TABLE OF CONTENTS

OVERVIEW

GENERAL OPERATION INFORMATION

The electrical system consist of different subsystems where some are inter-related:

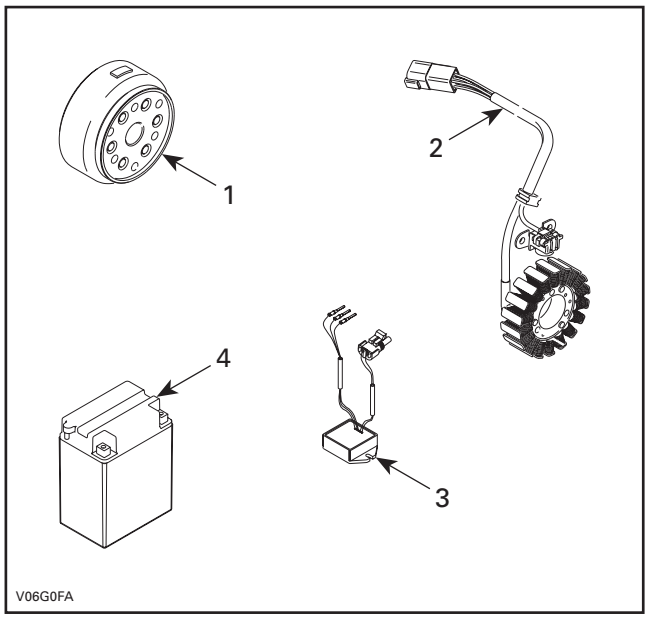
- charging system
- starting system
- ignition system
- accessories.

The following gives an outline of each components.

CHARGING SYSTEM

It is the source of electrical energy to charge the battery and keep it at a full state of charge. The magneto is coupled to the engine and it transforms magnetic field into electric current through a 3 phase, delta wound stator on 18 poles.

The magneto supplies unregulated AC current (alternative current) to the voltage regulator/rectifier.



1. *Magneto flywheel*
2. *Stator*
3. *Voltage regulator/rectifier*
4. *Battery*

Voltage Regulator/Rectifier

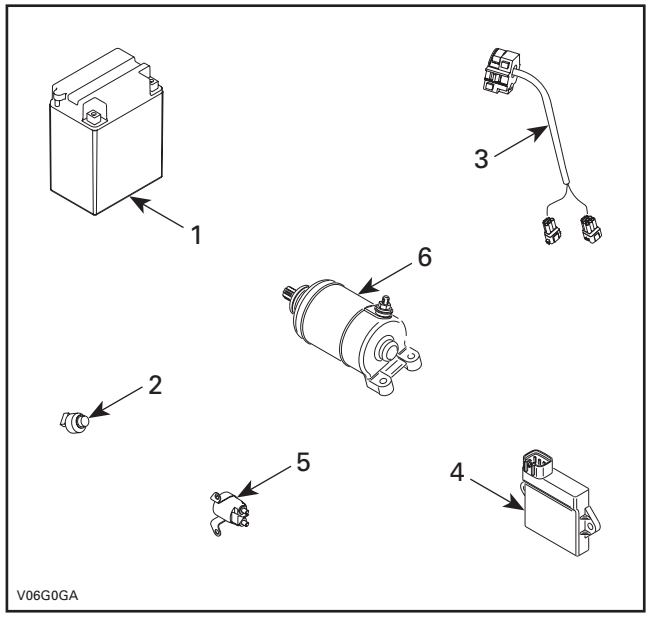
A 3-phase full-wave series-type voltage regulator/rectifier receives the AC voltage and rectifies (converts) it into DC. The voltage is also regulated to a maximum of 14.7 ± 0.4 volts (DC).

Battery

The battery supplies the entire vehicle. Therefore, DC current only is used in the entire electrical system.

STARTING SYSTEM

When ignition switch is turned on and start button is pressed, a signal is sent to the starting solenoid. The battery then supply the starter through the starting solenoid to start the engine.



TYPICAL

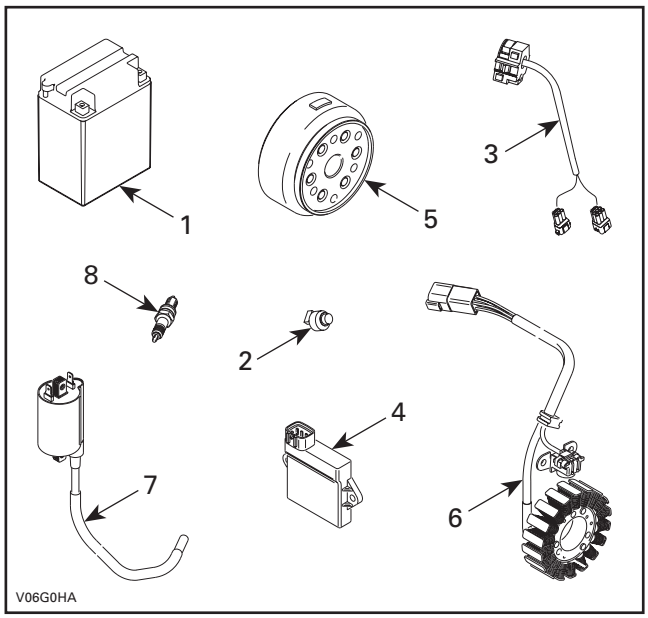
1. *Battery*
2. *Ignition switch*
3. *Start button*
4. *Electronic module*
5. *Solenoid*
6. *Electric starter*

Transmission must be NEUTRAL to allow engine starting.

However, an override mode allows to start the engine with the transmission lever in any position when holding front brake lever while pressing the start button.

IGNITION SYSTEM

An IDI (Inductive Discharge Ignition) system is utilized. The ignition system is made up of the following components:



TYPICAL

1. *Battery*
2. *Ignition switch*
3. *Start button*
4. *Electronic module*
5. *Magneto flywheel*
6. *Trigger coil with stator*
7. *Ignition coil*
8. *Spark plug*

Battery/Ignition Switch

The ignition switch allows battery to supply the electronic module for the ignition system.

Start Button

The start button enables the starting system.

Magneto Flywheel/Trigger Coil

The magneto flywheel features one protrusion that is working with the trigger coil. The trigger coil sends the signals to the electronic module to be processed for the ignition system.

Ignition Coil/Spark Plug

The ignition coil receives its signal from the electronic module. The ignition coil steps up the input voltage and the end result is firing of the spark plug.

Electronic Module

It is basically responsible for interpreting/computing information, distribution of information, ignition system, the engine RPM limiter and the vehicle speed limiter. It reads information through many external sensors to then compute the output actions to the related systems.

GENERAL TESTING/ TROUBLESHOOTING INFORMATION

The following gives general electrical-related problems. For specific system-related problems, refer to proper system section.

It is possible that a component seems to operate in static condition but in fact, it is defective. In this case, the best way to solve this problem is to remove the original part and replace it with one which is in good condition.

IMPORTANT: When having to solve an electrical problem, the first thing to do is to check battery condition as well as its cables and connections. Also ensure the ignition switch is turned on. Check related-circuit fuse condition with an ohmmeter — visual inspection could lead to false results — and solidity (close to battery). Also visually examine harness and connections.

CAUTION: It is recommended to always disconnect the battery when replacing any electric or electronic parts.

To perform verifications, a good quality multimeter such as Fluke 111 (P/N 529 035 868) should be used.

Pay particular attention to ensure that pins are not out of their connectors or out of shape. The troubleshooting procedures cover problems not resulting from one of these causes.

⚠ WARNING

Ensure all terminals are properly crimped on wires and connector housings are properly fastened.

Before replacing any electric or electronic part(s), always check electrical connections. Make sure that they are very tight and they make good contact and that they are corrosion-free. The voltage and current might be too weak to go through dirty wire pins. Check carefully if posts show signs of moisture, corrosion or if they look dull. Clean pins properly and then coat them with silicon-based dielectric grease or other appropriate lubricant (except if otherwise specified) when reassembling them. See connectors information below.

It is recommended to always disconnect the battery when replacing the any electric or electronic part(s).

⚠ WARNING

Always disconnect battery exactly in the specified order, BLACK (-) cable first. It is recommended to disconnect electrical connections prior to replacing any electric or electronic parts.

IMPORTANT: In usual electric circuit, the battery supplies a switch which then supplies the electric consumer. Therefore the switch opens and closes the positive side of the circuit. However, in our electrical system, the battery supplies the electric consumer then **the switch completes the circuit to the ground**. So the switch opens and closes the negative side of the circuit. Take this into account when troubleshooting the electrical system.

Pay attention to grounding wires.

Checking for Shorts Between 2 Wires

When checking continuity of a wire in a circuit, wires should be checked for short circuit as follows.

Make sure to isolate circuit wires by unplugging connectors.

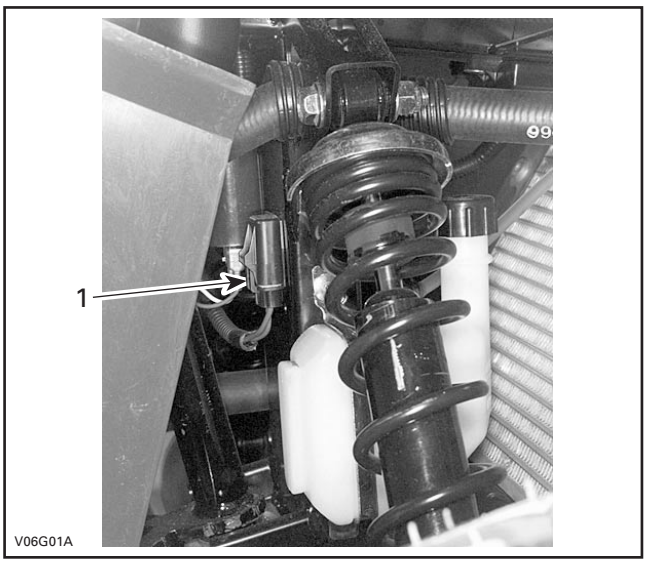
Let's suppose that the circuit to be checked has a RED and a BLACK wire. Using an ohmmeter, measure the resistance between the RED and the BLACK wire. The resistance should be infinite (0 L). Otherwise, there is a short circuit between both wires. We must therefore identify and correct the fault.

FUSE LOCATION

If the fuse is damaged, replace it by one of the same rating.

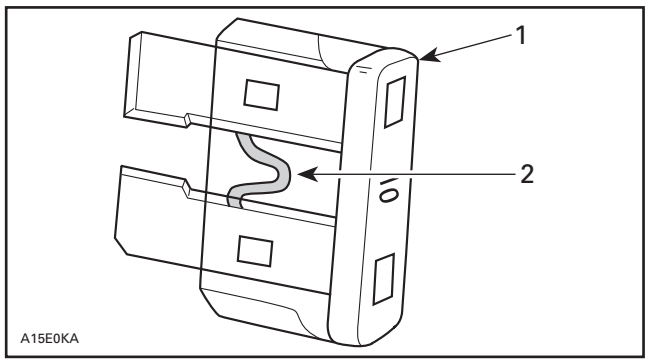
CAUTION: Do not use a higher rated fuse as this can cause severe damage.

