ring) (1).
- Separator rings (oil ring) (2).
- Secondary ring (scraper) (3).
- Top ring (compression) (4).

Remark:

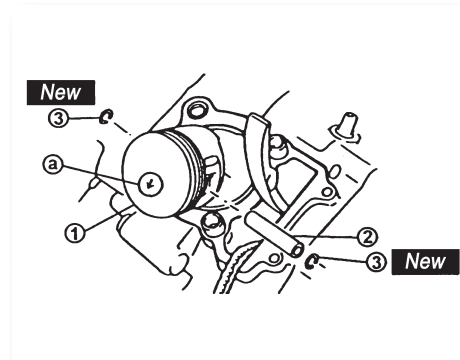
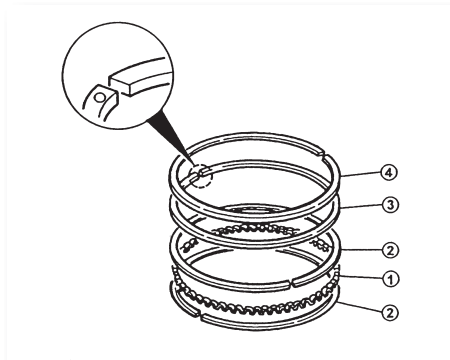
- Install the rings with the manufacturer trademark upwards.
- Lubricate the piston and the rings properly with motor oil.

2) INSTALL:

- Piston (1).
- Bolt (2).
- Clamp bolt New (3).

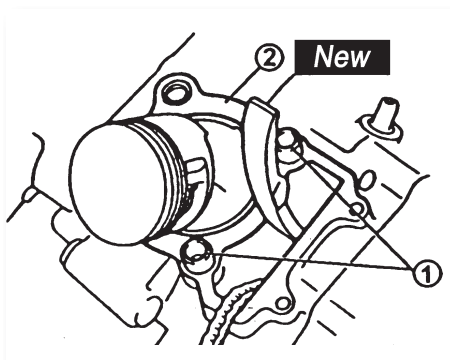
Remark:

- Apply motor oil on the bolt.
- This mark "=>" in the piston should be towards the exhaust side.
- Before installing the clamp bolt, cover the opening of the chassis with a clean cloth.



3) TO INSTALL:

- Tan guide (1)
- Gasket of the cylinder - New (2).





4) POSITION:

- Rings (1).

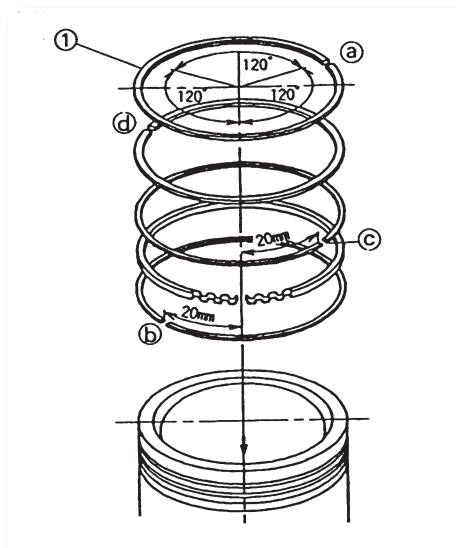
Remark:

- Position the tips of rings in accordance with the figure.

- (a) Top ring.
- (b) Oil ring (bottom).
- (c) Oil ring (top).
- (d) Secondary ring.

5) LUBRICATE:

- External surface of the piston.
- Rings.
- Internal Surface of the cylinder.

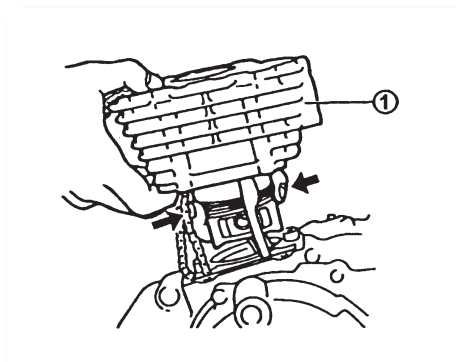


6) INSTALL:

- Special gasket New.
- Cylinder (1).

