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**16. ELECTRICAL EQUIPMENT**

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**ELECTRICAL EQUIPMENT**

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# 16. ELECTRICAL EQUIPMENT

## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- It is not necessary to check the battery electrolyte or fill with distilled water.
- Remove the battery from the motorcycle for charging. Do not remove the electrolyte cap..
- Do not quick charge the battery. Quick charging should only be done in an emergency..
- Charge the battery according to the charging current and time specified on the battery.
- When charging, check the voltage (open voltage) with an electric tester.
- When replacing the battery, do not use a traditional battery.

### SPECIFICATIONS

		2-Stroke	4-Stroke
Battery	Capacity	12V3AH	12V4AH
	Voltage	13.0□13.2V	13.0□13.2V
	Charging current	Standard Quick	0.4A/5H~10H 4A/0.5H
Spark plug	(NGK)	BR8HSA	C7HSA
Spark plug gap		0.6□0.7mm	0.6□0.7mm
Ignition coil resistance	Primary coil	0.153□0.187Ω	0.5Ω
	Secondary coil (with plug cap)	6.99k□10.21KΩ	8.12KΩ
	Secondary coil (without plug cap)	3.24k□3.96KΩ	3KΩ
Pulser coil resistance (20□)		80□160Ω	118.1□118.2Ω
Ignition timing		13.5°±2°BTDC/3000rpm	28°±2°BTDC/4000rpm

## TROUBLESHOOTING

### CHARGING SYSTEM

#### No power

- Dead battery
- Disconnected battery cable
- Fuse burned out
- Faulty ignition switch

#### Low power

- Weak battery
- Loose battery connection
- Charging system failure
- Faulty regulator/rectifier

#### Intermittent power

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

#### Charging system failure

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

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## IGNITION SYSTEM

### No spark at plug

- Faulty spark plug
- Poorly connected, broken or shorted wire
  - Between A.C. generator and CDI unit
  - Between CDI unit and ignition coil
  - Between CDI unit and ignition switch
  - Between ignition coil and spark plug
- Faulty ignition switch
- Faulty ignition coil
- Faulty CDI unit
- Faulty A.C. generator

### Engine starts but turns poorly

- Ignition primary circuit
  - Faulty ignition coil
  - Poorly connected wire or connector
- Ignition secondary circuit
  - Faulty ignition coil
  - Faulty spark plug
  - Poorly insulated plug cap
- Improper ignition timing
  - Battery voltage too low (6V max.)
  - Faulty CDI unit

## STARTING SYSTEM

### Starter motor won't turn

- Fuse burned out
- Weak battery
- Faulty ignition switch
- Faulty starter switch
- Faulty front or rear stop switch
- Faulty starter relay
- Poorly connected, broken or shorted wire
- Faulty starter motor

### Lack of power

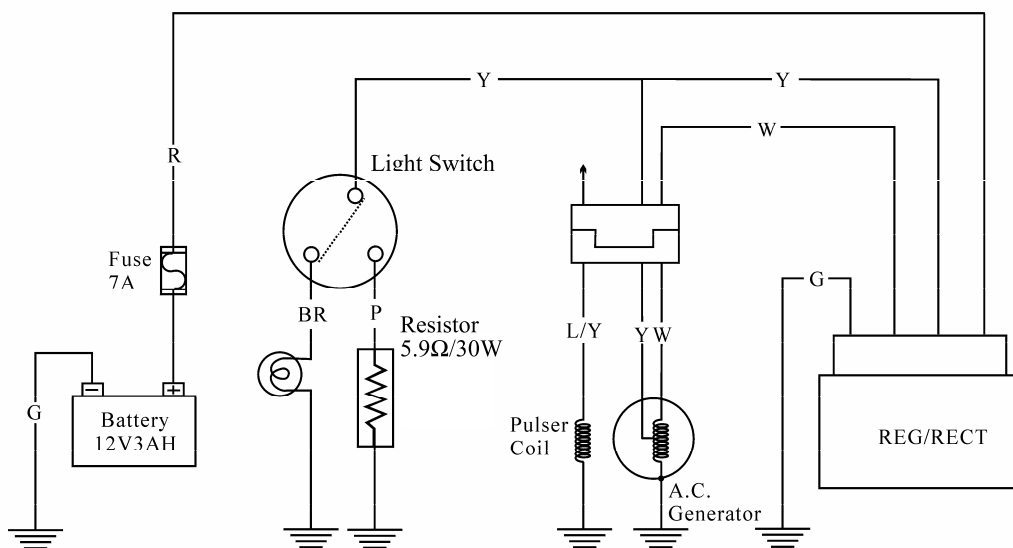
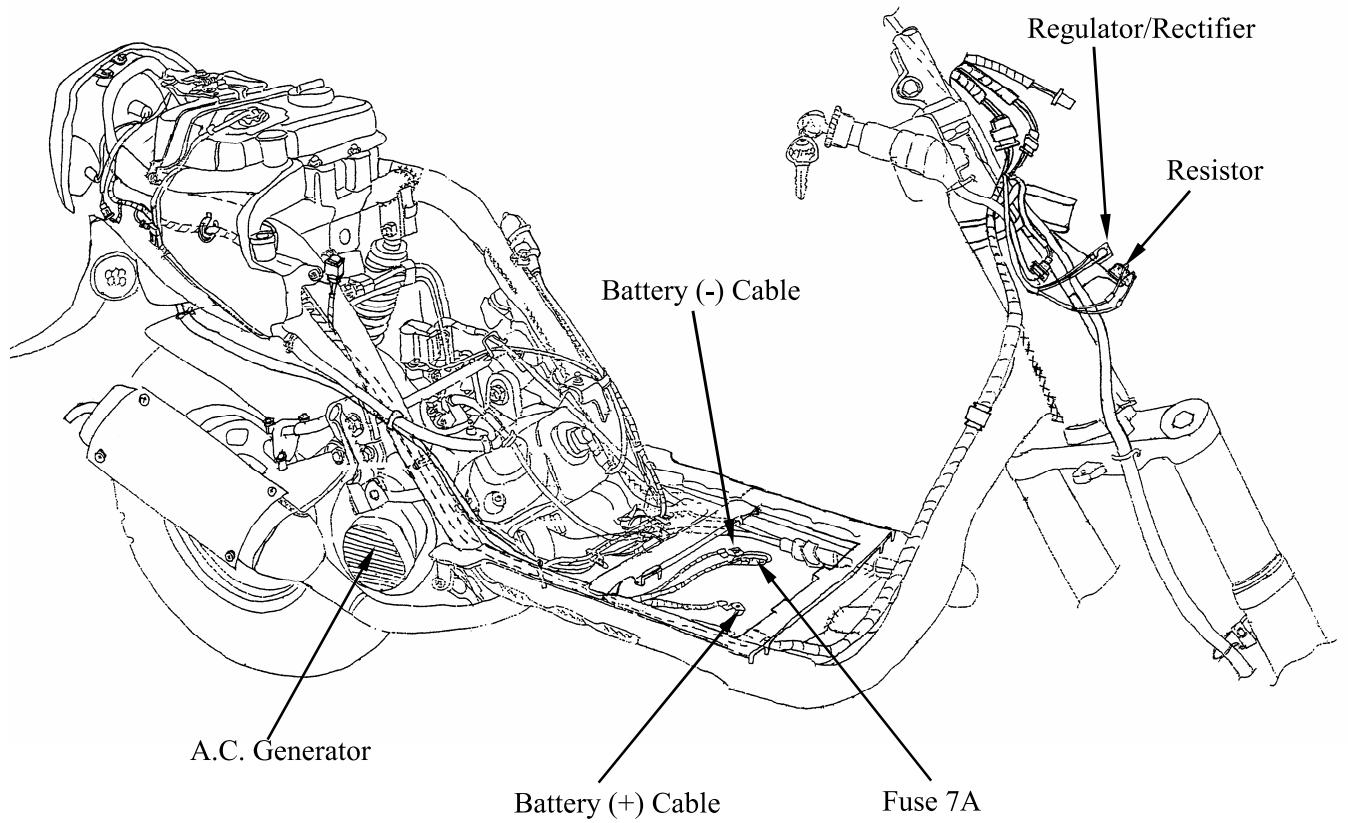
- Weak battery
- Loose wire or connection
- Foreign matter stuck in starter motor or pinion

