

SERVICE MANUAL

***Roadwin
250R FI***

HOW TO USE THIS MANUAL

This manual describes effective maintenance procedure for the VJF125 manufactured by DAELIM Motor Co., Ltd.

To ensure safety and optimal operating conditions of the vehicle, carry out regular inspections according to the maintenance schedule (Section 2).

Sections 1 through 2 provide information on overall vehicle; and section 3 describes maintenance procedure for the engine, frame and electrical systems.

To facilitate use of this manual, each page starts with disassembly and system diagrams, service information, and troubleshooting guide. If you cannot find the cause of trouble, refer to Section 21: Troubleshooting.

- Contents of this manual and specifications are subject to change without prior notice for improvement of vehicle quality.
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1. GENERAL INFORMATION

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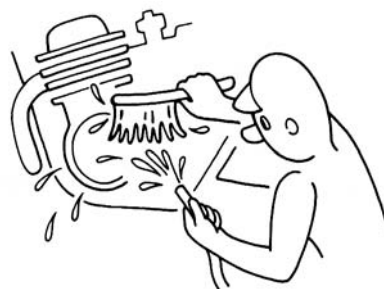
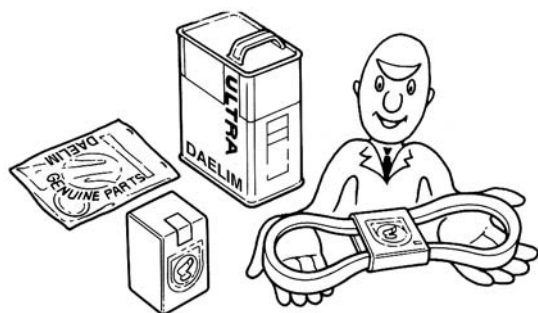
SERVICE INFORMATION

⚠ WARNING

1. Do not run the engine for a long time in closed or not well-ventilated area because the exhaust gas contains toxic substances such as carbon monoxide, hydrocarbon, nitric oxide.
2. The battery fluid(lean sulfuric acid) is extremely toxic. It is dangerous if skin is exposed to it or if it enters into the eye. Be careful in handling. When exposed to the battery fluid, wash it with water and get a medical check up.(store the battery fluid in a safe place to avoid touching by the children)
3. Pay attention not to be burned and always put on the protection gears because the engine or the muffler is hot right after engine stops.
4. Gasoline is extremely flammable. Maintenance must be performed in the place free of the open fire or electric spark.
5. When more than two person are working, always pay attention to other worker's action and always have safety in mind.
6. The skin exposed to used engine oil can be a major reason of the skin cancer. Pay attention not to be exposed and wash carefully with soap and water after handling.
7. If compressed air is used to clean the brake, dust scattered in the air can be breathed in by workers. Please take action not to scatter dust in the brake cleaner, etc.
8. Flammable nitrogen gas is generated during charging the battery so charging must be performed in well-ventilated area and free of the open fire and spark.

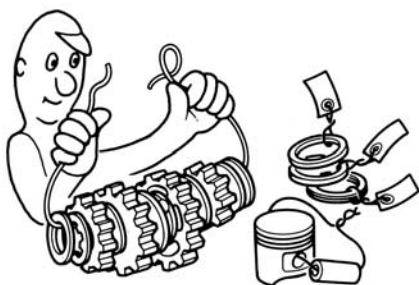
SERVICE RULES

1. Parts and lubrication oil must be DAELIM genuine or recommended parts.
2. Before maintenance, remove deposit or dust from the chassis.



GENERAL INFORMATION

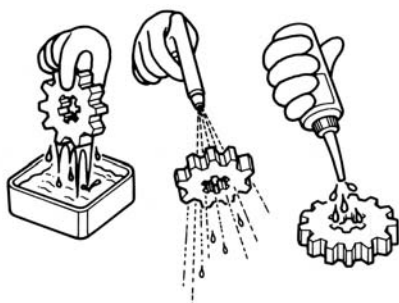
3. Store the parts of each system discriminatively to install each part in the right place.



4. After removing gasket, O-ring, piston pin clip and cotter pin, always replace them with the new one. When removing the snap ring, it can be easily missed after transformation or installation.



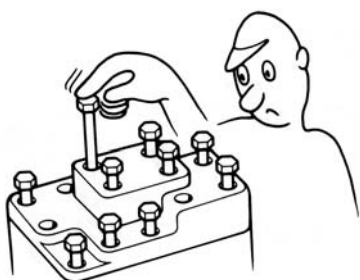
5. Clean the parts after the overhaul and before the test and remove the cleaning oil with compressed air. Apply oil to seal face during installation.



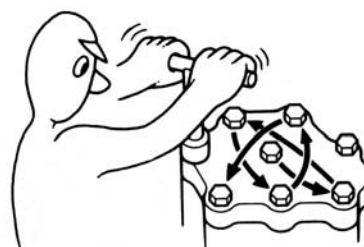
6. Check necessary place and measure necessary data during installation. When installing, return to the state before removing.



7. Align the bolts to uniform the tightening points before tightening them when you don't know the bolt length.



8. Bolts, nuts and pieces must be tightened from the bigger diameter to the smaller one, from inside to outside and diagonally with the specified torque.



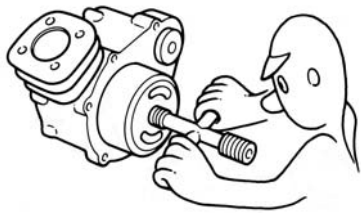
9. Check to see if the rubber part is worn out when removing it and replace it if necessary. Some rubber part is weak to gasoline and kerosene, so pay attention not to soak with gasoline or oils.



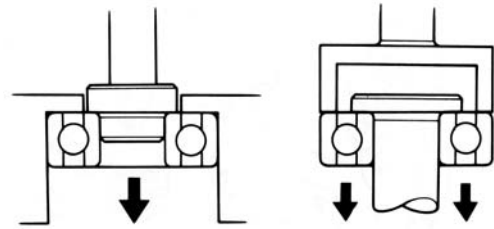
10. Recommended grease must be applied to or filled in the specified place.



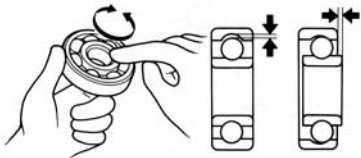
11. Maintenance needed to use the specialized tools must be performed with the right tool.



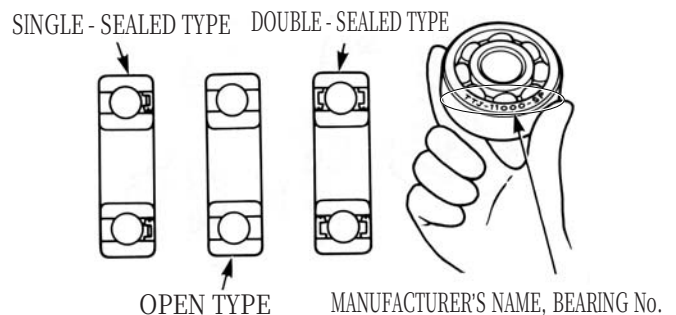
12. Never reuse the ball bearing removed with the ball applied pressure when removing press-fitted the bearing.



13. Check the smooth rotation of inner or outer race of the ball bearing by rotating it manually.
- Replace the ball bearing having excessive axial/longitudinal hanging.
 - Wipe the ball bearing likely to have hanging with cleaning oil.(except double-sided sealed type ball bearing)
 - Replace the ball bearing of which press-fitted part is slacked at the case or shaft.



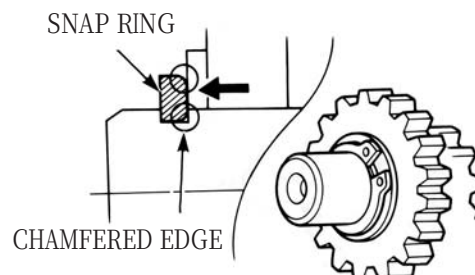
14. Pay attention to installation direction in case of the single-sided sealed ball bearing. Install the open-direction or double-sided sealed bearing in the way that the face marked with manufacturer and size should direct to the outer axle.



15. When blowing the ball bearing with compressed air after cleaning, keep the race from rotating. High speed rotation of the race may damage the bearing. Prior to installation, apply oil or grease to the bearing.



16. Install the snap ring so that chamfered side directs to the load-applied side. After installation, check the proper installation by rotating the snap ring.



17. Check each part for proper tightening and operation after installation.



18. The brake fluid and coolant can damage the painted plastic or rubber parts. Keep these parts from contacting with them and wash these parts with water in case of contact.

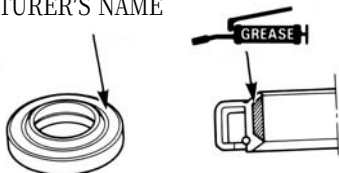


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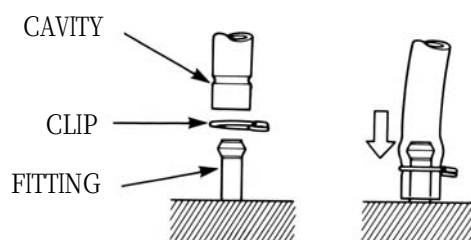
19. Install the oil seal so that the manufacturer marked surface directs outer surface.(direction not covered with oil)

- Pay attention not to bend or damage the lip.
- Apply the grease to the lip.

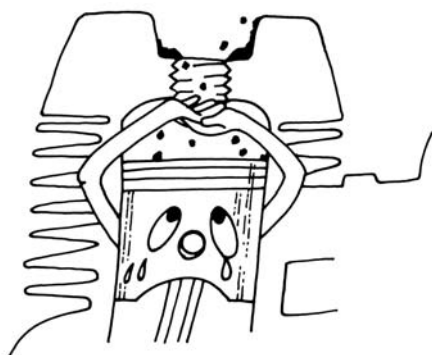
MANUFACTURER'S NAME



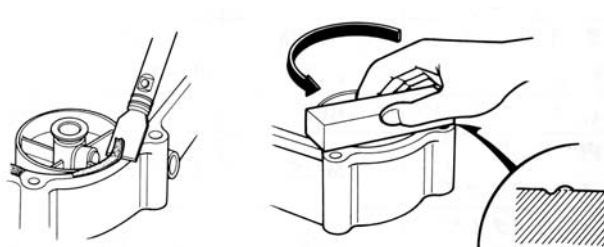
20. Connect the tube until the tube fully inserted in the joint. Install the clip if it is supplied. Replace the tube having slacked end.



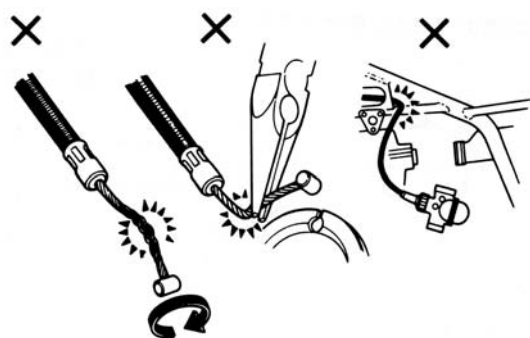
21. Keep the pneumatic system interior or the engine interior from the infiltration of dust.



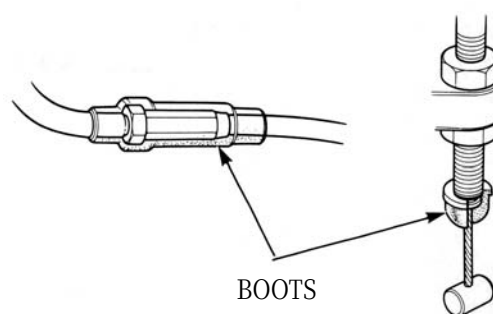
22. Install the gasket mounted in the contact surface of each case of the engine while removing gasket material completely. Remove damaged contact surface by wiping with the oil stone equally.



23. Pay attention not to bend the cable excessively. Transformed or damaged cable may cause malfunction or damage.

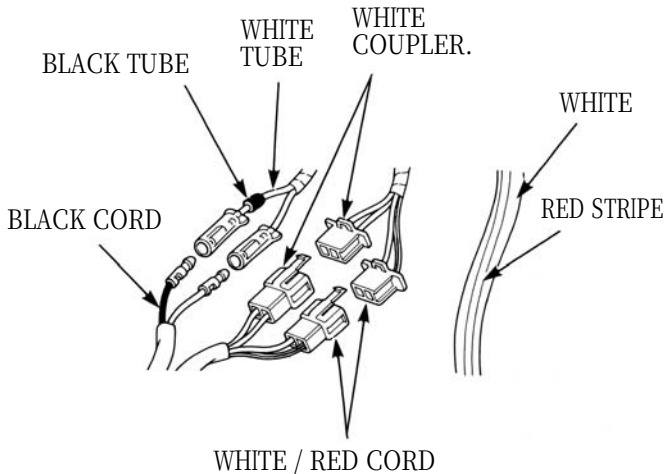


24. Install the boots with the installing groove by inserting the boots into the groove.

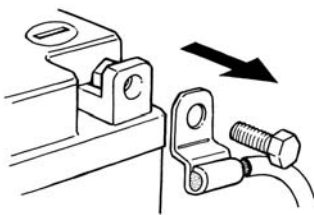


CAUTION WHEN WIRING

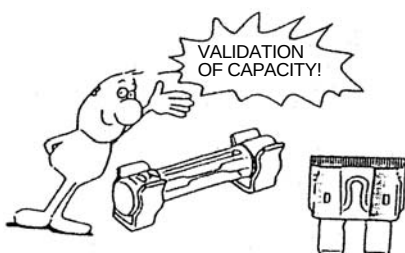
- Each cord must be connected depending on its color. When connecting different cord, attach color tube around the connector. Connect the coupler to the connector with same color and same pin number.
- Identify the two-colored cord by main color first and then striped color .



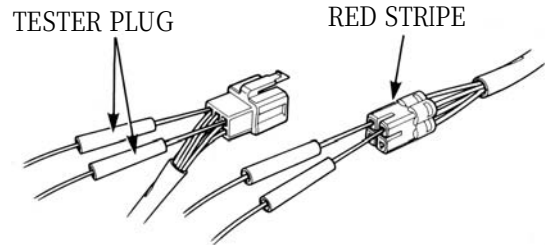
- When disconnecting the battery, the minus terminal must be disconnected first.
- Make sure that the tool such as spanner do not contact with the frame.



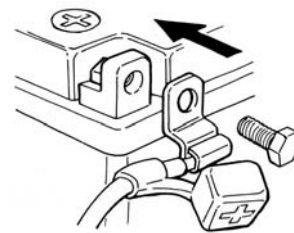
- If the fuse is short-circuited, find out the cause and repair. Replace with the fuse having the specified capacity.



- When measuring voltage or resistance of the cord terminal using tester, contact the tester plug behind of the coupler. Pay attention not to open the cord terminal and contact the tester plug from the front of the coupler in case of water-proof coupler.



- Recheck the condition of contact, securing and continuity of each part after maintenance.
- When connecting the battery, the plus terminal must be connected first.
- After connecting the terminal, apply the grease to the terminal.



- Connect covers to the terminal after maintenance.

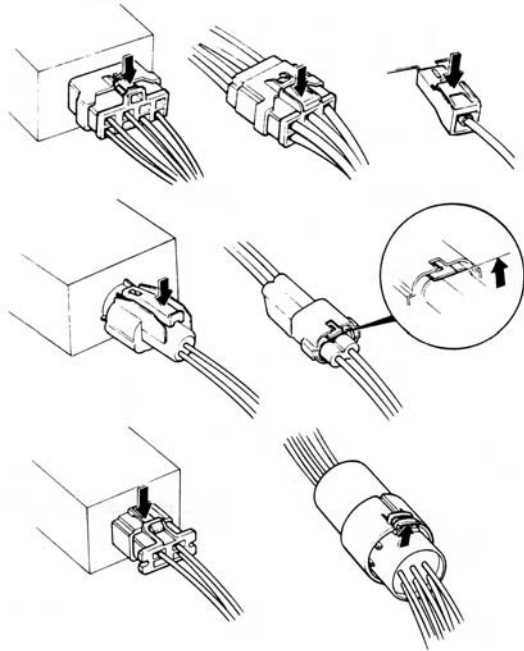


- If there is rust in the terminal, remove the rust with sand paper prior to connecting.

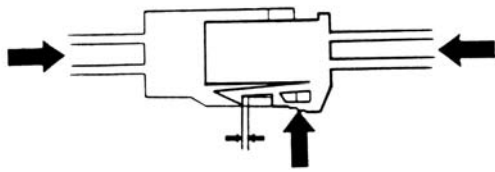


GENERAL INFORMATION

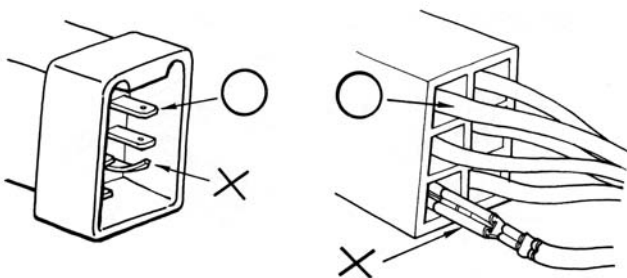
- Turn off the main switch before connecting/disconnecting.
- Release the lock to disconnect the lock of the coupler.
- The lock of the coupler has two types according to releasing method (press type and pull type) so release it properly according to the shape.
- Typical releasing method of the coupler is illustrated in the following.



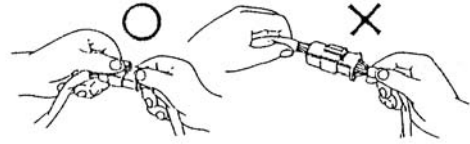
- Release the lock by inserting the coupler slightly and then narrowing connection to remove the coupler.



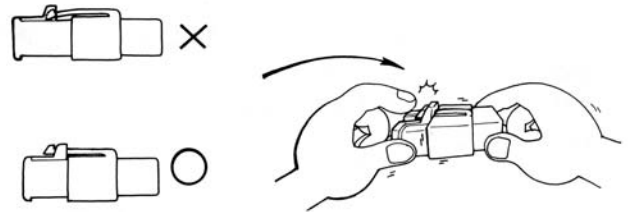
- Check to see if there is bended terminal and secure it to avoid disconnecting.



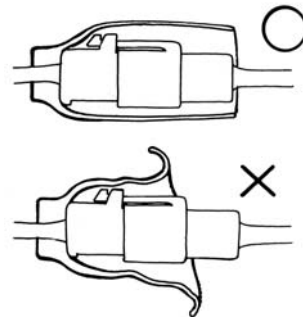
- When disconnecting the coupler, disconnect it while holding the coupler body. Pull while holding the wire harness cord and do not remove the coupler connection.



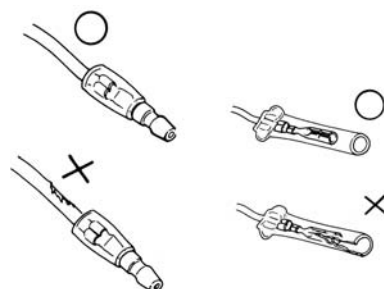
- Insert the lock of the coupler until the lock is fully secured.



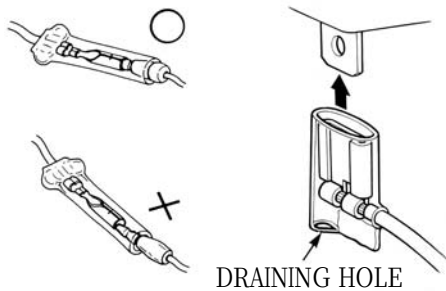
- Pay attention not to damage the vinyl cover of the coupler.



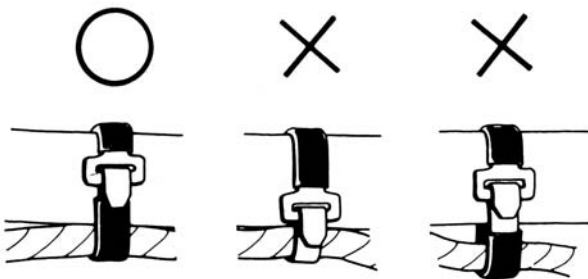
- If the wire harness coating is damaged, repair by winding vinyl tape or replace it.
- Prior to connecting the connector, make sure that the cover is not damaged and the mess terminal is not opened.



- Insert the connector until the vinyl cover is fully inserted into the terminal.
- The opening of the vinyl cover must face at the ground direction but in case of the plain connector, the draining opening must face at the sky direction.



- Wire band must be secured firmly in the specified location of the frame. In case of aluminium band, secure the wire harness to the coated part.



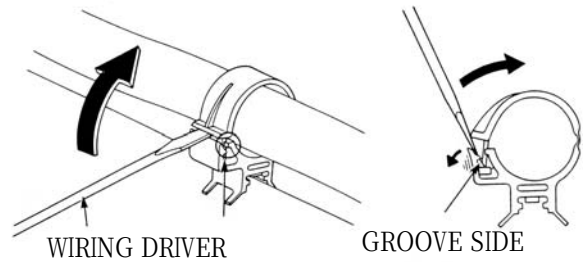
- In case of the weld clamp, do not clamp in the welded part.



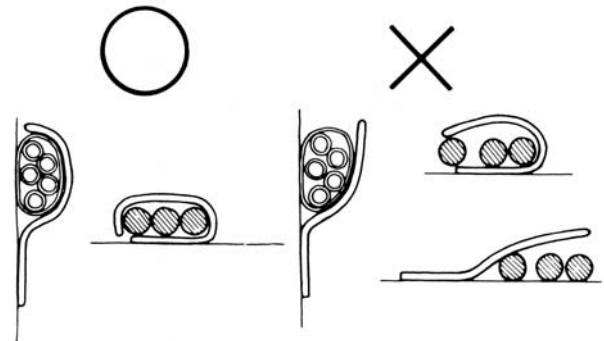
- When clamping the wire, pay attention not to contact with hot part.



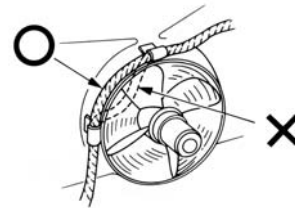
- When removing T-start, broaden the groove of T-start using the wiring driver and release the torque.
- Connect the harness and the hose to T-start and then insert until the groove is locked.
- When removing T-start from the frame, replace it with the new one.



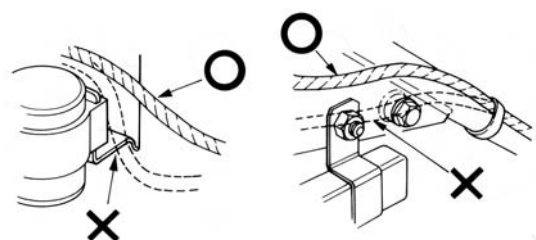
- Secure the wire harness firmly using the clamp.



- When clamping the wire harness, make sure that the harness is not contacted with the shaft or rotating part.

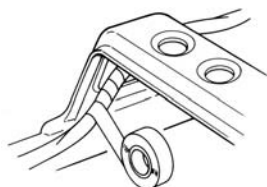


- The wire harness must be routed without contacting with the end of the lamp or any sharp edge.
- The wire harness must be routed without contacting with the end of the bolt or the piece.

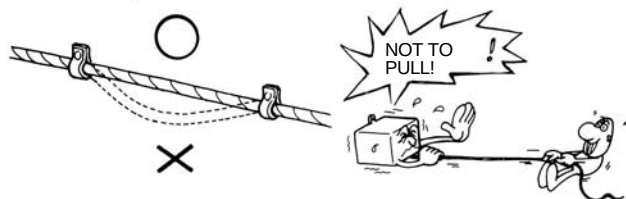


GENERAL INFORMATION

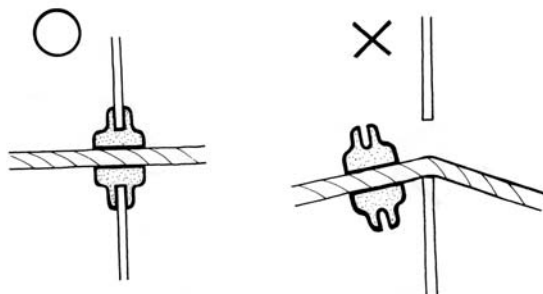
- In case that the wire harness is contacted with the end or the sharp edge, protect both parts with tube or tape.



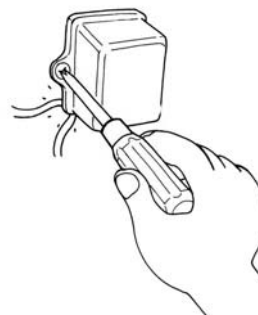
- The wire must not hang down or be pulled excessively.



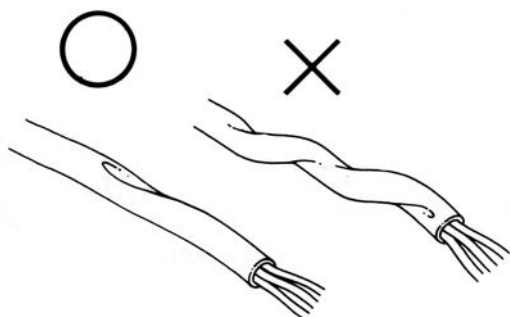
- If necessary, lock the wire harness properly.



- When mounting parts, make sure that the wire harness is not pressed by the parts.



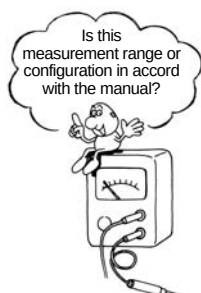
- Do not twist the wire harness.



- Wire the wire harness not to be pulled or expanded when the handle is turned to the right or the left completely. Avoid excessive bending or chewing and interference with the engine.



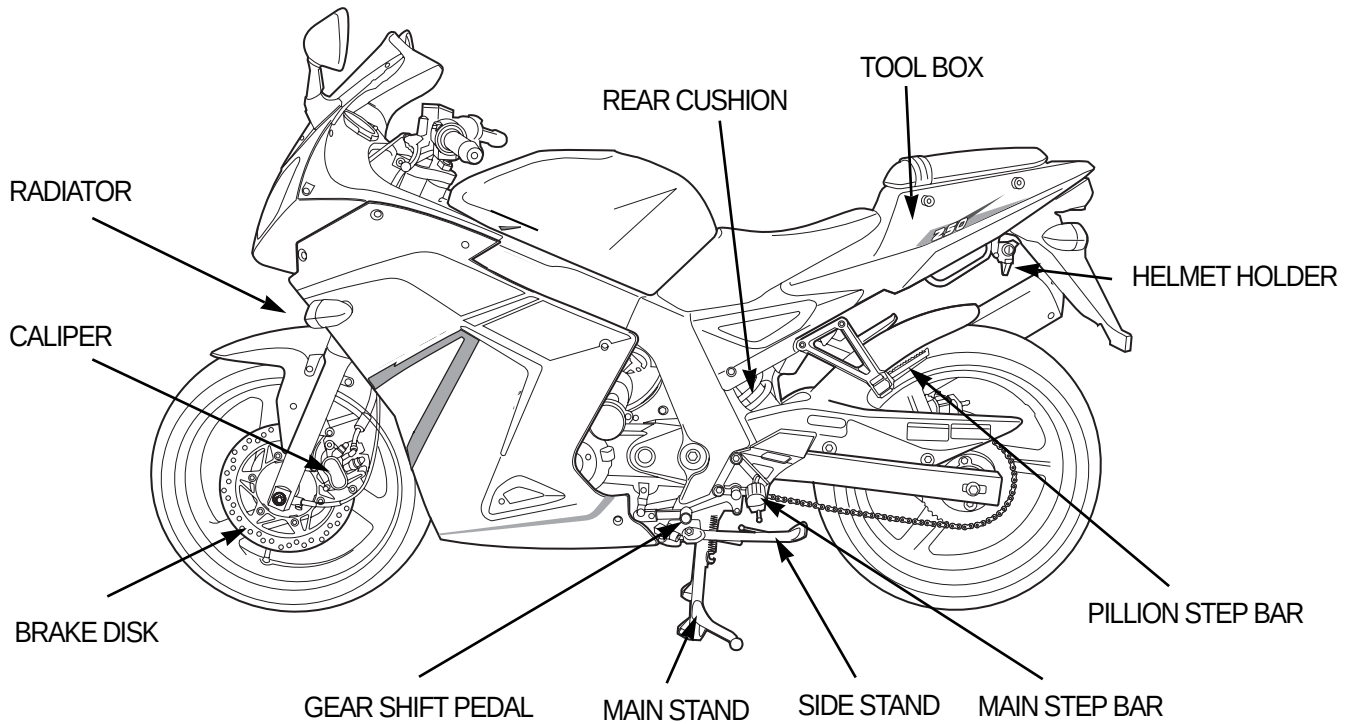
- Prior to using the tester, please read the manual carefully and understand the contents.
- When testing the resistance of the tester, the zero adjustment must be performed before testing.



- Do not drop or throw the parts especially semiconductor contained parts because these parts may be damaged by the impact of the drop.



MODEL IDENTIFICATION



ENGINE SERIAL NUMBER LOCATION

- The engine serial number is stamped on left crankcase.



FRAME SERIAL NUMBER LOCATION

- The frame serial number is stamped on the left side of steering head.

SPECIFICATIONS

ITEM		SPECIFICATIONS
DIMENSIONS	OVERALL LENGTH	2,025mm
	OVERALL WIDTH	778mm
	OVERALL HEIGHT	1,180mm
	WHEEL BASE	1,380mm
	SEAT HEIGHT	780mm
	GROUND CLEARANCE	139mm
	DRY WEIGHT	173kgf
	CURB WEIGHT	292kgf
FRAME	TYPE	Double Cradle
	FRONT SUSPENSION / STROKE	Telescopic / 130mm
	REAR SUSPENSION / STROKE	Swingarm / 28mm
	FRONT TIRE SIZE (TYPE)	110/70-17 54P (Tubeless)
	REAR TIRE SIZE (TYPE)	140/60-17 69P (Tubeless)
	TIRE PRESSURE 1 PERSON FRONT	2.00kgf/cm ² (200kPa)
	REAR	2.00kgf/cm ² (200kPa)
	2 PERSON FRONT	2.00kgf/cm ² (200kPa)
	REAR	2.25kgf/cm ² (225kPa)
	FRONT BRAKE	Hydraulic Disk
	REAR BRAKE	Hydraulic Disk
	FUEL CAPACITY	14.85 l
	FUEL RESERVE CAPACITY	4.0 l
	CASTER ANGLE	25.2°
ENGINE	TRAIL	93.5mm
	FRONT FORK OIL CAPACITY	265±2.5cc
	TYPE	Liquid 4-stroke DOHC(4 Valve)
	CYLINDER NUMBER, ARRANGEMENT	1 Cylinder, 20° Inclined from vertical
	BORE AND STROKE	56.5 X 49.5mm
	DISPLACEMENT	124.1cm ³
	COMPRESSION RATIO	11.8:1
	VALVE TRAIN	DOHC Chain Drive
	OIL CAPACITY	1.5 l After Disassembly
		1.35 l After Draining and Oil Filter Change
		1.3 l After Draining
	LUBRICATION SYSTEM	Wet Pressing and Spray
	AIR FILTRATION TYPE	Paper Filter
	CYLINDER COMPRESSION	13.0kgf/cm ² (600rpm)
	INTAKE VALVE OPEN	23° BTDC
	CLOSED	55° ABDC (1.12mm Lift)
	EXHAUST VALVE OPEN	66.3° BBDC
	CLOSED	23.6° ATDC (1.12mm Lift)
	VALVE CLEARANCE INTAKE	0.15±0.02mm
	(A COOLING-OFF PERIOD) EXHAUST	0.20±0.02mm
	ENGINE DRY WEIGHT	32.0kgf

ITEM		SPECIFICATIONS
DRIVE TRAIN	CLUTCH TYPE	Multiplate Wet Clutch / 5
	TRANSMISSION TYPE	Constant Mesh
	GEAR RATIO 1st	3.200(37/12 T)
	2nd	2.143(32/17 T)
	3rd	1.438(29/21 T)
	4th	1.095(23/21 T)
	5th	0.923(24/26 T)
	GEARSHIFT PATTERN	Left foot operated return system Down 1-N-2-3-4-5 Up
ELECTRICAL	IGNITION TYPE	Full Transisterized
	IGNITION TIMING	18° BTDC / 1,600(rpm)
	FULL ADVANCE	30° BTDC / 8,500(rpm)
	AC GENERATOR	12V-17A/5,000(rpm)
	BATTERY CAPACITY	12V 10AH
	SPARK PLUG	CR9EH - 9
	SPARK PLUG GAP	0.8 - 0.9mm
	FUSE CAPACITY	30A
	STARTING SYSTEM	Starter Motor
	HEADLIGHT	55W/55W
	POSITION LAMP	5W
	TURN SIGNAL LAMP	10W × 4
	STOP/TAIL LIGHTS	21W/5W
	SPEEDOMETER LAMP	3W
	NEUTRAL INDICATOR LAMP	LED × 1
	HIGH BEAM INDICATOR LAMP	LED
	WINKER INDICATOR LAMP	LED
	LICENCE PLATE LAMP	5W
	TACHOMETER LAMP	LED × 1
	MALFUNCTION INDICATOR LAMP	LED

GENERAL INFORMATION

TORQUE VALUES

ENGINE

ITEM	Q'TY	THREAD DIA (mm)	TORQUE kgf.m,(N.m)	REFERENCE
CAM HOLDER BOLT(SHBOLT)	8	M6×1.0	1.0~1.2	Apply Engine Oil
CYLINDER HEAD SPECIAL SOCKET NUT	4	M10×1.25	3.5~4.5	Apply Engine Oil
CYLINDER HEAD COVER BOLT	4	M6×1.0	0.8~1.2	
CAM CHAIN TENSIONER PIVOT BOLT	1	M6×1.0	0.8~1.2	
CAM CHAIN TENSIONER LIFTER BOLT	2	M6×1.0	1.0~1.4	
CAM CHAIN TENSIONER LIFTER SCREW	1	M6×1.0	0.35~0.5	
PRIMARY DRIVE GEAR NUT	1	M16×1.0	6.0~7.0	Apply Engine Oil
CLUCH LOCK NUT	1	M16×1.0	6.0~7.0	Apply Engine Oil
FLYWHEEL BOLT	1	M12×1.25	5.0~6.0	Apply Engine Oil
STARTER CLUTCH SOCKET BOLT	3	M8×1.25	3.0~3.4	Remove negative screw
BEARING SET PLATE BOLT	2	M6×1.0	1.0~1.4	Remove negative screw
OIL FILTER COVER SOCKET BOLT	3	M10×1.25	1.0~1.4	
SHIFT DRUM STOPPER ARM BOLT	1	M6×1.0	1.0~1.4	
DRIVE SPROCKET BOLT	2	M6×1.0	1.0~1.4	
R.CRANKCASE COVER BOLT	12	M6×1.0	1.0~1.2	
OIL FILTER COVER BOLT	1	M6×1.0	1.0~1.2	
L.CRANKCASE COVER BOLT	7	M6×1.0	1.0~1.2	
A.C GENERATOR CAP	1	M14×1.5	0.4~0.8	
CRANKSHAFT HOLE CAP	1	M30×1.5	1.0~2.0	
CRANKCASE BOLT	10	M6×1.0	1.0~1.2	
SPARK PLUG	1	M10×1.25	1.0~1.2	
START MOTOR NUT	1	M6×1.0	1.0~1.4	
TAPPET ADJUST HOLE CAP	1	M36×1.5	1.0~2.0	
ENGIN TEMPERATURE SENSOR	1	M12×1.25	1.0~2.0	

FRAME

ITEM	Q'TY	THREAD DIA (mm)	TORQUE kgf.m,(N.m)	REFERENCE
REAR ENGIN HANGER BOLT(UPPER)	1	M10×1.25	4.5~5.5	
REAR ENGIN HANGER BOLT(UNDER)	1	M10×1.25	5.0~6.0	
FRONT ENGIN HANGER BOLT(UPPER/UNDER)	2	M10×1.25	4.5~5.5	
FRONT ENGIN HANGER PLATE BOLT	4	M8×1.25	2.4~3.0	
STEERING HANDLE PIPE BOLT	2	M8×1.25	2.4~3.0	
SIDE STAND PIVOT SCREW	1	M10×1.25	1.0~2.0	
SIDE STAND PIVOT NUT	1	M10×1.25	4.0~5.0	HEX NUT
SPEEDOMETER GEAR BOX SCREW	1	M 5×0.8	0.35~0.5	
REAR AXLE NUT	1	M14×1.5	8.0~10.0	U- NUT
DRIVE SPROKET NUT	4	M10×1.25	5.5~6.5	U- NUT
REAR BRAKE OIL BOLT	2	M10×1.25	3.4~4.0	

FRAME

ITEM	Q'TY	THREAD DIA (mm)	TORQUE kgf.m,(N,m)	REFERENCE
REAR CALIPER BRACKET BOLT	2	M8×1.25	2.8~3.4	U- NUT
REAR MASTER CYLINDER HOLDER SOCKET BOLT	2	M6×1.0	1.0~1.4	
FRONT AXLE NUT	1	M14×1.5	5.5~6.5	
FRONT BRAKE DISK BOLT	6	M8×1.25	4.0~4.5	
BRAKE OIL BOLT (FRONT/REAR)	4	M10×1.25	3.0~4.0	
CALIPER BRACKET BOLT (FRONT/REAR)	4	M8×1.25	2.8~3.4	
FRONT MASTER CYLINDER HOLDER BOLT	2	M6×1.0	1.0~1.4	
STEERING STEM NUT	1	M22×1.0	6.0~9.0	
STEERING TOP THREAD	1	M22×1.0	0.25~0.35	
FORK TOP BRIDGE PINCH BOLT	2	M8×1.25	2.4~3.0	
BOTTOM BRIDGE PINCH BOLT	2	M8×1.25	3.0~4.0	
FORK HANDLE PIPE MOUNTING BOLT	2	M8×1.25	2.4~3.0	
SWINGARM PIVOT NUT	1	M14×1.25	8.0~10.0	U- NUT
REAR CUSHION UPPER/UNDER BOLT	2	M10×1.25	3.5~4.5	
CHAIN SLIDER SCREW	2	6mm Tapping	0.5~0.7	
L. DOWNTUBE COMP 'B'	4	M8×1.25	4.0~4.5	
HANDLE WEIGHT SOCKET BOLT	2	M8×1.25	1.8~2.5	
REAR BRAKE DISK SOCKET BOLT	5	M8×1.25	4.0~4.5	

*Torque specifications listed above are for important fastener. Other should be tighten to the standard torque values below.

TYPE	TORQUE		TYPE	TORQUE	
	kgf · m	N · m		kgf · m	N · m
5mm BOLT, NUT	4.0~6.0	0.45~0.6	5mm SCREW	3.4~5.0	0.35~0.5
6mm BOLT, NUT	8~12	0.8~1.2	6mm SCREW, FLANGE BOLT (Include SH type)	7~11	0.7~1.1
8mm BOLT, NUT	18~25	1.8~2.5	6mm FLANGE BOLT, NUT	9.8~14	1.0~1.4
10mm BOLT, NUT	29~39	3.0~4.0	8mm FLANGE BOLT, NUT	24~29	2.4~3.0
12mm BOLT, NUT	49~59	5.0~6.0	10mm FLANGE BOLT, NUT	34~44	3.5~4.5

*SH(Small Head) : It describe 6mm bolt of 8mm flange bolt.

GENERAL INFORMATION

SYMBOLS / ABBREVIATIONS

The following symbols are used in this manual to represent job-related warnings or cautions.

SYMBOL	MEANING	SYMBOL	MEANING
 WARNING	Indicates dangerous area. Serious accident may result if instructions are not followed.	 CAUTION	Indicates important work. Minor injury or vehicle part damage may result if instructions are not followed.
		 NOTE	Indicates general safety matters. Provides safety and appropriate handling procedures.

The following symbols indicate needed lubrication steps, the changing of parts, and required specialized tools, etc. when performing maintenance.

SYMBOL	CAUTION
	Use recommended engine oil, unless otherwise specified.
	Use molybdenum oil solution (mixture of the engine oil and molybdenum grease with the ratio 1:1)
	Use multi-purpose grease (Lithium based multi-purpose grease NLG #2 or equivalent)
	Use molybdenum disulfide grease (containing more than 3% molybdenum disulfide, NLGI #2 or equivalent)
	Use molybdenum disulfide paste containing more than 40% molybdenum disulfide, NLGI #2 or equivalent)
	Use silicone grease
	Apply a locking agent. Use the agent of the middle strength, unless otherwise specified
	Apply sealant
	Replace the parts with new ones before assembly
	Use brake fluid, DOT3 or DOT4. Use the recommended brake fluid, unless otherwise specified
	Use Fork or Suspension Fluid
	Use special tool
	Use option tool. These tools are obtained as you order parts.
(⇒3-1)	Indicates reference page. (Example : Refer to page 3-1)

Special grease, etc. that do not correspond to the above are indicated without using symbols.

TOOLS

SPECIAL		COMMON	
DESCRIPTION	REF. SEC.	DESCRIPTION	REF. SEC.
CLUTCH CENTER HOLDER	8	WRENCH, 8×9mm	2
ACG ROTOR PULLER	9	ADJUSTING WRENCH, B	2
VALVE GUIDE DRIVER	10	LOCK NUT WRENCH, 20×24mm	6
VALVE GUIDE REAMER	10	EXTENSION BAR	8, 14
UNIVERSAL BEARING PULLER	12	FLY WHEEL HOLDER	8, 9
BEARING REMOVER SET	12	VALVE SPRING COMPRESSOR	10
THREAD ADAPTER	12	DRIVER	12, 14, 15
ASSEMBLY SHAFT	12	ATTACHMENT	12, 14, 15
CRANK CASE ASSEMBLY COLOR	12	PILOT	12, 14, 15
BALL RACE DRIVER	14	FORK SEAL DRIVER BODY	14
STEERING STEM DRIVER	14	BEARING REMOVER HEAD	15
FORK SEAL DRIVER	14	BEARING REMOVER SHAFT	15
STEERING STEM SOCKET	14	LOCK NUT(M8)	10
SNAP RING PLIERS	16		

TESTER, GAUGE

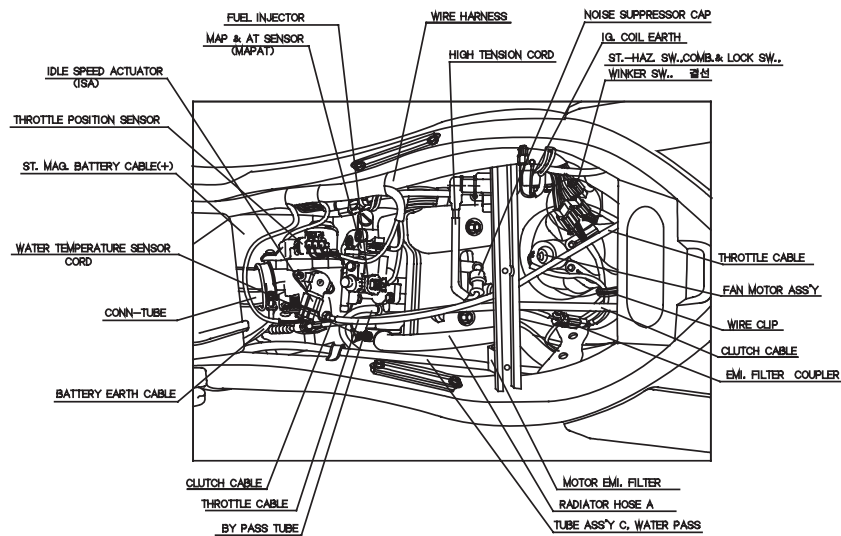
DESCRIPTION	REFERENCE SECTION	REMARK
COMPRESSION GAUGE	2	
DIGITAL MULTI TESTER	17, 18	
PVA TESTER	17, 18	
BATTERY TESTER	18	
TESTER RECORDER	5	

VALVE SEAT CUTTER

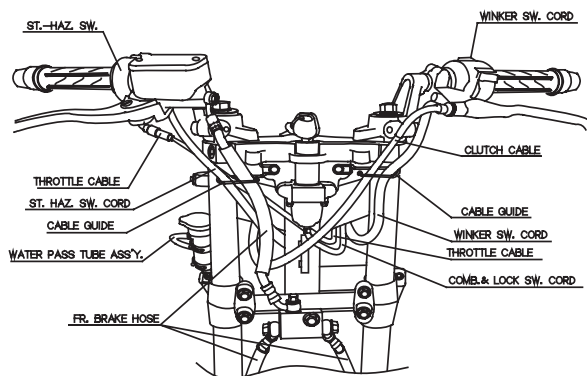
DESCRIPTION	REFERENCE SECTION	REMARK
VALVE SEAT CUTTER 45°	10	24.5mm IN, EX
VALVE SEAT CUTTER 35°	10	23mm IN
VALVE SEAT CUTTER 35°	10	20mm EX
VALVE SEAT CUTTER 60°	10	22mm IN, EX
CUTTER HOLDER 5mm	10	Use with Valve Seat

WIRING DIAGRAM

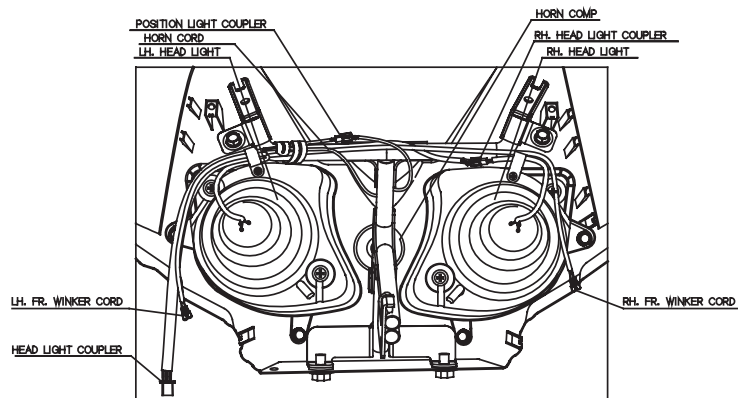




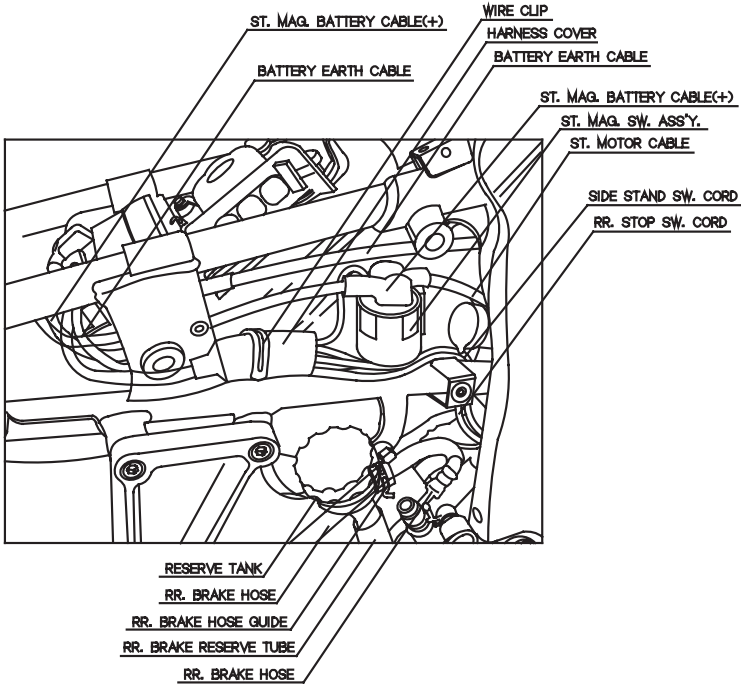
DETAIL OF VIEW D



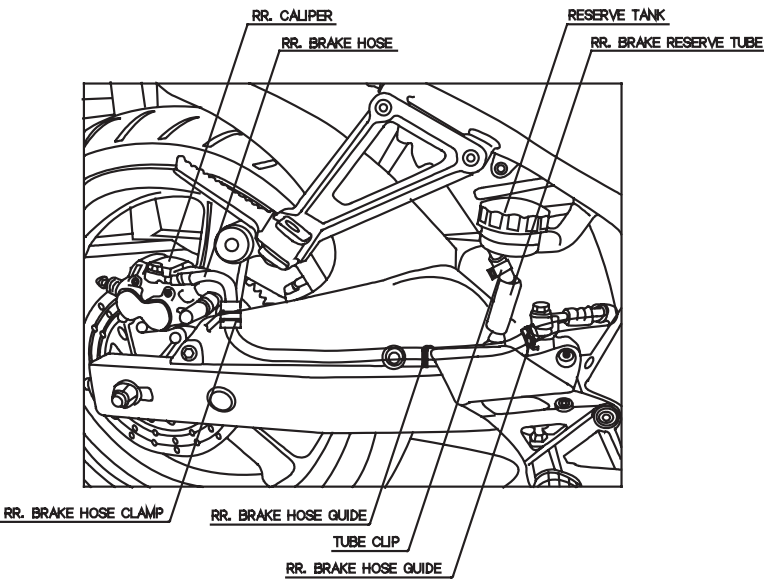
DETAIL OF VIEW C



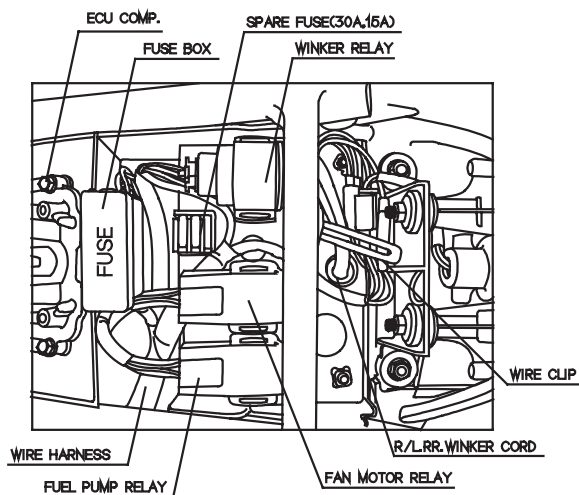
DETAIL OF HEAD LIGHT CASE PART



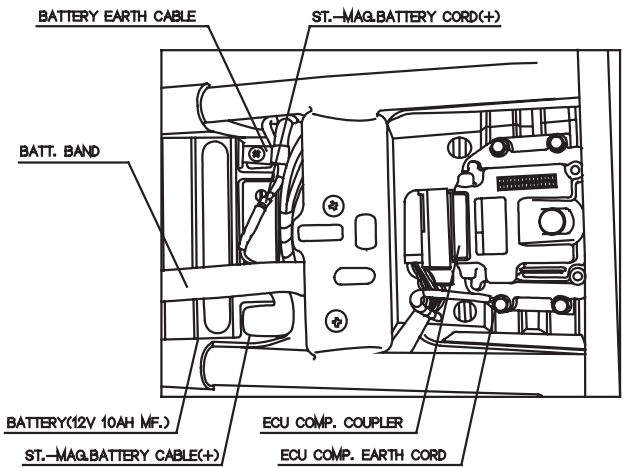
DETAIL OF VIEW B



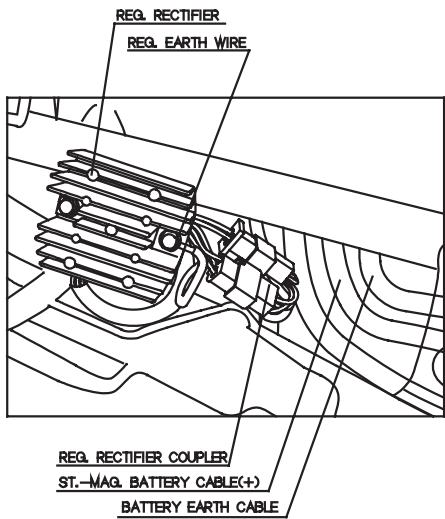
DETAIL OF VIEW A



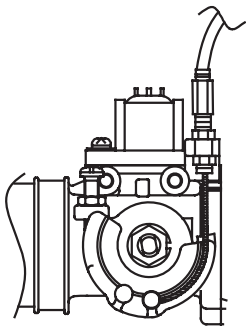
DETAIL OF FUSE BOX PART



DETAIL OF BATTERY PART



DETAIL OF REG. RECTIFIER PART



DETAIL OF THROTTLE BODY PART

MEMO

2. INSPECTIONS/ADJUSTMENTS

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SERVICE INFORMATION

WARNING

- The exhaust gas contains poisonous substance. Do not keep engine idling in a closed or poorly ventilated place for a long period of time.

NOTE

- For information on engine oil and oil filter, refer to sections 3-3 and 3-4.
- Stand the main stand prior to beginning work.

SPECIFICATIONS

THROTTLE GRIP PLAY		2~6mm
SPARK PLUG		CR9EH-9
SPARK PLUG GAP		0.8~0.9mm
VALVE CLEARANCE	IN.	0.15mm
	EX.	0.20mm
CARBURETOR IDLE SPEED		1,600rpm $\pm$ 100rpm
CYLINDER COMPRESSION		13.0kgf/cm ² (600rpm)
DRIVE CHAIN SLACK		10~20mm
REAR BRAKE PEDAL FREE PLAY		10~20mm
CLUTCH LEVER FREE PLAY		10~20mm

TIRES

COLD TIRE PRESSURE	DRIVER ONLY	FRONT	2.00kgf/cm ² (200kPa, 29psi)
		REAR	2.00kgf/cm ² (200kPa, 29psi)
	DRIVER AND A PASSENGER	FRONT	2.00kgf/cm ² (200kPa, 29psi)
		REAR	2.25kgf/cm ² (225kPa, 32psi)
TIRE SIZE		FRONT	110/70-17 54S
		REAR	140/60-17 69S
TIRE  PART MINIMUM-DEPTH		FRONT	5.5mm
		REAR	7.0mm

INSPECTIONS / ADJUSTMENTS

TORQUE VALUES

SPARK PLUG	1.0~1.2kgf-m
CYLINDER HEAD COVER BOLT	0.8~1.2kgf-m
AC GENERATOR CAP	0.4~0.8kgf-m
HOLE CAP 30mm	0.6~1.0kgf-m
AIR CLEANER CASE COVER SCREW	0.4~0.8kgf-m
REAR AXLE NUT	8.0~10.0kgf-m
DRIVE SPROCKET BOLT	1.0~1.4kgf-m
DRIVEN SPROCKET NUT	5.6~6.5kgf-m

TOOLS

WRENCH, 8 × 9mm
COMPRESSION GAUGE

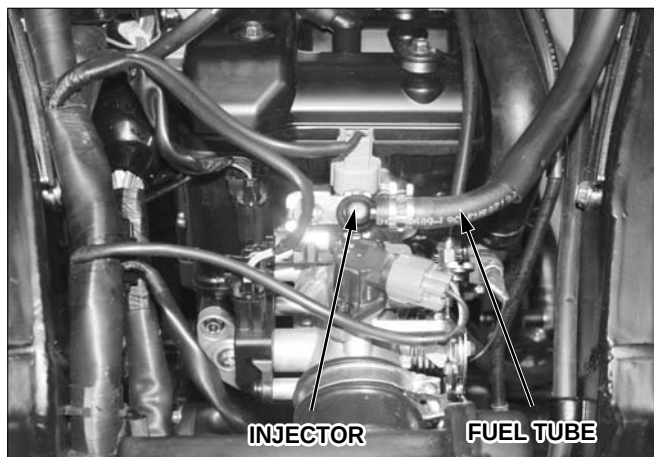
MAINTENANCE SCHEDULE

- Perform the Self Inspections Before Operation at each scheduled maintenance period.
- I : INSPECT AND CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY.
 R : REPLACE L : LUBRICATE C : CLEAN A : ADJUST

ITEM		FREQUENCY	ODOMETER READING(NOTE 1)					REMARK
			x 1000Km	1/2	4	8	12	
			MONTH		6	12	18	
*	FUEL LINE			I	I	I	I	
*	FUEL FILTER				R	R	R	
*	THROTTLE GRIP OPERATION				I	I	I	
	AIR CLEANER ELEMENT				R	R	R	NOTE (2)
	SPARK PLUG				I	R	I	
*	VALVE CLEARANCE			I	I	I	I	
*	ENGINE OIL			R	R	R	R	
**	ENGINE OIL FILTER ELEMENT			R	R	R	R	
	OIL FILTER SCREEN			C	C	C	C	
*	DRIVE CHAIN			Every 1,000km : I and L				
*	BRAKE FLUID				I	I	I	NOTE (3)
	BRAKE /PAD WEAR				I	I	I	
*	BRAKE SYSTEM			I	I	I	I	
*	BRAKE STOP SWITCH				I	I	I	
*	HEADLIGHT AIM				I	I	I	
	CLUTCH SYSTEM			I	I	I	I	
	SIDE STAND				I	I	I	
*	SUSPENSION				I	I	I	
**	BOLTS, NUTS, FASTENERS			I		I		
**	WHEELS/TIRES				I	I	I	
	STEERING HEAD BEARING			I		I		
	RADIATOR COOLANT			I	I	R	I	
	RADIATOR CORE			I	I	I	I	
	RADIATOR CAP			I	I	I		

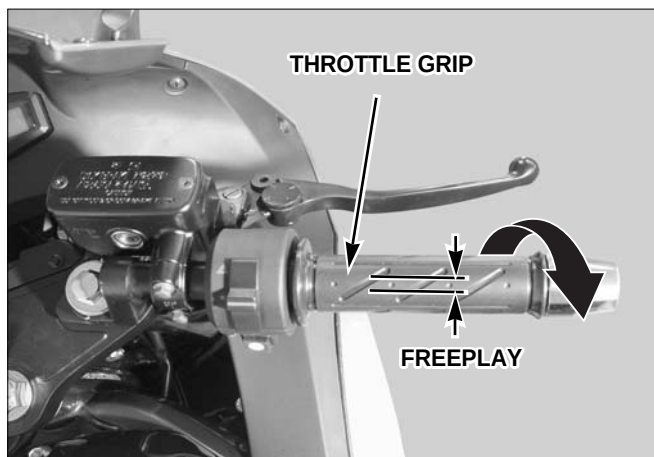
- * If you do not have the appropriate tools or information to conduct maintenance, or if you feel you are not capable to perform maintenance on this vehicle, contact authorized dealers or repair shops for maintenance and repairs.
- ** To ensure safety, inspections and maintenance of these parts must be carried out by dealers, or repair centers.

NOTES : (1) After the odometer reading exceeds 1,200Km, repeat maintenance service at intervals indicated in the table.
 (2) Service more frequently when riding in unusually wet or dusty areas.
 (3) Replace every 2 years, or at indicated odometer interval, whichever comes first. Replacement requires mechanical skill.



FUEL LINE (FUEL TUBE)

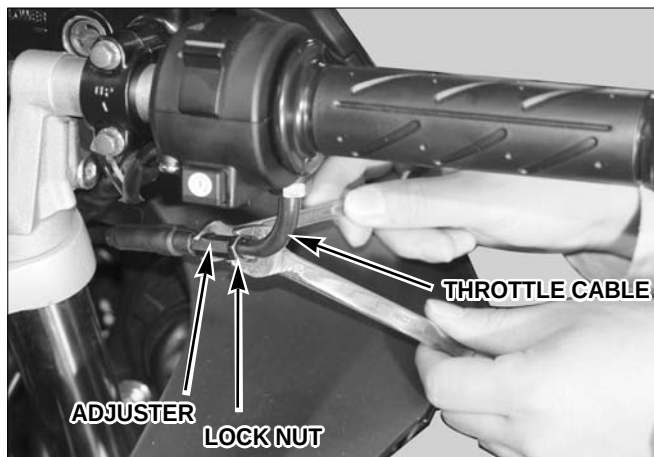
- Check the connection between injector and fuel tube.
- Check the fuel tube for deterioration, damage or leakage. Replace it if necessary.



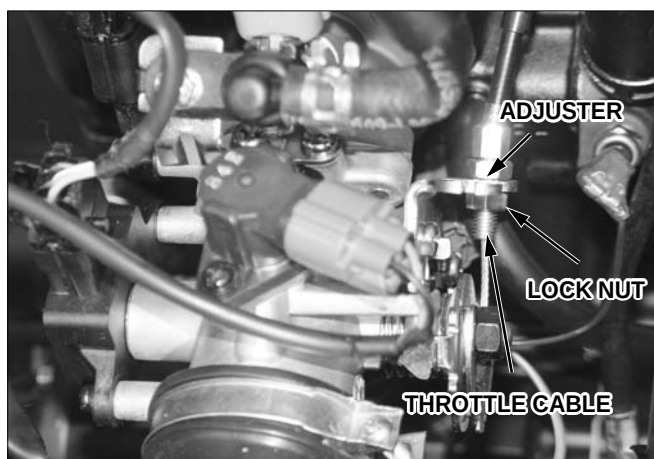
THROTTLE GRIP OPERATION

- Check if the throttle grip operates smoothly in all steering positions.
- If not operating smoothly, check the deterioration, damage and kink of the throttle cable.
- Measure the free play at the throttle grip.

FREE PLAY : 2~6mm



- For simple adjustment, use the adjuster under the throttle grip.
- Adjust the free play by loosening the lock nut and turning the adjuster.
- After adjusting, tighten the lock nut.



- Major adjustments are made with the lower adjuster.
- Adjust the free play by loosening the lock nut and turning the adjuster.
- After adjustment, tighten the lock nut securely.
- Recheck the throttle operation.
- Replace any damaged parts, if necessary.



AIR CLEANER

- Remove the seat. (⇒13-2)
- Loosen the 4 screws, remove the air cleaner cover.

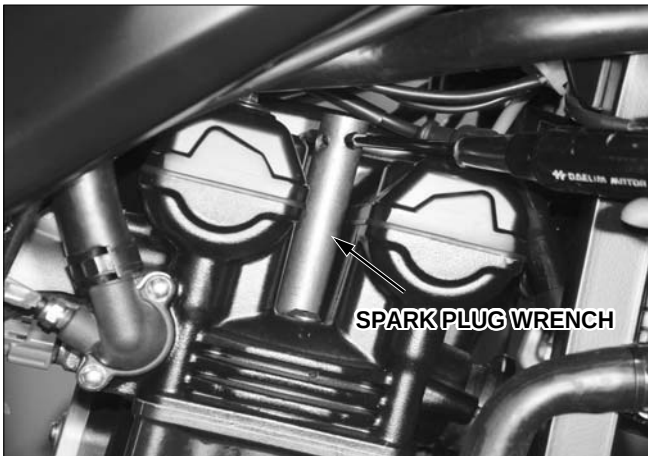


- Remove the air cleaner element.
- Also replace the filter any time it is excessively dirty or damage.

- Install in the reverse order of removal.

NOTE

- Do not reuse the filter element to clean by compressed air.



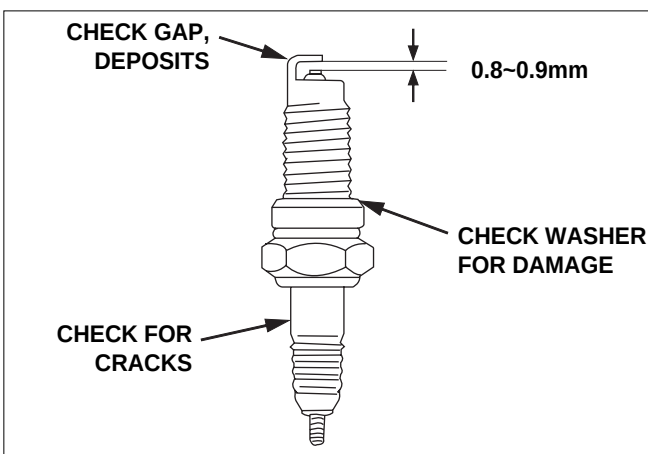
SPARK PLUG

- Remove the spark plug cap.
- Check the plug for damage, contamination or deposits.
- If the spark plug is severely contaminated or damaged, raplace with a new one. If the plug can be reused after removing only the carbon, use plug cleaner and wire brush to clean the plug.
- Always use a feeler gauge to check the gap.

GENUINE PLUG : CR9EH-9

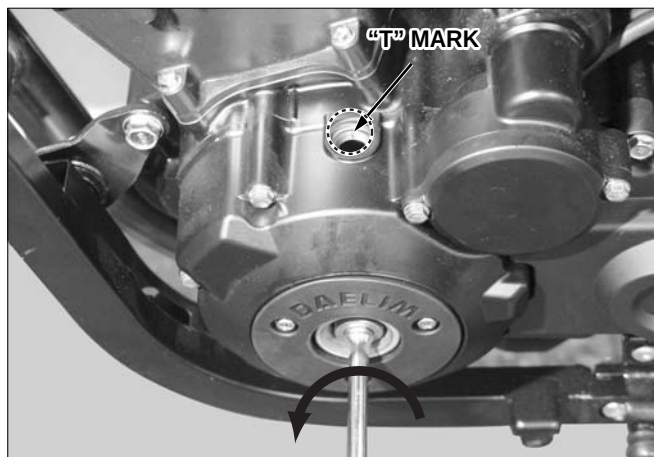
SPARK PLUG GAP : 0.8~0.9mm

TORQUE : 1.1kgf · m



CAUTION

- Make sure there is no dirt or debris on the seat of the spark plug hole before inserting the spark plug.
- To prevent damage to the cylinder head, handtighten the spark plug before using a wrench to tighten to the specified torque.
- Do not overtighten the spark plug.
- Assemble the spark plug.

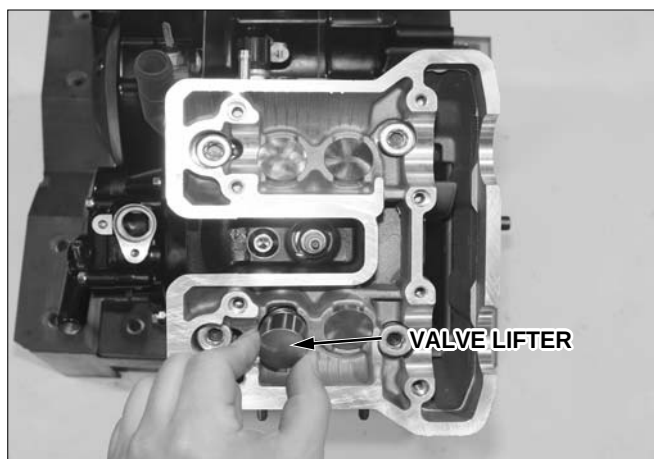
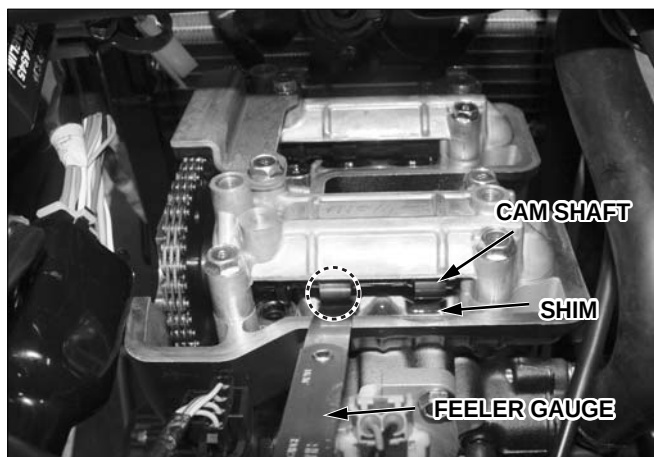


VALVE CLEARANCE

NOTE

- Inspect and adjust valve clearance while the engine is cold. (below 35° C/95°F)
- Remove the cylinder head cover.
- Remove the A.C generator cap and crankcase hole cap.
- Rotate the flywheel counterclockwise to align the "T" mark with the index mark on the left crankcase cover.
- Make sure the piston is at TDC(Top Dead Center) on the compression stroke.
- Measure the valve clearance with a feeler gauge.

**VALVE CLEARANCE : INTAKE : 0.15mm
EXHAUST : 0.20mm**

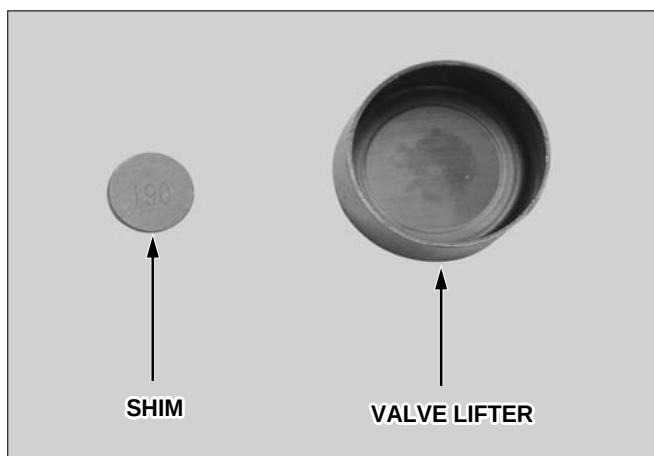


SHIM ADJUSTMENT

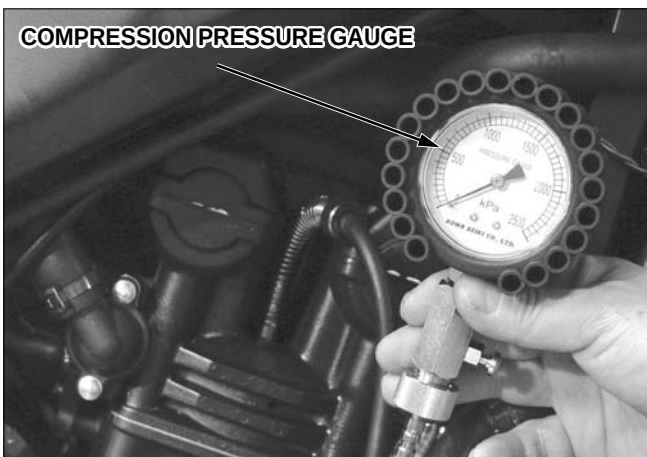
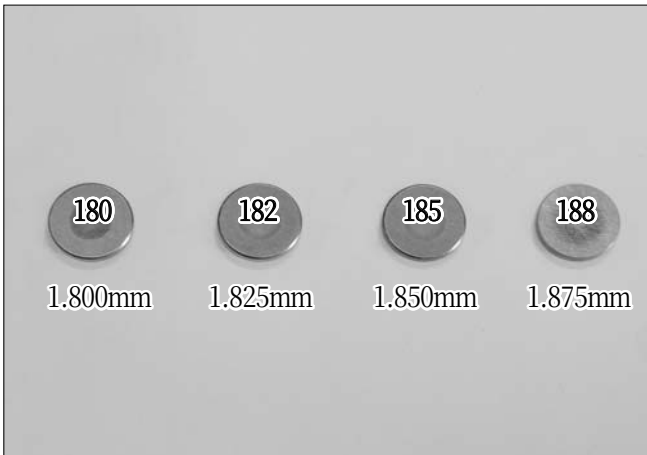
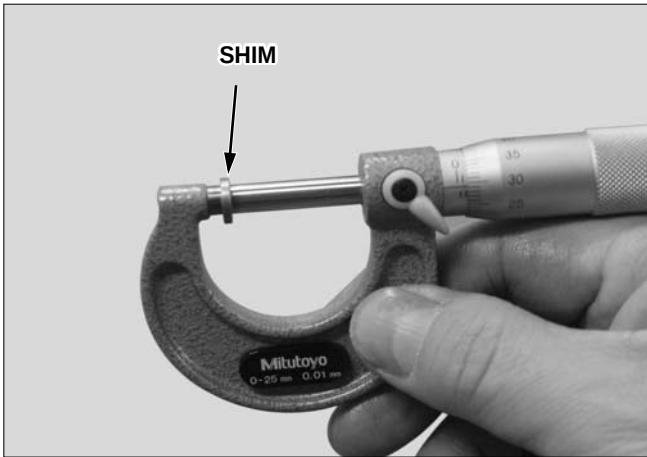
- If the valve clearance is out of standard, adjust the shim as below.
 - Remove the camshaft.
 - Remove the valve lifter and shim.

NOTE

- If the valve lifter is to be removed, use the special tool.
- Be careful not to drop the shim into the cylinder when remove the shim with valve lifter.
- If it is too difficult to remove the shim, use a tweezer or magnet.
- Valve lifter, and shim should be preserved on the assembly position distinguishably.



- Remove the valve lifter and clean by compressed air.
- Mop the oil from the attached area of shim, and measure and record the thickness with a micrometer.



NOTE

- The type of shim is 33
- The clearance of shim is 1,500mm to 2,300mm with 0.025mm clearance.

- Demanded thickness of shim : A
- Recorded clearance of the valve lifter : B
- Specified clearance of the valve lifter : C
(In : 0.15mm / Ex : 0.20mm)
- Removed thickness of the shim : D
- how to calculate : $A = (B - C) + D$

Example)

B : 0.06mm

D : 1.875mm

C : 0.15mm(IN)

$A = (0.06 - 0.15) + 1.875\text{mm}$

New thickness of the shim : 1.775mm

NOTE

- Measure the thickness of new shim and removed shim, using a micrometer accurately.
- If the demanded thickness of shim is over 2,300mm, check the valve seat and remove the carbon deposit and modify the valve seat.

- Install the chosen shim into the valve spring retainer.
- Apply the molybdenum to wet side of valve lifter and install the lifter.
- Install the cam shaft and rotate the crank shaft for many timed and recheck the valve clearance after setting the shim.
- Apply the engine oil to O-ring of pulse generator cover cap and install the cap.

TORQUE : 0.6kgf-m

CYLINDER COMPRESSION PRESSURE

- Warm up the engine to normal operating temperature.
- Stop the engine, disconnect the spark plug caps and spark plug. install the compression gauge. open the throttle completely and crank the engine with the starter motor until the gauge reading stops rising.

Tool:compression gauge.

NOTE

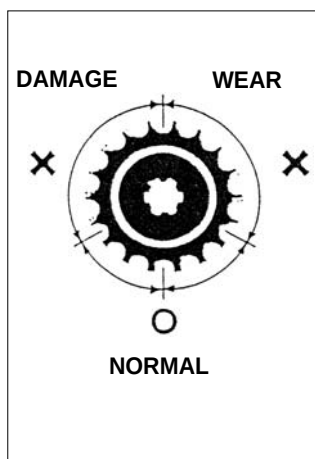
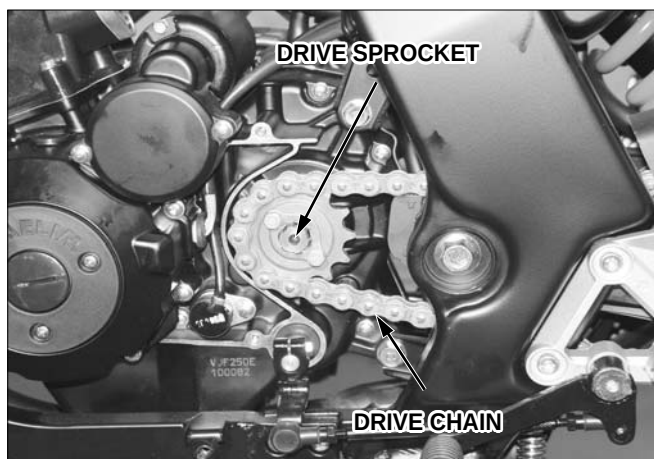
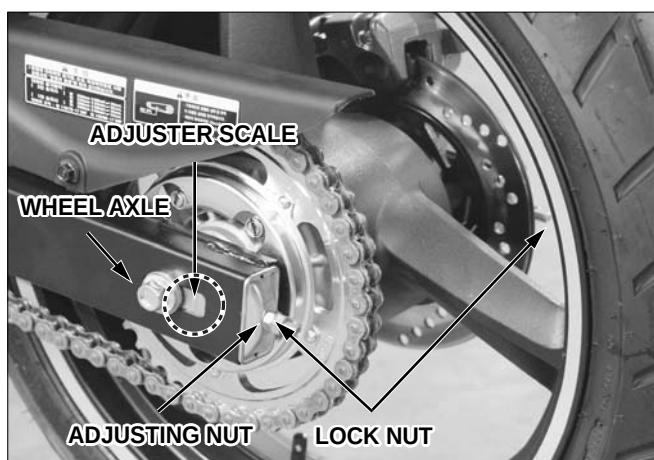
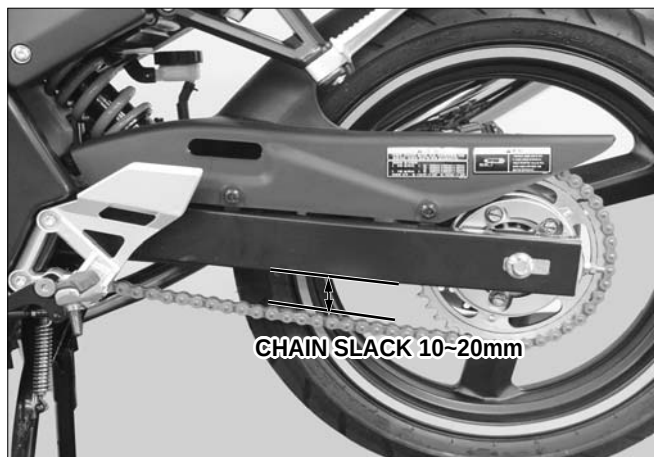
- The maximum reading is usually reached within 4~7seconds
- compression 13.0kg f/cm²

If compression is low, check the following

- Incorrect valve clearance adjustment.
- Valve leakage.
- Leak the gasket from the cylinder head.
- Worn piston/cylinder.

If compression is high, check the following

- Carbon deposits on the piston head, cylinder head.



DRIVE CHAIN

⚠ WARNING

- Because there is a danger which fingers get jammed in the drive chain, never inspect or adjust it while the engine is running.

DRIVE CHAIN SLACK ADJUSTMENT

- Turn off the ignition switch, support the motorcycle on its main stand, and shift the transmission into neutral.
- Check slack in the lower chain with a hand midway between the sprockets.

CHAIN SLACK : 25~35mm

- Adjust the slack of drive chain if necessary.
- Adjust it by loosening the axle nut, loosening both lock nuts of adjust, and turning the adjusting nut.

⚠ NOTE

- Make sure that the chain adjuster scale are aligned with the corresponding scale graduations on both sides of the swing arm.

- Tighten the axle nut with the specified torque.

TORQUE : 8.8kgf · m

DRIVE CHAIN INSPECTION

- Lubricate with #80-90 gear oil after removing the contamination of chain with a cleaner, and drying fully.
- Because an extremely lubricated oil splash while the chain moves round, clean it with a piece of cloth.
- After checking a wear and damage of the drive chain, replace it if necessary.

- After inspecting an excessive wear and damage of the drive sprocket, replace it if necessary.

⚠ NOTE

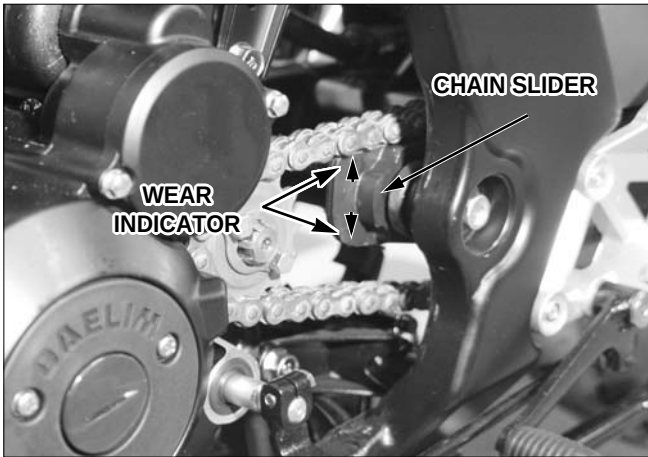
- Always replace the chain and sprocket as a set.
Because using the stretched chain and new sprocket or similar case, the parts will damage quickly cause by the pitch is not engage each other.

- Check the attaching bolts and nuts on the drive and driven sprockets.
If any are loose, tighten them to the specified torque.

TORQUE :

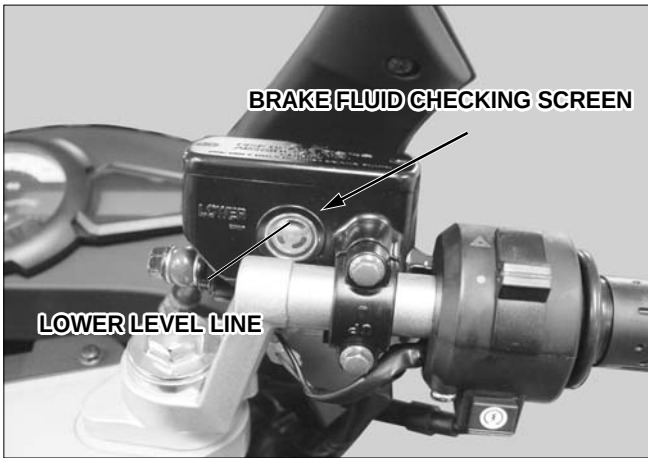
DRIVE SPROCKET BOLT : 1.2kgf · m

DRIVE SPROCKET NUT : 5.9kgf · m



DRIVE CHAIN SLIDER

- Inspect the drive chain slider for excessive wear or damage.
- If it is worn to the wear indicator, replace the drive chain slider.

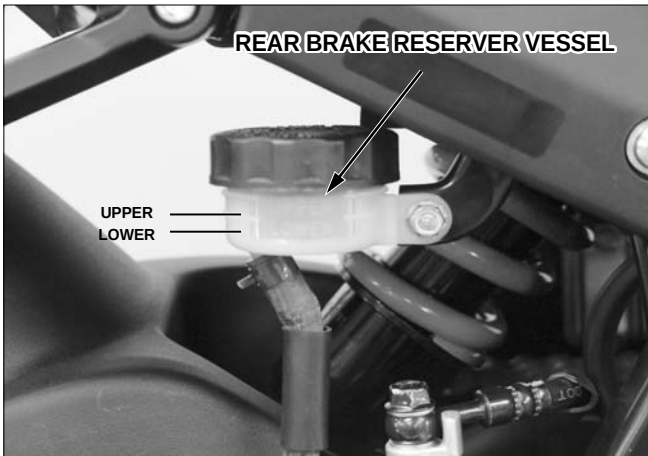


BRAKE FLUID

CAUTION

- Do not mix a dust or different types of fluid when filling the brake fluid.
- Mind that the reservoir is level in checking and filling it.
- Avoid spilling the fluid on painted, plastic, or rubber parts.

- When the fluid level is low, check the brake pads for wear. If the brake pads are not worn and the fluid level is low, check entire system for leaks.



FRONT BRAKE

- Turn the handlebar so that the reservoir is level and check the front brake fluid reservoir level.
- If the level is near the lower level line, check the brake pad wear.

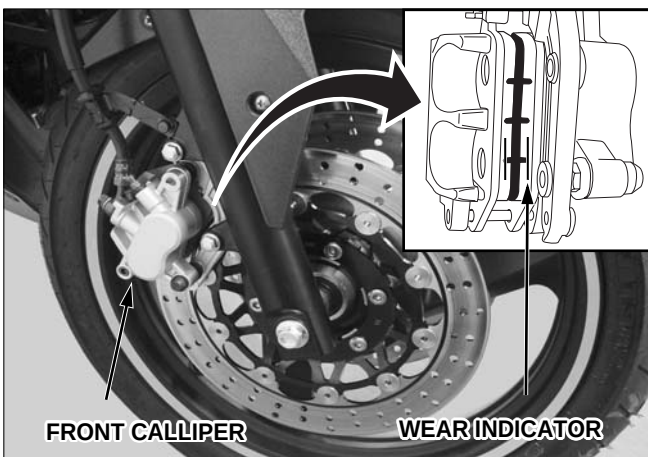
REAR BRAKE

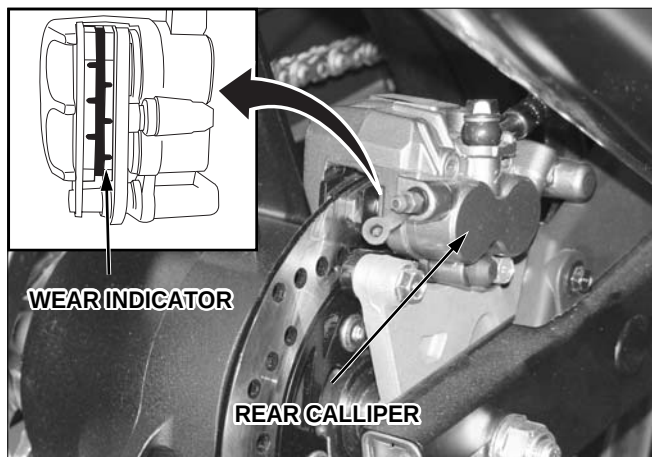
- Place the motorcycle on a level surface, and support it upright position.
- Check the rear brake fluid reservoir level.
- If the level is near the lower level line, check the brake pad wear.

BRAKE PAD WEAR

FRONT BRAKE PADS

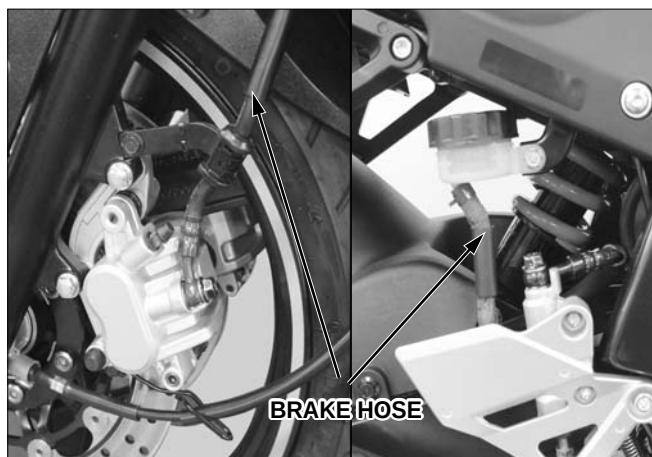
- Check the brake pads for wear.
- Replace the brake pads if either pad is worn to the bottom of wear limit groove.
- Refer to page 16-6 for brake pad replacement.





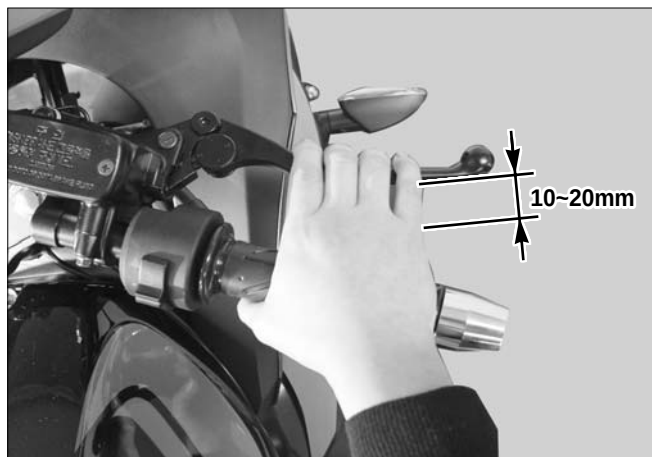
REAR BRAKE PADS

- Check the brake pads for wear.
- Replace the brake pads if either pad is worn to the bottom of wear limit groove.
- Refer to page 16-7 for brake pad replacement.



BRAKE SYSTEM

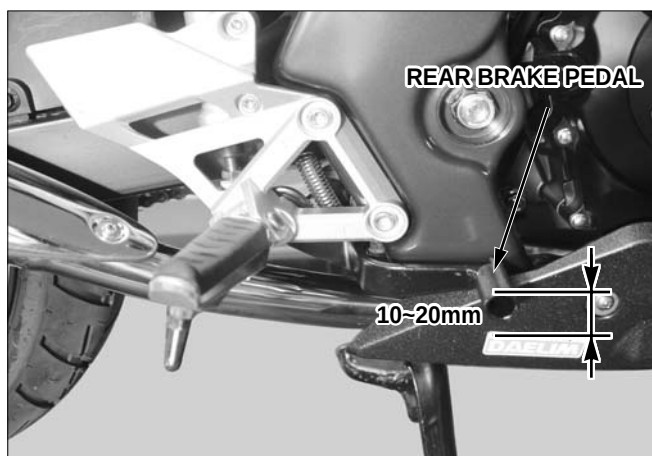
- Check to see if there is a crack and damage in the front and rear brake hose.
If leak, replace it with new one.



FRONT BRAKE LEVER FREE PLAY

- Check the free play after pulling the lever.

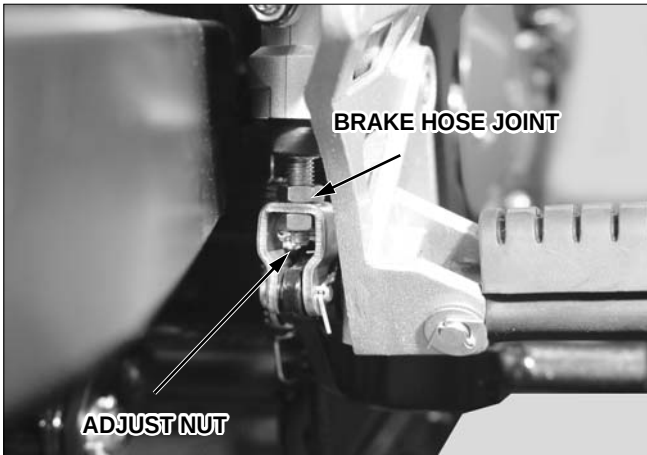
BRAKE LEVER FREE PLAY : 10~20mm



REAR BRAKE PEDAL FREE PLAY

- Adjust the brake pedal free play at the end part of pedal.

BRAKE PEDAL FREE PLAY : 10~20mm

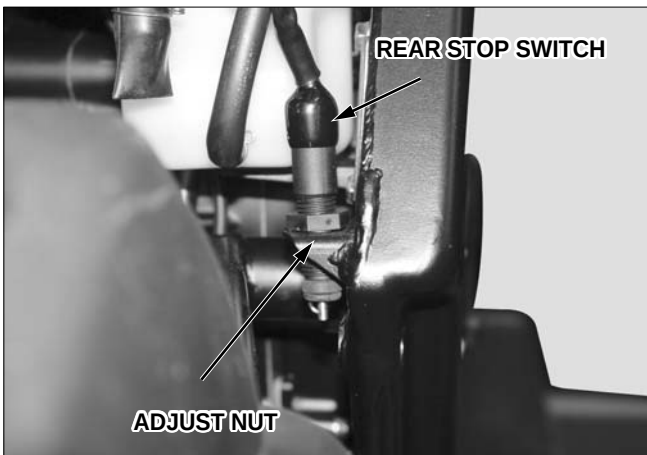


BRAKE PEDAL HEIGHT ADJUSTMENT

- Loosen the lock nut and turn the stopper bolt until the correct pedal height is obtained.
- After adjustment, tighten the lock nut securely.

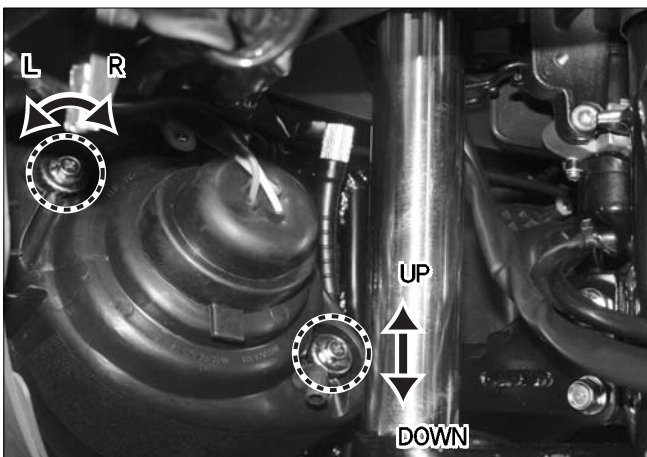
⚠ CAUTION

- The adjustment faulty of height may caused that the brake runs in state of operation.
- After adjusting the brake pedal height, inspect the operation of rear brake light switch and brake pedal, and adjust them if necessary.



BRAKE STOP SWITCH

- Adjust the brake stop switch by turning the adjust nut, pressing the switch so that the brake light will come on just before the brake pedal is depressed and brake engagement begins.



HEADLIGHT AIM

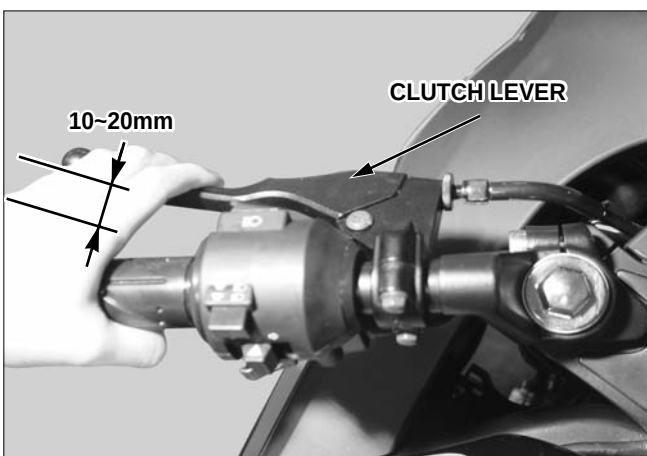
- Adjust the headlight beam vertically by turning the headlight case adjustment bolts.
- It can be adjusted up/down and left/right by adjustment bolt.

⚠ NOTE

- Adjust the headlight beam as specified by local laws and regulations.

⚠ CAUTION

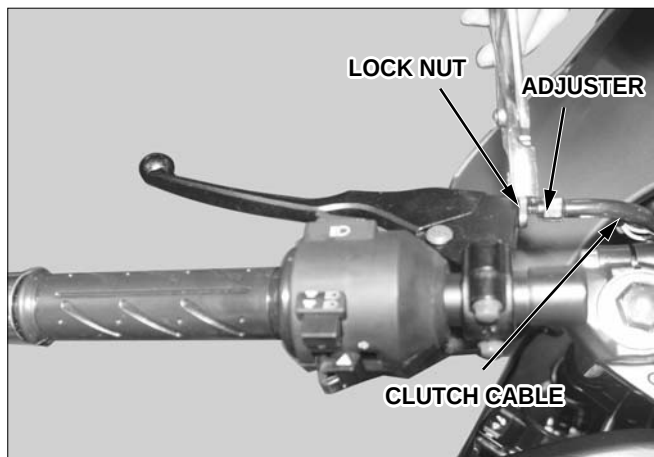
- An improperly adjusted headlight may blind oncoming drivers, or it may fail to light the road for a safe distance.



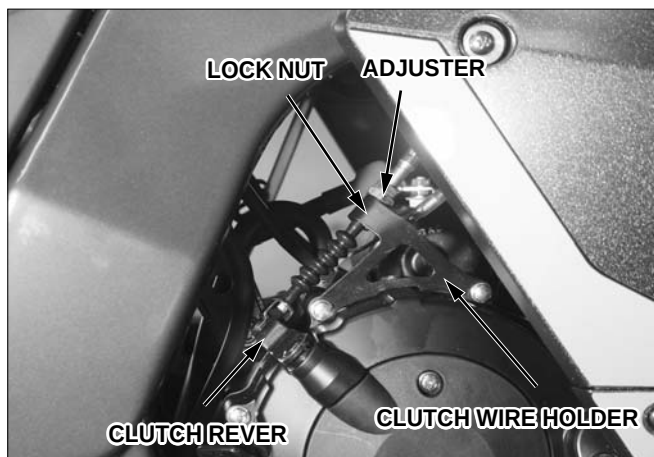
CLUTCH SYSTEM

- Measure the clutch lever free play at the end of the clutch lever.

FREE PLAY : 10~20mm



- Minor adjustments are made using the upper adjuster at the clutch lever.
- Loosen the lock nut and turn the adjuster.

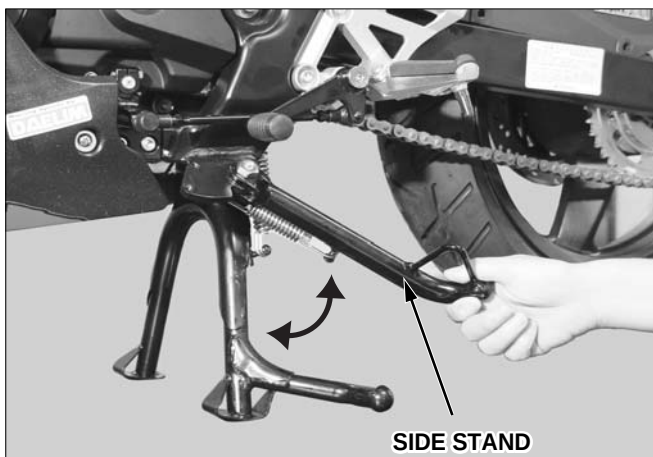


- Major adjustments are performed at the clutch arm.
- Loosen the lock nut and turn the adjuster nut to adjust free play.
- Hold the adjuster nut securely while tightening the lock nut.
- If proper free play cannot be obtained, or the clutch slips during test ride, disassemble and inspect the clutch.

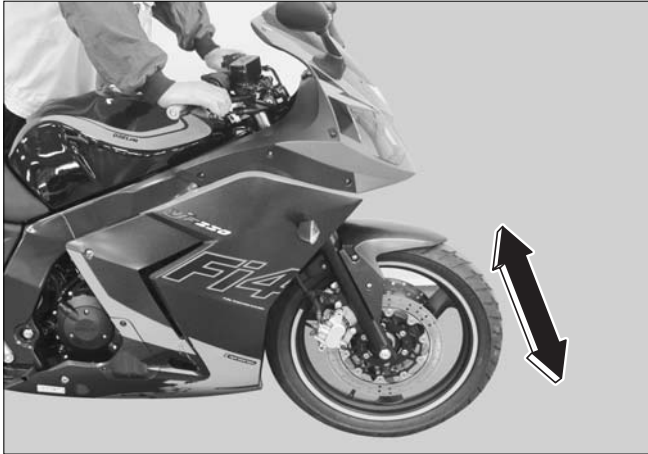


SIDE STAND

- Erect the main stand.



- Pull the lower end of the side stand, and see if it moves freely.
- If the side stand does not move smoothly, apply grease to the pivot area.
- If the side stand moves too freely, check the side stand spring.
- Check the axial movement of the side stand.



SUSPENSION

⚠ NOTE

- Do not ride motorcycle with an unsatisfactory suspension. Loose or worn suspension parts will lead to deterioration in the vehicle's safety and operation efficiency.

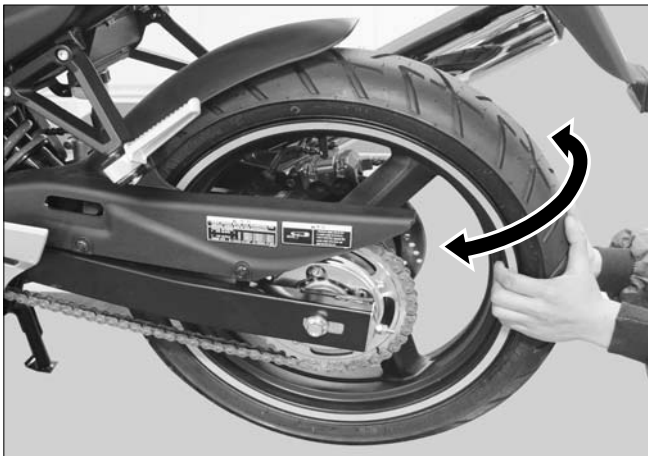
FRONT FORK

- Hold the brake lever, and compress the front fork up and down several times to check the operating conditions.
- Check the front fork for oil leakage, parts damage or looseness.



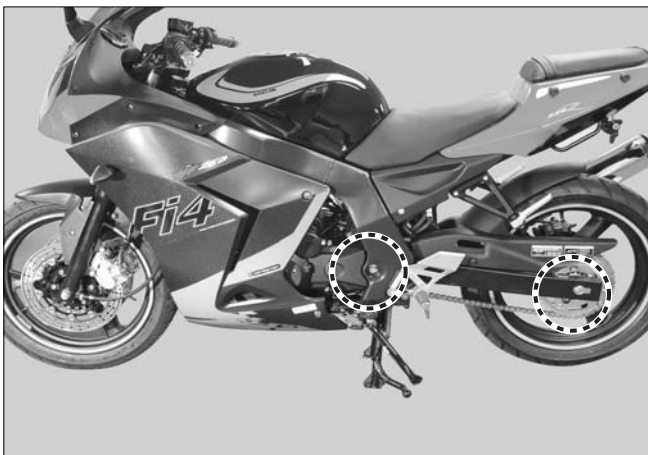
REAR CUSHION

- Compress the rear cushion up and down several times to check the operating conditions.
- Check the rear cushion for oil leakage, parts damage or looseness.



WHEEL INSPECTION

- Erect the motorcycle with the main stand.
- Check a wear of the rear fork bush by moving the rear wheel aside. If there is a free play, replace the rear fork bush.
- Tighten all nuts and bolts of the rear suspension.



BOLTS, NUTS, FASTENERS

- Check that all frame nuts and bolts are tightened to their correct torque values. (⇒2-3)
- Check that all safety clips, hose clamps and cable stays are in place and properly secured.



WHEEL/TIRE

⚠ NOTE

- Check the tire pressure when the tires have been cooled off. Check the tread (the part making contact with the road surface) and side for wear, cracks or damage. Replace damaged tires.

STANDARD PRESSURE

kgf/cm ² (kpa)		
ITEM	FRONT WHEEL	REAR WHEEL
DRIVER ONLY	2.00(200)	2.00(200)
DRIVER AND A PASSENGER	2.00(200)	2.25(225)

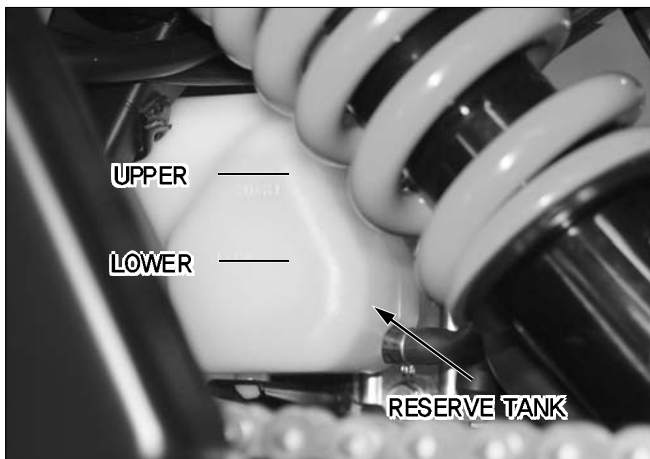
- Check the tread depth at the tire center.
- If the tread depth has reached the service limit, replace the tires.

SERVICE LIMIT : FRONT : 5.5 ± 0.5 mm
REAR : 7.0 ± 0.5mm

STEERING STEM

⚠ NOTE

- Check that the cables do not interfere with handlebar rotation.
- Erect the motorcycle securely and raise the front wheel off the ground.
- Check that the handlebar moves freely from side to side.
- If the handlebar moves unevenly, binds or has vertical movement, inspect the steering stem.



COOLANT LEVEL INSPECTION

- Erect the main stand prior to beginning work.
- Check the coolant level and the reserve tank.
- The level should be between the “UPPER” and “LOWER” level lines.
- Fill the coolant to the reserve tank up to the “F” (upper level).

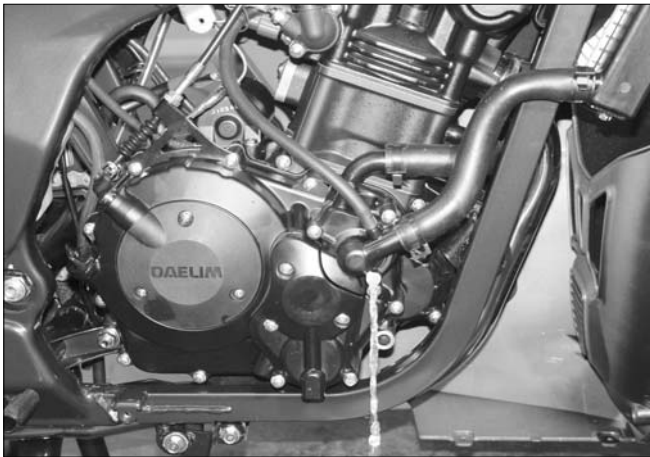
NOTE

- Unless the coolant is refilled or replaced, the engine temperature too high or low.
- Fill to the “F”(UPPER LEVEL) line.

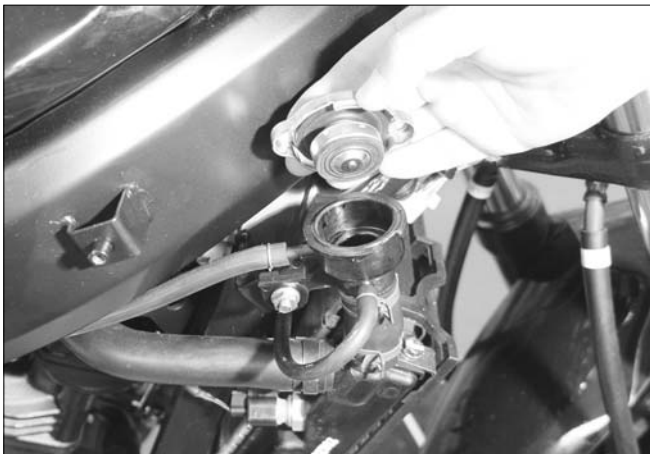


COOLANT REPLACEMENT

- Remove the radiator cap.



- Remove the drain bolt and drain the coolant. (Tilt the vehicle to the right in order to assure complete and rapid draining.)
- Install the drain bolt.



- Fill the radiator with new coolant.
COOLANT CAPACITY : $1,100 \pm 20\text{cc}$
RADIATOR CAPACITY : $1,000 \pm 20\text{cc}$
RESERVE TANK CAPACITY: $280 \pm 20\text{cc}$
- Start the engine. Bleed air from the coolant and check the level of coolant.
- Install the radiator cap.
- Fill the coolant with the reserve tank up to the upper level.