Remark:

- Install the cylinder with one of the hands, while compressing the rings with the other one.
- Goes the guide of the timing chain (exhaust side) to the cavity of the timing chain.





3.55 CYLINDER HEAD INSTALLATION

1) INSTALL:

- Tang guide New (1).
- Cylinder head gasket New (2).
- Guides of the timing chain (exhaust) (3).

2) INSTALL:

- Cylinder head
- Screw with washer (cylinder head).



Screws (cylinder head):

M8 (1-4):

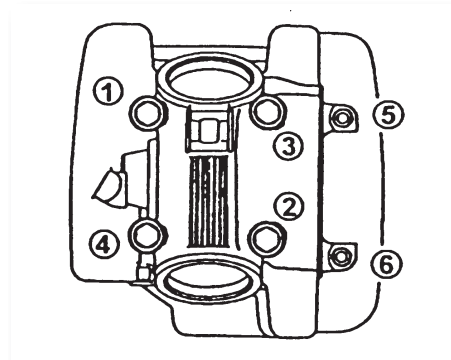
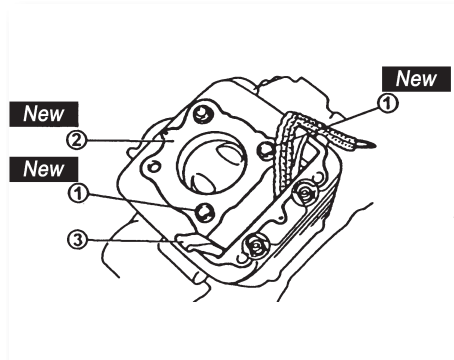
2,2Kgf.m (22 N.m)

M6 (5-6):

1.0 Kgf.m (10 N.m)

Remark:

- Apply motor oil on the threads of the screws.
- Press the screws in increasing order.

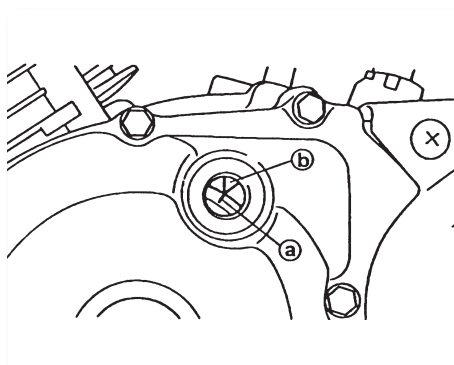


3) INSTALL:

- Control gear.
- Timing Chain.

Steps for the installation:

- Rotate the crankshaft anticlockwise till the mark (a) is aligned with the stationary point (b).
- Align the mark "I" (c) of the control gear with the stationary point (d) of the cylinder head.
- Install the timing (1) chain in the control gear (2) and install the gear in the camshaft.





Remark:

When installing the control gear, keep the timing chain as much tense as possible in the exhaust side.



Do not rotate the crankshaft during the installation of the camshaft. Damages can occur or the motor can be out of point.

- Extract the cable from the timing chain.

4) INSTALL:

- Clamp plate.

5) INSTALL:

- Screw (gear).

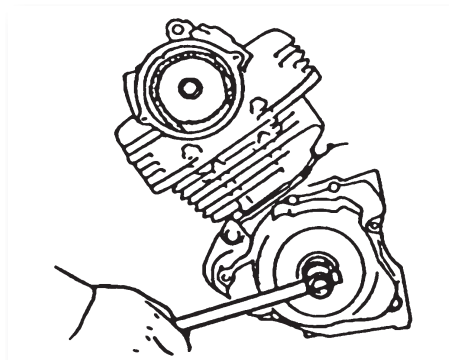
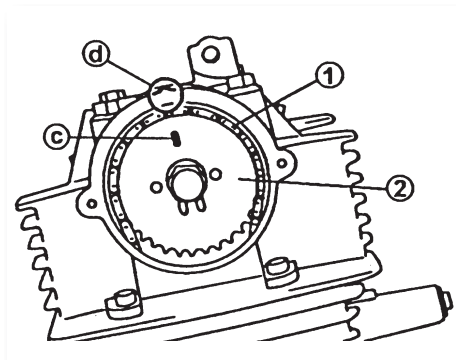


Screw (gear of the timing chain):

2.0 Kgf.m (20 N.m)

Remark:

Install the screw, while fastening the nut of the flywheel magneto with a spanner.

