

How to use this manual

This manual explains how to maintain procedure for the S2-125 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; section 3, assembly and disassembly procedures for external components, and section 4 describes maintenance procedure for the engine, frame and electrical systems.

To facilitate use of this manual, each page starts with disassembly and system diagrams, each page starts with disassembly and system diagrams, service information, and troubleshooting guide.

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

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Contents

General	Service Information	1
	Inspections / Adjustments	2
	External Parts	3
Engine	Lubrication System	4
	EMS(Engine Management System)	5
	Fuel System	6
	Engine Removal / Installation	7
	LH, Crank Case Cover Continuously Variable Transmission	8
	A.C Generator / Starter Clutch	9
	Cylinder Head / Valves	10
	Cylinder Head / Piston	11
	Transmission / Crank Shaft Crank Case	12
	Front Wheel / Front Fork / Steering / Brake	13
Frame	Rear Wheel / Rear Brake / Suspension / Rear Swing Arm	14
	Charging System	15
Electrical	Ignition System	16
	Starter System	17
	Lights / Switches / Horn	18
	Wiring diagram	19



S2 125 Fi

1. SERVICE INFORMATION

GENERAL SAFETY	1-1
SERVICE RULES	1-1
CAUTION WHEN WIRING	1-5
SERIAL NUMBER LOCATION	1-9
SPECIFICATIONS	1-10

TORQUE VALUES	1-12
STANDARD TORQUE VALUES	1-13
SYMBOLS	1-13
LUBRICATION OIL	1-14
WIRING DIAGRAM	1-15

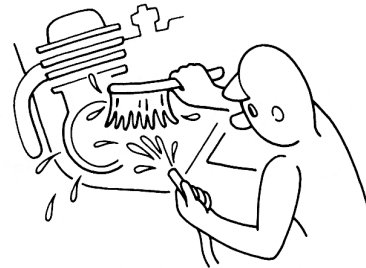
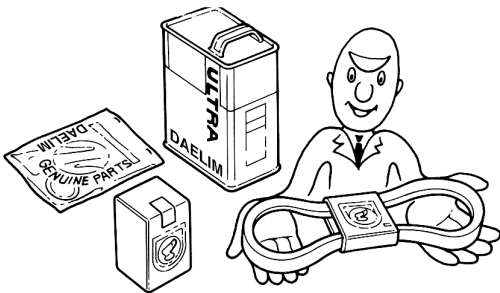
GENERAL SAFETY

⚠ 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 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 alway 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 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.

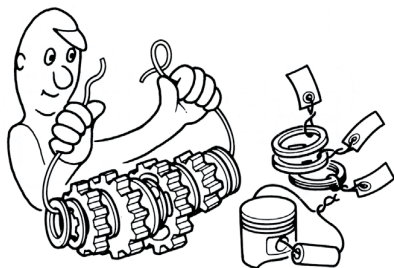
SERVICE RULES

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



SERVICE INFORMATION

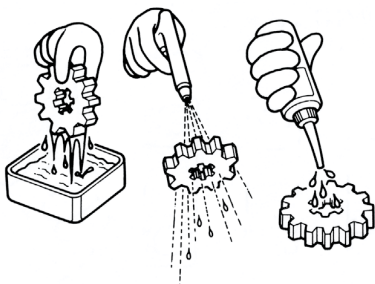
3. Store the parts of each system discriminatively to install each part in the right place.



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.



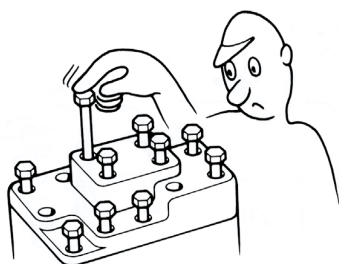
5. Clean the parts after the overhaul and before the test and remove the cleaning oil with compressed air. Apply oil to seal face during installation.



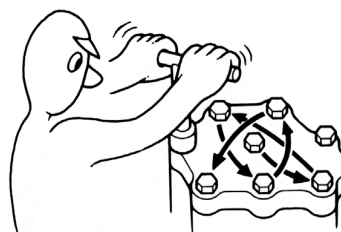
6. Check necessary place and measure necessary data during installation. When installing, return to the state before removing.



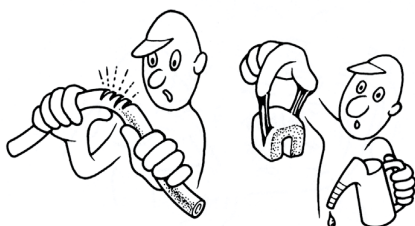
7. Align the bolts to uniform the tightening points before tightening them when you don't know the bolt length.



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.



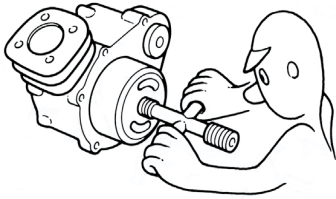
9. Check to see if the rubber part is worn out when removing it and replace it if necessary. Some rubber part is weak to gasoline and kerosene, so pay attention not to soak with gasoline or oils.



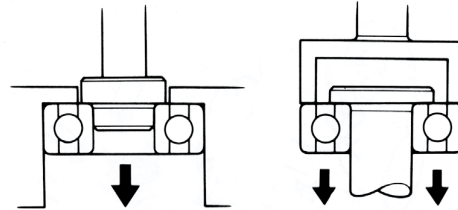
10. Recommended grease must be applied to or filled in the specified place.



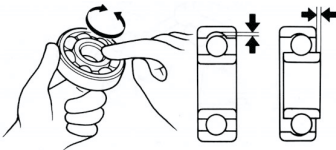
11. Maintenance needed to use the specialized tools must be performed with the right tool.



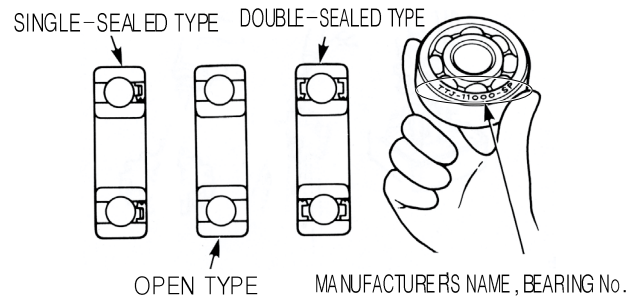
12. Never reuse the ball bearing removed with the ball applied pressure when removing press-fitted the bearing.



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.



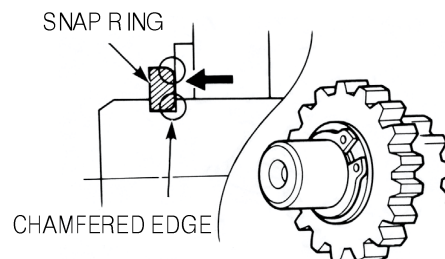
14. Pay attention to installation direction in case of the single-sided sealed ball bearing. Install the open-direction or double-sided sealed bearing in the way that the face marked with manufacturer and size should direct to the outer axle.



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.



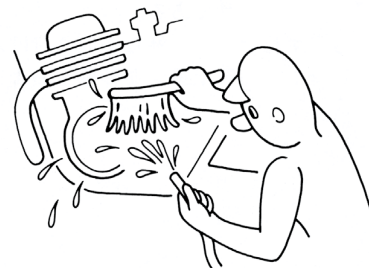
16. Install the snap ring so that chamfered side directs to the load-applied side. After installation, check the proper installation by rotating the snap ring.



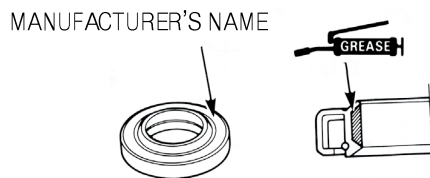
17. Check each part for proper tightening and operation after installation.



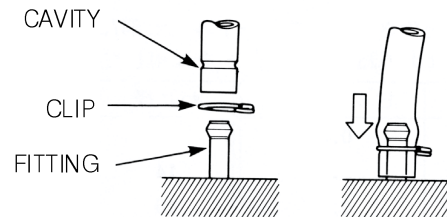
18. The brake fluid and coolant can damage the painted plastic or rubber parts. Keep these parts from contacting with them and wash these parts with water in case of contact.



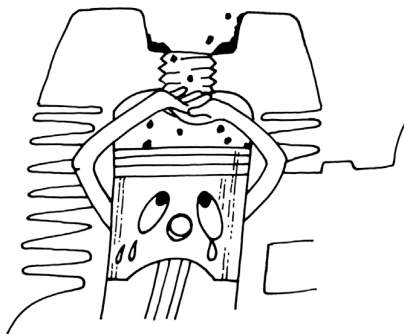
19. Install the oil seal so that the manufacturer marked surface directs outer surface.(direction not covered with oil)
- Pay attention not to bend or damage the lip.
 - Apply the grease to the lip.



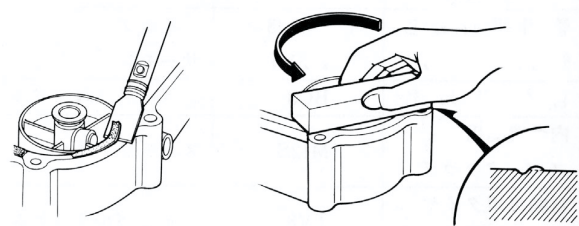
20. Connect the tube until the tube fully inserted in the joint. Install the clip if it is supplied. Replace the tube having slacked end.



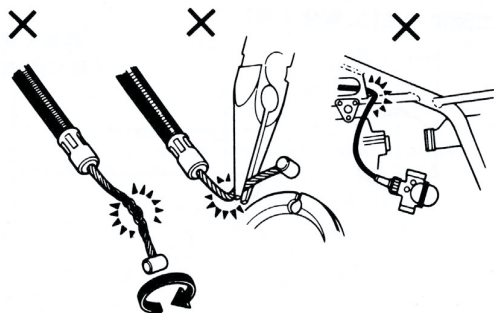
21. Keep the pneumatic system interior or the engine interior from the infiltration of dust.



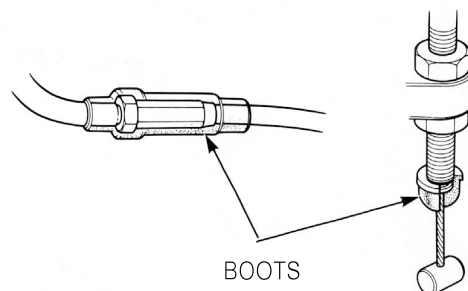
22. Install the gasket mounted in the contact surface of each case of the engine while removing gasket material completely. Remove damaged contact surface by wiping with the oil stone equally.



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

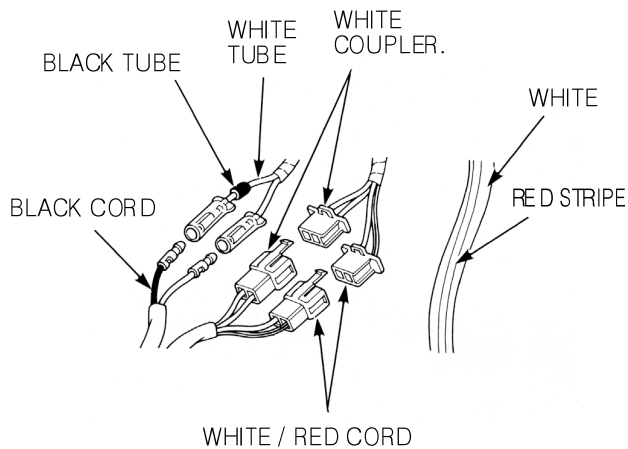


24. Install the boots with the installing groove by inserting the boots into the groove.

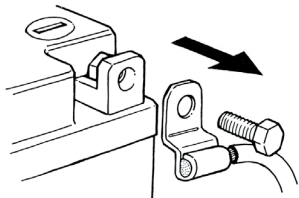


CAUTION WHEN WIRING

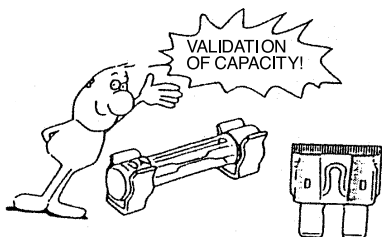
- Each cord must be connected depending on its color. When connecting different cord, attach color tube around the connector. Connect the coupler to the connector with same color and same pin number.
- Identify the two-colored cord by main color first and then striped color .



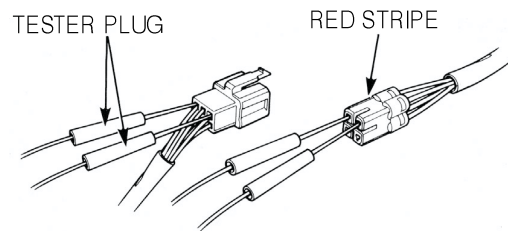
- When disconnecting the battery, the minus terminal must be disconnected first.
- Make sure that the tool such as spanner do not contact with the frame.



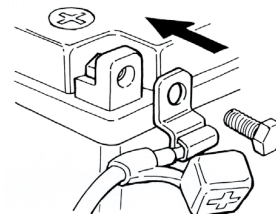
- If the fuse is short-circuited, find out the cause and repair. Replace with the fuse having the specified capacity.



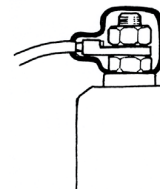
- When measuring voltage or resistance of the cord terminal using tester, contact the tester plug behind of the coupler. Pay attention not to open the cord terminal and contact the tester plug from the front of the coupler in case of water-proof coupler.



- 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.

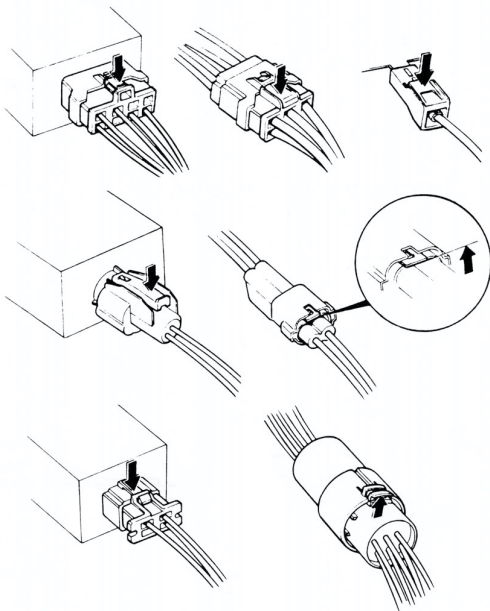


- If there is rust in the terminal, remove the rust with sand paper prior to connecting.

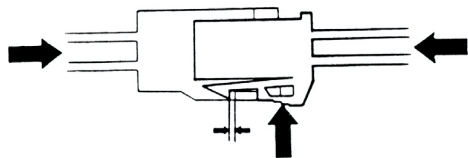


SERVICE INFORMATION

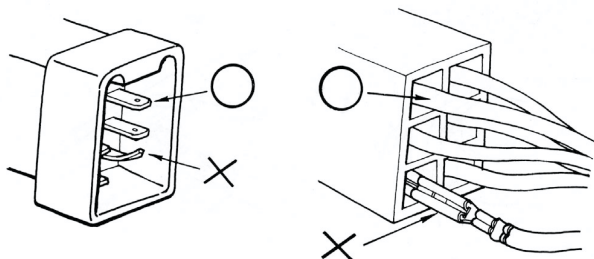
- Turn off the main switch before connecting/disconnecting.
- Release the lock to disconnect the lock of the coupler.
- The lock of the coupler has two types according to releasing method (press type and pull type) so release it properly according to the shape.
- Typical releasing method of the coupler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



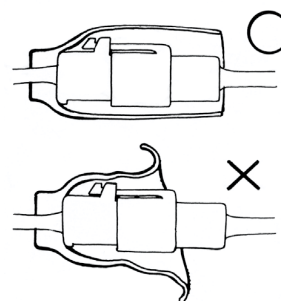
- When disconnecting the coupler, disconnect it while holding the coupler body. Pull while holding the wire harness cord and do not remove the coupler connection.



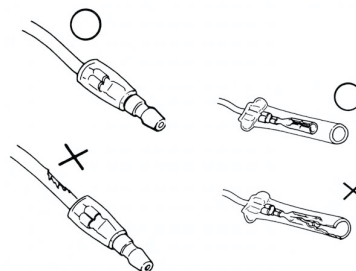
- Insert the lock of the coupler until the lock is fully secured.



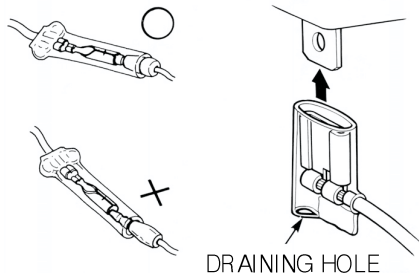
- Pay attention not to damage the vinyl cover of the coupler.



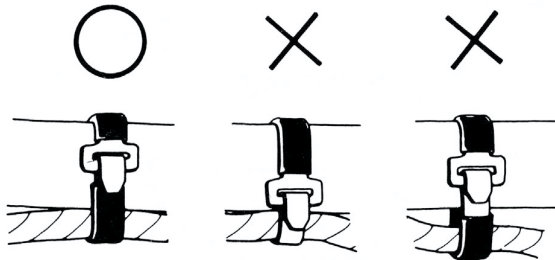
- If the wire harness coating is damaged, repair by winding vinyl tape or replace it.
- Prior to connecting the connector, make sure that the cover is not damaged and the mess terminal is not opened.



- 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.



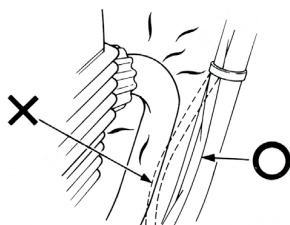
- Wire band must be secured firmly in the specified location of the frame. In case of aluminium band, secure the wire harness to the coated part.



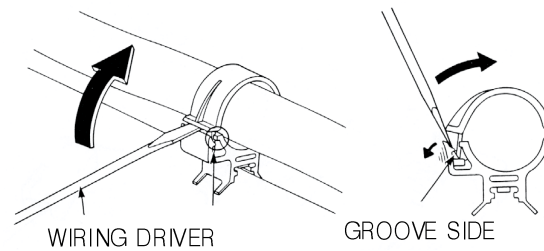
- In case of the weld clamp, do not clamp in the welded part.



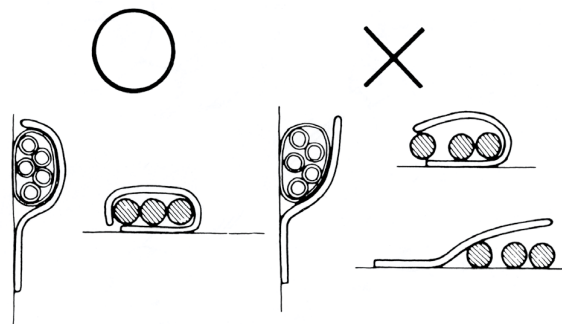
- When clamping the wire, pay attention not to contact with hot part.



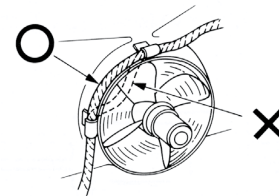
- When removing T-start, broaden the groove of T-start using the wiring driver and release the torque.
- Connect the harness and the hose to T-start and then insert until the groove is locked.
- When removing T-start from the frame, replace it with the new one.



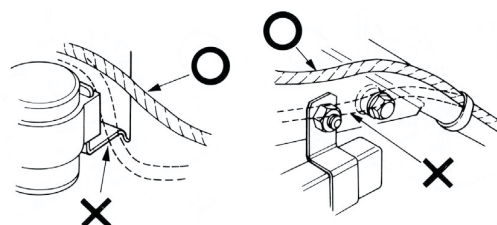
- Secure the wire harness firmly using the clamp.



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

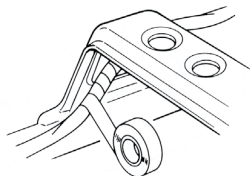


- The wire harness must be routed without contacting with the end of the lamp or any sharp edge.
- The wire harness must be routed without contacting with the end of the bolt or the piece.

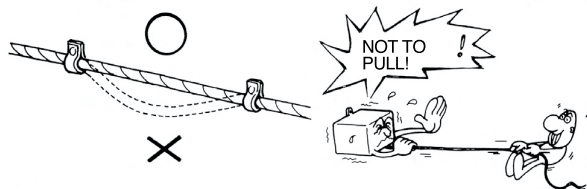


SERVICE INFORMATION

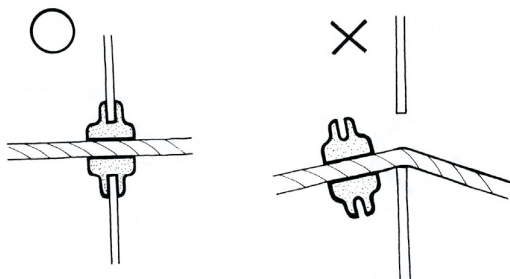
- In case that the wire harness is contacted with the end or the sharp edge, protect both parts with tube or tape.



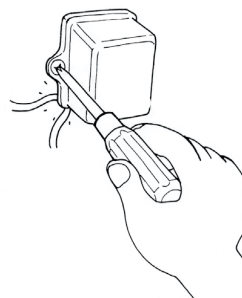
- The wire must not hang down or be pulled excessively.



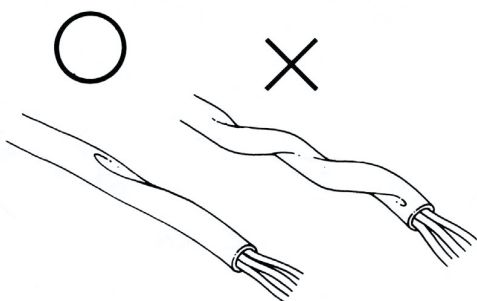
- If necessary, lock the wire harness properly.



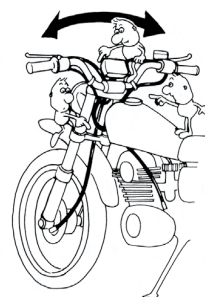
- When mounting parts, make sure that the wire harness is not pressed by the parts.



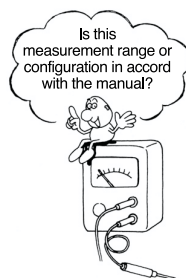
- Do not twist the wire harness.



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



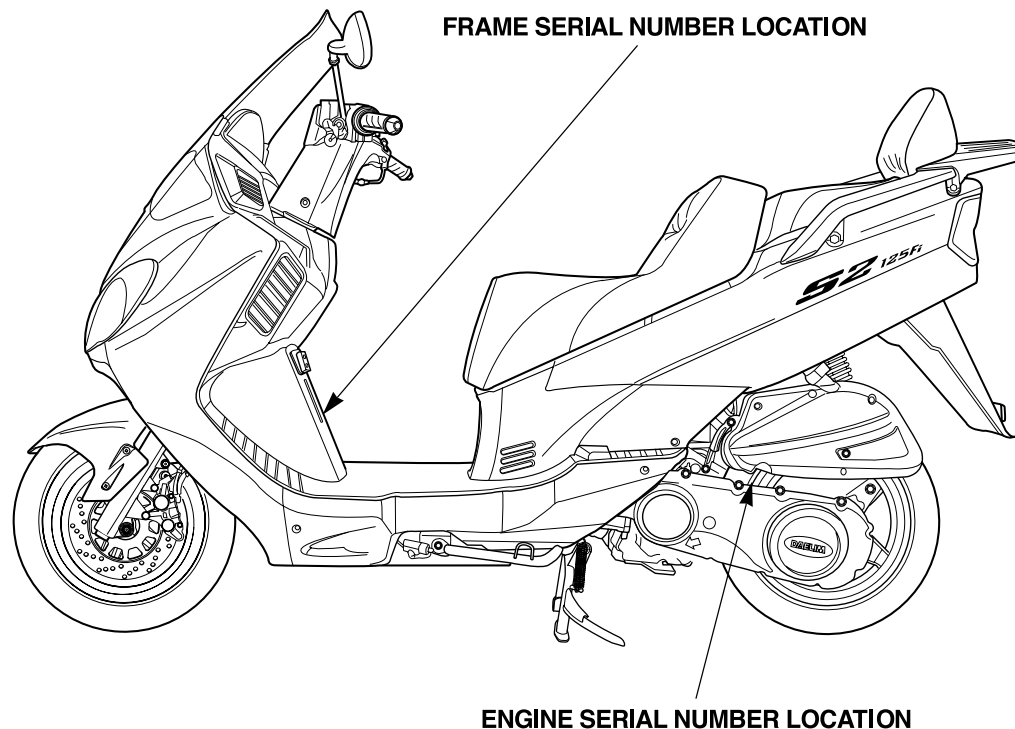
- Prior to using the tester, please read the manual carefully and understand the contents.
- When testing the resistance of the tester, the zero adjustment must be performed before testing.



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



SERIAL NUMBER LOCATION

**ENGINE SERIAL NUMBER LOCATION****FRAME SERIAL NUMBER LOCATION**

SPECIFICATIONS

ITEM		SPECIFICATIONS
DIMENSIONS	OVERALL LENGTH	2,110 mm
	OVERALL WIDTH	745 mm
	OVERALL HEIGHT	1,356 mm
	WHEEL BASE	1,481 mm
	SEAT HEIGHT	760 mm
	GROUND CLEARANCE	121 mm
	DRY WEIGHT	145kg
	GROSS WEIGHT	306.9kg
FRAME	TYPE	Underbone
	FRONT SUSPENSION / STROKE	Telescopic
	REAR SUSPENSION / STROKE	Swing arm
	FRONT TIRE SIZE / TYPE	120 / 70 - 12 / Tubeless
	REAR TIRE SIZE / TYPE	130 / 70 - 12 / Tubeless
	TIRE PRESSURE	1 PERSON FRONT 2.00 Kgf / cm ²
		REAR 2.00 Kgf / cm ²
		2 PERSON FRONT 2.00 Kgf / cm ²
		REAR 2.25 Kgf / cm ²
	FRONT BRAKE	Hydraulic disk
	REAR BRAKE	Hydraulic disk
	FUEL TANK CAPACITY	FULL CAPACITY 11.5 l
		RESERVE CAPACITY 2.2 l
ENGINE	CASTER ANGLE	27°
	TRAIL	87.1 mm
	FRONT FORK / REAR FORK OIL CAPACITY	135/65 cm ³
	TYPE	Oil cooled / air cooled 4 stroke SOHC engine
	CYLINDERS / ARRANGEMENT	1(Single cylinder), front angle 80°
	BORE AND STROKE	50.6 × 50.7 mm
	DISPLACEMENT	124.9 cc
	COMPRESSION RATIO	10.8 : 1
	VALVE TRAIN	SOHC chain drive
	OIL CAPACITY	1.1 l After disassembly
		0.75 l After Oil change
		0.8 l After Oil filter change
		0.9 l After Oil change with Oil in the Oil hose removed
	LUBRICATION SYSTEM	Forced pressure splash type
	AIR CLEANER TYPE	Paper Filter
	CYLINDER COMPRESSION	14.0 kgf / cm ² (550 rpm)
	INTAKE VALVE	OPEN 5° BTDC
		CLOSED 14° ABDC
	EXHAUST VALVE	OPEN 18° BBDC
		CLOSED 1° ATDC
	VALVE CLEARANCE (COOLING-OFF PERIOD)	
		INTAKE 0.12 ± 0.12 mm
		EXHAUST 0.12 ± 0.12 mm

ITEM		SPECIFICATIONS
ELECTRICAL SYSTEM	BATTERY TYPE / CAPACITY	Closed type (MF) 12V 10AH
	SPARK PLUG	CR8EH - 9 (NGK)
	SPARK PLUG GAP	0.8 - 0.9 mm
	FUSE CAPACITY	15A, 30A
	STARTING SYSTEM	Starter motor
	HEADLIGHT (HIGH / LOW)	12V 55W /12V 55W
	POSITION LIGHT	12V 5W
	WINKER LIGHTS (FR / RR)	12V 10W × 4
	TAIL / STOP LIGHT	12V 21 / 5W
	HIGH-BEAM PILOT	LED
	WINKER PILOT	LED
	METER LIGHTS	LED
	TRUNK LAMP	14V 1.4W
	LICENSE LAMP	12V 5W

TORQUE VALUES

ENGINE

ITEM	Q'TY	THREAD DIA (mm)	TORQUE VALUE	REFERENCE
OIL FILTER CAP	1	20	1.1 kgf · m	Apply engine oil
OIL DRAIN PLUG BOLT	1	12	2.5 kgf · m	
VALVE ADJUST SCREW LOCK NUT	4	5	0.8 kgf · m	
CYLINDER HEAD BOLT	2	6	1.0 kgf · m	
FLYWHEEL BOLT	1	12	5.5 kgf · m	
DRIVE FACE NUT	1	12	7.5 kgf · m	
CLUTCH OUTER BOLT	1	12	5.5 kgf · m	
SPARK PLUG	1	12	1.2 kgf · m	
DRIVE PLATE	1	30	5.5 kgf · m	
CAM SHAFT HOLDER NUT	4	8	2.0 kgf · m	
CAM CHAIN TENSIONER FLANGE BOLT	2	6	1.0 kgf · m	
CAM CHAIN TENSIONER PAN SCREW	1	6	0.4 kgf · m	
CYLINDER HEAD COVER BOLT	4	6	0.9 kgf · m	
MISSION COVER BOLT	8	6	1.2 kgf · m	
MISSION COVER DRAIN BOLT	1	8	1.0 kgf · m	
MISSION COVER CHECK BOLT	1	8	0.9 kgf · m	
COOLING FAN BOLT	3	6	1.0 kgf · m	
STARTING CLUTCH NUT	1	22	9.5 kgf · m	
STARTER MOTOR FLANGE BOLT	2	6	0.9 kgf · m	
RADIATOR OIL BOLT	4	12	3.2 kgf · m	
OIL PUMP FLAT SCREW	3	6	1.0 kgf · m	
OIL PUMP DRIVEN GEAR NUT	1	6	1.0 kgf · m	

FRAME

ITEM	Q'TY	THREAD DIA (mm)	TORQUE VALUE	REFERENCE
STEERING STEM NUT	1	26	7.0 kgf · m	Initial torque
STEERING TOP THREAD NUT	1	26	0.25 kgf · m	
FORK PIPE BOTTOM BRIDGE	1	10	7.5 kgf · m	
HANDLE POST	2	10	6.0 kgf · m	
FRONT AXLE NUT	1	12	6.0 kgf · m	
FRONT CALIPER BRACKET BOLT	2	8	3.1 kgf · m	
FRONT MASTER CYLINDER HOLDER BOLT	2	6	1.2 kgf · m	
FRONT DISK PLATE BOLT	3	8	4.25 kgf · m	
REAR AXLE NUT	1	16	12.5 kgf · m	
REAR CALIPER BRACKET BOLT	2	8	3.1 kgf · m	
REAR MASTER CYLINDER HOLDER BOLT	2	6	1.2 kgf · m	
REAR DISK PLATE BOLT	3	8	4.25 kgf · m	
SPEEDOMETER GEARBOX SCREW	1	5	0.43 kgf · m	
FRONT FORK BOLT	2	22	2.25 kgf · m	
REAR CUSHION UPPER BOLT	2	10	4.0 kgf · m	
REAR CUSHION UNDER BOLT	2	10	4.0 kgf · m	
REAR CUSHION LOCK NUT	2	10	3.5 kgf · m	
ENGINE HANGER UPPER BOLT	2	12	5.25 kgf · m	
ENGINE HANGER LOWER BOLT	1	10	4.5 kgf · m	
MAINSTAND BOLT	2	10	4.0 kgf · m	
SIDESTAND PIVET SCREW	1	10	1.5 kgf · m	
SIDESTAND PIVET NUT	1	10	4.5 kgf · m	

Torque values listed above are for specific tightening points. Torque values for other items are listed in the following table.

STANDARD TORQUE VALUES

ITEM	TORQUE VALUE	ITEM	TORQUE VALUE
5mm BOLT, NUT	0.5 kgf · m	5mm SCREW	0.4 kgf · m
6mm BOLT, NUT	1.0 kgf · m	6mm SCREW	0.9 kgf · m
8mm BOLT, NUT	2.2 kgf · m	6mm FLANGE BOLT, NUT	1.2 kgf · m
10mm BOLT, NUT	3.5 kgf · m	8mm FLANGE BOLT, NUT	2.7 kgf · m
12mm BOLT, NUT	5.5 kgf · m	10mm FLANGE BOLT, NUT	4.0 kgf · m

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.

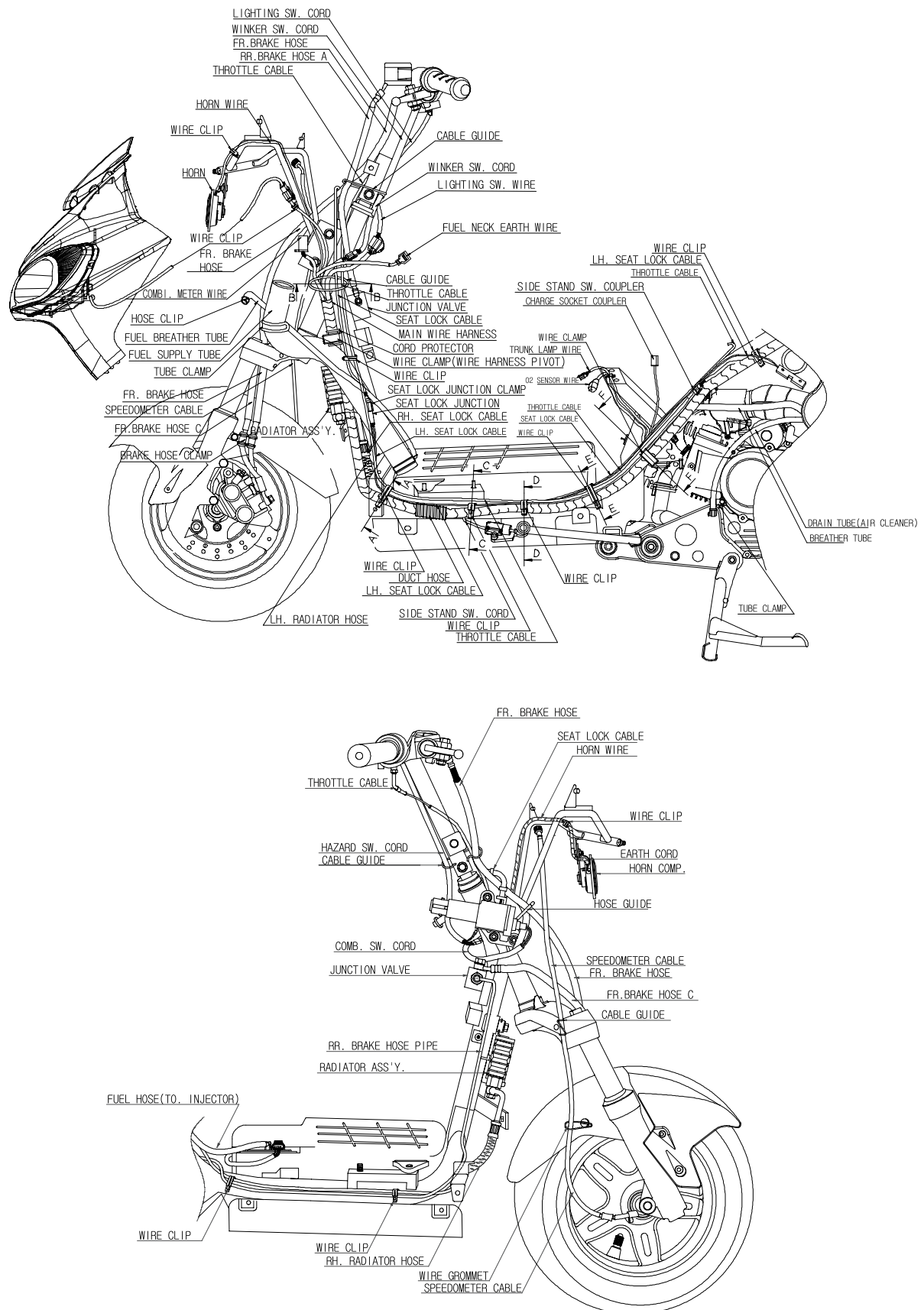
The following symbols indicate oil adding, oil change, or parts.

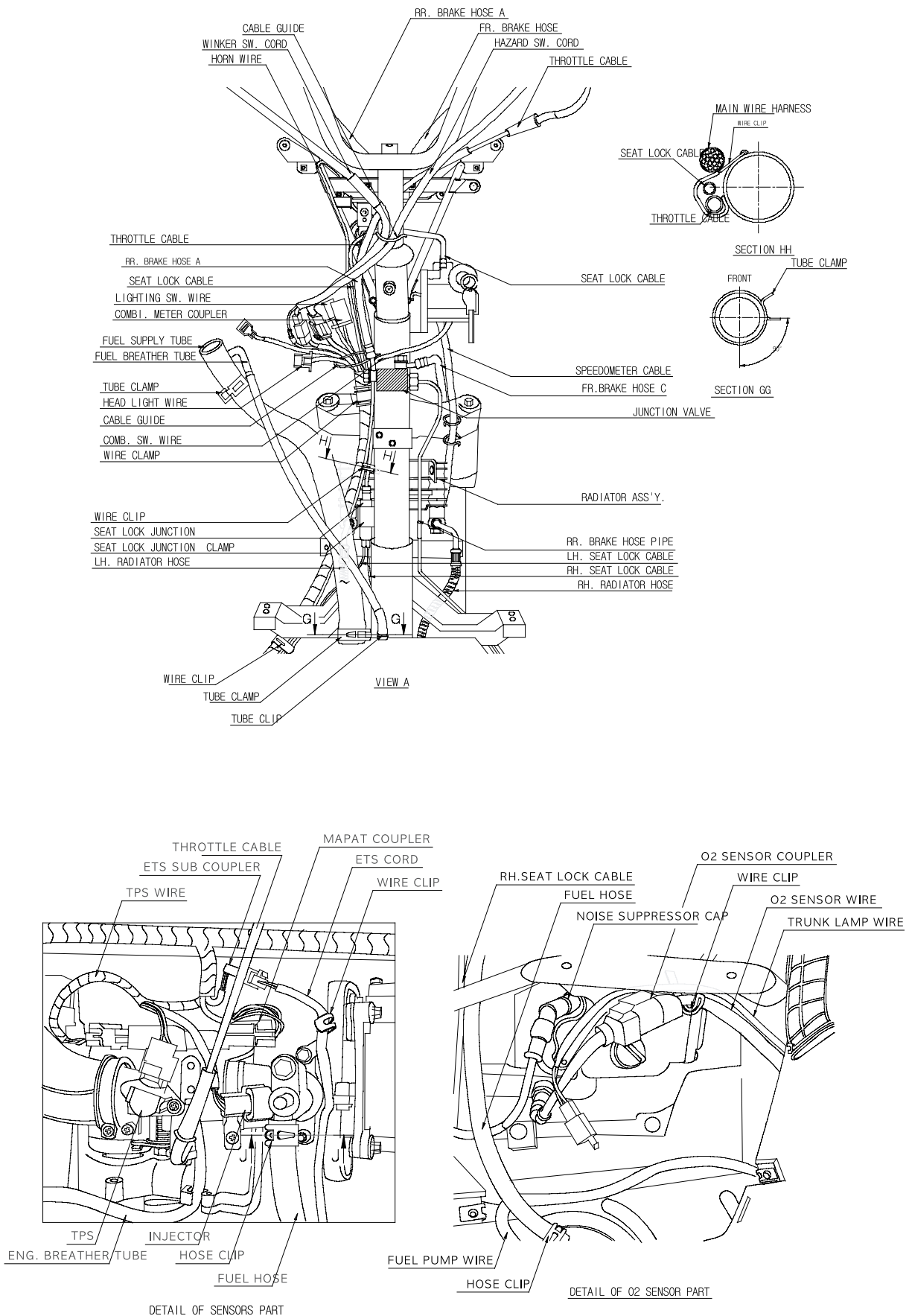
SYMBOL	MEANING
 OIL	Add oil. If there is no specific oil indicated, use the designated or recommended engine oil.
 GREASE	Apply grease
(⇒3-1)	Indicates reference page. (example : Refer to page 3-1)

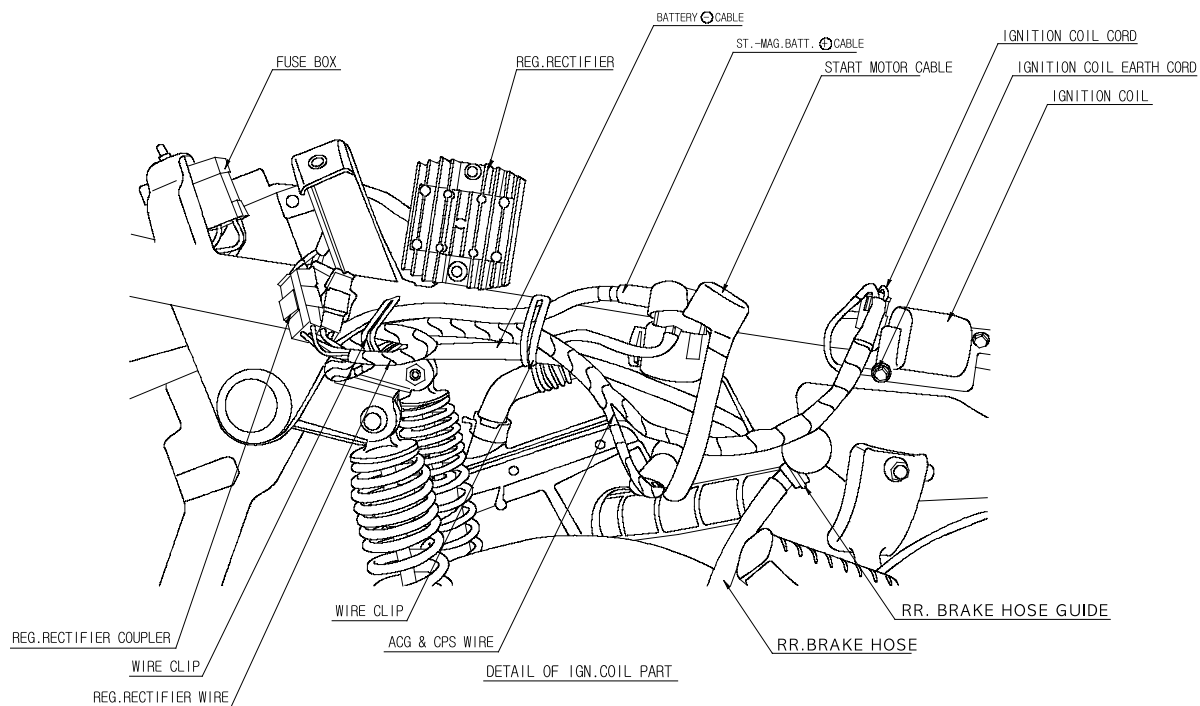
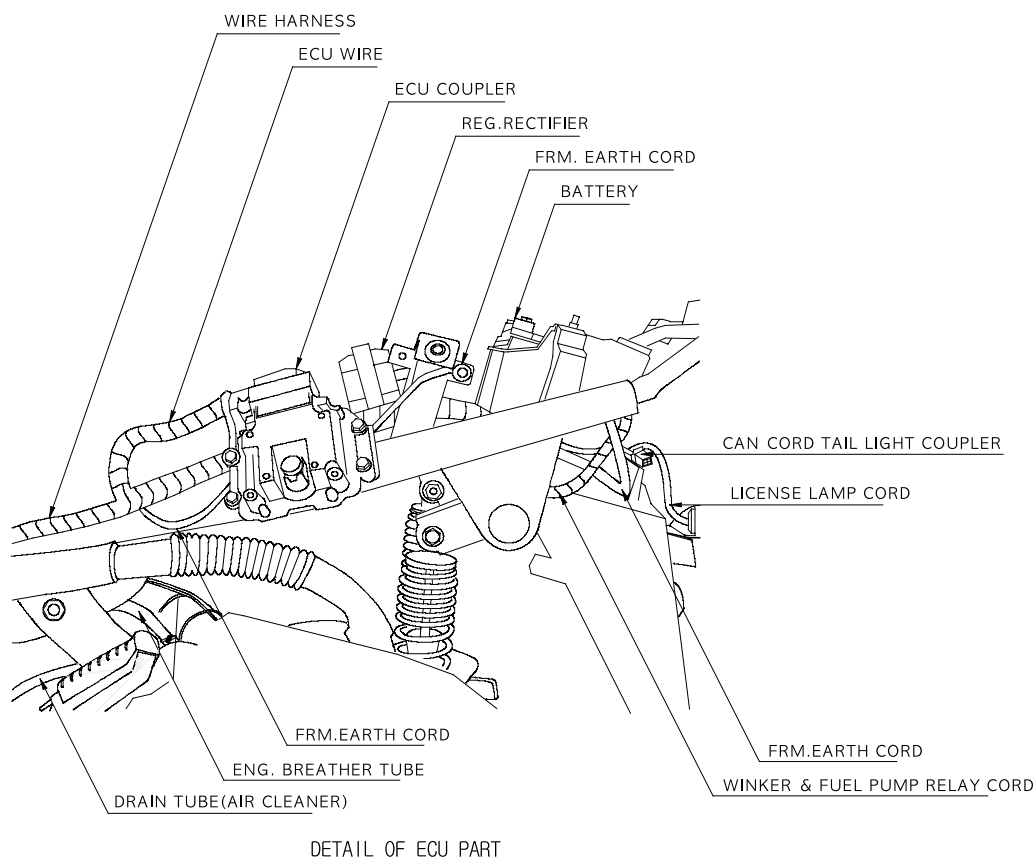
The following abbreviations are used in this manual.

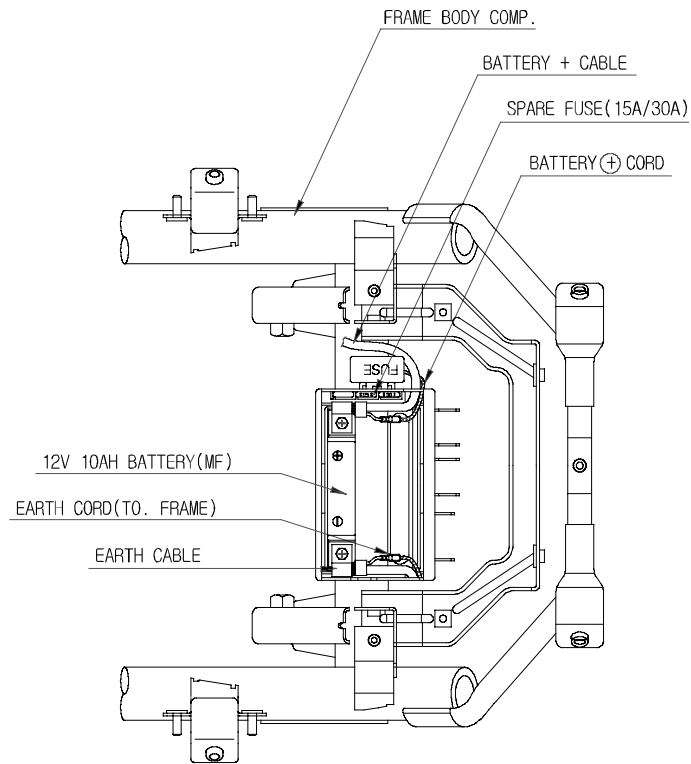
ASS'Y	ASSEMBLY
LH.	Left
RH.	Right

WIRING DIAGRAM

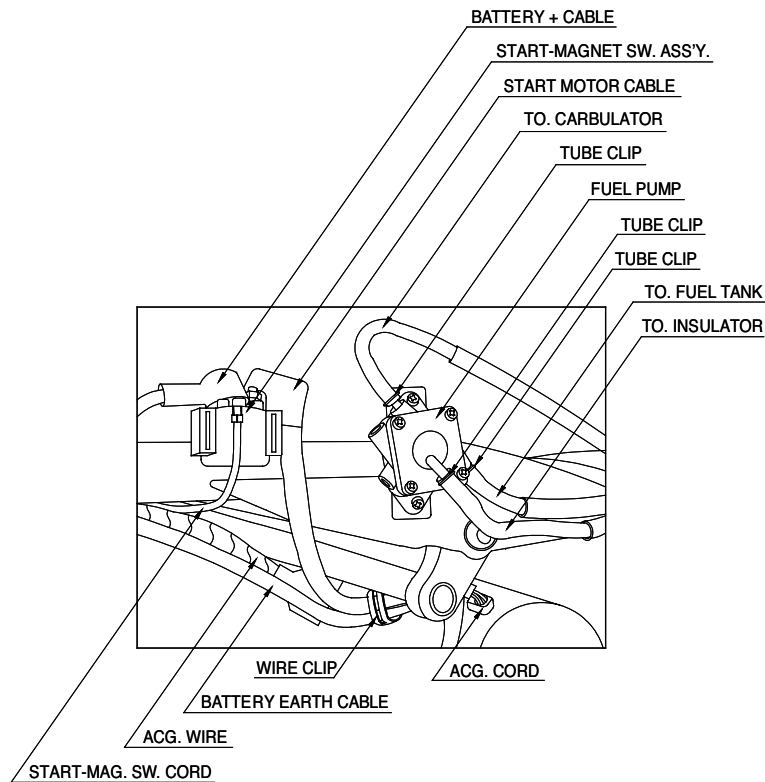








DETAIL OF BATTERY PART



MEMO

2. INSPECTIONS/ADJUSTMENTS

2

SERVICE INFORMATION . . .	2-1	BRAKE SYSTEM	2-7
MAINTENANCE SCHEDULE . . .	2-3	BRAKE LEVER FREE PLAY . .	2-8
FUEL LINE (FUEL TUBE) . . .	2-4	HEADLIGHT AIM	2-8
THROTTLE GRIP OPERATION . .	2-4	SIDE STAND	2-8
AIR CLEANER	2-4	SUSPENSION	2-9
SPARK PLUG	2-5	BOLTS, NUTS, FASTENERS . .	2-9
VALVE CLEARANCE	2-5	WHEELS/TIRES	2-10
CYLINDER COMPRESSION PRESSURE	2-6	STEERING HEAD BEARING	2-10
BRAKE FLUID	2-7		
BRAKE PAD/SHOE	2-7		

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 2-3 and 2-4
- Stand the main stand prior to beginning work.

SPECIFICATIONS

THROTTLE GRIP PLAY		2- 6mm
SPARK PLUG		CR8EH-9
SPARK PLUG GAP		0.8-0.9mm
VALVE CLEARANCE	IN	0.12±0.02mm
	EX	0.12±0.02mm
CARBURETOR IDLE SPEED		1,700±100rpm
CYLINDER COMPRESSION PRESSURE		14±2kgf/cm ² (550rpm)

TIRES

COLD TIRE PRESSURE	DRIVER ONLY	FRONT TIRE	2.00kgf/cm ²
		REAR TIRE	2.00kgf/cm ²
	DRIVER AND A PASSENGER	FRONT TIRE	2.00kgf/cm ²
		REAR TIRE	2.25kgf/cm ²
TIRE SIZE	FRONT TIRE		120/70 - 12 58S(Tubeless)
	REAR TIRE		130/70 - 12 62S(Tubeless)
MIN, TREAD DEPTH “ㇿ”	FRONT TIRE		0.5mm
	REAR TIRE		0.5mm

INSPECTIONS/ADJUSTMENTS

TORQUE VALUES

SPARK PLUG	1.1kgf · m
CYLINDER HEAD COVER BOLTS	1.0kgf · m
VALVE ADJUSTING NUTS	1.1kgf · m
TIMING HOLE CAP	0.6kgf · m

TOOLS

WRENCH 8X9mm
ADJUST WRENCH
COMPRESSION GAUGE

MAINTENANCE SCHEDULE

- Carry out pre-operation check at each scheduled maintenance period based on the information described in the owner's manual.
I : INSPECT AND CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY.
R : REPLACE L : LUBRICATE C : CLEAN
- These instructions are based on the assumption that the motorcycle will be used exclusively for its designed purpose. Sustained high speed operation, or operation in unusually wet or dusty conditions, will require more frequent service than specified in the following chart.

FREQUENCY ITEM		ODOMETER READING(NOTE 1)					REMARK	
		x 1000Km	1	4	8	12		16
		MONTH	1	6	12	18		24
*	FUEL LINE		I	I	I	I	I	
*	THROTTLE OPERATION		I	I	I	I	I	
	AIR CLEANER ELEMENT		I	R	R	R	R	
	SPARK PLUG		I	I	I	I	I	
	ENGINE OIL		R	R	R	R	R	
	ENGINE OIL FILTER		R	R	R	R	R	
	OIL FILTER SCREEN		C	C	C	C	C	
*	TRANSMISSION OIL					R		
	BRAKE FLUID		I	I	I	I	I	
	VALVE CLEARANCE		I	I	I	I	I	
*	BRAKE SHOE / PAD WEAR		I	I	I	I	I	
*	BRAKE SYSTEM		I	I	I	I	I	
	BRAKE STOP SWITCH			I	I	I	I	
*	HEADLIGHT ADJUSTMENT		I	I	I	I	I	
*	SUSPENSION			I	I	I	I	
*	BOLTS, NUTS, FASTENERS		I	I	I	I	I	
	WHEELS / TIRES		I	I	I	I	I	
	STEERING		I	I	I	I	I	
*	DRIVE VALTE			I	I	I	I	
**	WEIGHT ROLLER			I	I	I	I	
**	SLIDE PIECE			I	I	I	I	
	MOVABLE DRIVE FACE GREASE			L	L	L	L	

- * If there are no appropriate type of tools and maintenance data available, or if you do not have mechanical technology contact authorized maintenance shops, dealers or other designated repair shops for maintenance and inspections.
- ** To ensure safety, inspections and maintenance of these parts must be carried out by authorized maintenance shops, dealers or other designated repair shops.

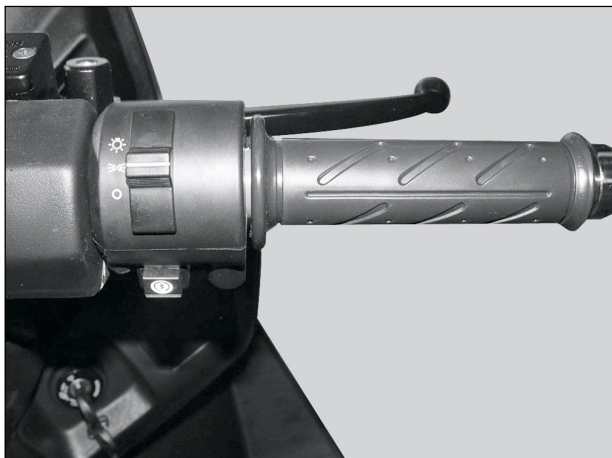
NOTE

1. After the odometer reading exceeds 12,000km, repeat maintenance service at intervals indicated in the table.
2. After riding in areas with high humidity or pollution, carry out maintenance service more frequently.
3. Replace every 2 years. Proper technology is required for this job.



FUEL LINE(FUEL TUBE)

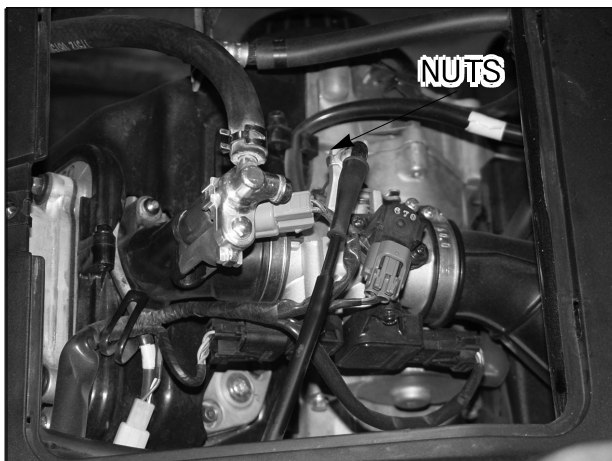
- Remove the luggage box.
- Check the fuel tube of the fuel auto cock connected to the fuel tank and carburetor. If the fuel tube is cranked, damaged or leaks, replace it.



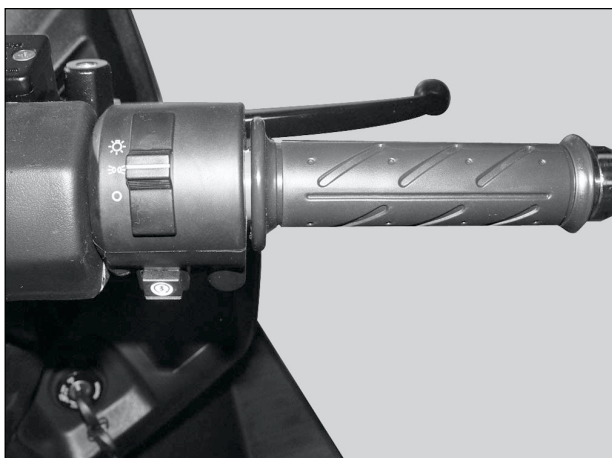
THROTTLE GRIP OPERATION

- Check if the throttle grip operates smoothly in any steering position.
- If the throttle grip does not operate properly, lubricate the throttle cable.
- If the throttle grip does not operate properly, check the throttle cable for aging, damage or kinking.
- Check the throttle grip free play.

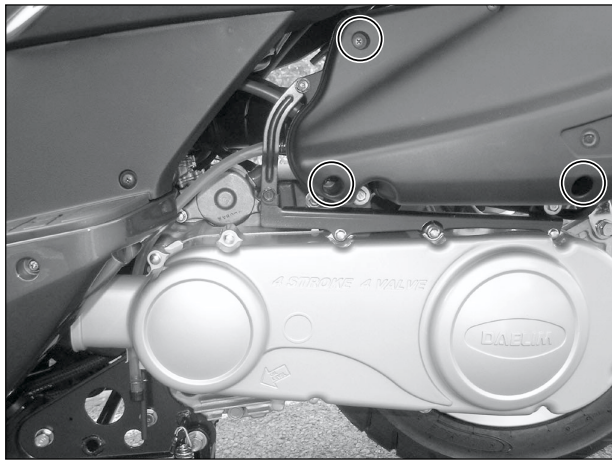
FREE PLAY : 2~6mm



- For main adjustment, loosen the lock nut and turn adjuster.
- After adjusting, tighten lock nut. After adjustment is completed, recheck the throttle grip free play.

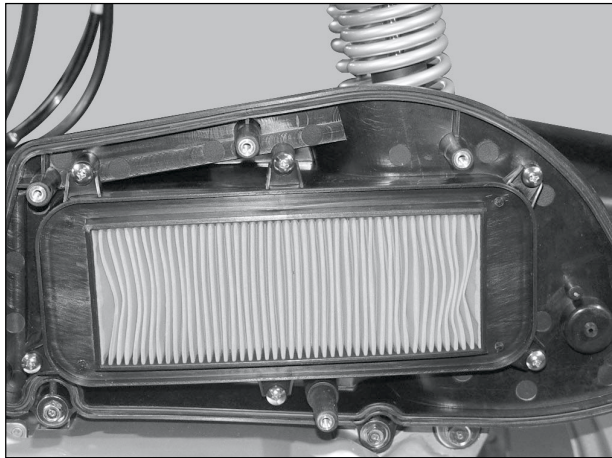


- For simple adjustment, use the adjuster under the throttle grip. RH.
- Remove the Rubber.
- Loosen the lock nut and turn the adjuster.



AIR CLEANER

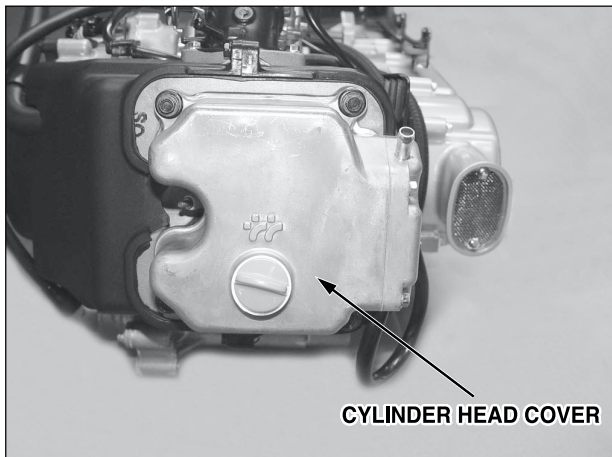
- Loosen the 6 screws securing the air cleaner case cover, remove it.
- Loosen the 6 screws securing the air cleaner element holder, remove it.



- Remove the air cleaner element.
- Wash away any accumulated dust or dirt, by gently squeezing it in non flammable or high flash point solvent.

⚠ WARNING

- Using gasoline or low flash point solvents for cleaning parts may result in a fire or explosion.

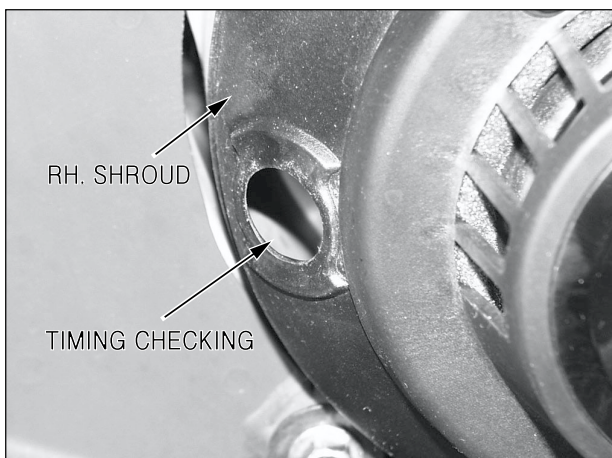


VALVE CLEARANCE

- Remove the following parts.
 - Luggage box. (⇒4-4)
 - Center cover. (⇒4-5)
- Loosen the 4 cylinder head bolts.

⚠ NOTE

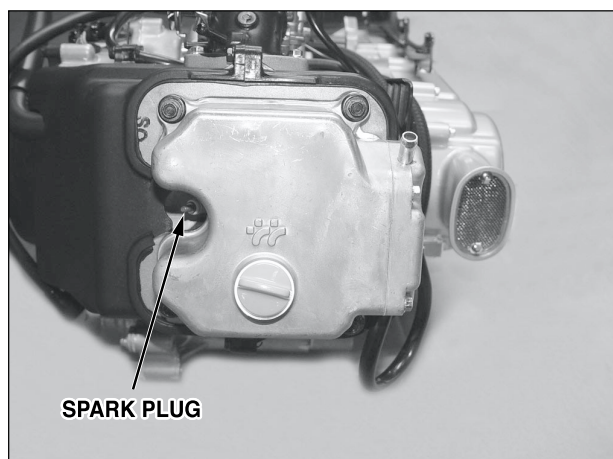
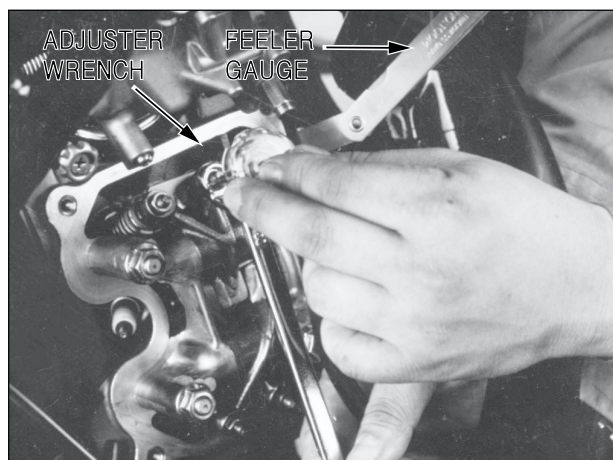
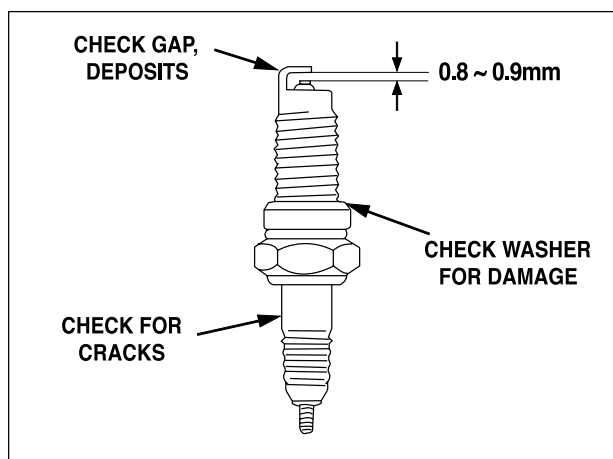
- Inspect and adjust the valve clearance when the engine is cool. (under 35°C / 95°F)
- Remove the cylinder head cover.
- Turn the flywheel counterclockwise, and align the "T" mark on the flywheel with the index mark on the RH. crank case cover.
- The piston at this time must be at the top dead center of the compression stroke.



- Measure valve clearance with a feeler gauge.

VALVE CLEARANCE : Intake : 0.12±0.02mm

Exhaust : 0.12±0.02mm



SPARK PLUG

- Remove the plug maintenance cover.
- Remove the spark plug cap and disassemble the plug.
- Check the plug for damage, contamination or deposits.
- If the spark plug is severely contaminated or damaged, replace 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 : CR8EH-9

SPARK PLUG : 0.8~0.9mm

TORQUE VALUE : 1.2kgf · 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, hand-tighten the spark plug before using a wrench to tighten to the specified torque.
- Do not overtighten the spark plug.

- Loosen the lock nut with a valve wrench, and set valve clearance to a prescribed level by turning the adjusting screw with a valve adjusting wrench.
- After setting clearance to the prescribed level, hold the adjuster screw with a valve adjusting wrench, and tighten the lock nut.

TORQUE VALUES : 0.8kgf · m

TOOLS : WRENCH 8X9mm

ADJUSTING WRENCH B

FEELER GAUGE

- Measure the valve clearance again.
- Install the cylinder head cover and tighten the bolts.

TORQUE VALUES : 0.9 kgf · m

CYLINDER COMPRESSION PRESSURE

- Start and warm up the engine.
- Remove the plug maintenance cover.
- Stop engine, and remove the spark plug cap and spark plug.
- Install a compression gauge.
- Open the throttle completely, and crank the engine with the starter motor until the gauge reading rising.

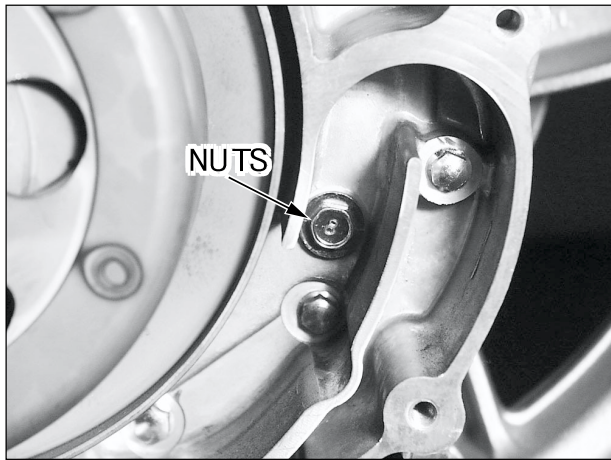
TOOL : COMPRESSION GAUGE

NOTE

- The maximum reading is usually reached within 4~7 seconds.

COMPRESSION PRESSURE : 14.0 kg/cm²

- If the pressure is low, check the following:
 - Inadequate valve clearance adjustment
 - Valve leakage
 - Leakage from the cylinder head gasket
 - Piston/cylinder worn
- If pressure is high, check the following:
 - Carbon deposits on the piston head, and cylinder head.



FINAL REDUCTION GEAR OIL

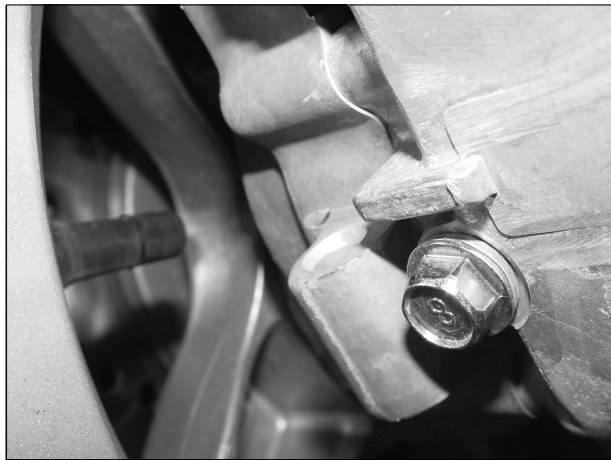
⚠ NOTE

Erect the main stand prior to beginning work.

- Erect the main stand prior to beginning work.
- Stop the engine and remove the oil check bolt.
- Check the oil level through the oil check hole.
- If the oil level is below, fill the oil (SAE90#).
- Install and tighten the oil check bolt.

⚠ NOTE

Make sure that the sealing washer is good condition.



GEAR OIL REPLACEMENT

- Remove the oil check bolt.
- Remove oil drain bolt and drain oil completely.
- Install and tighten the oil drain bolt.

TORQUE VALUE : 0.98kgf m

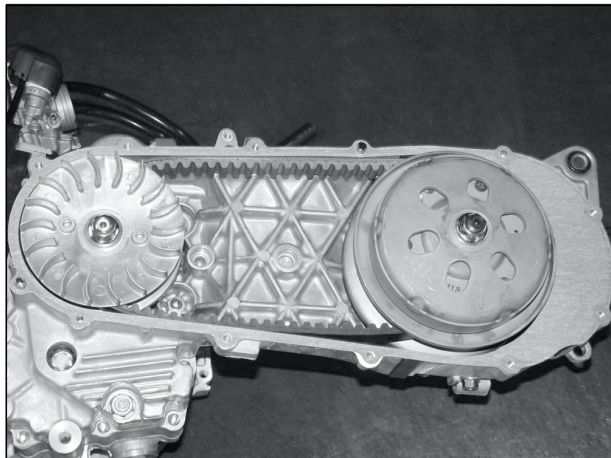
⚠ NOTE

Make sure that the sealing washer is good condition.

- Fill the recommended oil(SAE90#).

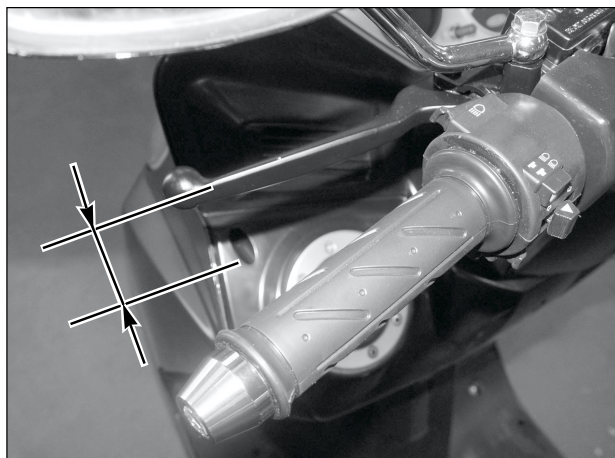
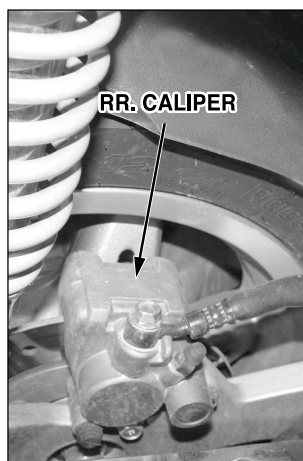
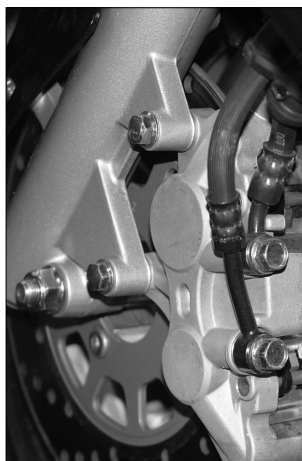
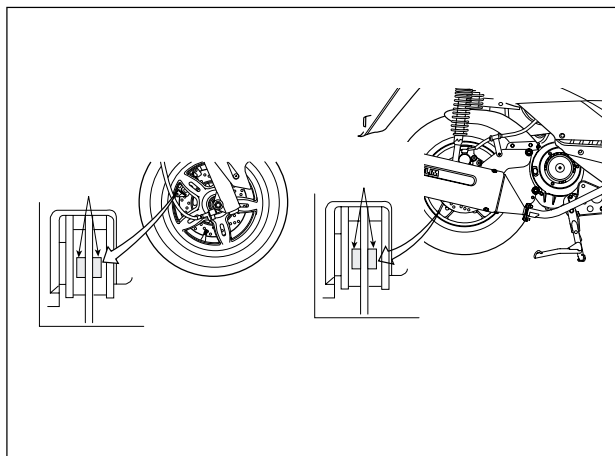
GEAR OIL CAPACITY

At disassembling: 200cc At replacing: 180cc



DRIVE BELT

- Remove the L.crankcase cover.
- Check the drive belt for wear or damage. Check
- scheduled maintenance period, replace the new drive belt if possible.



BRAKE FLUID

- Remove the brake fluid cover.
- Check the oil level inside the front brake reservoir. If the oil level is near the lower limit line, remove the reservoir diaphragm and fill DOT 3 and DOT 4 brake fluid to the top limit line.
- If the brake fluid reaches the lower limit line, check the entire brake system for leaks.

CAUTION

- Brake fluid will damage painted, plastic or rubber parts.
- Mixing incompatible fluids can impair braking efficiency.
- A leak in the brake system can lead to reduced braking efficiency and possible loss of braking ability.

BRAKE PAD/SHOE

BRAKE PAD REPLACEMENT

- Check the brake pads for wear.
- If the red mark on the pad reaches the brake disc, replace the pads.

NOTE

- Replace the brake pads in sets.

