

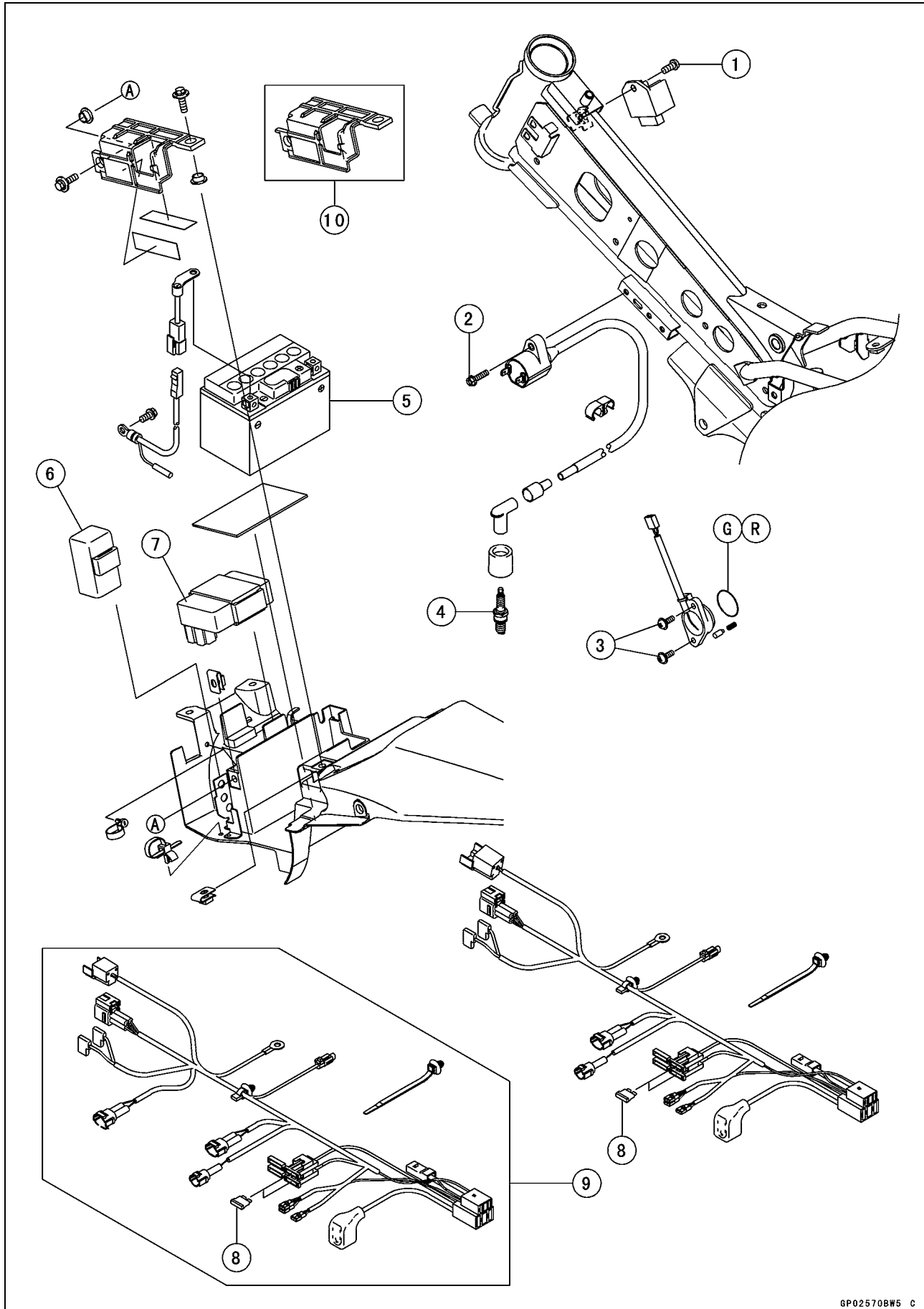
Electrical System

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15-2 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Regulator Mounting Screw	5.2	0.53	46 in·lb	
2	Ignition Coil Mounting Bolt	2.9	0.30	26 in·lb	
3	Gear Position Switch Screws	2.9	0.30	26 in·lb	
4	Spark Plug	13	1.3	115 in·lb	

5. Battery

6. Starter Relay

7. IC Igniter

8. Main Fuse 10 A

9. KLX110D Models

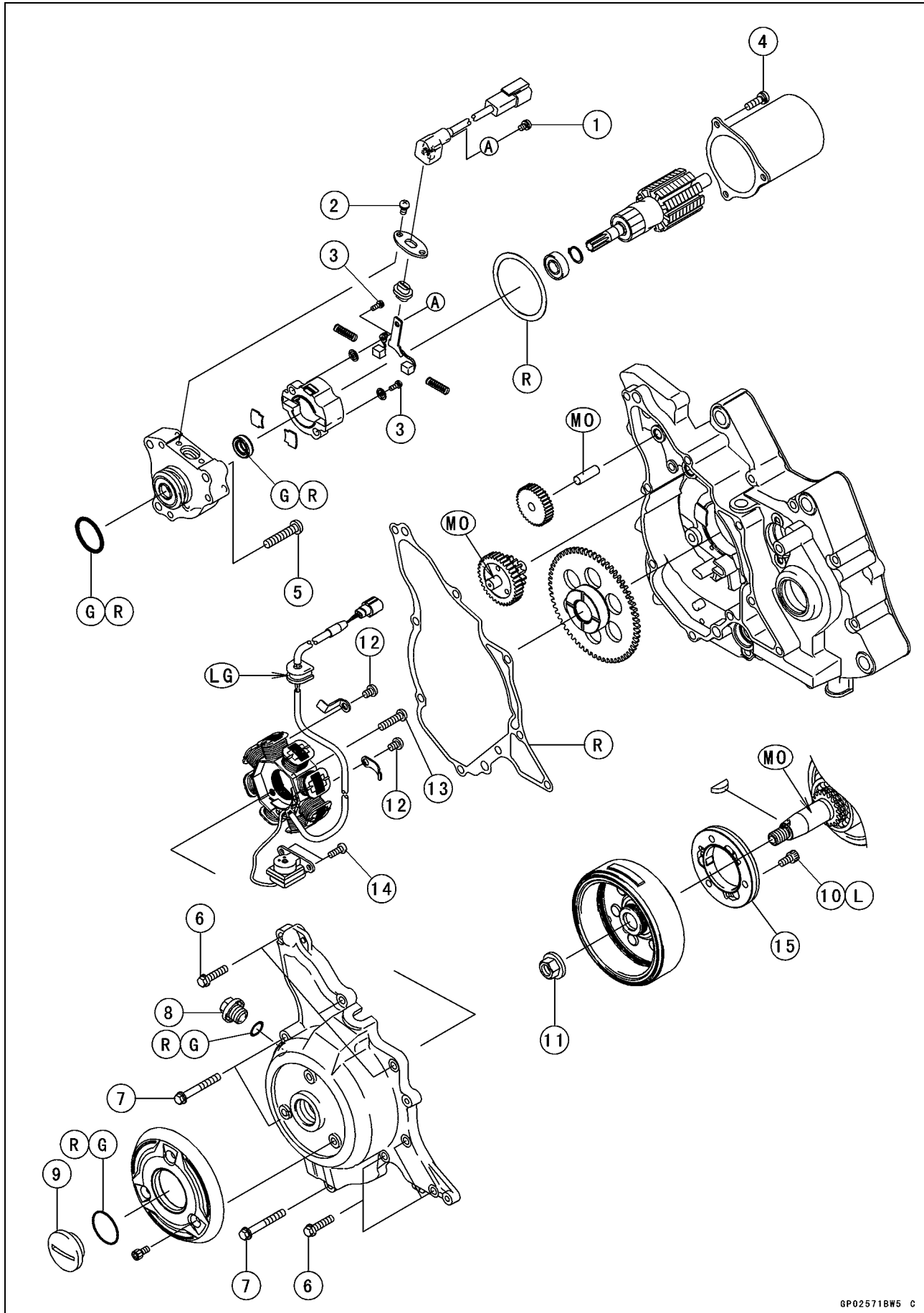
10. KLX110CA/DA Models

G: Apply Grease.

R: Replacement Parts

15-4 ELECTRICAL SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Starter Motor Terminal Screw	2.0	0.20	18 in·lb	
2	Terminal Cover Plate Screws	2.0	0.20	18 in·lb	
3	Brush Holder Plate Screws	0.9	0.09	8.0 in·lb	
4	End Cover Screws	4.4	0.45	39 in·lb	
5	Starter Motor Mounting Screws	5.2	0.53	46 in·lb	
6	Alternator Cover Bolts (L=25)	8.8	0.90	78 in·lb	
7	Alternator Cover Bolts (L=45)	8.8	0.90	78 in·lb	
8	Timing Inspection Cap	2.4	0.24	21 in·lb	
9	Alternator Rotor Nut Cap	2.4	0.24	21 in·lb	
10	Starter Motor Clutch Bolts	11.8	1.20	104 in·lb	L
11	Alternator Rotor Nut	53.9	5.50	39.8	
12	Alternator Lead Clamp Screws	5.2	0.53	46 in·lb	
13	Stator Mounting Screws	5.2	0.53	46 in·lb	
14	Crankshaft Sensor Mounting Screws	2.9	0.30	26 in·lb	

15. Starter Motor Clutch

G: Apply grease.

L: Apply a non-permanent locking agent.

MO: Apply molybdenum disulfide oil.

R: Replacement Parts

LG: Apply liquid gasket.

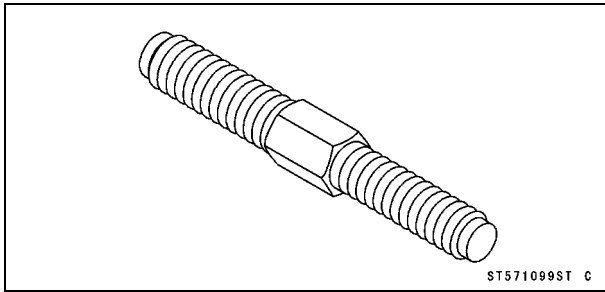
15-6 ELECTRICAL SYSTEM

Specifications

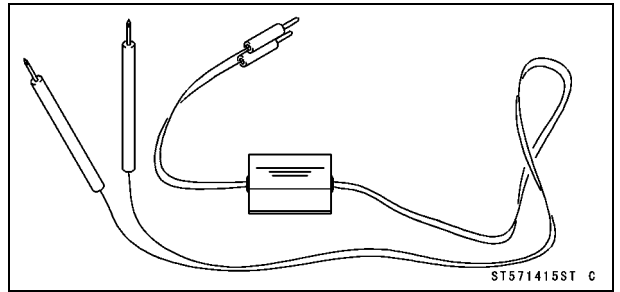
Item	Standard	Service Limit
Battery		
Type	Sealed Battery (wet)	---
Model Name	FTH4L-BS	---
Capacity	12 V 3 Ah	---
Voltage	12.6 V or more	---
Gross Weight	1.4 kg (3.1 lb)	---
Electrolyte Volume	0.18 L (10.98 cu in.)	---
Charging System		
Crankshaft Sensor Resistance	50 ~ 200 Ω at 20°C (68°F)	---
Alternator Output Voltage	in the text	---
Stator Coil Resistance	in the text	---
Charging Voltage	13.9 ~ 14.9 V	---
Ignition System		
Ignition Timing	BTDC 10° @1 650 r/min (rpm)	---
Ignition Coil:		
3 Needle Arcing Distance	7 mm (0.26 in.) or more	---
Primary Winding Resistance	0.19 ~ 0.23 Ω at 20°C (68°F)	---
Secondary Winding Resistance	2.5 ~ 3.7 k Ω at 20°C (68°F)	---
Primary Peak Voltage	100 V or more	---
Crankshaft Sensor Peak Voltage	2 V or more	---
Spark Plug:		
Type	NGK CR6HSA	---
Gap	0.6 ~ 0.7 mm (0.024 ~ 0.028 in.)	---
Electric Starter System		
Starter Motor:		
Brush Length	7.0 mm (0.28 in.)	3.5 mm (0.14 in.)
Commutator Diameter	22.0 mm (0.87 in.)	21.5 mm (0.85 in.)

Special Tools and Sealant

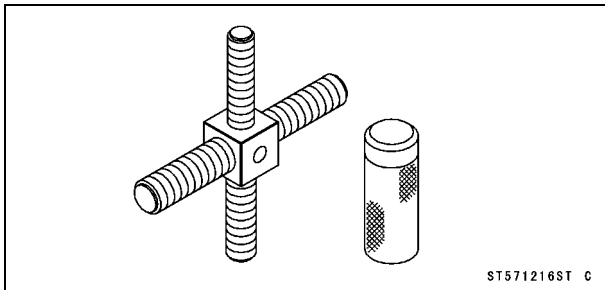
**Rotor Puller M18 × 1.5, M16 × 1.5:
57001-1099**



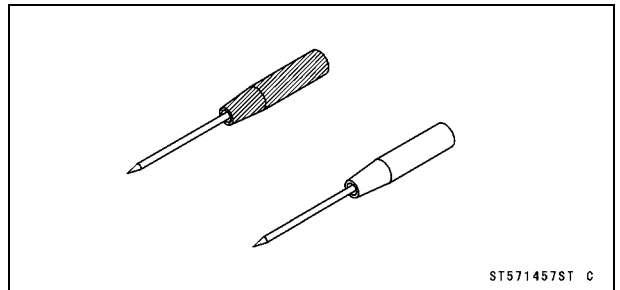
**Peak Voltage Adapter:
57001-1415**



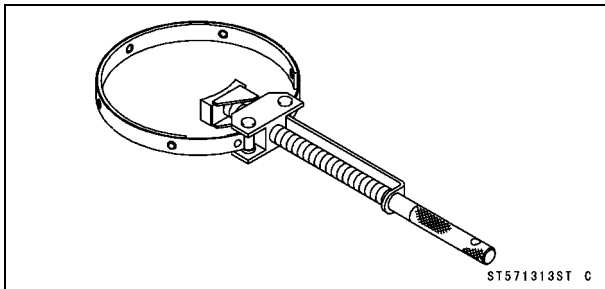
**Rotor Puller, M16/M18/M20/M22 × 1.5:
57001-1216**



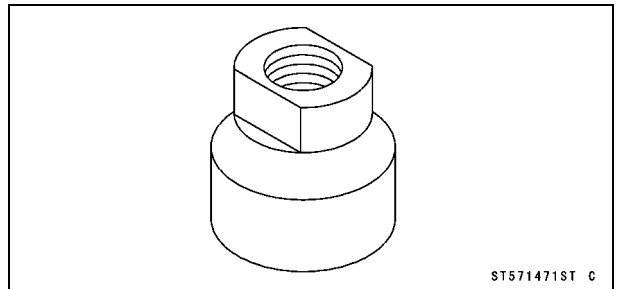
**Needle Adapter Set:
57001-1457**



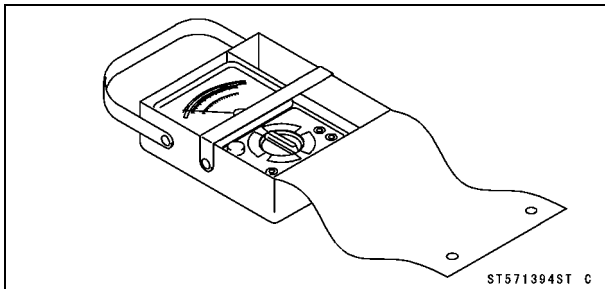
**Flywheel Holder:
57001-1313**



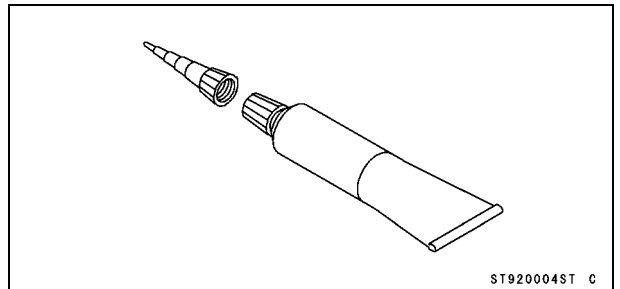
**Flywheel Puller, M28 × 1.0:
57001-1471**