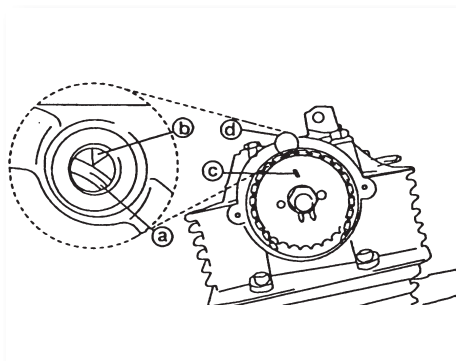


6) CONTROL:

- Marks of the flywheel (a).
- Align the stationary point (b) with the cover of the chassis (LI).

- Marks of the control gear "I" (d).
- Align the stationary point (c) with the cylinder head.

Non-aligned => **Adjust.**



**7) INSTALL:**

- Strut of the timing chain.

Steps for the installation:

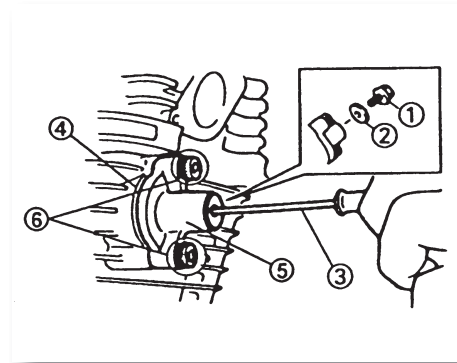
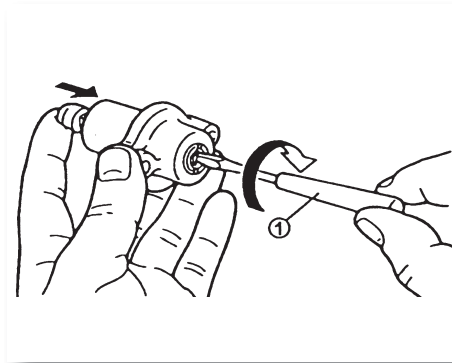
- Extract the screw from the cover of the strut.
- While the bolt of the strut is pressed lightly with the hand, use a screwdriver to turn the bolt of the strut clockwise completely.
- With the bolt completely tight, install the gasket (4) and the strut of the chain (5) and press the screw (6) with the specified torque.
- Loose the screwdriver. If all is correct with the gasket, press the screw of the cover (1) with the specified torque.

**Screws (strut of the timing chain):**

1,0 Kgf.m (10 N.m)

Screw of the cover (strut of the timing chain):

0,75 Kgf.m (7,5 N.m)

**8) CHECK:**

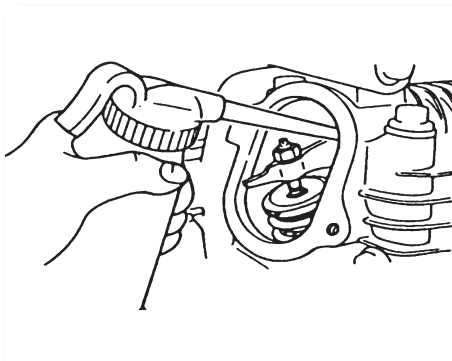
- Play of valves

Unspecified => **Adjust.**

See section: “**ADJUSTMENT OF THE VALVES SET**” in the **CHAPTER 3.**

9) LUBRICATE:

- With motor oil.





10) INSTALL:

- Valves cover (with the special gasket).
- Lateral cover of the cylinder head (with the special gasket).
- Screws (with washers).