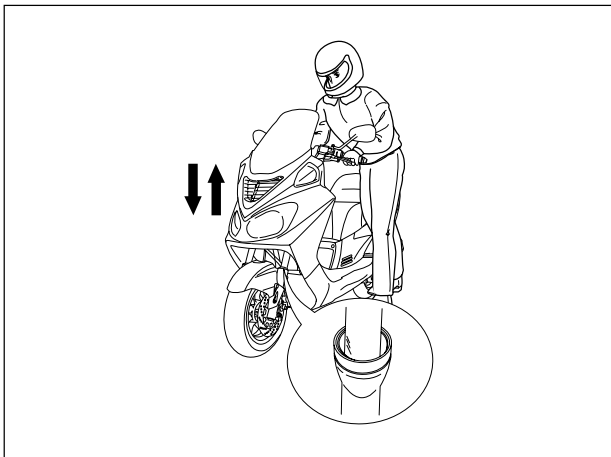
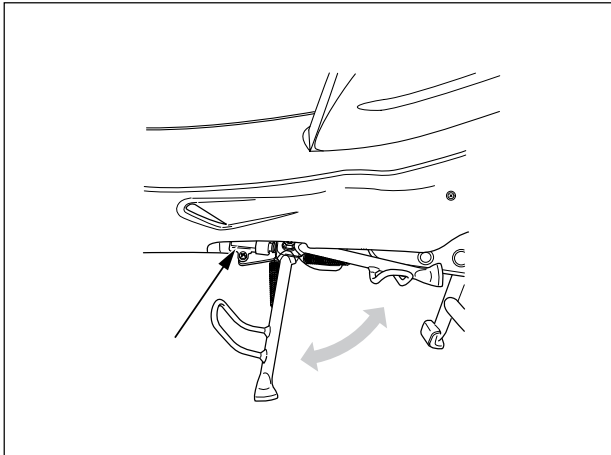
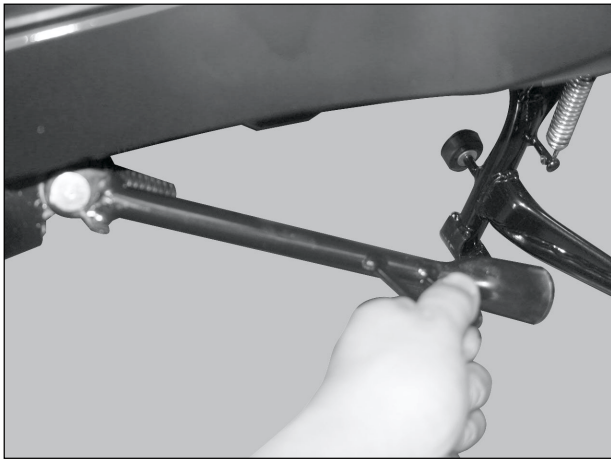
BRAKE SYSTEM

- Check the front brake hose for cracks or damage. If any leaks are found, replace immediately.
- Check the brake rod for looseness or damage, and replace it if necessary.

BRAKE LEVER FREE PLAY

- Check the free play after pulling the lever.

FRONT : 10~20mm
REAR : 10~20mm



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.
-
- Check the side stand ignition cut-off switch :
 - Put the side stand up.
 - Start the engine.
 - Lower the side stand. The engine should stop as you put the side stand down.
 - If there is a problem with the system, check the side stand switch.

SUSPENSION

⚠ NOTE

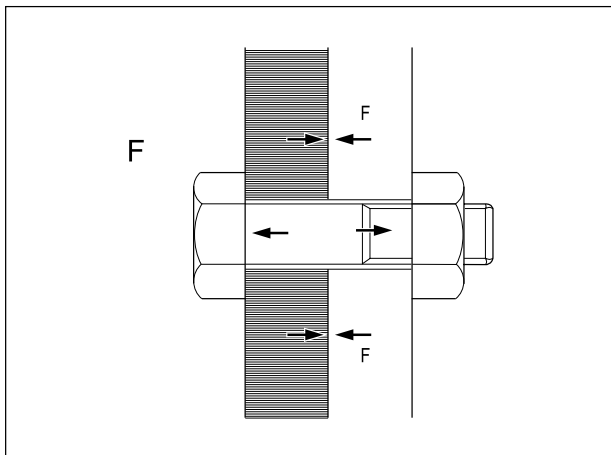
Do not ride motor cycle with an unsatisfactory suspension. Loose or worn suspension parts will lead to deterioration in the vehicle's safety and operation efficiency.

FRONT WHEEL

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

REAR WHEEL

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



BOLTS, NUTS, FASTENERS

- Check all nuts and bolts of the frame during the regular maintenance to check if they meet the prescribed torque value.
- Check all pins, clips, hose clamps and cable stays.

WHEELS/TIRES

NOTE

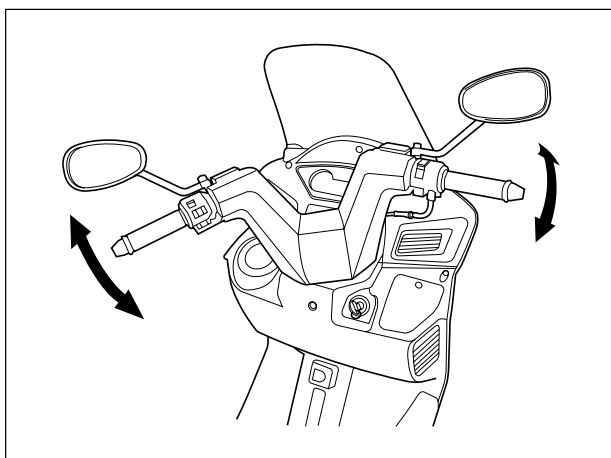
- Check the tire pressure when the tires have been cooled off. Check the tread (the part making contact with the road surface) and side for wear, cracks or damage. Replace damaged tires.

STANDARD PRESSURE

ITEM	kgf/cm ² (kpa)	
	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 tire.

SERVICE LIMIT : 0.5mm



STEERING HEAD BEARING

NOTE

- Check the cable if it interferes with the handle operation.

- Lift the front wheel and check if the handle moves right and left smoothly. If the handles move heavily, check if the cable or electric cord interferes with the handle. If the handle moves satisfactorily, adjust the steering head bearing.

3. EXTERNAL PARTS

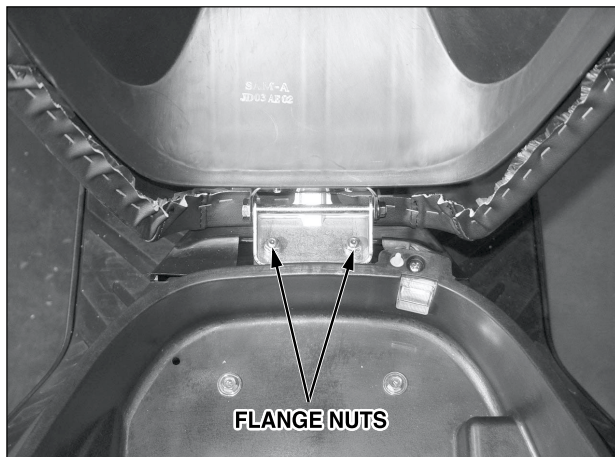
SERVICE INFORMATION	3-1	UNDER COVER	3-5
SEAT	3-2	HANDLE COVER	3-5
PILLION SEAT	3-2	FRONT COVER	3-5
LUGGAGE BOX TOP COVER	3-2	WINDSCREEN	3-6
REAR GRIP	3-2	FRONT UNDER COVER A	3-6
LUGGAGE BOX	3-3	FRONT UNDER COVER B	3-6
CENTER COVER	3-3	INNER COVER	3-7
BODY SIDE COVER	3-3	SPEEDOMETER COVER	3-7
BODY COVER	3-4	FRONT FENDER	3-8
REAR FENDER	3-4	REAR WHEEL MUDGUARD	3-8
FLOOR SIDE COVER	3-4	MUFFLER	3-8
FLOOR PANEL	3-4	EX. PIPE	3-8

SERVICE INFORMATION



NOTE

- This section describes external parts removal/installation.
- Do not apply unreasonable force when disassembling covers, to prevent possible damage.
- A muffler is hot. Do not service it immediately after the engine is stopped.



SEAT

- Release the seat lock by turning the main switch key to open the seat.
- Loosen the flange nuts and remove the seat.
- Install in the reverse order of removal.



PILLION SEAT

- Release the seat lock by turning the main switch key to open seat.
- Pull the pillion seat forward and remove it.
- Install in the reverse order of removal.



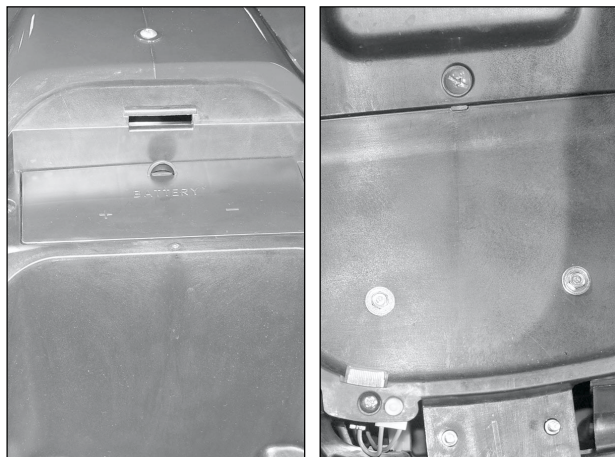
LUGGAGE BOX TOP COVER

- Loosen the 5 Tapping screws and remove the top cover.
- Install in the reverse order of removal.



REAR GRIP

- Remove the rear grip cap (R.L)
- Loosen the 4 special bolts.
- Install in the reverse order of removal.



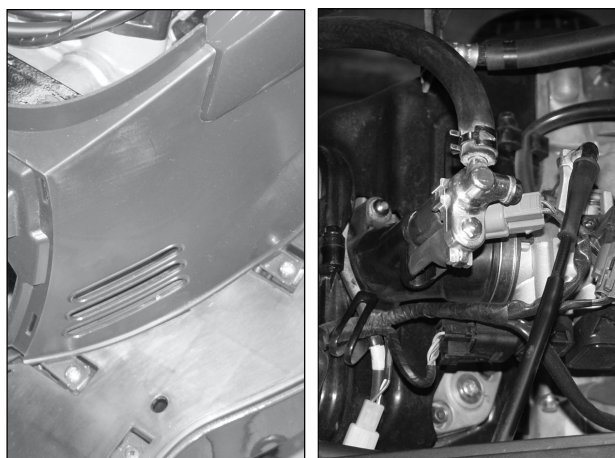
LUGGAGE BOX

- Remove the seat.
- Remove the pillion seat.
- Remove the luggage box top cover.
- Loosen the screws on the seat catch.
- Loosen the open stay nuts.
- Loosen the washer bolts.
- Remove the wire for the trunk lamp.
- Install in the reverse order of removal.



CENTER COVER

- Remove the floor mat.
- Loosen the 2 washer screws and 1 special screw.
- Install in the reverse order of removal.



BODY SIDE COVER

- Remove the center cover.
- Loosen the 2 washer screws.
- Loosen the 2 tapping screws securing the body side cover on the inside of the body cover.
- Install in the reverse order of removal.

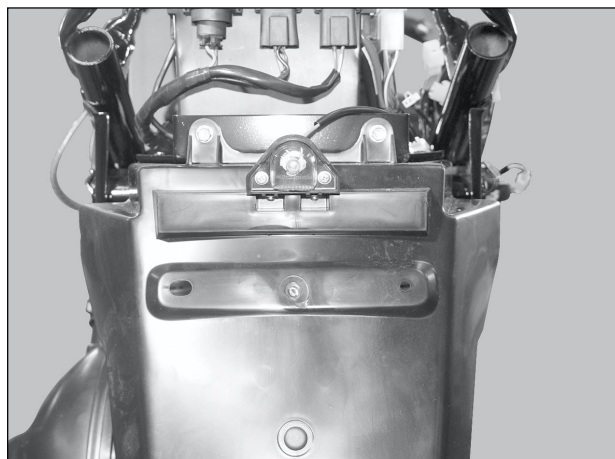
NOTE

- Remove the air duct cover in disassembling LH. body side cover.



BODY COVER

- Remove the Rr. Grip R/L
- Remove the following parts
 - Seat
 - Luggage box
 - Center cover
 - Body side cover
- Loosen the special screw
- Loosen the body cover clip (R/L)
- Remove the wire for the tail light and pull the body cover backward.
- Install in the reverse order of removal



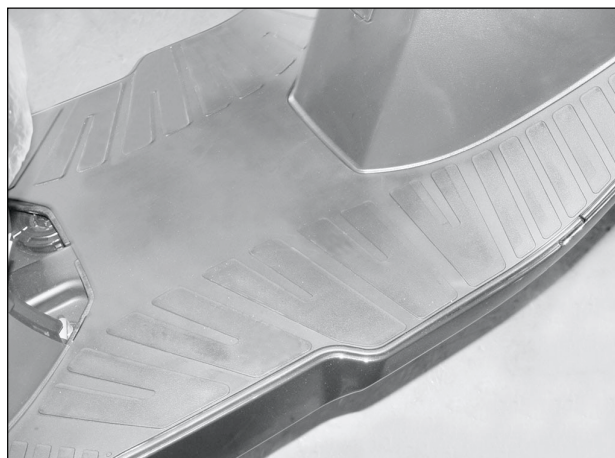
REAR FENDER

- Remove the body cover
- Loosen the 4 washer bolts and remove the Rr. fender
- Install in the reverse order of removal



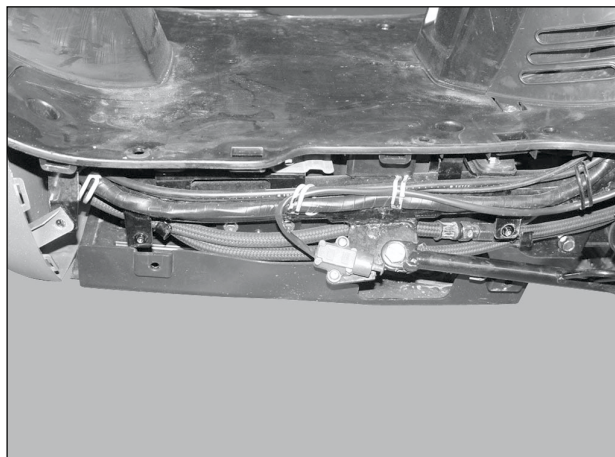
FLOOR SIDE COVER

- Remove the center cover
- Loosen the 3 body cover clips, 2 washer screws and 1 tapping screw in back side of left
- Remove the floor mat
- Install in the reverse order of removal



FLOOR PANEL

- Remove the floor side cover
- Loosen the 6 washer bolts
- Pull the floor panel backward to remove it
- Install in the reverse order of removal



UNDER COVER

- Loosen the 4 special screws (R/L, 2Ea for each) to remove the under cover
- Install in the reverse order of removal



HANDLE COVER

- Loosen the washer screw and tapping screw securing the under handle cover
- Loosen the screw in the top of the upper handle cover
- Remove the under handle cover
- Loosen the 2 screws (R/L) in the upper handle cover securing the steering handle
- Install in the reverse order of removal



FRONT COVER

- Loosen the 2 tapping screws securing the front cover
- Loosen the 2 tapping screws securing the inner cover
- Install in the reverse order of removal



WINDSCREEN

- Remove the front cover
- Loosen the 4 washer bolts and remove the windscreen
- Install in the reverse order of removal



FRONT UNDER COVER A

- Remove the front cover and windscreen
- Loosen the 7 tapping screws securing the inner cover
- Install in the reverse order of removal

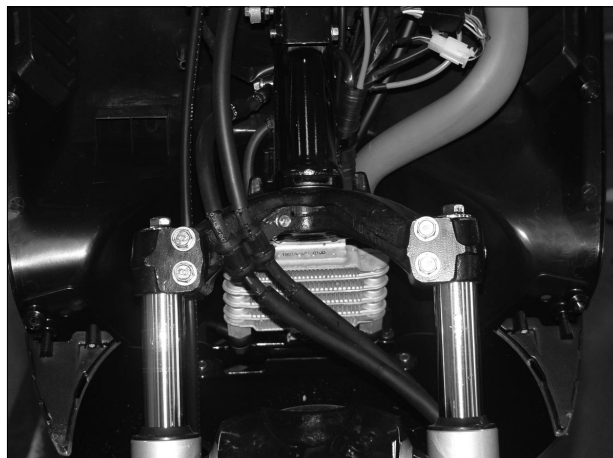


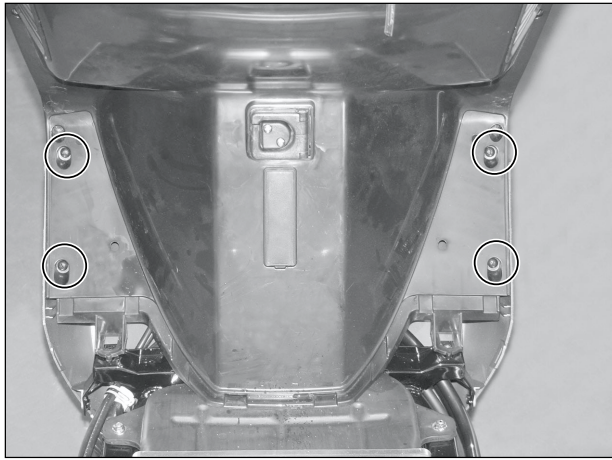
- Loosen the 2 washer bolts in the top of the front under cover
- Loosen the 2 tapping screws



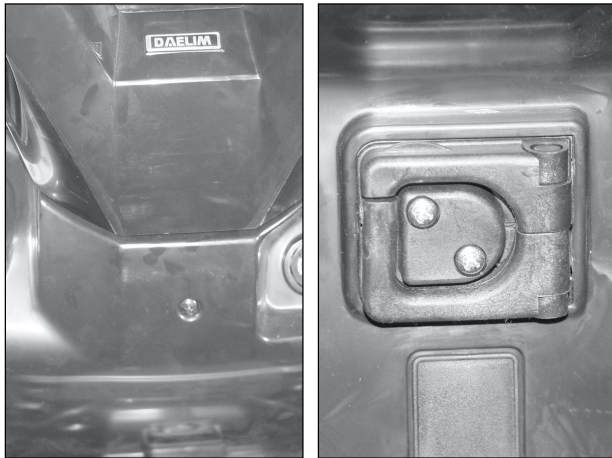
FRONT UNDER COVER B

- Loosen the 2 flange bolts
- Loosen the 4 tapping screws securing the inner cover



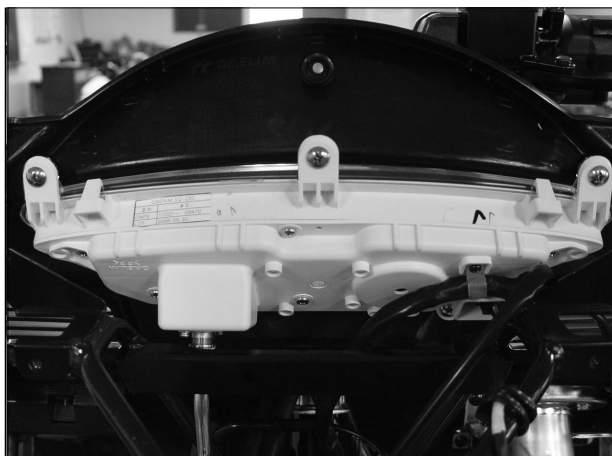
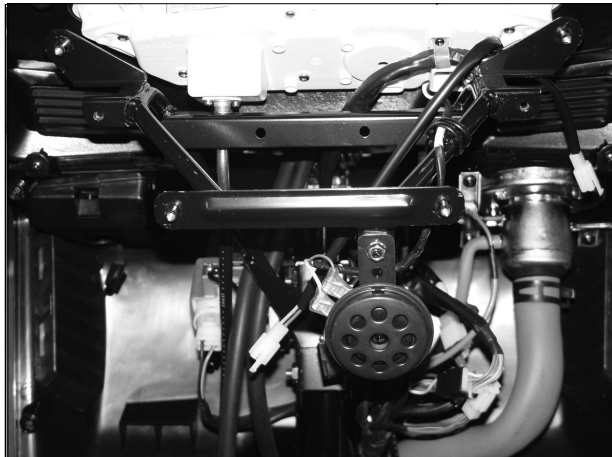


- Loosen the 4 tapping screws securing the inner cover



INNER COVER

- Remove the front cover and windscreen
- Remove the coolant reserve tank
- Remove the fuel tube clip
- Remove the breather tube
- Loosen the 3 screws securing the inner cover
- Remove the bag holder
- Loosen the 2 tapping screws securing the speedometer cover
- Install in the reverse order of removal



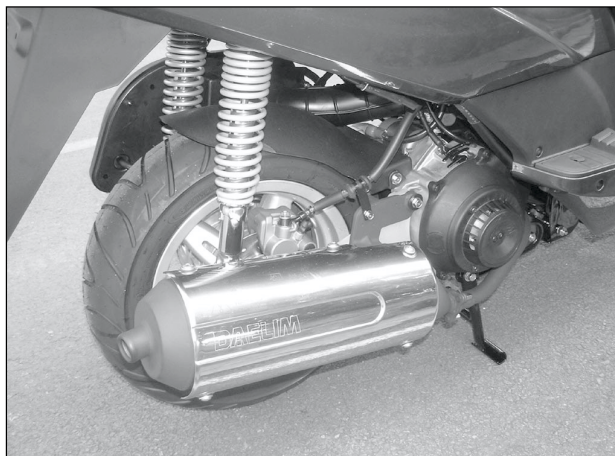
SPEEDOMETER COVER

- Remove the speedometer cable
- Remove the coupler and wire
- Loosen the 2 tapping screws securing the speedometer cover
- Install in the reverse order of removal



FRONT FENDER

- Loosen the 4 screws (R/L, 2Ea for each)
- Install in the reverse order of removal



REAL WHEEL MUDGUARD

- Loosen the 2 flange bolts of RH.
- Loosen the flange bolt securing the air cleaner and mudguard
- Remove the air cleaner
- Loosen the washer bolt securing the mudguard
- Install in the reverse order of removal

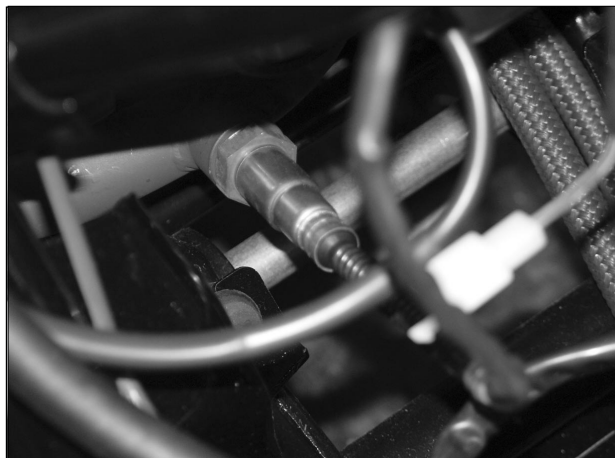


MUFFLER

- Loosen the muffler flange bolt securing Ex. pipe comp.
- Loosen the 3 bolts securing the Rr. Fork
- Remove the Ex. muffler comp.

⚠ NOTE

- Never performing the maintenance of the muffler right after stopping the vehicle because the muffler is extremely hot.



EX. PIPE

- Loosen the 2 cap nuts securing the cylinder comp.
- Pull the Ex. Pipe comp. downward to remove it
- Install in the reverse order of removal

⚠ NOTE

- Replace the packing when assembling the muffler and Ex. pipe comp.

4. LUBRICATION SYSTEM

SERVICE INFORMATION . . .	4-1	OIL PUMP	4-4
TROUBLESHOOTING	4-2	RADIATOR	4-7
ENGINE OIL LEVEL INSPECTION .	4-3	TRANSMISSION OIL INSPECTION .	4-8
ENGINE OIL CHANGE	4-3	LUBRICATION POINTS . . .	4-9
OIL FILTER ELEMENT CHANGE .	4-4		

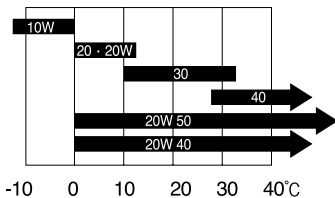
SERVICE INFORMATION

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	1.1 ℓ (After disassembly) 0.9 ℓ (After Oil change with Oil in the Oil hose removed) 0.8 ℓ (After Oil filter change) 0.75 ℓ (After Oil change)
RECOMMENDED OIL	API service classification : SE, SF, SH grade Viscosity : SAE10W-30 (Use appropriate type of oil with viscosity satisfying the atmospheric temperature In your riding area based on the table shown on the right side.) 

TRANSMISSION OIL

OIL CAPACITY	0.15 ℓ (Full capacity) 0.14 ℓ (After oil change)
RECOMMENDED OIL	DMC Pure mission oil or SAE 80W/90

TORQUE VALUES

OIL FILTER SCREEN CAP	1.5kgf · m
OIL FILTER COVER BOLT	1.1kgf · m
OIL PUMP MOUNTING BOLT	1.1kgf · m
OIL DRAIN PLUG BOLT	2.5kgf · m

TROUBLESHOOTING

Oil level low

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

Oil contamination

- Oil or filter not changed often enough.
- 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 on the main stand.
- Warm up the engine to heat the engine oil to an appropriate level.
- Stop the engine, and check the oil level line on the sight-glass installed on the LH. crank case cover.
- If the oil level is between the lower and higher sight-glass oil level line, oil level is satisfactory. If the oil level is below or near the lower level mark, add the recommended engine oil.



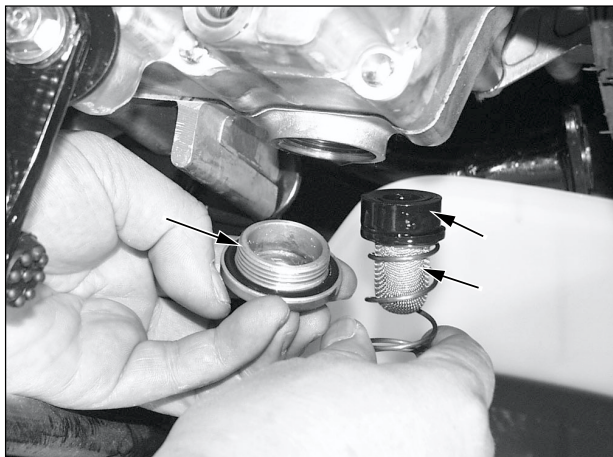
ENGINE OIL CHANGE

⚠ NOTE

To completely and rapidly drain engine oil, warm up engine and erect the motorcycle on its side stand.

- Loosen the oil drain plug bolt and drain engine oil.
- Operate the kick starter arm several times to remove the remaining oil from the engine.
- Tighten the oil drain plug bolt.

TORQUE VALUE : 2.0-3.0 kgf · m



⚠ CAUTION

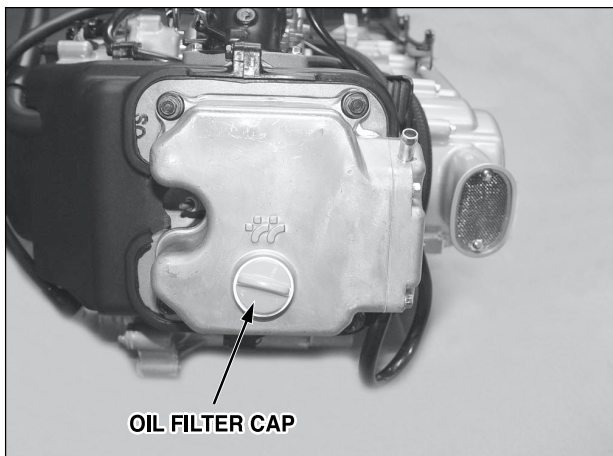
- It is extremely important to replace oil filter or clean the oil filter screen at the first maintenance interval (after 1,000Km).
- Clean the oil filter screen every 4,000Km.
- Clean the filter screen with fresh cleaning oil.
- Check the hole cap O-ring for satisfactory condition.
- Tighten the hole cap with specified tightening torque.

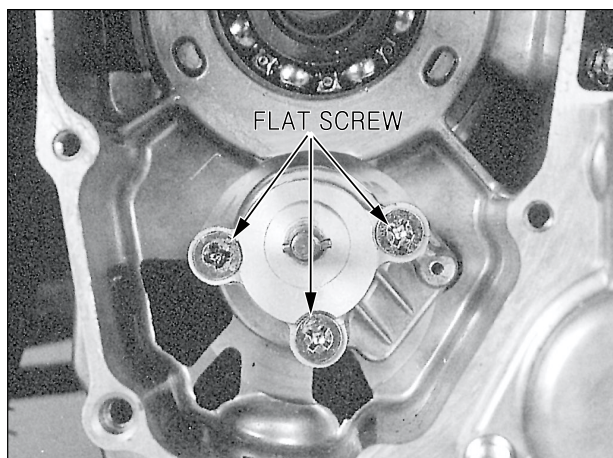
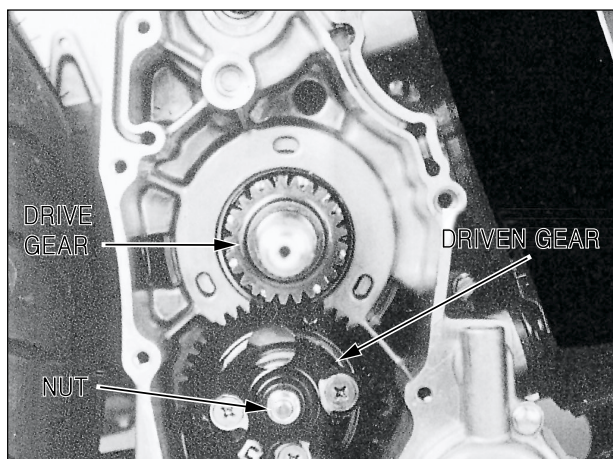
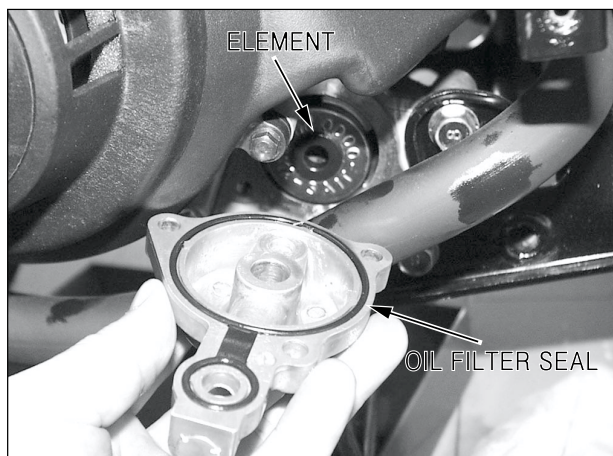
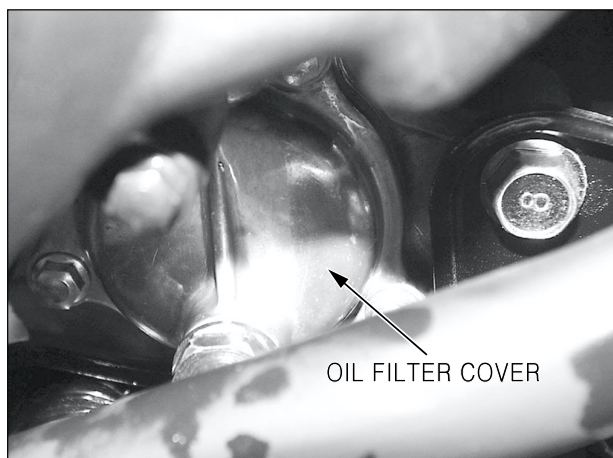
TORQUE VALUE : 1.5 kgf · m

- Loosen the special screw, remove the plug maintenance cover.
- Fill the recommended oil after opening oil filter cap of cylinder head cover.

OIL CAPACITY : 1.1 (After disassembly)
0.9 (After Oil change with Oil in the Oil hose removed)
0.8 (After Oil filter change)
0.75 (After Oil change)

- API service classification : SE, SF, SH grade.
- Start the engine and keep it idle for a few minutes.
- Stop the engine and check the oil level. If the oil level is low, add the recommended engine oil.
- Check on oil leaks.





OIL FILTER ELEMENT CHANGE

- Drain engine oil. (⇒4-3)
- Loosen the 3 flange bolts securing the oil filter cover, remove the oil filter cover.
- Remove the oil filter element and oil filter spring.

- Change the oil filter element with a new one.
- Check if the oil filter seal is in good condition.
- Assemble the filter element spring and filter cover, and tighten bolts.

TORQUE VALUE : OIL FILTER COVER 1.1kgf · m

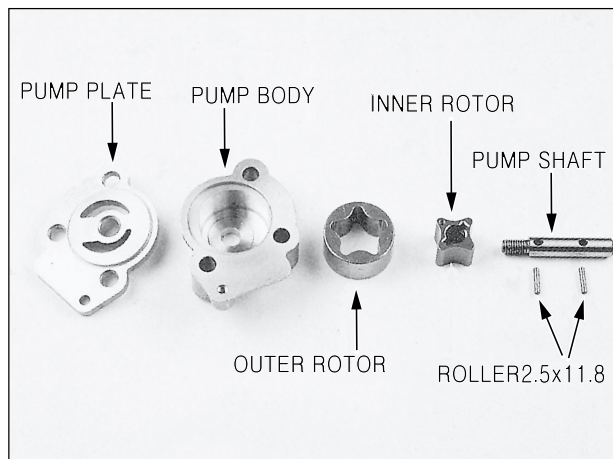
NOTE

- Always use a genuine oil filter element.
- Be sure to replace the oil filter seal when removing oil filter element.
- Be careful not to lose the oil filter spring when assembling the oil filter element.

OIL PUMP

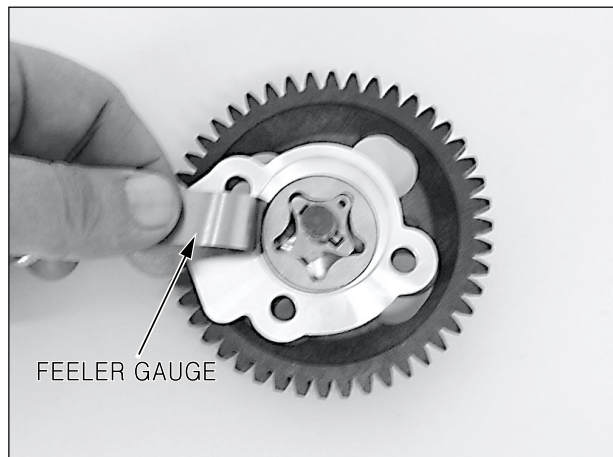
REMOVAL

- Remove the following parts :
 - Rear cushion lower bolt (⇒13-7)
 - Muffler (⇒3-8)
 - Rear swing arm (⇒13-7)
 - Rear caliper (⇒13-3)
 - Shroud (⇒8-2)
 - Cooling fan (⇒8-2)
 - A.C. generator (⇒8-2)
 - RH. crankcase cover (⇒8-4)
 - Starter driven gear (⇒8-7)
 - Reduction gear (⇒8-5)
 - Starting clutch assembly (⇒8-8)
- Loosen the oil pump driven gear setting nut.
- Remove the oil pump driven gear.
- Remove the oil pump drive gear.
- Loosen the 3 flat screws securing the oil pump.
- Remove the oil pump.



OIL PUMP DISASSEMBLY

- Loosen the screw securing the oil pump plate.
- Remove the oil pump body and the oil pump plate.
- Clean the oil pump body, inner and outer rotors with fresh cleaning oil.

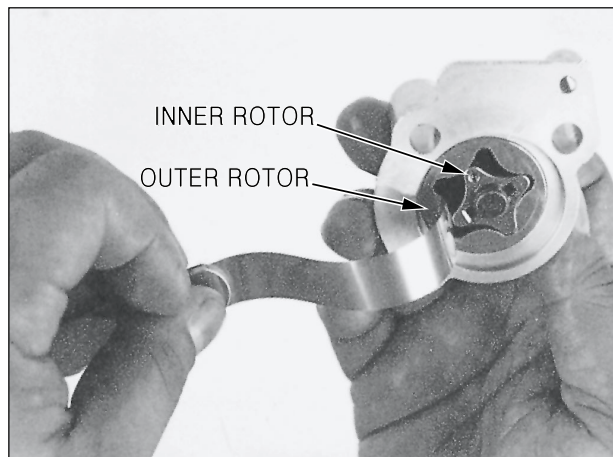


OIL PUMP INSPECTION

- Assemble the inner and outer rotors to the oil pump body.
- Measure the pump body clearance.

SERVICE LIMIT : 0.23mm

TOOL : FEELER GAUGE



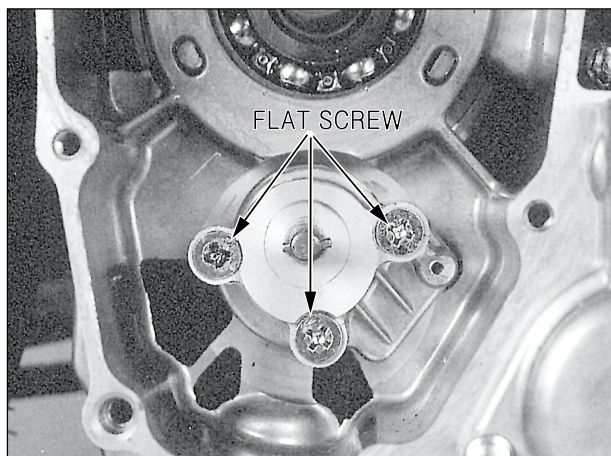
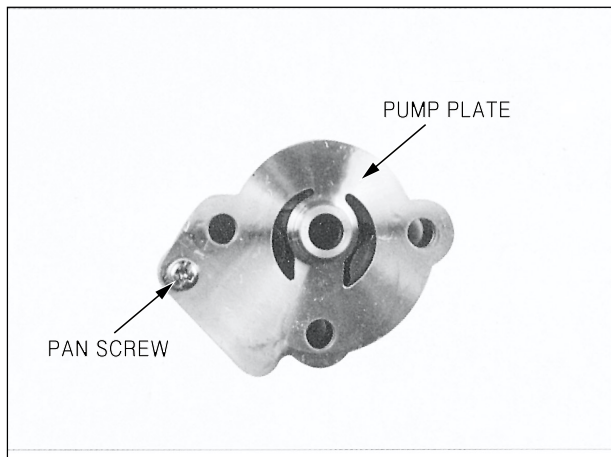
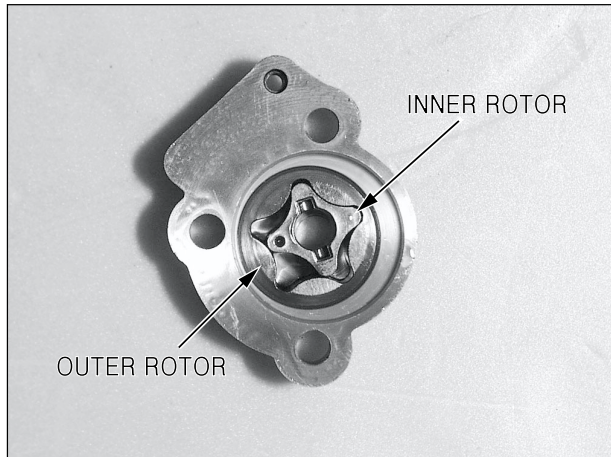
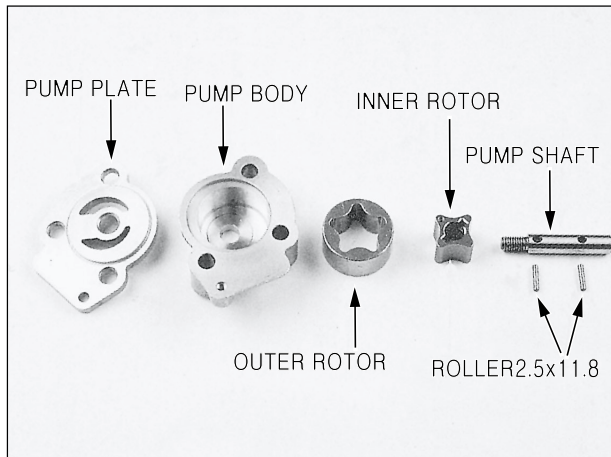
- Measure the rotor tip clearance.

SERVICE LIMIT : 0.18mm



- Measure the pump side clearance

SERVICE LIMIT : 0.12mm



OIL PUMP ASSEMBLY

- Clean all parts with fresh cleaning oil.

- Install the inner and outer rotors to the pump body.
- Assemble the pump shaft with setting pin.

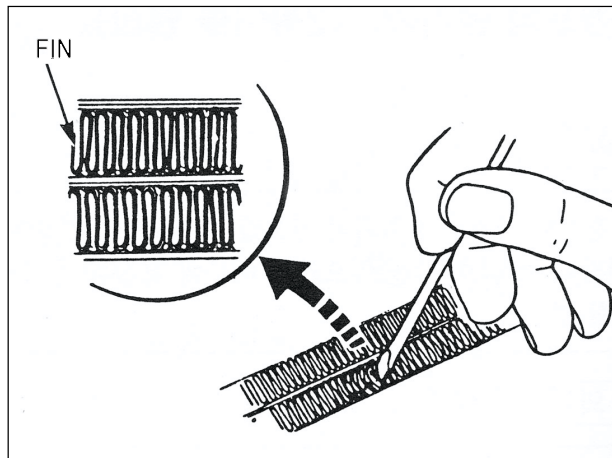
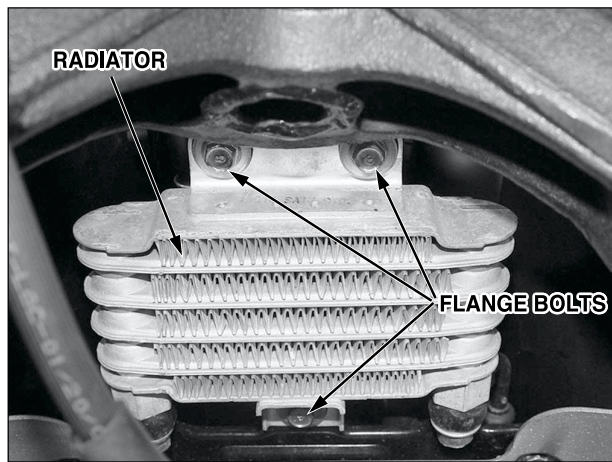
- Install the oil pump plate to the pump body.
- Tighten the pan screw.

NOTE

- After installing, check the oil pump to operate smoothly.

OIL PUMP INSTALLATION

- Install the oil pump to the RH. crankcase.
- Install the following parts.
 - Oil pump drive gear and driven gear.
 - Starting clutch assembly. (⇒8-8)
 - Starter driven gear and reduction gear (⇒8-5, 8-7)
 - A.C. generator (⇒8-2)
 - RH. crank case cover (⇒8-4)
 - Shroud and cooling fan (⇒8-2)
 - Rear swing arm (⇒13-7)
 - Rear caliper (⇒13-3)
 - Muffler (⇒3-8)



RADIATOR

REMOVAL

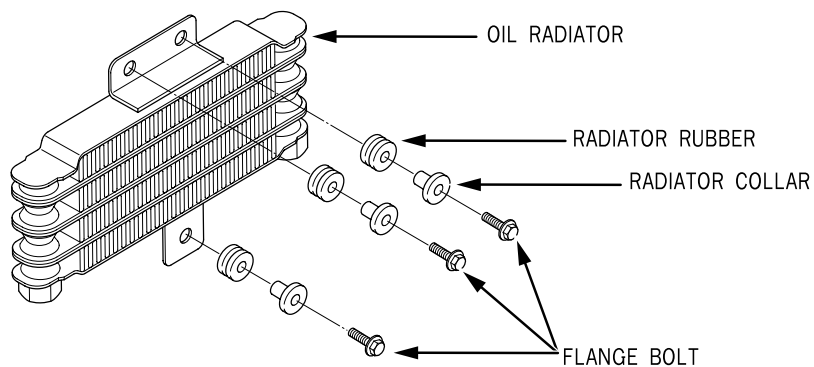
- Remove the front cover. (⇒3-5)
- Remove the front wheel. (⇒12-4)
- Loosen the 2 oil bolts and the 4 drain cock packings from the main pipe bracket.
- Loosen the 3 flange bolts securing the radiator.
- Remove the radiator.

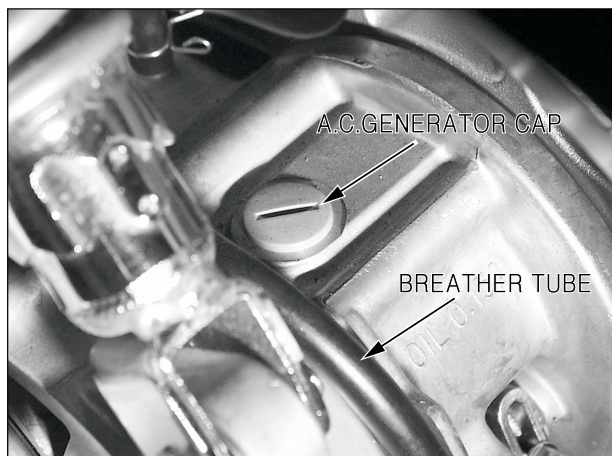
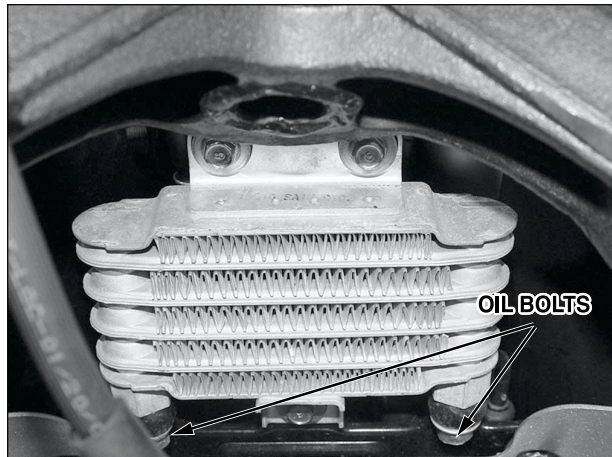
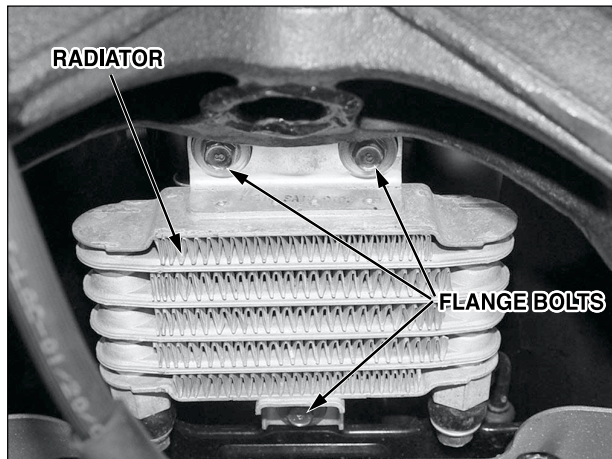
CAUTION

- Be careful not to damage the radiator when removing it.
- Pay attention not to turn over the vehicle.

INSPECTION

- Check the oil line connections for leaks.
- Check the oil cooler for bent or collapsed fins. Straighten the bent or collapsed fins with a suitable, small, blade-type screw driver if necessary.
- Check the air passages for clogging or restriction. Blow dirt out from between core fins with compressed air or wash off dirt with water.
- After installing, start the engine and check for leak. Stop the engine and check the oil level.





RADIATOR INSTALLATION

- Tighten the 3 radiator setting flange bolts to the main pipe bracket.

- Tighten the drain cock packings and oil bolts.

TORQUE VALUE : 3.2kgf · m

- Install the front wheel. (⇒12-4)
- Install the front cover. (⇒3-5)

⚠ CAUTION

- Pay attention not to turn over the vehicle.
- When installing the radiator, tighten the oil bolts with specified tightening torque.

TRANSMISSION OIL INSPECTION

- Remove the LH. crankcase cover. (⇒7-2)
- Check the body and the connection of each engine component for any leak.
- Remove the oil check bolt and check to see if the oil overflows from the oil check hole.
- If only the small amount of oil overflows, fill the recommended transmission oil through the oil filler hole gradually.

⚠ NOTE

- Oil level inspection must be performed in the flat ground with the vehicle being straight by raising the main stand.

RECOMMENDED OIL : SAE 80W/90

- Tighten the oil check bolt.

TORQUE VALUE : 0.9 kgf · m

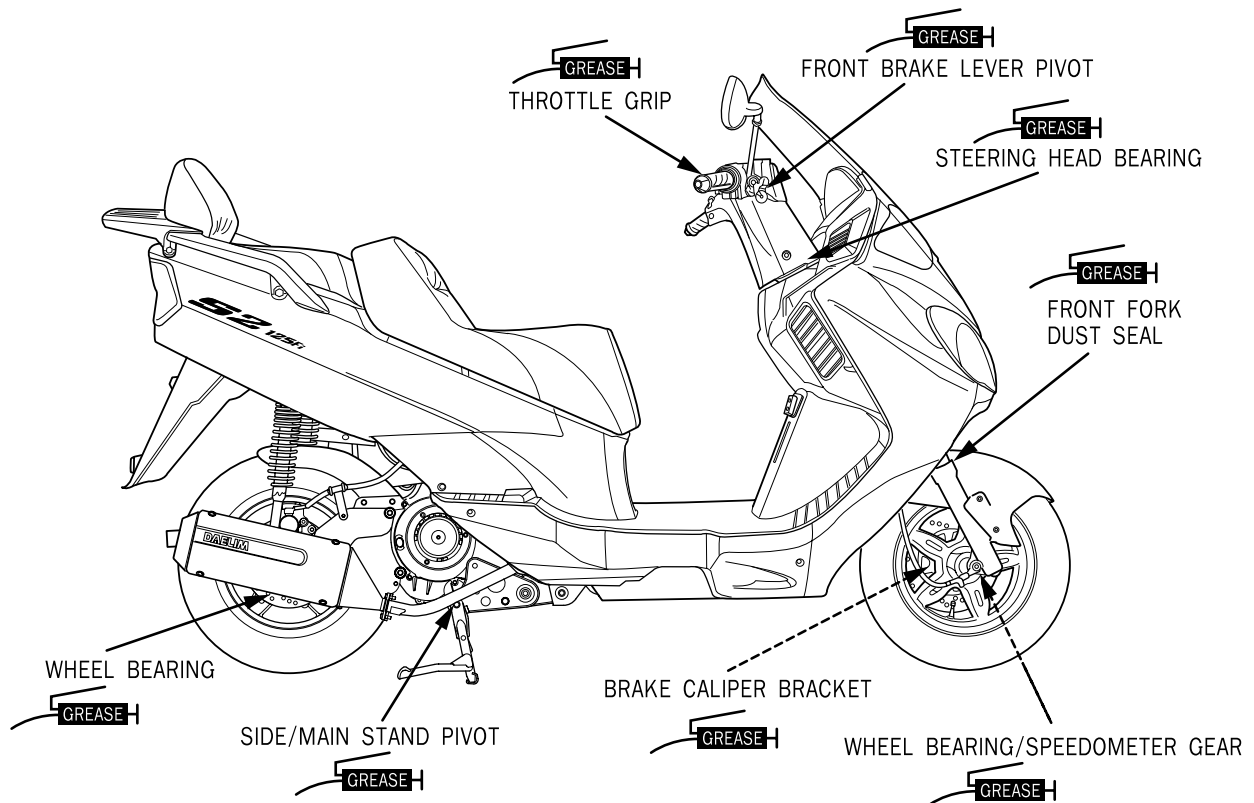
- Start the engine and check for leak.
- Install the LH. crankcase cover. (⇒7-2)

LUBRICATION POINTS

Unless specifically designated, use general grease to lubricate the lubrication points. For sliding parts not shown here, add oil or grease.

CONTROL CABLE LUBRICATION

Remove and clean the upper assembly of the throttle cable, and apply oil. If the cable has expanded, replace it.



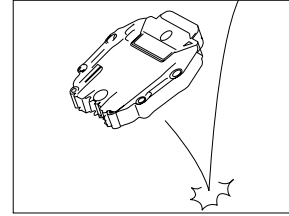
MEMO

5. EMS(Engine Management System)

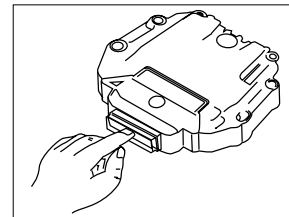
1. CAUTION WHEN REPAIRING THE EMS PARTS	5-2
2. THE COMPONENT PARTS OF THE EMS	5-3
3. TERMINAL ARRANGEMENT OF THE ECU	5-4
4. WIRING DIAGRAM OF THE ECU	5-4
5. SELF-DIAGNOSTIC FUNCTION BY MIL(Malfunction Indicator Lamp)	5-5
- Self diagnostic function	5-5
- Fail safe function	5-6
- How to check the fault code	5-7
- How to show the fault code	5-8
- How to read the fault code	5-8
- Fault code table	5-9
- How to remove the fault code	5-10
- EMS trouble shooting	5-10
6. INJECTOR	5-11
7. MAPAT	5-14
8. TPS	5-17
9. ETS	5-20
10. ISA	5-23
11. O ₂ (Oxygen) SENSOR	5-26
12. CHECKING OF MIL CIRCUIT	5-29
13. ECU (Electronic control unit)	5-30
14. IGNITION COIL/SPARK PLUG	5-31
15. CPS	5-32
16. FUEL PUMP	5-33
17. THROTTLE BODY	5-36
18. HOW TO USE THE SCAN WHEN THE ECU IS INITIALIZED	5-41
19. HOW TO USE THE SCAN WHEN THE ISA PWM IS ADJUSTING	5-43
20. HOW TO USE THE SCAN WHEN THE IGNITION TIMING IS CHECK.....	5-44
21. HOW TO USE THE SCAN WHEN ENGINE REVOLUTION IS CHECKING	5-45

1.CAUTION WHEN REPAIRING THE EMS PARTS.

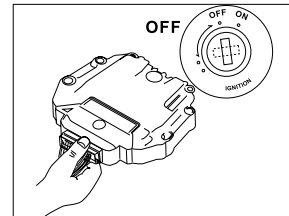
- If the fuse is short-circuited, find out the cause and repair.
Replace with the fuse having the specified capacity.
- Do not use the electric wires or others instead of the fuse.
- Do not drop or throw the EMS parts because these parts may be damaged by the impact of the drop.



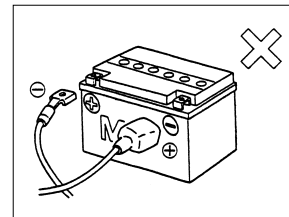
- Do not touch the ECU terminal, because it may be damaged by the static.



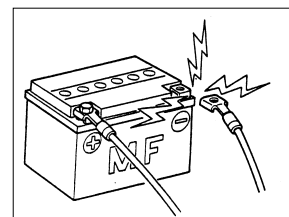
- The ignition key off when assembly and disassembly of the ECU coupler.
otherwise, it might be damage to ECU.



- Do not connect adversely the polarity of battery. otherwise, It may be broken the EMS parts



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



- Use the specitied 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.

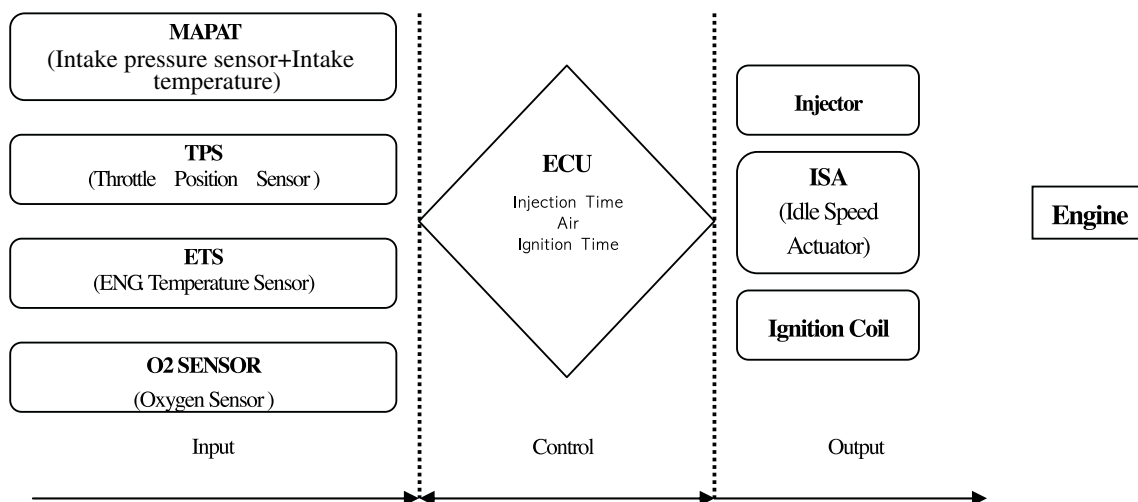
Injector sprays fuel into the intake system by injection signals of ECU.

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.

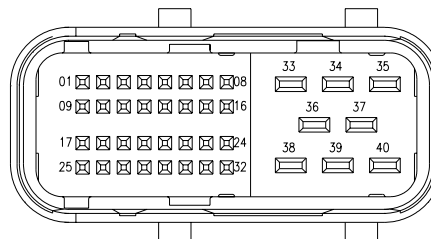
4) CONTROL SYSTEM

- 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

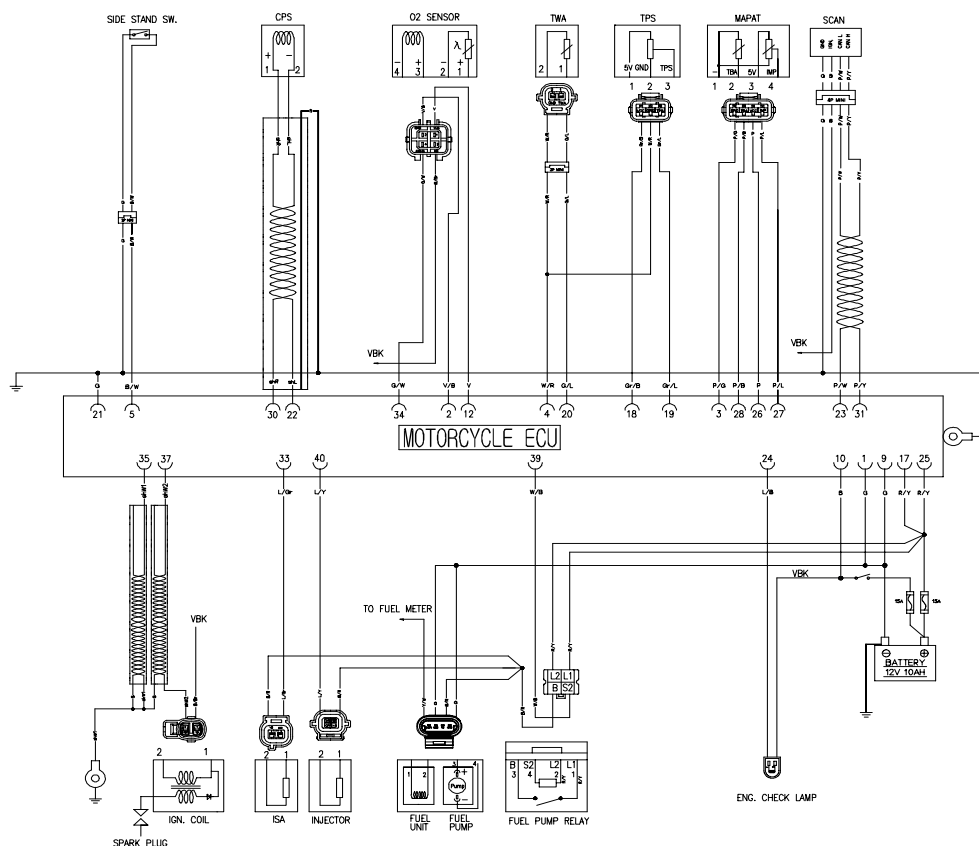
ECU PIN NO. VS FUNCTION			
PIN	ASSOCIATED FUNCTION	PIN	ASSOCIATED FUNCTION
01	GND_ECU (ECU GROUND)	21	GND
02	GND_VLS (SENSOR GROUND FOR VLS)	22	CRK_B (CRANK SHAFT SENSOR SIGNAL(-))
03	GND_IMP (SENSOR GROUND FOR IMP)	23	CAN_L (CAN LOW LINE FOR DIAGNOSTIC TOOL)
04	GND_SNS (SENSOR GROUND FOR TPS, TENG)	24	MIL (MALFUNCTION INDICATE LAMP OUTPUT)
05	ENGINE KILL_SW (ENGINE KILL SWITCH)	25	VB (BATTERY VOLTAGE)
06	NOT CONNECTED	26	VCC_IMP (5V SUPPLY FOR IMP)
07	NOT CONNECTED	27	IMP (INTAKE MANIFOLD PRESSURE SENSOR SIGNAL INPUT)
08	NOT CONNECTED	28	TBA (BREATHING AIR TEMPERATURE SIGNAL INPUT)
09	GND_ECU (ECU GROUND)	29	NEUT (NEUTRAL SWITCH SIGNAL INPUT)
10	VBK (BATTERY VOLTAGE AFTER IGNITION KEY)	30	CRK_A (CRANK SHAFT SENSOR SIGNAL(+))
11	NOT CONNECTED	31	CAN_H (CAN HIGH LINE FOR DIAGNOSTIC TOOL)
12	VLS (O2 SENSOR SIGNAL INPUT)	32	NOT CONNECTED
13	NOT CONNECTED	33	ISAPWM (IDLE SPEED ACTUATOR PWM OUTPUT)
14	NOT CONNECTED	34	VLS_HEAT(O2 SENSOR HEATER)
15	NOT CONNECTED	35	GND_IGC (IGNITION COIL GROUND)
16	NOT CONNECTED	36	NOT CONNECTED
17	VB (BATTERY VOLTAGE)	37	IGC (IGNITION COIL OUTPUT)
18	VCC_TPS (5V SUPPLY FOR TPS)	38	NOT CONNECTED
19	TPS (THROTTLE POSITION SENSOR SIGNAL INPUT)	39	RLY_EFP (ELECTRIC FUEL PUMP RELAY OUTPUT)
20	TWA (WATER TEMPERATURE SENSOR SIGNAL INPUT)	40	IV (INJECTOR CONTROL OUTPUT)



※Remarks

ECU PIN NO. 6,7,8,11,13,14,15,16,21,29,32,36,38 were not connected.

4. WIRING DIAGRAM OF THE ECU



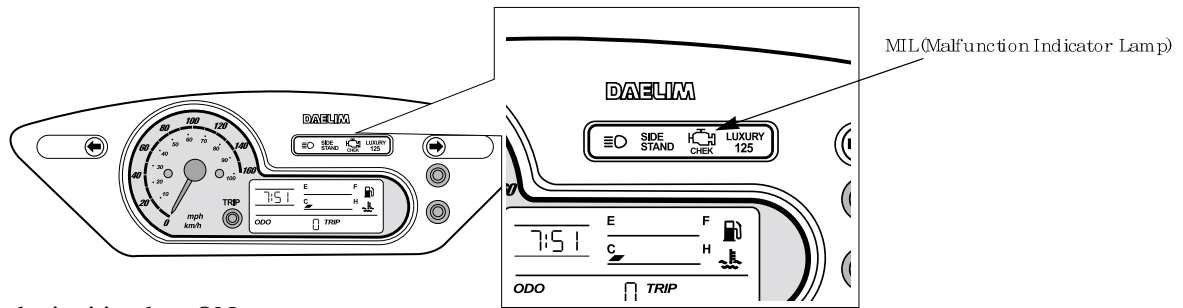
5. SELF-DIAGNOSTIC FUNCTION BY MIL (Malfunction Indicator Lamp)

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	
ON	Starting and driving are temporary	Refer to 1
	Unable	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 on/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	In case that intake air temperature is below 20°C, that of engine will be fixed to 20°C In case that intake air temperature is over 20°C, that of engine 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 as a temperature just before 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.

- 1) Use the MIL in the speedometer.
- 2) The diagnostic tool.

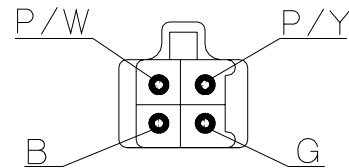
First) Use the MIL in the speedometer(refer to how to read the fault codes and fault codes table and diagnostic methods for each part)

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

- Turn off the ignition key
- Disassemble the rh.side cover
- The coupler to check the malfunction of vehicle is connected to the coupler of diagnostic tool.
(The coupler to check the malfunction of vehicle is placed in the rh.side cover)
- Turn on the ignition key
- Press the power button of diagnostic tool
- Checks according to diagnostic procedure of diagnostic tool.



The diagnostic Tool.



Coupler to check the malfunction diagnosis

Wire color to check the malfunction diagnosis

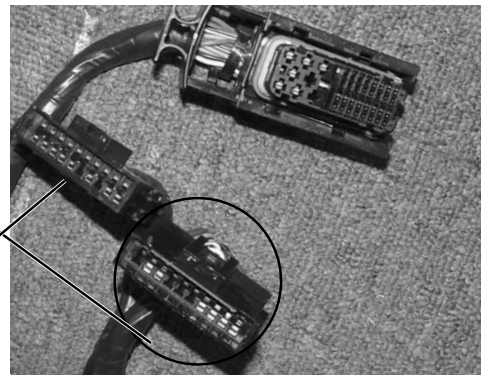
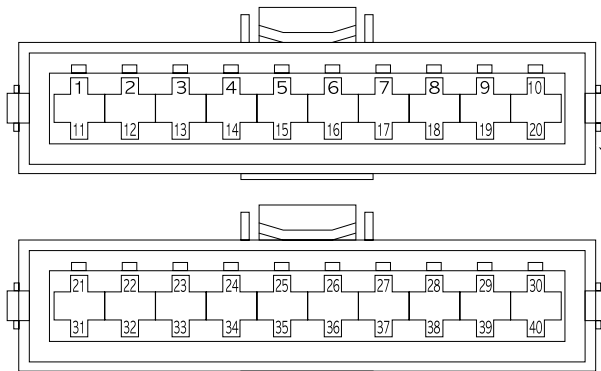
- P/W : PINK/WHITE
- P/Y : PINK/YELLOW
- B : BLACK
- G : GREEN

The wireharness to check the ECU

- This wireharness is connected with the ECU and main wireharness
It has two couplers to check the terminals.
- First coupler) ECU no.1~20
Second coupler) ECU no.21~40

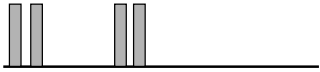
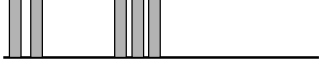
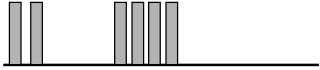
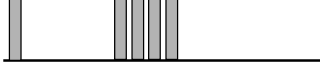
Arrangement of ECU PIN

- First coupler) ECU no.1,2,3,4,5,9,10,12,17,18,19,20 were connected
Second coupler) ECU no.36,38 were not connected



The wireharness to check the ECU

FAULT CODES TABLE

MIL INDICATION (The number of blinks)	Fault code no.	Priority order	Description
	00	-	No failure
	21	1	Injection valve failure(IV)
	22	2	Idle speed actuator failure (ISA)
	23	3	Electrical fuel pump failure (EFP)
	12	4	Intake Manifold absolute pressure signal failure (IMP)
	13	5	Throttle position signal failure (TPS)
	24	6	O2 sensor heater output failure (LSH)
	14	7	Lambda signal failure (VLS)
	15	8	Engine temperature signal failure (TENG)
	16	9	Breathing air temperature signal failure (TBA)
	28	11	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

6.INJECTOR

Remove

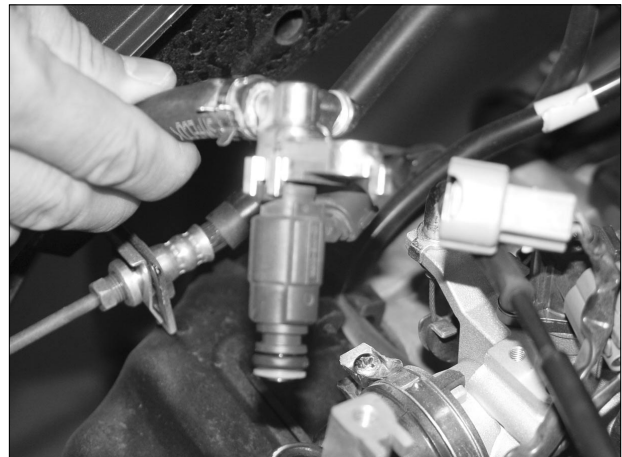
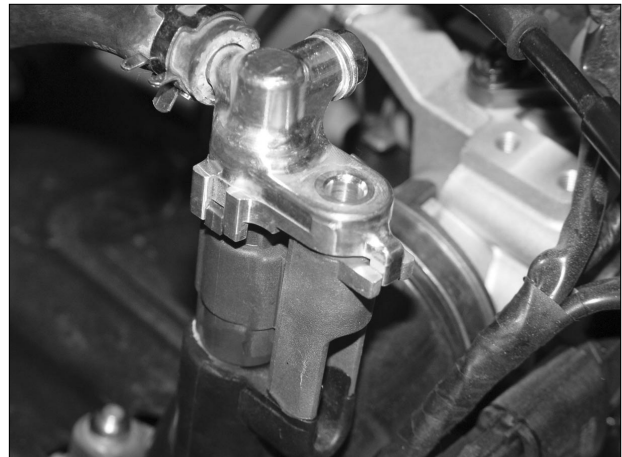
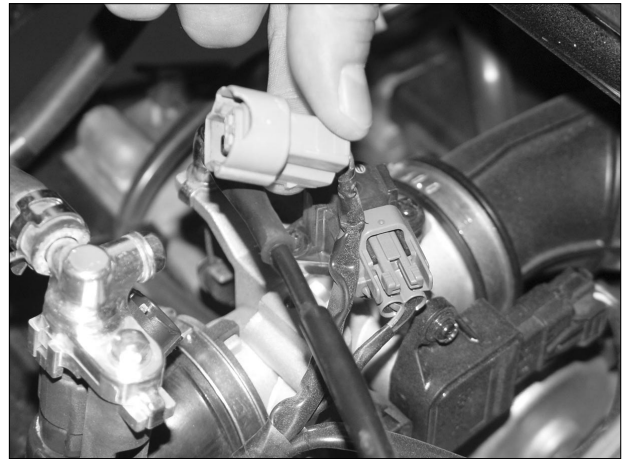
- Connector
- Connector bolt
- Injector and injector cap.
- Replace the injector

⚠CAUTION

- Before disassemble, the key is off.

⚠NOTICE

- Make sure that dust does not enter the throttle body insulator.



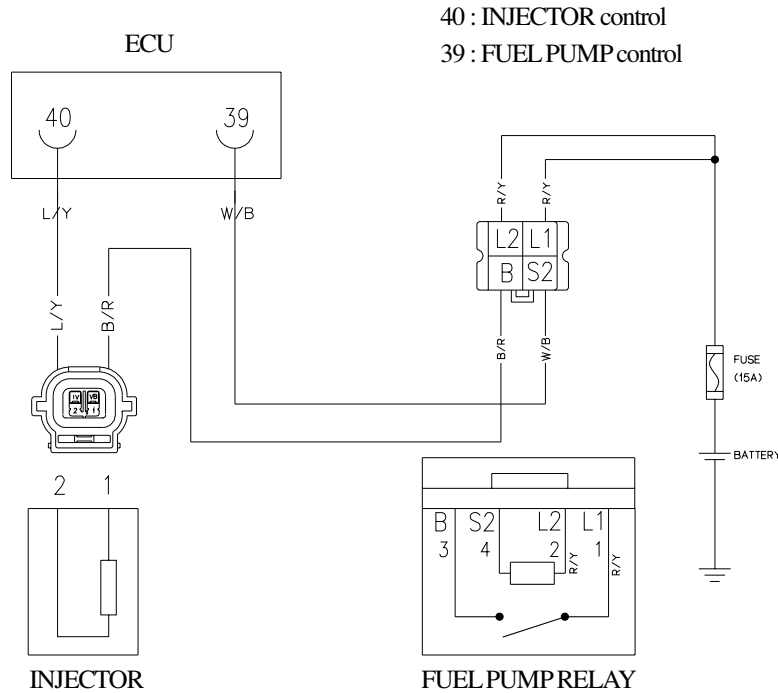
CHECKING METHODS BY FAULT CODES

Checking of the Injector circuit

- The fault code is displayed by MIL



- Checking Circuit



※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 ~ $\ominus$ 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(5-10).

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

- Located on the left- side of the throttle body

⚠CAUTION

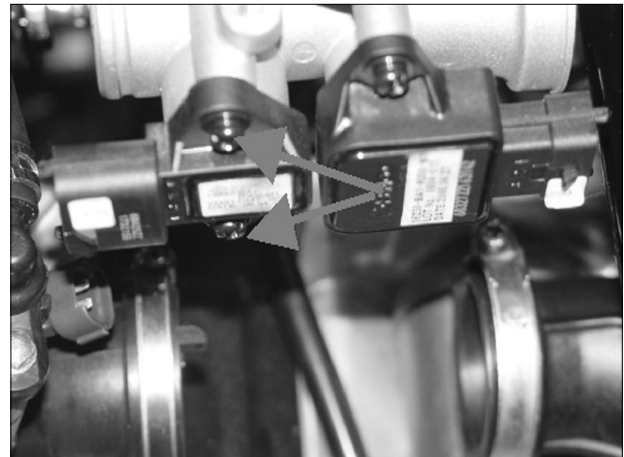
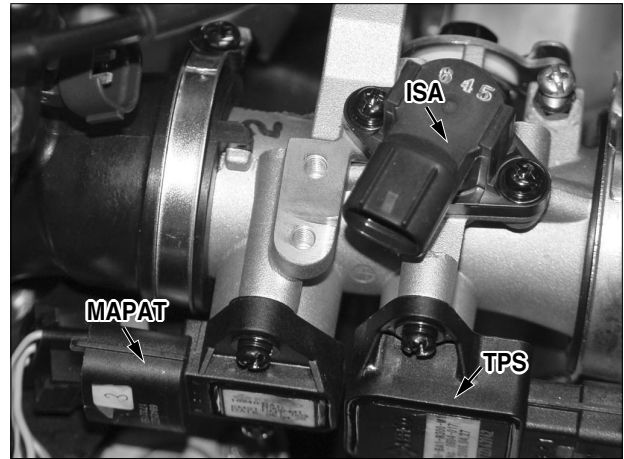
- Before disassembly, the key is off.