**Hand Tester:
57001-1394**



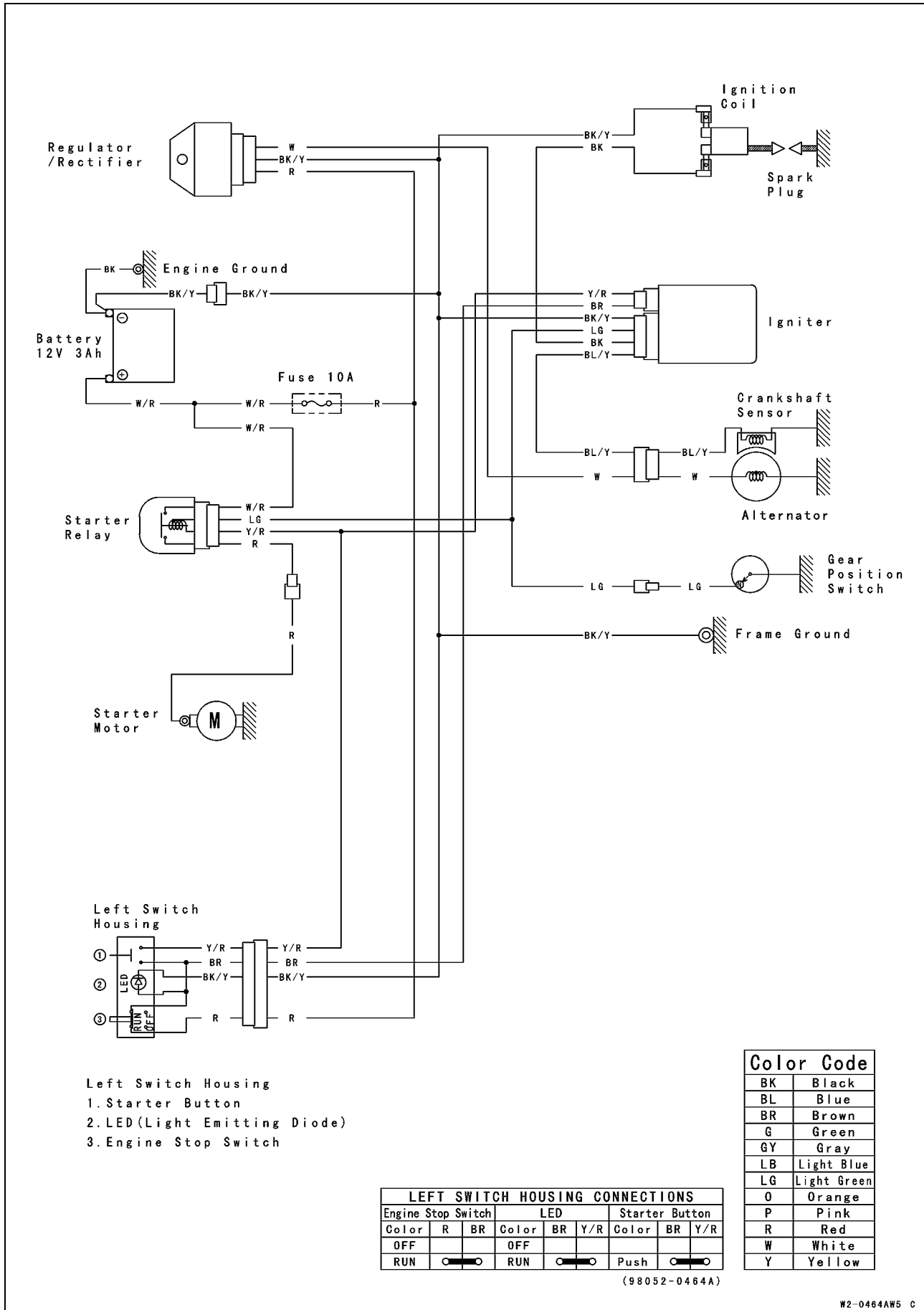
**Liquid Gasket, TB1211F:
92104-0004**



15-8 ELECTRICAL SYSTEM

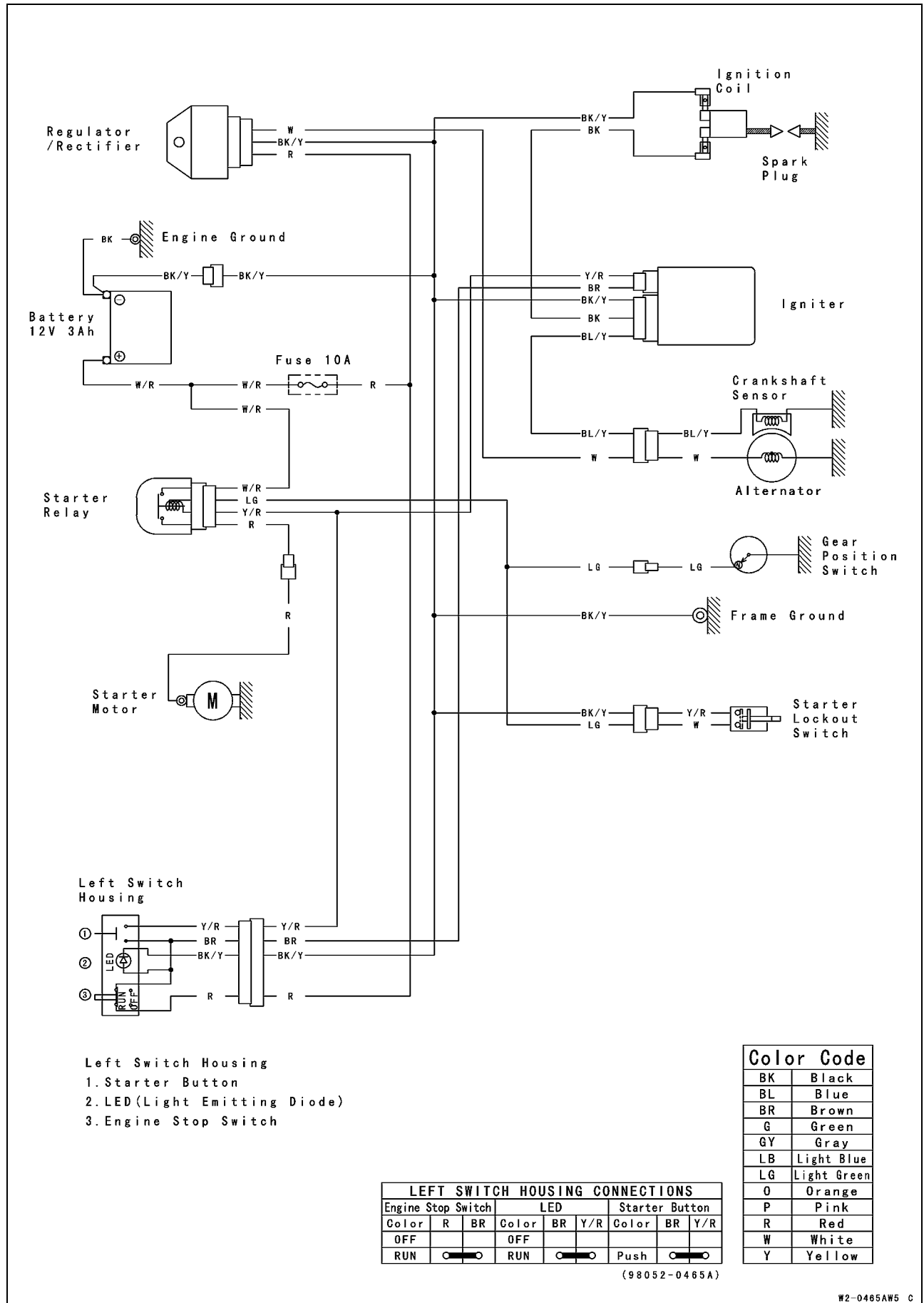
Wiring Diagram

KLX110CA Model



Wiring Diagram

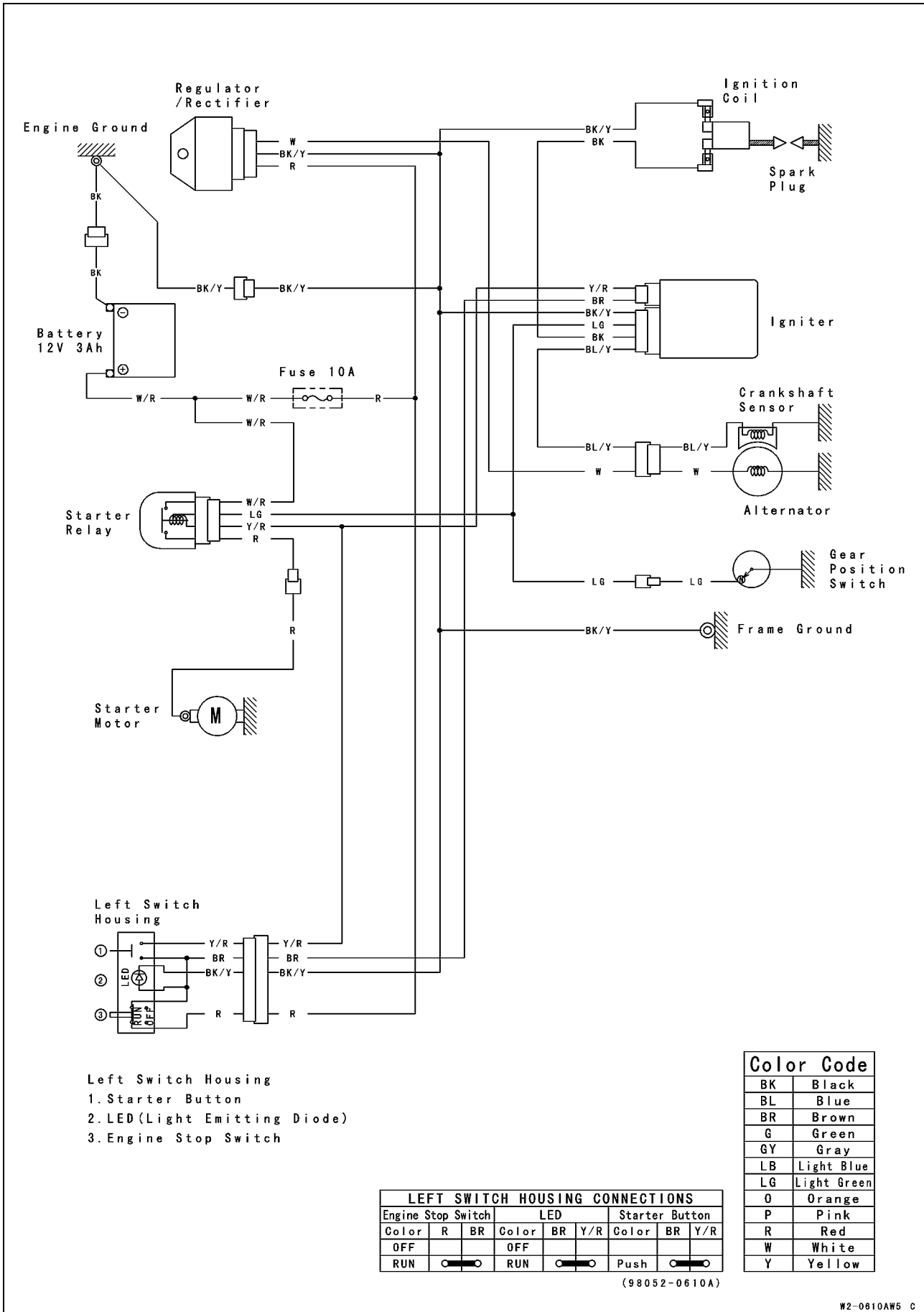
KLX110DA Model



15-10 ELECTRICAL SYSTEM

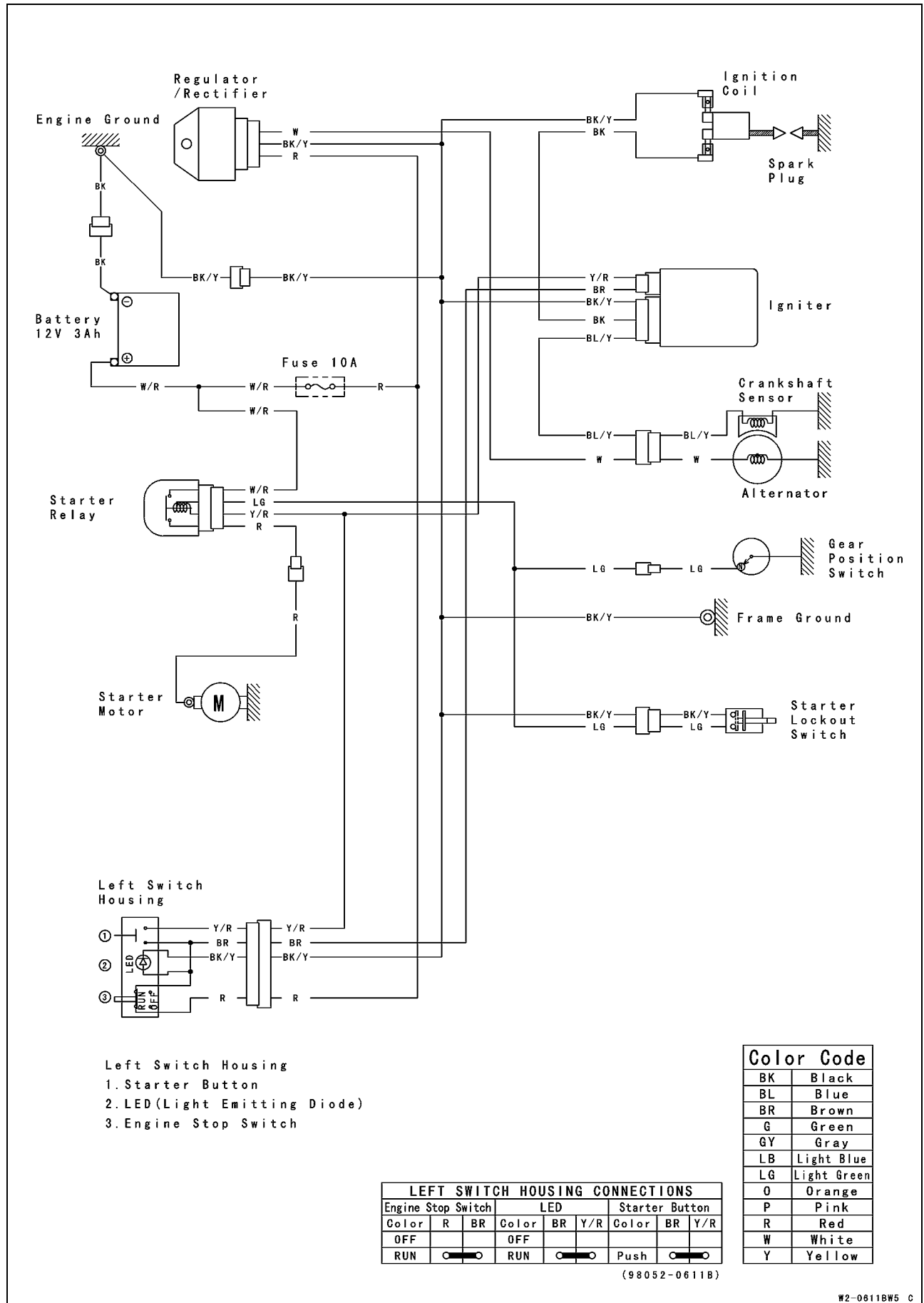
Wiring Diagram

KLX110CB Models ~



Wiring Diagram

KLX110DB Models ~



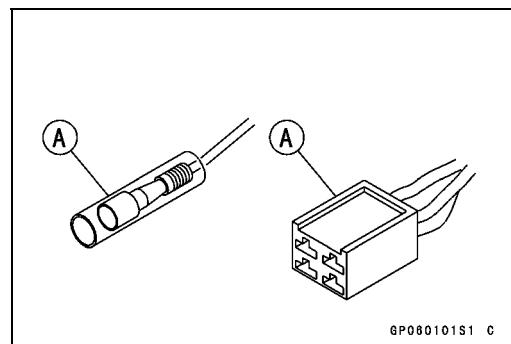
15-12 ELECTRICAL SYSTEM

Precautions

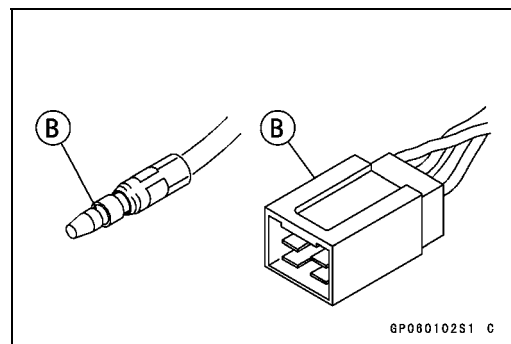
There are numbers of important precautions that are musts when servicing electrical systems. Learn and observe all the rules below.

- The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item(s), they too must be repaired or replaced, or the new replacement will soon fail again.
- Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Poor wires and bad connections will affect electrical system operation.
- Measure coil and winding resistance when the part is cold (at room temperature).
- Electrical Connectors

Connectors [A]



Connectors [B]



Safety Instructions:

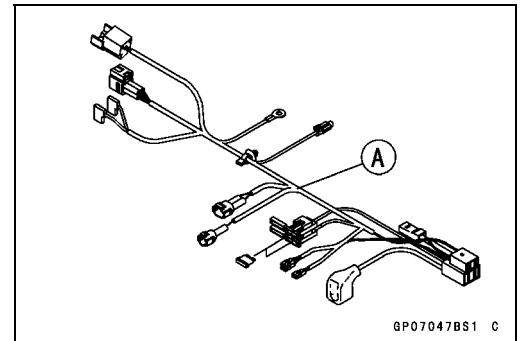
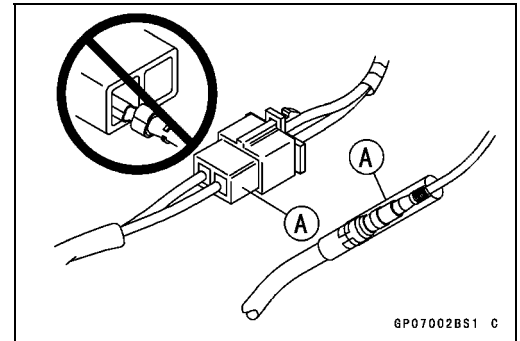
WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.

