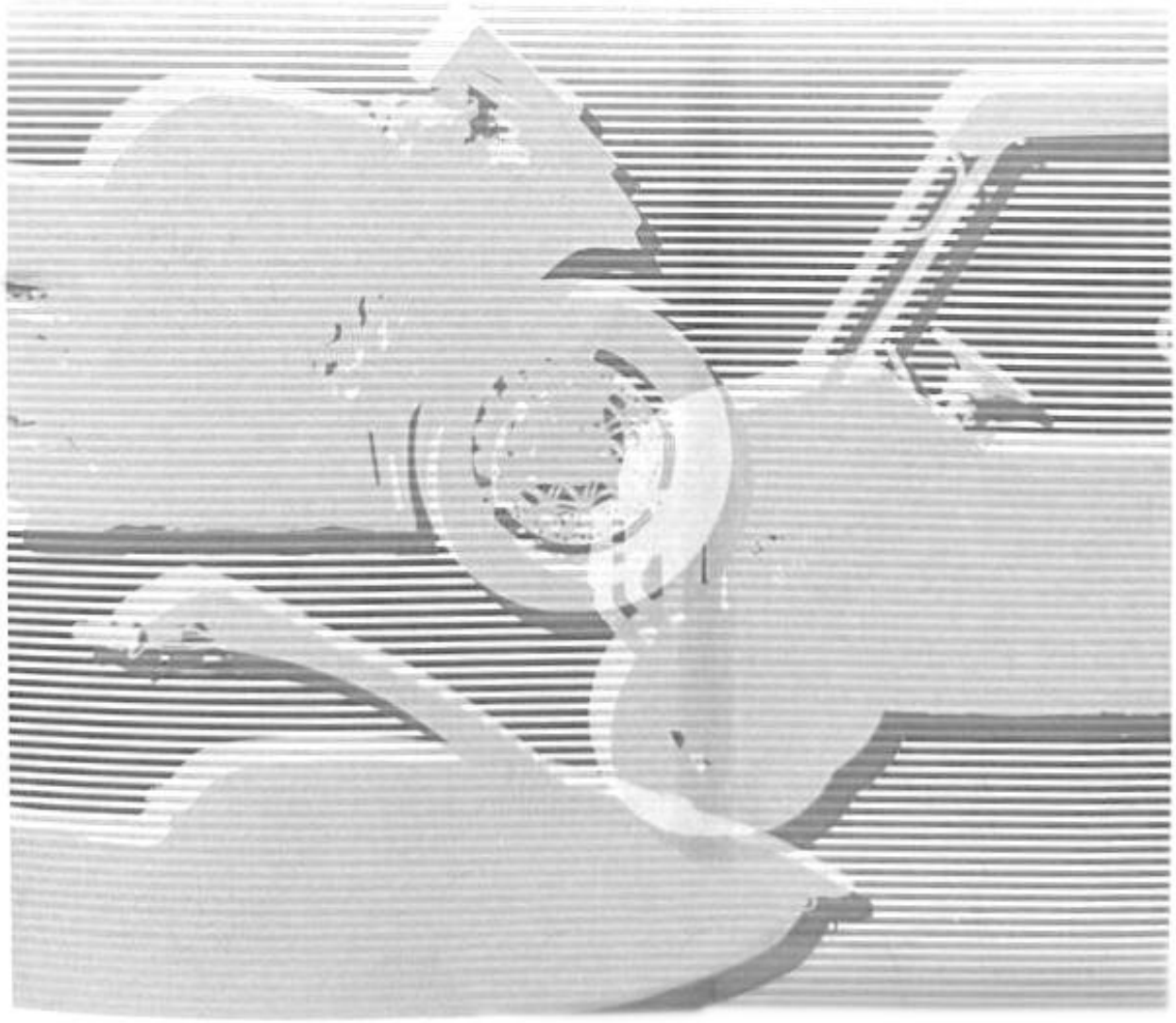
Kawasaki

Motorcycle
Service Manual

Ninja ZX-4R



Kawasaki

ZX400P/R/S

Motorcycle Service Manual

1st Edition (0) : Dec. 14, 2022

Quick Reference Guide

This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

LIST OF ABBREVIATIONS

A	ampere(s)	in.	inch(es)
ABDC	after bottom dead center	km/h	kilometers per hour
ABS	anti-lock brake system	L	liter(s)
AC	alternating current	LCD	liquid crystal display
Ah	ampere hour	LED	light emitting diode
ATDC	after top dead center	lb	pound(s)
BBDC	before bottom dead center	m	meter(s)
BDC	bottom dead center	min	minute(s)
BTDC	before top dead center	mmHg	millimeters of mercury
°C	degree(s) Celsius	mph	miles per hour
cmHg	centimeters of mercury	N	newton(s)
cu in.	cubic inch(es)	oz	ounce(s)
DC	direct current	Pa	pascal(s)
DFI	digital fuel injection	PS	horsepower
DOHC	double overhead camshaft	psi	pound(s) per square inch
DOT	department of transportation	qt	quart(s)
ECU	electronic control unit	r	revolution
F	farad(s)	rpm	revolution(s) per minute
°F	degree(s) Fahrenheit	s	second(s)
ft	foot, feet	TDC	top dead center
g	gram(s)	TIR	total indicator reading
gal	gallon(s)	V	volt(s)
h	hour(s)	W	watt(s)
HP	horsepower(s)	Ω	ohm(s)
IC	integrated circuit		

COUNTRY AND AREA CODES

CA	Canada	PH	Philippines
CAL	California	US	United States
ID	Indonesia		

Foreword

(About this manual)
This service manual explains maintenance procedures for removing, installing, disassembling, assembling, and adjusting, as necessary, including periodic inspection and maintenance of major parts of recording models.

(Disclaimer)
1. This book does not describe all the matters concerning maintenance. This book is made for people who have basic skills and knowledge on maintenance of Kawasaki Products (authorized Kawasaki dealers or other repairers). So those who do not have these skills and knowledge do not do maintenance or inspection with this manual. Skill shortage and lack of knowledge may cause maintenance troubles, parts breakage, etc.
2. All information contained in this publication is based on the latest product information available at the time of publication. No liability can be accepted for any inaccuracies or omissions in this publication, although every possible care has been taken to make it as complete and accurate as possible.
3. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.
4. The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. Please accept beforehand that the description content, illustration, photographs etc. may differ from actual vehicle due to vehicle specification change.
5. The content of the description may be changed without prior notice for vehicle specification change etc.

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

For example, if you want stick coil information, use the Quick Reference Guide to locate the Electrical System chapter. Then, use the Table of Contents on the first page of the chapter to find the Stick Coil section.

Whenever you see symbols, heed their instructions! Always follow safe operating and maintenance practices.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

This manual contains four more symbols which will help you distinguish different types of information.

NOTE

○*NOTE indicates information that may help or guide you in the operation or service of the vehicle.*

- Indicates a procedural step or work to be done.

○Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

★Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

General Information

Table of Contents

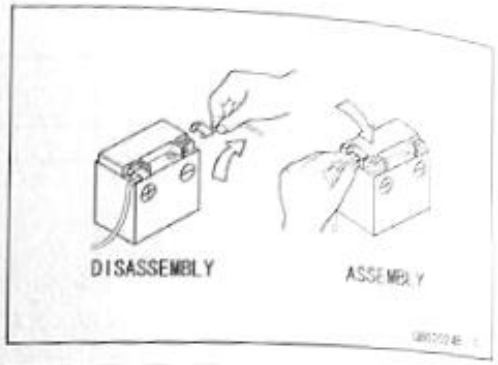
Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a motorcycle, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following.

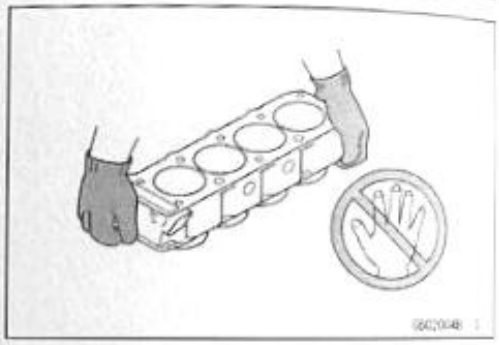
Battery Ground

Before completing any service on the motorcycle, disconnect the battery cables from the battery to prevent the engine from accidentally turning over. Disconnect the ground cable (–) first and then the positive (+). When completed with the service, first connect the positive (+) cable to the positive (+) terminal of the battery then the negative (–) cable to the negative (–) terminal.



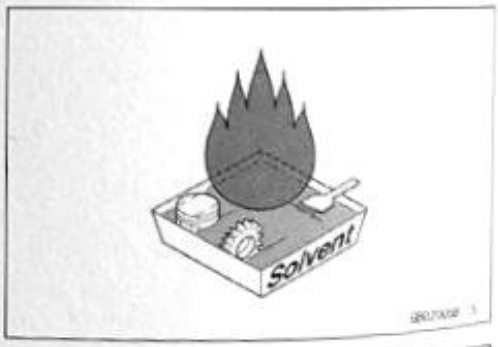
Edges of Parts

Lift large or heavy parts wearing gloves to prevent injury from possible sharp edges on the parts.



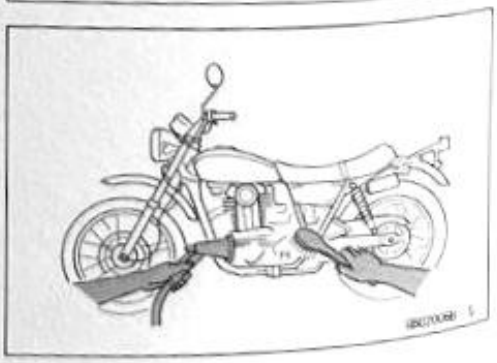
Solvent

Use a high flash-point solvent when cleaning parts. High flash-point solvent should be used according to directions of the solvent manufacturer.



Cleaning Vehicle before Disassembly

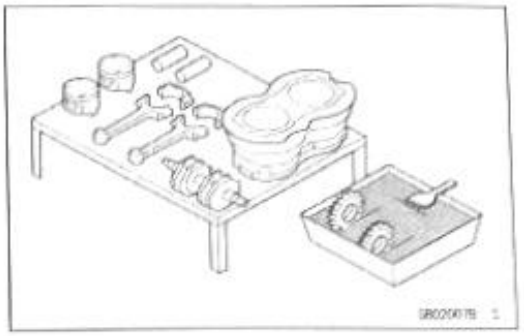
Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



Before Servicing

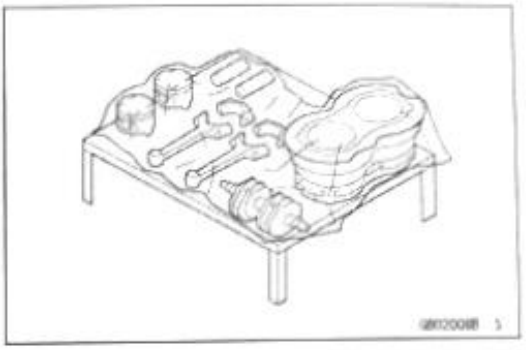
Arrangement and Cleaning of Removed Parts

Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



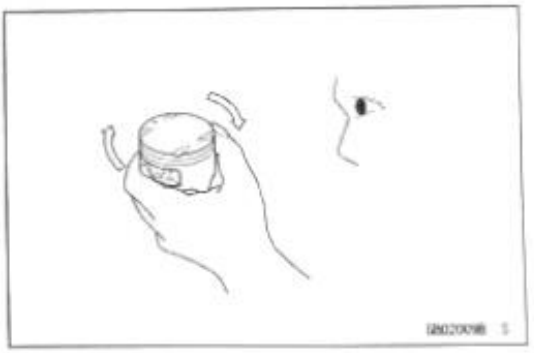
Storage of Removed Parts

After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



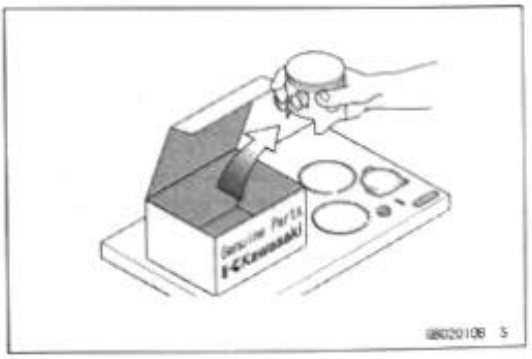
Inspection

Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its service limit.



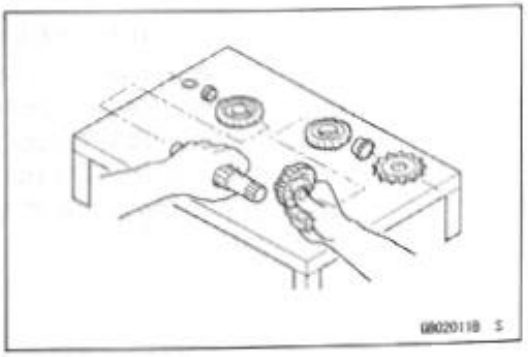
Replacement Parts

Replacement parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, oil seals, grease seals, circlips, cotter pins or self-locking nuts must be replaced with new ones whenever disassembled.



Assembly Order

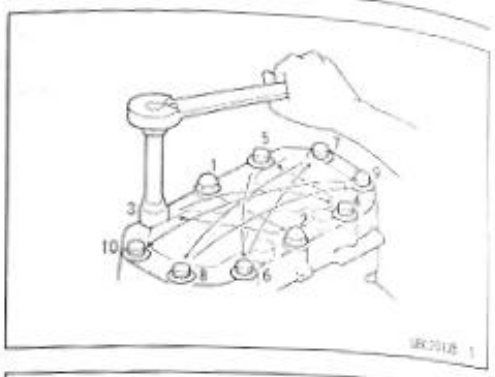
In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



Before Servicing

Tightening Sequence

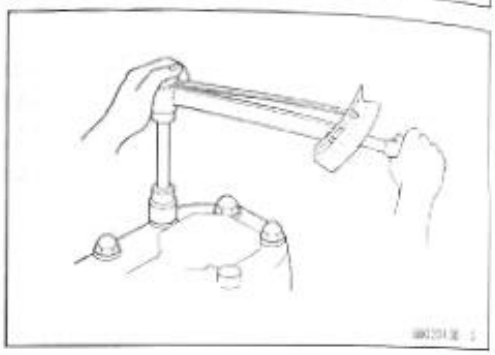
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



Tightening Torque

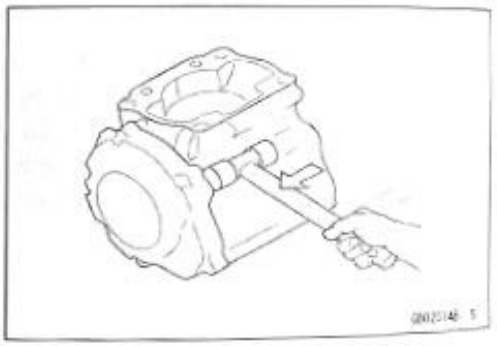
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

All of the tightening torque values are for use with dry, solvent - cleaned threads unless otherwise indicated. If a fastener which should have dry, clean threads gets contaminated with lubricant, etc., applying even the specified torque could damage it.



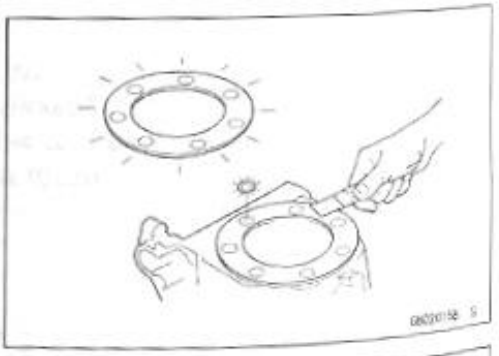
Force

Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non -permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.



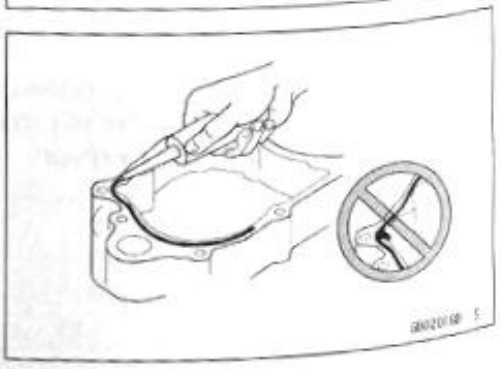
Gasket, O-ring

Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install the new gaskets and replace the used O-rings when re-assembling.



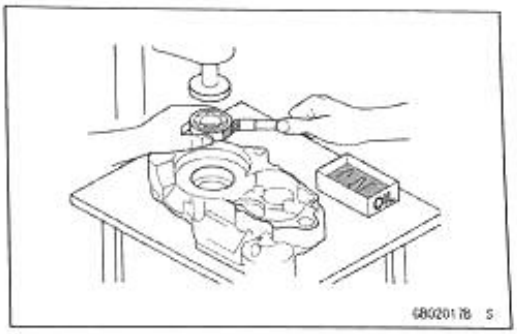
Liquid Gasket, Non-permanent Locking Agent

For applications that require Liquid Gasket or a Non-permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or non-permanent locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



Press

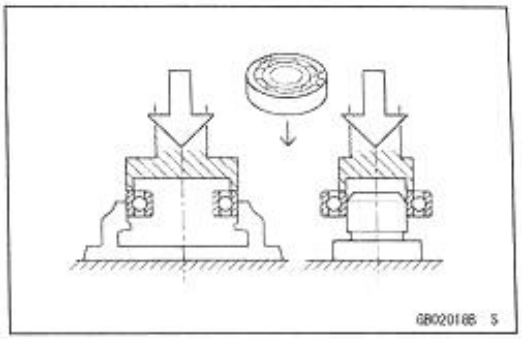
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

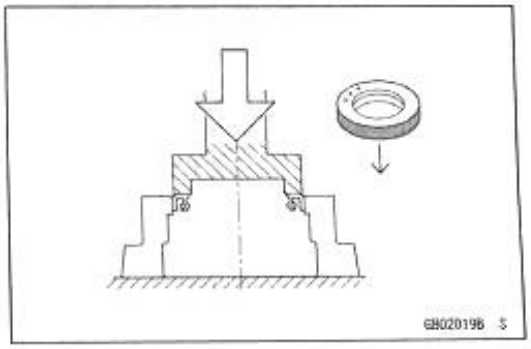
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

Pressing the incorrect race can cause pressure between the inner and outer race and result in bearing damage.

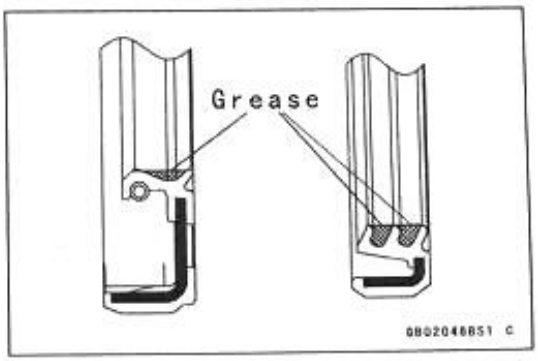


Oil Seal, Grease Seal

Do not remove pressed oil or grease seals unless removal is necessary. Replace with new ones whenever removed. Press new oil seals with manufacture and size marks facing out. Make sure the seal is aligned properly when installing.

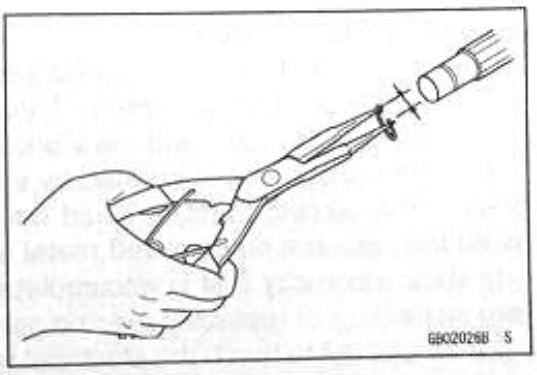


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

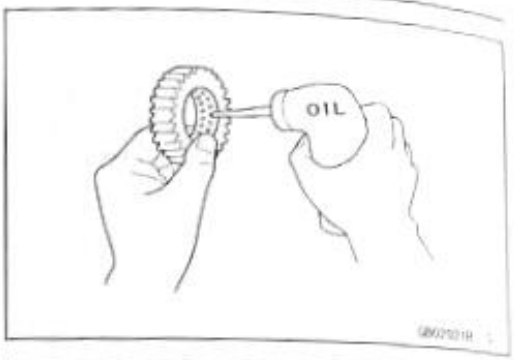
Replace the circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



Before Servicing

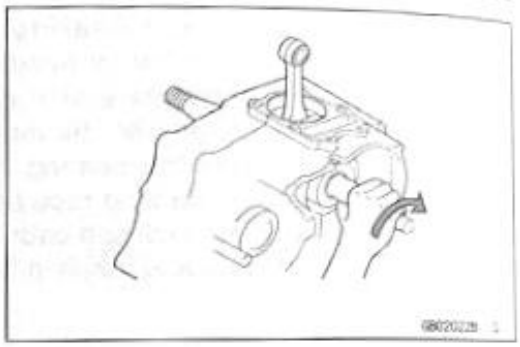
Lubrication

It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



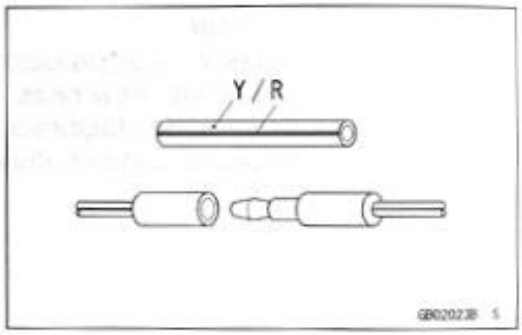
Direction of Engine Rotation

When rotating the crankshaft by hand, the free play amount of rotating direction will affect the adjustment. Rotate the crankshaft to positive direction (clockwise viewed from output side).



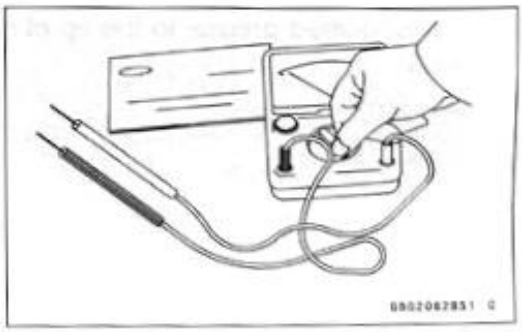
Electrical Wires

A two-color wire is identified first by the primary color and then the stripe color. Unless instructed otherwise, electrical wires must be connected to those of the same color.



Instrument

Use a meter that has enough accuracy for an accurate measurement. Read the manufacture's instructions thoroughly before using the meter. Incorrect values may lead to improper adjustments.



Handling Electronic Parts

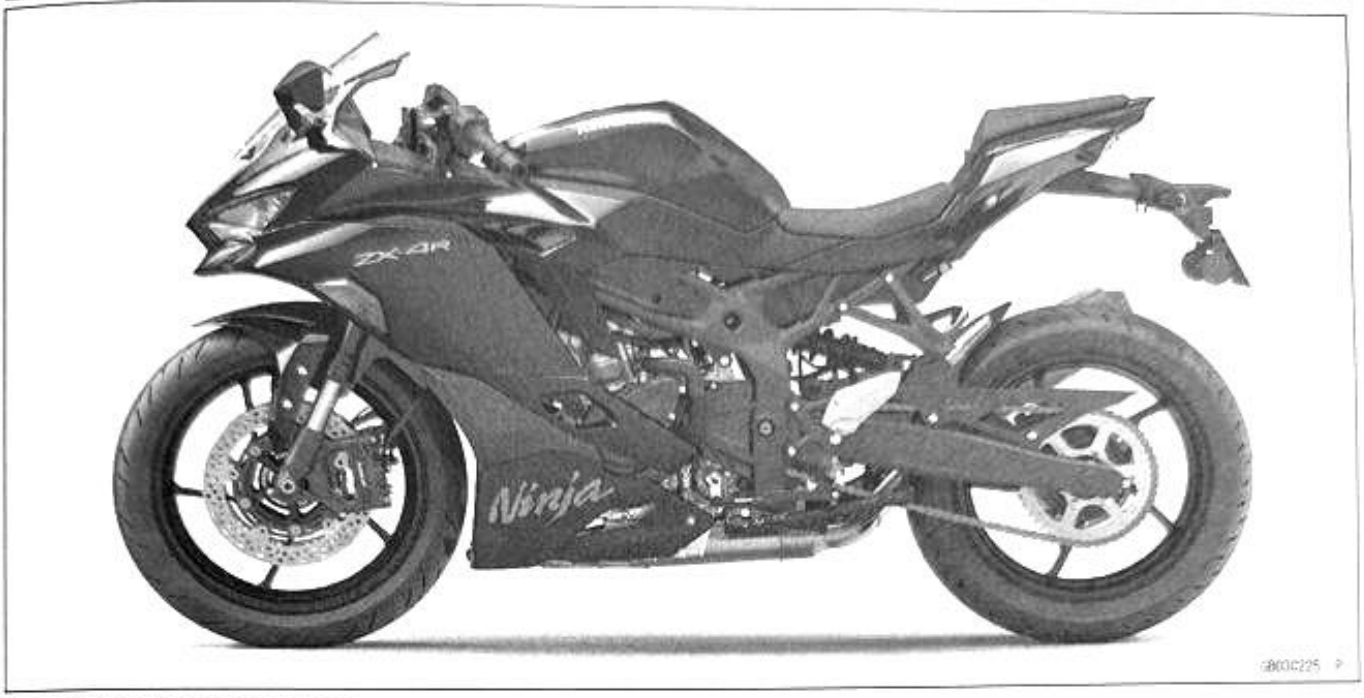
Severe impacts to electronic parts such as the ECU, sensor, and relay can damage them. If dropped on a hard surface, replace such parts with new ones.

If a high voltage that is created by static electricity is applied to the electric parts, it could cause them to fail. To avoid this, touch a non-painted metal surface to discharge any static electricity that is accumulated on your body before inspecting or replacing electric parts.

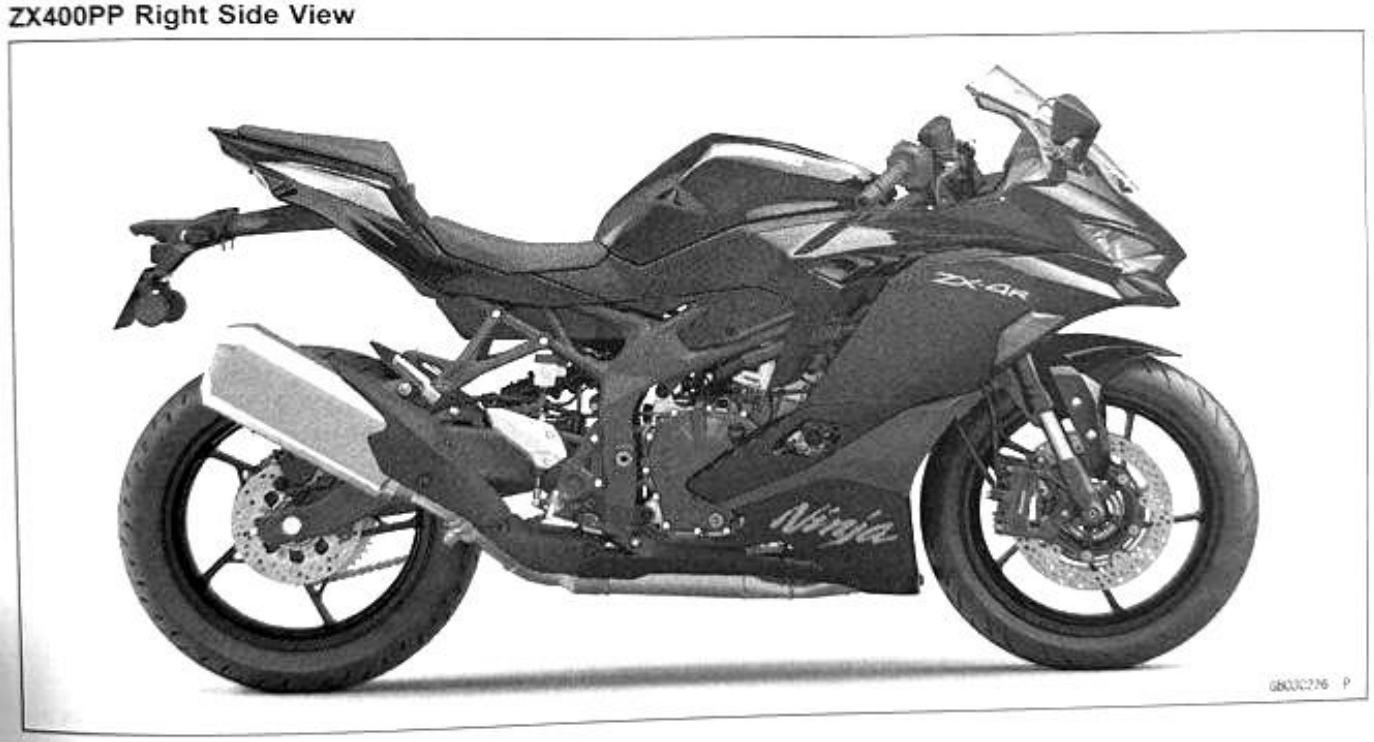
Be careful not to touch the electrical terminals of the electronic parts. The static electricity discharged from your body could damage them or deform the electrical terminals.

Model Identification

ZX400PP Left Side View

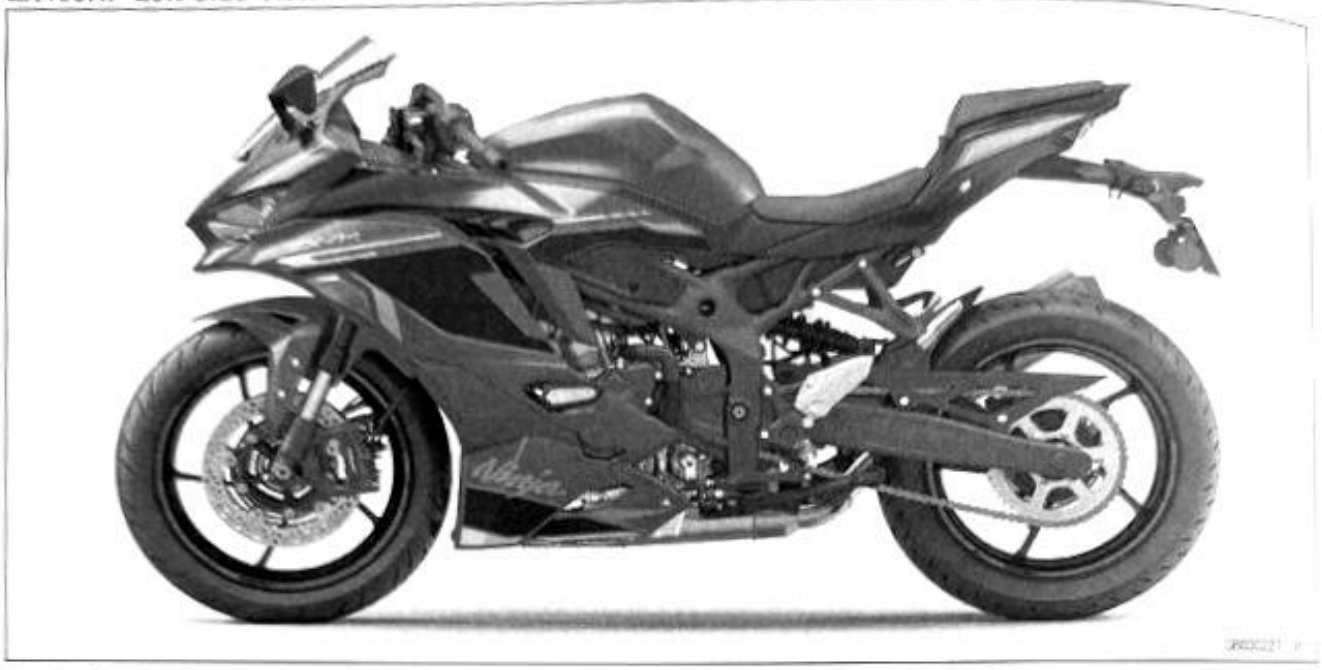


ZX400PP Right Side View



Model Identification

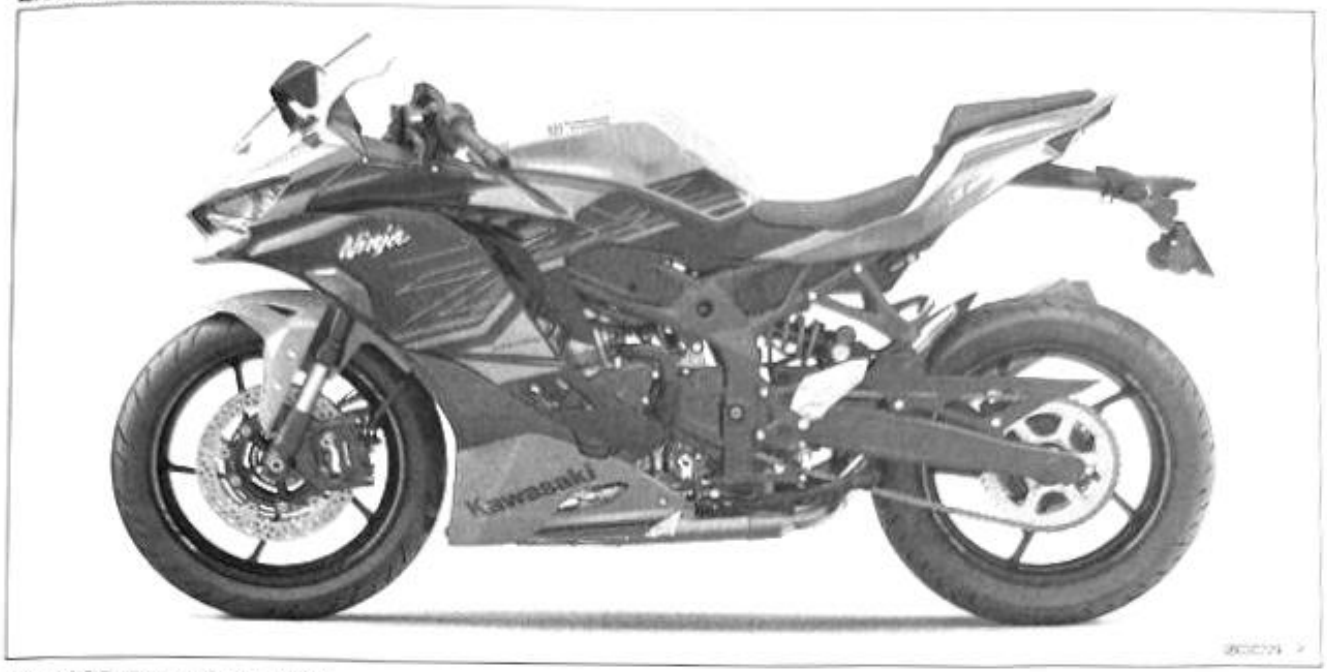
ZX400RP Left Side View



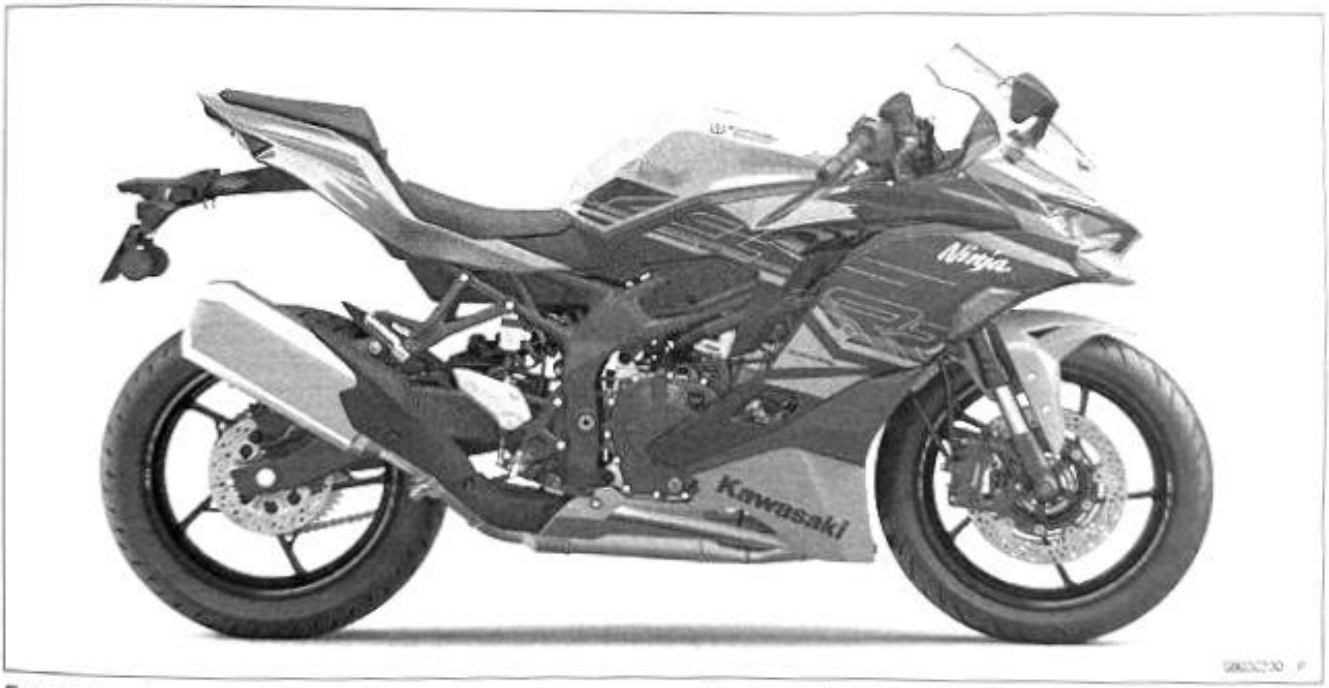
ZX400RP Right Side View

Model Identification

ZX400SP Left Side View

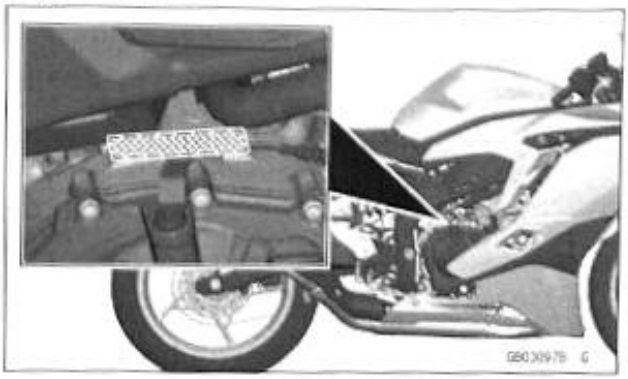


ZX400SP Right Side View



Frame Number

Engine Number



General Specifications

Item	ZX400PP/RP/SP
Dimensions:	
Overall Length	1 990 mm (78.35 in.)
Overall Width	765 mm (30.12 in.)
Overall Height	1 110 mm (43.70 in.)
Wheel Base	1 380 mm (54.33 in.)
Ground Clearance	135 mm (5.31 in.)
Seat Height	800 mm (31.5 in.)
Curb Mass:	
ZX400P/S:	188 kg (415 lb)
	(ID) 189 kg (417 lb)
Front	99 kg (218 lb)
Rear	89 kg (196 lb)
	(ID) 90 kg (198 lb)
ZX400R:	189 kg (417 lb)
Front	100 kg (221 lb)
Rear	89 kg (196 lb)
Fuel Tank Capacity	15 L (4.0 US gal)
Performance	
Minimum Turning Radius	2.6 m (8.5 ft.)
Engine	
Type	4-stroke, DOHC, 4-cylinder
Cooling System	Liquid-cooled
Bore and Stroke	57.0 × 39.1 mm (2.24 × 1.54 in.)
	(PH) 57.0 × 39.3 mm (2.24 × 1.55 in.)
Displacement	399 cm³ (24.3 cu in.)
	(PH) 401 cm³ (24.5 cu in.)
Compression Ratio	12.3 : 1
	(PH) 12.6 : 1
Maximum Horsepower	55.0 kW (75 PS) @ 14 500 r/min (rpm)
	(PH) 57.0 kW (77 PS) @ 14 000 r/min (rpm)
	(CA, CAL) – – –
Maximum Torque	37.6 N·m (3.8 kgf·m, 28 ft·lb) @ 12 500 r/min (rpm)
	(PH) 39.6 N·m (4.0 kgf·m, 29 ft·lb) @ 13 200 r/min (rpm)
	(CA, CAL) – – –
Fuel System	FI (Fuel injection) Primary: KEIHIN (Hitachi Astemo) ϕ34 x 4
Fuel Type:	Unleaded gasoline
Minimum Octane Rating:	
Research Octane number (RON)	91
	(PH) 95
Antiknock Index (RON + MON)/2	87
Starting System	Electric Starter
Ignition System	Battery and coil (transistorized)
Timing Advance	Electronically advanced (digital igniter in ECU)

General Specifications

Item	ZX400PP/RP/SP
Ignition Timing	9.5° BTDC @ 1 000 r/min (rpm) – 38.0° BTDC @ 6 500 r/min (rpm) (PH) 10.2° BTDC @ 1 600 r/min (rpm) – 35.0° BTDC @ 4 500 r/min (rpm) (CA, CAL) 10° BTDC @ 1 000 r/min (rpm) – 38° BTDC @ 6 500 r/min (rpm)
Spark Plug	NGK LMAR9G
Cylinder Numbering Method	Left to right, 1-2-3-4
Firing Order	1-2-4-3
Valve Timing:	
Intake:	
Open	23° (BTDC)
Close	63° (ABDC)
Duration	266°
Exhaust:	
Open	55° (BBDC)
Close	25° (ATDC)
Duration	260°
Lubrication System	Forced lubrication (wet sump)
Engine Oil:	
Grade	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	3.0 L (3.2 US qt)
Drive Train	
Primary Reduction System:	
Type	Gear
Reduction Ratio	2.029 (69/34)
Clutch Type	Wet multi disc
Transmission:	
Type	6-speed, constant mesh, return shift
Gear Ratios:	
1st	2.929 (41/14)
2nd	2.056 (37/18)
3rd	1.619 (34/21)
4th	1.333 (32/24)
5th	1.154 (30/26)
6th	1.037 (28/27)
Final Drive System:	
Type	Chain drive
Reduction Ratio	3.429 (48/14) (PH) 2.867 (43/15)
Overall Drive Ratio	7.216@ Top gear (PH) 6.033@ Top gear

General Specifications

Item	ZX400PP/RP/SP
Frame	
Type	Trelis, High-tensile steel
Caster (Rake Angle)	23.5° (non-adjustable)
Trail	97 mm (3.82 in.)
Tire:	
Front:	
Type	Tubeless
Size	120 / 70 ZR17M/C (58W)
Rim Size	17M/C x MT3.50
Rear:	
Type	Tubeless
Size	160 / 60 ZR17M/C (69W)
Rim Size	17M/C x MT4.50
Suspension:	
Front:	
Type	Telescopic fork (upside-down)
Wheel Travel	120 mm (4.72 in.)
Rear:	
Type	Swingarm (horizontal back-link)
Wheel Travel:	
ZX400P/R	112 mm (4.41 in.)
ZX400S	120 mm (4.72 in.)
Brake Type:	
Front	Dual discs
Rear	Single disc
Electrical Equipment	
Battery	12 V 8.6 Ah
Headlight	LED
City Light	LED
Brake/Tail Light	LED
Turn Signal Light	LED
License Plate Light	LED
Alternator:	
Type	Three-phase AC
Maximum Output	14.0 V - 21.0 A @5 000 r/min (rpm)

Specifications are subject to change without notice, and may not apply to every country.

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	× 0.01
milli	m	× 0.001
micro	μ	× 0.000001

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (IMP)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (IMP)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (IMP)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (IMP)
mL	×	0.06102	=	cu in.

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in.

Units of Torque:

N·m	×	0.1020	=	kgf·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb
kgf·m	×	9.807	=	N·m
kgf·m	×	7.233	=	ft·lb
kgf·m	×	86.80	=	in·lb

Units of Pressure:

kPa	×	0.01020	=	kgf/cm²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm²	×	98.07	=	kPa
kgf/cm²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

Units of Speed:

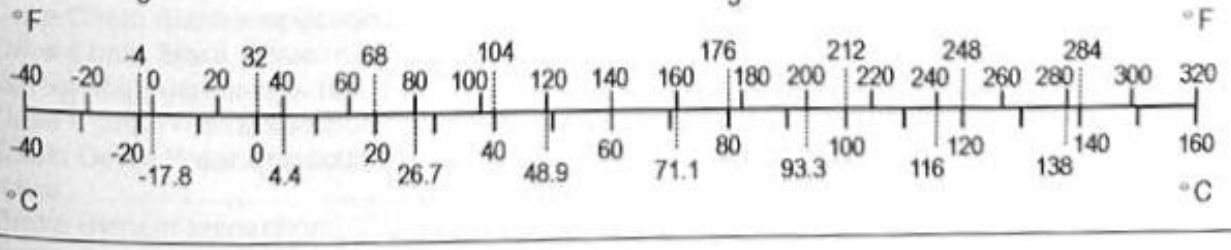
km/h	×	0.6214	=	mph

Units of Power:

kW	×	1.360	=	PS
kW	×	1.341	=	HP
PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature:

$$\frac{9(°C+40)}{5} - 40 = °F \qquad \frac{5(°F+40)}{9} - 40 = °C$$



Periodic Maintenance

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Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the motorcycle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

Periodic Inspection

*A: Service at number of years shown or indicated odometer reading intervals, whichever comes first.
*B: For higher odometer readings, repeat at the frequency interval established here.
*C: Service more frequently when operating in severe conditions: dusty, wet, muddy, high speed, or frequent starting/stopping.
○: Emission Related Item

Q: Inspection
↻: Change or Replace
🔧: Lubrication

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	12 (7.6)	24 (15.2)	36 (22.8)	48 (30.4)	See Page
Fuel System								
○	Air cleaner element (*C)				↻		↻	2-15
○	Idle speed		Q	Q	Q	Q	Q	2-16
○	Throttle control system (smooth return)	Q:1	Q	Q	Q	Q	Q	2-16
○	Engine vacuum synchronization			Q	Q	Q	Q	2-16
	Fuel system	Q:1	Q	Q	Q	Q	Q	2-19
	Fuel filter				↻		↻	2-20
	Fuel hose	↻:5						2-22
○	Evaporative emission control system				Q		Q	2-23
Cooling System								
	Cooling system	Q:1	Q	Q	Q	Q	Q	2-25
	Coolant, water hose and O-ring	↻:3				↻		2-25, 2-27
Engine Top End								
○	Valve clearance				Q		Q	2-28
○	Air suction system			Q	Q	Q	Q	2-33
Clutch								
	Clutch operation (play, engagement, disengagement)	Q:1	Q	Q	Q	Q	Q	2-34
Engine Lubrication System								
	Engine oil (*C) and oil filter	↻:1	↻	↻	↻	↻	↻	2-35, 2-36
Wheels and Tires								
	Wheel bearing damage	Q:1		Q	Q	Q	Q	2-37
Final Drive								
	Drive chain wear (*C)			Q	Q	Q	Q	2-41
	Drive chain guide wear			Q	Q	Q	Q	2-41

Periodic Maintenance Chart

	Items	year (*A)	Odometer Reading (*B) × 1 000 km (× 1 000 mile) 1 (0.6)	12 (7.6)	24 (15.2)	36 (22.8)	48 (30.4)	See Page
Brakes								
	Brake system	Q:1	Q	Q	Q	Q	Q	2-42
	Brake operation (effectiveness, play, no drag)	Q:1	Q	Q	Q	Q	Q	2-42
	Brake fluid (front and rear)	↻:2			↻		↻	2-43
	Brake hose	↻:4						2-44
	Rubber parts of brake master cylinder and caliper	↻:4					↻	2-46 2-48 2-49
Suspension								
	Suspension system	Q:1		Q	Q	Q	Q	2-54
	Lubrication of rear suspension				◣		◣	2-55
Steering								
	Steering play	Q:1	Q	Q	Q	Q	Q	2-55
	Steering stem bearing	◣:2			◣		◣	2-57
Electrical System								
	Electrical system	Q:1		Q	Q	Q	Q	2-58 2-60 2-61 2-61
○	Spark plug			↻	↻	↻	↻	2-62
Others								
	Chassis parts	◣:1		◣	◣	◣	◣	2-62
	Condition of bolts, nuts and fasteners		Q	Q	Q	Q	Q	2-63

Daily Checks

NOTE

○Daily maintenance items should also be checked at every scheduled dealer service.

Daily Maintenance Items		See Page
Fuel	Adequate supply in tank, no leaks	–
Engine oil	Oil level between level lines	–
Tires	Air pressure (when cold), install the air valve cap	2-36
	Tire wear	2-36
Drive chain	Slack: every 1 000 km (600 mile)	2-39
	Lubricate: every 600 km (400 mile)	2-38
Bolts, nuts and fasteners	Check for loose and/or missing bolts, nuts and fasteners	2-63
Steering	Action smooth but not loose from lock to lock	–
	No binding of control cables	–
Brakes	Brake pad wear	2-52
	Brake fluid level	2-43
	No brake fluid leakage	2-42
Throttle	Throttle grip operates smoothly	2-16
Clutch	Clutch lever free play	2-34
	Clutch lever operates smoothly	2-34
Coolant	No coolant leakage	2-25
	Coolant level between level lines (when engine is cold)	2-24
Electrical equipment	All lights (head, city, brake/tail, turn signal, license plate, warning/indicator), meter and horn work	2-58
Engine stop switch	Stops engine	2-61
Side stand	Return to its fully up position by spring tension	–
	Return spring not weak or not damaged	–
Rear view mirrors	Rear view sight	–

Torque and Locking Agent

The following tables list the tightening torque for the major fasteners requiring use of a non-permanent locking agent or silicone sealant etc. All of the values are for use with dry solvent cleaned threads unless otherwise indicated.

Letters used in the "Remarks" column mean:
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
L: Apply a non-permanent locking agent (Middle strength: Loctite 243 or equivalent)
LG: Apply liquid gasket.
Lh: Left-hand Threads
LN: Apply a non-permanent locking agent (High strength: Loctite 648 or equivalent)
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System (DFI)				
Intake Duct Bolts (M5)	0.5	0.05	4.4 in·lb	S
Intake Duct Bolt (M6)	4.0	0.41	35 in·lb	S
Intake Duct Clamp Bolt	2.9	0.30	26 in·lb	S
Air Cleaner Housing Bolt	8.0	0.82	71 in·lb	
Air Cleaner Element Screw	1.2	0.12	11 in·lb	
Air Cleaner Housing Assembly Screws	1.2	0.12	11 in·lb	
Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	
Intake Air Pressure Sensor Screws	4.9	0.50	43 in·lb	
Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	R
Delivery Pipe Assy Screws	3.4	0.35	30 in·lb	
Canister Bracket Bolts	9.8	1.0	87 in·lb	
Purge Valve Nut	7.0	0.71	62 in·lb	
Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
Fuel Pump Bolts	9.8	1.0	87 in·lb	R, S
Gear Position Sensor Bolt	10	1.0	89 in·lb	
Cooling System				
Coolant Reserve Tank Bolts	8.0	0.82	71 in·lb	
Connector Bracket Bolts	8.0	0.82	71 in·lb	
Radiator Bolt	9.8	1.0	87 in·lb	
Coolant Drain Bolt (Cylinder)	10	1.0	89 in·lb	
Radiator Fan Bolts	8.4	0.86	74 in·lb	R
Water Hose Fitting	10	1.0	89 in·lb	
Thermostat Housing Bolts	6.0	0.61	53 in·lb	
Water Hose Fitting Cover Bolt (L = 20 mm)	10	1.0	89 in·lb	
Water Hose Fitting Cover Bolt (L = 35 mm)	10	1.0	89 in·lb	R
Water Pipe Bolt	10	1.0	89 in·lb	
Water Pump Cover Bolts (L = 25 mm)	10	1.0	89 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Water Pump Cover Bolts (L = 55 mm)	10	1.0	89 in·lb	
Coolant Drain Bolt	10	1.0	89 in·lb	
Water Pump Impeller	10	1.0	89 in·lb	
Engine Top End				
Air Suction Valve Cover Bolts	10	1.0	89 in·lb	
Sub Cover Bolts	10	1.0	89 in·lb	
Cylinder Head Cover Bolts	10	1.0	89 in·lb	S
Camshaft Cap Bolts	12	1.2	106 in·lb	S
Cylinder Head Plugs	19.6	2.00	14.5	R
Camshaft Sprocket Bolts	15	1.5	11	LN
Camshaft Chain Tensioner Bolts	10	1.0	89 in·lb	
Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
Rear Camshaft Chain Guide Bolt	25	2.5	18	
Cylinder Head Bolts (M8)	see the text	←	←	MO, S
Cylinder Head Bolts (M6)	15	1.5	11	S
Muffler Body Cover Bolts	7.0	0.71	62 in·lb	
Muffler Body Bolt	25	2.5	18	
Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	S
Exhaust Pipe Bolt	20	2.0	15	S
Exhaust Pipe Cover Bolts	7.0	0.71	62 in·lb	
Muffler Body Clamp Bolt	15	1.5	11	
Clutch				
Clutch Lever Holder Clamp Bolts	8.8	0.90	78 in·lb	S
Clutch Stopper Bolts	10	1.0	89 in·lb	
Clutch Hub Nut	132	13.5	97.4	
Clutch Cover Bolts	10	1.0	89 in·lb	R (1), S
Engine Lubrication System				
Oil Nozzles (M5)	3.0	0.31	27 in·lb	
Oil Pipe Holder Bolts	10	1.0	89 in·lb	R
Oil Pump Driven Gear Bolt	10	1.0	89 in·lb	R
Oil Nozzle (M6)	4.0	0.41	35 in·lb	
Oil Passage Plugs	20	2.0	15	R
Oil Pressure Switch	15	1.5	11	LG
Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
Oil Filter	17.5	1.78	12.9	G, R
Oil Filter Pipe	35	3.6	26	L
Oil Pressure Relief Valve	15	1.5	11	L
Oil Pan Bracket Bolts	6.9	0.70	61 in·lb	
Oil Pan Bolts	10	1.0	89 in·lb	S
Engine Oil Drain Bolt	30	3.1	22	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Removal/Installation				
Engine Mounting Bolt (Front Right)	60	6.1	44	
Adjusting Collar Locknut	49	5.0	36	S
Adjusting Collar	1.5	0.15	13 in·lb	S
Engine Mounting Bolt (Front Left)	60	6.1	44	S
Engine Mounting Nut (Middle)	44	4.5	32	S
Engine Mounting Nut (Lower)	44	4.5	32	R, S
Crankshaft/Transmission				R, S
Connecting Rod Big End Nuts	see the text	←	←	MO
Oil Nozzles (M5)	3.0	0.31	27 in·lb	
Side Oil Plate Bolt	10	1.0	89 in·lb	
Breather Plate Bolts	10	1.0	89 in·lb	R
Oil Pressure Switch	15	1.5	11	LG
Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
Starter Motor Clutch Bolts	12	1.2	106 in·lb	R
Oil Passage Plugs	20	2.0	15	R
Oil Nozzle (M6)	4.0	0.41	35 in·lb	
Crankcase Bolts (M6, L = 55 mm)	10	1.0	89 in·lb	S
Crankcase Bolts (M8, L = 80 mm)	27.5	2.80	20.3	S
Crankcase Bolt (M7, L = 80 mm)	20	2.0	15	S
Crankcase Bolts (M6, L = 40 mm)	10	1.0	89 in·lb	S
Crankcase Bolt (M8, L = 50 mm)	27.5	2.80	20.3	S
Crankcase Bolts (M6, L = 30 mm)	10	1.0	89 in·lb	S
Crankcase Bolts (M8, L = 95 mm)	see the text	←	←	MO, S
Crankcase Bolts (M8, L = 55 mm)	20	2.0	15	S
Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	R
Shift Drum Bearing Holder Bolts	10	1.0	89 in·lb	R
Gear Positioning Lever Bolt	10	1.0	89 in·lb	R
Shift Shaft Return Spring Pin	29	3.0	21	R
Gear Position Sensor Bolt	10	1.0	89 in·lb	
Shift Lever Tie-rod Locknuts	7.0	0.71	62 in·lb	Lh (1)
Shift Lever Bolt	9.8	1.0	87 in·lb	
Shift Pedal Bolt	25	2.5	18	R
Wheels/Tires				
Front Axle Clamp Bolt	20	2.0	15	
Front Axle	98	10	72	
Rear Axle Nut	98	10	72	
Final Drive				
Chain Guide Bolt	2.0	0.20	18 in·lb	
Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	MO
Engine Sprocket Nut	127	13.0	93.7	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Rear Sprocket Nuts	59	6.0	44	R
Brakes				
Brake Hose Banjo Bolts	25	2.5	18	
Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 23 mm)	25	2.5	18	S
Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 37 mm)	25	2.5	18	S
Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	
Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
Front Master Cylinder Clamp Bolts	10	1.0	89 in·lb	S
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Front Wheel Rotation Sensor Rotor Bolts	4.2	0.43	37 in·lb	
Front Wheel Rotation Sensor Bolt	6.9	0.70	61 in·lb	
Bleed Valves	7.8	0.80	69 in·lb	
Front Brake Pad Pins	15	1.5	11	
Front Caliper Bolts	34	3.5	25	
Brake Disc Bolts	27	2.8	20	R, S
Rear Master Cylinder Push Rod Locknut	17	1.7	13	
Rear Master Cylinder Bolts	25	2.5	18	
Brake Pedal Bolt	8.8	0.90	78 in·lb	
Rear Caliper Pin Bolt	27	2.8	20	
Rear Brake Pad Pin	17	1.7	13	
Rear Caliper Bolts	22	2.2	16	
Rear Wheel Rotation Sensor Bolt	6.9	0.70	61 in·lb	
Suspension				
Upper Front Fork Clamp Bolts	25	2.5	18	
Lower Front Fork Clamp Bolts	23	2.3	17	AL
Front Fork Top Plugs	34	3.5	25	
Upper Rear Shock Absorber Nut	34	3.5	25	R, S
Swingarm Pivot Shaft Nut	98	10	72	S
Tie-Rod Bolt (L = 63 mm)	44	4.5	32	S
Swingarm Pivot Shaft	9.8	1.0	87 in·lb	S
Swingarm Pivot Shaft Locknut	98	10	72	S
Tie-Rod Bolt (L = 70 mm)	44	4.5	32	S
Rocker Arm Bolt	44	4.5	32	S
Lower Rear Shock Absorber Bolt	34	3.5	25	S
Steering				
Switch Housing Screws	3.5	0.36	31 in·lb	
Switch Housing Bolt (L = 30 mm)	3.5	0.36	31 in·lb	
Switch Housing Bolt (L = 50 mm)	3.5	0.36	31 in·lb	
Steering Stem Head Nut	80	8.2	59	S
Upper Front Fork Clamp Bolts	25	2.5	18	S

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Handlebar Clamp Bolts	25	2.5	18	
Handlebar Positioning Bolts	9.8	1.0	87 in·lb	S
Steering Stem Nut	20	2.0	15	R, S
Lower Front Fork Clamp Bolts	23	2.3	17	
Frame				
Upper Fairing Bracket Nuts	35	3.6	26	AL
Rear View Mirror Bolts	8.8	0.90	78 in·lb	R, S
Mud Guard Bolts	8.8	0.90	78 in·lb	
Seat Lock Cable Bracket Bolts	2.8	0.29	25 in·lb	S
Rear Footpeg Bracket Bolts	25	2.5	18	
Front Footpeg Bracket Bolts	25	2.5	18	
Side Stand Switch Bolt	8.8	0.90	78 in·lb	R
Side Stand Bracket Bolts	49	5.0	36	R
Side Stand Nut	44	4.5	32	R
Side Stand Bolt	44	4.5	32	R, S
Electrical System				S
Connector Bracket Bolts	8.0	0.82	71 in·lb	
Spark Plugs	13	1.3	115 in·lb	
Clamp Mounting Bolt	8.0	0.82	71 in·lb	
Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
Regulator/Rectifier Bracket Bolts	8.0	0.82	71 in·lb	
Alternator Cover Bolts	10	1.0	89 in·lb	S
Alternator Lead Holding Plate Bolt	10	1.0	89 in·lb	R
Stator Coil Bolts	12	1.2	106 in·lb	R
Alternator Rotor Bolt	80	8.2	59	MO
Starter Motor Clutch Bolts	12	1.2	106 in·lb	R
Timing Rotor Bolt	40	4.1	30	
Starter Motor Mounting Bolts	10	1.0	89 in·lb	
Starter Motor Through Bolts	5.0	0.51	44 in·lb	
Brush Holder Screw	3.8	0.39	34 in·lb	
Starter Motor Terminal Locknut	11	1.1	97 in·lb	
Starter Motor Cable Terminal Nut	6.9	0.70	61 in·lb	
Starter Relay Terminal Bolts	3.6	0.37	32 in·lb	
Engine Ground Terminal Bolt	6.9	0.70	61 in·lb	R
Crankshaft Sensor Bolts	6.0	0.61	53 in·lb	
Switch Housing Screws	3.5	0.36	31 in·lb	
Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
Switch Housing Bolts (L = 50 mm)	3.5	0.36	31 in·lb	
Switch Housing Bolts (L = 30 mm)	3.5	0.36	31 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	R
Side Stand Switch Bolt	8.8	0.90	78 in·lb	
Side Stand Switch Lead Clamp Bolt	6.9	0.70	61 in·lb	

Torque and Locking Agent

The table below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners

Threads Diameter (mm)	Torque		
	N·m	kgf·m	ft·lb
5	3.4 – 4.9	0.35 – 0.50	30 – 43 in·lb
6	5.9 – 7.8	0.60 – 0.80	52 – 69 in·lb
8	14 – 19	1.4 – 1.9	10 – 13.5
10	25 – 34	2.6 – 3.5	19 – 25
12	44 – 61	4.5 – 6.2	33 – 45
14	73 – 98	7.4 – 10.0	54 – 72
16	115 – 155	11.5 – 16.0	83 – 115
18	165 – 225	17.0 – 23.0	125 – 165
20	225 – 325	23.0 – 33.0	165 – 240

Specifications

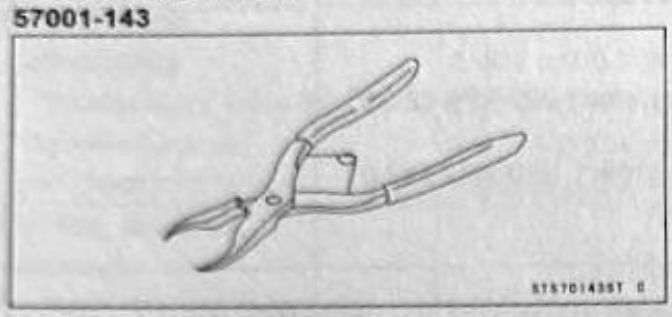
Item	Standard	Service Limit
Fuel System		
Idle Speed	1 400 ±100 r/min (rpm)	- - -
Throttle Body Vacuum	21.3 ±1.1 kPa (160 ±8 mmHg) at idle speed	- - -
Bypass Screws	0 – 2 1/2 (for reference)	- - -
Air Cleaner Element	Viscous paper element	- - -
Cooling System		
Coolant:		
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)	- - -
Color	Green	
Mixed Ratio	Soft water 50%, coolant 50%	- - -
Freezing Point	–35°C (–31°F)	- - -
Total Amount	2.0 L (2.1 US qt) (Reserve tank full level, including radiator and engine)	- - -
Engine Top End		
Valve Clearance:		
Exhaust	0.28 – 0.34 mm (0.0110 – 0.0134 in.)	- - -
Intake	0.16 – 0.22 mm (0.0063 – 0.0087 in.)	- - -
Clutch		
Clutch Lever Free Play	2 – 3 mm (0.08 – 0.12 in.)	- - -
Engine Lubrication System		
Engine Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	- - -
Viscosity	SAE 10W-40	- - -
Capacity	2.3 L (2.4 US qt) (When filter is not removed.)	- - -
	2.6 L (2.7 US qt) (When filter is removed.)	- - -
	3.0 L (3.2 US qt) (When engine is completely dry.)	- - -
Oil Level	Between upper and lower level lines (Wait several minutes after idling or running)	- - -
Wheels/Tires		
Tire Tread Depth:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	6.0 mm (0.24 in.)	UP to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)

Specifications

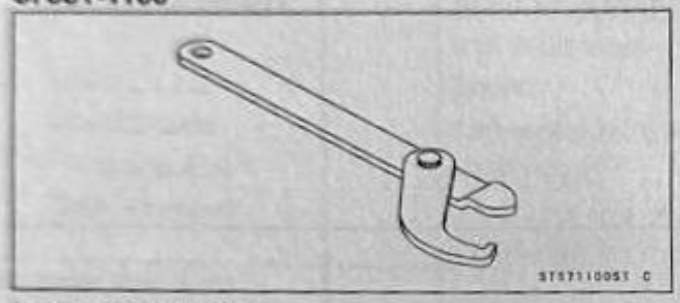
Item	Standard	Service Limit
Tire Air Pressure (when cold):		
Front	Up to 180 kg (397 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm², 36 psi)	– – –
Final Drive		
Drive Chain Slack	25 – 35 mm (1.0 – 1.4 in.)	– – –
Drive Chain 20-link Length	317.5 – 318.2 mm (12.50 – 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	DAIDO	– – –
Type	DID 520VM5	– – –
Link	114 links	– – –
	(PH) 112 links	– – –
Brakes		
Brake Fluid:		
Grade	DOT4	– – –
Brake Pad Lining Thickness:		
Front	4 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5 mm (0.20 in.)	1 mm (0.04 in.)
Brake Light Timing:		
Front	Pulled ON	– – –
Rear	ON after about 7 mm (0.28 in.) of pedal travel	– – –
Electrical System		
Spark Plug:		
Type	NGK LMAR9G	– – –
Gap	0.7 – 0.8 mm (0.028 – 0.031 in.)	– – –

Special Tools

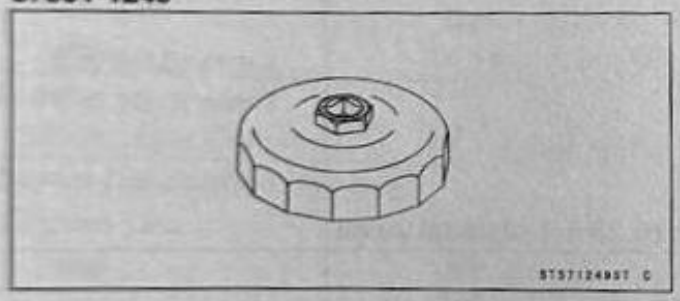
Inside Circlip Pliers:
57001-143



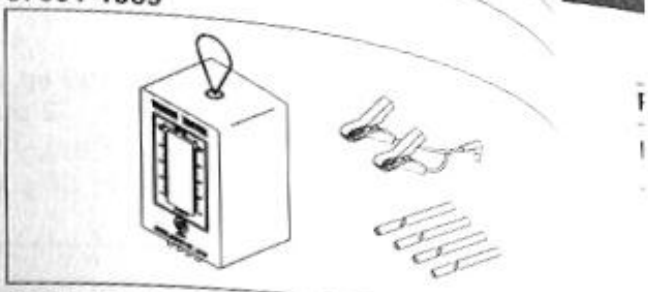
Steering Stem Nut Wrench:
57001-1100



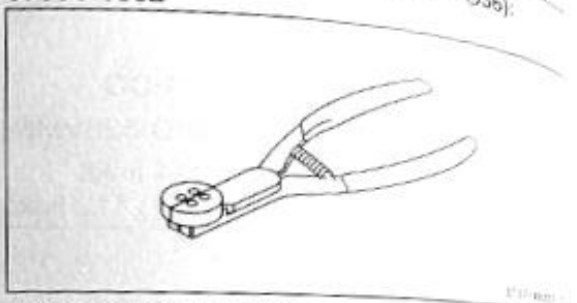
Oil Filter Wrench:
57001-1249



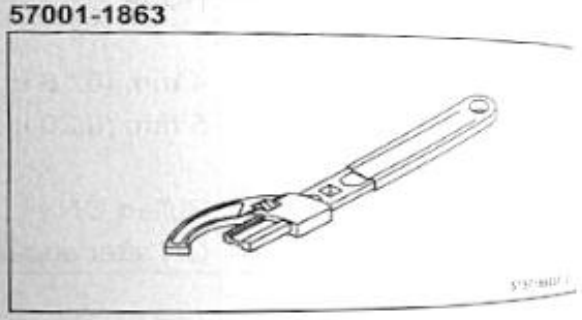
Vacuum Gauge:
57001-1369



Brake Caliper Piston Pliers (ϕ26 – ϕ36):
57001-1862



Adjustable Hook Wrench:
57001-1863



Periodic Maintenance Procedures

Fuel System (DFI)

Air Cleaner Element Replacement

NOTE

OIn dusty areas, the element should be replaced more frequently than the recommended interval.

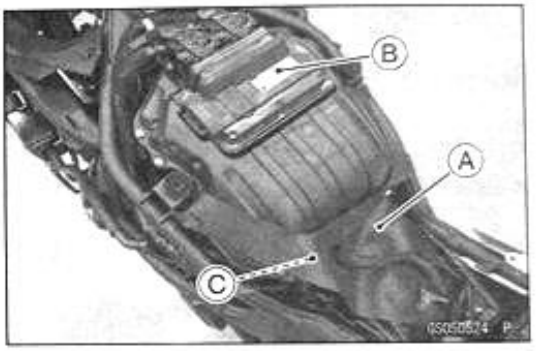
⚠ WARNING

If dirt or dust is allowed to pass through into the throttle body assy, the throttle may become stuck, possibly causing accident. Replace the air cleaner element according to the maintenance chart.

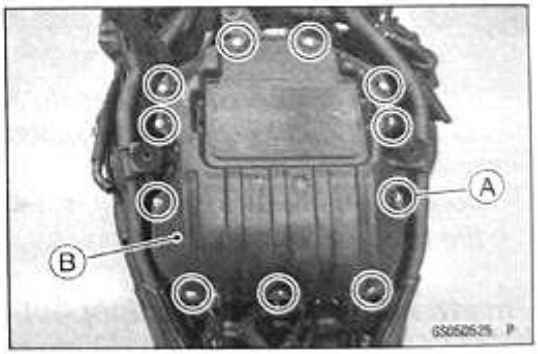
NOTICE

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

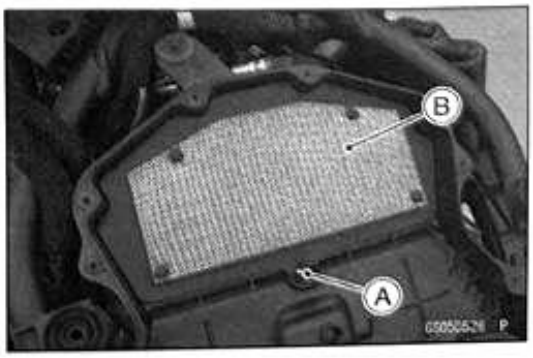
- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
  Heat Insulation Rubber Plate [A]
- Remove the ECU [B] with the harness connected from the air cleaner housing.
- Disconnect:
  Intake Air Temperature Sensor Connector [C]



- Remove:
  Air Cleaner Housing Assembly Screws [A]
  Upper Air Cleaner Housing [B]



- Remove the air cleaner element screw [A].
- Discard the air cleaner element [B].



Periodic Maintenance Procedures

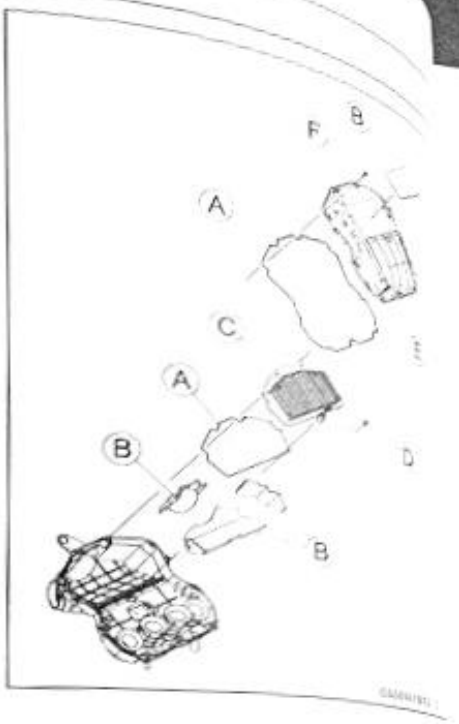
- Make sure the seals [A] and the pads [B] are installed.
- Install a new element [C] so that the screen side faces upward.
- Tighten:

  Torque - Air Cleaner Element Screw [D]: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Install:
  Upper Air Cleaner Housing [E]
- Tighten:

  Torque - Air Cleaner Housing Assembly Screws [F]: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Install the removed parts.



Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- Check the idle speed.

Idle Speed
Standard: 1 400 ±100 r/min (rpm)

Idle Speed Adjustment

NOTE

○*This motorcycle is equipped with the idle speed control system. The idle speed is adjusted automatically at the specified value (1 500 r/min (rpm)) by the idle speed control system. Therefore, it is not necessary to adjust the idle speed normally.*

Throttle Control System Inspection

- Check that the throttle grip [A] moves smoothly from full open to close.

★If the throttle grip does not moves smoothly, replace the right switch housing.

Engine Vacuum Synchronization Inspection

NOTE

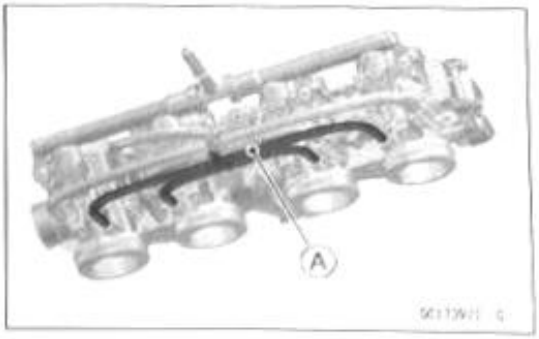
○*These procedures are explained on the assumption that the intake and exhaust systems of the engine are in good condition.*

- Situate the motorcycle so that it is vertical.
- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal(3-27))

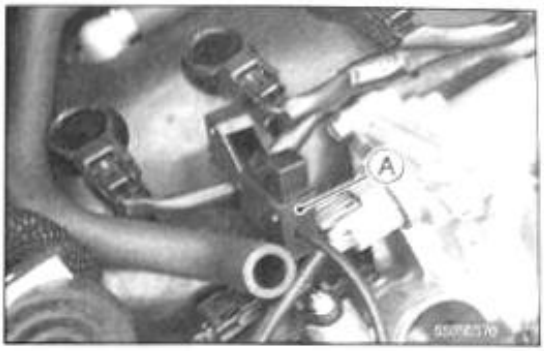
Periodic Maintenance Procedures

- Pull off the vacuum hoses [A] from the fittings of each throttle body.
- For ID model, pull off the rubber caps.
- Connect a vacuum gauge and hoses (Special Tool: 57001-1369) to the fittings on the throttle body.

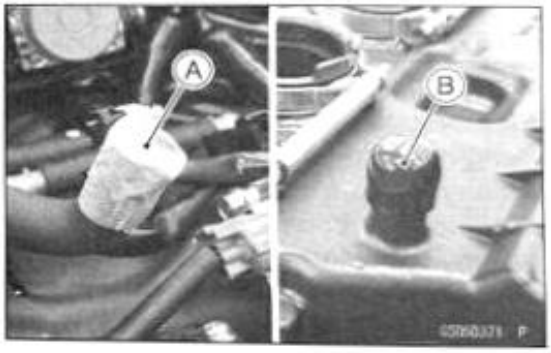
Special Tool - Vacuum Gauge: 57001-1369



- Install the throttle body assy (see Throttle Body Assy Installation(3-28)).
- Connect a highly accurate tachometer lead [A] to one of the stick coil primary leads.



- Plug the air switching valve hose end [A] and air cleaner housing fitting [B].
- Install the following parts temporarily.
  Air Cleaner Housing (see Air Cleaner Housing Installation(3-33))
  Fuel Tank (see Fuel Tank Installation(3-38))

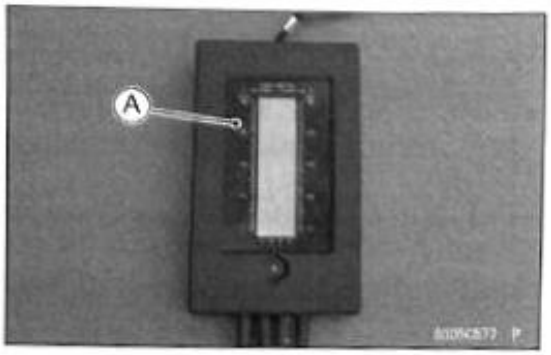


- Connect the Kawasaki Diagnostic System.
- Start the engine and warm it up thoroughly.
- Using the Kawasaki Diagnostic System, start the "Starting ETV engine vacuum synchronization" in the "Actuator Tests."

○The Kawasaki Diagnostic System controls the ETV system to maintain the throttle valve angle constant.

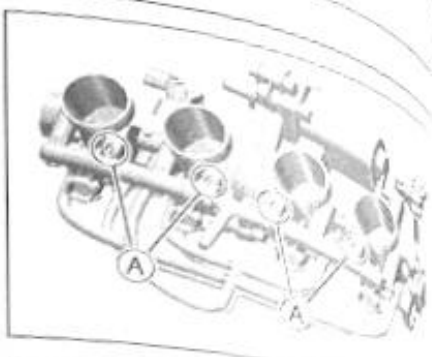
- While "Actuator Test," inspect the throttle body vacuum using the vacuum gauge [A].

Throttle Body Vacuum
Standard: 21.3 ±1.1 kPa (160 ±8 mmHg) at idle speed



Periodic Maintenance Procedures

★If any vacuum is not within specifications, adjust the bypass screws [A] with a flat tip screwdriver.

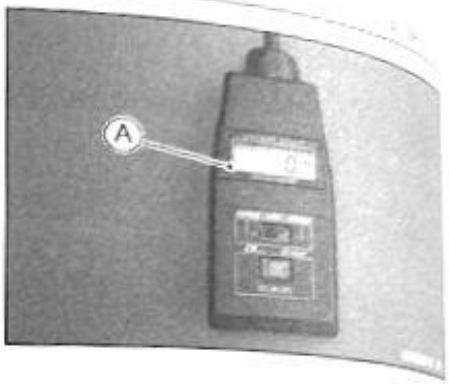


NOTE

○*Take care not to fall away the bypass screw.*

- Adjust the each vacuum (#1 – #4) to the standard value.

- Using the Kawasaki Diagnostic System, stop the engine vacuum synchronization mode with the "Stopping ETV engine vacuum synchronization" in the "Actuator Tests."
- Check the idle speed, using a highly accurate tachometer [A].



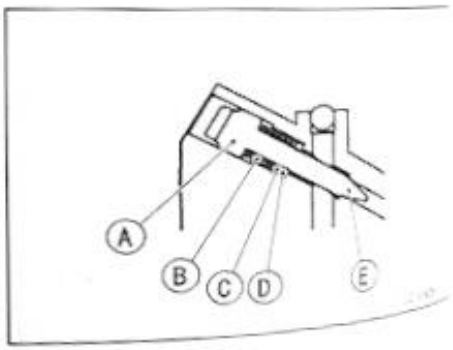
Idle Speed

Standard: 1 400 ±100 r/min (rpm)

NOTICE
Do not measure the idle speed by the tachometer of the meter unit.

- Check the vacuums as before.
★If all vacuums are within the specification range, finish the engine vacuum synchronization.
★If any vacuum cannot be adjusted within the specification, replace the bypass screws #1 – #4 with new ones, refer to the following procedure.

- Remove the throttle body assy (see Throttle Body Assy Removal(3-27)).
- Turn in the bypass screw [A] with counting the number of turns until it seals fully but not tightly. Record the number of turns.
- Remove:
  Bypass Screw
  Spring [B]
  Washer [C]
  O-ring [D]



- Check the bypass screw hole in the throttle body for carbon deposits.
★If any carbons accumulate, wipe the carbons off from the hole, using a cotton pad penetrated with a high flash-point solvent.
- Replace the bypass screw, spring, washer and O-ring as a set.
- Turn in the bypass screw until it seats fully but not tightly.

NOTICE
Do not over-tighten the bypass screw. The tapered portion [E] of the bypass screw could be damaged.

- Back out the same number of turns counted when first turned in. This is to set the screw to its original position.

NOTE

○*A throttle body has different "turns out" of the bypass screw for each individual unit. On setting the bypass screw, use the "turns out" determined during disassembly.*

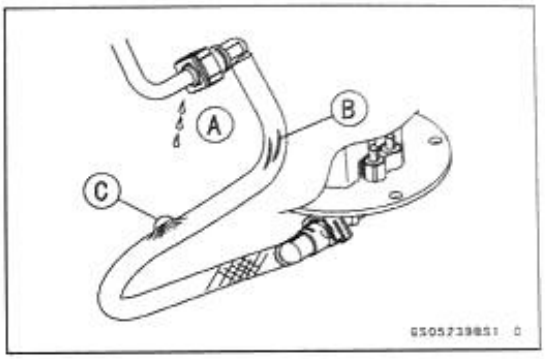
- Repeat the same procedure for other bypass screws.
- Repeat the synchronization.
- Remove the throttle body assy (see Throttle Body Assy Removal(3-27)).
- Remove the vacuum gauge hoses and install the vacuum hoses or rubber caps on the original position.
- Install the removed parts.

Fuel System Inspection

Fuel Hose Inspection (fuel leak, damage, installation condition)

○If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak [A] or the hose to burst. Remove the fuel tank (see Fuel Tank Removal(3-35)) and check the fuel hose.

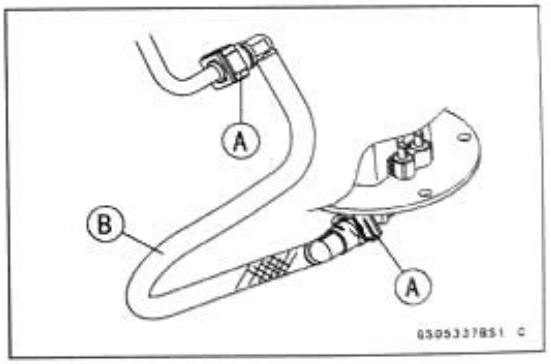
★Replace the fuel hose if any fraying, cracks [B] or bulges [C] are noticed.



- Check that the fuel hose is routed correctly (see Cable, Wire, and Hose Routing section (18-2)).

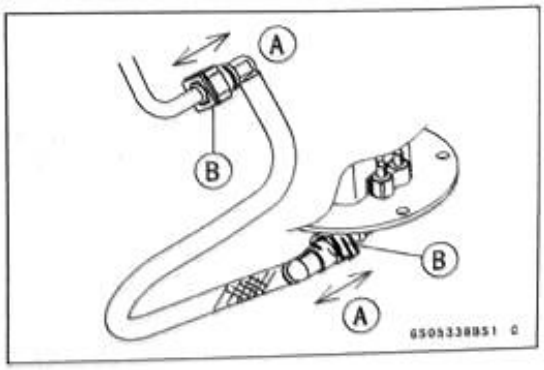
★Replace the hose if it has been sharply bent or kinked.

Hose Joints [A]
Fuel Hose [B]



- Check that the fuel hose joints are securely connected.

○Push and pull [A] the fuel hose joints [B] back and forth more than two times, and make sure it is locked.



⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.

★If it does not lock, reinstall the hose joint.

Periodic Maintenance Procedures

Fuel Filter Replacement

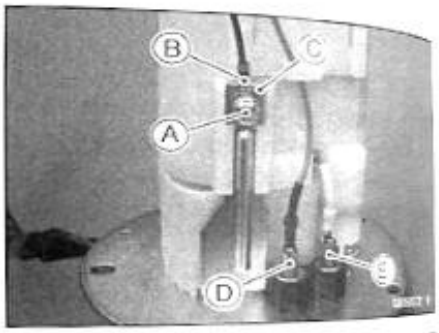
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

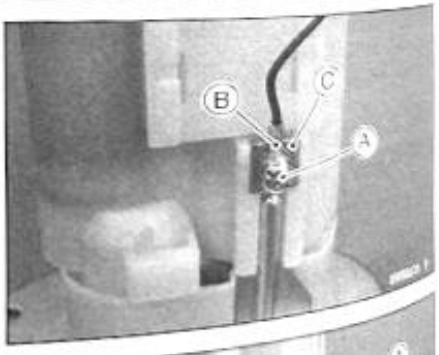
NOTICE

Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

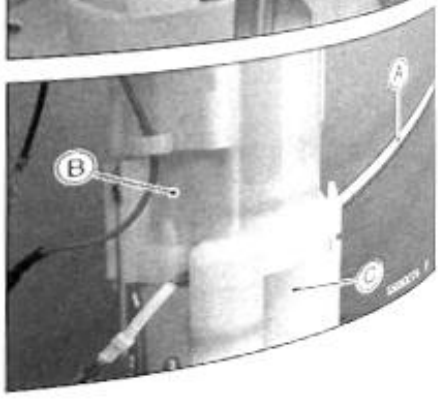
- Remove:
  Fuel Pump (see Fuel Pump Removal(3-22))
  Fuel Pump Assembly Screw [A]
  Lead Terminal [B]
  Plate [C]
- Disconnect:
  Lead Terminal (Yellow) [D]
  Lead Terminal (Light Blue) [E]



- Remove:
  Fuel Pump Assembly Screw [A]
  Lead Terminal [B]
  Plate [C]

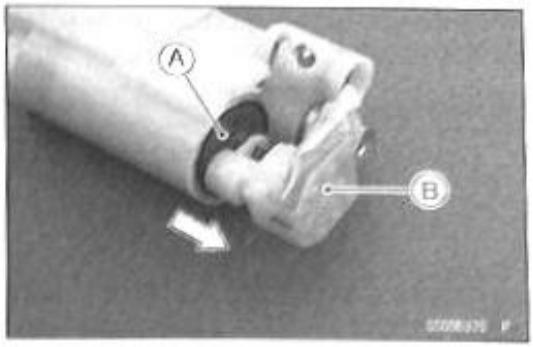


- Using the flat tip screwdriver [A], clear the tabs and remove the fuel pump fitting [B] from the case [C].

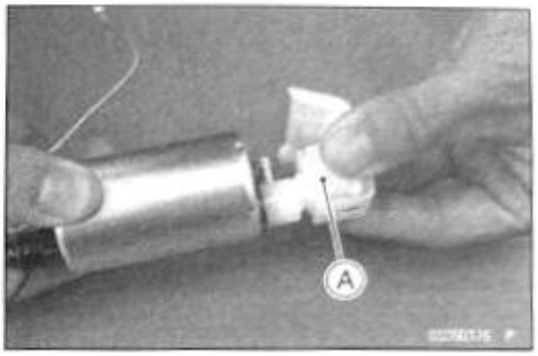


Periodic Maintenance Procedures

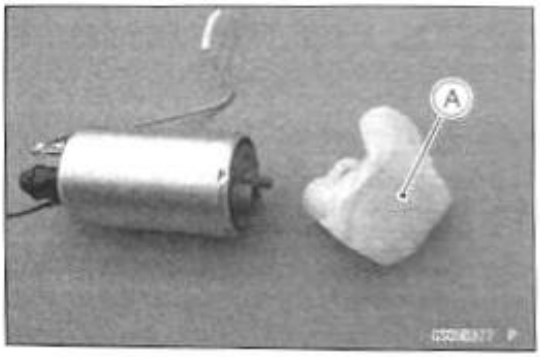
- Remove the fuel pump body [A] with fuel filter [B] from the fitting.



- Remove the fuel filter [A].

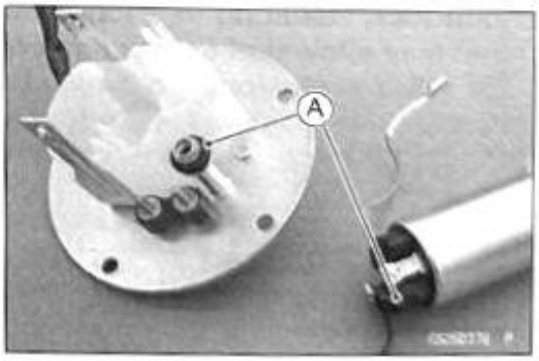


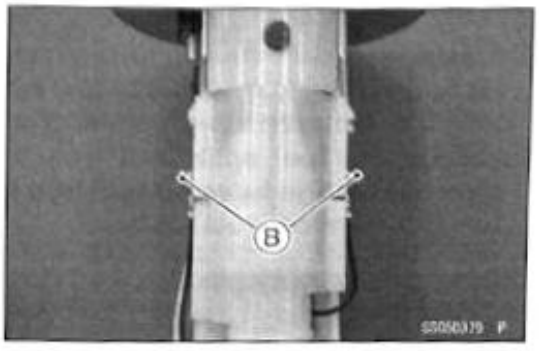
- Replace the fuel filter [A] with a new one.



- Replace the following parts with new ones and install the removed parts in the reverse procedure.
  O-rings [A]
  Fuel Pump Assembly Screws [B]
- Tighten:

Torque - Fuel Pump Assembly Screws: 0.98 N·m (0.10 kgf·m, 8.7 in·lb)

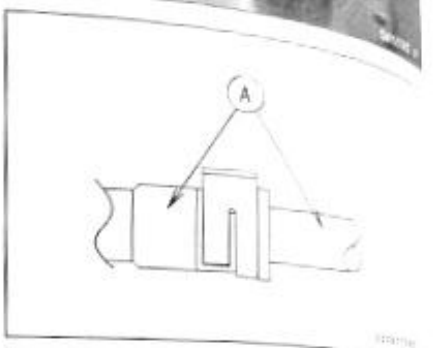




- Run the lead [A] into the guide [B].

Fuel Hose Replacement

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
  Heat Insulation Rubber Plate
- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

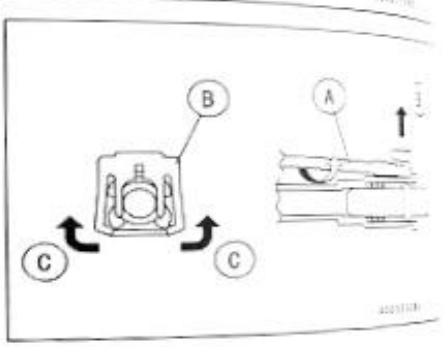


When removing with flat tip screwdriver

- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

When removing with fingers

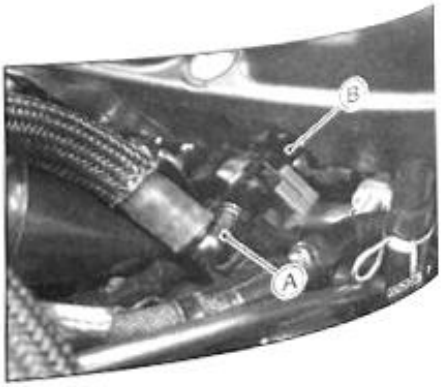
- Open and push up [C] the joint lock with your fingers.



NOTICE

Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.

- Pull the fuel hose joint [A] out of the delivery pipe [B].



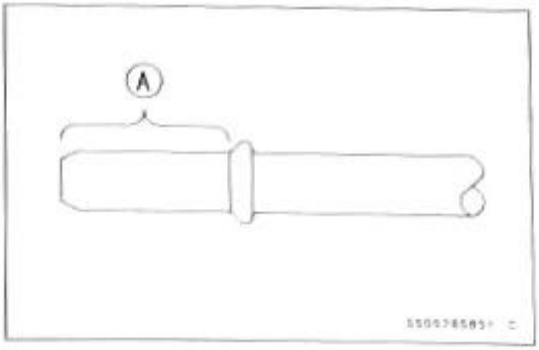
⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.

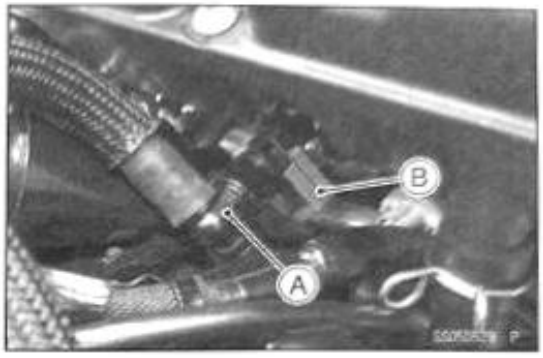
- Clean the delivery pipe.
- Cover the delivery pipe with the vinyl bag to keep it clean.

Periodic Maintenance Procedures

- Remove the vinyl bag on the pipe.
- Check that there are no flaws, burrs, and adhesion of foreign materials on the delivery pipe [A].



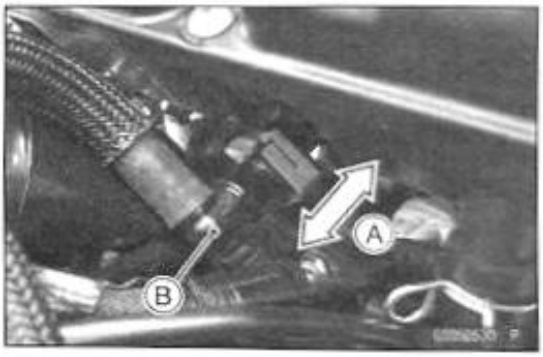
- Replace the fuel hose with a new one.
- Run the fuel hose correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Insert the fuel hose joint [A] straight onto the delivery pipe until the hose joint clicks.
- Push the joint lock [B].



- Push and pull [A] the fuel hose joint [B] back and forth more than two times and make sure it is locked and does not come off.

⚠ WARNING

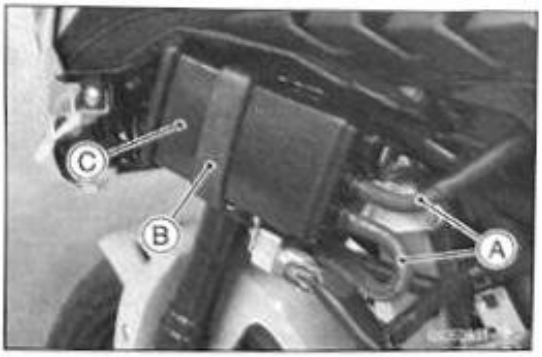
Leaking fuel can cause a fire or explosion resulting in severe burns. Make sure the fuel hose joint is installed correctly on the delivery pipe and that it doesn't leak.



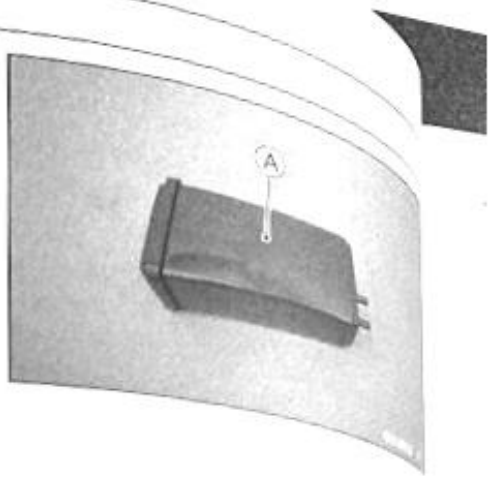
★If it comes off, reinstall the hose joint.
- Install the removed parts.
- Start the engine and check the fuel hose for leaks.

Evaporative Emission Control System Inspection

- Remove:
  Left Lower Fairing (see Lower Fairing Removal(15-18))
- Slide the clamps and disconnect the hoses [A].
- Remove:
  Band [B]
  Canister [C]



Periodic Maintenance Procedures



- Visually inspect the canister [A] for cracks or other damage.

★If the canister has any cracks or bad damage, replace it with a new one.

NOTE

○*The canister is designed to work well through the motorcycle's life without any maintenance if it is used under normal conditions.*

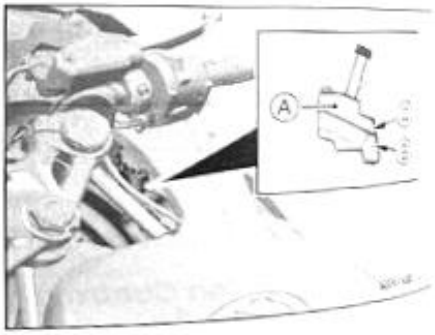
- Inspect the purge valve (see DTC P0444(17-94)) (see DTC P0458(17-95)) (see DTC P0459(17-95)).
- Replace any kinked, deteriorated or damaged hoses.
- Install the purge valve (see Purge Valve Installation(17-94)).
- Install the canister as the reverse order of removal.
- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).

○When installing the hoses, avoid sharp bending, kinking, flattening or twisting, and run the hoses with a minimum of bending so that the emission flow will not be obstructed.

- Check that the hoses are securely connected and clips are in position.
- Install the removed parts.

Cooling System

Coolant Level Inspection



NOTE

○*Check the level when the engine is cold (room or ambient temperature).*

- Check the coolant level in the reserve tank [A] with the motorcycle held perpendicular (Do not use the side stand).

★If the coolant level is lower than the "L" level line [B], remove the reserve tank cap and add coolant to the "F" level line [C].

"L": Low
"F": Full

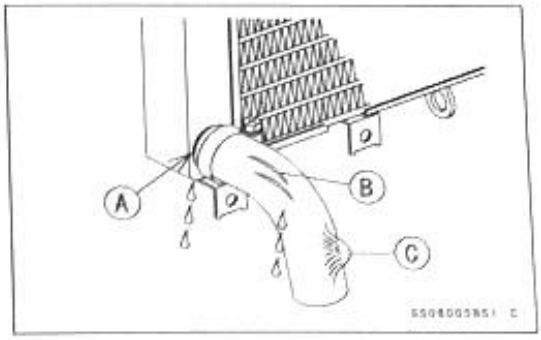
NOTICE

For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water alone can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.
If coolant must be added often or the reservoir tank has run completely dry, there is probably leakage in the cooling system. Check the system for leaks.
Coolant ruins painted surfaces. Immediately wash away any coolant that spills on the frame, engine, wheels or other painted parts.

Periodic Maintenance Procedures

Cooling System Inspection

Water Hose and Pipe Inspection (coolant leak, damage, installation condition)



○The high pressure inside the water hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained.

- Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

- Check that the hoses are securely connected.

Coolant Change

⚠ WARNING

Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

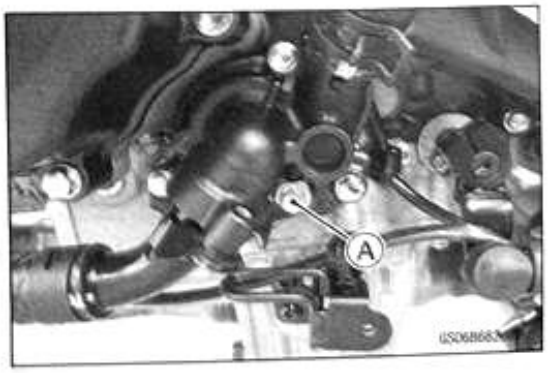
- Remove:
  Coolant Reserve Tank (see Coolant Reserve Tank Removal(4-9))
  Left Lower Fairings (see Lower Fairing Removal(15-18))
  Radiator Cap [A]

- Place a container under the coolant drain bolt [A], then remove the drain bolt.

○The coolant will drain from the radiator and engine.

- Replace the drain bolt gasket with a new one.
- Tighten the drain bolt with the gasket.

Torque - Coolant Drain Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)



Periodic Maintenance Procedures

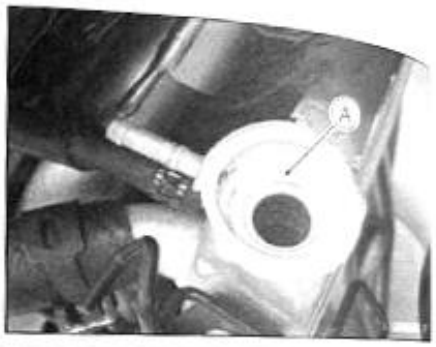
- When filling the coolant, choose a suitable mixture ratio by referring to the coolant manufacturer's directions.

NOTICE
Soft or distilled water must be used with the antifreeze in the cooling system. If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.

Water and Coolant Mixture Ratio (Recommended)

Soft Water:	**50%**
Coolant:	**50%**
Freezing Point:	**–35°C (–31°F)**
Total Amount:	**2.0 L (2.1 US qt)**

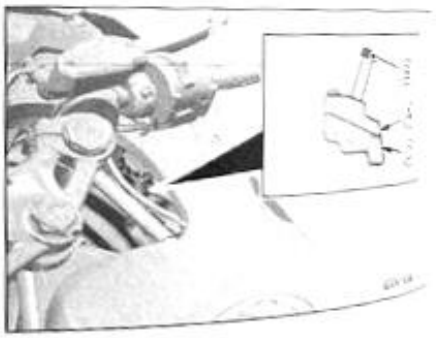
- Fill the radiator up to the filler neck [A] with coolant.



NOTE

○*Pour in the coolant slowly so that it can expel the air from the engine and radiator.*

- Check the cooling system for leaks.
- Tap the water hoses to force any air bubbles caught inside.
- Fill the radiator up to the filler neck with coolant.



- Install the coolant reserve tank (see Coolant Reserve Tank Installation(4-9)).
- Fill the reserve tank up to the "F" (full) level line [A] with coolant and install the cap [B].
- Install the radiator cap.
- Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
- Check the coolant level in the reserve tank after the engine cools down.

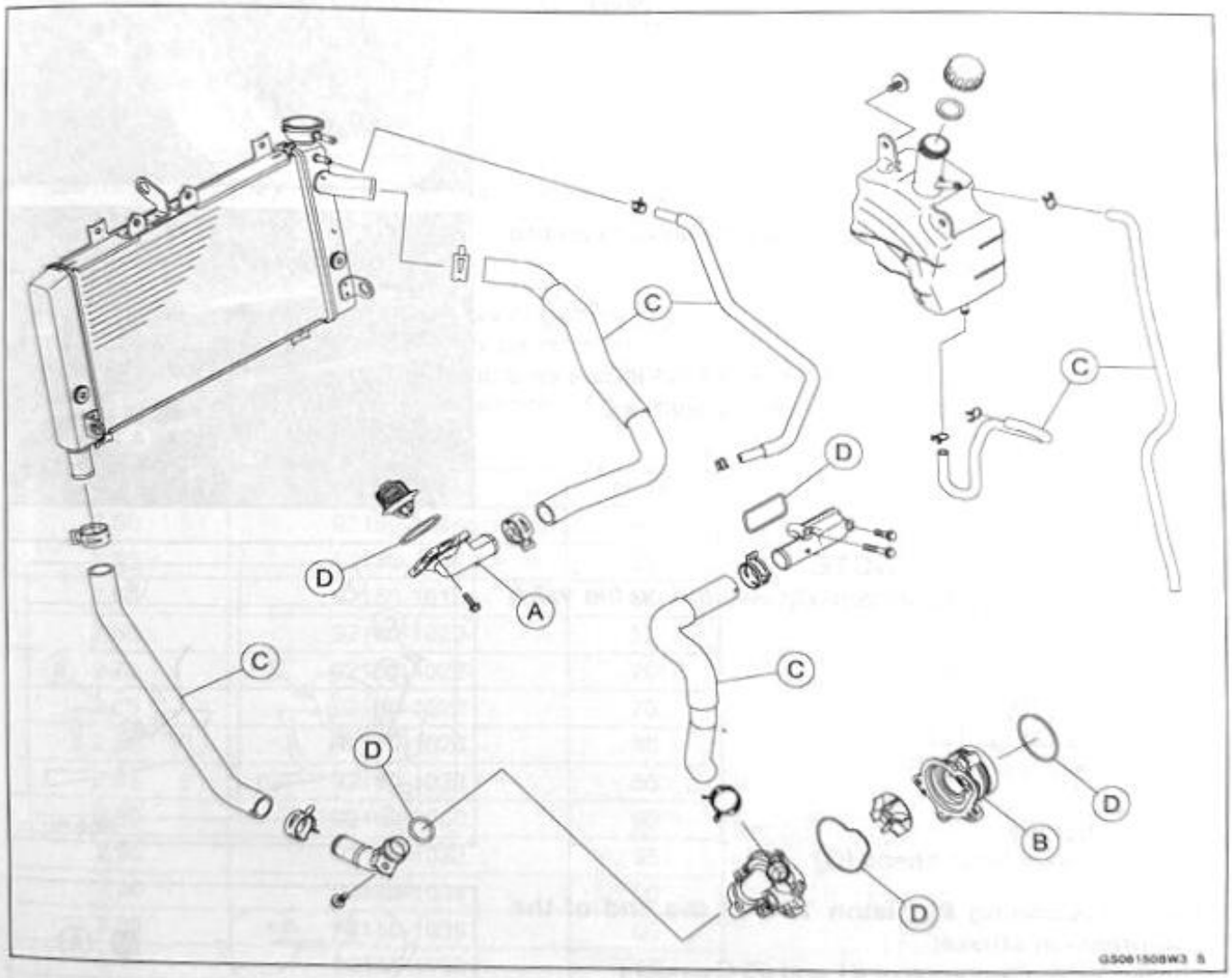
★If the coolant level is lower than the "L" (low) level line [C], add coolant to the "F" level line.

NOTICE
Do not add more coolant above the "F" level line.

Periodic Maintenance Procedures

Water Hose and O-ring Replacement

- Drain the coolant (see Coolant Change(2-25)).
- Remove:
  Thermostat Housing Cover [A] (see Thermostat Removal(4-18))
  Water Pump Housing [B] (see Water Pump Removal(4-10))
- Replace the hoses [C] and O-rings [D] with new ones.
- Apply grease or liquid gasket to the new O-rings.
- Run the new hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.
- Fill the coolant (see Coolant Change(2-25)).
- Check the cooling system for leaks.



Engine Top End

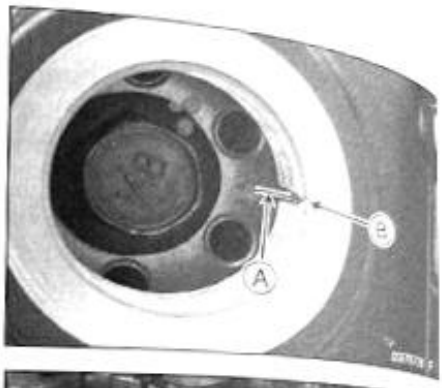
Valve Clearance Inspection

NOTE

○*Valve clearance must be checked and adjusted when the engine is cold (at room temperature).*

• Remove:
Cylinder Head Cover (see Cylinder Head Cover Removal(5-13))
Crankshaft Timing Plug (see Camshaft Removal(5-18))

• Using a wrench on the timing rotor bolt, turn the crankshaft clockwise until the line [A] (TDC mark for #1,4 pistons) on the timing rotor is aligned with the notch [B] in the edge of the timing inspection hole in the clutch cover as shown.



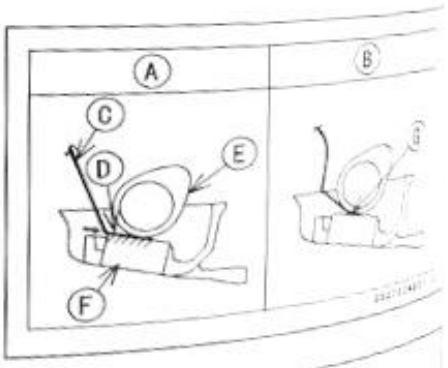
• Using a thickness gauge [A], measure the valve clearance between the cam and the valve lifter.

Valve Clearance
Standard:

Exhaust	**0.28 – 0.34 mm (0.0110 – 0.0134 in.)**
Intake	**0.16 – 0.22 mm (0.0063 – 0.0087 in.)**

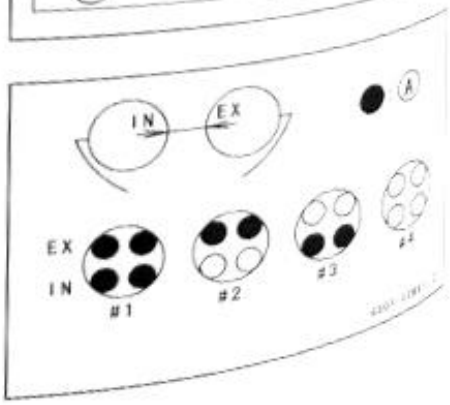
NOTE

○*Thickness gauge is horizontally inserted on the valve lifter.*



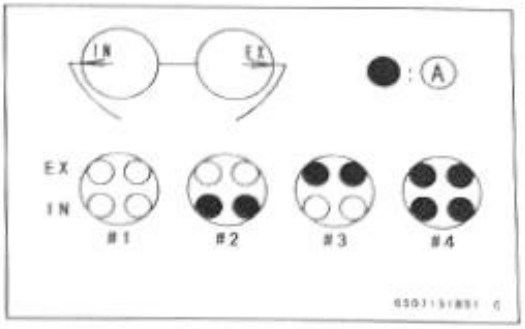
Appropriateness [A]
Inadequacy [B]
Thickness Gauge [C]
Horizontally Inserts [D]
Cam [E]
Valve Lifter [F]
Hits the Valve Lifter Ahead [G]

○**When positioning #1 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #1 and #3 Cylinders
Exhaust Valve Clearance of #1 and #2 Cylinders
Measuring Valve [A]



Periodic Maintenance Procedures

○**When positioning #4 piston TDC at the end of the compression stroke:**
Intake Valve Clearance of #2 and #4 Cylinders
Exhaust Valve Clearance of #3 and #4 Cylinders
Measuring Valve [A]



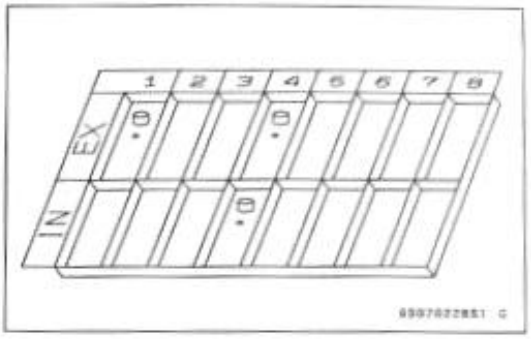
★If the valve clearance is not within the specified range, first record the clearance, and then adjust it.

Valve Clearance Adjustment

• To change the valve clearance, remove the camshaft chain tensioner, camshafts and valve lifters. Replace the shim with one of a different thickness.

NOTE

○*Mark and record the locations of the valve lifters and shims so that they can be reinstalled in their original positions.*



○Besides the standard shims in the valve clearance adjustment charts, the following shims may be installed at the factory. Although they are not available as spare parts, they can be used to adjust valve clearance.

Adjustment Shims

Thickness	Part Number	Mark
2.50	92180-1014	50
2.55	92180-1016	55
2.60	92180-1018	60
2.65	92180-1020	65
2.70	92180-1022	70
2.75	92180-1024	75
2.80	92180-1026	80
2.85	92180-1028	85
2.90	92180-1030	90
2.95	92180-1032	95
3.00	92180-1034	00
3.05	92180-1036	05
3.10	92180-1038	10
3.15	92180-1040	15
3.20	92180-1042	20
3.25	92180-1044	25
3.30	92180-1046	30
3.35	92180-1048	35
3.40	92180-1050	40
3.45	92180-1052	45
3.50	92180-1054	50

Periodic Maintenance Procedures

- Clean the shim to remove any dust or oil.
- Measure the thickness of the removed shim [A].

Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART INTAKE VALVE

	PRESENT SHIM (Example)																					
PART No. (92180-)	1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054
MARK	50	55	60	65	70	75	80	85	90	95	00	05	10	15	20	25	30	35	40	45	50
THICKNESS (mm)	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
0.00 – 0.02	–	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.03 – 0.07	–	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.08 – 0.12	–	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.13 – 0.22	SPECIFIED CLEARANCE/NO CHANGE REQUIRED																				
0.23 – 0.24	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
0.25 – 0.29	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
0.30 – 0.34	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
0.35 – 0.39	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
0.40 – 0.44	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
0.45 – 0.49	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
0.50 – 0.54	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
0.55 – 0.59	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
0.60 – 0.64	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
0.65 – 0.69	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
0.70 – 0.74	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
0.75 – 0.79	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
0.80 – 0.84	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
0.85 – 0.89	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
0.90 – 0.94	3.25	3.30	3.35	3.40	3.45	3.50															
0.95 – 0.99	3.30	3.35	3.40	3.45	3.50																
1.00 – 1.04	3.35	3.40	3.45	3.50																	
1.05 – 1.09	3.40	3.45	3.50																		
1.10 – 1.14	3.45	3.50																			
1.15 – 1.19	3.50																				

Example

VALVE CLEARANCE MEASUREMENT

INSTALL THE SHIM OF THIS THICKNESS (mm)

SS07257B 5

1. Measure the clearance (when engine is cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. Install the shim specified where the lines intersect. This shim will give the proper clearance.

Example: Present shim is **2.95 mm**
Measured clearance is **0.45 mm**
Replace **2.95 mm** shim with **3.25 mm** shim.

5. Remeasure the valve clearance and readjust if necessary.

Periodic Maintenance Procedures

VALVE CLEARANCE ADJUSTMENT CHART EXHAUST VALVE

VALVE CLEARANCE MEASUREMENT	PRESENT SHIM																					
PART No.(92180-)	1014	1016	1018	1020	1022	1024	1026	1028	1030	1032	1034	1036	1038	1040	1042	1044	1046	1048	1050	1052	1054	
MARK	50	55	60	65	70	75	80	85	90	95	00	05	10	15	20	25	30	35	40	45	50	
THICKNESS(mm)	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	
0.00-0.04	-	-	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	
0.05-0.09	-	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	
0.10-0.14	-	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	
0.15-0.19	-	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	
0.20-0.21	-	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	
0.22-0.31	SPECIFIED CLEARANCE/NO CHANGE REQUIRED																					
0.32-0.34	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50		
0.35-0.39	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50			
0.40-0.44	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50				
0.45-0.49	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50					
0.50-0.54	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50						
0.55-0.59	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50							
0.60-0.64	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50								
0.65-0.69	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50									
0.70-0.74	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50										
0.75-0.79	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50											
0.80-0.84	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50												
0.85-0.89	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50													
0.90-0.94	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50														
0.95-0.99	3.20	3.25	3.30	3.35	3.40	3.45	3.50															
1.00-1.04	3.25	3.30	3.35	3.40	3.45	3.50																
1.05-1.09	3.30	3.35	3.40	3.45	3.50																	
1.10-1.14	3.35	3.40	3.45	3.50																		
1.15-1.19	3.40	3.45	3.50																			
1.20-1.24	3.45	3.50																				
1.25-1.29	3.50																					

Example

INSTALL THE SHIM OF THIS THICKNESS(mm)

GS07120003 3

1. Measure the clearance (when engine is cold).
2. Check present shim size.
3. Match clearance in vertical column with present shim size in horizontal column.
4. Install the shim specified where the lines intersect. This shim will give the proper clearance.