Remove

- MAPAT connector
(Push by hand and pull to the front-side)
- Loosen the flange bolt 2EA.

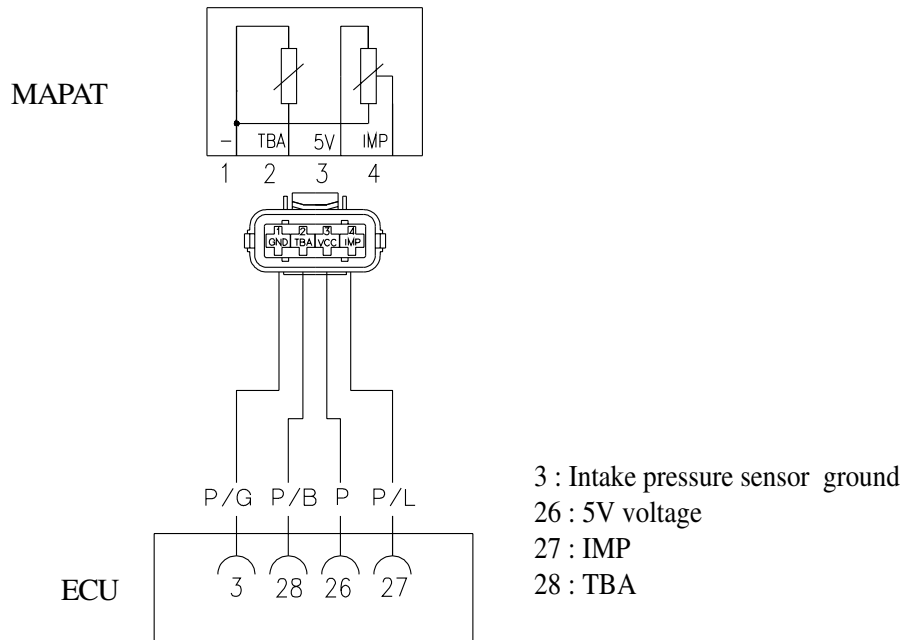
⚠CAUTION

- Be sure to check the coupler is toward to insulator.



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 :

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 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 : ⊕ MAPAT 3 terminal ~ ⊖ MAPAT 1 terminal

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

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

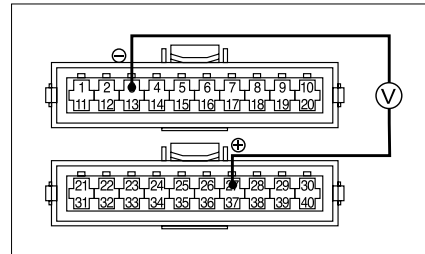
- 5) After fault repaired, To erase the memorized fault code in the ECU is refer to how to remove the fault code(5-10).

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 : ⊕ECU No. 27(P/L:PINK/BLUE) ~ ⊖ECU No.3(P/G : PINK/GREEN)
 - Measuring voltage : 0.1[V] ~ 4.8[V]

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

- The voltage of air pressure;
- 20[kPa]: 0.719 ~ 0.859[V]
- 107[kPa]: 4.154 ~ 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.

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.

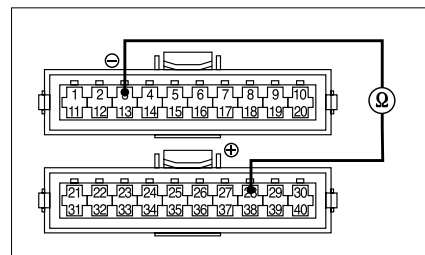
Checking of the intake temperature sensor

- 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 : ⊕ECU No. 28(P/B :PINK/BLUE) ~ ⊖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,

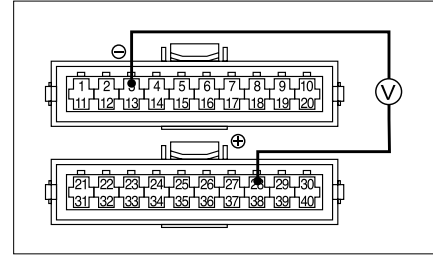
- Check the 'P' electric wire, 'P/G' electric wire, 'P/L' electric wire to see if they have been broken or have short- circuited if there is a bad contact of terminal No. 3, No. 26, No. 28 of ECU coupler.
- If the electric wire is no problem, ECU is broken.
- Replace the ECU with the new one, it rechecks.

Checking of intake temperature sensor

- 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)
~ $\ominus$ ECU No.3(IMP GROUND)
 - Measuring voltage: 0.1[V] ~ 4.9[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(5-10).

8.TPS(THROTTLE POSITION SENSOR)

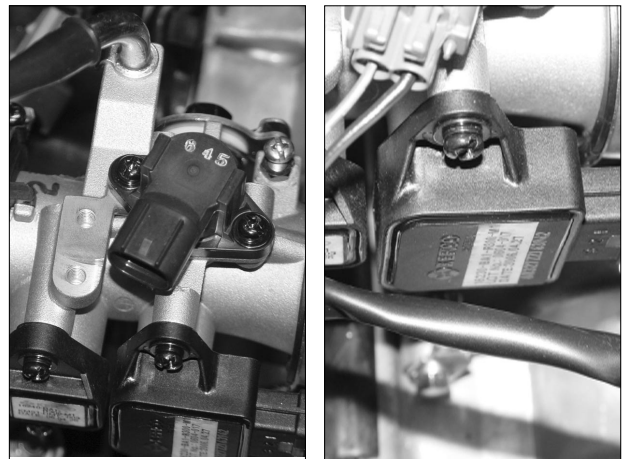
- It is Located on the right side of throttle body

⚠CAUTION

- Before disassembly, the key is off.

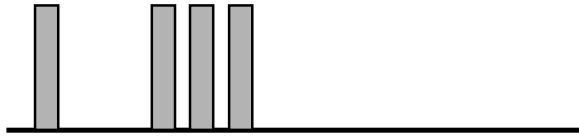
Remove

- Lh.side cover
- Air cleaner
- TPS connector
- TPS screw
- Replace the TPS

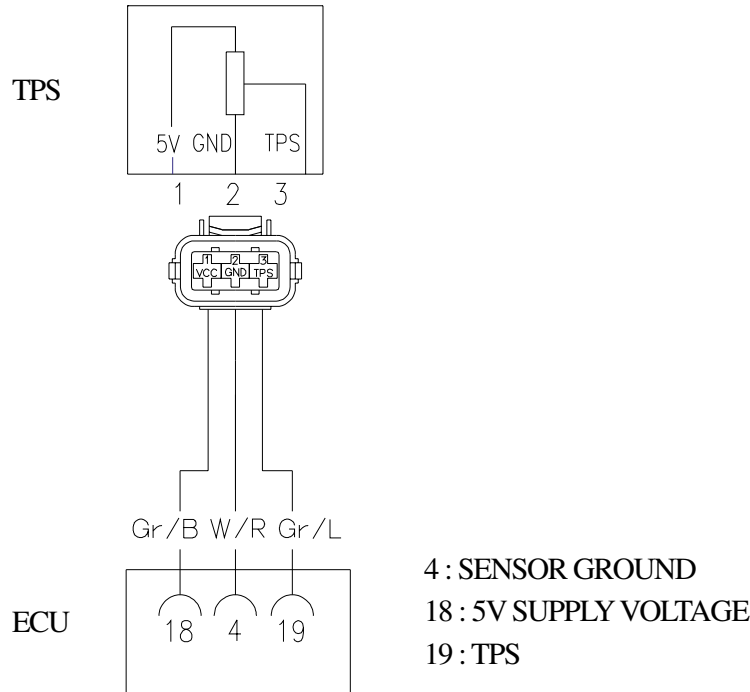


CHECKING THE TPS(Throttle Position Sensor) CIRCUIT DIAGRAM

- Fault code number i_s 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 : ⊕ECU NO.18(Gr/B : GRAY/BLACK) ~ ⊖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.

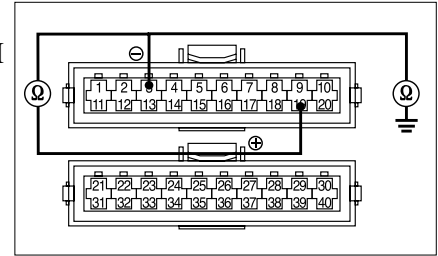
• Checking Procedure

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

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

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 leve, measure the resistance.

The resistance of TPS

If the throttle is totally closed : $1.38 \sim 1.6[\text{k}\Omega], 20 \pm 1^\circ\text{C}$

If the throttle is totally opened : About $2.4[\text{k}\Omega], 20 \pm 1^\circ\text{C}$

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 TPS coupler.

10) Turn on the ignition key.

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

- Rotate the throttle lever, measure the voltage

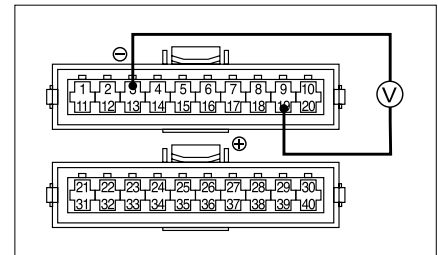
Measuring terminal: $\oplus$ ECU No. 19 (Gr/L: GRAY/BLUE) $\sim \ominus$ ECU No.4 (W/R : WHITE/RED)

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(5-10).

9.ETS(ENGINE TEMPERATURE SENSOR)

- Situated on the Right-hand side of cylinder head

⚠CAUTION

- Before disassembly, the key is off.

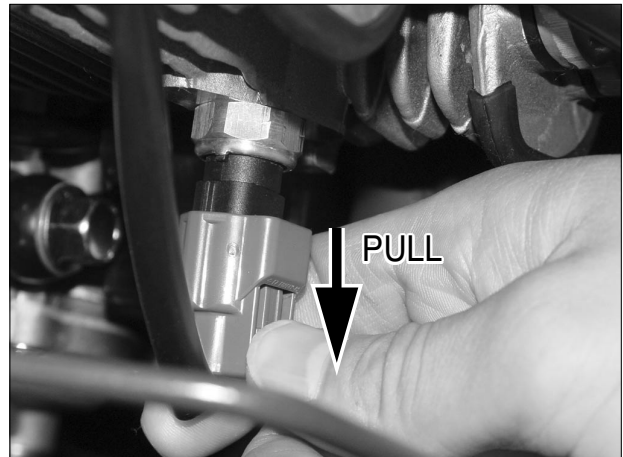
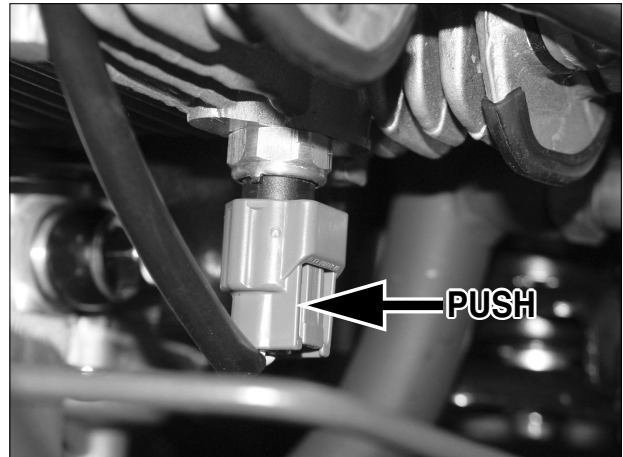
Remove

- Rh.shroud comp
- Connector by hand
- ETS
- Replace the ETS

- Install in reverse order of removal

⚠CAUTION

- ETS torque: 3 ± 0.3 [kgf • m]

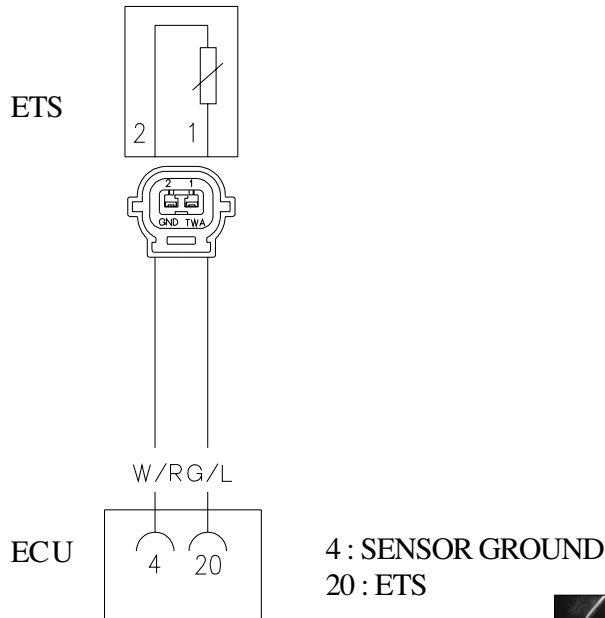


1)CHECKING THE CIRCUIT DIAGRAM OF ETS(Engine Temperature Sensor)

- 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 the ETS(Throttle Position Sensor) coupler is loose, or bad.
If there is no defect, measure the input voltage of ETS.
- 3) Disassemble the coupler of ETS
- 4) Turn on ignition key.
 - Measuring terminal : $\oplus$ ECU No. 20 (Gr/L: GREEN/BLUE) $\sim$ $\ominus$ 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 if there is 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[k Ω]~10.6[k Ω], 20 °C ~80 °C

Measuring terminal : Each terminal of ETS

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

- 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 4-20)

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 °C	10.6[k Ω]~14.4[k Ω]
80 °C	1.35[k Ω]~1.65[k Ω]
110 °C	0.57[k Ω]~0.69[k Ω]

Measuring unit of resistance : Resistance ' R '[k Ω]

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]

10.ISA(IDLE SPEED ACTUATOR)

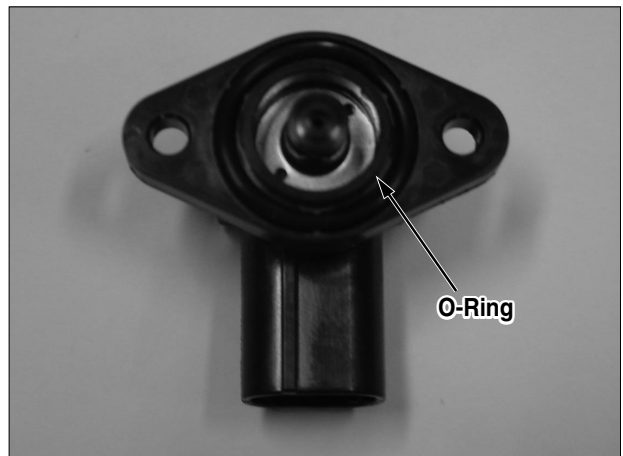
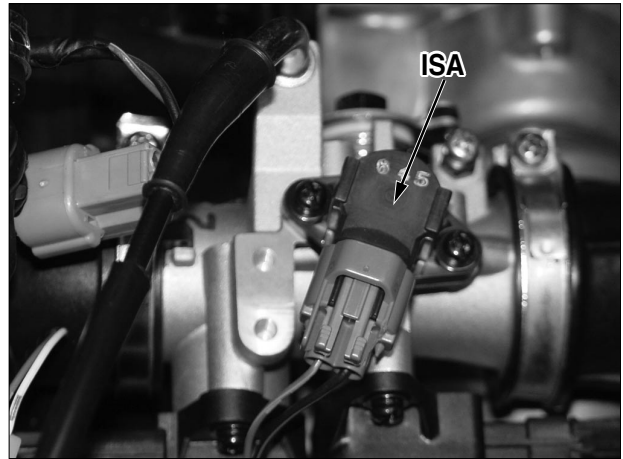
- It is located upwards on the throttle body

⚠CAUTION

- Before disassembly, the key is off.

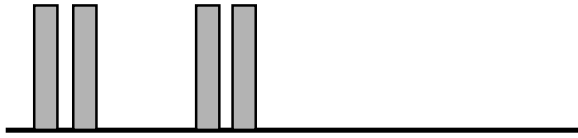
Remove

- SEAT
- Maintenance cover
- ISA connector

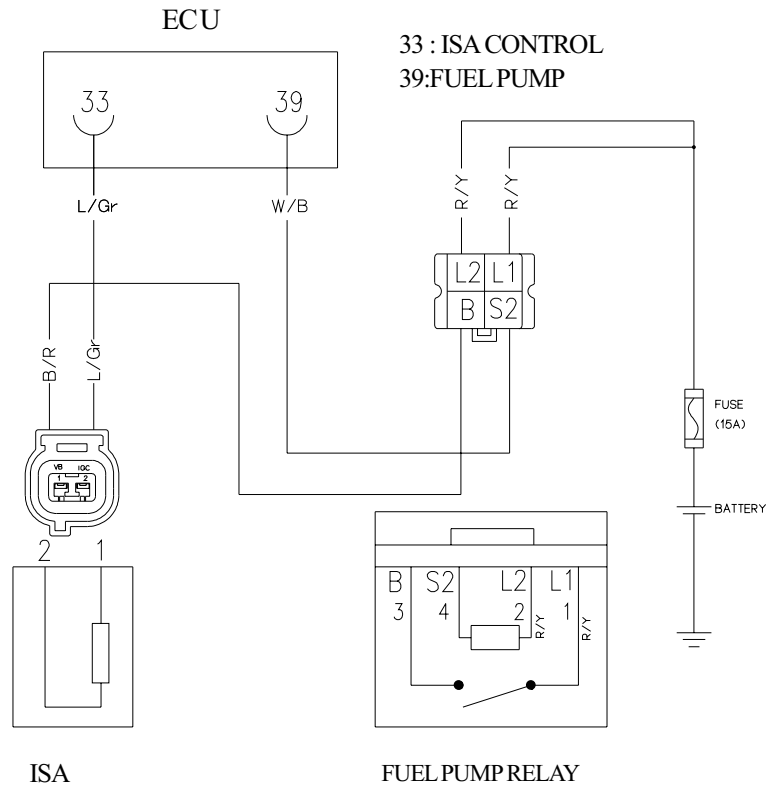


1)CHECK THE ISA(IDEL SPEED ACTUATOR) CIRCUIT.

- 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 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 not 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 (5-23)

※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 : 10~14[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(5-10)

11.O2(Oxygen) SENSOR

- Located on the exhaust pipe

⚠ CAUTION

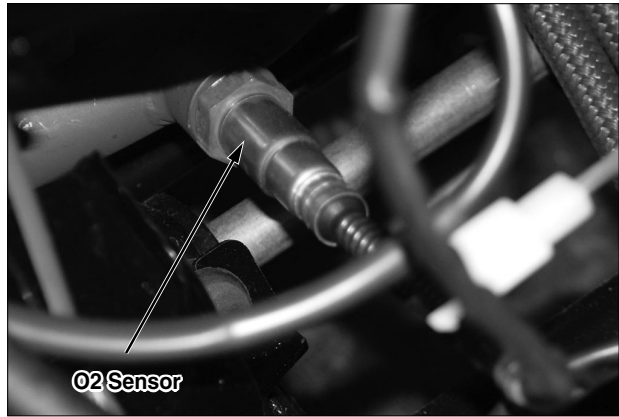
- Before disassembly, the key is off.

Remove

- SEAT
- O2 sensor connector
- Muffler
- O2 sensor

⚠ Warning

- Beware of muffler after driving as it is still hot to be burnt



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 °C
- Measuring terminal (side of wire-harness) : ⊕ oxygen(O₂)3 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 ECU coupler

※ refer to the ECU assembly/disassembly (4-34)

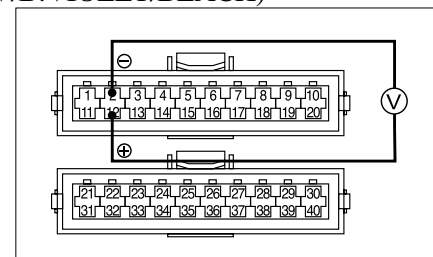
4) Turn on the ignition key

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 has 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.

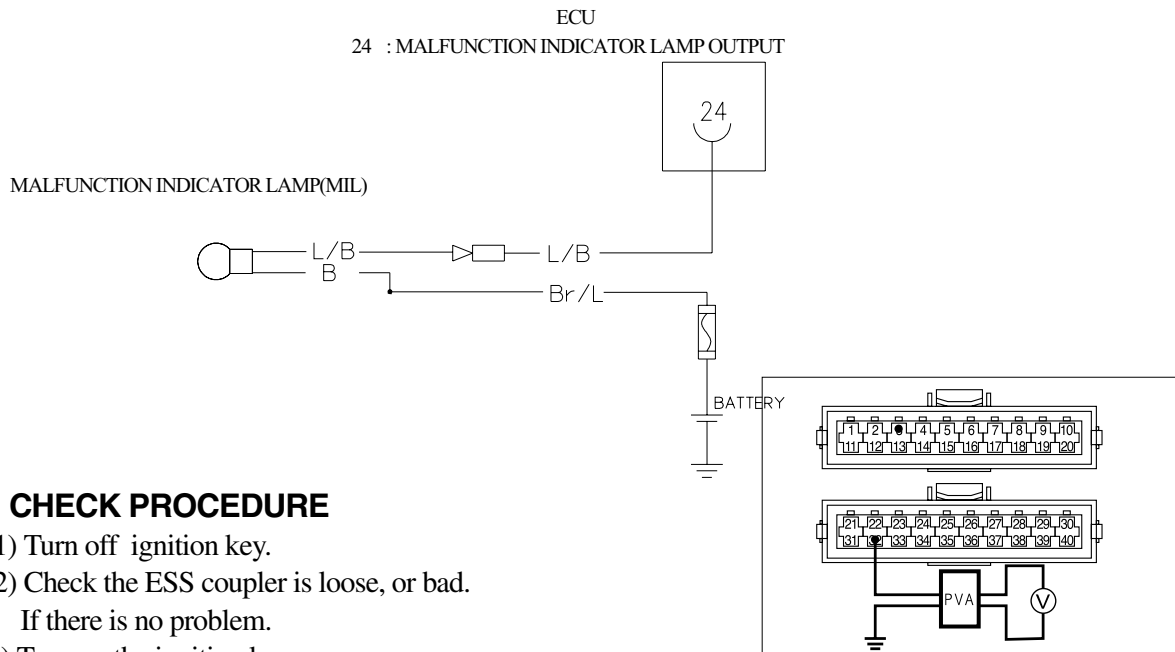
6) After fault repaired, to erase the memorized fault code in the ECU is refer to how to remove the fault code(5-10)

12.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 : $\oplus$ B electric wire $\sim \ominus$ EARTH $\Rightarrow$ Output voltage: battery voltage
 - Measuring terminal : $\oplus$ ECU No.24(L/B :BLUE /BLACK) $\sim \ominus$ EARTH $\Rightarrow$ 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(5-10)

13.ECU(ELECTRONIC CONTROL UNIT)

- Located inside the LH. side cover

⚠CAUTION

- Make sure that the key is off before disassembly

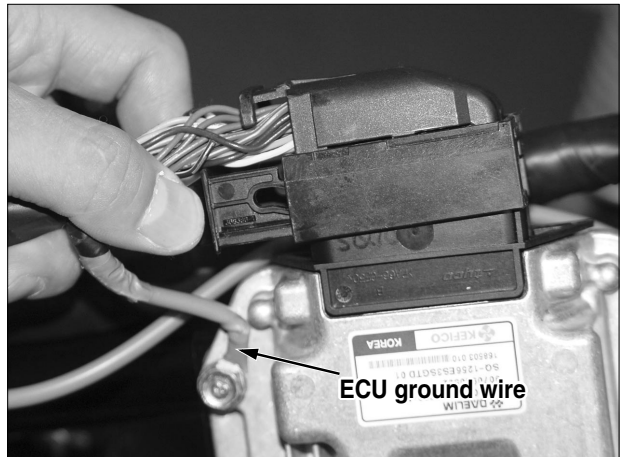
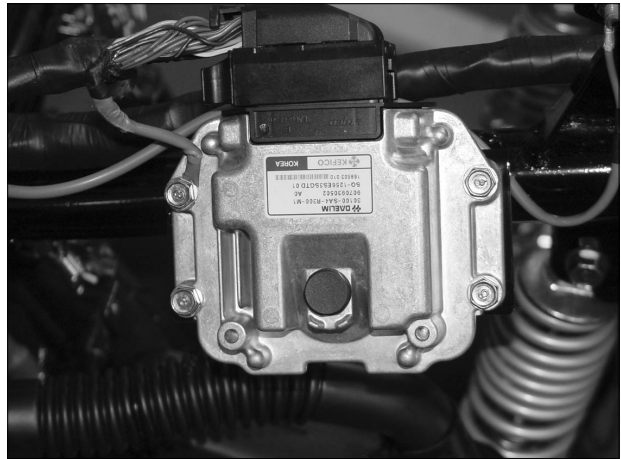
Remove

- Body cover
- Connector (A display portion is pulled behind)
- Flange bolt 4 EA
- Replace the ECU

- Install in the reverse order of removal.
- Replace the ECU

⚠CAUTION

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



14.IGNITION COIL

- Locate on the RH.body cover

⚠CAUTION

- Be sure to check the engine is cooling.
because a little gasoline remains, it is still hot.

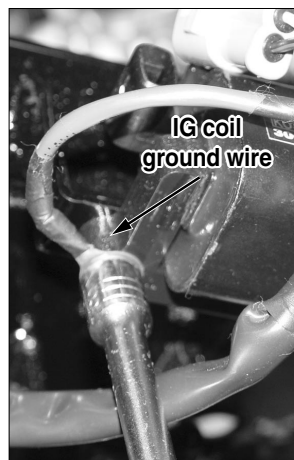
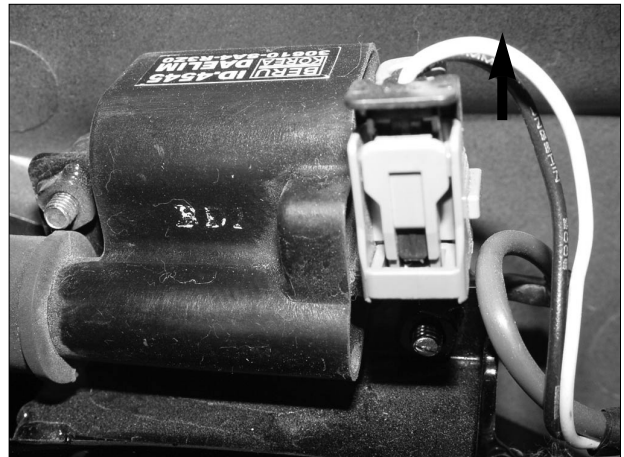
Remove

- SEAT
- Body cover
- Ignition coil
 - Connector
 - Spark plug cap
 - Ignition coil bolt 2EA
 - Ignition coil

⚠CAUTION

- Be sure to assemble the IG coil Ground wire.
Be sure to check the high tension cord is assembly like a picture.

- Install in the reverse order of removal.



15.CRANK POSITION SENSOR :CPS

- ENG RH.crankcase cover

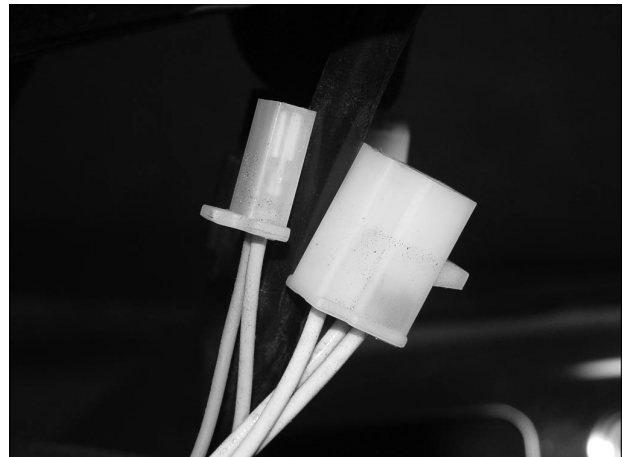
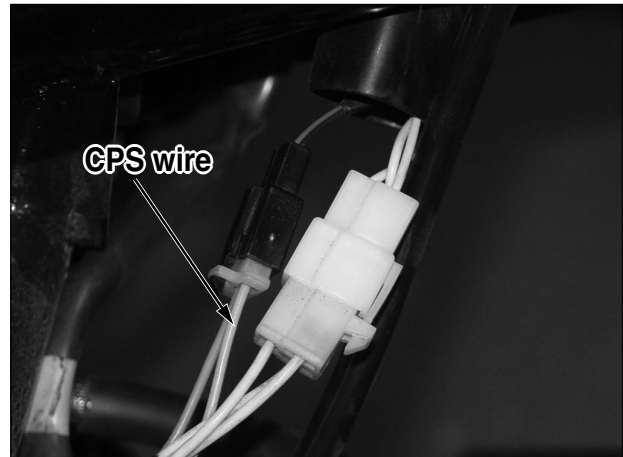
⚠CAUTION

- Before disassembly, the key is off.

Remove

- Connector
 - CPS connector(BLUE, LIGHT GREEN)
 - ACG connector(YELLOW)
- RH.shroud
- Cooling fan
- Flywheel
- Stator
- CPS screw
- Replace the CPS

- Install in the reverse order of removal.



16.FUEL PUMP

- Located below the floor panel

⚠ CAUTION

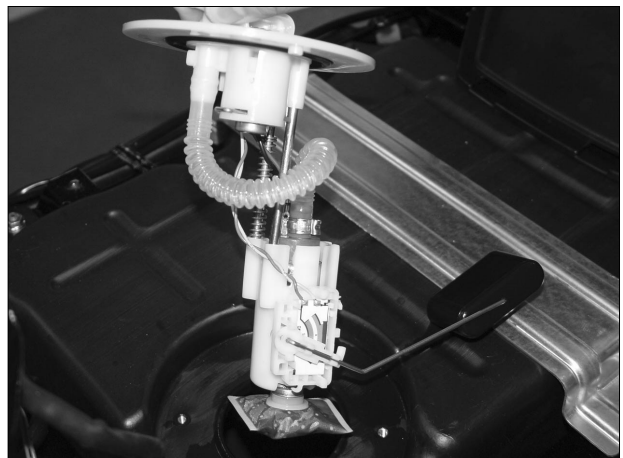
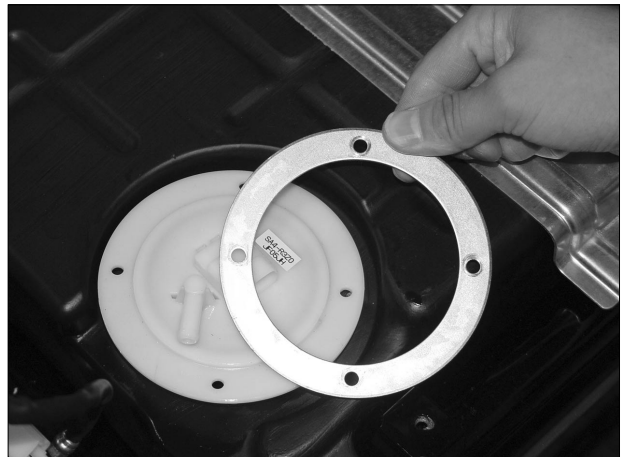
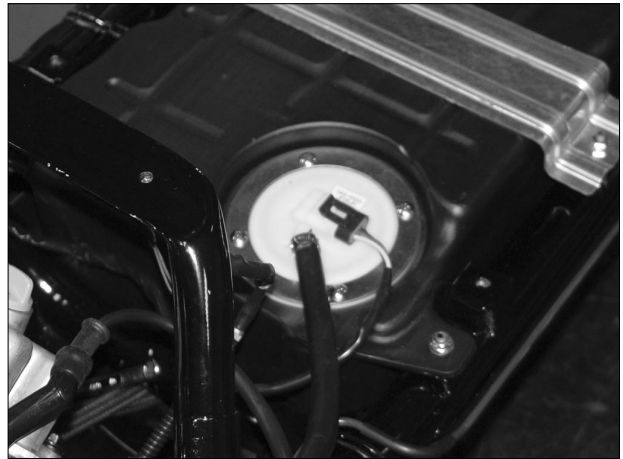
- Before disassembling, the key is off.

Remove

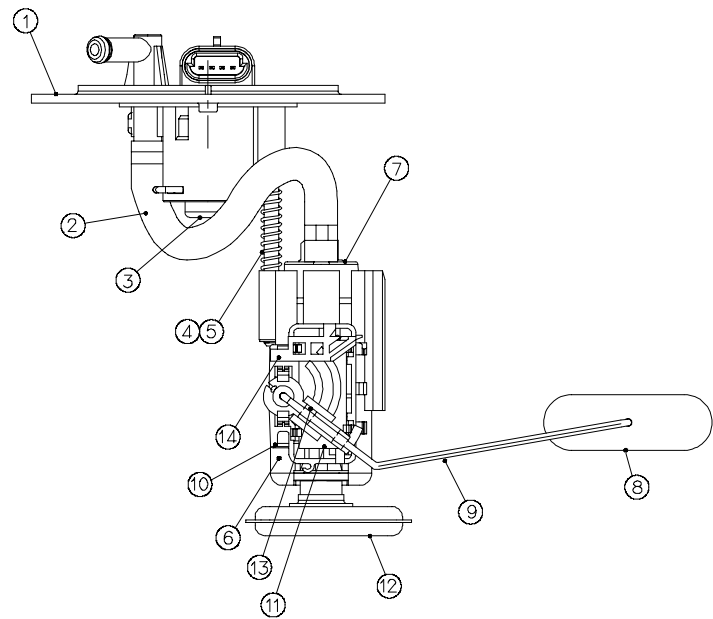
- Fuel pump nut 4EA
- Replace the fuel pump injector cap

* NOTICE

- Do not push the fuel pump base under the fuel tank when the fuel tank is stored.
- Always replace the packing when the fuel pump is removed.
- Before disconnecting the fuel hose, release the fuel pressure by loosening the fuel hose banjo bolt at the fuel tank
- Always replace the sealing washers when the fuel hose banjo bolt is removed or loosened.



16.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 BA	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)

A diagram of the fuel pump connector showing four terminals labeled A, B, C, and D. Terminal A is on the right, B is on the left, C is on the top, and D is on the bottom.

CONNECTOR WIRING		
LOCATION	FUNCTION	COLOR
A	LEVEL SENDER (+)	YELLOW
B	LEVEL SENDER (-)	GRAY
C	PUMP (+)	RED
D	GROUND	BLACK

CHECKING OF THE FUEL LEVEL GAUGE.

- Remove the fuel level gauge (19-10)
- Measure the resistance between terminals.

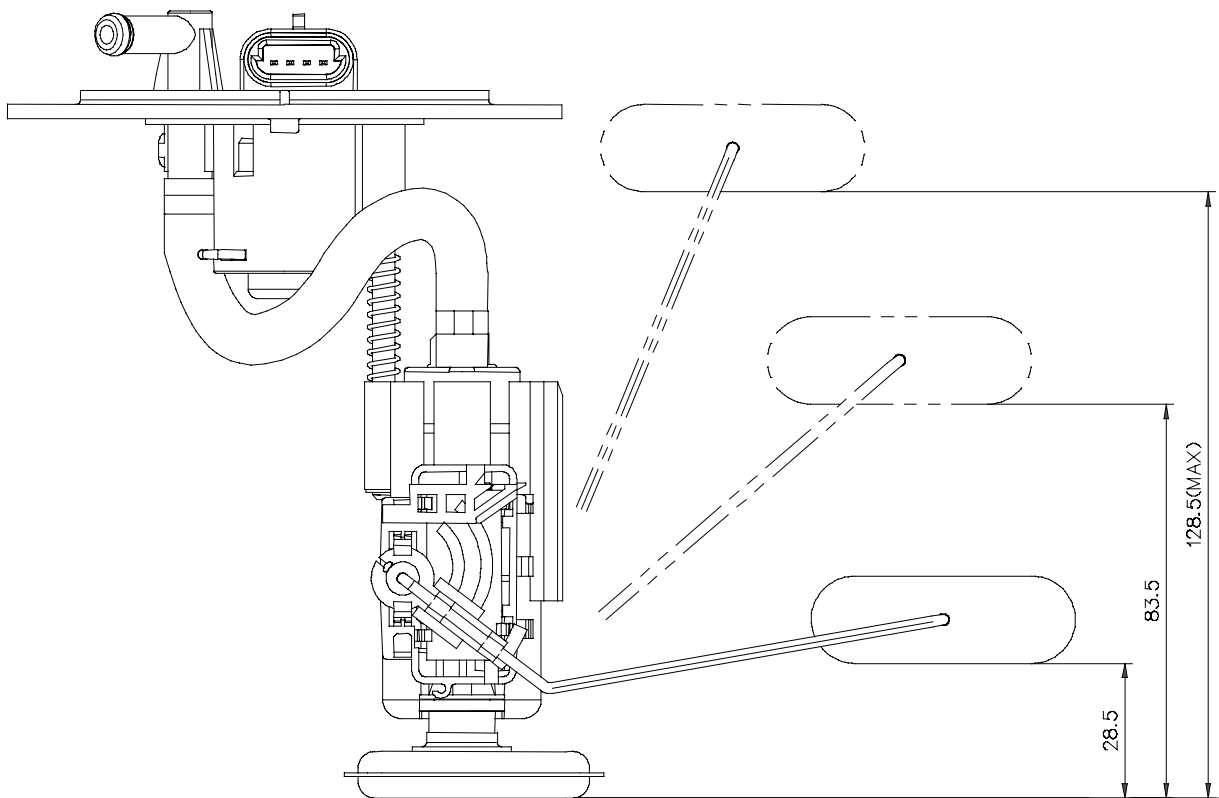
The FLOAT position	Terminals resistance [Ω]
F : 128.5[mm]	$40 \pm 5 [\Omega]$
1/2 : 83.5[mm]	$220 \pm 5 [\Omega]$
E : 28.5[mm]	$400 \pm 3 [\Omega]$

※ The float position is based on the “tank bottom plate” after assemble.

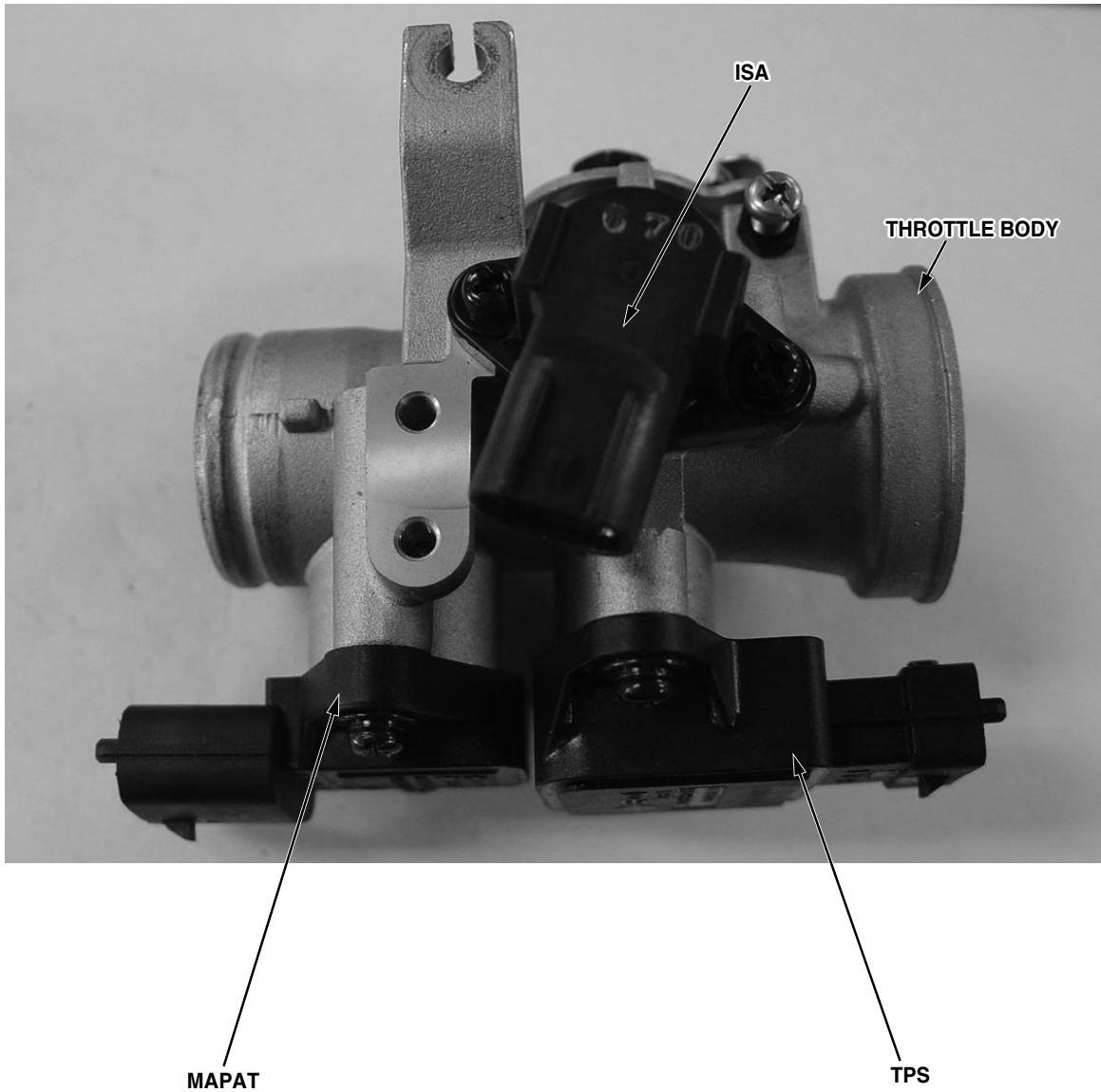
- Measure the resistance between Y/W (YELLOW/WHITE) wire and G(GROUND) wire of fuel unit terminal

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

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



17.THROTTLE BODY



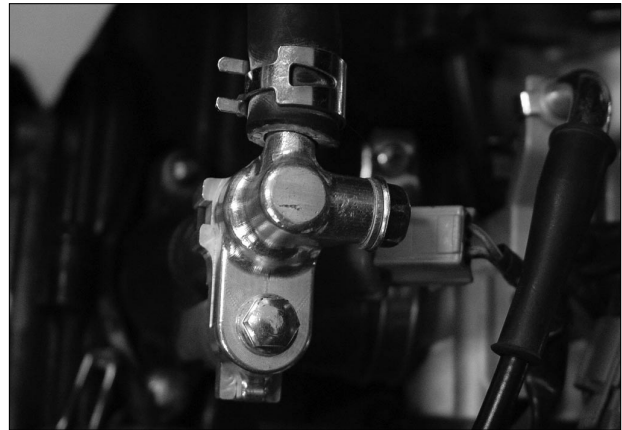
DISCONNECT THE THROTTLE BODY

- **Disconnect:**

- Luggage box
- TPS,ISA,MAPAT coupler
- Throttle cable

⚠CAUTION

- Do not disconnect both the throttle adjust screw “and” “adjusting nut”

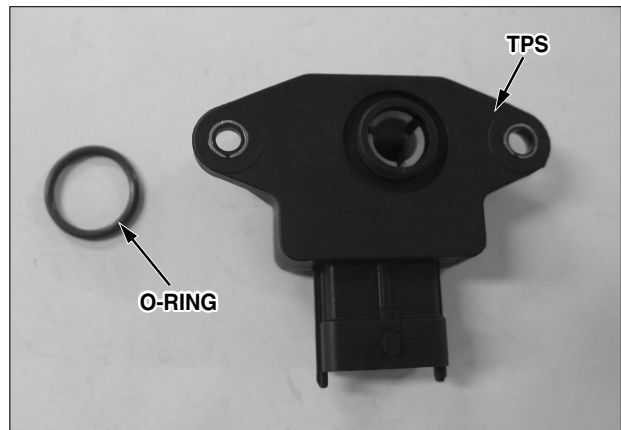


DISASSEMBLE THE THROTTLE BODY

- Disconnect the insulator and the connecting tube band 2ea at the air cleaner side.
- Disconnect the TPS (Throttle position sensor)
- Disconnect the ISA (Idle speed actuator)
- Disconnect the MAPAT

⚠CAUTION

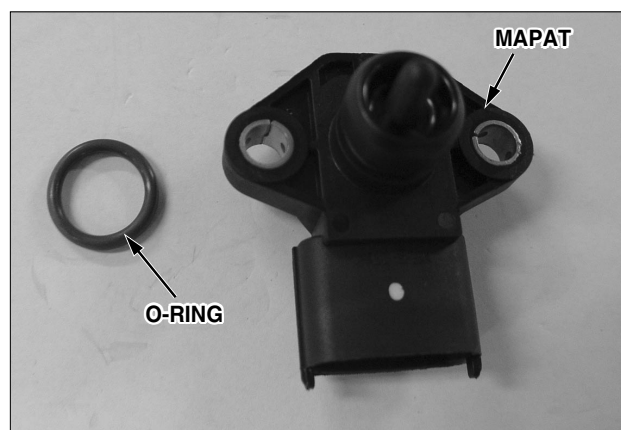
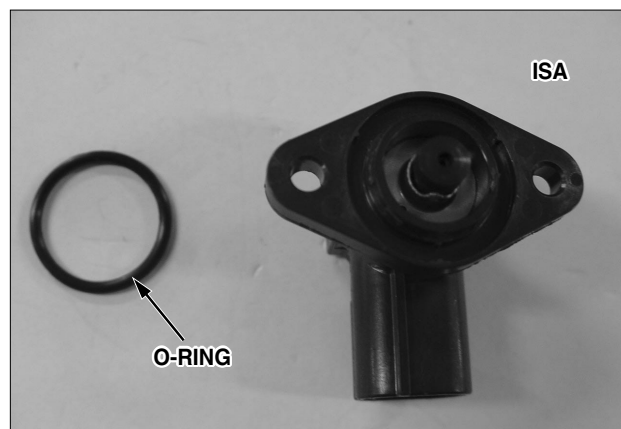
- Do not disconnect the throttle valve



CHECKING THE THROTTLE BODY

- **Check:**

- Throttle shaft
- Throttle valve



DISASSEMBLE THE INSULATOR

- **Disconnect:**

- Injector cap bolt
- Injector and injector cap at the same time from the insulator
- Injector and injector cap.

CHECKING THE INSULATOR

- **Check:**

- O-ring
- Insulator
- Injector

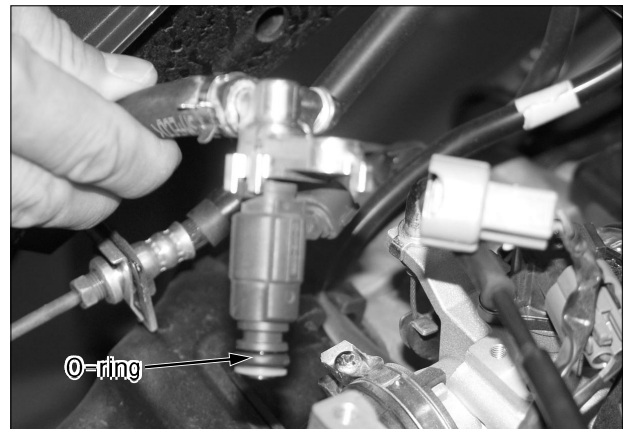
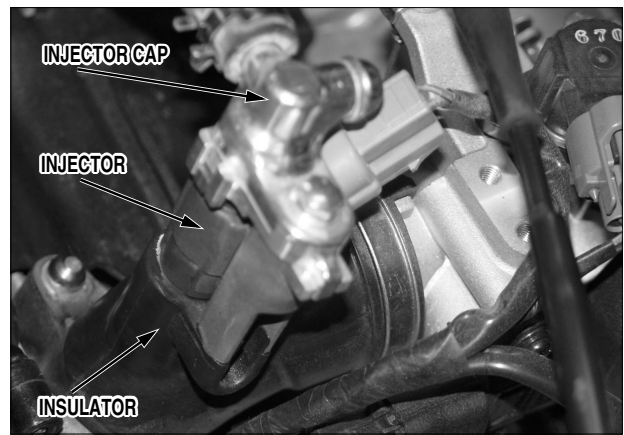
ASSEMBLY OF THE INSULATOR

- **Assemble is the reverse order of removal.**

- . Assemble the o-ring to insulator.

⚠CAUTION

- Replace the o-ring with new one.

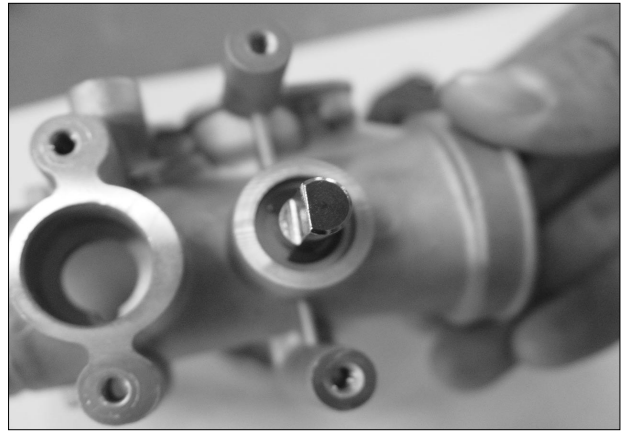


ASSEMBLY OF THE THROTTLE BODY

- Assembly is the reverse order of removal.
- Assemble the o-ring to the throttle body.

⚠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.
- Assemble the insulator gasket.

⚠CAUTION

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

ADJUSTMENT OF THROTTLE CABLE

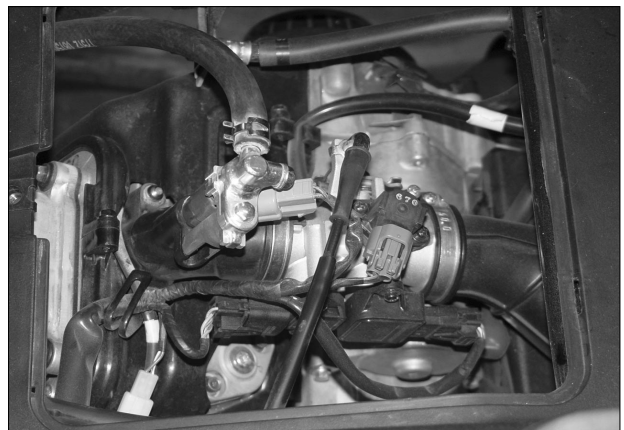
- Assemble the throttle cable
- Adjust the free play of the throttle grip (2-4)

INSPECTION OF SENSOR AND ACTUATOR

- Connect each sensor and the actuator's coupler.
- Check the ISA (Idle speed actuator) (5-23)
- Check the TPS (Throttle position sensor) (5-17)

⚠CAUTION

- Be sure to the value of TPS is whether the standard value after it became assembly.
- Check the MAPAT sensor (5-14)



SUPPLEMENT

ADJUSTMENT OF THROTTLE ADJUST SCREW

- A vehicle is assembled in the state which engine operation is possible.
- Loosen the maintenance cover and the adjust-screw is makes possible to adjust.
- 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 diagnostic tool.

⚠CAUTION

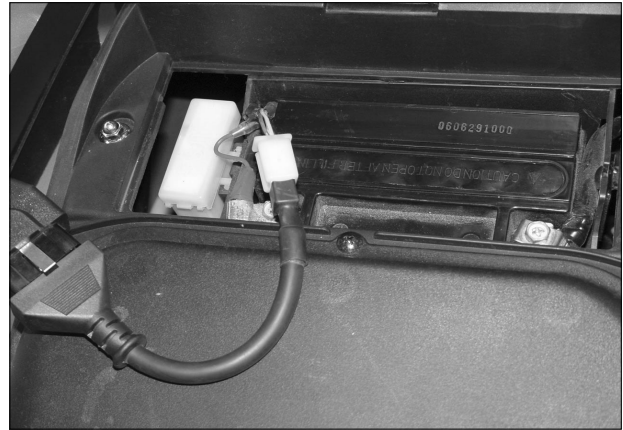
- The ECU is always initialized, before the engine is starting.

- The vehicle is warms up enough to adjust the idling speed.

⚠CAUTION

- If the ETS temperature is 90 degrees, adjust the ' throttle adjust screw '.

- By adjusting the throttle adjust screw.
- Adjust the value of ISA PWM to standard value, among the service data of diagnostic tool.
- ISA PWM : $12 \pm 2\%$, $1600 \pm 100\text{RPM}$
- After the ISA PWM became adjusted, fix the throttle adjust screw with adjusting nut.



18.HOW TO USE THE SCAN WHEN ECU IS INITIALIZED

- 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 diagnostic tool.
 - Press the enter button in the initial screen.
 - Press the enter in the vehicle diagnosis screen.
-
- Press the enter button on the resetting ECU values.

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

- Press the rest button on the following screen.

0. INITIAL SCREEN

01. VEHICLE DIAGNOSIS

02. SOFTWARE EDIT

03. SYSTEM SETUP

04. SCREEN CAPTURE VIEW

1. VEHICLE DIAGNOSIS

MODEL : CAN COMM.

SYSTEM : ENGINE

01. DIAGNOSTIC TROUBLE CODES

02. CURRENT DATA

03. FLIGHT RECORD

04. ACTUATION TEST

05. **RESETTING ECU VALUES**

06. IDENTIFICATION CHECK

1.5. RESETTING ECU VALUES

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

IF YOU ARE READY,
PRESS [ENTER] KEY!

1.5. RESETTING ADAPTIVE VALUES

RESETTING ECU VALUES

CONDITION

IG.KEY ON

ENGINE STOP

PRESS [REST], IF YOU ARE READY !

REST

- Press the enter button when it is ready

1.5. RESETTING ADAPTIVE VALUES	
RESETTING ECU VALUES	
C	ARE YOU SURE ? [ENTER/ESC] (CONDITION : KEY ON, ENGINE OFF)
PRESS [REST], IF YOU ARE READY ?	
REST	

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

1.5. RESETTING ADAPTIVE VALUES	
RESETTING ECU VALUES	
C	COMPLETED TURN IG.KEY OFF AND THEN ON
PRESS [REST], IF YOU ARE READY ?	
REST	

19. HOW TO USE THE SCAN WHEN THE ISA PWM IS 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.

- Press the enter button on the current data.

- By looking the displayed figure on the ISA PWM, adjust the throttle adjust screw.

0. INITIAL SCREEN

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

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

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

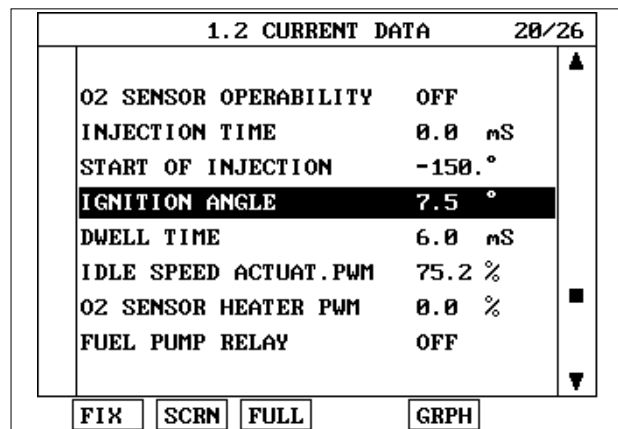
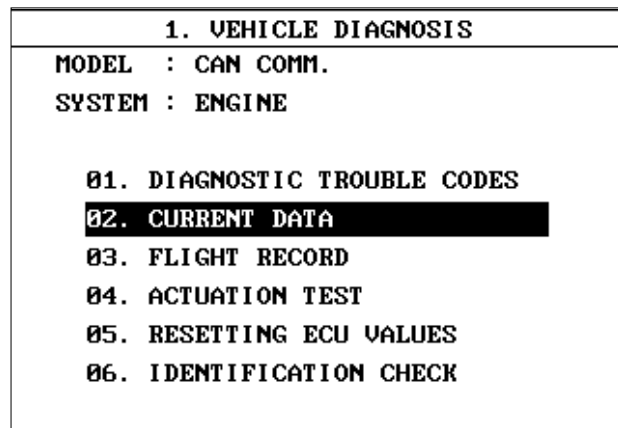
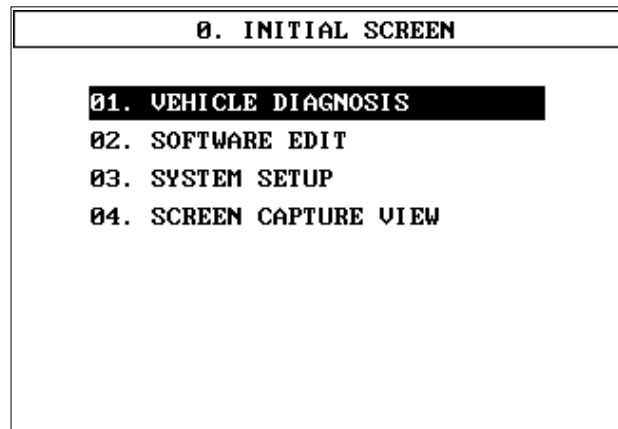
FIX SCRN FULL GRPH

20. HOW TO USE THE SCAN WHEN THE IGNITION TIMING IS CHECKING

- The coupler to check the malfunction of vehicle is connected to the coupler of diagnostic tool.
- Turn the Ignition key.
- 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.

- Press the enter button on the current data.

- To check the ignition angle



21. HOW TO USE THE SCAN WHEN ENGINE REVOLUTION IS CHECKING

- The coupler to check the malfunction of vehicle is connected to the coupler of diagnostic tool.
- Turn the Ignition key.
- 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.

- Press the enter button on the current data.

- Check the engine rpm on the engine speed

0. INITIAL SCREEN

01. VEHICLE DIAGNOSIS

- 02. SOFTWARE EDIT
- 03. SYSTEM SETUP
- 04. SCREEN CAPTURE VIEW

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

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

MEMO

6. FUEL SYSTEM

SERVICE INFORMATION . . 6-1

TROUBLESHOOTING . . . 6-2

FUEL TANK 6-3

SERVICE INFORMATION

GENERAL SAFETY

6

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.

CAUTION

- Do not excessively bend or twist cable. Distorted or damaged cable may lead to mechanical malfunctions.
- Pay particular attention to the position of O-ring. Replace with new ones when disassembled.
- If it is desired to store a vehicle for a period longer than 1 month.

SPECIFICATIONS

FUEL TANK CAPACITY : 11 l

RESERVE FUEL CAPACITY: 2.4 l

TOOL

FLOAT LEVEL GAUGE

TROUBLESHOOTING

The vehicle does not start.

- No gasoline in fuel tank.
- Too much fuel is flowing into cylinder.
- No spark emitted from spark plug.
- Air cleaner is blocked.
- Using low quality gasoline.
- Starter is damaged.
- Throttle cable is working improperly.
- Fuel tank is functioning improperly.

Idle is unstable and engine turns off after starting.

- Starter is damaged.
- Ignition system is damaged.
- Using low quality gasoline.
- Compression pressure is low.
- Air/Fuel mixture is either too lean or rich.

Mis-firing occurs when driving at high speeds.

- Ignition system is damaged.
- Mixture is too lean.

Back firing

- Ignition system is damaged.
- Mixture is too lean.

Insufficient power and high fuel consumption.

- Air cleaner is blocked.
- Ignition system is damaged.
- Mixture is too rich.

Air/Fuel mixture is extremely lean

- Oil level is low.
- Bad ventilation of air in tank cap.
- Fuel tube is bent, creased or blocked.

Air/Fuel mixture is extremely rich.

- Oil level is too high.
- Air cleaner is blocked.



FUEL TANK REMOVAL

WARNING

- Gasoline is extremely flammable. Avoid fire during work, and pay particular attention to electric sparks. Furthermore, the evaporated (gasified) gasoline is highly explosive. Work in a well-ventilated areas.

- Release the seat lock by turning the main switch key to open the seat.
- Remove the following parts.
 - Luggage box. (⇒3-2)
 - Floor panel leg.
 - Center cover.
 - Rear center cover.
 - Rear carrier/Back rest.
- Remove the fuel tube from the fuel tank.
- Remove the tube between the fuel tank and the fuel filter.
- Remove the fuel vapor tub.
- Remove the fuel tank.
- Install in the revers order of removal

NOTE

- After removing the fuel tank, be sure to close the fuel tank cap.

MEMO

7. ENGINE REMOVAL/INSTALLATION

SERVICE INFORMATION 7-1

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.

7

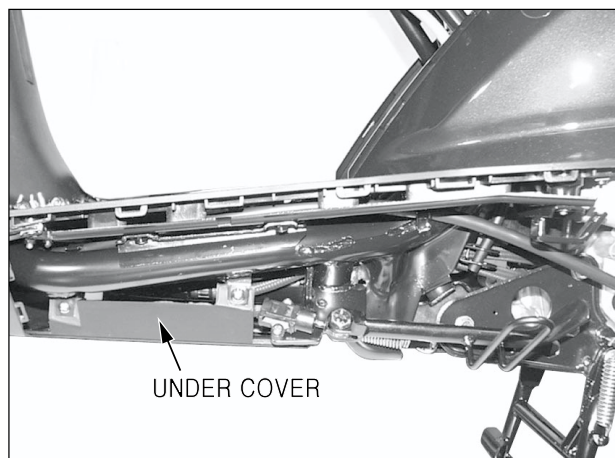
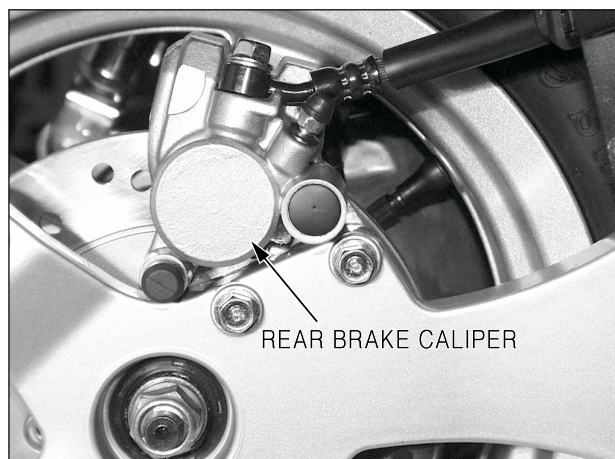
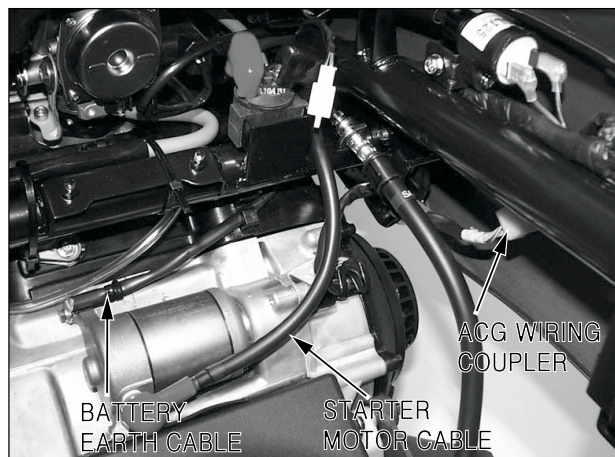
- The following works can be carried out without removing the engine from the vehicle body.

- TRANSMISSION (⇒ SECTION 11)
- STARTING CLUTCH (⇒ SECTION 8)
- OIL PUMP (⇒ SECTION 4)
- A.C. GENERATOR (⇒ SECTION 8)
- STARTER MOTOR (⇒ SECTION 16)
- CONTINUOUSLY VARIABLE TRANSMISSION (⇒ SECTION 7)
- CYLINDER HEAD/ CYLINDER/ PISTON (⇒ SECTION 9,10)
- EX. MUFFLER (⇒ SECTION 3)
- REAR SWING ARM (⇒ SECTION 13)

- Items to be worked after removing engine.
 - CRANKSHAFT, CRANKSHAFT BEARING, CRANK CASE BEARING
- Engine oil capacity : 1.1 l - when disassembled.

TORQUE VALUES :

ENGINE HANGER BOLT (FRONT) : 2.7kgf · m
(REAR) : 3.5kgf · m

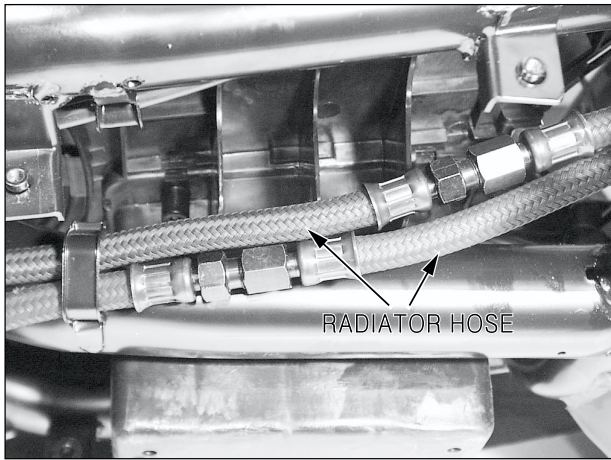


ENGINE REMOVAL

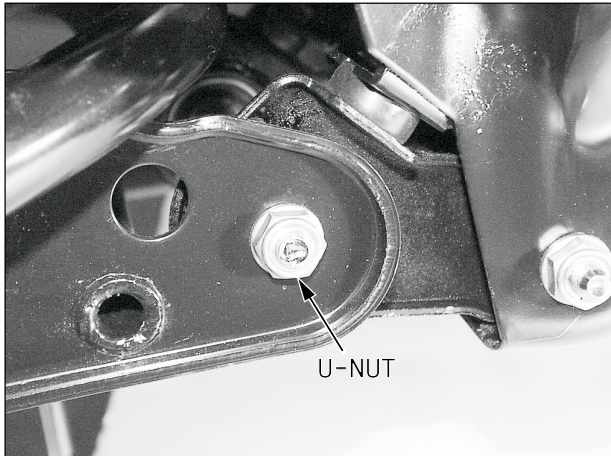
- Drain the engine oil.
- Release the seat lock by turning the main switch key to open the seat.
- Remove the following parts.
 - Luggage box (⇒3-2)
 - Center cover (⇒3-3)
 - Air cleaner (⇒2-5)
- Disconnect the A.C generator coupler and connector wiring connected to the A.C generator, disconnect the starter motor wiring cable.
- Remove the battery earth cable from the RH. shroud groove.
- Disconnect the high-tension cord from the engine.
- Remove the bleeder tube from the cylinder head cover.

- Remove the EX. muffler. (⇒3-8)
- Remove the rear brake caliper. (⇒13-3)

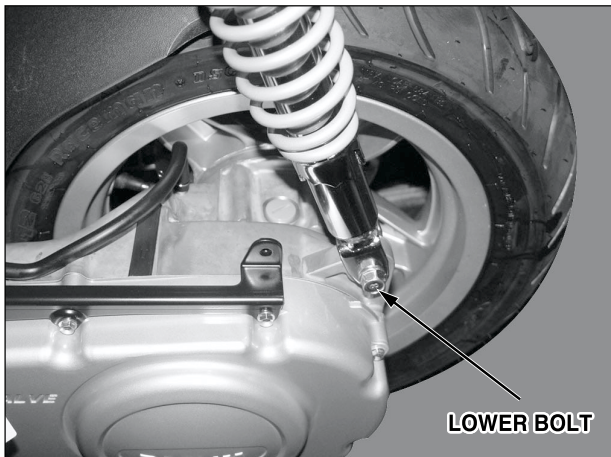
- Remove the RH./LH. floor side cover. (⇒3-4)
- Remove the under cover (⇒3-5)



- Remove the RH./LH. radiator hose, remove the RH./LH. radiator hose from the frame setting clamp.



- Loosen the U-nut securing the engine hanger.
- Loosen the rear cushion lower bolt.



- Remove the engine. (with the rear swing arm and rear wheel attached)
- Remove the rear swing arm. (⇒13-7)
- Remove the rear wheel. (⇒13-5)
- Remove the rear wheel mud guard. (⇒3-8)

ENGINE INSTALLATION

- Install in the reverse order of removal.

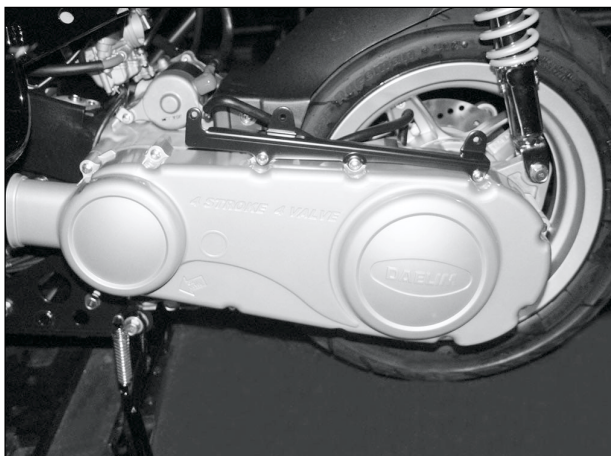
⚠ NOTE

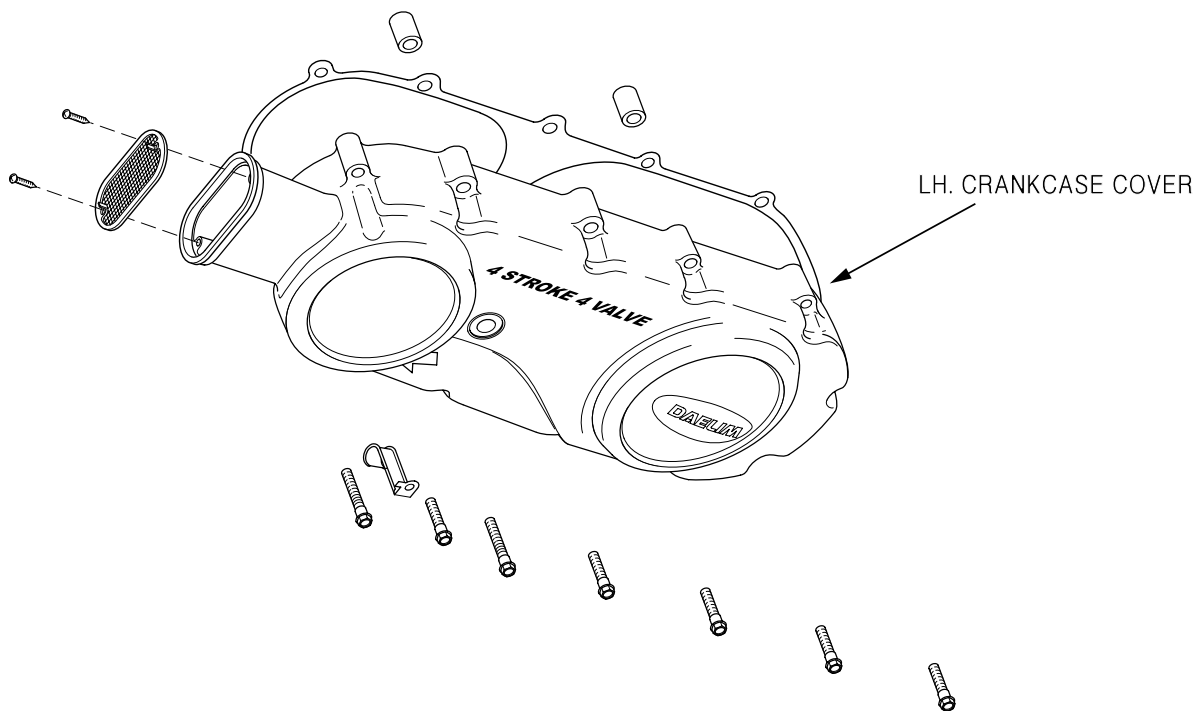
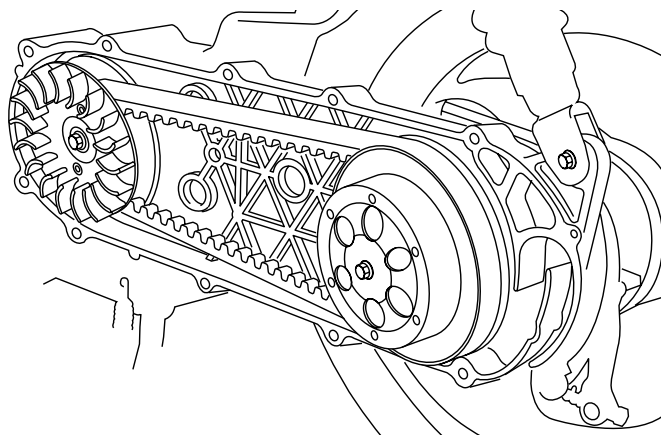
- Take precautions not to damage wiring and cable.
- Take precautions not to damage the threaded part of bolts.
- Arrange the cable, tubes and wiring in the right positions.

TORQUE VALUE

ENGINE HANGER BOLT (FRONT) : 4.5kgf · m
(REAR) : 4.5kgf · m

- Check the following after the engine is installed.
 - Engine oil
 - Electric systems.
 - Inspection of the throttle cable operation.





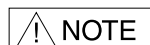
8. LH. CRANKCASE COVER /CONTINUOUSLY VARIABLE TRANSMISSION

SERVICE INFORMATION . . . 8-1	DRIVE BELT 8-6
TROUBLESHOOTING . . . 8-1	MOVABLE DRIVE FACE . . . 8-8
LH. CRANKCASE COVER . . 8-2	CLUTCH/DRIVEN PULLEY . . 8-11

SERVICE INFORMATION

GENERAL SAFETY

- Do not allow oil to contact the drive belt or the pulley face. The transmission rate of driving force is reduced with oil contact.
- Do not operate starter motor while the LH. crank case cover is removed.