Valve cover:

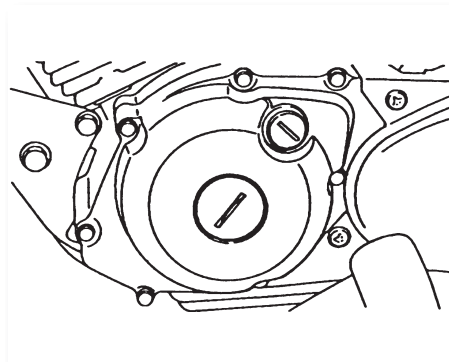
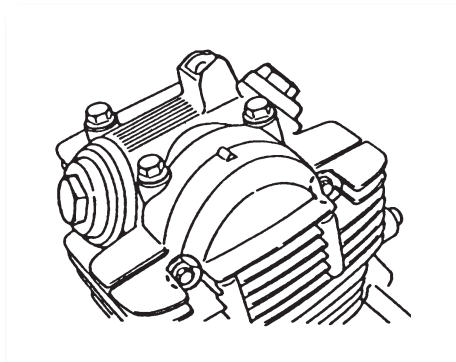
1,75 Kgf.m (17,5 N.m)

Screws (lateral cover of the cylinder head):

1,0 Kgf.m (10 N.m)

11) INSTALL:

- Cap of checking point (with the special gasket).
- Central cap (with O-ring).



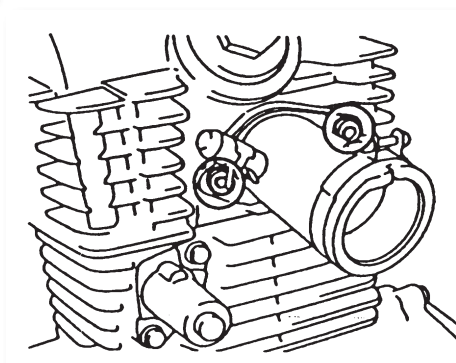
12) INSTALL:

- Gaskets (inlet collector).
- Inlet collector.



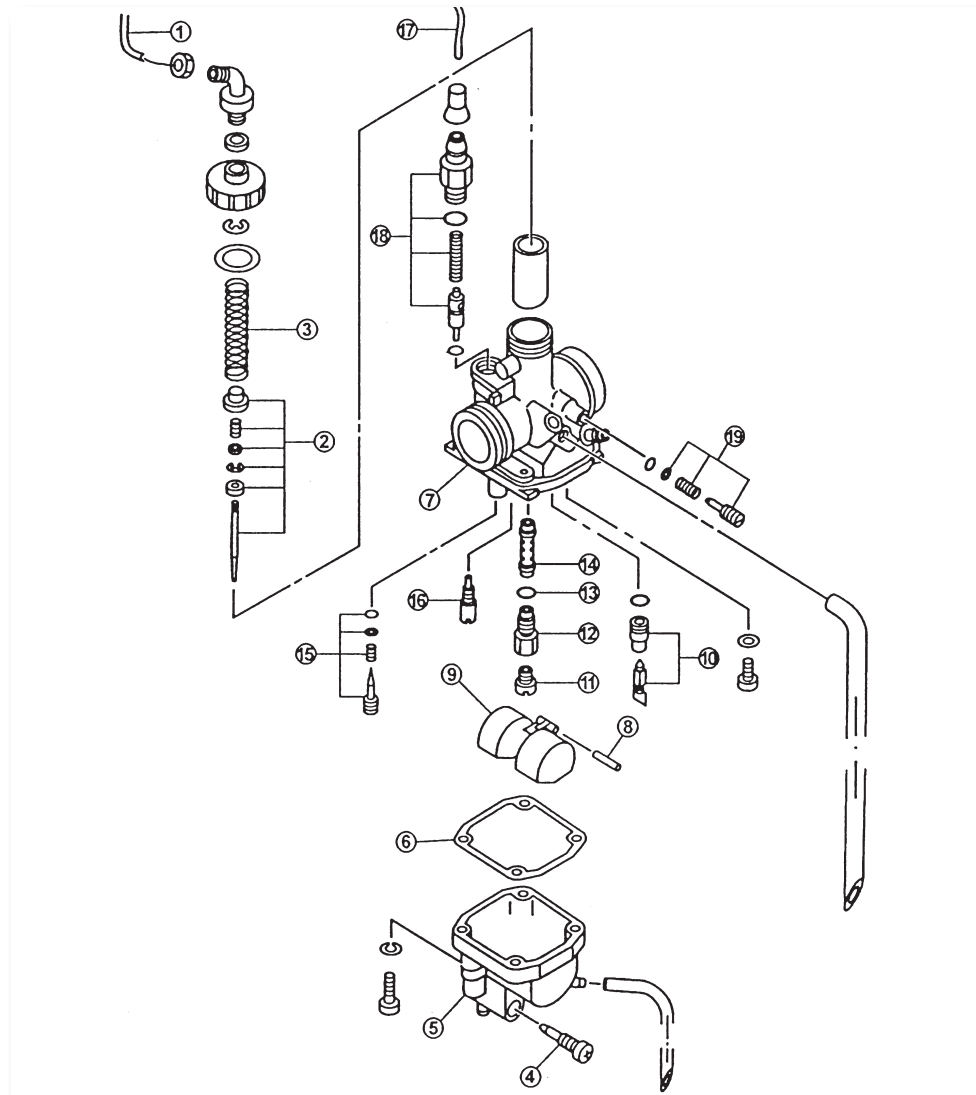
Screws (inlet collector):