Example: Present shim is **2.95 mm.**
Measured clearance is **0.47 mm.**
Replace **2.95 mm** shim with **3.15 mm** shim.

5. Remeasure the valve clearance and readjust if necessary.

NOTICE

Be sure to remeasure the clearance after selecting a shim according to the table. If the clearance is out of the specified range, use the additional shim.

○If there is no valve clearance, use a shim that is a few sizes smaller, and remeasure the valve clearance.

- When installing the shim, face the marked side toward the valve lifter. At this time, apply engine oil to the shim or the valve lifter to keep the shim in place during camshaft installation.

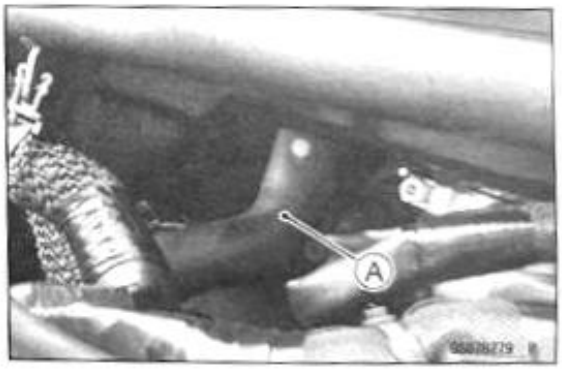
NOTICE

Do not put shim stock under the shim. This may cause the shim to pop out at high rpm, causing extensive engine damage.
Do not grind the shim. This may cause it to fracture, causing extensive engine damage.

- Apply engine oil to the valve lifter surface and install the lifter.
- Install the camshafts (see Camshaft Installation(5-19)).
- Recheck the valve clearance and readjust if necessary.
- Install the removed parts.

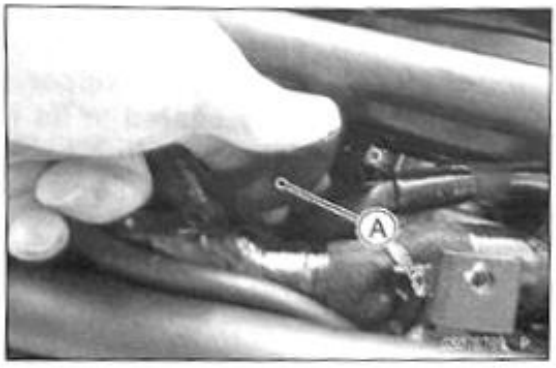
Air Suction System Damage Inspection

- Remove:
  Left Side Cover (see Side Cover Removal(15-26))
- Disconnect:
  Air Switching Valve Hose [A]



- Start the engine and run it at idle speed.
- Plug the air switching valve hose end [A] with your finger and feel vacuum pulsing in the hose.

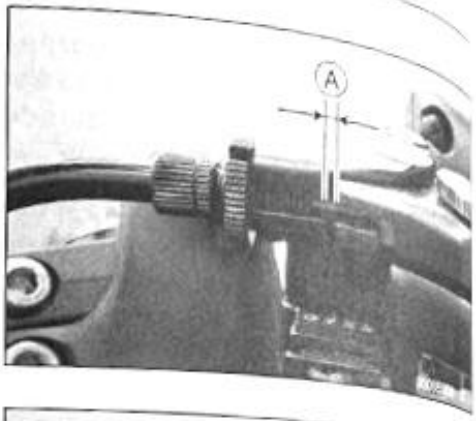
★If there is no vacuum pulsation, check the hose line for leak. If there is no leak, check the air switching valve (see Air Switching Valve Unit Test(16-53)) or air suction valve (see Air Suction Valve Inspection(5-11)).



Periodic Maintenance Procedures

Clutch

Clutch Operation Inspection



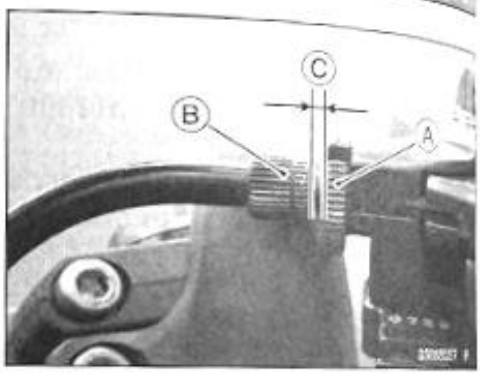
- Pull the clutch lever just enough to take up the free play [A].
- Measure the gap between the lever and the lever holder.

★If the gap is too wide, the clutch may not release fully. If the gap is too narrow, the clutch may not engage fully. In either case, adjust it.

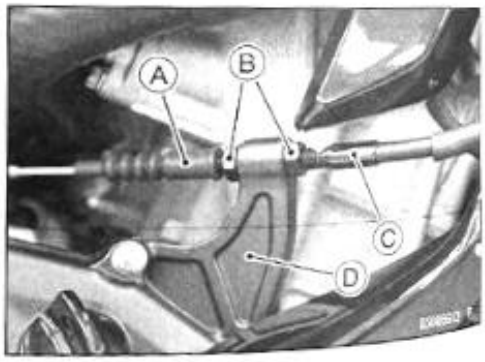
Clutch Lever Free Play
Standard: 2 – 3 mm (0.08 – 0.12 in.)

⚠ WARNING

The engine and exhaust system get extremely hot during normal operation and can cause serious burns. Never touch the engine or exhaust pipe during clutch adjustment.



- Loosen the locknut [A].
- Turn the adjuster [B] so that 5 – 6 mm (0.20 – 0.24 in.) [C] of threads is visible.



- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen both adjusting nuts [B] at the clutch cover as far as they will go.
- Pull the clutch outer cable [C] tight and tighten the adjusting nuts against the clutch cover [D].
- Slip the dust cover back onto place.
- Turn the adjuster at the clutch lever until the free play is correct.

⚠ WARNING

Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

- After the adjustment, start the engine and check that the clutch does not slip and that it releases properly.

Periodic Maintenance Procedures

Engine Lubrication System

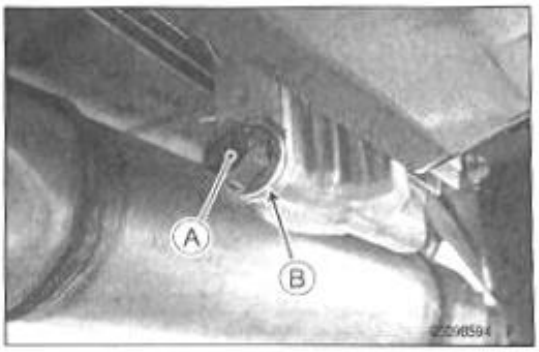
Engine Oil Change

- Situate the motorcycle so that it is vertical after warming up the engine.
- Remove the engine oil drain bolt [A] to drain the oil.

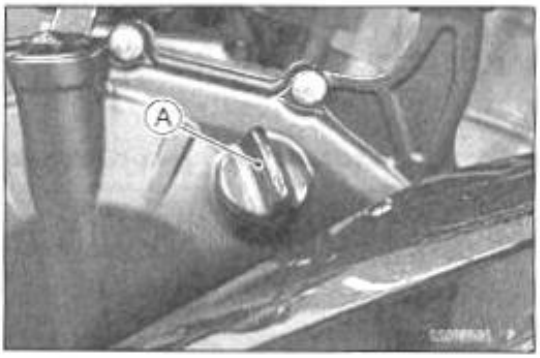
○The oil in the oil filter can be drained by removing the filter (see Oil Filter Replacement(2-36)).

- Replace the drain bolt gasket [B] with a new one.
- Tighten:

Torque - Engine Oil Drain Bolt: 30 N·m (3.1 kgf·m, 22 ft·lb)



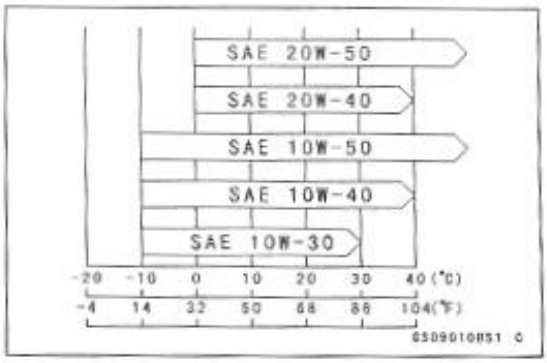
- Remove the oil filler plug [A].



- Pour in the specified type and amount of oil.

Recommended Engine Oil

Type:	**API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2**
Viscosity:	**SAE 10W-40**
Capacity:	**2.3 L (2.4 US qt) (when filter is not removed.)**
	2.6 L (2.7 US qt) (when filter is removed.)
	3.0 L (3.2 US qt) (when engine is completely dry.)



NOTE

○*Do not add any chemical additive to the oil. Oils fulfilling the above requirements are fully formulated and provide adequate lubrication for both the engine and the clutch.*

○*Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*

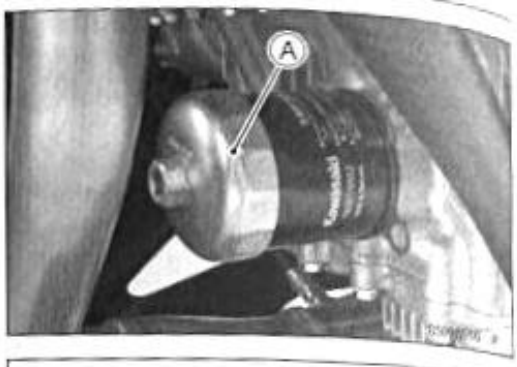
- Replace the O-ring of the oil filler plug with a new one.
- Apply grease to the new O-ring and install it.
- Install the oil filler plug.
- Check the oil level (see Oil Level Inspection(7-7)).

Periodic Maintenance Procedures

Oil Filter Replacement

- Remove the left lower fairing (see Lower Fairing Removal(15-18)).
- Drain the engine oil (see Engine Oil Change(2-35)).
- Remove the oil filter with the oil filter wrench [A].

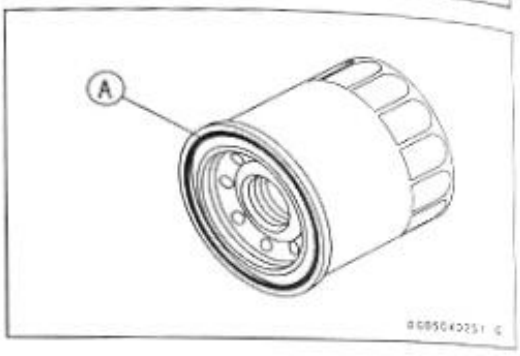
Special Tool - Oil Filter Wrench: 57001-1249



- Replace the filter with a new one.
- Apply grease to the gasket [A] before installation.
- Tighten the filter with the oil filter wrench.

Special Tool - Oil Filter Wrench: 57001-1249

Torque - Oil Filter: 17.5 N·m (1.78 kgf·m, 12.9 ft·lb)



NOTE

○*Hand tightening of the oil filter can not be allowed since it does not reach to this tightening torque.*

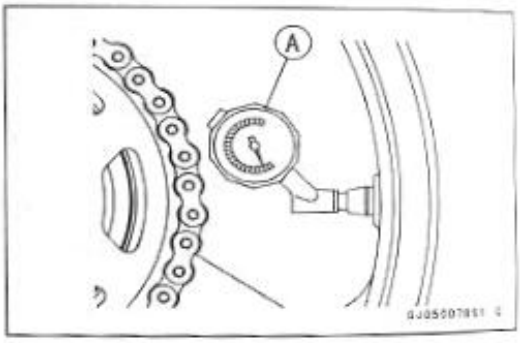
- Pour in the specified type and capacity of oil (see Engine Oil Change(2-35)).

Wheels/Tires

Air Pressure Inspection

- Remove the air valve cap.
- Measure the tire air pressure with an air pressure gauge [A] when the tires are cold (that is, when the motorcycle has not been ridden more than a mile during the past 3 hours).
- Install the air valve cap.

★Adjust the tire air pressure according to the specifications if necessary.



Air Pressure (when Cold)

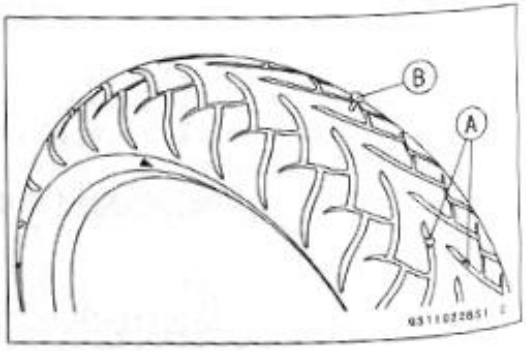
Front:	**Up to 180 kg (397 lb) load:**
	225 kPa (2.25 kgf/cm², 32 psi)
Rear:	**Up to 180 kg (397 lb) load:**
	250 kPa (2.50 kgf/cm², 36 psi)

Wheels and Tires Inspection

Wheel/Tire Damage Inspection

- Remove any imbedded stones [A] or other foreign particles [B] from tread.
- Visually inspect the tire for cracks and cuts, and replace the tire if necessary. Swelling or high spots indicate internal damage, requiring tire replacement.
- Visually inspect the wheel for cracks, cuts and dents damage.

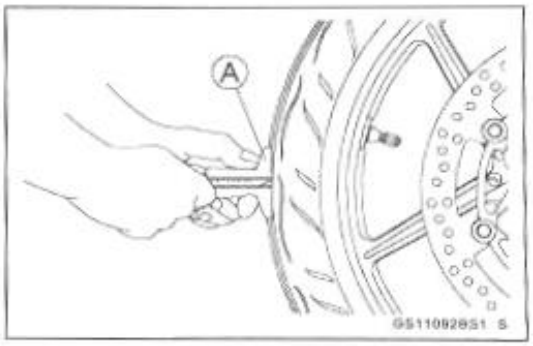
★If any damage is found, replace the wheel if necessary.



Periodic Maintenance Procedures

Tire Tread Wear Inspection

As the tire tread wears down, the tire becomes more susceptible to puncture and failure. An accepted estimate is that 90% of all tire failures occur during the last 10% of tread life (90% worn). So it is false economy and unsafe to use the tires until they are bald.



- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurement at several places.

★If any measurement is less than the service limit, replace the tire (see Tire Removal(10-14)).

Tread Depth

Standard:	
Front	**4.0 mm (0.16 in.)**
Rear	**6.0 mm (0.24 in.)**
Service Limit:	
Front	**1 mm (0.04 in.)**
Rear	**2 mm (0.08 in.) (Up to 130 km/h (80 mph))**
	3 mm (0.12 in.) (Over 130 km/h (80 mph))

⚠ WARNING

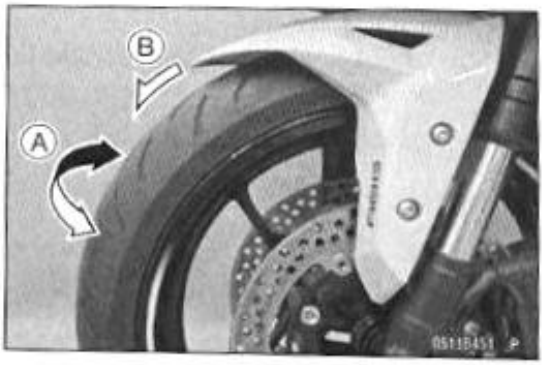
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

NOTE

○*Most countries may have their own regulations a minimum tire tread depth: be sure to follow them.*

○*Check and balance the wheel when a tire is replaced with a new one.*

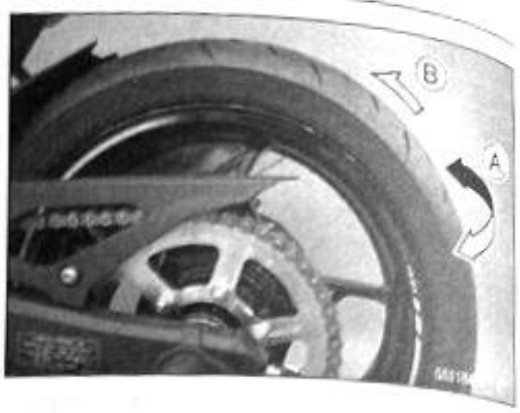
Wheel Bearing Damage Inspection



- Raise the front wheel off the ground with the stand (see Front Wheel Removal(10-6)).
- Turn the handlebars all the way to the right or left.
- Inspect the roughness of the front wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the front wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the front wheel (see Front Wheel Removal(10-6)) and inspect the wheel bearing (see Hub Bearing Inspection(10-18)).

Periodic Maintenance Procedures



- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal(10-7)).
- Inspect the roughness of the rear wheel bearing by pushing and pulling [A] the wheel.
- Spin [B] the rear wheel lightly, and check for smoothly turn, roughness, binding or noise.

★If roughness, binding or noise is found, remove the rear wheel (see Rear Wheel Removal(10-7)) and inspect the wheel bearing (see Hub Bearing Inspection(10-18)) and coupling (see Coupling Bearing Inspection(11-13)).

Final Drive

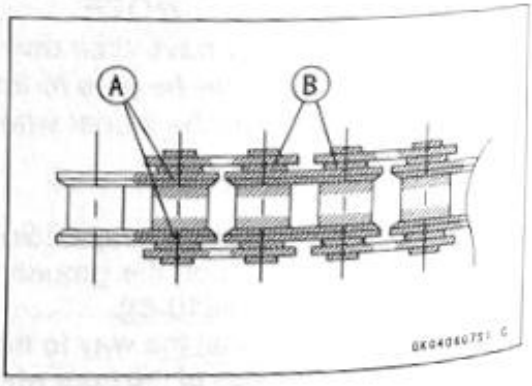
Drive Chain Lubrication Condition Inspection

Lubrication is necessary after riding through rain or on wet roads, or any time that the chain appears dry.

Use a lubricant for sealed chains to prevent deterioration of chain seals. If the chain is especially dirty, clean it using a cleaner for sealed chains following the instructions supplied by the chain cleaner manufacturer.

NOTICE

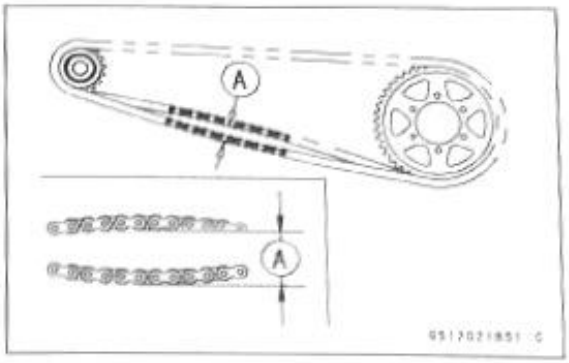
The O-rings between the side plates seal in the lubricant between the pin and the bushing. To avoid damaging the O-rings and resultant loss of lubricant, observe the following rules.
Use only chain cleaner for cleaning of the O-ring of the drive chain. Any other cleaning solution such as gasoline will cause deterioration and swelling of the O-ring. Immediately blow the chain dry with compressed air after cleaning. Complete cleaning and drying the chain within 10 minutes.



- Apply chain oil to the sides of the rollers so that oil will penetrate to the rollers and bushings. Apply the oil to the O-rings so that the O-rings will be coated with oil.
- Wipe off any excess oil.
  Oil Applied Areas [A]
  O-rings [B]
- Wipe off lubricant that gets on the tire surface.

Periodic Maintenance Procedures

Drive Chain Slack Inspection



NOTE

○Check the slack with the motorcycle setting on its side stand.

○Clean the chain if it is dirty, and lubricate it if it appears dry.

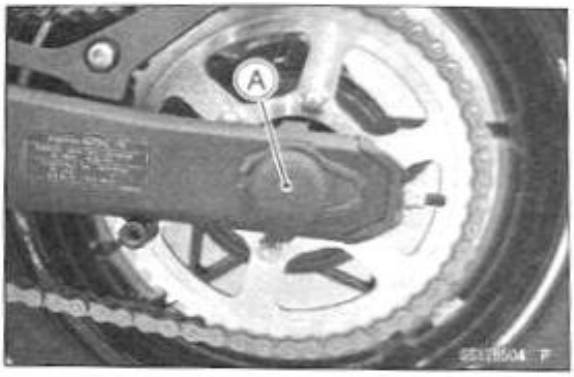
- Check the wheel alignment (see Wheel Alignment Inspection(2-40)).
- Rotate the rear wheel to find the position where the chain is tightest.
- Measure the vertical movement (chain slack) [A] midway between the sprockets.

★If the chain slack exceeds the standard, adjust it.

Chain Slack
Standard: 25 – 35 mm (1.0 – 1.4 in.)

Drive Chain Slack Adjustment

- Remove the rubber cap [A].

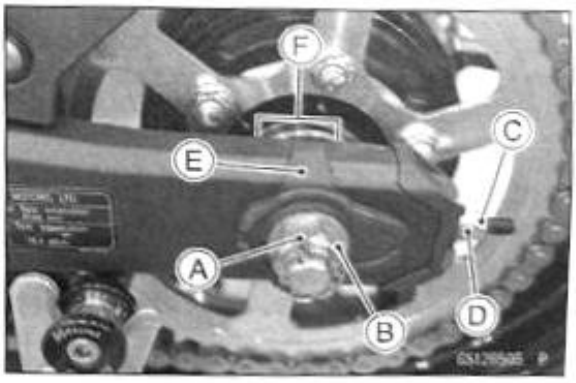


- Remove the cotter pin [A], and loosen the axle nut [B].
- Loosen the both chain adjuster locknuts [C].

★If the chain is too loose, turn in the right and left chain adjusters [D] evenly.

★If the chain is too tight, turn out the right and left chain adjusters evenly, and push the wheel forward.

- Turn both chain adjusters evenly until the drive chain has the correct amount of slack. To keep the chain and wheel properly aligned, the left wheel alignment indicator [E] should align with the same swingarm mark [F] that the right wheel alignment indicator aligns with.



⚠ WARNING

Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.

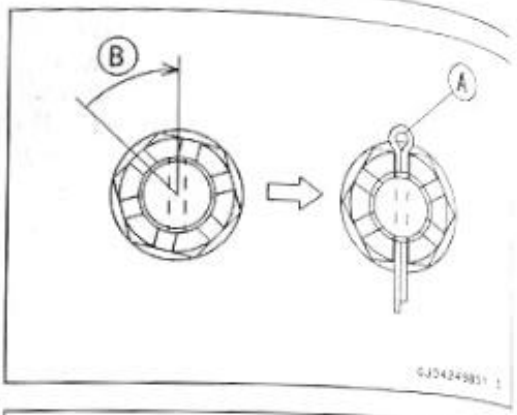
- Tighten both chain adjuster locknuts securely.
- Tighten:

Torque - Rear Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)

- Turn the wheel, measure the chain slack again at the tightest position, and readjust if necessary.

Periodic Maintenance Procedures

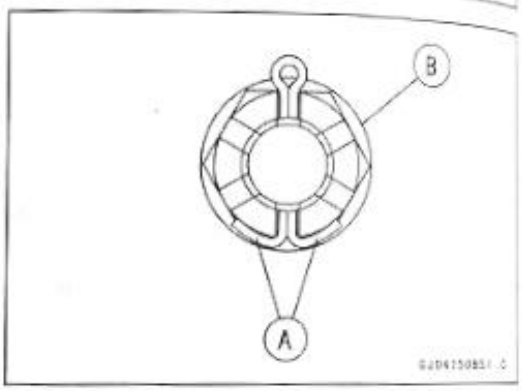
- Insert a new cotter pin [A].



NOTE

○When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
○It should be within 30 degrees.
○Loosen once and tighten again when the slot goes past the nearest hole.

- Bend the cotter pin [A] along the nut [B].



⚠ WARNING

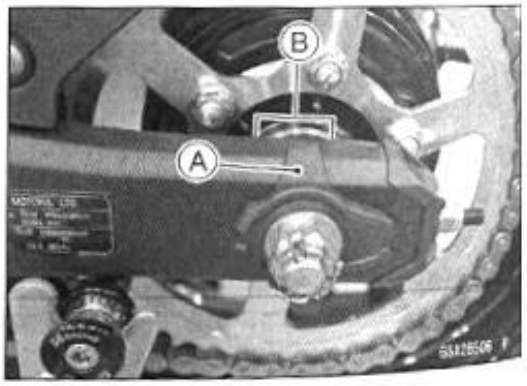
A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.

- Install the rubber cap.

Wheel Alignment Inspection

- Check that the right alignment indicator [A] aligns with the same swingarm mark [B] that the right alignment indicator aligns with.

★If they are not, adjust the chain slack and align the wheel alignment (see Drive Chain Slack Adjustment(2-39)).



NOTE

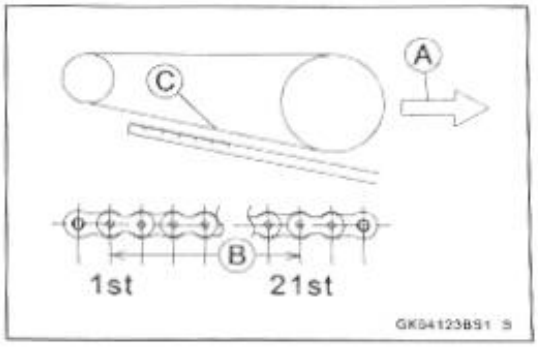
○Wheel alignment can be also checked using the straightedge or string method.

⚠ WARNING

Misalignment of the wheel will result in abnormal wear and may result in an unsafe riding condition. Be sure the wheel is properly aligned.

Periodic Maintenance Procedures

Drive Chain Wear Inspection



- Remove the mud guard (see Mud Guard Removal(15-40)).
- Rotate the rear wheel to inspect the drive chain for damaged rollers, and loose pins and links.

★If there is any irregularity, replace the drive chain.

★Lubricate the drive chain if it appears dry.

- The drive chain may wear unevenly, so check the chain slack by changing the position, and position the loosest part of the drive chain lower side.
- Loosen the rear axle shaft, and pull [A] the rear wheel rearward to stretch the drive chain steady. Measure the length of 20 links [B] on the straight part [C] of the lower side of chain from the pin center of the 1st pin to the pin center of the 21st pin.

★If any measurements exceed the service limit, replace the chain. Also, replace the front and rear sprockets when the drive chain is replaced.

Drive Chain 20-link Length

Standard:	**317.5 – 318.2 mm (12.50 – 12.53 in.)**
Service Limit:	**319 mm (12.6 in.)**

⚠ WARNING

A chain that breaks or jumps off the sprockets could snag on the engine sprocket or lock the rear wheel, severely damaging the motorcycle and causing it to go out of control. Inspect the chain for damage and proper adjustment before each ride. If chain wear exceeds the service limit, replace it with the standard chain.

Standard Chain

Make:	**DAIDO**
Type:	**DID 520VM5**
Link:	**114 links**
	(PH) 112 links

Chain Guide Wear Inspection

- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal(11-10))
- Visually inspect the chain guide (interfering portion [A] with the drive chain).

★Replace the chain guide if it shows any signs of abnormal wear or damage.

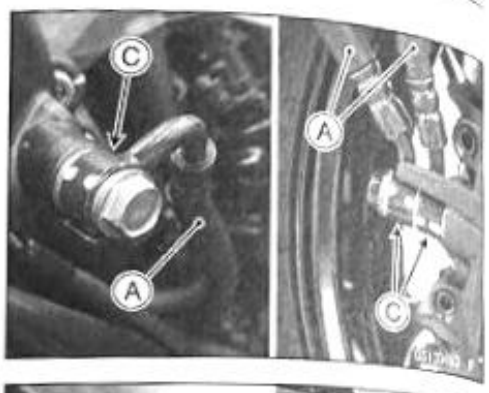
Brakes

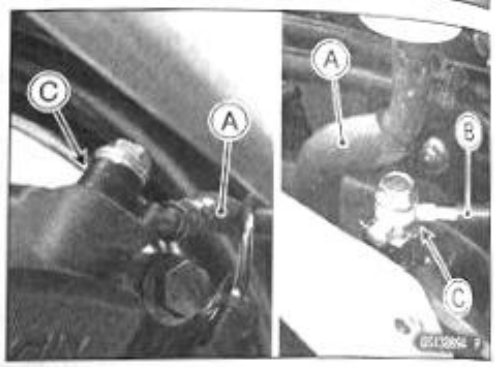
Brake System Inspection

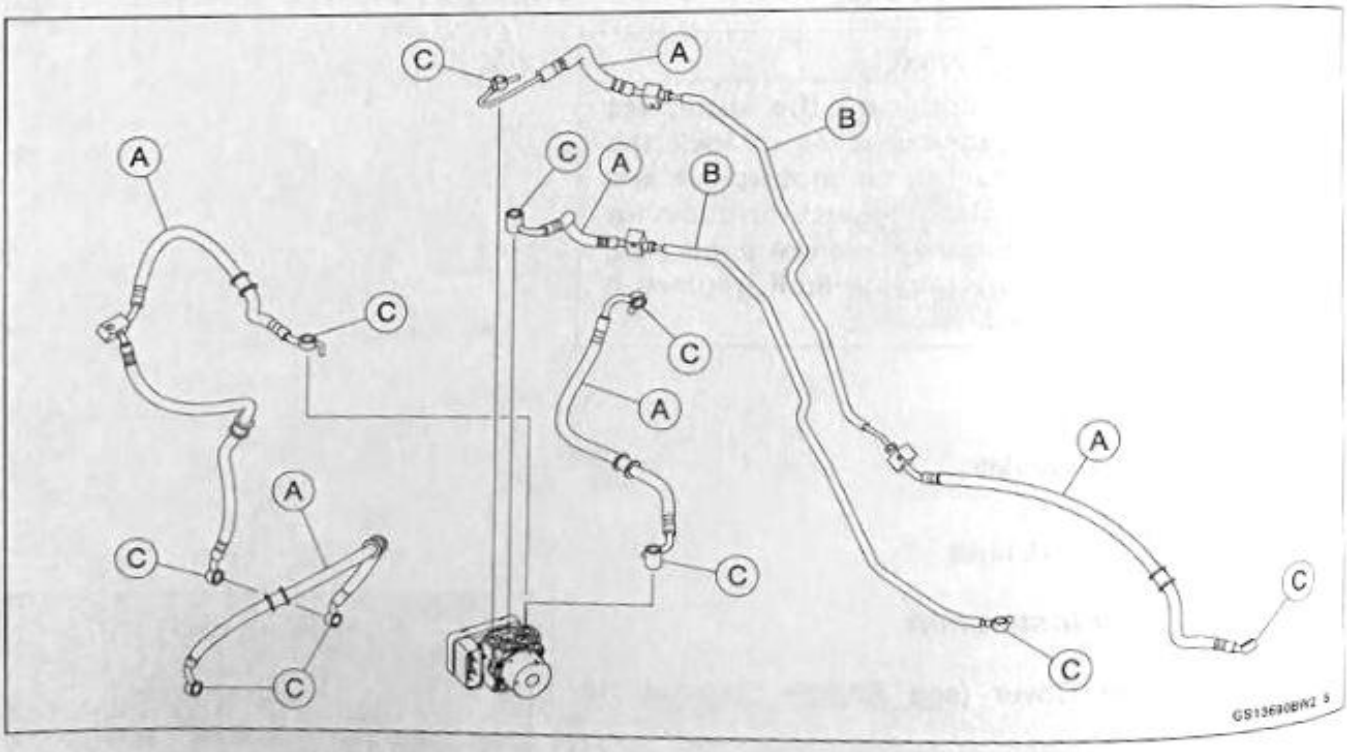
Brake Fluid Leak (Brake Hose and Pipe) Inspection

- Remove the air cleaner housing (see Air Cleaner Housing Removal(3-31)).
- Apply the brake lever or pedal and inspect the brake fluid leak from the brake hoses [A], pipes [B] and fittings [C].

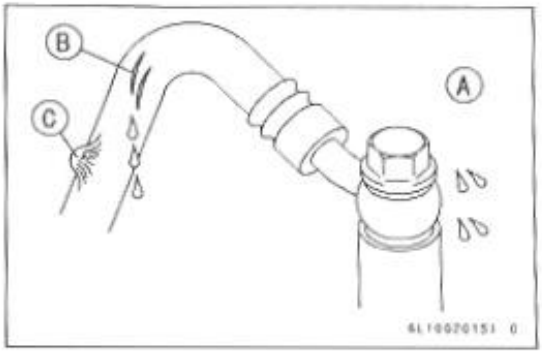
★If the brake fluid leaked from any position, inspect or replace the problem part.







Brake Hose and Pipe Damage and Installation Condition Inspection



- Remove the air cleaner housing (see Air Cleaner Housing Removal(3-31)).
- Inspect the brake hoses, pipe and fittings for deterioration, cracks and signs of leakage.

○The high pressure inside the brake line can cause fluid to leak [A] or the hose, pipe to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace the hose and pipe if any crack [B], bulge [C] or leakage is noticed.

★Tighten any brake hose banjo bolts and brake pipe joint nuts.

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolts (ABS Hydraulic Unit): 25 N·m (2.5 kgf·m, 18 ft·lb)

- Inspect the brake hose and pipe routing.

★If any brake hose and pipe routing is incorrect, run the brake hose and pipe (see Cable, Wire, and Hose Routing section (18-2)).

Brake Operation Inspection

- Inspect the operation of the front and rear brake by running the vehicle on the dry road.

★If the brake operation is insufficiency, inspect the brake system.

⚠ WARNING

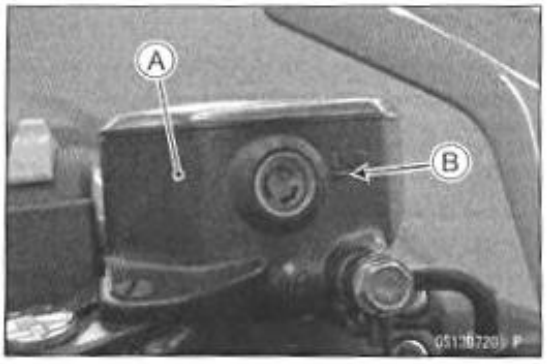
When test riding the vehicle, be aware of surrounding traffic for your safety.

Brake Fluid Level Inspection

- Check that the brake fluid level in the front brake reservoir [A] is above the lower level line [B].

NOTE

○*Hold the reservoir horizontal by turning the handlebars when checking brake fluid level.*



NOTICE

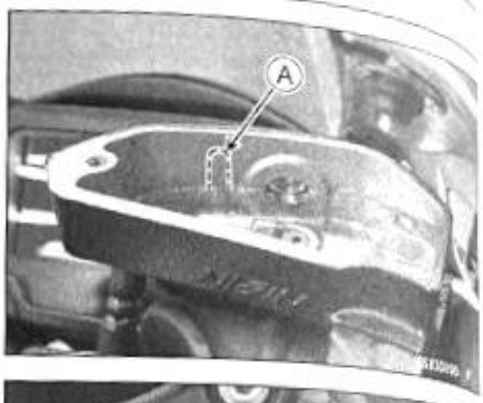
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

Periodic Maintenance Procedures

★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [A].

• Tighten:

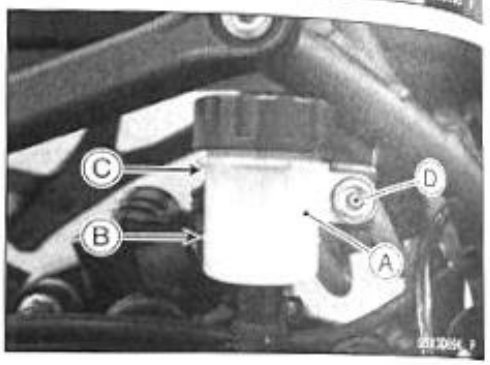
Torque - Front Brake Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)



• Check that the brake fluid level in the rear brake reservoir [A] is above the lower level line [B].

NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.



★If the fluid level is lower than the lower level line, fill the reservoir to the upper level line [C].

○Remove the bolt [D].

⚠ WARNING

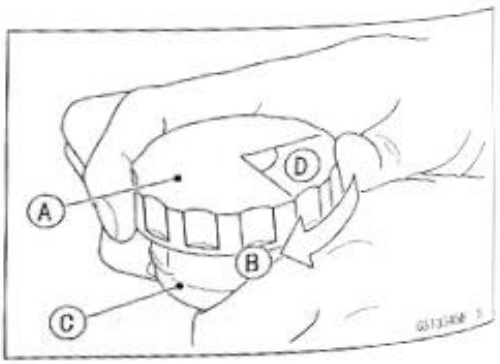
Mixing brands and types of brake fluid can reduce the brake system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified.

Recommended Disc Brake Fluid
Grade: DOT4

• Follow the procedure below to install the rear brake fluid reservoir cap correctly.

○First, tighten the brake fluid reservoir cap [A] clockwise [B] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body [C], then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body.

• Install the rear brake fluid reservoir and tighten the bolt.



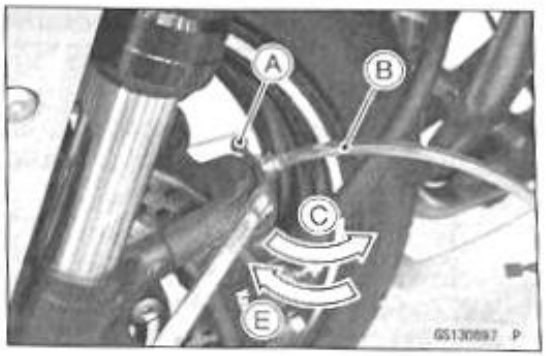
Brake Fluid Change

NOTE

○*The procedure to change the front brake fluid is as follows. Changing the rear brake fluid is the same as for the front brake.*

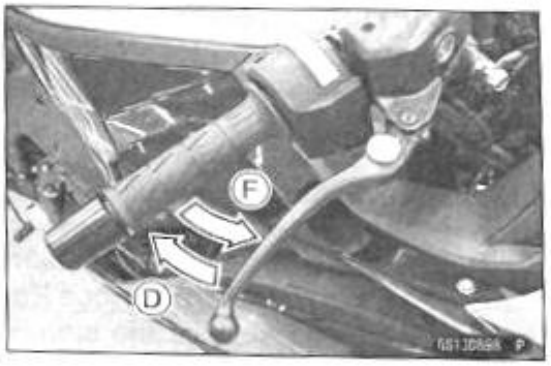
Periodic Maintenance Procedures

- Level the brake fluid reservoir.
- Remove the reservoir cap, diaphragm plate and diaphragm.
- Remove the rubber cap [A] from the bleed valve on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.
- Fill the reservoir with fresh specified brake fluid.
- Change the brake fluid.



ORepeat this operation until fresh brake fluid comes out from the plastic hose or the color of the fluid changes.

1. Open the bleed valve [C].
2. Apply the brake and hold it [D].
3. Close the bleed valve [E].
4. Release the brake [F].



NOTE

O*The fluid level must be checked often during the changing operation and replenished with fresh brake fluid. If the fluid in the reservoir runs out any time during the changing operation, the brakes will need to be bled since air will have entered the brake line.*

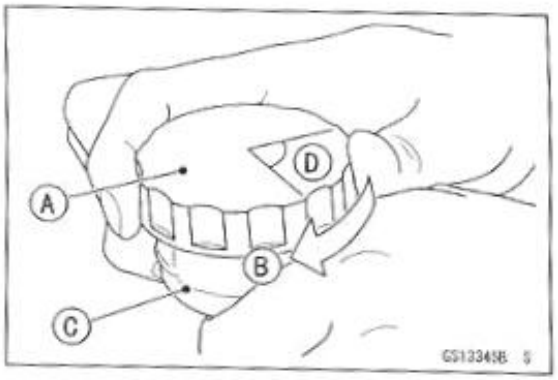
O*Front Brake: Repeat the above steps for the other caliper.*

- Remove the clear plastic hose.
- Install the diaphragm, diaphragm plate and reservoir cap.

Torque - Front Brake Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

- Follow the procedure below to install the rear brake fluid reservoir cap correctly.

OFirst, tighten the brake fluid reservoir cap [A] clockwise [B] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body [C], then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body.



- Install the rear brake fluid reservoir and tighten the bolt.

- Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

★If necessary, bleed the air from the lines.

Periodic Maintenance Procedures

Brake Hose and Pipe Replacement

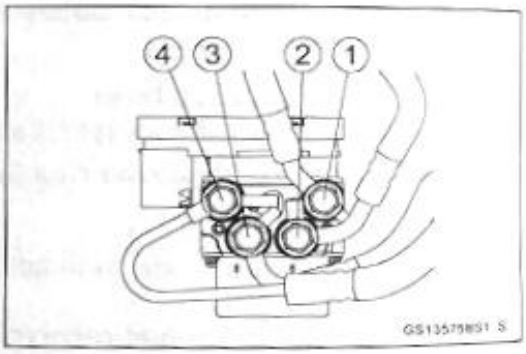
NOTICE
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
  Bolts [A] [B]
  Clamps [C]
  Brake Hose Banjo Bolts [D]
  Bands
- Replace the bolt [B] with a new one.
- There are washers on each side of the brake hose and pipe fitting. Replace them with new ones when installing.
- Install the brake pipes and brake hoses to the specified angle (see Cable, Wire, and Hose Routing section (18-2)).

○Touch the brake hose to the stopper of the caliper and master cylinder.

- Tighten the brake hose banjo bolts (ABS hydraulic unit) following the specified tightening sequence [1 – 4].

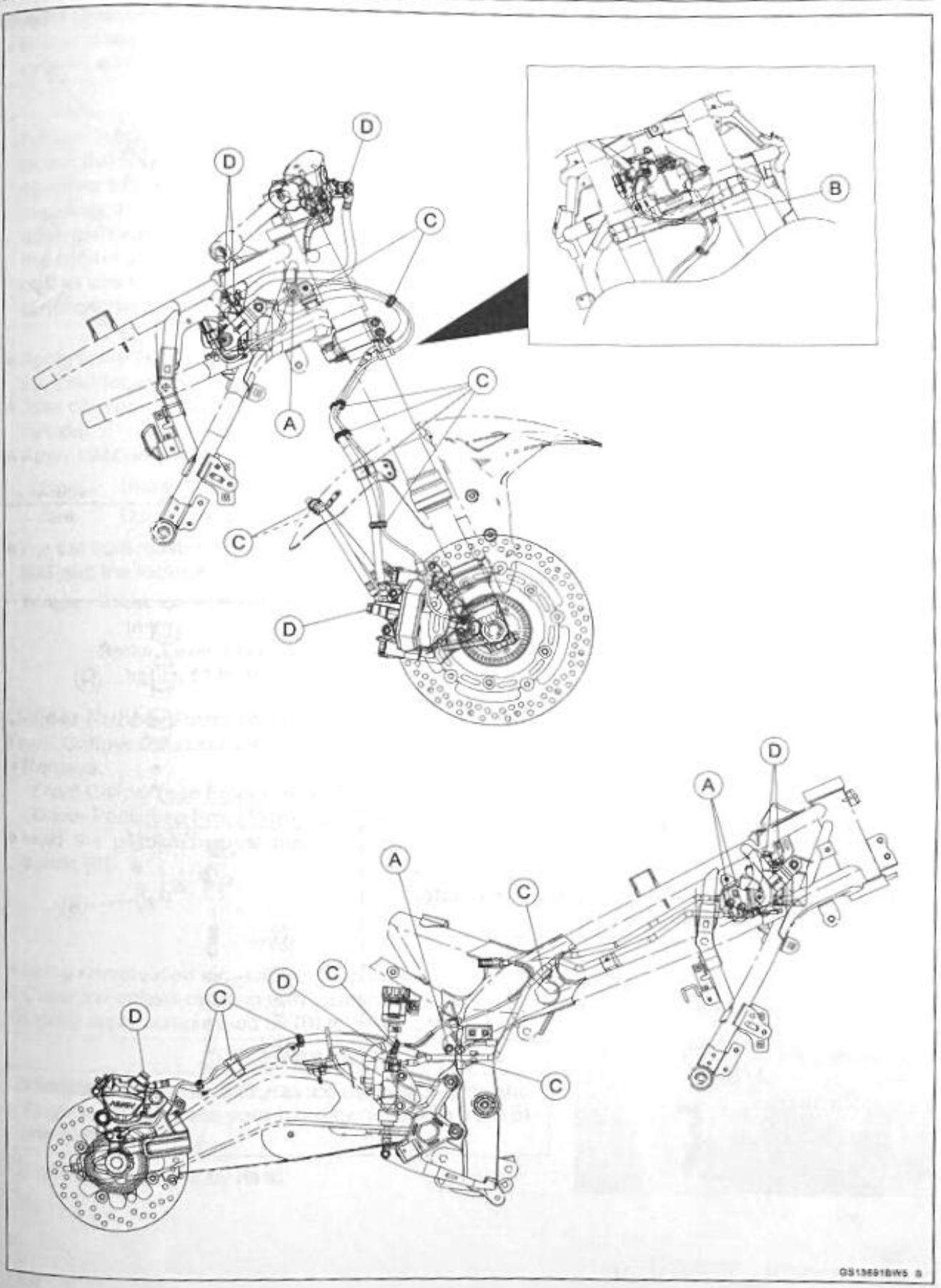
Torque - Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 23 mm) [1, 4]: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 37 mm) [2, 3]: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Tighten:

Torque - Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Fill the brake line after installing the brake hose and pipe (see Brake Fluid Change(2-44)).
- Install the removed parts.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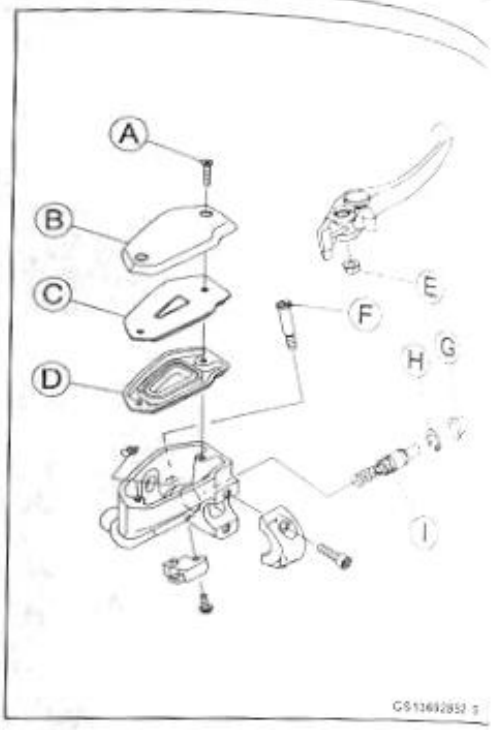
Master Cylinder Rubber Parts Replacement

Front Master Cylinder Disassembly

- Remove:
  Front Master Cylinder (see Front Master Cylinder Removal(12-17))
  Front Brake Reservoir Cap Screws [A]
  Reservoir Cap [B]
  Diaphragm Plate [C]
  Diaphragm [D]
- Remove the locknut [E] and pivot bolt [F], and remove the brake lever.
- Remove the dust cover [G] and circlip [H].

  Special Tool - Inside Circlip Pliers: 57001-143
- Pull out the piston assembly [I].



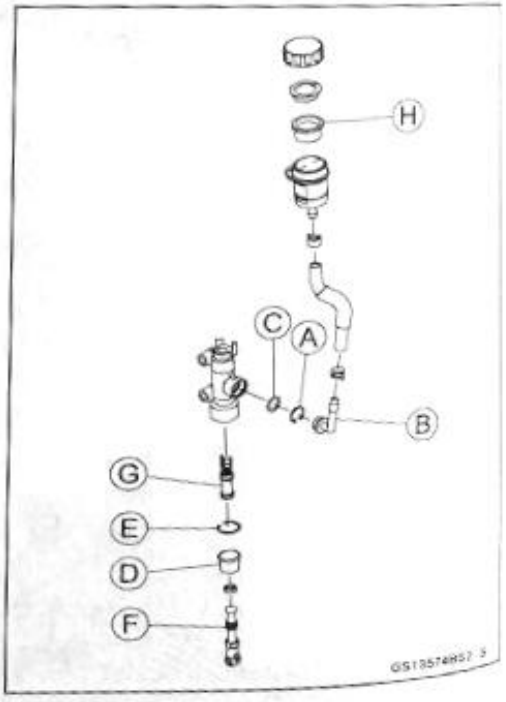
NOTICE
Do not remove the secondary cup from the piston since removal will damage it.

- Replace:
  Diaphragm [D]
  Dust Cover [G]
  Circlip [H]
  Piston Assembly [I]

Rear Master Cylinder Disassembly

- Remove the rear master cylinder (see Rear Master Cylinder Removal(12-18)).
- Remove the circlip [A], connector [B] and O-ring [C].

  Special Tool - Inside Circlip Pliers: 57001-143
- Slide the dust cover [D] out of place, and remove the circlip [E].
- Pull out the push rod assembly [F].
- Remove the piston assembly [G].



NOTICE
Do not remove the secondary cup from the piston since removal will damage it.

- Replace:
  Circlip [A]
  O-ring [C]
  Circlip [E]
  Push Rod Assembly [F]
  Piston Assembly [G]
  Diaphragm [H]

Master Cylinder Assembly

- Before assembly, clean all parts including the master cylinder with brake fluid or alcohol.

NOTICE

Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the disc brake.

- Apply brake fluid to the new parts and to the inner wall of the cylinder.
- Take care not to scratch the piston or the inner wall of the cylinder.
- Apply silicone grease to the followings.

Front: Brake Lever Pivot Bolt

Rear: Dust Cover of Push Rod Assembly

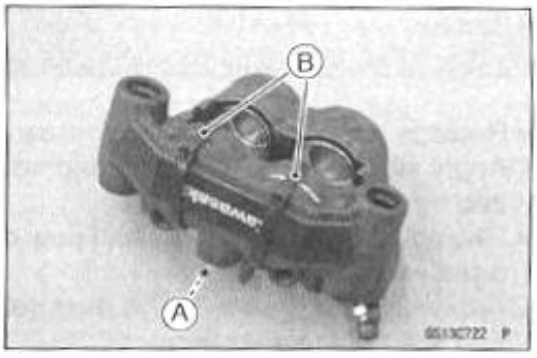
- For the front master cylinder, tighten the brake lever pivot bolt and the locknut.

Torque - Brake Lever Pivot Bolt: 1.0 N·m (0.10 kgf·m, 8.9 in·lb)
Brake Lever Pivot Bolt Locknut: 5.9 N·m (0.60 kgf·m, 52 in·lb)

Caliper Rubber Parts Replacement

Front Caliper Disassembly

- Remove:
  Front Caliper (see Front Caliper Removal(12-11))
  Brake Pads (see Front Brake Pad Removal(12-15))
- Hold the pistons nearest the oil passage [A] with the bands [B].



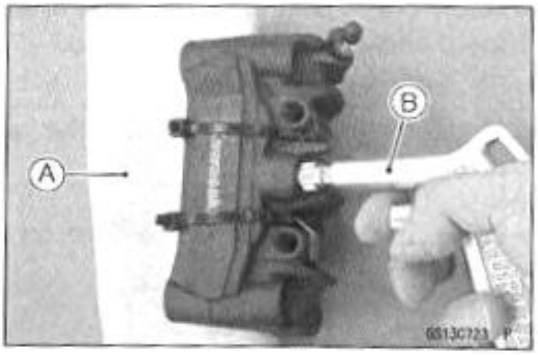
- Using compressed air, remove the pistons.

○Cover the caliper opening with a clean heavy cloth [A].
○Lightly apply compressed air [B] to the oil passage.

⚠ WARNING

The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

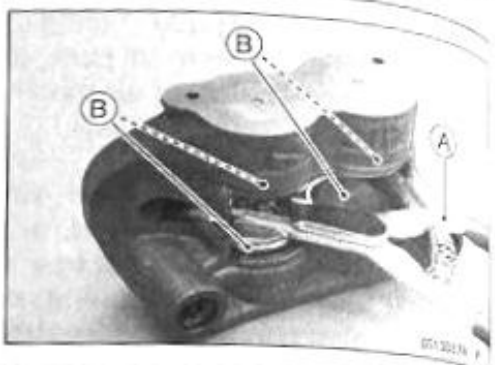
○Pull out the pistons by hand.



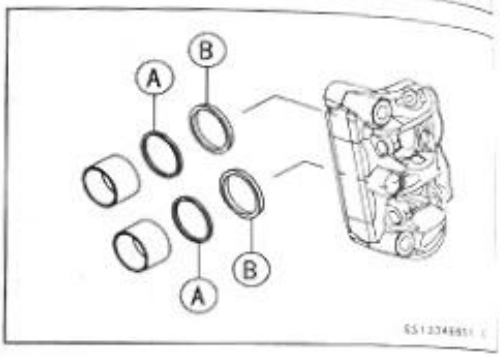
Periodic Maintenance Procedures

- When compressed air is not used, using the brake caliper piston pliers [A] remove the pistons [B].

  Special Tool - Brake Caliper Piston Pliers (φ26 – φ36): 57001-1862



- Remove the dust seals [A] and fluid seals [B].
- Cut the bands.
- Repeat the previous step to remove the pistons from the other side of the caliper body.
- Remove the bleed valve and rubber cap.



Front Caliper Assembly

- Clean the caliper parts except for the pads.

NOTICE
For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

- Install the bleed valve and rubber cap.
- Tighten:

  Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

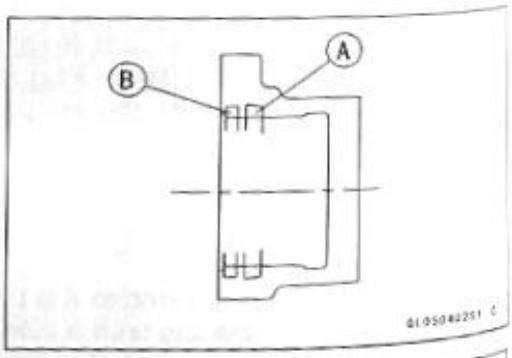
- Replace the fluid seals [A] with new ones.

○Apply silicone grease to the fluid seals, and install them into the cylinders by hand.

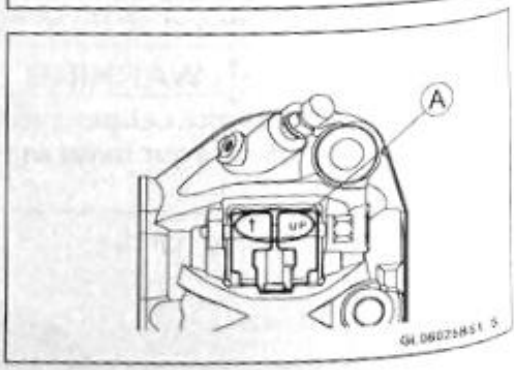
- Replace the dust seals [B] with new ones if they are damaged.

○Apply silicone grease to the dust seals, and install them into the cylinders by hand.

- Apply brake fluid to the outside of the pistons, and push them into each cylinder by hand.

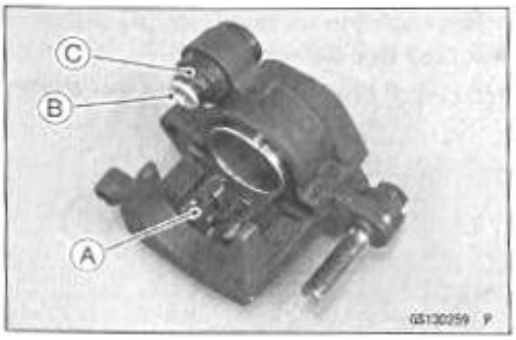


- Install the pad spring so that the arrow mark [A] faces upward.
- Install the removed parts.
- Wipe up any spilled brake fluid on the caliper with wet cloth.



Rear Caliper Disassembly

- Remove:
  Rear Caliper (see Rear Caliper Removal(12-12))
  Brake Pad (see Rear Brake Pad Removal(12-16))
  Pad Spring [A]
  Sleeve [B]
  Friction Boot [C]



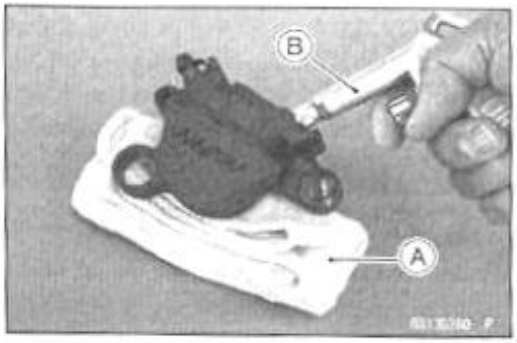
- Using compressed air, remove the piston.

○Cover the caliper opening with a clean heavy cloth [A].

○Remove the piston by lightly applying compressed air [B] to where the brake line fits into the caliper.

⚠ WARNING

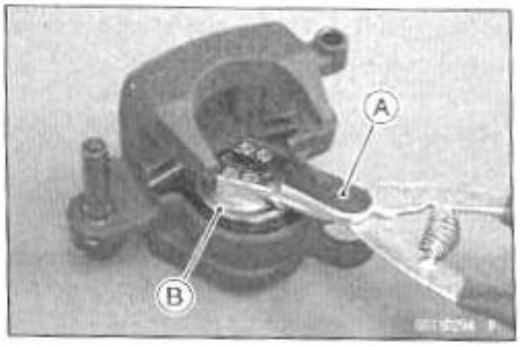
The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.



- When compressed air is not used, using the brake caliper piston pliers [A] remove the piston [B].

  Special Tool - Brake Caliper Piston Pliers (φ26 – φ36): 57001-1862

- Remove the dust seal and fluid seal.
- Remove the bleed valve and rubber cap.



Rear Caliper Assembly

- Clean the caliper parts except for the pads.

NOTICE

For cleaning the parts, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol.

- Install the bleed valve and rubber cap.
- Tighten:

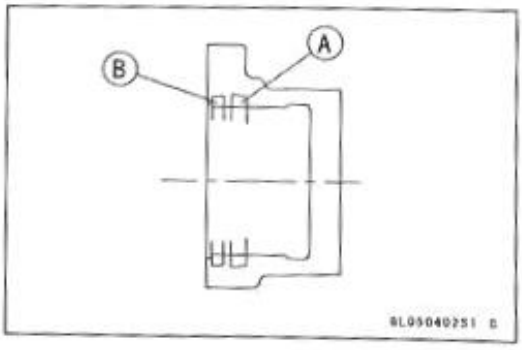
  Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- Replace the fluid seal [A] with a new one.

○Apply silicone grease to the fluid seal, and install it into the cylinder by hand.

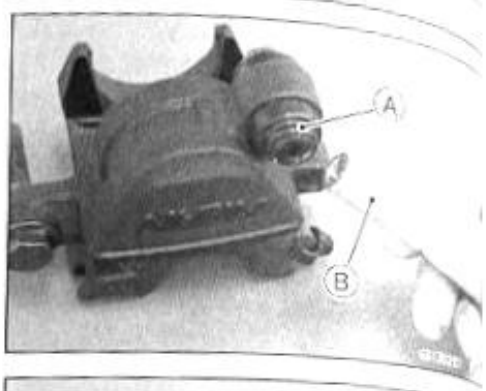
- Replace the dust seal [B] with a new one.

○Apply silicone grease to the dust seal, and install it into the cylinder by hand.

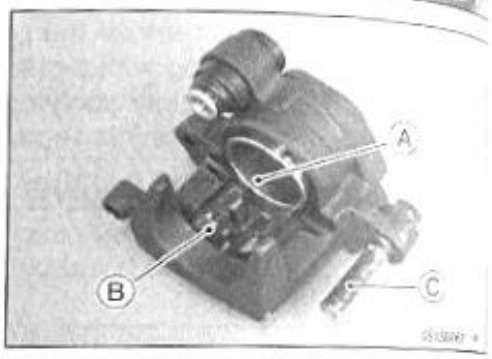


- Replace the friction boot [A] with a new one and install it.
- Install the sleeve [B].

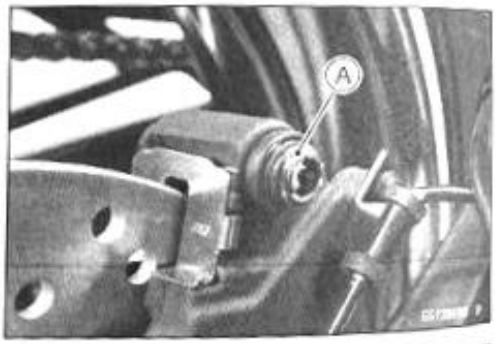
○Apply a silicone grease to the sleeve.



- Apply brake fluid to the outside of the piston [A], and push it into the cylinder by hand.
- Install the pad spring [B] in the caliper as shown.
- Apply silicone grease to the caliper pin bolt [C].



- Replace the dust boot [A] with a new one if it is damaged.
- Install the removed parts.
- Wipe up any spilled brake fluid on the caliper with wet cloth.

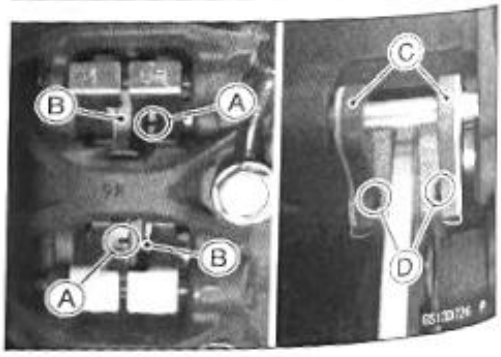


Brake Pad Wear Inspection

- Clean the brake calipers especially around the brake pads.
- Visually inspect the lining thickness of the brake pads in each caliper.

○Use an inspection mirror as required.

★If the wear indicators [A] of the front brake pads [B] cannot be seen (i.e. worn out), or the rear brake pads [C] has been worn until the wear indicator [D], remove the brake pads (see Front Brake Pad Removal(12-15)) (see Rear Brake Pad Removal(12-16)) and inspect them as follows.



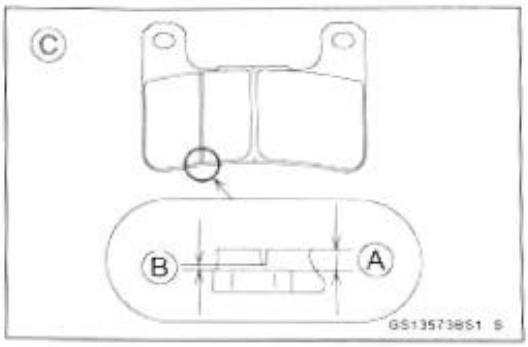
Periodic Maintenance Procedures

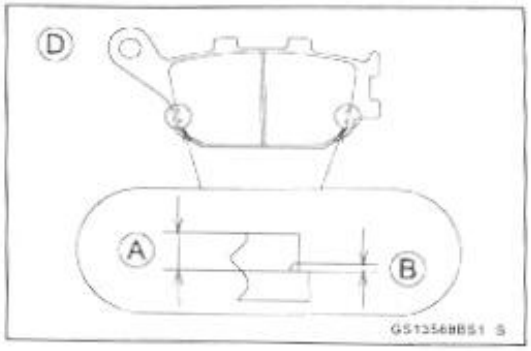
- Check the lining thickness [A] of the pads in each caliper.

★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.
Front Brake Pad [C]
Rear Brake Pad [D]

Pad Lining Thickness

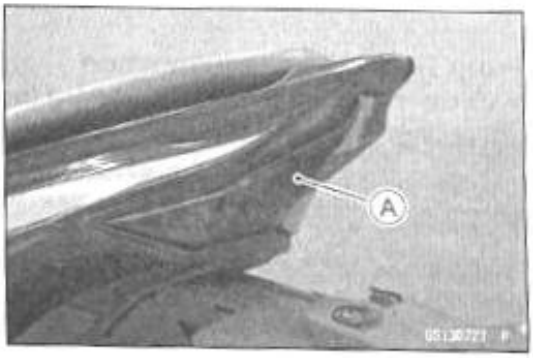
Standard:	
Front	**4 mm (0.16 in.)**
Rear	**5 mm (0.20 in.)**
Service Limit:	**1 mm (0.04 in.)**





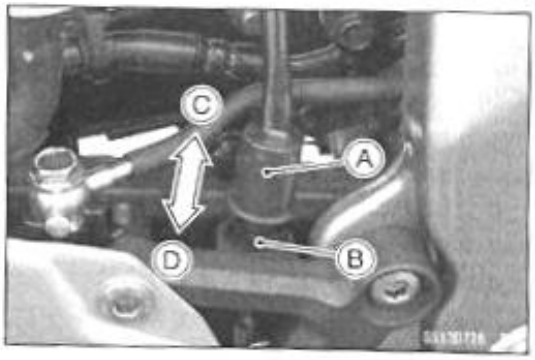
Brake Light Switch Operation Inspection

- Turn the ignition switch on.
- The brake light [A] should go on when the brake lever is applied or after the brake pedal is depressed about 7 mm (0.28 in.).



★If it does not, adjust the brake light switch.

- While holding the switch body [A], turn the adjusting nut [B] to adjust the switch.
Light sooner as the body rises [C]
Light later as the body lowers [D]



NOTICE

To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

★If it does not go on, inspect or replace the following parts.
Battery (see Charging Condition Inspection(16-21))
Brake Light (see Brake/Tail Light Removal(16-48))
Main Fuse 30 A and Brake Light/Horn Fuse 10 A (see Fuse Inspection(16-97))
Front Brake Light Switch [A] (see Switch Inspection(16-90))
Rear Brake Light Switch (see Switch Inspection(16-90))
Harness (see Wiring Inspection(16-19))

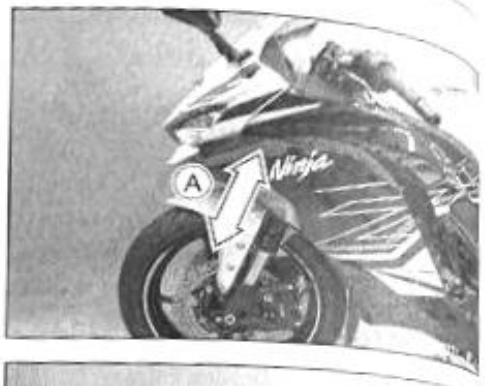
Suspension

Suspension System Inspection

Front Forks/Rear Shock Absorber Operation Inspection

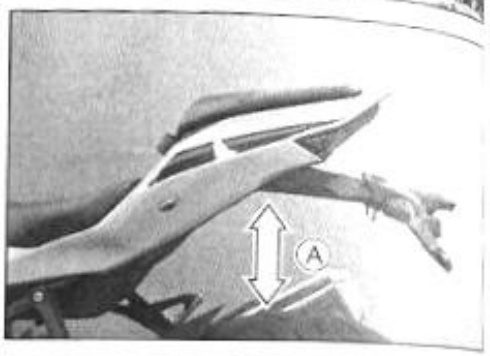
- Pump the forks down and up [A] 4 or 5 times, and inspect the smooth stroke.

★If the forks do not smoothly or noise is found, inspect the fork oil level or fork clamps (see Front Fork Oil Change(13-16)).



- Pump the seat down and up [A] 4 or 5 times, and inspect the smooth stroke.

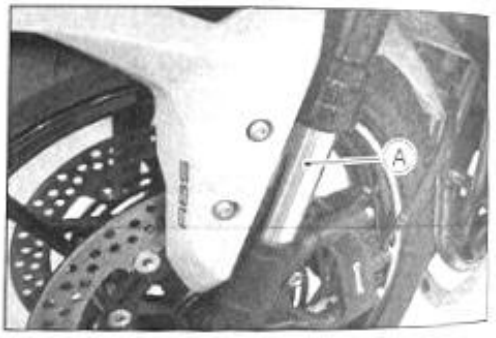
★If the shock absorber does not smoothly stroke or noise is found, inspect the oil leak.



Front Fork Oil Leak Inspection

- Visually inspect the front forks [A] for oil leakage.

★Replace any defective parts, if necessary.

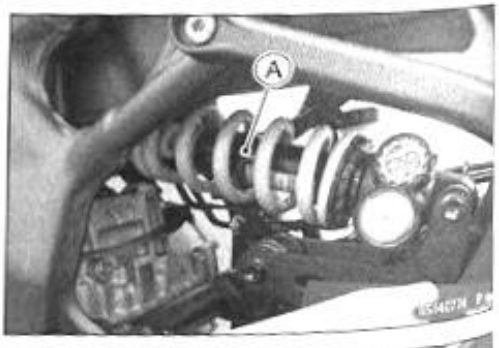


Rear Shock Absorber Oil Leak Inspection

- Visually inspect that there is no oil stain on the parts around the rear shock absorber [A].

OSince the rear shock absorber body and the piston rod are covered, it is difficult to inspect directly.

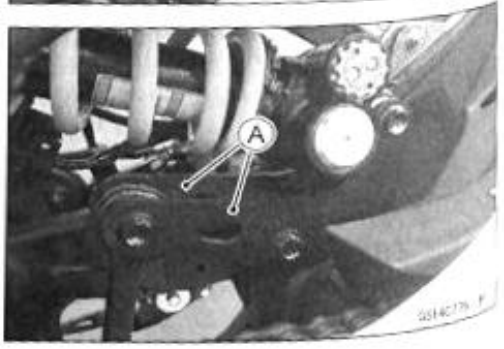
★If the oil leakage is found on it, replace the rear shock absorber with a new one.



Rocker Arm Operation Inspection

- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

★If the rocker arms [A] do not smoothly stroke or noise is found, inspect the fasteners and bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection(13-41)).

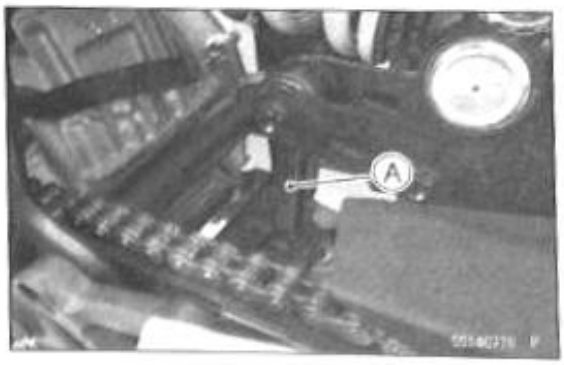


Periodic Maintenance Procedures

Tie-Rod Operation Inspection

- Pump the seat down and up 4 or 5 times, and inspect the smooth stroke.

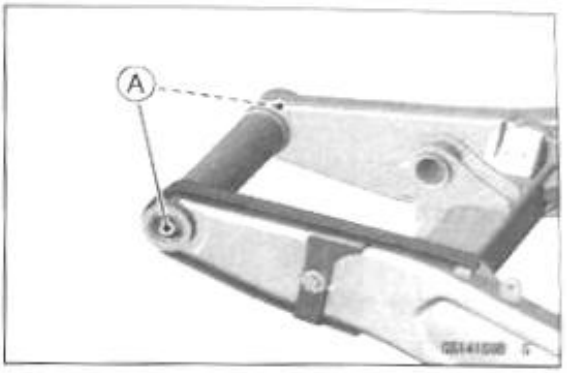
★If the tie-rod [A] do not smoothly stroke or noise is found, inspect the fasteners and tie-rod bearings (see Rocker Arm/Tie-Rod Bearing, Sleeve Inspection(13-41)).



Lubrication of Rear Suspension

Swingarm Pivot Lubrication

- Remove:
  Swingarm (see Swingarm Removal(13-33))
  Grease Seals (Both Sides)
  Sleeve
- Using a high flash-point solvent, clean the old grease out of the needle bearings [A].
- Apply plenty of grease to the inner surface of the needle bearings.
- Apply thin coat of grease to the lips of the oil seals.
- Install the removed parts.



Steering

Steering Play Inspection

- Raise the front wheel off the ground with the front stand or the webbing sling.
- With the front wheel pointing straight ahead, alternately push each end of the handlebar. Confirm the front wheel should swing lightly left and right until the fork hits the stop.

★If the wheel binds or catches before the stop, the steering is too tight.

- Feel for steering looseness by pushing and pulling [A] the forks.

★If you feel looseness, the steering is too loose.

NOTE

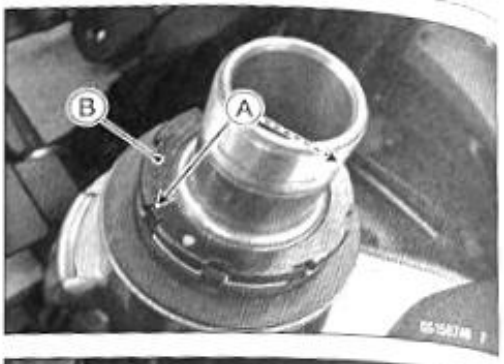
○*The wirings will have some effect on the motion of the fork which must be taken into account.*
○*Be sure the leads are properly routed.*
○*The bearings must be in good condition and properly lubricated in order for any test to be valid.*

Periodic Maintenance Procedures

Steering Play Adjustment

- Remove:
  Steering Stem Head (see Handlebar Removal(14-11))
- Raise the front wheel off the ground.
- Straighten the claws [A] of the claw washer.
- Remove:
  Steering Stem Locknut [B]
  Claw Washer

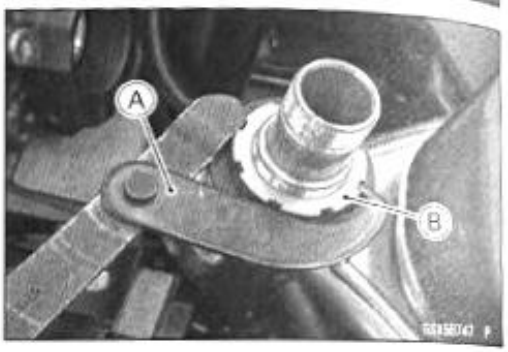
Special Tool - Steering Stem Nut Wrench: 57001-1100



- Adjust the steering using the steering stem nut wrench [A].

★If the steering is too tight, loosen the stem nut [B] a fraction of a turn.

★If the steering is too loose, tighten the stem nut a fraction of a turn.

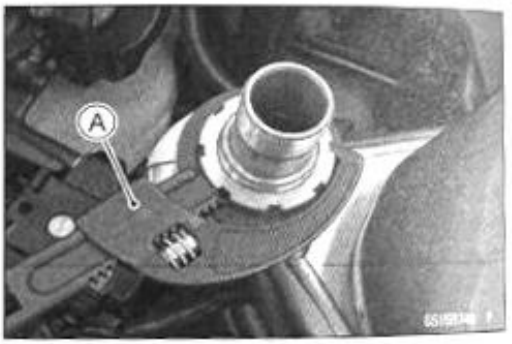


NOTE

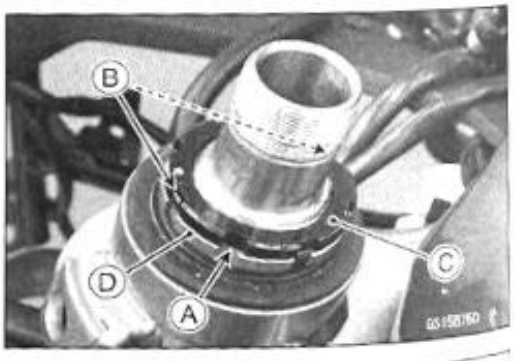
○*Turn the stem nut 1/8 turn at time maximum.*

○You may adjust the steering using the adjustable hook wrench [A].

Special Tool - Adjustable Hook Wrench: 57001-1863



- Replace the claw washer [A] with a new one.
- Install the claw washer so that its bent claws [B] faces upward, and engage the bent claws with the grooves of steering stem locknut [C].
- Hand tighten the steering stem locknut until it contacts against the claw washer.
- Check if the grooves of the steering stem locknut aligns with the grooves of the steering stem nut [D].

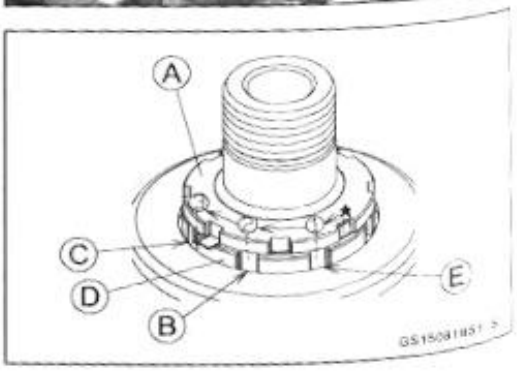


In case of the claws positioned between the grooves:

- Tighten the steering stem locknut [A] until the straight claws aligned with second [B] or 3rd groove [C] of the steering stem nut [D].

○Count the number of groove from the **first** aligned groove [E] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.

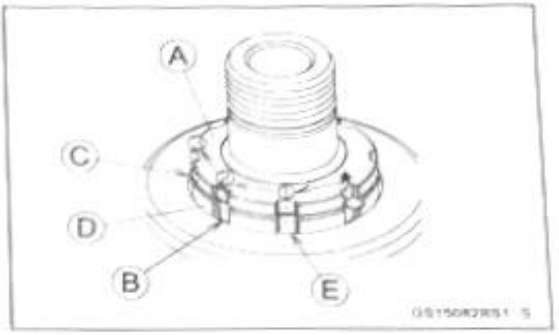


In case of the claws aligned with the grooves:

- Tighten the steering stem locknut [A] until the straight claws aligned with second [B] or 3rd groove [C] of the steering stem nut [D].

○Count the number of groove from the **next** aligned groove [E] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.



- Install the steering stem head.
- Install the washer, and temporarily tighten the steering stem head nut.

NOTE

○*Tighten the steering stem head nut first, next the upper front fork clamp bolts.*

- Tighten:

Torque - Steering Stem Head Nut: 80 N·m (8.2 kgf·m, 59 ft·lb)
Upper Front Fork Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

⚠ WARNING

If the handlebars do not turn to the steering stop, they may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section (18-2)).

- Check the steering again.

★If the steering is still too tight or too loose, repeat the adjustment.

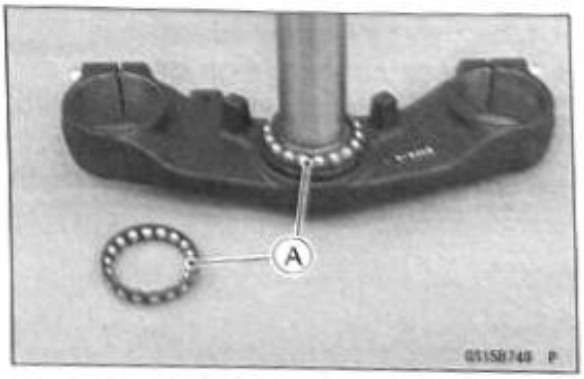
- Install the removed parts.

Steering Stem Bearing Lubrication

- Remove the steering stem (see Stem, Stem Bearing Removal(14-6)).
- Using a high flash-point solvent, wash the upper and lower ball bearings [A] in the cages, and wipe the upper and lower outer races, which are press-fitted into the frame head pipe, clean off grease and dirt.
- Visually check the outer races and the ball bearings.

★Replace the bearing assemblies if they show wear or damage.

- Pack the upper and lower ball bearings in the cages with grease, and apply a light coat of grease to the upper and lower outer races.
- Install the steering stem (see Stem, Stem Bearing Installation(14-7)).
- Adjust the steering (see Steering Play Adjustment(2-56)).



Electrical System

Lights and Switches Operation Inspection

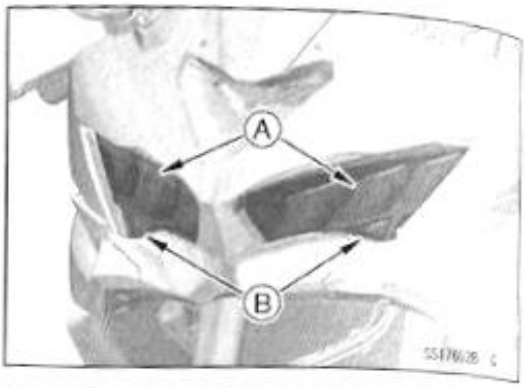
First Step

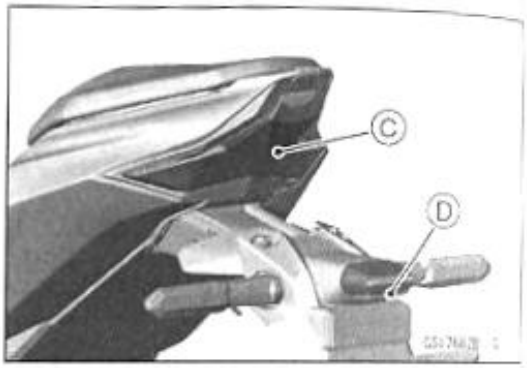
- Set the gear position in the neutral position.
- Turn the ignition switch on.
- The following lights should go on.

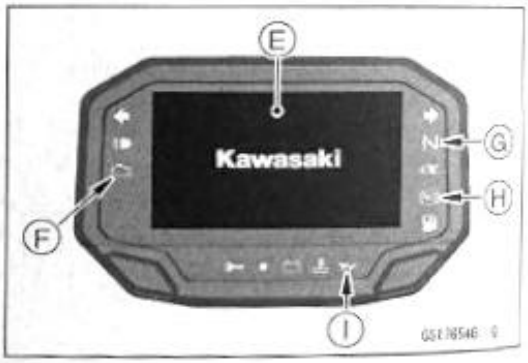
Headlights [A]
City Lights [B]
Taillight [C]
License Plate Light [D]
Meter Panel LCD [E]
Yellow Engine Warning Indicator Light [F]
Green Neutral Indicator Light [G]
Yellow ABS Indicator Light [H]
Oil Pressure Warning Indicator [I]

★If the light does not go on, inspect or replace the following parts.

Battery (see Charging Condition Inspection(16-21))
Headlight Assembly (see Upper Fairing Disassembly(15-22))
Brake/Tail Light (see Brake/Tail Light Removal(16-48))
License Plate Light (see Flap Disassembly(15-32))
Meter Panel LCD (see Meter Unit Inspection(16-59))
Indicator Lights (see Meter Unit Inspection(16-59))
ECU (see ECU Power Supply Inspection(3-13))
Main Fuse 30 A, Meter Fuse 10 A, Headlight Fuse 15 A, and Brake Light/Horn Fuse 10 A (see Fuse Inspection(16-97))
Ignition Switch (see Switch Inspection(16-90))
Oil Pressure Switch (see Switch Inspection(16-90))
Gear Position Sensor (see DTC P0914(17-80)) (see DTC P0915(17-80)) (see DTC P0916(17-81))
Harness (see Wiring Inspection(16-19))







- Turn the ignition switch off.
- The all lights should go off.

○The red warning indicator will blinks. Refer to the Immobilizer System section.

★If the light does not go off, replace the ignition switch.

Periodic Maintenance Procedures

Second Step

- Turn the ignition switch on.
- Turn on the turn signal switch [A] (left or right position).
- The left or right turn signal lights [B] (front and rear) according to the switch position should blink.
- The green turn signal indicator lights [C] in the meter unit should blink.

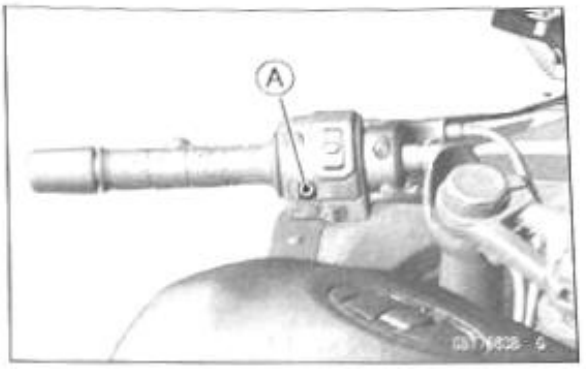
★If the each light does not blink, inspect or replace the following parts.

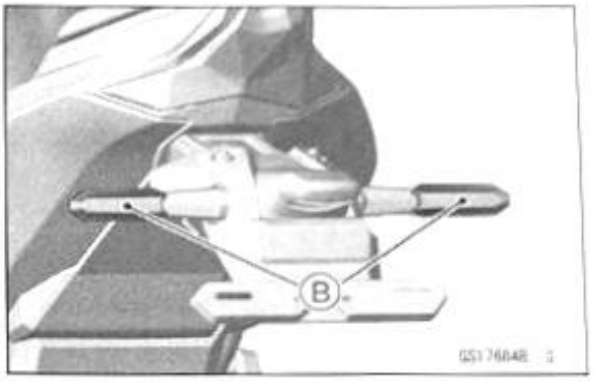
Turn Signal Light (see Lower Fairing Disassembly(15-20)) (see Flap Disassembly(15-32))
Green Turn Signal Indicator Light (see Meter Unit Inspection(16-59))
Turn Signal Relay Fuse 10 A (see Fuse Inspection(16-97))
Turn Signal Switch (see Switch Inspection(16-90))
Turn Signal Relay (see Turn Signal Relay Inspection(16-51))
Harness (see Wiring Inspection(16-19))

- Push the turn signal switch.
- The turn signal lights and green turn signal indicator light should go off.

★If the light does not go off, inspect or replace the following parts.

Turn Signal Switch (see Switch Inspection(16-90))
Turn Signal Relay (see Turn Signal Relay Inspection(16-51))



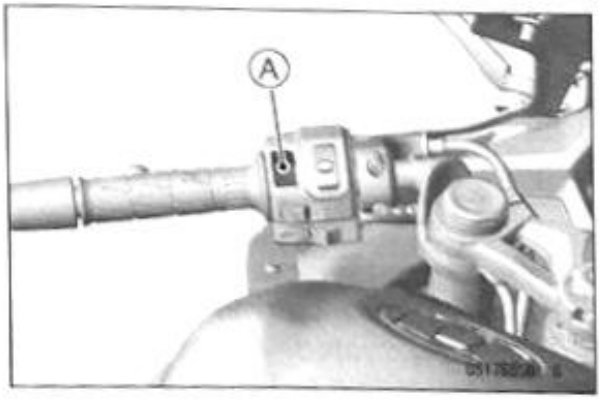


Third Step

- Set the dimmer switch [A] to low beam position.
- Turn the ignition switch on.
- The low beam headlights should go on.

★If the low beam headlights do not go on, inspect or replace the following parts.

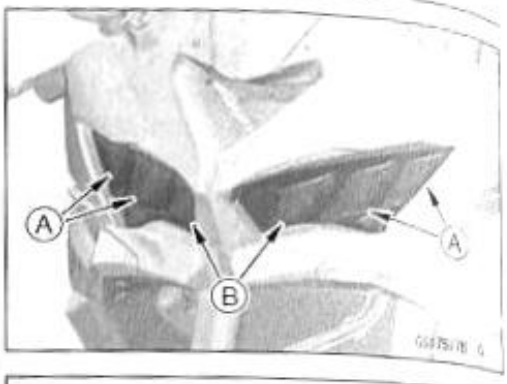
Headlight Assembly (see Upper Fairing Disassembly(15-22))
Headlight Fuse 15 A (see Fuse Inspection(16-97))
Dimmer Switch (see Switch Inspection(16-90))
Headlight Relay (see Relay Circuit Inspection(16-93))
Harness (see Wiring Inspection(16-19))



- Set the dimmer switch to high beam position.
- The low beam [A] and high beam [B] headlights should go on.
- The blue high beam indicator light [C] should goes on.

★If the high beam headlight and/or blue high beam indicator light does not go on, inspect or replace the following parts.
Headlight Assembly (see Upper Fairing Disassembly(15-22))
Dimmer Switch (see Switch Inspection(16-90))
Meter Unit (see Meter Unit Inspection(16-59))

- Turn the ignition switch off.
- The headlights and blue high beam indicator light should go off.



Headlight Aiming Inspection

- Inspect the headlight beam for aiming.

★If the headlight beam points to one side rather than straight ahead, adjust the horizontal beam.

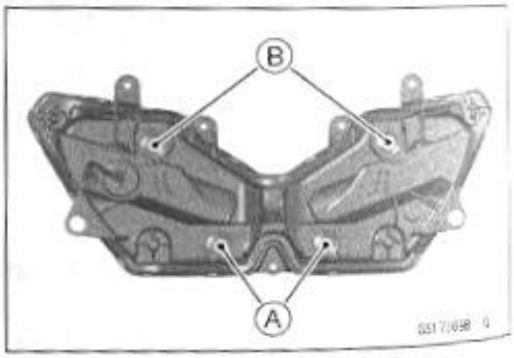
Headlight Beam Horizontal Adjustment

- Turn the horizontal adjuster [A] in both headlights in or out until the beam points straight ahead.

★If the headlight beam points too low or high, adjust the vertical beam.

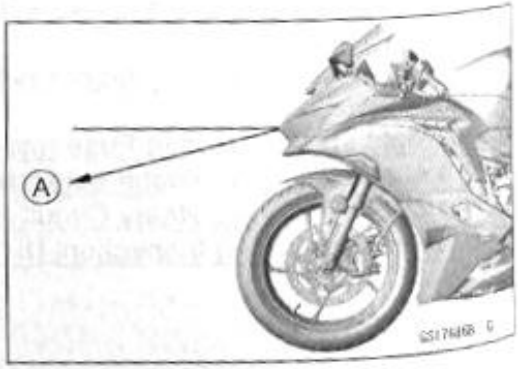
Headlight Beam Vertical Adjustment

- Turn the vertical adjuster [B] in both headlights in or out to adjust the headlight vertically.



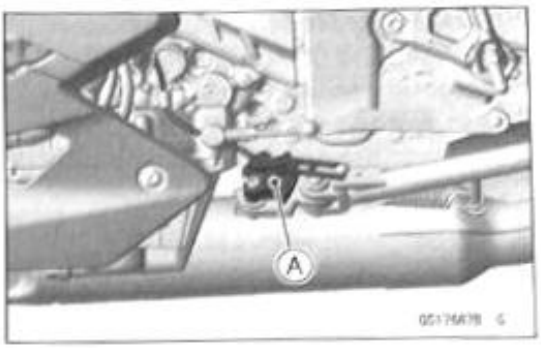
NOTE

○*On high beam, the brightest point [A] should be slightly below horizontal with the motorcycle on its wheels and the rider seated. Adjust the headlight to the proper angle according to local regulations.*



Periodic Maintenance Procedures

Side Stand Switch Operation Inspection



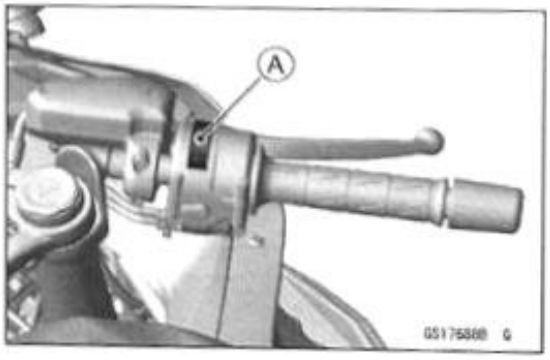
- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal(10-7)).
- Inspect the side stand switch [A] operation accordance to below table.

Side Stand Switch Operation

Side Stand	Gear Position	Clutch Lever	Engine Start	Engine Run
Up	Neutral	Released	Starts	Continue running
Up	Neutral	Pulled in	Starts	Continue running
Up	In Gear	Released	Does not start	Continue running
Up	In Gear	Pulled in	Starts	Continue running
Down	Neutral	Released	Starts	Continue running
Down	Neutral	Pulled in	Starts	Continue running
Down	In Gear	Released	Does not start	Stops
Down	In Gear	Pulled in	Does not start	Stops

★If the side stand switch operation does not work, inspect or replace the following parts.
Battery (see Charging Condition Inspection(16-21))
Main Fuse 30 A (see Fuse Inspection(16-97))
Ignition Switch (see Switch Inspection(16-90))
Side Stand Switch (see Switch Inspection(16-90))
Ignition Fuse 15 A (see Fuse Inspection(16-97))
Engine Start/Stop Switch (see Switch Inspection(16-90))
Relay Box (see Relay Circuit Inspection(16-93))
Starter Lockout Switch (see Switch Inspection(16-90))
Starter Relay (see Starter Relay Inspection(16-45))
Gear Position Sensor (see DTC P0914(17-80)) (see DTC P0915(17-80)) (see DTC P0916(17-81))
Harness (see Wiring Inspection(16-19))
★If the all parts are good condition, replace the ECU.

Engine Start/Stop Switch Operation Inspection

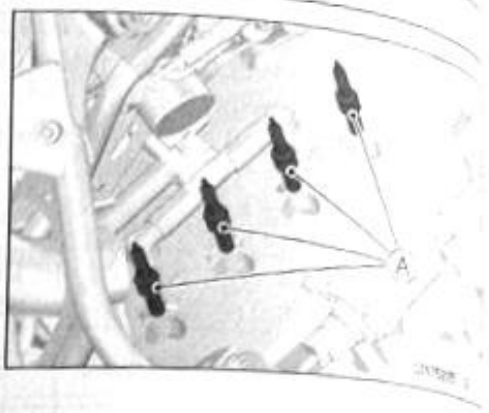


- Turn the ignition switch on.
- Set the gear position in the neutral position.
- Set the engine start/stop switch [A] to run position.
- Slide the start/stop switch down and start the engine.
- Set the engine start/stop switch to stop position.
- Immediately the engine should be stop.

★If the engine does not stop, inspect or replace the engine start/stop switch (see Switch Inspection(16-90)).
★If the engine start/stop switch is good condition, replace the ECU.

Periodic Maintenance Procedures

Spark Plug Replacement



- Remove the stick coils (see Stick Coil Removal(16-34)).
- Remove the spark plugs [A] using the 14 mm (0.55 in.) plug wrench vertically.
- Replace the spark plugs with new ones.

Standard Spark Plug
Type: NGK LMAR9G

- Insert the spark plug vertically into the spark plug hole with the spark plug installed in the plug wrench, and finger -tighten it first.

NOTICE
If tightening the spark plug with the wrench inclined, the insulator of the spark plug may break.

- Tighten:

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

- Install the stick coils (see Stick Coil Installation(16-34)).
- After installation, be sure the stick coils are installed securely by pulling up them lightly.

Others

Chassis Parts Lubrication

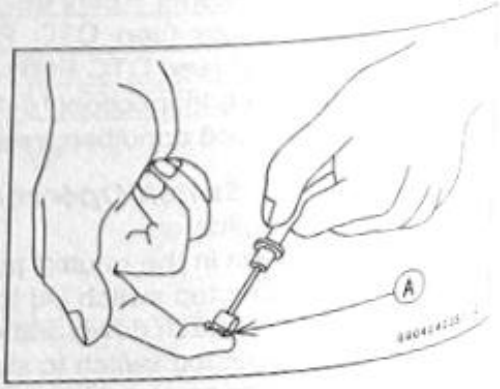
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure water spray, perform the general lubrication.*

Pivots: Lubricate with Grease.
Brake Lever
Brake Pedal
Clutch Lever
Side Stand

Points: Lubricate with Grease.
Clutch Inner Cable Upper and Lower Ends [A]

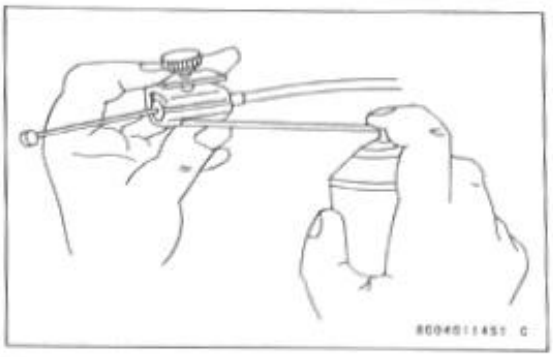


Cables: Lubricate with Rust Inhibitor.

Clutch Cable

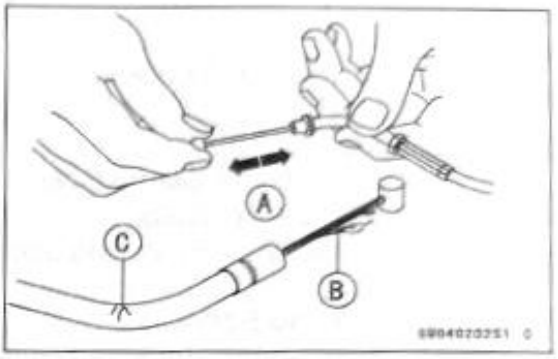
- Lubricate the cables by seeping the oil between the cable and housing.

○The cable may be lubricated by using a commercially available pressure cable lubricator with an aerosol cable lubricant.



- With the cable disconnected at both ends, the inner cable should move freely [A] within the cable housing.

★If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



Condition of Bolts, Nuts and Fasteners Tightness Inspection

- Check the tightness of the bolts and nuts listed here. Also, check to see that each cotter pin is in place and in good condition.

NOTE

○*For the engine fasteners, check the tightness of them when the engine is cold (at room temperature).*

★If there are loose fasteners, retighten them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not in the appropriate chapter, see the Standard Torque Table. For each fastener, first loosen it by 1/2 turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

Periodic Maintenance Procedures

Bolt, Nut and Fastener to be checked

Engine:
- Clutch Lever Pivot Bolt Locknut
- Engine Mounting Bolts and Nuts
- Exhaust Pipe Holder Nuts
- Muffler Body Bolts and Nuts
- Radiator Bolt

Wheels:
- Front Axle Clamp Bolts
- Front Axle
- Rear Axle Nut

Brakes:
- Brake Lever Pivot Bolt Locknut
- Brake Pedal Bolt
- Caliper Bolts
- Front Master Cylinder Clamp Bolts
- Rear Master Cylinder Bolts
- Rear Master Cylinder Push Rod Joint Cotter Pin

Suspension:
- Front Fork Clamp Bolts
- Rear Shock Absorber Bolts and Nuts
- Swingarm Pivot Shaft Nut
- Tie-rod Bolts
- Rocker Arm Bolt

Steering:
- Handlebar Clamp Bolts
- Steering Stem Head Nut

Others:
- Footpeg Bracket Bolts
- Front Fender Bolts
- Side Stand Bolt
- Side Stand Bracket Bolts

Fuel System (DFI)

Table of Contents

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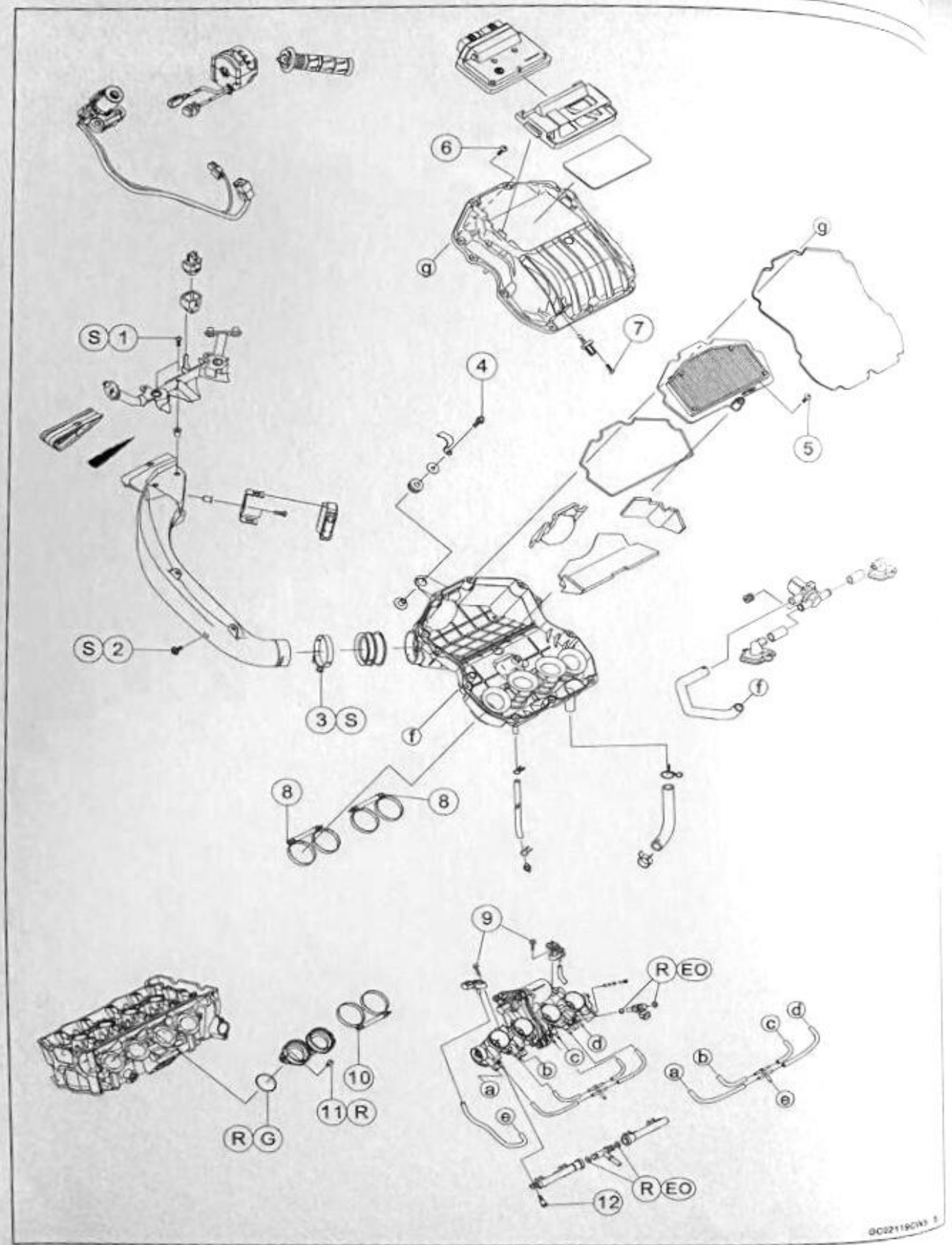
Exploded View

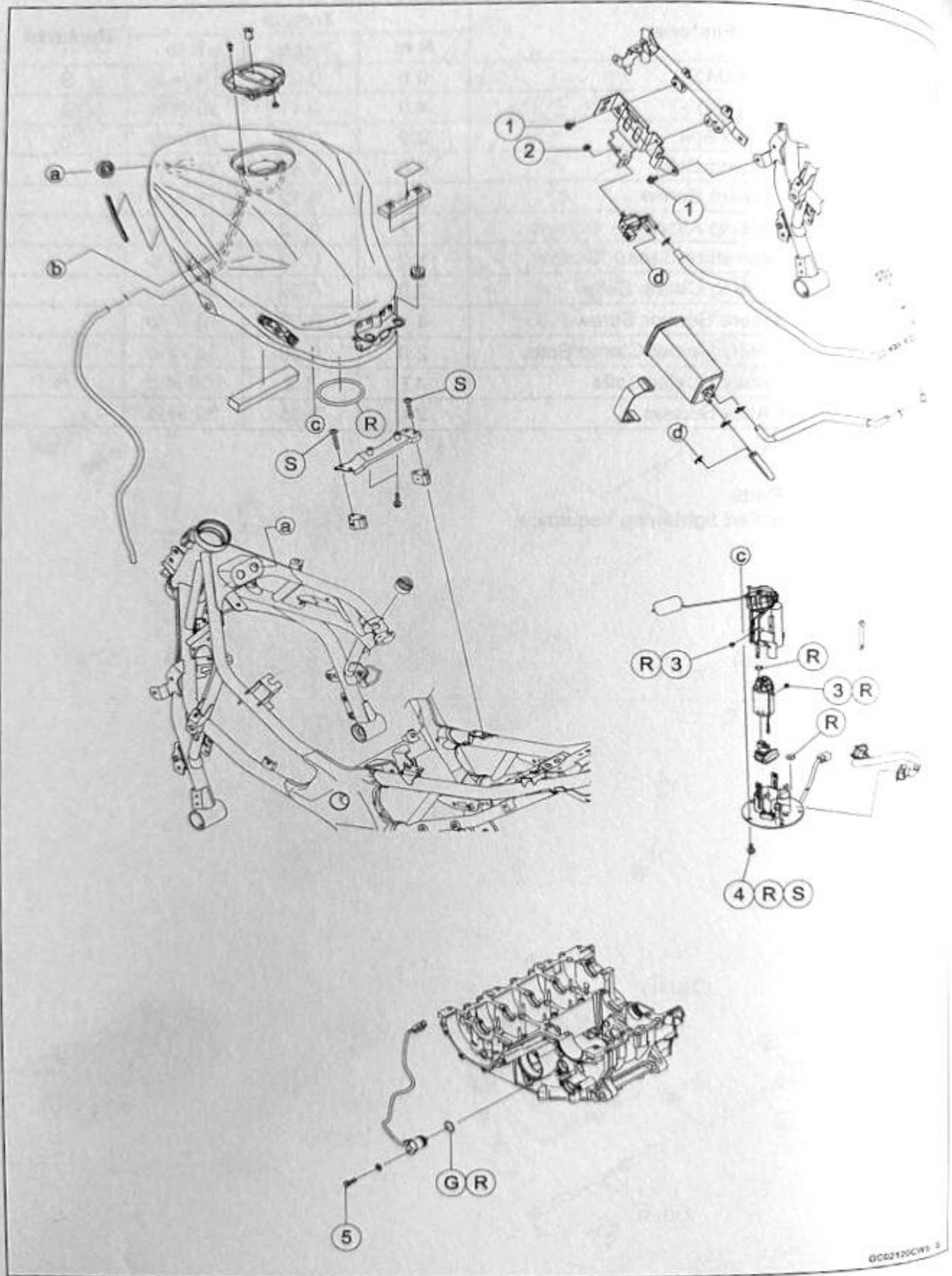


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Intake Duct Bolts (M5)	0.5	0.05	4.4 in·lb	S
2	Intake Duct Bolt (M6)	4.0	0.41	35 in·lb	S
3	Intake Duct Clamp Bolt	2.9	0.30	26 in·lb	S
4	Air Cleaner Housing Bolt	8.0	0.82	71 in·lb	
5	Air Cleaner Element Screw	1.2	0.12	11 in·lb	
6	Air Cleaner Housing Assembly Screws	1.2	0.12	11 in·lb	
7	Intake Air Temperature Sensor Screw	1.2	0.12	11 in·lb	
8	Air Cleaner Housing Clamp Bolts	2.0	0.20	18 in·lb	
9	Intake Air Pressure Sensor Screws	4.9	0.50	43 in·lb	
10	Throttle Body Assy Holder Clamp Bolts	2.0	0.20	18 in·lb	
11	Throttle Body Assy Holder Bolts	12	1.2	106 in·lb	R
12	Delivery Pipe Assy Screws	3.4	0.35	30 in·lb	

EO: Apply engine oil.
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Canister Bracket Bolts	9.8	1.0	87 in·lb	
2	Purge Valve Nut	7.0	0.71	62 in·lb	
3	Fuel Pump Assembly Screws	0.98	0.10	8.7 in·lb	R
4	Fuel Pump Bolts	9.8	1.0	87 in·lb	R, S
5	Gear Position Sensor Bolt	10	1.0	89 in·lb	

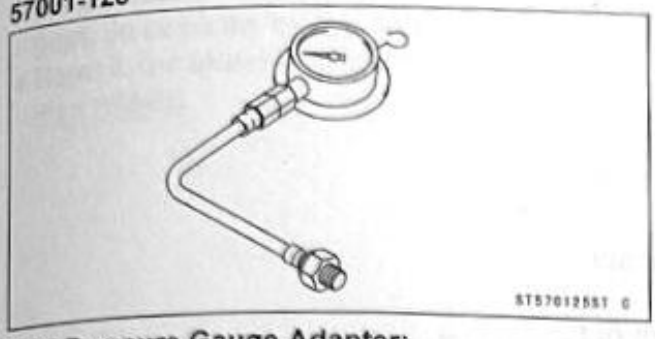
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

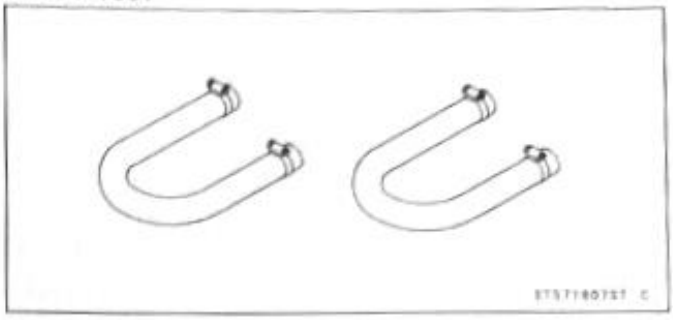
Item	Standard
Digital Fuel Injection System	
Idle Speed	1 400 ±100 r/min (rpm)
Throttle body assy:	
Throttle Valve	Single Throttle Valve
Bore	ϕ34 mm (1.3 in.)
Throttle Body Vacuum	21.3 ±1.1 kPa (160 ±8 mmHg) at idle speed
Bypass Screws	0 – 2 1/2 (for reference)
ECU:	
Make	MITSUBISHI
Type	Digital memory type, with built in IC igniter, sealed with resin
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm², 43 psi) with engine idling
Fuel Pump:	
Type	In-tank pump
Discharge	50 mL (1.7 US oz.) or more for 3 seconds
Air Cleaner	
Air Cleaner Element	Viscous paper element

Special Tools and Sealant

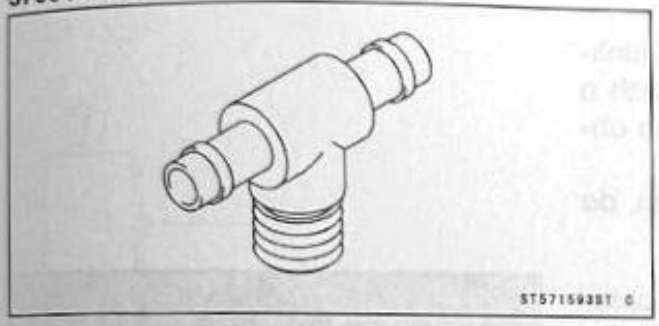
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



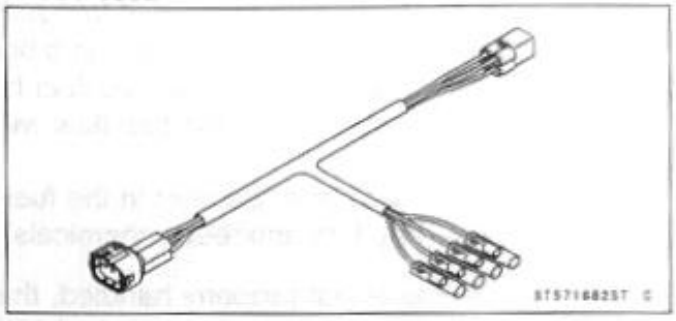
Fuel Hose:
57001-1607



Fuel Pressure Gauge Adapter:
57001-1593



Oxygen Sensor Measuring Adapter:
57001-1682



DFI Servicing Precautions

There are a number of important precautions that should be followed servicing the DFI system.

- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- When installing the fuel hoses, avoid sharp bending, kinking, flattening or twisting, and run the fuel hoses with a minimum of bending so that the fuel flow will not be obstructed.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

- If the motorcycle is not properly handled, the high pressure inside the fuel line can cause fuel to leak or the hose to burst. Remove the fuel tank (see Fuel Tank Removal(3-35)) and check the fuel hose [A].

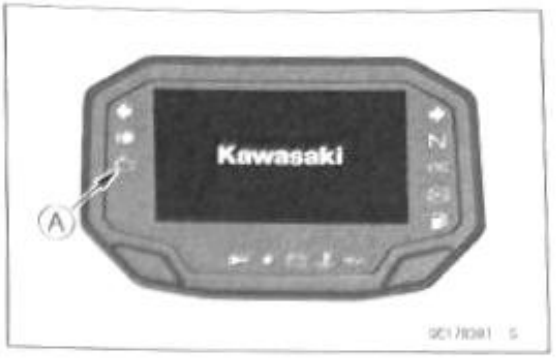
★Replace the fuel hose if any fraying, cracks or bulges are noticed.

Warning Indicator Light

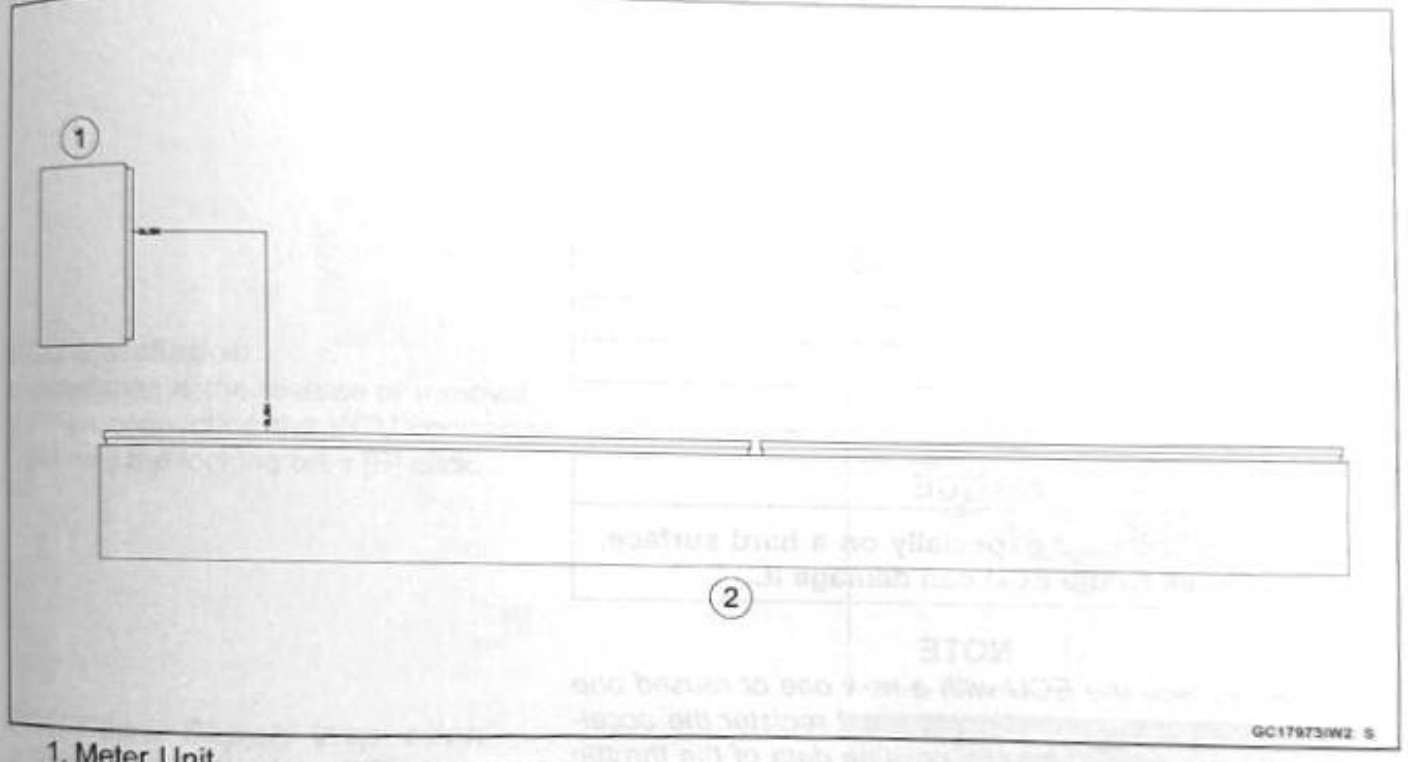
Yellow Engine Warning Indicator Light Inspection

On this model, the yellow engine warning indicator light [A] goes on or blinks by the data sent from the ECU.

- Refer to the Meter Unit Inspection (see Meter Unit Inspection(16-59)).