### Starter motor rotates but engine does not start

- Faulty starter pinion
- Starter motor rotates reversely
- Faulty starter clutch
- Weak battery

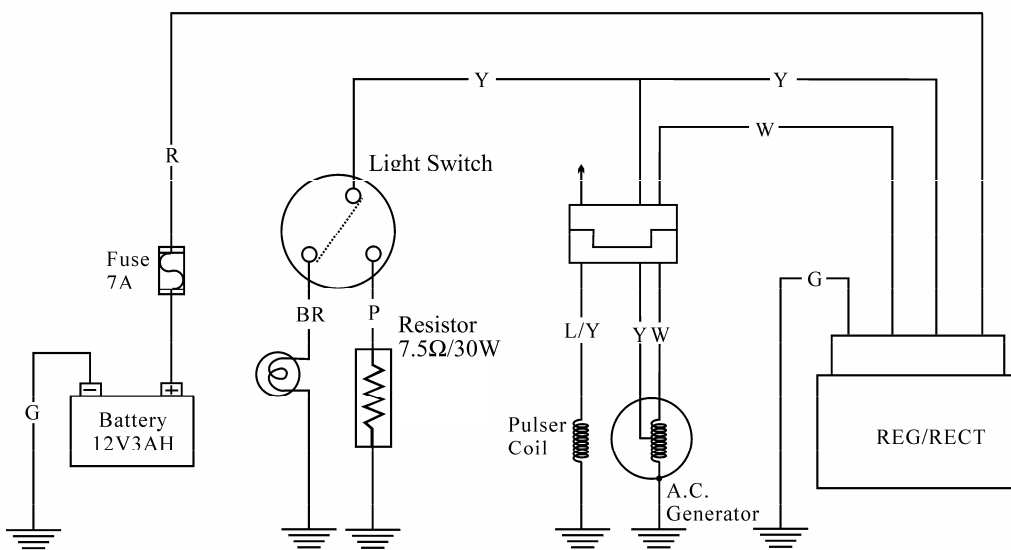
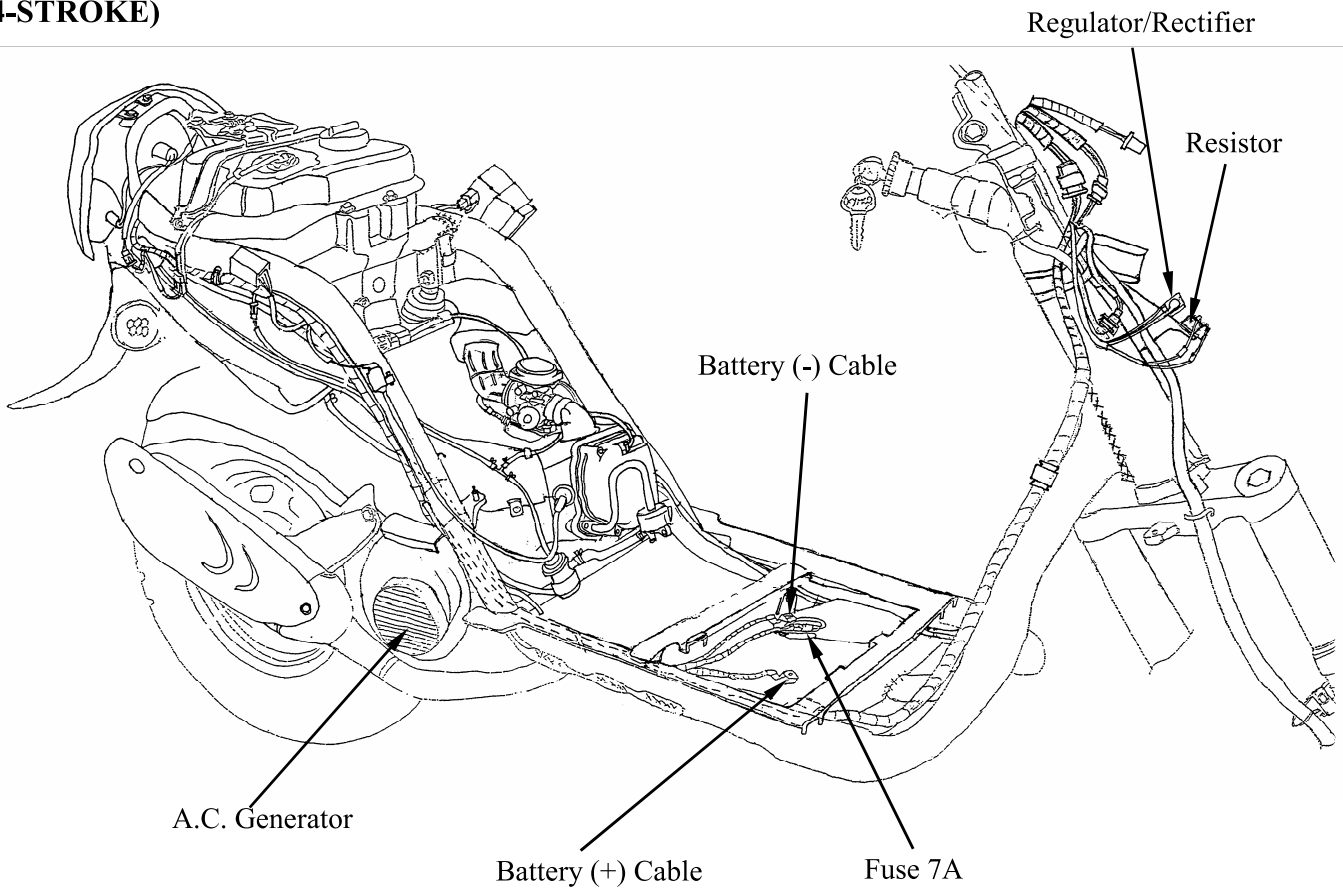
# 16. ELECTRICAL EQUIPMENT

## CHARGING SYSTEM (2-STROKE)



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## CHARGING SYSTEM (4-STROKE)

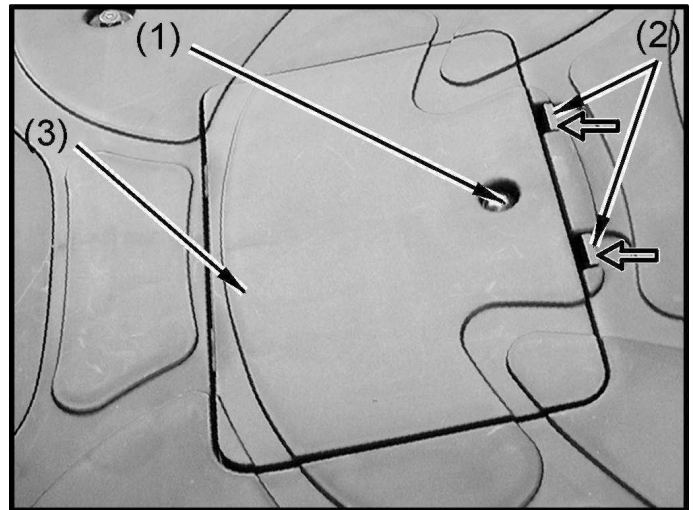


# 16. ELECTRICAL EQUIPMENT

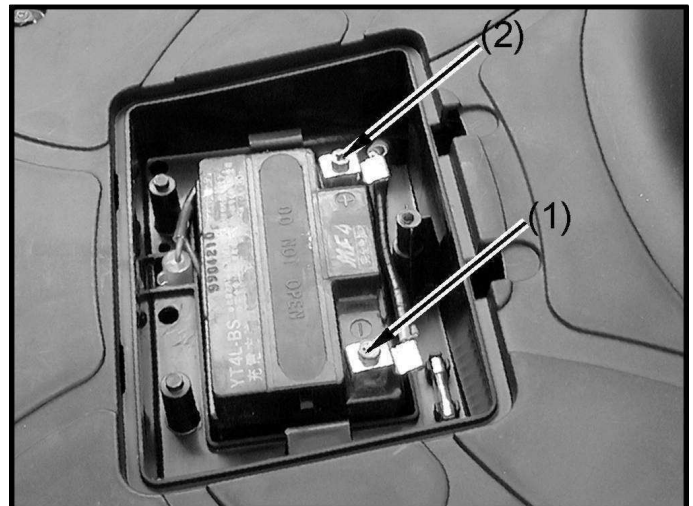
## BATTERY

### BATTERY REMOVAL

1. Make sure the ignition switch is OFF.
2. Remove the screw (1).
3. Push the two retainer clips (2) and remove the battery cover (3)



4. Disconnect the negative (-) terminal lead (1) from the battery first, then disconnect the positive (+) terminal lead (2).
5. Remove the battery.