1,0 Kgf.m (10 N.m)





3.56 CARBURETTOR



- | | |
|-------------------------------|-------------------------------|
| 1) Cable of the accelerator | 16) Low spout |
| 2) Lock valve unit | 17) Cable of the choke |
| 3) Spring of the lock valve | 18) Choke unit |
| 4) Drainage screw | 19) Screw of the idling speed |
| 5) Carburettor tank | |
| 6) Gasket of the tank | |
| 7) Body of the carburettor | |
| 8) Tang of the float | |
| 9) Float | |
| 10) Needle valve unit | |
| 11) High spout | |
| 12) Diffuser 1 | |
| 13) Special gasket | |
| 14) Diffuser 2 | |
| 15) Pilot screw unit (of air) | |



3.57 DISASSEMBLY

Remark:

• All the parts here below can be cleaned and inspected without disassembling the carburettor. (All the internal parts, excepting the choke).

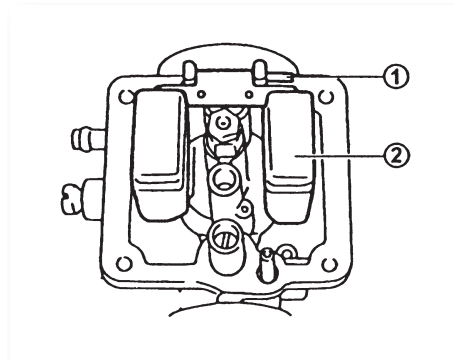
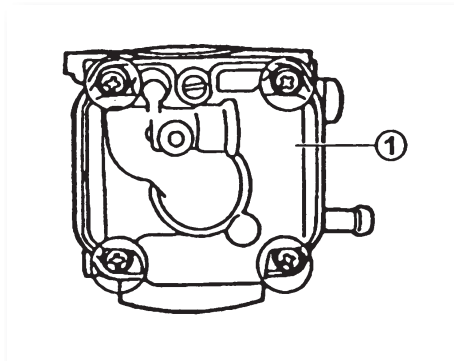
- Lock valve
- Needle of the lock valve
- All the spouts
- Float
- Needle valve
- Seating of the needle valve
- Diffuser
- Needle of the lock valve

1) EXTRACT:

- Carburettor tank (1).
- Gasket of the tank.

