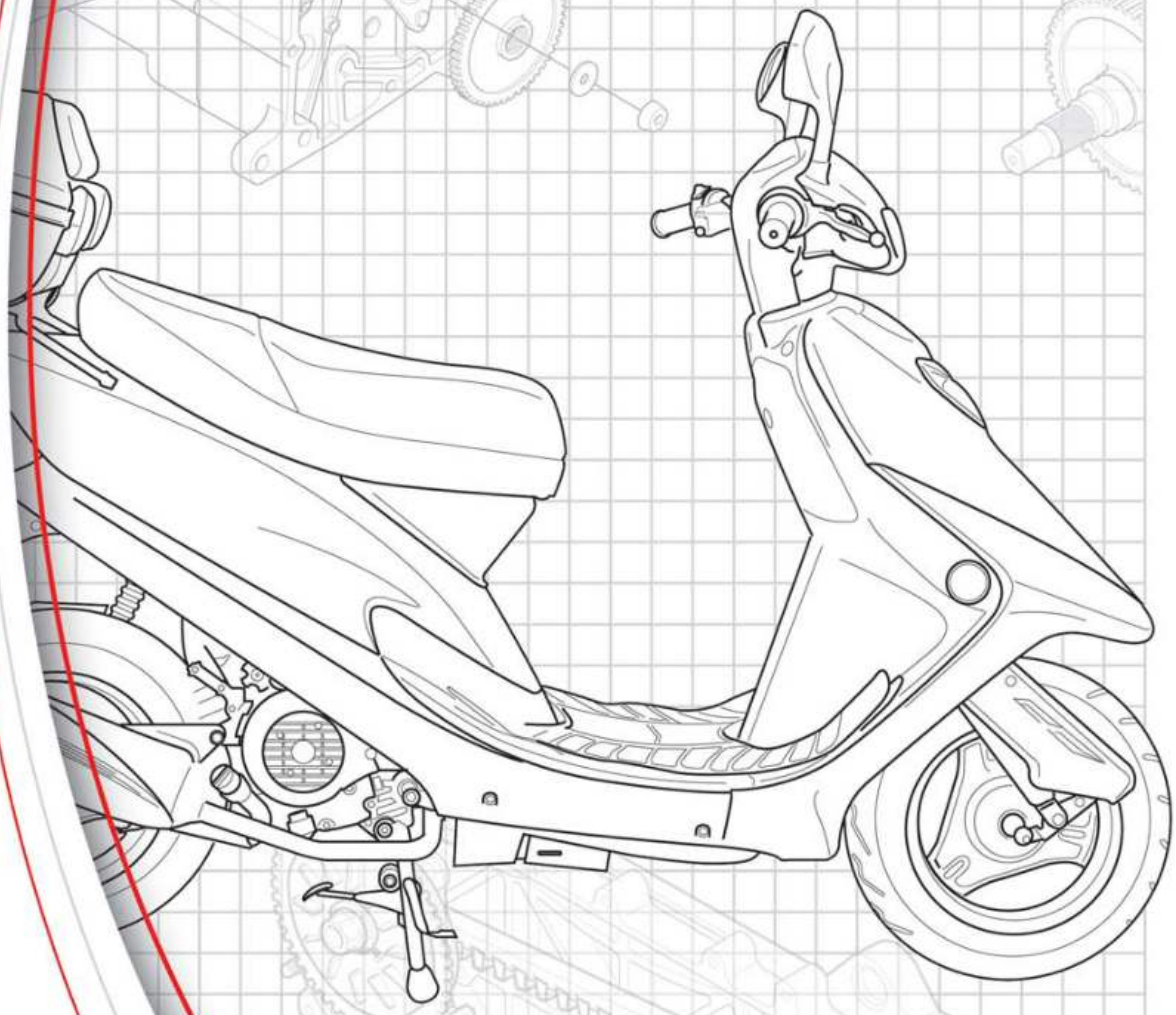
- 49 CC, 4 STROKE ENGINE
- 31 MPH TOP SPEED
- 140 MILE RANGE
- CDI IGNITION ELECTRIC KICKSTART
- DRUM BRAKES
- 47.2" WHEELBASE
- WEIGHT: 209 LBS

AUTHENTIC PANTERRA MOTORWORKS™

Service Manual



PANTERRA

Gasoline Powered Scooter

Fusion/Retro/Freedom

Forward

This manual is intended to serve as an introduction to the PanTerra motor scooter and to provide basic material and information about the maintenance and servicing of this vehicle.

Chapter 1 covers the product specifications and technical data as well as basic adjustments and maintenance of the scooter. Also included is a section on maintenance techniques, troubleshooting and problem solving.

Chapter 2 covers disassembly and servicing of the body panels for the scooter.

Chapter 3 covers all of the technical information necessary to perform routine maintenance on the scooter along with diagrams that will help you in this process. A scheduled maintenance chart is included to help keep track of important maintenance requirements.

Chapter 4 covers the operation and repair of the lubrication system for the scooter engine.

Chapter 5 covers the operation and repair of the fuel system including the carburetor.

Chapter 6 covers the removal and installation of the engine to the scooter.

Chapter 7 covers diagnostic procedures and repair methods for the cylinder head and valve train of the engine.

Chapter 8 covers service and repairs of the cylinder, piston and rings of the engine.

Chapter 9 covers diagnostic procedures, service and repairs of the primary drive system and the kick-starting system.

Chapter 10 covers service and repair of the final transmission drive assembly.

Chapter 11 covers service and repair of the crankcase and crankshaft assembly.

Chapter 12 covers the service and repairs for the steering system, front suspension and front braking system.

Chapter 13 covers the service and repair for the rear suspension and brake systems.

Chapter 14 covers service and repair to the charging system.

Chapter 15 covers service and repair to the ignition system.

Chapter 16 covers service and repair to the electric start system.

Chapter 17 covers service and repair to the lighting and general electric systems.

If you cannot find the information that you require in this manual, or for further help with the servicing or repair of this scooter, contact PanTerra Customer Service at 626 336 1128 Between the hours of 8am & 5pm PST

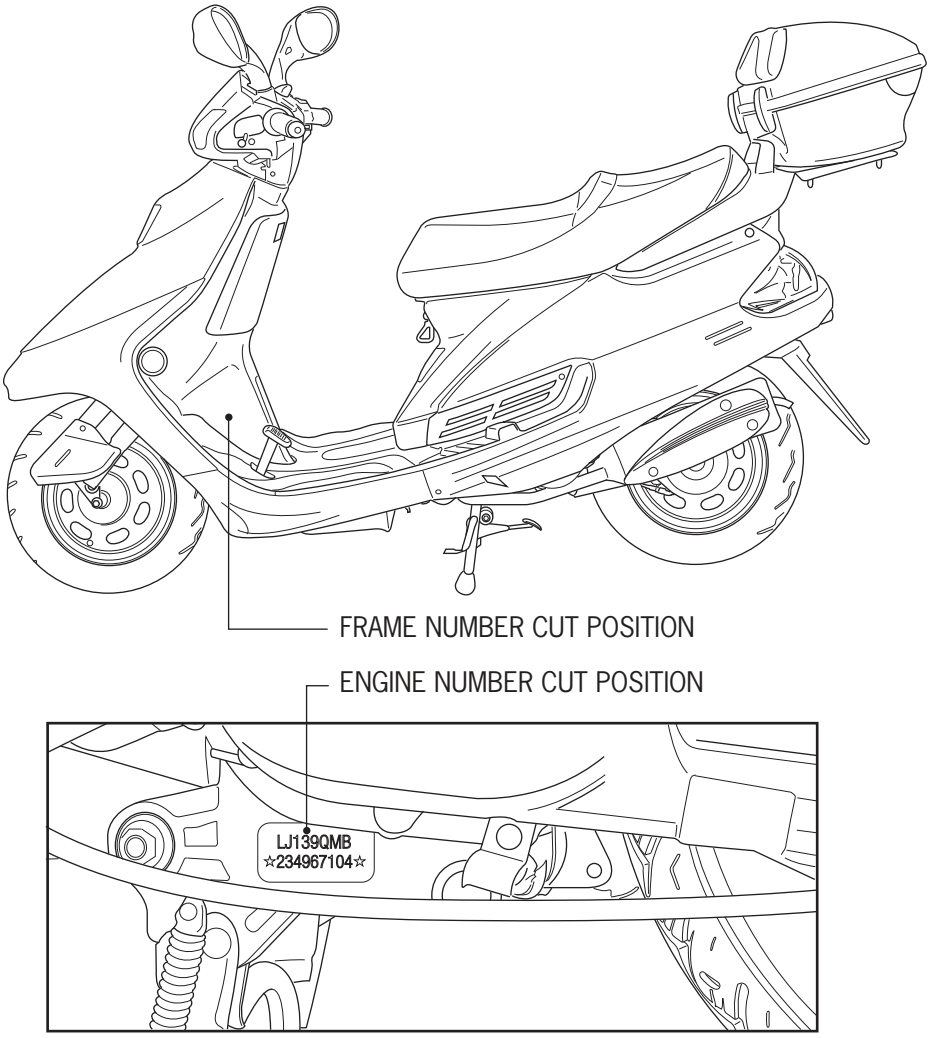
Table of Contents

Chapter	Topic	Page
CHAPTER 1:	Introduction	2
CHAPTER 2:	Body Cover and Exhaust System	28
CHAPTER 3:	Scheduled Maintenance	33
CHAPTER 4:	Lubricating System	45
CHAPTER 5:	Fuel System	52
CHAPTER 6:	Engine Removal and Installation	67
CHAPTER 7:	Cylinder Head Valve	71
CHAPTER 8:	Body Cover and Exhaust System	88
CHAPTER 9:	Driving Belt Device & The Starting Lever	96
CHAPTER 10:	The Final Transmission Assembly	110
CHAPTER 11:	The Crankcase and the Crankshaft	116
CHAPTER 12:	The Front Wheel, Front Brake, Front Buffer and the Front Fork	124
CHAPTER 13:	The Rear Wheel, the Rear Brake & Rear Shock	140
CHAPTER 14:	The Battery and the Charging System	146
CHAPTER 15:	Ignition System	160
CHAPTER 16:	Starter System	166
CHAPTER 17:	Meters, Switches and Lighting System	173
INDEX	180	

1. General Information

Topic	Page	Topic	Page
Engine and Frame Number Positions	1-1	Tools	1-12
Product Specifications and Technical Data	1-2	Oil and Grease Supply Chart	1-13
		Control Cables and Wiring Diagram	1-14
Technical Tips	1-3	Failure Diagnostics	1-21
Torque Settings	1-11		

Location for: Engine Number/Frame Number



1. General Information

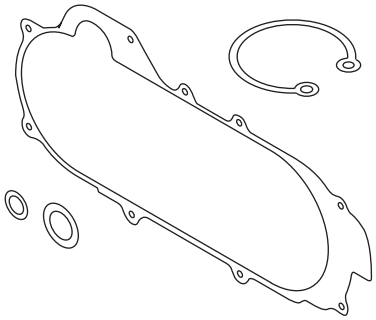
Product Specifications and Technical Data

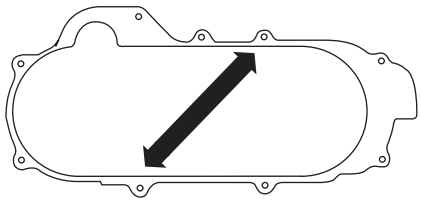
Scooter Model	Retro
	Fusion
	Freedom
Length	1685mm (66.5 inches)
Width	660mm (26 inches)
Height	1070mm (42 inches)
Wheel base	1195mm (47 inches)
Engine type	4-stroke OHC
Displacement	49.5cc
Fuel requirements	Lead-free gasoline
Dry weight	
Front	35kgs (77 lbs)
Rear	56kgs (123 lbs)
Total	91kgs (200 lbs)
Curb weight	
Front	37kgs (81.5 lbs)
Rear	60kgs (132 lbs)
Total	97kgs (213.5 lbs)
Tire size	
Front	3.00 x 10
Rear	3.00 x 10
Ground clearance	80mm (3.25 inches)
Stopping distance	4m from 30km/hr
	16 ft from 18 mph.
Turning radius	1.65m (5.5 ft)
Engine Specs	
Type	4-stroke SI
Starting	Electric/kick start
Cylinders	Single
Combustion chamber	Hemispherical
Valve train	Single OHC
Bore	39mm (13.34 inches)
Stroke	41.4mm (1.63 inches)
Displacement	49.5cc
Compression ratio	10.5:1
Compression pressure	15kg/cm
	215psi
Power	2.2 HP @ 8000 RPM
Torque	4.5 ft lbs @ 6000 RPM
Intake timing	6˚ BTDC-28˚ ATDC
Exhaust timing	38˚ BBDC-6˚ BTDC
Valve lash	.05mm
Idle speed	1850-1900RPM
Oil system	Pressure/splash
Oil pump	Internal gear
Oil filter	Full-flow filter and screen
Oil capacity	.8L (32 oz)
Cooling	Ducted forced air
Air cleaner	Foam and paper
Carburetor type	CVK 50
Venturi	18mm
Throttle mechanism	Butterfly type
Ignition system	CDI type
	13˚BTDC @ 2000 RPM
Spark plug	NGK C7HSA Champion Z9Y
Gap	.5-.6mm (.022-.024 inch)
Battery	12V 4AH
Drive system	
Clutch	Dry multi plate
Transmission	CVT
Shifting	Automatic
Final Drive	Double reduction
1st step	3.2:1
2nd step	3.4:1
Steer tube angle	64˚
Steering angle	45˚
Tire pressure front	1.75kg/cm (26psi)
Tire pressure rear	2.25kg/cm (35psi)
Front brake	Hydraulic disc
Rear brake	Mechanical drum
Suspension front	Telescopic
Suspension rear	Trailing arm
Shock absorber front	Coil spring/hydraulic
Shock absorber rear	Coil over hydraulic shock
Frame type	Tubular space frame

1. General Information

Technical Tips

•Replace all gaskets, o-rings, circlips and cotter pins when performing maintenance on the scooter. Nuts and bolts on all engine covers should be tightened in a diagonal pattern to uniformly distribute clamp force.

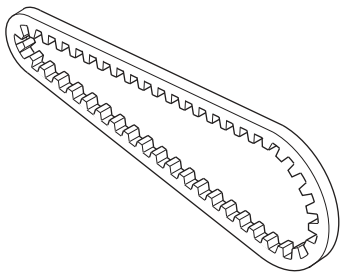




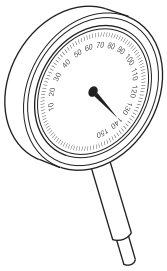
•Use lubricants recommended in this manual at all times to assure peak performance from the scooter.



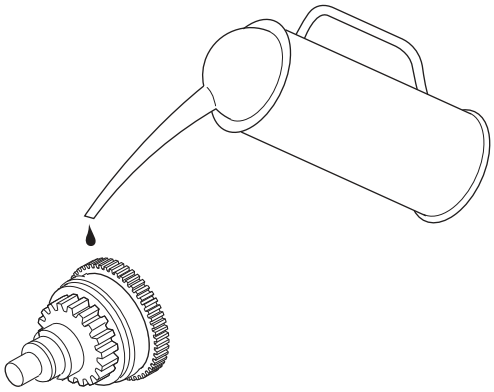
•Use only genuine replacement parts when performing repairs to the scooter.



•Special service tools may be required to perform maintenance and repairs on this scooter. Always use the proper tools to prevent damage to the scooter.



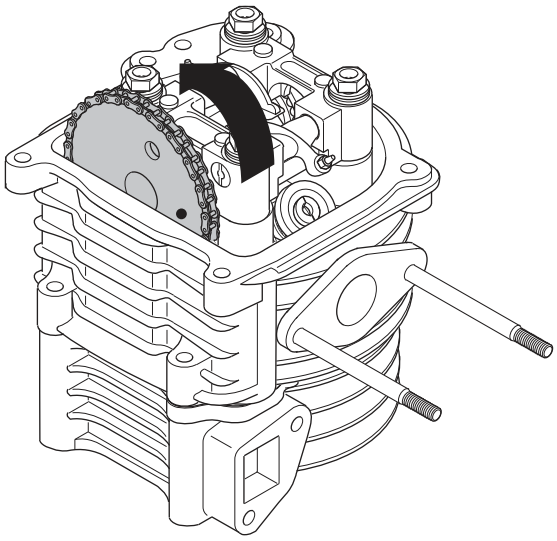
•Clean and lubricate all engine parts during the disassembly and reassembly process to prevent damage to the engine.



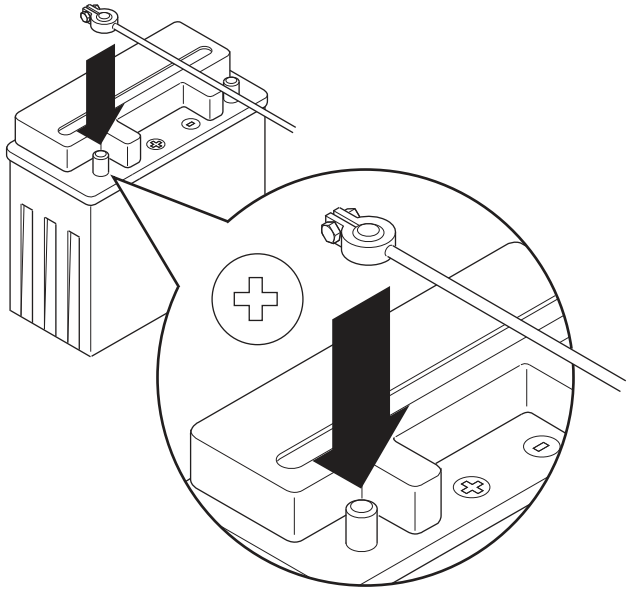
1. General Information

Technical Tips (continued)

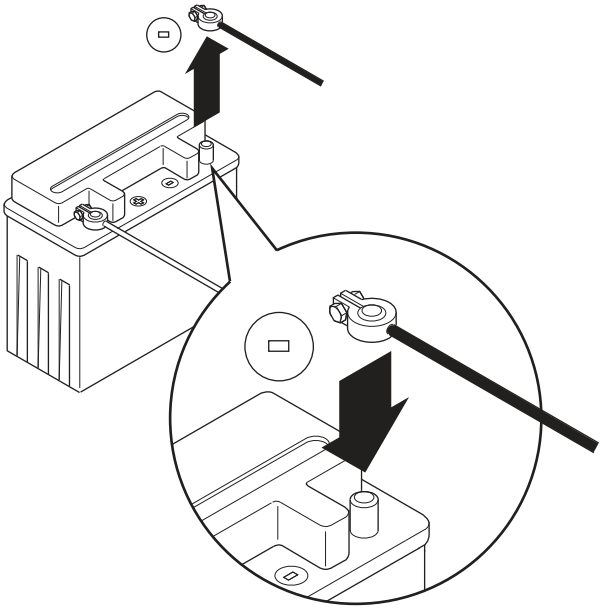
•When performing maintenance on the scooter, make sure that all moving parts and controls move freely and return to their proper position.



•When connecting the battery, always connect the positive terminal first.



•When disconnecting the battery, always disconnect the negative terminal first.



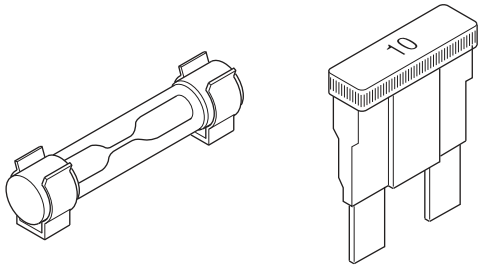
•Make sure that tools and service equipment do not come in contact with both battery terminals.

•Cover both battery terminals with a light coat of grease to prevent corrosion.

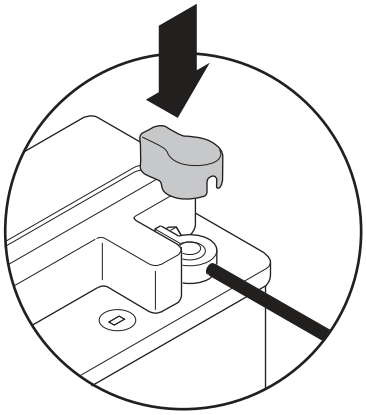
1. General Information

Technical Tips (continued)

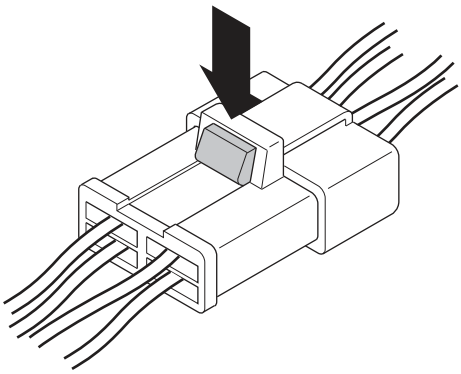
•When replacing fuses, always use an exact replacement. Do not use fuses of a higher amp rating!



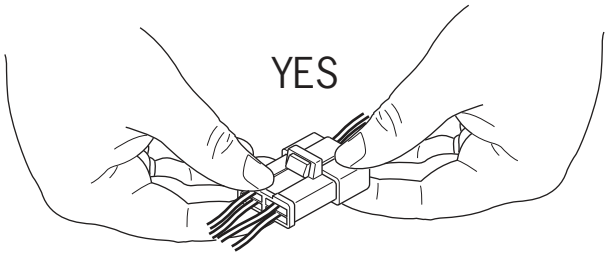
•Replace all rubber caps on wire connectors after performing maintenance.

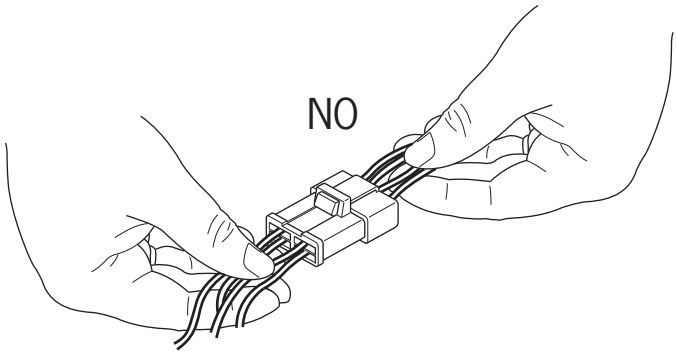


•When disconnecting wire connectors, press firmly on the locking tab and pull the body of the connectors. Never pull on the wires



•When assembling wire connectors, press firmly to assure the lock tab fully engages.





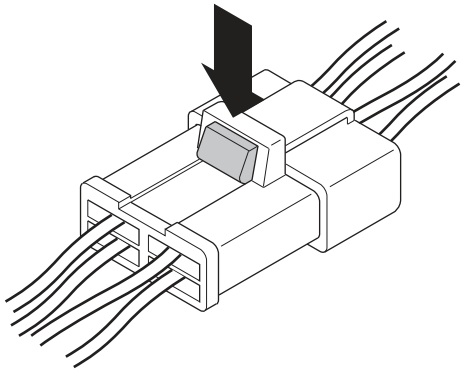
•Make sure that all wire terminals are properly in place before attempting to assemble any wire connector.

1. General Information

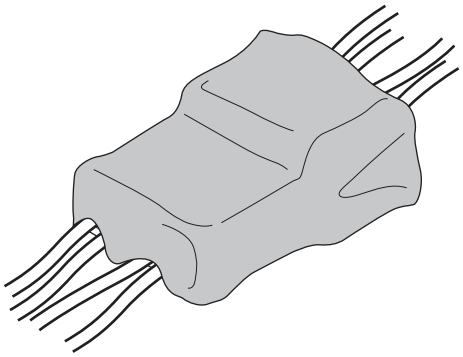
Technical Tips (continued)

•Make sure that all wiring connectors are fully seated and lock tubs engaged.

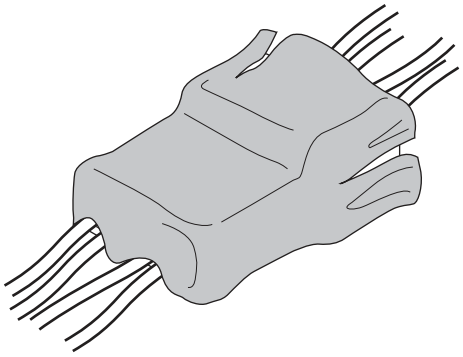
•Check if almuce of connector is covered and fixation is tight.



•Make sure that all protective covers are properly in place over the wiring connectors.



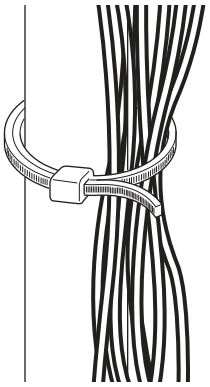
•Never reuse damaged wire terminals or connectors.



•Never reuse damaged wire terminals or connectors.

•Replace all rubber covers on wire connectors to prevent water from getting into the connector.

•Strip of main wire must be fixed on assigned position.



•Insulator of aluminum strip must be affixed to wires.

•Make sure that all wiring harness retainers are properly placed.

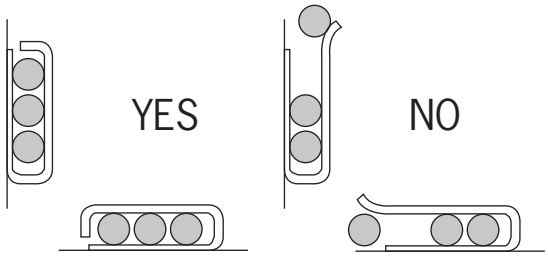
•Do not over tighten wiring ties to prevent pinching of wires.

•Do not allow wiring harness to hang in loose loops.

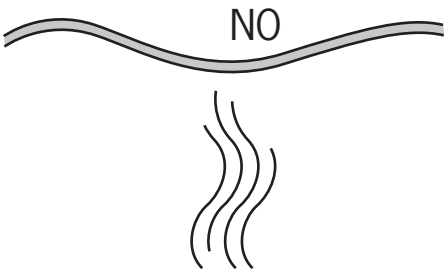
1. General Information

Technical Tips (continued)

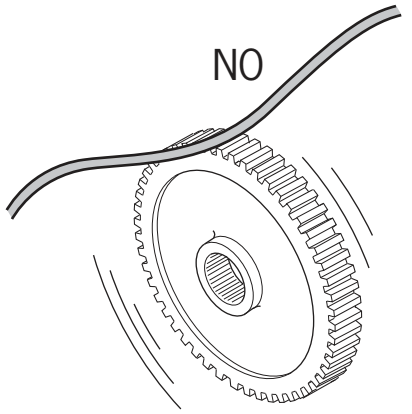
•Make sure that all wire clips are properly attached.

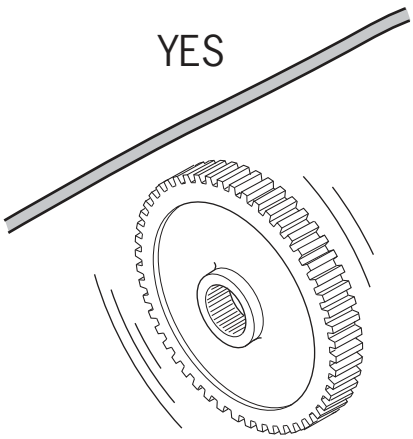


•Make sure that the wiring harness and all wires do not contact hot components or surface parts of the scooter.

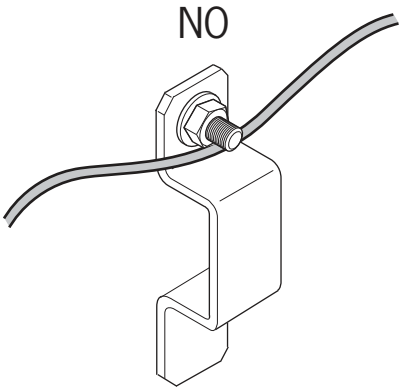


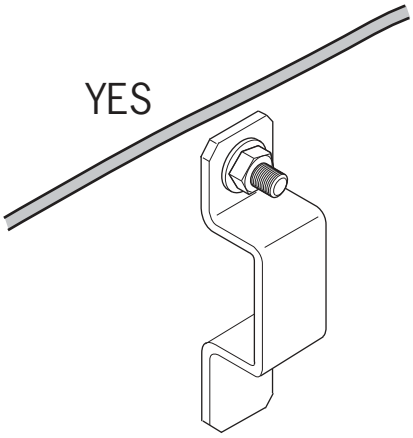
•Make sure that the wiring harness and all wires do not contact moving or rotating parts of the scooter.





•Make sure that the wiring harness and all wires do not contact sharp edges or parts of the scooter. Use tape to prevent damage to wires on sharp edges.





1. General Information

Technical Tips (continued)

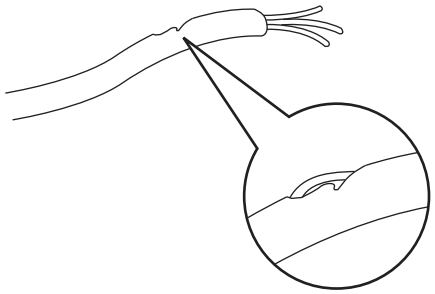
•Do not pull wires too tightly.

•Use tape to protect against sharp edges.

•Make sure that all rubber grommets are in place to protect the wiring harness.

•Do not reuse broken or frayed wires.

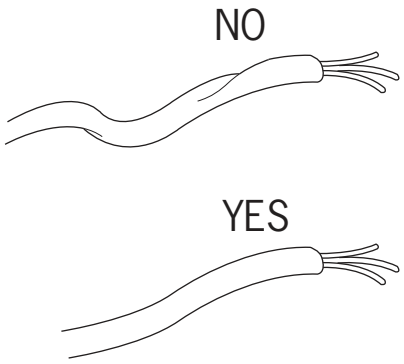
•Repair or replace wires as necessary.



1. General Information

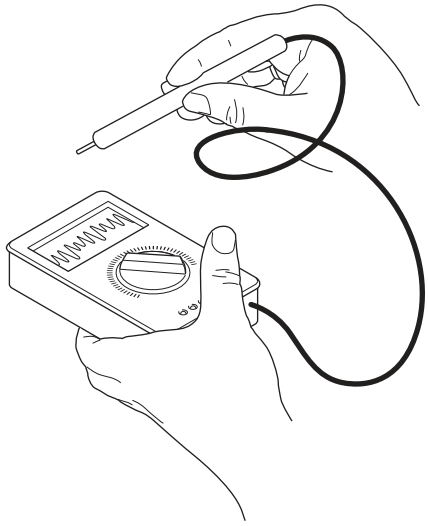
Technical Tips (continued)

•Do not twist or knot wires when performing maintenance on the scooter.



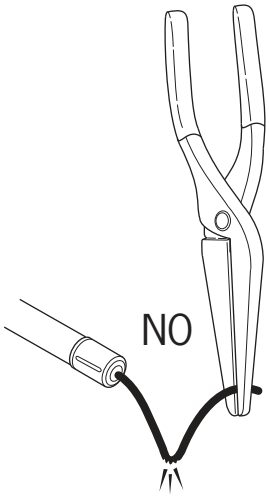
•Make sure the wiring harnesses to the handlebars are not too tight or too loose by turning the handlebars both right and left while making sure there is no pinching or pulling of the wires.

•Make sure that you understand the proper use of test equipment to perform maintenance on the scooter. This will prevent accidental damage to the electrical system of the scooter.



•Use electrical contact cleaner and abrasive paper to clean corrosion from any wire terminals.

•Take care to prevent inadvertent damage to wiring and cables.



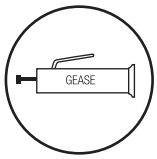
1. General Information

Technical Tips (continued)

Definitions of diagrams
The following icons are used to highlight important operations in the service of the scooter.



Lubricating oil required.



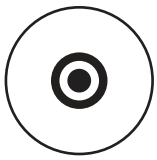
Grease required.



Engine oil required.



Special tools required.



Special attention required.



Dangerous and important, special care required.

1. General Information

Torque Settings

Standard Torque Settings

General Torque Requirements for Standard Fasteners

Fastener Type	Torque	Fastener Type	Torque
5mm Cap Screw	.5 kg/cm	5mm Socket Head Screw	.4 kg/cm
6mm Cap Screw	1 kg/cm	6mm Socket Head Screw	.9 kg/cm
8mm Cap Screw	2.2 kg/cm	8mm Flange Head Screw	1.2 kg/cm
10mm Cap Screw	3.5 kg/cm	10mm Flange Head Screw	2.7 kg/cm
12mm Cap Screw	5.5 kg/cm	12mm Flange Head Screw	4.0 kg/cm

Special Torque Settings

Torque Requirements for Engine Fasteners

Fastener Type	Number Used	Dia. (mm)	Torque kg m (in. lbs)	Comments
Cylinder Bolt A	2	8	.9	
Cylinder Bolt B	2	8	.9	
Oil Filter Screen Cap	1	30	1.5	
Exhaust Pipe Flange Bolt	2	6	.9	
Flange Screw Belt Pulley	4	8	2.0	Lubricate with Engine Oil
Valve Adjusters	2	5	.9	Lubricate with Engine Oil
Cam Chain Adjuster	1	6	1.0	
Guide Plate Screw Oil Fill Screw	1	8	1.3	
Clutch Cover Screw	1	12	5.5	
Clutch Driven Unit Mounting Screw	1	12	5.5	
Starter Motor Mounting Screw	2	6	1.0	
Oil Pump Mounting Screw	3	6	1.2	
Clutch Driver Mounting Screw	1	12	5.5	
ACG coil Mounting Screw	3	6	1.0	
Cam Chain Adjuster Screw	1	6	.5	
Spark Plug	1	10	1.2	

Torque Requirements for Frame Fasteners

Fastener Type	Number Used	Dia. (mm)	Torque kg m (in. lbs)	Comments
Cylinder Bolt A	1	25.4	8-12	
Cylinder Bolt B	1	10	4-5	
Oil Filter Screen Cap	1	14	8-10	
Exhaust Pipe Flange Bolt	1	10	3-4	
Flange Screw Belt Pulley	1	8	2-3	Use Soft Set Lock Tite
Valve Adjusters	1	5	.5	

1. General Information

Tool Requirements

For general maintenance and repair of the scooter, a complete basic set of metric sized tools is required. This should include; Open-end wrenches, sockets and ratchet, hex keys, straight and Philips screw drivers, standard pliers, needle-nosed pliers, wire cutters, wire strippers, scraper, pin punch, hammer and soft faced mallet.

For a more extensive tear down and rebuild of the scooter, there are a variety of special tools that will be required. These include the following:

- Valve spring compressor
- Valve guide reamer
- Feeler gage set
- Slide hammer bearing and seal remover
- Bearing press
- Torque wrench
- Ring compressor
- Clutch spring compressor
- Fly wheel puller
- Electronic multi meter

1. General Information

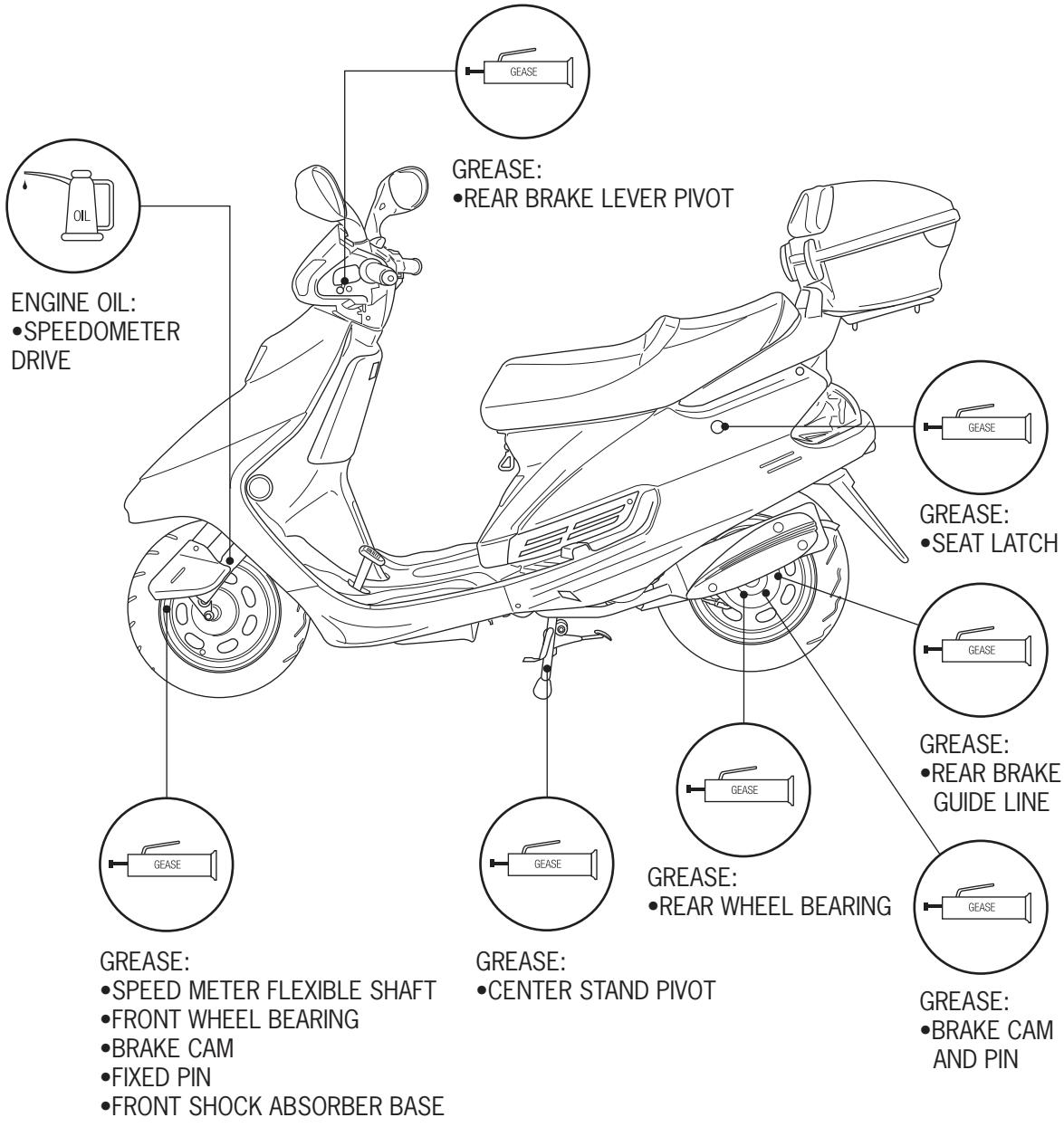
Lubrication Requirements: Engine

Item Location	Recommended Lubricant
valve guide valve stem moving part	SAE 5W 30 Engine Oil
cam shaft lug surface	API-SG Grade Engine Oil
valve rocking arm friction surface	oil
camshaft drive chain	grease
cylinder fixed screw bolts and nuts	oil
around piston and piston ring groove	oil
around piston pin	oil
cylinder surface	oil
connecting rod, piston pin bore	oil
connecting rod big end	oil
crankshaft R, L side oil seal starter reduction rear engaging (mating) part	oil
coundershaft gear engaging part	oil
final gear engaging part	oil
each bearing rotational part	grease
o-ring surface	oil
oil seal lip	oil
starter idle gear	oil
friction spring moving part, shaft moving part	grease
shaft moving groove part	oil
starter drive axle	grease
AC-generator connector	adhesive

1. General Information

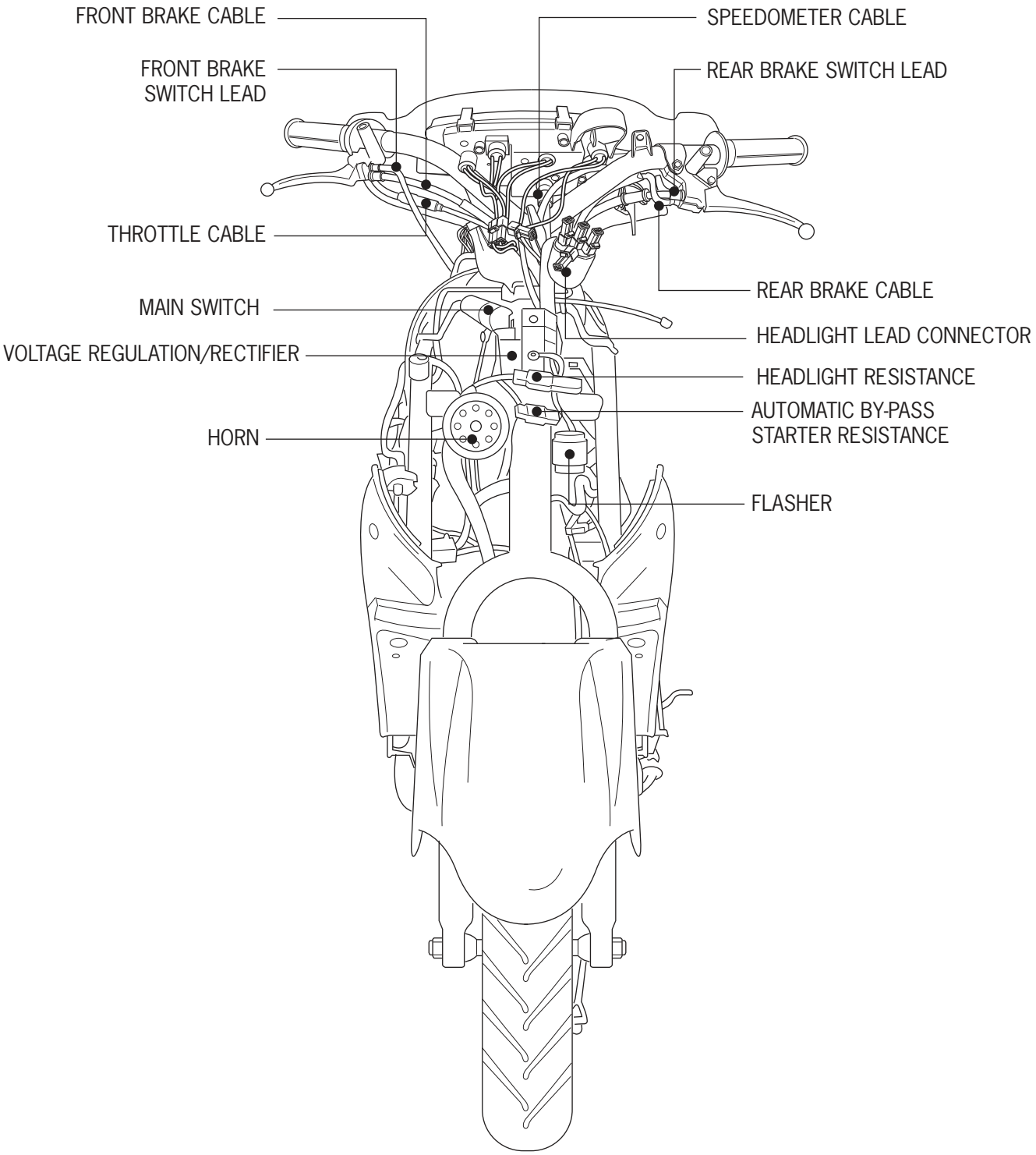
Chassis

•Apply oil to the following parts.
•Use grease in the parts other than specified ones.
•Apply engine oil or grease to the moving parts to prevent abnormal noise and to raise durability.

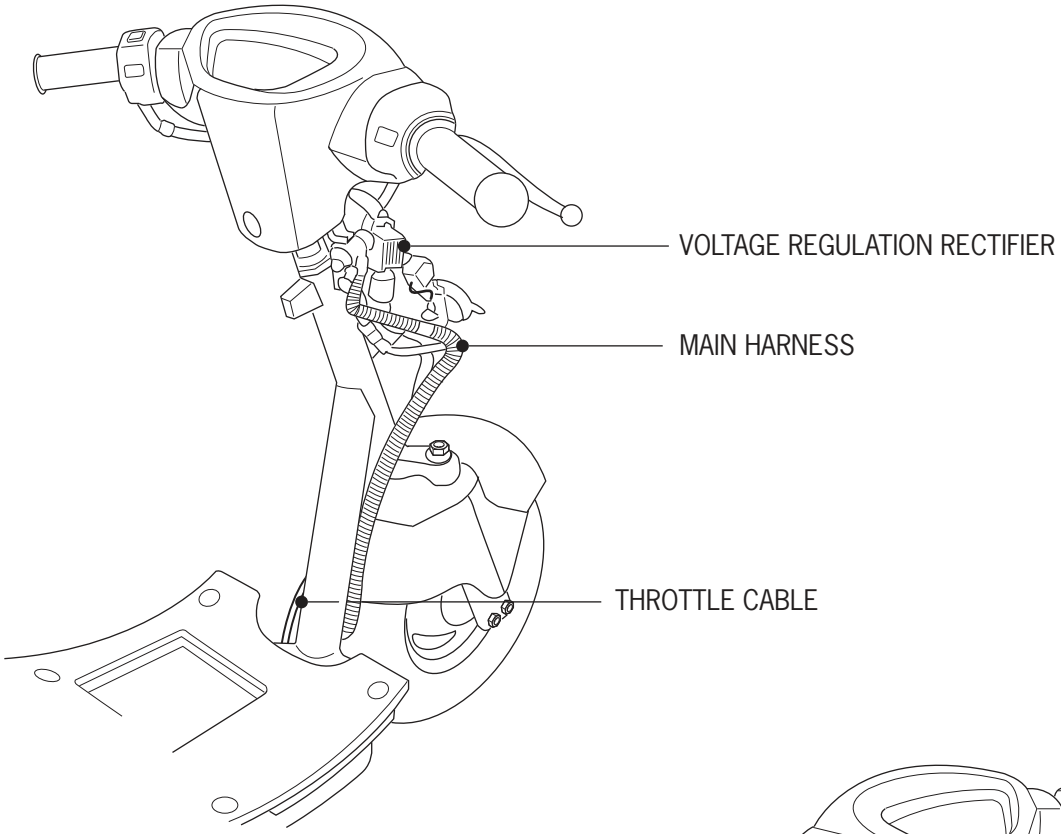


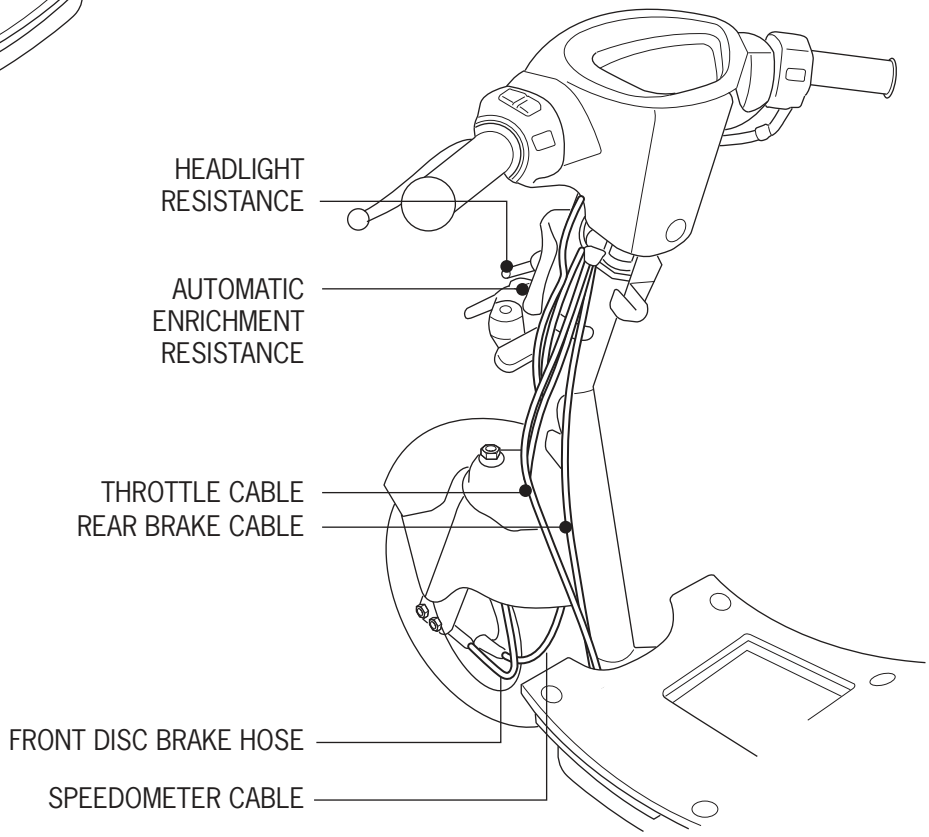
1. General Information

Cable Routing Diagram

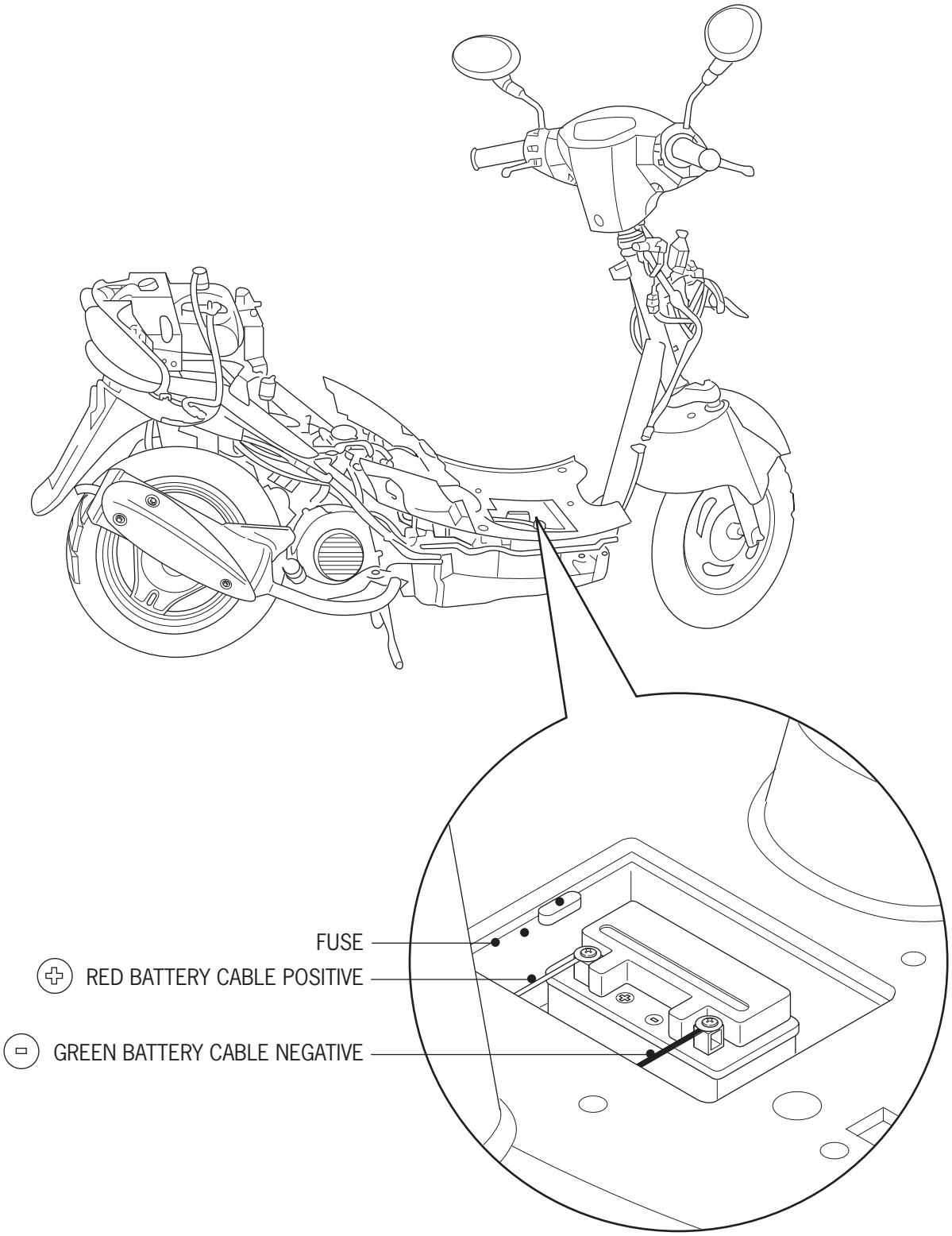


1. General Information

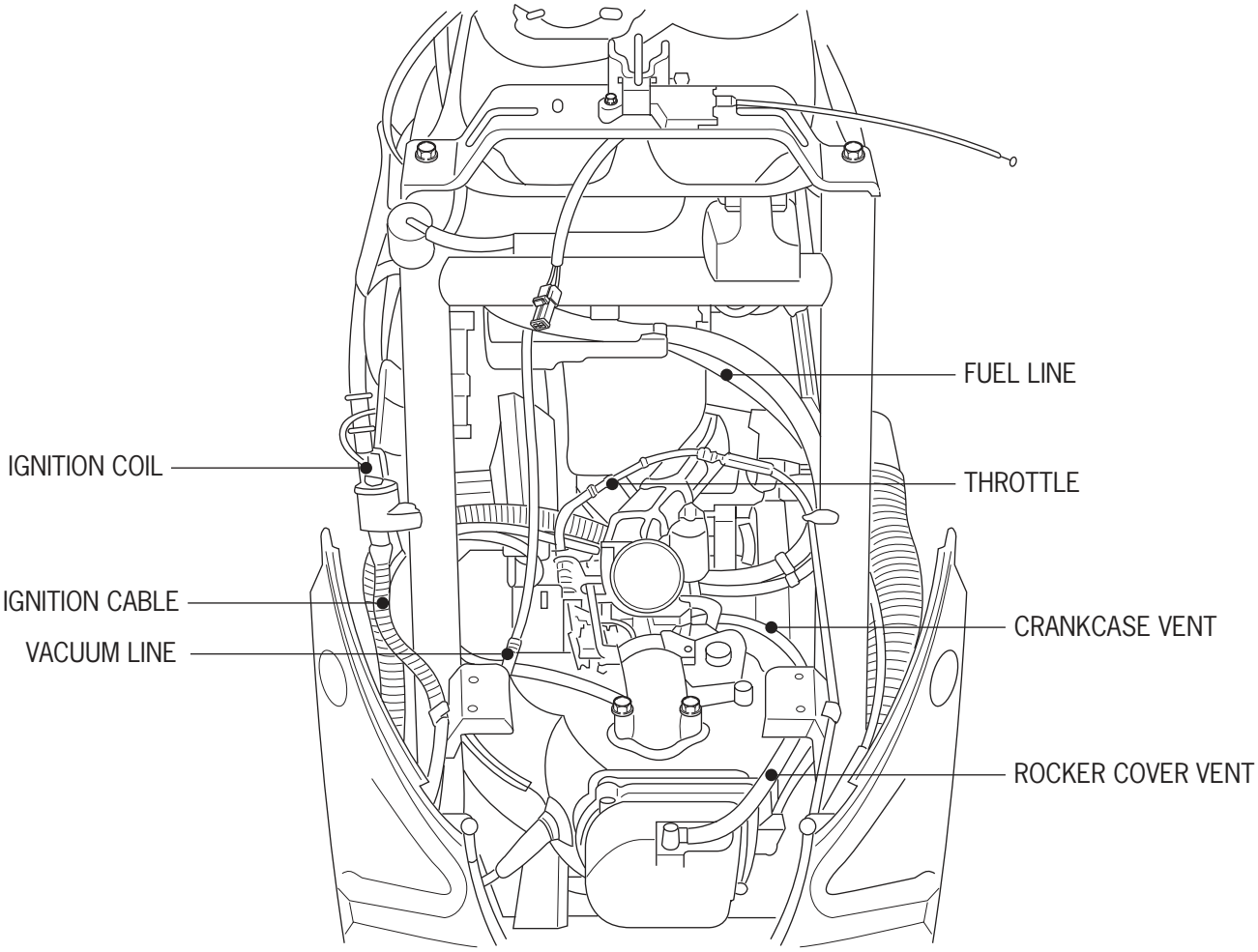




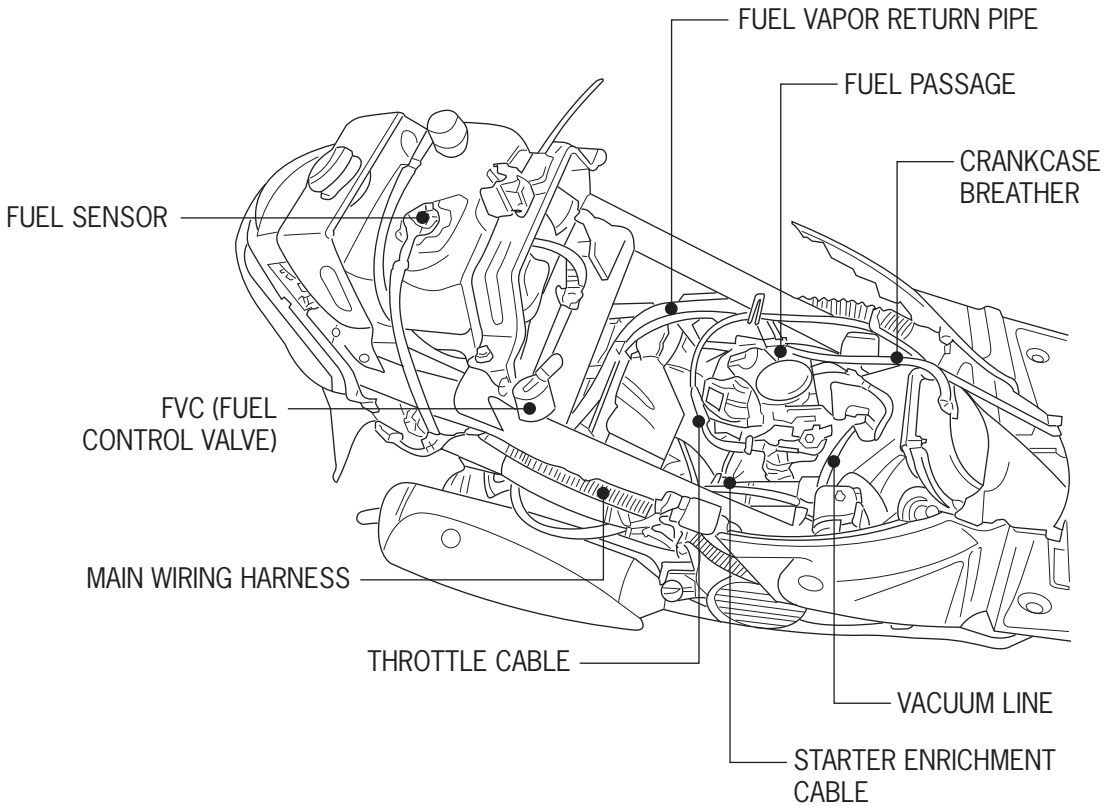
1. General Information

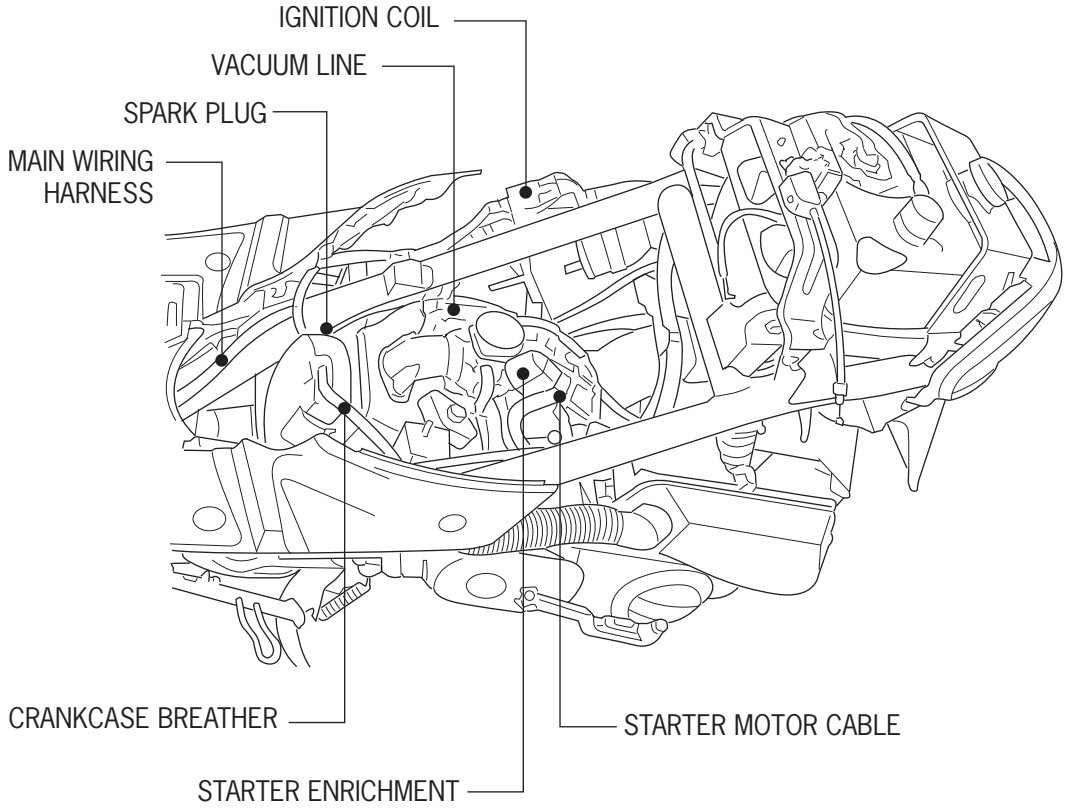


1. General Information

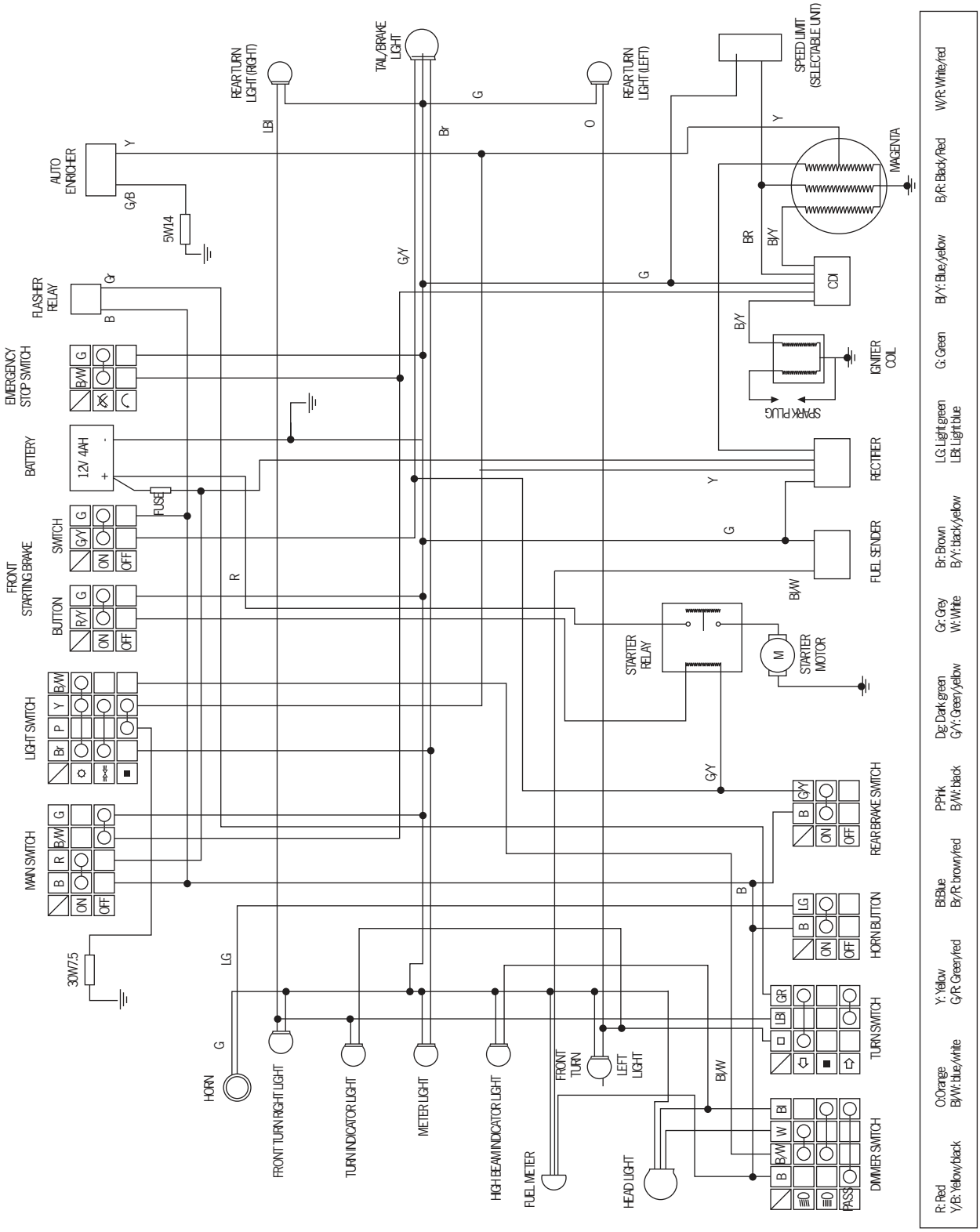


1. General Information



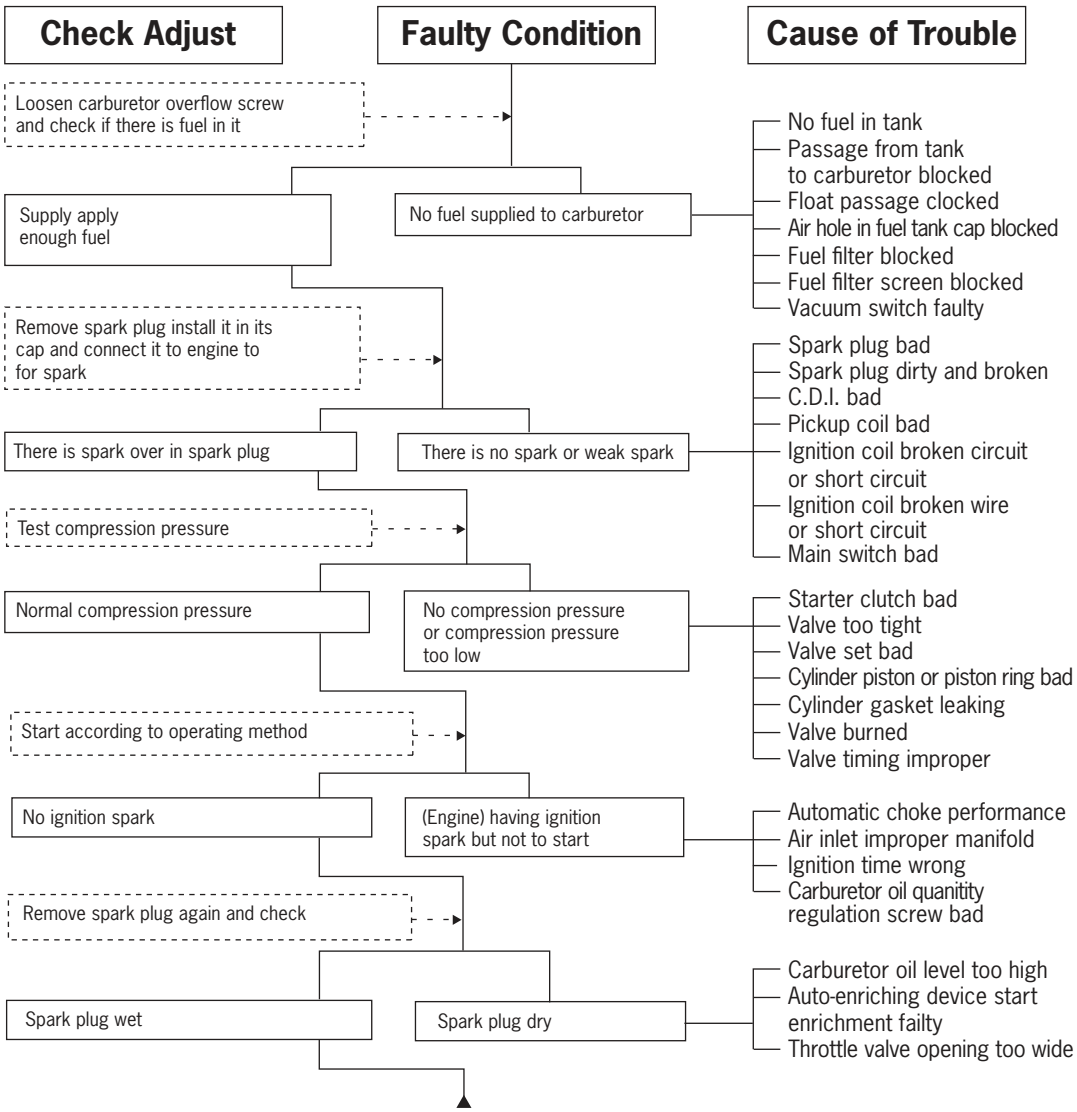


1. General Information



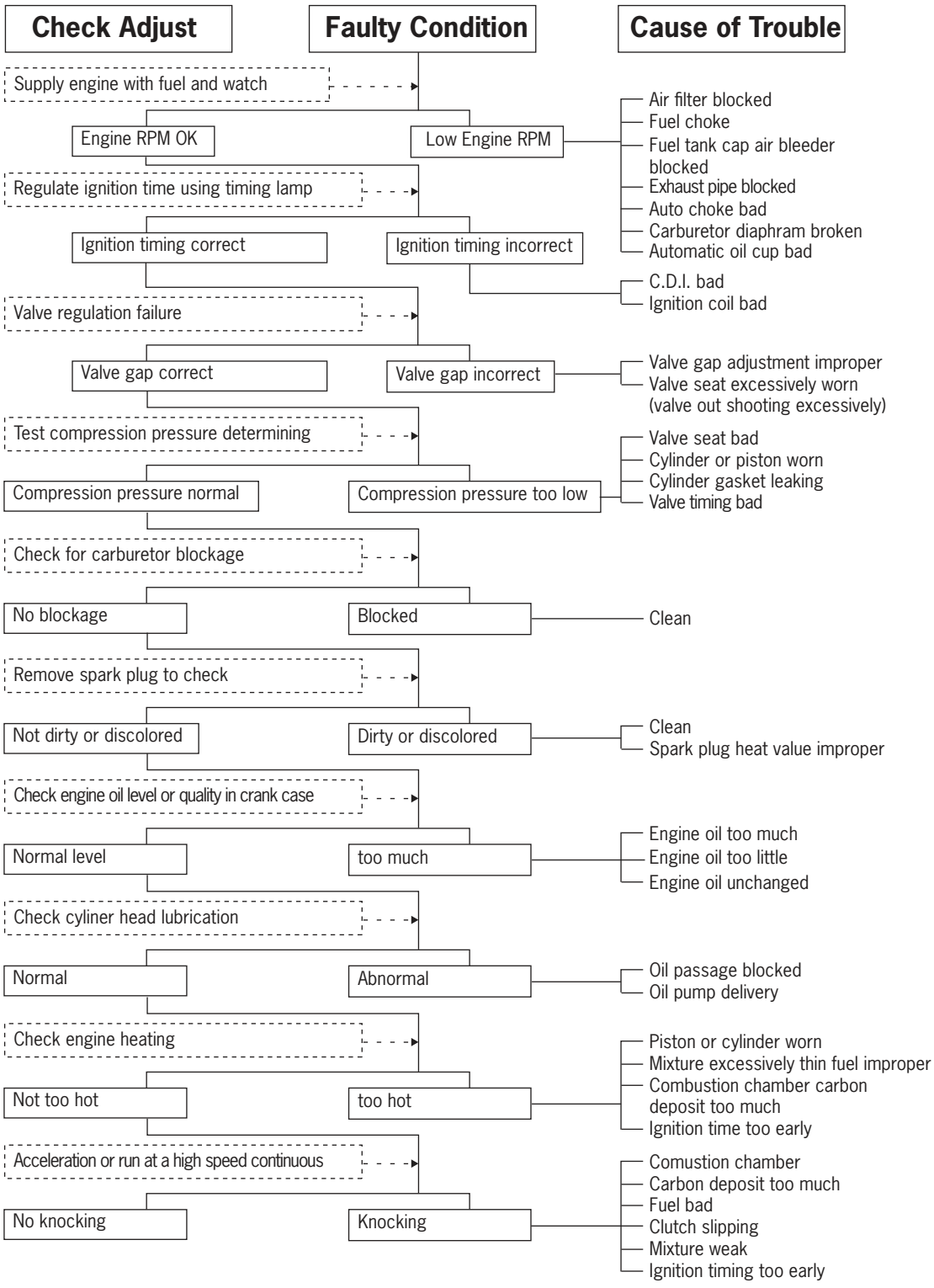
1. General Information

Trouble Shooting Guide
Starter Failure or Hard Starting



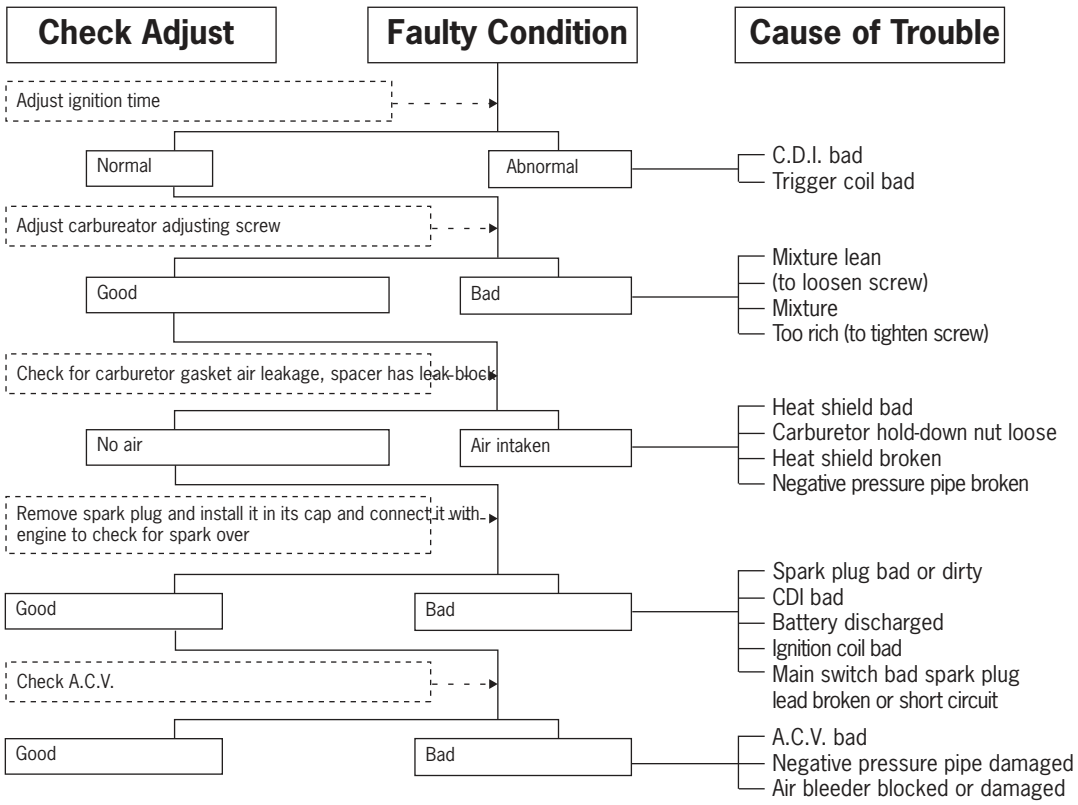
1. General Information

Trouble Shooting Guide (under speed, no power)