- Take precautions not to apply the grease oil to the movable drive face or weight roller.

8

SPECIFICATIONS

ITEM	STANDARD	SERVICE LIMIT
MOVABLE DRIVE FACE BUSHING INNER DIAMETER	24.000-24.013mm	24.05mm
DRIVE FACE BOSS OUTER DIAMETER	23.980-23.993mm	23.96mm
DRIVE BELT WIDTH	22mm	20.50mm
WEIGHT ROLLER OUTER DIAMETER	19.95-20.02mm	19.50mm
CLUTCH OUTER INNER DIAMETER	120.0-120.2mm	120.50mm
DRIVEN FACE SPRING PLAY	97.85mm	90.00mm
DRIVEN FACE OUTER DIAMETER	37.965-37.985mm	37.94mm
DRIVEN FACE INNER DIAMETER	38.000-38.025mm	38.06mm

TROUBLESHOOTING

Engine starts but motorcycle does not work.

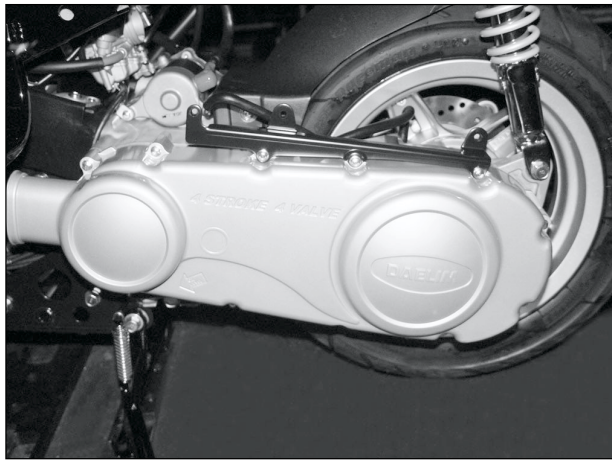
- Drive belt worn.
- Ramp plate damaged.
- Clutch shoe worn or damaged.
- Movable driven face spring cut.

Engine stops, or the vehicle runs suddenly, after starting.

- Clutch shoe spring cut.

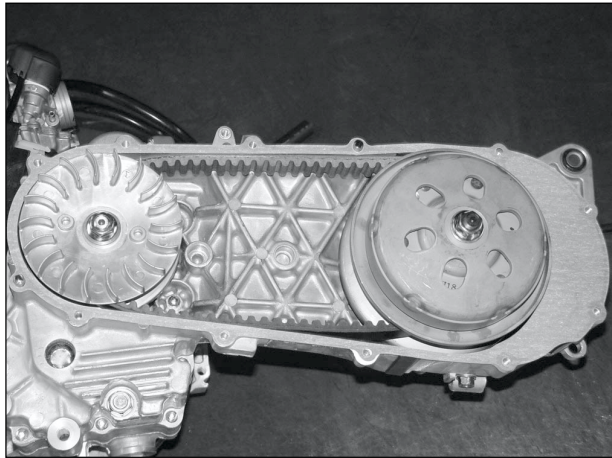
Vehicle unable to run at the maximum speed, or lack of output

- Drive belt worn.
- Defective movable driven face spring.
- Weight roller worn.
- Pulley face contaminated.

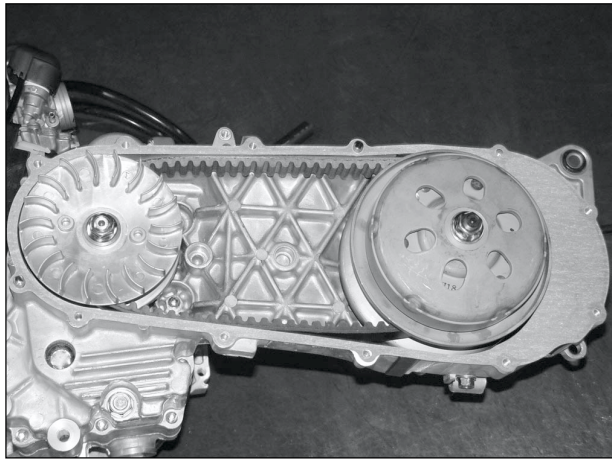


LH. CRANKCASE COVER REMOVAL

- Remove the 12 flange bolts securing LH. crankcase.



- Remove the LH. crankcase cover.
- Remove the gasket and dowel pin.

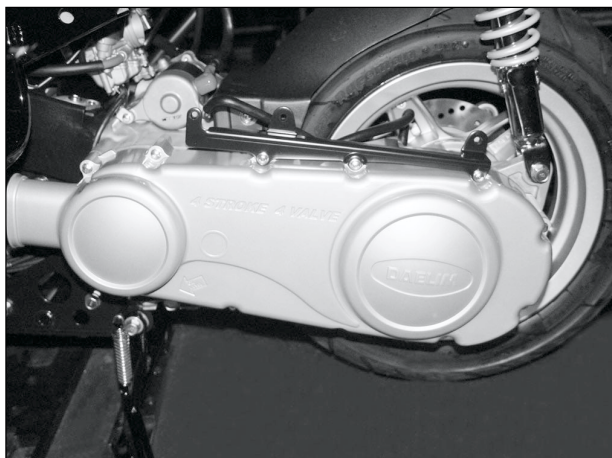


INSTALLATION

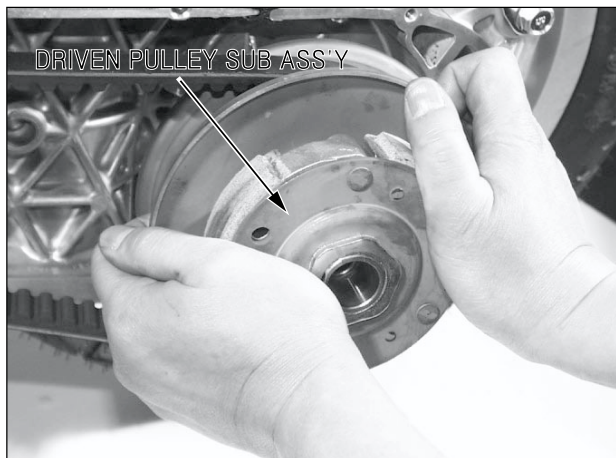
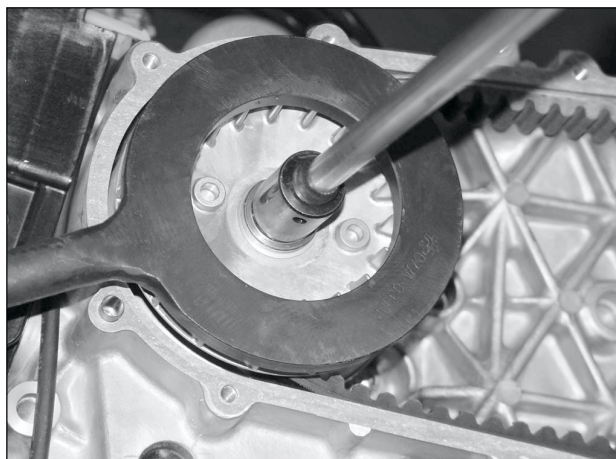
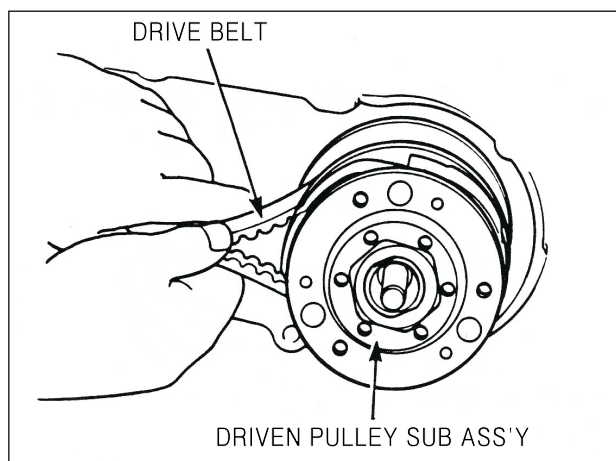
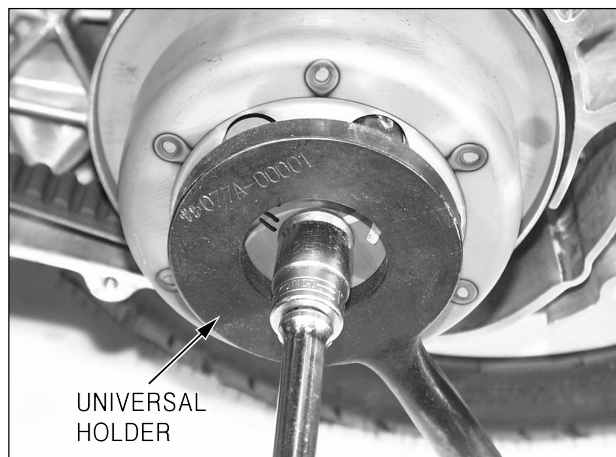
- Install the new gasket and dowel pin after removing the gasket of the crankcase surface.

⚠ NOTE

- Align the bolts to uniform the tightening location before tightening then when you don't know the bolt length.
- Tighten the bolts diagonally with specified tightening torque.
- Be sure to replace a new gasket and dowel pin



- Tighten the LH. crankcase cover bolts.



DRIVE BELT

REMOVAL

- Remove the LH. crankcase cover. (⇒7-2)
- Hold the clutch outer using the universal holder and remove the nut.
- Remove the clutch outer.

TOOL: UNIVERSAL HOLDER

⚠ CAUTION

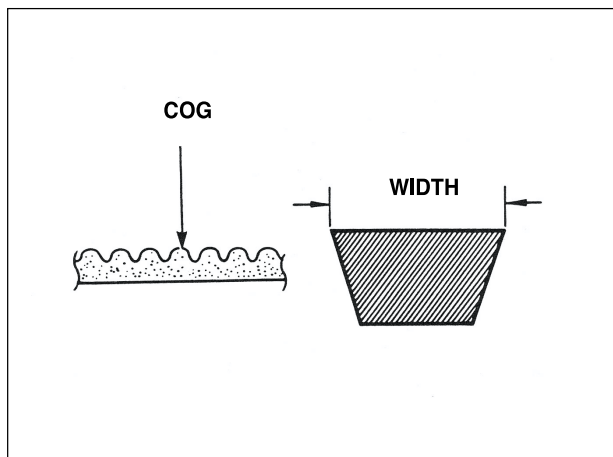
- Use the special tool when loosening the lock nut. Holding the rear wheel or rear brake will damage the final reduction system.

- Squeeze the drive belt into the pulley groove as shown so that it slackens enough to remove the driven pulley from the drive shaft.

- Loosen the drive face setting nut 12mm with the clutch center holder.
- Remove the kick starter ratchet and drive face.

TOOL : DRIVE FACE HOLDER

- Remove the driven pulley sub assembly with the drive belt in place.
- Remove the drive belt from the driven pulley groove and drive pulley groove.



DRIVE BELT INSPECTION

- Check the drive belt for cracks, pry separation and wear; replace as necessary.
- Measure the width of the drive belt as shown.
- Replace the belt if the service limit is exceeded.

SERVICE LIMIT : 20.5mm

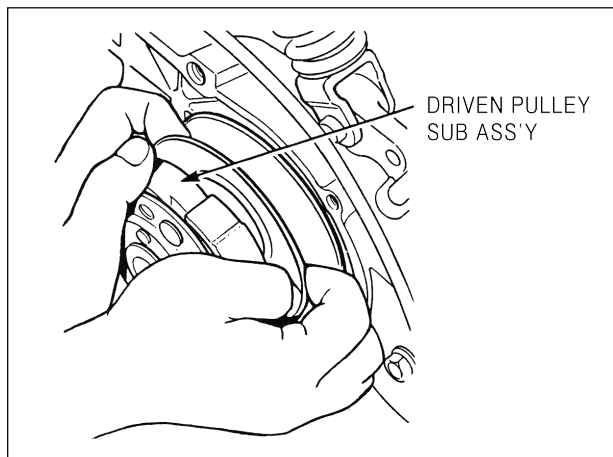
NOTE

- Use only a genuine DAELIM replacement drive belt.
- Do not get oil or grease on the drive belt or pulley faces. Clean off any grease or oil before reinstalling.

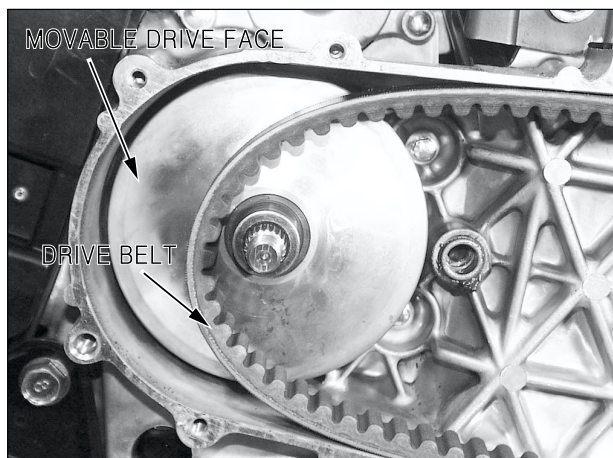


DRIVE BELT INSTALLATION

- Temporarily install the driven pulley sub assembly on the drive shaft.



- Turn the pulley clockwise and spread the faces apart while installing the drive belt.
- Remove the pulley assembly once with the drive belt installed.

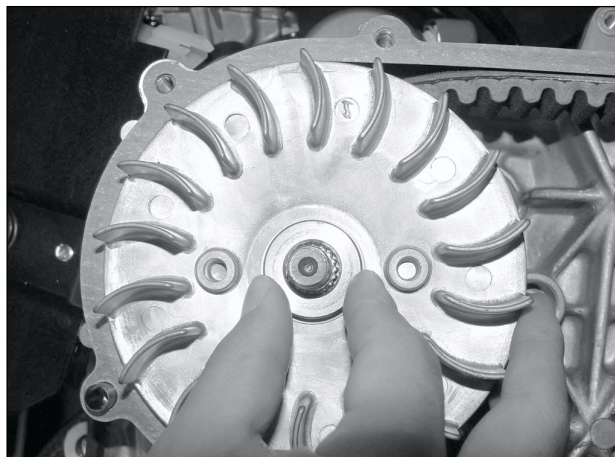


- Put the drive belt over the movable drive face.
- Install the drive face to the LH. crank shaft, and install the kick starter ratchet.
- Hold the drive face using the drive face holder and tighten the nut to the specified torque.

TORQUE VALUE : 7.0-8.0 kgf · m
TOOL : DRIVE FACE HOLDER

NOTE

- Hold the faces apart preventing them from closing.

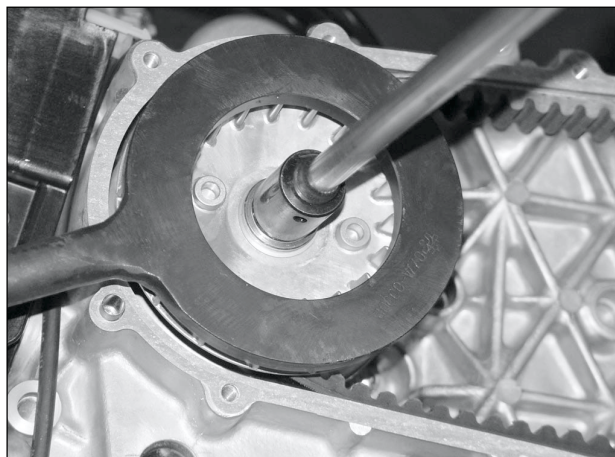


- Reinstall the driven pulley on the drive shaft with the drive belt attached.
- Hold the clutch outer using the universal holder. Tighten the nut to the specified torque.

TORQUE VALUE : 5.0-6.0 kgf · m

TOOL : UNIVERSAL HOLDER

- Reinstall the LH. crankcase cover. (⇨7-2)



MOVABLE DRIVE FACE

REMOVAL

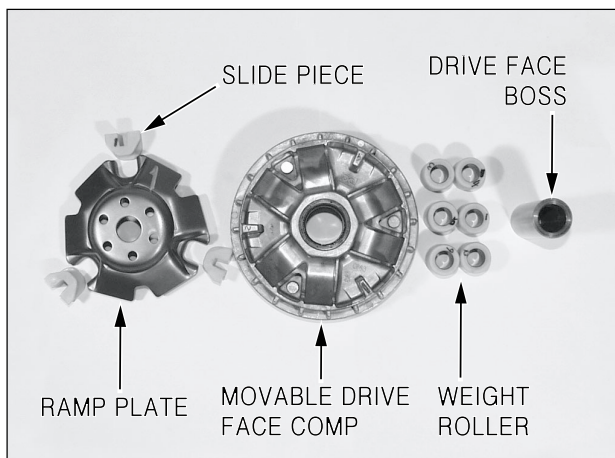
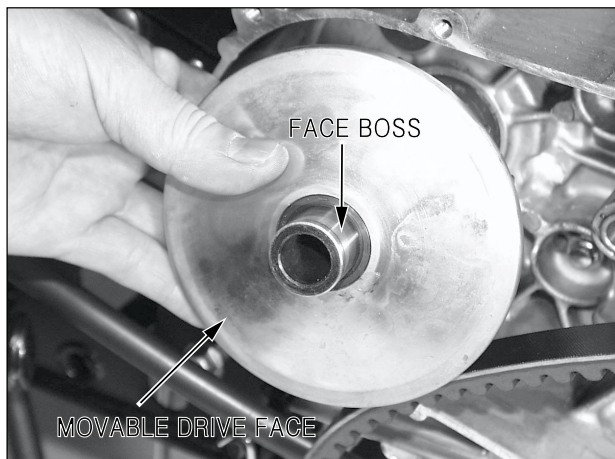
- Remove the LH. crankcase cover. (⇨7-2)
- Hold the drive face using the drive face holder and remove the nut.

TOOL : DRIVE FACE HOLDER

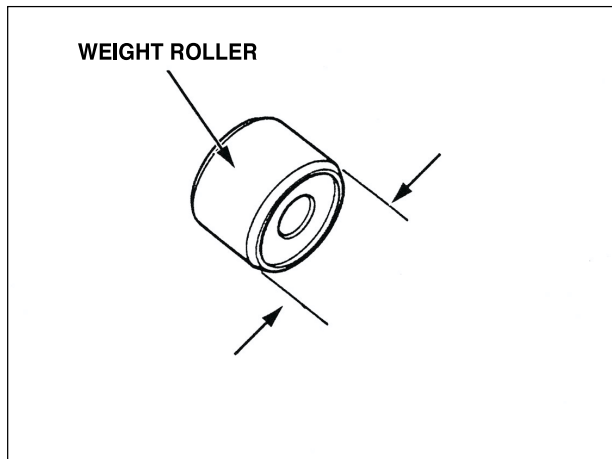
- Remove the kick starter ratchet and drive face.
- If the drive face holder cannot be used, remove the cooling fan at the right side of the crankshaft, and hold the flywheel with the universal holder.

TOOL : UNIVERSAL HOLDER

- Remove the drive belt. (⇨7-3)
- Remove the movable drive face and drive face boss.



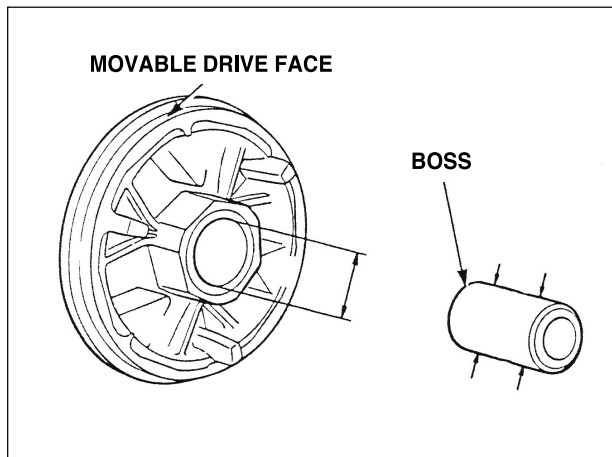
- Remove the ramp plate, weight rollers and oil seal from the movable drive face.



MOVABLE DRIVE FACE INSPECTION

- The weight rollers push on the movable drive face (by centrifugal force); worn or damaged weight rollers will interfere with this force.
- Check the rollers for wear or damage and replace as necessary.
- Measure the O.D. of each roller, replace if the service limit is exceeded.

SERVICE LIMIT : 19.5mm



- Check the drive face boss for wear or damage and replace as necessary.
- Measure the O.D of the drive face boss. Replace the boss if the service limit is exceeded.
- Measure the I.D. of the drive face. Replace it if the service limit is exceeded.
- Movable drive face boss outer diameter.

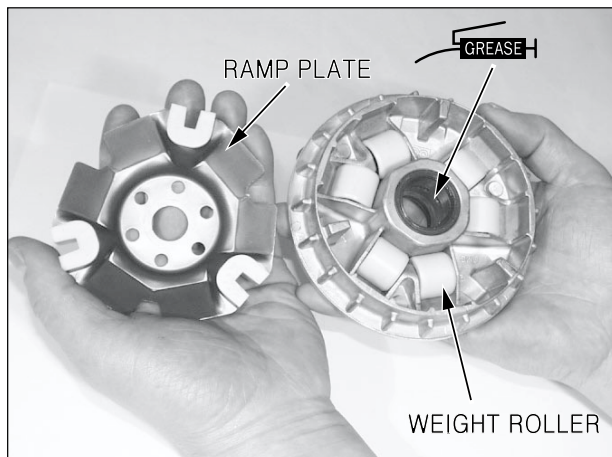
SERVICE LIMIT : 23.960mm

- Movable drive face inner diameter.

SERVICE LIMIT : 24.025mm

MOVABLE DRIVE FACE INSTALLATION

- Install the weight roller on the movable drive face.
- Install the ramp plate.



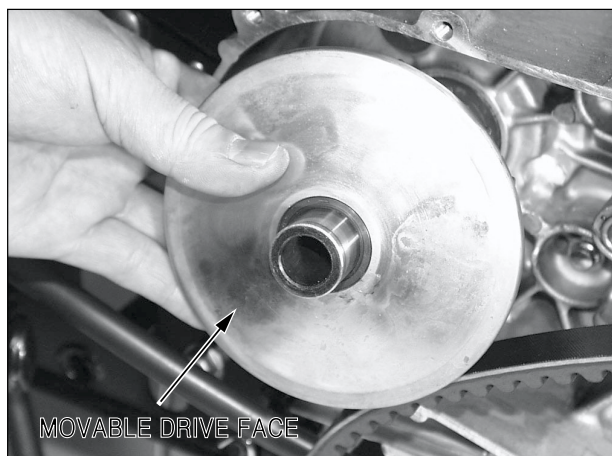
- Apply the inside of the movable drive face with the specified amount of grease.

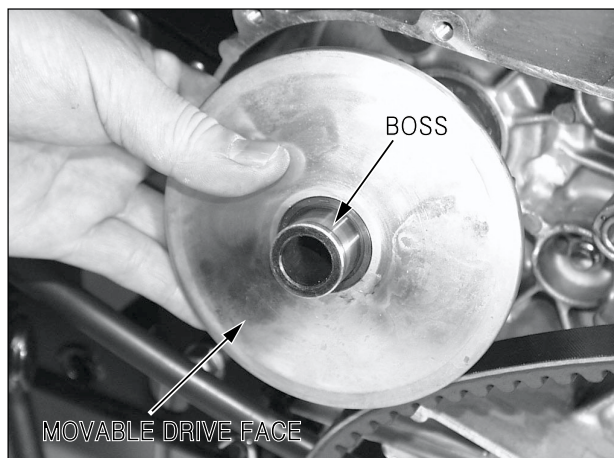
SPECIFIED GREASE : ALVANIA EP2
GREASE APPLICATION : 0.5-1.5 g

- Install the movable drive face boss.

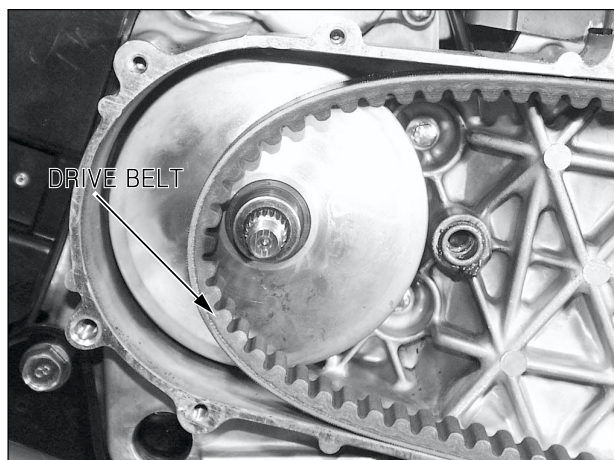
NOTE

- Do not get the grease on the drive face. Remove any misplaced grease with a degreasing agent.
- Use only the specified grease in the specified amount.

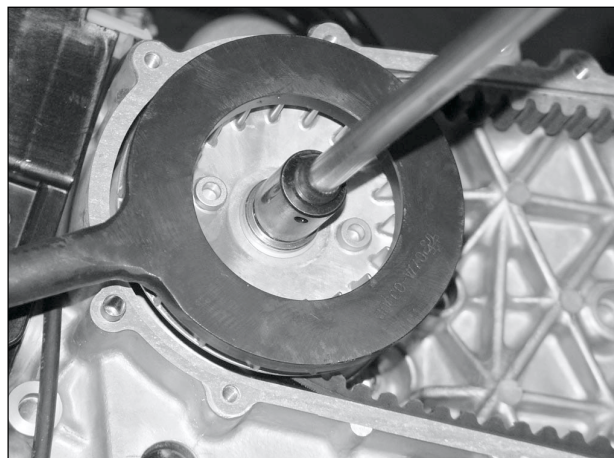




- Install the movable drive face on the crank shaft.



- Squeeze the drive belt into the drive face groove and pull the drive belt over the drive face shaft.



- Hold the drive face using the drive face holder and tighten the nut to the specified torque.

TORQUE VALUE : 7.0-8.0 kgf · m

TOOL : DRIVE FACE HOLDER

NOTE

- Tighten the drive face nut to the specified torque.
- Correctly match the drive face and crank shaft serration when assembling.
- If the drive face holder cannot be used, remove the cooling fan and hold the flywheel with the universal holder.

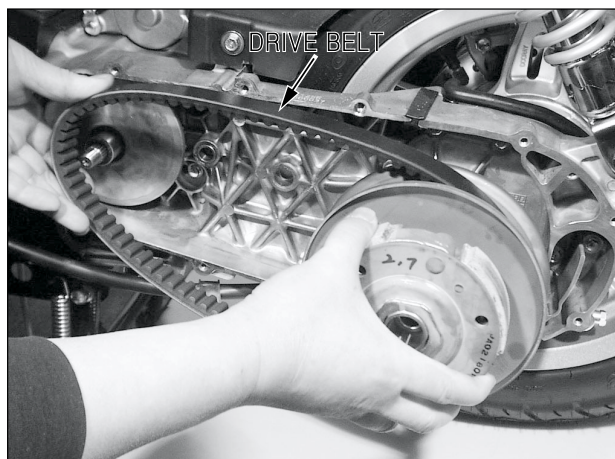
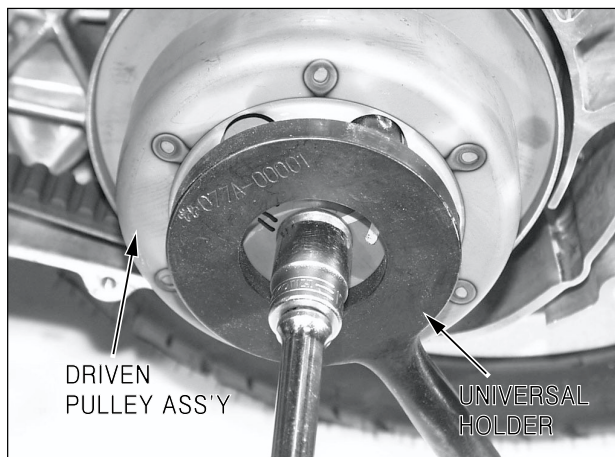
- Install the LH. crankcase cover. (⇨7-2)

CLUTCH/DRIVEN PULLEY

REMOVAL

- Remove the LH. crankcase cover. (☞7-2)
- Remove the drive face. (☞7-5)
- Hold the clutch outer using the universal holder and remove the flange nut, then remove the clutch outer.

**TOOLS : UNIVERSAL HOLDER
DRIVE FACE HOLDER**



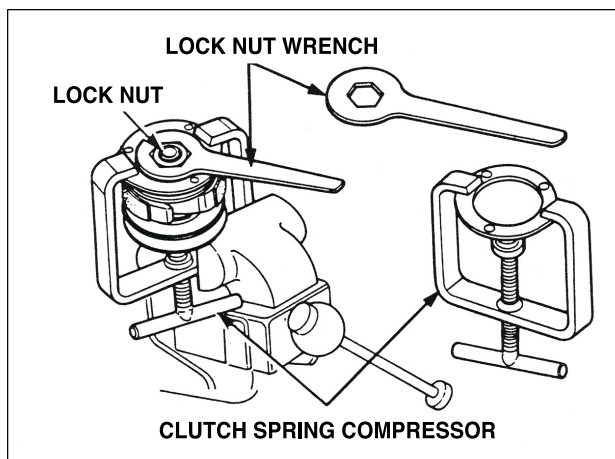
- Remove the driven pulley sub assembly from the drive shaft.
- Remove the drive belt.

DISASSEMBLY

- Install a clutch spring compressor on the pulley assembly and tighten the tool to gain access to the nut.

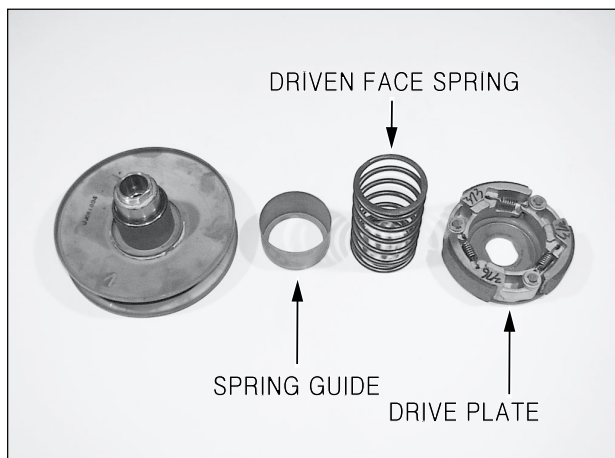
⚠ NOTE

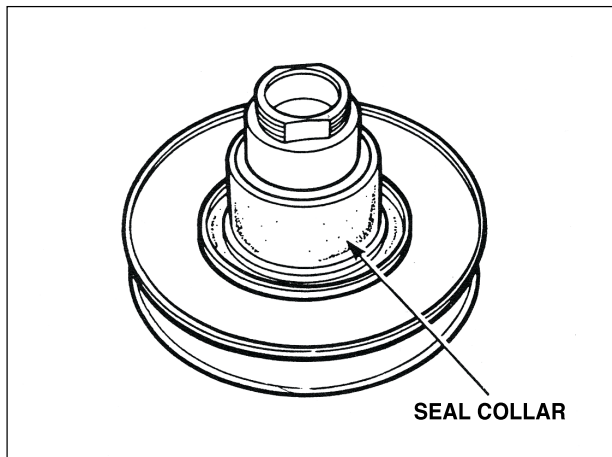
- Do not overtighten the compressor.



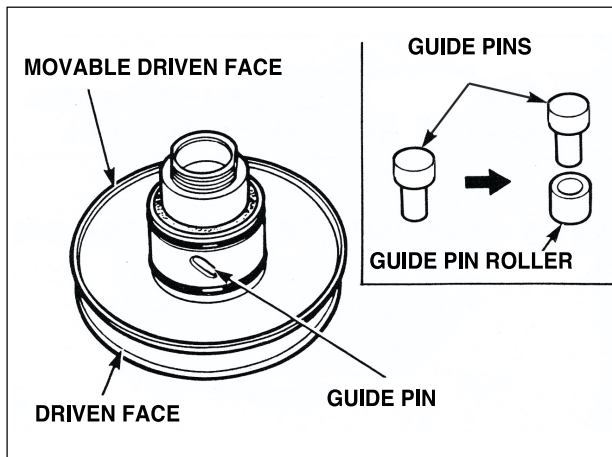
- Hold the clutch spring compressor in a vise as shown and remove the lock nut using the lock nut wrench.
- Loosen the clutch spring compressor and disassembly the clutch and spring from the driven pulley.

**TOOLS : CLUTCH SPRING COMPRESSOR
LOCK NUT WRENCH**

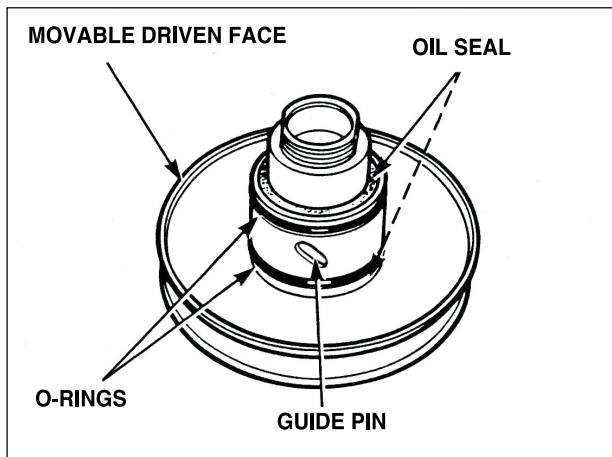




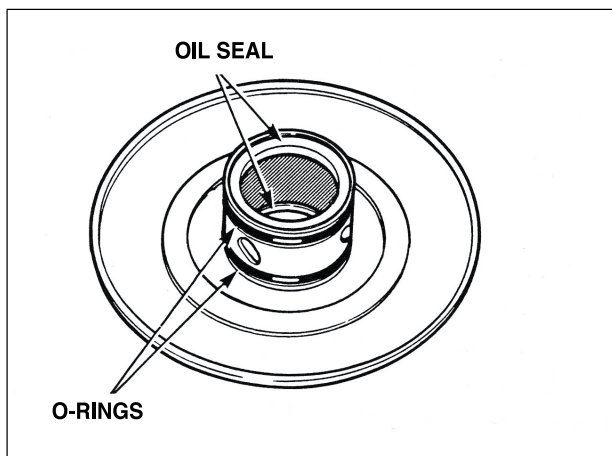
- Remove the seal collar from the driven pulley.



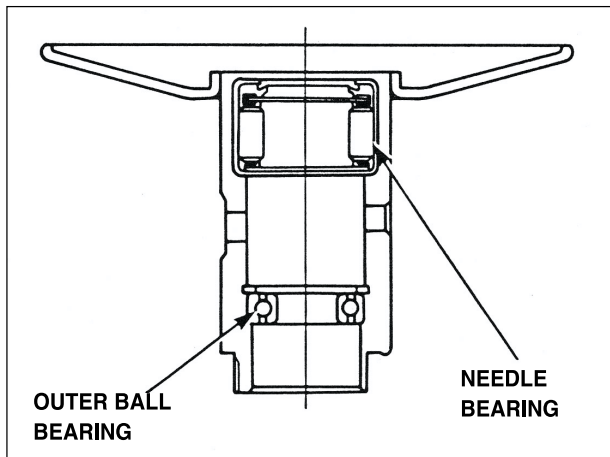
- Remove the guide pins and guide pin rollers and the movable driven face.



- Remove the O-ring and oil seals from the movable driven face



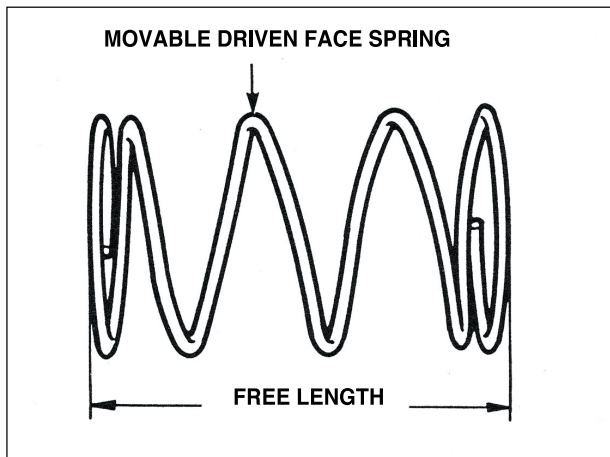
- Remove the movable driven face.



CLUTCH / DRIVEN PULLEY INSPECTION

Driven Face Bearing Inspection

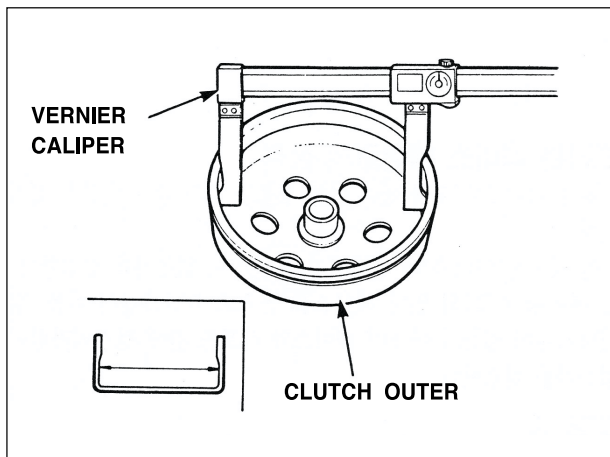
- Check the inner bearing oil seal (if installed) for damage; replace as necessary.
- Check the needle bearing for damage or excessive play and replace as necessary.
- Turn the inner race of the outer bearing with your finger. Check that the bearing turns smoothly and quietly, and that the bearing outer race fits securely. Replace the bearing if necessary.



Movable Driven Face Spring Inspection

- Measure the free length of the driven pulley spring and replace if the service limit is exceeded.

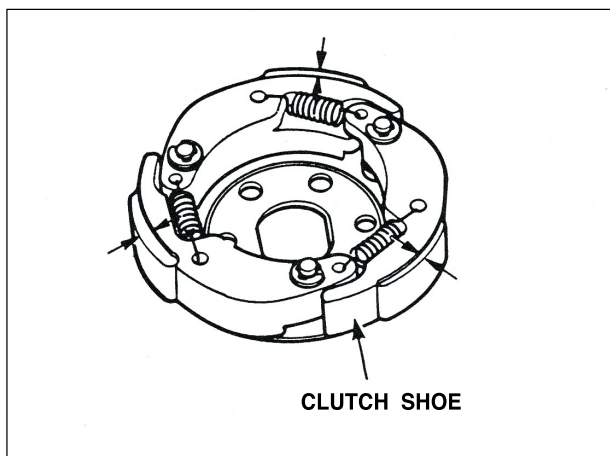
SERVICE LIMIT : 97.23mm
TOOL : VERNIER CALIPER



Clutch Outer

- Measure the I.D. at shoe contact surface of the clutch outer. Replace the outer if the service limit is exceeded.

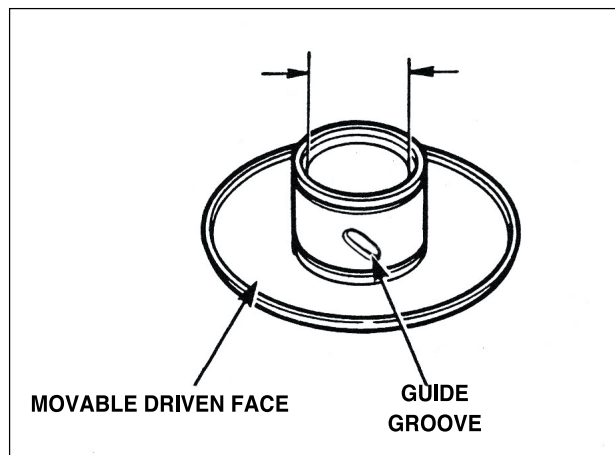
SERVICE LIMIT : 120.5mm



Clutch Shoe Inspection

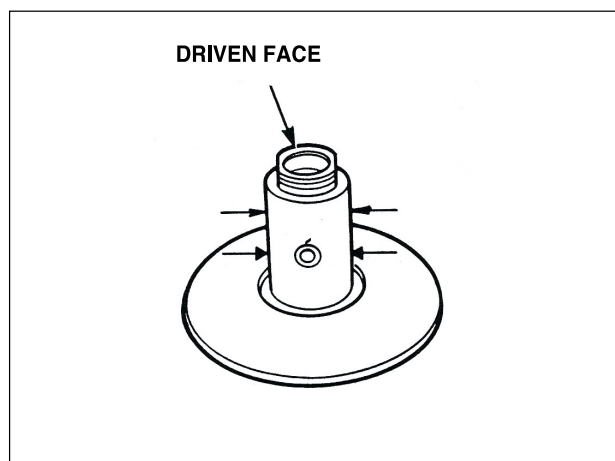
- Measure the thickness of each shoe ; replace if the service limit is exceeded.

SERVICE LIMIT : 2.0mm



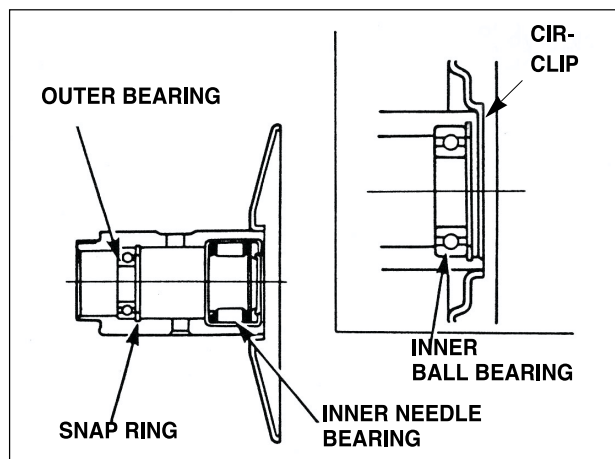
- Check the following;
 - Movable driven face for damage or excessive wear.
 - Guide pin groove for damage or deformation.
- Replace damaged or worn parts as necessary.
- Measure the I.D. of the movable driven face; replace if the service limit is exceeded.

SERVICE LIMIT : 38.060 mm



- Check the driven face for damage or excessive wear; replace as necessary
- Measure the O.D. of the driven face; replace if the service limit is exceeded.

SERVICE LIMIT : 33.94 mm



DRIVEN FACE BEARING REPLACEMENT

- Remove the inner bearing.

NOTE

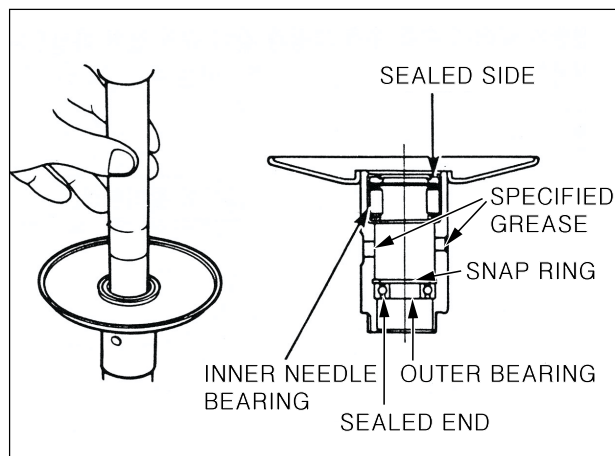
- If the driven face has an oil seal at inner bearing side, remove the oil seal first.
- If a ball bearing is used on the inside, remove the snap ring first then remove the bearing.

- Remove the snap ring then drive out the outer bearing toward the inner bearing side.
- Drive a new outer bearing into place with the sealed end toward the outside. Install the snap ring securely.

NOTE

- Apply the specified amount of specified grease as shown.

GREASE APPLICATION : 9.0-9.5 g



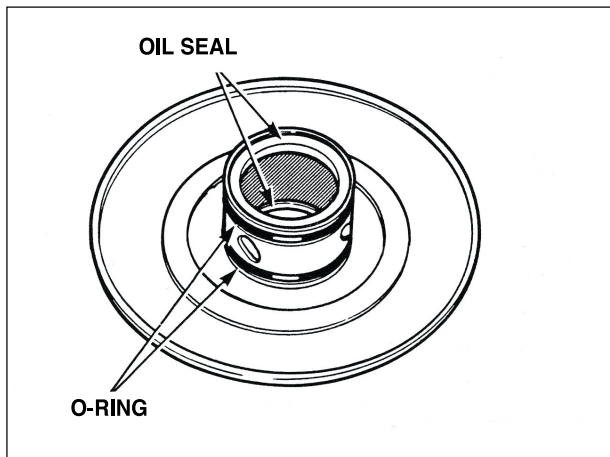
- Install in a new inner bearing.

NOTE

- Install the bearing with the sealed side facing out.
- Install the needle bearing using a hydraulic press.
- Install the ball bearing by driving it in or using a hydraulic press.

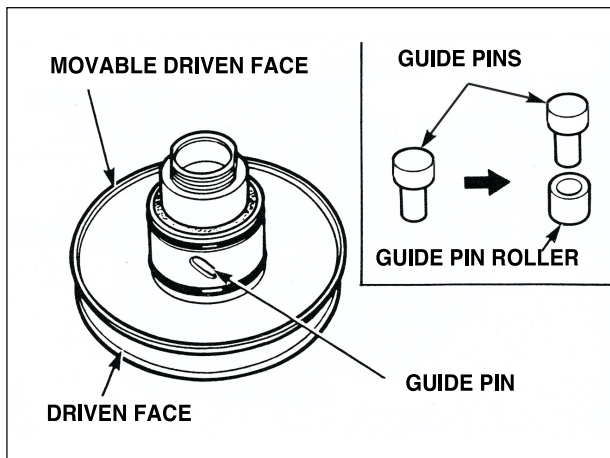
- Install the snap ring into the groove in the driven face.
- Install a new oil seal with the lip toward the bearing (if required).

**TOOLS : BEARING DRIVER ATTACHMENT
DRIVE PILOT**

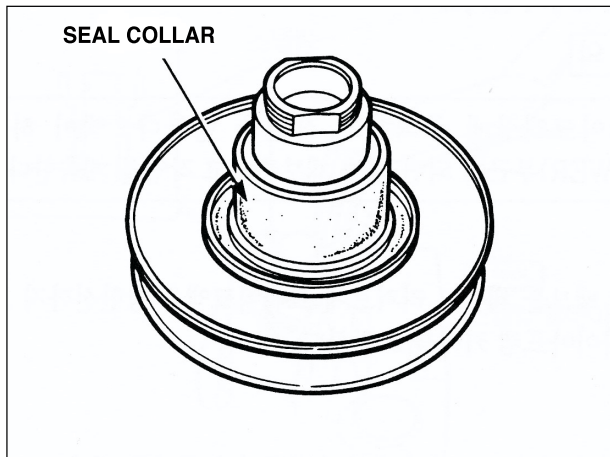


CLUTCH / DRIVEN PULLEY ASSEMBLY

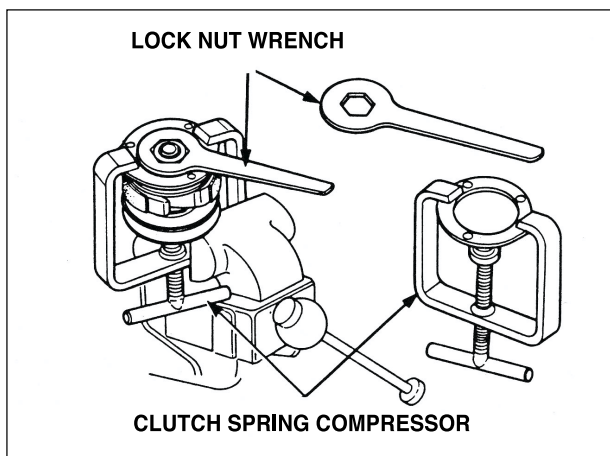
- Install new oil seals and O-rings on the movable driven pulley face.



- Install the movable face on the driven pulley face.
- Install the guide pins, or guide pins and guide pin rollers.



- Install the seal collar.

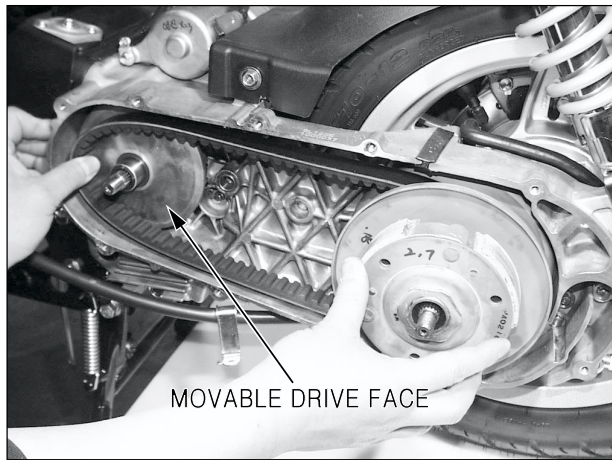


- Assemble the driven pulley, spring and clutch in the clutch spring compressor. Compress the assembly by turning the tool handle until the lock nut can be installed.
- Clamp the clutch spring compressor in a vise and tighten the lock nut to the specified torque using the lock nut wrench.

TORQUE VALUE : 5.0 kgf · m

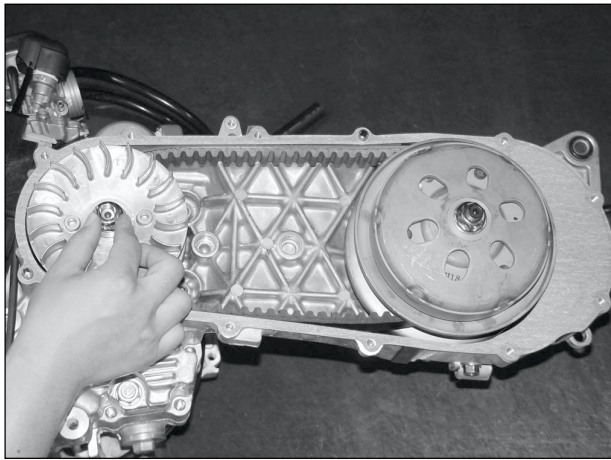
- Remove the spring compressor.

**TOOLS : CLUTCH SPRING COMPRESSOR
LOCK NUT WRENCH**

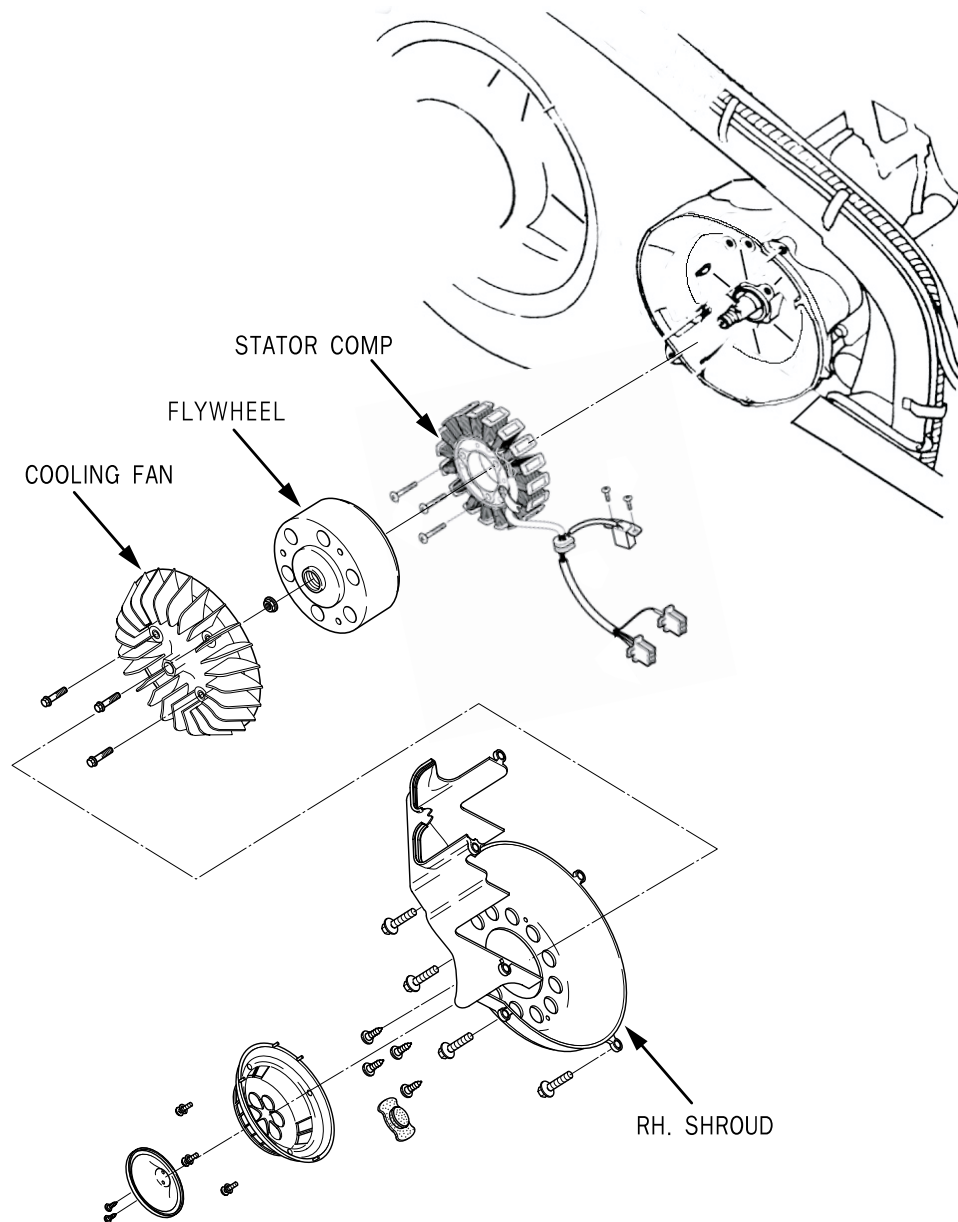


CLUTCH/DRIVEN PULLEY INSTALLATION

- Install the clutch / driven pulley and drive belt onto the drive shaft.
- Install the drive belt. (⇨7-3)



- Install the drive face. (⇨7-5)
- Install the LH. crankcase cover. (⇨7-2)



9. A.C GENERATOR / STARTER CLUTCH

SERVICE INFORMATION 9-1	RH. CRANKCASE COVER . . . 9-4
SHROUD 9-2	STARTER REDUCTION GEAR · 9-5
A.C GENERATOR 9-2	STARTER CLUTCH 9-6

SERVICE INFORMATION

GENERAL SAFETY

- This section describes the removal and assembling of the A.C generator.
- For information on A.C generator inspection, refer to the section 15.
- The charging system can be maintained without removing the engine.

SPECIFICATIONS

Unit : mm

ITEM	STANDARD VALUE		SERVICE LIMIT
STARTER DRIVEN GEAR	O.D	39.622 - 39.635	39.53
	I.D	32.000 - 32.025	32.10
REDUCTION GEAR	I.D	12.016 - 12.034	12.10
REDUCTION GEAR SHAFT	O.D	11.966 - 11.984	11.97

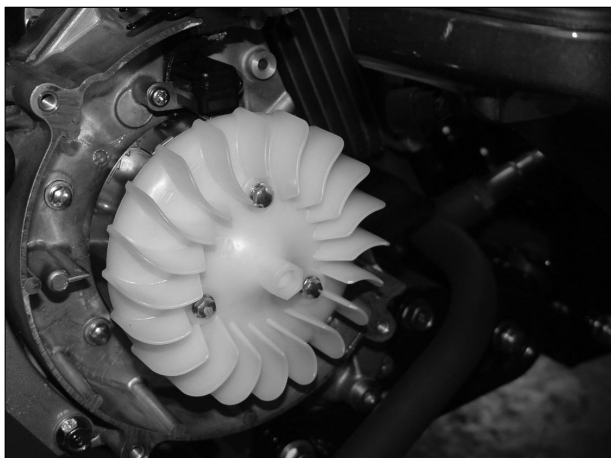
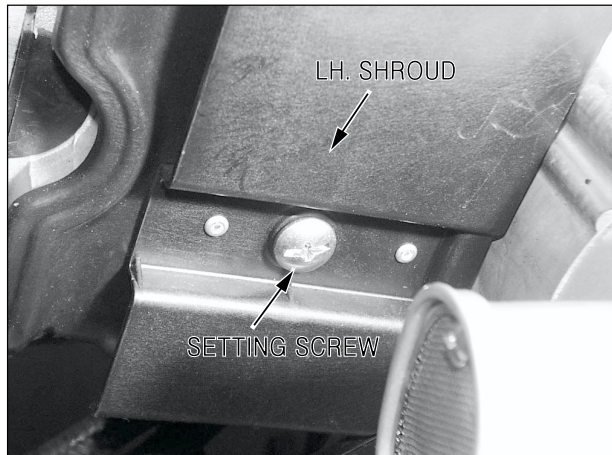
9

TORQUE VALUES

FLY WHEEL BOLT	5.5 kgf · m
STARTER CLUTCH LOCK NUT	9.5 kgf · m
RH. CRANKCASE COVER BOLT	1.1 kgf · m

TOOLS

SPECIAL SOCKET (12.7 x 28 x 120)
A.C.G ROTOR PULLER



SHROUD

REMOVAL

- Remove the following parts.
 - Luggage box (⇒3-2)
 - Center cover (⇒3-3)
 - Engine (⇒6-2)

- Loosen the RH. shroud 4 flange bolts and 4 tapping screws.
- Remove the RH. shroud.
- Loosen the LH. shroud setting screw.
- Remove the LH. shroud.
- Install in the reverse order of removal.

NOTE

- Before removing the RH. shroud, be sure to remove the RH. floor side cover and rear cushion upper bolt.

A.C GENERATOR

REMOVAL

- Loosen the rear cushion under bolt.
- Remove the following parts.
 - Luggage box (⇒3-2)
 - Body cover (⇒3-4)
 - Center cover (⇒3-3)
 - Engine (⇒6-2)
 - RH. shroud comp (⇒8-2)

- Remove the A.C.G wiring coupler and connector connected to the wire harness.
- Remove the A.C.G wiring from the A.C.G wiring setting clamp securing the engine and frame.
- Loosen the 3 cooling fan bolts.

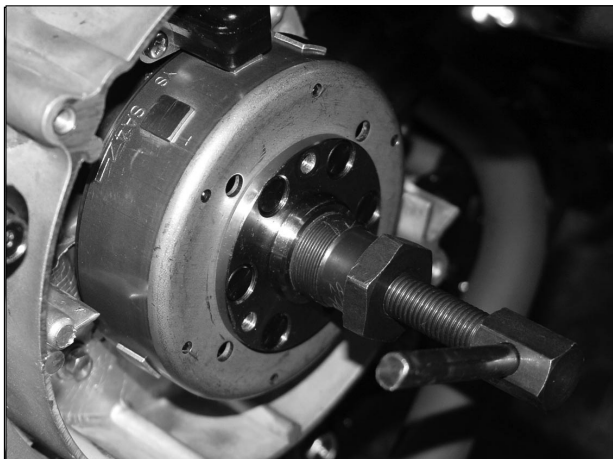
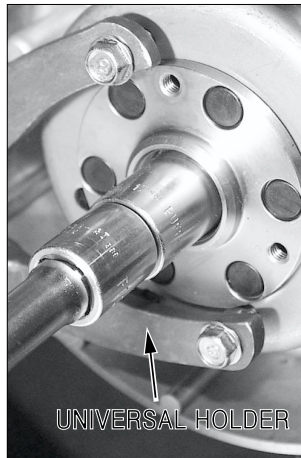
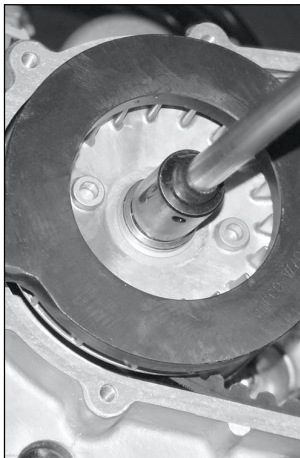


- Install the universal holder on the flywheel.
- If the universal holder cannot be used, remove the LH. crankcase cover at the left side of the crankshaft, and hold the drive face with the drive face holder.
- Loosen the flange nut securing the fly wheel, and remove the flywheel using the A.C.G rotor puller.

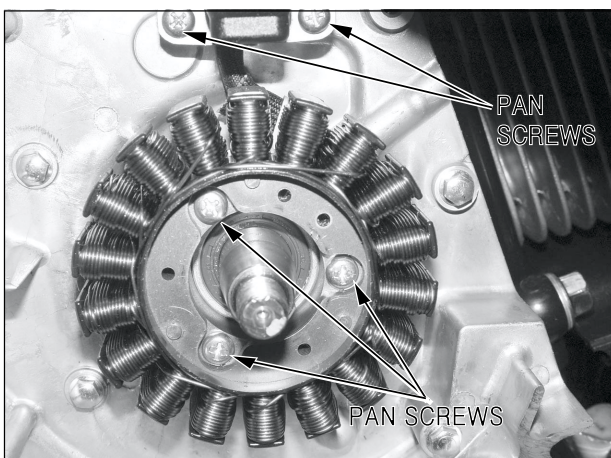
⚠ CAUTION

- Insert the puller shaft and remove the flywheel after inserting the A.C.G rotor puller and securing it with spanner.
- The flywheel may easily removed if you rotate the puller while tapping the roller shaft with metal hammer.
- Always use a holder and a puller to remove the flywheel. Do not try to remove the flywheel by hammering directly on it. The crankshaft or components could be damaged.
- After removing the flywheel, check the woodruff key for damage and wear.

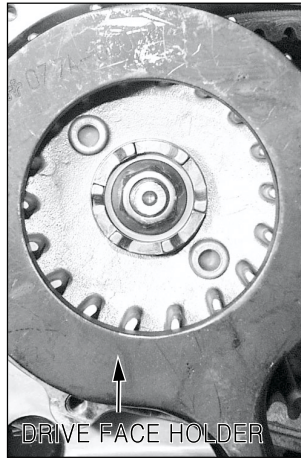
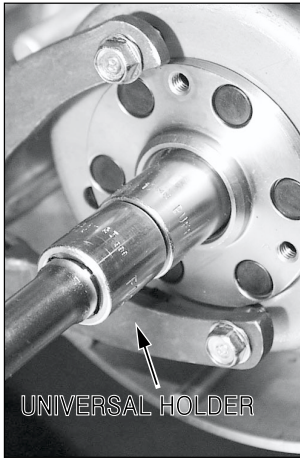
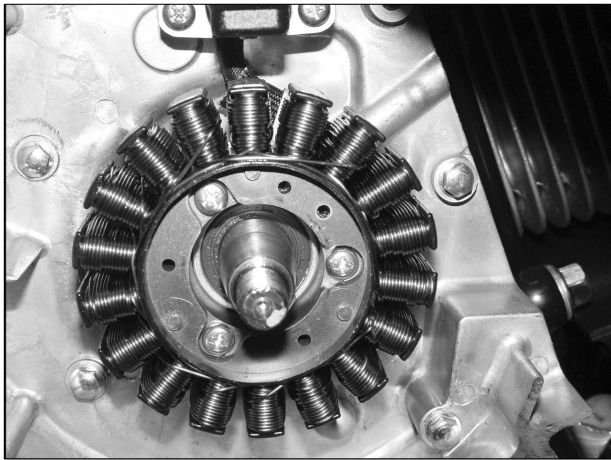
**TOOLS : A.C.G ROTOR PULLER
UNIVERSAL HOLDER
DRIVE FACE HOLDER**



- Loosen the 2 pan screws securing the pulse generator, and remove it.



- Loosen the 3 starter setting pan screws, remove the stator.



A.C GENERATOR INSTALLTION

- Install the stator to the RH. crankcase cover.
- Clean the tapered portion of the crankshaft.
- Clean the inside part of the flywheel.
- Check the woodruff key, install the flywheel by aligning the groove with the woodruff key.

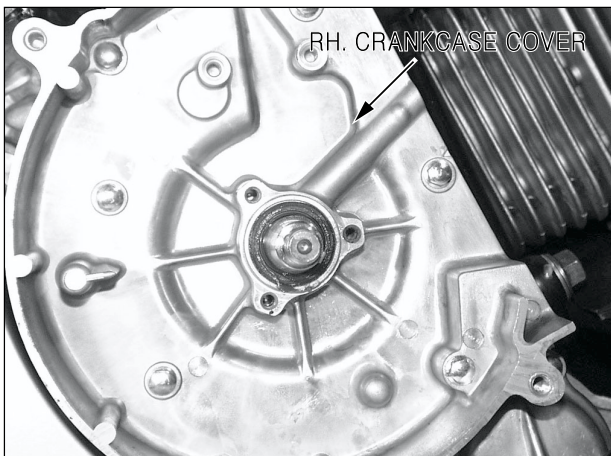
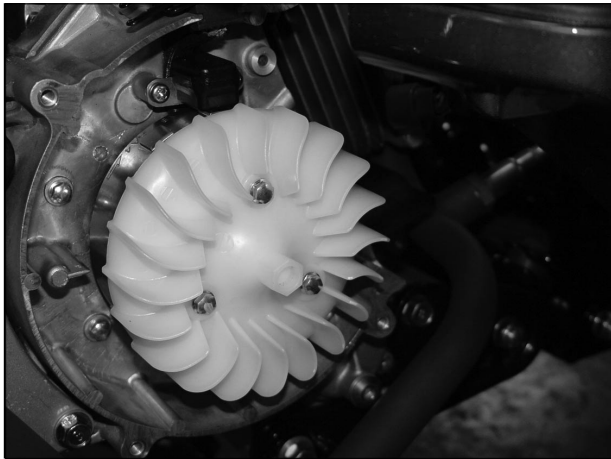
- Temporarily install the flywheel nut, hold the flywheel with the universal holder, and tighten the flywheel nut with the specified torque.

TORQUE VALUE : 5.0 - 6.0 kgf · m
TOOL : UNIVERSAL HOLDER

⚠ NOTE

- If the universal holder cannot be used, remove the LH. crankcase cover and hold the drive face with the drive face holder.

TORQUE VALUE : 0.8 - 1.2 kgf · m
TOOL : DRIVE FACE HOLDER

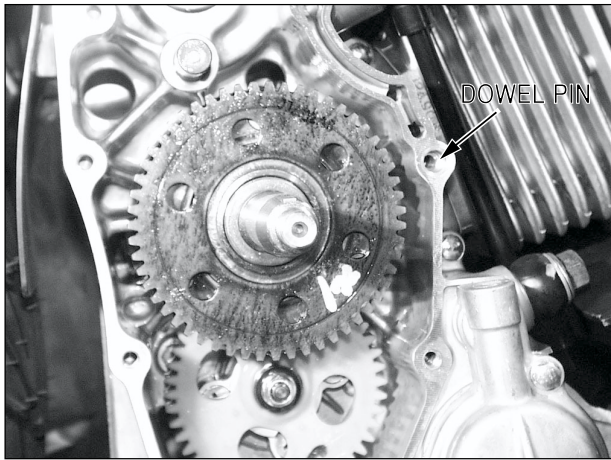


- Install the RH. shroud. (⇒8-2)
- Connect the A.C.G wiring coupler and connector to the wire harness, and install the wiring with the clamp.
- Insert the battery earth cable to the shroud groove.
- Install the rear cushion under bolt.
- Install the RH. floor side cover. (⇒4-7)
- Install the center cover. (⇒4-5)
- Install the luggage box. (⇒4-4)

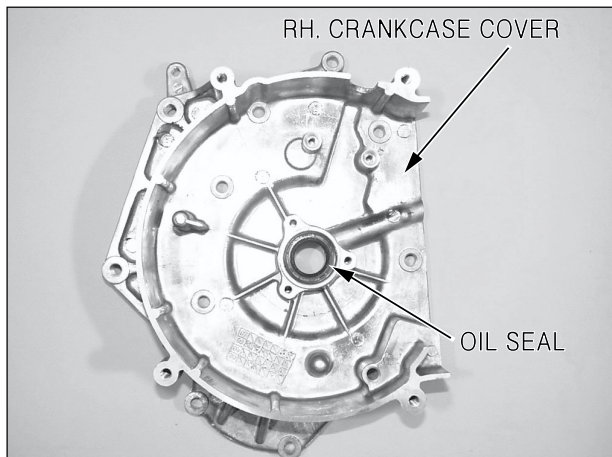
RH. CRANKCASE COVER

REMOVAL

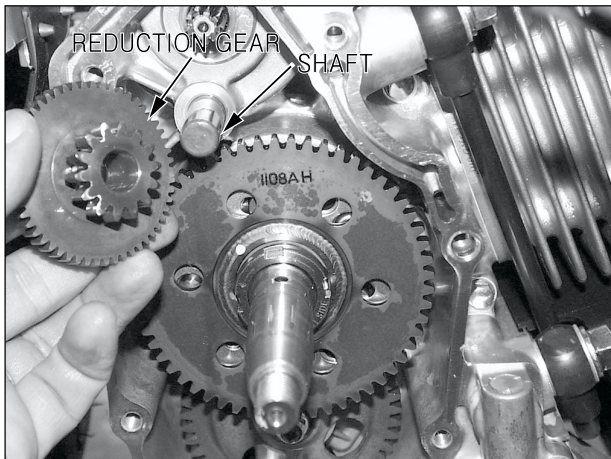
- Loosen the rear cushion under bolt.
- Remove the following parts.
 - Luggage box (⇒3-2)
 - Center cover (⇒3-3)
 - RH. floor side cover (⇒3-4)
 - RH. shroud (⇒8-2)
 - EX. muffler (⇒3-8)
 - Rear caliper (⇒13-3)
 - Rear swing arm (⇒13-7)
 - Cooling fan (⇒8-2)
 - A.C Generator (⇒8-2)



- Loosen the 9 RH. crankcase cover setting bolts.
- Remove the RH. crankcase cover.
- Remove the gasket and dowel pin.



- Remove the RH. crankcase cover oil seal.
- Check the oil seal for wear or damage and replace with a new one as necessary.



STARTER REDUCTION GEAR

REMOVAL

- Remove the starter reduction gear and shaft.

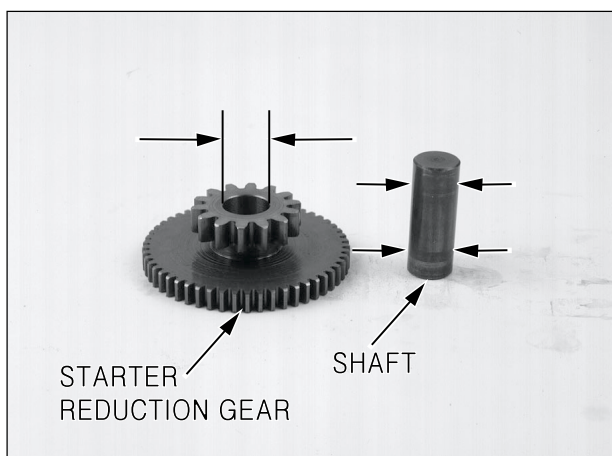
INSPECTION

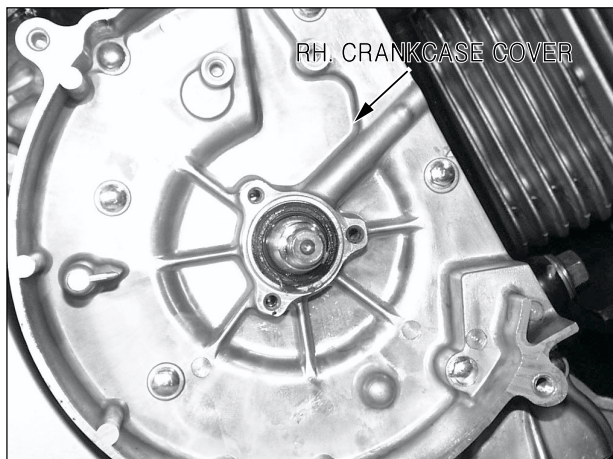
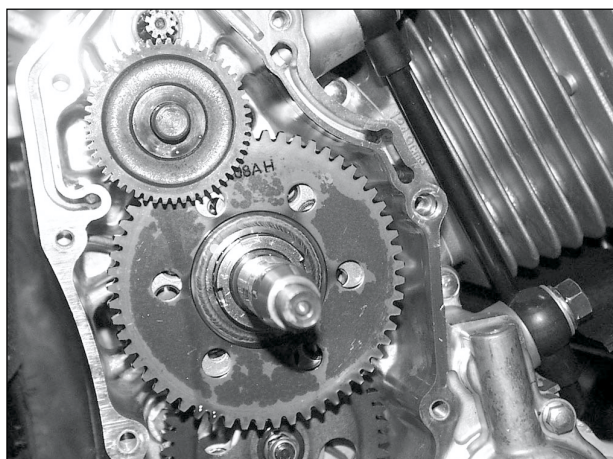
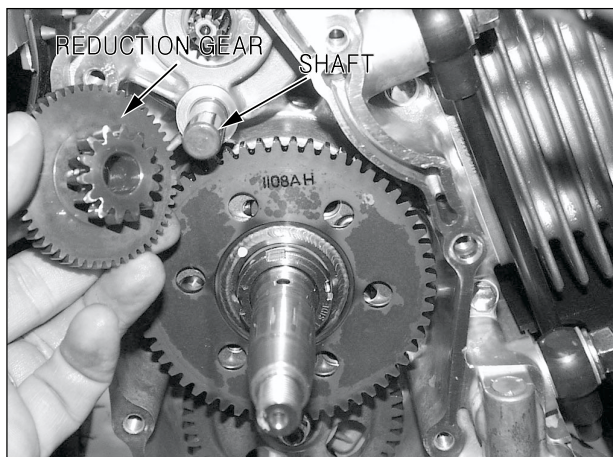
- Check the reduction gear for wear or damage.
- Measure the inner diameter of the gear.

SERVICE LIMIT : 12.10 mm

- Measure the outer diameter of the gear shaft.

SERVICE LIMIT : 11.97 mm





STARTER REDUCTION GEAR INSTALLATION

- Install the starter reduction gear and shaft.