Fuse is located behind front right shock, near coolant reservoir. Remove the cluster cover to allow an access at the fuse holder.



1. Fuse holder

To remove fuse from holder, unclip and remove holder cover then pull fuse out. Check if filament is melted.

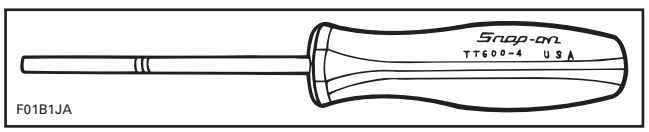


TYPICAL

1. Fuse
2. Check if melted

SERVICING PACKARD CONNECTORS

To remove terminal from Packard connector housing, use Snap-on TT600-4 tool.



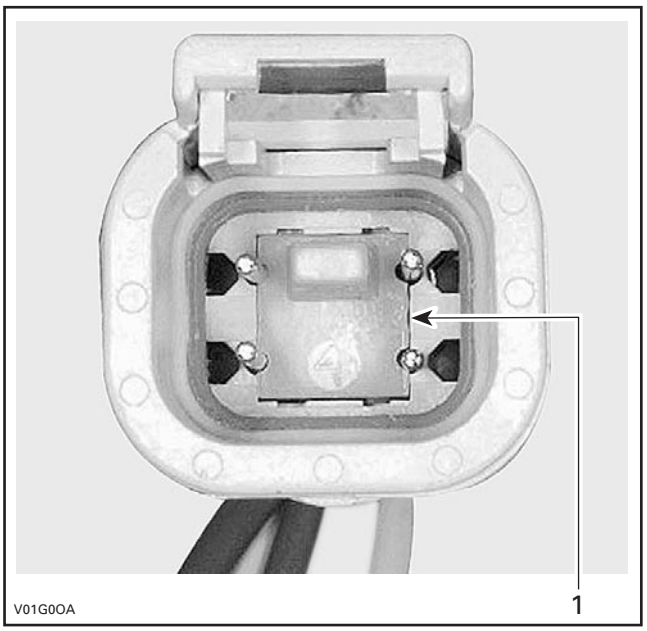
SERVICING DEUTSCH CONNECTORS

Waterproof Connector Housing

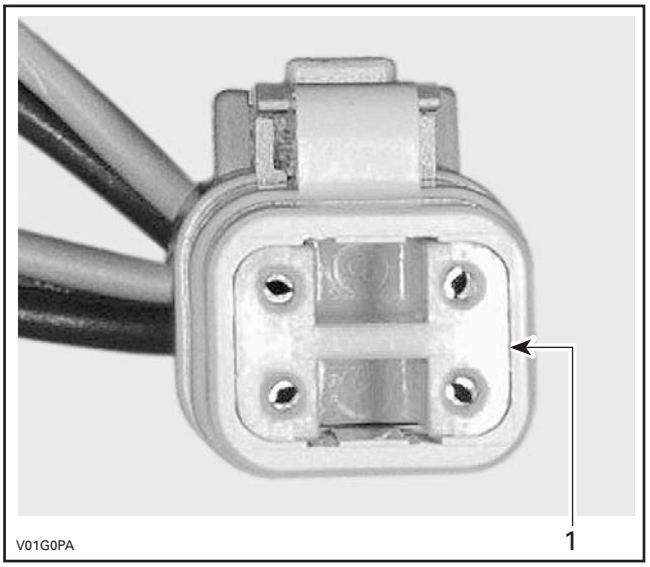
Female and Male Connector Housing

To remove:

– Using a long nose pliers, pull out the lock.



FEMALE HOUSING
1. Female lock

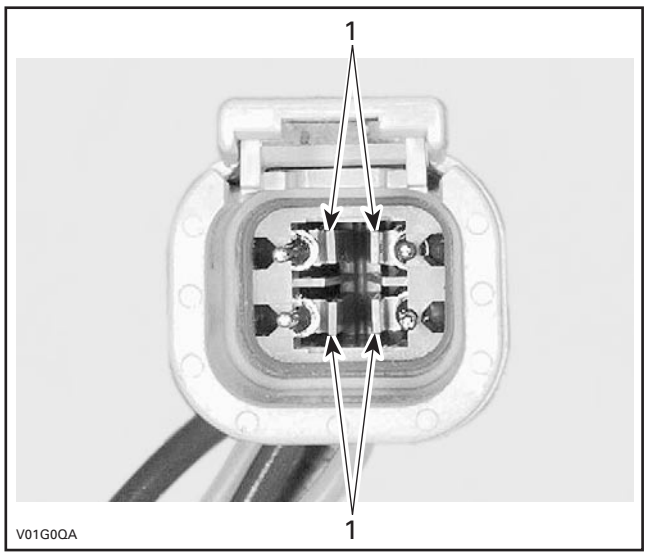


MALE HOUSING
1. Male lock

NOTE: Before extraction, push wire forward to relieve pressure on retaining tab.

– Insert a 4.8 mm (0.189 in) wide screwdriver blade inside the front of the contact cavity.

– Pry back the retaining tab while gently pulling wire back until contact is removed.



FEMALE CONNECTOR HOUSING
1. Retaining tab

To install:

– For insertion of signal contact, make sure the lock is removed.

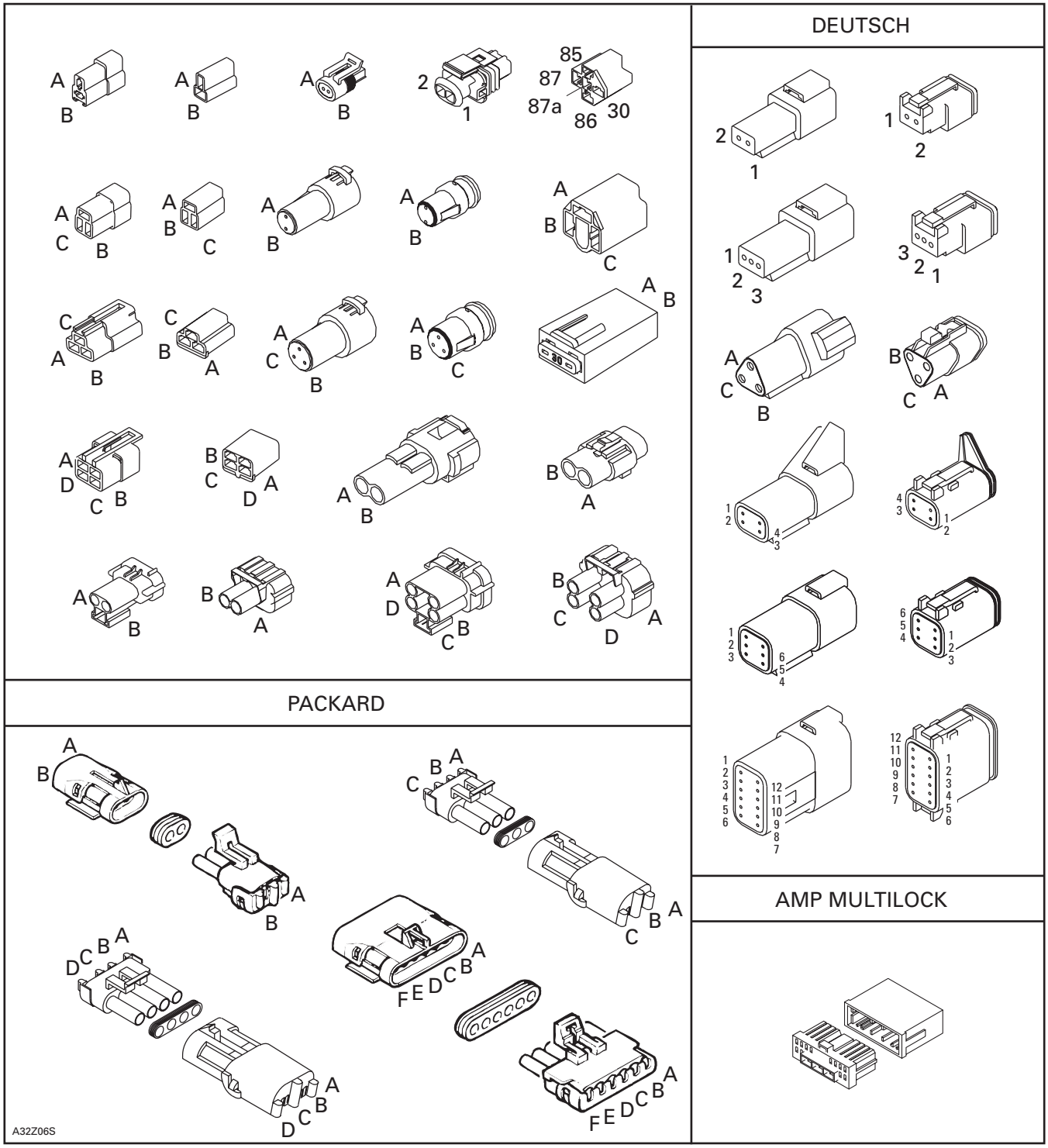
– Insert contact into appropriate circuit cavity and push as far as it will go.

– Pull back on the contact wire to be sure the retention fingers are holding the contact.

– After all required contacts have been inserted, the lock must be installed.

CAUTION: Never apply dielectric grease on contacts in plug connector. The use of dielectric grease will make the seal swollen and move out of the connector. Do not lubricate.

IDENTIFICATION OF MAJOR CONNECTOR PINS

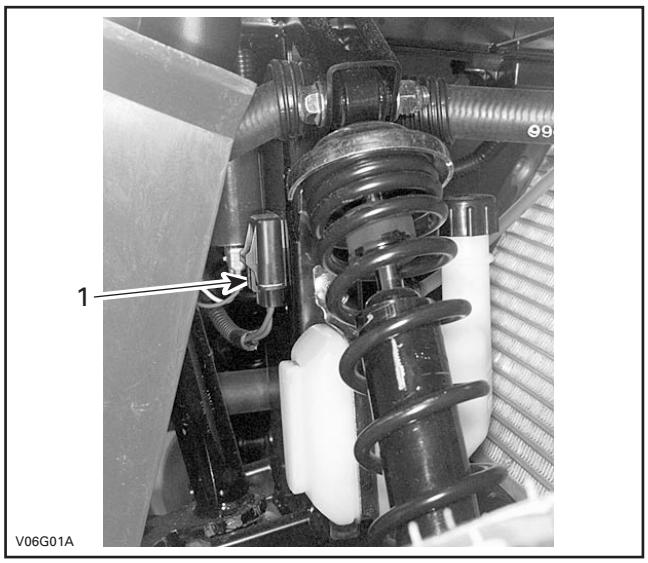


CHARGING SYSTEM

TESTING PROCEDURE

NOTE: First, ensure that battery is in good condition prior to performing the following test using a current inductive ammeter such as Snap-on MT 110.