- This model adopts the battery which needs no refilling of distilled water.
- When cleaning the terminals, remove the screws attaching the battery cover on the footboard and then open the battery cover.
- When battery terminals are corroded, take out the battery for cleaning.
- After cleaning, apply a thin coat of grease or vaseline to battery terminals and then install the battery.

- Never open the closed-type battery electrolyte cap.
- If the scooter will not be used for a long time, the battery will discharge electricity by itself. Remove the battery and put it in a cool place after it is fully charged to prevent electricity leakage.
- If the scooter will not be used for a long time, remove the negative (-) terminal.
- Do not smoke or allow flames or sparks near the battery while removing and installing it.
- Turn off the ignition switch before removal or installation. The negative (-) terminal shall be removed first and the positive (+) terminal shall be installed first.
- Tighten the loose terminal nuts securely.

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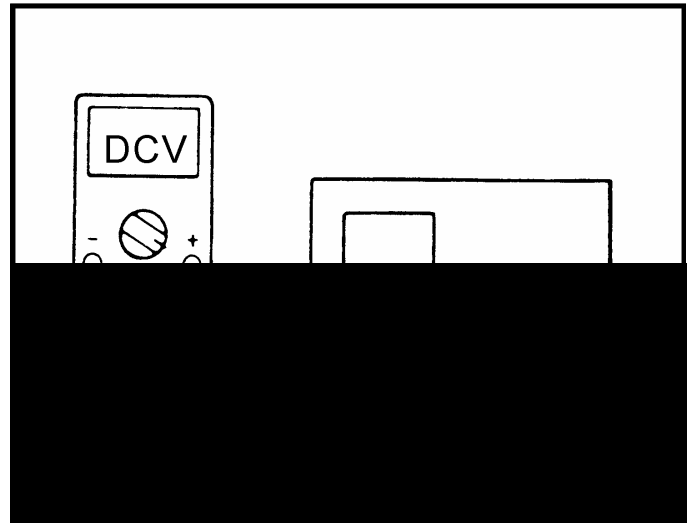
## BATTERY INSPECTION

Remove the battery cover and disconnect the battery cables.

Measure the voltage (20°C/68°F) between the battery terminals.

Fully charged : 13.0V□13.2V

Undercharged: 12.3V max.



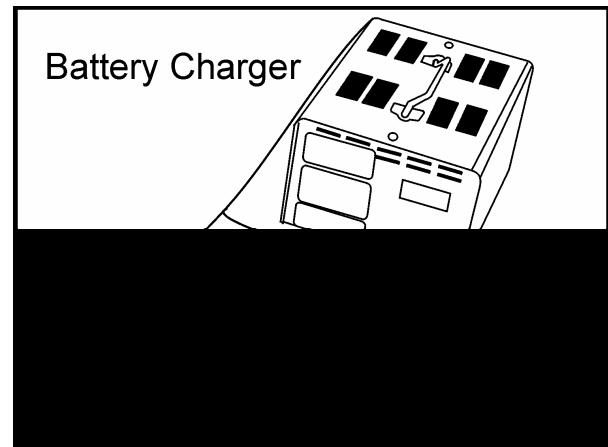
## CHARGING METHOD

Connect the charger positive (+) cable to the battery positive (+) cable.

Connect the charger negative (-) cable to the battery negative (-) cable.



- Keep flames and sparks away from a charging battery.
- Turn power ON/OFF at the charger, not at the battery terminals to prevent sparks near the battery.
- Charge the battery according to the current specified on the battery surface.



Black

Red

Charging current: Standard : 0.4A

Quick : 4A

Charging time : Standard : 5 ~10hours

Quick : 0.5 hour

After charging: Open circuit voltage: 12.8V min.



- Quick charging should only be done in an emergency.
- During quick charging, the battery temperature should not exceed 45□.
- Measure the voltage 30 minutes after the battery is charged.

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### CURRENT LEAKAGE TEST

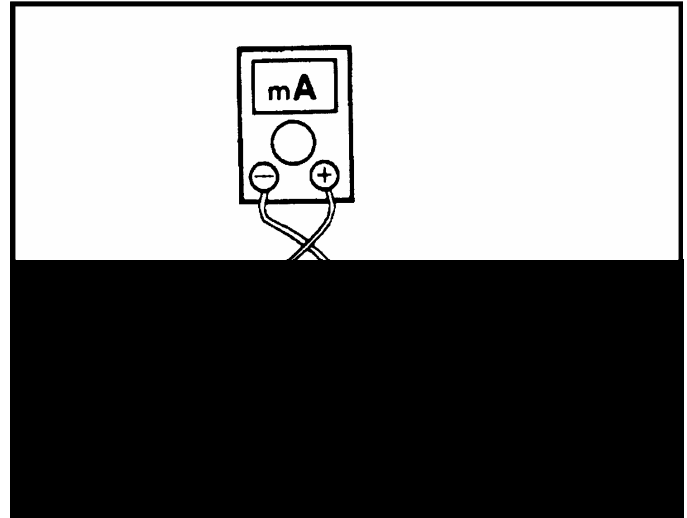
Turn the ignition switch “OFF”.

Remove the battery cover.

Disconnect the negative (-) cable from the battery.

Connect the ammeter (+) probe to the negative (-) cable and the ammeter (-) probe to the battery (-) terminal.

With the ignition switch “OFF”, check for current leakage.



- When measuring current using a tester, set it to high range, and then bring the range down to an appropriate level. Current flow higher than the range selected may blow out the fuse in the tester.
- While measuring current, do not turn the ignition switch “ON”. A sudden surge of current may blow out the fuse in the tester.

Specified current leakage: 1mA maximum

If current leakage exceeds the specified value, a shorted circuit is likely.

Locate the short by disconnecting connections one by one and measuring the current.



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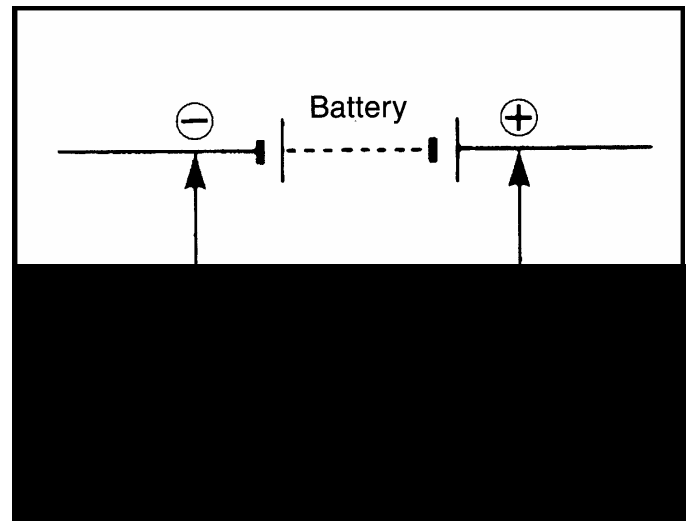
## CHARGING VOLTAGE INSPECTION

- Make sure the battery is in good condition before performing this test.