Electrical Wiring

Wiring Inspection

- Visually inspect the wiring for signs of burning, fraying, etc.
- ★ If any wiring is poor, replace the damaged wiring.
- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
- ★ If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.
- Check the wiring for continuity.
- Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
- Connect a digital meter between the ends of the leads.
- ★ If the digital meter does not read about 0Ω , the lead is defective. Replace the lead or the wiring harness [A] if necessary.



15-14 ELECTRICAL SYSTEM

Battery

Battery Removal

- Remove:
 - Seat (see Seat Removal in the Frame chapter)
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
 - Battery Holder Bolts [A]
- Slide the battery, and disconnect the negative (-) cable [B] and then positive (+) cable [C].

NOTICE

Be sure to disconnect the negative (-) cable first.

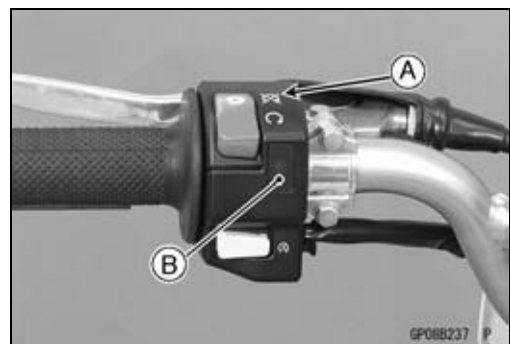
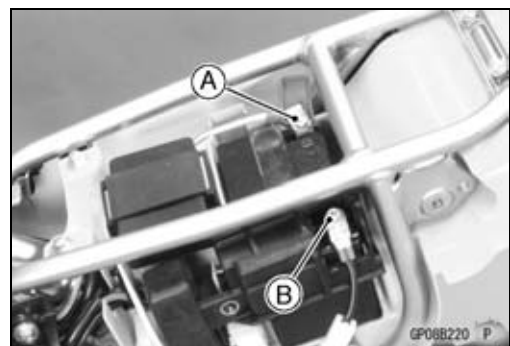
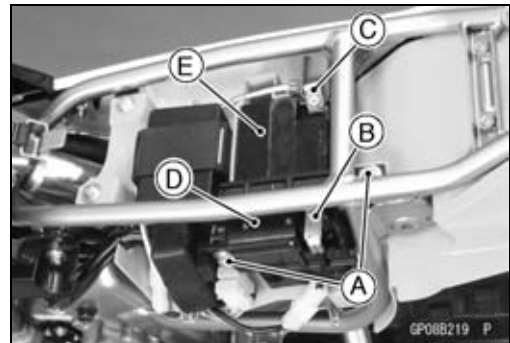
- Remove:
 - Battery Holder [D]
 - Battery [E]

Battery Installation

- Visually inspect the surface of the battery container.
- ★ If any signs of cracking or electrolyte leakage from the sides of the battery, replace it.
- Put the battery and battery holder into the battery case.
- Connect the positive cable [A] to the (+) terminal first, and then the negative cable [B] to the (-) terminal.
- Tighten the battery holder bolts.
- Apply a little grease on the terminals to prevent corrosion.
- Cover the (+) terminal with the cap.
- Install the removed parts (see appropriate chapter).

NOTE

○ To avoid the battery discharging, check that the engine stop switch is in the stop position [A] and the indicator light (LED) [B] goes off when the motorcycle is not used.



Battery Activation

Electrolyte Filling

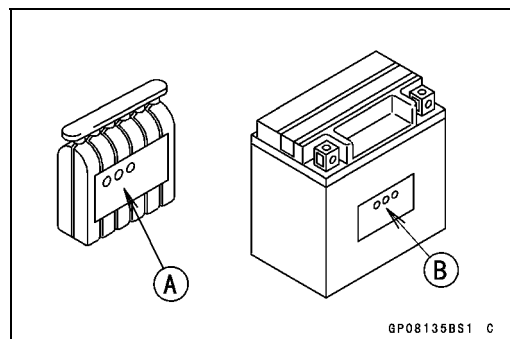
- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name

KLX110C/D: FTH4L-BS

NOTICE

Each battery comes with its own specific electrolyte container; using the wrong container may overfill the battery with incorrect electrolyte, which can shorten battery life and deteriorate battery performance. Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type.



Battery

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.

⚠ DANGER

Sulfuric acid in battery electrolyte can cause severe burns. To prevent burns, wear protective clothing and safety glasses when handling electrolyte. If the electrolyte comes in contact with your skin or eyes, wash the area with liberal amounts of water and seek medical attention for more severe burns.

- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

NOTE

○The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.

- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.

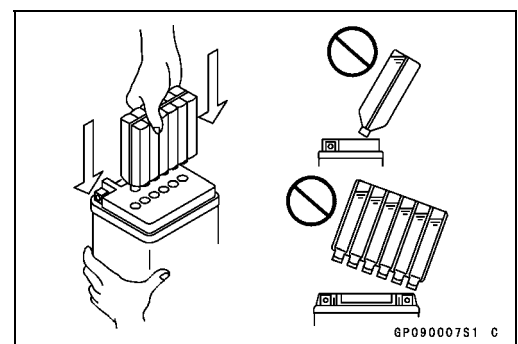
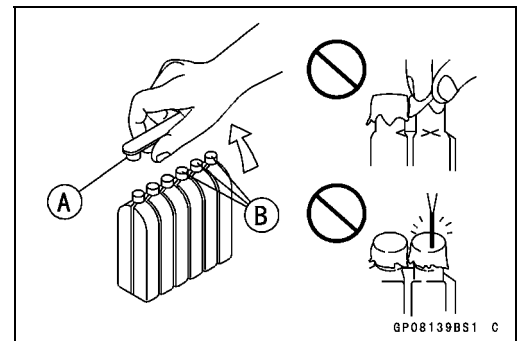
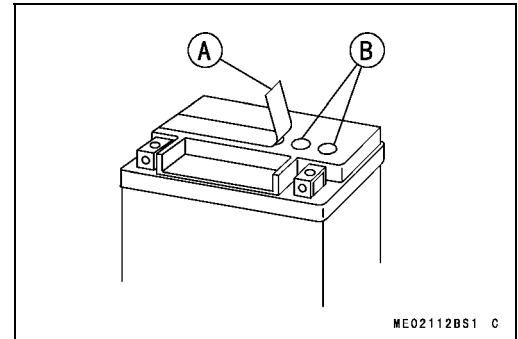
NOTE

○Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.

- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.

NOTE

○Do not tilt the electrolyte container.



15-16 ELECTRICAL SYSTEM

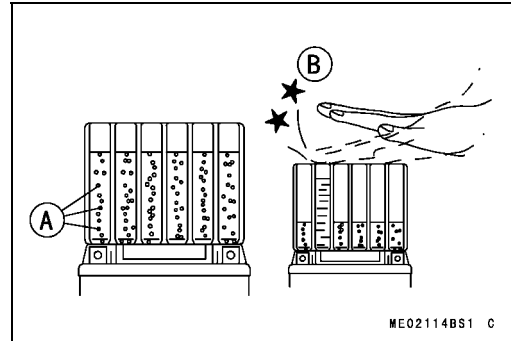
Battery

- Check the electrolyte flow.
- ★ If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.

NOTE

○ Be careful not to have the battery fall down.

- Keep the container in place. Don't remove the container from the battery, the battery requires all the electrolyte from the container for proper operation.



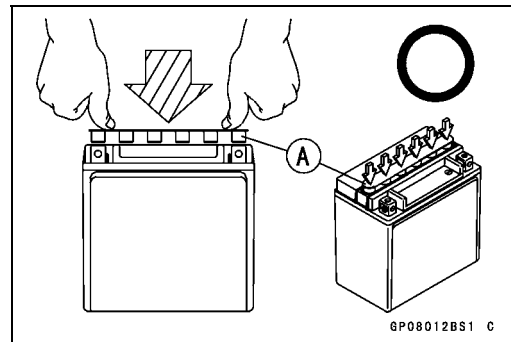
NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the container until it is completely empty.

- After filling, let the battery sit for 20 ~ 60 minutes with the electrolyte container kept in place, which is required for the electrolyte to fully permeate into the plates.
- Make sure that the container cells have emptied completely, and remove the container from the battery.
- Place the strip of caps [A] loosely over the filler ports, press down firmly with both hands to seat the strip of caps into the battery (don't pound or hammer). When properly installed, the strip of caps will be level with the top of the battery.

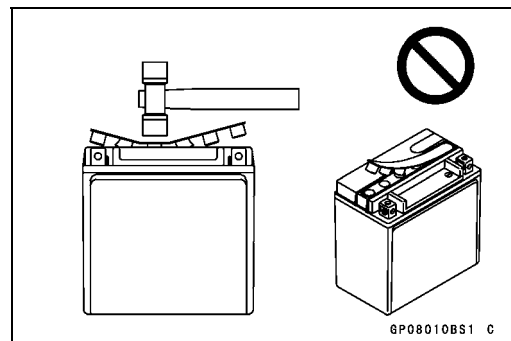
NOTICE

Once the strip of caps is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.



NOTE

○ Charging the battery immediately after filling can shorten service life.



Battery

Initial Charge

- Newly activated sealed batteries require an initial charge.

Standard Charge: 0.9 A × 5 ~ 10 hours

- ★ If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:

Battery Mate 150-9

OptiMate PRO 4-S/PRO S/PRO2

Yuasa MB-2040/2060

Christie C10122S

- ★ If the above chargers are not available, use equivalent one.
- Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. (Voltage immediately after charging becomes temporarily high. For accurate measuring, let the battery sit for given time.)

NOTE

- *Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. If voltage is not at least 12.6 V, repeat charging cycle.*
- *To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds. Re-check voltage and if less than 12.6 V repeat the charging cycle and load test. If still below 12.6 V the battery is defective.*

Precautions

- 1) No need of topping-up.

No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.

- 2) Refreshing charge.

Give a refresh charge for 5 to 10 hours with charging current shown in the specification (see Refreshing Charge).

When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above. Never remove the seal cap during refresh charge.

If by chance an excessive amount of gas is generated due to overcharging, the relief valve releases the gas to keep the battery normal.

- 3) When you do not use the motorcycle for months.

Give a refresh charge before you store the motorcycle. And then store it with the negative cable removed. However, check the battery's state of charge at **every month** to be sure it meets the minimum 12.4 V specification and charge it to 100 % state of charge.

- 4) Battery life.

If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it (Provided, however, the vehicle's starting system has no problem).

15-18 ELECTRICAL SYSTEM

Battery

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medical attention for more severe burns.

Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electric system. Therefore, replace a sealed battery only on a motorcycle which was originally equipped with a sealed battery.

Be careful, if a sealed battery is installed on a motorcycle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Charging Condition Inspection

- Refer to Battery Charging Condition Inspection in the Periodic Maintenance chapter.

Refreshing Charge

- Remove the battery (see Battery Removal).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Charge with current and time as stated below.

Terminal Voltage: 11.5 ~ less than 12.6 V

Standard Charge 0.4 A × 5 ~ 10 h (see following chart)

Quick Charge 4 A × 0.5 h

NOTICE

If possible, do not quick charge. If quick charge is done unavoidably, do standard charge later on.

Terminal Voltage: less than 11.5 V

Charging Method: 0.4 A × 20 h

NOTE

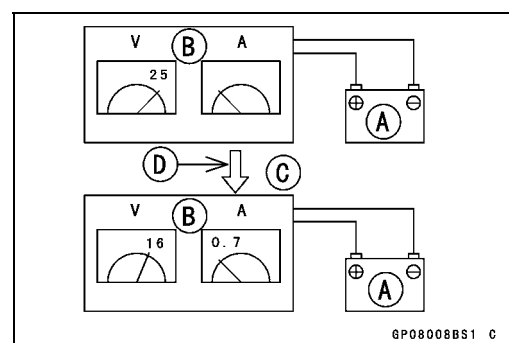
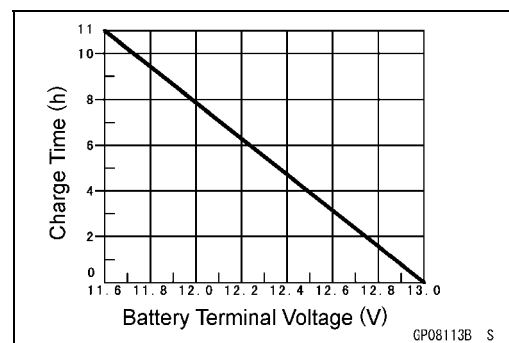
- Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.

Battery [A]

Battery Charger [B]

Standard Value [C]

Current starts to flow [D].



Battery

- Determine the battery condition after refresh charge.
- Determine the condition of the battery left for 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

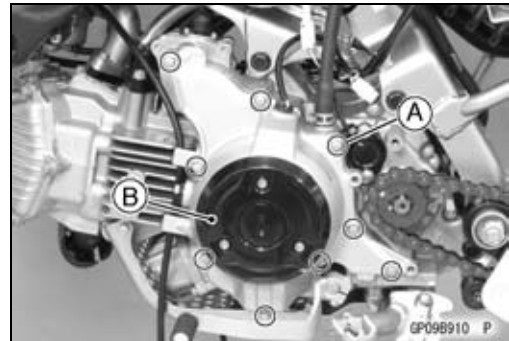
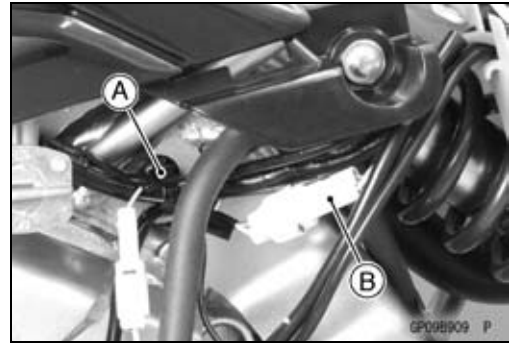
Criteria	Judgement
12.6 V or higher	Good
12.0 ~ lower than 12.6 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

15-20 ELECTRICAL SYSTEM

Charging System

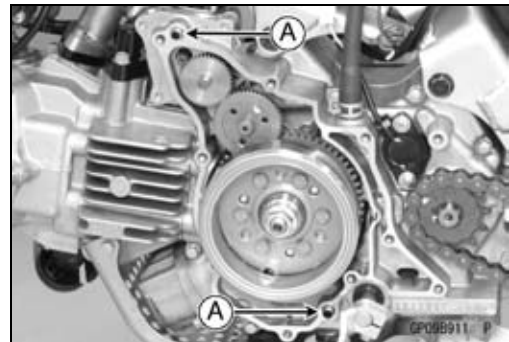
Alternator Cover Removal

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
 - Seat (see Seat Removal in the Frame chapter)
 - Engine Sprocket Cover (see Engine Sprocket Removal in the Final Drive chapter)
- Clear the lead from the clamp [A].
- Disconnect the alternator lead connector [B].
- Remove:
 - Alternator Cover Bolts [A]
 - Alternator Cover [B]



Alternator Cover Installation

- Be sure to install the dowel pins [A].
- Install a new gasket.



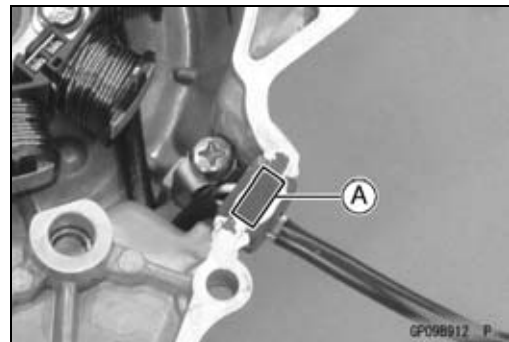
- Using a high flash-point solvent, clean off any oil or dirt that may be on the silicone sealant coating area. Dry them with a clean cloth.
- Apply liquid gasket to the area [A] to the alternator lead grommet.

Sealant - Liquid Gasket, TB1211F: 92104-0004

NOTE

○ Wipe off excess silicone sealant after installing the alternator cover.

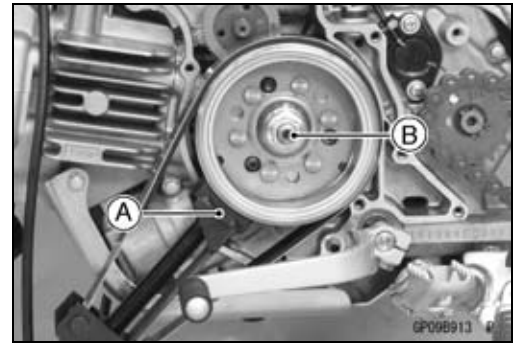
- Install the alternator cover.
 - Torque - Alternator Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
- Install the removed parts (see appropriate chapters).



Charging System

Alternator Rotor Removal

- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Starter Idle Gear and Washers
 - Wipe oil off the outer circumference of the rotor.
 - Hold the alternator rotor steady with the flywheel holder [A], and remove the alternator rotor nut [B].
- Special Tool - Flywheel Holder: 57001-1313**
- Remove the flywheel holder.