Yellow Engine Warning Indicator Circuit



1. Meter Unit
2. ECU

ECU

ECU Identification

○Most countries have their own regulations, so each ECU has different characteristic. So, do not confuse ECU with each other and use only the ECU for your model. Otherwise, the motorcycle cannot clear the regulation.

ZX400P

Part Number	Specification
21175-1855	CA
21175-1857	PH

ZX400R

Part Number	Specification
21175-1863	PH

ZX400S

Part Number	Specification
21175-1863	PH
21175-1875	CA
	CAL
21175-1876	ID

ECU Removal

NOTICE
Never drop the ECU especially on a hard surface. Such a shock to the ECU can damage it.

NOTE

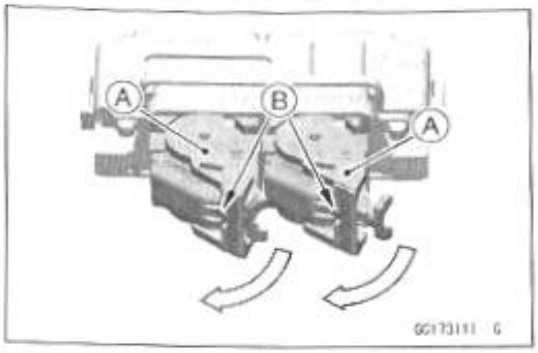
○*When replace the ECU with a new one or reused one from another motorcycle, you must register the accelerator position and throttle position data of the throttle body to the ECU.*

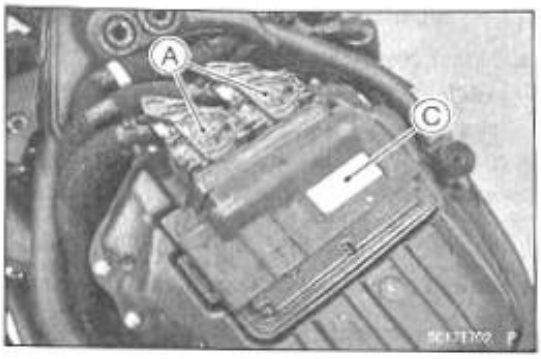
○*Register the ignition key correctly before doing the following procedure (see Key Registration(16-68)).*

1. In the new ECU, wait the 10 seconds at the idle speed and the coolant temperature 40°C (104°F) or more to register the sensor position to the ECU.
2. In the reused ECU, erase the stored service code memory using Kawasaki Diagnostic System, and wait the 10 seconds at the idle speed and the coolant temperature 40°C (104°F) or more to register the sensor position to the ECU.

ECU

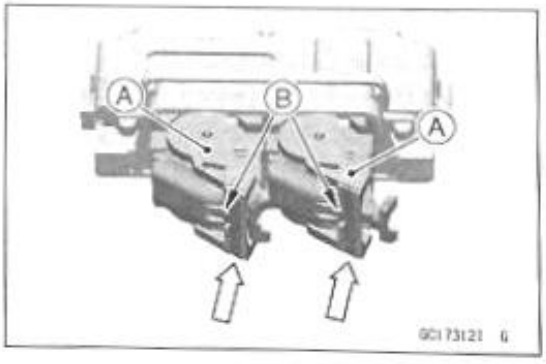
- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
- Pull the levers [A] while releasing the locking tabs [B], and disconnect the ECU connectors.
- Remove the ECU [C] from the air cleaner housing.





ECU Installation

- Installation is the reverse of removal.
- When connecting the ECU connectors, push the levers [A] until the locking tabs [B] click.



ECU Power Supply Inspection

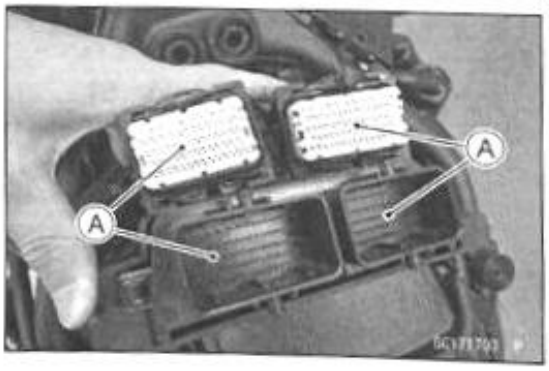
- Remove the ECU (see ECU Removal(3-12)).
- Visually inspect the ECU connectors.

★If the connector is clogged with mud or dust, blow it off with compressed air.

- Visually inspect the terminals [A] of the ECU and main harness connectors.

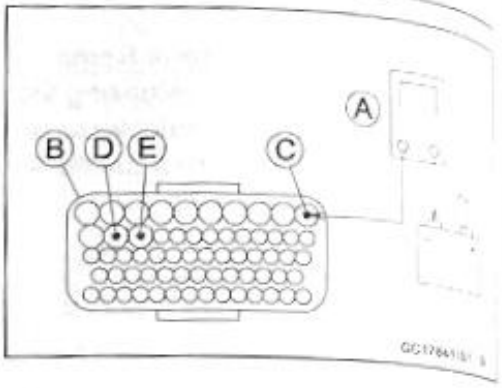
★If the terminals of the main harness connectors are damaged, replace the main harness.

★If the terminals of the ECU connectors are damaged, replace the ECU.



ECU

- Set a digital meter [A] and check the following wiring for continuity.
  ECU Connector [B]



ECU Grounding Inspection
Connections:

(I) ECU Terminal 10 [C], 12 [D] or 13 [E]	⟷	**Battery (–) Terminal**
(II) Engine Ground	⟷	**Battery (–) Terminal**

Criteria:
Both: 0 Ω

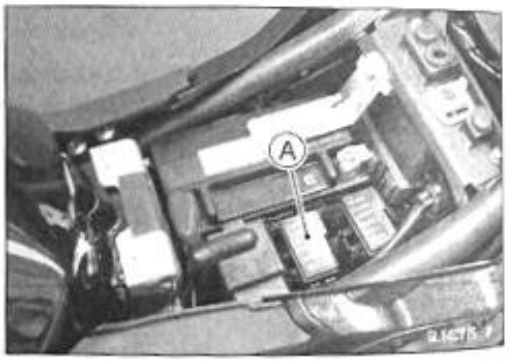
★If no continuity, check the connectors, the engine ground lead, or main harness, and repair or replace them if necessary.
★If the wiring is good, check the power source voltage of the ECU.

NOTE

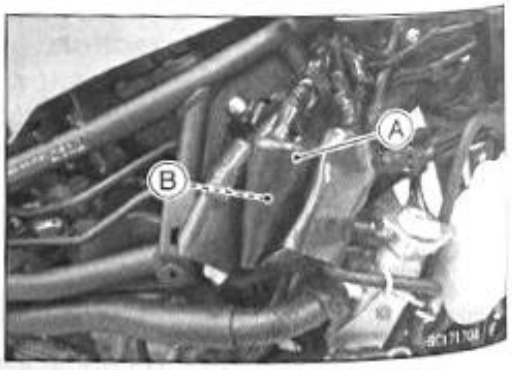
○*Be sure the battery is fully charged.*

- Connect the ECU connectors.

- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
  Fuse Box (1) [A] (see Fuse Box Fuse Removal(16-97))

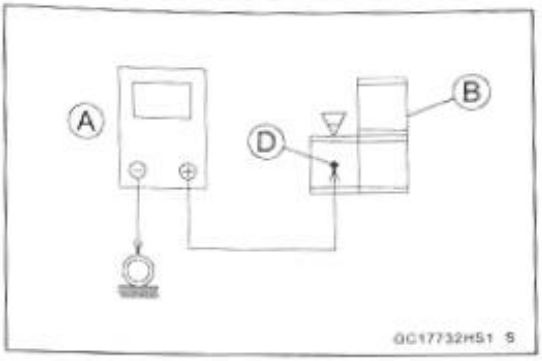


- Slide the dust cover [A].
- Disconnect:
  Ignition Switch Connector [B]



ECU

• Connect the digital meter [A] to the ignition switch connector [B] and fuse box (1) [C].



ECU Power Supply Inspection

Connections:

(I) Digital Meter (+) → W lead [D]

Digital Meter (–) → Frame Ground Terminal

(II) Digital Meter (+) → BR/W lead [E]

Digital Meter (–) → Frame Ground Terminal

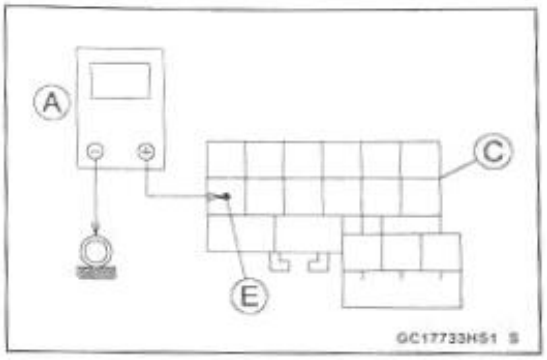
Ignition Switch OFF:

(I) Battery Voltage

(II) 0 V

Ignition Switch ON:

Both: Battery Voltage



★If the reading is out of the specification, check the following.

Main Fuse 30 A (see Fuse Inspection(16-97))

ECU Fuse 15 A (see Fuse Inspection(16-97))

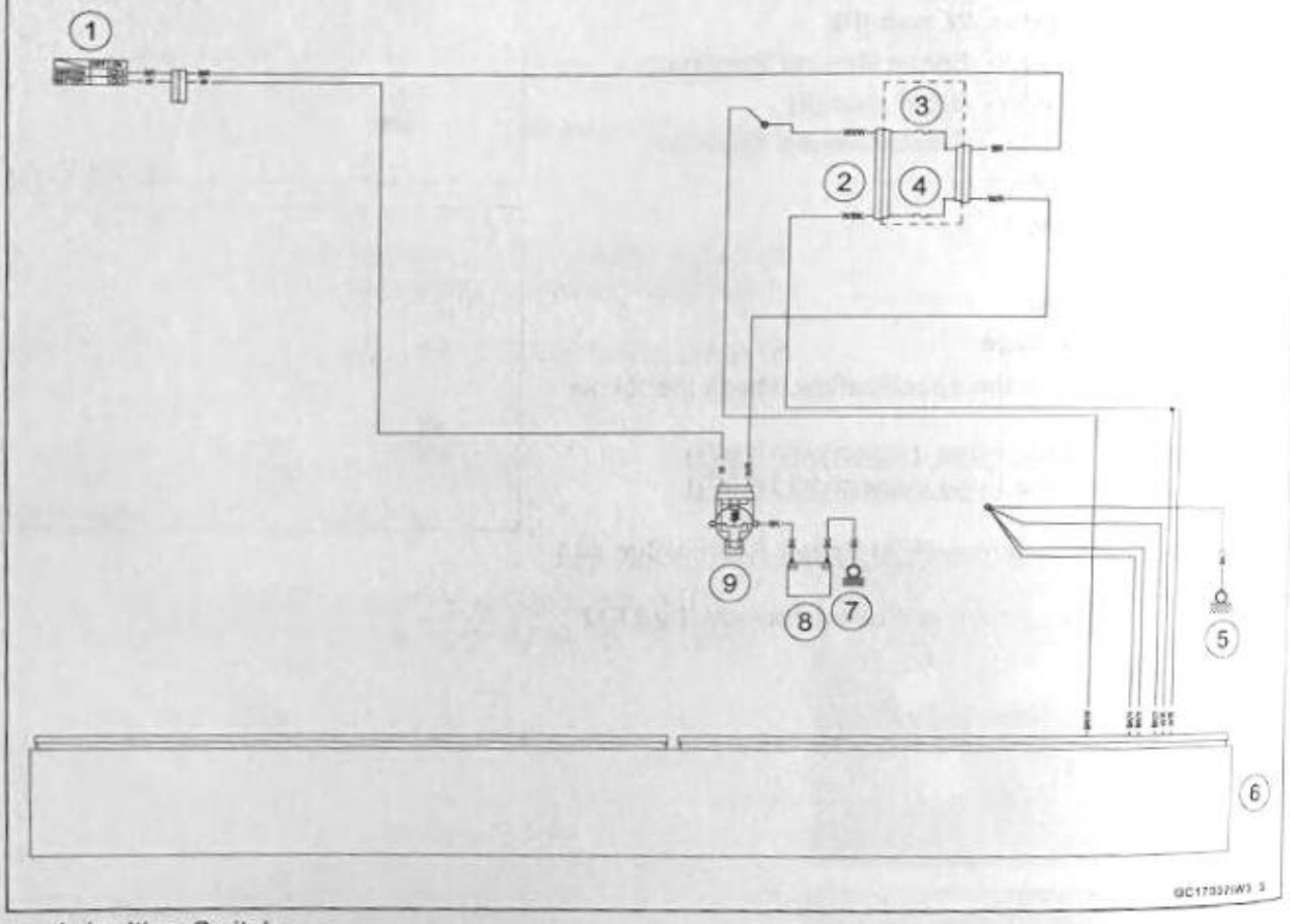
Ignition Fuse 15A

Power Source Wiring (see ECU Power Source Circuit(3-16))

★If the fuse, wiring and relay are good, replace the ECU.

ECU

ECU Power Source Circuit



1. Ignition Switch
2. Fuse Box (1)
3. Ignition Fuse 15 A
4. ECU Fuse 15 A
5. Frame Ground
6. ECU
7. Engine Ground
8. Battery
9. Main Fuse 30 A

ECU Fuse Removal

• Refer to the Fuse Box Fuse Removal (see Fuse Box Fuse Removal(16-97)).

ECU Fuse Installation

★If a fuse fails during operation, inspect the DFI system to determine the cause, and then replace it with a new fuse of proper amperage.

• Refer to the Fuse Installation (see Fuse Installation(16-97)).

ECU Fuse Inspection

• Refer to the Fuse Inspection (see Fuse Inspection(16-97)).

ECU Main Relay Removal/Installation

○The ECU main relay is built in the relay box [A].

• Refer to the Relay Box Removal (see Relay Box Removal(16-93)).

ECU Main Relay Inspection

• Refer to the Relay Circuit Inspection (see Relay Circuit Inspection(16-93)).

Fuel Line

Fuel Pressure Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Fuel Hose (see Fuel Hose Replacement(2-22))

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump and the delivery pipe of the throttle body assy.

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Install the fuel pressure gauge adapter [A] and fuel hoses (Special Tool: 57001-1607) [B] between the fuel outlet pipe and delivery pipe.
- Secure the fuel hoses with the clamps.
- Connect the pressure gauge [C] to the fuel pressure gauge adapter.

Special Tools - Oil Pressure Gauge, 5 kgf/cm²: 57001-125
Fuel Pressure Gauge Adapter: 57001-1593
Fuel Hose: 57001-1607

⚠ WARNING

Fuel is extremely flammable and can be explosive under certain conditions resulting in serious injury or death. Do not try to start the engine with the fuel hoses disconnected.

- Connect the fuel pump connector.
- Slide the engine start/stop switch to run position.
- Turn the ignition switch on.

○The fuel pump should operate for 3 seconds, and then should stop.

NOTE

○*After turning on the engine start/stop switch and ignition switch, inspect the fuel leakage from the connected portion of the special tools.*

NOTICE

Do not drive the fuel pump 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Start the engine, and let it idle.
- Measure the fuel pressure with the engine idling.

Fuel Pressure (with Engine Idling)
Standard: 294 kPa (3.0 kgf/cm², 43 psi)

NOTE

○*The gauge needle will fluctuate. Read the pressure at the average of the maximum and minimum indications.*

- Turn the ignition switch off.

★If the fuel pressure is much higher than specified, replace the fuel pump because the fuel pressure regulator in the fuel pump have been clogged or stuck.

★If the fuel pressure is much lower than specified, check the following.

Fuel Line Leakage (see Fuel Line Leak Inspection(3-21))
Amount of Fuel Flow (see Fuel Flow Rate Inspection(3-19))

- After above checks, measure the fuel pressure again.
- Remove the fuel pressure gauge, hoses and adapter.
- Install:

Fuel Hose (see Fuel Hose Replacement(2-22))

- Start the engine and check for fuel leakage.
- Install the removed parts.

Fuel Flow Rate Inspection

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

NOTE

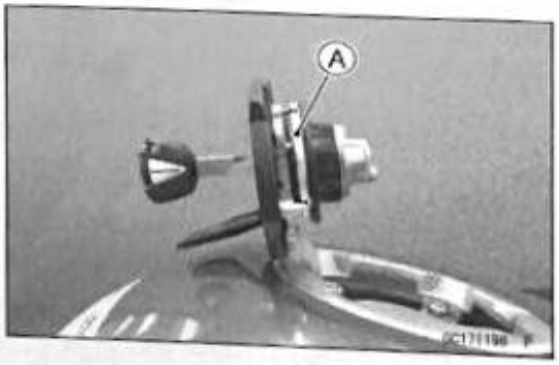
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Wait until the engine cools down.
- Prepare a fuel hose (Special Tool: 57001-1607) and a measuring cylinder.

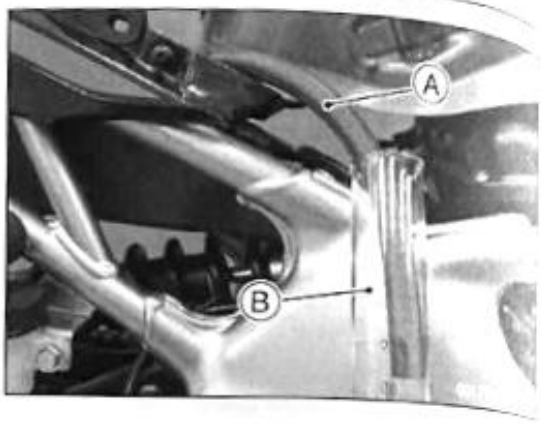
Special Tool - Fuel Hose: 57001-1607

- Open the fuel tank cap [A] to lower the pressure in the tank.
- Disconnect the fuel hose from the fuel pump (see Fuel Tank Removal(3-35)).

○Be sure to place a piece of cloth around the fuel outlet pipe of the fuel pump.



Fuel Line



- Connect the prepared fuel hose [A] to the fuel outlet pipe.
- Secure the fuel hose with a clamp.
- Insert the fuel hose into the measuring cylinder [B].

⚠ WARNING

Wipe off spilled out fuel immediately.
Be sure to hold the measuring cylinder vertical.

- Close the fuel tank cap.
- Slide the engine start/stop switch to run position.
- Turn the ignition switch on.

○The fuel pump should operate for 3 seconds, and then should stop.

NOTICE

Do not drive the fuel pump 3 seconds or more without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Measure the discharge for 3 seconds.

○Repeat this operation several times.

Amount of Fuel Flow
Standard: 50 mL (1.7 US oz.) or more for 3 seconds

- Turn the ignition switch off.

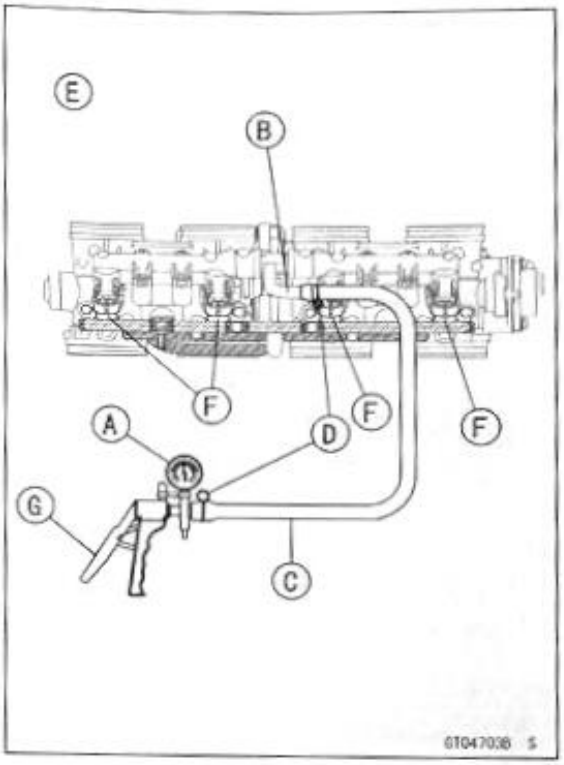
★If the fuel flow is much less than the specified, replace the fuel pump.

- Install the fuel hose (see Fuel Tank Installation(3-38)).
- Start the engine and check for fuel leakage.

Fuel Line Leak Inspection

• Remove:
Throttle Body Assy (see Throttle Body Assy Removal(3-27))
• Check the fuel injector fuel line for leakage as follows.
○Connect a commercially available vacuum/pressure pump [A] to the nipple of the delivery pipe [B] with the fuel hose [C] (both ends with the clamps [D]) as shown.
Rear View [E]
○Apply soap and water solution to the areas [F] as shown.
○Watching the pressure gauge, squeeze the pump lever [G], and build up the pressure until the pressure reaches the maximum pressure.

Fuel Injector Fuel Line Maximum Pressure
Standard: 300 kPa (3.06 kgf/cm², 43 psi)



NOTICE

During pressure testing, do not exceed the maximum pressure for which the system is designed.

○Watch the gauge for at least 6 seconds.
★If the pressure holds steady, the fuel line is good.
★If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe, fuel injectors and related parts.
○Repeat the leak test, and check the fuel line for no leakage.
• Install the removed parts.
• Start the engine and check for fuel leakage.

Fuel Pump

Fuel Pump Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

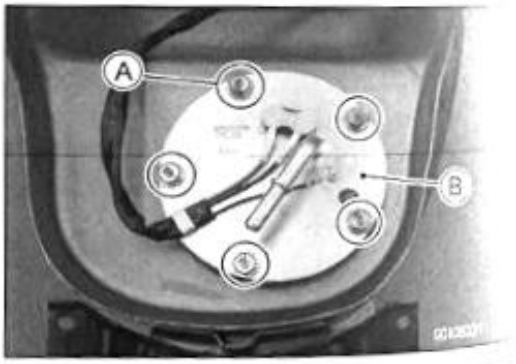
NOTICE

Never drop the fuel pump especially on a hard surface. Such a shock to the pump can damage it.

- Draw the fuel out from the fuel tank with a commercially available electric pump.
- Remove the fuel tank (see Fuel Tank Removal(3-35)).

○Be careful of fuel spillage from the fuel tank since fuel still remains in the fuel tank and fuel pump. Plug the fuel pipe of the fuel tank.

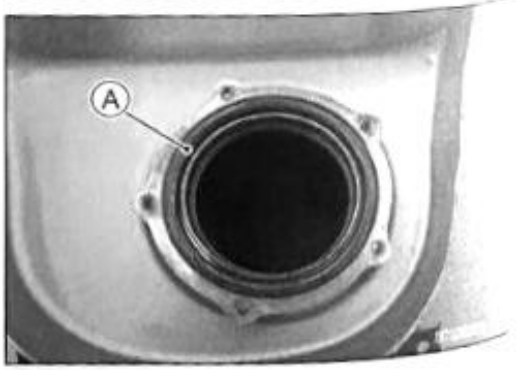
- Turn the fuel tank upside down.
- Remove the fuel pump bolts [A], and take out the fuel pump [B].



NOTICE

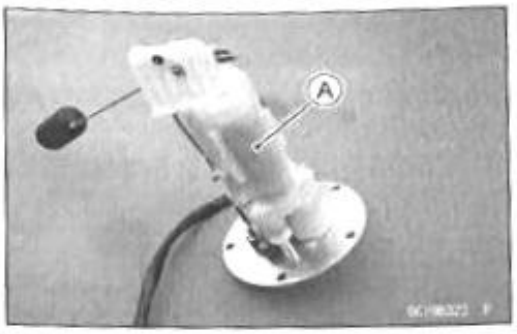
Do not pull the leads of the fuel pump. If they are pulled, the lead terminals may be damaged.

- Discard the fuel pump gasket [A].



Fuel Pump

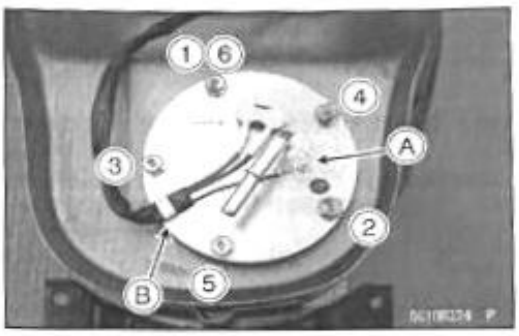
Fuel Pump Installation



- Remove dirt or dust from the fuel pump [A] by lightly applying compressed air.
- Replace the fuel pump gasket with a new one.

NOTE

OBe careful not to bend the fuel level sensor arm.



- Check that the fuel pump terminal [A] and clamp [B] are in place.
- Replace the fuel pump bolts with new ones.
- Tighten the fuel pump bolts following the specified tightening sequence [1 – 6] temporarily.
- Tighten the fuel pump bolts with the specified torque by the same sequence.

Torque - Fuel Pump Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Tighten the pump bolts again to check the tightness.
- Install the removed parts.

Fuel Pump Operation Inspection

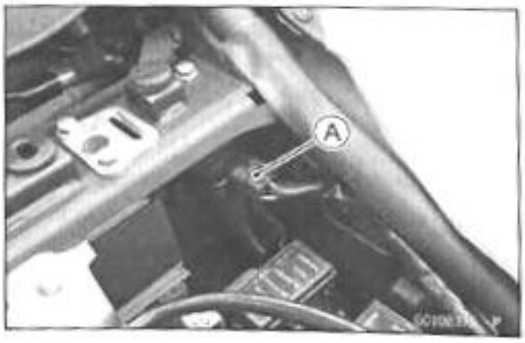
NOTE

OBe sure the battery is fully charged.

- Turn the engine start/stop switch to run position.
- Turn the ignition switch on and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
- Turn the ignition switch off.

★If the pump does not operate as described above, check the operating voltage (see Fuel Pump Operating Voltage Inspection(3-23)).

Fuel Pump Operating Voltage Inspection



NOTE

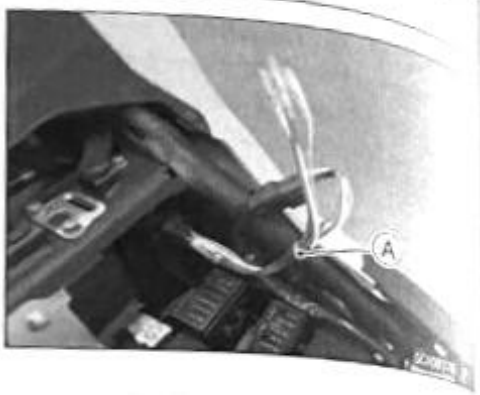
OBe sure the battery is fully charged.

- Turn the ignition switch off.
- Remove the front seat (see Front Seat Removal(15-16)).
- Disconnect the fuel pump connector [A].

Fuel Pump

- Connect the oxygen sensor measuring adapter [A] between fuel pump connectors.

Special Tool - Oxygen Sensor Measuring Adapter: 57001 -1682



- Connect a digital meter to the measuring adapter leads.

Fuel Pump Operating Voltage
Connections to Adapter:
Digital Meter (+) → BR (pump BK/Y) lead
Digital Meter (–) → W (pump BK/W) lead

- Measure the operating voltage with engine stopped and with the connector joined.
- Turn the engine start/stop switch to run position.
- Turn the ignition switch on.

Operating Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.

★If the reading is in specification, but the pump does not operate, replace the fuel pump.

(When power is detected but out of specification)

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection(16-93)).

★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection(3-13)).

★If the ground and power supply are good, replace the ECU.

(When power is not detected)

★If there is no battery voltage, check the fuel pump relay (see Relay Circuit Inspection(16-93)).

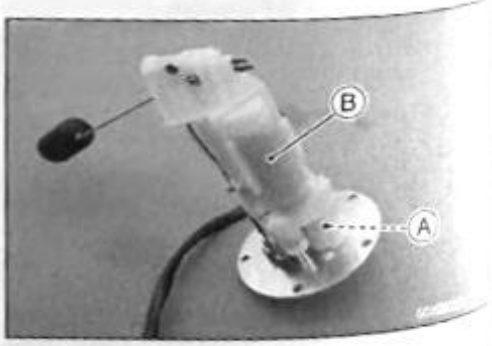
★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Circuit(3-26)).

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection(3-13)).

★If the ground and power supply are good, replace the ECU.

Pressure Regulator Removal

○The pressure regulator [A] is built into the fuel pump [B] and can not be removed.



Fuel Pump

Fuel Pump Relay Removal

OThe fuel pump relay is built in the relay box [A].

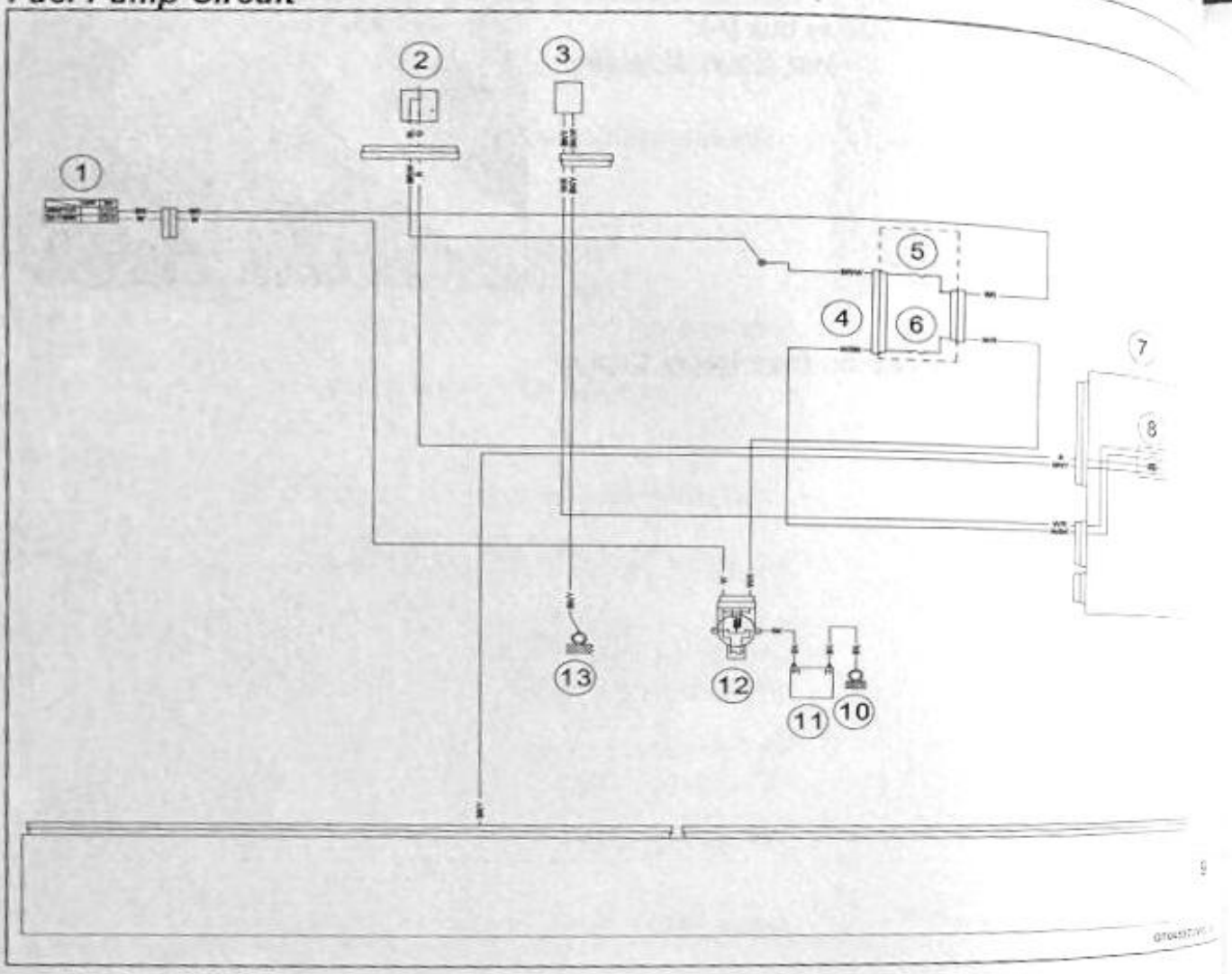
- Refer to the Relay Box Removal (see Relay Box Removal(16-93)).

Fuel Pump Relay Inspection

- Refer to the Relay Circuit Inspection (see Relay Circuit Inspection(16-93)).

Fuel Pump

Fuel Pump Circuit



1. Ignition Switch
2. Engine Start/Stop Switch (Engine Stop)
3. Fuel Pump
4. Fuse Box (1)
5. Ignition Fuse 15 A
6. ECU Fuse 15 A
7. Relay Box
8. Fuel Pump Relay
9. ECU
10. Engine Ground
11. Battery
12. Main Fuse 30 A
13. Frame Ground

Throttle Body Assy

Idle Speed Inspection

• Refer to the Idle Speed Inspection (see Idle Speed Inspection(2-16)).

Idle Speed Adjustment

• Refer to the Idle Speed Adjustment (see Idle Speed Adjustment(2-16)).

Throttle Bore Cleaning

• Check the throttle bore for cleanliness as follows.

○Remove the throttle body assy (see Throttle Body Assy Removal(3-27)).

○Check the throttle valves and throttle bores for carbon deposits by opening the throttle valves.

★If any carbon accumulates, wipe the carbon off the throttle bores around the throttle bores and the throttle valves, using a cotton pad penetrated with a high flash-point solvent.

Synchronization Inspection/Adjustment

• Refer to the Engine Vacuum Synchronization Inspection (see Engine Vacuum Synchronization Inspection(2-16)).

Throttle Body Assy Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

NOTICE

Never drop the throttle body assy especially on a hard surface. Such a shock to the body assy can damage it.

NOTE

○*When replace the throttle body assy with a new one or reused one from another motorcycle, you must register the throttle position data of the throttle body to the ECU. Erase the stored service code memory using Kawasaki Diagnostic System, and wait the 10 seconds at the idle speed and the coolant temperature 40°C (104°F) or more to register the sensor position to the ECU.*

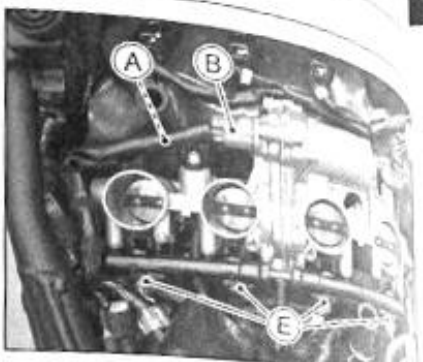
• Remove:

Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))

Fuel Hose (see Fuel Hose Replacement(2-22))

Throttle Body Assy

- Disconnect:
  Intake Air Pressure Sensor #1 Connector [A]
  ETV Actuator Connector [B]
  Intake Air Pressure Sensor #2 Connector [C]
  Throttle Position Sensor Connector [D]
  Fuel Injector Connectors [E]



- Loosen:
  Throttle Body Assy Holder Clamp Bolt [A] (Both Sides)
- Remove the throttle body assy.
- After removing the throttle body assy, stuff pieces of lint -free, clean cloth into the throttle body assy holders.

NOTICE
If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

Throttle Body Assy Installation

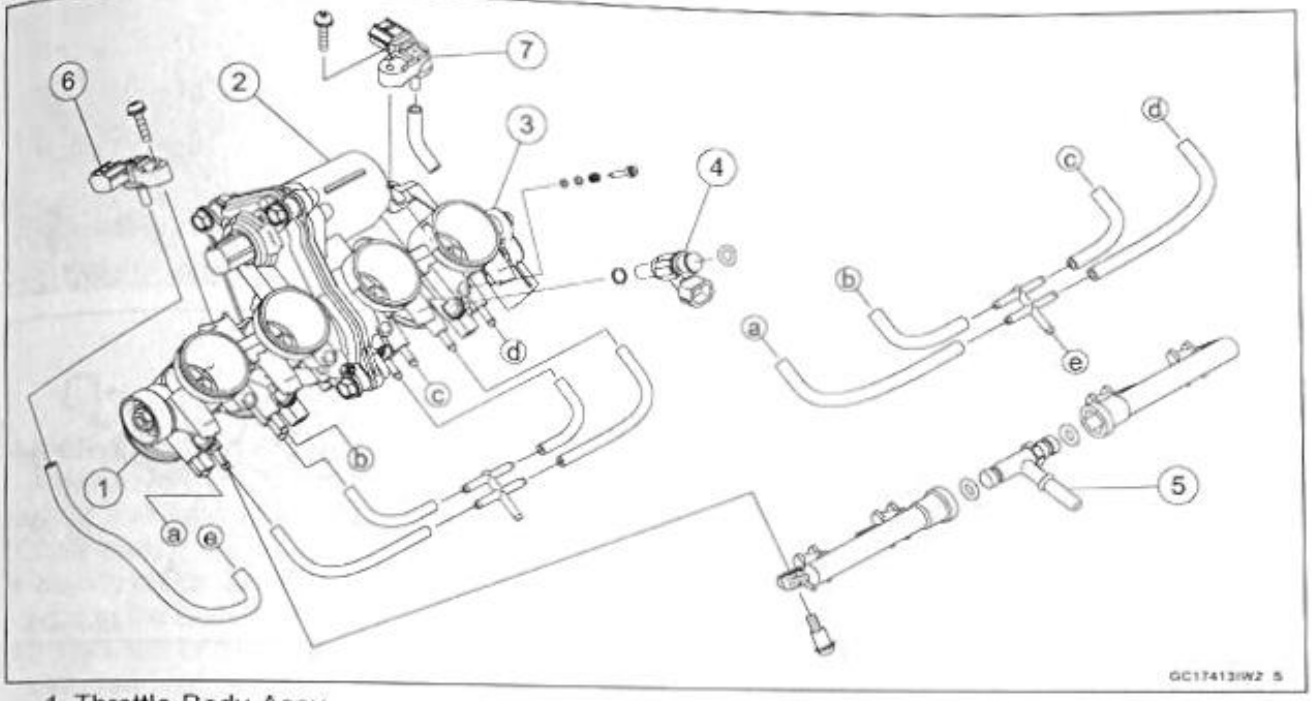
- Installation is the reverse of removal.
- Tighten:

Torque - Throttle Body Assy Holder Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)

- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).

Throttle Body Assy

Throttle Body Assy Disassembly



1. Throttle Body Assy
2. ETV Actuator
3. Throttle Position Sensor
4. Fuel Injectors
5. Delivery Pipe Assy
6. Intake Air Pressure Sensor #1
7. Intake Air Pressure Sensor #2

NOTICE

Do not remove, disassemble or adjust the throttle position sensor, ETV actuator, throttle link mechanism and throttle body assy, because they are adjust or set surely at the manufacturer. Adjustment of these parts could result in poor performance, requiring replacement of the throttle body assy.

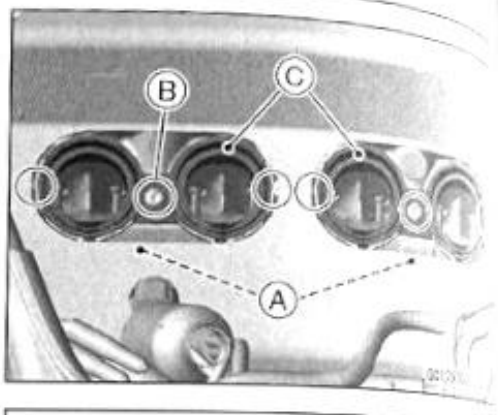
- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal(3-27))
  Intake Air Pressure Sensor #1 (see Intake Air Pressure Sensor #1 Removal(17-58))
  Intake Air Pressure Sensor #2 (see Intake Air Pressure Sensor #2 Removal(17-67))
  Fuel Injectors (see Fuel Injector Removal(17-99))

Throttle Body Assy Assembly

- Assembly is the reverse of disassembly.

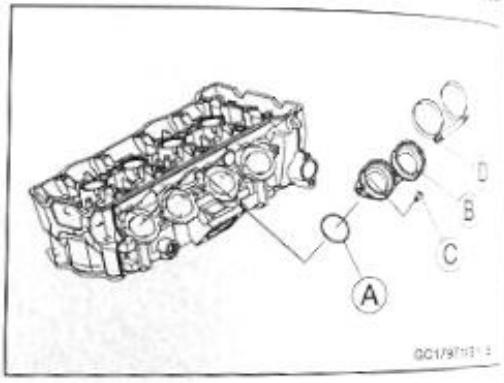
Throttle Body Assy

Throttle Body Assy Holder Removal



- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal(3-27))
  Clamps [A]
  Throttle Body Assy Holder Bolts [B]
  Throttle Body Assy Holders [C]

Throttle Body Assy Holder Installation



- Replace the O-rings [A] with new ones.
- Apply grease to the O-rings and install them.
- Install:
  Throttle Body Assy Holders [B]
- Replace the throttle body assy holder bolts [C] with new ones and tighten them.

Torque - Throttle Body Assy Holder Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Install:
  Clamps [D]
  Throttle Body Assy (see Throttle Body Assy Installation(3-28))

Air Cleaner

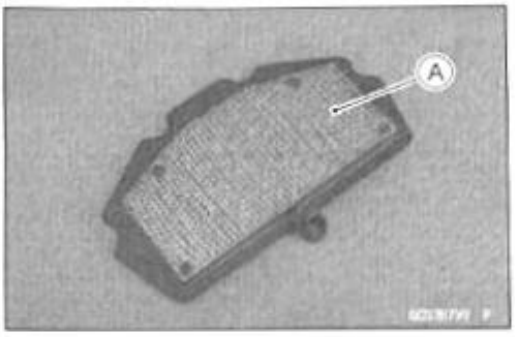
Air Cleaner Element Removal/Installation

- Refer to the Air Cleaner Element Replacement (see Air Cleaner Element Replacement(2-15)).

Air Cleaner Element Inspection

- Remove the air cleaner element (see Air Cleaner Element Replacement(2-15)).
- Visually check the element [A] for tears or breaks.

★If the element has any tears or breaks, replace the element.

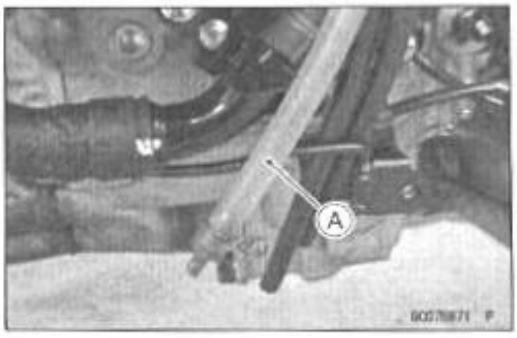


Air Cleaner Oil Draining

A drain hose [A] is connected to the bottom of the air cleaner housing to drain water or oil accumulated in the cleaner part.

- Visually check the drain hose, if the water or oil accumulates in the hose.

★If any water or oil accumulates in the drain hose, slide the clamp and remove the plug from the drain hose and drain it.

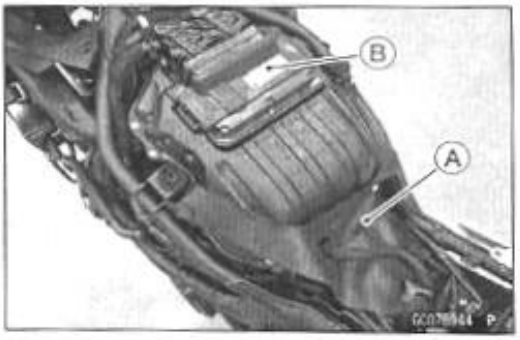


⚠ WARNING

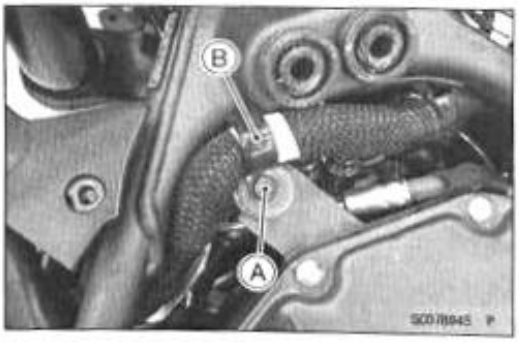
Oil on tires will make them slippery and can cause an accident and injury. Be sure to reinstall the cap in the air cleaner housing after draining.

Air Cleaner Housing Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
  Heat Insulation Rubber Plate [A]
- Remove the ECU [B] with the harness connected from the air cleaner housing.

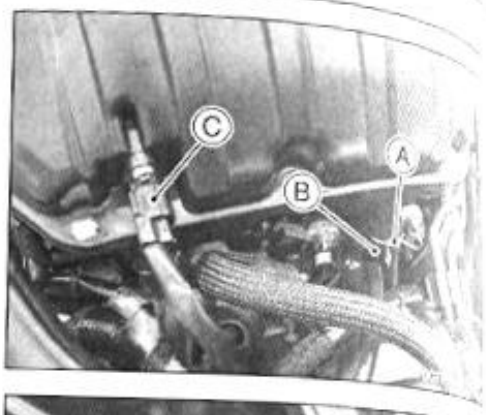


- Remove:
  Air Cleaner Housing Bolt [A]
  Clamp [B]

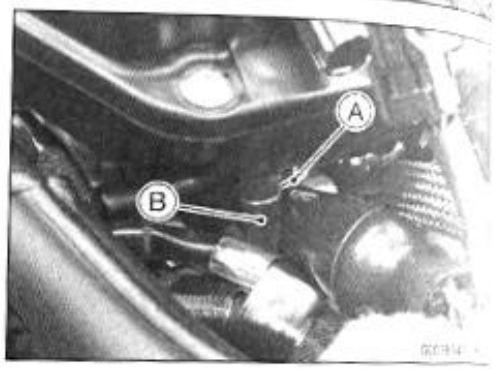


Air Cleaner

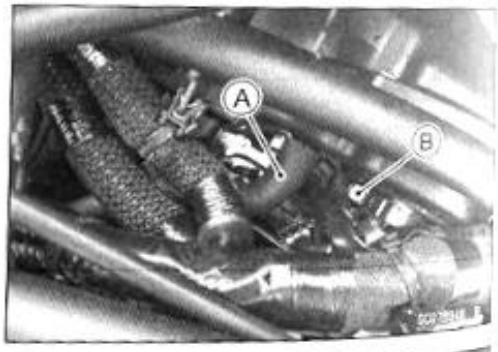
- Slide the clamp [A].
- Disconnect:
  Breather Hose [B]
  Intake Air Temperature Sensor Connector [C]



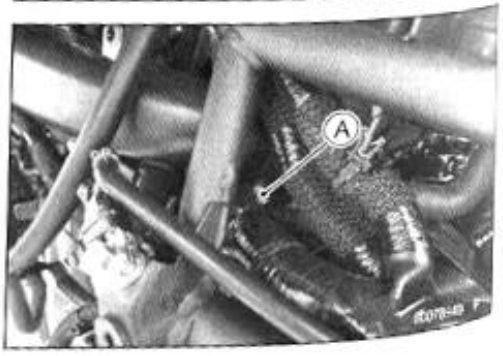
- Slide the clamp [A].
- Disconnect:
  Drain Hose [B]



- Disconnect the air switching valve hose [A].
- Loosen the air cleaner housing clamp bolt [B] on both sides.



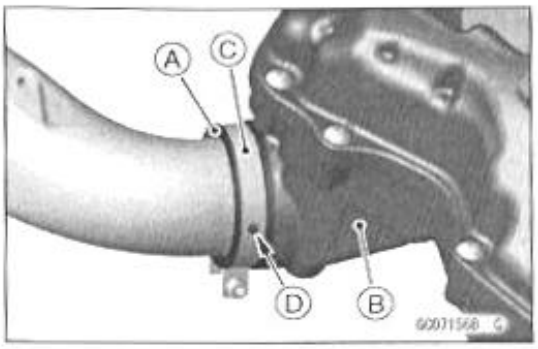
- Loosen the intake duct clamp bolt [A].
- Remove the air cleaner housing.



Air Cleaner Housing Installation

- Installation is the reverse of removal.
- Check the rubber duct [A] is in place on the air cleaner housing [B].
- Run the hose, cable and leads correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten:

Torque - Air Cleaner Housing Clamp Bolts: 2.0 N·m (0.20 kgf·m, 18 in·lb)
Air Cleaner Housing Bolt: 8.0 N·m (0.82 kgf·m, 71 in·lb)

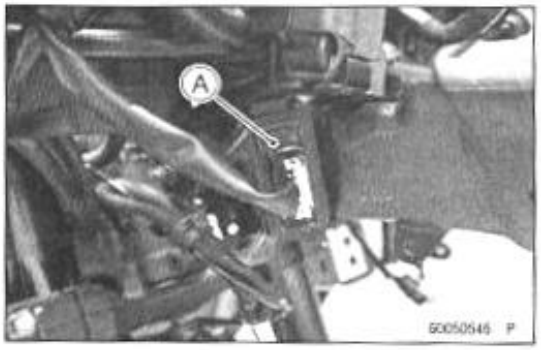


- Fit the hole of clamp [C] to the projection [D] of rubber duct.
- Tighten:

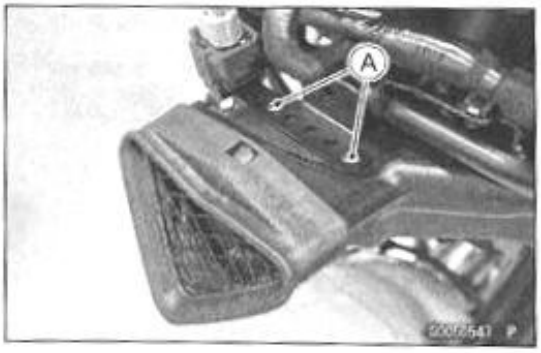
Torque - Intake Duct Clamp Bolt: 2.9 N·m (0.30 kgf·m, 26 in·lb)

Intake Duct Removal

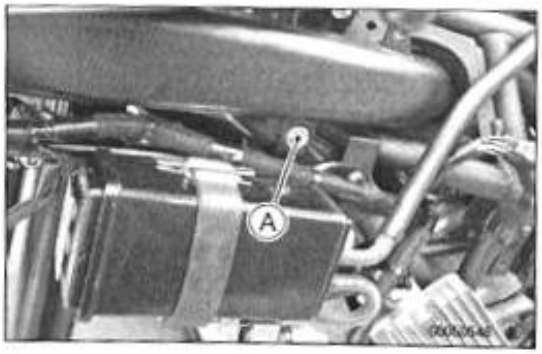
- Remove:
  Upper Fairing (see Upper Fairing Removal(15-21))
- For immobilizer system equipped models, remove the immobilizer amplifier [A] from the bracket.



- Remove:
  Intake Duct Bolts (M5) [A]

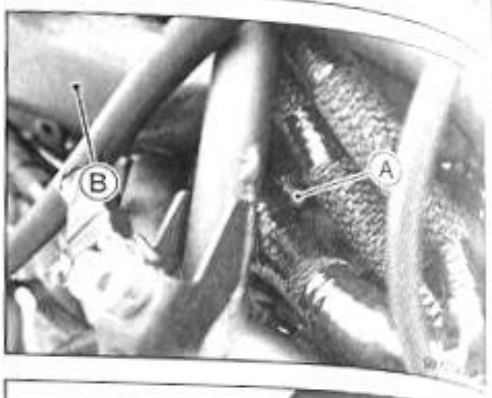


- Remove:
  Intake Duct Bolt (M6) [A]



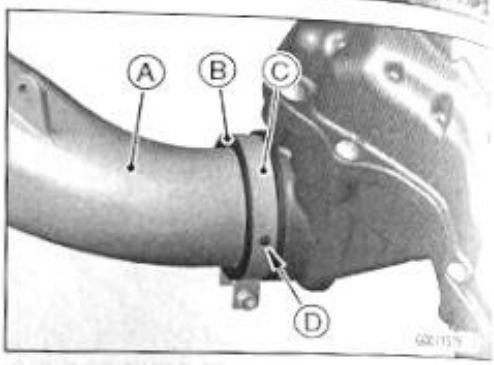
Air Cleaner

- Loosen the intake duct clamp bolt [A].
- Remove the intake duct [B].



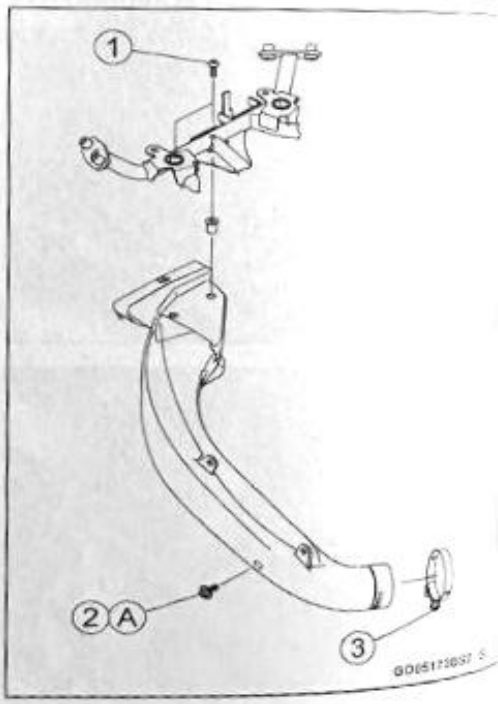
Intake Duct Installation

- Installation is the reverse of removal.
- Insert the intake duct [A] into the rubber duct [B] of the air cleaner housing.
- Fit the hole of clamp [C] to the projection [D] of rubber duct.



- Tighten the intake duct bolt (M6) [A] temporarily.
- Tighten the bolts to specified torque in the following order.

Torque - 1. Intake Duct Bolts (M5): 0.5 N·m (0.05 kgf·m, 4.4 in·lb)
2. Intake Duct Bolt (M6): 4.0 N·m (0.41 kgf·m, 35 in·lb)
3. Intake Duct Clamp Bolt: 2.9 N·m (0.30 kgf·m, 26 in·lb)



Fuel Tank

Fuel Tank Removal

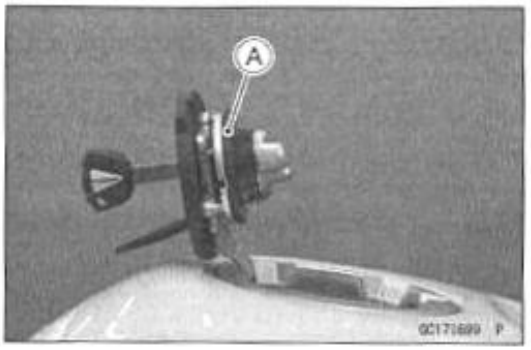
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch off. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Turn the ignition switch off.
- Wait until the engine cools down.
- Disconnect the battery (–) terminal (see Battery Removal(16-20)).

- Open the fuel tank cap [A] to lower the pressure in the tank.

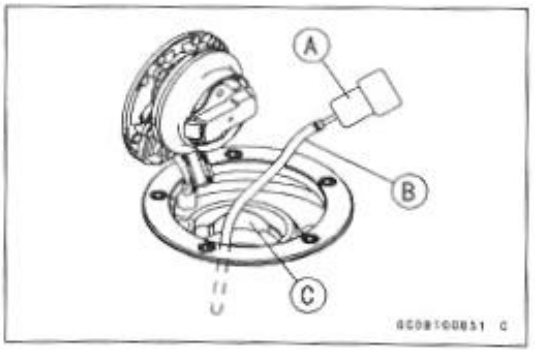
○During tank removal, keep the tank cap open to release pressure in the tank. This makes fuel spillage less.



- Draw the fuel out from the fuel tank with a commercially available pump [A].

○Use a soft plastic hose [B] as a pump intake hose in order to insert the hose smoothly.

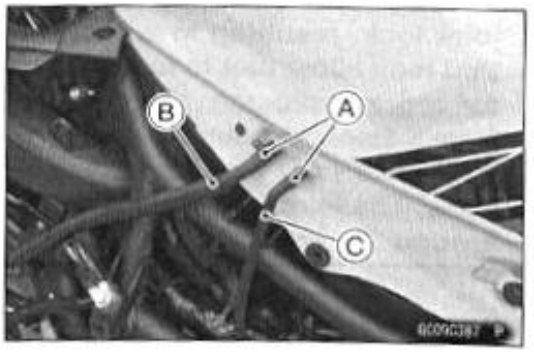
○Put the hose through the fill opening [C] into the tank and draw the fuel out.



⚠ WARNING

Spilled fuel is flammable and can be explosive under certain conditions. The fuel can not be removed completely from the fuel tank. Be careful for remained fuel spillage.

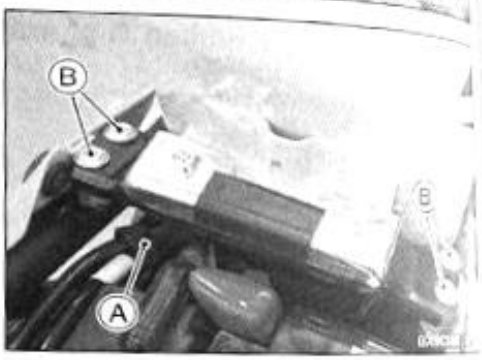
- Remove:
  Side Covers (see Side Cover Removal(15-26))
- Slide the clamps [A].
- Disconnect:
  Breather Hose [B]
  Drain Hose [C]



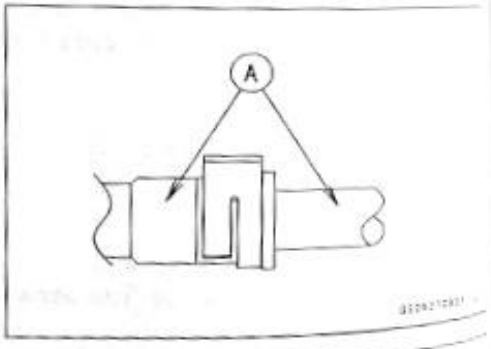
Fuel Tank

- Disconnect:
  Fuel Pump Connector [A]

- Remove:
  Clamp [A]
  Bolts [B]



- Be sure to place a piece of cloth around the fuel hose joint.
- Wipe off the dirt of the surface [A] around the connection using a cloth or a soft brush.

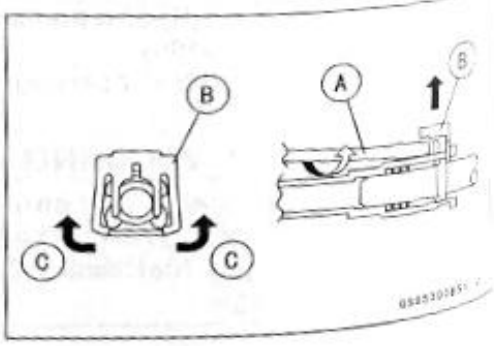


When removing with flat tip screwdriver

- Insert the flat tip screwdriver [A] into slit on the joint lock [B].
- Turn the driver to disconnect the joint lock.

When removing with fingers

- Open and push up [C] the joint lock with your fingers.

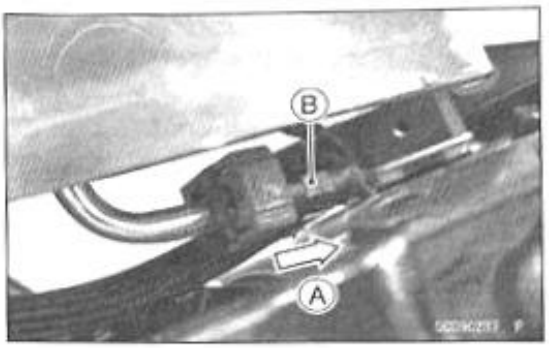


NOTICE

Prying or excessively widening the joint lock ends for fuel hose removal will permanently deform the joint lock, resulting in a loose or incomplete lock that may allow fuel to leak and create the potential for a fire explosion. To prevent fire or explosion from a damaged joint lock, do not pry or excessively widen the joint lock ends when removing the fuel hose. The joint lock has a retaining edge that locks around the housing.

Fuel Tank

- Pull [A] the fuel hose joint [B] out of the outlet pipe.

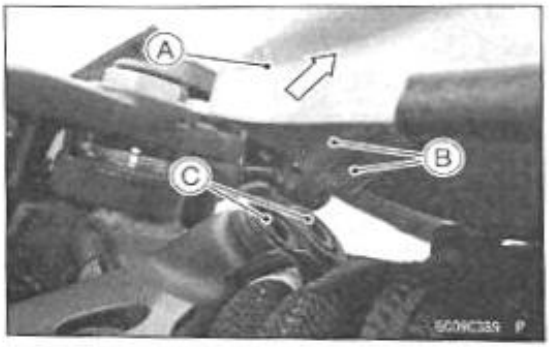


⚠ WARNING

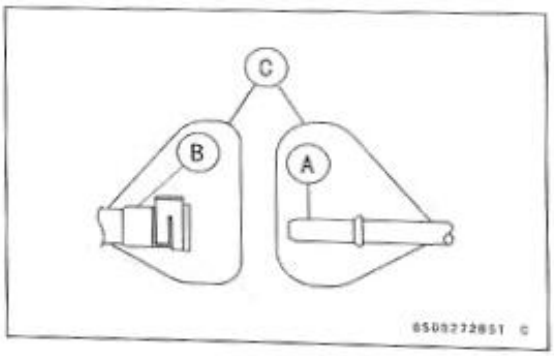
Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

- Close the fuel tank cap.
- Remove the fuel tank [A] rearward to clear the projections [B] from the dampers [C], and place it on a flat surface.

○Do not apply the load to the fuel pipe of the fuel pump.



- Clean the pipe [A].
- Cover the pipe and the hose joint [B] with the vinyl bags [C] to keep it clean.



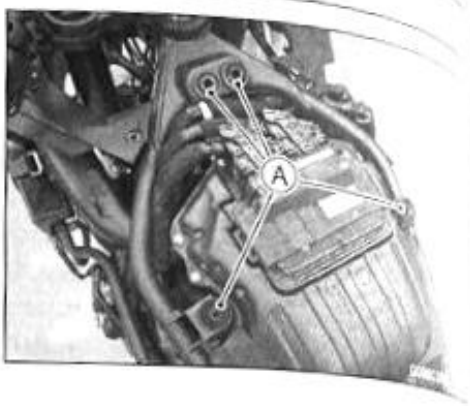
Fuel Tank

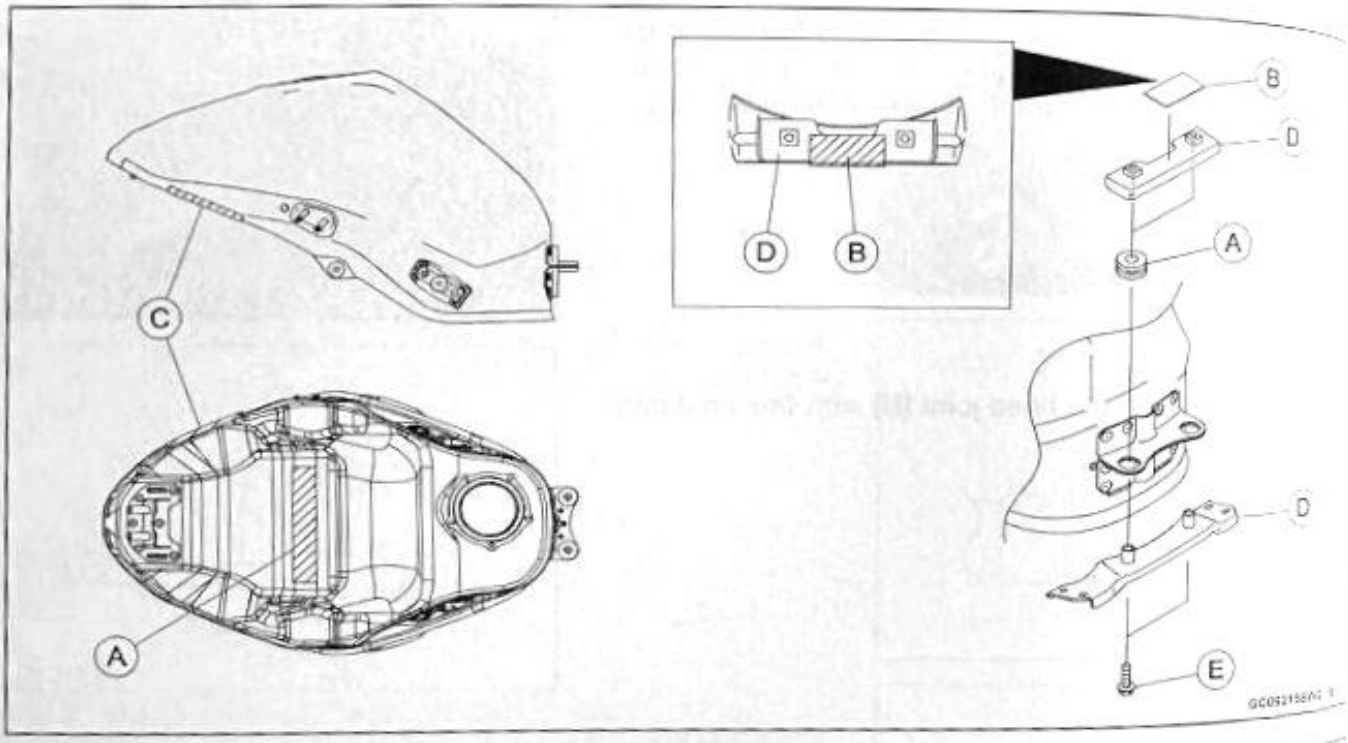
Fuel Tank Installation

- Note the above WARNING (see Fuel Tank Removal(3-35)).
- Check that the dampers [A], pad [B] and trim [C] are in place on the frame and fuel tank.

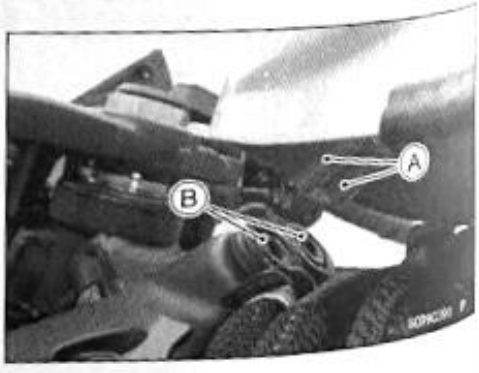
★If the dampers, pad and trim are damaged or deteriorated, replace them.

- Install:
  Fuel Tank Brackets [D]
  Bolts [E]
- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).





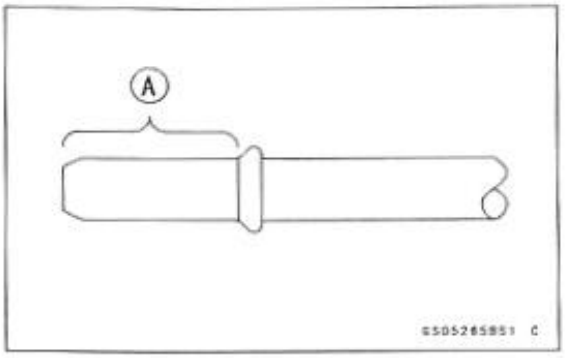
- Insert the projections [A] of the fuel tank to the dampers [B].



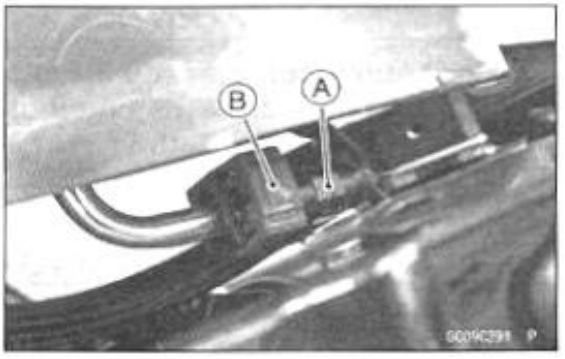
- Remove the vinyl bag on the pipe and fuel hose joint.
- Check the joint lock for deformation and wear.

★If the joint lock is deformed, replace the fuel hose with a new one.

- Check that there are no flaws, burrs, and adhesion of foreign materials on the pipe [A].
- Apply engine oil to the pipe.



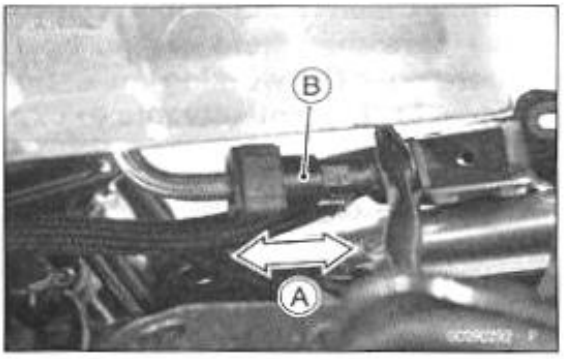
- Insert the fuel hose joint [A] straight onto the fuel outlet pipe until the hose joint clicks.
- Push the joint lock [B] until the hose joint clicks.



- Push and pull [A] the hose joint [B] back and forth more than two times, and make sure it is locked does not come off.

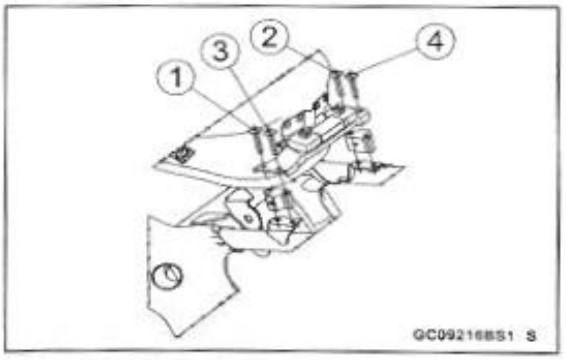
⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe.



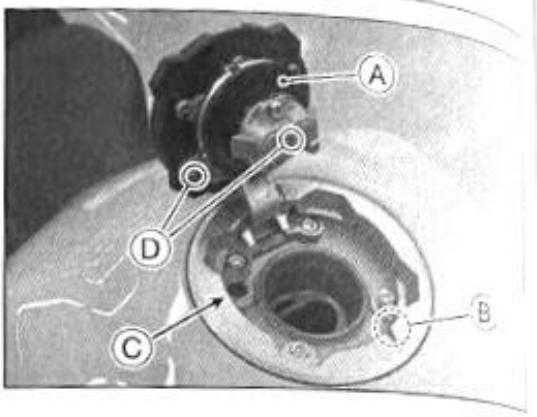
★If it comes off, reinstall the hose joint.

- Connect the fuel pump connector and battery (–) terminal (see Battery Installation(16-20)).
- Tighten the fuel tank bolts following the specified tightening sequence [1 – 4].
- Install the removed parts.



Fuel Tank

Fuel Tank and Cap Inspection



- Open the tank cap.
- Visually inspect the gasket [A] on the tank cap for any damage.

★Replace the tank cap if gasket is damaged.

- Check to see if the water drain pipe [B] and fuel breather pipe [C] in the tank are not clogged. Check the tank cap breather also.

★If they are clogged, remove the tank and drain it, and then blow the breather free with compressed air.

NOTICE

Do not apply compressed air to the air vent holes [D] in the tank cap. This could cause damage and clogging of the labyrinth in the cap.

Fuel Tank Cleaning

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low flash-point solvents to clean the tank.

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
  Fuel Pump (see Fuel Pump Removal(3-22))
- Pour some high flash-point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the fuel tank.
- Dry the tank with compressed air.
- Install:
  Fuel Pump (see Fuel Pump Installation(3-23))
  Fuel Tank (see Fuel Tank Installation(3-38))

Evaporative Emission Control System

The Evaporative Emission Control System routes fuel vapors from the fuel system into the running engine or stores the vapors in a canister when the engine is stopped. Although no adjustments are required, a thorough visual inspection must be made at the intervals specified by the Periodic Maintenance Chart.

Parts Removal/Installation

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch off. Do not smoke. Make sure the area is well ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

NOTICE

If gasoline, solvent, water or any other liquid enters the canister, the canister's vapor absorbing capacity is greatly reduced. If the canister does become contaminated, replace it with a new one.

- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)). Make sure they do not get pinched or kinked.

Hose Inspection

- Refer to the Evaporative Emission Control System Inspection (see Evaporative Emission Control System Inspection(2-23)).

Purge Valve Inspection

- Refer to the Purge Valve Inspection (see DTC P0444(17-94)) (see DTC P0458(17-95)) (see DTC P0459(17-95)).

Canister Inspection

- Refer to the Evaporative Emission Control System Inspection (see Evaporative Emission Control System Inspection(2-23)).

Cooling System

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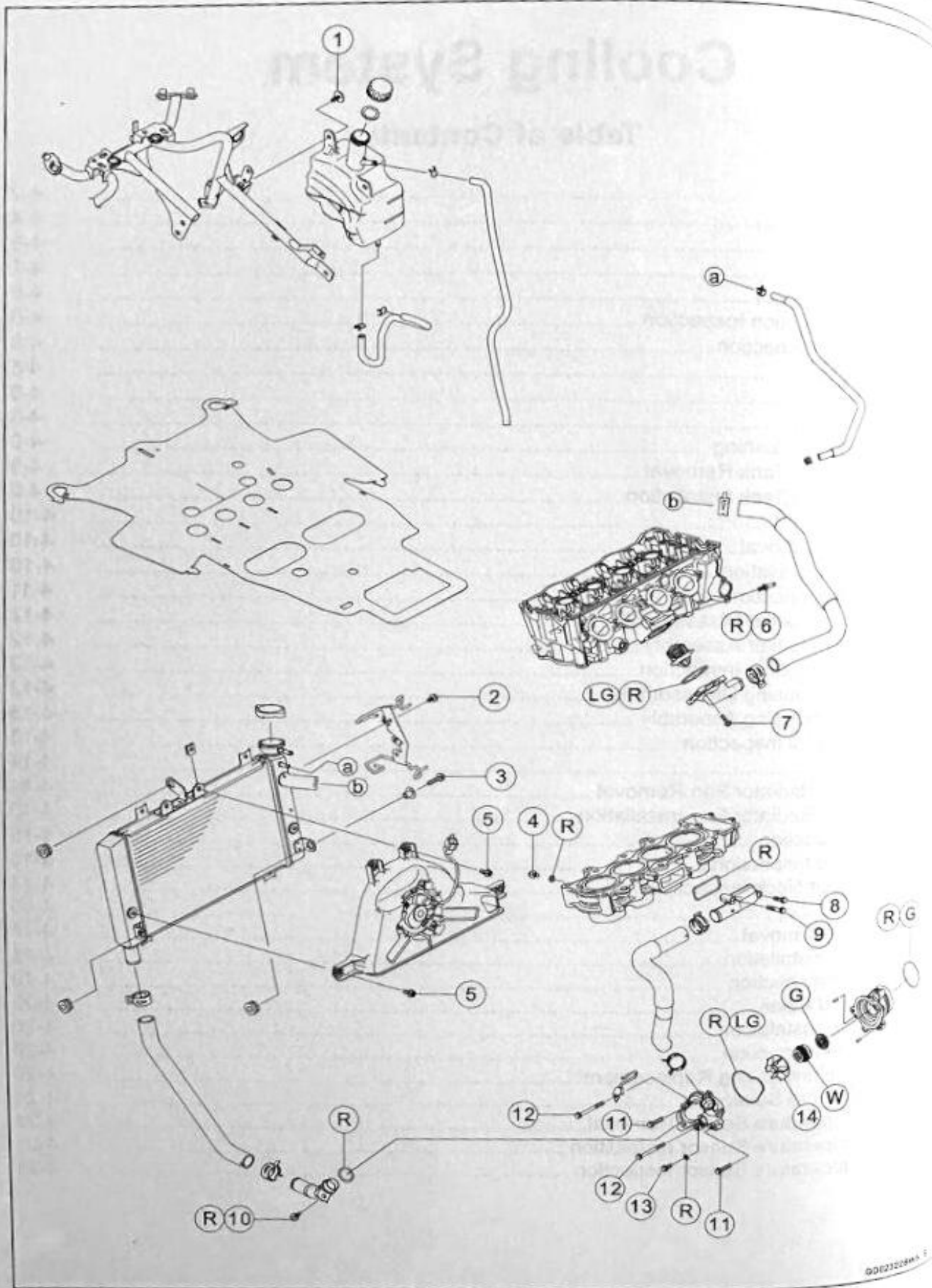
Exploded View

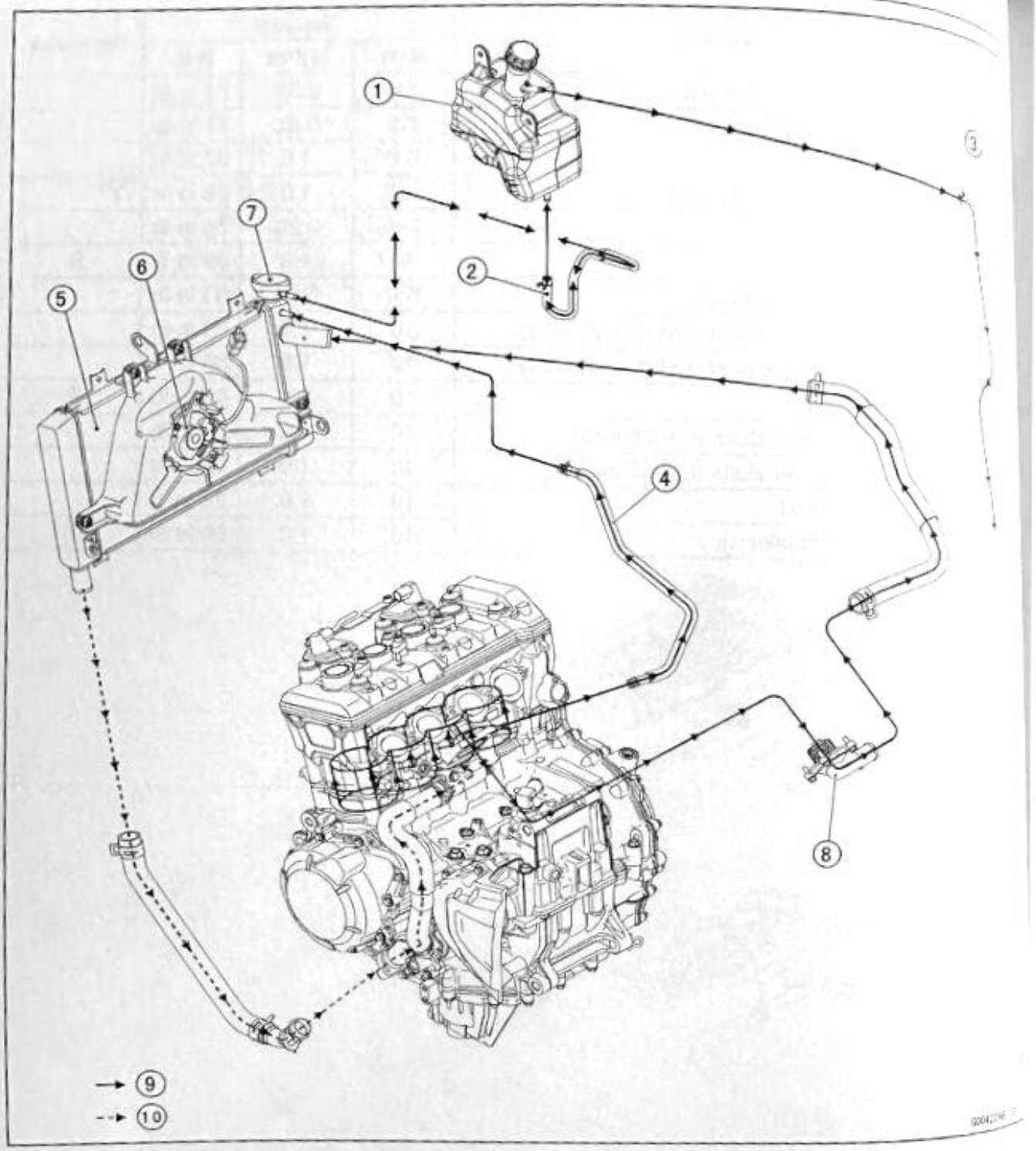


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Coolant Reserve Tank Bolts	8.0	0.82	71 in·lb	
2	Connector Bracket Bolts	8.0	0.82	71 in·lb	
3	Radiator Bolt	9.8	1.0	87 in·lb	
4	Coolant Drain Bolt (Cylinder)	10	1.0	89 in·lb	
5	Radiator Fan Bolts	8.4	0.86	74 in·lb	
6	Water Hose Fitting	10	1.0	89 in·lb	R
7	Thermostat Housing Bolts	6.0	0.61	53 in·lb	
8	Water Hose Fitting Cover Bolt (L = 20 mm)	10	1.0	89 in·lb	
9	Water Hose Fitting Cover Bolt (L = 35 mm)	10	1.0	89 in·lb	
10	Water Pipe Bolt	10	1.0	89 in·lb	R
11	Water Pump Cover Bolts (L = 25 mm)	10	1.0	89 in·lb	
12	Water Pump Cover Bolts (L = 55 mm)	10	1.0	89 in·lb	
13	Coolant Drain Bolt	10	1.0	89 in·lb	
14	Water Pump Impeller	10	1.0	89 in·lb	

G: Apply grease.
LG: Apply liquid gasket.
R: Replacement Parts
W: Apply water.

Coolant Flow Chart



1. Reserve Tank
2. Radiator Overflow Hose
3. Reserve Tank Overflow Hose
4. Air Bleeder Hose
5. Radiator
6. Radiator Fan
7. Radiator Cap
8. Thermostat Housing
9. Hot Coolant
10. Cold Coolant

Coolant Flow Chart

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than 80.5 – 83.5°C (177 – 182°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 80.5 – 83.5°C (177 – 182°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 100°C (212°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 97°C (207°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

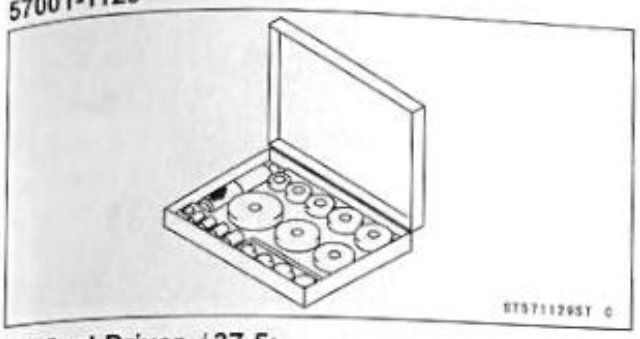
The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 107.9 – 137.3 kPa (1.10 – 1.40 kgf/cm², 15.6 – 19.9 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 107.9 – 137.3 kPa (1.10 – 1.40 kgf/cm², 15.6 – 19.9 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

Specifications

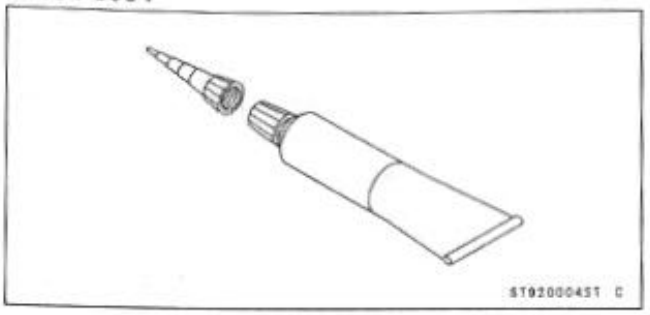
Item	Standard
Coolant Provided when Shipping	
Type (Recommended)	Permanent type of antifreeze (soft water and ethylene glyc plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)
Color	Green
Mixed Ratio	Soft water 50%, coolant 50%
Freezing Point	−35°C (−31°F)
Total Amount	2.0 L (2.1 US qt) (Reserve tank full level, including radiator and engine)
Radiator Cap	
Relief Pressure	107.9 – 137.3 kPa (1.10 – 1.40 kgf/cm², 15.6 – 19.9 psi)
Thermostat	
Valve Opening Temperature	80.5 – 83.5°C (177 – 182°F)
Valve Full Opening Lift	8 mm (0.31 in.) or more @95°C (203°F)

Special Tools

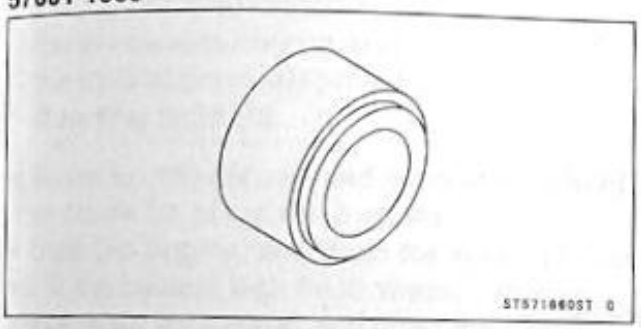
Bearing Driver Set:
57001-1129



Liquid Gasket, TB1211F:
92104-0004

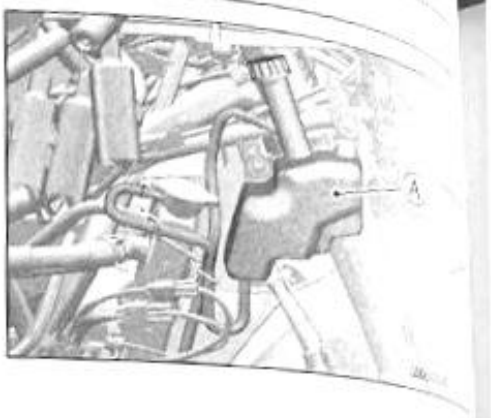


Oil Seal Driver ϕ37.5:
57001-1660



Coolant

Coolant Deterioration Inspection



- Remove the right side cover (see Side Cover Removal(15-26)).
- Visually inspect the coolant in the reserve tank [A].

★If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

★If the coolant gives off an abnormal smell, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

Coolant Level Inspection

- Refer to the Coolant Level Inspection (see Coolant Level Inspection(2-24)).

Coolant Draining

- Refer to the Coolant Change (see Coolant Change(2-25)).

Coolant Filling

- Refer to the Coolant Change (see Coolant Change(2-25)).

Pressure Testing

- Remove the right lower fairing (see Lower Fairing Removal(15-18)).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the filler neck.

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

- Build up pressure in the system carefully until the pressure reaches 137.3 kPa (1.40 kgf/cm², 19.9 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 137.3 kPa (1.40 kgf/cm², 19.9 psi).

- Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the system is all right.

★If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket and the water pump.

- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Install the right lower fairing (see Lower Fairing Installation(15-19)).

Coolant

Cooling System Flushing

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the water passage and considerable reduce the efficiency of the cooling system.

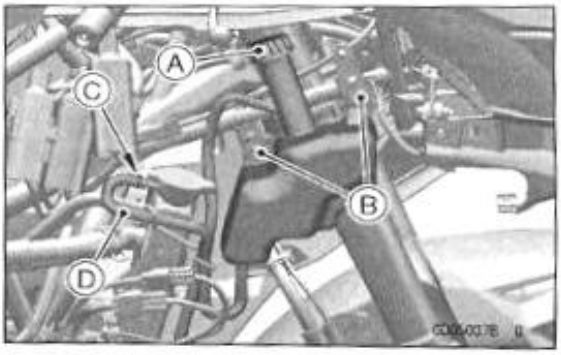
- Drain the cooling system (see Coolant Change(2-25)).
- Fill the cooling system with fresh water mixed with a flushing compound.

NOTICE

Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.

- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see Coolant Change(2-25)).

Coolant Reserve Tank Removal



- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
  Coolant Reserve Tank Cap [A]
  Coolant Reserve Tank Bolts [B]
- Pour the coolant into a container.
- Slide the clamp [C] and disconnect the radiator overflow hose [D].
- Remove the coolant reserve tank.

Coolant Reserve Tank Installation

- Installation is the reverse of removal.
- Tighten:

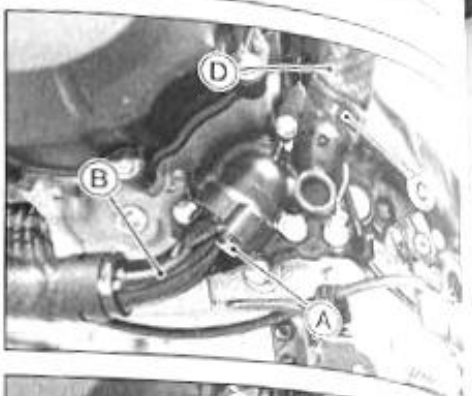
Torque - Coolant Reserve Tank Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Fill the coolant reserve tank with the coolant (see Coolant Change(2-25)).

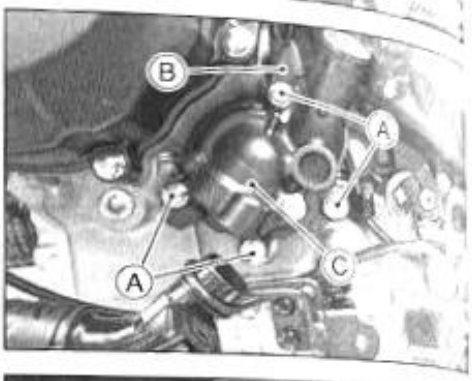
Water Pump

Water Pump Removal

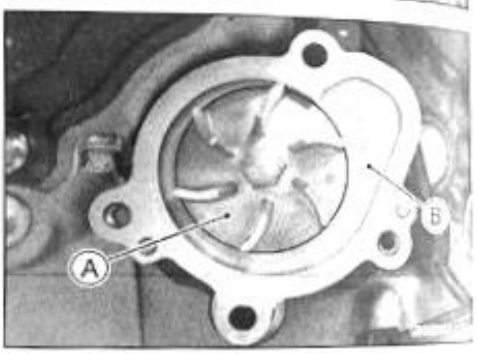
- Drain:
  Coolant (see Coolant Change(2-25))
  Engine Oil (see Engine Oil Change(2-35))
- Remove:
  Left Lower Fairing (see Lower Fairing Removal(15-18))
- Remove the water pipe bolt [A], and disconnect the water pipe [B].
- Slide the water hose clamp [C].
- Disconnect the water hose [D].



- Remove:
  Water Pump Cover Bolts [A]
  Bracket [B]
  Water Pump Cover [C]

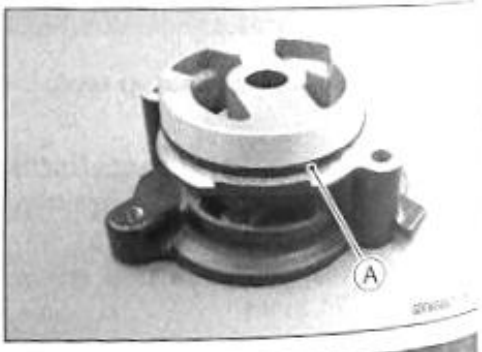


- Remove:
  Water Pump Impeller [A]
  Water Pump Housing [B]



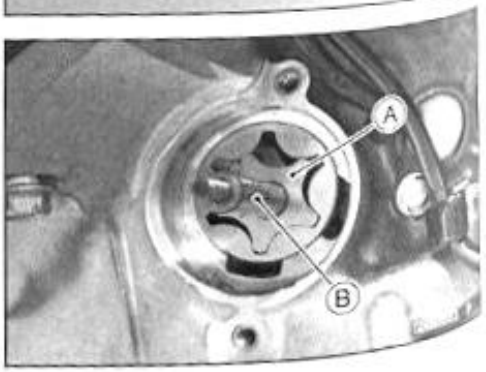
Water Pump Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring, and install it.



- Be sure that the inner rotor [A] and oil (water) pump shaft [B] are in position.

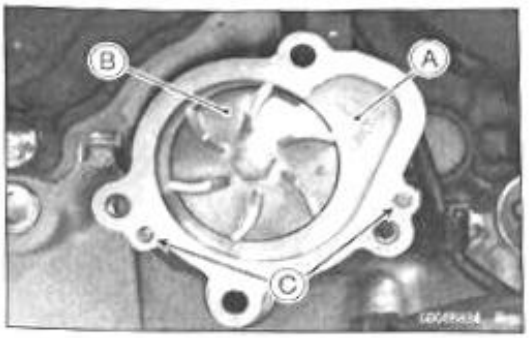
OInstall the inner rotor and oil (water) pump shaft if removed (see Oil Pump Installation(7-12)).



- Install:
  Water Pump Housing [A]
  Water Pump Impeller [B]
- Tighten:

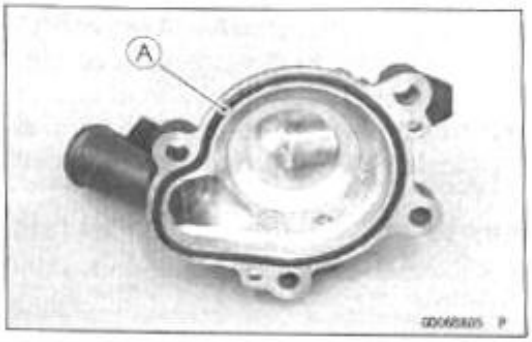
Torque - Water Pump Impeller: 10 N·m (1.0 kgf·m, 89 in·lb)

- Be sure to install the dowel pins [C].



- Replace the O-ring [A] with a new one.
- Apply liquid gasket on the O-ring to retain the O-ring in the water pump cover.

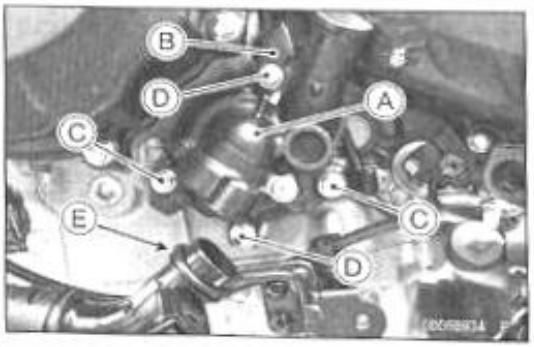
Sealant - Liquid Gasket, TB1211F: 92104-0004



- Install:
  Water Pump Cover [A]
  Bracket [B]
- Tighten:

Torque - Water Pump Cover Bolts (L = 25 mm) [C]: 10 N·m (1.0 kgf·m, 89 in·lb)
Water Pump Cover Bolts (L = 55 mm) [D]: 10 N·m (1.0 kgf·m, 89 in·lb)

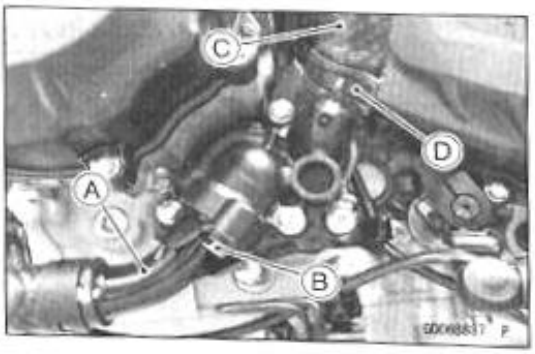
- Replace the O-ring [E] with a new one.



- Install the water pipe [A] to the water pump cover.
- Replace the water pipe bolt [B] with a new one, and tighten it.

Torque - Water Pipe Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the water hose [C] and clamp [D].
- Install the removed parts.



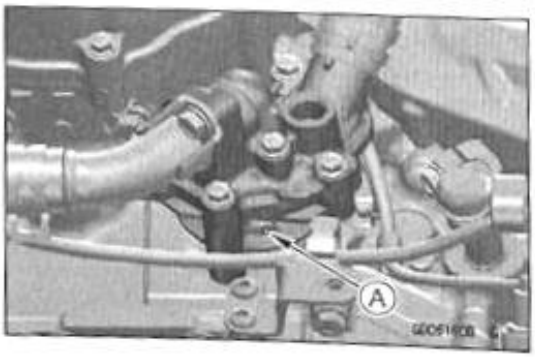
Water Pump Inspection

- Remove the left lower fairing (see Lower Fairing Removal(15-18)).
- Check the drainage outlet passage [A] at the bottom of the water pump housing for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.

OWhen coolant does not continuously leak, it is normal.

★If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit.

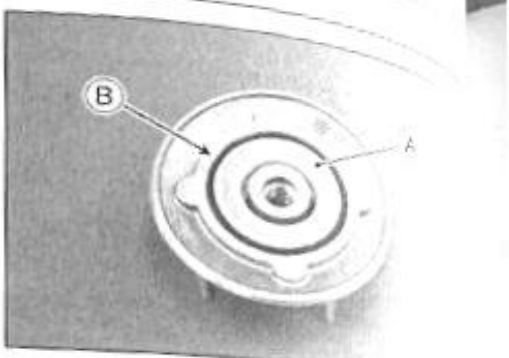
★If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the oil seal.



Water Pump

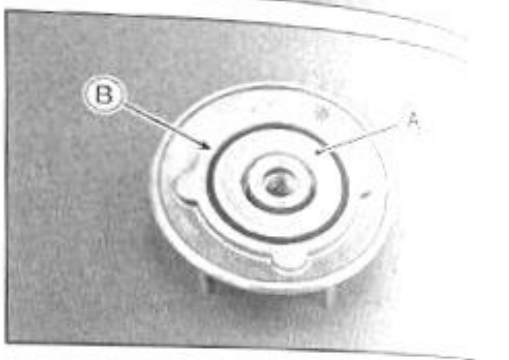
Water Pump Impeller Disassembly

- Remove the water pump impeller (see Water Pump Removal(4-10)).
- The sealing seat [A] and rubber seal [B] may be removed easily by hand.



Water Pump Impeller Assembly

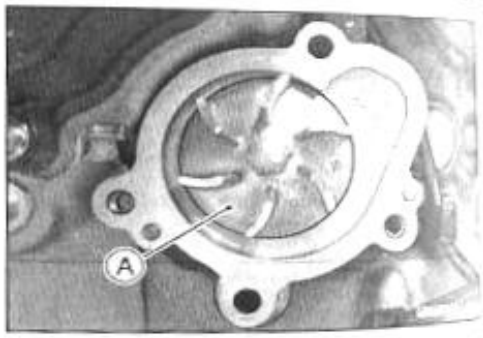
- Apply water to the surfaces of the sealing seat [A] and rubber seal [B].
- Install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.
- Install the water pump impeller (see Water Pump Installation(4-10)).



Water Pump Impeller Inspection

- Remove the water pump cover (see Water Pump Removal(4-10)).
- Visually inspect the water pump impeller [A].

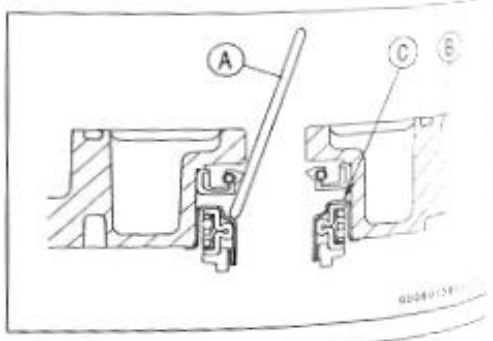
★If the surface is corroded or if the blades are damaged, replace the water pump impeller.



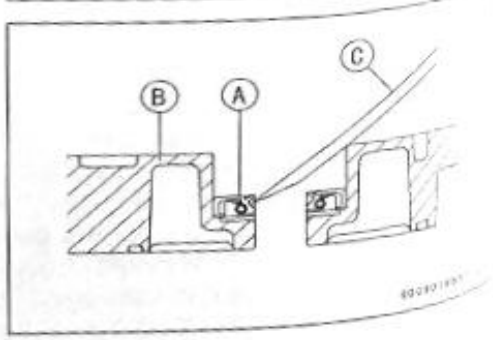
Water Pump Housing Disassembly

NOTICE
Do not damage the hole wall of the water pump housing.

- Insert a bar [A] into the pump housing [B], and hammer evenly around the circumference of the mechanical seal bottom [C].



- Take the oil seal [A] out of the housing [B] with a hook [C].



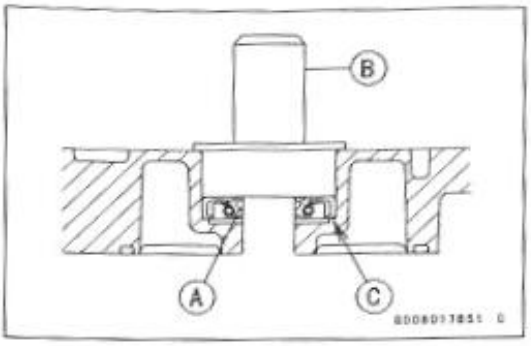
Water Pump Housing Assembly

NOTICE

Do not reuse the mechanical seal and oil seal.

- Replace the oil seal with a new one.
- Apply grease to the oil seal lips [A].
- Press the oil seal into the housing with a bearing driver [B] until it stops at the bottom surface [C] of the housing.

Special Tool - Bearing Driver Set: 57001-1129

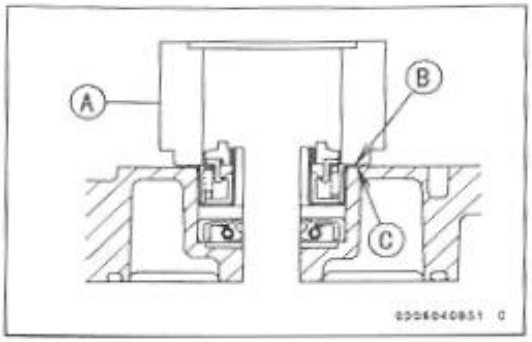


NOTICE

Be careful not to damage the sealing surface of the mechanical seal.

- Replace the mechanical seal with a new one.
- Apply soap and water solution to the mechanical seal installation surface.
- Press the mechanical seal into the housing with the oil seal driver [A] until its flange [B] touches the surface [C] of the housing.

Special Tool - Oil Seal Driver ϕ37.5: 57001-1660

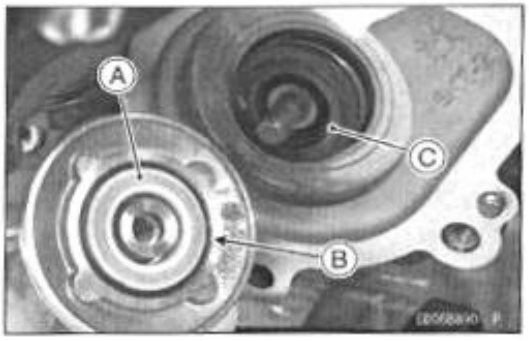


Mechanical Seal Inspection

- Remove the water pump impeller (see Water Pump Removal(4-10)).
- Visually inspect the mechanical seal.

★If any one of the parts is damaged, replace the mechanical seal as a unit.

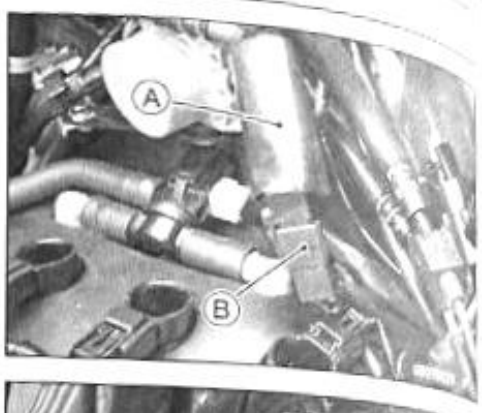
Impeller Sealing Seat Surface [A]
Rubber Seal [B]
Mechanical Seal [C]



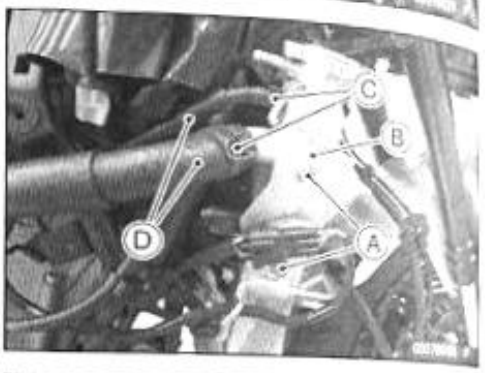
Radiator

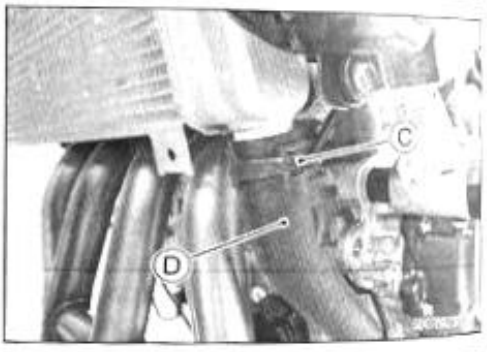
Radiator and Radiator Fan Removal

- Drain the coolant (see Coolant Change(2-25)).
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
  Coolant Reserve Tank (see Coolant Reserve Tank Removal(4-9))
- Slide the dust cover [A].
- Disconnect the radiator fan motor connector [B].

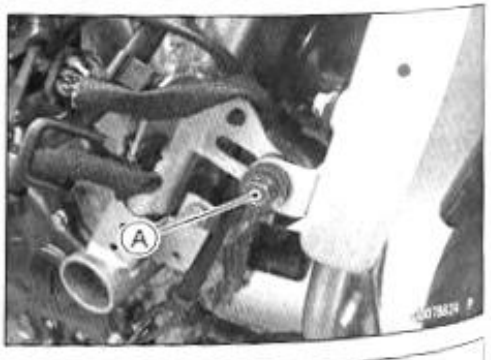


- Remove the connector bracket bolts [A].
- Remove the connector bracket [B] from the radiator.
- Slide the water hose clamps [C].
- Disconnect the water hoses [D].

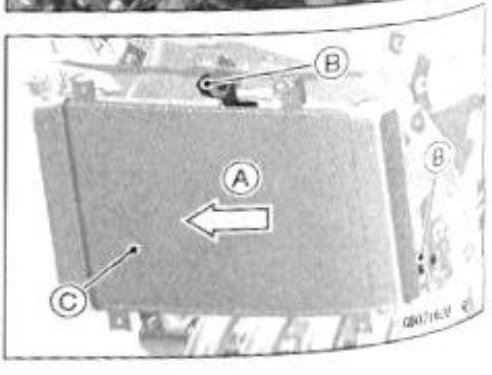




- Remove the radiator bolt [A].



- Move the radiator rightward [A] to clear the frame projections [B].
- Remove the radiator [C].

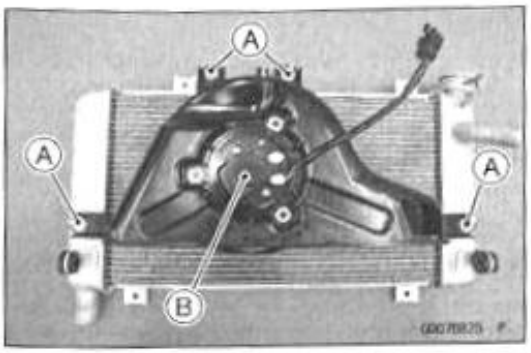


NOTICE

Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.

Radiator

- Remove:
  Radiator Fan Bolts [A]
  Radiator Fan [B]

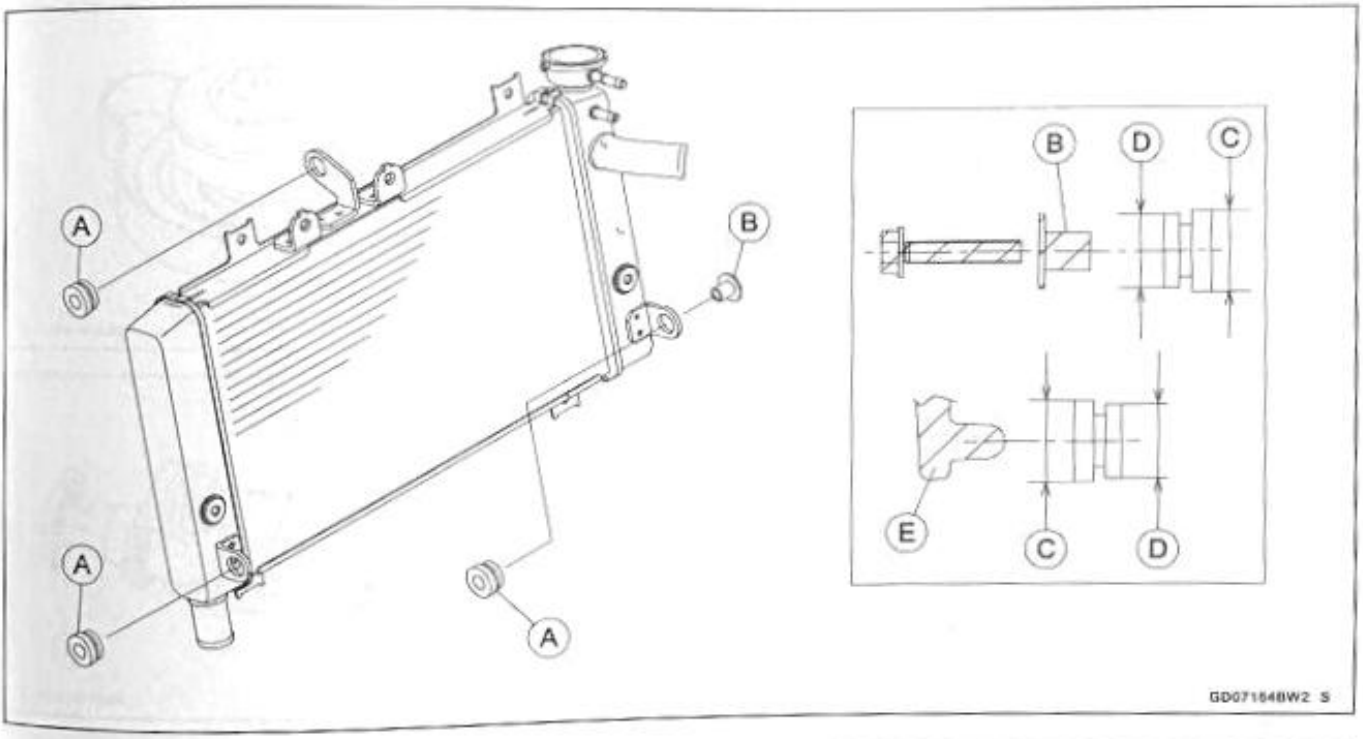


Radiator and Radiator Fan Installation

- Installation is the reverse of removal.
- Install the radiator fan and radiator fan bolts.
- Tighten:

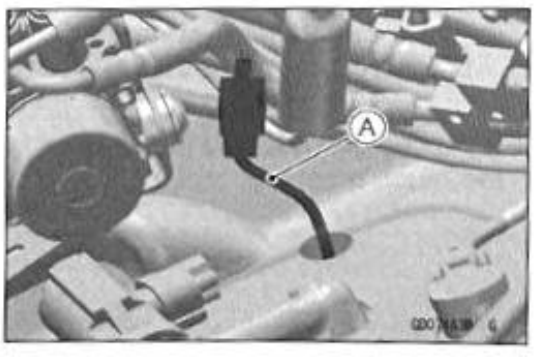
Torque - Radiator Fan Bolts: 8.4 N·m (0.86 kgf·m, 74 in·lb)

- Check the rubber dampers [A] and collar [B] are installed as shown.
  Larger [C]
  Smaller [D]
  Frame Projection [E]



- Run the radiator fan motor lead [A] into the hole.
- Install the water hoses and clamps (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten:

Torque - Radiator Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Connector Bracket Bolts: 8.0 N·m (0.82 kgf·m, 71 in·lb)



Radiator

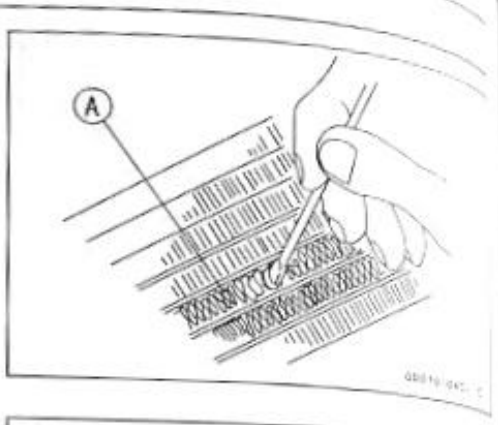
Radiator Inspection

- Remove the radiator (see Radiator and Radiator Fan Removal(4-14)).
- Check the radiator core.

★If there are obstructions to air flow, remove them.

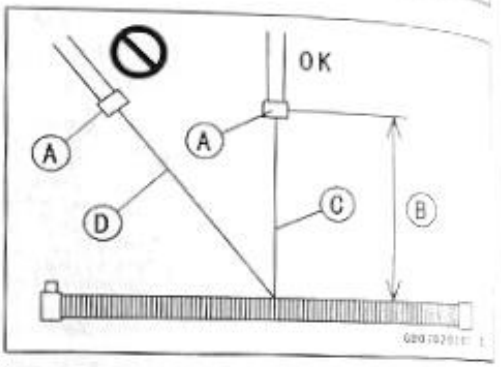
★If the corrugated fins [A] are deformed, carefully straighten them.

★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.



NOTICE

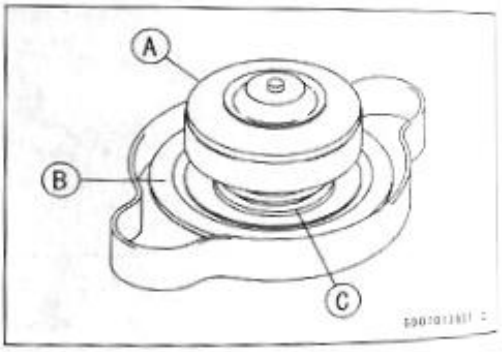
When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage:
Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core.
Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.
Run the steam gun, following the core fin direction.



Radiator Cap Inspection

- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
  Radiator Cap
- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].

★If any one of them shows visible damage, replace the cap with a new one.



- Install the cap [A] on a cooling system pressure tester [B].

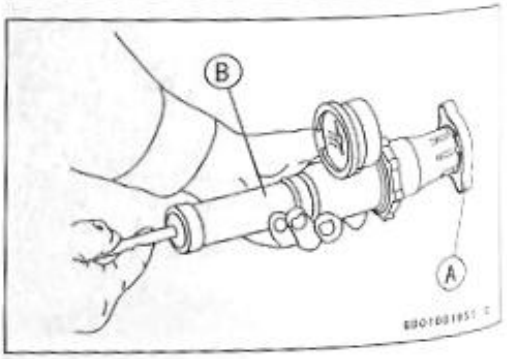
NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.

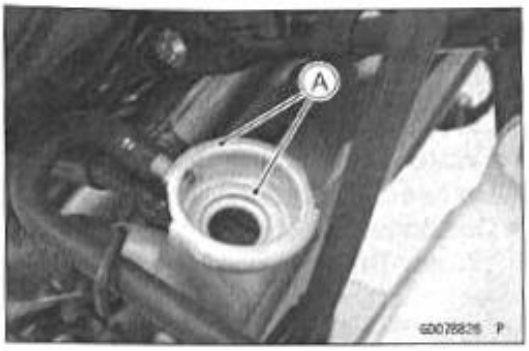
Radiator Cap Relief Pressure
Standard: 107.9 – 137.3 kPa (1.10– 1.40 kgf/cm², 15.6 – 19.9 psi)

★If the cap can not hold the specified pressure or if it holds too much pressure, replace it with a new one.



Radiator Filler Neck Inspection

- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
  Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.