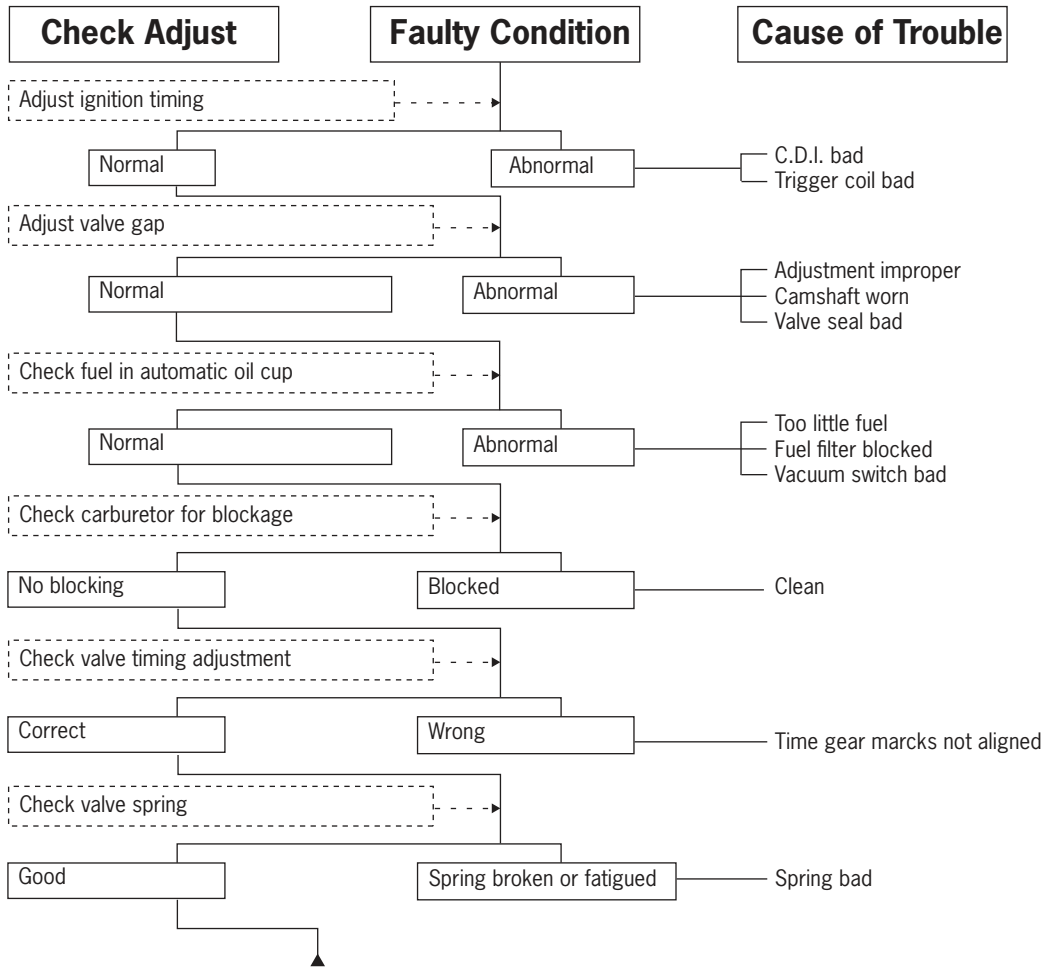
1. General Information

Trouble Shooting Guide (under speed, no power)



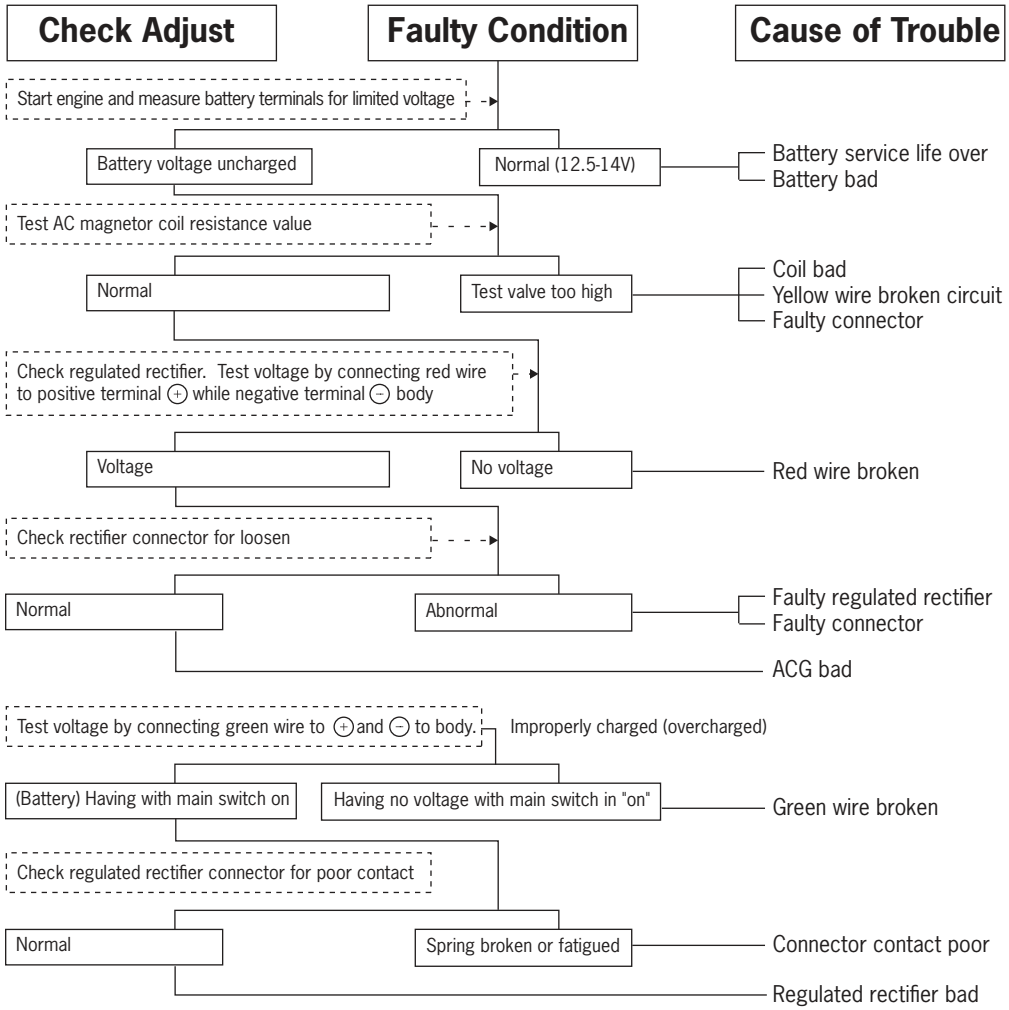
1. General Information

Trouble Shooting Guide (high speed)



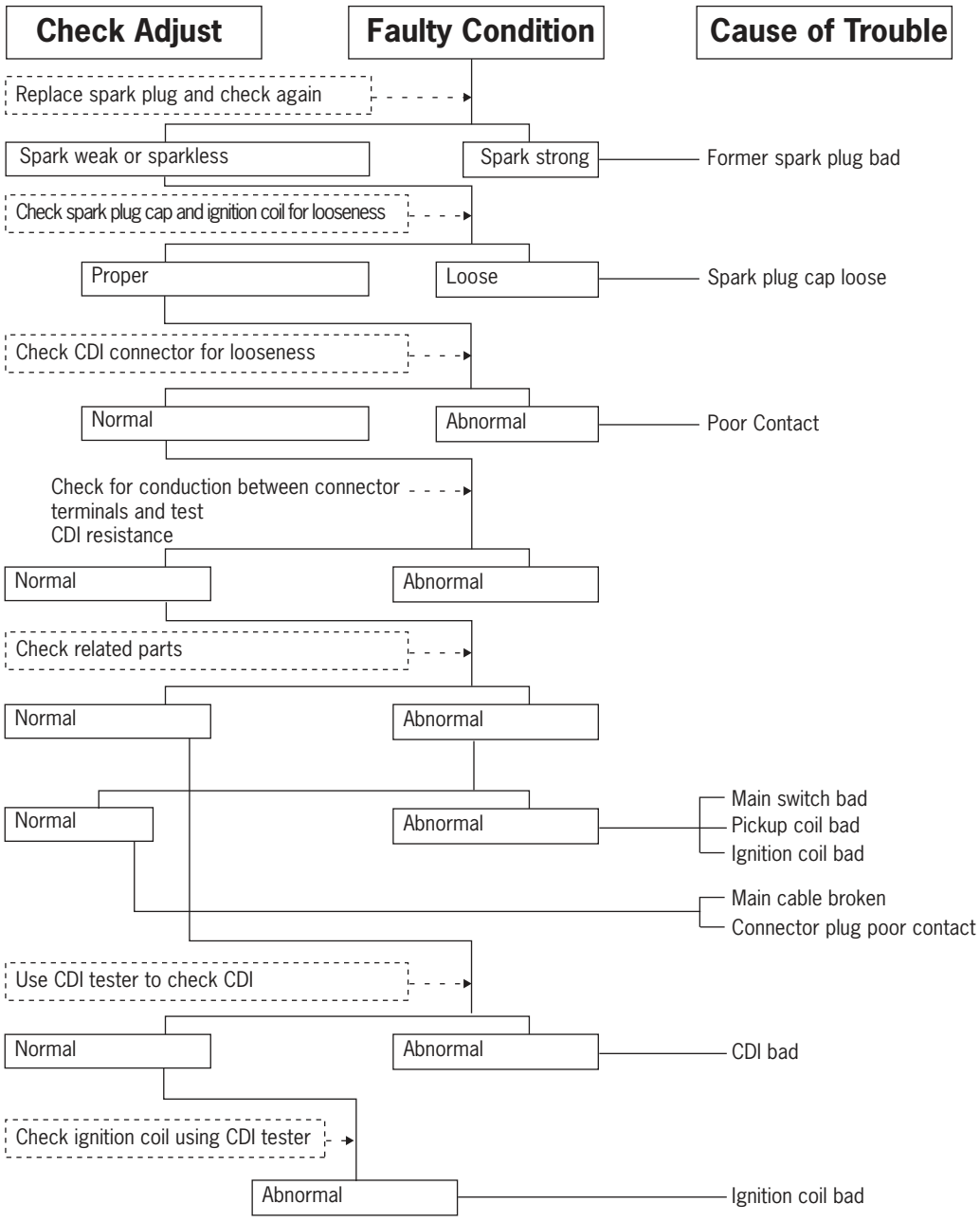
1. General Information

Trouble Shooting Guide-Improper Battery Charging (Battery overdischarge or overcharge)



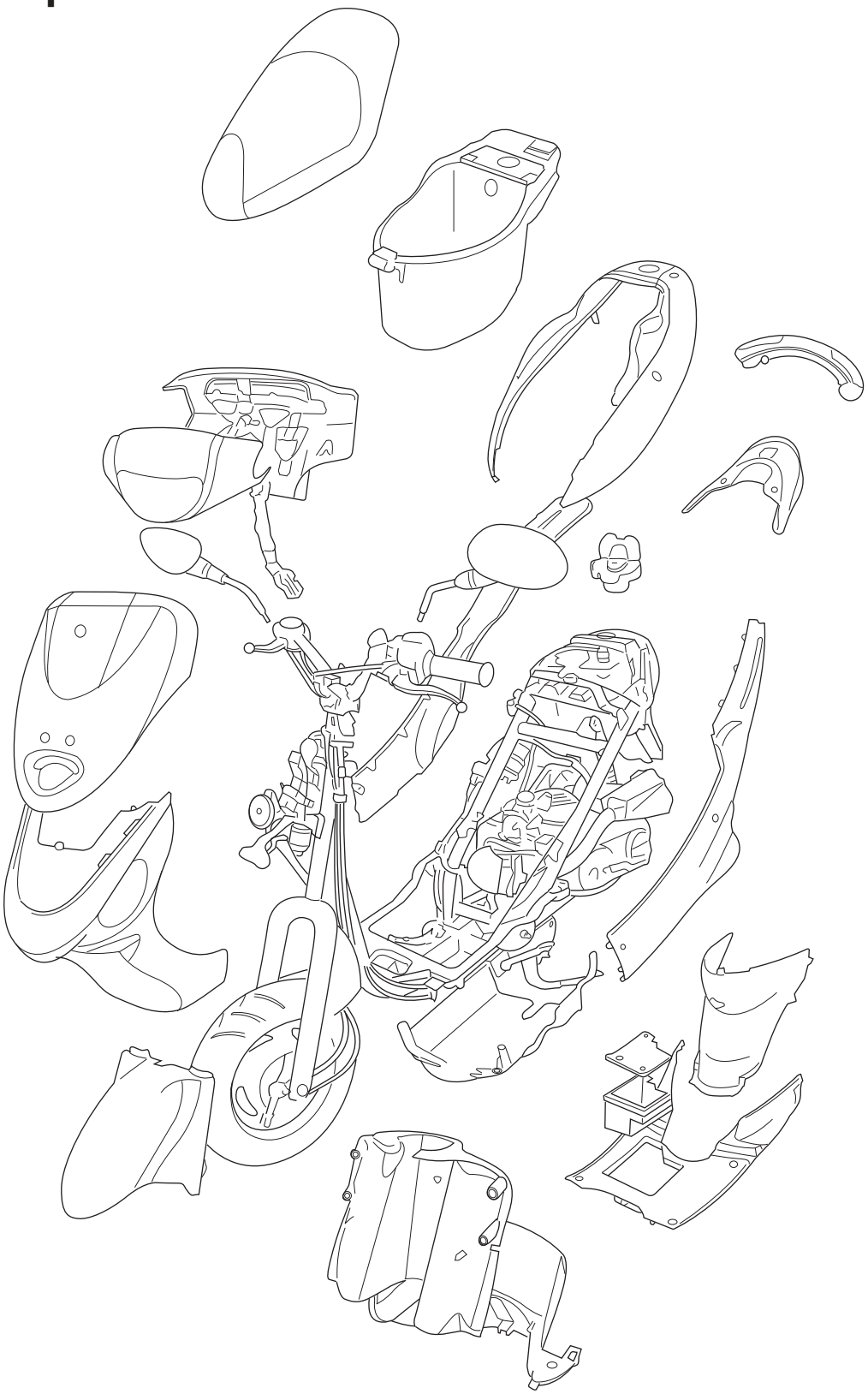
1. General Information

Trouble Shooting Guide (no spark)



1. General Information

Body Exploded View



2. Body Cover and Exhaust System

Topic	Page
General Information	2-1
Body Cover Removal	2-2
Exhaust System Removal	2-4

General Information

•Do not use excessive force when removing body panels. Use a firm, consistent force to disengage the tabs and remove the panels.

•Do not pry or pound on the body panels. The mounting tabs are not designed to withstand prying, pounding or twisting.

Parts to be removed and sequence of removal.
•Front headlight and meter cover.
•Back headlight and meter cover.
•Front fender.
•Front body cover.
•Front body panel.
•Seat and helmet box.
•Rear handhold and taillight assembly.
•Footboard cover and battery cover.
•Footboard and rear cover.
•Front frame cover.
•Covers and body side panels.
•Bottom cover.

Torque requirements
•Body mounting nuts and screws 1.2kg-m
•Exhaust pipe bolts 35kg-m

2. Body Cover and Exhaust System

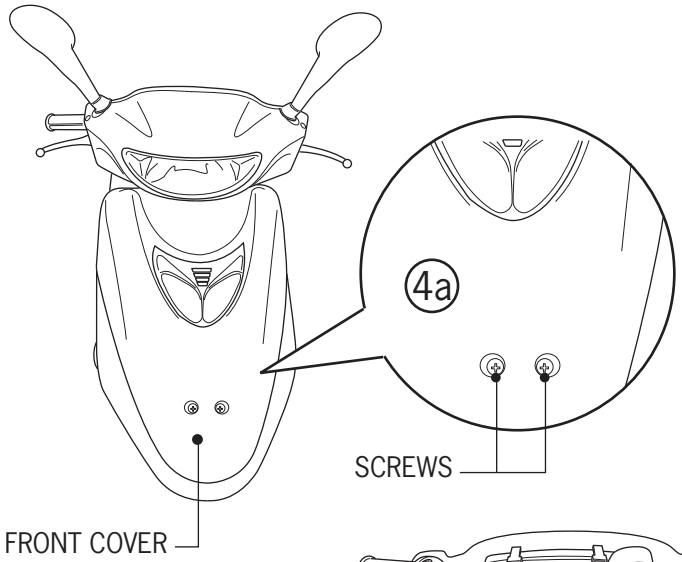
Body Cover Removal

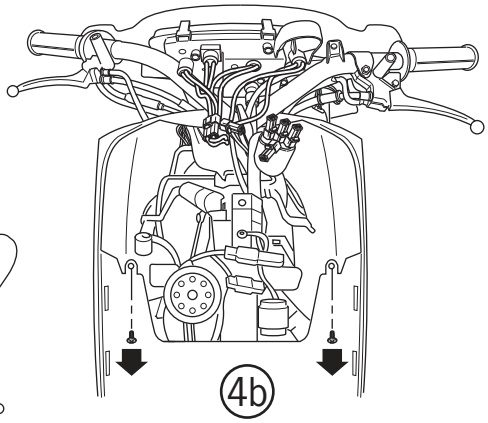
Front Panel Removal

1. Remove one front cover screw from front of panel.
2. Remove two screws on both left and right sides. Remove front panel. Install front panel in the reverse order.

Front Cover Removal

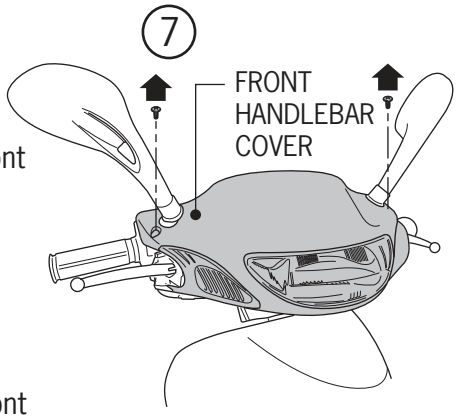
3. Remover rear cover, left and right side covers and front wheel.
4. Remove two screws in front cover (4a).
and remove two screws on each side (left and right) (4b). Remove front cover.
5. Install front cover in the reverse removal order.
6. Make sure to support the scooter while removing the front wheel to prevent it from falling.

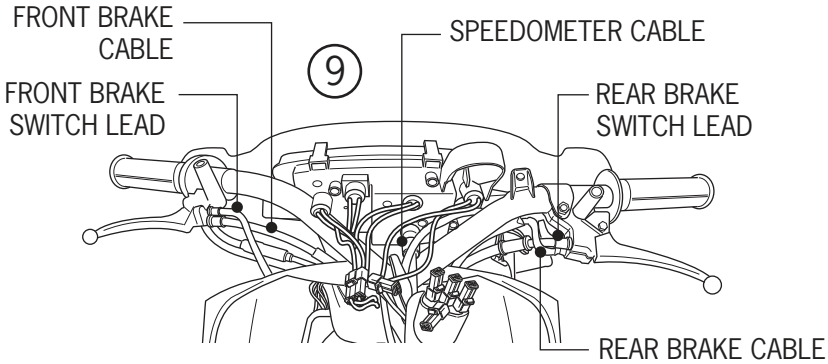




Front and Rear Handlebar Cover Removal

7. Remove two screws on front of handlebar cover and remove one screw in both right and left sides of rear handlebar cover.
8. Disconnect headlight lead and remove front handlebar cover.
9. Disconnect speedometer lead, left and right switches and brake switch connector. Remove one fix screw in rear handlebar cover.
10. Remove the fix screw in each side of rear handlebar cover. Remove rear handlebar cover.
11. Remove the removal order for installation.





2. Body Cover and Exhaust System

Body Cover Removal

1. Remove middle luggage box after opening the seat and removing the four lock nuts.

2. Remove two center cover screws.

3. Remove center cover.

4. Remove left and right cover. (2-3)

5. Remove three rear-rack screws.

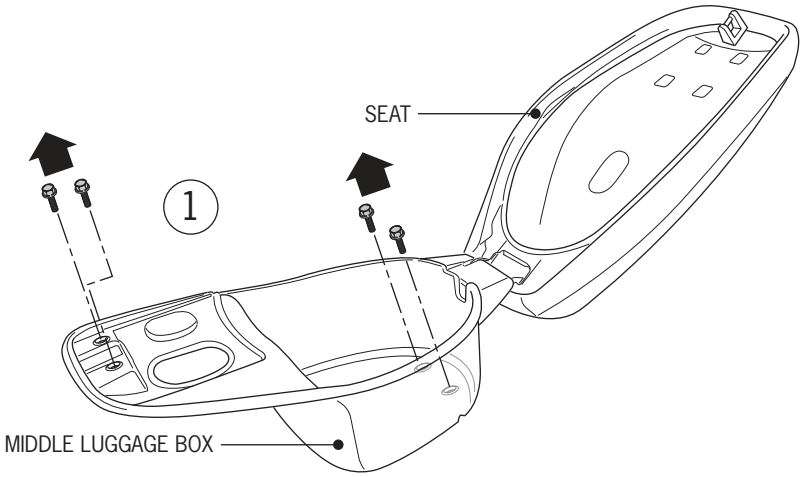
6. Remove rear rack.

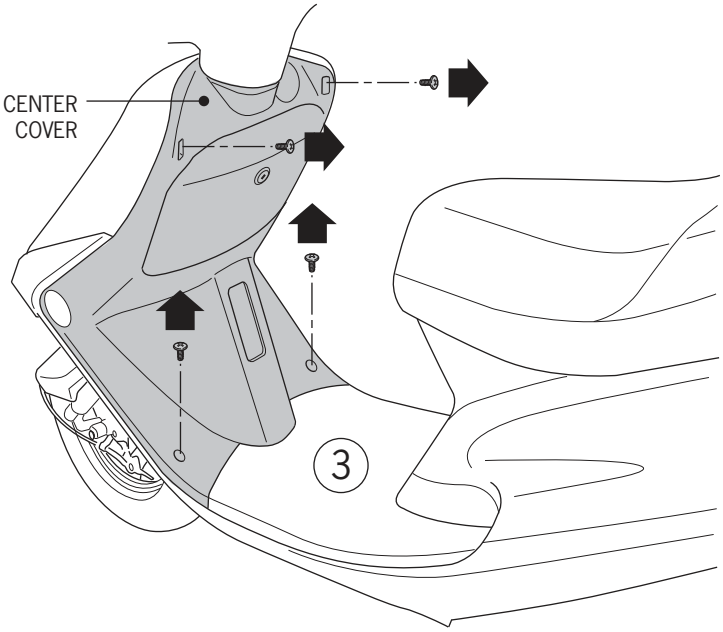
7. Remove screws in rear of body panel.

8. Remove the two screws in the front of the body panel.

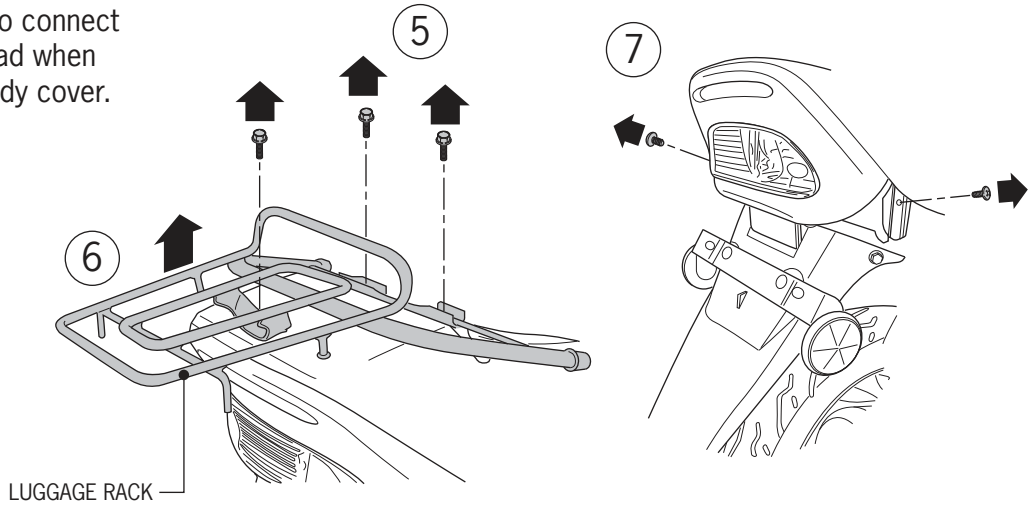
9. Disconnect seat lock lead.

10. Remove the removal order for installation.





Make sure to connect seat lock lead when installing body cover.



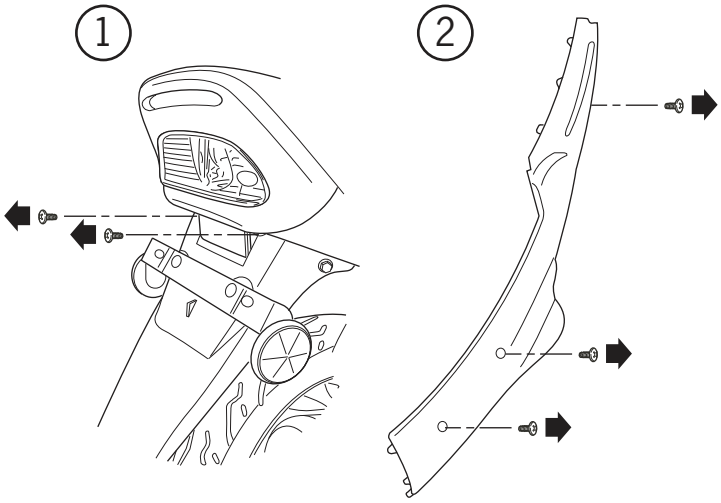
2. Body Cover and Exhaust System

Right and Left Side Mold Removal

1. Remove two rear body screws.

2. Remove three screws in either side of mold.

3. Remove left and right side panels.



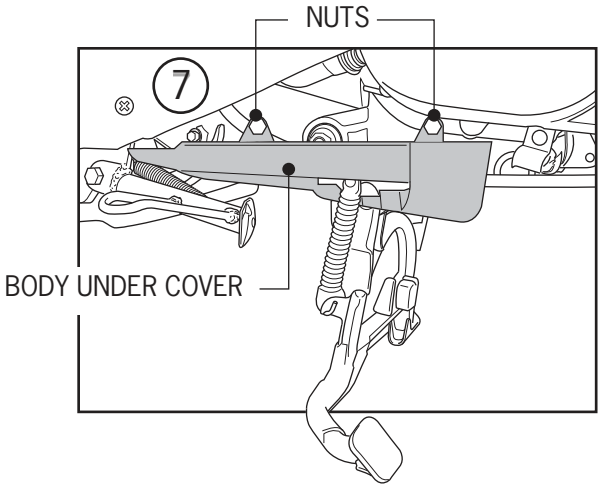
Body under Cover Removal

5. Remove rear body panel.

6. Remove left and right side panels.

7. Remove two nuts in either side of body under cover.

8. Remove body cover.



Floor Panel Removal

1. Remove battery cover, disconnect battery lead and dismount battery.

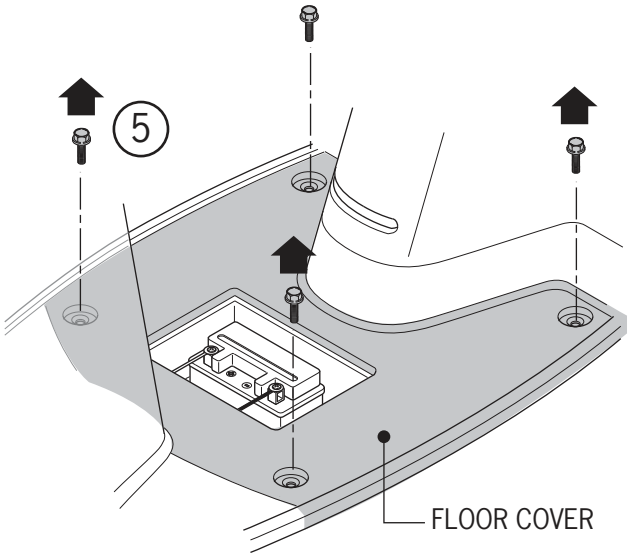
2. Disconnect C.D.I. wire and take it out of battery box.

3. Remove body cover.

4. Remove the speed-limiting governor.

5. Remove four check bolts in the floor panel.

6. Remove floor panel.



2. Body Cover and Exhaust System

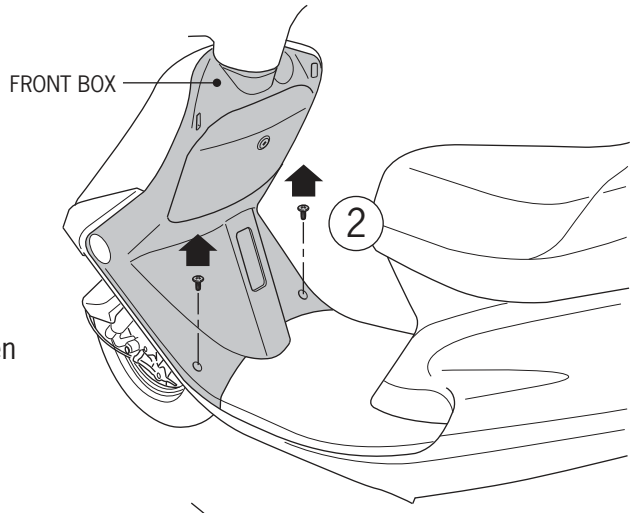
Front Box Removal

1. Remove front cover and front panel.

2. Remove two catch bolts in the front of the floor panel.

3. Remove the front box catch bolt.

4. Remove main switch outer ring and then remove front box outwardly and upwardly.



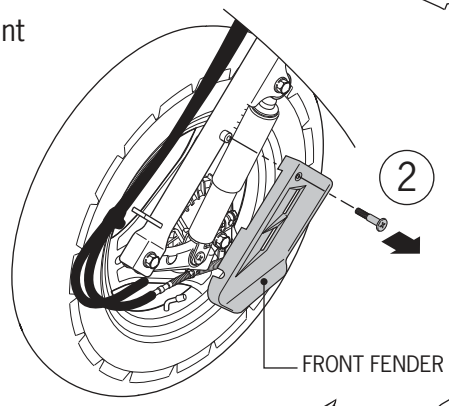
Front and Rear Fenders Removal

1. Remove the two fix screws in the front fender.

2. Dismount the front fender.

3. Remove the two catch bolts in the rear fender stay.

4. Remove the rear fender stay.



Exhaust Pipe Removal

1. Remove the two nuts in the pipe joint.

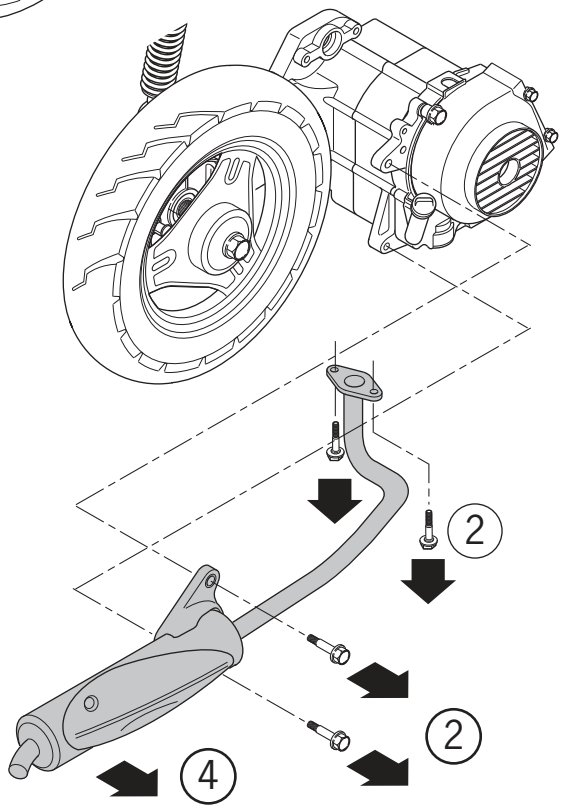
2. Remove the two pipe catch bolts.

3. Remove the exhaust pipe.

4. Remove the joint ring.

•Install exhaust pipe joint ring before installing exhaust pipe.
•Install exhaust pipe joint nuts and fasten them and then install exhaust pipe catch bolts and fasten them.

Torque:
•Exhaust pipe catch bolt 3.5kg/m
•Exhaust pipe joint jam nut 1.2kg/m
•Use a new exhaust pipe carrier ring when reassembling the exhaust system.



3. Scheduled Maintenance

Topic	Page	Topic	Page
Frame and Tire Type	3-2	Drive Belt	3-8
Maintenance Chart	3-3	Rear Brake Arm	3-9
Fuel Filter	3-4	Brake System Front Brake	3-9
Throttle Operation Lever	3-4	Rear Brake	3-9
Air filter	3-5	Front Lamp Adjustment	3-10
Replacing Frequency	3-5	Clutch Engagement	3-10
Spark Plug	3-5	Front Suspension	3-10
Valve Adjustment	3-6	Rear Suspension	3-10
Carburetor Idle Speed	3-6	Nut and Bolt Tightness	3-11
Ignition Timing	3-7	Collar Rim Tire	3-11
Cylinder Pressure	3-7	Air Pressure	3-11
Removing the Spark Plug	3-7	Tire Standards	3-11
Final Reduction Gear Engine Oil	3-8	Steering System	3-12

General Information

Warning
Always make sure you are in a well-ventilated area before the engine starts. Never start the engine in an enclosed area. Gasoline powered engine exhaust fumes are poisonous and can cause loss of consciousness and death. Do not smoke or allow open flames or sparks in or near the area where refueling is performed or where gasoline is stored.

3. Scheduled Maintenance

Frame
•Front brake lever free play: 10-20mm
•Rear brake lever free play: 10-20mm

Tire unit: kg/cm^2

	1 Person	2 Persons
Front	1.5, 17 dsi	1.75, 19 dsi
Rear	2.0, 23 dsi	2.2, 28 dsi

Tire type
•Front: 3.00 x10
•Rear: 3.00 x10

Torque:
•Front wheel axle nut 4.0-5.0kg/m
•Rear wheel axle nut 8.0-10.0kg/m

3. Scheduled Maintenance

Maintenance Chart
Perform regular maintenance, according to maintenance handbook.

I: Inspect, clean, lubricate, add fix or replace when necessary.
A: Adjust B: Clean C: Replace D: Tighten

Frequency / Item	Whichever comes first	Mileage (Km)											
		km 1000 / mi 620	km 2000 / mi 1240	km 3000 / mi 1860	km 4000 / mi 2480	km 5000 / mi 3100	km 6000 / mi 3720	km 7000 / mi 4340	km 8000 / mi 4960	km 9000 / mi 5580	km 10000 / mi 6200	km 11000 / mi 6820	km 12000 / mi 7440
Engine oil		the first 300km/ 186 mi	R	R	R	R	R	R	R	R	R	R	R
Engine oil filter		300km/ 186 mi			C				C				
Fuel filter screen										R			
Gear oil	Note 3	new R 300km/ 186 mi				R				R			
Valve gap			A		A				A				A
Carburetor					I				I				I
Air filter	Note 2, 3	I				R					R		
Spark plug		Clean every 3000Km Replace when necessary											
Brake system			I	I	I	I	I	I	I	I	I	I	I
Drive belt									I				
Suspension					I				I				I
Screws and nusts									I				
Tire					I								I
Steering stem bearing		I					I						I

•For safety reasons, it is recommended that service be performed by a dealer.

Note:
1. For mileage higher than what is specified in the chart, the maintenance should be repeated at the same interval listed.

2. More frequent maintenance is required if the vehicle is used in dusty areas or in rain.

3. More frequent replacement is required if the vehicle is subjected to sever use, such as heavy load operation, long trips or operation in rain.

3. Scheduled Maintenance

Fuel Filter

1. Remove luggage box (2-2)

2. Check fuel line for ageing or damage.

3. Replace with a new one in case damaged or leaking.

Throttle Lever Operation

1. Check throttle for proper operation.

2. Check throttle grip free play.
   Free play: 2-6mm (.078 in.-.236 in.).

3. Adjust free play using the adjusting nut in the throttle cable and the adjuster at the carburetor.

•Major adjustment should be made at carburetor.

•Adjust it by loosening the jam nut and rotating adjusting nut.

•Fine adjustment should be made at the throttle grip.

•Remove outer cover, loosen jam nut and rotate adjusting nut to adjust it.

3. Scheduled Maintenance

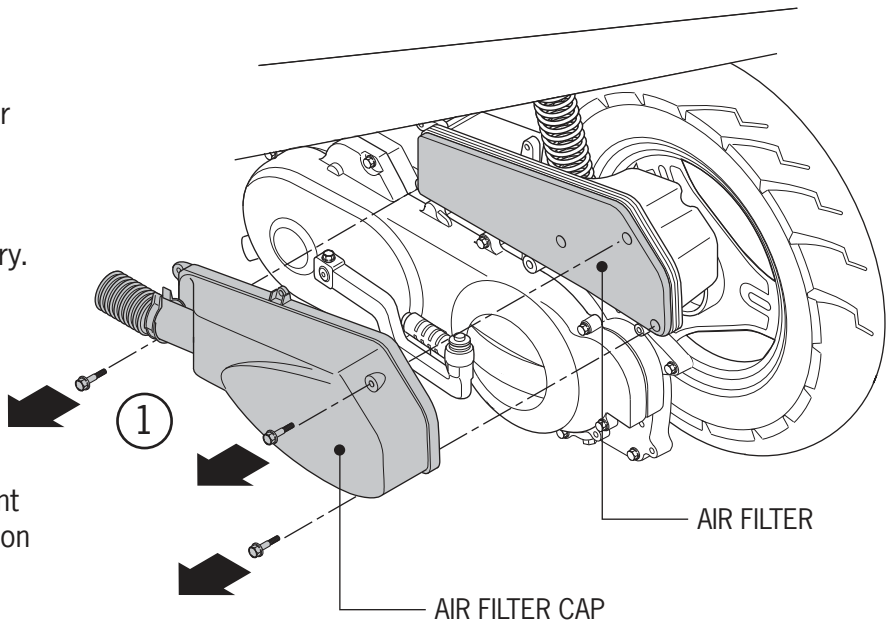
Air Filter

Filter Replacement

1. Remove air filter cap, fix screw and remove the air filter cap.

2. Check filter for dirt or damage. Replace as necessary.

Do not attempt to clean the filter element.



Replacing Frequency

1. More frequent replacement is required if vehicle is driven on dusty roads or in the rain.

2. Make sure the air filter cover is securely in place.

Spark Plug

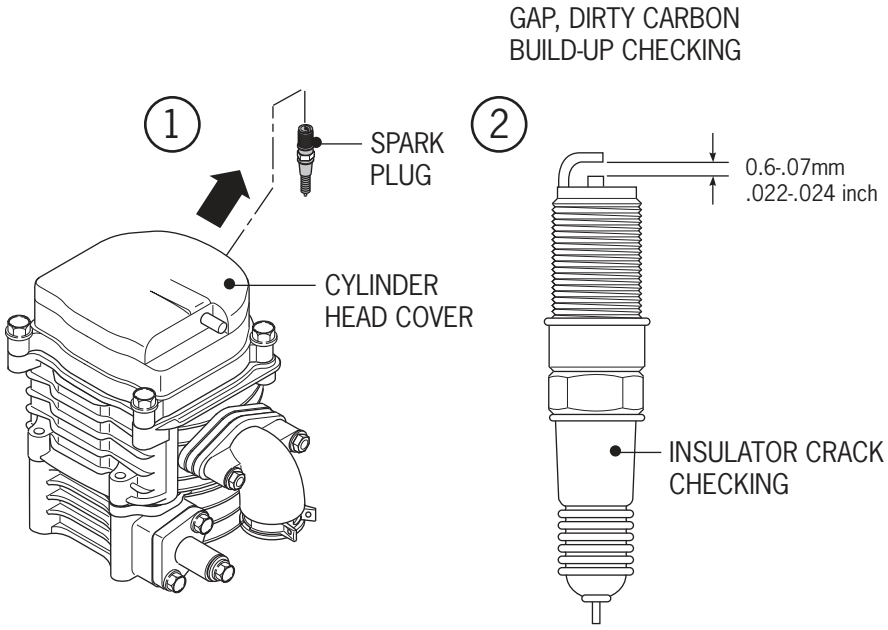
1. Remove spark plug.

2. Check spark plug for burning, dirt or deposit.

3. Clean it with a spark-plug cleaner or steel brush in case of dirt or carbon deposits.

Specified spark plug:
NGK: C7HSA Champion
Check spark plug gap
Gap: 0.6-.07mm (.022-.024 in.)

4. Check plug for dirt, carbon build-up or cracking of insulator.



3. Scheduled Maintenance

Valve Adjustment

Always check and adjust with engine temperature lower than 35˚C (95˚F)

1. Remove cylinder head cover.

2. Rotate cooling fan to camshaft. Locate mark at center top, aligning magneto fly wheel mark with that on crankcase. Magneto “T” mark and box crankshaft mark.

   Valve gap checking and adjustment valve gap:
   IN: 0.05mm (.00197 in.)
   EX: 0.05mm (.00197 in.)

3. To adjust the valve gap, loosen am nut and rotate adjusting nut.

Valve Adjustment Wrench

Be sure to check valve gap again, after locking jam nut.

Carburetor Idle Speed

Idle adjustment should be made with the engine warmed up.

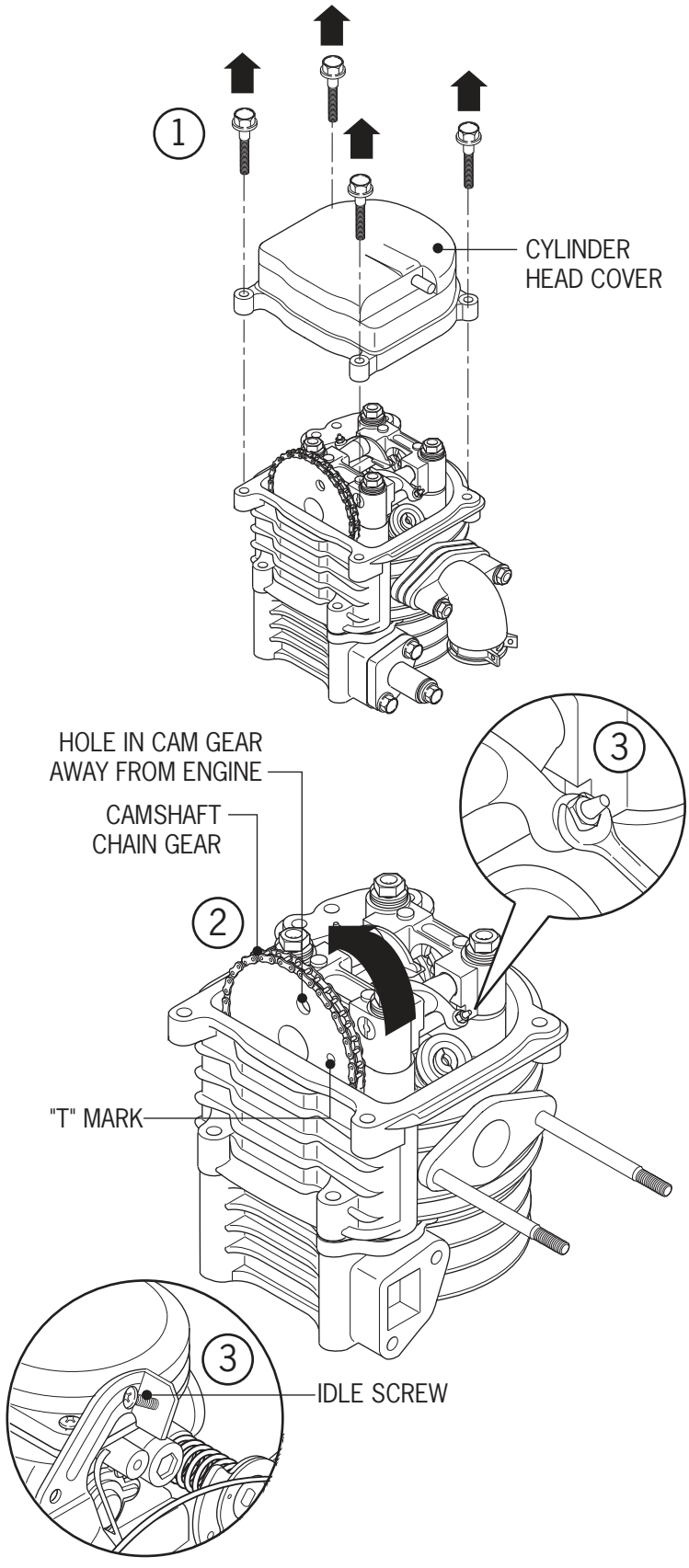
1. Remove cover.

2. After the engine warms up, connect it to an engine revolution counter.

3. Adjust idle screw until specified revolution is obtained.

   Minimum idling speed: 1900+190rpm

4. Readjust the screw if the idle speed is not steady or fuel cannot be properly applied.



3. Scheduled Maintenance

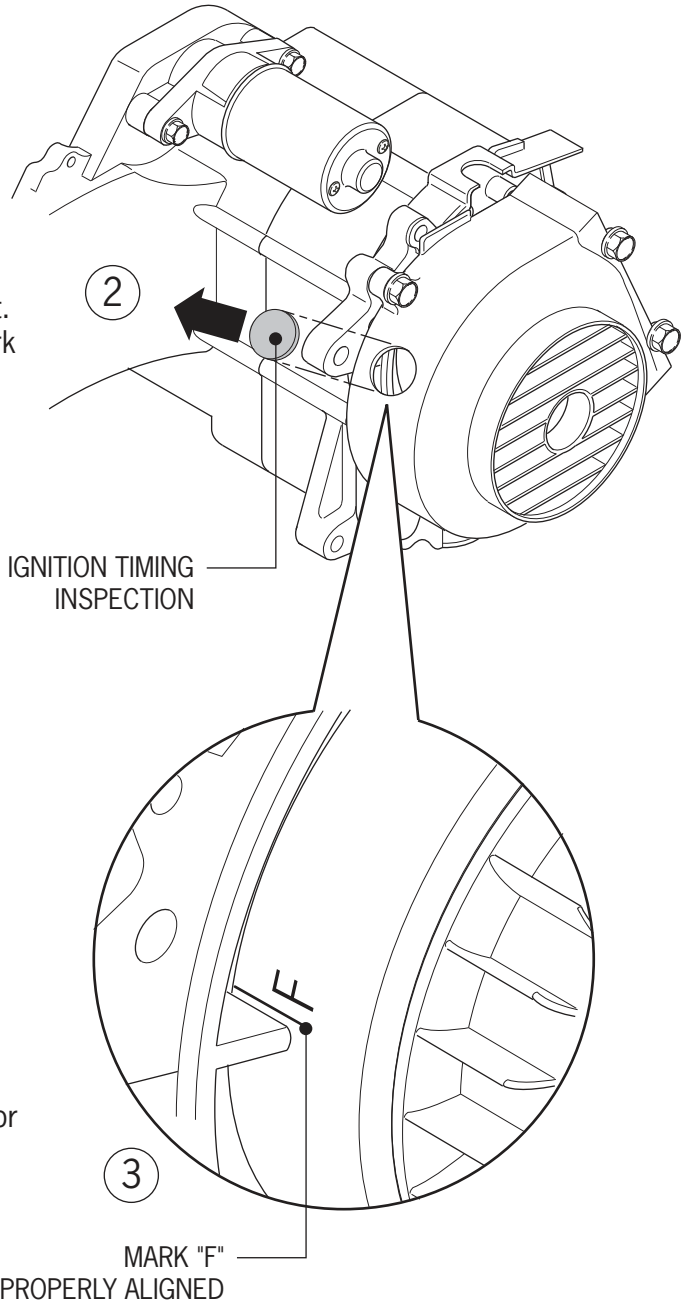
Ignition Time

◉ Equipped with CDI, there is no need for ignition setting.

◉ Check ignition system if ignition time is incorrect.

1. Dismount right body cover.
2. Remove ignition timing inspection.
3. Check ignition timing using the timing light. Crankcase mark must be aligned with mark “F” on flywheel while engine is at idle speed. The timing should advance as the RPM is increased.

   The timing mark should align with the crankcase mark at 3000 RPM.



Cylinder Pressure

1. Measure cylinder pressure with the engine warmed up.
2. Dismount middle luggage box and middle cover (2-2).

Remove spark plug.

1. Install cylinder pressure gauge.
2. With throttle valve fully open, start starter motor to measure cylinder pressure. (213psi)
3. Compression pressure: 15kg/cm2 -600rpm.
4. If the pressure is excessively low, check for the following:

   •Valve leakage
   •Valve gap too tight
   •Cylinder head gasket damaged
   •Piston ring worn
   •Piston or cylinder worn

5. Check combustion chamber and piston top for excessive deposit if compression pressure is too high.

3. Scheduled Maintenance

Final check of gear engine oil reduction

Checking oil volume, build up main foot rest so that build up body becomes vertical on plain ground.

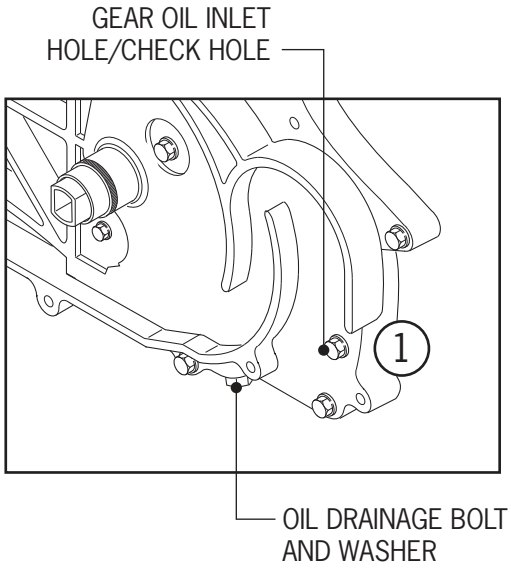
1. Dismount gear oil adjusting bolt after stopping engine.

2. The oil level should be just under the regulation screw bolt hole. Add gear oil when oil level is too low.

    •Gear oil recommended: SAE 90W

3. Build up gear oil regulator screw bolt.

4. Confirm whether or not the packing washer is broken.



Changing Gear Oil

1. Remove gear oil adjusting bolt and drain oil.

2. Confirm whether or not packing washer is broken.

3. Add recommended gear oil.

    •Gear oil capacity: 0.12l-40ES
    •Bolt torque: 0.9kg-m 780 lbs.

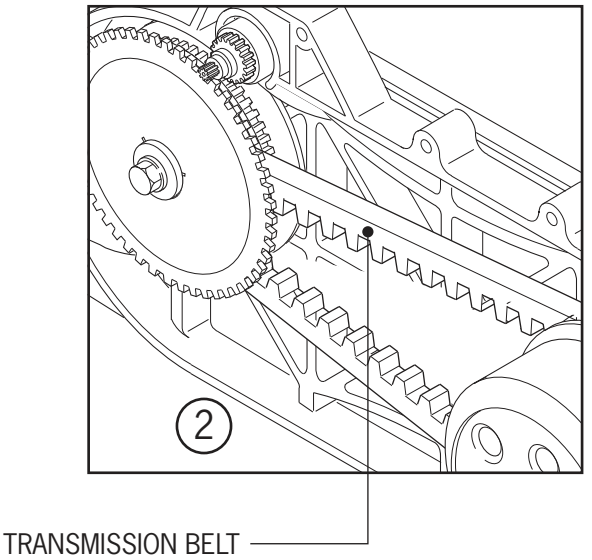
4. Check if there is any leakage after work is performed.

Transmission Belt

1. Detach the left crankcase cover (9-2).

2. Check whether there is wear and tear of transmission belt.

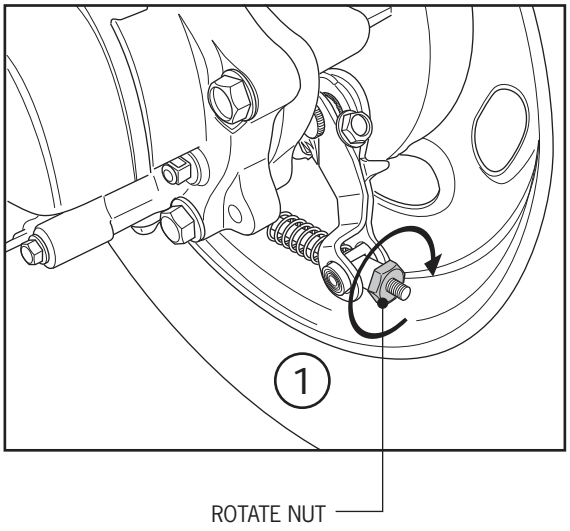
3. Change with new one when necessary or during timely maintenance.



3. Scheduled Maintenance

Rear Brake Arm

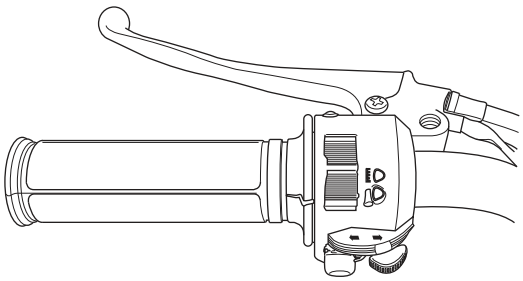
1. Change new pedal when brake bar is pulled to stopping position and the sparrow of brake arm is in alignment with the brake plate mark.



Brake System-Front Brake

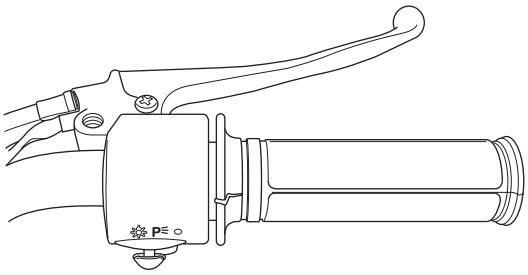
1. Check free gap of front brake bar.
   •Free gap: 10-20mm (0.5 in.).

2. Rotate adjusting nut to regulate free gap of brake bar when it is beyond valve.



Rear Brake

•Check free gap of rear brake bar.
•Free gap: 10-20mm (0.5 in.).



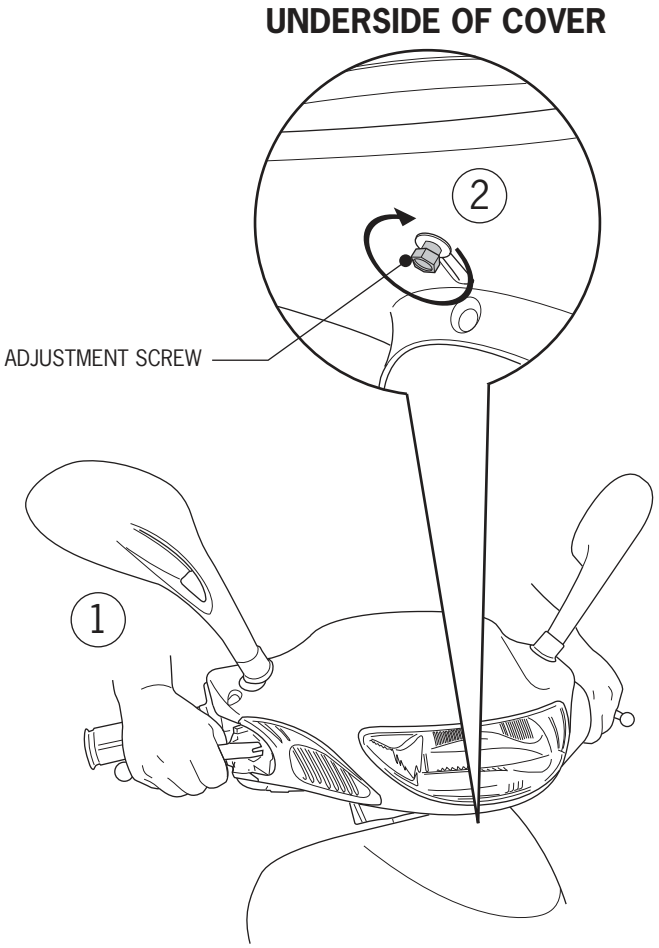
3. Scheduled Maintenance

Front Lamp Adjustment

1. Rotate nut to adjust free gap when it exceeds proper adjustment.

2. Turn main switch to “on” and start engine.

3. Rotate adjusting screw of front lamp to aim the light.



Clutch Engagement

1. Start engine and increase RPM slowly to check performance of clutch.

- Clutch should engage at 2200 RPM.
- Service and replace clutch as necessary should slippage occur.

Front Suspension

1. Pull front brake bar tightly and compress front for up and down to check its performance.

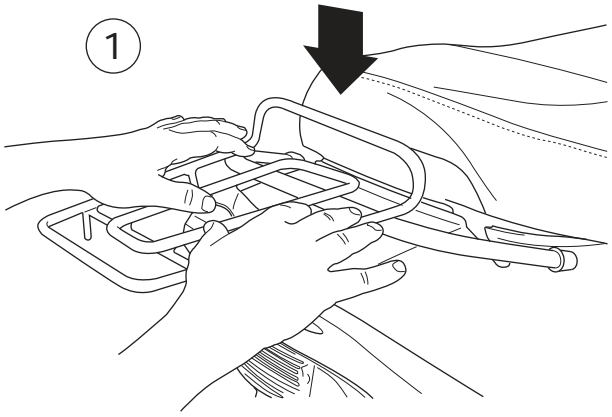
2. Check for leakage of front for and/or soft springs.

Rear Suspension

1. Compress rear shocks up and down to check performance.

2. Check for leakage of rear shock or soft springs.

3. Suspend rear wheel and push it left and right to check engine suspension sleeve for wear.



3. Scheduled Maintenance

Nut and Bolt Tightness

1. Check all nuts and bolts for proper tightness.

2. Adjust torque as necessary.

Collar Rim Tire

1. Check tire pressure.

Measure tire pressure when tire is cold.

Air Pressure

Front Tire	1.75kg/cm	17psi
Rear Tire	2.00kg/cm	23psi

Tire Standards

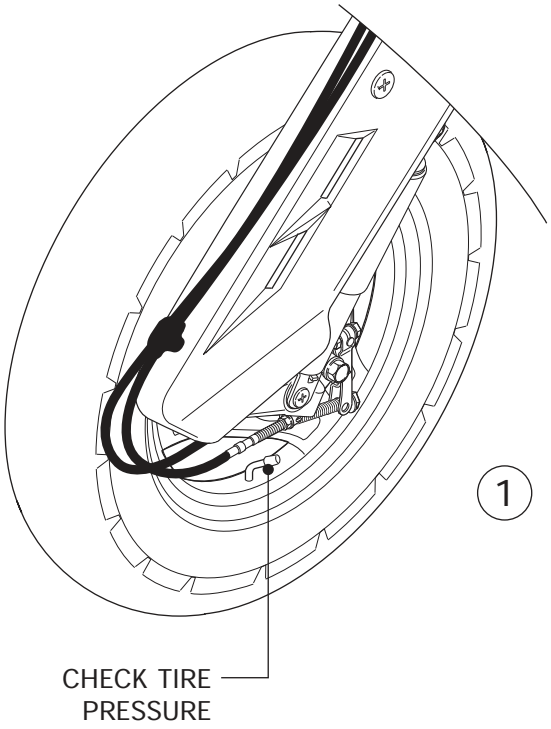
•Front tire: 3.00 x 10
•Rear tire: 3.00 x 10

1. Check if front wheel axle has slack.

2. Check if rear wheel axle nut has slack.

3. Tighten when necessary to stipulated torque if there is slack.

Torque:
•Front wheel axle nut 4.0-5.0 kg-m 28-32 ft lbs
•Rear wheel axle nut 8.0-10.0 kg-m 55-65 ft lbs



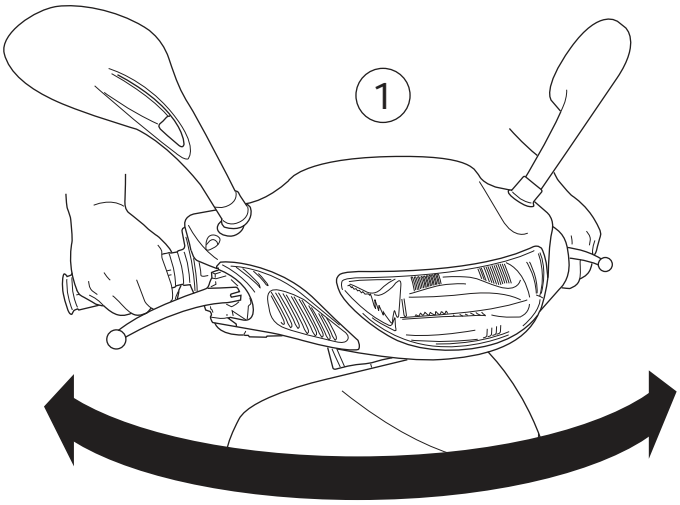
3. Scheduled Maintenance

Steering

1. Swing handlebars left and right to check if there is interference from the wires.

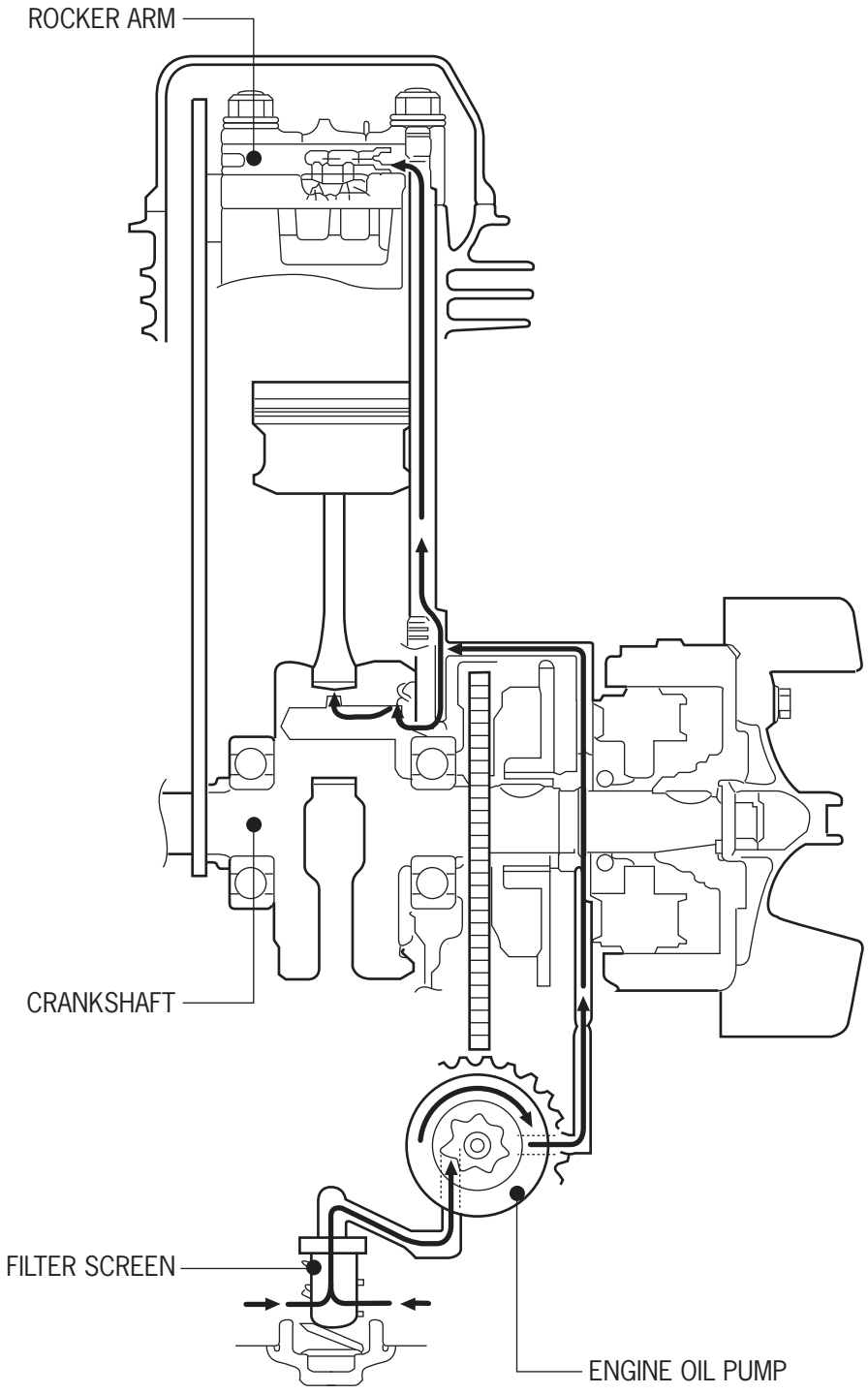
2. Grasp handlebars and rotate from left to right while holding the front wheel straight. There should be slippage.