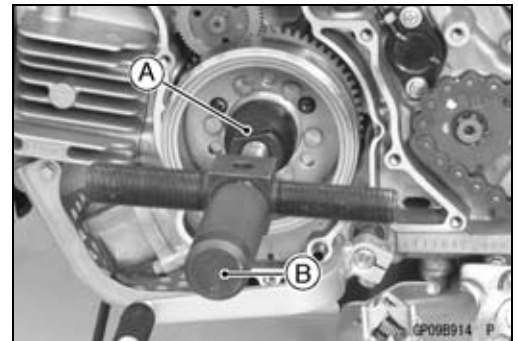
- Using the flywheel puller [A] and rotor puller [B], remove the alternator rotor from the crankshaft.

Special Tools - Flywheel Puller, M28 × 1.0: 57001-1471

Rotor Puller, M16/M18/M20/M22 × 1.5: 57001-1216 or

Rotor Puller M18 × 1.5, M16 × 1.5: 57001-1099

- Hold the flywheel puller using a wrench, screw in the rotor puller and remove the alternator rotor.



NOTE

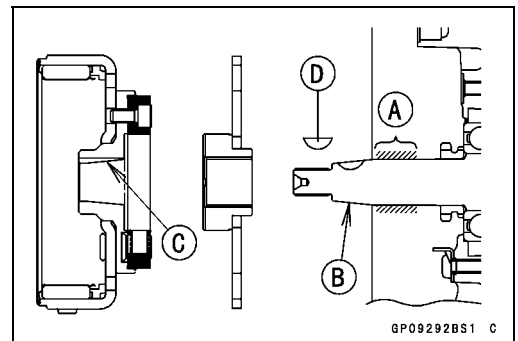
- If the rotor is difficult to remove using a rotor puller (57001-1216), tap the cap head on the rotor puller with a hammer, while holding the rotor puller in the direction of the turning.

NOTICE

Do not attempt to strike the grab bar or the alternator rotor itself. Striking the bar or the rotor can cause the bar to bend or the magnets to lose their magnetism.

Alternator Rotor Installation

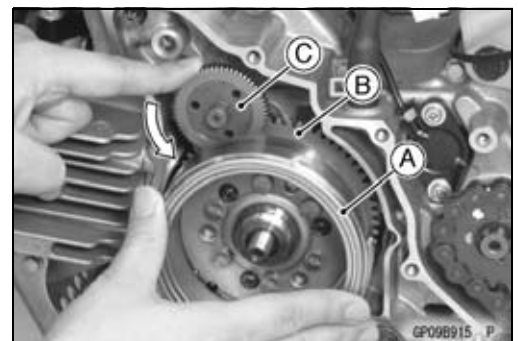
- Apply molybdenum disulfide oil to the crankshaft [A].
- Using high flash-point solvent, clean off any oil or dirt on the crankshaft tapered portion [B] and rotor tapered portion [C]. Dry them with a clean cloth.
- Fit the woodruff key [D] securely in the slot on the crankshaft.



- Install the rotor [A] while turning the starter motor clutch gear [B] clockwise.

NOTE

- Remove the starter idle gear and turn the torque limiter gear [C] counterclockwise.



15-22 ELECTRICAL SYSTEM

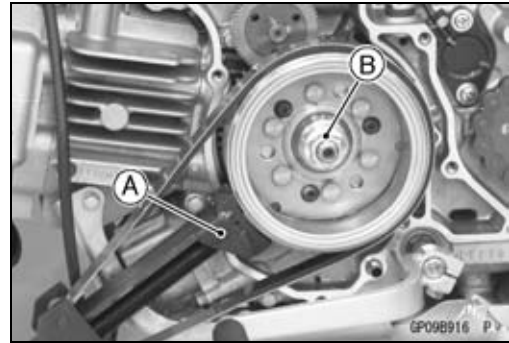
Charging System

- Hold the rotor steady with the flywheel holder [A], tighten the rotor nut [B].

Torque - Alternator Rotor Nut: 53.9 N·m (5.50 kgf·m, 39.8 ft·lb)

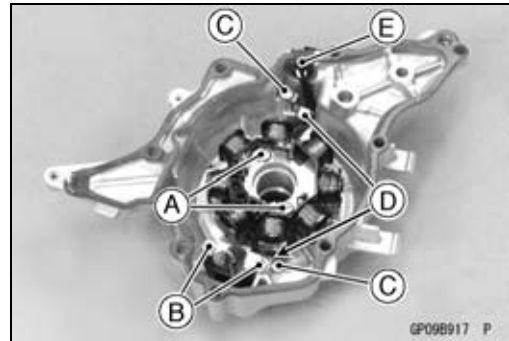
Special Tool - Flywheel Holder: 57001-1313

- Install the alternator cover (see Alternator Cover Installation).



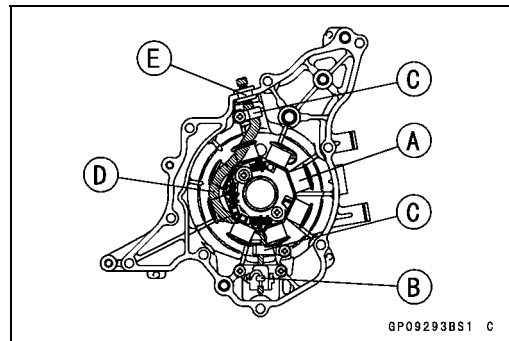
Stator Removal

- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Stator Screws [A]
 - Crankshaft Sensor Screws [B]
 - Alternator Lead Clamp Screws [C]
 - Lead Clamps [D]
 - Wiring Grommet [E]
- Take off the stator and the crankshaft sensor as a set.



Stator Installation

- Install:
 - Stator [A]
 - Crankshaft Sensor [B]
 - Clamps [C]
- Run the alternator lead [D] as shown.
- Tighten:
 - Torque - Stator Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)**
 - Crankshaft Sensor Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)**
 - Alternator Lead Clamp Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)**
- Using a high flash-point solvent, clean off any oil or dirt that may be on the silicone sealant coating area. Dry them with a clean cloth.
- Apply liquid gasket around the circumference of the wiring grommet [E].
- Sealant - Liquid Gasket, TB1211F: 92104-0004**
- Set the stator wiring grommet securely in the notch of the alternator cover.
- Install the alternator cover (see Alternator Cover Installation).



Alternator Inspection

- There are three types of alternator problems: short, open (wire burned out), or loss in rotor magnetism.
- A short or open in one of the coil wires will result in either a low output, or no output at all.
- A loss in rotor magnetism, which may be caused by dropping or hitting the rotor by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System

- Check the alternator output voltage, do the following procedures.
- Remove:
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
 - Seat (see Seat Removal in the Frame chapter)
- Clear the leads from the clamp [A].
- Connect a tester to the connector [B] as shown in the table 1, using the needle adapter set.
- Start the engine.
- Run it at the rpm given in the table 1.
- Note the voltage readings.

Special Tool - Needle Adapter Set: 57001-1457

Table 1, Alternator Output Voltage

Connections		Reading @4 000 rpm
Tester (+) to	Tester (-) to	
White lead	Ground	AC 48 V or more

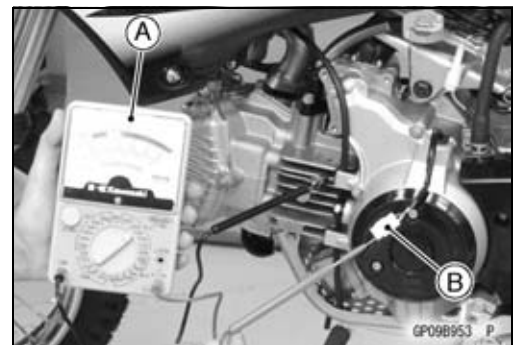
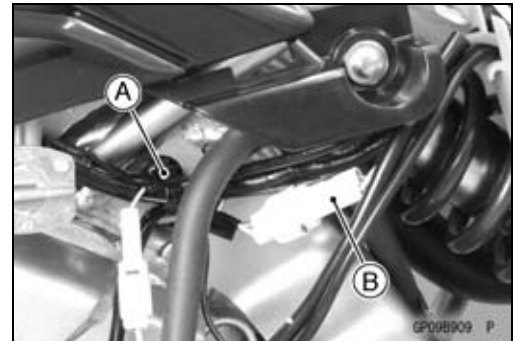
- ★ If the output voltage shows the value in the table, the alternator operates properly.
- ★ If the output voltage shows a much lower reading than that given in the table indicates that the alternator is defective.

- Check the stator coil resistance as follows.
 - Stop the engine.
 - Disconnect the alternator lead connector.
 - Connect the tester [A] to the connector [B] as shown in the table 2.
 - Note the readings.

Table 2, Stator Coil Resistance

Connections		Reading
Tester (+) to	Tester (-) to	
White lead	Ground	0.2 ~ 1.0 Ω

- ★ If there is more resistance than shown in the table, or no tester reading (∞) the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
- Using the tester, measure the resistance between each leads and chassis ground.
- ★ Any tester reading less than infinity (∞) indicates a short, necessitating stator replacement.
- ★ If the stator coils have normal resistance, but the voltage check showed the alternator to be defective; then the rotor have probably weakened, and the rotor must be replaced.

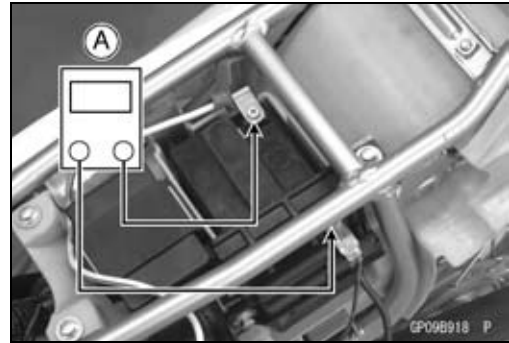


15-24 ELECTRICAL SYSTEM

Charging System

Charging Voltage Inspection

- Remove:
 - Seat (see Seat Removal in the Frame chapter)
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
- Check the battery condition (see Charging Condition Inspection).
- Warm up the engine to obtain actual alternator operating conditions.
- Connect a digital meter [A] as shown in the table.



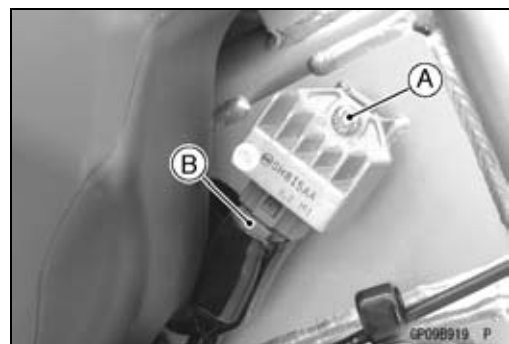
Charging Voltage

Connections		Reading
Meter (+) to	Meter (-) to	
Battery (+) Terminal	Battery (-) Terminal	DC 13.9 ~ 14.9 V

- Start the engine, and note the voltage readings at various engine speeds. The readings should show nearly battery voltage when the engine speed is low, and, as the engine speed rises, the readings should also rise. But they must be kept under the specified voltage.
- Stop the engine and disconnect the digital meter.
- ★ If the charging voltage is kept between the values given in the table, the charging system is considered to be working normally.
- ★ If the charging voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.
- ★ If the charging voltage does not rise as the engine speed increases, the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Regulator/Rectifier Inspection

- Remove the shroud (see Shroud Removal in the Frame chapter).
- Remove the screw [A], and disconnect the connector [B].



Charging System

- With the Kawasaki hand tester, measure the internal resistance in both directions between the terminals.

Special Tool - Hand Tester: 57001-1394

- ★ If the reading is not the specified value, replace the regulator/rectifier.

Internal Resistance @20°C (68°F)

Unit: kΩ

	Terminal	Tester (+) Lead		
		A	B	C
(-)*	A	—	6.9 ~ 70	∞
	B	∞	—	∞
	C	∞	∞	—

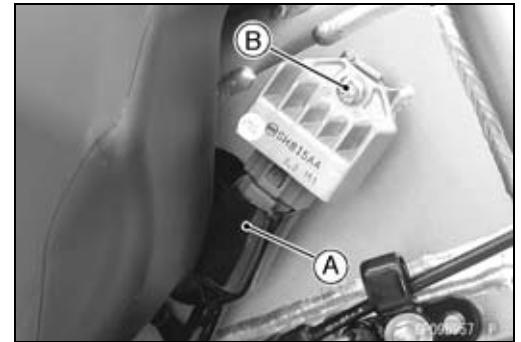
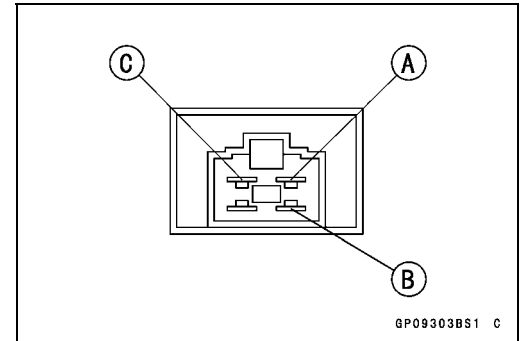
(-)*: Tester (-) Lead

NOTICE

Use only Hand Tester 57001-1394 for this test. An ohmmeter other than the Hand Tester may show different readings. If a megger or a meter with a large-capacity battery is used, the regulator will be damaged.

- Connect the regulator/rectifier lead connector and install the rubber cover [A] over the connector.
- Tighten:

Torque - Regulator Mounting Screw [B]: 5.2 N·m (0.53 kgf·m, 46 in·lb)

