

16. ELECTRICAL SYSTEM

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SERVICE INFORMATION

GENERAL

⚠ WARNING

- *If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death.*
- When servicing the electrical system, always follow the steps in the troubleshooting sequence on page 16-3.
- The ignition control module (ICM) may be damaged if dropped. Also, if the connector is disconnected when current is present, the excessive voltage may damage the ignition control module (ICM).
- Ignition timing cannot be adjusted since the ignition control module (ICM) is non-adjustable. If ignition timing is incorrect, check the system components and replace any faulty parts.
- A faulty ignition system is often related to poorly connected or corroded connectors. Check those connections before proceeding.
- Use a spark plug of the correct heat range. Using a spark plug with an incorrect heat range can damage the engine.
- For alternator removal and installation, see section 10.

ELECTRICAL SYSTEM

SPECIFICATIONS

ITEM		SPECIFICATIONS	
Spark plug	Standard	NGK	NIPPON U27FER9
	For cold climate (Below 5°C/41°F)	CR9EH-9	U24FE 3
Ignition timing	Initial	CR8EH-9	8° BTDC at 1,900 ± 200 min ⁻¹ (rpm)
	Full advance		28° ± 2° BTDC at 4,300 min ⁻¹ (rpm)
Spark plug gap			0.8 – 0.9 mm (0.031 – 0.035 in)
Ignition coil primary peak voltage			100 V minimum
Ignition pulse generator peak voltage			0.7 V minimum
Exciter coil peak voltage			100 V minimum
Lighting coil resistance (At 20°C/68°F)	AC		0.2 – 1.2 Ω
	DC		0.2 – 1.2 Ω
Headlight			12 V 35/35 W
Taillight			12 V 5 W
Alternator/output			0.14 kW/5,000 min ⁻¹ (rpm)
AC regulator specific voltage			12.0 – 14.0 V/3,000 min ⁻¹ (rpm)

TORQUE VALUES

Timing hole cap
Crankshaft hole cap
Spark plug

10 N·m (1.0 kgf·m, 7.2 lbf·ft) Apply grease to the threads and flange surface
8 N·m (0.8 kgf·m, 5.8 lbf·ft) Apply grease to the threads and flange surface
12 N·m (1.2 kgf·m, 9 lbf·ft)

TOOLS

Special
Imrie diagnostic tester (model 625) or
Peak voltage adaptor

07HGJ – 0020100 with
Commercially available digital multimeter
(impedance 10 MΩ/DCV minimum)

TROUBLESHOOTING

- Inspect the following before diagnosing the system.
 - Faulty spark plug
 - Loose spark plug cap or spark plug wire connection
 - Water got into the spark plug cap (Leaking the ignition coil secondary voltage)
- Temporarily exchange the ignition coil with a known good one and perform the spark test. If there spark, the exchanged ignition coil is faulty.

IGNITION SYSTEM

No spark at plug

Unusual condition		Probable cause (Check in numerical order)
Ignition coil primary voltage	Low peak voltage.	<ol style="list-style-type: none"> 1. The multimeter impedance is too low. 2. Cranking speed is too low. 3. The sampling timing of the tester and measured pulse were not synchronized (System is normal if measured voltage is over the standard voltage at least once). 4. Poorly connected connectors or an open circuit in ignition system. 5. Faulty exciter coil (Measure the peak voltage). 6. Faulty ICM (in case when above No.1 – 5 are normal).
	No peak voltage.	<ol style="list-style-type: none"> 1. Incorrect peak voltage adapter connections. 2. Short circuit in engine stop switch wire. 3. Faulty engine stop switch. 4. Loose or poor connected ICM connectors. 5. Open circuit or poor condition in ground wire of the ICM. 6. Faulty peak voltage adaptor. 7. Faulty exciter coil (Measure the peak voltage). 8. Faulty ignition pulse generator. 9. Faulty ICM (in case when above No. 1 – 8 are normal).
	Peak voltage is normal, but no spark jumps at plug.	<ol style="list-style-type: none"> 1. Faulty spark plug or leaking ignition coil secondary current. 2. Faulty ignition coil.
Exciter coil	Low peak voltage.	<ol style="list-style-type: none"> 1. The multimeter impedance is too low. 2. Cranking speed is too low. 3. The sampling timing of the tester and measured pulse were not synchronized (System is normal if measured voltage is over the standard voltage at least once). 4. Faulty exciter coil (in case when above No.1 – 3 are normal).
	No peak voltage.	<ol style="list-style-type: none"> 1. Faulty peak voltage adaptor. 2. Faulty exciter coil.
Ignition pulse generator	Low peak voltage.	<ol style="list-style-type: none"> 1. The multimeter impedance is too low. 2. Cranking speed is too low. 3. The sampling timing of the tester and measured pulse were not synchronized (System is normal if measured voltage is over the standard voltage at least once). 4. Faulty ignition pulse generator (in case when above No. 1 – 3 are normal).
	Low peak voltage.	<ol style="list-style-type: none"> 1. Faulty peak voltage adaptor. 2. Faulty ignition pulse generator.

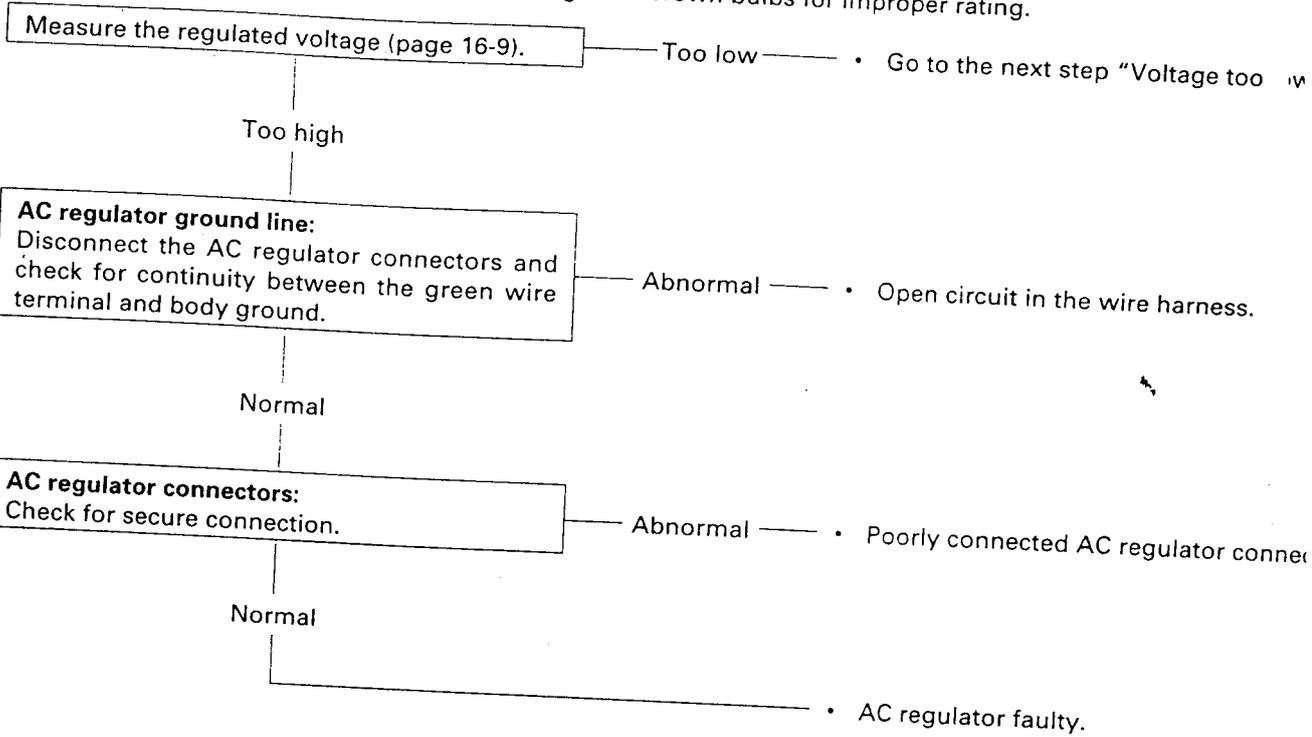
Light does not come on when engine is running

- Bulb burned out
- Wiring to that component has an open circuit
- Faulty ignition coil

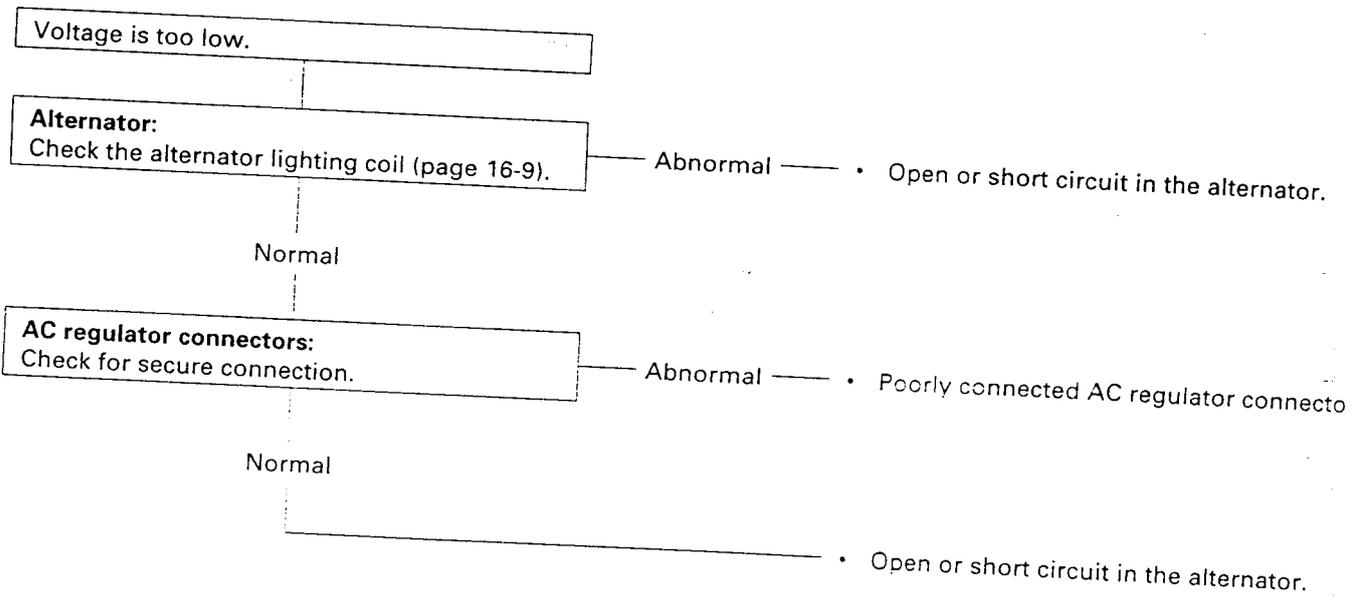
ELECTRICAL SYSTEM

LIGHTING SYSTEM

Before inspecting, check the headlight and taillight for brown bulbs for improper rating.