3. Check steering bearing adjustment. Fork should turn freely with play in bearing.



4. Lubricating System

Lubricating System



4. Lubricating System

Topic	Page	Topic	Page
Overall engine requirements	4-2	Engine Oil Pump Removal	4-4
Problem diagnosis	4-2	Oil Pump Disassembly	4-5
Engine oil/filter screen	4-3	Checking	4-5
Oil Volume	4-3	Assembling	4-6
Oil Changed	4-3	Installation	4-6

Overall Engine Requirements

Special Attention
Use proper motor oil SAE 10W 30.
Use only clean, fresh oil.
Do not rebuild oil pump. Replace with a new pump when needed.
Check for leakage after replacing pump.

Basic Material

Item		Nunmul value	Replace at
Engine oil pump	Gap between inner rotator and external rotor	–	0.12mm .005in
	Gap between external rotor and pump body	–	0.12mm .005in
	Gap between and surface of rotor and pump body	0.05-0.10mm .001-.004in	0.2mm .008in

Problem Diagnosis

Loss of engine oil
•Engine oil natural consumption.
•Engine oil leakage.
•Piston ring wear, bad assembly.
•Valve guide oil seal is worn.

No oil pressure
•Pump worn.
•Use of wrong oil.
•Oil level low.

Engine burning excessive oil
•Blocked oil passage.
•Use of wrong oil.
•Worn rings.
•Valves worn or damaged.

4. Lubricating System

Engine Oil/Filter Screen

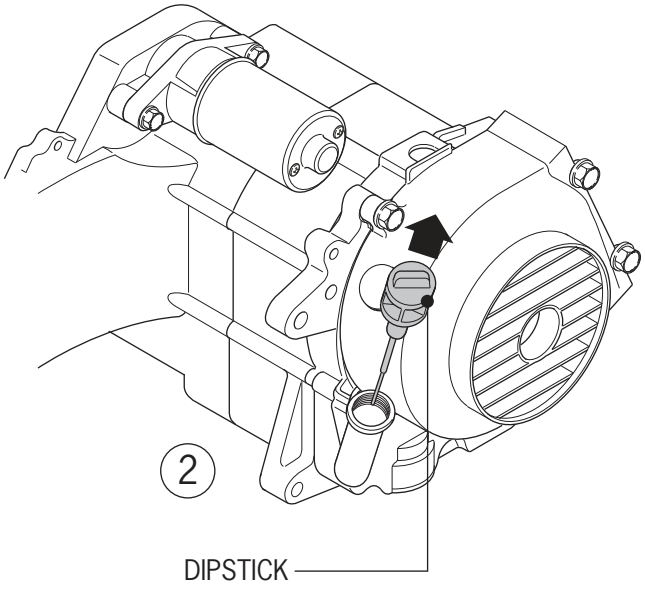
Oil Volume

1. Check oil with scooter parked on level ground on center stand.

Put scooter on the plain place when oil volume is checked.

Run engine for two or three minutes and then turn it off. After two to three minutes, check the oil level.

2. Check the oil level when the oil dipstick is unscrewed and out.
3. Add oil to upper limit level on the dipstick.



Oil Changed

It is easier to drain oil when motor is warm.

1. Remove drain bolt to completely drain oil.
2. Disassemble the oil filter screen cover and take off the oil filter screen. Use high-pressure air to clean the filter screen. Wash with solvent and dry before reinstalling.

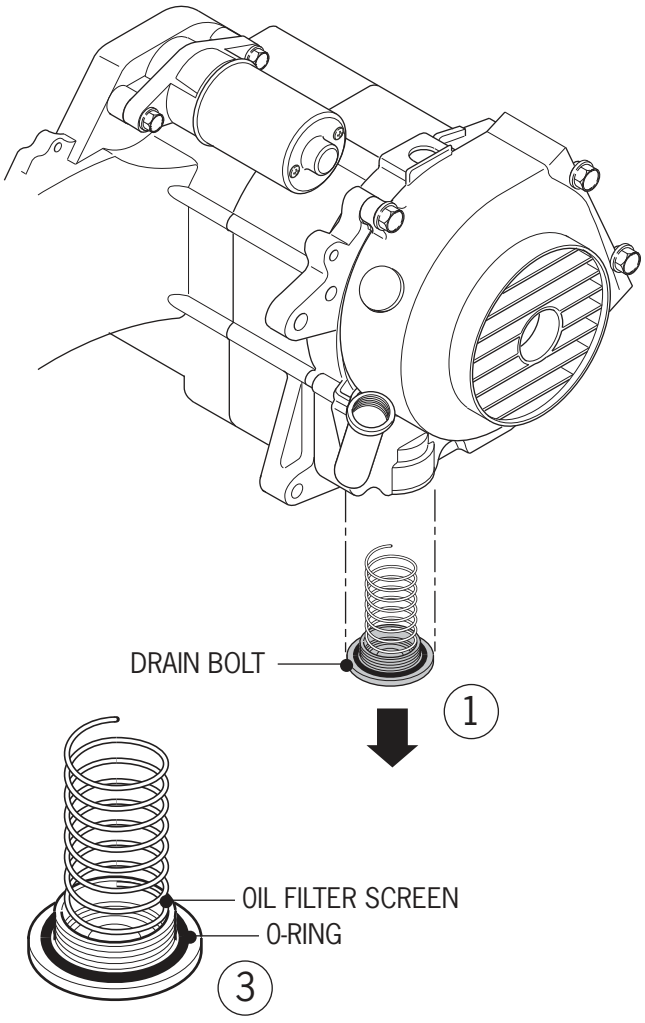
3. Check o-ring for damage. Replace if necessary.
4. Assemble engine oil filter screen and filter screen cover.

   •Torsion value: 1.4kg-m
   1300 ft lbs

5. Add assigned oil to determined volume.

   •Engine oil capacity: 0.8L
   •320ES

6. Check for oil leaks.
7. Run engine for 1-2 minutes at idle speed.
8. Turn engine off and check oil level. Add oil if needed.



4. Lubricating System

Oil Pump Removal

1. Remove engine right outer cover fan magnetor.

2. Remove alternator rotor.

3. Remove stator pules coil.

4. Remove eight bolts of right crankshaft case cover and take off crankshaft case cover.

5. Remove washer and fixed pin.

6. Remove the fixed nut of the gear in the oil pump.

7. Take off the gear of the oil pump.

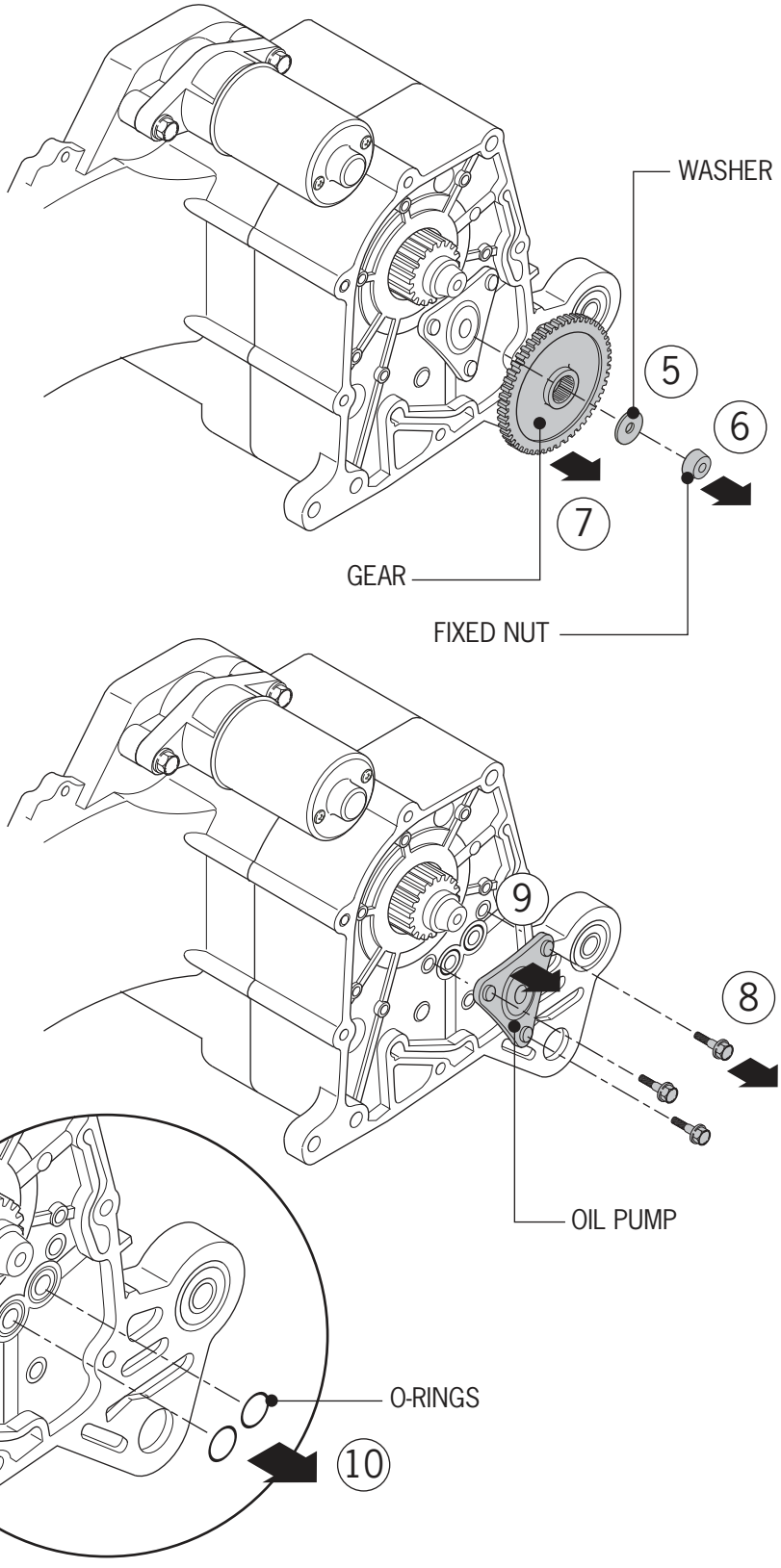
8. Remove fixed bolts of oil pump module body.

9. Take off oil pump.

10. Take off two o-rings.

11. Check o-rings for damage.

12. Replace if necessary.

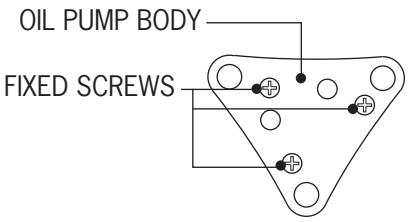


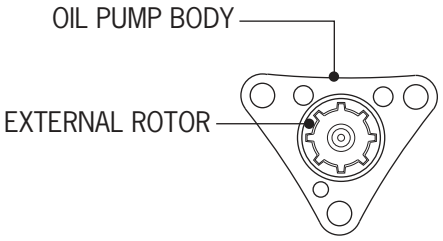
4. Lubricating System

Oil Pump Disassembly

1. Remove three fixed screws in oil pump body.

2. Disassemble oil pump.





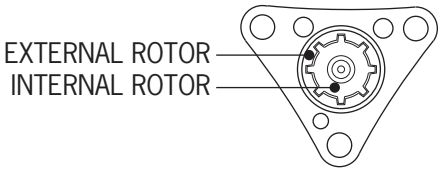
Checking

1. Check the gap between the oil pump module body and the external rotator.

   •Used limit: 0.12mm (.005 in.).

2. Check the gap between the surface of the rotator and the body.

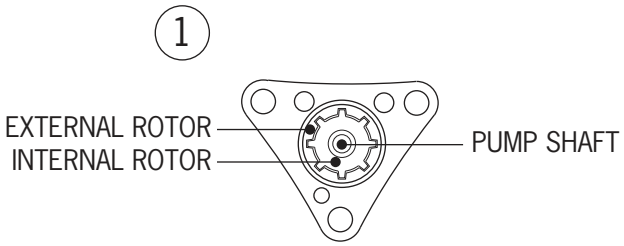
   •Used limit: 0.2mm (.008 in.).



4. Lubricating System

Assembling

1. Assemble inner and outer rotators and oil pump shaft.



Be careful of alignment between pump bearing unfilled corner and inner rotator unfilled corner.

2. Assemble pump cover and tighten screws.

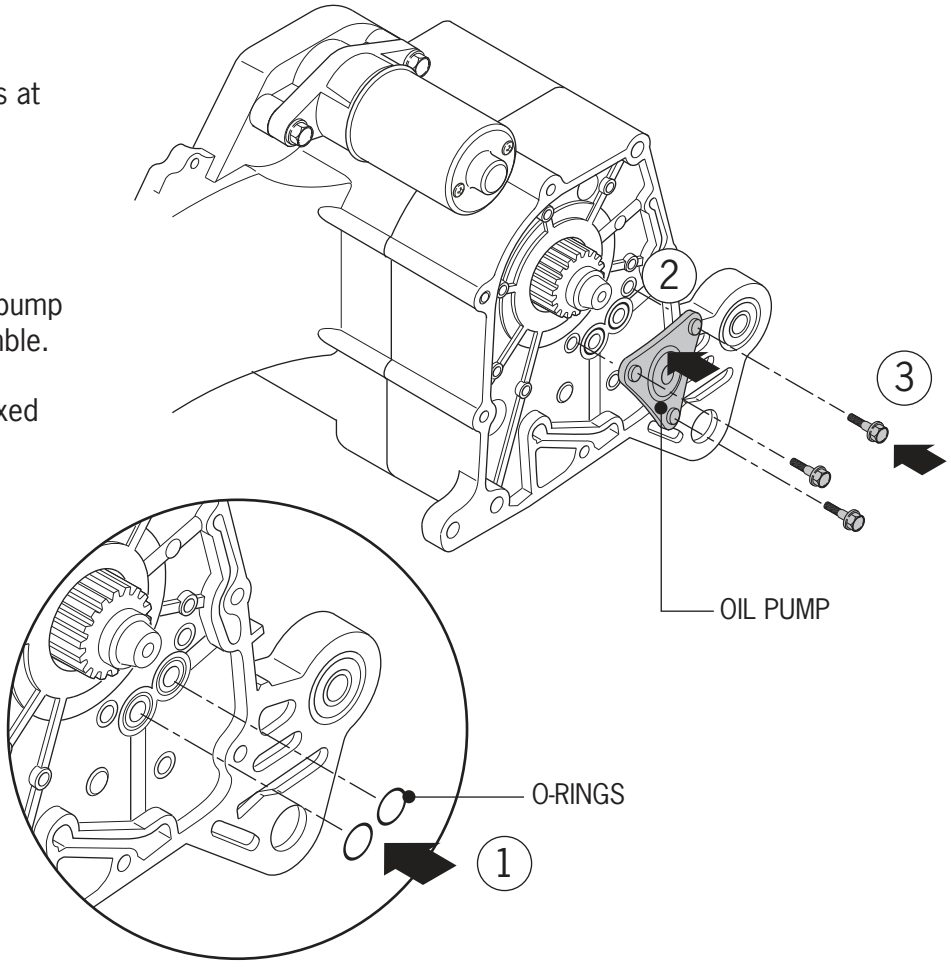
Installation

1. First put two o-rings at the oil pump seat.

2. Put oil pump in the crankshaft case.

First add oil to pump and then assemble.

3. Tighten the three fixed screws.



4. Lubricating System

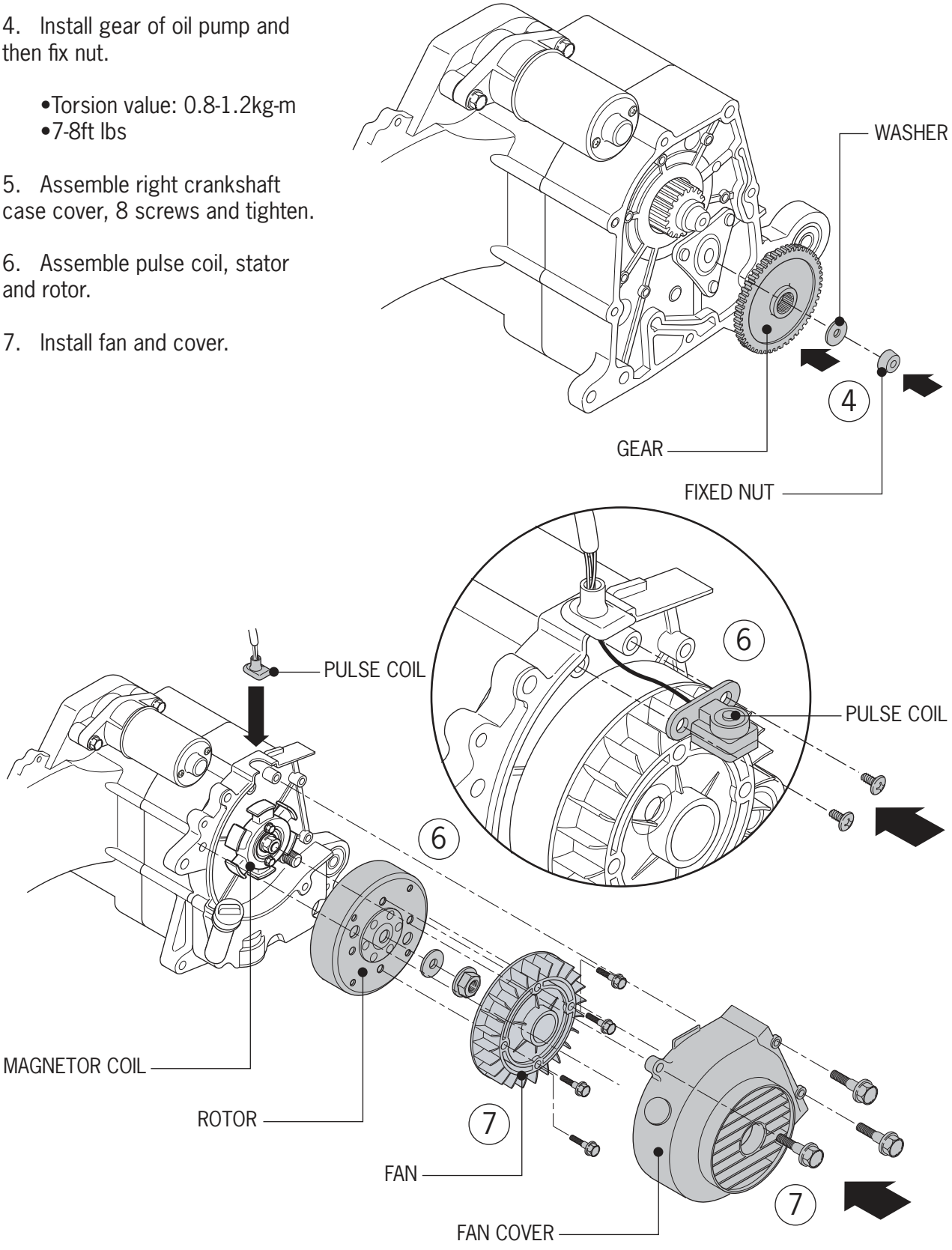
4. Install gear of oil pump and then fix nut.

- Torsion value: 0.8-1.2kg-m
- 7-8ft lbs

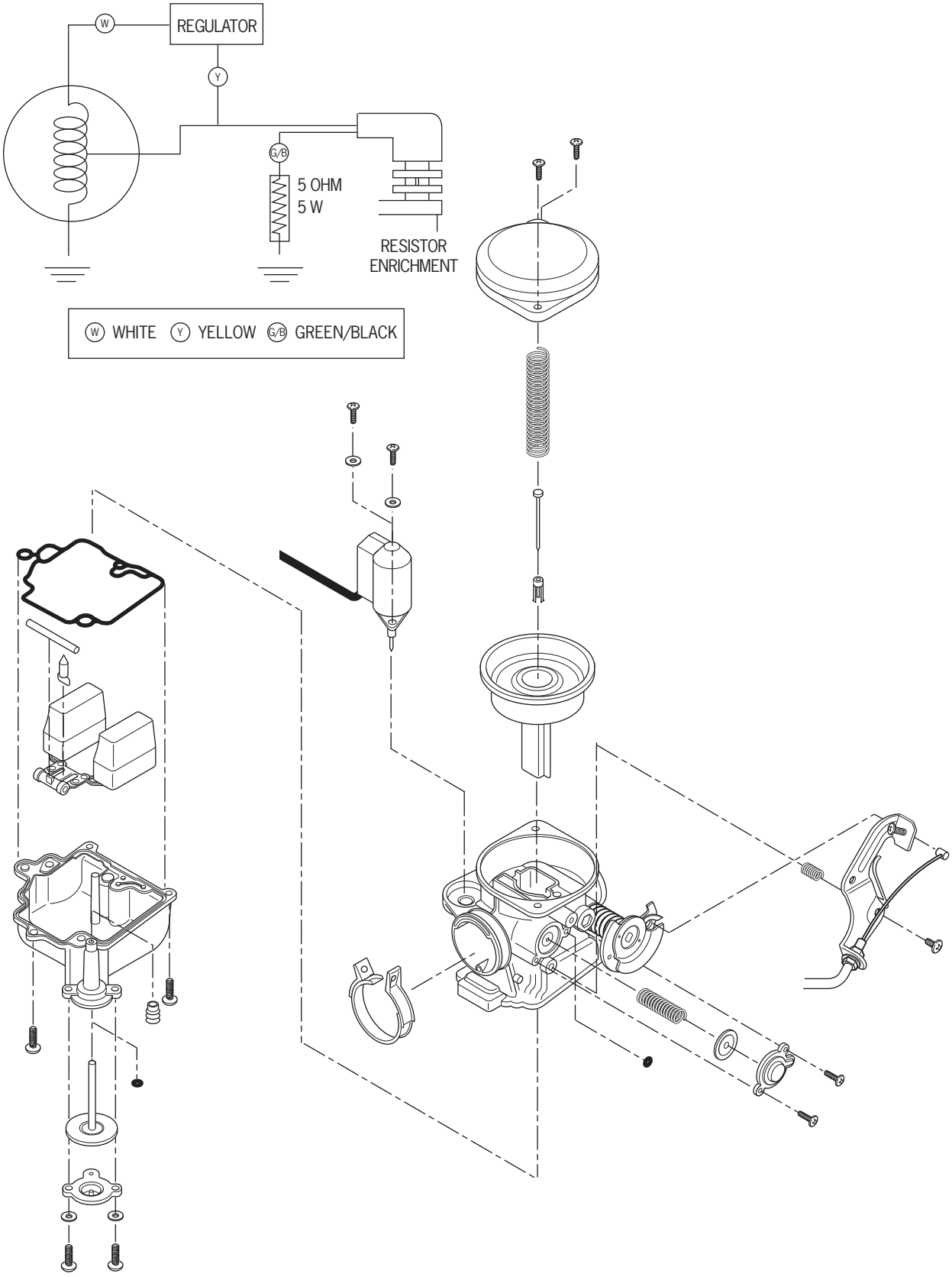
5. Assemble right crankshaft case cover, 8 screws and tighten.

6. Assemble pulse coil, stator and rotor.

7. Install fan and cover.



5. Fuel System



5. Fuel System

Topic	Page	Topic	Page
General information	5-2	Disassembly of Accelerator Pump	5-10
Troubleshooting	5-3	Checking Accelerator Pump	5-10
Disassembly of Carburetor	5-4	Assembly of carburetor	5-11
Checking Auto-choke	5-4	Disassembling Fuel tank	5-12
Air cutoff valve	5-6	Assembly of Fuel Tank	5-12
Assembling	5-6	Carburetor Adjustment	5-13
Vacuum Chamber-Break Down	5-7	Automatic Fuel Valve	5-14
Assembly of Vacuum Chamber	5-7	Fuel Meter Sending Unit	5-14
Float bowl and Disassembly	5-8	Air Filter Inspection	5-15
Checking Float Valve	5-9		

General Information

Warning!
Work on the fuel system in a well-ventilated area that is free of sparks or open flames. Do not breathe the vapors from the gasoline. Wear protective gloves to prevent skin irritation.

•Open the bowl drain and allow all gasoline in the carburetor to drain into an appropriate container prior to removing or servicing it.

•Remove control cables and wires carefully to prevent damage.

•Check all o-rings for damage. Replace as necessary.

•Remove carburetor from the scooter before attempting to service the fuel bowl or vacuum canister.

•When cleaning the carburetor, remove the vacuum diaphragm before using air or solvents for cleaning. This will prevent damage to the diaphragm.

•When storing the scooter for a period of time exceeding one month, use a quality fuel stabilizer to prevent deterioration of the fuel and damage to the carburetor.

Repairing material

Specification	Standard valve
Carburetor type	Constant velocity-CVK
Venturi Bore	17mm (.67 in.)
Fuel Level	mm
Main jet	
Idle jet	.27 mm (.12 in.)
Idle speed	1600 RPM
Throttle free play	5mm (.125 in.)
Mixture screw setting	3 turns out

5. Fuel System

Troubleshooting

Engine is hard to start
•No spark
•Low compression
•No fuel in carburetor
-Blocked fuel line
-Blocked fuel filter
-Blocked vacuum line
-Leaky vacuum line
-Dirty float needle
-Float set too high

Too much fuel to engine
-Blocked air filter
-Manifold air leak
-Bad auto choke
-Blocked air passage in carburetor

Air/fuel mixture too rich or too lean
•Bad auto choke
•Plugged idle jet
•Float needle stuck or dirty
•Float height too high or too low
•Blocked air passage in carburetor
•Dirty air filter
•Air leak at carburetor or manifold

Misfire under acceleration
•Poor spark
•Air mixture screw too lean
•Bad accelerator pump

Poor drivability
•Weak spark/bad ignition system
•Blocked fuel line
•Blocked fuel filter
•Bad fuel
•Water in fuel
•Air leak at carburetor or manifold
•Improper float level
•Bad auto choke
•Obstructed jet in carburetor
•Vacuum slide stuck
•Damaged vacuum diaphragm
•Dirt in carburetor

5. Fuel System

Disassembly of carburetor

1. Remove seat and helmet storage tub.

2. Remove right side body panel.

3. Disconnect cable connector for auto choke.

4. Loosen carburetor drain screw and drain fuel from float bowl.

5. Loosen clumps in intake tube and main fold.

6. Loosen throttle cable and remove from support and from throttle control plate.

7. Remove fuel line from carburetor.

8. Remove air inlet tube from carburetor and pull carburetor straight back out of intake manifold.

9. Remove auto choke from carburetor.

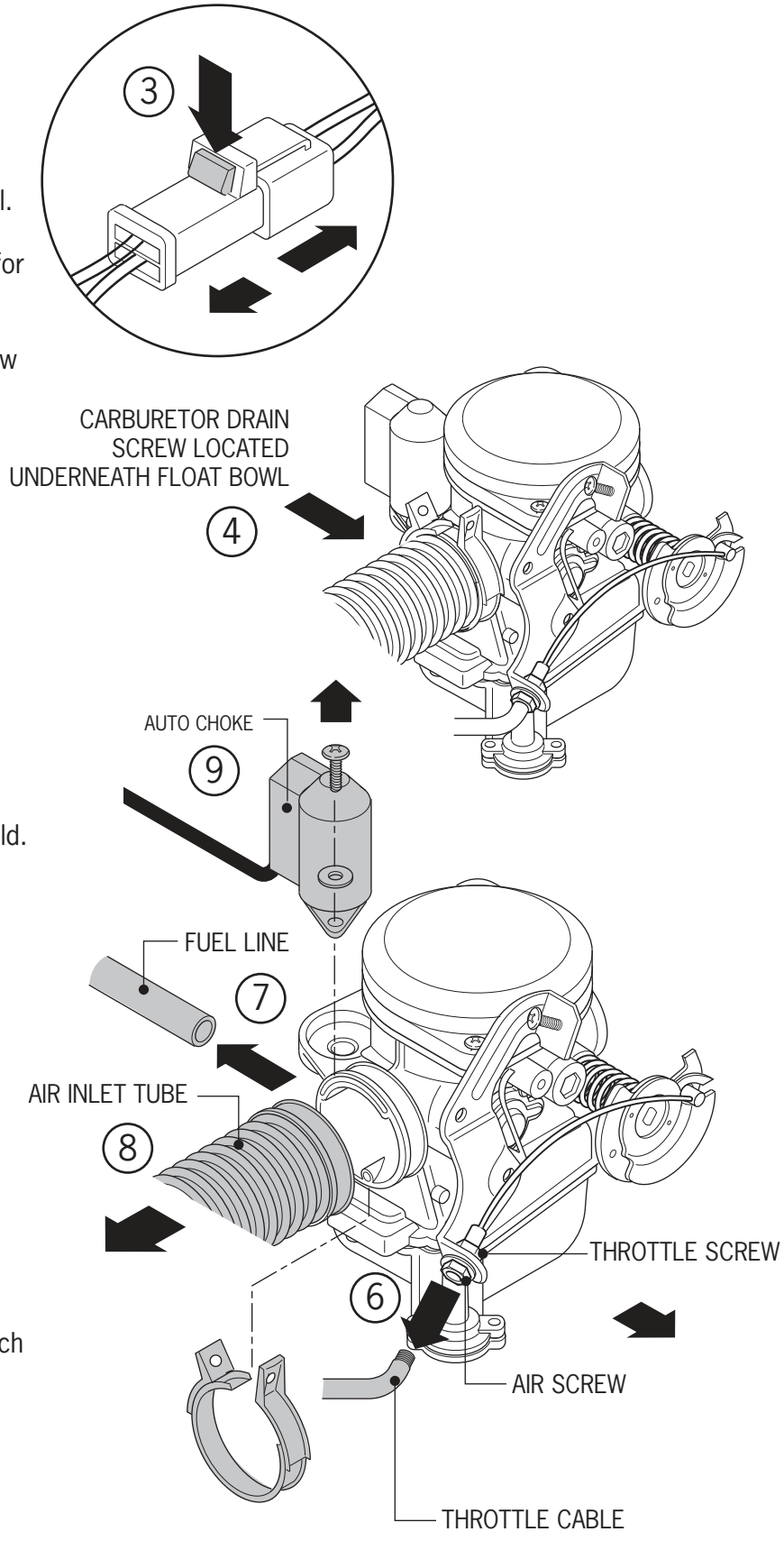
Checking Auto Choke

1. Check resistance volume.

2. Standard value below 5 when cold.

3. Connect auto choke to 12V battery.

4. Plunger should extend 3/8 inch in 5 minutes.



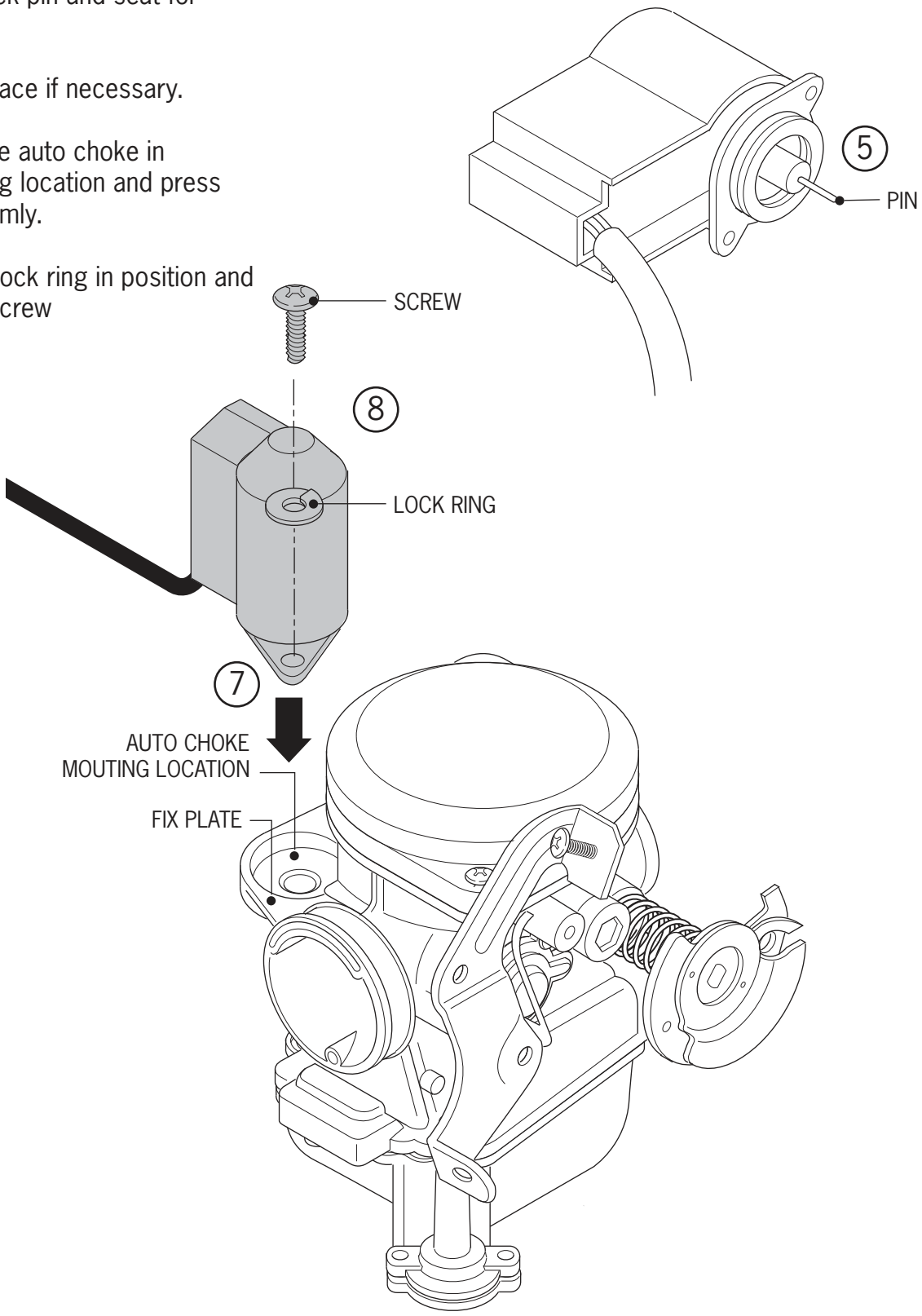
5. Fuel System

5. Check pin and seat for wear.

6. Replace if necessary.

7. Place auto choke in mounting location and press down firmly.

8. Put lock ring in position and fasten screw



5. Fuel System

Air Cut Off Valve

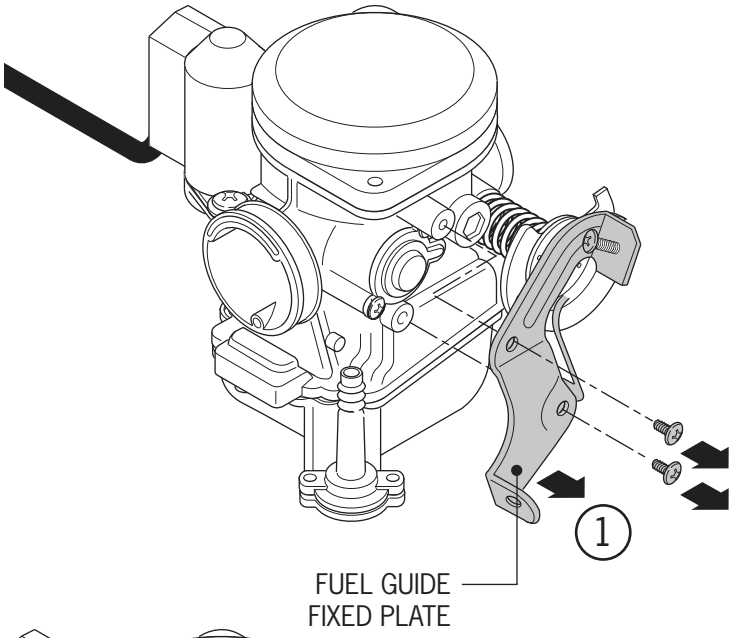
1. Disassemble two screws in fuel guide fixed plate and remove fixed plate.

2. Disassemble two screws in air cut off valve.

3. Take off spring and vacuum plate.

4. Check for wear on plate, replace if necessary.

5. Clean the passage way to remove dirt or varnish.



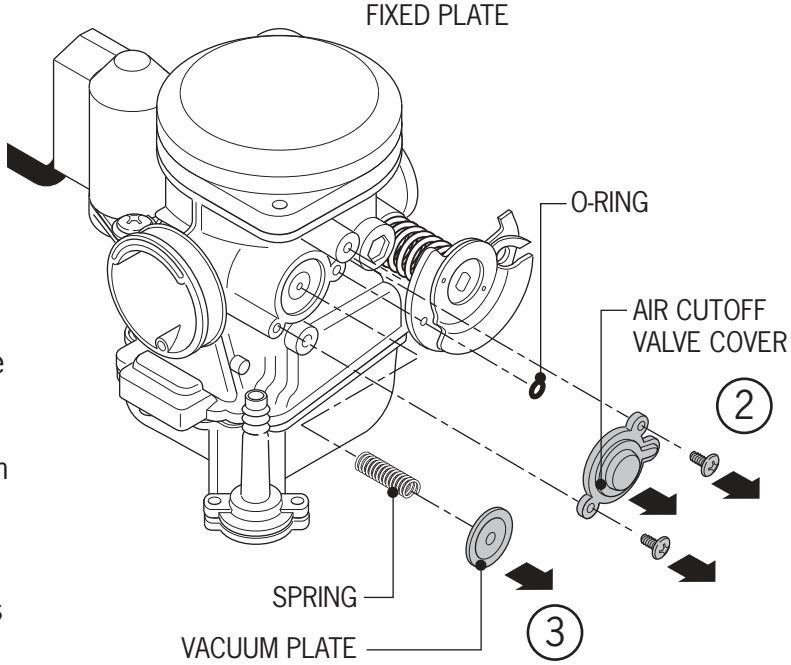
Assembling

1. Install plate to carburetor.

2. Install spring and cover of air cut-off valve.

3. Build up fuel guide line fixed plate and tighten two screws.

- Be sure that furrow of vacuum plate is aligned with the carburetor glove.
- Make sure that cover tightens into place.



5. Fuel System

Vacuum Chamber-Break down

1. Remove two screws and take off cover.

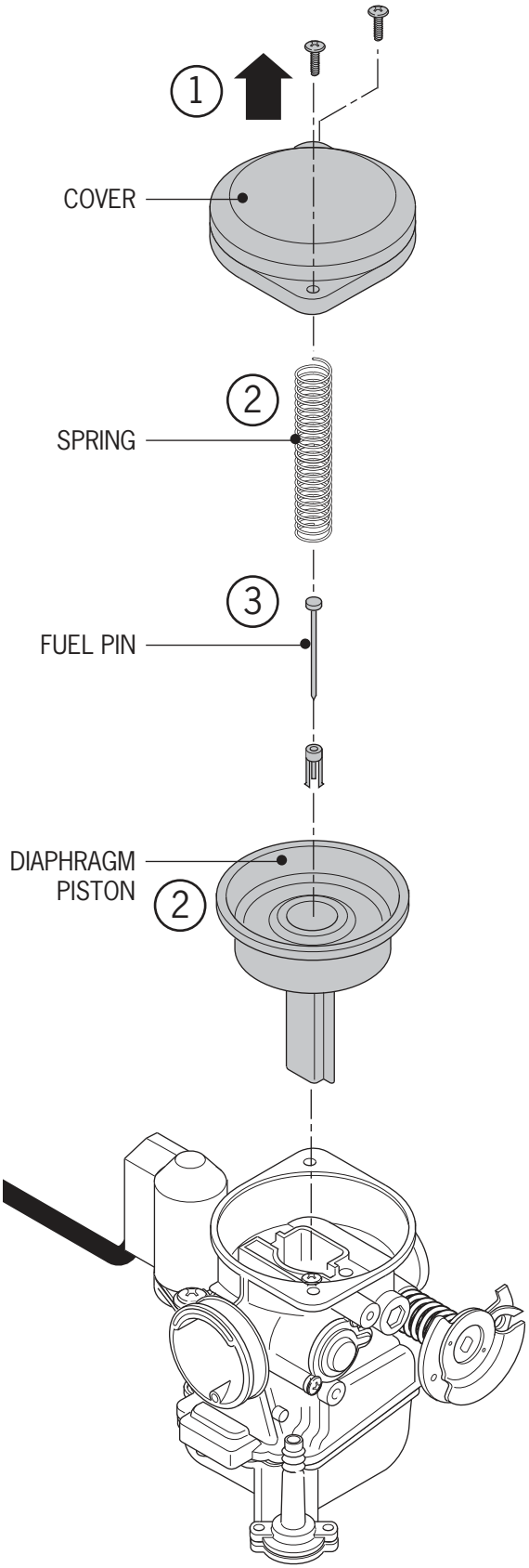
2. Remove spring, diaphragm piston.

3. Remove fuel pin and slide.

Take special care not to damage diaphragm. Replace if damaged.

Checking

1. Check pin for wear and replace if necessary.



Assembling

1. Install piston or plate to body of carburetor.

2. Push the button of the piston to vacuum chamber side and keep open completely. Install spring and cover.

3. Install screw.

Be sure to hold slide and piston in up position when installing cover and tighten screw.

5. Fuel System

Float Bowl

Disassembling

1. Disassemble three screws and take off float bowl.

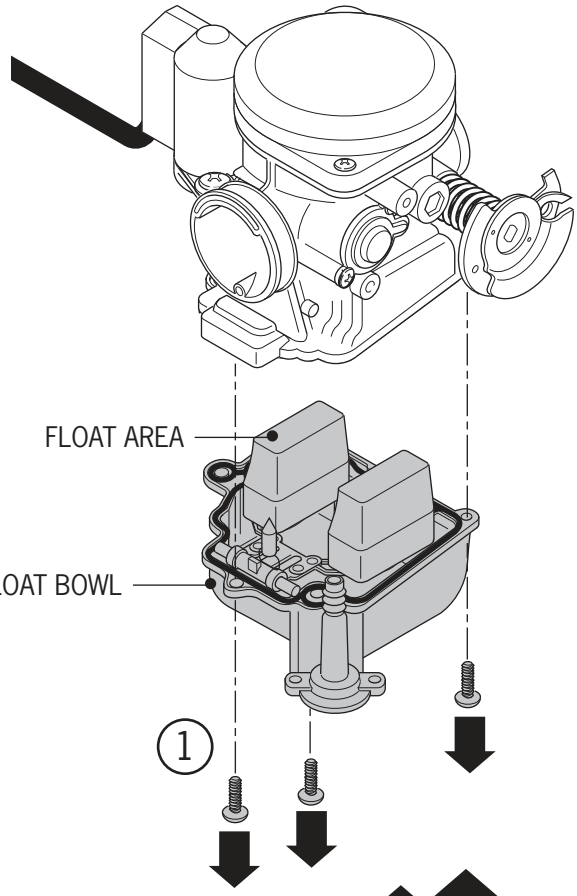
2. Remove float pin spring.

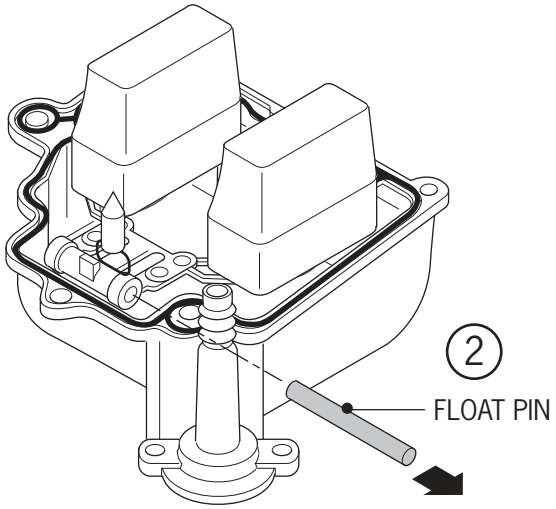
3. Remove high-speed jet, low-speed jet and fuel volume control screw.

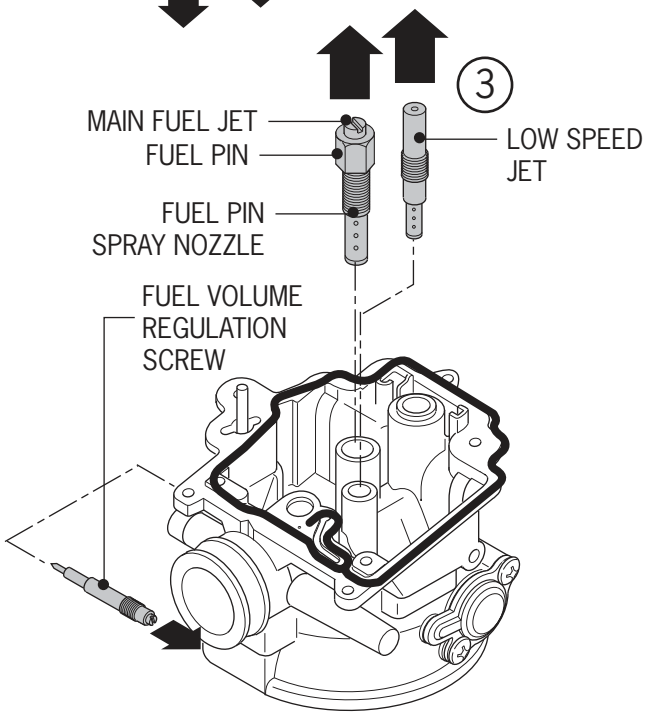
- Be careful not to break the fuel jets and control screw.
- Count the turns when removing the fuel volume control screw.
- When reinstalling jets and screws, do not over tighten.

4. Clean jets with solvent and compressed air.

5. Clean body of carburetor by blowing air through all passages.







5. Fuel System

Checking

1. Check float valve and valve seat for damage.

2. Check float valve and valve seat wear, pitting or buildup of dirt.

3. Any leakage of the valve or a buildup of dirt will affect the fuel level in the float bowl and cause drivability problems.

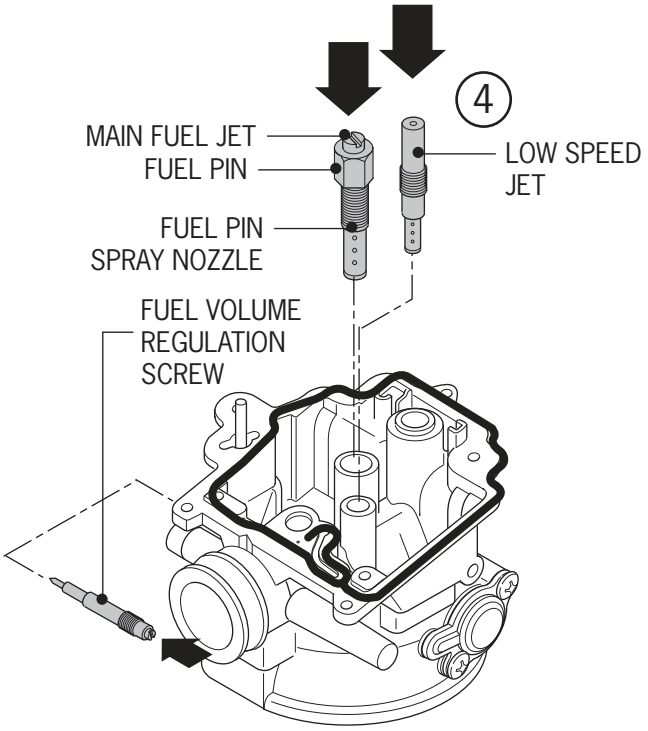
4. Assemble the low speed jet, fuel pin spray nozzle, fuel pin spray seat and main jet into the bottom of the carburetor housing.

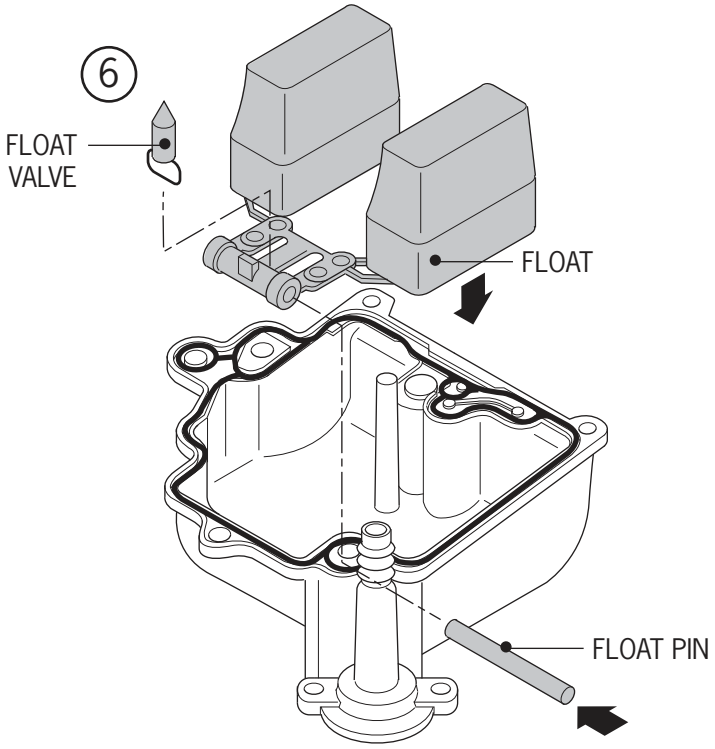
5. Set the fuel level in the bowl by adjusting the fuel regulation screw. The standard setting is 2 turns, plus or minus a 1/4 turn.

6. Assemble the float valve, float and float pin to the bottom of the carburetor using the retainer pin.

7. Check the operation of the float and valve. All parts should move freely and not bind.

8. After assembling the float, check for proper fuel level using a small ruler or a float gage. The proper fuel level is 20.5mm (.807 in.).





5. Fuel System

Accelerator Pump

1. Remove two screws on pump and take off cover.

2. Take off spring and acceleration pump plate.

Checking

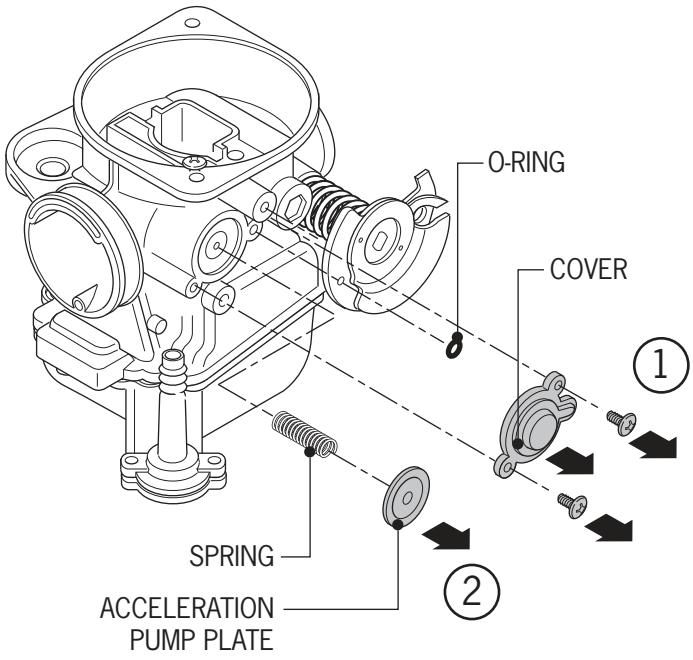
1. Check acceleration pump plate for cracks or hardening of the rubber. Replace as necessary.

2. Check for blocked fuel passages.

3. Clean by high pressure air.

4. Reverse steps to reassemble.

5. Take special care with the accelerator pump plate to avoid damage.



5. Fuel System

Assembly of Carburetor

1. Slide carburetor carefully into the manifold, making sure to align the tab on the manifold with the notch on the carburetor. Securely tighten the clamp screw to fix the carburetor in place. Do not over tighten the screws as this can cause damage to the manifold.

2. Attach the inlet pipe to the rear of the carburetor and tighten the clamp screw.

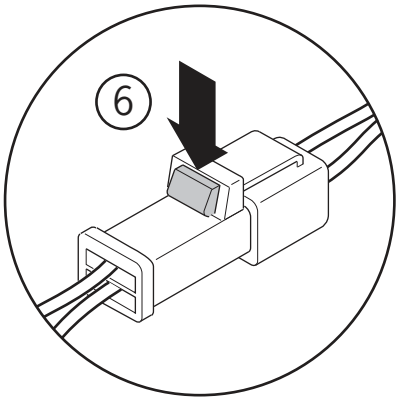
3. Attach the throttle cable to the throttle by installing the cable lug into the notch on the throttle plage. Insert the outer casing of the throttle cable into the cable support bracket. Make sure to align the “D” shape of the adjusting sleeve with the ‘D” shape hole of the bracket.

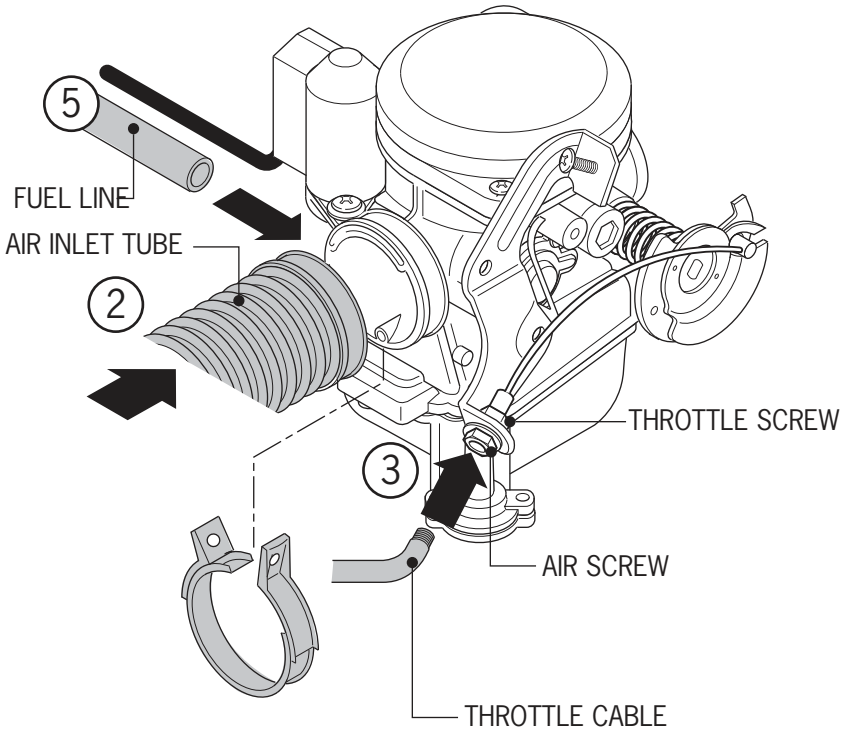
4. Use the adjusting nut and stop nut to set the cable tension. Correct adjustment should allow 1/4 inch of free play in the cable.

5. Attach the fuel line from the tank to the inlet on the carburetor and clamp securely.

6. Connect the wiring harness from the auto choke to the proper connection on the main wiring harness.

7. After starting the engine, set the idle speed using the idle adjusting screw.





5. Fuel System

Disassembling Fuel Tank

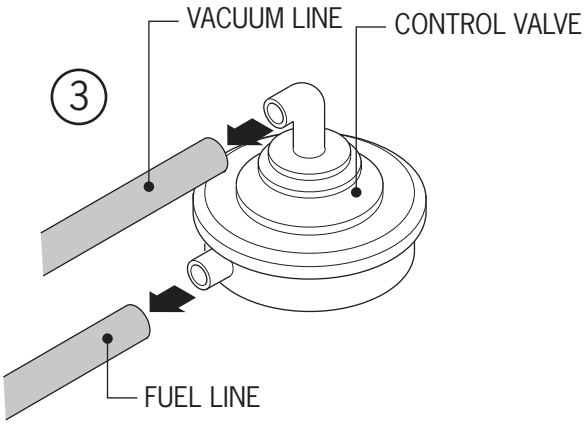
1. Disassemble the body cover.

2. Disconnect the wiring harness from the fuel level sending unit.

3. Disconnect the fuel line and vacuum line from the auto fuel valve.

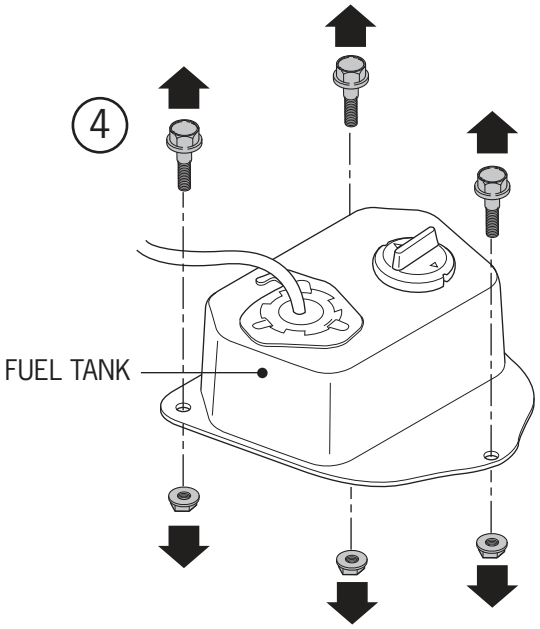
4. Remove three bolts and nuts to loosen the fuel tank.

5. Remove the fuel tank from the frame.



Assembly of Fuel Tank

1. Reverse steps for reassembly.



5. Fuel System

Carburetor Adjustment

It is generally not necessary to adjust the mixture screw on the side of the carburetor. This screw is preset at the factory and will have little effect on the performance of the carburetor.

1. If this screw has been removed for cleaning of the carburetor, it should be reset carefully. The standard setting is two turns out, plus or minus1/4 turn.

2. To set this position, run the engine until warm and allow it to idle. Turn the screw in or out a little at a time and measure the idle RPM. The correct setting is achieved when the idle speed is maximized.

3. Adjust the idle speed of the engine once the engine has been warmed up.

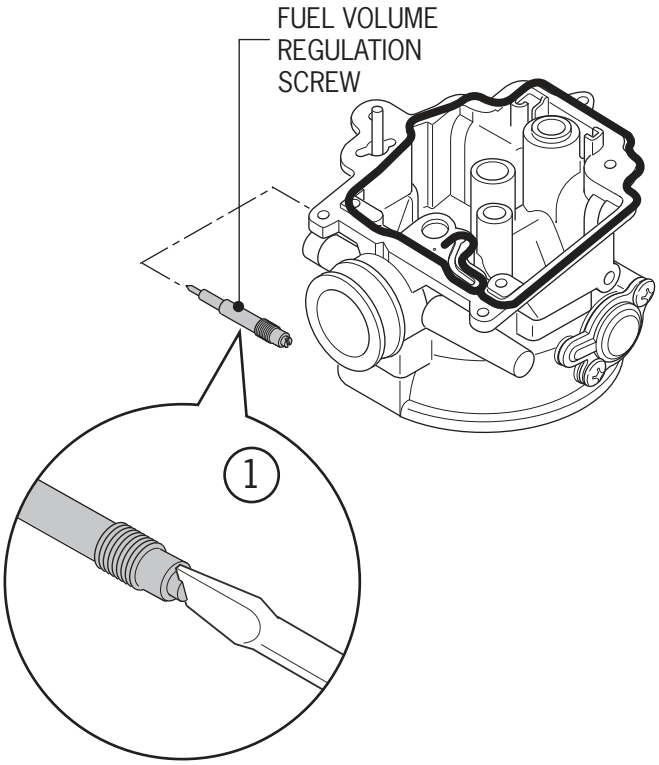
4. Set the warm idle speed to 1900RPM, plus or minus 100RPM.

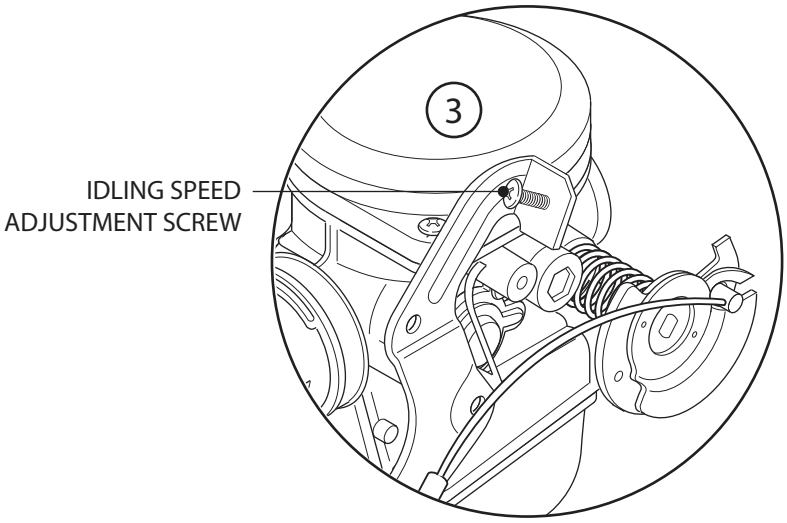
5. Check for engine return to idle speed after running at part throttle.

6. Make sure that the throttle cable allows the throttle control plate to return to the stop screw.

7. If needed, readjust the mixture screw to help stabilize idle performance.

NOTE: SOME COMPONENTS REMOVED FOR CLARITY.





5. Fuel System

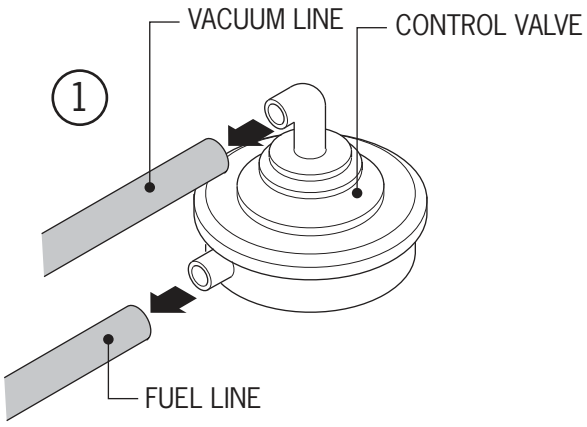
Automatic Fuel Valve

1. Disconnect the fuel line and the vacuum line from the control valve and from the carburetor and intake manifold. Carefully inspect these lines. Any blockage, deterioration, damage, or cracking of these lines can cause improper functioning of the fuel valve. Replace these lines as necessary.

2. Always make sure that the clamps work properly when replacing these lines in order to assure a tight seal of the lines at the fittings on the valve, carburetor and manifold.

3. To check the operation of the valve, apply a vacuum to the input fitting of the valve. Fuel should flow freely when the vacuum is applied and stop when it is removed.

4. Never attempt to clean the valve with high-pressure air. This will damage the valve and require replacement.



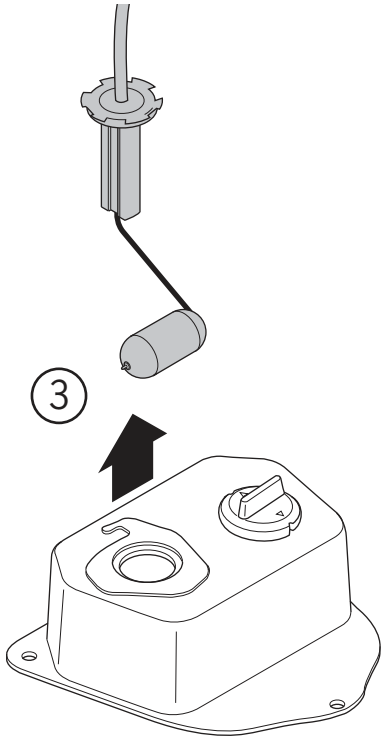
Fuel Meter Sending Unit

1. Disconnect the sending unit wiring harness.

2. Disconnect four mounting screws.

3. Lift and turn the sending arm to allow the float arm and float to be removed from the fuel tank. Take care not to bend or damage the float arm as this can cause improper readings.

4. Check the movement of the arm. It should move freely without binding or hesitation. Check the continuity of the coil. If it is open, the unit needs replacement. When reassembling the sending units, make sure that the gasket is not damaged to avoid leakage.



5. Fuel System

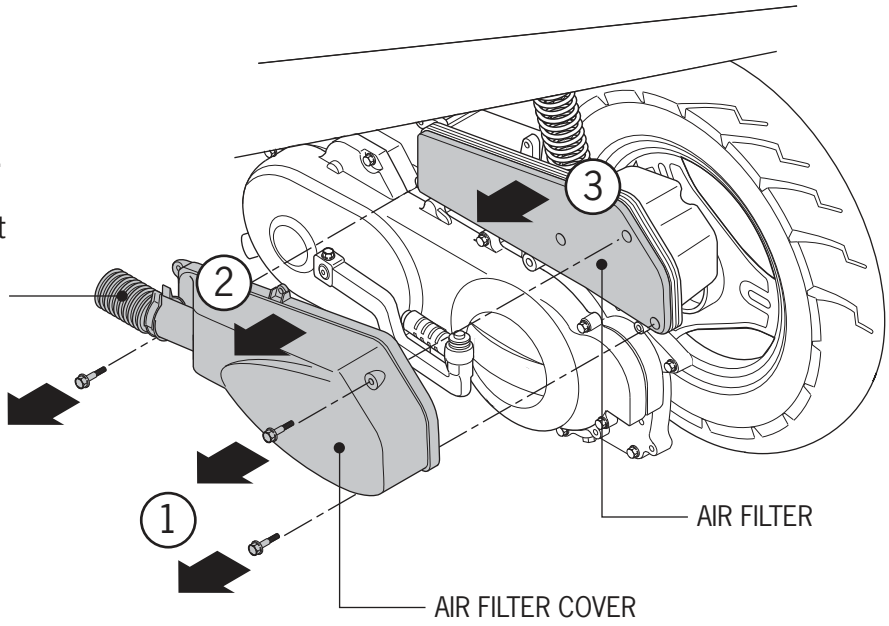
Air Filter Inspection

1. Remove air filter cover screws.

2. Remove cover.

3. Remove air filter element.

4. Remove clamp on air inlet tube.



5. Disconnect air tube from carburetor.

6. Remove air box. Make sure that the element is clean and free of dirt and oil. Excessive dirt and oil on the element can reduce engine performance.

7. During reassembly, make sure that the cover and tube connections are tight and do not leak. Air filter box leakage can reduce engine performance.

6. Engine Removal and Installation

Topic	Page
Special requirements	6-1
Engine removal	6-2
Engine installation	6-4

Special Requirements

- Remove all body panels carefully to provide ease of access to the engine.
- Use care when disconnecting the battery cables and fuel lines.
- Use protective clothing such as gloves and safety glasses to protect your body.

6. Engine Removal and Installation

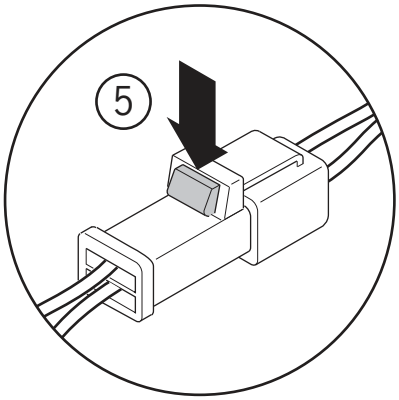
Engine Removal

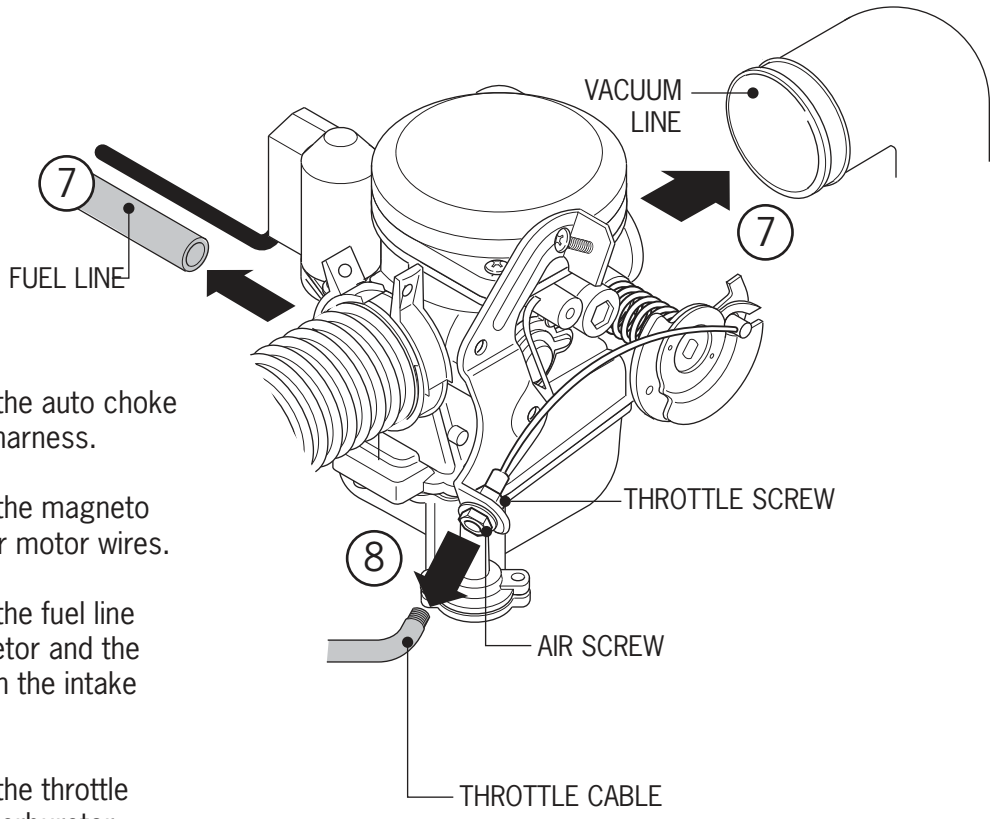
1. Disconnect the battery ground wire.