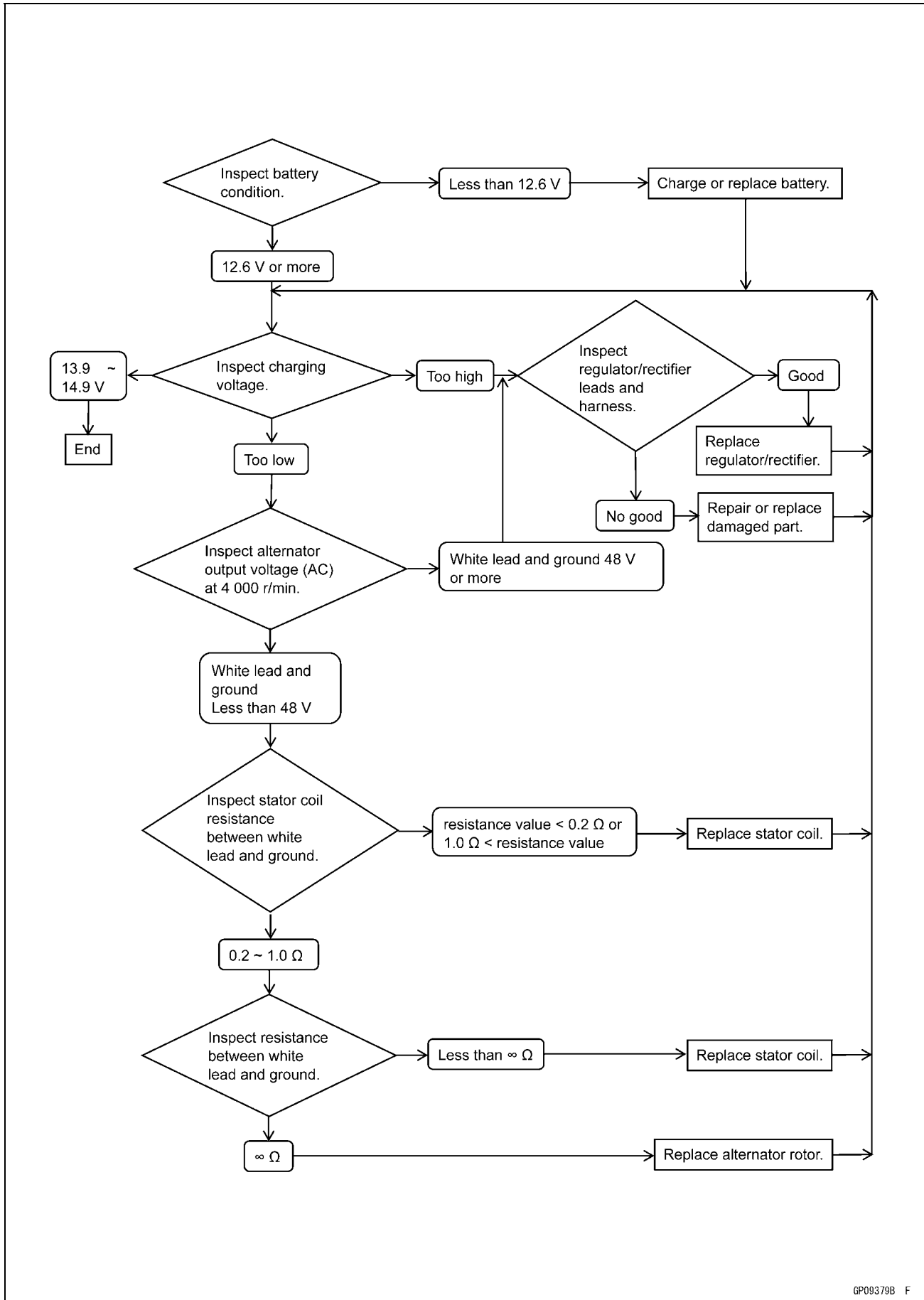


15-26 ELECTRICAL SYSTEM

Charging System

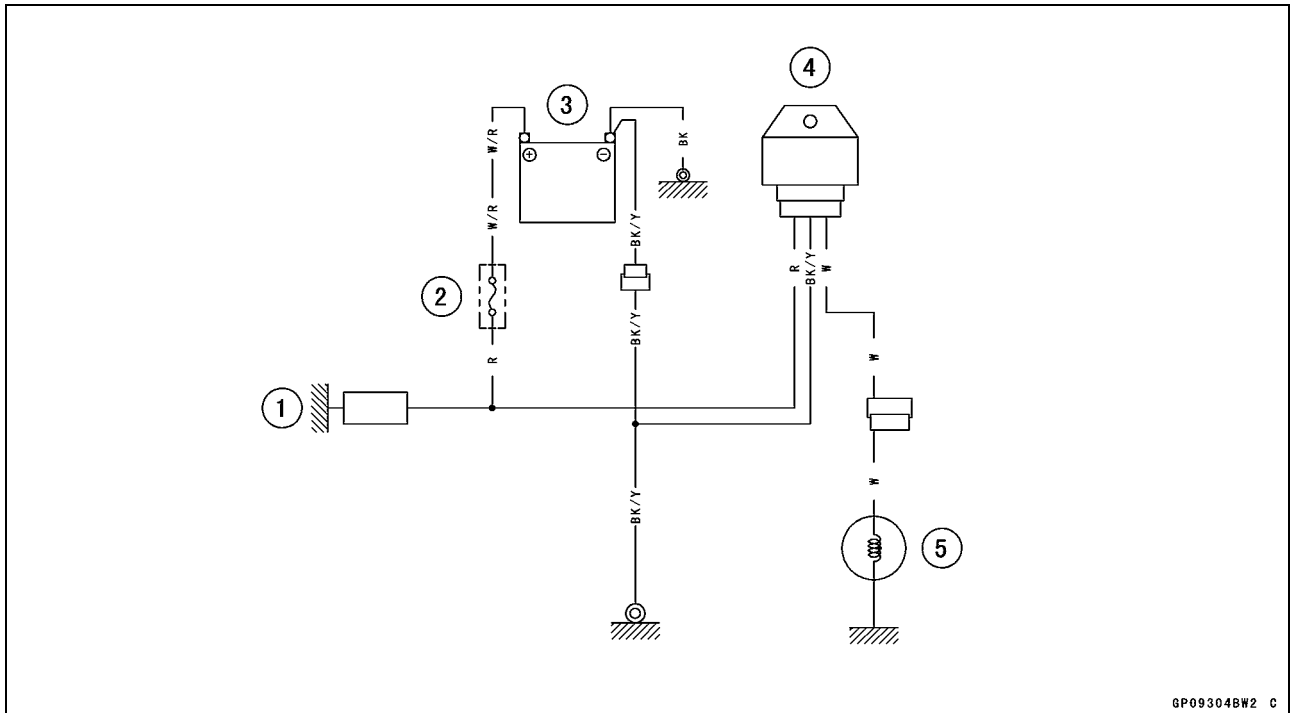
Charging System Troubleshooting

- Recharge the battery if it is discharged.



Charging System

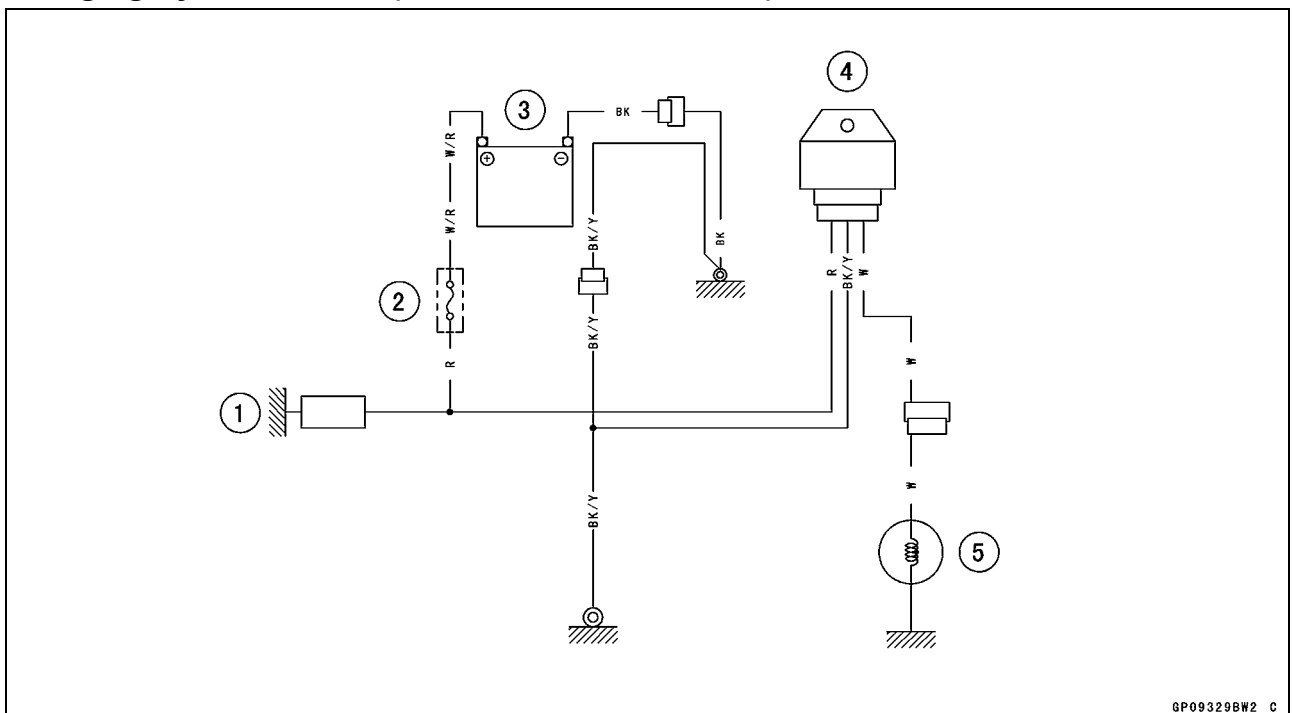
Charging System Circuit (KLX110CA/DA Models)



GP09304BW2 C

1. Load
2. Main Fuse 10 A
3. Battery 12 V 3 Ah
4. Regulator/Rectifier
5. Alternator

Charging System Circuit (KLX110CB/DB Models ~)



GP09329BW2 C

1. Load
2. Main Fuse 10 A
3. Battery 12 V 3 Ah
4. Regulator/Rectifier
5. Alternator

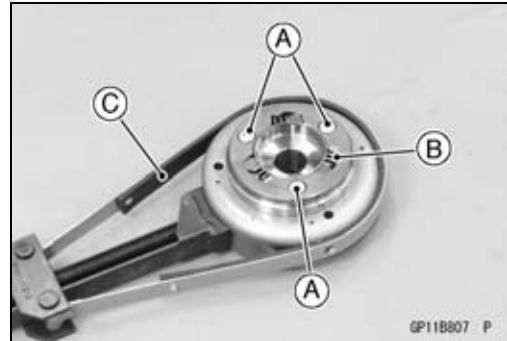
15-28 ELECTRICAL SYSTEM

Starter Motor Clutch

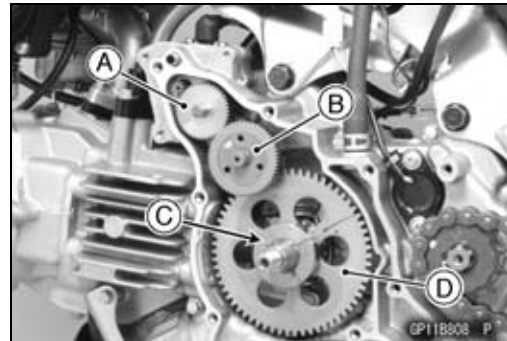
Starter Motor Clutch/Starter Motor Clutch Gear Removal

- Remove:
 - Alternator Rotor (see Alternator Rotor Removal)
- Remove the bolts [A] and take off the starter motor clutch [B] from the rotor.

Special Tool - Flywheel Holder [C]: 57001-1313



- Pull the starter motor idle gear [A] and shaft out of the crankcase.
- Remove the torque limiter [B].
- Remove the woodruff key [C] and starter motor clutch gear [D].

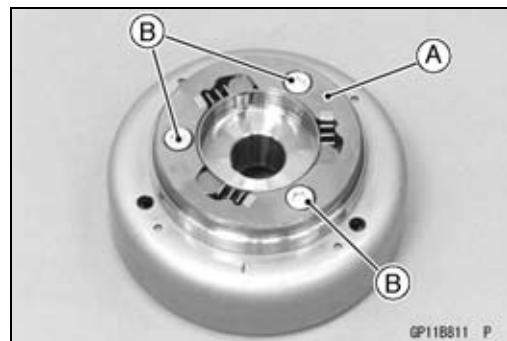


Starter Motor Clutch/Starter Motor Clutch Gear Installation

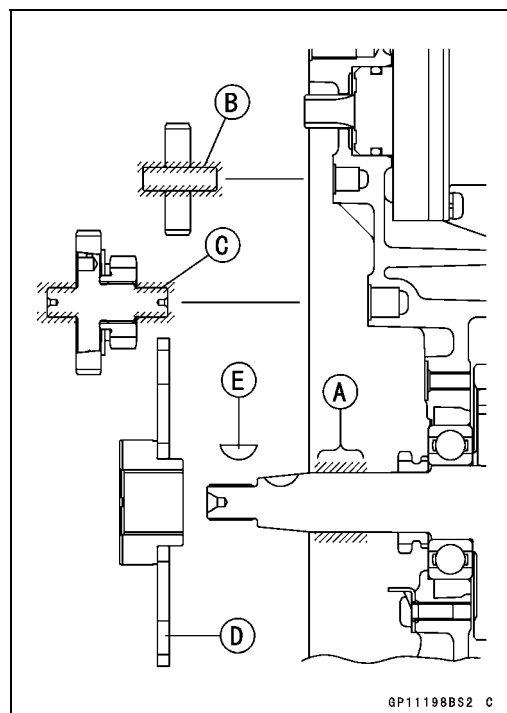
- Apply a non-permanent locking agent to the starter motor clutch bolts.
- Install the starter motor clutch [A] to the alternator rotor.
- Tighten:

Torque - Starter Motor Clutch Bolts [B]: 11.8 N·m (1.20 kgf·m, 104 in·lb)

Special Tool - Flywheel Holder: 57001-1313



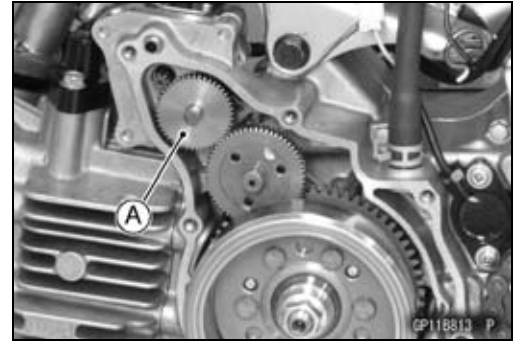
- Apply molybdenum disulfide oil solution to the following:
 - Crankshaft [A]
 - Starter Motor Idle Gear Shaft [B]
 - Torque Limiter Shaft [C]
- Install:
 - Starter Motor Clutch Gear [D]
 - Starter Motor Idle Gear
 - Torque Limiter
 - Woodruff Key [E]
 - Alternator Rotor (see Alternator Rotor Installation)



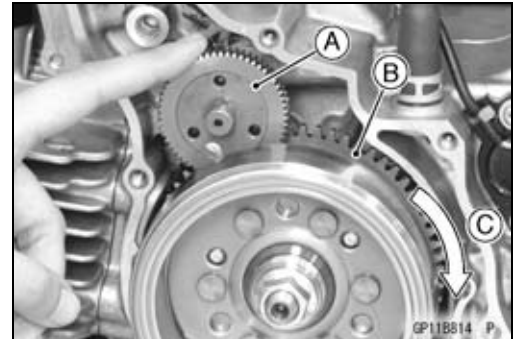
Starter Motor Clutch

Starter Motor Clutch Inspection

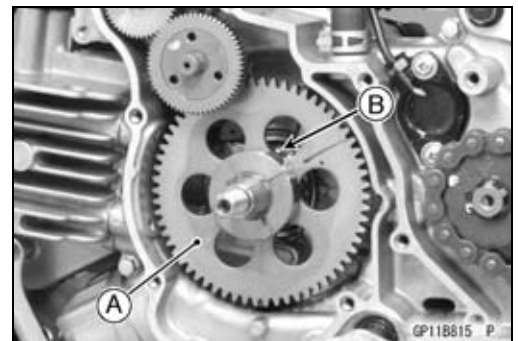
- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Alternator Cover (see Alternator Cover Removal)
 - Starter Motor Idle Gear [A]



- Turn the torque limiter [A] by hand. The starter motor clutch gear [B] should turn clockwise freely [C] but should not turn counterclockwise.
- ★ If the starter motor clutch does not operate as it should or if it makes noise, go to the next step.
- Disassemble the starter motor clutch, and visually inspect the clutch parts.
- ★ If there is any worn or damaged part, replace it.

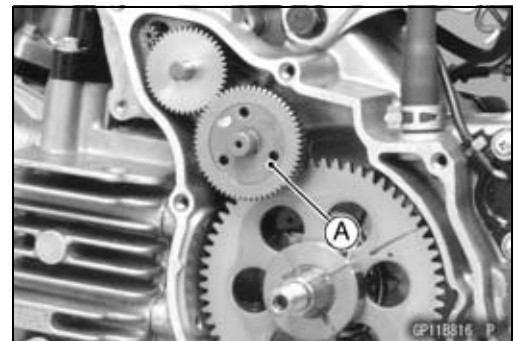


- Remove the alternator rotor (see Alternator Rotor Removal).
- Inspect the starter motor clutch gear [A].
- ★ If the sliding surfaces [B] are worn or damaged, replace the starter motor clutch gear.



Starter Torque Limiter Inspection

- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance chapter).
- Remove:
 - Alternator Rotor (see Alternator Rotor Removal)
 - Torque Limiter [A]
- Visually inspect the torque limiter.
- ★ If the limiter has wear, discoloration or other damage, replace it as a unit.



15-30 ELECTRICAL SYSTEM

Ignition System

⚠ WARNING

The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or ignition coil lead while the engine is running, or you could receive a severe electrical shock.

Crankshaft Sensor Removal

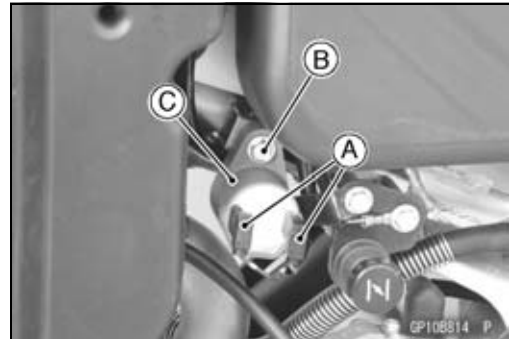
- Refer to the Stator Removal.

Crankshaft Sensor Installation

- Refer to the Stator Installation.

Ignition Coil Removal/Installation

- Remove:
 - Shroud (see Shroud Removal in the Frame chapter)
 - Spark Plug Cap
- Disconnect the ignition coil leads [A].
- Remove the mounting bolt [B] and remove the ignition coil [C].



- Installation is the reverse of removal; note the following.
- Tighten:

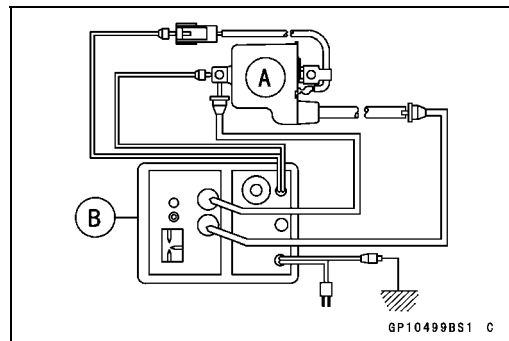
Torque - Ignition Coil Mounting Bolt: 2.9 N·m (0.30 kgf·m, 26 in·lb)

Ignition Coil Inspection

Measuring Arcing Distance

The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance using the coil tester for the 3-needle method.

- Remove the ignition coil (see Ignition Coil Removal/Installation).
- Connect the ignition coil (with the spark plug cap installed on the spark plug lead) [A] to the tester [B], and measure the arcing distance.



⚠ WARNING

To avoid extremely high voltage shocks, do not touch the coil body or leads.

- ★ If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.

3 Needle Arcing Distance

Standard: 7 mm (0.26 in.) or more

- To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil lead. Remove the cap by turning it counter-clockwise.
- ★ If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug cap.

Ignition System

Measuring Coil Resistance

If the arcing tester is not available, the coil can be checked for a broken or badly shorted winding with an ohmmeter. However, an ohmmeter cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

- Remove the ignition coil (see Ignition Coil Removal/Installation).
- Measure the primary winding resistance [A].
 - Connect an ohmmeter between the coil terminals.
 - Set the meter to the $\times 1 \Omega$ range, and read the meter.
- Measure the secondary winding resistance [B].
 - Remove the spark plug cap by turning it counterclockwise.
 - Connect an ohmmeter between the spark plug lead and the green terminal (earth).
 - Set the meter to the $\times 1 \text{ k}\Omega$ range, and read the meter.