If the battery is regularly discharged, check main (25 amp) fuse located behind front right shock, near coolant reservoir.



1. Fuse holder

The voltage regulator/rectifier could be the culprit of a blown fuse. To check, simply disconnect the voltage regulator/rectifier from the circuit.

If the fuse still burns, check for a defective wire.

CAUTION: Do not use a higher rated fuse as this can cause severe damage.

The magneto connector is located on the RH side of vehicle , between fuel tank and frame.

On some vehicle the magneto connector is located under fuel tank. To get access to magneto connector remove:

– seat (refer **BODY**)

– fuel tank (refer **FUEL CIRCUIT**).

Voltage Regulator/Rectifier

STATIC TEST: CONTINUITY

1. Due to internal circuitry, there is no static test available.

DYNAMIC TEST

Current Test

Proceed as follows:

– Start engine.

– Lay an inductive ammeter on positive cable of battery.

– Bring engine to approximately 3500 RPM.

Depending on battery charge, current reading should be approximately **5 amperes**. If not, check magneto output prior to concluding that voltage regulator/rectifier is faulty.

Voltage Test

Proceed as follows:

– Start engine.

– Connect a multimeter to battery posts. Set multimeter to Vdc scale.

– Bring engine to approximately 3500 RPM.

If multimeter reads over 15 volts, voltage regulator/rectifier is defective. Replace it.

NOTE: Whatever the voltmeter type used (peak voltage or RMS), the voltage must not exceed 15 V. A faulty voltage regulator/rectifier will allow voltage to exceed 15 V as engine speed is increased.

NOTE: If it is continually necessary to add distilled water to the battery, this indicates an over voltage situation, requiring replacement of the voltage regulator/rectifier. If, on the other hand, the battery will not stay charged, the problem can be any of the charging circuit components. If these all check good, you would be accurate in assuming the problem to be in the voltage regulator/rectifier.

If there is no charging at the battery with the preceding voltage test, the following test can also be performed.

Voltage Regulator/Rectifier Output Test

Remove the main (25 amp) fuse.

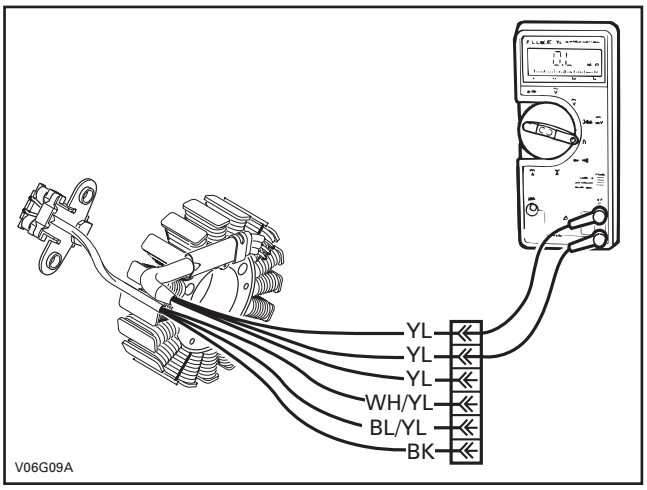
Connect the negative probe on engine and the positive probe in the charging system fuse location where the value is 0 Vdc. The obtained value in the other location should be 12 Vdc.

NOTE: If the voltage regulator/rectifier is within the specification, the wiring harness between the voltage regulator/rectifier and battery is defective. If the voltage regulator/rectifier is out of specification and the stator test good, the voltage regulator/rectifier is defective.

Stator

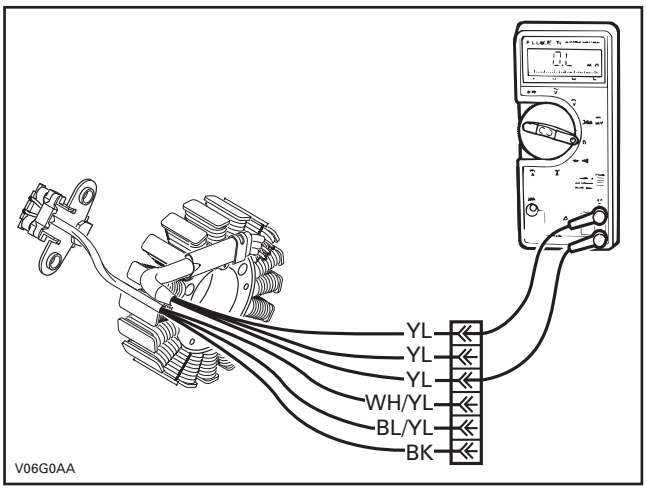
STATIC TEST: CONTINUITY

1. Disconnect the magneto wiring harness connector. With a good multimeter (preferably a digital one), place the 2 meter test probes onto the stator wire leads AC-1 and AC-2 of the stator. The resistance should be 0.3 Ω ± 0.2.



TYPICAL

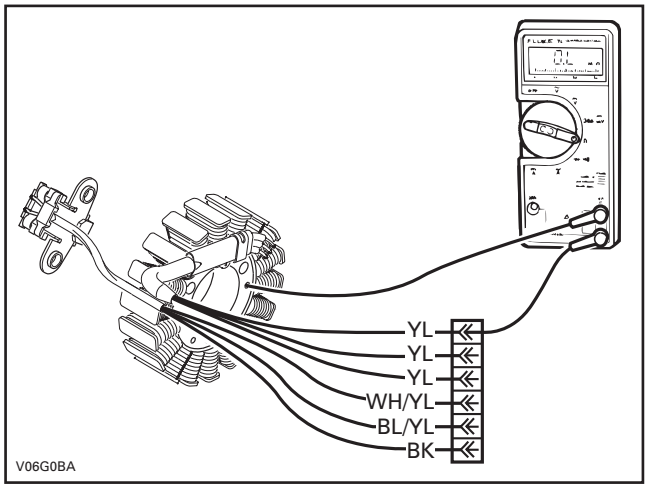
2. Place either meter test probe into the remaining stator lead (AC-3) and note the resistance (same as step no. 1). If the readings are out of specification, the stator will need to be replaced.



TYPICAL

STATIC TEST: INSULATION

With the stator leads disconnected, insert either meter test probe onto AC-1 and ground the other meter test probe to the engine or the stator iron core and note the reading. There should be no continuity (infinity) between the stator insulated coils and ground. If there is a reading, the stator coils and/or the wiring from the coils is grounded and needs to be replaced/repaired respectively.



TYPICAL

DYNAMIC TEST

1. Unplug magneto wiring harness connector.
2. On magneto side, connect test probes of the multimeter to two of the YELLOW wires.
3. Set multimeter to Vac scale.
4. Put the fuel tank back on the vehicle.
5. Crank engine. The obtained value should be between 6 ± 0.5 Vac.
6. Repeat operation 3 times.
7. If the stator is out of specification, replace it.

Trigger Coil

STATIC TEST

Unplug the magneto connector.

Measure the resistance between WHITE/YELLOW and BLUE/YELLOW wires. The obtained value should be between 190 to 300 Ω.

If the resistance is out of specifications, change the trigger coil.

STARTING SYSTEM

BATTERY

TROUBLESHOOTING

SYMPTOM: DISCHARGED OR WEAK BATTERY	
CAUSE	REMEDY
1. Battery posts and/or cable terminal oxidized.	Clean and coat with dielectric grease.
2. Loose or bad connections.	Check wiring and connector cleanliness, damaged or short circuit.
3. Faulty battery (sulfated, doesn't keep a full charge, damaged casing, loose rectifier).	Replace.
4. Main system fuse burnt or faulty voltage regulator/rectifier.*	First check charging system generator coil. If it is in good condition replace fuse or rectifier.
5. Faulty charging system generator coil.*	Replace.

* To test charging system, refer to CHARGING SYSTEM.

BATTERY TESTING

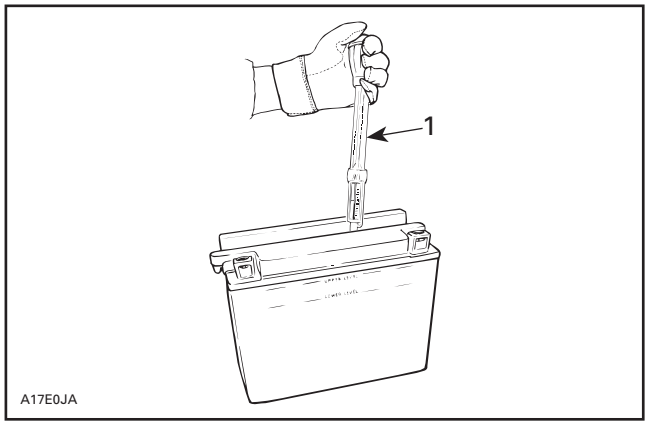
There are 2 types of battery tests: unloaded and loaded. An unloaded test is made on a battery without discharging current. It is the simplest and commonly used. However, be aware that the voltage test can be good while the battery has not enough power to start the engine. A load test gives more accuracy of the battery condition.

Unload Test

Check charge condition using either a hydrometer or a multimeter.

With a multimeter, voltage readings appear instantly to show the state of charge. Always respect polarity. A fully charged battery will have a reading of 12.6 Vdc.

A hydrometer more accurately measures the charge of a battery in terms of specific gravity of the electrolyte. A fully charged battery will have a specific gravity between 1.265 to 1.280.



TYPICAL
1. Specific gravity 1.265

A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 21°C (70°F).

In order to obtain correct readings, adjust the initial reading by **adding** .004 points to the hydrometer readings for each 5.5°C (10°F) **above** 21°C (70°F) and by **subtracting** .004 point for every 5.5°C (10°F) **below** 21°C (70°F).

This chart will be useful to find the correct reading.

ELECTROLYTE TEMPERATURE		OPERATION TO PERFORM		
°C	°F			
38	100	add	.012	to the reading
32	90		.008	
27	80		.004	
21	**70**	**correct reading**		
16	60	subtract	.004	from the reading
10	50		.008	
4	40		.012	
- 1	30		.016	

EXAMPLE NO. 1
Temperature below 21°C (70°F):
Hydrometer reading: 1.250
Electrolyte temperature: - 1°C (30°F)
Subtract .016 Sp. Gr.
Corrected Sp. Gr. is 1.234

EXAMPLE NO. 2
Temperature above 21°C (70°F):
Hydrometer reading: 1.235
Electrolyte temperature: 38°C (100°F)
Add .012 Sp. Gr.
Corrected Sp. Gr. is 1.247

Load Test

This is the best test of battery condition under a starting load. Use a load testing device that has an adjustable load.