2. Remove body panels to expose engine.

3. Disconnect the engine ground wire.

4. Remove the spark plug cable from the spark plug and the ignition coil.





5. Disconnect the auto choke from the wiring harness.

6. Disconnect the magneto wires and starter motor wires.

7. Disconnect the fuel line from the carburetor and the vacuum line from the intake manifold.

8. Disconnect the throttle cable from the carburetor.

9. Remove the air filter box.

6. Engine Removal and Installation

10. Disassemble the brake control cable from the brake control arm.

11. Remove the rear shock absorber.

12. Remove the engine support bolt and move the chassis up the forwards.

13. Support the chassis in position temporarily.

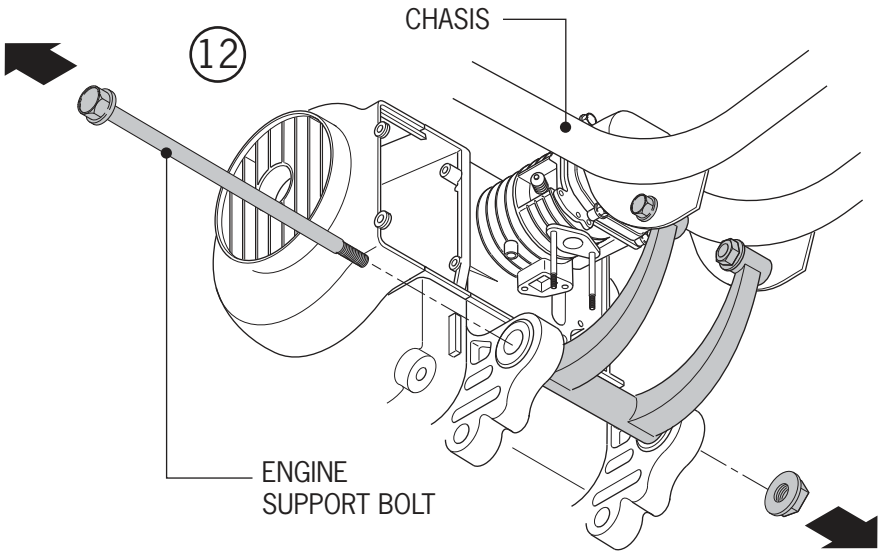
14. Remove the side stand spring and side stand.

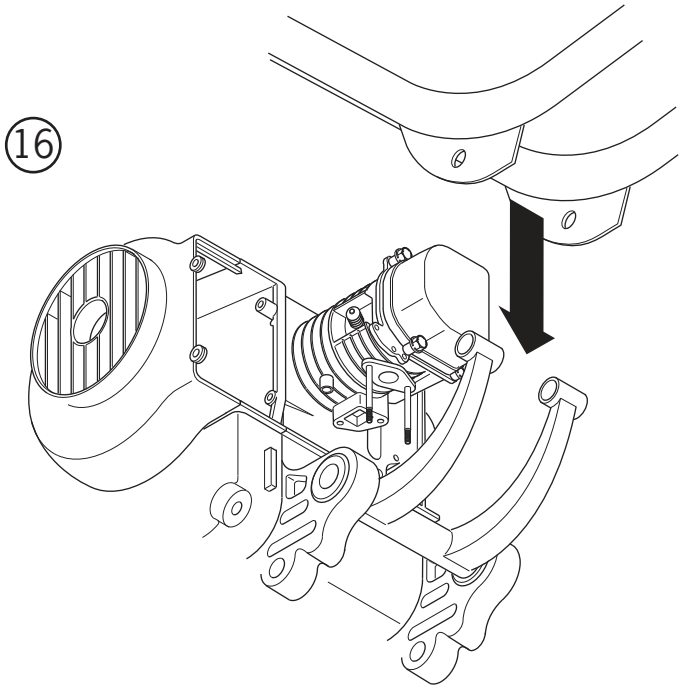
15. Remove the front engine support bolt to disconnect the engine from the chassis.

16. Separate the engine from the chassis.

17. Check the condition of the engine support isolation mounts. If they are worn or damaged, replace them during the engine installation process.

UNDERSIDE OF SCOOTER





6. Engine Removal and Installation

Engine Installation

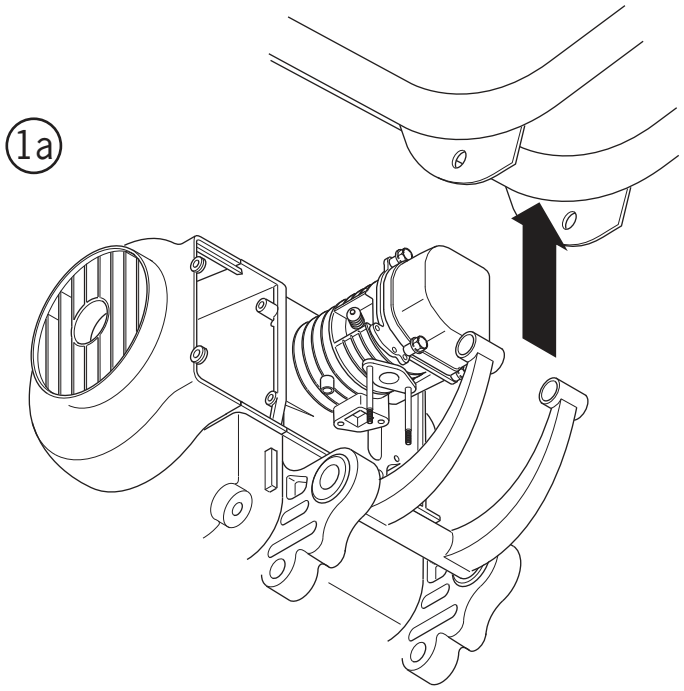
1. Attach front engine support bolt into position and tighten to 5kg-m (35 ft-lbs).

2. Slide chassis to the rear to align the rear mount and install the mounting bolt. Tighten to 5 kg-m (35 ft-lbs).

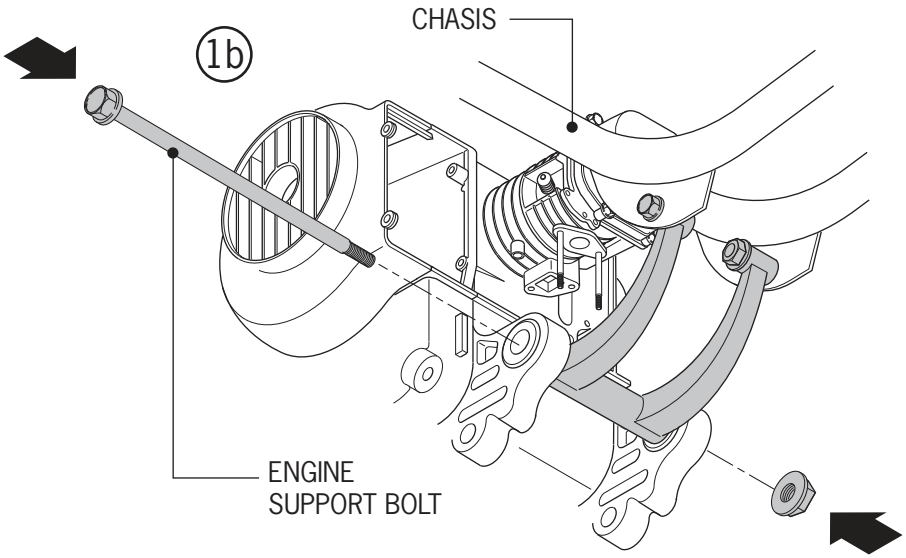
3. Attach the rear shock absorber and tighten to 4 kg-m (28 ft-lbs).

4. Complete the remainder of the assembly process in reverse order of the disassembly.

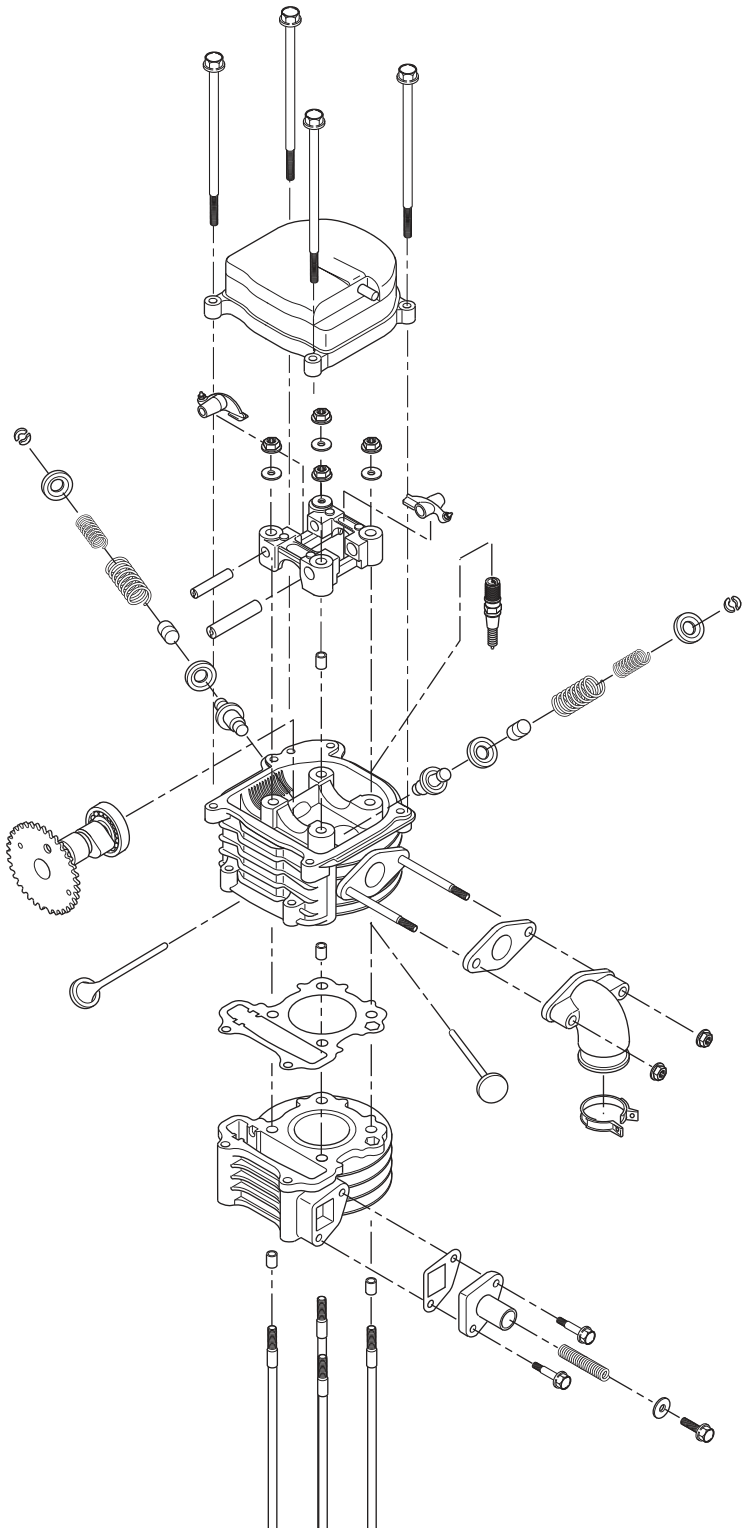
5. When assembly is complete, make sure to check the throttle adjustment and brake adjustment before attempting to ride the scooter.



UNDERSIDE OF SCOOTER



7. Cylinder Head Valve



7. Cylinder Head Valve

Topic	Page	Topic	Page
Important information	7-2	Valve Seat Chamfer Cutting Tools	7-12
Trouble diagnosis	7-3	Valve Seat Cutting	7-12
Camshaft Disassembly	7-4	Building up of Cylinder Head	7-13
Checking of Camshaft Bearing Rocker Arm	7-7	Installing Cylinder Head	7-14
Cylinder Head Disassembly	7-7	Camshaft Assembly	7-15
Cylinder Head Break Down	7-9	Camshaft Chain Regulator Assembling	7-16
Checking Cylinder Head	7-9		
Valve and Valve Guide	7-10		

Important Information

•When working on the cylinder head and valve train, always use engine oil to lubricate sliding parts when assembling. Never assemble dry parts into the valve train.

•The camshaft is lubricated by engine oil supplied via an oil passage in the cylinder head. Make sure that this passage is clean and open when you reassemble the head.

•When measuring parts to determine wear, wash the parts with solvent and dry them in order to get accurate measurements.

•When disassembling the valve components, keep them in order and reinstall them in the reverse order.

Item		Standard valve	Used Limit
Valve gap (cold)	IN	(0.04) 0.05	——
	EX	(0.04) 0.05	——
Cylinder head compressed pressure		15kg/cm^2-600rpm	——
Cylinder head surface twisting			0.05
Camshaft conver angle height	IN	25,761	25.681
	EX	25,604	25.24
Valve rocker arm inner diameter	IN	10,000-10.015	10.10
	EX	10,000-10.015	10.10
Valve rocker arm bearing outer diameter	IN	9,972-9,987	9.91
	EX	9,972-9,987	9.91
Valve seat angle	IN	1.0	1.8
	EX	1.0	1.8
Valve bar outer diameter	IN	4,975-4,900	4.9
	EX	4.955-4,970	4.9
Valve guide pipr inner diameter	IN	5,000-5,012	5.3
	EX	5,000-5,012	5.3
Gap between valve bar and guide pipe	IN	0.010-0.037	0.08
	EX	0.030-0.057	0.10
Valve spring	Inner spring	29.1	26.1
	Outer spring	33.5	30.5

7. Cylinder Head Valve

Torque Value
•Camshaft bolt 16 ft lbs
•Lubricate threads with oil
•Valve gap adjusting screw cap 7 ft lbs



General tools
•Valve spring compressor
•45 degrees IN/EX
•Valve seat reamer 24.5mm
•Plane reamer 30 degrees IN
•Valve seat reamer25mm
•Plane reamer 32 degrees EX
•Valve seat reamer 22mm
•Plane reamer 60 degrees IN/EX
•Valve seat reamer 26mm
•Reamer damping fixture 5mm



Special tools
•Valve spring compressor accessories
•Valve gap regulatory spanner
•Valve guide screwdriver
•Valve guide reamer

Trouble Diagnosis
•Confirm poor operation of cylinder head by measuring pressure or by noise produced by engine upper end.

Slow Speed Hitch
Compression pressure too low
Bad valve gap
Burning or curving of valve
Bad valve timing
Broken valve spring
Bad valve seat
Leakage of cylinder head gasket
Warped cylinder head surface or cracking
Bad spark plug

Compression Pressure Too High
•Too much carbon buildup in combustion chamber

White Smoke from Exhaust Pipe
•Wearing of valve guide
•Broken oil seal

Abnormal Noise
•Bad valve gap
•Broken or burning of valve or valve spring
•Wearing and breaking of camshaft
•Wearing of inner chain adjusting plate
•Wearing of cam shaft and valve rocker arm

7. Cylinder Head Valve

Disassembling of Camshaft

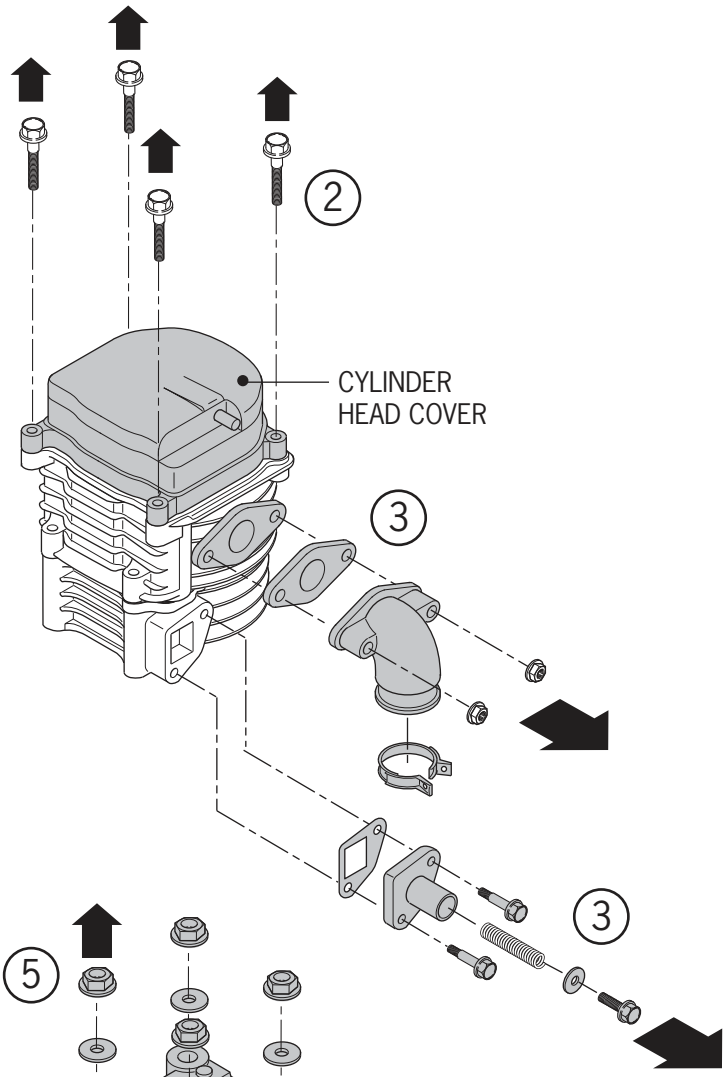
1. Disassemble middle cover. (2-2)

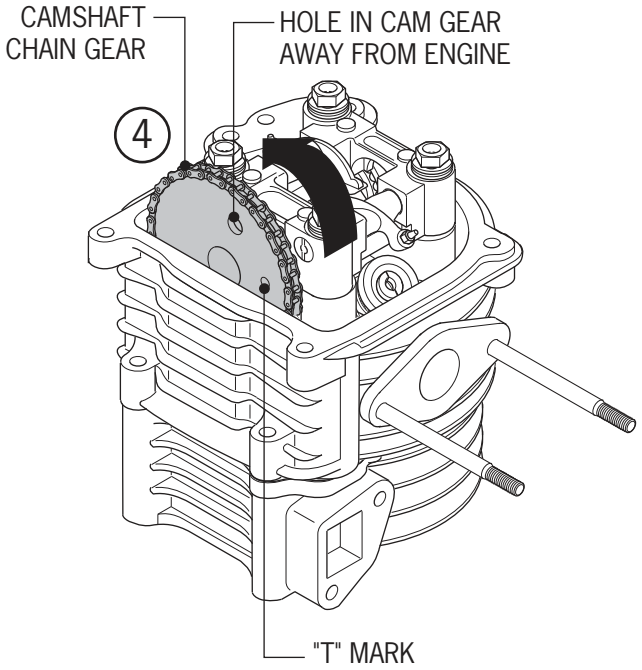
2. Remove four bolts and two nuts, take off valve cover.

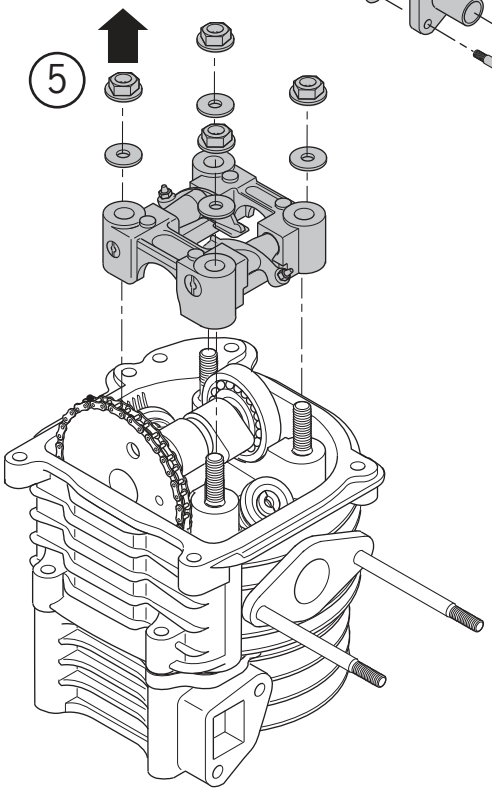
3. Disassemble cam chair adjusting bolt and spring.

4. Use the kick-start lever to slowly turn engine until “T” mark on flywheel lines up with indicator on crankcase. Check position of camshaft to find if both valves are closed. The hole in the cam gear should be away from the engine. If this is not correct, rotate the crank one revolution to achieve this alignment.

5. Remove four bolts and remove camshaft caps.







7. Cylinder Head Valve

6. Remove rocker arms and pivots.

7. Remove camshaft gear from camshaft chain.

8. Remove camshaft.

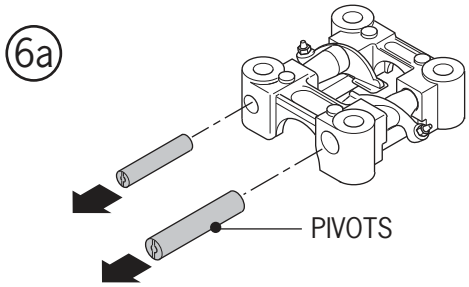
9. Check Camshaft

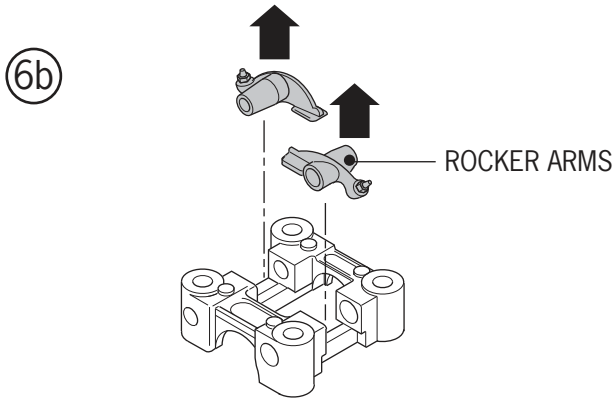
10. Check cam lift.
    - •Use limit: IN: 25.681mm below change
    - •EX: 25.524mm below change

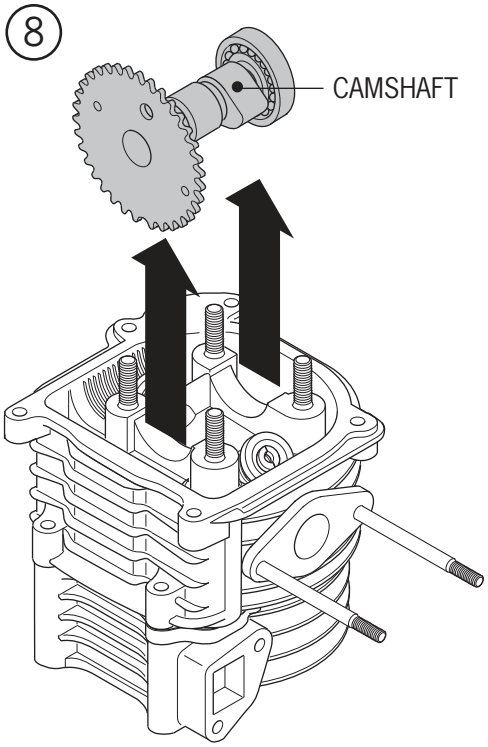
11. Check surface of cam lobes for weary surface breakdown, scuffing or cracking.

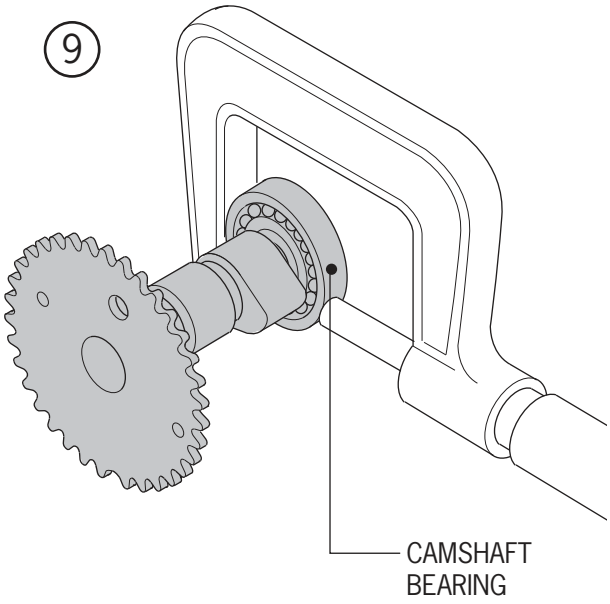
12. Check camshaft and bearing for loose fit or damage.

13. If any excessive wear or damage is found, replace the camshaft.









7. Cylinder Head Valve

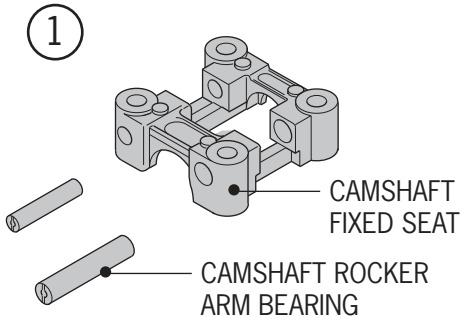
MEMO

7. Cylinder Head Valve

Checking of Camshaft Bearing Rocker Arm

1. Check if camshaft bearing fixed seat and camshaft rocker arm and camshaft rocker bearing is worn or broken.

2. Measure outer diameter of camshaft bearing fixed seat and camshaft rocker arm. Used limit: 9.91mm (.390 in.). Change if worn larger.

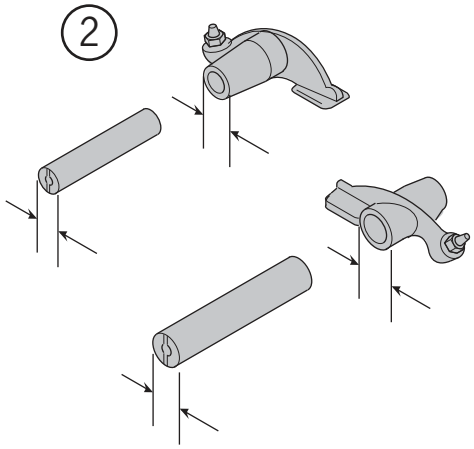


- Inner diameter of camshaft rocker arm. Used limit: 10.10mm (.398 in.). Change if worn larger.

- Outer diameter of camshaft rocker arm bearing and camshaft rocker arm. Used limit: 9.91mm (.390 in.).Change if worn larger.

- The gap between camshaft rocker arm and camshaft rocker arm bearing.

  Used limit: 0.10mm (.004 in.). Change if worn larger.



Disassembly of Cylinder Head

1. Remove camshaft bearing. (7-4)

2. Remove carburetor (5-4)

3. Remove exhaust pipe. (2-4)

3. Remove inlet manifold.

7. Cylinder Head Valve

4. Remove fan cover.

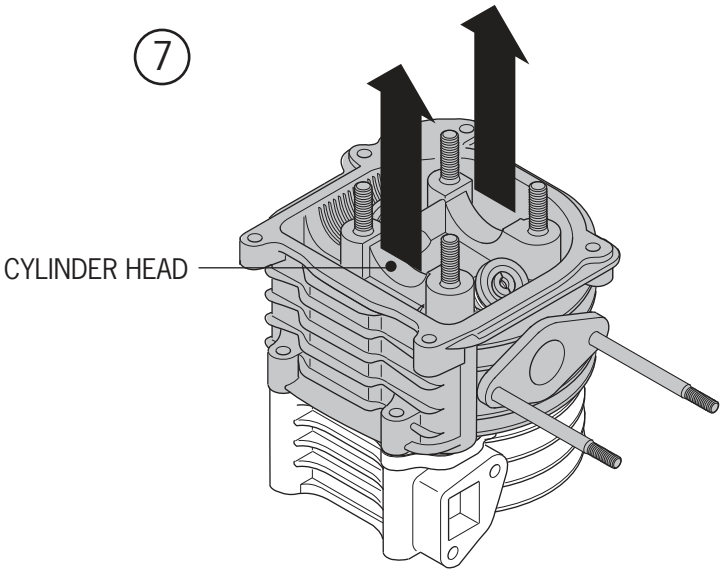
5. Remove bolt and screw of engine cover.

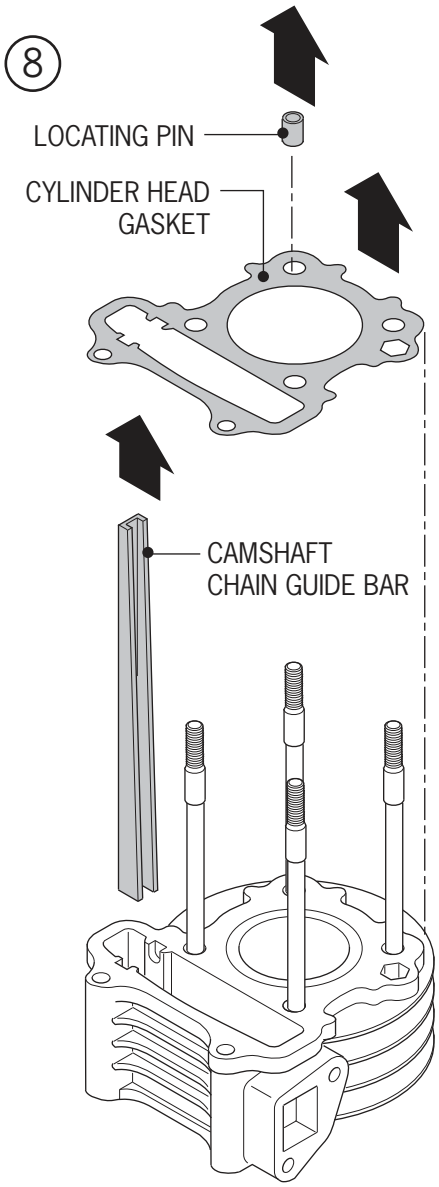
6. Disassemble and remove engine cover.

7. Pull up on cylinder head to break gasket and slide off cylinder stands.

8. Take off location pin and cylinder head gasket.

9. Take off camshaft chain guide bar.

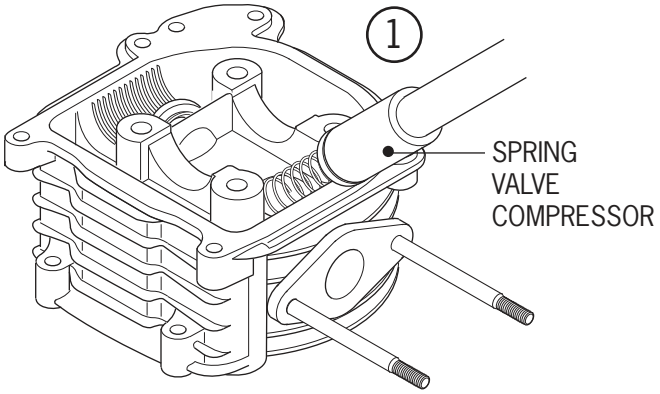




7. Cylinder Head Valve

Breaking Down of Cylinder Head

1. Use valve spring compressor to take off lock clip and supporter and valve spring, spring seat valve.

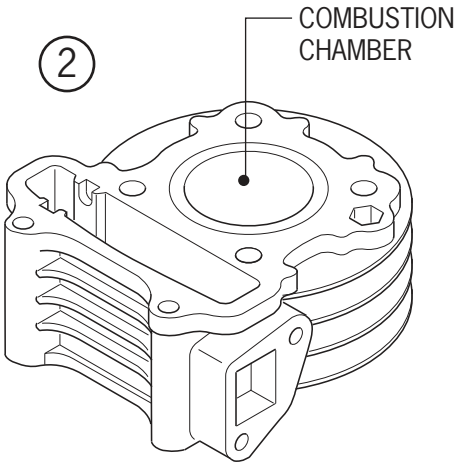


Place parts in sequence after disassembling and assemble in reverse order during reassembly.

2. Clean carbon deposits from combustion chamber.

3. Get rid of gasket material on cylinder head surface.

Don't damage cylinder head sealing surface.

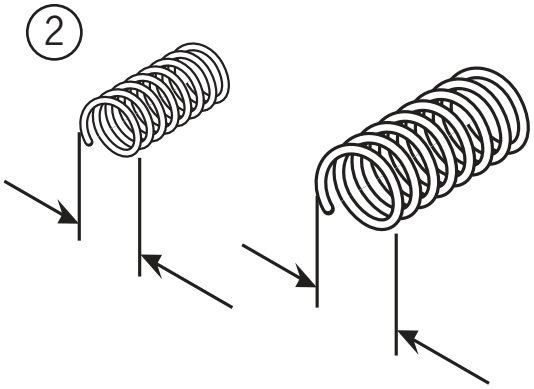


Checking Cylinder Head

1. Check spark plug hole for damage.
2. Check valve spring seats for alignment.

Used limit: 0.05mm (.002 in.) above align
•Measure length of inner and outer springs.

Used limit:
•Change if inner spring below 26.1mm (1.03 in.).
•Change if outer spring is below 30.5mm (1.2 in.).



7. Cylinder Head Valve

Valve and Valve Guide

1. Check if valve is beat, burnt or broken.

2. Check if valve and valve guide are blocked.

3. Measure every valve stem's outer diameter.
   •Used limit: Change if below 4.9mm.

Remove carbon deposits from valve guide using a reamer.

SPECIAL TOOLS

Rotate reamer in proper direction and do not stop rotation to push in or pull out.

4. Measure inner diameter of every valve guide.

Used limit:
IN: Change if above 5.3mm.
EX: Change if above 5.3mm.

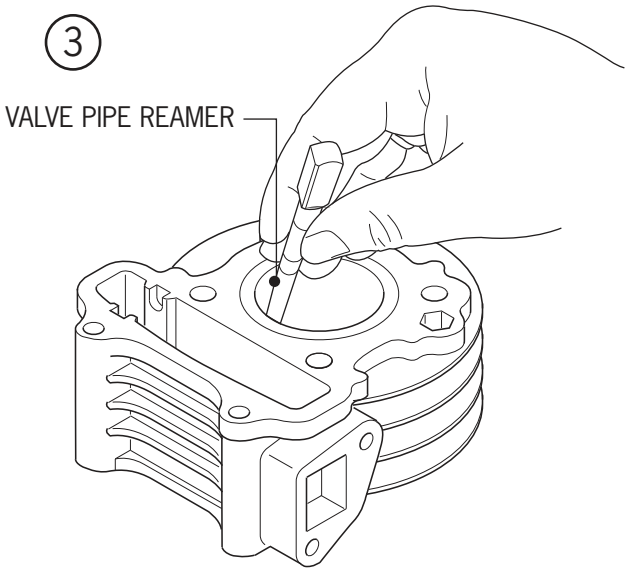
Valve guide replacement

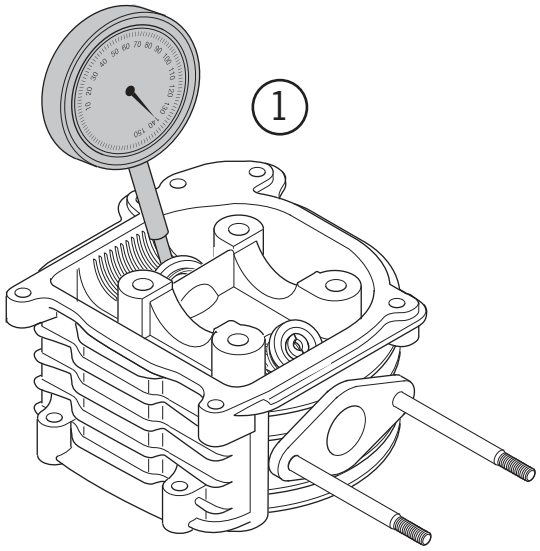
1. Operate cylinder at the temperature of about 100˚C-15˚C 212˚F.

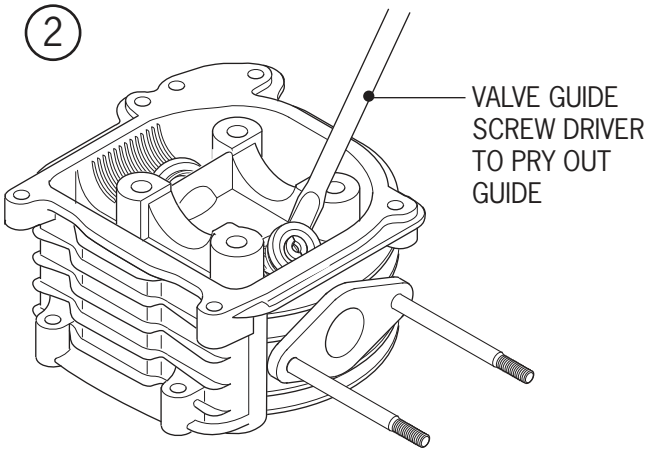
Heat cylinder head quickly and evenly to prevent warping.

2. Press, cut or pry out the valve guide.

Be careful to not damage cylinder head surface.







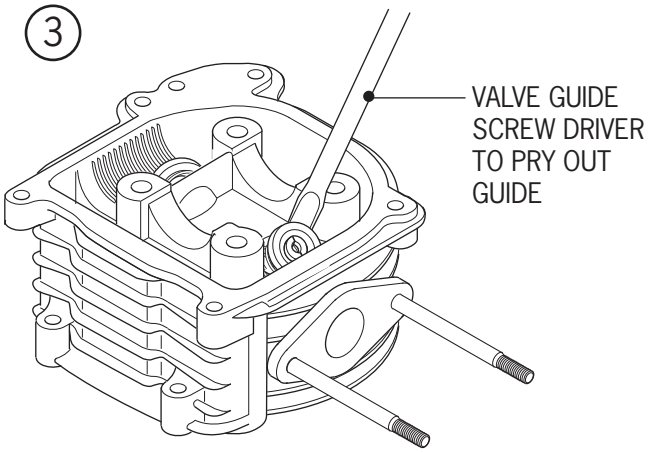
7. Cylinder Head Valve

3. Press in the new valve guide. Spread engine oil on new o-ring and build up new valve guide pipe. Make sure cylinder head is still warm when pressing in new guides.

4. Size valve guide with reamer after installing.

Use cutting oil on reamer. Rotate reamer in proper direction and do not stop rotation to punch in or pull out.

5. Clean cylinder head and get rid of cut bits of metal and dust.



SPECIAL TOOLS

Special tools
•Valve guide pipe reamer
•Valve Seat Checking and Correcting
•Valve Seat Checking

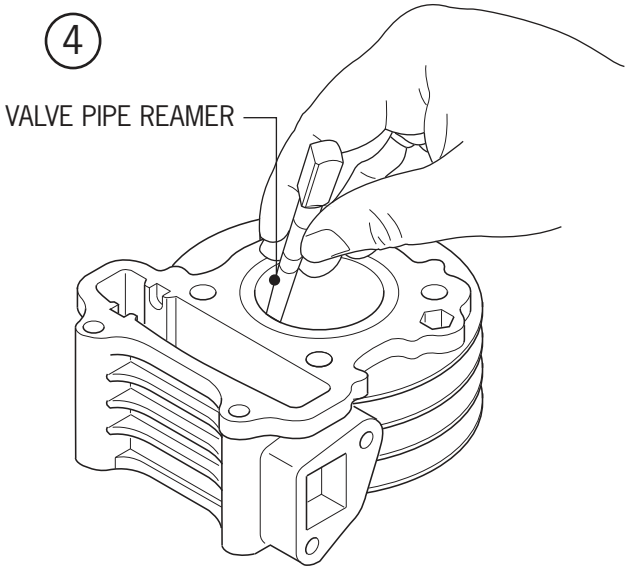
6. Remove carbon deposit from combustion chamber valves.

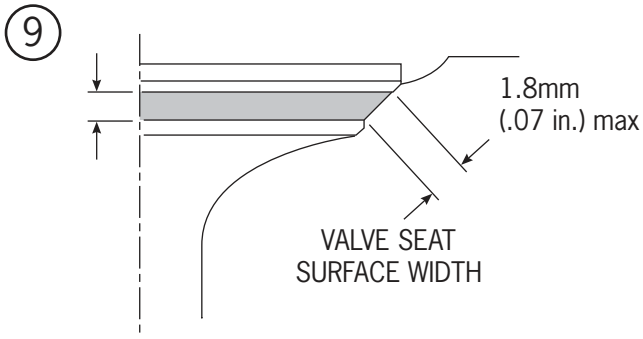
7. Spread emery on seat surface between valve and valve seat. Use polishing bar to wear in valve.

8. Take out valve and check valve seat surface. Change if valve surface is course or facial polished.

Valve seat surface width checking
Used limit: above 1.8mm (.07 in.) correct.

9. Correct valve seat with chamfered tool if surface width is not even, too wide or too narrow.





7. Cylinder Head Valve

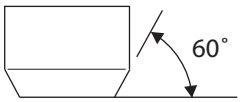
Valve Seat Chamfer Cutting Tools

\Refer to valve chamfered tool handbook for details.

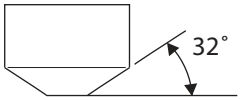
1. Press and rotate with 4-5kg 10-12 lb force to polish and cut when correcting.

Use chamfered tool after spreading engine oil on it.

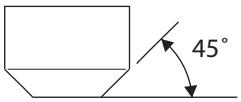
IN, EX: (30mm)



IN, EX: (32mm)



IN: (24.5mm)
EX: (27.5mm)



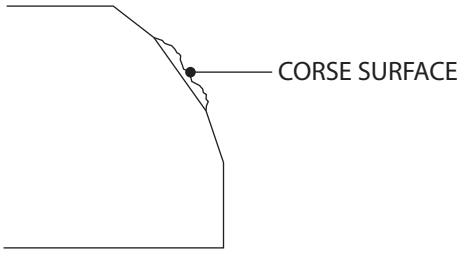
Valve Seat Cutting

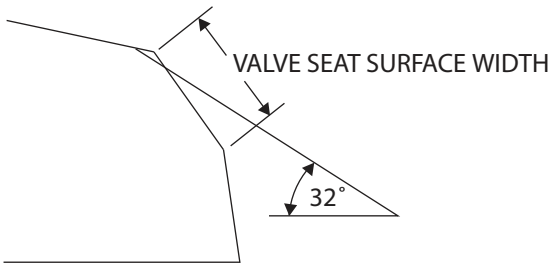
1. Do not polish or cut excessively.

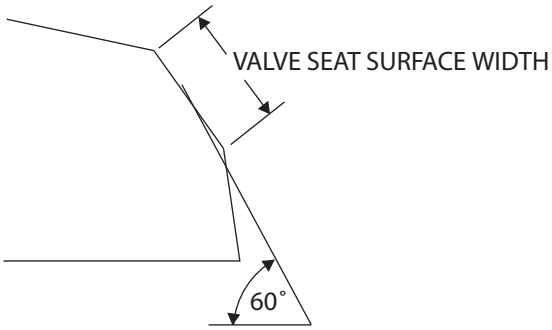
2. Cut primary surface with 450 cutting head.

3. Chamfer inner edge with 320 cutting head.

4. Correct inner surface by sixty-degree chamfered tool.



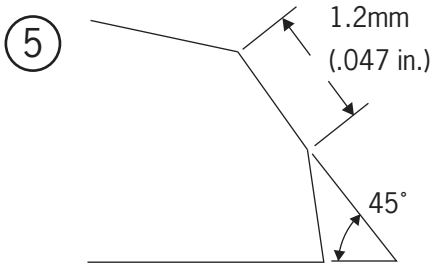




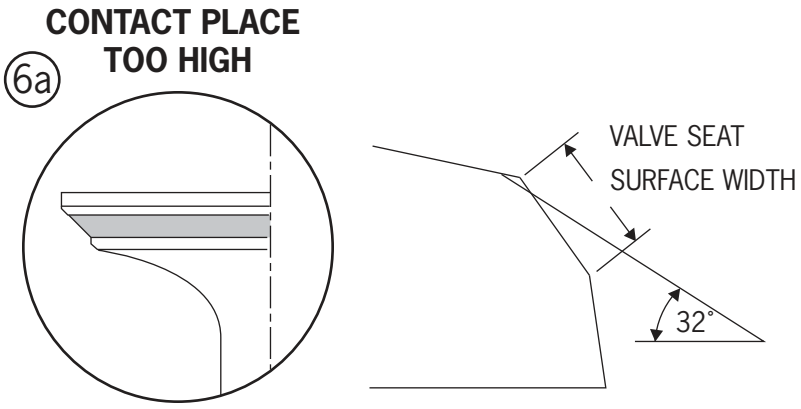
7. Cylinder Head Valve

5. Trim valve seat to assigned seat width and valve seat width with 45 degree chamfered cutting tool.

Standard valve: 1.0 mm (.393 in.)
Check contact place of valve seat.

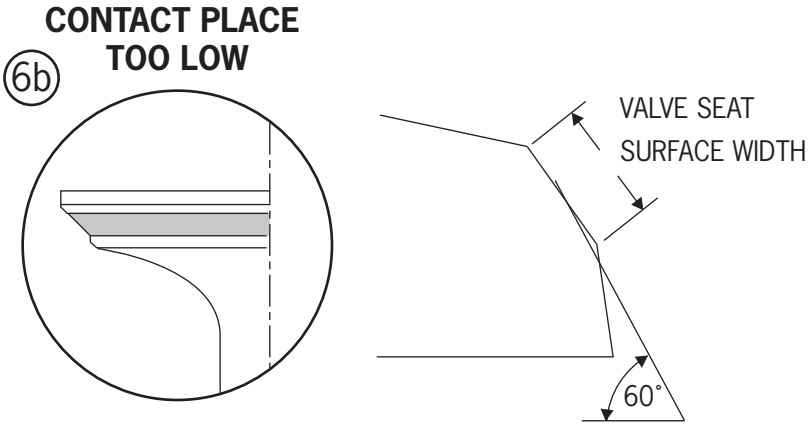


6. Polish with 30-degree chamfered cutting tool if he contact place is too high. Trim to assigned width with 45-degree chamfered cutting tool. Polish valve contact surface with emery and polishing bar after correcting bar.



7. Wash and clean cylinder and valve after polishing and grinding.

> Rotate and press softly when polishing. Don't put emery into valve and valve guide pipe when polishing.



8. Spread red ink on 45-degree seat surface and confirm if the center of the contact surface of the valve is even after correction.

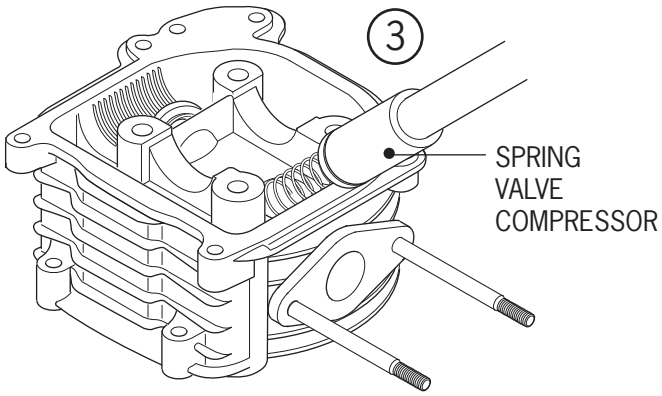
Building Up of Cylinder Head

1. Build Up Spring Seat

> Use new oil seals when reassembling.

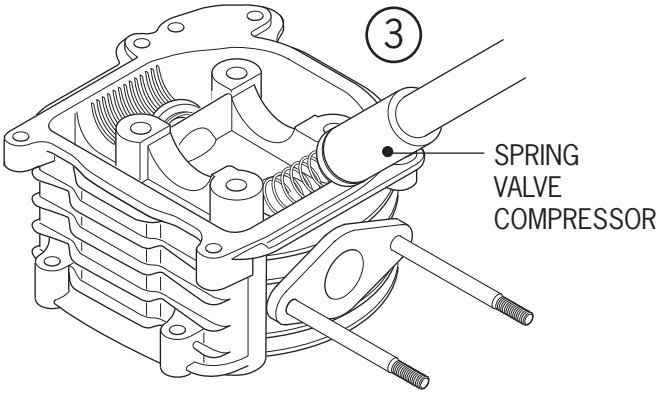
2. Spread engine oil on valve stem and put into valve guide.

3. Build up inner and outer valve spring and put in valve collar using spring compressor.



7. Cylinder Head Valve

4. Use valve spring compressor accessory to make valve contact with valve collar. Use plastic mallet two or three times softly on the ends of the valve to seat collars.



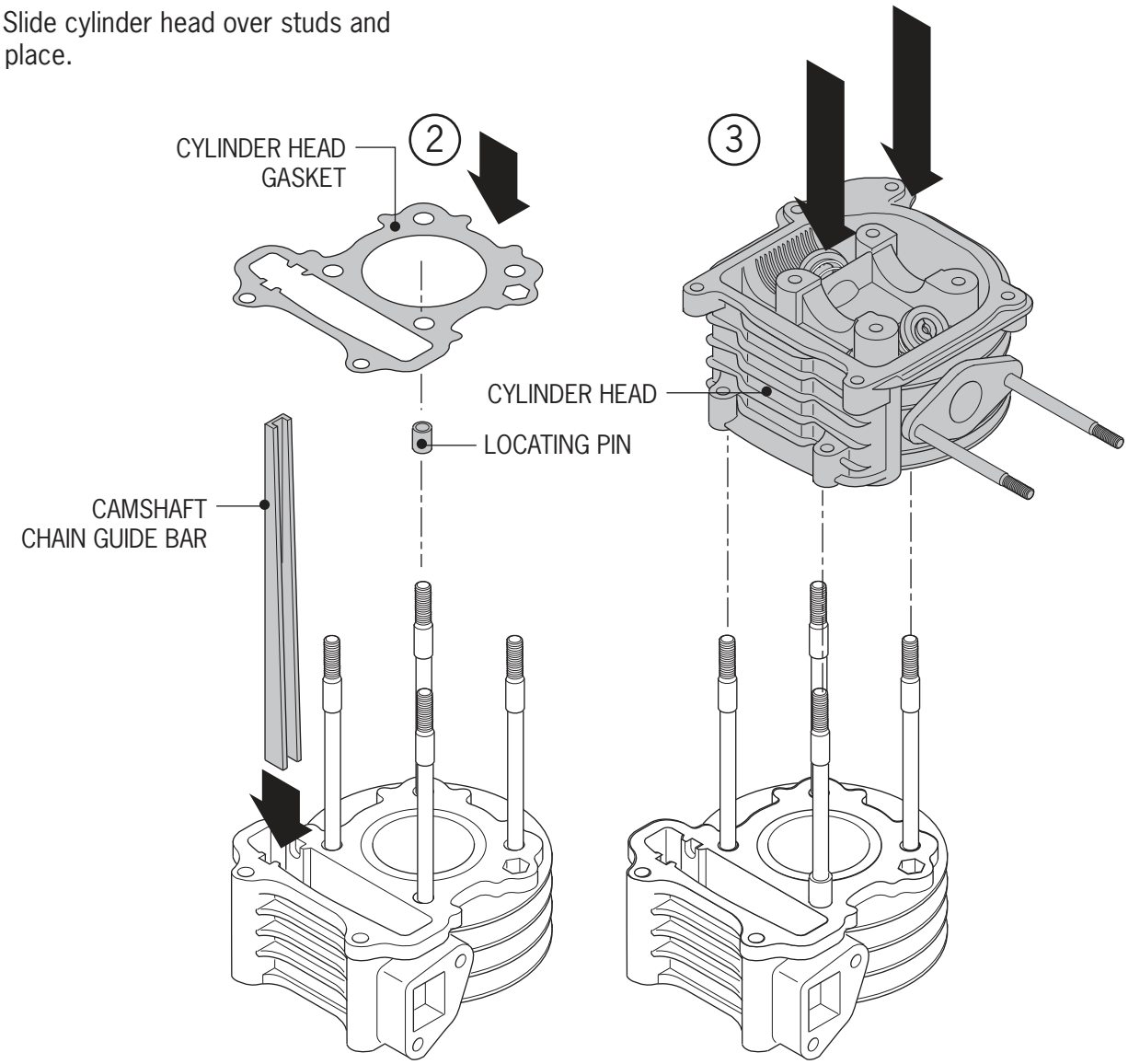
When using mallet, be careful to not damage valves.

Installing Cylinder Head

1. Install locating pin and gasket.

2. Install cam chain adjuster plate.

3. Slide cylinder head over studs and into place.



7. Cylinder Head Valve

Camshaft Assembly

1. Assemble rocker arm and rocker shaft.

Make alignment between shaft end and fixed screw bolt hole of camshaft seat when valve rocker shaft is assembled.

2. Install the camshaft into the cylinder head. Seat the camshaft into the fixed seat and check alignment.

3. Install camshaft fixed seat.

4. Rotate flywheel and align “T” mark on flywheel with crankshaft mark.

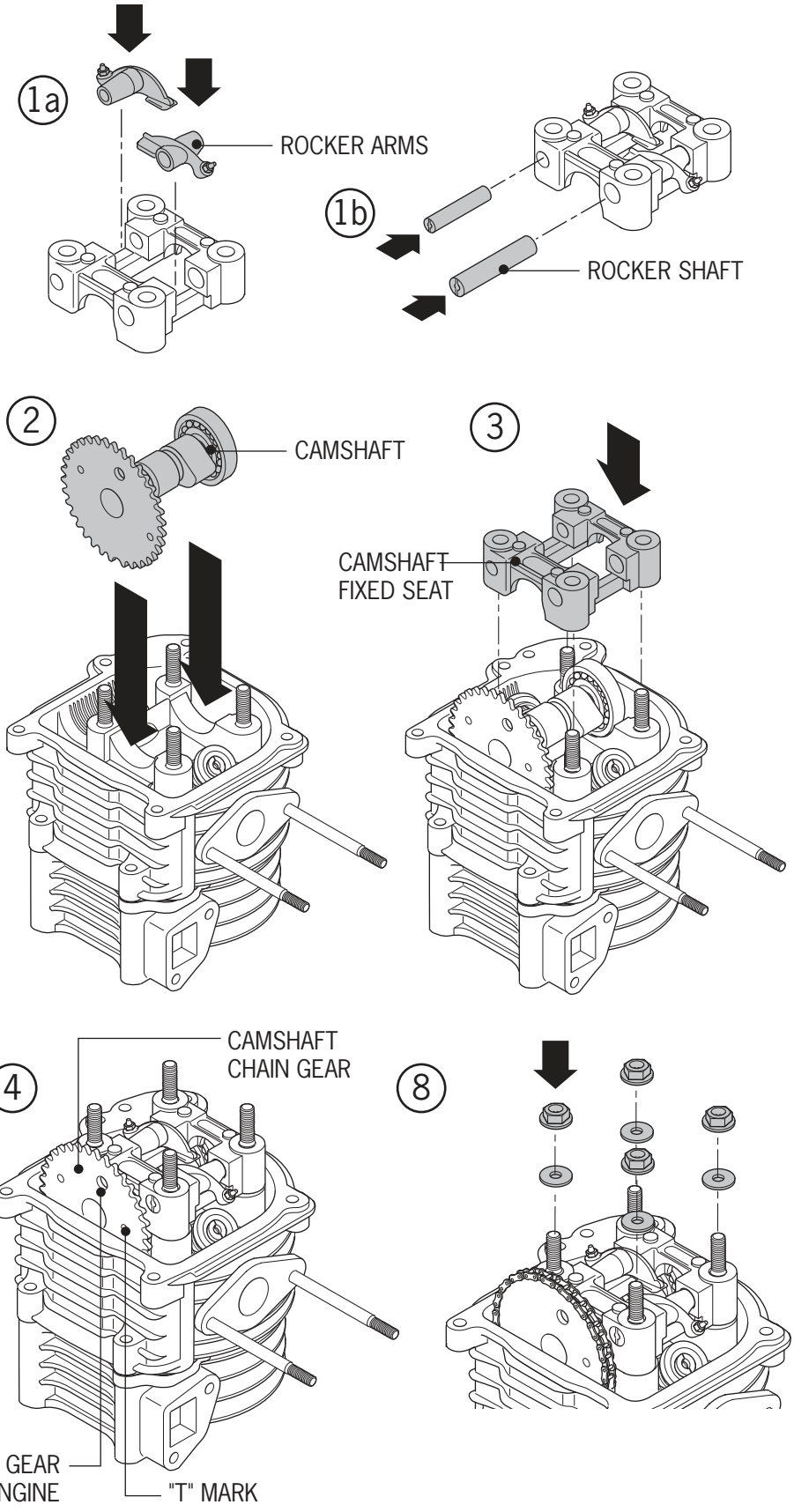
5. Align the camshaft chain gear round hole away from engine.

6. Install camshaft chain on camshaft gear.

7. Assemble fixed studs.

8. Assemble camshaft seat, space and nut into cylinder head. Tighten cylinder head nut and bolt securely.

Torque valve:
Camshaft fixed nut:
2.0kg-m 15 ft lbs



7. Cylinder Head Valve

Camshaft Chain Regulator Assembling

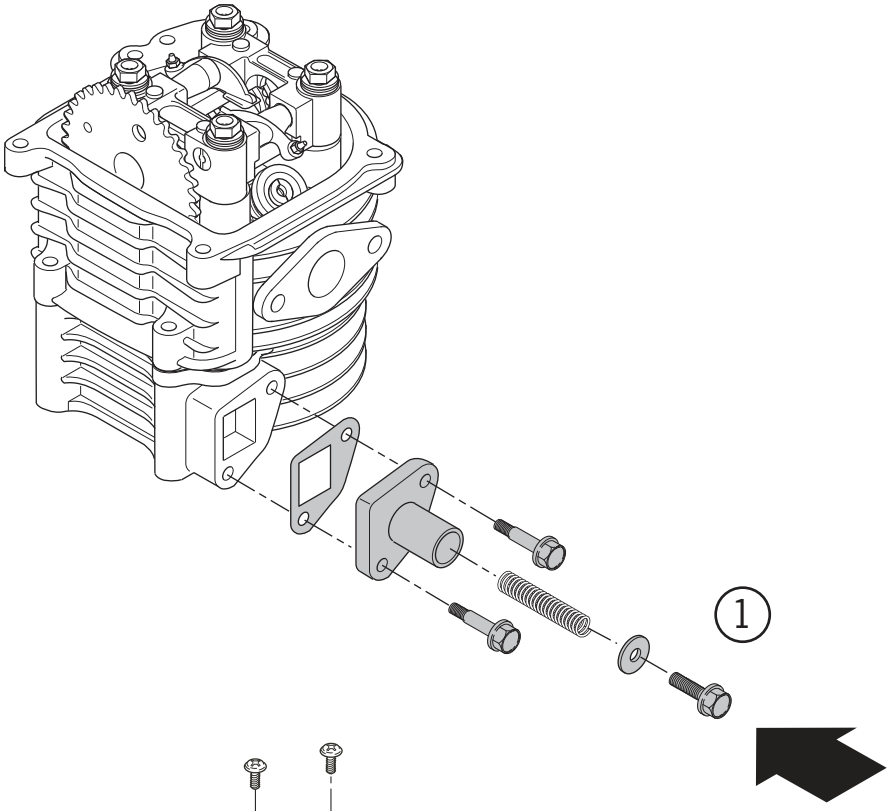
1. First, build up camshaft chain regulator and spacer. Second, lock two fixed bolts. Third, put spring into camshaft chain regulator. Last, assemble the o-ring and fixed bolt.

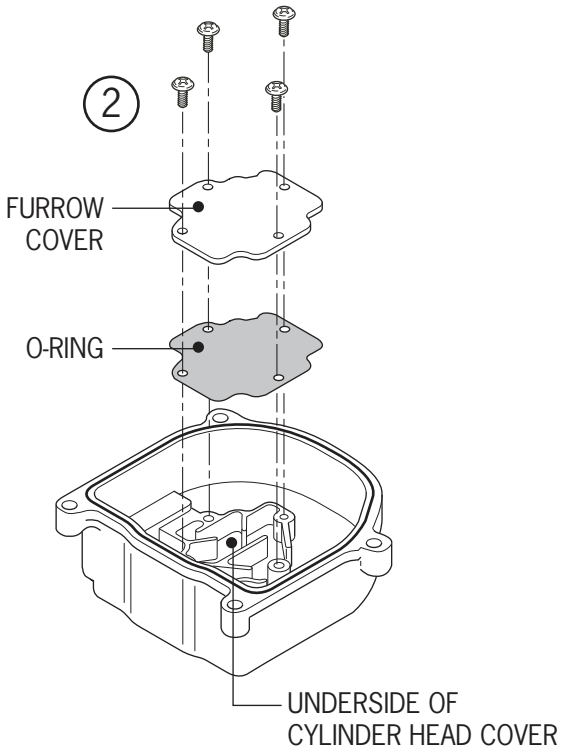
Press down regulator master jaw and drive down driving bar when camshaft chain regulator is assembled.

Torsion valve: 0.3-0.5 kg-m
Regulate valve gap: (3-5)

2. Change the ring of he cylinder head cover and assemble the cylinder head cover.

Put o-ring into furrow.





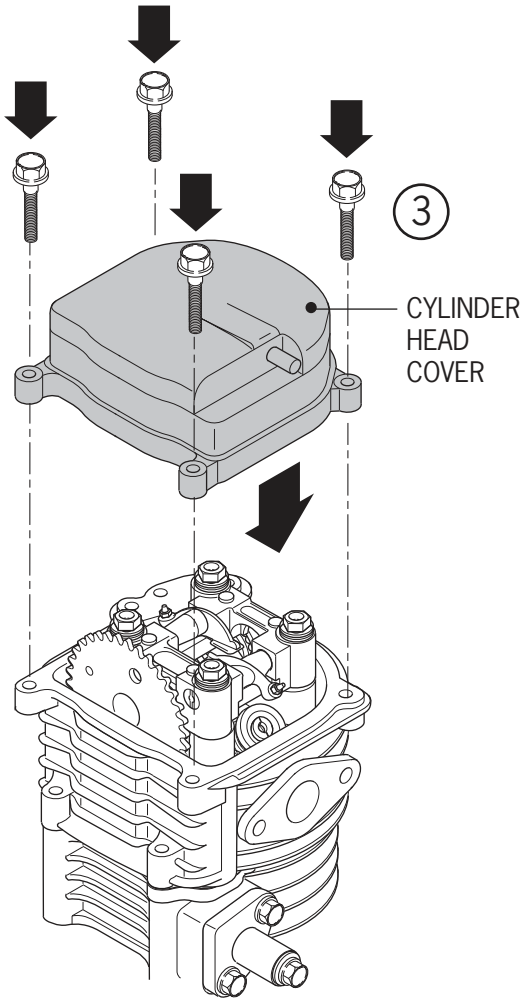
7. Cylinder Head Valve

3. Lock fixed screw bolt of cylinder head cover.

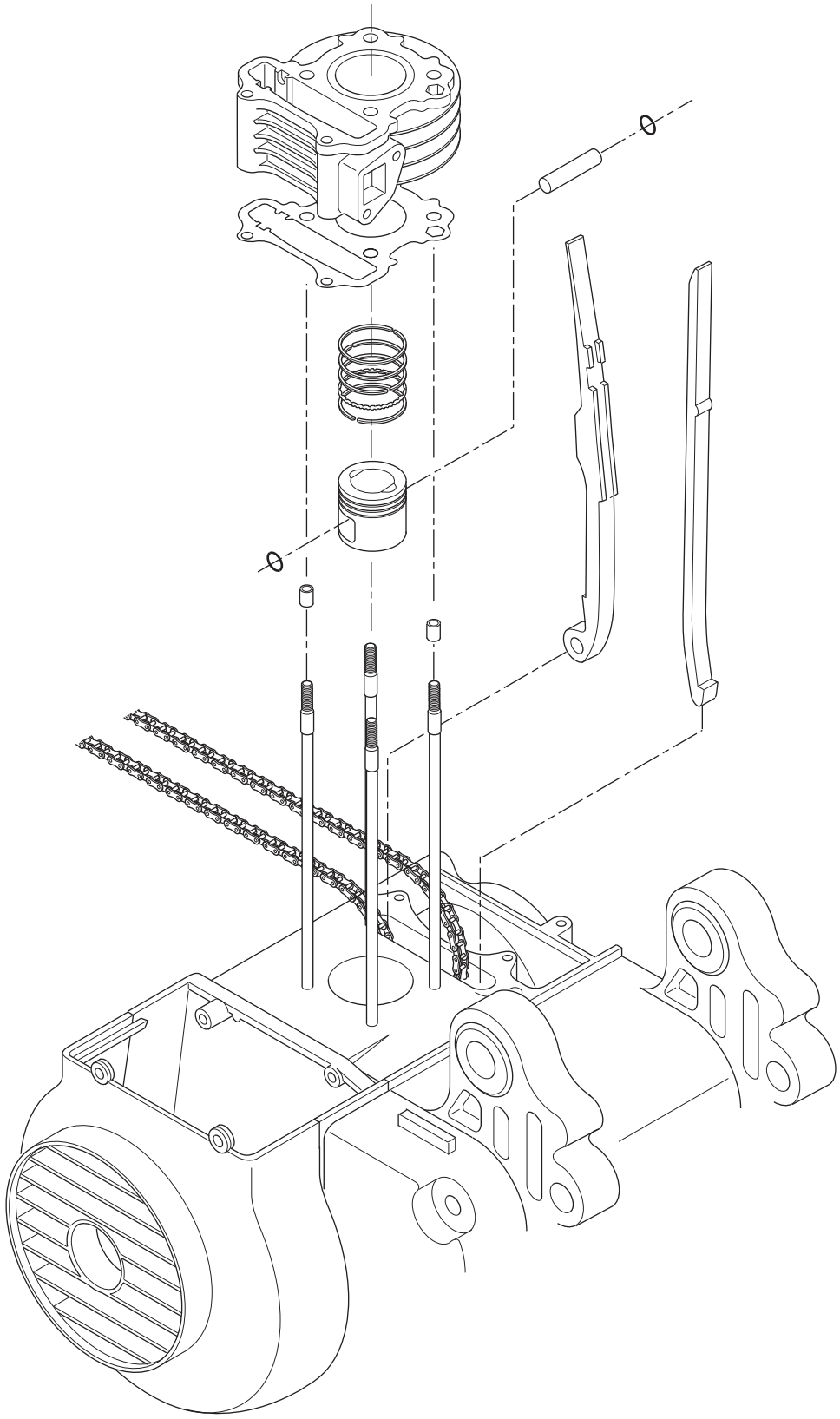
Torsion valve: 0.8-1.2 kg-m

4. Spread grease on threading position of camshaft fixed seat screw bolt.

5. Lock two or three times at diagonal of camshaft fixed seat screw cap.



8. Cylinder and Piston



8. Cylinder and Piston

Topic	Page	Topic	Page
Material	8-2	Removing the piston	8-3
Troubleshooting	8-2	Assembling the piston	8-7
Removing the cylinder	8-3	Assembling the cylinder	8-8
Checking the Cylinder	8-5		

Important Points

•The work on the cylinder and piston can be done on the engine without complete disassembly.
•After taking them apart, clean and dry the cylinder and piston with the compressed air before measuring and testing.

unit: mm

Item			Normal size	Max. Service Allowance
Cylinder	ID		(0.04) 0.05	39.10
	Distortion		——	0.05
	Cylindricity		——	0.05
	Out-of-roundness		——	0.05
Piston	Clearance between the ring and the ring groove		0.015-0.055	0.09
			0.015-0.055	0.09
	Compressed gap		0.08-0.20	0.45
			0.05-0.20	0.45
			0.20-0.70	——
Piston ring	OD of piston		38.980-38.780	38.7
	Check point of OD		9mm away from skirt	——
	Clearance between piston and cylinder		0.010-0.040	0.1
	ID of the piston pin hole		13.002-13.008	13.04
OD of the piston pin			12.994-13.000	12.96
Clearance between the piston pin and the hole			0.002-0.014	0.02
ID of the small end of the connecting rod			13.016-13.034	13.06

Troubleshooting

•In case of difficulty starting or unsteady running at low speeds, check if there is white smoke coming out of the air hole pipe of the crankcase. If that is the case, the piston ring is worn, burnt or broken.

Low Compression Pressure

•The piston ring is worn, burnt or broken.
•The piston/cylinder is worn or damaged.