Voltage too low



IGNITION SYSTEM INSPECTION

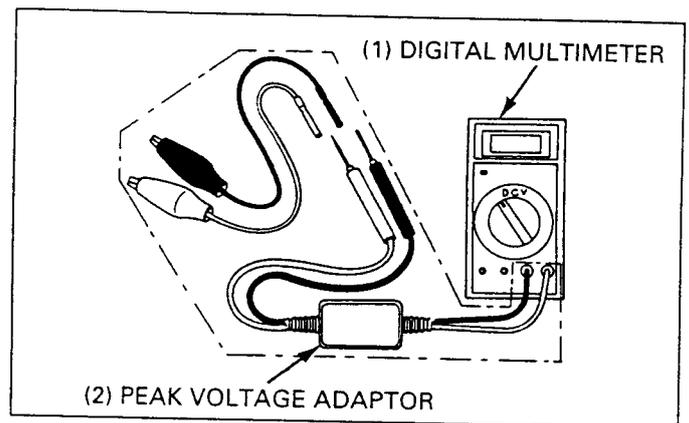
NOTE

- If there is no spark at plug, check all connections for loose or poor contact before measuring each peak voltage.
- Use recommended digital multimeter or commercially available digital multimeter with an impedance of 10 M Ω /DCV minimum if you are using the peak voltage adaptor. The display value differs depending upon the internal impedance of the multimeter.
- If using Imrie diagnostic tester (model 625), follow the manufacturer's instructions.

Connect the peak voltage adaptor to the digital multimeter, or use the Imrie diagnostic tester.

TOOL:

Imrie diagnostic tester (model 625) or
 Peak voltage adaptor 07HGJ - 0020100 with
 Commercially available digital multimeter
 (impedance 10 M Ω /DCV minimum)



IGNITION PRIMARY PEAK VOLTAGE

NOTE

- Check all connections before inspection. If the system is disconnected, incorrect peak voltage might be measured.
- Check cylinder compression and check that the spark plug is installed correctly.

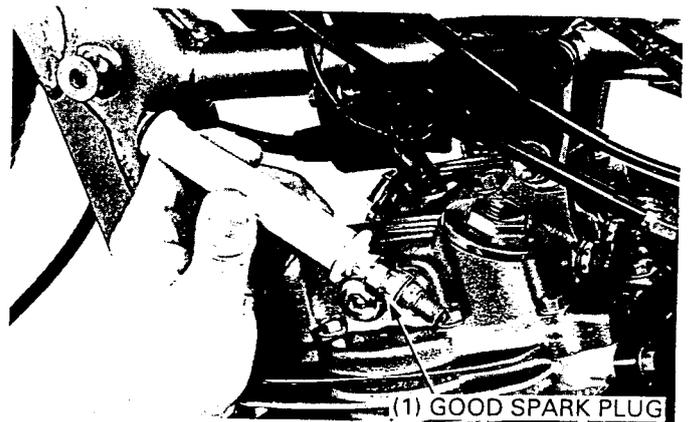
Remove the fuel tank (page 5-3).

Shift the transmission into neutral. Disconnect the spark plug cap from the spark plug. Connect a good known spark plug to the spark plug cap and ground the spark plug to the cylinder as done in a spark test.

Connect the peak voltage adaptor or Imrie tester to the ignition coil.

NOTE

- Do not disconnect the ignition coil primary wires.



ELECTRICAL SYSTEM

TOOL:

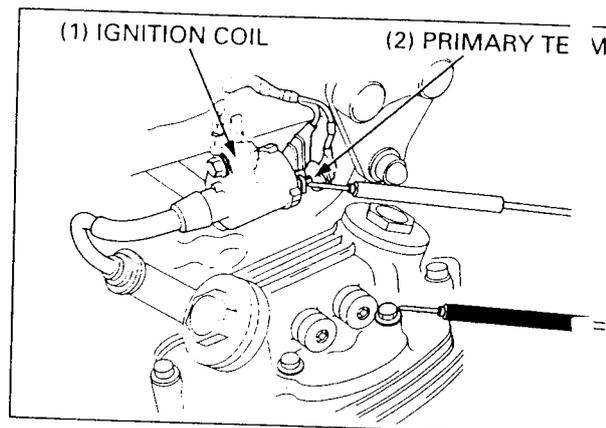
Imrie diagnostic tester (model 625) or
Peak voltage adaptor 07HGJ - 0020100 with
Commercially available digital multimeter
(impedance 10 M Ω /DCV minimum)

CONNECTION:

Black/Yellow terminal (+) - Body ground (-)

Crank the engine with the kickstarter and read ignition coil primary peak voltage.

PEAK VOLTAGE: 100 V minimum



⚠ WARNING

- Avoid touching the spark plug and tester probes to prevent electric shock.

If the peak voltage is lower than standard value, follow the checks described in the troubleshooting on page 16-3.

EXCITER COIL PEAK VOLTAGE

NOTE

- Check cylinder compression and check that the spark plug is installed correctly.

Disconnect the ICM 4P and 2P connectors.
Connect the peak voltage adaptor or Imrie tester probes to the 2P connector terminals of the exciter coil wire.

TOOL:

Imrie diagnostic tester (model 625) or
Peak voltage adaptor 07HGJ - 0020100 with
Commercially available digital multimeter
(impedance 10 M Ω /DCV minimum)

CONNECTION:

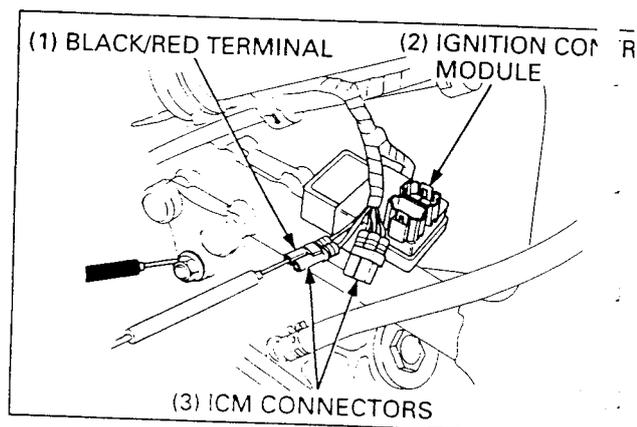
Black/Red terminal (+) - Body ground (-)

Crank the engine with the kickstarter and read exciter coil peak voltage.

PEAK VOLTAGE: 100 V minimum

⚠ WARNING

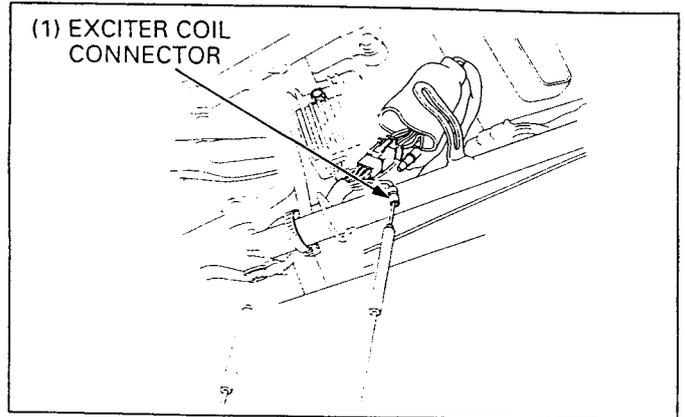
- Avoid touching the spark plug and tester probes to prevent electric shock.



If the peak voltage is lower than standard value, recheck the following:

Remove the seat (page 2-2).
 Disconnect the exciter coil black connector.
 Connect the peak voltage adaptor or Imrie tester probes to the connector terminal of the exciter coil side and recheck the peak voltage.

If the peak voltage at the ICM connector is abnormal and peak voltage at the exciter coil connector is normal, check for poorly connected connectors or a broken wire harness.
 If the peak voltage is abnormal at both connectors, follow the checks described in the troubleshooting on page 16-3.



IGNITION PULSE GENERATOR PEAK VOLTAGE

NOTE

- Check cylinder compression and check that the spark plug is installed correctly.

Disconnect the ICM 4P and 2P connectors.
 Connect the peak voltage adaptor or Imrie tester probes to the 4P connector terminals of the ignition pulse generator wires.