Apply a load of 3 times the ampere-hour rating of the battery. At 14 seconds into the test, check battery voltage; if battery is in good condition, it will have at least 10.5 Vdc.

REMOVAL

Remove RH side cover and RH footwell (refer BODY).

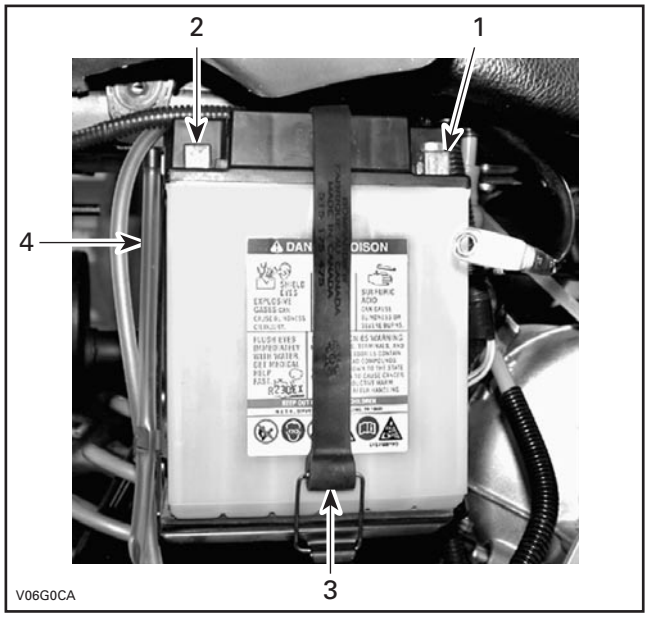
Disconnect BLACK (-) cable first then RED (+) cable.

⚠ WARNING

Always respect this order for disassembly; disconnect BLACK (-) cable first. Electrolyte or fuel vapors can be present in engine compartment and a spark may ignite them and possibly cause personal injuries.

Remove the holding strap.

Pull out vent tube.



1. *Negative terminal*
2. *Positive terminal*
3. *Holding strap*
4. *Vent tube*

Remove battery from vehicle being careful not to tilt it so that electrolyte flows out of vent tube.

⚠ WARNING

Battery electrolyte is a caustic substance that burns or destroys organic tissues by chemical action. Avoid contact with eyes, skin and clothing. Wear protective eyeglasses and a suitable pair of non-absorbent gloves when removing the battery by hand. Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water.

CAUTION: Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water.

CLEANING

⚠ WARNING

Battery electrolyte is a caustic substance that burns or destroys organic tissues by chemical action. Avoid contact with eyes, skin and clothing. Wear protective eyeglasses and a suitable pair of non-absorbent gloves when removing the battery by hand. Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water.

Clean the battery casing, caps, cables and battery posts using a solution of baking soda and water.

Remove corrosion (if so) from battery cable terminals and battery posts using a firm wire brush. Rinse with clear water and dry well.

INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casing is damaged, replace battery and thoroughly clean battery rack with water and baking soda.

⚠ WARNING

Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

Inspect battery rack mounting.

Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

⚠ WARNING

Battery caps do not have vent holes. Make sure that vent tube is not obstructed.

BATTERY STORAGE

Disconnect and remove battery from the vehicle (see above).

Check electrolyte level in each cell, add distilled water up to upper level line.

CAUTION: Do not overfill.

The battery must always be stored in fully charged condition. If required, charge until specific gravity of 1.260 is obtained.

CAUTION: Battery electrolyte temperature must not exceed 50°C (122°F). The casing should not feel hot.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 293 550 004) or petroleum jelly on terminals.

Clean battery casing and caps using a solution of baking soda and water. Do not allow cleaning solution to enter battery, otherwise it will destroy the electrolyte. Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum.

During the storage period, recheck electrolyte level and specific gravity readings at least every 40 days. As necessary, keep the battery at its upper level line and near full charge as possible (trickle charge).

ACTIVATION OF A NEW BATTERY

⚠ WARNING

Never charge or boost battery while installed on vehicle.

CAUTION: Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

A new battery is factory fresh dry charged. For storage purposes, it is fitted with a temporary sealing tube.

Do not remove the sealing tube or loosen battery caps unless activation is desired.

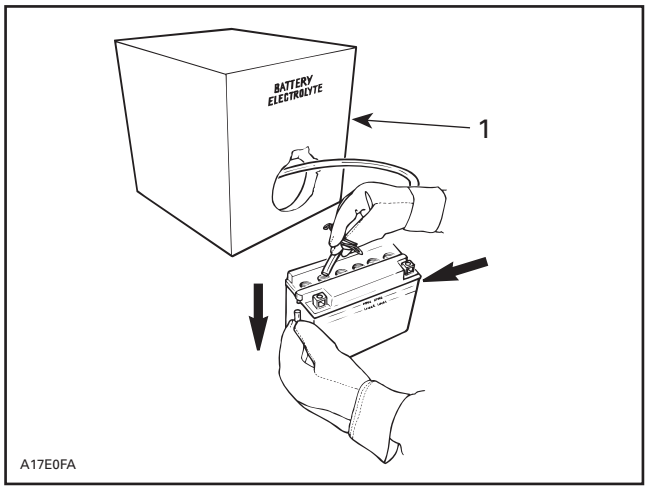
In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

Perform the following operations anytime a new battery is to be installed.

1. Remove the sealing tube from the vent elbow. Install vent tube, included in the battery kit, to battery elbow.

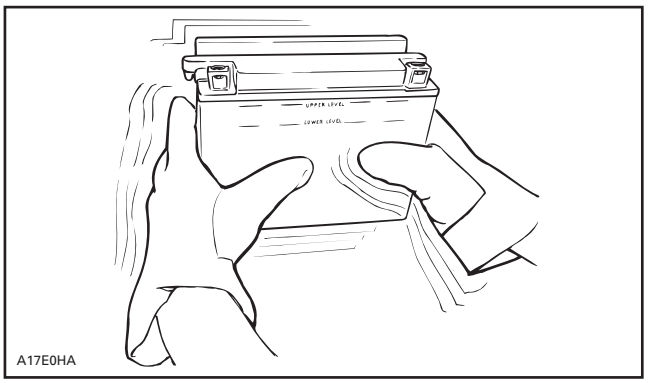
⚠ WARNING

Failure to remove the sealing tube could result in an explosion.



1. Battery electrolyte

2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity: 1.260 at 20°C (68°F)).
3. Allow the battery to stand for 30 minutes MINIMUM so that electrolyte soaks through battery cells.
4. Allow gas bubbles to escape by lightly shaking battery by hand.



5. Readjust the electrolyte level to the UPPER LEVEL line.

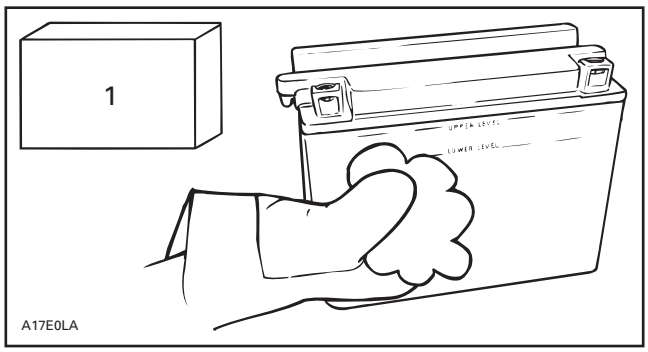
6. Connect a 2 A battery charger for until the battery is fully charged.

⚠ WARNING

Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Always turn battery charger off prior to disconnecting cables. Otherwise a spark will occur and battery might explode.

CAUTION: If charging rate raises higher than 2.4 A reduce it immediately. If cell temperature rises higher than 50°C (122°F) (if the casing feels hot) discontinue charging temporarily or reduce the charging rate.

7. Disconnect battery charger.
8. Test battery state of charge. Use a hydrometer.
9. Let battery settle for 1 hour.
10. Allow gas bubbles to escape by lightly shaking battery.
11. Readjust electrolyte level.
12. Reinstall caps and clean any electrolyte spillage using a solution of baking soda and water.



1. Baking soda

CAUTION: Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

NOTE: It is recommended to verify the battery charge once a month. If necessary, fully charge battery.

TIPS FOR CHARGING A USED BATTERY

⚠ WARNING

Prior to charging the battery, always remove it from vehicle.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging has begun.

Do not charge a frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about 2 hours before charging.

⚠ WARNING

Do not place battery near open flame.

The time required to charge a battery will vary depending on some factors such as:

– Battery temperature: The charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warms up, it will accept a higher rate of charge.
– State of charge: Because the electrolyte is nearly pure water in a completely discharged battery, it cannot accept current as well as electrolyte. This is the reason the battery will not accept current when the charging cycle first begins. As the battery remains on the charger, the current from the charger causes the electrolytic acid content to rise which makes the electrolyte a better conductor and then, the battery will accept a higher charging rate.
– Type of charger: Battery chargers vary in the amount of voltage and current that they can supply. Therefore, the time required for the battery to begin accepting measurable current will also vary.

Charging a Very Flat or Completely Discharged Battery

Unless this procedure is properly followed, a good battery may be needlessly replaced.

– Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in term of milliamperes, because electrolyte is nearly pure water as explained above. It could be some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem not to accept any charge.
– Exceptionally for this particular case, set the charger to a high rate.

NOTE: Some chargers have a polarity protection feature which prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. This will make it appear that the battery will not accept a charge. Follow the charger manufacturer's instruction on how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

– Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.
– If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.
– If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner.
– It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

INSTALLATION

Reinstall and fasten the battery, making sure to reinstall the vent tube.

⚠ WARNING

Connect RED (+) cable first then BLACK (-) cable. Always connect RED (+) cable first.

NOTE: Place the RED **(+)** cable between holding strap and battery.