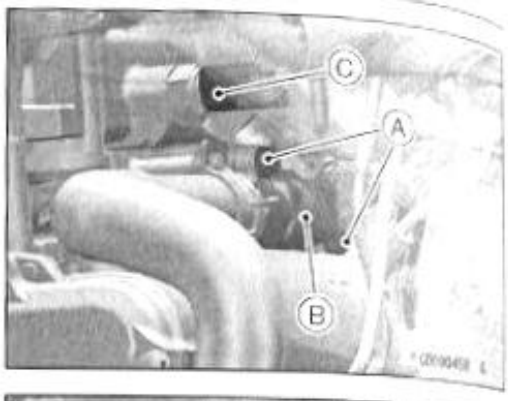
Thermostat

Thermostat Removal

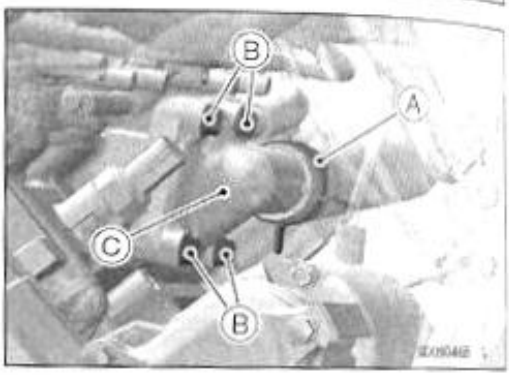
- Drain the coolant (see Coolant Change(2-25)).
- Remove:
  Water Hose Fitting Cover Bolts [A]
  Water Hose Fitting Cover [B]

○No need to disconnect the water hose and cover.

- Disconnect:
  Water Temperature Sensor Connector [C]

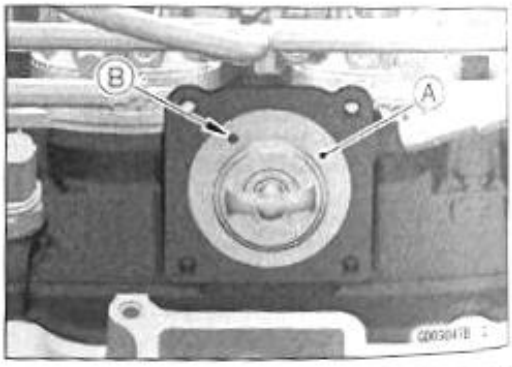


- Slide the water hose clamp [A] and disconnect the water hose.
- Remove:
  Thermostat Housing Bolts [B]
  Thermostat Housing [C]
  Thermostat



Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] faces upward.



- Replace the O-ring [A] with a new one.
- Apply liquid gasket on the O-ring to retain the O-ring in the thermostat housing, and install it.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

- Install the thermostat housing.

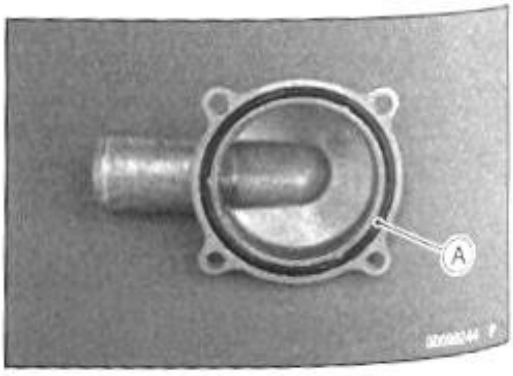
NOTE

○*Note that the thermostat does not move at the place when installing the thermostat housing.*

- Tighten:

  Torque - Thermostat Housing Bolts: 6.0 N·m (0.61 kgf·m, 53 in·lb)

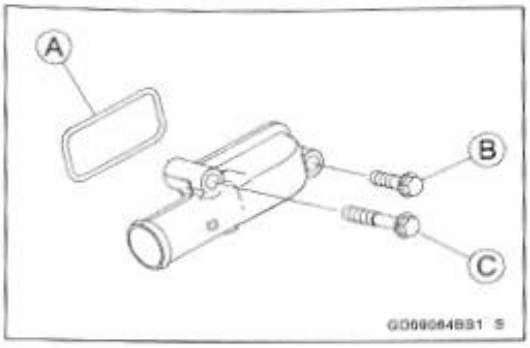
- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).



- Replace the O-ring [A] with a new one.
- Install the water hose fitting cover.
- Tighten:

Torque - **Water Hose Fitting Cover Bolt (L = 20 mm) [B]: 10 N·m (1.0 kgf·m, 89 in·lb)**
Water Hose Fitting Cover Bolt (L = 35 mm) [C]: 10 N·m (1.0 kgf·m, 89 in·lb)

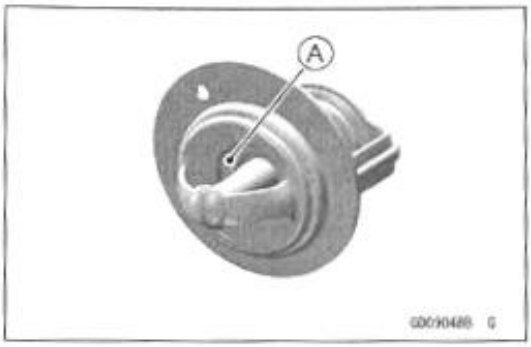
- Connect the water temperature sensor connector.
- Fill the radiator with coolant (see Coolant Change(2-25)).
- Install the removed parts.



Thermostat Inspection

- Remove the thermostat (see Thermostat Removal(4-18)).
- Inspect the thermostat valve [A] at room temperature.

★If the valve is open, replace the thermostat with a new one.

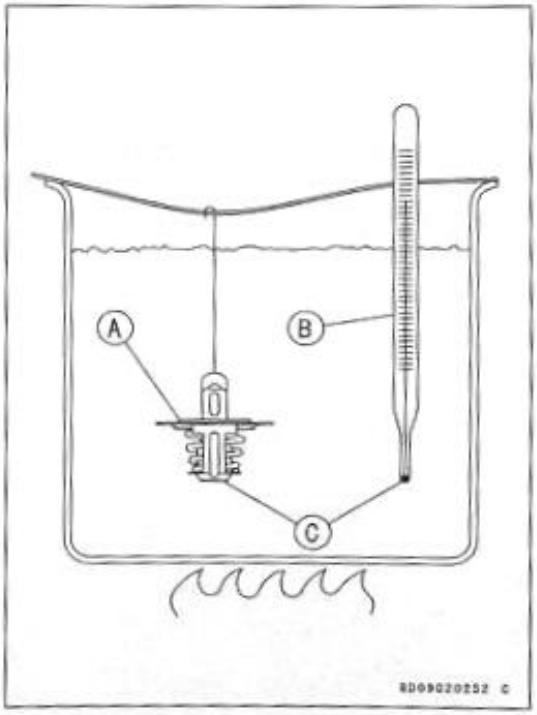


- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.

○The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.

★If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature
80.5 – 83.5°C (177 – 182°F)



Water Hose and Pipes

Water Hose Installation

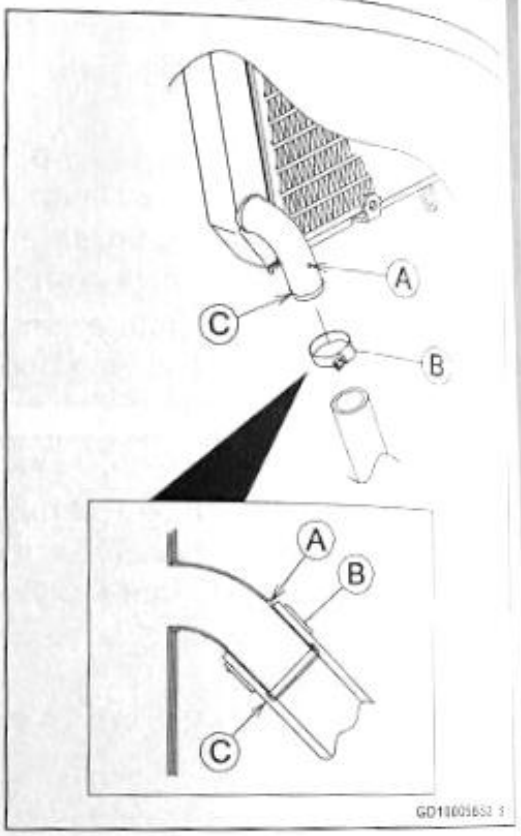
- Run the hoses (see Cable, Wire, and Hose Routing section (18-2)).
- Install the hoses and pipes.

○Be careful to follow bending direction of the hoses, and avoid sharp bending, kinking, flattening or twisting.

○If the hose fitting has a small projection [A], insert the water hose until it comes into contact with the projection shape (Hose shall not ride on the projection shape).

- Install the clamp [B] between the hose retaining bulge [C] and projection of the fitting to prevent contacting them. This will prevent the hoses from working loose.

○There are cases when the clamping position describes in detail in the Periodic Maintenance chapter or Appendix chapter.



Water Hose Inspection

- Refer to the Cooling System Inspection (see Cooling System Inspection(2-25)).

Water Hose and O-ring Replacement

- Refer to the Water Hose and O-ring Replacement (see Water Hose and O-ring Replacement(2-27)).

NOTICE

The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to the water temperature sensor can damage it.

Water Temperature Sensor Removal

- Refer to the Water Temperature Sensor Removal (see Water Temperature Sensor Removal(17-64)).

Water Temperature Sensor Installation

- Refer to the Water Temperature Sensor Installation (see Water Temperature Sensor Installation(17-64)).

Water Temperature Sensor Inspection

- Refer to the Water Temperature Sensor Inspection (see Water Temperature Sensor Inspection(16-91)).

Engine Top End

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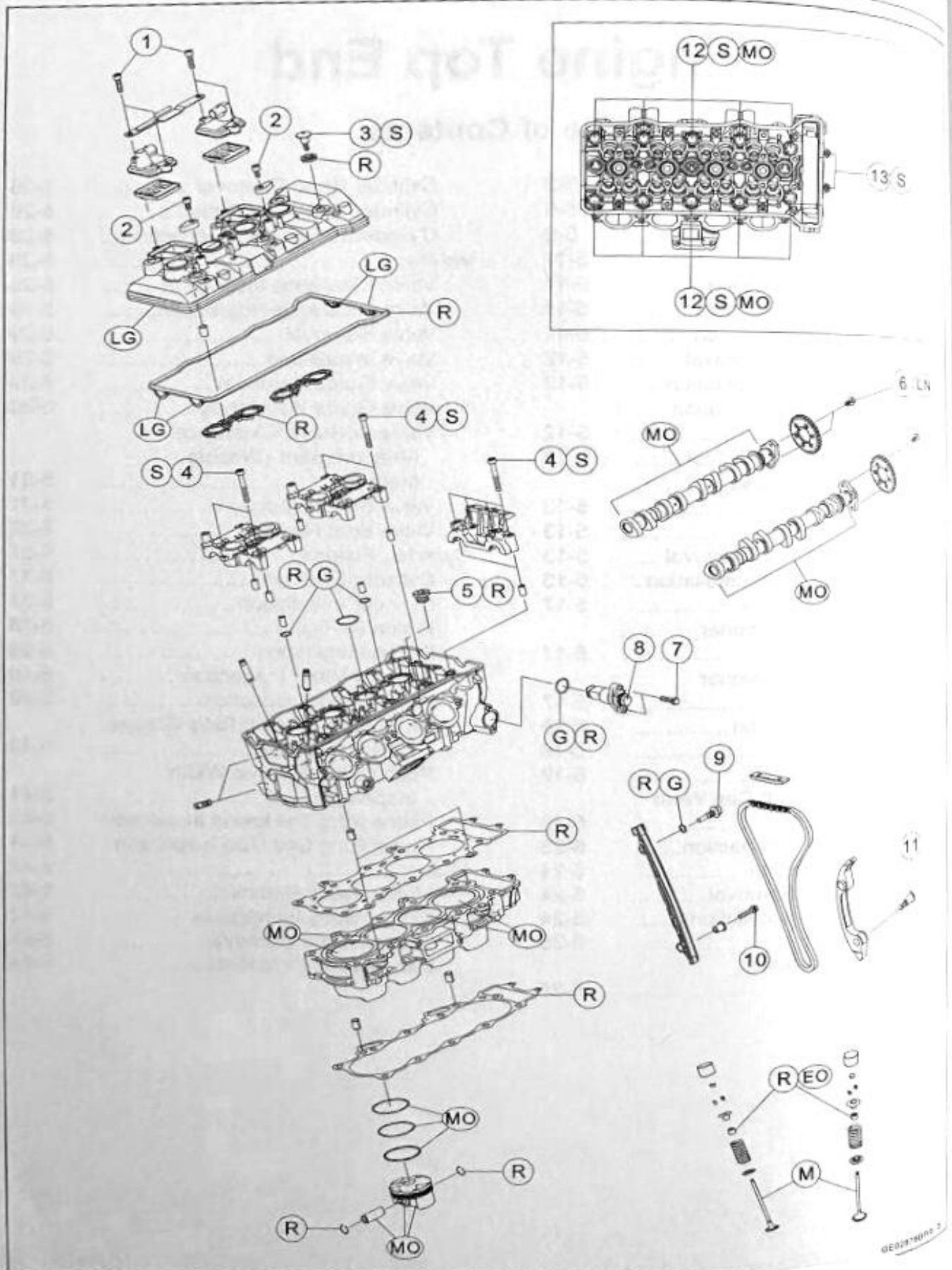
Exploded View

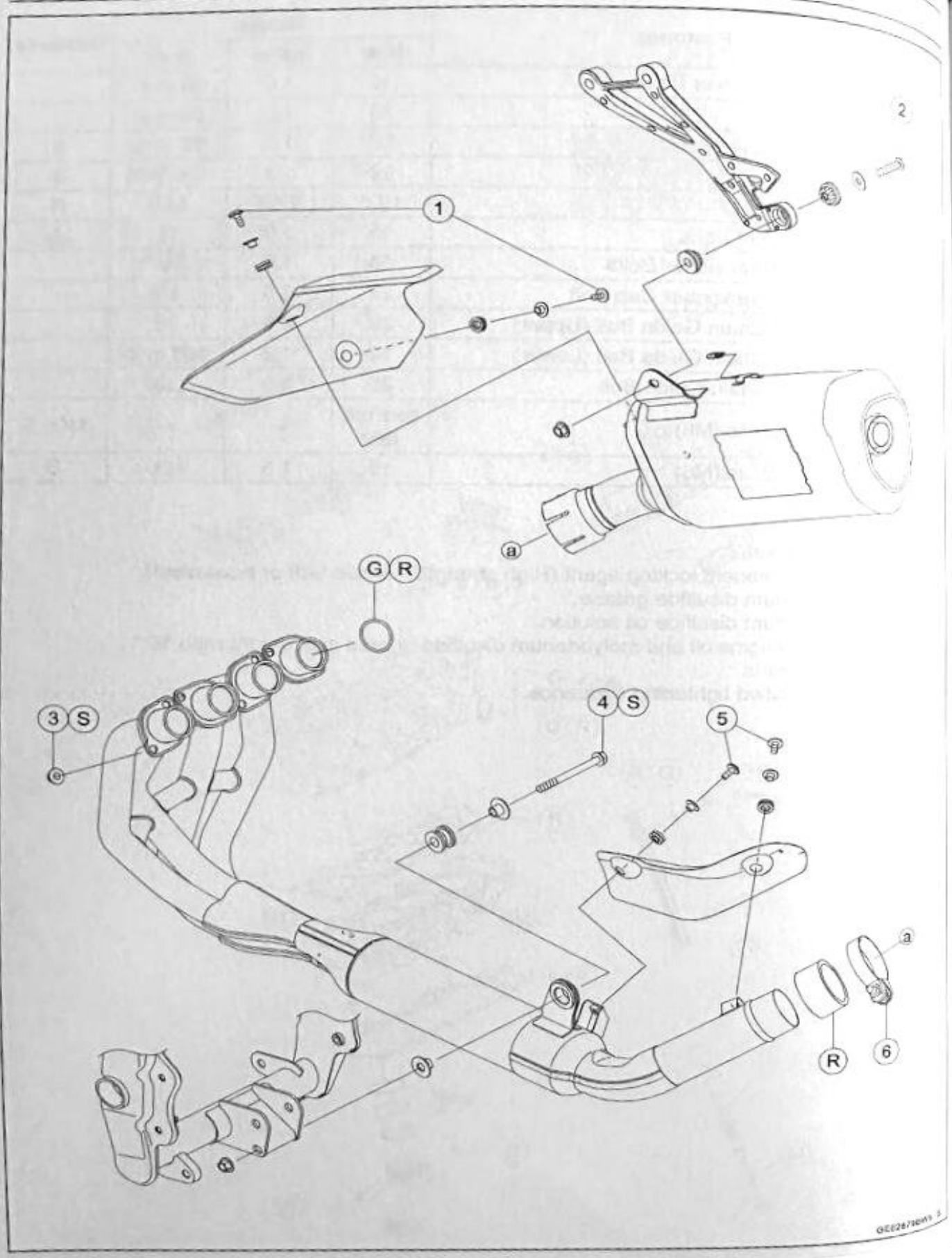


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Air Suction Valve Cover Bolts	10	1.0	89 in·lb	
2	Sub Cover Bolts	10	1.0	89 in·lb	
3	Cylinder Head Cover Bolts	10	1.0	89 in·lb	S
4	Camshaft Cap Bolts	12	1.2	106 in·lb	S
5	Cylinder Head Plugs	19.6	2.00	14.5	R
6	Camshaft Sprocket Bolts	15	1.5	11	LN
7	Camshaft Chain Tensioner Bolts	10	1.0	89 in·lb	
8	Camshaft Chain Tensioner Cap Bolt	20	2.0	15	
9	Front Camshaft Chain Guide Bolt (Upper)	25	2.5	18	
10	Front Camshaft Chain Guide Bolt (Lower)	12	1.2	106 in·lb	
11	Rear Camshaft Chain Guide Bolt	25	2.5	18	
12	Cylinder Head Bolts (M8)	see the text	←	←	MO, S
13	Cylinder Head Bolts (M6)	15	1.5	11	S

EO: Apply engine oil.
G: Apply grease.
LG: Apply liquid gasket.
LN: Apply a non-permanent locking agent (High strength: Loctite 648 or equivalent).
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Muffler Body Cover Bolts	7.0	0.71	62 in·lb	
2	Muffler Body Bolt	25	2.5	18	
3	Exhaust Pipe Holder Nuts	12	1.2	106 in·lb	S
4	Exhaust Pipe Bolt	20	2.0	15	S
5	Exhaust Pipe Cover Bolts	7.0	0.71	62 in·lb	
6	Muffler Body Clamp Bolt	15	1.5	11	

G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

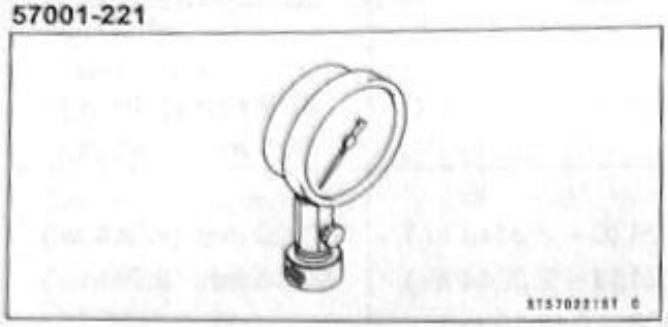
Item	Standard	Service Limit
Camshafts		
Cam Height:		
Exhaust	32.843 – 32.957 mm (1.2930 – 1.2975 in.)	32.74 mm (1.289 in.)
Intake	33.243 – 33.357 mm (1.3088 – 1.3133 in.)	33.14 mm (1.305 in.)
Camshaft Journal/Cap Clearance	0.038 – 0.081 mm (0.0015 – 0.0032 in.)	0.17 mm (0.0067 in.)
Camshaft Journal Diameter	19.940 – 19.962 mm (0.78504 – 0.78590 in.)	19.91 mm (0.7839 in.)
Camshaft Bearing Inside Diameter	20.000 – 20.021 mm (0.78740 – 0.78823 in.)	20.08 mm (0.7905 in.)
Camshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.004 in.)
Cylinder Head		
Cylinder Compression	Usable Range 833 – 1 288 kPa (8.50 – 13.14 kgf/cm², 121 – 186.8 psi) @390 r/min (rpm)	– – –
Cylinder Head Warp	– – –	0.05 mm (0.002 in.)
Valves		
Valve Clearance:		
Exhaust	0.28 – 0.34 mm (0.0110 – 0.0134 in.)	– – –
Intake	0.16 – 0.22 mm (0.0063 – 0.0087 in.)	– – –
Valve Head Thickness:		
Exhaust	0.7 mm (0.028 in.)	0.6 mm (0.02 in.)
Intake	0.5 mm (0.020 in.)	0.3 mm (0.01 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)
Valve Stem Diameter:		
Exhaust	3.955 – 3.970 mm (0.1557 – 0.1563 in.)	3.94 mm (0.155 in.)
Intake	3.975 – 3.990 mm (0.1565 – 0.1571 in.)	3.96 mm (0.156 in.)
Valve Guide Inside Diameter:		
Exhaust	4.000 – 4.012 mm (0.1575 – 0.1580 in.)	4.08 mm (0.161 in.)
Intake	4.000 – 4.012 mm (0.1575 – 0.1580 in.)	4.08 mm (0.161 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.09 – 0.16 mm (0.0035 – 0.0063 in.)	0.36 mm (0.014 in.)
Intake	0.03 – 0.10 mm (0.0012 – 0.0039 in.)	0.29 mm (0.011 in.)
Valve Seat Cutting Angle	45°, 32°, 65°, 67.5°	– – –
Valve Seating Surface:		
Outside Diameter:		
Exhaust	18.7 – 18.9 mm (0.736 – 0.744 in.)	– – –
Intake	21.8 – 22.0 mm (0.858 – 0.866 in.)	– – –
Width:		
Exhaust	0.8 – 1.2 mm (0.031 – 0.047 in.)	– – –
Intake	0.5 – 1.0 mm (0.020 – 0.039 in.)	– – –

Specifications

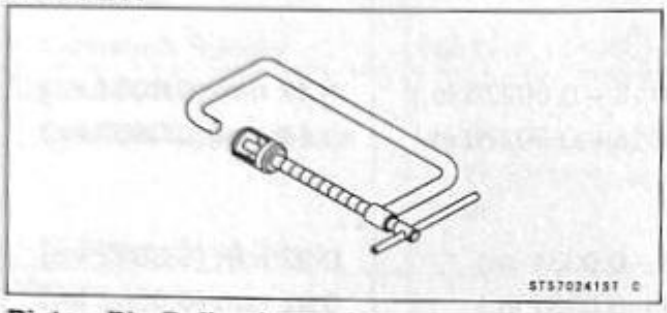
Item	Standard	Service Limit
Valve Spring Free Length:		
Exhaust	39.0 mm (1.54 in.)	37.9 mm (1.49 in.)
Intake	36.9 mm (1.45 in.)	35.8 mm (1.41 in.)
Cylinders, Pistons		
Cylinder Inside Diameter	56.994 – 57.006 mm (2.2439 – 2.2443 in.)	57.09 mm (2.248 in.)
Piston Diameter	56.300 – 56.500 mm (2.2165 – 2.2244 in.)	56.15 mm (2.211 in.)
Piston/Cylinder Clearance	0.020 – 0.047 mm (0.0008 – 0.0019 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.030 – 0.070 mm (0.00118 – 0.00276 in.)	0.17 mm (0.0067 in.)
Second	0.030 – 0.070 mm (0.00118 – 0.00276 in.)	0.17 mm (0.0067 in.)
Piston Ring Groove Width:		
Top	0.82 – 0.84 mm (0.0323 – 0.0331 in.)	0.92 mm (0.0362 in.)
Second	0.82 – 0.84 mm (0.0323 – 0.0331 in.)	0.92 mm (0.0362 in.)
Piston Ring Thickness:		
Top	0.77 – 0.79 mm (0.030 – 0.031 in.)	0.70 mm (0.028 in.)
Second	0.77 – 0.79 mm (0.030 – 0.031 in.)	0.70 mm (0.028 in.)
Piston Ring End Gap:		
Top	0.12 – 0.22 mm (0.0047 – 0.0087 in.)	0.5 mm (0.02 in.)
Second	0.30 – 0.45 mm (0.0118 – 0.0177 in.)	0.8 mm (0.03 in.)

Special Tools and Sealants

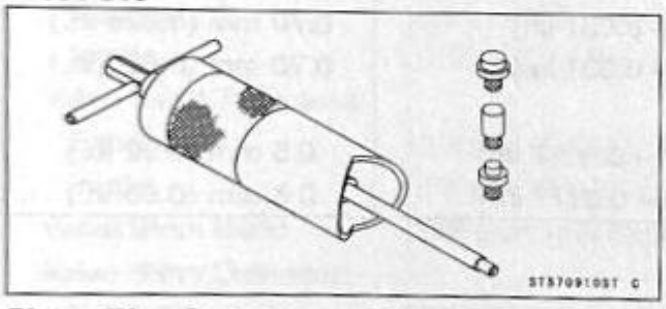
Compression Gauge, 20 kgf/cm²:
57001-221



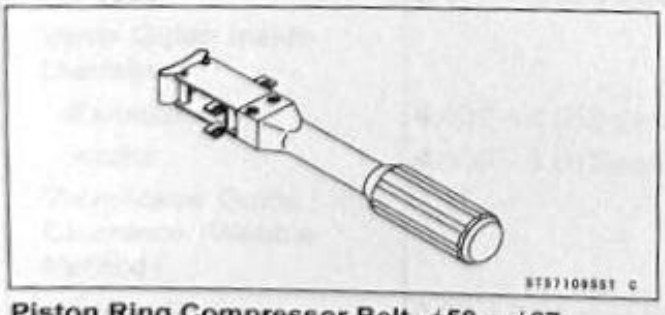
Valve Spring Compressor Assembly:
57001-241



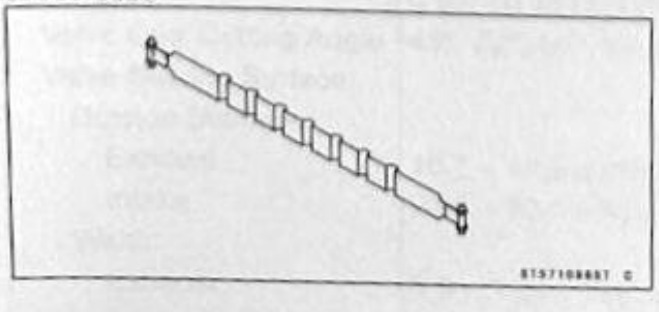
Piston Pin Puller Assembly:
57001-910



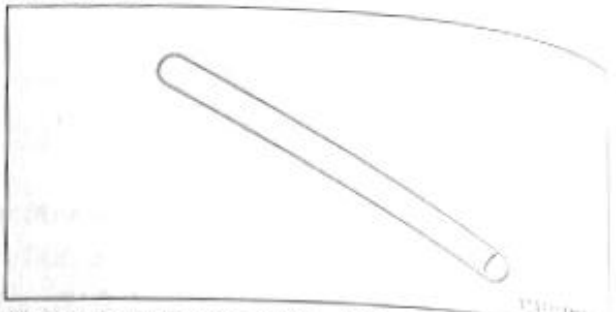
Piston Ring Compressor Grip:
57001-1095



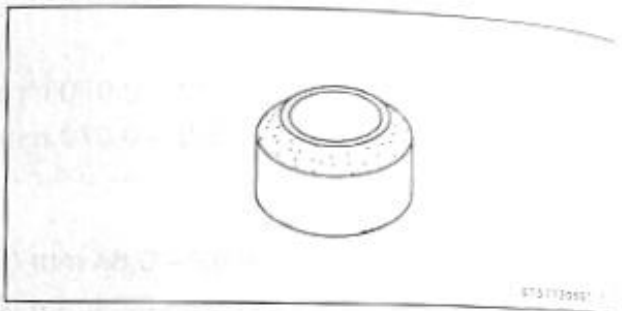
Piston Ring Compressor Belt, ϕ50 – ϕ67:
57001-1096



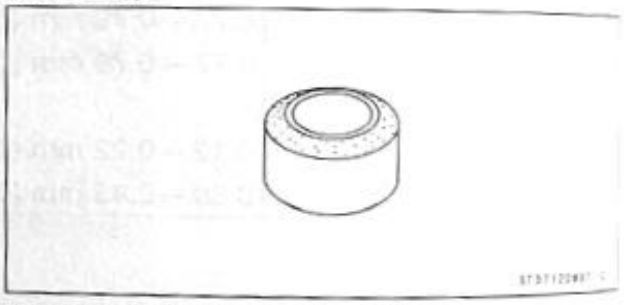
Valve Seat Cutter Holder Bar:
57001-1128



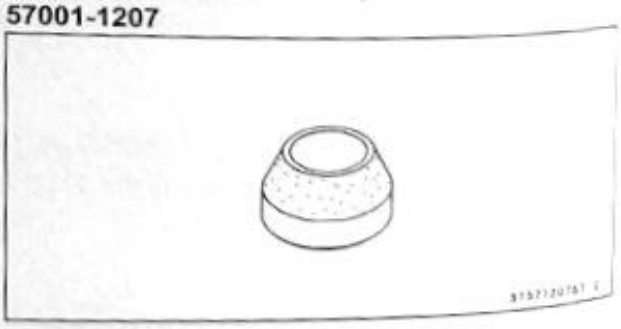
Valve Seat Cutter, 45° - ϕ22:
57001-1205



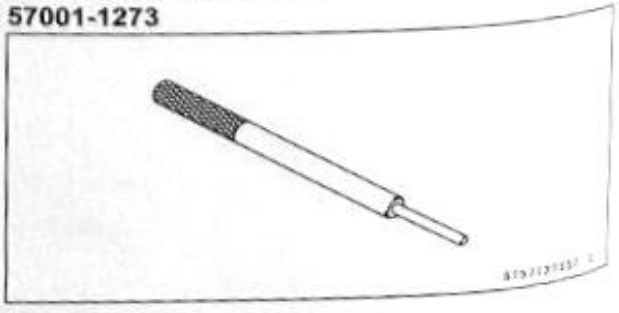
Valve Seat Cutter, 32° - ϕ22:
57001-1206



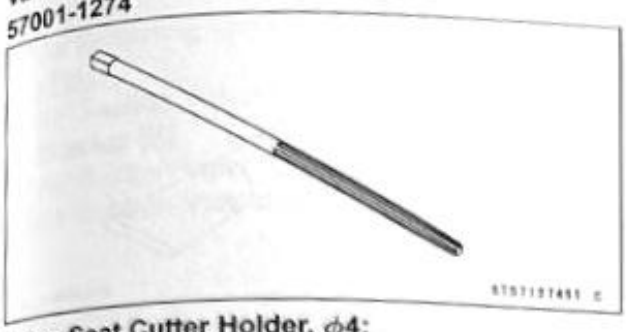
Valve Seat Cutter, 67.5° - ϕ22:
57001-1207



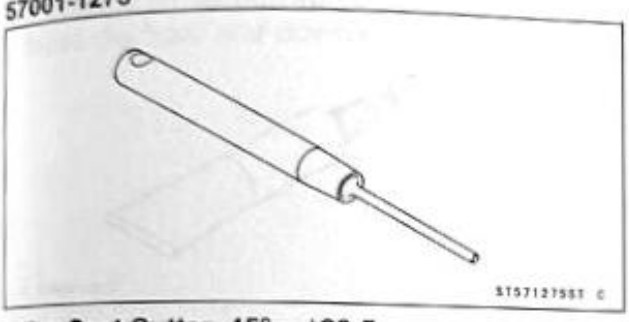
Valve Guide Arbor, ϕ4:
57001-1273



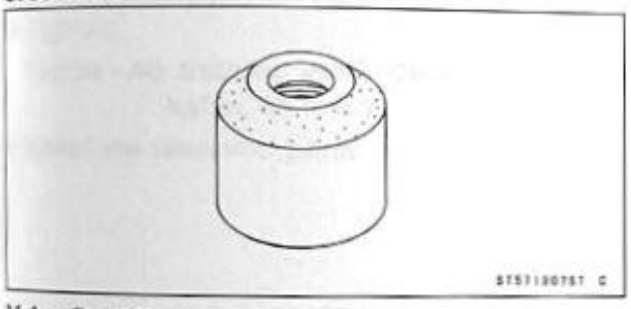
Valve Guide Reamer, ϕ4:
57001-1274



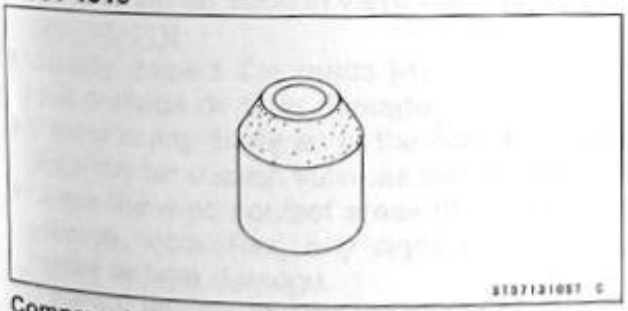
Valve Seat Cutter Holder, ϕ4:
57001-1275



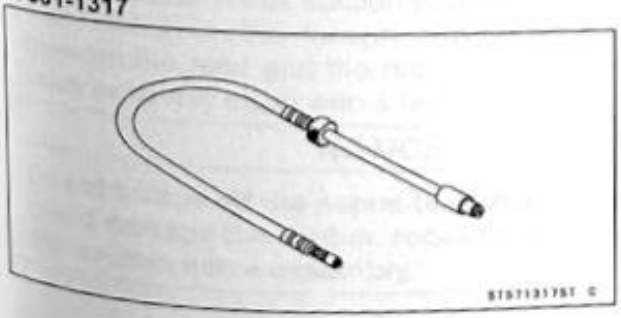
Valve Seat Cutter, 45° - ϕ20.5:
57001-1307



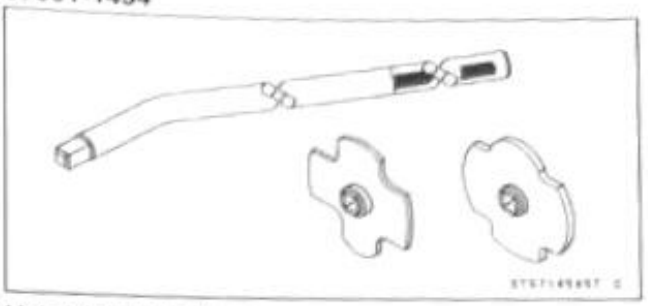
Valve Seat Cutter, 65° - ϕ19:
57001-1310



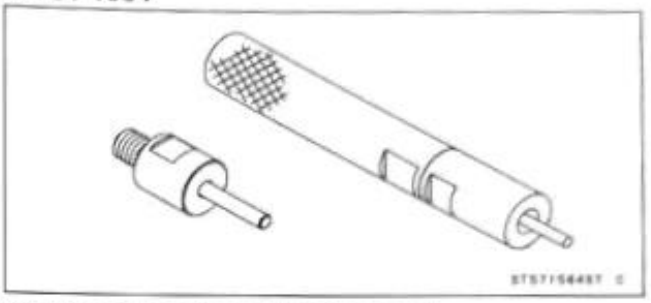
Compression Gauge Adapter, M10 × 1.0:
57001-1317



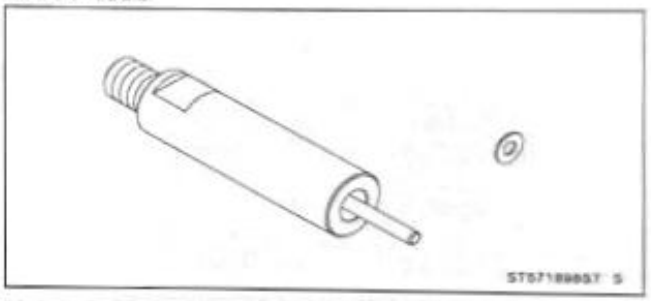
Filler Cap Driver:
57001-1454



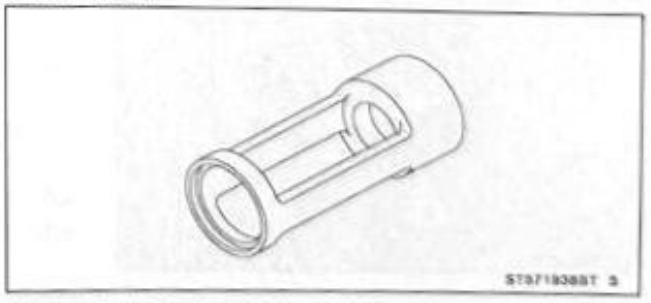
Valve Guide Driver:
57001-1564



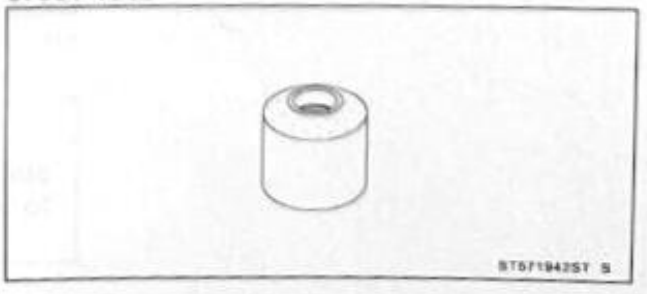
Valve Guide Driver Attachment I:
57001-1898



Valve Spring Compressor Adapter, ϕ18.2:
57001-1938

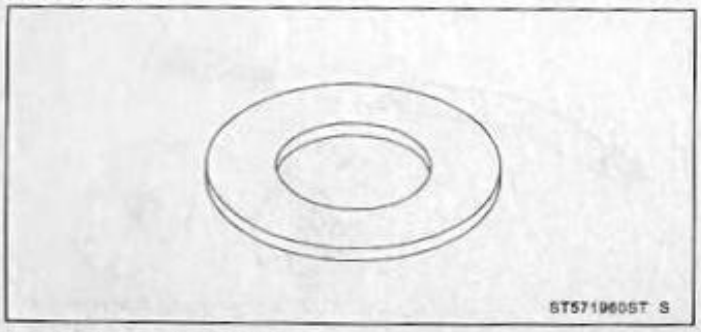


Valve Seat Cutter, 32° - ϕ19:
57001-1942

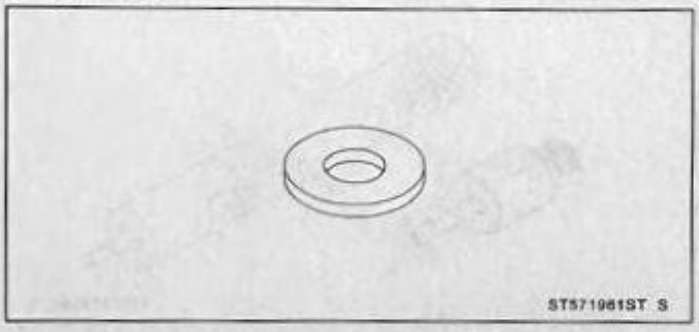


Special Tools and Sealants

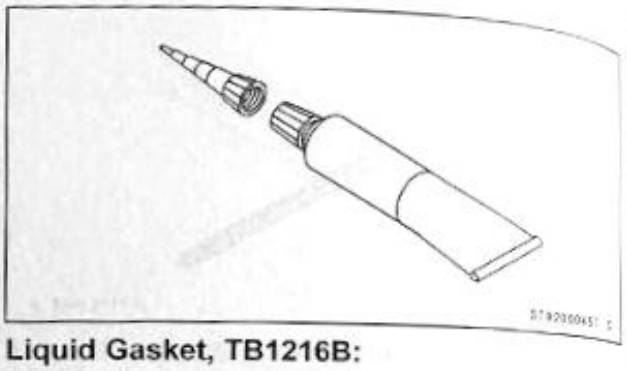
Spacer, ϕ19, +1.0:
57001-1960



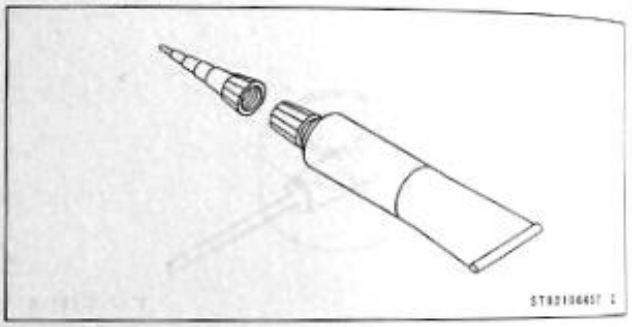
Spacer, ϕ9.1, +0.8:
57001-1961



Liquid Gasket, TB1211F:
92104-0004

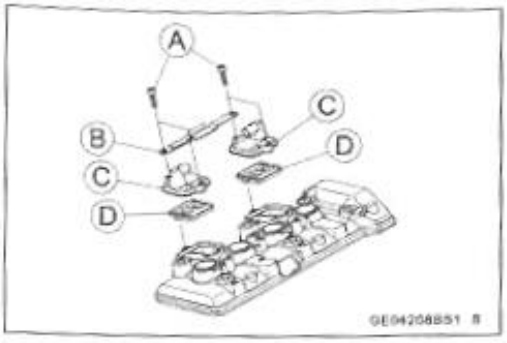


Liquid Gasket, TB1216B:
92104-1064



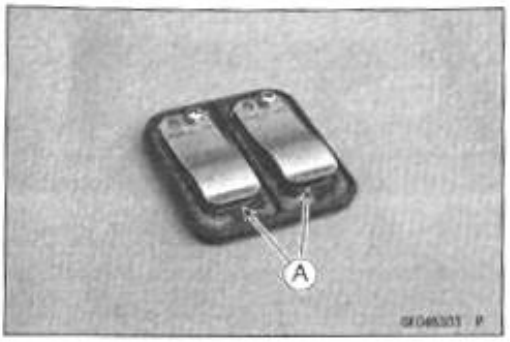
Air Suction Valve Removal

- Remove:
  Air Switching Valve (see Air Switching Valve Removal(5-12))
  Air Suction Valve Cover Bolts [A]
  Bracket [B]
  Air Suction Valve Covers [C]
  Air Suction Valve Covers [D]



Air Suction Valve Installation

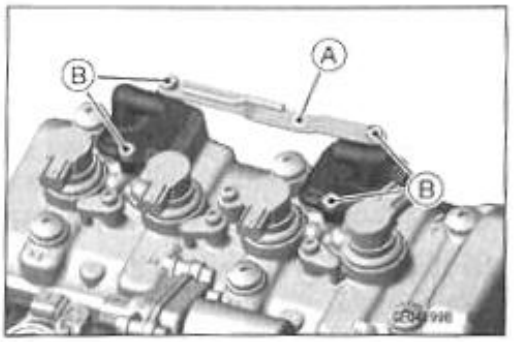
- Install the air suction valve so that opening [A] of the reed faces the front and downward.



- Install the air suction valve covers.
- Install the bracket [A] as shown.
- Tighten:

Torque - Air Suction Valve Cover Bolts [B]: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the removed parts.



Air Suction Valve Inspection

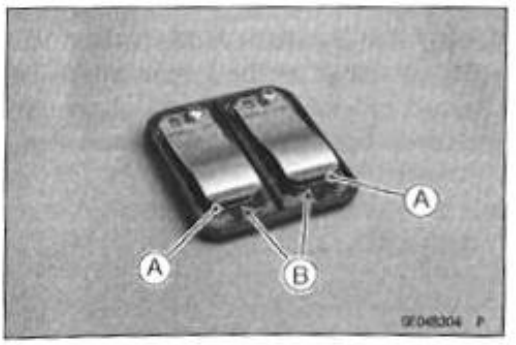
- Remove the air suction valve (see Air Suction Valve Removal(5-11)).
- Visually inspect the reeds [A] for cracks, folds, warps, heat damage or other damage.

★If there is any doubt as to the condition of the reeds, replace the air suction valve as an assembly.

- Check the reed contact areas [B] of the valve holder for grooves, scratches, any signs of separation from the holder or heat damage.

★If there is any doubt as to the condition of the reed contact areas, replace the air suction valve as an assembly.

★If any carbon or other foreign particles have accumulated between the reed and the reed contact area, wash the valve assembly clean with a high flash-point solvent.



NOTICE

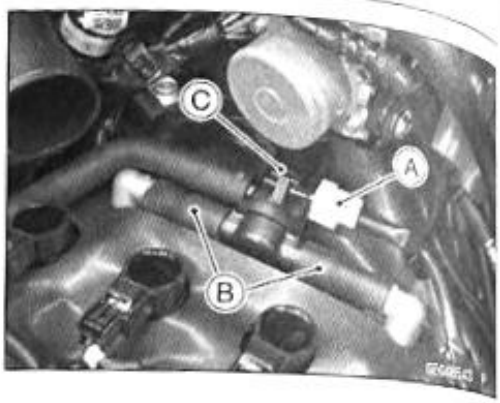
Do not scrape off the deposits with a scraper as this could damage the rubber, requiring replacement of the suction valve assembly.

Clean Air System

Air Switching Valve Removal

NOTICE

Never drop the air switching valve especially on a hard surface. Such a shock to the air switching valve can damaged it.



- Remove the air cleaner housing (see Air Cleaner Housing Removal(3-31)).
- Disconnect the connector [A].
- Disconnect the hoses [B] from the air suction valve covers.
- Remove the air switching valve [C] with hose from the bracket.

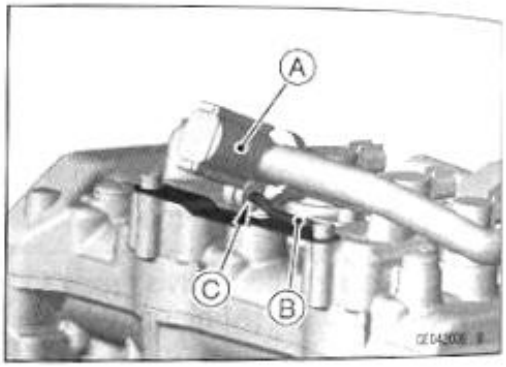
Air Switching Valve Installation

- Install the air switching valve [A] with hoses.

OInsert the hose until it come into contact with the projection shape (Hose shall not ride on the projection shape).

OInsert the bracket [B] into the air switching valve hole [C].

- Install the removed parts.



Air Switching Valve Operation Test

- Refer to the Air Suction System Damage Inspection (see Air Suction System Damage Inspection(2-33)).

Air Switching Valve Unit Test

- Refer to the Air Switching Valve Unit Test (see Air Switching Valve Unit Test(16-53)).

Clean Air System Hose Inspection

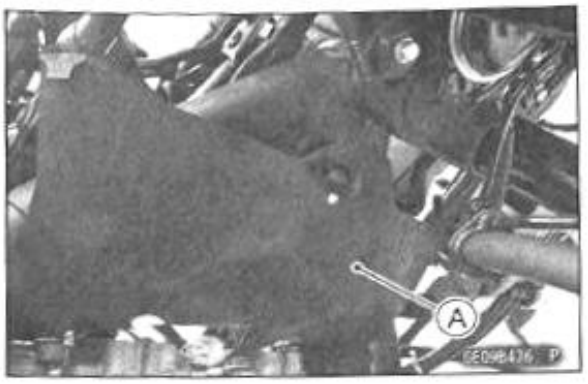
- Be sure that all the hoses are routed without being flattened or kinked, and are connected correctly to the air cleaner housing, air switching valve and air suction valve covers.

★If they are not, correct them. Replace them if they are damaged.

Cylinder Head Cover

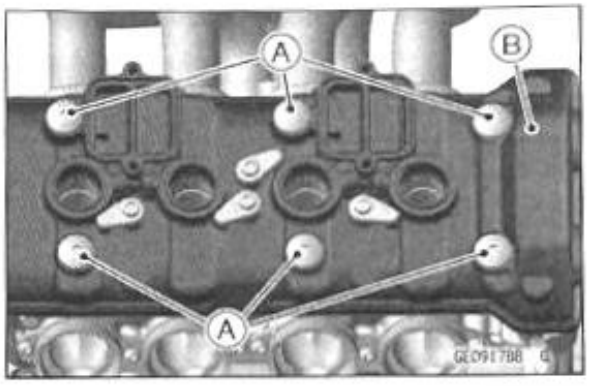
Cylinder Head Cover Removal

- Remove:
  Air Suction Valves (see Air Suction Valve Removal(5-11))
  Stick Coils (see Stick Coil Removal(16-34))
  Radiator (see Radiator and Radiator Fan Removal(4-14))
  Throttle Body Assy (see Throttle Body Assy Removal(3-27))



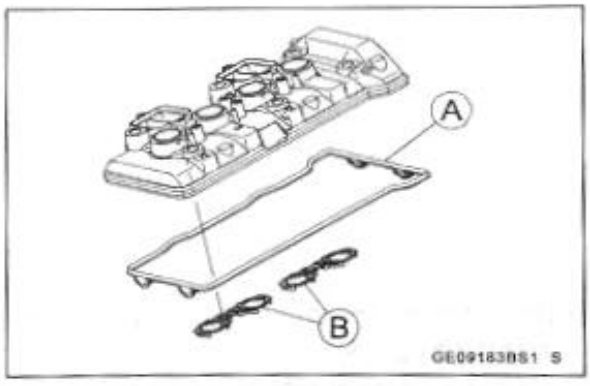
- Free the tabs of the heat insulation rubber plate [A], and turn it over.

- Remove:
  Cylinder Head Cover Bolts [A] with Washers
  Cylinder Head Cover [B]
  Gasket



Cylinder Head Cover Installation

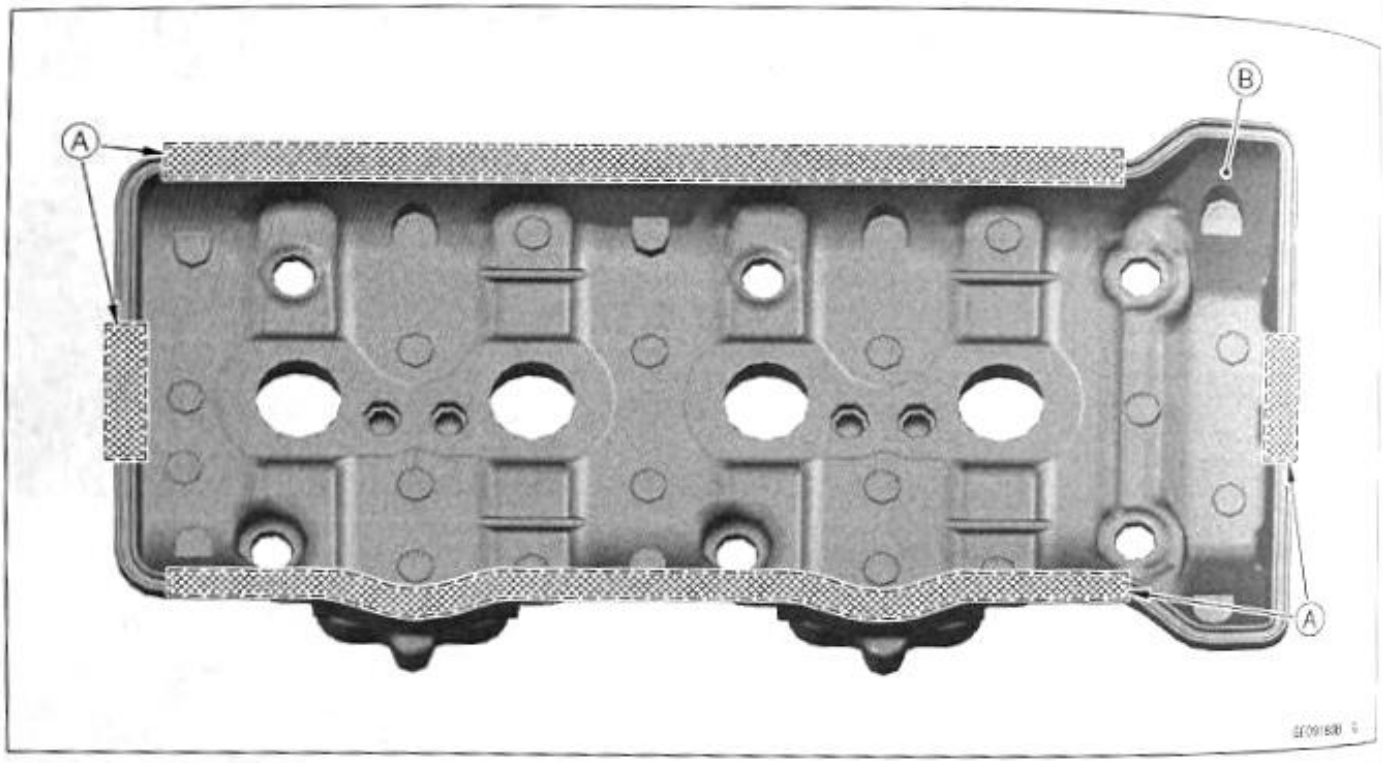
- Replace the cylinder head cover gasket [A] and plug hole gaskets [B] with new ones.



Cylinder Head Cover

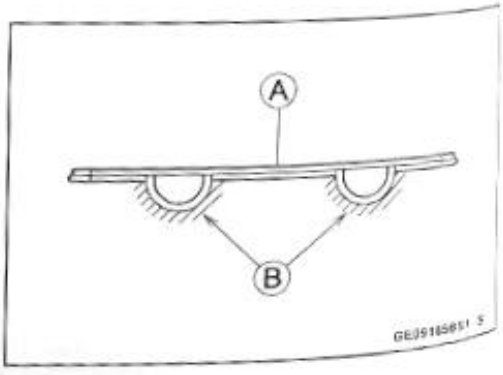
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket the groove [A] on the sealing surface to retain the gasket in the cylinder head cover [B] as shown.

Sealant - Liquid Gasket, TB1211F: 92104-0004

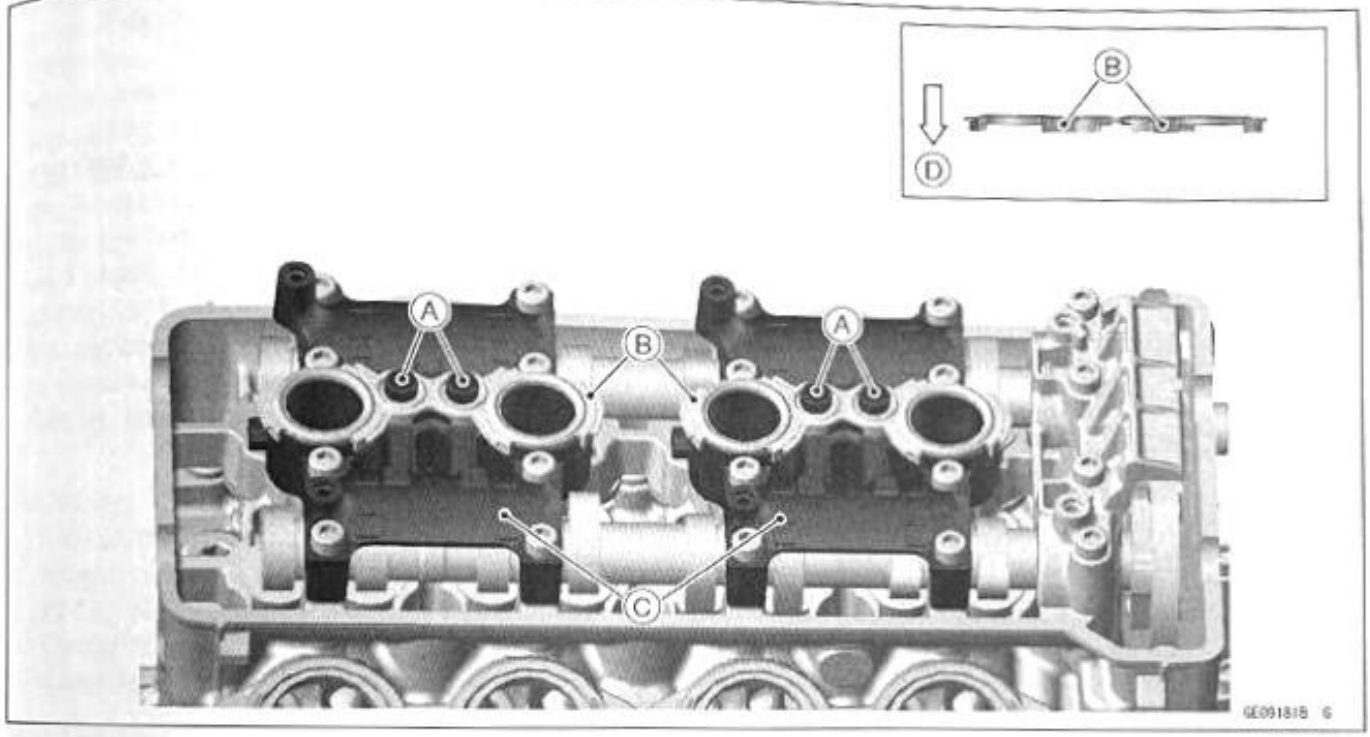


- Install the cylinder head cover gasket [A] to the cylinder head cover.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [B] to the cylinder head cover gasket as shown.

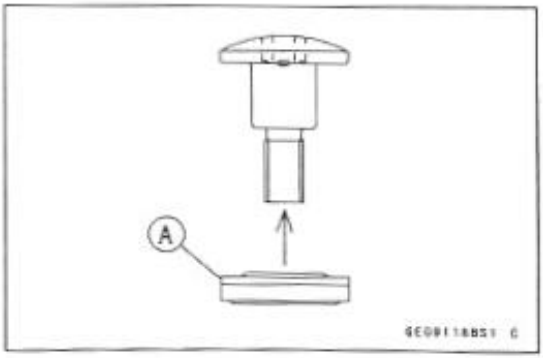
Sealant - Liquid Gasket, TB1216B: 92104-1064



• Install the dowel pins [A] and plug hole gaskets [B] to the camshaft caps [C].
oInstall the plug hole gaskets as shown.
Camshaft Cap Side [D]

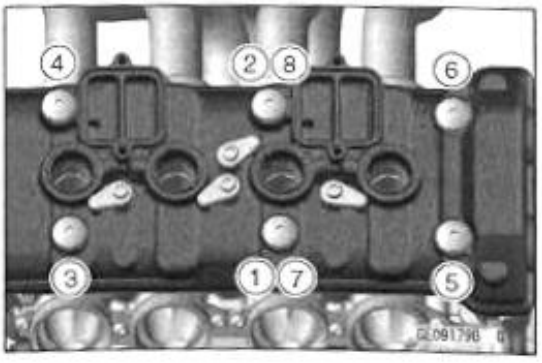


• Replace the washers with new ones.
• Install the washers with the metal side [A] faces upward.



• Tighten the cylinder head cover bolts following the specified tightening sequence [1 – 8].

Torque - Cylinder Head Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

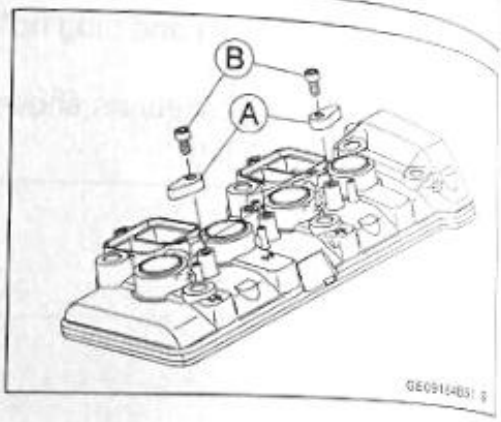


Cylinder Head Cover

- When installing the sub covers [A], note the following.
- Install:
  Sub Covers
- Tighten:

Torque - Sub Cover Bolts [B]: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the removed parts.



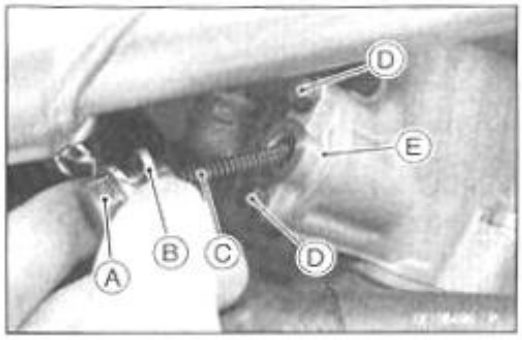
Camshaft Chain Tensioner

Camshaft Chain Tensioner Removal

NOTICE

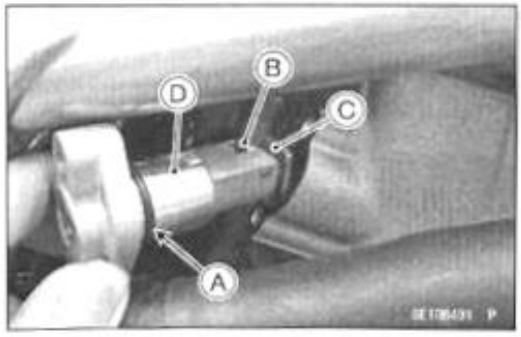
This is a non-return type camshaft chain tensioner. The push rod does not return to its original position once it moves out to take up camshaft chain slack. Observe all the rules listed below.
When removing the tensioner, do not take out the mounting bolts only halfway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation."
Do not turn over the crankshaft while the tensioner is removed. This could upset the camshaft chain timing, and damage the valves.

- Remove:
  Camshaft Chain Tensioner Cap Bolt [A]
  Washer [B]
  Spring [C]
  Camshaft Chain Tensioner Bolts [D]
  Camshaft Chain Tensioner Body [E]

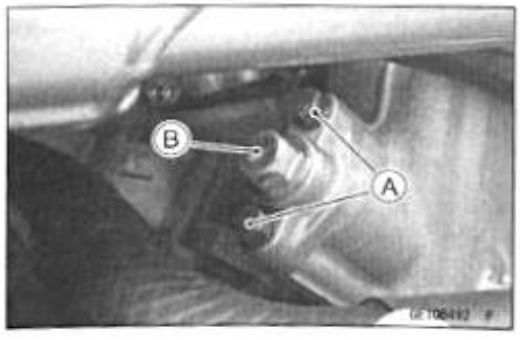


Camshaft Chain Tensioner Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the new O-ring.
- Release the stopper [B] and push the push rod [C] into the interior of the tensioner body [D].
- Install the tensioner body so that the stopper faces upward.



- Tighten:
  Torque - Camshaft Chain Tensioner Bolts [A]: 10 N·m (1.0 kgf·m, 89 in·lb)
- Install the spring and washer.
- Tighten:
  Torque - Camshaft Chain Tensioner Cap Bolt [B]: 20 N·m (2.0 kgf·m, 15 ft·lb)
- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.

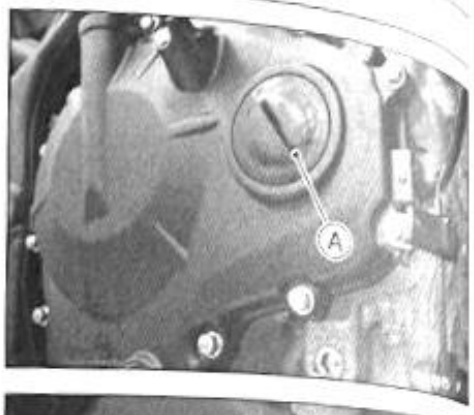


Camshaft, Camshaft Chain

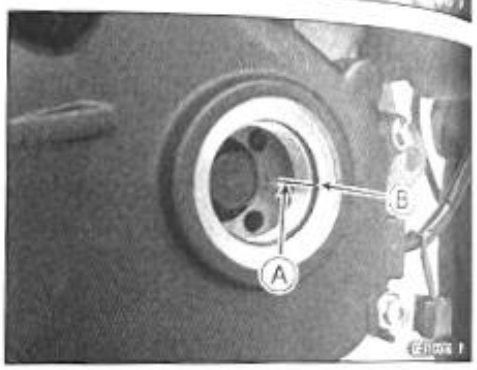
Camshaft Removal

- Remove:
  Cylinder Head Cover (see Cylinder Head Cover Removal(5-13))
  Crankshaft Timing Plug [A]

Special Tool - Filler Cap Driver: 57001-1454

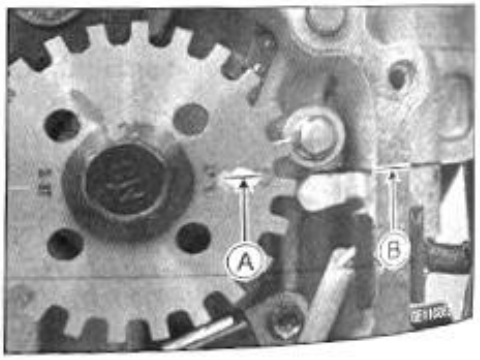


- Using a wrench on the timing rotor bolt, turn the crankshaft clockwise until the line [A] (TDC mark for #1, 4 pistons) on the timing rotor is aligned with the notch [B] in the edge of the timing inspection hole in the clutch cover as shown.

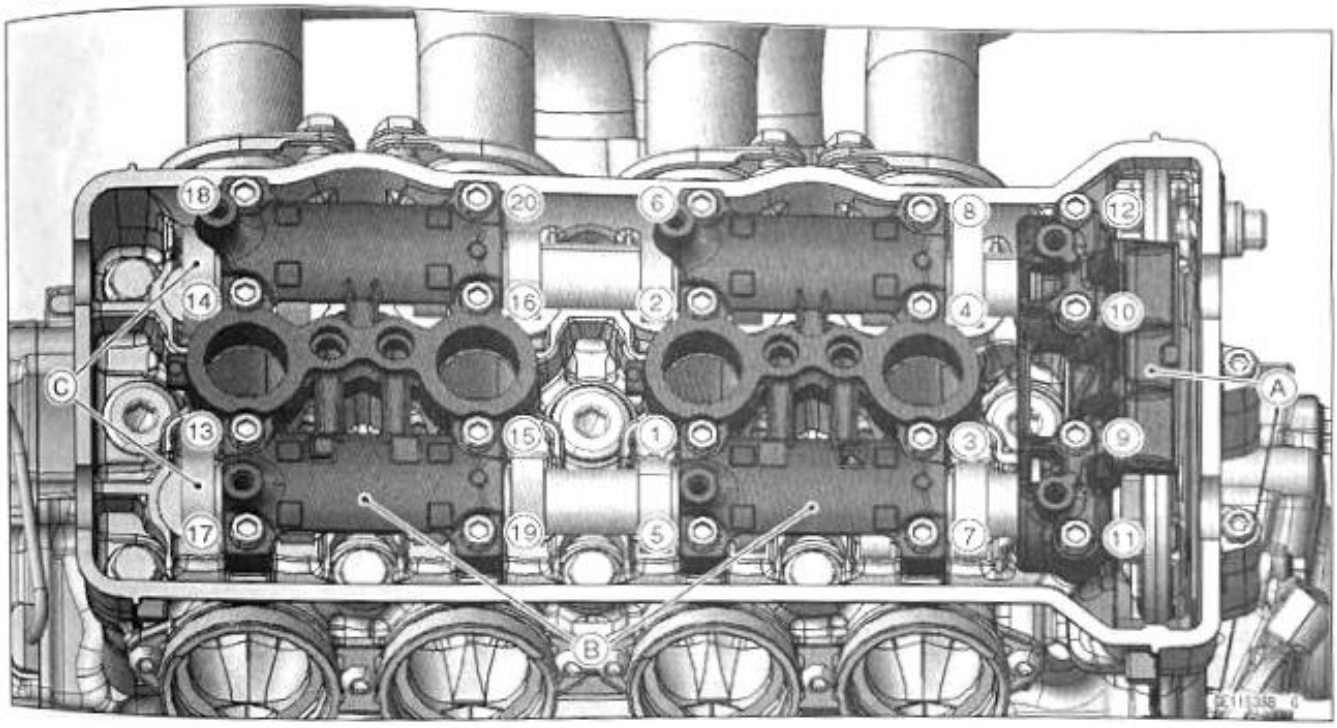


★If the clutch cover is removed, perform the next procedure.

- Using a wrench on the timing rotor bolt, turn the crankshaft clockwise until the line [A] (TDC mark for #1, 4 pistons) on the timing rotor is aligned with the mating surface [B] of the crankcase.



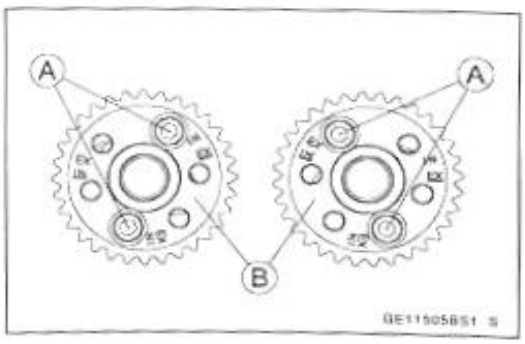
- Remove the camshaft chain tensioner (see Camshaft Chain Tensioner Removal(5-17)).
- Loosen the upper camshaft chain guide bolts and camshaft cap bolts gradually and evenly as shown sequence [1 – 20], and remove them.
- Remove:
  Upper Camshaft Chain Guide [A]
  Camshaft Caps [B]
  Camshafts [C]
- Stuff a clean cloth into the chain tunnel to keep any parts from dropping into the crankcase.



- Remove:
  Camshaft Sprocket Bolts [A]
  Camshaft Sprockets [B]

NOTICE

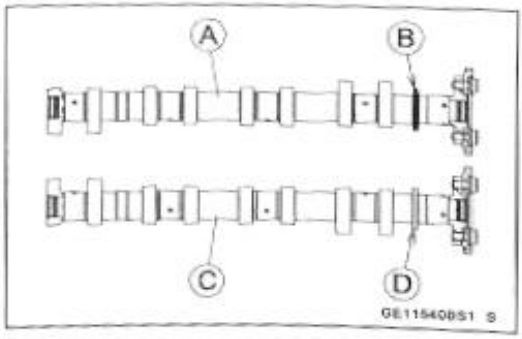
The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.



Camshaft Installation

NOTE

○*The exhaust camshaft [A] has a identification groove [B] and the intake camshaft [C] has not a groove [D], as shown. Be careful not to mix up these shafts.*



Camshaft, Camshaft Chain

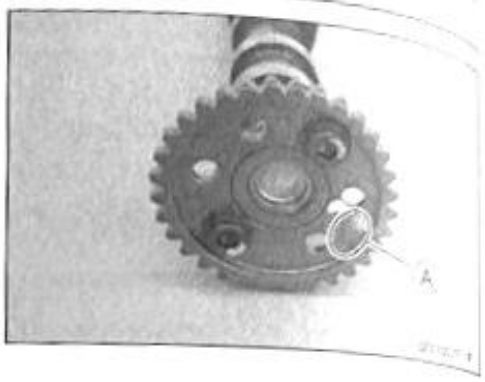
- Install the camshaft sprockets so that position the timing marks [A] outside.

○The intake camshaft sprocket and exhaust camshaft sprocket are identical.

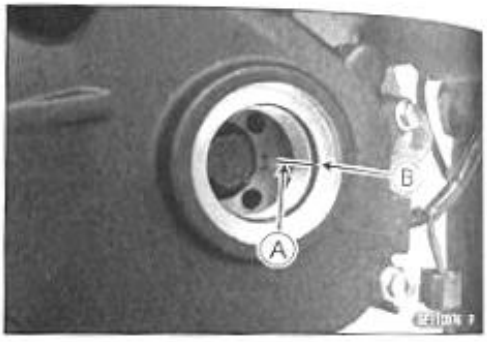
- Apply a non-permanent locking agent (High strength: Loctite 648 or equivalent) to the threads of the camshaft sprocket bolts and tighten them.

Torque - Camshaft Sprocket Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Apply molybdenum disulfide oil solution to all cam parts and journals.

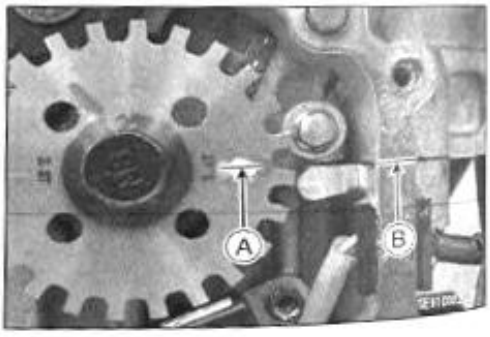


- Using a wrench on the timing rotor bolt, turn the crankshaft clockwise until the line [A] (TDC mark for #1, 4 pistons) on the timing rotor is aligned with the notch [B] in the edge of the timing inspection hole in the clutch cover as shown.



★If the clutch cover is removed, perform the next procedure.

- Using a wrench on the timing rotor bolt, turn the crankshaft clockwise until the line [A] (TDC mark for #1, 4 pistons) on the timing rotor is aligned with the mating surface [B] of the crankcase.

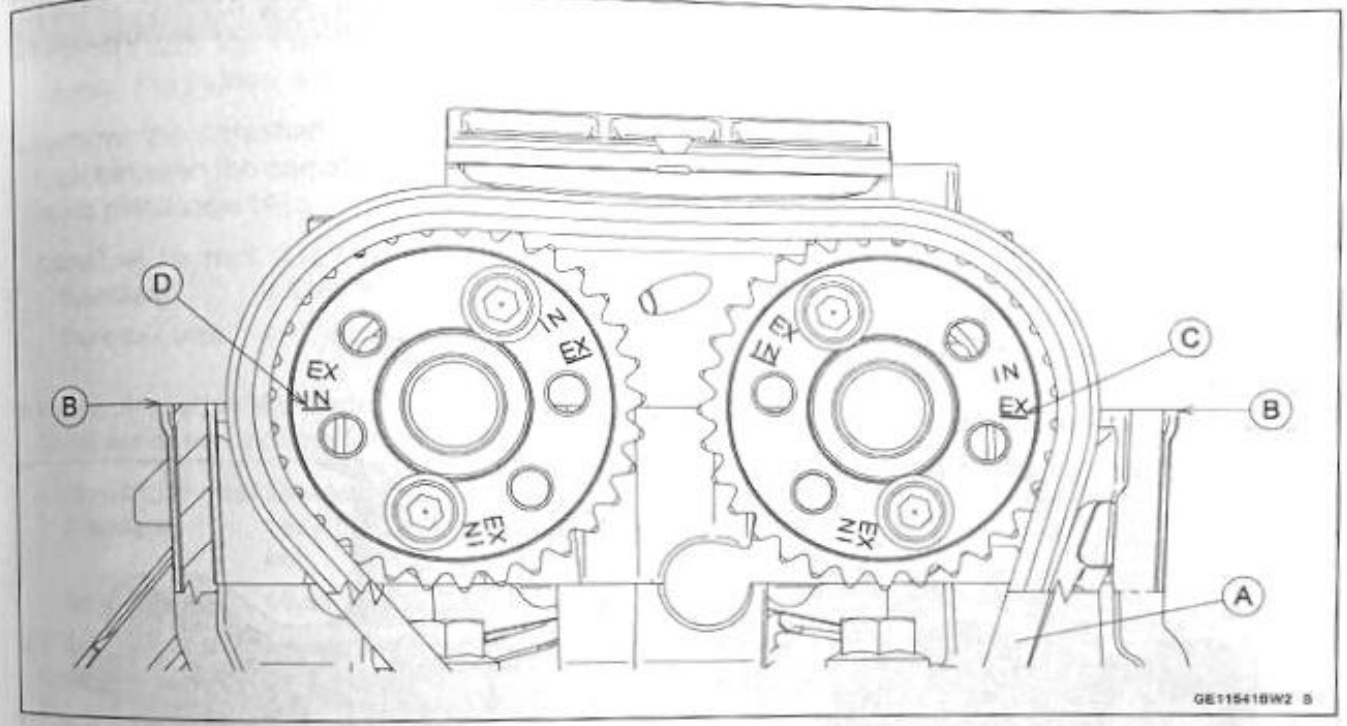


NOTICE

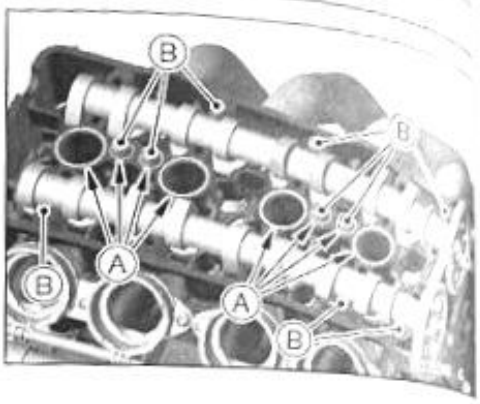
The crankshaft may be turned while the camshafts are removed. Always pull the chain taut while turning the crankshaft. This avoids kinking the chain on the lower (crankshaft) sprocket. A kinked chain could damage both the chain and the sprocket.

- Pull the tension side (exhaust side) [A] of the chain taut to install the chain.
- Engage the camshaft chain with the sprockets so that timing marks on the sprockets are positioned as shown.

○The timing marks must be aligned with the cylinder head upper surface [B].
EX mark [C]
IN mark [D]



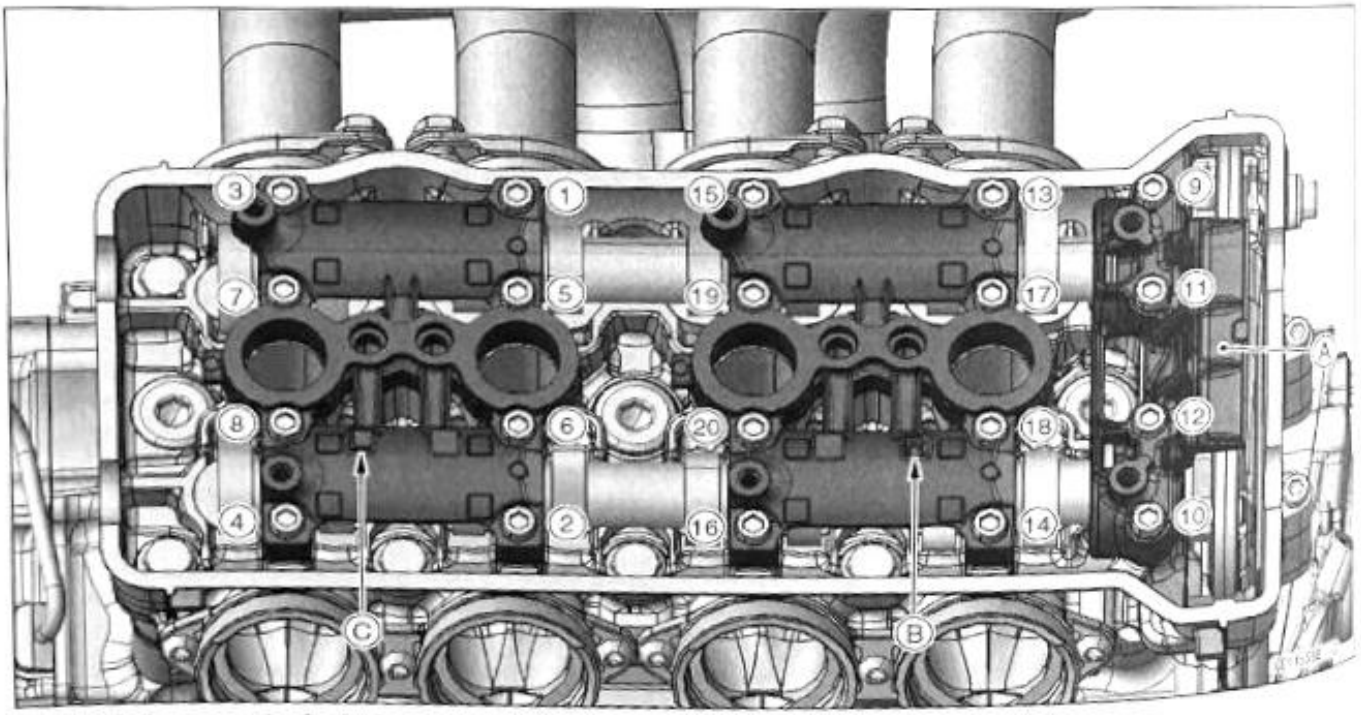
Camshaft, Camshaft Chain



- Replace the O-rings [A] with new ones.
- Apply grease to the new O-rings.
- Install:
  O-rings
  Dowel Pins [B]

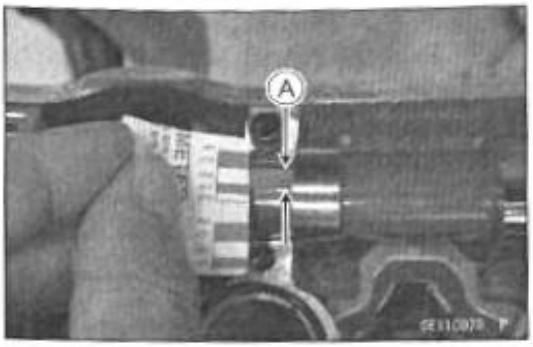
- Install the camshaft caps and upper camshaft chain guide [A] as shown.
  "R" Mark [B]
  "L" Mark [C]
- First tighten the camshaft cap bolts of upper camshaft chain guide temporarily.
- Tighten the all camshaft cap bolts evenly to seat the camshaft in place, then tighten all bolts following the specified tightening sequence [1 – 20].

Torque - Camshaft Cap Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



- Install the camshaft chain tensioner (see Camshaft Chain Tensioner Installation(5-17)).
- Turn the crankshaft 2 turns clockwise to allow the tensioner to expand and recheck the camshaft chain timing.
- Install the removed parts.

Camshaft, Camshaft Cap Wear Inspection



- Remove:
  Camshaft Caps (see Camshaft Removal(5-18))
- Cut the strips of plastigage (press gauge) to journal width. Place a strip on each journal parallel to the camshaft installed in the correct position.
- Tighten the camshaft cap bolts to the specified torque (see Camshaft Installation(5-19)).

NOTE

oDo not turn the camshaft when the plastigage is between the journal and camshaft cap.

- Remove the camshaft cap again, measure each clearance between the camshaft journal and the camshaft cap using plastigage [A].

Camshaft Journal, Cap Clearance

Standard: **0.038 – 0.081 mm (0.0015 – 0.0032 in.)**

Service Limit: **0.17 mm (0.0067 in.)**

★If any clearance exceeds the service limit, measure the diameter of each camshaft journal with a micrometer.

Camshaft Journal Diameter

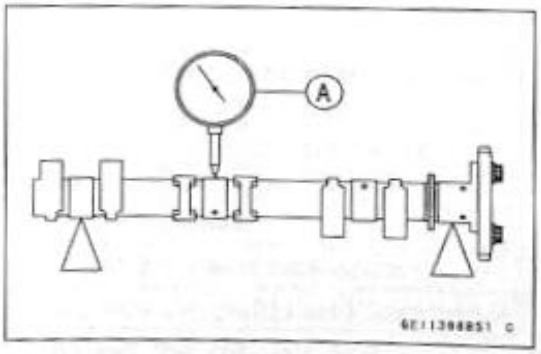
Standard: **19.940 – 19.962 mm (0.78504 – 0.78590 in.)**

Service Limit: **19.91 mm (0.7839 in.)**

★If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.

★If the clearance still remains out of the service limit, replace the cylinder head unit.

Camshaft Runout Inspection



- Remove the camshafts (see Camshaft Removal(5-18)).
- Set the camshaft in a camshaft alignment jig or on V blocks.
- Measure the runout with a dial gauge [A] at the specified place as shown.

★If the runout exceeds the service limit, replace the camshaft.

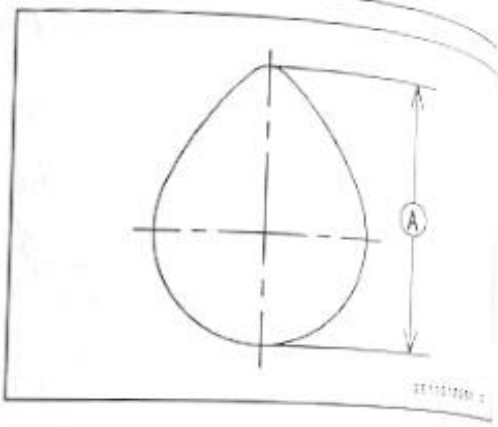
Camshaft Runout

Standard: **TIR 0.02 mm (0.0008 in.) or less**

Service Limit: **TIR 0.1 mm (0.004 in.)**

Camshaft, Camshaft Chain

Cam Wear Inspection



- Remove the camshafts (see Camshaft Removal(5-18)).
- Measure the height [A] of each cam with a micrometer.

★If the cams are worn down past the service limit, replace the camshaft.

Cam Height

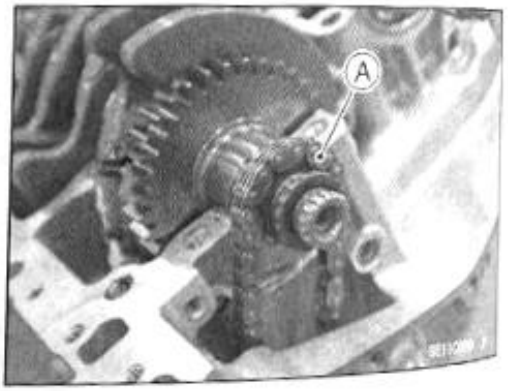
Standard:

Exhaust	**32.843 – 32.957 mm (1.2930 – 1.2975 in.)**
Intake	**33.243 – 33.357 mm (1.3088 – 1.3133 in.)**

Service Limit:

Exhaust	**32.74 mm (1.289 in.)**
Intake	**33.14 mm (1.305 in.)**

Camshaft Chain Removal



- Split the crankcase (see Crankcase Splitting(9-9)).
- Remove the camshaft chain [A] from the crankshaft sprocket.

Camshaft Chain Installation

- Install the camshaft chain to the crankshaft sprocket.
- Assemble the crankcase (see Crankcase Assembly(9-11)).

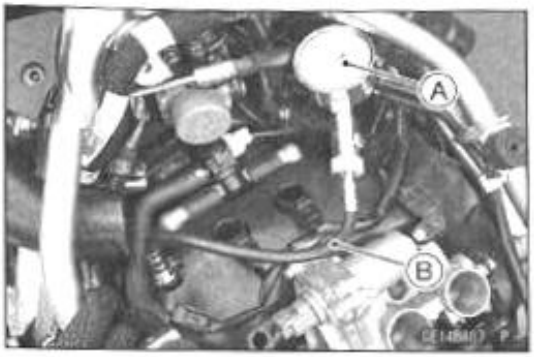
Cylinder Compression Measurement

NOTE

OUse the battery which is fully charged.

- Warm up the engine thoroughly.
- Stop the engine.
- Remove:
  Spark Plugs (see Spark Plug Replacement(2-62))

- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.



Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1317

Cylinder Compression (Usable Range)
833 – 1 288 kPa (8.50 – 13.14 kgf/cm², 121 – 186.8 psi)
@390 r/min (rpm)

- Repeat the measurement for the other cylinders.
- Install the spark plugs (see Spark Plug Replacement(2-62)).

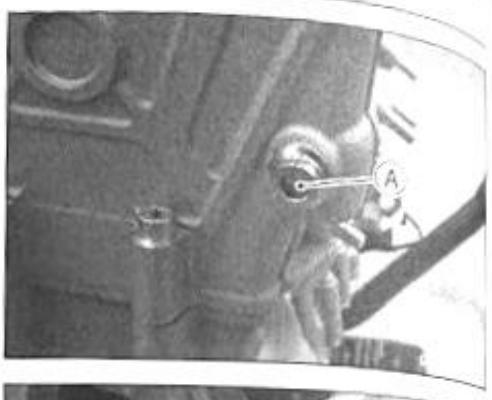
OThe following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
Cylinder compression is lower than usable range.	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.

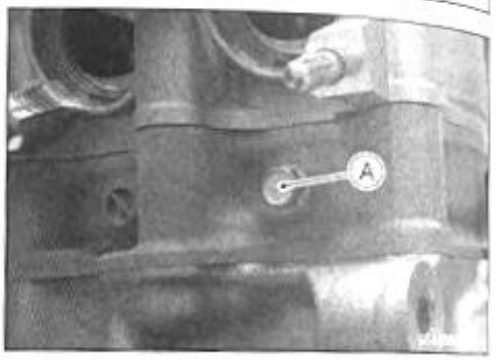
Cylinder Head

Cylinder Head Removal

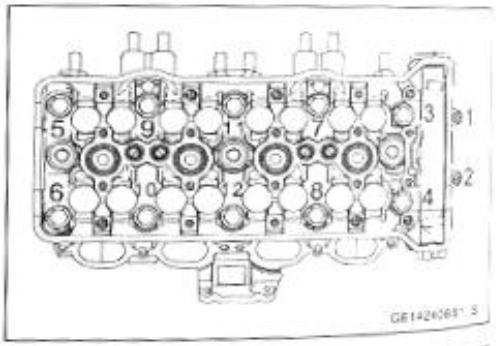
- Remove the engine (see Engine Removal(8-5)).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
  Camshafts (see Camshaft Removal(5-18))
  Front Camshaft Chain Guide Bolt (Upper) [A]



- Remove:
  Coolant Drain Bolt (Cylinder) [A]
  Washer
- Drain the coolant.



- Loosen the M6 and M8 cylinder head bolts as shown sequence [1 – 12], and remove them and washers.
- Remove the cylinder head.

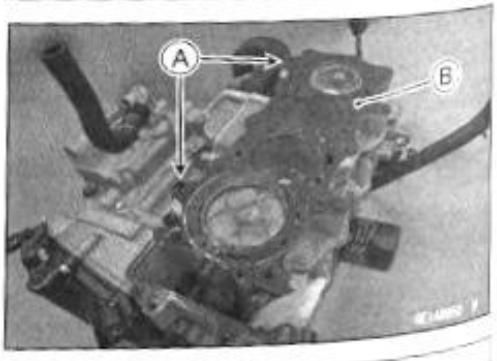


Cylinder Head Installation

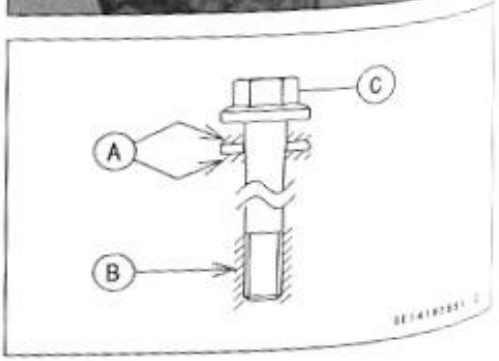
NOTE

○*The camshaft cap is machined with the cylinder head, so if a new cylinder head is installed, use the cap that is supplied with the new head.*

- Install the dowel pins [A].
- Replace the cylinder head gasket [B] with a new one.
- Install the cylinder head.



- Replace the cylinder head bolt washers with new ones.
- Apply molybdenum disulfide oil solution to both sides [A] of the cylinder head bolt washers and the threads [B] of the M8 cylinder head bolts [C].



Cylinder Head

- Tighten the M8 cylinder head bolts following the tightening sequence [1 –10].

○First, tighten the bolts with the specified torque.

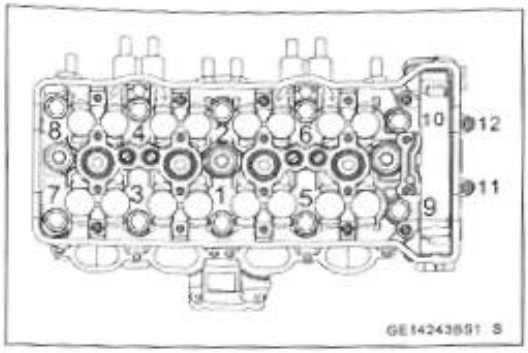
Torque - Cylinder Head Bolts (M8): 12 N·m (1.2 kgf·m, 106 in·lb)

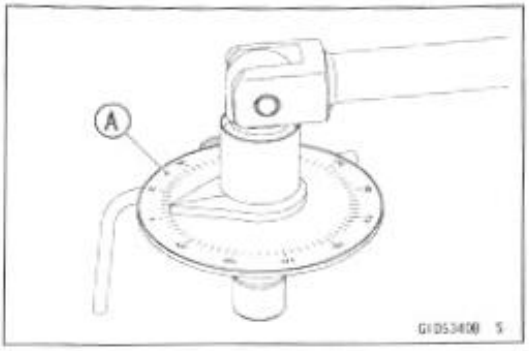
○Next, using a angle torque gauge [A], tighten the bolts specified angle.

Angle - Cylinder Head Bolts (M8): 114°

- Tighten the M6 cylinder head bolts as shown sequence [11, 12].

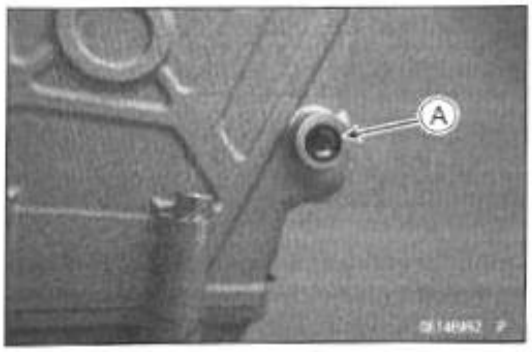
Torque - Cylinder Head Bolts (M6): 15 N·m (1.5 kgf·m, 11 ft·lb)





- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the front camshaft chain guide.
- Tighten:

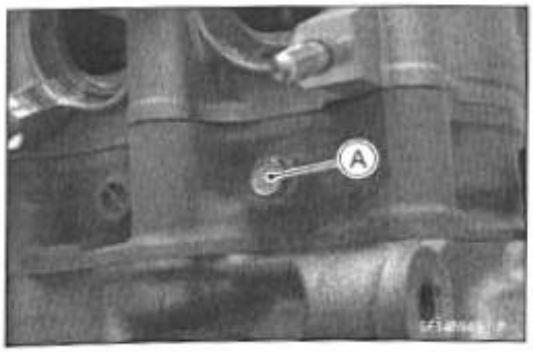
Torque - Front Camshaft Chain Guide Bolt (Upper): 25 N·m (2.5 kgf·m, 18 ft·lb)



- Replace the washer with a new one.
- Tighten:

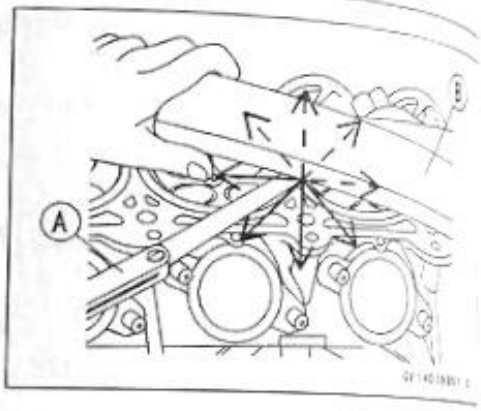
Torque - Coolant Drain Bolt (Cylinder) [A]: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the removed parts.



Cylinder Head

Cylinder Head Warp Inspection



- Clean the cylinder head.
- Lay a straightedge across the lower surface of the cylinder head at several positions.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head.

Cylinder Head Warp

Standard: – – –

Service Limit: **0.05 mm (0.002 in.)**

★If the cylinder head is warped more than the service limit, replace it.

★If the cylinder head is warped less than the service limit, repair the head by rubbing the lower surface on emery paper secured to a surface plate (first No. 200, then No. 400).

Valves

Valve Clearance Inspection

- Refer to the Valve Clearance Inspection (see Valve Clearance Inspection(2-28)).

Valve Clearance Adjustment

- Refer to the Valve Clearance Adjustment (see Valve Clearance Adjustment(2-29)).

Valve Removal

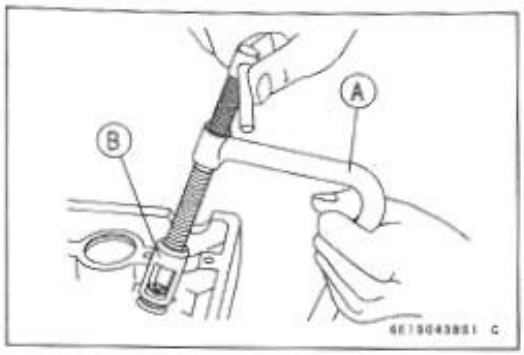
- Remove:
  Cylinder Head (see Cylinder Head Removal(5-26))
  Valve Lifter and Shim

NOTE

OMark and record the valve lifter and shim locations so they can be installed in their original positions.

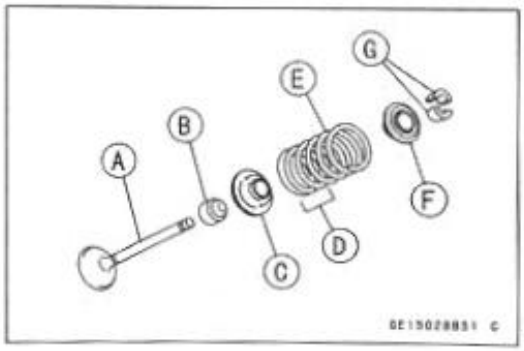
- Using the valve spring compressor assembly [A] and adapter [B], remove the valve.

Special Tools - Valve Spring Compressor Assembly: 57001 -241
Valve Spring Compressor Adapter, ϕ18.2: 57001-1938



Valve Installation

- Replace the oil seal with a new one.
- Apply a thin coat of molybdenum disulfide grease to the valve stem before valve installation.
- Apply engine oil to the oil seal lips.
- Install the springs so that the point side faces upwards.
  Valve Stem [A]
  Oil Seal [B]
  Spring Seat [C]
  Closed Coil End [D]
  Valve Spring [E]
  EX - Orange Paint
  IN - Light Blue Paint
  Retainer [F]
  Split Keepers [G]



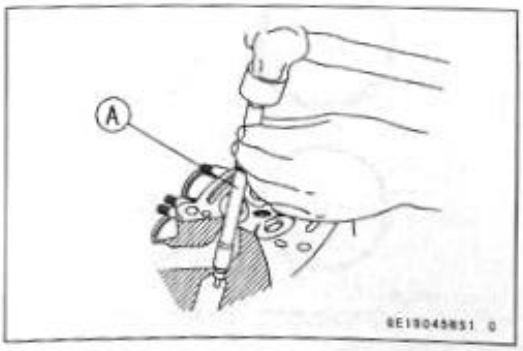
Valve Guide Removal

- Remove:
  Valve (see Valve Removal(5-29))
  Oil Seal
  Spring Seat
- Heat the area around the valve guide to 120 – 150°C (248 – 302°F), and hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

NOTICE

Do not heat the cylinder head with a torch. This will warp the cylinder head. Soak the cylinder head in oil and heat the oil.

Special Tool - Valve Guide Arbor, ϕ4: 57001-1273



Valves

Valve Guide Installation

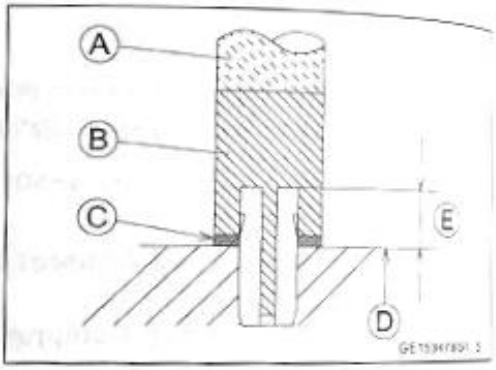
- Apply oil to the valve guide outer surface before installation.
- Heat the area around the valve guide hole to about 120 – 150°C (248 – 302°F).

NOTICE
Do not heat the cylinder head with a torch. This Will warp the cylinder head. Soak the cylinder head and heat the oil.

Exhaust Side

- Using the valve guide driver [A], attachment [B] and spacer [C], press and insert the valve guide in until the spacer surface touches the head surface [D].
  14.3 – 14.5 mm (0.563 – 0.571 in.) [E]

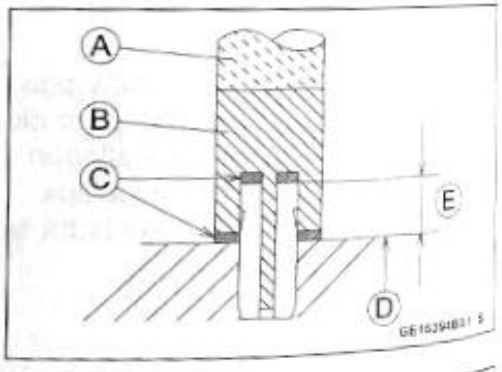
Special Tools - Valve Guide Driver: 57001-1564
Valve Guide Driver Attachment I: 57001 -1898
Spacer, ϕ19, t1.0: 57001-1960



Intake Side

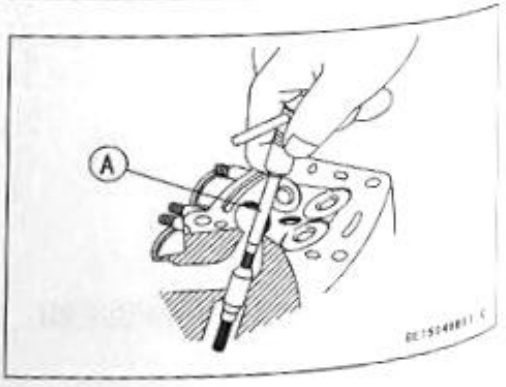
- Using the valve guide driver [A], attachment [B] and spacers [C], press and insert the valve guide in until the spacer surface touches the head surface [D].
  13.5 – 13.7 mm (0.531 – 0.539 in.) [E]

Special Tools - Valve Guide Driver: 57001-1564
Valve Guide Driver Attachment I: 57001 -1898
Spacer, ϕ19, t1.0: 57001-1960
Spacer, ϕ9.1, t0.8: 57001-1961



- Ream the valve guide with valve guide reamer [A], even if the old guide is reused.

Special Tool - Valve Guide Reamer, ϕ4: 57001-1274

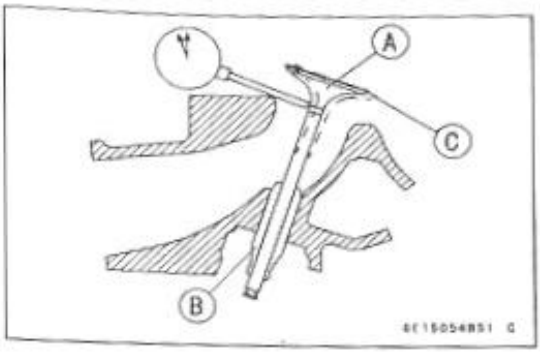


Valve-to-Guide Clearance Measurement (Wobble Method)

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move the stem back and forth [C] to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the guide.



NOTE

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

Valve/Valve Guide Clearance (Wobble Method)

Standard:

Exhaust	**0.09 – 0.16 mm (0.0035 – 0.0063 in.)**
Intake	**0.03 – 0.10 mm (0.0012 – 0.0039 in.)**

Service Limit:

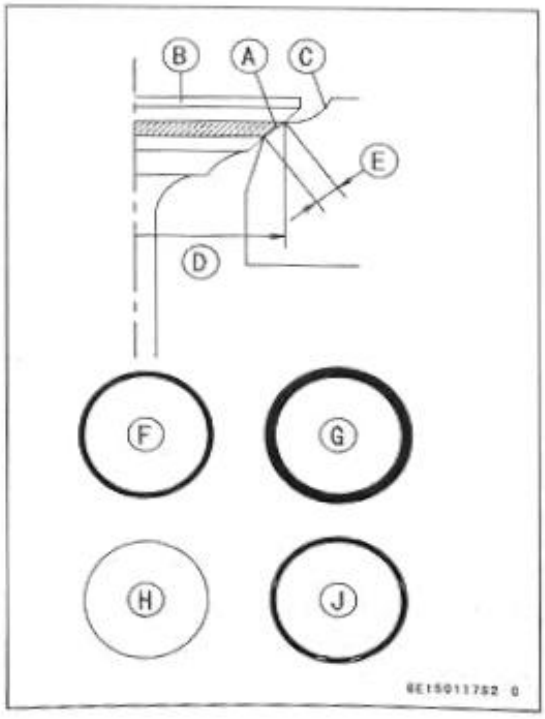
Exhaust	**0.36 mm (0.014 in.)**
Intake	**0.29 mm (0.011 in.)**

Valve Seat Inspection

- Remove the valve (see Valve Removal(5-29)).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter is too large or too small, repair the seat (see Valve Seat Repair(5-32)).



Valve Seating Surface Outside Diameter

Standard:

Exhaust	**18.7 – 18.9 mm (0.736 – 0.744 in.)**
Intake	**21.8 – 22.0 mm (0.858 – 0.866 in.)**

○Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with a vernier caliper.

Good [F]

★If the width is too wide [G], too narrow [H] or uneven [J], repair the seat (see Valve Seat Repair(5-32)).

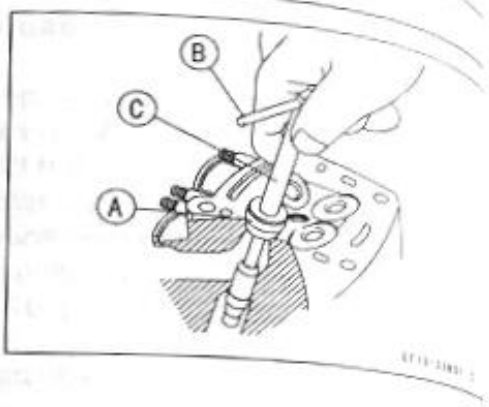
Valve Seating Surface Width

Standard:

Exhaust	**0.8 – 1.2 mm (0.031 – 0.047 in.)**
Intake	**0.5 – 1.0 mm (0.020 – 0.039 in.)**

Valves

Valve Seat Repair



- Repair the valve seat with the valve seat cutters [A].

Special Tools - Valve Seat Cutter Holder Bar [B]: 57001 -1128
Valve Seat Cutter Holder, ϕ4 [C]: 57001-1275

[For Exhaust Valve Seat]
Valve Seat Cutter, 45° - ϕ20.5: 57001-1307
Valve Seat Cutter, 65° - ϕ19: 57001-1310
Valve Seat Cutter, 32° - ϕ19: 57001-1942

[For Intake Valve Seat]
Valve Seat Cutter, 45° - ϕ22: 57001-1205
Valve Seat Cutter, 32° - ϕ22: 57001-1206
Valve Seat Cutter, 67.5° - ϕ22: 57001-1207

★If the manufacturer's instructions are not available, use the following procedure.

Seat Cutter Operation Care

1. This valve seat cutter is developed to grind the valve for repair. Therefore the cutter must not be used for other purposes than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTICE
Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.

4. Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond portion.

NOTE

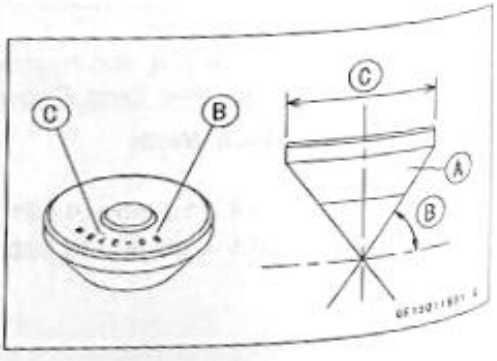
○*Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter

The marks stamped on the back of the cutter [A] represent the following.

60° ..... Cutter angle [B]
37.5ϕ ..... Outer diameter of cutter [C]



Valves

Operating Procedures

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

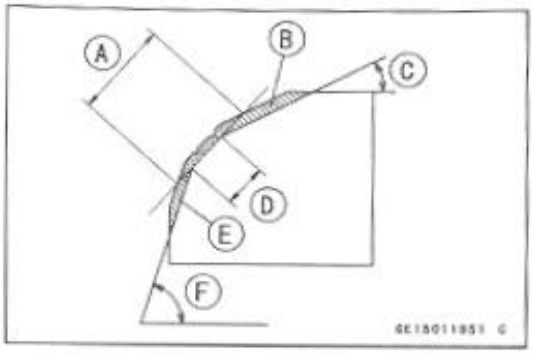
NOTICE

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° grind until the diameter is within the specified range.

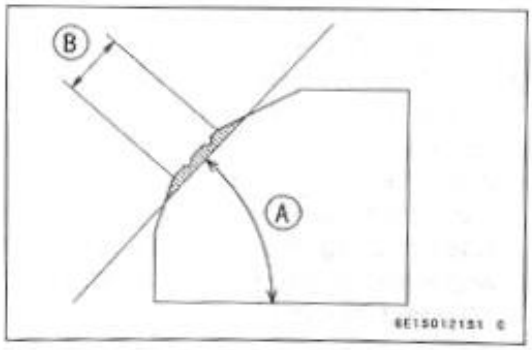
Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 65° or 67.5°
65° or 67.5° [F]



- Measure the outside diameter of the seating surface with a vernier caliper.

★If the outside diameter of the seating surface is too small, repeat the 45° [A] grind until the diameter is within the specified range.

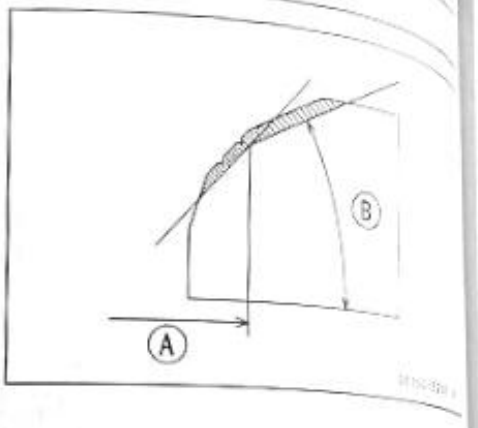
Original Seating Surface [B]



NOTE

○*Remove all pittings of flaws from 45° ground surface.*
○*After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 65° (or 67.5°) grinding operation easier.*
○*When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.*

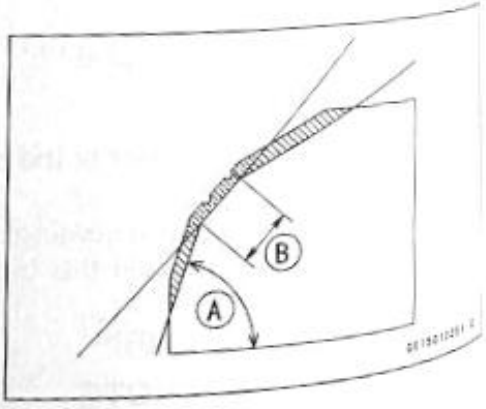
Valves



★If the outside diameter [A] of the seating surface is too large, make the 32° [B] grind described below.
★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.
• Grind the seat at a 32° angle until the seat outside diameter is within the specified range.
○To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.
○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.

NOTICE
The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

○After making the 32° grind, return to the seat outside diameter measurement step above.
• To measure the seat width, use a vernier caliper to measure the width of the 45° angle portion of the seat at several places around the seat.
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat outside diameter measurement step above.

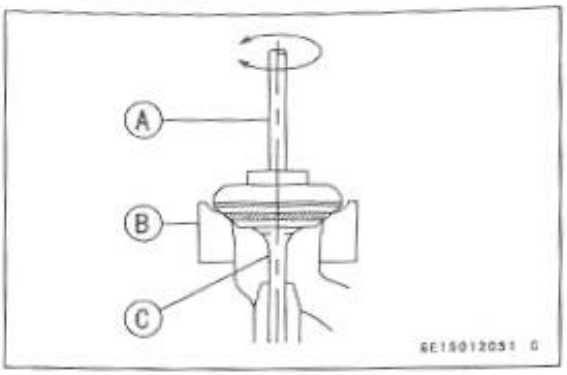


★If the seat width is too wide, make the 65° or 67.5° [A] grind described below.
★If the seat width is within the specified range, lap the valve to the seat as described below.
• Grind the seat at a 65° or 67.5° angle until the seat width is within the specified range.
○To make the 65° or 67.5° grind, fit 65° or 67.5° cutter into the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 65° or 67.5° grind, return to the seat width measurement step above.

Correct Width [B]

Valves

- Lap the valve to the valve seat, once the seat width and outside diameter are within the ranges specified above.
  - OPut a little coarse grinding compound on the face of the valve in a number of places around the valve head.
  - OSpin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
  - ORepeat the process with a fine grinding compound.



Lapper [A]
Valve Seat [B]
Valve [C]

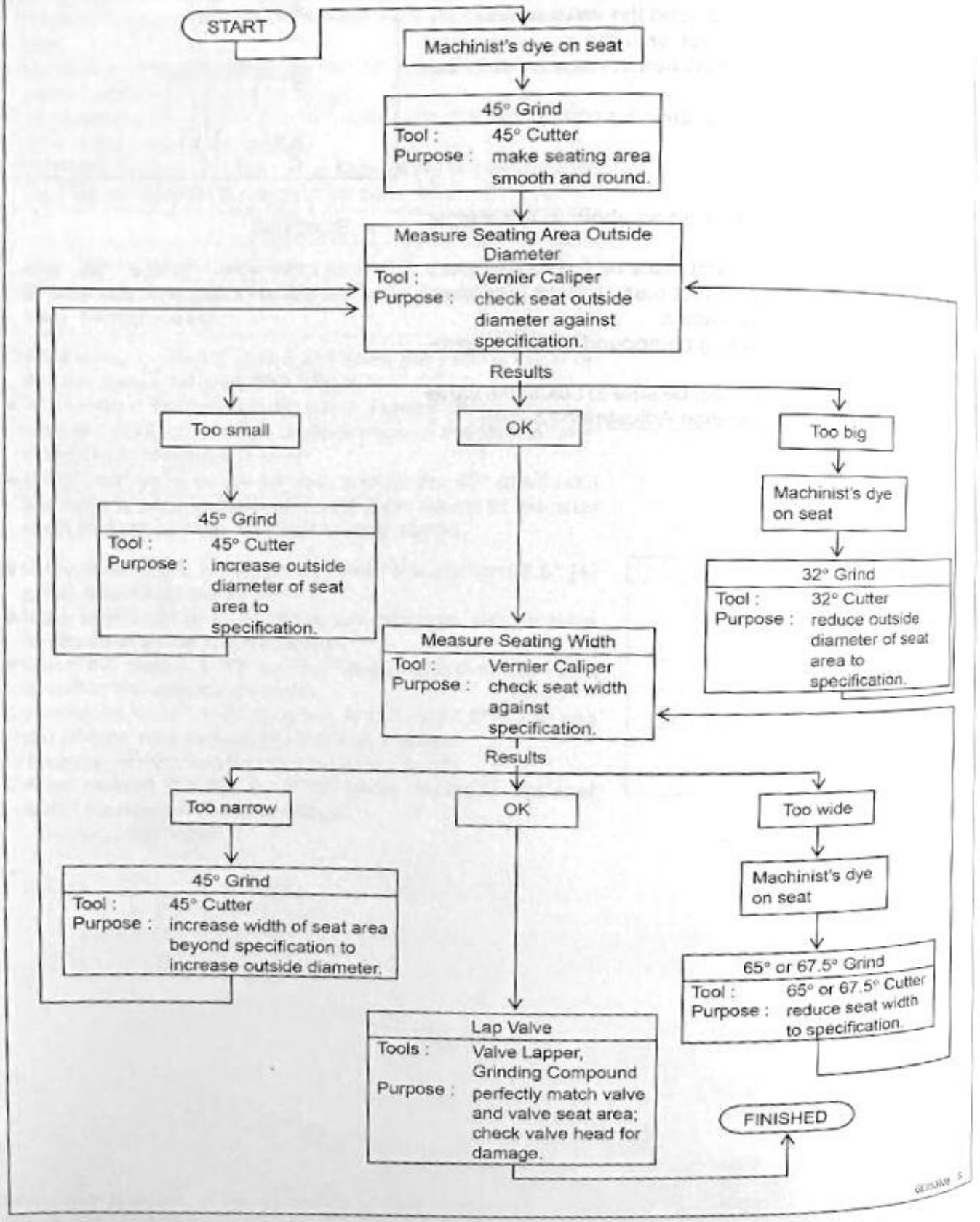
- The seating area should be marked about in the middle of the valve face.