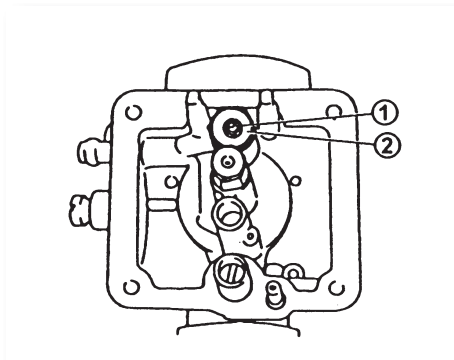
2) EXTRACT:

- Tang of the float (1).
- Float (2).



3) EXTRACT:

- Needle valve (1).
- Seating of the needle valve (2).

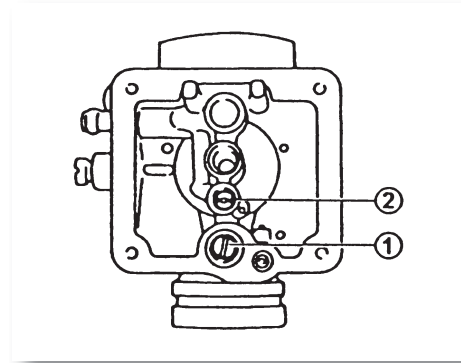
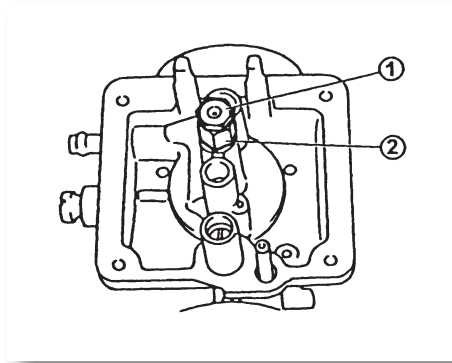


**4) EXTRACT:**

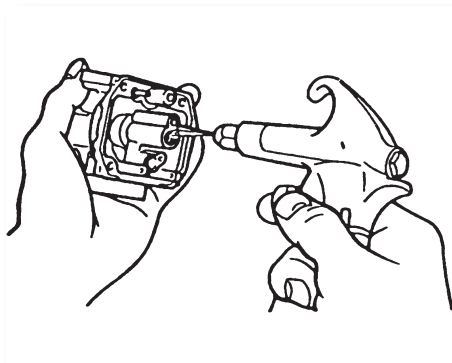
- High spout (1).
- Diffuser (2).
- Special gasket.

**5) EXTRACT:**

- Pilot screw unit (of air) (1).
- Low spout (2).

**3.58 CHECKING****1) CHECK:**

- Body of the carburettor
- Carburettor tank
- Place of the spouts
Cracks / damages => **Replace.**
- Fuel leaks
Obstruction => **Clean as mentioned before..**
- Body of the carburettor tank
- Contamination => **Clean.**





Steps for the cleaning:

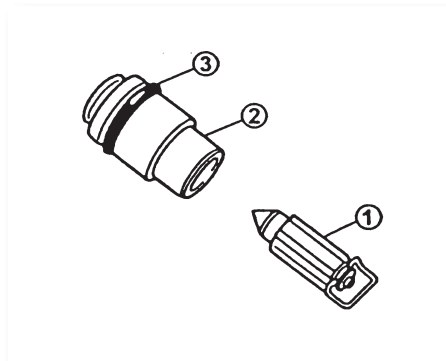
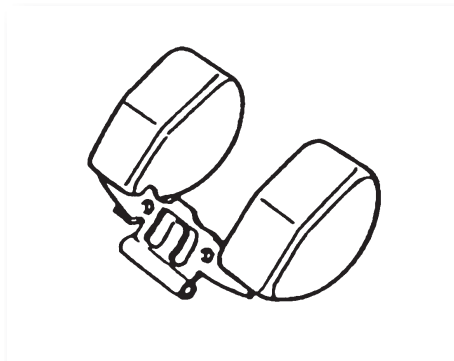
- Wash the whole carburettor with kerosene or petrol. (Do not use solutions with a chemical products base for cleaning the carburettor).
- Blow all the leaks and spouts with compressed air.