Compression Pressure is Too High

•Carbon deposits on the piston and the combustion chamber.

White Smoke Coming Out of the Exhaust Pipe

•The piston ring is worn or damaged.
•The piston/cylinder is worn or damaged.

Knocking Noise by the Piston

•The cylinder, the piston or the piston ring is worn.
•The piston pin and its hole are worn.

8. Cylinder and Piston

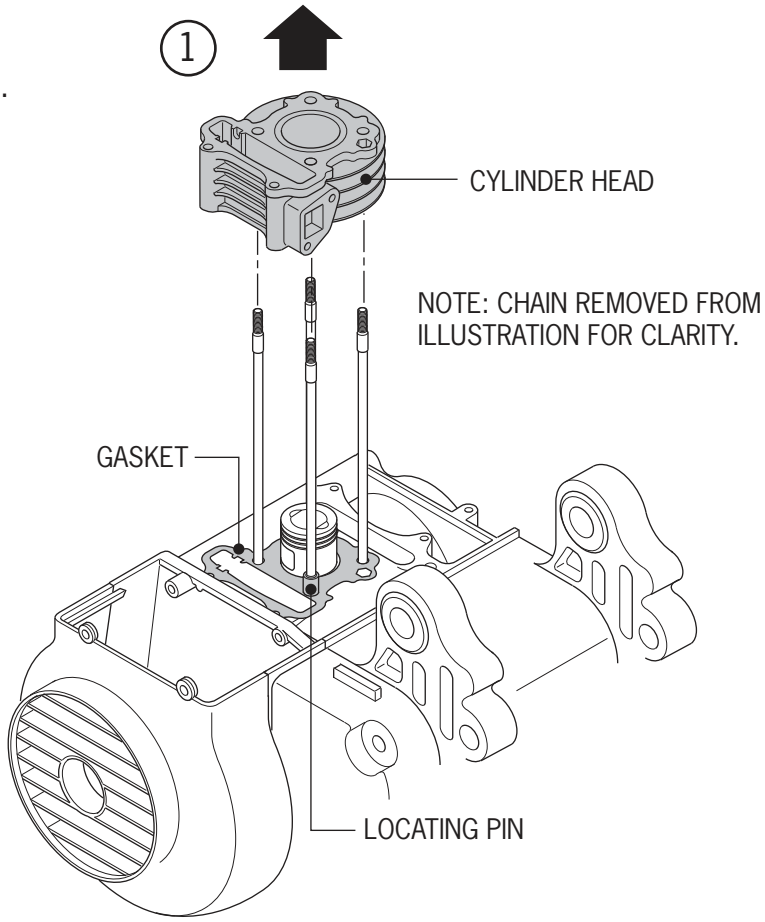
Removing the Cylinder

1. Detach the cylinder head (refer to 7-6).

2. Remove the chain guide of the cam chain.

3. Remove the cylinder.

4. Remove the cylinder gasket and the locating pin from the top of the cylinder and the base of the cylinder.



Removing the Piston

1. Remove the piston pin snap ring.

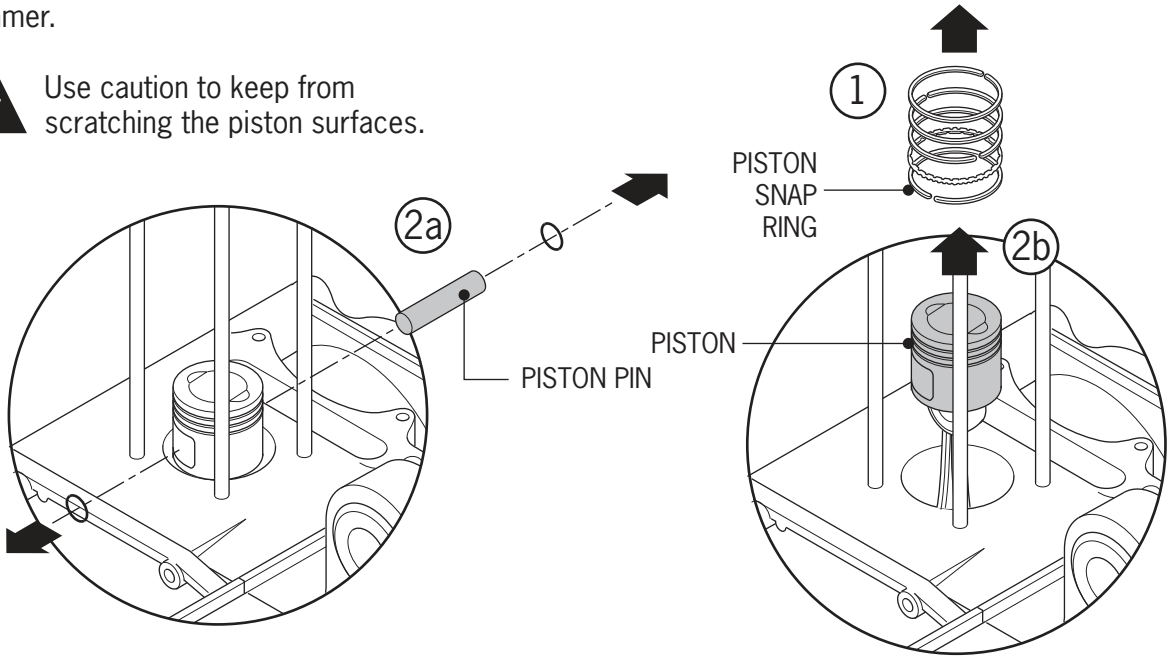
Attention:
Don't drop the snap ring into the crankcase.

2. Take out the piston pin and then the piston.

3. Push the piston pin from the side opposite the removed snap ring.

4. Use a small punch or drift pin if necessary and top gently with a soft-faced bummer.

Use caution to keep from scratching the piston surfaces.



8. Cylinder and Piston

Checking the piston, the piston pin and the piston ring.

Attention:
Don't damage or break the ring.

1. Clear off all of the carbon deposits from the ring groove.

2. Mount the ring and measure the clearance of the ring groove.

   Maximum service allowance:
   The top ring: Replace when it goes beyond 0.09mm (.035 in.).

   The second ring: Replace when it goes beyond 0.09mm (.035 in.).

3. Remove the piston rings.
Install the piston rings into the bottom of the cylinder.

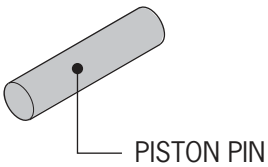
Attention:
Use the piston head to press the rings into place in the cylinder.

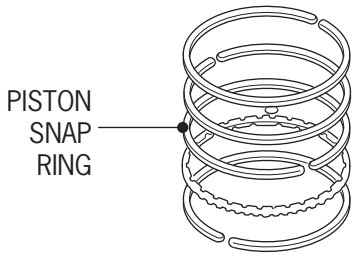
4. Measure the piston ring gap in bore.

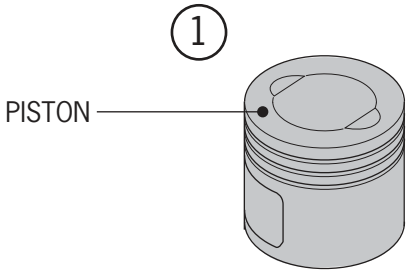
   Maximum service allowance:
   Replace when it goes beyond 0.45mm (.018 in.).

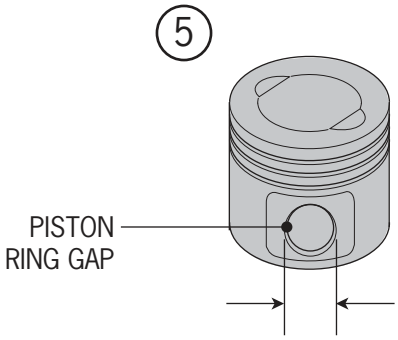
5. Measure the ID of the piston pin hole.

   Maximum service allowance:
   Replace when it goes beyond 13.04mm (.51 in.).





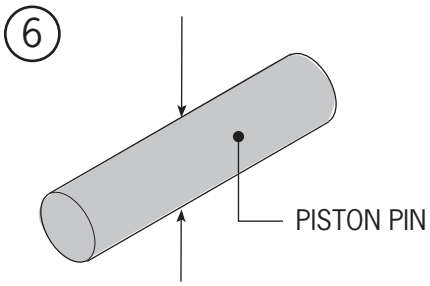




8. Cylinder and Piston

6. Measure the OD of the piston pin.

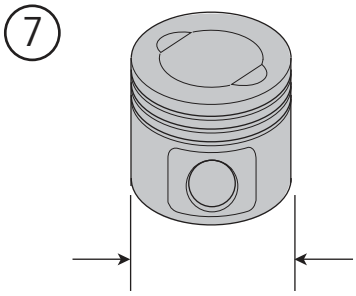
Maximum service allowance:
Replace when it is below 12.96 mm, (.51 in.).



7. Measure the OD of the piston.

Attention:
Measure it in a position which forms 90 degree with the center of the piston pin and which is 9mm away from the skirt.

Maximum service allowance:
Replace when it is below 38.7 mm (1.52 in.).



8. Measure the clearance between the piston pin and the pin hole.

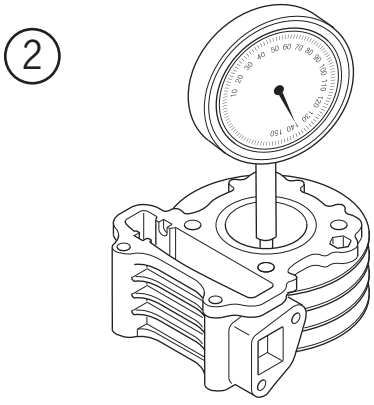
Maximum service allowance:
Replace when it goes beyond 0.02 mm (.0008 in.).

Checking the Cylinder

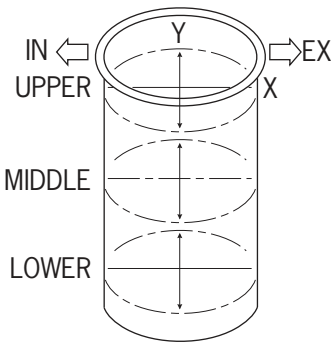
1. Check whether it's scratched, worn or damaged in its inner surface.

2. Measure its ID in three positions (upper, middle and lower) which form 90 degrees (x-y direction) with the piston hole.

Maximum service allowance:
Repair or replace when it goes beyond 0.1mm (.004 in.).
The difference between X and Y directions is out-of-roundness.



The cylindricity is the ID difference (between X and Y directions), measuring at three positions (upper, middle and lower). The largest measured value will be considered the result. This indicates a taper of the cylinder.



Maximum service allowance:
Out-of-roundness:
Repair or replace when it goes beyond 0.05mm (.002 in.).
Cylindricity:
Repair or replace when it goes beyond 0.05mm (.002 in.).

8. Cylinder and Piston

3. Check the distortion of the cylinder.

Maximum service allowance: Repair or replace when it goes beyond 0.05mm (.002 in.).

4. Measure the ID of the small end of the connecting rod.

Maximum service allowance: Replace when it goes beyond 13.06mm (.51 in.).

Attention:
Don't scratch the piston or break the piston ring.

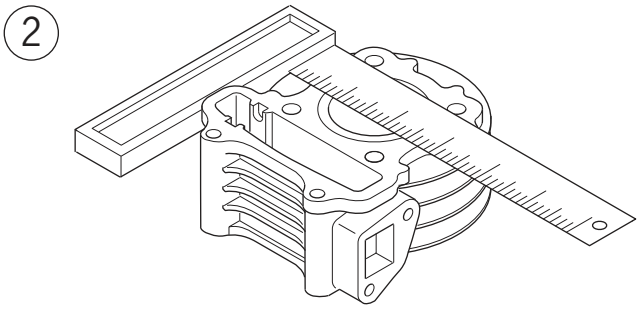
When replacing the ring, keep the surface with a markup.

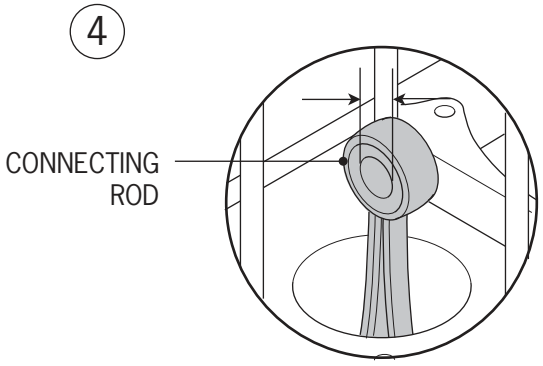
After assembling, make sure that the ring can be turned freely in the ring groove.

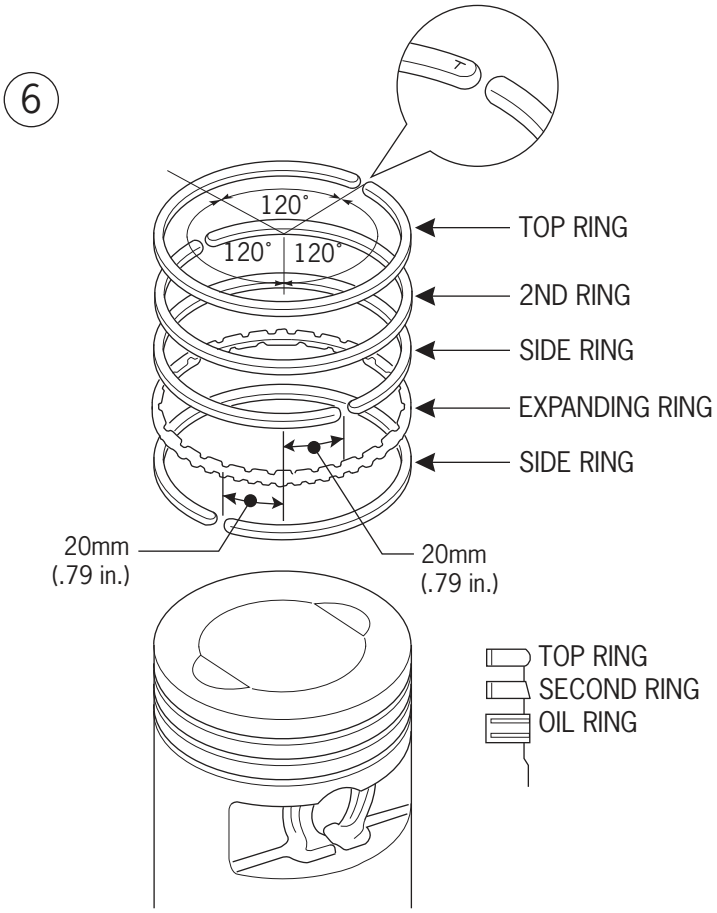
5. Lightly coat the rings with engine oil before installing them on the piston.

6. Make sure to keep ring end gaps rotated at 120° increments.

7. Cover piston and rings with a light coat of engine oil.



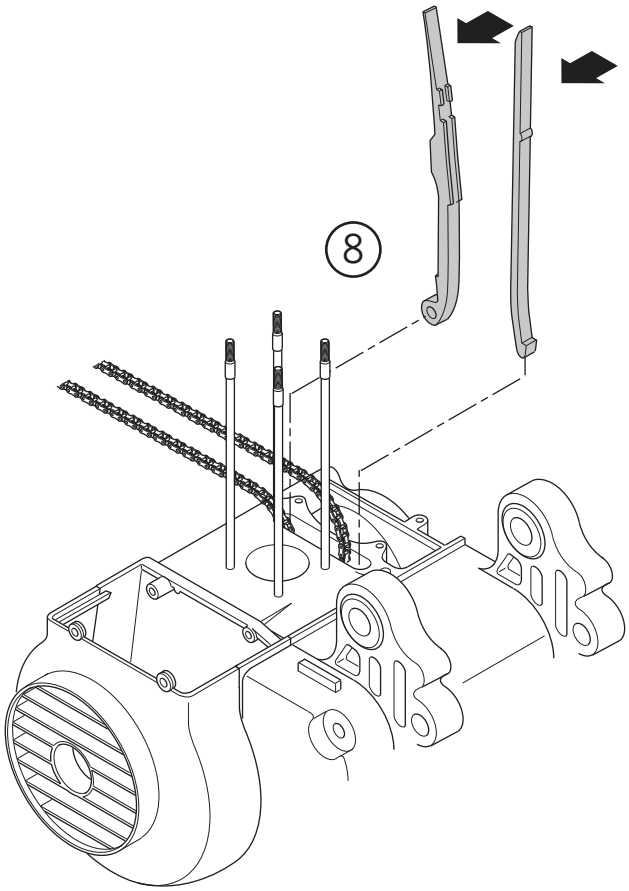




8. Cylinder and Piston

8. Install the chain guide lever of the cam.

Attention:
Make sure that the lug of the guide lever enters the notch of the cylinder.



Assembling the Piston

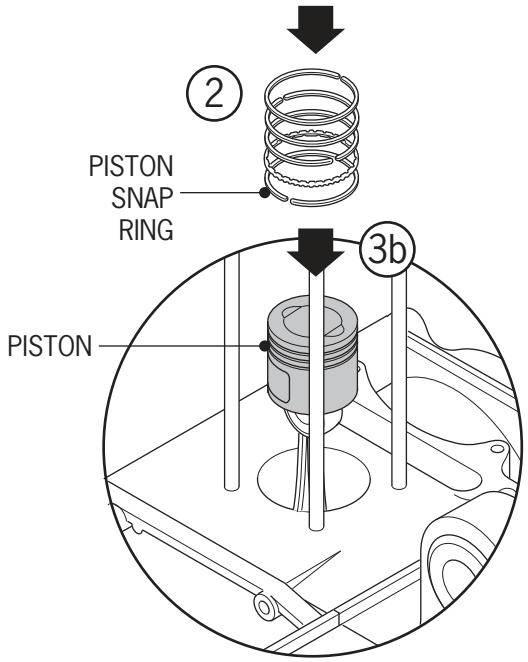
1. Scrape away the gasket adhering on the surface of the crankcase.

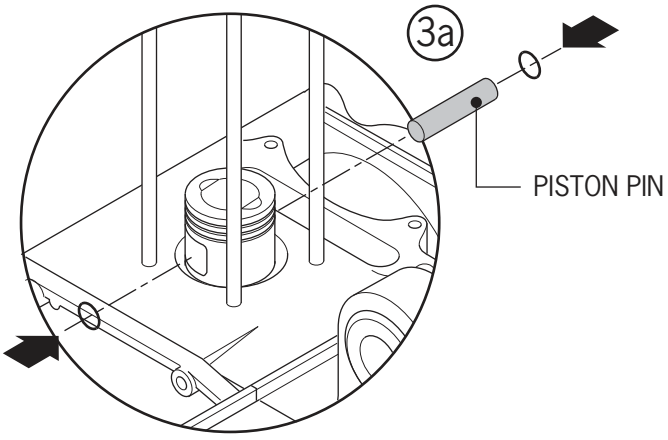
Attention:
Be sure not to let any matter drop into the crankcase.

2. Assemble the piston and the piston pin.

Attention:
When assembling, keep the mark “in” (on the top of the piston) toward the inlet valve.

Be sure not to let the piston pin snap ring fall into the crankcase. Use a cloth to keep debris out of the crankcase.





8. Cylinder and Piston

Assembling the Cylinder

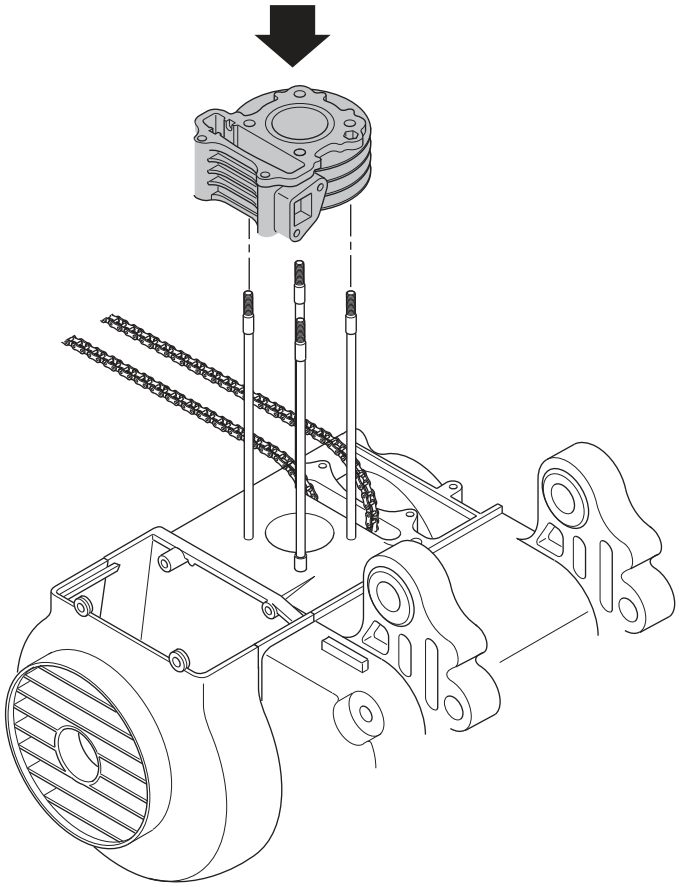
3. Install the locating pin and the gasket to the crankcase.

4. Coat the inner surface of the cylinder, the piston and the piston ring with oil.

5. When assembling the piston rings, they must be compressed into the cylinder.

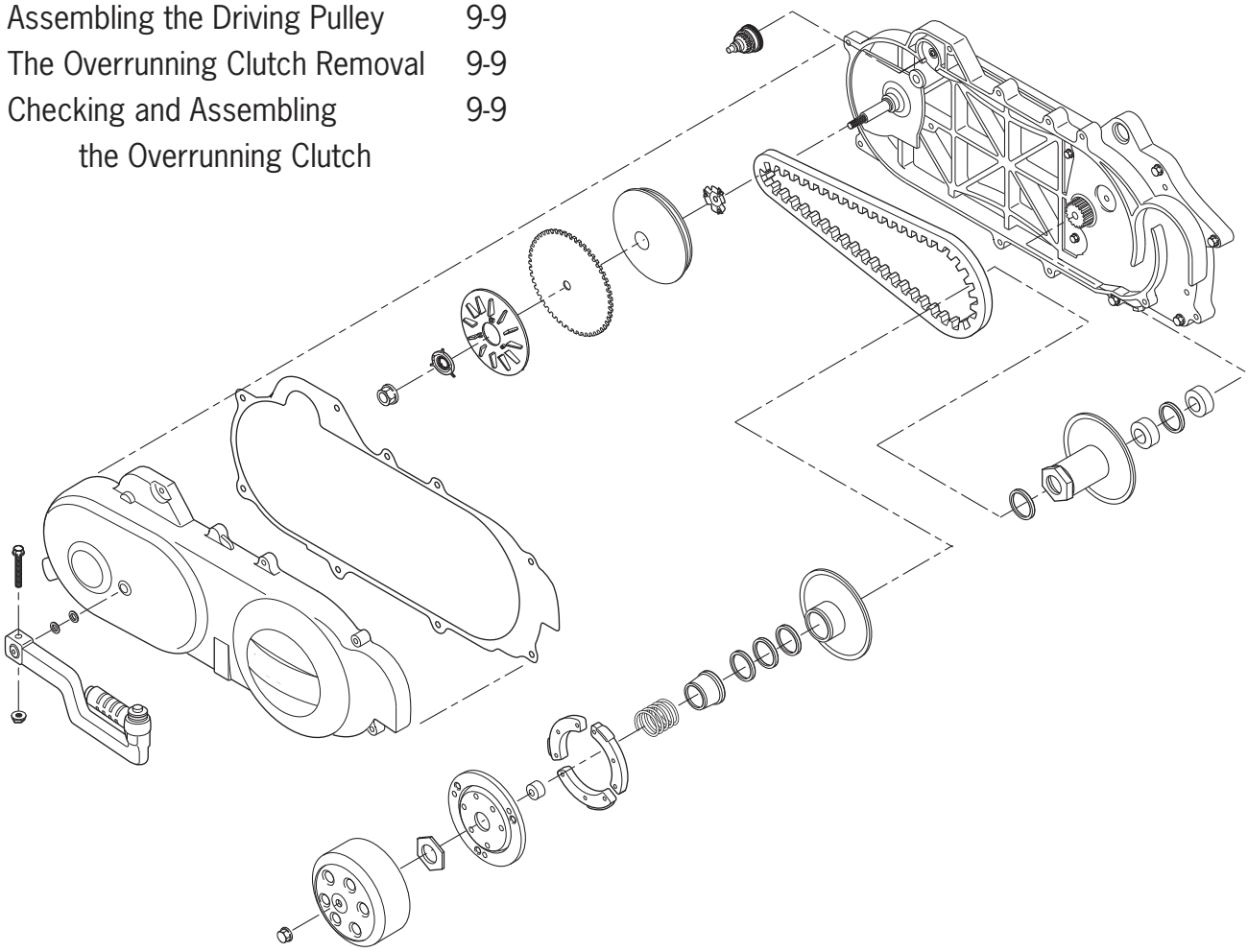
Attention:
Don't damage or break the piston ring.

Be sure not to make the position of the ring gap point to the inlet and outlet valves and parallel with the piston ring.



9. Driving Belt Device & The Starting Lever

Topic	Page	Topic	Page
Important Points	9-2	The Clutch/Transmission Pulley	9-10
Troubleshooting	9-2	Removing the Clutch/ Transmission Pulley	
Detaching the Left Crankcase Cover	9-3	Disassembling the Clutch/ Transmission Pulley	9-10
Removing the Starting Pivot	9-3	Checking the Clutch Transmission Pulley	9-11
Checking the Starting Pivot	9-4	Replacing the transmission pulley and the bearing	9-12
Installing the Starting Assembly	9-4	The Clutch/Transmission Pulley Assembly	9-13
Assembling the Left Crankcase Cover	9-5	Assembling the Clutch Housing	9-14
Checking the Driving Belt	9-6		
Replacing the Driving Belt	9-6		
Assembling the Driving Belt	9-7		
The Driving Pulley-Dismounting	9-7		
Taking the Driving Pulley Apart	9-7		
Checking the Driving Pulley	9-8		
Assembling the Driving Pulley	9-9		
The Overrunning Clutch Removal	9-9		
Checking and Assembling the Overrunning Clutch	9-9		



9. Driving Belt Device & The Starting Lever

Important Points

•This chapter is about the driving unit, the clutch/driven unit and the starting lever.

•The work on them can be done on the engine, without the disassembly.

•The surface of the driving belt and the drive units are not allowed to have oil adhering to them. If there is any, remove it to minimize the slip between the belt and the drive units.

Tech Criterion

Item	Normal Size	Max. Serice Allowable
ID of the sleeve of the sliding driving plate	23.989-24.05-	24.24
OD of the hub of the sliding driving plate	20.010-22.025	19.97
Width of the driving belt	18	17
Thickness of the clutch brake lining		2.0
ID of the clutch housing	107.0-107.22	107.5
Free length of the driven belt spring	98.1	107.5
OD of the driving plate	33.965-33.985	92.8
ID of the sliding driving plate	34.0-34.25	34.06
OD of the roller	13.0	12.4

Torque
The nut of the driving plate
3.8kg/m 28ft lbs
The nut of the clutch housing
5.5kg/m 40ft lbs
The bolt of the driving plate
0.3kg/m 40in lbs
The nut of the clutch/driving plate
0.45kg/m 40in lbs



•Universal stand



•Compressing device for clutch spring
•Socket (39mm) for
Socket (39mm) for the fix nut
•Bearing driver

Troubleshooting

The motorcycle doesn't run after the engine is started
•The driving belt is worn
•The driving plate is broken
•The brake lining is worn or broken
•The spring of the driven plate is fractured

Sudden breakdown during running
•The spring of the brake lining is fractured

Power can't develop fully
•The driving belt is worn
•Distortion of the driven belt spring
•The roller is worn
•The driving plate surface is dirty

9. Driving Belt Device & The Starting Lever

Detaching the Left Crankcase Cover

1. Unlock the clip for the air tube for the driving belt.

2. Remove eight bolts and then take off the left crankcase cover and the locating pin.

3. Check whether the gasket is damaged or fractured.

Removing the Starting Pivot

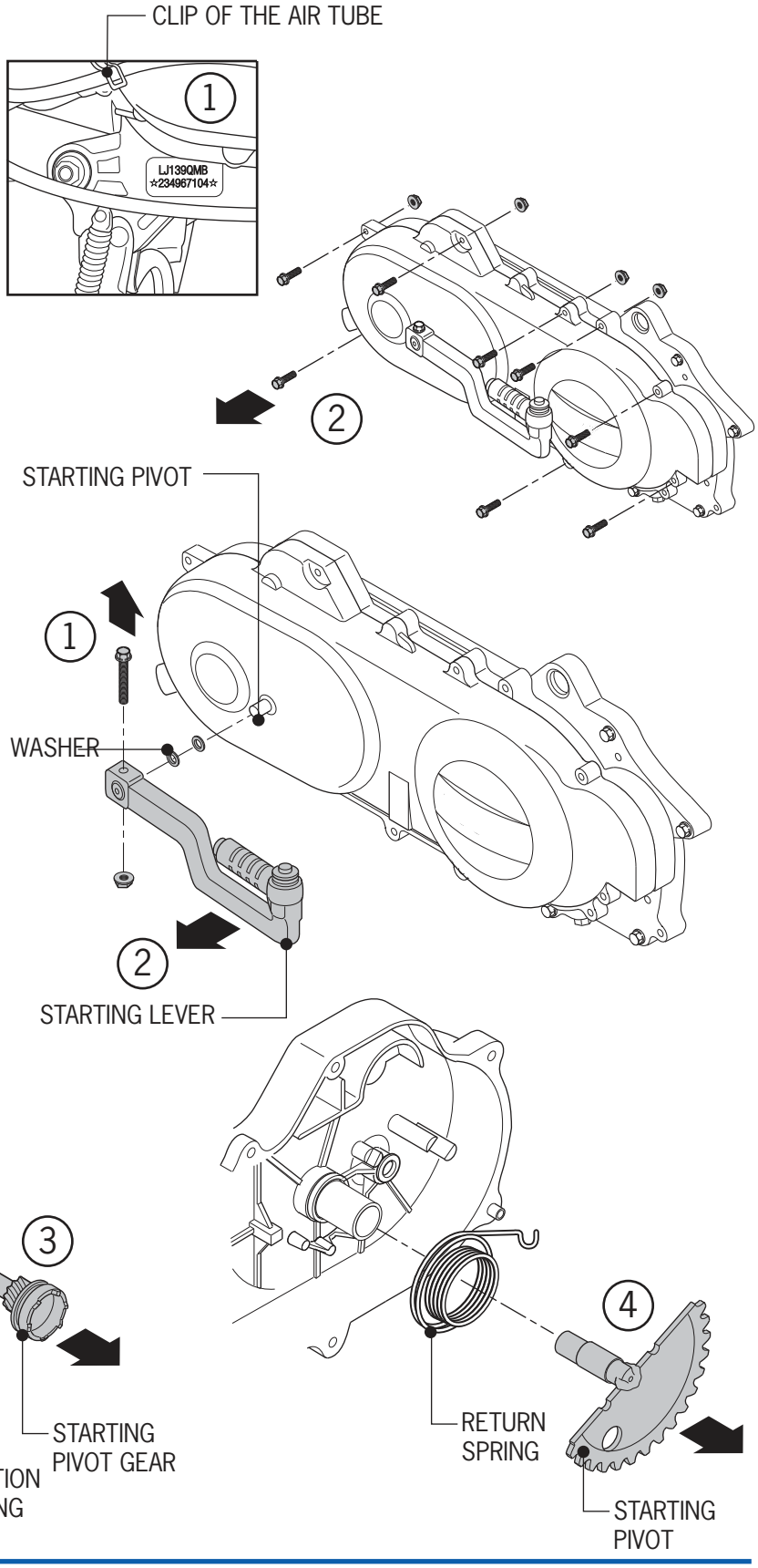
1. Remove the starting lever from the pivot.

2. Remove the retainer and the washer from the starting pivot.

3. Turn the starting pivot gently and remove the driving gear and the friction spring together.

4. Remove the starting pivot and the return spring.

5. Detach the starting pivot sleeve.



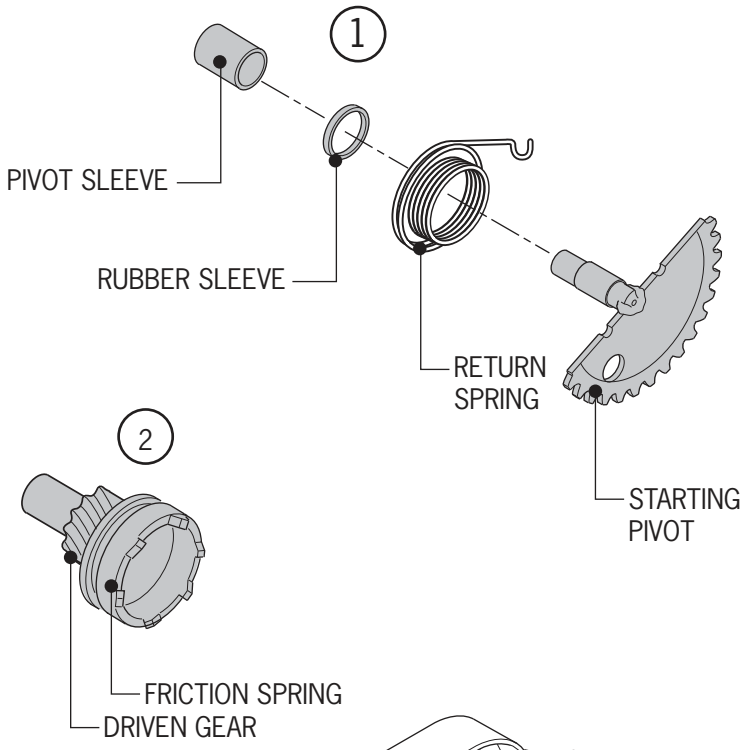
9. Driving Belt Device & The Starting Lever

Checking the Starting Pivot

1. Check if the pivot and the gear are worn. Check if there is any softness of the starting return spring. Check if there is any excessive wear on the pivot sleeve.

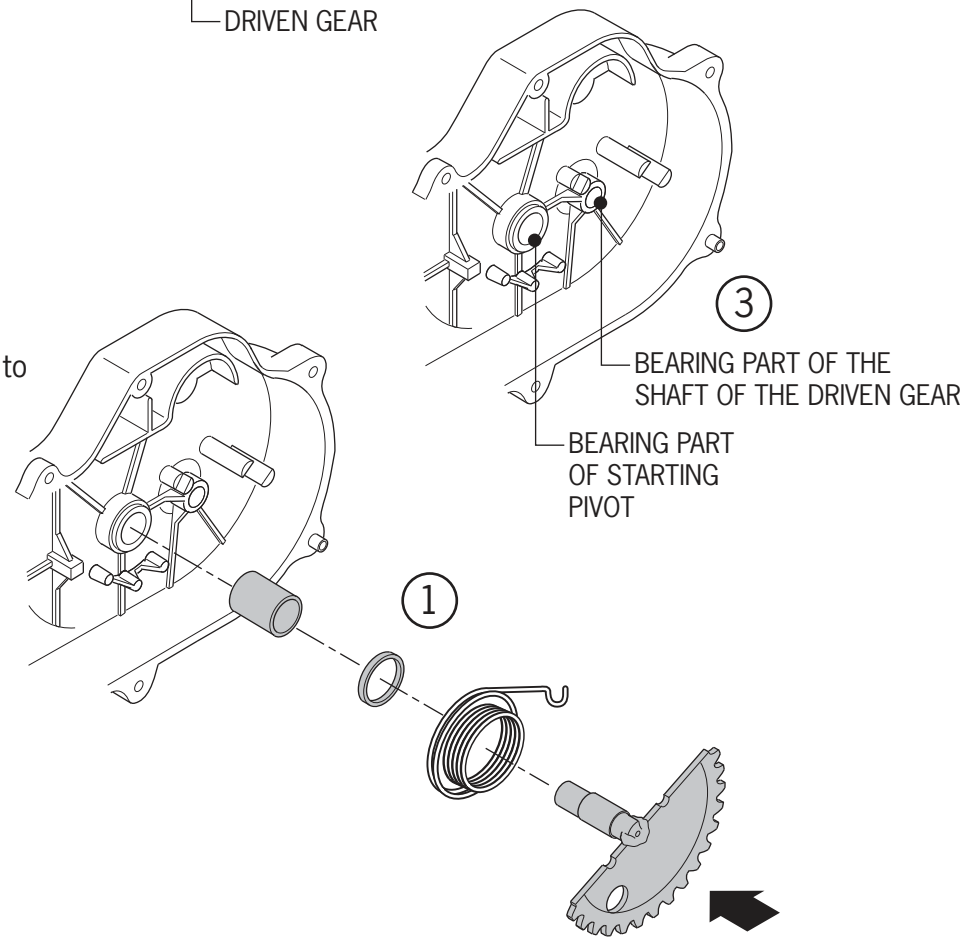
2. Check if the driven gear is worn or has failed. Check if the friction spring is worn or fractured.

3. Check if there is any excessive wear on the bearing part of the starting pivot and of the shaft of the driven gear. Replace any parts showing excessive or unusual wear.



Installing the Starting Assembly

1. Install the starting pivot sleeve and the return spring to the crankcase cover.



9. Driving Belt Device & The Starting Lever

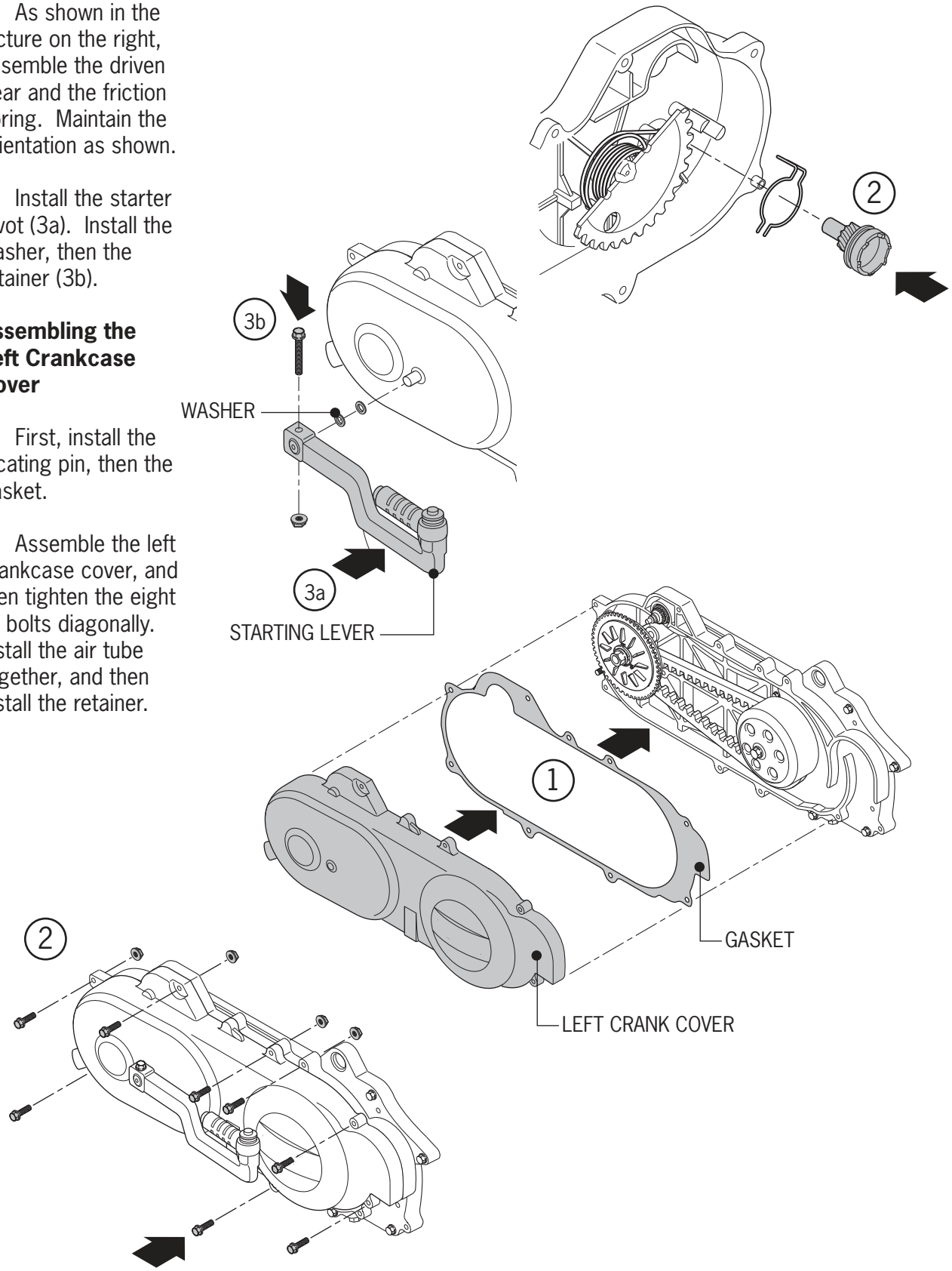
2. As shown in the picture on the right, assemble the driven gear and the friction spring. Maintain the orientation as shown.

3. Install the starter pivot (3a). Install the washer, then the retainer (3b).

Assembling the Left Crankcase Cover

1. First, install the locating pin, then the gasket.

2. Assemble the left crankcase cover, and then tighten the eight fix bolts diagonally. Install the air tube together, and then install the retainer.

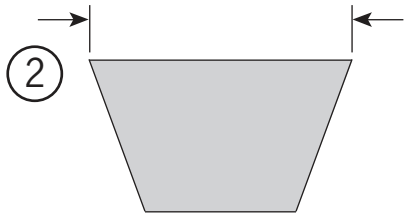


9. Driving Belt Device & The Starting Lever

Checking the Driving Belt

1. Detach the left crankcase cover.

2. Check if the driving belt is cracked, frayed, or if there is abnormal wear. Measure the width of the belt. Maximum service allowance: 17mm (.7 in.).



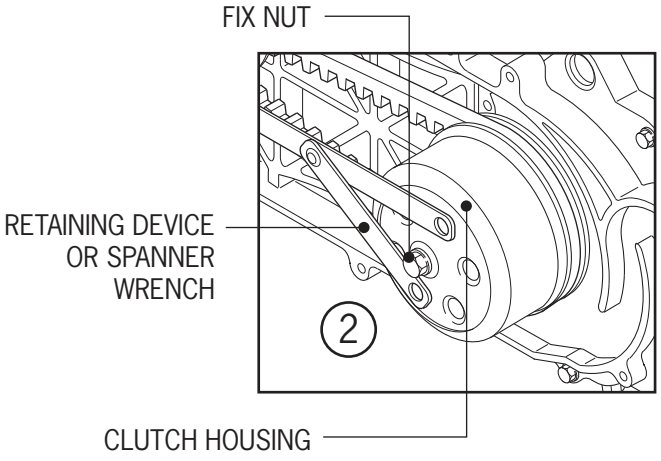
Replacing the Driving Belt

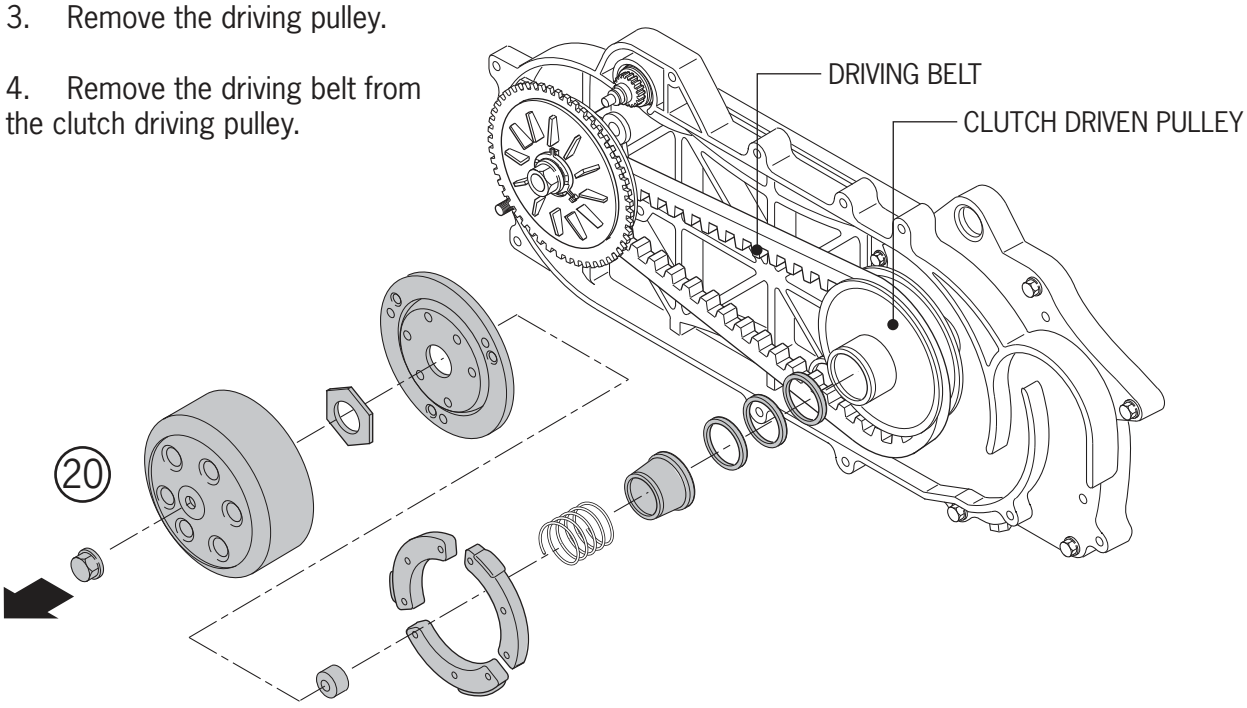
1. Remove the eight fix bolts, then remove he crankcase cover.

2. Remove driving pulley. Use a retaining device to hold the driving pulley and screw out of the 10mm (.39 in.) bolt.

3. Remove the driving pulley.

4. Remove the driving belt from the clutch driving pulley.





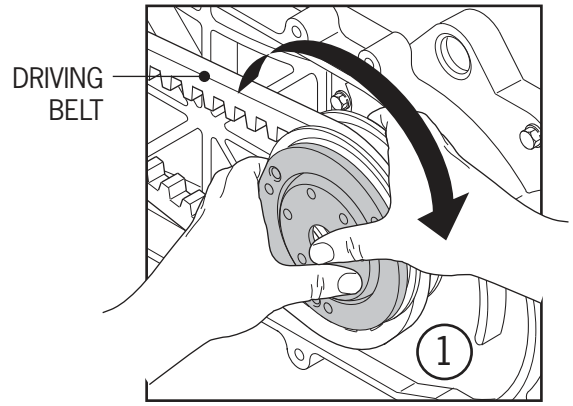
9. Driving Belt Device & The Starting Lever

Assembling the Driving Belt

1. Turn the driving pulley clockwise to keep the notches of the belt in expanded condition. Then install the new driving belt.

2. Install the driving belt on the driving pulley. Install the driving pulley, the starting ratchet and 10mm (.39 in.) washer. Then install and tighten the nut. Torque: 3,8kg/m 28ft lbs

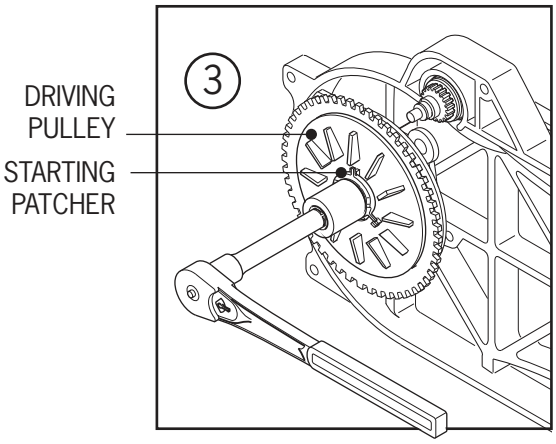
Attention:
During assembly, be sure to align the splints of the driving unit with those on the crank shaft with the ratchet.



The Driving Pulley-Dismounting

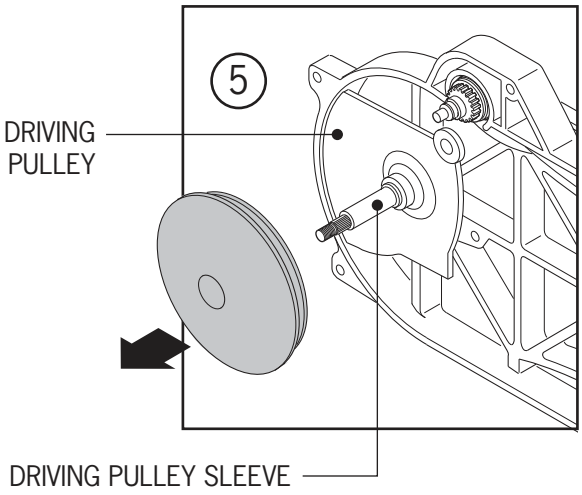
3. Use a retaining device or spanner wrench to hold the driving pulley.

4. Screw out the 10mm (.39 in.) nut, and then remove the ratchet, the 10mm (.39 in.) nut and the driving pulley.



Taking the Driving Pulley Apart

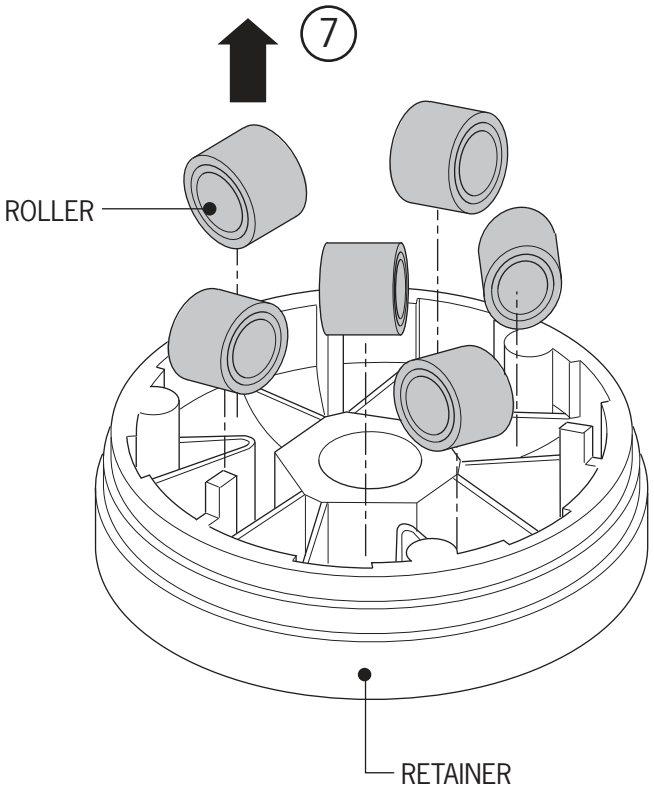
5. Remove the driving pulley and the sleeve from the crankshaft.



9. Driving Belt Device & The Starting Lever

6. Remove the retainer.

7. Remove the rollers.



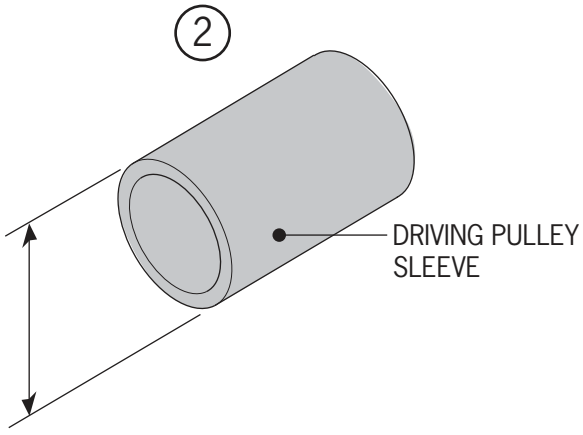
Checking the driving pulley

1. Check the wear of the rollers. Measure the OD of the roller.

Maximum service allowance. Replace when it is below 12.4mm (.47 in.).

2. Check the wear of the driving pulley sleeve. Measure the OD of the moving section of the sleeve.

Maximum service allowance: Replace when it is below 33.94mm (1.37 in.).



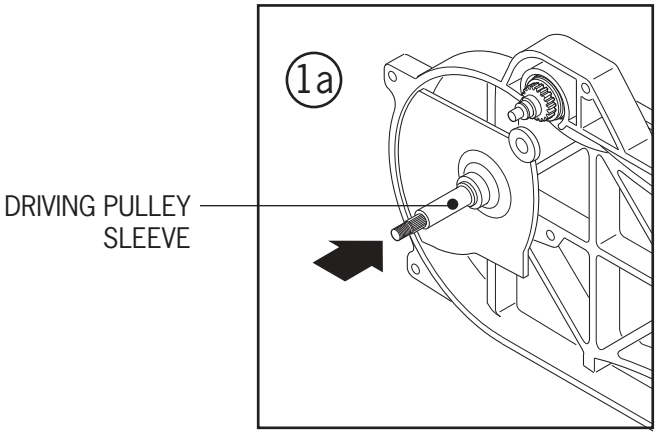
9. Driving Belt Device & The Starting Lever

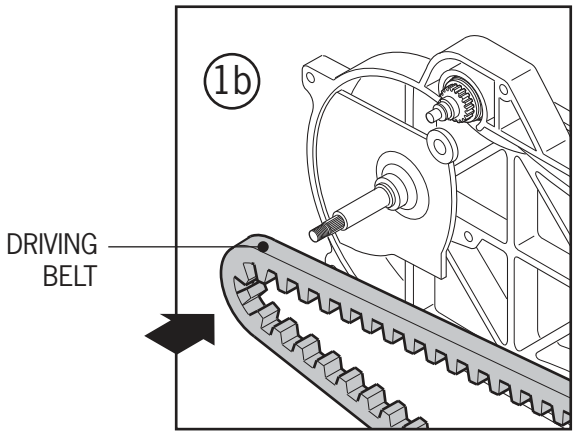
Assembling the Driving Pulley

1. Install the driving pulley sleeve and the driving pulley on the crankshaft (1a). Install the driving belt on the crankshaft (1b). Install the driving pulley and the washer (1c).

Tighten 10mm (.39 in.) nut.
Torque: 3.8kg/m 28ft lbs

Attention:
There mustn't be any grease on the surface of the driven belt and the driving pulley.



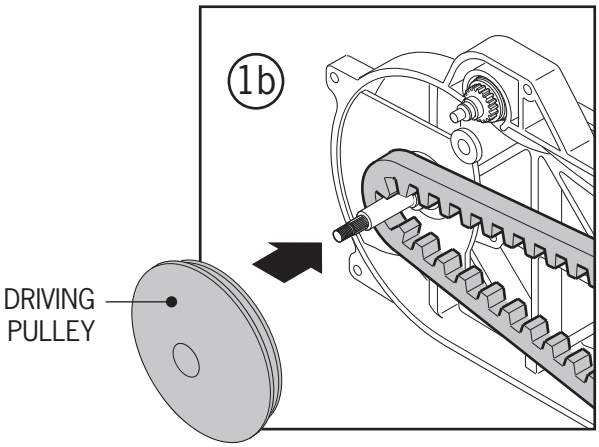


The Overrunning Clutch (Starter Pinion) Removal

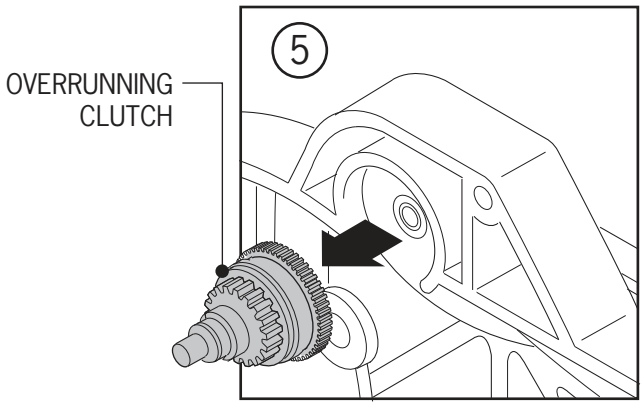
2. Remove the left crankcase cover .
3. Remove the driving pulley.
4. Remove the seat of the overrunning clutch.
5. Remove the overrunning clutch.

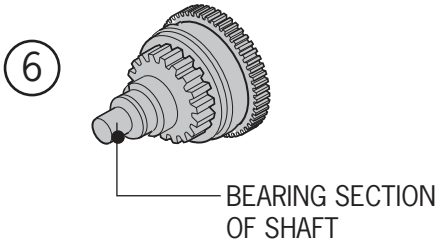
Checking and Assembling

6. Check if the bearing part of the overrunning clutch shaft is worn.
7. Check if the clutch runs smoothly.
8. Check the wear of the gear and the bearing part of the shaft.
9. Coat the bearing part of the clutch shaft with a bit of grease.
10. Assemble it in the opposite sequence of removal.



Overrunning Clutch



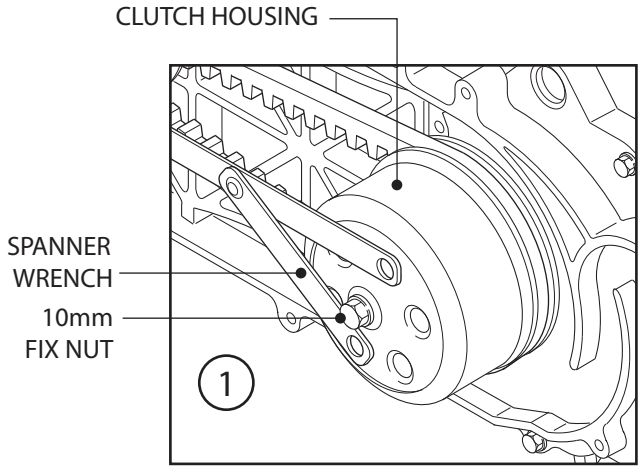


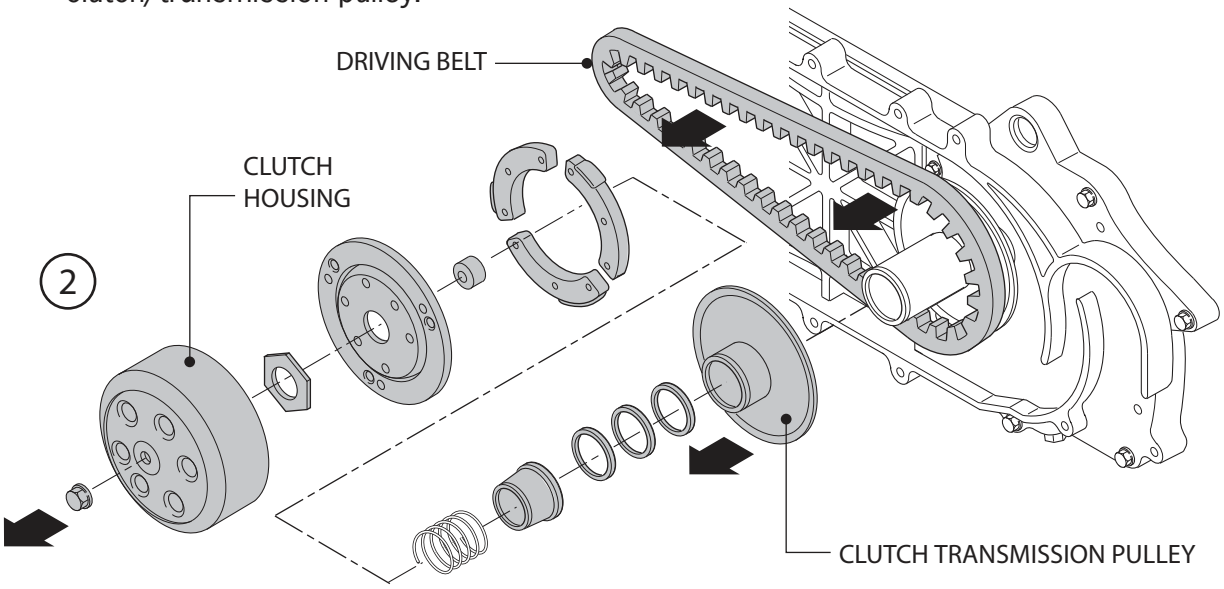
9. Driving Belt Device & The Starting Lever

The Clutch/Transmission Pulley Removing the Clutch/Transmission Pulley

1. Remove the driving pulley. Then use a spanner wrench to hold the clutch housing to screw out the 10mm (.39 in.) nut.

2. Remove the clutch housing. Remove the clutch/transmission pulley. Remove the driving belt from the clutch/transmission pulley.



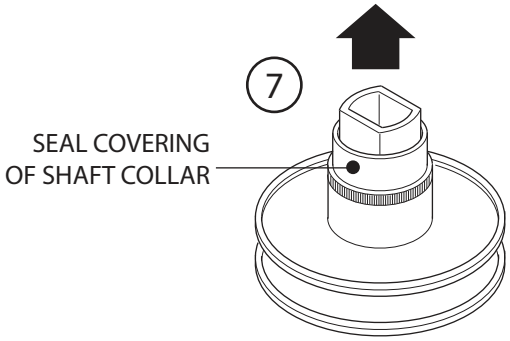


Disassembling the Clutch/Transmission Pulley

5. Use a spring compressor for the clutch spring to press down the transmission pulley spring to remove the special nut (28mm, 1.102 in.).

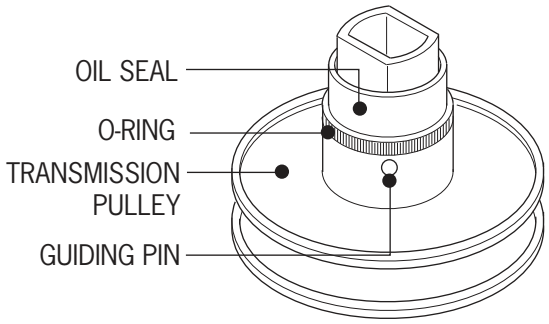
6. Remove the clutch spring.

7. Remove the sealing cover of the shaft collar.



9. Driving Belt Device & The Starting Lever

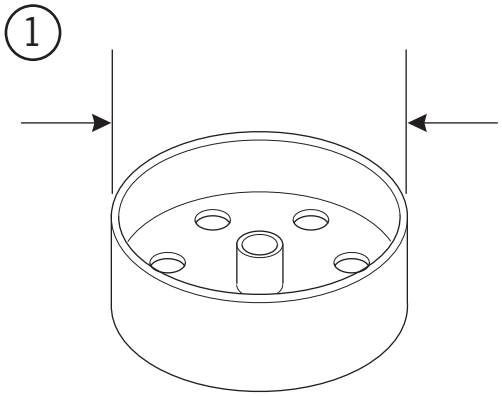
8. Remove the guide rolling pin from the transmission pulley assembly, and then take out the o-ring and the oil seal.



Checking the Clutch Transmission Pulley

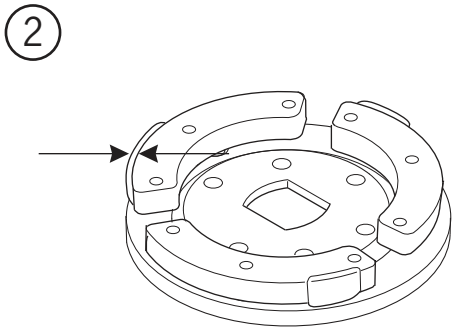
1. Check the wear of the clutch housing. Measure the ID of the clutch housing.

Maximum service allowance: Replace when it goes beyond 107.5mm (4.23 in.).



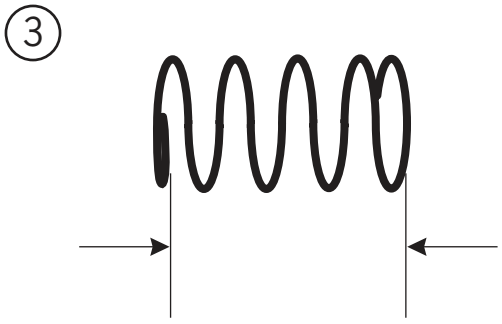
2. Check the wear of the clutch lining. Measure the thickness of the lining.

Maximum service allowance: Replace, when it is below 2.0mm (.078 in.).



3. Measure the free length of the transmission pulley spring.

Maximum service allowance: Replace when it below 92.8mm (3.65).



9. Driving Belt Device & The Starting Lever

4. Check the wear of the transmission pulley. Measure the OD of the pulley.

Maximum service allowance:
Replace when it is below 19.97mm (.79 in.).

5. Check the wear of the transmission pulley. Measure the ID of the pulley.

Maximum service allowance:
Replace when it goes beyond 24.24mm (.95 in.).

6. Check if the guide rolling pin is excessively worn or unevenly worn.
Replace as necessary.

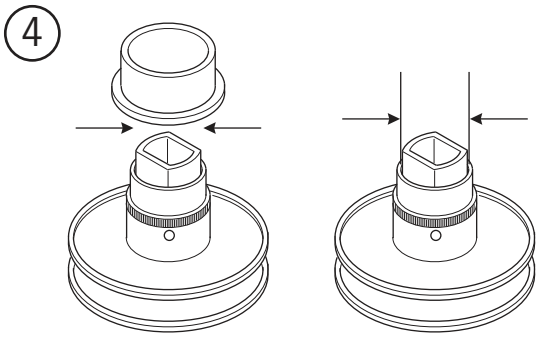
Replacing the transmission pulley and the bearing

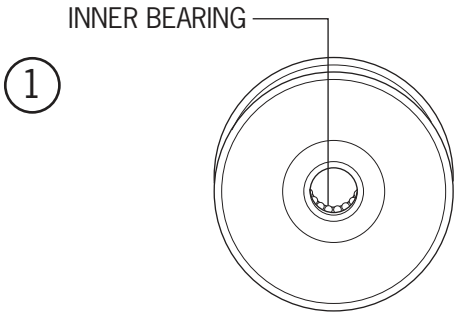
1. Check the needle bearing for wear or excessive free play, gritty feel or noise. Replace as necessary.

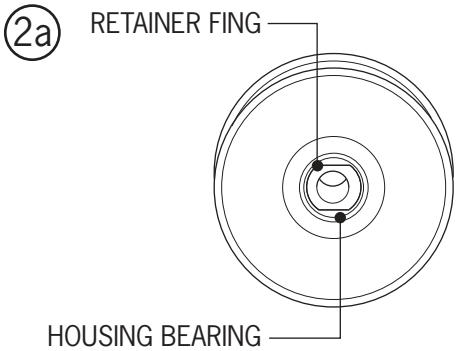
2. Check the housing bearing for wear. Remove the retainer and take out the housing bearing.

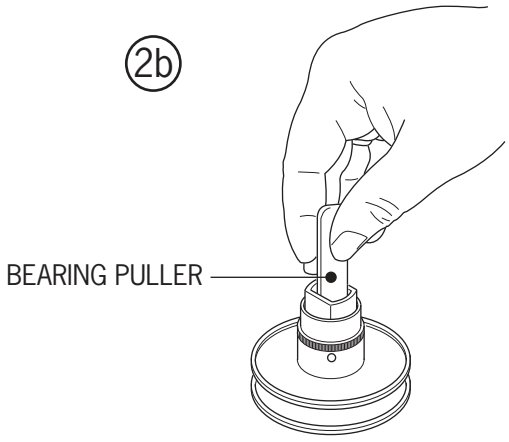
3. Drive in the new housing bearing, keeping the lid side up.

Attention:
Grease new bearings when installing. Grease able to resist > 230°.



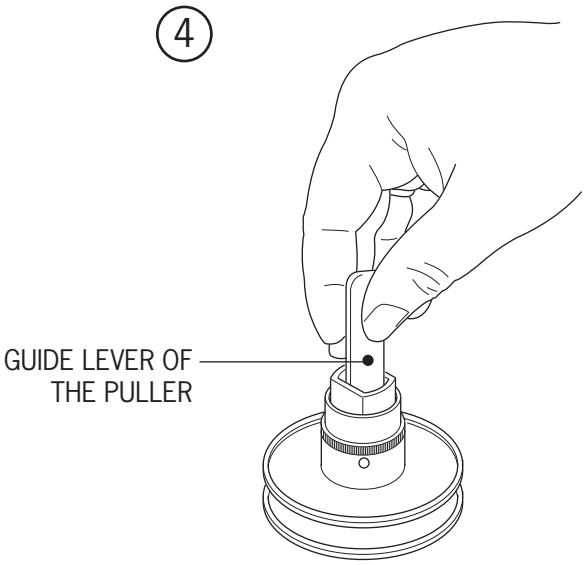






9. Driving Belt Device & The Starting Lever

4. Drive in the new needle bearing, keeping the “mark” side up.



The Clutch/Transmission Pulley Assembly

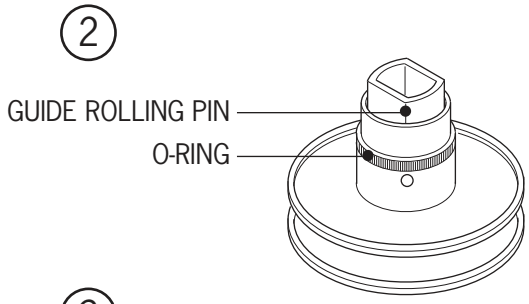
1. Assemble the transmission pulley guide pin and oil seal.