★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.

- Be sure to remove all grinding compound before assembly.
- When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment(2-29)).

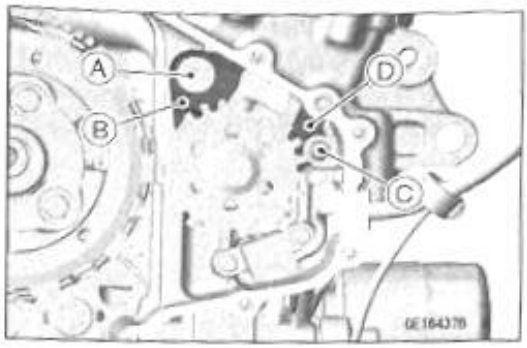
Valves

Valve Seat Repair



Cylinder Removal

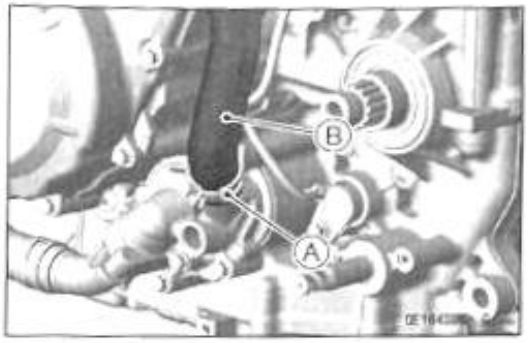
- Remove:
  Cylinder Head (see Cylinder Head Removal(5-26))
  Clutch Cover (see Clutch Cover Removal(6-10))
  Rear Camshaft Chain Guide Bolt [A]
  Rear Camshaft Chain Guide [B]
  Front Camshaft Chain Guide Bolt (Lower) [C] and Collar
  Front Camshaft Chain Guide [D]



- Slide the clamp [A] and disconnect the water hose [B].
  Cylinder

NOTE

If it is hard to remove it, tap lightly using a plastic-faced mallet.

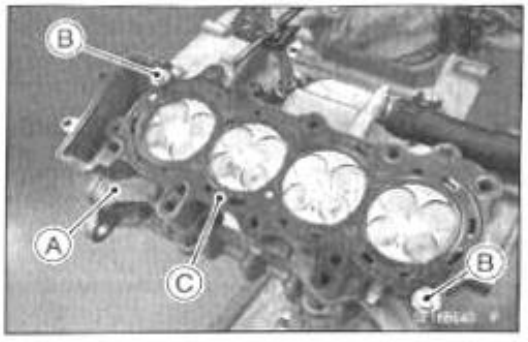


Cylinder Installation

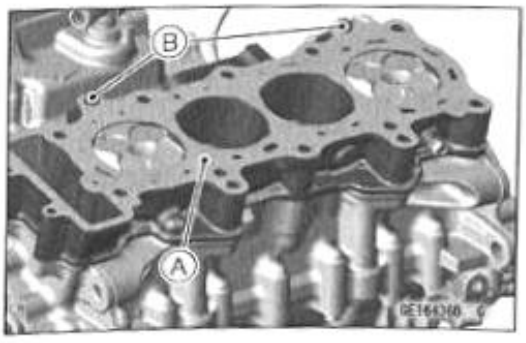
NOTE

If a new cylinder is used, use new piston ring.

- Sprit the crankcase (see Crankcase Splitting(9-9)).
- Insert the pistons to the cylinder (see Piston Installation(5-38)).
- Install the cylinder [A] using suitable bolts [B], washers and old gasket [C].
  Bolt – M8 × L = 55 mm (2.2 in.)



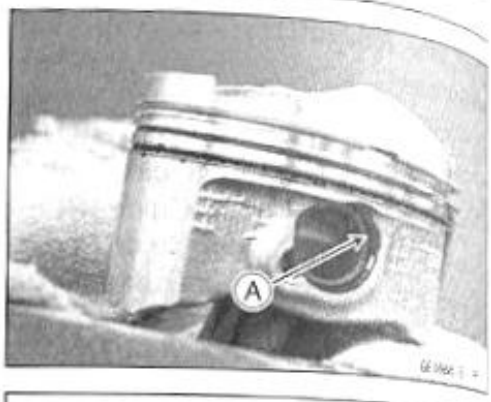
- Install:
  Crankshaft (see Crankshaft Installation(9-17))
  Connecting Rods (see Connecting Rod Installation(9-18))
  Lower Crankcase (see Crankcase Assembly(9-11))
- Remove:
  Suitable Bolts and Washers
  Old Gasket
- Replace the cylinder gasket [A] with a new one.
- Install:
  Dowel Pins [B]
  Cylinder Gasket
- Install the removed parts.



Cylinder, Pistons

Piston Removal

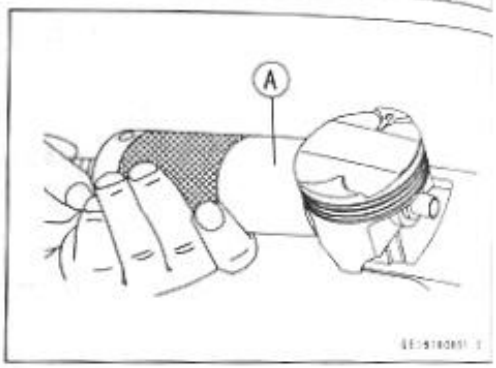
- Remove the cylinder (see Cylinder Removal(5-37)).
- Place a clean cloth under the pistons and remove the piston pin snap ring [A] from the outside of each piston.



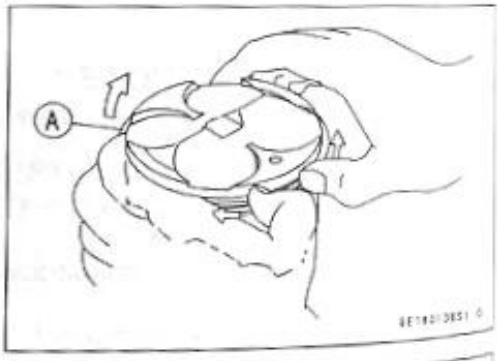
- Using the piston pin puller assembly [A], remove the piston pins.

  Special Tool - Piston Pin Puller Assembly: 57001-910

- Remove the pistons.



- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Piston Installation

NOTE

○*If a new piston is used, use new piston ring.*

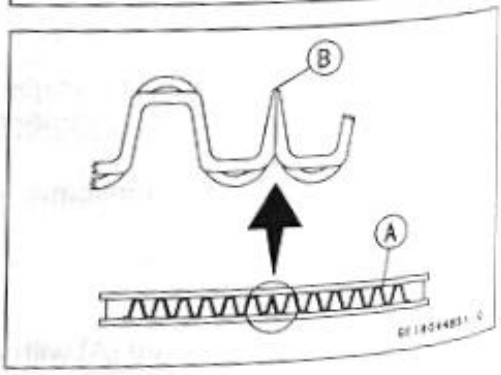
- Apply molybdenum disulfide oil solution to the oil ring expander, and install the oil ring expander [A] in the bottom piston ring groove so the ends [B] not butt together.
- Apply molybdenum disulfide oil solution to the oil ring steel rails, and install the oil ring steel rails, one above the expander and one below it.

○Spread the rail with your thumbs, but only enough to fit the rail over the piston.

○Release the rail into the bottom piston ring groove.

NOTE

○*The oil ring rails have no "top" or "bottom."*

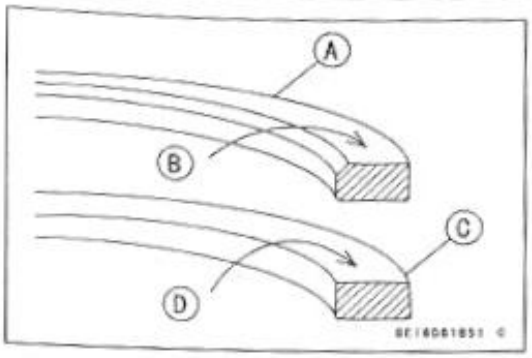


• Apply molybdenum disulfide oil solution to the piston rings.

NOTE

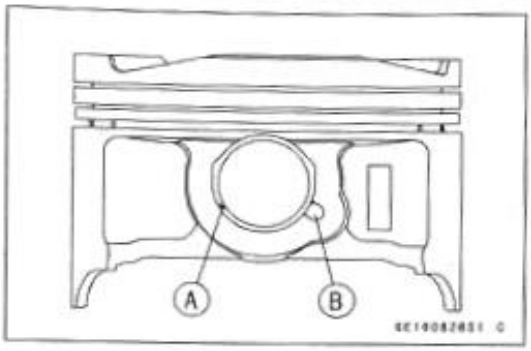
ODo not mix up the top and second ring.

• Install the top ring [A] so that the "1R" mark [B] faces up.
• Install the second ring [C] so that the "2R" mark [D] faces up.



• Apply molybdenum disulfide oil solution to the piston pins and piston journals.
• Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

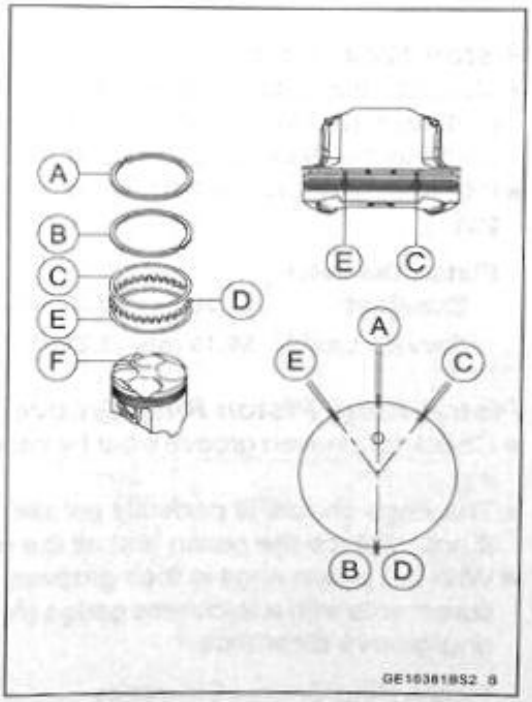
OWhen installing the piston pin snap ring, compress it only enough to install it and no more.



NOTICE

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

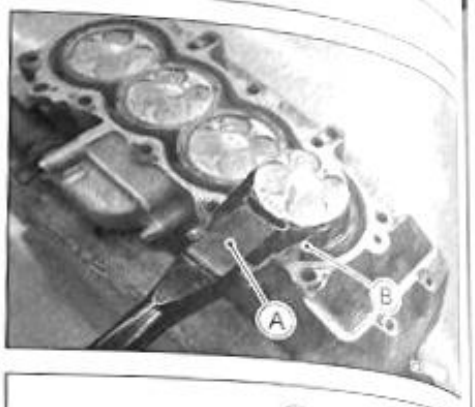
• The piston ring openings must be positioned as shown.
Top Ring [A]
Second Ring [B]
Upper Oil Ring Steel Rail [C]
Oil Ring Expander [D]
Lower Oil Ring Steel Rail [E]
Dent [F]



Cylinder, Pistons

- Apply molybdenum disulfide oil solution to the cylinder bore and piston skirt.
- Using the piston ring compressor assembly to install the piston from the cylinder head side.

Special Tool - Piston Ring Compressor Grip [A]: 57001 -1095
Piston Ring Compressor Belt, ϕ50 – ϕ67 [B]: 57001-1096



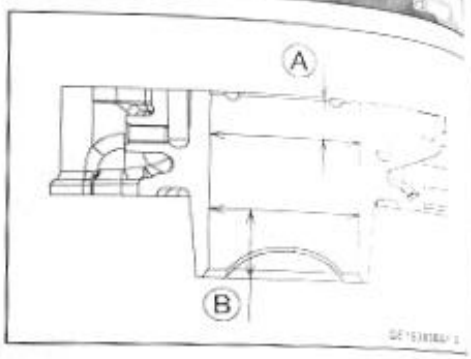
- Install the cylinder (see Cylinder Installation(5-37)).

Cylinder Wear Inspection

- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the two locations (total of four measurements) as shown.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.

10 mm (0.39 in.) [A]
20 mm (0.79 in.) [B]



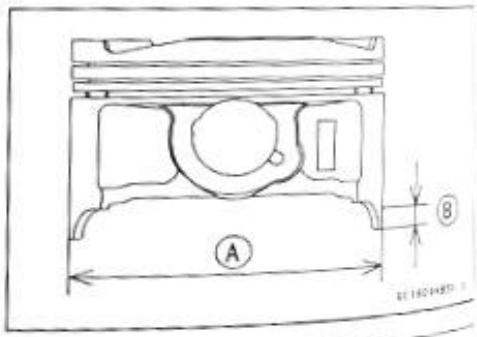
Cylinder Inside Diameter

Standard:	**56.994 – 57.006 mm (2.2439 – 2.2443 in.)**
Service Limit:	**57.09 mm (2.248 in.)**

Piston Wear Inspection

- Measure the outside diameter [A] of each piston 11 mm (0.43 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under service limit, replace the piston.



Piston Diameter

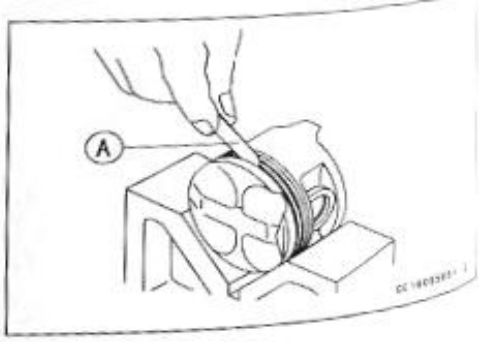
Standard:	**56.300 – 56.500 mm (2.2165 – 2.2244 in.)**
Service Limit:	**56.15 mm (2.211 in.)**

Piston Ring, Piston Ring Groove Wear Inspection

- Check for uneven groove wear by inspecting the ring seating.

★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

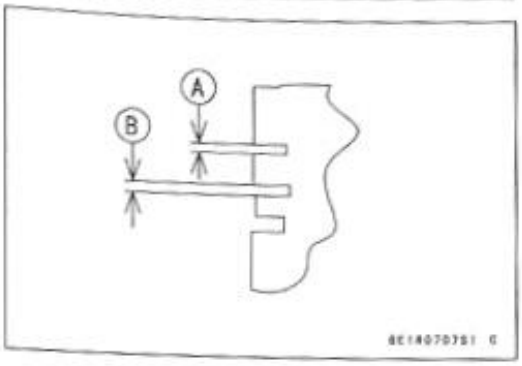


Piston Ring/Groove Clearance

Standard:	
Top	**0.030 – 0.070 mm (0.00118 – 0.00276 in.)**
Second	**0.030 – 0.070 mm (0.00118 – 0.00276 in.)**
Service Limit:	
Top	**0.17 mm (0.0067 in.)**
Second	**0.17 mm (0.0067 in.)**

Piston Ring Groove Width Inspection

• Measure the piston ring groove width.
○ Use a vernier caliper at several points around the piston.



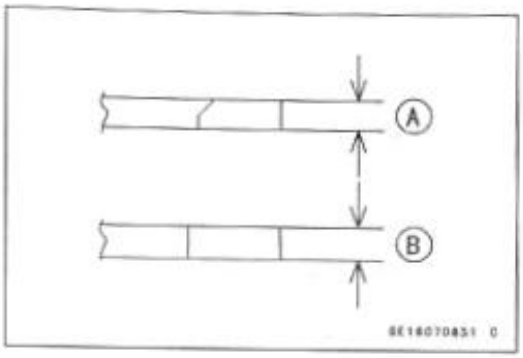
Piston Ring Groove Width

Standard:	
Top [A]	0.82 – 0.84 mm (0.0323 – 0.0331 in.)
Second [B]	0.82 – 0.84 mm (0.0323 – 0.0331 in.)
Service Limit:	
Top	0.92 mm (0.0362 in.)
Second	0.92 mm (0.0362 in.)

★ If the width of any of the two grooves are wider than the service limit at any point, replace the piston.

Piston Ring Thickness Inspection

• Measure the piston ring thickness.
○ Use the micrometer to measure at several points around the ring.



Piston Ring Thickness

Standard:	
Top [A]	0.77 – 0.79 mm (0.030 – 0.031 in.)
Second [B]	0.77 – 0.79 mm (0.030 – 0.031 in.)
Service Limit:	
Top	0.70 mm (0.028 in.)
Second	0.70 mm (0.028 in.)

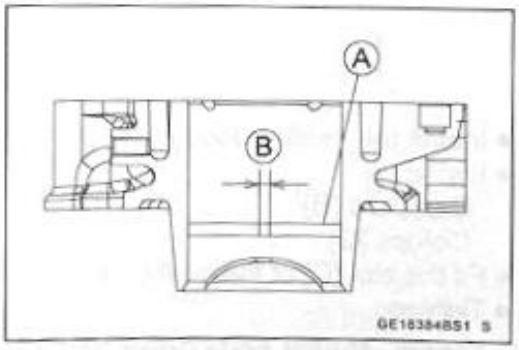
★ If any of the measurements is less than the service limit on either of the rings, replace all the rings.

NOTE

○ *When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

Piston Ring End Gap Inspection

• Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
• Measure the gap [B] between the ends of the ring with a thickness gauge.



Piston Ring End Gap

Standard:	
Top	0.12 – 0.22 mm (0.0047 – 0.0087 in.)
Second	0.30 – 0.45 mm (0.0118 – 0.0177 in.)
Service Limit:	
Top	0.5 mm (0.02 in.)
Second	0.8 mm (0.03 in.)

★ If the end gap of either ring is greater than the service limit, replace all the rings.

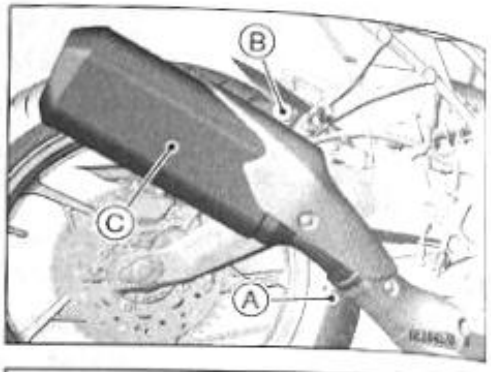
Muffler

⚠ WARNING

The muffler body can become extremely hot during normal operation and cause severe burns. Do not remove the muffler body while it is hot.

Muffler Body Removal

- Loosen the muffler body clamp bolt [A].
- Remove the muffler body bolt [B], washer and nut.
- Remove the muffler body [C] backward.



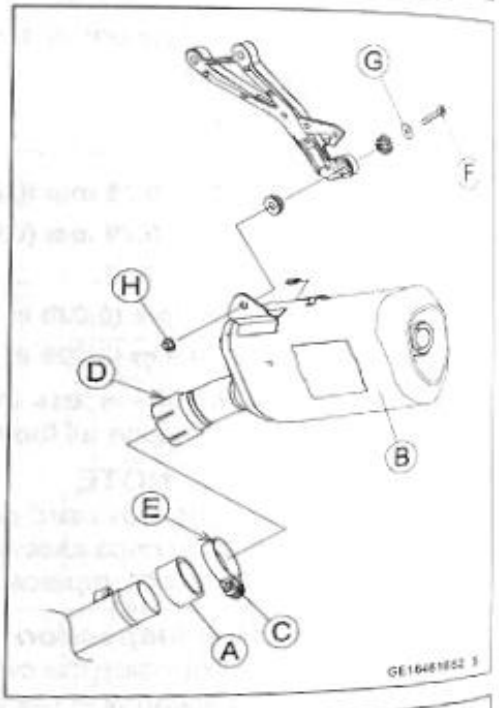
Muffler Body Installation

- Replace the muffler body gasket [A] with a new one.
- Install the muffler body gasket to the muffler body [B] so that the chamfer side faces exhaust pipe.
- Install the muffler body clamp [C].

○Insert the projection [D] into the slot [E].

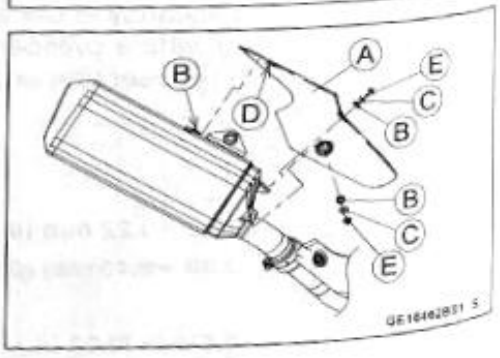
- Install:
  Muffler Body
  Muffler Body Bolt [F]
  Washer [G]
  Nut [H]
- Tighten:

Torque - Muffler Body Clamp Bolt: 15 N·m (1.5 kgf·m, 11 ft·lb)
Muffler Body Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Install the muffler body cover [A] if removed.
- Install:
  Dampers [B]
  Collars [C]
- Fit the slot [D] of the muffler body cover onto the damper.
- Tighten:

Torque - Muffler Body Cover Bolt [E]: 7.0 N·m (0.71 kgf·m, 62 ft·lb)

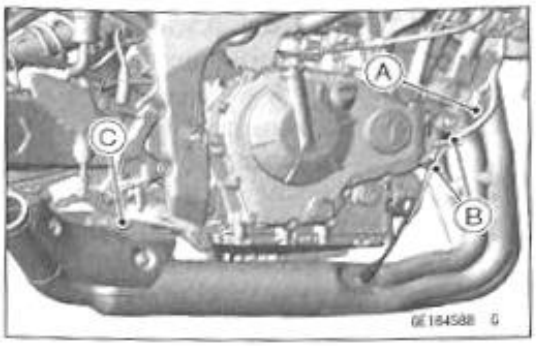


- Thoroughly warm up the engine, wait until the engine cools down, retighten all the bolts.

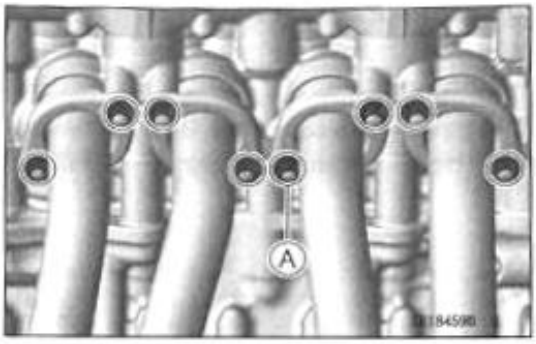
Muffler

Exhaust Pipe Removal

- Remove:
  Lower Fairings (see Lower Fairing Removal(15-18))
  Muffler Body (see Muffler Body Removal(5-42))
- Slide the dust cover.
- Disconnect the front oxygen sensor connector [A].
- Open the clamps [B].
- Support the exhaust pipe with the suitable stand.
- Remove:
  Exhaust Pipe Bolt [C] and Nut

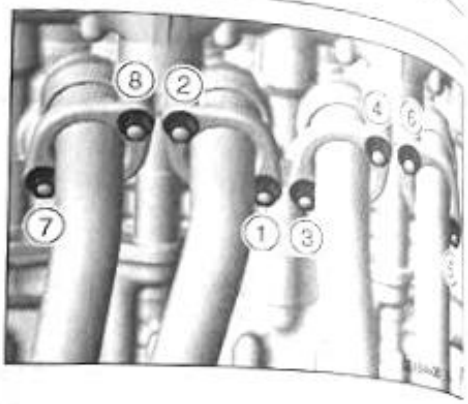


- Remove:
  Exhaust Pipe Holder Nuts [A]
  Exhaust Pipe with Front Oxygen Sensor



Muffler

Exhaust Pipe Installation

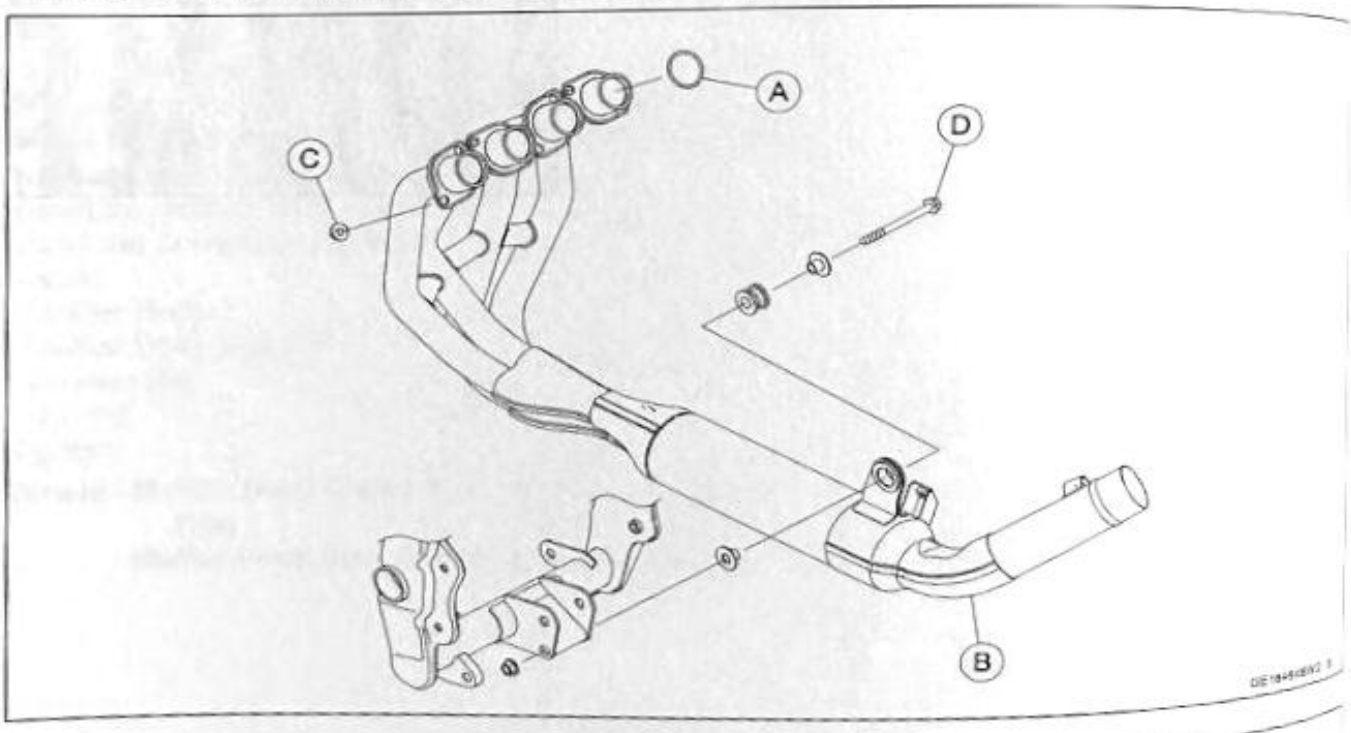


- Replace the exhaust pipe gaskets [A] with new ones.
- Apply grease to the exhaust pipe gaskets and install them.
- Install the exhaust pipe [B].
- Support the exhaust pipe with the suitable stand.
- Temporarily tighten the exhaust pipe holder nuts [C] following the specified tightening sequence [1 – 8].
- Temporarily tighten the exhaust pipe bolt [D].
- Tighten the exhaust pipe holder nuts following the specified tightening sequence [1 – 8].

Torque - Exhaust Pipe Holder Nuts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Tighten:

Torque - Exhaust Pipe Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)

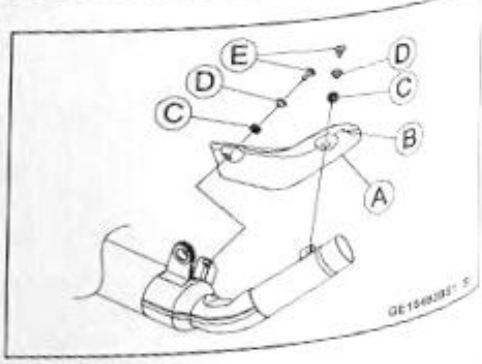


- Run the front oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the exhaust pipe cover [A] if removed.

○Install the exhaust pipe cover so that the hole [B] faces backward.

- Install:
  Damper [C]
  Collars [D]
- Tighten:

Torque - Exhaust Pipe Cover Bolts [E]: 7.0 N·m (0.71 kgf·m, 62 in·lb)

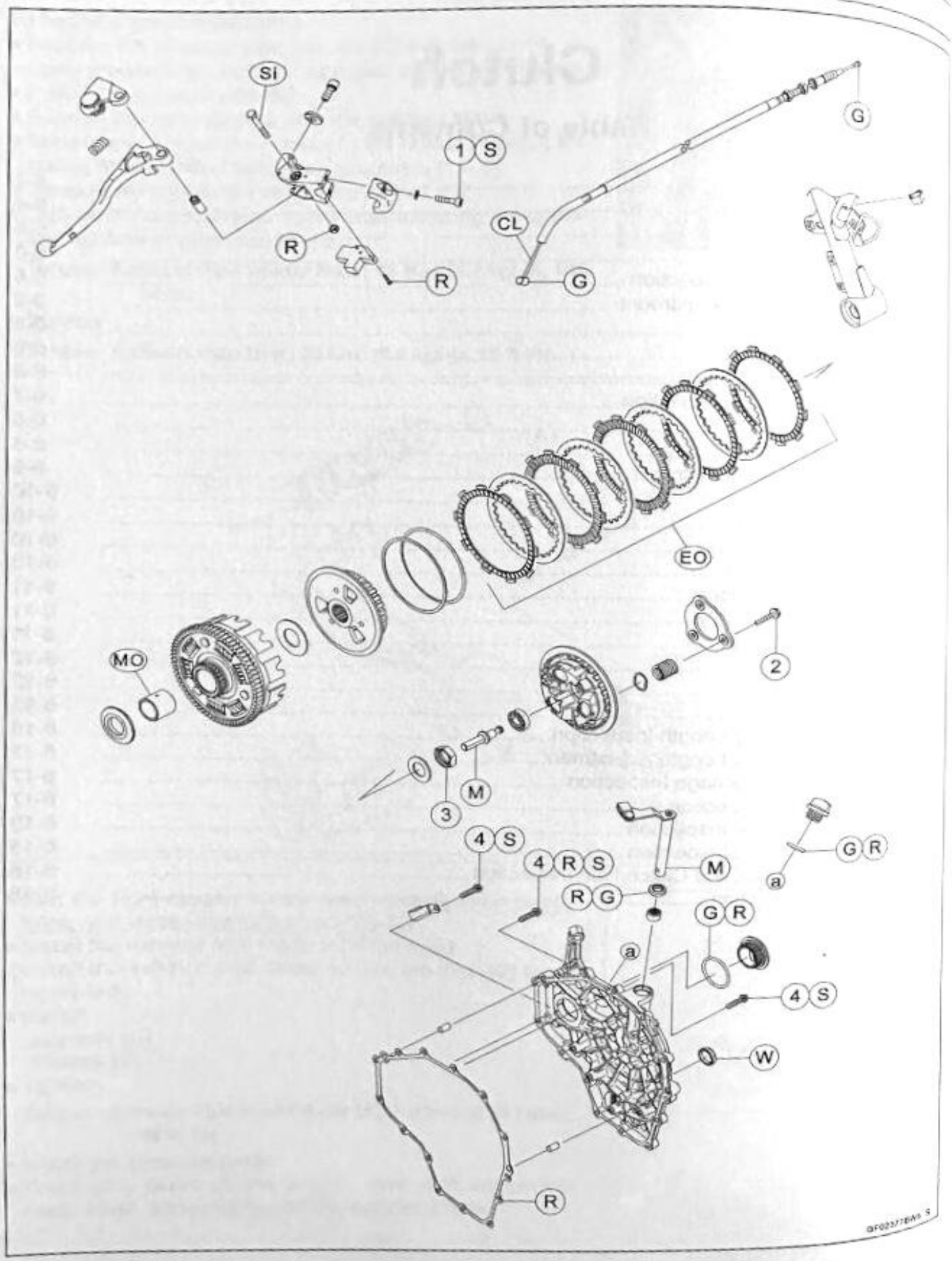


- Install the removed parts.
- Thoroughly warm up the engine, wait until the engine cools down, and retighten all the bolts and nuts.

Clutch

Table of Contents

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Clutch Lever Holder Clamp Bolts	8.8	0.90	78 in·lb	S
2	Clutch Stopper Bolts	10	1.0	89 in·lb	
3	Clutch Hub Nut	132	13.5	97.4	
4	Clutch Cover Bolts	10	1.0	89 in·lb	R (1), S

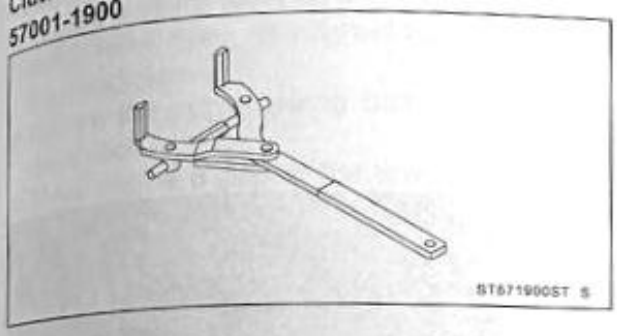
CL: Apply cable lubricant.
EO: Apply engine oil.
G: Apply grease.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.
W: Apply water.

Specifications

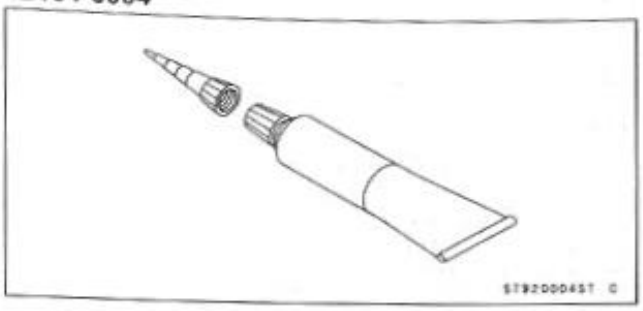
Item	Standard	Service Limit
Clutch Lever and Cable		
Clutch Lever Position	5-way adjustable (to suit rider)	– – –
Clutch Lever Free Play	2 – 3 mm (0.08 – 0.12 in.)	– – –
Clutch		
Clutch Plate Assembly Length	(Reference) 22.42 – 23.42 mm (0.88 – 0.92 in.)	– – –
Friction Plate Thickness	2.92 – 3.08 mm (0.115 – 0.121 in.)	2.6 mm (0.10 in.)
Friction and Steel Plate Warp	0.15 mm (0.0059 in.) or less	0.3 mm (0.01 in.)

Special Tools and Sealant

Clutch Holder:
57001-1900



Liquid Gasket, TB1211F:
92104-0004



Clutch Lever and Cable

Clutch Lever Free Play Inspection

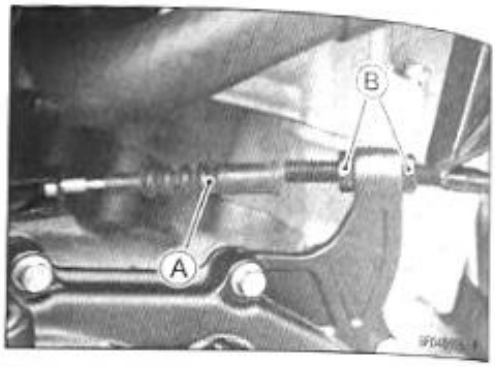
- Refer to the Clutch Operation Inspection (see Clutch Operation Inspection (2-34)).

Clutch Lever Free Play Adjustment

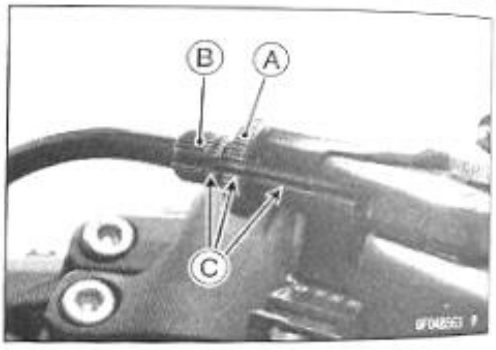
- Refer to the Clutch Operation Inspection (see Clutch Operation Inspection (2-34)).

Clutch Cable Removal

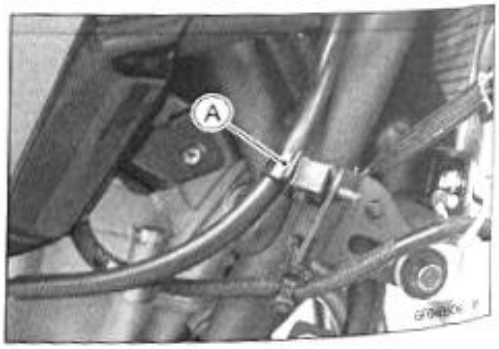
- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
- Slide the dust cover [A] at the clutch cable lower end out of place.
- Loosen the nuts [B], and slide the lower end of the clutch cable to give the cable plenty of play.



- Loosen the locknut [A] and screw in the adjuster [B].
- Line up the slots [C] in the clutch lever, locknut and adjuster, and then free the cable from the adjuster.
- Free the clutch inner cable tip from the clutch release lever.



- Open the clamp [A] to free the clutch cable.
- Remove the clutch cable out of the frame.



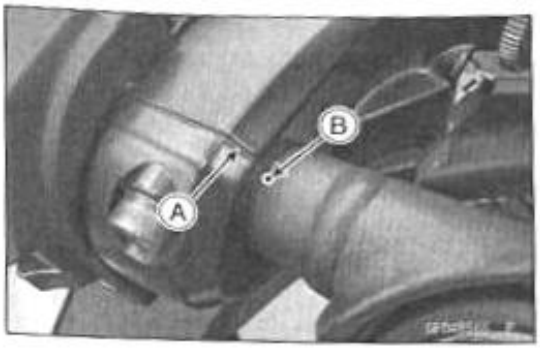
Clutch Cable Installation

- Run the clutch cable correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Adjust the clutch cable (see Clutch Operation Inspection (2-34)).
- Install the removed parts.

Clutch Cable Lubrication

- Refer to the Chassis Parts Lubrication (see Chassis Parts Lubrication (2-62)).

Clutch Lever Assembly Installation



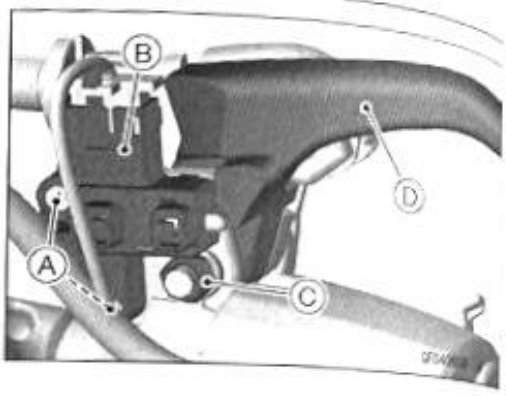
- Install the clutch lever so that the mating surface [A] of the clutch lever clamp is aligned with the punch mark [B] of the handlebar.
- Tighten the upper clamp bolt first, and then the lower clamp bolt.

○There will be a gap at the lower part of the clamp after tightening.

Torque - Clutch Lever Holder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

Clutch Lever and Cable

Clutch Lever Removal

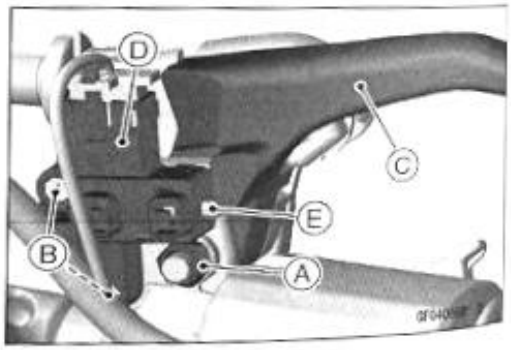


- Remove the upper end of the clutch cable (see Clutch Cable Removal(6-6)).
- Loosen the clutch lever holder clamp bolts.
- Remove:
  Starter Lockout Switch Screws [A]
  Starter Lockout Switch [B]
  Clutch Lever Pivot Locknut [C]
  Clutch Lever Pivot Bolt
  Clutch Lever [D]

Clutch Lever Installation

⚠ WARNING

If the starter lockout switch pin has been damaged the starter lockout system will not work properly. This allows the motorcycle to be started in gear with the clutch lever released (clutch engaged), creating sudden forward movement that can result in an accident or injury.
Check that the starter lockout switch operates properly when installing the clutch lever.



- Replace the clutch lever pivot locknut [A] and starter lockout switch screws [B] with new ones.
- Install the clutch lever [C] and clutch lever pivot bolt.
- Tighten the clutch lever locknut securely.
- Install the starter lockout switch [D].

OTake care not to damage a pin [E] when installing the starter lockout switch.

- Tighten the starter lockout switch screws securely.
- Tighten the clutch lever holder clamp bolt (see Clutch Lever Assembly Installation(6-7))
- Install the upper end of the clutch cable (see Clutch Cable Installation(6-6)).
- Adjust the clutch cable (see Clutch Operation Inspection (2-34)).
- Check that the pin of the starter lockout switch moves smoothly.

⚠ WARNING

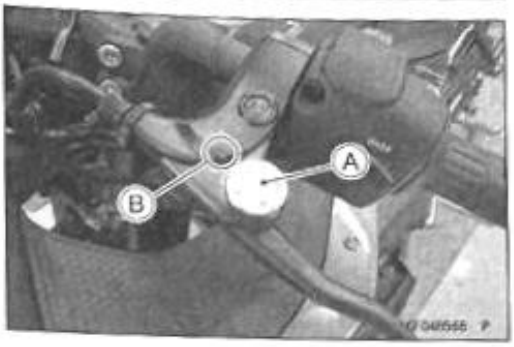
Too much cable play can prevent clutch disengagement and cause an accident resulting in serious injury or death. When adjusting the clutch or replacing the cable, be sure the upper end of the clutch outer cable is fully seated in its fitting, or it could slip into place later, creating enough cable play to prevent clutch disengagement.

Clutch Lever Position Adjustment

The adjuster has 5 positions so that the clutch lever position can be adjusted to suit the operator's hand.

• Push the lever forward and turn the adjuster [A] to align the number with the mark [B] on the lever holder.

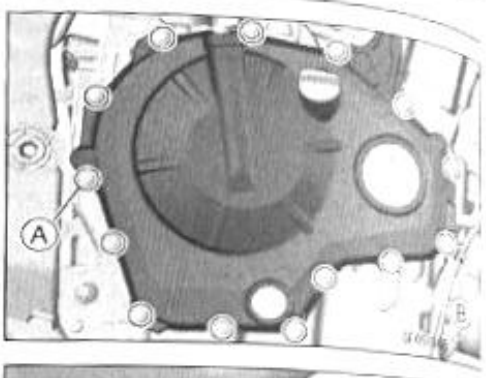
○The distance from the grip to the lever is minimum at number 5 and maximum at number 1.



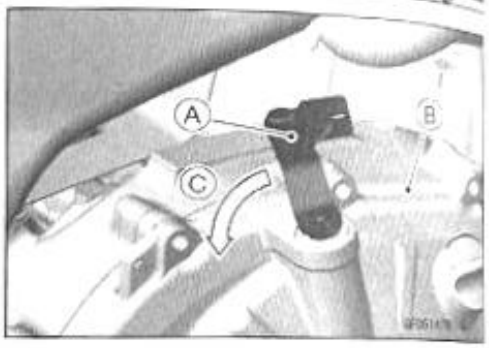
Clutch Cover

Clutch Cover Removal

- Drain the engine oil (see Engine Oil Change(2-35)).
- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
  Clutch Cable Lower End (see Clutch Cable Removal(6-6))
  Clutch Cover Bolts [A]
  Clamp [B]



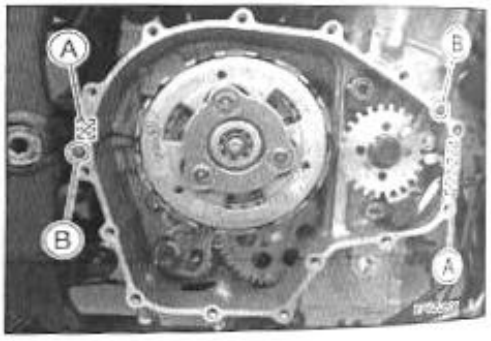
- Turn the release lever [A] counterclockwise as shown, and remove the clutch cover [B].
  About 90° [C]



Clutch Cover Installation

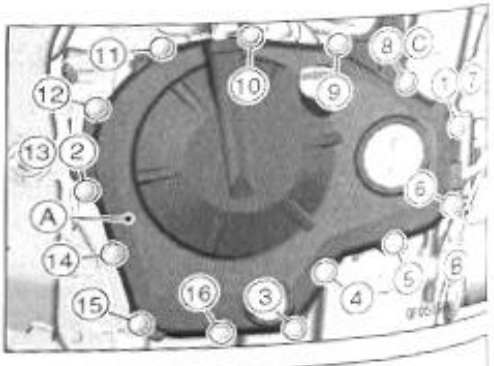
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth
- Apply liquid gasket to the areas [A] where the mating surface of the crankcase touches the clutch cover gasket and circumference of the crankshaft sensor gromet.

  Sealant - Liquid Gasket, TB1211F: 92104-0004



- Be sure that the dowel pins [B] are in position.
- Replace the clutch cover gasket with a new one and install it.
- Install:
  Clutch Cover [A]
  Clamp [B]
- Replace only one clutch cover bolt [C] with a new one.
- Tighten the clutch cover bolts following the specified tightening sequence [1 – 16].

  Torque - Clutch Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)



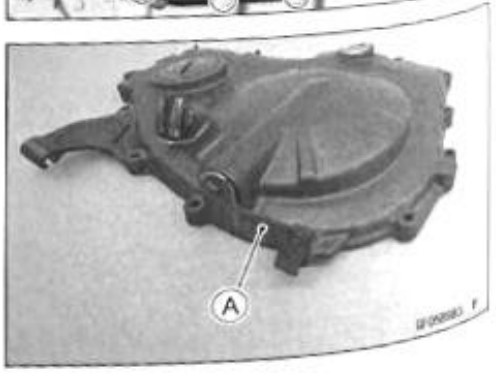
- Install the removed parts.

Release Shaft Removal

NOTICE

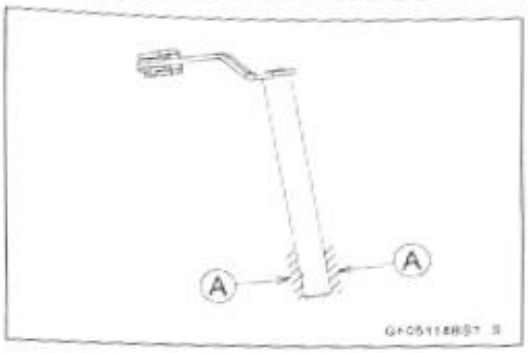
Do not remove the clutch release lever and shaft assembly unless it is absolutely necessary. If removed, the oil seal replacement may be required.

- Remove the clutch cover (see Clutch Cover Removal(6-10)).
- Pull the release lever and shaft assembly [A] straight out of the clutch cover.



Release Shaft Installation

- Apply grease to the oil seal lips on the upper ridge of the clutch cover.
- Apply molybdenum disulfide grease to the pusher-holding portion [A] on the release shaft.
- Insert the release shaft straight into the upper hole of the clutch cover.

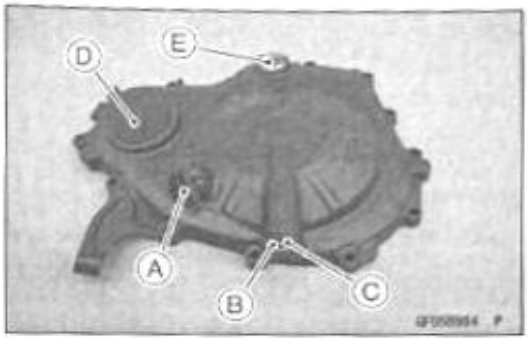


NOTICE

When inserting the release shaft, be careful not to remove the spring of the oil seal.

Clutch Cover Disassembly

- Remove:
  Clutch Cover (see Clutch Cover Removal(6-10))
  Release Lever and Shaft Assembly (see Release Shaft Removal(6-10))
  Oil Filler Plug [A]
  Oil Seal [B]
  Needle Bearing [C]
  Camshaft Timing Plug [D]
  Oil Level Inspection Window [E]



Clutch Cover Assembly

- Replace the needle bearing and oil seal with new ones.

NOTE

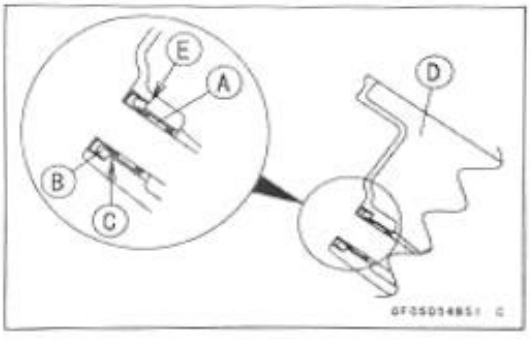
OInstall the needle bearing so that the manufacture's mark face out.

- Install the needle bearing [A] and oil seal [B] position as shown.

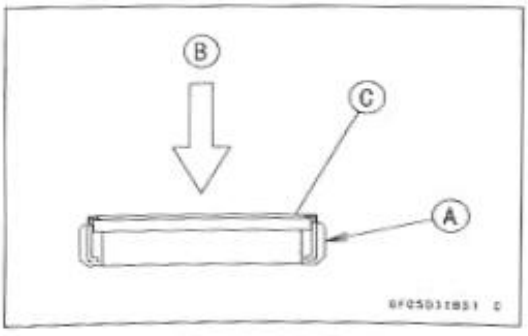
OPress the needle bearing so that the bearing surface [C] is flush with the housing end of clutch cover [D].

OPress the oil seal until the bottom [E].

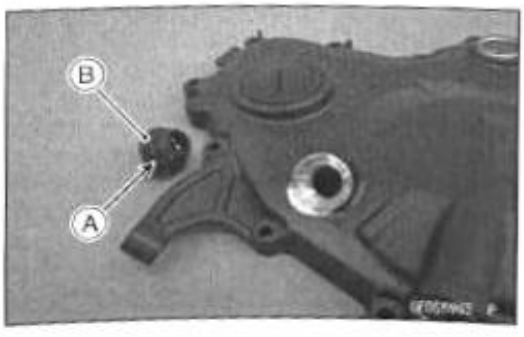
- Apply grease to the oil seal lips.



- Apply water to the rubber of the oil level inspection window [A] and press [B] it so that the ring [C] faces outside.



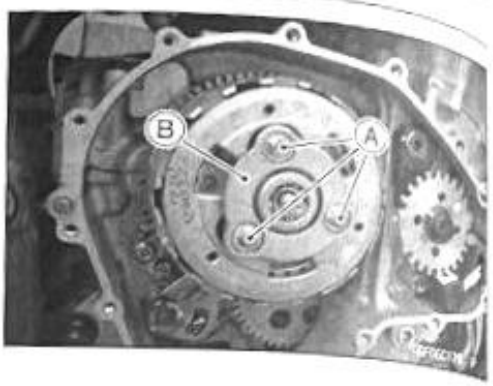
- Replace the O-ring [A] of the oil filler plug [B] with a new one.
- Apply grease to the new O-ring.
- Tighten the oil filler plug.



Clutch

Clutch Removal

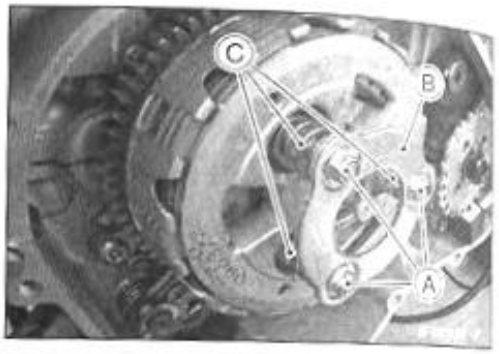
- Remove the clutch cover (see Clutch Cover Removal(6-10)).
- Loosen the three clutch stopper bolts [A] alternately with little by little (1/4 turn at a time) to prevent tilting the clutch stopper plate [B].



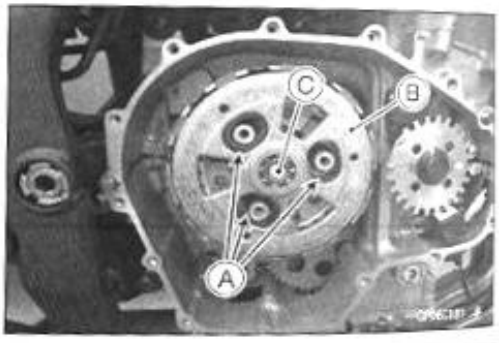
NOTICE
Do not loosen the one or two clutch stopper bolt at once to prevent clutch stopper plate from warpage by the spring force.

- Remove:
  - Clutch Stopper Bolts [A]
  - Clutch Stopper Plate [B]
  - Clutch Springs [C]
- Visually inspect the clutch stopper plate.

★If the clutch stopper plate is warped, replace it with a new one.

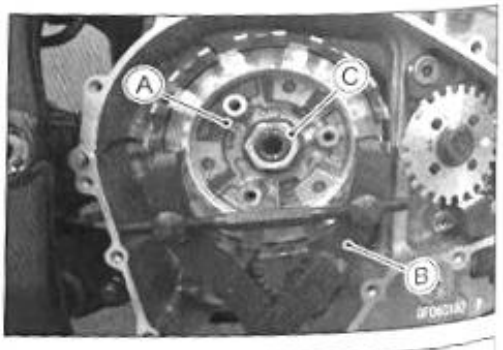


- Remove:
  - Spring Seats [A]
  - Clutch Pressure Plate [B] (with Bearing and Pusher [C])
  - Friction Plates and Steel Plates
  - Spring
  - Spring Sheet

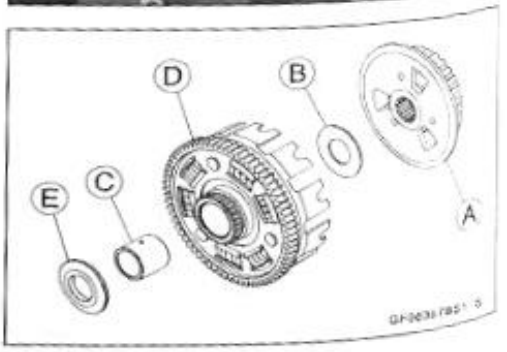


- Hold the clutch hub [A] steady with the clutch holder [B], and remove the clutch hub nut [C] and washers.

Special Tool - Clutch Holder: 57001-1900

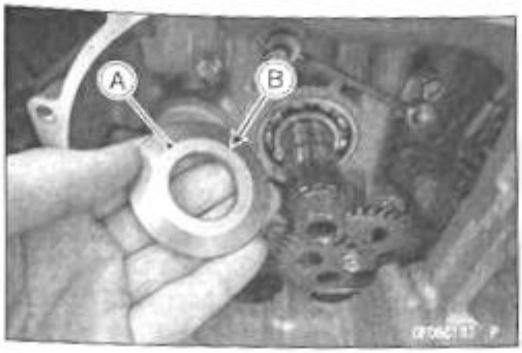


- Remove:
  - Clutch Hub [A]
  - Spacer [B]
  - Collar [C]
  - Clutch Housing [D]
  - Spacer [E]

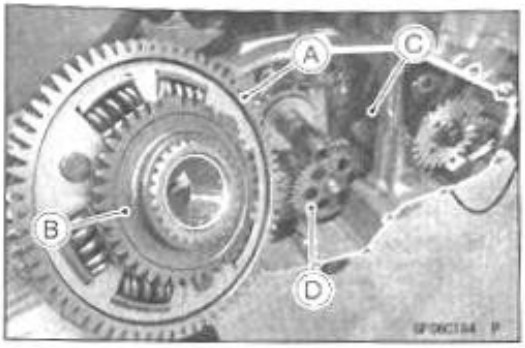


Clutch Installation

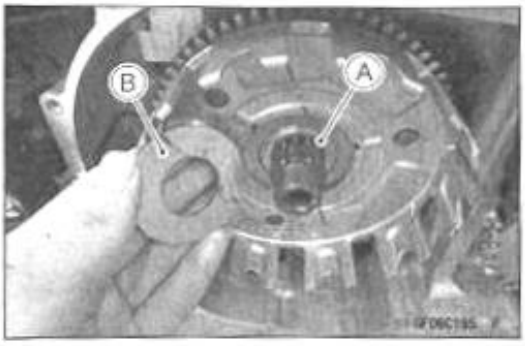
- Install the spacer [A] so that the tapered side [B] faces inward.



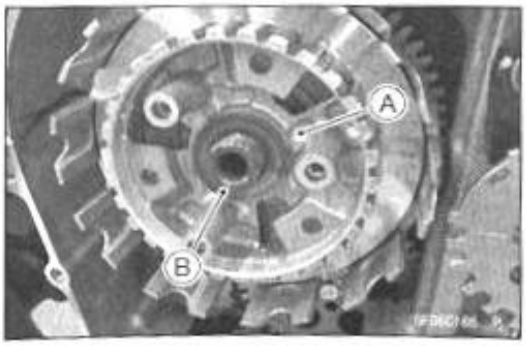
- Engage the clutch housing gear [A] and oil pump drive gear [B] with the crankshaft primary gear [C] and oil pump driven gear [D].



- Apply molybdenum disulfide oil solution to the coller [A].
- Install:
  Coller
  Spacer [B]



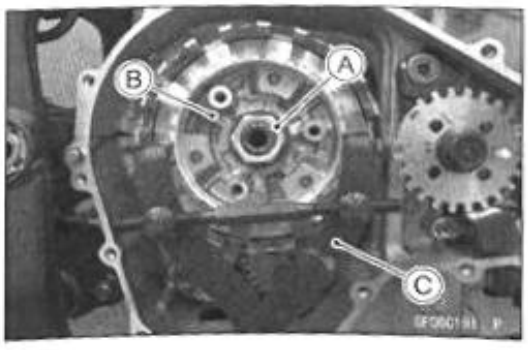
- Install:
  Clutch Hub [A]
  Washer [B]



- Install the clutch hub nut [A].
- Replace the clutch hub nut [A] with a new one.
- Hold the clutch hub [B] steady with the clutch holder [C], and tighten the clutch hub nut.

Special Tool - Clutch Holder: 57001-1900

Torque - Clutch Hub Nut: 132 N·m (13.5 kgf·m, 97.4 ft·lb)



Clutch

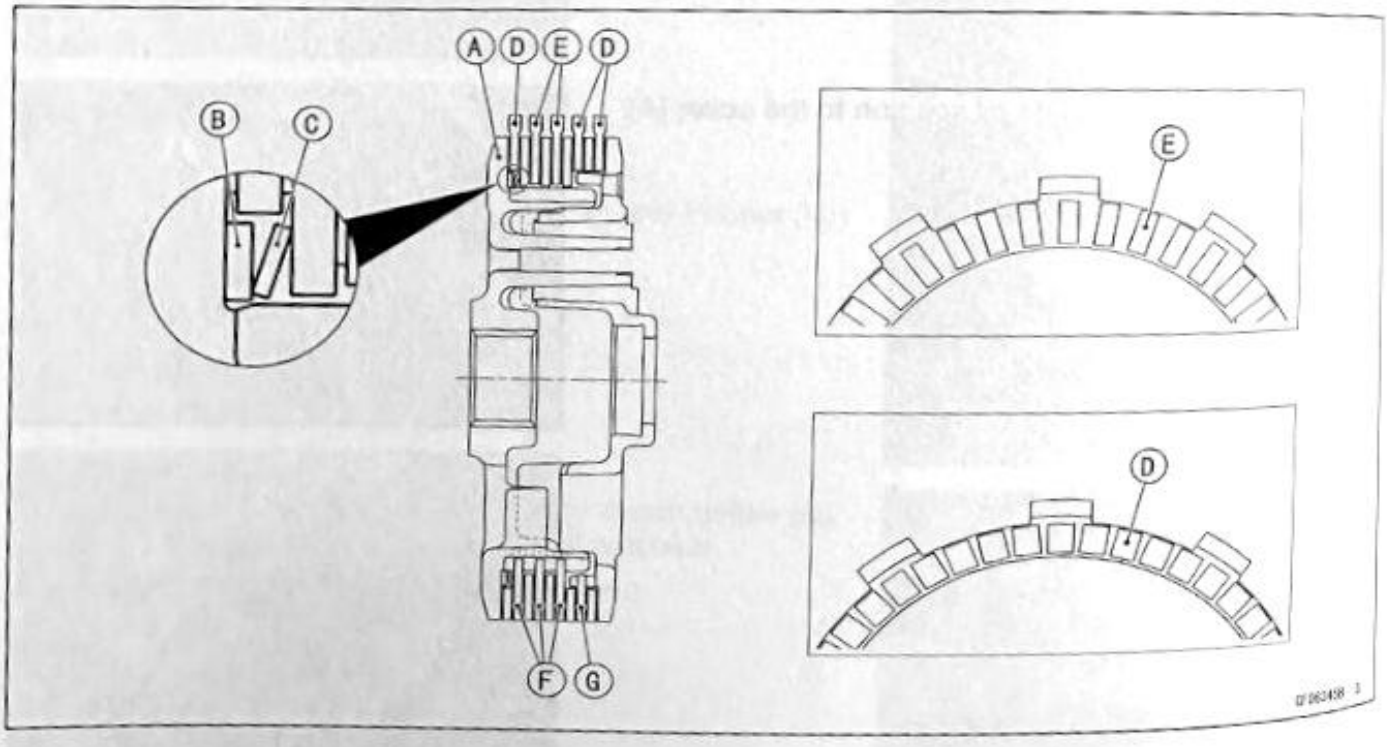
- Install the friction plates and steel plate alternately as shown.
  Clutch Hub [A]
  Spring Seat [B]
  Spring [C]
  Friction Plates [D] (Smaller Lining Blocks)
  Friction Plates [E] (Larger Lining Blocks)
  Steel Plates [F] (Smaller Inside Diameter)
  Steel Plate [G] (Larger Inside Diameter)

NOTE

○*These are 2 different friction plates and 2 different steel plates installed in the clutch plate assembly.*

NOTICE

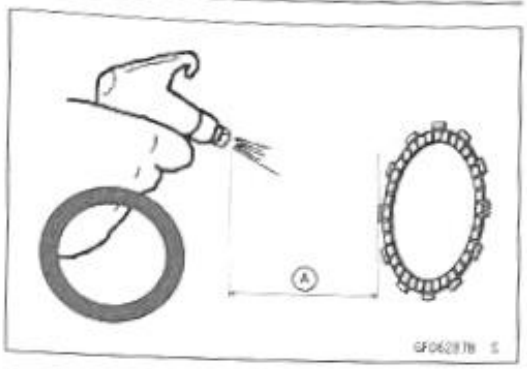
If new dry steel plates and friction plates are installed, apply engine oil to the surfaces of each plate to avoid clutch plate seizure.

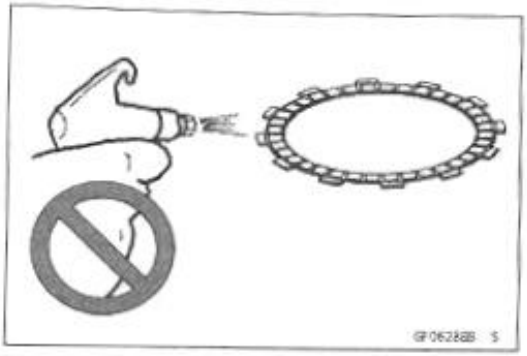


NOTICE

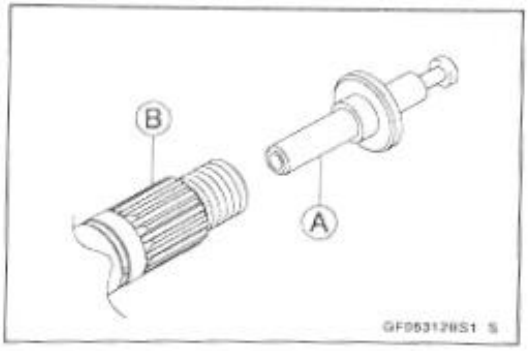
High pressure air blasts may detach clutch friction material from the friction plate. To prevent material detachment, set air pressure lower than 0.5 MPa (5 kg/cm², 73 psi), do not place air nozzle closer than 30 cm (12 in.) to friction plate and only blow air at a right angle to the plate, facing the friction material. Do not blow air from the side (horizontally) of the plate since it is more likely to detach the friction material.

more than 30 cm (12 in.) [A]





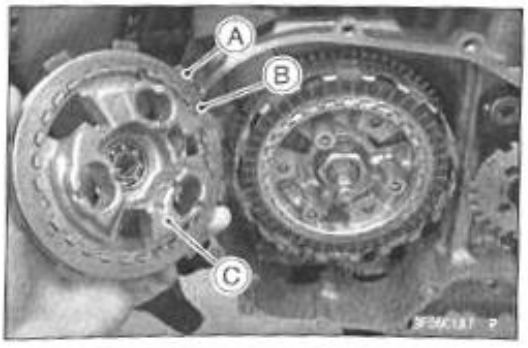
- Apply molybdenum disulfide grease to the pusher end [A].
- Install the pusher into the drive shaft [B].



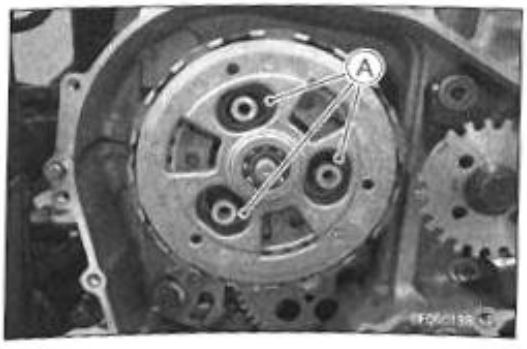
- Put the last friction plate [A] and steel plate [B] on the clutch pressure plate [C] and install them.

NOTE

OMake sure that the clutch pressure plate is installed without a gap.



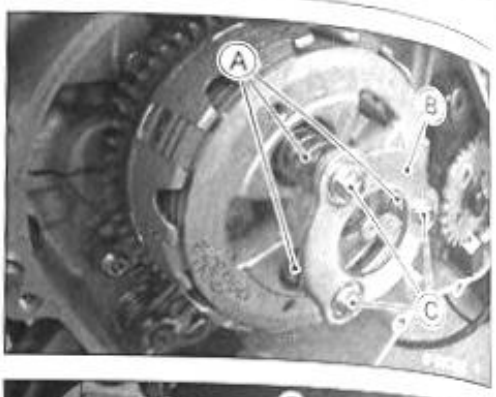
- Be sure to install the spring seats [A] on the clutch pressure plate.



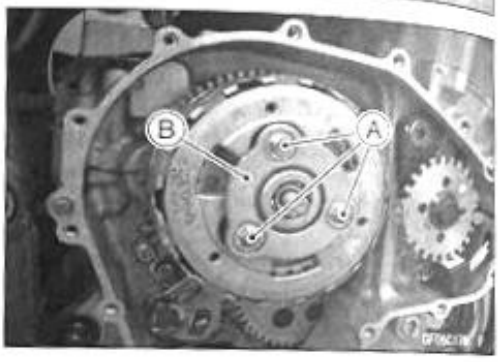
Clutch

- Install:
  Clutch Springs [A]
  Clutch Stopper Plate [B]
- Tighten the three clutch stopper bolts [C] by hand until they just begin to press each clutch spring.

○Hold the clutch pressure plate by hand while tightening the clutch stopper bolts.



- Tighten the three clutch stopper bolts [A] alternately with little by little (1/4 turn at a time) to prevent tilting the clutch stopper plate [B].



NOTICE
Do not tighten the one or two clutch stopper bolt at once to prevent the clutch stopper plate from warpage by the spring force.

- Tighten:

Torque - Clutch Stopper Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the clutch cover (see Clutch Cover Installation(6-10)).

Clutch Plate Assembly Length Inspection

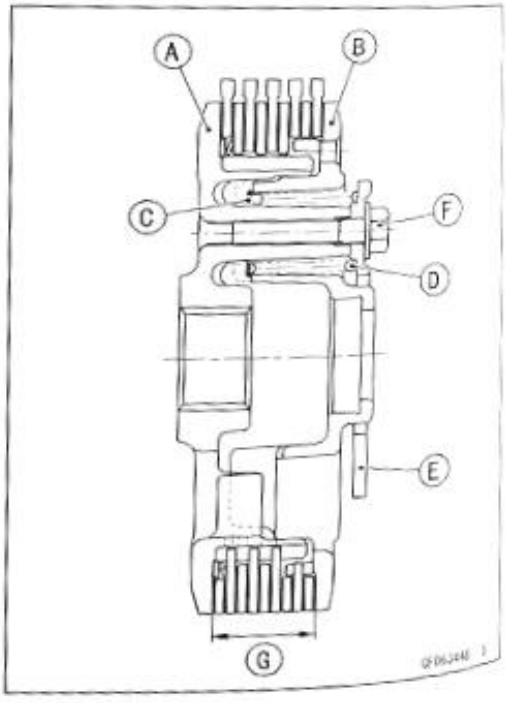
- Assemble the friction plates and steel plates (see Clutch Installation(6-13)).
- Assemble the following parts.
  Clutch Hub [A]
  Clutch Pressure Plate [B]
  Spring Seats [C]
  Clutch Springs [D]
  Clutch Stopper Plate [E]
  Clutch Stopper Bolts [F]

Torque - Clutch Stopper Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

- Measure the clutch plate assembly length [G].

Clutch Plate Assembly Length
22.42 – 23.42 mm (0.88 – 0.92 in.)

★If the length is not within the specified range, adjust the length (see Clutch Plate Assembly Length Adjustment(6-17)).



Clutch Plate Assembly Length Adjustment

- Inspect the clutch plate assembly length, and then replace the steel plate(s) which brings the length within the specified range.
- Remove:
  Clutch Spring Bolts
  Clutch Stopper Plates
  Clutch Springs
  Clutch Pressure Plate
  Spring Seats
- Replace the following steel plate(s).

Thickness	Part Number
1.6 mm (0.063 in.)	13089-0043
2.0 mm (0.079 in.) (STD)	13089-0041
2.3 mm (0.091 in.)	13089-0044

NOTE

○Do not use the steel plate of 1.6 mm (0.063 in.) and 2.3 mm (0.091 in.) thickness at the same time.
○When adjusting the clutch plate assembly, install the steel plate of 1.6 mm (0.063 in.) or 2.3 mm (0.091 in.) thickness to the second or third from the clutch pressure plate.

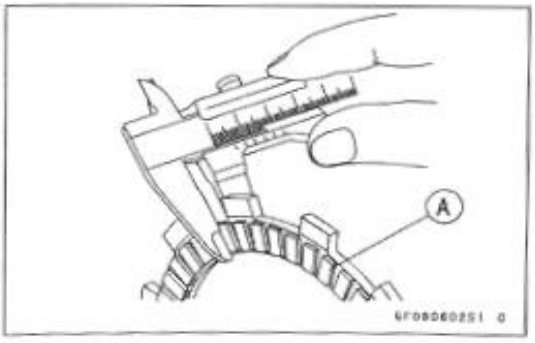
- Install the removed parts, and inspect the clutch plate assembly length.

Torque - Clutch Stopper Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

Clutch Plate, Wear, Damage Inspection

- Visually inspect the friction and steel plates for signs of seizure, overheating (discoloration), or uneven wear.
- Measure the thickness of each friction plate [A] at several points.

★If any plates show signs of damage, or if they have worn past the service limit, replace them with new ones.

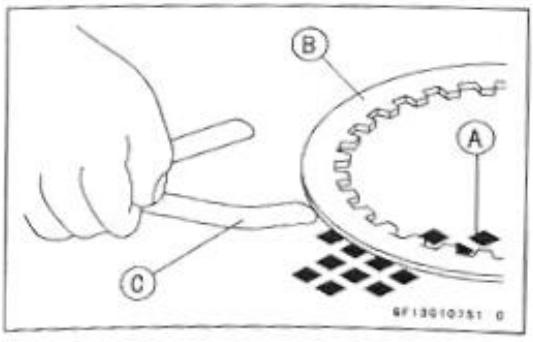


Friction Plate Thickness
Standard: **2.92 – 3.08 mm (0.115 – 0.121 in.)**
Service Limit: **2.6 mm (0.10 in.)**

Clutch Plate Warp Inspection

- Place each friction plate or steel plate on a surface plate and measure the gap between the surface plate [A] and each friction plate or steel plate [B] with a thickness gauge [C]. The gap is the amount of friction or steel plate warp.

★If any plate is warped over the service limit, replace it with a new one.



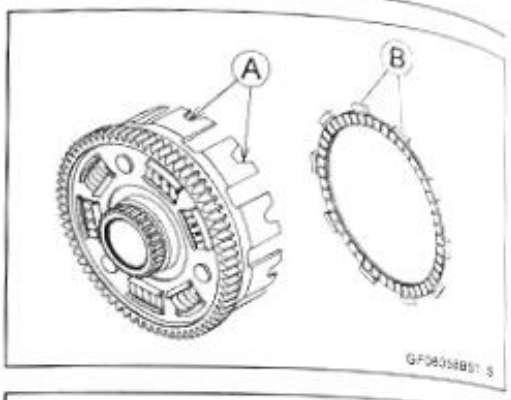
Friction and Steel Plate Warp
Standard: **0.15 mm (0.0059 in.) or less**
Service Limit: **0.3 mm (0.01 in.)**

Clutch

Clutch Housing Finger Inspection

- Visually inspect the clutch housing fingers [A] where the friction plate tangs [B] hit them.

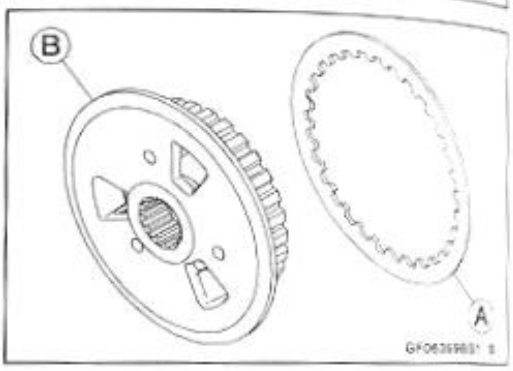
★If they are badly worn or if there are groove cuts where the tangs hit, replace the housing. Also, replace the friction plates if their tangs are damaged.



Clutch Housing Spline Inspection

- Visually inspect where the teeth on the steel plates [A] wear against the clutch hub splines [B].

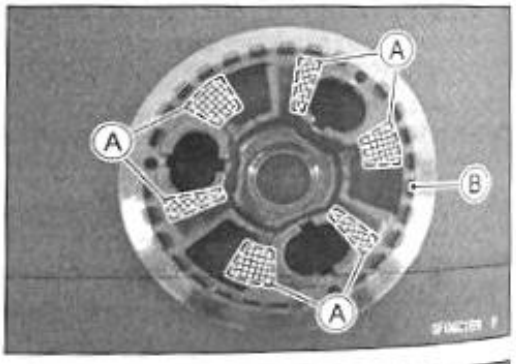
★If there are notches worn into the splines, replace the clutch hub. Also, replace the steel plates if their teeth are damaged.

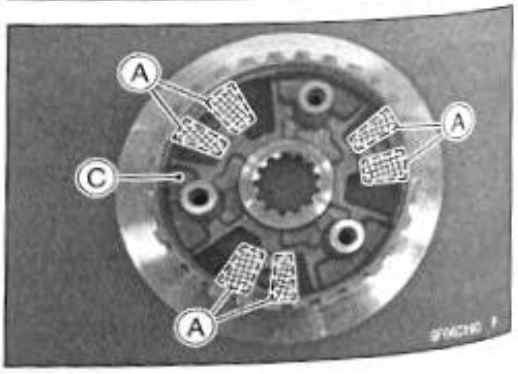


Clutch Pressure Plate and Clutch Hub Inspection

- Visually inspect the contact areas [A] of the clutch pressure plate [B] and clutch hub [C] for damage.

★If the contact areas are damaged replace them with new ones.





Clutch Spring Inspection

★If all the components are good, but the problem still exists, replace the clutch springs.

Engine Lubrication System

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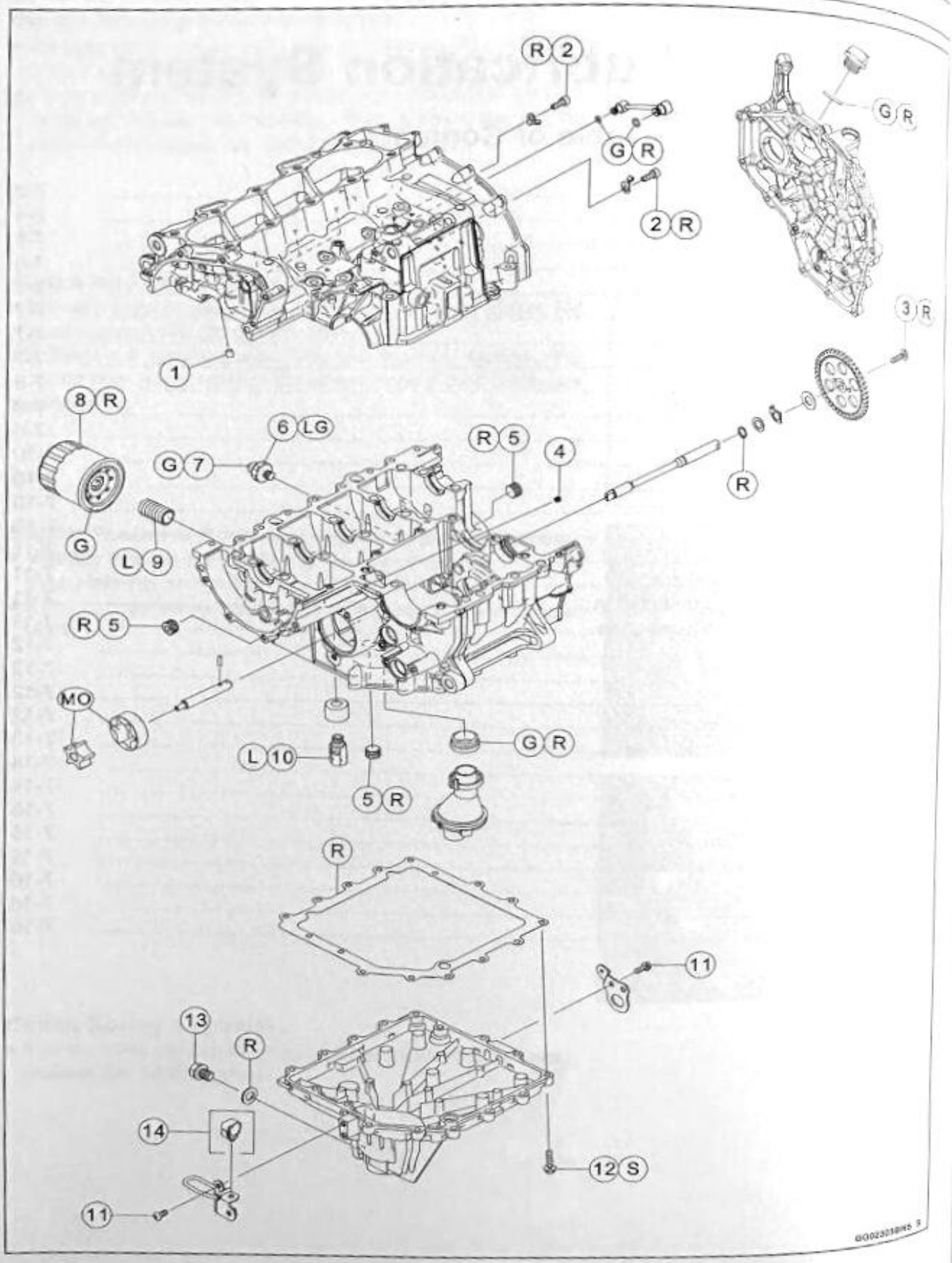
Exploded View

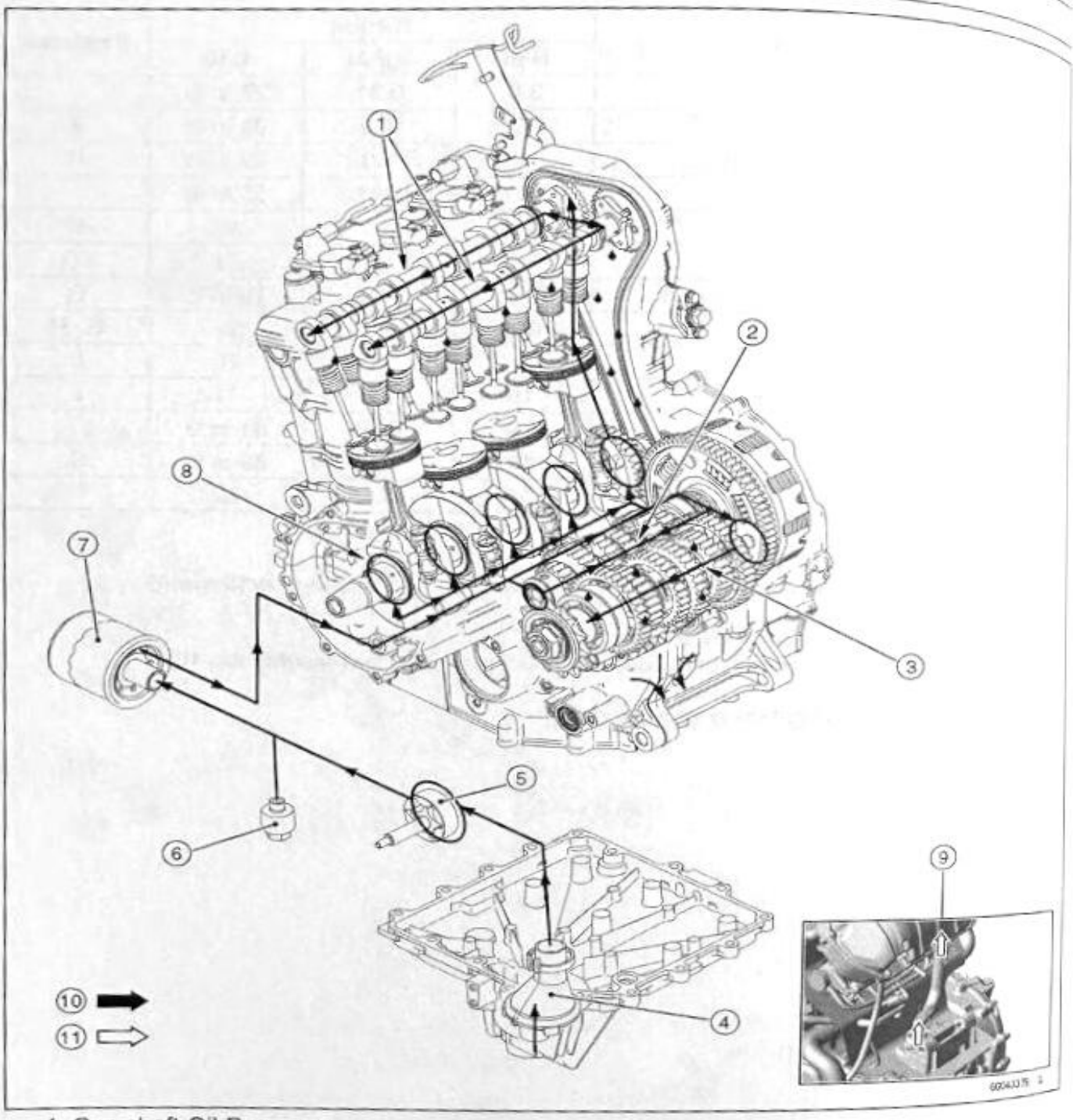


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Nozzles (M5)	3.0	0.31	27 in·lb	
2	Oil Pipe Holder Bolts	10	1.0	89 in·lb	R
3	Oil Pump Driven Gear Bolt	10	1.0	89 in·lb	R
4	Oil Nozzle (M6)	4.0	0.41	35 in·lb	
5	Oil Passage Plugs	20	2.0	15	R
6	Oil Pressure Switch	15	1.5	11	LG
7	Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
8	Oil Filter	17.5	1.78	12.9	G, R
9	Oil Filter Pipe	35	3.6	26	L
10	Oil Pressure Relief Valve	15	1.5	11	L
11	Oil Pan Bracket Bolts	6.9	0.70	61 in·lb	
12	Oil Pan Bolts	10	1.0	89 in·lb	S
13	Engine Oil Drain Bolt	30	3.1	22	

14. Equipped Models
G: Apply grease.
L: Apply a non-permanent locking agent (Middle strength: Loctite 243 or equivalent).
LG: Apply liquid gasket.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Engine Oil Flow Chart



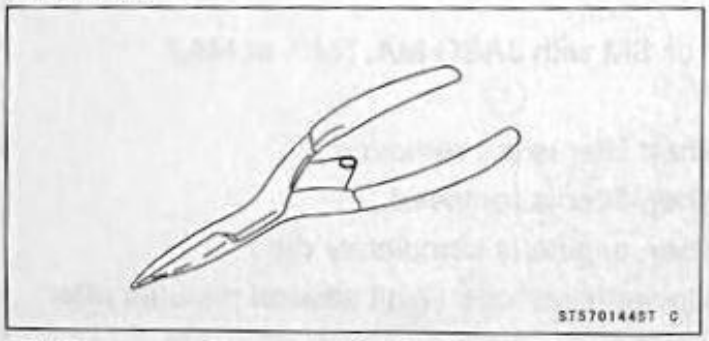
1. Camshaft Oil Passages
2. Drive Shaft Oil Passage
3. Output Shaft Oil Passage
4. Oil Screen
5. Oil Pump
6. Oil Pressure Relief Valve
7. Oil Filter
8. Crankshaft Oil Passage
9. Blowby Gas Flow
10. Engine Oil
11. Blowby Gas

Specifications

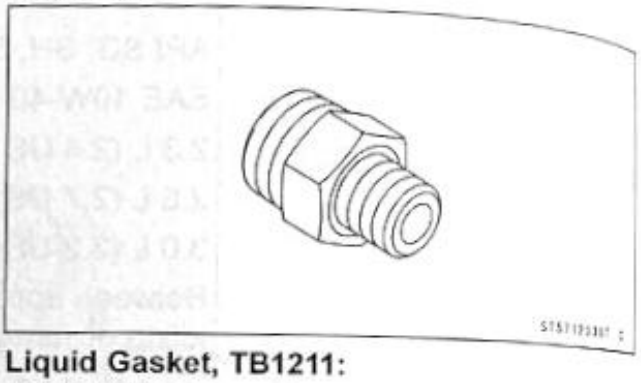
Item	Standard
Engine Oil	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	2.3 L (2.4 US qt) (When filter is not removed.) 2.6 L (2.7 US qt) (When filter is removed.) 3.0 L (3.2 US qt) (When engine is completely dry.)
Level	Between upper and lower level lines (Wait several minutes after idling or running)
Oil Pressure Measurement	
Oil Pressure	About 110 kPa (1.12 kgf/cm², 16.0 psi) @4 000 r/min (rpm), Oil Temperature 90°C (194°F)

Special Tools and Sealants

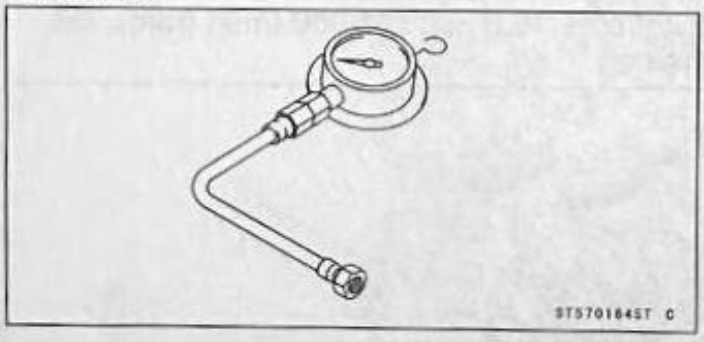
Outside Circlip Pliers:
57001-144



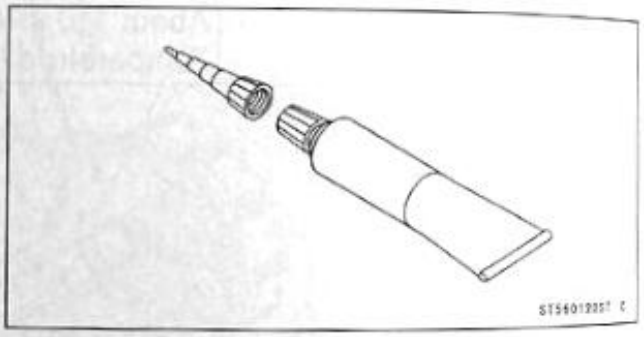
Oil Pressure Gauge Adapter, PT3/8:
57001-1233



Oil Pressure Gauge, 10 kgf/cm²:
57001-164



Liquid Gasket, TB1211:
56019-120



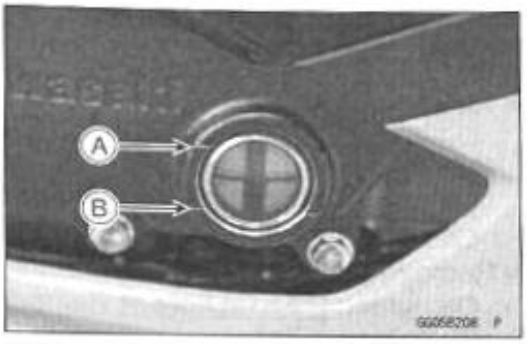
Engine Oil and Oil Filter

⚠ WARNING

Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

- Check that the engine oil level is between the upper [A] and lower [B] levels in the oil level inspection window.



NOTE

- *Situate the motorcycle so that it is perpendicular to the ground.*
- *If the motorcycle has just been used, wait several minutes for all the oil to drain down.*
- *If the oil has just been changed, start the engine and run it for several minutes at idle speed. This fills the oil filter with oil. Stop the engine, then wait several minutes until the oil settles.*

NOTICE

Racing the engine before the oil reaches every part can cause engine seizure.
If the engine oil gets extremely low or if the oil pump or oil passages clog up or otherwise do not function properly, the red warning indicator light and oil pressure warning indicator will light. If it stays on when the engine is running above idle speed, stop the engine immediately and find the cause.

★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.

★If the oil level is too low, add the correct amount of oil through the oil filler opening. Use the same type and make of oil that is already in the engine.

NOTE

- *If the engine oil type and make are unknown, use any brand of the specified oil to top off the level in preference to running the engine with the oil level low. Then at your earliest convenience, change the oil completely.*

Engine Oil Change

- Refer to the Engine Oil Change (see Engine Oil Change(2-35)).

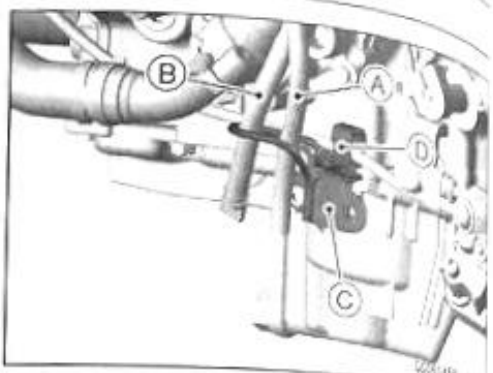
Oil Filter Replacement

- Refer to the Oil Filter Replacement (see Oil Filter Replacement(2-36)).

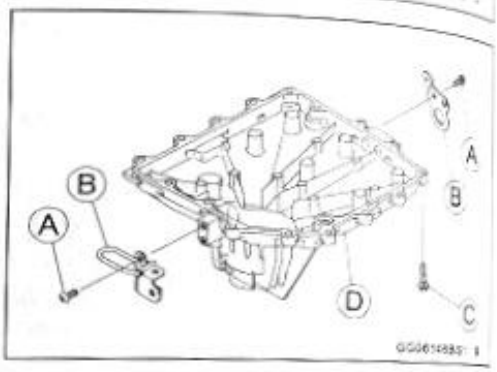
Oil Pan

Oil Pan Removal

- Remove:
  Exhaust Pipe (see Exhaust Pipe Removal(5-43))
- Free the air cleaner housing drain hose [A] and fuel tank drain hose [B] from the bracket [C].
- For quick shifter equipped models, open the clamp [D].

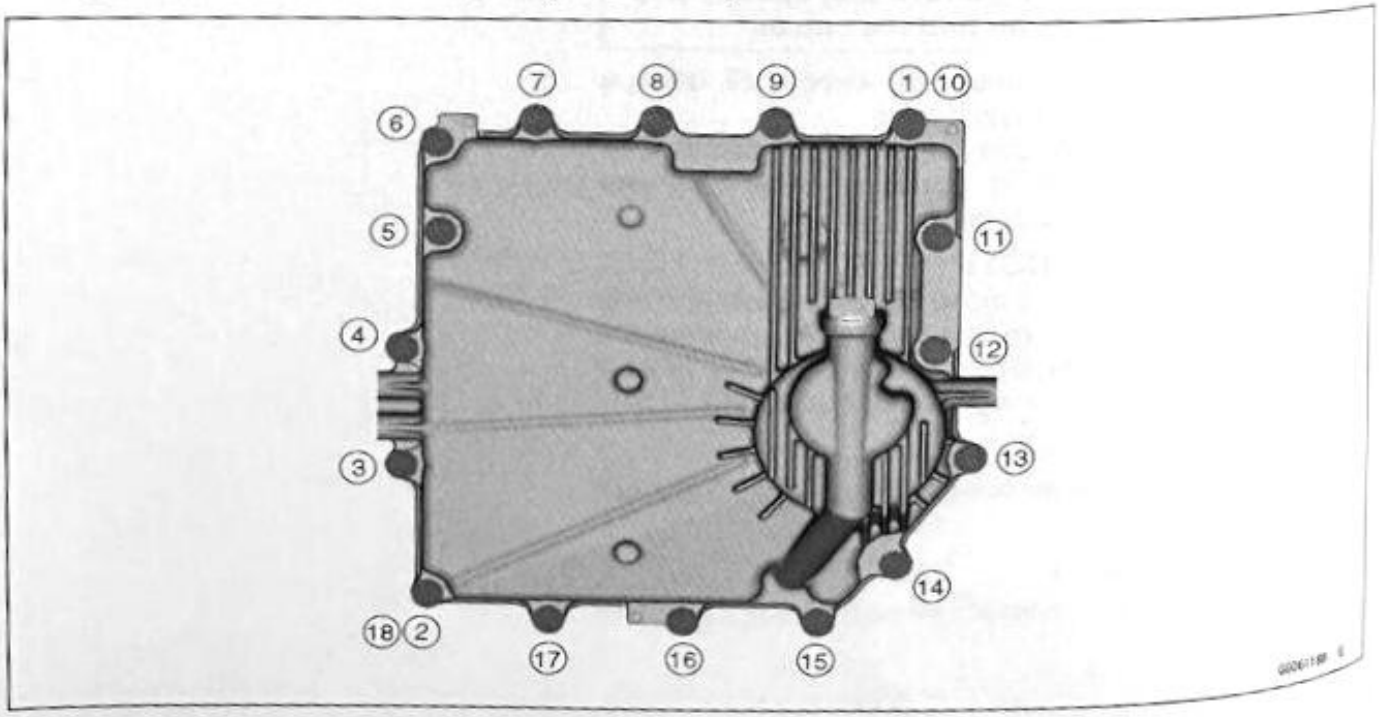


- Remove:
  Oil Pan Bracket Bolts [A]
  Oil Pan Brackets [B]
  Oil Pan Bolts [C]
  Oil Pan [D]
- Remove the following parts if necessary.
  Oil Screen (see Oil Screen Removal(7-10))
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal(7-11))



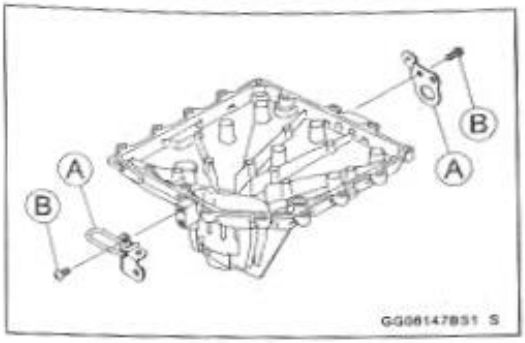
Oil Pan Installation

- Install the following parts if removed.
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Installation(7-11))
  Oil Screen (see Oil Screen Installation(7-10))
- Replace the oil pan gasket with a new one.
- Tighten the oil pan bolts following sequence [1 – 18].
  Torque - Oil Pan Bolts: 10 N·m (1.0 kgf-m, 89 in-lb)



Oil Pan

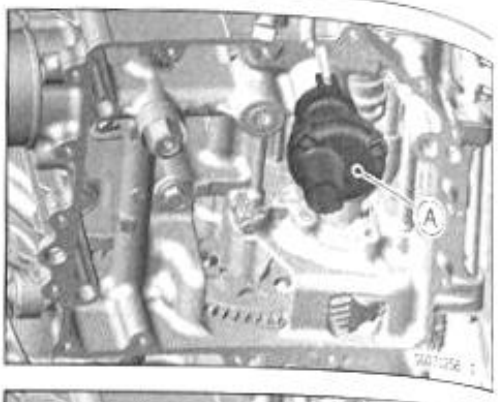
- Install:
  Oil Pan Brackets [A]
- Tighten:
  Torque - Oil Pan Bracket Bolts [B]: 6.9 N·m (0.70 kgf·m, 61 in·lb)
- Run the hose and lead correctly (see Cable, Wire, and Hose Routing section (18-2)).



- Install the removed parts.

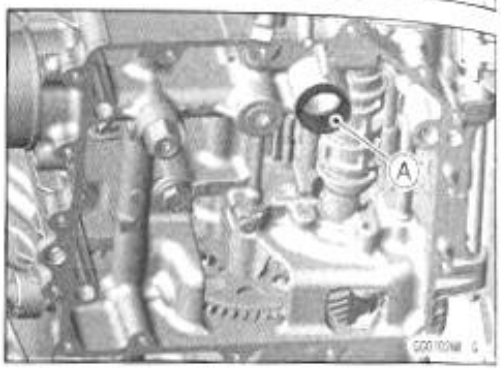
Oil Screen

Oil Screen Removal



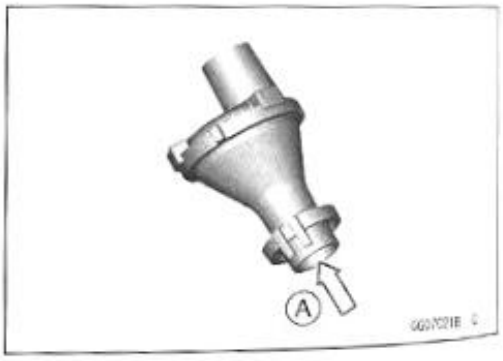
- Remove:
  Oil Pan (see Oil Pan Removal(7-8))
  Oil Screen [A]

Oil Screen Installation



- Clean the oil screen (see Oil Screen Cleaning(7-10)).
- Replace the O-ring [A] with a new one, and install it.
- Apply grease to the O-ring.
- Install:
  Oil Screen
  Oil Pan (see Oil Pan Installation(7-8))

Oil Screen Cleaning



- Remove the oil screen (see Oil Screen Removal(7-10)).
- Clean the oil screen with a high flash-point solvent and remove the particles stuck.
- Blow away the particles by applying compressed air [A] from the inside to the outside (from the clean side to the dirty side).

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the screen.

NOTE

○*While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

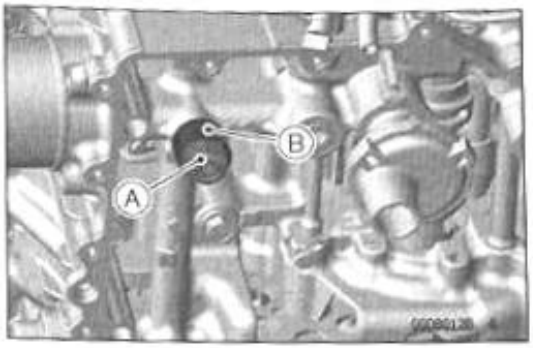
- Check the oil screen carefully for any damage.

★If the screen is damaged, replace the oil screen.

Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal

- Remove:
  Oil Pan (see Oil Pan Removal(7-8))
  Oil Pressure Relief Valve [A]
  Cover [B]



Oil Pressure Relief Valve Installation

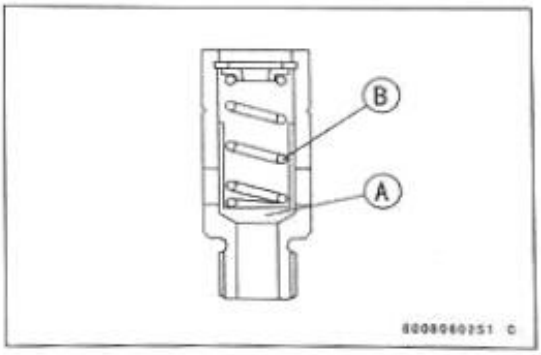
- Apply a non-permanent locking agent (Middle strength: Loctite 243 or equivalent) to the threads of the oil pressure relief valve.
- Install the oil pressure relief valve with the cover.
- Tighten:

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the removed parts.

Oil Pressure Relief Valve Inspection

- Check to see if the valve [A] slides smoothly when pushing it in with a wooden or other soft rod, and see if it comes back to its seat by spring [B] pressure.



NOTE

Inspect the valve in its assembled state. Disassembly and assembly may change the valve performance.

★If any rough spots are found during above inspection, wash the valve clean with a high flash-point solvent and blow out any foreign particles that may be in the valve with compressed air.

⚠ WARNING

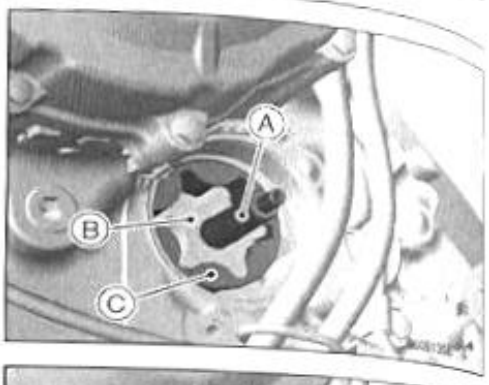
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the oil pressure relief valve.

★If cleaning does not solve the problem, replace the oil pressure relief valve as an assembly. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

Oil Pump

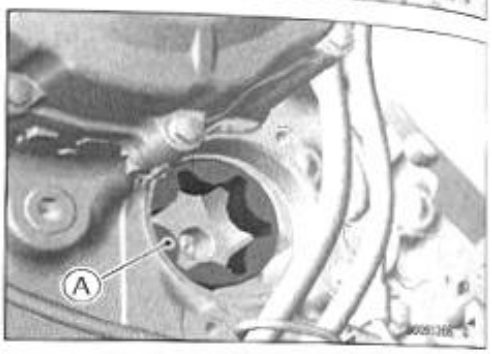
Oil Pump Removal

- Remove:
  Water Pump (see Water Pump Removal(4-10))
  Oil (Water) Pump Shaft [A] with Inner Rotor [B]
  Outer Rotor [C]

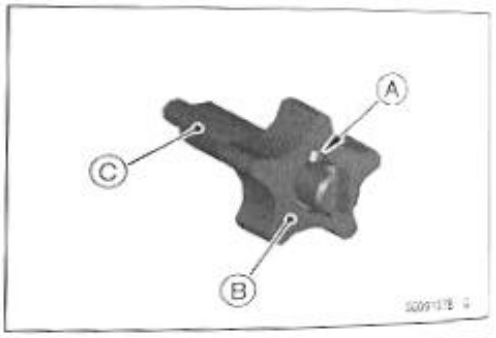


Oil Pump Installation

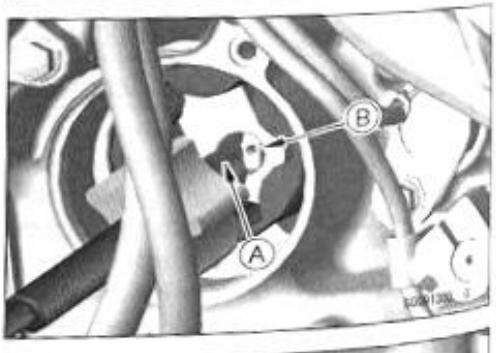
- Install the outer rotor [A] into the crankcase.



- Assemble the pin [A], inner rotor [B] and oil (water) pump shaft [C].



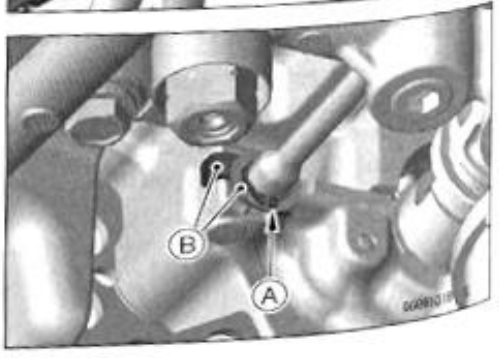
- Apply molybdenum disulfide oil solution to the mating surface of the outer rotor and the inner rotor.
- Turn the pump shaft so that the slot [A] in its shaft fits onto the projection [B] of the pump drive gear shaft.
- Install the removed parts.



Oil Pump Driven Gear Removal

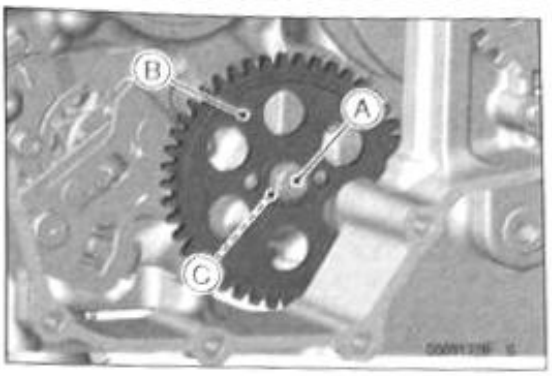
- Remove:
  Clutch (see Clutch Removal(6-12))
  Oil Pan (see Oil Pan Removal(7-8))
  Circlip [A] and Washers [B]

  Special Tool - Outside Circlip Pliers: 57001-144



Oil Pump

- Remove:
  Oil Pump Driven Gear Bolt [A]
  Oil Pump Driven Gear [B]
  Washer [C]



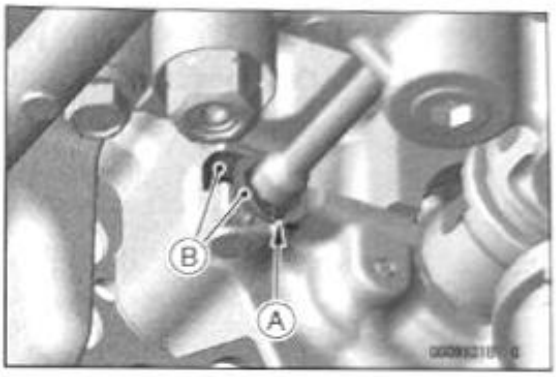
Oil Pump Driven Gear Installation

- Apply molybdenum disulfide oil solution to the hole of the oil pump driven gear shaft in the crankcase.
- Replace the circlip [A] with a new one.
- Insert the oil pump driven gear shaft to the lower crankcase.

OFit the projection on the shaft and oil (water) pump shaft slot.

- Install the washers [B] and circlip as shown.

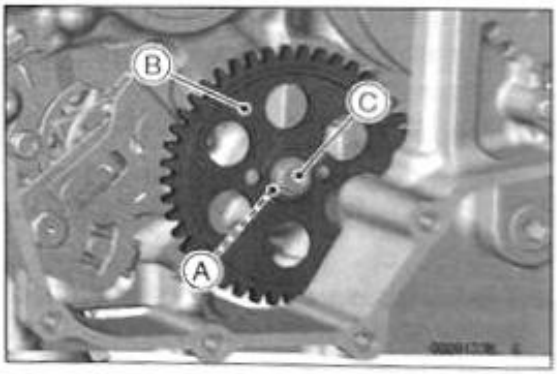
Special Tool - Outside Circlip Pliers: 57001-144



- Install the washer [A] and the oil pump driven gear [B].
- Replace the oil pump driven gear bolt [C] with a new one.
- Hold the oil pump driven gear steady and tighten the oil pump driven gear bolt.

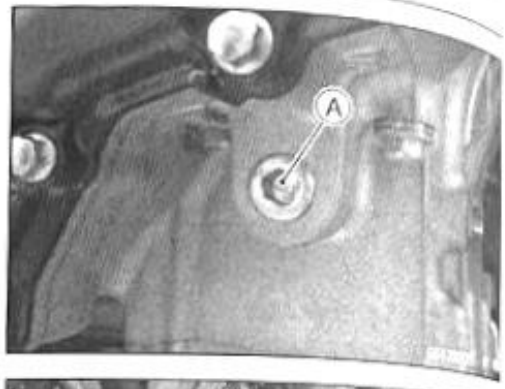
Torque - Oil Pump Driven Gear Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the removed parts.

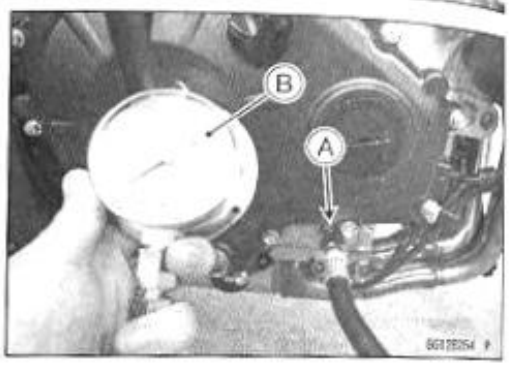


Oil Pressure Measurement

Oil Pressure Measurement



- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
  Oil Passage Plug [A]



- Attach the adapter [A] and gauge [B] to the plug hole.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, PT3/8: 57001 -1233

- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge.

Oil Pressure
Standard: About 110 kPa (1.12 kgf/cm², 16.0 psi) @4 000 r/min (rpm), oil temperature 90°C (194°F)

★If the oil pressure is much lower than the standard, check the oil pump, relief valve, and/or crankshaft bearing insert wear immediately.

★If the reading is much higher than the standard, check the oil passages for clogging.

- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Replace the oil passage plug with a new one.

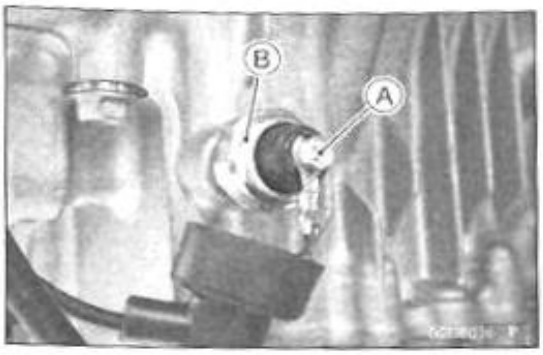
Torque - Oil Passage Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Install the right lower fairing (see Lower Fairing Installation(15-19)).

Oil Pressure Switch

Oil Pressure Switch Removal

- Drain the engine oil (see Engine Oil Change(2-35)).
- Remove the right lower fairing (see Lower Fairing Removal(15-18)).
- Slide the switch cover.
- Remove:
  Oil Pressure Switch Terminal Bolt [A]
  Oil Pressure Switch [B]



Oil Pressure Switch Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the threads of the oil pressure switch and tighten it.

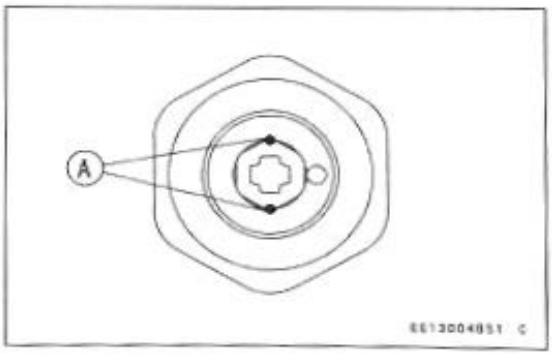
Sealant - Liquid Gasket, TB1211: 56019-120

Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Apply a thin coat of grease to the both sides of the terminal.

NOTE

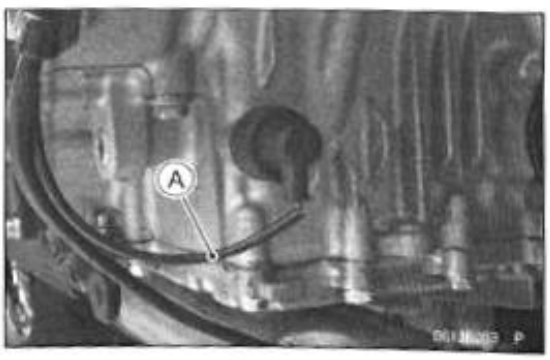
○*The applied grease should not close the two breather holes [A] for switch diaphragm.*



- Install the switch lead [A] to the switch terminal as shown.
- Tighten:

Torque - Oil Pressure Switch Terminal Bolt: 2.0 N·m (0.20 kgf·m, 18 in·lb)

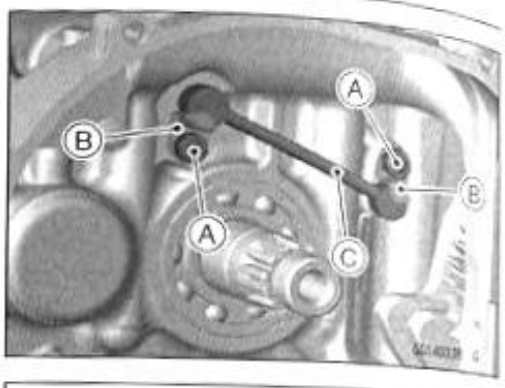
- Install the switch cover.
- Install the removed parts.



Oil Pipe

Oil Pipe Removal

- Remove:
  Clutch (see Clutch Removal(6-12))
  Oil Pipe Holder Bolts [A]
  Oil Pipe Holders [B]
  Oil Pipe [C]

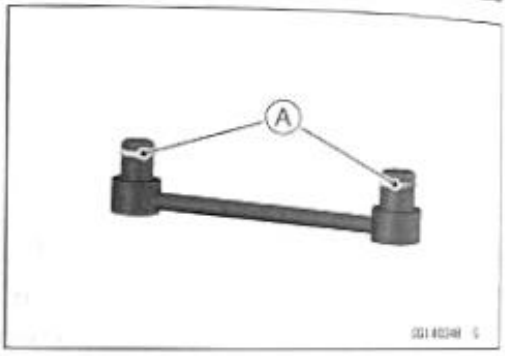


Oil Pipe Installation

- Installation is reverse of removal.
- Replace the O-rings [A] and oil pipe holder bolts with new ones.
- Apply grease to the O-rings, and install them.
- Tighten:

  Torque - Oil Pipe Holder Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the removed parts.