- Remove the gasket residues from the RH. crankcase.
- Install a new gasket and dowel pin.
- Tighten the RH. crankcase cover with setting bolts.
- Install the following parts.
 - A.C. Generator (⇒8-2)
 - Cooling fan (⇒8-2)
 - RH. shroud (⇒8-2)
 - Rear swing arm (⇒13-7)
 - Rear caliper (⇒13-3)
 - EX. muffler (⇒3-8)
 - RH. floor side cover (⇒4-7)
 - Luggage box (⇒3-2)
- Tighten the rear cushion under bolt.

STARTER CLUTCH

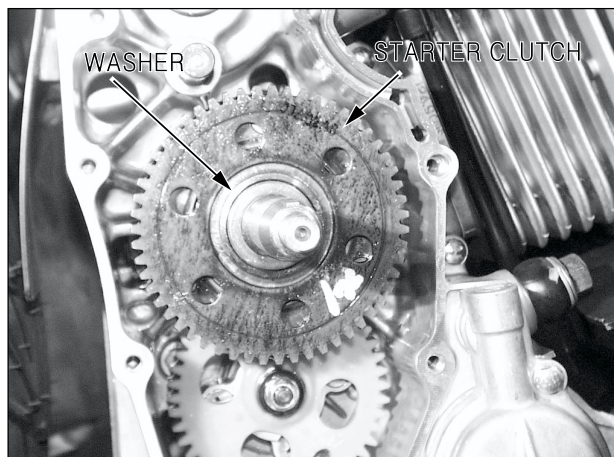
REMOVAL

- Loosen the rear cushion under bolt.
- Remove the following parts.
 - RH. floor side cover (⇒3-4)
 - RH. shroud (⇒8-2)
 - Cooling fan (⇒8-2)
 - A.C Generator (⇒8-2)
 - EX. muffler (⇒3-8)
 - Rear caliper (⇒13-3)
 - Rear swing arm (⇒13-7)
 - RH. crankcase cover (⇒8-4)
- Remove the LH. crankcase cover and hold the drive face with the drive face holder.
- Loosen the starter clutch lock nut with a special socket.

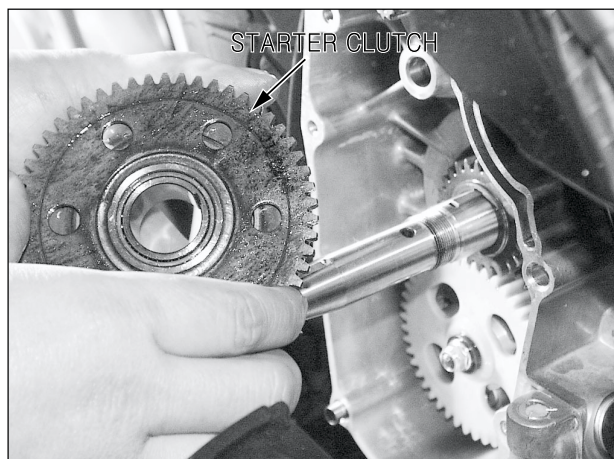
TORQUE VALUE : 9.5 kgf · m

TOOLS : SPECIAL SOCKET (12.7x28x120)

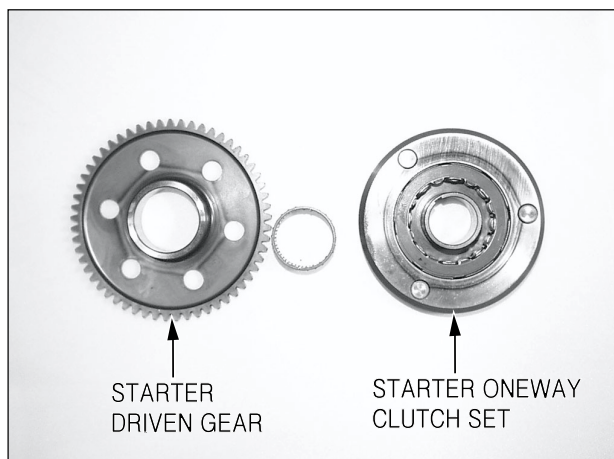
DRIVE FACE HOLDER



- Remove the washer.
- Remove the starter driven gear and starter clutch.

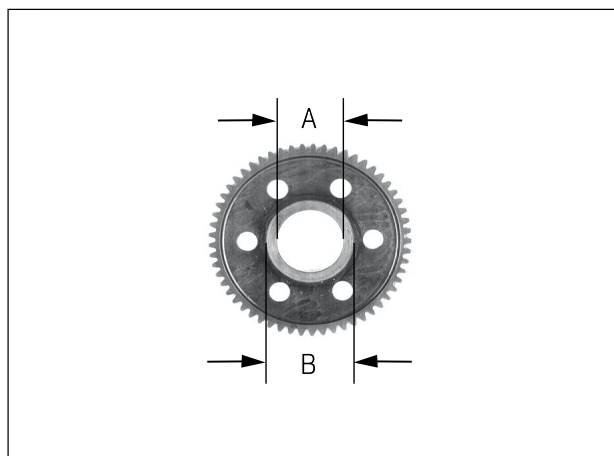


- Check the starter driven gear and starter clutch for proper operation.
- Remove the starter clutch.



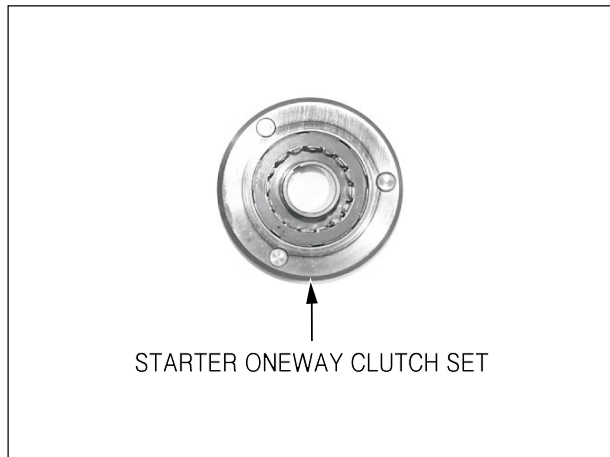
STARTER CLUTCH INSPECTION

- Remove the starter driven gear, needle bearing and starter oneway clutch set from the starter clutch assembly.



- Check the starter driven gear for wear or damage.
- Measure the inner diameter of the starter driven gear.

SERVICE LIMIT : A : 32.10 mm
B : 39.53 mm

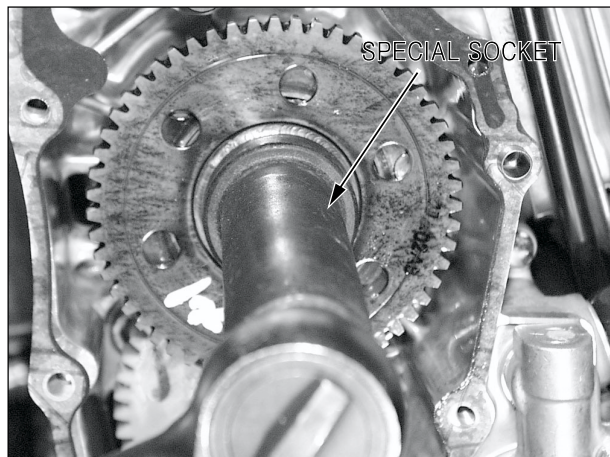
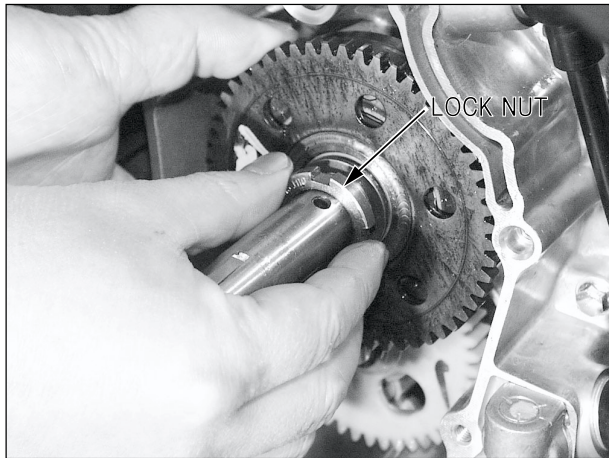


STARTER CLUTCH INSTALLATION

- Install the starter oneway clutch set, starter driven gear and needle bearing to the starter clutch assembly.
- Install the starter clutch to the RH. crankshaft.

NOTE

- When installing the starter clutch, match it with the groove accurately



- Install the thrust washer.
- Temporarily install the starter clutch lock nut.

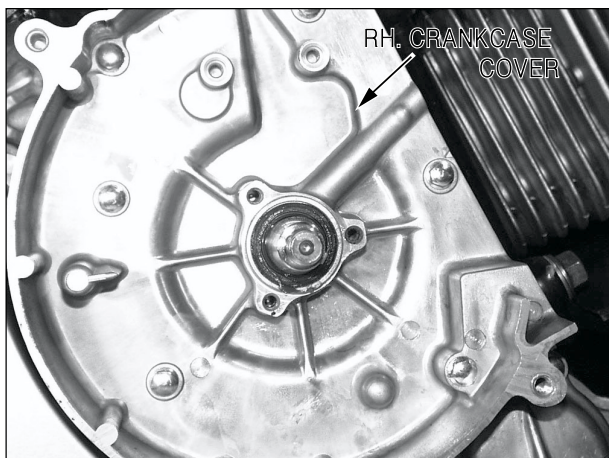
- Hold the drive face with the drive face holder.
- Tighten the starter clutch lock nut with a special socket.

NOTE

- Tighten the lock nut with specified torque.

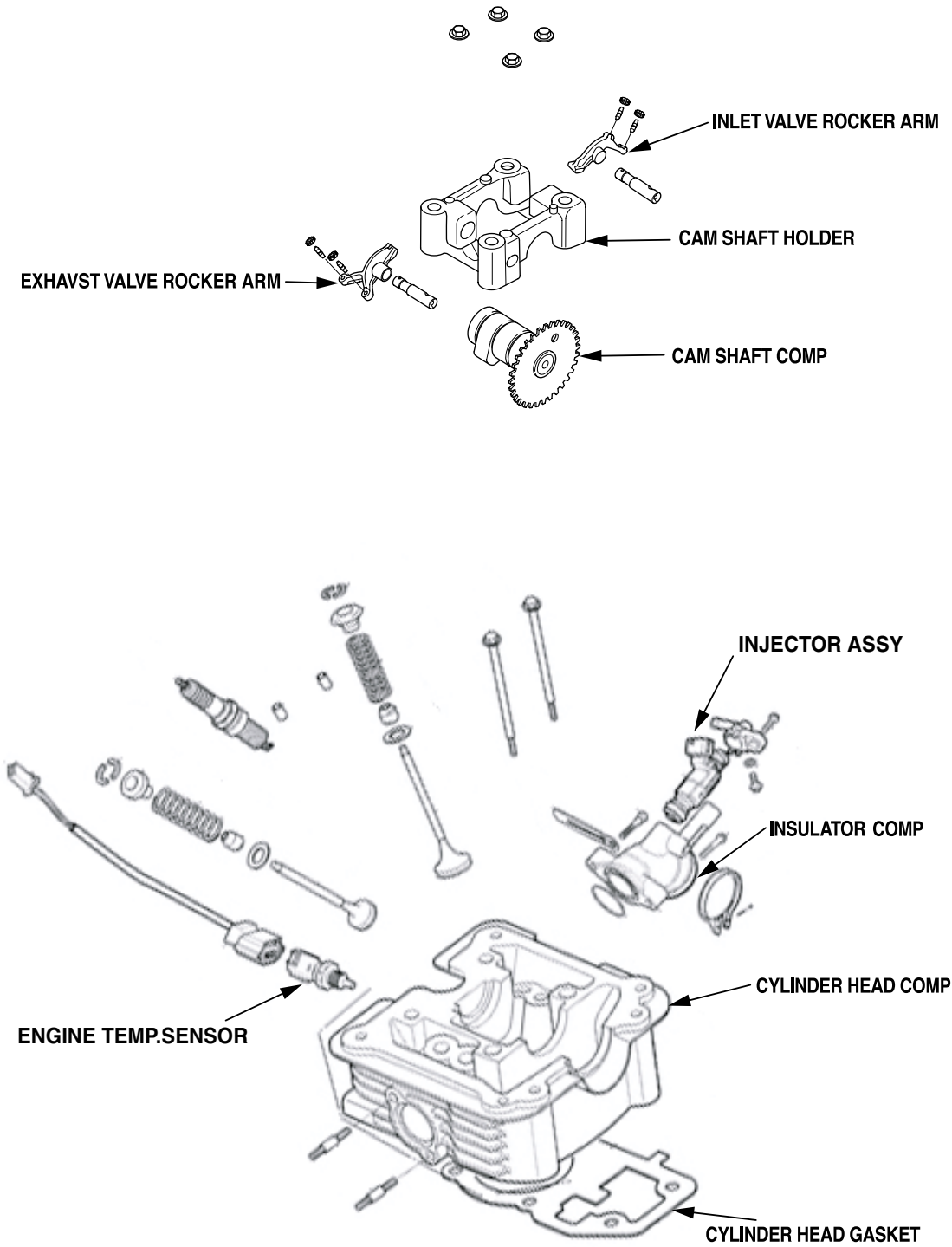
TORQUE VALUE : 9.5 kgf · m

**TOOLS : SPECIAL SOCKET (12.7x28x120)
DRIVE FACE HOLDER**



- Install the following parts.
 - RH. crankcase cover (⇒8-2)
 - A.C Generator (⇒8-2)
 - Cooling fan (⇒8-2)
 - RH. shroud (⇒8-2)
 - Rear swing arm (⇒13-7)
 - Rear caliper (⇒13-3)
 - EX. muffler (⇒3-8)
 - RH. floor side cover (⇒3-4)
 - LH. crankcase cover (⇒7-2)
- Tighten the rear cushion upper bolt.

MEMO



10. CYLINDER HEAD / VALVES

SERVICE INFORMATION	10-1	VALVES	10-6
TROUBLESHOOTING	10-2	VALVE GUIDES	10-7
CAMSHAFT	10-3	VALVE SEATS	10-8
CYLINDER HEAD	10-5	CYLINDER HEAD ASSEMBLY .	10-11
VALVE SPRINGS	10-6	CAMSHAFT ASSEMBLY . . .	10-13

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 oil 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
ROCKER ARM	ROCKER ARM INNER DIAMETER		12.016 - 12.034	39.05
	ROCKER ARM SHAFT OUTER DIAMETER		11.982 - 12.000	11.950
CAMSHAFT	CAM HEIGHT	IN	33.835 - 33.995	33.625
		EX	33.984 - 34.144	33.765
	CAMSHAFT OUTER DIAMETER		15.005 - 15.018	15.040
CYLINDER HEAD WARPAGE			-	-
VALVE VALVE GUIDE	VALVE SPRING FREE LENGTH	IN,EX	37.21	36.90
	VALVE STEM OUTER DIAMETER	IN	4.972 - 4.984	4.920
		EX	4.952 - 4.964	4.900
	VALVE GUIDE INNER DIAMETER	IN,EX	5.000 - 5.012	5.030
	CLEARANCE BETWEEN STEM AND GUIDE	IN	0.016 - 0.040	0.090
		EX	0.036 - 0.060	0.120
VALVE SEAT WIDTH			0.8 - 1.0	1.4

TORQUE VALUES

CAM CHAIN TENSIONER PIVOT BOLT	1.0 kgf · m
SPARK PLUG	1.2 kgf · m
CAMSHAFT HOLDER 8mm NUT	2.0 kgf · m
CAM CHAIN TENSIONER MOUNTING BOLT	1.2 kgf · m
CAM CHAIN TENSIONER SEALING SCREW	0.4 kgf · m
CYLINDER HEAD COVER BOLT	0.9 kgf · m
CYLINDER HEAD BOLT	1.1 kgf · m
TAPPET ADJUST NUT	0.8 kgf · m

TOOLS

VALVE GUIDE REAMER
VALVE GUIDE DRIVER
VALVE SPRING COMPRESSOR
VALVE SEAT CUTTER
SEAT CUTTER IN 37° (21.5mm)
EX 37° (18.5mm)
IN 45° (22.0mm)
EX 45° (22.0mm)
IN 55° (20.0mm)
EX 55° (20.0mm)

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)
 - Burned or bent valves
 - Incorrect valve timing
 - Broken valve spring
 - Uneven valve seating
- Cylinder head
 - Leaking or damage head gasket
 - Warped or cracked cylinder head
- Cylinder, piston (see section 10)

Excessive white smoke

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

Rough idle

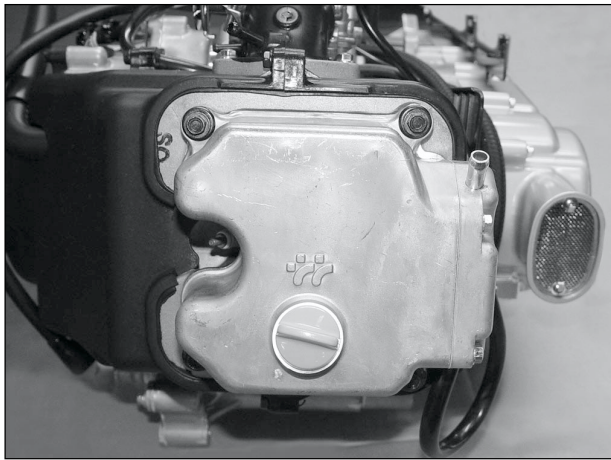
- Low cylinder compression

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
- Worn rocker arm and / or shaft
- Loose or worn cam chain
- Worn or damaged cam chain tensioner
- Damaged cylinder head gasket
- Incorrect spark plug installation



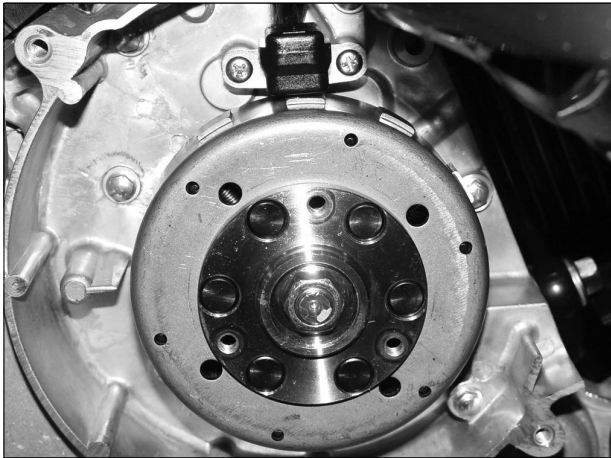
CAMSHAFT

REMOVAL

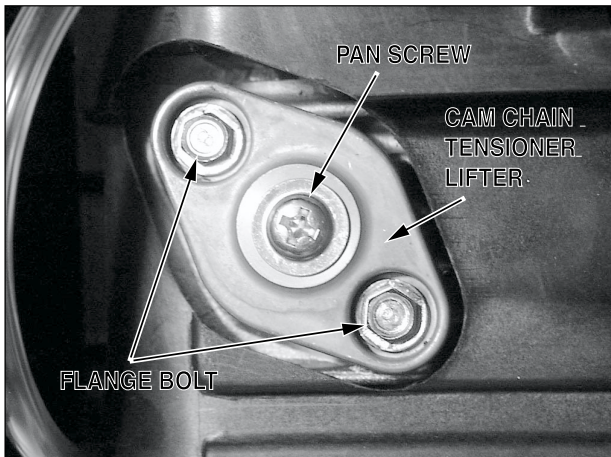
- Remove the luggage box. (⇒3-2)
- Remove the center cover. (⇒3-3)
- Loosen the cylinder head cover bolts, remove the cover.
- Remove the shroud grommet B of the fan cover.

NOTE

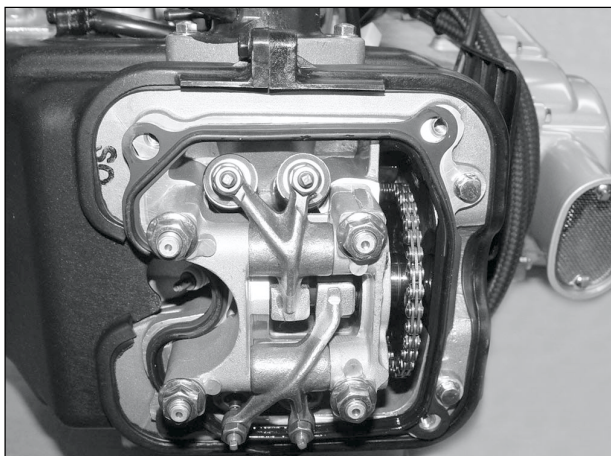
- The camshaft can be maintained without removing the engine.



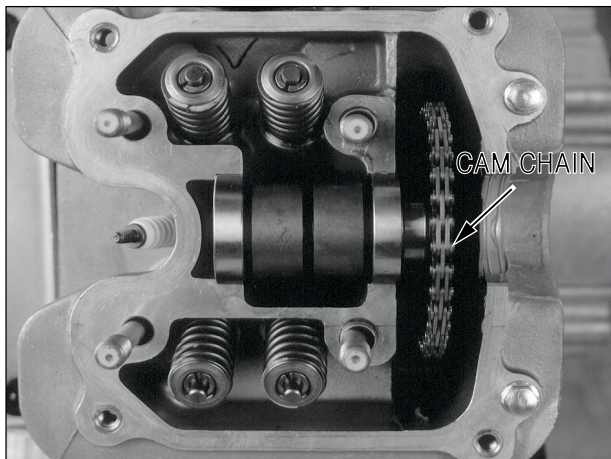
- Turn the crankshaft to the left, and align the "T" mark of the flywheel with the index mark of the RH. crankcase cover.
- Verify that the piston is located at the top dead center. (Make all camshaft lobes face downward.)
- If all camshaft lobes face upward, rotate the crankshaft to the left for 1 turn (360°), and align the "T" mark with the index mark once again.



- Loosen the pan screw of the cam chain, remove the tensioner flange bolts and tensioner lifter.



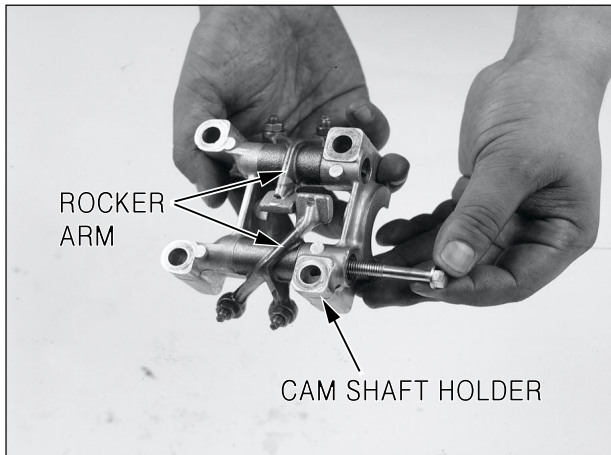
- Loosen the 4 camshaft holder 8mm nuts.
- Remove the cam cover plate.
- Remove the camshaft holder from the cylinder head.



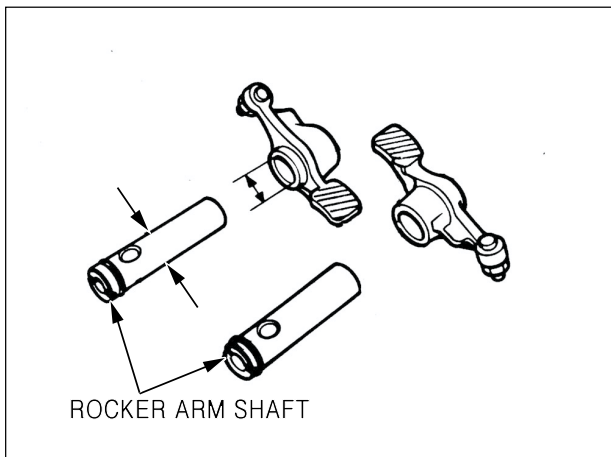
- Remove the cam chain from the camshaft.

NOTE

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



- Insert the 6mm bolt into the rocker arm shaft, and pulling bolts to remove the rocker arm shaft.
- Remove the rocker arm.
- Remove the other side rocker arm shaft and rocker arm in the same sequence.



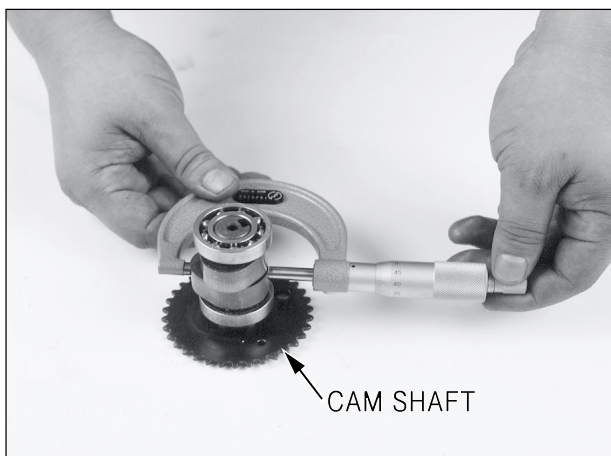
CAMSHAFT INSPECTION

- Check the rocker arm and rocker arm shaft for wear or damage.
- Measure the inner diameter of the rocker arm.

SERVICE LIMIT : 12.060 mm

- Measure the outer diameter of the rocker arm shaft.

SERVICE LIMIT : 11.950 mm



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

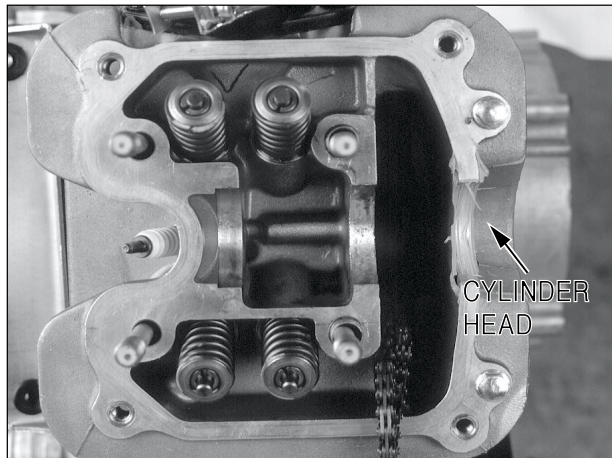
**SERVICE LIMIT : IN : 33.625 mm
EX: 33.765 mm**



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

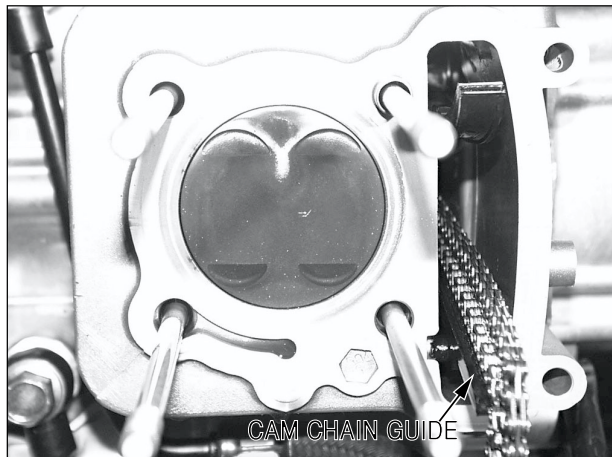
⚠ CAUTION

- Be sure to check the valve clearance.

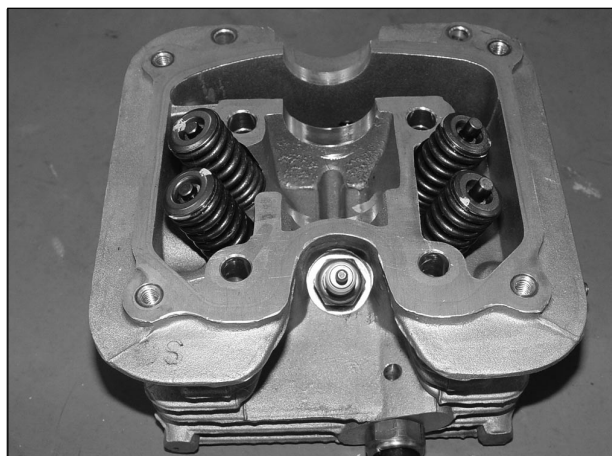


CYLINDER HEAD REMOVAL

- Remove the engine from the frame. (⇒6-2)
- Remove the cylinder head cover.
- Remove the RH. LH. shroud. (⇒8-2)
- Remove the camshaft. (⇒9-3)
- Remove the EX. pipe. (⇒3-8)
- Remove the cylinder head.

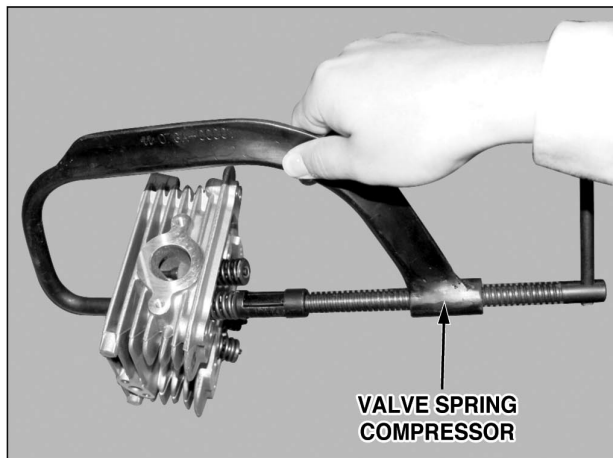


- Remove the cylinder head gasket, dowel pin and cam chain guide from the cylinder.



DISASSEMBLY

- Remove the spark plug from the cylinder head.



- Remove the valve spring, valve cotter, retainer, spring and valve. Using the valve spring compressor.

TOOL : VALVE SPRING COMPRESSOR

⚠ NOTE

- To prevent the loss of tension, do not compress the valve spring more than necessary.
- Mark the disassembled parts so that they can be reassembled into the original position later.

- Remove the valve spring seat and valve stem seal. Remove carbon deposits from the inside of the combustion chamber.

CYLINDER HEAD INSPECTION

- Remove gasket marks from the cylinder head gasket.

⚠ NOTE

- Take precautions not to damage the cylinder head gasket attachment.

- Check the spark plug assembling hole and the valve seat for cracks.
- Using a square and a feeler gauge, check the cylinder head distortion.

SERVICE LIMIT : 0.1 mm

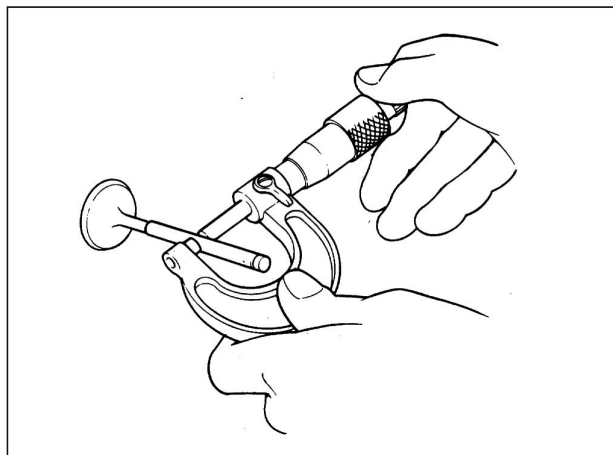
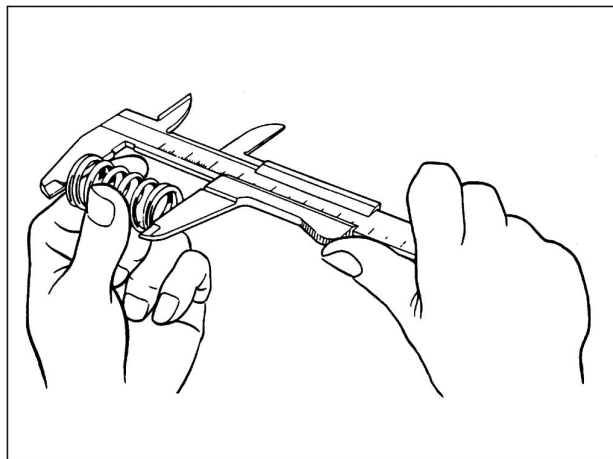
VALVE SPRINGS

- Measure the free length of the inner and outer valve springs.

SERVICE LIMIT : 36.90 mm

⚠ NOTE

- Replace the valve spring with new one if the length of any one is less than the service limit.

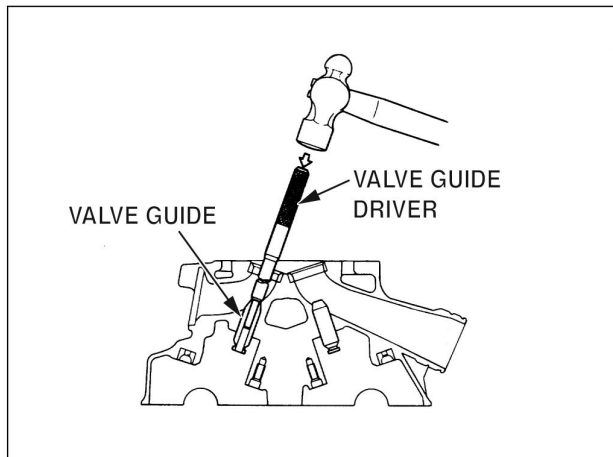
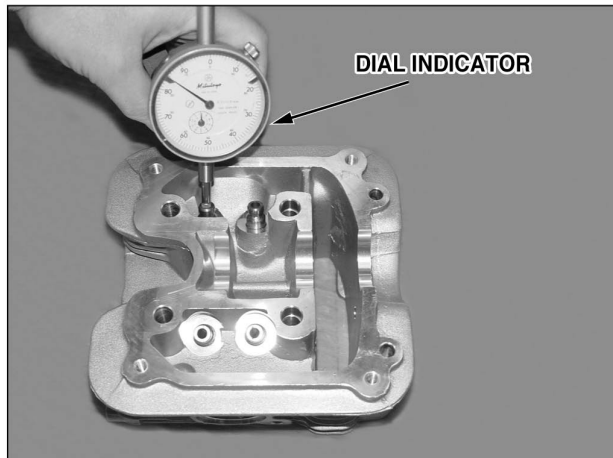
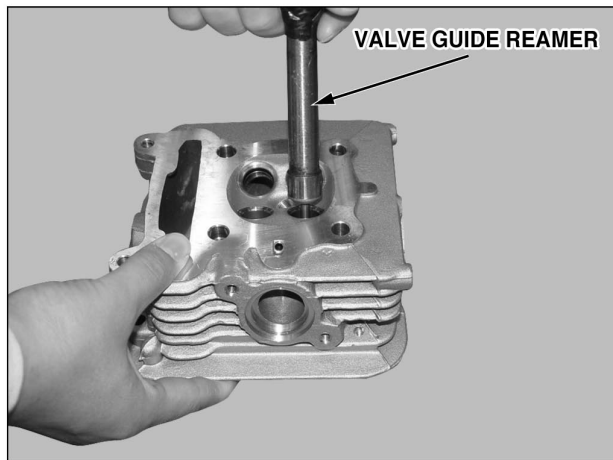


VALVES

- Inspect each valve for bending, burning, scratches or abnormal wear.
- Insert the valves in their original positions in the cylinder head. Check that each valve moves up and down smoothly, without binding.
- Measure and record the valve stem outer diameter in three places along the valve guide sliding area.

**SERVICE LIMIT : IN : 4.920 mm
EX: 4.900 mm**

- Replace the valve with a new one if the service limit is exceeded.



VALVE GUIDES

INSPECTION

- 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

- 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.
- Rotate the reamer clockwise, never counterclockwise when inserting and removing.

TOOL : VALVE GUIDE REAMER

- Measure and record each valve guide inner diameter.

SERVICE LIMIT : 5.030 mm

- Measure the guide-to-stem clearance with a dial indicator while rocking the stem in the direction of normal thrust.

**SERVICE LIMIT : IN : 0.090 mm
EX: 0.120 mm**

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

REPLACEMENT

NOTE

- Refinish the valve seats whenever the valve guides are replaced to prevent uneven seating.

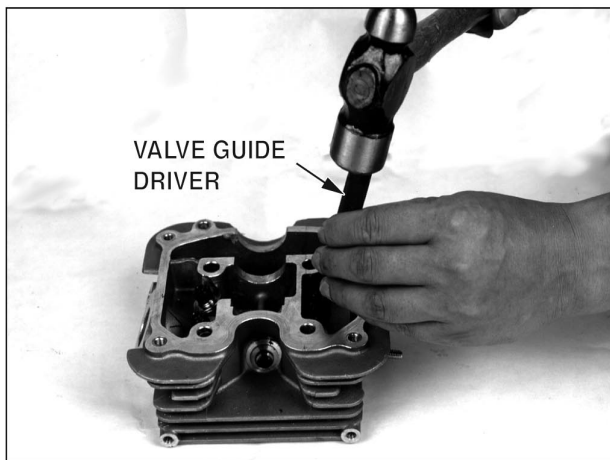
- Heat the cylinder head to 130° C - 140° C (275° F - 290° F).
- Do not heat the cylinder head beyond 150° C (300° F).
- Use temperature indicator sticks, available from welding supply stores, to be sure the cylinder head is heated to the proper temperature.

CAUTION

- Using a torch to heat the cylinder head may cause warping.

WARNING

- Wear insulated gloves to avoid burns when handling the heated cylinder head.



- 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.

- Apply oil to a new O-ring and install it onto a new valve guide.
- Drive the new guide in from the camshaft side of the cylinder head while the cylinder head is still heated.

TOOL : VALVE GUIDE DRIVER

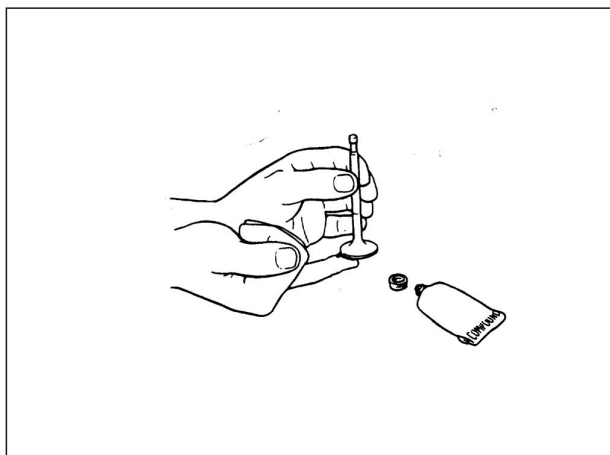
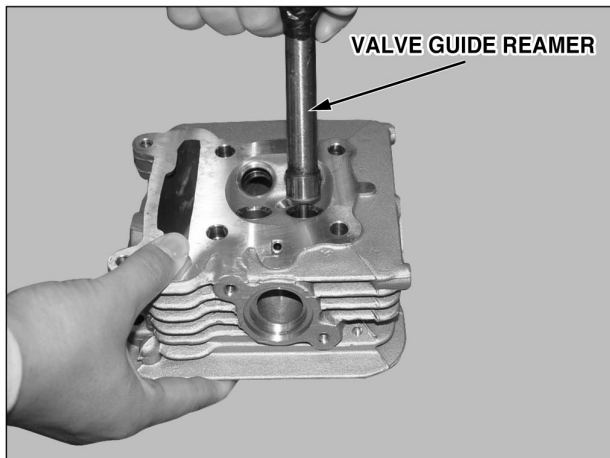
- When reaming new valve guides, insert the valve guide reamer from the combustion chamber side.

⚠ 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
- Rotate the reamer clockwise, never counterclockwise when inserting and removing.

TOOL : VALVE GUIDE DRIVER

- Reface the valve seats and clean the cylinder head thoroughly to remove any metal particles.



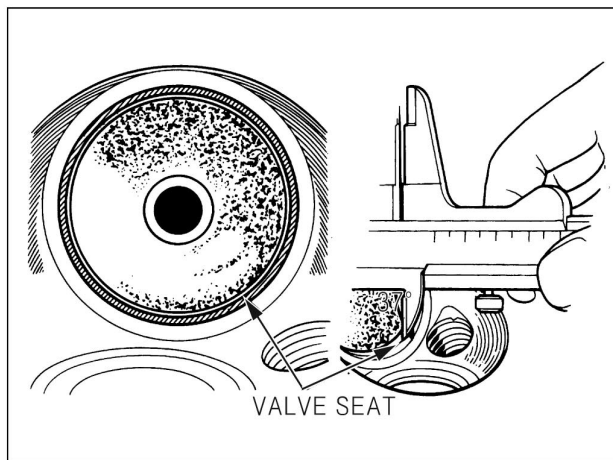
VALVE SEATS

INSPECTION

- Clean all intake and exhaust valves thoroughly to remove carbon deposits.
- Apply a light coating of Prussian Blue to each valve face.

⚠ NOTE

- 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 and stem tips cannot be ground. If a valve face or stem tip is rough, worn unevenly, or contacts the seat improperly, the valve must be replaced.

- Measure the valve seat width.

STANDARD VALUE : 0.8 -1.0 mm

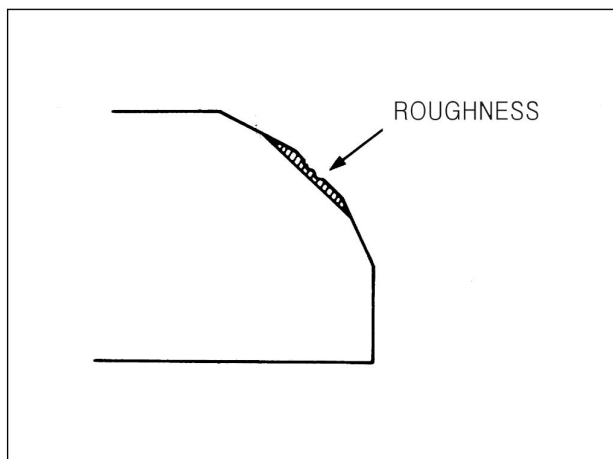
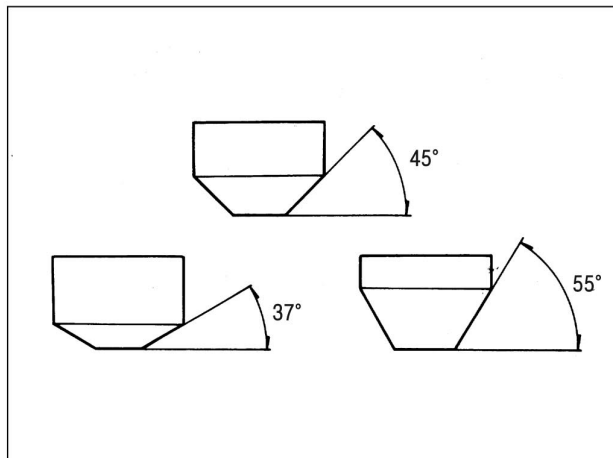
SERVICE LIMIT : 1.4 mm

VALVE SEAT REFACING

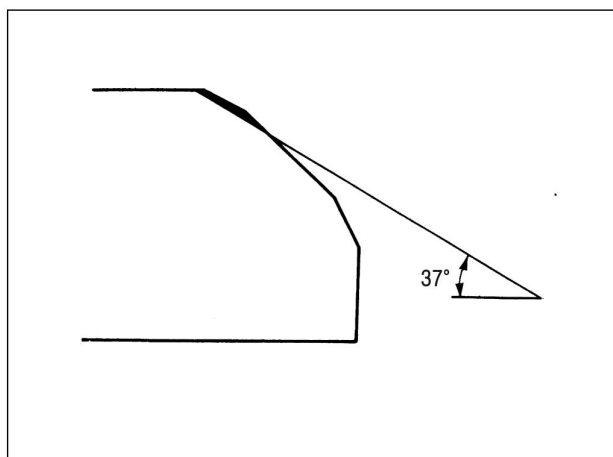
- Reface the worn valve seat by using valve seat cutters and grinders.

NOTE

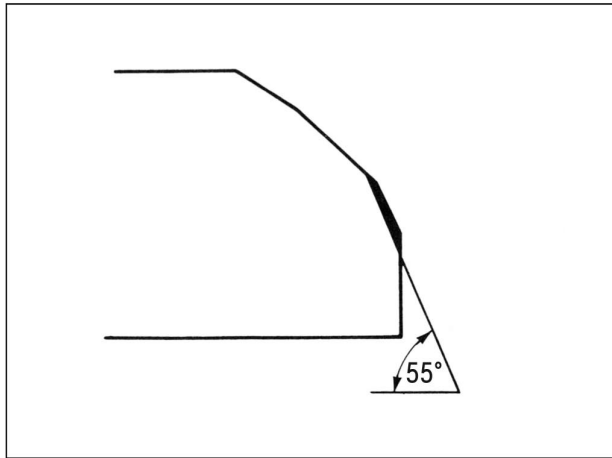
- Follow the refacer manufacturer's operating instructions.
- Reface the valve seat whenever the valve guide has been replaced.
- Be careful not to grind the seat more than necessary.



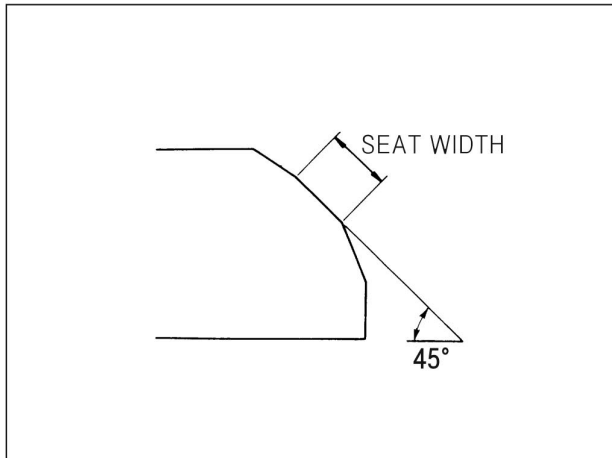
- Using a 45 degree cutter, remove any roughness or irregularities from the seat.



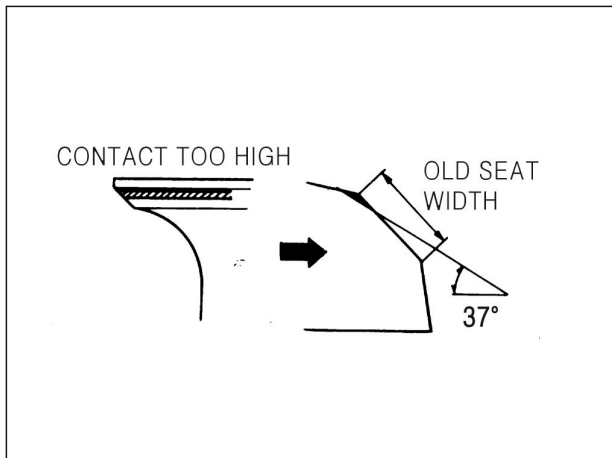
- Using a 37 degree cutter, remove $\frac{1}{4}$ of the existing valve seat material.



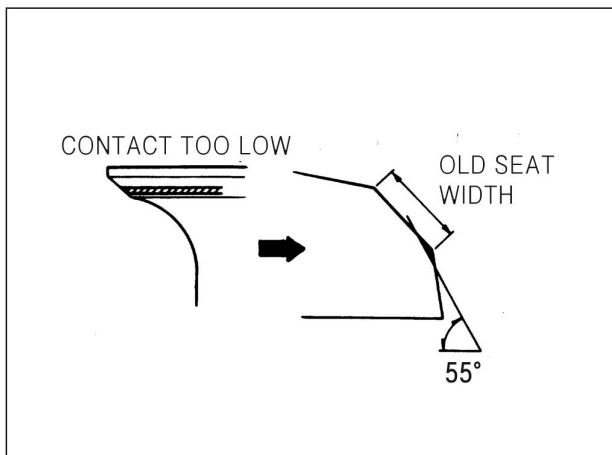
- Using a 55 degree cutter, remove the bottom $\frac{1}{4}$ of the old seat.



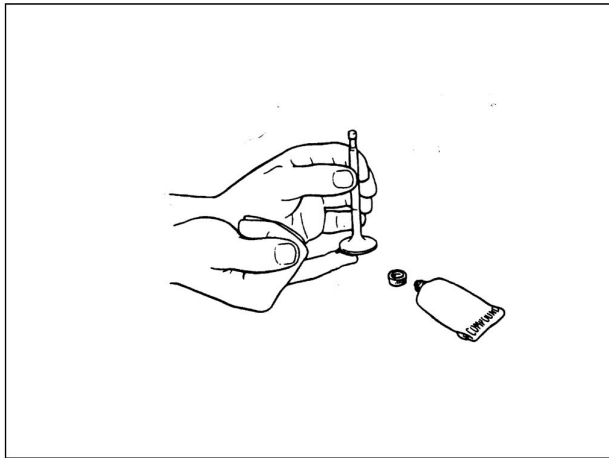
- Using a 45 degree cutter, cut the seat to the proper width.



- If the contact area is too high on the valve, the seat must be lowered using a 37 degree flat cutter. Refinish the seat to specifications, using a 45 degree finish cutter.



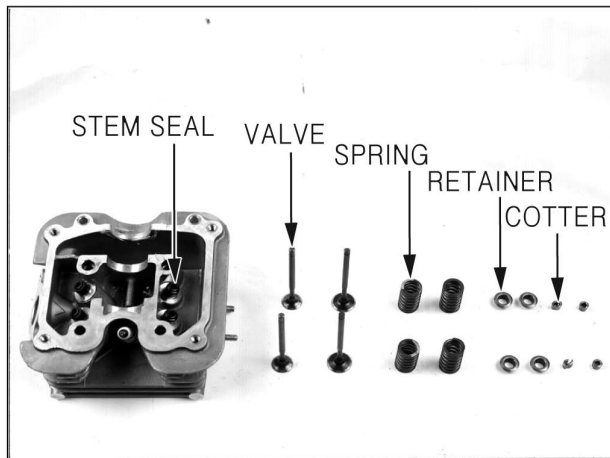
- If the contact area is too low on the valve, the seat must be raised using a 55 degree inner cutter. Refinish the seat to specifications, using a 45 degree finish cutter.



- After cutting the valve seat, apply lapping compound to the valve face, and insert the valve with a valve guide reamer.

NOTE

- Do not excessively press and turn the valve to set it as it may cause damage. Gently strike and set the valve.
- The seat surface may become worn on one side if the valve is set in the same position. Turn the valve slightly when setting it.
- Take precautions not to allow compound to get into the clearance between the stem and guide while the valve is being set.



CYLINDER HEAD ASSEMBLY

- Install new stem seals.

NOTE

- Replace the stem seals with new ones whenever a stem seal is removed.

- Lubricate each valve stem with molybdenum disulfide grease and insert the valve into the valve guide.

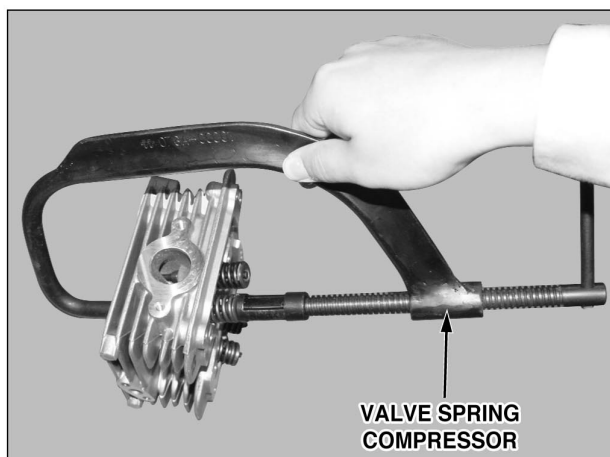
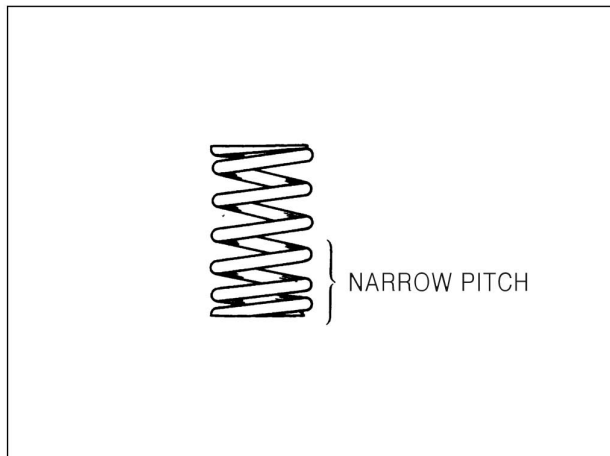
CAUTION

- Turning a valve too fast can damage the stem seals.

- Install the spring seats, valve springs and retainers.

NOTE

- For valve spring with varying pitch, install the valve springs with the narrow pitch end facing down.



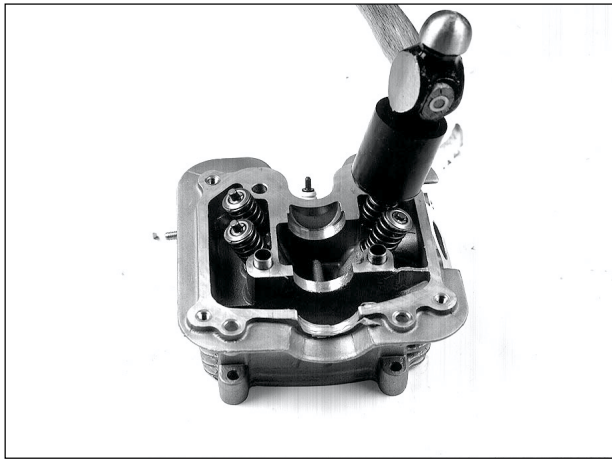
- Compress the valve springs with the valve spring compressor and install the valve cotters.

CAUTION

- Compressing the valve spring more than necessary when installing the valve cotters may cause loss of valve spring tension.

TOOL : VALVE SPRING COMPRESSOR

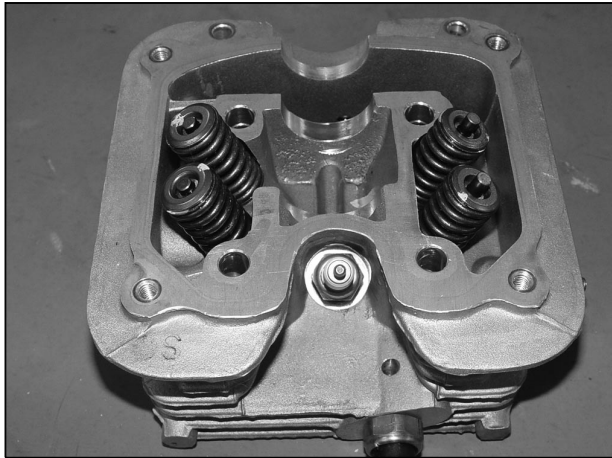
CYLINDER HEAD / VALVE



- Tap the valve stems gently with a soft hammer to firmly seat the cotters.

CAUTION

- Take necessary precautions not to damage the valve.

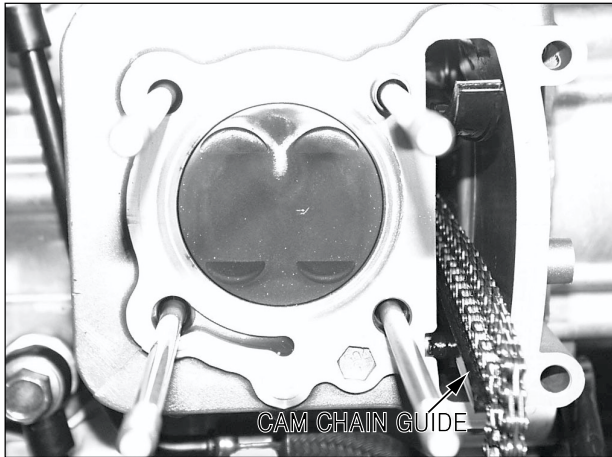


- Apply engine oil to the new O-ring, and assemble it to the carburetor insulator groove.
- Tighten the carburetor insulator with mounting bolts.
- Install the cam chain tensioner, and assemble pivot bolts.

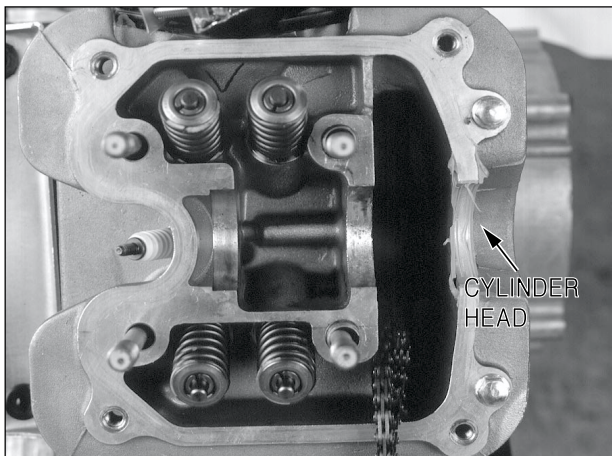
TORQUE : 1.0 kgf · m

- Install the spark plug.

TORQUE : 1.2 kgf · m

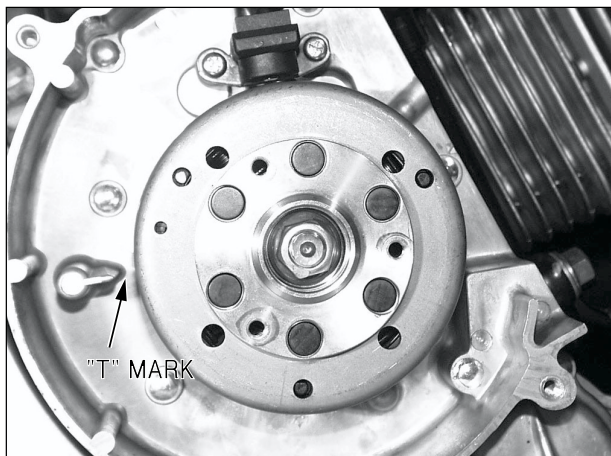
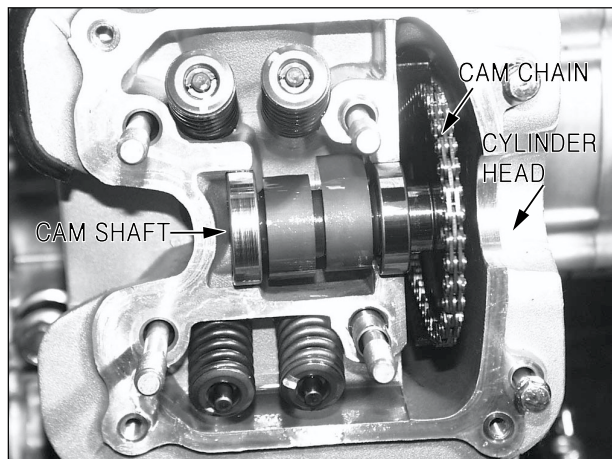
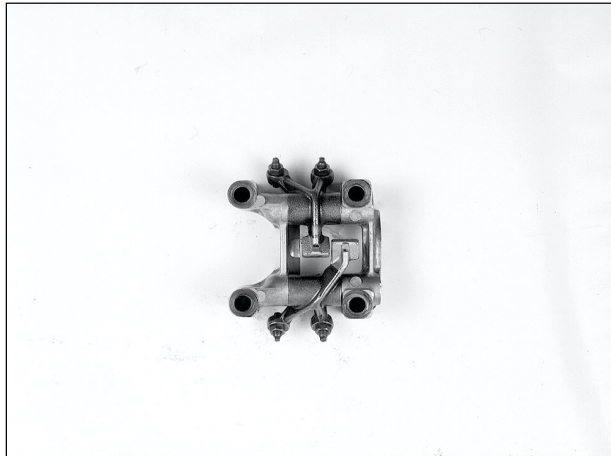
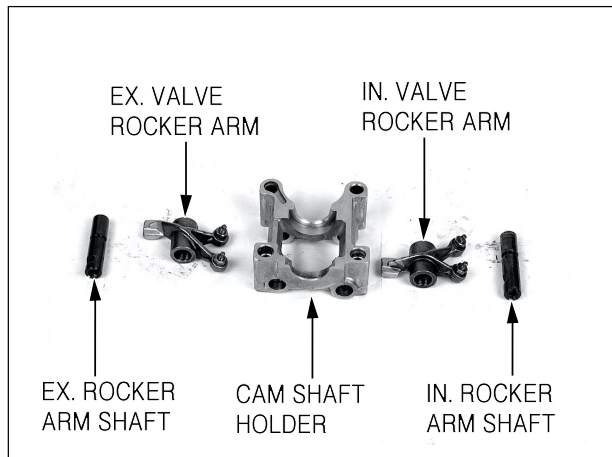


- Clean any gasket material from the cylinder mating surface.
- Install the cam chain guide to the cylinder.
- Install the dowel pins and new gasket.



- Install the cylinder head.

CAMSHAFT ASSEMBLY



- Apply engine oil to the rocker arm shaft, and assemble the rocker arm to the camshaft holder.

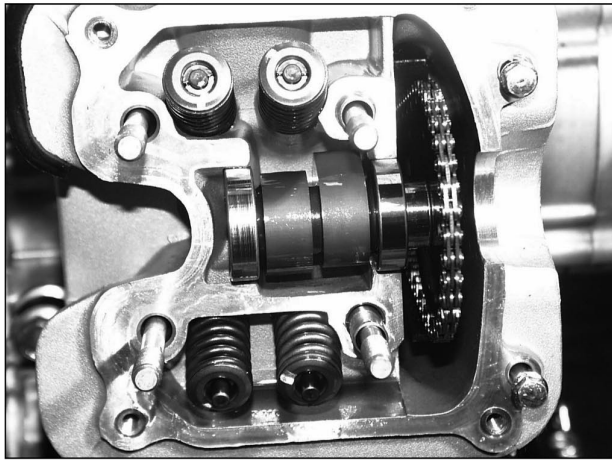
- Tighten the rocker arm shaft with 6mm bolts, and align the bolt hole of the camshaft holder with the fitting side of the rocker arm shaft.

- Check the camshaft assembly for abnormal condition, and place it on the cylinder head.
- Put the cam chain on the cam sprocket.

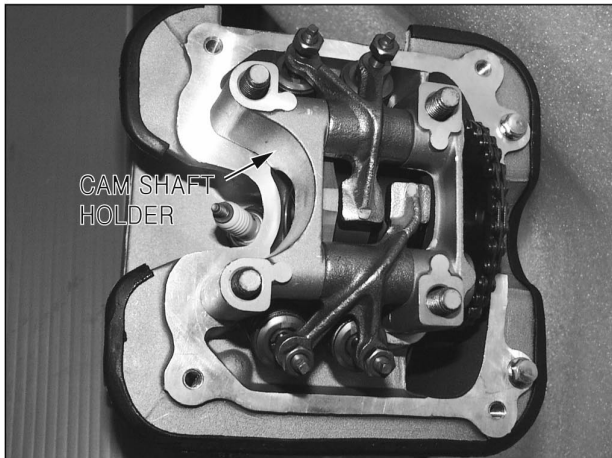
- Slowly rotate the crankshaft counterclockwise, and align the "T" mark of the flywheel with the index mark of the RH. crank case cover.

⚠ CAUTION

- Take precautions not to allow the cam chain to come off the camshaft timing gear while turning the camshaft.



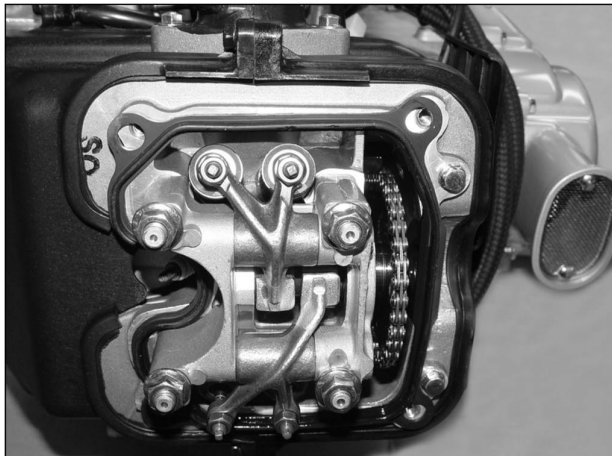
- Apply engine oil to the camshaft, and install it on the cylinder head with the cam thread facing downward.
- Assemble the cam chain and cam sprocket after matching the cam sprocket timing mark in parallel with the top of the cylinder head.



- Install the dowel pins on the cylinder head.
- Install the camshaft holder.

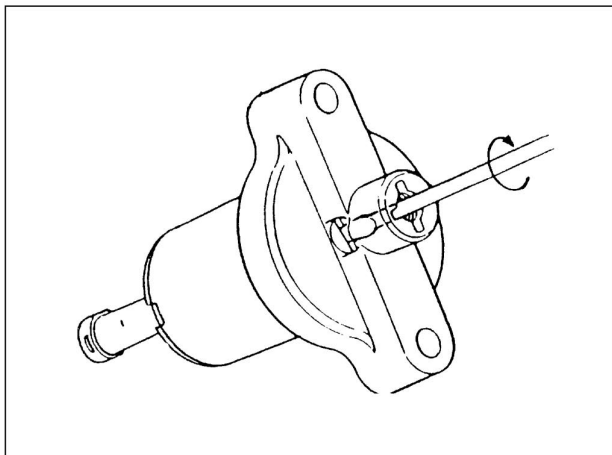
⚠ CAUTION

- The hole of the camshaft holder and the fitting section of the rocker arm shaft fit section must be in alignment.
- Of IN and EX, the shorter rocker arm should be installed on the IN side.



- Install the cam cover plate.
- Apply engine oil to the threaded part; install the camshaft holder nut and bolts, and tighten them driving with 2 - 3 times.

TORQUE VALUE : 2.0 kgf · m



- Remove the pan screws and seals from the cam chain tensioner lifter.
- Rotate the tensioner shaft clockwise with a small driver, and insert the shaft into the body completely.

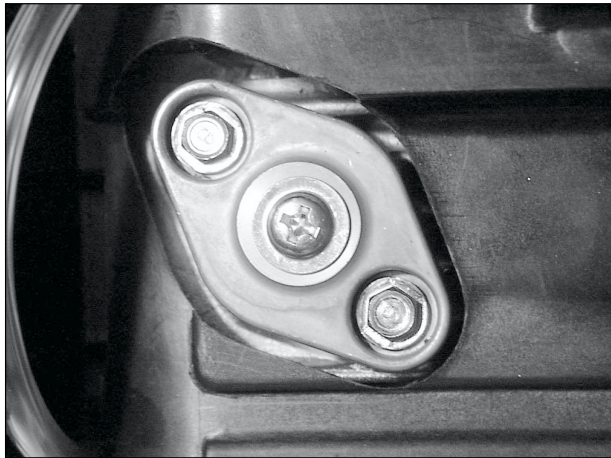
⚠ CAUTION

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



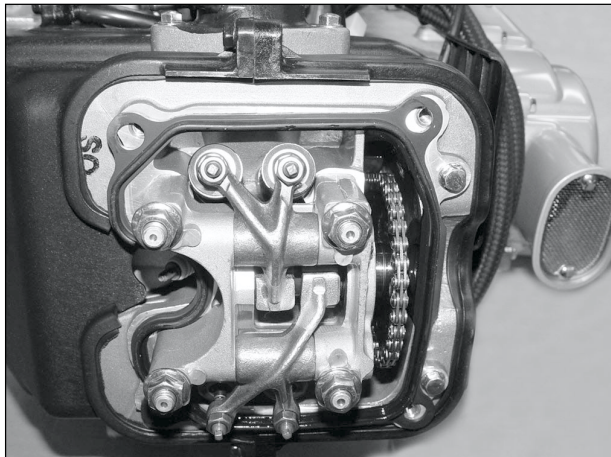
- Fix the tensioner shaft with a hard clip.
- Assemble a new gasket to the tensioner lifter, and install the tensioner lifter on the cylinder.
- Tighten the tensioner mounting bolts.

TORQUE VALUE : 1.2 kgf · m

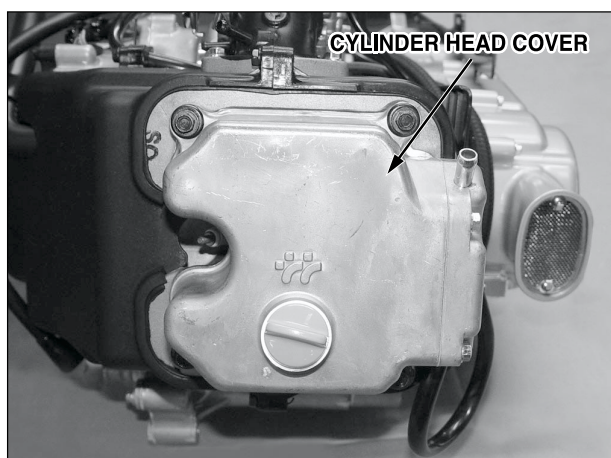


- Remove the tensioner shaft clip from the tensioner lifter. Assemble the O-ring and pan screws to the tensioner lifter.

TORQUE VALUE : 0.4 kgf · m



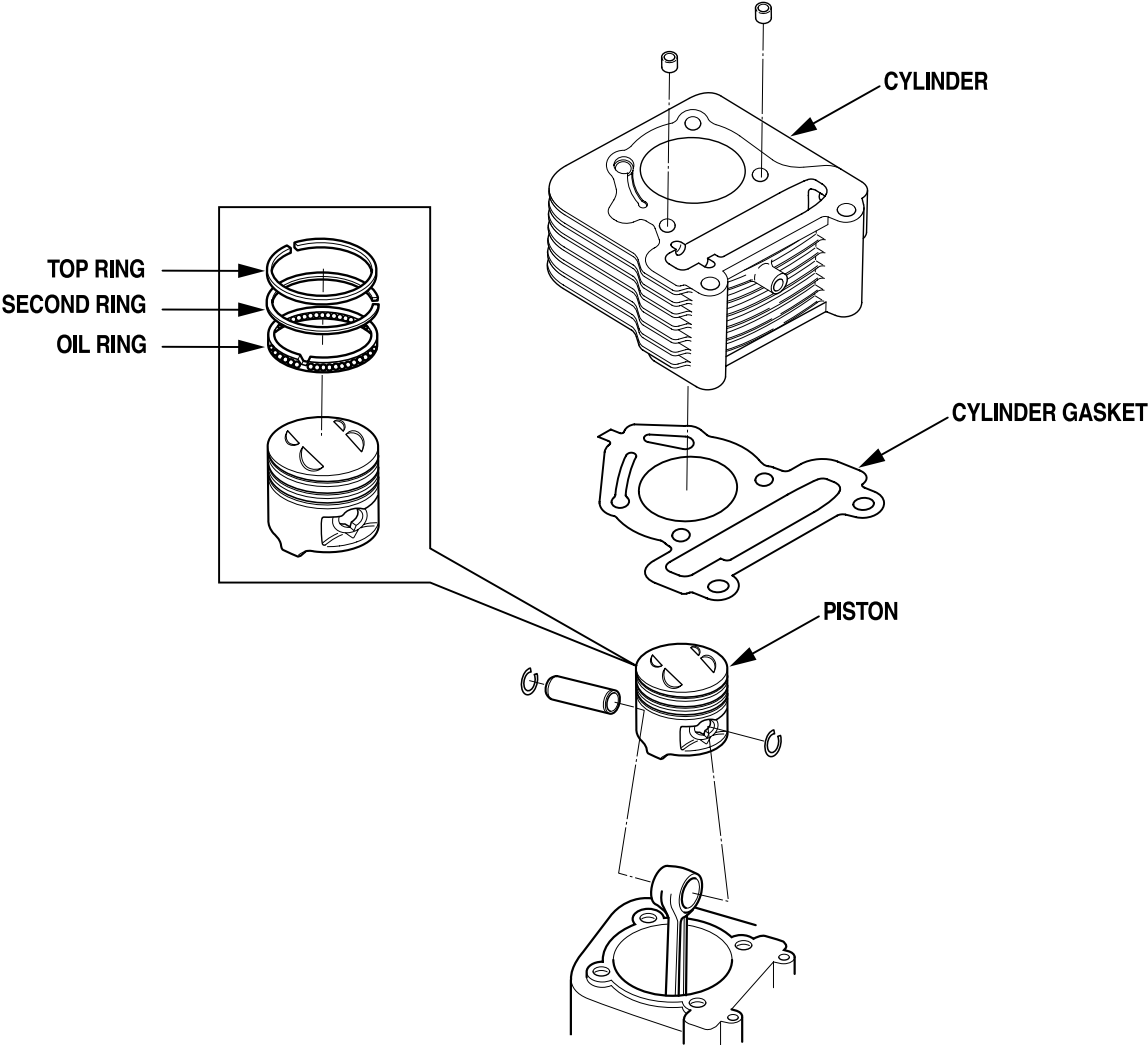
- Fill clean engine oil into the operating parts of the cylinder head.
- Adjust the valve clearance. (⇒2-5)
- Remove oil from the cylinder head cover grooves, and accurately assemble the gasket to the cover.



- Install the cylinder head cover.
- Tighten the cylinder head cover bolts.

TORQUE VALUE : 0.9 kgf · m

- Install the throttle body insulator.
- Install the EX. pipe. (⇒3-8)
- Install the RH. / LH. shroud. (⇒8-12)
- Install the engine to the frame. (⇒6-2)



11. CYLINDER / PISTON

SERVICE INFORMATION . . . 11-1

TROUBLESHOOTING 11-1

CYLINDER 11-2

PISTON / PISTON RING . . 11-3

CYLINDER INSTALLATION . 11-5

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.
- Check parts after disassembling, and clean and dry with an air hose prior to taking measurements.