MEMO

3. LUBRICATION

SERVICE INFORMATION . . .	3-1
TROUBLESHOOTING	3-2
ENGINE OIL LEVEL INSPECTION .	3-3
ENGINE OIL CHANGE	3-3

OIL FILTER ELEMENT CHANGE .	3-4
OIL PUMP	3-4
LUBRICATION POINTS . . .	3-7

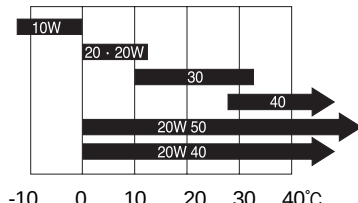
SERVICE INFORMATION

GENERAL SAFETY

⚠ WARNING

1. The exhaust gas contains poisonous substance. Do not keep engine idling in a closed or poorly ventilated place for a long period of time.
2. Used engine oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. It is desirable not to handle used oil frequently; however, wash your hands thoroughly with soap and water immediately after handling the used oil.
3. The oil pump can be serviced without removing the engine from the frame.

ENGINE OIL

OIL CAPACITY	1.5 l (After disassembly) 1.35 l (After Oil filter change) 1.3 l (After Oil change)
RECOMMENDED OIL	Daelim pure oil (4cycle motics 4) API service classification : SL grade Viscosity : SAE10W-40 (Use appropriate type of oil with viscosity satisfying the atmospheric temperature in your riding area based on the table shown on the right side.) 

OIL PUMP

Unit : mm

ITEM	STANDARD VALUE	SERVICE LIMIT
PUMP BODY CLEARANCE	0.15~0.20	0.25
ROTOR END CLEARANCE	0.15	0.20

TORQUE VALUES

OIL DRAIN CAP	1.5kgf · m
OIL FILTER COVER BOLT	1.1kgf · m

TROUBLESHOOTING

Engine oil level too low

- Oil consumption naturally.
- External oil leaks.
- Worn piston ring or incorrect piston ring installation.
- Worn valve guide or seal.

Oil contamination

- Oil or filter not changed regularly.
- Faulty head gasket.
- Worn piston rings.

Low or no oil pressure

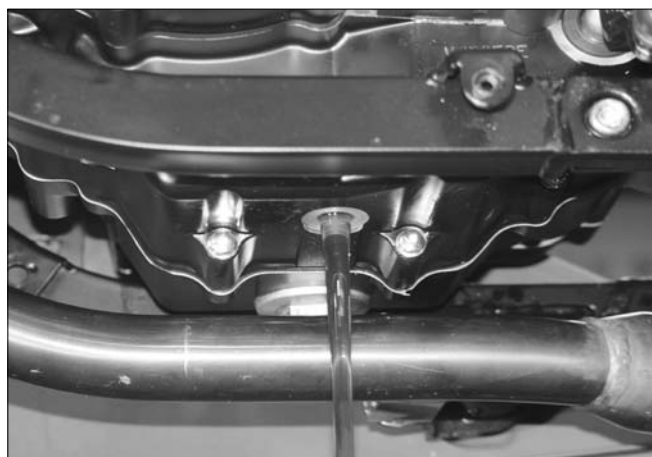
- Clogged oil orifice.
- Incorrect oil being used.

ENGINE OIL LEVEL INSPECTION

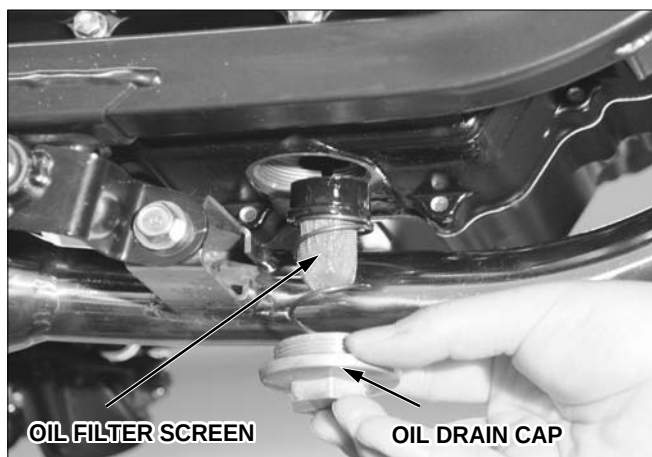


- Erect the motorcycle by main stand.
- Start the engine and let it be warm fully.
- Stop the engine, remove the oil level gauge and wipe it clean.
- Check the oil level with the level gauge by inserting it in engine screwing level gauge.
It is good if the oil surface is between the lower level mark and upper that of the level gauge. If the oil level is near the lower level mark on the dipstick or below that, full to the upper level mark with the recommended oil.

ENGINE OIL CHANGE



- Loosen the drain plug bolt on the LH. crank case and drain the oil.
- Loosen the oil drain cap on the RH. crank case.



- Clean filter screen with a clean wash. Check if the oil filter screen seal rubber and O-ring of the tappet adjust hole are in good condition.
- Unscrew the spark plug from the spark plug cap and operate the starter motor for a second to remove the remaining oil from the engine.
- Install the filter screen, spring and tappet adjust hole cap.

NOTE

- Make the engine warm and erect the motorcycle with side stand in order to assure complete and rapid draining.

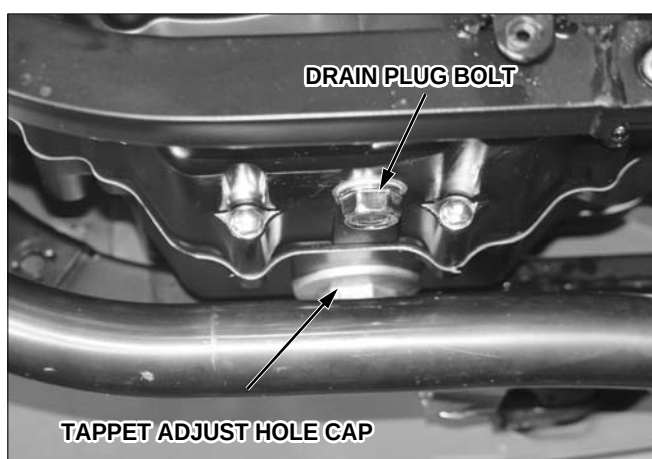
TORQUE : 1.5 kgf · m

- Fill the crankcase with recommended engine oil.

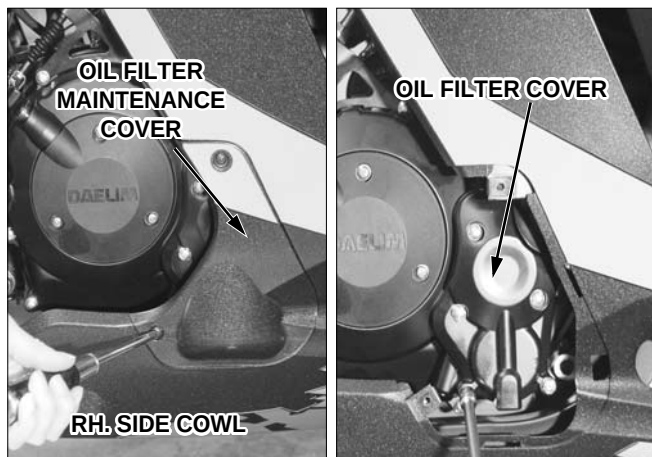
**OIL CAPACITY: 1.5 l (After disassembly)
1.35 l (After oil filter change)
1.3 l (After oil change)**

RECOMMENDED ENGINE OIL :

**Genuine oil
API classification : SL grade
viscosity : 10W-40**

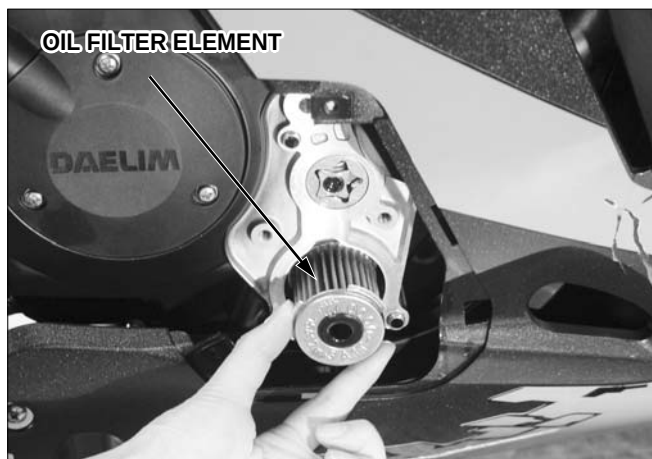


- Install the oil level gauge.
- Start the engine and let it idle for a few minutes.
- Stop the engine and recheck the oil level, if necessary, supply the recommended oil.
- Check to see if the oil is leak.

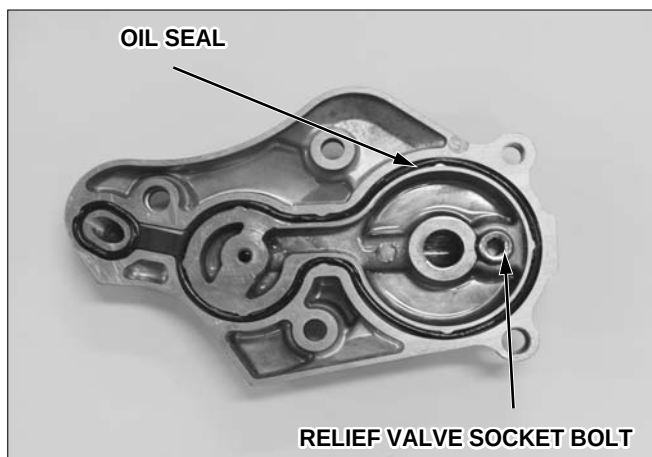


OIL FILTER ELEMENT CHANGE

- Remove the oilfilter maintenance cover on RH. side cowl.
- Drain the engine oil. (⇒3-3)



- Remove the oilfilter cover bolt, filter cover, filter element and spring.
- Change the oilfilter element with a new one.



- If the valve is turned on completely when it pushed, or the valve is turned off automatically when it relocated again, it is fine.
- Check the oil filtercover seal is in good condition.
- Change the oil filter cover seal with a new one.
- Install the filter element, spring and oil filter cover and tighten the bolts to the specified torque.

TORQUE : 1.1 kgf · m (11 N · m)

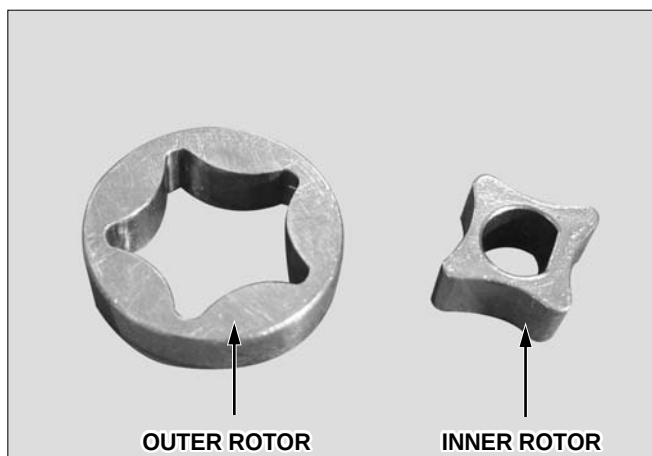
- Fill the genuine engine oil to the crankcase. (⇒3-1)



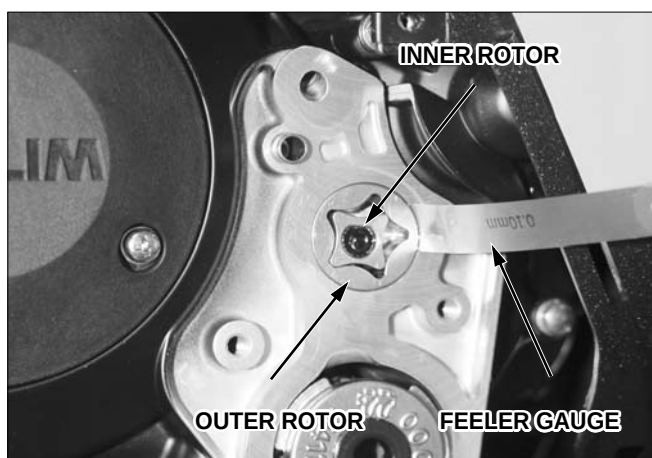
OIL PUMP

REMOVAL

- Drain the engine oil. (⇒3-3)
- Remove the oil filter. (⇒3-4)



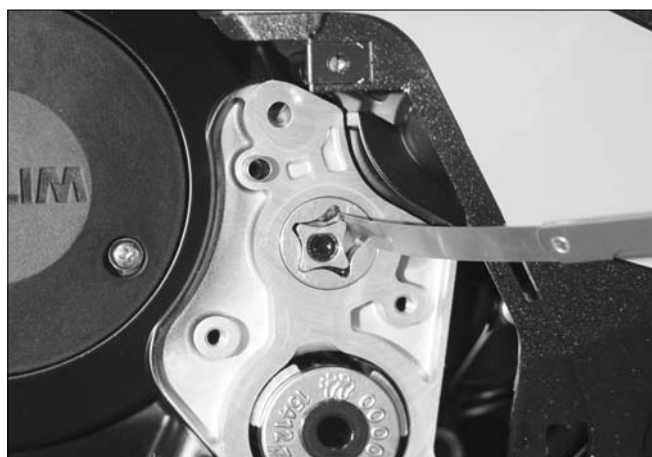
- Clean the oil pump body (inner and outer) and rotors with fresh cleaning oil.



INSPECTION

- Install the inner and outer rotors into the oil pump body.
- Measure the pump body clearance.

SERVICE LIMIT : 0.25mm



- Measure the rotor end clearance.

SERVICE LIMIT : 0.20mm



ASSEMBLY

- Clean all parts with fresh cleaning oil.
- Install the Inner and outer rotor to the pump body.

NOTE

- After installing, check the oil pump to operate smoothly

INSTALLATION

- Install the oil filter cover to the RH.crank case.
- Fill the recommended oil into the crankcase. (⇒3-3)

LUBRICATION

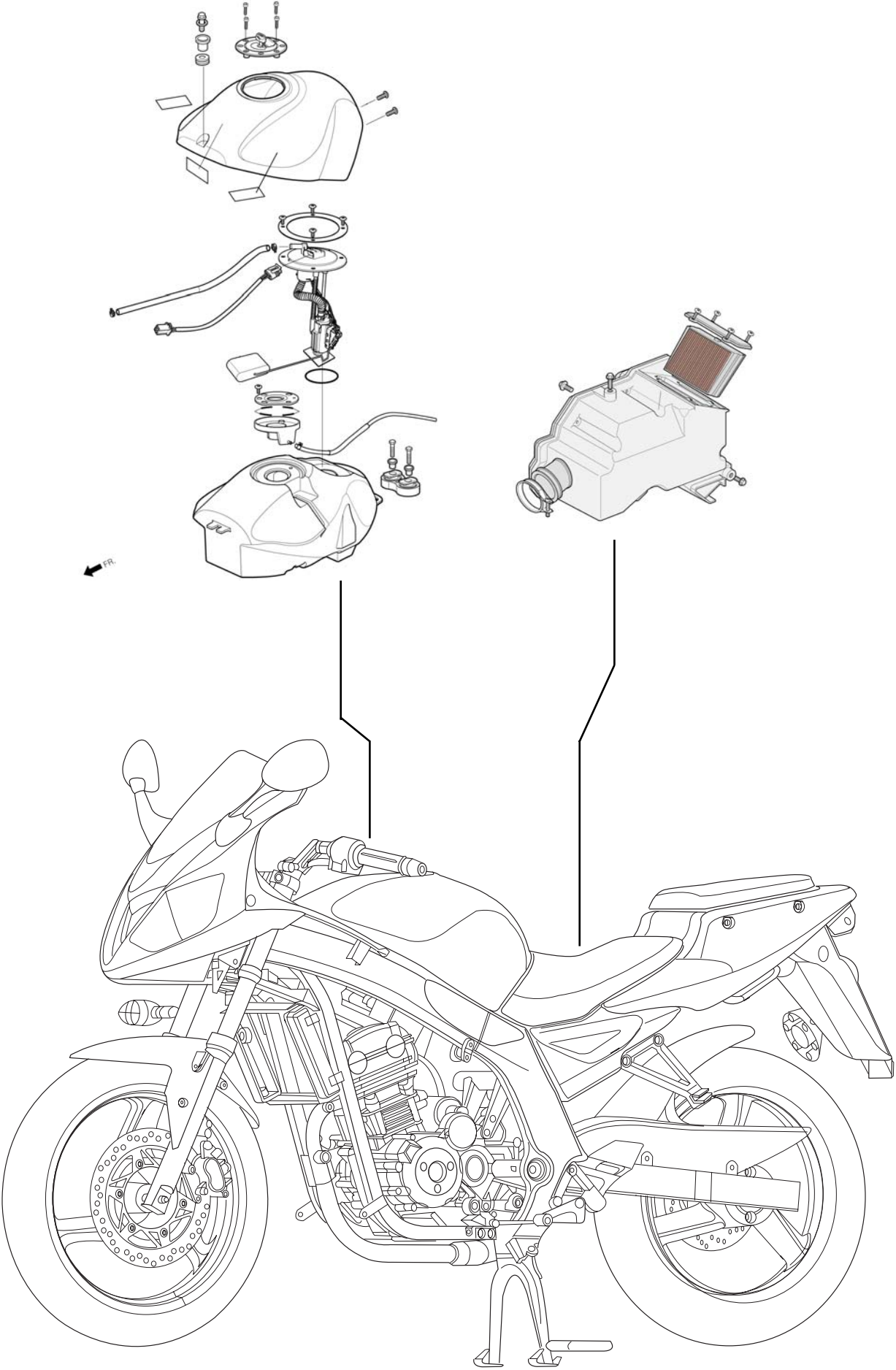
LUBRICATION POINTS

Use general grease

ITEM	POSITION	CLASS
STEERING HEAD PIPE UPPER BRIDGE	SECTION ROTATE	SHEEL ALVANIA EP2 or SUITABLENESS WIDTH
STEERING HEAD PIPE UNDER BRIDGE	//	//
SWING ARM PIVOT BUSH	SLIDING PART	//
SWING ARM PIVOT COLOR	//	//
SWING ARM PIVOT SEAL	EDGE PART	//
SWING ARM PIVOT BEARING	SLIDING PART	//
FRONT BRAKE MASTER CYLINDER	INSIDE PART OF MASTER CYLINDER CUP	DOT3 or DOT 4
FRONT MASTER CYLINDER PISTON	SLIDING PART	ASSEMBLY OIL CCI No.20 or SUITABLENESS WIDTH
FRONT BRAKE LEVER PIVOT	//	BRAKE GREASE SPECIAL
FRONT / REER CALIPER SLIDER PIN	//	//
FRONT / REER CALIPER PISTON SEAL	EDGE PART	ASSEMBLY OIL CCI No.20 or SUITABLENESS WIDTH
REER BRAKE PEDAL PIVOT	SLIDING PART	MTSUBISHI MULTIPURPOSE No.20 or SUITABLENESS WIDTH
FRONT / REER WHEEL DUST SEAL	EDGE PART	//
SPEEDOMETER GEAR BOX	GEAR COUPLING	DAPHNE EPONEX EP2 or SUITABLENESS WIDTH
FRONT FORK	INSIDE	ULTRA CUSH OIL NO.10 SUITABLENESS WIDTH
FRONT FORK OIL SEAL	EDGE PART	LIQUID O - RING #400
CLUTCH LEVER PIVOT BOLT	SLIDING PART	GREASE
THROTTLE GRIP / GRIP RUBBER	CONCORDANT PART	CEMEDINE #540 or SUITABLENESS WIDTH
THROTTLE GRIP PIPE	SLIDING PART	MTSUBISHI MULTIPURPOSE No.20 or SUITABLENESS WIDTH
THROTTLE CABLE	CASTING AND CONTACT INSIDE PART	SILICON GREASE
CLUTCH CABLE	CASTING INSIDE PART	//
SIDE STAND PIVOT	SLIDING PART	MTSUBISHI MULTIPURPOSE No.20 or SUITABLENESS WIDTH
MAIN STAND PIVOT	//	MTSUBISHI MULTIPURPOSE No.20 or SUITABLENESS WIDTH
GEAR CHANGE PEDAL PIVOT	//	MTSUBISHI MULTIPURPOSE No.20 or SUITABLENESS WIDTH

Apply oil or grease to the other sliding surfaces not shown here.

MEMO



4. FUEL SYSTEM

SERVICE INFORMATION . . .	4-1
TROUBLESHOOTING	4-2

FUEL TANK	4-3
AIR CLEANER CASE	4-4

SERVICE INFORMATION

GENERAL SAFETY

WARNING

- Gasoline is extremely flammable. Avoid fire in the work place, also paying particular attention to sparks. Furthermore, the evaporated (gasified) gasoline is highly explosive. Work in a well-ventilated areas.
- Exhaust gas contains poisonous substance. Do not keep engine running for a long period of time in a closed, or poorly ventilated area.

STANDARD OF MAINTENANCE

- Fuel tank capacity : 14.85 l
- Reserve fuel capacity: 4.0 l
- Fuel pump specification : KGF38
 - Flow quantity : Mimnim 20 l /hr
 - Flow pressure : 380kpa
- Injector specification
 - Injector angle : 15°
 - Operation pressure : 380kpa

TORQUE VALUE

Air cleaner case cover screw 0.43kgf · m (4.3N · m)

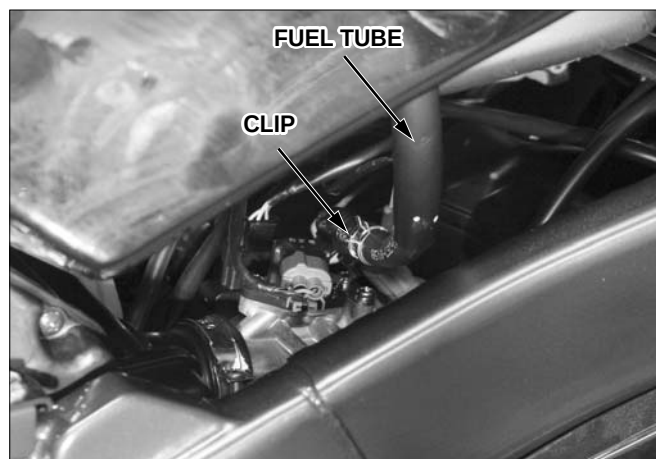
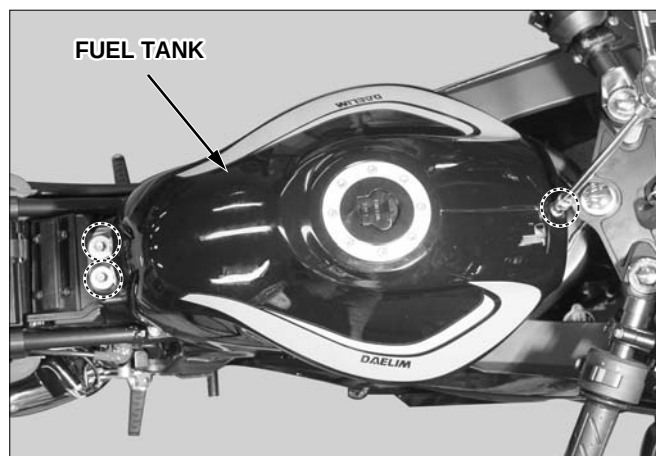
TOOL

Float level gauge

TROUBLESHOOTING

Engine cranks but won't start

- No fule in tank
- No fule to carburetor
- Cylinder flooded with fuel
- Clogged air cleaner
- No spark at plug



FULE TANK

REMOVAL

⚠ WARNING

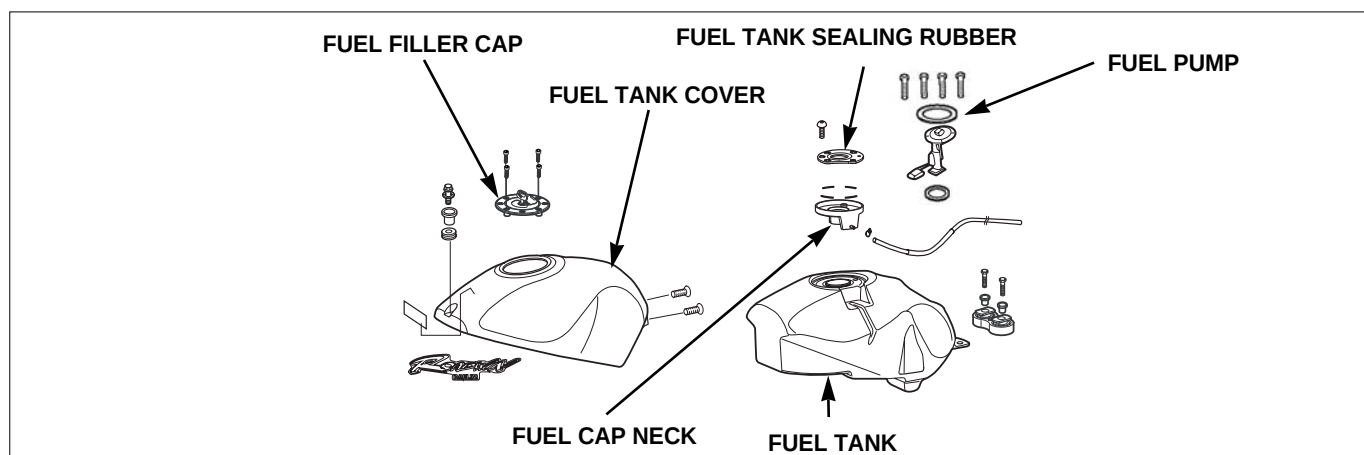
- Do not smoke or allow flames or sparks in the work area because gasoline is extremely flammable. Immediately wipe off a leaked gasoline.

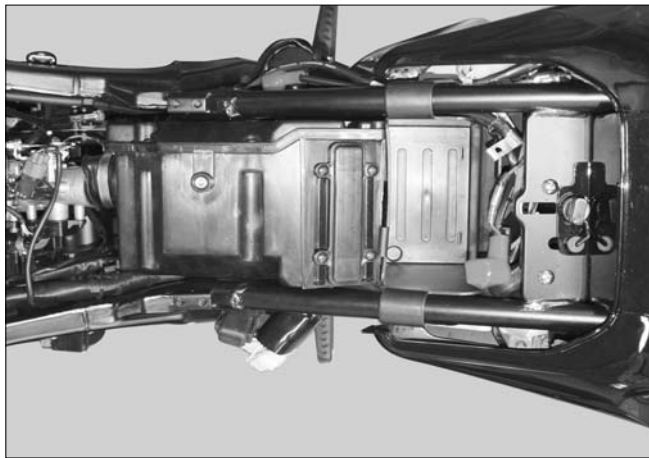
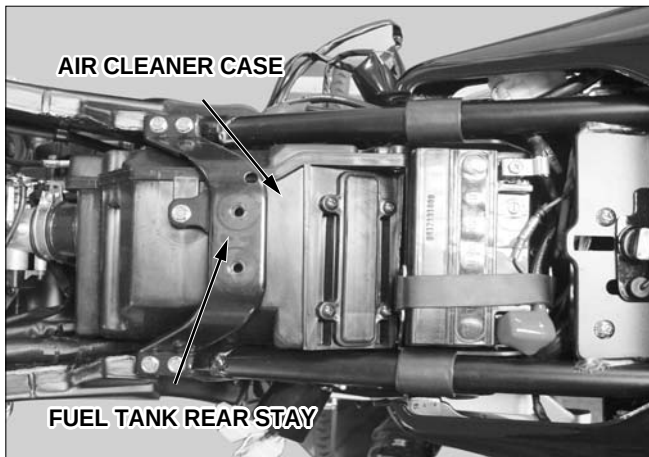
- Remove the seat.
- Remove the fuel tank cover by looseing the 2 special screws and washer bolt.
- Disconnect the fuel serve cord.

- After lift a section of the fuel tank, seperate a clip of the fuel tank and the hose.
- Remove the fuel tank.

INSTALLATION

- Install the fuel tank in the reverse order of removal.
- After installation, check if there is a gasoline leak.





AIR CLEANER CASE

REMOVAL

- Remove the main seat.
- Remove the fuel tank.
- Remove the RH. LH. side covers.
- Remove the fuel tank rear stay.

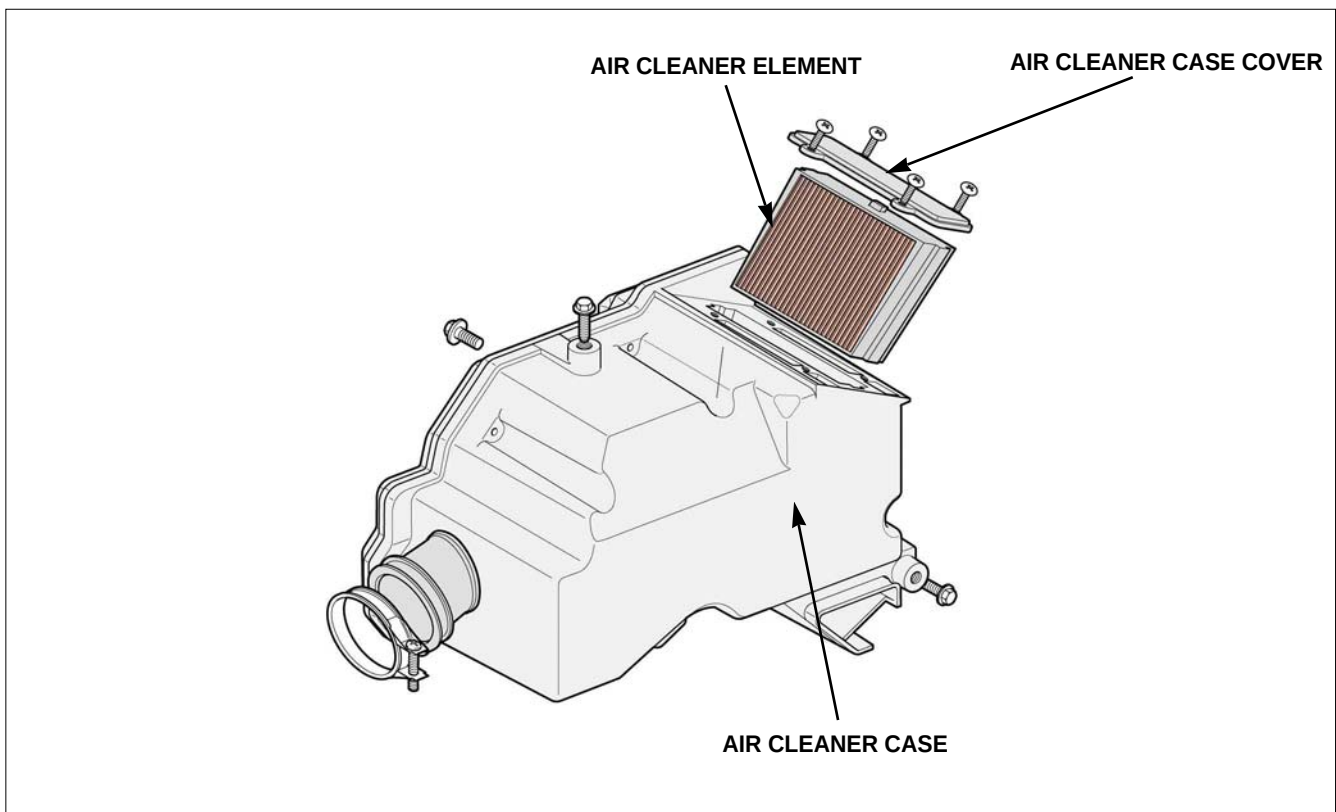
- Remove the battery.
- Remove the battery box by loosening the washer bolt.
- Remove the air cleaner connecting tube band.
- Remove the air cleaner case mounting bolts, then remove the air cleaner case.

INSTALLATION

- Install in the reverse order of removal.

⚠ NOTE

- Insert the hook area of battery box into the front hole of rear fender accurately when assemble the air cleaner case.



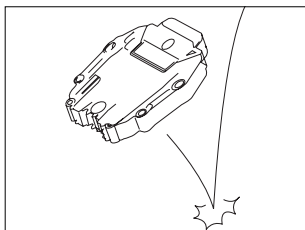
MEMO

5. EMS(Engine Management System)

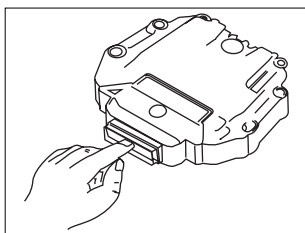
1. CAUTION WHEN REPAIRING THE EMS PARTS	5-2
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1.CAUTION WHEN REPAIRING THE EMS PARTS.

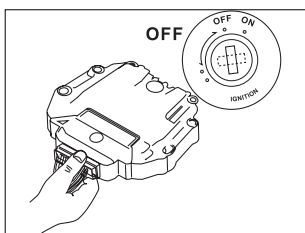
- If the fuse is short-circuited, find out the cause and repair, replace with the fuse having the specified capacity.
- Do not use the electric wires or others instead of the fuse.
- Do not drop or throw the EMS parts, because these parts may be damaged by the impact of the drop.



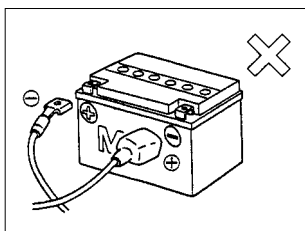
- Do not touch the ECU terminal, because it may be damaged by the static.



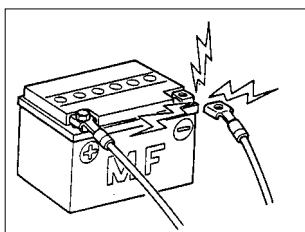
- The ignition key off before assembly and disassembly of the ECU coupler. Otherwise, it might be damage to ECU.



- Do not connect adversely the polarity of battery, otherwise, it might be broken the EMS parts



- While engine operating, do not disassemble the battery terminal. Otherwise, it might cause damaged the EMS parts.



- Use the specified voltmeter and resistance meter.

2.THE COMPONENT PARTS OF THE EMS

EMS CONSISTS OF INTAKE AND FULE, IGNITION AND CONTROL SYSTEM.

1) INTAKE SYSTEM

As a system which controls and measures air to be necessary for combustion in engine, the intake system is composed of pressure sensor of intake parts, intake on sensor, throttle position sensor, throttle body, air cleaner and ISA(Idle Speed Actuator), etc.

In idling, because throttle value is almost closed, the idle status of engine shall be controlled by means that idle speed control system is installed in order to control small of quantity of air being necessary for combustion.

2) FUEL SYSTEM

As a system to supply required fuel for consumption in engine combustion chamber from fuel tank to injector, this Fuel system is composed of fuel tank, fuel pump, fuel filter, fuel pressure regulator, division pipe and injector.

The fuel in tank, being high pressed by fuel pump, moves to the division pipe through fuel filter.

Next the fuel is supplied to injector being highly maintained as regulated pressure about the pressure of intake system.

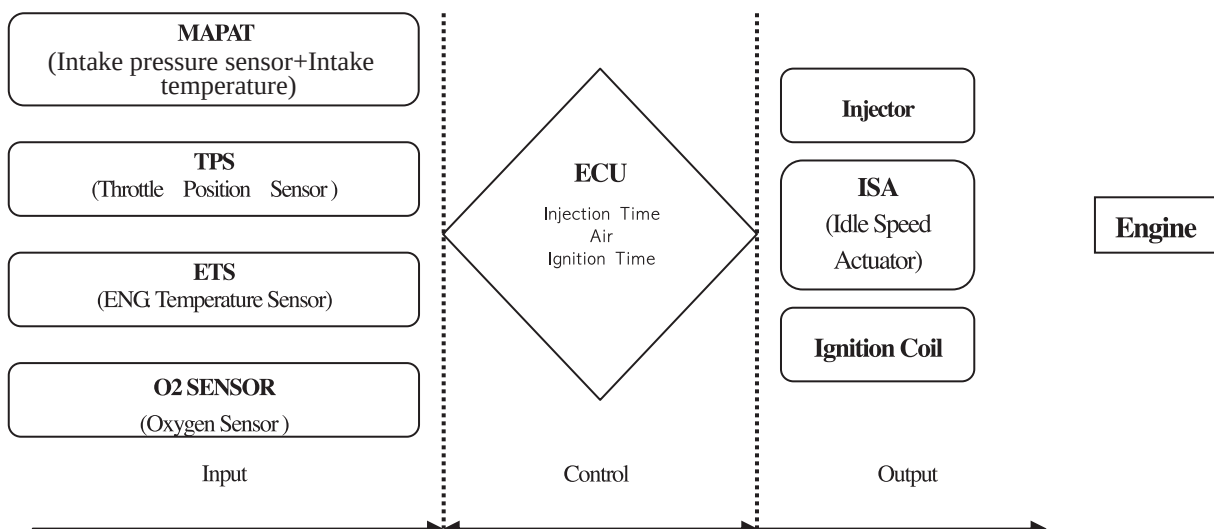
Injector sprays fuel into the intake system by injection signals of ECU.

3) IGNITION SYSTEM

The ignition system is composed of spark plug which makes ignition spark, a spark timing control part to control proper spark time in cylinder, high-voltage system, and so forth.

4) CONTROL SYSTEM

- ① Various sensors to move electric signals converted by checking the current engine status
- ② Input interface which works various processes like regulating voltage levels, removal of noise, A/D conversion, amplifying of inputted signals from above sensors.
- ③ Micro-computer which decides output value through various calculating, arithmetic and logic processing.
- ④ Output interface to amplify the above output signals.
- ⑤ Actuator being mechanically worked by receiving the amplified output signals.

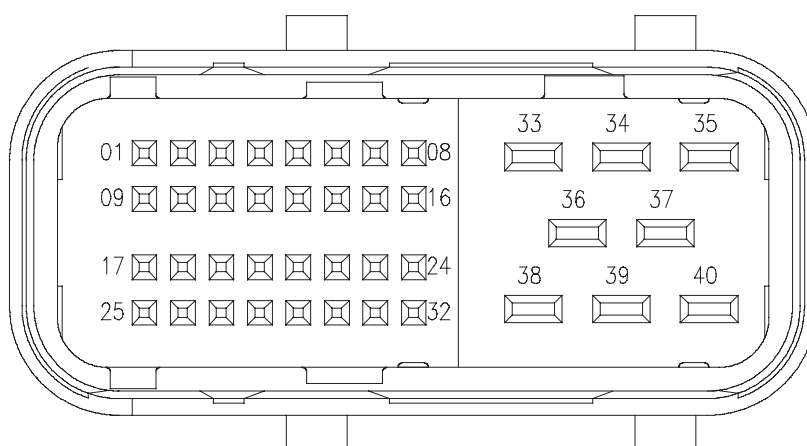


3. TERMINAL ARRANGEMENT OF THE ECU

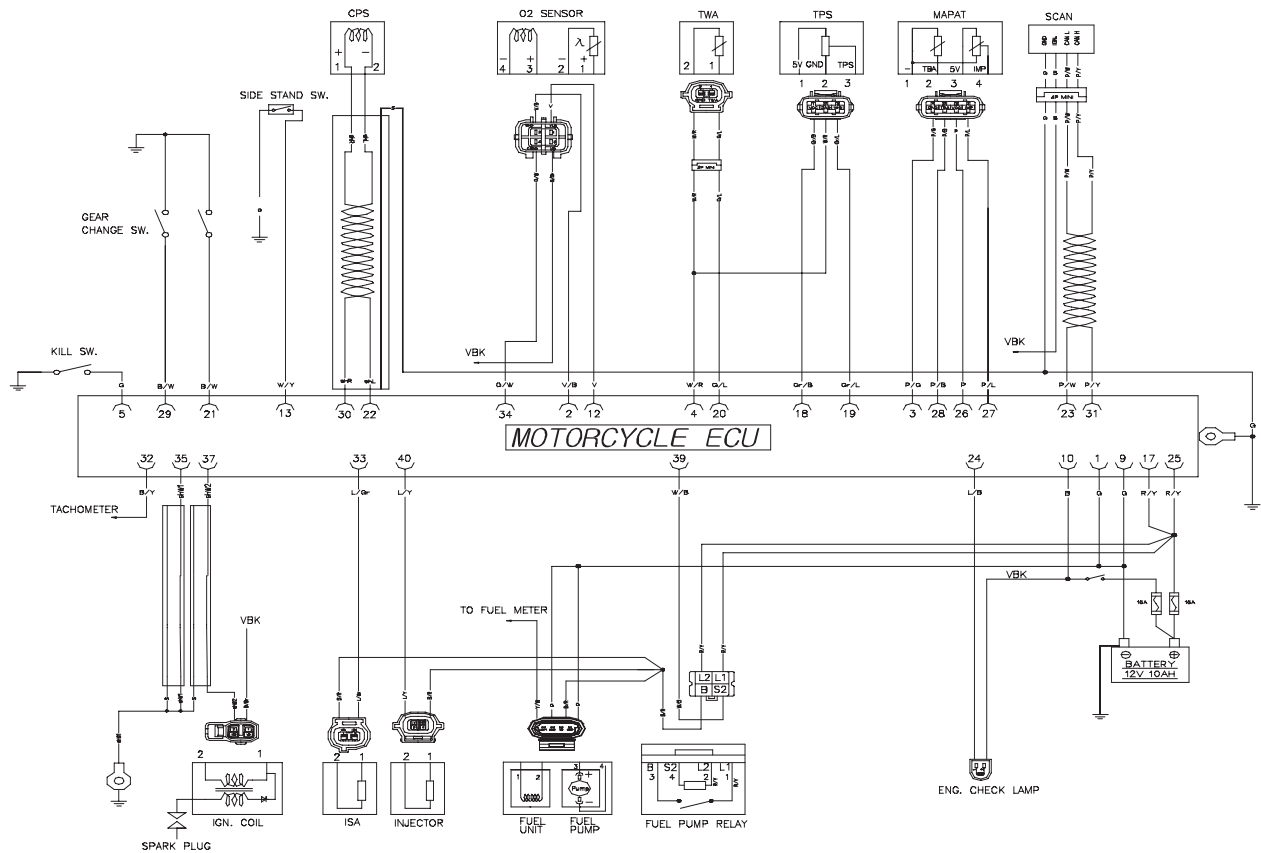
ECU PIN NO. VS FUNCTION			
PIN NO.	FUNCTION	PIN NO.	FUNCTION
01	ECU Earth	21	Third Gear
02	Oxygen sensor Earth	22	Crank Position Signal B
03	Intake pressure sensor Earth	23	Communication LOW
04	TPS. ETS Earth	24	MIL
05	Engine KILL	25	Battery Power
06	-	26	Intake pressure sensor power(5V)
07	-	27	Intake pressure sensor Signal
08	-	28	Intake temperature sensor Signal
09	ECU Earth	29	Neutral Gear
10	After main key turn on, Battery power	30	Crank Position Signal A
11	-	31	Communication HIGH
12	Oxygen sensor Signal	32	Engine Speed Signal
13	Side stand Signal	33	Idle Speed Actuator
14	-	34	Oxygen sensor Heat
15	-	35	Ignition coil Earth
16	-	36	-
17	Battery Power supply	37	Ignition Signal
18	TPS Power (5V) supply	38	HEad lamp relay Signal
19	Throttle Position Sensor Signal	39	Fuel pump relay Signal
20	Engine Temperature Sensor Signal	40	Injector Signal

※Remarks

- ECU PIN NO. 6,7,8,11,14,15,16,36 were not connected.
- Terminal arrangement is based on the ECU.



4. WIRING DIAGRAM OF THE ECU



5. AN ERROR CHECKLIST FOR EACH TERMINAL OF ECU

PIN NO.	ERROR Checklist						PIN NO.	ERROR Checklist					
	Starting	Idle RPM Stability	Driving	Durability	SCAN tool communication	MIL		Starting	Idle RPM Stability	Driving	Durability	SCAN tool communication	MIL
ECU 01	O	O	O	X	O	X	ECU 23	O	O	O	O	X	X
ECU 02	O	X	O	X	O	O	ECU 24	-	-	-	-	O	X
ECU 03	O	X	O	X	O	O	ECU 25	X	-	X	-	X	X
ECU 04	O	X	O	X	O	O	ECU 26	O	X	O	X	O	O
ECU 05	X	-	X	-	O	X	ECU 27	O	X	O	X	O	O
6, 7, 8	-	-	-	-	-	-	ECU 28	O	X	O	X	O	O
ECU 09	O	O	O	X	O	X	ECU 29	X	-	X	-	O	X
ECU 10	X	-	X	-	X	X	ECU 30	X	-	X	-	O	X
ECU 11	-	-	-	-	-	-	ECU 31	O	O	O	O	X	X
ECU 12	O	X	O	X	O	O	ECU 32	O	O	O	O	O	O
ECU 13	X	-	X	-	O	X	ECU 33	O	X	O	O	O	O
14,15,16	-	-	-	-	-	-	ECU 34	O	X	O	X	O	O
ECU 17	X	-	X	-	X	X	ECU 35	X	-	X	-	O	X
ECU 18	O	X	O	X	O	O	ECU 36	-	-	-	-	-	-
ECU 19	O	X	O	X	O	O	ECU 37	X	-	X	-	O	X
ECU 20	O	X	O	X	O	O	ECU 38	O	O	O	O	O	O
ECU 21	O	O	O	O	O	X	ECU 39	X	-	X	-	O	O
ECU 22	X	-	X	-	O	X	ECU 40	X	-	X	-	O	O

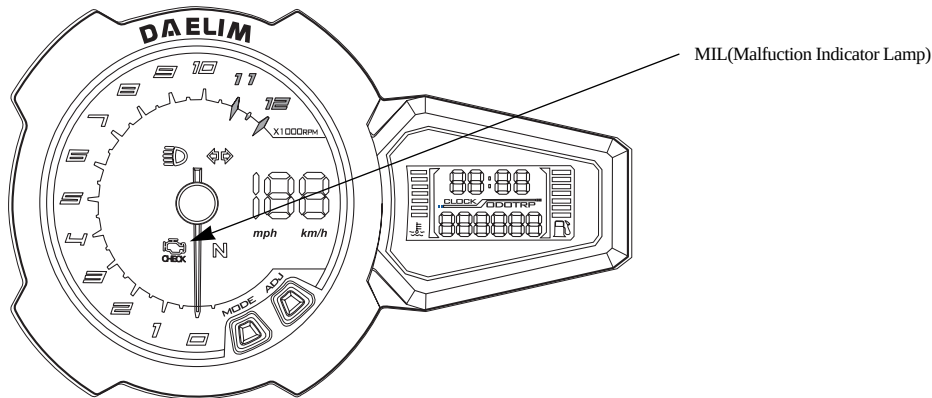
6. SELF-DIAGNOSTIC FUNCTION BY MIL (Malfunction Indicator Lamp)

SELF-DIAGNOSTIC FUNCTION

The EMS is equipped with self-diagnostic function in order to ensure that the engine control system is operation normally. If this function detects a malfunction in the system, it immediately operates and illuminates the MIL (malfunction indicator lamp). It gives the rider that malfunction has occurred in the system.

However, the ECU takes fail-safe function, it enables to drive only temporary when that happen.

Normally, the MIL illuminates for 3 seconds, when the main key is turned on.



※ when the ignition key ON.

MIL	Engine operation	Remarks
OFF	Able to engine start	
ON	Starting and driving are temporary	Refer to 1
	Unable to engine start	Refer to 2

Remarks 1

If the EMS has some problem and the MIL on and off, engine starting and driving are temporary by the EMS's fail safe function. But the EMS is not normal condition, so check the vehicle and repair soonest.

Remarks 2

It might not be able to starting and driving when following problems happen.

- Crankposition sensor
- Injector
- Fuel pump

※ The MIL on and blink(when this function detects a malfunction in the system)

MIL	Conditions
ON	MIL on continuously, when the engine operating
Blink	MIL blinks, when the main key is turn on (engine is stop)

FAIL-SAFE FUNCTION

If the ECU checks something wrong , the vehicle can be driven by its fail safe function.

However, if there are something wrong in fuel pump, injector, crank position sensor, the engine operation can be impossible.

FAILSAFE	SENSOR	ENGINE MIL
Starting possible	ENGINE TEMPERATURE SENSOR TPS INTAKE PRESSURE SENSOR INTAKE TEMPERATURE SENSOR	Ignition Key on : MIL off In engine operation : MIL on
Bad starting	CRANK POSITION SENSOR FUEL PUMP INJECTOR	

If there is something wrong in the EMS, it has fail safe function in order for engine to work and to cover a minimum driving of vehicle.

Contents	FAILSAFE	Starting	Driving
ENGINE TEMPERATURE SENSOR	If air intake temperature is below 20°C , engine temperature will be fixed to 20°C If air intake temperature is over 20°C , engine temperature will be fixed to 80°C	Possible	Possible
TPS	Depending upon engine rpm, the opening degree of Throttle Valve has a temporary value.	Possible	Possible
INTAKE PRESSURE SENSOR	The value of intake pressure is fixed as the pressure just before when the intake pressure sensor is out of order.	Possible	Possible
INTAKE TEMPERATURE SENSOR	The value of intake temperature is fixed to 20.25°C when the intake pressure sensor is out of order.	Possible	Possible

⚠CAUTION

If the MIL on and blink, starting and driving are temporary by fail safe function, but, because the conditions of engine operation are not perfect, this can be used in an urgent case. In this case, safe repairing of vehicle shall be required.

HOW TO CHECK THE FAULT CODE

There are two methods of checking the fault codes.

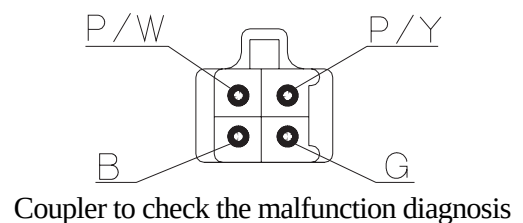
Use the MIL in the speedometer and the diagnostic tool.

First) Use the MIL in the Speedometer for checking.

- Turn off the ignition key
- The MIL blinks continuously
- Find the defects by checking the number of lighting, the fault code can be verified (refer to the fault code table)

Second) The diagnostic tool (refer to scan user's manual for checking.)

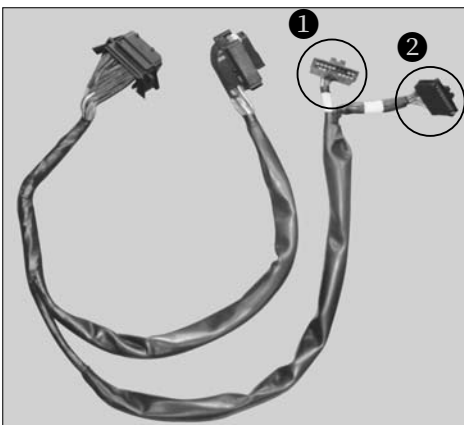
- Turn off the ignition key
- Assemble the coupler of diagnostic tool with the coupler to check the malfunction of vehicle.
- Turn on the ignition key
- Press the power button of diagnostic tool
- Checks according to diagnostic procedure of diagnostic tool.



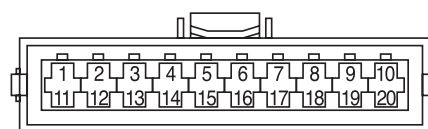
Wire color to check the malfunction diagnosis

-P/W : PINK/WHITE	: CAN_L
-P/Y : PINK/YELLOW	: CAN_H
-B : BLACK	: IGNITION KEY
-G : GREEN	: GROUND

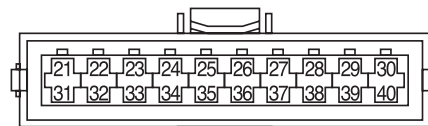
Third) Use the wireharness for checking



① Coupler for checking (ECU 1 - ECU 20 PIN)



② Coupler for checking (ECU 21 - ECU 40 PIN)



Measure the wire harness for checking by connecting the ECU with main wire harness to check the ECU.
It has two coupler to check the terminal.

The wireharness to check the ECU arrangement

① Coupler for checking : ECU PIN no. 1,2,3,4,5,9,10,12,17,18,19,20 were connected.
ECU PIN no. 6,7,8,11,13,14,15,16 is not connected.

② Coupler for checking : ECU PIN no. 21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,37,39,40 were connected.
ECU PIN no. 36 is not connected.

HOW TO SHOW THE FAULT CODE

There are two methods to show the Fault codes.

First) The methods to show in engine operation

In engine operation, when there is something wrong in each part of EMS, the MIL keeps light on without the light on/off function of MIL in order for driver to acknowledge defect. This time, so for checking the fault code, stop the vehicle and engine, and in the ignition key on, by checking the number of lighting, the fault code can be verified.(refer to the fault code table)

Second) The ways of indication only turn on the ignition key.

When only ignition key is on and if the defect of each part brings out, the MIL keeps showing the Fault code of defect part repeatedly in order to give defect information to driver.

⚠CAUTION

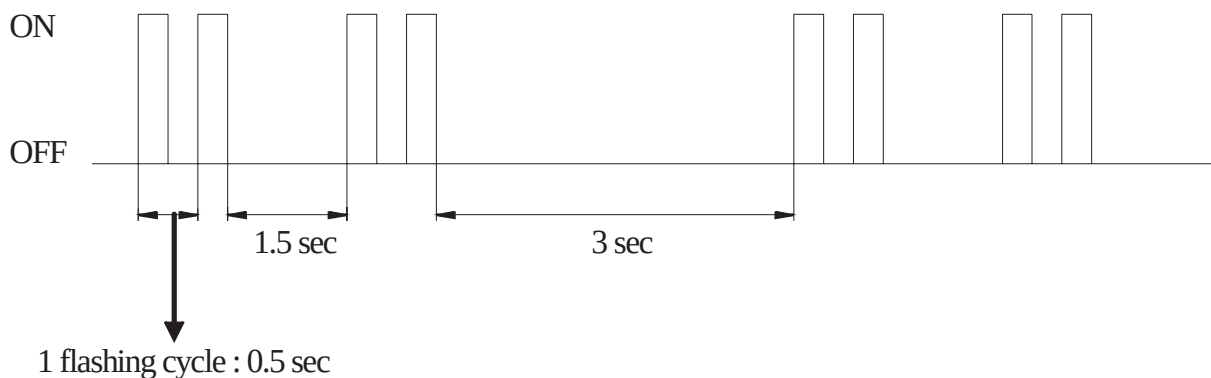
If the MIL on when engine is working, engine is able to be operated by fail safe. However, in the event that Injector, Fuel pump, Ignition coil has something wrong, vehicle may not be driven and engine not started.

HOW TO READ THE FAULT CODE

The fault codes are showed as 2 digits on the MIL of EMS.

Only one defect code is showed up to prior sequence of defects. This time, that fault code is repeatedly showed.

E.g.) The Fault code of ISA



If many problems will happened in the EMS parts at the same time, only one fault code is displayed by the priority, however, the ECU remembers all the fault codes.

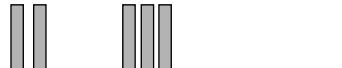
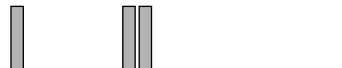
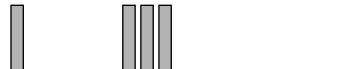
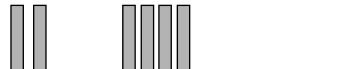
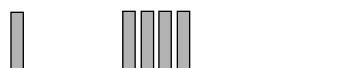
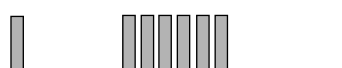
After revise the code, remove the memorized fault code by the method of warm up.(5-10)

(Refer to remove the fault codes)

When the vehicle is checked using the diagnosis tool.

- If the vehicle is check using the malfunction diagnosis tool, all fault code check is possible.

FAULT CODES TABLE

MIL INDICATION (The number of blinks)	Fault code no.	Priority order	Description
	0 0	—	No failure
	1 1	1	Crank position sensor failure(CKP)
	2 1	2	Injection valve failure(IV)
	2 2	3	Idle speed actuator failure (ISA)
	2 3	4	Electrical fuel pump failure (EFP)
	1 2	5	Intake Manifold absolute pressure signal failure (IMP)
	1 3	6	Throttle position signal failure (TPS)
	2 4	7	O2 sensor heater output failure (LSH)
	1 4	8	Lambda signal failure (VLS)
	1 5	9	Engine temperature signal failure (TENG)
	1 6	10	Breathing air temperature signal failure (TBA)
	2 5	11	Engine speed signal output failure (ESS)
	2 6	12	Headlamp relay failure
	2 8	13	Malfunction indicate lamp failure (MIL)

HOW TO REMOVE THE FAULT CODE

Remove the fault codes in two ways;

First) Full warm up

1. Starting the engine.
 - The MIL blinks continuously because the ECU memorized the fault code yet.
2. Full warm up the engine (keep idling five minutes)
3. Turn off the ignition key after full warm up the engine
4. Turn on the ignition key again, and check whether the fault code is disappeared or not.

After full warm up, it is possible to check the fault code is removed with the ignition key on/off.

If many problems happened in the EMS parts at the same time, only one defect code will be displayed by the priority order.

Even though repair a fault and remove the memorized fault code, another fault code blinks. at this time, revise the fault and remove the memorized fault code by the warm up.

Second) Malfunction diagnosis tool

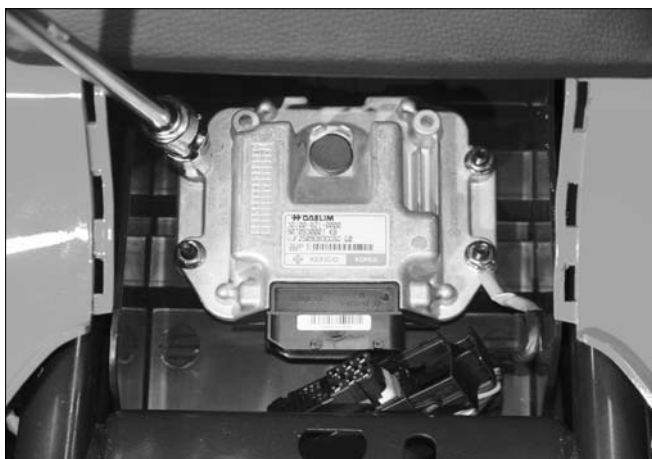
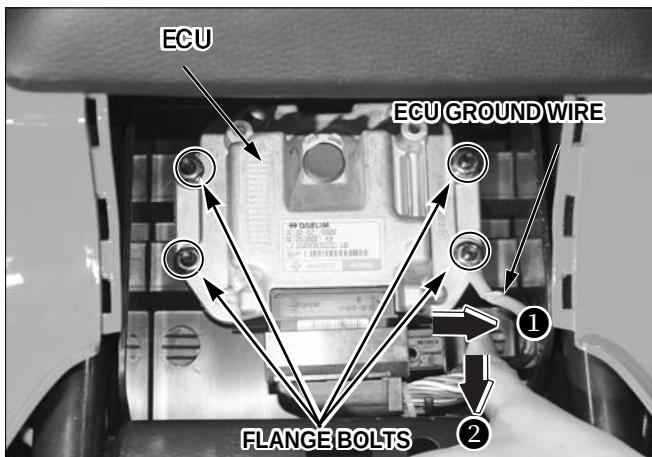
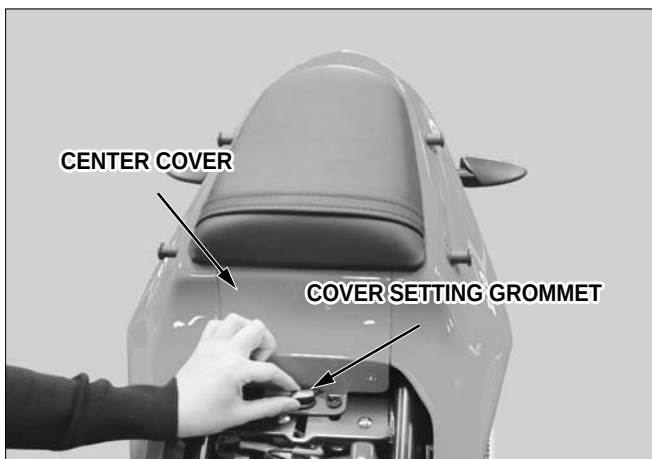
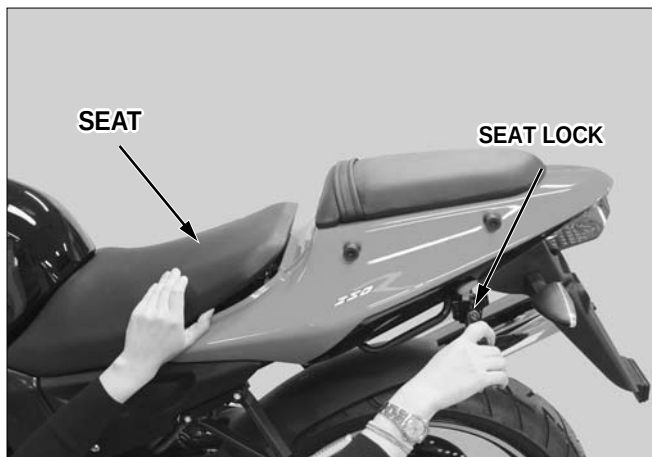
(refer to the scan user's manual)

EMS TROUBLE SHOOTING

Inspection before diagnosis

Inspect the following before malfunction diagnosis.

- Quantity of engine oil and leakage
- Quantity of fuel and leakage
- Blocked of air cleaner
- Condition of battery
- Free play of throttle cable
- Cutting of fuse
- Leakage of emission gas
- Connection of each coupler
- Cylinder pressure
- Condition of spark plug



7.ECU(ELECTRONIC CONTROL UNIT)

- It is located inside a pillion seat

CAUTION

- The key is off before disassembly.

- Remove the setting grommet and center cover.

• Remove

- ECU coupler
- Remove the coupler in sequence
- Remove the 4 flange bolts securing ECU

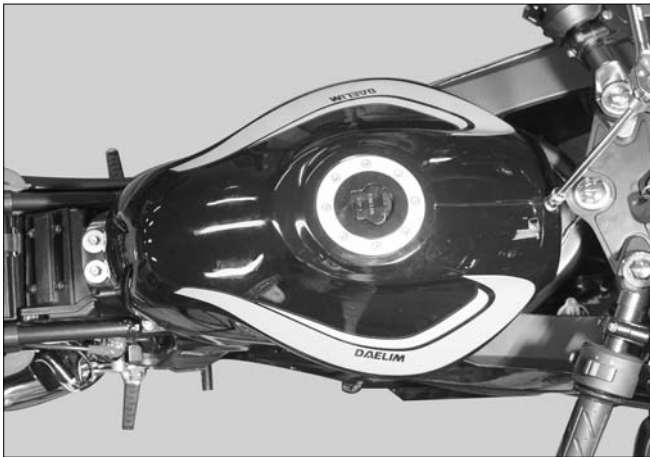
• Install

- Install in the reverse order of removal

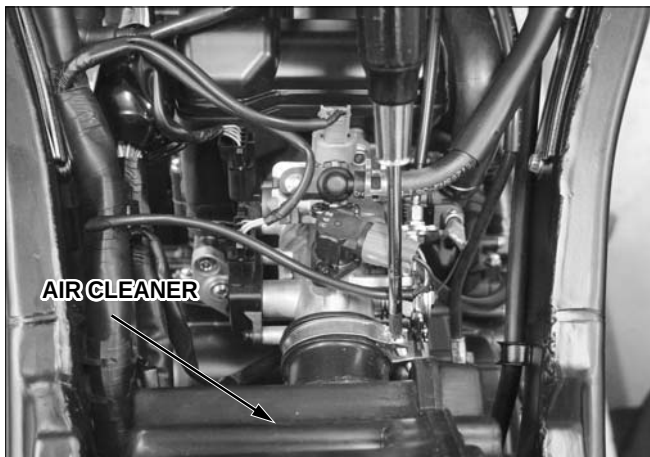
CAUTION

- Be sure to assemble the ECU ground wire.
(The color is green)

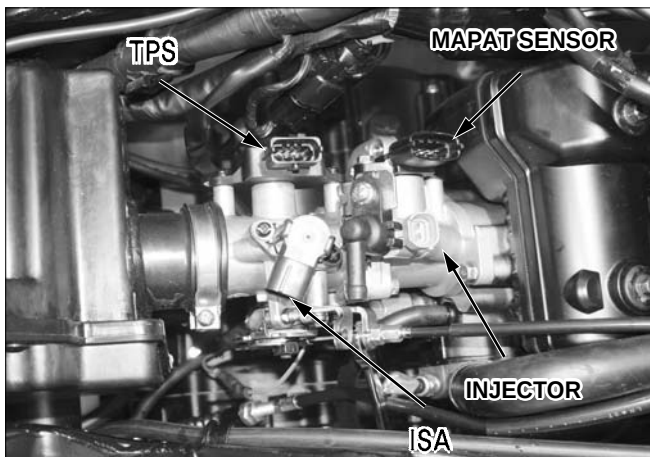
8. THROTTLE BODY



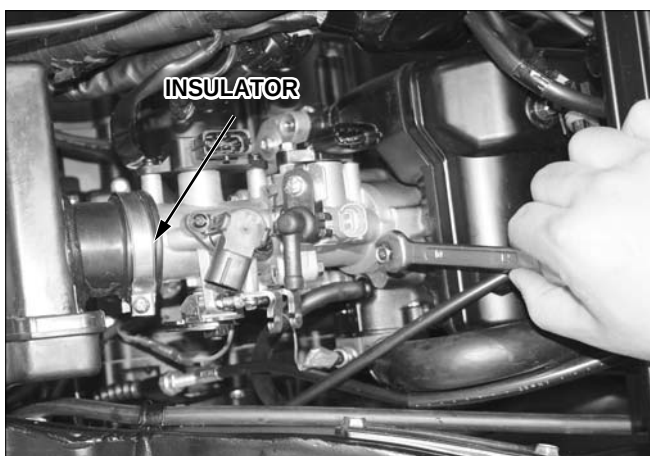
- Remove the seat support pipe.
- Remove the fuel tank.



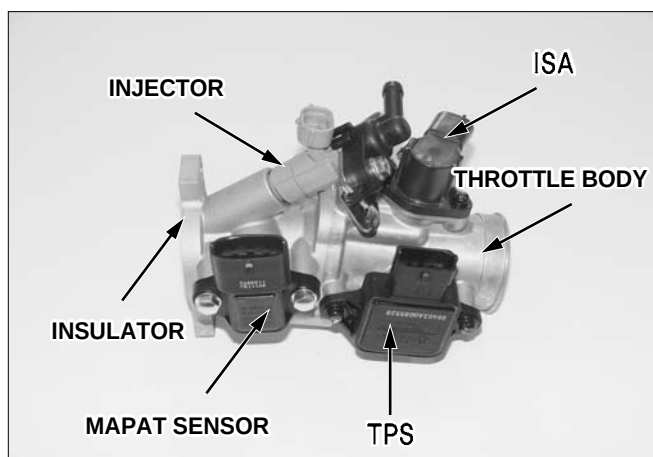
- Loosen the screw securing air cleaner connecting tube band.
- Remove the throttle body and air cleaner.



- Remove the gasoline in fuel tube.
- Disconnect fuel tube securing inject or cap.
- Disconnect injector, MAPAT, throttle sensor, ISA coupler.
- Disconnect throttle cable.



- Loosen the 2 flange bolts securing insulator and remove the throttle body assy.

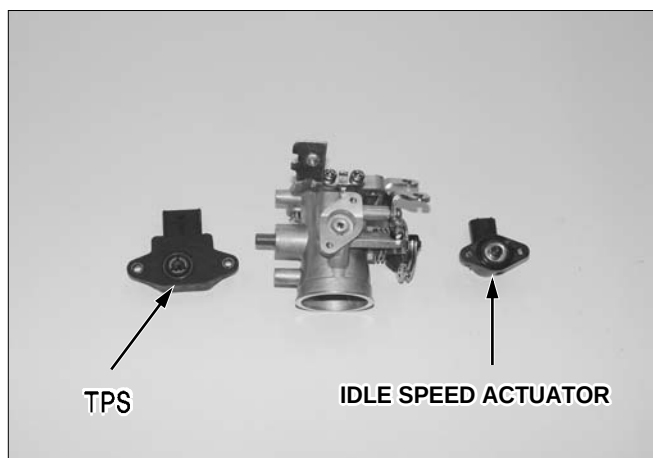


DISCONNECT THE THROTTLE BODY

- Remove the each component parts securing throttle body and check.

⚠CAUTION

- Do not disconnect both the throttle adjust screw and adjust nut.



REMOVE

- Loosen the throttle body 2 bolts securing the insulator.
- Disconnect the TPS (Throttle position sensor).
- Disconnect the ISA (Idle speed actuator).
- Disconnect the MAPAT.

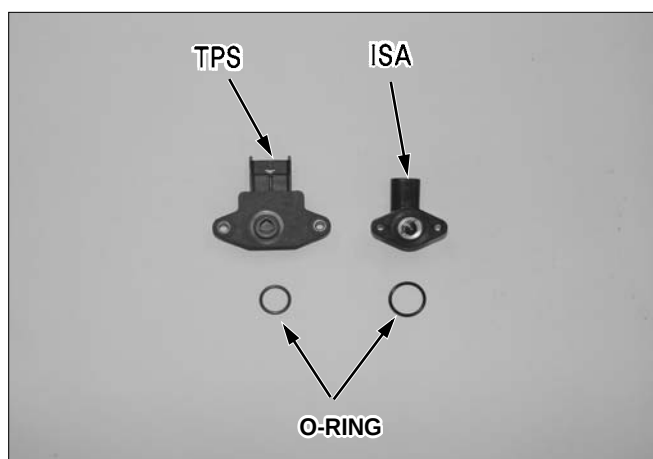
⚠CAUTION

- Do not disconnect the throttle valve.



CHECKING THE THROTTLE BODY

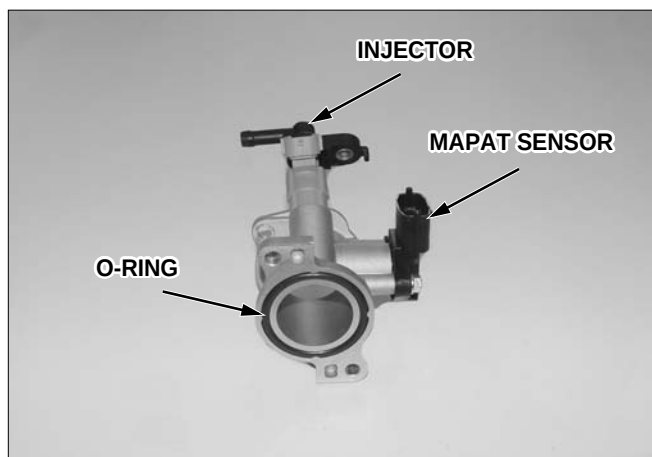
- Checking the O-ring.
- Checking the Throttle shaft.
- Checking the Throttle valve.



- Checking the ISA.
- Checking the TPS.

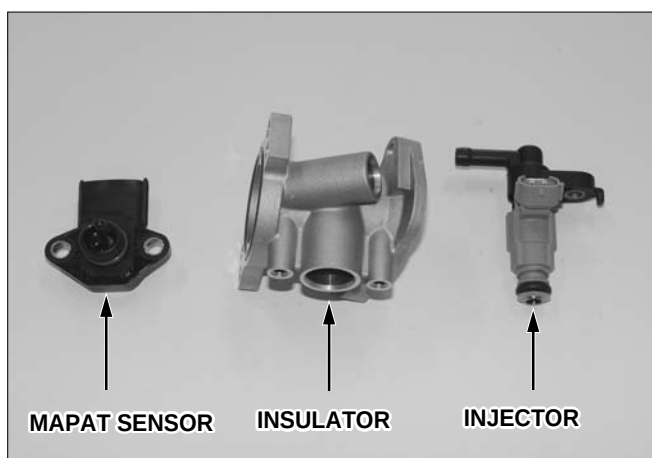
⚠CAUTION

- Replace the O-ring with new one.

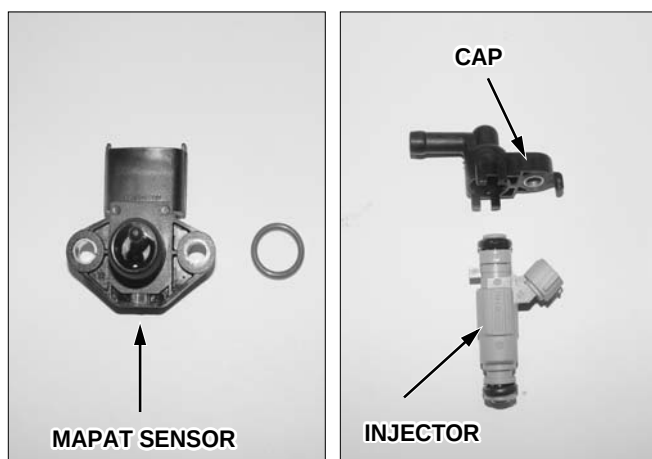


DISASSEMBLE THE INSULATOR

- Disconnect injector cap bolt.



- Disconnect injector and injector cap at the same time from the insulator.
- Disconnect injector and injector cap.

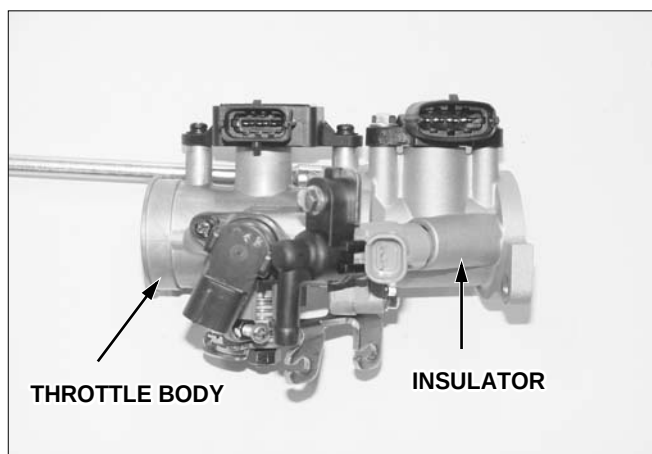


CHECKING THE INSULATOR

- Check the O-ring.
- Check the insulator inside.
- Check the MAPAT sensor.
- Check the injector
- Assemble in the reverse order of removal.

CAUTION

- Replace the o-ring with new one.

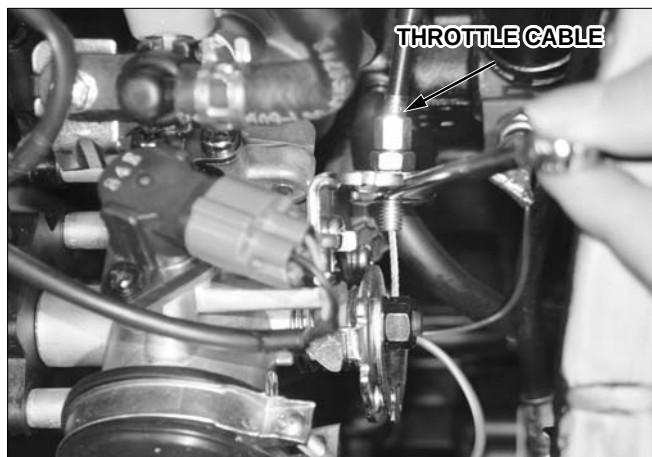


INSTALLATION OF INSULATOR AND THROTTLE BODY

- Installation of insulator and throttle body in the reverse order of removal.
- Check the o-ring when the insulator assembly.
Torque : 1.0 kgf · m

CAUTION

- Replace the gasket with new one.
- Install the assembled insulator and throttle body to the cylinder head.
Torque : 1.2 kgf · m



ASSEMBLY

- Assemble the throttle cable.
- Adjust the free play of throttle grip.



INSPECTION OF SENSOR AND ACTUATOR

- Connect each sensor and the actuator coupler.
- Check the ISA.
- Check the TPS.
- Check the MAPAT sensor.

⚠CAUTION

- Be sure to the valve of TPS is whether the standard valve after it became assembly.

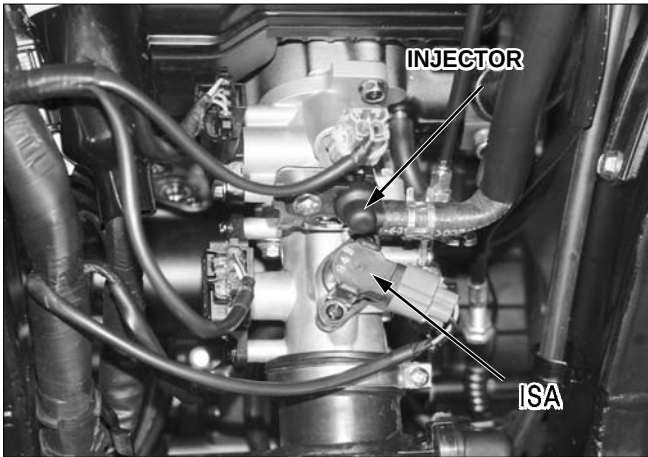


ADJUSTMENT OF IDLE SPEED ACTUATOR (ISA)

⚠CAUTION

- The ECU is always initilized, before the engine is starting.
- The vehicle is warms up enough to adjust the idling speed.
- Disconnect the RH. side cover.
- Connect the coupler of scanner to the coupler of diagnostic tool.
- Press the POWER button on the scanner and check the ISA value.
- If the ISA value is not around 20% adjust it using the adjust screw to around 20% in 80~90°C of engine temperature.





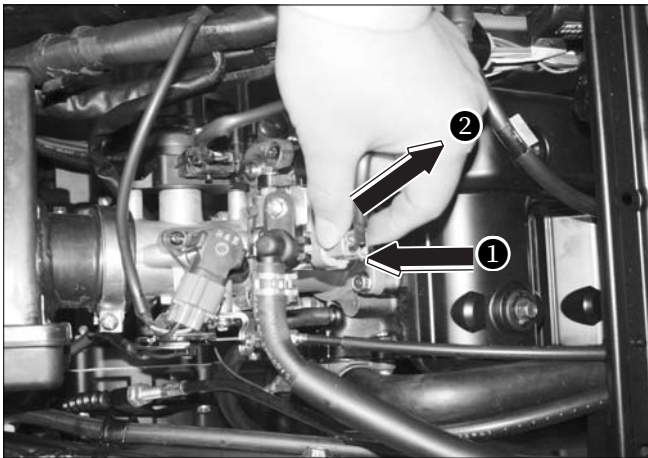
9.INJECTOR

Remove

- Remove the fuel tank.

CAUTION

- The key is off before disassembly.



- After push the injector coupler, pulling it upward.



- Remove the injector cap bolt.

CAUTION

- Be sure to check the engine is cooling because a little gasoline remains. it could be still hot and it could be cause fire.
- Be sure to injector the gasoline, after remove the coupler from the ignition coil.
- It could be damaged for the fire, sparked on the spark plug.



- Remove the injector.

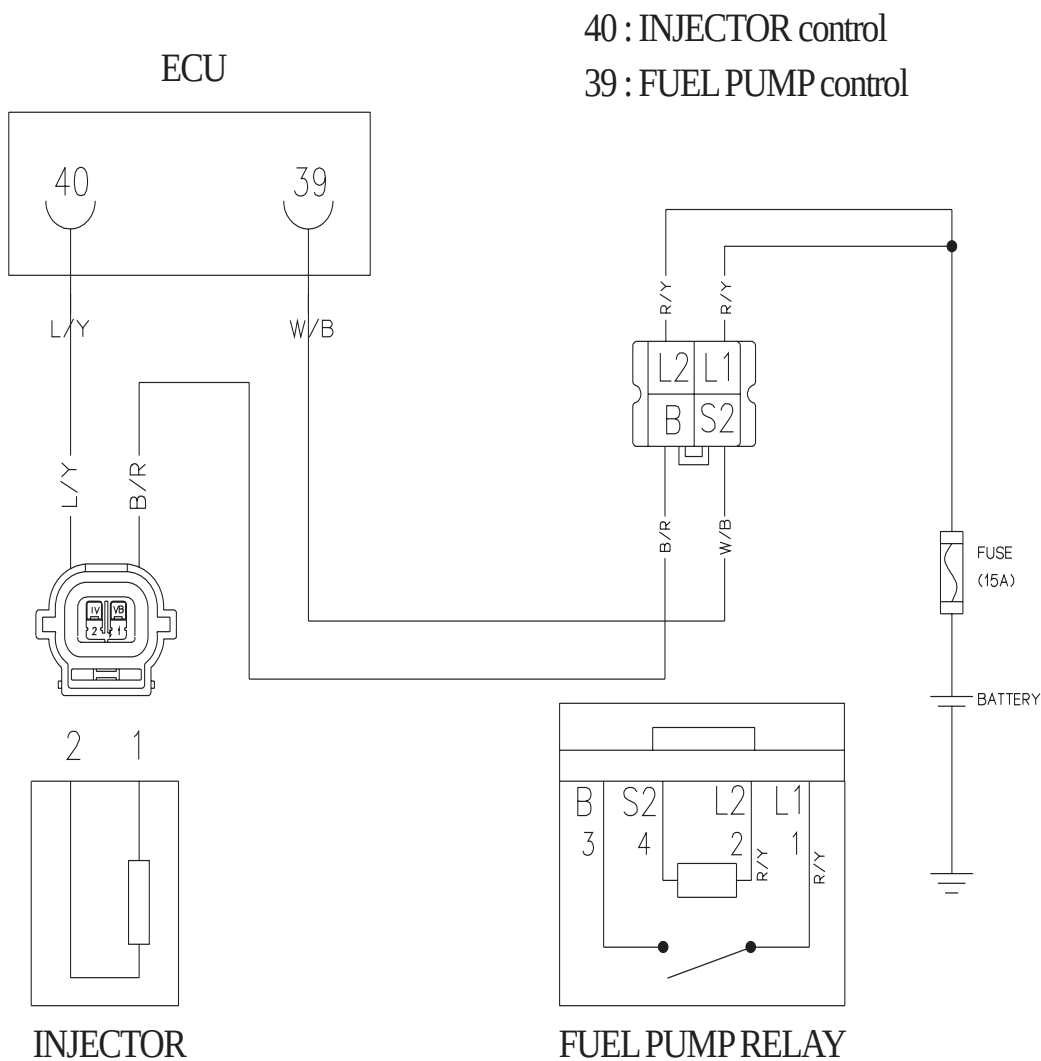
Assemble

- Install in reverse order of removal.

CHECKING METHODS BY FAULT CODES

Checking of the Injector circuit

- The fault code is displayed by MIL



※ Coupler terminal is based on wire harness.

CHECKING PROCEDURE

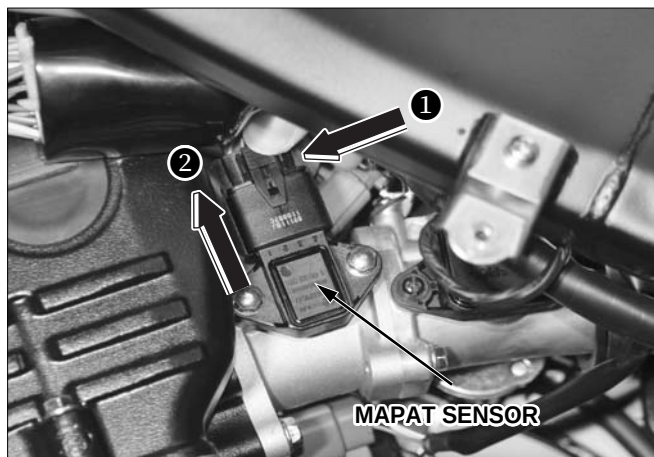
- 1) Turn off the ignition key.
- 2) Check to see if the injector coupler has come loose or the wire is peeling off.
If there is no problem, measured the resistance of injector.
- 3) Disassemble the injector coupler and measure the resistance between injector terminals.
The resistance of injector : $14.5 \pm 0.7 [\Omega]$, 20 °C

※ Remarks : measuring unit for resistance : resistance ' R ' [Ω]

- 4) If there is no problem, check the continuity between each terminal and ground.
The resistance between each terminal and ground : $\infty [\Omega]$
If resistance value is not normal, replace injector with the new one.
- 5) If the resistance is normal, turns on the ignition key
- If the fuel pump operated for 3 seconds, the power supply relay of injector is normal.
- 6) Measure between the voltage of coupler.
Measuring terminal : $\oplus$ BLACK/RED electric wire $\sim \ominus$ ground
Measuring voltage : battery voltage – 1.0[V]over

※ Remarks : Measuring unit of voltage : voltage [V]

- 7) If the measured voltage is normal,
 - Check the 'Blue/Yellow' electric wire to see if they have been broken or have short-circuited or if the wire-harness coupler and the ECU coupler are a bad contact (ECU terminal No. 40)
 - If there is no problem in the electric wires, ECU is broken
 - Replace the ECU with new one, it rechecks
- 8) If the measured voltage is not normal,
 - Check the Black/Red electric wire to see if they have been broken or have short-circuited.
 - Check the fuel pump relay.
- 9) After fault repaired, to erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11).



10. MAPAT(Manifold Air pressure sensor, Temperature sensor)

- It is Located on the left side of the throttle body.

Remove

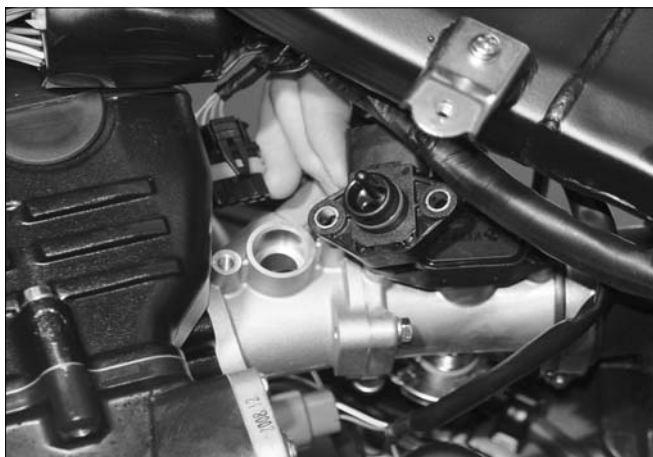
- Remove the MAPAT sensor coupler.

⚠ CAUTION

- The key is off before disassembly.



- Loosen the MAPAT sensor screw 2EA.



- Remove the MAPAT sensor.

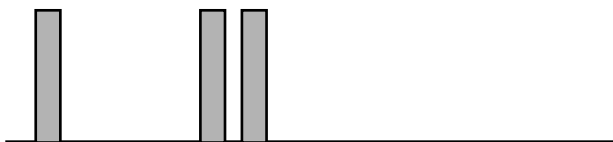
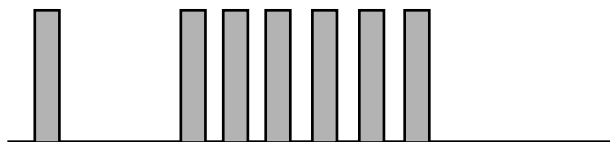
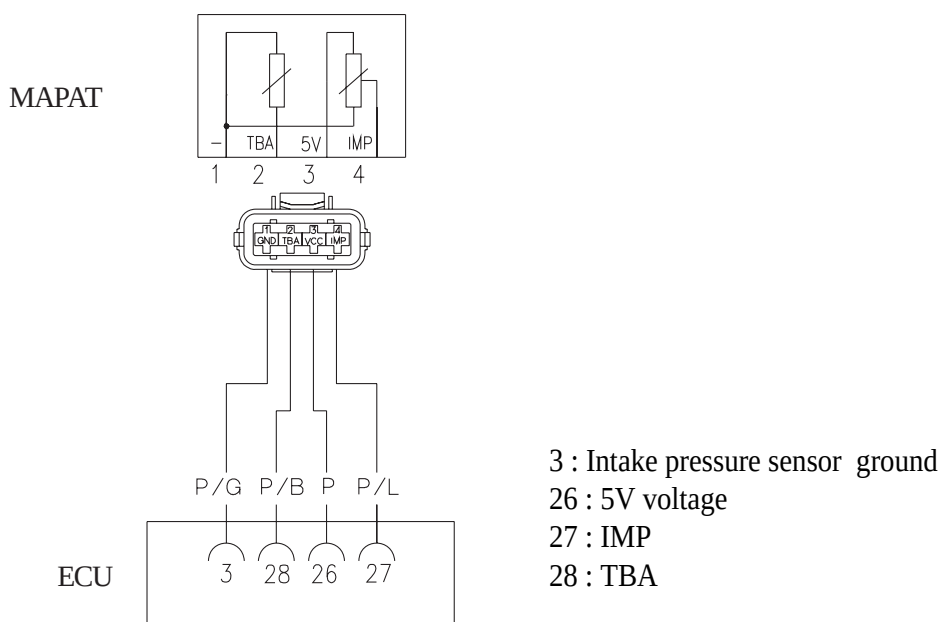


Assemble

- Install in reverse order of removal.

Check the MAPAT Circuit(Intake Pressure Sensor (IMP)+Intake Temperature Sensor(TBA))'s circuit

- Fault code number is displayed by MIL

The Fault code of intake pressure sensor**The Fault code of intake temperature sensor****Checking circuit**

※ Coupler terminal is based on the side of wire-harness

CHECKING PROCEDURE

- 1) Turn off the ignition key .
- 2) Check to see if the MAPAT coupler has come loose or the wire is peeling off.
If there is normal, measured the input 5 voltage of MAPAT's coupler.
- 3) Disassemble the coupler of MAPAT and turn on the ignition key
- 4) Measure the input voltage of MAPAT (intake pressure sensor + intake temperature sensor)'s coupler.
 - Input voltage : 4.5 ~ 5.5[V]
 - Measuring terminal : $\oplus$ MAPAT 3 terminal $\sim \ominus$ MAPAT 1 terminal

※ Remarks : Measuring unit of voltage : voltage [V]

- 5) If voltage value is not normal,
 - Check to see if the ECU coupler is loose or if there is a bad contact.
 - Check the 'P' electric wire, 'P/G' electric wire, 'P/L' to see if they have been broken short-circuited

※ Remark : refer to (5-16) if the intake pressure sensor is broken

refer to (5-16) if the intake temperature sensor is broken

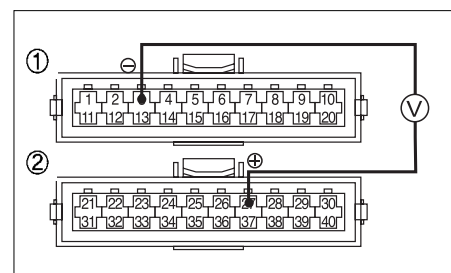
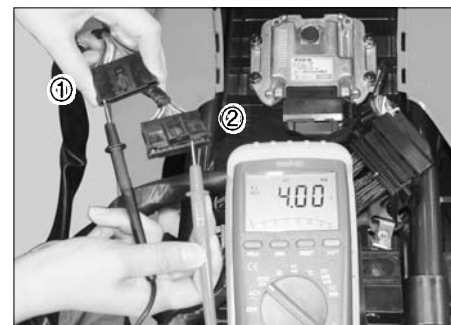
After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11).

CHECKING OF THE INTAKE PRESSURE SENSOR

- 1) If voltage value is normal, turn off the ignition key.
Connect the MAPAT(intake pressure sensor + intake temperature sensor) coupler
- 2) The wire-harness to check the ECU is connected with the ECU with a wire-harness coupler.
Refer to how to assemble or disassemble the ECU (5-32)
- 3) Turn on the ignition key. Start engine and operate idle.
- 4) Measure the voltage of intake pressure sensor for ECU check.
 - Measuring the voltage of intake pressure sensor.
 - Measuring terminal : $\oplus$ ECU No. 27(P/L:PINK/BLUE) $\sim$ $\ominus$ ECU No.3(P/G : PINK/GREEN)
 - Measuring voltage : 0.1[V] $\sim$ 4.8[V]
- ※ Remarks : Measuring unit of voltage : Voltage [V]
 - The voltage of air pressure;
 - 20[kPa]: 0.719 $\sim$ 0.859[V]
 - 107[kPa]: 4.154 $\sim$ 4.294[V]
- 5) If the measured voltage is not normal,
 - Check the 'P' electric wire, 'P/G' electric wire, 'P/L' electric wire to see if they have been broken or have short- circuited.
 - Replace the MAPAT sensor with the new one and it rechecks.



Connecting the wire harness for checking



If measuring voltage is normal,

- Check the 'P' electric wire, 'P/G' electric wire, 'P/L' electric wire to see if they have been broken or have short- circuited if there is a bad contact.
 - badness of terminal No. 3, No. 26, No.27 of ECU coupler.
 - If the electric wire is no problem, ECU is broken.
 - Replace the ECU with the new one, it rechecks.
- 6) After repaired, refer to the fault code removal method to erase the memorized fault code in the ECU.

CHECKING OF INTAKE TEMPERATURE SENSOR

- 1) If voltage value is normal, turn off ignition key.
- 2) Disassemble the MAPAT coupler and measure the resistance of intake temperature sensor.
Resistance of intake pressure sensor : $2000 \pm 100[\Omega]$, $25 \pm 1^{\circ}\text{C}$
Measuring terminal : $\oplus$ ECU No. 28(P/B : PINK/BLUE) $\sim$ $\ominus$ ECU No. 3(P/G : PINK/GROUND)

※ Remarks : Measuring value for resistance : Resistance[Ω]

- The Voltage of air pressure;
- $24 \sim 26[^{\circ}\text{C}]$: $1800 \sim 2200[\Omega]$
- $99 \sim 101[^{\circ}\text{C}]$: $161 \sim 206[\Omega]$

- 3) If measuring resistance is not normal,
 - Replace the MAPAT sensor with new one and it rechecks.

If the measured voltage is normal,

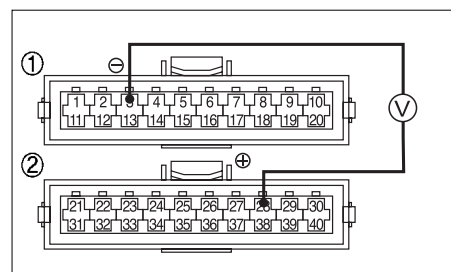
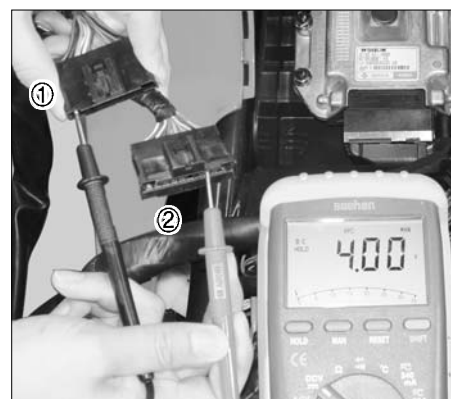
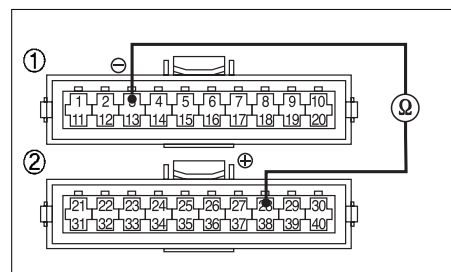
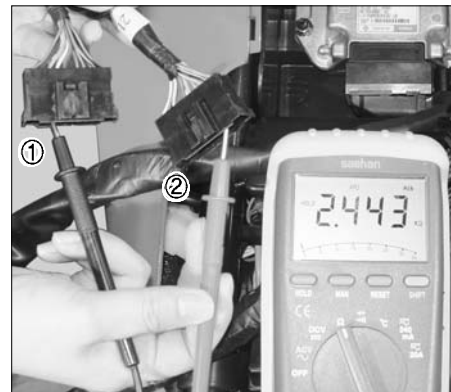
- Check the 'P' electric wire, 'P/G' electric wire, 'P/L' electric wire to see if they have been broken or have short- circuited if there is a bad contact of terminal No. 3, No. 26, No. 27 of ECU coupler.
 - If the electric wire is no problem, ECU is broken.
 - Replace the ECU with the new one, it rechecks.
- 4) Turn on the ignition key. Start the engine and idling.
 - 5) Measure the voltage of intake pressure sensor for ECU check.
 - Measuring the voltage of intake pressure sensor
 - Measuring terminal: $\oplus$ ECU No.28(TBA)
 $\sim$ $\ominus$ ECU No.3(IMP ground)
 - Measuring voltage: $0.1[\text{V}] \sim 4.9[\text{V}]$

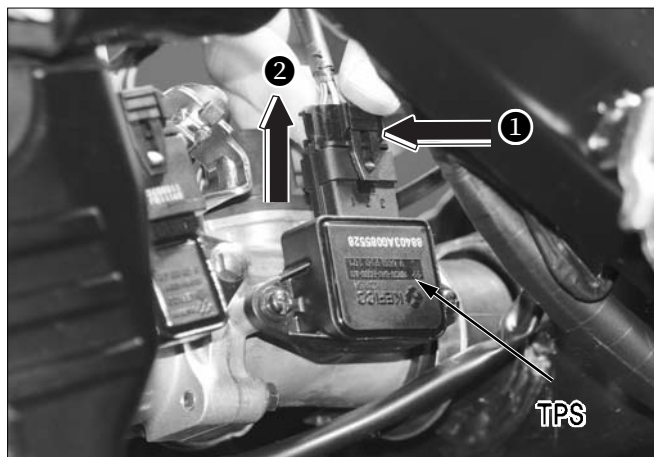
※Remarks : Measuring unit of voltage : Voltage [V]

- 6) If the measured voltage is not normal,
 - Check the 'P' electric wire, 'P/G' electric wire, 'P /L' electric wire to see if they have been broken or have short- circuited.
 - Replace the MAPAT sensor with new one and it rechecks.

If the measured voltage is normal,

- Check the 'P' electric wire, 'P/G' electric wire, 'P/L' electric wire to see if they have been broken or have short- circuited if there is a bad contact of terminal No. 3, No. 26, No.28 of ECU coupler.
 - If the electric wire is no problem, ECU is broken.
 - Replace ECU with the new one, it rechecks.
- 7) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11).





11.TPS(THROTTLE POSITION SENSOR)

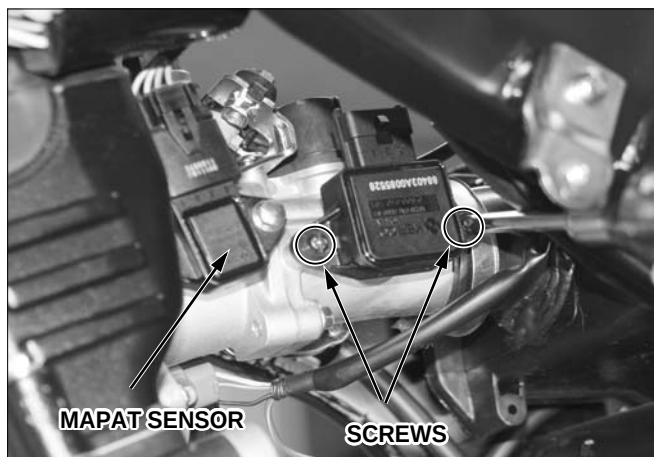
- It is located on the left side of throttle body.

Remove

- Press the TPS coupler then remove it with pulling.

⚠CAUTION

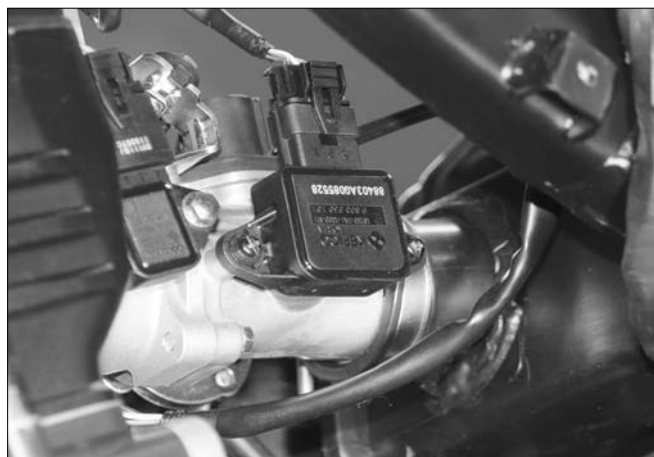
- The key is off before disassembly.



- Remove the TPS screw 2EA



- Remove the TPS

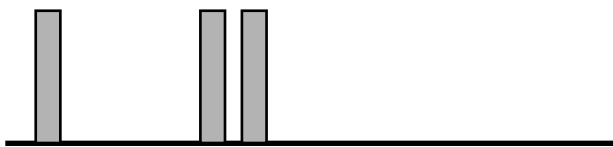
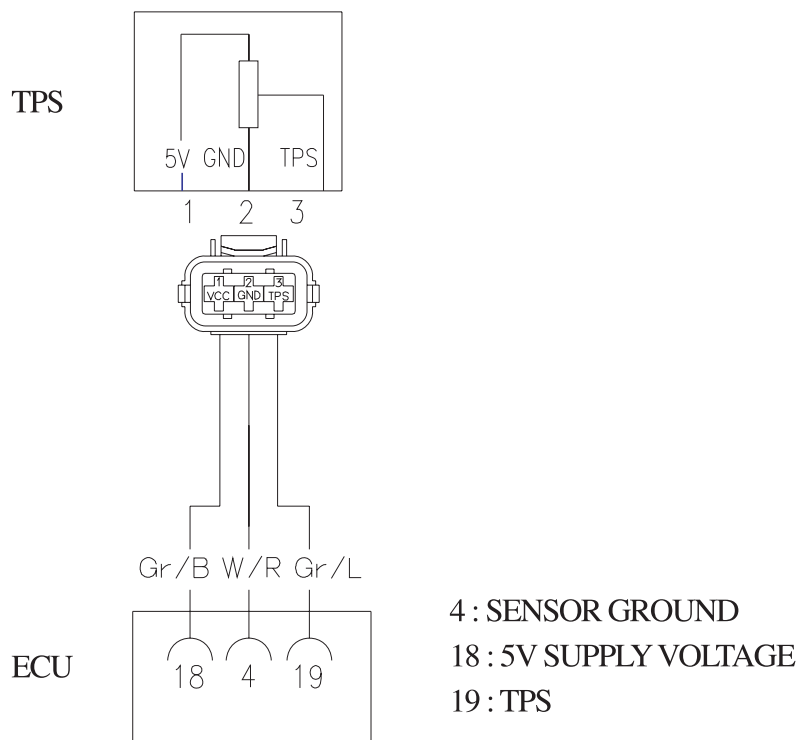


Assemble

- Install in reverse order of removal.

CHECKING THE TPS(Throttle Position Sensor) CIRCUIT DIAGRAM

- Fault code number is displayed by MIL

**Checking circuit**

※ The coupler terminal is based on the side of wire-harness

• Checking Procedure

- 1) Turn off ignition key .
- 2) Check the TPS(Throttle Position Sensor) coupler is loose, or bad.
If there is no defect, measure the input voltage of TPS.
- 3) Disassemble the TPS coupler
- 4) Turn on the ignition key.
 - Input voltage : 4.5 ~ 5.5[V]
 - Measuring terminal : $\oplus$ ECU NO.18(Gr/B : GRAY/BLACK) ~ $\ominus$ ECU NO.4 (W/R : WHITE/RED)

Measure the terminal voltage of TPS's coupler.

Measuring voltage : 4.5[V] ~ 5.5[V]

※ Remarks : Measuring unit of voltage : Voltage [V]

If voltage value is not normal,

- Check to see if the ECU coupler is loose if there is bad contact.
- Check the 'GR/B' electric wire, 'W/R' electric wire, 'GR /L' electric wire to see if they have been broken or have short- circuited.

- 5) If the value of voltage is normal, turn off the ignition key.

• Checking Procedure

6) Check continuity between the Sensor Ground Terminal of TPS and Earth.

The continuity TPS : $0 \sim 1.0[\Omega]$, $20 \pm 1^\circ\text{C}$

Measuring Terminal : $\oplus$ ECU No. 4 (W/R : WHITE/RED) $\sim$ $\ominus$ EARTH

※Remarks : Measuring unit for resistance : Resistance ' R ' [Ω]

7) If not problem, measure the resistance of TPS.

By turning round throttle Lever, measure the resistance.

The resistance of TPS

If the throttle is totally closed : $0.9 \sim 1.6[\text{k}\Omega]$, $20 \pm 1^\circ\text{C}$

If the throttle is totally opened : $2.3 \sim 2.6[\text{k}\Omega]$, $20 \pm 1^\circ\text{C}$

Measuring Terminal : $\oplus$ ECU No. 19 (Gr/L: GRAY/BLUE) $\sim$

$\ominus$ ECU No.4 (W/R : WHITE/RED)

※Remarks : Measuring value of resistance : Resistance[k Ω]

8) If resistance and the continuity are not abnormal.

- Adjust correctly the position of TPS
- Replace the TPS with the new one and re-check.

9) If resistance and continuity are normal, connect the coupler of TPS.

10) Turn on the ignition key.

11) Measure the TPS voltage of the wire-harness to check the ECU.

- Rotate the throttle lever, measure the voltage

Measuring terminal: $\oplus$ ECU No. 19 (Gr/L: GRAY/BLUE) $\sim$

$\ominus$ ECU No.4 (W/R : WHITE/RED)

Output voltage of TPS

-If the throttle is totally closed : $0.1 \sim 0.6[\text{V}]$

-If the throttle is totally opened : $4.0 \sim 5.5 [\text{V}]$

※Remarks : Measuring unit for voltage : Voltage [V]

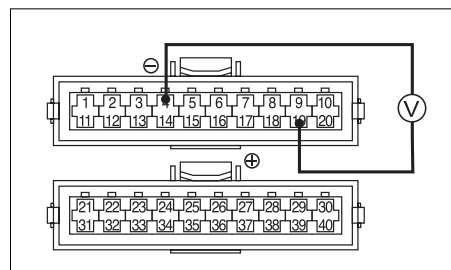
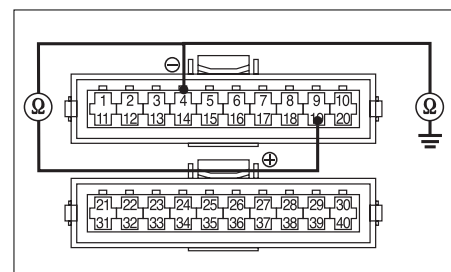
12) If the measured voltage is abnormal,

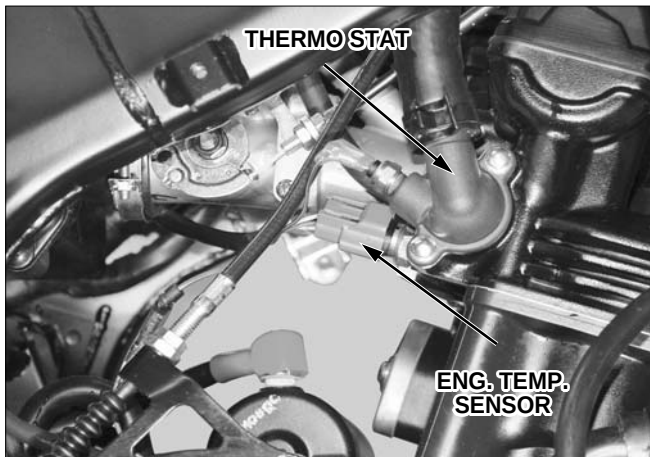
- Replace the TPS with the new one, and re-check.