Engine Removal/Installation

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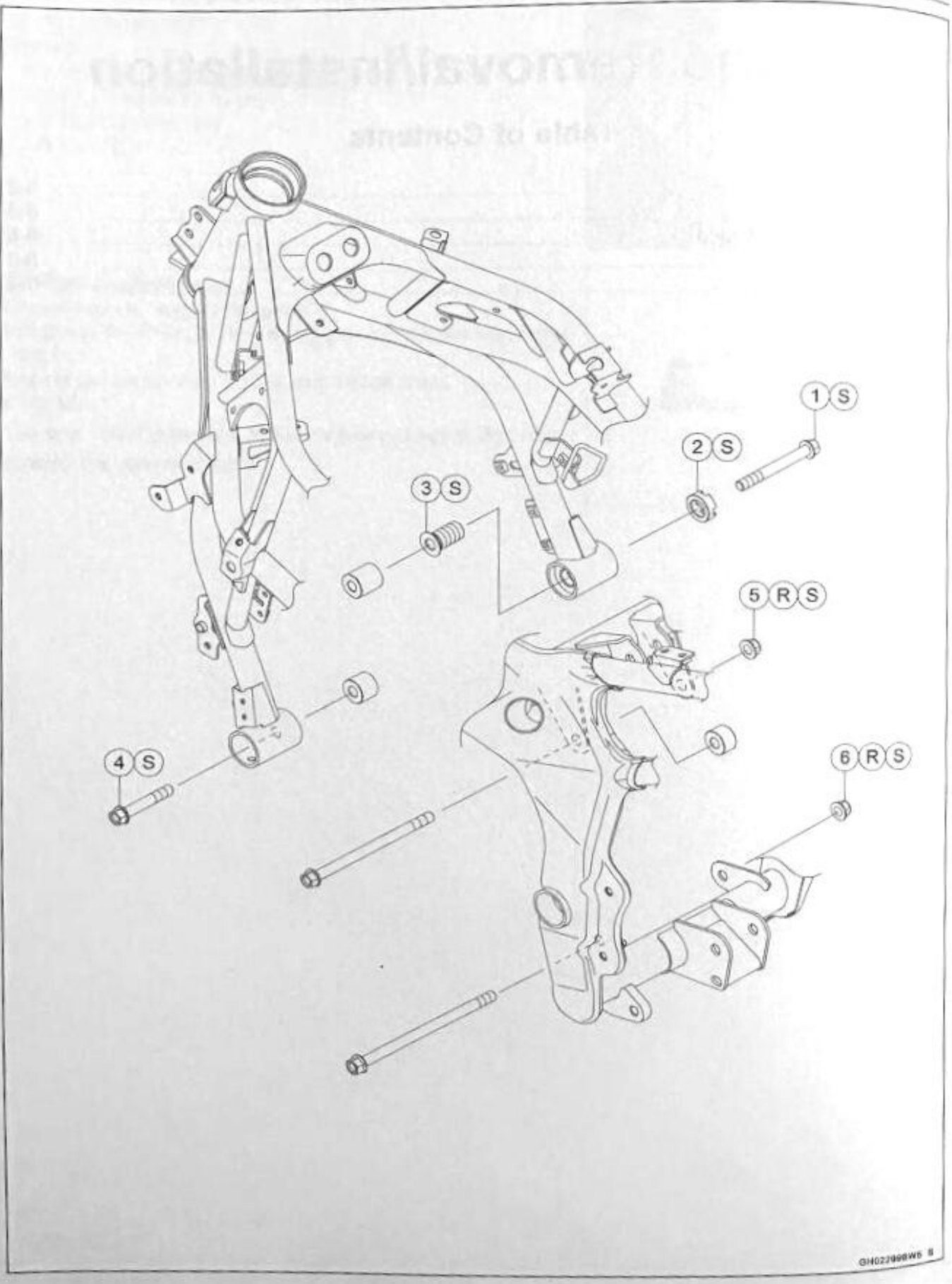
Exploded View



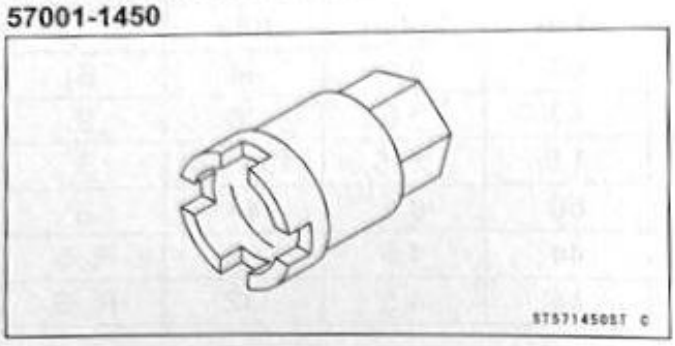
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Mounting Bolt (Front Right)	60	6.1	44	S
2	Adjusting Collar Locknut	49	5.0	36	S
3	Adjusting Collar	1.5	0.15	13 in·lb	S
4	Engine Mounting Bolt (Front Left)	60	6.1	44	S
5	Engine Mounting Nut (Middle)	44	4.5	32	R, S
6	Engine Mounting Nut (Lower)	44	4.5	32	R, S

R: Replacement Parts
S: Follow the specified tightening sequence.

Special Tool

Engine Mount Nut Wrench:
57001-1450



Engine Removal/Installation

Engine Removal

- Support the rear part of the swingarm with a stand.
- Squeeze the brake lever slowly and hold it with a band [A].

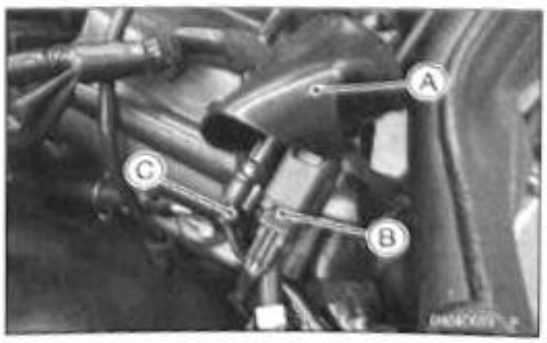
⚠ WARNING

Motorcycle may fall over unexpectedly resulting in an accident or injury. Be sure to hold the front brake when removing the engine.

NOTICE

Be sure to hold the front brake when removing the engine, or the motorcycle may fall over. The engine or the motorcycle could be damaged.

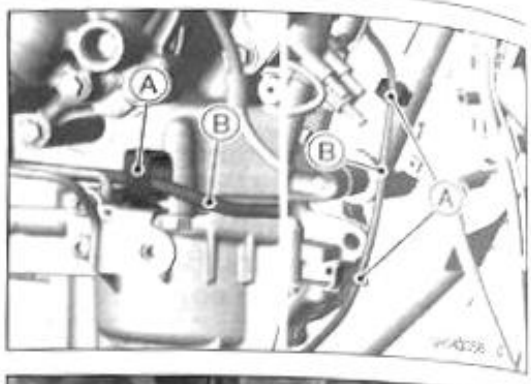
- Drain:
  Engine Oil (see Engine Oil Change(2-35))
  Coolant (see Coolant Change(2-25))
- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal(3-27))
  Clutch Cable Lower End (see Clutch Cable Removal(6-6))
  Radiator (see Radiator and Radiator Fan Removal(4-14))
  Exhaust Pipe (see Exhaust Pipe Removal(5-43))
  Shift Lever (see Shift Pedal Removal(9-28))
  Engine Sprocket (see Engine Sprocket Removal(11-10))
- Disconnect:
  Stick Coil Connectors (see Stick Coil Removal(16-34))
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal(17-64))
  Starter Motor Cable (see Starter Motor Removal(16-41))
  Crankshaft Sensor/Oil Pressure Switch Connector (see Crankshaft Sensor Removal(16-31))
  Alternator Connector (see Alternator Cover Removal(16-23))
  Air Switching Valve Connector (see Air Switching Valve Removal(5-12))
  Quick Shifter Sensor Connector (Equipped Models) (see Shift Pedal Removal(9-28))



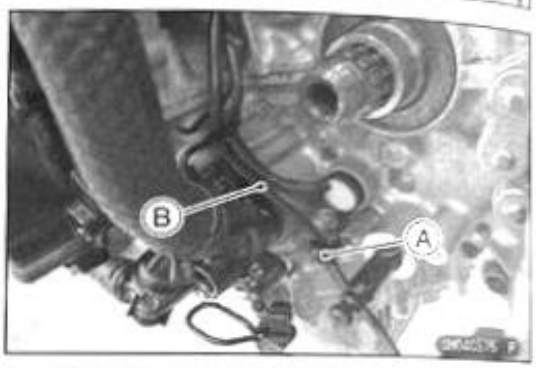
- Slide the dust cover [A].
- Disconnect:
  Gear Position Sensor Connector [B]
  Side Stand Switch Connector [C]

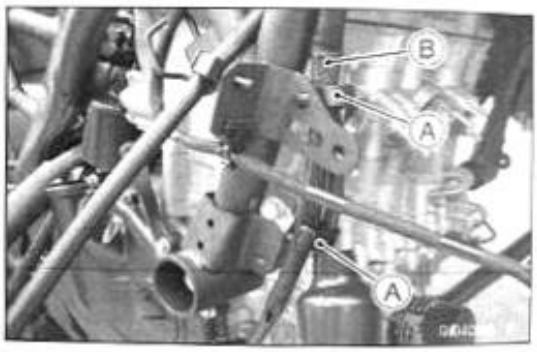
Engine Removal/Installation

- For quick shifter equipped models, open the clamps [A] to free the lead [B].

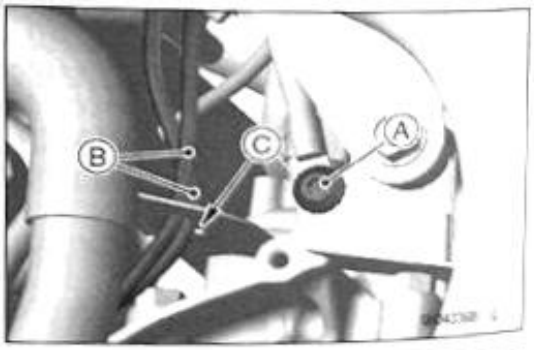


- Open the clamps [A] to free the leads [B].





- Remove the engine ground cable terminal bolt [A].
- Free the leads [B] from the hole [C].

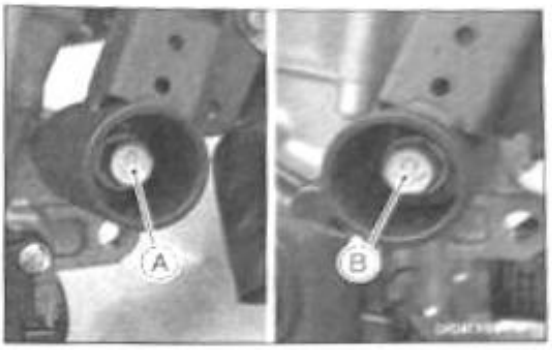


- Free [A] the heat insulation plate from the frame.

Engine Removal/Installation

• Support the engine with a suitable stand [A].
○Put a plank [B] onto the suitable stand for engine balance.

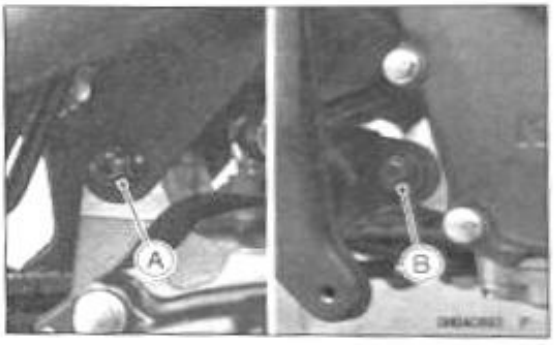
• Remove:
Engine Mounting Bolt (Front Right) [A] and Collar
Engine Mounting Bolt (Front Left) [B] and Collar



• Remove:
Engine Mounting Nut (Middle) [A]
Engine Mounting Nut (Lower) [B]

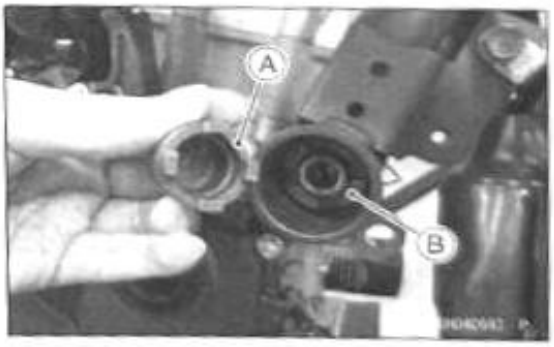
NOTE

○*Hold the mounting bolt not to turn when loosening the engine mounting nuts (middle and lower).*



• Using the engine mount nut wrench [A], loosen the lock-nuts [B].

Special Tool - Engine Mount Nut Wrench: 57001-1450



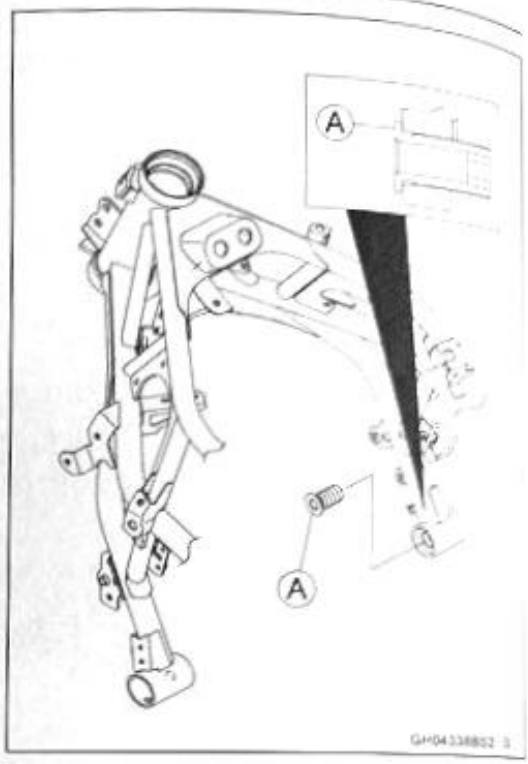
• Using the Hexagon Wrench, turn the adjusting collar [A] counterclockwise to make the gap between the engine and adjusting collar.

• Pull out the engine mounting bolts and remove the collar.
• Using the stand, take out the engine.

Engine Removal/Installation

Engine Installation

- Install the adjusting collar [A] to the frame until end of the threads.



- Replace the engine mounting nuts with new ones.
- Support the engine with a suitable stand.

○Put a plank onto the suitable stand for engine balance.
○Support the engine until all bolts have been tightened.

- Install the engine mounting bolts and nuts, following the specified installing sequence.

○First, insert the collar (L = 15 mm) [A] between the frame and the engine and penetrate the engine mounting bolt (Middle) [B] and the engine mounting bolt (Lower) [C].
○Second, insert the collar (L = 20 mm) [D] and tighten the engine mounting bolt (Front Left) [E] temporarily.
○Third, tighten the engine mounting nut (Lower) [F] temporarily.
○Fourth, tighten the engine mounting nut (Middle) [G] temporarily.
○Fifth, insert the collar (L = 27.5 mm) [H] between the frame and the engine and penetrate the engine mounting bolt (Front Right) [I].
○Sixth, tighten the engine mounting nut (Lower) [F].

Torque - Engine Mounting Nut (Lower): 44 N·m (4.5 kgf·m, 32 ft·lb)

○Seventh, tighten the engine mounting nut (Middle) [G].

Torque - Engine Mounting Nut (Middle): 44 N·m (4.5 kgf·m, 32 ft·lb)

○Eighth, tighten the engine mounting bolt (Front Left) [E].

Torque - Engine Mounting Bolt (Front Left): 60 N·m (6.1 kgf·m, 44 ft·lb)

○Ninth, remove the engine mounting bolt (Front Right) [I] and tighten the adjusting collar [J] until the collar touches the engine.

Torque - Adjusting Collar: 1.5 N·m (0.15 kg·fm, 13 in·lb)

○Tenth, tighten the adjusting collar locknut [K].

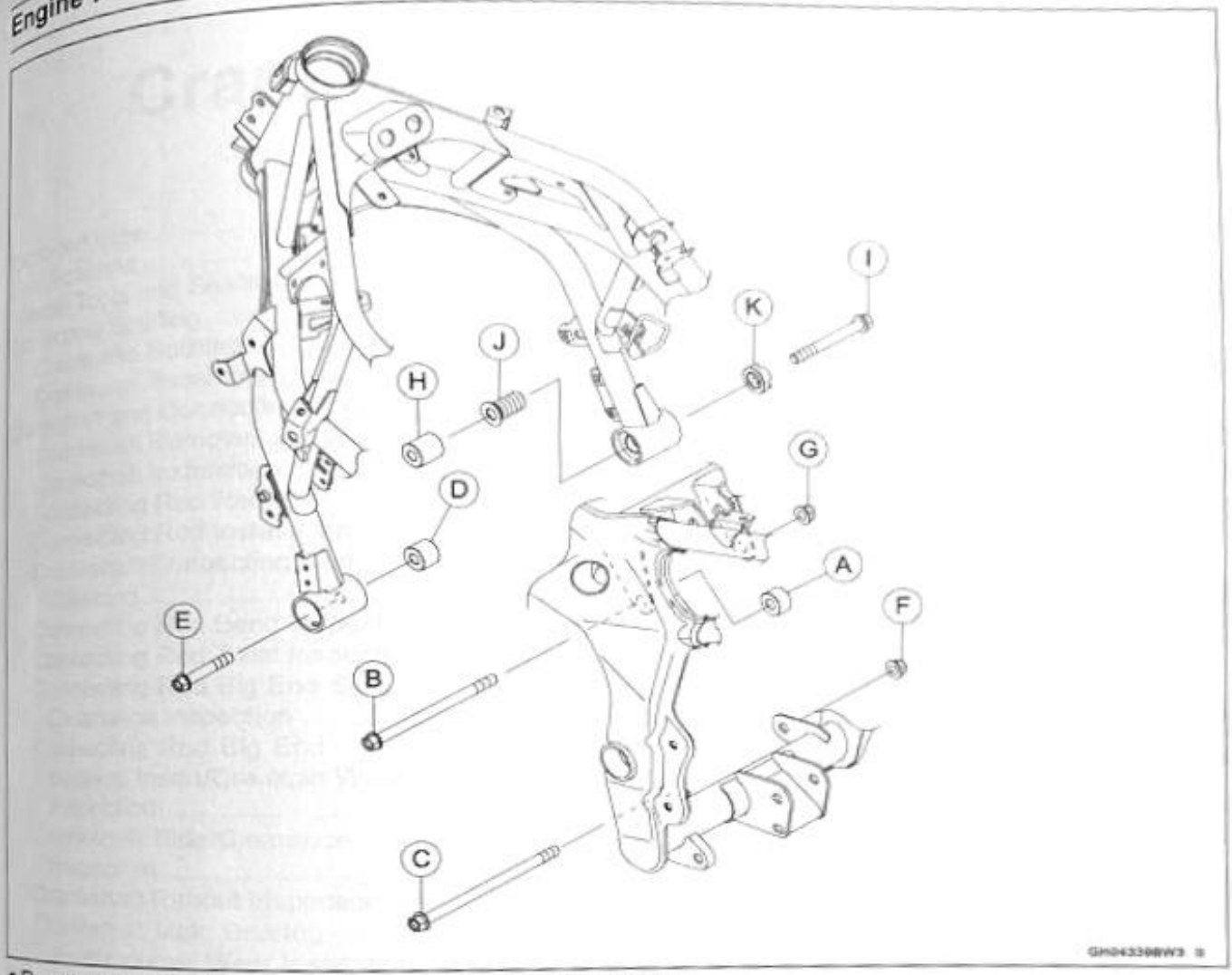
Special Tool - Engine Mount Nut Wrench: 57001-1450

Torque - Adjusting Collar Locknut: 49 N·m (5.0 kg·fm, 36 ft·lb)

○Eleventh, install the engine mounting bolt (Front Right) [I] and tighten it.

Torque - Engine Mounting Bolt (Front Right): 60 N·m (6.1 kgf·m, 44 ft·lb)

Engine Removal/Installation



- Run the leads, cables and hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.
- Adjust:
  Clutch Cable (see Clutch Operation Inspection (2-34))
  Drive Chain (see Drive Chain Slack Adjustment(2-39))
- Fill the engine with engine oil (see Engine Oil Change(2-35)).
- Fill the engine with coolant (see Coolant Change(2-25)).

Crankshaft/Transmission

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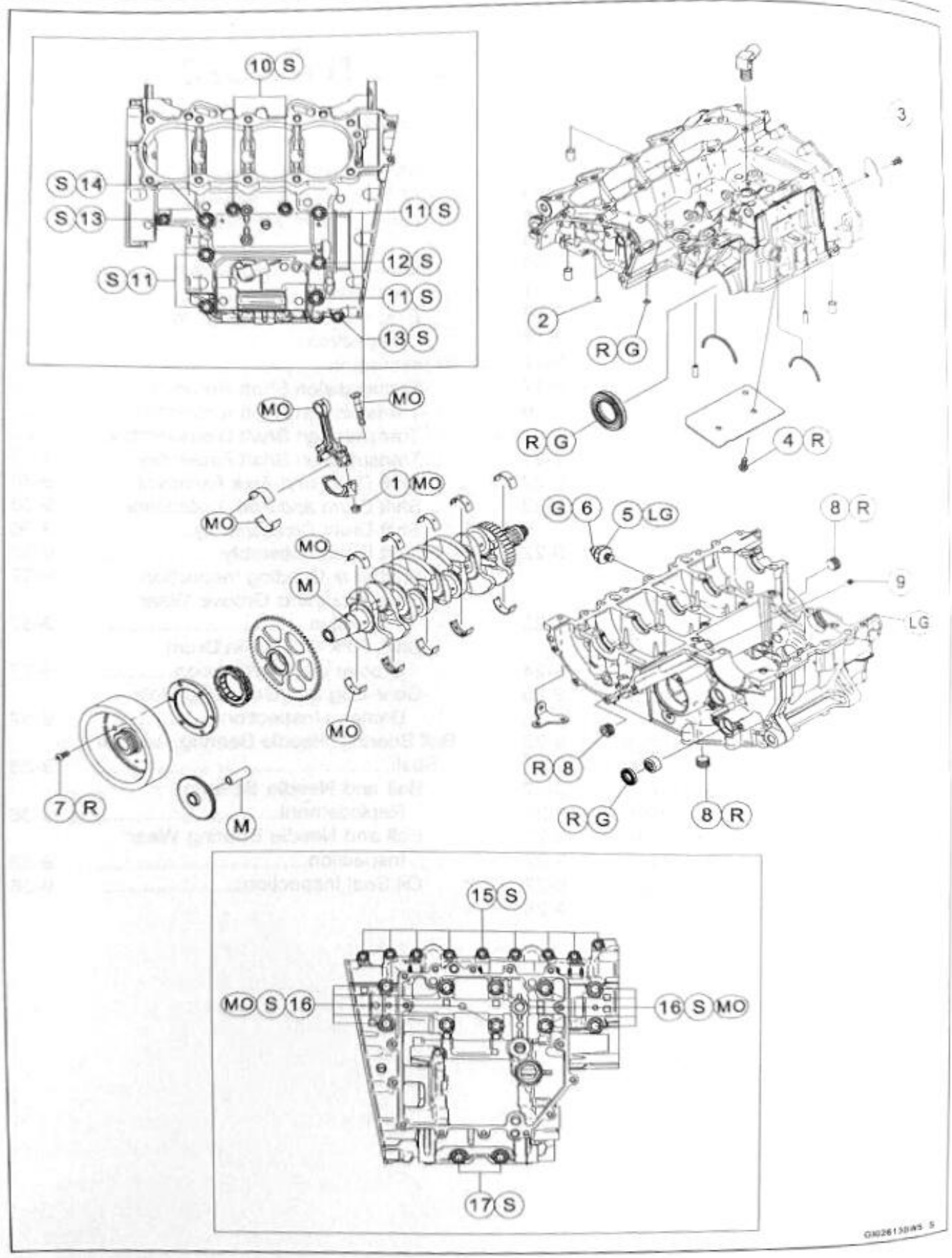
Exploded View

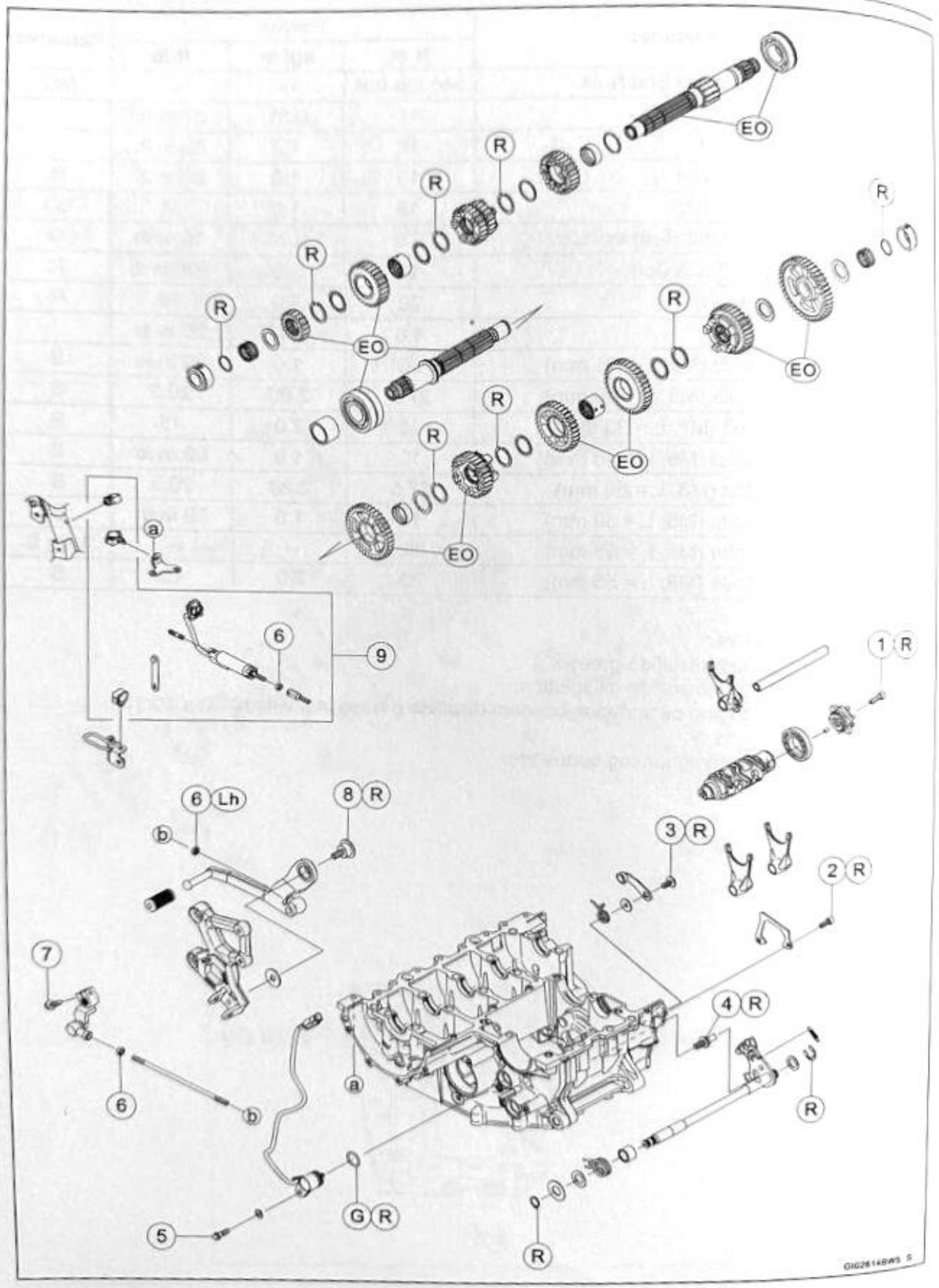


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connecting Rod Big End Nuts	see the text	←	←	MO
2	Oil Nozzles (M5)	3.0	0.31	27 in·lb	
3	Side Oil Plate Bolt	10	1.0	89 in·lb	
4	Breather Plate Bolts	10	1.0	89 in·lb	R
5	Oil Pressure Switch	15	1.5	11	LG
6	Oil Pressure Switch Terminal Bolt	2.0	0.20	18 in·lb	G
7	Starter Motor Clutch Bolts	12	1.2	106 in·lb	R
8	Oil Passage Plugs	20	2.0	15	R
9	Oil Nozzle (M6)	4.0	0.41	35 in·lb	
10	Crankcase Bolts (M6, L = 55 mm)	10	1.0	89 in·lb	S
11	Crankcase Bolts (M8, L = 80 mm)	27.5	2.80	20.3	S
12	Crankcase Bolt (M7, L = 80 mm)	20	2.0	15	S
13	Crankcase Bolts (M6, L = 40 mm)	10	1.0	89 in·lb	S
14	Crankcase Bolt (M8, L = 50 mm)	27.5	2.80	20.3	S
15	Crankcase Bolts (M6, L = 30 mm)	10	1.0	89 in·lb	S
16	Crankcase Bolts (M8, L = 95 mm)	see the text	←	←	MO, S
17	Crankcase Bolts (M8, L = 55 mm)	20	2.0	15	S

G: Apply grease.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Shift Drum Cam Holder Bolt	12	1.2	106 in·lb	R
2	Shift Drum Bearing Holder Bolts	10	1.0	89 in·lb	R
3	Gear Positioning Lever Bolt	10	1.0	89 in·lb	R
4	Shift Shaft Return Spring Pin	29	3.0	21	R
5	Gear Position Sensor Bolt	10	1.0	89 in·lb	
6	Shift Lever Tie-rod Locknuts	7.0	0.71	62 in·lb	Lh (1)
7	Shift Lever Bolt	9.8	1.0	87 in·lb	
8	Shift Pedal Bolt	25	2.5	18	R

9. Equipped Models
EO: Apply engine oil.
G: Apply grease.
Lh: Left-hand Threads
R: Replacement Parts

Specifications

Item	Standard	Service Limit
Crankcase, Crankshaft/Connecting Rods		
Connecting Rod Bend	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Twist	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Big End:		
Side Clearance	0.33 – 0.58 mm (0.0130 – 0.0228 in.)	0.8 mm (0.03 in.)
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.045 – 0.077 mm (0.0018 – 0.0030 in.)	0.11 mm (0.0043 in.)
Crankpin Diameter:	29.984 – 30.000 mm (1.1805 – 1.1811 in.)	29.97 mm (1.180 in.)
Marking:		
None	29.984 – 29.992 mm (1.1805 – 1.18079 in.)	– – –
○	29.993 – 30.000 mm (1.18082 – 1.1811 in.)	– – –
Connecting Rod Big End Inside Diameter:	33.000 – 33.016 mm (1.2992 – 1.2998 in.)	– – –
Marking:		
None	33.000 – 33.008 mm (1.2992 – 1.29952 in.)	– – –
○	33.009 – 33.016 mm (1.29956 – 1.2998 in.)	– – –
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.475 – 1.480 mm (0.05807 – 0.05827 in.)	– – –
Black	1.480 – 1.485 mm (0.05827 – 0.05846 in.)	– – –
Blue	1.485 – 1.490 mm (0.05846 – 0.05866 in.)	– – –
Connecting Rod Bolt Stretch	(Usable Range) 0.28 – 0.38 mm (0.0110 – 0.0150 in.)	– – –
Crankshaft Side Clearance	0.09 – 0.19 mm (0.0035 – 0.0075 in.)	0.39 mm (0.0154 in.)
Crankshaft #2 Main Journal Width	18.49 – 18.54 mm (0.728 – 0.730 in.)	– – –
Crankshaft Runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.05 mm (0.0020 in.)
Crankshaft Main Bearing Insert/Journal Clearance	0.029 – 0.063 mm (0.0011 – 0.0025 in.)	0.09 mm (0.0035 in.)
Crankshaft Main Journal Diameter:	29.984 – 30.000 mm (1.1805 – 1.1811 in.)	29.96 mm (1.1795 in.)
Marking:		
None	29.984 – 29.992 mm (1.1805 – 1.18079 in.)	– – –
1	29.993 – 30.000 mm (1.18082 – 1.1811 in.)	– – –
Crankcase Main Bearing Bore Diameter:	33.000 – 33.016 mm (1.2992 – 1.2998 in.)	– – –
Marking:		
○	33.000 – 33.008 mm (1.2992 – 1.29952 in.)	– – –
None	33.009 – 33.016 mm (1.29956 – 1.2998 in.)	– – –

Specifications

Item	Standard	Service Limit
Crankshaft Main Bearing Insert Thickness:		
Brown	1.491 – 1.495 mm (0.05870 – 0.05886 in.)	– – –
Black	1.495 – 1.499 mm (0.05886 – 0.05902 in.)	– – –
Blue	1.499 – 1.503 mm (0.05902 – 0.05917 in.)	– – –
Transmission		
Shift Fork Ear Thickness	4.9 – 5.0 mm (0.19 – 0.20 in.)	4.8 mm (0.19 in.)
Shifter Groove Width	5.05 – 5.15 mm (0.199 – 0.203 in.)	5.3 mm (0.21 in.)
Shift Fork Guide Pin Diameter	5.9 – 6.0 mm (0.23 – 0.24 in.)	5.8 mm (0.23 in.)
Shift Drum Groove Width	6.05 – 6.20 mm (0.238 – 0.244 in.)	6.3 mm (0.25 in.)

Connecting Rod Big End Bearing Insert Selection

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-1181
None	None	Black	92139-1180
○	○		
○	None	Blue	92139-1179

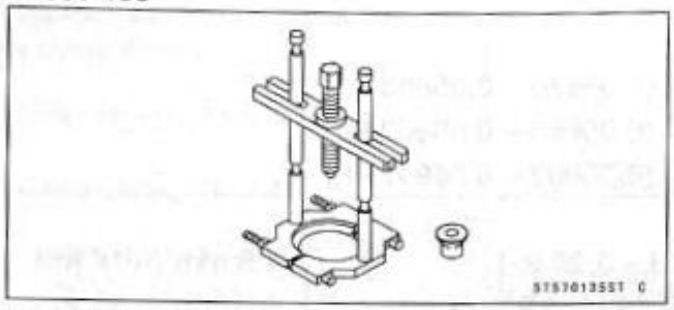
Crankshaft Main Bearing Insert Selection

Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-1187	2, 4
			92139-1184	1, 3, 5
None	1	Black	92139-1186	2, 4
○	None		92139-1183	1, 3, 5
None	None	Blue	92139-1185	2, 4
			92139-1182	1, 3, 5

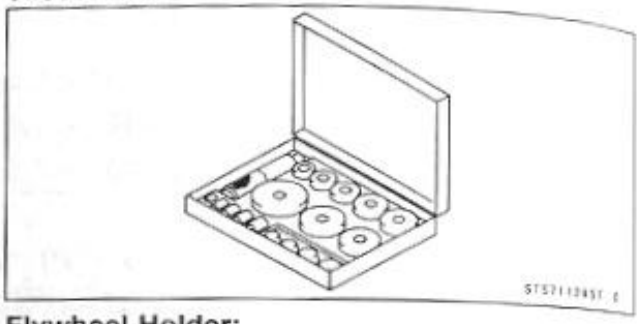
*: The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

Special Tools and Sealants

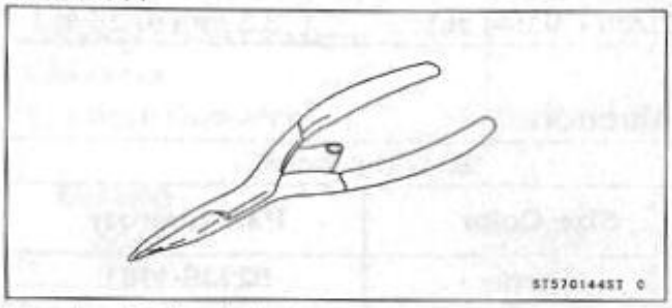
Bearing Puller:
57001-135



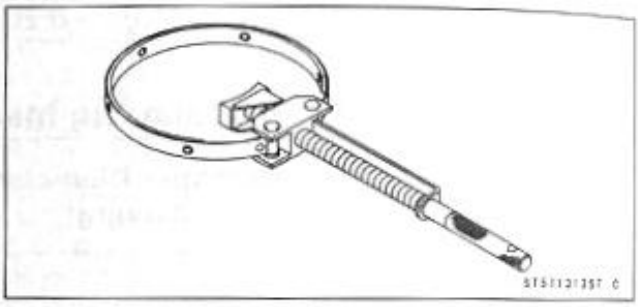
Bearing Driver Set:
57001-1129



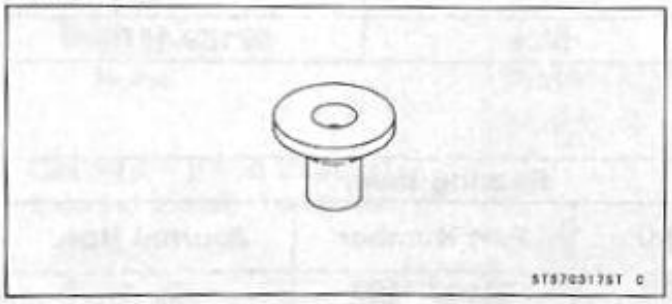
Outside Circlip Pliers:
57001-144



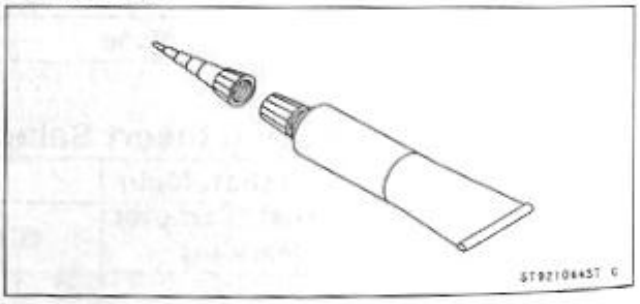
Flywheel Holder:
57001-1313



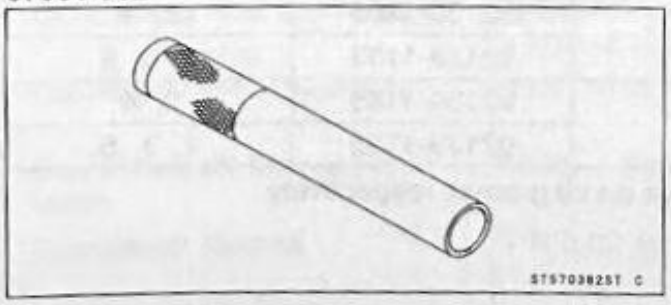
Bearing Puller Adapter:
57001-317



Liquid Gasket, TB1216B:
92104-1064



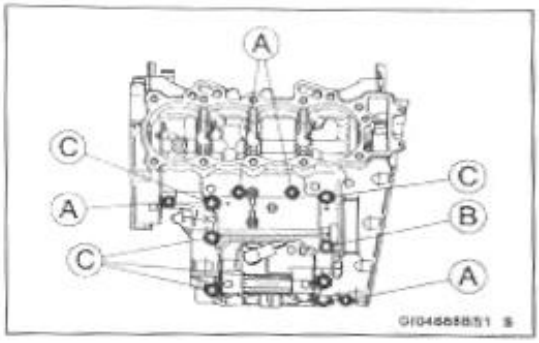
Bearing Driver, ϕ32:
57001-382



Crankcase Splitting

- Remove the engine (see Engine Removal(8-5)).
- Set the engine on a clean surface and hold the engine steady while parts are being removed.
- Remove:
  Cylinder (see Cylinder Removal(5-37))
  Oil Pipe (see Oil Pipe Removal(7-16))
  Timing Rotor (see Timing Rotor Removal(16-33))
  External Shift Mechanism (see External Shift Mechanism Removal(9-29))
  Starter Motor (see Starter Motor Removal(16-41))
  Oil Pump (see Oil Pump Removal(7-12))
  Alternator Rotor (see Alternator Rotor Removal(16-24))
  Oil Screen (see Oil Screen Removal(7-10))
  Oil Filter (see Oil Filter Replacement(2-36))
  Oil Pressure Relief Valve (see Oil Pressure Relief Valve Removal(7-11))

- Remove the upper crankcase bolts in order from the small bolts.
  M6 Bolts [A]
  M7 Bolt [B]
  M8 Bolts [C]



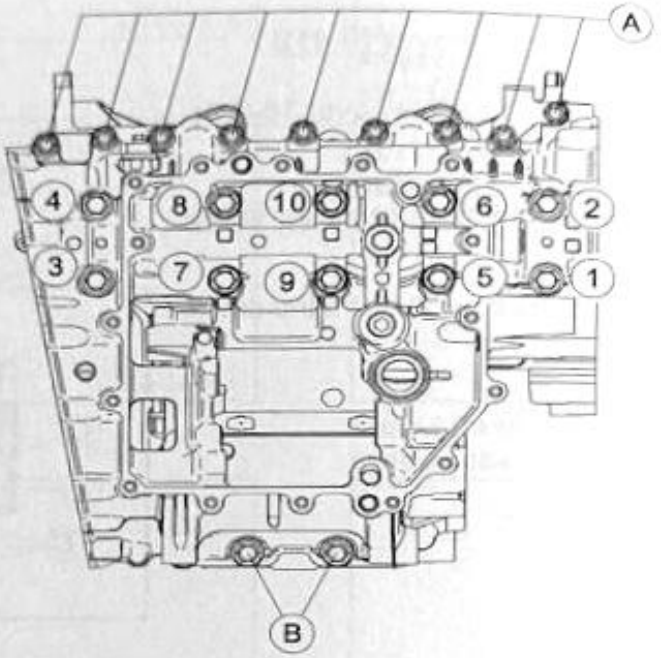
Crankcase Splitting

- Remove the lower crankcase bolts, following the specified sequence.

○First, loosen the M6 bolts [A] and remove the bracket.
○Second, loosen the M8 bolts [B].
○Last, loosen the M8 bolts as shown sequence [1 – 10].

- Tap lightly around the crankcase mating surface with a plastic mallet, and split the crankcase.

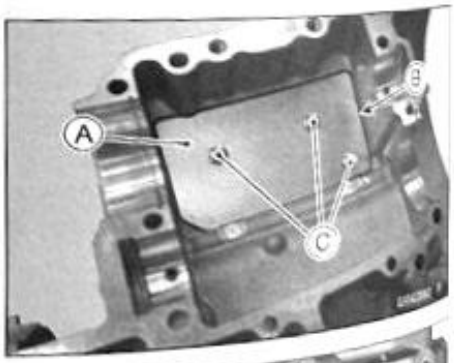
○Take care not to damage the crankcase.



- Remove the connecting Rods (see Connecting Rod Removal(9-17)).

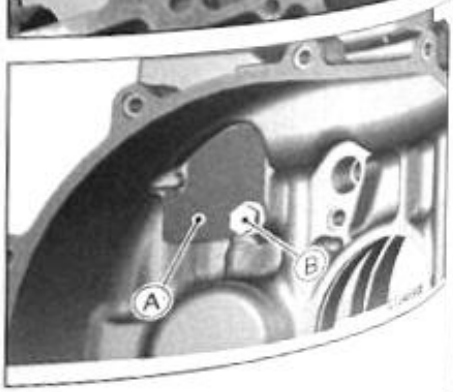
★If the breather plate [A] is to be removed, follow the next procedure.

- Remove:
  Transmission Shafts (see Transmission Shaft Removal(9-32))
- Cut the gasket [B] around the plate.
- Remove:
  Breather Plate Bolts [C]
  Breather Plate



★If the side oil plate [A] is to be removed, follow the next procedure.

- Remove:
  Side Oil Plate Bolt [B]
  Side Oil Plate



Crankcase Splitting

Crankcase Assembly

NOTICE

The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

- With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.

⚠ WARNING

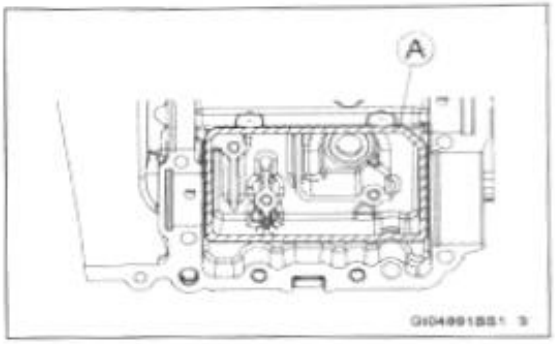
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the crankcase in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the crankcase.

- Using compressed air, blow out the oil passages in the crankcase halves.

Upper Crankcase Assembly

- If the breather plate on the upper crankcase half was removed, follow the next procedure.
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the breather plate mating surface [A] and then install the breather plate.

Sealant - Liquid Gasket, TB1216B: 92104-1064



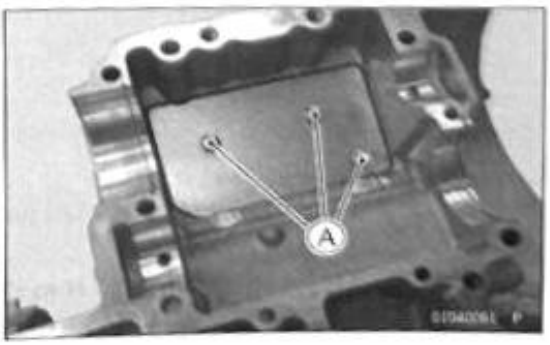
NOTE

Make the application finish within 20 minutes when the liquid gasket to the mating surface of the breather plate is applied.

Moreover fit the plate and tighten the bolts just after application of the liquid gasket.

- Replace the breather plate bolts [A] with new ones.
- Tighten:

Torque - Breather Plate Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

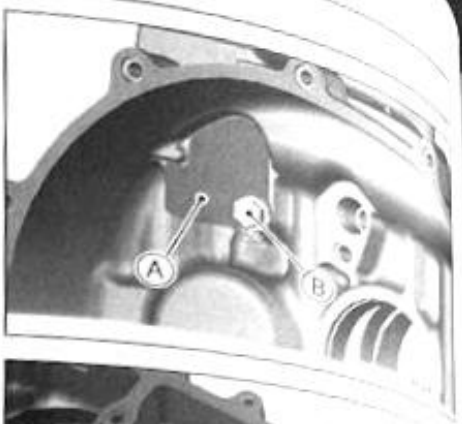


Crankcase Splitting

★If the side oil plate [A] on the upper crankcase half was removed, install it as shown.

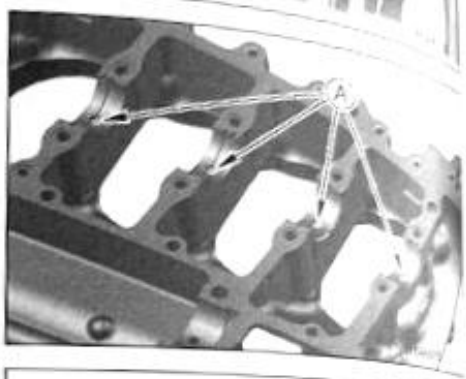
- Tighten:

Torque - Side Oil Plate Bolt [B]: 10 N·m (1.0 kgf·m, 89 in·lb)



- Tighten:

Torque - Oil Nozzles (M5) [A]: 3.0 N·m (0.31 kgf·m, 27 in·lb)

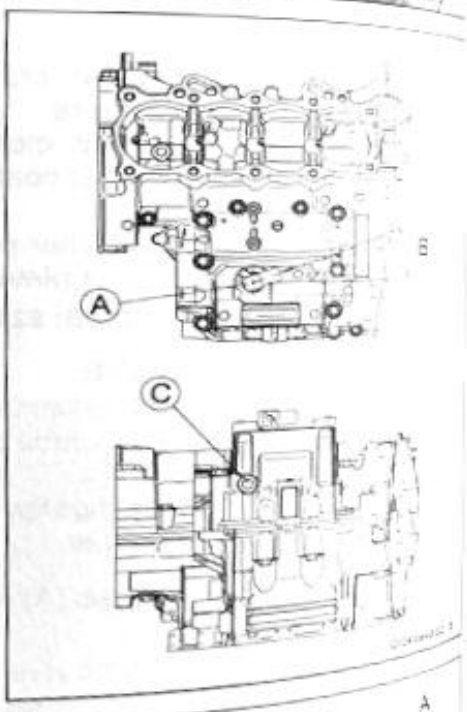


- Press the fitting [A] until it is bottomed and should have proper angel as show.
  20° [B]

Special Tool - Bearing Driver Set: 57001-1129

- Press the plug [C] in the upper crankcase so that the plug is flush with the end of the hole.

Special Tool - Bearing Driver Set: 57001-1129



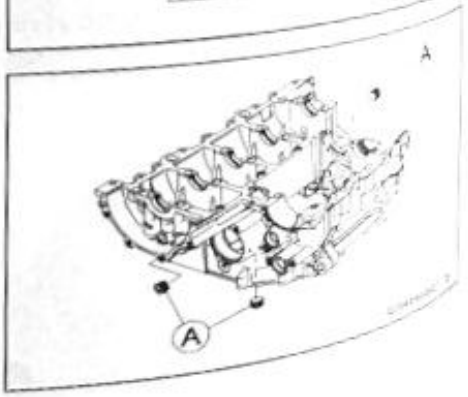
Lower Crankcase Assembly

- Replace the oil passage plugs [A] with new ones.
- Tighten:

Torque - Oil Passage Plugs: 20 N·m (2.0 kgf·m, 15 ft·lb)

- Press the plugs in the upper crankcase so that the plug is flush with the end of the hole.

Special Tool - Bearing Driver Set: 57001-1129



Crankcase Splitting

• Tighten:
Torque - Oil Nozzle (M6) [A]: 4.0 N·m (0.41 kgf·m, 35 in·lb)

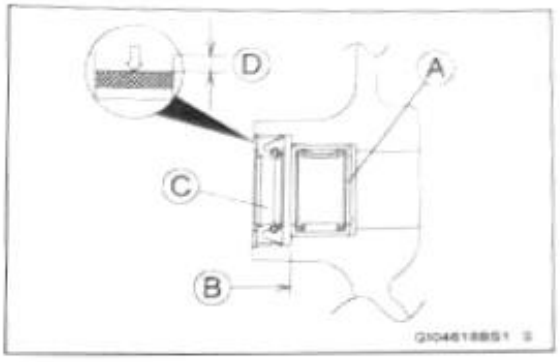
• Press the new needle bearing [A] for the shift shaft so that its marked side faces outside and its surface [B] is flush with the end of the hole.

Special Tool - Bearing Driver Set: 57001-1129

• Install the new oil seal [C] as shown.
0.5 – 1.0 mm (0.02 – 0.04 in.) [D]

Special Tool - Bearing Driver Set: 57001-1129

• Apply grease to the oil seal lips.



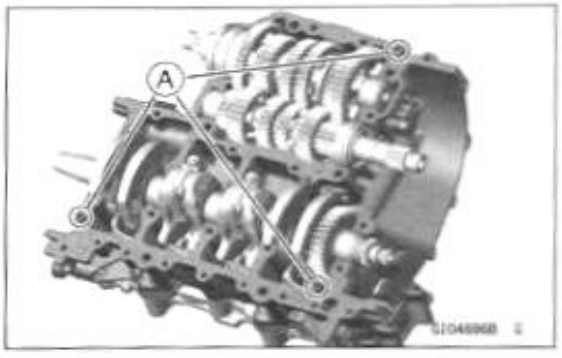
Crankcase Halves Assembly

• Install:
Cylinder (see Cylinder Installation(5-37))
Transmission Shafts (see Transmission Shaft Installation(9-32))
Shift Drum and Shift Forks (see Shift Drum and Fork Installation(9-36))
Dowel Pins [A]

• Before fitting the lower case on the upper case, check the following.

○Be sure to hang the camshaft chain on the crankshaft.

○Check to see that the shift drum and transmission gears are in the neutral position.



Crankcase Splitting

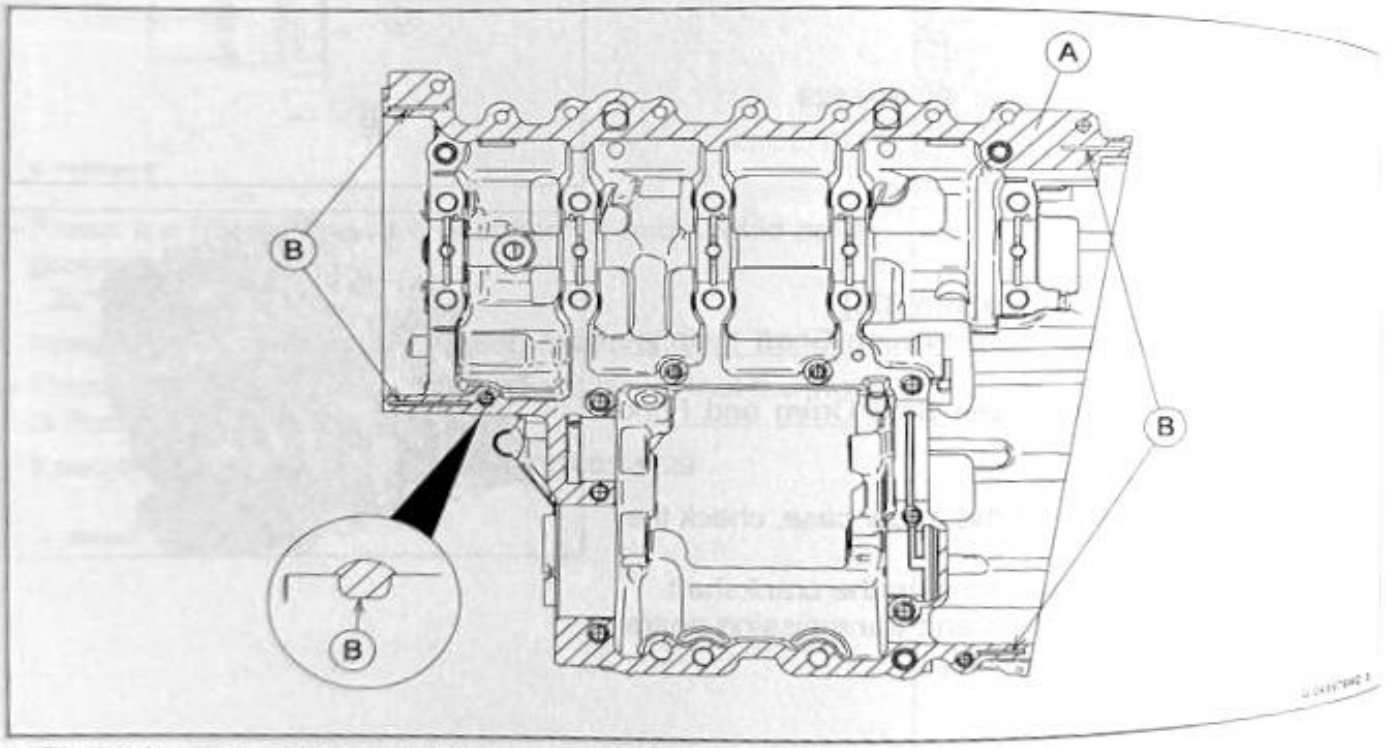
- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to the mating surface of the lower crankcase half.

Sealant - Liquid Gasket, TB1216B: 92104-1064

NOTE

○Especially, apply a liquid gasket so that it shall be filled up on the grooves [B].

NOTICE
Do not apply liquid gasket around the crankshaft main bearing inserts and oil passage holes.



- Fit the lower crankcase to the upper crankcase.

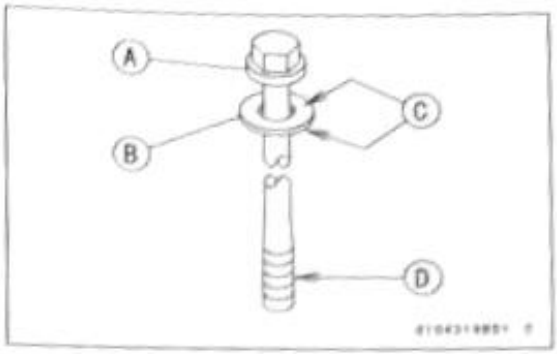
NOTE

○Make the application finish within 20 minutes when the liquid gasket to the mating surface of the lower crankcase half is applied.

○Moreover fit the case and tighten the bolts just after application of the liquid gasket.

Crankcase Splitting

• The crankcase bolts (M8, L = 95 mm) [A] have copper plated washers [B], replace them with new ones.
• Apply molybdenum disulfide oil solution to both sides [C] of the copper plated washer and threads [D] of the M8 bolts.



• Tighten the lower crankcase bolts using the following steps.

○Tighten the crankcase bolts (M8, L = 95 mm) with copper plated washers temporarily following the specified sequence [1 – 10].

Torque - Crankcase Bolts (M8, L = 95 mm): 10 N·m (1.0 kgf·m, 89 in·lb)

○Tighten the crankcase bolts (M8, L = 95 mm) with the specified torque by the same sequence.

Torque - Crankcase Bolts (M8, L = 95 mm): 20 N·m (2.0 kgf·m, 15 ft·lb)

○Tighten the crankcase bolts (M8, L = 95 mm) with the specified angle by the same sequence.

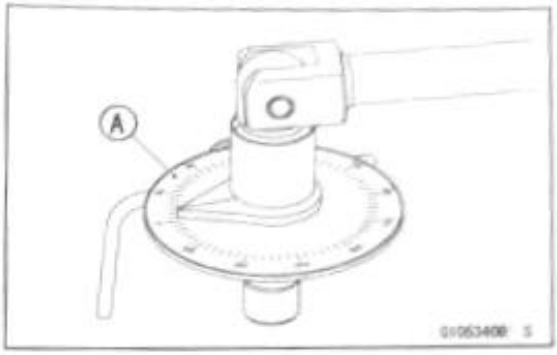
Angle - Crankcase Bolts (M8, L = 95 mm): 40° ±2

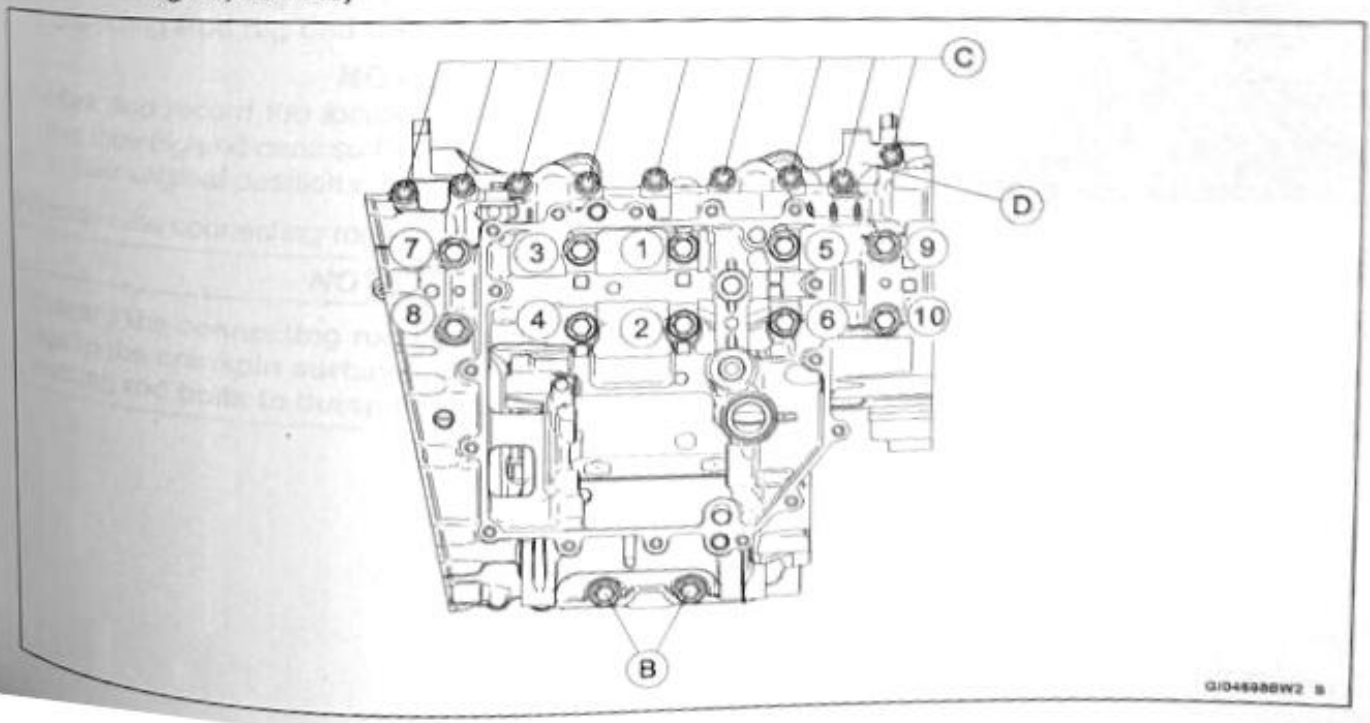
○Tighten the crankcase bolts (M8, L = 55 mm) [B].

Torque - Crankcase Bolts (M8, L = 55 mm): 20 N·m (2.0 kgf·m, 15 ft·lb)

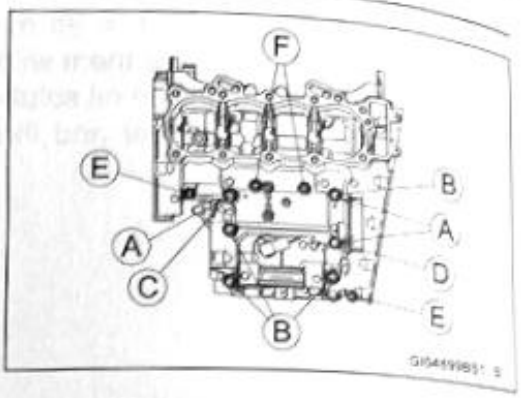
○Tighten the crankcase bolts (M6, L = 30 mm) [C] with the bracket [D].

Torque - Crankcase Bolts (M6, L = 30 mm): 10 N·m (1.0 kgf·m, 89 in·lb)





Crankcase Splitting



- Tighten the upper crankcase bolts using the following steps.

○Replace the washers [A] with new ones.

○Tighten the M8 bolts.

Torque - Crankcase Bolts (M8, L = 80 mm) [B]: 27.5 N·m (2.8 kgf·m, 20.3 ft·lb)
Crankcase Bolt (M8, L = 50 mm) [C]: 27.5 N·m (2.8 kgf·m, 20.3 ft·lb)

○Tighten the M7 bolt [D].

Torque - Crankcase Bolts (M7, L = 80 mm): 20 N·m (2.0 kgf·m, 15 ft·lb)

○Tighten the M6 bolts.

Torque - Crankcase Bolts (M6, L = 40 mm) [E]: 10 N·m (1.0 kgf·m, 89 in·lb)
Crankcase Bolts (M6, L = 55 mm) [F]: 10 N·m (1.0 kgf·m, 89 in·lb)

- After tightening all crankcase bolts, check the following items.

○Wipe up the liquid gasket that seeps out around the crankcase mating surface.

○Crankshaft and transmission shafts turn freely.

○While spinning the output shaft, gears shift smoothly from the 1st to 6th gear, and 6th to 1st.

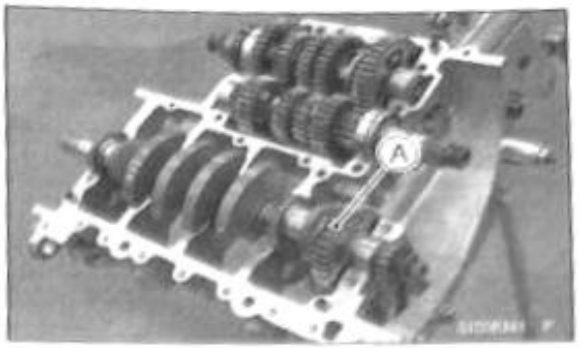
○When the output shaft stays still, the gear can not be shifted to 2nd gear or other higher gear positions.

- Install the removed parts.

Crankshaft and Connecting Rods

Crankshaft Removal

- Split the crankcase (see Crankcase Splitting(9-9)).
- Remove:
  Crankshaft [A]



Crankshaft Installation

NOTE

○If the crankshaft is replaced with a new one, refer to the Connecting Rod Big End Bearing Insert Selection in the Specifications.

NOTICE

If the crankshaft, bearing inserts, or crankcase halves are replaced with new ones, select the bearing inserts and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

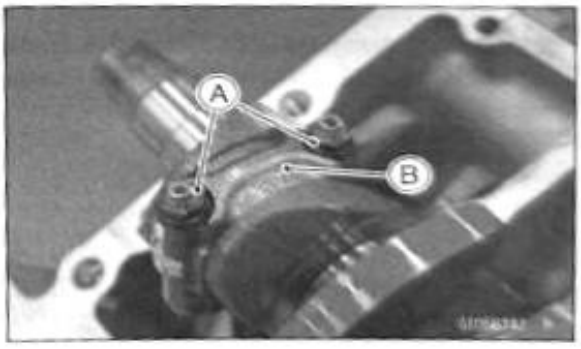
- Apply molybdenum disulfide oil solution to the crankshaft main bearing inserts.
- Install the crankshaft with the camshaft chain [A] hanging on it.
- Install the removed parts.

Connecting Rod Removal

- Split the crankcase (see Crankcase Splitting(9-9)).
- Remove:
  Connecting Rod Big End Nuts [A]
  Connecting Rod Big End Caps [B]

NOTE

○Mark and record the locations of the connecting rods and their big end caps so that they can be reassembled in their original positions.



- Remove the connecting rods from the crankshaft.

NOTICE

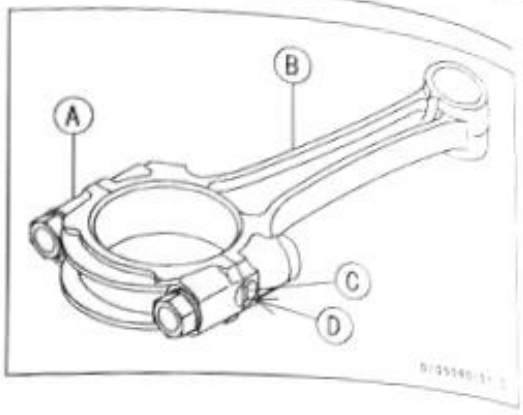
Discard the connecting rod bolts. To prevent damage to the crankpin surfaces, do not allow the connecting rod bolts to bump against the crankpins.

Crankshaft and Connecting Rods

Connecting Rod Installation

NOTICE

To minimize vibration, the connecting rods should have the same weight mark.

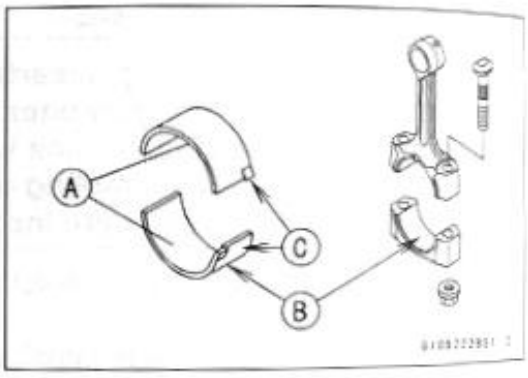


Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark [D]: "○" or no mark

NOTICE

If the connecting rods, big end bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage (press gauge) before assembling engine to be sure the correct bearing inserts are installed.

- Apply molybdenum disulfide oil solution [A] to the inner surfaces of upper and lower bearing inserts.
- Do not apply any grease or oil to the cap inside and cap insert outside [B].
- Install the inserts so that their nails [C] are on the same side and fit them into the recess of the connecting rod and cap.

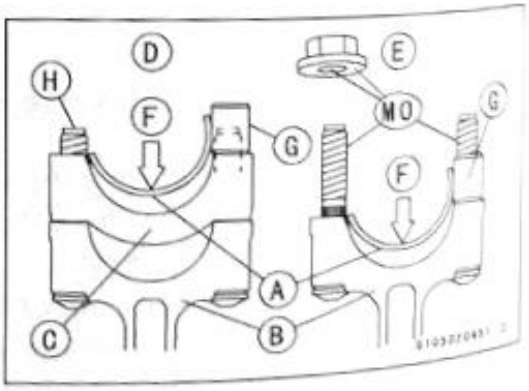


NOTICE

Wrong application of oil and grease could cause bearing damage.

○When installing the inserts [A], be careful not to damage the insert surface with the edge of the connecting rod [B] or the cap [C]. One way to install inserts is as follows.

Installation [D] to Cap
Installation [E] to Connecting Rod
Push [F]
Spare Dowel Pin [G]
Connecting Rod Bolts [H]



- Remove debris and clean the surface of inserts.
- Install the cap on the connecting rod, aligning the weight and diameter marks.
- Apply molybdenum disulfide oil solution to the threads and seating surfaces of the big end nuts and bolts.

Crankshaft and Connecting Rods

• Install each connecting rod on its original crankpin.
○The connecting rod big end is bolted using the "plastic region fastening method."
○This method precisely achieves the needed clamping force without exceeding it unnecessarily, allowing the use of thinner, lighter bolts further decreasing connecting rod weight.
○There are two types of the plastic region fastening. One is a bolt length measurement method and other is a rotation angle method. Observe one of the following two, but the bolt length measurement method is preferable because this is a more reliable way to tighten the big end nuts.

NOTICE

The connecting rod bolts are designed to stretch when tightened. Never reuse the connecting rod bolts. See the table below for correct bolt and nut usage.

NOTICE

Be careful not to overtighten the nuts.
The bolts must be positioned on the seating surface correctly to prevent the bolt heads from hitting the crankcase.

(1) Bolt Length Measurement Method
• Be sure to clean the bolts, nuts, and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts, and nuts are treated with an anti-rust solution.

⚠ WARNING

Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

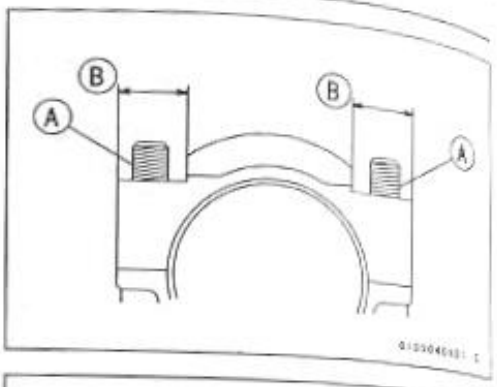
Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

Crankshaft and Connecting Rods

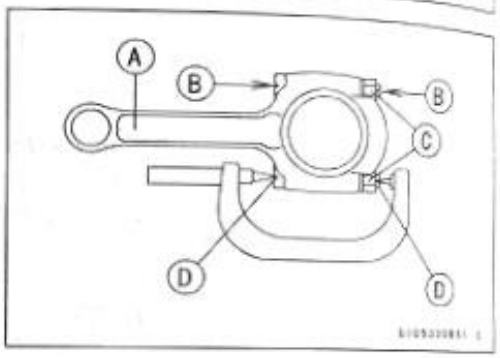
- Install new bolts and nuts in reused connecting rod.

★If the connecting rod assy was replaced, use the bolts and nuts attached to the new connecting rod assy.

- Apply a small amount of molybdenum disulfide oil solution to the following portions.
  Threads [A] of Bolts and Nuts
  Seating Surfaces [B] of Nuts and Connecting Rod Caps



- Dent both bolt head and bolt tip with a punch as shown.
- Before tightening, use a point micrometer to measure the length of new connecting rod bolts and record the values to find the bolt stretch.
  Connecting Rod [A]
  Dent here with a punch [B].
  Nuts [C]
  Fit micrometer pins into dents [D].
- Tighten the big end nuts until the bolt elongation reaches the length specified in the table.



Bolt Length after tightening − Bolt Length before tightening = Bolt Stretch

Connecting Rod Bolt Stretch
Usable Range: 0.28 – 0.38 mm (0.0110 – 0.0150 in.)

- Check the length of the connecting rod bolts.

★If the stretch is more than the usable range, the bolt has stretched too much. An overelongated bolt may break in use.

(2) Rotation Angle Method

★If you do not have a point micrometer, you may tighten the nuts using the "Rotation Angle Method."

- Be sure to clean the bolts, nuts and connecting rods thoroughly with a high flash-point solvent, because the new connecting rods, bolts and nuts are treated with an anti -rust solution.

⚠ WARNING

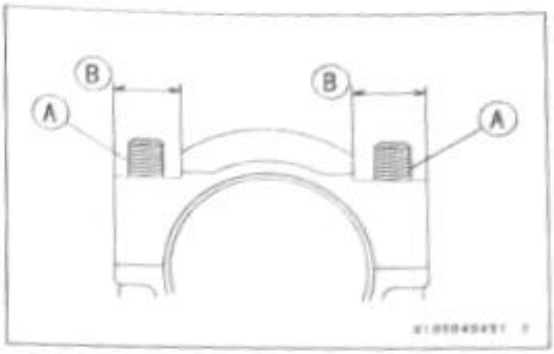
Gasoline and low flash-point solvents can be flammable and/or explosive and cause severe burns. Clean the bolts, nuts, and connecting rods in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean them.

NOTICE

Immediately dry the bolts and nuts with compressed air after cleaning.
Clean and dry the bolts and nuts completely.

Crankshaft and Connecting Rods

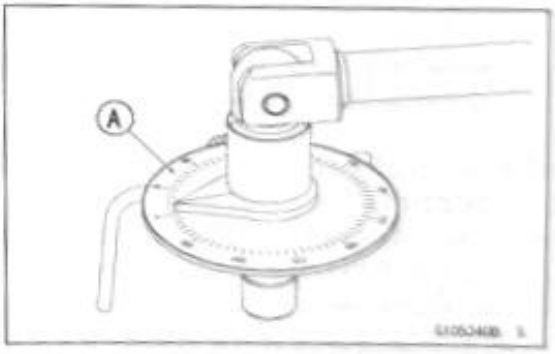
• Install new bolts and nuts in reused connecting rods.
★If the connecting rod assy was replaced, use the bolts and nuts attached to the new connecting rod assy.
• Apply a small amount of molybdenum disulfide oil solution to the following portions.
Threads [A] of Bolts and Nuts
Seating Surfaces [B] of Nuts and Connecting Rod Caps



• First, tighten the nuts to the specified torque. See the table below.
• Next, tighten the nuts **173° ±5°** .

Connecting Rod Assy	Bolt	Nut	Torque + Angle N·m (kgf·m, ft·lb)
New	Use the bolts attached to new con-rod.	Attached to new con-rod	14 (1.4, 10) + 173°
		New	14 (1.4, 10) + 173°
Used	Replace the bolts with new ones.	Used	14 (1.4, 10) + 173°
		New	14 (1.4, 10) + 173°

○The nuts can be tightened by using a torque angle gauge [A].

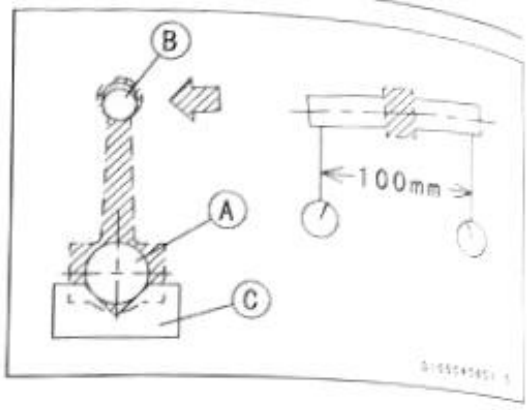


Crankshaft/Connecting Rod Cleaning

• After removing the connecting rods from the crankshaft, clean them with a high flash-point solvent.
• Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

Crankshaft and Connecting Rods

Connecting Rod Bend Inspection

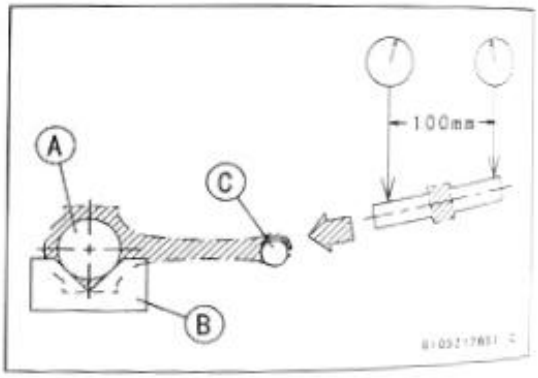


- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an big-end arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

★If the connecting rod bend exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Bend
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Twist Inspection

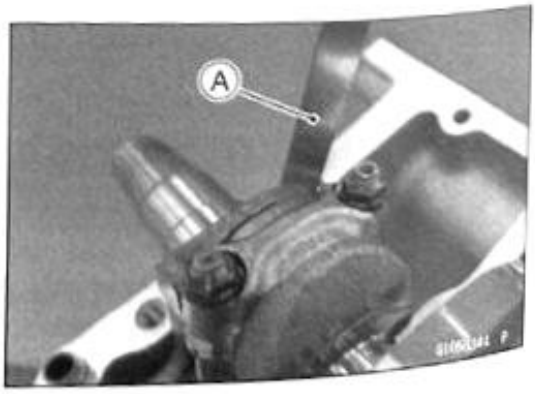


- With the big-end arbor [A] still on V block [B], hold the connecting rod horizontally and measure the amount that the arbor [C] varies from being paralleled with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★If the connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

Connecting Rod Big End Side Clearance Inspection



- Measure connecting rod big end side clearance.

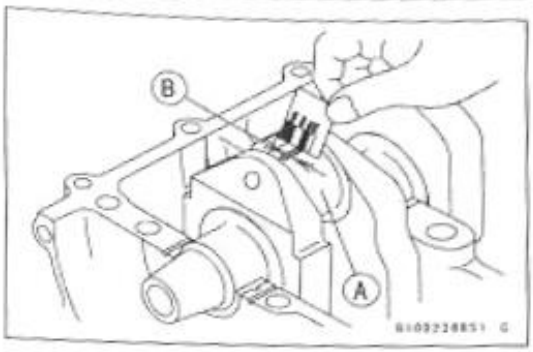
○Insert a thickness gauge [A] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance
Standard: 0.33 – 0.58 mm (0.0130 – 0.0228 in.)
Service Limit: 0.8 mm (0.03 in.)

★If the clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If the clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

Crankshaft and Connecting Rods

Connecting Rod Big End Bearing Insert/Crankpin Wear Inspection



- Remove the connecting rod big end (see Connecting Rod Removal(9-17)).
- Cut strips of plastigage (press gauge) to crankpin width. Place a strip on the crankpin parallel to the crankshaft installed in the correct position.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation(9-18)).

NOTE

ODo not move the connecting rod and crankshaft during clearance measurement.

- Remove the connecting rod big end again, measure each clearance between the bearing insert and crankpin [A] using plastigage (press gauge) [B].

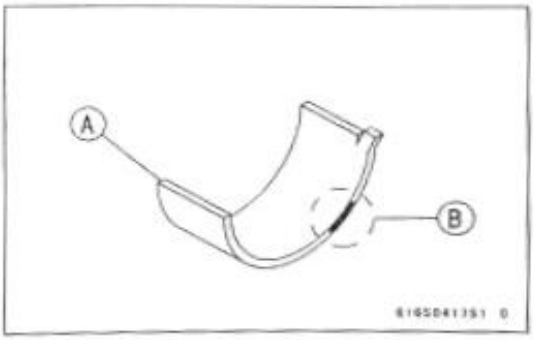
NOTICE

After measurement, replace the connecting rod bolts.

Connecting Rod Big End Bearing Insert/Crankpin Clearance

Standard: **0.045 – 0.077 mm (0.0018 – 0.0030 in.)**

Service Limit: **0.11 mm (0.0043 in.)**



★If the clearance is within the standard, no bearing replacement is required.

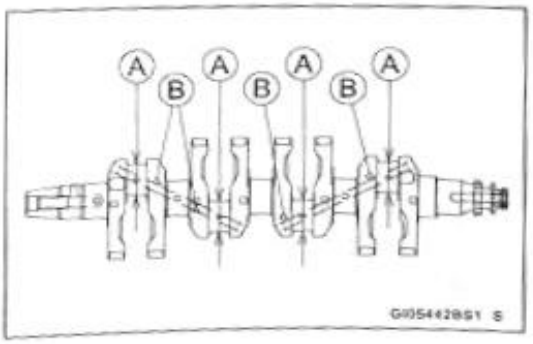
★If the clearance is between 0.078 mm (0.0031 in.) and the service limit (0.11 mm, 0.0043 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/crankpin clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankpins.

Crankpin Diameter

Standard: **29.984 – 30.000 mm (1.1805 – 1.1811 in.)**

Service Limit: **29.97 mm (1.180 in.)**



★If any crankpin has worn past the service limit, replace the crankshaft with a new one.

★If the measured crankpin diameters [A] are not less than the service limit, but do not coincide with the original diameter markings [B] on the crankshaft, make new marks on it.

Crankpin Diameter Marks

None **29.984 – 29.992 mm (1.1805 – 1.18079 in.)**

○ **29.993 – 30.000 mm (1.18082 – 1.1811 in.)**

△: Crankpin Diameter Marks, "○" or no mark.

Crankshaft and Connecting Rods

- Measure the connecting rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the connecting rod big end nuts to the specified torque (see Connecting Rod Installation(9-18)).

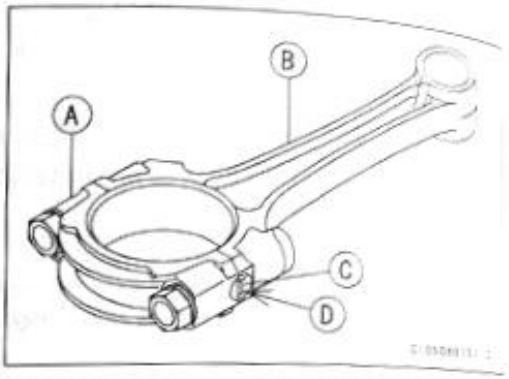
NOTE

○*The mark already on the big end should almost coincide with the measurement.*

Connecting Rod Big End Inside Diameter Marks

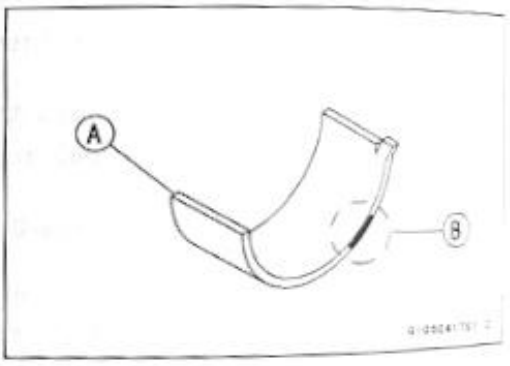
None	**33.000 – 33.008 mm (1.2992 – 1.29952 in.)**
○	**33.009 – 33.016 mm (1.29956 – 1.2998 in.)**

Big End Cap [A]
Connecting Rod [B]
Weight Mark, Alphabet [C]
Diameter Mark (Around Weight Mark) [D]: "○" or no mark



- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding.
  Size Color [B]

Con-rod Big End Inside Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92139-1181
None	None	Black	92139-1180
○	○		
○	None	Blue	92139-1179



- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

Crankshaft Side Clearance Inspection

- Insert a thickness gauge [A] between the crankcase main bearing and the crank web at the #2 journal to determine clearance.

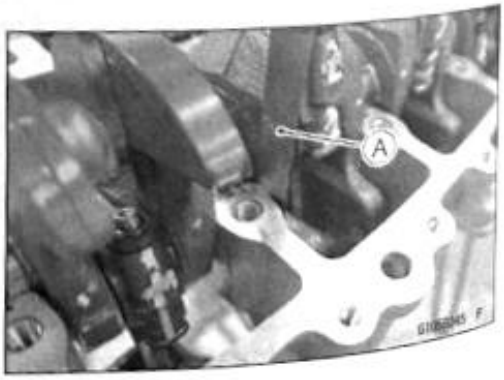
★If the clearance exceeds the service limit, replace the crankcase halves as a set.

NOTE

○*The upper and lower crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.*

Crankshaft Side Clearance

Standard:	**0.09 – 0.19 mm (0.0035 – 0.0075 in.)**
Service Limit:	**0.39 mm (0.0154 in.)**



Crankshaft and Connecting Rods

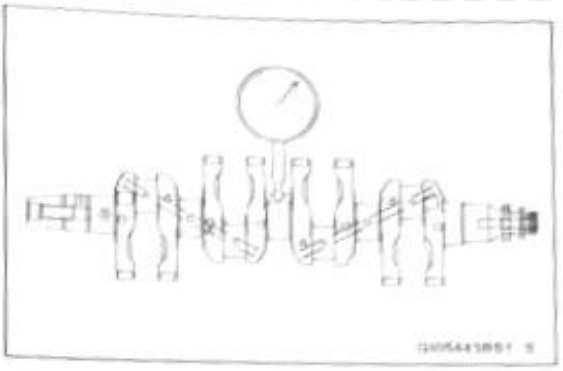
Crankshaft Runout Inspection

- Measure the crankshaft runout.
- ★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout

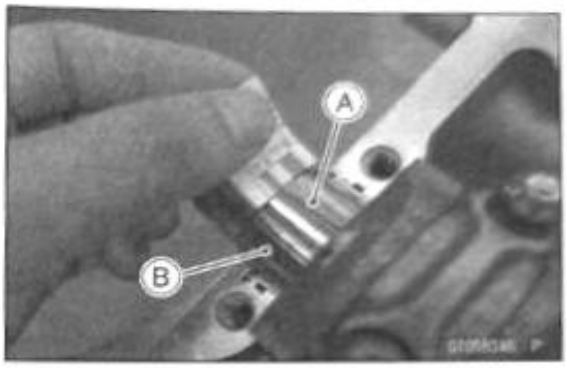
Standard: TIR 0.02 mm (0.0008 in.) or less

Service Limit: TIR 0.05 mm (0.0020 in.)



Crankshaft Main Bearing Insert/Journal Wear Inspection

- Split the crankcase (see Crankcase Splitting(9-9)).
- Cut strips of plastigage (press gauge) [A] to journal width.
- Place a strip on each journal parallel to the crankshaft installed in the correct position.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly(9-11)).



NOTE

○*Do not turn the crankshaft during clearance measurement.*

○*Journal clearance less than 0.025 mm (0.00098 in.) can not be measured by plastigage, however, using genuine parts maintains the minimum standard clearance.*

- Split the crankcase again, measure each clearance between the bearing insert and journal [B] using plastigage (press gauge).

Crankshaft Main Bearing Insert/Journal Clearance

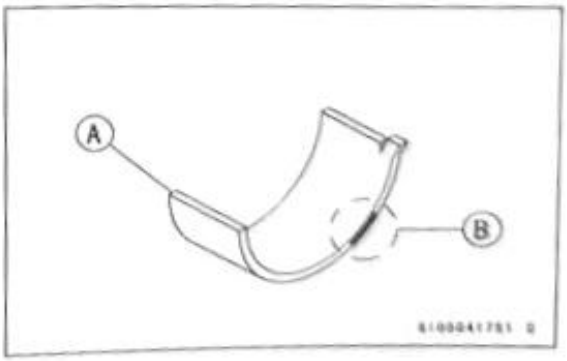
Standard: 0.029 – 0.063 mm (0.0011 – 0.0025 in.)

Service Limit: 0.09 mm (0.0035 in.)

★If the clearance is within the standard, no bearing replacement is required.

★If the clearance is between 0.064 mm (0.00252 in.) and the service limit (0.09 mm, 0.0035 in.), replace the bearing inserts [A] with inserts painted blue [B]. Check insert/journal clearance with the plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

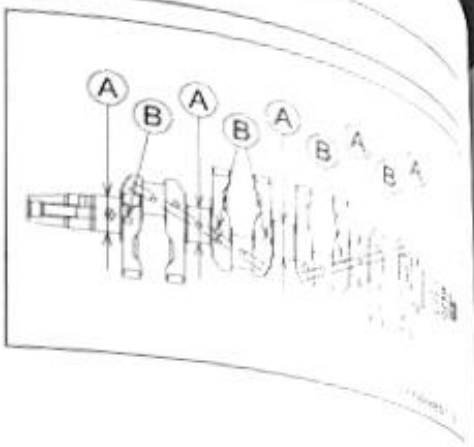
★If the clearance exceeds the service limit, measure the diameter of the crankshaft main journal.



Crankshaft and Connecting Rods

Crankshaft Main Journal Diameter
Standard: 29.984 – 30.000 mm (1.1805 – 1.1811 in.)
Service Limit: 29.96 mm (1.1795 in.)

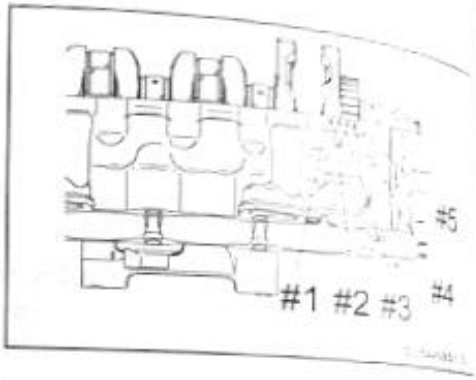
★If any journal has worn past the service limit, replace the crankshaft with a new one.
★If the measured journal diameters [A] are not less than the service limit, but do not coincide with the original diameter markings [B] on the crankshaft, make new marks on it.



Crankshaft Main Journal Diameter Marks
None 29.984 – 29.992 mm (1.1805 – 1.18079 in.)
1 29.993 – 30.000 mm (1.18082 – 1.1811 in.)

□: Crankshaft Main Journal Diameter Marks, "1" or no mark.

- Measure the main bearing inside diameter, and mark the upper crankcase half in accordance with the inside diameter.
  Crankcase Main Bearing Inside Diameter Marks: "○" or no mark.
- Tighten the crankcase bolts to the specified torque (see Crankcase Assembly(9-11)).

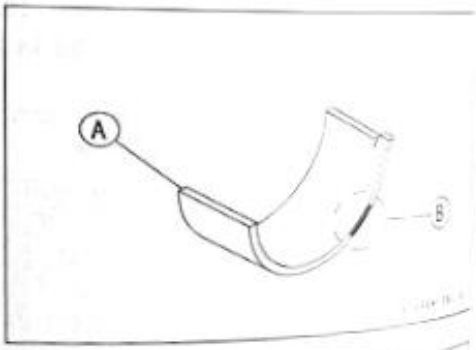


NOTE

○*The mark already on the upper crankcase half should almost coincide with the measurement.*

Crankcase Main Bearing Bore Diameter Marks
○ 33.000 – 33.008 mm (1.2992 – 1.29952 in.)
None 33.009 – 33.016 mm (1.29956 – 1.2998 in.)

- Select the proper bearing insert [A] in accordance with the combination of the crankcase and crankshaft coding.
  Size Color [B]



Crankcase Main Bearing Inside Diameter Marking	Crankshaft Main Journal Diameter Marking	Bearing Insert*		
		Size Color	Part Number	Journal Nos.
○	1	Brown	92139-1187	2, 4
			92139-1184	1, 3, 5
None	1	Black	92139-1186	2, 4
○	None		92139-1183	1, 3, 5
None	None	Blue	92139-1185	2, 4
			92139-1182	1, 3, 5

* The bearing inserts for Nos. 2 and 4 journals have an oil groove, respectively.

- Install the new inserts in the crankcase halves and check insert/journal clearance with the plastigage.

Starter Motor Clutch

Starter Motor Clutch Removal

- Refer to the Starter Motor Clutch Disassembly (see Starter Motor Clutch Disassembly(9-27)).

Starter Motor Clutch Installation

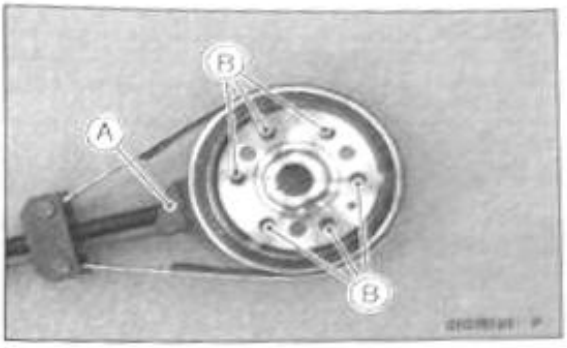
- Refer to the Starter Motor Clutch Assembly (see Starter Motor Clutch Assembly(9-27)).

Starter Motor Clutch Disassembly

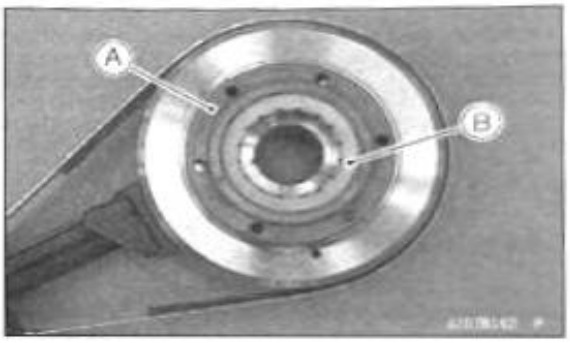
- Remove the alternator rotor (see Alternator Rotor Removal(16-24)).
- Hold the alternator rotor with the flywheel holder [A].

Special Tool - Flywheel Holder: 57001-1313

- Remove the starter motor clutch bolts [B].



- Remove:
  Starter Motor Clutch Housing [A]
  Starter Motor Clutch [B]



Starter Motor Clutch Assembly

- Install the starter motor clutch to the housing so that the flange [A] fit to the housing groove [B].
- Hold the alternator rotor with the flywheel holder.

Special Tool - Flywheel Holder: 57001-1313

- Replace the starter motor clutch bolts with new ones.
- Tighten:

Torque - Starter Motor Clutch Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)

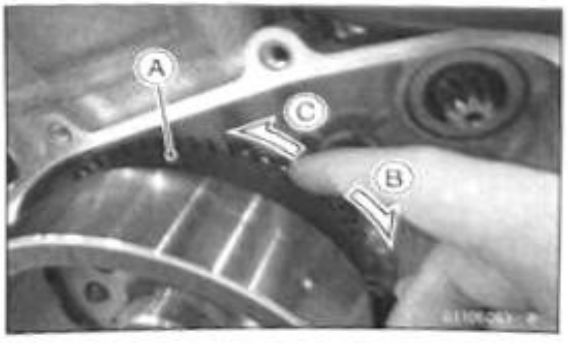
Starter Motor Clutch Inspection

- Remove:
  Alternator Cover (see Alternator Cover Removal(16-23))
  Starter Idle Gear and Shaft
- Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn clockwise [B] freely, but should not turn counterclockwise [C].

★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.



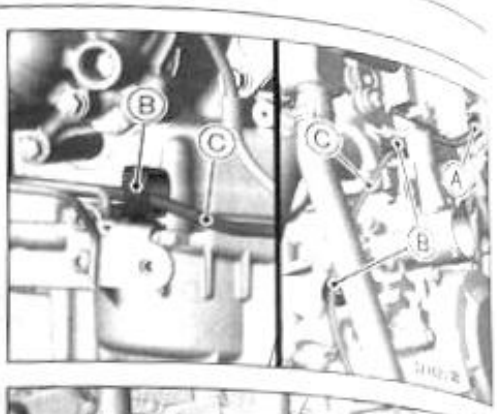
NOTE

○Examine the starter motor clutch gear as well. Replace it if it worn or damaged.

External Shift Mechanism

Shift Pedal Removal

- For the quick shifter sensor equipped models, refer to the following procedure.
- Remove the left side cover (see Side Cover Removal(15-26)).
- Disconnect the quick shifter sensor connector [A] and open the clamp [B] to free the lead [C].

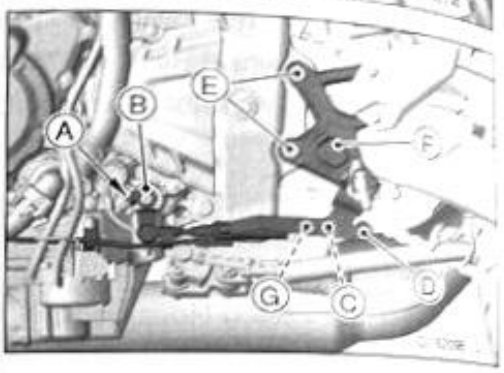


- Remove:
  Shift Lever Bolt [A]
  Shift Lever [B]

★If the tie-rod is removed from the shift pedal and shift lever, note the following.

○The following portions have left-hand threads.
  Locknut [C] of Shift Pedal Side
  Ball Joint [D] of Shift Pedal

- Remove:
  Front Footpeg Bracket Bolts [E]
  Front Footpeg Bracket [F] with Tie-Rod [G]

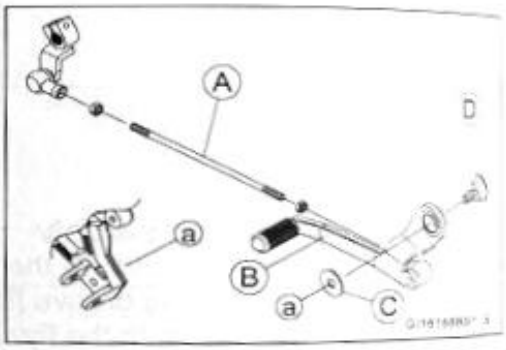


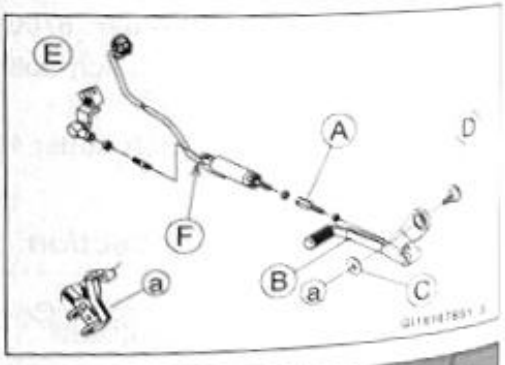
Shift Pedal Installation

- Install:
  Tie-Rod [A]
  Shift Pedal [B]
  Washer [C]
- Replace the shift pedal bolt [D] with a new one.
- Tighten:

Torque - Shift Pedal Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

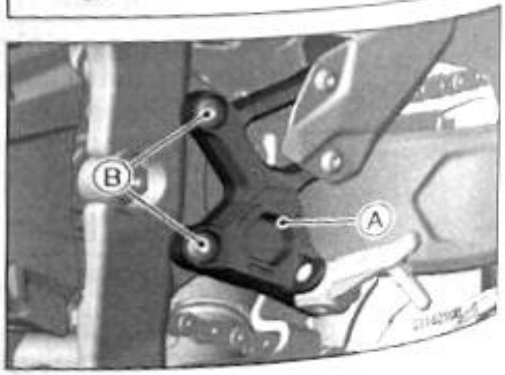
- For the quick shifter sensor equipped model [E], the quick shifter sensor lead [F] faces to the downward.





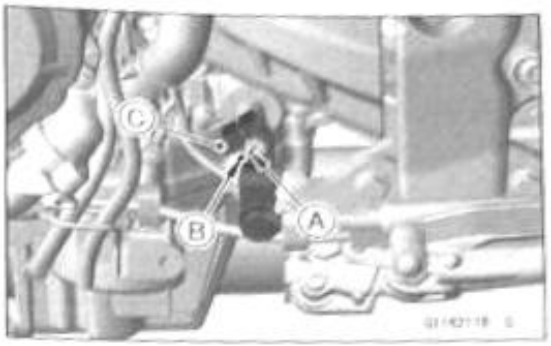
- Install the front footpeg bracket [A].
- Replace the front footpeg bracket bolts with new ones.
- Tighten:

Torque - Front Footpeg Bracket Bolts [B]: 25 N·m (2.5 kgf·m, 18 ft·lb)

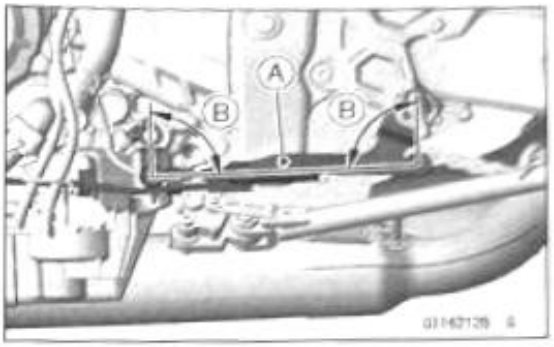


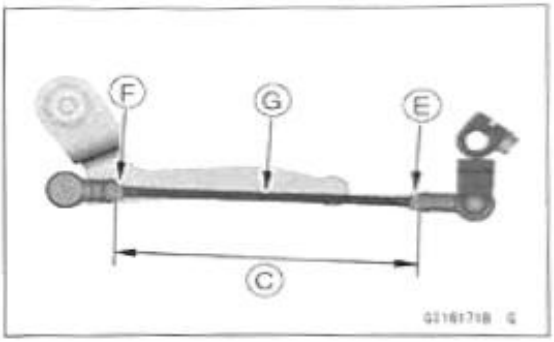
External Shift Mechanism

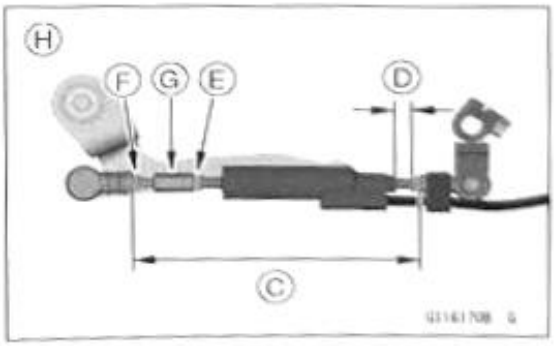
• Align the ruled line [A] on the shift shaft with the punch mark [B] of the shift lever.
• Tighten:
Torque - Shift Lever Bolt [C]: 9.8 N·m (1.0 kgf·m, 87 in·lb)



• After installation, confirm that the shift pedal [A] is positioned as shown.
90° [B]
About 153.5 mm (6.043 in) [C]
7.5 – 8.5 mm (0.30 – 0.33 in) [D]
★If the pedal position is different, adjust it as follows.
○To adjust the pedal position, loosen the front locknut [E] and rear locknut [F] (left-hand threads), and then turn the tie-rod [G].
○Tighten the locknuts securely.
Quick Shifter Sensor Equipped Models [H]

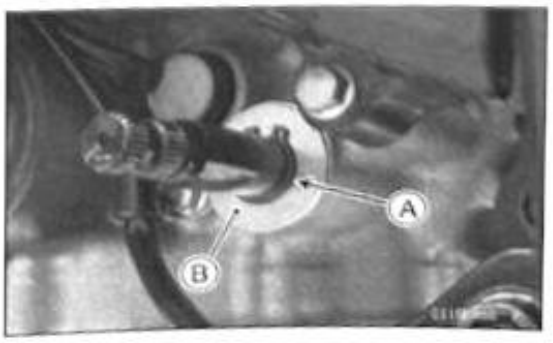






External Shift Mechanism Removal

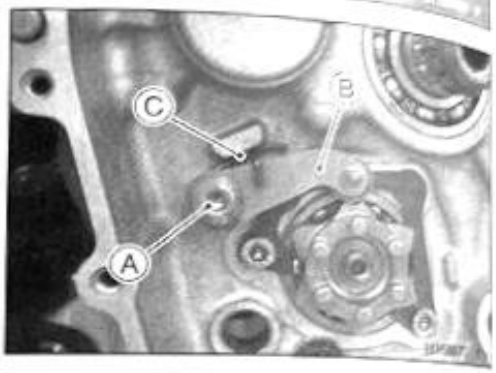
• Remove:
Shift Lever (see Shift Pedal Removal(9-28))
Oil Pump Driven Gear (see Oil Pump Driven Gear Removal(7-12))
Circlip [A]
Washer [B]
Special Tool - Outside Circlip Pliers: 57001-144



External Shift Mechanism

- Remove:
  Shift Shaft Assembly [A]

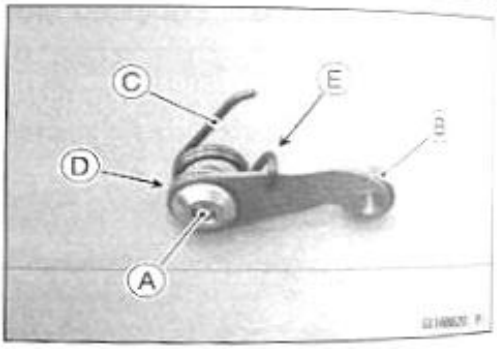
- Remove:
  Gear Positioning Lever Bolt [A]
  Gear Positioning Lever [B]
  Collar
  Collar and Spring [C]



External Shift Mechanism Installation

- Replace the gear positioning lever bolt [A] with a new one.
- Assemble the following parts as shown.
  Gear Positioning Lever [B]
  Spring [C]
  Collar [D]
  Gear Positioning Lever Bolt

○Hang the spring end [E] to the gear positioning lever.



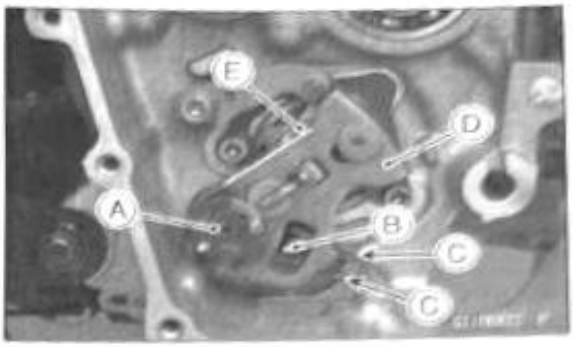
- While prying the gear positioning lever [A], tighten the gear positioning lever bolt [B].

  Torque - Gear Positioning Lever Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)

- Apply grease to the lips of the oil seal [A].

External Shift Mechanism

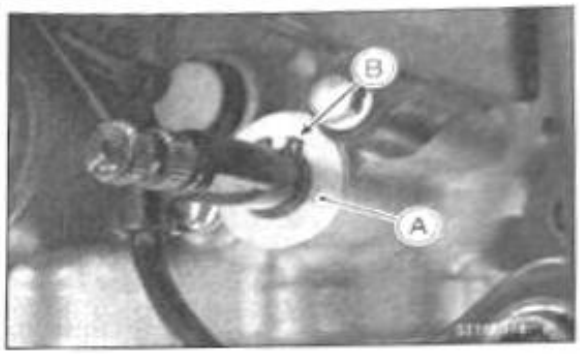
• Install the shift shaft [A] so that the return spring pin [B] fits between the spring [C].
• Pull the shift mechanism arm [D], and hang it to the shift drum cam [E].



• Install the washer [A].
• Replace the circlip [B] with a new one, and install it.

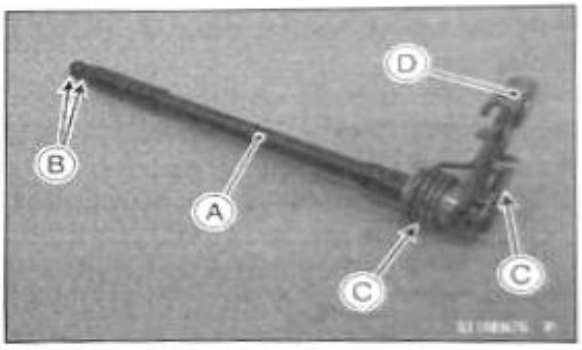
Special Tool - **Outside Circlip Pliers: 57001-144**

OFit the circlip into the groove of the shift shaft securely.
• Install the removed parts.



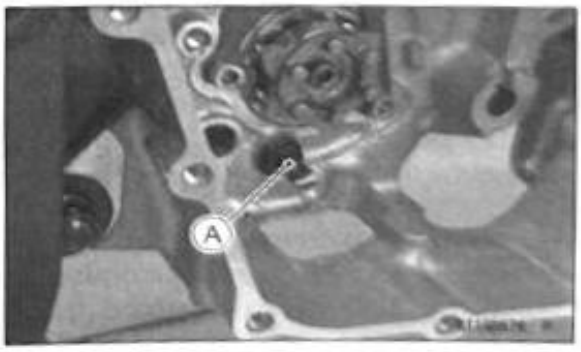
External Shift Mechanism Inspection

• Examine the shift shaft [A] for any damage.
★If the shaft is bent, straighten or replace it.
★If the serration [B] are damaged, replace the shaft.
★If the springs [C] are damaged in any way, replace them.
★If the shift mechanism arm [D] is damaged in any way, replace the shift shaft.

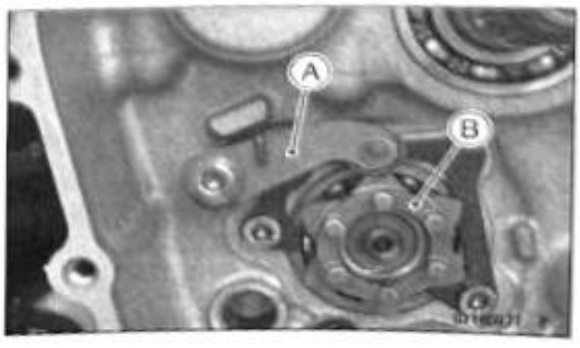


• Check the return spring pin [A] is not loose.
★If it is loose, remove it, replace and tighten it.

Torque - **Shift Shaft Return Spring Pin: 29 N·m (3.0 kgf·m, 21 ft·lb)**



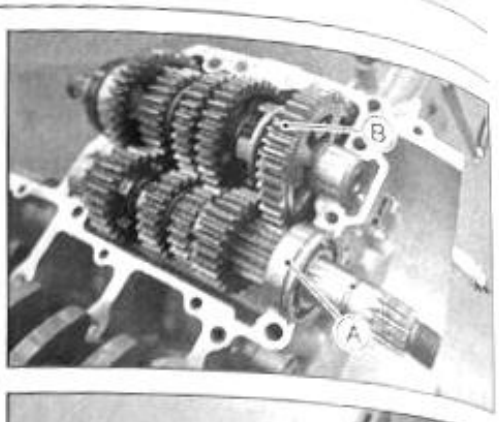
• Check the gear positioning lever [A] and its spring for breaks or distortion.
★If the lever or spring are damaged in any way, replace them.
• Visually inspect the shift drum cam [B].
★If it is badly worn or shows any damage, replace it.



Transmission

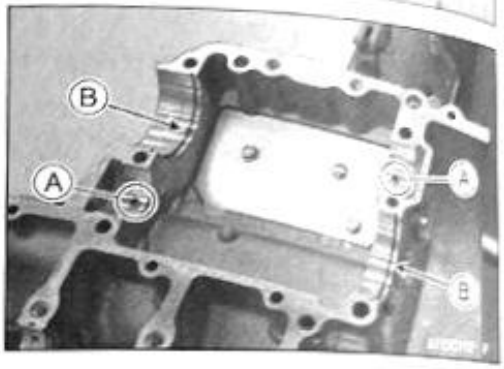
Transmission Shaft Removal

- Split the crankcase (see Crankcase Splitting(9-9)).
- Remove the drive shaft [A] and output shaft [B].



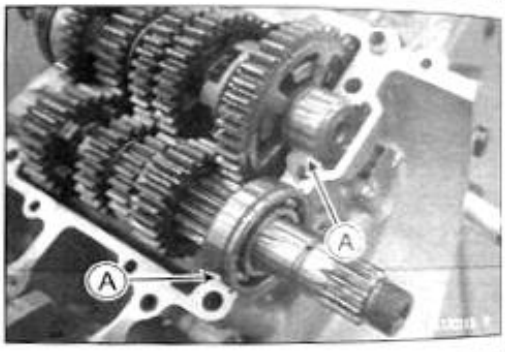
Transmission Shaft Installation

- Check to see that the set pins [A] and set rings [B] are in place.

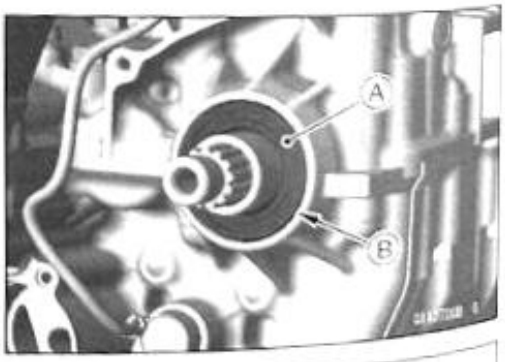


- Apply molybdenum disulfide oil solution to the transmission gears.
- Install the drive shaft and output shaft into the upper crankcase half.
- Apply engine oil to the bearings.

○The bearing set pins and rings must match properly with the holes or grooves in the bearing outer races or bearings. When they are properly matched, there is no clearance [A] between the crankcase and the bearing outer races or bearings.



- Assemble the crankcase (see Crankcase Assembly(9-11)).
- Replace the oil seal [A] with a new one.
- Apply grease to the oil seal lips and the inner circumference of the oil seal.
- Apply soap and water solution to the outer circumference of the oil seal so that it will go into place smoothly.
- Press in the oil seal into the crankcase so that the surface of the oil seal is flush with the surface [B] of the crankcase.



Transmission Shaft Disassembly

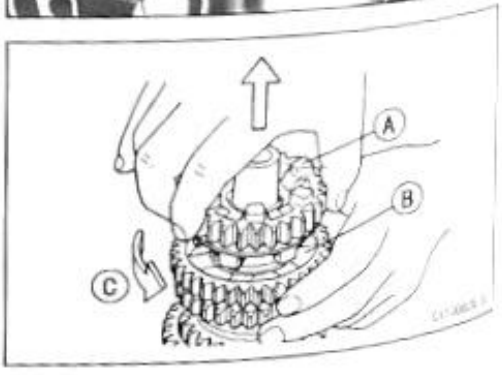
- Remove the transmission shafts (see Transmission Shaft Removal(9-32)).
- Remove the circlips, and disassemble the transmission shafts.

Special Tool - Outside Circlip Pliers: 57001-144

- The 5th gear [A] on the output shaft has three steel balls assembled into it for the positive neutral finder mechanism. Remove the 5th gear.

○Set the output shaft in a vertical position holding the 3rd gear [B].

○Spin the 5th gear quickly [C] and pull it off upward.

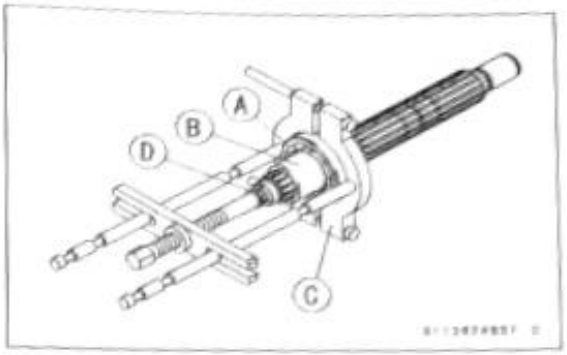


Transmission

• Remove the ball bearing [A] from each shafts and collar [B] from output shaft.

Special Tools - Bearing Puller [C]: 57001-135
Bearing Puller Adapter [D]: 57001-317

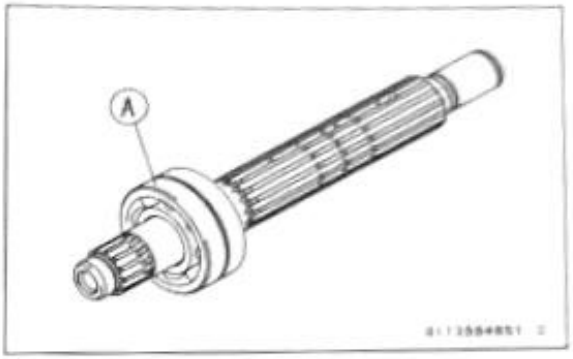
• Discard the bearing and collar (output shaft).