Start the engine and warm it up to operating temperature; stop the engine.

Connect the multimeter between the positive and negative terminals of the battery.

- To prevent a short, make absolutely certain which are the positive and negative terminals or cable.



With the headlight on high beam, restart the engine.

Measure the voltage on the multimeter when the engine runs at 8000 rpm

**Charging Limit Voltage:**  $14.5 \pm 0.5V/8000rpm$

If the limit voltage is not within the specified range, check the regulator/rectifier.

## A.C. GENERATOR (CHARGING COIL) INSPECTION

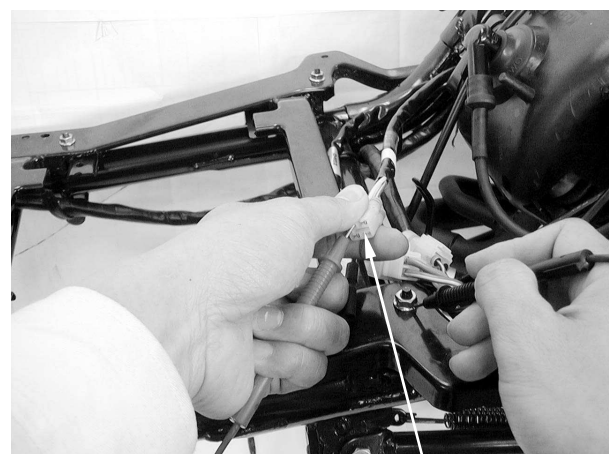
- Inspect with the engine installed.

Remove the met-in box and center cover. (⇒ 13-5)

Disconnect the A.C. generator connector. Measure the resistances between the charging coil terminals (white- ground) and lighting coil terminals (yellow-ground).

**Resistance (2-Stroke):**

Charging coil	white- ground	$0.2 \square 1.2\Omega$
Lighting coil	yellow- ground	$0.3 \square 1.0\Omega$



A.C. Generator Connector

Refer to 8 section for A.C. generator removal.

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## Resistance (4-Stroke):

Charging coil	white- ground	0.9Ω
Lighting coil	yellow- ground	0.7Ω

Refer to 8 section for A.C. generator removal.



A.C. Generator Connector

## RESISTOR INSPECTION

Remove the frame front cover. (⇒13-4)

Measure the resistance between the resistor B pink wire and ground.

Measure the resistance between the resistor A green/black wire and ground.

### Resistance (2-Stroke):

Resistor A: 9.2□11.2Ω

Resistor B: 5.3□6.5Ω

### Resistance (4-Stroke):

Resistor A: 7.7□8.3Ω

Resistor B: 12.0□12.8Ω



Faulty resistor is the cause of faulty operation of the auto bystarter.

Resistor B



Resistor A

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## REGULATOR/RECTIFIER INSPECTION

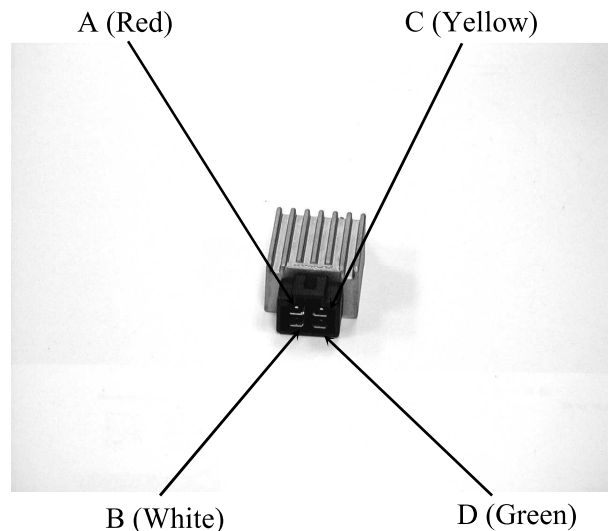
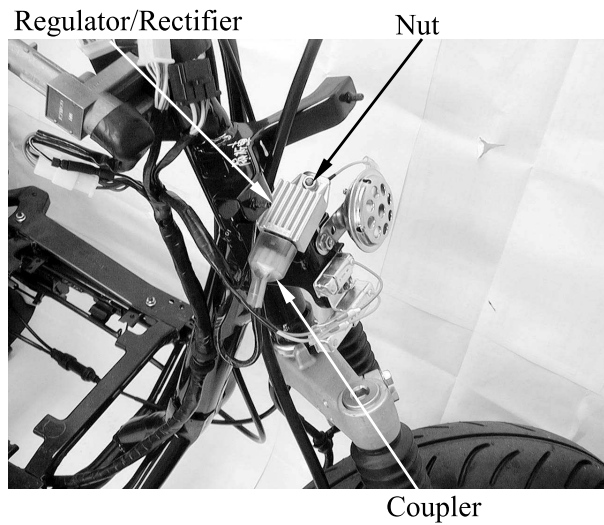
Remove the front cover. (⇒ 13-4)

Disconnect the regulator/rectifier wire coupler and remove the nut to remove the regulator/rectifier.

Measure the resistances between the terminals.

Replace the regulator/rectifier if the readings are not within the specifications in the table below.

□ • Due to the semiconductor in circuit, it is necessary to use a specified tester for accurate testing. Use of an improper tester in an improper range may give false readings.



### 2-Stroke

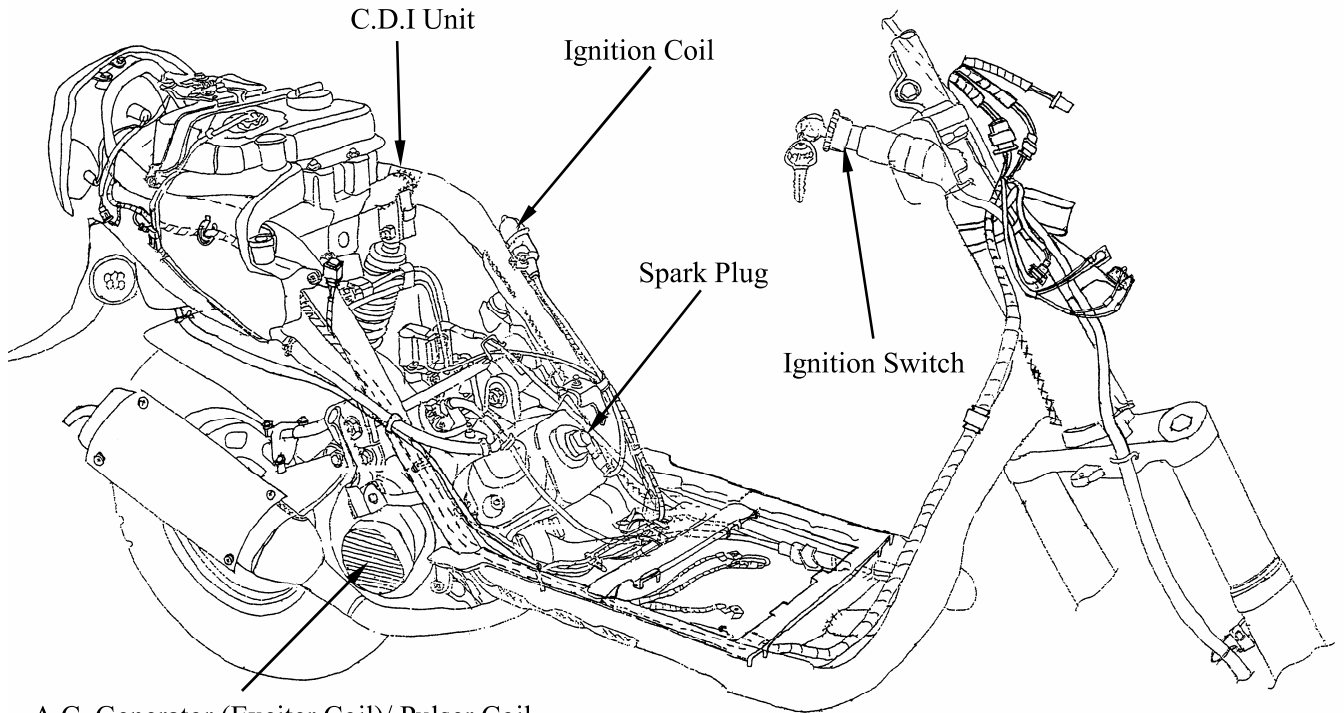
Probe⊕ Probe(-)	A (R)	B (W)	C (Y)	D (G)
A (R)		∞	∞	∞
B (W)	3-10KΩ		∞	∞
C (Y)	∞	∞		33-35KΩ
D (G)	∞	∞	33-35KΩ	