If the measured voltage is normal,

- Check the 'GR/B' electric wire, 'GR/L' electric wire, 'W/R' electric wire to see if they have been broken or have short- circuited if there is a bad contact of terminal No. 4, No. 18, No. 19 of ECU coupler.
- If there is no problem in wires, ECU has broken down.
- Replace ECU with the new one, and recheck.

13) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11).





12.ETS(ENGINE TEMPERATURE SENSOR)

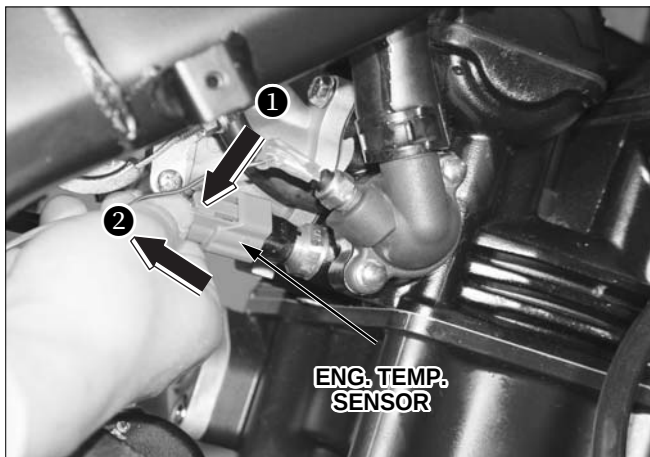
- It is located on the left-hand side of cylinder head.

Remove

- After pressing the ETS coupler and pull it..

⚠CAUTION

- The key is off, before disassembly.



- Remove the ETS coupler.



- Remove the ETS.

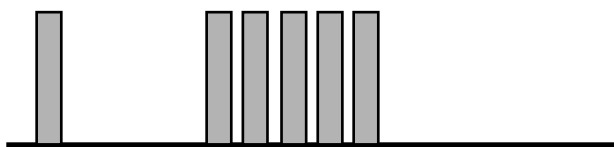


Assemble

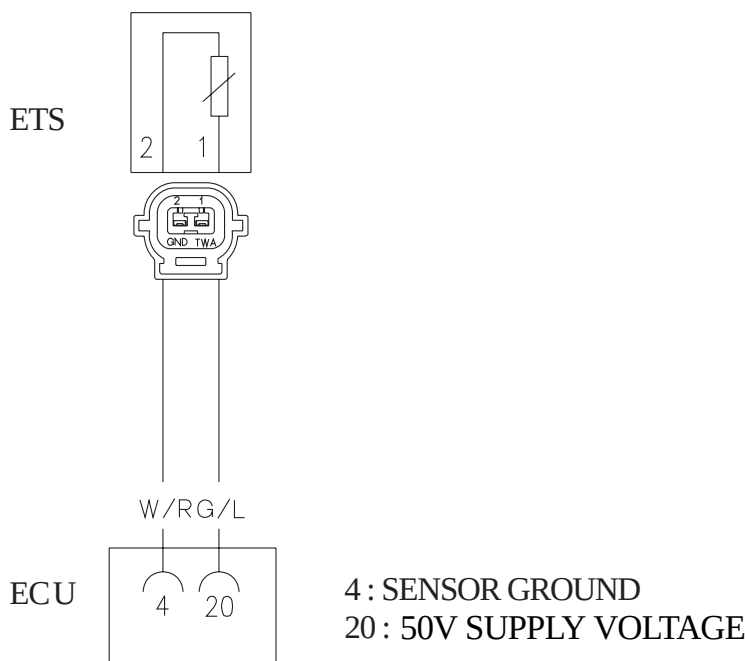
- Install in reverse order of removal.

1)CHECKING THE CIRCUIT DIAGRAM OF ETS(Engine Temperature Sensor)

- Fault code number is displayed by MIL



CHECKING CIRCUIT



※ Coupler terminal is based on the side of wire-harness

• Checking Procedure

- 1) Turn off the ignition key .
- 2) Check to see if the ETS(Throttle Position Sensor) coupler is loose,
If there is no defect, measure the input voltage of ETS.
- 3) Disassemble the coupler of ETS
- 4) Turn on ignition key.
 - Measuring terminal : ⊕ECU No. 20 (Gr/L: GREEN/BLUE)
 - ~ ⊖ECU No.4 (W/R : WHITE/RED)



Measure the terminal voltage of ETS's coupler.

Measuring voltage : 4.5[V] ~ 5.5[V]

※Remarks : Measuring unit for voltage : voltage [V]

If the voltage value is not normal,

- Check to see if the ECU coupler is loose, or bad contact.
 - Check the 'G/L' electric wire, 'W/R' electric wire, 'W/R' electric wire to see if they have been broken or have short- circuited.
- 5) If the voltage value is normal, turn off the ignition key.
 - 6) Disassemble the coupler of ETS, and measure the resistance of ETS.

Resistance of ETS :1.6[kΩ] ~10.6[kΩ],20℃ ~80℃

Measuring terminal : Each terminal of ETS

※Remarks : Measuring unit for resistance : Resistance ' R ' [kΩ]

6-1) If the measured value is not normal,

- Replace the ETS with the new one, recheck.

If the measured value is normal,

- Check the G/L electric wire, W/R electric wire to see if they have been broken or have short-circuited or if the ECU coupler is a bad contact (No.4, No. 20.)
- If the electric wire is no problem, ECU is broken.
- Replace ECU with the new one, recheck.

6-2) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-10).

• Checking Procedure

1) Disassembly

- Disassemble the ETS(Engine Temperature Sensor) : (Refer to 5-27)

2) Check the ETS(Engine Temperature Sensor)

- Connect two terminals of ETS to the probe of the tester and insert even its screw point of ETS into oil.
- Read the temperature of thermometer depending upon oil temperature's change and tester's value.

Characters of ETS

Temperature	Resistance value
20 ℃	10.6[kΩ]~14.4[kΩ]
80 ℃	1.35[kΩ]~1.65[kΩ]
110 ℃	0.57[kΩ]~0.69[kΩ]

Measuring unit of resistance : Resistance ' R '[kΩ]

If the value of resistance is high or out of the standard value, replace the ETS with the new one.

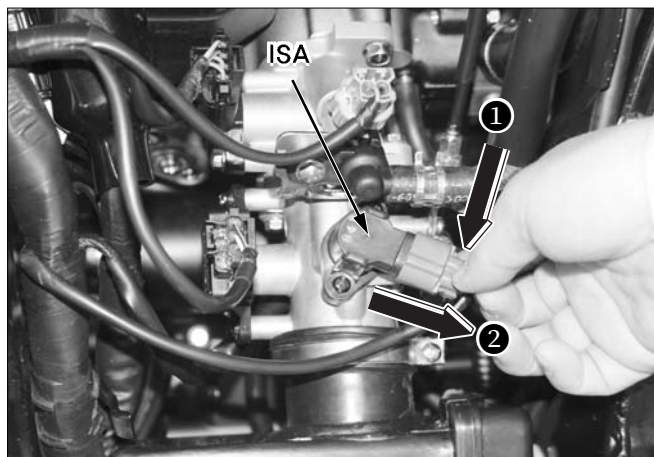
⚠CAUTION

- 1)Be careful do not fell down the ETS, because its weakness.
- 2)Be careful the ETS and the Thermometer do not to touched to oil bowl.
- 3)Be careful oil temperature will not raised more than measurement temperature.

3) Install

- Install in the reverse order of removal with standard torque.

ETS torque : 3.0[kgf • m]



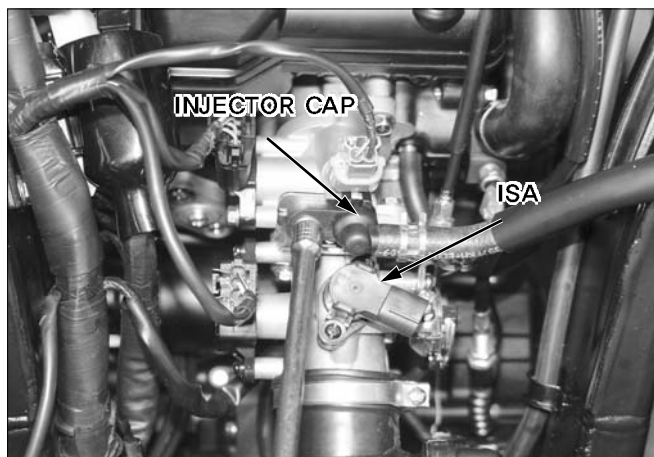
13.ISA(IDLE SPEED ACTUATOR)

Remove

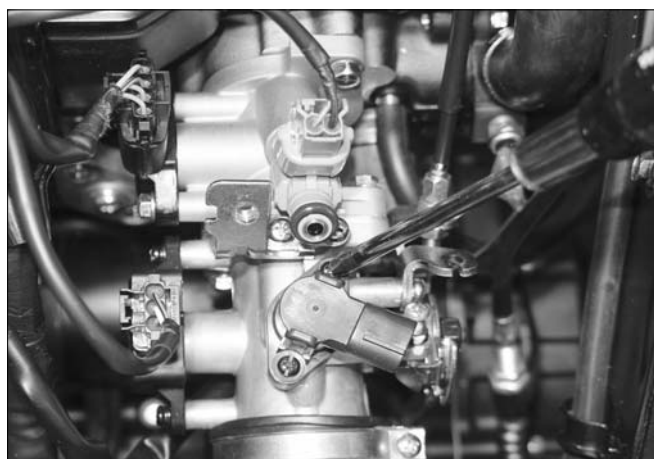
- Remove the ISA coupler

⚠ CAUTION

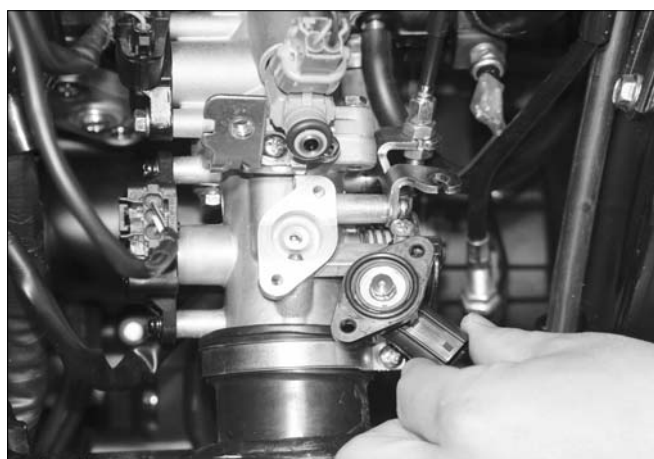
- The key is off, before disassembly.



- Remove the injector cap firstly for dismantling the ISA.



- Remove the ISA screws. (2EA)



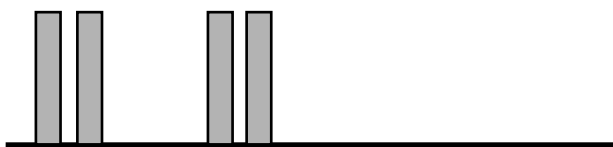
- Remove the ISA.

Assemble

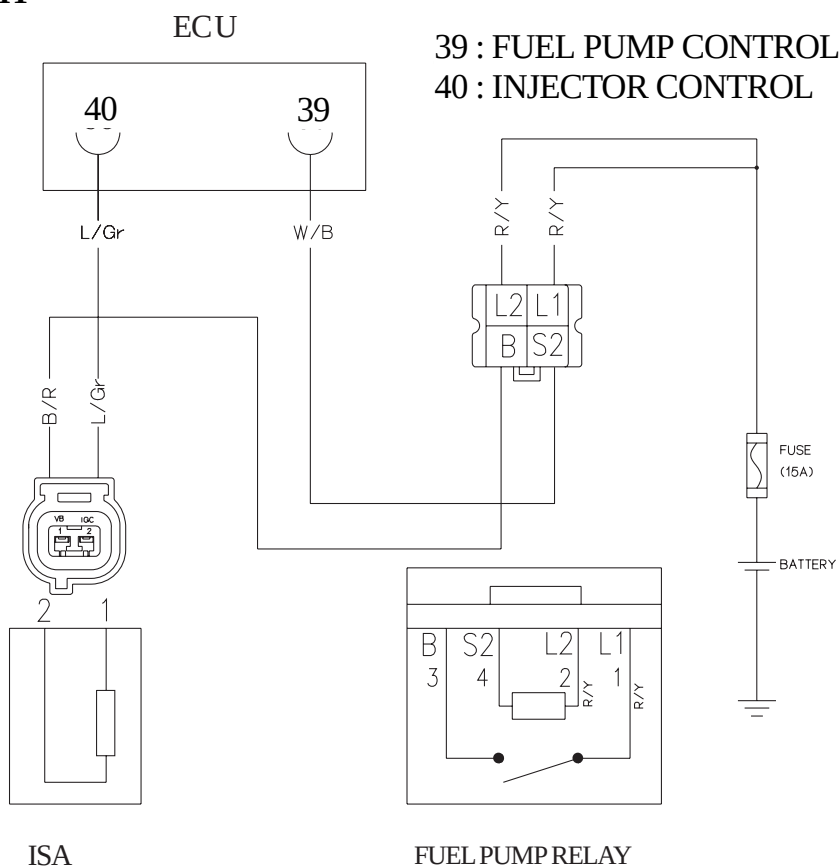
- Install in reverse order of removal.

1)CHECK THE ISA(IDEL SPEED ACTUATOR) CIRCUIT.

- Showing of defects codes by MIL



CHECKING CIRCUIT



※ Coupler terminal is based on the side of the wire-harness

• CHECK PROCEDURE

- 1) Turn off ignition key .
- 2) Check to see if the ISA(Throttle Position Sensor) coupler is loose, or bad.If there is no defect, measure the input voltage of ISA
- 3) Disassemble the coupler of ISA, measure the resistance between ISA terminals.

ISA resistance : 31.5~ 38.5[Ω],20 °C

※ remarks : Measuring unit of resistance : Resistance 'R'[Ω]



- 4) If there is no problem, check about the level of electricity flow between each terminal, and between each ground.

Resistance between each terminal , and between each ground : ∞ [Ω]

If measure resistance value is not normal, replace with the new one

Disassembly and Assembly : refer to (5-28)

※ remarks : Measuring unit for resistance : Resistance 'R'[Ω]

• CHECK PROCEDURE

- 5) If the measured resistance and continuity is abnormal.
 - Replace ISA with the new one, and recheck.
- 6) If resistance and continuity is normal, connect the coupler of ISA.
- 7) Turn on ignition key
- 8) Measure ISA voltage of wire-harness to check ECU.
 - Measuring terminal : $\oplus$ B/R electric wire $\sim$ $\ominus$ EARTH
 - Output voltage of ISA : BATTERY VOLTAGE[V]

※Remarks : Voltage measuring unit : Voltage [V]

If the measured voltage is normal,

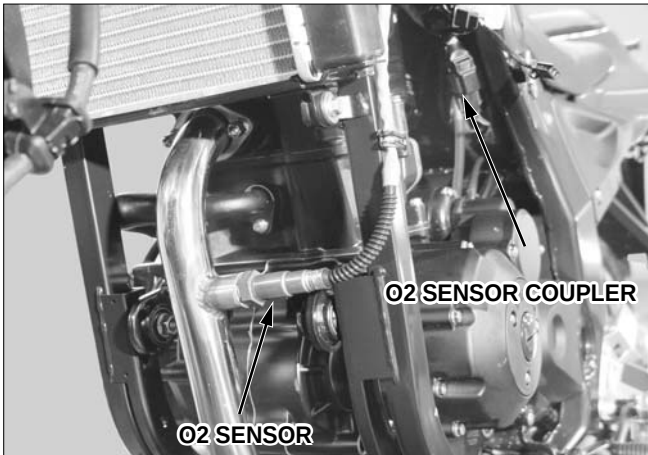
- Check the 'B/R' electric wire, 'L/G' electric wire, 'W/R' electric wire to see if they have been broken or have short-circuited if there is a bad contact of terminal No. 33, No. 39 of ECU coupler.
- If there is no problem in wires, ECU has broken down.
- Replace ECU with the new one, recheck.

If the measured voltage is abnormal,

- Check the 'B/R' electric wire, 'L/G' electric wire, 'W/B' electric wire to see if they have been broken or have short-circuited.

- 9) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11)



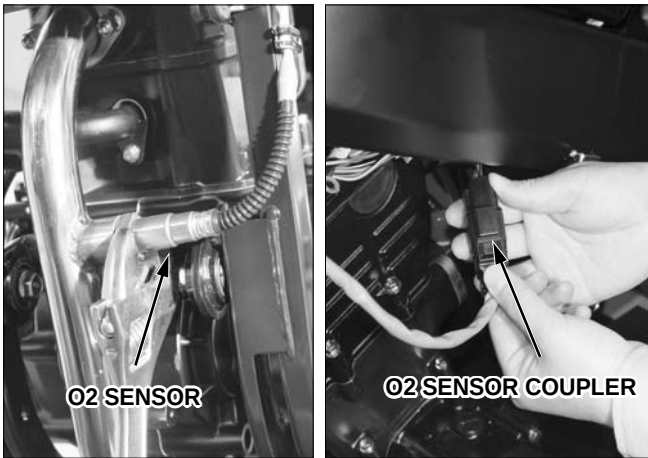


14.O2(Oxygen) SENSOR

- It is located on the exhaust pipe

CAUTION

- The key is off before disassembly.



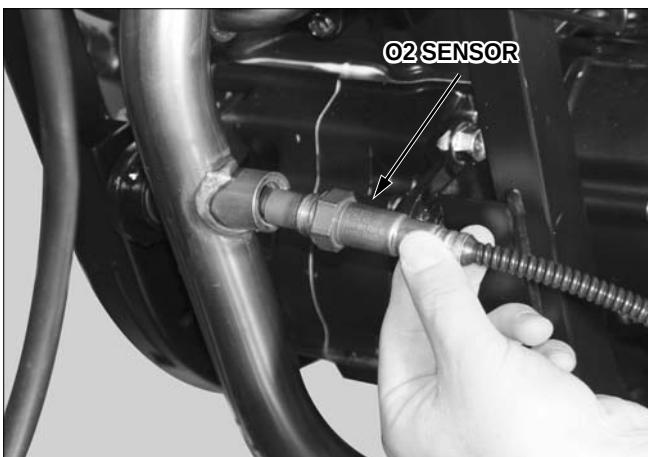
Remove

- Center cowl
- O2 sensor coupler

- Check the O2 sensor.

WARNING

- Handle with care or fragile.

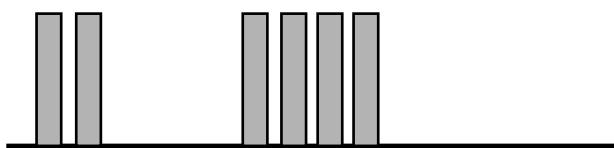


Assemble

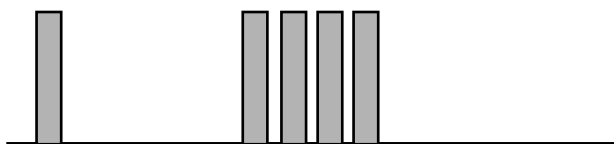
- Install in reverse order of removal.

1) CHECKING OF OXYGEN(O₂) SENSOR CIRCUIT

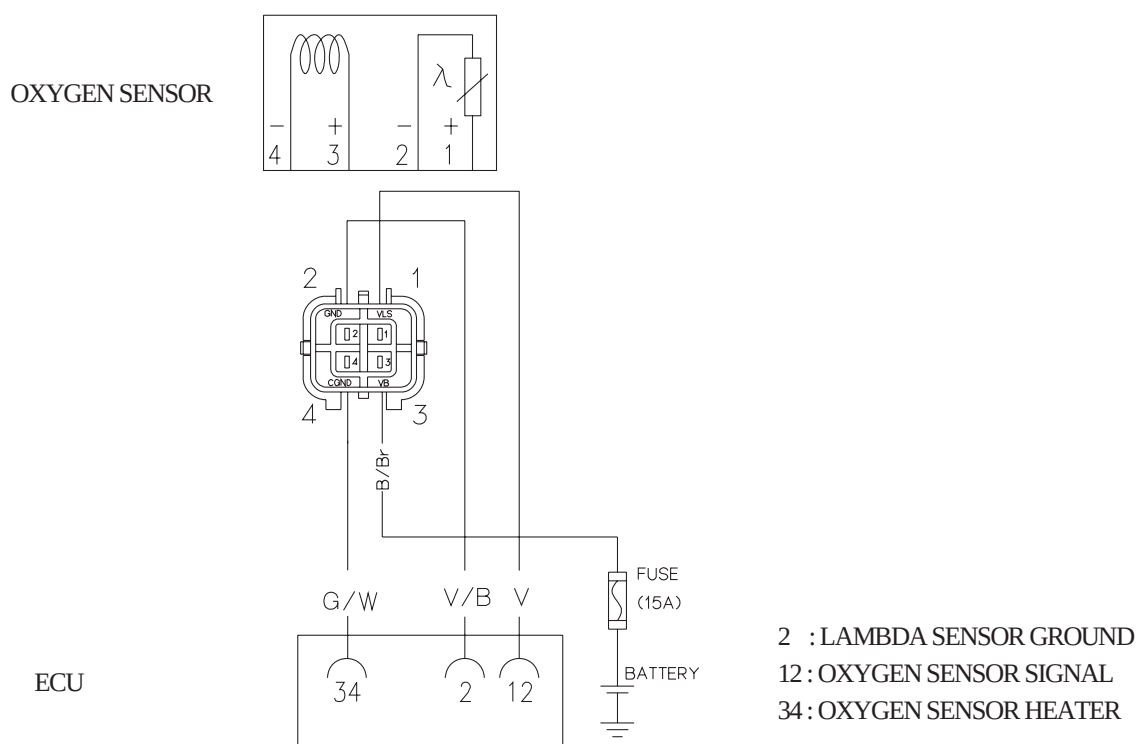
- Fault code number is displayed by MIL



- Fault code number is displayed by MIL of the oxygen(O₂)sensor lambda signal.



CHECKING CIRCUIT



※ Coupler terminal is based on the side of Wire-Harness.

CHECKING FOR A FAULT CODE BY OXYGEN(O₂)SENSOR HEATER

- Turn off the ignition key.
- Check the O₂(oxygen) coupler is loose, or bad.
If there is no defect, measure the input voltage of O₂(oxygen)
- Disassemble the coupler of oxygen(O₂)sensor and turn on ignition key
- Measure input voltage of oxygen(O₂)sensor coupler
 - Input voltage : Battery voltage[V]
 - Measuring terminal (side of Wire-harness) : ⊕oxygen(O₂)3 terminal of sensor coupler (B/BR : BLACK/BROWN) ~ ⊖EARTH

※Remarks : Measuring unit of voltage : Voltage[V]

CHECKING FOR A FAULT CODE BY OXYGEN(O₂)SENSOR HEATER

If the voltage value is abnormal,

- Check to see if the ECU coupler is loose or if there is bad contact.
- Check the 'B/B' electric wire, 'G/W' electric wire to see if they have been broken or have short- circuited.

5) If the voltage value is normal, turn off the ignition key.

- Measure the Resistance of oxygen (O₂) Sensor heater : about 9[Ω], about 22℃
- Measuring terminal (side of wire-harness) : ⊕ oxygen(O₂)4 terminal of sensor coupler (B/BR : BLACK/BROWN) ~ ⊖ ECU No.34(G/W :GREEN/WHITE)

※ Remarks : Measuring unit of Resistance : Resistance 'R'[Ω]

6) If the measured resistance is abnormal,

- Replace the oxygen(O₂)sensor with new one and recheck it.

If the measured resistance is normal,

- Check the 'B/B' electric wire, 'G/W' electric wire to see if they have been broken or have short- circuited.
- If the electric wire is no problem, the ECU is broken.
- Replace the ECU with new one, and recheck it.

CHECKING FOR A FAULT CODE BY OXYGEN(O₂)SENSOR LAMBDA SIGNAL

1) Turn off the ignition key

2) Check the O₂(oxygen) coupler is loose, or bad.

If there is no defect, measure the input voltage of O₂(oxygen)

3) The wire-harness to check the ECU is connected to the ECU with a coupler.
refer to the ECU assembly/disassembly.

4) Turn on the ignition key

5) Measure the oxygen(O₂)sensor voltage of wire harness to check ECU.

- Measuring terminal: ⊕ ECU No.12(V :VIOLET)~ ⊖ ECU No.2(V/B:VIOLET/BLACK)
- Output voltage of oxygen(O₂) sensor : 0.1~0.8[V]

※ Remark : Measuring unit of voltage : Voltage[V]

Assembly of oxygen(O₂)sensor : 4.08 ~ 6.12[kgf • m]

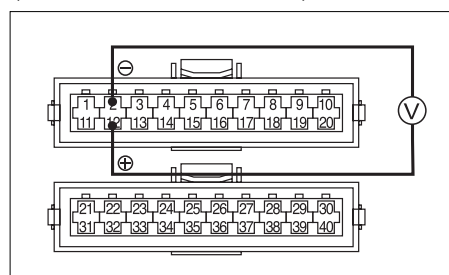
If the measured voltage is normal,

- Check the 'B/R' electric wire, 'V' electric wire, 'V/B' electric wire to see if they have been broken or have short- circuited if there is a bad contact of terminal No. 2, No. 12 of ECU coupler.
- If there is no problem in wires, ECU is broken.
- Replace the ECU with new one, and recheck it.

If the measured voltage is abnormal,

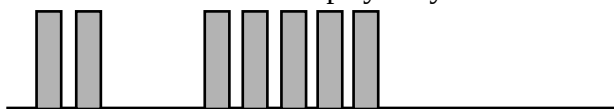
- Check the 'V' electric wire, 'V/B' electric wire, 'W/B' electric wire to see if they have been broken or have short- circuited.

6) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11)

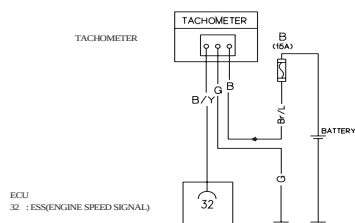


15.CHECKING OF ENGINE SPEED SIGNAL(ESS)CIRCUIT

- Fault code number is displayed by MIL



CHECKING CIRCUIT



※ Coupler terminal is based on the side of Wire-Harness.

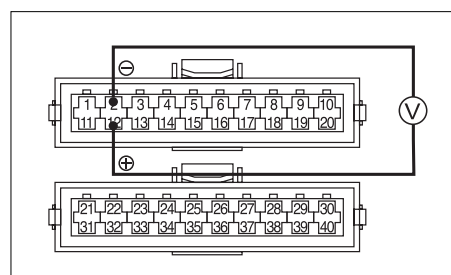
• CHECK PROCEDURE

- 1) Turn off the ignition key.
- 2) Check the ESS coupler is loose, or bad.
If there is no problem, check the resistance of tachometer.
- 3) Check the resistance between each terminals and ground.
 - Measuring terminal: ⊕B electric wire ~ ⊖EARTH,
 - ⊕ ECU NO. 32 (B/Y:BLACK/YELLOW) ~ ⊖EARTH
 - The resistance between each terminals and ground : ∞[Ω]

If the measured resistance value is abnormal, replace the part with new one.

Refer to () for assembly and disassembly

※ Remark : Measuring unit of voltage : Resistance [Ω]



- 4) If the measured resistance and continuity are abnormal,
 - Replace the tachometer with new one, and it rechecks.
- 5) If the resistance and continuity are normal, contact the tachometer coupler.
- 6) Turn on the ignition key.
- 7) Measure the voltage or tachometer of wire harness for ECU check.
 - Measuring terminal: ⊕B electric wire ~ ⊖G electric wire => Output Voltage: battery voltage
 - Measuring terminal: ECU No. 32(B/Y: BLACK/YELLOW) ~ ⊖G electric wire => Output voltage: 9[V]~15[V]
 - Measuring terminal: ECU No. 32(B/Y: BLACK/YELLOW) ~ ⊖G Measuring the output voltage of electric wire, using the PVA(peak voltage adapter) multi-tester tool.

※ Remark : Measuring unit of voltage : Voltage[V]

If the measured voltage is normal,

- Check the 'B/Y' electric wire, 'B' electric wire, 'G' electric wire to see if they have been broken or have short-circuited if there is a bad contact of terminal No. 32 of ECU coupler.
- If there is no problem in wires, ECU has is broken.
- Replace the ECU with new one, and recheck it.

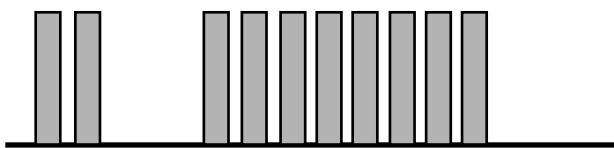
If the measured voltage is abnormal,

- Check the 'B/Y' electric wire, 'B' electric wire, 'G' electric wire to see if they have been broken or have short-circuited.

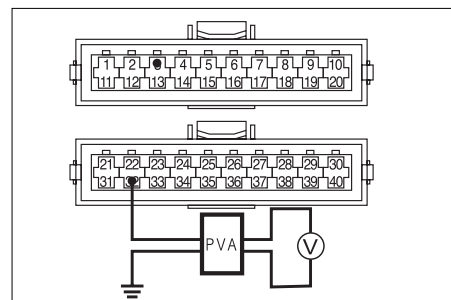
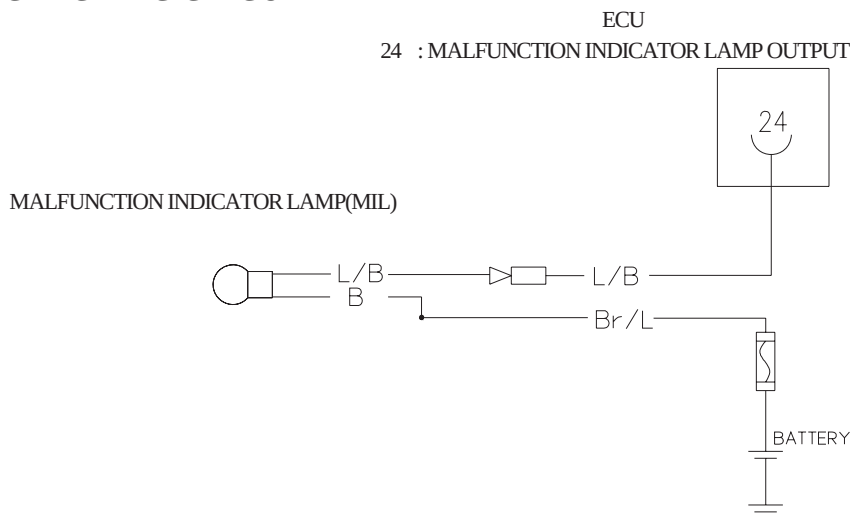
8) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11)

16.CHECKING OF MIL(MALFUNCTION INDICATOR LAMP)CIRCUIT

- Fault code number is displayed by MIL



CHECKING CIRCUIT



• CHECK PROCEDURE

- 1) Turn off ignition key.
- 2) Check the ESS coupler is loose, or bad.
If there is no problem.
- 3) Turn on the ignition key.
- 4) Check the MIL on for 3 seconds when turn on the ignition key at the same time.
 - If there is no lighting, check the Lamp.
 - But If the Lamp is working for 3 second,
- 5) Measure the MIL voltage of wire harness to check ECU.
 - Measuring terminal : ⊕B electric wire ~ ⊖ EARTH => Output Voltage: battery voltage
 - Measuring terminal : ⊕ECU No.24(L/B :BLUE /BLACK) ~ ⊖ EARTH => Output voltage: battery voltage

※Remarks : Measuring unit of voltage : Voltage[V]

If the measured voltage is normal,

- Check the 'L/B' electric wire, 'B' electric wire, 'Br/L' electric wire to see if they have been broken or have short- circuited if there is a bad contact of terminal No. 24 of ECU coupler.
- If there is no problem in wires, ECU has is broken.
- Replace the ECU with new one, and rechecks it.

If the measured voltage is abnormal,

- Check the 'L/B' electric wire, 'B' electric wire, 'Br/L' electric wire to see if they have been broken or have short- circuited.

- 6) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-11)



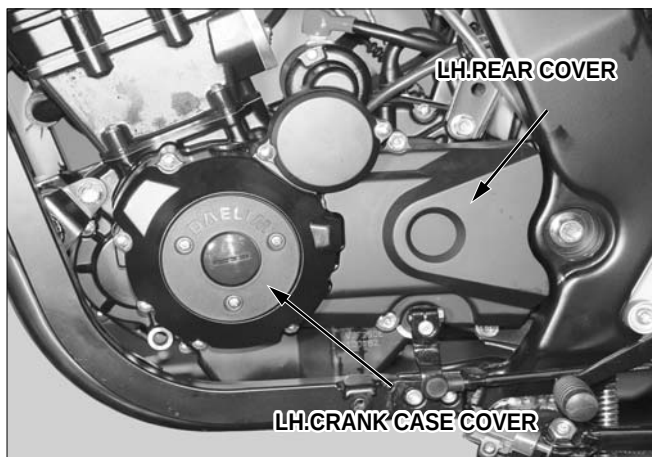
17.CKP(CRANK POSITION SENSOR)

• Remove

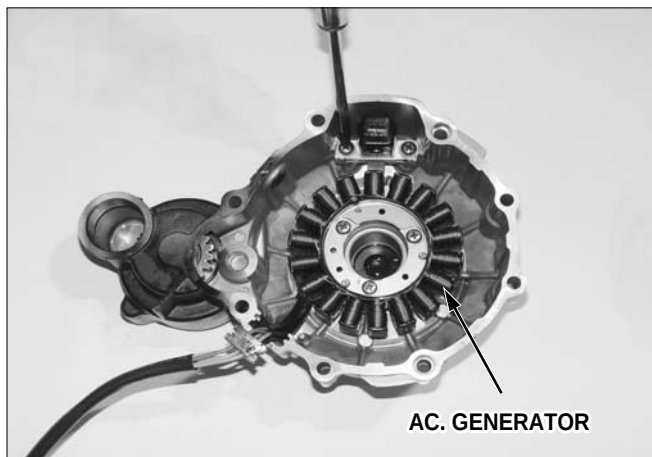
- Remove the LH. side cover.
- Remove the ACG coupler.
- Remove the CKP coupler.

⚠ CAUTION

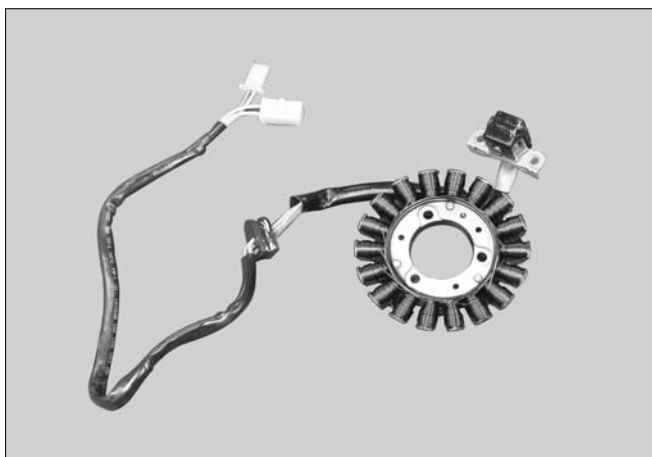
- Before disassembly, the key is off.



- Remove the LH. RR. cover.
- Remove the LH. crank case cover.



- Remove the 3 screws securing ACG stator.
- Remove the 2 screws securing CKP.



- Check the ACG stator and position sensor.
- Take precaution not to use the stator comp (18 terminal) like the carburetor type stator.



- Check the fly wheel.
- Fly wheel for the EMS system have 10 spots on the fly wheel protrusion. It is different with carburetor type.
- Check the mark or contamination on the protrusion.

⚠CAUTION

- When replace the fly wheel, check the 10 spots of protrusion part.



ASSEMBLY

- Assembly is the reverse order of removal.



CHECKING OF CKP(Crank Position Sensor)

MEASUREMENT RESISTANCE

- Remove the LH. side cover.
- Disconnect the ACG coupler and (L/G) connector.
- Measure the resistance between G and L.
STANDARD : 80~150Ω(20°C)

MEASUREMENT PVA

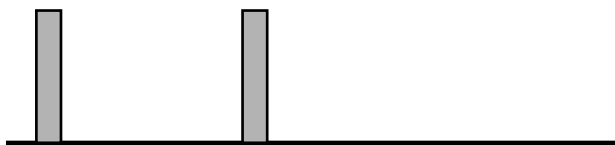
- Disconnect the ACG (L/G) connector.
- Connect the (+)cord of PVA tester to the green terminal or ground wire.
- Connect the (-)cord of PVA tester to the blue terminal.
- Crank the engine with the starter motor and measure the peak voltage of crank position sensor coil.
- HIGHEST VOLTAGE : 1.5V Over.
TOOL : PVA Multy tester.



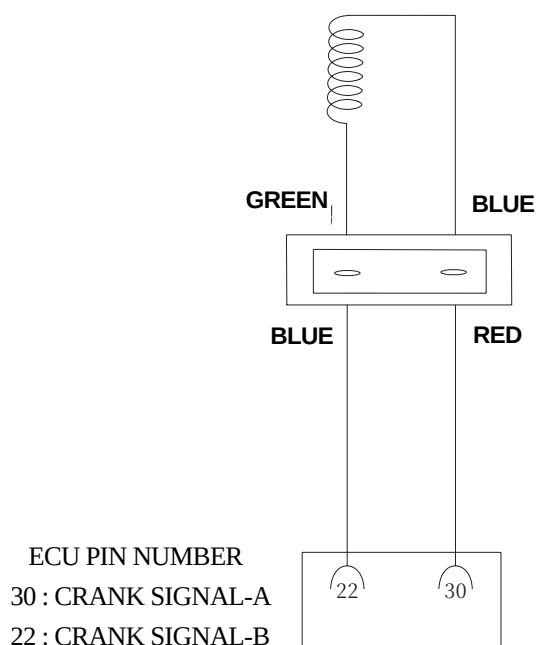
- Assembly is the reverse order of removal.

CHECK THE CIRCUIT OF CKP

- Fault code number is displayed by MIL



CHECKING CIRCUIT

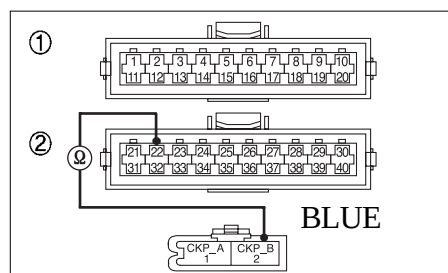
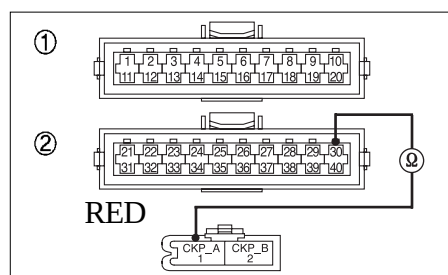


• CHECK PROCEDURE

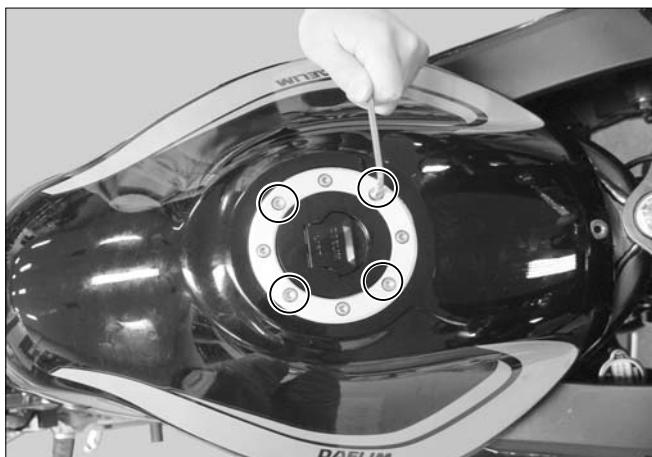
- 1) Turn ON ignition key.
- 2) Check to see if the ENGINE SINK ON is ON or OFF with diagnosis tool.
 - When start up the ENGINE SINK ON change “OFF” to “ON”, it’s okay.
 - Check if ENGINE SINK ON is OFF while start up.
 - Remove the A.C. generator.
 - If there are over 10 spots on the flywheel protrusion, replace it.
 - Check the CKP is working or NOT (metal residue)
- 3) Turn OFF ignition key, check the breaking of A.C GEN CKP.
 - Check the A.C. GEN CKP resistance.
 - measuring resistance : 80 ~ 150[Ω]

4) Check if crank signal A,B wires is breaks or not.

- Remove the ECU, connect wire harness for inspection to wire harness of vehicle.
- Check the wiring of crank signal A
 - Measure terminal : No. 30 pin of wire harness for inspection - Red wire of coupler of CKP.
 - Measuring resistance : 0 ~ 1[Ω]



5) After fault repaired, to erase the memorized fault code in the ECU is refer to how to remove the fault code.(5-11)



18.FUEL PUMP

- It is located inside a fuel tank
- Remove the seat.
- Loosen the washer bolt, 2 flange bolts securing fuel tank.
- Loosen the 4 socket bolts and remove the fuel filler cap.

CAUTION

- The key is off before disassembly.

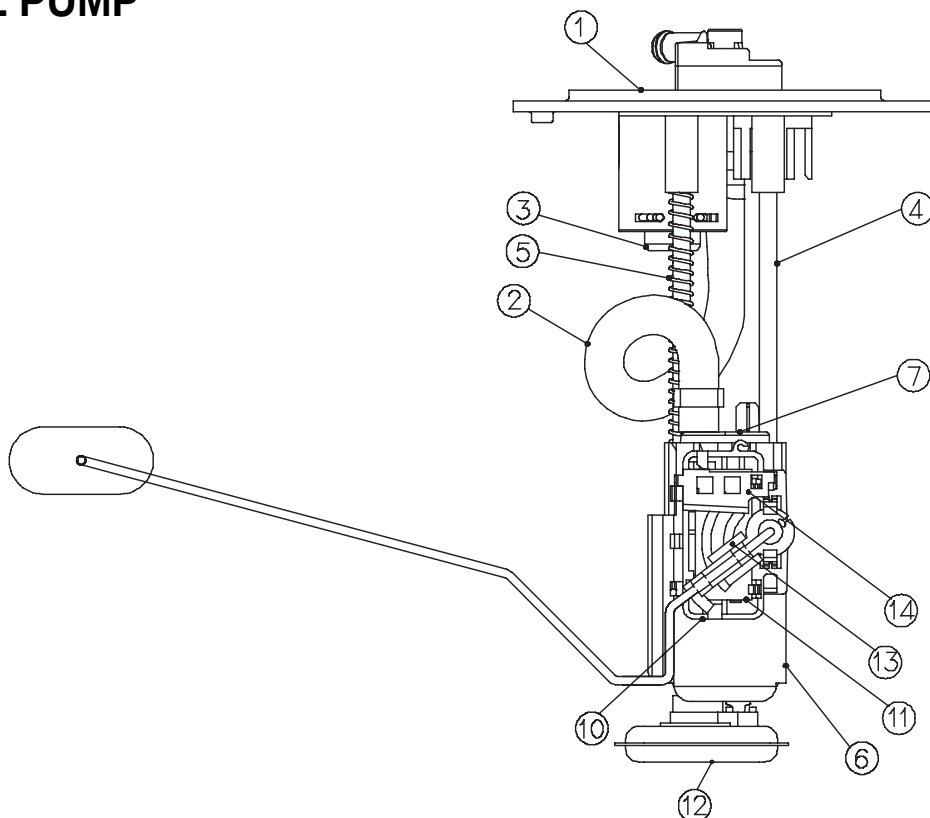


Remove

- Loosen the 2 special screws.
- Remove the tank cover.
- Remove the fuel tube.
- Remove the fuel pump coupler.
- Loosen the 4 special screws and remove the fuel pump setting plate.
- Remove the fuel pump.

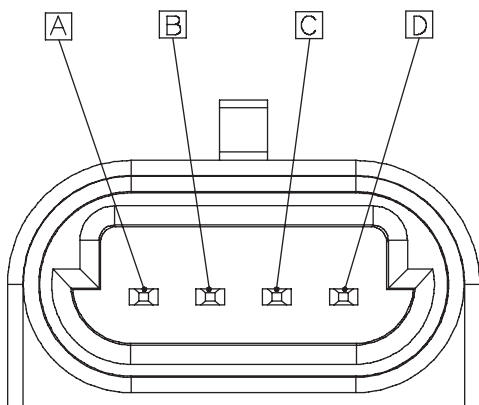


18.FUEL PUMP



NO	PARTS NAME	NO	PARTS NAME
1	FLANGE ASS'Y	8	FLOAT
2	CONVOLUTED HOSE	9	FLOAT WIRE
3	PRESSURE REGULATOR	10	RESISTOR CARD BODY
4	SUPPORT BAR	11	RESISTER CARD
5	SPRING BOTTOM REF	12	PRIMARY STRAINER
6	PUMP RETAINER	13	CONTACT PLATE
7	FUEL PUMP	14	STOPPER

- The terminal arrangement of the fuel pump
(The following color chart is the internal color of the fuel pump)



CONNECTOR WIRING		
LOCATION	FUNCTION	COLOR
A	LEVEL SENDER (UNIT 1)	YELLOW
B	LEVEL SENDER (UNIT 2)	BLUE
C	PUMP (+)	RED
D	GROUND	BLACK

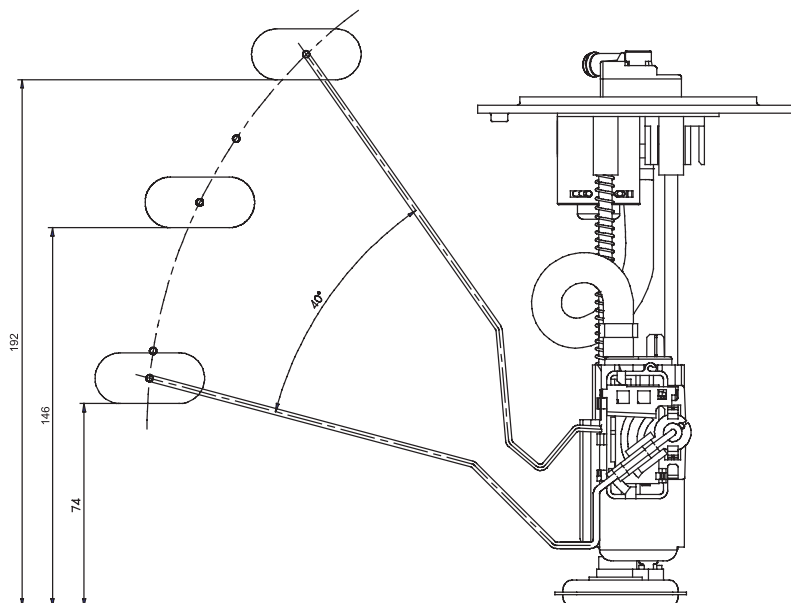
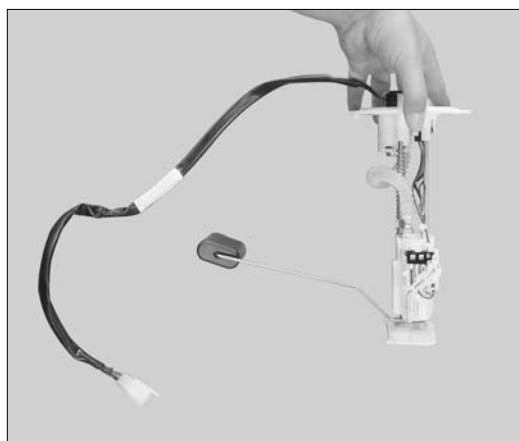
- Check the fuel pump.
- Remove the fuel pump.
- Measure the resistance between terminals.

The FLOAT position	Terminals resistance [Ω]
F : 192[mm]	$30 \pm 5 [\Omega]$
1/2 : 138[mm]	$300 \pm 5 [\Omega]$
E : 74[mm]	$566 \pm 3 [\Omega]$

- The float position is based on tank bottom plate.
- Measure the resistance between Y/W (YELLOW/WHITE) wire and G(GROUND) wire of fuel unit terminal

※ Remark : measuring unit of resistance : resistance[Ω]

- If the measured resistance value is out of standard at float position, replace the fuel unit.



CHECK THE BLOW PRESSURE OF FUEL PUMP

- Blow pressure : 3.8 Bar
- After remove fuel tube from the injector, turn the ignition key ON/OFF 3 times, when the fuel come out about 130cc over, it's Okay.
If under 130cc, check the fuel pump. Replace it if necessary.
(Be sure to the resistance of battery is over 12.6V)

ASSEMBLY

- Assembly is the reverse order of removal.

0. INITIAL SCREEN**01. VEHICLE DIAGNOSIS****02. SOFTWARE EDIT****03. SYSTEM SETUP****04. SCREEN CAPTURE VIEW****19.HOW TO USE SCAN****ECU INITIALIZING**

- The coupler to check the malfunction of vehicle is connected to the coupler of diagnostic tool.
- Turn on the Ignition key.
- Press the power button of the diagnostic tool.
- Press the enter button in the initial screen.
- Press the enter in the vehicle diagnosis screen.

1. VEHICLE DIAGNOSIS**MODEL : CAN COMM.****SYSTEM : ENGINE****01. DIAGNOSTIC TROUBLE CODES****02. CURRENT DATA****03. FLIGHT RECORD****04. ACTUATION TEST****05. RESETTNG ECU VALUES****06. IDENTIFICATION CHECK**

- Press the enter button on the resetting ECU values.

1.5. RESETTNG ECU VALUES

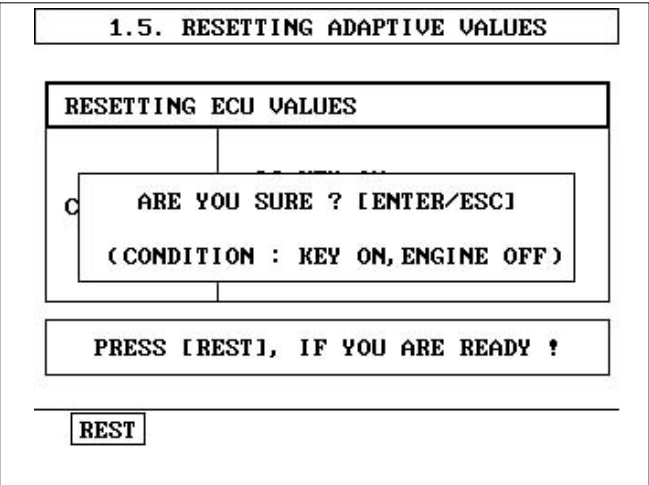
**THIS FUNCTION IS FOR RESETTNG
THE ADAPTIVE VALUES FROM THE
USED ECU WHEN REPLACING IT.**

**IF YOU ARE READY,
PRESS [ENTER] KEY!**

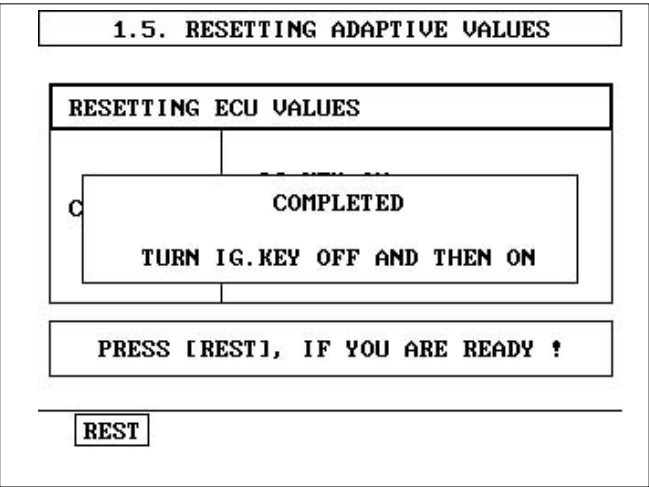
- If the enter-key is press than the ECU will reset.

1.5. RESETTNG ADAPTIVE VALUES**RESETTNG ECU VALUES****CONDITION****IG.KEY ON****ENGINE STOP****PRESS [REST], IF YOU ARE READY ?****REST**

- Press the rest button on the following screen.



- Press the enter button when it is ready



- When the ECU was initialized, turn off the Ignition key and then turn on the ignition key.

0. INITIAL SCREEN

- 01. VEHICLE DIAGNOSIS**
- 02. SOFTWARE EDIT
- 03. SYSTEM SETUP
- 04. SCREEN CAPTURE VIEW

ISA PWM ADJUSTING

- The coupler to check the malfunction of vehicle is connected to the coupler of diagnostic tool.
- Turn the Ignition key on.
- Press the power button of the diagnosis tool.
- Press the enter button on the initial screen.
- Press the button at the vehicle diagnostic screen.

1. VEHICLE DIAGNOSIS

MODEL : CAN COMM.

SYSTEM : ENGINE

- 01. DIAGNOSTIC TROUBLE CODES
- 02. CURRENT DATA**
- 03. FLIGHT RECORD
- 04. ACTUATION TEST
- 05. RESETING ECU VALUES
- 06. IDENTIFICATION CHECK

- Press the enter button on the current data.

1.2 CURRENT DATA 22/26

INJECTION TIME	0.0 mS
START OF INJECTION	-150.°
IGNITION ANGLE	7.5 °
DWELL TIME	6.0 mS
IDLE SPEED ACTUAT. PWM	46.1 %
O2 SENSOR HEATER PWM	0.0 %
FUEL PUMP RELAY	OFF
INDICATION LAMP	OFF

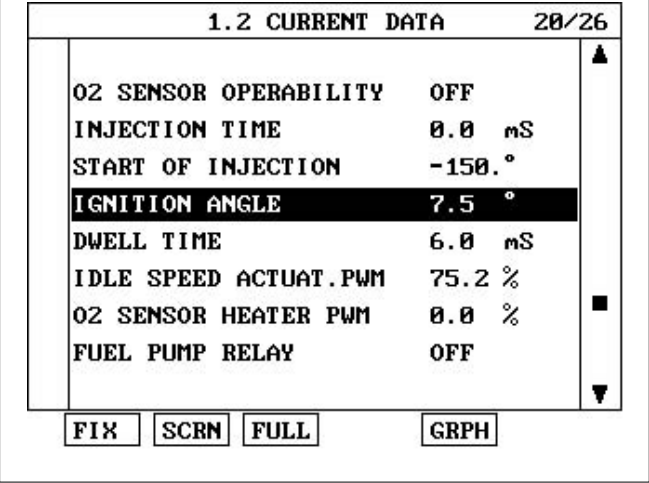
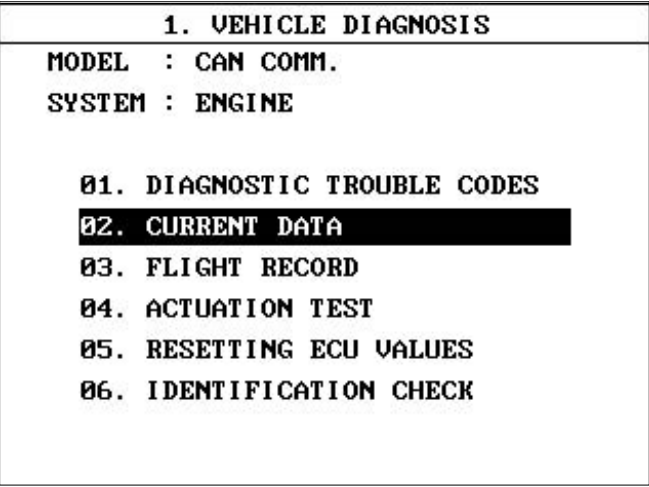
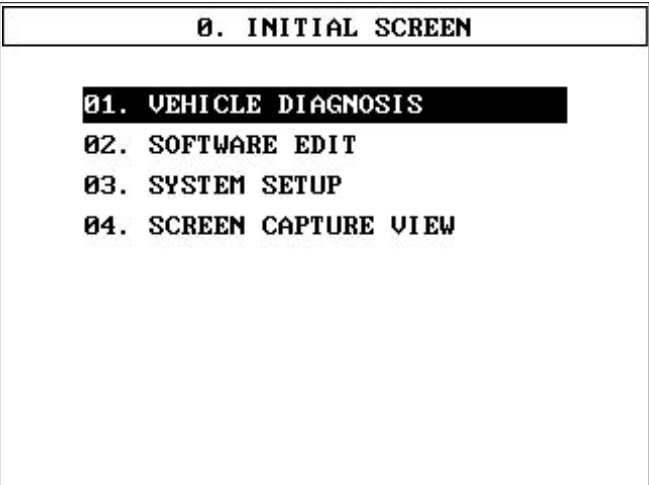
FIX

SCRN

FULL

GRPH

- By looking the displayed figure on the idle speed actuator PWM, adjust the throttle adjust screw. (Refer to 5-41)



IGNITION TIMING CHECK

- The coupler to check the malfunction of vehicle is connected to the coupler of diagnostic tool.
- Turn the Ignition key on.
- Press the power button of the diagnosis tool.
- Press the enter button on the initial screen.
- Press the enter button on the vehicle diagnosis screen.

- Press the enter button on the current data.

- To check the ignition angle

0. INITIAL SCREEN

- 01. VEHICLE DIAGNOSIS**
- 02. SOFTWARE EDIT
- 03. SYSTEM SETUP
- 04. SCREEN CAPTURE VIEW

ENGINE RPM CHECK

- The coupler to check the malfunction of vehicle is connected to the coupler of diagnostic tool.
- Start the engine.
- Press the power button of the diagnosis tool.
- Press the enter button on the initial screen.
- Press the enter button on the vehicle diagnosis screen.

1. VEHICLE DIAGNOSIS

MODEL : CAN COMM.

SYSTEM : ENGINE

- 01. DIAGNOSTIC TROUBLE CODES
- 02. CURRENT DATA**
- 03. FLIGHT RECORD
- 04. ACTUATION TEST
- 05. RESETING ECU VALUES
- 06. IDENTIFICATION CHECK

- Press the enter button on the current data.

1.2 CURRENT DATA 01/26

ENGINE SPEED	0 rpm
ENGINE IDLE TARGET RPM	1825 rpm
TPS	100.0%
TPS ADAPTATION	20.2 %
ENGINE TEMPERATURE	26.3 °C
BATTERY	12.1 V
BREATHING AIR TEMP.	27.0 °C
INT.MANIFOLD PRESSURE	1007.hPa

FIX

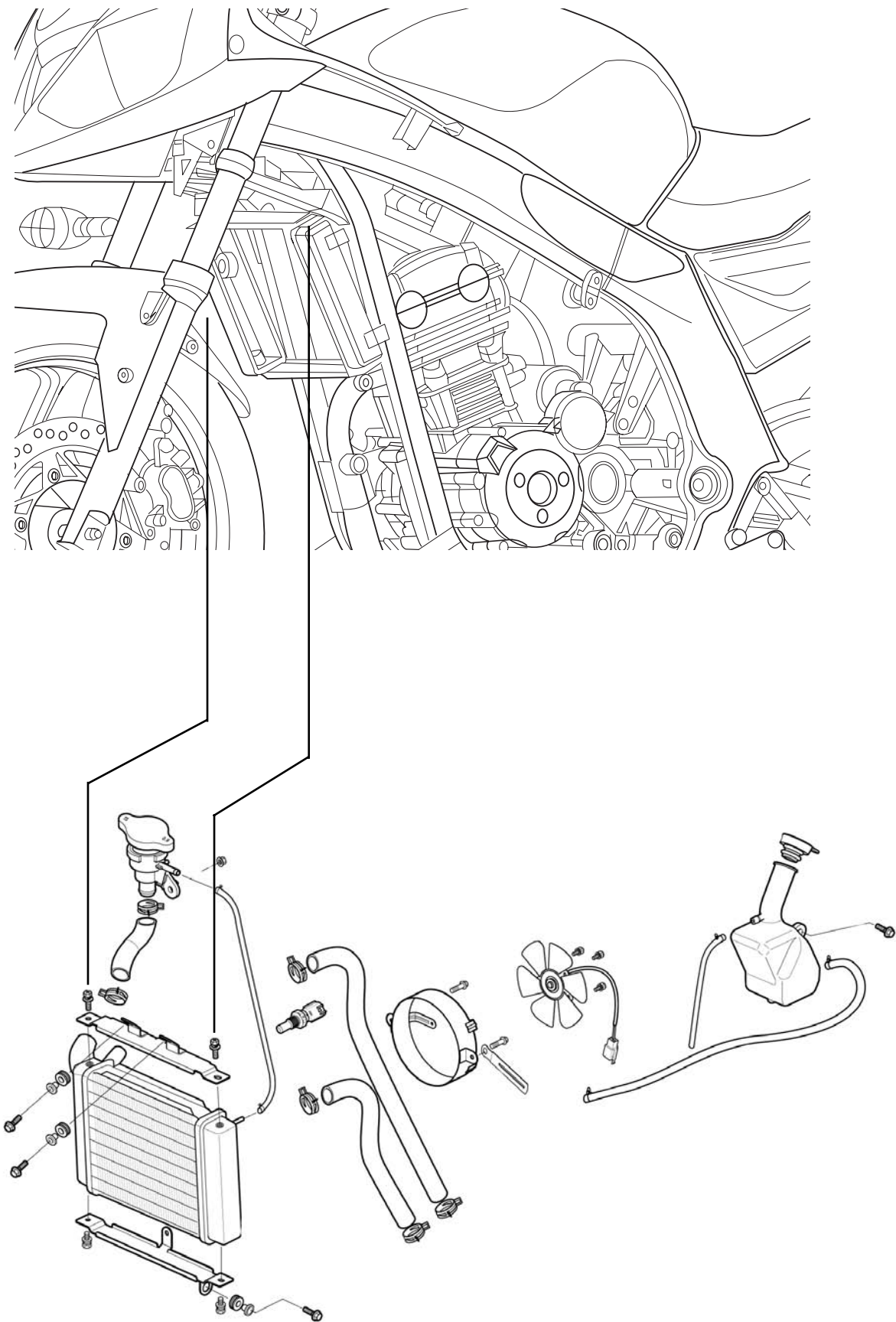
SCRN

FULL

GRPH

- Check the engine rpm on the engine speed

COOLING SYSTEM



6. COOLING SYSTEM

SERVICE INFORMATION 6-1
STROUBLESHOOTING 6-2
COOLANT 6-3
COOLING SYSTEM INSPECTION . 6-3
COOLING SYSTEM TEST 6-4
RADIATOR 6-4

RADIATOR DISASSEMBLY . 6-5
CHECK THERMOSTATIC SWITCH . 6-6
RADIATOR INSTALLATION . 6-6
WATER PUMP 6-7
TERMOSENSOR 6-10
THERMOSTATIC 6-10

SERVICE INFORMATION

NOTE

- Do not remove the radiator cap if the coolant temperature is over 100°C.
 - It is very dangerous removing the cap while the engine is hot and the coolant is under pressure may cause serious scalding.
 - When the temperature is below, carefully remove the cap with a cloth.
 - Cooling system service should be done while the engine is cool.
 - Radiator coolant is toxic. Keep it away from skin, eyes and clothes.
 - If any coolant gets on your skin or clothes, rinse thoroughly with soap and water.
 - If any coolant gets in your eyes, rinse them with water and consults a doctor immediately.
 - If any coolant is swallowed, induce vomiting, gargle and consult a physician immediately.
 - Especially pay attention to reserve the coolant. Keep out of reach of children.
-
- Do not remove the radiator cap, except to refill or drain the cooling system after servicing the cooling system.
 - Avoid spilling coolant on painted surfaces, if contaminated, do wash in water immediately.
 - After disassembling or servicing the cooling system, check for leaks with a radiator cap tester.(sale at a market)

SPECIFICATIONS

RADIATOR CAP RELIEF PRESSURE		0.9±0.1kg/cm ²	
THERMOSTAT TEMPERATURE	BEGIN TO OPEN	80±2°C	
	FULLY OPEN	90±3°C	
	VALVE LIFT	3.5~4.5mm	
COOLANT CAPACITY		Full : 1,100cc Exchange : 1,000cc	RESERVE TANK : 280±20cc

TORQUE VALUE

WATER PUMP IMPELLER 1.0~1.4kgf · m
WATER PUMP COVER BOLT 0.8~1.2kgf · m

TROUBLESHOOTING

Engine temperature too high

- Faulty temperature gauge or thermo sensor
- Air in cooling system
- Faulty thermostat stuck (Thermostat stuck closed)
- Passages blocked in radiator, hoses or water jacket
- Faulty fan motor switch
- Faulty water pump

Engine temperature too low or unstable

- Faulty temperature gauge or thermo sensor
- Faulty thermostat stuck (Thermostat stuck open)
- Faulty fan motor switch

Coolant leaks

- Faulty water pump mechanical seal
- Damaged or deteriorated O-rings
- Faulty radiator cap
- Damaged or deteriorated gasket
- Loose hose connection or clamp

COOLANT

COOLANT INSPECTION

- Radiator coolant mixes the distilled water.
- Standard consistently : 30~50%

NOTE

- Coolant mixes the light water and radiator liquid about 5°C of tolerance in respect to the minimum temperature.

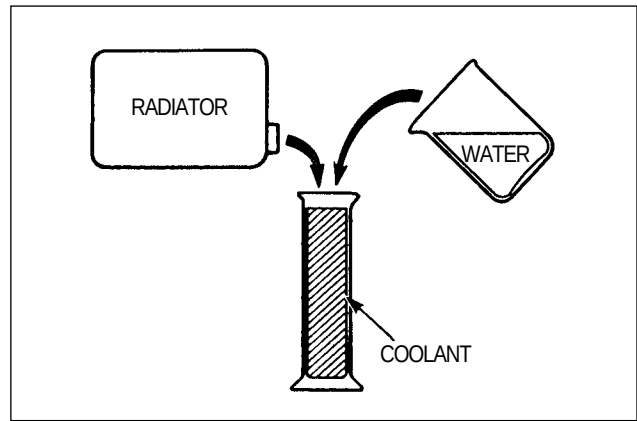
WARNING

- Radiator coolant is toxic. Keep it away from skin, eyes and clothes.
 - If any coolant gets on your skin or clothes, rinse thoroughly with soap and water.
 - If any coolant gets in your eyes, rinse them with water and consults a doctor immediately.
 - If any coolant is swallowed, induce vomiting, gargle and consult a physician immediately.
 - Especially pay attention to reserve the coolant. Keep out of reach of children.

COOLING SYSTEM INSPECTION SPECIFIC GRAVITY TEST OF COOLANT

NOTE

- Follow the hydrometer manufacturer's instructions.
- Check the coolant specific gravity using a hydrometer.
- Check the contamination of the coolant.

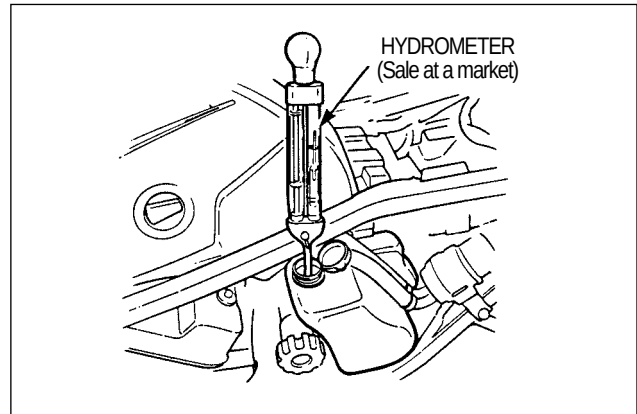


RADIATOR COOLANT MIXTURE CHART (ANTICORROSIVE AND ANTIFREEZE)

When the whole capacity of coolant is 2000cc

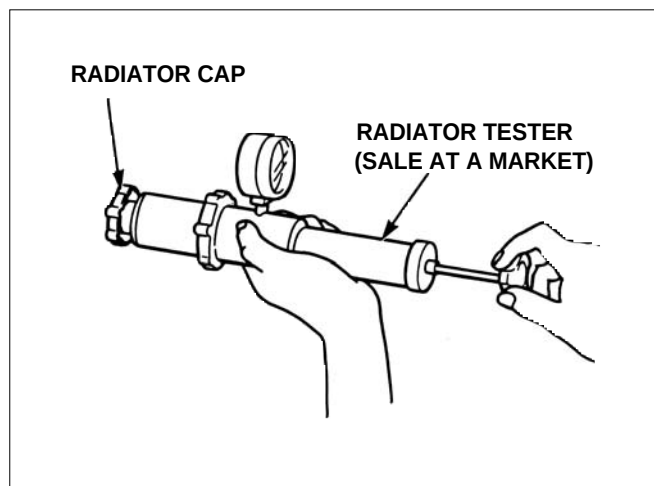
(Unit:cc)

Minimum temperature	Mixture	Ratio	Distilled water
-9°C	20%	400	1,600
-16°C	30%	600	1,400
-25°C	40%	800	1,200
-37°C	50%	1,000	1,000
-44.5°C	60%	1,100	900



COOLANT GRAVITY CHART

COOLANT RATIO%	0	5	10	15	20	25	30	35	40	45	50
5	1.009	1.009	1.008	1.009	1.007	1.006	1.005	1.003	1.001	0.999	0.997
10	1.018	1.017	1.017	1.016	1.015	1.014	1.013	1.011	1.009	1.007	1.005
15	1.028	1.027	1.026	1.025	1.024	1.022	1.020	1.018	1.016	1.014	1.012
20	1.036	1.035	1.034	1.033	1.031	1.029	1.027	1.025	1.023	1.021	1.019
25	1.045	1.044	1.043	1.042	1.040	1.038	1.036	1.034	1.031	1.028	1.025
30	1.053	1.052	1.051	1.049	1.047	1.045	1.043	1.041	1.038	1.035	1.032
35	1.063	1.062	1.060	1.058	1.056	1.054	1.052	1.049	1.046	1.043	1.040
40	1.072	1.070	1.068	1.066	1.064	1.062	1.059	1.056	1.053	1.050	1.047
45	1.080	1.078	1.076	1.074	1.072	1.069	1.066	1.063	1.060	1.057	1.054
50	1.086	1.084	1.082	1.080	1.077	1.074	1.071	1.068	1.065	1.062	1.059
55	1.095	1.093	1.091	1.088	1.085	1.082	1.079	1.076	1.073	1.070	1.067
60	1.100	1.098	1.095	1.092	1.089	1.086	1.083	1.080	1.077	1.074	1.071



COOLING SYSTEM TEST

- Install the radiator cap onto the radiator tester.
- Press it with specified pressure and it must keep the pressure for at least six seconds.

NOTE

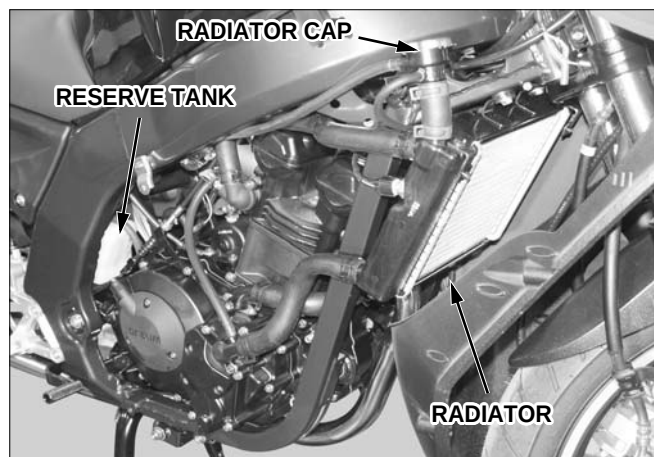
- Apply water to the cap sealing surface before the test.

Radiator Cap Relief Pressure : $0.9 \pm 0.15 \text{ kg/cm}^2$

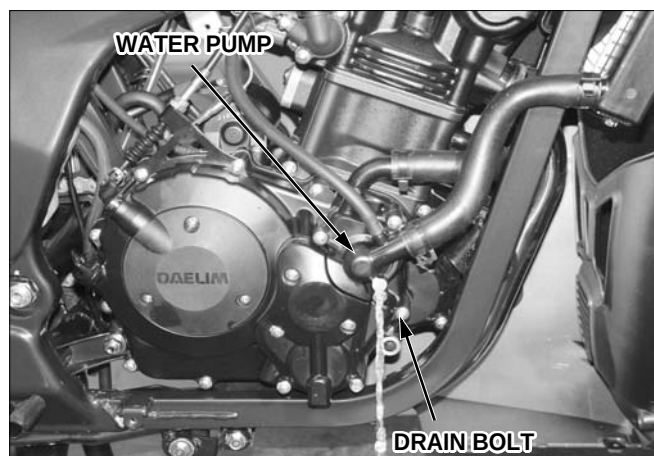


RADIATOR INSPECTION

- Remove the center cowl and side cowl.
- Remove the RH. side cowl.

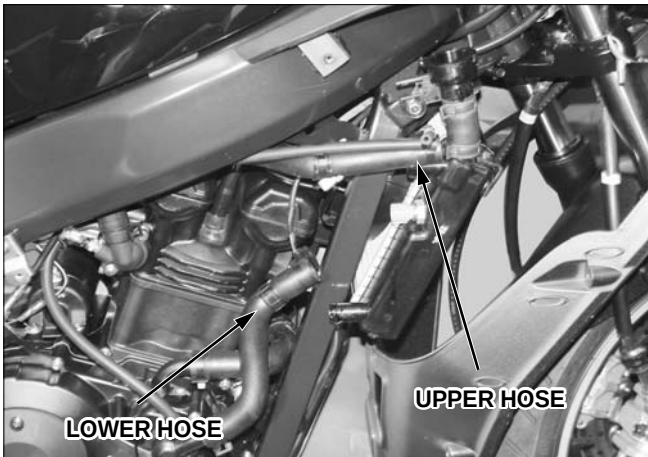


- Inspect the radiator soldered joints and shims for leaks.
- Blow dirt out from between core fins with compressed air.

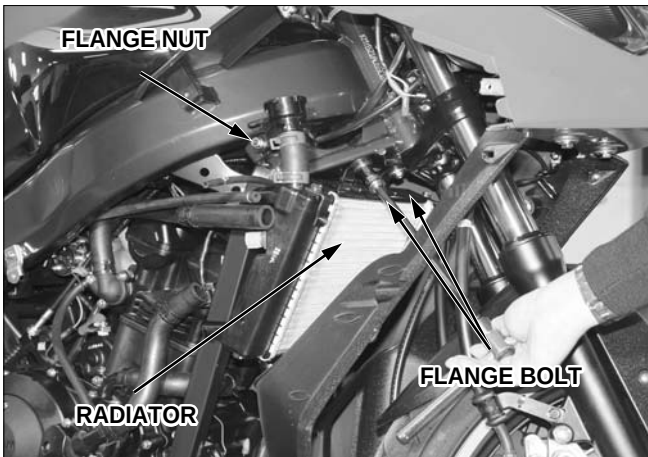


REMOVAL

- Remove the radiator cap.
- Drain the coolant.
- Disconnect the air vent tube from the radiator filler.
- Remove the overflow tube clamp and disconnect the overflow tube.



- Loosen the hose band and disconnect the upper hose and lower hose from the radiator.
- Disconnect the thermostatic switch wire coupler.
- Disconnect the fan motor wire coupler.

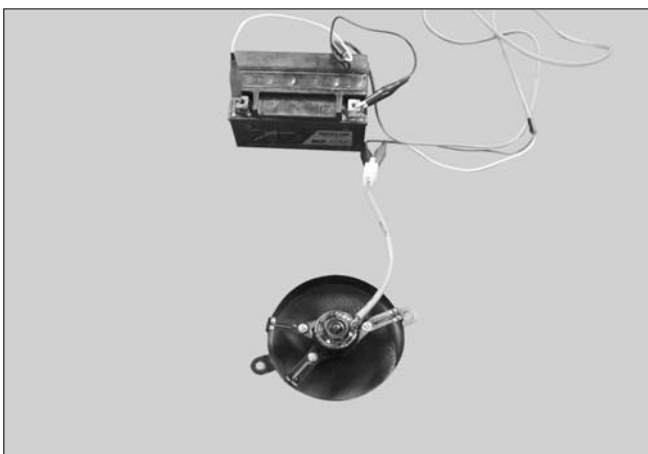


- Remove 2 bolts and 1 nut on the radiator.

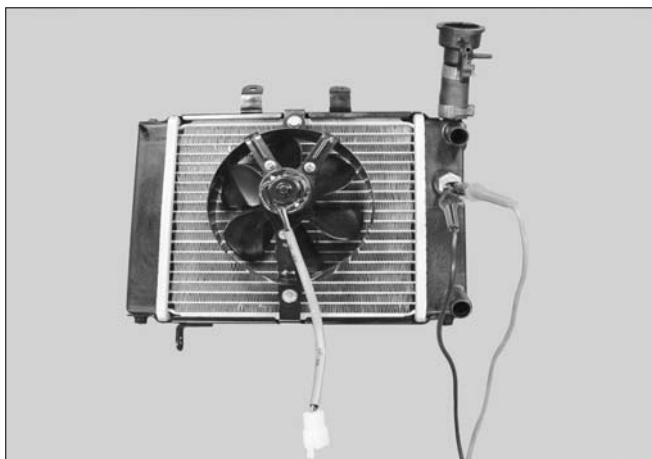


REMOVAL

- Remove 3 bolts and then remove the fan/shroud from the radiator.



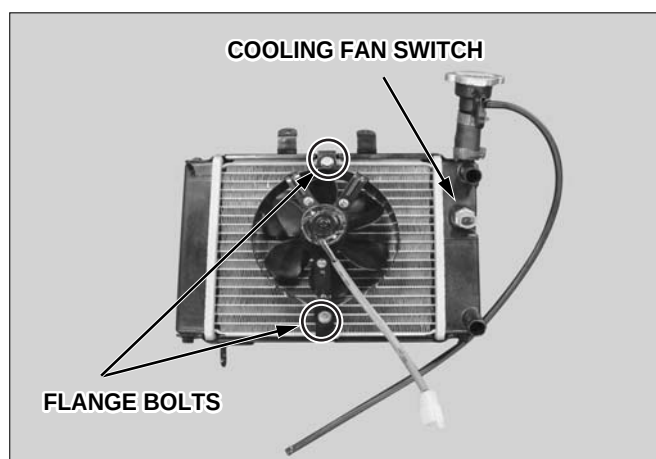
- Connect the fan motor wire to battery.
- Check the fan rotate well.



CHECK THERMOSTATIC SWITCH

REMOVAL

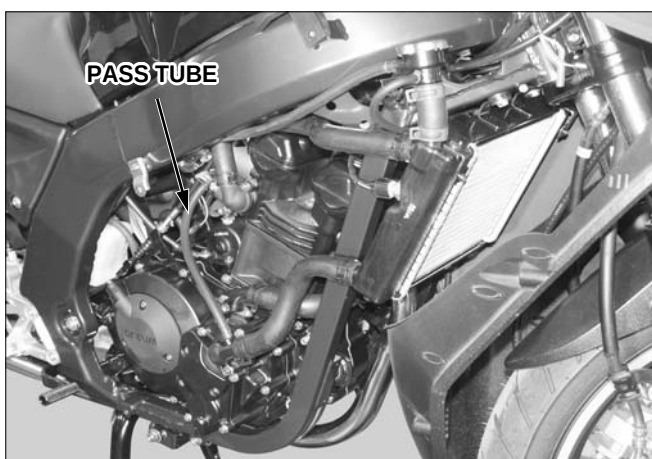
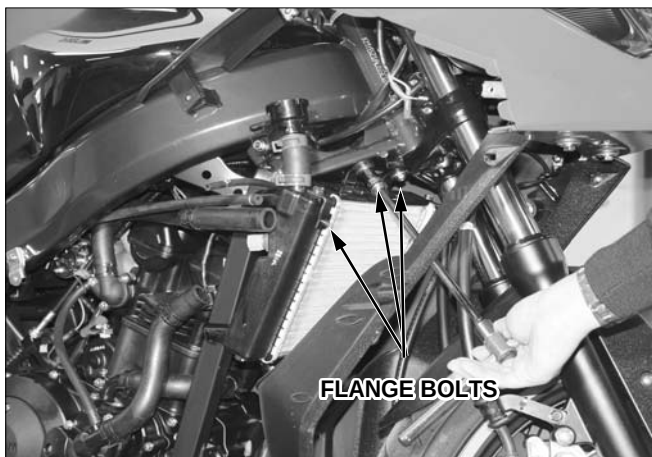
- When coolant temperature is lower than 83~87°C the thermostatic switch OFF.
- When coolant temperature is over 88~92°C the thermostatic switch ON.



- Install the fan shroud on the radiator with the 2 bolts.

RADIATOR INSTALLATION

- Install the radiator on the radiator bracket with the 2 bolts and 1 nut.



- Connect the upper and lower hoses and tighten securely them with hose bands.
- Assemble the pass tube.
- Connect the thermostatic switch wire and fan motor wire coupler.



- Connect the overflow tube and tighten it securely with the tube clamp.
- Fill the radiator with coolant.
- Connect the vent tube to the radiator filler.
- After installation, check for coolant leaks.

NOTE

- The coolant must be filled up to the inlet.

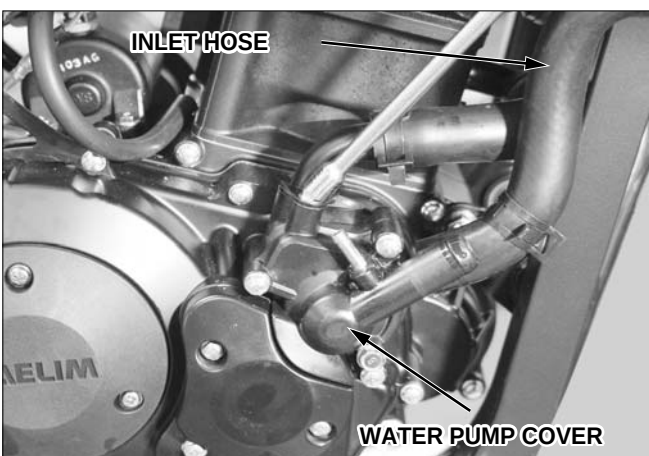
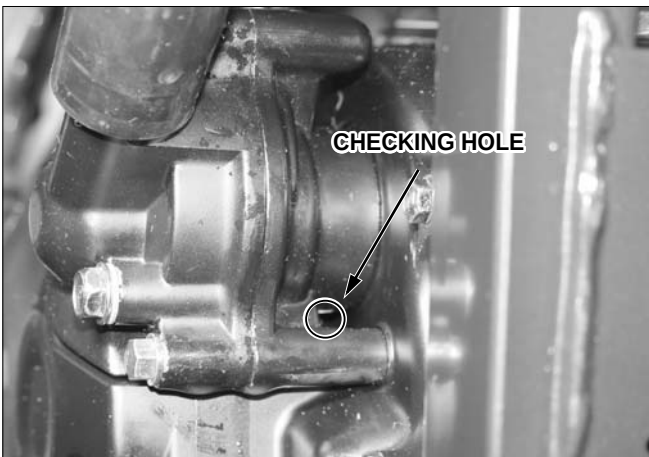


- Put the transmission gear in neutral and start the engine.
- Idling the engine for a few minutes, deflate air in cooling system with a snap slightly, then refill the coolant.
- After checking the amount of coolant in reserve tank, if it is not enough, fill up it to the upper level.
- Install the RH/LH side cowl and center cowl.

WATER PUMP

MECHANICAL SEAL (WATER SEAL) INSPECTION

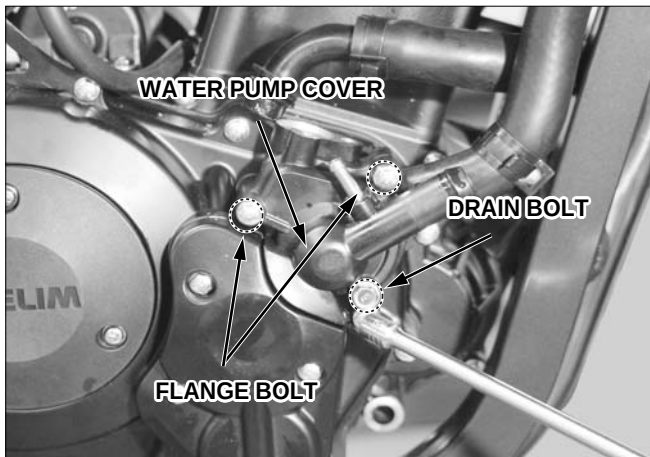
- At the checking hole, inspect the mechanical seal for damage and leakage.
- If the coolant leaks, disassemble the water pump, check the mechanical seal and replace it.



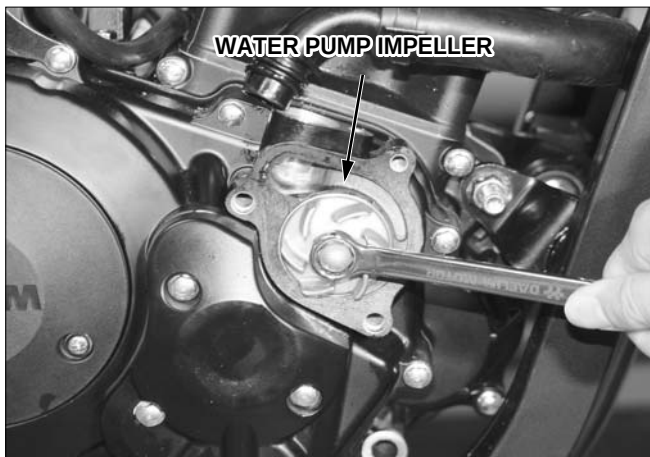
WATER PUMP / IMPELLER REMOVAL

- Remove the coolant inlet hose.

COOLING SYSTEM



- Loosen the 3 bolts and remove the water pump cover.



- Remove the water pump impeller.

NOTE

- The impeller has left hand threads.



- Inspect the mechanical (water) seal and seal washer for wear or damage.

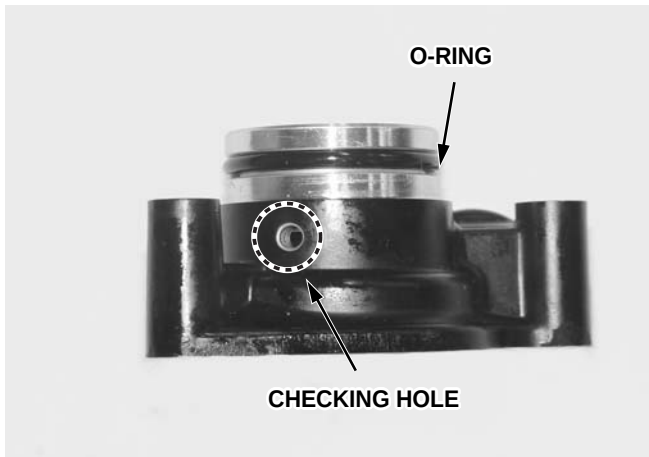
NOTE

- The mechanical seal and seal washer change with a set.

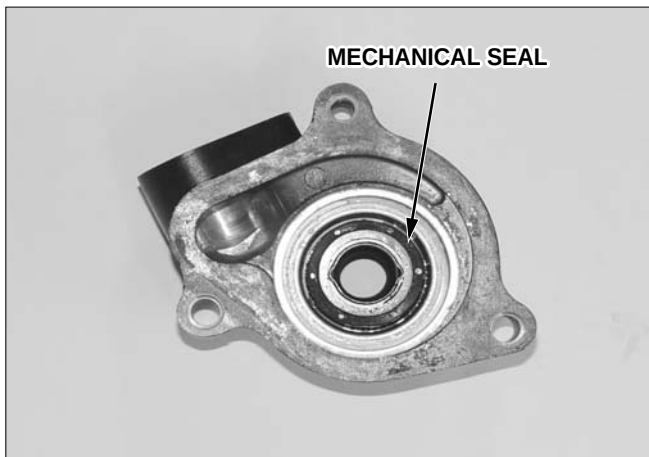


WATER PUMP BODY REMOVAL REMOVE

- Water pump body.



- Check the coolant checking hole.
- Check the water pump body and O-ring for damage and wear.



MECHANICAL SEAL REPLACEMENT

- Remove water pump assembly from the inside by tool.
- Replace the mechanical seal with new one.

NOTE

- The mechanical seal and the seal washer change with a set.

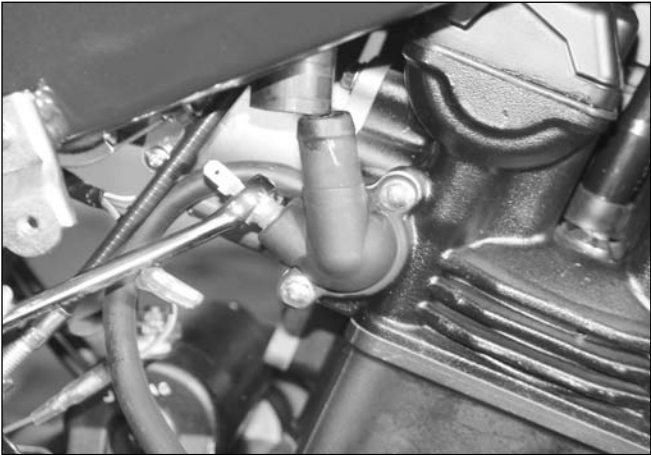
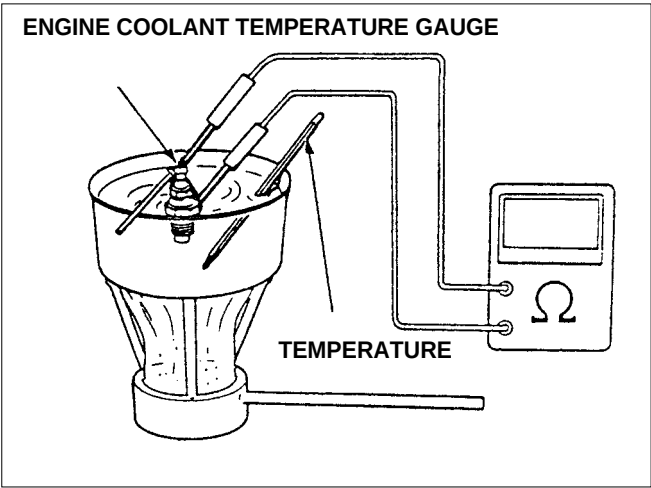
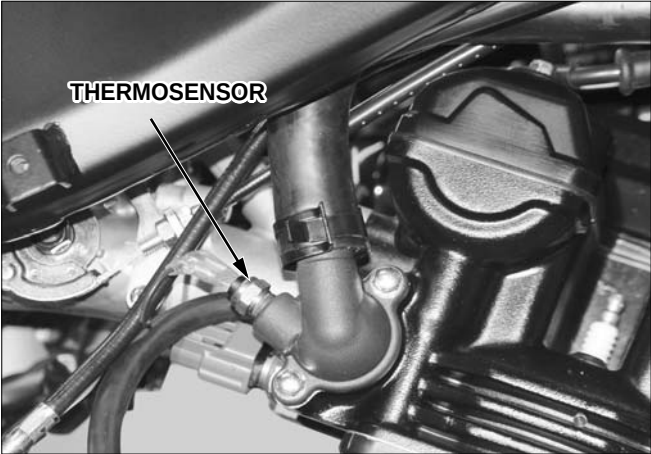


WATER PUMP / IMPELLER INSTALLATION

- When the mechanical seal is replaced, a new seal washer must be installed to the impeller.
- Install in the reverse order of removal



- Install the water pump cover.
- Install in the reverse order of removal.



ENGINE COOLANT TEMPERATURE GAUGE

REMOVAL

- Remove RH.side cowl.
 - Drain the coolant.
 - Disconnect the engine coolant temperature gauge wire.
-
- Remove the engine coolant temperature gauge.

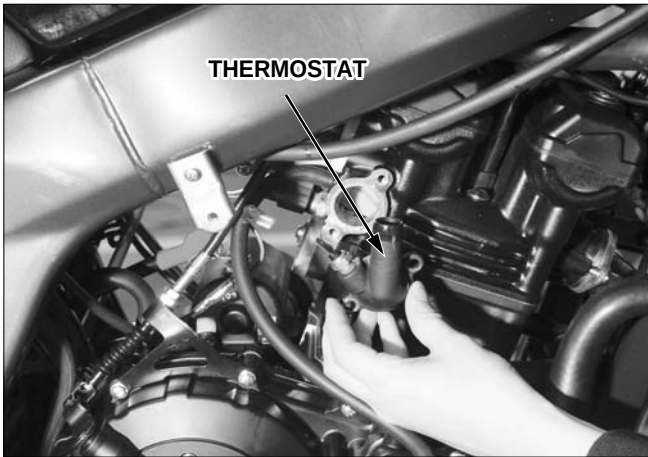
INSPECTION

- Soak the engine coolant temperature gauge in the beaker(fill the beaker with water)
- Heats up the beaker.
- Measure the resistance.

Temperature(°C)	50	80	100	120
Resistance(Ω)	154	52	27	16

INSTALLATION

- Apply a sealant to the threads and install the thermostat cover.
- Connect the engine coolant temperature gauge coupler.



THERMOSTAT

REMOVAL

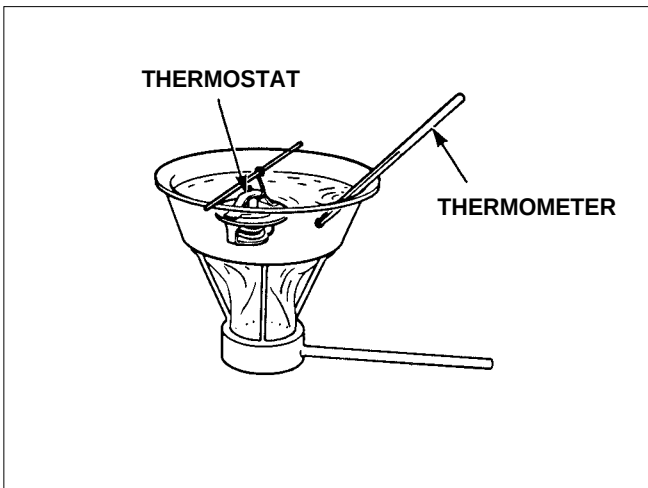
- Disconnect the water hose from the thermostat cover.
- Remove the 2 bolts and separate the thermostat cover.
- Remove the thermostat from thermostat cover.

INSPECTION

- Suspend the thermostat in a pan of water over a burner and gradually raise the water temperature to check its operation.

Technical data

Begins to open	$80 \pm 2^{\circ}\text{C}$
Full-open	$90^{\circ}\text{C} \pm 3^{\circ}\text{C}$
Valve lift	3.5~4.5mm



⚠ NOTE

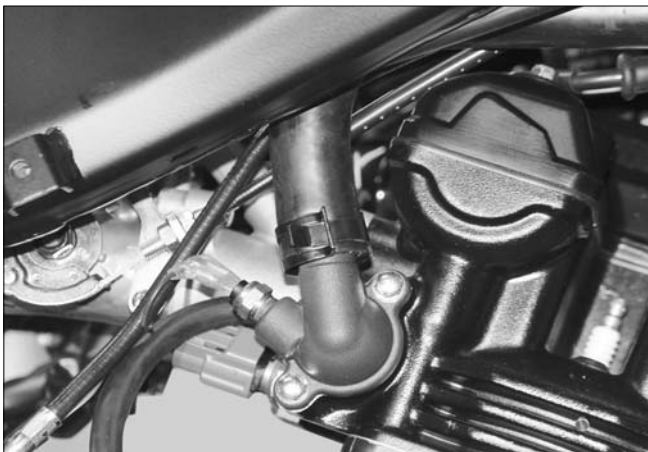
- Do not let the thermostat touch the pan as it will give a false reading.
- Replace the thermostat if the valve stays open at room temperature.
- Test the thermostat after it is opened for about 5 minutes and hold the temperature at 70°C

INSTALLATION

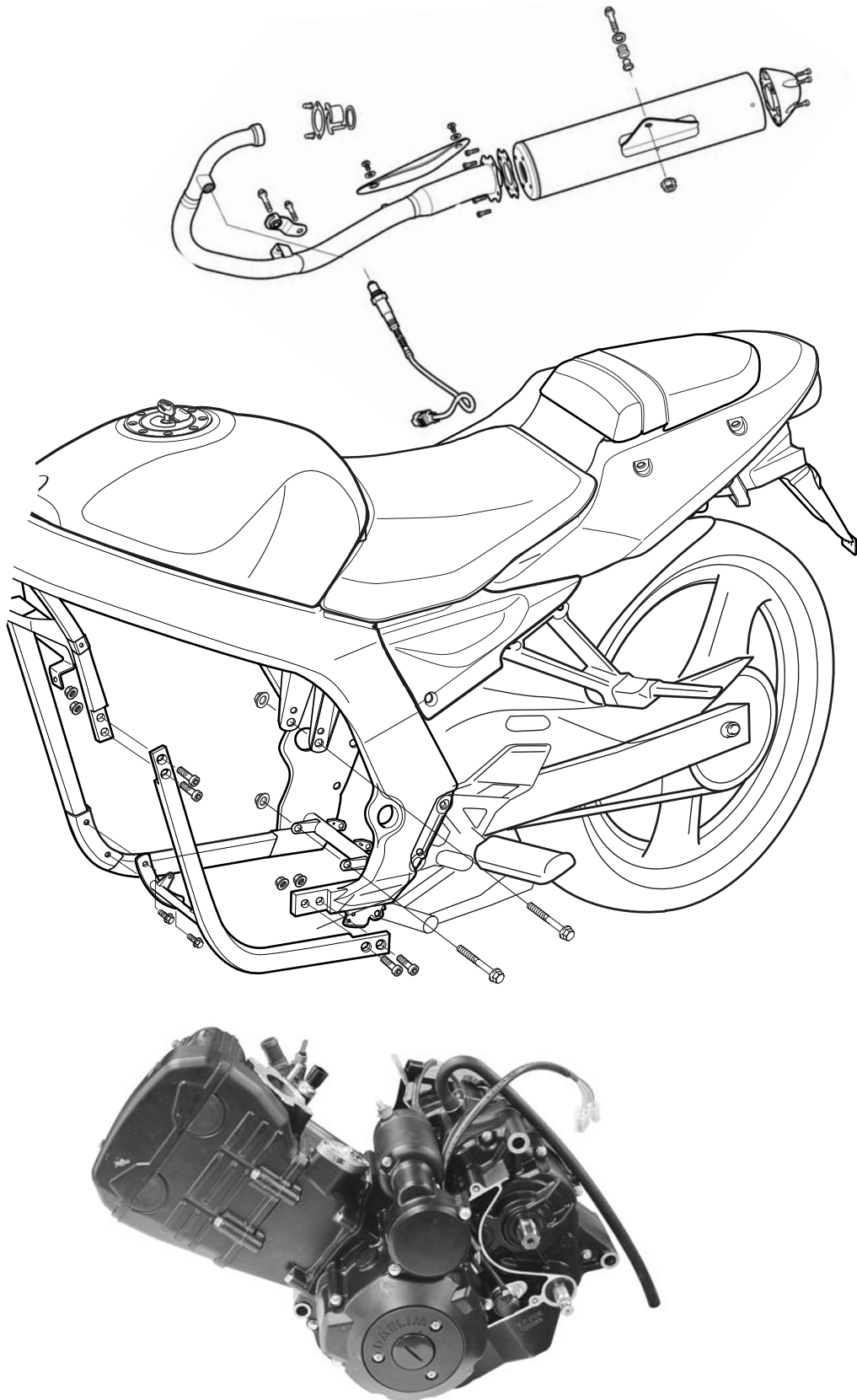
- Install in the reverse order of removal.

⚠ NOTE

- When assembling, the location of air vent hole must be upward.



ENGINE REMOVAL/INSTALLATION



7. ENGINE REMOVAL/INSTALLATION

SERVICE INFORMATION 7-1

ENGINE INSTALLATION 7-3

ENGINE REMOVAL 7-2

SERVICE INFORMATION

GENERAL SAFETY



NOTE

- Use a jack to remove or install the engine. Support the motorcycle with a jack firmly, taking precautions not to damage the frame, engine, cable or harness.
- Attach tape to the frame to protect it during the engine removal or installation.

- The following works require engine removal for service.

- Cylinder head/valve
- Cylinder/piston
- Transmission
- Crank shaft

SPECIFICATION

ITEM	SPECIFICATIONS
ENGINE OIL CAPACITY(AT DISASSEMBLY)	1.5 l

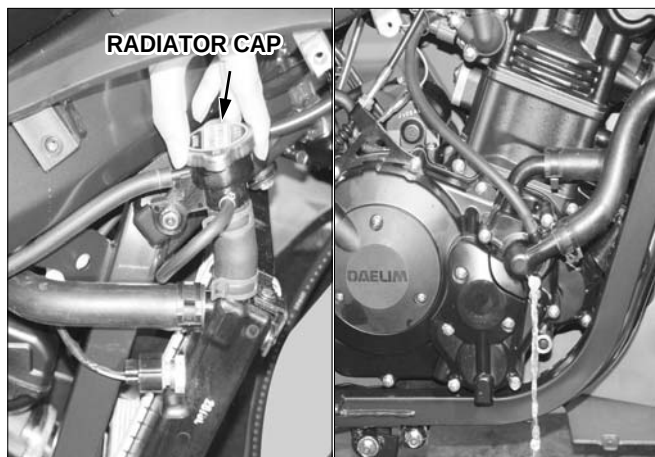
TORQUE VALUES :

ENGINE HANGER BOLT (FRONT) :	4.9kgf · m
(REAR) :	4.9kgf · m
GEAR CHANGE ARM BOLT :	1.2kgf · m
DRIVE SPROCKET BOLT :	1.2kgf · m
LH. DOWNTUBE MOUNTING BOLT (SPECIAL BOLT) :	4.2kgf · m



ENGINE REMOVAL

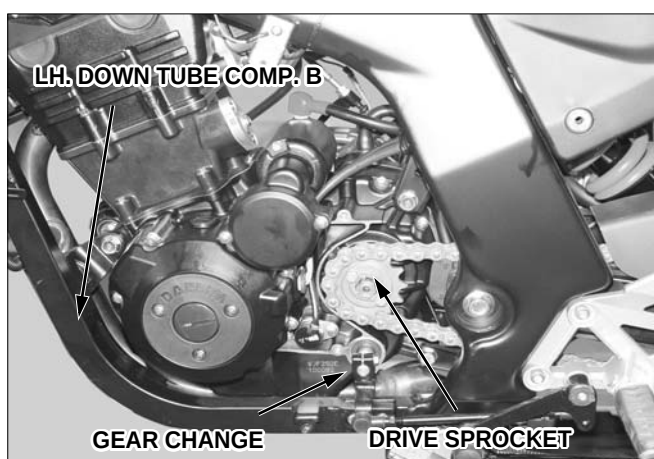
- Drain the engine oil. (⇒3-3)
- Remove the muffler. (⇒13-4)
- Remove the battery ground cable and clutch cable.
- Remove the throttlebody from the engine.



- Remove the RH. side cowl and LH. side cowl.
- Drain the coolant.
 - Remove the radiator cap
 - Loosen the drain bolt from the water pump and drain the coolant.



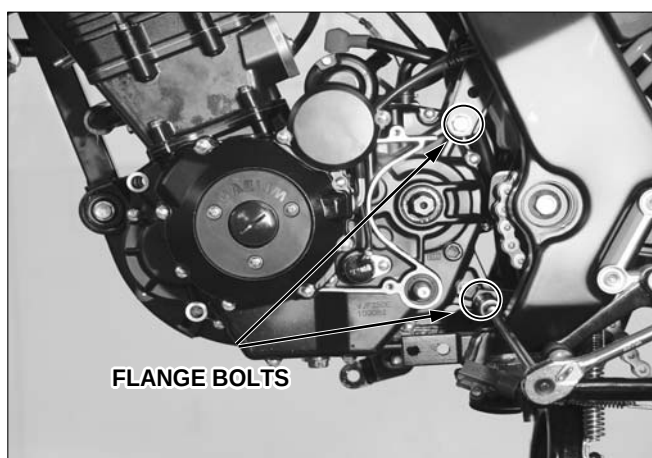
- Loosen the hose band and remove the radiator hose from the engine.



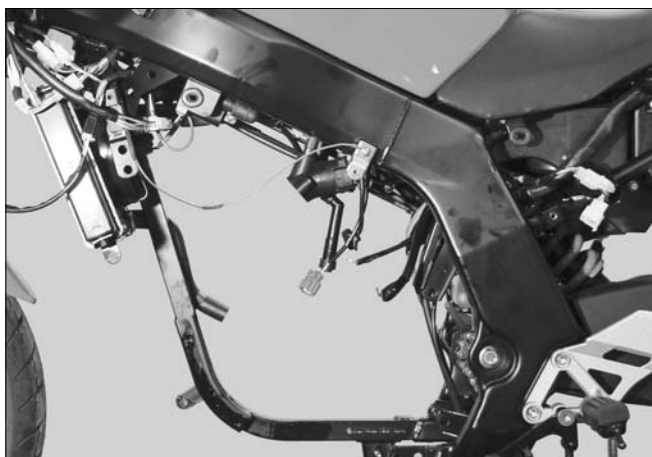
- Disconnect the AC generator wire coupler and gear position switch wire coupler.
- Disconnect the starter motor cable.
- Remove the gear change arm.
- Remove the LH. rear cover.
- Loosen the rear axle nut and drive chain adjuster nut then remove the drive sprocket after pushing the rear wheel forward.