2) INSPECT:

- Float
- Damages => **Replace.**

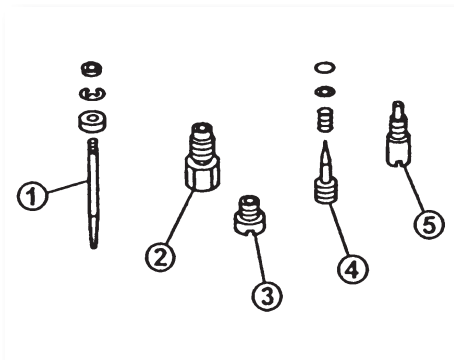
3) INSPECT:

- Needle valve (1).
 - Seating of the needle valve (2).
 - Special gasket (3).
- Damages / wear / obstruction => **Replace the unit.**



4) INSPECT:

- Needle of the lock valve (1).
 - Diffuser I (2).
 - High spout (3).
 - Low spout (4).
 - Pilot screw (of air) (5).
- Warping / wear / damages => **Replace.**
- Obstruction => **Blow the spouts with compressed air.**

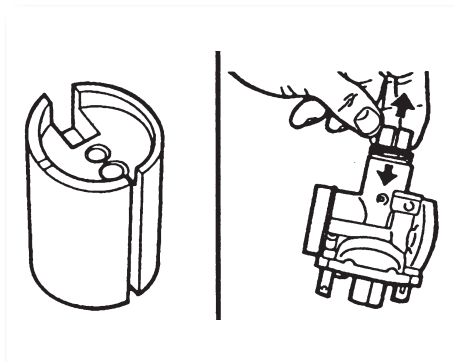


**5) CONTROL:**

- Free movement

Place the lock valve in the body of the carburettor and control if this moves freely.

Obstruction = > **Replace.**

**3.59 ASSEMBLY**

Invert the procedure of “**DISASSEMBLY**”.

Pay attention to the following points:



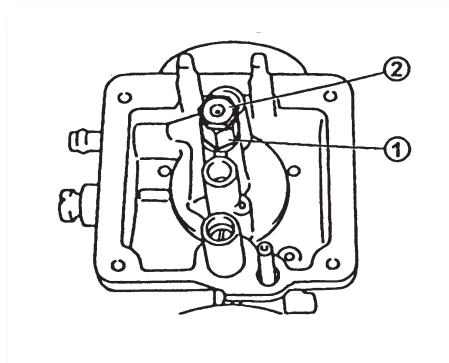
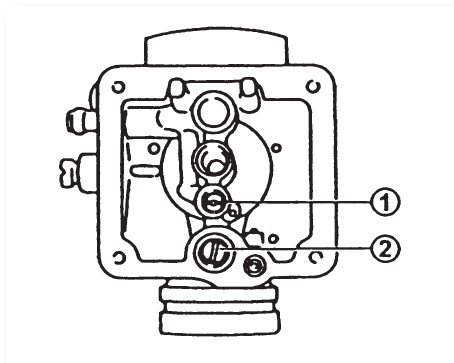
- Before the assembly, wash all the parts with kerosene.
- Always use new gaskets.

1) INSTALL:

- Low spout (1).
- Pilot screw unit (of air) (2).

2) INSTALL:

- Special gasket New
- Diffuser (1).
- High spout (2).



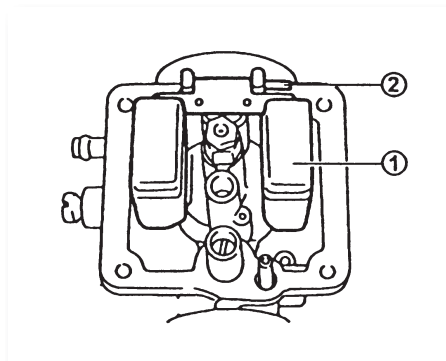
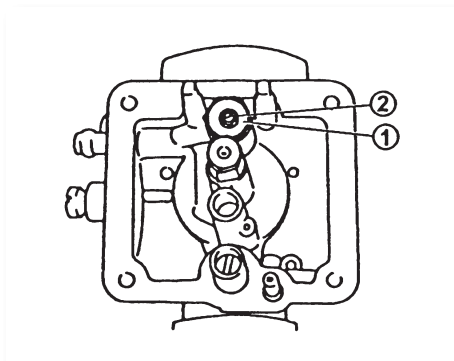


3) INSTALL:

- Seating of the needle valve (1).
- Needle valve (2).