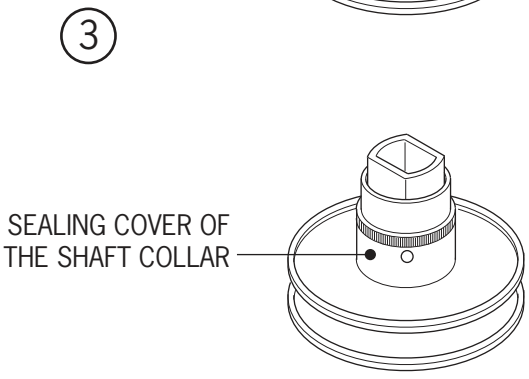
2. Install the sealing cover of the collar.

3. Assemble the transmission pulley disk and the spring to the clutch assembly, pressing down with the spring compressor for the clutch spring.

4. Install the 28mm fix nut and tighten it.

Torque: 5.0-6.0kg/m 35-40ft lbs





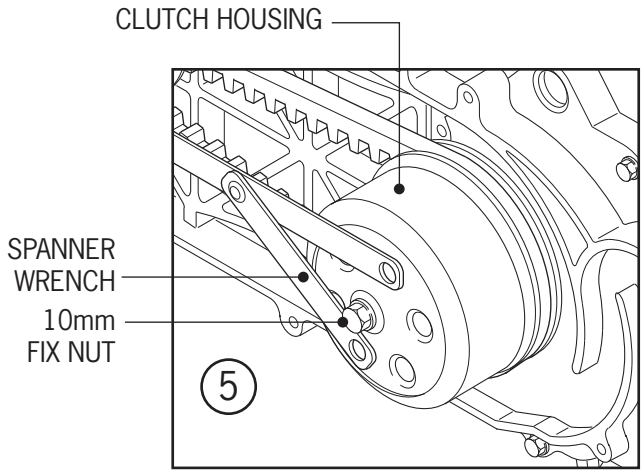
9. Driving Belt Device & The Starting Lever

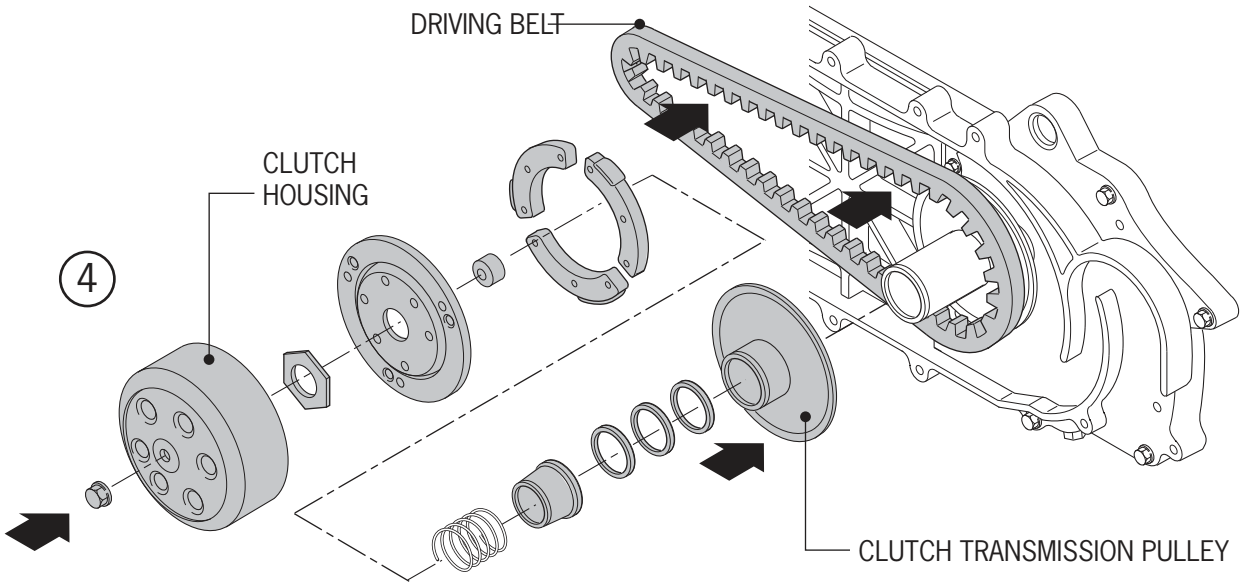
4. Assembling the clutch/transmission pulley, put the driving belt onto the clutch/transmission pulley, then onto the driving shaft.

Assembling the Clutch Housing

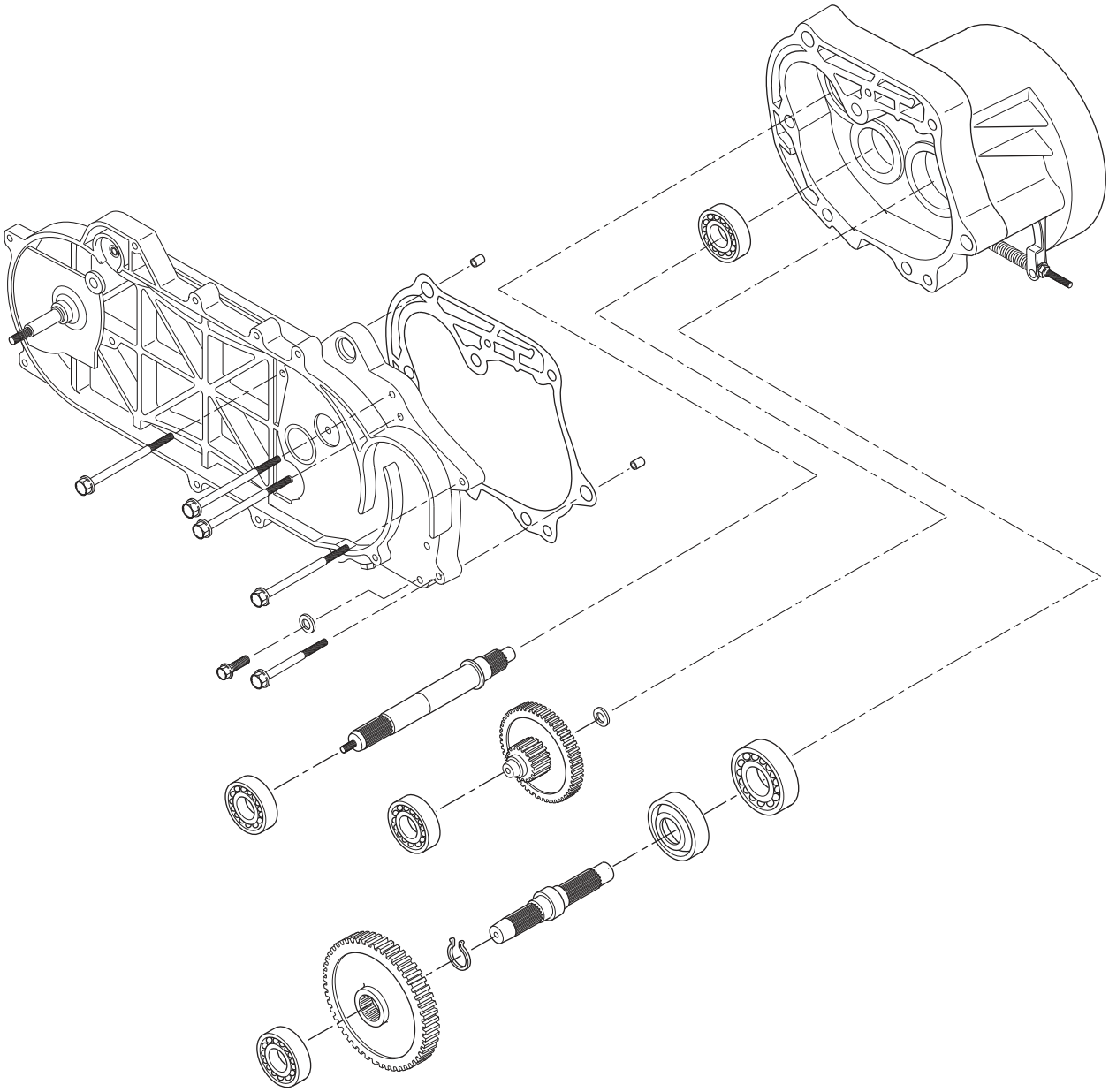
5. Use a spanner wrench to hold the housing, then install the 10mm (.39 in.) nut and tighten it.

Torque: 5.5kg/m 38ft lbs
Assemble the left crankcase cover.





10. The Final Transmission Assembly



10. The Final Transmission Assembly

Topic	Page	Topic	Page
General Information	10-2	Replacing the Bearing (on the side of the crankcase)	10-5
Dismantling the Final Transmission Assembly	10-3	Assembling the Final Gear Set	10-5
Replacing Bearing (on the side of the transmission gearbox cover)	10-4		

General Information

•Designated oil: SAE 90# Gear Oil
•Filling 0.12L 4 ounces
•Changing 0.10L 3.5 ounces



•Bearing pulling set 12mm
•Bearing pulling set 15mm
•Sleeve shaft for assembling the crankshaft
•Sleeve lever for assembling the crankshaft



•Bearing outer race driver 3740mm
•Bearing outer race driver 3235mm
•Guide lever for the bearing driver 17mm
•Guide lever for the bearing driver 15mm
•Guide lever for the bearing driver 12mm
•Bearing driver

Troubleshooting

The scooter doesn't run after the engine is started
•The transmission gear failed
•The driving belt is worn or broken
•The clutch failed

Developing abnormal noise when it runs
•The gear is worn, burnt or has damaged teeth
•The bearing is worn and getting loose

Oil leakage
•Too much oil
•The oil seal is broken

10. The Final Transmission Assembly

Dismantling the final transmission assembly

1. Remove the rear brake cable.

2. Remove the rear wheel (refer to 13-3).

3. Remove the left crankcase cover (refer to 9-2).

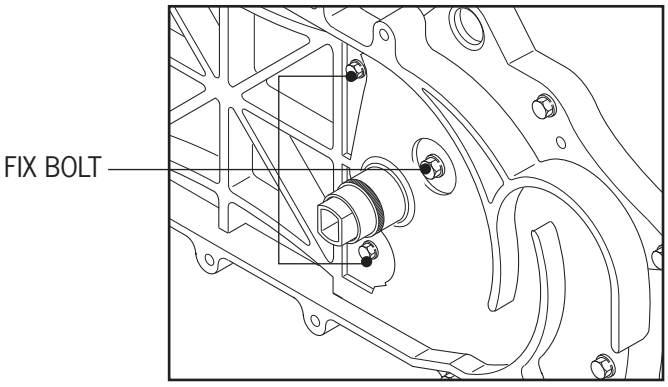
4. Remove the driven pulley of the clutch (refer to 9-5).

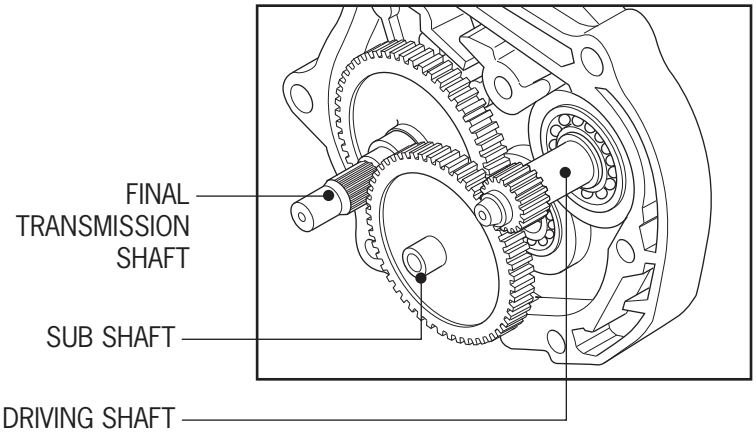
5. Drain the oil out of the final transmission.

6. Remove the bolts of the final transmission gearbox.

7. Remove the transmission gearbox cover.

8. Remove the gasket and the locating pin.



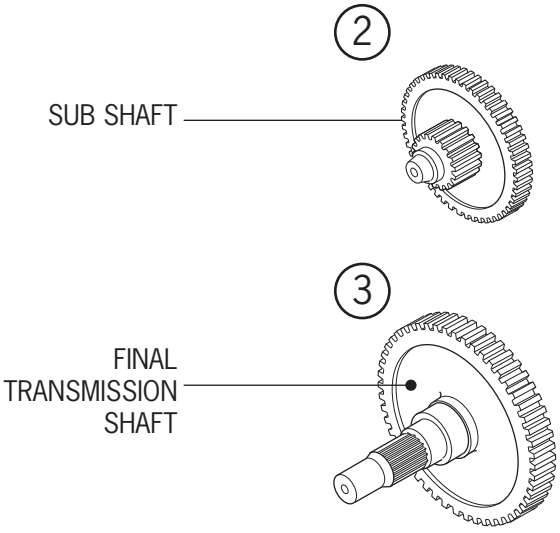


Detach the final transmission gearbox cover

1. Check the final transmission assembly.

2. Check if the sub shaft gear is worn or damaged.

3. Check if the final transmission gear is burnt or damaged.



10. The Final Transmission Assembly

4. Check if the bearing in the left crankcase and the oil seal are worn or damaged.

5. Check if the driving shaft (the main clutch shaft) and the gear are worn or damaged.

6. Check if the oil seal in the bearing of the transmission gearbox cover and that of the bearing of the final gear shaft are worn or have failed.

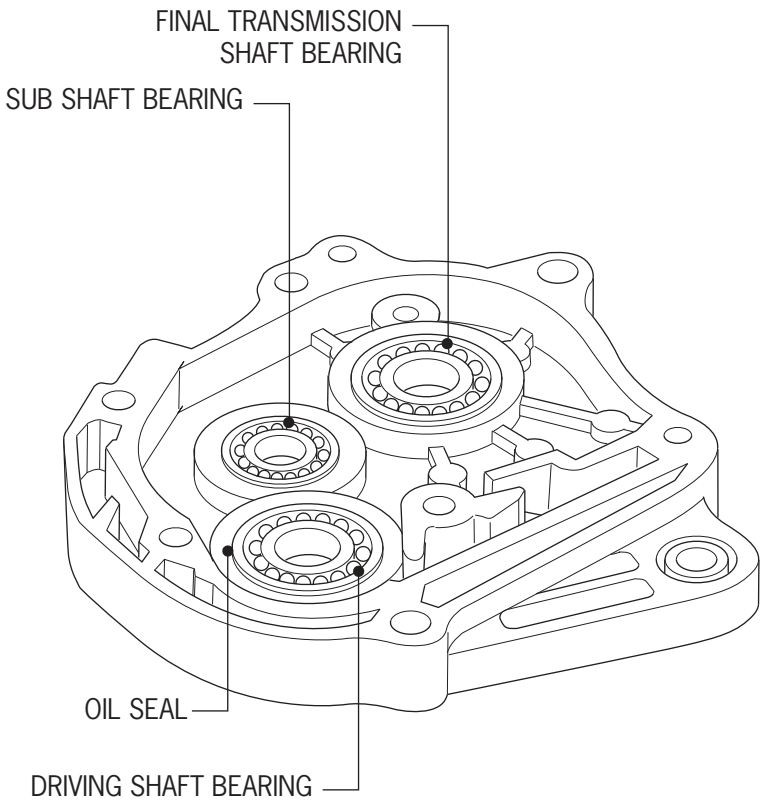
Attention:
Don't dismantle the final transmission gearbox, except that some parts have to be replaced. While replacing the driving shaft, the oil seal must be replaced by new ones.

Replacing Bearing (on the side of the transmission gearbox cover)

1. Use a bearing puller to remove the bearing in the final transmission gearbox.

2. Remove the oil seal on the final transmission shaft.

3. Drive in the new bearing to the final transmission cover.



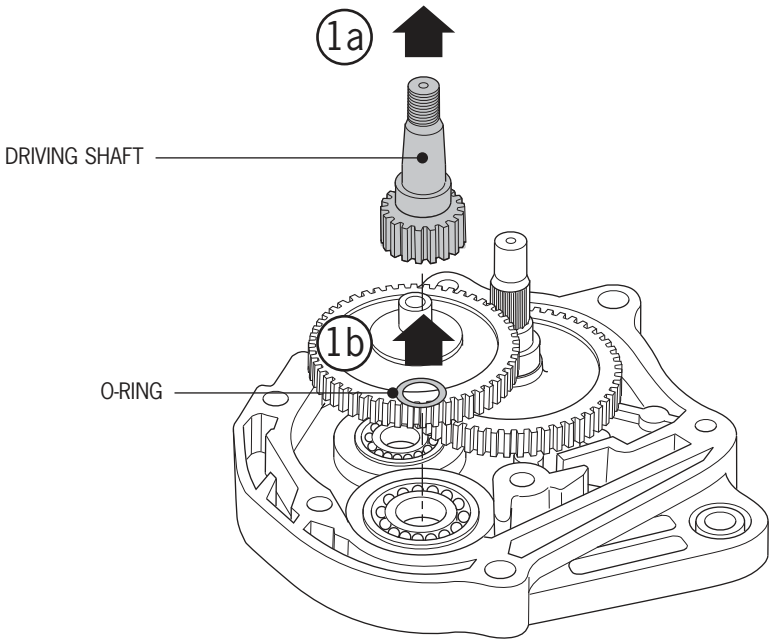
10. The Final Transmission Assembly

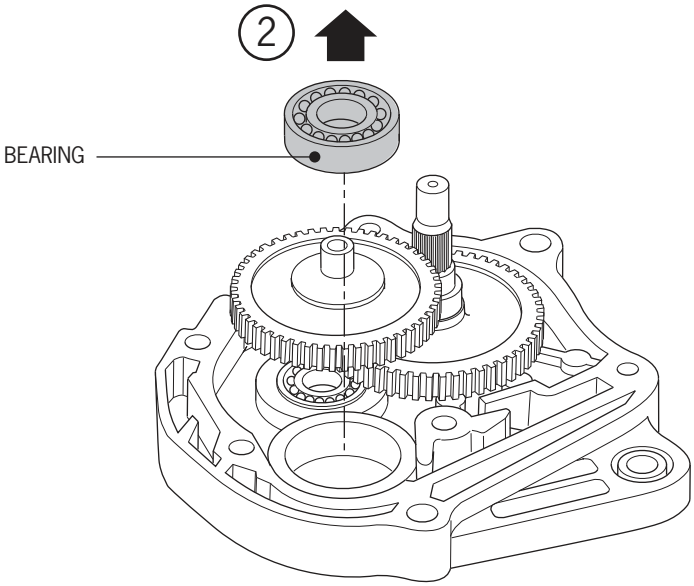
Replacing the Bearing (on the side of the crankcase)

1. Remove the driving shaft (the clutch main shaft).
Then remove the oil seal of the shaft.

2. Use a bearing puller to remove the bearing in the final transmission gearbox.

3. Drive the new bearing into the final transmission gearbox. Install the new oil seal fro the drive shaft.





Assembling the Final Gear Set

1. First, install the drive shaft into the final gearbox. Then install the final transmission gear shaft (output shaft) to the final gearbox.

10. The Final Transmission Assembly

3. Attach the sub shaft and the washer to the final transmission gearbox. Install the resin washer to the sub shaft; install the locating pin and the new gasket.

4. Put on the final gearbox cover.

5. Tighten the bolts of the final gearbox cover.

6. Assemble the clutch/driving pulley disk (refer to 9-8).

7. After assembling, fill the gear box with 90w gear oil (refer to 3-7).

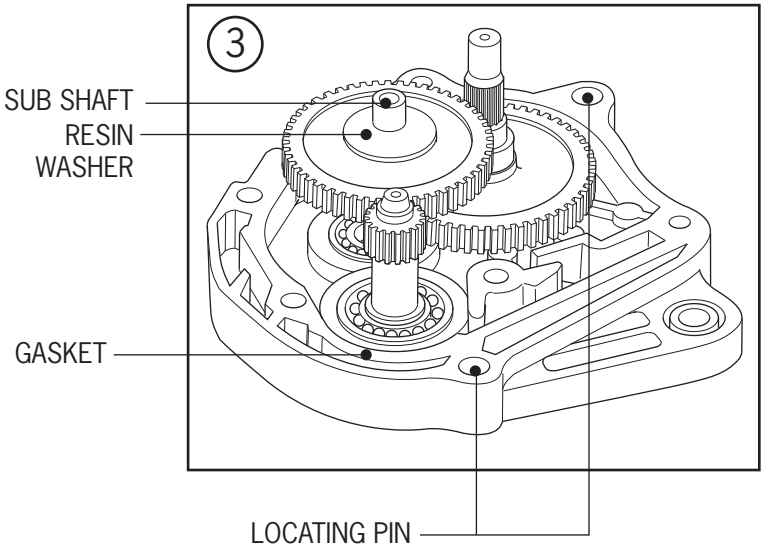
Designated gear oil: SAE 90#
Volume of the gearbox:
Filling: 0.12L 4 ounces
Changing: 0.10L 3.5 ounces

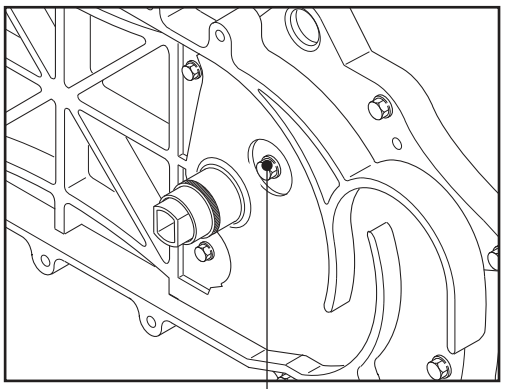
8. Screw up the oil screw and tighten it.

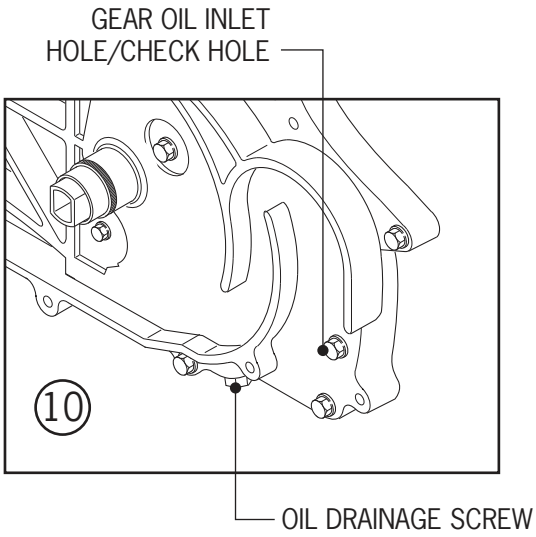
Torque: 1.0-1.4kg/m 8-10ft lbs

9. Start the engine to check if there is oil leakage.

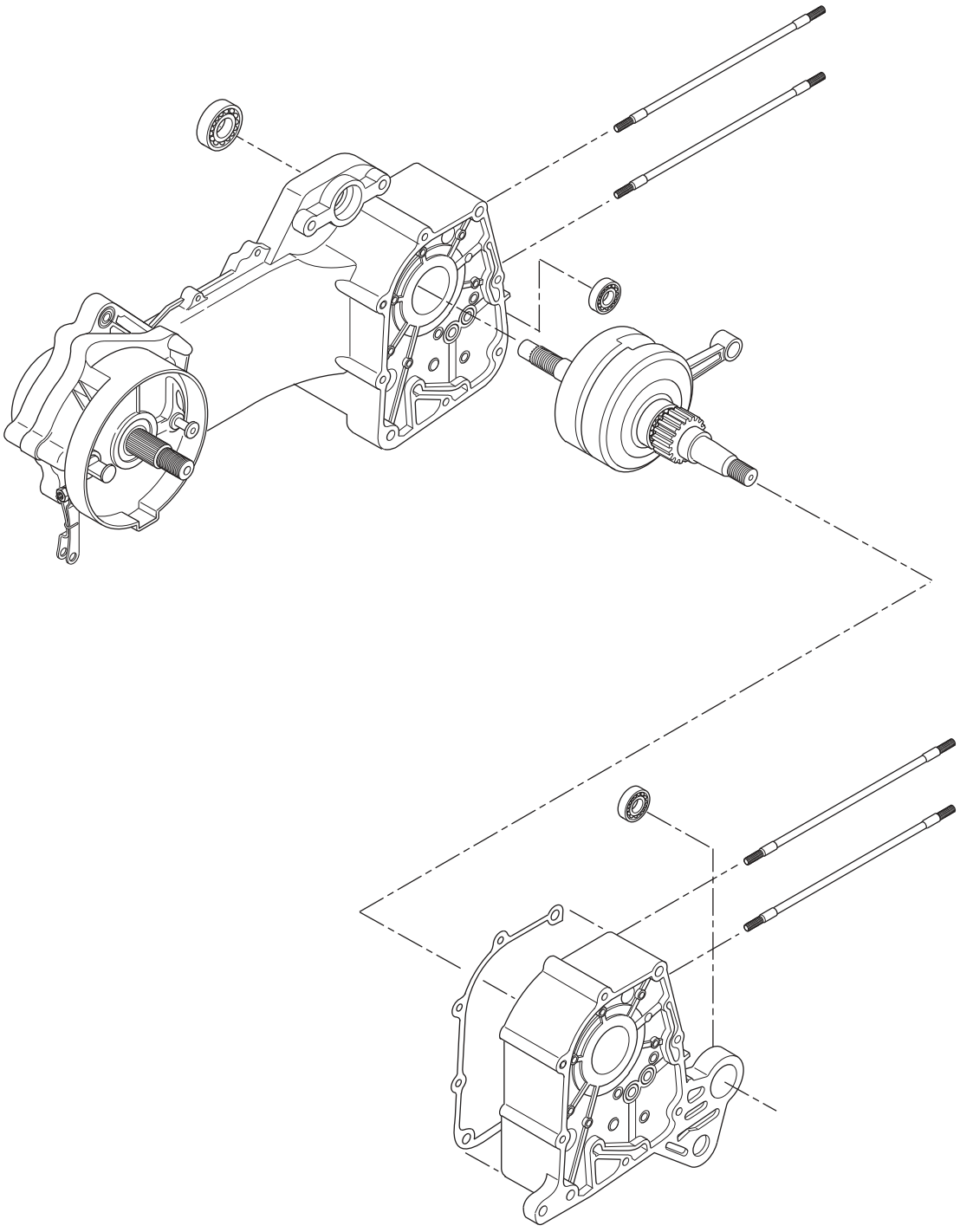
10. Check the oil level. Replenish it with the designated gear oil when the oil is not sufficient (through the oil checking hole).







11. The Crankcase and the Crankshaft



11. The Crankcase and the Crankshaft

Topic	Page
Important points	11-1
Diagnosis	11-1
Dismantling the crankcase	11-3
The crankshaft	11-4
Assembling the crankcase	11-5

Important Points

•The chapter gives instructions related to the crankshaft and dismantling the crankcase. Before striking, it's necessary to take the engine apart.

•Complete the following work before taking the crankcase apart. Remove the following:

•The cylinder head (refer to Chapter 7)

•The cylinder and the piston (refer to Chapter 8)

•The driving plate and the driven plate (refer to Chapter 9)

•AC generator (refer to Chapter 14)

•The carburetor and the air filter (refer to Chapter 14)

•The rear wheel and the rear buffer (refer to Chapter 13)

•The starting motor (refer to Chapter 16)

•The oil pump (refer to Chapter 4)

Tech Criteria

	Item	Normal size	Max. Service Allowance
Crankshaft	The clearance of the both sides of the big end of the connecting rod	0.10-0.35	0.55
	The clearance of X-Y directions of the journal of the big end of the connecting rod	0-0.008	0.05
	Run out		0.10

Torque:

Crankcase bolt	0.9kg/m 7ft lbs
Bolt for the chain adjusting guide lever cam	1.0kg/m 8ft lbs

Troubleshooting

Abnormal noise from the engine

•The crankshaft bearing is getting slack

•The crankshaft pin bearing is becoming loose

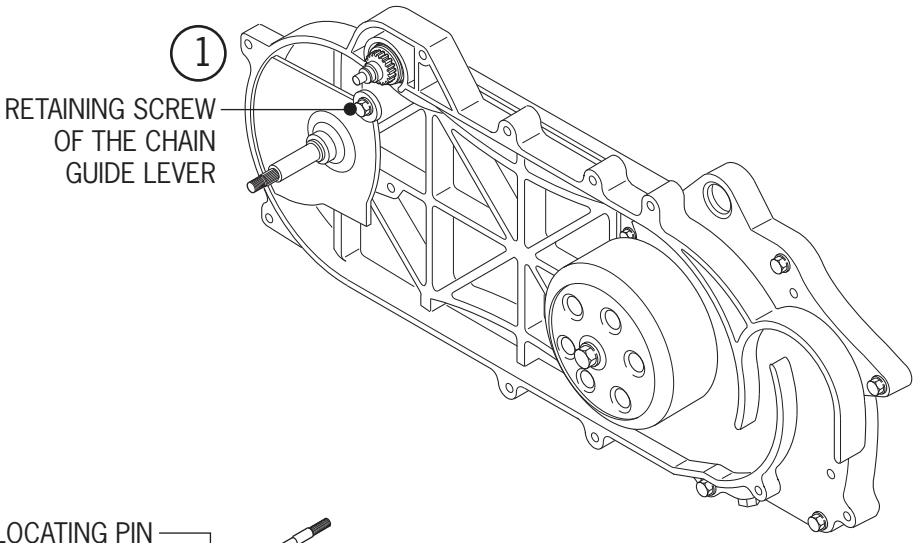
11. The Crankcase and the Crankshaft

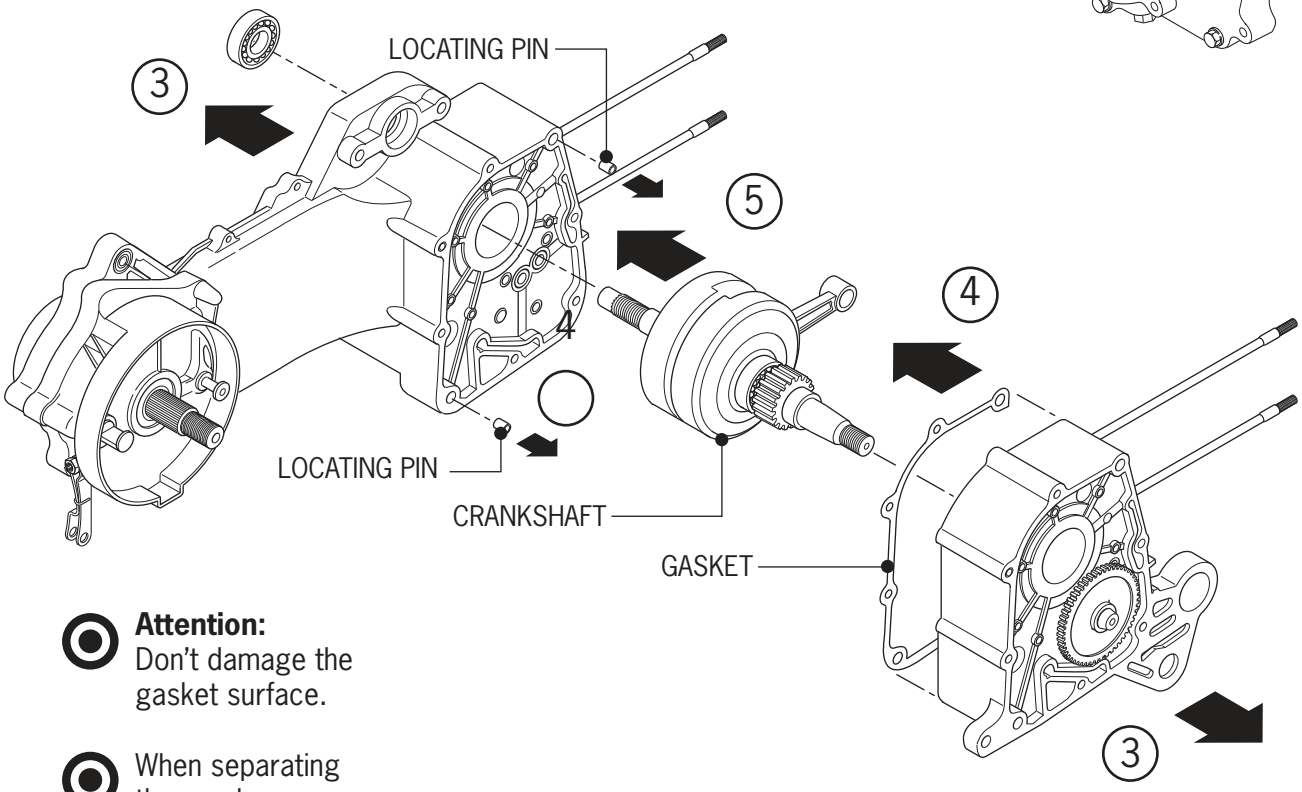
Dismantling the Crankcase

1. Detach the bolt of the chain adjusting guide lever of the cam and remove the lever.

2. Remove assembly bolts of the crankcase.

3. Dismantle the right and left crankcases.





Attention:
Don't damage the gasket surface.

When separating the crankcases, don't use a screwdriver to pry them apart.

4. Remove the gasket and the locating pin.

5. Remove the crankshaft from the crankcase.

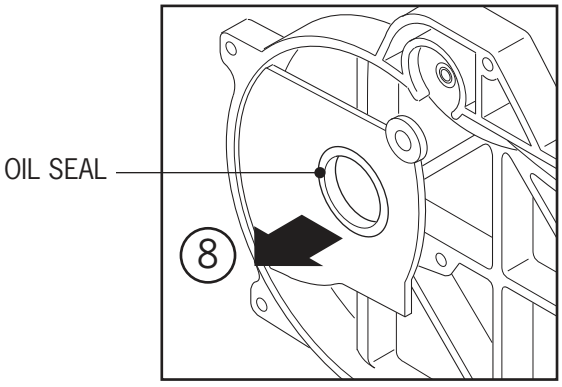
11. The Crankcase and the Crankshaft

7. Scrape the gasket away from the joint surfaces.

Attention: be sure not to scratch the joint surfaces.

8. Remove the oil seal from the left crankcase.

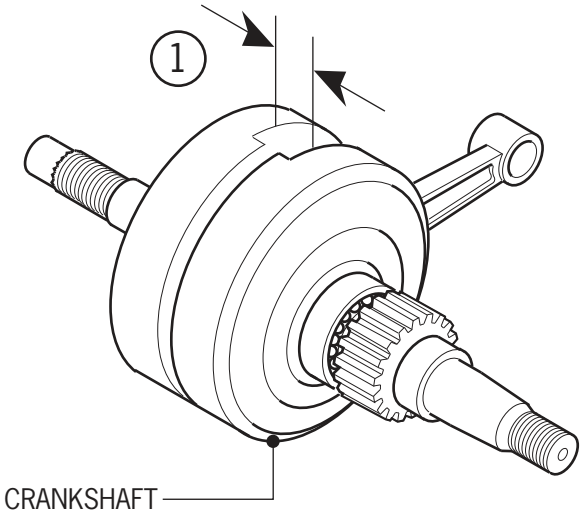
9. Remove the oil seal from the right crankcase.



The Crankshaft

1. Measure the left and right clearance between both sides of the big end of the connecting rod.

Maximum service allowance: Replace when it goes beyond 0.55mm (.02 in.).



11. The Crankcase and the Crankshaft

2. Check the clearance of the journal of the big end of the connecting rod in X-Y directions.

Maximum service allowance:
Replace when it goes beyond 0.05mm (.002 in.).

3. Measure the run-out of the crankshaft.

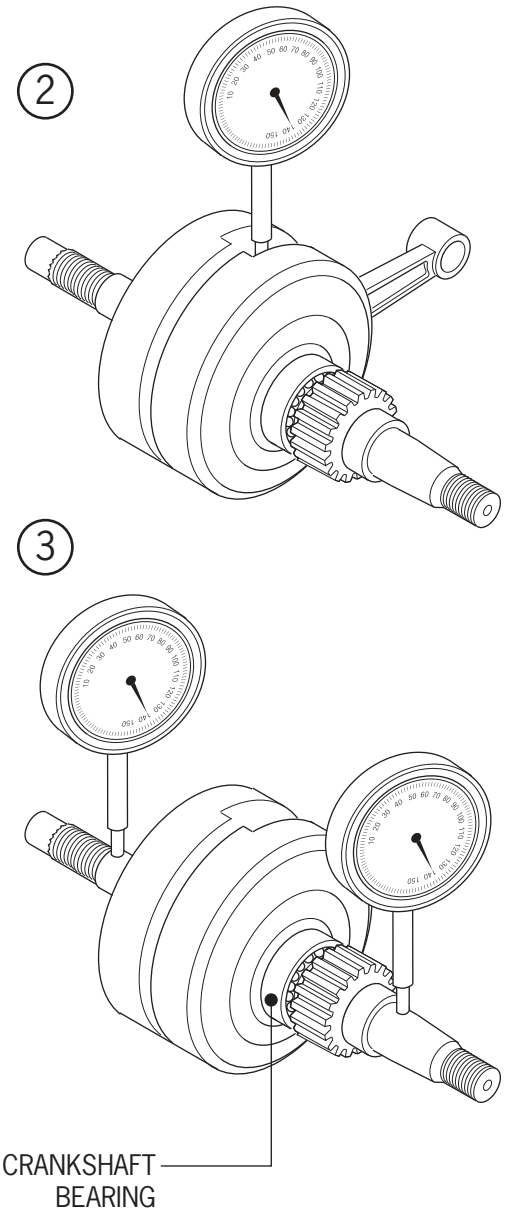
Maximum service allowance;
Replace when it goes beyond 0.10mm (.004 in.).

4. Check if there is any abnormal noise and looseness when the crankshaft bearing revolves. Replace totally if any abnormal noise/looseness is detected.

Assembling the Crankcase

1. Use the following tools to install the oil seal of the crankcase:

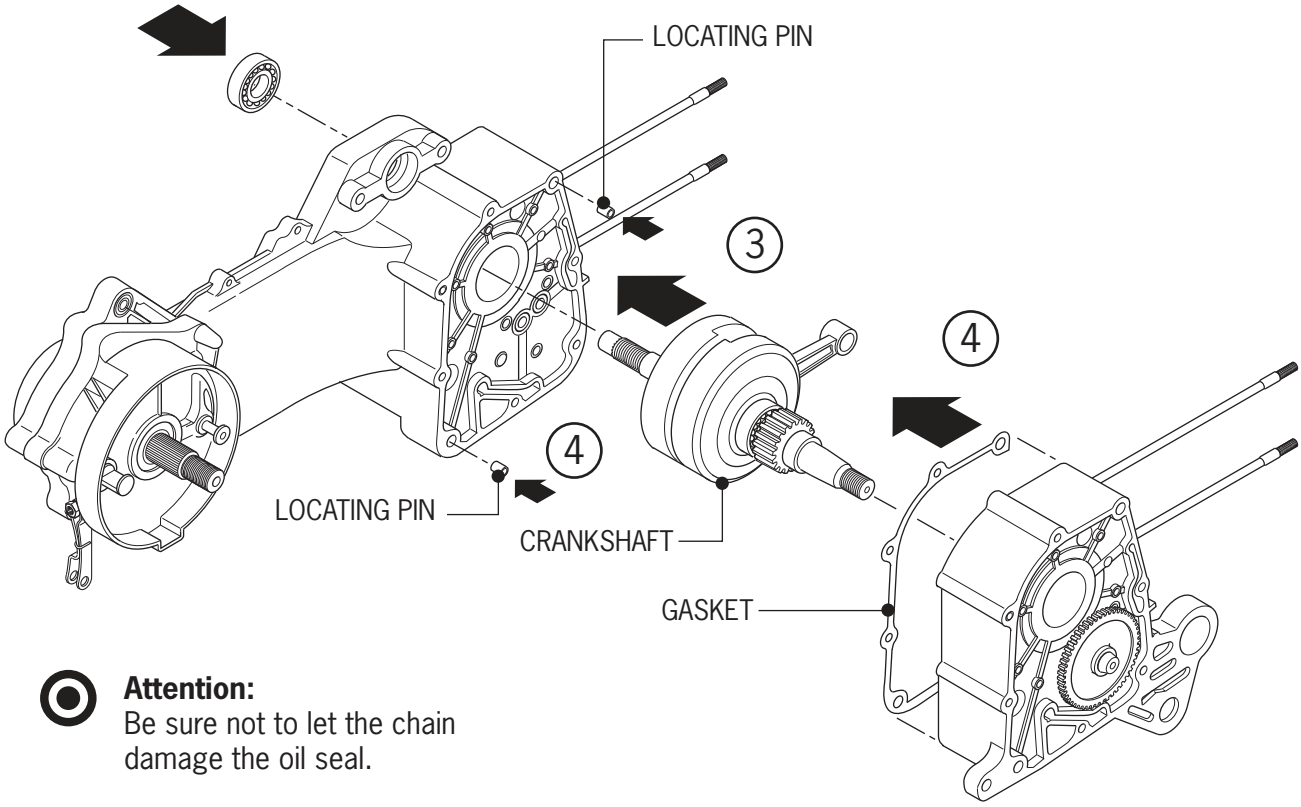
- Bearing outer race driver
- Bearing outer race 32x35mm (1.26 in. x 1.38 in.)



11. The Crankcase and the Crankshaft

2. Install the cam chain into the left crankcase.

3. Assemble the crankshaft into the left crankcase.



Attention:
Be sure not to let the chain damage the oil seal.

4. Put the new locating pin and the gasket onto the left crankcase.

Attention:
Keep the left crankcase downward to assemble with the right crankcase.

5. Tighten the bolts of the crankcase.

Torque: 0.9kg/m 7ft lbs

11. The Crankcase and the Crankshaft

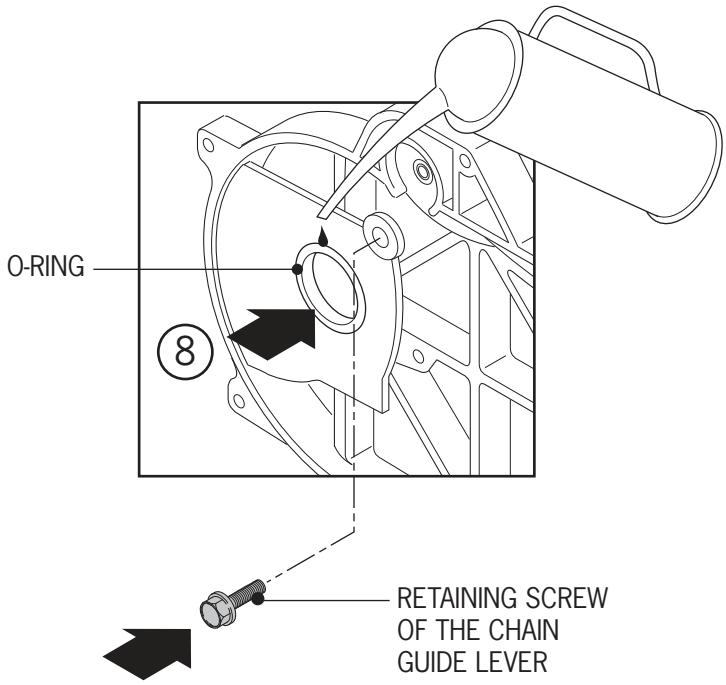
6. Install the cam chain adjusting lever.

7. Install the o-ring onto the bolt of the chain adjusting lever.

8. Coat the o-ring with oil, and then lock it.

Torque: 1.0kg/m 8ft lbs

Attention:
Be sure to put the o-ring into the groove.

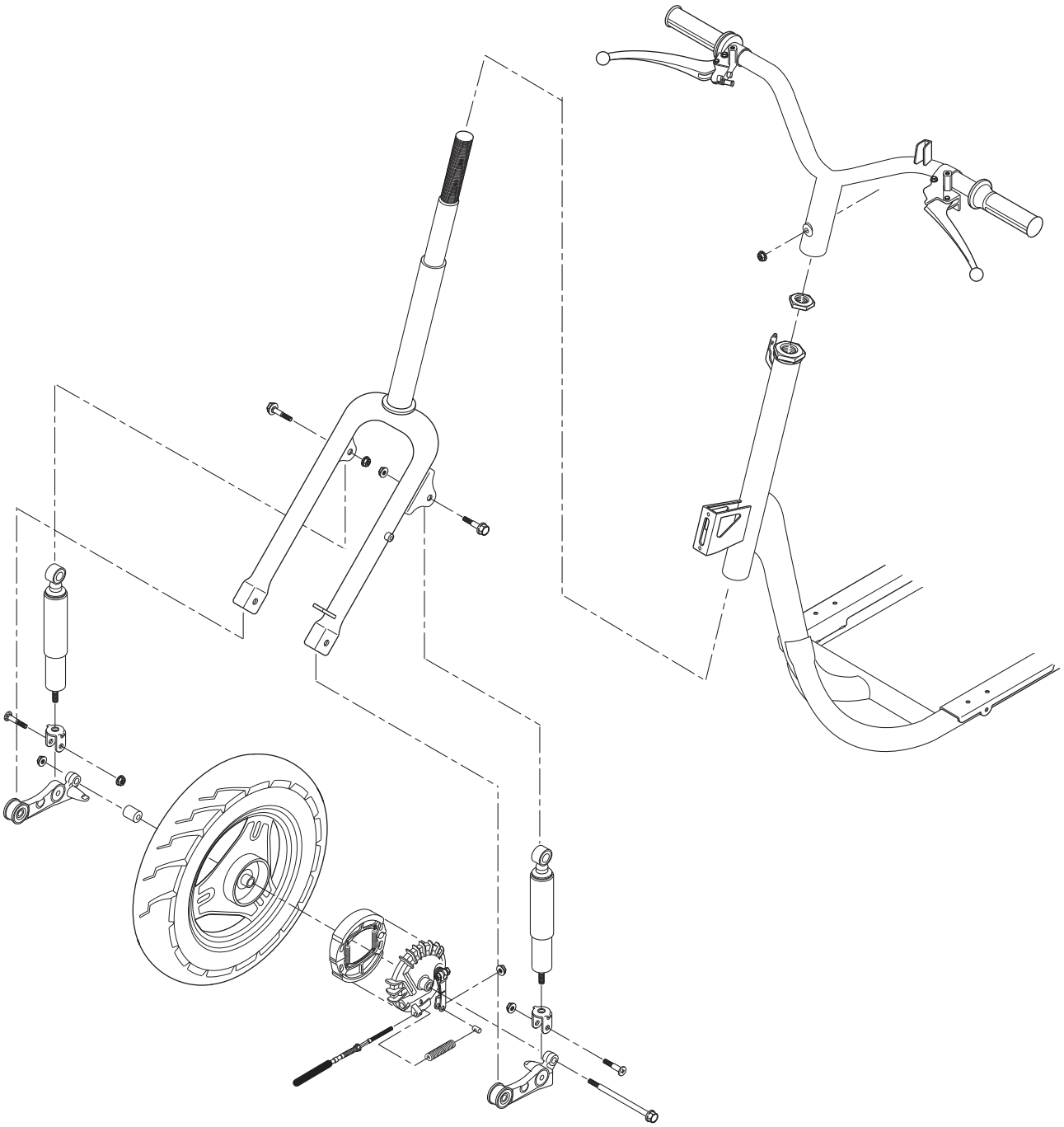


11. The Crankcase and the Crankshaft

MEMO

12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

Topic	Page	Topic	Page
Instructions	12-2	Dismantling the Front Shock	12-10
Troubleshooting	12-3	Assembling Sequence	12-11
Removing the Steering Handlebars	12-4	The Front Fork	12-12
Assembling the Steering Handlebars	12-4	Replacing the Ball Cone Race	12-12
Front Wheel Removal	12-5	Replacing the Upper Race	12-12
Dismantling of Wheel	12-6	Assembling the Upper Race	12-13
Assembly of Wheel	12-7	Checking the Brake Lining	12-14
Assembling the front wheel	12-8	Dismantling the Front Brake	12-14
Dismounting the Front Shock	12-9	Assembling the Front Brake	12-14

Notes:
When detaching the front wheel, use a jack at the bottom of the frame to support it. Make sure that the scooter won't overturn when the front wheel is away from the ground. During operation, be sure not to let oil get into the brake hub or onto the brake lining.

Tech Criterion

Item		Normal Size	Limit (mm)
Bending of the wheel axle		——	0.2 (.197 in.)
Runout of the front wheel rim	Longitudinal Hop	——	2.0 (.079 in.)
	Transversal Wobble	——	2.0 (.079 in.)
ID of the front brake hub		110 (4.33 in.)	111(4.36 in.)
The thickness of the brake lining		4.0 (.157 in.)	2.0 (.079 in.)
The free length of the front shock spring		202.5 (7.97 in.)	198 (7.78 in.)

Torque

The steering lever	*4.0-5.0kg/m 30ft lbs*
The nut of the steering lever	*8.0-12.0kg/m 50-60ft lbs*
The top race of the steering lever	*0.5-1.3kg/m 40-70in lbs*
The nut of the front buffer	*2.0-2.5kg/m 16ft lbs*
The nut of the front wheel axle	*4.5-5.0kg/m 30ft lbs*
The bolt of the brake rock arm	*0.4-0.7kg/m 30-50in lbs*

12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork



Spanner wrench
Outer race puller 28x30mm
Compressor for the shock absorber
Withdrawal tool for the ball bowl
Pliers for the inner retainer ring



Drive bar
Outer race driver 37x40mm
Dismantling lever 10mm
Bearing puller
Bearing puller bar 10mm
Spring compressor

Diagnosis
- The steering lever is too heavy
- The top race of the lever is too tight.
- The ball is broken in the steering mechanism.
- Low tire pressure.

The steering lever is uneven
- The right and left shocks are uneven.
- The front fork is crooked.
- The front axle is bent.

Poor brake function
- Improper brake adjustment.
- Worn brake lining.
- Dirty brake lining.
- Worn camshaft of the brake lining.
- The brake hub is worn.
- Loose brake actuator arm.

Bad brake function (disk brake)
- Air is entering the brake system.
- Brake fluid is deteriorated.
- Dirty and failed brake disk liner and/or brake disk.
- Worn brake pads.
- The oil seal and the piston are worn (of the main cylinder).
- Clogged brake fluid passage.
- Deformed brake disk.
- One side of the brake caliper is worn.

The front wheel wobbles
- Deformed rim.
- Bearing of the front wheel is getting slack.
- Deformed wheel rib.
- Uneven tire mounting or wear.
- Loose axle.

The front shock is too weak
- Spring is soft, worn or broken.
- Low oil level in fork.

The front shock is producing abnormal noise
- Fork is misaligned.
- Bolt of the front fork is getting loose.
- Low oil level in fork.

12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

Removing the Steering Handlebars

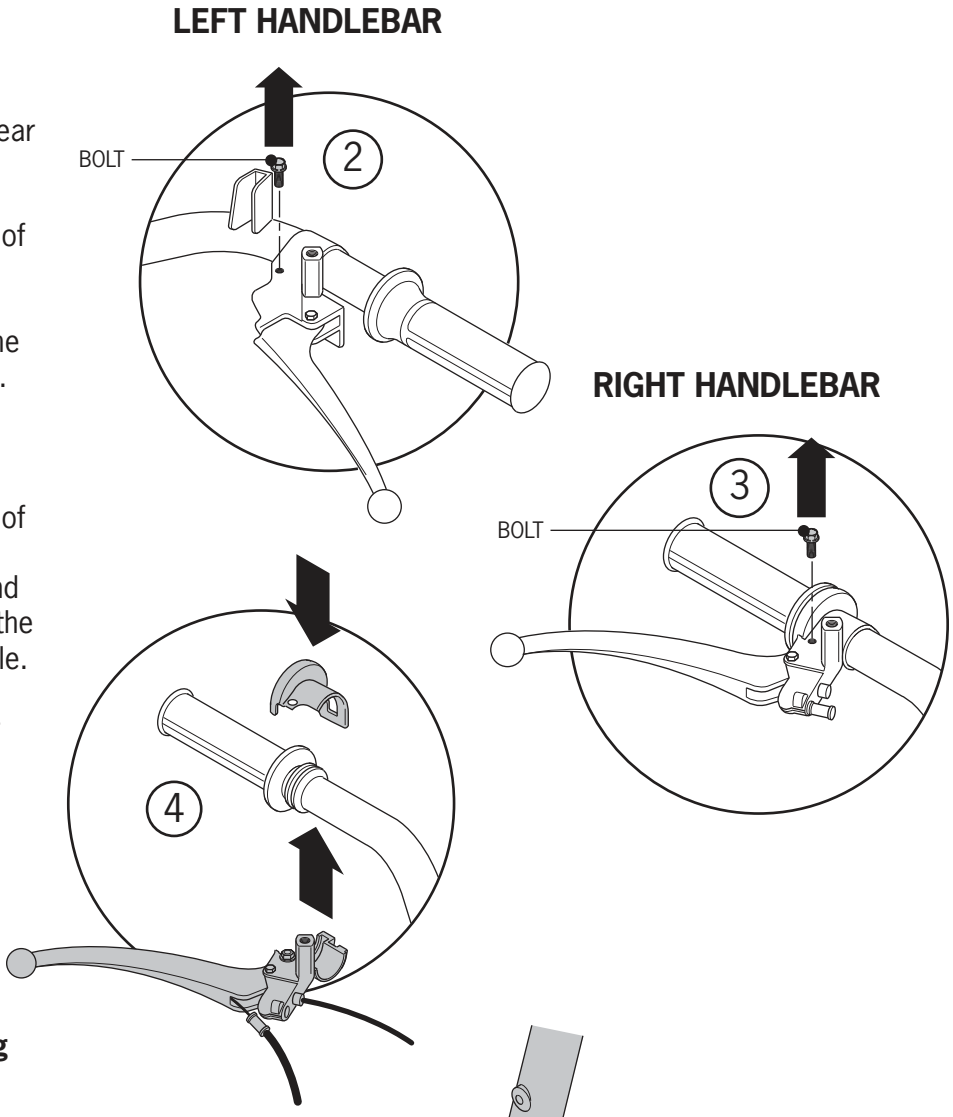
1. Detach the front and rear covers of the handlebars.

2. Remove the two bolts of the left brake lever.

3. Remove the bolts of the right hydraulic brake drum. These parts may be one assembly.

4. Remove the two bolts of the throttle control and remove the throttle grip and the cable. Finally, remove the throttle grip from the handle.

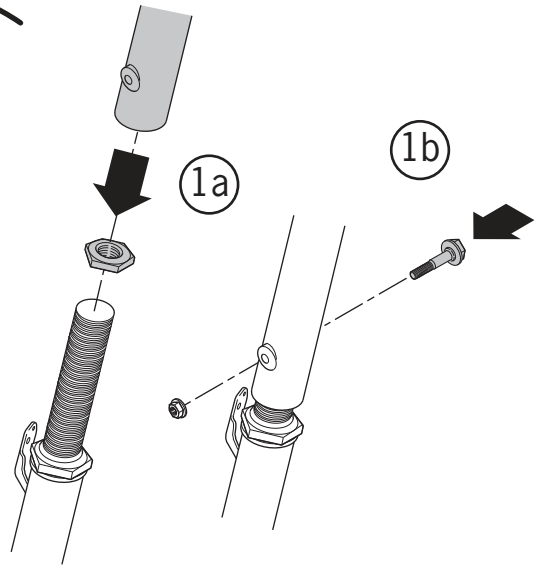
5. Remove the handlebar clamp bolts.



Assembling the Steering Handlebars

1. Align the lug of the handlebar clamp to the groove of the steering lever, then install and tighten the bolt.

Torque: 4.0-5.0 kg/m
28-35ft lbs



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

3. Coat the end of the throttle grip with grease.

4. Install the throttle grip and then the cable.

5. To assemble, reverse order of disassembly steps.

Front Wheel Removal

1. Lift the frame to make sure the front wheel is off the ground. Support the scooter in this position.

2. Detach the screw of the speedometer cable and remove the cable.

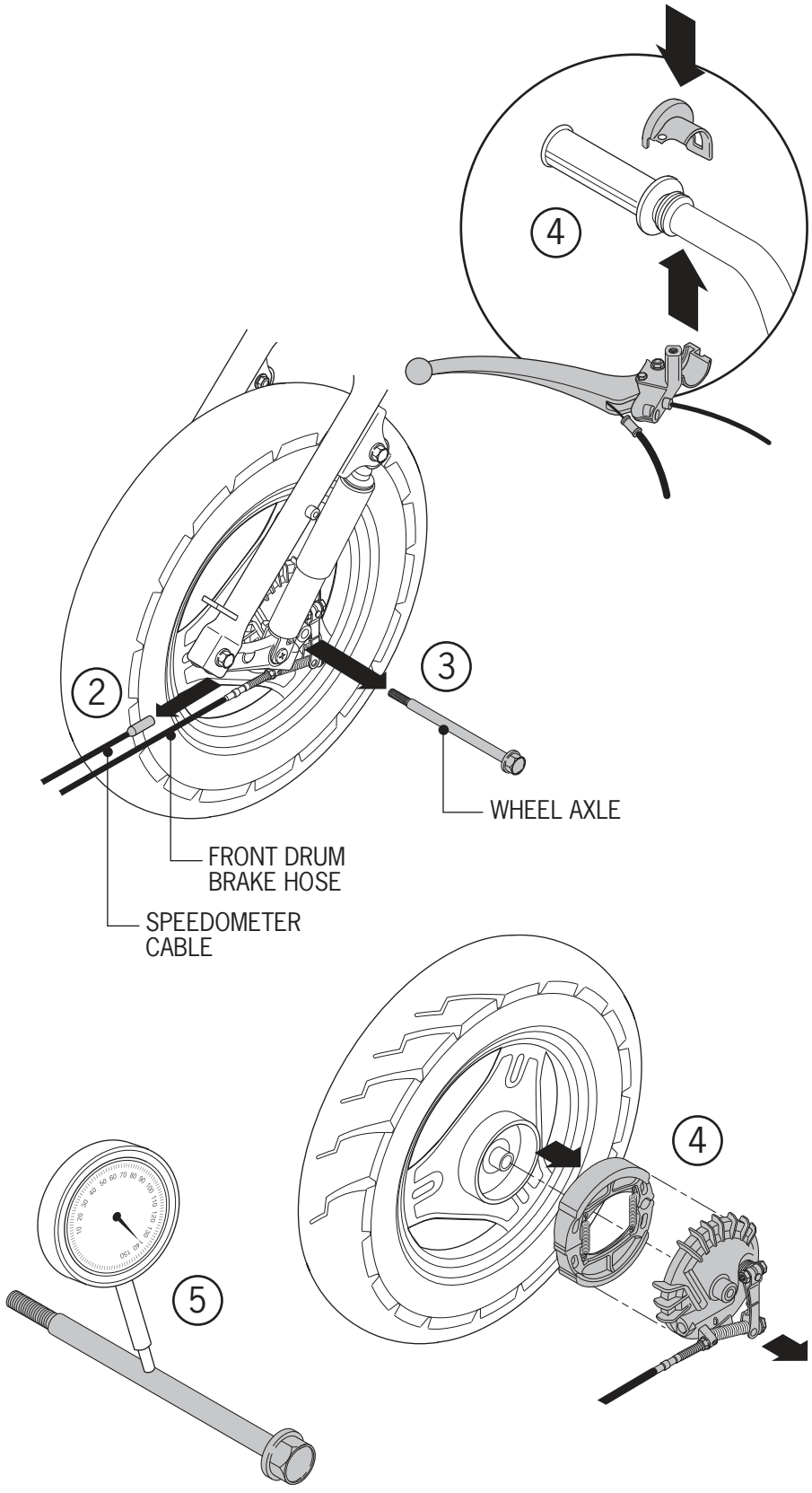
3. Remove the nut of the front wheel axle; take out the axle and the wheel.

4. Remove the drum disk and the collar.

Checking

5. Check the straightness of the axle. The meter indicates 1/2 of the total bending value.

Maximum service allowance: Replace when it goes beyond 0.2mm (.008 in.).



12. The Front Wheel, Front Brake,

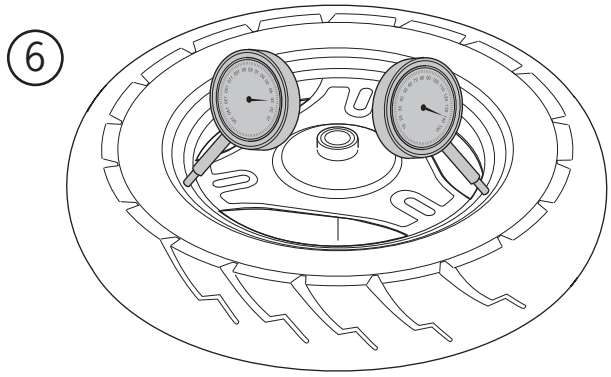
Front Buffer and the Front Fork

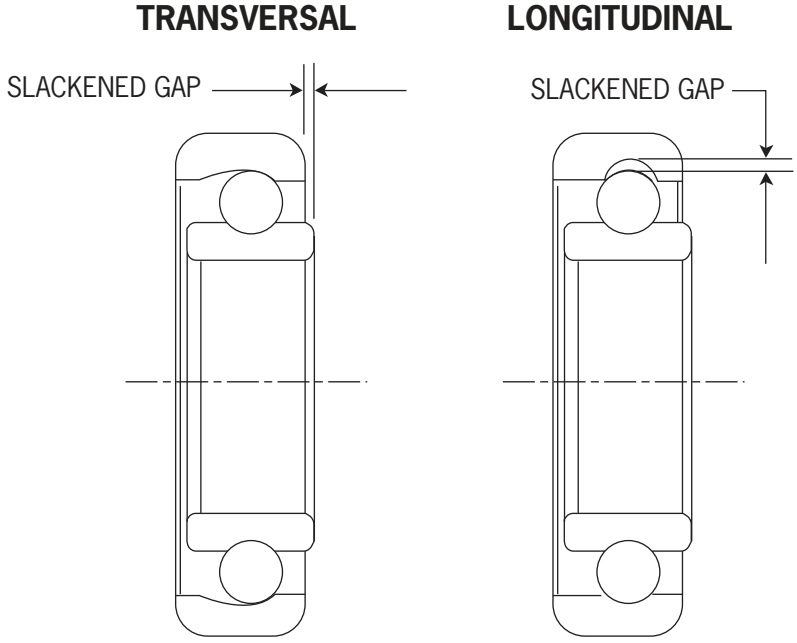
6. Check the run-out of the wheel rim.

Maximum service allowance:
Hop-longitudinal 2.0mm (.079 in.)
Wobble-transversal 2.0mm (.079 in.)

7. Replace when it goes beyond the above value.

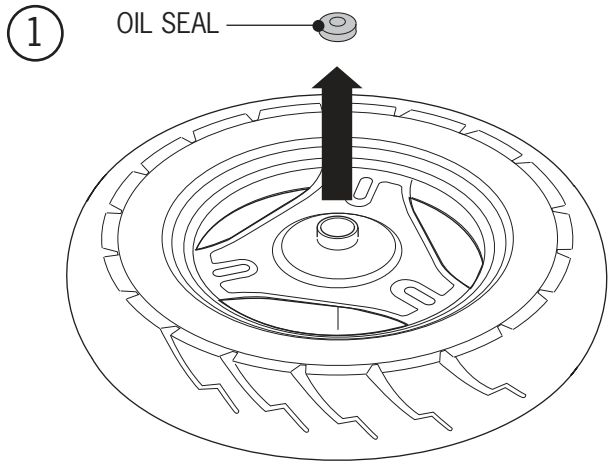
8. Replace the bearing when it produces abnormal noise or gets loose.





Dismantling of Wheel

1. Remove oil seal.



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

2. Detach the rim bearing and the spacer.

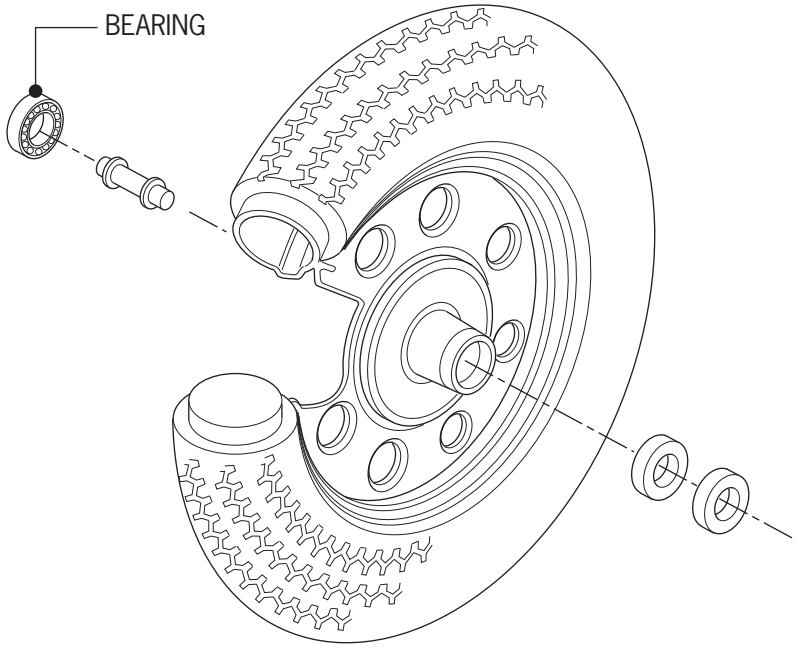
Assembly of Wheel

1. Fill the bearing with grease

2. Drive the left bearing first.

3. Install the spacer, then drive in the right bearing.

Attention:
Keep the oil (dust) seal side of the bearing outwards, then drive it evenly.



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

6. Coat the oil seal with grease, and then install it.

7. Attach the collar.

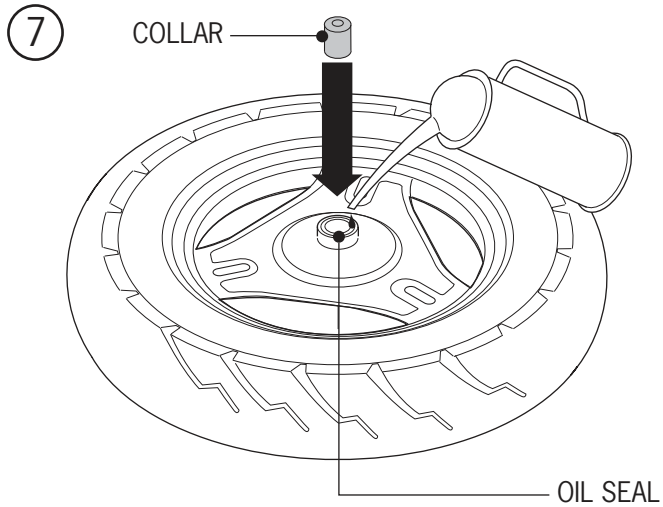
Assembling the front wheel.

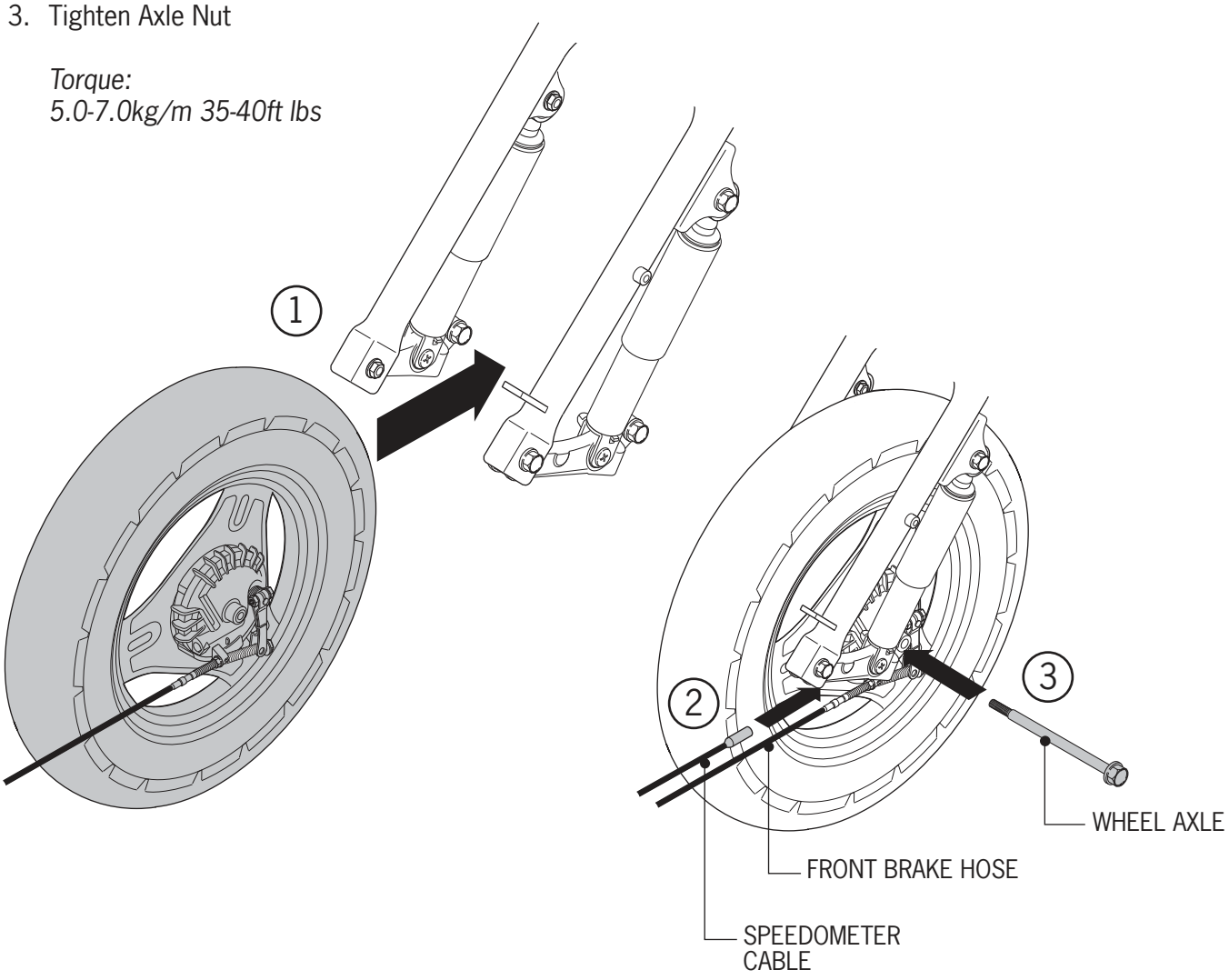
1. Point the lug of the gear bank of the speedometer to the notch of the front fork leg. Then assemble the front wheel.