- Remove the 2 rear engine hanger bolts, then remove the LH. downtube comp. B.



- Remove the bolt and flange bolt securing engine hanger plate then remove the engine.



ENGINE INSTALLATION

Engine installation is essentially the reverse order of removal.

⚠ NOTE

- Carefully align mounting points with the jack to prevent damage from mounting bolt threads and wire harness and cables.
- Be careful not to damage any part of the frame and bolt nuts.
- Be sure to install the cables, tubes, and wires to their correct positions(⇒ 1~8).

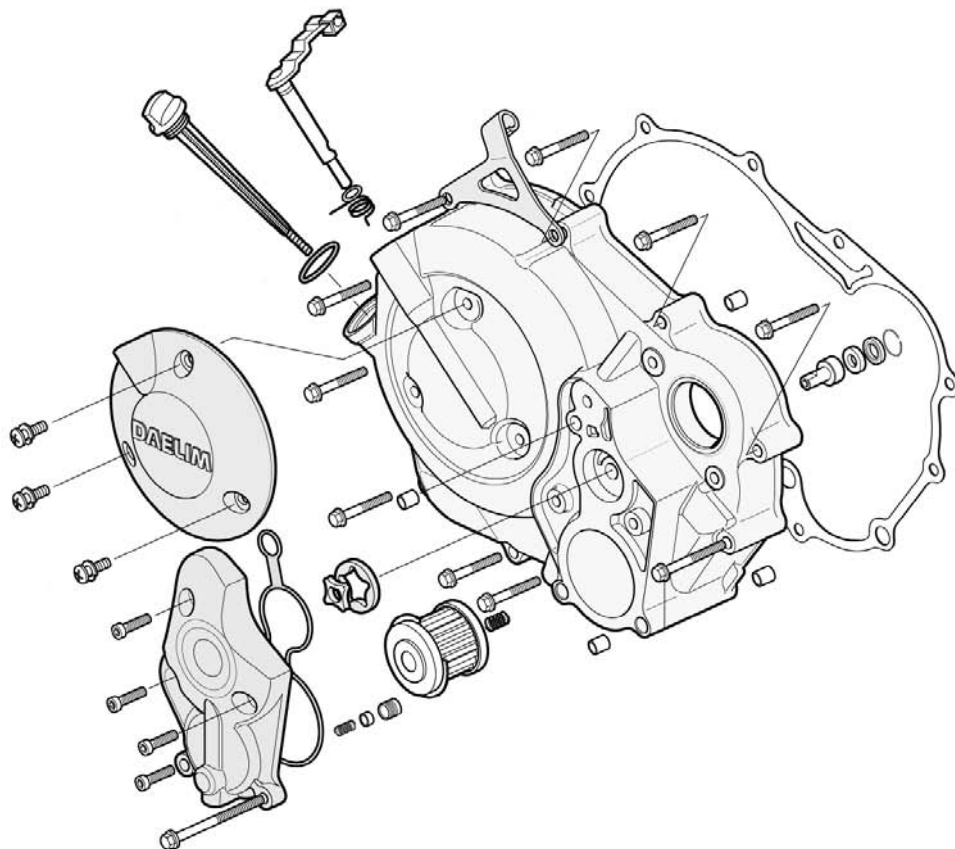
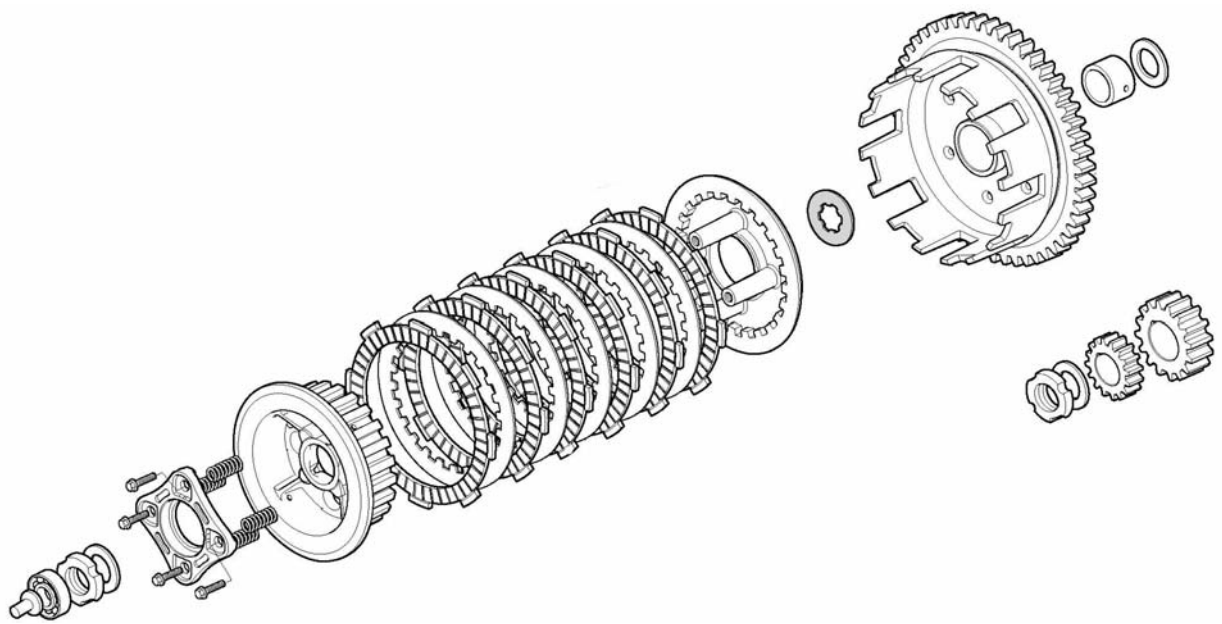
TORQUE :

ENGINE HANGER BOLTS :

(FRONT)	4.9kgf · m(49N · m)
(REAR)	4.9kgf · m(49N · m)
GEAR CHANGE ARM BOLT	1.2kgf · m(12N · m)
DRIVE SPROCKET BOLT	1.2kgf · m(12N · m)

- Inspect the following after installing the engine.
 - Engine oil level
 - Throttle grip operation and free play.
 - Clutch lever operation and free play.
 - Drive chain slack





8. CLUTCH / GEARSHIFT

SERVICE INFORMATION	8-1	GEARSHIFT SPINDLE	8-7
TROUBLESHOOTING	8-2	CLUTCH INSTALLATION	8-9
RH. CRANK	8-3	PRIMARY DRIVE GEAR	8-10
CLUTCH REMOVAL	8-4	RH. CRANKCASE COVER INSTALLATION .	8-12

SERVICE INFORMATION

GENERAL SAFETY

- The clutch, gearshift spindle can be serviced with the engine in the frame.
- If the shift fork, drum and transmission require service, remove the engine and separate the crankcase.
- The quality and level of fluid affect clutch operation. If the clutch slips, check the fluid level before servicing the clutch system.

8

SPECIFICATIONS

Unit : mm

ITEM	STANDARD VALUE	SERVICE LIMIT
CLUTCH SPRING FREE LENGTH	35.5	34.2
CLUTCH DISK THICKNESS	2.9~3.0	2.6
CLUTCH PLATE WARPAGE		0.2
CLUTCH OUTER I.D	28.000~28.013	28.030
CLUTCH OUTER GUIDE O.D.	28-0.020~0.033	28.5±0.1

TORQUE VALUES

CLUTCH LOCK NUT	6.5kgf · m - Apply engine oil
DRUM STOPPER ARM BOLT	1.2kgf · m
PRIMARY DRIVE GEAR NUT	6.5kgf · m - Apply engine oil
RH. CRANKCASE COVER BOLT	1.1kgf · m
GEAR SHIFT PEDAL BOLT	1.2kgf · m

TOOLS

CLUTCH CENTER HOLDER
LOCK NUT WRENCH
EXTENSION BAR
FLYWHEEL HOLDER

TROUBLESHOOTING

Clutch working problem can be solved by adjusting a cable free play.

Clutch leverworking is too hard

- Damaged, clogged or sticking clutch cable
- Damaged lifter mechanism
- Damaged clutch lifter plate bearing
- Incorrect wiring of clutch cable

When gripping the clutch tightly, the vehicle moves

- Too big clutch lever free play
- Clutch plate warpage
- Clutch lock nut loose
- High fluid level or high fluid weight

Clutch slippage

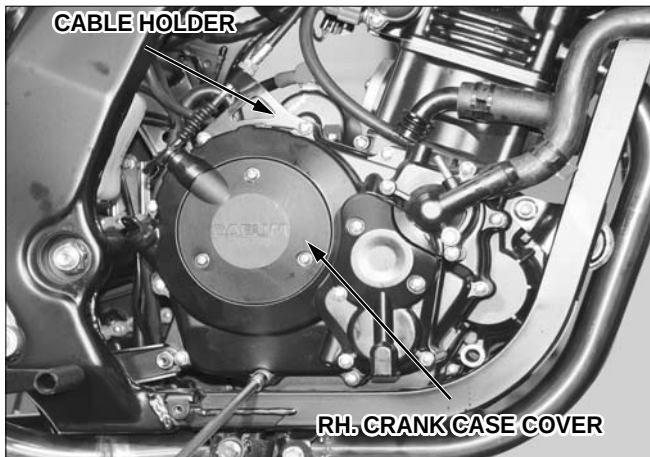
- Sticking lifter hydraulic system
- Worn disks
- Weak spring
- Too small clutch lever free play

Difficult to engage the gear

- Incorrect clutch adjustment(too big free play)
- Bent shift fork
- Bent shift fork shaft
- Damaged gear shift spindle
- Damaged shift drum guide groove
- Damaged shift drum guide pin

Gear disengages

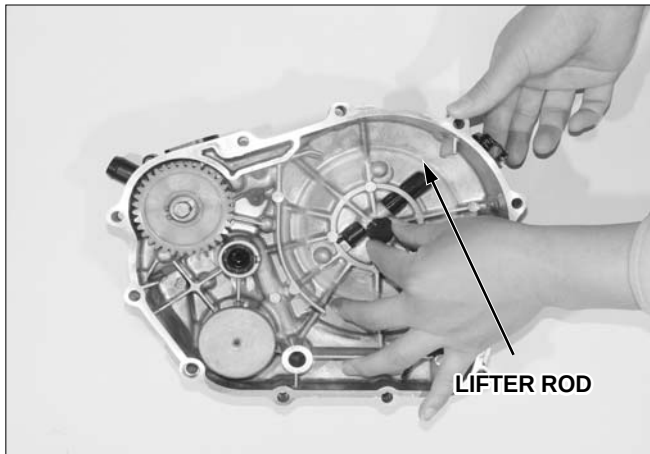
- Worn the protrusion of a gear
- Bent shift fork shaft
- Damaged shift drum stopper
- Worn shift drum guide groove
- Worn gear shift fork groove



RH. CRANKCASE COVER

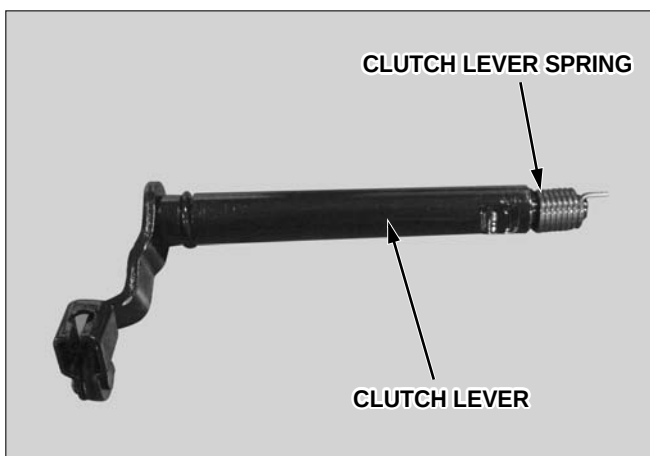
REMOVAL

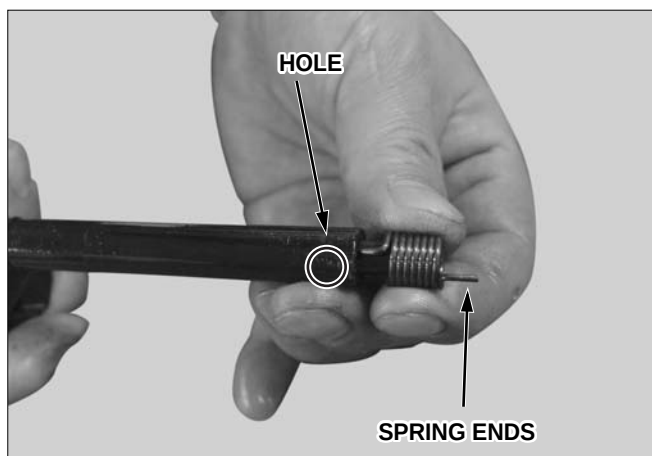
- Drain the engine oil and coolant.
- Remove the clutch adjuster locknut and the adjusting nut, then disconnect the clutch cable end from the clutch lever.
- Remove the right crankcase cover bolts and remove the right crankcase cover.
- Remove the two dowel pins and gasket.



CLUTCH LEVER/LIFTER ROD REMOVAL

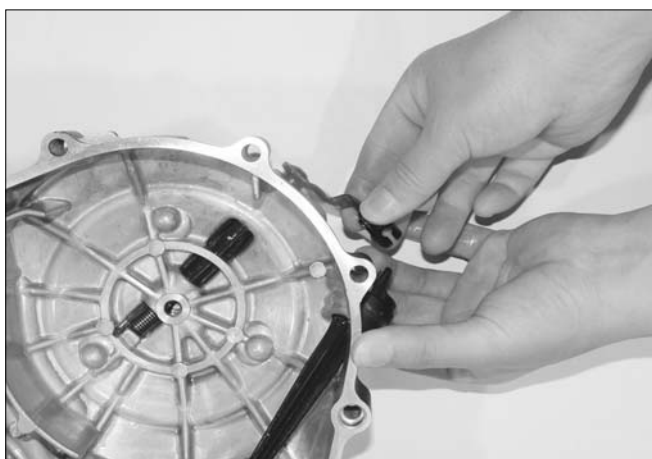
- Remove the clutch lifter rod.
- Remove the clutch lever and spring from the RH. crankcase cover simultaneously.
- Remove the clutch lever spring and O-ring from the clutch lever.
- Check the wear and damage of the lifter rod and clutch lever and clutch lever spring.



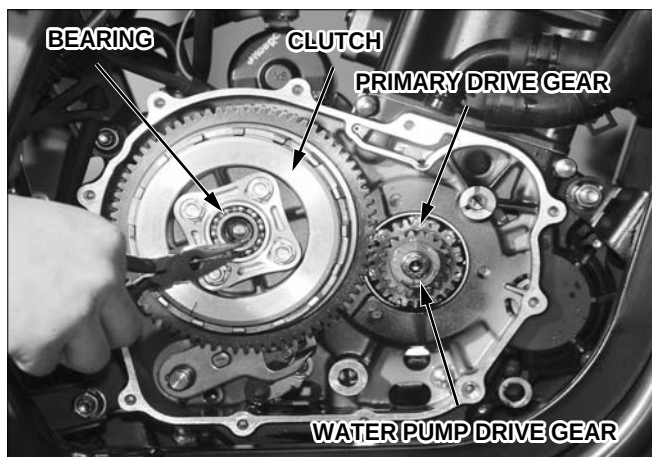


CLUTCH LEVER INSTALLATION

- Apply the grease to the new O-ring, and install it to the clutch lever.
- Install the clutch lever spring into the hole of the clutch lever ends.



- After installing the clutch lever into the RH. crankcase cover, turn the clutch lever to the clockwise and install the lifter rod aligning the clutch lever with the RH. crankcase cover hole.

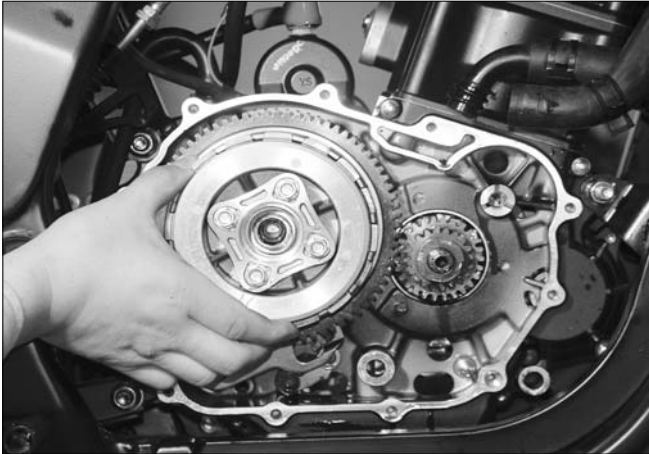


CLUTCH REMOVAL

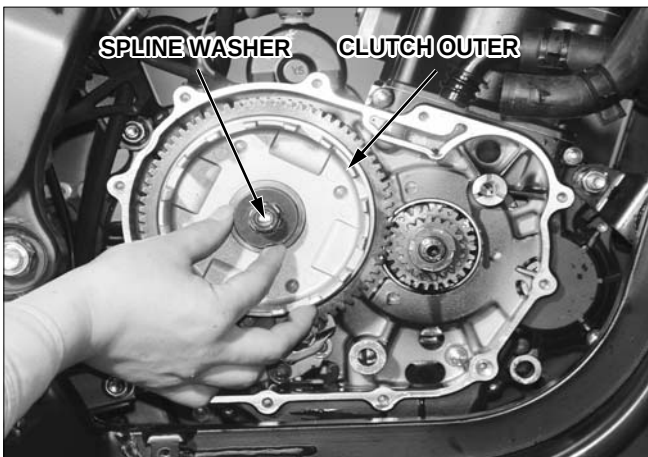
- Remove the bearing.



- Remove the clutch lock nut.



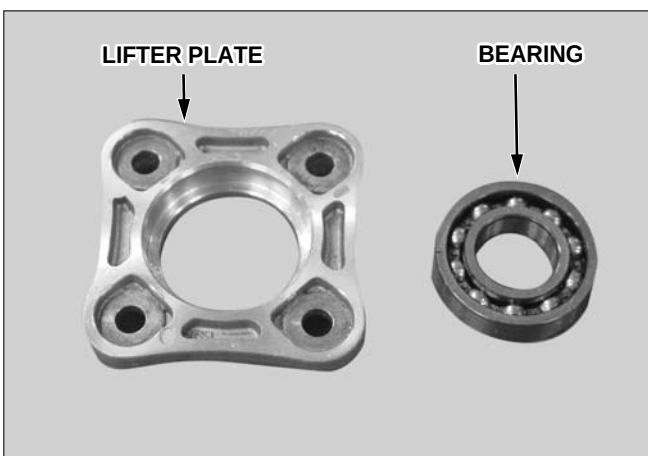
- Remove the lock washer.
- Remove the clutch inner assy.



- Remove the spline washer.



- Remove the clutch outer guide and thrust washer.

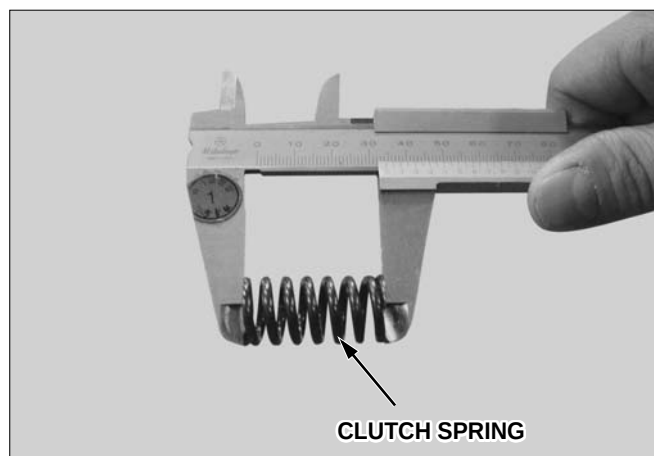


INSPECTION

- Remove the clutch center, disk plate, clutch spring and check the other part each.
- Inspect the lifter plate bearing for damage.
(It rotates by hand, if the free play is big, replace them)
- Inspect the lifter plate for damage.
- If necessary, replace them.

NOTE

- Remove the clutch spring to diagonal direction.

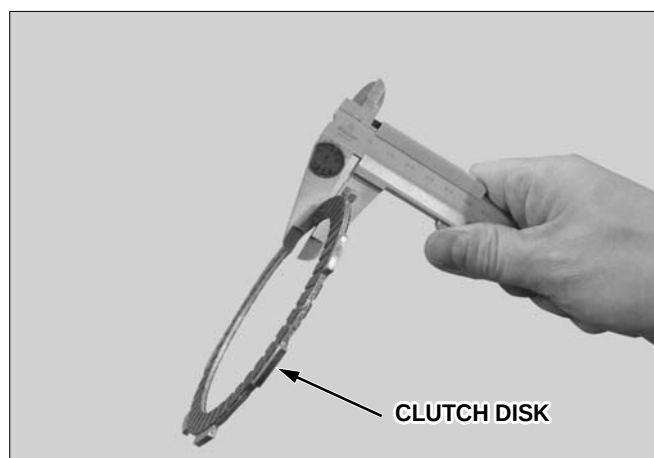


- Measure the clutch spring free length; replace the springs if the measurement is not within the service limit.

SERVICE LIMIT : 34.2mm

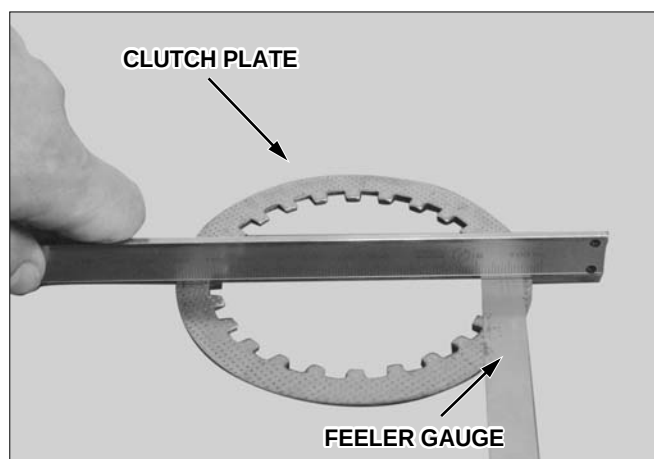
⚠ NOTE

- Replace the clutch disks and plates as a set.(4EA)



- Measure the disk thickness and replace the disks if the service limit is exceeded.

SERVICE LIMIT : 2.6mm



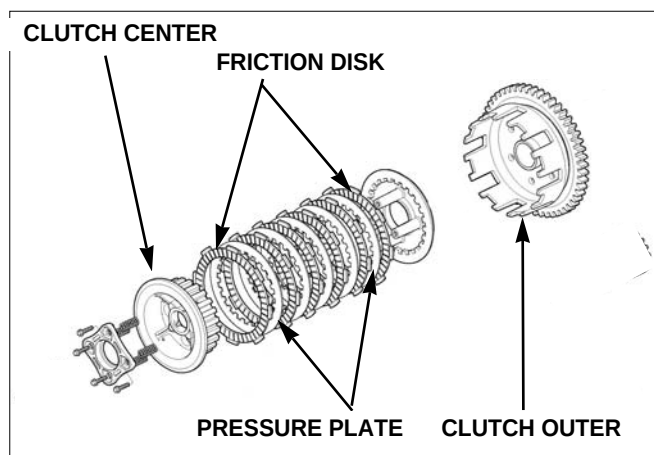
⚠ NOTE

- Warped clutch plates prevent the clutch from disengaging properly.
- Check the slots (ㄣ) in the clutch outer for nicks or indentations made by the clutch discs. If necessary replace them.
- Measure the inside diameter of clutch outer.

SERVICE LIMIT : 28.030mm

- Measure the outside diameter of clutch outer guide.

SERVICE LIMIT : 27.950mm

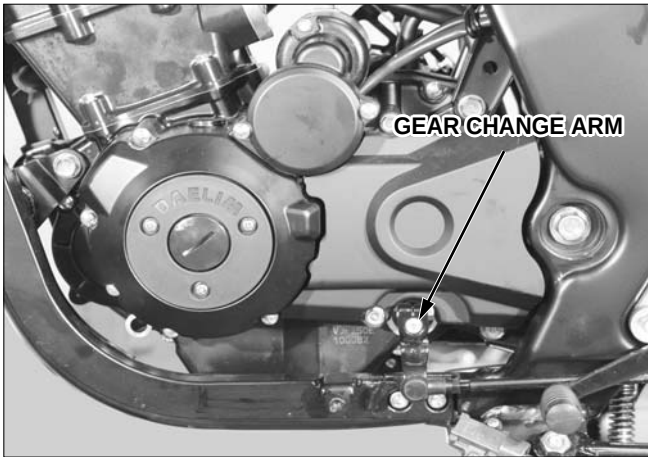


INSTALLATION

- Apply the clean engine oil to the clutch friction disk and pressure plate.
- Install the 7pcs disks and 6pcs plates into the clutch center by turns.
- Install the spring, lifter plate and clutch spring bolts to diagonal direction.

⚠ NOTE

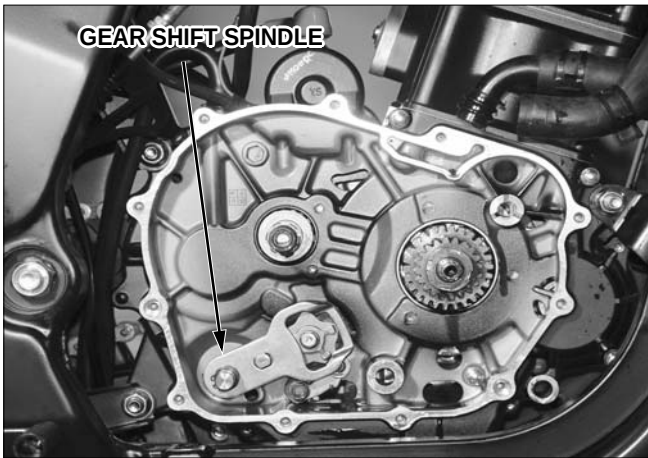
- Check the condition that the pressure plate is depressed the friction disk and disk plate correctly.



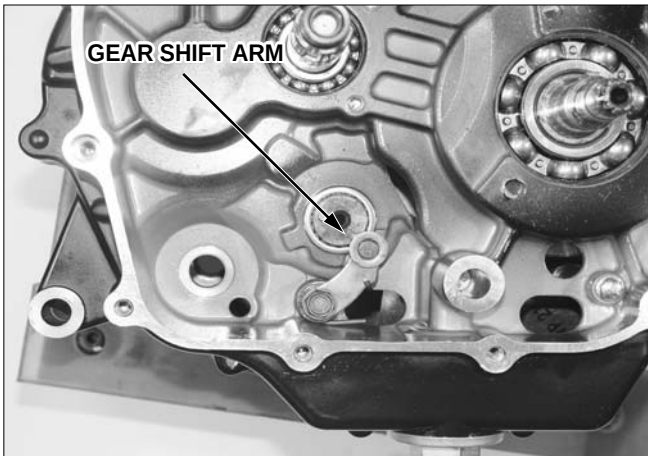
GEAR SHIFT SPINDLE

REMOVAL

- Loosen the hex bolt at L.H. side and remove the gear change arm.



- Remove the RH. crankcase cover.(⇒ 8-3)
- Remove clutch assembly.(⇒ 8-4)
- Remove the gear shift spindle and thrust washer.

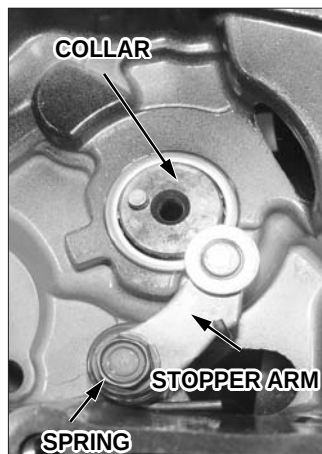
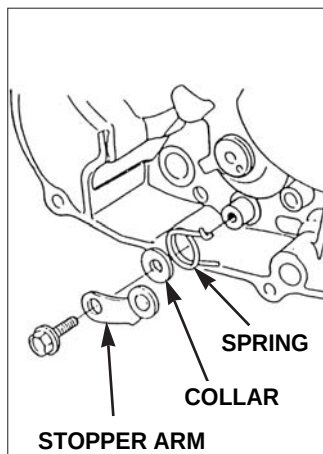


- Remove the gear shift cam bolt, cam and roller.
- Remove the drum stopper bolt, drum stopper, collar and spring.
- Remove the pivot securing gear shift and remove the spring and washer pivot.



INSPECTION

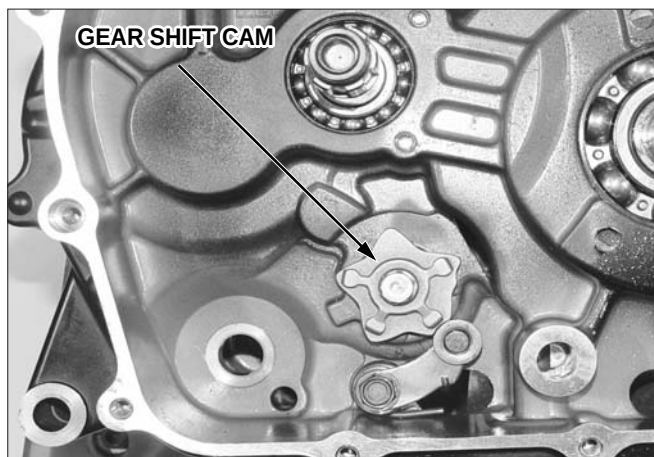
- Check the gear shift spindle for wear or damage.
- Inspect the gear shift plate for deformation, wear, or other damage.
- Check the return spring and gear shift plate spring for wear or damage.



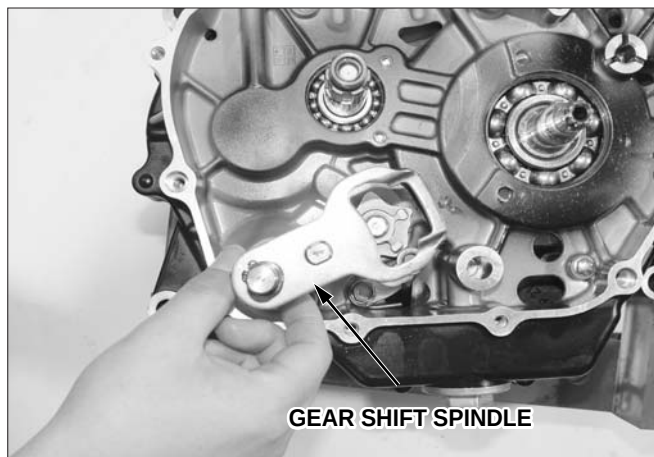
INSTALLATION

- Install the collar, spring, drum stopper and bolt.
- Tighten the bolt.

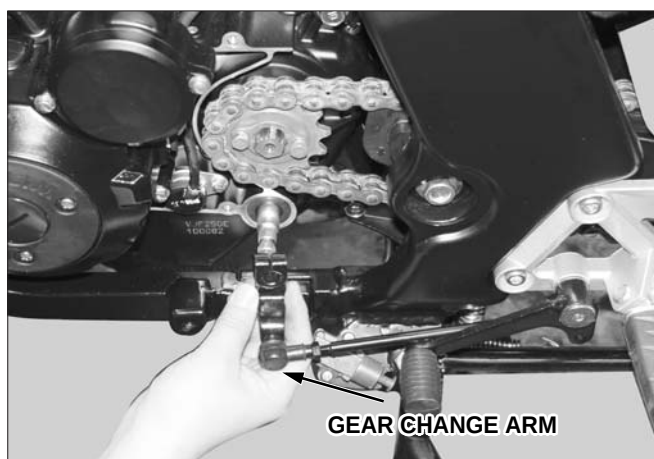
TORQUE : 1.2kgf · m



- Press the drum stopper and install the gear shift cam, aligning the roller with the gear shift cam hole.

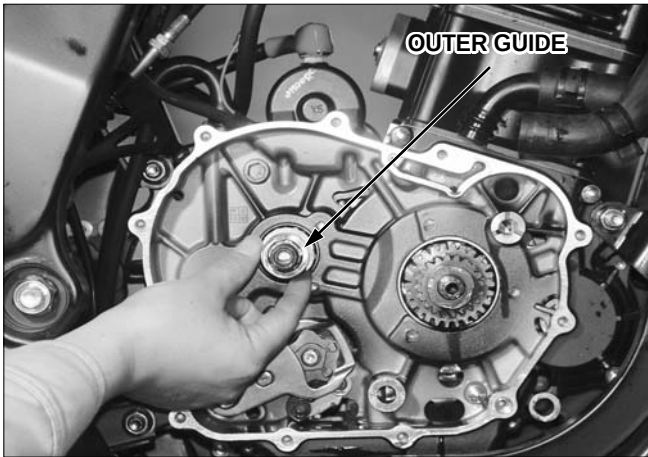


- Install the thrust washer into the gear shift spindle.
- Install the gear shift spindle into the crank case, aligning the teeth of the return spring with the tappet of the right crank case as shown.

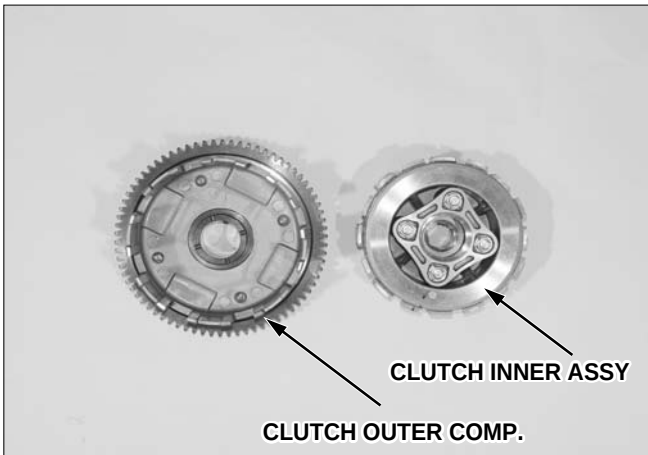


- Install the following:
 - Clutch assembly.
 - RH. crank case cover
- Install the gear shift arm aligning its slit with the punch mark on the gear shift spindle.
- Install and tighten the pinch bolt to the specified torque.

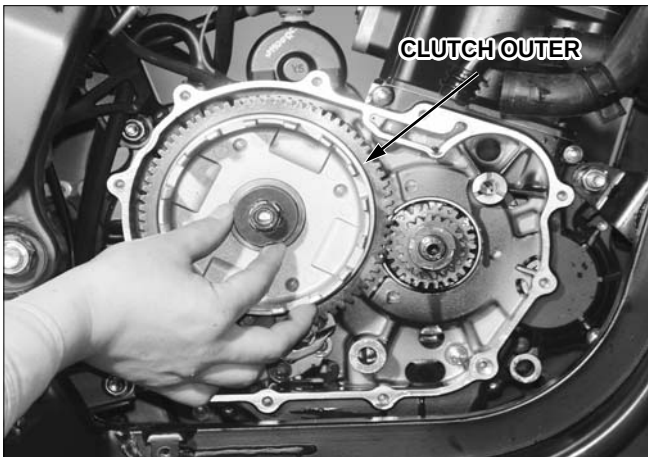
CLUTCH INSTALLATION



- Coat the clutch outer guide with clean engine oil.



- Install the trust washer and outer guide into the main shaft.



- Install the clutch outer into the main shaft.
- Install the spline washer.



- Install the clutch inner ass'y to clutch outer.
- Install the lockwasher.
- Apply the clean engine oil to the washer and install the lock nut temporarily

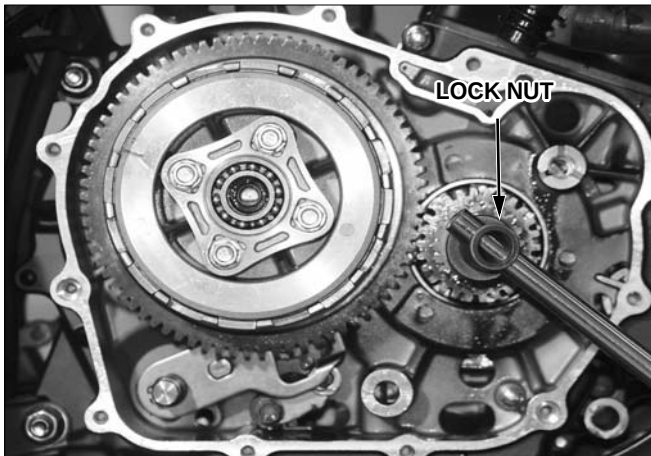


- Install the lock nut by pressing clutch center into the clutch center holder.

TORQUE : 6.5kgf · m



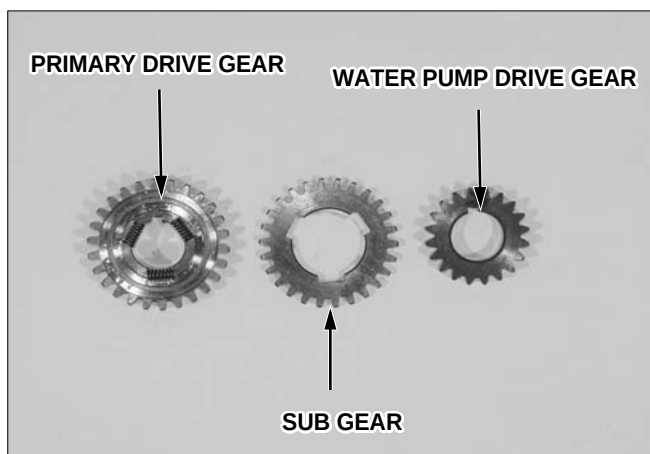
- Install the bearing.



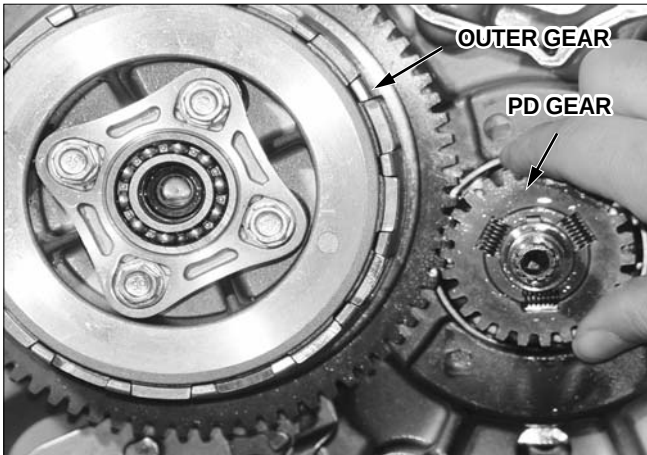
PRIMARY DRIVE GEAR

REMOVAL

- Remove the LH. crankcase cover.
- Loosen the locknut.



- Remove the water drive gear.
- Remove the primary drive gear and sub gear.
- Check the wear or damage and if have the problem replace it.

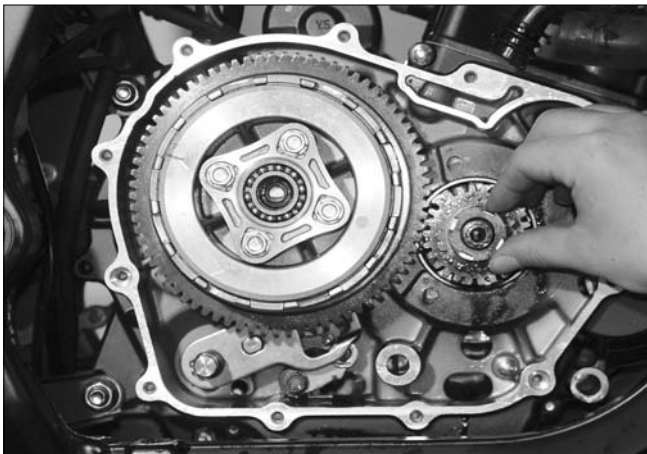


INSTALLATION

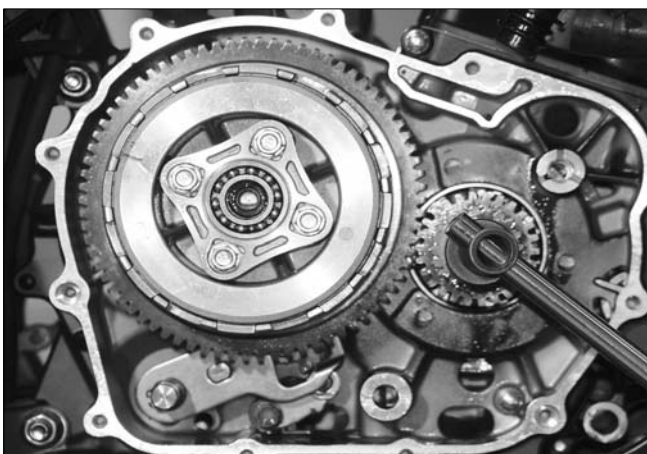
- Insert the woodruff key into the key groove of the crankshaft.
- Align the primary drive gear key groove with the crankshaft key.
- Align the sub gear and clutch outer groove and install the gear.



- Install the water pump drive gear.



- Install the lock washer.
- Coat the nut with clean engine oil, and temporarily tighten the lock nut.



- Tighten the primary drive gear lock nut.

TORQUE : 6.5kgf · m



RH. CRANKCASE COVER INSTALLATION

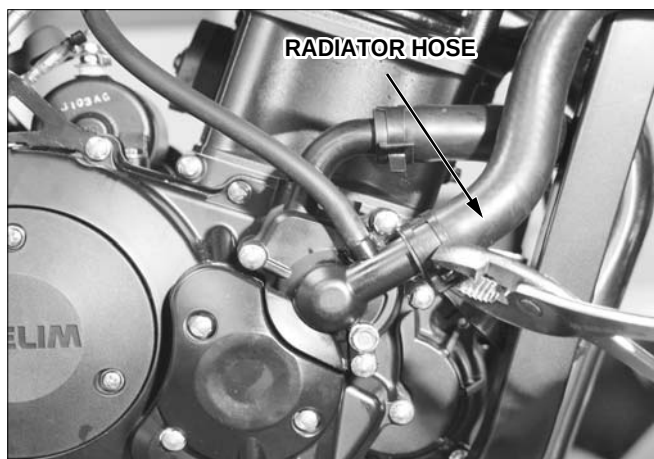
- Remove the gasket from the crankcase surface.
- Install the two dowel pins and a new gasket.



- Install the crankcase cover bolts and clutch cable holder.

TORQUE : 1.1kgf · m

- Connect the clutch cable end to the clutch lever, then install the clutch wire holder with the two bolts.
- Adjust the clutch lever free play. (⇒ 2-12)
- Remove the oil level gauge, then fill the crankcase with the recommended oil.(⇒ 3-3)



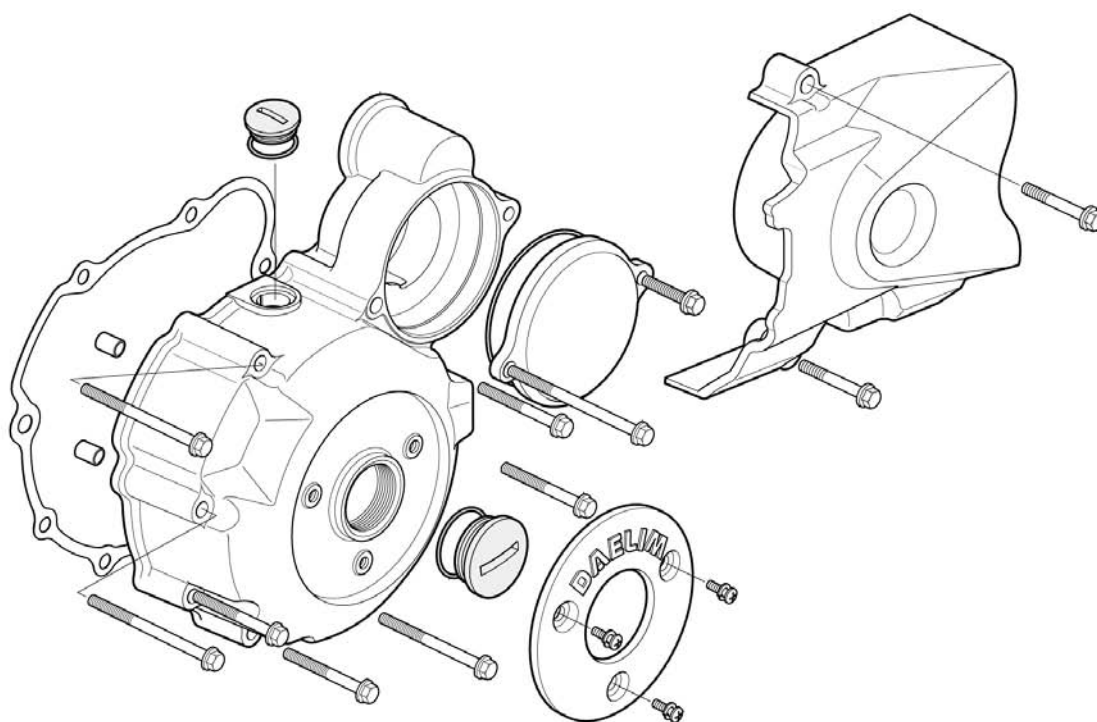
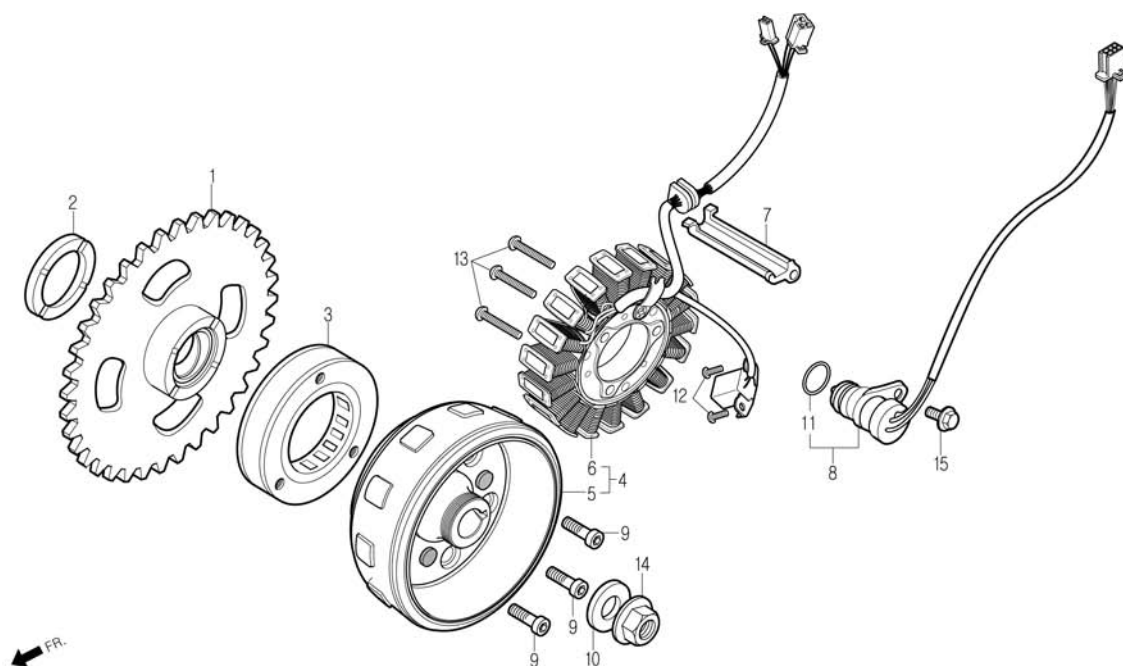
- Connect the radiator hose
- Pour the coolant.



- Install the side cowls and center cowl.
- Install in the reverse order of removal.

MEMO

A.C GENERATOR / STARTER CLUTCH



9. A.C GENERATOR / FLY WHEEL

SERVICE INFORMATION . . . 9-1

STARTER CLUTCH 9-5

A.C GENERATOR 9-2

STARTOR 9-6

SERVICE INFORMATION

GENERAL SAFETY

- This section covers removal and installation of the A.C. generator.
- Refer to section 17 for inspection of the A.C. generator.
- The A.C. generator/starter clutch service can be done with the engine installed in the frame.

SPECIFICATIONS

Unit:mm

ITEM		STANDARD VALUE	SERVICE LIMIT
STARTER DRIVEN GEAR	O.D.	39.622~39.635	39.607
	I.D	22.010~22.022	22.100
STARTER IDLE GEAR	I.D	10.013~10.045	10.100
STARTER IDLE GEAR SHAFT	O.D	9.991~10.000	9.970
REDUCTION GEAR	I.D	10.013~10.045	10.100
REDUCTION GEAR SHAFT	O.D	9.991~10.000	9.970

TORQUE VALUES

FLYWHEEL BOLT	5.5kgf · m(55N · m)
STARTER CLUTCH SOCKET BOLT	3.2kgf · m(32N · m)
LEFT CRANK CASE COVER BOLT	1.1kgf · m(11N · m)

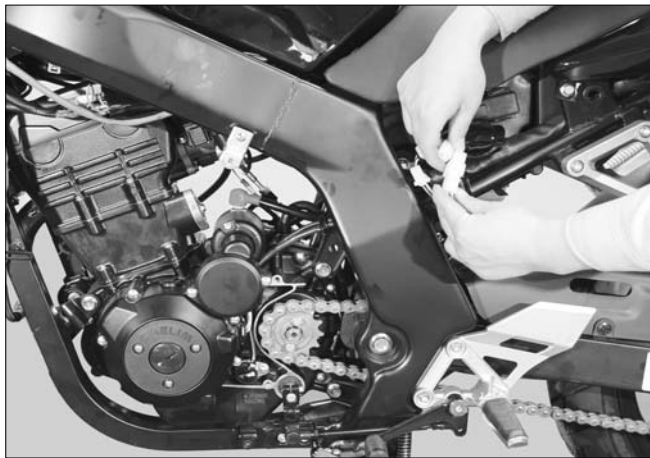
TOOLS

ACG ROTOR PULLER
FLYWHEEL HOLDER



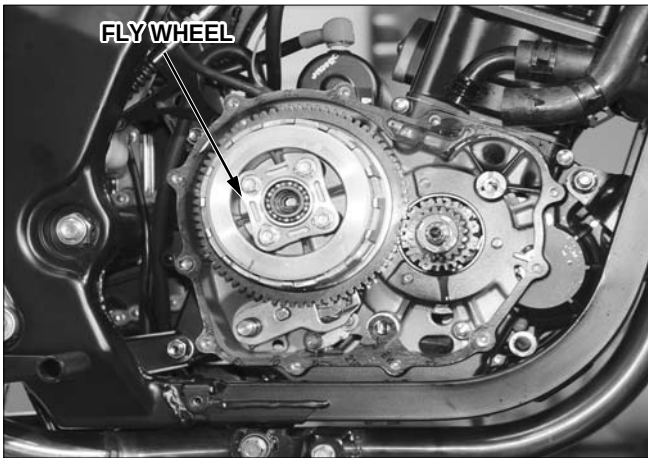
A.C GENERATOR REMOVAL

- Remove the LH. rear cover.
- Remove the AC. generator coupler connecting of gear change switch.
- Remove the starter reduction gear cover.
- Remove the starter reduction gear shaft and starter reduction gear.





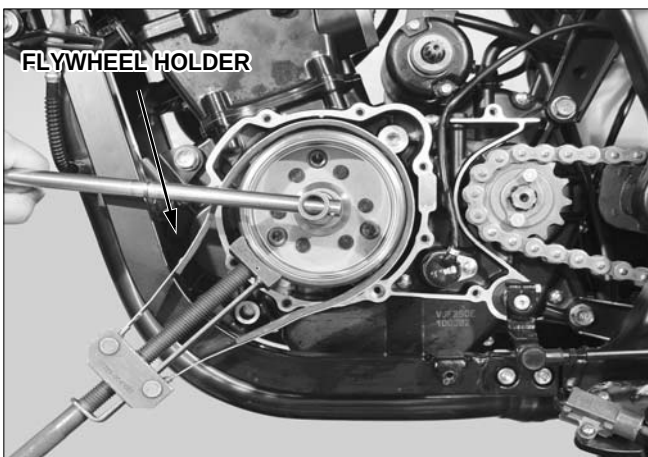
- Remove the left crankcase cover bolts and left crankcase cover.



- Remove the gasket and the dowel pins.



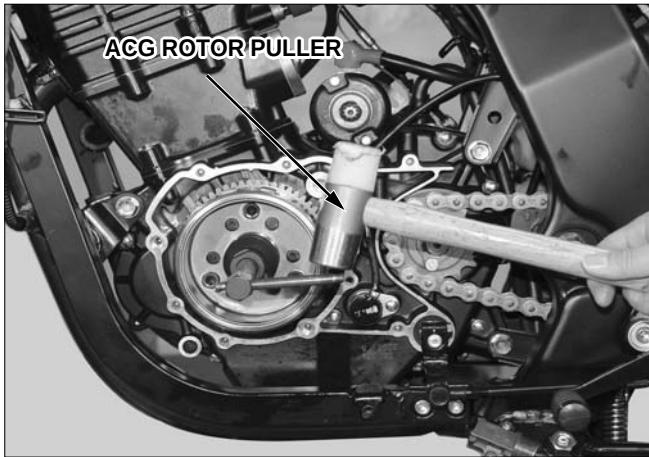
- Remove the starter idle gear shaft.



- Hold the flywheel rotor with a flywheel holder, and remove the rotor bolt.

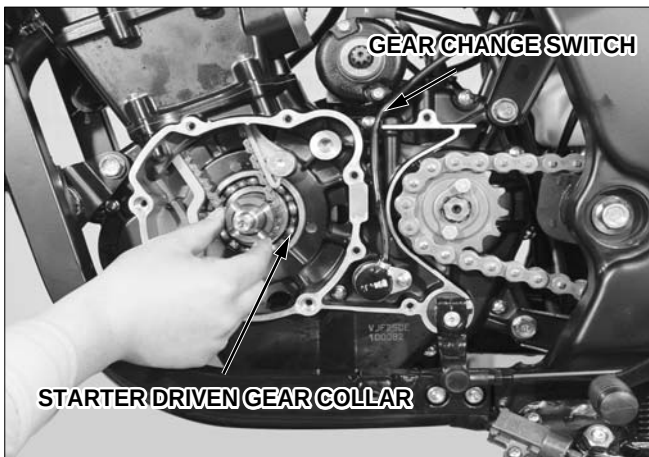
**TOOL : LOCKNUT WRENCH
FLY WHEEL HOLDER**

A.C GENERATOR / STARTER CLUTCH

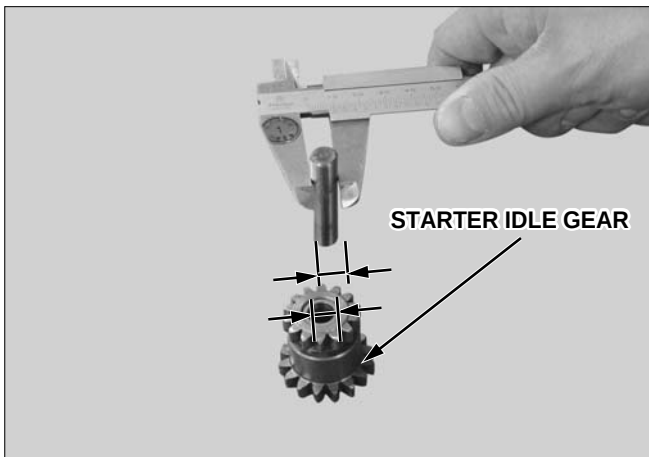


- After installing the ACG rotor puller on the rotor, remove the rotor.

TOOL : ACG ROTOR PULLER



- Remove the fly wheel and starter driven gear collar.



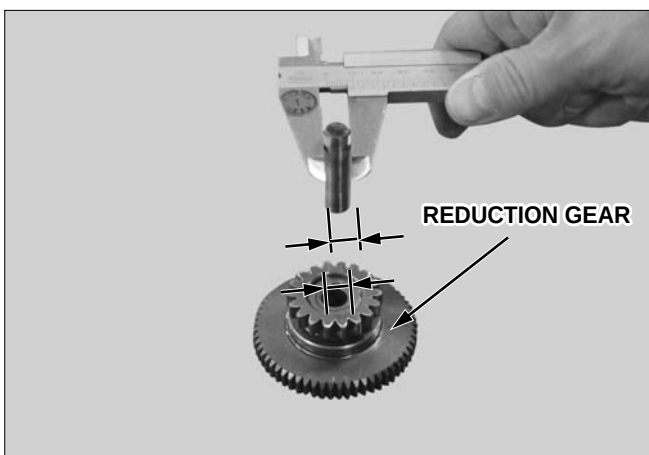
STARTER IDLE GEAR INSPECTION

- Inspect the wear and damage of starter idle gear.
- Measure the gear inside diameter.

SERVICE LIMIT : 10.100mm

- Measure the gear shaft outside diameter.

SERVICE LIMIT : 9.970mm



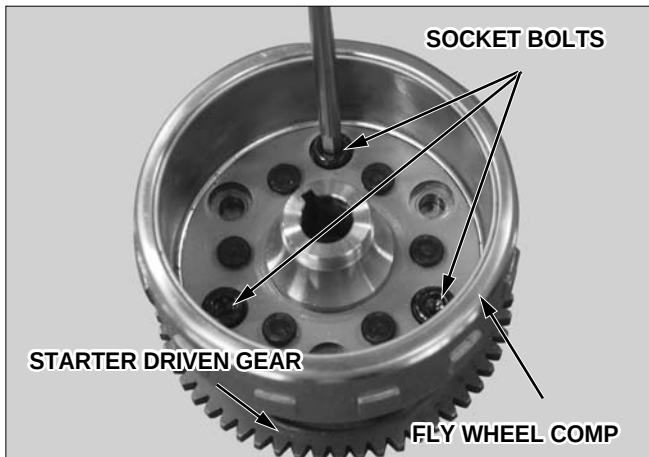
REDUCTION GEAR INSPECTION

- Inspect the wear and damage of reduction gear.
- Measure the gear inside diameter.

SERVICE LIMIT : 10.100mm

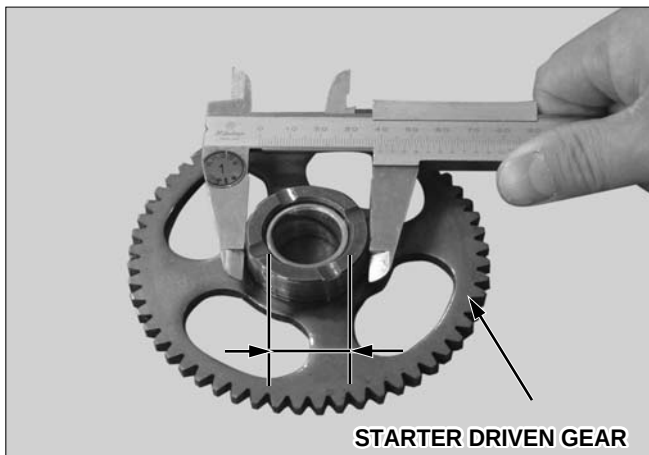
- Measure the gear shaft outside diameter.

SERVICE LIMIT : 9.970mm



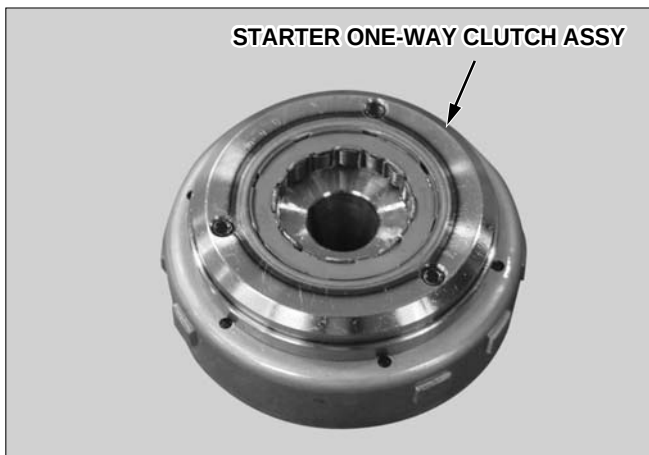
STARTER CLUTCH DISASSEMBLY

- Remove the flywheel.
- Remove the three socket bolts, and remove the starter clutch (one way clutch) from the flywheel.



- Check the starter driven gear for damage or wear.
- Measure the starter driven gear I.D. and O.D.

**SERVICE LIMIT : O.D. : 39.607mm
I.D. : 22.100mm**



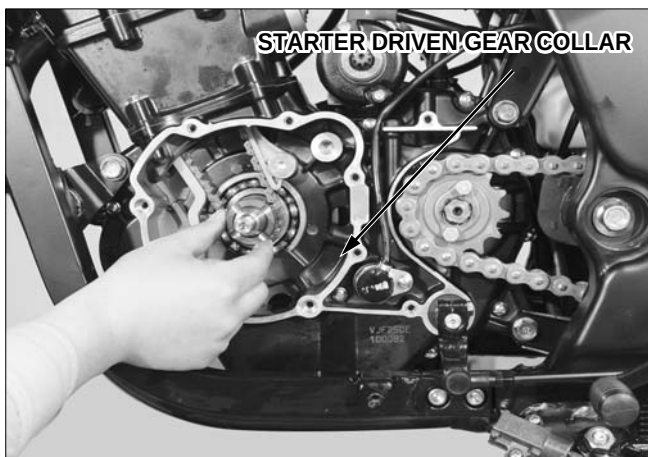
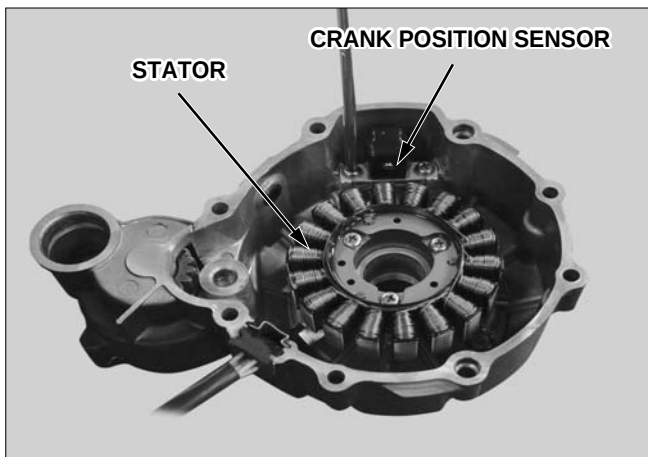
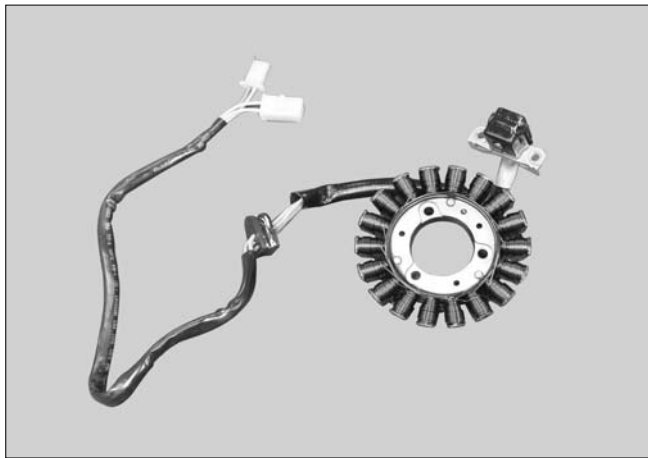
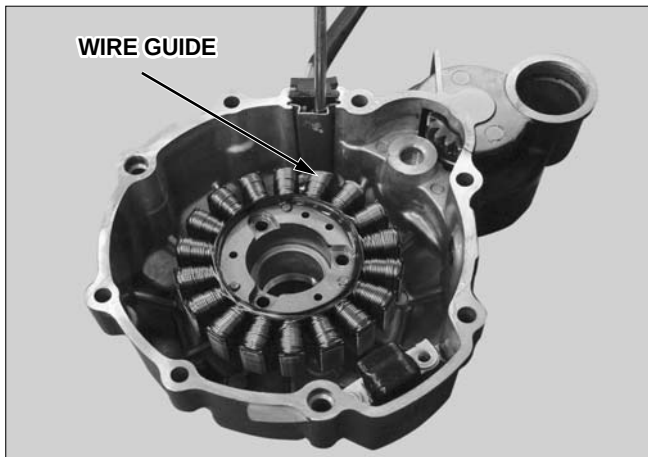
INSTALLTION

- Check the one-way clutch for wear or damage.
- Install the one-way clutch flange into the clutch outer.
- Apply the screw locking bond to the socket bolt and install it.

TORQUE : 3.2kgf-m



- Grip the flywheel.
- Check the operation of the one-way clutch by turning the driven gear.
- You should be able to turn the driven gear counterclockwise smoothly, but the gear should not turn clockwise.(as like photo)



STATOR REMOVAL / INSTALLATION

- Remove the crank position sensor screw, then remove crank position sensor.
- Remove the wire guide using a long nose plier and $\ominus$ screwdriver.

- Loosen the stator screw and remove the stator.

- Install in the reverse order of removal.

NOTE

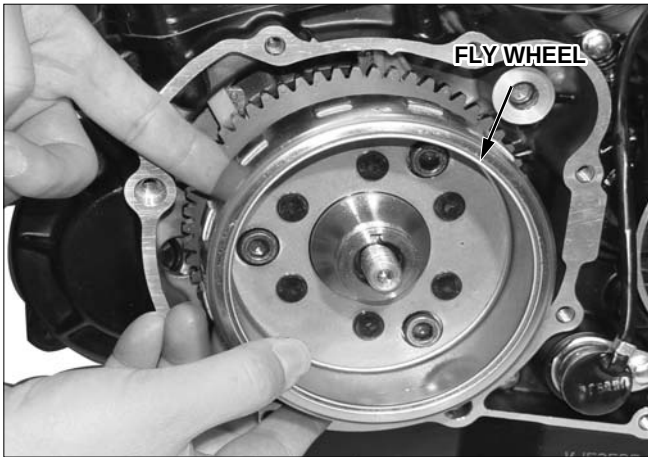
- Fix the grommet to groove part correctly.

INSTALLTION

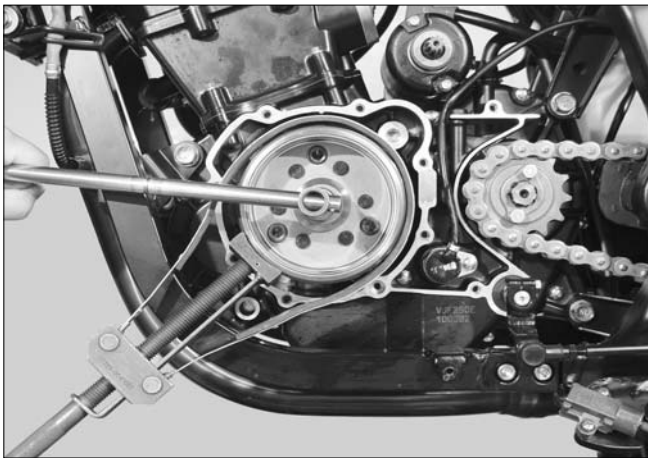
- Install the starter driven gear collar.
- Clean the taper part of crank shaft and remove the dust.
- If installing the rotor with dust in taper part, the key will be damaged. Because the contacted area of taper will be small and it will occur the stress in the woodruff key.

NOTE

- After checking whether inside magnet of rotor is attached by the bolts and nuts, install them. If installing the rotor with the foreign material, the starter coil is damaged.



- Install the woodruff key into the crank shaft key groove.



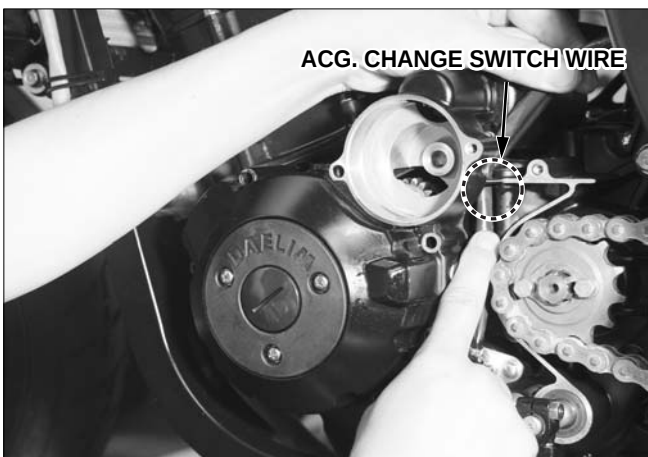
- Install the rotor bolt temporarily.
- After fixing the flywheel with holder, tighten the fly wheel nut.

TORQUE : 5.5kgf-m

**TOOLS : FLYWHEEL HOLDER
LOCKNUT WRENCH**

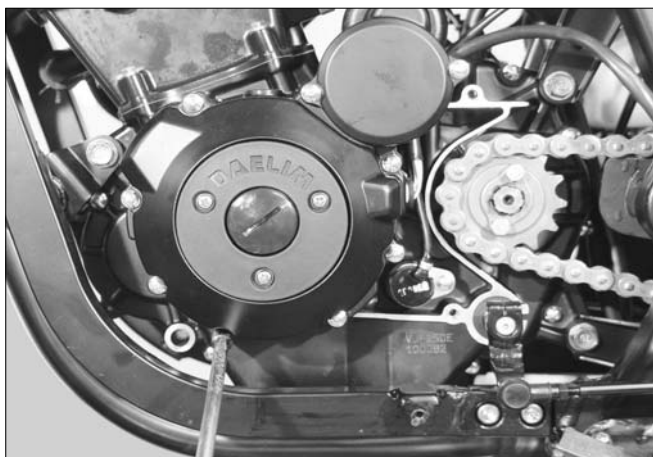


- Install starter idle gear and shaft.
- Install new gasket and dowel pins.



- Install the LH. crank shaft cover at this time be careful not to catch the wires in between the cover and case.

A.C GENERATOR / STARTER CLUTCH

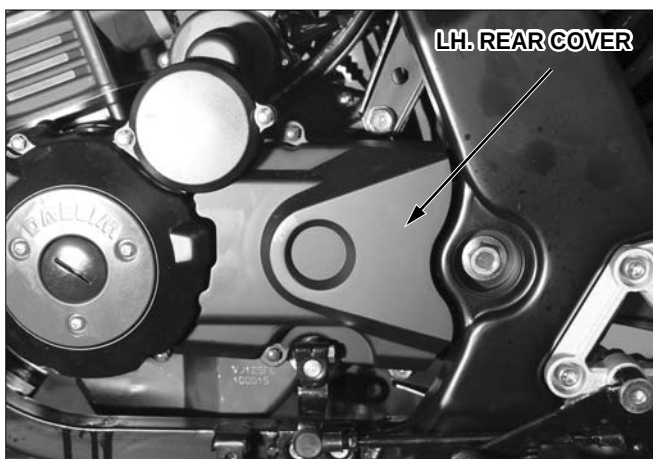


- Replace the O-ring with new one and install the reduction gear cover.
- Cover the reduction gear cover and install the two bolts.
- Install the LH. crank cover bolt.

TORQUE : 1.1kgf-m



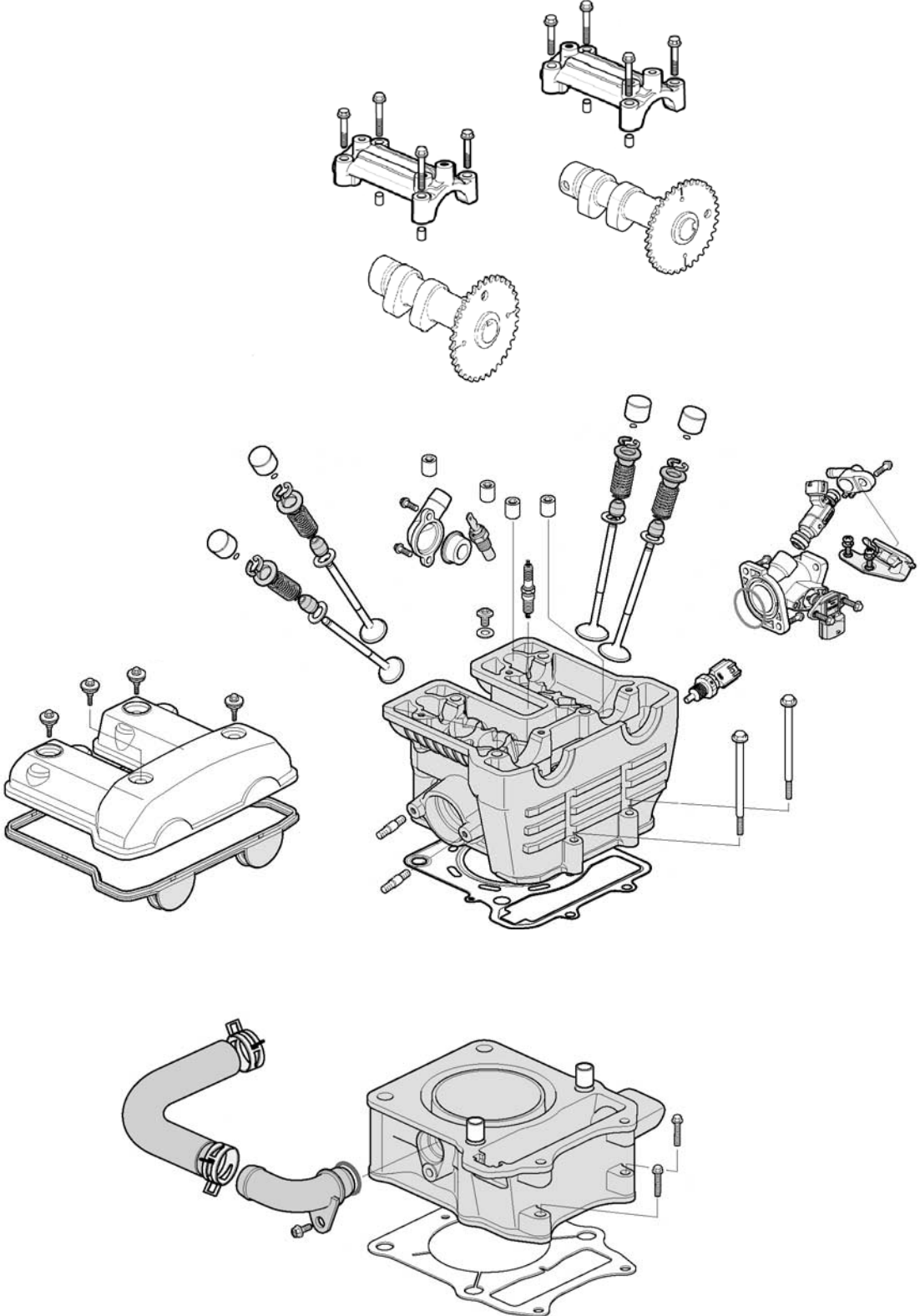
- Connect the AC. generator wire coupler and gear change wire coupler.



- Install the LH. rear cover.

TORQUE : 1.2kgf-m

MEMO



10. CYLINDER HEAD / VALVES

SERVICE INFORMATION	10-1	VALVE SPRINGS	10-6
TROUBLESHOOTING	10-2	VALVE GUIDES	10-7
CAMSHAFT	10-3	VALVE SEATS	10-8
CYLINDER HEAD	10-4	CYLINDER HEAD ASSEMBLY .	10-8

SERVICE INFORMATION

GENERAL SAFETY

- The rocker arm and the camshaft can be serviced without removing the engine. However, the engine must be removed from the frame to maintain the cylinder head.
- The oil of camshaft is supplied through the cylinder head oil hole. Clean the oil hole prior to assembling the cylinder head.

SPECIFICATIONS

Unit : mm

ITEM			STANDARD VALUE	SERVICE LIMIT
CAMSHAFT	CAM HEIGHT	IN	32.02~32.18	31.90
		EX	31.72~31.88	31.60
VALVE, VALVE GUIDE	VALVE SPRING FREE LENGTH	IN,EX	41.40	40.00
	VALVE STEM OUTER DIAMETER	IN	4.975~4.990	4.925
		EX	4.995~4.970	4.905
	VALVE GUIDE INNER DIAMETER	IN,EX	5.000~5.012	5.030
	CLEARANCE BETWEEN STEM AND GUIDE	IN	0.010~0.037	0.080
		EX	0.030~0.057	0.100
	VALVE SEAT WIDTH		0.7~0.9	1.3

TORQUE VALUES

CAM CHAIN TENSIONER PIVOT BOLT	1.0 kgf · m (10N · m)
SPARK PLUG	1.1 kgf · m (11N · m)
CYLINDER HEADSPECIAL SOCKET BOLT	4.0 kgf · m (40N · m)
CAM CHAIN TENSIONER LIFTER BOLT	1.2 kgf · m (12N · m)
CAM CHAIN TENSIONER LIFTER SCREW	0.4 kgf · m (4N · m)
CYLINDER HEAD COVER BOLT	1.0 kgf · m (10N · m)
CRANK SHAFT HOLE CAP	0.8 kgf · m (8N · m)
A.C.GENERATOR CAP	0.6 kgf · m (6N · m)

TOOLS

VALVE GUIDE REAMER
VALVE GUIDE DRIVER
VALVE SPRING COMPRESSOR
VALVE SEAT CUTTER

TROUBLESHOOTING

Enging top-end problems useally affect engine performance. These can be diagnosed by a compression or leak down test, or by tracing noises to the top-end with a sounding rod or stethoscope.

Low comperssion

- Valves
 - Incorrect valve adjustment (see section 3)
 - Valve springs damage
 - Incorrect valve timing
 - Uneven valve seating
- Cylinder head
 - Leaking or damage head gasket
 - Warped or cracked cylinder head
- Cylinder, piston (see section 10,11)

Excessive white smoke

- Worn valve guide or valve stem
- Damaged valve stem seal
- Worn or damaged piston ring

Rough idle

- Low cylinder compression

Compression too high

- Excessive carbon build-up on piston or combustion chamber

Excessive noise

- Incorrect valve adjustment
- Sticking valve or broken valve spring
- Damaged or worn camshaft
- Loose or worn cam chain
- Worn or damaged cam chain tensioner



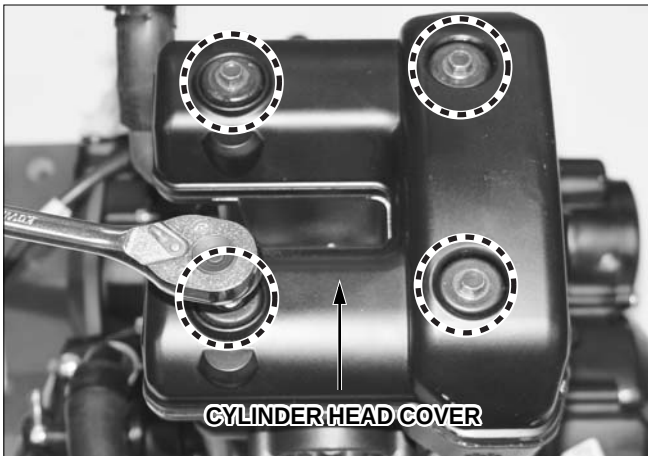
CAMSHAFT

REMOVAL

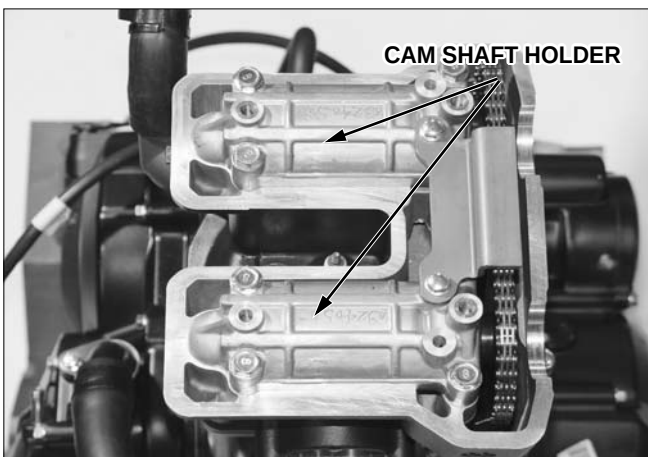
- Remove the side cowl.
- Remove the noise suppressor cap assembly from the spark plug.



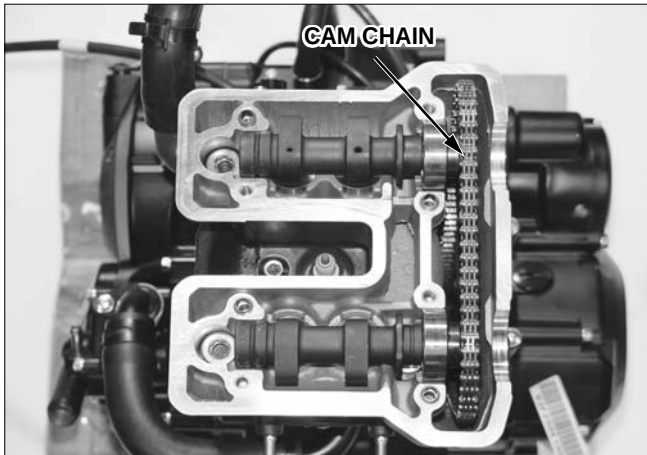
- Loosen the screw of the cam chain tensioner and remove the tensioner mounting bolt.
- Remove the AC generator cap and crank shaft hole cap out of the left crankcase cover.
- Turn the crankshaft to the left, and align the “ T ” mark of the flywheel with the index mark of the LH. crankcase cover.
- Verify that the piston is located at the top dead center. (Make all camshaft lobes face downward.)
- If all camshaft lobes face upward, rotate the crankshaft to the left for 1 turn (180 °), and align the “ T ” mark with the index mark once again.



- Remove the fuel tank.
- Loosen the 4 cylinder head cover special bolts and remove the cover.



- Remove the 8 flange bolts of the camshaft holder and remove the camshaft holder from the cylinderhead.
- Remove the cam chain from the camshaft.



- Remove the cam chain from the cam shaft.
- Take precautions not to allow the cam chain to drop into crankcase.
- Remove the cam shaft.

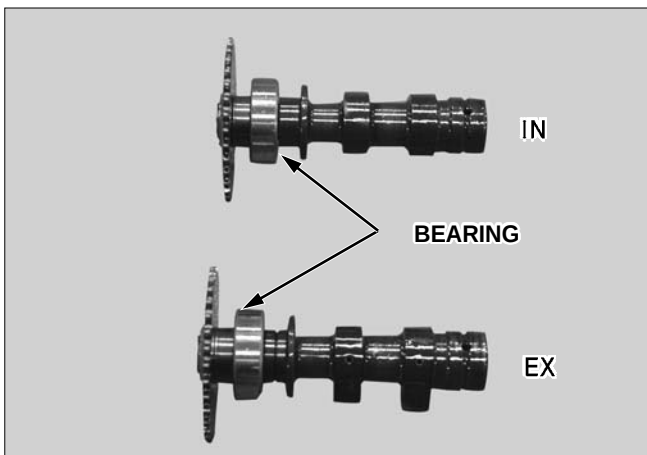
⚠ NOTE

- Take precautions not to allow the cam chain to drop into the crankcase.

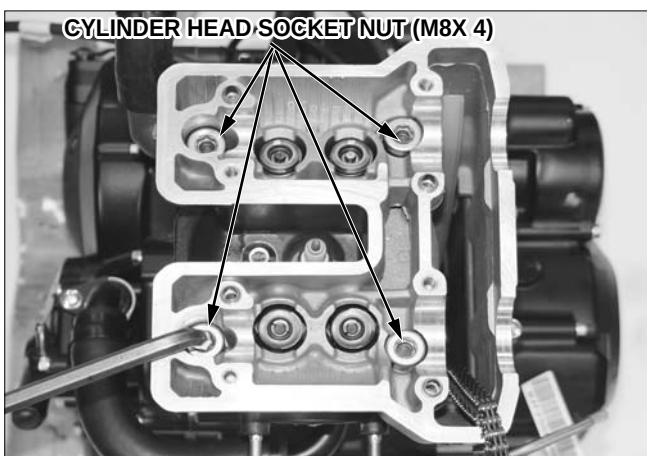


- Check the cam lobes of the camshaft for wear or damage.
- Measure the height of the cam lobe.

SERVICE LIMIT : IN : 31.9 mm
EX: 31.6 mm



- Manually turn the camshaft bearing outer race, and check if it turns smoothly.
- Check the bearing for wear or damage.

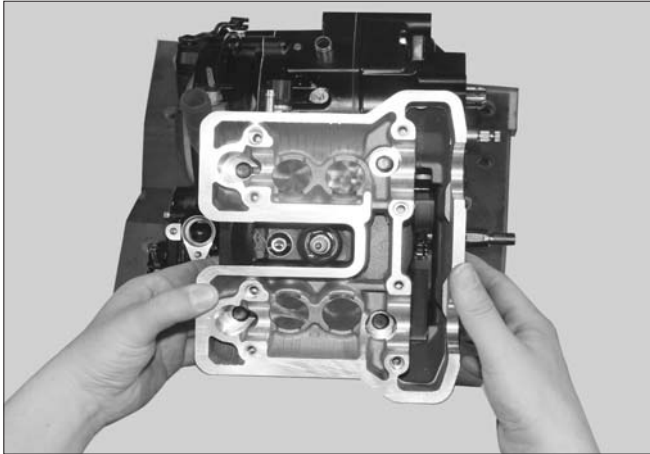


CYLINDER HEAD

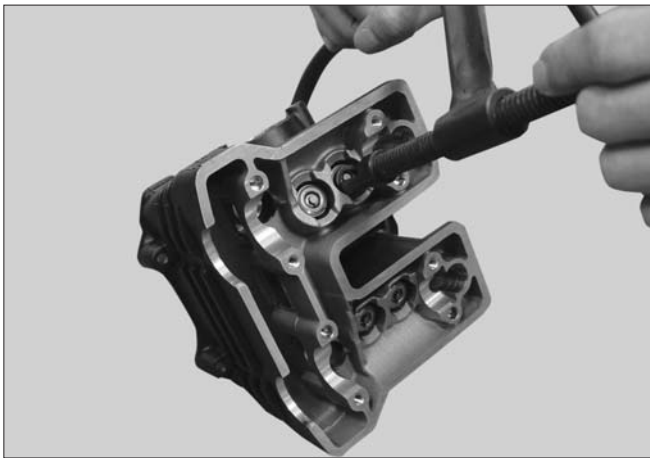
REMOVAL

- Remove the cylinder head cover
- Remove the camshaft.
- Remove the cylinder head special socket nut(M8)
- Remove the throttle body insulator.

CYLINDER HEAD DISASSEMBLY



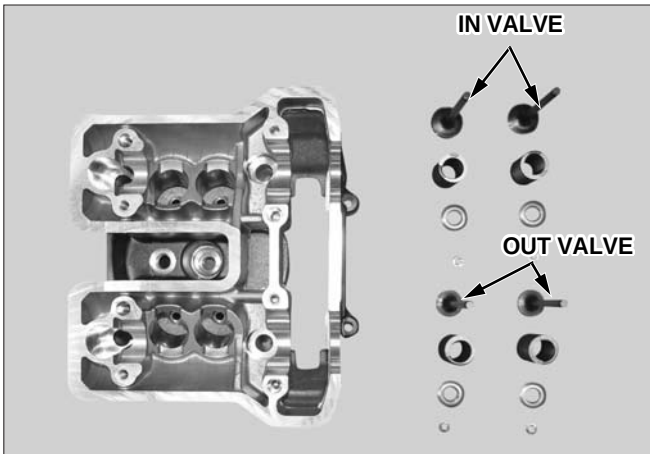
- Remove the cylinder head from cylinder.
- Remove the cylinder head gasket, dowel pin and cam chain guide.



- Remove the valve spring cotter, retainer, spring and valve using the valve spring compressor.
Tool: Valve spring compressor

⚠ CAUTION

- To prevent the loss of tension, do not compress the valve springs more than necessary to remove the cotters.



* NOTE

- Mark all parts during disassembly so they can be placed back in their original locations.
- Remove the valve stem seals and valve spring seals, remove the carbon deposits from the combustion chamber.

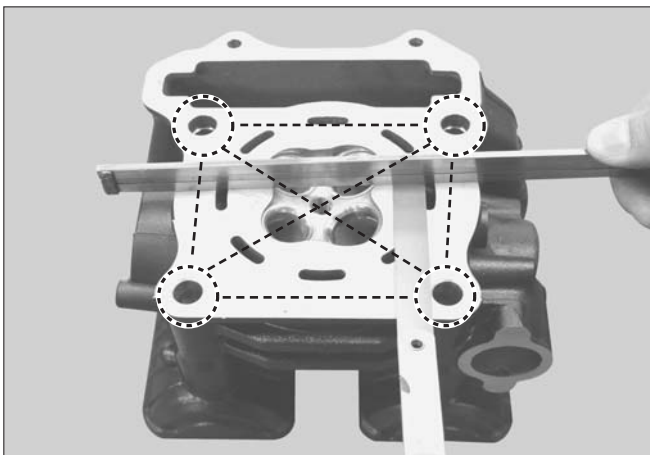
INSPECTION

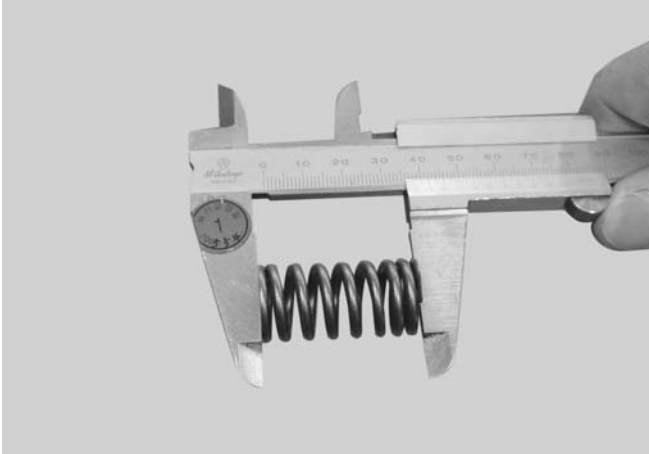
CYLINDER HEAD

- Clean off the head gasket surface.
- Inspect the spark plug assembly hole and the crack of near valve seat. Check for the warp of the cylinder head with a square and filler gauge.
Service Limit : 0.1mm

⚠ CAUTION

- Avoid damaging the gasket surfaces.



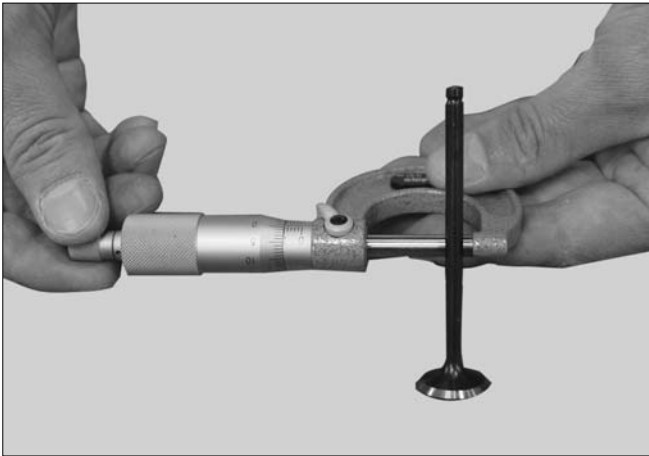


VALVE SPRING

- Measure the free length of valve spring.
Service Limit : 40.0mm

CAUTION

- If any valve spring is shorter than the service limit, it must be replaced as a set.



INTERVAL BETWEEN VALVE STEM AND VALVE GUIDE

- Inspect each valve for bending, burning, scratches or abnormal wear.
- Check the operating condition using the valve guide.
- Measure and record external diameter of valve stem.

SERVICE LIMIT : IN : 4.925 mm
EX: 4.905 mm



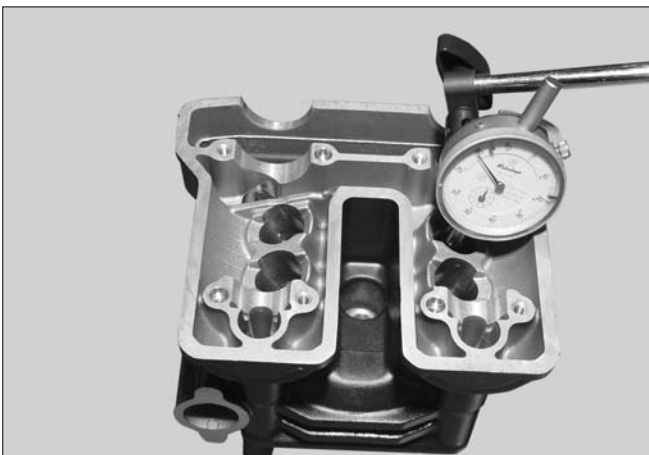
- Insert the valve guide reamer from the combustion chamber side and ream the guide to remove any carbon build-up before measuring the guide.

NOTE

- Rotate the reamer clockwise during the installation and removal of reamer.

Otherwise, it may cause the damage to the inside of the guide.

TOOL : VALVE GUIDE REAMER



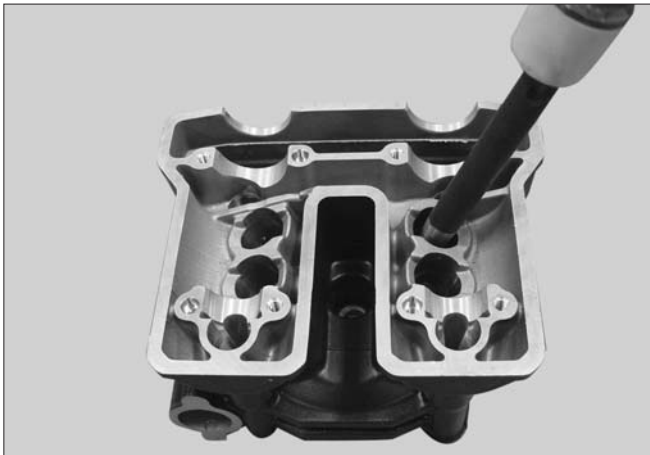
- Measure and record each valve guide inner diameter.

SERVICE LIMIT : 5.030 mm

- Measure the gap between valve stem and guide.

SERVICE LIMIT : IN : 0.080 mm
EX: 0.100 mm

- Measure the inner diameter of the new valve guide. If the clearance is not within the service limit, replace the valve.



VALVE GUIDES REPLACEMENT

⚠ NOTE

- Refinish the valve seats whenever the valve guides are replaced to prevent uneven seating.
- Replace the cylinder head with the temperature of 130°C - 140°C.
- Do not heat the cylinder head beyond 150°C.
- Unskillful operation can give the burns.
- Do not heat the cylinder head partly using the torch that may cause the cylinder head warping.

- Support the cylinder head and drive the old guides out of the combustion chamber side of the cylinder head.

TOOL : VALVE GUIDE DRIVER

⚠ CAUTION

- Avoid damaging the head when driving the valve guide out.

- Install the new O-ring to new valve guide.
- Insert the valve guide from the upper part of cylinder head.

TOOL : VALVE GUIDE DRIVER

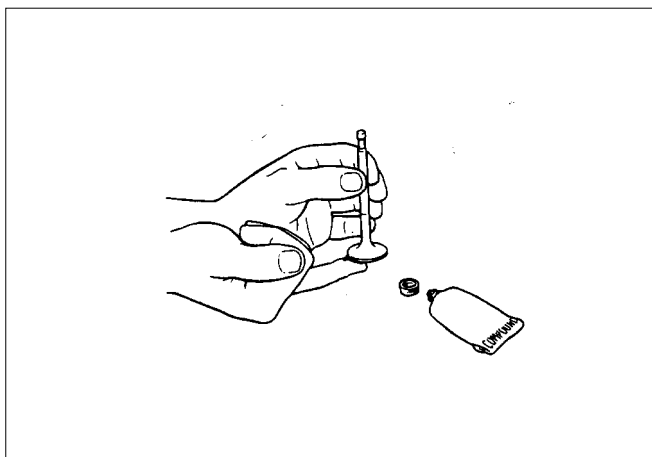
- After insert the valve guide, complete the valve guide reamer by putting the valve guide reamer on the cylinder head's combustion chamber.

TOOL : VALVE GUIDE REAMER

⚠ NOTE

- Take care not to tilt or lean the reamer in the guide while reaming. Otherwise, the valve is installed slanted, that causes oil leaks from the stem seal and improper valve seat contact and results in the valve seat refacing not able to be performed.
- Use cutting oil on the reamer during this operation.

- Reface and clean the cylinder head.
- Inspect and correct around the valve seat.



VALVE SEATS INSPECTION / REFACE

- Clean all intake and exhaust valves thoroughly to remove carbon deposits.
- Apply a light coating of Prussian Blue to each valve face.
- Tap the valve against the valve seat several times with the valve guide reamer, without rotating the valve, to check for proper valve seat contact.
- Remove the valve and inspect the valve seat face.
- The valve seat contact should be within the specified width and evenly all around the circumference.
If the valve seat width is not within specification, reface the valve seat.

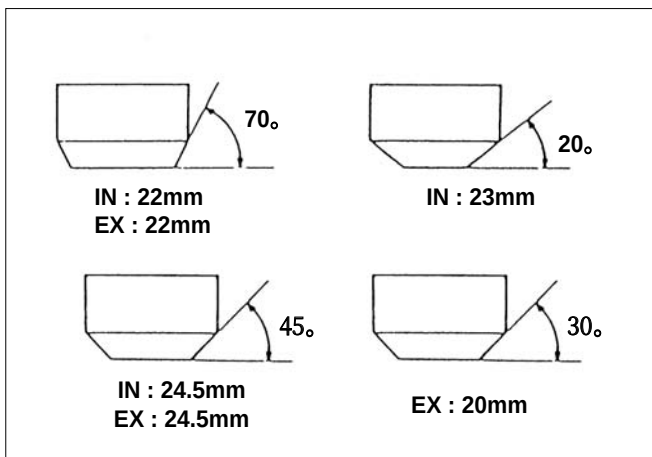
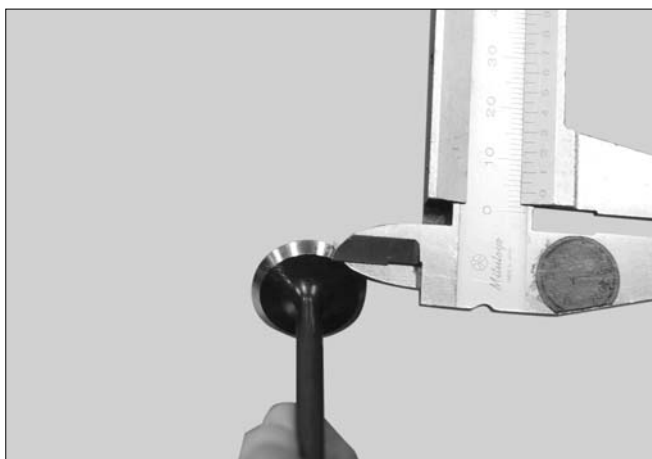
NOTE

- Valve faces cannot be ground. If a valve face is rough, worn unevenly, or contacts the seat improperly, the valve must be replaced.

- Measure the valve seat width.

STANDARD VALUE : 0.7~0.9 mm

SERVICE LIMIT : 1.3 mm

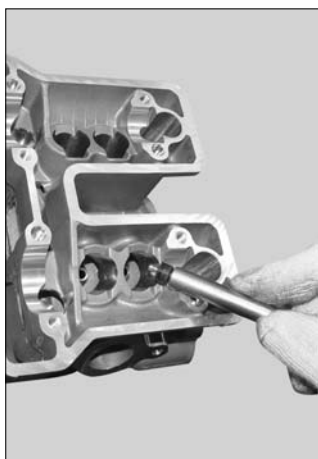


VALVE SEAT CUTTER

- Reface the worn valve seat by using valve seat cutters and grinders.

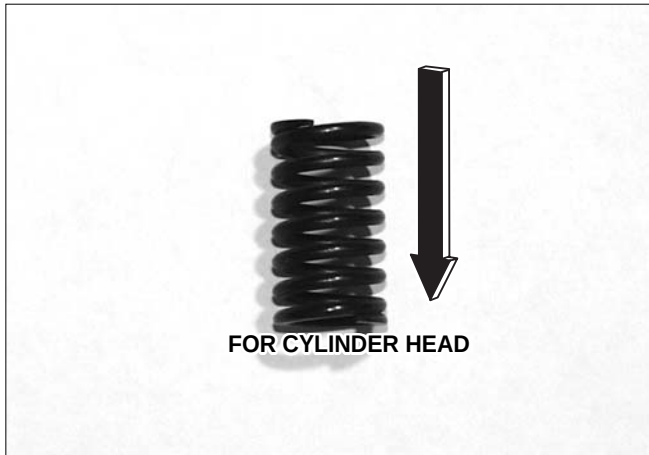
NOTE

- Follow the refacer manufacturer's operating instructions.
- Be careful not to grind the seat more than necessary.

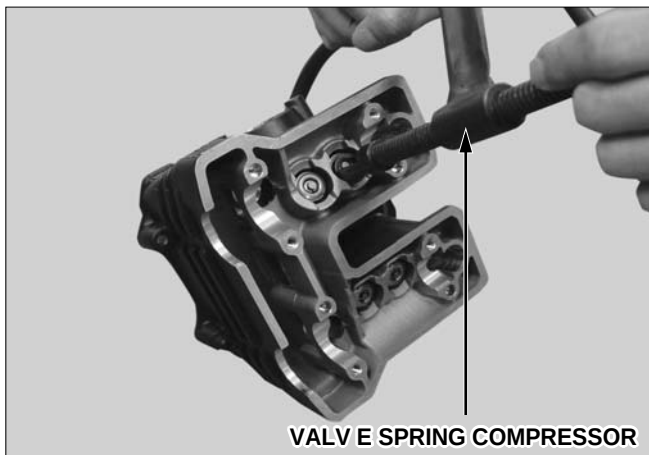


CYLINDER HEAD ASSEMBLY

- Install new stem seals and valve spring seat.
- Lubricate each valve stem with molybdenum grease and insert the valve into the valve guide turning it slowly to avoid damage the stem seals.
- Check to see if the valve move up and down smoothly.



- Install the valve springs with the narrow pitch forward to cylinder head.

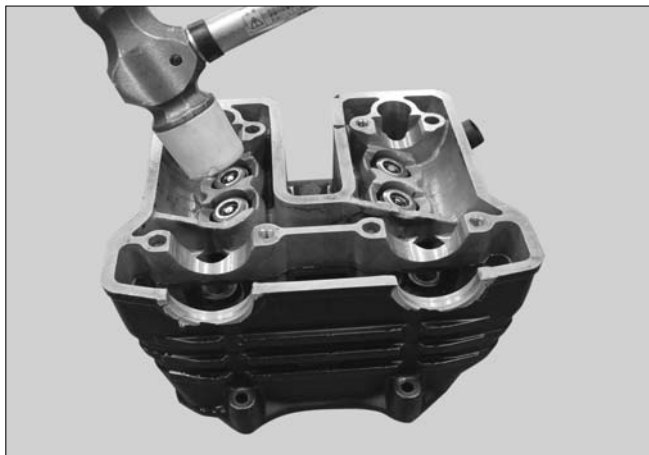


- Install the spring retainer.
- Using the valve spring compressor.
- Install the valve cotters.

 CAUTION

- Do not compress the valve spring more than necessary.

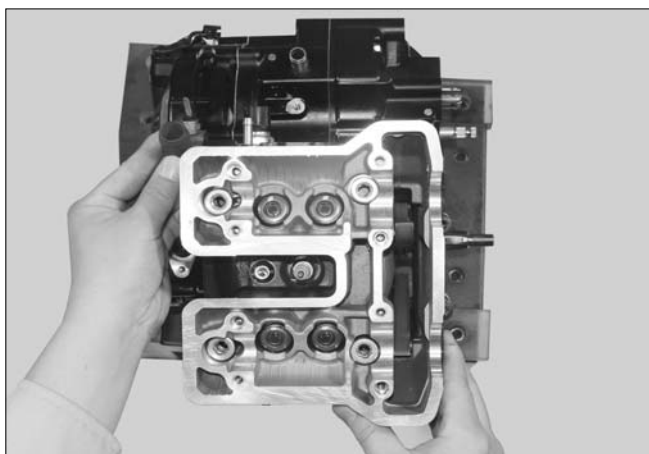
TOOL : VALVE SPRING COMPRESSOR



- Tap the valve stems gently 2~3times with a soft hammer to firmly seat the cotters.

 CAUTION

- Take necessary precautions not to damage the valve.