TOOL:

Imrie diagnostic tester (model 625) or
 Peak voltage adaptor 07HGJ - 0020100 with
 Commercially available digital multimeter
 (impedance 10 MΩ/DCV minimum)

CONNECTION:

Blue/Yellow terminal (+) - Green/White terminal (-)

Crank the engine with the kickstarter and read ignition pulse generator peak voltage.

PEAK VOLTAGE: 0.7 V minimum

⚠ WARNING

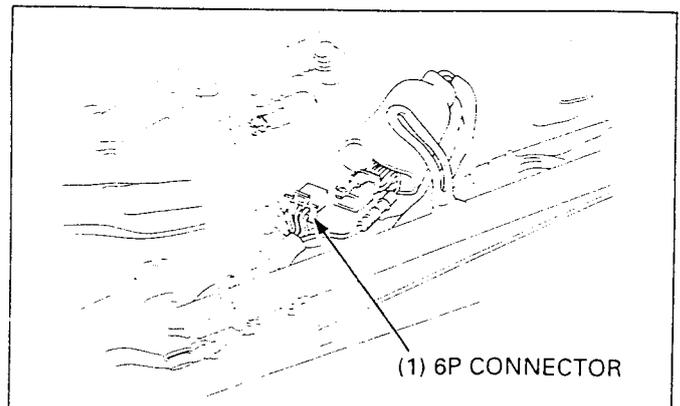
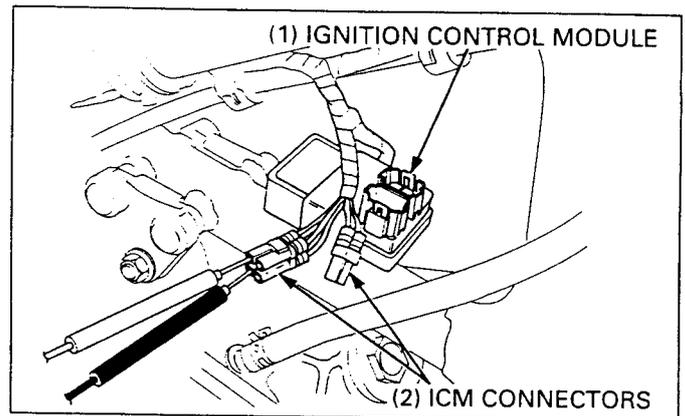
- Avoid touching the spark plug and tester probes to prevent electric shock.

If the peak voltage is lower than standard value, recheck the following:

Remove the seat (page 2-2).
 Disconnect the AC generator 6P connector.
 Connect the peak voltage adaptor or Imrie tester probes to the connector terminal of the ignition pulse generator side and recheck the peak voltage.

If the peak voltage at the ICM connector is abnormal and peak voltage at the ignition pulse generator connector is normal, check for poorly connected connectors or a broken wire harness.

If the peak voltage is abnormal, follow the checks described in the troubleshooting on page 16-3.



ELECTRICAL SYSTEM

IGNITION COIL REMOVAL/INSTALLATION

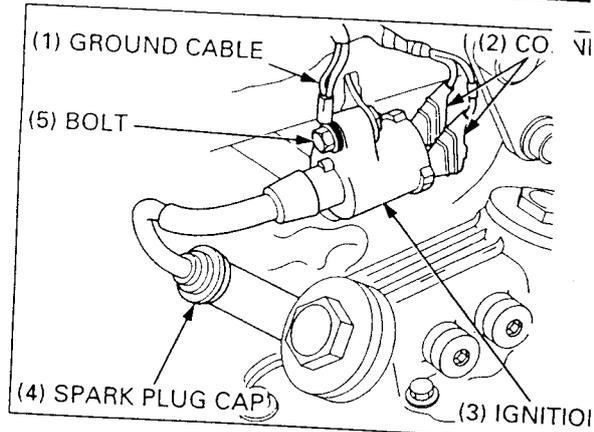
Remove the fuel tank (page 5-3).

Disconnect the ignition coil primary connectors.
Disconnect the spark plug cap.
Remove the bolt and ground cable.
Remove the ignition coil.

Installation is in the reverse order of removal.

NOTE

- Install the bolt with the ground cable and tighten it.



IGNITION TIMING

⚠ WARNING

- *If the engine must be running to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death.*

NOTE

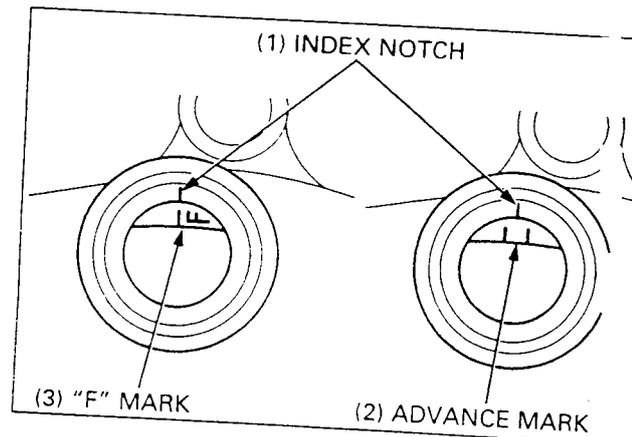
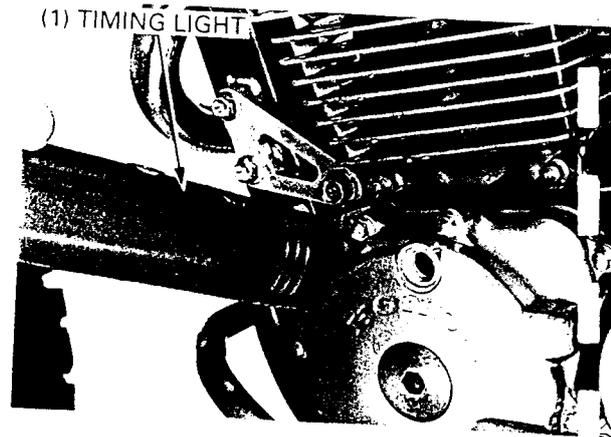
- The capacitor discharge ignition system is factory preset and need only be checked when an electrical system component is replaced.

Warm up the engine and remove the timing hole cap.
Connect a timing light and tachometer.

The timing is correct if the "F" mark on the flywheel aligns with the index notch on the left crankcase cover at $1,300 \pm 100$ min⁻¹ (rpm).

To check the advance, raise the engine speed to 4,300 min⁻¹ (rpm); the index notch should be between the advance marks.

If the ignition timing is incorrect, inspect the ICM and ignition pulse generator.



ALTERNATOR

INSPECTION

Remove the seat (page 2-2).

NOTE

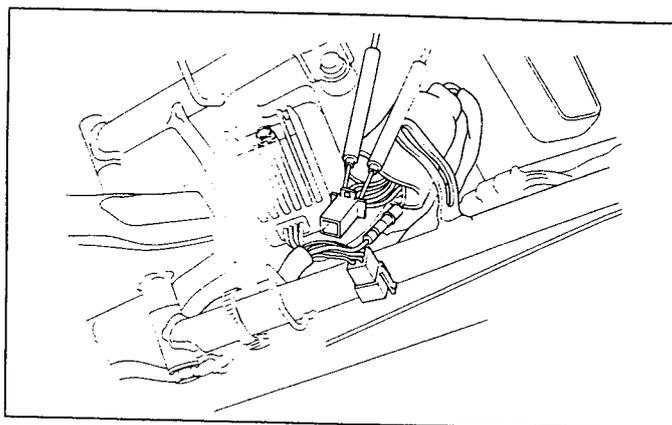
- It is not necessary to remove the stator coil make this test.

Disconnect the alternator 6P connector.
Measure the lighting coil (DC) resistance between the pink wire terminal and yellow wire terminal.

STANDARD: 0.2 – 1.2 Ω (20°C/68°F)

Disconnect the alternator 6P connector.
Measure the lighting coil (AC) resistance between the White/Yellow wire terminal and body ground.

STANDARD: 0.2 – 1.2 Ω (20°C/68°F)



AC REGULATOR

VOLTAGE TEST

⚠ WARNING

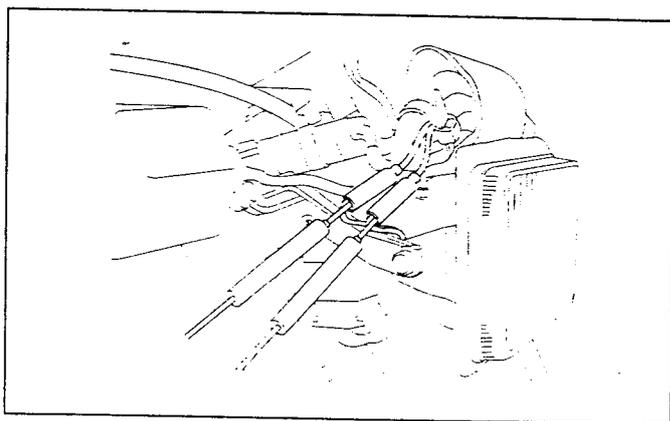
- *If the engine must be to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death.*

Warm up the engine.
Stop the engine and remove the headlight case (page 16-12).
Connect a voltmeter between the Blue wire terminal and (+) probe, Green wire terminal and (-) probe.
Turn the headlight switch ON. (except U type)
Start the engine and turn the headlight dimmer switch Hi position.

Check the meter reading while increasing engine speed slowly.

Specific voltage: 12.5 – 13.5 V/3,000 min⁻¹ (rpm)

If the regulated voltage is out of the specifications, follow the checks described of the lighting system troubleshooting on page 16-4.