1. Cable between battery and strap

STARTING SYSTEM TROUBLESHOOTING

SYMPTOM	CAUSE	REMEDY
Starter does not turn.	Ignition switch is in the OFF position.	Turn switch in the ON position.
	Burnt fuse.	Check main fuse and wiring condition.
	Transmission is not set on Neutral.	Set transmission in Neutral or use the override mode.
	Poor contact of battery terminal(s) or ground cable connections.	Clean and tighten terminal(s).
	Weak battery.	Recharge battery.
	Poor contact or open circuit of: start button and engine stop switch, ignition switch or starting solenoid.	Check and replace defective part.
	NEUTRAL switches is defective.	Check NEUTRAL switche and wiring condition.
	Engine mechanical problem (ensure that other electric components are good).	Communicate with the Service Representative.
Starter turns; but does not crank the engine.	Poor contact of battery terminal(s).	Clean and tighten terminal(s).
	Poor battery ground cable connection.	Clean and tighten.
	Burnt or poor contact of solenoid switch contact disc.	Replace starting solenoid.
	Poor contact of brush.	Straighten commutator and brush or replace electric starter.
	Burnt commutator.	Turn commutator in a lathe or replace electric starter.
	Worn commutator segments.	Undercut mica or replace electric starter.
	Shorted armature.	Replace electric starter.
	Weak brush spring tension.	Replace electric starter.
	Weak magnet.	Replace electric starter.
	Worn bushings.	Replace electric starter.
	Weak battery.	Recharge or replace battery.
Starter turns, but overrunning drive pinion does not mesh with ring gear.	Worn drive pinion gear.	Replace starter drive pinion.
	Defective drive.	Replace starter drive pinion.
	Poor movement of drive on splines.	Replace starter drive pinion.
	Worn drive bushing.	Replace starter drive pinion.
	Worn ring gear.	Recharge ring gear.
Starter motor keeps running.	Shorted starting solenoid or sticked start button.	Replace starter solenoid.
	Melted solenoid contacts.	Replace starter solenoid.
	Sticking or defective starter drive pinion.	Replace starter drive pinion.

STARTING SYSTEM TESTS

GENERAL

First ensure the problem is not related to engine mechanical components.

Causes of troubles are not necessarily related to starter but may be due to a burnt fuse (main), faulty battery, start button, ignition switch, engine stop switch, starting solenoid, electrical cables or connections.

Check these components before removing starter. Consult also the Starting System Troubleshooting table above for a general view of possible problems.

⚠ WARNING

Short circuiting electric starter is always a danger, therefore disconnect BLACK (-) cable before carrying out any kind of maintenance on starting system. Do not place tools on battery.

Fuses

Make sure the main fuse is in good condition. If the fuse test good, continue the next tests.

Battery

To check battery condition, refer to **Battery** above. If it tests good, continue the next tests.

Starting Solenoid

NOTE: Solenoid is located on frame, near battery rack.

Ensure the solenoid receives electric current as follows. Using a multimeter, place a probe on the RED wire (starter side) and the other probe on frame. Measure the voltage when pressing the start button with the ignition key turned on.

If solenoid does not properly receive voltage, the start button can be suspected.

If solenoid receives voltage, test the solenoid as follows.

Disconnect large cables from solenoid.

Inspect connections and clean as necessary. Solenoid condition can be checked with an ohmmeter. Install test probes on large connectors of solenoid. Measure resistance when current is applied to small connectors; if it is more than a few ohms, replace solenoid.

If solenoid test good, check the electric starter. If starter test good, the NEUTRAL switches can be suspected.

Ignition Switch

A quick test to validate it is working. Turn the ignition switch ON. If the lights turn on the ignition switch is good. Otherwise, refer to **IGNITION SYSTEM**, for testing procedure. If it tests good, continue the next tests.

Engine Stop Switch

If engine does not start when placing engine stop switch to RUN and pressing the start button, test the engine stop switch as follows.

Remove the steering cover and unplug the multi-function switch connector.

Using a multimeter, measure the resistance between the following wires.

POSITION	WIRE	RESISTANCE
Switch to OFF	BLACK and BLACK/WHITE	1 Ω max.
Switch to RUN		Infinite (0.L)

Replace multi-function switch if defective.

If switch tests good, check wiring. If it tests good, continue the next tests.

Start Button

If engine does not turn when pressing the start button, test the switch as follows.

Remove the steering cover and unplug the multi-function switch connector.

Using a multimeter, measure the resistance between the following wires.

POSITION	WIRE	RESISTANCE
Switch released	RED/VIOLET and YELLOW/RED	Infinite (0.L)
Switch depressed and held		0.6 Ω max.

Replace multi-function switch if defective.

If switch tests good, check wiring going to electronic module. If it tests good, continue the next tests.

Electrical Cables or Connections

Check all connections, cables and wires. Tighten any loose cables. Replace any chafe wires/cables.

If wiring and connectors are good, check the electric starter. See below.

Electric Starter

NOTE: Starter is located in the middle of engine.

Remove LH footwell to give access to the starter. Refer to **BODY/FRAME**.

Remove carburetor to get access to the starter. Refer to CARBURETOR.

Using boosting cables, carefully supply current from the battery directly to the starter. Connect the BLACK (-) cable first. Then connect the remaining jump cable from the battery then to the starter.

If starter now turns ensure the cables/connections from battery to solenoid and to starter are in good condition. If they test good, the NEUTRAL switche can be suspected.

If starter does not turn, check for mechanical problems in the starter.

ELECTRIC STARTER

REMOVAL

Turn OFF ignition switch.

Disconnect BLACK (-) cable connection from battery.

⚠ WARNING

Always disconnect BLACK (-) cable first and reconnect last.

Disconnect RED (+) cable connection from battery.

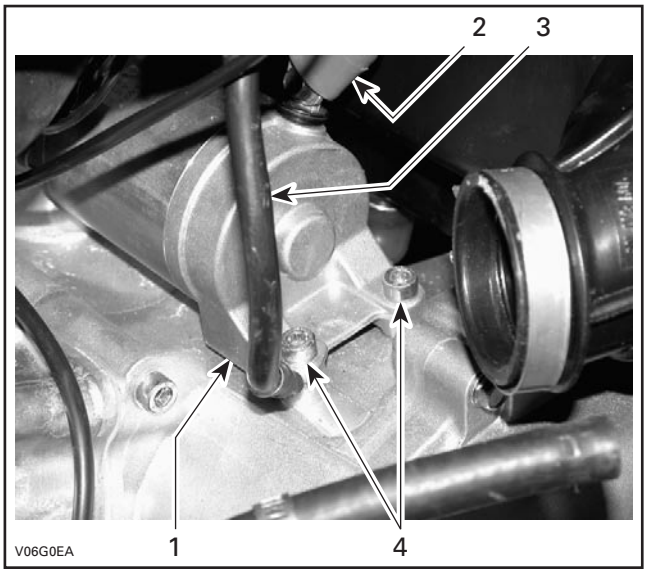
Remove LH footwell. Refer to **BODY/FRAME**.

Remove Carburetor. Refer to CARBURETOR.

Disconnect all cables from starter.

Remove starter mount screws.

Pull starter out.



1. *Starter*
2. *Red battery cable*
3. *Black (-) cable*
4. *Mounting screws*

INSTALLATION

Installation is essentially the reverse of removal procedure. However, pay particular attention to the following.

Make sure that starter and engine mating surfaces are free of debris. Serious trouble may arise if starter is not properly aligned.

Torque starter mounting screws to 10 N•m (88 lbf•**in**).

Connect the RED (+) battery cable to the starter and torque nut to 2.5 N•m (22 lbf•**in**). Apply dielectric grease on terminal and nut.

First connect RED (+) cable to battery then connect the BLACK (-) cable.

⚠ WARNING

Always connect RED (+) cable first then BLACK (-) cable last. Whenever connecting the RED (+) cable to the starter motor make sure the battery cables are disconnected to prevent electric shock.

Test starter operation.

IGNITION SYSTEM

IGNITION SYSTEM TESTING PROCEDURE

GENERAL

Ignition Problems

When dealing with ignition problems, the following items should be checked in this order. After one item has been checked and it is found not to be the problem, continue with the next item:

1. main fuse condition
2. spark occurrence
3. battery condition
4. ignition switch
5. trigger coil
6. ignition coil
7. electronic module.

Intermittent Ignition Problems

In dealing with intermittent problems there is no easy diagnosis. For example, problems that occur only at normal engine operating temperature have to be tested under similar conditions.

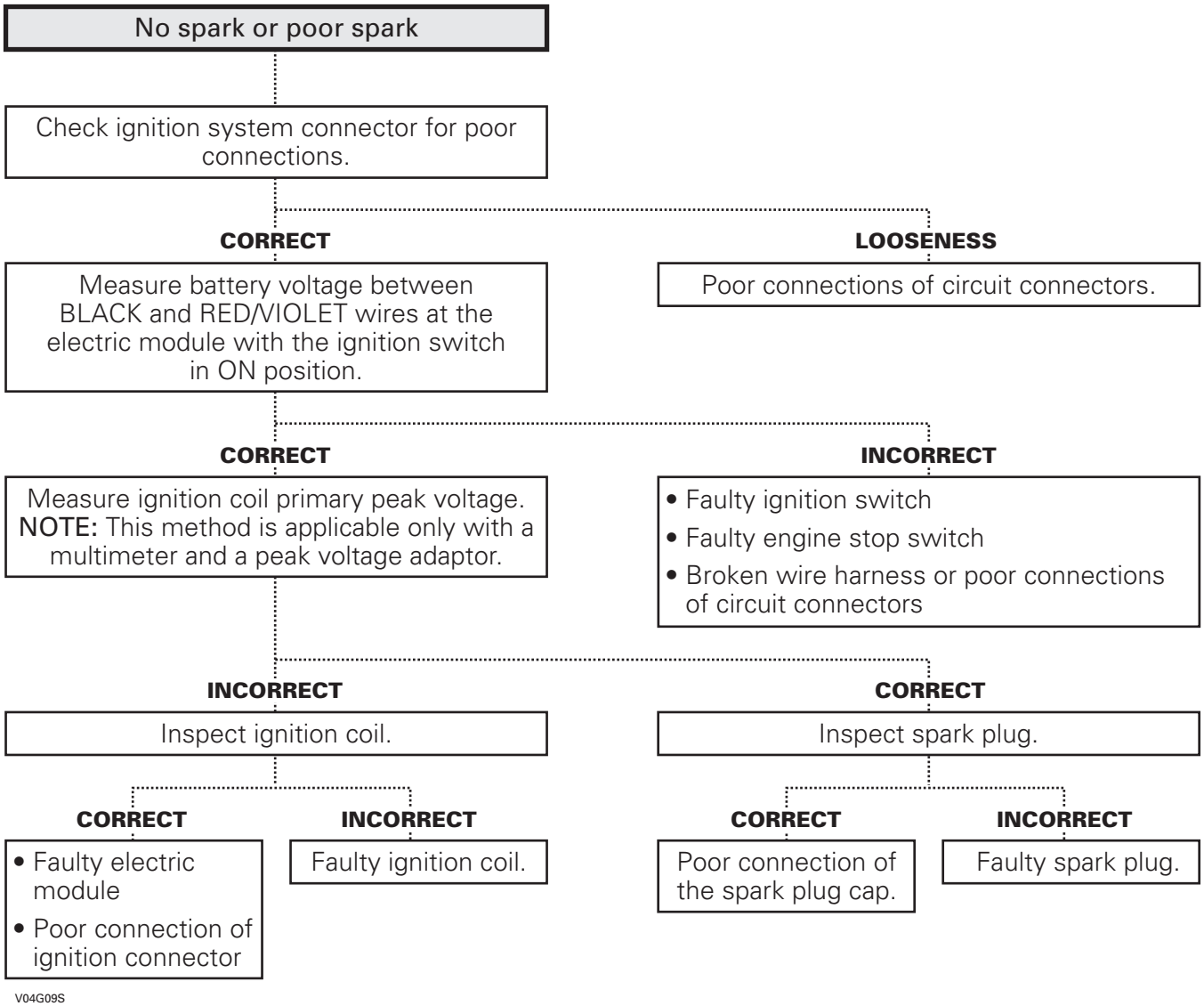
In most cases of temperature and/or vibration failure, only parts replacement might solve the problem as most of these failures return to normal when engine is not running.