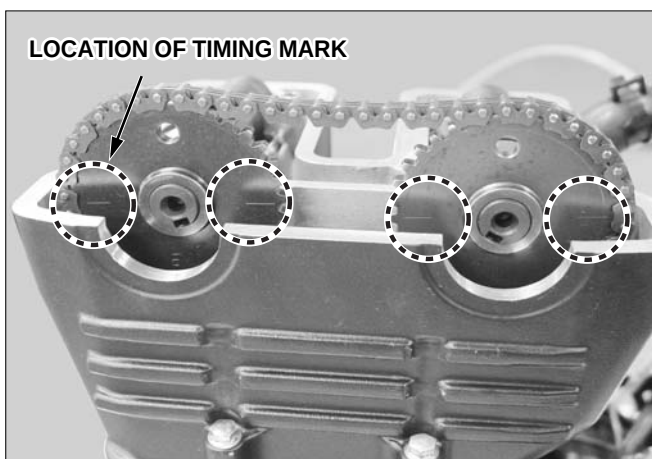
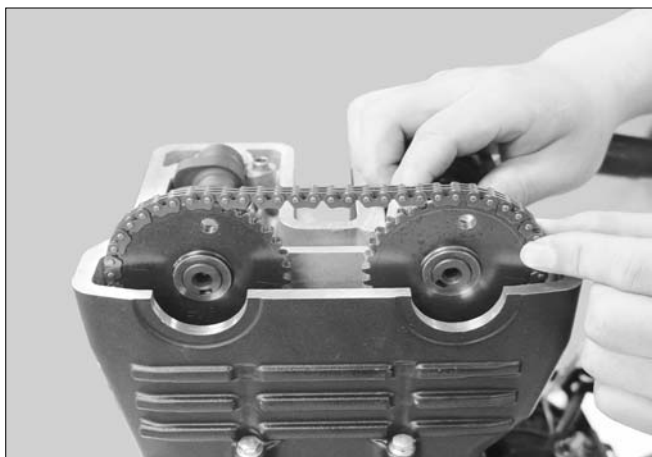
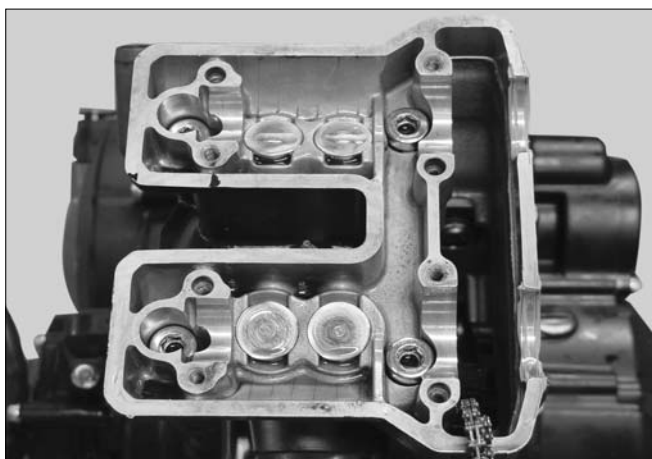
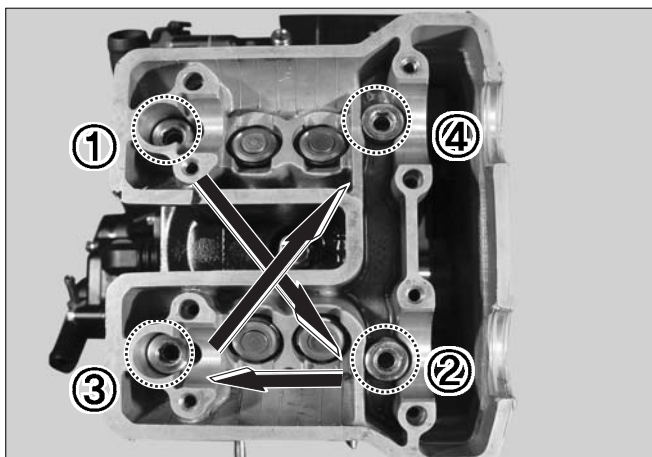


- Install the cam chain tensioner, and assemble pivot bolts.

TORQUE : 1.0 kgf · m

- Install the spark plug.

TORQUE : 1.1 kgf · m



CYLINDER HEAD INSTALLATION

- Clean any gasket material from the cylinder surface.
- Install the cam chain guide to the cylinder.
- Install the dowel pins and new gasket.
- Install the cylinder head.
(Install in reverse order of removal)

NOTE

- When install the 'cylinder head special socket nut' (M8 ×1.25), tighten them for 2times as shown picture.

- ① half installation→ ② Complete installation→
- ③ Complete installation→④ Complete installation→
- ① Complete installation

TORQUE : 4.0 kgf · m

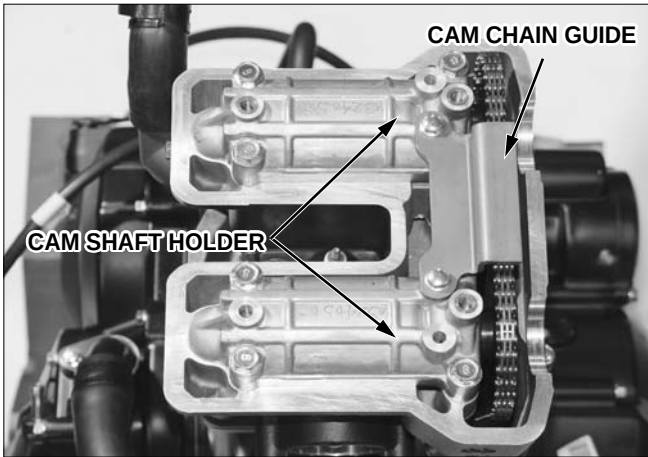
- Assemble the shim in place.
- After checking the camshaft for damage, put it to the cylinder head.

- Slowly rotate the crankshaft counterclockwise, and align the " T " mark of the flywheel with the index mark of the LH. crankcase cover.

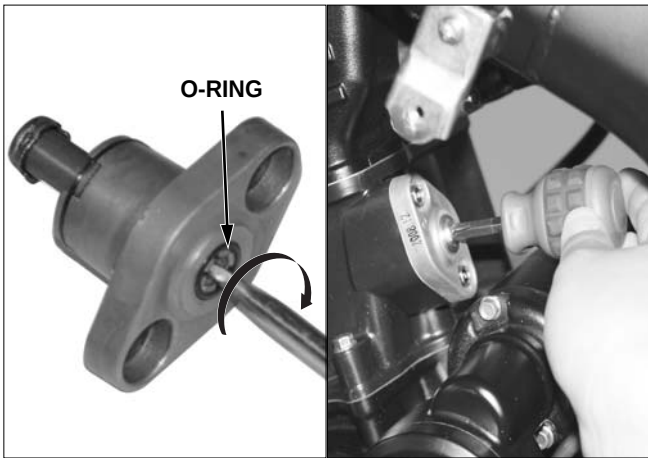
CAUTION

- Take precautions not to allow the cam chain to drop into the camshaft timing gear while turning the camshaft.

- Apply engine oil to the camshaft then assemble the cam chain and cam sprocket after matching the cam sprocket timing mark in parallel with the top of the cylinder head.



- Install the dowel pins on the cylinder head.
- Install the camshaft holder.
- Install the cam chain guide.



- Remove the sealing screws and o-ring from the cam chain tensioner.
- Rotate the tensioner shaft clockwise with a small screwdriver, and insert the shaft into the body completely.
- Assemble a new gasket to the tensioner lifter, and install the tensioner lifter on the cylinder.
- Install tensioner lifter bolt.

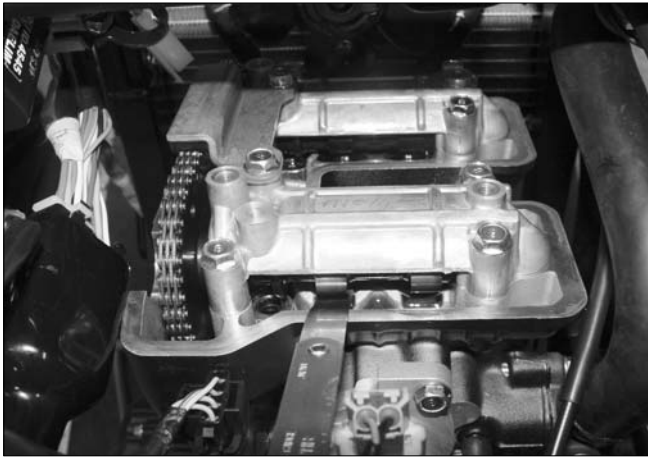
TORQUE : 1.2 kgf · m

- Install the O-ring and sealing screw to the tensioner lifer.

TORQUE : 0.4 kgf · m

⚠ CAUTION

- If the cam chain tensioner lifter is dropped, the shaft will advance by the spring force.

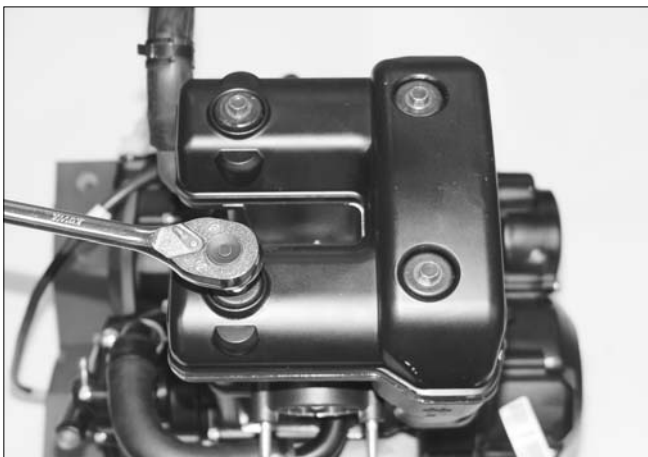


- Fill clean engine oil into the operating parts of the cylinder head.
- Adjust the valve clearance.
- If the valve clearance is unfit, adjust the shim.
- Install the 30mm cap and A.C generator cap.

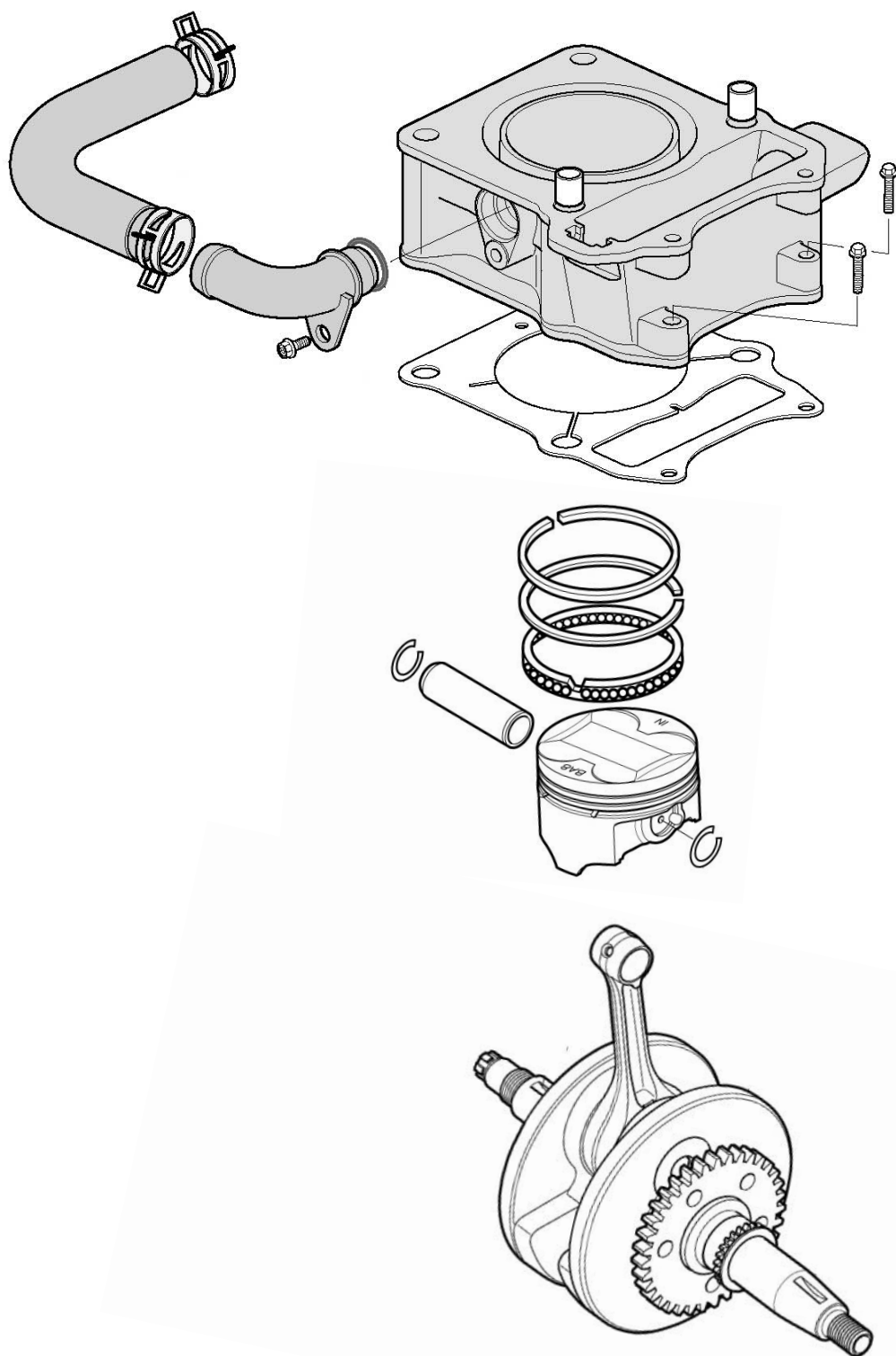
TORQUE :

30mm CAP : 0.8kgf · m

A.C.GENERATOR CAP : 0.6kgf · m



- Remove oil from the cylinder head cover grooves, and accurately assemble the gasket to the cylinder head cover.
 - Install the cylinder head cover.
 - Tighten the cylinder head cover bolt.
- TORQUE : 1.0 kgf · m**



11. CYLINDER / PISTON

SERVICE INFORMATION · · · 11-1
TROUBLESHOOTING · · · · 11-1
CYLINDER REMOVAL · · · · 11-2

PISTON / PISTON RING · · 11-3
CYLINDER INSTALLATION · 11-6

SERVICE INFORMATION

GENERAL SAFETY

- Be careful not to damage the mating surfaces by using a screwdriver when disassembling the cylinder. Do not strike the cylinder too hard during disassembly, even with a rubber or plastic mallet, to prevent the possibility of damage to the cylinder fins.
- Take care not to damage the cylinder wall and piston.

SPECIFICATIONS

Unit : mm

ITEM			STANDARD VALUE	SERVICE LIMIT
CYLINDER	INNER DIAMETER		73.005~73.015	73.10
	CYLINDRICAL		-	0.10
	ROUNDLESS		-	0.05
	HEAD CONTACT WARPAGE		-	0.10
PISTON, PISTON PIN, PISTON RING	PISTON SKIRT OUTER DIAMETER		72.985~72.965	72.60
	PISTON PIN HOLE INNER DIAMETER		17.002~17.008	17.04
	PISTON PIN OUTER DIAMETER		16.994~17.000	16.96
	PISTON-TO-PISTON PIN CLEARANCE		0.002~0.014	0.02
	PISTON RING-TO-GROOVE CLEARANCE	TOP	0.015~0.045	0.09
		SECOND	0.015~0.045	0.09
	PISTON RING JOINT GAP	TOP / SECOND	0.35~0.45	0.50
		OIL RING (SIDE RAIL)	0.20~0.70	1.10
CYLINDER-TO-PISTON CLEARANCE			0.020~0.050	0.30
CONNECTING ROD SMALL END INNER DIAMETER			17.010~17.028	17.06
GAP BETWEEN CONNECTING ROD SMALL END AND PISTON PIN			0.010~0.034	0.04

TROUBLESHOOTING

Compression too low

- Worn piston
- Worn, damaged piston ring
- Worn cylinder

Excessive smoke

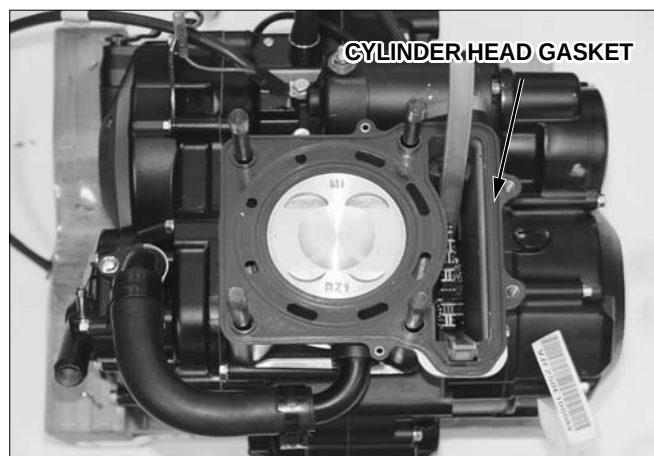
- Worn cylinder, piston or piston rings
- Improper installation of piston ring
- Scored or scratched piston or cylinder

Overheating

- Excessive carbon build-up on top of piston

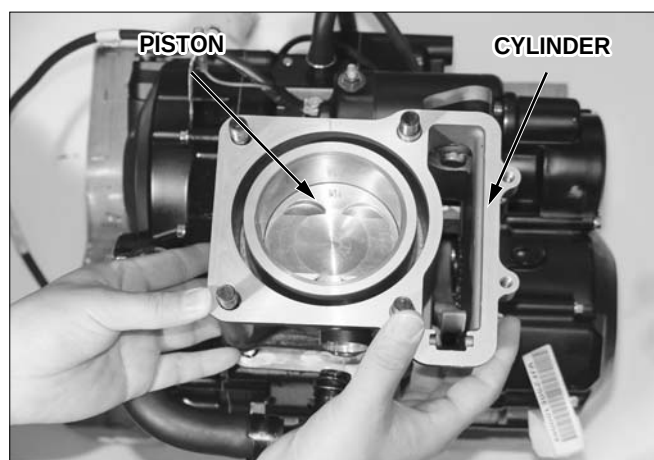
Abnormal noise

- Worn cylinder and piston
- Worn connecting rod small end bearing or piston pin
- Damaged piston ring
- Excessive carbon build-up on top of piston



CYLINDER REMOVAL

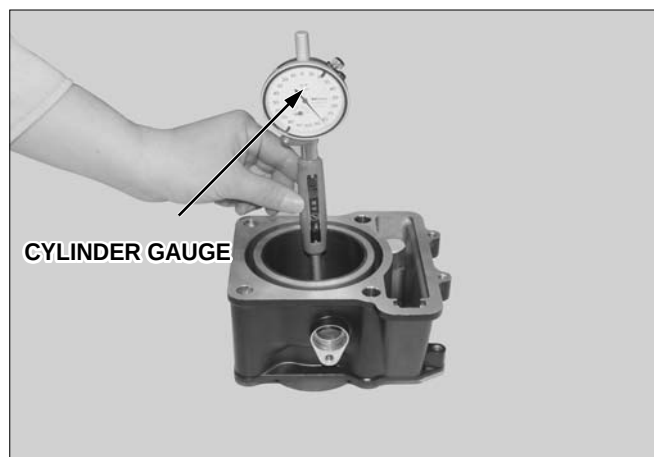
- Remove the cylinder head. (⇒10-5)
- Remove the cylinder head gasket.
- Remove the cam chain guide from the cylinder.
- Remove the cylinder.



- Remove the gasket and dowel pin. Carefully remove any adhering gasket material from the cylinder mating surface.

NOTE

- Take care not to damage the cylinder interface.



INSPECTION

- Inspect the cylinder wall for scratches and wear.
- Measure and record the cylinder inner diameter at three levels in both an X and Y axis.
- Take the maximum reading to determine the cylinder wear.

SERVICE LIMIT : 73.005~73.015 mm

- Measure the piston outer diameter.
- Calculate the piston-to-cylinder clearance. Take the maximum reading to determine the clearance.

SERVICE LIMIT : 0.30 mm

- Calculate the cylinder roundness and cylindrical at three levels in an X and Y axis. Take the maximum reading to determine the roundness and cylindrical.

SERVICE LIMIT : ROUNDNESS : 0.05 mm

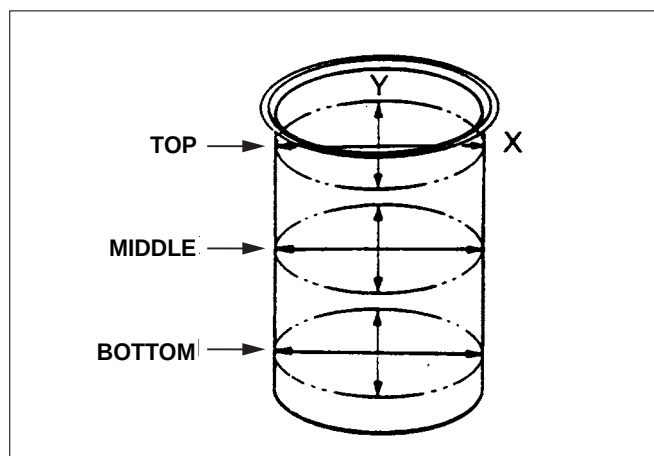
CYLINDRICAL : 0.1 mm

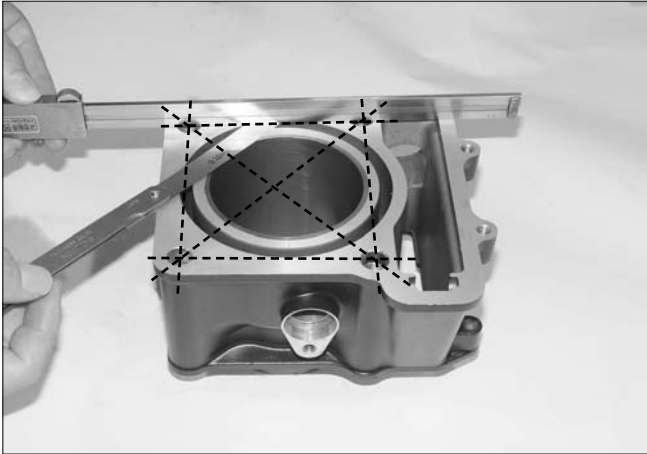
- If any of the cylinder measurements exceed the service limits, replace the cylinder.

**SERVICE LIMIT : OUT-OF-ROUND : 0.2 mm , 0.50mm
: 0.75mm , 1.0mm**

STANDARD LIMIT : 0.020~0.050 mm

- If the piston outer diameter is oversize, boring the cylinder to fit.





WARPAGE INSPECTION

- Check the torsion of contact surface in gasket cylinder.
SERVICE LIMIT : 0.100 mm



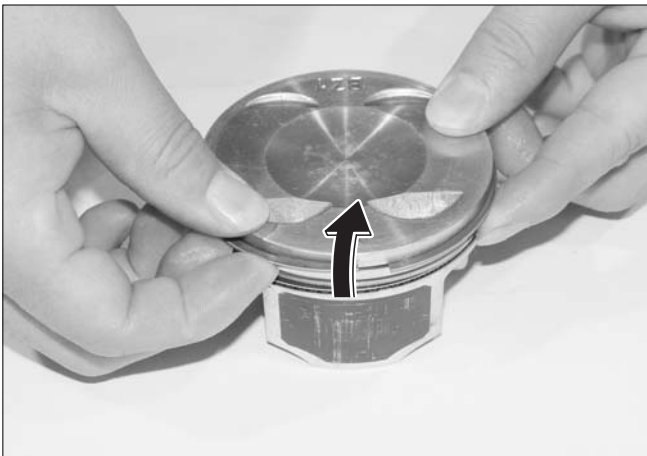
PISTON

REMOVAL

- Remove the piston pin clip.

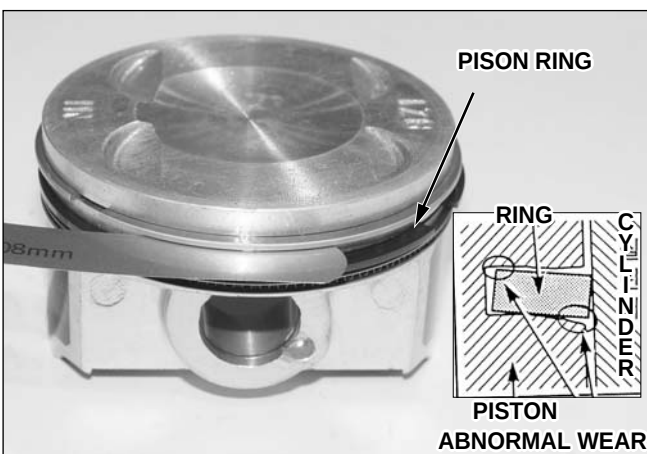
 **NOTE**

- Take precautions not to allow the piston pin clip to drop into the crank case.



 **NOTE**

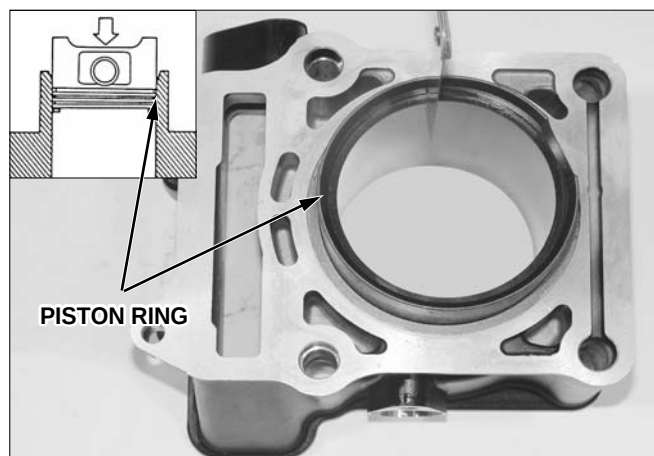
- Do not damage or scratch the piston.



- Measure the clearance between the piston ring and piston grooves.

SERVICE LIMIT : TOP : 0.090 mm
SECOND : 0.090 mm
OIL RING : 0.090 mm

- Inspect the piston for wear or damage.



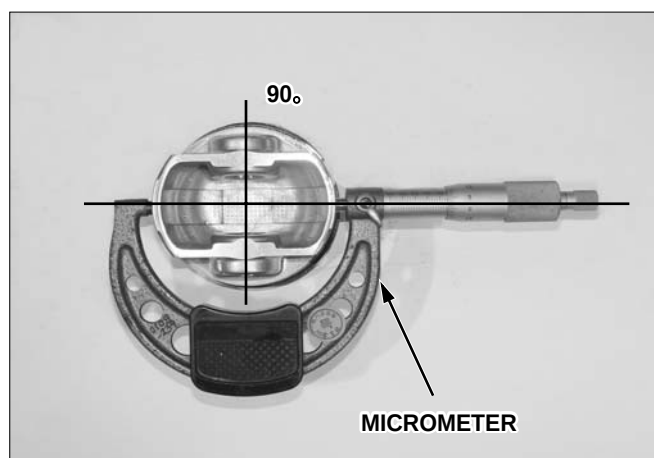
- Insert the piston ring into the inside cylinder, check the piston ring clearance.

SERVICE LIMIT TOP/SECOND: 0.5mm
OIL RING : 1.10mm.



NOTE

- Push the rings into the cylinder with the top of the piston to be sure they are squarely in the cylinder.



- Measure the outer diameter of the piston at 10mm from the bottom and 90° to the piston pin.
- Replace the piston if the service limit is exceeded.

SERVICE LIMIT : 72.965 - 72.985 mm

PISTON PIN INSPECTION

- Measure the piston pin hole inside diameter.

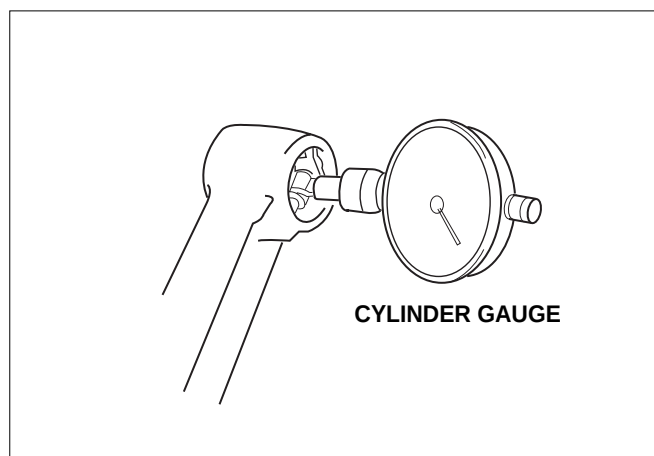
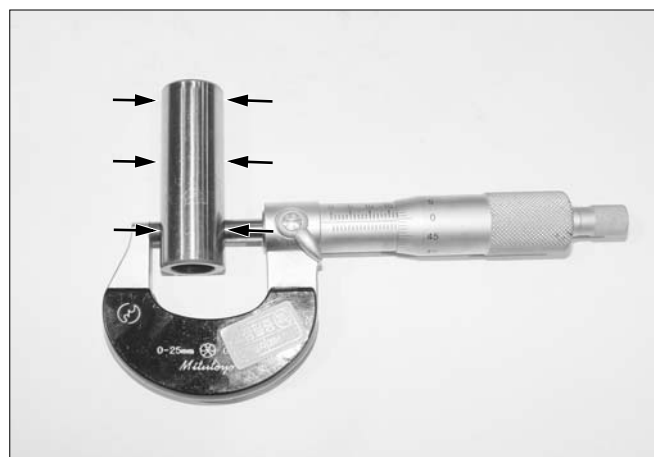
SERVICE LIMIT : 17.002 - 17.008 mm

- Measure the piston pin outer diameter.

SERVICE LIMIT : 16.994 ~ 17.000 mm

- Calculate the clearance between the piston and the piston pin.

SERVICE LIMIT : 0.008 mm

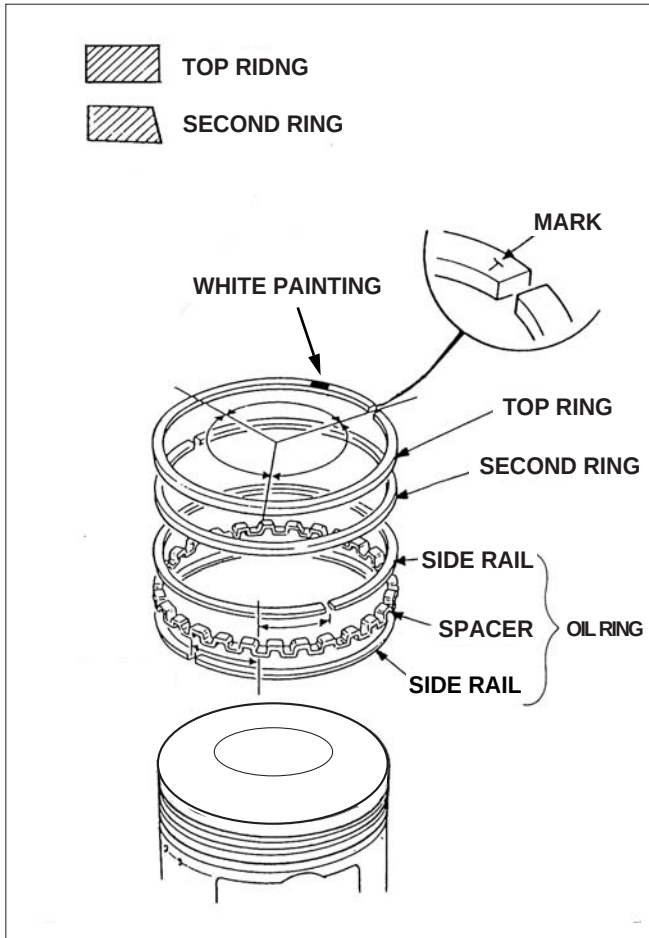


- Measure the inner diameter of the connecting rod small end.

SERVICE LIMIT : 17.010 ~ 17.028 mm

- Calculate the clearance between the inner diameter of the connecting rod small end and piston pin.

SERVICE LIMIT : 0.028 ~ 0.066 mm



PISTON / CYLINDER ASSEMBLY

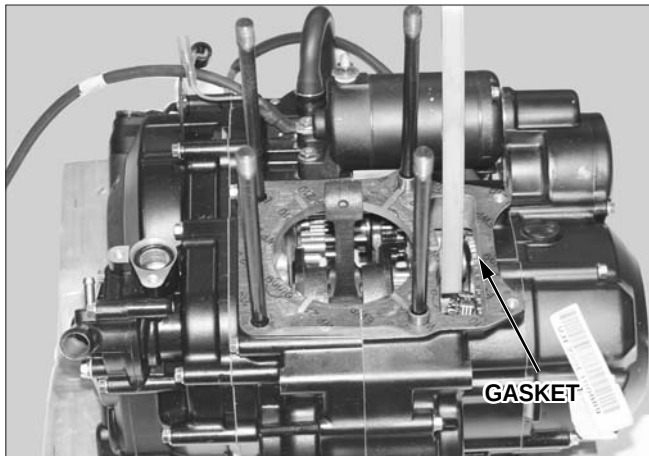
PISTON RING ASSEMBLY

- Clean the piston ring grooves and insert the piston rings.

NOTE

- Be careful not to damage the piston and rings during assembly.
- Do not confuse the top and second rings.
- Space the ring end gaps 120 degrees apart.
- Install the ring forward to the marking facing up.
- Do not accord the side rail of oil ring

- After installation, the rings should rotate freely in the ring grooves.

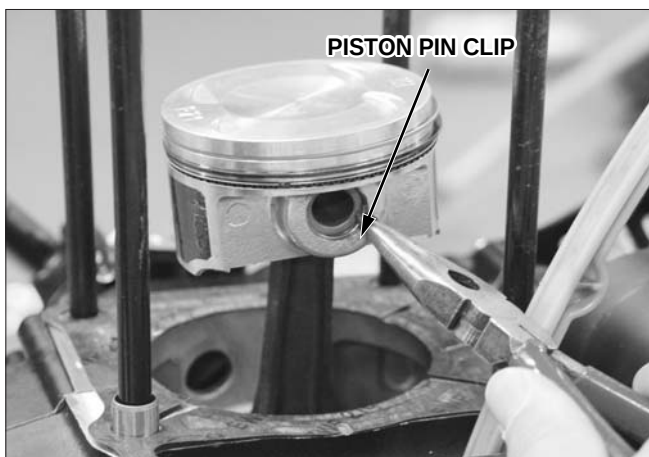


PISTON / CYLINDER INSTALLATION

- Remove gasket on the crank case surface.

NOTE

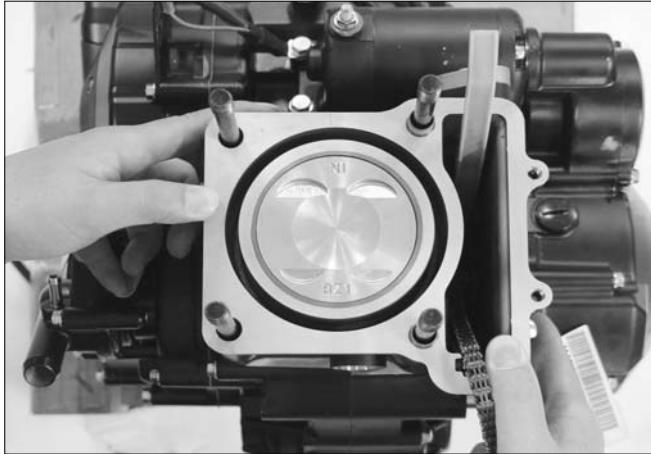
- Place a clean shop towel over the crankcase to prevent the clip from falling into the crankcase.
- Do not damage the contact place of gasket



- Insert the piston and piston into the conrod
- Install new piston pin clips.

CAUTION

- "IN" MARK, it does toward to intake side.
- Take care not to drop the piston pin clip into the crankcase.
- Do not align the clip's end gap with the piston cutout.

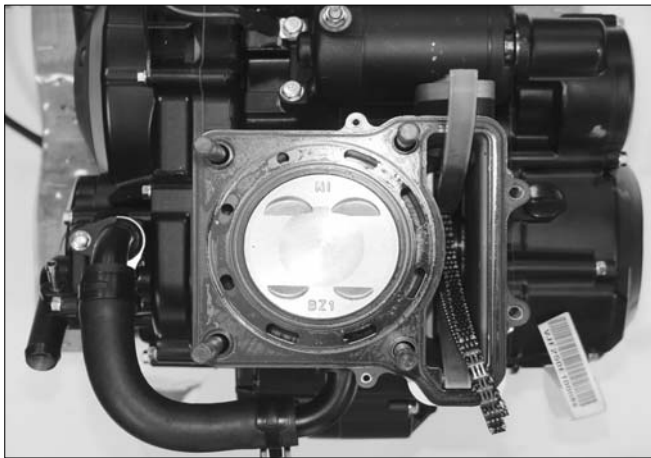


CYLINDER INSTALLATION

- Install a new cylinder gasket and dowel pins.
- Coat the cylinder wall with clean engine oil and lubricate the piston rings and install the cylinder.

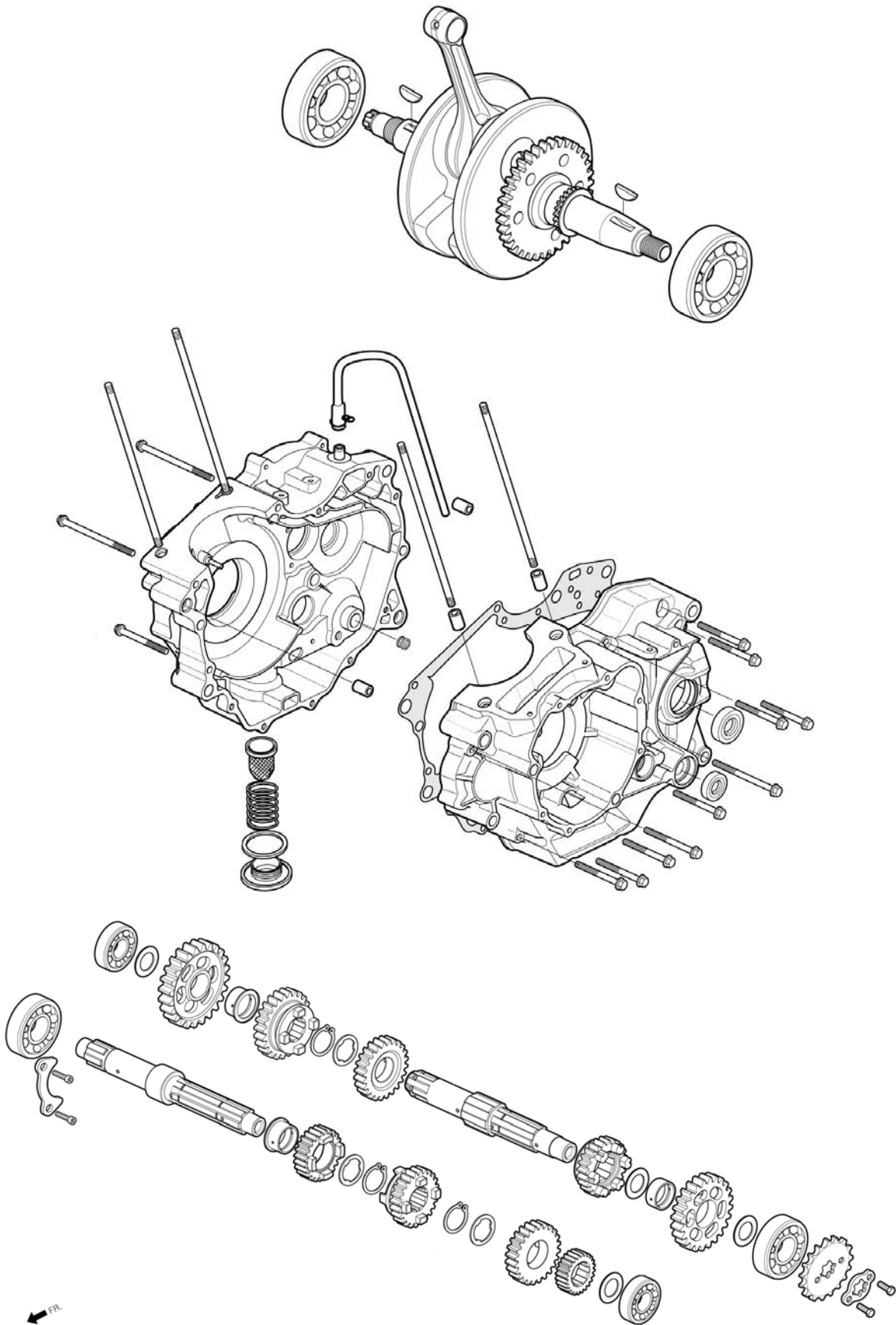
NOTE

- Be careful not to damage the piston rings.
- Be careful not to drop the cam chain into the crankcase.



- Install the lower part of the cam chain guide to the “ 額 ” part of the crankcase, and install the cam chain guide by aligning the projection part with the “ 額 ” part of cylinder.
- Install the cylinder head. (⇒10-10)
- Install in reverse order of removal.

MEMO



12. CRANKCASE/TRANSMISSION/CRANKSHAFT

SERVICE INFORMATION	12-1	CRANKCASE BEARING	12-7
TROUBLESHOOTING	12-2	CRANKSHAFT INSTALLATION	12-8
CRANKCASE DISASSEMBLY	12-3	TRANSMISSION ASSEMBLY	12-9
TRANSMISSION DISASSEMBLY	12-4	CRANKCASE ASSEMBLY	12-11
CRANKSHAFT	12-6		

SERVICE INFORMATION

GENERAL SAFETY

- To service the transmission, crank shaft and kick starter, the crankcase should be disassembled.
- Before disassembling the crankcase, the following parts must be removed.
 - CLUTCH, GEAR SHIFT SPINDLE (⇒ SECTION 8)
 - A.C. GENERATOR, STARTER CLUTCH (⇒ SECTION 9)
 - CYLINDER HEAD (⇒ SECTION 10)
 - CYLINDER, PISTON (⇒ SECTION 11)
 - STARTER MOTOR (⇒ SECTION 19)

SPECIFICATIONS

Unit: mm

ITEM			STANDARD VALUE	SERVICE LIMIT
SHIFT FORK/SHAFT	FORK	I.D.	12.000~12.018	12.050
		CLAW THICKNESS	4.930~5.000	4.500
	SHAFT O.D.		11.976~11.994	11.960
TRANSMISSION	MAIN SHAFT O.D.	M3, M5	19.967~19.980	19.930
	COUNTER SHAFT O.D.	C1	16.466~16.484	16.440
		C2	19.974~19.987	19.940
		C4	19.959~19.980	19.930
	GEAR I.D.	M5	23.000~23.021	23.050
		M3, C2	23.020~23.041	23.070
		C4	20.020~20.041	20.070
		C1	20.000~20.021	20.050
	GEAR BUSHING O.D.	M5	22.959~22.980	22.930
		M3, C2	22.979~23.000	22.950
		C1	19.959~19.980	19.930
	GEAR-TO-BUSHING I.D.	M3, C2	20.000~20.021	20.050
		C1	16.500~16.518	16.550
	GEAR-TO-BUSHING CLEARANCE	M3, M5 C1, C2	0.020~0.062	0.100
	GEAR-TO-SHAFT CLEARANCE	C4	0.040~0.082	0.120
	BUSH-TO-SHAFT CLEARANCE	M3	0.200~0.062	0.100
		C1	0.016~0.052	0.090
		C2	0.013~0.047	0.090

ITEM		STANDARD VALUE	SERVICE LIMIT
CRANKSHAFT	CONNECTING ROD BIG END SIDE CLEARANCE	0.050~0.300	0.600
	CONNECTING ROD BID END VERTICAL DIRECTION CLEARANCE	0~0.008	0.050
	CRANKSHAFT RUNOUT	RIGHT	0.100
		LEFT	0.100

TORQUE VALUES

BEARING SETTING PLATE 1.2kgf · m(12N · m)

CRANKCASE BOLT 1.1kgf · m(11N · m)

TOOLS

UNIVERSAL BEARING PULLER

BEARING REMOVER SET

DRIVER

ATTACHMENT

PIROT

THREAD ADAPTER

ASSEMBLY SHAFT

CRANKCASE ASSEMBLY COLLAR

TROUBLESHOOTING**Hard to shift**

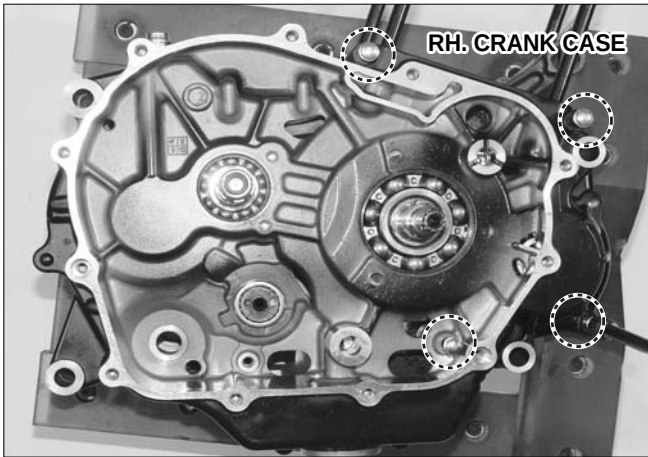
- Incorrect clutch system adjustment (Free play is too big)
- Shift fork bent
- Shift fork shaft bent
- Gear shift spindle claw bent
- Shift drum guide grooves damaged
- Shift fork guide spot damaged

Engine noise

- Connecting rod big end bearing worn
- Connecting rod bent
- Crank shaft main bearing worn or breakage
- Transmission gear worn or breakage

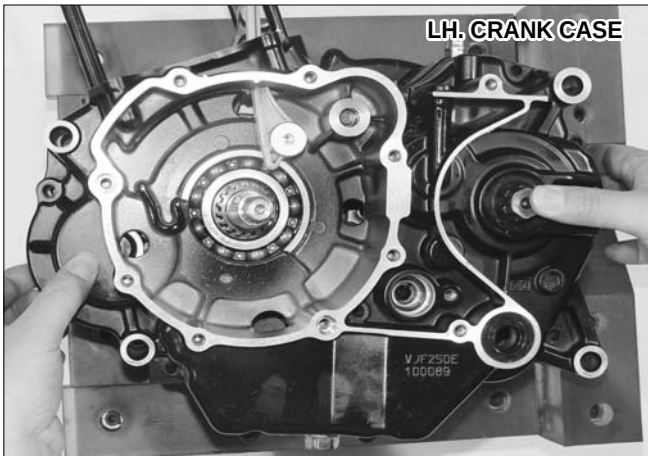
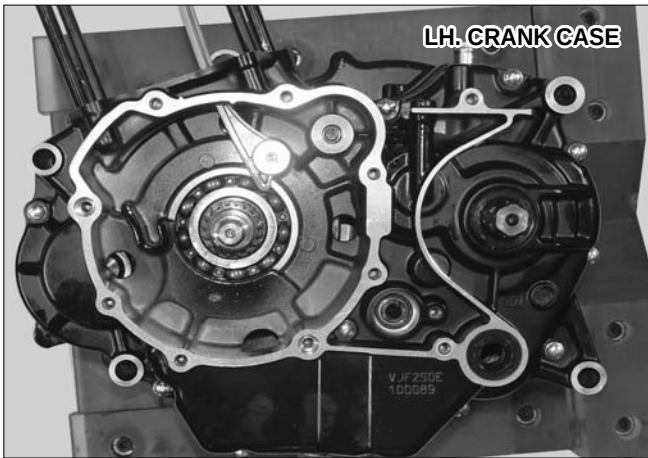
Transmission jumps out of gear

- Gear dogs worn
- Shift fork shaft bent
- Shift drum stopper damaged
- Shift drum guide grooves worn
- Shift fork grooves worn



CRANKCASE DISASSEMBLY

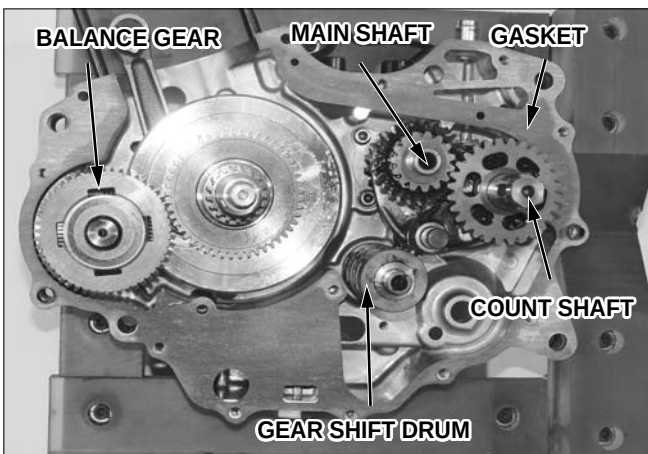
- Drain the coolant.
- The engine must be separated from the frame.
(⇒ section 7)
- Refer to the service information for removal of necessary parts before disassembling the crankcase.
- Remove the LH. cover / Fly wheel.
- Remove the RH. cover / Clutch.
- Remove the Cylinder head / Cylinder / Piston.
- Remove the 4pcs bolts from the RH. crankcase.
- Loosen the ten 11pcs bolts from the LH. crankcase in a crisscross pattern, remove the bolts.



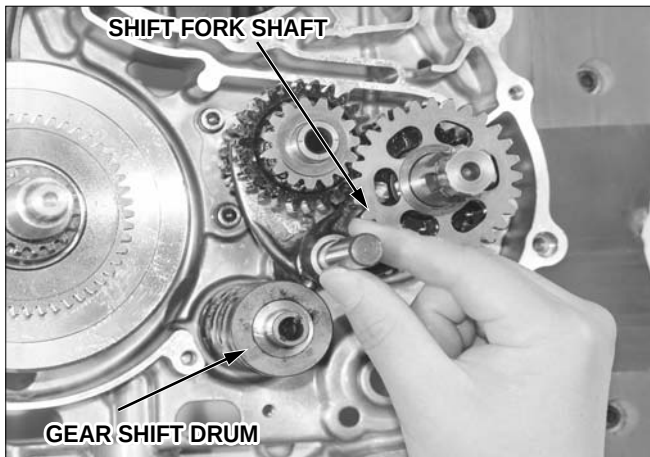
- Place the crank case down, and separate the LH. crankcase from the RH. crankcase by tapping the crankcase with a soft hammer.

NOTE

- Be careful not to distort the mating surface of the crankcase during removal.

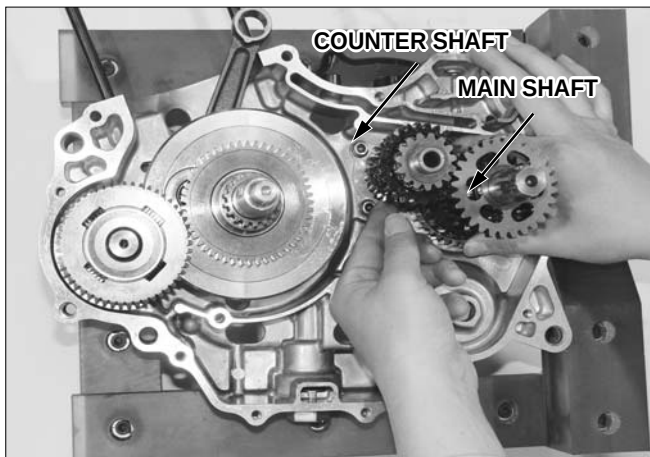


- Remove the dowel pins and gasket.



TRANSMISSION DISASSEMBLY

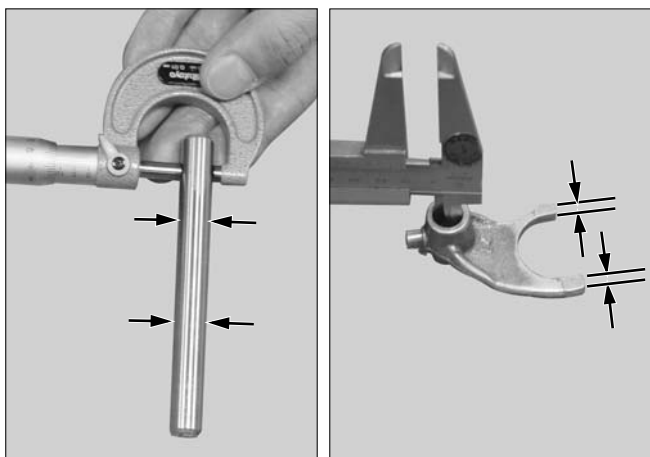
- Remove the shift fork shaft.
- Remove the shift fork and the shift drum.



- Remove the main shaft and the counter shaft as an assembly.



- Remove the crank balancer gear.



INSPECTION

- Check the shift fork for wear or damage.
- Measure the shift fork inside diameter and the shift fork claw thickness.

SERVICE LIMIT :

INSIDE DIAMETER : 12.050mm

CLAW THICKNESS : 4.500mm

- Check the shift fork shaft for wear or damage.
- Measure the shift fork shaft outside diameter in shift fork operation part.

SERVICE LIMIT : 11.960mm



- Check the shift drum for wear or damage.
- Check the shift drum guide groove for partial wear or damage.



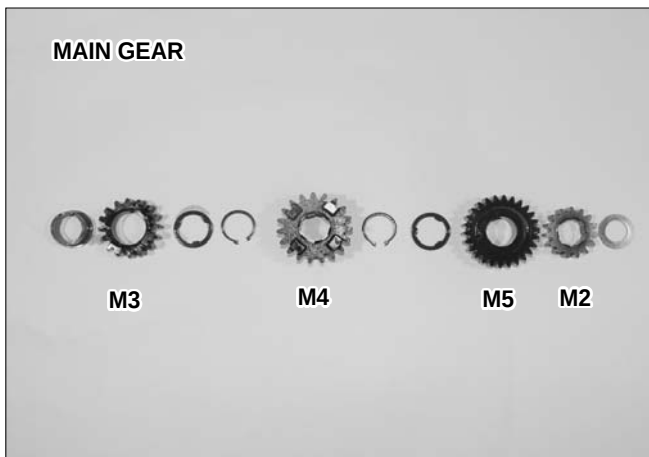
- Measure the main shaft and counter shaft outside diameter.

SERVICE LIMIT : M3, M5 : 19.930mm

C1 : 16.440mm

C2 : 19.940mm

C4 : 19.930mm



- Check the gear holes teeth and threads for wear and damage.

- Measure the gear inside diameter.

SERVICE LIMIT : M5 : 23.050mm

M3, C2 : 23.070mm

C4 : 20.070mm

C1 : 20.050mm

- Measure the gear bush inside diameter and outside diameter.

SERVICE LIMIT :

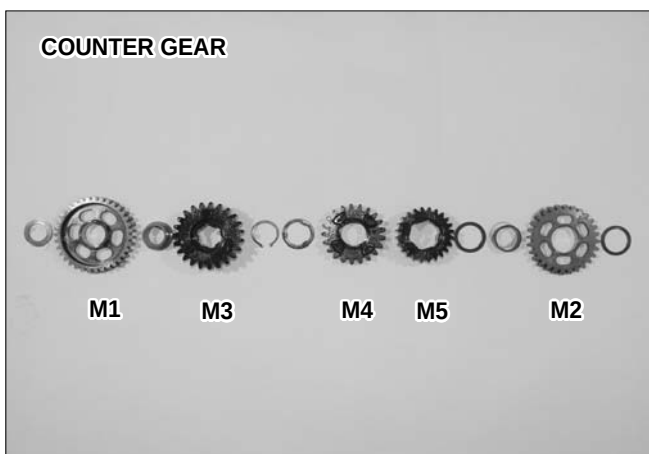
M5 : OUTSIDE DIAMETER : 22.930mm

M3, M2 OUTSIDE DIAMETER : 22.950mm

C1 OUTSIDE DIAMETER : 19.930mm

M3, C2 INSIDE DIAMETER : 20.050mm

C1 INSIDE DIAMETER : 16.550mm



- Measure out the gear-to-bush clearance.

SERVICE LIMIT :

M3, M5, C1, C2 : 0.100mm

- Measure out the gear-to-shaft clearance.

SERVICE LIMIT : C4 : 0.120mm

- Measure out the bush-to-shaft clearance.

SERVICE LIMIT : M3 : 0.100mm

C1 : 0.090mm

C2 : 0.090mm

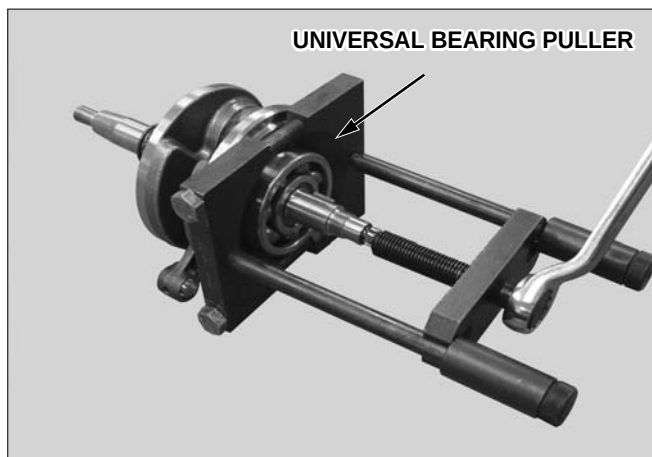


CRANKSHAFT

REMOVAL

- Remove the transmission.
- Remove the crankshaft from the RH. crankcase using a hydraulic press.
- Remove the remaining bearings in the RH. crankcase with a driver handle and outer driver.

**TOOLS : DRIVER
ATTACHMENT**

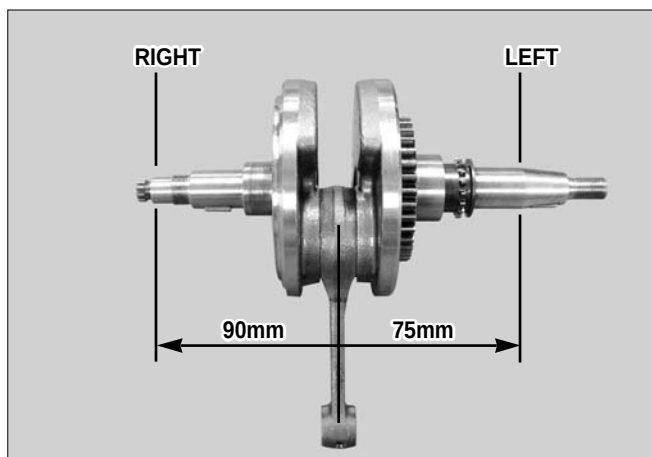


- If the bearing is left on the crankshaft, use a universal bearing puller to remove it.

TOOL : UNIVERSAL BEARING PULLER

NOTE

- After removing the crankshaft from the RH. crankcase, replace the RH. crankshaft bearing with a new one.

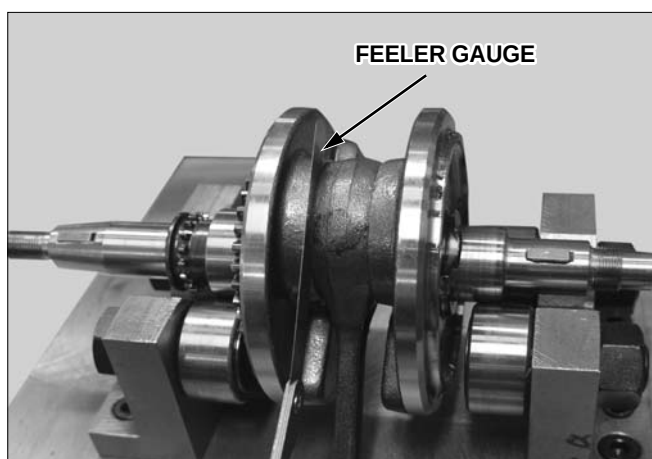


INSPECTION

- Place the crankshaft on a stand or V-block, and measure the crankshaft runout using dial gauge.

SERVICE LIMIT : RIGHT : 0.100 mm

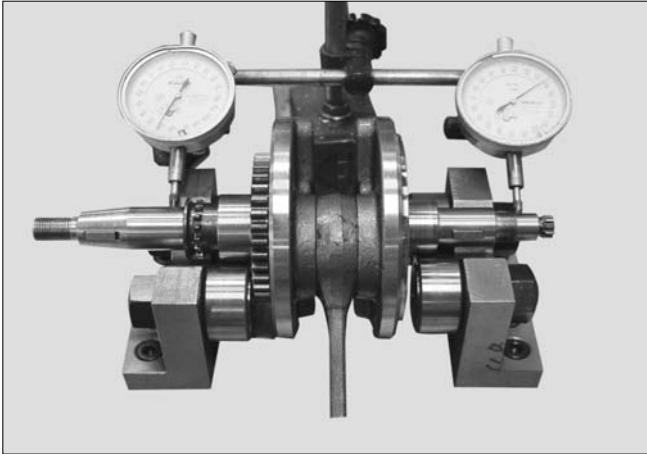
LEFT : 0.100 mm



- Measure the side clearance between the crankshaft and connecting rod big end by the feeler gauge.

SERVICE LIMIT : 0.600mm

TOOL : FEELER GAUGE



- Measure the connecting rod radial clearance in both X and Y directions.
- Replace the crankshaft if the service limit is exceeded.

SERVICE LIMIT : 0.050 mm

CRANKCASE BEARING

- Remove the transmission and crank shaft.

INSPECTION

- Turn the Inner race of bearing with fingers and inspect for smooth turning. Also inspect that the outer race is driven into the case exactly. If the clearance is excessive, or the driving for the case is loose, remove and replace them.

CAUTION

- Replace the transmission bearing with the right and left sets.

REPLACEMENT

LH. Crankcase

- Remove the crank balance shaft bearing, main shaft bearing, crank shaft bearing with the tools.

TOOL : BEARING REMOVER SET

- Remove the counter shaft bearing and oil seal.
- Coat the new bearing with clean engine oil, and install it into the crank case.

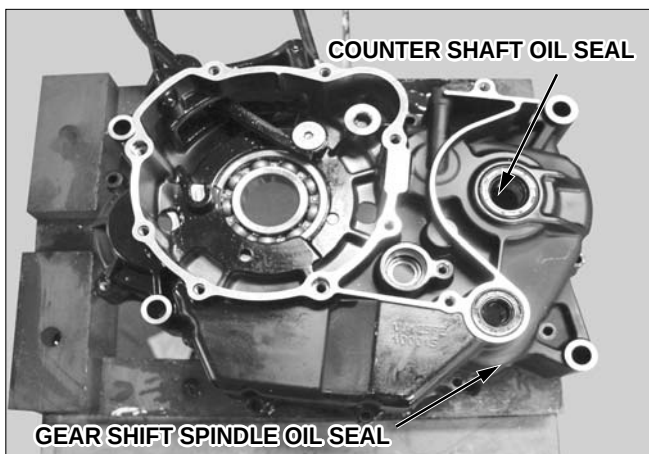
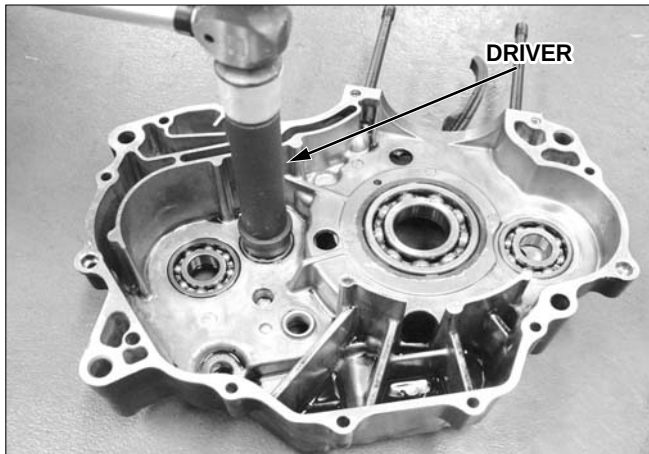
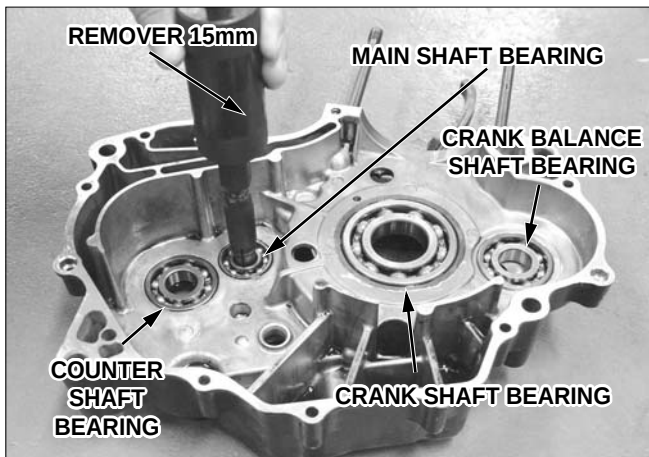
TOOLS : MAIN SHAFT BEARING :

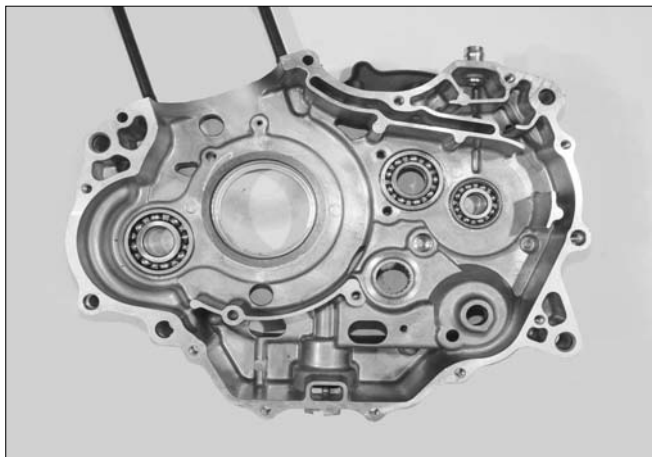
- DRIVER
- ATTACHMENT

COUNTER SHAFT BEARING:

- DRIVER
- ATTACHMENT
- PILOT

- Pressing the new counter shaft oil seal.
- Inspect the gear shift spindle oil seal for wear and damage, it must be replaced if necessary.





RH. Crank Case

- Remove the main shaft bearing set plate.
- Remove the main shaft bearing, counter shaft bearing and crank shaft bearing from crankcase.
- Apply the new bearing with clean engine oil and install it into crankcase.



- Insert closely the cooling jet into crankcase.
 - Insert angle: $10^{\circ} \pm 2^{\circ}$

TOOLS :

MAIN SHAFT / COUNTER SHAFT / CRANK BALANCER SHAFT BEARING

- DRIVER
- ATTACHMENT
- PILOT



- Coat the socket bolt screw part with oil and install the main shaft bearing set plate.

TORQUE : 1.2kgf · m (12N · m)

CRANKSHAFT INSTALLATION

- Coat a new left crankshaft bearing with clean engine oil and install new bearings into the right crankcase.

TOOLS : DRIVER

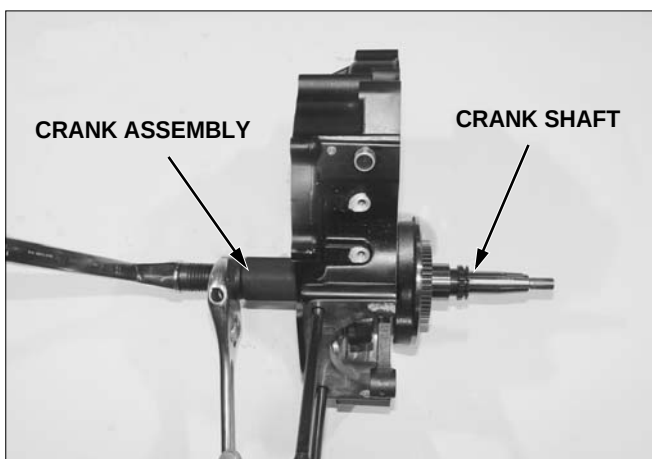
ATTACHMENT

PILOT

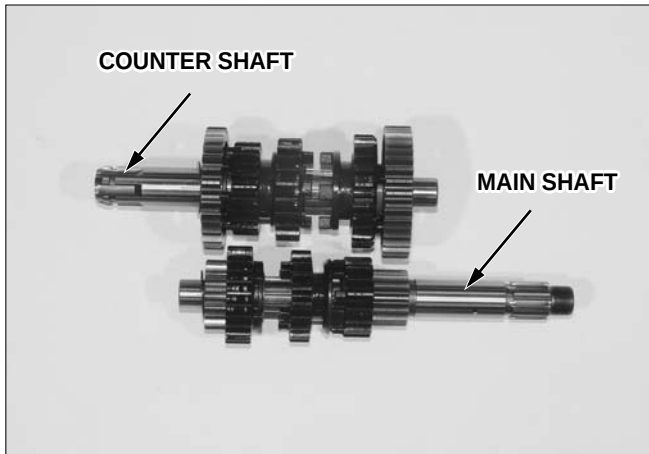
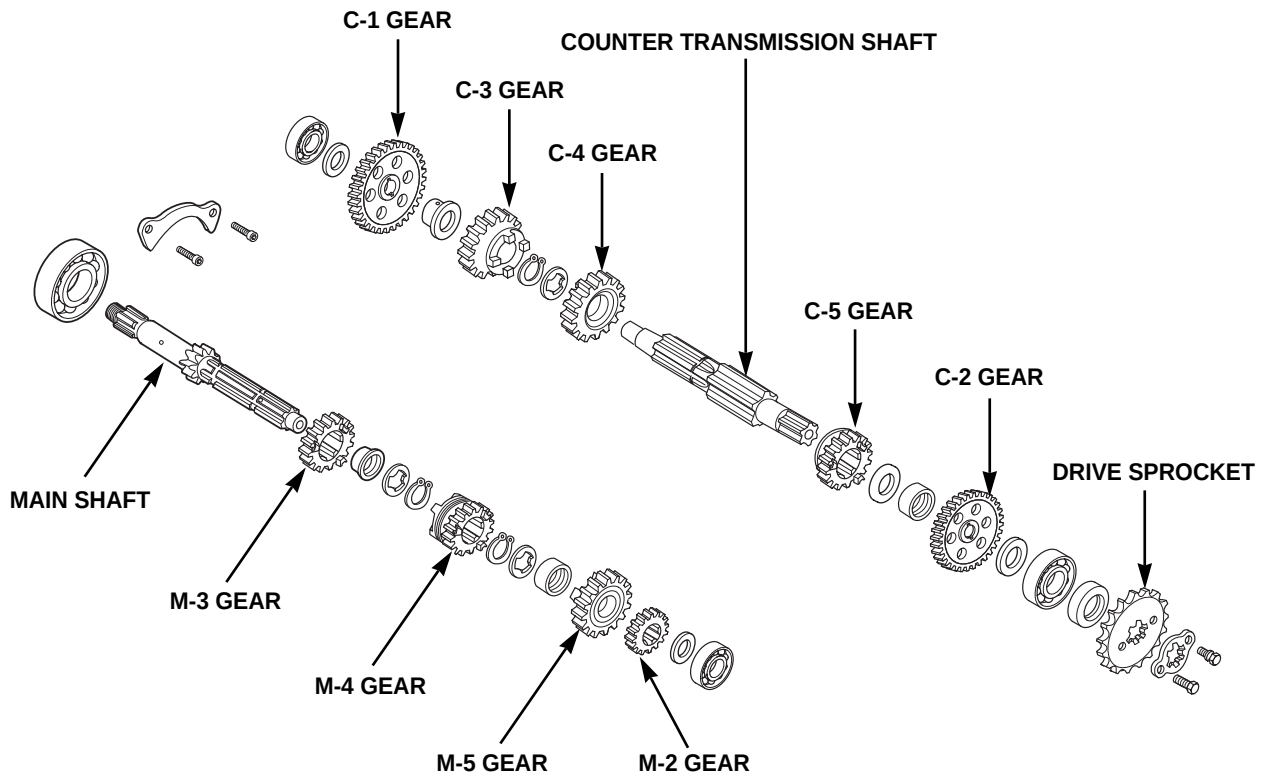
- Install the crankshaft into the RH. crankcase with the following tools:

TOOLS : ASSEMBLY SHAFT

CRANKSHAFT ASSEMBLY COLLAR



TRANSMISSION ASSEMBLY



- Apply the gear and gear bush with clean engine oil and install the main shaft and counter shaft.
- Check the gears for freedom of movement or rotation on the shaft.

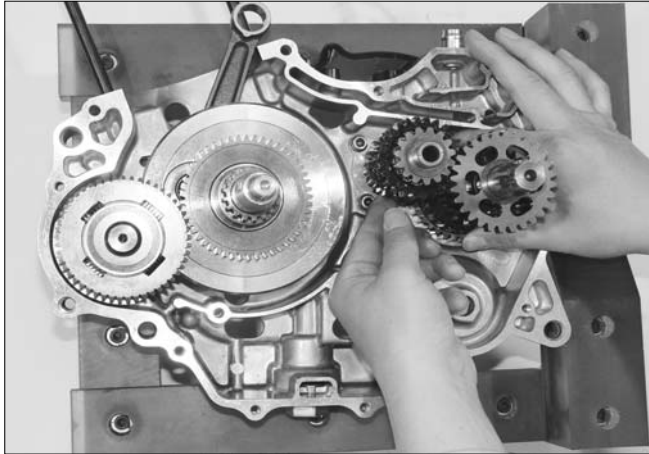
NOTE

- Note the installation direction of each snap ring.
- Do not use the worn snap ring again.
- Check the snap rings are seated in the grooves spinning the rings. Align the end gaps of the snap ring with the grooves of spline.

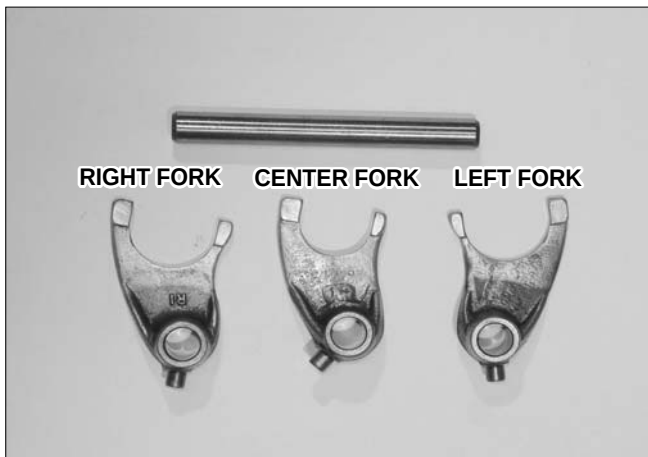


NOTE

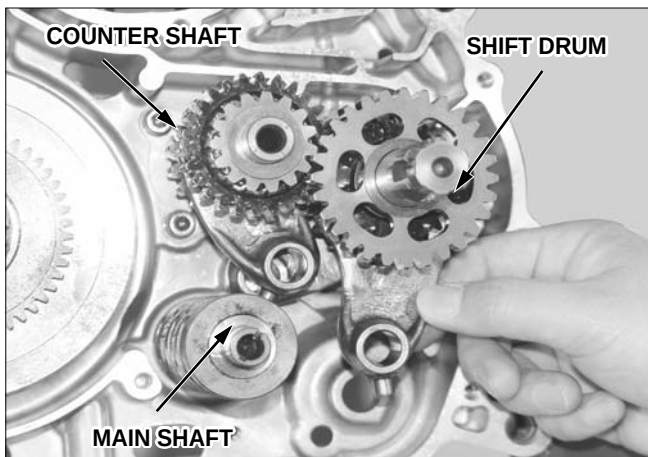
- Align the balancer drive gear and balancer driven gear with the marking location.



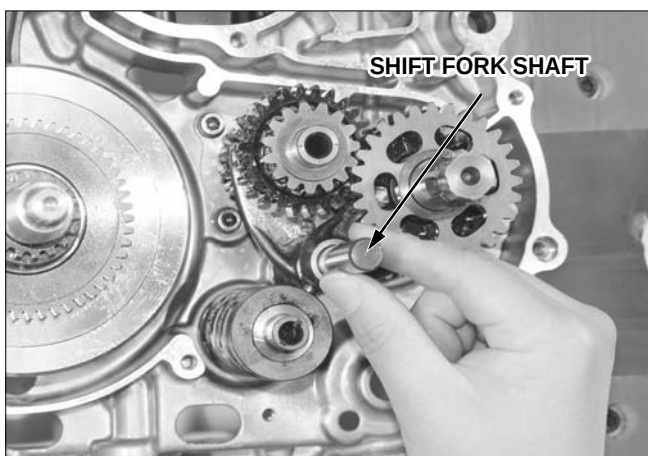
- Install the main shaft and counter shaft on RH. crank case together.



- Check the marks on the shift forks.
 - L. fork : “L” mark
 - Center fork : “C” mark
 - R. fork : “R” mark



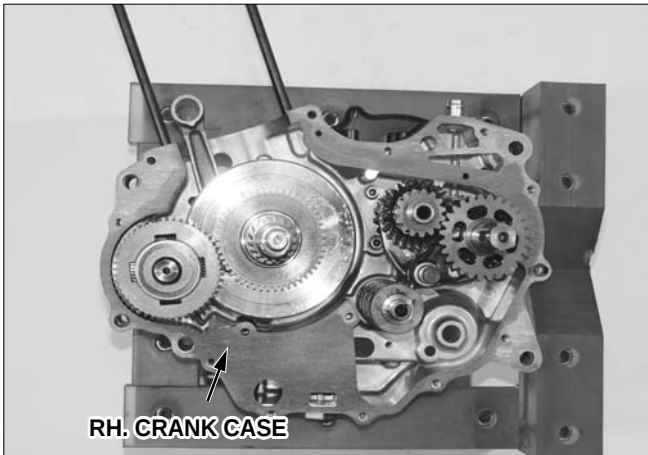
- Install the L. fork mark and center fork and then install R. fork.
- Install the shift drum. Install the shift fork guide pin into the guide groove of the drum.



- Install the shift fork into the shift fork shaft, then install the shift fork shaft into the RH. crankcase assembling hole.

CRANKCASE ASSEMBLY

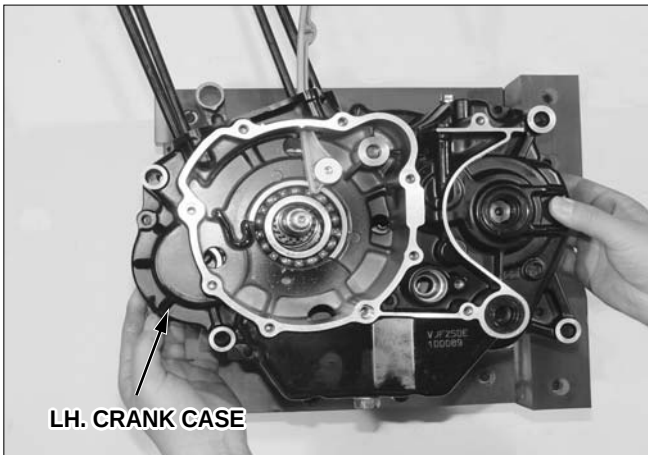
- Install the dowel pins and a new gasket.



- Install the LH. crank case.

NOTE

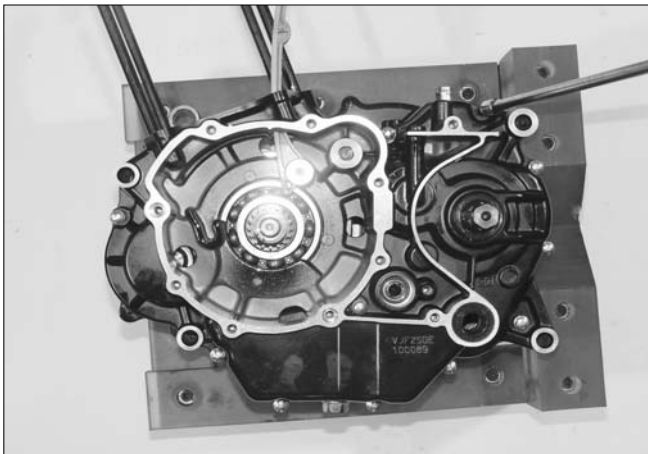
- Make sure that there is no gap between the mating surfaces of the right and left crankcase.



- Tighten the LH. crankcase bolts in a crisscross pattern in 2-3 steps.

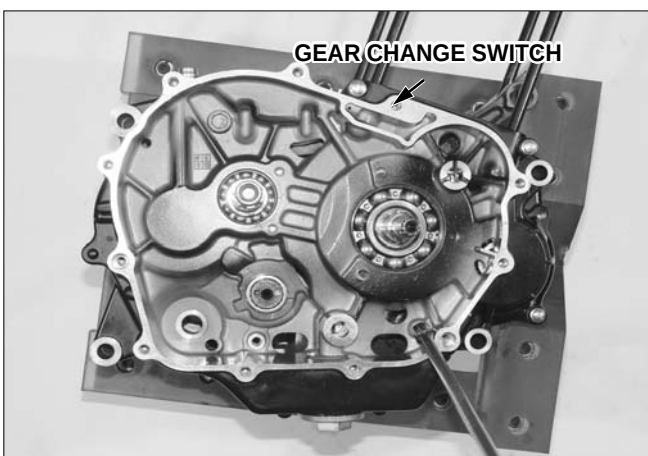
TORQUE : 1.1kgf · m(11N · m)

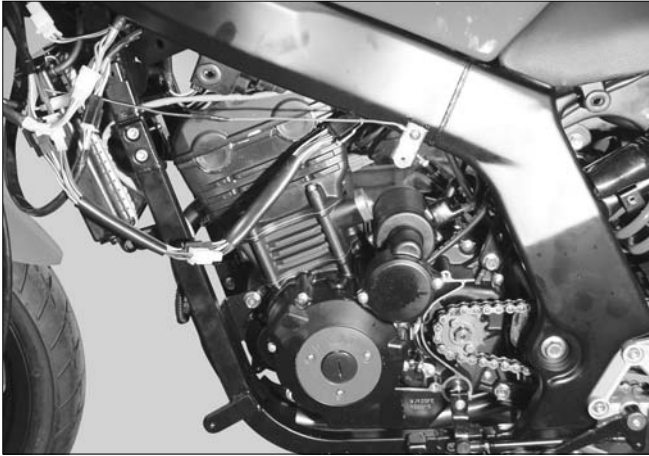
- After replacing the o-ring of the gear change switch to a new one, coat the new o-ring with engine oil, then install the switch pin into the groove of the shift drum.



- Tighten the 4pcs of RH. crankcase bolt.

TORQUE : 1.1kgf · m(11N · m)



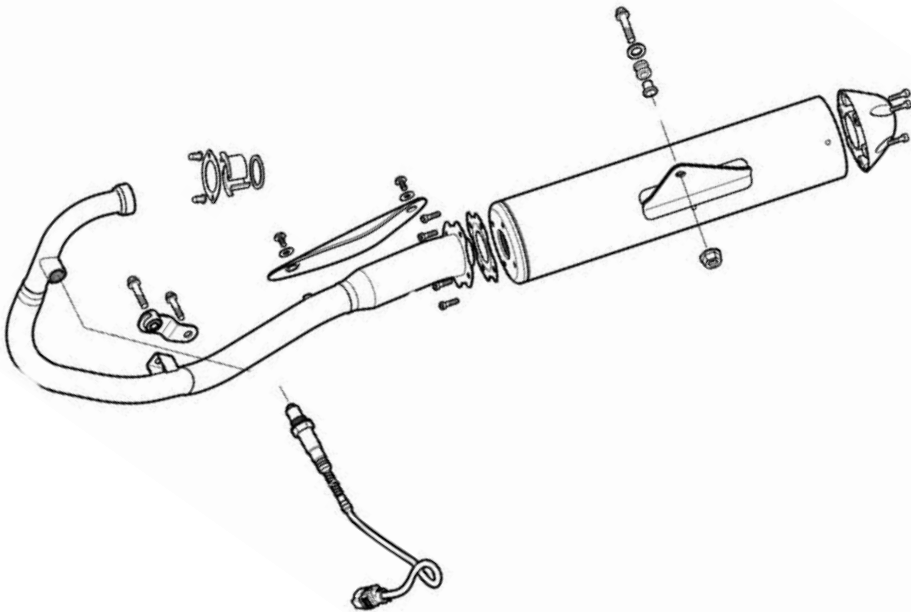
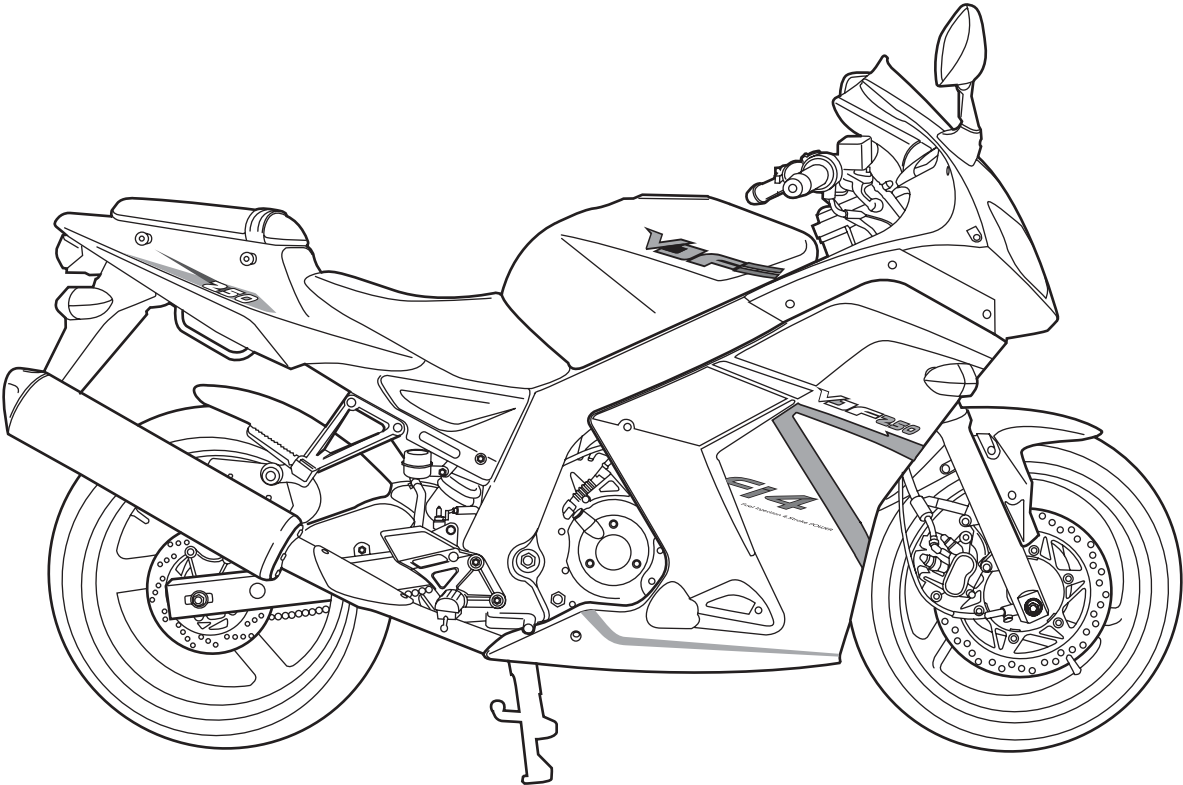


- Install the below parts.
 - Clutch / RH. cover
 - Cylinder / Cylinder head
 - Flywheel / LH. cover
- Install the engine on the frame. (⇒Section 7)
- Pour the engine oil.
- Pour the coolant.



- Install of the cowl in the reverse order of removal.

MEMO



13. SEAT / EXHAUST MUFFLER

SERVICE INFORMATION	13-1	REAR WHEEL MUDGUARD . .	13-3
SEAT/SIDE COVER	13-2	MUFFLER/EXHAUST PIPE . . .	13-4
REAR SEAT (PILLION SEAT) . .	13-2	FRONT FENDER	13-5
REAR COWL	13-3		
REAR FENDER	13-3		

SERVICE INFORMATION

GENERAL SAFETY

 WARNING

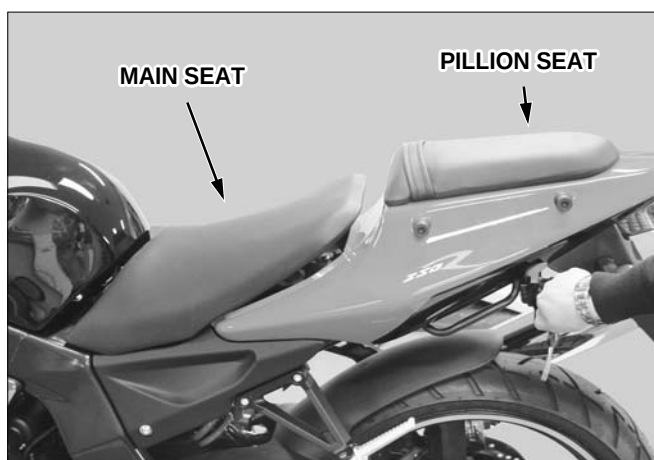
- Beware of the muffler after driving or engine stop, as it is still hot to be burnt especially never children touch on it.



SIDE COVER / SEAT

SIDE COVER REMOVAL

- Remove the seat.
- Remove the RH/LH. side cover special bolts, then remove the RH/HL. side covers.
- Remove the side cover hook from the grommet of the frame, by pulling the side cover forward.



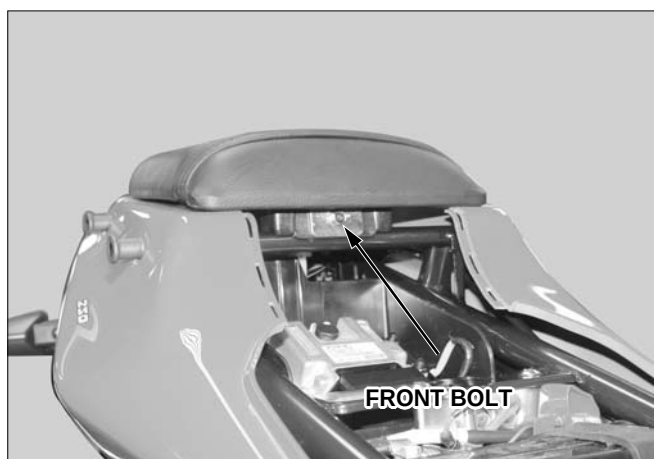
SEAT REMOVAL

- Turn the helmet holder left to unlock the seat and then pull the seat back and up.
- Installation is in the reverse order of removal.

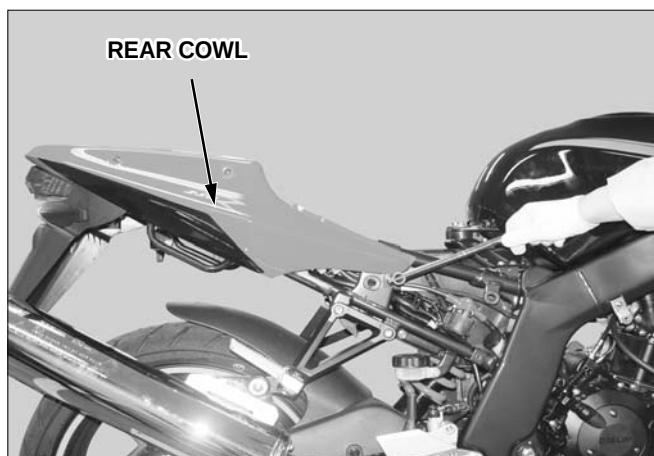


REAR SEAT(PILLION SEAT)

- Remove the seat.
- Remove the center cover setting grommet and center cover.

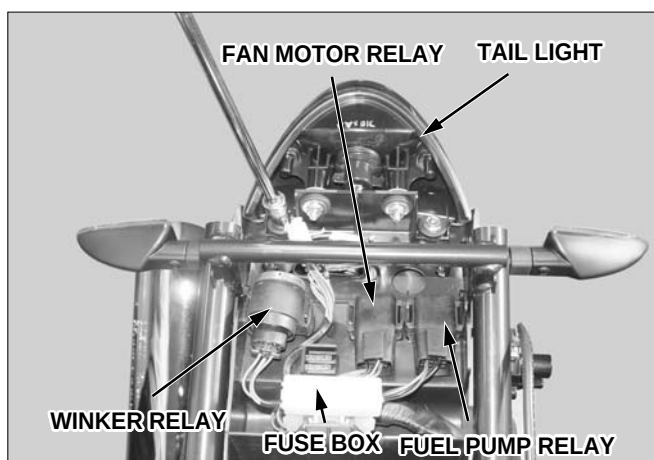


- Remove a flange bolt, and then pull the seat front and up.
- Installation is in the reverse order of removal.



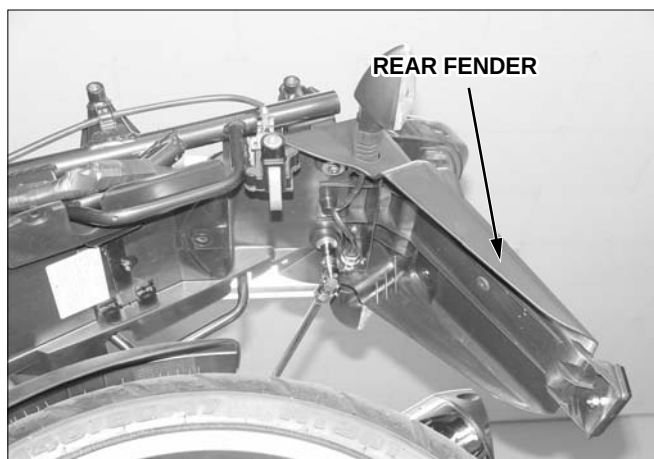
REAR COWL

- Remove the below parts.
 - The seat.
 - The R/L. side cover.
 - The center cover.
 - The pillion seat.
 - The two flange bolts and 4 special bolts.(RH./LH.)
 - The rear fender mounting 4 body cover clips.(RH./LH.)
- Carefully spread the bottom of both sides of the rear cowl, then remove it.
- Installation is in the reverse order of removal.



REAR FENDER

- Remove the seat.
- Remove the RH. / LH. side cover.
- Remove the center cover.
- Remove the pillion seat.
- Remove the rear cowl.
- Remove the head light relay, winker relay from the rear fender.
- Remove the tail light, winker connector.



- Remove the R/L special screws.
- Remove 4 pcs flange bolts on bottom of rear fender.
- Remove the rear fender from the frame.
- Installation is in the reverse order of removal.



REAR WHEEL MUDGUARD

- Remove the 4 rear wheel mudguard mounting bolts and rear wheel mudguard.
- Installation is in the reverse order of removal.

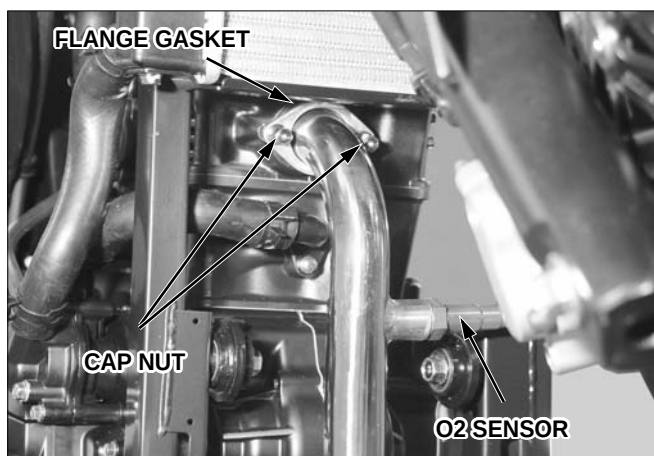
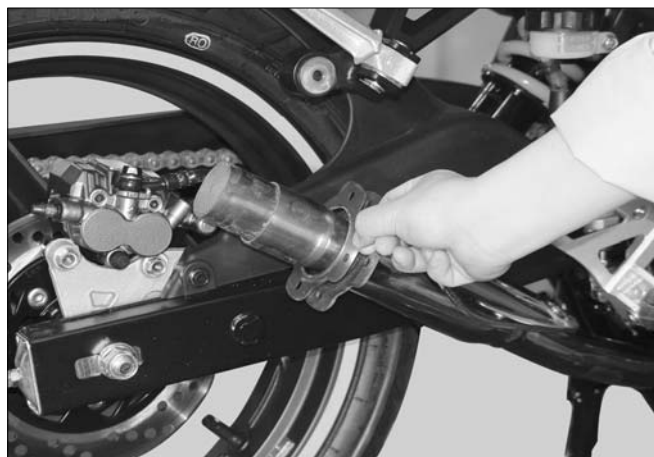
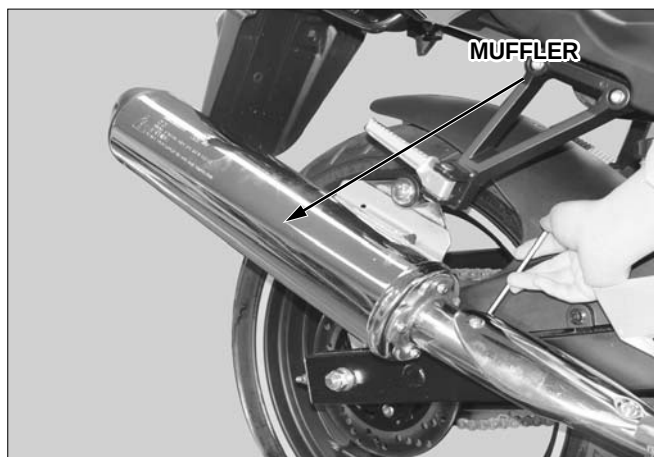
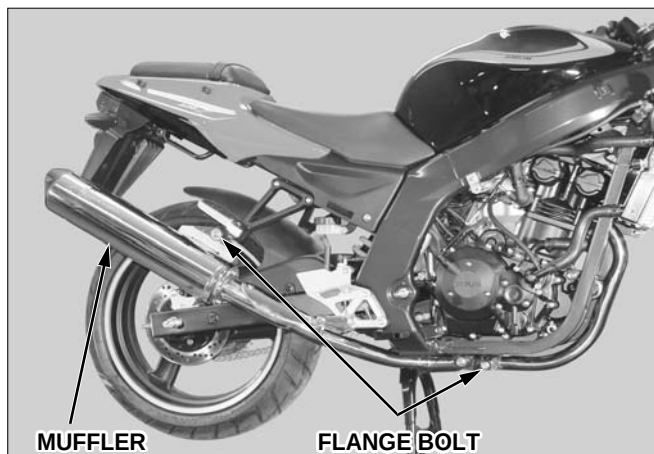
MUFFLER/EXHAUST PIPE

WARNING

- Do not service the exhaust system while it is hot.

REMOVAL

- Remove the exhaust pipe and 4 muffler body mounting socket bolts.
- Remove the muffler mounting bolt/nut securing pillion step bracket and remove the muffler.
- Remove the exhaust pipe flange gasket.
- Remove the oxygen sensor.
- Remove the 2pcs exhaust pipe joint cap nuts.



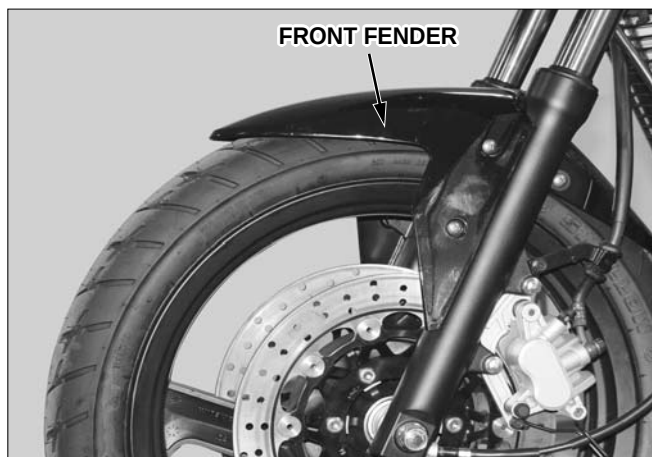


INSTALLATION

- Install the removed parts in the reverse order of removal.

CAUTION

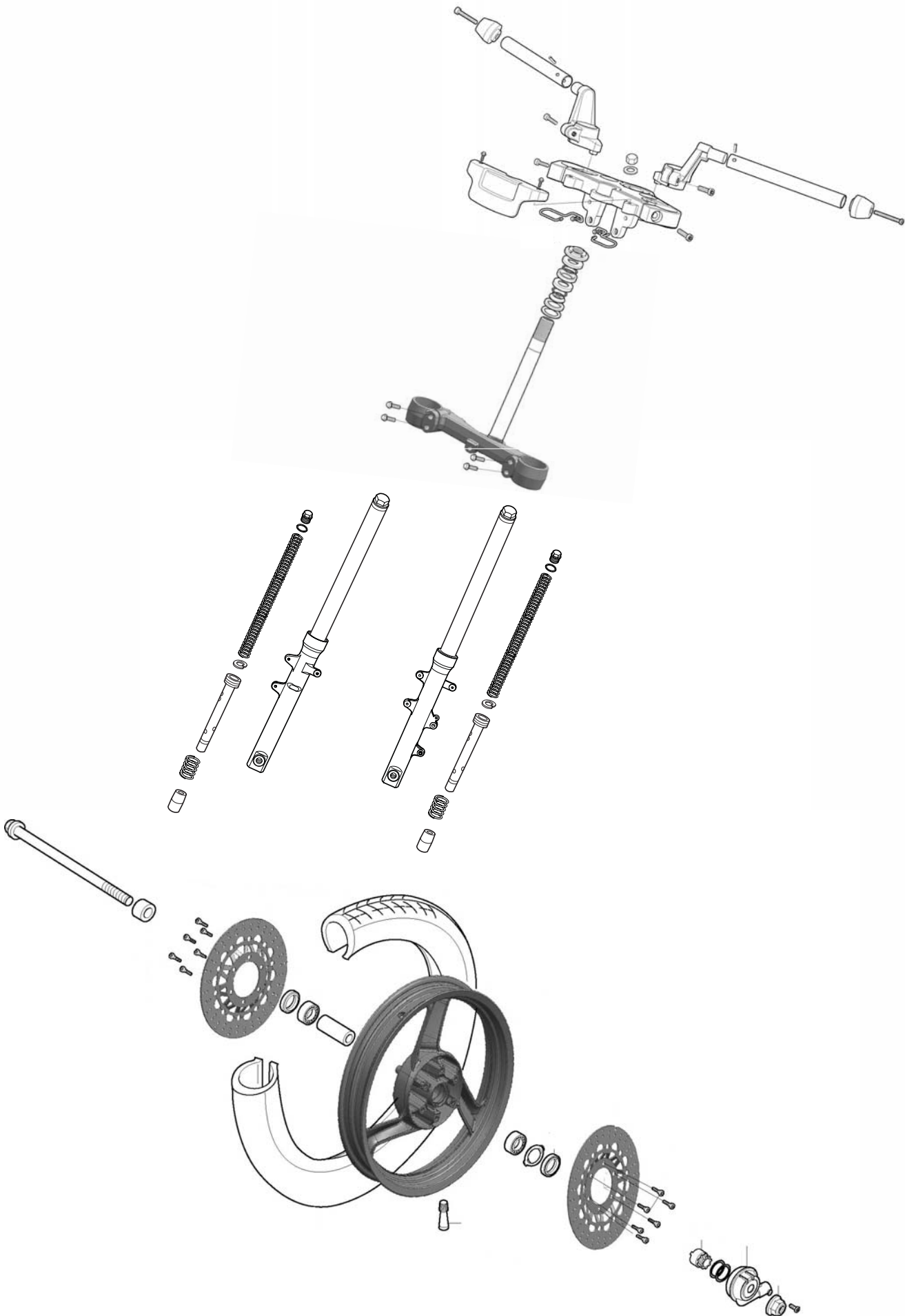
- Check the protrusion of the exhaust pipe stud bolt.
- Install the new exhaust pipe gasket onto the exhaust ports of the cylinder head.
- Install the new gasket onto the exhaust pipe.
- When install the muffler temporarily install the flange bolt to the damper stay and the hex cap nut then tighten the hex cap nut and the flange bolt.



FRONT FENDER

- Remove the front fender mounting 6pcs special screws. (RH/LH.)
- Remove the front fender forward.
- Install in the reverse order of removal.

FRONT WHEEL/FRONT FORK/STEERING



14. FRONT WHEEL/FRONT FORK/STEERING

SERVICE INFORMATION 14-1	FRONT WHEEL 14-7
TROUBLESHOOTING 14-2	FRONT FORK 14-12
HANDLEBARS 14-3	STEERING STEM 14-20

SERVICE INFORMATION

GENERAL SAFETY

⚠ WARNING

- A contaminated brake disk and pad reduce stopping power. Discard contaminated pads and clean a contaminated disk with a brake degreasing agent.
- Because inhaled asbestos fibers have been found to cause respiratory disease and cancer, work so that the fibers near the brake pad can't spread to the brake cleaner.
- When removing or installing tires from the rim, use the special tire lever and rim protector so that the rim can't be damaged.
- This section covers maintenance of the front wheel, front fork and steering stem. Refer to section 15 for front brake service.
- Use a jack or a hoist under the engine to support the motorcycle.