### 4-Stroke

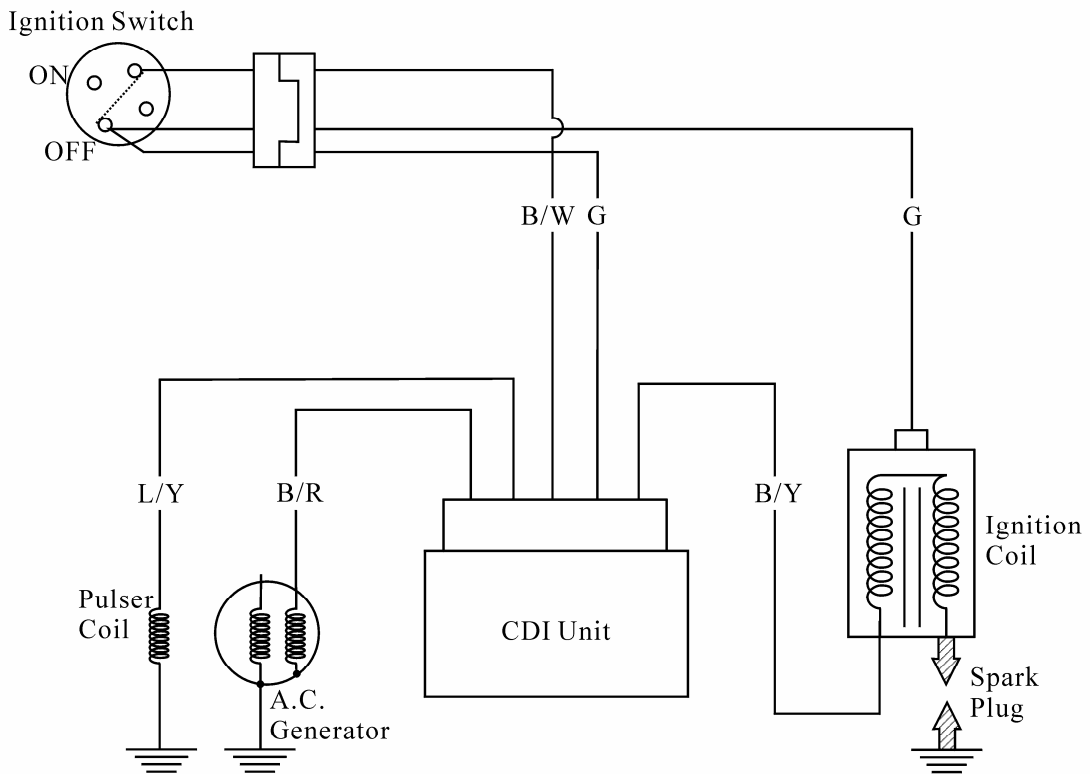
Probe⊕ Probe(-)	A (R)	B (W)	C (Y)	D (G)
A (R)		3-4MΩ	∞	∞
B (W)	6-8MΩ		∞	∞
C (Y)	∞	∞		14-15MΩ
D (G)	∞	∞	14-15MΩ	

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## IGNITION SYSTEM (2-STROKE)

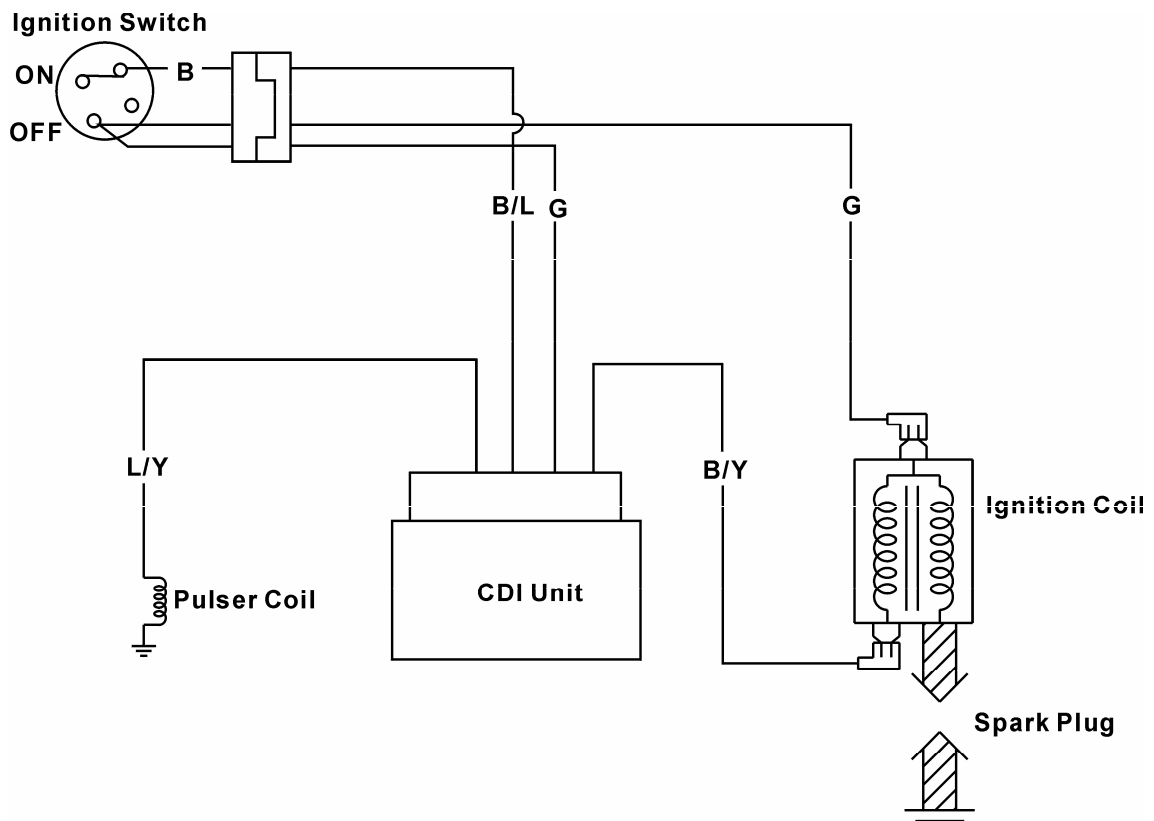
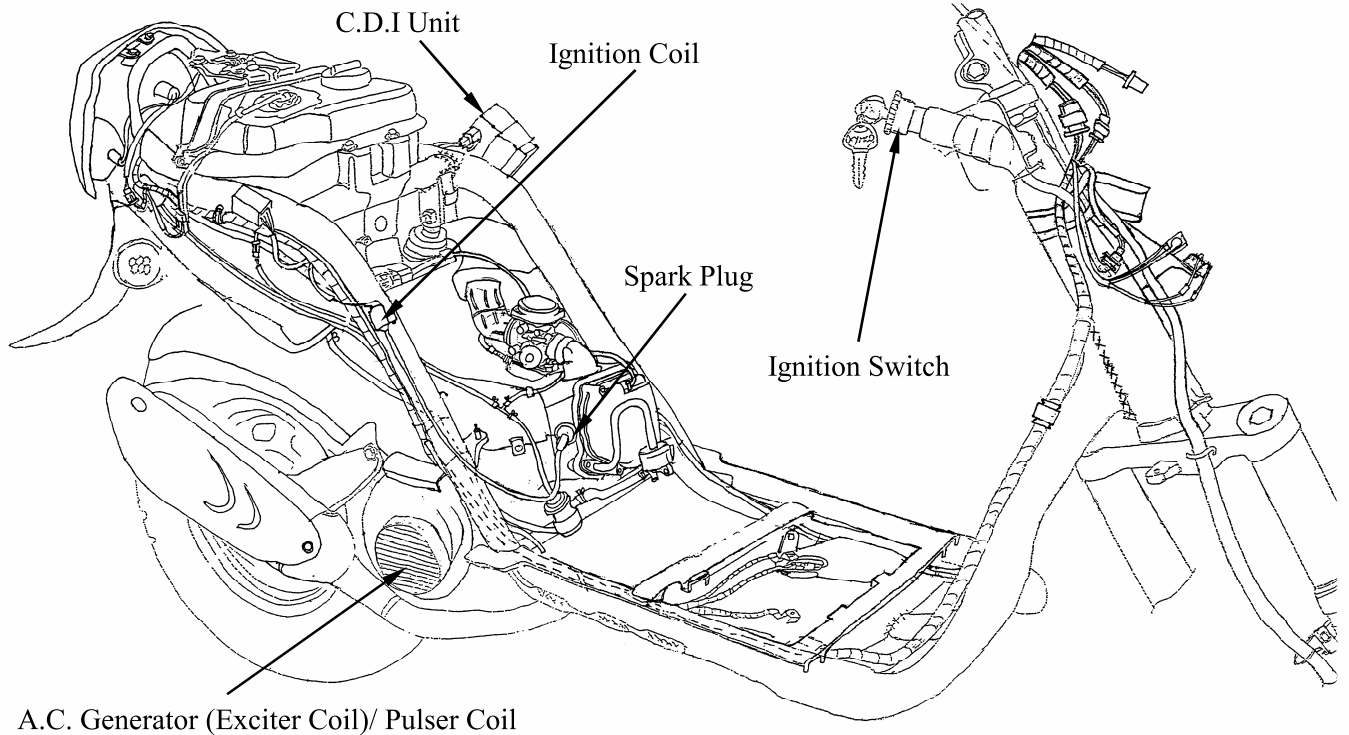