Multiple Problems

There is always the possibility of more than one faulty part. If after a component has been replaced, the problem still persists, carefully repeat the complete test procedure to find the other faulty part.

TROUBLESHOOTING

NOTE: Check that the transmission is in NEUTRAL position and the engine stop switch is in "RUN" position. Check that main fuse is not burned and if battery is fully-charged before diagnosing.



IGNITION SYSTEM TEST

Safety Precautions

⚠ WARNING

To prevent powerful electric shocks while cranking engine, neither touch any electronic ignition components (ignition coil, wire harness, etc.) nor tester lead clips. Also make sure that tester leads do not touch any metallic object.

Main Fuse Condition

Check main fuse condition. Replace burnt fuse as necessary.

Spark Occurrence

Remove spark plug and connect to the ignition coil. While holding the spark plug against a metallic part of the engine, start the engine. Look for a spark at the spark plug tip. Replace defective spark plug.

Keep in mind that a spark plug might test good this way while not being able to work properly under combustion chamber mixture and pressure.

If known good spark plug does not work, continue the other tests.

Battery Condition

A battery must be present in the vehicle to allow the ignition system to work. Also, at least 8 V is required for proper operation. Check battery voltage.

Ignition Switch

A quick test to validate it is working. Turn the ignition switch ON. If the headlight turn on, the ignition switch is good.

Test

Remove console and disconnect ignition switch.

Measure voltage between RED supply wire and the battery ground. If voltage is lower than battery voltage, test the wiring. If voltage is good, test switch.

Use a multimeter and measure the resistance between the following wires.

POSITION	WIRE	RESISTANCE
OFF	RED and RED/YELLOW	Infinite (0.L)
OFF	RED and RED/VIOLET	Infinite (0.L)
ON (w/lights)	RED and RED/YELLOW	0.2 ± 0.2 Ω max.
ON (w/lights)	RED and RED/VIOLET	0.2 ± 0.2 Ω max.
ON (w/o lights)	RED and RED/YELLOW	Infinite (0.L)
ON (w/o lights)	RED and RED/VIOLET	0.2 ± 0.2 Ω max.

Replace switch if defective.

If switch is good, continue the other tests.

Trigger Coil Voltage Testing

NOTE: The trigger coil is not adjustable.

STATIC TEST: CONTINUITY

Check resistance with a high-sensitivity ohmmeter.

1. Disconnect the large connector from the electronic module.
2. Connect multimeter probes to the BLACK/YELLOW wire and to the BLACK wire.
3. Measure resistance; it should be between 190 - 300 ohms.

DYNAMIC TEST

1. Disconnect the magneto connector.
2. Connect multimeter probes to the BLACK/YELLOW wire and to the BLACK wire, then bring selector switch to $\tilde{V}$ and scale to 00.0^{Vac}.
3. Press START button, note result. The obtained value should be between 0.4 and 0.7 Vac. Repeat operation 3 times.
4. If the trigger coil is out of specification, replace it. If it tests good continue the other tests.

Ignition Coil

Ignition coil is mounted on frame along steering cloumn, in front of engine.

NOTE: An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter. Replacing the stick coil may be necessary as a test.

First, check the ignition coil primary peak voltage.

Remove spark plug.

Insert a pin into RED/VIOLET wire location in ignition coil connector and connect a multimeter probe to it. Place the other probe on the engine.

Shift transmission into NEUTRAL and turn ignition switch ON. Then, place the stop engine switch to RUN position.

Crank engine a few seconds and check the ignition coil primary peak voltage.

Repeat operation 3 times and note the highest peak voltage.

The ignition coil peak voltage should be around 12 Vdc.

If the peak voltage is lower than the specification, check the ignition coil resistance.

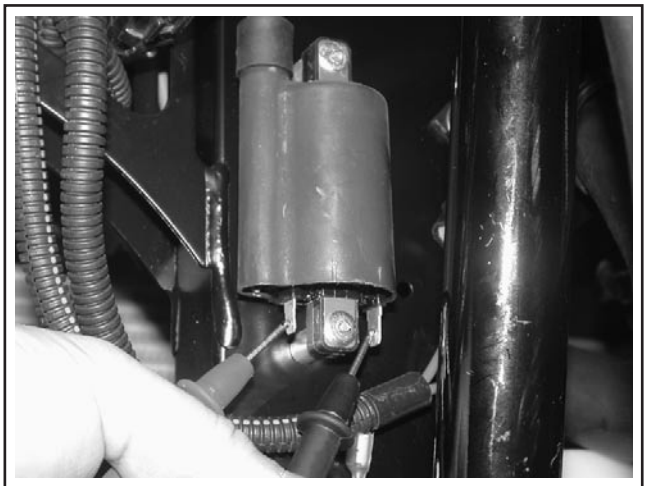
Ignition Coil Resistance

Disconnect both connectors from the ignition coil.

Using a multimeter, check the resistance in both primary and secondary windings.

For checking the resistance of primary windings, do as follows:

Connect the RED (+) probe of multimeter to the WHITE/GREEN wire location and BLACK (-) probe of multimeter to the RED/VIOLET wire location the ignition coil.



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PRIMARY WILDING

The primary wilding resistance should be between 2.2 ± 0.3 Ω at 20°C (68°F).

For checking the resistance of secondary windings, do as follows:

Connect the RED (+) probe of multimeter to the WHITE/GREEN wire location of the ignition coil and BLACK (-) probe of multimeter to the high tension cable.

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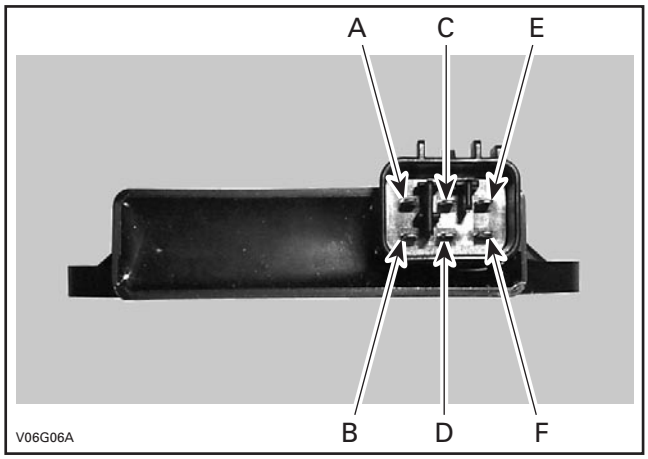
SECONDARY WILDING

SECONDARY WILDING	RESISTANCE AT 20°C (68°F)
With spark plug cap	18 ± 2.5 kΩ
Without spark plug cap	13 ± 2.5 kΩ

NOTE: Make sure to reconnect WHITE/GREEN wire connector to positive (+) and RED/VIOLET to negative (-) terminals of the ignition coil after the test.



POSITIVE (+) TESTER LINE	NEGATIVE (-) TESTER LINE					
	A	**B**	**C**	**D**	**E**	**F**
A		O.L.	2.985 KΩ	2.567 MΩ	18.41 KΩ	2.481 KΩ
B	2.540 MΩ		2.539 MΩ	6.37 MΩ	2.538 MΩ	6.23 MΩ
C	2.983 KΩ	O.L.		2.528 MΩ	21.43 KΩ	2.441 MΩ
D	O.L.	O.L.	O.L.		O.L.	O.L.
E	18.84 KΩ	O.L.	21.85 KΩ	2.490 MΩ		2.412 MΩ
F	O.L.	O.L.	O.L.	O.L.	O.L.	

Electronic Module

IDI (Inductive discharge ignition)

When every other components above have been tested and are good, the electronic module can be suspected. Ensure wiring and connectors are in good condition prior to replacing the electronic module.

TEST

NOTE: On the multimeter, set measuring range from 1 MΩ – 10 MΩ. Make sure that positive and negative tester probes are installed on the appropriate wires.

If a fault is detected, the electronic module must be replaced.

IGNITION TIMING

It is impossible to check the ignition timing with a timing lamp because there is no access window or mark.

SPARK PLUG

DISASSEMBLY

Disconnect t hen remove the ignition coil.

Unscrew the spark plug one turn.

Clean the spark plug and cylinder head with pressurized air.

Reinstall ignition coil, unscrew spark plug completely then remove it.

HEAT RANGE

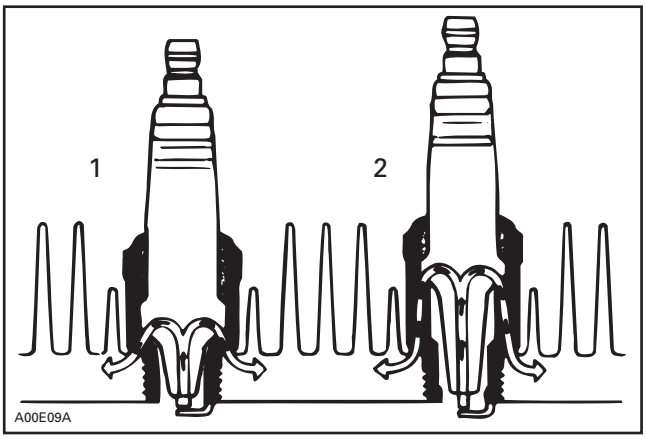
The proper heat range of the spark plugs is determined by the spark plugs ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be and inversely, the shorter the heat path, the colder the operating temperature will be.

A "cold" type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The "hot" type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



TYPICAL

1. *Cold*
2. *Hot*

CAUTION: Severe engine damage might occur or major plastic parts might melt if a wrong heat range plug is used.

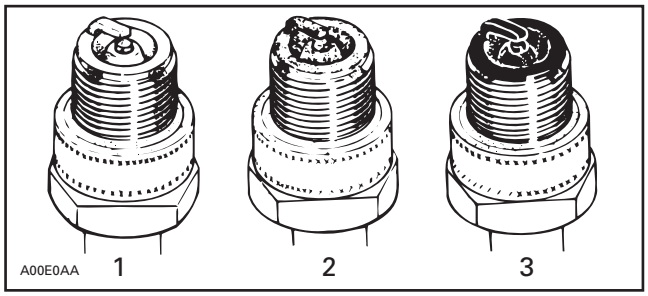
A too "hot" plug will result in overheating pre-ignition, etc.