Ignition Coil Winding Resistance

Primary windings: 0.19 ~ 0.23 Ω at 20°C (68°F)

Secondary windings: 2.5 ~ 3.7 $\text{k}\Omega$ at 20°C (68°F)

- ★ If the meter does not read as specified, replace the coil.
- ★ If the meter reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.
- Check the spark plug lead for visible damage.
- ★ If the spark plug lead is damaged, replace the coil.

Spark Plug Cleaning and Inspection

- Refer to the Spark Plug Cleaning and Inspection in the Periodic Maintenance chapter.

Spark Plug Gap Inspection

- Refer to the Spark Plug Cleaning and Inspection in the Periodic Maintenance chapter.

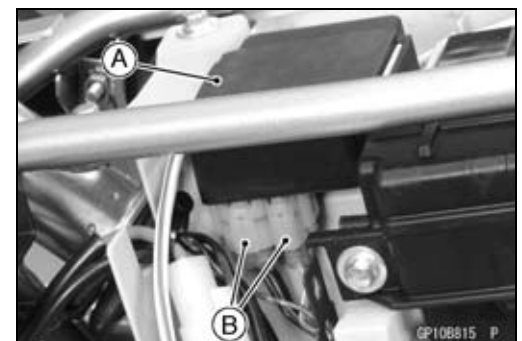
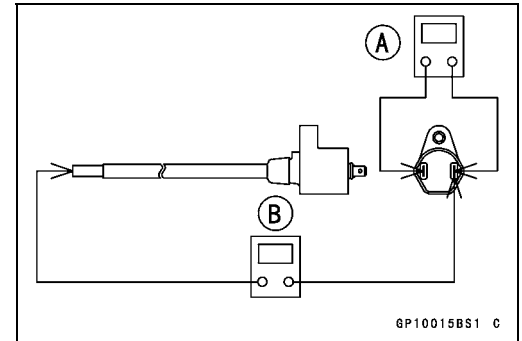
Igniter Removal

- Remove:
 - Seat (see Seat Removal in the Frame chapter)
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
 - Starter Relay
- Remove the igniter [A], and disconnect the igniter connectors [B].

Igniter Inspection

NOTICE

When inspecting the IC Igniter observe the following to avoid damage to the IC Igniter.
Do not disconnect the IC Igniter while the engine is running.
This may damage the IC Igniter.



15-32 ELECTRICAL SYSTEM

Ignition System

Ignition Coil Primary Peak Voltage Check

- Disconnect the spark plug cap from the spark plug, but do not remove the spark plug.
- Connect the good spark plug [A] to the spark plug cap, then touch the engine with it.

NOTE

○ Measure the voltage with each lead connected correctly. The correct value may not be obtained if disconnected.

○ Maintain the correct value of compression pressure for the cylinder (Be sure to measure the voltage with the spark plug install to the cylinder head).

- Connect the peak voltage adapter [B] between the terminal of primary lead (black) and ground connection of the unit with the lead of the ignition coil [C] connected.

Special Tools - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Needle Adapter Set: 57001-1457

Connection:	Adapter	Digital Meter
Ground [D] ←	Red Lead →	(+)
Black Lead [E] ←	Black Lead →	(-)

IC Igniter [F]

Needle Adapter [G]

- Shift the gear to the neutral position.
- Crank the engine by pushing the starter button several times to measure the peak voltage of the primary ignition coil.

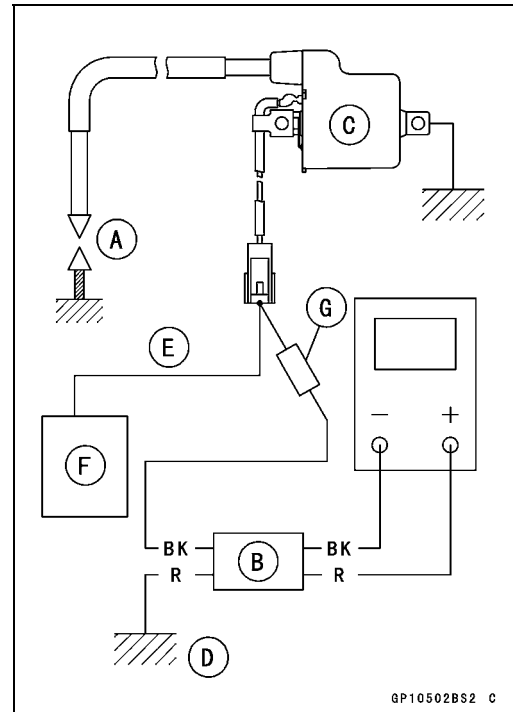
Ignition Coil Primary Peak Voltage

Standard: 100 V or more

⚠ WARNING

Electrical equipment can cause serious electrical shock. To avoid being shocked, do not touch the metal portion of the probe when measuring voltage.

- ★ If the voltage is less than the specified value, check the ignition coil (see Ignition Coil Inspection).
- ★ If the ignition coil is good, check the other parts (see the flow chart in this section).
- ★ If the all parts are good, replace the igniter.



Ignition System

Crankshaft Sensor Peak Voltage Check

- To check the peak voltage, do the following procedures.
- Disconnect the alternator lead connector from the main harness (see Alternator Cover Removal).

NOTE

- Measure the voltage with each lead connected correctly. The correct value may not be obtained if disconnected.
- Maintain the correct value of compression pressure for the cylinder (Be sure to measure the voltage with the spark plug installed to the cylinder head).
- Connect the peak voltage adapter [A] to the digital meter and the terminals of the alternator lead connector [B].

Special Tool - Peak Voltage Adapter: 57001-1415

Type: KEK-54-9-B

Connection:	Adapter	Digital Meter
Blue/Yellow Lead [C]	← Red Lead →	(+)
Ground	← Black Lead →	(-)

- Crank the engine by pushing the starter button several times with the transmission gear in neutral to measure the peak voltage of the crankshaft sensor.

Crankshaft Sensor Peak Voltage

Standard: DC 2 V or more

⚠ WARNING

Electrical equipment can cause serious electrical shock. To avoid being shocked, do not touch the metal portion of the probe when measuring voltage.

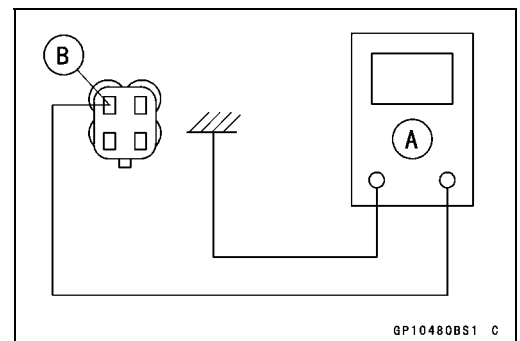
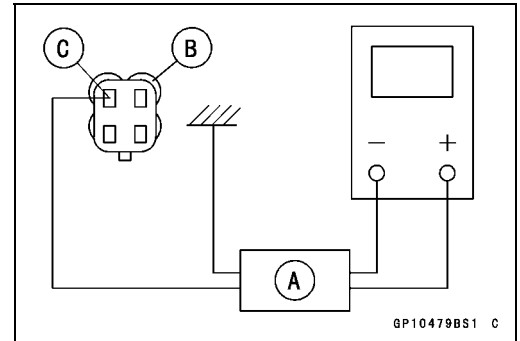
- ★ If the voltage is less than the specified, check the crankshaft sensor (see Crankshaft Sensor Inspection).
- ★ If the crankshaft sensor is good, check the other parts (see the flow chart in this section).
- ★ If the all parts are good, replace the igniter.

Crankshaft Sensor Inspection

- Remove:
 - Alternator Lead Connector (see Alternator Cover Removal).
- Using a digital meter [A] and connect it to the Blue/Yellow lead [B] in the connector and the ground.
- ★ If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the crankshaft sensor is shorted, and must be replaced.

Crankshaft Sensor Resistance

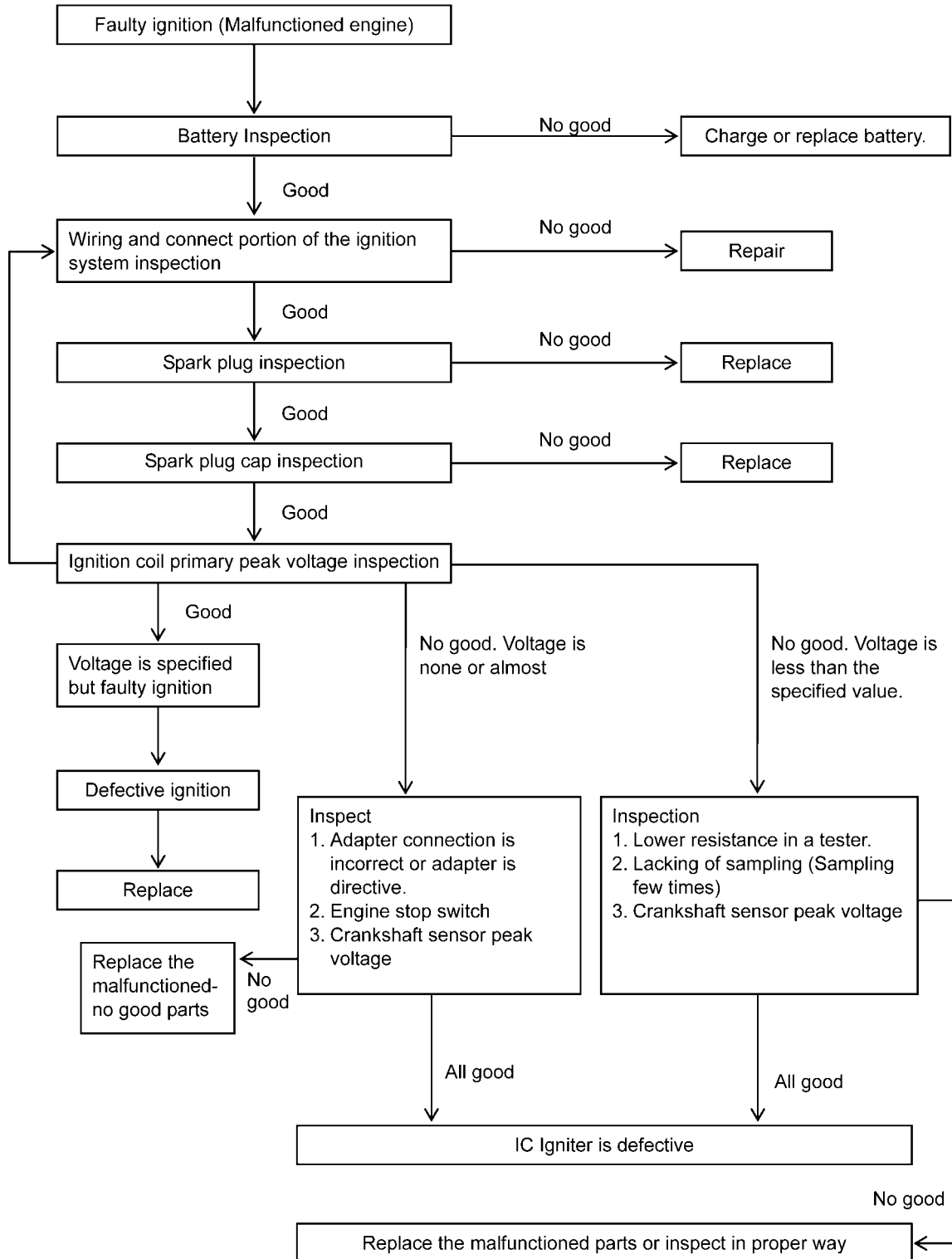
Standard: 50 ~ 200 Ω at 20°C (68°F)



15-34 ELECTRICAL SYSTEM

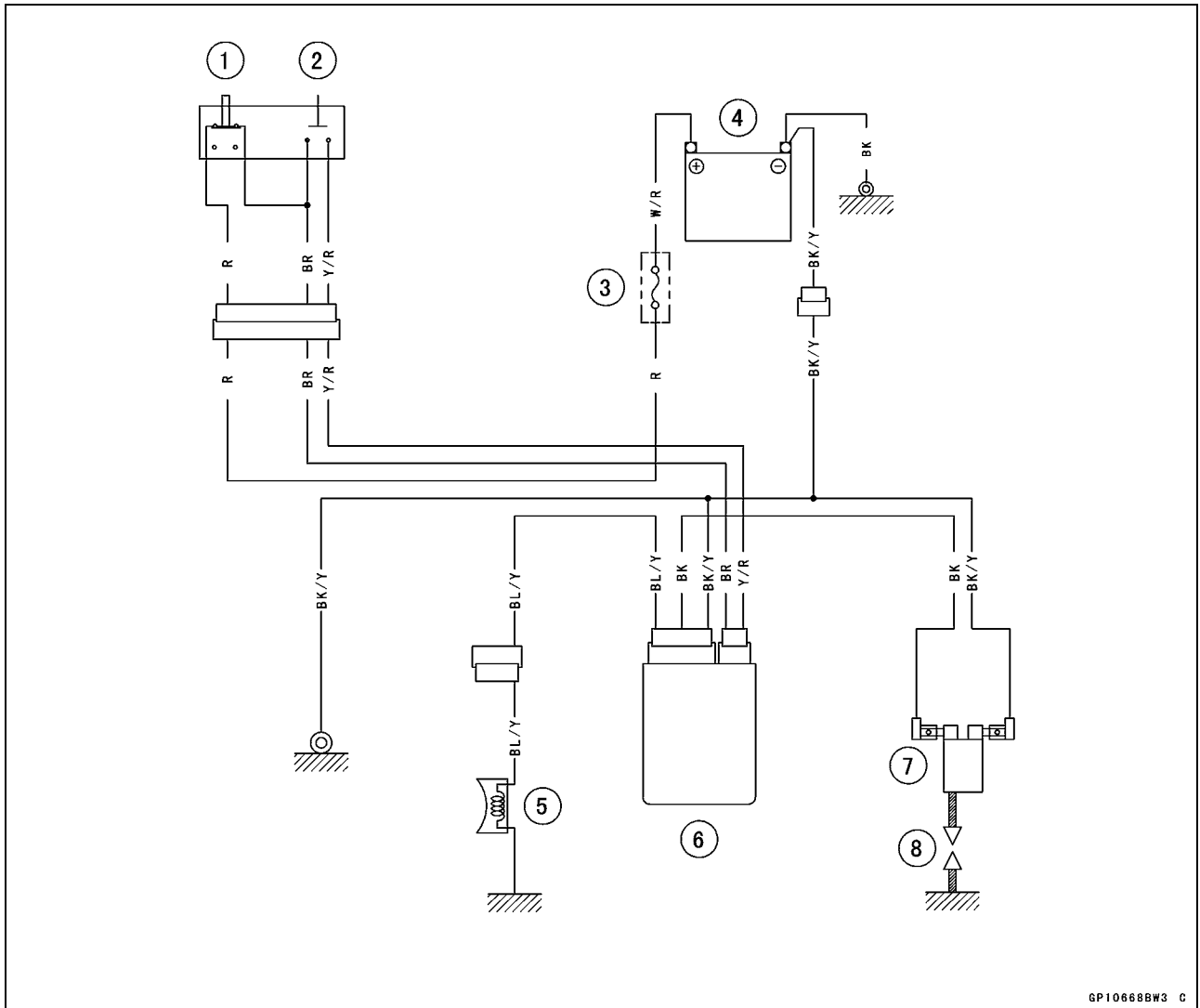
Ignition System

Troubleshooting



Ignition System

Ignition System Circuit (KLX110CA/DA Models)