SPECIFICATIONS

Unit : mm

ITEM			STANDARD VALUE	SERVICE LIMIT
CYLINDER	INNER DIAMETER		56.000-56.010 mm	56.100 mm
	TAPER		-	0.050 mm
	OUT-OF-ROUND		-	0.005 mm
	HEAD CONTACT WARPAGE		-	0.020 mm
PISTON, PISTON PIN, PISTON RING	PISTON SKIRT OUTER DIAMETER		55.925-55.945 mm	58.825 mm
	PISTON PIN HOLE INNER DIAMETER		15.002-15.008 mm	15.040 mm
	PISTON PIN OUTER DIAMETER		14.994-15.000 mm	14.960 mm
	PISTON-TO-PISTON PIN CLEARANCE		0.002-0.014 mm	0.020 mm
	PISTON RING-TO-GROOVE CLEARANCE	TOP	0.040-0.067 mm	0.110 mm
		SECOND	0.025-0.052 mm	0.080 mm
	PISTON RING JOINT GAP	TOP / SECOND	0.10-0.25 mm	0.50 mm
		OIL RING (SIDE RAIL)	0.20-0.70 mm	1.10 mm
CYLINDER-TO-PISTON CLEARANCE			0.055-0.090 mm	0.200 mm
CONNECTING ROD SMALL END INNER DIAMETER			15.010-15.028 mm	15.060 mm
GAP BETWEEN CONNECTING ROD SMALL END AND PISTON PIN			0.010-0.034 mm	0.040 mm

11

TROUBLESHOOTING

Comperssion too low

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

Excessive smoke

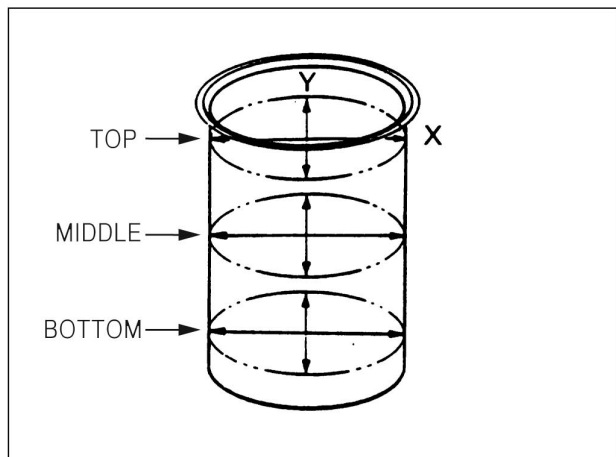
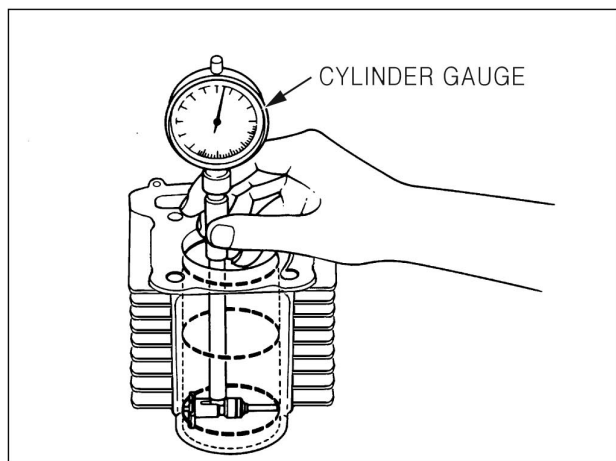
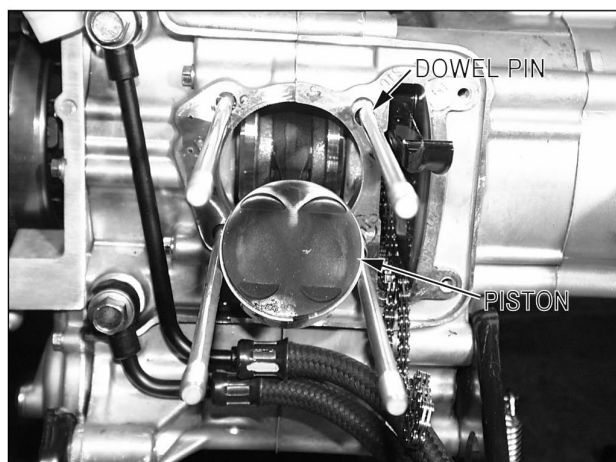
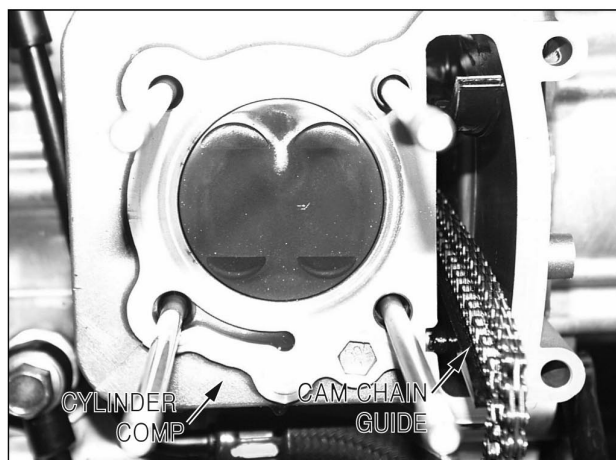
- Worn cylinder, piston or piston rings
- Improper installation of piston ring
- Scored or scratched piston or cylinder wall

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 engine from the frame. (⇒6-2)
- Remove the EX. pipe. (⇒3-8)
- Remove the camshaft. (⇒9-3)
- Remove the cylinder head. (⇒9-5)
- 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 / head mating surface. Do not scratch the surface.

NOTE

- Take care not to damage the cylinder mating surface.

WEAR 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.

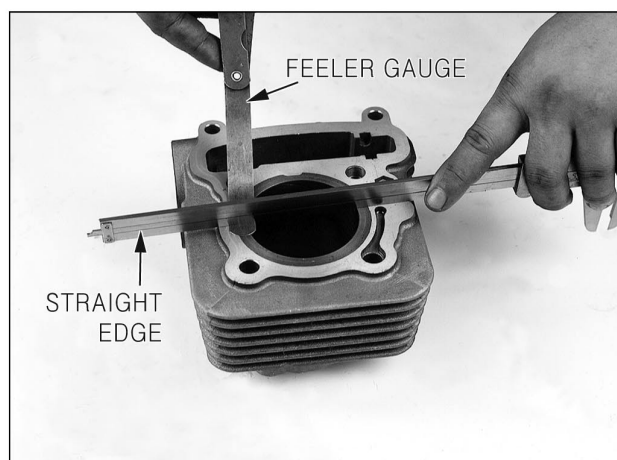
SERVICE LIMIT : 56.100 mm

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

SERVICE LIMIT : 0.2 mm

- Calculate the cylinder for out-of-round at three levels in an X and Y axis. Take the maximum reading to determine the out-of-round.
- Calculate the cylinder for taper at three levels in an X and Y axis. Take the maximum reading to determine the taper.
- If any of the cylinder measurements exceed the service limits, replace the cylinder.

**SERVICE LIMIT : OUT-OF-ROUND : 0.005 mm
TAPER : 0.05 mm**



WARPAGE INSPECTION

- Check the cylinder for warpage by placing a straight edge and feeler gauge across the stud holes. Replace the cylinder if the service limit is exceeded.

SERVICE LIMIT : 0.02 mm

NOTE

- Any clearance between the cylinder and head due to damage or warpage will result in compression leaks and reduced performance.



PISTON / PISTON RING

REMOVAL

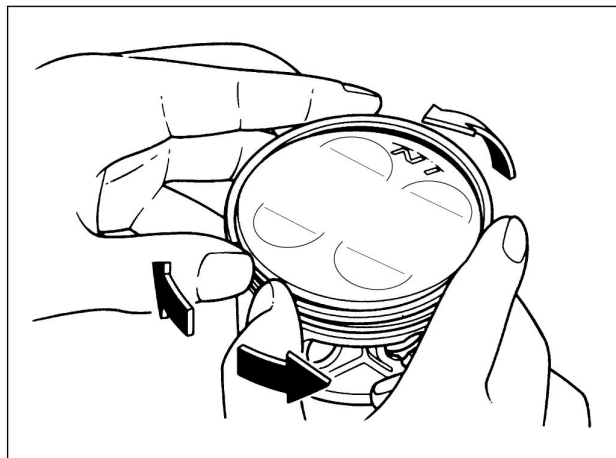
NOTE

- Place a clean shop towel over the crankcase to prevent the possibility of the clip falling into the crankcase.

- Remove the piston pin clip using a pair of pliers.
- Press the piston pin out of the piston.

NOTE

- Do not damage or scratch the piston.
- Do not apply side force to the connecting rod.
- Do not let the clip fall into the crankcase.



INSPECTION

- Clean carbon deposits from the piston.
- Inspect the piston rings for movement by pressing the rings. The rings should be able to move in its groove without catching.
- Spread each piston ring and remove it by lifting it up at a point just opposite the gap.

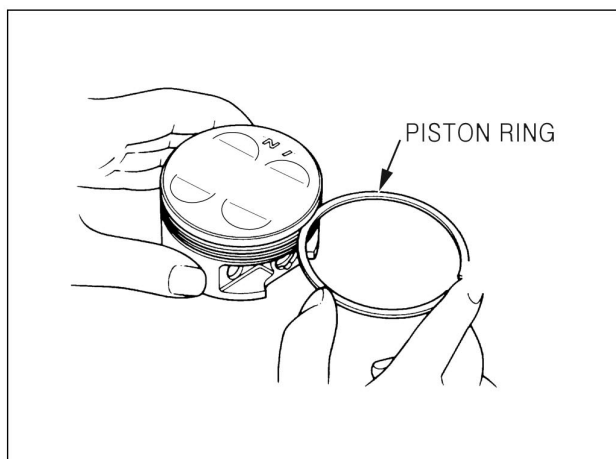
CAUTION

- Do not damage the piston ring by spreading the ends too far.

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

SERVICE LIMIT : TOP : 0.110 mm
SECOND : 0.080 mm
OIL RING : 0.280 mm

- Inspect the piston for wear or damage.



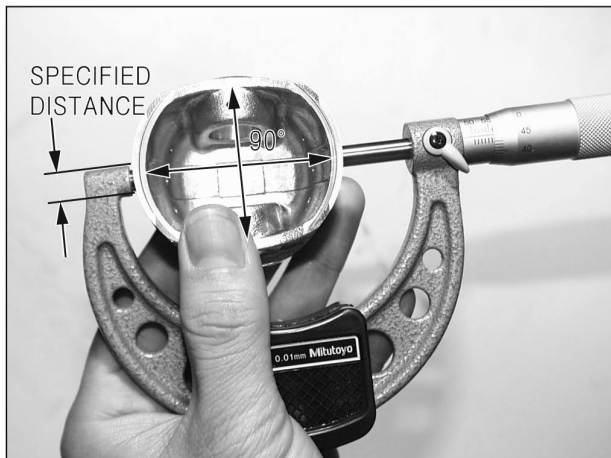


- Insert the piston ring into the bottom of the cylinder squarely, using the piston.
- Measure the end gap using a feeler gauge. Replace the ring if the service limit is exceeded.

NOTE

- Always replace piston ring as a set.

SERVICE LIMIT : TOP / SECOND : 0.50 mm
OIL RING (SIDE RAIL) : 1.10 mm
TOOL : FEELER GAUGE



- Measure and record the piston outer diameter 90° to the piston pin bore and at the point specified (10mm), near the bottom of the piston skirt.
- Replace the piston if the service limit is exceeded.

SERVICE LIMIT : 55.825 mm

PISTON PIN INSPECTION

- Measure the piston pin bore inner diameter in an X and Y axis. Take the maximum reading to determine the inner diameter.
- Replace the piston if the inner diameter is over the service limit.

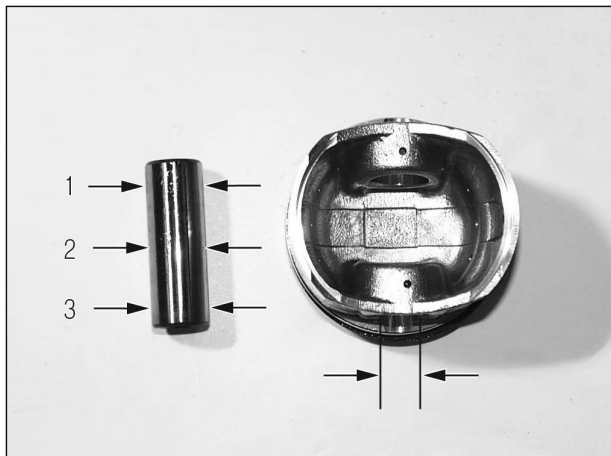
SERVICE LIMIT : 15.04 mm

- Measure the piston pin outer diameter at three points.
- Replace the piston pin if the service limit is exceeded.

SERVICE LIMIT : 14.960 mm

- Calculate the piston pin-to-pin bore clearance by subtracting the piston pin outer diameter from the pin bore inner diameter.

SERVICE LIMIT : 0.020 mm



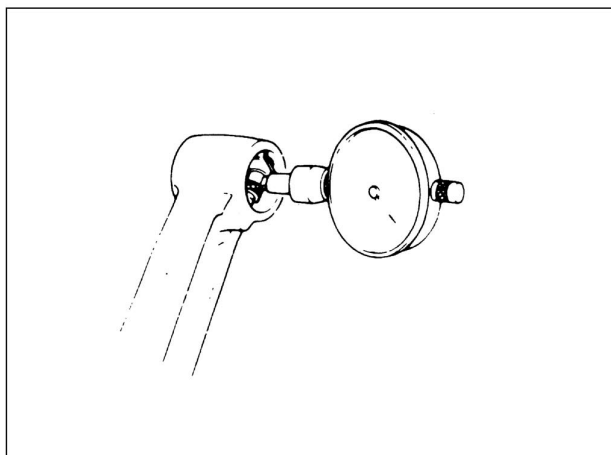
SMALL END BEARING SURFACE INSPECTION

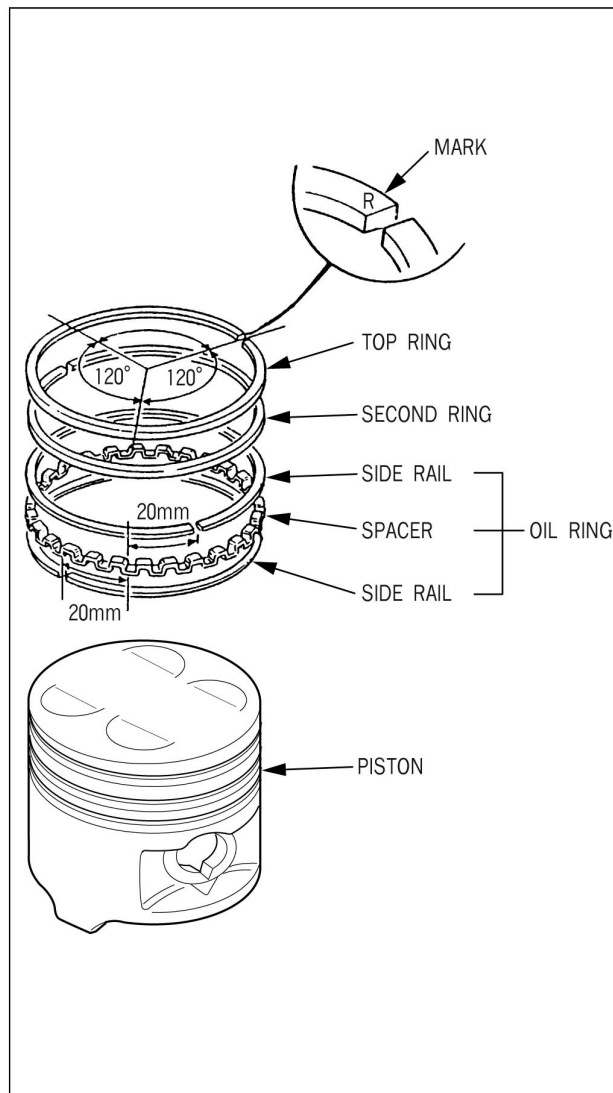
- Measure the inner diameter of the connecting rod small end.

SERVICE LIMIT : 15.060 mm

- Calculate the connecting rod small end-to-piston pin clearance.

SERVICE LIMIT : 0.040 mm





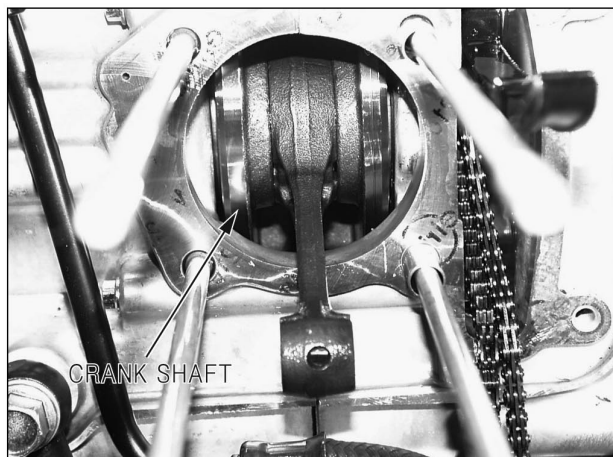
PISTON / PISTON RING INSTALLATION

- Clean the piston heads, ring lands and skirts.
- Carefully install the piston rings onto the piston with the markings facing up.

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.
- Space the side rail gaps 40mm or more apart as shown.

- After installing the rings they should rotate freely, without sticking.



PISTON INSTALLATION

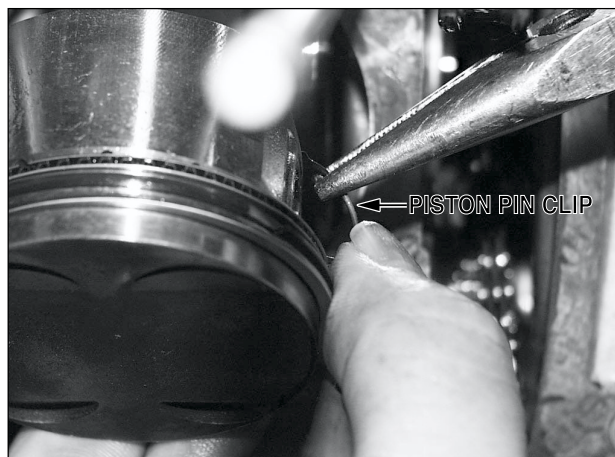
NOTE

- Place a clean shop towel over the crankcase to prevent the clip from falling into the crankcase.

- Install the piston and insert the piston pin.

NOTE

- The mark that is stamped on the piston head should be facing the correct direction.
 "IN" MARK : TO INTAKE SIDE
 "EX" MARK : TO EXHAUST SIDE



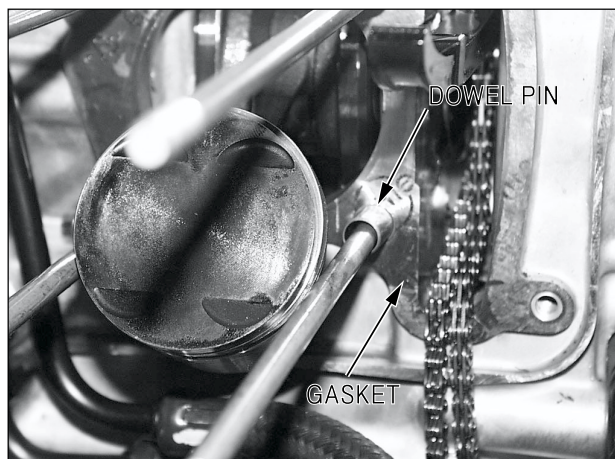
- Install new piston pin clips.

⚠ CAUTION

- Always use new piston pin clips. Reinstalling used piston pin clips may lead to serious engine damage.

⚠ NOTE

- Take care not to drop the piston pin clip into the crankcase.
- Set the piston pin clip in the groove properly.
- Do not align the clip's end gap with the piston cutout.

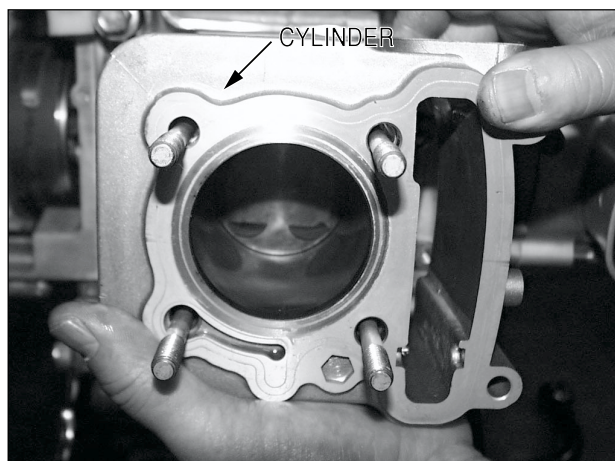


CYLINDER INSTALLATION

- Make sure that the piston ring end gap is correct.
- Carefully remove any adhering gasket material from the cylinder / head mating surface. Do not scratch the surface.
- Install a new cylinder gasket and dowel pins.

⚠ NOTE

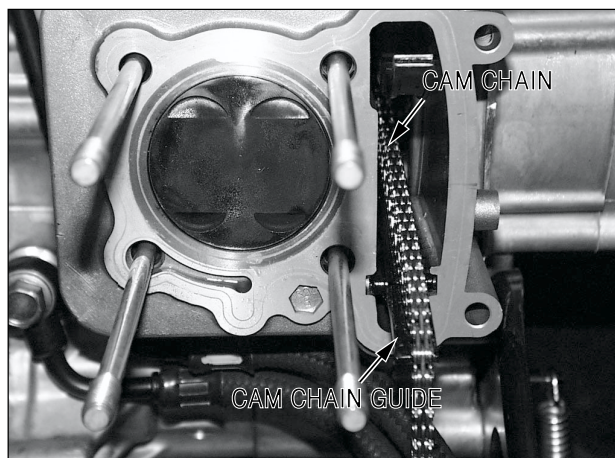
- Take care not to damage the cylinder mating surface.



- Coat the cylinder wall with clean engine oil and lubricate the piston rings and install the cylinder.

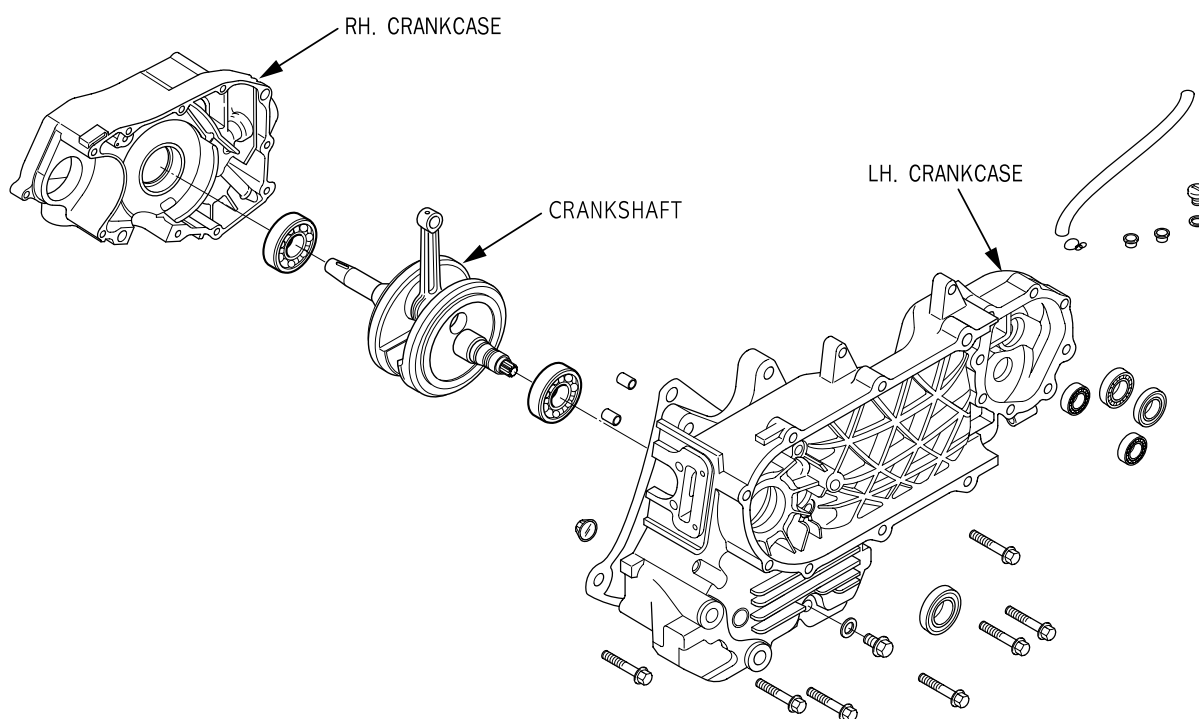
⚠ NOTE

- 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 “ㄣ” part of the crankcase, and install the cam chain guide by aligning the projection part with the “ㄣ” part of cylinder.
- Install the cylinder head. (⇒9-11)
- Install the camshaft. (⇒9-13)
- Install the cylinder head cover.
- Install the EX. pipe. (⇒3-8)
- Install the engine to the frame. (⇒6-2)

MEMO



12. TRANSMISSION/CRANKSHAFT/CRANKCASE

SERVICE INFORMATION 12-1	CRANKSHAFT REMOVAL 12-7
TROUBLESHOOTING 12-2	TRANSMISSION BEARING . . . 12-8
TRANSMISSION 12-3	CRANKSHAFT INSTALLATION . 12-9
CRANK CASE REMOVAL 12-6	CRANK CASE INSTALLATION . 12-10

SERVICE INFORMATION

GENERAL SAFETY

- This section describes how to remove the crank case and to maintain the transmission and the crankshaft.
- Service transmission without removing the engine from the vehicle. However, to prevent damage to the LH. crank case, remove the engine and disassemble the rear brake prior to changing the LH. crank case bearing.
- Always use special tools to change the drive shaft. Fix the bearing inner race, and install the shaft.
- The following parts must be removed prior to removing the crank case. Follow the removal procedure specified in each section.
 - OIL PUMP (⇒SECTION 2)
 - ENGINE (⇒SECTION 6)
 - CYLINDER HEAD/ CYLINDER/ PISTON (⇒SECTION 9 AND 10)
 - AC GENERATOR (⇒SECTION 8)
 - DRIVE PULLEY (⇒SECTION 7)
 - CLUTCH/DRIVEN PULLEY (⇒SECTION 7)
- The following parts must be removed prior to changing the LH. crank case. Follow the removal procedure specified in each section.
 - TRANSMISSION (⇒SECTION 11)
- To assemble the crank case and crankshaft, set the special tool to the inner race of the crankshaft bearing, and push and assemble. Remove the bearing from the crankshaft during disassembling work, and insert a new bearing in the case. Install the oil seal after the case is assembled.

12

SPECIFICATIONS

ITEM		STANDARD VALUE	SERVICE LIMIT
CRANK SHAFT	CONNECTING ROD	0.15 ~ 0.60 mm	0.60 mm
	LARGE END SIDE CLEARANCE	0.1 ~ 0.35 mm	
	CONNECTING ROD BIG END	0 ~ 0.008 mm	0.05 mm
	CRANKSHAFT SHAKING	RIGHT	0.1 mm
		LEFT	0.1 mm

TRANSMISSION OIL

OIL CAPACITY	0.15 l (Full capacity) 0.14 l (After oil change)
RECOMMENDED OIL	DMC Pure mission oil or SAE 80W/90

TORQUE VALUE

CRANK CASE BOLT 1.0kg-m

TOOLS

- UNIVERSAL BEARING PULLER
- BEARING REMOVER SET
- REMOVER ASSEMBLY
- REMOVER SHAFT
- REMOVER HEAD
- SLIDING WEIGHT
- ASSEMBLY SHAFT

TROUBLESHOOTING

Engine Noise

- Connecting rod big and small ends loose.
- Crank pin bearing loose.

Engine started but unable to move out

- Transmission damage.
- Transmission seized.

Noise during operation

- Gear worn, overheated, or cranked.
- Bearing worn.

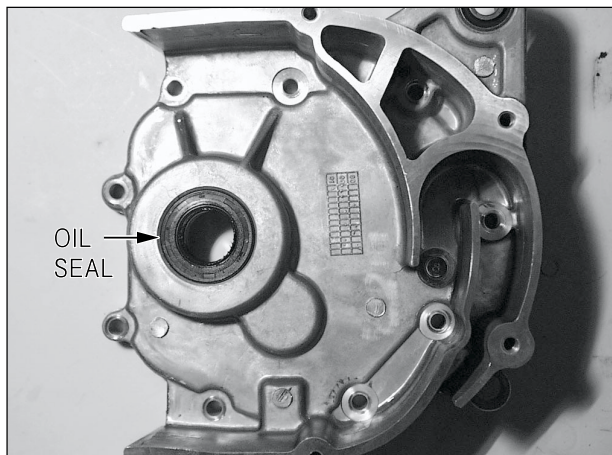
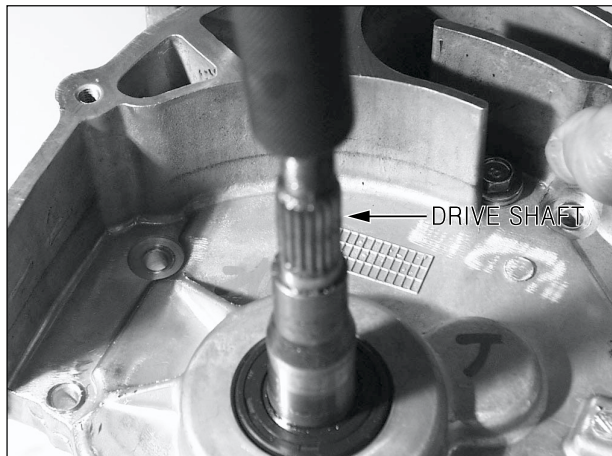
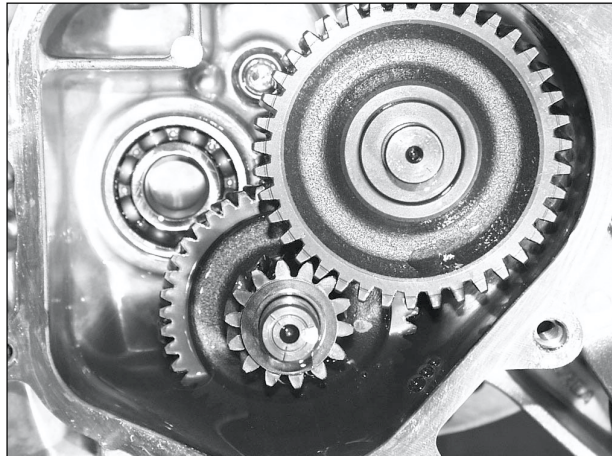
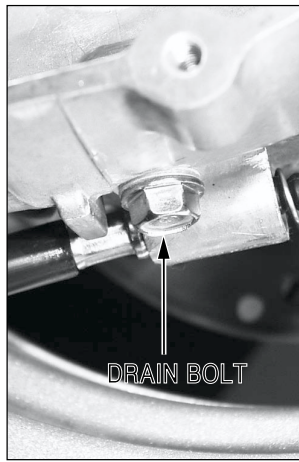
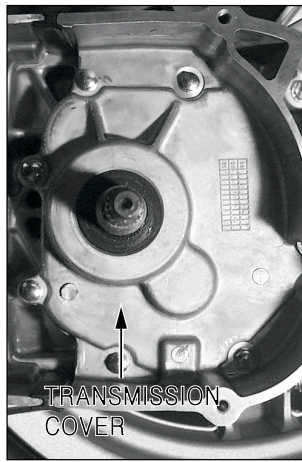
Oil leaks

- Excessive oil level.
- Oil seal worn or damaged.

TRANSMISSION

DISASSEMBLY

- Loosen the drain bolt, drain the mission oil.
- Remove the LH. crankcase cover. (⇒7-2)
- Remove the continuously variable transmission. (⇒SECTION 7)
- Remove the EX. muffler. (⇒3-8)
- Remove the rear swing arm. (⇒13-8)
- Remove the rear brake caliper. (⇒13-3)
- Remove the rear wheel. (⇒13-5)
- Loosen the rear cushion upper bolt.
- Remove the transmission bleeder tube from the mission cover groove.
- Loosen the 8 transmission cover bolts.
- Remove the transmission cover.
- Remove the gasket and dowel pin.

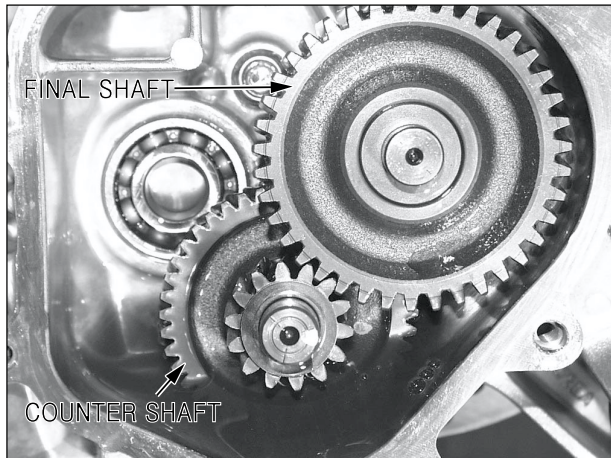


- Remove the drive shaft from the transmission cover by using a hydraulic press.

NOTE

- Take precautions not to damage the cover joints.

- Remove the oil seal of the drive shaft.



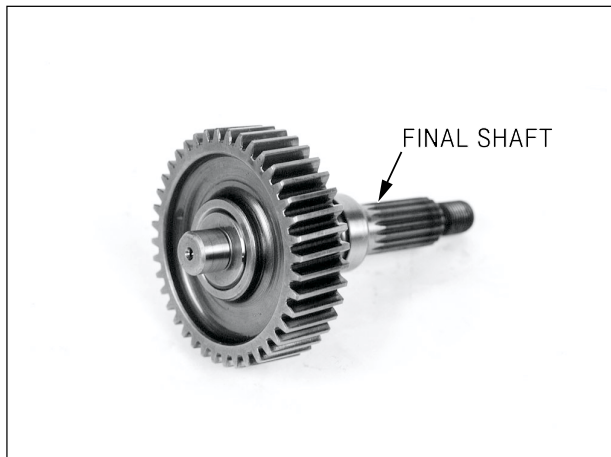
- Remove the final shaft and the counter shaft comp.

TRANSMISSION INSPECTION

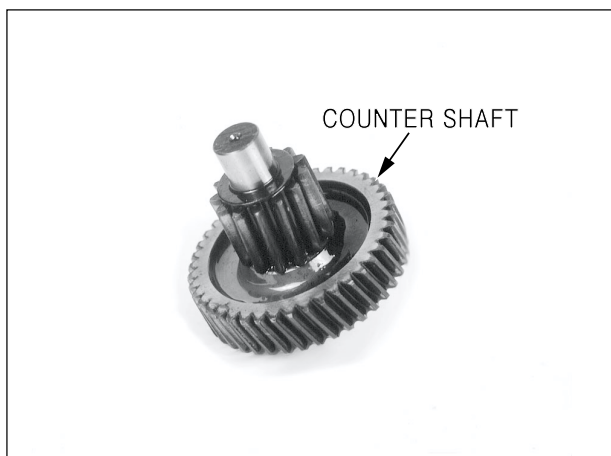
- Check the drive shaft for wear or damage.



- Check the final shaft for wear or damage.

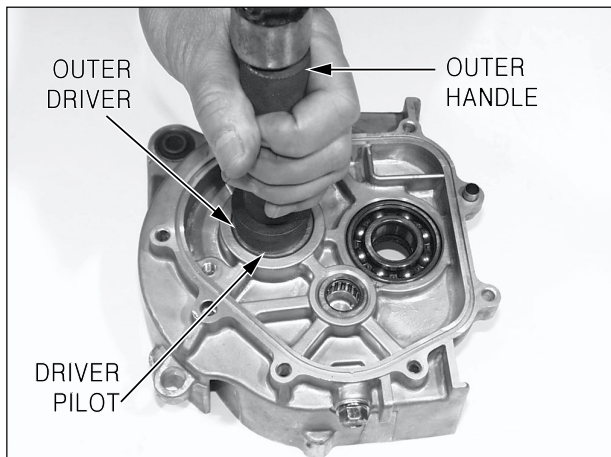
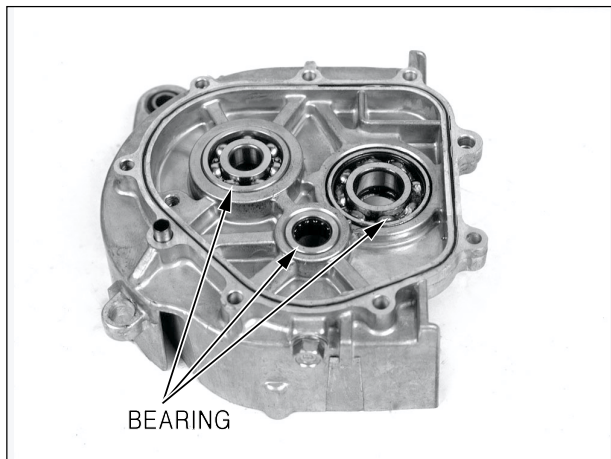


- Check the counter shaft for wear or damage.



TRANSMISSION BEARING INSPECTION

- Check that the bearing outer race fits the case tightly without play.
- Turn the inner race and check that the bearing turns smoothly and quietly.
- Replace the bearings if necessary.



- Install the bearing to the case with special tools.

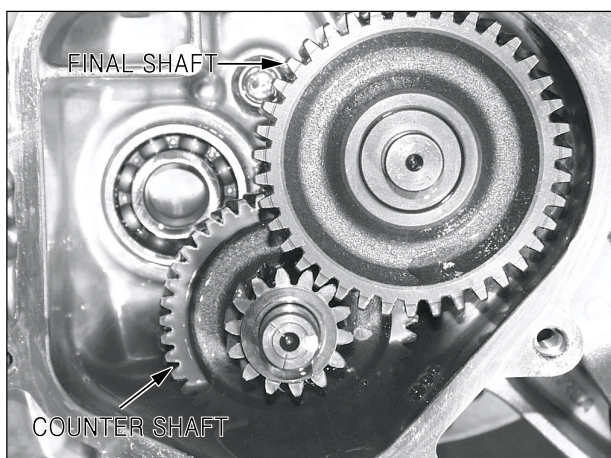
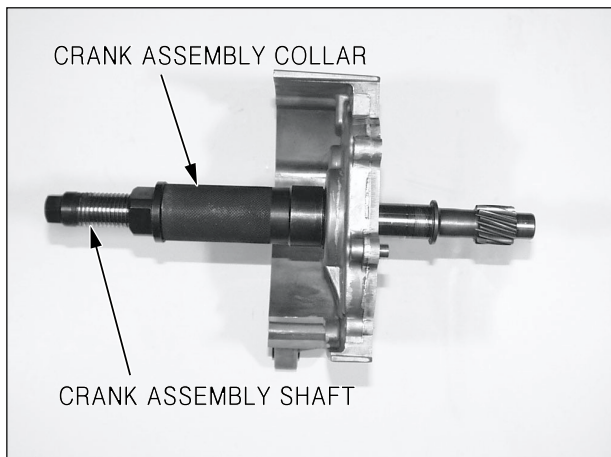
**TOOLS : DRIVE HANDLE A
OUTER DRIVER
DRIVER PILOT**

- Check the LH. crankcase oil seal for wear or damage.

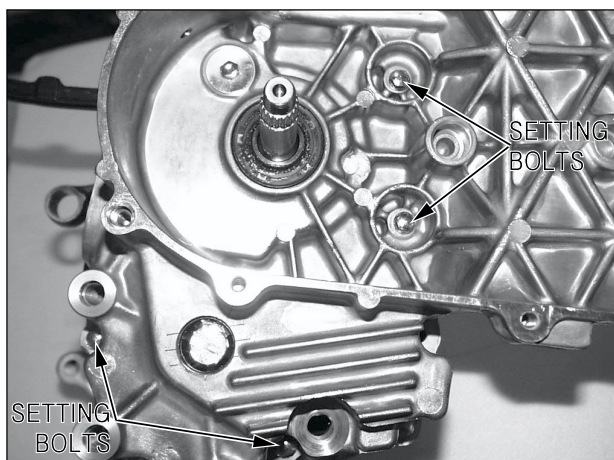
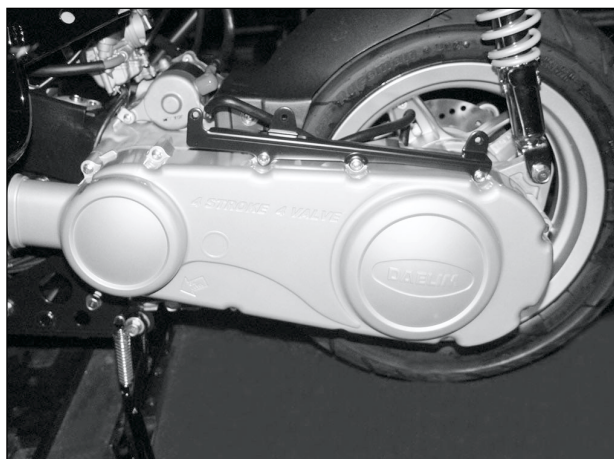
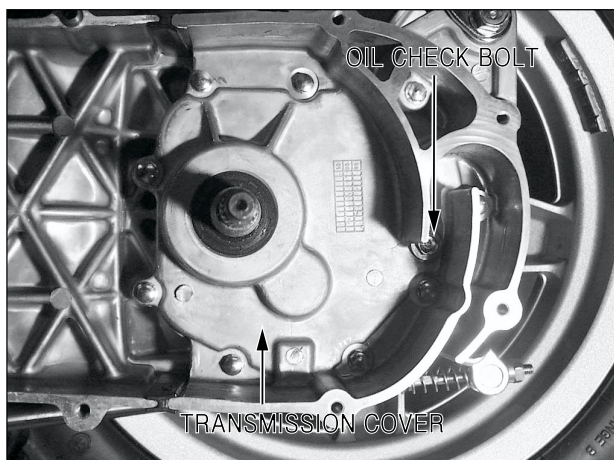
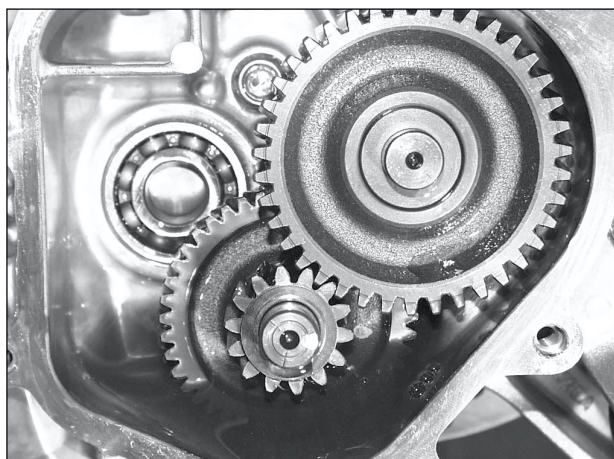
TRANSMISSION ASSEMBLY

- Install the drive shaft on the transmission cover.
- Install a new drive shaft oil seal.

**TOOLS : CRANK ASSEMBLY SHAFT
CRANK ASSEMBLY COLLAR**



- Install the final shaft and counter shaft on the LH. crank case.



- Install a new gasket and dowel pin.

- Tighten the transmission cover with the setting bolts.
- Install the following parts.
 - Rear wheel (⇒13-5)
 - Rear swing arm (⇒13-8)
 - Rear brake caliper (⇒13-3)
 - EX. muffler (⇒ 3-8)
 - Continuously variable transmission (⇒SECTION 7)
 - RH. crank case cover (⇒8-4)
- Install the rear cushion upper bolt.
- Install the transmission bleeder tube.
- Remove the oil check bolt, release the transmission oil filler ACG cap or the LH. crankcase until the oil overflow through oil hole and fill the recommended oil slowly.
- Install the oil check bolt and the cap.

RECOMMENDED OIL : SAE 80W- 90
TRANSMISSION OIL AMOUNT : 0.15 l

CRANK CASE REMOVAL

- Remove the engine from the frame. (⇒6-2)
 - Remove the RH./LH. crankcase cover.(⇒8-4,7-2)
 - Remove the transmission cover. (⇒11-3)
 - Remove the parts to disassemble crankcase.
-
- Loosen the 8 RH./LH. crankcase setting bolts.



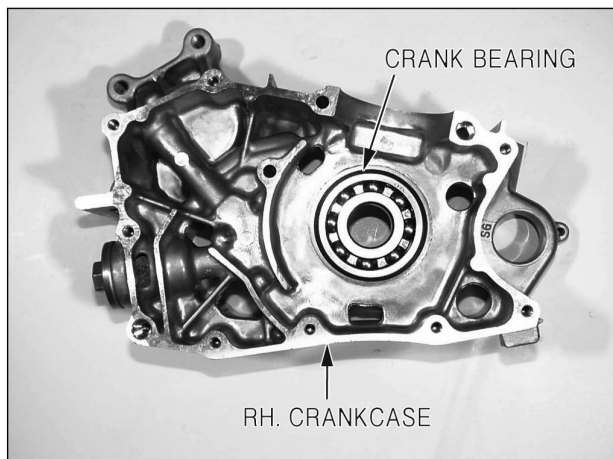
- Remove the transmission bleeder tube.
- Remove the RH./LH. radiator hose from the RH. crankcase.
- Face the LH. crankcase downward, and remove the RH. crankcase from the LH. crankcase while tapping a few places on the LH. crankcase with a plastic hammer.

NOTE

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



- Remove the dowel pin and gasket.



CRANKSHAFT REMOVAL

- Remove the crankshaft from the RH. crankcase by using a crankshaft remover.
- If the bearing is left on the RH. crankcase, use the driver handle and the outer driver to remove it.

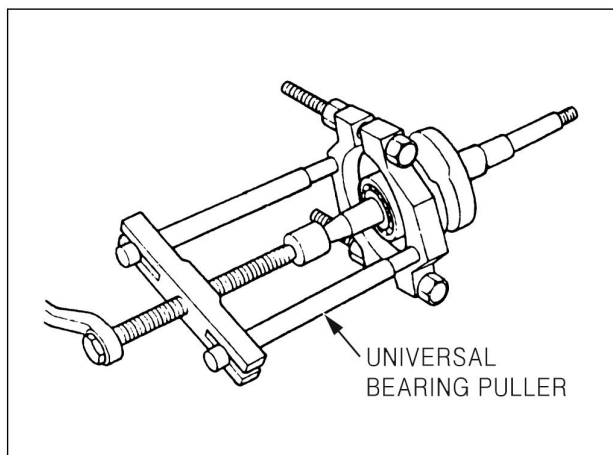
**TOOLS : DRIVER
ATTACHMENT, 42 X 47 mm**

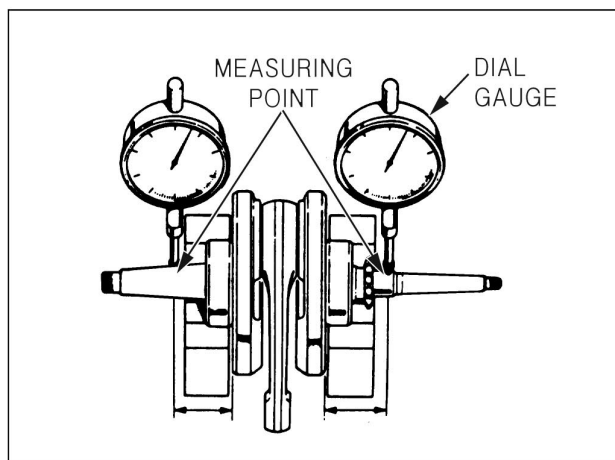
- If the bearing is left on the crankshaft, use a bearing puller to remove it.

TOOL : UNIVERSAL BEARING PULLER

NOTE

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

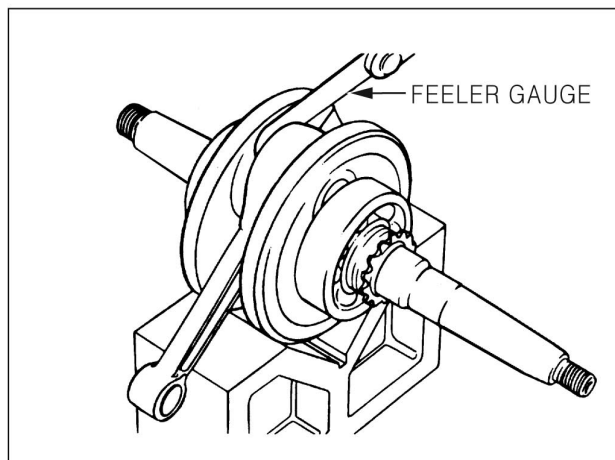




CRANKSHAFT INSPECTION

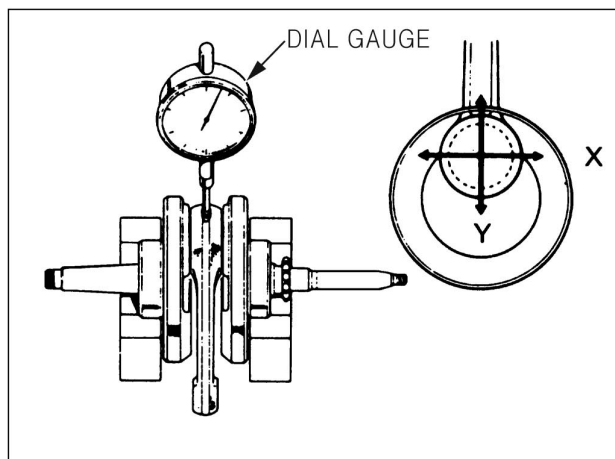
- Place the crankshaft on a stand or V-block, and measure the crankshaft runout using dial gauge.

**SERVICE LIMIT : RIGHT : 0.1 mm
LEFT : 0.1 mm**



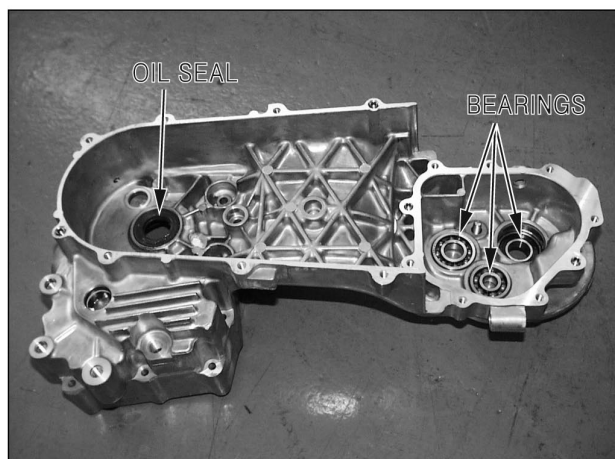
- Measure the side clearance by inserting the feeler gauge between the crankshaft and connecting rod big end as shown.

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 : 0.05 mm

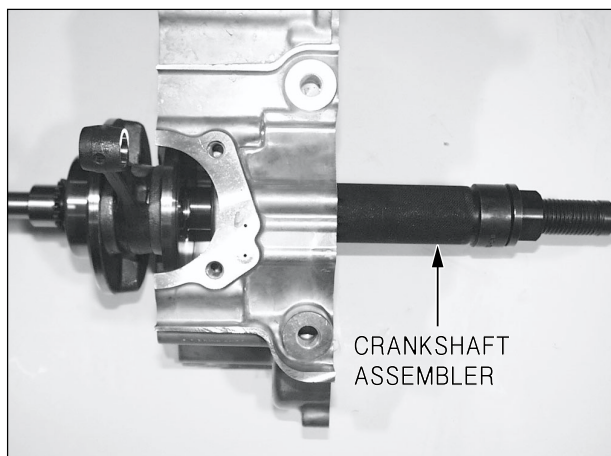
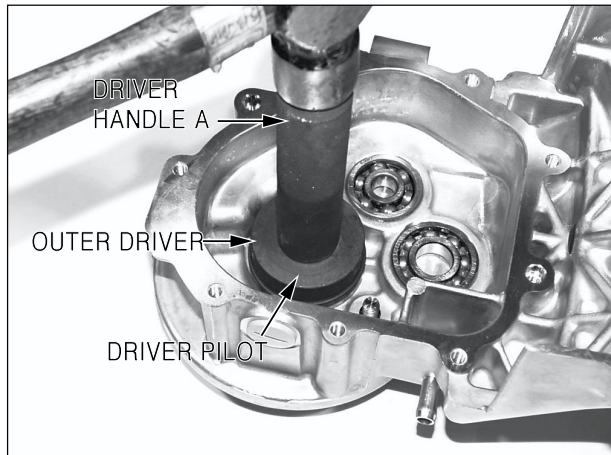
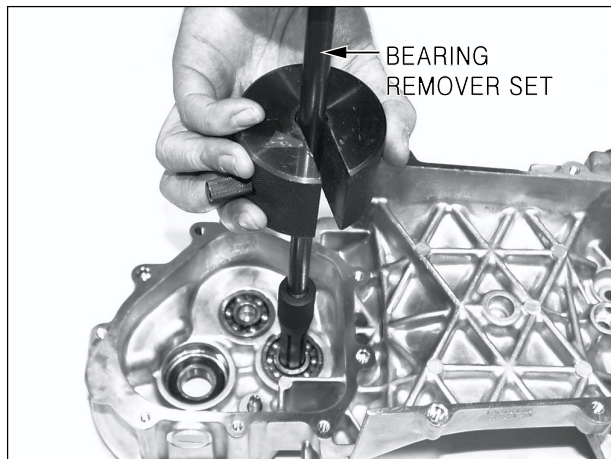


TRANSMISSION BEARING

- Remove the transmission and crankshaft.

INSPECTION

- Check that the bearing outer race fits the case tightly without play.
- Turn the inner race and check that the bearing turns smoothly and quietly.
- Replace the bearing if necessary.



TRANSMISSION BEARING REPLACEMENT

LH. crankcase

- Use special tools to remove the drive shaft bearing.

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

- Remove the final shaft bearing and oil seal.
- Remove the countergear bearing.
- Apply clean engine oil to a new bearing, and assemble it to the crankcase.

**TOOLS : DRIVER HANDLE A
DRIVER PILOT
OUTER DRIVER**

- Install a new final shaft oil seal.

CRANKSHAFT INSTALLATION

- Apply clean engine oil to the new RH. crankshaft bearing, and press in the bearing into the RH. crankcase.

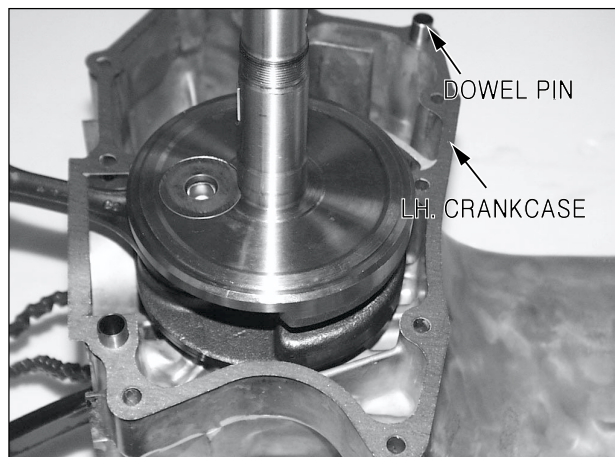
**TOOLS : DRIVER HANDLE A
OUTER DRIVER
DRIVER PILOT**

- Use special tools to assemble the crankshaft bearing to the RH. crankcase.

**TOOLS : DRIVER HANDLE A
OUTER DRIVER
DRIVER PILOT**

CRANKCASE INSTALLATION

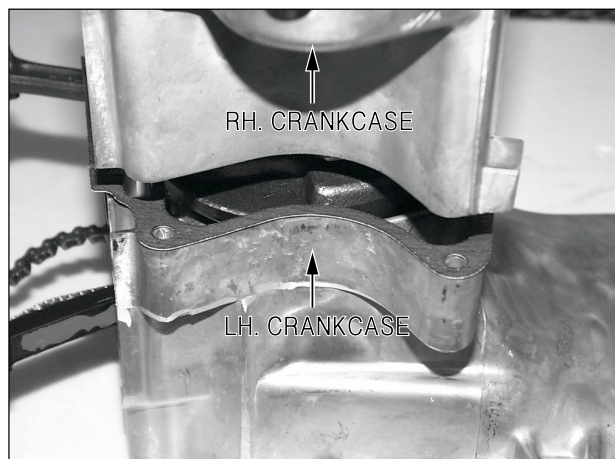
- Install the dowel pins and a new gasket.
- Install the cam chain to the LH. crankcase.



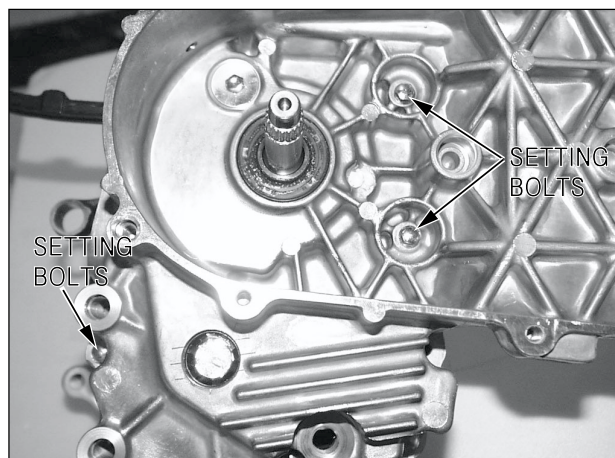
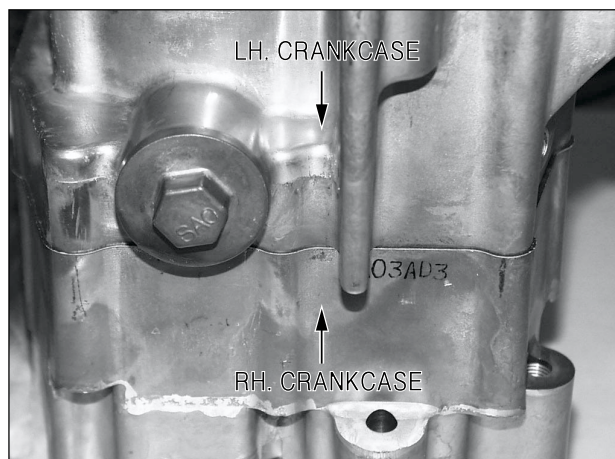
- Install the RH. crankcase to the LH. crankcase.

NOTE

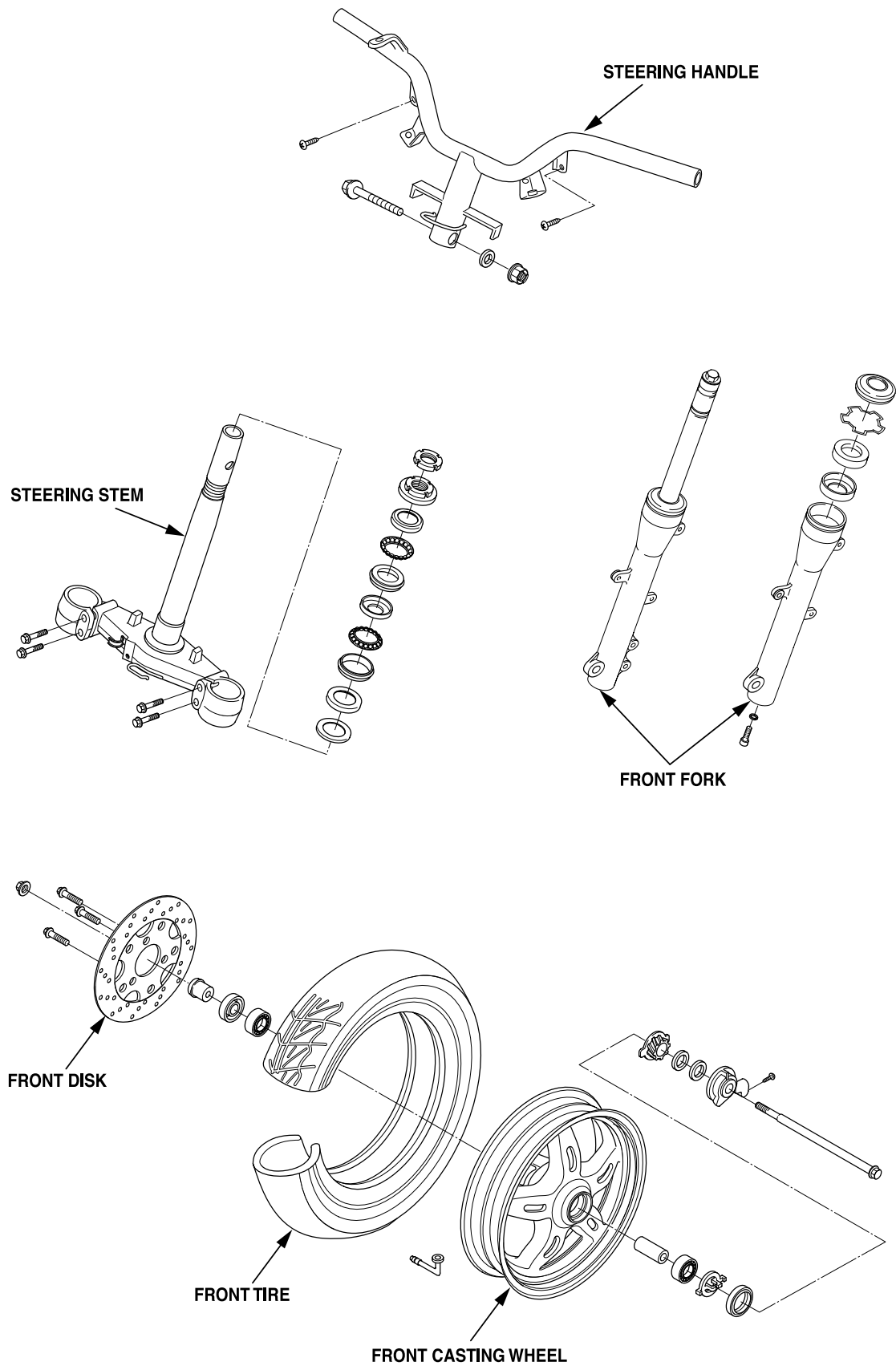
- Make sure that the gasket is completely attached without any clearance.



- Install the RH./LH. radiator hose.
- Install the bleeder tube to the LH. crankcase.
- Install the removed parts.
- Install the engine on the frame.(⇒6-2)



MEMO



13. FRONT WHEEL/FRONT FORK/STEERING/BRAKE

SERVICE INFORMATION 13-1

TROUBLESHOOTING 13-2

STEERING HANDLE 13-3

FRONT WHEEL 13-4

FRONT WHEEL BEARING . . . 13-5

SPEEDOMETER 13-6

FRONT WHEEL INSTALLATION · 13-7

FRONT BRAKE 13-7

BRAKE FLUID 13-10

BRAKE CALIPER 13-12

FRONT FORK 13-14

STEERING STEM 13-19

SERVICE INFORMATION

GENERAL SAFETY



- Keep oil or brake fluid off the brake disk and pad because the contaminated brake disk and pad reduces the braking performance. If contaminated, replace the pad with a new one, and clean the disk.
- Use special tire levers and rim protectors to remove or assemble tires to protect the rim from being damaged.
- Place a jack underneath the engine to support the 2-wheeled vehicle.

SPECIFICATIONS

ITEM		STANDARD (mm)	SERVICE LIMIT (mm)
AXLE SHAFT RUNOUT		-	0.2mm
FRONT WHEEL RIM RUNOUT	RADICAL	-	2.0mm
	AXIAL	-	2.0mm
FRONT SHOCK ABSORBER SPRING FREE LENGTH		240.6mm	233mm
BRAKE DISK THICKNESS		3.8~4.2mm	3.0mm
BRAKE DISK RUNOUT		-	0.30mm
FRONT BRAKE CALIPER PISTON O.D.		33.914~33.935mm	33.87mm
FRONT BRAKE CALIPER CYLINDER I.D.		34~34.039mm	34.01mm
REAR BRAKE CALIPER PISTON O.D.		25.278~25.328mm	25.27mm
REAR BRAKE CALIPER CYLINDER I.D.		25.44~25.41mm	25.42mm
FRONT COMBI BRAKE CALIPER PISTON O.D		24.914~24.935mm	25.27mm
FRONT COMBI BRAKE CALIPER CYLINDER I.D		25~25.039mm	25.07mm

TORQUE VALUES

STEERING STEM LOCK NUT	7.84~11.76kg · m
STEERING TOP CONE RACE	0.49~1.27kgf · m
FRONT SHOCK ABSORBER BOLT	1.98~2.45kgf · m
FRONT AXLE NUT	4.41~4.9kgf · m
BRAKE CALIPER BOLT	2.45~3.43kgf · m

TROUBLESHOOTING

Hard steering

- Steering bearing adjustment nut too tight.
- Faulty steering stem bearings.
- Damaged steering stem bearings.
- Insufficient tire pressure.

Steers to one side or does not track straight

- Unevenly adjusted right and left shock absorbers.
- Bent front forks.
- Bent front axle : wheel installed incorrectly.

Front wheel wobbling

- Bent rim.
- Worn front wheel bearings.
- Faulty tire.
- Axle nut not tightened properly.
- Wheel out of balance.

Soft suspension

- Weak fork springs.
- Insufficient fluid in front forks.

Hard suspension

- Incorrect fluid weight in front forks.
- Front fork air pressure incorrect.
- Bent fork tubes.
- Clogged fluid passage.
- Clogged anti-dive orifice.

Front suspension noise

- Worn slider or guide bushings.
- Insufficient fluid in forks.
- Loose front fork fasteners.
- Lack of grease in speedometer gear box.

Brake lever soft or spongy

- Air in hydraulic system
- Mixed brake fluid and wet
- Contaminated brake pad or disk
- Worn caliper piston seal
- Worn master cylinder piston seal
- Worn brake pad
- Contaminated caliper inside
- Caliper not sliding properly
- Worn brake pad or disk
- Low brake fluid level
- Clogged fluid passage
- Warped or deformed brake disk
- Sticking or worn caliper piston
- Sticking or worn master cylinder piston
- Contaminated master cylinder inside
- Bent brake lever

Brake lever hard

- Clogged brake system
- Sticking caliper piston
- Caliper not sliding properly
- Clogged fluid passage
- Worn caliper piston seal
- Sticking or worn master cylinder piston
- Bent brake lever

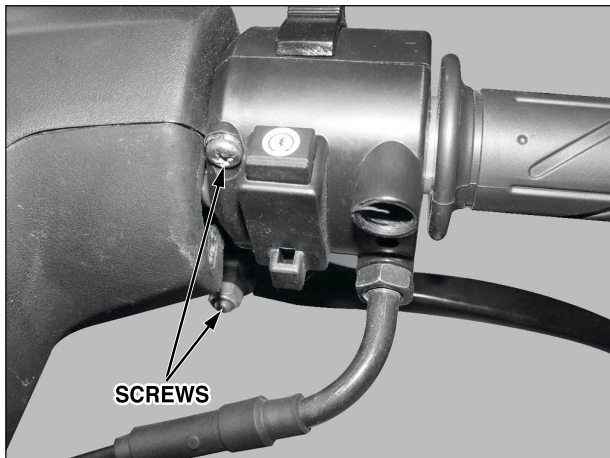
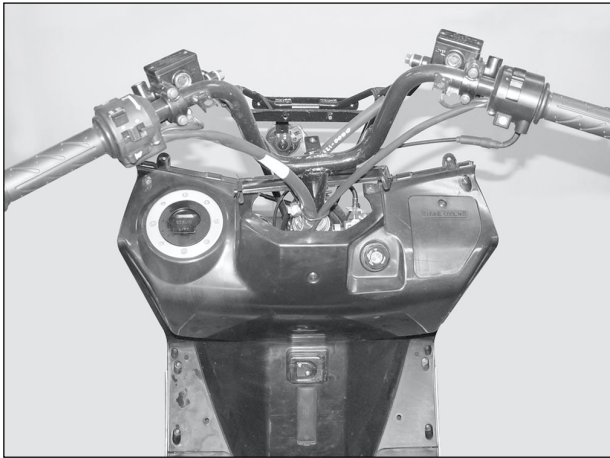
Brake drags

- Contaminated brake pad or disk
- Misaligned wheel
- Worn brake pad or disk
- Warped or deformed disk
- Caliper not sliding properly
- Hydraulic system contaminated with dust

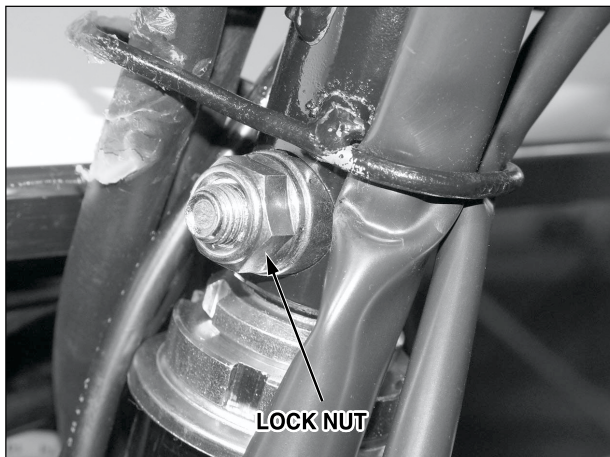
STEERING HANDLE

REMOVAL

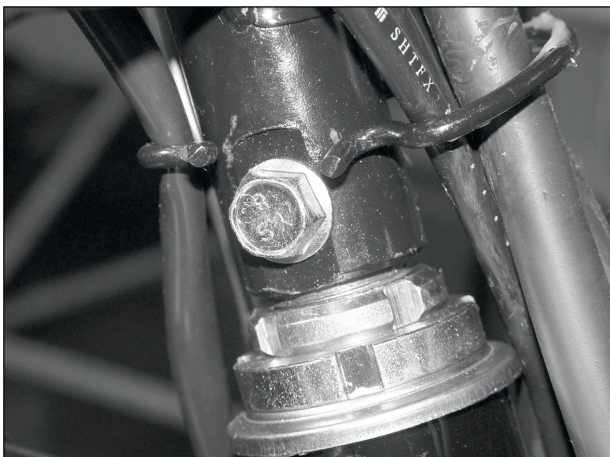
- Remove the upper handle cover and the under handle cover from the handle bar.
- Loosen the bolts securing the front and rear brake master cylinder.
- Remove the front cover, front under cover and speedometer cover.



- Loosen the 4 screws securing the housing.
- Disconnect the throttle cable from the throttle grip and remove the throttle grip from the handlebar.



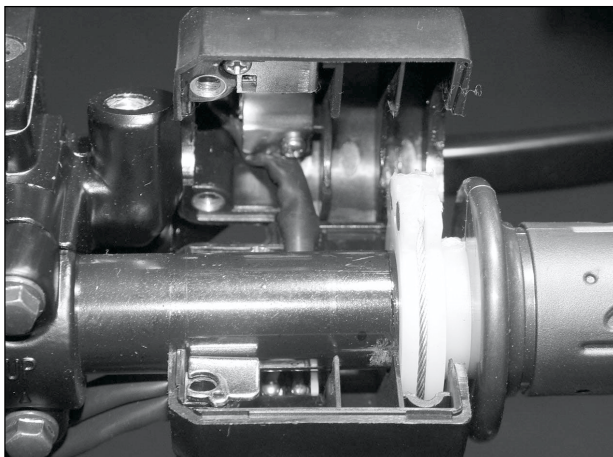
- Remove the handlebar lock nut and take out the bolt.
- Remove the handlebar.



INSTALLATION

- Install the handlebar onto the steering stem and install the handlebar collar, lock nut and bolt.
- Tighten the bolt, to the specified torque.

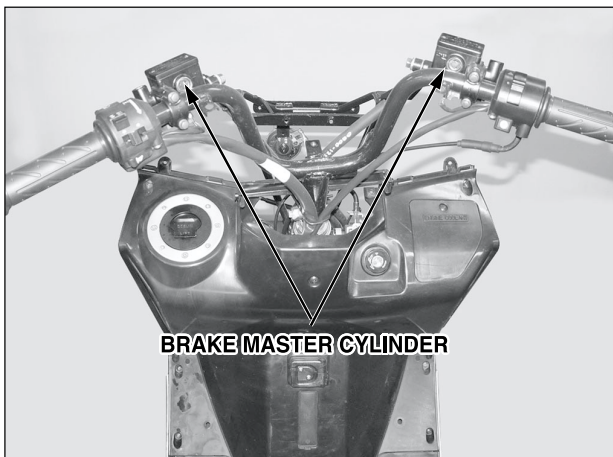
TORQUE VALUE : 3.92~4.9kgf · m



- Lubricate the throttle grip front end with grease and then install the throttle grip.
Connect the throttle cable to the throttle grip.
- Install the right and left handlebar switches and tighten the screws.

NOTE

- Adjust the throttle grip free play to the specified range of 2~6mm.

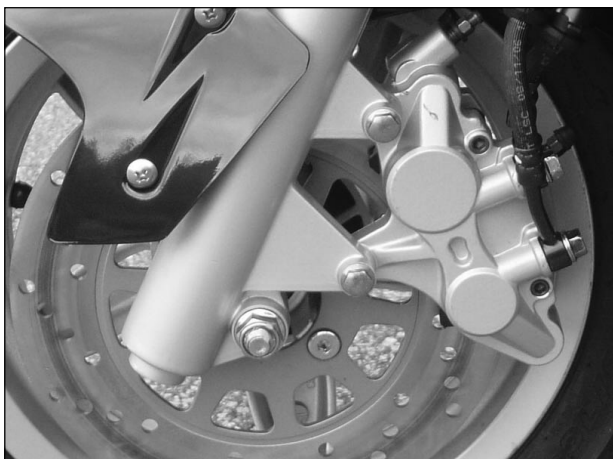


- Install the front and rear brake master cylinders.

NOTE

- Install the brake master cylinders by aligning the index marks.

- Install in the reverse order of removal.