A.C. Generator (Exciter Coil)/ Pulser Coil



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## IGNITION SYSTEM (4-STROKE)



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## IGNITION COIL INSPECTION

### Continuity Test

□ This test is to inspect the continuity of ignition coil.

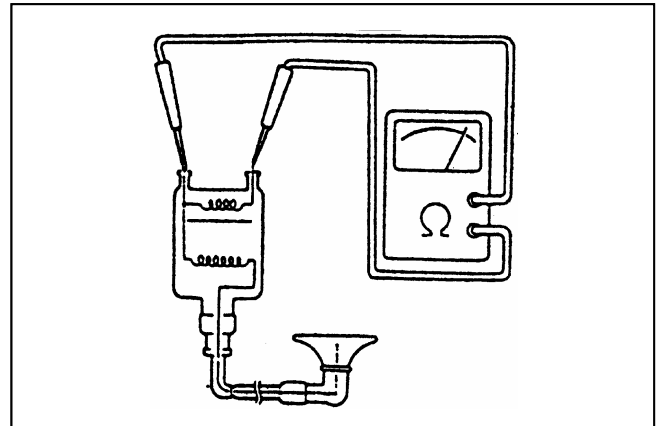
Remove the met-in box and center cover.  
(⇒13-5)

Measure the resistance between the ignition coil primary coil terminals.

**Resistance (20□):**

2-Stroke: 0.153□0.187Ω

4-Stroke: 0.5Ω



Measure the secondary coil resistance between the spark plug cap and the primary coil terminal as Figure A shown.

**Resistance (20□) (with plug cap):**

2-Stroke: 6.99K□10.21KΩ

4-Stroke: 8.12KΩ

Measure the secondary coil resistance between the ignition coil terminal and the primary coil terminal as Figure B shown.

**Resistance (20□) (without plug cap):**

2-Stroke: 3.24K□3.96KΩ

4-Stroke: 3KΩ

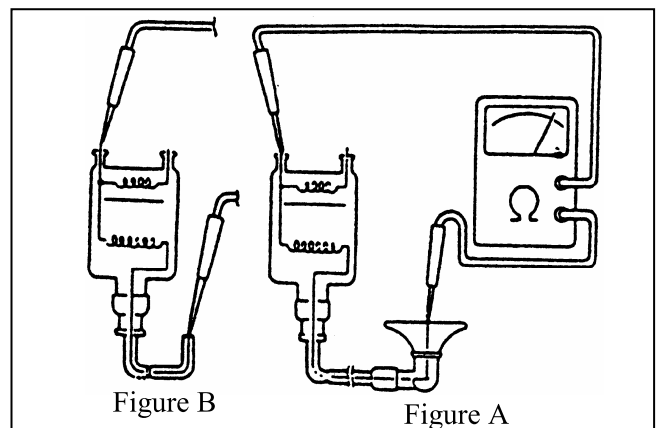


Figure B

Figure A

### Performance Test

Remove the ignition coil.



Ignition Coil

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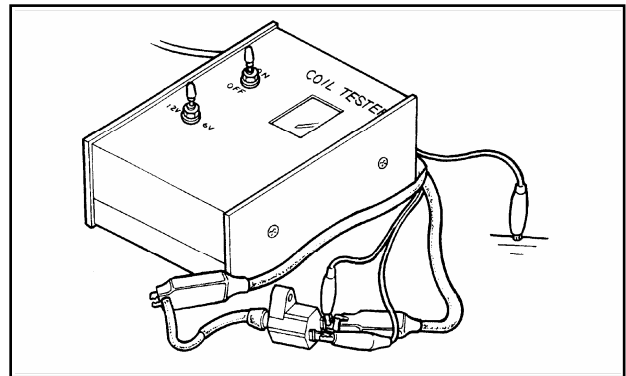
Inspect the ignition coil with an ignition coil tester.

Follow the ignition coil tester manufacturer's instructions.

1. Turn the changeover switch to 12V and connect the ignition coil to the tester.
2. Turn the power switch ON and check the spark from the watch window.

- Good : Normal and continuous spark
- Faulty : Weak or intermittent spark

The test is performed at both conditions that the ignition coil is cold and hot.



## A.C. GENERATOR

### Exciter Coil/Pulser Coil Inspection

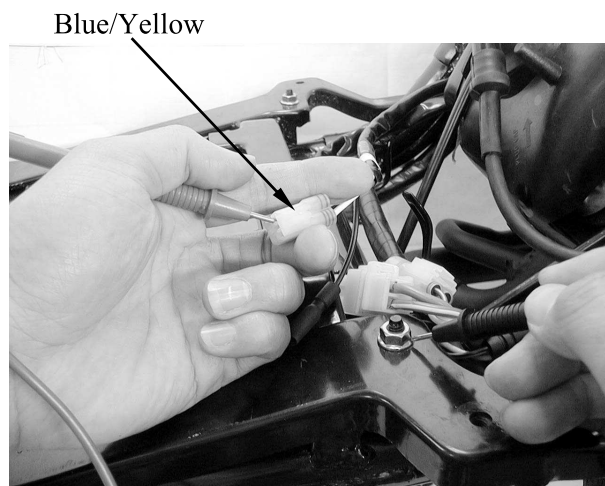
This test is performed with the stator installed in the engine.

Remove the met-in box and center cover. (⇒13-5)

Disconnect the A.C. generator wire connector.  
Measure the pulser coil resistance between the blue/yellow wire and ground.

**Resistance (20□):**  
2-Stroke: 80□160Ω

**Resistance (20□):**  
4-Stroke: 118.1□118.2Ω



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## CDI UNIT INSPECTION

Remove the met-in box. (⇒13-5)

Disconnect the CDI coupler and remove the CDI unit.