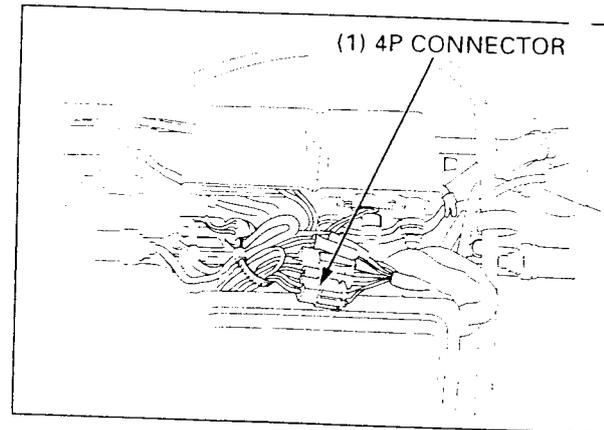
ELECTRICAL SYSTEM

REGULATOR/RECTIFIER

REMOVAL

Remove the headlight case (page 16-11).

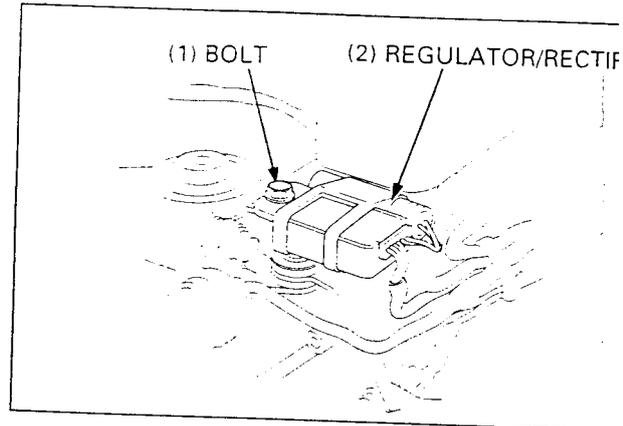
Release the clamp and disconnect the regulator/rectifier 4P connector.



Remove the bolt and regulator/rectifier.

INSTALLATION

Installation is in the reverse order of removal.



REGULATED VOLTAGE INSPECTION

NOTE

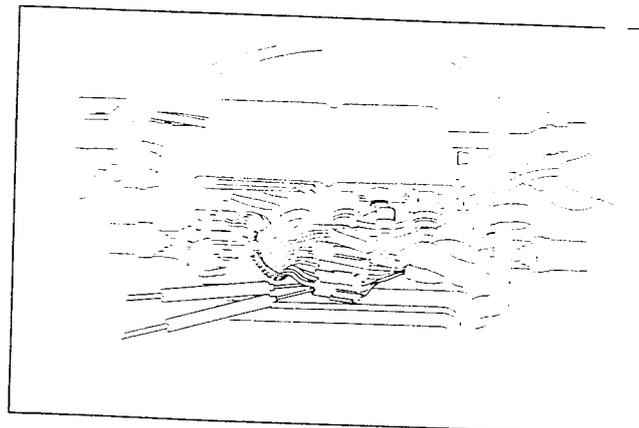
- Measuring circuits with a large capacity that exceeds the capacity of the tester may cause damage to the tester. Before stating each test, set the tester at the high capacity range first, then gradually down to low capacity range in order to ensure that you have the correct range and do not damage the tester.
- When measuring small capacity circuits, keep the ignition switch off. If the switch is suddenly turned on during a test, the tester fuse may be blow.

⚠ WARNING

- *If the engine must be to do some work, make sure the area is well-ventilated. Never run the engine in an enclosed area. The exhaust contains poisonous carbon monoxide gas that may cause loss of consciousness and may lead to death.*

Start the engine and warm it up to the operating temperature, stop the engine.
Connect the voltmeter to the regulator/rectifier.

CONNECTION: BLACK (+) – GREEN (-)



Restart the engine.
Measure voltage on the multi tester when the engine runs at 5,000 min⁻¹ (rpm).

Regulated voltage: 14.0 – 15.0 V at 5,000 min⁻¹ (rpm)

NOTE

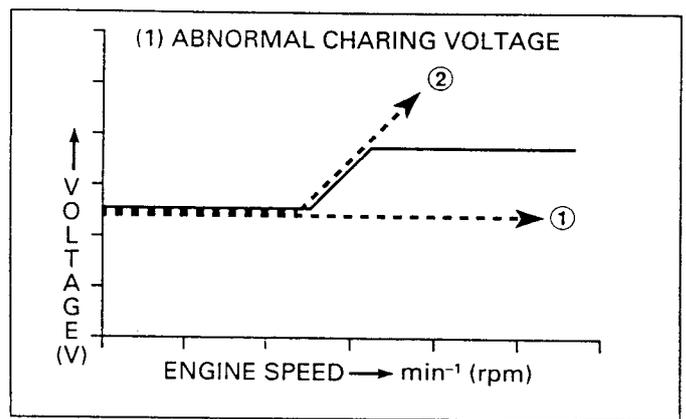
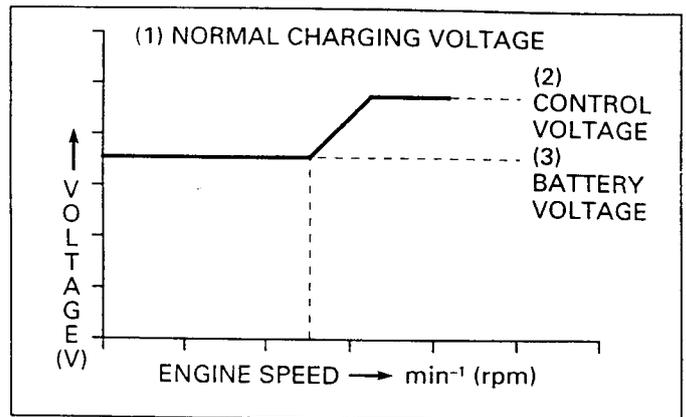
- The speed at which voltage starts rise cannot be checked as it varies with the temperature and loads of the generator

1. VOLTAGE NOT RAISED TO REGULATED VOLTAGE

- Open or shorted circuit in the wire harness or poorly connected connector
- Open or shorted of the alternator
- Faulty regulator/rectifier

2. Regulated voltage too high

- Faulty regulator rectifier



WIRE HARNESS INSPECTION

Remove the headlight case (page 16-11).

Release the clamp and disconnect the regulator/rectifier 4P connector.

Measure the lighting coil (DC) resistance between the pink wire terminal and yellow wire terminal.

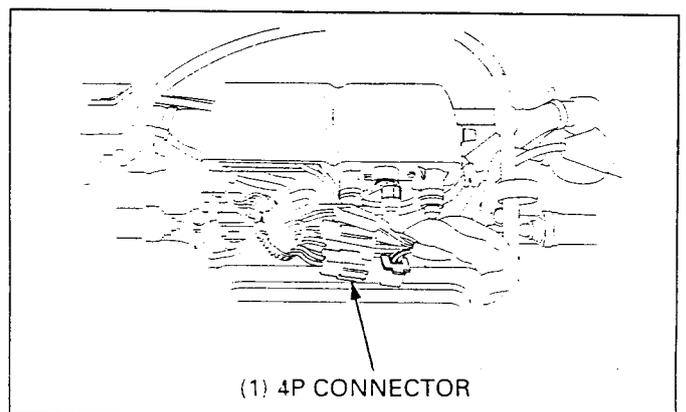
STANDARD: 0.2 – 1.2 Ω (20°C/68°F)

Check for continuity for the green wire terminal and body ground.

STANDARD: CONTINUITY

Check for continuity for the yellow wire terminal and body ground.

STANDARD: NO CONTINUITY

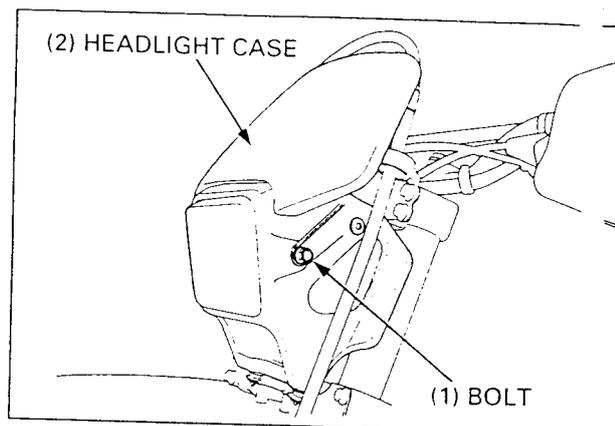


ELECTRICAL SYSTEM

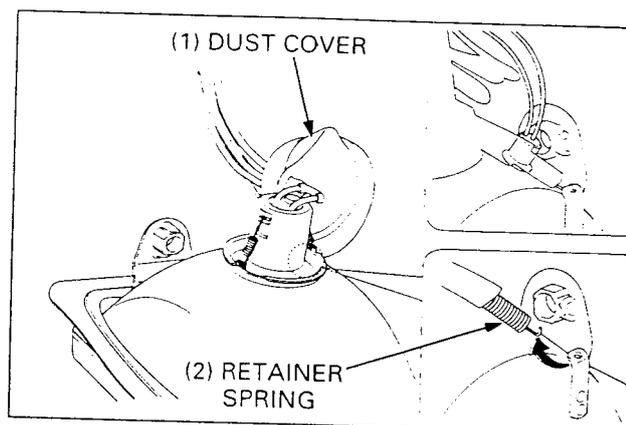
HEADLIGHT

REMOVAL (BULB REPLACEMENT)

Remove the two bolts.
Remove the headlight case.