A too "cold" plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling or low-speed riding, or running on a too rich mixture due to abuse of choke, a clogged air filter, a faulty carburetor adjustment, incorrect fuel, defective ignition system, incorrect ignition timing, incorrect spark plug gap, lubricating oil entering the combustion chamber, or too cold spark plug. The plug face of a fouled spark plug has either a wet black deposit or a black carbon fouling. Such coatings form a conductive connection between the center electrode and ground.

SPARK PLUG ANALYSIS



TYPICAL

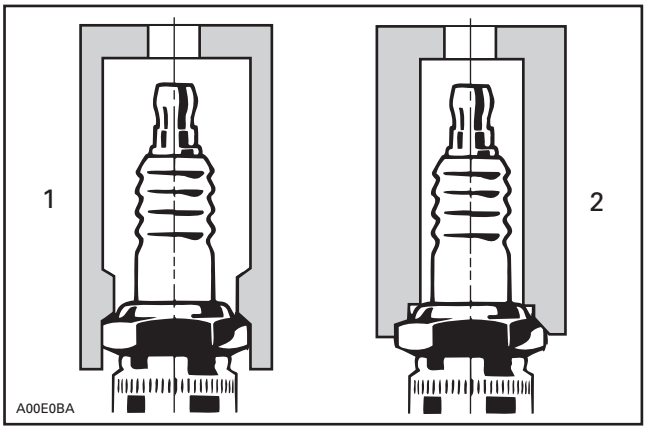
1. *Overheated (light grey, white)*
2. *Normal (light brown, brown)*
3. *Fouled (black, wet or dry, dark deposits, grey, melted coating)*

The plug face reveals the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug face (i.e. the part of the plug projecting into the combustion chamber).

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

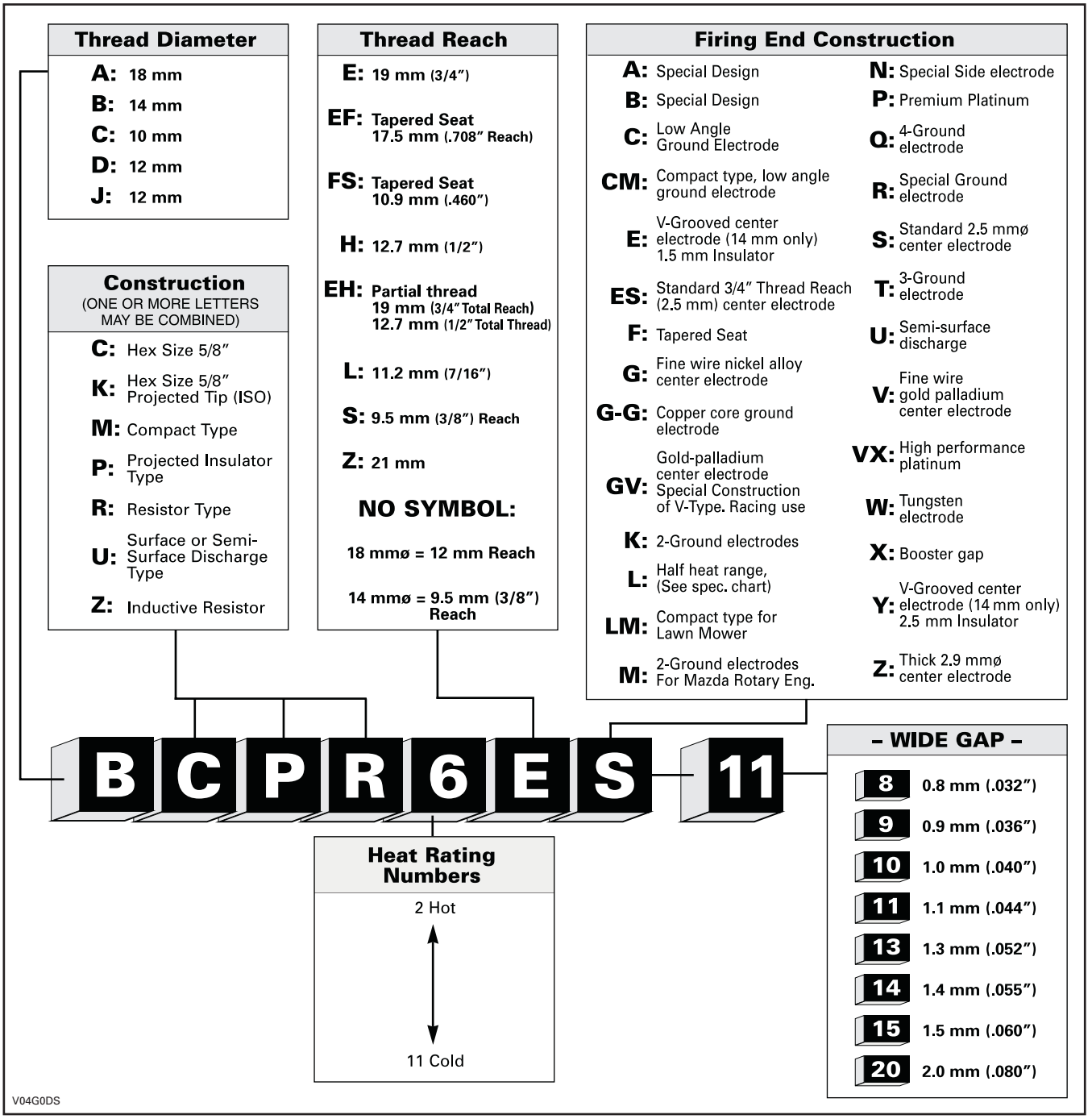
1. Using a wire feeler gauge, set electrode gap to 0.7 mm (.027 in).
2. Apply anti-seize lubricant over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head, with the ignition coil, and tighten with a torque wrench and a proper socket.



1. *Proper socket*
2. *Improper socket*

4. Torque spark plug to 18 N•m (159 lbf•**in**).

NGK SPARK PLUG SYMBOL EXPLANATION



INSTRUMENTS AND ACCESSORIES

GENERAL

⚠ WARNING

It is recommended to always disconnect the battery when replacing any electric or electronic parts. Always disconnect battery exactly in the specified order, BLACK (-) cable first. Do not place tools on battery.

HEADLIGHT

Test

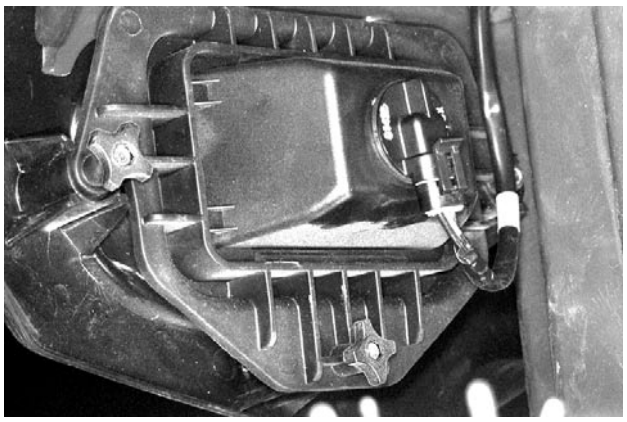
Refer to TESTS section.

Bulb Replacement

Always check light operation after replacement.

CAUTION: Never touch glass portion of an halogen bulb with bare fingers, it shortens its operating life. If glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

Unplug connector from headlight.



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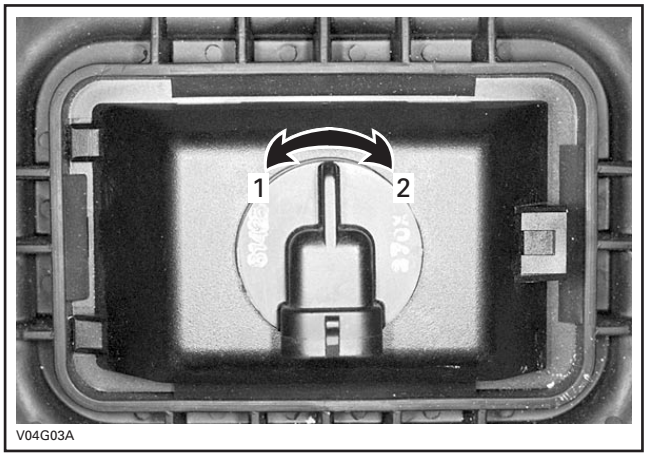
TYPICAL

Rotate bulb socket counterclockwise then remove headlight bulb.



V04G03A

TYPICAL

1. *Unlock*
2. *Lock*

Properly reinstall removed parts in the reverse order of their removal.

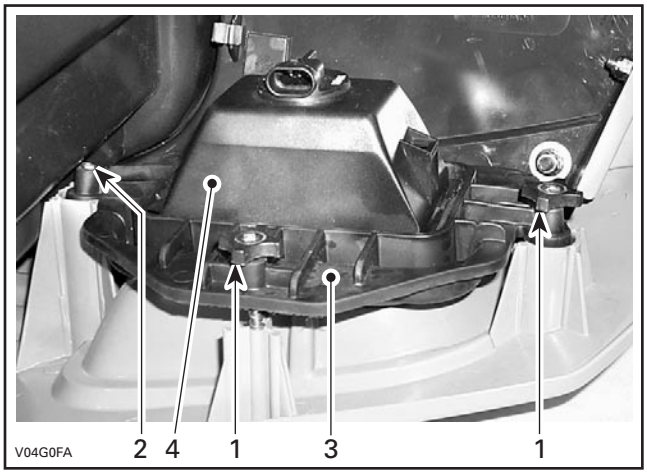
Removal

NOTE: Use the same procedure for RH or LH headlight.

Unplug the headlight connector.

Remove both knobs.

Remove the last screw retaining headlight holder.



V04G0FA

TYPICAL

1. *Knobs*
2. *Retaining screw*
3. *Headlight holder*
4. *Headlight housing*

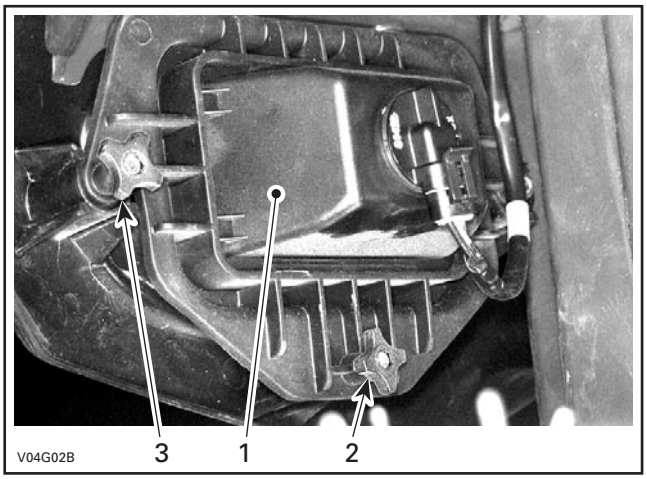
Installation

Properly reinstall removed parts in the reverse order of their removal.