CDI Unit

## CDI CIRCUIT INSPECTION

Measure the resistance between the terminals.

Replace the CDI unit if the readings are not within the specifications in the table below.

- Due to the semiconductor in circuit, it is necessary to use a specified tester for accurate testing. Use of an improper tester in an improper range may give false readings.
- Use a Sanwa Electric Tester or Kowa Electric Tester (TH-5H).
- In this table, “Needle swings then returns” indicates that there is a charging current applied to a condenser. The needle will then remain at “∞” unless the condenser is discharged.

Use the x KΩ range for the Sanwa Tester.

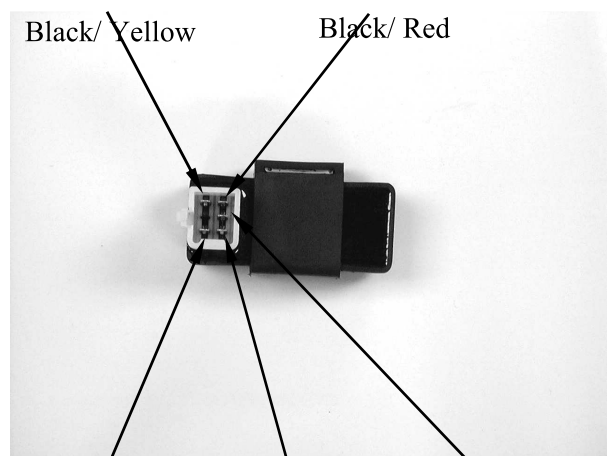
Use the x 100Ω range for the Kowa Tester.

**(2-Stroke)**

Unit:

KΩ

Probe⊕ (-)Probe	Black/ Yellow	Black/ Red	Black/ White	Blue/ Yellow	Green
Black/ Yellow		∞	∞	∞	∞
Black/ Red	∞		1-10	∞	∞
Black/ White	∞	∞		∞	∞
Blue/ Yellow	∞	3-40	80-120		10-30
Green	∞	2-10	10-30	∞	



Blue/ Yellow

Green

Black/ White

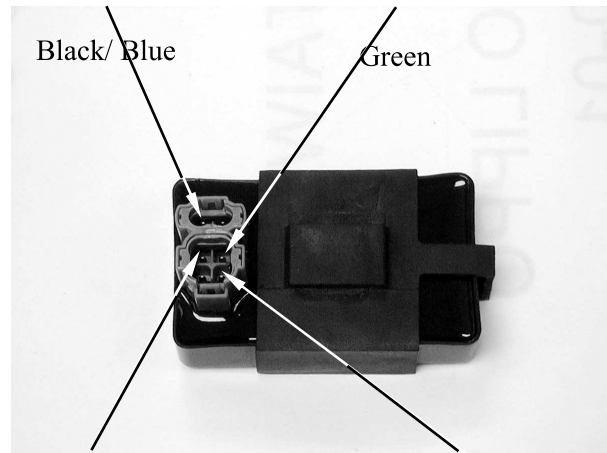


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**(4-Stroke)**  
Ω

Unit:

Probe⊕ (-)Probe	Black/ Blue	Black/ Yellow	Blue/ Yellow	Green
Black/ Blue		∞	∞	∞
Black/ Yellow	9.2M-9.25 M		310K-320 K	310K-320 K
Blue/ Yellow	8.81M-8.8 5M	310K-320 K		1K
Green	8.86M-8.8 8M	310K-320 K	1K	

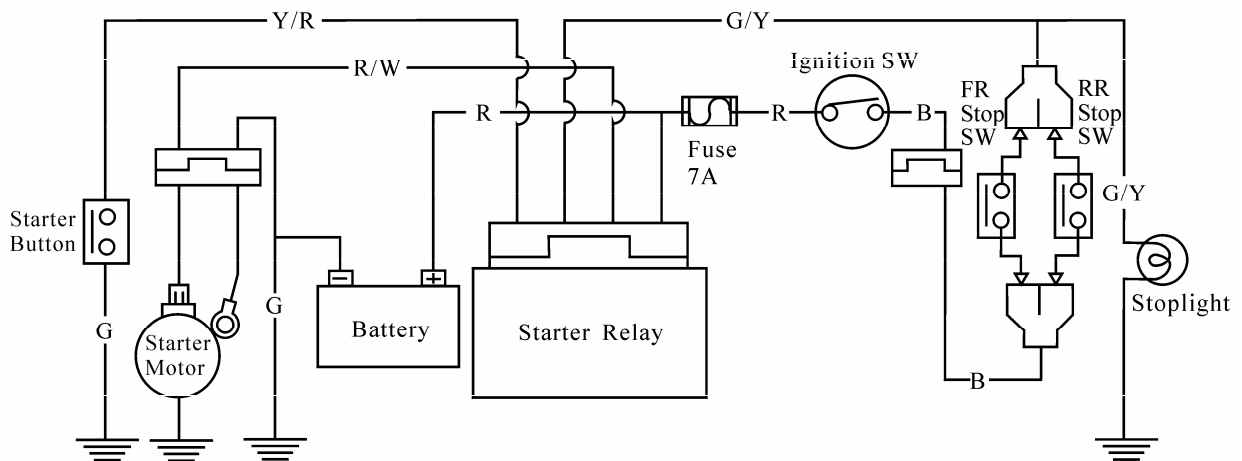
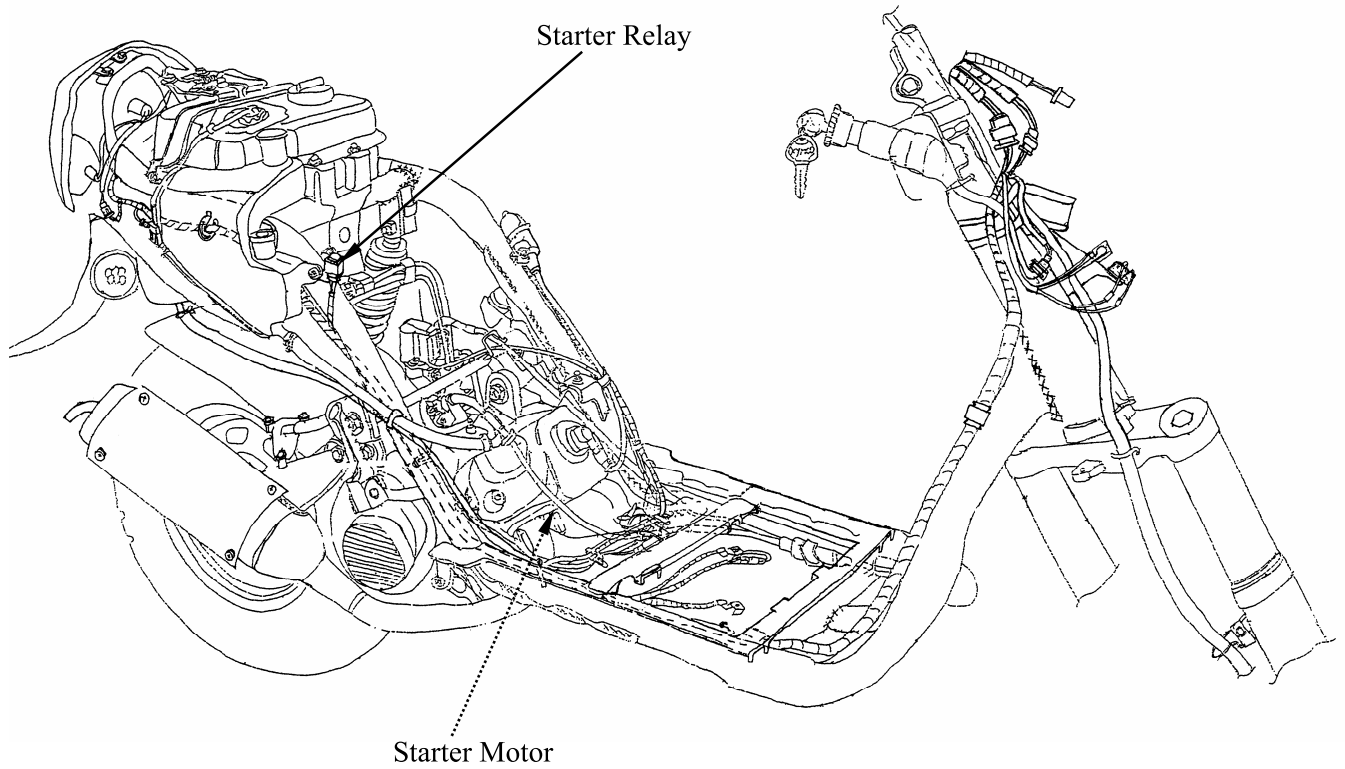