SPECIFICATIONS

Unit : mm

ITEM		STANDARD VALUE	SERVICE LIMIT
FRONT AXLE DEFLECTION		-	0.2
FRONT WHEEL RIM VIBRATION	RADICAL	-	2.0
	AXIAL	-	2.0
FRONT FORK PIPE DEFLECTION		-	0.2
FRONT FORK FLUID CAPACITY		245±2.5cc	-
FORK SPRING FREE LENGTH		528.0	480.0

14

TORQUE VALUES

STEERING HANDLE PIPE BOLT	2.6kgf · m(26N · m)
FRONT BRAKE DISK BOLT	4.2kgf · m(42N · m)
FRONT AXLE NUT	5.9kgf · m(59N · m)
FORK TOP BRIDGE PINCH BOLT	2.6kgf · m(26N · m)
FORK BOTTOM BRIDGE PINCH BOLT	3.4kgf · m(34N · m)
FORK TUBE CAP BOLT	2.3kgf · m(23N · m)
FORK SOCKET BOLT	2.0kgf · m(20N · m) (Apply locking agent)
CALIPER BRACKET BOLT	3.0kgf · m(30N · m)
STEERING STEM NUT	7.4kgf · m(74N · m)
STEERING TOP THREAD NUT	2.5kgf · m(25N · m) (Initial torque)
	0.3kgf · m(3N · m) (Last torque)
HANDLE WEIGHT SOCKET BOLT	2.0kgf · m(20N · m)

TOOLS

SPECIAL TOOLS

BALL RACE DRIVER
STEERING STEM DRIVER
FORK SEAL DRIVER
STEERING STEM SOCKET

COMMON TOOLS

EXTENSION BAR
DRIVER
FORK SEAL DRIVER / BODY
LOCK NUT WRENCH
BEARING REMOVER SHAFT
REMOVER HEAD
ATTACHMENT
PILOT

TROUBLESHOOTING

Hard steering

- Bearing adjustment nut too tight
- Damaged, worn steering head bearing
- Damaged, worn inner and outer race
- Insufficient tire pressure
- Worn tire

Steers to one side

- Damaged, incorrectly tightened steering head bearing
- Unbalance of left, right cushion
- Bent front fork
- Bent front axle shaft and inclined tire
- Worn tire
- Worn wheel bearing
- Worn swing arm pivot

Front wheel wobbling

- Deformed rim
- Worn wheel bearings

Soft suspension

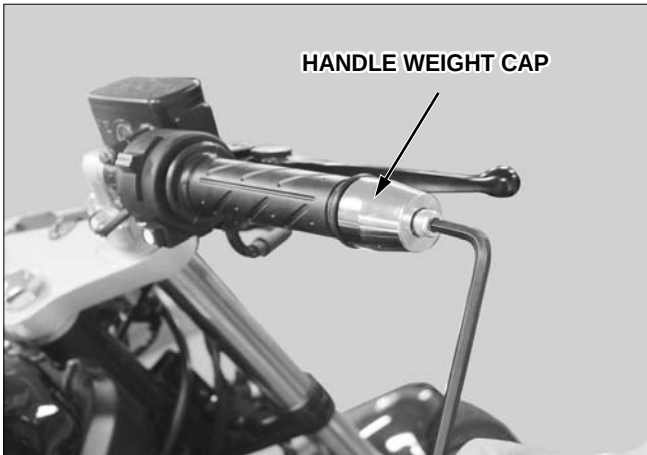
- Weak springs
- Oil level too low
- Inferiorization of oil
- Oil viscosity too low

Hard suspension

- Bend fork tube
- Oil level too high
- Oil viscosity too high
- Too much air in tire

Strange noise of front cushion

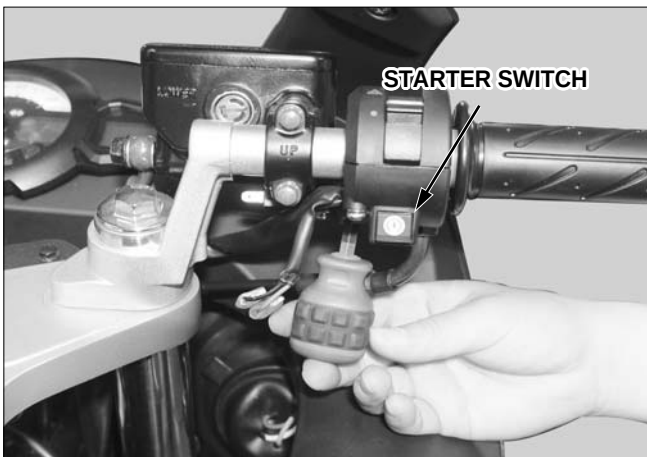
- Defective bottom case
- Loose fork leg fasteners
- Insufficient fork oil



HANDLE BARS

REMOVAL

- Loosen the socket bolt from the end of the RH. handle grip.



- Loosen the 2 screws.

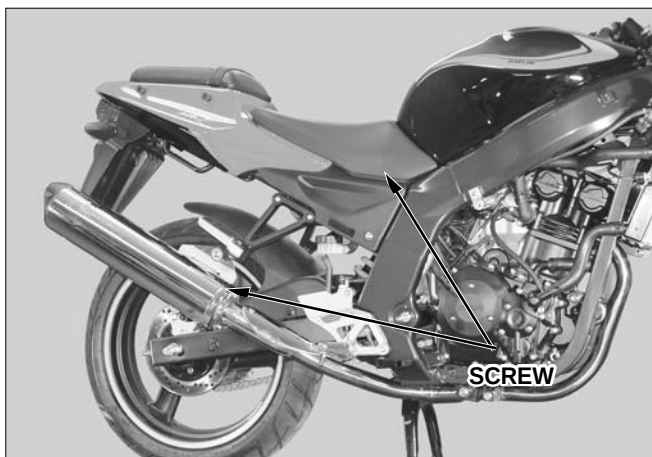


- Remove the starter switch from RH. steering handle.



- Remove the front stop switch wire from the switch.
- Loosen the 2 master cylinder holder bolts, remove the holder and master cylinder.

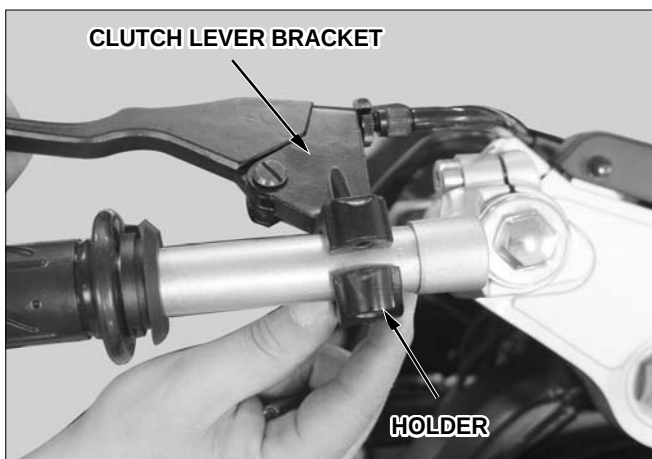
FRONT WHEEL/Front FORK/STEERING



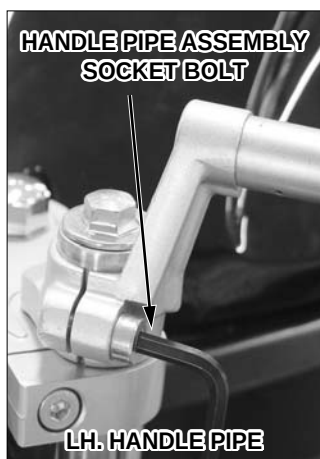
- Remove the 2pcs screws on the left handlebar switch.



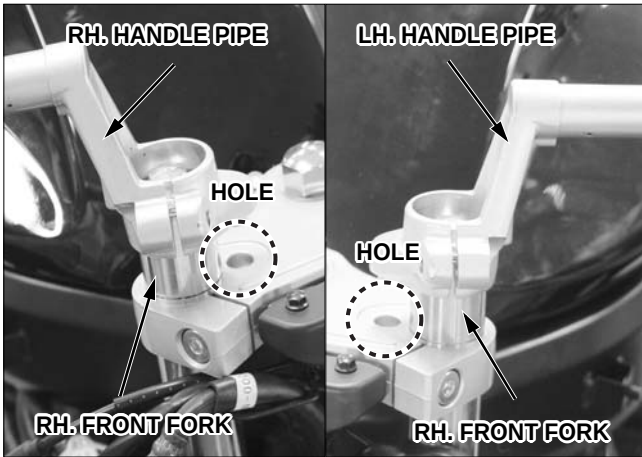
- Remove the winker switch.



- Loosen the 2pcs clutch lever bracket holder bolts.
- Loosen the socket bolts on LH. handle grip end and remove the handle weight cap.
- Remove the LH. handle grip and choke lever from the handle bar.



- Loosen the handle pipe pinch RH/LH bolt.
- Remove the handlebars from the front forks.



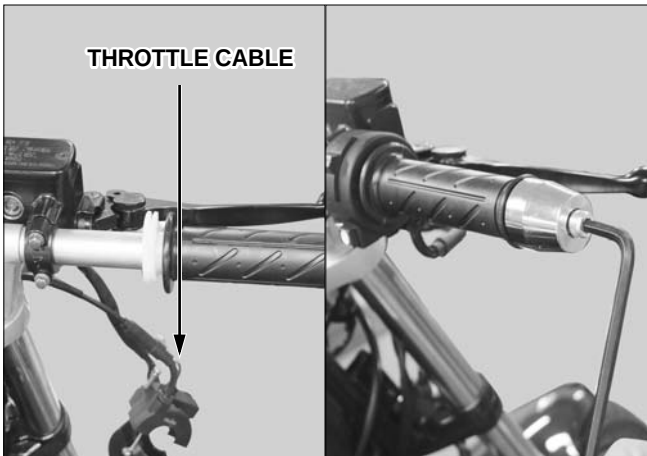
INSTALLATION

- Install the handlebars onto the front forks. Install the handle pipe while aligning its grooves with the fork top bridge holes.
- Tighten the handle pipe pinch bolts to the specified torque.

TORQUE : 2.6kgf · m

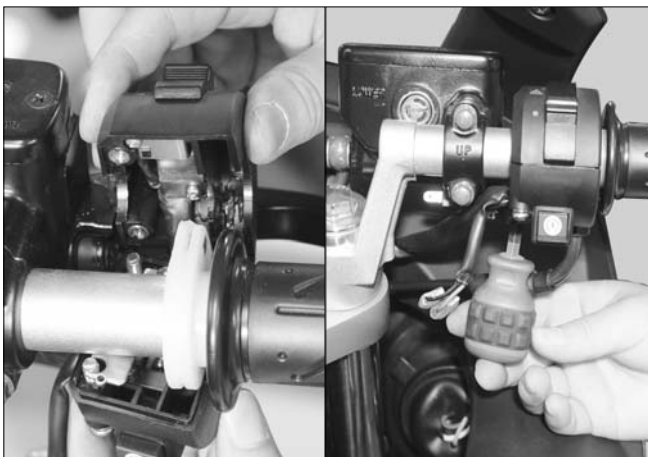


- Install the clutch lever bracket with the “UP” mark of the holder facing up.



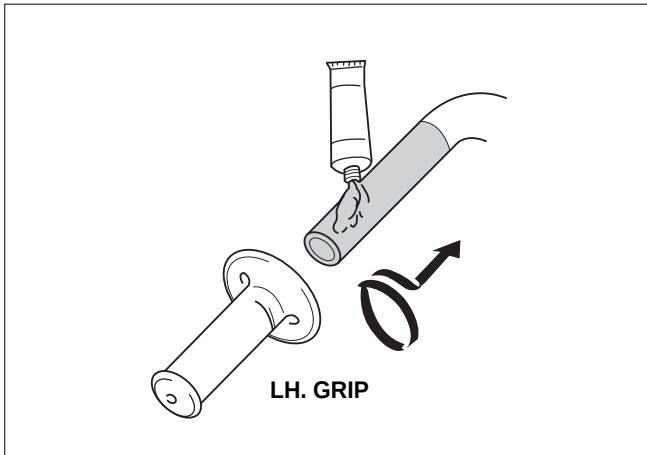
- Connect the throttle cable to the throttle pipe.
- Install the winker switch housing aligning its locating pin with the hole in the handlebar.
- Install the handle weight cap, tighten the socket bolts.

TORQUE : 2.0kgf · m



- Install the master cylinder by aligning the end of the master cylinder with the punch mark on the handle bar, tighten the upper bolts firstly, then tighten the lower bolts.
- Connect the front stop switch wires.

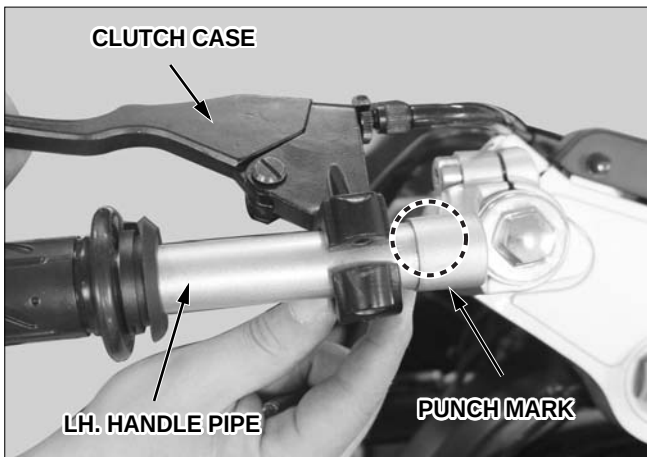
FRONT WHEEL/FRONT FORK/STEERING



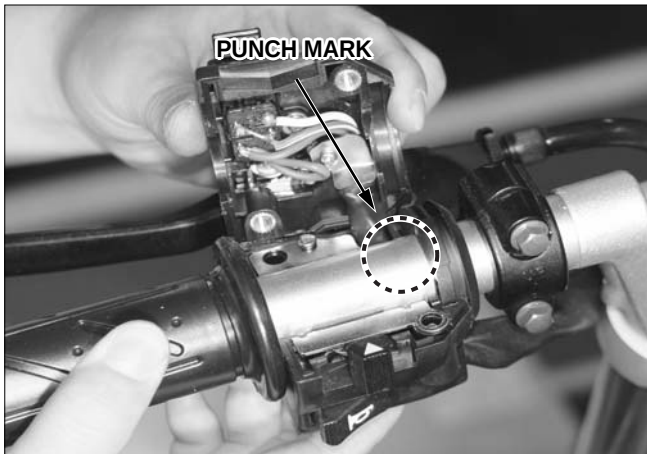
- Insert the throttle pipe to the handle bar.
- Wait 3-5 minutes and install the grip.
- Rotate the grip for even application of the adhesive.
- Clean the bonding surface to avoid oil, grease or gasoline from attaching.

CAUTION

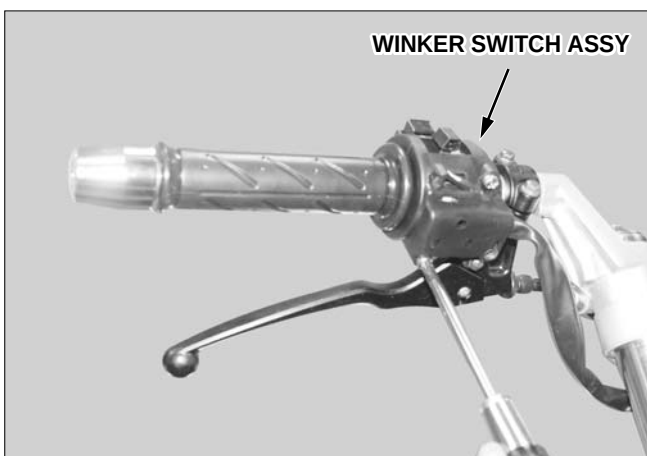
- Leave in for minimum 1 hour until the bond it dried.



- Install the master cylinder with the "UP" mark of the holder facing up.
- Install the master cylinder by aligning the end of the master cylinder with the punch mark on the handlebar.
- Tighten the upper bolt first, the lower bolt.



- Install the winker switch housing aligning it is locating pin with the hole on the handle bar.

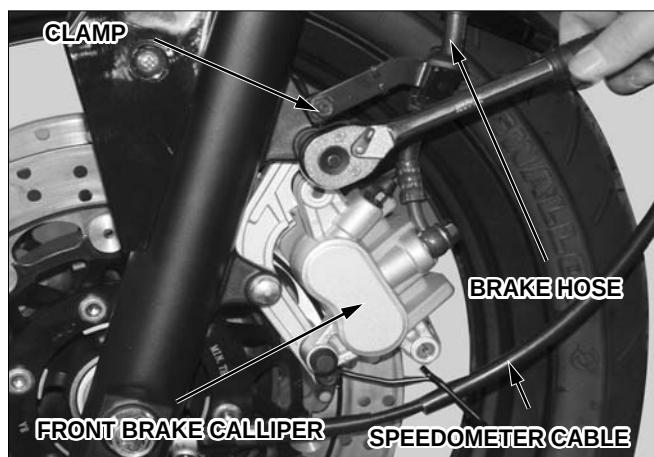


- Insall the screws.

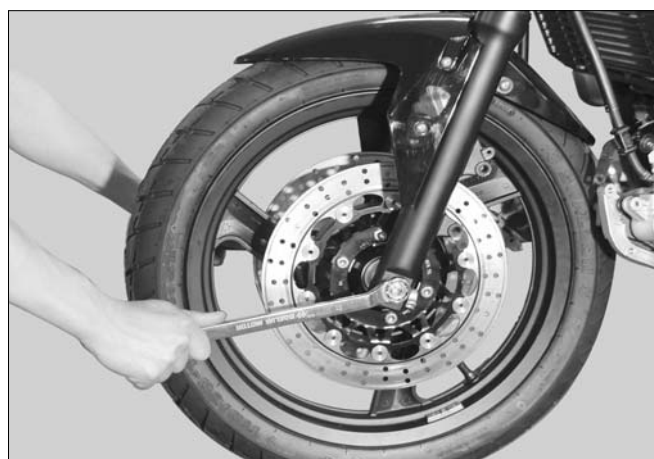
FRONT WHEEL

REMOVAL

- Loosen the brake hose clamp bolts and remove the clamp.
- Loosen the 2 flange bolts securing the bottom case and remove the caliper.



- Remove the speedometer gear box screws and remove the cable.



- Loosen the axle screw and pull the speedometer cable out of the speedometer gear box.
- Remove the axle nut, front axle the front wheel and R. side collar.

NOTE

- Don't operate the brake lever after removing the front wheel.

INSPECTION

Axle

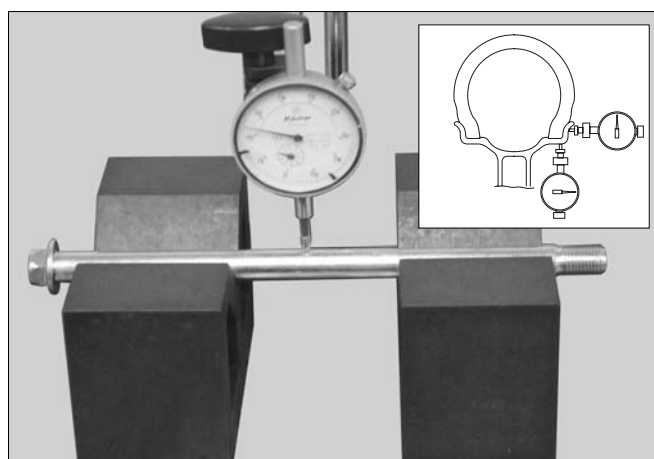
- Measure the runout of the front axle.
- Install the front axle in v-block and measure the runout with dial gauge.

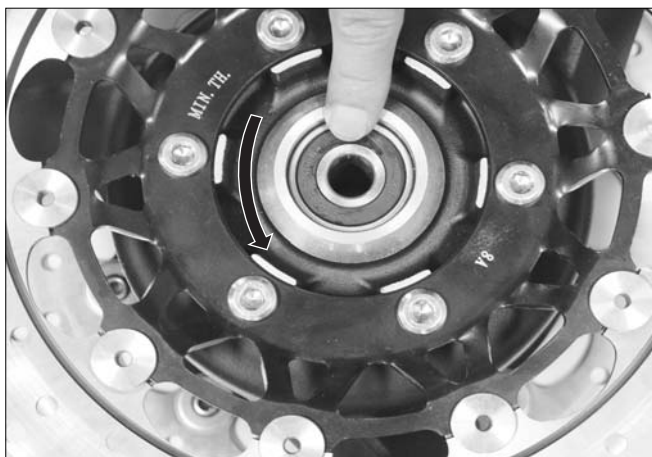
SERVICE LIMIT : 2.0mm

Wheel rim runout

- Check the rim runout by placing the wheel in a turning stand.
- Spin the wheel slowly and read the runout using a dial indicator.

**SERVICE LIMIT : RADIAL : 2.0mm
AXIAL : 2.0mm**



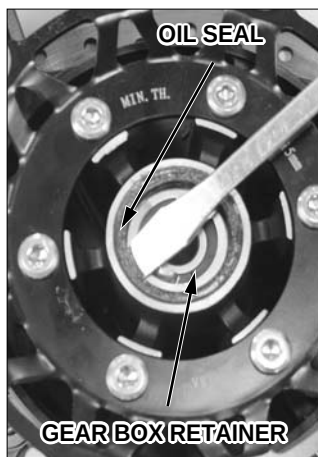
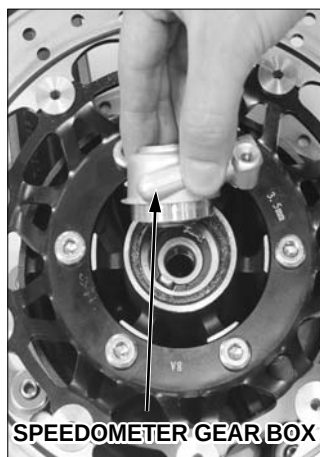


BEARING INSPECTION

- Turn the inner race of each bearing with finger.
- Bearing should turn smoothly and quietly. Also check that the bearing outer race fits tightly in the hub.
- If the bearing is worn, replace the new one.

NOTE

- Replace the bearing in pairs.



DISASSEMBLY

- Remove and speedometer gear box, oil seal and gear box retainer.



- Loosen the 6 LH. brake disk bolts on front rim and remove the brake disk.



- Loosen the 6 RH. brake disk bolts on front rim and remove the brake disk.

NOTE

- Check the disk for defects. (⇒16-9)



WHEEL BEARING REPLACEMENT

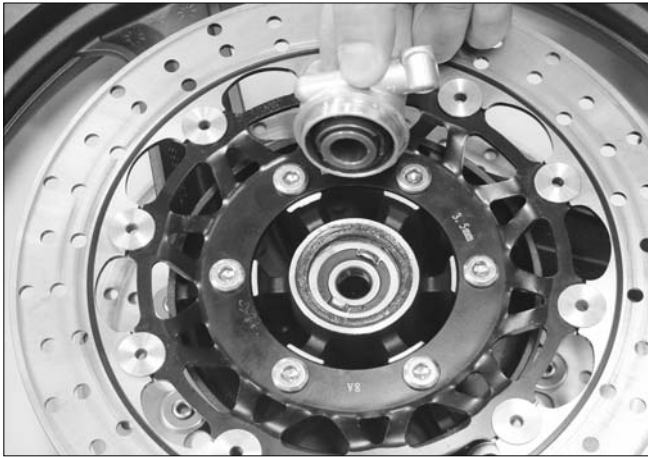
- Install the bearing remover head into the bearing.
- Remove the distance collar and drive out the other bearing.

**TOOLS : BEARING REMOVER HEAD
BEARING REMOVER SHAFT**

NOTE

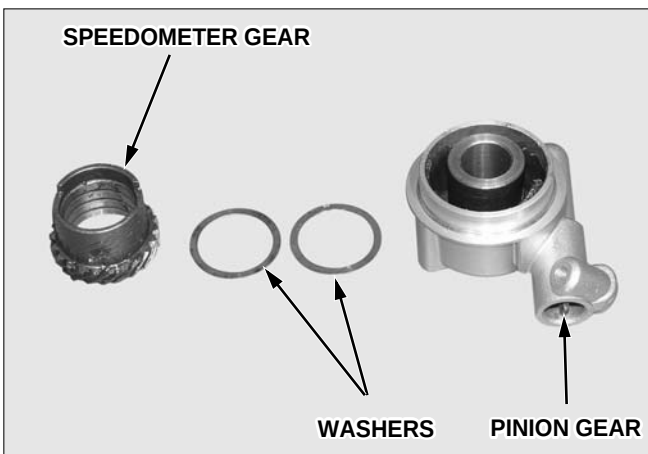
- Always replace bearings as a sets, and never use old bearings.
- Apply sufficient amount of grease to the bearing.
- Insert the right bearing with its seal surface facing outside.
- Do not tilt the bearing. Insert accurately.
- Upon assembling the distance collar, insert the left bearing with its seal surface facing outside.

**TOOLS : DRIVER
ATTACHMENT
PILOT**



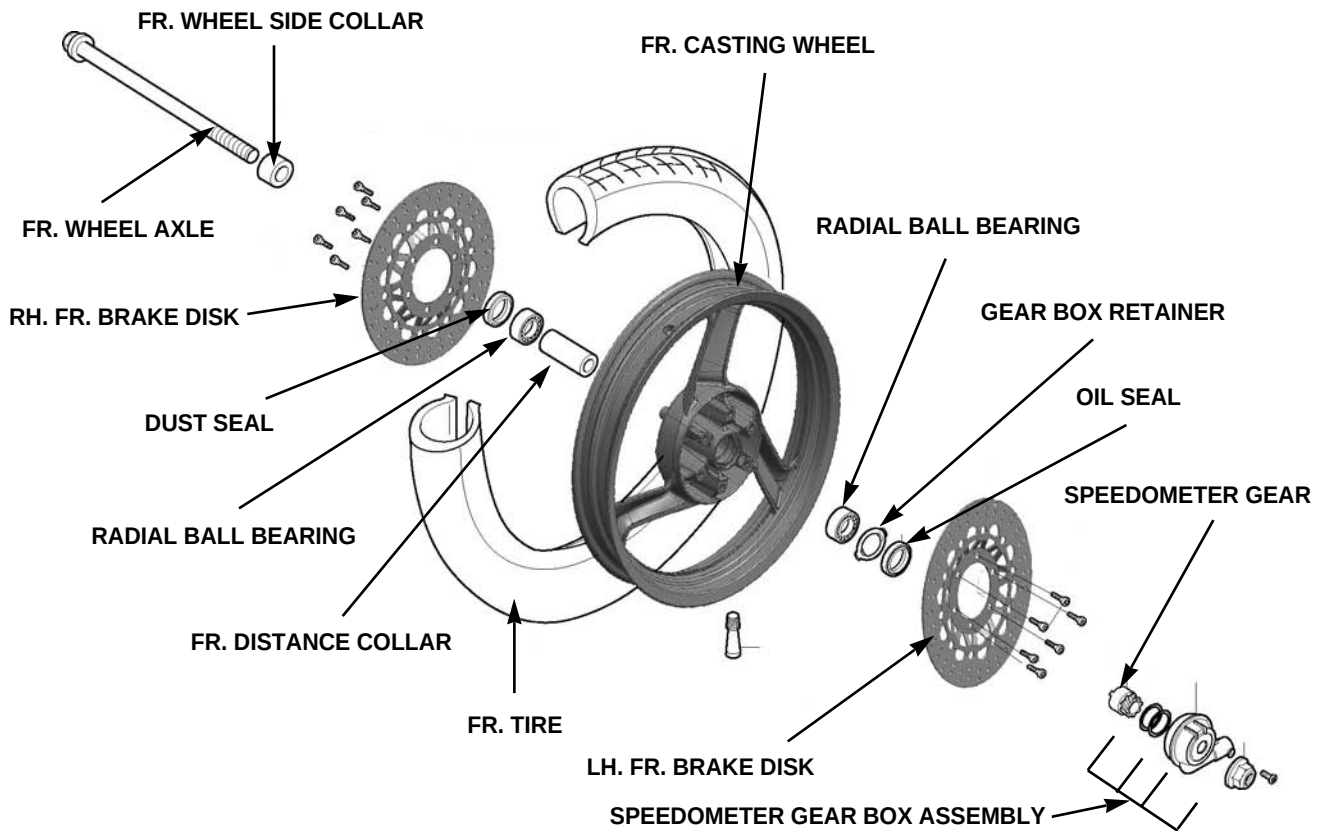
SPEEDOMETER GEAR REPLACEMENT

- Remove the speedometer gear and washer from the speedometer gear box.



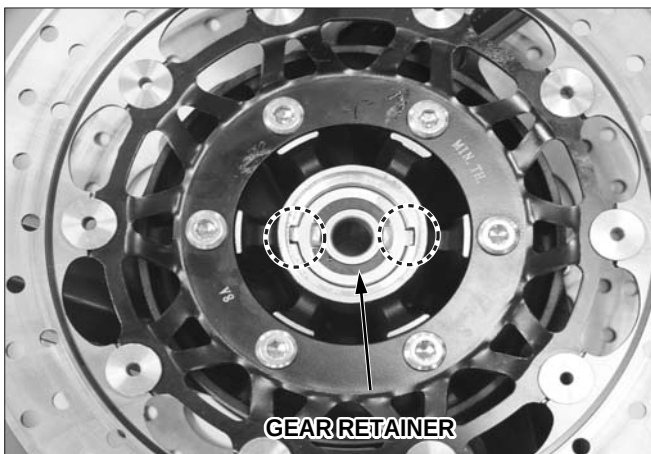
- Check the gear for wear or damage.
- Install the washers.
- Apply grease to the speedometer gear and install it.

ASSEMBLY

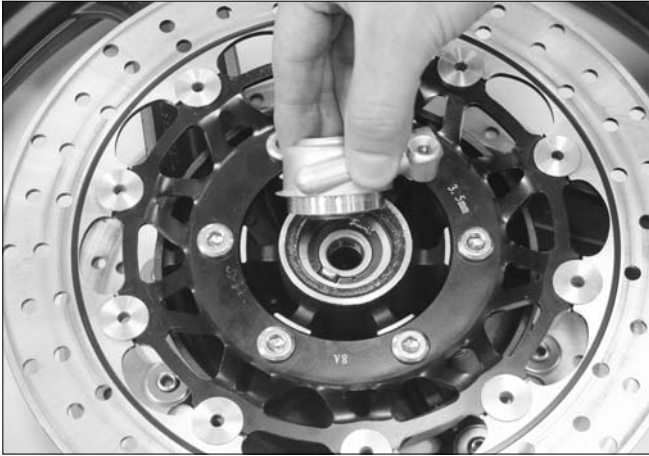


- Install the brake disk on LH. front rim.
- Install and tighten the new mounting bolts to the specified torque.

TORQUE : 4.2 kgf · m (42N · m)



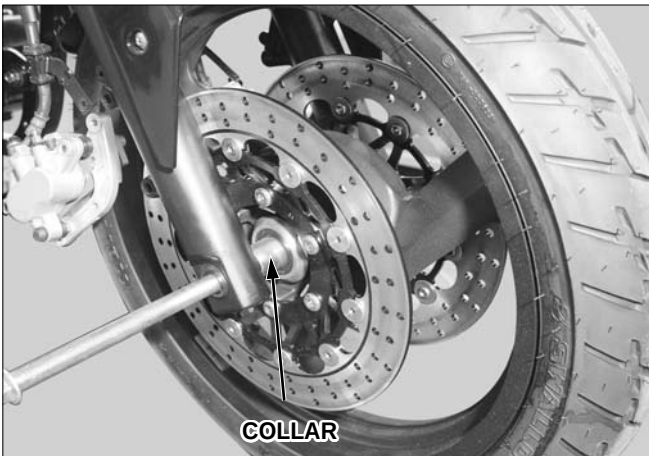
- Install the gear box retainer to wheel projection.
- Apply grease to the rim part of LH. oil seal and pressing to front rim.



- Align the wheel hub tangs with the slots of the gear box retainer, and assemble the speedometer gear box seal.



- Apply grease to the dust seal rim.
- Install the dust seal.



INSTALLATION

- Place the front wheel between the front forks.
- Align the slot of the speedometer gear box with the tangs of the left fork slider.
- Insert the front axle into the speedometer gear box and the wheel hub.
- Install the axle nut.

TORQUE : 5.9 kgf · m

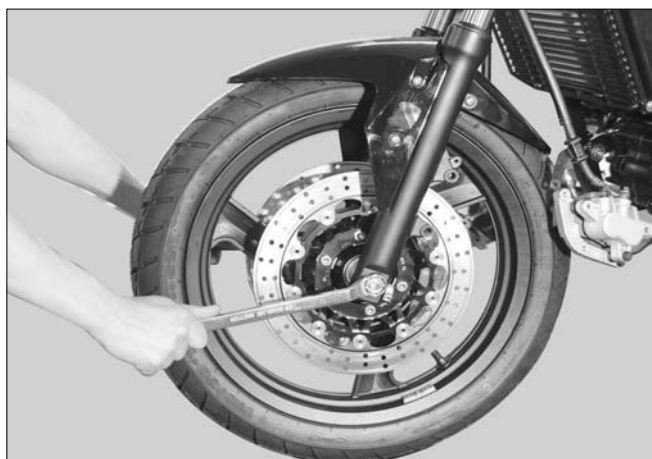


- Install the speedometer cable and tighten it correctly with the screw.



- Install the RH/LH caliper and tighten the new mounting bolts to the specified torque.

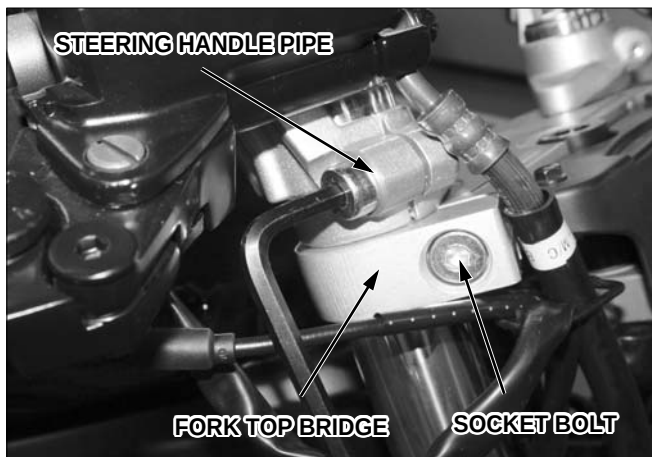
TORQUE : 3.0kgf · m (30N · m)



FRONT FORK

REMOVE

- Remove the front fender. (⇒13-5)
- Remove the RH/LH front caliper.
- Remove the front wheel. (⇒14-7)

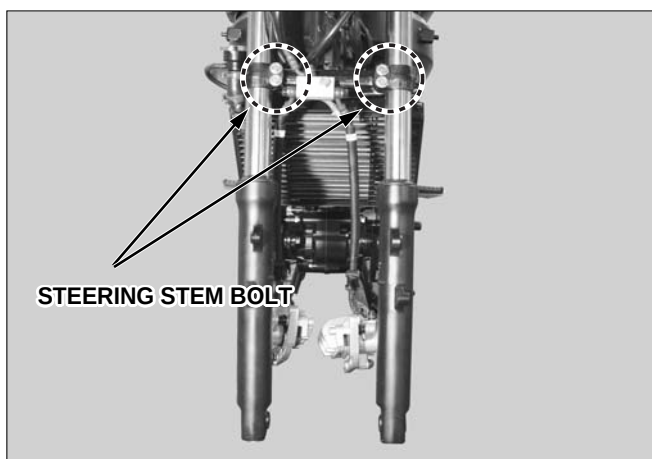


- When the front fork will be disassembled, loosen the fork pipe bolt, but do not remove it yet.

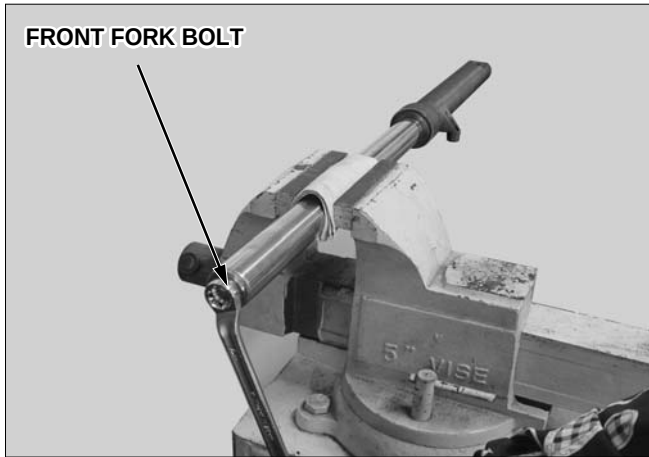
⚠ CAUTION

- Support the motorcycle securely under the engine not to turn over it.

- Loosen the handle pipe pinch bolt.
- Loosen the fork top bridge pinch bolt.



- Loosen the fork bottom pinch bolt and remove the fork pipe from the handle pipe, fork top bridge and steering stem.



DESASSEMBLY

- Remove the front fork bolt.

NOTE

- If the bolt is completely loosened, the fork pipe bolt may spring out by the force for the spring.
- Remove the fork spring, and expand and release the fork pipe several times to drain fork oil.

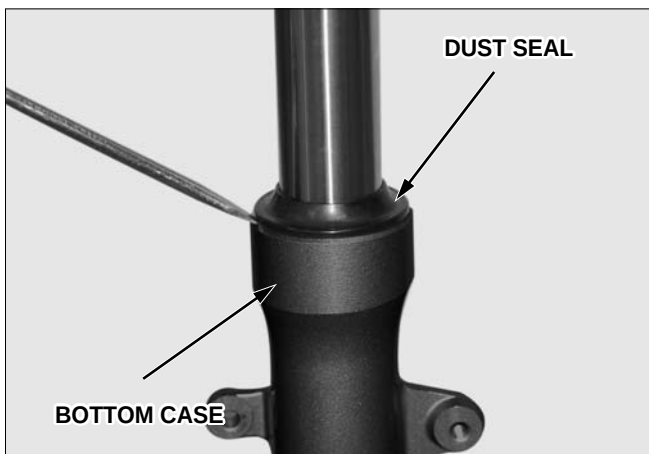


NOTE

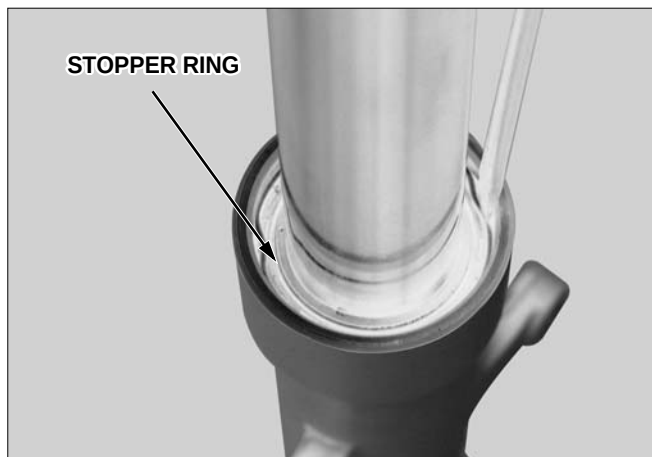
- If the socket bolt turns idle cannot be removed, temporarily assemble the spring and the fork tube cap blot first.
- Hold the bottom case firmly with a vise, taking precautions not to distort or damage it.



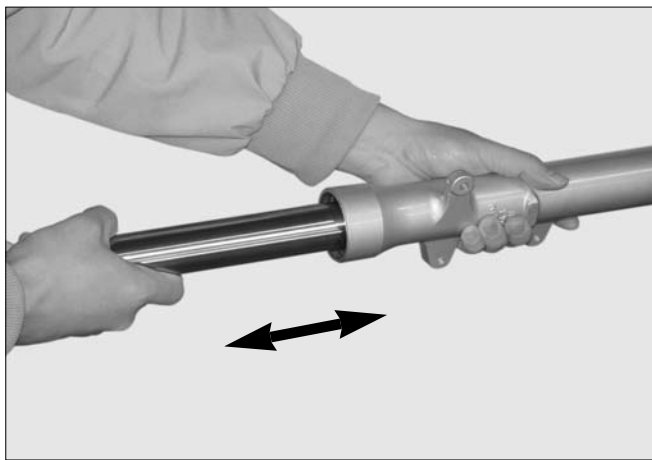
- Remove the piston ring, seat pipe and rebound spring from the fork pipe.



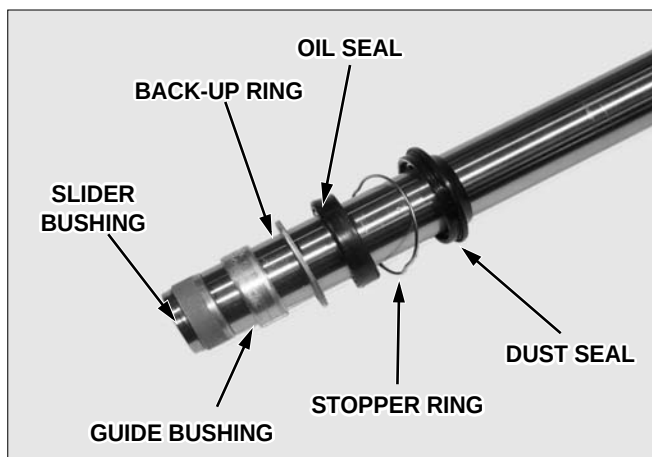
- Remove the dust seal.



- Remove the oil seal stopper ring.

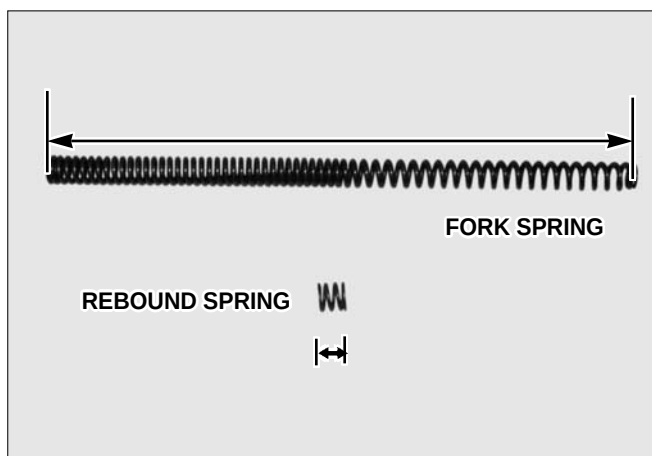


- Pull the fork pipe out until you feel resistance from the slider bushing.
- Then move it in and out, tapping the bushing lightly until the fork pipe separates from the bottom case.



NOTE

- Remove the slider bushing, guide bushing, back-up ring, oil seal, stopper ring and dust seal from the fork pipe.

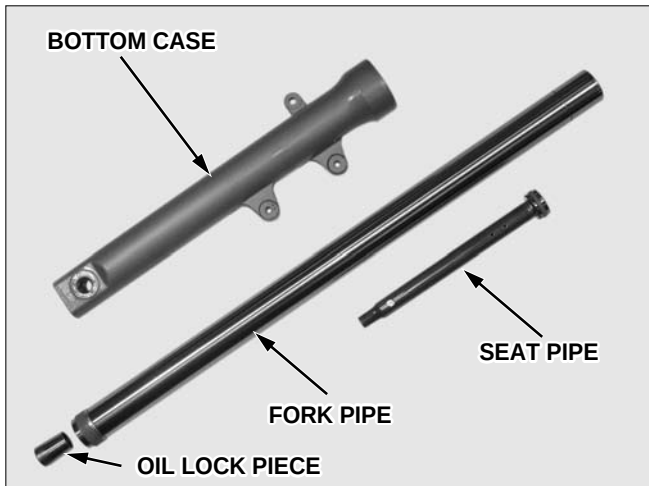


INSPECTION

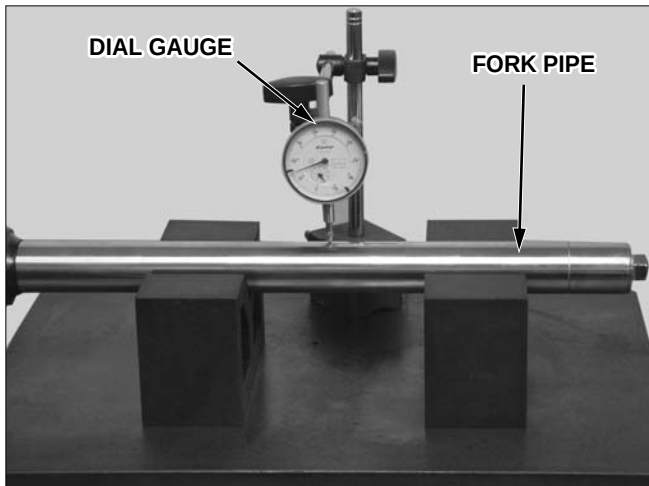
- Place the fork spring on a level place, and measure the free length.
- If the free length deviates from the service limit, replace the springs with new ones.

SERVICE LIMIT : FORK SPRING : 480mm
REBOUND SPRING : 21.6mm

FRONT WHEEL/FRONT FORK/STEERING

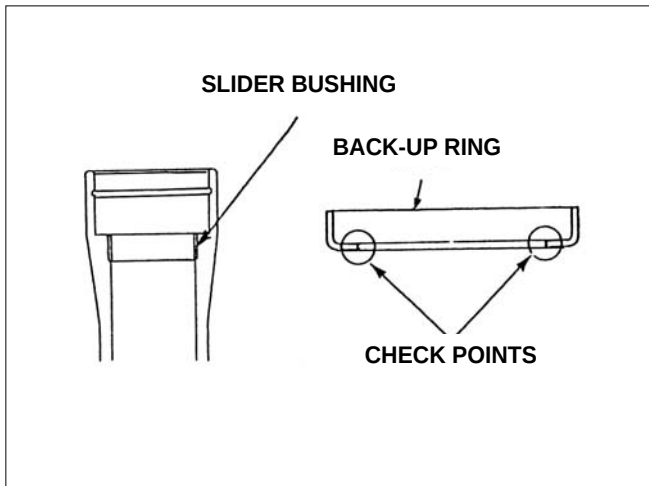


- Check components for damage or abnormal wear. Replace defective parts with new ones.



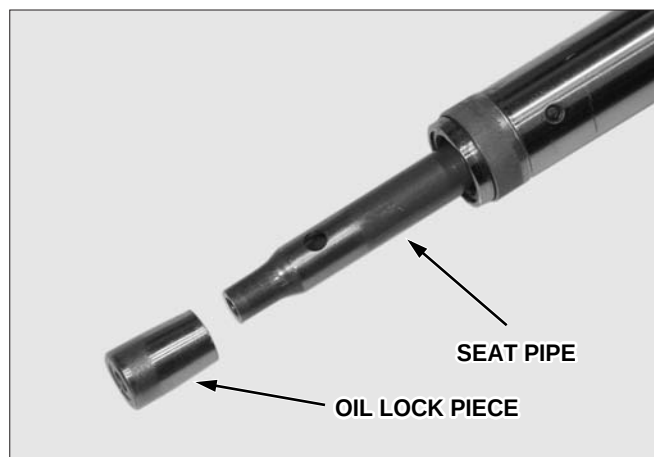
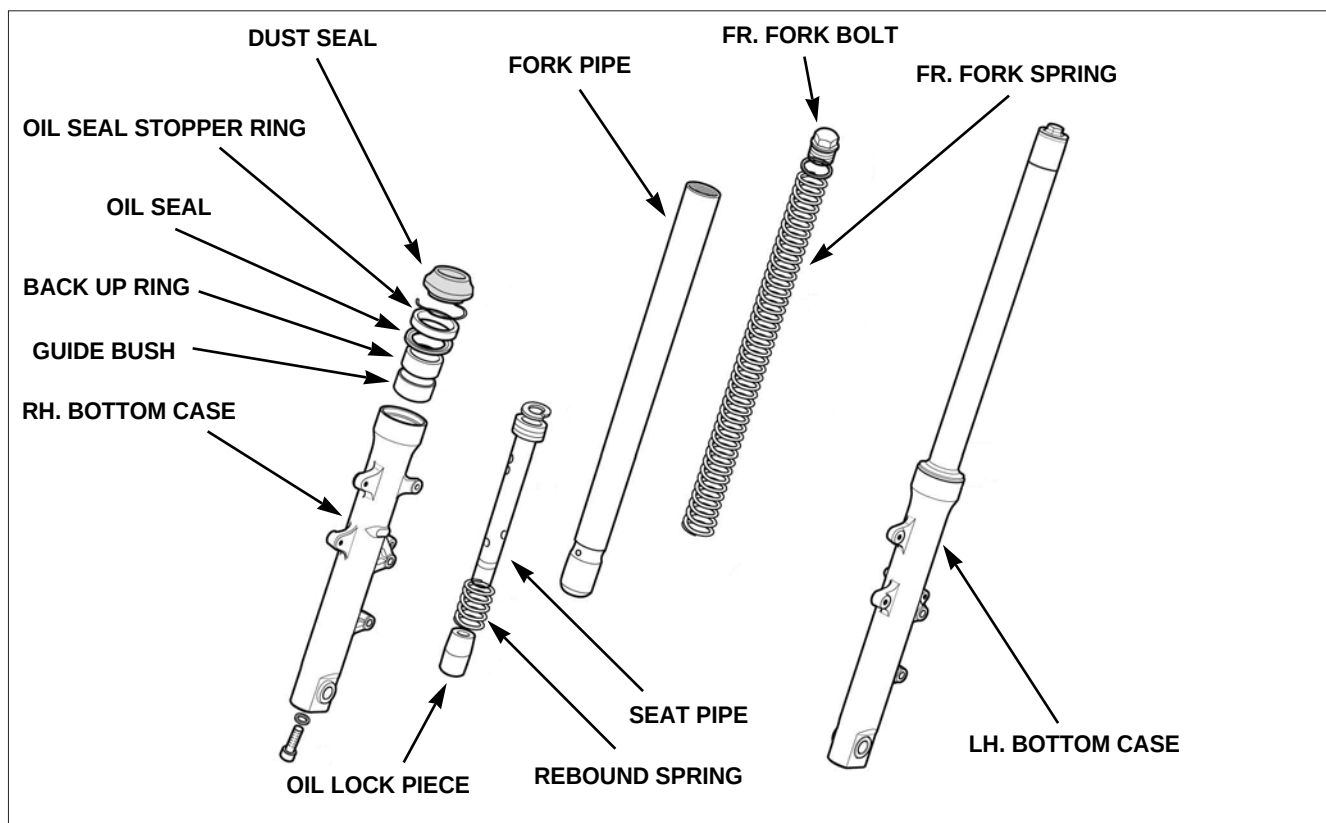
- Place the fork pipe in V-block and measure the runout. Actual runout is 1/2 the total indicator reading.

SERVICE LIMIT : 0.2mm

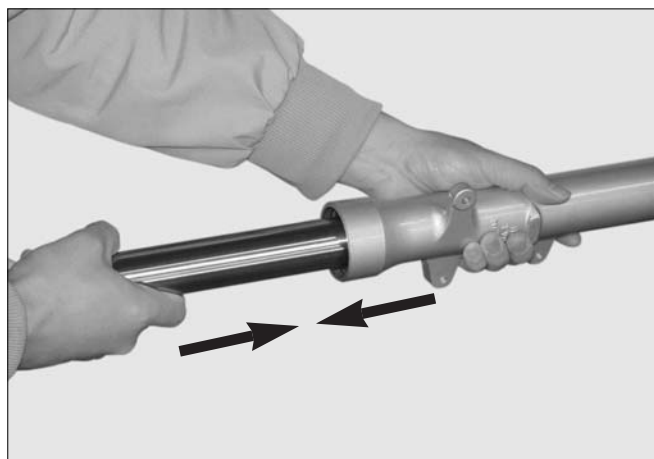


- Visually inspect the slider and fork pipe bushings.
- Replace the bushings if there is excessive scoring or scratching, or if the teflon is worn so that the copper surface appears on more than 3/4 of the entire surface.

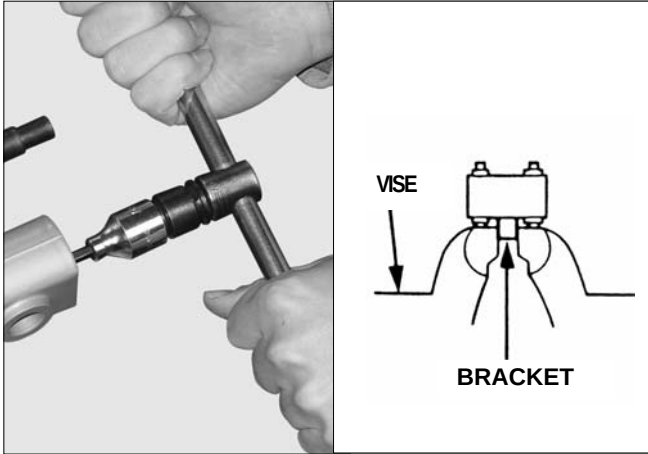
ASSEMBLY



- Before assembly, wash all parts with a non-flammable solvent and wipe them dry.
- Install the oil lock piece onto the end of the seat pipe.
- Install the seat pipe into the fork pipe.
- Install the fork pipe into the bottom case.



- Install the guide bush and slider bush.
- Install the fork pipe into the bottom case.

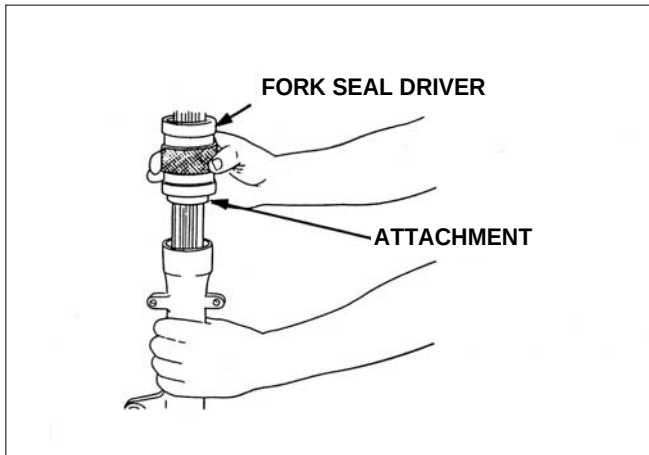


- Wrap the bottom case with a piece of cloth, and fix it to the vise.
- Apply screw locking agent to the socket bolt thread, and assemble the socket bolt to the seat pipe.

TORQUE : 2.0 kgf · m (20 N · m)

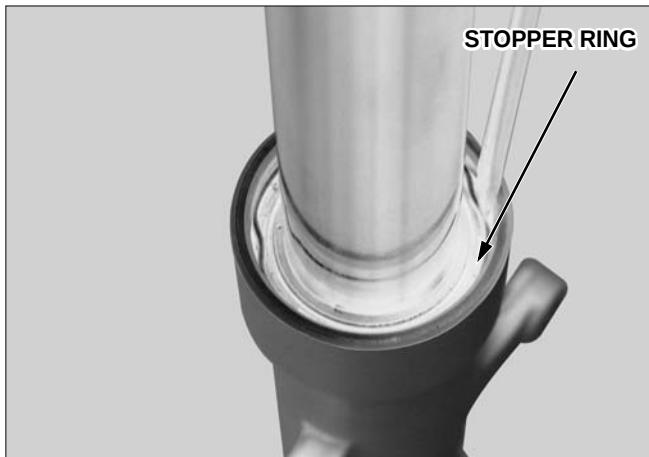
NOTE

- When a vise is used to hold the bottom case, do not insert the case itself but insert the bracket.

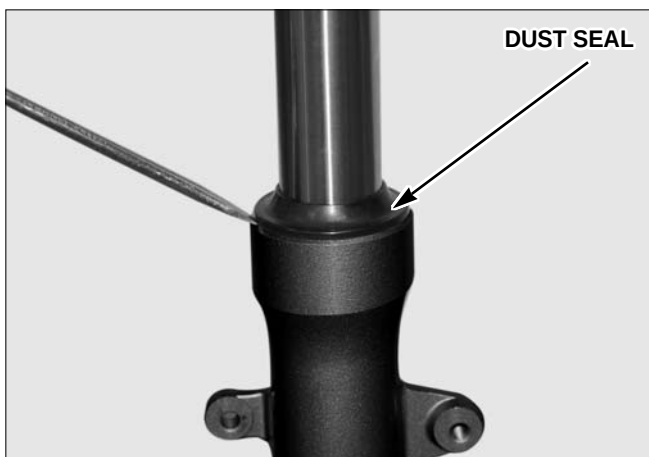


- Apply ATF(Automatic Transmission Fluid) to a new oil seal.
- Assemble the oil seal to the bottom case.
- Install the oil seal with special tools until the attachment groove of the bottom case set ring is exposed.

**TOOLS : OIL SEAL DRIVER
OIL SEAL DRIVER BODY**

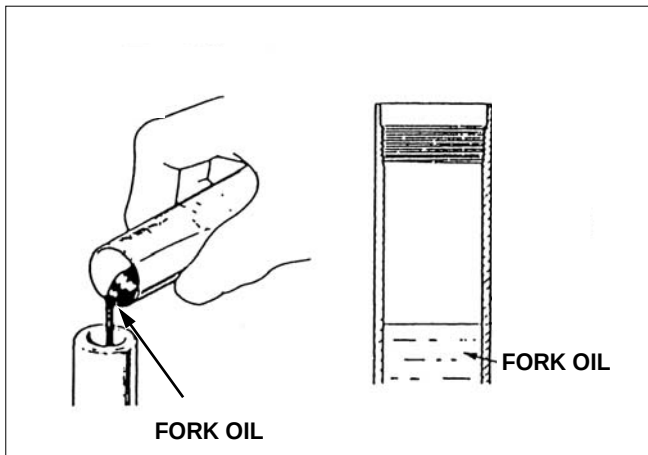


- Install the oil seal stopper ring.
- Install the oil seal stopper ring into the bottom case correctly.



- Install the dust seal.

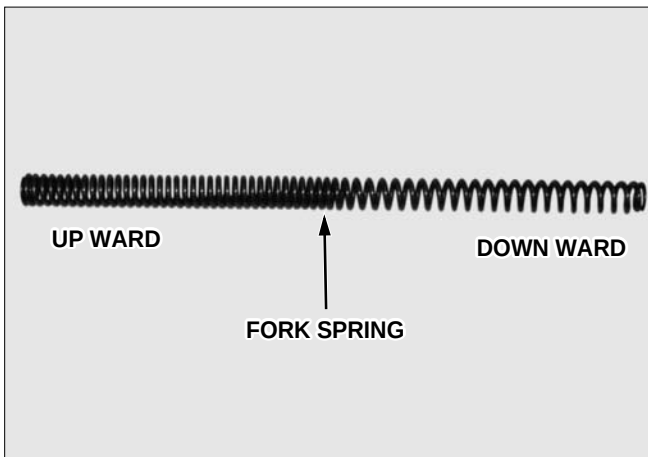
FRONT WHEEL/FRONT FORK/STEERING



- Pour the specified amount of automatic transmission fluid(ATF) into the fork pipe.

CAPACITY : $245 \pm 2.5\text{cc}$

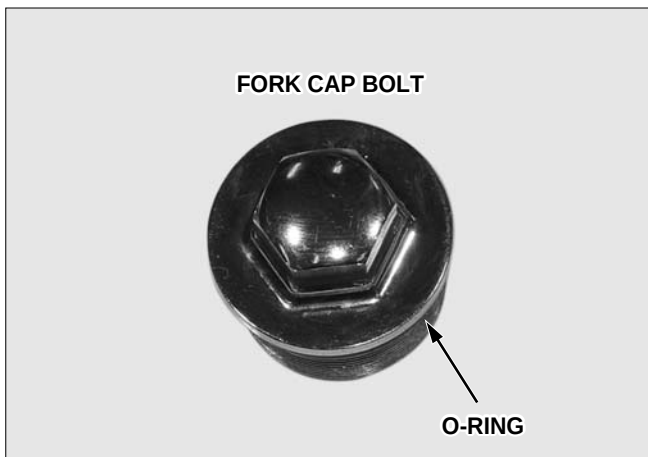
- Slowly press the fork tube 2-3 times to discharge air.



- Install the fork spring to the fork tube.

NOTE

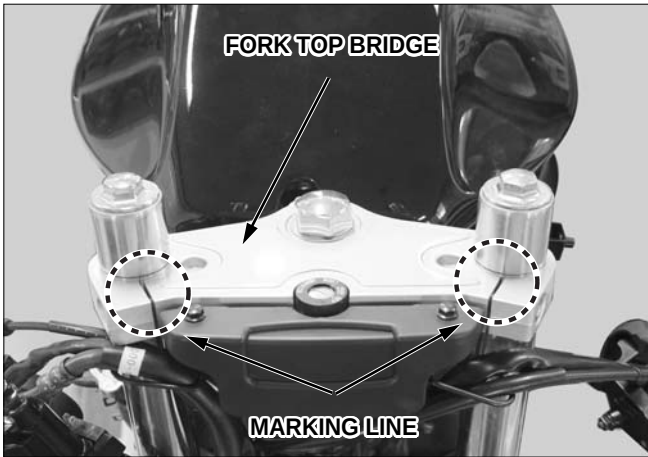
- Install the spring with the smaller pitch side facing downward.



- Install the new O-ring to the fork cap bolt.

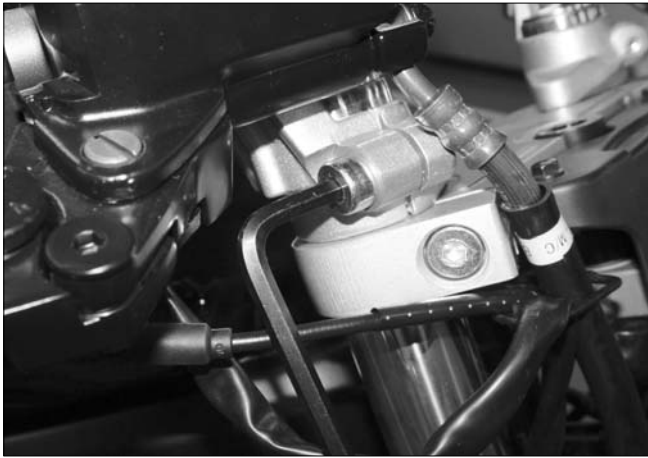


- Install the fork cap bolt to the fork pipe.



INSTALLATION

- Install the fork pipe through the bottom bridge, fork top bridge and handle pipe.
- Position the marking line of the fork pipe with the upper surface of the top bridge as shown.

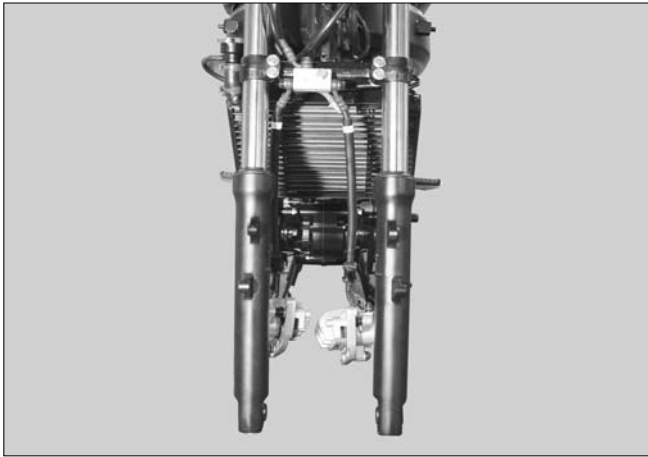


- Tighten the fork top bridge pinch bolt to the specified torque.

TORQUE : 2.6 kgf · m

- Tighten the handle pipe pinch bolt to the specified torque.

TORQUE : 2.6 kgf · m

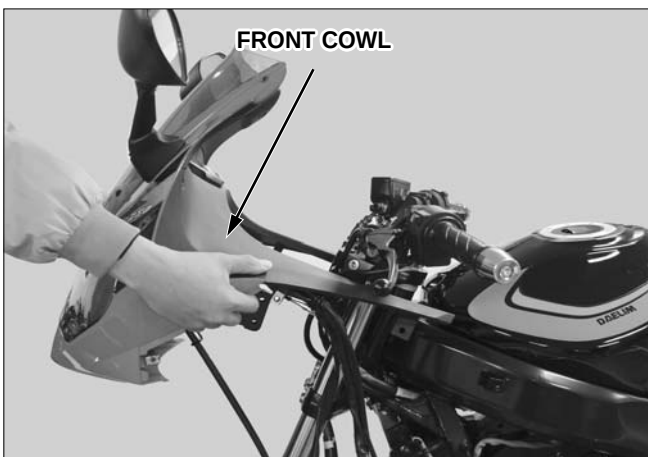


- Tighten the steering stem to the specified torque.

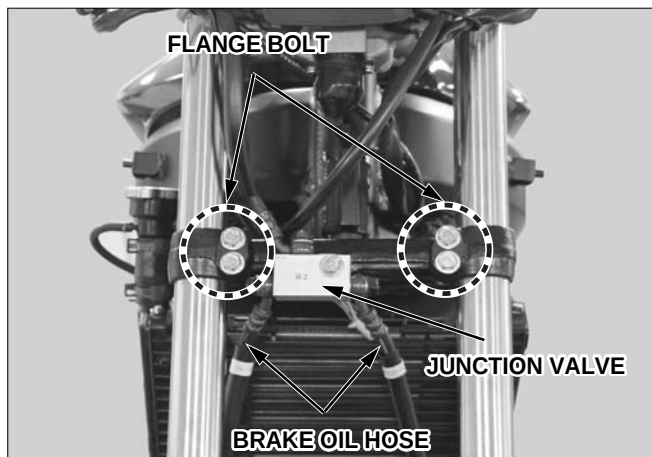
TORQUE : 7.4 kgf · m

- Tighten the fork cap bolt to the specified torque.

TORQUE : 2.3 kgf · m



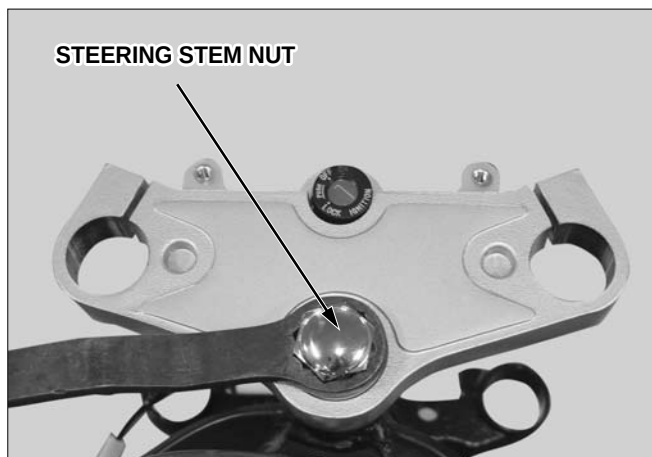
- Install the following.
 - Front wheel.
 - Front fender.
 - Front cowl
 - Side cowls



STEERING STEM

REMOVAL

- Remove the following :
 - Front wheel
 - Handle bars
 - Front fork
- Remove the 2 flange bolts and front brake hose stay.

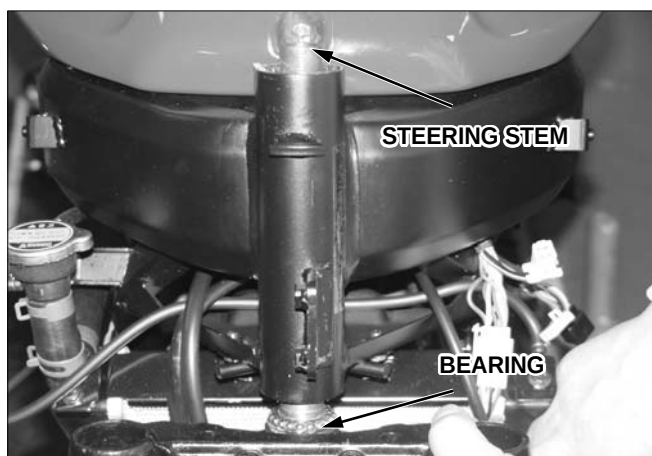


- Remove the steering stem nut.



- Remove the steering head top thread nut using the special tool.

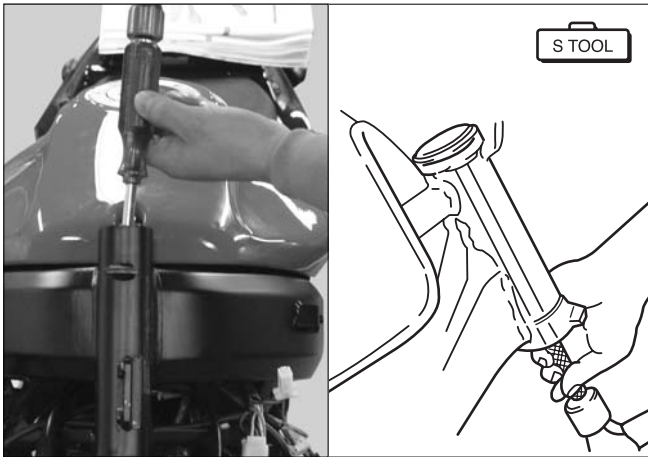
TOOL : STEERING STEM SOCKET



- Remove the following :
 - Steering top cone race
 - Steering steel ball
 - Steering stem

NOTE

- Place a shop towel under the steering stem to catch the steel balls.
- Check the steel ball, cone race, ball race for damage or abnormal wear and replace as necessary.



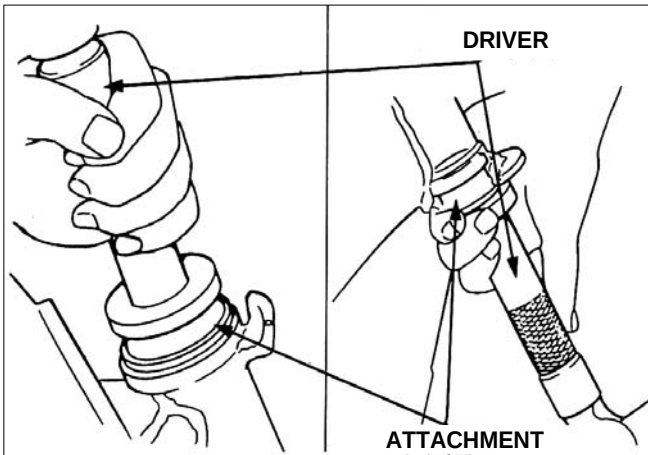
RACE REPLACEMENT

NOTE

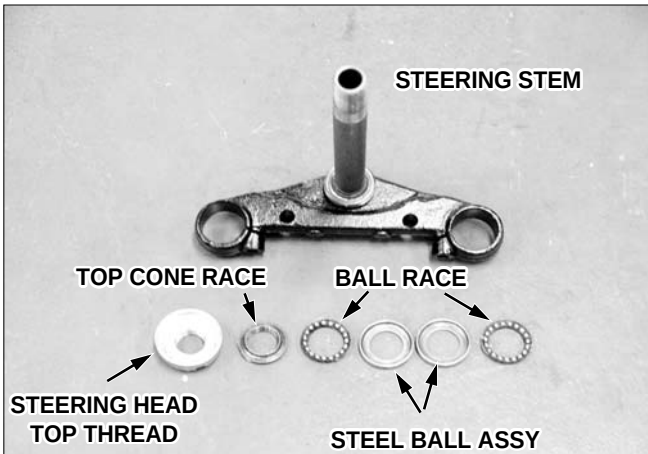
- Replace the cone races and ball races in pairs.

- Remove the top ball races bottom ball race from the steering head using the ball race driver.

TOOL : BALL RACE DRIVER

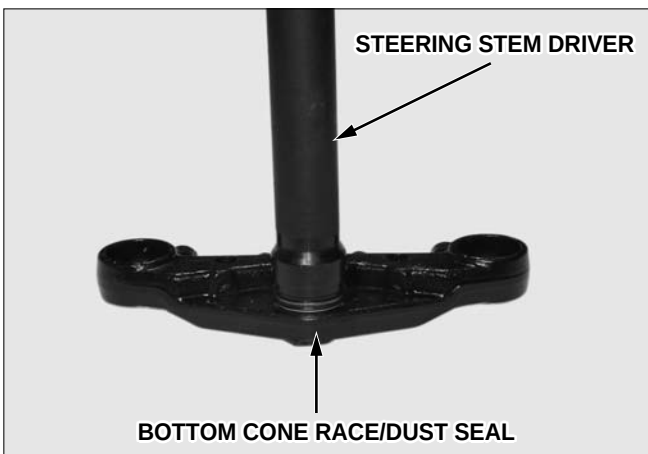


- Install the new ball races of the frame using the driver and attachment.



- Temporarily install the steering stem nut onto the stem to prevent the threads from being damaged when removing the bottom cone race from the stem.

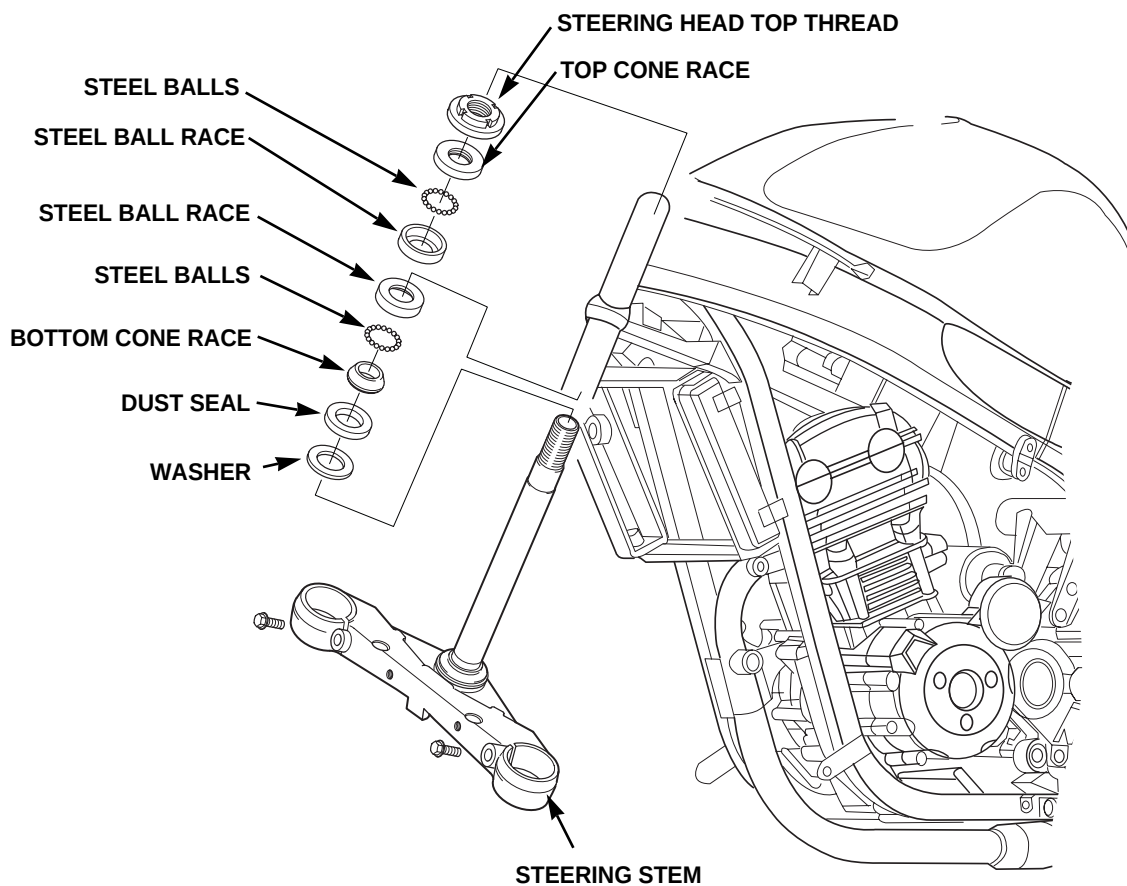
- Inspect the followings.
 - Steering head top threads
 - Steering cone top race
 - Steering steel ball ass'y
 - Steering ball race



- Install the new dust seal and washer into the steering stem.
- Install a new bottom cone race into the steering stem using a special tool and a hydraulic press.

TOOL : STEERING STEM DRIVER

INSTALLATION



- Apply grease to top and bottom ball races and install the steel ball assy.
- Insert the steering stem into the steering head pipe.
- Install the steel ball and top cone race.

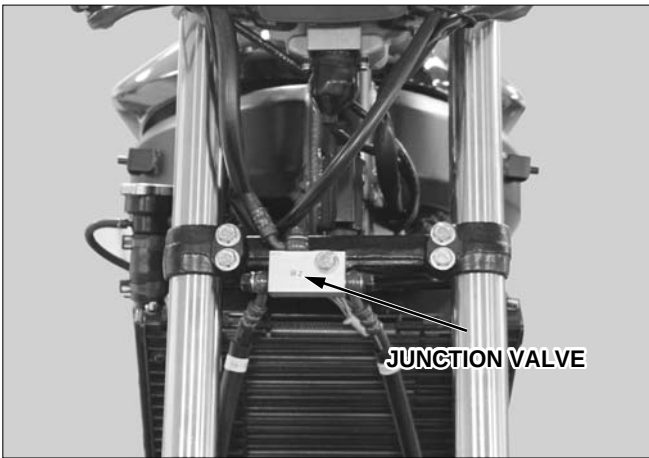


- Tighten the steering head top thread.
TORQUE : 2.5 kgf · m (INITIAL TORQUE)
TOOL : STEERING STEM SOCKET
- Move the steering stem right and left, five times to seat the steel balls.
- Retighten the steering head top thread to the specified torque.
TORQUE : 0.3 kgf · m (FINAL TORQUE)



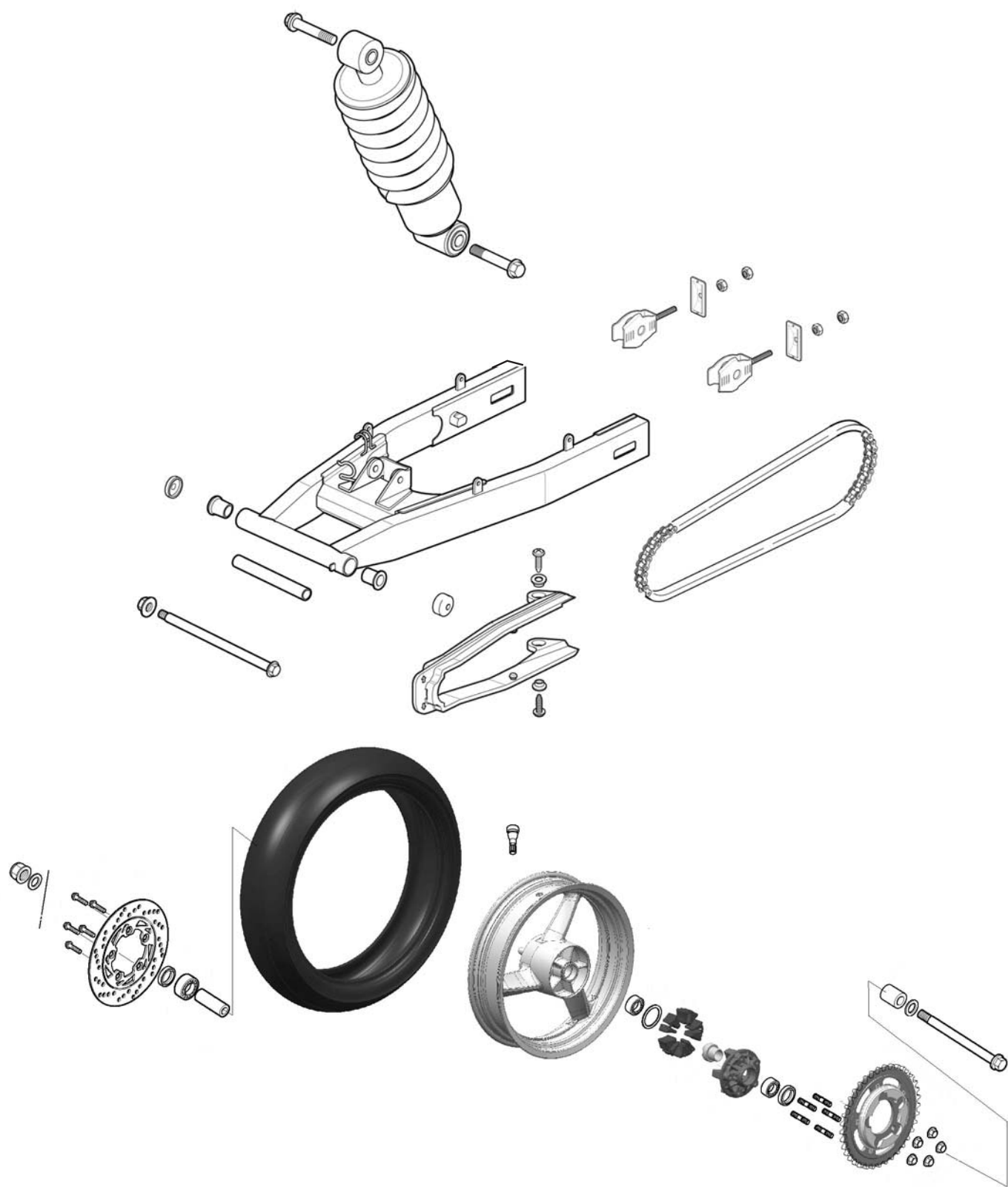
- Install the top bridge, washer and steering stem nut.
- Temporarily install the R/L front forks, then tighten the steering stem nut to the specified torque.

TORQUE : 7.4 kgf · m



- Install the front brake hose junction valve and tighten the flange bolts.
- Install the following:
 - Front wheel
 - Front fender
 - Front cowl
 - Side cowls

REAR WHEEL/REAR SUSPENSION



15. REAR WHEEL/REAR SUSPENSION

SERVICE INFORMATION	15-1	REAR CUSHION	15-7
TROUBLESHOOTING	15-2	SWINGARM	15-9
REAR WHEEL	15-3		

SERVICE INFORMATION

SPECIFICATIONS

Unit : mm

ITEM		STANDARD VALUE	SERVICE LIMIT
AXLE RUNOUT		-	0.2
REAR WHEEL RIM RUNOUT	RADICAL	-	2.0
	AXIAL	-	2.0
REAR CUSHION SPRING FREE LENGTH		131	-

TORQUE VALUES

REAR BRAKE DISK BLOT	4.2kgf · m
REAR AXLE NUT	8.8kgf · m
REAR CUSHION UPPER / DOWN BOLT	5.4kgf · m
REAR CUSHION UNDER BOLT	4.0kgf · m
SWINGARM PIVOT NUT	8.8kgf · m
FINAL DRIVEN SPROCKET NUT	5.9kgf · m

TOOLS

ATTACHMENT
PILOT
DRIVER
BEARING REMOVER SHAFT
BEARING REMOVER HEAD

TROUBLESHOOTING

Wobble rear wheel

- Deformed rim
- Worn rear wheel bearing
- Damaged tire
- Axle not tightened properly
- Insufficient air in tire
- Worn rear fork bush

Weak rear cushion

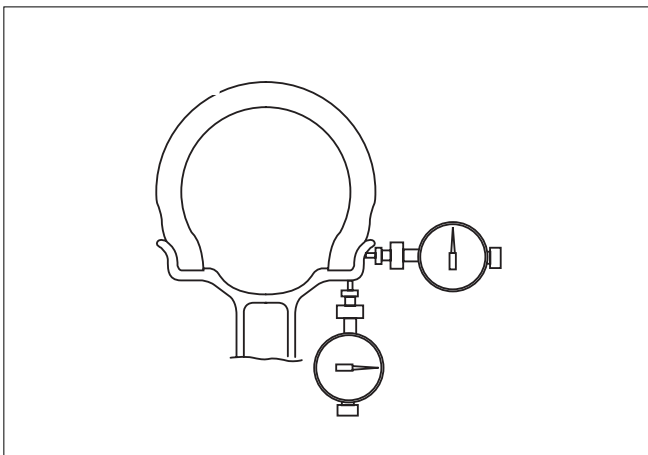
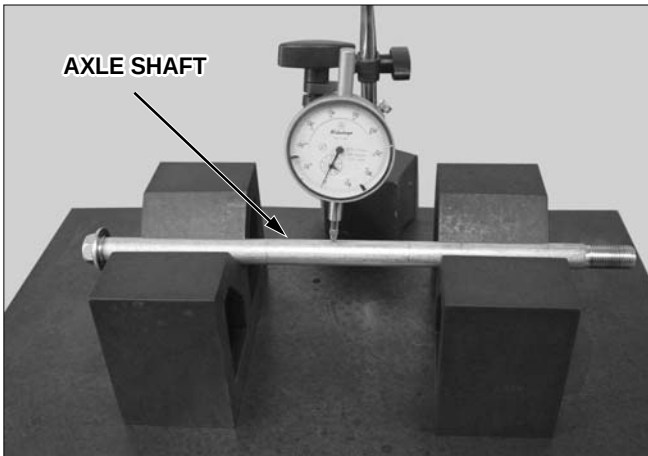
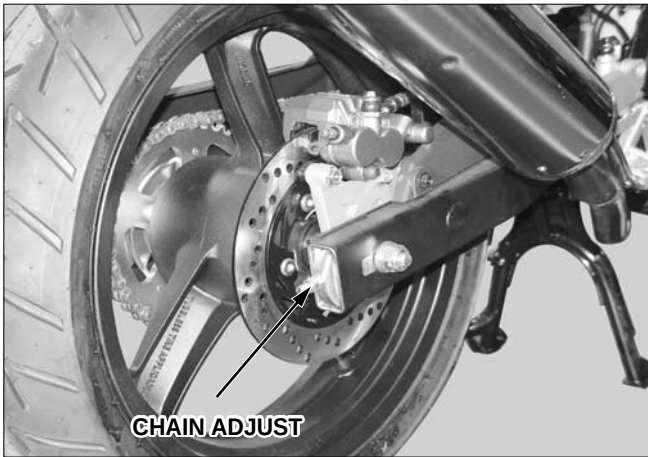
- Weak spring
- Incorrect rear damper

Hard rear cushion

- Bent damper rod

Rear cushion noise

- Loose fasteners



REAR WHEEL

REMOVAL

- Erect the motorcycle using a main stand.
- Loosen the chain adjust nuts and lock nuts.
- Remove the axle nut (U-nut).
- Push the rear wheel forward.
- Remove the drive chain from the driven sprocket.
- Remove the axle from the left side and remove the rear wheel.
- Remove the side collars.(2EA)

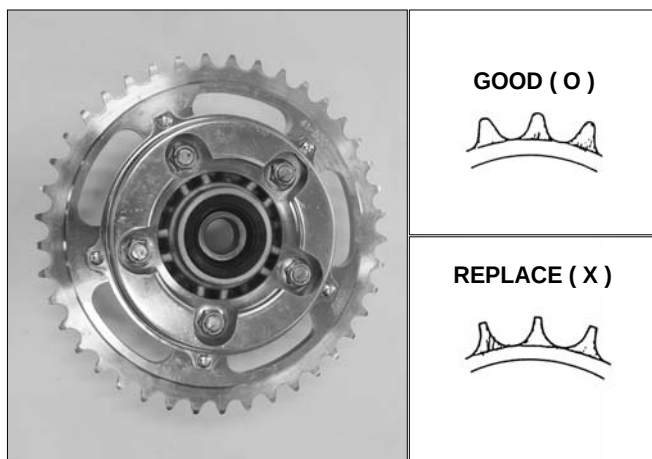
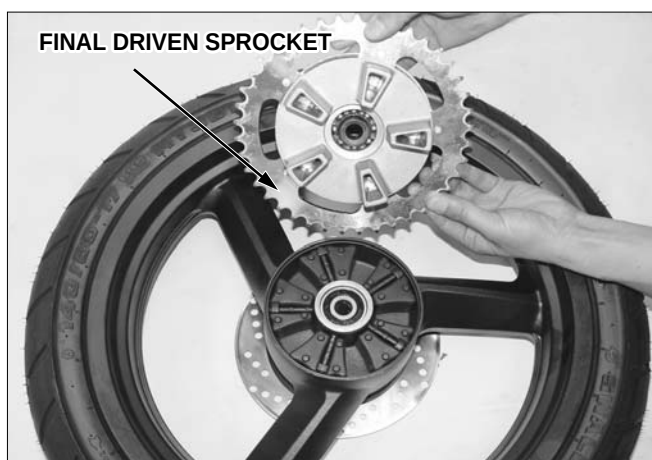
INSPECTION

- Inspect the bending of axle shaft.

SERVICE LIMIT : 0.20mm

- Spin the wheel slowly and read the runout.

**SERVICE LIMIT : RADIAL : 2.0mm
AXIAL : 2.0mm**



REMOVAL

- Remove the side collar.
- Loosen the 5 disk bolts, remove the disk brake.
- Remove the oil-seal.

- Remove the final driven sprocket.

- Check the teeth of the final driven sprocket.
- Replace the sprocket if worn or damaged.

NOTE

- Check the drive chain and driven sprocket at the same time.

- Check the rear wheel damper.
- Replace the damper, if it damaged.



- Turn the each bearing.
- Replace it if damaged.

REPLACEMENT BEARING

- Install the bearing remover into the bearing.
- install the bearing remover shaft at the opposite position, and remove the wheel bearing by heating with a hammer.
- After removing the distance collar, remove the other bearing.

TOOLS :
BEARING REMOVER SHAFT
REMOVER HEAD

NOTE

- If the wheel bearing was replaced, Be sure to replace it with new one.

- Apply the grease to the bearing.
- Insert the new bearing in parallel with the seal side facing outside. After inserting the distance collar, insert the bearing of the right side with the seal facing outside.

TOOLS :
DRIVER
ATTACHMENT
PILOT



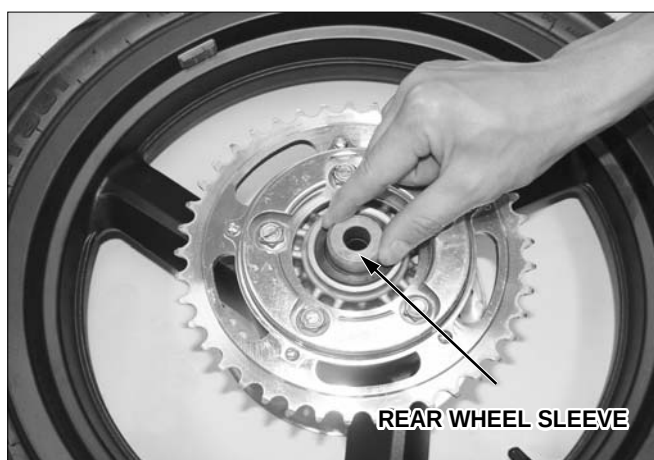
ASSEMBLY



REAR WHEEL/REAR SUSPENSION



- Install the dust seal after applying the grease.
- Install the final driven sprocket.



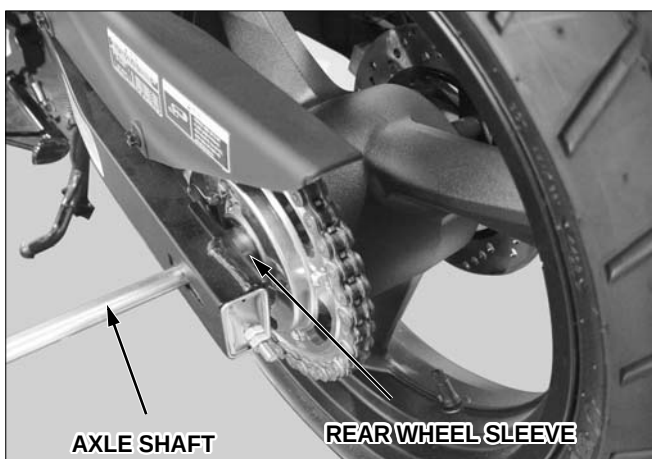
- Install the rear wheel sleeve.

TORQUE : 5.9 kgf · m



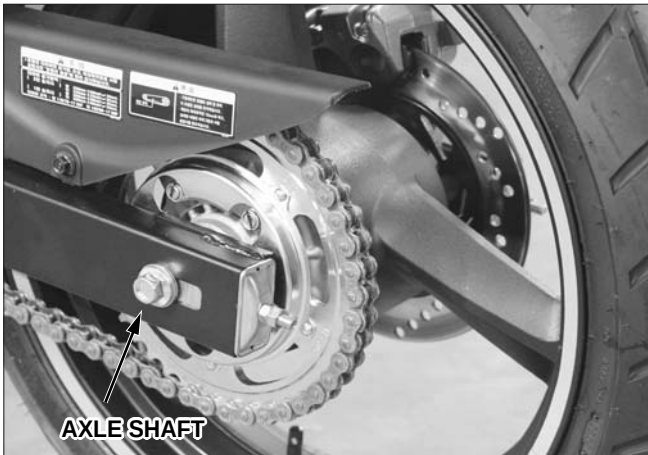
- Install the brake disk with literal mark facing out.
- Install and tighten the bolts to the specified torque.

TORQUE : 4.2 kgf · m



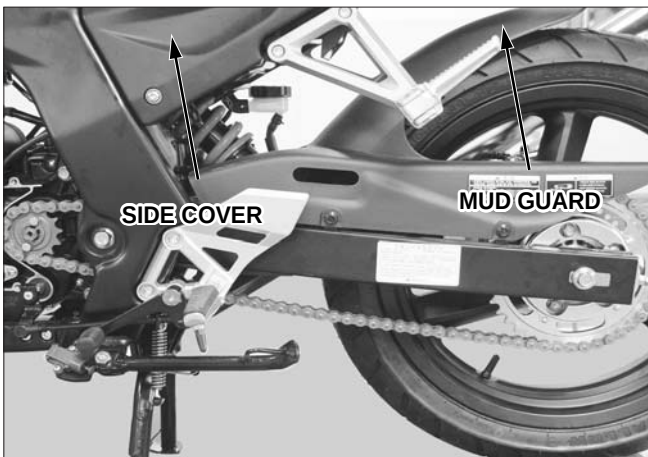
INSTALLATION

- Install the side collar on RH. side rear wheel.
- Place the rear wheel into the swingarm.
- Install the drive chain over the driven sprocket.
- Install the axle from the left side.



- Install the axle nut temporary.
- By tightening the chain adjust nut, adjust the drive chain slack. (⇒2-8)
- Tighten the axle nut to the specified torque.

TORQUE : 8.8 kgf · m



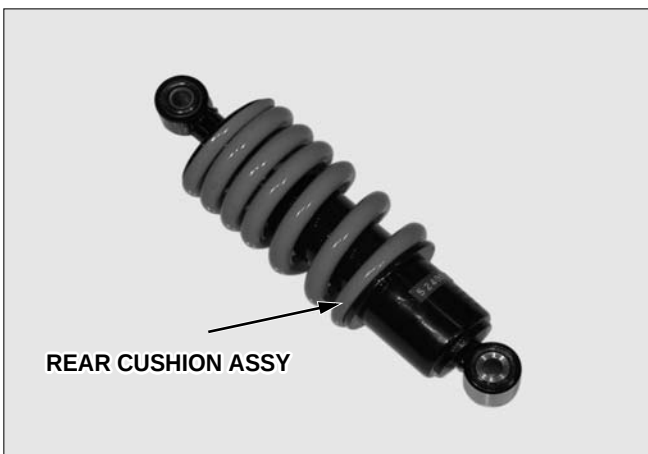
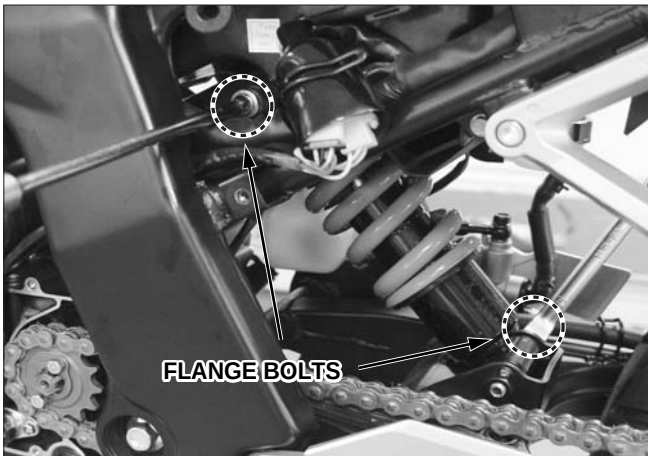
REAR CUSHION

REMOVAL

- Raise and support the motorcycle with main stand.
- Remove the rear wheel mudguard.
- Remove the rear cushion lower flange bolt.
- Remove the LH. side cover.
- Loosen the rear cushion upper flange bolt, and remove the rear cushion.

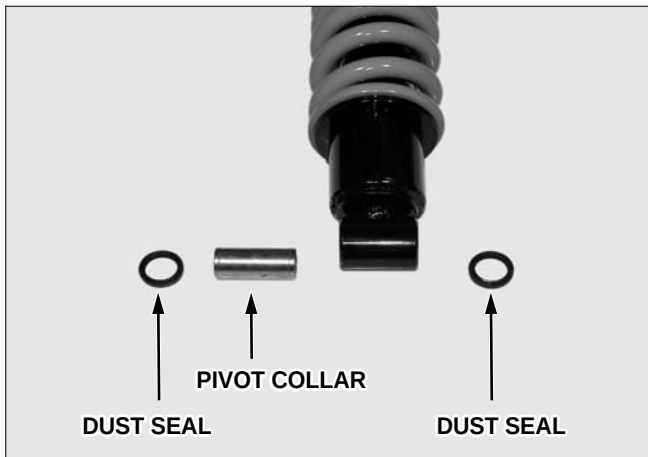
WARNING

- The damper unit is filled with high pressure nitrogen gas. Do not disassemble gas damper unit.
- Heating a gas-filled damper can lead to an explosive release of pressure which can cause a serious injury.



INSPECTION

- Visually inspect the rear cushion for damage.
- Check for the :
 - Damper rod for bend or damage
 - Damper unit for deformation or oil leaks
 - Cushion rubber for wear or damage
- Check all the other parts for wear or damage.
- If necessary, replace the rear cushion as an assembly.



BUSHING REPLACEMENT

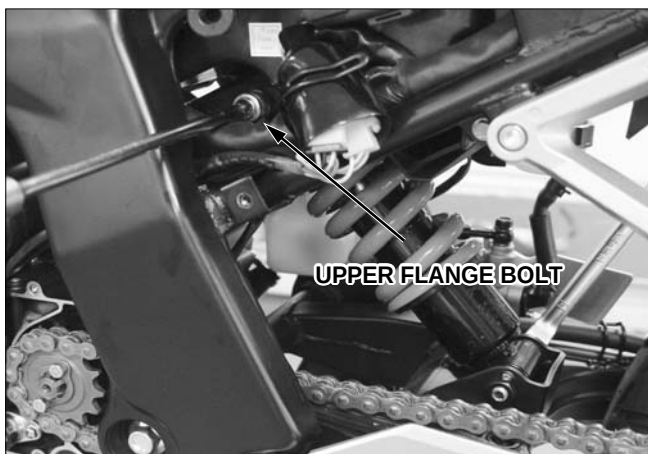
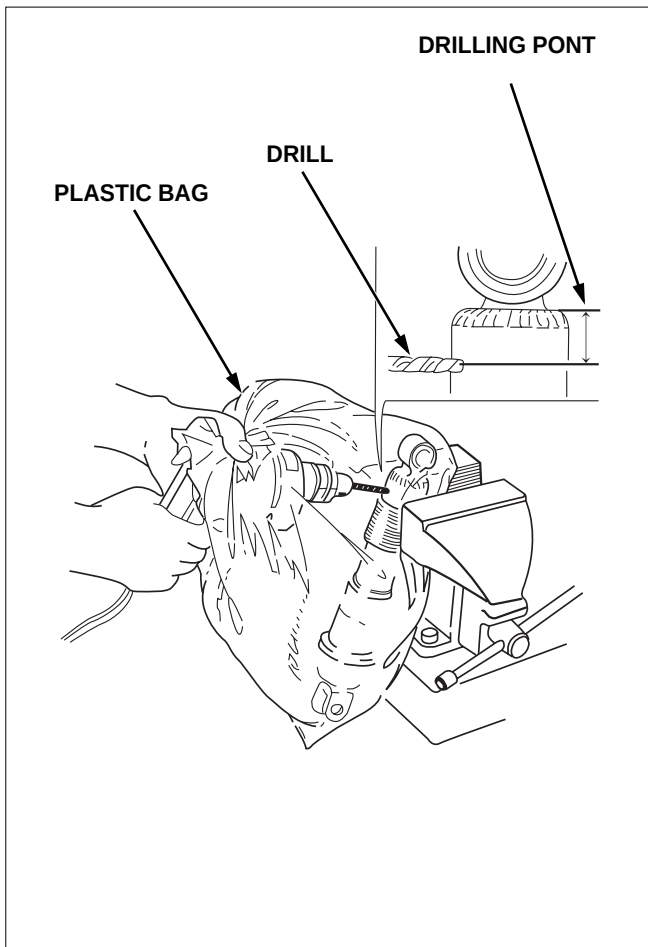
- Remove the pivot collar and 2 dust seals.
- Press out the bushing out of the rear cushion lower mount using the special tools.
- Install a new bushing into the lower cushion mount .
- Apply grease to the new dust seal lips, install them into the lower mount.
- Install the pivot collar.

REAR CUSHION DISPOSAL PROCEDURE

- Punch the damper case center to mark drilling.
- Wrap the rear cushion inside a plastic bag.
- Support the rear cushion upright in a vise.
- Though the open end of the bag, insert a drill motor with a sharp 2~3mm drill bit.
- Hold the bag around the drill motor and briefly run the drill motor inside the bag; this will inflate the bag with air from the motor and help keep the bag from getting caught in the bit when you start.

⚠ WARNING

- Always wear eyes protection to avoid getting metal shavings in your eyes when gas pressure is released.
- Drilling farther into the damper case than specified can puncture the oil chamber.



INSTALLATION

- Install the rear cushion into the frame and install the rear cushion upper flange bolt to the specified torque.
TORQUE : 3.4 kgf · m
- Install the LH. side cover.



- Install the rear cushion lower mounting bolt.
- Tighten the bolt to the specified torque.

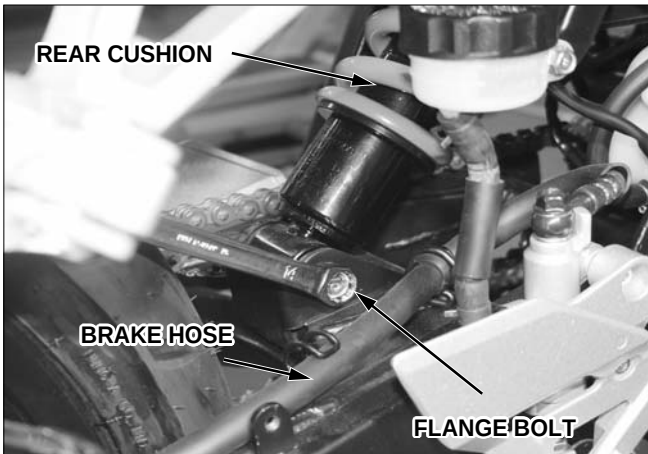
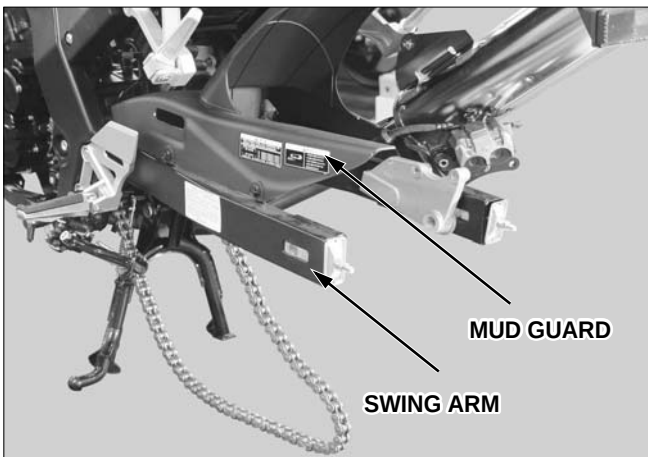
TORQUE : 4.0 kgf · m

- Install the rear wheel mudguard.

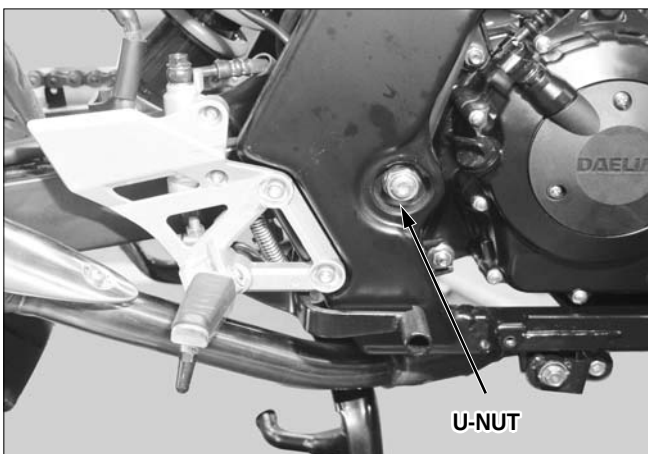
SWINGARM

REMOVAL

- Remove the rear wheel. (⇒15-3)
- Remove the mudguard mounting R/L (2EA) bolts and rear wheel mudguard.



- Remove the brake hose from the swingarm clamp.
- Remove the rear cushion and swing arm securing bolts lower flange bolt.



- Remove the U-nut and swingarm pivot bolt and then remove the swingarm from the frame.

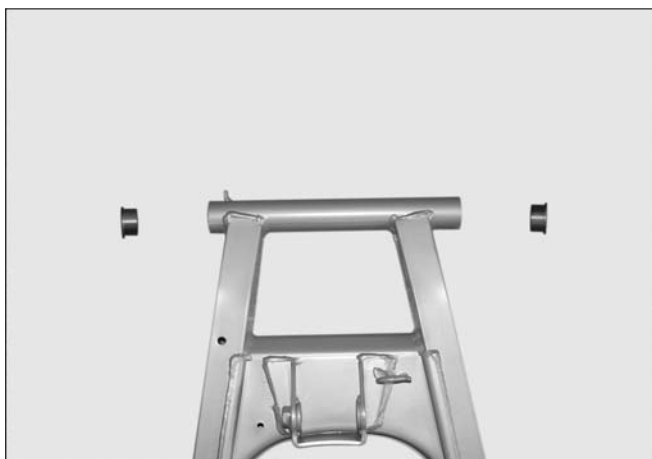
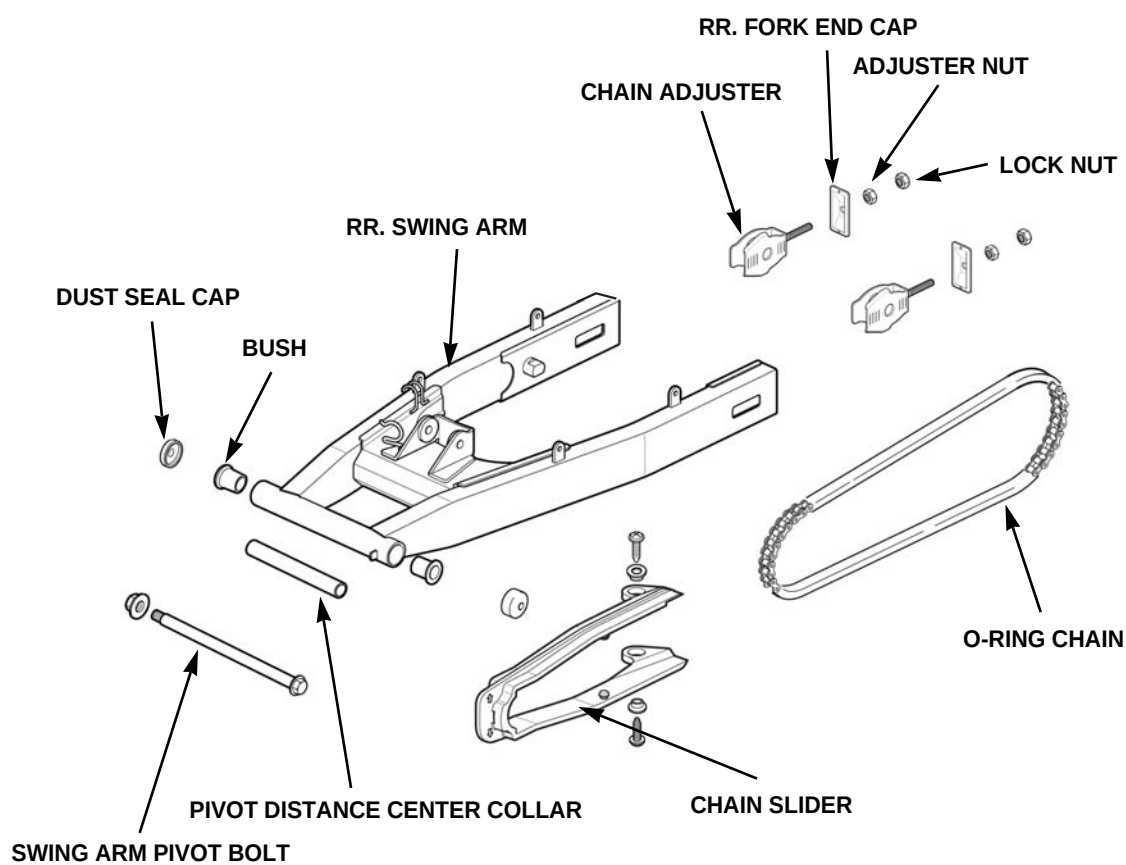
REAR WHEEL/REAR SUSPENSION



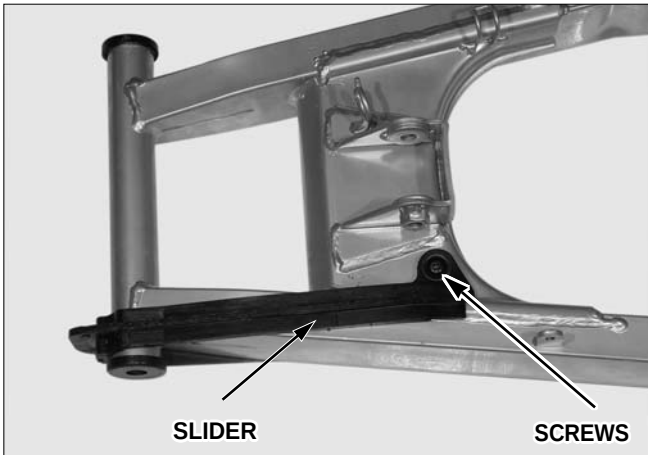
DISASSEMBLY/INSPECTION

- Remove the upper and lower screws and chain slider.
- Check the chain slider for wear or damage.
- Remove the dust seal caps pivot distance center collar and bush.
- Check the dust seal caps, center collar and bush for wear or damage.