FRONT WHEEL

REMOVAL

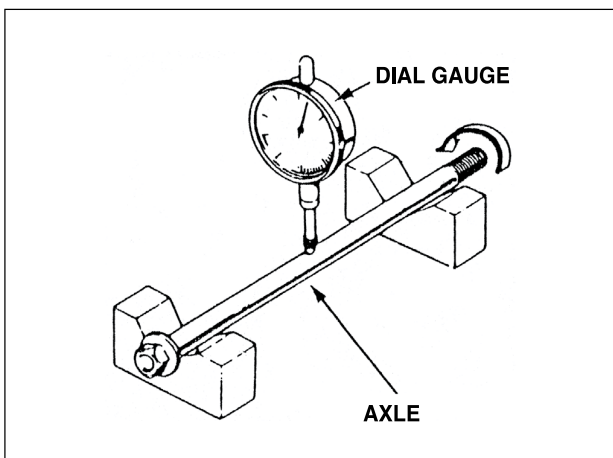
- Jack the motorcycle front wheel off the ground.
- Remove the front axle nut to pull out the axle.
- Remove the front wheel and the speedometer gear unit.

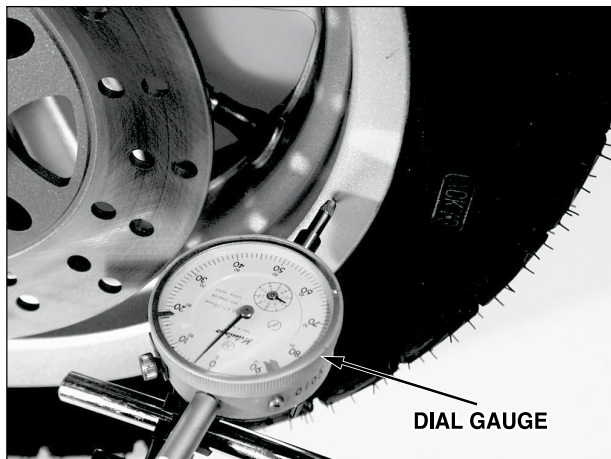
INSPECTION

AXLE RUNOUT

- Set the axle in V blocks and measure the runout using a dial gauge.
- The actual runout is 1/2 of the total indicator reading.

SERVICE LIMIT : 0.2mm replace if over





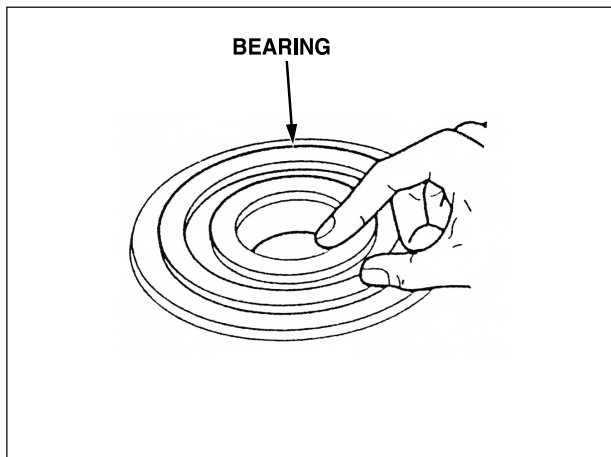
WHEEL RIM

- Check the wheel rim runout.

SERVICE LIMIT :

RADIAL : 2.0mm replace if over

AXIAL : 2.0mm replace if over



FRONT WHEEL BEARING INSPECTION

- Turn the inner race of each bearing with your finger to see if they turn smoothly and quietly. Also check if the outer race fits tightly in the hub.
- Replace the bearings if the races do not turn smoothly, quietly, or if they fit loosely in the hub.



WHEEL BEARING REPLACEMENT

- Install the bearing remover head and the remover shaft on the wheel, and remove the bearing and distance collar.

⚠ NOTE

- Always replace bearings in pairs, and never use old bearings.

TOOLS : BEARING REMOVER HEAD BEARING REMOVER

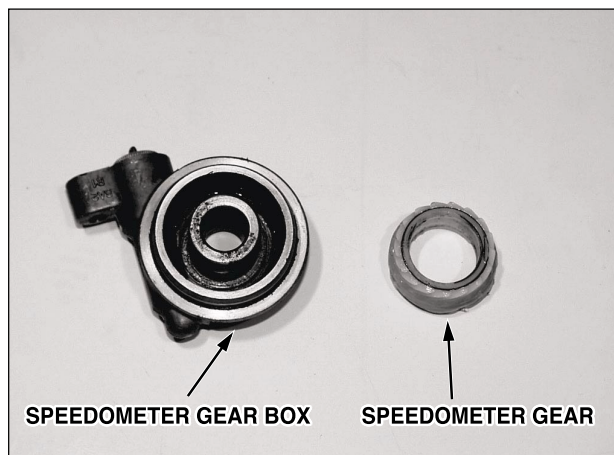
- Apply sufficient amount of grease to the bearing.
- Insert the right bearing with its seal surface facing outside.
- Do not tilt the bearing. Insert accurately.
- Upon assembling the distance collar, insert the left bearing with its seal surface facing outside.

TOOLS : DRIVER HANDLE A DRIVER PILOT OUTER DRIVER



⚠ CAUTION

- The bearing inserted in the last must be inserted until it contacts with the distance collar.
- Excessively inserted bearing can cause damage the opposite side bearing.



SPEEDOMETER GEAR REPLACEMENT

- Remove the speedometer gear and washer from the speedometer gear box.
- Check the gear for wear or damage.
- Install the washer.
- Apply grease to the speedometer gear prior to assembling.
- Install the washer.
- Apply grease to the speedometer gear unit and install.



FRONT WHEEL ASSEMBLY

- Apply grease to the left side dust seal rim.
- Install the left side dust seal.
- Install the brake disk.
- Install disk bolts.

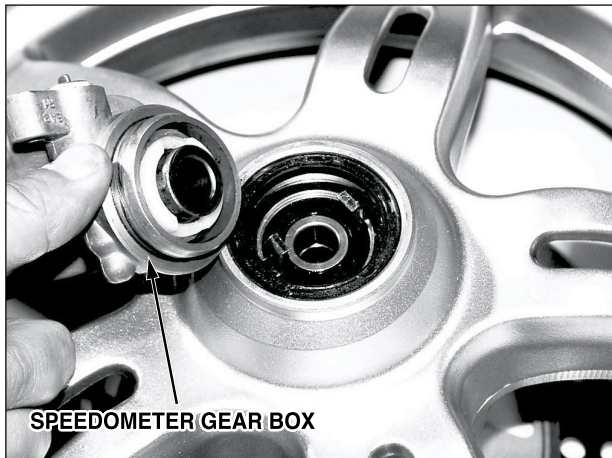
TORQUE VALUE : 4.0~4.5kgf · m



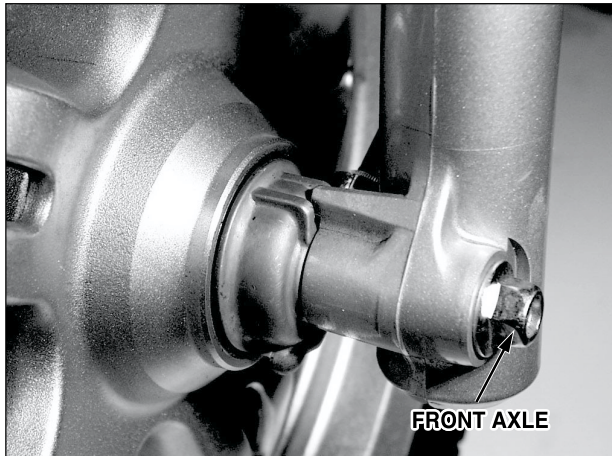
- Install the left side collar.



- Install the speedometer gear unit by aligning its retaining pawl with the hub cutout.

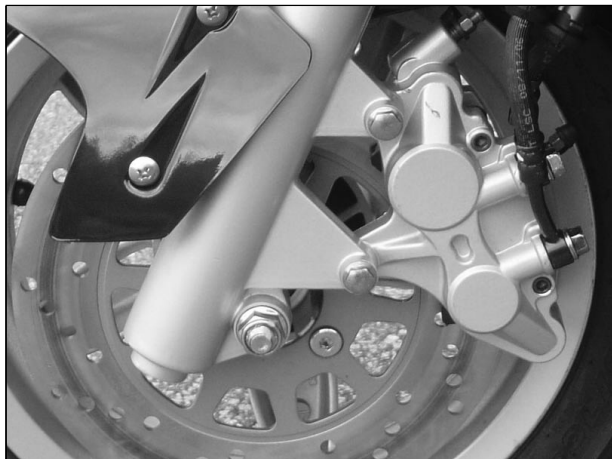


- Apply grease to the dust seal rim.
- Install the dust seal, and align the tangs of the speedometer gear retainer with the gear groove to assemble the speedometer gear box.



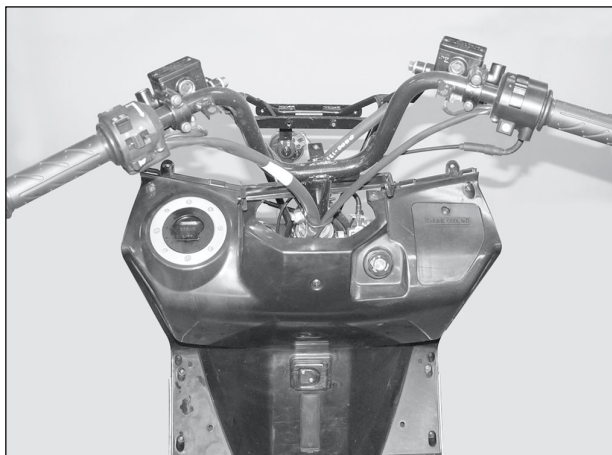
FRONT WHEEL INSTALLATION

- Insert the front wheel between the front forks.
- Insert the disk, taking precautions not to damage the pad, and assemble the wheel.
- Align the slots of the speedometer gear 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.
- Install the speedometer cable, and tighten with screws.
- Place the front wheel on the ground, and tighten the axle nut to the specified torque.

TORQUE VALUE : 5.0-7.0 kgf · m



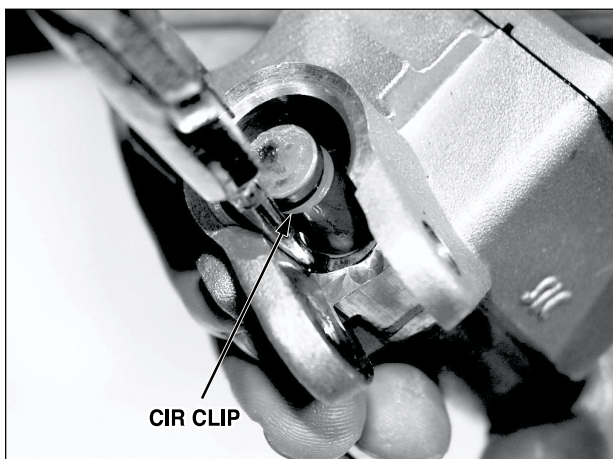
FRONT WHEEL BRAKE MASTER CYLINDER REMOVAL

- Remove the handlebar covers.
- First drain the brake fluid from the hydraulic brake system.
- Disconnect the front stop switch wire connector.
- Remove the brake fluid tube bolt.
- Remove the two bolts securing the brake master cylinder.
- Remove the brake master cylinder.



NOTE

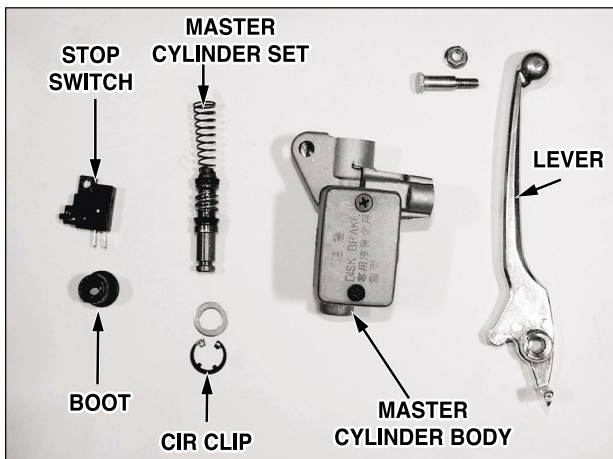
- When servicing the brake system, use shop towels to cover rubber and plastic parts and coated surfaces to avoid being contaminated by brake fluid.
- When removing the brake fluid tube bolt, be sure to plug the tube end to avoid brake fluid leakage.



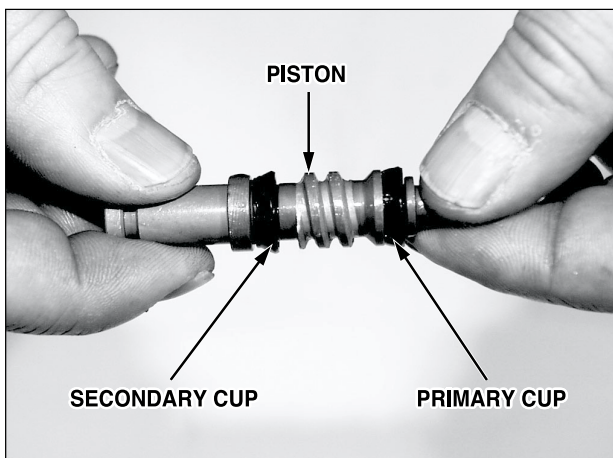
DISASSEMBLY

- Remove the Fr/Rr stop switch.
- Take out the boot and circlip from the master cylinder.

TOOLS : SNAP RING PLIERS



- Remove the washer, piston, spring from the master cylinder.
- Clean the master cylinder, reserve, master piston with the recommended brake fluid.



INSPECTION

- Check the piston periphery for scores, scratches or nicks and replace if necessary.
- Check the primary and secondary cups for wear.



NOTE

- If there is any leak of fluid when installing new piston, it may indicate the side wear of the cylinder by the direction of the piston contacting face. In this case, the master cylinder must be replaced also.

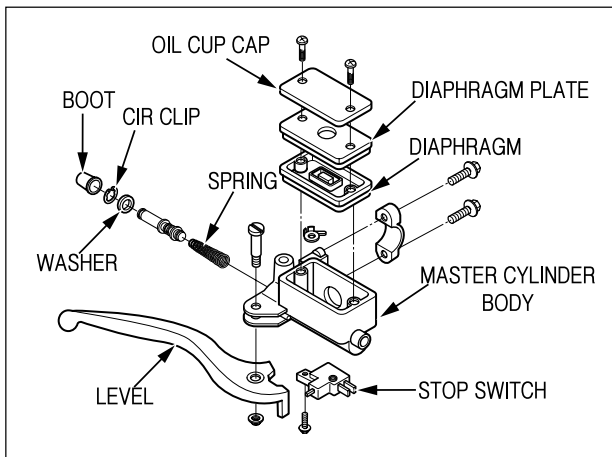
- Check the master cylinder for scores, scratches or nicks and replace if necessary.

ASSEMBLY

CAUTION

- Replace the piston, spring, cups and snap ring as a set.
- Be sure that each part is free from dust or dirt before reassembly.
- When cleaning with the brake fluid, use the specified brake fluid.

- Coat the piston, cup with the fresh brake fluid and install it on the piston. Install the spring with its larger diameter end toward the master cylinder.

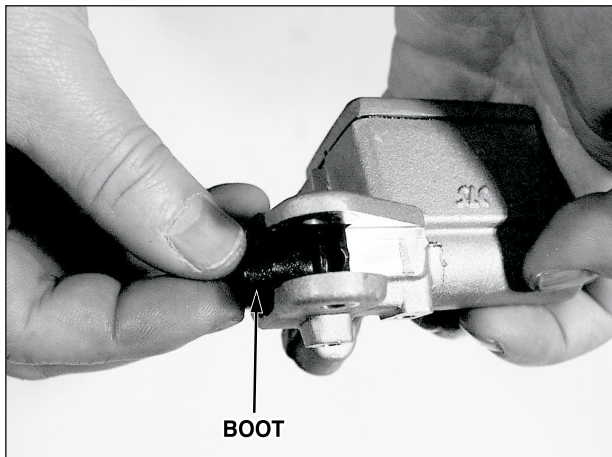


CAUTION

- When installing the cups, do not allow the lips to turn inside out.
- Note the installation direction of the snap ring.
- Be certain that the snap ring is seated firmly in the groove.

- Install the primary cup with its concaved side toward the inner side of the master cylinder.
- Install the snap ring.
- Install the rubber boot in the groove properly.

TOOL : SNAP RING PLIERS

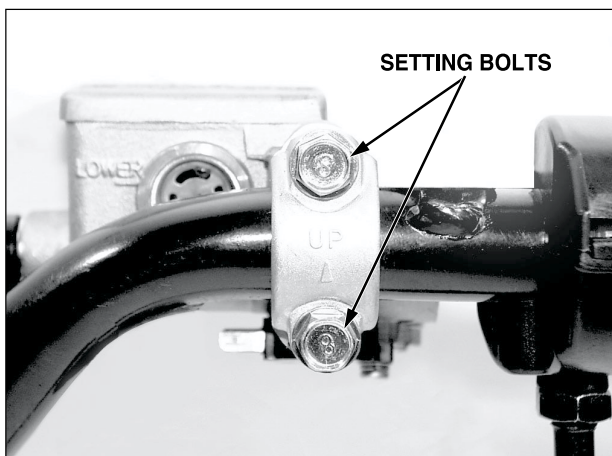


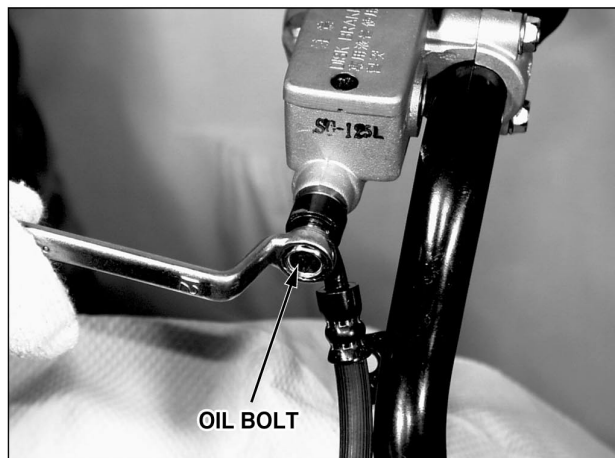
INSTALLATION

- Install the front / rear master cylinder to the handle bar.

NOTE

- Install the holder with its "UP" mark facing upwards, and align the holder joint with the punch mark on the handle bar.
- Tighten the holder upper bolt first.





- Install the brake hose to the master cylinder with 2 new sealing washers and the hose bolt.

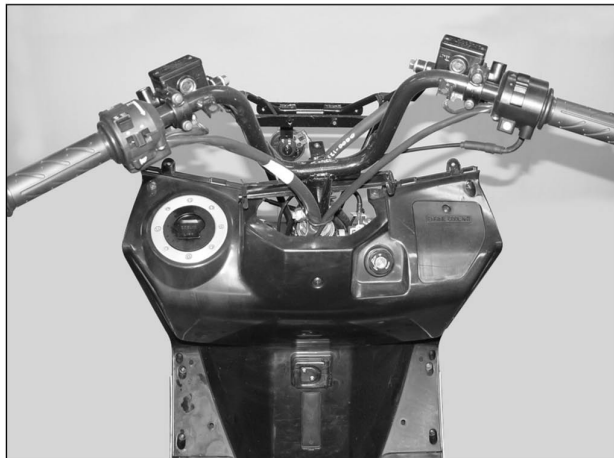
TORQUE VALUE : 2.5~3.5 kgf · m

- Loosen the 2 flat screws, remove the oil cup cap, diaphragm plate and diaphragm.
- Fill the brake fluid, and bleed air.
- Install the diaphragm, diaphragm plate and the oil cup cap, tighten the 2 flat screws.

BRAKE FLUID

⚠ CAUTION

- A contaminate disk or pad reduces braking power. Do not allow the disk or pad to be contaminated by oil.
- Replace contaminated pads, and remove pollutants from the disk completely.
- Check the brake fluid level often, and replenish new fluid as required. Do not spill fluid on painted, plastic or rubber parts.



- Remove the wind screen.
- Remove the oil cup cap, diaphragm plate and diaphragm from the master cylinder.
- Connect the bleeder hose to the bleeder valve. Loosen the bleeder valve, and pump the brake lever repeatedly.
- When there is no more fluid flowing out of the bleeder valve, stop pumping the brake lever.



AIR BLEEDING

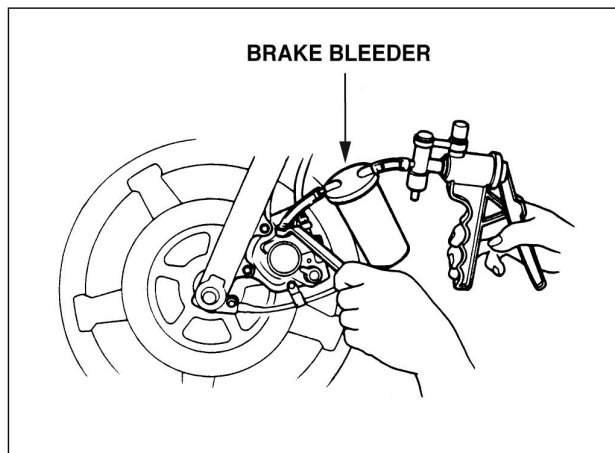
<When the brake bleeder is available>

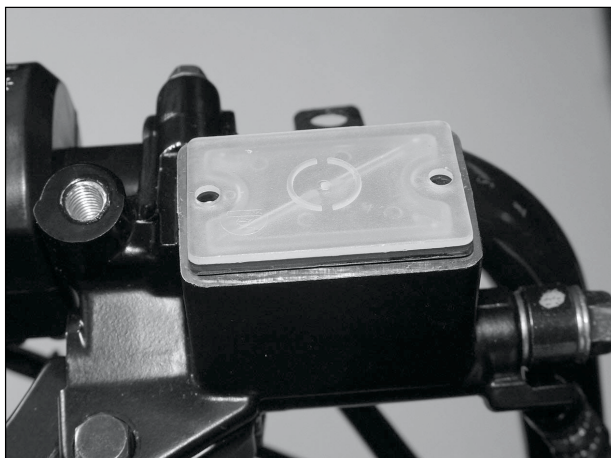
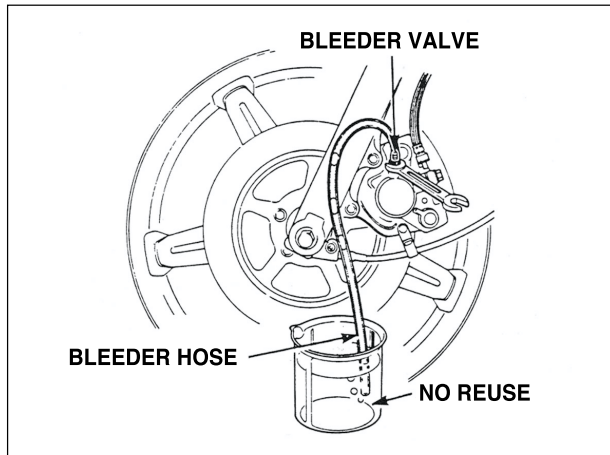
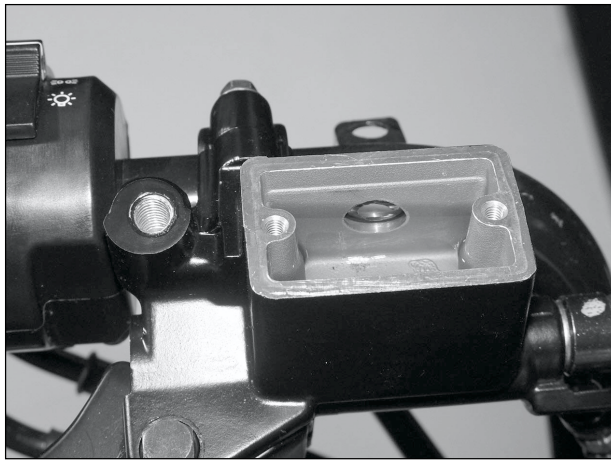
- Fill the reservoir with DOT 3 or 4 brake fluid up to the upper level.

⚠ CAUTION

- To prevent chemical changed, do not use different types of brake fluid.

- Connect the recommended brake bleeder to the bleeder valve.
- Loosen the bleeder valve while pumping the brake lever.
- Repeat this operation until the brake fluid flows out of the brake bleeder.
- Add brake fluid.





⚠ NOTE

- Check the fluid level often, and replenish fluid if the amount of fluid is reduced to the lower level.
- Read the user's manual carefully prior to disassembling or using the brake bleeder.
- Protect the bleeder valve with tape to prevent air from entering the bleeder valve.

- Repeat the above procedures until no air bubbles appear in the bleeder hose.
- Squeeze the bleeder valve and operate the brake lever to check the ingress of air.

<When the brake bleeder is not available>

- Fill the brake fluid up to the upper limit line.
 - Connect the transparent bleeder hose to the bleeder valve and place the other end of the hose in a container.
- ① Squeeze the brake lever, then open the bleeder valve 1/2 turn, and close the valve.

⚠ NOTE

- Do not release the brake lever until the bleeder valve has been closed.
- Check the brake fluid level often while bleeding the system to prevent air from being pumped into the system.

- ② Release the brake lever slowly and wait several seconds after it reaches the end of its travel.
- ③ Repeat the above steps ① and ② until bubbles cease to appear in the fluid at the end of the hose.

- 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 VALUE : 0.4~0.7 kgf · m

- Be sure that the brake fluid is up to the upper level of the master cylinder and refill if necessary
- Reinstall the diaphragm, diaphragm plate and oil cup cap.

TORQUE VALUE : 1.0 kgf · m



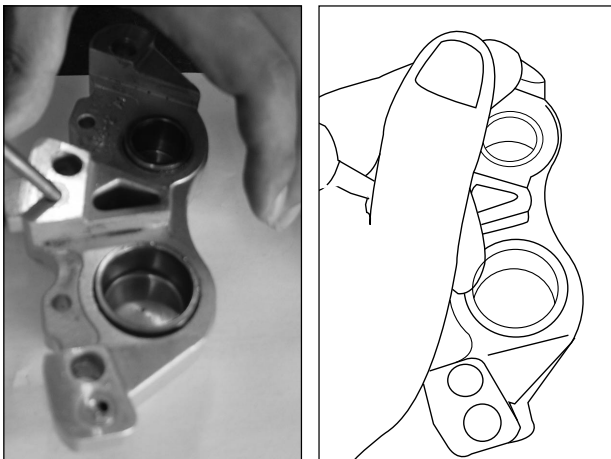
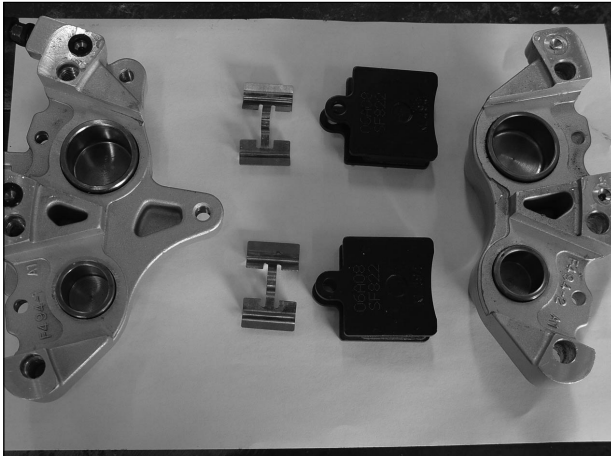
BRAKE CALIPER

REMOVAL

- First drain the brake fluid from the hydraulic brake system.
- Remove the brake fluid tube bolt.
- Remove the two bolts attaching the brake caliper.
- Remove the brake caliper.

DISASSEMBLY

- Remove the two brake pads dowelpins and three bolts from the brake caliper.
- Remove the brake pads.



- Remove the piston from the brake caliper.
- If necessary, use compressed air to squeeze out the piston through the brake fluid inlet opening and place a shop towel under the caliper to avoid contamination caused by the removed piston..
- Check the piston cylinder for scratches or wear and replace if necessary.

⚠ WARNING

- Never use the high-pressure air or bring the air gun too close.
- Never touch the inside of the caliper



Piston Oil Seal

- Push the piston oil seal outward to remove it.
- Clean the oil seal groove with brake fluid.

INSPECTION

- Check the piston for scratches or wear.
- Measure the piston O.D. with a micrometer gauge.
- Top service limit : 26.91mm
- Under service limit:33.87mm

- Check the caliper cylinder for scratches or wear and measure the cylinder bore.
- Top service limit : 27.05mm
- Under service limit:34.01mm

ASSEMBLY

- Clean all removed parts.
- Apply silicon grease to the piston and oil seal.
- Lubricate the brake caliper cylinder inside wall with brake fluid.
- Install the brake caliper piston with grooved side facing out.

- Install the piston with its outer end protruding 3~5mm beyond the brake caliper.

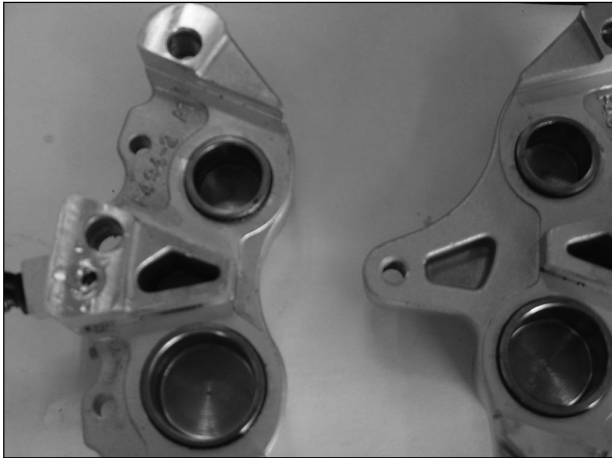
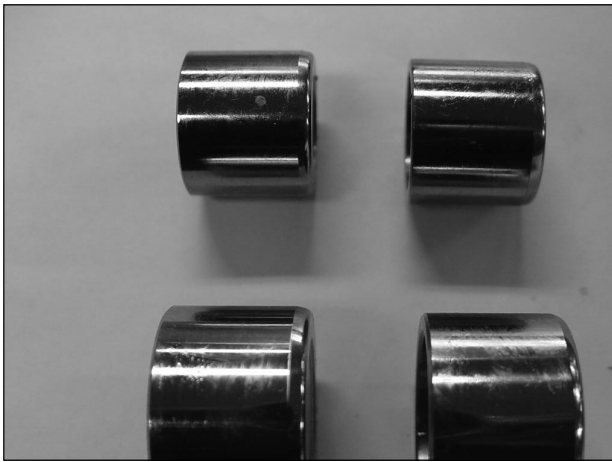
- Wipe off excessive brake fluid with a clean shop towel. Apply silicon grease to the brake caliper seat pin and caliper inside.
- Install the brake caliper seat.

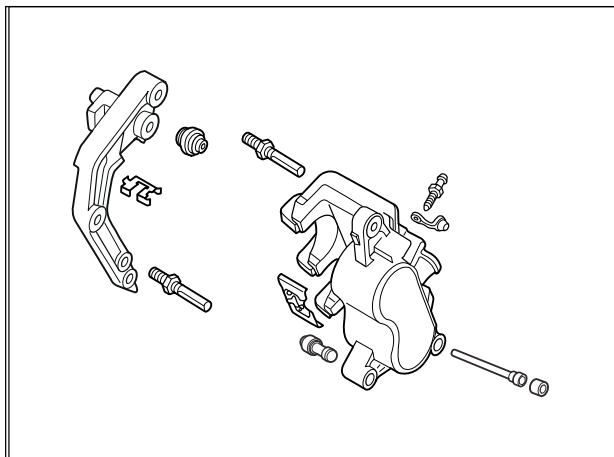
INSTALLATION

- Install the brake caliper to the shock absorber and tighten the two bolts.

- Torque : 24.5~34.3N·m

- When installing the brake caliper, be sure to position the brake disk between the two brake pads.





- Apply the silicone grease to the boot.
- Connect the boot to the portion of the caliper.
- Install the pad spring in the caliper.
- Install the caliper pin bolt and the slide pin in the caliper.
- Install the brake pad and the hanger pin in the caliper.



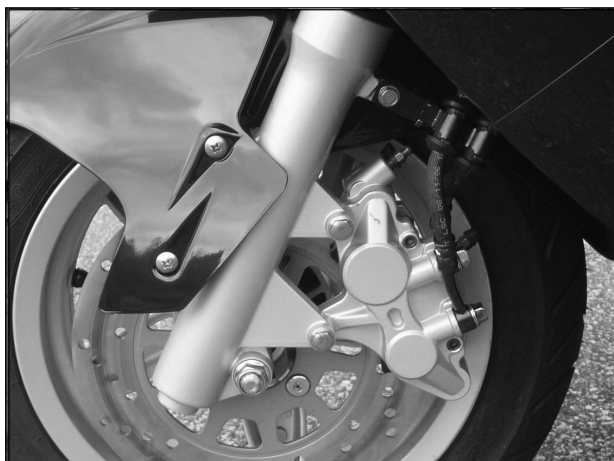
- Install the front caliper to the front fork
- Tighten the bolt to the specified torque.

TORQUE VALUE : 3.0kgf · m

- Connect the brake hose to the caliper and install 2 sealing washers and oil bolt.
- Tighten the oil bolt to the specified torque

TORQUE VALUE : 3.4kgf · m

- Fill the brake fluid to the upper limit line and bleed air.



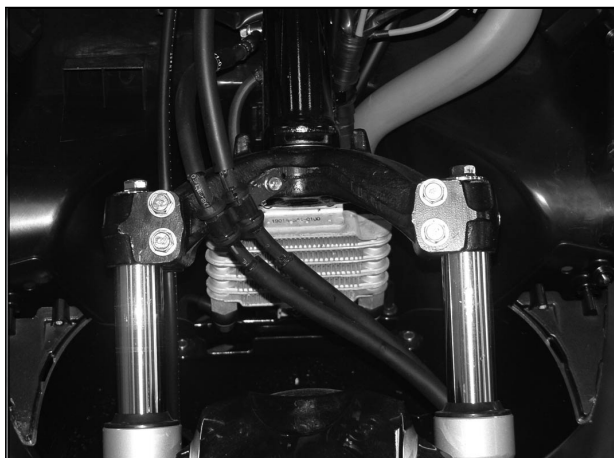
FRONT FORK REMOVAL

- Remove the following parts.
 - Front under cover
 - Front brake caliper
 - Front fender
 - Front wheel

- When removing the front fork, loosen the fork pipe bolt lightly.

NOTE

- Support the vehicle securely under the engine not to turn over it.
- Loosen the fork pipe bolt, but do not remove it.



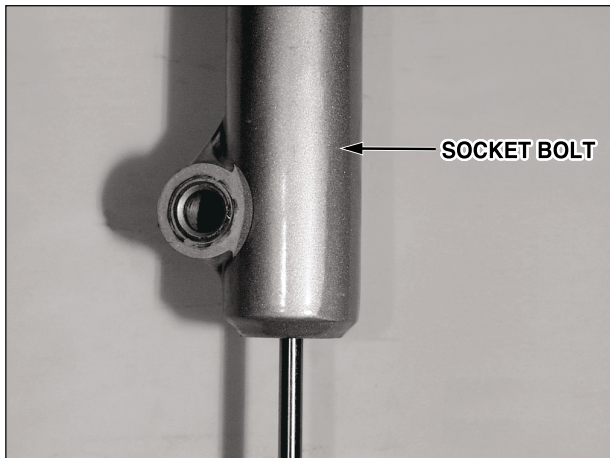
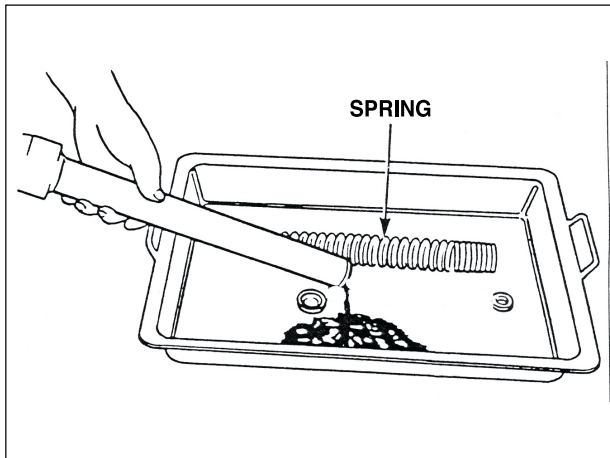
- Loosen the 4 setting bolts securing the RH./LH. front fork, remove the RH./LH. front fork.
- After removal of RH. front fork, loosen the flange bolt and remove the front brake hose clamp A.

DISASSEMBLY

- Remove the fork pipe bolt.

NOTE

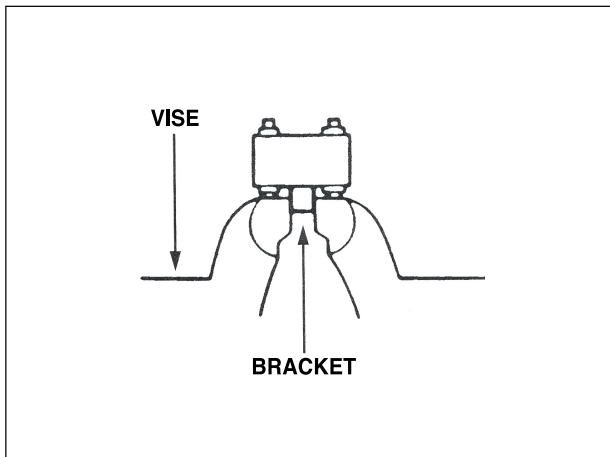
- If the screw is completely loosened, the fork tube cap bolt may spring out by the force of the spring. Take due precautions.
- Remove the fork spring, and expand and release the fork pipe several times to drain fork oil.



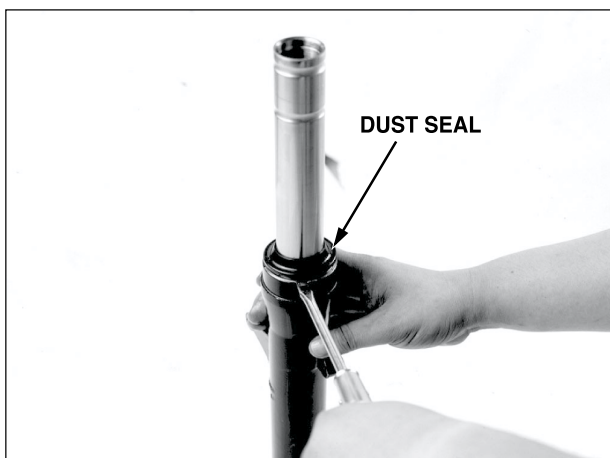
- Wrap the bottom case with a piece of cloth, and remove the socket bolt.

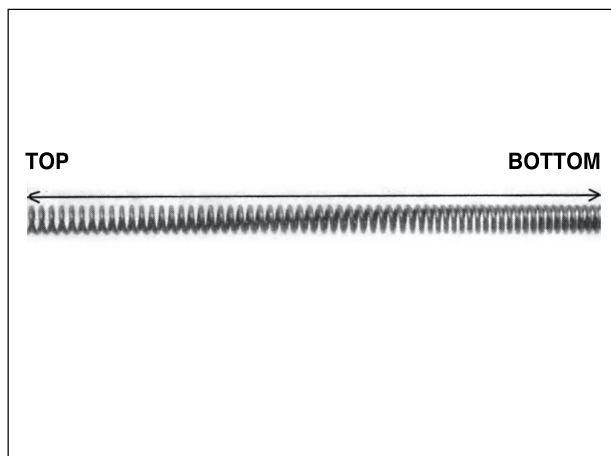
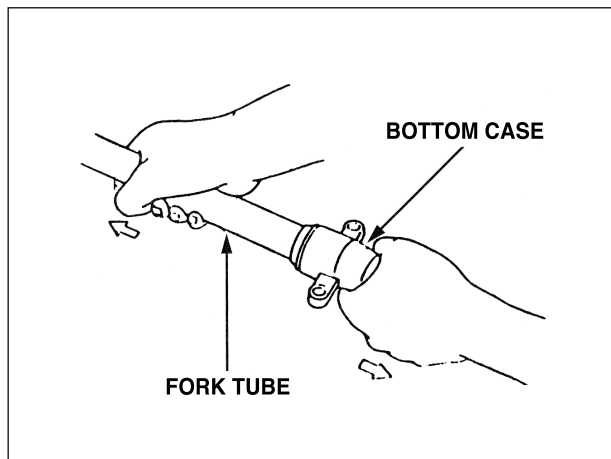
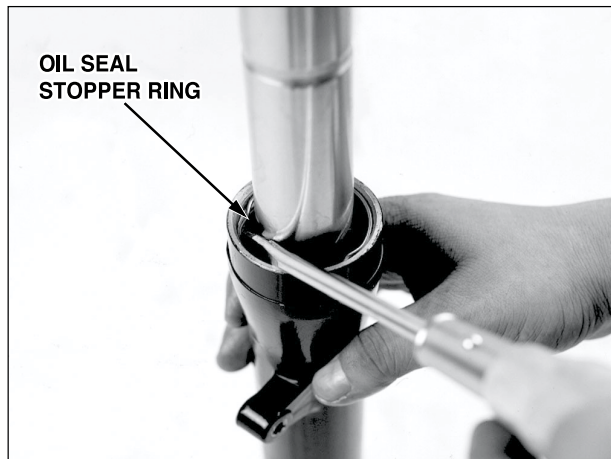
NOTE

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



- Remove the dust seal.





- Remove the oil seal stopper ring.

- Remove the oil seal.

NOTE

- Take precautions not to damage the interior and exterior rim of the bottom case.

- Remove the fork tube from the bottom case.
- Remove the piston and rebound spring from the fork tube.

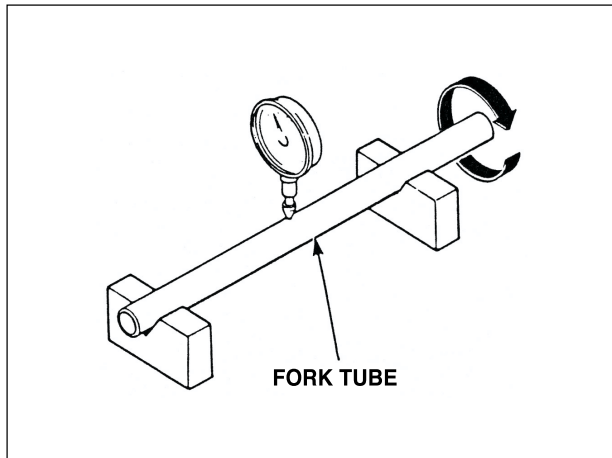
FRONT FORK INSPECTION

- Place the fork spring on a level place, and measure the free length.
- If the free length deviates from the service limit, replace the spring with a new one.
- Check components for damage or abnormal wear. Replace defective parts with new ones.

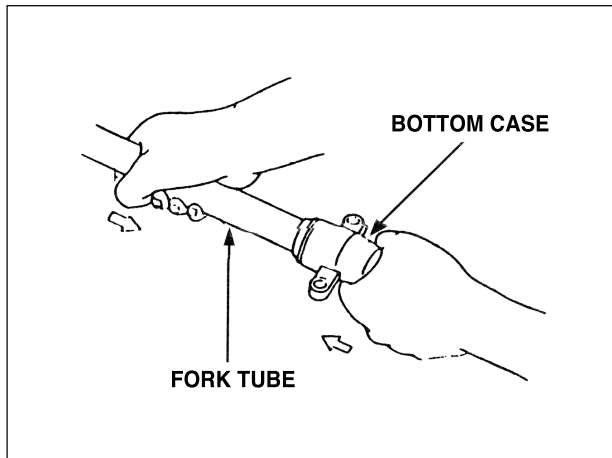
SERVICE LIMIT : FORK SPRING 235mm

- Set the fork pipe on a V-blocks, and measure fork pipe deflection by rotating with a dial gauge.

SERVICE LIMIT : Replace if the deflection is greater than 0.2mm

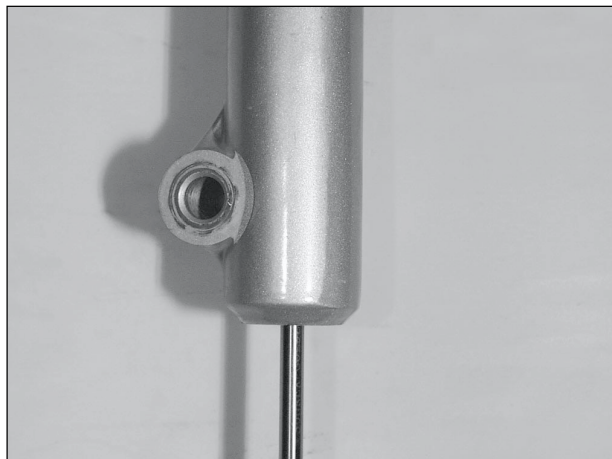


- Check the slider bush contact face.
- If the slider bush is extensively damaged, replace the bottom case.



FRONT FORK ASSEMBLY

- Wash parts with clean oil prior to assembling.
- Assemble the rebound spring and the fork piston to the fork tube.
- Assemble the fork tube to the bottom case.

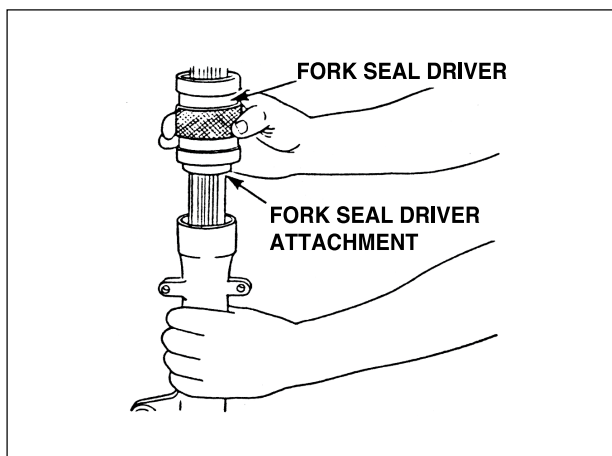


- Wrap the bottom case with a piece of cloth, and fix it to the vise.
- Apply screw locking agent to the socket bolt thread, and assemble the socket bolt to the fork piston.

TORQUE VALUE : 2.0kgf · m

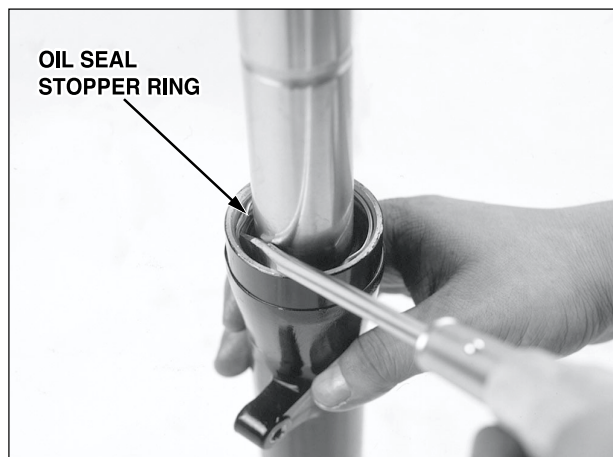
NOTE

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

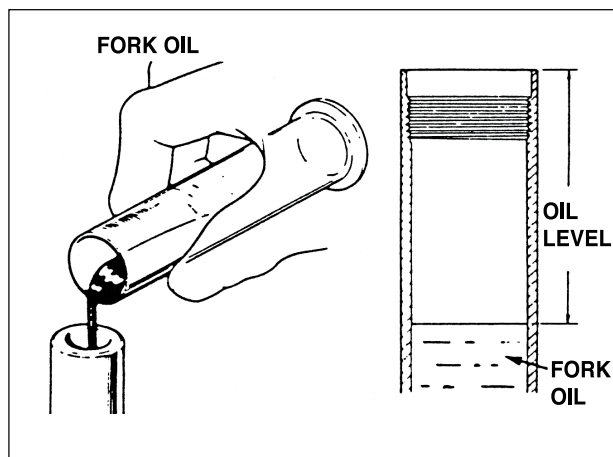


- Apply ATF to a new oil seal.
- Assemble the oil seal to the bottom case.
- Insert the oil seal with special tools until the attachment groove of the bottom case set ring is exposed.

**TOOLS : FORK SEAL DRIVER
FORK SEAL DRIVER BODY**



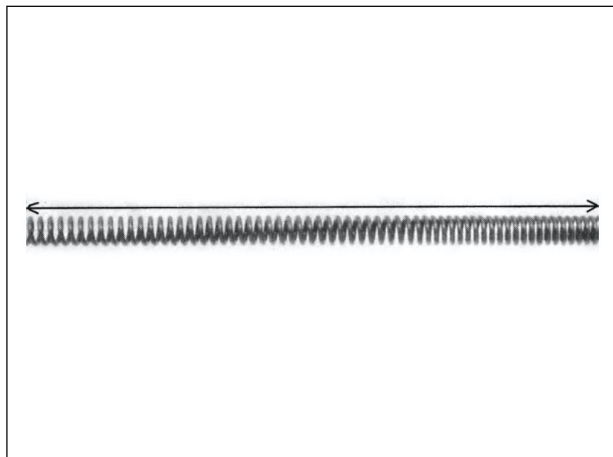
- Install the oil seal stopper ring
- Accurately assemble the oil seal stop ring to the bottom case.



- Install the dust seal.
- Fill a prescribed amount of automatic transmission fluid(ATF) into the fork tube.

CAPACITY : 90cm³

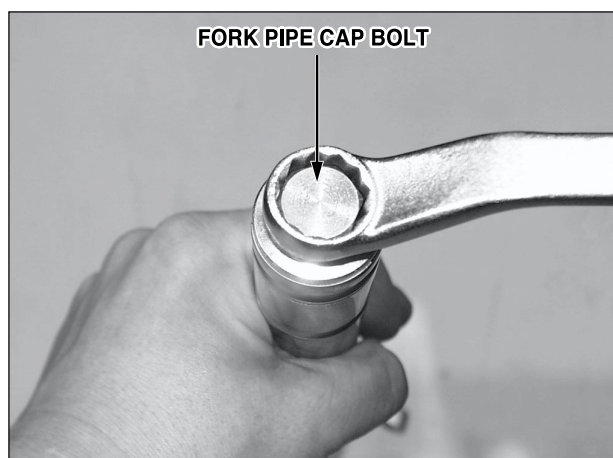
- Slowly press the fork tube 2-3 times to discharge air.



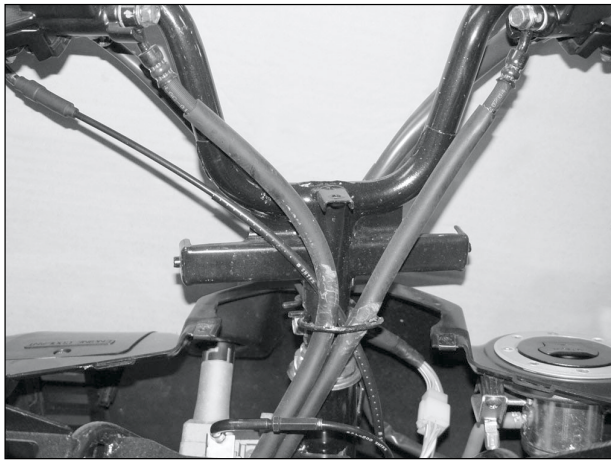
- Assemble the spring to the fork pipe.

⚠ NOTE

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



- Assemble the fork bolt to the fork pipe.

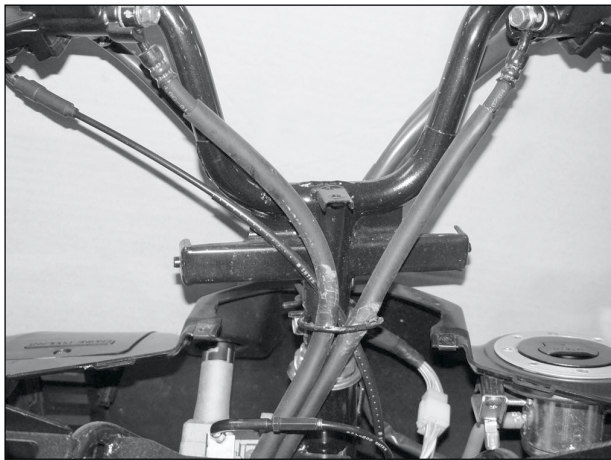


- Install the front fork to the steering stem.

- Install the front fork setting bolts.

TORQUE VALUE : 7.5 kgf · m

- Install the brake hose clip A to the RH. front fork.



STEERING STEM REMOVAL

- Remove the following parts.

- Handle cover
- Handle bar
- Front cover
- Front under cover
- Inner cover
- Front wheel
- Front fork



! NOTE

- Be careful not to turn over the vehicle.

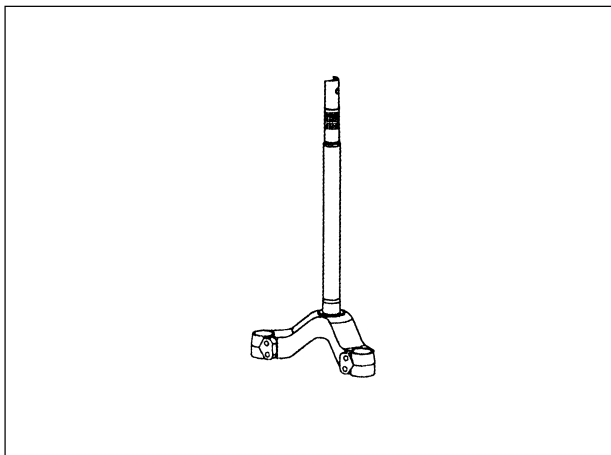
- Remove the steering stem nut using the steering stem nut socket.

TOOL : STEERING STEM NUT SOCKET

- Remove the steering top thread nut using the steering stem socket.

TOOL : STEERING STEM SOCKET

- Remove the top cone race.
- Check the upper ball assembly, top cone race and ball race for damage or abnormal and replace as necessary.
- Check the bottom cone race for wear and damage.





- Remove the steering top ball race from the head pipe.
- Remove the steering bottom race.

NOTE

- Check all of the races and balls for damage or abnormal wear and replace as necessary.
- If the vehicle has been involved in an accident, examine the area around the steering head for crack.



INSTALLATION

- Install the steering head dust seal washer and dust seal onto the steering stem.
- Press in the steering bottom cone race using the steering stem driver.
- Install the under ball ass'y into the steering stem.

TOOL : STEERING STEM DRIVER

- Install the steering stem into the head pipe.
- Install the steering upper ball ass'y into the steering stem.
- Install the top cone race and steering top thread onto the steering head.
- Tighten the top thread to specified torque, then loosen the top thread 1/8 turn

TORQUE VALUE : 0.15~0.25kgf · m

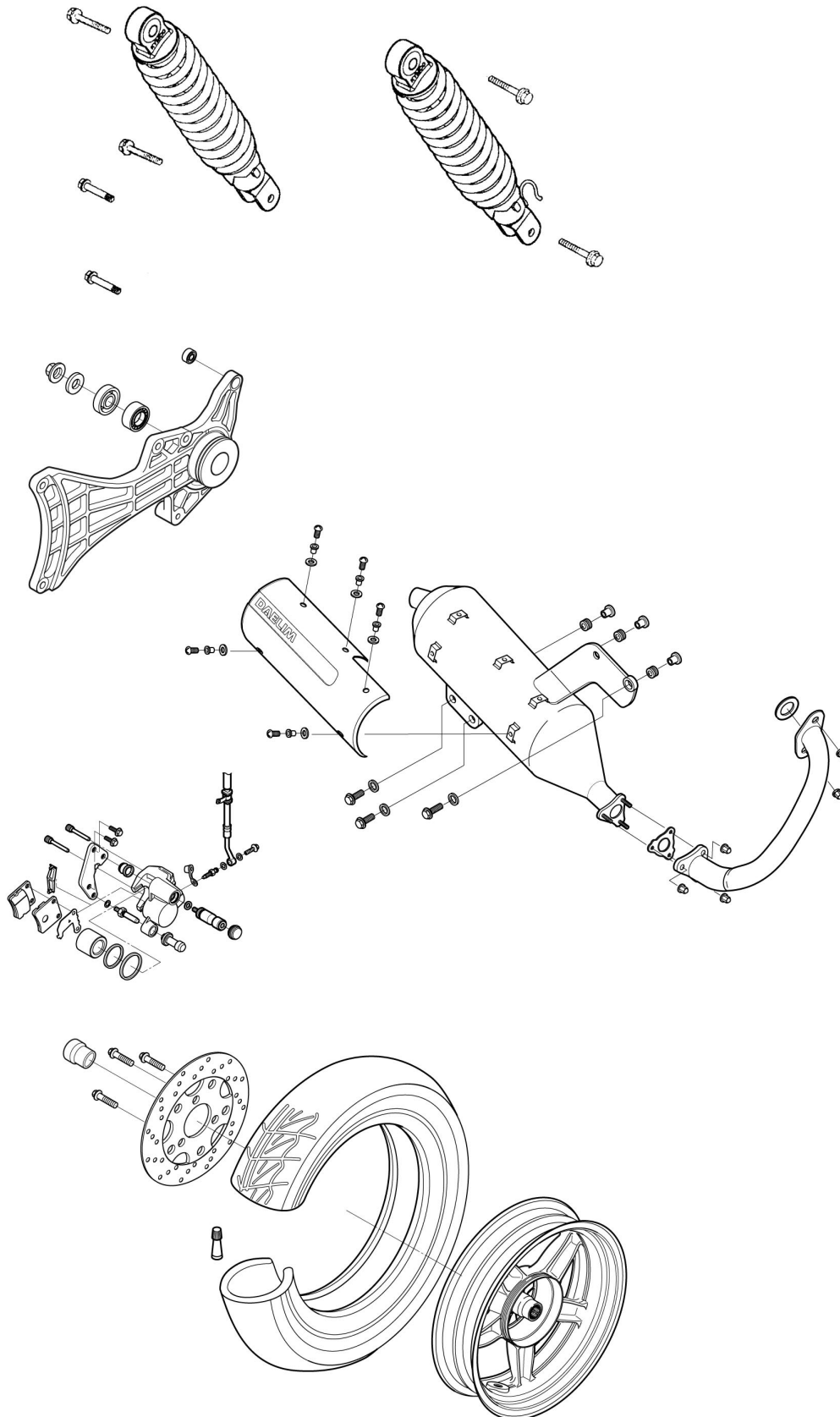
- Recheck that the steering stem moves smoothly without play or binding.
- Tighten the steering stem lock nut temporarily.

TOOLS : STEERING STEM LOCK NUT SOCKET STEERING STEM SOCKET

- Install the following parts.
 - Front fork
 - Front wheel
 - Inner cover
 - Front under cover
 - Front cover
 - Handle bar
 - Handle cover

MEMO

REAR WHEEL/BRAKE/SUSPENSION/REAR SWING ARM



14. REAR WHEEL/BRAKE/SUSPENSION/REAR SWING ARM

SERVICE INFORMATION . . .	14-1	PARKING WHEEL	14-5
TROUBLESHOOTING	14-2	REAR CUSHION	14-7
REAR BRAKE	14-3	REAR SWING ARM	14-7

SERVICE INFORMATION

GENERAL SAFETY

- If the brake drum or lining is contaminated with oil, braking power will be lost. If contaminated with oil, clean the brake drum, and replace the brake shoe.
- Inhaled asbestos fibers have been found to cause respiratory disease and cancer. Never use an air hose or dry brush to clean brake assemblies. Use a brake cleaner, designed to minimize the hazard caused by airborne asbestos fibers.

SPECIFICATIONS

ITEM		STANDARD VALUE	SERVICE LIMIT
AXLE SHAFT DEFLECTION		-	0.2 mm
REAR WHEEL RIM WOBBLER	RADICAL	-	2.0 mm
	AXIAL	-	2.0 mm
REAR BRAKE DRUM INNER DIAMETER		110.0 mm	111.0 mm
REAR BRAKE LINING THICKNESS		4.0 mm	2.0 mm
REAR CUSHION SPRING FREE LENGTH		250.8 mm	243.3 mm

TORQUE VALUES :

REAR CUSHION UPPER BOLT	3.5~4.5kgf · m
REAR CUSHION LOWER BOLT	3.5~4.5kgf · m
REAR CUSHION ROD LOCK NUT	3.0~4.5kgf · m
REAR AXLE NUT	6.0~8.0kgf · m

TROUBLESHOOTING

Wobble or vibration in motorcycle

- Tire pressure incorrect
- Faulty tire
- Bent rim
- Loose wheel bearing
- Swing arm bushing worn
- Wheel out of balance

Soft suspension

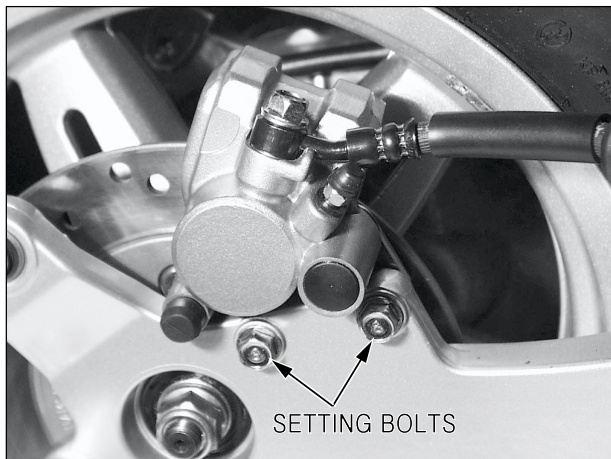
- Weak springs
- Rear damper improperly adjusted, oil leakage

Hard suspension

- Rear damper improperly adjusted
- Bent shock absorber rod

Suspension noise

- Loose fasteners
- Worn shock



REAR BRAKE

REMOVAL

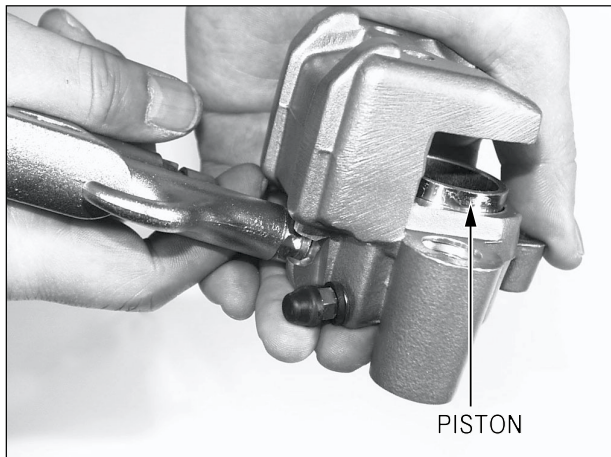
- Remove the muffler.
- Loosen the rear break tube bolt and remove the break tube.
- Loosen 2 bolts and remove rear break caliper.



INSPECTION

- Inspect break pad and disk.
- Measure the break disk thickness.

SERVICE LIMIT : 3mm



DISASSEMBLY

- Remove the rear break caliper.
- Inspect caliper assembly.
- Remove the pad spring, slide pin, caliper bracket, and boot from the caliper body.
- Check the boot for wear and damage and replace if necessary.



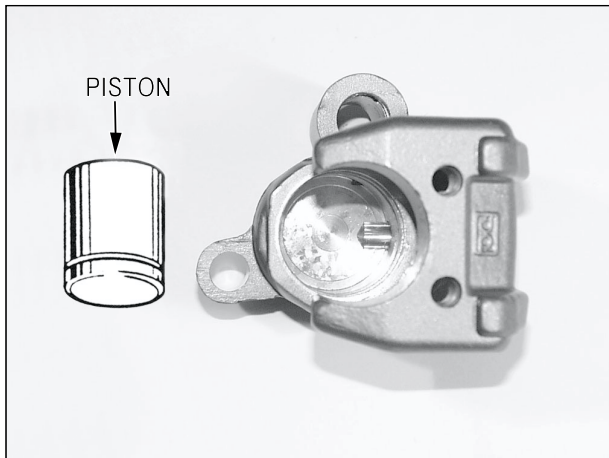
- Wind the caliper facing down with cloth to prevent the piston or break fluid from leaking.
- Remove the piston from the caliper while blowing the low-pressure air in the opening of the break hose.

CAUTION

- Never use the high-pressure air or bring the air gun too close.
- Never touch the inside of the caliper



- Disassemble the piston seal and the dust seal.
- Clean the piston and inside of caliper with brake fluid.



INSPECTION

- Check the caliper cylinder bore for scoring, scratches or other damage.
- Measure the caliper I.D.

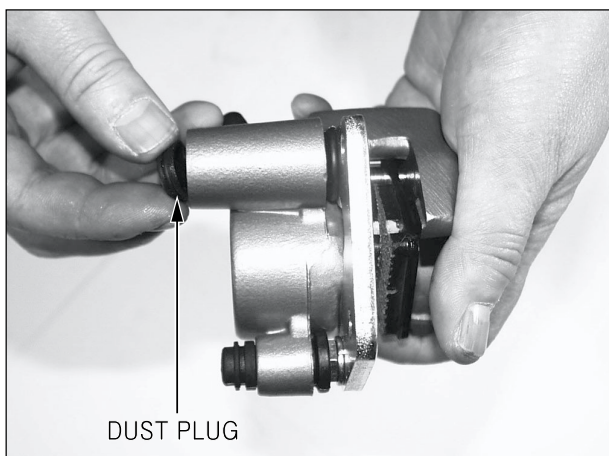
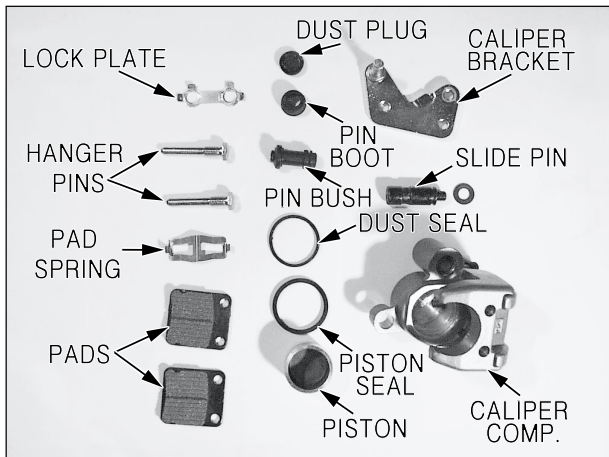
SERVICE LIMIT : 25.07mm

- Inspect piston surface for scratch or damage.
- Measure the piston O.D.

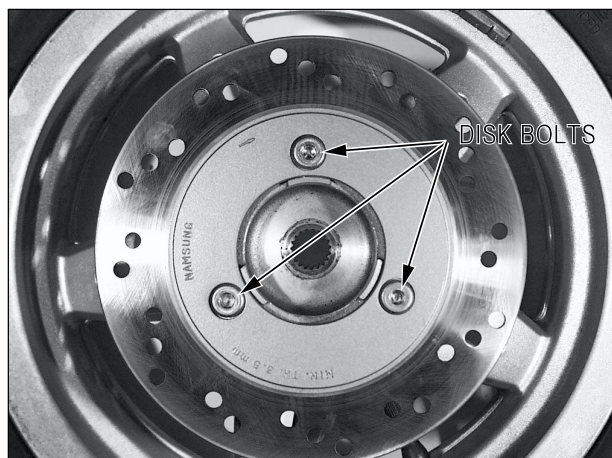
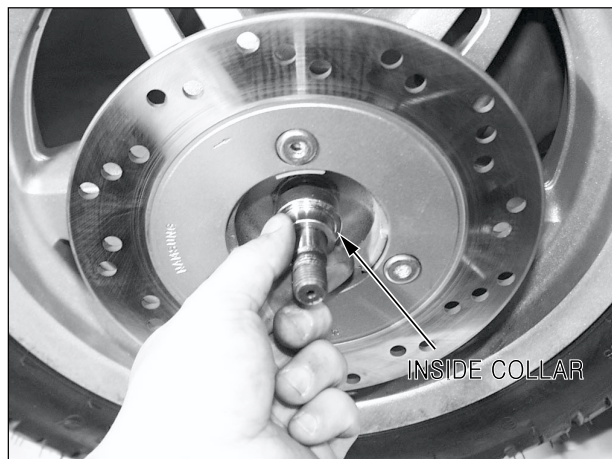
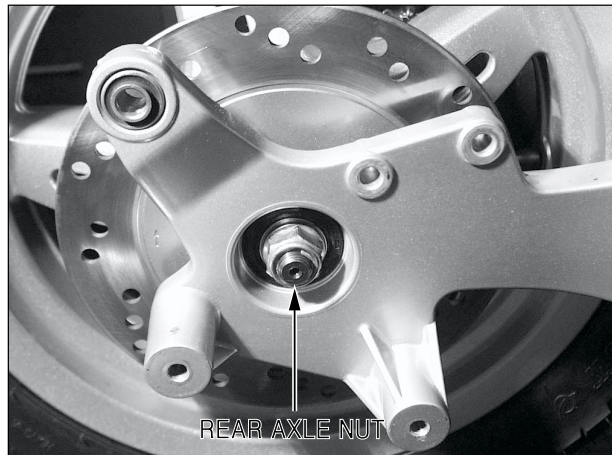
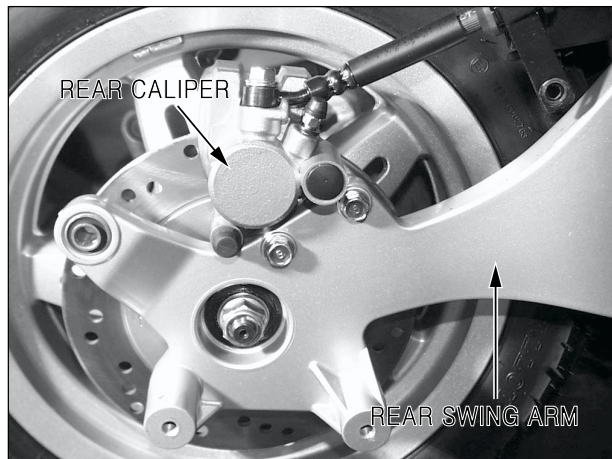
SERVICE LIMIT : 24.8mm

BRAKE CALIPER ASSEMBLY

- Clean the piston seal and the dust seal with the brake fluid and install them in the caliper. Install the piston in the caliper with the groove side of the piston facing the pad.



- Apply the silicone grease to the pin bush.
- Connect the pin bush to the portion of the caliper.
- Install the pad spring in the caliper.
- Install the caliper pin bolt and the caliper bracket in the caliper.
- Install the brake pad in the caliper.



REAR WHEEL

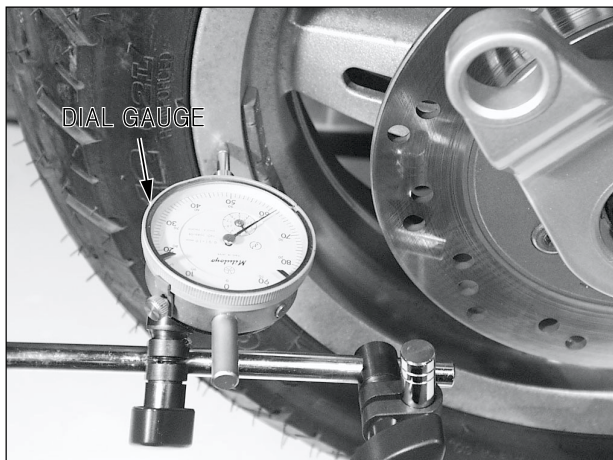
REMOVAL

- Support the motorcycle on the main stand.
- Loosen the parking brake rod adjust nut B, and remove the parking brake cable.
- Remove the brake arm joint B from the rear parking brake arm.
- Remove the muffler. (⇒3-8)
- Remove the rear brake caliper assembly from the rear swing arm.

- Loosen the rear axle nut.

- Remove the rear swing arm. (⇒13-7)
- Remove the rear wheel inside collar.
- Remove the rear wheel mudguard. (⇒3-8)
- Remove the rear wheel.

- Loosen the 3 rear brake disk bolts, remove the rear brake disk from the rear wheel.

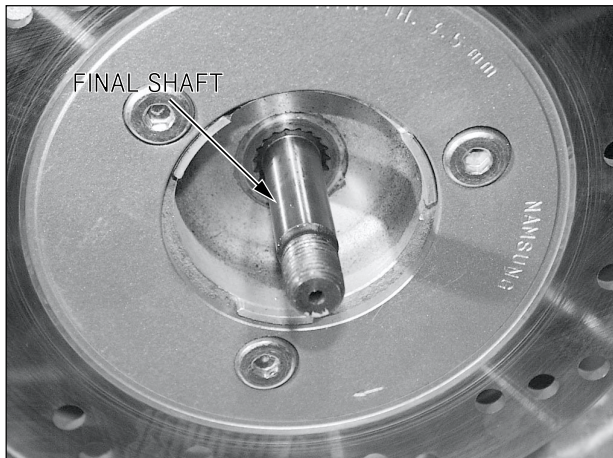


REAR WHEEL INSPECTION

- Check the rim for wobbles by rotating the wheel.

SERVICE LIMIT : Radial 2.0mm
Axial 2.0mm

TOOL : DIAL GAUGE



REAR WHEEL INSTALLATION

- Install the rear brake disk.
- Insert the rear wheel over the final shaft.



- Install the rear wheel inside collar.
- Install the rear swing arm. (⇒13-8)
- Tighten the rear axle U-nut to the specified torque.