Black/ Yellow

Blue/ Yellow

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## ELECTRIC STARTER



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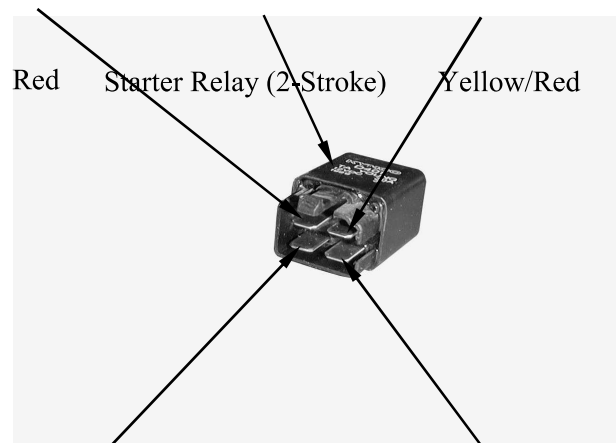
## STARTER RELAY INSPECTION

Remove the met-in box. (⇒13-5)

Disconnect the starter relay coupler and then remove the starter relay.



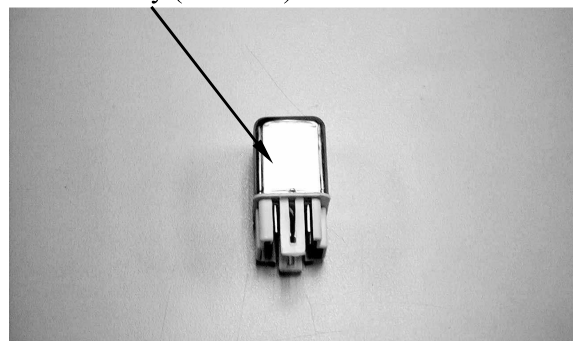
Connect the starter relay green/yellow terminal to the 12V battery positive (+) terminal and the relay yellow/red terminal to the battery negative (-) terminal. Check for continuity between the starter relay red and red/white terminals. The relay is normal if there is continuity.



Red/White

Green/Yellow

Starter Relay (4-Stroke)



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## STARTER MOTOR REMOVAL

Disconnect the starter motor cable.  
Remove the two bolts attaching the starter motor and remove the starter motor.

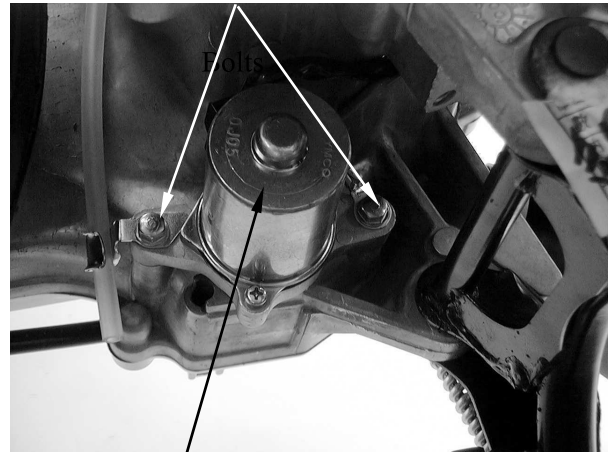
The installation sequence is the reverse of removal.

Connect the starter motor cable connector  
Check the O-ring for wear or damage and replace it if necessary.

Apply grease to the O-ring and install the starter motor.

Tighten the two mounting bolts.

**Torque:** 0.8□1.2kgf-m

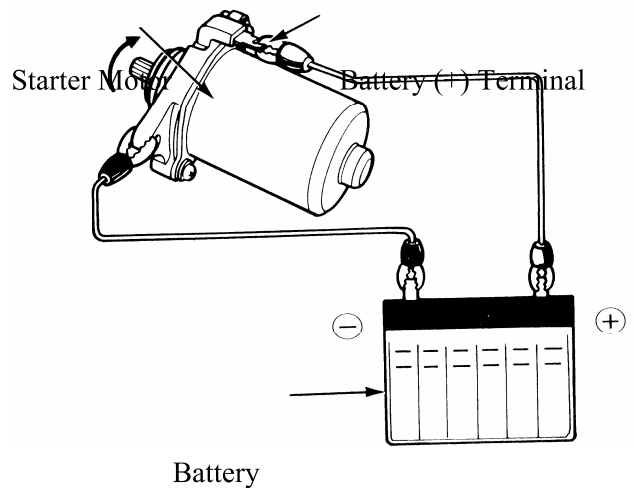


Starter Motor

□ The starter motor cable connector must be installed properly.

## STARTER MOTOR INSPECTION

Connect a battery across the starter motor and check for its operation.



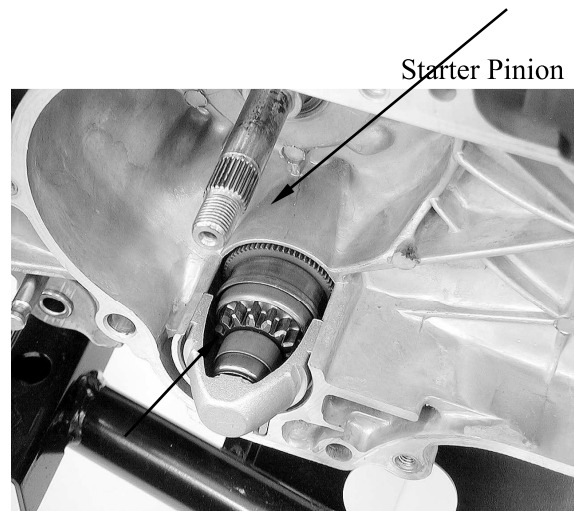
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### STARTER PINION

#### REMOVAL

Remove the left crankcase cover.  
Remove the drive pulley.  
(Refer to chapter 9)

Remove the starter pinion cover (2-stroke).  
Remove the starter pinion.



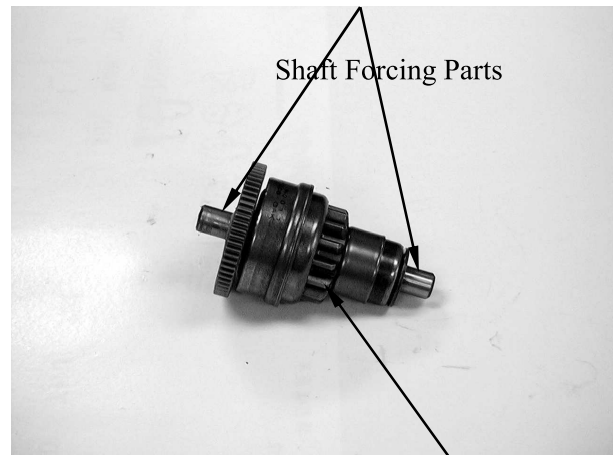
Starter Pinion Cover (2-Stroke)

#### INSPECTION

Inspect the starter pinion seat for wear.  
Inspect the starter pinion for smooth operation.  
Inspect the starter pinion shaft forcing parts for wear and damage.

#### INSTALLATION

Apply a small amount of grease to the starter pinion teeth.  
Install the starter pinion in the reverse order of removal.



Starter Pinion