Adjustment

Adjust beam aiming as follows:

Turn knobs to adjust beam height and side orientation as explained below. Adjust both headlights evenly.



TYPICAL

1. *Headlight cover*
2. *Beam height adjustment*
3. *Beam side adjustment*

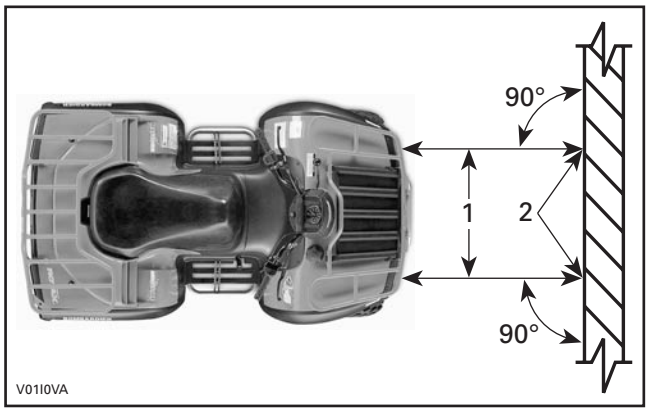
HEADLIGHT BEAM AIMING

Select **high** intensity.

Beam aiming is correct when center of high beam is 131 mm (5 in) below the headlight horizontal center line, scribed on a test surface, 5 m (17 ft) away.

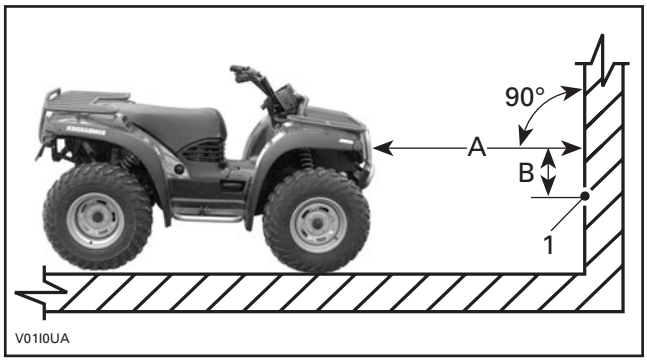
NOTE: Sit down the driver or place the same weight on the vehicle.

Measure headlight center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 131 mm (5 in) below scribed line.



TYPICAL

1. *Headlights center lines*
2. *Light beam center*



TYPICAL

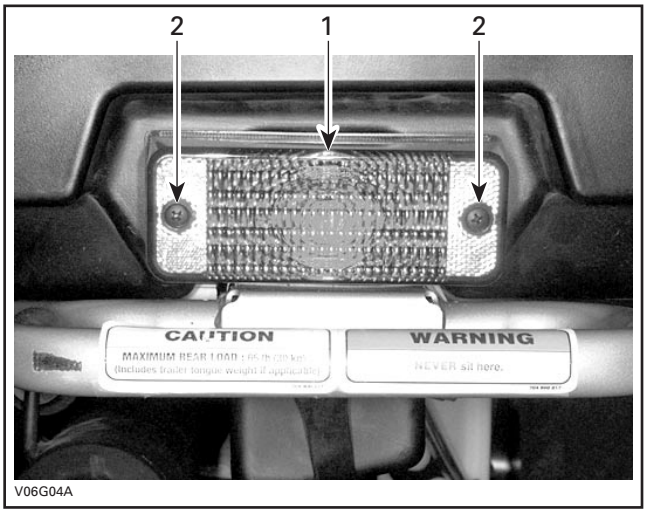
1. *Light beam center*

A. 5 m (17 ft)
B. 131 mm (5 in)

TAILLIGHT

Bulb Replacement

Unscrew lens screws to expose bulb.



1. Lens
2. Screws

Push bulb in and hold while turning counterclockwise to release.

Install the new bulb by first pushing in while turning clockwise.

IGNITION SWITCH

Test

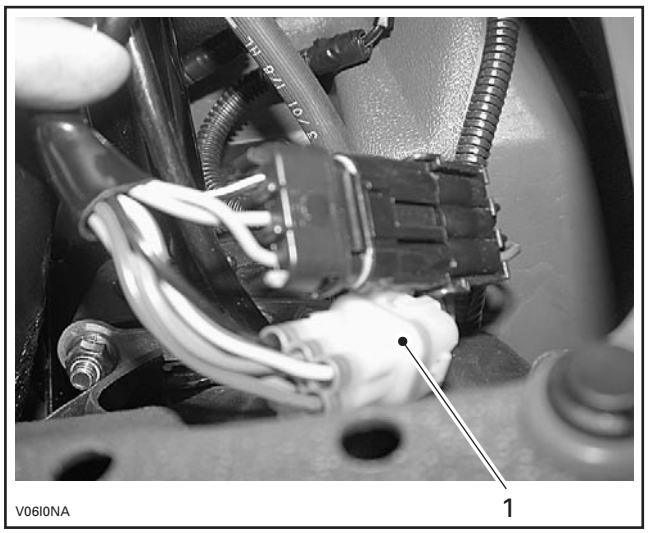
Refer to **IGNITION SYSTEM**.

Removal

Lift the dash board and unscrew the ignition switch nut.

NOTE: Do not unplug connectors when steering cover is lifted.

Unplug the switch connector.



1. Switch connector

Installation

For the installation, reverse the removal procedure.

INDICATOR LAMP

Test

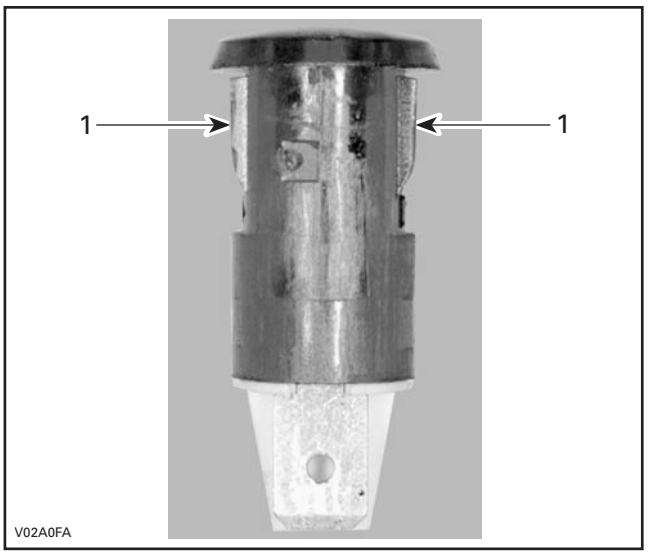
Refer to TESTS section.

Replacement

Remove the dash board.

Unplug wires on indicator lamp.

Press both tabs then pull indicator lamp out of hole.



1. Tabs

Installation

For installation, reverse the removal procedure.

ELECTRONIC MODULE

Test

Refer to **IGNITION SYSTEM** for testing procedures.

Removal

The electronic module is located on the front frame under front luggage rack.

To remove, unscrew bolts retaining electronic module to frame and unplug the connectors.

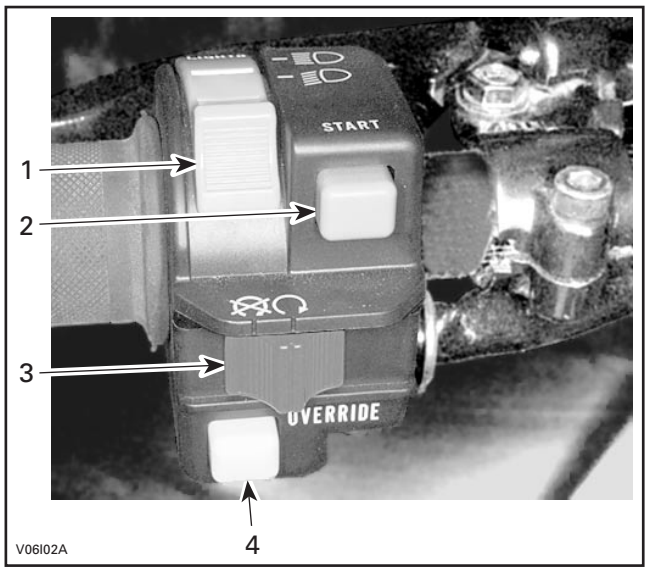
Installation

For the installation, reverse the removal procedure.

TEST

MULTI-FUNCTION SWITCH

Apply parking brake, place transmission lever in NEUTRAL position and start engine.



1. Headlight switch
2. Start switch
3. Engine stop switch
4. Override switch

Headlight Switch

Select low beam position on headlight switch.

Using a multimeter, measure the voltage between GREEN and BLACK wires.

The obtained value should be between 12 and 14.5 Vdc.

Place the headlight switch selector on high beam position.

Measure the voltage between BLUE and BLACK wires. The obtained value should be between 12 and 14.5 Vdc.

– No voltage:
  • Check wiring condition and headlight switch.
– Voltage is good:
  • Change headlight bulb(s).

Using a multimeter, measure the resistance between the following wires.

POSITION	WIRE	RESISTANCE
Switch to LO	YELLOW/RED and GREEN	0.2 ± 0.2 Ω max.
Switch to HI	YELLOW/RED and BLUE	0.2 ± 0.2 Ω max.

Replace multifunction switch if defective.

Start Switch

Using a multimeter, measure the resistance between the following wires.

SWITCH	WIRE	RESISTANCE
Start switch released	RED/VIOLET and YELLOW/RED	0.2 ± 0.2 Ω max.
Start switch pushed		Infinite (O.L.)

Replace multifunction switch if defective.

Engine Stop Switch

Using a multimeter, measure the resistance between the following wires.

SWITCH	WIRE	RESISTANCE
Engine stop switch on STOP position	BLACK/WHITE and BLACK	0.2 ± 0.2 Ω max.
Engine stop switch on RUN position		Infinite (O.L.)

Replace multifunction switch if defective.

Override Switch

Using a multimeter, measure the resistance between the following wires.

SWITCH	WIRE	RESISTANCE
Override switch pushed	VIOLET/GREY and VIOLET/GREY	0.2 ± 0.2 Ω max.
Override switch released		Infinite (O.L.)

Replace multifunction switch if defective.

INDICATOR LIGHTS

Remove dash board.

Unplug indicator light connector.

Test each LEDS. The TEMPERATURE/OIL, REVERSE and NEUTRAL LEDS can be tested with 12 Vdc.

LEDS	WIRES COLOR
Temperature/Oil	RED/VIOLET and BLACK/GREY
Reverse	RED/VIOLET and VIOLET/GREY
Neutral	RED/VIOLET and YELLOW/GREY

– LEDS are good:
  - Check wiring condition.
  - Check connectors.

– LEDS are burned:
  - Change indicator lights.