Transmission Shaft Assembly

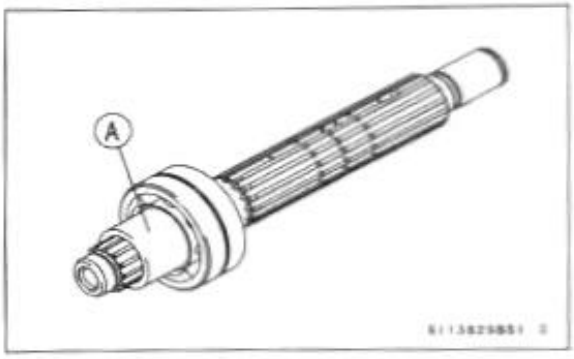
• Install the new ball bearing [A] on the each shaft, using the bearing driver.

Spacial Tool - Bearing Driver, ϕ32: 57001-382

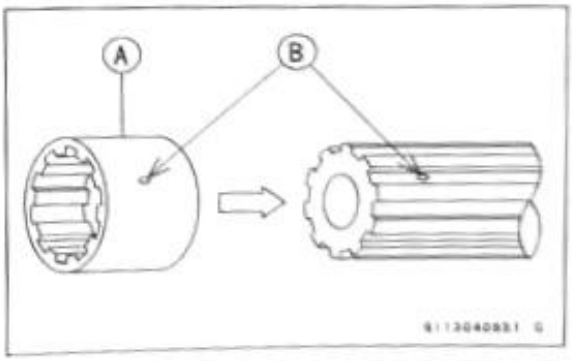


• Install the collar [A] on the output shaft, using the bearing driver.

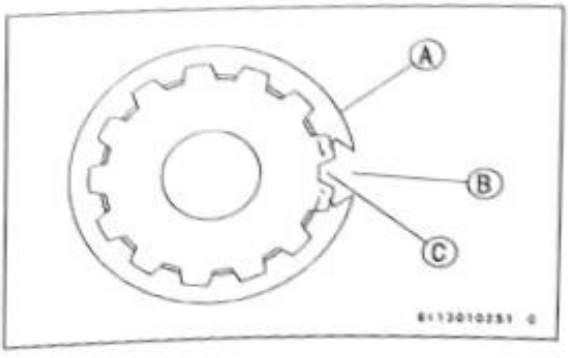
Special Tool - Bearing Driver, ϕ32: 57001-382



• Apply engine oil to the bushings, ball bearings and shafts.
• Install the gear bushings [A] on the shaft with their holes [B] aligned.



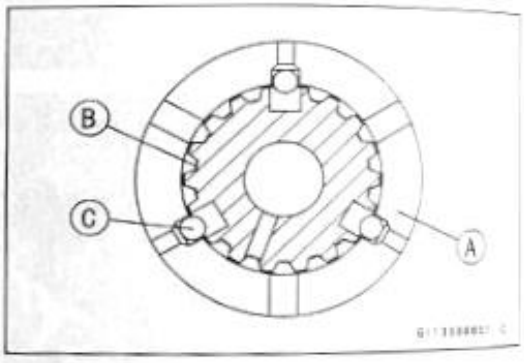
• Replace any circlips removed with new ones.
• Install the circlips [A] so that the opening [B] is aligned with a spline groove [C].



Transmission

- The drive shaft gears can be recognized by size: the gear with the smallest diameter is 1st gear, and the largest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 3rd/4th gear onto the drive shaft with their oil holes aligned.
- Install the 5th and 6th gear bushings onto the drive shaft with their oil holes aligned.
- The output shaft gears can be recognized by size: the gear with the largest diameter is 1st gear, and the smallest one is 6th gear. Be sure that all parts are put back in the correct sequence and all circlips and washers are properly in place.
- Install the 6th gear onto the output shaft with their oil holes aligned.
- Install the 2nd and 3rd/4th gear bushings onto the output shaft with their oil holes aligned.

- Fit the steel balls into the 5th gear holes in the output shaft, aligning the holes as shown.
  5th Gear [A]
  Output Shaft [B]
  Steel Balls [C]

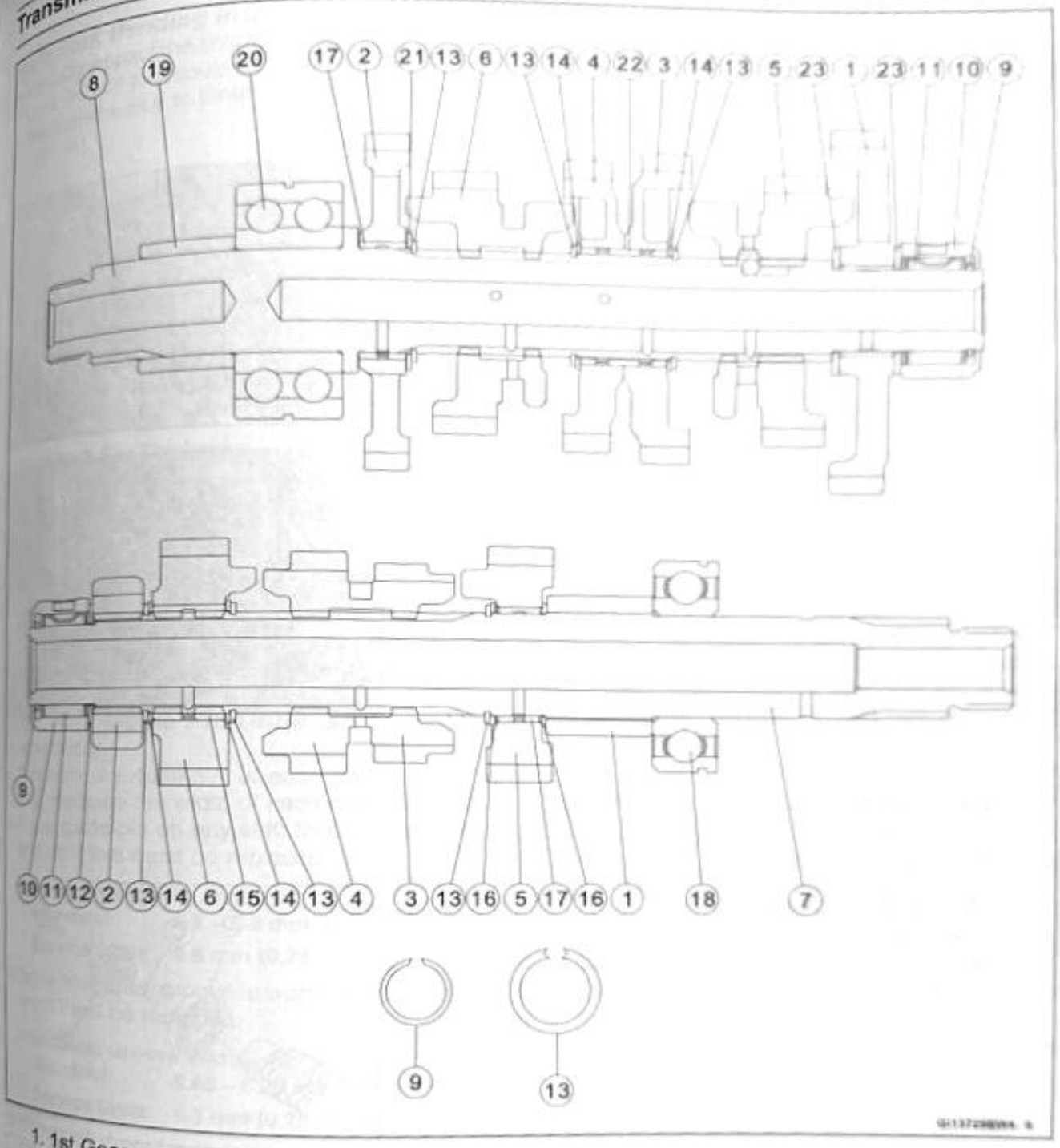


NOTICE
Do not apply grease to the balls to hold them in place. This will cause the positive neutral finder mechanism to malfunction.

○After assembling the 5th gear with steel balls in place on the output shaft, check the ball-locking effect that the 5th gear doesn't come out of the output shaft when moving it up and down by hand.

- Check that each gear spins or slides freely on the transmission shafts without binding after assembly.

Transmission



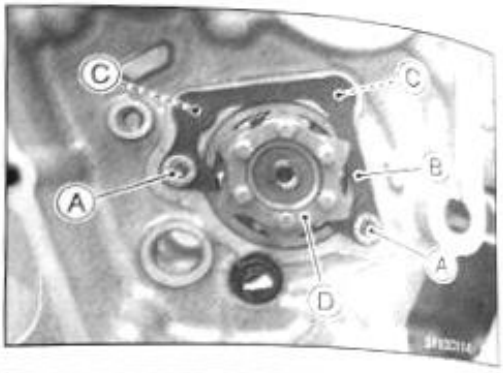
1. 1st Gear
2. 2nd Gear
3. 3rd Gear
4. 4th Gear
5. 5th Gear
6. 6th (Top) Gear
7. Drive Shaft
8. Output Shaft
9. Circlip
10. Bearing Outer Race
11. Needle Bearing
12. Washer, ϕ30 × 20.5 mm (1.2 × 0.8 in.)
13. Circlip
14. Toothed Washer
15. Toothed Bushing, L = 16.6 mm (0.65 in.)
16. Washer, ϕ30 × 25.3 mm (1.2 × 1.0 in.)
17. Bushing, ϕ28 mm (1.1 in.)
18. Ball Bearing, ϕ52 mm (2.0 in.)
19. Collar
20. Ball Bearing, ϕ57 mm (2.2 in.)
21. Washer, ϕ33 × 25.3 mm (1.3 × 1.0 in.)
22. Toothed Bushing, L = 20.0 mm (0.79 in.)
23. Washer, ϕ31 × 20.5 mm (1.2 × 0.8 in.)

Transmission

Shift Drum and Fork Removal

NOTICE
Never drop the shift drum, especially on a hard surface. Such a shock to the shift drum can damage it.

- Remove:
  Lower Crankcase Half (see Crankcase Splitting(9-9))
  Transmission Shafts (see Transmission Shaft Removal(9-32))
  Gear Positioning Lever (see External Shift Mechanism Removal(9-29))
  Shift Drum Bearing Holder Bolts [A]
  Shift Drum Bearing Holder [B]
- Pull out the shift rods [C], and remove the shift forks.
- Pull out the shift drum [D].



Shift Drum and Fork Installation

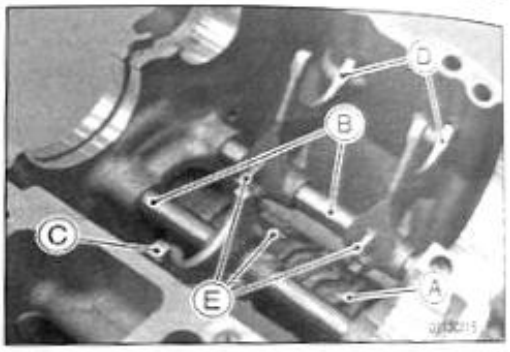
- Apply engine oil to the shift drum, forks and rods.
- Install the shift drum [A].
- Install the shift rods [B] and shift forks, note the following.

○The rods are identical.
○Position the one with shortest ears [C] on the drive shaft and place the pin in the center groove in the shift drum.
○The two forks [D] on the output shaft are identical.
○Face the stoppers [E] on the shift forks inward.

- Replace the shift drum bearing holder bolts with new ones.
- Tighten:

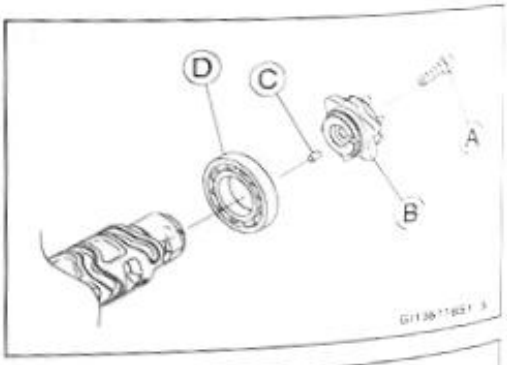
Torque - Shift Drum Bearing Holder Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)

- Install the removed parts.



Shift Drum Disassembly

- Remove the shift drum (see Shift Drum and Fork Removal(9-36)).
- While holding the shift drum with a vise, remove the shift drum cam holder bolt [A].
- Remove:
  Shift Drum Cam [B]
  Dowel Pin [C]
  Ball Bearing [D]



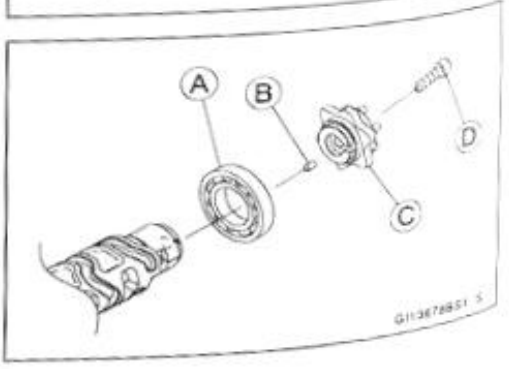
Shift Drum Assembly

- Install:
  Ball Bearing [A]
  Dowel Pin [B] and Shift Drum Cam [C]

○Align the pin with the groove in the shift drum cam.

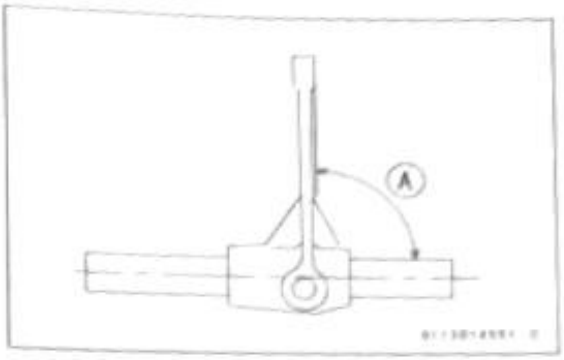
- Replace the shift drum cam holder bolt [D] with a new one.
- Tighten:

Torque - Shift Drum Cam Holder Bolt: 12 N·m (1.2 kgf·m, 106 in·lb)



Shift Fork Bending Inspection

• Visually inspect the shift forks, and replace any fork that is bent. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
90° [A]



Shift Fork/Gear Groove Wear Inspection

• Measure the thickness of the shift fork ears [A], and measure the width of the gear grooves [B].
★If the thickness of a shift fork ear is less than the service limit, the shift fork must be replaced.

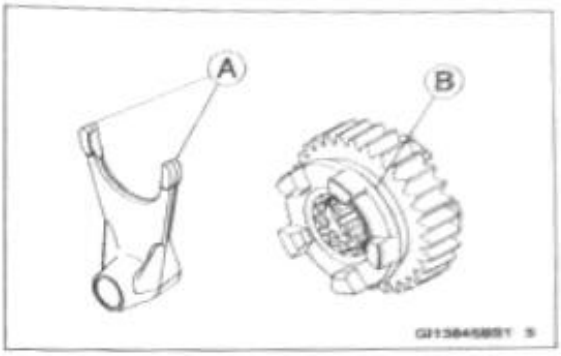
Shift Fork Ear Thickness

Standard:	**4.9 – 5.0 mm (0.19 – 0.20 in.)**
Service Limit:	**4.8 mm (0.19 in.)**

★If the gear groove is worn over the service limit, the gear must be replaced.

Shifter Groove Width

Standard:	**5.05 – 5.15 mm (0.199 – 0.203 in.)**
Service Limit:	**5.3 mm (0.21 in.)**



Shift Fork Guide Pin/Drum Groove Wear Inspection

• Measure the diameter of each shift fork guide pins [A], and measure the width of each shift drum grooves [B].
★If the guide pin on any shift fork is less than the service limit, the fork must be replaced.

Shift Fork Guide Pin Diameter

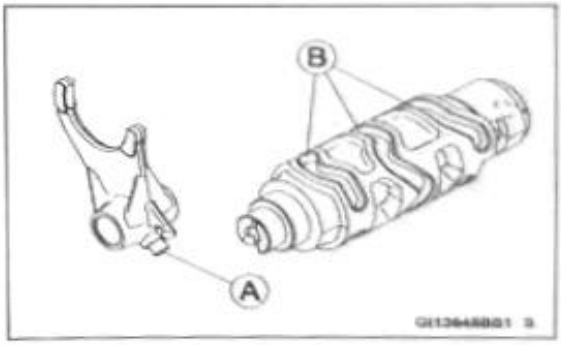
Standard:	**5.9 – 6.0 mm (0.23 – 0.24 in.)**
Service Limit:	**5.8 mm (0.23 in.)**

★If any shift drum groove is worn over the service limit, the drum must be replaced.

Shift Drum Groove Width

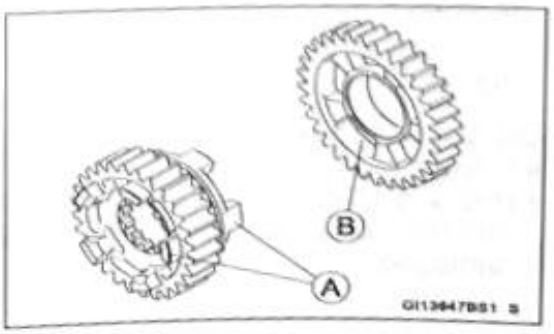
Standard:	**6.05 – 6.20 mm (0.238 – 0.244 in.)**
Service Limit:	**6.3 mm (0.25 in.)**

★If the shift drum has been replaced, replace the gear position sensor as a set.



Gear Dog and Gear Dog Hole Damage Inspection

• Visually inspect the gear dogs [A] and gear dog holes [B].
★Replace any damaged gears or gears with excessively worn dogs or dog holes.



Ball Bearing, Needle Bearing, and Oil Seal

Ball and Needle Bearing Replacement

NOTICE

Do not remove the ball or needle bearings unless it is necessary. Removal may damage them.

- Using a press or puller, remove the ball bearing and/or needle bearings.

NOTE

○*In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.*

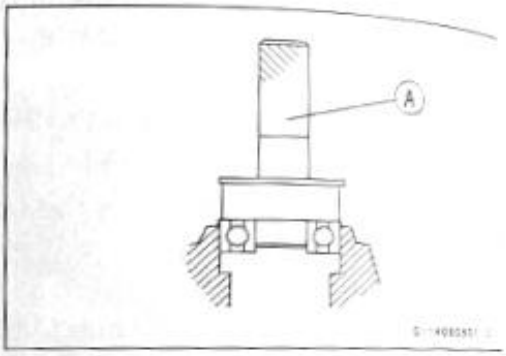
NOTICE

Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.

- Using a press and the bearing driver set [A], install the new ball bearing until it stops at the bottom of its housing.

○The new needle bearings must be pressed into the crankcase so that the end is flush with the end of the hole.

Special Tool - Bearing Driver Set: 57001-1129



Ball and Needle Bearing Wear Inspection

NOTICE

Do not remove the bearings for inspection. Removal may damage them.

- Check the ball bearings.

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high flash-point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

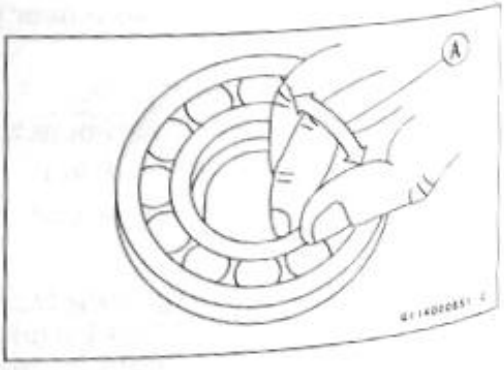
○Spin [A] the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

- Check the needle bearings.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of a needle bearing, replace it.



Oil Seal Inspection

- Inspect the oil seals.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

Wheels/Tires

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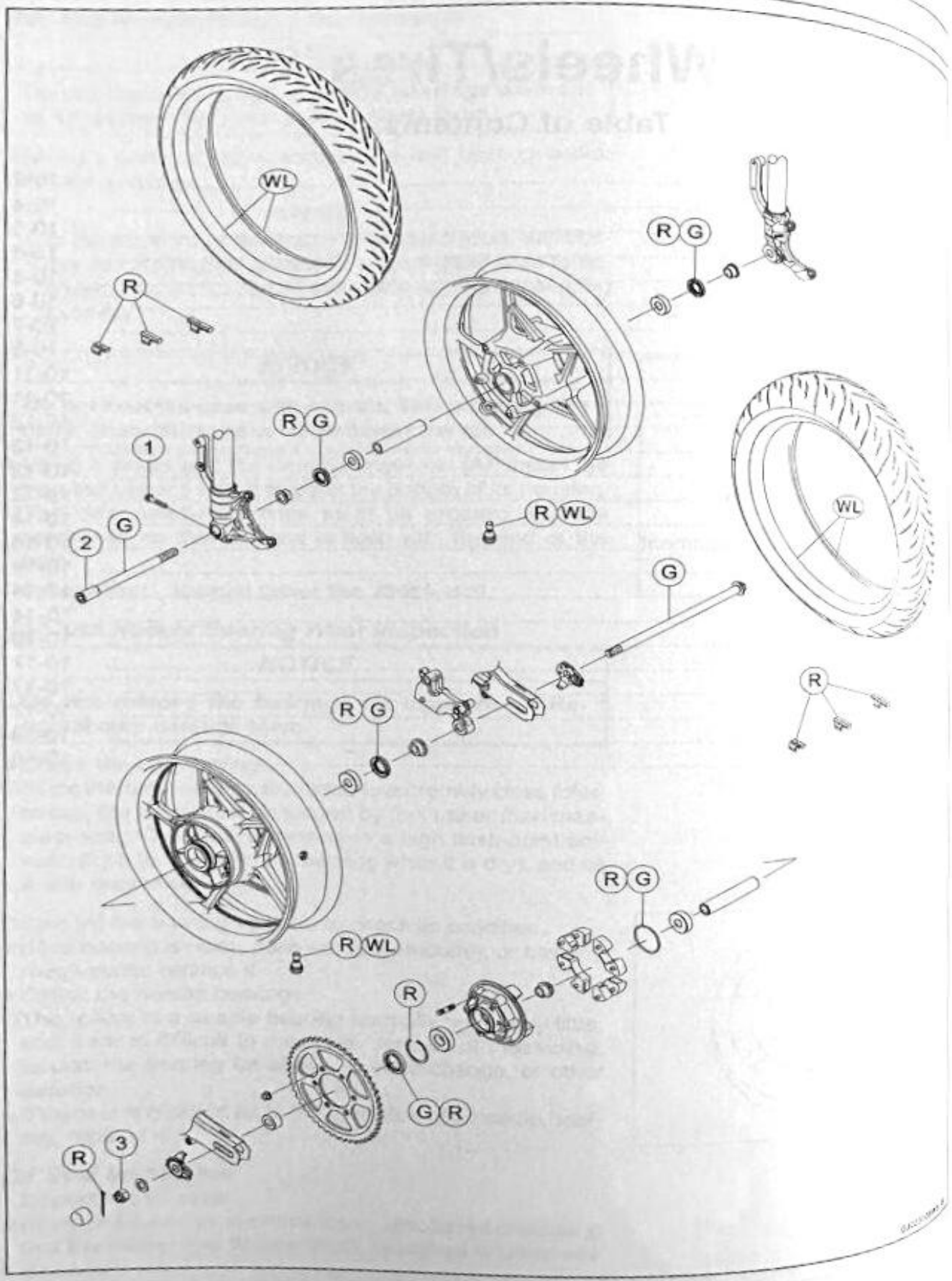
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Clamp Bolt	20	2.0	15	
2	Front Axle	98	10	72	
3	Rear Axle Nut	98	10	72	

G: Apply grease.
R: Replacement Parts
WL: Apply soap and water solution or rubber lubricant.

Specifications

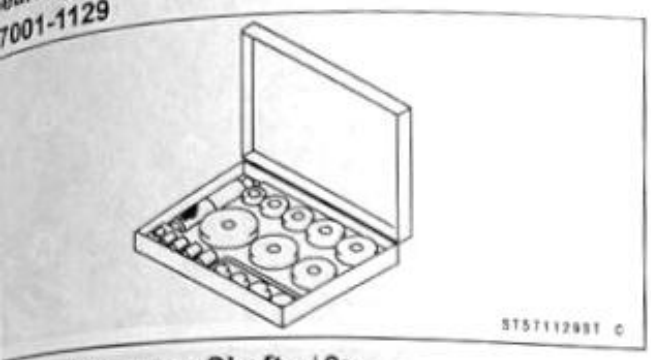
Item	Standard	Service Limit
Wheels (Rims)		
Rim Runout:		
Axial	TIR 0.5 mm (0.02 in.) or less	TIR 1.0 mm (0.04 in.)
Radial	TIR 0.8 mm (0.03 in.) or less	TIR 1.0 mm (0.04 in.)
Axle Runout/100 mm (3.94 in.)	TIR 0.03 mm (0.001 in.) or less	TIR 0.2 mm (0.008 in.)
Wheel Balance	10 g (0.35 oz.) or less	– – –
Balance Weights	10 g (0.35 oz.), 20 g (0.71 oz.), 30 g (1.06 oz.)	– – –
Rim Size:		
Front	17M/C × MT3.50	– – –
Rear	17M/C × MT4.50	– – –
Tires		
Air Pressure (when cold):		
Front	Up to 180 kg (397 lb) load: 225 kPa (2.25 kgf/cm², 32 psi)	– – –
Rear	Up to 180 kg (397 lb) load: 250 kPa (2.50 kgf/cm², 36 psi)	– – –
Tread Depth:		
Front	4.0 mm (0.16 in.)	1 mm (0.04 in.)
Rear	6.0 mm (0.24 in.)	UP to 130 km/h (80 mph): 2 mm (0.08 in.) Over 130 km/h (80 mph): 3 mm (0.12 in.)
Standard Tires:		
Front:		
Make	DUNLOP	– – –
Type	SPORTMAX, GPR-300F W (ID)SPORTMAX, GPR-300F X	– – –
Size	120/70 ZR17 MC (58W)	– – –
Rear:		
Make	DUNLOP	– – –
Type	SPORTMAX, GPR-300 W	– – –
Size	160/60 ZR17 MC (69W)	– – –

⚠ WARNING

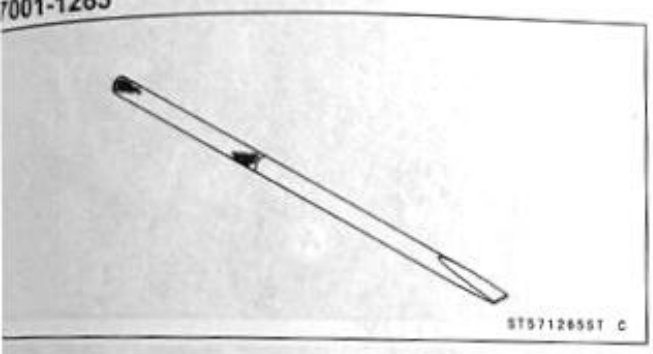
Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

Special Tools

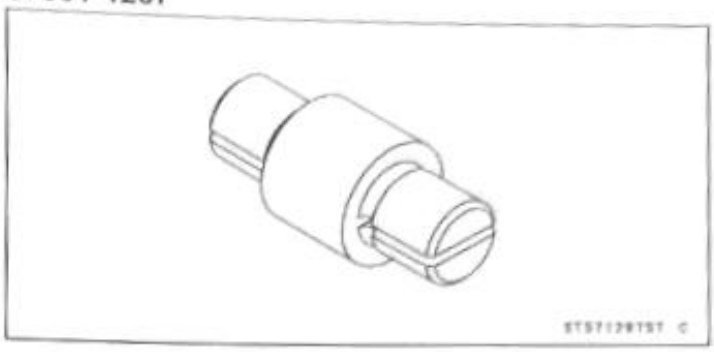
Bearing Driver Set:
57001-1129



Bearing Remover Shaft, ϕ9:
57001-1265



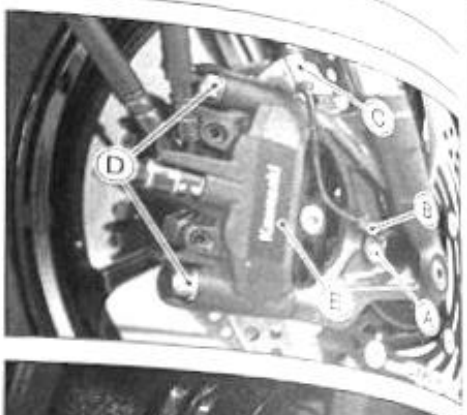
Bearing Remover Head, ϕ15 × ϕ17:
57001-1267



Wheels (Rims)

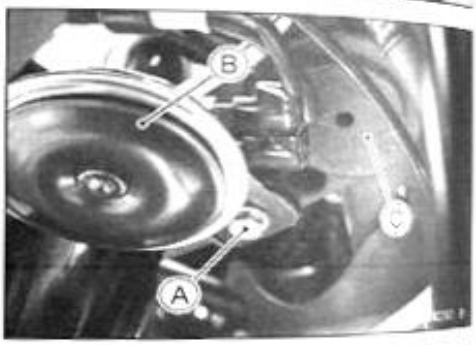
Front Wheel Removal

- Remove the bolt [A] and front wheel rotation sensor [B], and clear the front wheel rotation sensor lead from the clamp [C].
- Remove:
  Front Caliper Bolts (Both Sides) [D]
  Front Caliper (Both Sides) [E]

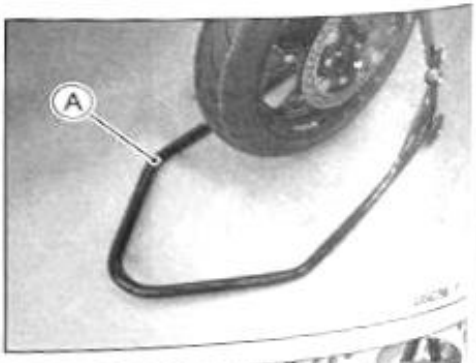


- Loosen:
  Front Axle Clamp Bolt [A]
  Front Axle [B]

- Remove:
  Bolt [A]
  Horn [B] with Collar
  Grommet [C]



- Raise the front wheel off the ground with the stand [A].
- Pull out the front axle to the left and drop the front wheel out of the front forks.



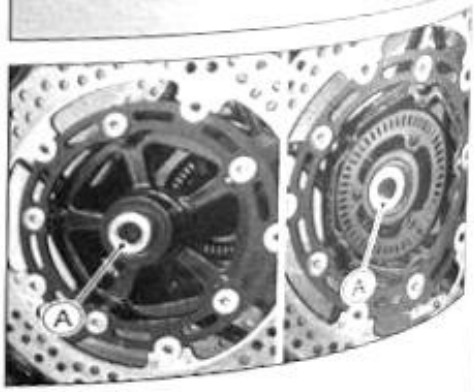
NOTICE

Do not lay the wheel down on one of the discs. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Front Wheel Installation

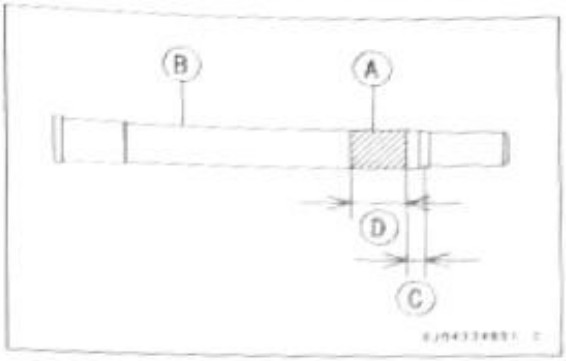
- Apply grease to the grease seal lips.
- Fit the collar [A] on the both sides of the hub.

○The collars are identical.



Wheels (Rims)

• Apply a thin coat of grease [A] to the front axle [B] for rust prevention.
About 10 mm (0.4 in.) [C]
About 30 mm (1.2 in.) [D]



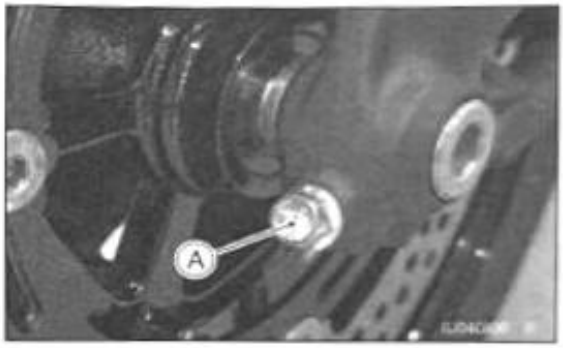
NOTE

○Do not apply grease to the threads of the axle.

• Insert the front axle from the left side.
• Wipe off excess grease if necessary.
• Temporarily tighten the front axle and remove the stand.
• Tighten:

Torque - Front Axle: 98 N·m (10 kgf·m, 72 ft·lb)

• Before tightening the front axle clamp bolt [A] on the left front fork leg, pump the front fork up and down 4 or 5 times to seat the front fork legs on the front axle.



NOTE

○Put a block in front of the front wheel to stop moving.

• Tighten:

Torque - Front Axle Clamp Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)

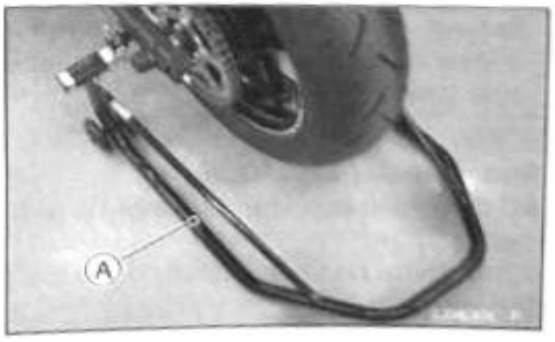
• Install the removed parts.
• Check the front brake effectiveness (see Brake Operation Inspection(2-43)).

⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

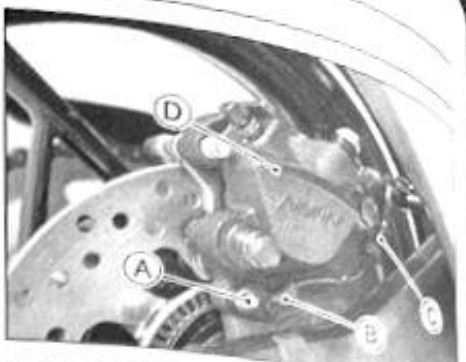
Rear Wheel Removal

• Raise the rear wheel off the ground with the stand [A].



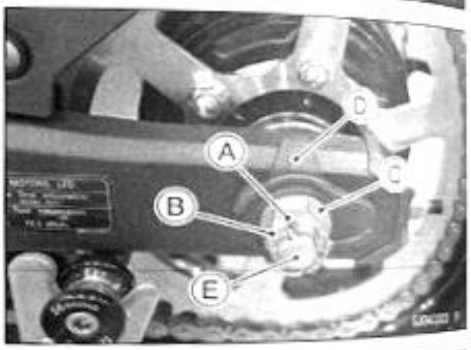
Wheels (Rims)

- Remove the bolt [A] and rear wheel rotation sensor [B], and clear the rear wheel rotation sensor lead from the clamp [C].
- Remove the rear caliper [D] together with the brake hose (see Rear Caliper Removal(12-12)).



- Remove the cap [A].

- Remove:
  Cotter Pin [A]
  Rear Axle Nut [B]
  Washer [C]
  Wheel Alignment Indicator [D] (Both Sides)
  Rear Axle [E] (from Right Side)



- Remove the drive chain [A] from the rear sprocket toward the left.
- Move the rear wheel back and remove it.

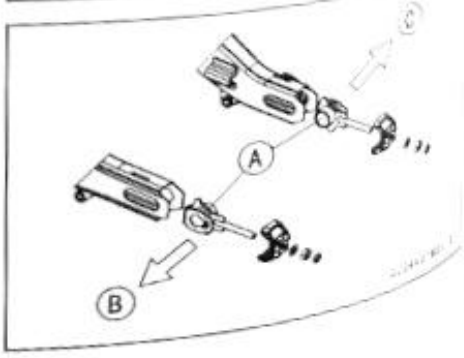
NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

Rear Wheel Installation

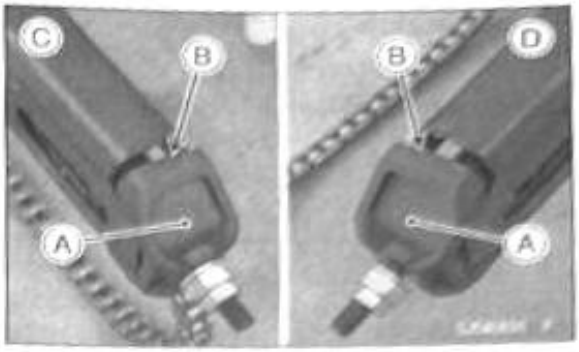
★If the chain adjuster assembly is removed, install the next procedure.

- Install the chain adjusters [A] to the swingarm as shown.
  Left Side [B]
  Right Side [C]

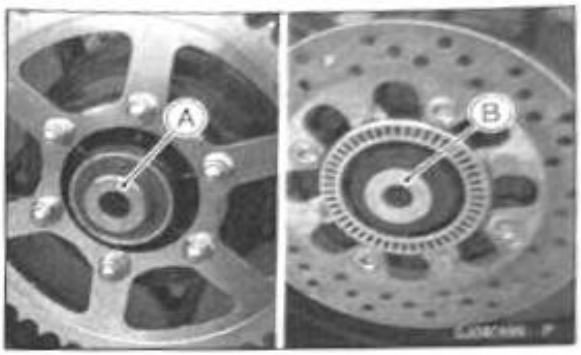


Wheels (Rims)

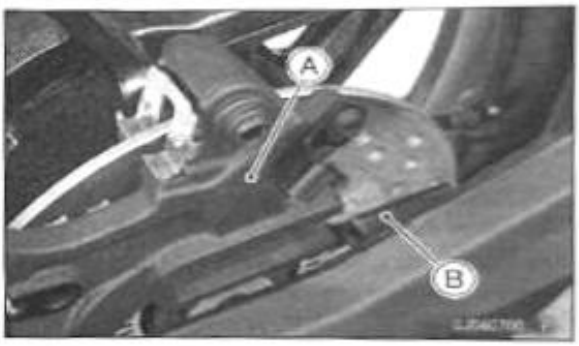
• Install the caps [A] so that the stepped side [B] faces inside of the swingarm.
Left Side [C]
Right Side [D]



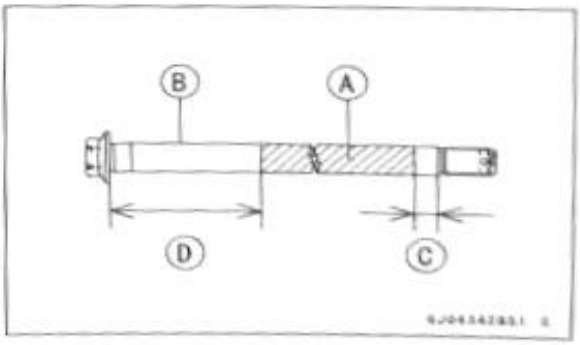
• Apply grease to the grease seal lips.
• Fit the collars on the both sides of the hub.
Left Side Collar [A]
Right Side Collar [B] (with Flange)



• Install the caliper bracket [A] onto the stopper [B] of the swingarm.
• Engage the drive chain with the rear sprocket.



• Apply a thin coat of grease [A] to the rear axle [B] for rust prevention.
About 10 mm (0.4 in.) [C]
About 70 mm (2.8 in.) [D]



NOTE

○Do not apply grease to the threads of the axle.

• Insert the axle from the right side of the wheel.
• Wipe off any excess grease if necessary.
• Install the washer and rear axle nut.
• Adjust the drive chain slack before tightening the axle nut (see Drive Chain Slack Inspection(2-39)).
• Tighten:

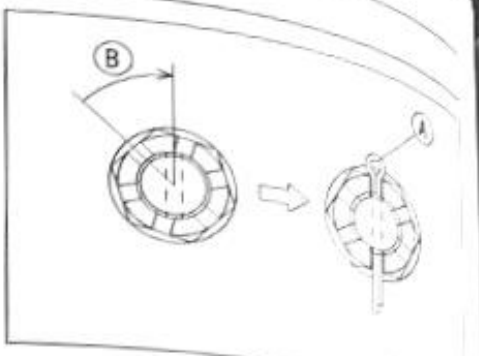
Torque - Rear Axle Nut: 98 N·m (10 kgf·m, 72 ft·lb)

Wheels (Rims)

- Insert a new cotter pin [A].

NOTE

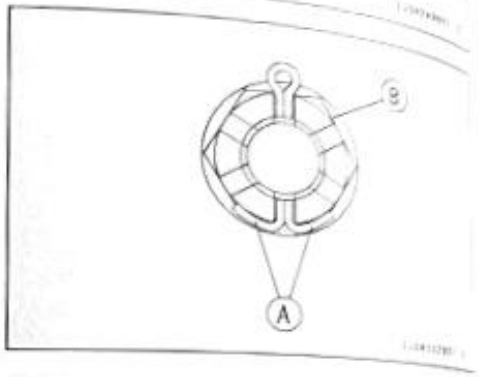
○When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.
○It should be within 30 degrees.
○Loosen once and tighten again when the slot goes past the nearest hole.



- Bend the cotter pin ends [A] along the nut [B].

⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.



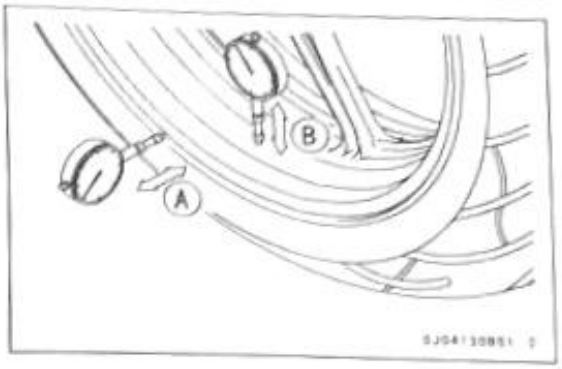
- Install the cap.
- Install the removed parts.
- Check the rear brake effectiveness (see Brake Operation Inspection(2-43)).

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Wheels (Rims)

Wheel Inspection



- Raise the front/rear wheel off the ground with the stand (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)).
- Spin the wheel lightly, and check for roughness or binding.
★If roughness or binding is found, replace the hub bearings.
- Inspect the wheel for small cracks, dents, bending, or warp.
★If there is any damage to the wheel, replace the wheel.
- Remove the wheel, and support it with the tire by the axle.
- Measure the rim runout, axial [A] and radial [B], with a dial gauge.
★If rim runout exceeds the service limit, check the hub bearings (see Hub Bearing Inspection(10-18)).
★If the problem is not due to the bearings, replace the wheel.

Rim Runout (with tire installed)

Standard:

Axial	**TIR 0.5 mm (0.02 in.) or less**
Radial	**TIR 0.8 mm (0.03 in.) or less**

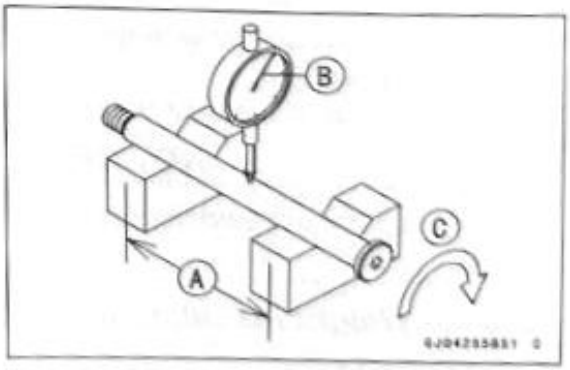
Service Limit:

Axial	**TIR 2.0 mm (0.08 in.)**
Radial	**TIR 2.0 mm (0.08 in.)**

⚠ WARNING

Damaged wheel parts may fail and cause an accident resulting in serious injury or death. Never attempt to repair a damaged wheel part. If the wheel part is damaged, it must be replaced with a new one.

Axle Inspection



- Remove the front and rear axles (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)).
- Visually inspect the front and rear axle for damages.
★If the axle is damaged or bent, replace it.
- Place the axle in V blocks that are 100 mm (3.94 in.) [A] apart, and set a dial gauge [B] on the axle at a point halfway between the blocks. Turn [C] the axle to measure the runout. The difference between the highest and lowest dial readings is the amount of runout.
★If axle runout exceeds the service limit, replace the axle.

Axle Runout/100 mm (3.94 in.)

Standard:	**TIR 0.03 mm (0.001 in.) or less**
Service Limit:	**TIR 0.2 mm (0.008 in.)**

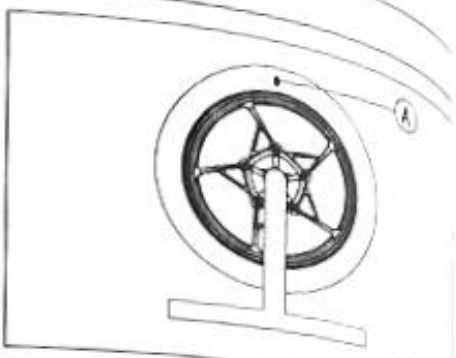
Wheels (Rims)

Balance Inspection

- Remove the front and rear wheels (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)).
- Support the wheel so that it can be spun freely.
- Spin the wheel lightly, and mark [A] the wheel at the top when the wheel stops.

○Repeat this procedure several times. If the wheel stops of its own accord in various positions, it is well balanced.

★If the wheel always stops in one position, adjust the wheel balance (see Balance Adjustment(10-12)).

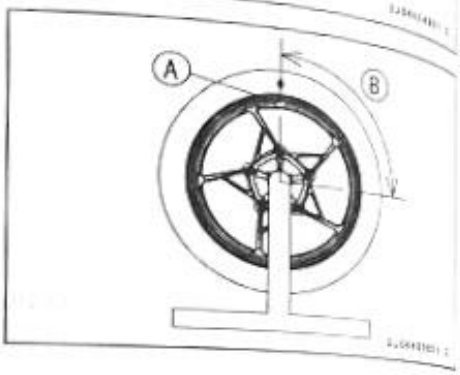


Balance Adjustment

- If the wheel always stops in one position, provisionally attach a balance weight [A] on the rim at the marking using adhesive tape.
- Rotate the wheel 1/4 turn [B], and see whether or not the wheel stops in this position. If it does, the correct balance weight is being used.

★If the wheel rotates and the weight goes up, replace the weight with the next heavier size. If the wheel rotates and the weight goes down, replace the weight with the next lighter size. Repeat these steps until the wheel remains at rest after being rotated 1/4 turn.

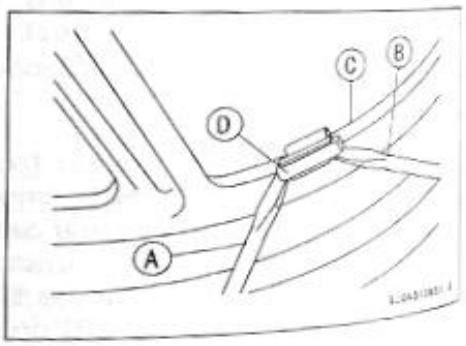
- Rotate the wheel another 1/4 turn and then another 1/4 turn to see if the wheel is correctly balanced.
- Repeat the entire procedure as many times as necessary to achieve correct wheel balance.
- Permanently install the balance weight.



Balance Weight Removal

- Insert a flat tip screwdrivers [A] [B] between the rib [C] and weight [D] as shown.
- Pry the balance weight with two screwdrivers and remove the balance weight.
- Discard the used balance weight.

NOTICE
Do not tap the screwdrivers. The rim could be damaged.



Balance Weight Installation

Balance Weight

Part Number	Weight
41075-0007	10 g (0.35 oz.)
41075-0008	20 g (0.71 oz.)
41075-0009	30 g (1.06 oz.)

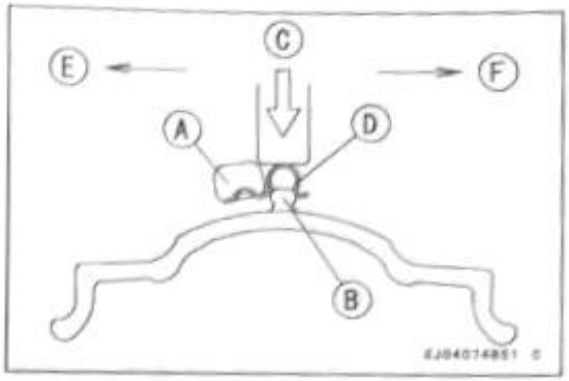
NOTE

○*Balance weights are available from Kawasaki dealers in 10, 20 and 30 grams (0.35, 0.71 and 1.06 oz.) sizes. An imbalance of less than 10 grams (0.35 oz.) will not usually affect running stability.*

○*Do not use four or more balance weight (more than 90 grams, 3.2 oz.). If the wheel requires an excess balance weight, disassemble the wheel to find the cause.*

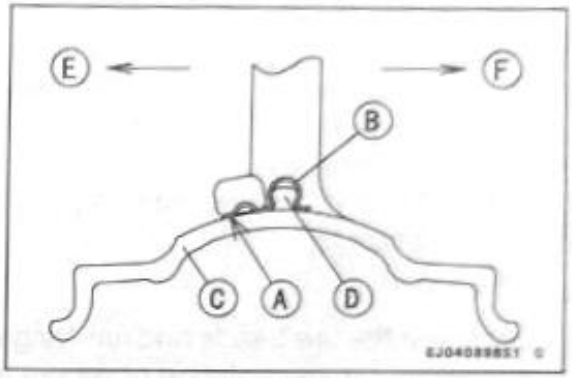
Wheels (Rims)

- Slip the balance weight [A] onto the rib [B] by pushing or lightly hammering [C] the clip [D].
  Left Side [E]
  Right Side [F]



- Check that the blade [A] and clip [B] are fully seated on the rim [C] and that the clip is hooked over the rib [D].
  Left Side [E]
  Right Side [F]

If the balance weight has any play, discard it.



⚠ WARNING

Unbalanced wheels can create an unsafe riding condition. If the balance weight has any play on the rib of the rim, the blade and/or clip have been stretched. Replace the loose balance weight. Do not reuse used balance weight.

Tires

Air Pressure Inspection/Adjustment

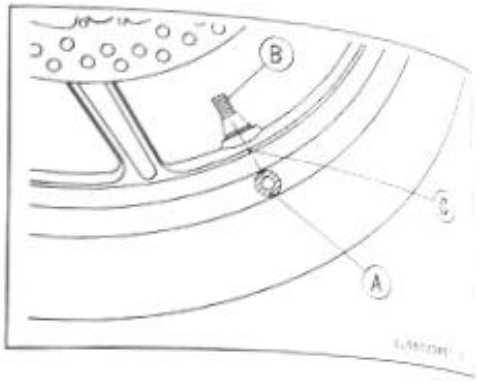
- Refer to the Air Pressure Inspection (see Air Pressure Inspection(2-36)).

Tire Inspection

- Refer to the Wheels and Tires Inspection (see Wheels and Tires Inspection(2-36)).

Tire Removal

- Remove:
  Wheels (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7))
  Valve Core (Let out the air)
- To maintain wheel balance, mark the valve stem position on the tire with chalk so that the tire can be reinstalled in the same position.
  Chalk Mark or Yellow Mark [A]
  Valve Stem [B]
  Align [C]



- Lubricate the tire beads and rim flanges on both sides with a soap and water solution or rubber lubricant. This helps the tire beads slip off the rim flanges.

NOTICE

Never lubricate with engine oil or petroleum distillates because they will deteriorate the tire.

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

○The tires cannot be removed with hand tools because they fit the rims too tightly.

Tire Installation

⚠ WARNING

Some replacement tires may adversely affect handling and cause an accident resulting in serious injury or death. To ensure proper handling and stability, use only the recommended standard tires for replacement, inflated to the standard pressure.

- Inspect the rim and tire, and replace them if necessary.
- Clean the sealing surfaces of the rim and tire, and smooth the sealing surfaces of the rim with a fine emery cloth if necessary.
- Remove the air valve and discard it.

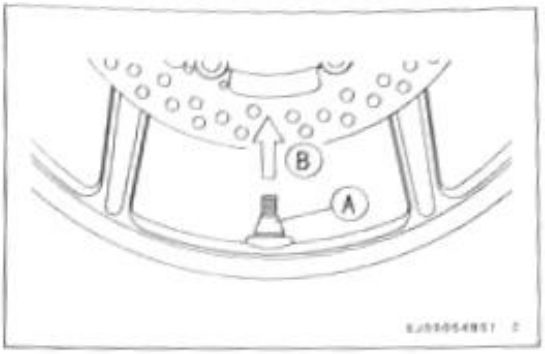
NOTICE

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.

Tires

• Install a new valve in the rim.

○Remove the valve cap, lubricate the stem seal [A] with a soap and water solution or rubber lubricant, and pull [B] the valve stem through the rim from the inside out until it snaps into place.

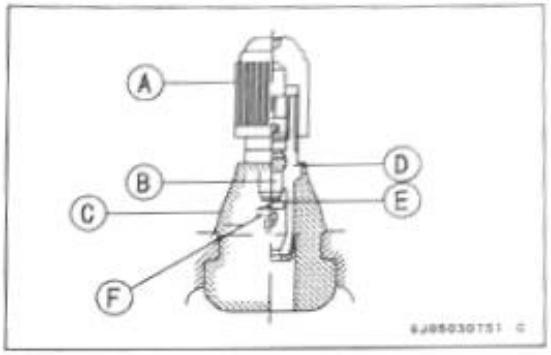


NOTICE

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.

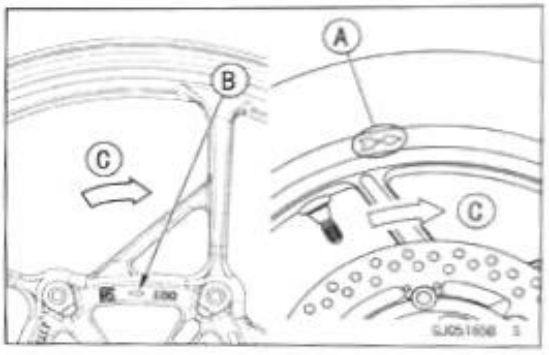
○The air valve is as shown.

Valve Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]

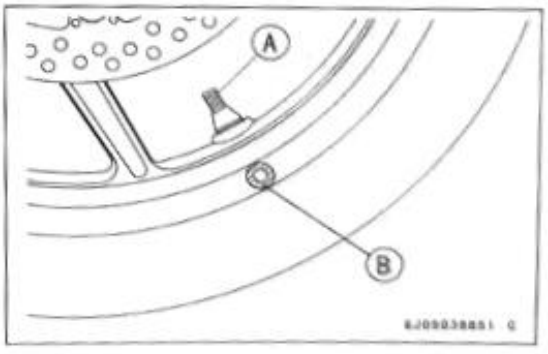


• Check the tire rotation mark on the front and rear tires and install them on the rim accordingly.

Tire Rotation Mark [A]
Wheel Rotation Mark [B] (Front Wheel)
Rotating Direction [C]



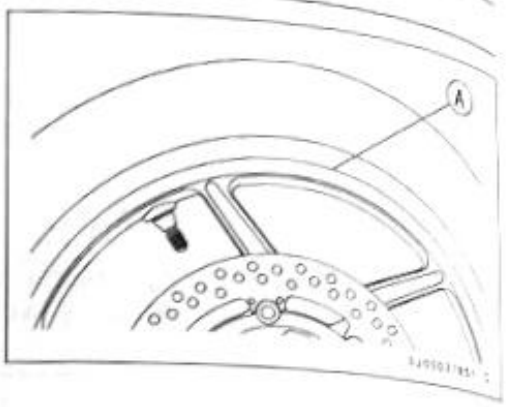
• Position the tire on the rim so that the valve [A] align with the tire balance mark [B] (the chalk mark made during removal, or the yellow paint mark on a new tire).
• Install the tire bead over the rim flange using a suitable commercially available tire changer.
• Lubricate the tire beads and rim flanges with a soap and water solution or rubber lubricant to help seat the tire beads in the sealing surfaces of the rim while inflating the tire.
• Center the rim in the tire beads, and inflate the tire with compressed air until the tire beads seat in the sealing surfaces.



⚠ WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than 400 kPa (4.0 kgf/cm², 57 psi).

Tires



- Check to see that the rim lines [A] on both sides of the tire sidewalls are parallel with the rim flanges.

★If the rim flanges and tire sidewall rim lines are not parallel, remove the valve core.

- Lubricate the rim flanges and tire beads.
- Install the valve core and inflate the tire again.
- After the tire beads seat in the rim flanges, check for air leakage.

○Inflate the tire slightly above standard inflation.

○Use a soap and water solution or submerge the tire, and check for bubbles that would indicate leakage.

- Adjust the air pressure to the specified pressure (see Air Pressure Inspection(2-36)).
- Install the air valve cap.
- Adjust the wheel balance (see Balance Adjustment(10-12)).

Tire Repair

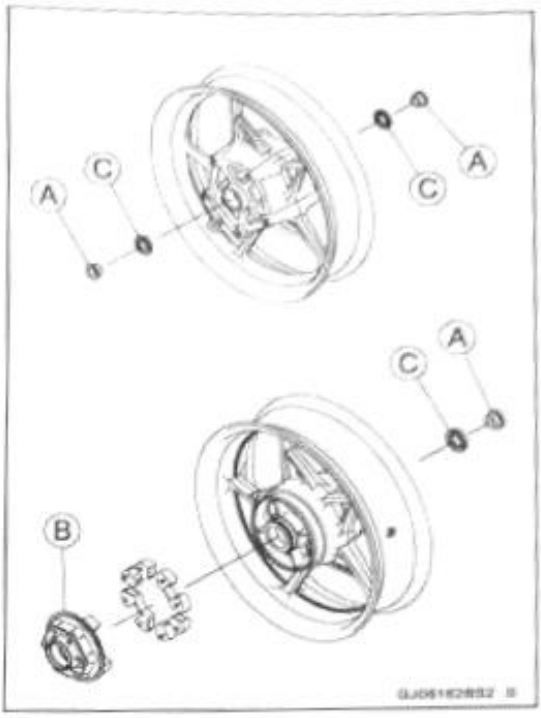
Currently two types of repair for tubeless tires have come into wide use. One type is called a temporary (external) repair which can be carried out without removing the tire from the rim, and the other type is called permanent (internal) repair which requires tire removal. It is generally understood that higher running durability is obtained by permanent (internal) repairs than by temporary (external) ones. Also, permanent (internal) repairs have the advantage of permitting a thorough examination for secondary damage not visible from external inspection of the tire. For these reasons, Kawasaki does not recommend temporary (external) repair. Only appropriate permanent (internal) repairs are recommended. Repair methods may vary slightly from make to make. Follow the repair methods indicated by the manufacturer of the repair tools and materials so that safe results can be obtained.

Hub Bearing

Hub Bearing Removal

- Remove the wheels (see Front Wheel Removal(10-6)) (see Rear Wheel Removal(10-7)) and rear sprocket (see Rear Sprocket Removal(11-11)), and take out the following.

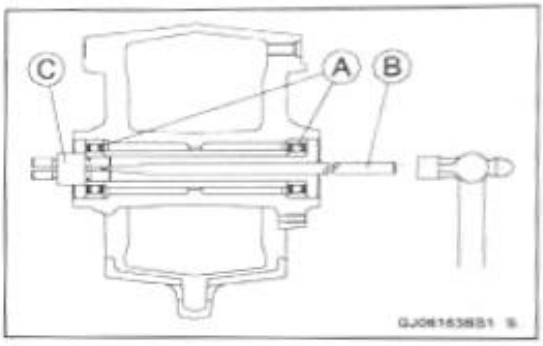
Collars [A]
Coupling [B] (Out of rear hub)
Grease Seals [C]



- Use the bearing remover to remove the hub bearings [A].

NOTICE

Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.



Special Tools - Bearing Remover Shaft, ϕ9 [B]: 57001-1265
Bearing Remover Head, ϕ15 × ϕ17 [C]: 57001-1267

Hub Bearing Installation

- Before installing the hub bearings, blow any dirt or foreign particles out of the hub with compressed air to prevent contamination of the bearings.
- Replace the bearings with new ones.
- Install the bearings by using the bearing driver set which does not contact the bearing inner race.

NOTE

○*Install the bearings so that the marked side faces out.*

- Press in each right bearing [A] until it is bottomed.

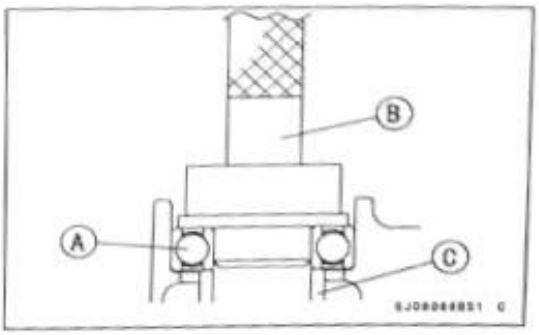
Special Tool - Bearing Driver Set [B]: 57001-1129

- Install the collar [C].
- Press in each left bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129

- Confirm that the axle can be inserted smoothly.
- Confirm that the each bearing inner race can be turned smoothly. Then visually inspect that the inner race of the opposite side turns.

★If they do not turn smoothly, remove the bearings and sleeve and visually inspect the wheel and sleeve.

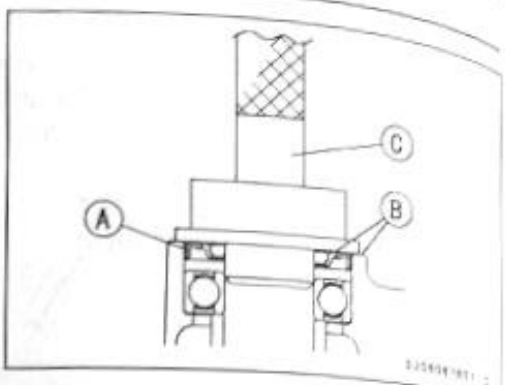


Hub Bearing

- Replace the grease seals with new ones.
- Press in the grease seals [A] so that the seal surface is flush [B] with the end of the hole.

Special Tool - Bearing Driver Set [C]: 57001-1129

- Apply grease to the grease seal lips.
- Install the removed parts.

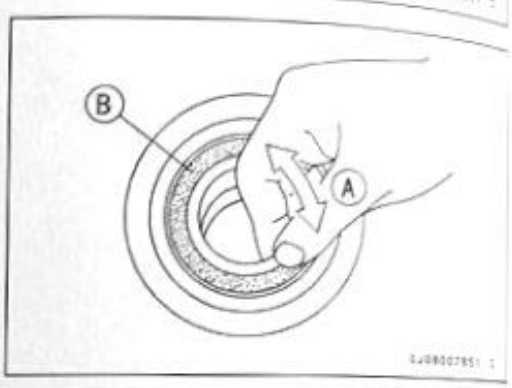


Hub Bearing Inspection

Since the hub bearings are made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○*Do not remove any bearings for inspection. If any bearings are removed, they will need to be replaced with new ones.*



- Turn each bearing in the hub back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.

- Examine the bearing seal [B] for tears or leakage.

★If the seal is torn or is leaking, replace the bearing.

Hub Bearing Lubrication

NOTE

○*Since the hub bearings are packed with grease and sealed, lubrication is not required.*

Final Drive

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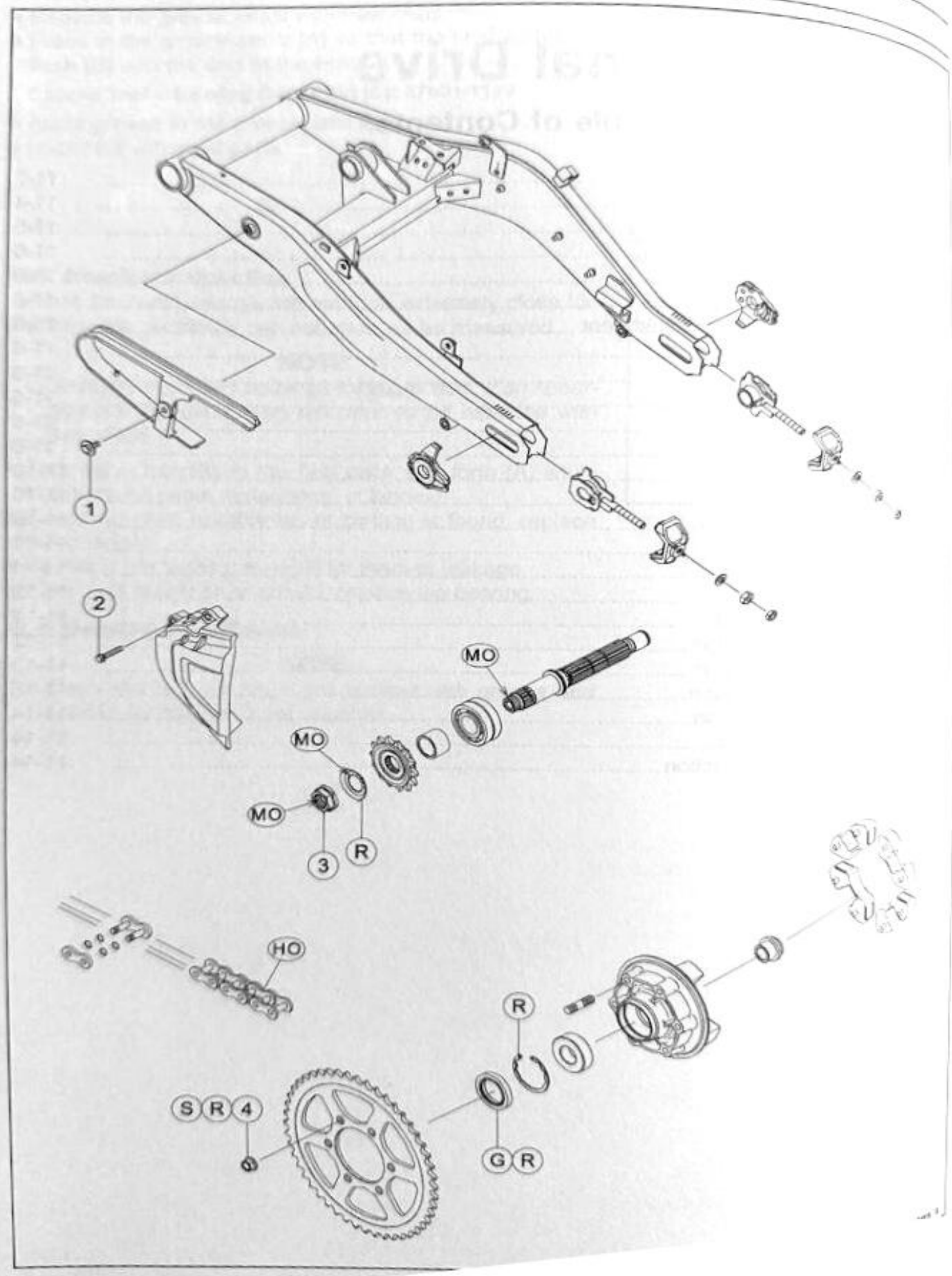
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Chain Guide Bolt	2.0	0.20	18 in·lb	
2	Engine Sprocket Cover Bolts	9.8	1.0	87 in·lb	
3	Engine Sprocket Nut	127	13.0	93.7	MO
4	Rear Sprocket Nuts	59	6.0	44	R

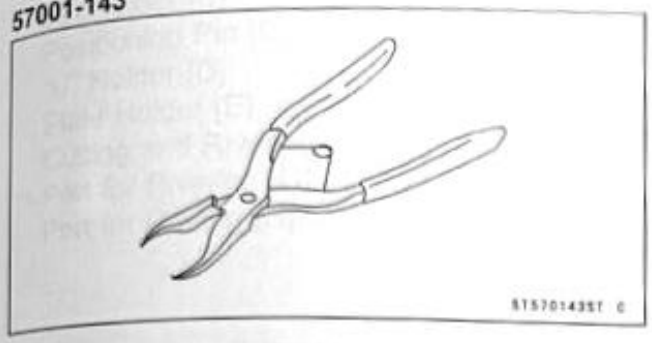
G: Apply grease.
HO: Apply heavy oil.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

Item	Standard	Service Limit
Drive Chain		
Drive Chain Slack	25 – 35 mm (1.0 – 1.4 in.)	– – –
Drive Chain Wear (20-link Length)	317.5 – 318.2 mm (12.50 – 12.53 in.)	319 mm (12.6 in.)
Standard Chain:		
Make	DAIDO	– – –
Type	DID 520VM5	– – –
Link	114 links	– – –
	(PH) 112 links	– – –
Link Pin Outside Diameter (When drive chain replacing)	5.4 – 5.8 mm (0.21 – 0.23 in.)	– – –
Link Plates Outside width (When drive chain replacing)	19.6 mm (0.772 in.) or less	– – –
Sprockets		
Rear Sprocket Warp	TIR 0.4 mm (0.016 in.) or less	TIR 0.5 mm (0.020 in.)

Special Tools

Inside Circlip Pliers:
57001-143



Bearing Driver Set:
57001-1129

Drive Chain

Drive Chain Slack Inspection

- Refer to the Drive Chain Slack Inspection (see Drive Chain Slack Inspection(2-39)).

Drive Chain Slack Adjustment

- Refer to the Drive Chain Slack Adjustment (see Drive Chain Slack Adjustment(2-39)).

Wheel Alignment Inspection/Adjustment

- Refer to the Wheel Alignment Inspection (see Wheel Alignment Inspection(2-40)).

Drive Chain Wear Inspection

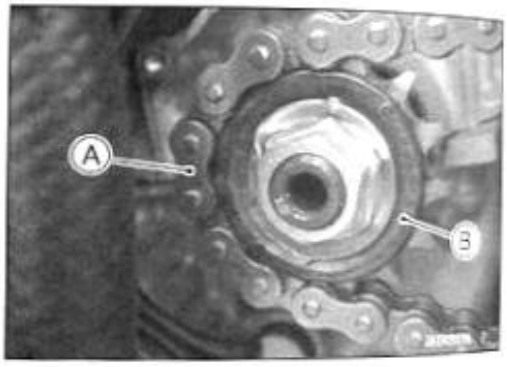
- Refer to the Drive Chain Wear Inspection (see Drive Chain Wear Inspection(2-41)).

Drive Chain Lubrication

- Refer to the Drive Chain Lubrication Condition Inspection (see Drive Chain Lubrication Condition Inspection(2-38)).

Drive Chain Removal

- Remove:
  Engine Sprocket Cover (see Engine Sprocket Removal(11-10))
  Swingarm (see Swingarm Removal(13-33))
- Disengage the drive chain [A] from the engine sprocket [B].
- Remove the drive chain rearward.



Drive Chain Installation

- Install the drive chain, and engage the engine sprocket.
- Install the removed parts.
- Adjust the chain slack after installing the chain (see Drive Chain Slack Adjustment(2-39)).

Drive Chain Replacement

NOTE

○*Since the drive chain is installed through the swingarm, the chain cannot be removed other than by cutting it. Prepare the new link pin, link plate, grease seals, and tools for rejoining the chain.*

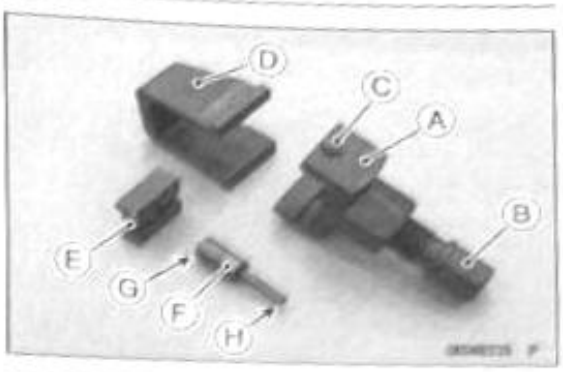
- Using a suitable tool, replace the drive chain.

Recommended Tool - DID Chain Joint "ZJ"
Make DAIDO KOGYO

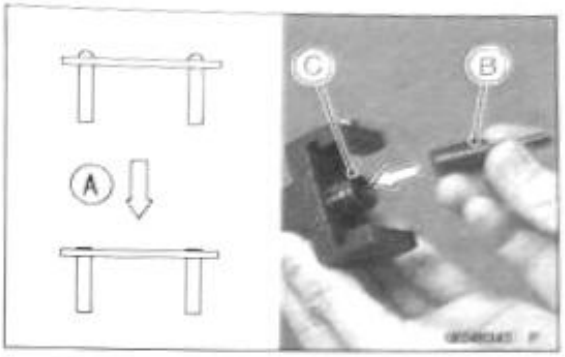
NOTICE
Read the Tool Manual before replacing the chain.

Drive Chain

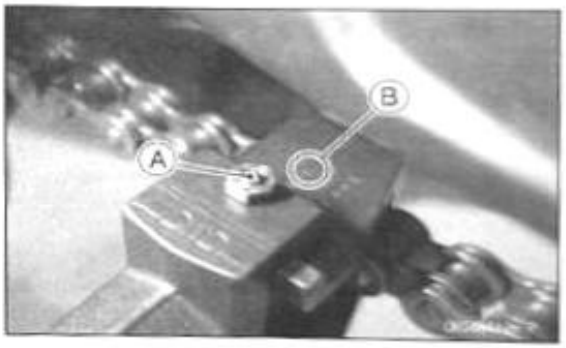
Body [A]
Pin Holder [B]
Positioning Pin [C]
"U" Holder [D]
Plate Holder [E]
Cutting and Riveting Pin [F]
Part for Riveting [G]
Part for Cutting [H]



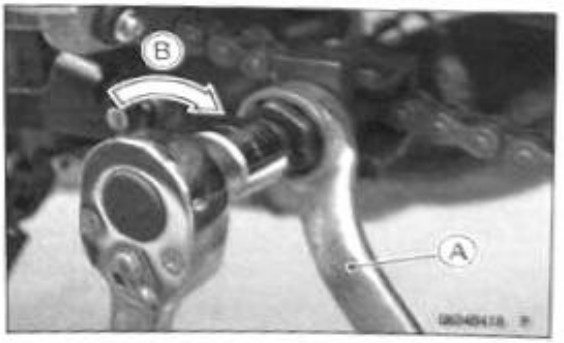
- Grind [A] the heads of the link pin to make it flat.
- Set the cutting and riveting pin [B] in the pin holder [C] as shown.



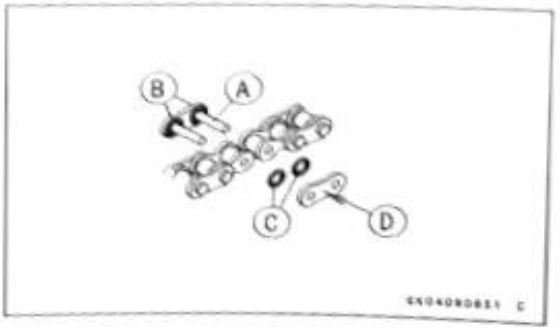
- Set the "U" holder and body, align the positioning pin [A] with the "A" mark [B].
- Tighten the pin holder by hand until the cutting and riveting pin touches the link pin.
- Be sure that the cutting and riveting pin hits center of the link pin.



- Hold the body with a wrench [A].
- Turn the pin holder clockwise [B] with another wrench, and remove the link pin.
- Do the same procedure for removal of the other link pin.

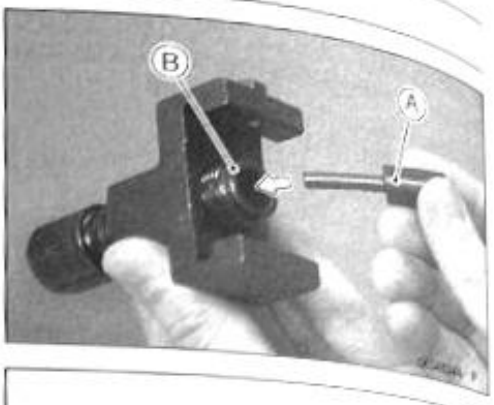


- Engage the new drive chain to the old drive chain, and change the position of the chains by pulling the old chain.
- Remove the old drive chain from the new drive chain.
- Replace the link pin [A], link plate and grease seals [B] [C] with new ones.
- Apply grease to the link pin and grease seals.
- Install the grease seals on the link pin and insert it in the ends of the drive chain.
- Install the link plate so that the mark [D] faces out.

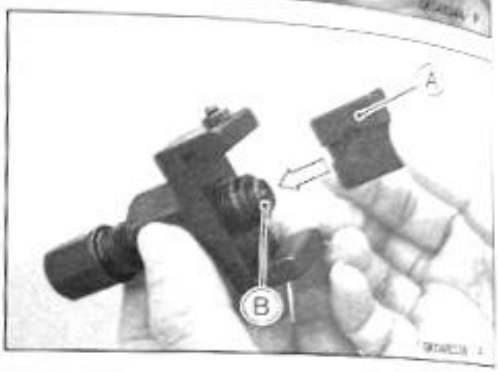


Drive Chain

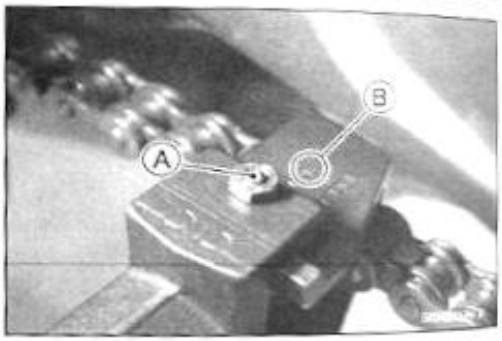
- Set the cutting and riveting pin [A] in the pin holder [B] as shown.



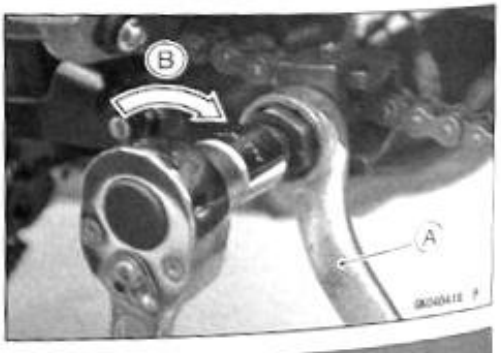
- Set the plate holder [A] on the cutting and riveting pin [B] as shown.



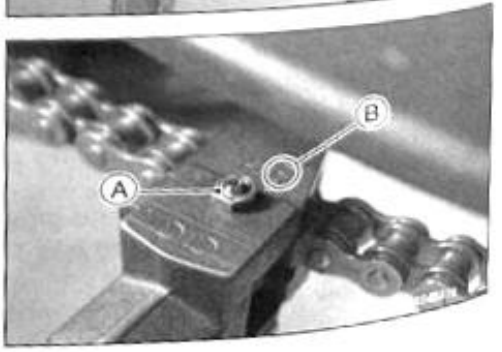
- Set the "U" holder and body, align the positioning pin [A] with the "A" mark [B].
- Tighten the pin holder by hand until the cutting and riveting pin touches the link pin.



- Hold the body with a wrench [A].
- Turn the pin holder clockwise [B] with another wrench and press in the link plate on the link pin.
- Remove the "U" holder and body.
- Remove the plate holder.

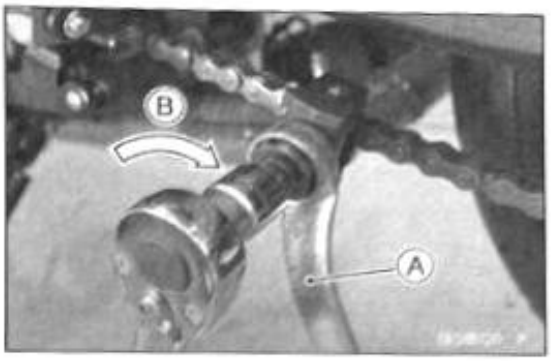


- Set the "U" holder and body, align the positioning pin [A] with the "B" mark [B].
- Tighten the pin holder by hand until the cutting and riveting pin touches the link pin.



Drive Chain

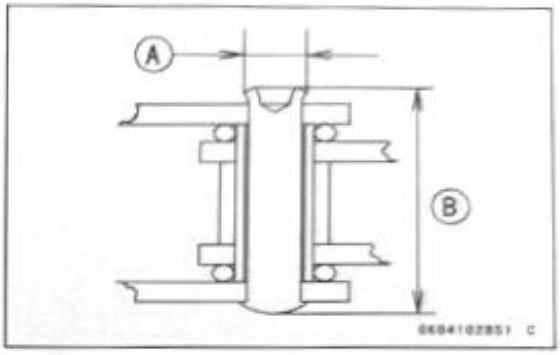
- Hold the body with a wrench [A].
- Turn the pin holder clockwise [B] with another wrench until the cutting and riveting pin touches the link plate.
- Do the same procedure for installation of the other link pin.



- After riveting, check the ends of the riveted pins for cracks.
- Measure the outside diameter [A] and the length [B] of the link pin.

Link Pin Outside Diameter
Standard: 5.4 – 5.8 mm (0.21 – 0.23 in.)

Link Plates Outside Width
Standard: 19.6 mm (0.772 in.) or less



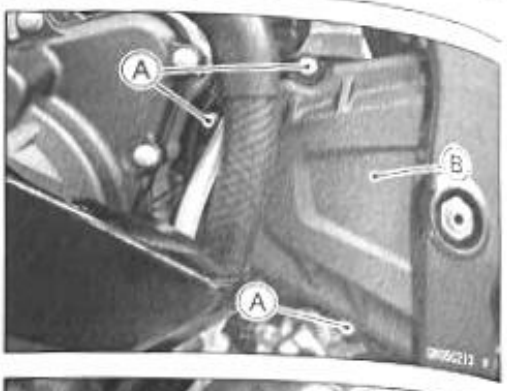
★If the reading is not within the specified range, cut and rejoin the chain again.

- Check that the rollers move smoothly.
- Adjust the drive chain slack after installing the chain (see Drive Chain Slack Adjustment(2-39)).

Sprocket, Coupling

Engine Sprocket Removal

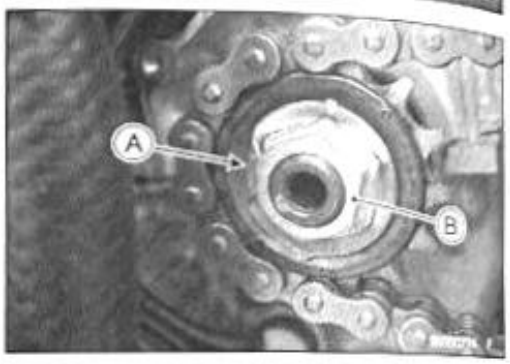
- Remove:
  Engine Sprocket Cover Bolts [A]
  Engine Sprocket Cover [B]



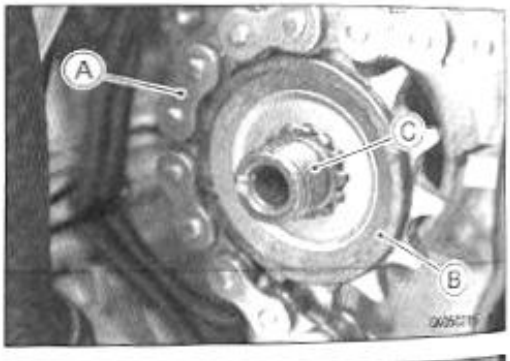
- Flatten out the bended washer [A].
- Remove the engine sprocket nut [B] and washer.

NOTE

○*When loosening the engine sprocket nut, hold the rear brake on.*



- Raise the rear wheel off the ground with the stand (see Rear Wheel Removal(10-7)).
- Loosen the drive chain (see Drive Chain Slack Adjustment(2-39)).
- Disengage the drive chain [A] from the engine sprocket [B].
- Pull the engine sprocket off the output shaft [C].



Engine Sprocket Installation

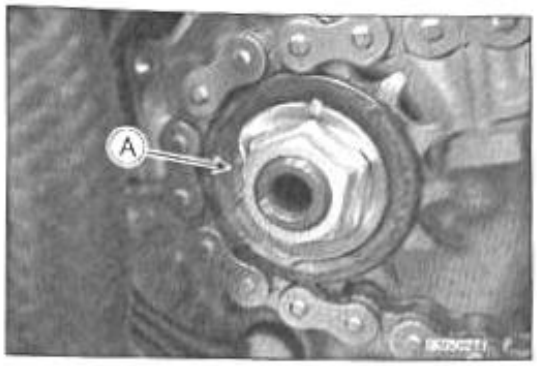
- Replace the sprocket washer and axle cotter pin with a new one.
- Engage the drive chain and the engine sprocket.
- Install the engine sprocket onto the output shaft.
- Install the engine sprocket so that protruding side [A] face inward.
- Apply molybdenum disulfide oil solution to the threads and the seating surface of the engine sprocket nut.
- Install the washer.
- Tighten:

Torque - Engine Sprocket Nut: 127 N·m (13.0 kgf·m, 93.7 ft·lb)

NOTE

○*Tighten the engine sprocket nut while applying the rear brake.*

- After tightening the engine sprocket nut, bend [A] the one side of the washer over the nut.
- Adjust the drive chain slack after installing the engine sprocket (see Drive Chain Slack Adjustment(2-39)).



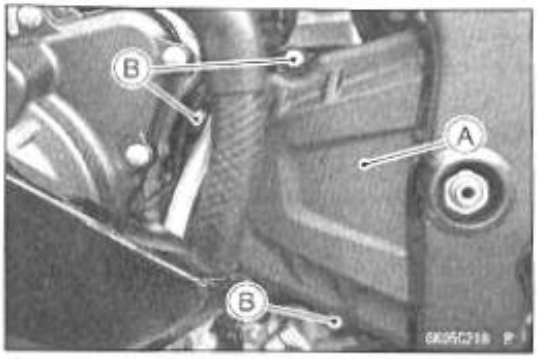
- Install the engine sprocket cover [A].

○Do not bite the gear position sensor lead and side stand switch lead.

- Tighten:

Torque - Engine Sprocket Cover Bolts [B]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).

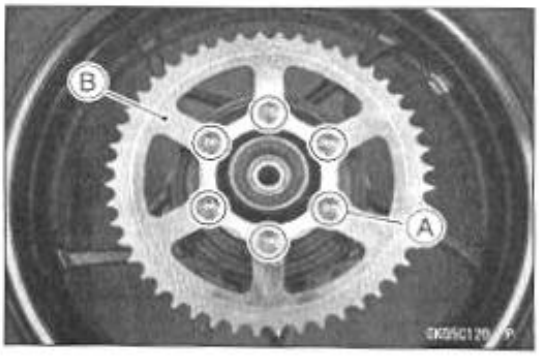


Rear Sprocket Removal

- Remove the rear wheel (see Rear Wheel Removal(10-7)).

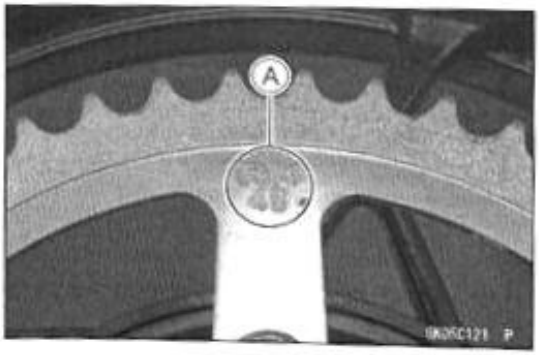
NOTICE
Do not lay the wheel on the ground with the disc facing down. This can damage or warp the disc. Place blocks under the wheel so that the disc does not touch the ground.

- Remove:
  Rear Sprocket Nuts [A]
  Rear Sprocket [B]



Rear Sprocket Installation

- Replace the rear sprocket nuts with new ones.
- Install the sprocket facing the tooth number marking [A] outward.

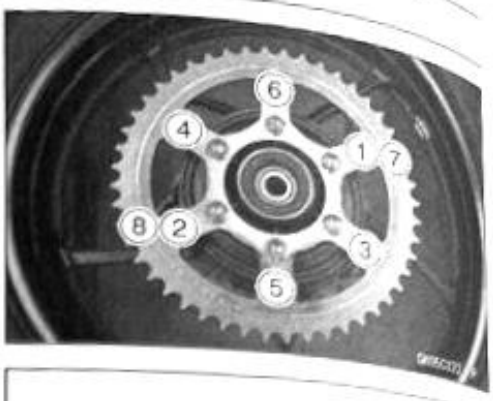


Sprocket, Coupling

- Tighten the rear sprocket nuts following the specified tightening sequence [1 – 8].

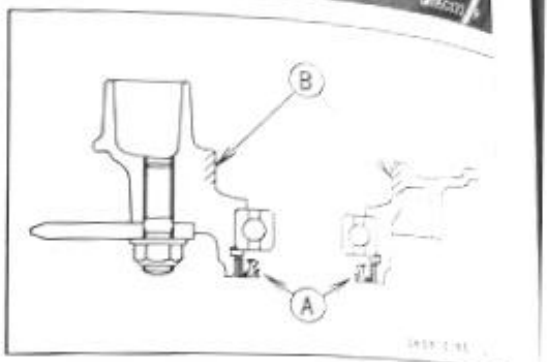
  Torque - Rear Sprocket Nuts: 59 N·m (6.0 kgf·m, 44 ft·lb)

- After tightening, check that the bolt ends protrude from the nuts.
- Install the rear wheel (see Rear Wheel Installation(10-8)).

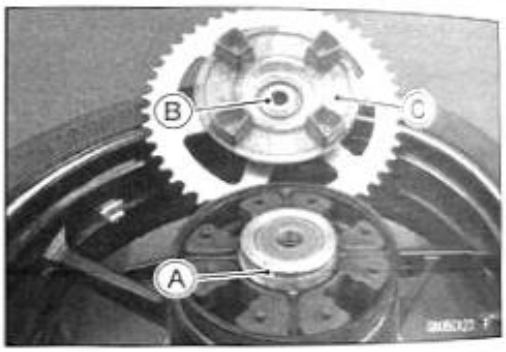


Coupling Installation

- Apply grease to the following.
  Coupling Grease Seal Lips [A]
  Coupling Internal Surface [B]

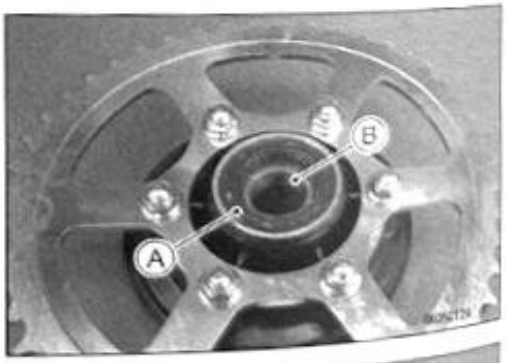


- Replace the O-ring [A] with a new one, and apply grease to it.
- Install:
  O-ring
  Collar [B]
  Coupling [C]



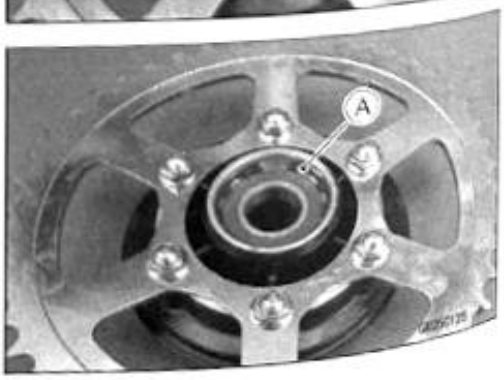
Coupling Bearing Removal

- Remove:
  Coupling
  Grease Seal [A]
  Collar [B]

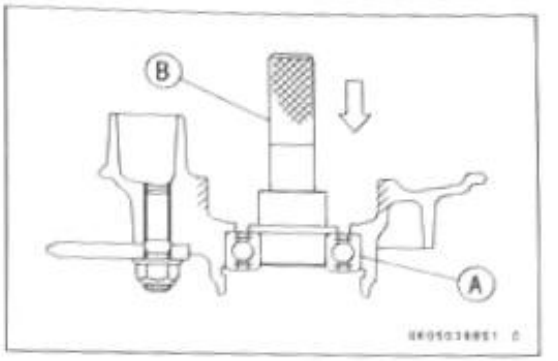


- Remove the circlip [A].

  Special Tool - Inside Circlip Pliers: 57001-143

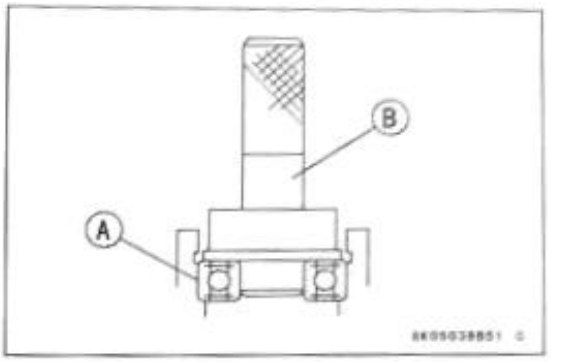


• Remove the bearing [A] by tapping from the wheel side.
Special Tool - Bearing Driver Set [B]: 57001-1129



Coupling Bearing Installation

• Replace the bearing with a new one.
• Press in the bearing [A] until it is bottomed.
Special Tool - Bearing Driver Set [B]: 57001-1129
• Replace the circlip with a new one.
Special Tool - Inside Circlip Pliers: 57001-143



• Replace the grease seal with a new one.
• Press in the grease seal so that the seal surface is flush with the end of the hole.
Special Tool - Bearing Driver Set: 57001-1129
• Apply grease to the grease seal lip.
• Install the removed parts.

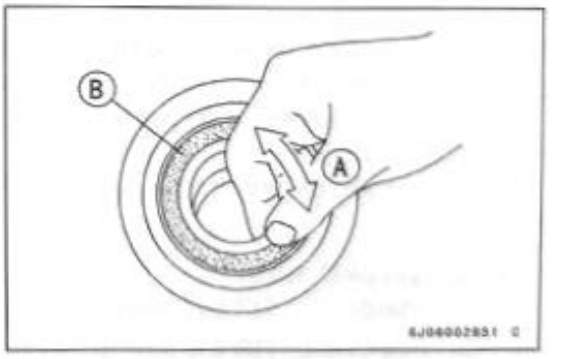
Coupling Bearing Inspection

Since the coupling bearing is made to extremely close tolerances, the clearance can not normally be measured.

NOTE

○*It is not necessary to remove the coupling bearing for inspection. If the bearing is removed, it will need to be replaced with a new one.*

• Turn the bearing in the coupling back and forth [A] while checking for plays, roughness or binding.
★If the bearing play, roughness or binding is found, replace the bearing.
• Examine the bearing seal [B] for tears or leakage.
★If the seal is torn or is leaking, replace the bearing.



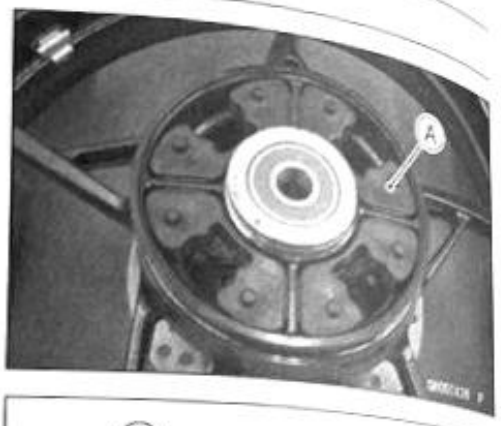
Coupling Bearing Lubrication

NOTE

○*Since the coupling bearing is packed with grease and sealed, lubrication is not required.*

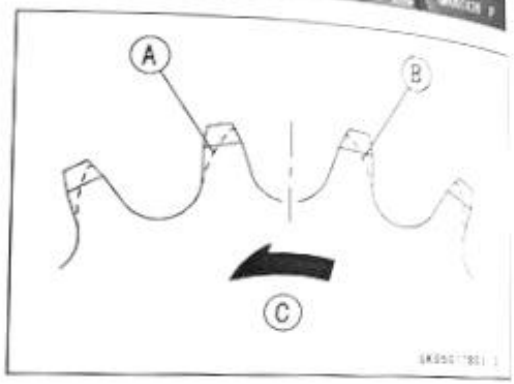
Sprocket, Coupling

Coupling Damper Inspection



- Remove the rear wheel coupling, and inspect the rubber dampers [A].
- Replace the damper if it appears damaged or deteriorated.

Sprocket Wear Inspection



- Visually inspect the engine and rear sprocket teeth for wear and damage.

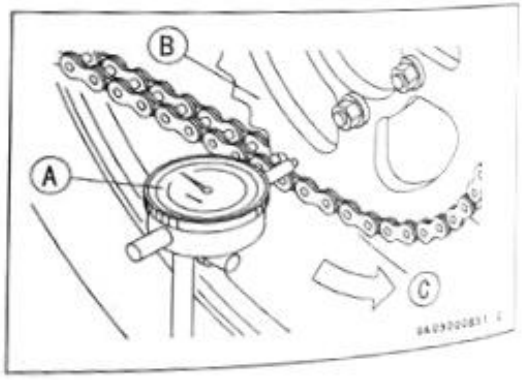
★If the teeth are worn as illustrated, replace the sprocket, and inspect the drive chain wear (see Drive Chain Wear Inspection(2-41)).

Worn Tooth (Engine Sprocket) [A]
Worn Tooth (Rear Sprocket) [B]
Direction of Rotation [C]

NOTE

If a sprocket requires replacement, the chain is probably worn also. When replacing a sprocket, inspect the chain.

Rear Sprocket Warp Inspection



- Raise the rear wheel off the ground with the stand so that it will turn freely.
- Set a dial gauge [A] against the rear sprocket [B] near the teeth as shown, and rotate [C] the rear wheel to measure the sprocket runout (warp). The difference between the highest and lowest dial gauge readings is the amount of runout (warp).

★If the runout exceeds the service limit, replace the rear sprocket.

Rear Sprocket Warp

Standard: TIR 0.4 mm (0.016 in.) or less

Service Limit: TIR 0.5 mm (0.020 in.)

Brakes

Table of Contents

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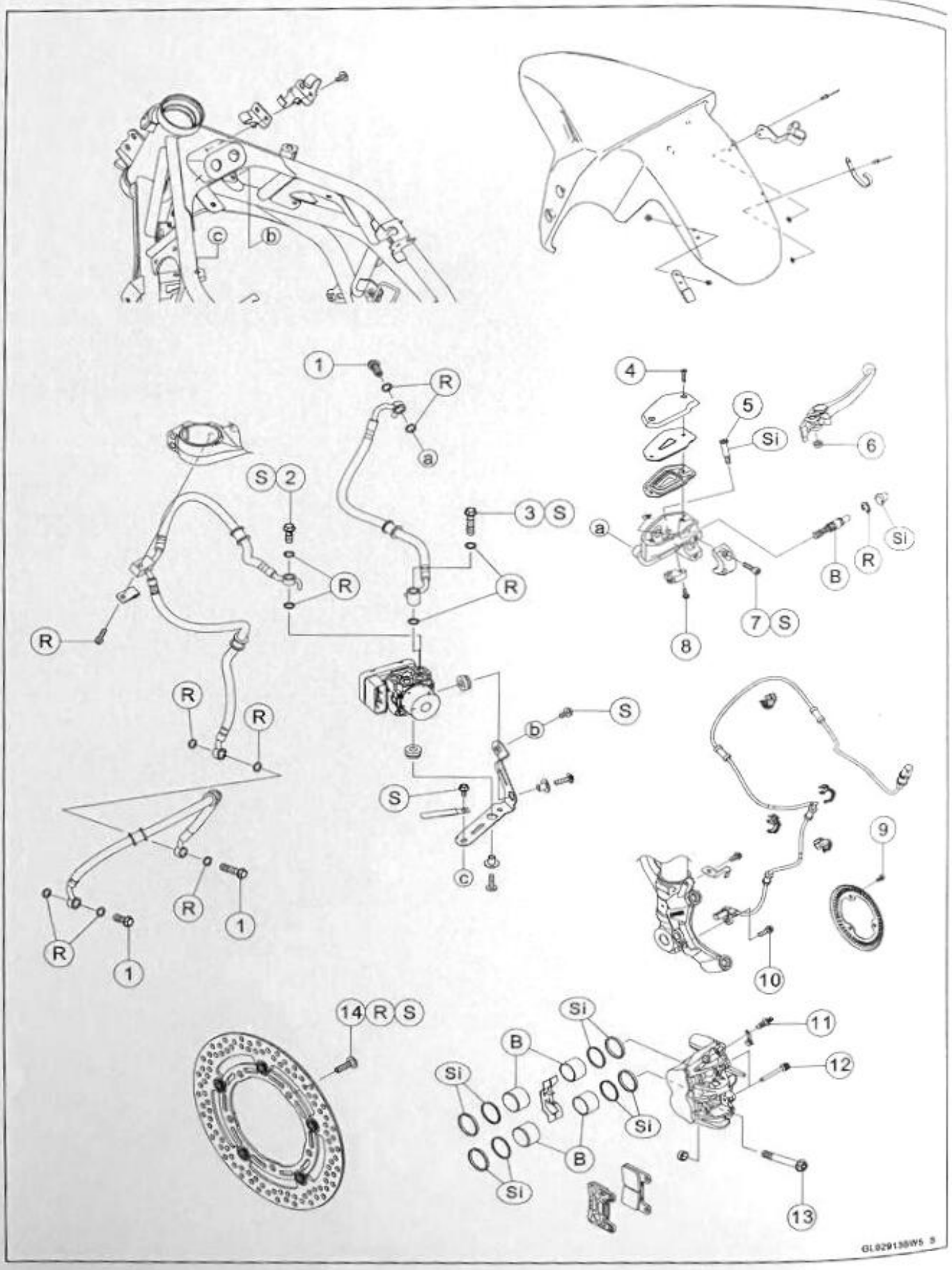
Exploded View

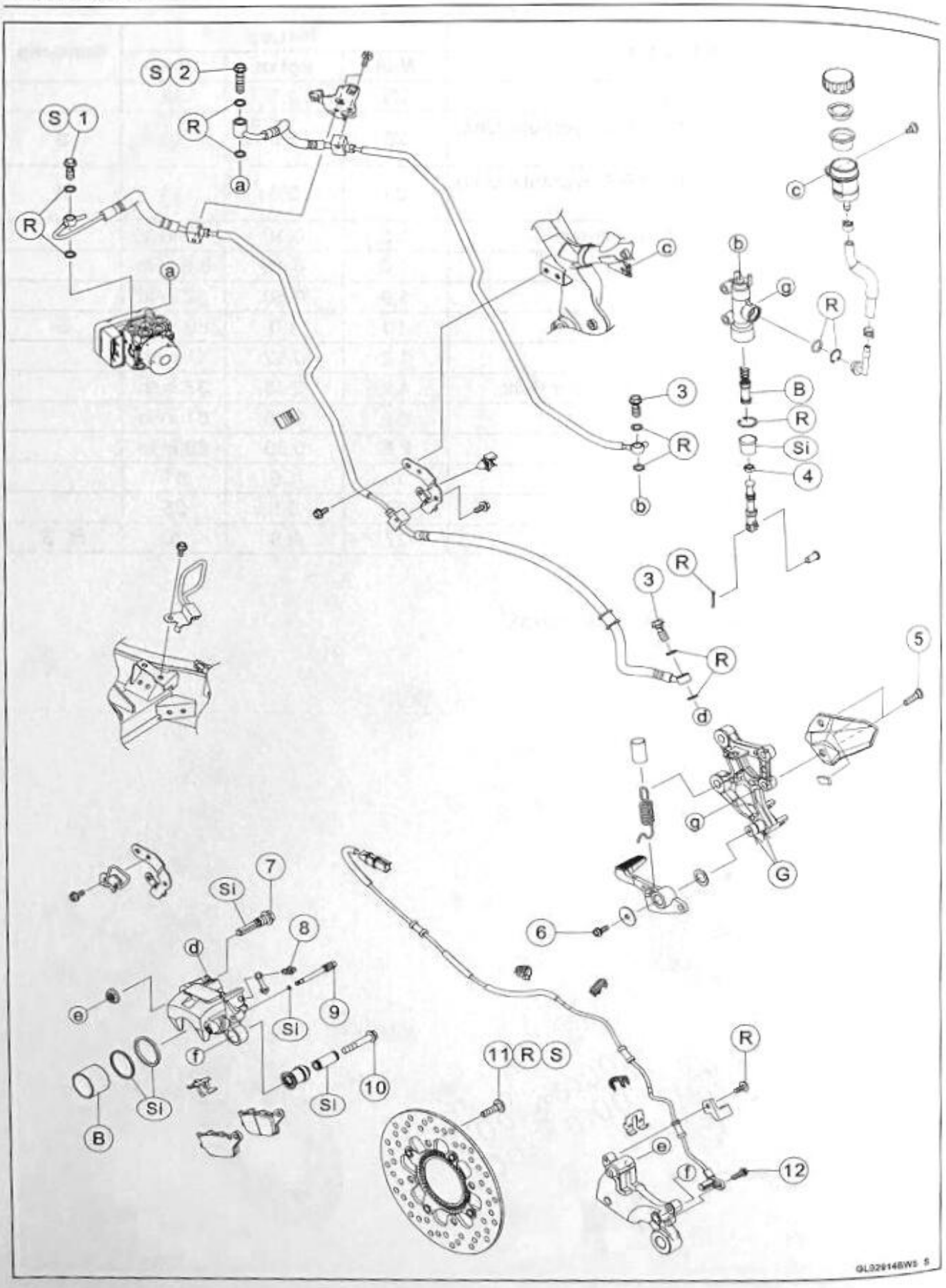


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	25	2.5	18	
2	Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 23 mm)	25	2.5	18	S
3	Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 37 mm)	25	2.5	18	S
4	Front Brake Reservoir Cap Screws	1.5	0.15	13 in·lb	
5	Brake Lever Pivot Bolt	1.0	0.10	8.9 in·lb	
6	Brake Lever Pivot Bolt Locknut	5.9	0.60	52 in·lb	
7	Front Master Cylinder Clamp Bolts	10	1.0	89 in·lb	S
8	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
9	Front Wheel Rotation Sensor Rotor Bolts	4.2	0.43	37 in·lb	
10	Front Wheel Rotation Sensor Bolt	6.9	0.70	61 in·lb	
11	Bleed Valves	7.8	0.80	69 in·lb	
12	Front Brake Pad Pins	15	1.5	11	
13	Front Caliper Bolts	34	3.5	25	
14	Brake Disc Bolts	27	2.8	20	R, S

B: Apply brake fluid.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 23 mm)	25	2.5	18	S
2	Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 37 mm)	25	2.5	18	S
3	Brake Hose Banjo Bolts	25	2.5	18	
4	Rear Master Cylinder Push Rod Locknut	17	1.7	13	
5	Rear Master Cylinder Bolts	25	2.5	18	
6	Brake Pedal Bolt	8.8	0.90	78 in·lb	
7	Rear Caliper Pin Bolt	27	2.8	20	
8	Bleed Valve	7.8	0.80	69 in·lb	
9	Rear Brake Pad Pin	17	1.7	13	
10	Rear Caliper Bolts	22	2.2	16	
11	Brake Disc Bolts	27	2.8	20	R, S
12	Rear Wheel Rotation Sensor Bolt	6.9	0.70	61 in·lb	

B: Apply brake fluid.
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.
Si: Apply silicone grease.

NOTE

○*When disassembling the brake hose and pipe, disassemble them by the unit as shown in the exploded view.*

Specifications

Item	Standard	Service Limit
Brake Lever, Brake Pedal		
Brake Lever Position	5-way adjustable (to suit rider)	– – –
Brake Lever Free Play	Non-adjustable	– – –
Pedal Free Play	Non-adjustable	– – –
Pedal Position	About 61 mm (2.4 in.) below top of footpeg	– – –
Brake Pads		
Lining Thickness:		
Front	4 mm (0.16 in.)	1 mm (0.04 in.)
Rear	5 mm (0.20 in.)	1 mm (0.04 in.)
Brake Discs		
Thickness:		
Front	3.8 – 4.2 mm (0.15 – 0.17 in.)	3.5 mm (0.14 in.)
Rear	4.8 – 5.2 mm (0.19 – 0.20 in.)	4.5 mm (0.18 in.)
Runout:		
Front	TIR 0.2 mm (0.008 in.) or less	TIR 0.3 mm (0.013 in.)
Rear	TIR 0.15 mm (0.0059 in.) or less	TIR 0.3 mm (0.013 in.)
Brake Fluid		
Grade	DOT4	– – –
ABS		
ABS Hydraulic Unit:		
Make	NISSIN (Hitachi astemo)	– – –
Wheel Rotation Sensor Air Gap:		
Front	0.552 – 1.228 mm (0.02173 – 0.04835 in.)	– – –
Rear	0.537 – 1.343 mm (0.02114 – 0.05287 in.)	– – –

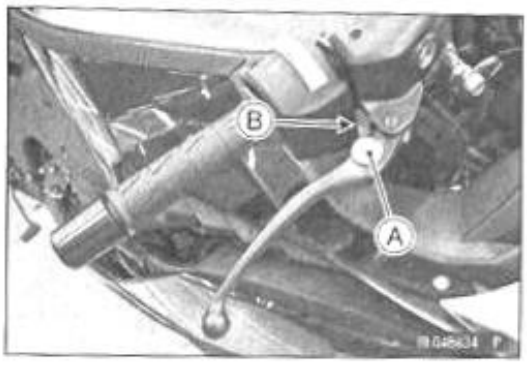
Brake Pedal

Brake Lever Position Adjustment

The brake lever adjuster has 5 positions so that the brake lever position can be adjusted to suit the operator's hand.

- Push the lever forward and turn the adjuster [A] to align the number with the arrow mark [B] on the lever.

○The distance from the grip to the lever is minimum at number 5 and maximum at number 1.



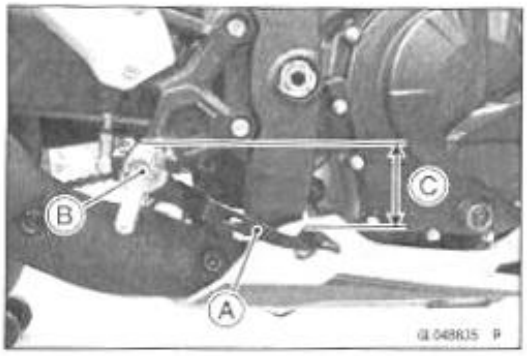
Brake Pedal Position Inspection

- Check that the brake pedal [A] is in the correct position. Footpeg [B]

Pedal Position

Standard: **About 61 mm (2.4 in.) [C] below top of footpeg**

★If it is incorrect, adjust the brake pedal position.



Brake Pedal Position Adjustment

NOTE

○*Usually it is not necessary to adjust the pedal position, but always adjust it when push rod locknut has been loosened.*

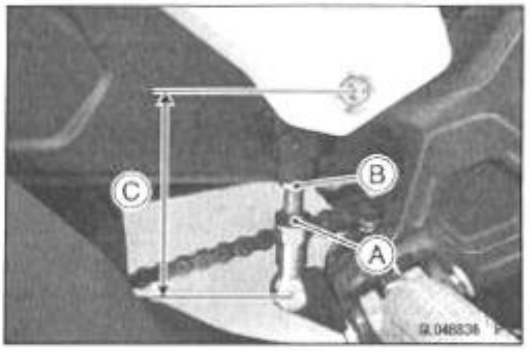
- Loosen the locknut [A] and turn the push rod with the hex head [B] to achieve the correct pedal position.

★If the length [C] shown is **78 ±1 mm (3.07 ±0.04 in.)**, the pedal position will be within the standard range.

- Tighten:

Torque - Rear Master Cylinder Push Rod Locknut: 17 N·m (1.7 kgf·m, 13 ft·lb)

- Check the brake light switch operation (see Brake Light Switch Operation Inspection(2-53)).

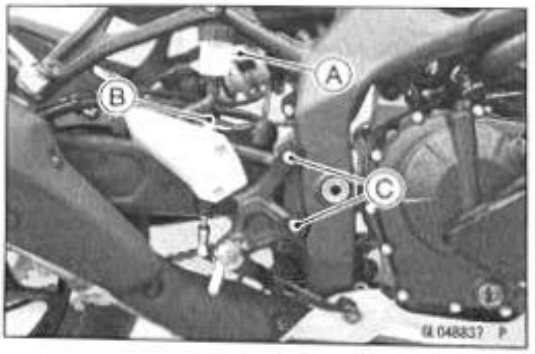


Brake Pedal Removal

- Remove the bolt [A].
- Loosen the banjo bolt [B] and tighten it loosely to prevent the fluid spillage.

NOTICE

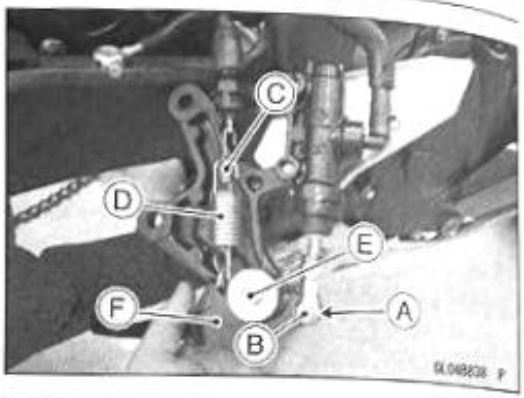
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.



- Remove the right front footpeg bracket bolts [C].
- Remove the banjo bolt and disconnect the brake hose.
- Turn the right front footpeg bracket inside out.

Brake Pedal

- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Brake Light Switch Spring [C]
  Return Spring [D]
  Brake Pedal Bolt [E] with Washer
  Brake Pedal [F]
  Washer

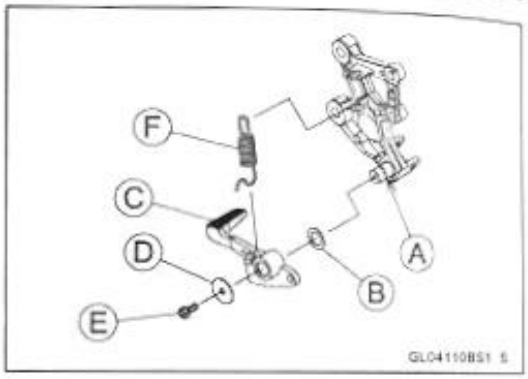


Brake Pedal Installation

- Apply grease to the pivot shaft [A] and install the washer [B].
- Install:
  Brake Pedal [C]
  Washer [D]
- Tighten:

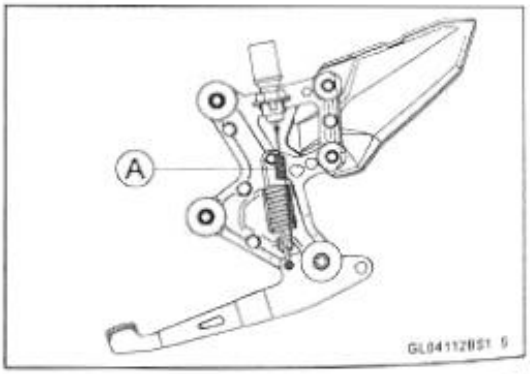
Torque - Brake Pedal Bolt [E]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Hook:
  Return Spring [F]



- Hook the longer end of the rear brake light switch spring [A] to the return spring.