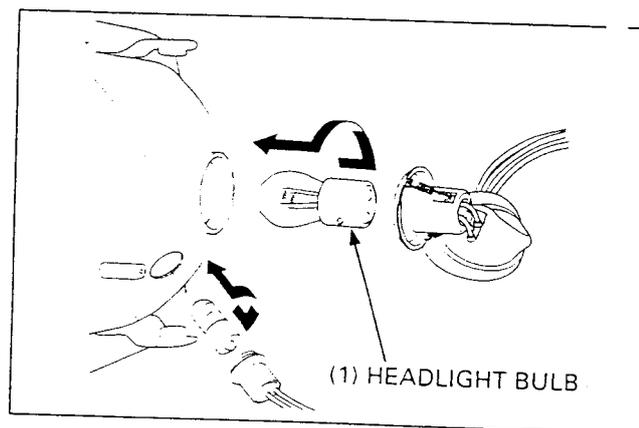


Remove the dust cover.
Remove the retainer spring.



Remove the headlight bulb/retainer assembly.
Remove the bulb by turning it counterclockwise.

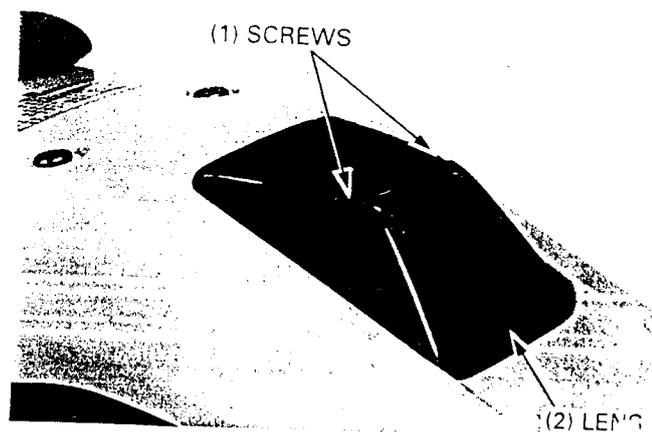
Installation is in the reverse order of removal.

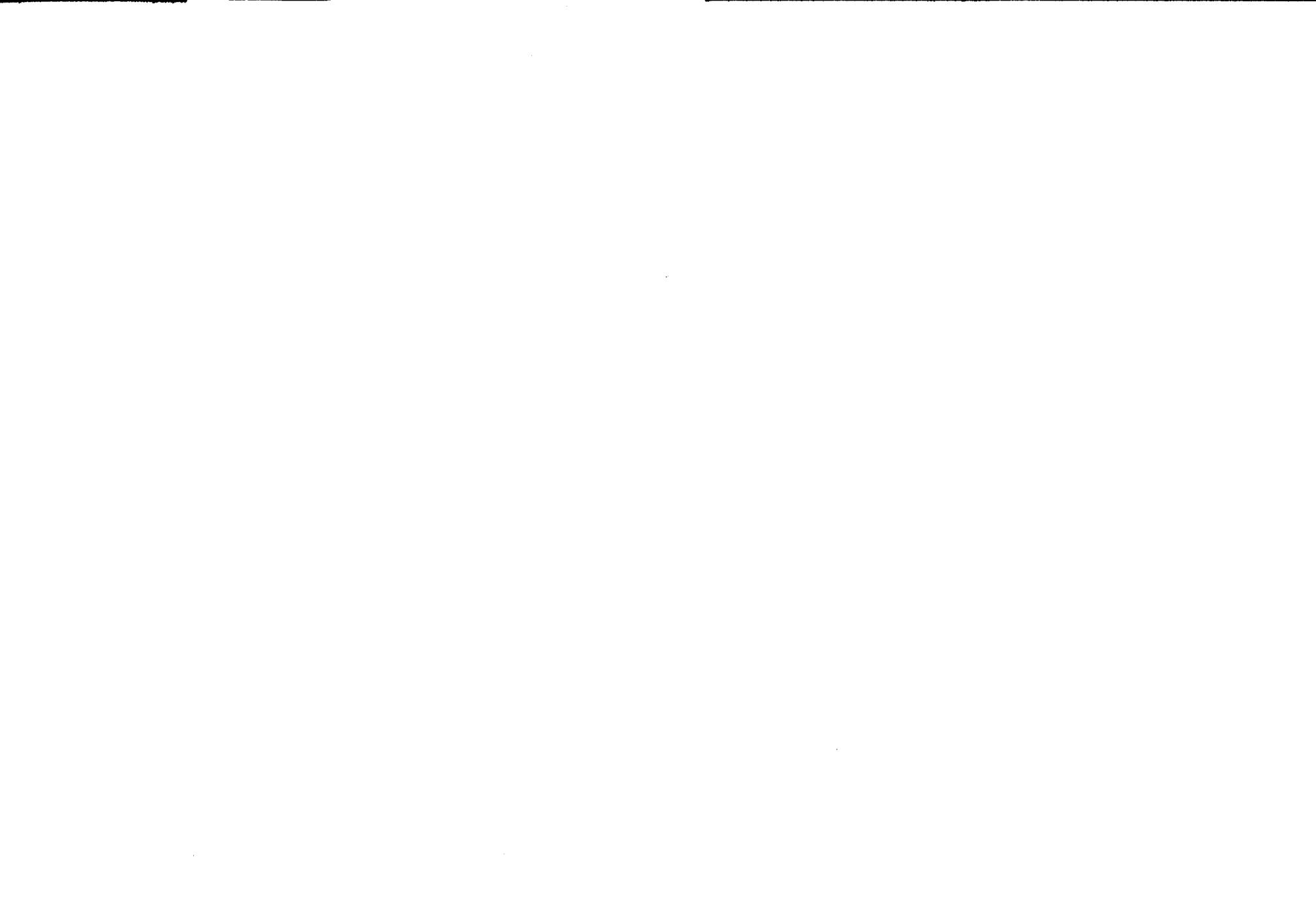


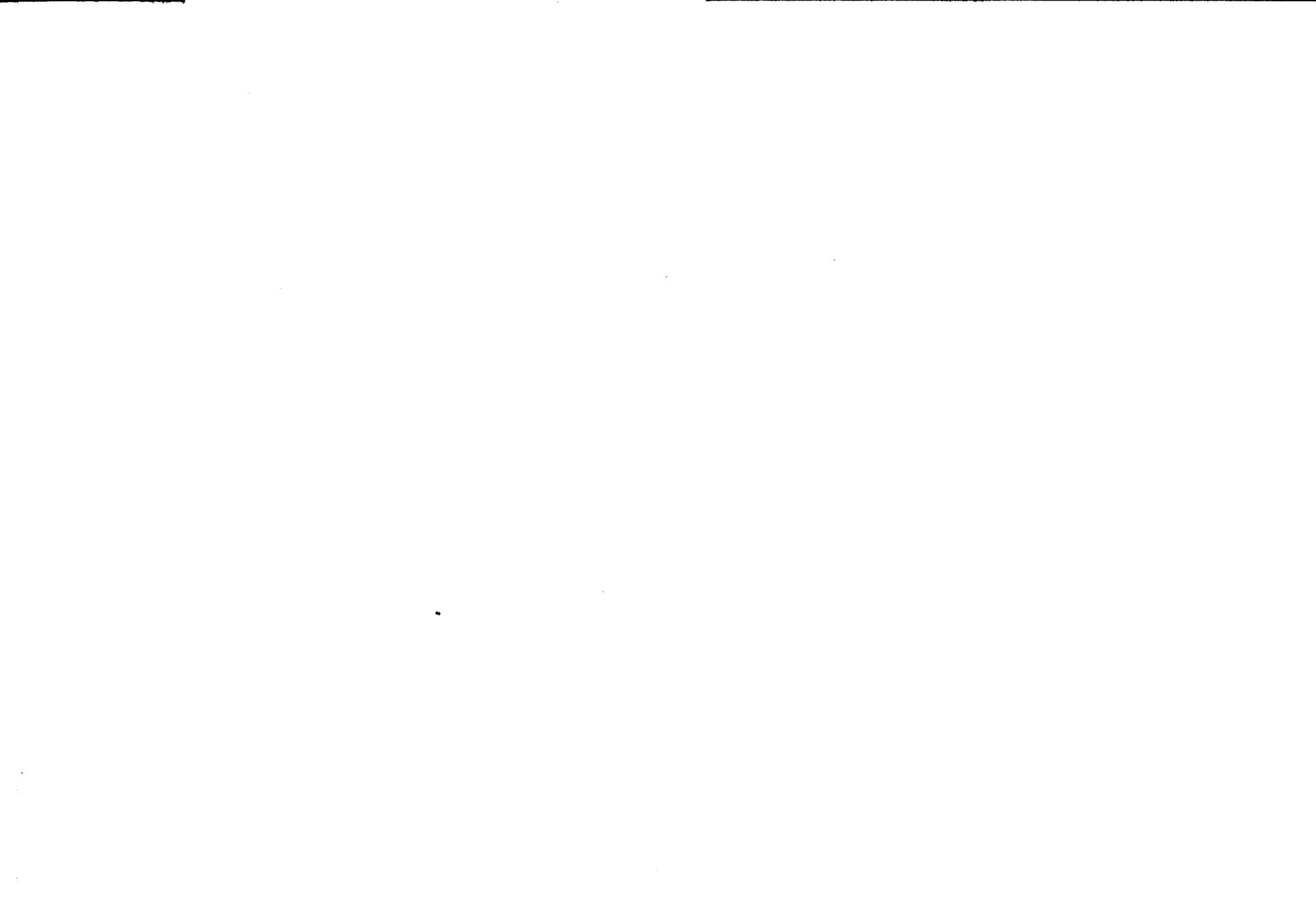
TAIL/BRAKE LIGHT

BULB REPLACEMENT

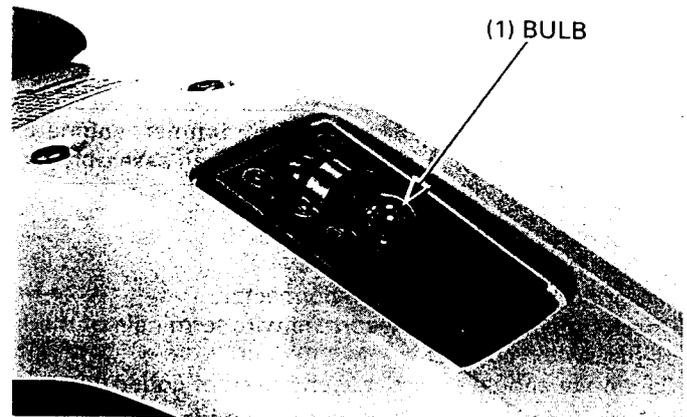
Remove the two screws and taillight lens.