ASSEMBLY



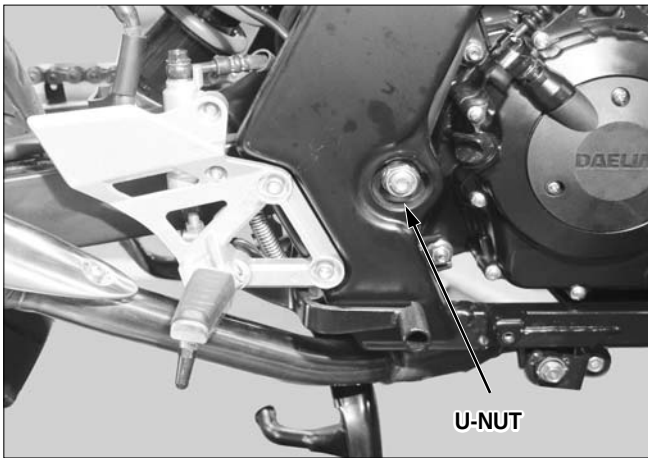
- Apply grease to the center collar, bearing and bushes.
- Install the center collar, bearings and bushes to the swingarm.



- Install the dust seal caps into the swingarm.
- Install the drive chain slider on the swingarm, then tighten the screws.

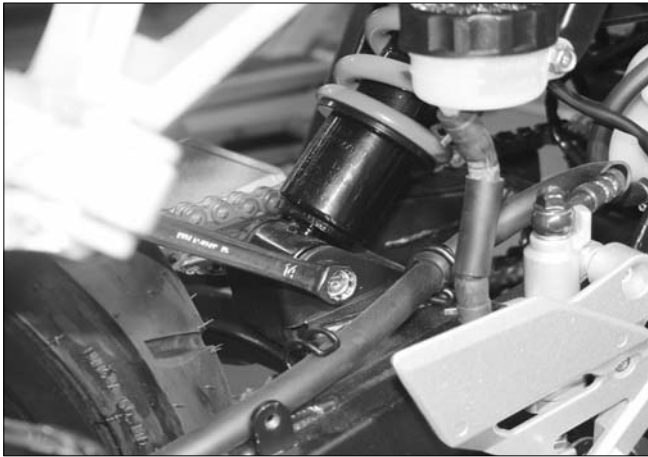
TORQUE : 0.6 kgf · m (6 N · m)

INSTALLATION



- Apply thin coat of grease to the swingarm pivot bolt surface.
- Align the drive chain installed swingarm to drive slider and install the frame.
- Install the pivot bolt from the left side and tighten the u-nut to the specified torque.

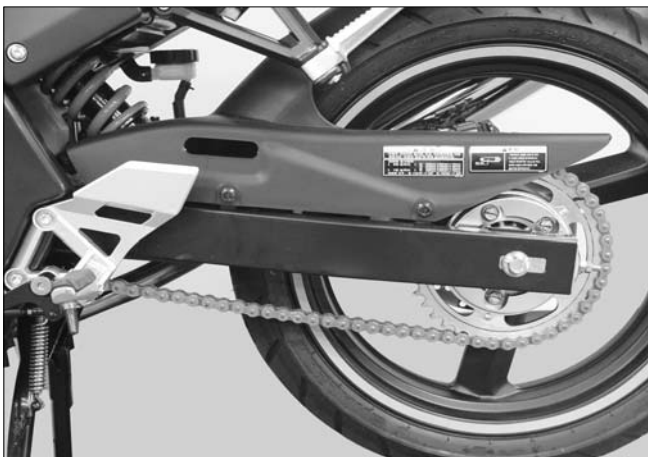
TORQUE : 8.8 kgf · m



- Install the swingarm-to-rear cushion lower flange bolt, then tighten the bolt to the specified torque.

TORQUE : 4.0 kgf · m

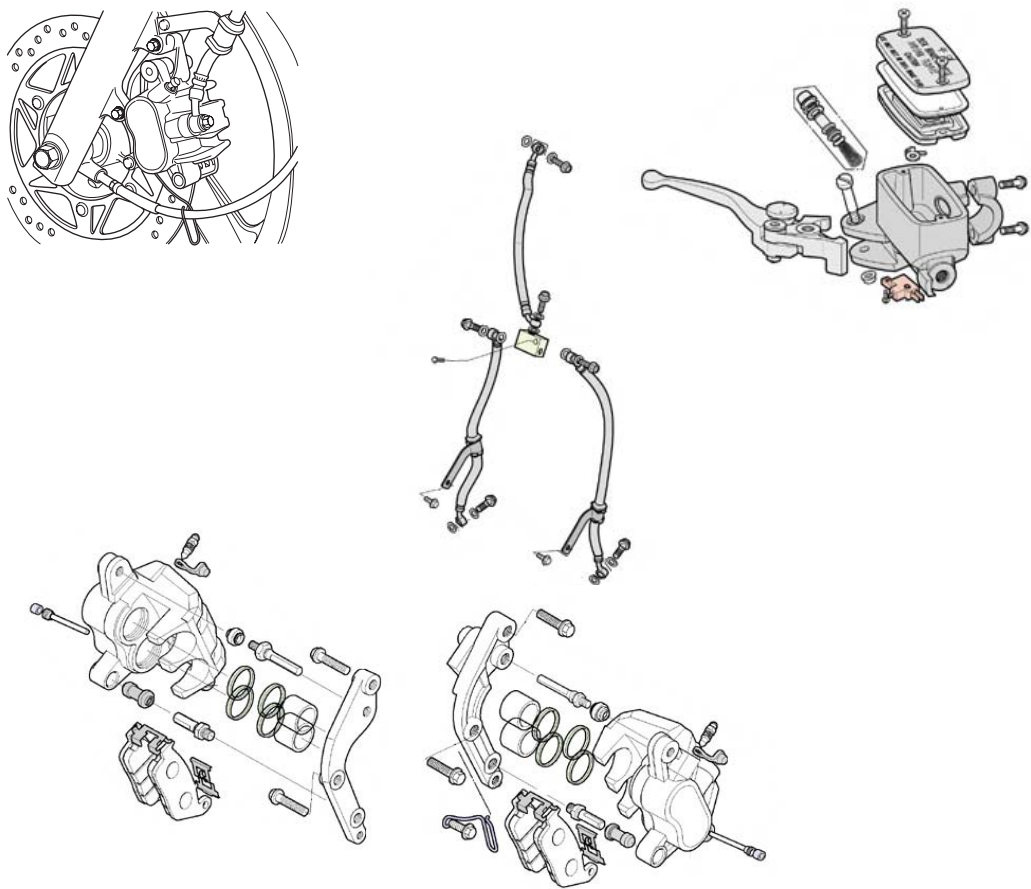
- Install the brake hose to swingarm clamp correctly.
- Install the rear caliper bracket into the groove of the swingarm.



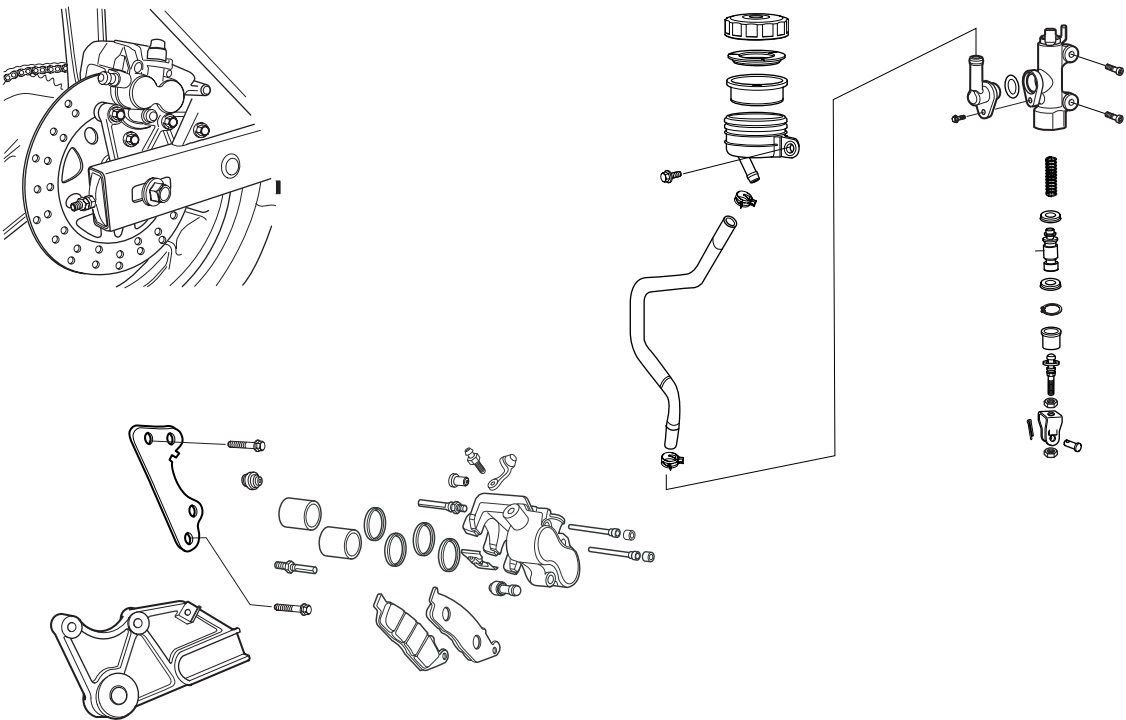
- Install the rear wheel mudguard and tighten the mudguard 4 mounting bolts.
- Install the rear wheel. (⇒15-3)
- Install the removed parts in the reverse order of removal.

HYDRAULIC BRAKE

FRONT :



REAR :



16. HYDRAULIC BRAKE

SERVICE INFORMATION	16-1	FRONT MASTER CYLINDER . . .	16-9
TROUBLESHOOTING	16-2	REAR MASTER CYLINDER . . .	16-13
BRAKE FLUID REPLACEMENT/ AIR BLEEDING	16-3	FRONT BRAKE CALIPER	16-18
BRAKE PAD/DISK	16-6	REAR BRAKE CALIPER	16-20
		BRAKE PEDAL	16-23

SERVICE INFORMATION

GENERAL SAFETY

⚠ WARNING

Frequent inhalation of brake pad dust, regardless of material composition could be hazardous to your health.

- Avoid breathing dust particles.
- Never use an air hose or brush to clean brake assemblies use and OSHA-approved vacuum cleaner.

- Don't put in dust or water when filling the reservoir.
- Don't mix different types of fluid to prevent from changing chemically.
- Don't use the removed brake fluid.
- Avoid spilling brake fluid or painted plastic and rubber parts because of damaging them.
- Cover the joint part of the hose to prevent the leak the brake fluid from leaked.
- Clean the removed parts with brake fluid and check the airing of each part with a compressed air.
- Arrange the removed parts not to be soiled with dust or dirt.
- After checking if dust or dirt soils each part, install them.
- Always replace the specified parts.
- Brake pad can be removed without disconnecting the hose.
- Bleed the air in case of removing the brake hose.

SPECIFICATIONS

Unit : mm

ITEM		STANDARD VALUE	SERVICE LIMIT
FRONT	SPECIFIED BRAKE FLUID	DOT4	-
	BRAKE DISK THICKNESS	4.0	3.5
	BRAKE DISK VIBRATION	0.1	0.3
	MASTER CYLINDER I. D.	14.000~14.043	14.055
	MASTER PISTON O. D.	13.878~13.905	13.866
	CALIPER CYLINDER I. D.	25.000~25.033	25.07
	CALIPER PISTON O. D.	24.914~24.935	24.87
REAR	SPECIFIED BRAKE FLUID	DOT4	-
	BRAKE DISK THICKNESS	4.0	3.0
	BRAKE DISK VIBRATION	0.1	0.3
	MASTER CYLINDER I. D.	12.700~12.743	12.755
	MASTER PISTON O. D.	12.657~12.684	12.645
	CALIPER CYLINDER I. D.	25.000~25.033	25.070
	CALIPER PISTON O. D.	24.914~24.935	24.870

HYDRAULIC BRAKE

TORQUE VALUES

BRAKE CALIPER BRACKET BOLT (FRONT/REAR)	3.0kgf · m
BRAKE CALIPER BLEEDER VALVE (FRONT/REAR)	0.6kgf · m
BRAKE CALIPER HANGER PIN (FRONT/REAR)	2.3kgf · m
BRAKE PAD PIN BOLT (FRONT/REAR)	1.8kgf · m
BRAKE OIL BOLT (FRONT/REAR)	3.4kgf · m
MASTER CYLINDER RESERVE CAP SCREW	1.0kgf · m
BRAKE LEVER PIVOT BOLT	1.0kgf · m
BRAKE LEVER PIVOT LOCK NUT	1.0kgf · m
REAR MASTER CYLINDER HOLDER SOCKET BOLT	1.2kgf · m

TOOL

SNAP RING PLIERS

TROUBLESHOOTING

Brake lever/pedal soft or spongy

- Air bubbles in the hydraulic system.
- Leaking hydraulic system.
- Contaminated brake pad / disk .
- Worn caliper piston seal.
- Worn master cylinder piston seal.
- Worn brake pad/disk.
- Contaminated caliper.
- Caliper not sliding properly.
- Low brake fluid level.
- Clogged fluid passage.
- Warped / deformed brake disk.
- Sticking / worn caliper piston.
- Sticking / worn master cylinder piston.
- Contaminated master cylinder.
- Bent brake lever/pedal.

Brake lever/pedal hard

- Clogged / restricted brake system.
- Sticking / worn caliper piston.
- Caliper not sliding properly.
- Clogged / restricted fluid passage.
- Worn caliper piston seal.
- Sticking / worn master cylinder piston.
- Bent brake lever/pedal.

Brake drags

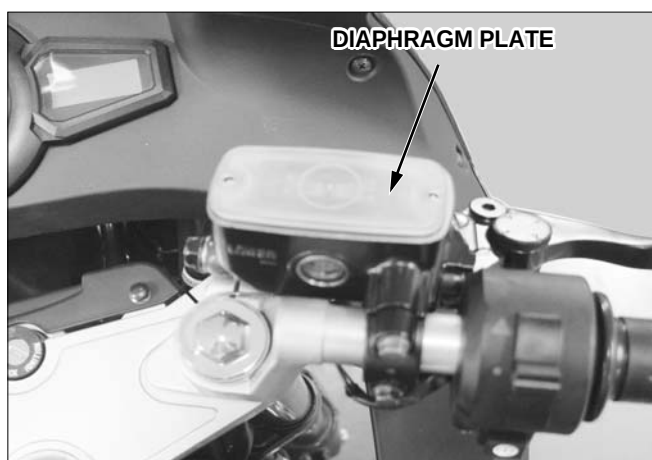
- Contaminated brake pad / disk.
- Misaligned wheel.
- Clogged / restricted brake hose joint.
- Warped / deformed brake disk.
- Caliper not sliding properly.
- Clogged/restricted brake hydraulic system
- Sticking/worn caliper piston
- Clogged master cylinder port



BRAKE FLUID REPLACEMENT/ AIR BLEEDING

⚠ NOTE

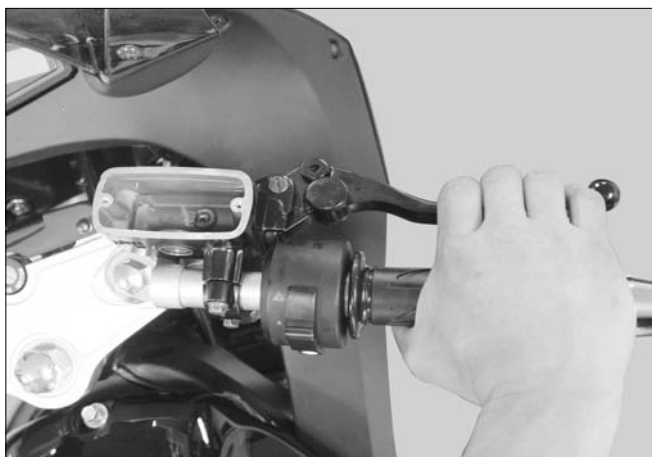
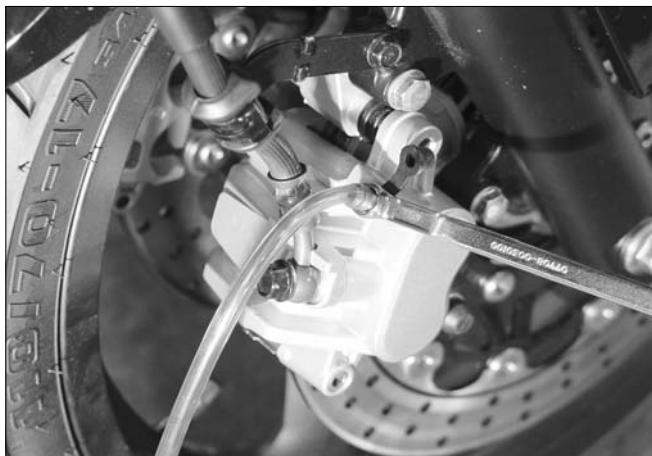
- Do not allow foreign material to enter the system when filling the reservoir.
- Avoid spilling fluid on painted, plastic, or rubber parts.



BRAKE FLUID DRAINING

<Front brake>

- Turn the handlebar until the reservoir is parallel to the ground, before removing the reservoir cap.
- Remove the 2 screws and master cylinder.
- Remove the diaphragm plate and diaphragm from the master cylinder.
- Connect the bleeder hose to caliper bleeder valve.



- Loosen the bleeder valve and pump the brake lever or pedal.
- Stop pumping the lever or pedal when no more fluid flows out of the bleeder valve.

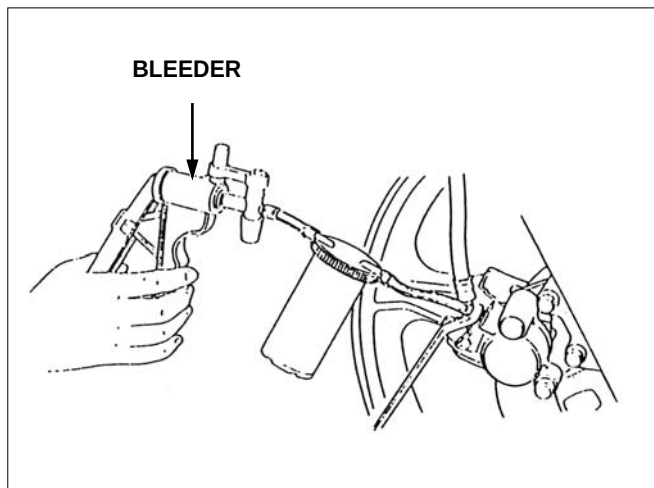


<Rear brake>

- Remove the RH. side cover.
- Remove the reservoir cap.



- Remove the reservoir cap plate and diaphragm.
- Drain the brake fluid as same way when the front brake fluid draining.



BRAKE FLUID FILLING

- Fill the reservoir with DOT4 brake fluid up to the upper level.

CAUTION

- Do not mix different types of fluid. There are not compatible.

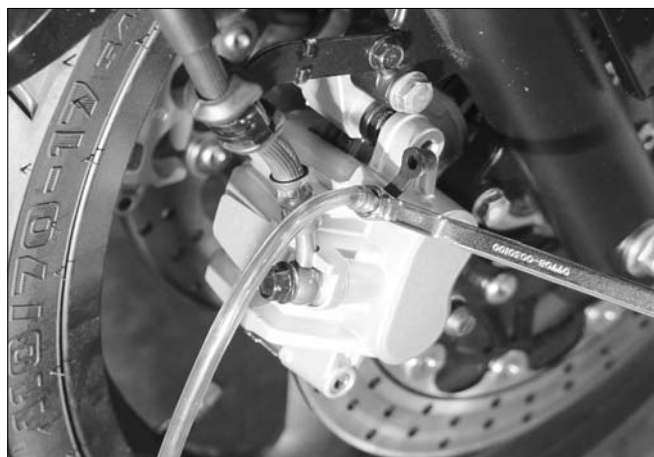
- Connect a recommended brake bleeder to the bleeder valve.
- Pump the brake bleeder and loosen the bleeder valve, adding fluid when the fluid level in the master cylinder reservoir is low.

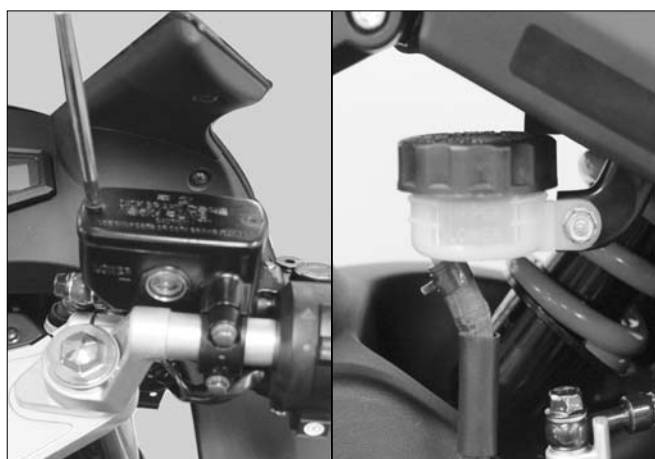
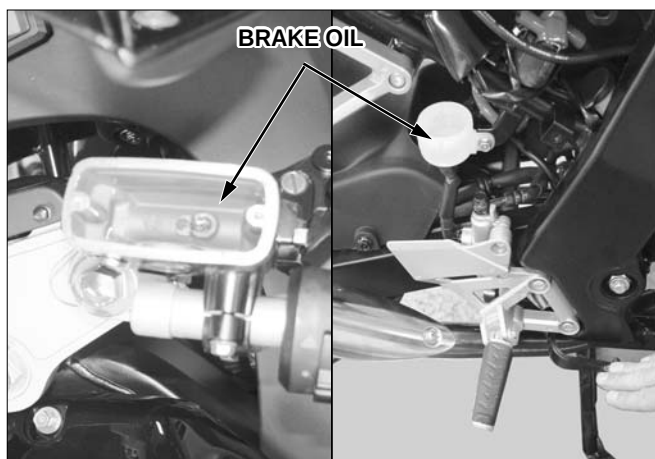
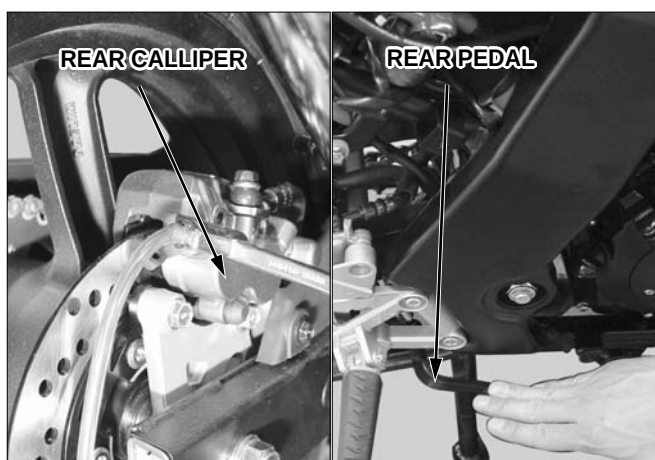
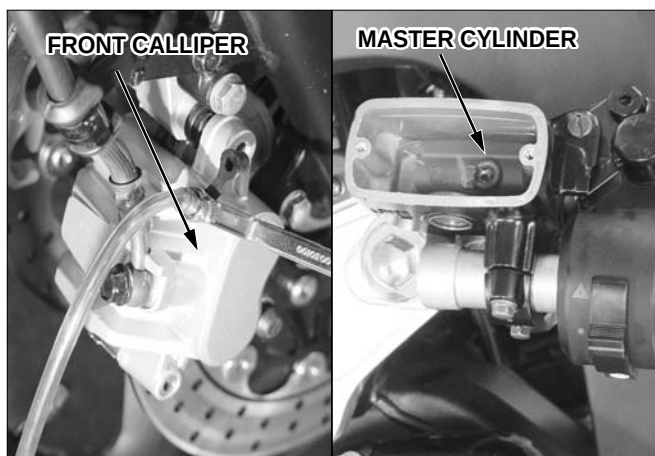
- Repeat the previous step procedures until air bubbles do not appear in the plastic hose.

NOTE

- If a brake bleeder is not available, fill the master cylinder and operate the brake lever or pedal to fill the system.

- Tighten the bleeder valve.





BRAKE BLEEDING

<When the brake bleeder is not available>

- Connect a clear bleeder hose to the bleeder valve.
- Pump up the system pressure with the lever or pedal until there are no air bubbles in the fluid flowing out of the master cylinder and lever or pedal resistance is felt.

1. Squeeze the brke lever or push the brake pedal, open the bleeder valve 1/2 turn and then close the valve.

⚠ CAUTION

- Do not release the brake lever or pedal until the bleeder valve has been closed.

2. Release the brake lever or pedal until the bleeder valve has been closed.

3. Repeat steps 1 and 2 until bubbles cease to appear in the fluid coming out of the bleeder valve.

⚠ NOTE

- Check the fluid level often, and add fluid if the fluid level is near the lower level.
- If no air leaks out of the bleeder hose, operate the brake lever to check the presence of air.

- Tighten the bleeder valve.

TORQUE : 0.6 kgf · m (6N · m)

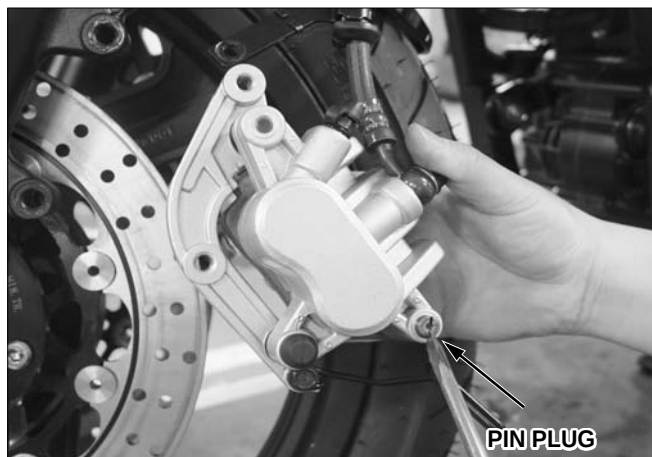
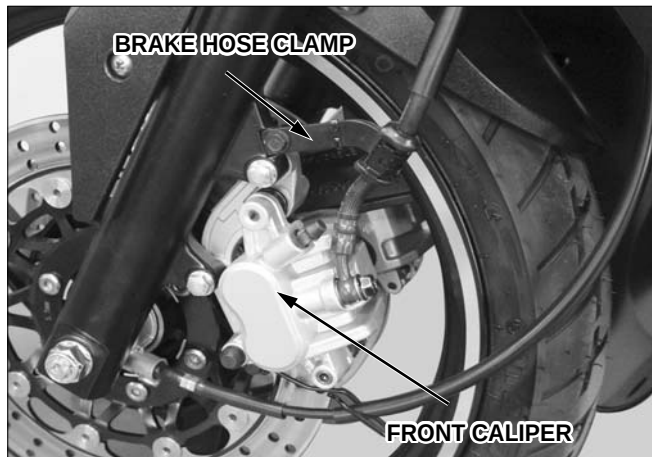
- Fill the fluid reservoir to the upper level.
- Reinstall the diaphragm and diaphragm plate.

<Front brake>

- Install the master cylinder cap, and tighten the screws.

<Rear brake>

- Install the reservoir cap securely.
- Install the RH. side cover.
- Install the seat.

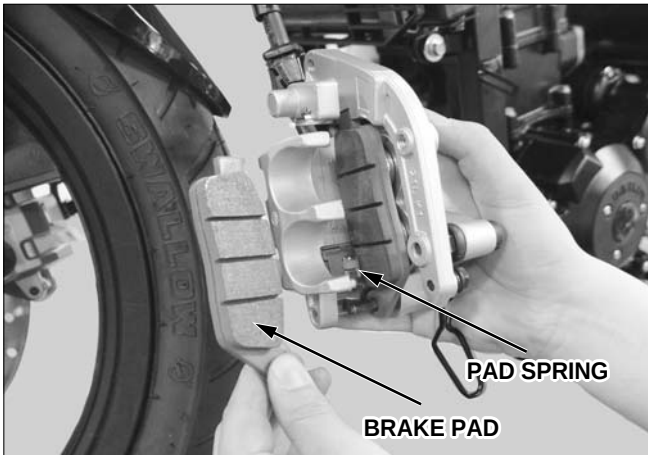


BRAKE PAD/DISK

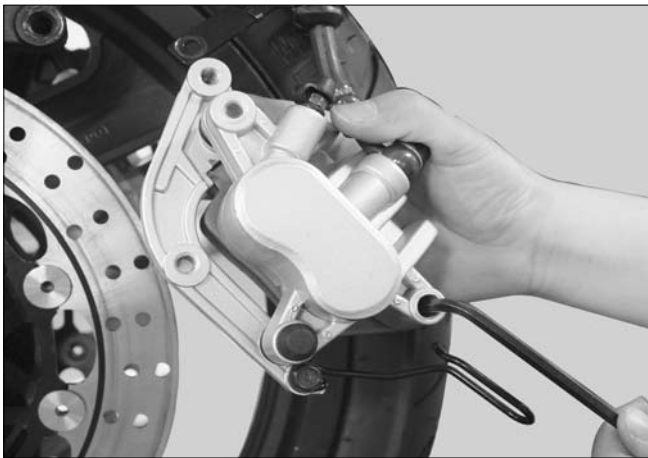
FRONT BRAKE PAD REPLACEMENT

⚠ NOTE

- When replacing brake pads, replace whole set.
 - Do not remove the brake hose when replacing brake pads.
- Remove the brake hose clamp from the front fork.
 - Remove the pin plug using the L. wrench.
 - Loosen the hanger pin.
 - Remove the caliper bracket 2 bolts and remove the brake capliper.
 - Press the caliper pistons all the way in to allow installation of new brake pads.
- Remove the pin plug.
 - Remove the hanger pin and replace the brake pads.
- Clean the inside of the caliper especially around the caliper pistons.



- Make sure the brake pad spring is in place.
- Install the new brake pads.
- Install the hanger pin.



- Install the brake caliper to the fork so the disk is positioned between the pads.
- Install and tighten the new brake caliper mounting bolts to the specified torque.

TORQUE : 3.0 kgf · m (30 N · m)

- Tighten the hanger pin and pin bolt.

TORQUE : 1.8 kgf · m (18 N · m)



REAR BRAKE PAD REPLACEMENT

- Remove the rear wheel mudguard. (⇒13-3)
- Remove the rear brake hose clamp.
- Push the caliper pistons all the way in by pushing the caliper body inward to allow installation of new brake pads.



- Loosen the dust plug.
- Loosen the hanger pins.
- Remove the rear caliper bracket bolts secured rear caliper bracket and bracket caliper.

HYDRAULIC BRAKE



- Remove the hanger pins and brake pads.

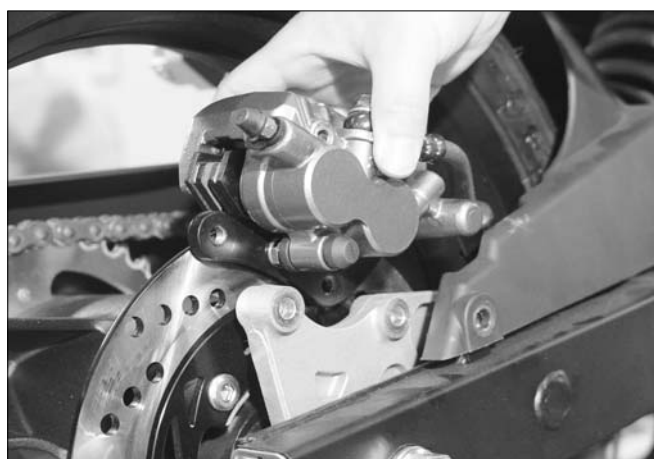


- Make sure the brake pad spring is in place.
- Install the new brake pads.



- Install the hanger pins.

TORQUE : 2.3 kgf · m



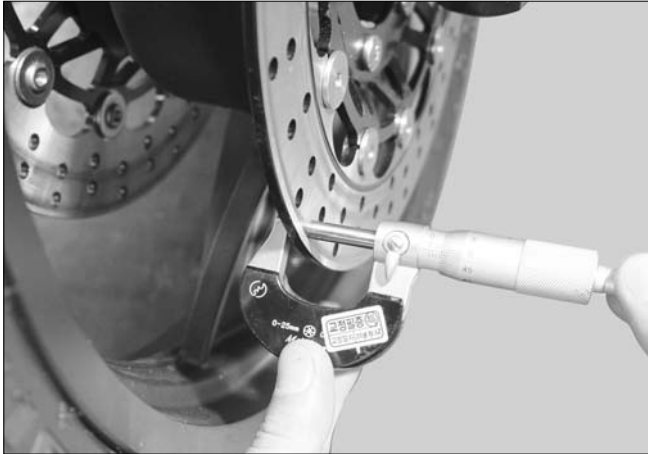
- Install the brake caliper to the caliper bracket so the disk is positioned between the pads.
- Tighten the brake caliper mounting bolts.

TORQUE : 3.0 kgf · m

- Tighten the pin plugs.

TORQUE : 1.8 kgf · m

- Install the rear brake hose clamp.
- Install the rear wheel mudguard.



BRAKE DISK INSPECTION

- Visually inspect the brake disk for damage or crack.
- Measure the brake disk thickness with a micrometer.

SERVICE LIMIT : FRONT: 3.5mm

REAR : 3.0mm

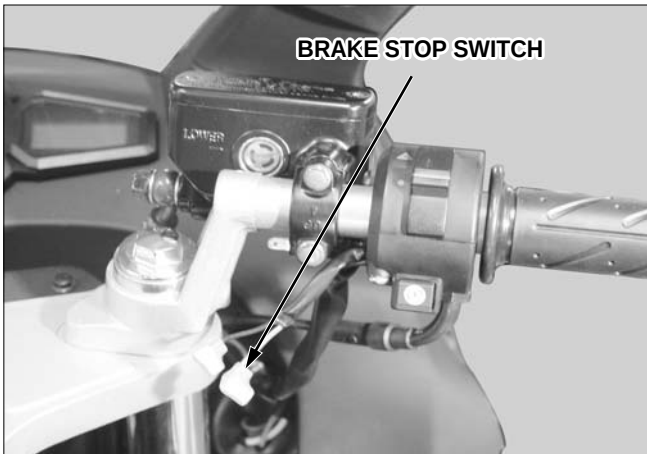
- Replace the brake disk if the smallest measurement is less than the service limit.



- Measure the brake disk runout with a dial indicator.

SERVICE LIMIT : 0.3mm

- Check the wheel bearing for excessive play, if the warpage exceeds the service limit.
- Replace the brake disk if the wheel bearings are normal.



FRONT MASTER CYLINDER

REMOVAL

- Drain the brake fluid. (16-3)
- Disconnect the the front brake stop switch wire.
- Remove the brake hose oil bolt and washers.

CAUTION

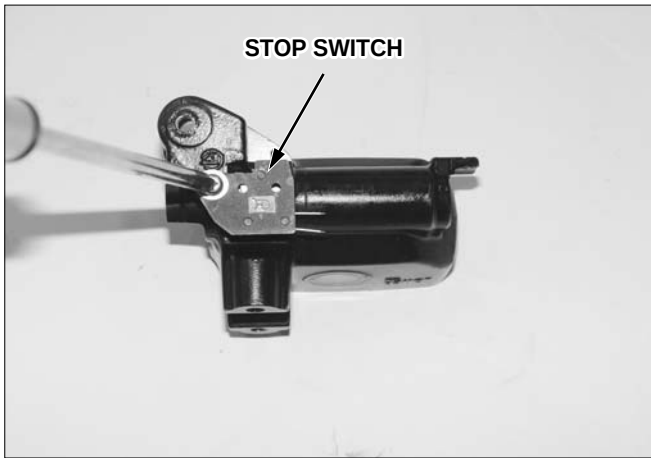
- Brake fluid causes damage to the painted, plastic or rubber parts. Do not spill fluid on these parts.
- If contaminated, gently wipe off the fluid with a piece of cloth or wash in water. Close hose joints properly to prevent leakage of brake fluid.



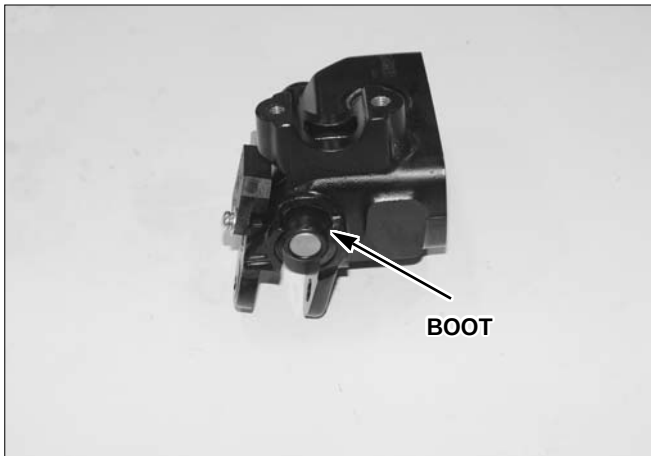


DISASSEMBLY

- Remove the handle lever bolt/nut and RH. handle lever assembly.



- Loosen the screw and remove the front brake stop switch.



- Remove the boot.

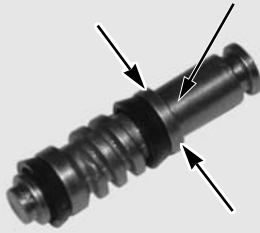


- Remove the circlip from the master cylinder.

TOOL : SNAP RING PLIERS

- Remove the master piston and spring.
- Clean the inside of the cylinder and reservoir with brake fluid.

MASTER CYLINDER PISTON



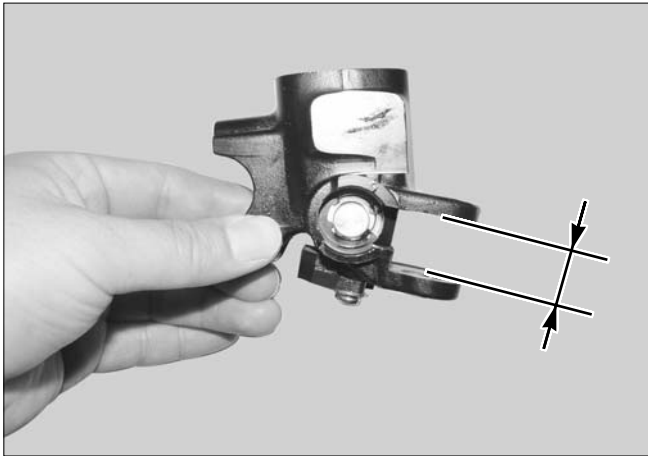
INSPECTION

- Check the piston for abnormal scratches.
- Check the primary cup and secondary cup for fatigue or damage.
- Measure the master cylinder piston O. D.

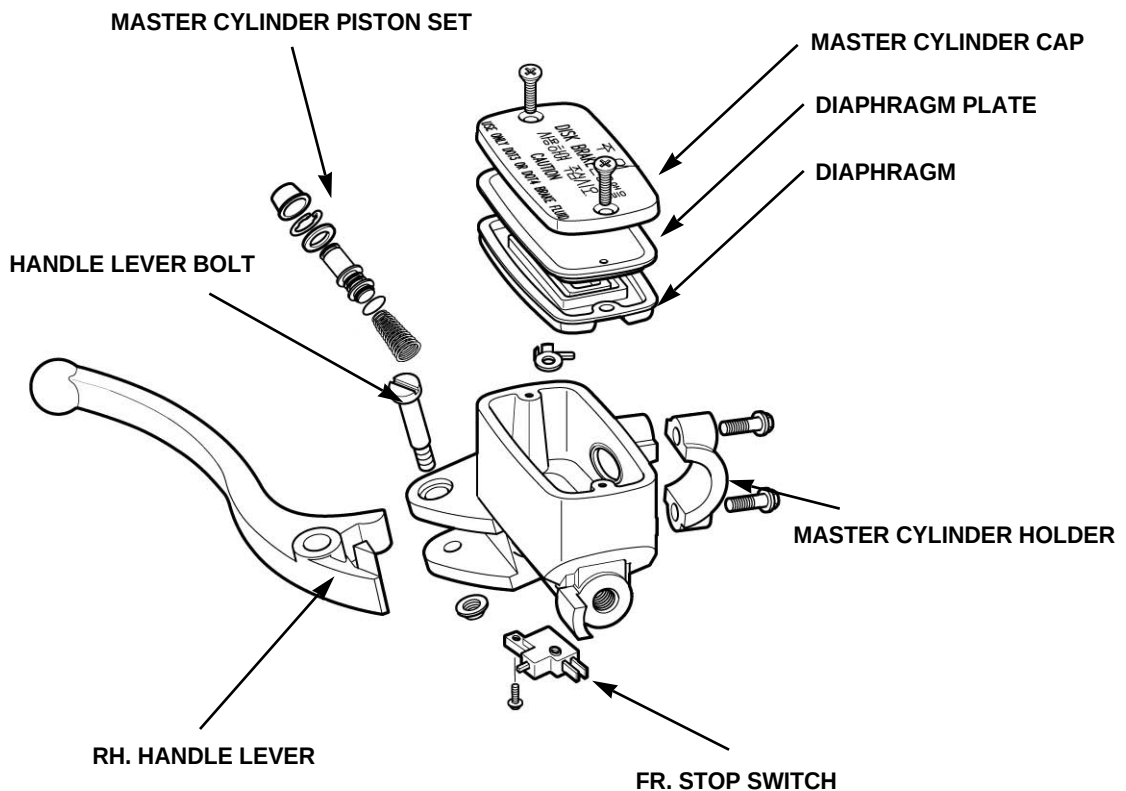
SERVICE LIMIT : 13.866mm

- Check the master cylinder for abnormal scratches.
- Measure the master cylinder I.D.

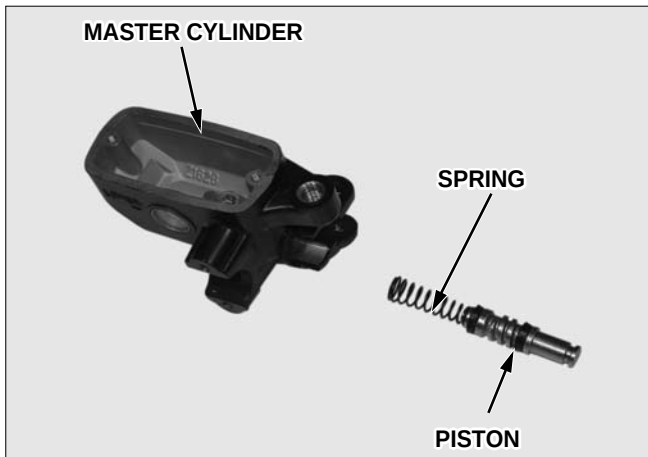
SERVICE LIMIT : 14.055mm



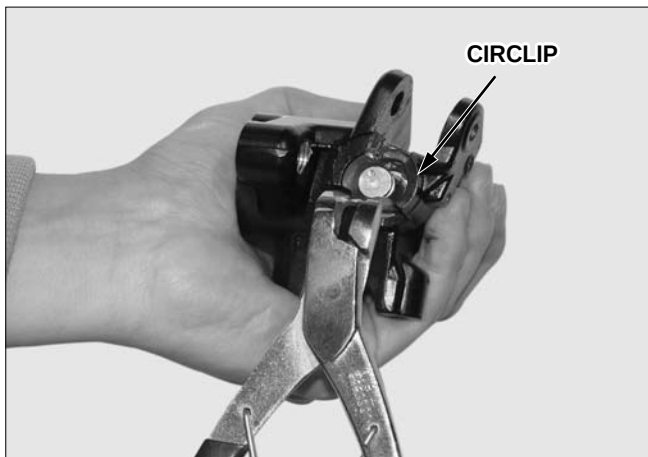
ASSEMBLY



HYDRAULIC BRAKE

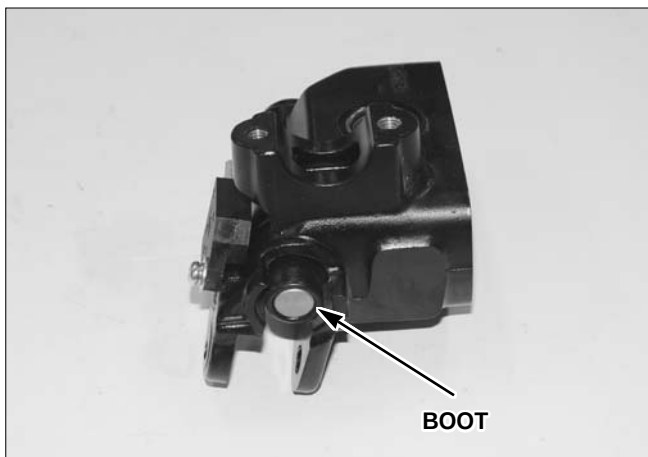


- Coat all parts with clean brake fluid before assembly.
- Dip the piston in brake fluid.
- Install the spring into the piston.
- Install the piston assembly into the master cylinder.

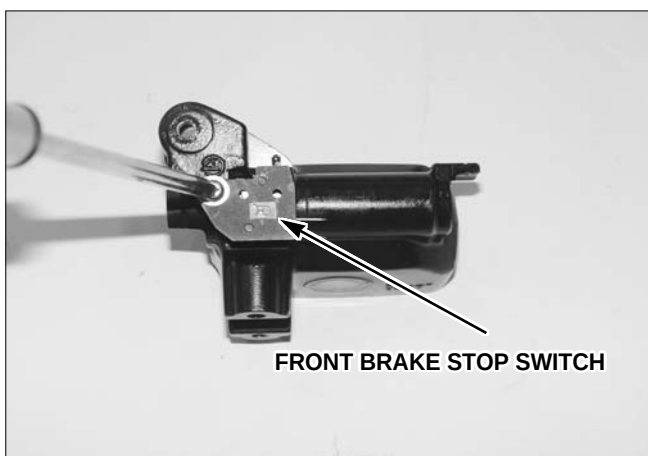


- Install the circlip.

TOOL : SNAP RING PLIERS



- Install the boot.

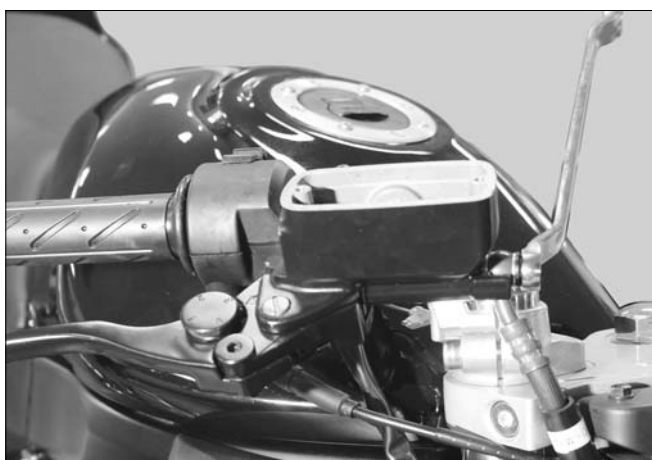


- Install the front stop switch and tighten the screw.
- Install the RH. handle lever, tighten the bolt and nut.



INSTALLATION

- Place the master cylinder assembly on the handlebar.
- Install the master cylinder holder with the "UP" mark facing up.
- Tighten the upper bolt first, then the lower bolt.



- Install the oil bolt and new washer on brake hose.
- Tighten the brake hose oil bolt.

TORQUE : 3.4 kgf · m



- Connect the front brake switch wire.
- Fill the reservoir to the upper level and bleed the brake system. (⇒16-5)



REAR MASTER CYLINDER

REMOVAL

- Drain the brake fluid. (⇒16-3)
- Remove the rear reservoir mounting bolt.
- Remove the rear brake hose oil bolt and washers.

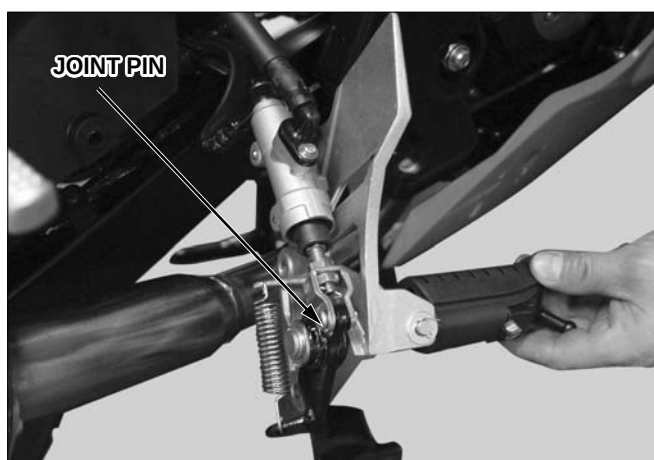
⚠ CAUTION

- Brake fluid causes damage to the painted, plastic or rubber parts. Do not spill fluid on these parts.
- If contaminated, gently wipe off the fluid with a piece of cloth or wash in water. Close hose joints properly to prevent leakage of brake fluid.

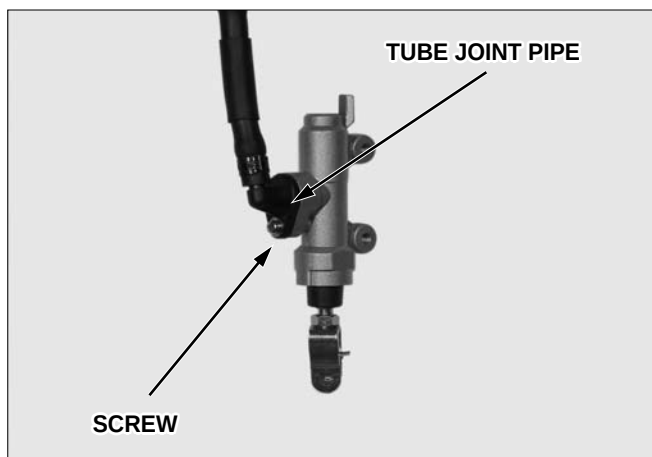
HYDRAULIC BRAKE



- Remove the two main step holder socket bolts and main step bar assembly.
- Unhook the rear brake stop switch spring from the brake pedal spring.

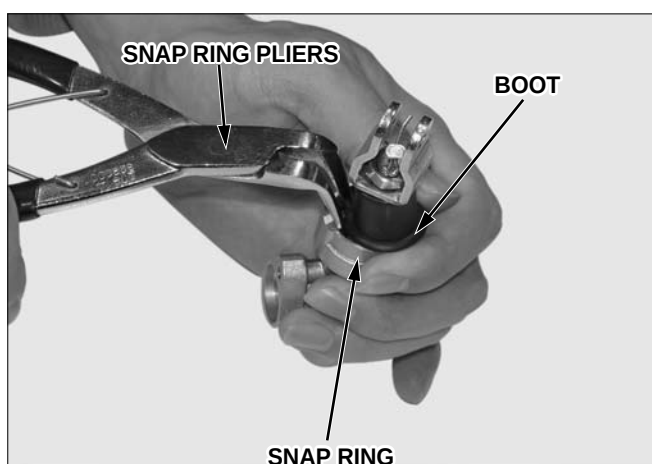


- Remove the 2 master cylinder bolts.
- Remove the joint pin C.
- Remove the master cylinder mounting socket bolts and master cylinder assembly.



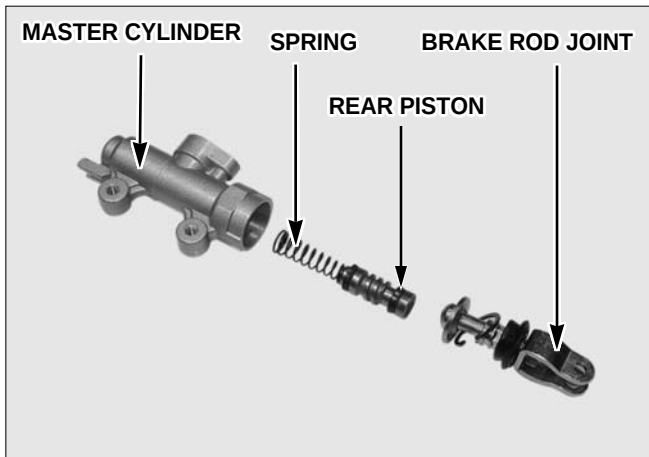
DISASSEMBLY

- Remove the screw and tube joint pipe from the master cylinder.

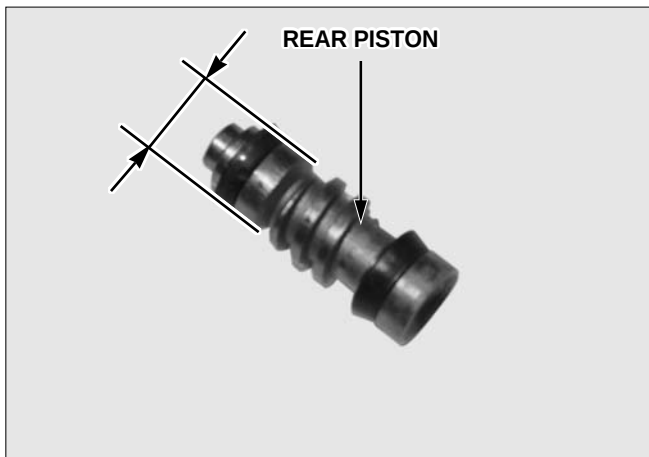


- Remove the boot.
- Remove the internal circlip using the tool from the master cylinder body.

TOOL : SNAP RING PLIERS



- Remove the brake rod joint, rear piston and spring.
- Clean the inside of the cylinder with brake fluid.



INSPECTION

- Check the piston for abnormal scratches.
- Check the primary cup and secondary cup for fatigue or damage.
- Measure the master rear piston O.D.

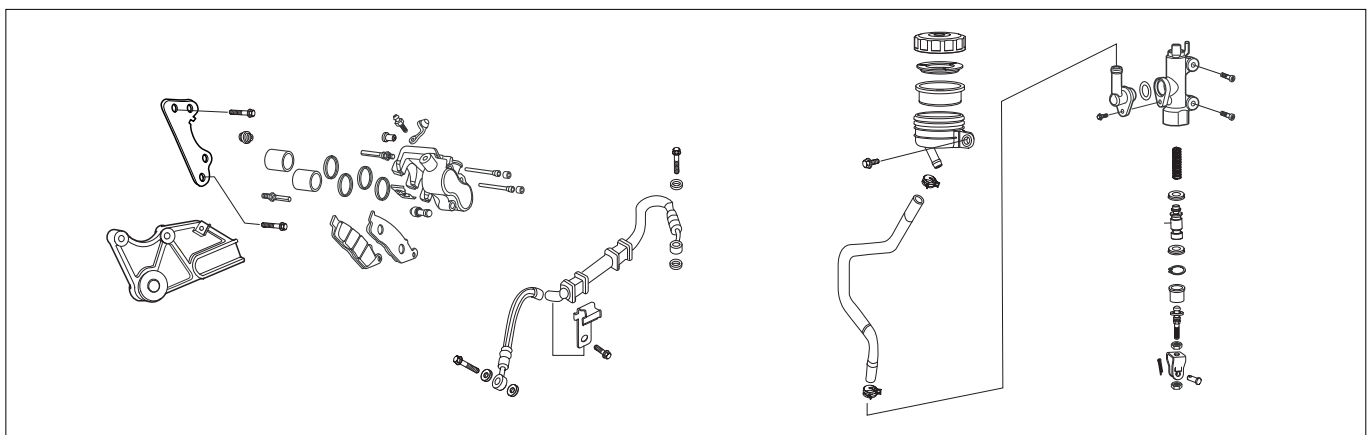
SERVICE LIMIT : 12.645mm



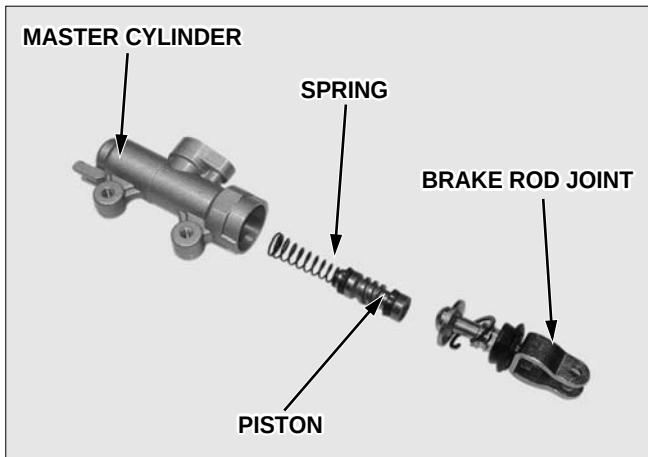
- Check the master cylinder for abnormal scratches.
- Measure the master cylinder I.D.

SERVICE LIMIT : 12.755mm

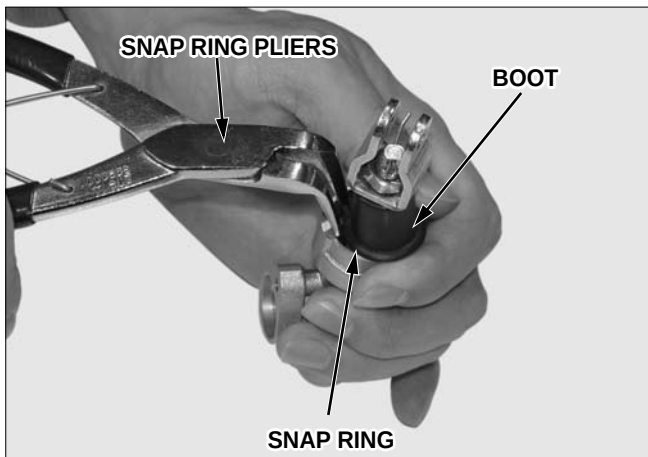
ASSEMBLY



HYDRAULIC BRAKE



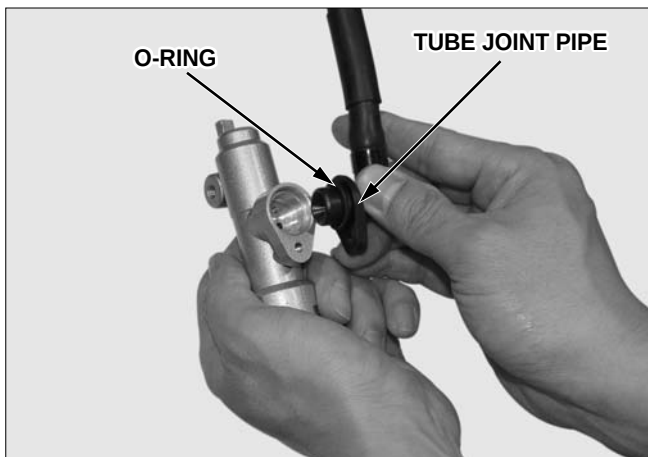
- Coat all parts with clean brake fluid before assembly.
- Dip the piston in brake fluid.
- Install the spring to the secondary cup.
- Install the spring/secondary cup and master piston assembly.



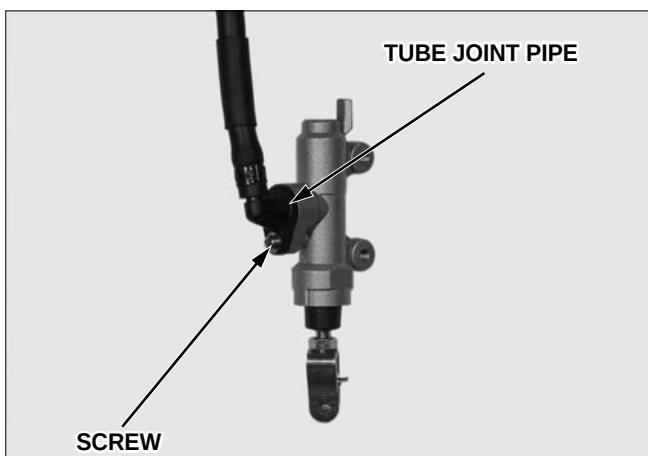
- Install the rear brake rod into the master cylinder.
- Install the internal circlip.

TOOL : SNAP RING PLIERS

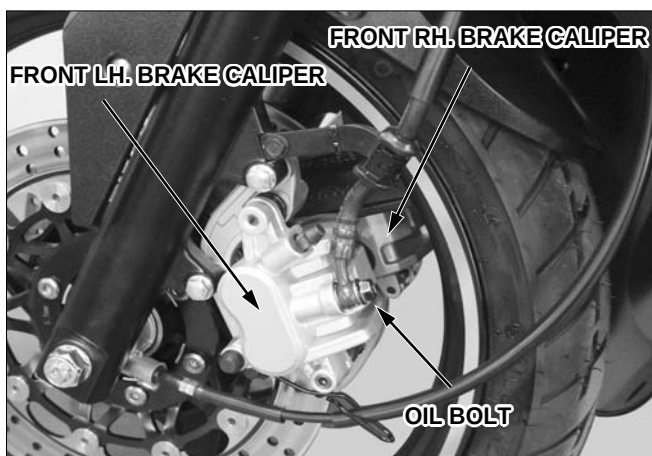
- Install the boot.



- Apply brake fluid to a new O-ring and install it into the tube joint pipe.
- Install the tube joint pipe into the master cylinder.



- Tighten the screw to the specified torque.



INSTALLATION

- Place the master cylinder into the main step holder, install the master cylinder mounting socket bolts.
- Connect the brake pedal to the brake rod joint.
- Install the joint pin C and secure it with a new cotter pin.

- Hook the stop switch spring to the brake pedal spring.
- Install the main step bar assembly to the frame, tighten the socket bolts to the specified torque.

TORQUE : 3.5kgf · m

- Tighten the master cylinder mounting socket bolts.

- Install the brake hose with the oil bolt and new washers.
- Tighten the oil bolt to the specified torque.

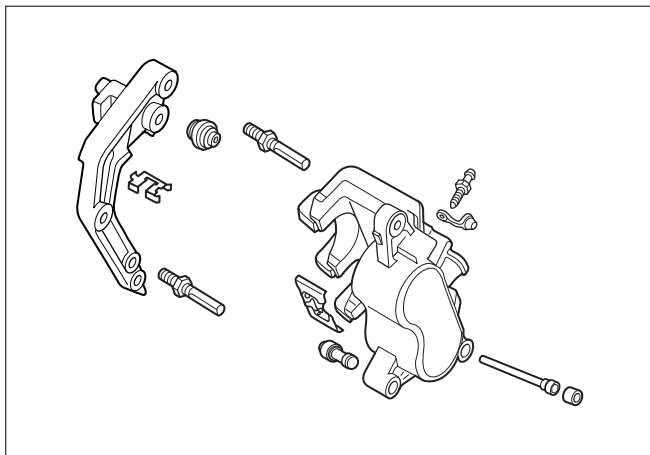
TORQUE : 3.4 kgf · m

- Tighten the rear reserve mounting bolt.
- Fill the brake fluid to the upper level and bleed the brake system. (⇒16-5)
- Adjust the brake pedal free-play. (⇒2-11)

FRONT BRAKE CALIPER

REMOVAL

- Drain the brake fluid from RH/LH brake caliper. (⇒16-3)
- Remove the oil bolt and oil bolt washer.
- Remove the speedometer cable clamp.
- Remove the caliper mounting bolts, caliper and the brake pads. (⇒16-6)



⚠ NOTE

- Avoid spilling fluid on painted, plastic, or rubber parts.
- Keep oil off the brake disk or pad, because the contaminated brake disk or pads reduce the braking performance if contaminated.
- Replace the pad with a new one and clean the disk.

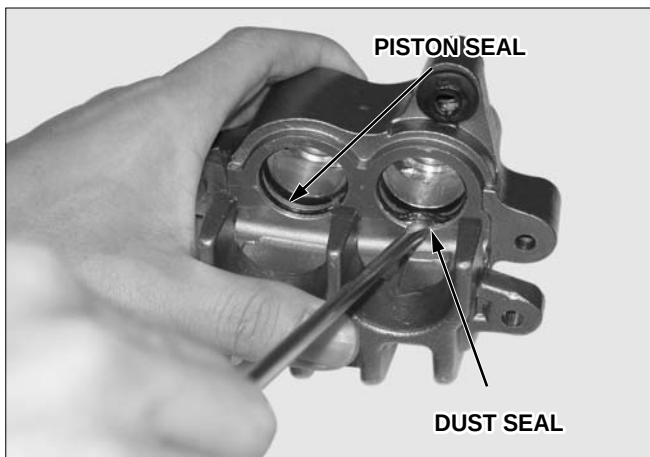


DISASSEMBLY

- Remove the pad spring, slide pin, caliper bracket and boot from the caliper body.
- If there is any wear or damage in the boot, replace it with a new one.
- Install corrugated cardboard or soft wood sheet between the pistons.
- Apply small squirts of air pressure to the brake hose assembly part to remove the pistons from the caliper.

⚠ CAUTION

- Do not use high pressure air or bring the air gun too close.
- Do not touch the inside of caliper.
- Remove the piston seal and dust seal.



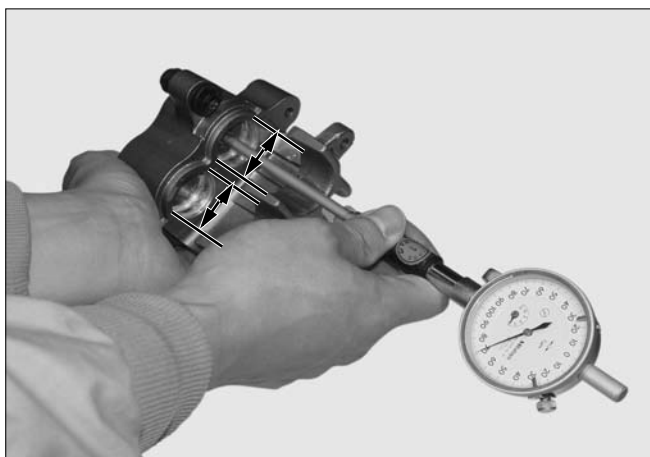
⚠ NOTE

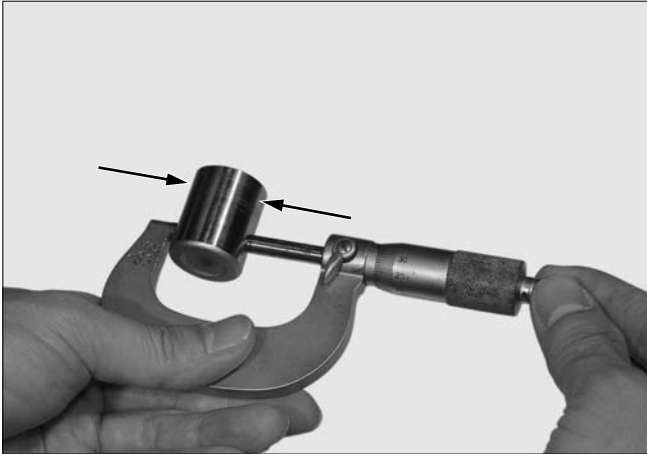
- Be careful not to damage the caliper inside.
- Clean the caliper inside and piston with brake fluid.

INSPECTION

- Check the caliper friction surface for damage or scratches.
- Measure the caliper I. D.

SERVICE LIMIT : 25.07mm



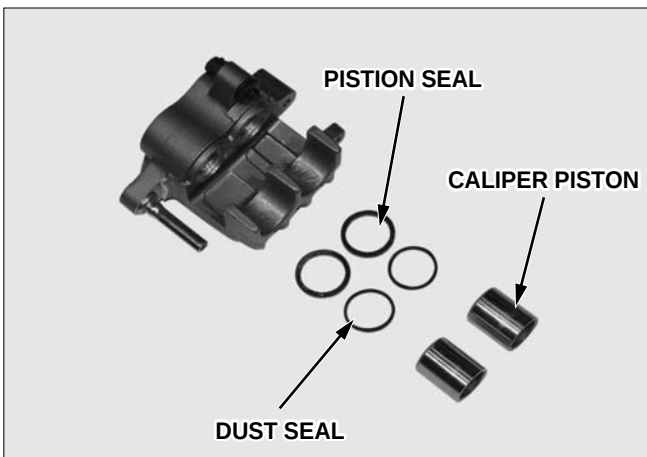
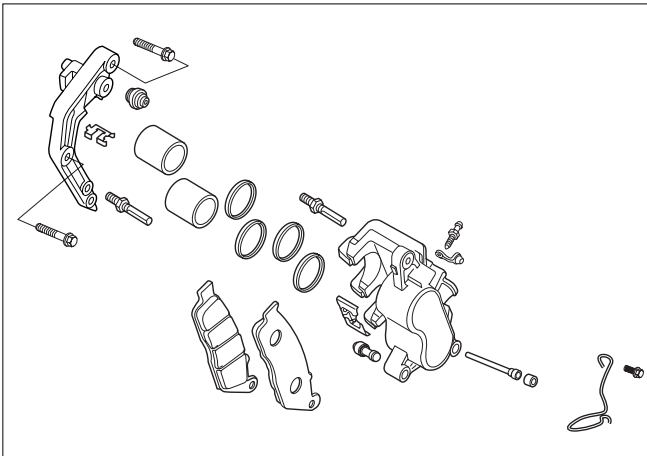


- Check the appearance of piston for damage or scratches.
- Measure the piston O. D.

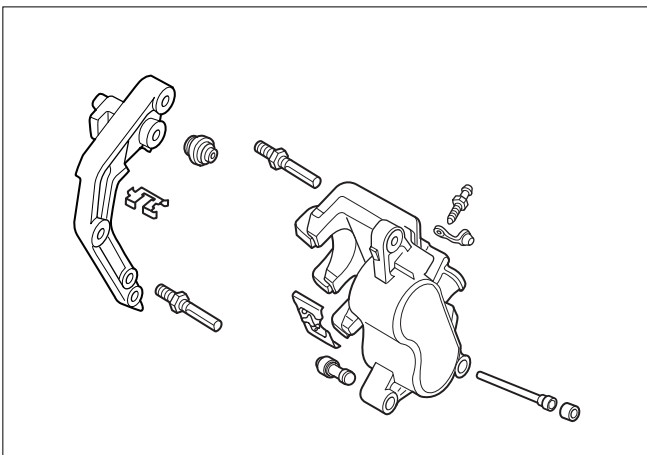
SERVICE LIMIT : 24.87mm

ASSEMBLY

- Clean the piston seal and dust seal with brake fluid, install it into caliper groove.



- When install the piston to the caliper the groove side of piston have to toward pad.



- Coat the silicon grease on the boot.
- Install the boot to the caliper groove.
- Install the pad spring to the caliper.
- Install the caliper pin bolt then install the caliper bracket to caliper.
- Install the brake pad to brake caliper.



INSTALLATION

- Install the front caliper to front fork.
- Tighten the caliper mounting bolts to the specified torque.

TORQUE : 3.0kgf · m

- Install the brake hose to the caliper body with two new 2 oil bolts washers and oil bolts.
- Tighten the oil bolt to the specified torque.

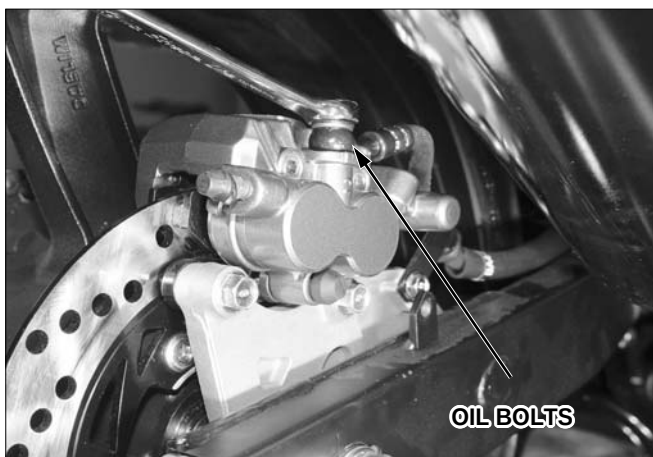
TORQUE : 3.4kgf · m (34 N · m)

- Fill the brake fluid to upper level, bleed the brake system. (16-5)

REAR BRAKE CALIPER

REMOVAL

- Drain the brake fluid. (16-3)
- Remove the oil bolt and oil washer.



- Remove the rear caliper bracket bolts, caliper and the brake pads. (16-7)



DISASSEMBLY

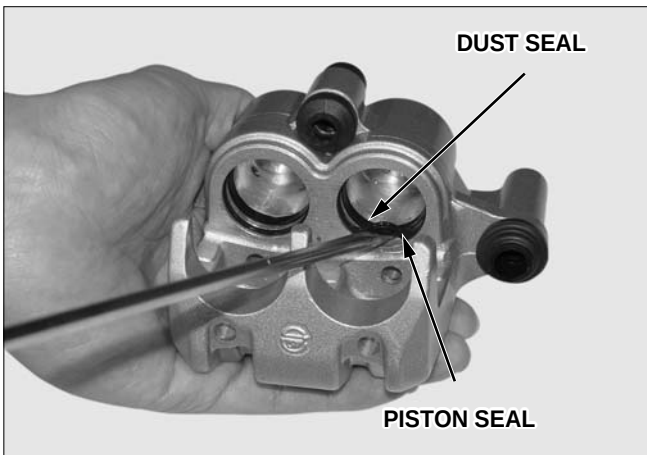
- Remove the spring, slide pin, caliper bracket and boot from the caliper body.
- If there is any wear or damage in the boot, replace it with a new one.



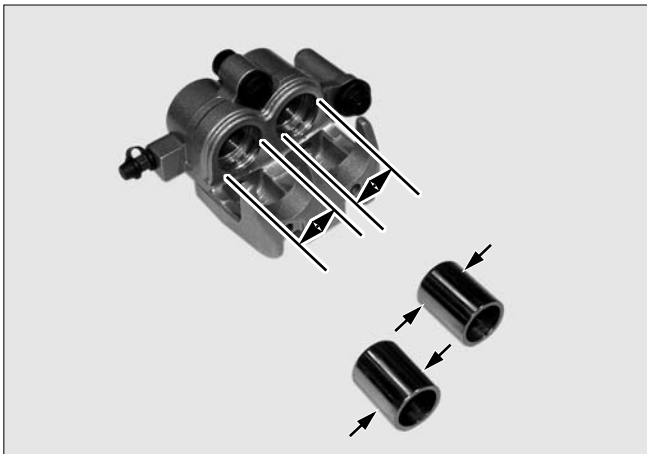
- Wrap the caliper with piece of cloth to avoid piston and brake fluid leakage and facing the piston downward.
- Remove the piston from the caliper while blowing the low pressure air in the opening of the brake hose.

CAUTION

- Do not use high pressure air or bring the airgun too close.
- Do not touch the inside of caliper.



- Remove the piston seal and dust seal.
- Clean the caliper inside and piston with brake fluid.



INSPECTION

- Check the appearance of caliper for damage or scratches..
- Measure the caliper I. D.

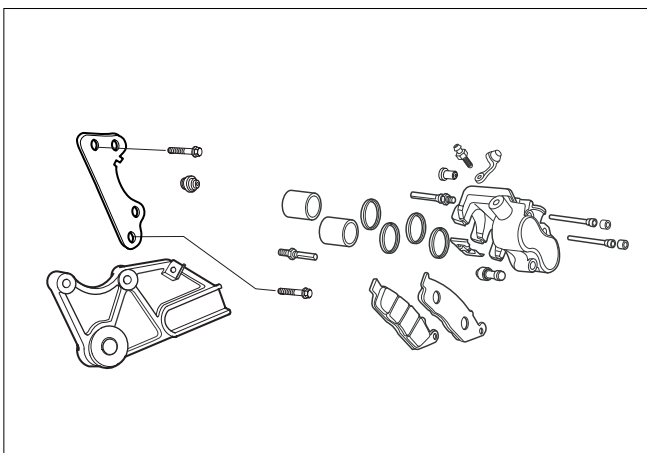
SERVICE LIMIT : 25.070mm

- Check the appearance of pistons for damage or scratches.
- Measure the piston O. D.

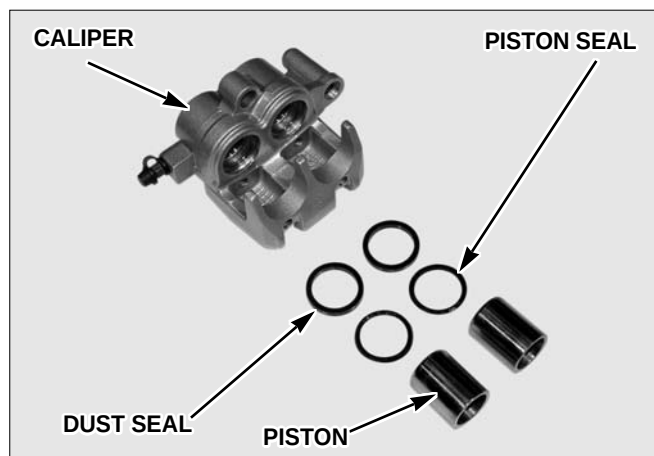
SERVICE LIMIT : 24.870mm

ASSEMBLY

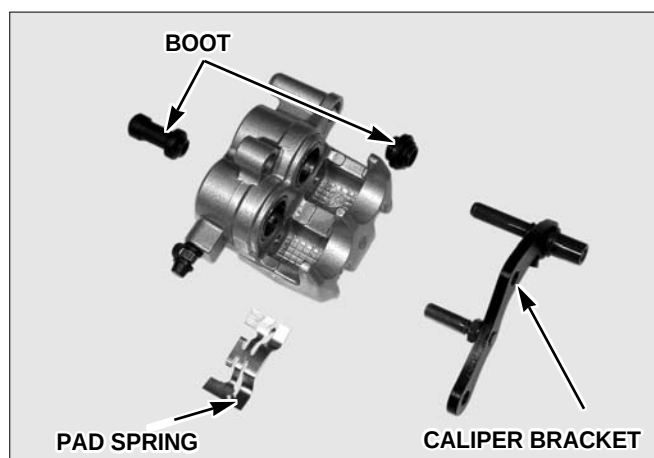
- Clean the piston seal, dust seal with brake fluid install it into caliper groove.



HYDRAULIC BRAKE



- Install the piston in the caliper with groove side of the piston facing the pad.



- Coat the silicone grease on the boot.
- Install the boot to the caliper groove.
- Install the pad spring to the caliper.
- Install the caliper pin bolt and the caliper bracket to caliper.
- Install the brake pad to brake caliper.



INSTALLATION

- Install the rear caliper to rear caliper bracket.
- Tighten the caliper mounting bolts to the specified torque.

TORQUE : 3.0kgf · m

- Install the brake hose to the caliper body with two new 2 oil bolts washers and oil bolts.
- Tighten the oil bolt to the specified torque.

TORQUE : 3.4kgf · m (34 N · m)

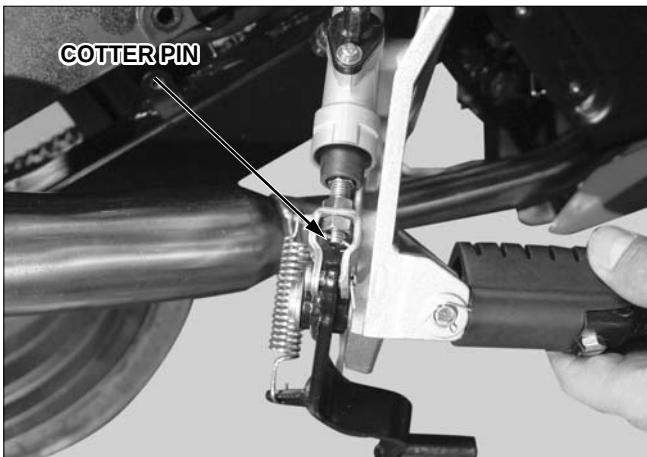
- Fill the brake fluid to upper level, bleed the brake system. (16-5)

BRAKE PEDAL

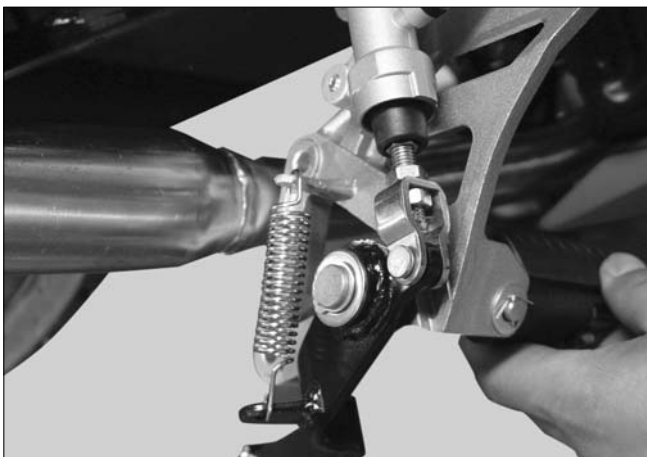
REMOVAL

- Remove the main step holder mounting socket bolts and main stepbar assembly.
- Unhook the stop switch spring from the brake pedal spring.



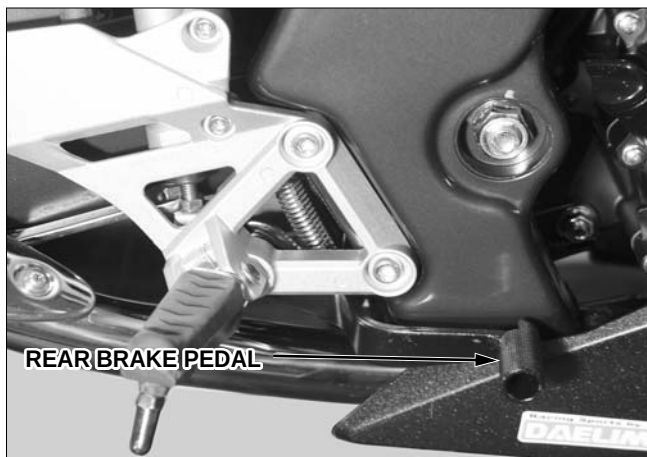


- Stretch and pull out the brake pedal joint cotter pin and remove the joint pin C.
- Remove the brake pedal spring from the brake pedal.
- Remove the external cir-clip, washer and brake pedal.

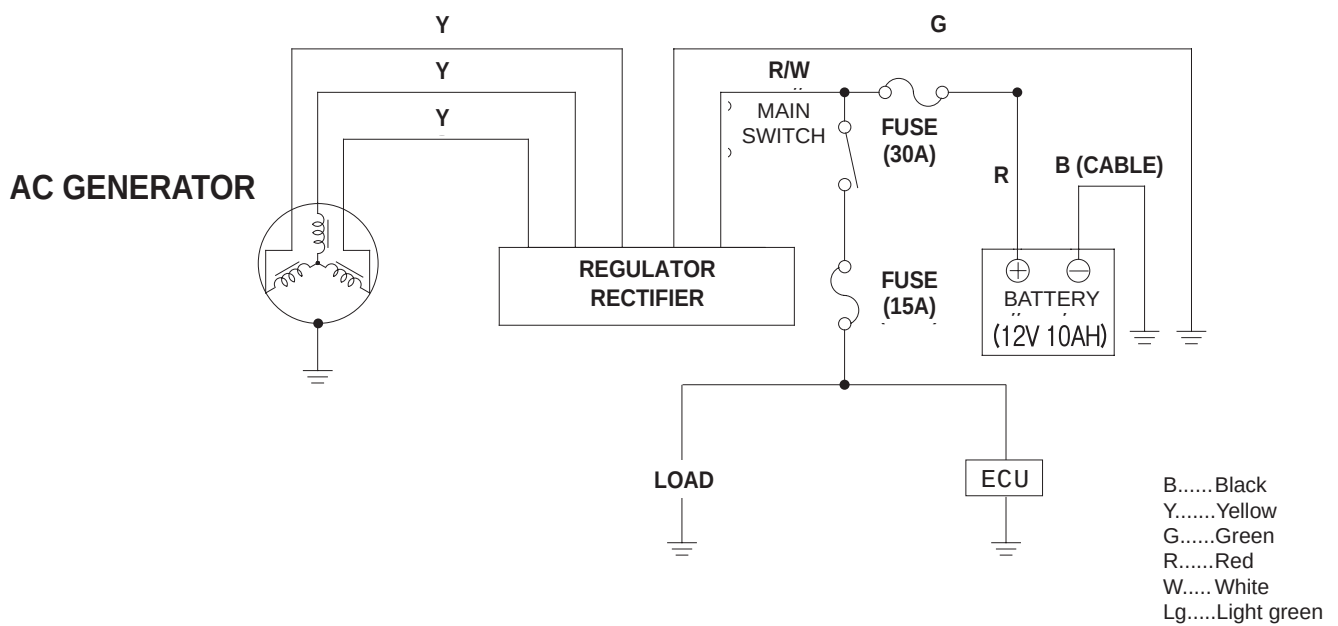
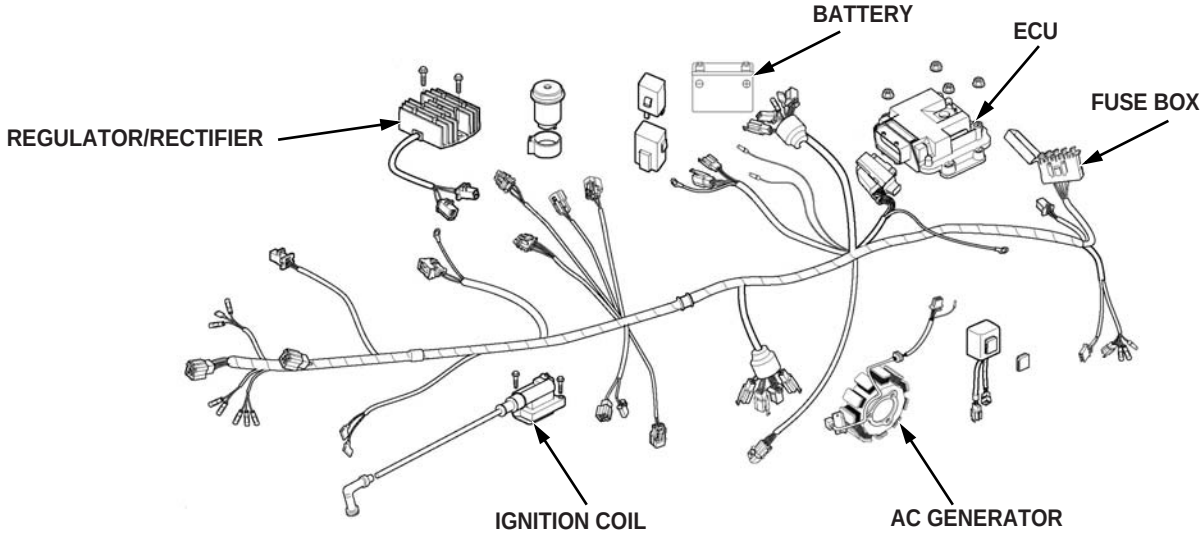


INSTALLATION

- Install the brake pedal to main step holder and assemble the washer and external cir-clip.
- Connect the brake pedal to the brake rod joint.
- Install the joint pin C and secure it with a new cotter pin.



- Hook the stop switch spring to the brake pedal spring.
- Install and tighten the main step bar socket bolts into the frame to specified torque.



17. BATTERY/CHARGING SYSTEM

CHARGING DIAGRAM	17-0	CHARGING SYSTEM INSPECTION .	17-4
SERVICE INFORMATION	17-1	REGULATOR/RECTIFIER	17-5
TROUBLESHOOTING	17-2	A.C. GENERATOR CHARGING COIL	
BATTERY	17-3	INSPECTION	17-6

SERVICE INFORMATION

⚠ WARNING

- Do not place flammable materials near battery when charging. This can be a fire hazard as hydrogen gas is created during charging battery.
- Do not allow battery acid to come into contact with clothes, skin or eyes. Battery acid contact can cause burns or loss of eye sight. If contact occurs, thoroughly clean with water, and if acid enters eyes, flush with water and see a doctor.
- If battery acid gets on clothing, as it can seep through or make a hole through the clothing and make its way to the skin, make sure to change clothing that has come into contact with battery acid and wash the battery acid from the clothes.

⚠ CAUTION

- This vehicle has a maintenance-free(MF) battery. Because MF batteries use different charging equipment, take special care when performing maintenance and especially when replacing parts. Not all regular battery equipment is compatible with MF batteries.
- When charging the battery, remove the battery from the frame.
- There is the possibility of damaging the regulator/rectifier, etc. If the terminal or coupler is separated/connected when electricity is over flowing through the electrical devices. Make sure to turn the main switch OFF when performing maintenance to the charging equipment.

- If the battery is allowed to repeatedly lose all its charge, is repeatedly over-charged, or if it is left in an un-charged state, the battery can be damaged, its life can be reduced, or it can lose some of its strength. It is important to note here that the battery will naturally last 2-3 years of normal use, and although it will re-charge, its load is reduced, leading to a loss in battery strength.
- It is possible for the battery to become overcharged from battery body load. If a battery cell becomes short-circuited and if a state develops where voltage is not created between the terminals, the regulator will not operate and excessive voltage will develop in the battery and normal cell electrolytes will decrease.
- If the vehicle is not used for a long period, make sure to charge the battery every three months. If not so, the battery ability to store electricity is reduced.
- For information on generator disassembly, refer to section 8.

SPECIFICATIONS

ITEM		STANDARD VALUES
BATTERY	Capacity	12V - 10AH (MF)
	Terminal-to-terminal voltage (When fully charged)	13.0-13.2V
	Current leakage	Not to exceed 1mA
A.C.GENERATOR	Charging Coil resistance value (20° C)	0.1-1.5 Ω (20° C)
	rpm at Charging Start	1,350 rpm (Headlight ON)
REGULATOR / RECTIFIER	Type	Thyristor system
	Regulated Voltage	14.5 $\pm$ 1.0V / 5,000(rpm)

TOOLS

DIGITAL TESTER, PVA MULTI-TESTER, BATTERY TESTER, SCANNER

TROUBLESHOOTING

No power (Key turned on)

- Dead battery.
 - Low fluid level.
 - Low specific gravity.
- Charging system failure.
- Disconnected battery cable.
- Main fuse burned out.
- Faulty ignition switch.
- Loose connection on short circuit in wire harness.

Low power (Key turned on)

- Battery undercharged.
 - Low fluid level.
 - Low specific gravity.
- Charging system failure.
- Loose battery connection.

Low power (Engine running)

- Battery undercharged.
- Battery is failing.
- Charging system failure.

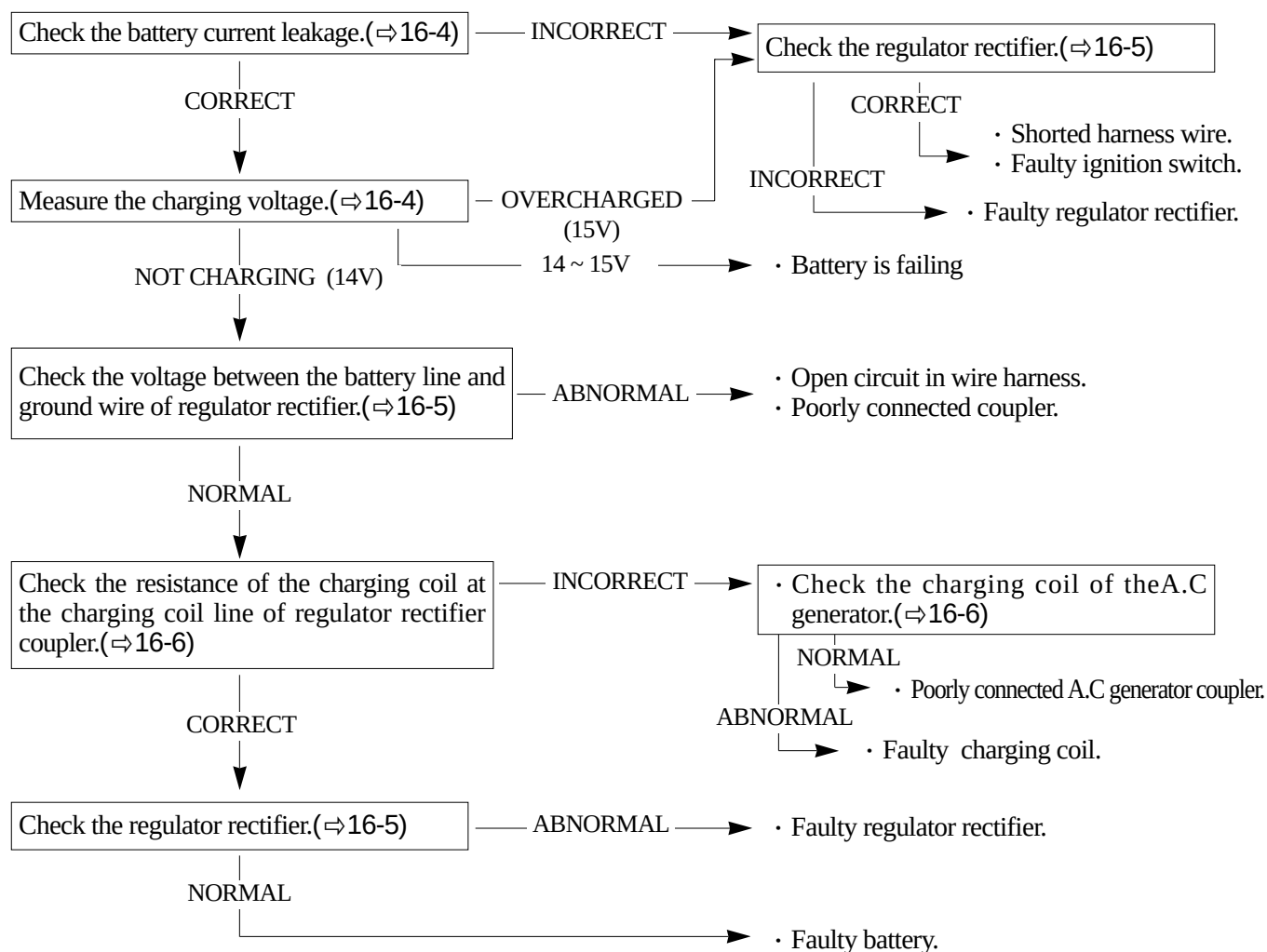
Intermittent power

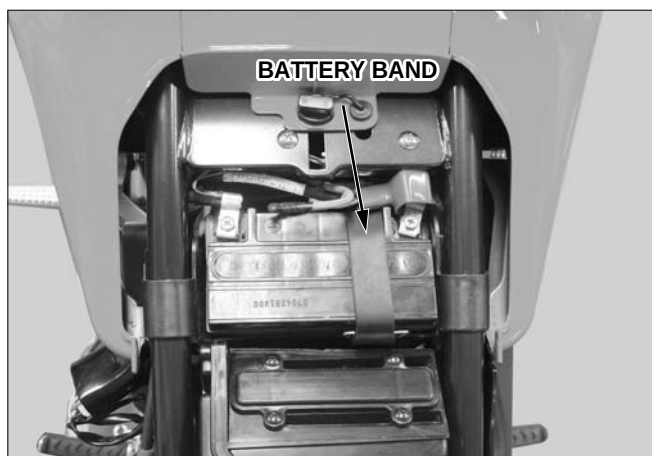
- Loose battery connection.
- Loose charging system connection.
- Loose starting system connection.
- Loose connection or short circuit in ignition system.
- Loose connection or short circuit in lighting system.
- Loose connection or short circuit in wire harness.

Charging System faulty

- Loose broken or shorted wire or connection.
- Faulty regulator rectifier.
- Faulty A.C generator..

Charging System faulty





BATTERY

REMOVAL/INSTALLATION

- Remove the seat. (⇒ 13-2)
- Remove the battery band.
- Disconnect the negative (-) cable and then the positive (+) cable and remove the battery.
- Install the battery in the reverse order of removal with the proper wiring.

⚠ CAUTION

- Connect the positive terminal first and then the negative cable.

VOLTAGE INSPECTION

- Measure the battery voltage using a multi tester.

VOLTAGE:

- Fully charged : 13.0~13.2V

- Under charged : Below 12.3V

TOOL : MULTI-TESTER

⚠ NOTE

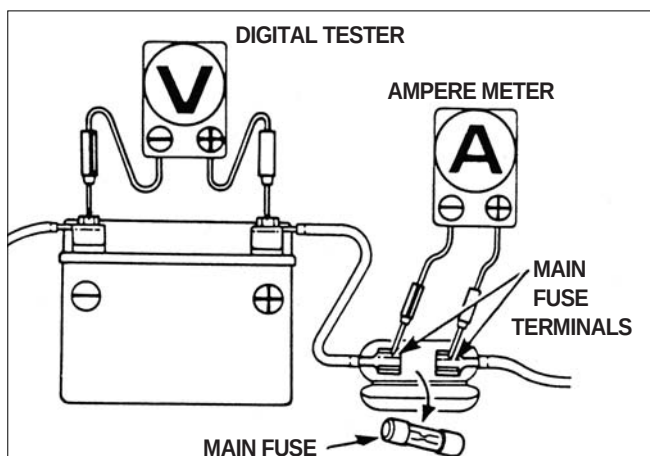
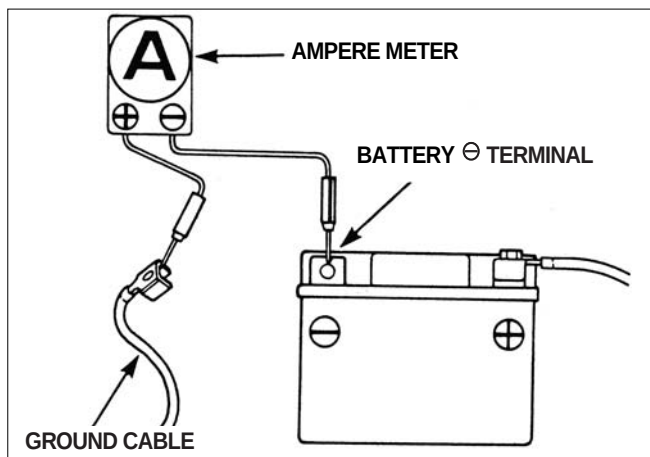
- Use a voltmeter that will accurately indicate 0.1V difference.
- Never open the sealed filler cap.
- When measuring the battery voltage after charging, leave it for at least 30 minutes, or the accurate results cannot be obtained because the battery voltage fluctuates just after charging.

BATTERY CHARGING

- Remove the battery.
- Connect the charger positive (+) cable to the battery positive (+) terminal.
- Connect the charger negative(-) cable to the battery negative(-) terminal.

⚠ NOTE

- Quick-charging should only be done in an emergency ; slow charging is preferred.
- For battery charging ; do not exceed the charging current and time specified on the battery. Using excessive current or extending the charging time may damage the battery.



CHARGING SYSTEM INSPECTION

CURRENT LEAKAGE INSPECTION

- Turn the ignition switch off and disconnect the negative battery cable from the battery.
- Connect an ammeter between negative (-) terminal and ground cable.
- With the ignition switch off, check for current leakage.

LEAK CURRENT : Not to exceed 1mA
TOOL : DIGITAL TESTER

⚠ NOTE

- When measuring current using a tester, set it to a high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition on. A sudden surge of current may blow out the fuse in the tester.

- If current leakage exceeds the standard value, a shorted circuit is likely to exist.

CHARGING VOLTAGE INSPECTION

⚠ NOTE

- Be sure that the battery is fully charged before performing this test. The amount of current flow may change abruptly if not sufficiently charged. Use a battery whose specific gravity is 13.0 ~ 13.2V.
- When the engine is started using the starter motor, a large amount of current may flow from the battery temporarily.

- After warming up the engine, replace the battery with a fully charged battery.
- Connect a tester between the battery terminals.
- Connect an ammeter between the terminals of the main fuse.

⚠ NOTE

- If the probes are connected in reverse order, the registered current flow direction when charging and discharging the battery will be reversed as well.

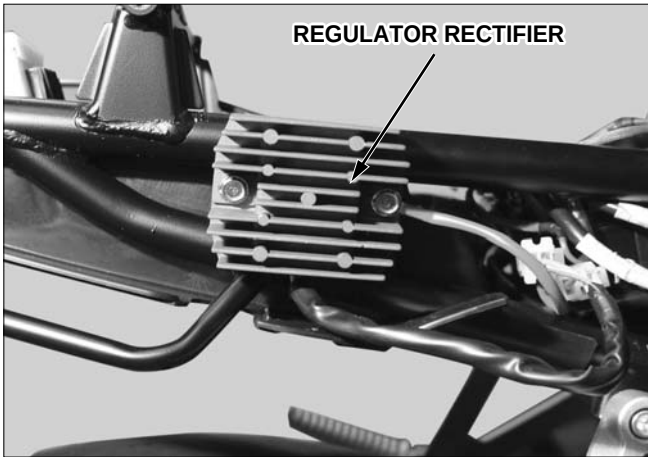
- Turn the headlight ON and start the engine.
- Gradually increase the engine speed and measure the charging voltage at the specified rpm.

CONTROL VOLTAGE : $14.5 \pm 1.0V$ / 5,000rpm

TOOL : DIGITAL TESTER, AMPERE METER, SCANNER

⚠ CAUTION

- Do not disconnect the battery or any cable in the charging system without first switching off the ignition switch. Failure to follow this precaution can damage the tester or electrical components.



REGULATOR/RECTIFIER

HARNESS SIDE CIRCUIT INSPECTION

- Remove the seat. (⇒13-2)
- Remove the LH. side cover. (⇒13-2)
- Disconnect the regulator/rectifier coupler.
- Inspect the wiring circuits at each terminal of the wire harness side.

Inspection Items

ITEM	INSPECTION
BATTERY WIRE(RED)	Check that there is voltage between battery line (+) and ground line.
GROUND WIRE(GREEN)	Check continuity between ground and frame.
CHARGING COIL WIRE (YELLOW)	Check that the resistance of the coil is within the specified range. (0.1~1.5 Ω)
	Check not continuity between coil and frame.
VOLTAGE DETECTION LINE (BLACK)	Check that there is battery voltage between voltage detection line (+) and ground wire the ignition is ON.

REGULATOR / RECTIFIER UNIT INSPECTION

- If all inspections on the wire harness side are normal and there are no loose connections at the regulator rectifier coupler, inspect the regulator rectifier unit by measuring the resistance between the terminals.

NOTE

- Resistance value will not be accurate if the probes touch your fingers.
- Use the following recommended tester.
- Using another manufacturer's equipment may not allow you to obtain the specified values.

RESISTANCE VALUE

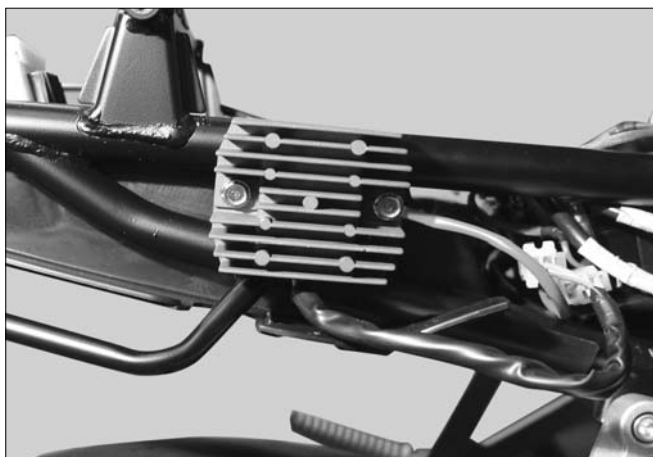
Unit : kΩ, (20°C)

Tester ⊕	R	B	Y	Y	Y
Tester ⊖					
R		28~36	∞	∞	∞
G	28~36		∞	∞	∞
Y	∞	∞		∞	∞
Y	∞	∞	∞		∞
Y	∞	∞	∞	∞	

- Replace the regulator rectifier unit if the resistance value between the terminals is abnormal.