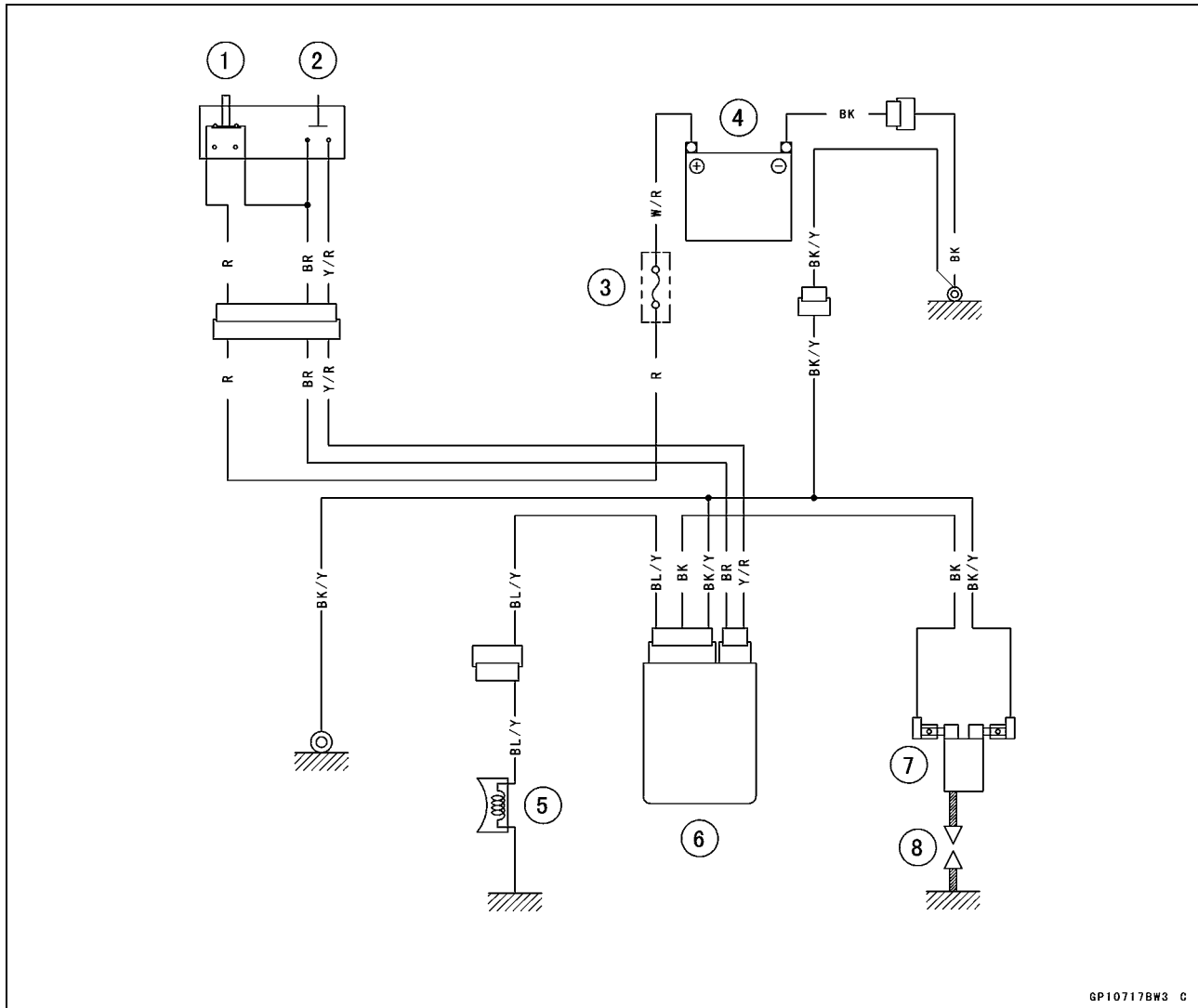
GP10668BW3 C

1. Engine Stop Switch
2. Engine Starter Button
3. Main Fuse 10 A
4. Battery 12 V 3 Ah
5. Crankshaft Sensor
6. IC Igniter
7. Ignition Coil
8. Spark Plug

15-36 ELECTRICAL SYSTEM

Ignition System

Ignition System Circuit (KLX110CB/DB Models ~)



GP10717BW3 C

1. Engine Stop Switch
2. Engine Starter Button
3. Main Fuse 10 A
4. Battery 12 V 3 Ah
5. Crankshaft Sensor
6. IC Igniter
7. Ignition Coil
8. Spark Plug

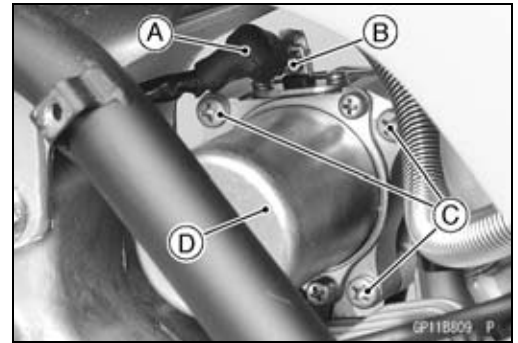
Electrical Starter System

Starter Motor Removal

NOTICE

Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Remove:
 - Exhaust Pipe Cover (see Muffler Removal in the Engine Top End chapter)
- Slide out the rubber cap [A].
- Remove:
 - Starter Motor Terminal Screw [B]
 - Starter Motor Mounting Screws [C]
- Pull out the starter motor [D].

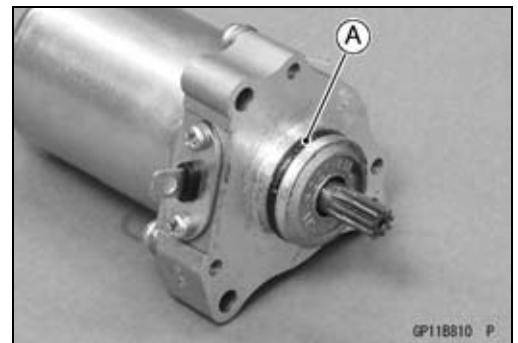


Starter Motor Installation

NOTICE

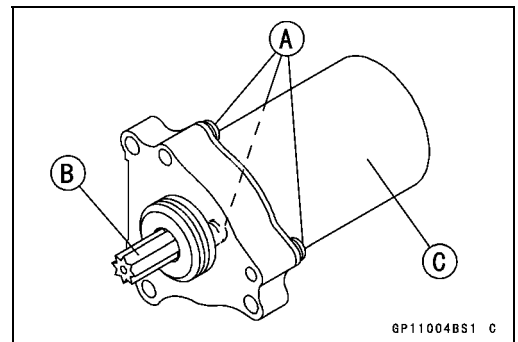
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Replace the O-ring [A] with a new one.
 - Apply grease to the O-ring.
 - Install the starter motor and other removed parts.
- Torque - Starter Motor Mounting Screws: 5.2 N·m (0.53 kgf·m, 46 in·lb)**
- Starter Motor Terminal Screw: 2.0 N·m (0.20 kgf·m, 18 in·lb)**



Starter Motor Disassembly

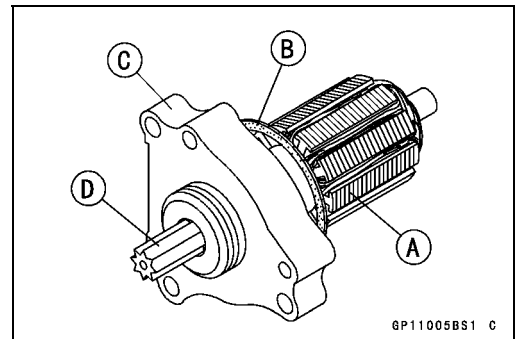
- Remove the starter motor (see Starter Motor Removal).
- Remove the end cover screws [A] with lockwashers.
- Hold the pinion gear portion [B] and pull out the yoke [C].



- Remove the armature [A] and gasket [B] from the end cover [C].

NOTE

○ Wrap the pinion gear portion [D] by the vinyl tape before removal of the armature.



15-38 ELECTRICAL SYSTEM

Electrical Starter System

NOTE

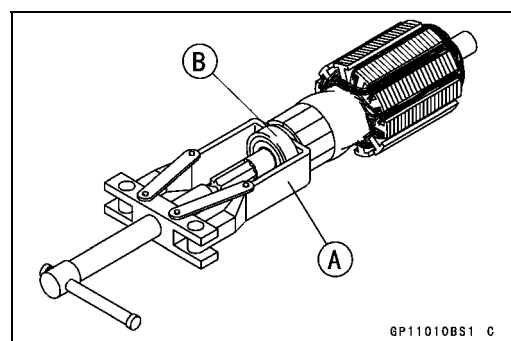
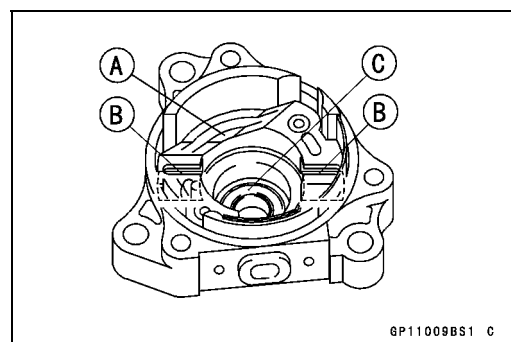
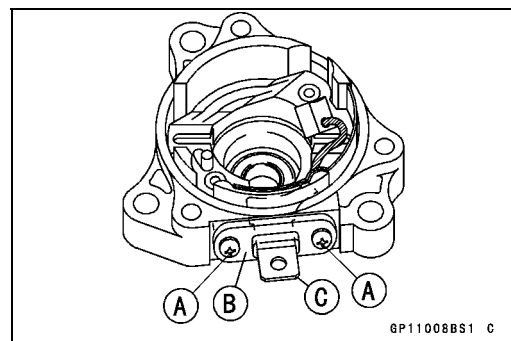
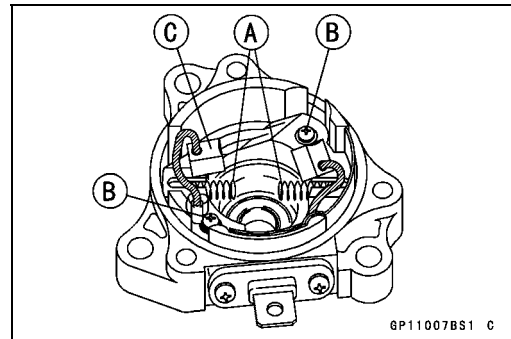
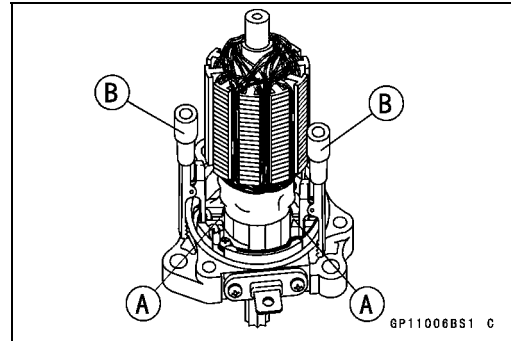
○ Hold the carbon brush leads [A], using the suitable tool [B] as shown.

- Pull out the carbon brush spring [A].
- Remove the brush holder screws [B] with lockwashers and flat washers.
- Remove the (-) carbon brush [C].

- Remove the terminal cover plate screws [A] and terminal cover plate [B].
- Push the terminal [C] into the end cover.
- Remove the terminal with (+) carbon brush.

- Remove the brush holder plate [A] and insulator plates [B].
- Using a suitable tool (or oil seal remover), remove the oil seal [C] from the end cover.

- Using a suitable tool [A] (or bearing puller), remove the bearing [B] from the armature shaft.



Electrical Starter System

Starter Motor Assembly

- Smooth the commutator surface if necessary with fine emery paper (more than #600).
- Blow or wipe the parts of the starter motor to clean the dust or any carbon particles.
- Replace the oil seal with a new one.
- Apply engine oil to the oil seal outer circumference.
- Press in the oil seal [A].
- Install the oil seal so that the marked side faces yoke side.
- Install the insulator plates [B] and the brush holder plate [C].
- Install the terminal [D] through the grommet [E] from inside to outside.
- Tighten the brush holder plate screws [F] (one screw should be tightened with the carbon brush lead).

Torque - Brush Holder Plate Screws: 0.9 N·m (0.09 kgf·m, 8 in·lb)

- Apply adhesive cement [A] to the terminal [B] as shown.
- Install the terminal cover plate so that the flat side faces outside.
- Tighten:

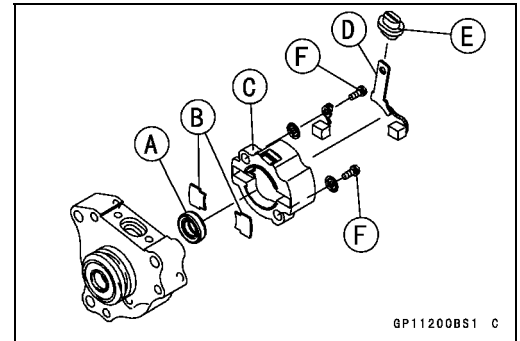
Torque - Terminal Cover Plate Screws: 2.0 N·m (0.20 kgf·m, 18 in·lb)

- Replace the bearing with a new one.
- Press in the bearing [A] with a suitable tool.

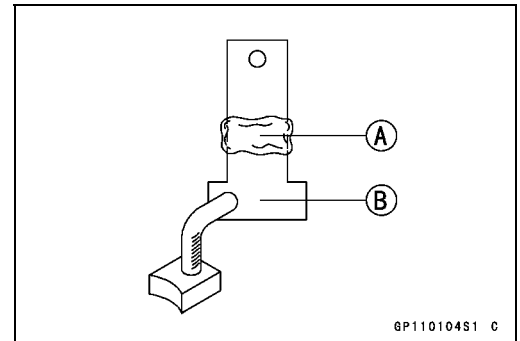
NOTE

- Install the bearing with the marked side toward the pinion gear.
- Spin the bearing by hand to check its condition. If it is noisy or does not spin smoothly, replace it.

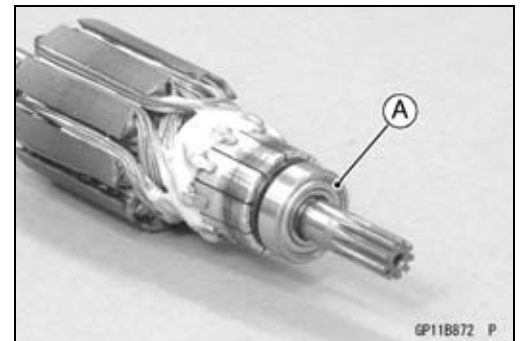
- Insert the (–) carbon brush spring into the brush holder [A].
- Insert the (–) carbon brush [B] into the brush holder until it is bottomed.



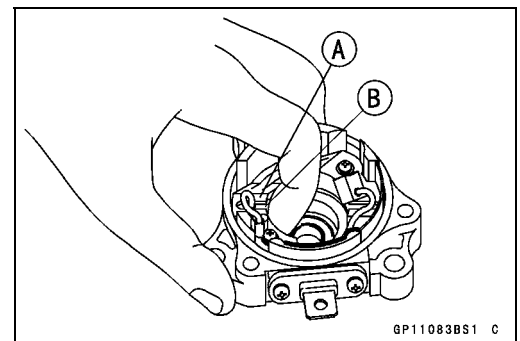
GP11200BS1 C



GP110104S1 C



GP118872 P

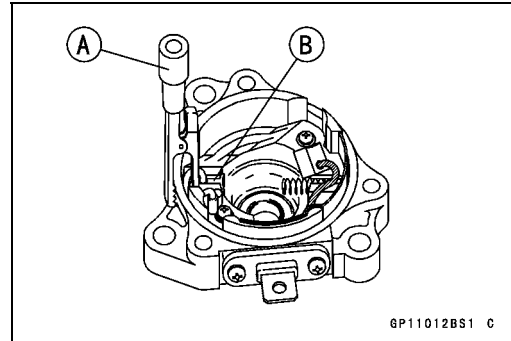


GP11083BS1 C

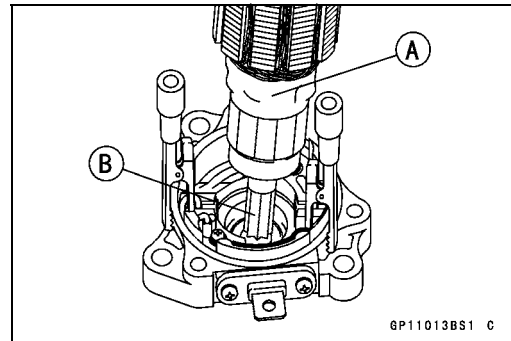
15-40 ELECTRICAL SYSTEM

Electrical Starter System

- Hold the (-) carbon brush in the brush holder so that a suitable tool [A] could hold the (-) carbon brush lead [B] as shown.
- Install the (+) carbon brush spring.



- Hold the (+) carbon brush lead with a suitable tool.
- Apply high-temperature grease to the oil seal lip.
- Before inserting the armature [A], wrap the pinion gear portion [B] by the vinyl tape.
- Remove the suitable tool.



- Check that movement of the carbon brushes is smooth and they touch the commutator properly.
- Raise the lead.
- Apply high-temperature grease to the shaft end of the armature.
- Install the gasket and yoke to the end cover.
- Tighten:
Torque - End Cover Screws: 4.4 N·m (0.45 kgf·m, 39 in·lb)
- Install the starter motor.

Starter Motor Brush Inspection

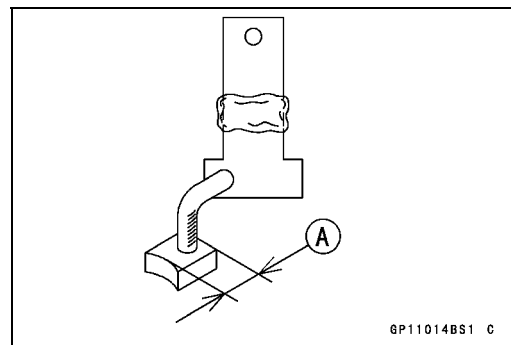
- Measure the overall length [A] of each brush.

Starter Motor Brush Length

Standard: 7.0 mm (0.28 in.)

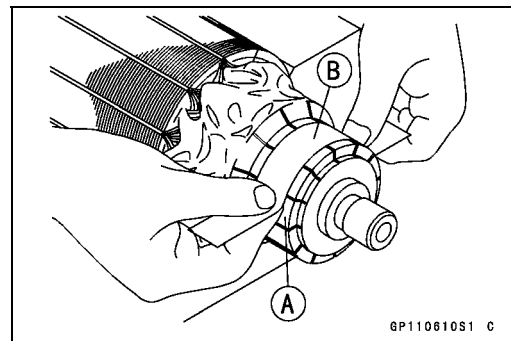
Service Limit: 3.5 mm (0.14 in.)

- ★ If any is worn down to the service limit, replace the carbon brush.