2. Install the speedometer and adjust its routing.

3. Tighten Axle Nut

Torque:
5.0-7.0kg/m 35-40ft lbs





12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

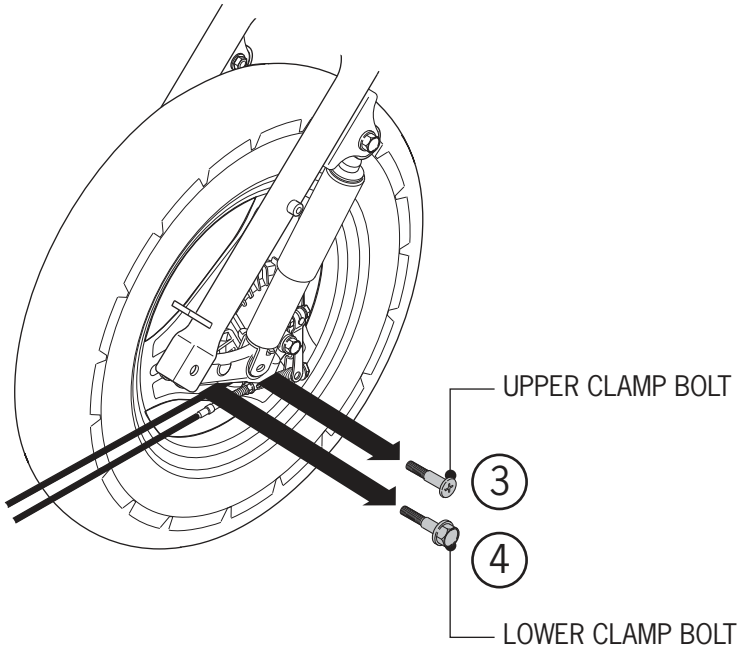
Dismounting the Front Shock

1. Remove the front wheel (refer to 12-4).

2. Remove the lower front cover (refer to 2-1).

3. Remove the upper clamp bolt.

4. Loosen the lower clamp bolt to take out the front shock.



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

Dismantling the Front Shock

1. Remove the oil/dust seal.

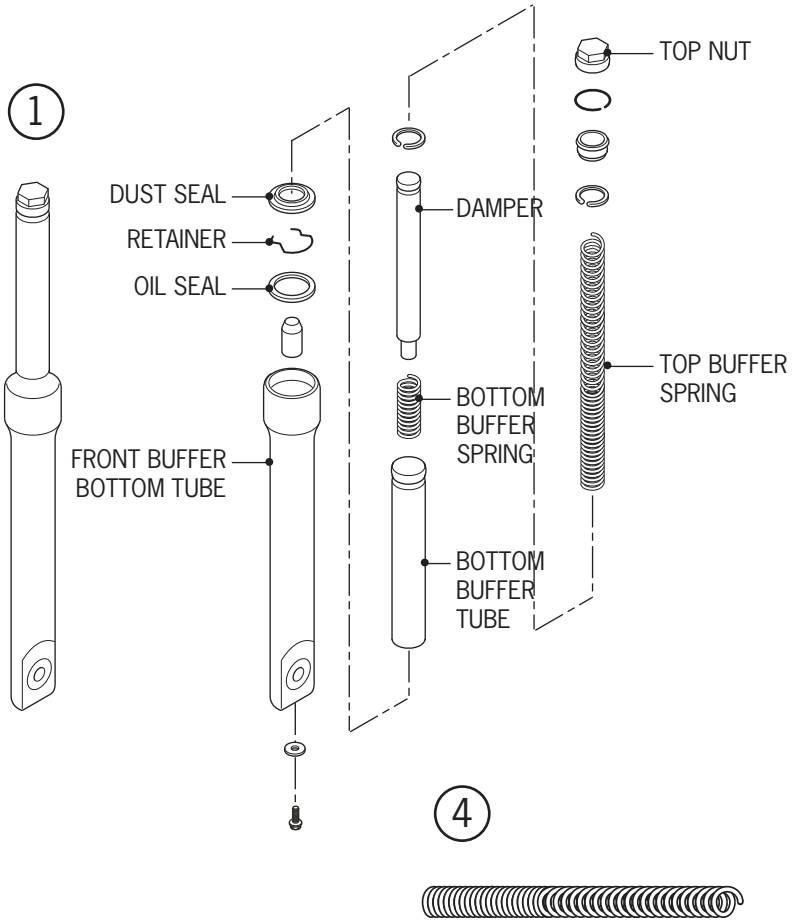
2. Remove the outer retainer.
Use a bench vise to hold the front fork bottom tube to remove the guide lever of the damper, the socket hex-head bolt and the copper washer.
Use a bench vise to hold the front fork tube.

3. Remove the top nut, the spring, the damper and the buffer spring.

Attention:
When fixing the front fork tube, use a cloth to wrap it and don't exert too much force.

4. Measure the free length of the spring.

Max. service allowance:
198mm (7.8 in.)



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

5. Install the buffer spring on the guide lever of the damper, then into the front fork tube. Then install the buffer spring and lock the nuts.

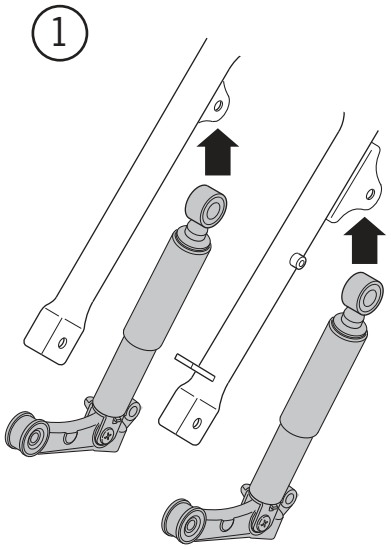
Attention:
When laying down the spring, keep the coil-tight of it down.

6. Use a bench vise to secure the shock bottom tube, and then tighten the socket bolt.

7. Spread the thread locking compound to the washer and the bolt, and then tighten them up together.

Torque: 1.5-3.0kg/m 10-15ft lbs
Designated: Special damper oil
Volume: 85ml (30 ounces)

8. Attach the outer retainer and then the dust-proof cover.



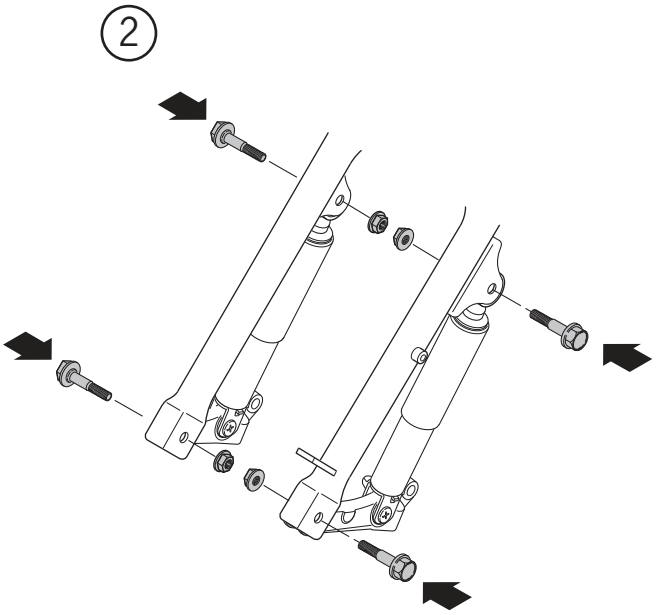
Assembling Sequence

1. Attach the front shock.

2. Install down the upper clamp bolt. Tighten the lower and upper clamp bolts.

Attention:
Make sure that the joint of the upper bolt hole and the groove of the front fork tube (front damper) are properly aligned.

3. Attach the front wheel (refer to 12-4).



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

The Front Fork

Front fork removal

1. Detach the handlebar (refer to 12-3).

2. Remove the front wheel (refer to 12-4).

3. Remove the cable of the speedometer, the rear brake cable, the front brake hose and the front brake caliper.

4. Remove the top race of the steering lever and slide them out of the steering tube.

5. Check if the ball race and the balls on the cone race are worn or failed. Replace as necessary.

Replacing the Ball Cone Race

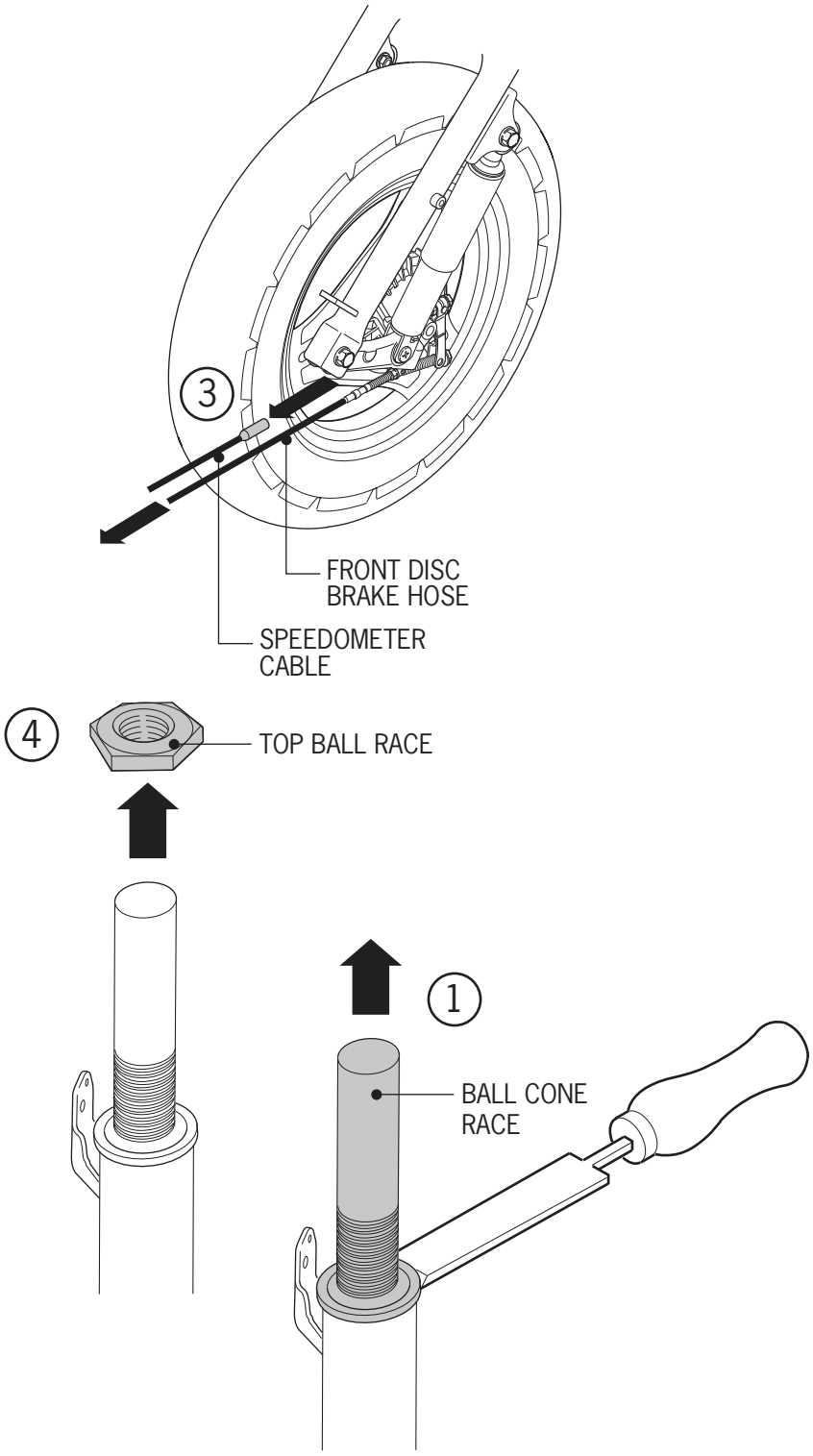
1. Remove the race with a chisel and hammer.

Attention:
Don't damage the steering lever and the front fork.

2. Use a suitable driver to drive in the new cone race into place.

Replacing the Upper Race

1. Remove the upper race using a puller or prying tool.



12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

2. Press in the new race.

Attention:
Be sure to press the race all the way into place.

Assembling the Upper Race

1. Coat the race with grease and set the race into the sleuth. Then coat the race with grease.

2. Install the front fork.

3. Coat the top race with grease and set it in place.

4. After tightening the top race, turn it back and forth several times to make the bearing set into place.

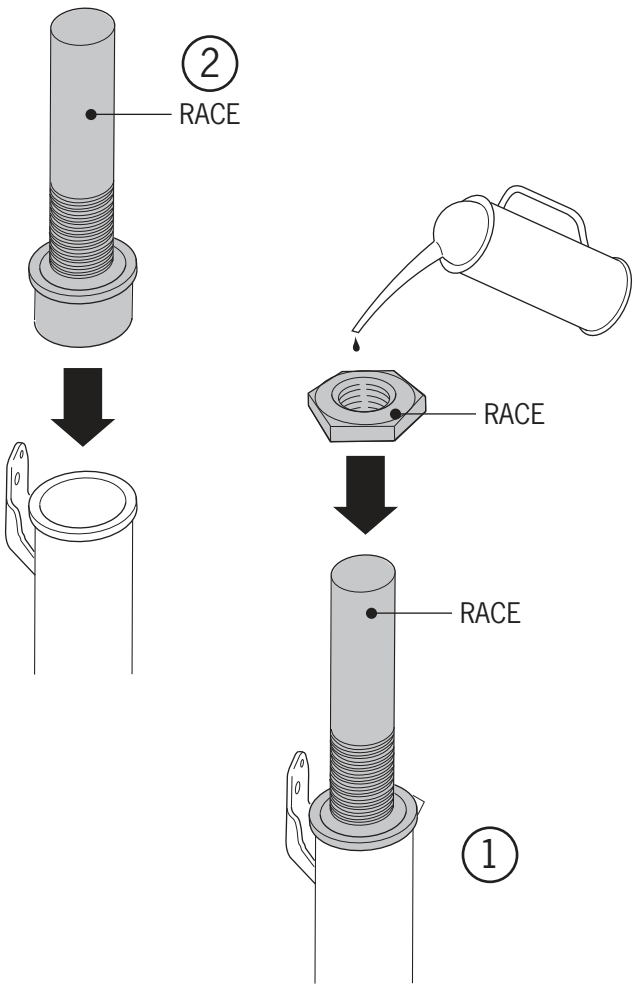
5. Install the top race, and then tighten the upper nut.

Torque: 8.0-12.0kg/m 50-60ft lbs

6. Attach the front wheel (refer to 12-7).

7. Attach the handle (refer to 12-3).

8. Attach the cables (refer to 1-15).



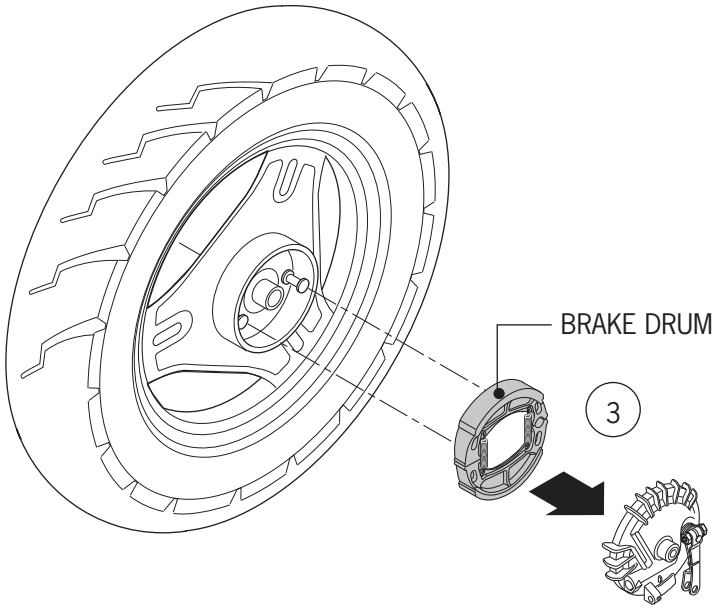
12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

Checking the Brake Lining

1. Measure the thickness of the brake lining. Replace when it is below 2.0mm (.079 in.)

Attention:
Don't have the oil adhere to the lining surface.



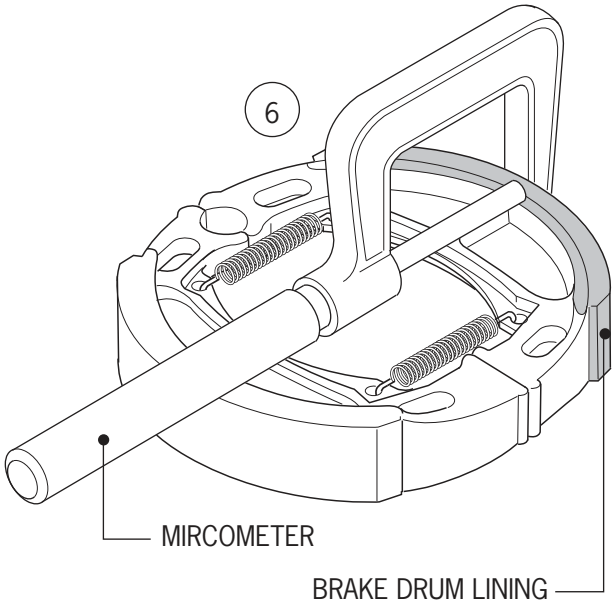
Dismantling the Front Brake

3. Remove the adjusting nut of the front brake.

4. Remove the brake lining.

5. Remove the fix bolt of the brake arm.

6. Remove the brake arm.



Assembling the Front Brake

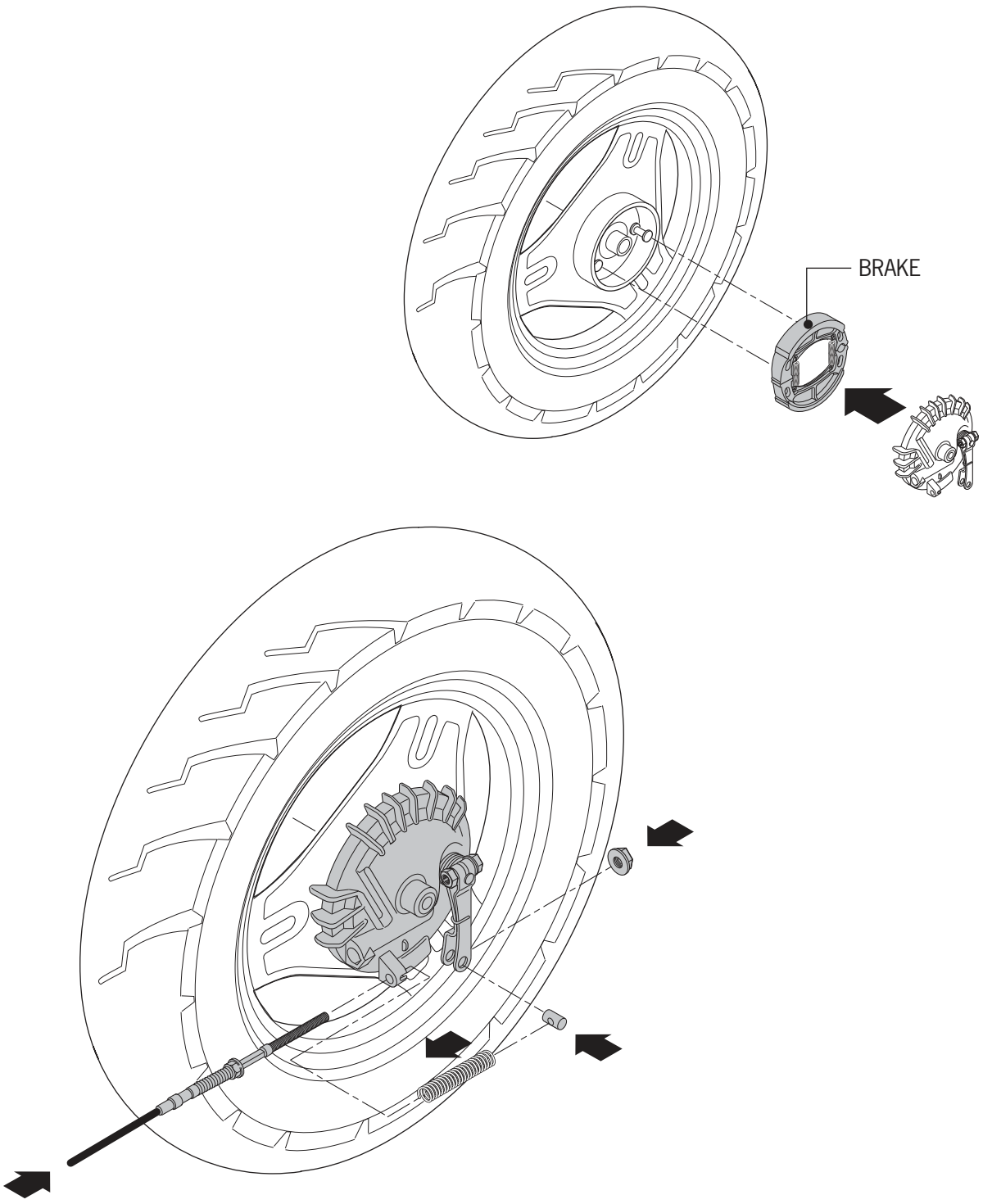
8. Spread grease on the moving parts of the lining and of the fix pin (locating pin).

9. Spread grease on the moving part of the brake cam shaft and then assemble it.

10. Install the brake lining.

12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

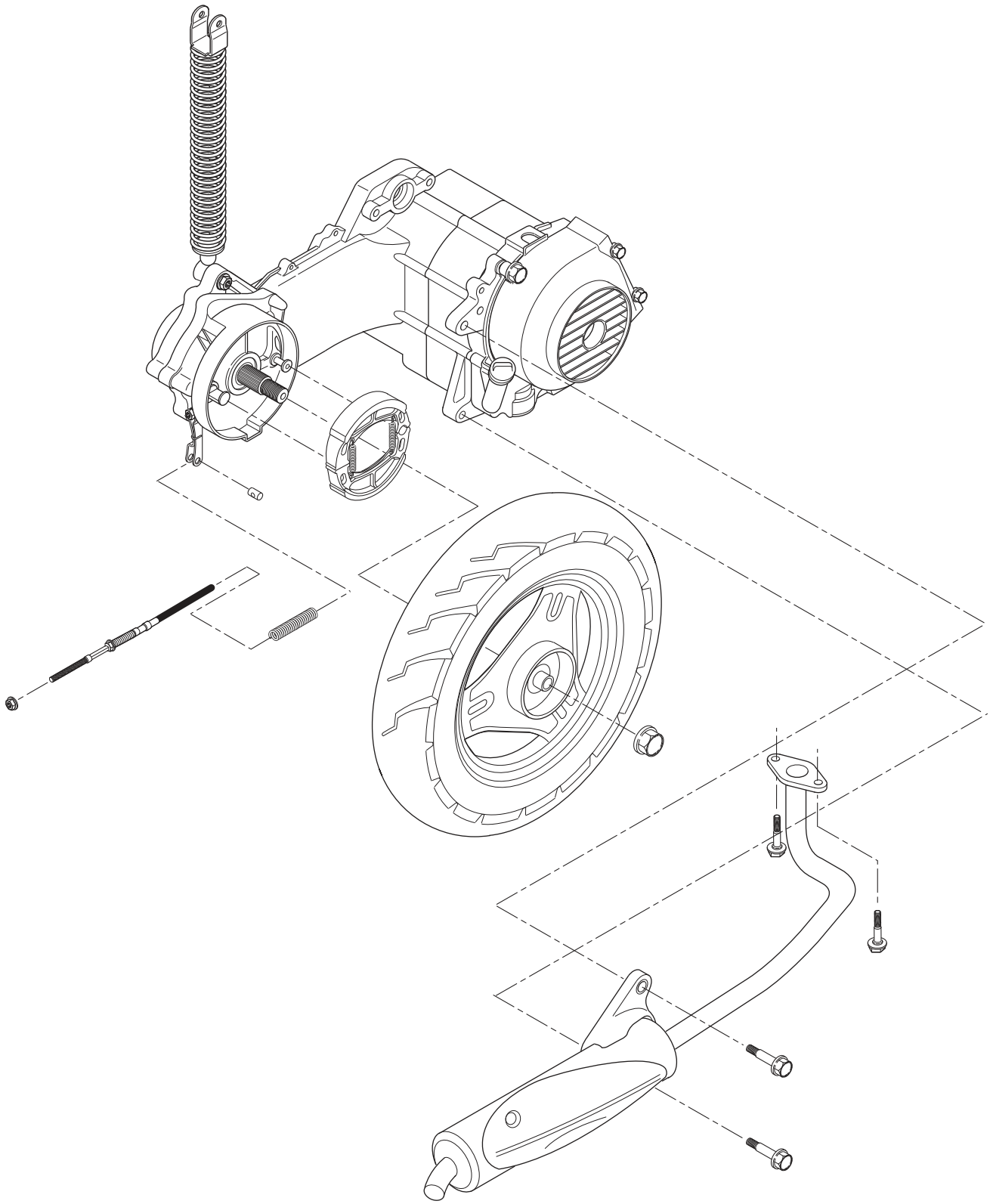


12. The Front Wheel, Front Brake,

Front Buffer and the Front Fork

MEMO

13. The Rear Wheel, the Rear Brake & Rear Shock



13. The Rear Wheel, the Rear Brake & Rear Shock

Topic	Page	Topic	Page
Important points	13-2	Checking the Rear Brake	13-4
Troubleshooting	13-2	Dismantling the Rear Brake	13-4
Detaching the Rear Wheel	13-3	Assembling the Rear Brake	13-4
Checking the Rear Wheel	13-3	Dismounting the Rear Shock	13-5
Assembling The Rear Wheel	13-3	Assembling the Rear Shock	13-6

Important Points

During operation, it's not allowable to have oil adhere to the inner surface of the brake hub and the surface of the lining. Use brake solvent to remove oil.

Tech Criterion

Check Position	Item		Normal Size	Limit (mm)
Rear Wheel	Runout	Longitudinal Hop	——	2.0 (.079 in.)
		Transversal Wobble	——	2.0 (.079 in.)
	ID of the rear brake hub		110 (4.33 in.)	111 (4.36 in.)
	Thickness of the rear brake lining		4.0 (.157 in.)	2.0 (.079 in.)
Free length of the rear shock spring			202.5 (7.97 in.)	198 (7.78 in.)

Torque

The nut of the rear wheel axle	*10.0kg•m*	*75ft lbs*
The top of the rear buffer	*4.5kg•m*	*30ft lbs*
The bottom bolt of the rear buffer	*3.0kg•m*	*20ft lbs*
The connection nut of the silencer	*1.2kg•m*	*10ft lbs*
The fix bolt of the silencer	*3.5kg•m*	*25ft lbs*

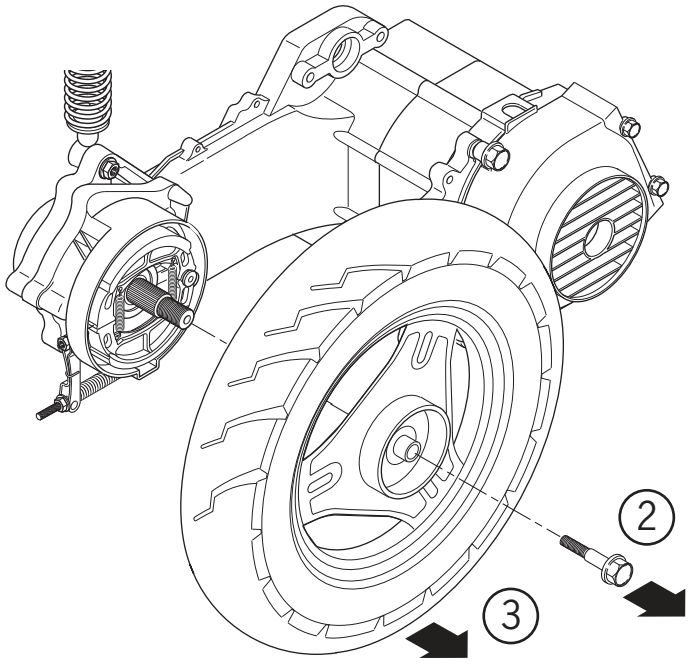
Diagnosis

The rear wheel wobbles
- •Deformation of the rear rim
- •Bad tire mounting or bent

The rear shock is too weak
- •Spring bent or broken

Misadjusted brake
- •Wear of the brake lining
- •Wear of the brake lining cam
- •Brake cam worn
- •Brake hub worn

13. The Rear Wheel, the Rear Brake & Rear Shock



Detaching the Rear Wheel

1. Detach the exhaust pipe (refer to 2-8)
2. Remove the nut of the rear wheel axle.
3. Remove the rear wheel.

Checking the Rear Wheel

1. Check the run-out of the rear wheel.

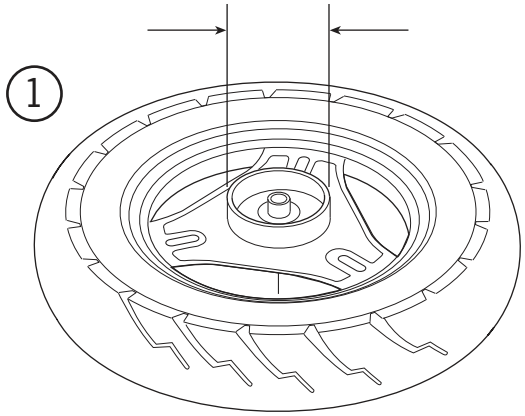
   Maximum service allowance:
   Longitudinal: 2.0mm (.079 in.) Hop
   Transversal: 2.0mm (.079 in.) Wobble

   Replace when it goes beyond the above value.

2. Check the rear brake hub.
3. Measure the ID of the rear brake hub.

   Maximum service allowance:
   111mm (4.37 in.)

   Replace when it goes beyond the above value.



Assembling the Rear Wheel

1. Assemble in the opposite sequence of the dismantling.

   T*he rear wheel axle:*
   Torque: 10.00kg•m 75ft lbs
   Torque of the exhaust pipe:
   Connection nut: 1.2kg•m 10ft lbs
   Fix bolt: 3.5kg•m 25ft lbs

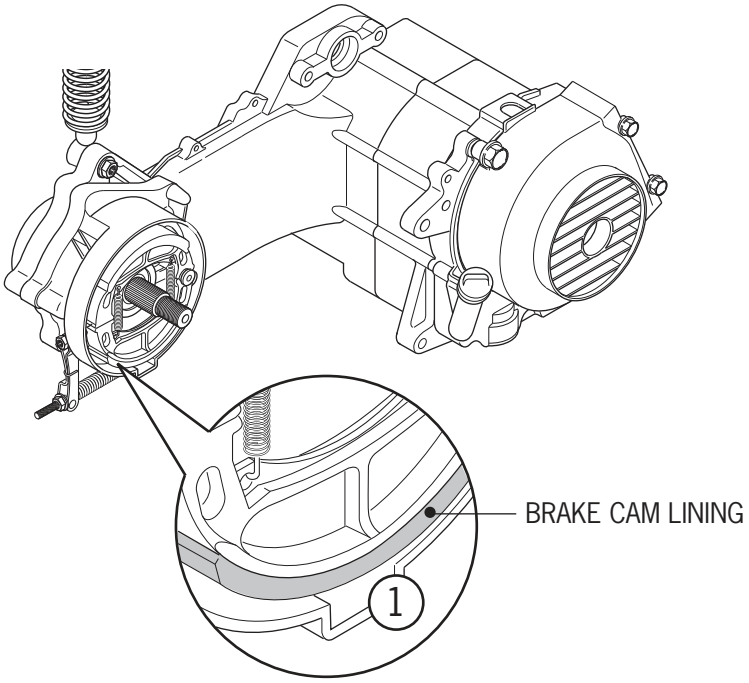
Attention:
When assembling the exhaust pipe, first fasten the connection at the bend, and then install the support bolt.

13. The Rear Wheel, the Rear Brake & Rear Shock

Checking the Brake Lining

1. Measure the thickness of the brake lining. Replace when it is below 2.0mm (.079 in.).

Attention:
Don't have the oil adhere to the lining surface.



Dismantling the Rear Brake

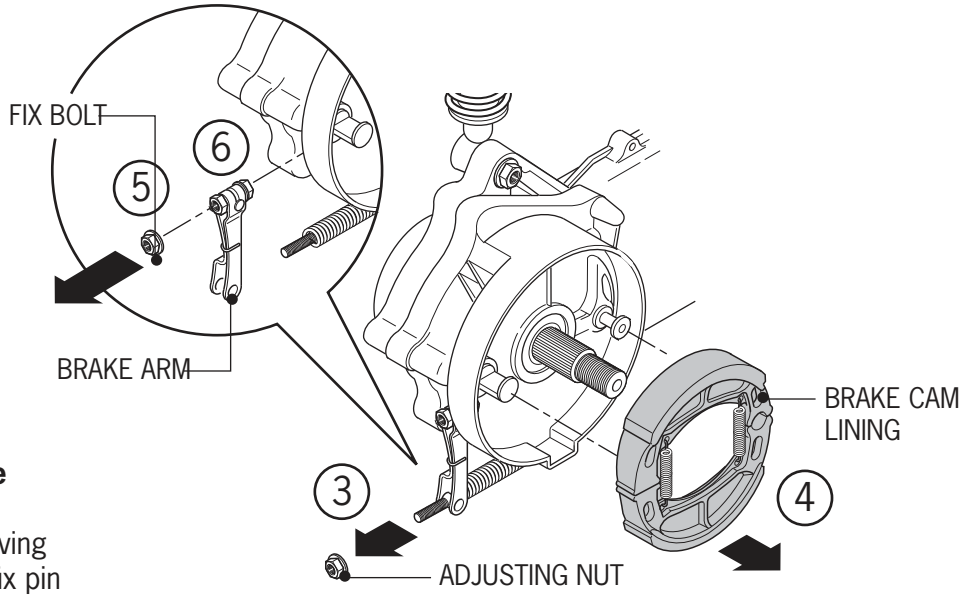
3. Remove the adjusting nut of the rear brake.

4. Remove the brake lining.

5. Remove the fix bolt of the brake arm.

6. Remove the brake arm.

7. Remove the brake cam.

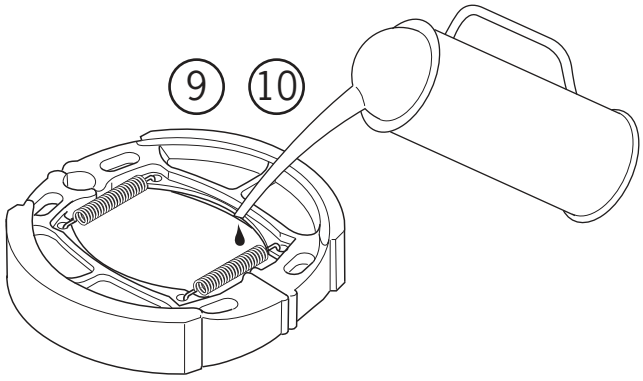


Assembling the Rear Brake

8. Spread grease on the moving parts of the lining and of the fix pin (locating pin).

9. Spread grease on the moving part of the brake cam shaft and then assemble it.

10. Install the brake lining.



13. The Rear Wheel, the Rear Brake & Rear Shock

11. Assemble the wear indication board and the brake arm.

12. Assemble the brake arm and the brake cam.

Attention:
Point the “gullet” mark of the brake arm to the “dot” mark of the brake cam, and then assemble them.

13. Install and tighten the bolt of the brake arm.

14. Install and tighten the fix bolt of the set arm.

15. Install the return spring of the brake arm.

16. Install the pin of the brake arm.

17. Install the adjusting nut of the brake cable.

18. Assemble the rear wheel (refer to 13-2).

19. Adjust the clearance of the brake lever (refer to 13-8).

Dismounting the Rear Shock

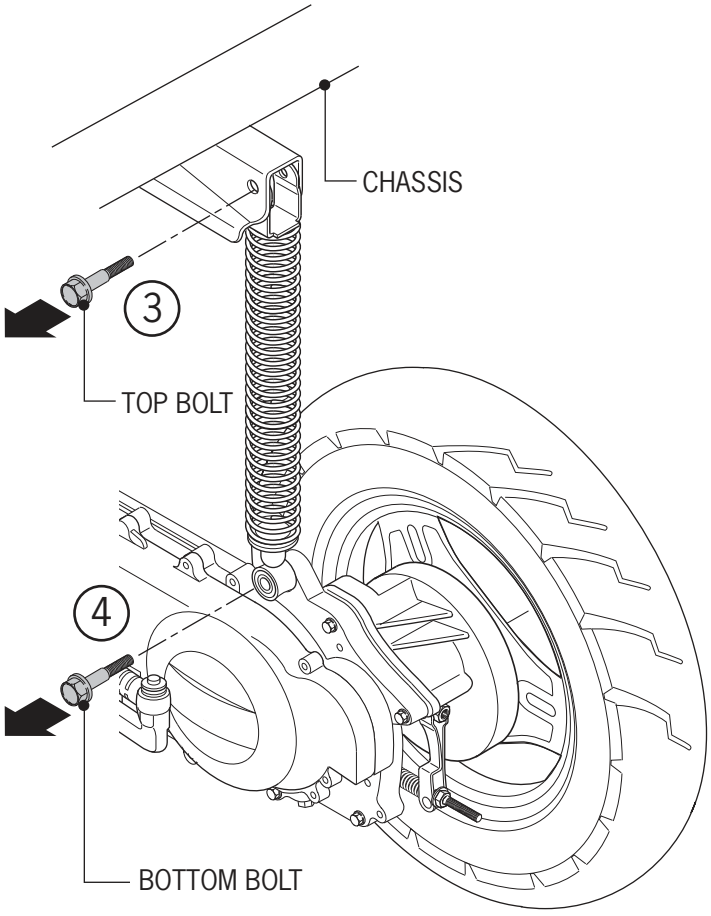
1. Remove the lid of the body (refer to 2-2).

2. Remove the case of the air filter (refer to 3-4).

3. Remove the top bolt of the rear shock.

4. Remove the bottom bolt of the rear shock.

5. Remove the rear shock.



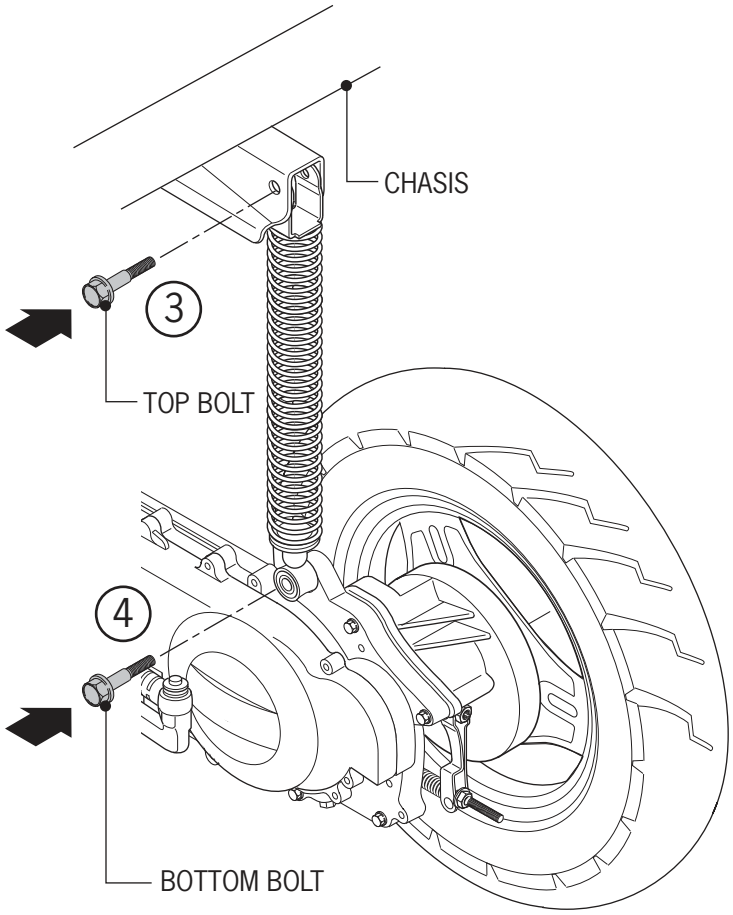
13. The Rear Wheel, the Rear Brake & Rear Shock

Assembling the Rear Shock

1. Attach the rear shock.
2. Install the top bolt of the shock.
3. Install the bottom bolt of the shock.
4. Tighten the nuts and the bolts.

   Torque
   Top bolt: 4.5kg•m 30ft lbs
   Bottom bolt: 3.0kg•m 20ft lbs

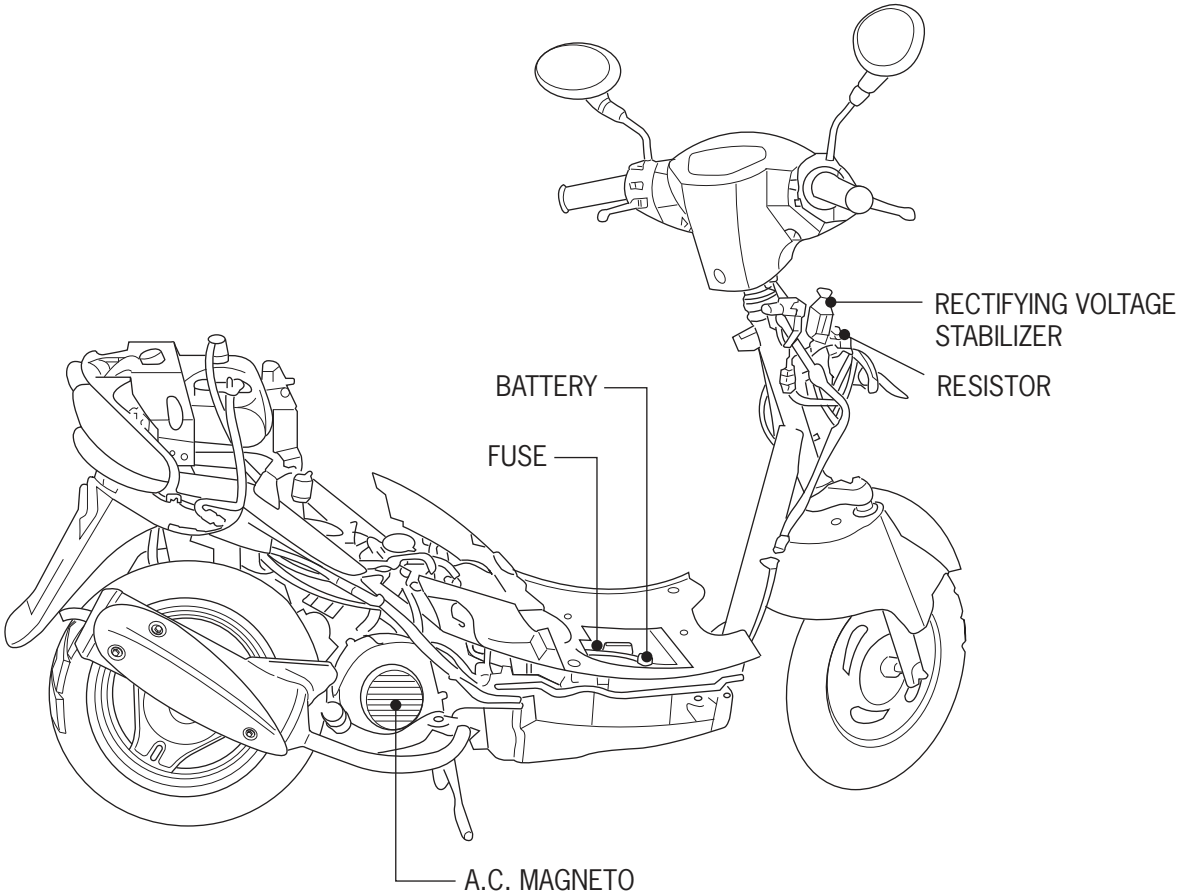
5. Assemble the lid of the body.

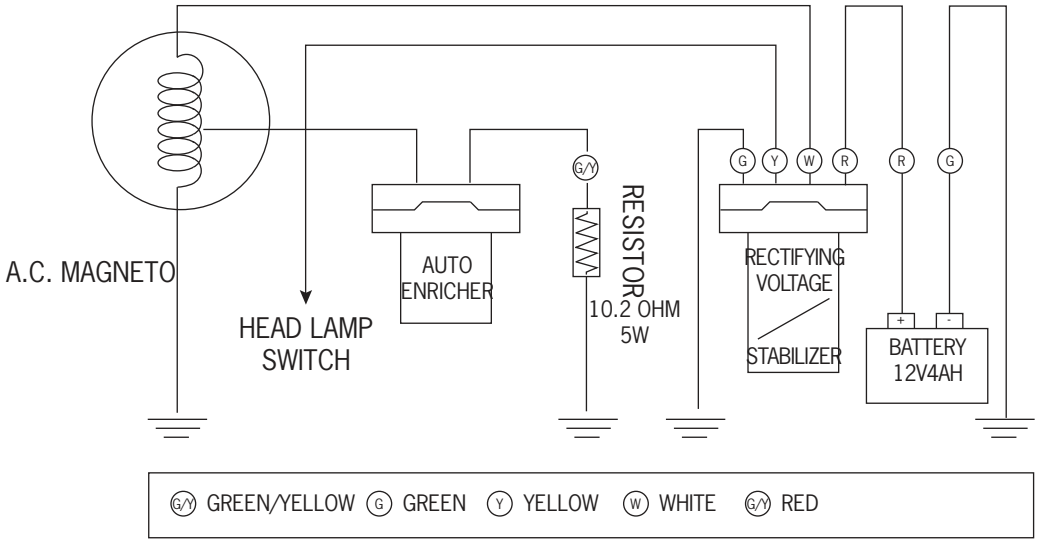


14. The Battery and the Charging System

MEMO

14. The Battery and the Charging System





14. The Battery and the Charging System

Topic	Page	Topic	Page
Instructions	14-1	The Charging System	
Diagnosis	14-2	Testing short circuit	14-7
The battery	14-3	Assembling the magnetor	14-8
The charging system	14-4	The Magneto Charging Coil	14-9
The rectifying voltage stabilizer	14-5	Checking The magneto lighting coil	14-9
The magnetor charging coil	14-6	Checking the Resistor	14-9
Checking the resistor	14-6	Dismounting the Magneto	14-9
Dismantling the magnetor	14-6	Assembling the Magneto	14-11

Important Points

The electrolyte (diluted sulfuric acid) is very toxic. Be sure not to splash it onto clothes, the skin or eyes to protect them from being burnt. Eye contact with acid may cause blindness. In case of being splashed, use a large amount of clean water to flush and rinse the parts that the acid came into contact with. See a doctor immediately. If the electrolyte gets into the clothes, which will permeate to the skin, remove them immediately, then put them in water to rinse.

•The battery can withstand numerous cycles of charging and discharging as long as it is not left in a discharged condition for a long period of time.

•If the battery is overcharging, this can be seen by close inspection of the battery itself. If the battery is exposed to an extreme overcharge condition, it can break down and short circuit internally. In this condition, the battery will produce zero voltage under all load and charge conditions. The battery can be overcharged and “boil off” the electrolyte solution. This problem can be due to excessive time on a battery charger or a failed voltage regulator.

•If the scooter is left to sit for a long time or is stored, the battery will slowly discharge. It is advisable to recharge the battery before attempting to start the scooter after a period of storage.

•When filling a new battery with acid, allow it to sit and “breath” for fifteen minutes before installing it into the scooter or charging it. It is advisable to charge a new battery after filling with acid even though it may appear to have sufficient charge.

•When working on the scooter’s electrical system, make sure that the main switch is turned off and/or the battery is disconnected. Disconnecting and reconnecting of live circuits can cause high instantaneous currents that can damage the battery.

•Any short-circuiting of the wiring can cause damage to the battery.

14. The Battery and the Charging System

Tech Criteria

Item			Data	
Battery	Capacity/Type		12 V-4AH or 12V-5AH	
	VOLT (20˚C)	Fully charging	13.1V	
		Low limit	12.3V	
	Charging CUR		Standard: 0.4A; Fast: 2A	
	Charging hours		Standard: 5-10 hrs; Fast 1hr	
Magneto	Capacity		0.144KW/5000rpm	
	Resistance of lighting coil (20˚C)		Between yellow-clean	0.1-1.0 OHM
	Resistance of charging coil (20˚C)		Between white-clean	0.2-1.2 OHM
Rectifing Volt Stabilizer	Type		Single phase, half-wave SCR charging; SCR half-wave short circuit mode	
	Limited volt	Lighting	12-14/5000 rpm (multimeter, RPM meter)	
			13.5 +/- 0.5V	
		Charging	14.5 +/- 0.5V/3000-8000rpm	
	Resistance (20˚C)		5W/4 OHM	
Resistor	Resistance (20˚C)		30W/7.5 OHM	

Torque

The bolt of the triggering coil	*0.5kg·m 40in lbs*
The fix bolt of the coil	*0.9kg·m 4ft lbs*
The fix bolt of the flywheel	*3.8kg·m 25ft lbs*
The bolt of the cooling fan	*0.9kg·m 7ft lbs*

Tool

Universal fixing wrench
Fly wheel puller
Multi-meter

Diagnosis

No power supply
- Battery over-discharging
- Battery wiring improper
- Burnt fuse
- Broken electro switch lock

Unstable current
- Bad battery wiring contact
- Bad contact of discharging system
- Poor contact/short circuit of the lighting system.

Low voltage
- Improper battery charging
- Bad contact
- Poor charging system
- Damaged rectifying volt stabilizer

Poor charging system
- Bad contact, breaking or short circuit of the wiring connector
- Poor rectifying stabilizer
- Damaged magneto

14. The Battery and the Charging System

Detaching the Battery

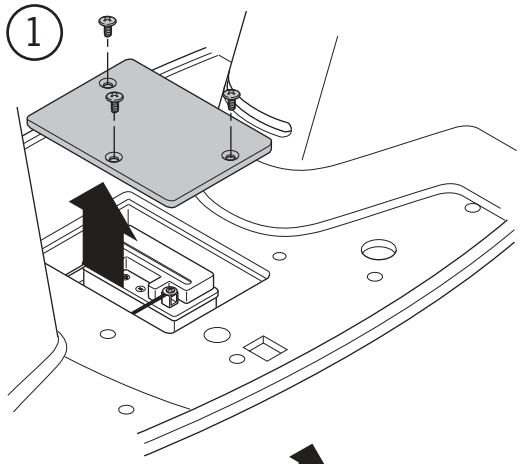
1. Remove the screws of the battery cover under the floor mat.

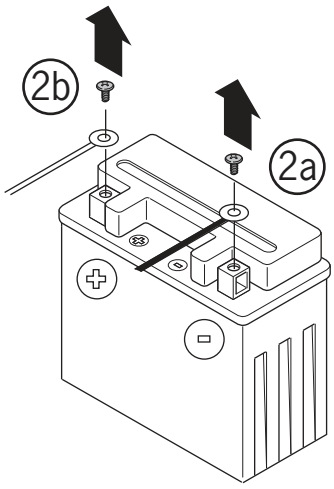
2. Open the cover and remove the battery cable attachment screws.

Attention:
First detach the negative (-) terminal wire, then the (+) terminal wire. When detaching the positive (+) terminal wire, make sure that the tool does not contact the frame.

3. When assembling, operate in the opposite sequence of dismounting.

Attention:
In order to prevent short circuiting, first connect the (+) terminal wire, then the negative (-) terminal wire





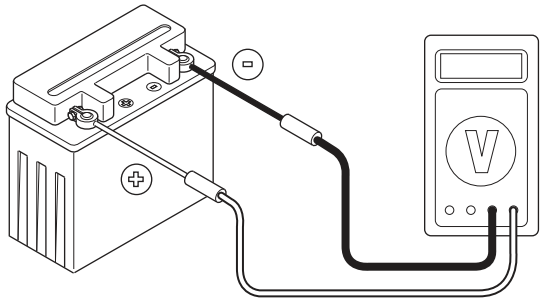
Checking the charging condition (open circuit volt)

1. Open the battery cover and disconnect the battery.

2. Measure the voltage across the terminals of the battery.

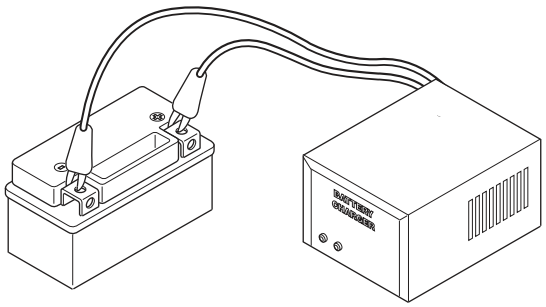
Fully charged: 13.1V
Inadequately charged: 12.3V

Attention:
Use a volt meter to check the charging condition.



Charging

1. Connection The (+) terminal pole of the charger to the (+) terminal pole of the battery. The negative (-) terminal pole of the charger to the negative (-) terminal pole of the battery.



14. The Battery and the Charging System

Attention:
•No sparks should be allowed around the battery.

•Turn off the charger first, either at the beginning or the end of the charging, to prevent sparks, which can cause an explosion.

•When charging, operate at the current and time marked on the battery.

•Unless in an emergency situation, do not use fast charging.

•Measure the voltage only 30 minutes after charging.

Charging current:
Standard 0.4A
Fast: 2A

Charging Hours:
Standard: 5-10hrs
Fast: 1hrs.

When charging ends:
Open-circuit voltage: above 12.8V

Note: During charging, the temperature of the battery is not allowed to go beyond 45˚C (110˚F).

14. The Battery and the Charging System

The Charging System

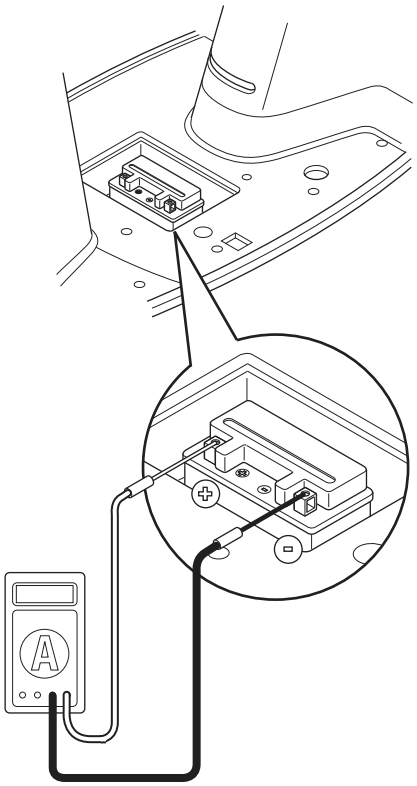
Testing short circuit

1. Detach the earth wire from the battery.

2. Connect the ammeter between the "-" terminal of the battery and the earth wire, the main switch being in the “off” position to check whether it’s short-circuited.

Attention:
The (+) terminal terminal of the multi-meter is connected to the "-" pole of the battery, while negative (-) terminal wire of the multi-meter is connected to the earth wire.

3. When an abnormal sign appears, check if there is a short circuit in the main switch and the main cable.



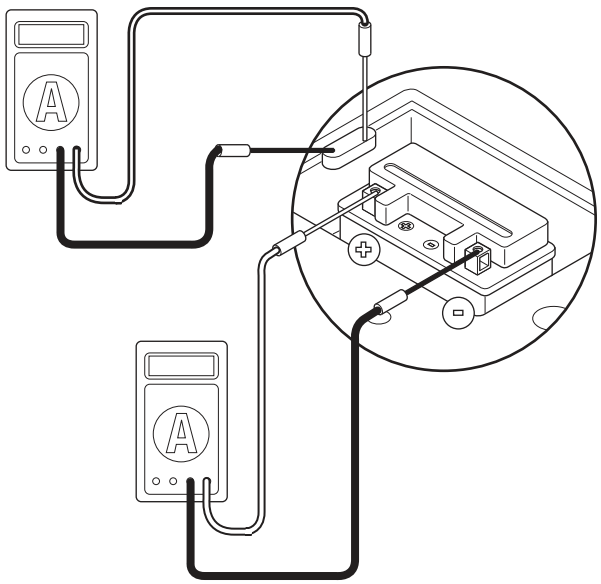
Checking the Charging Condition
1. When the battery is in full charging condition, use a multi-meter to test.

2. After the engine is warmed up, install the fully-charged battery. Connect the voltmeter across the terminals of the battery.

3. Remove the main fuse and connect the ammeter between the terminals.

4. Connect the RPM meter to the engine.

5. Start the engine, when the speed of the engine slowly rises, measure the charging voltage and current.



Limiting Voltage/Current:
Below 14-15V0.5A (Below 5000rpm)

When the limiting voltage goes beyond the above scope, check the rectifying voltage stabilizer (refer to 14-5).

Switch Position / RPM	OFF	P	H
2500	>1.0A	>1.0A	>1.0A
5000	>1.5A	>1.5A	>1.5A

14. The Battery and the Charging System

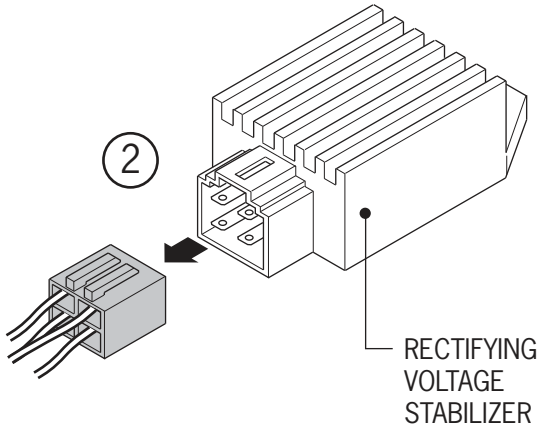
The rectifying voltage stabilizer

1. Checking the main cable circuit.

2. Detach the 4P plug from the rectifying voltage stabilizer.

3. Check the conductivity between terminals of the main cable in the following way:

Item (matching color wire)



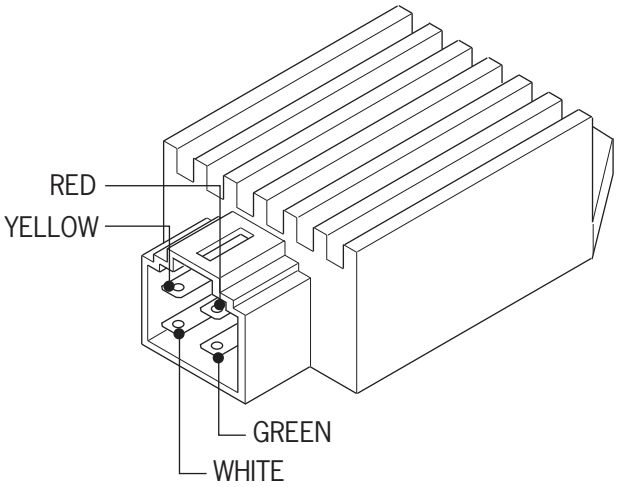
Checking the Rectifying Voltage Regulator

1. After the main cable has been tested and found normal, check the plug of the rectifying voltage stabilizer contact well and measure the resistance among the terminals of the regulator.

Attention:
Make sure that your finger doesn't touch the metal part of the test bar of the multi-meter because the human body has resistance.

Use a multi-meter to test.

Test positions per chart.



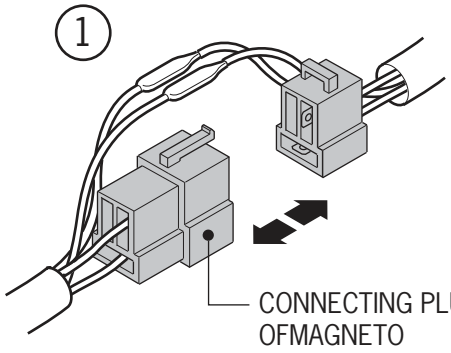
2. When the resistance among the terminals is abnormal, replace the rectifying voltage stabilizer.

Multimeter ⊕ / Multi-meter ⊖	White	Yellow	Red	Green
White		∞	3K-50K	∞
Yellow	∞		∞	5K-100K
Red	∞	∞		∞
Green	∞	5K-100K	∞	

14. The Battery and the Charging System

The Magneto Charging Coil

Attention:
The operation of the magneto charging coil can be done in the engine.



Checking

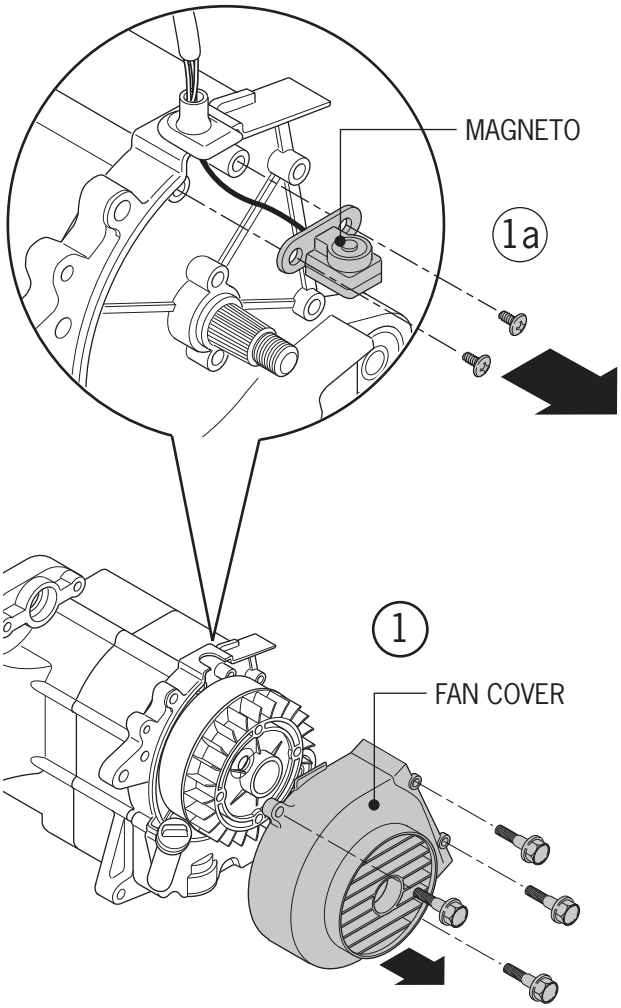
1. Detach the connecting plug of the magneto.

2. Use a multi-meter to measure the resistance between the white wire of the magneto and the ground.

Criterion: 0.2-1.2 OHM (20ºC)
When the value goes beyond the criterion, replace the magneto coil.

Checking The magneto lighting coil

Attention:
The operation of the lighting coil can be done in the engine.



1. Detach the connecting plug of the magneto.

2. Use a multi-meter to measure the resistance between the yellow wire and the ground.

Criterion: 0.1-1.0OHM (20ºC)
When the value goes beyond the criterion, replace the magneto coil.

Checking the Resistor

1. Measure the resistance between the resistor wire and the ground.

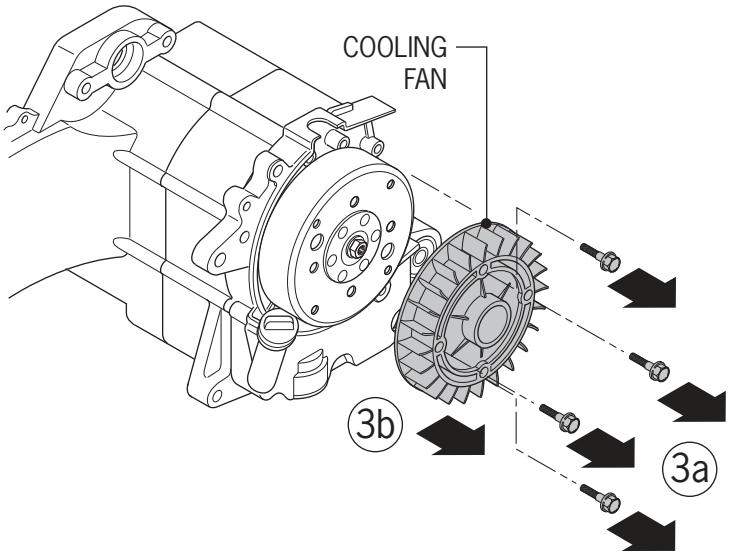
Criterion: 30W7.5 OHM : 6.0-9.0 OHM
5W14 OHM : 13-15 OHM

Dismounting the Magneto

1. Detach the right side guide strip (refer to 2-3) Remove the four bolts, four screws and remove the fan cover.

14. The Battery and the Charging System

3. Remove the four bolts and remove the cooling fan.



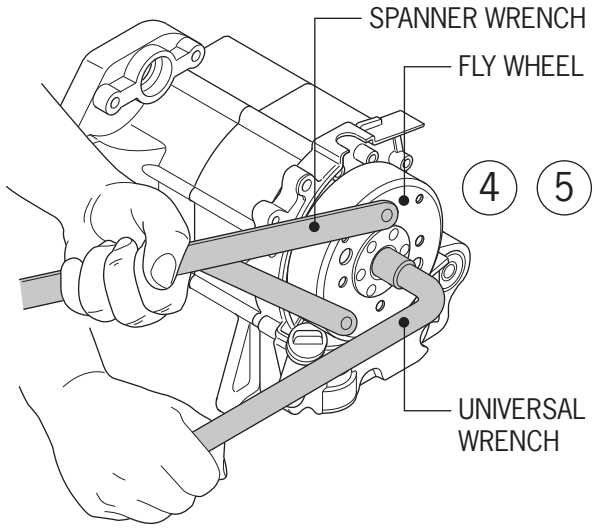
4. Use a universal solid wrench to secure the flywheel. Detach the fix nuts of the flywheel.

5. Use a spanner wrench hold flywheel while removing the retaining nut.

6. Use a flywheel puller to remove the flywheel.

7. Remove and save the key.

8. Detach the connecting wire of the magneto.



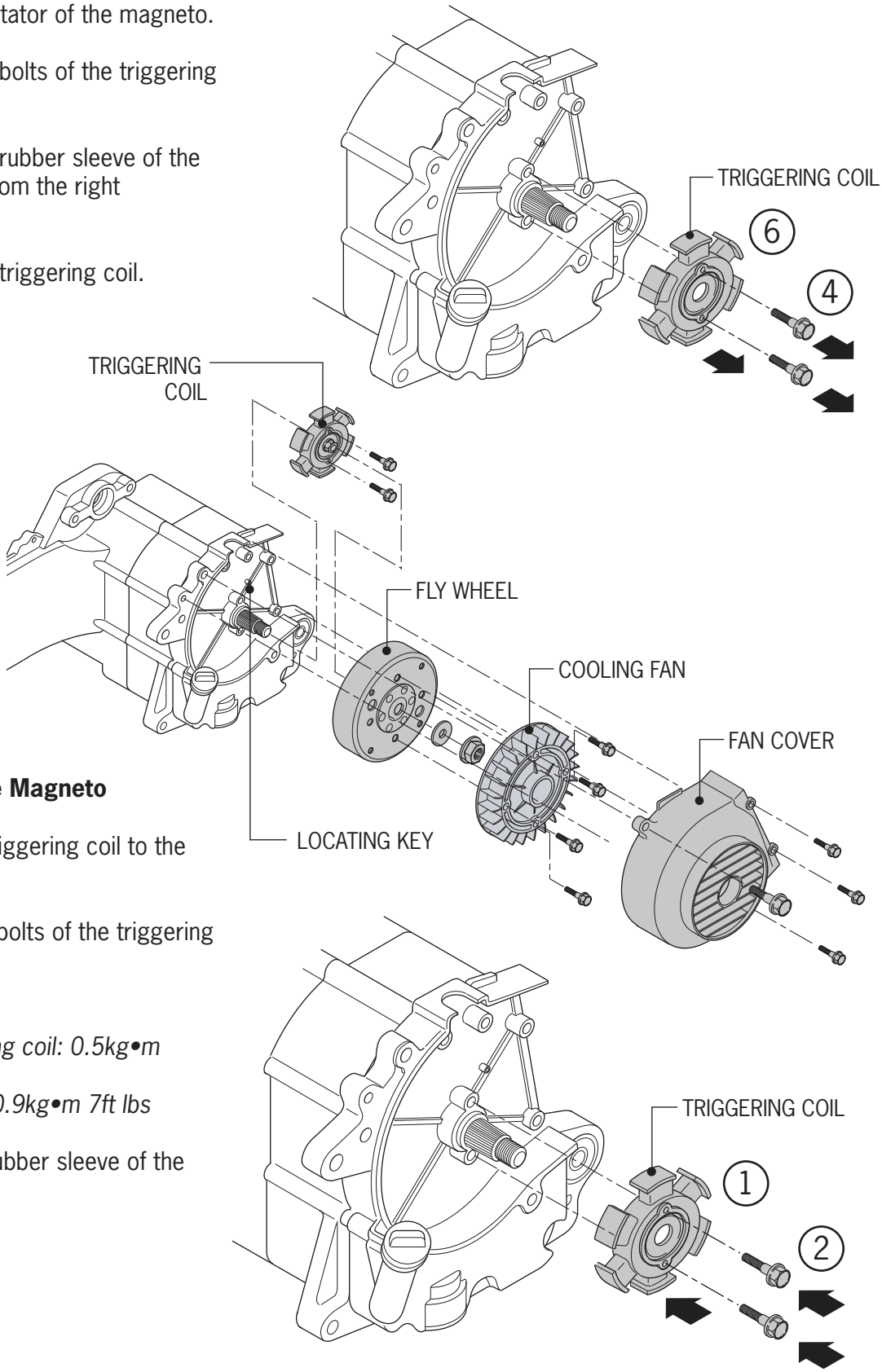
14. The Battery and the Charging System

3. Detach the stator of the magneto.

4. Remove the bolts of the triggering coil.

5. Remove the rubber sleeve of the magnetor wire from the right crankcase.

6. Remove the triggering coil.



Assembling the Magneto

1. Attach the triggering coil to the right crankcase.

2. Lock the fix bolts of the triggering coil.

Torque:
The triggering coil: 0.5kg•m 40in lbs
The stator: 0.9kg•m 7ft lbs

3. Set up the rubber sleeve of the magneto wire.

14. The Battery and the Charging System

4. Connect the connecting wire of the magnetor.

5. Clean the cone part of the crankshaft and of the flywheel. Be sure to lay the locating key of the flywheel into the keyway on the crankshaft precisely. Point the groove of the flywheel to the locating key on the crankshaft and then assemble it.