TOOL : MULTI TESTER

- ' ∞ ' indicate more than 1[MΩ]



REMOVAL/INSTALLATION

- Disconnect the regulator/rectifier coupler.
- Remove the regulator/rectifier unit mounting bolts and regulator/rectifier.
- Install the regulator/rectifier unit in the reverse order of removal.



A.C. GENERATOR CHARGING COIL INSPECTION

- Remove the seat. (⇒13-2)
- Remove the L.H. side cover. (⇒13-2)
- Disconnect the A.C generator cord coupler.
- Measure the resistance between the yellow leads.

RESISTANCE VALUE : 0.1~1.5 Ω (20°C)

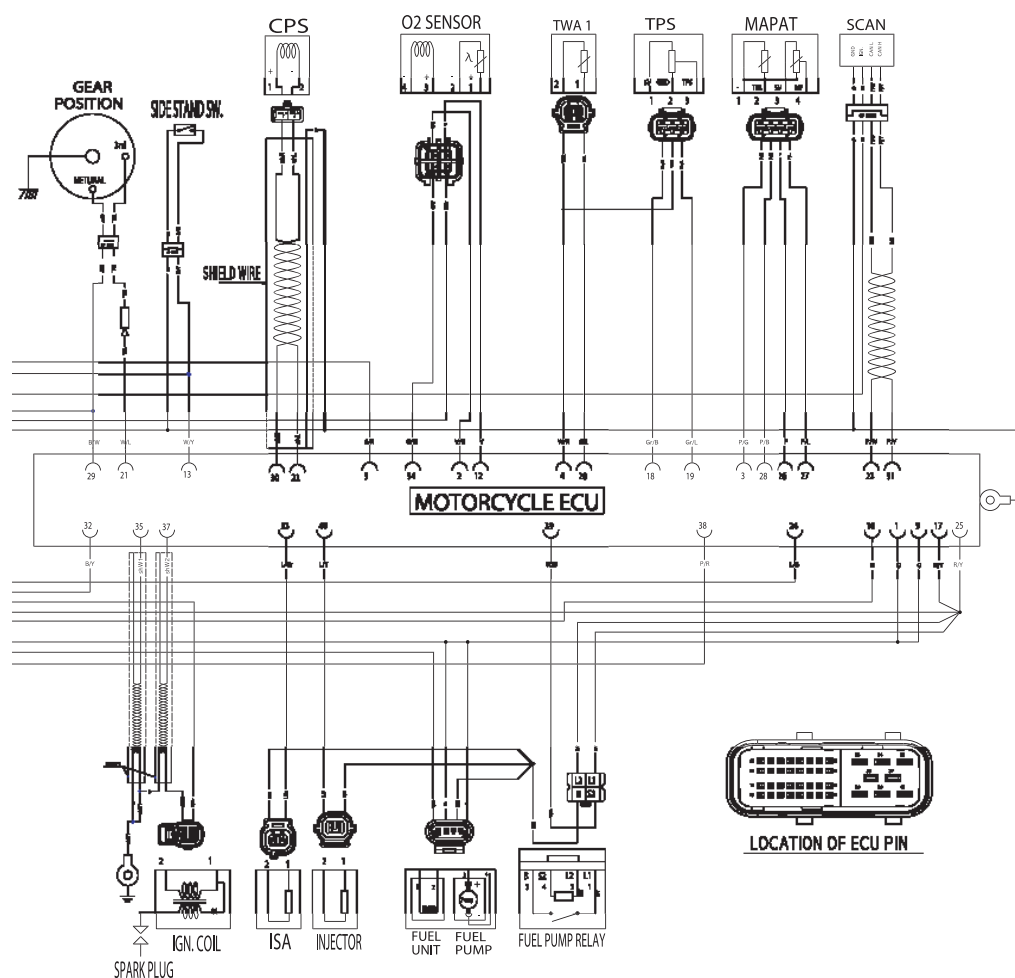
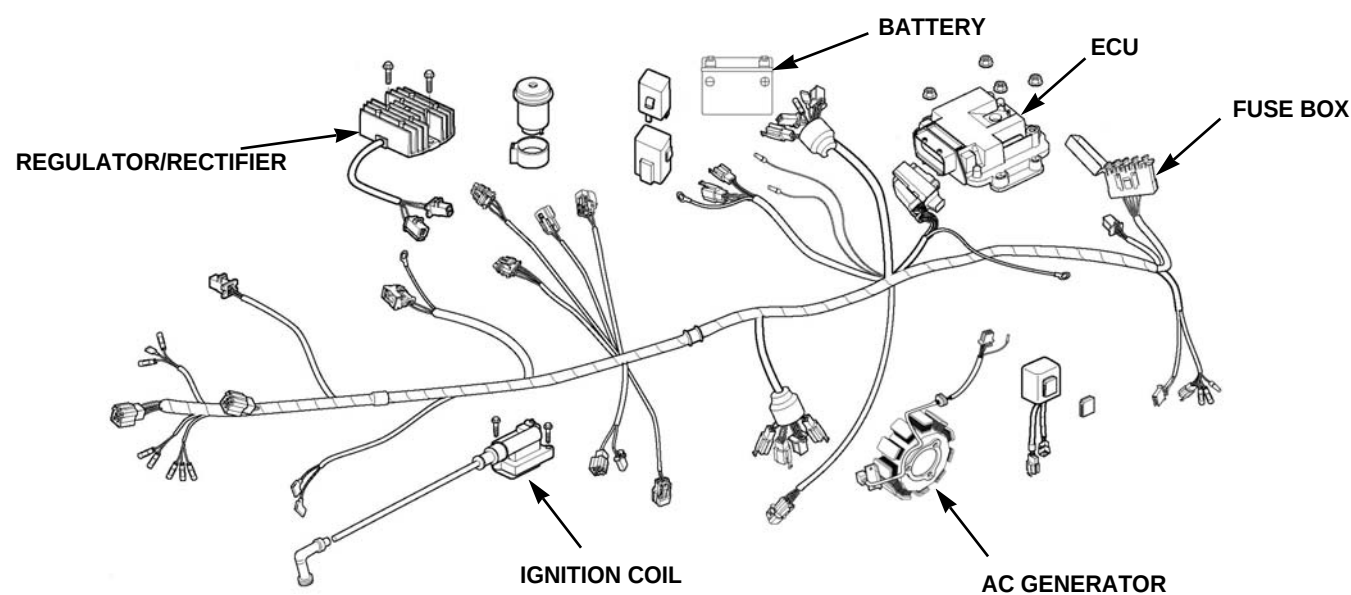
- If the resistance values are much larger than the specified value, or if there is continuity between terminals and earth terminals, replace the stator with a new one.
- Install in the reverse order of removal.

NOTE

- This test is done with the starter mounted to the engine.

MEMO

IGNITION SYSTEM



18. IGNITION SYSTEM

IGNITION DIAGRAM 18-0

SERVICE INFORMATION 18-1

TROUBLESHOOTING 18-2

CRANK POSITION SENSOR INSPECTION . 18-3

IGNITION COIL INSPECTION . . 18-4

SIDE STAND SWITCH 18-5

SERVICE INFORMATION

GENERAL SAFETY

- Inspect the ignition system in proper sequence based on the troubleshooting.
- Dropping or giving a shock to the ECU unit causes a trouble.
- There should be battery voltage with the ignition and engine stop switched ON. Turn the main switch OFF while serving.
- TRANSISTOR ignition system is used and it can not be adjusted.
- Couplers are connected to other couplers which have same colour.
- Coil standard resistance may not be obtained due to the different measuring circumstances.
- A faulty ignition system is often related to poorly connected connectors. Check those connections before proceeding.
- This manual gives explanations on inspections to receive peak voltage. As inspections for coil resistance values are also included, it may be difficult to make a correct determination.
- Conduct inspection on the main switch by referring to the wiring diagram continuity chart. (⇒chapter 21-1)

SPECIFICATIONS

Item			Standard
Ignition coil resistance 20°C(68°F)	Primary Coil		$0.73 \pm 0.08 \Omega$, 23°C ± 5°C
	Secondary Coil	Without the spark plug cap	(15kΩ)
Crank position sensor resistance 20°C(68°F)			80-150Ω, 20°C
Ignition timing	IDLE (1,600 ± 100RPM)		BTDC 18°C

TOOLS

DIGITAL TESTER

PVA MULTI-TESTER

TROUBLESHOOTING

No spark at plug. (TOOL : PVA MULTI TESTER)

UNUSUAL CONDITION		PROBABLE CAUSE (CHECK IN NUMERICAL ORDER)
IGNITION COIL PRIMARY VOLTAGE	Low peak voltage.	1. The multimeter impedance is too low. 2. Cranking speed is too slow. - Battery is undercharged 3. The sample timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Poorly connected connectors or an open circuit in ignition system. 5. Faulty ignition coil. 6. Faulty ECU unit (in case when above No. 1~5 are normal).
	No peak voltage.	1. Incorrect peak voltage adaptor connections. 2. Faulty ignition switch. 3. Loose or poorly connected ECU unit connector. 4. Open circuit or poor connection in ground cord of the ECU unit. 5. Faulty peak voltage adaptor. 6. Faulty ECU unit (in case when above No. 1~6 are normal).
	Peak voltage is normal, but no spark jumps at plug.	1. Faulty spark plug or leaking ignition coil secondary current ampere. 2. Faulty ignition coil.
CRANK POSITION SENSOR	Low peak voltage.	1. The multimeter impedance is too low. 2. Cranking speed is too slow. - Battery is undercharged (or operating force of the kick starter is weak). 3. The sample timing of the tester and measured pulse were not synchronized. (System is normal if measured voltage is over the standard voltage at least once.) 4. Faulty pulse generator (in case when above No. 1~3 are normal).
	No peak voltage.	1. Faulty peak voltage adaptor. 2. Faulty crank position sensor

Inspection Items

ITEM	INSPECTION
MAIN SWITCH	Check the battery voltage between main switch wire (black) and ground wire when the ignition is ON
CRANK POSITION SENSOR	Check the resistance of coil (between blue / yellow and green) is within the specified range. (80~150 Ω , 20°C)
IGNITION COIL (PRIMARY COIL)	Check the resistance of coil (between black / yellow and green) is within the specified range. (0.73~0.08 Ω , 23°C $\pm$ 5°C)
GROUND WIRE	Check continuity between ground and frame.

- If measured data is out of standard, and there is no spark at plug, check the ignition coil by using a tester.

TOOL : DIGITAL TESTER



CRANK POSITION SENSOR INSPECTION

RESISTANCE MEASUREMENT

- Remove the seat. ($\Rightarrow$ 13-2)
- Remove the LH. side cover ($\Rightarrow$ 13-2)
- Disconnect the A.C generator 4P coupler and blue/yellow wire connector.
- Measure the resistance between the green and blue/yellow.

STANDARD VALUE : 80-150 Ω (20°C)



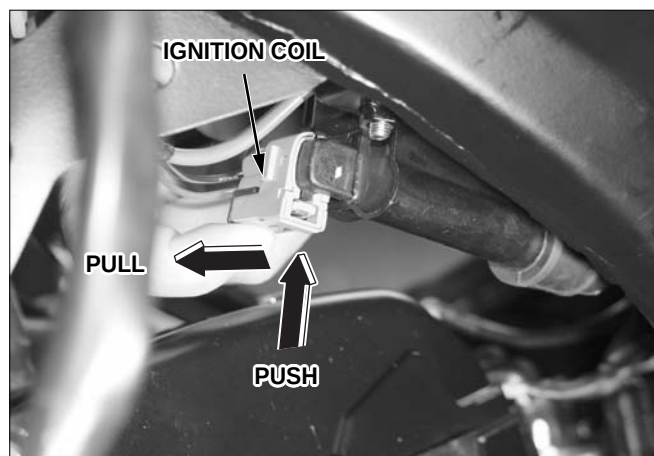
PVA MEASUREMENT

- Disconnect the A.C generator blue / yellow wire connector.
- Connect the blue/yellow wire terminal to the PVA tester (+) terminal.
- Connect the PVA tester (-) terminal to the green wire terminal or no painting area (ground)
- Crank the engine with the starter motor and measure the peak voltage of pulse generator.

PEAK VOLTAGE : OVER 1.5V

TOOL : PVA MULTI TESTER

- Install in the reverse order of removal.



IGNITION COIL INSPECTION

- Disconnect the ignition coil coupler.

NOTE

- Since the resistance value of the primary coil is small, it is too difficult to judgment even if the problem happen from the short circuit.



PRIMARY COIL

- Measure the resistance between the two terminals of the ignition primary coil.
 - If the resistance value is within the specified range the coil is good.
 - If resistance is (infinite), replace the coil with a new one.
- STANDARD VALUE : (Resistance) $0.73 \pm 0.08 \Omega$,
23°C $\pm$ 0.5°C(Voltage) over 100V**



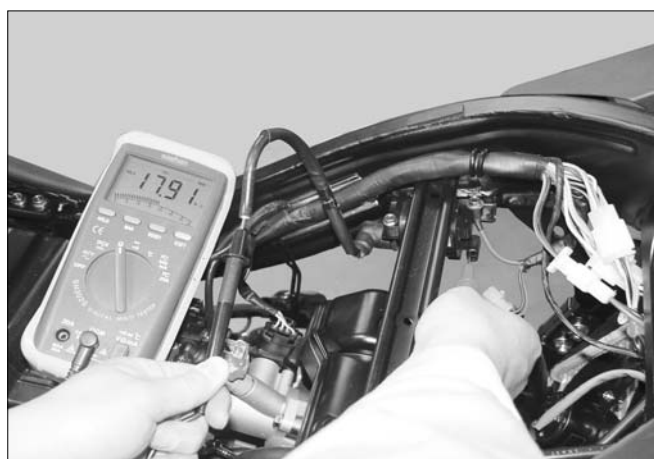
SECONDARY COIL

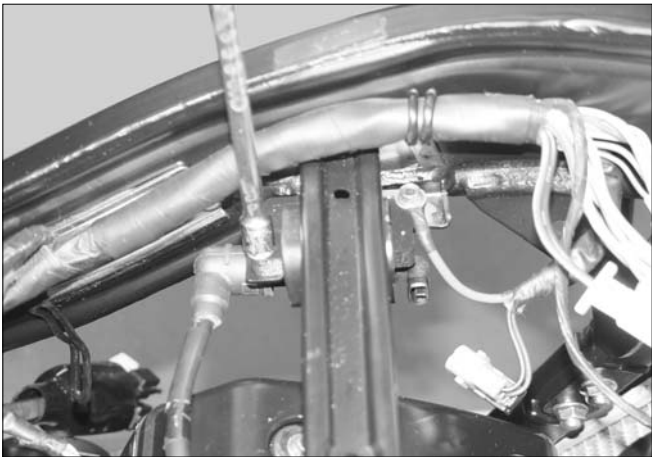
- With the spark plug cap on, measure the resistance between the primary coil terminal and the spark plug cap.
- If the resistance value is within the specified range, then the coil is good.
- If the resistance is (open wire), disconnect the spark plug cap and measure the secondary coil resistance.

REFERENCE VALUE : 15K Ω

NOTE

- Don't measure the secondary coil voltage of ignition coil





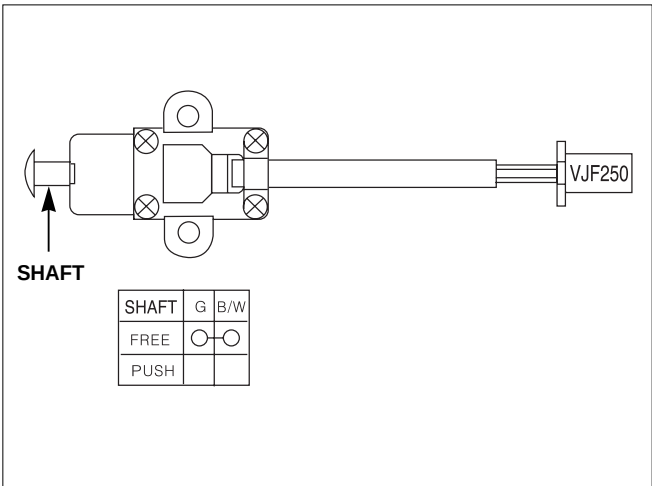
REPLACEMENT

- Remove the high-tension cord from the plug, remove the plug cap.
- Remove the primary wire from the ignition coil.
- Loosen the ignition coil mounting bolt securing the frame, remove the ignition coil.
- Install in the reverse order of removal.

SIDE STAND SWITCH

REMOVAL

- Remove the RH side cover.
- Remove the side stand switch couper connected with main wire harness
- Remove the side stand switch mounting screws and remove the cord clamp and side stand switch.



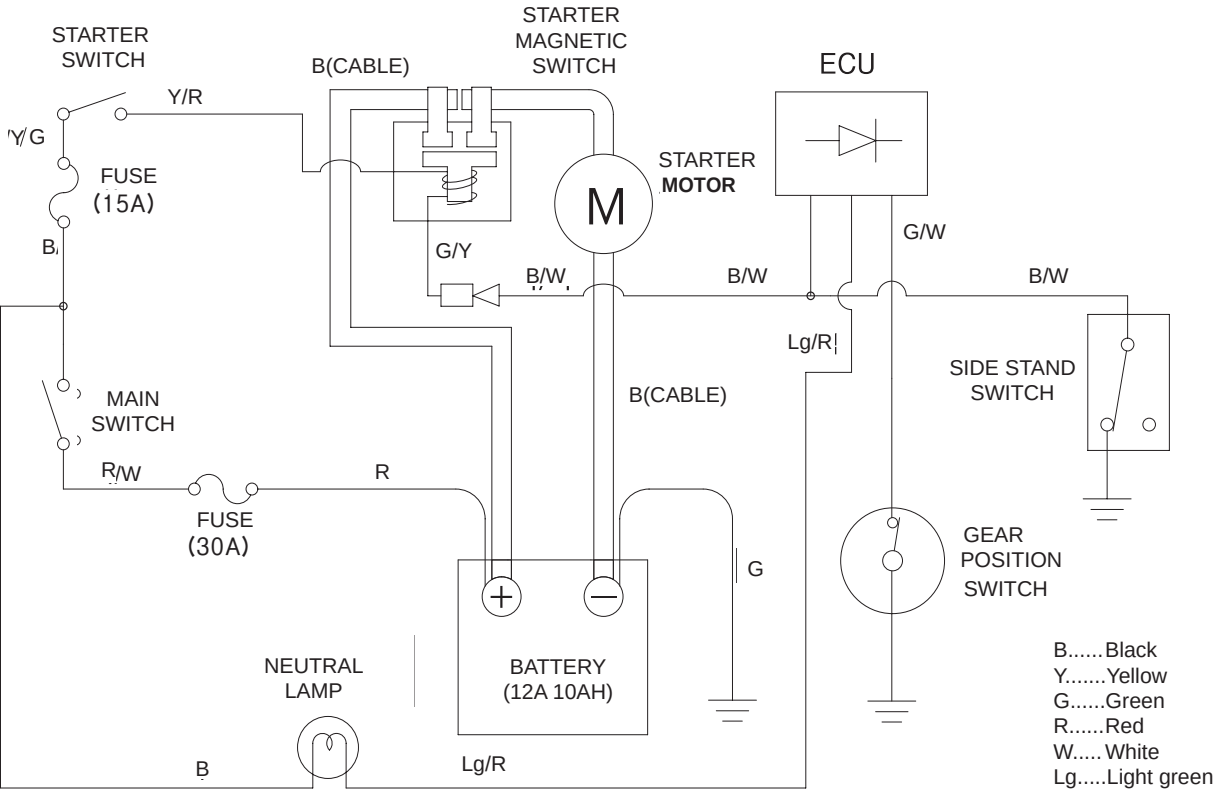
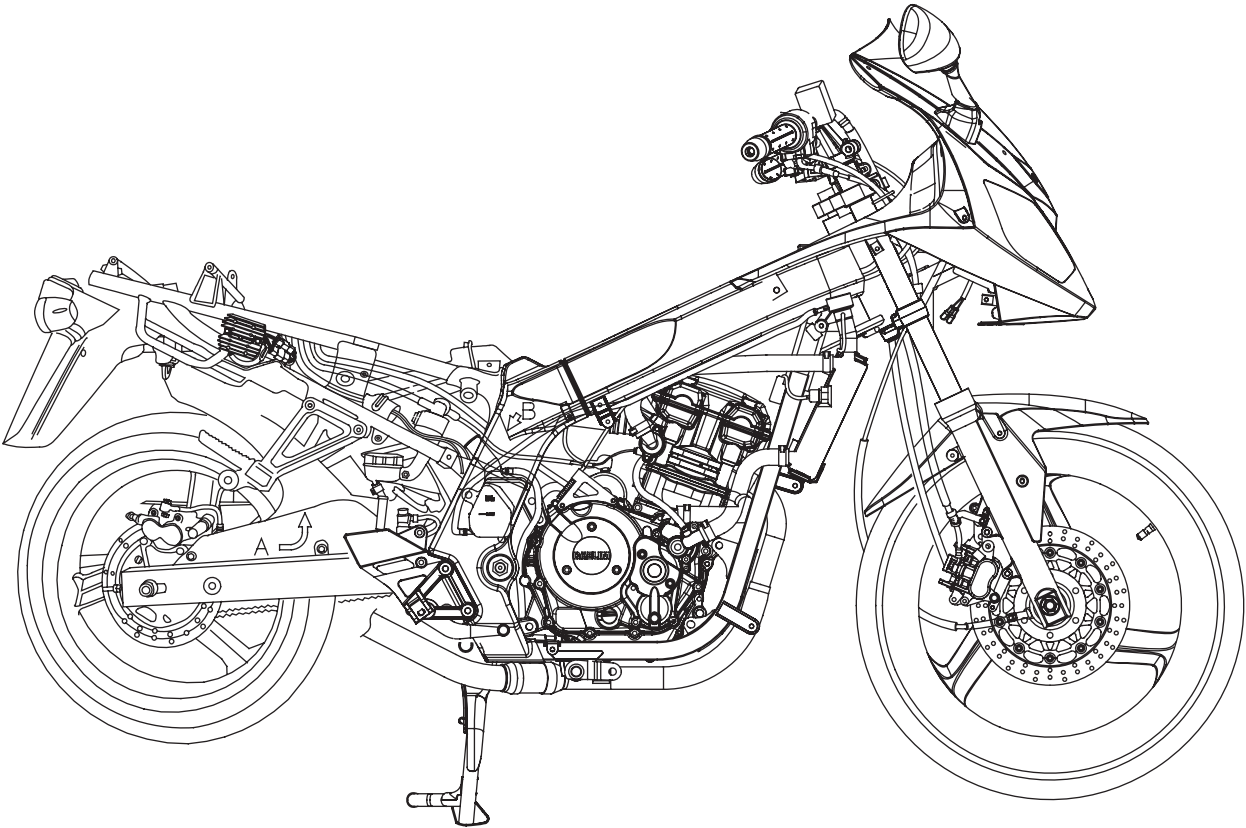
INSPECTION

- Check the following terminals.

ITEM		TERMINALS COLOR	STANDARD
SIDE STAND SWITCH			
ON (Side stand erected)	PUSH THE SHAFT	BLACK/WHITE AND GREEN TERMINAL PUSH THE SHAFT	NORMAL IF THERE IS CONTINUITY
OFF (Side stand pull back)	RELEASE THE SHAFT	BLACK/WHITE AND GREEN TERMINAL RELEASE THE SHAFT	NORMAL IF THERE IS NO CONTINUITY

- Install in the reverse order of removal.

ELECTRIC STARTER



19. ELECTRIC STARTER

STARTING DIAGRAM	19-0	STARTER MOTOR	19-3
SERVICE INFORMATION	19-1	STARTER MAGNETIC SWITCH .	19-6
TROUBLESHOOTING	19-2		

SERVICE INFORMATION

GENERAL SAFETY

 WARNING

- Always turn the ignition switch OFF before servicing the starter motor. The moter could suddenly start, causing serious injury.
- The starter motor can be maintained without removing the engine from the vehicle.
 - A weak battery may be unable to turn the starter motor quickly enough, or supply adequate ignition current.
 - If the current is kept flowing through the starter motor to turn it while the engine is not cranking over, the starter motor may be damaged.

SPECIFICATION

Unit : mm

ITEM	STANDARD VALUE	SERVICE LIMIT
STARTER MOTOR BRUSH LENGTH	10.2mm	5.0mm

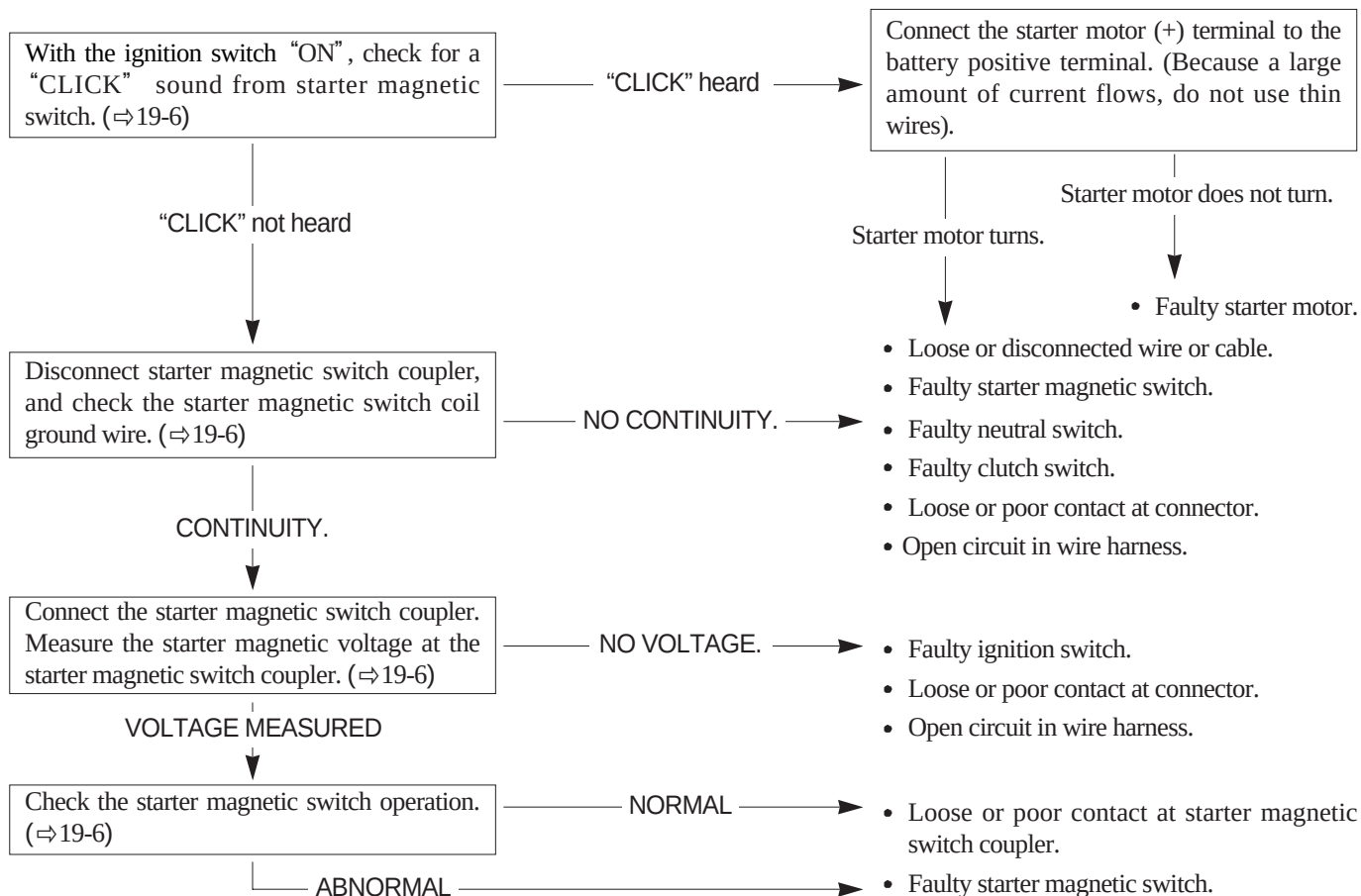
TOOLS

- MULTI TESTER
- VERNIER CALIPER
- SCANNER

TROUBLESHOOTING

Starter motor will not turn.

- Check for a blown out main fuse before servicing.
- Make sure the battery is fully charged and in good condition.



Starter motor turns engine slowly.

- Low battery voltage.
- Poorly connected battery terminal cable.
- Poorly connected starter motor cable.
- Faulty starter motor.
- Poorly connected battery ground cable.
- Damaged or worn brush.

Starter motor and engine turns, but engine does not start.

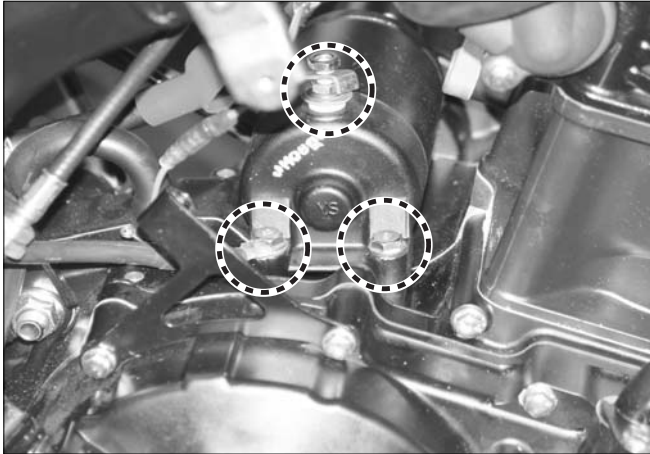
- Faulty ignition system.
- Engine problems.
- Excessive reduction gear friction.

Starter motor turns, but engine does not turn

- Starter motor is running backwards.
 - Brushes assembled improperly.
 - Case assembled improperly.
 - Terminals connected improperly.
- Faulty starter clutch.
- Damaged or faulty starter drive gear

Starter magnetic switch "Clicks", but engine does not turn over

- Crankshaft does not turn due to engine problems.



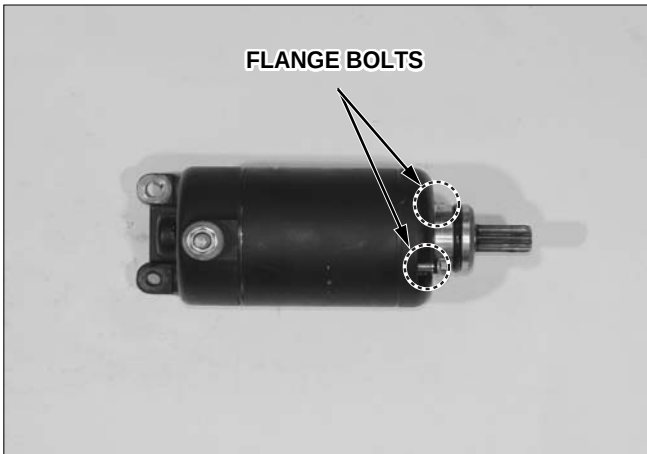
STARTER MOTOR

REMOVAL

- With the ignition switch turned to "OFF", remove the negative cable at the battery before servicing the starter motor.
- Remove the rubber cap.
- Remove the nut and starter motor cable from the starter motor.
- Remove the starter motor mounting bolts and ground cable.

⚠ WARNING

- Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.

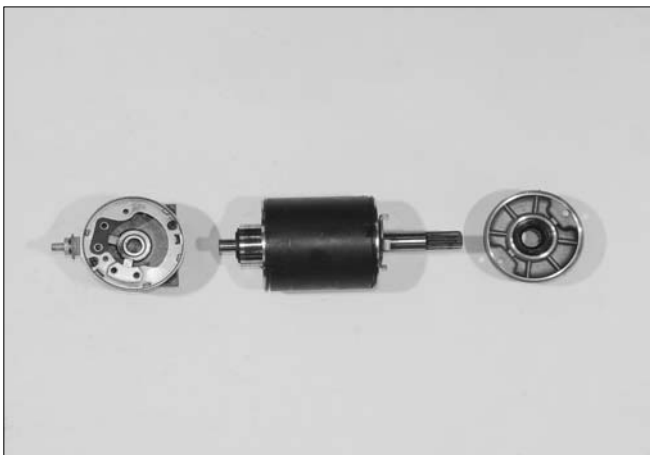


DISASSEMBLY

- Remove the following.
 - O-ring
 - Starter motor case bolts / spring washers
 - Front cover
 - Seal ring
 - Lock washer
 - Washer
 - Cir-clip
 - Rear cover ass'y
 - 2 pcs washer
 - Amature

INSPECTION

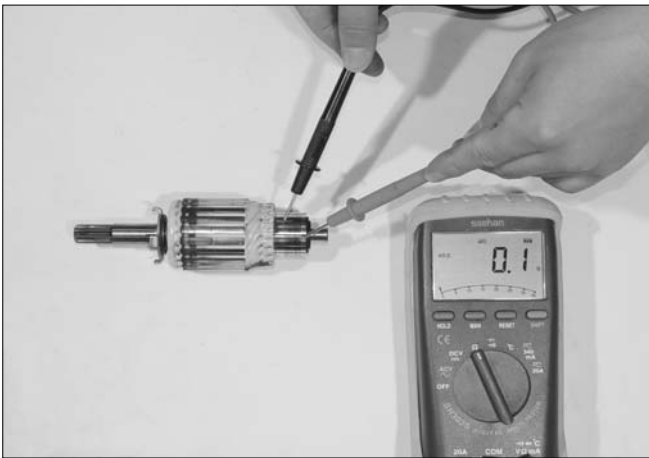
- Check the bushing in the rear cover for wear or damage.
- Check the oil seal and bushing in the front cover for wear or damage.



ELECTRIC STARTER



- Check the commutator bars of the armature for discoloration.
- Discoloration of the commutator bars.→ Replace with a new one.



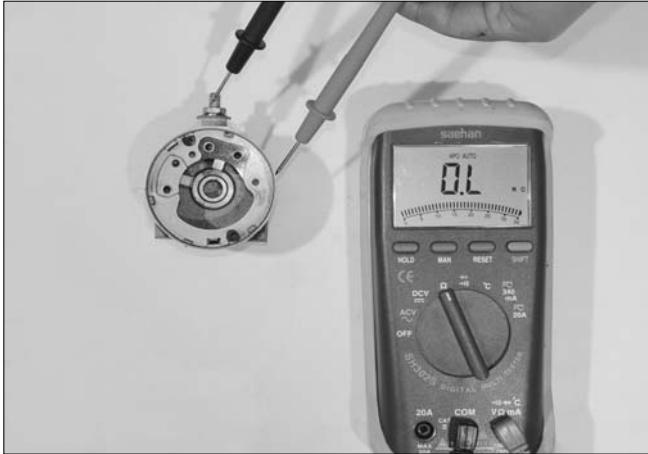
- Check for continuity between pairs of commutator bars.
- There should be continuity.



- Check for continuity between each commutator bar and armature shaft.
- There should be no continuity.



- Check for continuity between the insulated brush and cable terminal.
- There should be continuity.



- Check for continuity between the cable terminal and the case.
- There should be no continuity.



- Inspect the brushes for damage and measure the brush length.

SERVICE LIMIT : 5 mm



- Install the following :
 - New O-ring
 - Insulators
 - Washer
 - Washer nut
- Install the brushes into the brush holder.
- Install the brush holder into the motor case, aligning the holder tab with the motor case groove.
- Install the armature in the motor case, while pushing in the brushes into the brush holder.



- When installing the armature into the motor case, hold the armature tightly to keep the magnet of the case from pulling the armature against it.

NOTE

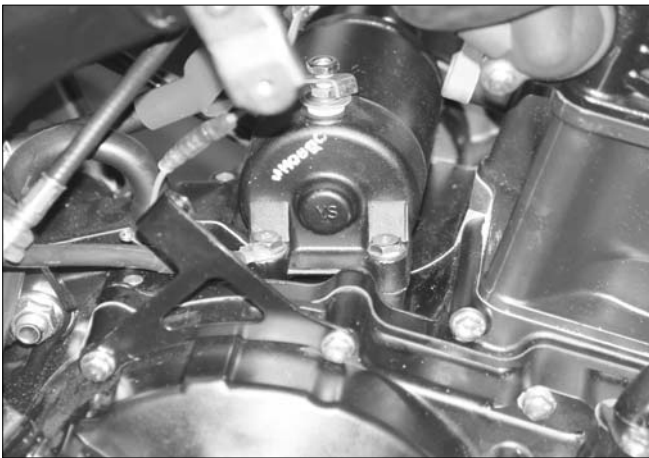
- The coil may be damaged if the magnet pulls the armature against the case.

- Install the two washers.
- Install a new seal ring onto the motor case.
- Apply thin coat of grease to the armature shaft end.
- Install the rear cover, aligning its mark with the motor case mark.

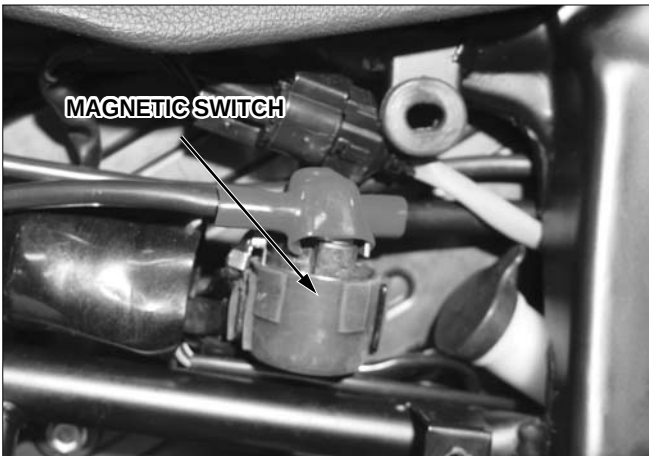


INSTALLATION

- Coat a new O-ring with oil and install it into the starter motor groove.
- Install the starter motor into the crankcase.



- Install the ground cable and mounting bolts, and tighten the bolts securely.
- Install the clutch wire holder.
- Install the starter motor cable, then tighten the terminal nut securely.
- Install the rubber cap securely.



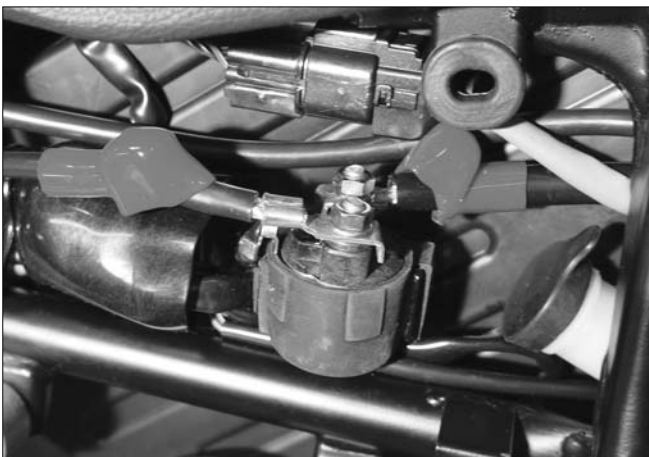
STARTER MAGNETIC SWITCH

REMOVAL

- Remove the seat. (⇒13-2)
- Remove the RH. side cover. (13-2)
- Disconnect the battery ⊕ wire cable from the starter magnetic switch terminal.
- Disconnect the starter motor cable from the starter magnetic switch terminal.
- Disconnect the Yellow/Red and Green/Yellow connector from the wire harness.
- Remove the starter magnetic switch from the bracket of the frame.

OPERATION INSPECTION

- Shift the transmission into neutral.
- Turn the ignition switch to "ON", and push the starter switch button.
- The coil is normal if the starter magnetic switch clicks.
- If you don't hear the switch "CLICK", inspect the magnetic switch using the procedure below.





STARTER MAGNETIC SWITCH VOLTAGE INSPECTION

- Connect the starter magnetic switch connector.
- Shift the transmission into neutral.
- Measure the voltage between the Yellow/Red wire terminal(+) and ground (-).
- If the battery voltage appears only when the starter switch is pushed with the ignition switch to "ON", it is normal.



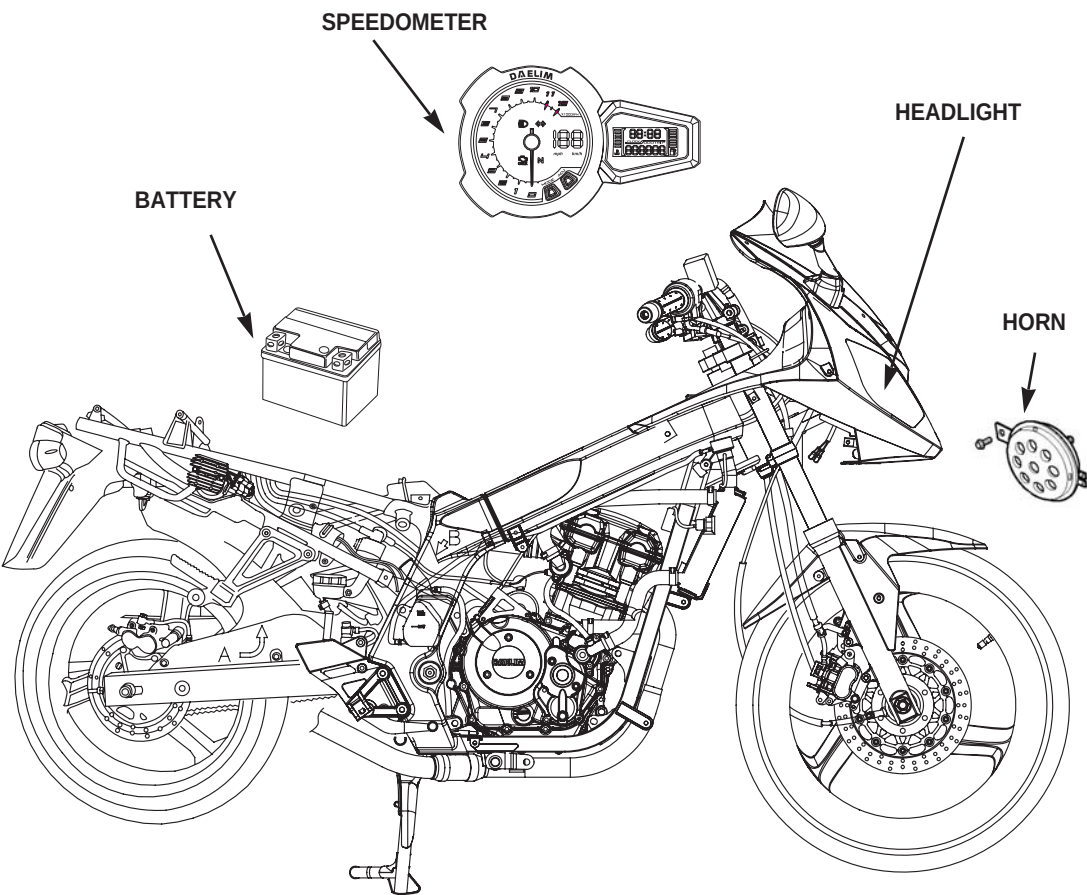
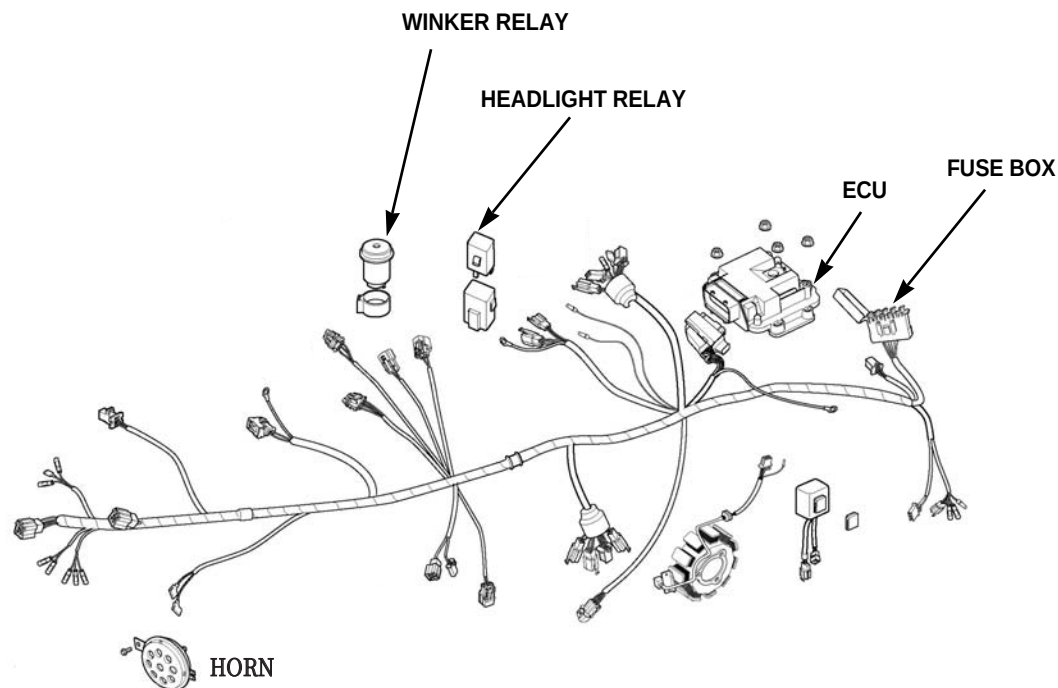
CONTINUITY INSPECTION

- Disconnect the wire connector of the magnetic switch.
- Connect the positive wire to the yellow/red wire terminal and the negative wire to the green/yellow wire terminal.
- There should be continuity.



INSTALLATION

- Install in the reverse order of removal.



20. LIGHTS/SWITCHES/HORN

SYSTEM LOCATION	20-0	MAIN SWITCH	20-5
SERVICE INFORMATION	20-1	HANDLEBAR SWITCHES	20-6
TROUBLESHOOTING	20-1	FRONT/REAR STOP SWITCH .	20-7
HEADLIGHT	20-2	GEAR CHANGE SWITCH	20-8
FRONT/REAR WINKER	20-3	HORN	20-8
STOP/TAIL LIGHT	20-3	WINKER RELAY	20-8
COMBINATION METER	20-4		

SERVICE INFORMATION

GENERAL SAFETY

- Connect the same color wires together. Connect couplers carrying the same color and the same number of pins together.
- All couplers are equipped with tabs which can be locked. Remove these locks prior to disassembling ; and insert these tabs all the way until locked when assembling.
- Carry out continuity test on circuits or parts to diagnose electric systems. The continuity test on normal parts can be carried out without removing the parts from the vehicle. Simply disconnect the wires and connect a continuity tester or an ohmmeter to the coupler terminals or connectors.
- The continuity test is conducted to check if electric power is connected between 2 terminals. If there is coil resistance within circuits, or to check the large resistance resulting form the connector corrosion, an ohmmeter is required to check the circuit resistance value.
- The following color codes are used throughout this section.

B = Black

Y = Yellow

L = Blue

G = Green

R = Red

W = White

Br = Brown

O = Orange

Sb = Sky Blue

Lg = Light Green

P = Pink

V = Violet

Gr = Gray

TROUBLESHOOTING

Light not turned on when the main switch is ON

- Faulty light bulb
- Faulty switch
- Faulty or disconnected wiring
- Fuse cut
- Battery discharged

Dim headlight

- Battery discharged
- Wiring and switch resistance high

Headlight Hi-Low bean cannot be charged

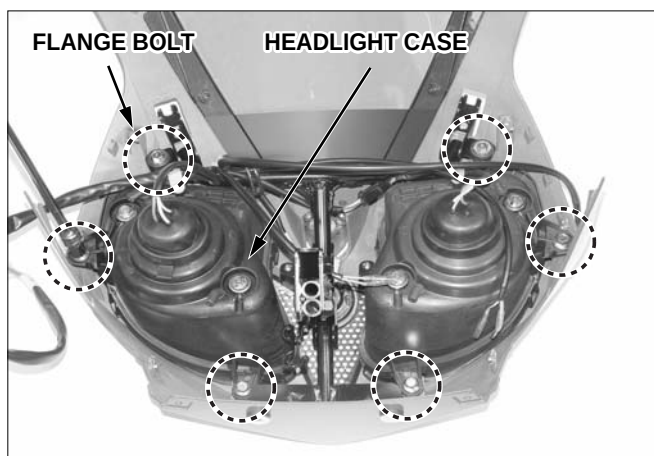
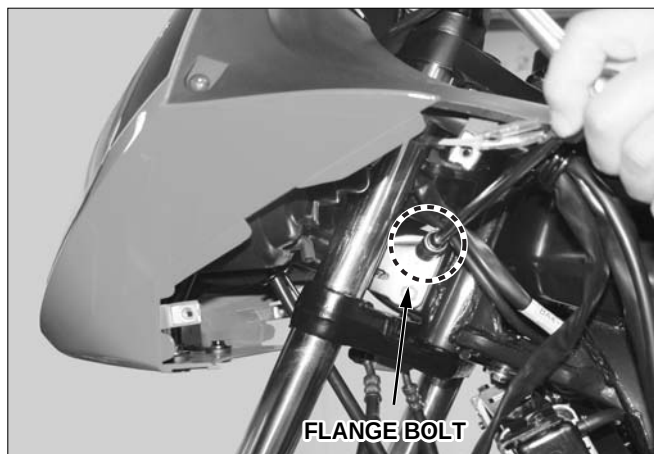
- Faulty light bulb
- Faulty dimmer switch

Fuel meter indicator malfunctioning

- Coupler separated.
- Harness disconnected.
- Float operation malfuction.
- Fuel unit damaged.

Fuel meter needle unstable

- Coupler loose.
- Fuel unit damaged.
- Meter damaged.



HEADLIGHT

BULB REPLACEMENT

- Loosen the flange bolt secured front cowl stay.
- Remove the headlight, winker, speedometer coupler.

- Remove the headlight dust cover.

- Push the headlight retainer and remove the bulb.

CAUTION

- If you touch the bulb with your bare hands, clean it with a cloth moistened with denatured alcohol to prevent early bulb failure.
- Avoid touching Halogen headlight bulb. Finger prints can create hot spot that cause a bulb to break.

- Install in the reverse order of removal

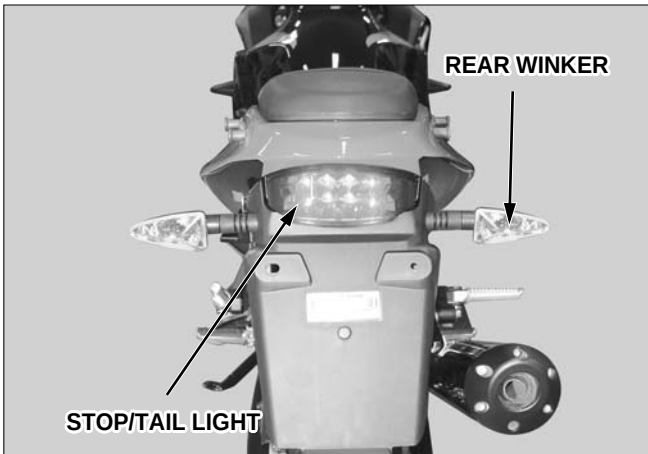
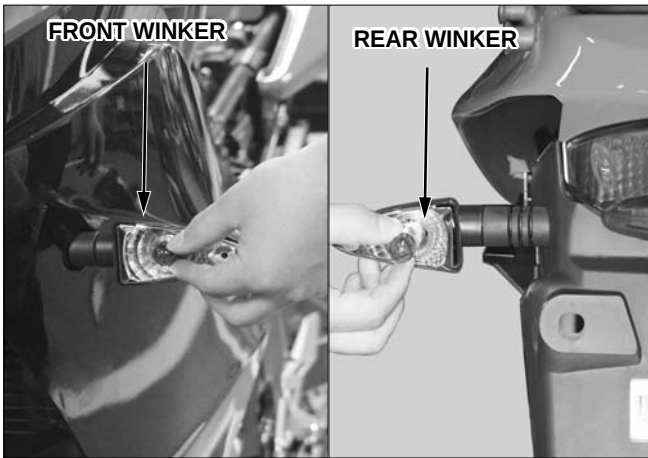
HEADLIGHT CASE REMOVAL/INSTALLATION

- Remove
 - Center cowl
 - Side cowl RH/CH
 - Front cowl stay
 - Inner panel
- Remove the headlight case mounting bolts and headlight case from the headlight stay.
- Disconnect the all cords from the wiring.
- Remove the headlight case.
- Install in the reverse order of removal.



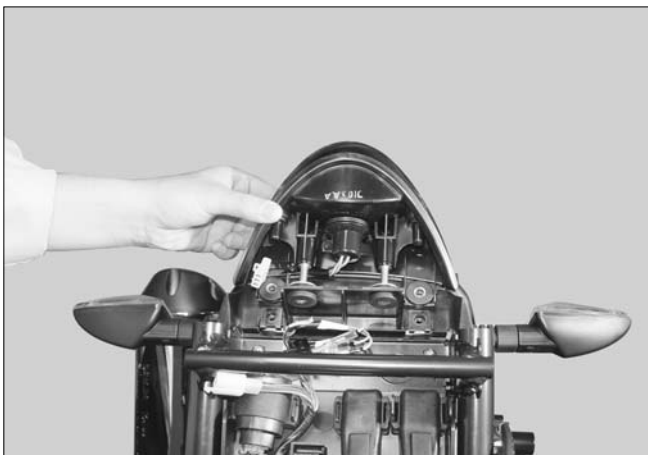
FRONT/REAR WINKER BULB REPLACEMENT

- Remove the screw and winker lens.
- While pushing the bulb, turn the bulb counterclockwise to remove it and replace with a new one.
- Install the winker lens in the reverse order of removal.



STOP/TAIL LIGHT INSPECTION

- Turn the ignition switch to "ON", and check the tail light operation.
- Check that the stop/tail light unit light on with the front brake lever and/or rear brake pedal applied.
- When ever any one does not turn on, replace the stop/tail light bulb.



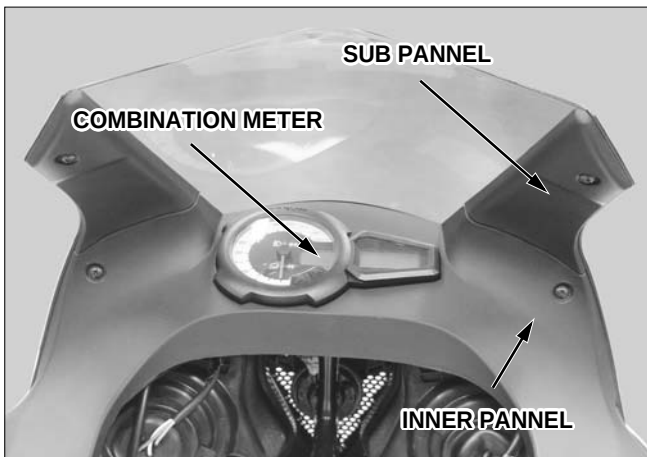
BULB REPLACEMENT

- Remove the screws and tail light lens.
- Slightly press down on the bulb and turn it counterclockwise.
- Replace with a new bulb.
- Install in the reverse order of removal.

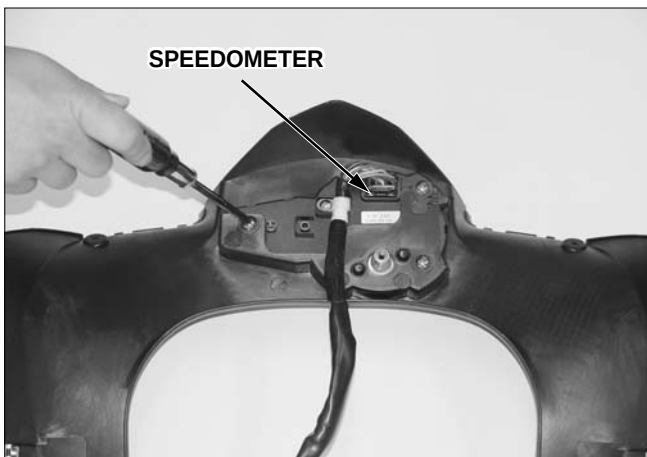


COMBINATION METER REMOVAL

- Remove the side RH/LH cowl.
- Remove the front cowl.



- Remove the inner pannel.
- Loosen the speedometer cable nut and remove the cable from the meter.
- Disconnect combination meter connect.



- Loosen the combination meter mounting screws, remove the combination meter.



INSTALLATION

- Install in the reverse order of removal.



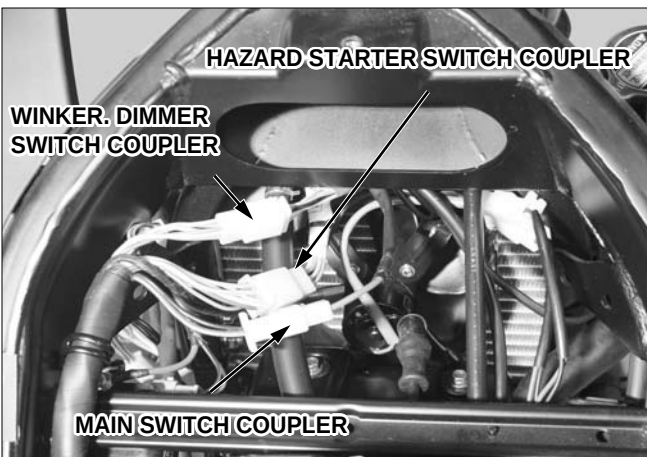
NOTE

- After installing, check to see if the each switch is working properly.
- connect the wire and cable accurately.



MAIN SWITCH REMOVAL

- Remove the main seat
- Remove the fuel tank
- Remove the main switcs coupler



INSPECTION

- Check for continuity between the wire terminals of the main switch connector in each switch position.
- Continuity should exist between the color coded wires as follows:

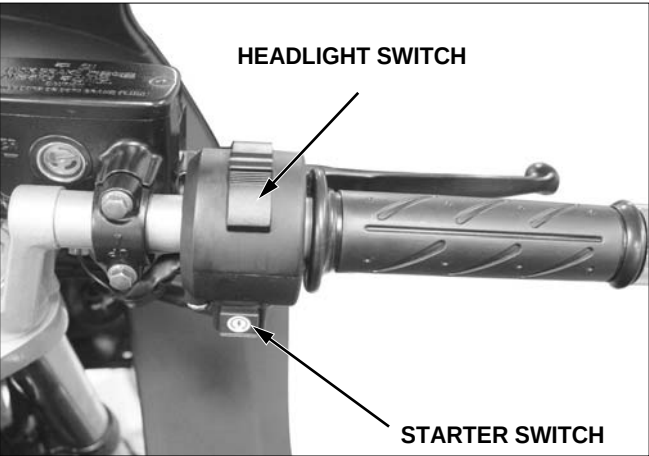
MAIN SWITCH

	BAT1	BAT2	KEY
ON	○	○	KEY ON
OFF			KEY OFF
LOCK			KEY OFF/LOCK
COLOR	R/W	B	-



HANDLEBAR SWITCHES

- Check for continuity between the wire terminals of the handlebar switch connector.
- Continuity should exist between the color coded wire terminals as follows:



STARTER SWITCH

	ST 1	BAT 2
FREE		
PUSH	○	○
COLOR	Y/R	B

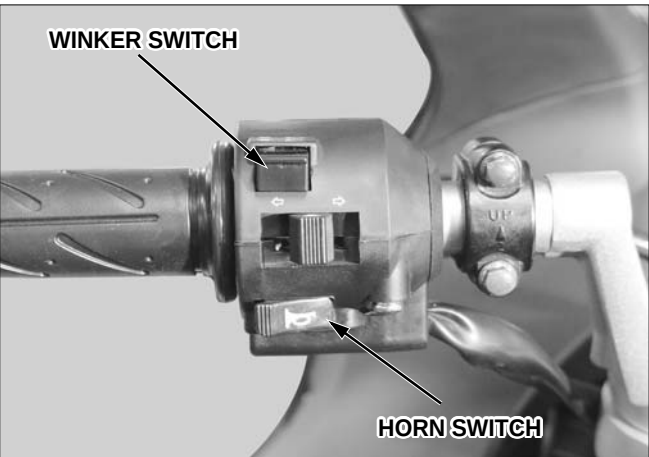
HEADLIGHT SWITCH

	W	R	L
OFF			
P	○	○	
H	○	○	○
COLOR	V	Br	Br/L



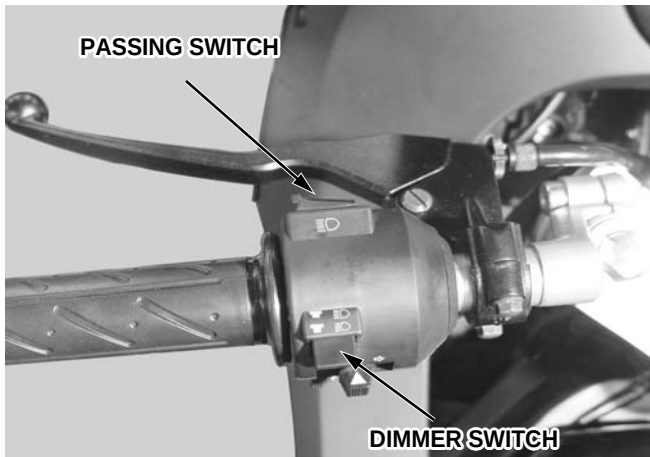
WINKER SWITCH

	W	R	L
R	○	○	
N			
L	○		○
COLOR	Gr	SB	O



HORN SWITCH

	HO	BAT 2
FREE		
PUSH	○	○
COLOR	LG	B



DIMMER SWITCH

	BAT3	HI	LO
Hi	○	○	
(N)	○	○	○
Lo	○		○
COLOR	B/W	L	W

PASSING SWITCH

	BAT2	HI
Hi	○	○
COLOR	B	L



ASSEMBLY

- Install in the reverse order of removal.

FRONT/REAR STOP SWITCH

FRONT

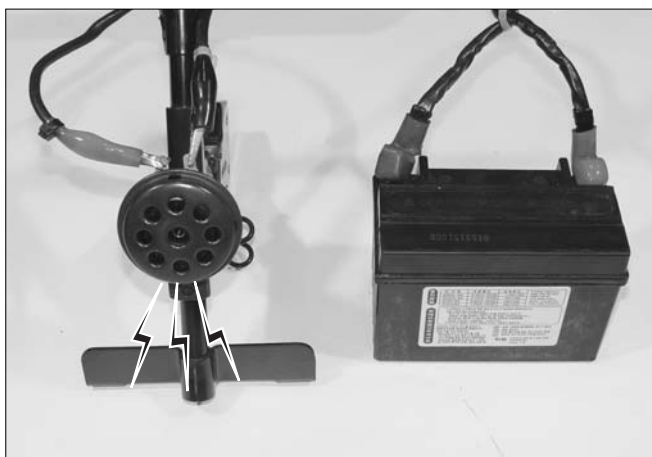
- Disconnect the front stop switch connectors and check for continuity between the terminals.
- There should be continuity with the brake lever applied, and there should be no continuity with the brake lever is released.



REAR

- Remove the seat (⇒13-2)
- Remove the RH. side cover. (⇒13-2)
- Disconnect the rear stop switch connector and check for continuity between the terminals.
- There should be continuity with the brake pedal applied, and there should be no continuity with the brake pedal is released.





GEAR CHANGE SWITCH

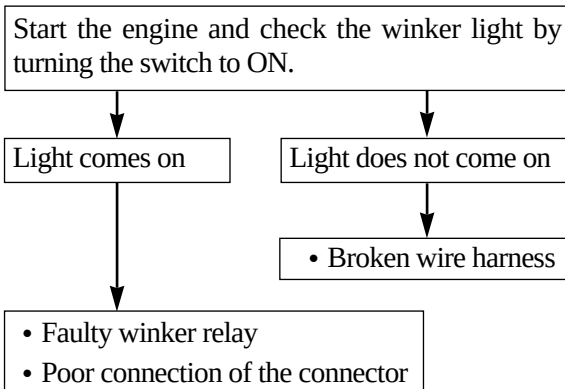
- Remove the seat. (13-2)
- Remove the LH. side cover. (13-2)
- Disconnect the neutral switch connector from the switch.
- Shift the transmission into neutral and check for continuity between the green/white wire terminal and ground.
- There should be continuity with the transmission is in neutral, and no continuity when the transmission is into gear.

HORN

- Disconnect the wire connectors from the horn.
- Connect the 12V battery to the horn terminal directly. The horn is normal if it sounds when the 12V battery is connected across the horn terminals.

WINKER RELAY

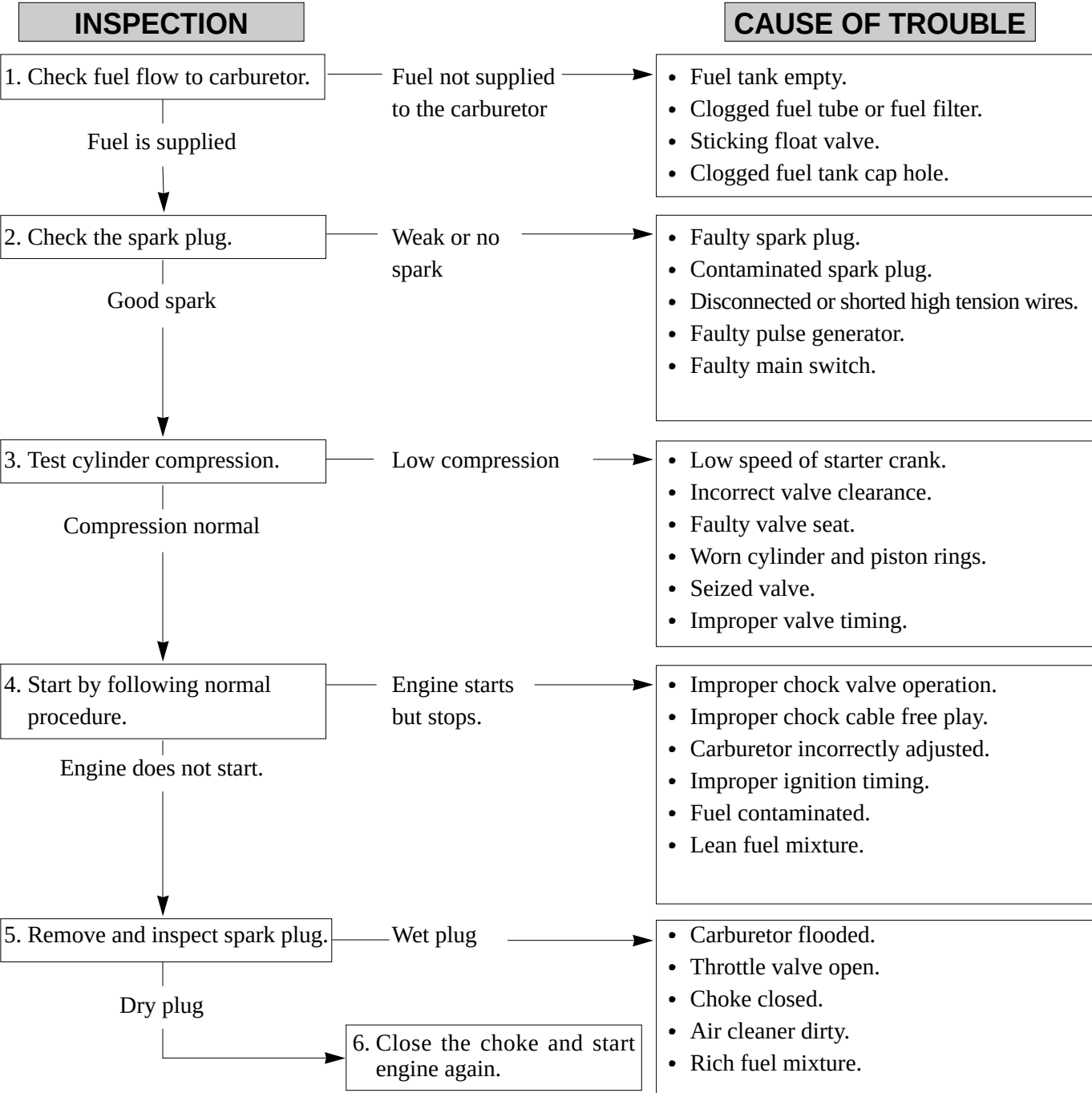
- Remove the rear seat. (⇒13-2)
- Check the following:
 - Battery condition
 - Burned bulbs
 - Burned fuse
 - Main switch and winker switch function
 - Loose connectors
- If the above items are all normal, check the following:
 1. Short the Black and Gray terminals of the winker relay connector with a jumper wire.



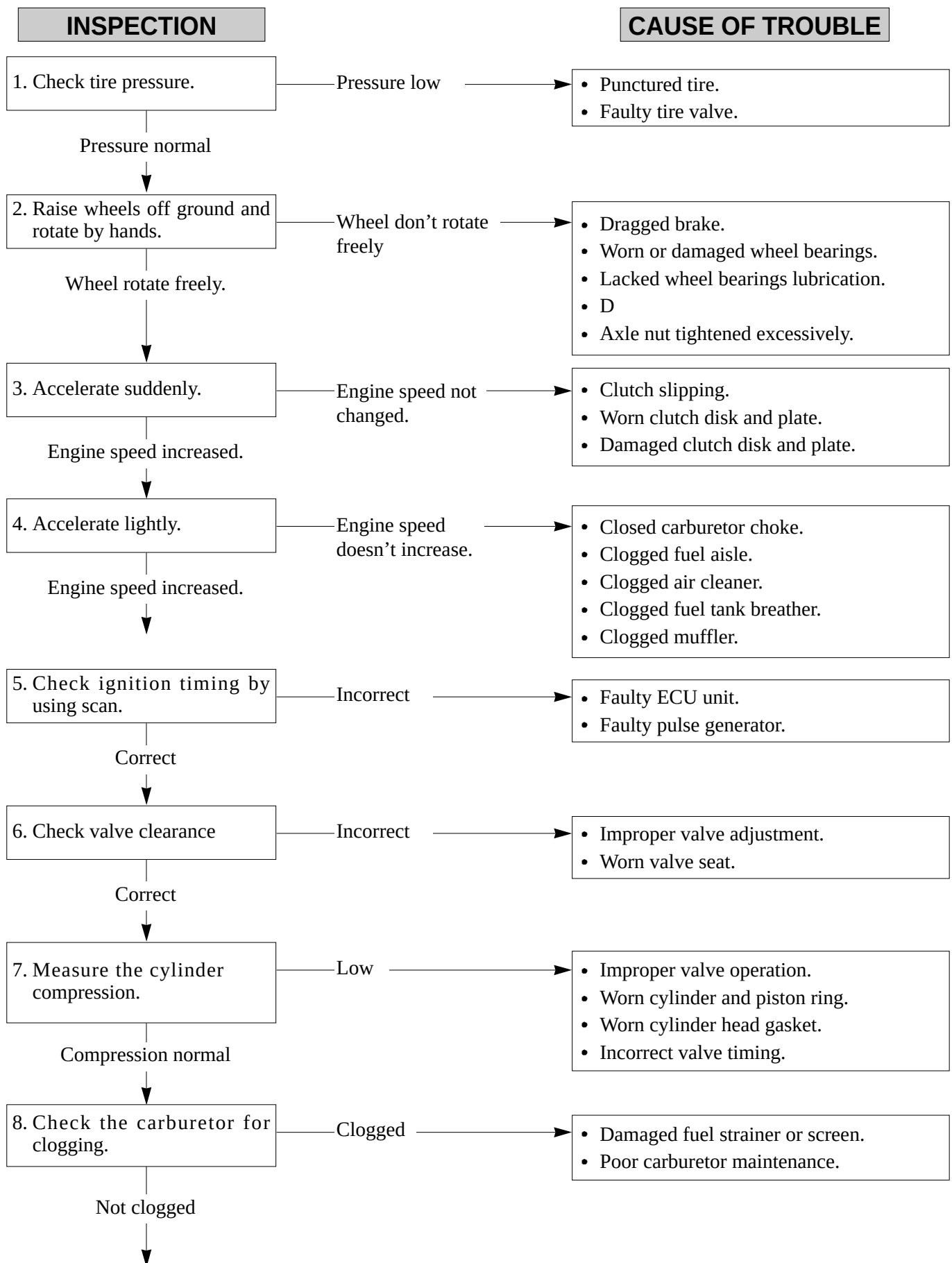
21. TROUBLESHOOTING

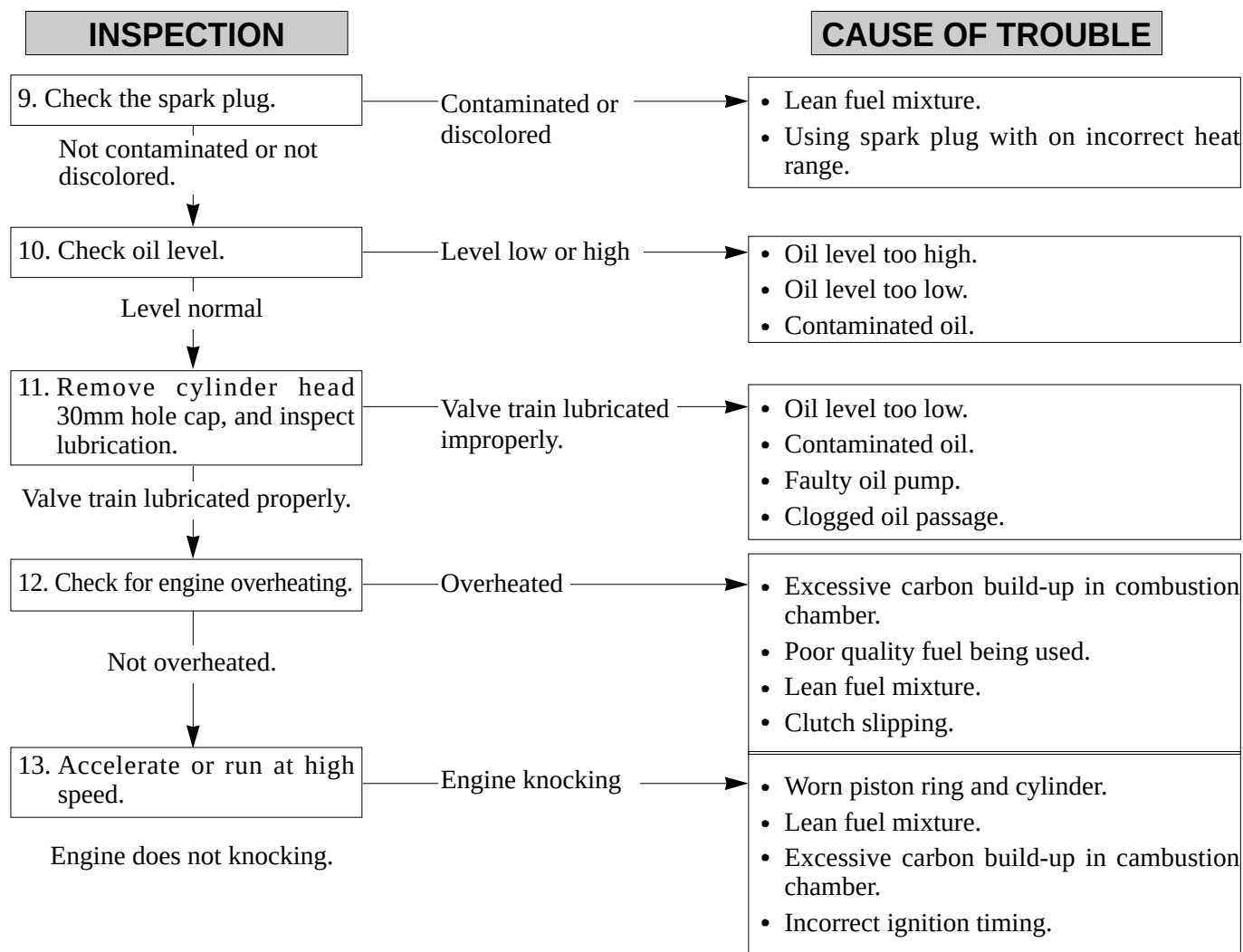
ENGINE WON'T START OR IS HARD TO START	21-1	POOR HANDLING	21-4
ENGINE LACKS POWER	21-2	POOR FRONT/REAR SUSPENSION PERFORMANCE	21-5
POOR PERFORMANCE (AT LOW AND IDLE SPEED)	21-3	FUEL GAUGE	21-5
POOR PERFORMANCE (AT HIGH SPEED)	21-4		

ENGINE WON'T START OR IS HARD TO START

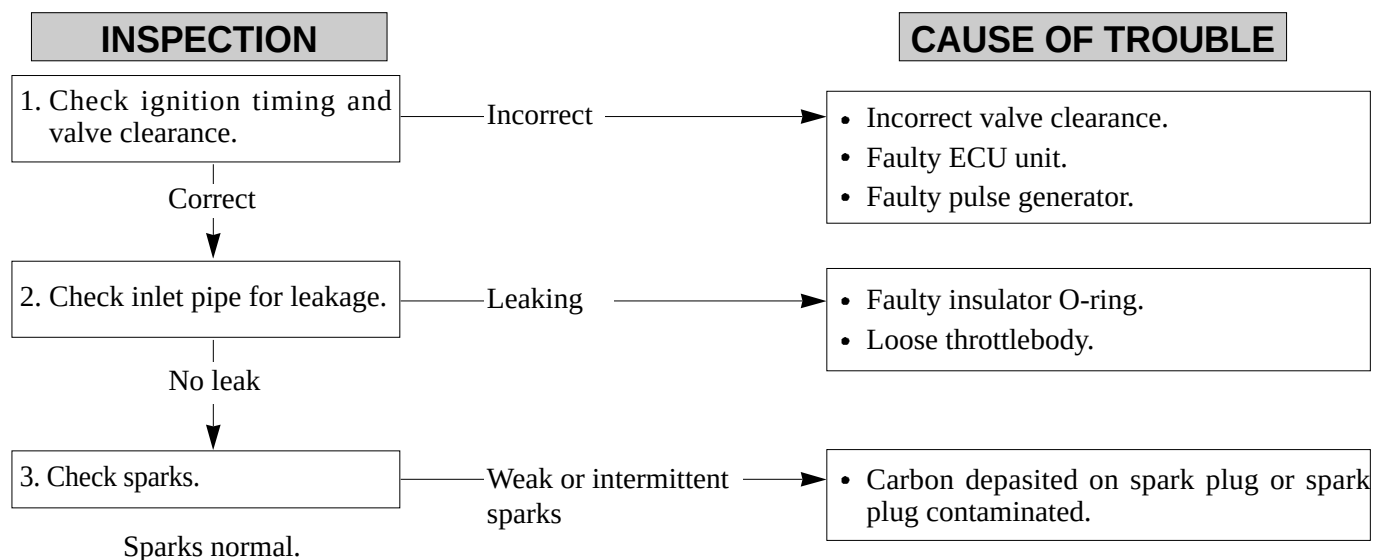


ENGINE LACKS POWER

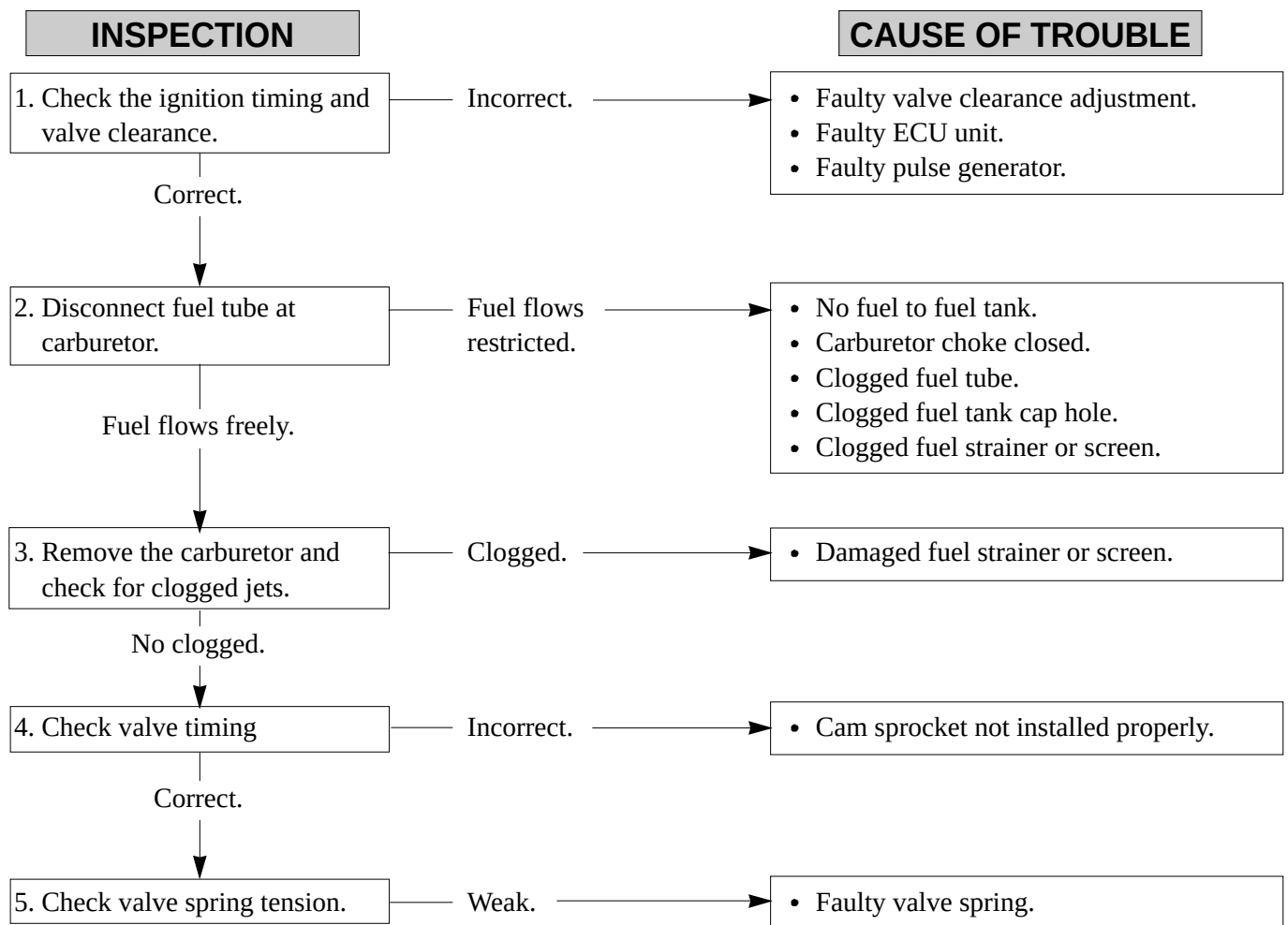




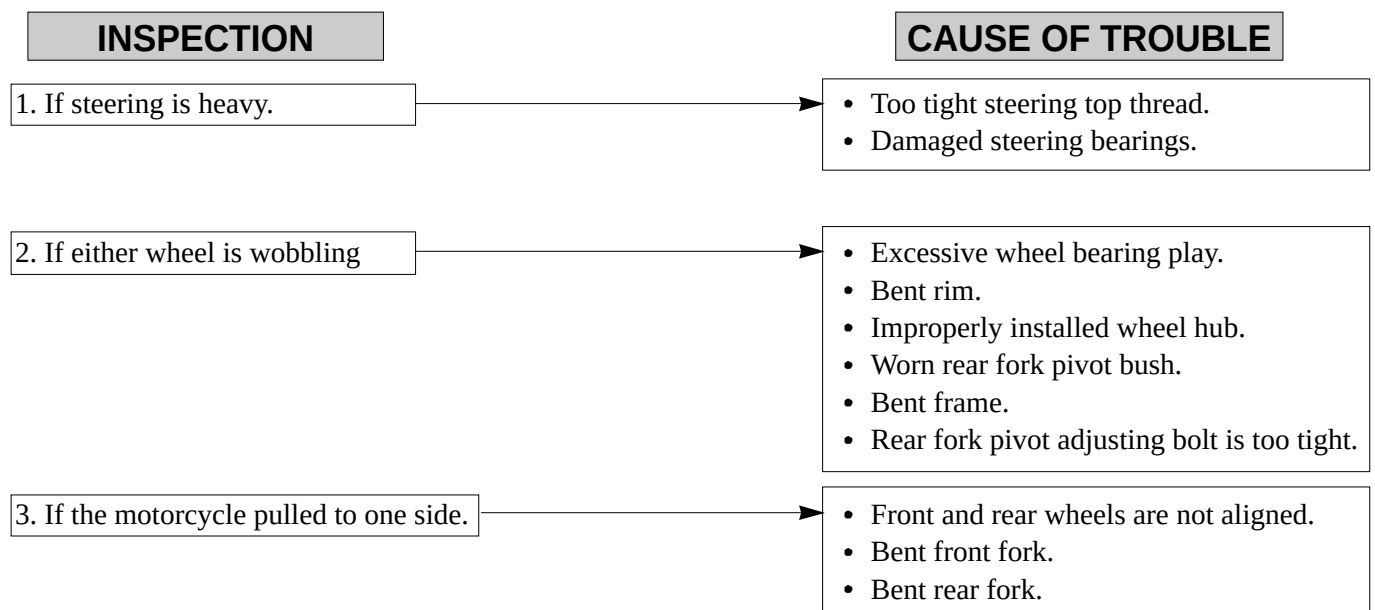
POOR PERFORMANCE (AT LOW AND IDLE SPEED)



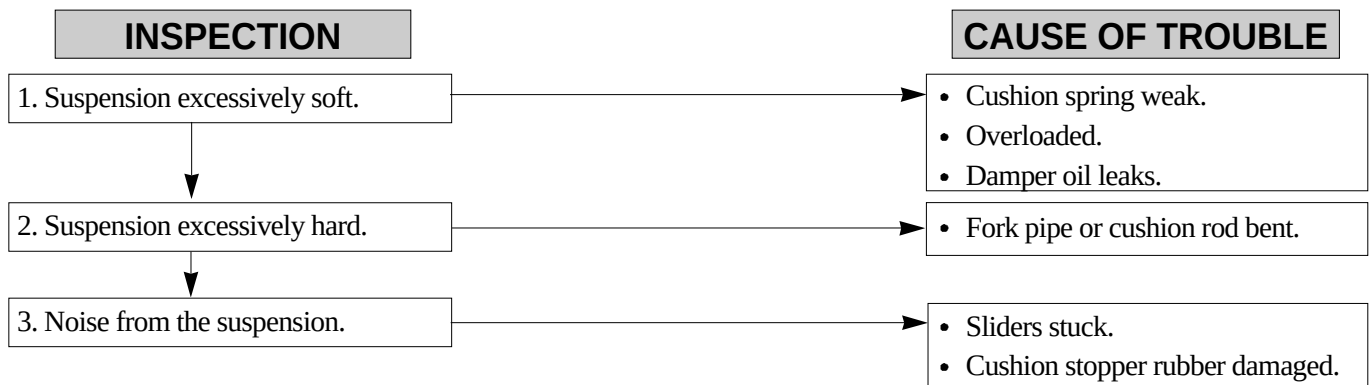
POOR PERFORMANCE(AT HIGH SPEED)



POOR HANDLING

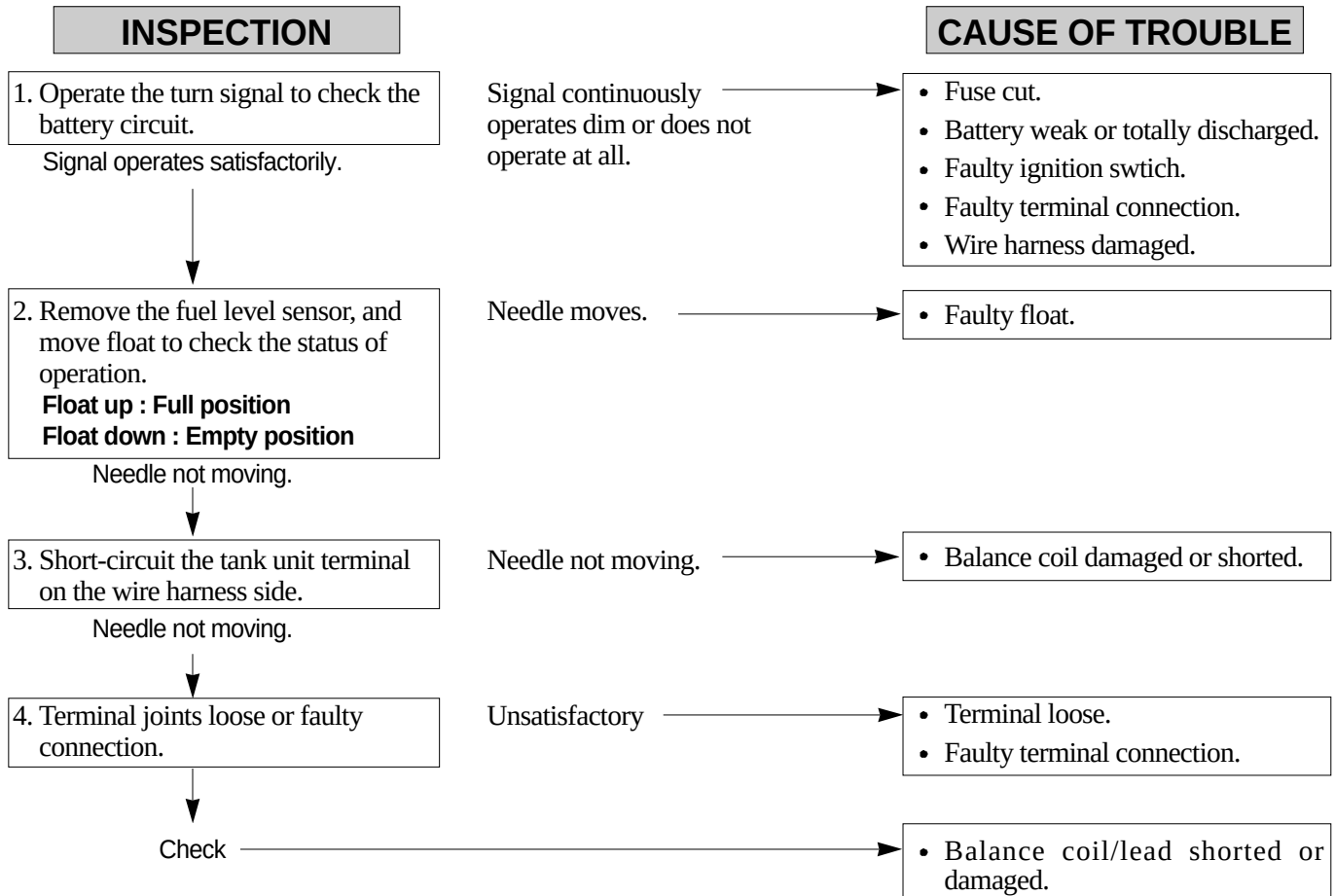


POOR FRONT/REAR SUSPENSION PERFORMANCE



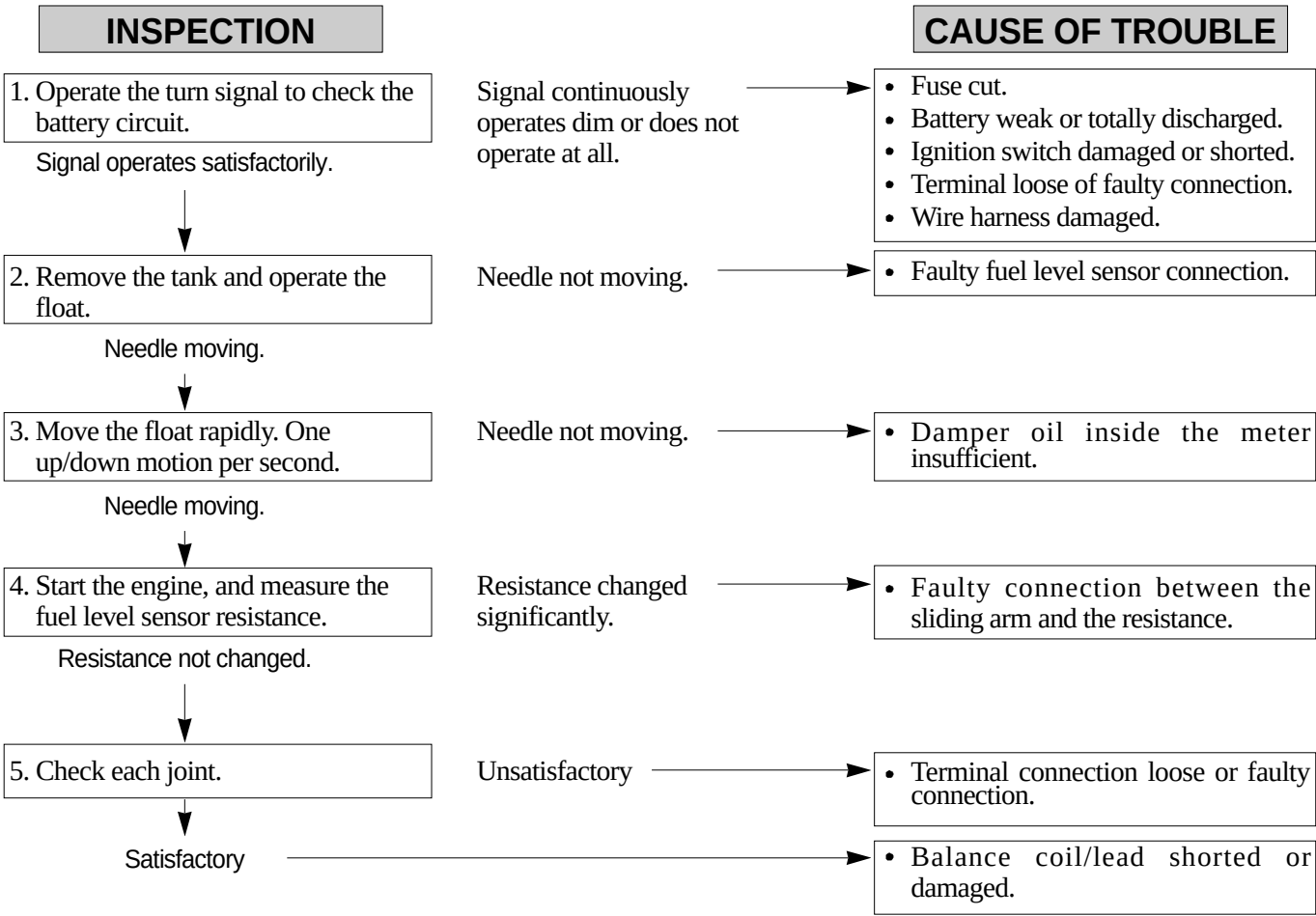
FUEL GAUGE

GAUGE READING INACCURATE (IGNITION SWITCH ON)



TROUBLESHOOTING

GAUGE NEEDLE SHAKES OR VERTICALLY WOBBLES. (IGNITION SWITCH ON)



MEMO

MEMO

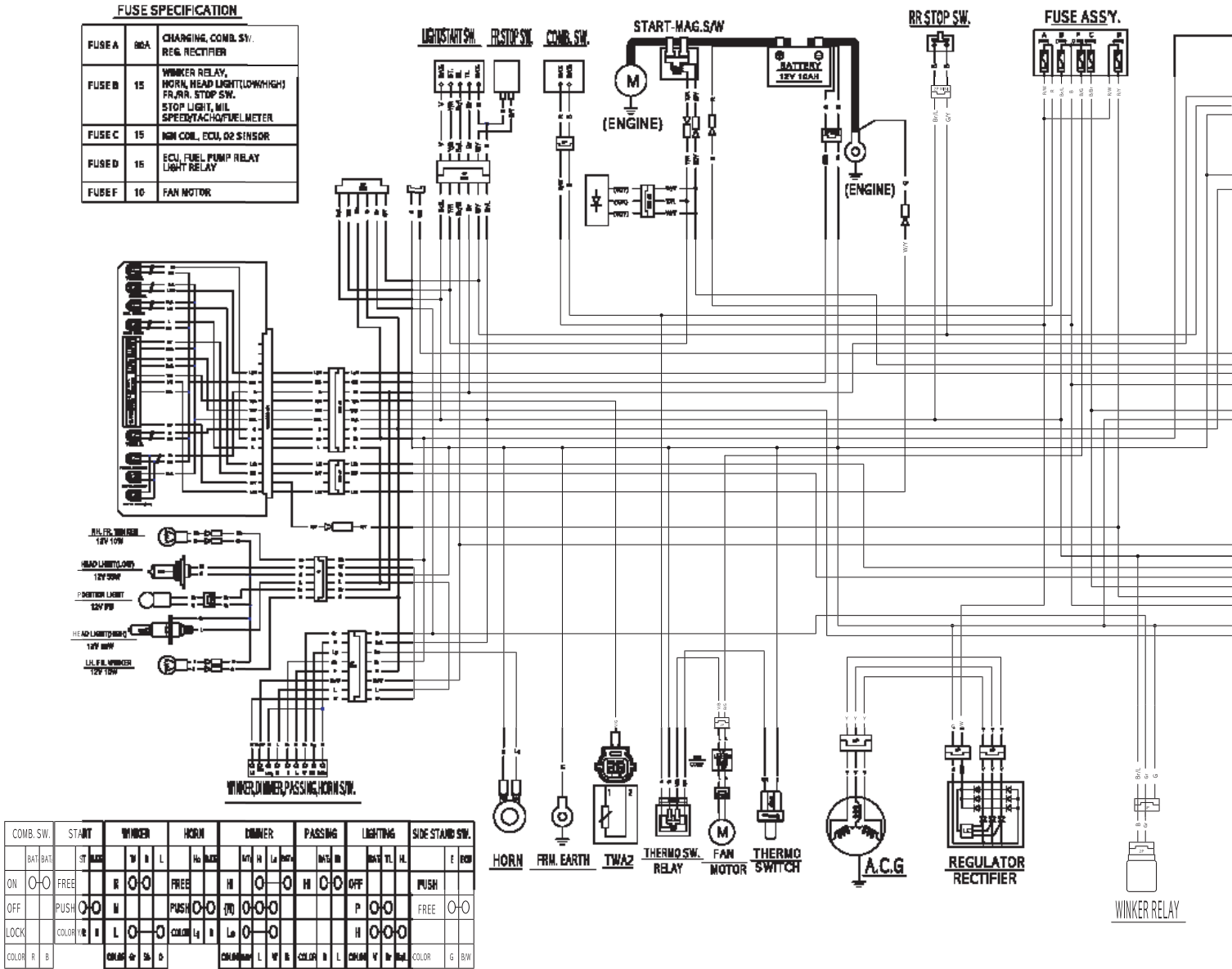
MEMO

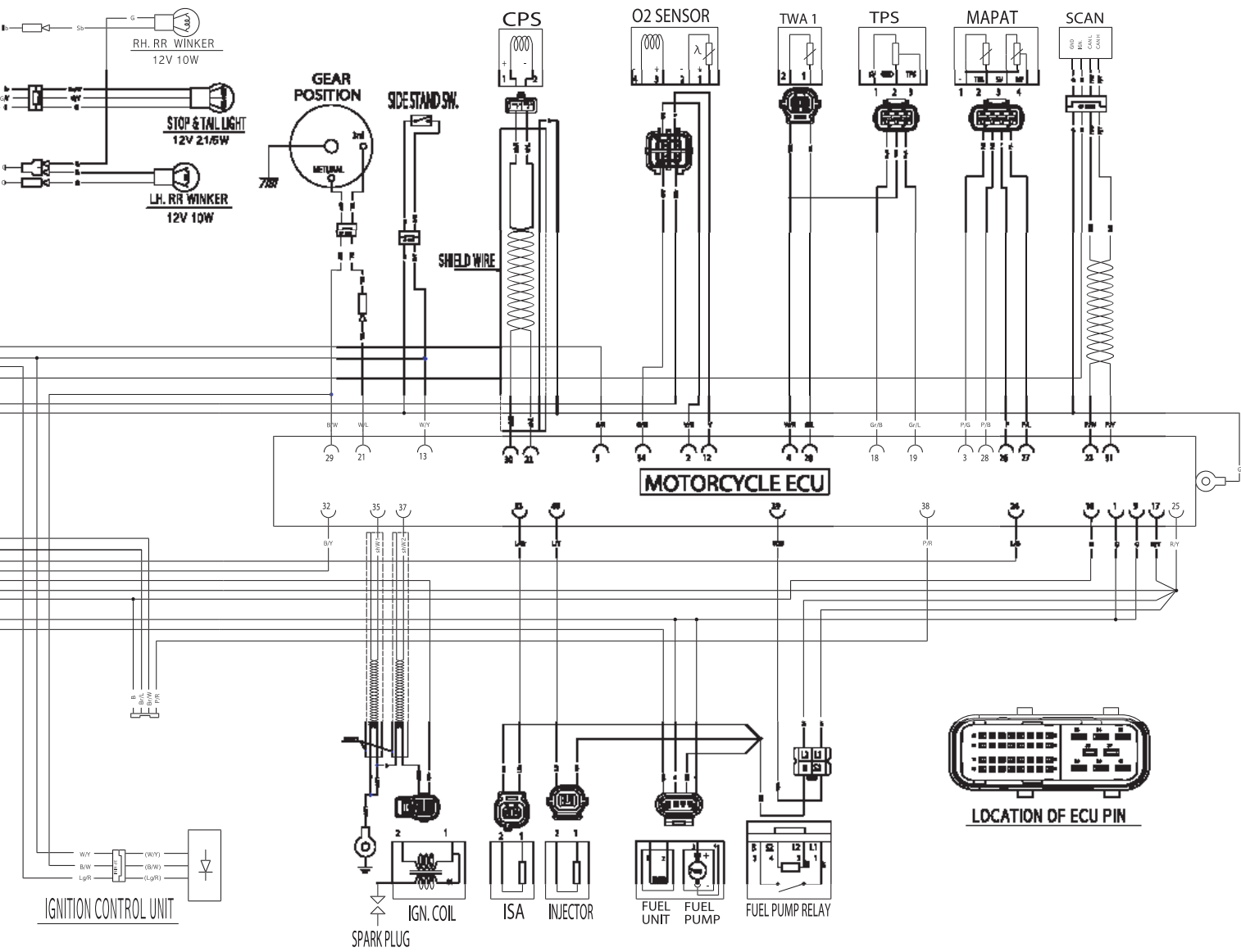
MEMO

22. WIRING DIAGRAM

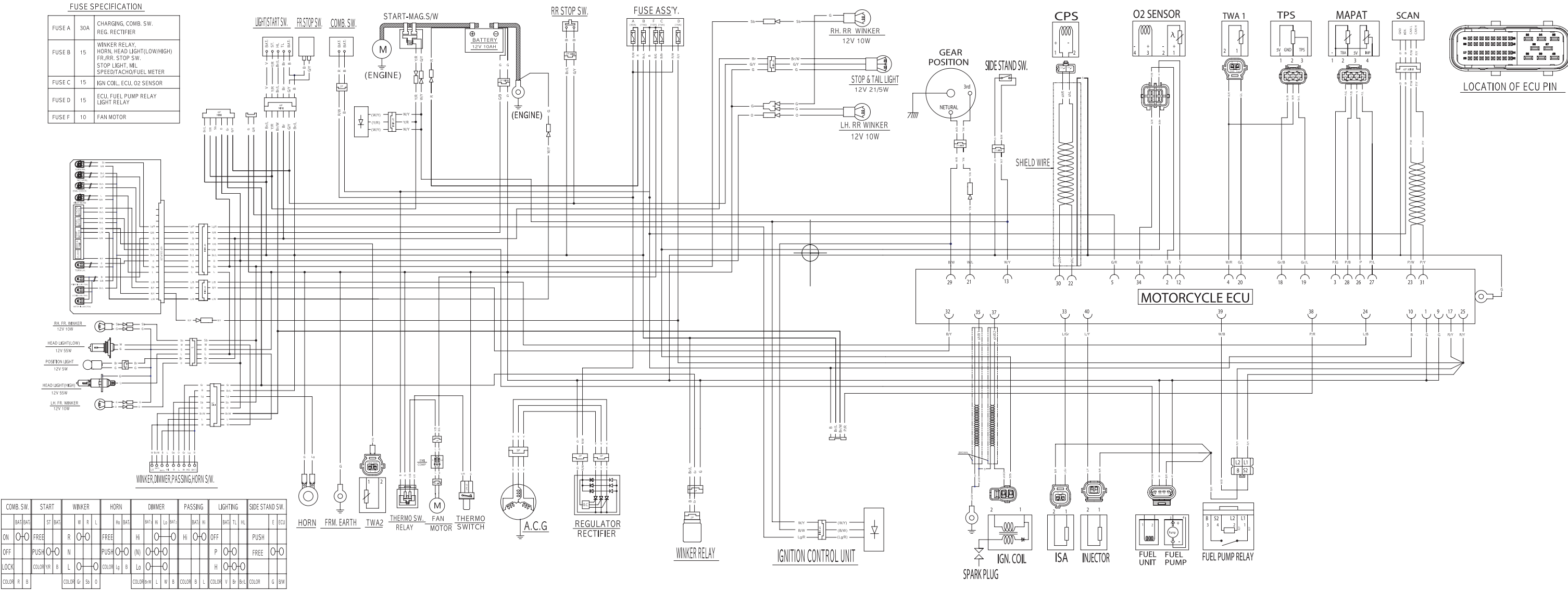
FUSE SPECIFICATION

FUSE A	80A	CHARGING, COMB. SV. REG. RECTIFIER
FUSE B	15	WINKER RELAY, HORN, HEAD LIGHT(LOW/HIGH) FR./RR. STOP SW., STOP LIGHT, MIL SPEED/TACHO/FUELMETER
FUSE C	15	IGN. COIL, ECU, O2 SENSOR
FUSE D	15	ECU, FUEL PUMP RELAY LIGHT RELAY
FUSE E	10	FAN MOTOR





22. WIRING DIAGRAM



Roadwin
250R FI

SERVICE MANUAL

2009. 10 PRINTED
2009. 10 PUBLICATION

COPY PROHIBIT

 **DAELIM MOTOR**



- HEAD OFFICE (FACTORY)

#58, SUNG SAN-DONG, CHANGWON, KYUNGNAM, KOREA
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