Commutator Cleaning/Inspection

- Smooth the commutator surface [A] if necessary with fine emery cloth [B], and clean out the grooves.

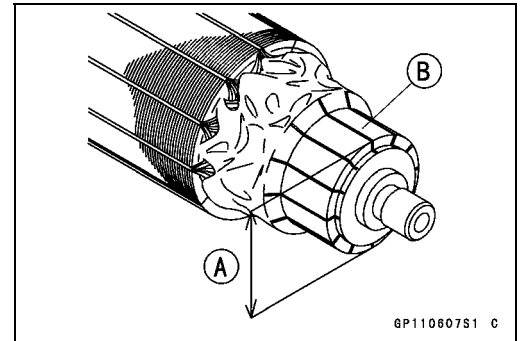


Electrical Starter System

- Measure the outer diameter [A] of the commutator [B].
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.

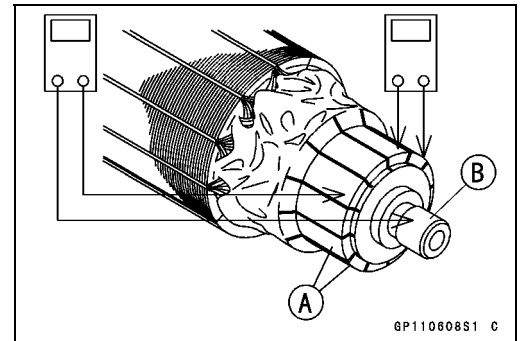
Commutator Diameter

Standard:	22.0 mm (0.87 in.)
Service Limit:	21.5 mm (0.85 in.)



Armature Inspection

- Using a digital meter, measure the resistance between any two commutator segments [A].
- ★ If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.
- Using the digital meter, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced.

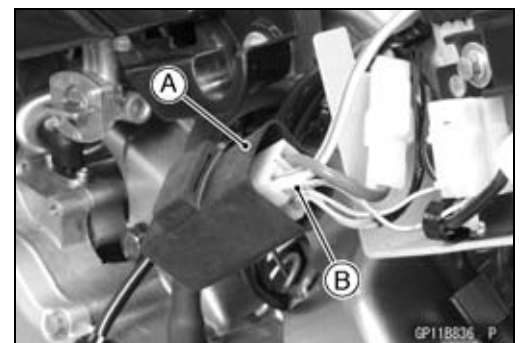


NOTE

○ Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the digital meter. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.

Starter Relay Inspection

- Remove:
 - Seat (see Seat Removal in the Frame chapter)
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
- Tuck up the cover [A] and disconnect the connector [B].



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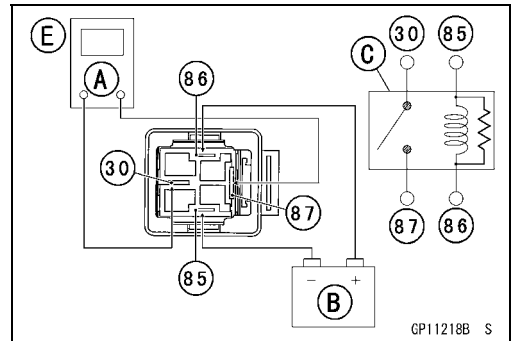
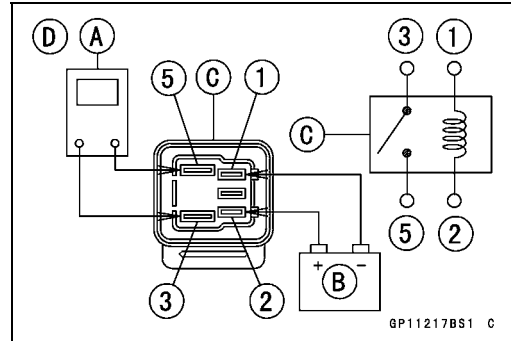
Electrical Starter System

- Connect a digital meter [A] and 12 V battery [B] to the starter relay [C] as shown in the figure.
- ★ If the relay does not work as specified, the relay is defective. Replace the relay.
 - KLX110CA/DA Models [D]
 - KLX110CB/DB Models ~ [E]

Starter Relay Inspection

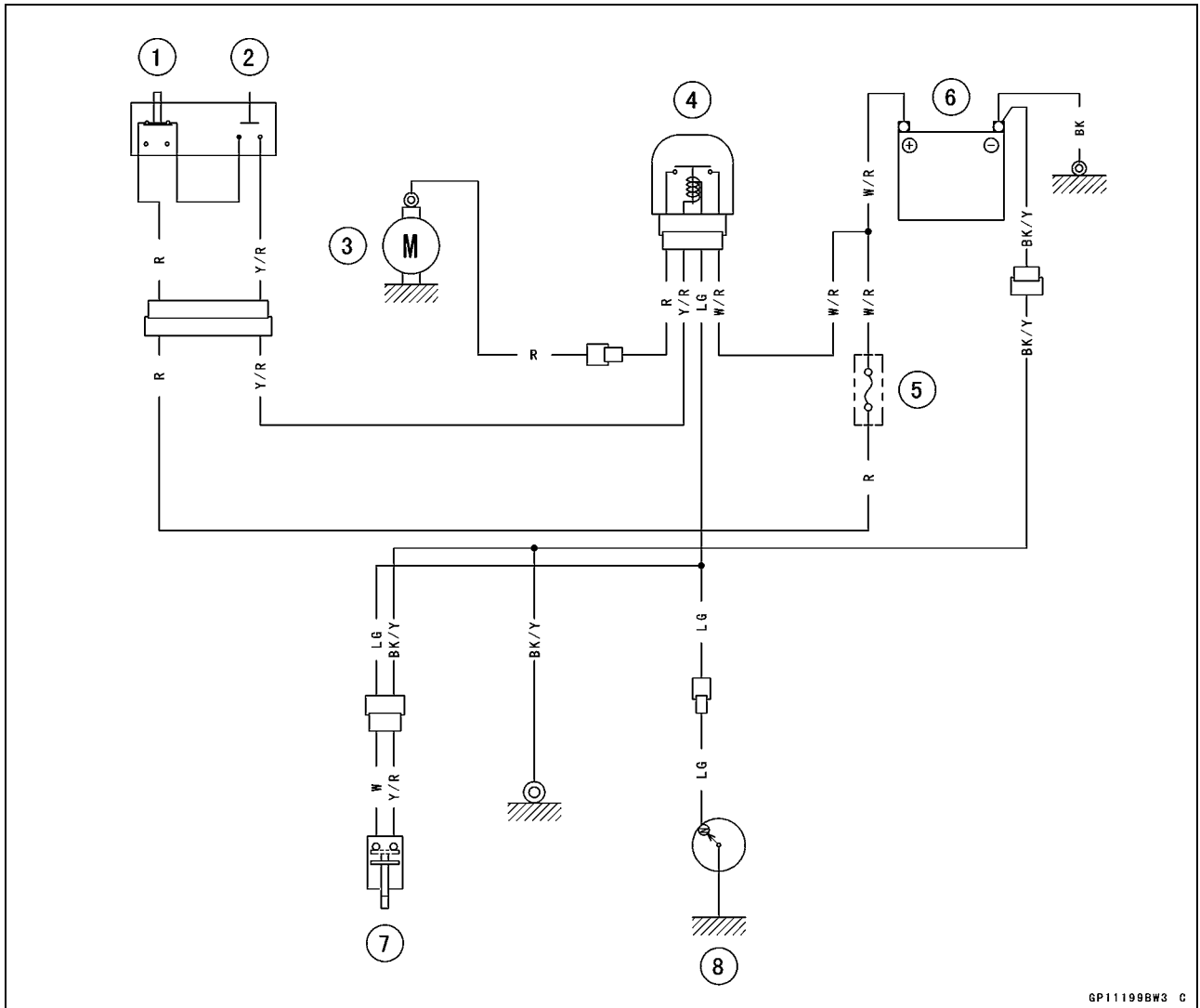
Standard: **When battery is connected** → 0 Ω
 When battery is disconnected → ∞ Ω

- Install the cables and other removed parts.
Torque - Starter Relay Terminal Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)



Electrical Starter System

Electrical Starter System Circuit (KLX110CA/DA Models)



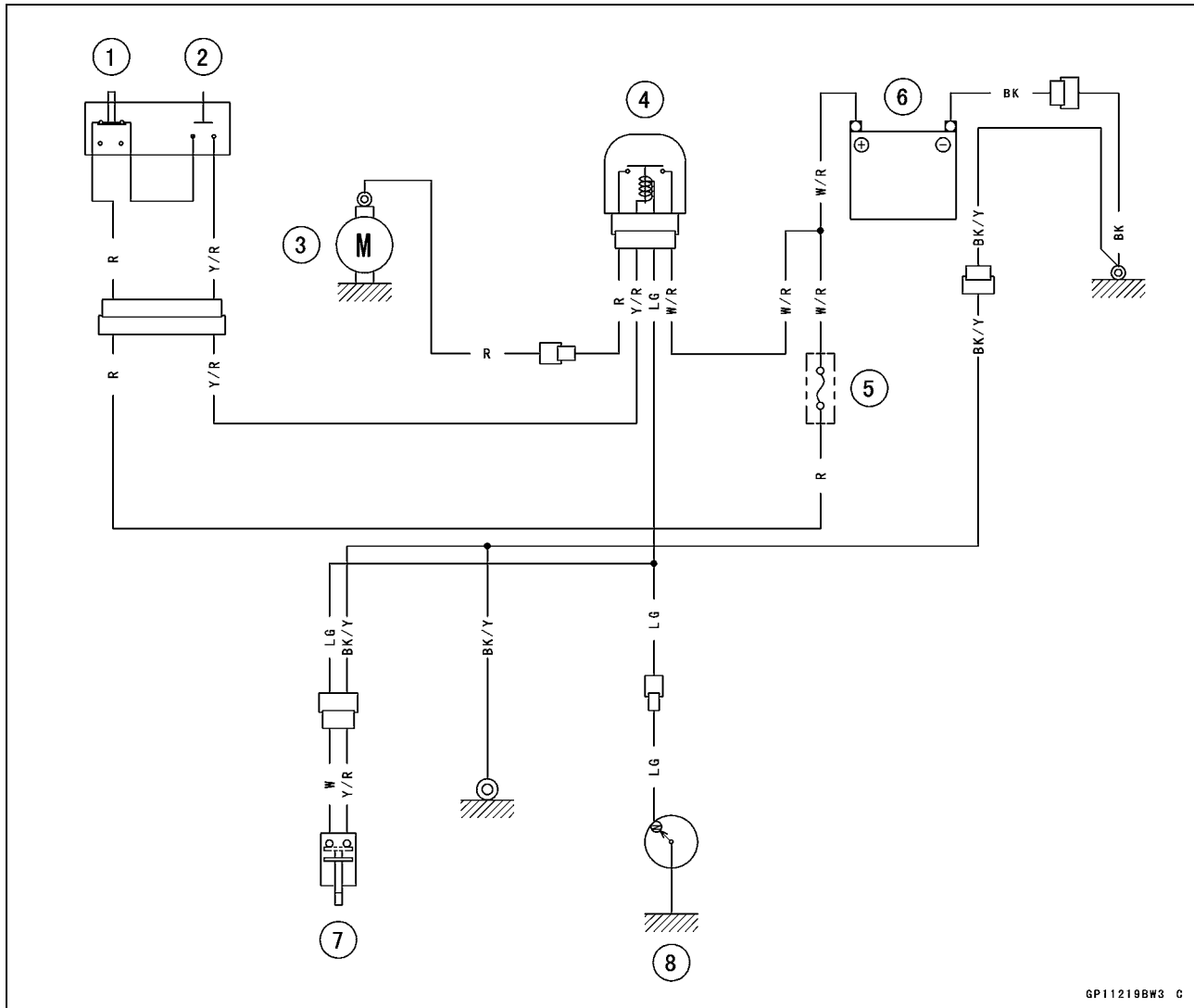
GP11199BW3 C

1. Engine Stop Switch
2. Engine Starter Button
3. Starter Motor
4. Starter Relay
5. Main Fuse 10 A
6. Battery 12 V 3 Ah
7. Starter Lockout Switch (KLX110D Models)
8. Gear Position Switch

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Electrical Starter System

Electrical Starter System Circuit (KLX110CB/DB Models ~)



GP11219BW3 C

1. Engine Stop Switch
2. Engine Starter Button
3. Starter Motor
4. Starter Relay
5. Main Fuse 10 A
6. Battery 12 V 3 Ah
7. Starter Lockout Switch (KLX110D Models)
8. Gear Position Switch

Switches and Sensors

Switch Inspection

- Using a digital meter, check to see that only the connections shown in the table have continuity (about zero ohms).
- ★ If the switch has an open or short, repair it or replace it with a new one.

Engine Stop Switch		
Color	R	BR
Stop		
Run	○—	—○

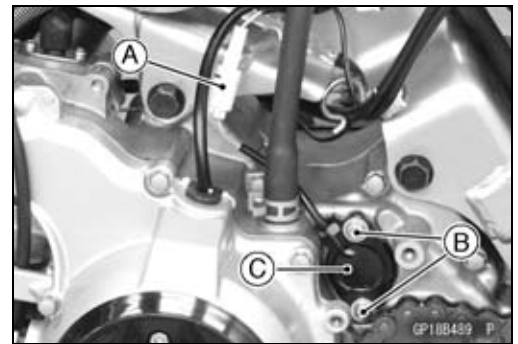
GP18552BN3 C

Starter Button		
Color	BR	Y/R
Release		
Push	○—	—○

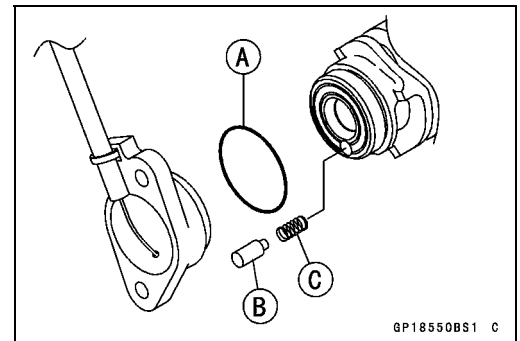
GP18553BN3 C

Gear Position Switch Removal

- Disconnect the gear position switch lead connector [A].
- Remove:
 - Engine Sprocket Cover (see Drive Chain Removal in the Final Drive chapter)
 - Screws [B]
 - Gear Position Switch [C]



- Remove:
 - O-ring [A]
 - Gear Position Switch Finger [B]
 - Spring [C]



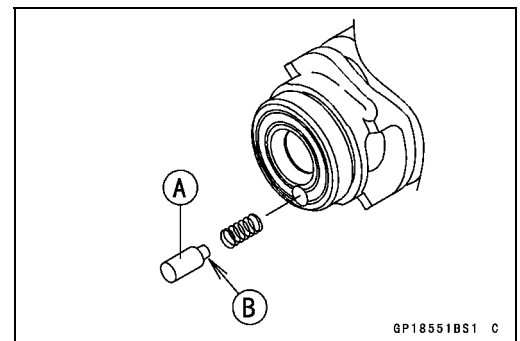
GP18550BS1 C

Gear Position Switch Installation

- Insert the spring into the hole in the shift drum.
- Insert the switch finger [A] so that the small diameter [B] is toward hole side.
- Replace the O-ring with a new one.
- Apply high-temperature grease to the O-ring.
- Clean the contact points on the position switch.
- Tighten the gear position switch screw.

Torque - Gear Position Switch Screws: 2.9 N·m (0.30 kgf·m, 26 in·lb)

- Install the other removed parts.



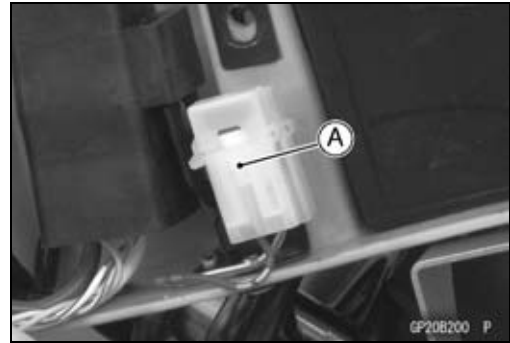
GP18551BS1 C

15-46 ELECTRICAL SYSTEM

Fuses

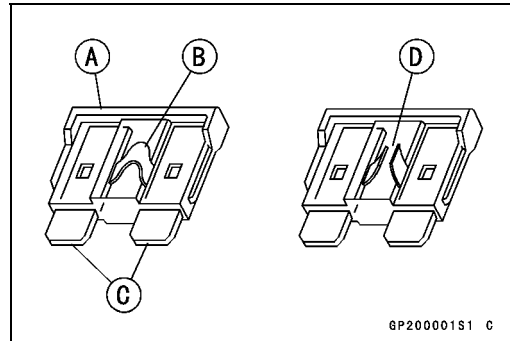
Main Fuse 10 A Removal

- Remove:
 - Seat (see Seat Removal in the Frame chapter)
 - Left Side Cover (see Side Cover Removal in the Frame chapter)
- Remove the main fuse [A].



Main Fuse 10 A Inspection

- Remove the fuse (see Main Fuse 10 A Removal) and inspect the fuse element.
- ★ If the fuse element is blown, replace the fuse.
 - Housing [A]
 - Fuse Element [B]
 - Terminal [C]
 - Blown Element [D]



NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.