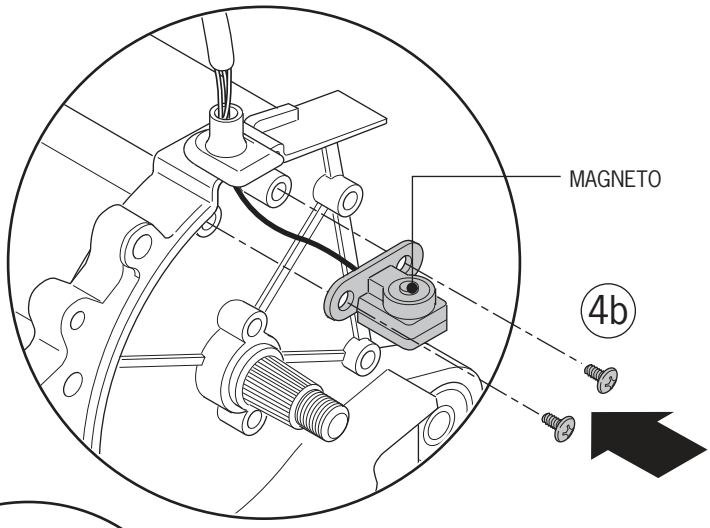
Attention:
Make sure that there is no bolt/nut inside the flywheel, and then assemble it.

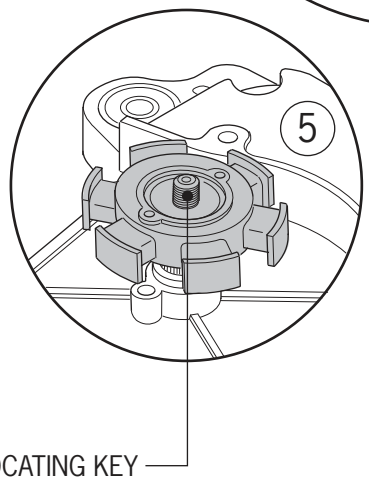
6. Use a universal solid wrench to hold the flywheel, and then lock the nut.

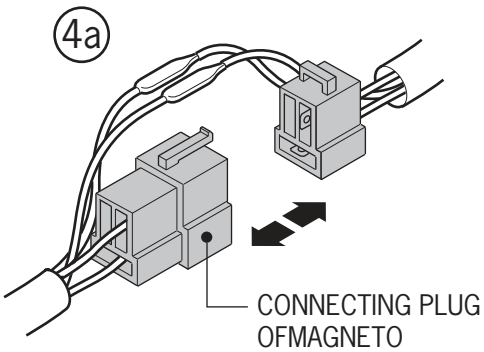
Torque: 3.8•m

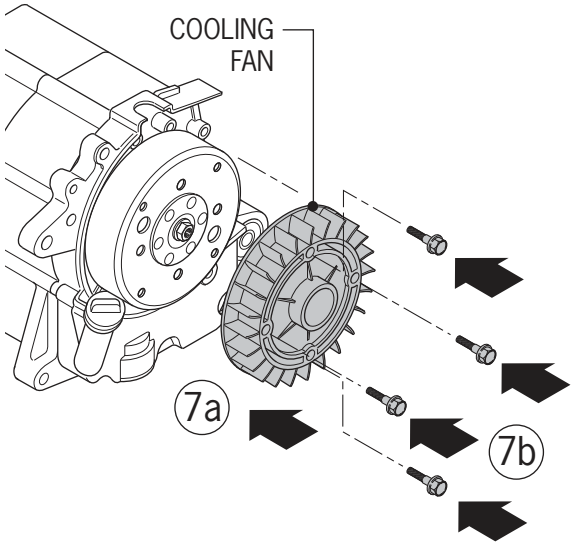
7. Set up the cooling fan

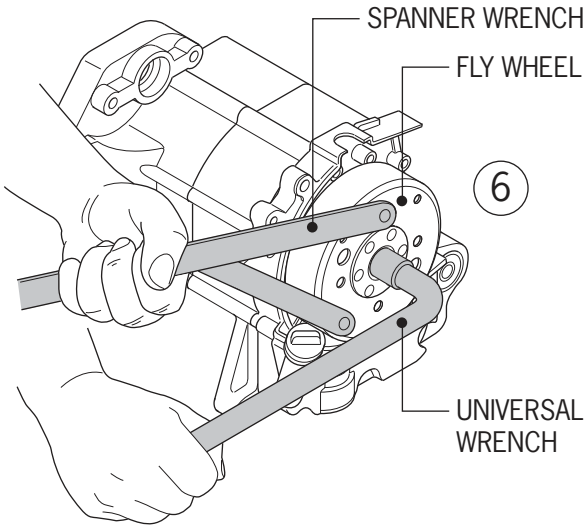
Torque: 0.9kg•m





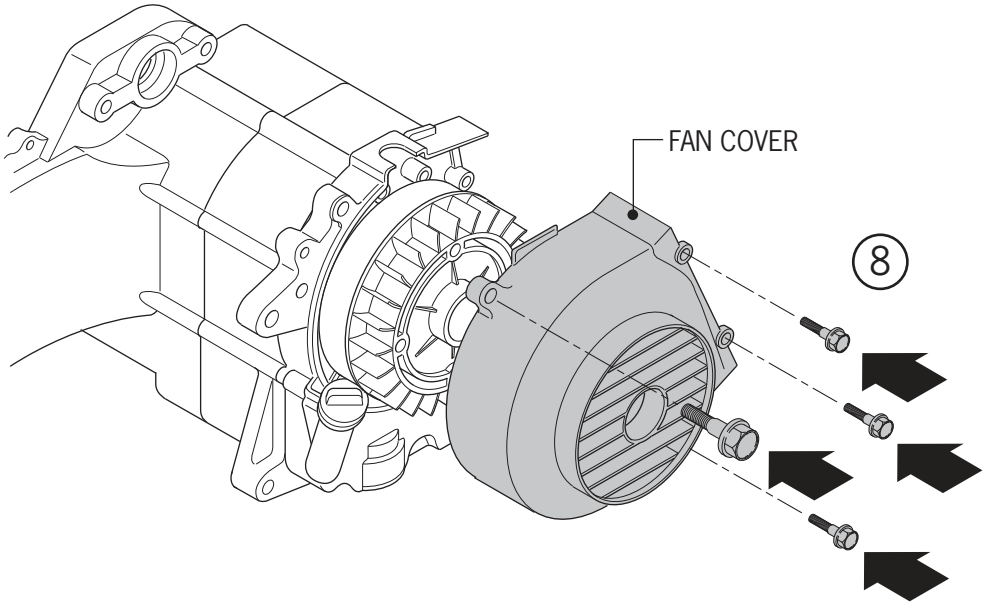






14. The Battery and the Charging System

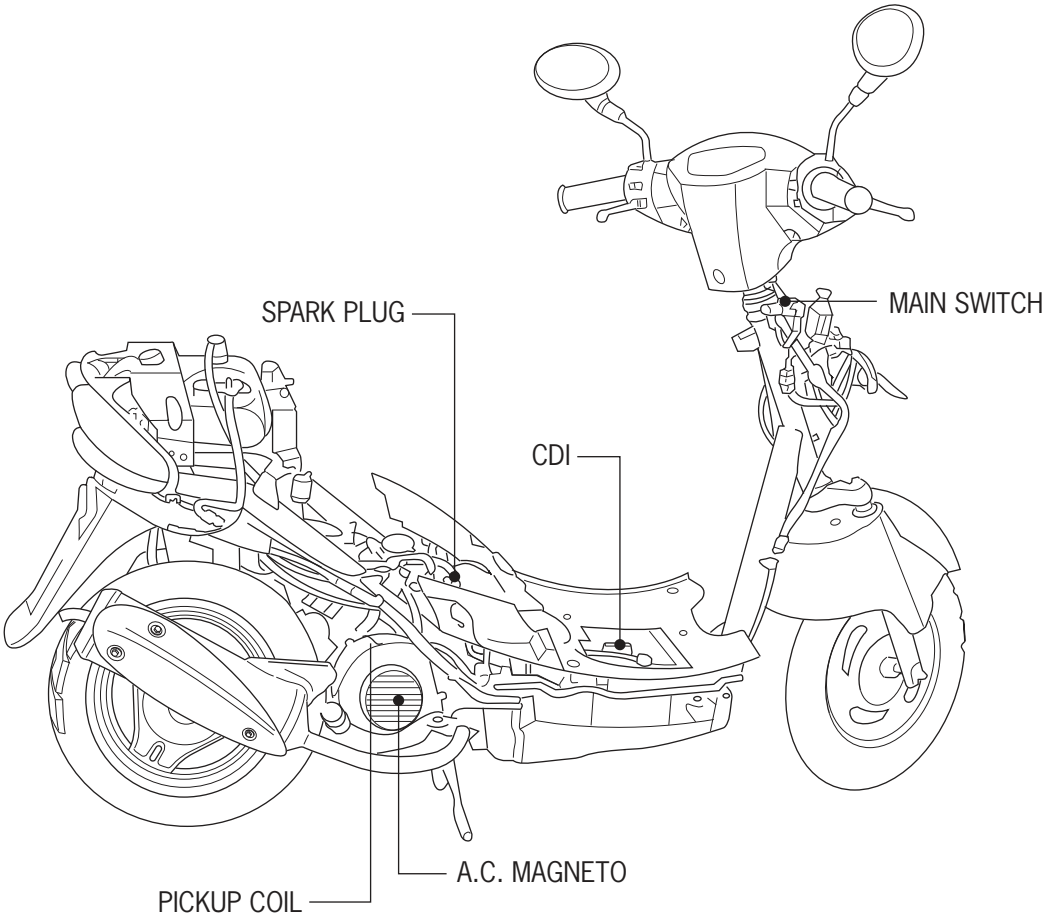
8. Install the fan cover and securely tighten fasteners.

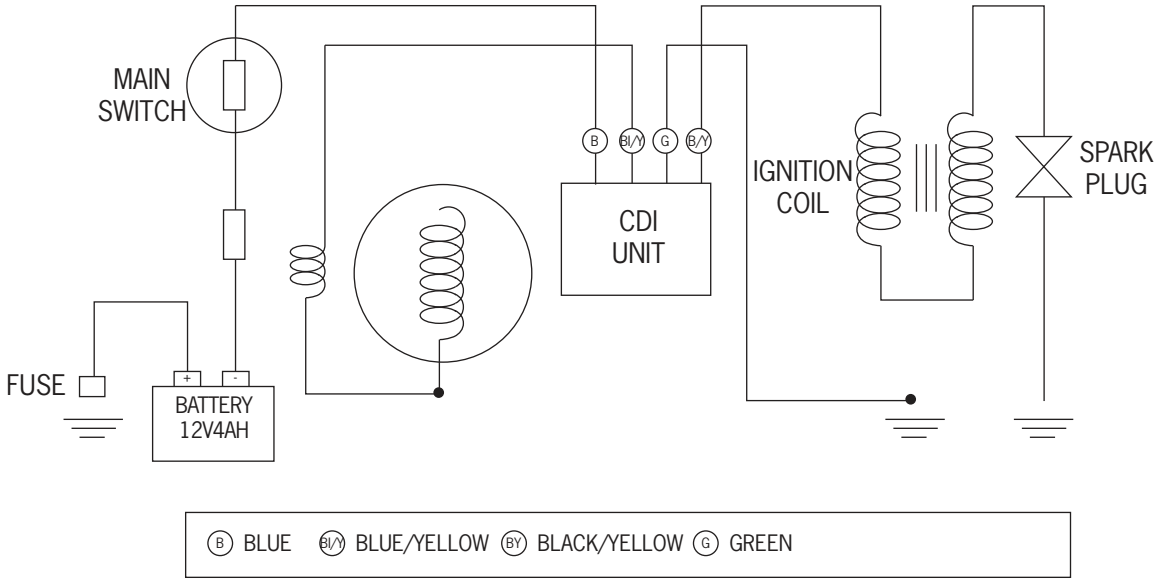


14. The Battery and the Charging System

MEMO

15. Ignition System





15. Ignition System

Topic	Page
General Information	15-2
Troubleshooting	15-3
CDI unit inspection	15-4
Ignition Coil Removal Steps	15-5
Magneto Pickup Coil Inspection	15-6
Spark Advance Angle Inspection	15-6

General Information

•Check ignition system in accordance with the troubleshooting procedure in Section 15-2.

•As the ignition system has an electric automatic spark control in the CDI unit, there is no need for spark advance angle adjustment.

•CDI should not be disconnected or subjected to input. Damage or failure can occur.

•Poor contact may be the cause of many ignition system faulty cases. Check all terminal connections to be sure they are clean and tight whenever troubleshooting an electrical problem.

•Make sure spark plug heat range is correct. Using an incorrect spark plug will result in improper engine operation or spark plug damage.

•Peak voltage is used as reference point in tests. Record coil resistance tests.

•When inspecting spark plug, refer to related instructions in Chapter 3.

•When removing AC generator and pickup coil, refer to instructions in Chapter 14.

Reference Standard

Item			Standard valve
Specific spark plug	Standard		(NGK)C7HSA Champion Z9Y
	Hot		(NGK)C6HSA
	Cold		(NGK)C8HSA
Spark plug gap			0.6-0.7mm
Spark advance angle	Maximum advance in "F" position		13˚ +/- 1˚ (2000r/min)
Ignition coil resistance (20)	Primary coil		0.1-1.0 OHM
	Secondary coil	With cap	7-9K OHM
		Without cap	3-4K OHM
Pickup coil resistance (20)			1-10 OHM
Primary ignition coil peak voltage			Over 120V
Pickup coil peak voltage			Over 2.1V

15. Ignition System

Troubleshooting

High Tension Voltage Too Low
- Crankshaft revolution too slow or battery voltage too low
- Ignition system wiring loose
- Faulty ignition coil
- Faulty CDI unit
- Faulty pickup coil

High Tension Voltage Intermittent
- Faulty main switch
- Poor CDI terminal connection
- Poor CDI ground
- Faulty pickup coil
- Poor high-tension lead terminal connection
- Faulty CDI unit

High Tension Voltage Normal but No Spark
- Faulty spark plug
- Faulty spark plug cap

No High Tension Voltage
- Faulty main switch
- Battery discharged or faulty rectification system
- Faulty charge system
- Faulty ignition coil
- Faulty CDI United Equine Foundation No or

Intermittent High Tension Voltage
- Faulty ignition coil
- Battery voltage too low
- Faulty charge system

15. Ignition System

CDI Inspection

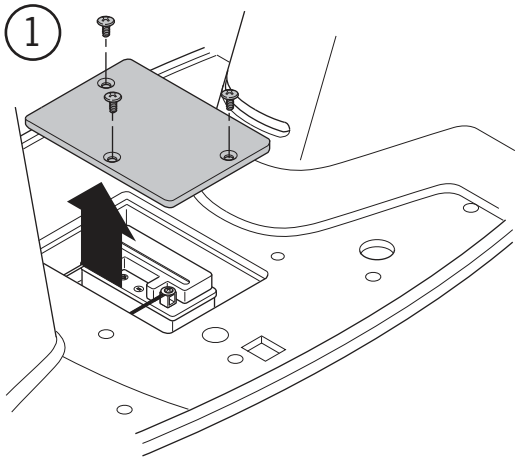
1. Remove the three screws from the battery case cover.

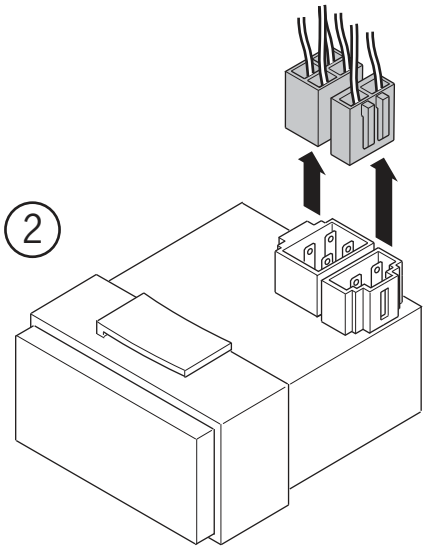
2. Disconnect the CDI module from the wire harness.

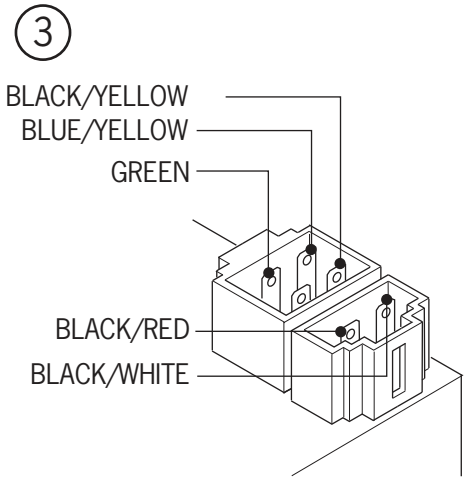
3. Test resistance of the terminals with a multi-meter.

Attention:
Since there is semiconductor in return circuit, testing results may be significantly different if different multi-meters are used.

If the pointer on the dial flickers and finally stops at in testing, it should be regarded as normal. Because the capacitor in the CDI module is charged while being tested, it cannot discharge at this time.







15. Ignition System

Ignition Coil Removal Steps

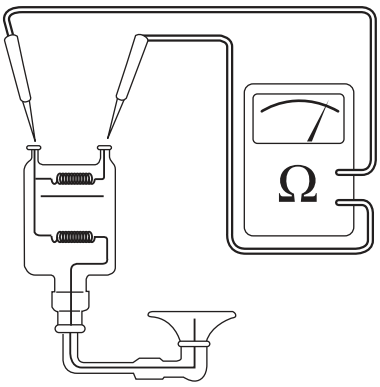
1. Remove the middle box.

2. Remove the spark plug cap.

3. Disconnect the wires, remove the ignition coil jam nuts and remove the ignition coil.
Inspection

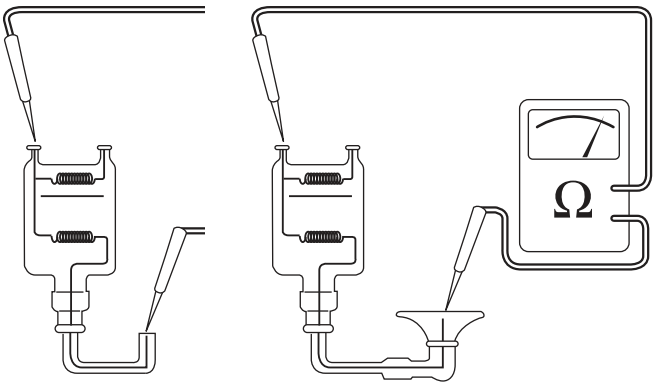
4. Check the ignition coil circuit. The spark advance angle does not need to be adjusted.

If the spark advance is abnormal, check the CDI, pickup coil or magneto. Replace the ignition coil if necessary.



5. Test the primary coil resistance, the standard value of which should be 0.1-1.0Ω.

6. Test the secondary coil resistance from spark plug cap negative terminals. The standard value should be 7-9kΩ (with cap) and 3-4kΩ (without cap).



7. Test coil using after-market spark tester.

8. Perform the following inspection in accordance with the operating instructions in the manual.

   a. Set the ignition coil tester switch to 12V and connect the tester to the ignition coil.

   b. Turn the switch to the ON position to check spark frequency from the inspection door.

   In good condition: Sparking continuously
   In faulty condition: Sparking abnormally.

15. Ignition System

Magneto Pickup Coil Inspection

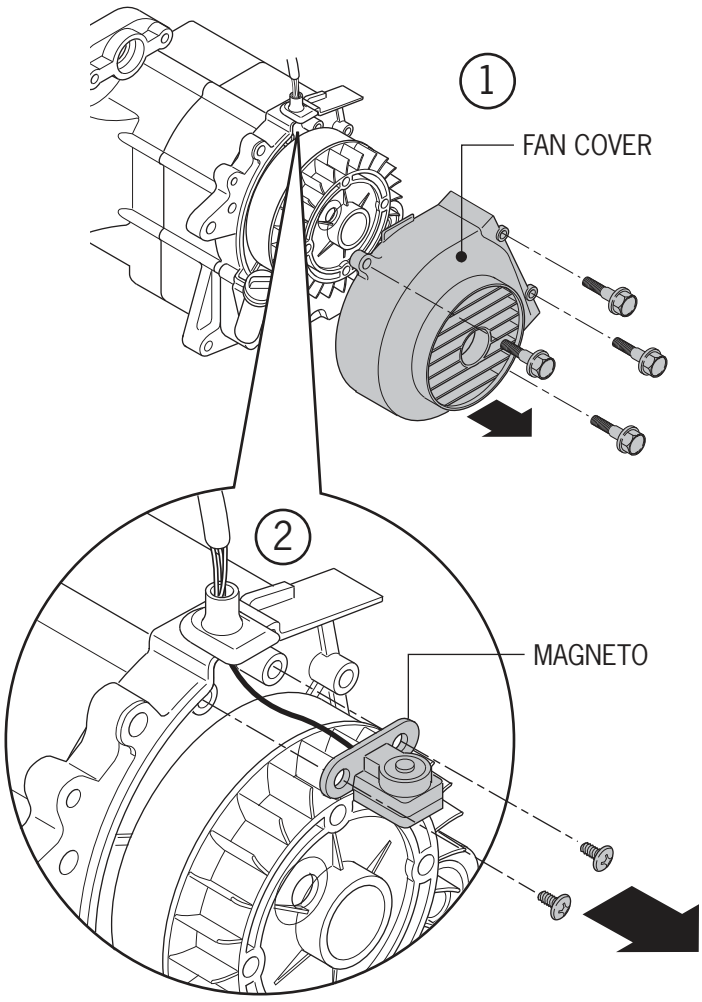
This test is to be conducted with the stator mounted in the engine.

1. Remove the fan cover.

2. Disconnect the magneto.

3. Test the pickup coil resistance between the blue/yellow and green lead terminals whose standard value is 80-160.

4. Dismounting the magnetor (refer to 14-6).



Charging Coil Inspection

1. Test the charging coil resistance between the black/red and the green lead terminals whose standard value is 500-600 .

Spark Advance Angle Inspection

Since CDI is used, there is no need to adjust the timing advance.

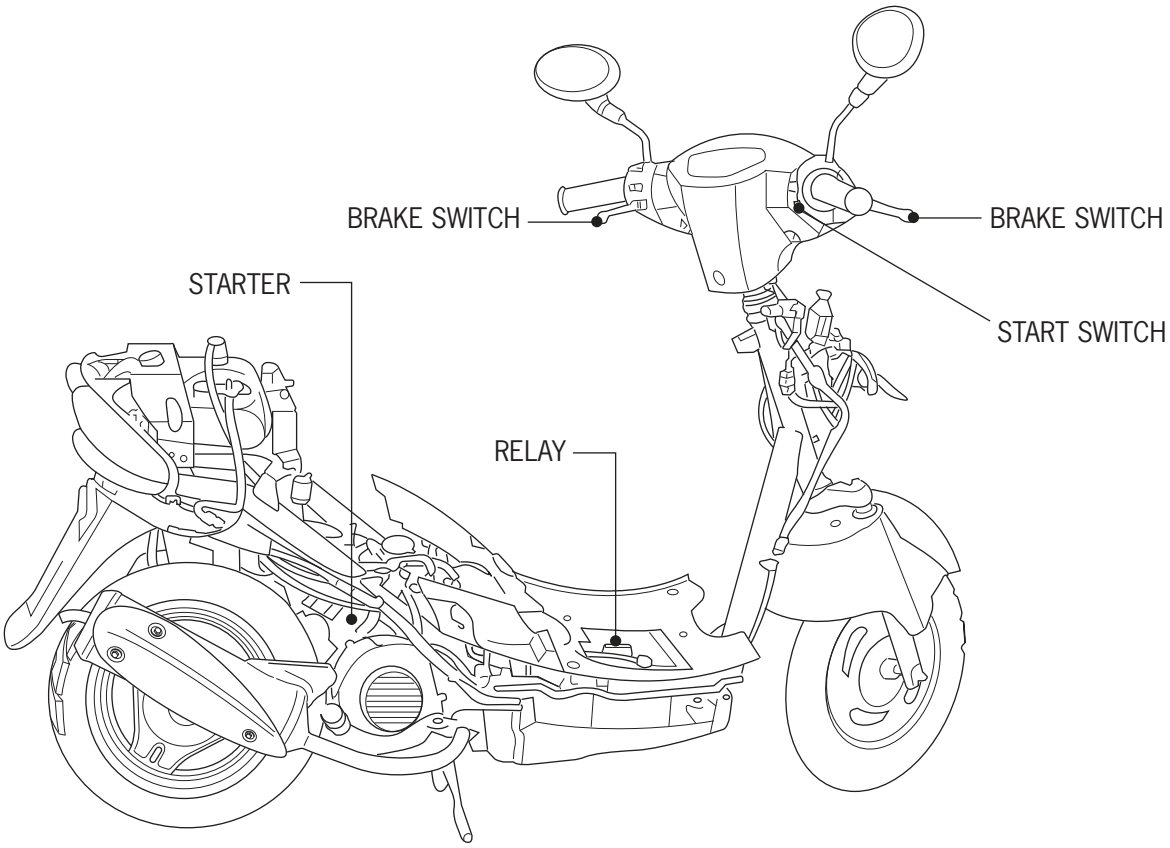
If the spark advance is abnormal, inspect CDI, pickup coil or magneto. Replace if necessary.

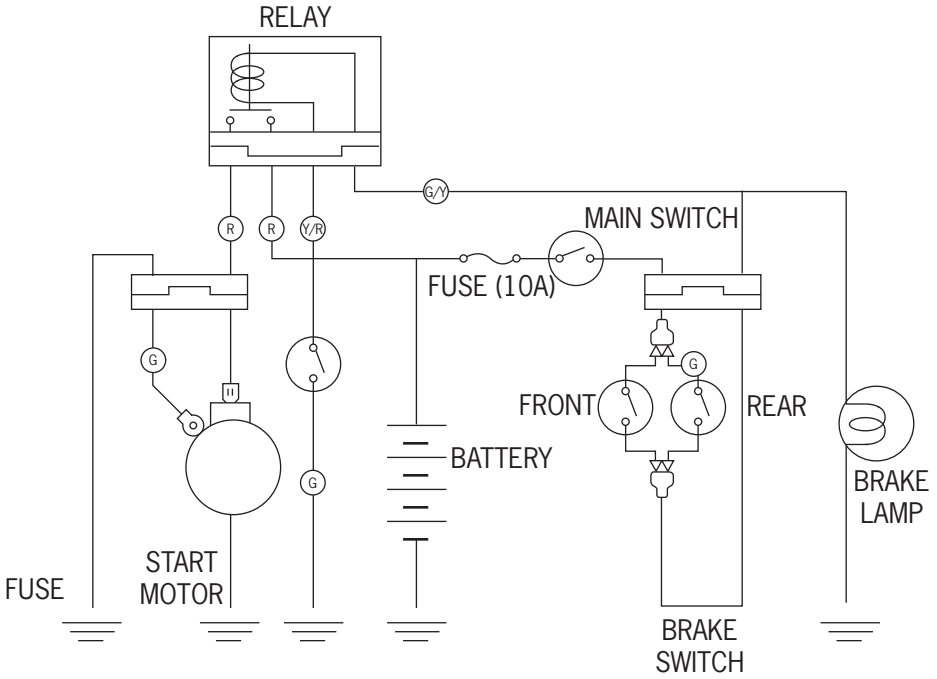
3. Remove timing lid.

4. After the engine is warmed up, check the spark advance angle by the spark timing lamp. It is proper for “F” to align with + 2˚ with the engine revolving at a speed of 1700rpm.

The spark advance angle should be 13˚ + 1˚ (2000r/min).

16. Starter System





B RED Y/R YELLOW/RED G/Y GREEN/YELLOW G GREEN

16. Starter System

Topic	Page	Topic	Page
General Information	16-2	Starter Motor Inspection	16-6
Troubleshooting	16-2	Starter Motor Installation	16-6
Starter Motor Removal	16-3	Starter Pinion Removal	16-7
Starter Disassembly	16-3	Starter Pinion Inspection	16-7
Starter Inspection	16-3	Starter Pinion Installation	16-7
Inspecting the Starter Relay	16-5		

General Information

•The starter motor can be removed without disassembly of the engine.

Installation Reference Standard

Item	Standard valve	Wear Limit
Starter motor brush length	8.5 mm (.335 in.)	5 mm (.2 in.)

Fastener Torque Specification

Starter motor clutch cover bolt
1.2kg-m 8-9 ft lbs
Starter motor clutch jam nut
9.5kg-m 65-68ft lbs



Hex key



Open end wrenches

Troubleshooting

Starter Motor Does Not Turn
•Fuse broken
•Battery discharged
•Faulty main switch
•Faulty starter clutch
•Faulty brake switch

Starter Motor Turns Over Slowly
•Battery discharged
•Poor or faulty cable connections
•Starter motor gear seized by a foreign object

Starter Motor Turns – Engine Does Not Rotate
•Faulty starter clutch
•Starter motor reversal
•Battery discharged

16. Starter System

Starter Motor Removal

Never work on the starter motor until main switch is turned off and the battery ground wire is disconnected to ensure that the motor cannot turn.

1. Remove the starter motor lead clamp.

2. Remove the two bolts and remove the starter motor.

3. Roll up the water-proof rubber cover to disconnect the starter motor.

Starter Disassembly

1. Remove the two case bolts and remove the motor housing from the internal parts.

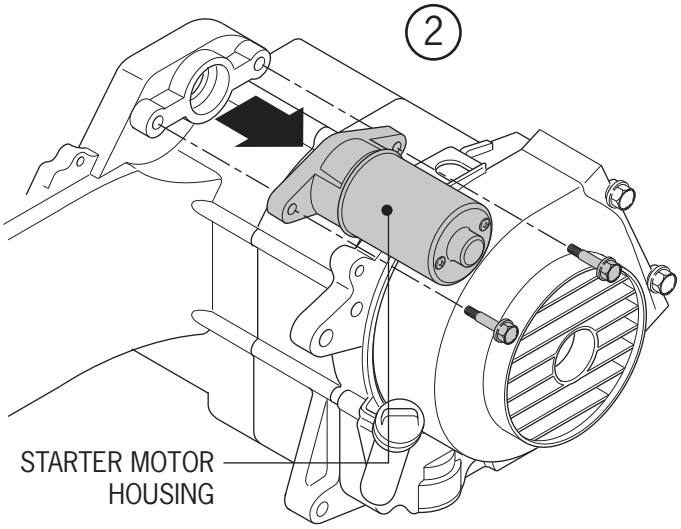
Starter Inspection

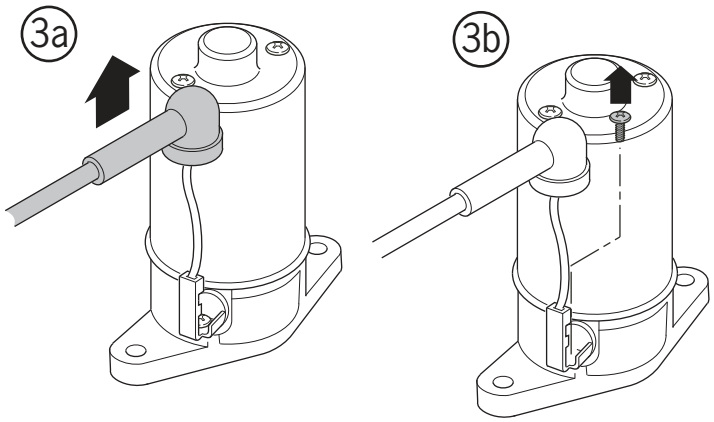
2. Inspect brushes and commutator for wear, damage or discoloration. Replace if necessary.

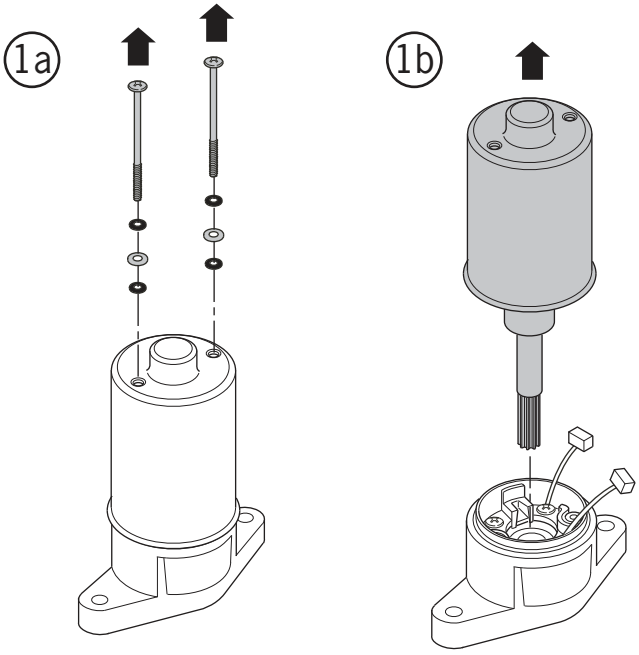
3. Clean attached metal particles from the commutator surfaces.

4. Measure the resistance between each contact surface of the components.

5. Make sure there is no conduction current between each commutator segment and the armature shaft.







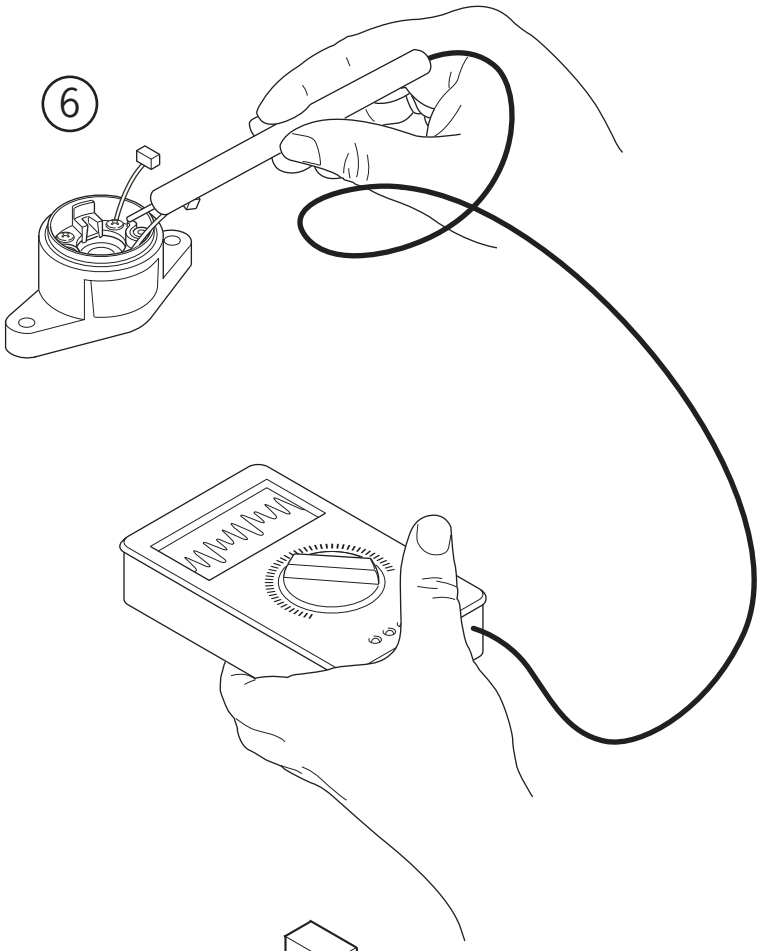
16. Starter System

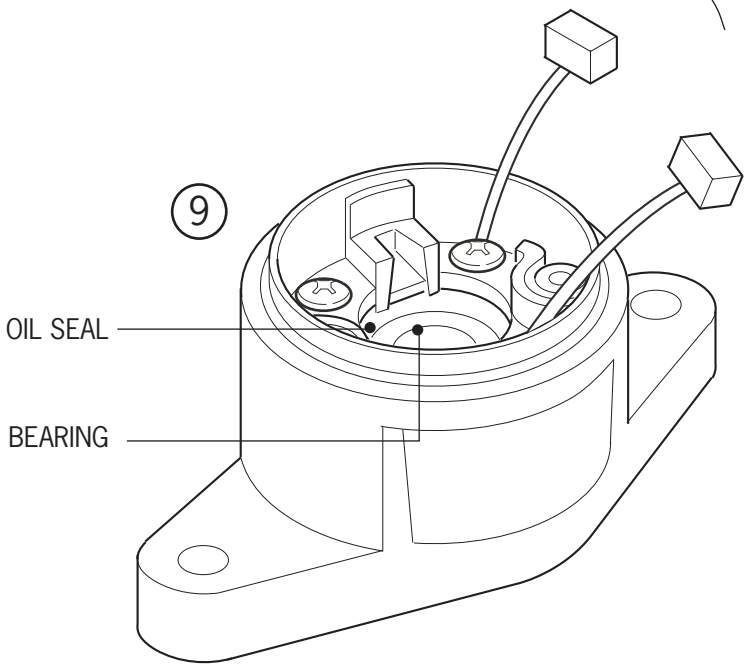
6. Check the starter motor housing conductivity. Be sure there is no conduction current between the cable terminal and the starter motor housing.

7. Check conductivity between the lead terminal and the brush. Replace them if necessary.

8. Measure the brush length. Its service limit is 5mm (.2 in.). Replace it if necessary. Check brush holder for conduction current. Replace if necessary.

9. Inspect bearing in front bracket for smooth rotation and for looseness when installed. Replace it if necessary. Inspect dust cover for wear or damage.





16. Starter System

10. Apply grease to the dust cover.

11. Install spring brush in its holder.

12. Apply a light film of grease to both ends of the sliding surfaces of the armature shaft.

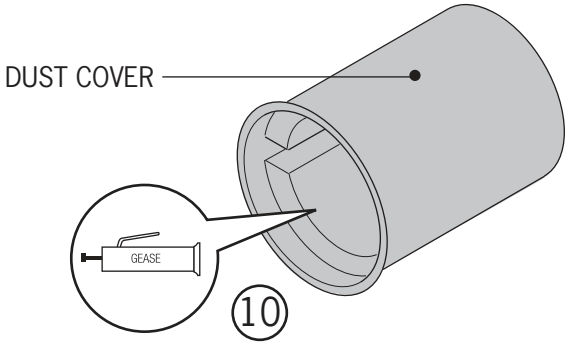
13. Install armature in front bracket.

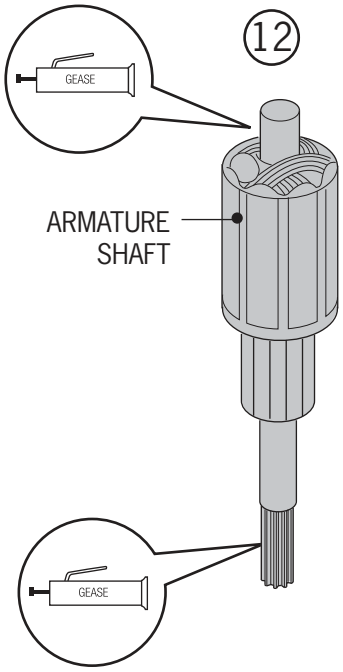
- Make sure the surfaces between the brush and the armature are not damaged.
- Be sure the dust cover lip is not damaged by the armature mount shaft.

14. Install a new o-ring in front bracket.

15. Engage motor housing with that of front bracket. Install two housing bolts.

- When engaging the housing with the front bracket, install the armature first, hold the armature shaft and then install the housing in case the armature is drawn out by the magnet.



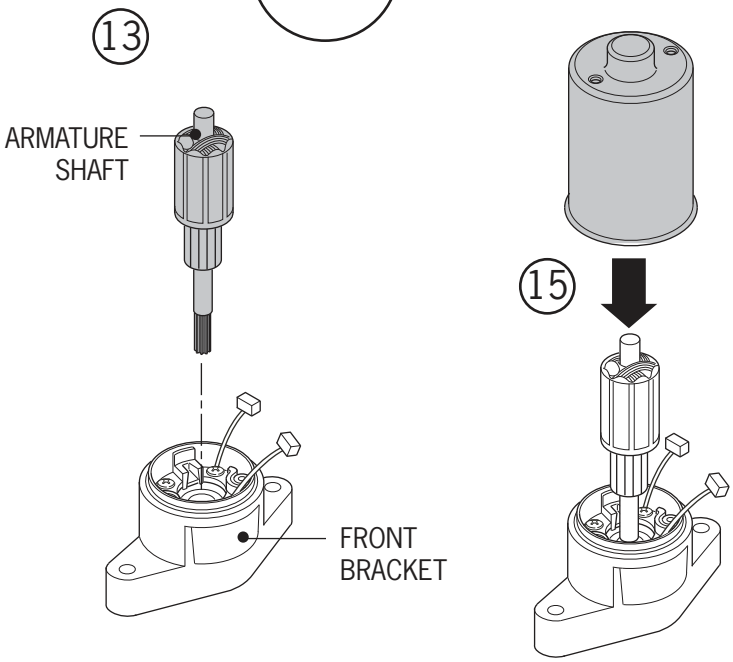


Starter Relay Inspection

1. Remove right side body panel.

2. With main switch in the “on” position, depress the starter button to check for a click, which indicates proper operation of relay. If starter button is depressed without a click, perform the following steps.

- Test starter relay voltage.
- Inspect starter relay ground return circuit.
- Inspect starter relay.



16. Starter System

3. To inspect starter relay voltage: Stand the scooter on is center stand, measure the voltage between the starter relay negative terminal (green/yellow cable) and the ground.

Turn the main switch to “on”, pull the brake levers and make sure the battery voltage is available at the relay (12 volts). If there is no battery voltage, inspect the brake switch electrical conductivity and wiring.

To inspect starter relay:

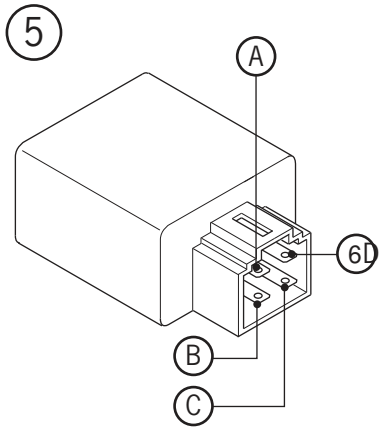
1. Remove the right side body panel.

2. Disconnect the starter relay unit coupler from the wire harness and remove it. Use ohm meter or continuity tester to check coil.

3. Connect the meter to terminals card D. This circuit should read closed. Use ohm meter or continuity tester C.

4. Check contactor.

5. Connect the meter to terminals A and B. This circuit should read open with terminals C and D disconnected and read closed with terminals C and D applied to 12 volt supply.

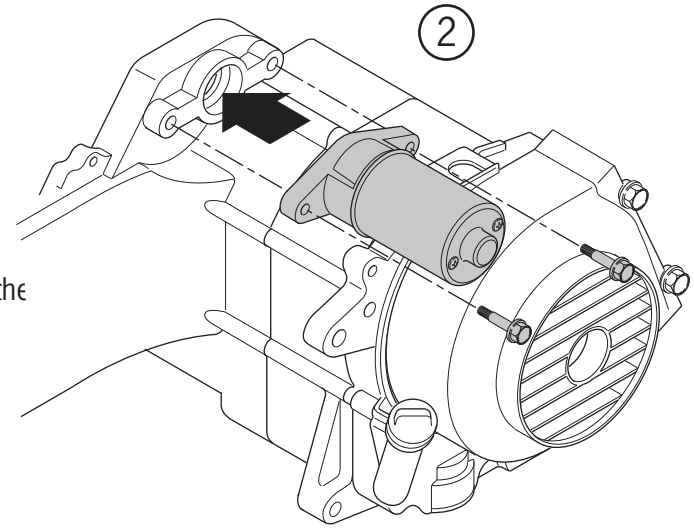


Starter Motor Installation

1. Apply grease to the starter motor o-ring and install the starter motor.

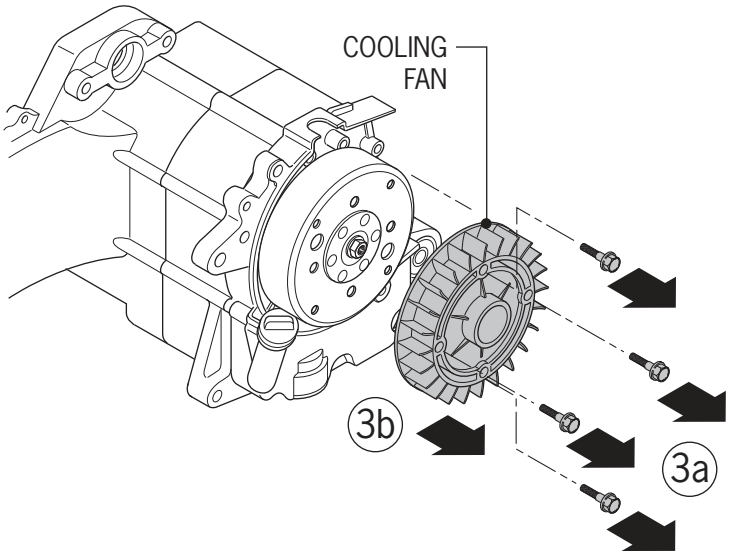
2. Install the two bolts.

3. Connect the starter motor terminals to the harness.



16. Starter System

3. Remove the four bolts and remove the cooling fan.



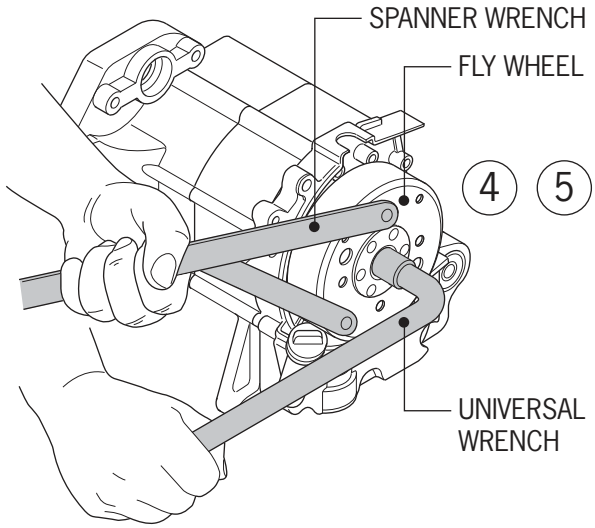
4. Use a universal solid wrench to secure the flywheel. Detach the fix nuts of the flywheel.

5. Use a spanner wrench hold flywheel while removing the retaining nut.

6. Use a flywheel puller to remove the flywheel.

7. Remove and save the key.

8. Detach the connecting wire of the magneto.



17. Meters, Switches and Lighting System

MEMO

17. Meters, Switches and Lighting System

Topic	Page	Topic	Page
Maintenance information	17-2	Replacing the Horn Switch	17-5
Troubleshooting	17-2	Main Switch Inspection	17-5
Fuel Sensor Removal	17-3	Replacing the Main Switch	17-5
Fuel Sensor Installation	17-3	Brake Light Switch Inspection	17-6
Fuel Sensor Testing	17-3	Horn Inspection	17-6
Fuel Gauge Inspection	17-3	Replacing the Horn Switch	17-6
Handlebar switch	17-2	Speedometer Removal and Reinstallation	17-6
Light Switch Inspection	17-4	Headlight Removal and Installation	17-7
Starter Switch Inspection	17-4	Bulb Replacement and Installation	17-7
Dimmer Switch Inspection	17-4	Taillight, brake light, rear position light or license light	17-7
Turn Light Switch Inspection	17-4		
Engine Stop Switch Inspection	17-4		
Horn Switch	17-5		

Maintenance

Operating Points

•Always be sure that colors match when wires are connected, that wires are installed in harness tube or supported by insulating tape after connection and that connectors match wire color in assembly.

•Make sure connectors fit properly to assure connection.

•Be sure to always test switch operation after installation.

Troubleshooting

If the brake light or turn light fails to come on with the ignition switch “ON,” it may be caused by:

•Bad bulb
•Faulty switch
•Lead broken
•Fuse blown
•Battery discharged
•Faulty wire matching
•Bad flasher

If the fuel indicator fails to come on:

•Lead disconnected
•Wire broken
•Improper float operation
•Faulty fuel sensor
•Bad meter

If light is dim:

•Faulty magneto lighting coil
•Excessive voltage at matching wire or switch
•Faulty rectifier regulator

If the dimmer switch does not operate properly:

•Bad bulb
•Faulty switch

If fuel indicator pointer moves unsteadily:

Loose lead connection
•Faulty fuel sensor
•Faulty meter

17. Meters, Switches and Lighting System

Fuel Sensor Removal

Avoid sparks and flames when working on the fuel system.

1. Remove the middle luggage box.

2. Remove the right body panel.

3. Disconnect the fuel sensor from the wire harness.

4. Remove the bolt of the fuel sensor.

Make sure not to damage the fuel sensor lead.

5. Remove the fuel sensor.

Be sure that the fuel sensor float is not beat.

Fuel Sensor Installation

6. Reverse the removal procedure for installation.

7. Be sure to align the groove on the fuel sensor with the mark on the fuel tank.

8. The mark on the sensor should be aligned with that on the fuel tank.

Fuel Sensor Testing

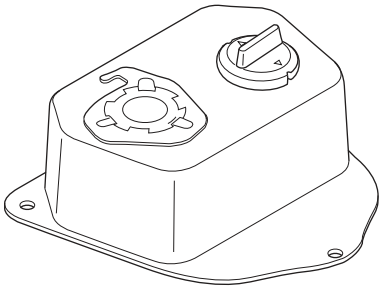
1. Remove the fuel sensor.

2. Measure the resistance of each terminal with the float in each position.

Fuel Gauge Inspection

With the ignition switch “ON,” connect the lead. Turn on the turn signal to be sure the battery-return circuit is intact before performing the inspection. Check the gauge reading by changing the float position.

④



Lead Terminal	Float Up	Float Down
Gree-Blue/White	7+/- 2 OHM	96+/- 2 OHM

Float Position	Reading
Up	F
Down	E

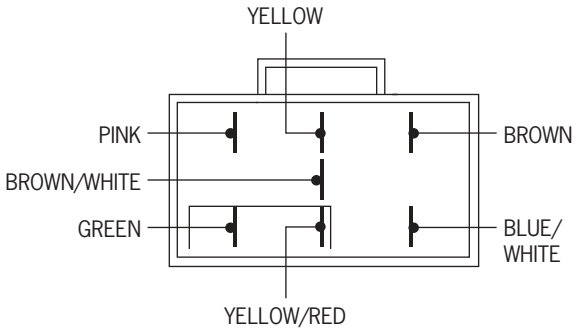
17. Meters, Switches and Lighting System

Handlebar Switches Inspection

1. Remove the speedometer cover.

2. Disconnect the handlebar connector and check each terminal for conduction.

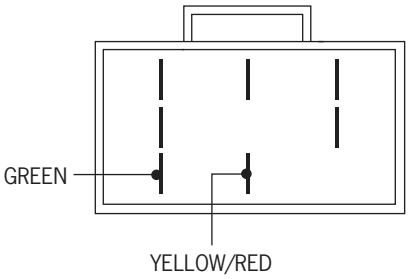
3. Inspect each switch if abnormal.



Lights Switch

Color	Blue/White	Yellow	Brown	Brown/White	Pink
Code	Bl/W	Y	Br	Br/W	P
●		○			○
≡0 0≡		○	○	○	
☼	○	○	○		

Set an Ohm meter at X1 OHM when using it.

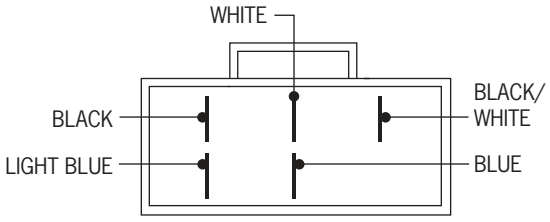


Starter Switch

Color	Yellow/Red	Green
Code	Y/R	G
Released		
Depressed	○	○

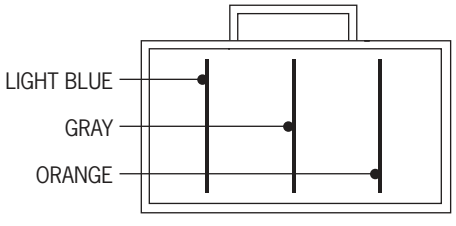
Dimmer Switch

Color	Blue/White	Blue	White
Code	Bl/W	Bl	W
≡0 Hi	○	○	
≡0 Lo	○		○



Turn Light Switch

Color	Blue/White	Blue	White
Code	Gr	LBl	O
R	○	○	
Off			
L	○		○



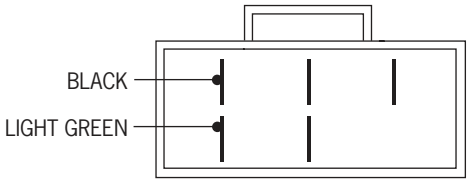
Engine Stop Switch

	Black 1	Black 2
Run		
Stop	○	○

17. Meters, Switches and Lighting System

Hom Switch

Color	Light Green	BLACK
Code	LG	B
Released		
Depressed	○———	———○



Replacing the horn switch:

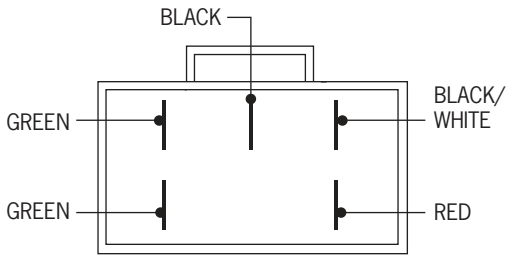
1. Remove the front panel.

2. Remove the handlebar cover.

3. Disconnect the wire connector.

4. Remove switch from housing.

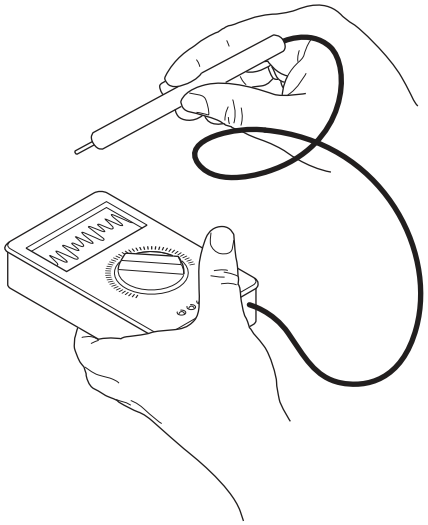
5. Reverse the removal procedure for installation.



Main Switch Inspection

1. Remove the front panel.

2. Disconnect the main switch wire connector to check the connection at each terminal.



Main Switch

Color	Red	Black	Black/White	Green
Code	R	B	B/W	G
On	○———	———○		
Off			○———	———○

Replacing the main switch:

1. Remove the front panel.

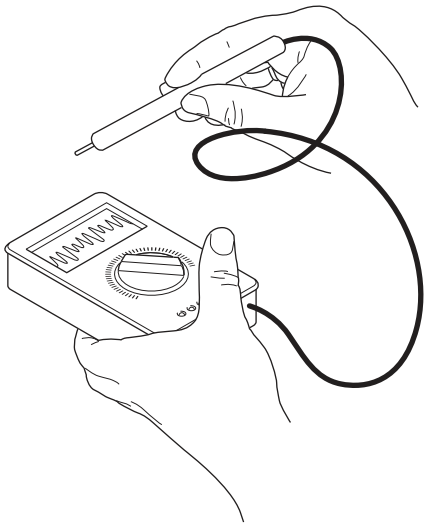
2. Disconnect the main switch wire connector.

3. Remove the two mounting bolts and remove the main switch.

4. Reverse the removal procedure for installation.

17. Meters, Switches and Lighting System

Brake Light Switch Inspection



1. Remove the speedometer cover.
2. Disconnect the front brake switch lead.
3. Operate the front brake lever to check the switch for proper operation.
4. Disconnect the rear brake switch wire connector.
5. Operate the rear brake lever to check for proper operation.
6. The above tests can be conducted with a continuity tester or ohm meter.

Horn Inspection

1. Remove the front panel.
2. Disconnect the horn wire connector and connect the terminal to a battery (12V).
3. The horn is good if it sounds properly.
4. Check operation of switch with ohm meter or continuity tester.

To replace the horn switch:

5. Disconnect the horn switch wire connector.
6. Remove the mounting bolt.
7. Remove the horn.
8. Reverse the procedure for installation.

Speedometer Removal and Reinstallation

1. Remove front and rear handlebar covers (refer to 12-2).
2. Disconnect all the wiring connectors.
3. Remove the three set screws and speedometer.
4. Reverse the removal procedure for installation.

17. Meters, Switches and Lighting System

Headlight Removal and Installation

1. Remove the speedometer cover (refer to 2-1).

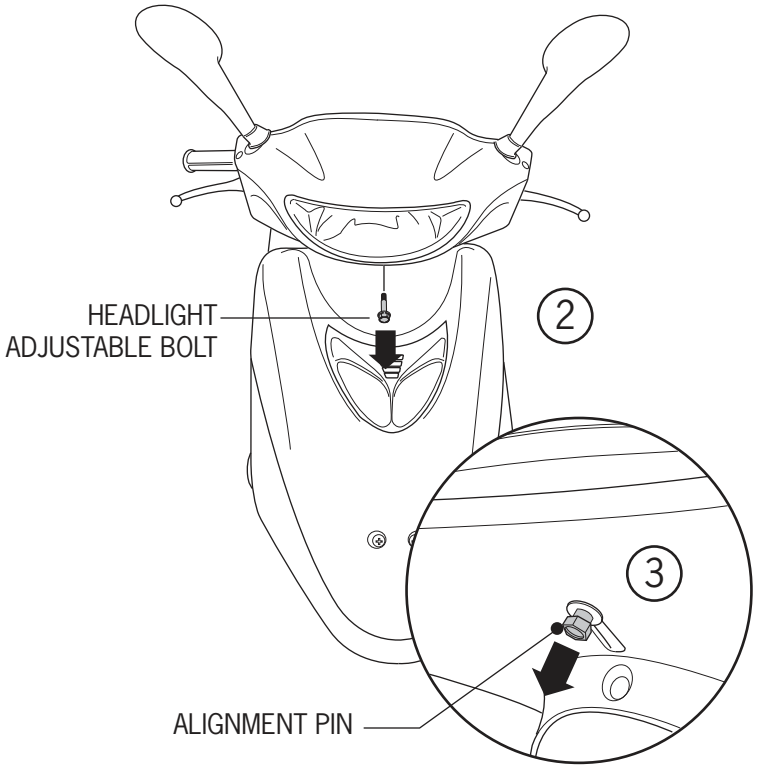
2. Remove the headlight adjustable bolt.

3. Remove the alignment pin and headlight.

4. Reverse the removal procedure for installation.

- Be sure to align the headlight tab with groove in odometer cover.

- The headlight beam should be adjusted after installation (3-12).



UNDERSIDE OF COVER

Bulb Replacement and Installation

1. Remove the speedometer cover.

2. Remove the headlight or front marker light bulb for replacement.

3. Reverse the procedure for installation.

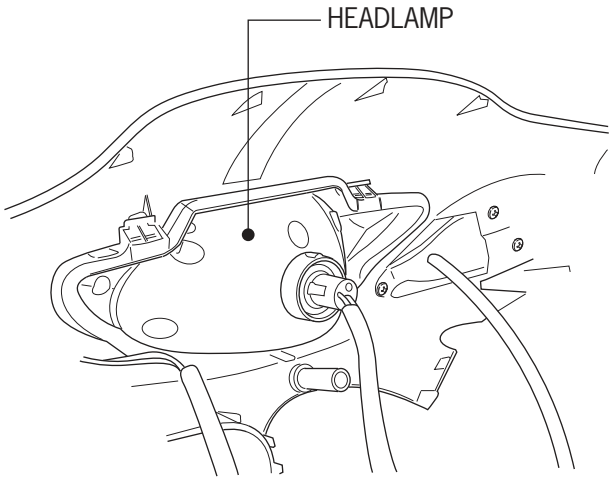
Taillight, brake light, rear position light or license light

1. Remove the two screws in the rear panel.

2. Remove the rear panel, two set screws in rear light cover and light cover.

3. Remove the light bulb for replacement.

4. Reverse the procedure for installation.



Index

-A-

Page

Auto-Choke- checking..... 55

-B-

Ball Cone Race- replacing..... 135
Battery and Charging System- diagnosis..... 149
Battery and Charging System- instructions..... 148
Battery..... 150
Bearing- Side Gearbox Cover- replacing..... 113
Bearing- Side of Crankcase- replacing..... 114
Belt- Driving- assembly..... 101
Belt- Driving- checking..... 100
Belt- Driving- replacing..... 100
Body Cover- removal..... 29
Bolt- tightness..... 43
Brake Arm- rear..... 41
Brake Arm..... 41
Brake Light..... 179
Brake Lining- checking..... 137
Brake- rear- assembling..... 137
Brake- Rear- assembling..... 143
Brake- Rear- checking..... 143
Brake- rear- dismantling..... 137
Brake- Rear- dismantling..... 143
Brake System Front Brake..... 41
Bulb- replacement and installation..... 179

-C-

Camshaft Assembly..... 85
Camshaft- Bearing Rocker Arm- checking..... 77
Camshaft Chain Regulator- assembling 86
Camshaft- disassembly 74
Carburetor- adjustment 64
Carburetor- assembly..... 62
Carburetor- disassembly..... 55
Carburetor Idle Speed 38
CDI Unit- inspection..... 163
Charging System- Short Circuit- testing..... 154
Charging System..... 151
Clutch- engagement..... 42
Clutch Housing- assembly..... 108
Clutch/Transmission- Pulley and bearing – replacing..... 106
Clutch/Transmission- Pulley assembly..... 107
Clutch/Transmission- Pulley- checking..... 105

Index

Clutch/Transmission- Pulley- disassembly..... 104
Clutch/Transmission- Pulley- removal..... 104
Control Cables and Wiring Diagram..... 14
Crankcase and Crankshaft- diagnosis..... 117
Crankcase and Crankshaft- Important Points..... 117
Crankcase- assembly..... 121
Crankcase Cover- left- assembly..... 99
Crankcase Cover- left- detaching..... 97
Crankcase- dismantling..... 119
Crankshaft..... 120
Cylinder and Piston – material..... 89
Cylinder and Piston – troubleshooting..... 89
Cylinder- assembly..... 95
Cylinder- checking..... 92
Cylinder Head- breakdown..... 79
Cylinder Head- building up..... 83
Cylinder Head- checking..... 79
Cylinder Head- disassembly..... 77
Cylinder Head- important information..... 72
Cylinder Head- installing..... 84
Cylinder Head- trouble diagnosis..... 73
Cylinder Pressure..... 39
Cylinder- removal..... 90

-D-

Drive Belt..... 40
Driving Belt Important Points..... 96
Driving Belt Troubleshooting..... 96

-E-

Engine and Frame Number Positions..... 1
Engine- installation..... 70
Engine Oil/Filter Screen..... 47
Engine Problem diagnosis..... 46
Engine- removal..... 68
Engine Requirements..... 46
Engine- special requirements..... 67
Exhaust System- removal..... 32

-F-

Failure Diagnostics..... 21
Filter- Air..... 37
Filter- Air- inspection..... 66
Filter- Air- replacing Frequency..... 37
Filter- Fuel..... 36

Index

Final Gear Set- assembling..... 114
Float Bowl- disassembly..... 59
Fork- Front..... 135
Frame Type..... 34
Front Wheel / Brake- instructions..... 125
Front Wheel / Brake- troubleshooting..... 126
Front Wheel- assembly..... 131
Front Wheel- removal..... 128
Fuel System- information..... 53
Fuel System- troubleshooting..... 54
Fuel Tank- assembly..... 63
Fuel Tank- disassembly 63

-G-

Gauge- Fuel- Inspection 175

-H-

Handlebars- assembling..... 127
Handlebars- removing..... 127
Headlight- removal and installation..... 179
Horn- inspection..... 178

-I-

Ignition Coil- removal..... 164
Ignition System- general information..... 161
Ignition System- troubleshooting..... 162
Ignition Timing..... 39

-L-

Lamp Adjustment Front..... 42
License Light..... 179

-M-

Magneto- assembling..... 155
Magneto Charging Coil..... 153
Magneto Charging Coil..... 156
Magneto- dismantling..... 153
Magneto- dismounting..... 156
Magneto Lighting Coil- checking..... 156
Magneto Lighting Coil Resistor- checking..... 156
Magneto Pickup Coil- inspection..... 165
Magneto- reassembling 158
Maintenance Chart..... 35

Index

Meter- Fuel Sending Unit..... 65
Meters, Switches and Lighting System- maintenance information..... 174
Meters, Switches and Lighting System- troubleshooting..... 174

-N-

Nut- tightening..... 43

-O-

Oil and Grease Supply Chart..... 13
Oil- Gear Engine..... 40
Oil- volume..... 47
Oil-changed..... 47
Oil-checking..... 49
Overrunning Clutch- checking and assembling..... 103
Overrunning Clutch- removal..... 103

-P-

Piston- assembly..... 94
Piston- removal..... 90
Product Specifications and Technical Data..... 2
Pulley- Driving- assembly..... 103
Pulley- Driving- checking..... 102
Pulley- Driving- disassembly..... 101
Pulley- Driving- dismounting..... 101
Pump- Accelerator- checking..... 61
Pump- Accelerator- disassembly..... 61
Pump- Oil - assembling..... 50
Pump- Oil - disassembly..... 49
Pump- Oil - installation..... 50
Pump- Oil- removal..... 48

-R-

Rear Position Light..... 179
Rear Wheel/ Brake/ Shock- important points..... 141
Rear Wheel/ Brake/ Shock- troubleshooting..... 141
Removing the Spark Plug..... 39
Resistor- Magneto- checking..... 153

-S-

Sensor- Fuel- installation..... 175
Sensor- Fuel- removal..... 175
Sensor- Fuel- testing..... 175
Shock- assembly sequence..... 134

Index

Shock- Front- dismantling..... 133
Shock- Front- dismounting..... 132
Shock- Rear- assembling..... 145
Shock- Rear- dismounting..... 144
Spark- Advance Angle Inspection..... 165
Spark Plug..... 37
Speedometer- removal and reinstallation..... 178
Starting Assembly- installation..... 98
Starting Pivot- checking..... 98
Starting Pivot- removing..... 97
Steering System..... 44
Suspension- Front..... 42
Suspension- Rear..... 42
Switch- Brake Light- inspection..... 178
Switch- Dimmer- inspection..... 176
Switch- Engine Stop- inspection..... 176
Switch- handlebar..... 174
Switch- Horn- replacing..... 177
Switch- Horn- replacing..... 178
Switch- Horn..... 177
Switch- Light- inspection..... 176
Switch- Main- inspection..... 177
Switch- Main- replacing..... 177
Switch- Starter- inspection..... 176
Switch- Turn Light- inspection..... 176

-T-

Taillight..... 179
Technical Tips..... 3
Throttle Operation Lever..... 36
Tire- Air Pressure..... 43
Tire- Collar..... 43
Tire Rim..... 43
Tire- Type..... 34
Tools..... 12
Torque Settings 11
Transmission Final Assembly- dismantling..... 112
Transmission General Information..... 111

-U-

Upper Race- assembling..... 136
Upper Race- replacing..... 135

-V-

Vacuum Chamber- assembly..... 58

Index

Vacuum Chamber-breakdown..... 58
Valve- adjustment..... 38
Valve- Air Cutoff..... 57
Valve- Air Cutoff- assembling..... 57
Valve and Valve Guide..... 80
Valve- Float- checking..... 60
Valve Fuel- automatic..... 65
Valve Seat Chamfer Cutting Tools..... 82
Valve Seat Cutting..... 82
Voltage Stabilizer- Rectifying..... 152

-W-

Wheel- assembly..... 130