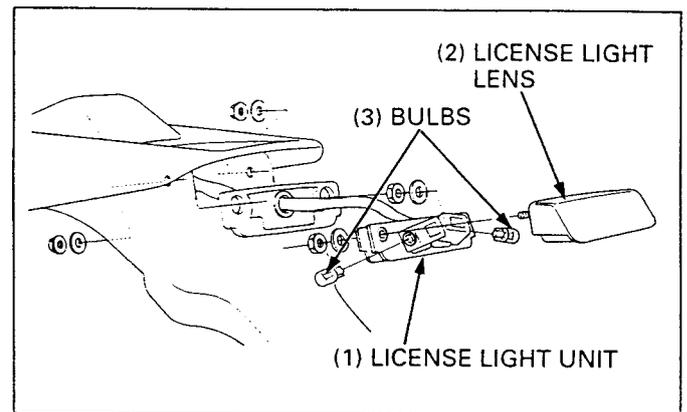
Replace the tail/brake light bulb.



LICENSE LIGHT

BULB REPLACEMENT

Remove the two nuts and license light unit.
Remove the two nuts and license light lens.
Replace the license light bulbs.

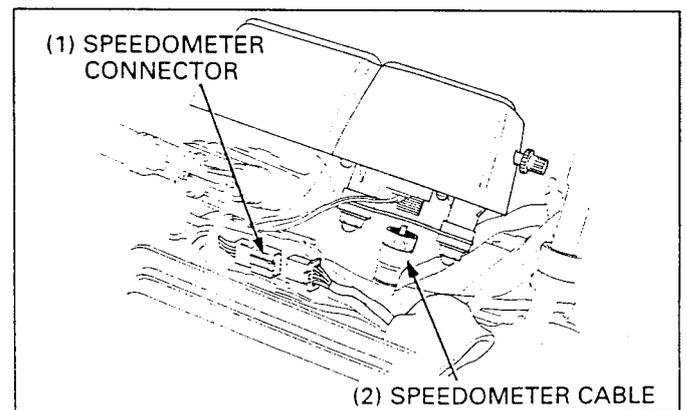


SPEEDOMETER

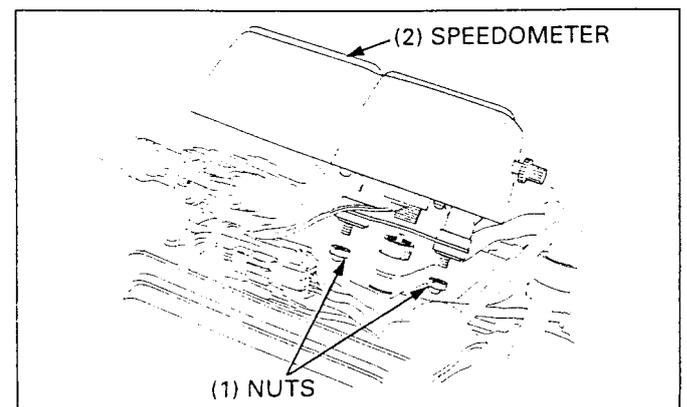
REMOVAL

Remove the headlight case (page 16-13).

Disconnect the speedometer connector and speedometer cable.



Remove the two nuts and speedometer.



ELECTRICAL SYSTEM

HANDLEBAR SWITCHES

NOTE

- The handlebar switches (lighting, dimmer, engine stop, starter switches) must be replaced as an assembly.

Remove the headlight case (page 16-10).

Disconnect handlebar switch connector.

Check for continuity between the wire terminals of the handlebar switch connector.

Continuity should exist between the color coded wire terminals as follows:

HORN SWITCH

	B	HO
FREE		
PUSH	○—○	
COLOR	B	LG

ENGINE STOP SWITCH

	E	IG
OFF	○—○	
RUN		
COLOR	G	BW

LIGHTING/DIMMER SWITCH

ED type:

	B	TL	HL	C1
•				
P	○—○			
H	○—○		○—○	
COLOR	B	BR		W/Y

	HI	HI	LO
LO	○—○		○
(N)	○—○	○—○	○
HI	○—○		
COLOR		L	W

DK type:

	C1	TL	HL
H	○—○	○—○	○—○
COLOR	W/Y	BR	•

	HL	HI	LO
LO	○—○		○
(N)	○—○	○—○	○
HI	○—○		
COLOR	•	L	W

U type:

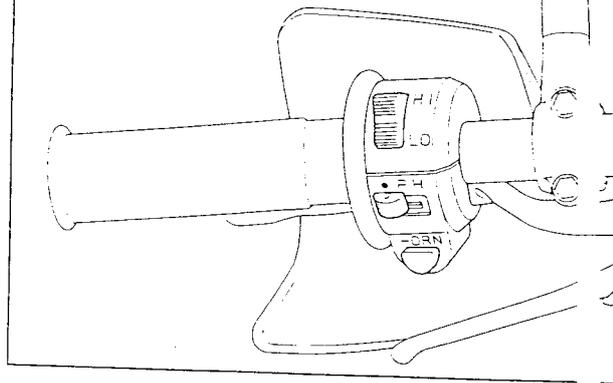
	C1	HI	LO
LO	○—○		○
(N)	○—○	○—○	○
HI	○—○		
COLOR	BR	L	W

TURN SIGNAL SWITCH

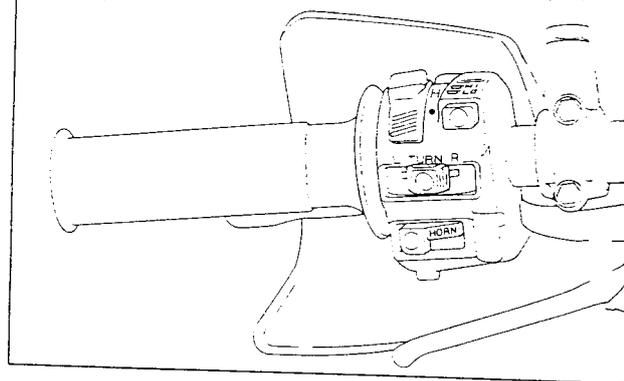
DK, U types:

	R1	W1	L1		R2	W2	L2
R	○—○				R	○—○	
N					N		
L		○—○			L		○—○
COLOR	SB	GR	O		COLOR	SB/W	GR/W/O/W

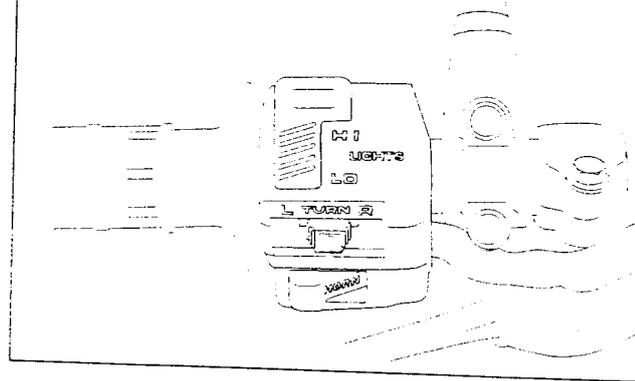
ED type:



DK type:



U type:

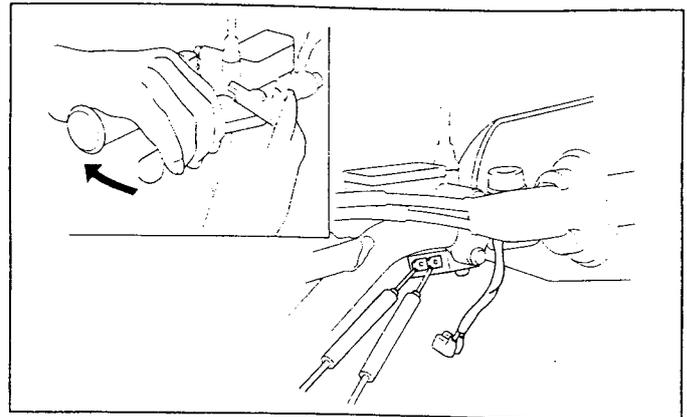


FRONT BRAKE LIGHT SWITCH

INSPECTION

Disconnect the front brake light switch wires and check for continuity.

There should be continuity with the front brake applied and no continuity with it released.



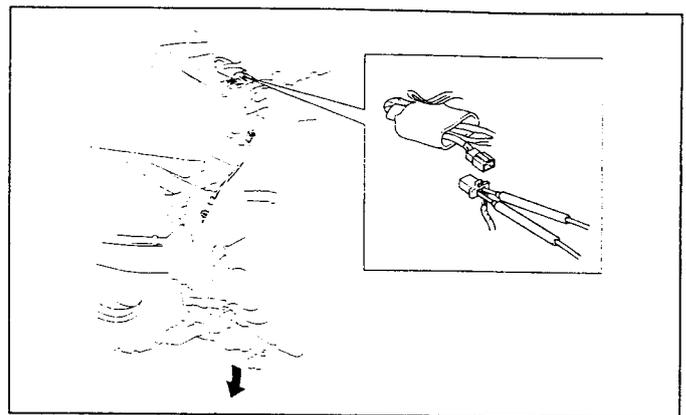
REAR BRAKE LIGHT SWITCH

INSPECTION

Remove the seat (page 2-2).