TORQUE VALUE : 6.0~8.0 kgf · m

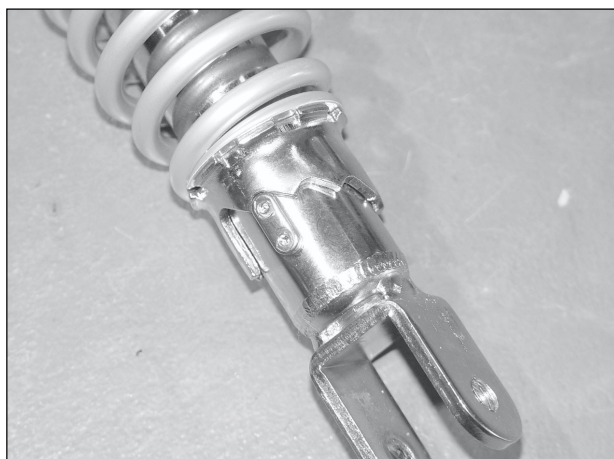
- Install the rear brake caliper assembly to the rear swing arm.
- Install the EX. muffler. (⇒3-8)
- Install the rear wheel mudguard. (⇒3-8)



- Insert the brake arm joint B into the rear parking brake arm, and connect the brake arm joint B to the parking brake cable and tighten the adjust nut B.

⚠ NOTE

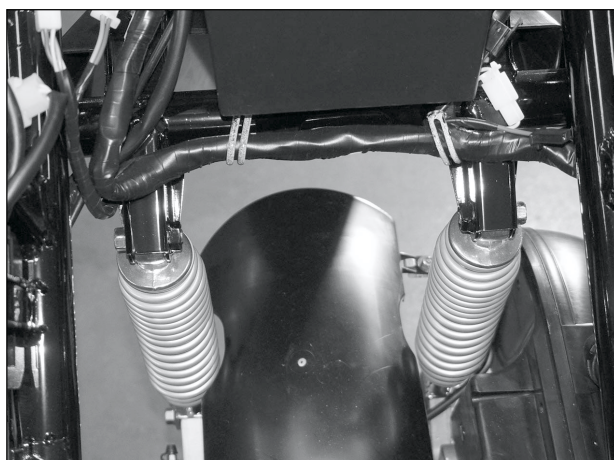
- After installing the parking brake, be sure to adjust the parking brake free play.



REAR CUSHION ADJUST

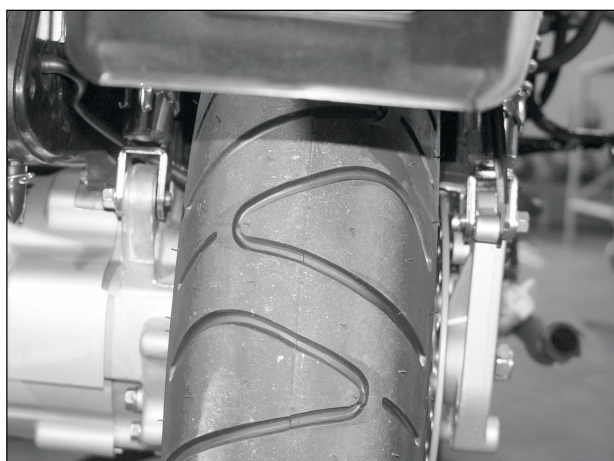
- Adjust the cushion spring according to the load condition.
- The rear cushion can be adjusted as below.

1	-	2	-	3	-	4	-	5
				medium				hard



REAR CUSHION REMOVAL

- Remove the luggage box.
- Remove the air cleaner.
- Remove the upper bolt.
- Remove the lower bolt.
- Remove the rear cushion.



INSTALLATION

- Install in the reverse order of removal.

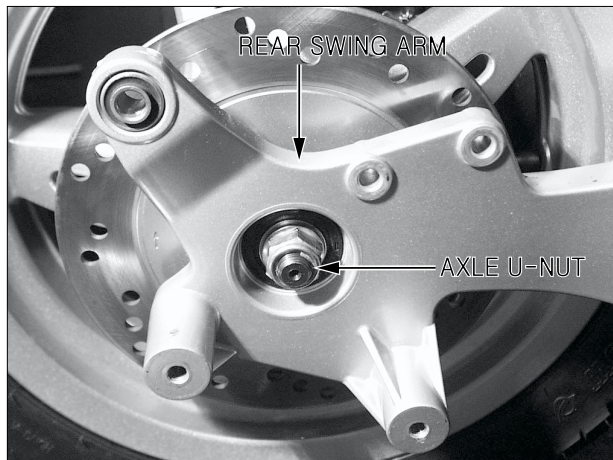
TORQUE VALUE : 3.92kgf · m



REAR SWING ARM

REMOVAL

- Remove the EX. muffler. (⇒3-8)
- Remove the rear brake caliper. (⇒13-3)
- Loosen the flange bolt securing the RH. crank case cover.
- Loosen the rear axle U-nut.
- Remove the rear swing arm.



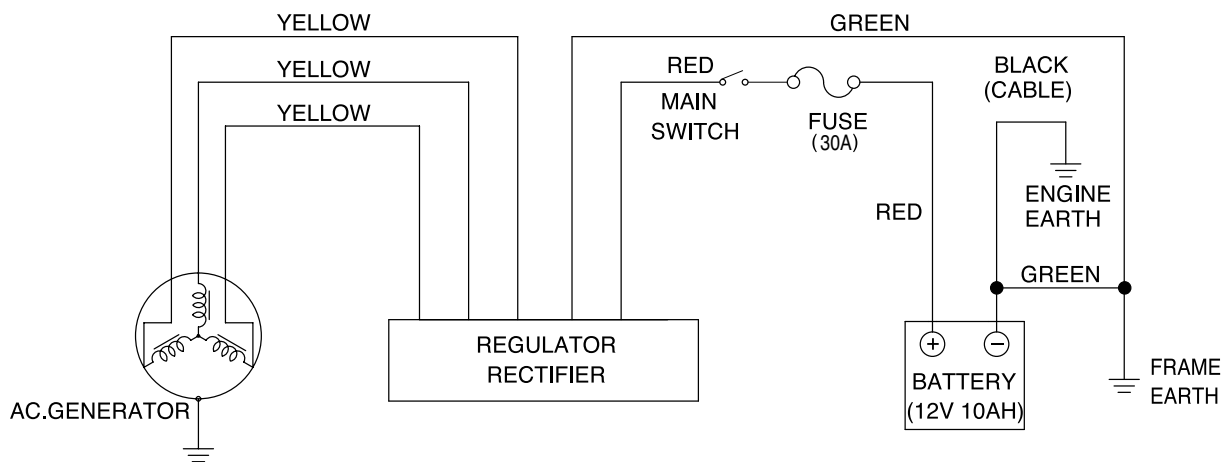
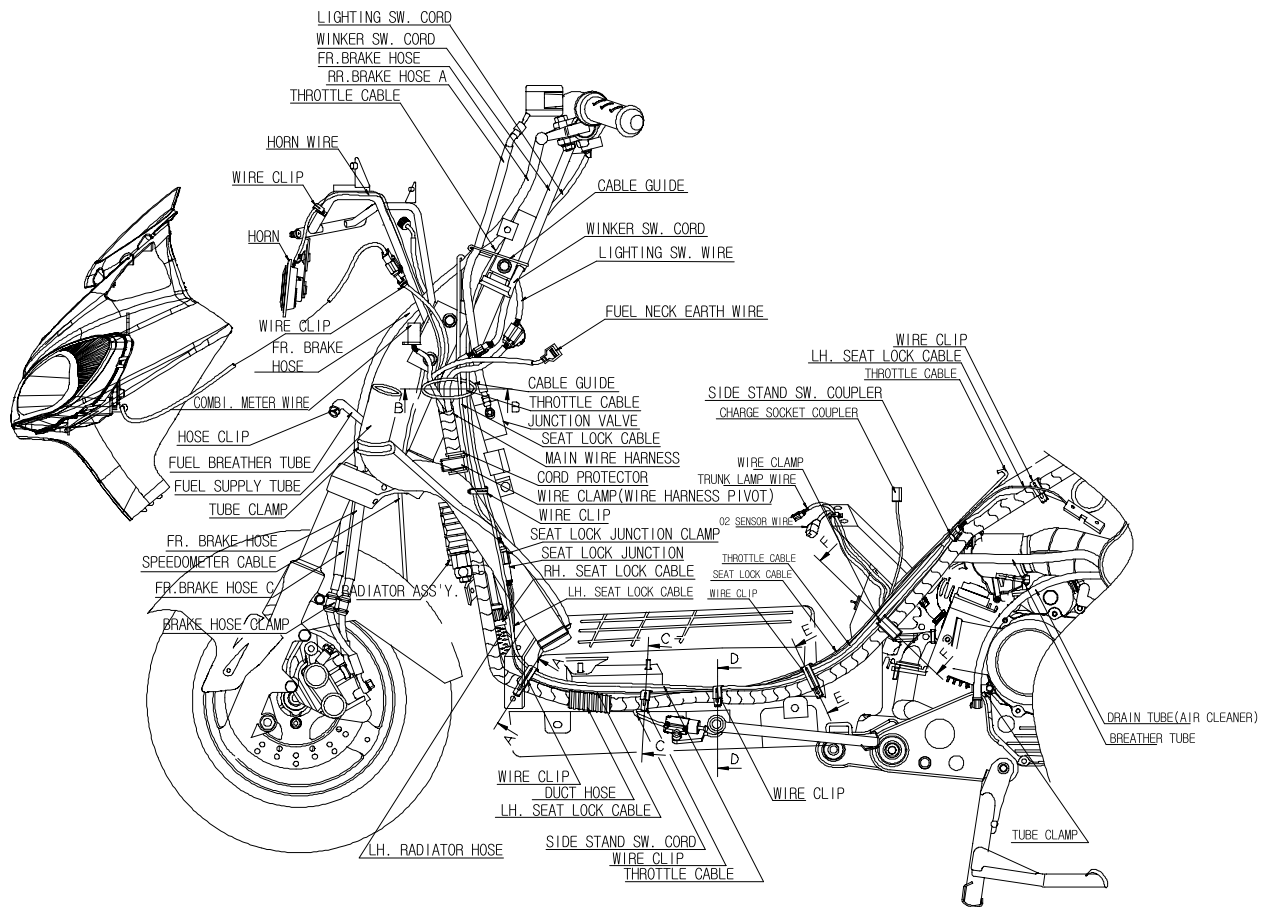
DISASSEMBLY

- Disassemble the rear wheel outside collar from the rear swing arm.
- Disassemble the oil seal ($28 \times 42 \times 7$) and radial ball bearing (6302UU).
- Install in the reverse order of removal.

TORQUE VALUE

- REAR WHEEL AXLE NUT : $6.0 \sim 8.0 \text{ kgf} \cdot \text{m}$

MEMO



15. CHARGING SYSTEM

SERVICE INFORMATION 15-1

TROUBLESHOOTING 15-2

BATTERY 15-2

CHARGING SYSTEM INSPECTION · 15-3

A.C. GENERATOR INSPECTION · 15-4

REGULATOR RECTIFIER INSPECTION · 15-5

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 and do not open stopper.
- 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.

15

SPECIFICATIONS

ITEM		STANDARD VALUES
BATTERY	Capacity	12V - 10AH (MF)
	Terminal-to-terminal voltage (When fully charged)	13.0 - 13.2V
A.C.GENERATOR	Charging coil resistance value (20° C)	0.6 - 1.6Ω
	rpm at charging start	1,500rpm
REGULATOR /RECTIFIER	Regulator voltage	14.5±0.1V

TOOLS

DIGITAL TESTER, PVA MULTI-TESTER, RPM TESTER, BATTERY TESTER

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.

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.

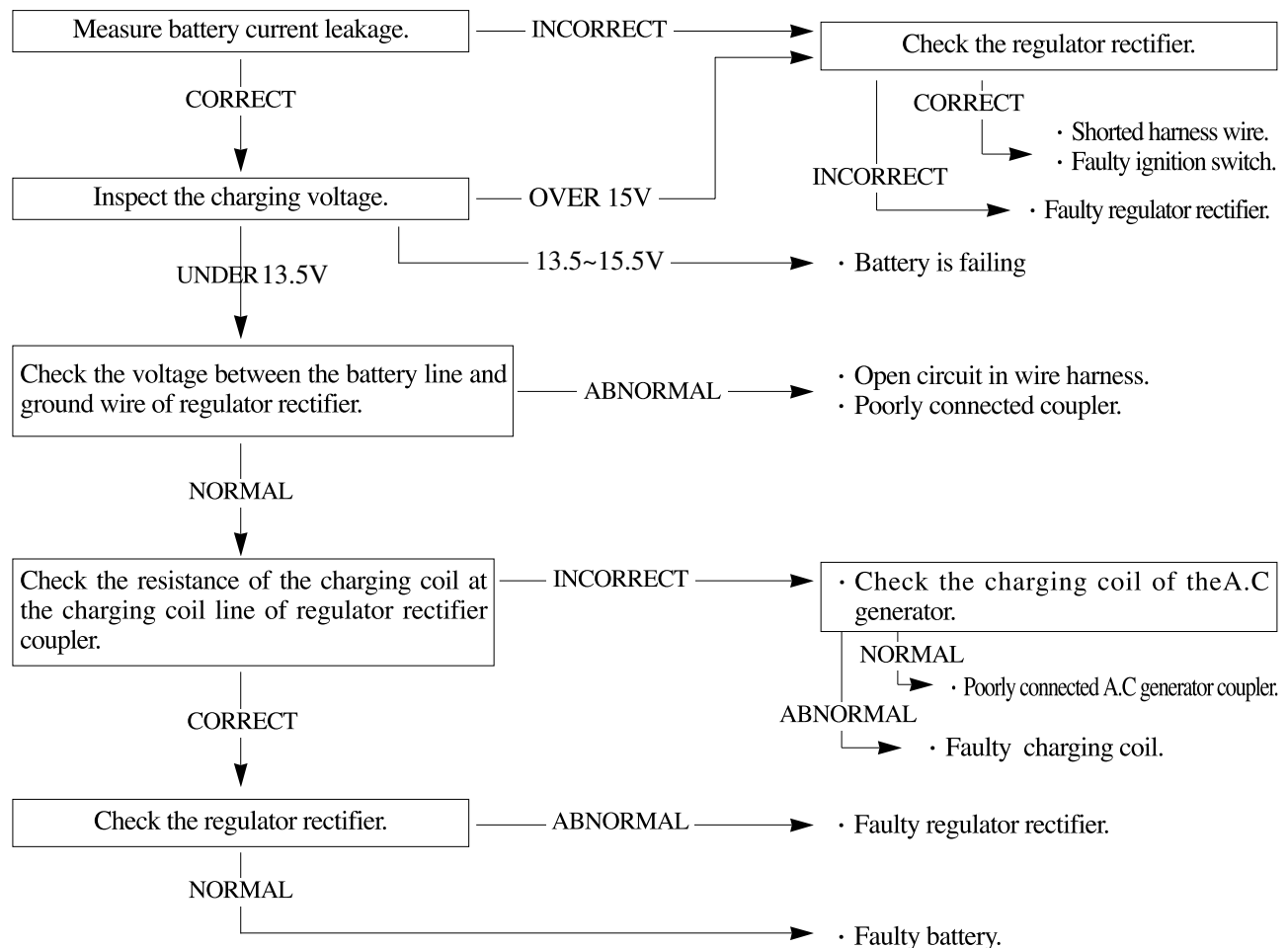
Intermittent power

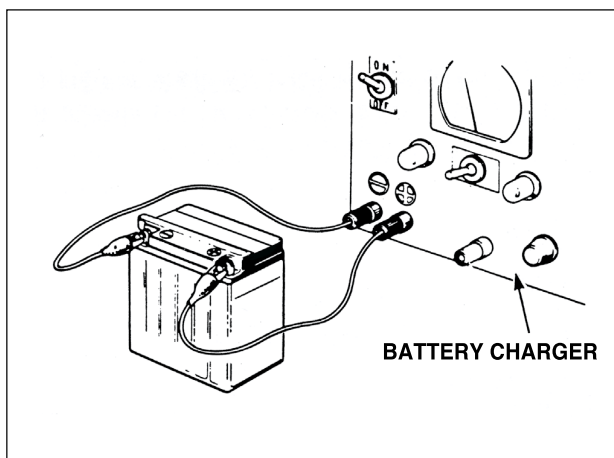
- Loose battery connection.
- Loose charging system connection.
- Loose starting system connection.
- Loose connection or short circuit in ignition system.
- Loose connection or short circuit in lighting system.

Charging system failure

- Loose, broken or shorted wire or connection.
- Faulty regulator rectifier.
- Faulty A.C generator.

CHARGING SYSTEM





BATTERY

- Remove the seat and luggage box.
- Loosen the screws securing the battery cover and remove the battery cover.

- Remove the battery.
- First disconnect the negative “⊖” battery cable, and then disconnect the positive “⊕” cable.

⚠ NOTE

- When disconnecting the battery positive ⊕ cable, do not touch the frame with tool ; otherwise it will cause short circuit and sparks to fire the fuel.

- The installation sequence is the reverse of removal.

⚠ NOTE

- First connect the positive ⊕ cable and then negative ⊖ cable to avoid short circuit.

BATTERY (OPEN-CIRCUIT VOLTAGE) INSPECTION

- Remove the battery cover.
- Disconnect the battery terminals from the battery.
- Measure the voltage between the battery terminals.

- FULLY CHARGED : 13.2V

- INSUFFICIENTLY CHARGED : UNDER 12.3V

TOOL : DIGITAL TESTER

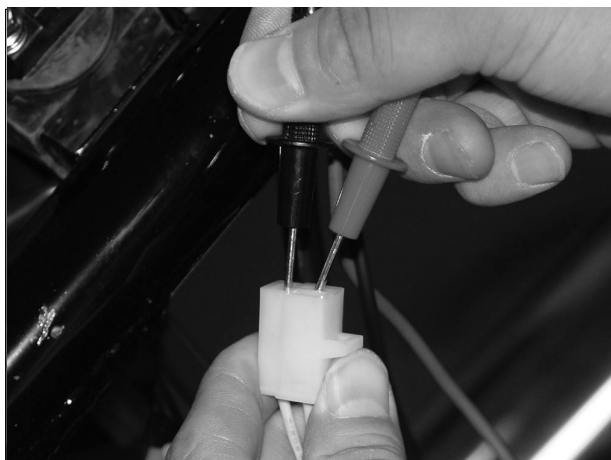
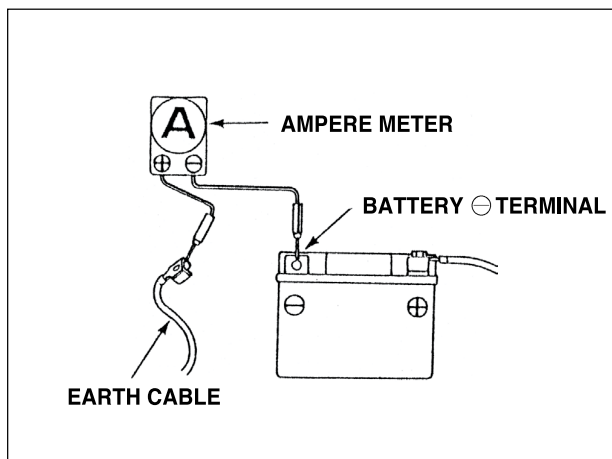
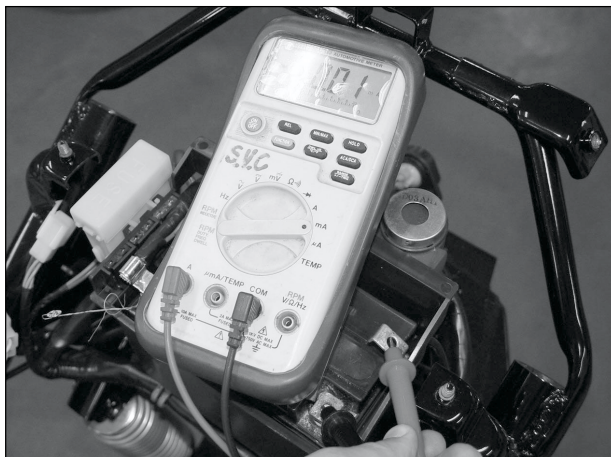
⚠ NOTE

- Use a voltmeter that will accurately indicate 0.1V difference.
- 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.

- Connect the charger positive (+) cable to the battery positive (+) terminal.
- Connect the charger negative (-) cable to the battery negative (-) terminal.

⚠ NOTE

- Keep flames and sparks away from a charging battery.
- Turn power ON/OFF at the charger, not at the battery terminals to prevent sparks near the battery.
- Charge the battery according to the current specified on the battery.
- During quick charging, the battery temperature should not exceed 45°C



CHARGING SYSTEM INSPECTION

LEAK TEST

- Turn off the ignition switch, and disconnect the ground (-) cable from the battery.
- Connect an ampere meter between negative (-) terminal and ground cable.
- With the ignition switch off, measure the leakage current.

LEAK CURRENT : Not to exceed 0.5A(max)

TOOL : DIGITAL TESTER

⚠ NOTE

- When measuring current using a tester, set it to a large range, and then bring it down the range to an appropriate level.
- Current flow larger 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.

A.C. GENERATOR INSPECTION

⚠ NOTE

- This test can be made without removing the stator from the engine. Disconnect the yellow wire from the auto bystarter.

- Remove the frame center cover.
- Disconnect the A.C. generator connector.

- Measure the resistance between the yellow wires.
- Replace the stator if resistance value is high or there is continuity between each yellow wire and ground.
- Resistance : yellow~yellow 0.6~1.6Ω



REGULATOR RECTIFIER INSPECTION

- Remove the luggage box.
- Remove the regulator rectifier coupler.
- Measure each terminal.

RESISTANCE VALUE

Unit : $k\Omega$, (20°C)

Tester $\oplus$ Tester $\ominus$	R	G	Y	Y	Y
R		28~36	∞	∞	∞
G	28~36		∞	∞	∞
Y	∞	∞		∞	∞
Y	∞	∞	∞		∞
Y	∞	∞	∞	∞	

- Replace the regulator rectifier unit if the resistance value between the terminals is abnormal.

MEMO

16. IGNITION SYSTEM

SERVICE INFORMATION 16-1
TROUBLESHOOTING 16-3
PULSE GENERATOR INSPECTION . 16-4
IGNITION COIL INSPECTION . . 16-5

IGNITION TIMING INSPECTION . 16-6
SIDE STAND IGNITION
CUT-OFF SWITCH 16-6

SERVICE INFORMATION

GENERAL SAFETY

- Follow the steps described in the troubleshooting flow chart when servicing the ignition system.
- Use spark plug of the correct heat range. Using spark plug with an incorrect heat range can damage the engine.
- Connect the same color cords. Pay particular attention to colors prior to removing wiring. Connect the same color couplers.
- 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 18)

SPECIFICATIONS

ITEM			STANDARD VALUE
SPARK PLUG			NGK CR8EH-9
SPARK PLUG GAP			0.8~0.9mm
IGNITION COIL RESISTANCE VALUE 20°C	PRIMARY COIL		0.73±0.08Ω(23°C±5°C)
	SECONDARY COIL	WITHOUT PLUG CAP	(15KΩ)
PULSE GENERATOR COIL RESISTANCE VALUE 20°C			80~150 Ω

TOOLS

DIGITAL TESTER
PVA MULTI-TESTER
CDI TESTER

TROUBLESHOOTING

No spark at plug.

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 (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. Poorly connected connectors or an open circuit in ignition system. 5. Faulty ignition system control circuit such as side stand switch. 6. Faulty ignition coil.
	No peak voltage.	1. Incorrect peak voltage adaptor connections. 2. Faulty ignition switch. 4. Faulty ignition system control circuit such as side stand switch. 5. Faulty peak voltage adaptor.
	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.
PULSE GENERATOR	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 pulse generator.



PULSE GENERATOR INSPECTION

RESISTANCE MEASUREMENT

- Release the seat lock with the main key.
- Remove the luggage box. (⇒3-3)
- Disconnect the pulser generator 2P coupler and the blue / yellow wire connector.
- Measure the resistance between the green and blue / yellow.

STANDARD VALUE : 80~150 Ω (20°C)

PVA MEASUREMENT

- Disconnect the pulser generator blue wire connector.
- Connect the peak voltage adaptor probes to the pulse generator wire terminal of the wire harness side connector and 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

- Remove the seat lock with the main key.
- Remove the luggage box.
- Remove the center cover.
- Remove the primary wire.

NOTE

· Since the resistance value of the primary coil is inherently very small, it is difficult to distinguish it from a shorted wire.

- 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 : 1.5~3.5 Ω

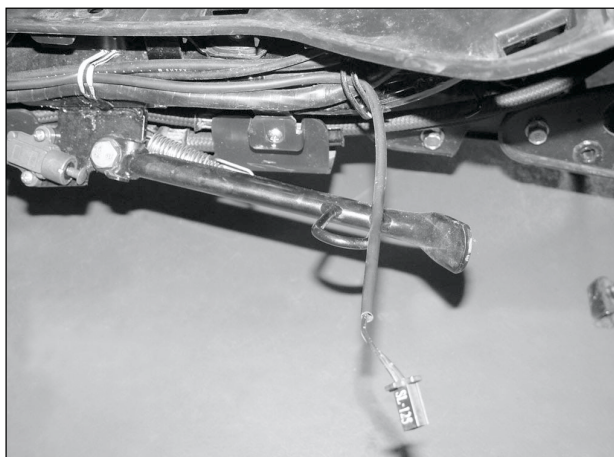
- With the spark plug cap on, measure the resistance between the primary coil terminal and the spark plug cap.
- If the resistance value is within the specified range, then the coil is good.
- If the resistance is ∞ (open wire), disconnect the spark plug cap and measure the secondary coil resistance.

STANDARD VALUE : (17~21 $\text{k}\Omega$)

- The secondary coil resistance might not measure cause by the high voltage diode inside the ignition coil.

REPLACEMENT

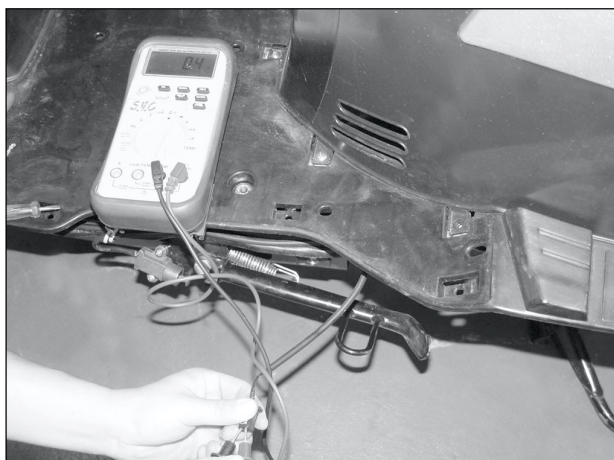
- Remove the high-tension cord from the plug, remove the plug cap.
- Remove the wire from the ignition coil.
- Remove the primary wire from the ignition coil.
- Loosen the ignition coil fixing bolt securing the frame, Remove the ignition coil.
- Install in the reverse order of removal.



SIDE STAND IGNITION CUT-OFF SWITCH

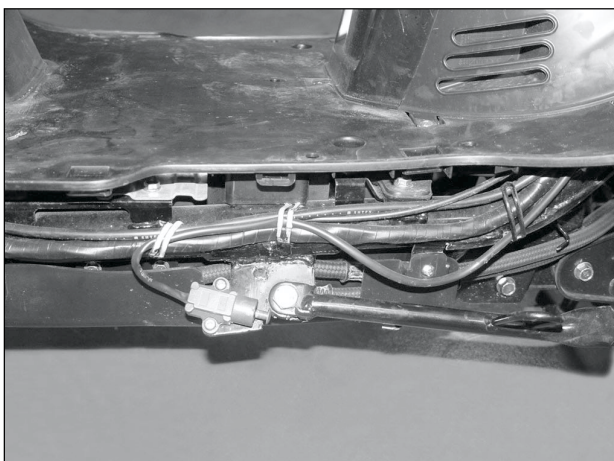
INSPECTION

- Remove the floor mat.
- Remove the RH. floor side cover. (⇒3-4)
- Remove the coupler of the side stand switch.



- Check for continuity between the terminal as shown below ;

ITEM	TERMINAL	SPECIFICATION
ON (Side stand is lowered)	GREEN AND BLACK/WHITE	NO CONTINUITY
OFF (Side stand is retracted)	GREEN AND BLACK/WHITE	CONTINUITY

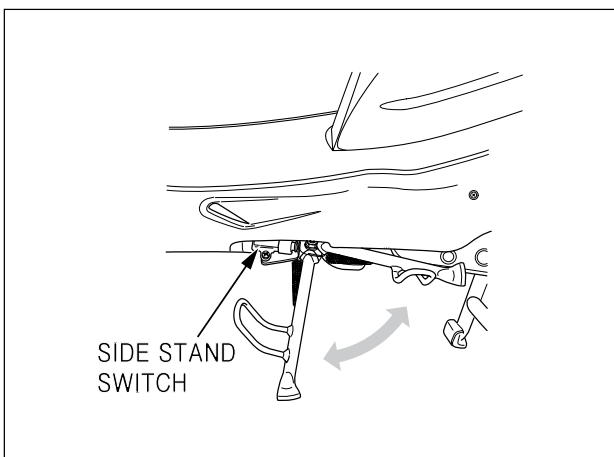


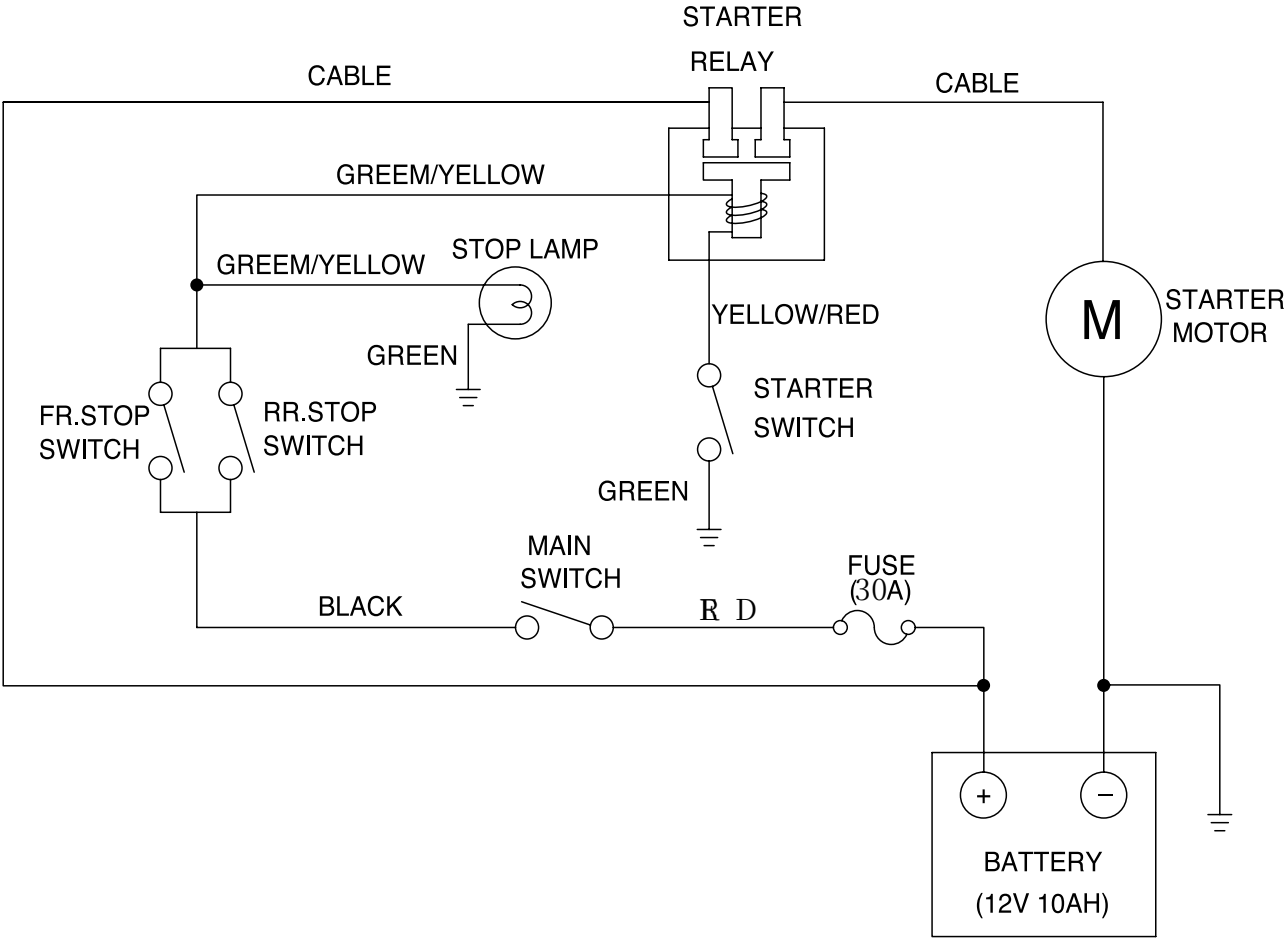
REMOVAL

- Remove the floor mat.
- Remove the center cover. (⇒3-3)
- Remove the RH. floor side cover. (⇒3-4)
- Remove the coupler of the side stand switch.
- Remove the LH. floor side cover. (⇒3-4)
- Loosen the side stand switch mounting 2 bolts.
- Release the wire clamps and remove the side stand switch.

INSTALLATION

- Install in the reverse order of removal.
- Check the side stand ignition cut-off switch.
 - Put the side stand up.
 - Start the engine.
 - Lower the side stand. The engine should stop as you put the side stand down.





17. STARTER SYSTEM

SERVICE INFORMATION 17-1	STARTER MOTOR 17-4
STARTER DEVICES LOCATION . 17-2	STARTER MAGNETIC SWITCH . 17-7
TROUBLESHOOTING 17-3	

SERVICE INFORMATION

GENERAL SAFETY

WARNING

• Always turn the ignition switch OFF before servicing the starter motor. The motor 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.
- The starter motor may be damaged if current is allowed to flow to it when the engine cannot turn over.
- The engine may not be turned over if the stop switch is faulty.

SPECIFICATION

ITEM	STANDARD VALUE	SERVICE LIMIT
STARTER MOTOR BRUSH LENGTH	10.2 mm	5 mm

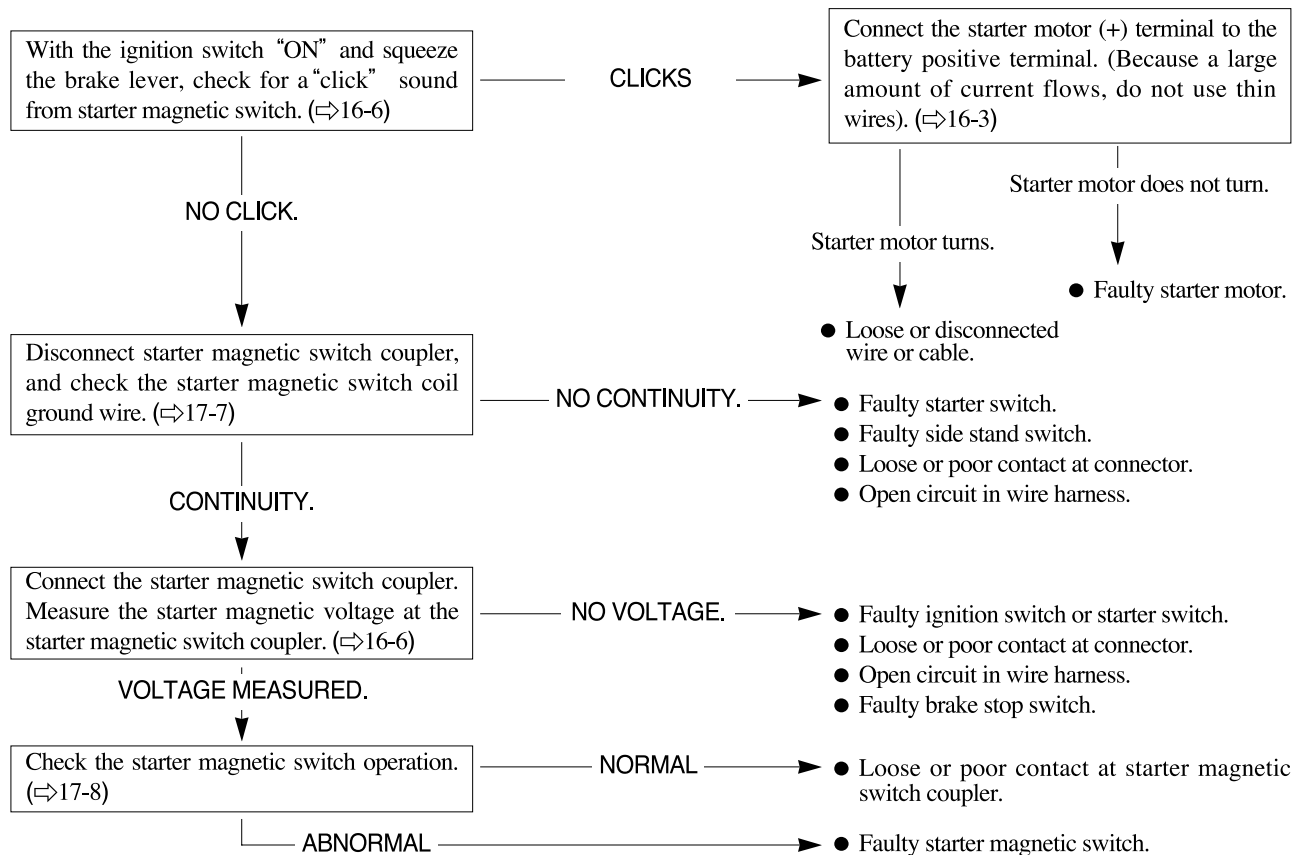
TOOLS

DIGITAL TESTER
VERNIER CALIPER

TROUBLESHOOTING

Starter motor will not turn.

- Check for a blown main fuse before servicing.
- Check that the stop light is correctly adjusted.
- Check that the side stand is positioned in the condition under which the engine can be started.



Starter motor turns slowly.

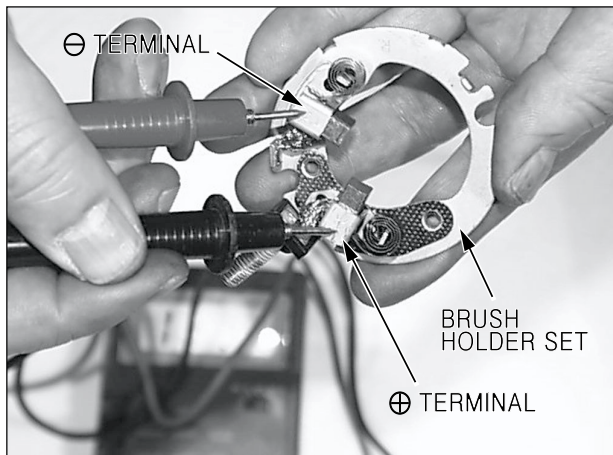
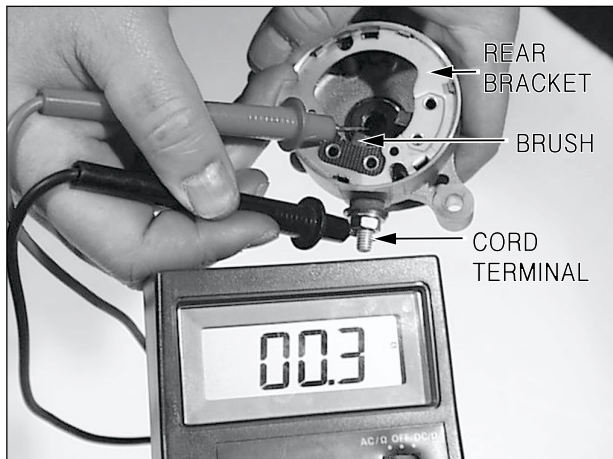
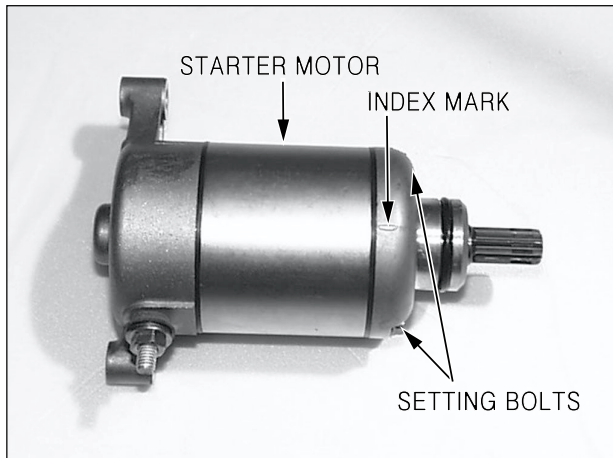
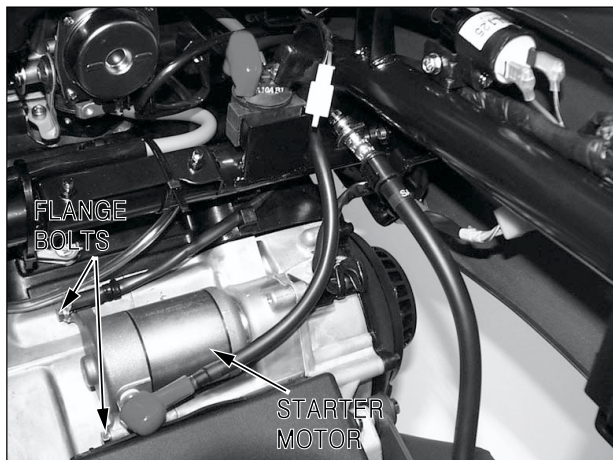
- Low specific gravity in battery. (or dead battery)
- Poorly connected battery terminal cable.
- Poorly connected starter motor cable.
- Faulty starter motor.
- Poorly connected battery ground cable.
- Damaged or worn brush.

Starter motor and engine turns, but engine does not start.

- Faulty ignition system.
- Engine problems.

Starter motor turns, but engine does not turn over.

- Starter motor is running backwards.
 - Brushes assembled improperly.
 - Case assembled improperly.
 - Terminals connected improperly.
- Faulty starter clutch.
- Damaged starter gear.



STARTER MOTOR

REMOVAL

- Release the seat lock with the main key.
- Remove the luggage box. (⇒3-3)
- Remove the starter motor cable from the starter magnetic switch.
- Loosen the 2 flange bolts securing the engine case, remove the battery earth cable and starter motor.
- Install in the reverse order of removal.

⚠ NOTE

- Always turn the ignition switch OFF before servicing the starter motor. The motor could suddenly start, causing serious injury.
- Accurately tighten the battery earth cable.

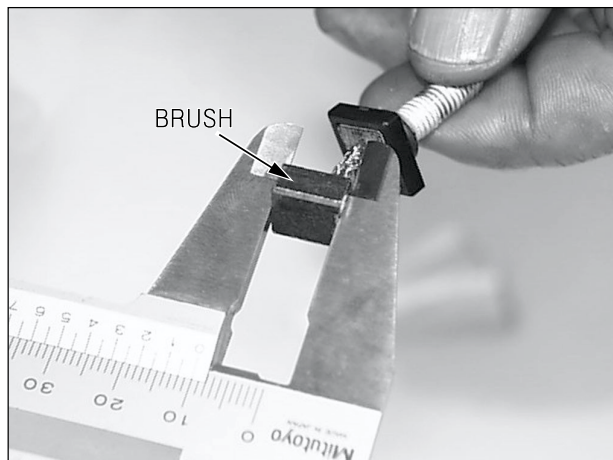
DISASSEMBLY

- Remove the starter motor cable.
- Before disassembling the starter motor mark the position of the case and cover so the starter can be assembled correctly later.
- Loosen the starter motor case bolts and remove the motor cover.

INSPECTION

- Check for continuity of the starter motor case.
 - Between cord terminal“⊕” and bracket“⊖”: normal if no continuity.
 - Between cord terminal and brush : normal if there is continuity.
- If abnormal, replace with a new one.
- Loosen the brush terminal setting nut, remove the brush holder set.
- Check for continuity between “⊕” and “⊖” terminals of the brush holder.
- If there is continuity, replace with a new one.

STARTER SYSTEM



- Remove the brush spring, and then remove the brush.
- Measure the brush length. Replace the brush if it is worn beyond the service limit.

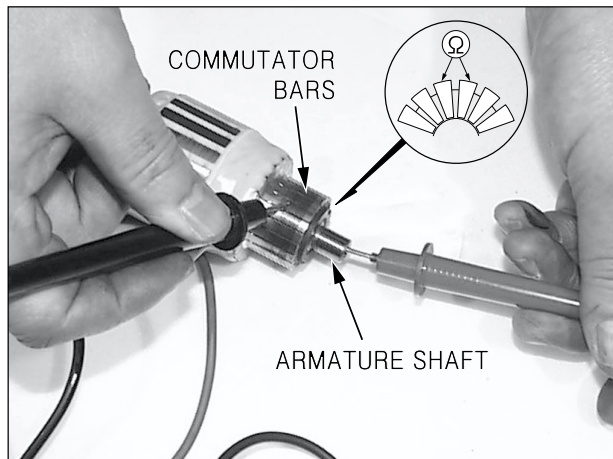
SERVICE LIMIT : 5 mm
TOOL : VERNIER CALIPER

NOTE

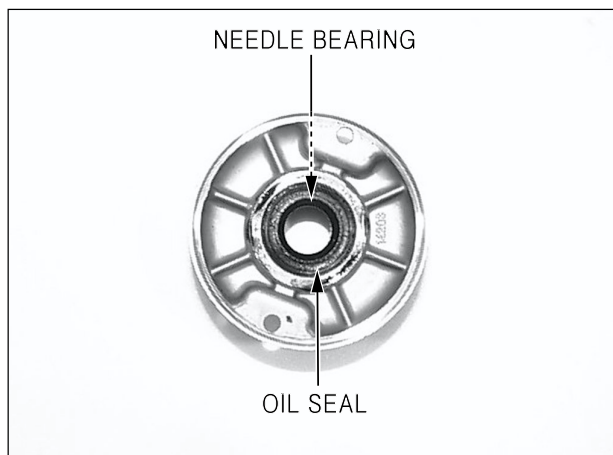
- If replacement, replace with a brush holder set.



- Check the commutator for :
 - Damage or abnormal wear. → Replace with a new one.
 - Discoloration of the commutator bar. → Replace with a new one.
 - Metallic debris between commutator bars. → Clean it off.

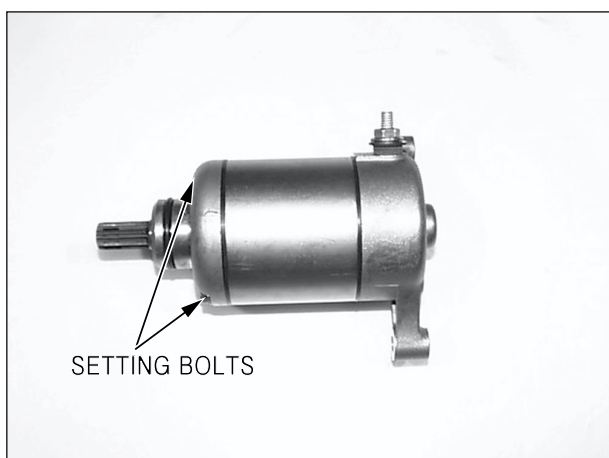
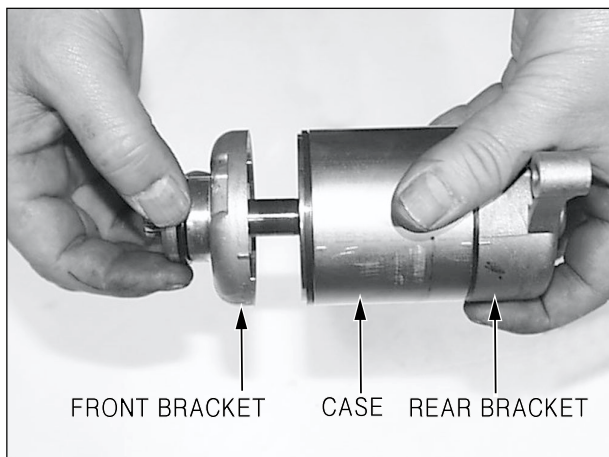
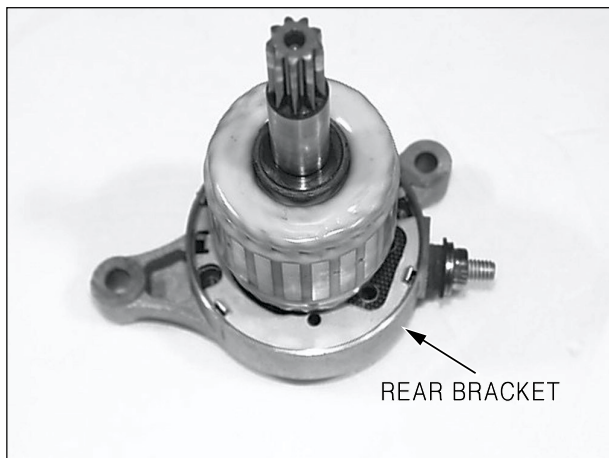
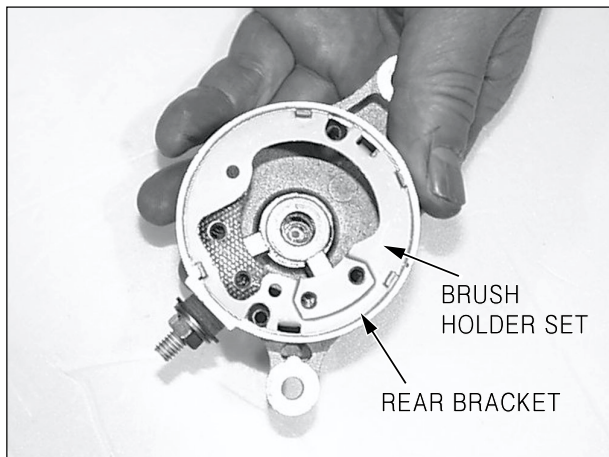


- Check for continuity between pairs of commutator bars.
- Make a continuity check between individual commutator bars and the armature shaft.
- There should be no continuity.



- Check the needle bearing and oil seal.
 - Do not rotate smoothly. → Replace with a new one.
 - Damage oil seal. → Replace with a new one.

STARTER MOTOR ASSEMBLY



- Install the brush and brush spring to the brush hold set.
- Insert the brush terminal into the rear bracket, and install the terminal set and flange nut.
- Align the brush holder set with the rear bracket groove, and install the brush holder set.
- Apply grease to both ends of the armature shaft, and install the 2 washers.

- Push and hold the brush inside the rear bracket, and insert the armature into the rear bracket groove.
- Align the case mark with the rear bracket mark, and install the case.
- Insert the thrust washer (0.5t), thrust washer (0.2t), slip washer and thrust support.

⚠ CAUTION

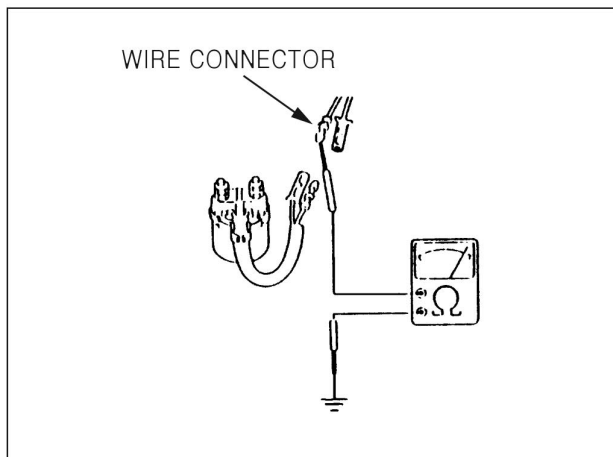
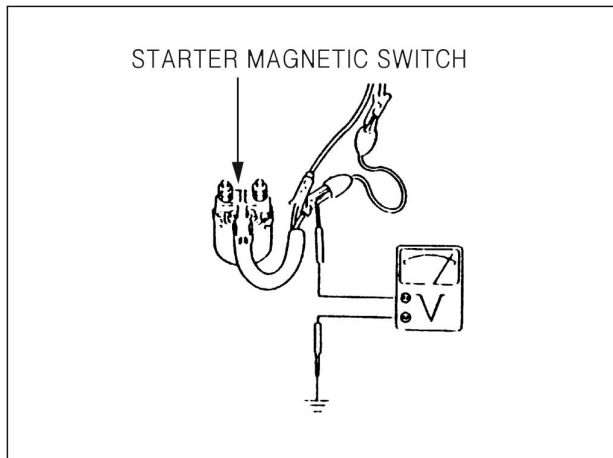
- The sliding surfaces of the brushes can be damaged if they are not installed properly.
- When inserting the armature into the case, hold the armature tightly to keep the magnet from pulling the armature against the case.

- Align the front bracket with the case mark, and install the front bracket.

- Tighten the motor cover bolts.

⚠ CAUTION

- When installing the cover, take care to prevent damaging the oil seal lip with the shaft.
- Overtightening the starter motor cable terminal nuts may cause the inside the starter motor, resulting in serious damage to the inner connectors.



STARTER MAGNETIC SWITCH

REMOVAL

- Release the seat lock with the main key.
- Remove the luggage box. (⇒3-3)
- Remove the center cover. (⇒3-3)
- Remove the battery (+) cable from the starter magnetic switch terminal.
- Remove the starter motor cable from the starter magnetic switch terminal.
- Disconnect the yellow / red connector and green / yellow connector from the wire harness.
- Remove the starter magnetic switch from the switch setting bracket securing the frame.
- Install in the reverse order of removal.

INSPECTION

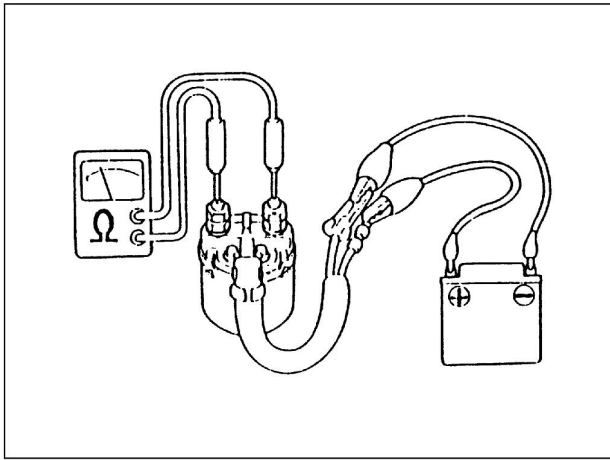
- Check if the starter magnetic switch “clicks” when it is turned ON.
 - Clicks → · Poorly connected battery terminal and motor terminal of the switch. (Check the starter magnetic switch)
 - No clicks → · No starter magnetic switch input voltage. (Faulty relay ground line and starter magnetic switch)

Starter magnetic switch voltage

- Measure the voltage between the yellow / red wire (+) and ground at the starter magnetic switch connector.
- If battery voltage appears only when the starter switch is pressed, it is normal.

Starter magnetic switch ground line

- Disconnect the wire connector from the starter magnetic switch and check for continuity between the ground wire (green / yellow) and ground.

**OPERATION CHECK**

- Disconnect the magnetic switch wire connector.
- Apply battery voltage between terminals, when the yellow / red wire is connected to the positive (+) battery terminal and the green / yellow wire to the negative (-) battery terminal.
- If there is continuity between battery and motor terminal, it is normal.

MEMO

18. LIGHTS/SWITCHES/HORN

SERVICE INFORMATION	18-1	TAIL LIGHT/REAR WINKER BULB	
TROUBLESHOOTING	18-1	REPLACEMENT	18-4
MAIN SWITCH	18-2		
HANDLE SWITCH	18-2		
HORN	18-3		
FUEL UNIT	18-3		
HEADLIGHT BULB REPLACEMENT .	18-4		
FRONT WINKER REPLACEMENT . .	18-4		

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 from the connector corrosion, an ohmmeter is required to check the circuit resistance value.

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 beam cannot be changed

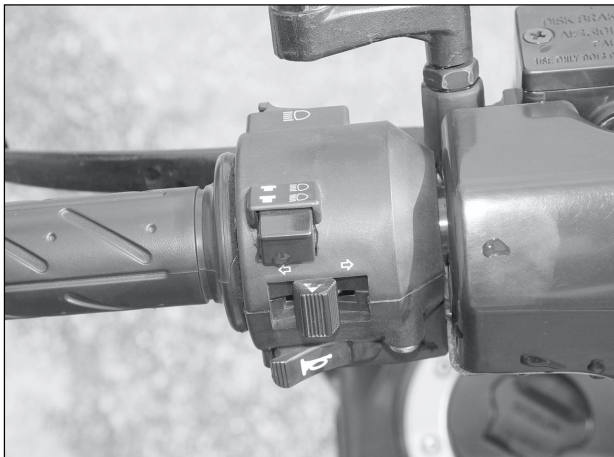
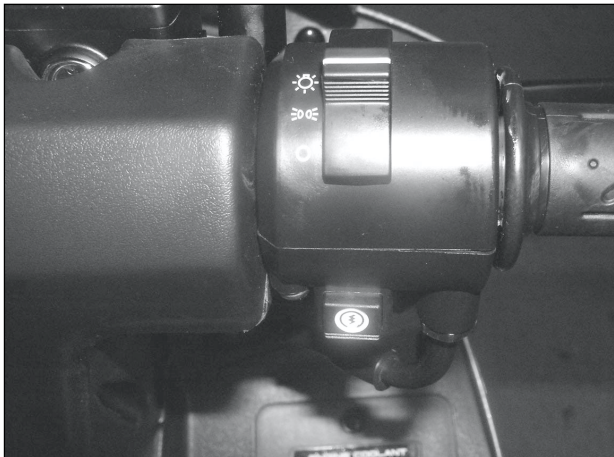
- Faulty light bulb
- Faulty dimmer switch

Fuel meter indicator malfunctioning

- Coupler separated.
- Harness disconnected.
- Float operation malfunction.
- Fuel unit damaged.

Fuel meter needle unstable

- Coupler loose.
- Fuel unit damaged.
- Meter damaged.



MAIN SWITCH

- Remove the front covers.
- Disconnect the ignition switch wire couplers.
- Check for continuity between the wire terminals.

	BAT 1	BAT 2
COLOR	RED	BLACK
OFF		
ON		

HANDLE SWITCH

- Remove the headlight.
- Disconnect the connector of handle switch.
- Check for continuity between teminals.
- Remove the Fr. cover.
- Remove the coupler wire.
- Test each teminal of handle switch.

HEADLIGHT SWITCH

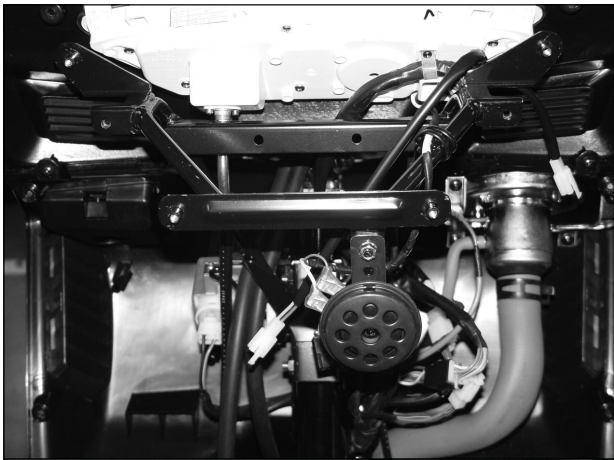
LIGHTING			
	BAT 2	TL	HL
OFF			
P			
H			
COLOR	Br/L	Br	P

WINKER SWITCH

	W	R	L
R			
N			
L			
COLOR	GRAY	SKY BLUE	ORANGE

HORN SWITCH

	HO	BAT2
FREE		
PUSH		
COLOR	LIGHT GREEN	BLACK

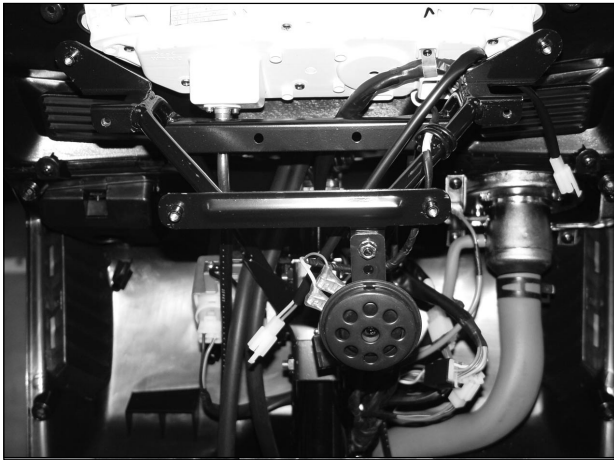


PASSING SWITCH

	BAT2	HI
HI		
COLOR	BLACK	BLUE

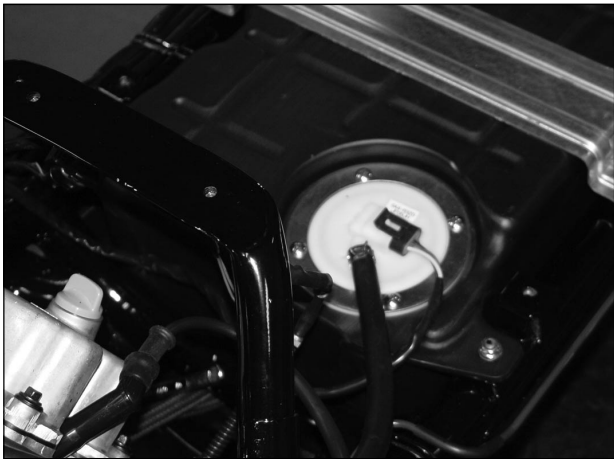
DIMMER SWITCH

	BAT3	HI	LO	BAT2
HI				
(N)				
LO				
COLOR	BROWN/WHITE	BLUE	WHITE	BLACK



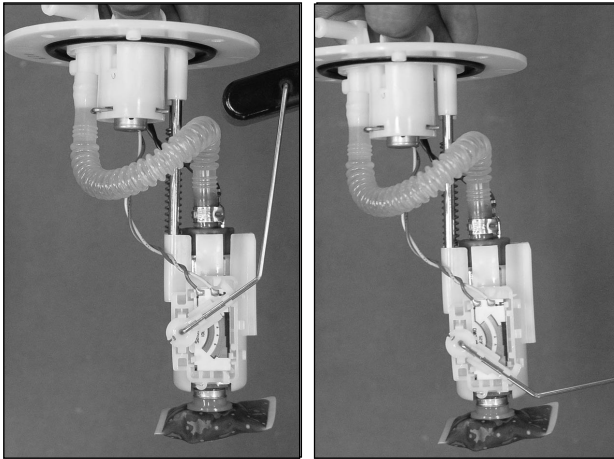
HORN

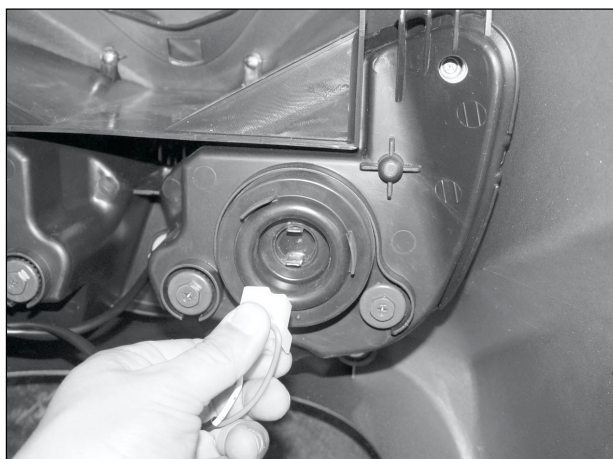
- Remove the horn from the wire connector.
- Connect the horn terminal with 12V battery.
- Normal if it sounds.



FUEL UNIT

- Remove the floor panel.
- Be cover full not to be damaged for the wire.
- Check the base packing for damage.
- Measure the resistance between the fuel unit upper and lower.





HEADLIGHT BULB REPLACEMENT

- Remove the front cover.
- Remove the headlight coupler and winker coupler.
- Remove the bulb socket of rubber boots.
- Remove the rubber boots.
- Replace the headlight bulb.

⚠ NOTE

- When replacing the bulb, be sure not to put finger and contaminated gloves prints on the headlight bulb, as they may create hot spots on the bulb and cause it to fail.
- Note the following when replacing the bulb.
 - Do not replace while the headlight is ON. After it is turned OFF, be sure to let it cool down before servicing.
 - Wear clean gloves while replacing the bulb. Do not put finger prints on the headlight bulb.
 - If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol and clean it with a clean cloth again.
 - Be sure to install the rubber cover after replacing the bulb.



FRONT WINKER BULB REPLACEMENT

- Loosen the 2 screws, remove the winker lens.
- Replace the winker bulb.



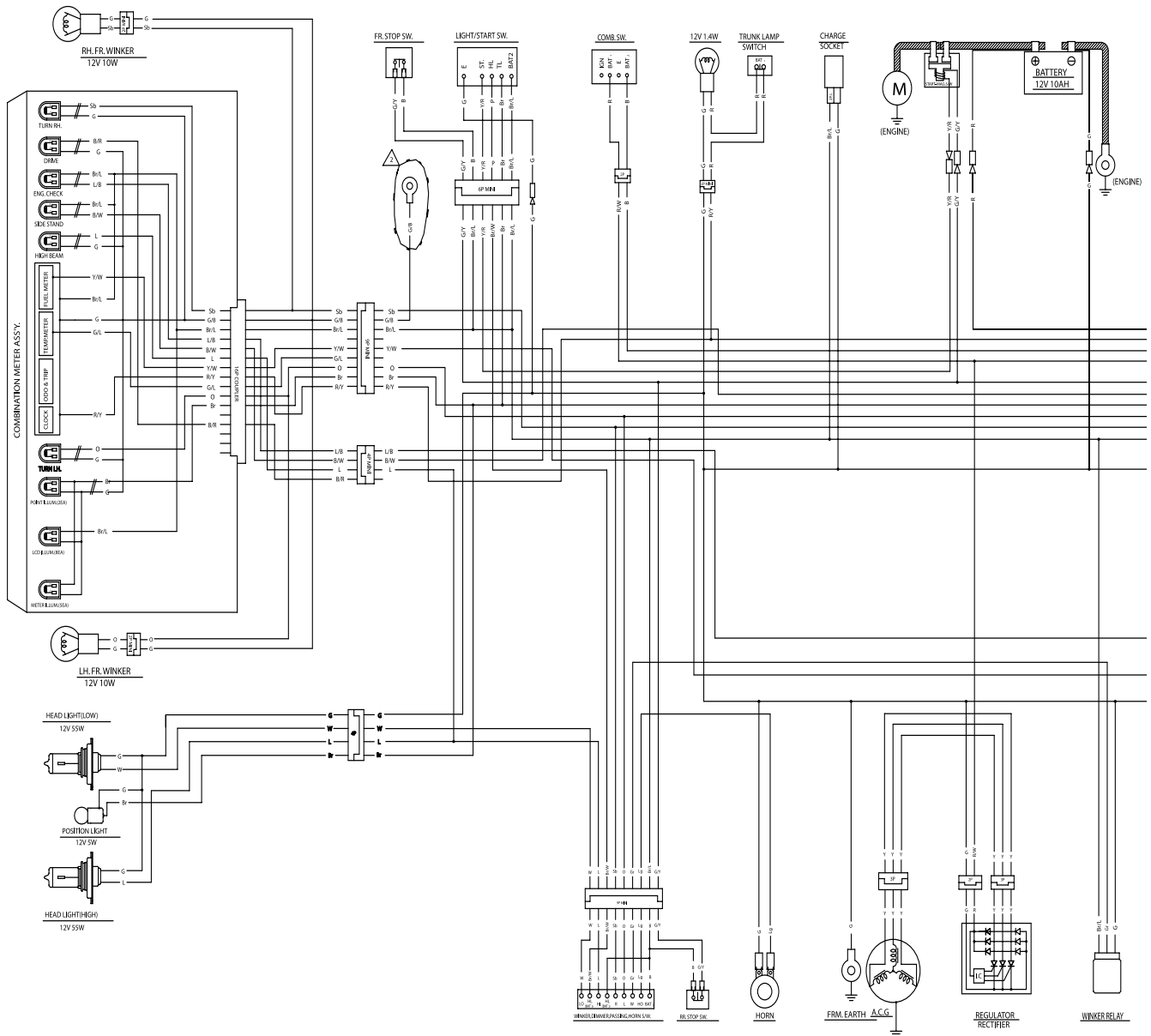
TAILLIGHT/REAR WINKER BULB REPLACEMENT

- Loosen the 2 screws of taillight.
- Remove the taillight lens and winker lens.
- Replace the taillight bulb and winker bulb.

MEMO

MEMO

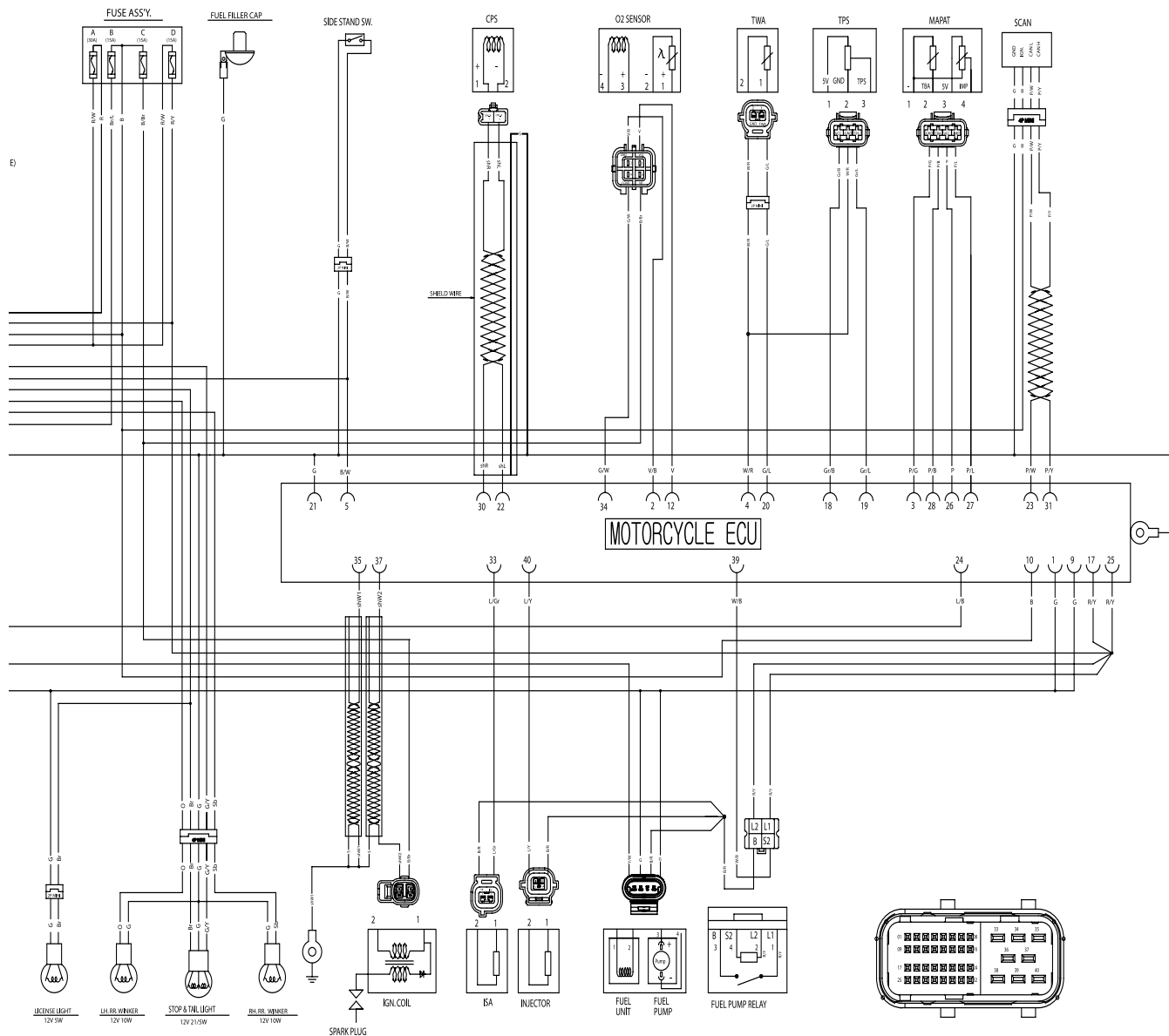
19. CIRCUIT DIAGRAM



COMB. SW.	START	LIGHTING	WINKER	HORN	DIMMER	PASSING	SIDE STAND SW.	TRUNK LAMP
BAT. BAT. 1	ST. E	BAT. TL. HL.	W. R. L.	Ho. BAT.	BAT. 1 HI. LO. BAT. 2	BAT. 2 HI.	ECU. GND.	BAT. BAT.
ON ○ ○	FREE	OFF	R ○ ○	FREE	Hi ○ ○ ○	FREE	PUSH ○ ○	FREE ○ ○
OFF	PUSH ○ ○	P ○ ○	N	PUSH ○ ○	(N) ○ ○ ○	PUSH ○ ○	FREE	PUSH
LOCK	COLOR Y/R G	H ○ ○ ○	L ○ ○ ○	COLOR Lg B	Lo ○ ○ ○	COLOR B L	COLOR B/W G	COLOR R R
COLOR R B		COLOR Br/L Br P	COLOR Gr Sb O		COLOR Br/W L W B			

V VIOLET	Br BROWN
B BLACK	O ORANGE
Y YELLOW	Sb SKY BLUE
L BLUE	Lg LIGHT GREEN
G GREEN	P PINK
R RED	Gr GRAY
W WHITE	

COLOR COMB. - GROUND/MARKING



LOCATION OF ECU PIN

FUSE SPECIFICATION			
FUSE A	30A	CHARGING COMB. SW. REG. RECTIFIER	
FUSE B	15A	WINKER RELAY, HORN, HEAD LIGHT (LOW/HIGH), F.R./R.L. STOP SW, STOP LIGHT, M.L. SPEED/FUEL METER	
FUSE C	15A	IGN. COIL, O2 SENSOR	
FUSE D	15A	ECU, FUEL PUMP RELAY, LIGHT RELAY	

COLOR COMB.: GROUND/MARKING