4) INSTALL:

- Float (1).
- Tang of float (2).



5) MEASURE:

- Height of the float (a) without the gasket.

Incorrect = > **Adjust.**

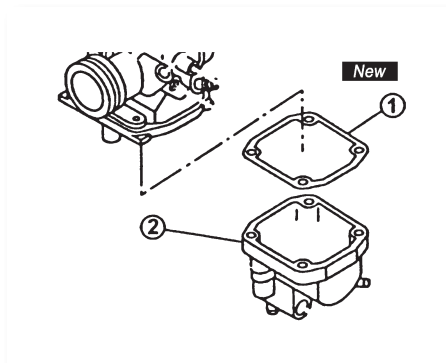
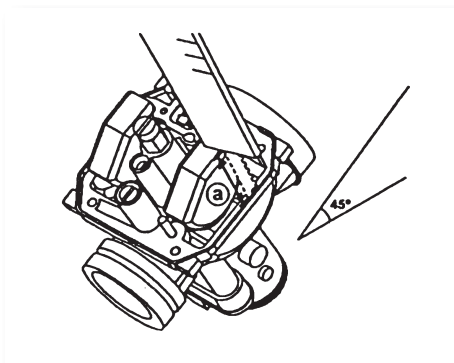


Height of the float:

18,9 mm

6) INSTALL:

- Gasket of the carburettor tank (1) - New
- Carburettor tank (2).





3.60 FUEL LEVEL ADJUSTMENT

I) MEASURE:

- Level of fuel (a).

Unspecified => **Adjust.**

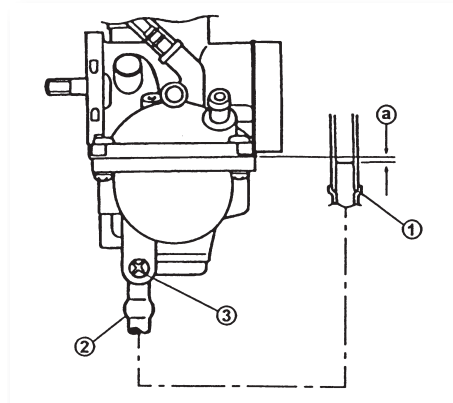


Level of fuel:

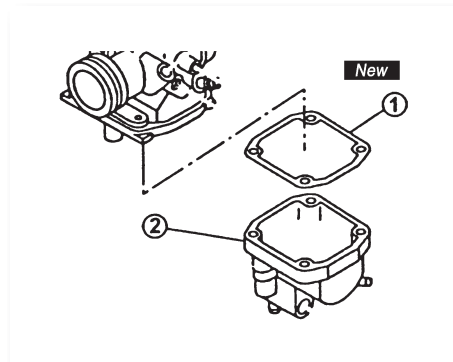
6—7 mm under the line of the tank.

Steps for adjustment:

- Place the motorcycle in a flat surface.
- Place a jack or a support under the engine to guarantee the carburettor in the vertical position.
- Connect the gauge of fuel level (1) in the drainage pipe (2).



- Loosen the drainage screw (3).
- Hold the gauge vertically near the line of the carburettor tank.
- Measure the level of fuel (a) with the gauge.
- If the level is incorrect, adjust it.
- Extract the carburettor.
- Inspect the valve seating and the needle valve.
- If those pieces are worn, replace both.
- If they are normal, adjust the float level by bending the needle support on the float slightly.
- Install the carburettor.
- Control the level of fuel again.





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