Disconnect the rear brake light switch wires and check for continuity.

There should be continuity with the front brake applied and no continuity with it released.

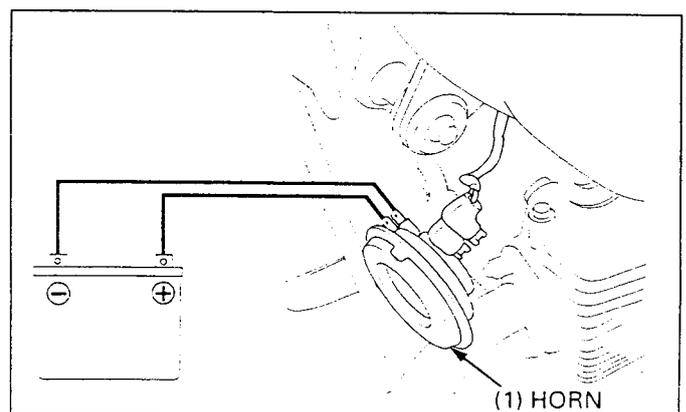


HORN

INSPECTION

Disconnect the horn wire connectors from the horn. Connect a 12 V battery to the horn terminals.

The horn is normal if it sounds when the 12 V battery is connected across the horn terminals.



ELECTRICAL SYSTEM

TURN SIGNAL RELAY

PERFORMANCE TEST

Remove the headlight case (page 16-11).

Disconnect the turn signal connector.

1. Short the black and gray terminals of the turn signal relay connector with a jumper wire. Start the engine and check the turn signal light by turning the switch ON.

Light comes on

Light does not come on

- Broken wire harness

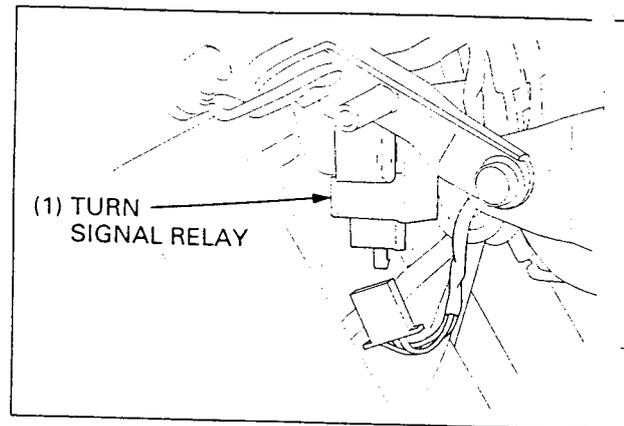
2. Check for continuity between the green terminal of the relay connector and ground.

Continuity

No continuity

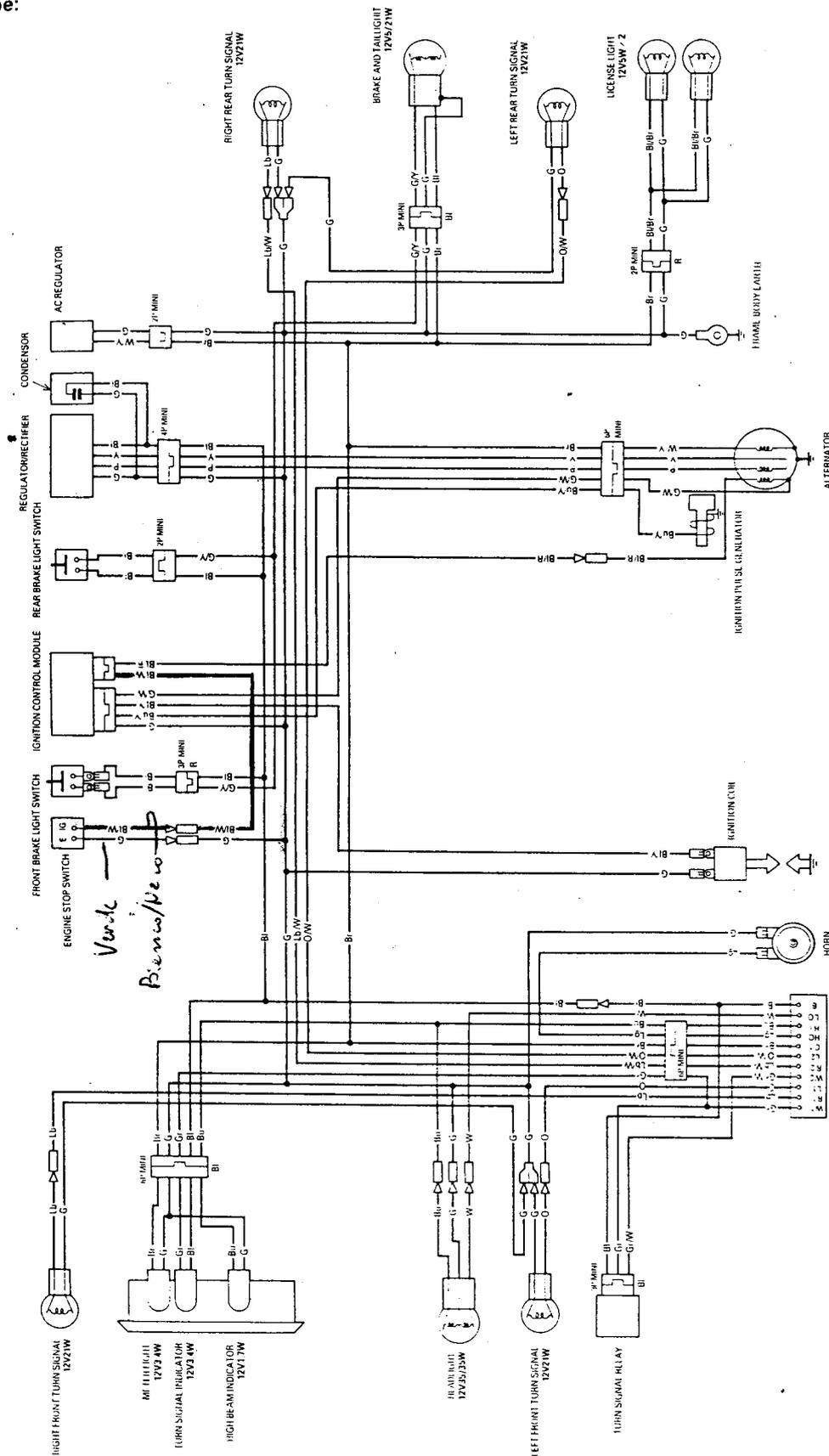
- Broken ground wire

- Faulty turn signal relay.
- Poor connection of the connector.



U type:

0030Z-KCE-6500



Verde
Bianco/Verde

- Bl BLACK
- Bw BROWN
- B BLUE
- O ORANGE
- G GREEN
- L LIGHT BLUE
- R RED
- P PINK
- W WHITE
- Gr GRAY

TURN SIGNAL SWITCH

	R1	W1	L1		R2	W2	L2
R				R			
N				N			
L				L			
COND. COLOR	Bl	Gr	O	COND. COLOR	Bl/W	Gr/W	O/W

DIMMER SWITCH

	C1	H1	LO
LO			
(N)			
H1			
COND. COLOR	Bl	Bl	W

HORN SWITCH

	B	HO
FALE		
PUSH		
COND. COLOR	Bl	ly

ENGINE STOP SWITCH

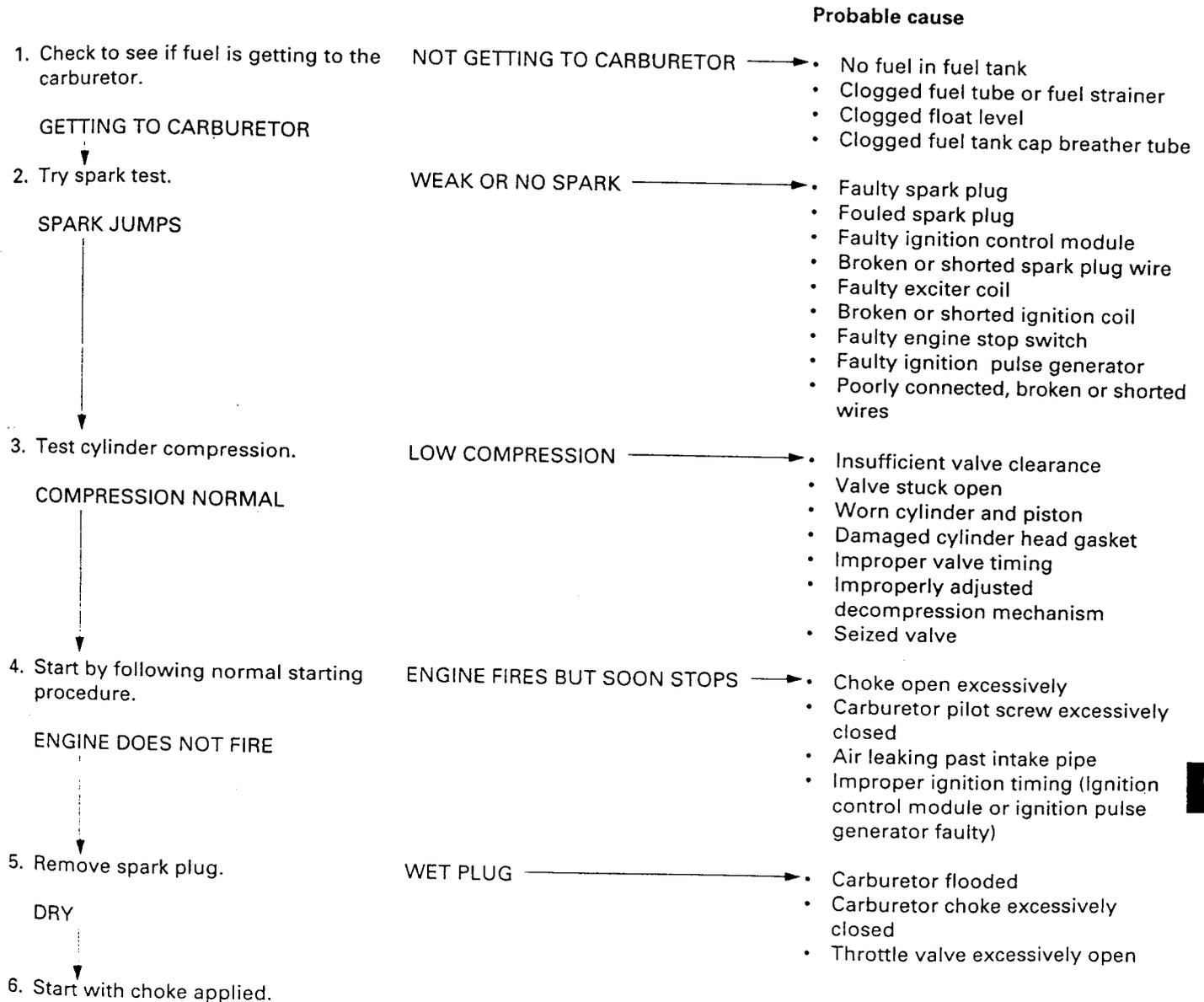
	E	IS
OFF		
RUN		
COND. COLOR	G	Bl/W

MEMO

18. TROUBLESHOOTING

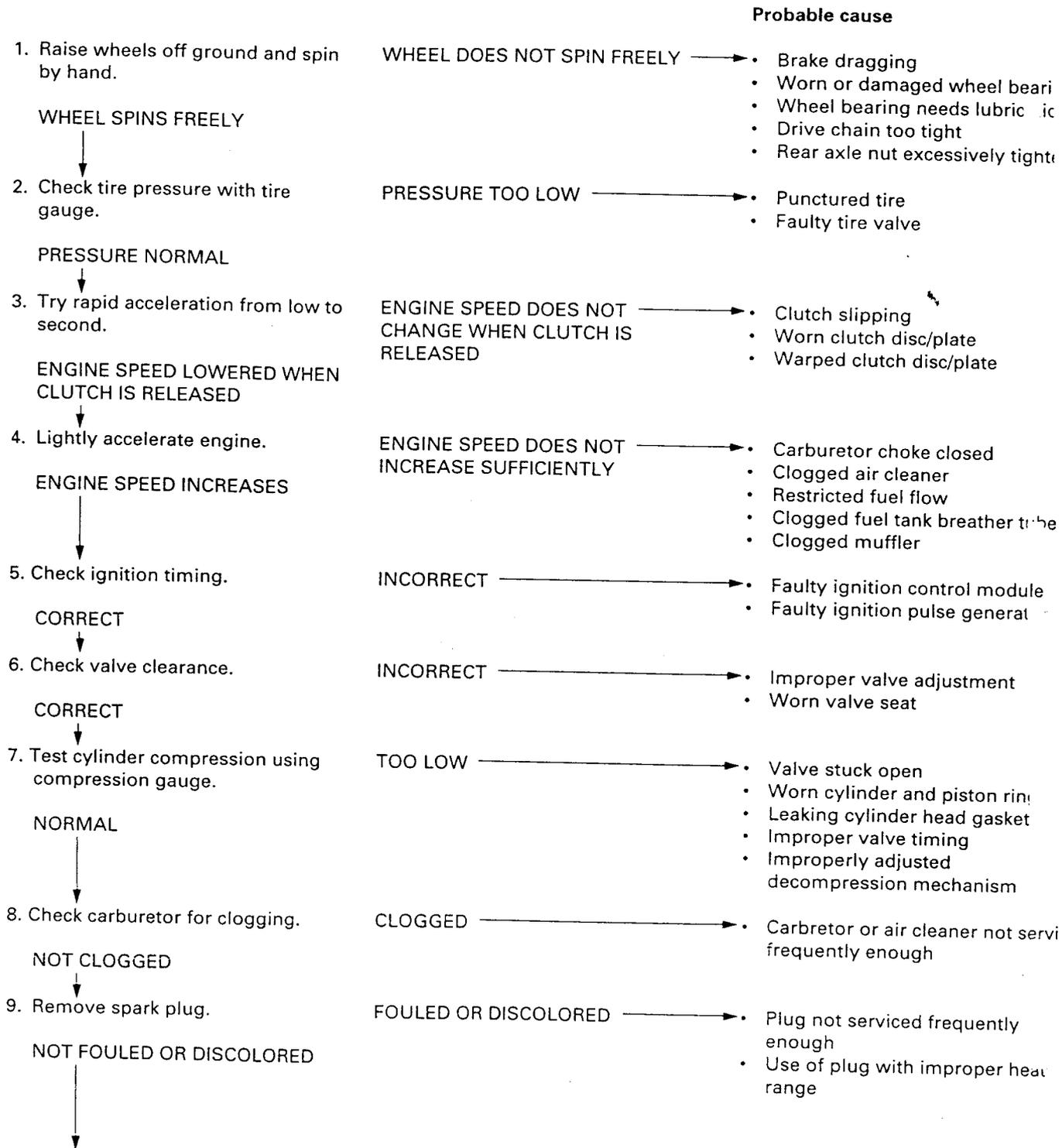
ENGINE DOES NOT START OR IS HARD TO START	18-1	POOR PERFORMANCE AT HIGH SPEED	18-4
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POOR PERFORMANCE AT LOW AND IDLE SPEED	18-3		

ENGINE DOES NOT TO START OR IS HARD TO START



TROUBLESHOOTING

ENGINE LACKS POWER



10. Remove oil level gauge and check oil level.

OIL LEVEL INCORRECT

- Oil level too high
- Oil level too low

CORRECT

11. Remove valve hole cap and inspect lubrication.

VALVE TRAIN NOT LUBRICATED PROPERLY

- Clogged oil passage
- Clogged oil control orifice
- Contaminated oil
- Faulty oil pump

VALVE TRAIN LUBRICATED PROPERLY

12. Check if engine overheats.

OVERHEATED

- Excessive carbon build-up in combustion chamber
- Improper quality fuel
- Clutch slipping
- Fuel/air mixture too lean

NORMAL

13. Accelerate or run at high speed.

ENGINE KNOCKS

- Worn piston and cylinder
- Fuel/air mixture too lean
- Use of improper grade of fuel
- Excessive carbon build-up in combustion chamber
- Ignition timing too advanced (Faulty ignition control module)

ENGINE DOES NOT KNOCK

POOR PERFORMANCE AT LOW AND IDLE SPEED

Probable cause

1. Check ignition timing and valve clearance.

INCORRECT

- Improper valve clearance
- Improper ignition timing (Faulty ignition control module or ignition pulse generator)

CORRECT

2. Check carburetor pilot screw adjustment.

INCORRECT

- Fuel/air mixture too lean (To correct, screw out)
- Fuel/air mixture too rich (To correct, screw in)

CORRECT

3. Check if air is leaking past manifold.

LEAKING

- Deteriorated insulator O-ring
- Loose carburetor

NOT LEAKING

4. Try spark test

WEAK OR INTERMITTENT SPARK

- Faulty, carbon or wet fouled spark plug
- Faulty ignition control module
- Faulty alternator
- Faulty ignition coil
- Faulty ignition pulse generator
- Loose or bare wires

GOOD SPARK

TROUBLESHOOTING

POOR PERFORMANCE AT HIGH SPEED

		Probable cause
1. Check ignition timing and valve clearance.	INCORRECT	<ul style="list-style-type: none">• Improper valve clearance• Improper ignition timing (Faulty ignition control module or ignition pulse generator)
CORRECT		
↓		
2. Disconnect fuel line at carburetor.	FUEL FLOW RESTRICTED	<ul style="list-style-type: none">• Lack of fuel in fuel tank• Clogged fuel line• Clogged fuel tank breather tube• Clogged fuel valve• Clogged fuel strainer
FUEL FLOWS FREELY		
↓		
3. Remove carburetor and check for clogged jet(s).	CLOGGED	<ul style="list-style-type: none">• Clean
NOT CLOGGED		
↓		
4. Check valve timing.	INCORRECT	<ul style="list-style-type: none">• Cam sprocket not installed properly
CORRECT		
↓		
5. Check valve spring tension	WEAK	<ul style="list-style-type: none">• Faulty spring
NOT WEAKENED		
↓		
6. Check muffler plate for clogging	CLOGGED	<ul style="list-style-type: none">• Remove and clean

POOR HANDLING ————— Check tire pressure.

	Probable cause
1. If steering is heavy. —————	<ul style="list-style-type: none">• Steering bearing adjustment too tight• Damaged steering bearing(s)
2. If either wheel is wobbling —————	<ul style="list-style-type: none">• Excessive wheel bearing play• Bent rim• Improperly installed wheel hub• Swingarm pivot bearing excessive play• Bent frame• Loose swingarm pivot bolt
3. If the motorcycle pulls to one side —————	<ul style="list-style-type: none">• Front and rear wheels not aligned• Bent front suspension or axle• Bent swingarm• Bent frame

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