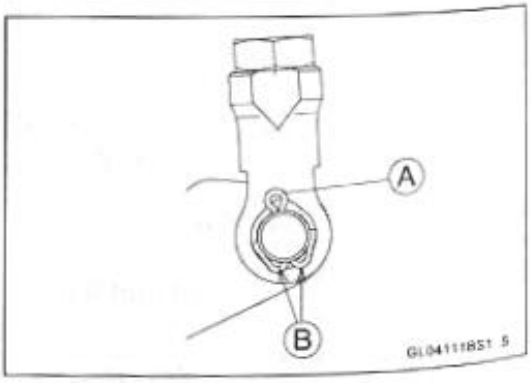
OFace the longer end of the rear brake light switch spring forward.



- Replace the cotter pin [A] and front footpeg bracket bolts with new ones.
- Insert the joint pin from the outside.
- Insert the cotter pin and bend the pin ends [B].
- Install the right front footpeg bracket.
- Tighten:

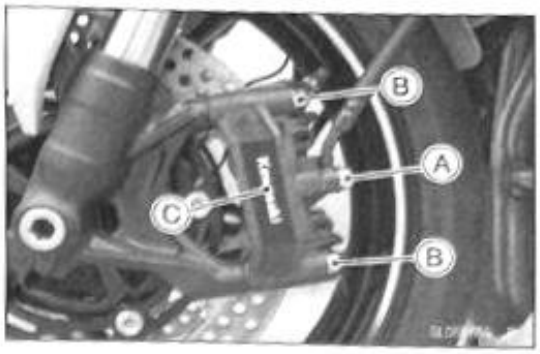
Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the brake pedal position (see Brake Pedal Position Inspection (12-9)).
- Install the removed parts.



Calipers

Front Caliper Removal



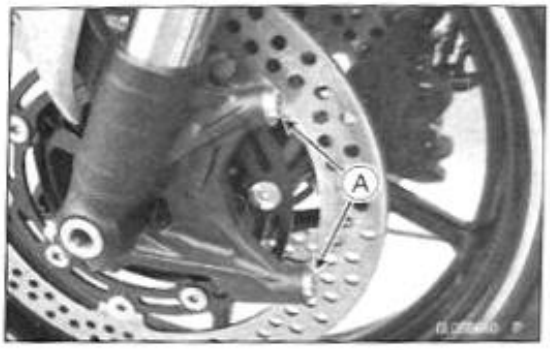
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the caliper bolts [B], and detach the caliper [C] from the disc.
- Remove the banjo bolt and disconnect the brake hose from the caliper (see Brake Hose and Pipe Replacement(2-46)).

NOTICE

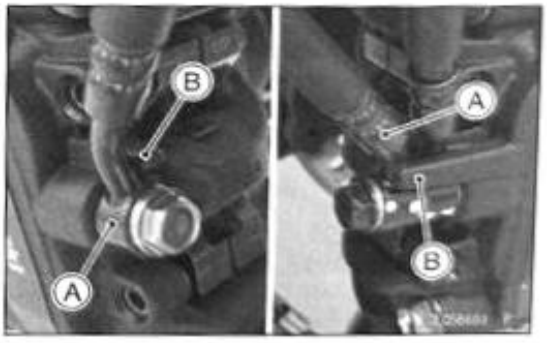
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

○Take care not to spill the brake fluid on the painted or plastic parts.
○Temporarily secure the end of the brake hose to some high place to keep fluid loss to a minimum.
○Immediately wash away any brake fluid that spills.

Front Caliper Installation



- Be sure to install the collars [A] on the fork leg.



- Replace the washers that are on each side of the hose fitting with new ones.
- Install:
  Front Caliper
  Brake Hose Lower End

○Touch the brake hoses [A] to the stoppers [B] of the caliper.
○Avoid sharp bending, kinking, flatting or twisting.

- Tighten:

Torque - Front Caliper Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)
Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

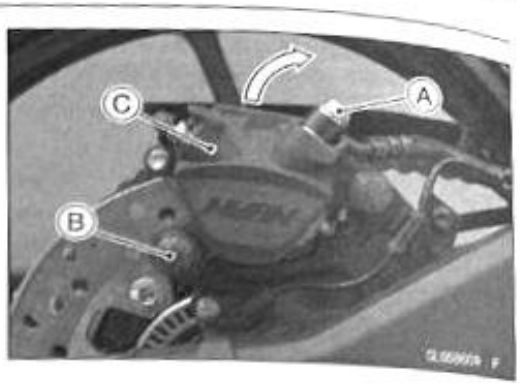
- Check the fluid level in the brake fluid reservoir.
- Bleed the brake line (see Brake Line Bleeding(12-22)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Calipers

Rear Caliper Removal



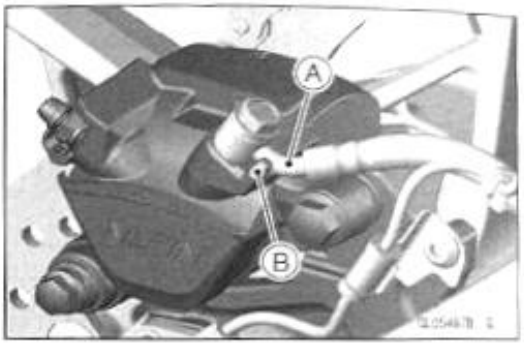
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Remove the rear caliper bolt [B].
- Remove the banjo bolt and disconnect the brake hose from the caliper (see Brake Hose and Pipe Replacement(2-46)).

NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Turn the rear caliper [C] forward.
- Pull out the rear caliper with brake pads to the right while clear the brake disc.

Rear Caliper Installation



- Replace the washers that are on each side of the hose fitting with new ones.
- Install the caliper and brake hose lower end.

○Touch the brake hose [A] to the stopper [B] of the caliper.
○Avoid sharp bending, kinking, flatting or twisting.

- Tighten:

Torque - Rear Caliper Bolt: 22 N·m (2.2 kgf·m, 16 ft·lb)
Brake Hose Banjo Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Check the fluid level in the brake fluid reservoir.
- Bleed the brake line (see Brake Line Bleeding(12-22)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Front Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-49)).

Front Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-49)).

Rear Caliper Disassembly

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-49)).

Rear Caliper Assembly

- Refer to the Caliper Rubber Parts Replacement (see Caliper Rubber Parts Replacement(2-49)).

Calipers

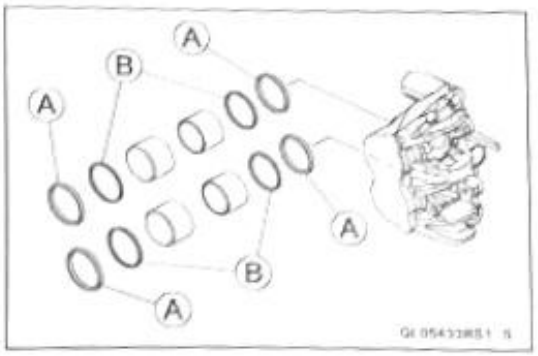
Caliper Fluid Seal Damage Inspection

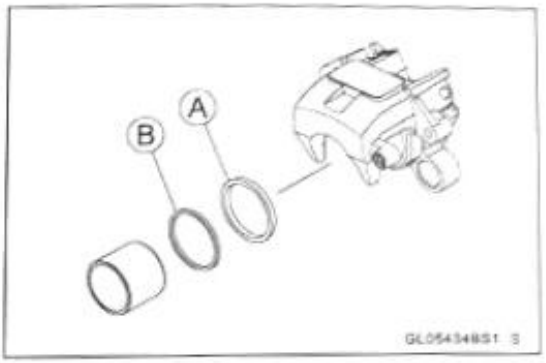
The fluid seals (piston seals) [A] are placed around the piston to maintain clearance between the pad and the disc. If the seal is in a poor condition, it could lead the pad to wear excessively or the brake to drag, which may cause the temperature of the discs or the brake fluid to increase.

- Replace the fluid seal if it exhibits any of the conditions listed below.

○Brake fluid leakage around the pad.
○Brakes overheat.
○Considerable difference in inner and outer pad wear.
○Seal and piston are stuck together.

★If the fluid seal is replaced, replace the dust seal [B] as well. Also, replace all seals every other time the pads are changed.



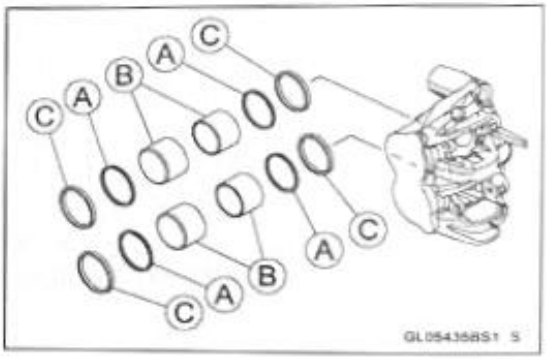


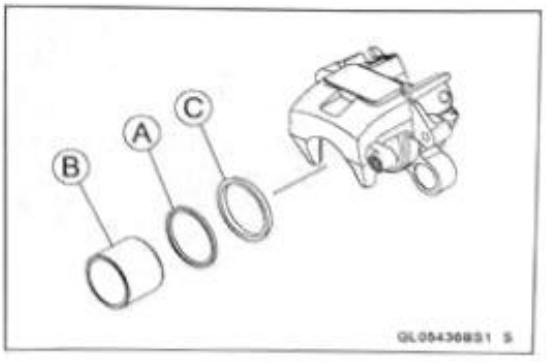
Caliper Dust Seal Damage Inspection

- Check that the dust seals [A] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace the dust seals with new ones.

Pistons [B]
Fluid Seals [C]

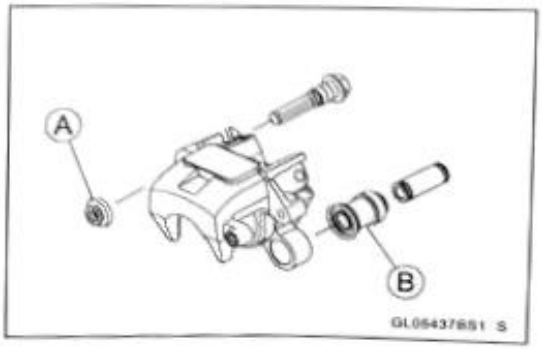




Rear Caliper Dust Boot and Friction Boot Damage Inspection

- Check that the dust boot [A] and friction boot [B] are not cracked, worn, swollen, or otherwise damaged.

★If they show any damage, replace them with new ones.

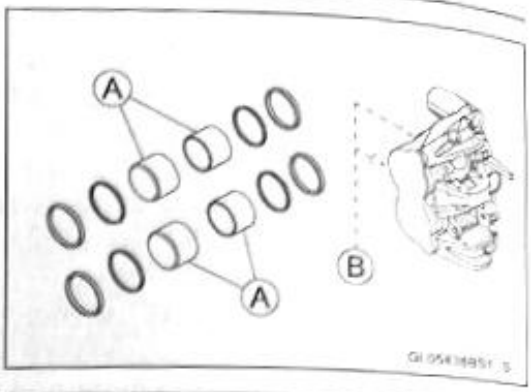


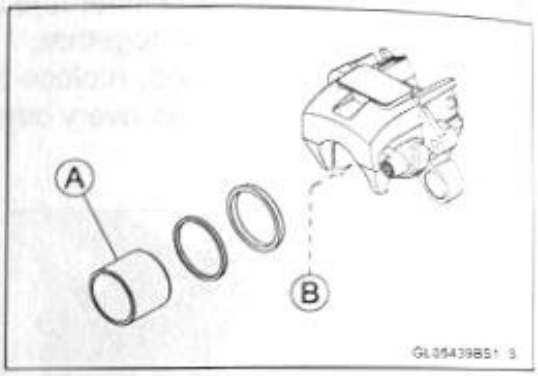
Calipers

Caliper Piston and Cylinder Damage Inspection

- Visually inspect the pistons [A] and cylinder surfaces [B].

★Replace the caliper if the cylinder and piston are badly scores or rusty.

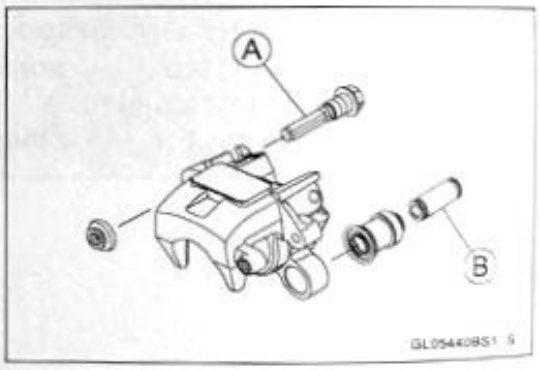




Rear Caliper Pin Bolt/Collar Wear Inspection

The caliper body must slide smoothly on the caliper pin bolt [A] and collar [B]. If the caliper body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper pin bolt and collar are not badly worn or stepped, and that the dust boot and friction boot are not damaged.



★If the friction boot is damaged, replace the friction boot.

★If the caliper pin bolt and collar are damaged, replace them.

Torque - Rear Caliper Pin Bolt: 27 N·m (2.8 kgf·m, 20 ft·lb)

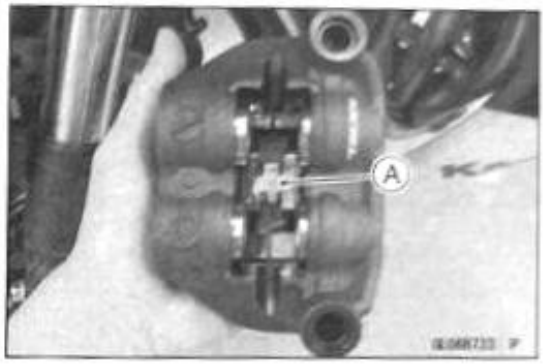
Brake Pads

Front Brake Pad Removal

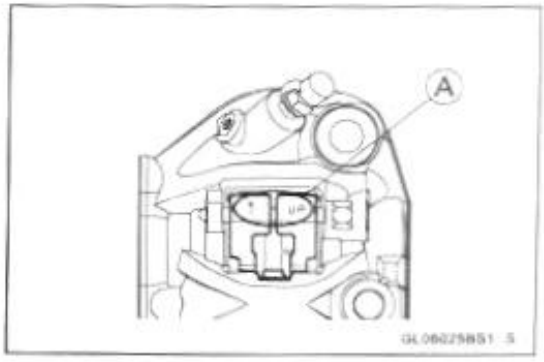
- Loosen the pad pins [A].
- Remove the front caliper with the hose installed (see Front Caliper Removal(12-11)).
- Remove:
  Pad Pins
  Brake Pads

Front Brake Pad Installation

- Check that the pad spring [A] is in place on the caliper.



○When install the pad spring so that the arrow mark [A] faces upward.

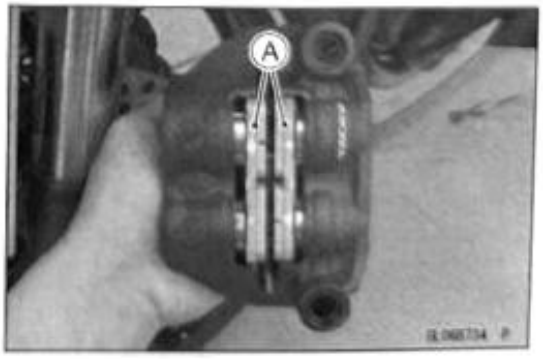


- Push the caliper pistons in by hand as far as it will go.
- Install the brake pads [A] on the pad spring correctly.

○Fit the pad into the groove of the caliper as shown.

- Install the pad pins while pushing the brake pads lightly.
- Tighten the pad pins temporarily.
- Install the front caliper (see Front Caliper Installation(12-11)).
- Tighten:

Torque - Front Brake Pad Pins: 15 N·m (1.5 kgf·m, 11 ft·lb)



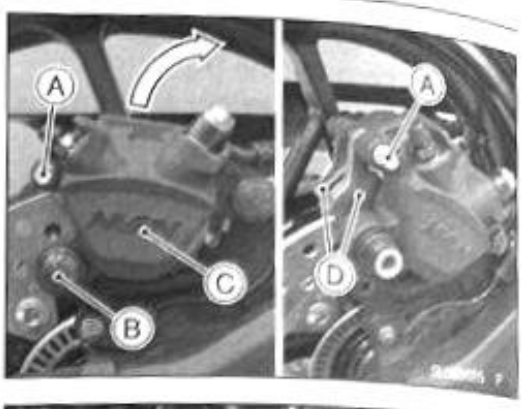
⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Brake Pads

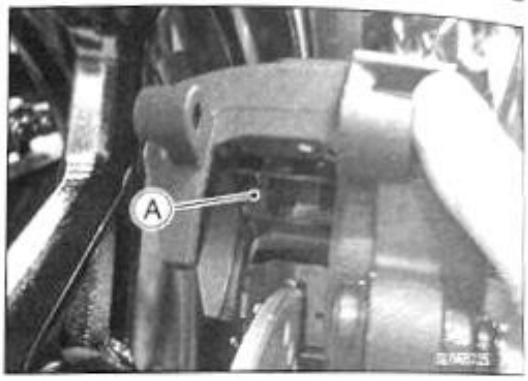
Rear Brake Pad Removal

- Loosen the pad pin [A].
- Remove the caliper bolt [B].
- Turn the rear caliper [C] forward.
- Remove the pad pin.
- Remove the brake pads [D] from the rear caliper.



Rear Brake Pad Installation

- Check that the pad spring [A] is in place on the caliper.
- Push the caliper piston in by hand as far as it will go.

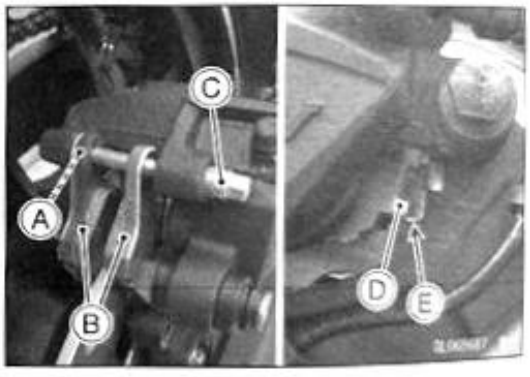


- Apply a silicone grease to the O-ring [A] on the pad pin.
- Install the brake pads [B] to the caliper.
- Insert the pad pin [C] through the brake pads and tighten the pad pin temporarily.
- Lower the rear caliper over the brake pads.

○Fit the tabs [D] of the brake pads on the step [E] of the caliper holder.

- Tighten:

Torque - Rear Caliper Bolt : 22 N·m (2.2 kgf·m, 16 ft·lb)
Rear Brake Pad Pin : 17 N·m (1.7 kgf·m, 13 ft·lb)



- Secure the brake hose to the clamp on the swingarm.

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the motorcycle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

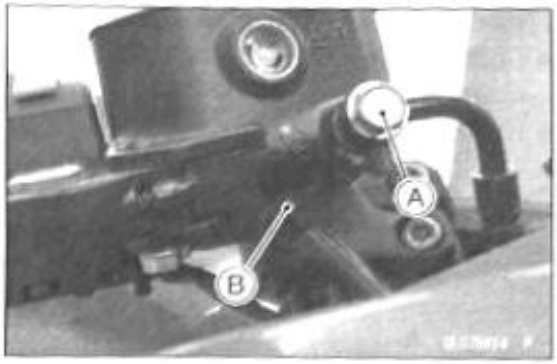
Brake Pad Wear Inspection

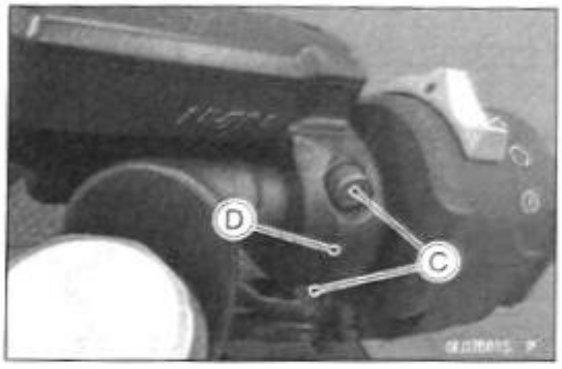
- Refer to the Brake Pad Wear Inspection (see Brake Pad Wear Inspection(2-52)).

Master Cylinder

Front Master Cylinder Removal

- Remove the banjo bolt [A] to disconnect the brake hose from the master cylinder (see Brake Hose and Pipe Replacement(2-46)).
- Disconnect the front brake light switch connectors [B].
- Remove the clamp bolts [C] and master cylinder with clamp [D] to remove the master cylinder assembly.





NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

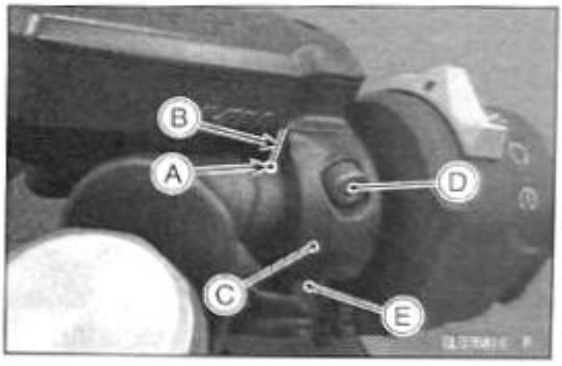
Front Master Cylinder Installation

- Install the front master cylinder so that the punch mark [A] of the handlebar is aligned with the mating surface [B] of the master cylinder and clamp.
- Install the master cylinder clamp [C].
- Tighten the upper clamp bolt [D] first, and then the lower clamp bolt [E].

○There will be a gap at the lower part of the clamp after tightening.

Torque - Front Master Cylinder Clamp Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Connect the front brake light switch connectors.



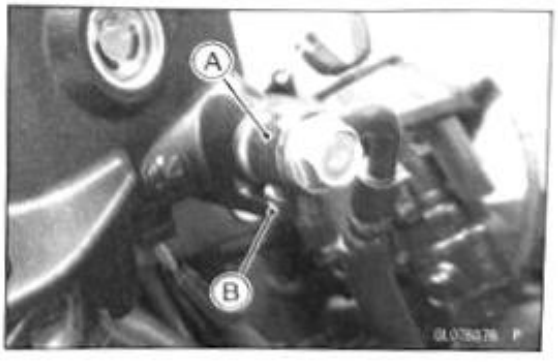
- Replace the washers that are on each side of the hose fitting with new ones.
- Install the brake hose.

○Touch the brake hose [A] to the stopper [B] of the front master cylinder.

- Tighten:

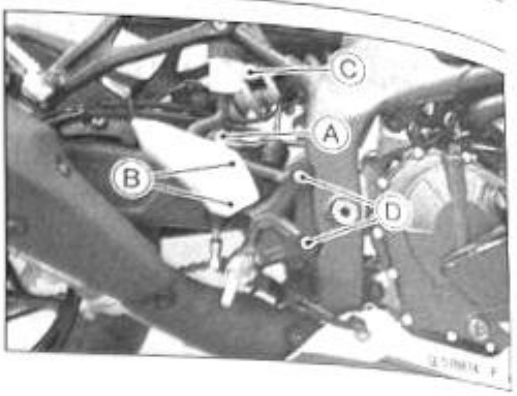
Torque - Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding(12-22)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.



Master Cylinder

Rear Master Cylinder Removal

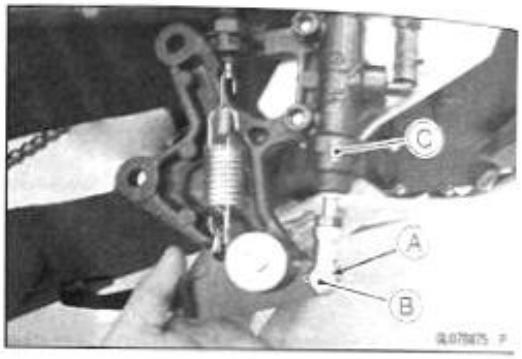


- Loosen the brake hose banjo bolt [A] and rear master cylinder bolts [B].
- Remove:
  Bolt [C]
  Right Front Footpeg Bracket Bolts [D]
  Brake Hose Banjo Bolt

NOTICE

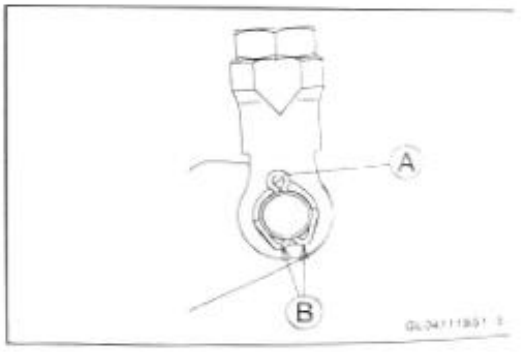
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Drain the brake fluid into a container.
- Turn the right front footpeg bracket inside out.



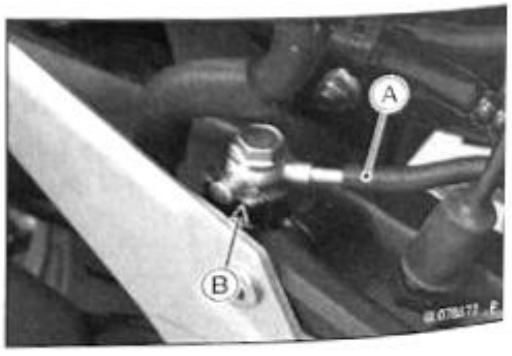
- Remove:
  Cotter Pin [A]
  Joint Pin [B]
  Rear Master Cylinder Bolts
  Rear Master Cylinder [C]

Rear Master Cylinder Installation



- Replace the cotter pin [A] and front footpeg bracket bolts with new ones.
- Insert the joint pin from the outside.
- Insert the cotter pin and bend the pin ends [B].
- Install:
  Guard
  Rear Master Cylinder Bolt
  Right Front Footpeg Bracket
- Tighten:

Torque - Front Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



- Replace the washers that are on each side of the hose fitting with new ones.
- Fit the brake hose fitting into the groove on the rear master cylinder.
- Tighten:

Torque - Rear Master Cylinder Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Bleed the brake line (see Brake Line Bleeding(12-22)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

Front Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement (see Master Cylinder Rubber Parts Replacement(2-48)).

Rear Master Cylinder Disassembly

- Refer to the Master Cylinder Rubber Parts Replacement (see Master Cylinder Rubber Parts Replacement(2-48)).

Master Cylinder Assembly

- Refer to the Master Cylinder Rubber Parts Replacement (see Master Cylinder Rubber Parts Replacement(2-48)).

Master Cylinder Inspection

- Disassemble the front and rear master cylinders (see Master Cylinder Rubber Parts Replacement(2-48)).
- Check that there are no scratches, rust or pitting on the inner wall [A] of each master cylinder and on the outside of each piston [B].

★If a master cylinder or piston shows any damage, replace them.

- Inspect the primary cup [C] and secondary cup [D].

★If a cup is worn, damaged softened (rotted), or swollen, the piston assembly should be replaced to renew the cups.

★If fluid leakage is noted at the brake lever, the piston assembly should be replaced to renew the cups.

- Check the dust covers [E] for damage.

★If they are damaged, replace them.

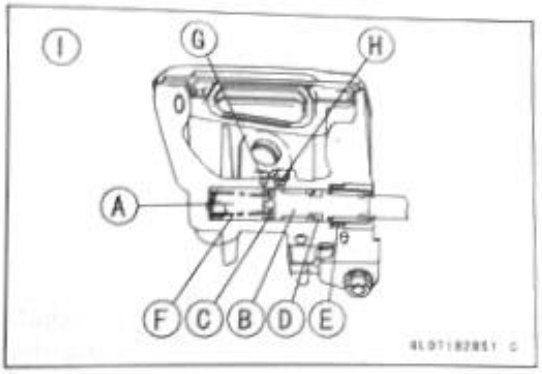
- Check the piston return springs [F] for any damage.

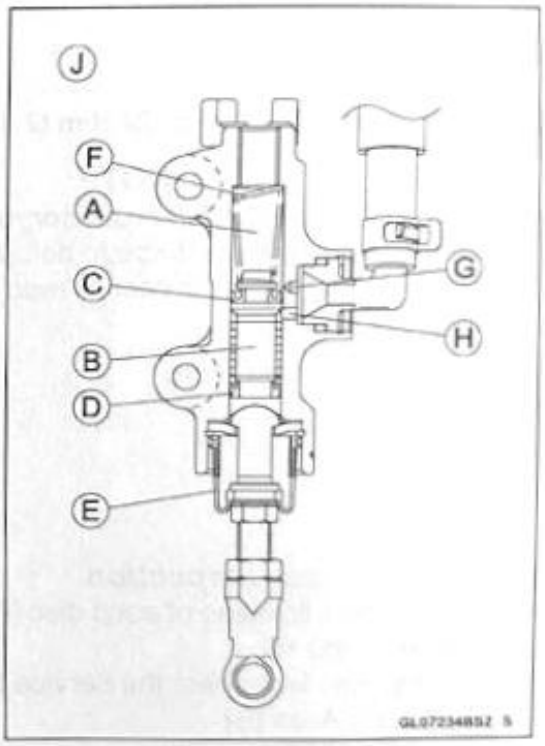
★If the springs are damaged, replace them.

- Check that relief port [G] and supply port [H] are not plugged.

★If the relief port becomes plugged, the brake pads will drag on the disc. Blow the ports clean with compressed air.

Front Master Cylinder [I]
Rear Master Cylinder [J]

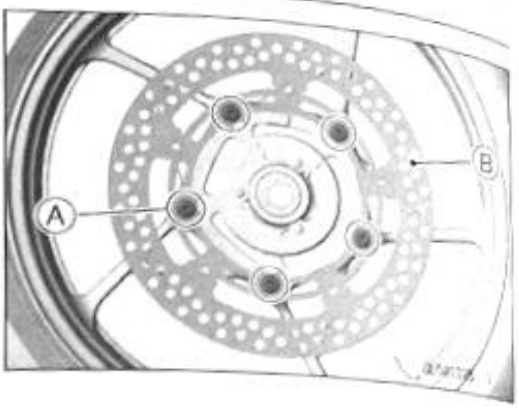




Brake Disc

Brake Disc Removal

- Remove:
  Front Wheel (see Front Wheel Removal(10-6))
  Rear Wheel (see Rear Wheel Removal(10-7))
  Brake Disc Bolts [A]
  Brake Disc [B]

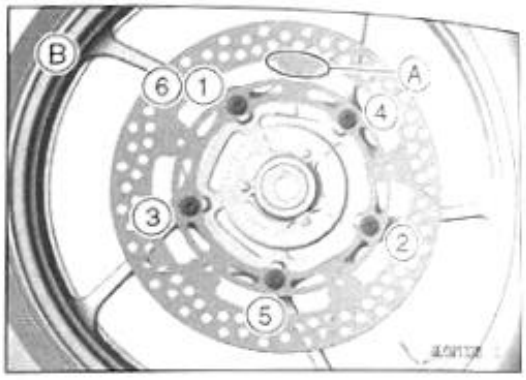


NOTE

○*Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.*

Brake Disc Installation

- Install the brake disc on the wheel so that the marked side [A] faces out.
- Replace the front and rear brake disc bolts with new ones.
- Tighten the front and rear brake disc bolts following the specified tightening sequence.
  Front Brake Disc [B]
  Rear Brake Disc [C]

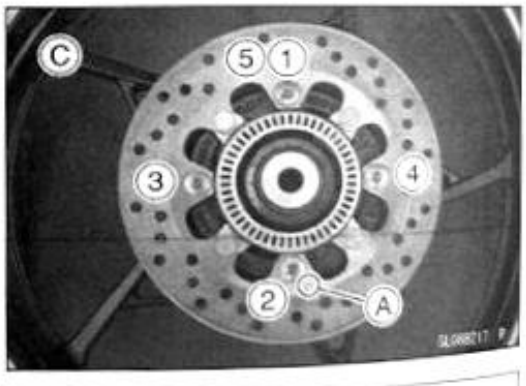


Torque - Brake Disc Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)

NOTE

○*Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.*

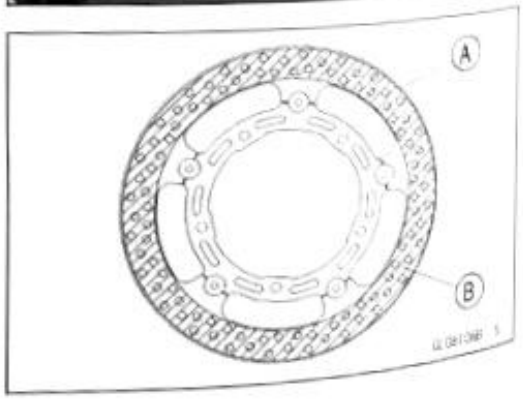
- Install the removed parts.



Brake Disc Wear Inspection

- Measure the thickness of each disc [A] at the point where it has worn the most.

★If the disc has worn past the service limit, replace it.
Measuring Area [B]

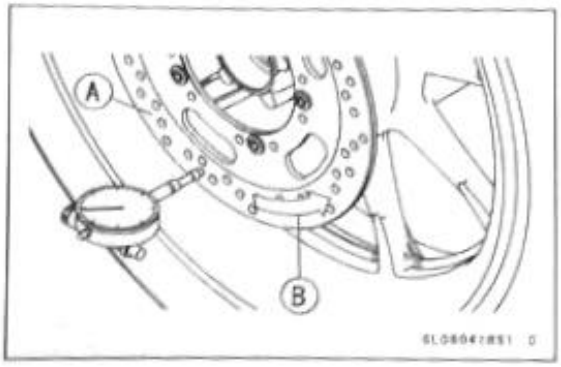


Brake Discs Thickness

Standard:	
Front	**3.8 – 4.2 mm (0.15 – 0.17 in.)**
Rear	**4.8 – 5.2 mm (0.19 – 0.20 in.)**
Service Limit:	
Front	**3.5 mm (0.14 in.)**
Rear	**4.5 mm (0.18 in.)**

Brake Disc

Brake Disc Warp Inspection



- Raise the front/rear wheel off the ground.

○For front disc inspection, turn the handlebar fully to one side.

- Set up a dial gauge against the disc [A] as shown and measure disc runout, while turning [B] the wheel by hand.

★If runout exceeds the service limit, replace the disc.

Disc Runout

Standard:	
Front	**TIR 0.2 mm (0.008 in.) or less**
Rear	**TIR 0.15 mm (0.0059 in.) or less**
Service Limit:	**TIR 0.3 mm (0.013 in.)**

Brake Fluid

Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection (see Brake Fluid Level Inspection(2-43)).

Brake Fluid Change

- Refer to the Brake Fluid Change (see Brake Fluid Change(2-44)).

Brake Line Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake lever or pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake lever or pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever or pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTICE

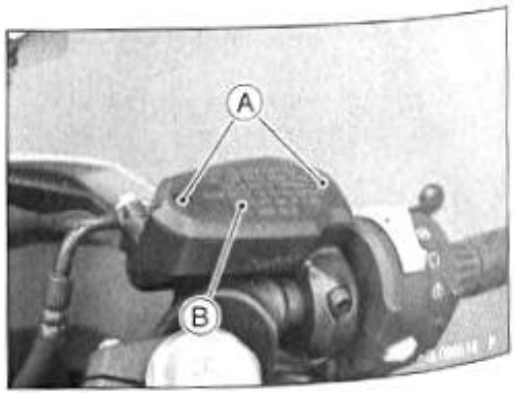
Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

NOTE

○*The procedure to bleed the front brake line is as follows. Bleeding the rear brake line is the same as for the front brake.*

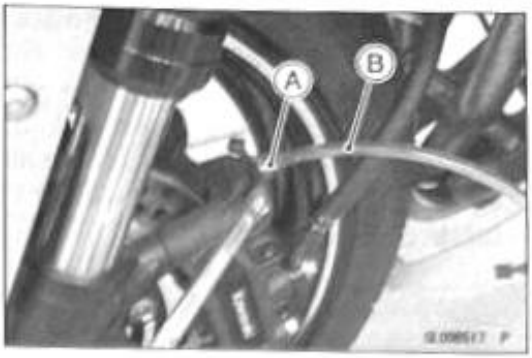
- Remove:
  Front Brake Reservoir Cap Screws [A]
  Reservoir cap [B]
  Diaphragm Plate
  Diaphragm
- Fill the reservoir with fresh brake fluid to the upper level line in the reservoir.
- Slowly pump the brake lever several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

○Bleed the air completely from the master cylinder by this operation.



Brake Fluid

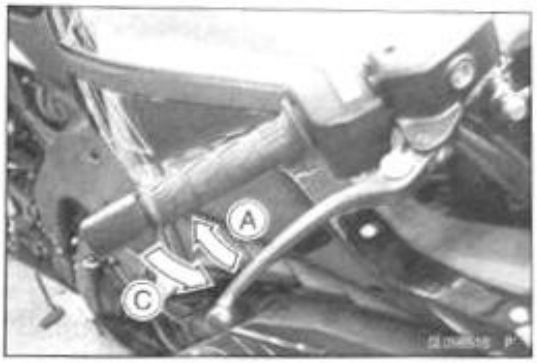
- Remove the rubber cap from the bleed valve [A] on the caliper.
- Attach a clear plastic hose [B] to the bleed valve, and run the other end of the hose into a container.



- Bleed the brake line and the caliper.

○Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake lever until it becomes hard, and apply the brake and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake applied.
3. Release the brake [C].



NOTICE

After pumping the brake lever several times, releasing it without opening and closing of the bleed valve may cause brake fluid to be blown back from the master cylinder reservoir. Brake fluid spilt on painted surfaces and plastic parts will quickly damage them. Be sure to open and close the bleed valve.

NOTE

○*The fluid level must be checked often during the bleeding operation and replenished with fresh brake fluid as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*

○*Tap the brake hose lightly from the caliper to the reservoir for more complete bleeding.*

○*Front Brake: First bleeding the right caliper then repeat the above steps for the left caliper.*

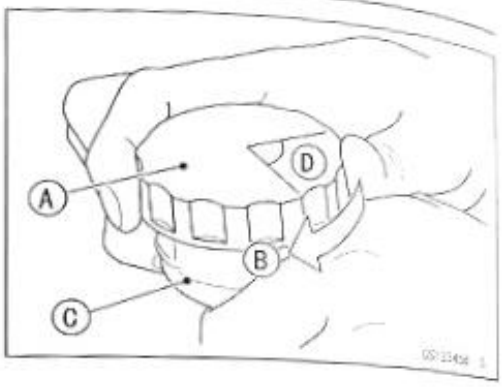
- Remove the clear plastic hose.
- Tighten the bleed valve, and install the rubber cap.

Torque - Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- Check the fluid level (see Brake Fluid Level Inspection(2-43)).
- Install the diaphragm, diaphragm plate and reservoir cap.
- Tighten:

Torque - Front Brake Reservoir Cap Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)

Brake Fluid



- Follow the procedure below to install the rear brake fluid reservoir cap correctly.

OFirst, tighten the rear brake fluid reservoir cap [A] clockwise [B] by hand until slight resistance is felt indicating that the cap is seated on the reservoir body [C], then tighten the cap an additional 1/6 turn [D] while holding the brake fluid reservoir body.

- After bleeding is done, check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

When working with the disc brake, observe the precautions listed below.

- **Never reuse old brake fluid.**
- **Do not use fluid from a container that has been left unsealed or that has been open for a long time.**
- **Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.**
- **Do not leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.**
- **Do not change the fluid in the rain or when a strong wind is blowing.**
- **Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning of the brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.**
- **When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high flash-point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.**
- **Brake fluid quickly damages painted surfaces; any spilled fluid should be completely wiped up immediately.**
- **If any of the brake line fittings or the bleed valve is opened at any time, the AIR MUST BE BLED FROM THE BRAKE LINE.**

Brake Hose

Brake Hose Removal/Installation

- Refer to the Brake Hose and Pipe Replacement (see Brake Hose and Pipe Replacement(2-46)).

Brake Hose Inspection

- Refer to the Brake System Inspection (see Brake System Inspection(2-42)).

Anti-Lock Brake System

ABS Servicing Precautions

There are a number of important precautions that should be followed servicing the ABS.

○The ABS has many brake lines, pipes, and leads. And the ABS cannot detect problems with the conventional braking system (brake disc wear, unevenly worn brake pad, and other mechanical faults). To prevent trouble, check the brake lines and pipes for correct routing and connection, the wiring for correct routing, and the brakes for proper braking power. Be sure to check for fluid leakage, and bleed the brake line thoroughly.

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If any of the brake line fittings, including the ABS hydraulic unit joint nuts, or the bleed valve is opened at any time, the air must be bled completely from the brake line. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

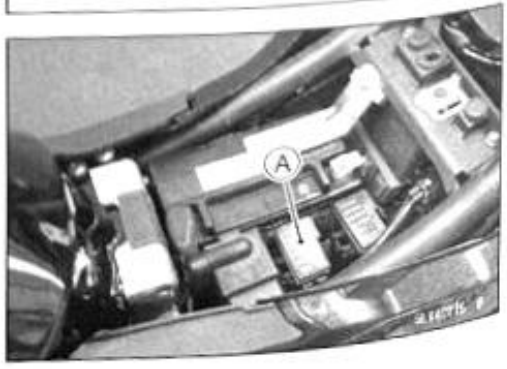
NOTICE

Do not ride the motorcycle with air in the brake line, or the ABS could malfunction.

○When the ABS operates, the ABS makes noise and the rider feels the reaction force on the brake lever and brake pedal. This is a normal condition. It informs the rider that the ABS is operating normally.

Yellow ABS Indicator Light Inspection

○In this model, the yellow ABS indicator light [A] goes on or blinks by the control of the ABS hydraulic unit.



Yellow ABS Indicator Light Stays ON (Error function after the ignition switch turned on - No Service Code)

- Perform the Pre-Diagnosis Inspection 1 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.

Step 1

- Check the ignition fuse 15 A in the fuse box (1) [A] for blown.

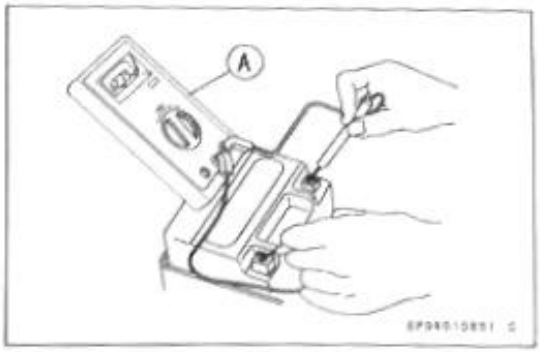
★If the fuse is blown, replace the fuse.

★If the fuse is not blown, go to next step.

Anti-Lock Brake System

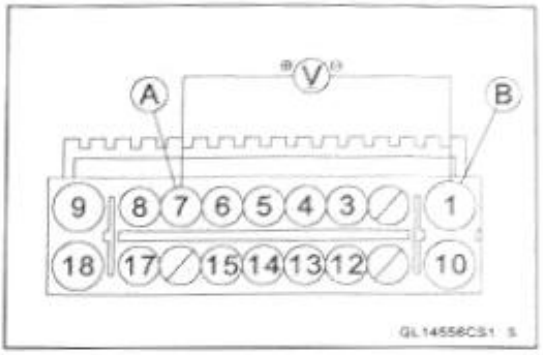
Step 2
- Measure the battery terminal voltage using a voltmeter [A].

○The battery voltage should be within 10 – 16 V.
★If the voltage without specifications, recharge or replace the battery.
★If the voltage within specifications, go to next step.



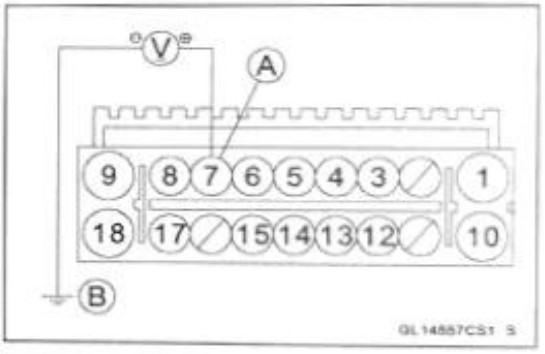
Step 3
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 7 (BR/W) (+) [A] and terminal 1 (BK/Y) (–) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 – 16 V) should be appeared while the ignition switch turned on.
★If the battery voltage appeared, go to step 4.
★If the battery voltage does not appear, go to next step.



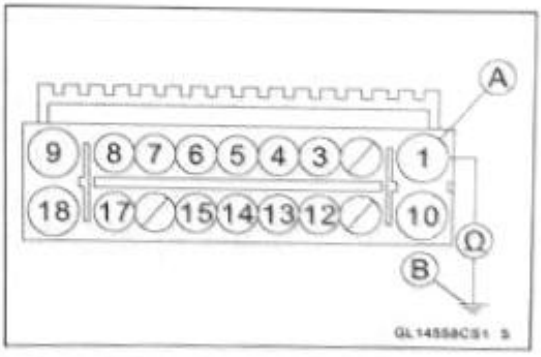
Step 3-1
- Check the voltage between the terminal 7 (BR/W) (+) [A] of the ABS hydraulic unit connector and a frame ground (–) [B].

○The battery voltage (10 – 16 V) should be appeared while the ignition switch turned on.
★If the battery voltage does not appear, repair or replace the main harness.
★If the battery voltage appeared, go to next step.



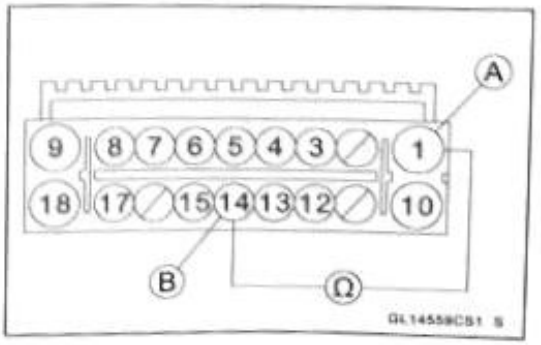
Step 3-2
- Check for continuity between the terminal 1 (BK/Y) [A] of the ABS hydraulic unit connector and a frame ground [B].

★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the ABS hydraulic unit.



Step 4
- With the self-diagnosis terminal connected to the ground, check for continuity between the terminal 1 (BK/Y) [A] and terminal 14 (GY) [B] of the ABS hydraulic unit connector.

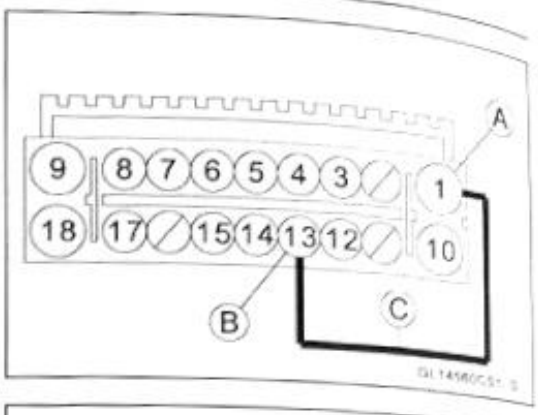
★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Anti-Lock Brake System

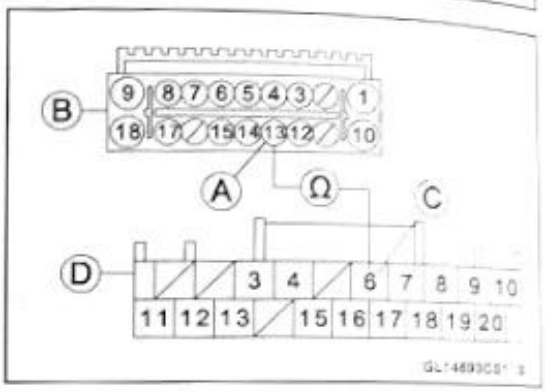
Step 5
- Jump the terminal 1 (BK/Y) [A] and terminal 13 (BL/Y) [B] at the ABS hydraulic unit connector using a jumper read [C].
- Check the yellow ABS indicator light with the ignition switch turned on.

★If the indicator goes off, replace the ABS hydraulic unit.
★If the indicator goes on, go to next step.



Step 6
- Disconnect the connector from the meter unit (see Meter Unit Removal(16-56)).
- Check for continuity between the terminal 13 (BL/Y) [A] of the ABS hydraulic unit connector [B] and terminal 6 (BL/Y) [C] of the meter connector [D].

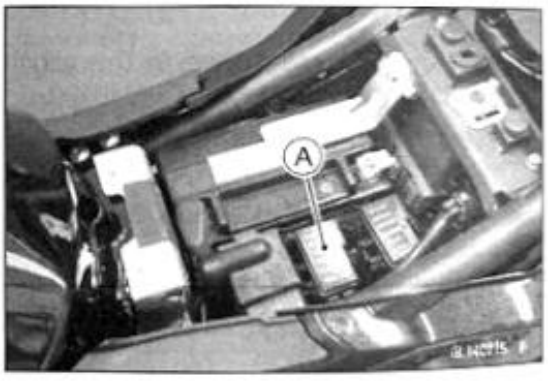
★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the meter unit with a new one.



Yellow ABS Indicator Light does not go on (When the Ignition Switch turned on)
- Perform the Pre-Diagnosis Inspection 1 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.

Step 1
- Check the meter fuse 10 A in the fuse box (1) [A] for blown.

★If the fuse is blown, replace the fuse.
★If the fuse is not blown, go to next step.

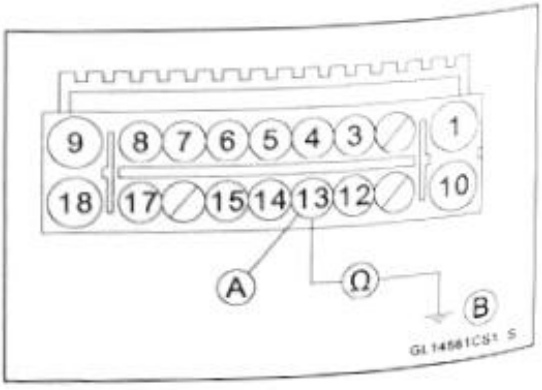


Step 2
- Disconnect the ABS hydraulic unit connector and check the yellow ABS indicator light for function.

○The yellow ABS indicator light should goes on when the ignition switch turned on.
★If the indicator does not goes on, go to next step.
★If the indicator goes on, go to step 3.

Step 2-1
- Disconnect the connector from the meter unit (see Meter Unit Removal(16-56)).
- Check for continuity between the terminal 13 (BL/Y) [A] of the ABS hydraulic unit connector and a frame ground [B].

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the meter unit with a new one.



Anti-Lock Brake System

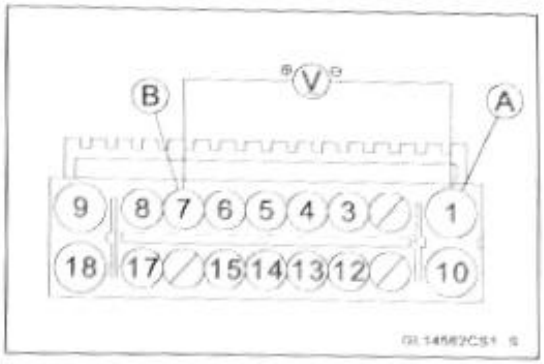
Step 3

- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 – 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, go to next step.



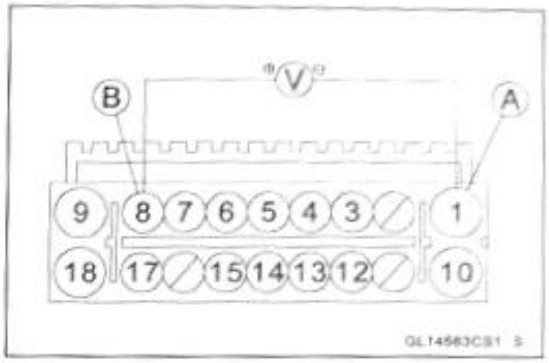
Step 4

- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 8 (BK/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 – 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, go to next step.



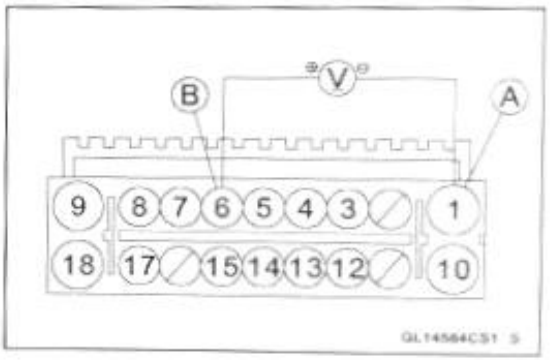
Step 5

- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 6 (BK/O) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 – 16 V) should not appear while the ignition switch turned off.

★If the battery voltage appeared, repair or replace the main harness.

★If the battery voltage does not appear, replace the ABS hydraulic unit.



ABS Hydraulic Unit Removal

NOTICE

The ABS hydraulic unit [A] has been adjusted and set with precision at the factory. Therefore, it should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface.

Be careful not to get water or mud on the ABS hydraulic unit.

NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

- Drain the brake fluid from the front and rear brake lines.

○Drain the brake fluid through the bleed valve by pumping the brake lever and pedal.

○Be sure to place a cloth under the ABS hydraulic unit.

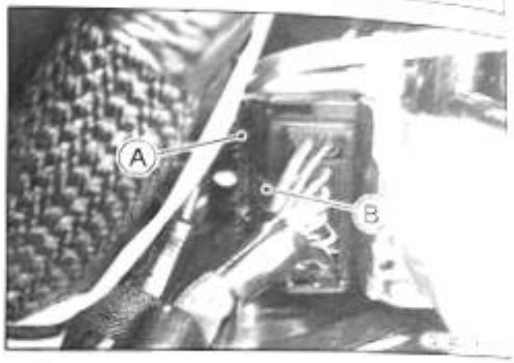
Anti-Lock Brake System

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Open the clamp [A].

- Pull the lever [A] while pushing the locking tab [B] and disconnect the ABS hydraulic unit connector.

NOTICE

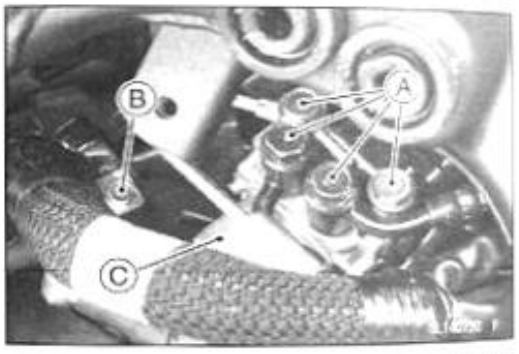
To protect the ABS hydraulic unit from the electrical surge, always disconnect the ABS hydraulic unit connector while the ignition switch is turned off.



- Remove:
  Brake Hose Banjo Bolts [A]
  ABS Hydraulic Unit Bracket Bolts [B]
  ABS Hydraulic Unit [C]

NOTE

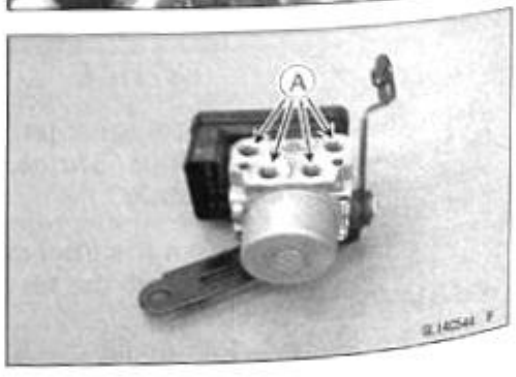
○*Be careful not to bend the brake pipe while removing the ABS hydraulic unit.*



- Plug the ports [A] on the ABS hydraulic unit to prevent entering a foreign matter into the unit.
- Wrap the brake pipe openings with a vinyl bag to prevent brake fluid leakage and entering a foreign matter into the hydraulic system.

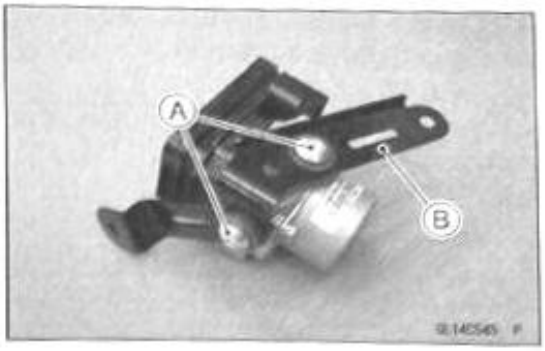
NOTICE

- **Do not allow entering a foreign matter into the hydraulic system while disconnecting the hydraulic lines.**
- **Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.**



Anti-Lock Brake System

- Remove:
  Bolts [A] and Collars
  Bracket [B]



NOTICE

The ABS hydraulic unit has been adjusted and set with precision at the factory. Do not try to disassemble and repair the ABS hydraulic unit.

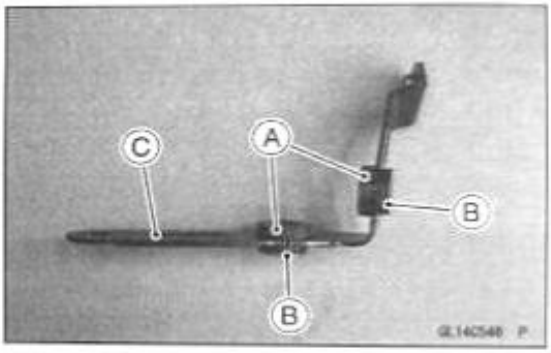
ABS Hydraulic Unit Installation

NOTICE

Brake fluid quickly damages painted plastic surfaces; any spilled fluid should be completely washed away immediately.

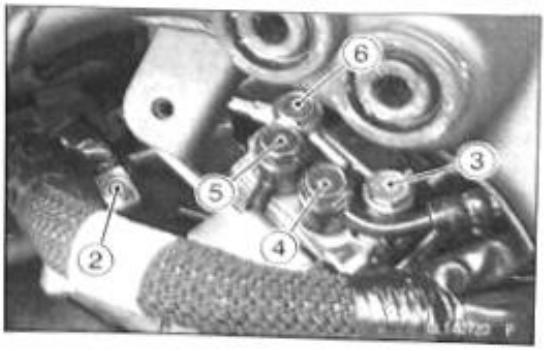
- Be sure to install the dampers [A] and flanged collars [B] on the bracket [C].

○When installing the dampers, face the large diameter side inside.



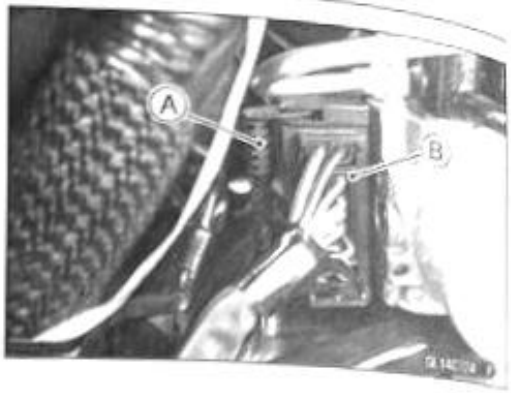
- Install the ABS hydraulic unit together with the bracket, and tighten the bolts following the specified tightening sequence [1 – 2].
- Replace the washers that are on each side of the pipe fitting with new ones.
- Install the brake hoses (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten the brake hose banjo bolts (ABS hydraulic unit) following the specified tightening sequence [3 – 6].

Torque - Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 23 mm) [3, 6]: 25 N·m (2.5 kgf·m, 18 ft·lb)
Brake Hose Banjo Bolts (ABS Hydraulic Unit) (L = 37 mm) [4, 5]: 25 N·m (2.5 kgf·m, 18 ft·lb)



Anti-Lock Brake System

- Push the lever [A] forward until locked by the locking tab to connect the ABS hydraulic unit connector [B].
- Bleed the brake line (see Brake Line Bleeding(12-22)).
- Check the brake for good braking power, no brake drag, and no fluid leakage.
- Install the removed parts.



ABS Hydraulic Unit Inspection

- Remove the ABS hydraulic unit (see ABS Hydraulic Unit Removal(12-29)).
- Visually inspect the ABS hydraulic unit.

★Replace the ABS hydraulic unit if any of them are cracked, or otherwise damaged.

- Visually inspect the connector terminals [A].

★Replace the ABS hydraulic unit or main harness if either of the terminals are cracked, bent, or otherwise damaged.

★If the ABS hydraulic unit connector is clogged with mud or dust, blow it off with compressed air.

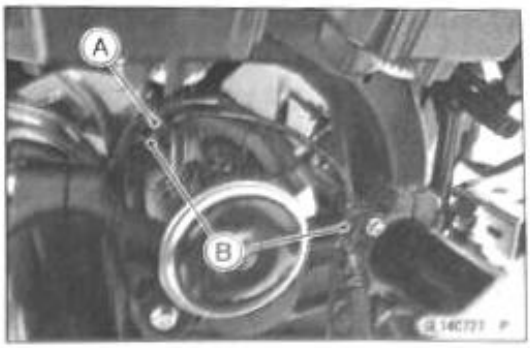
Front Wheel Rotation Sensor Removal

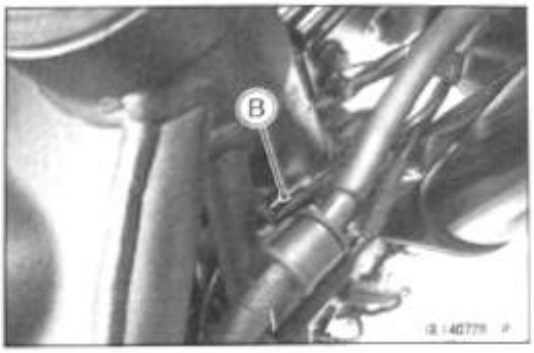
NOTICE
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor. **Do not try to disassemble or repair the wheel rotation sensor.**

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Slide the dust cover [A], and disconnect the front wheel rotation sensor connector [B].

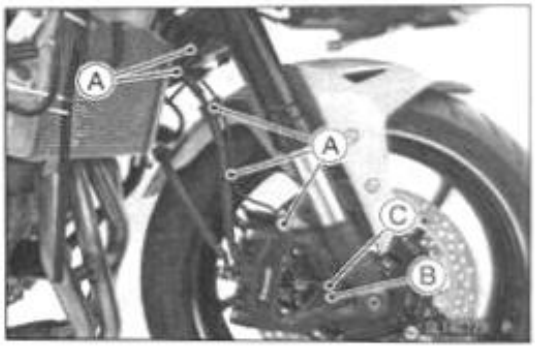
Anti-Lock Brake System

- Open the clamp [A].
- Clear the sensor lead from the clamps [B].





- Clear the sensor lead from the clamps [A].
- Remove:
  Front Wheel Rotation Sensor Bolt [B]
  Front Wheel Rotation Sensor [C]



Front Wheel Rotation Sensor Installation

- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten:

Torque - Front Wheel Rotation Sensor Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)

Rear Wheel Rotation Sensor Removal

NOTICE

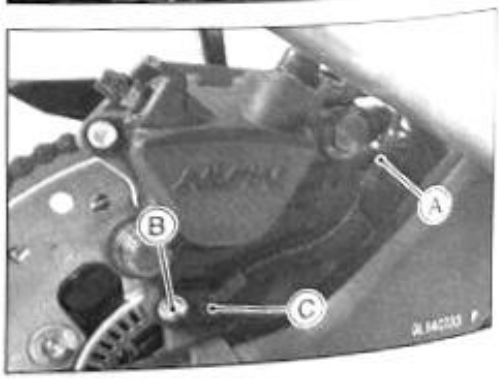
The wheel rotation sensor should be handled carefully, never struck sharply, as with a hammer, or allowed to fall on a hard surface since the wheel rotation sensor is precision made. Be careful not to get water or mud on the wheel rotation sensor.
Do not try to disassemble or repair the wheel rotation sensor.

Anti-Lock Brake System

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
- Disconnect the rear wheel rotation sensor connector [A].

- Clear the sensor lead from the clamps [A].

- Clear the sensor lead from the clamp [A].
- Remove:
  Rear Wheel Rotation Sensor Bolt [B]
  Rear Wheel Rotation Sensor [C]



Rear Wheel Rotation Sensor Installation

- Installation is the reverse of removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten:

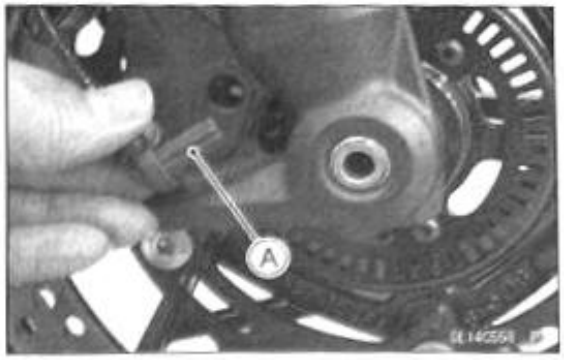
Torque - Rear Wheel Rotation Sensor Bolt: 6.9 N·m (0.70 kgf·m, 61 in·lb)

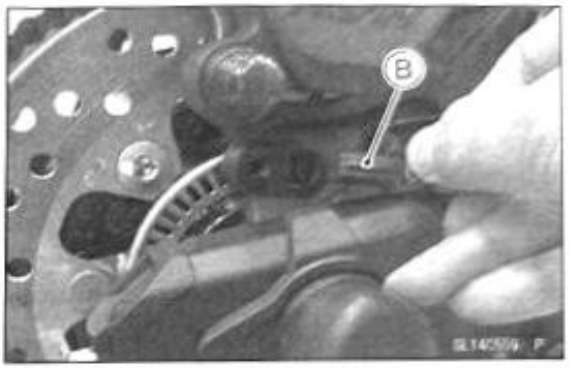
Anti-Lock Brake System

Wheel Rotation Sensor Inspection

- Remove the front wheel rotation sensor [A] from the front fork.
- Remove the rear wheel rotation sensor [B] from the caliper bracket.
- Visually inspect the wheel rotation sensors.

★Replace the wheel rotation sensor if it is cracked, bent, or otherwise damaged.





Wheel Rotation Sensor Air Gap Inspection

- Raise the front/rear wheel off the ground.
- Measure the air gap between the sensor and sensor rotor at several points.

Thickness Gauge [A]

Air Gap

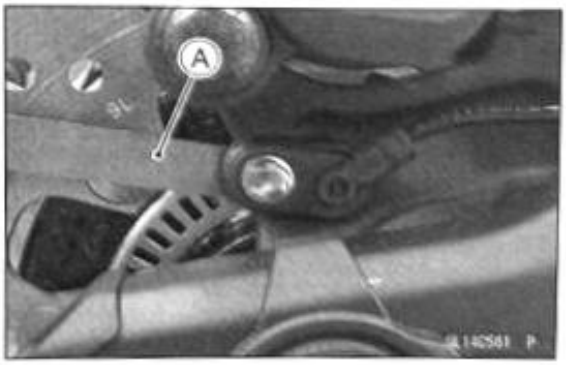
Standard:

Front	**0.552 – 1.228 mm (0.02173 – 0.04835 in.)**
Rear	**0.537 – 1.343 mm (0.02114 – 0.05287 in.)**

NOTE

○*The sensor air gap cannot be adjusted.*

★If the air gap is not within the specification, inspect the hub bearing (see Hub Bearing Inspection(10-18)), sensor, sensor rotor and sensor installation condition (see Wheel Rotation Sensor Inspection(12-35)).



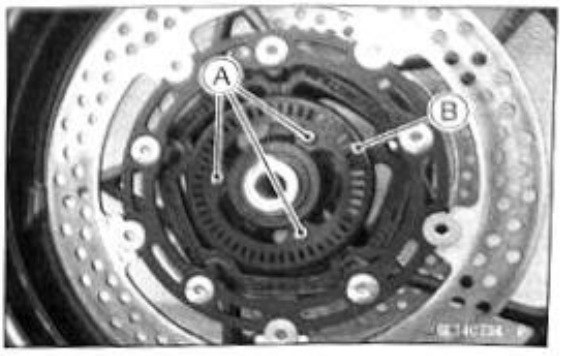
Front Wheel Rotation Sensor Rotor Removal

- Remove:

Front Wheel (see Front Wheel Removal(10-6))
Front Wheel Rotation Sensor Rotor Bolts [A]
Front Wheel Rotation Sensor Rotor [B]

NOTE

○*Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.*



Anti-Lock Brake System

Front Wheel Rotation Sensor Rotor Installation

- Installation is the reverse of removal.
- Tighten:

Torque - Front Wheel Rotation Sensor Rotor Bolts: 4.2 N·m (0.43 kgf·m, 37 in·lb)

NOTE

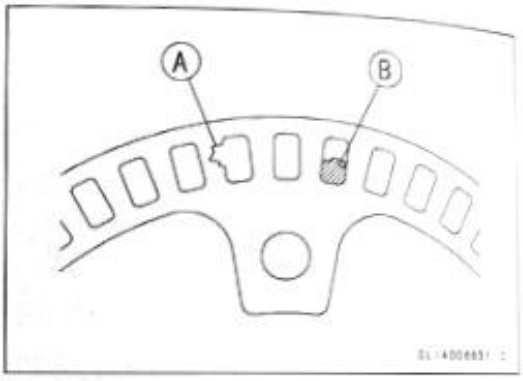
○*Handle the wheel rotation sensor rotor carefully and do not apply the external force to deform it. There is a possibility that the sensor cannot read the signal correctly from the rotor.*

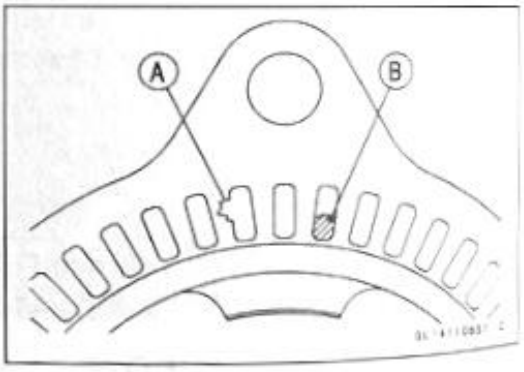
Wheel Rotation Sensor Rotor Inspection

- Visually inspect the wheel rotation sensor rotor.

★If the rotor is deformed or damaged (chipped teeth [A]), replace the sensor rotor with a new one.

★If there is iron or other magnetic deposits [B], remove the deposits.





Fuse Removal

- Refer to the Fuse Box Fuse Removal (see Fuse Box Fuse Removal(16-97)).

Fuse Installation

- If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage (see Fuse Installation(16-97)).

Fuse Inspection

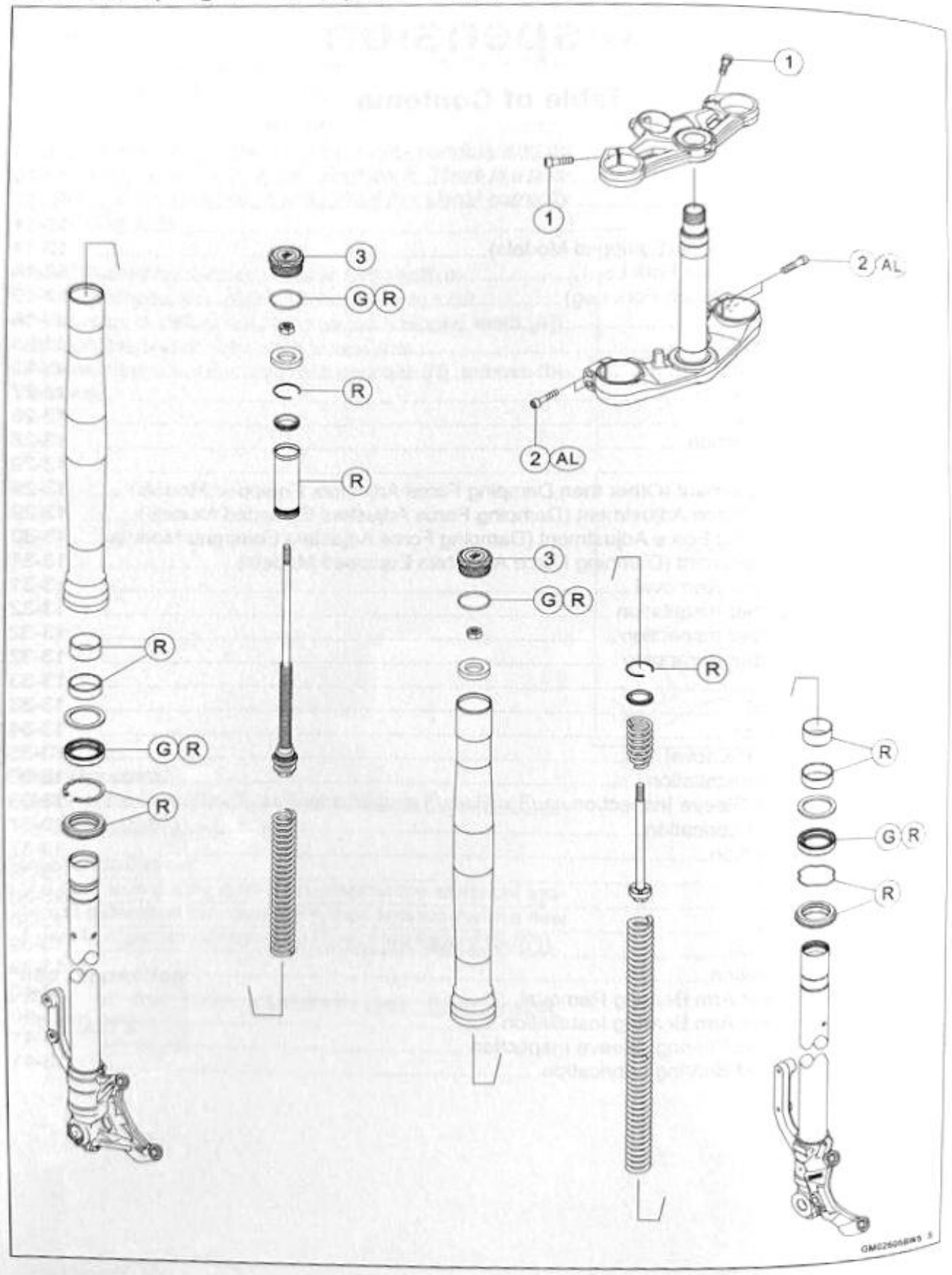
- Refer to the Fuse Inspection (see Fuse Inspection(16-97)).

Suspension

Table of Contents

Exploded View

Other than Spring Preload Adjuster Equipped Models



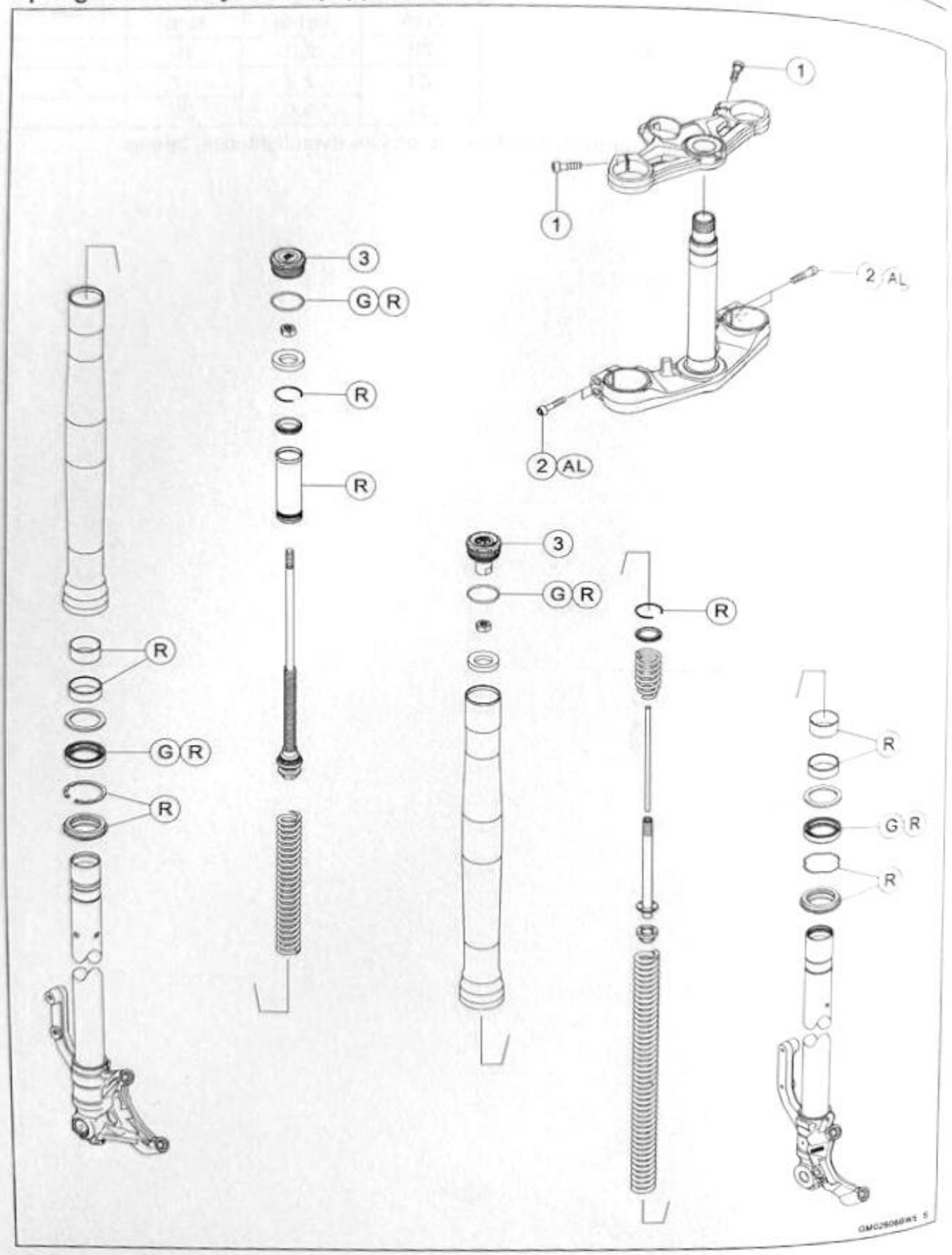
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Front Fork Clamp Bolts	25	2.5	18	
2	Lower Front Fork Clamp Bolts	23	2.3	17	AL
3	Front Fork Top Plugs	34	3.5	25	

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
R: Replacement Parts

Exploded View

Spring Preload Adjuster Equipped Models



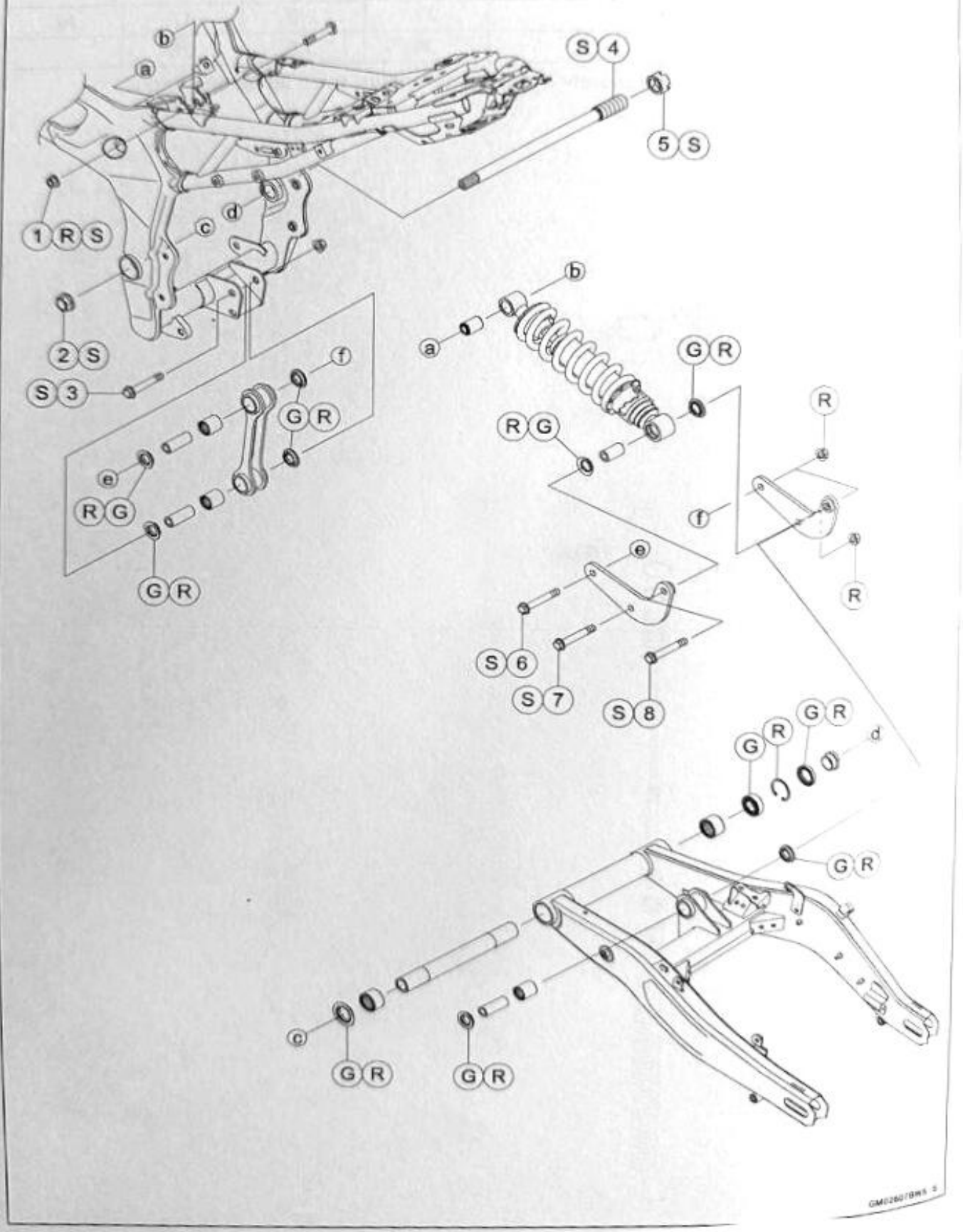
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Front Fork Clamp Bolts	25	2.5	18	
2	Lower Front Fork Clamp Bolts	23	2.3	17	AL
3	Front Fork Top Plugs	34	3.5	25	

AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
R: Replacement Parts

Exploded View

Other than Damping Force Adjusters Equipped Models



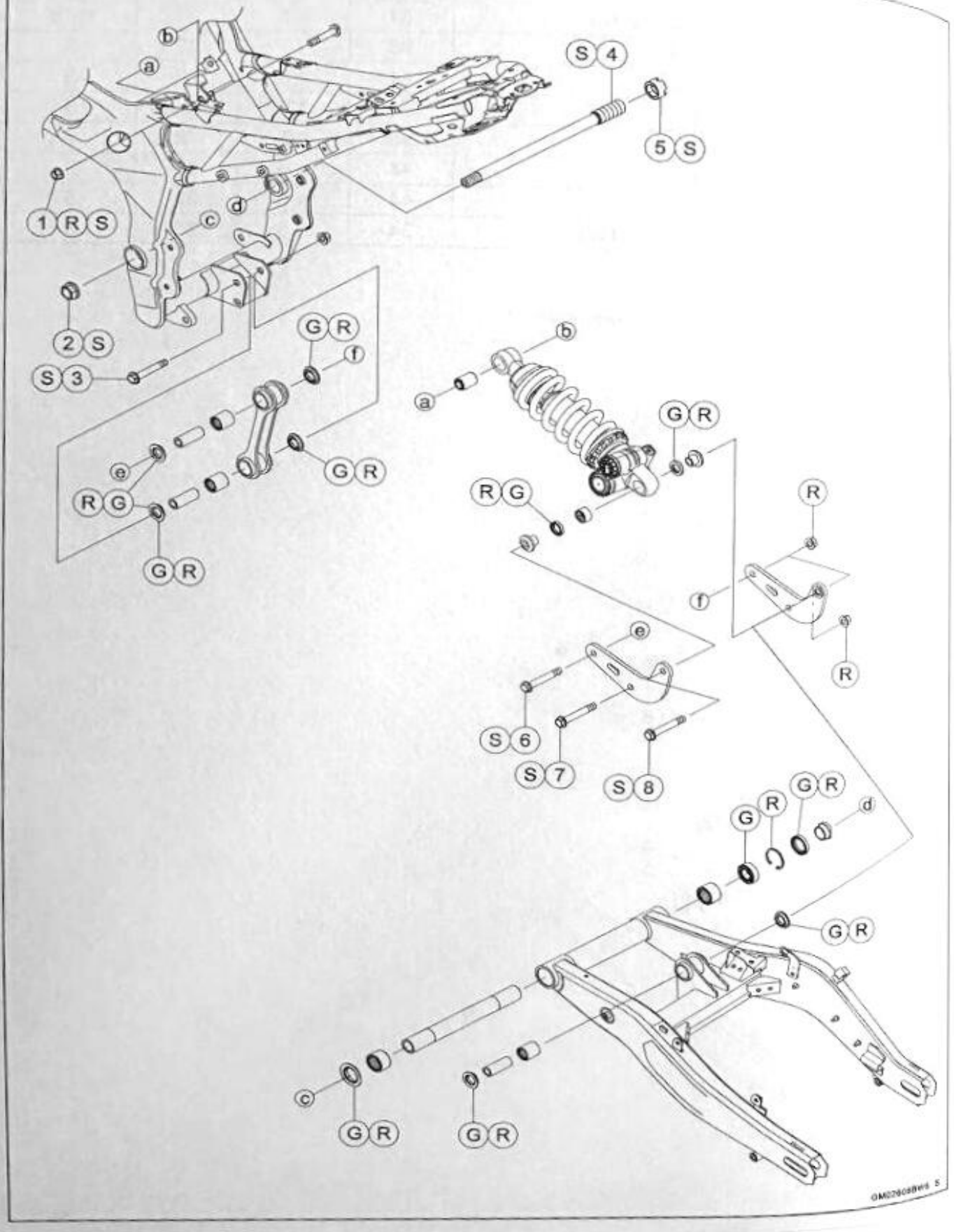
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Rear Shock Absorber Nut	34	3.5	25	R, S
2	Swingarm Pivot Shaft Nut	98	10	72	S
3	Tie-Rod Bolt (L = 63 mm)	44	4.5	32	S
4	Swingarm Pivot Shaft	9.8	1.0	87 in·lb	S
5	Swingarm Pivot Shaft Locknut	98	10	72	S
6	Tie-Rod Bolt (L = 70 mm)	44	4.5	32	S
7	Rocker Arm Bolt	44	4.5	32	S
8	Lower Rear Shock Absorber Bolt	34	3.5	25	S

G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View

Damping Force Adjusters Equipped Models



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Rear Shock Absorber Nut	34	3.5	25	R, S
2	Swingarm Pivot Shaft Nut	98	10	72	S
3	Tie-Rod Bolt (L = 63 mm)	44	4.5	32	S
4	Swingarm Pivot Shaft	9.8	1.0	87 in·lb	S
5	Swingarm Pivot Shaft Locknut	98	10	72	S
6	Tie-Rod Bolt (L = 70 mm)	44	4.5	32	S
7	Rocker Arm Bolt	44	4.5	32	S
8	Lower Rear Shock Absorber Bolt	34	3.5	25	S

G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Specifications

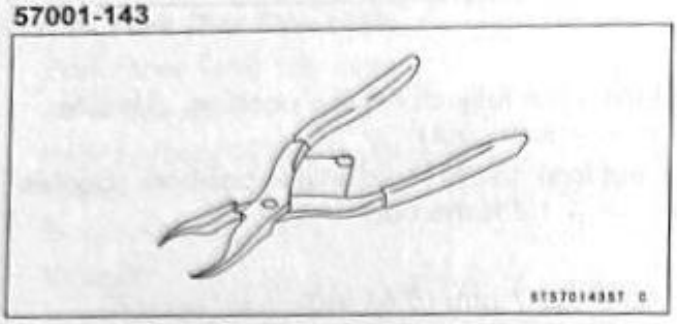
Item	Standard
Front Fork (Per One Unit)	
Fork Inner Tube Diameter	ϕ37 mm (1.5 in.)
Air Pressure	Atmospheric pressure (non-adjustable)
Fork Spring Preload Setting (Equipped Models)	2 turns in from the fully counterclockwise position (Usable Range: 0 ⟷ 20 turns in)
Suspension Oil	Kawasaki SS-47 or equivalent
Amount:	
Left Front Fork:	
When Changing Oil	Approx. 340 mL (11.5 US oz.)
After Disassembly and Completely Dry	398 ±2.5 mL (13.5 ±0.08 US oz.)
Right Front Fork :	
Other than Spring Preload Adjuster Equipped Models:	
When Changing Oil	Approx. 355 mL (12.0 US oz.)
After Disassembly and Completely Dry	416 ±2.5 mL (14.1 ±0.08 US oz.)
Spring Preload Adjuster Equipped Models:	
When Changing Oil	Approx. 345 mL (11.7 US oz.)
After Disassembly and Completely Dry	405 ±2.5 mL (13.7 ±0.08 US oz.)
Fork Oil Level:	
Left Front Fork	67 ±2 mm (2.6 ±0.08 in.) (Fully Compressed, without Spring, below from the Top of then Outer Tube)
Right Front Fork :	
Other than Spring Preload Adjuster Equipped Models	131 ±2 mm (5.2 ±0.08 in.) (Fully Compressed, without Spring, below from the Top of then Outer Tube)
Spring Preload Adjuster Equipped Models	141 ±2 mm (5.6 ±0.08 in.) (Fully Compressed, without Spring, below from the Top of then Outer Tube)
Fork Spring Free Length:	
Left Front Fork	344.8 mm (13.57 in.) (Service Limit: 338 mm (13.3 in.))
Right Front Fork :	
Other than Spring Preload Adjuster Equipped Models	538.8 mm (21.21 in.) (Service Limit: 529 mm (20.8 in.))
Spring Preload Adjuster Equipped Models	521.5 mm (20.53 in.) (Service Limit: 512 mm (20.2 in.))
Rear Shock Absorber	
Other than Damping Force Adjusters Equipped Models:	
Spring Preload Setting Position	2nd position (from the weakest position) (Usable Range: 1st ⟷ 5th position)
Gas Pressure	980 – 1 280 kPa (10.00 – 13.06 kgf/cm², 142.1 – 185.6 psi, non-adjustable)

Specifications

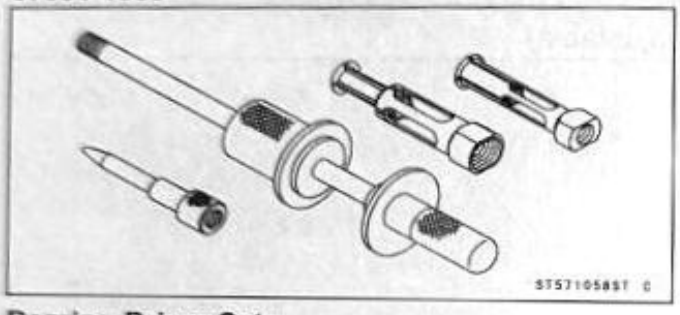
Item	Standard
Damping Force Adjusters Equipped Model:	
Rebound Damper Setting	2 turns out from the fully clockwise position. (Usable Range: 0 ⟷ 4 turns out)
Compression Damper Setting	2 1/4 turns out from the fully clockwise position. (Usable Range: 0 ⟷ 4 1/2 turns out)
Spring Preload Setting Position:	
Standard	Spring length: 162.7 mm (6.41 in.)
Usable Range	Spring length: 157.0 – 167.0 mm (6.181 – 6.575 in.)
Gas Pressure	980 – 1 280 kPa (10.00 – 13.06 kgf/cm², 142.1 – 185.6 psi, non-adjustable)

Special Tools

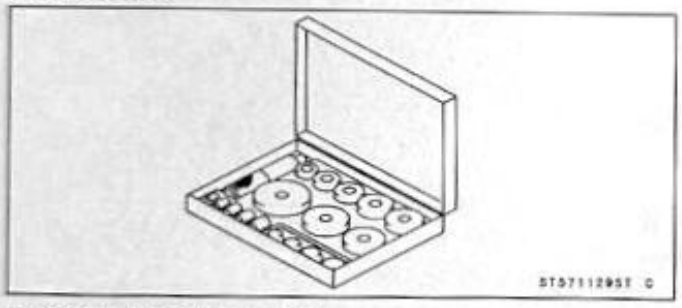
Inside Circlip Pliers:
57001-143



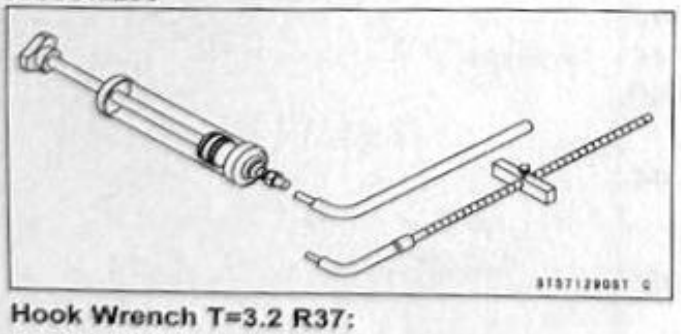
Oil Seal & Bearing Remover:
57001-1058



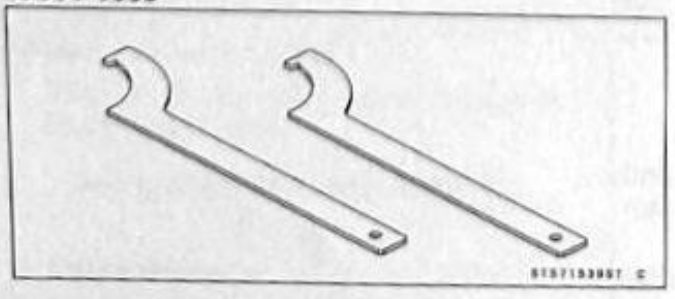
Bearing Driver Set:
57001-1129



Fork Oil Level Gauge:
57001-1290

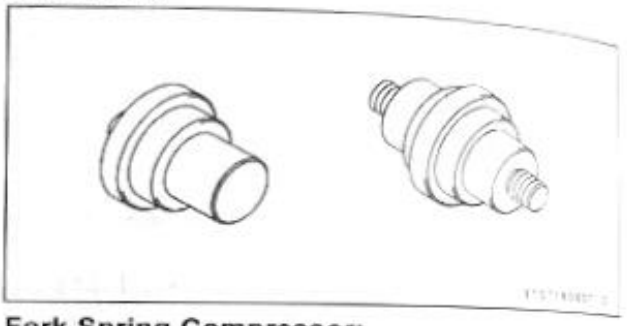


Hook Wrench T=3.2 R37:
57001-1539

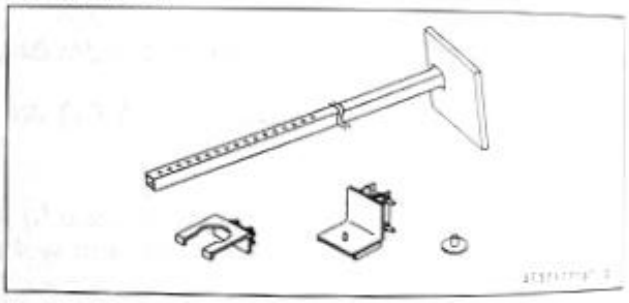


Hook Wrench R=35:
57001-1580

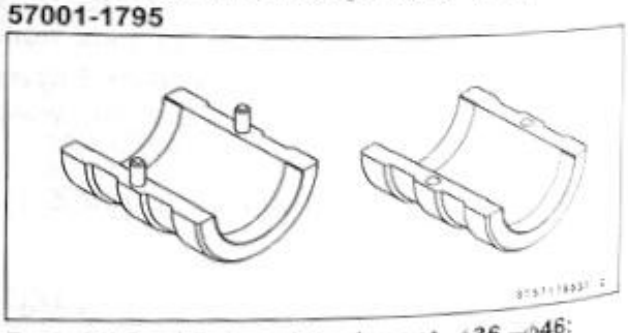
Needle Bearing Driver, ϕ17/ϕ18:
57001-1609



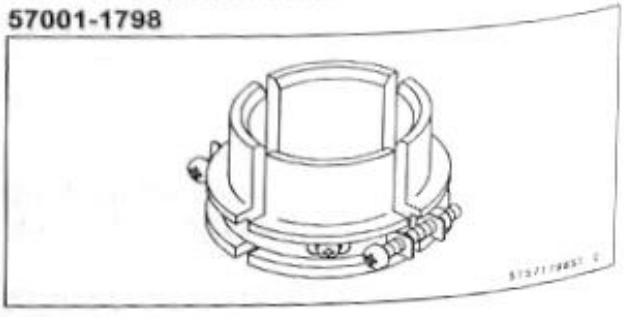
Fork Spring Compressor:
57001-1771



Fork Oil Seal Driver Weight, ϕ26 –ϕ46:
57001-1795

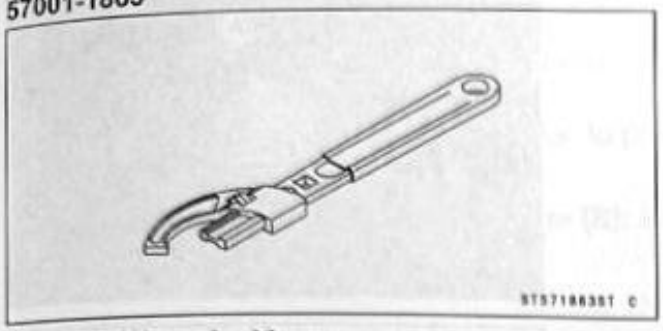


Fork Oil Seal Driver Attachment, ϕ36 –ϕ46:
57001-1798

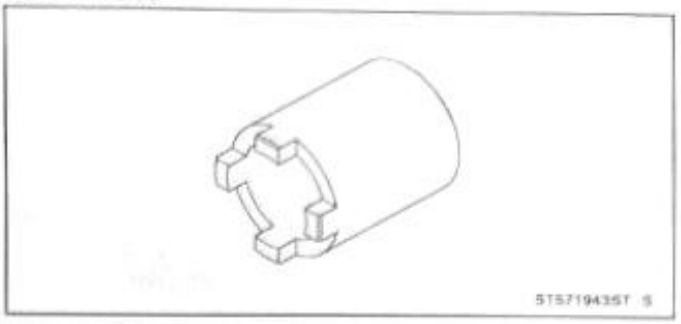


Special Tools

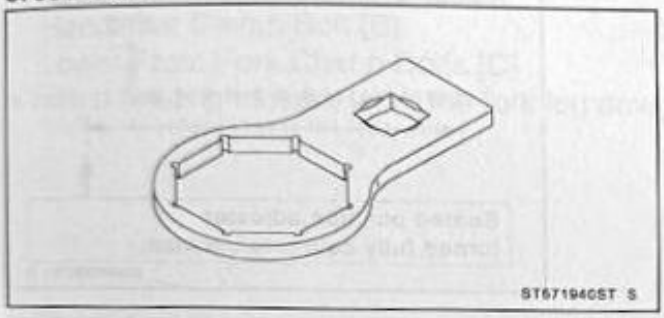
Adjustable Hook Wrench:
57001-1863



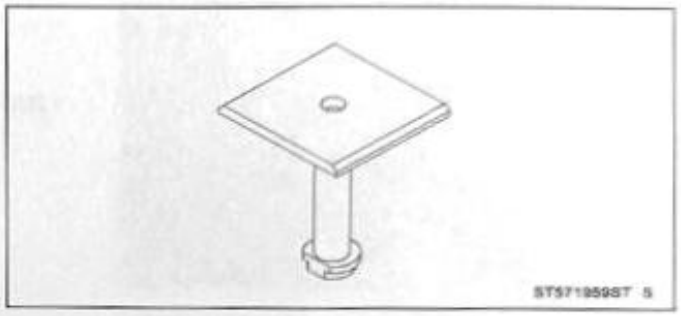
Swingarm Pivot Nut Wrench
57001-1943



Top Plug Wrench, 41 mm
57001-1940



Fork Spring Compressor Adapter:
57001-1959

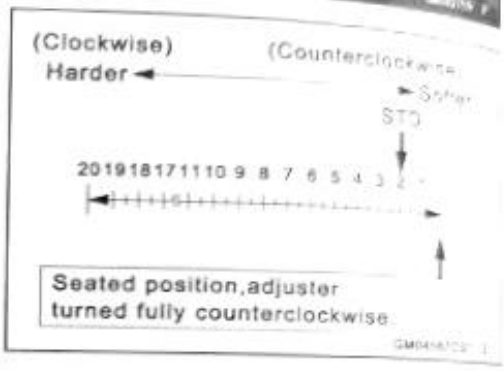


Front Fork

Spring Preload Adjustment (Equipped Models)

- To adjust the spring preload, turn the spring preload adjuster [A].

○The standard adjuster setting is the **2 turns in** from the fully counterclockwise position.



○The spring preload can be left soft for average riding. But it should be adjusted harder for high speed riding or riding with a passenger. If the spring action feels too soft or too stiff, adjust it in accordance with the following table.

Spring Action

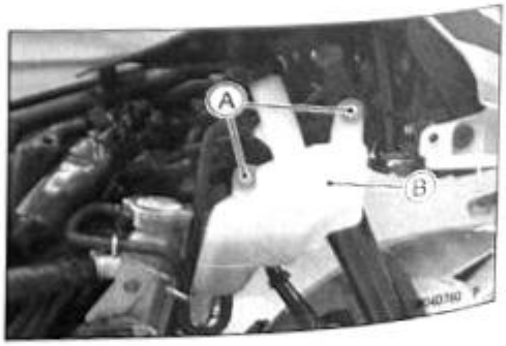
Adjuster Position	Damping Force	Setting	Load	Road	Speed
0	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
20 turns in	Strong	Hard	Heavy	Bad	High

NOTICE

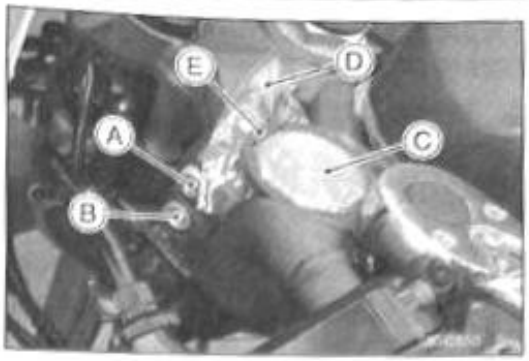
Do not force the spring preload adjuster beyond the fully seated position, or the adjusting mechanism may be damaged.

Front Fork Removal (Each Fork Leg)

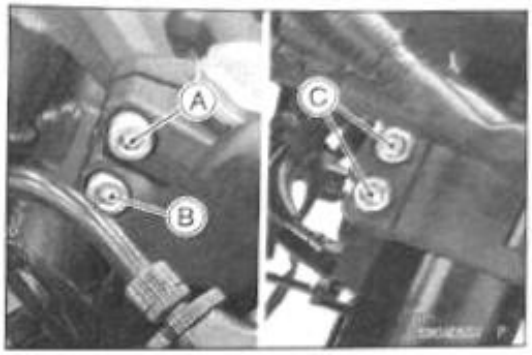
- Remove:
  Side Covers (see Side Cover Removal(15-26))
- For right side, remove the coolant reserve tank bolts [A] to free the reserve tank [B].
- Raise the front wheel off the ground with the stand (see Front Wheel Removal(10-6)).



• Remove:
Front Fender (see Front Fender Removal(15-31))
★If fork leg is to be disassembled, loosen the upper front fork clamp bolt [A] and handlebar clamp bolt [B]. Then, loosen the top plug [C] beforehand.
○Place a plastic bag [D] over the top plug to protect the top plug.
Special Tool - Top Plug Wrench, 41 mm [E]: 57001-1940

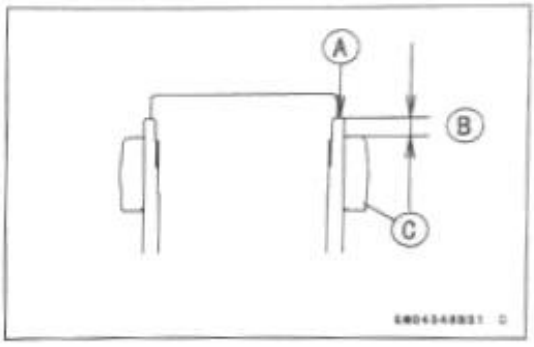


• Loosen:
Upper Front Fork Clamp Bolt [A]
Handlebar Clamp Bolt [B]
Lower Front Fork Clamp Bolts [C]
• With a twisting motion, work the fork leg down and out.



Front Fork Installation (Each Fork Leg)

• Install the fork so that the top plug end [A] of the outer tube as shown.
8 mm (0.31 in.) [B]
Steering Stem Head [C]
• Tighten:
Torque - Lower Front Fork Clamp Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)



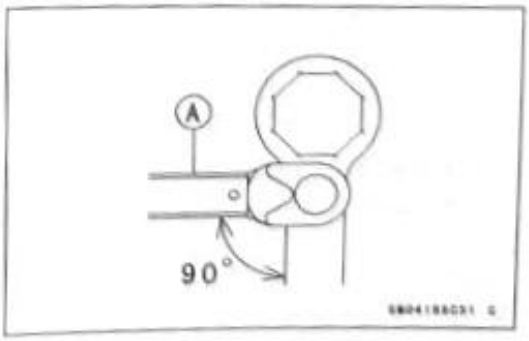
NOTE

○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

• Place a plastic bag over the top plug to protect the plug.
• Tighten:
Torque - Front Fork Top Plug: 34 N·m (3.5 kgf·m, 25 ft·lb)

NOTE

○*Tighten the front fork top plug before tightening the handlebar clamp bolt and upper front fork clamp bolt.*
○*To obtain the correct tightening torque with your torque wrench [A], install it to the special tool as shown.*



• Tighten:
Torque - Upper Front Fork Clamp Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)
Handlebar Clamp Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)
• Install the removed parts.

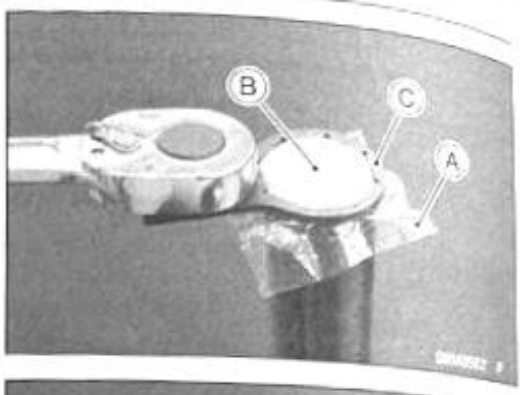
Front Fork

Front Fork Oil Change

Left Front Fork

- Remove the front fork (see Front Fork Removal (Each Fork Leg)(13-14)).
- Hold the inner tube lower end in a vise.
- Place a plastic bag [A] over the top plug [B] to protect the top plug.
- Unscrew the top plug out of the outer tube.

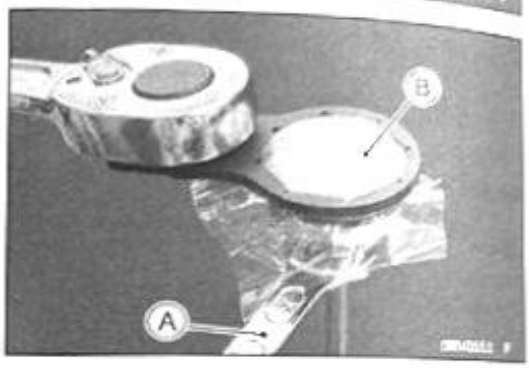
Special Tool - Top Plug Wrench, 41 mm [C]: 57001-1940



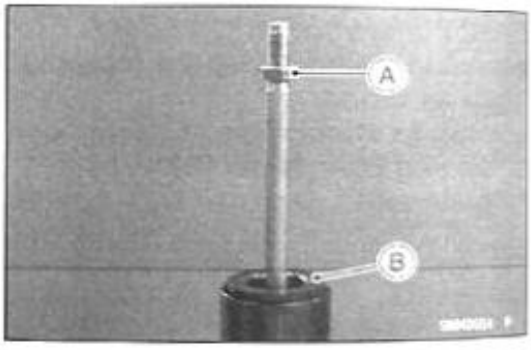
- Holding the locknut with a wrench [A], remove the top plug [B] from the piston rod.

○Place a plastic bag over the top plug to protect the top plug.

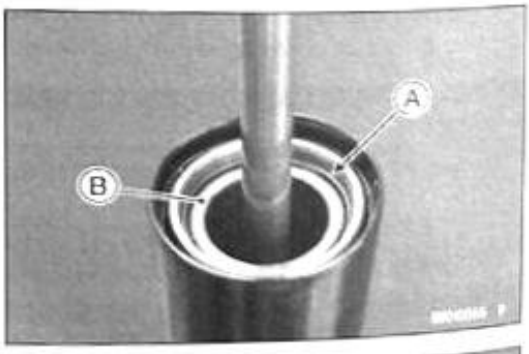
Special Tool - Top Plug Wrench, 41 mm: 57001-1940



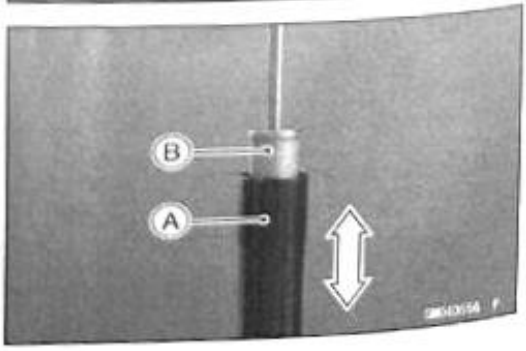
- Remove:
  Locknut [A]
  Seat Rubber [B]



- Remove the circlip [A] with the suitable tool.
- Remove the stopper [B].

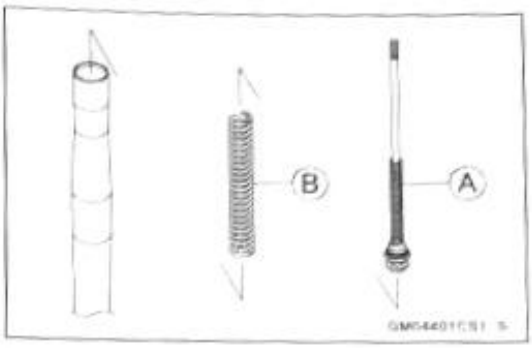


- Pump the outer tube [A] quickly within 300 mm (11.8 in.) to remove the piston rod guide case [B].

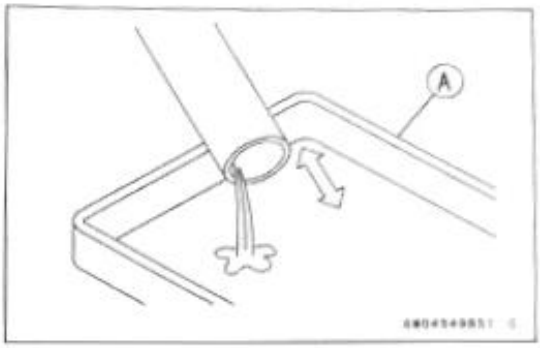


Front Fork

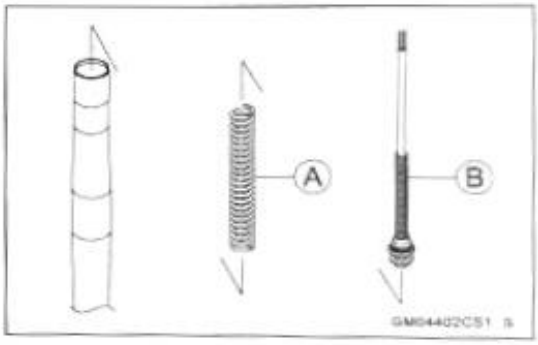
• Remove:
Piston Rod [A]
Fork Spring [B]



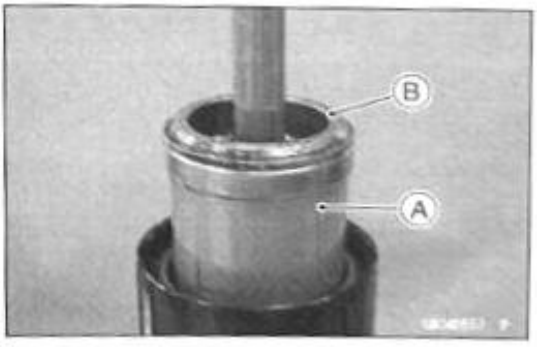
• Drain the fork oil into a suitable container [A].
○Pump the inner tube up and down at least 10 times to expel the oil from the fork.



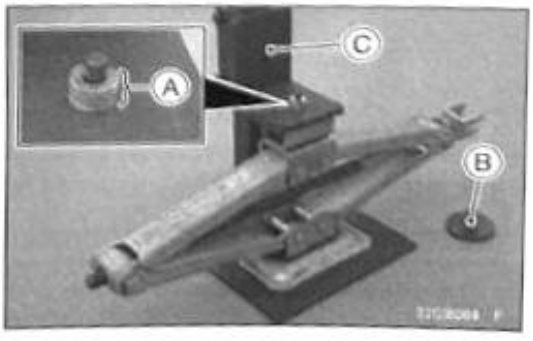
• Install:
Fork Spring [A]
Piston Rod [B]



• Replace the piston rod guide case [A] with a new one.
• Install the piston rod guide case into the inner tube until it can be pushed down by hand.
• Install the stopper [B] on the piston rod guide case.
○The chamfer side facing up.

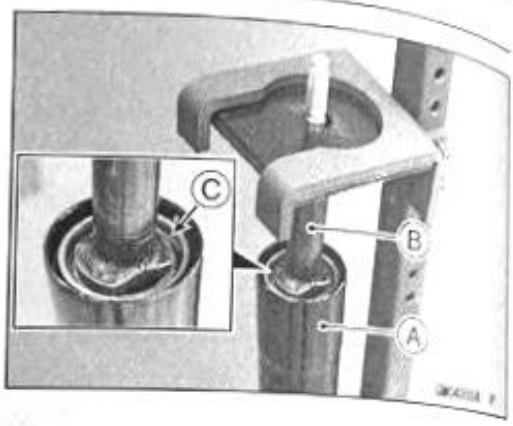


• Prepare the about 8 mm spacer [A] (ex.: P/No. 411AA0600, Qty. 8).
• Remove the protector [B] attached in the fork spring compressor [C] to install the spacer.
Special Tool - Fork Spring Compressor: 57001-1771



Front Fork

- Set the front fork [A] and adapter [B] to the fork spring compressor, and push the piston rod guide case down with the available jack.



NOTE

○*Do not push down the stopper more than 1.5 mm (0.059 in.) from the original position. The front fork may be damaged.*

Special Tool - Fork Spring Compressor Adapter: 57001 -1959

- Replace the circlip [C] with a new one, and install it.
- Remove the front fork from the fork spring compressor (special tool).
- Hold the front fork vertically in a vise.
- Slide up the outer tube about the 400 mm (15.7 in.) from the bottomed position.
- Pour in the type and amount of fork oil specified.

Suspension Oil - SS-47 (1 L): 44091-0010
Amount:
When changing oil:
Approx. 340 mL (11.5 US oz.)
After disassembly and completely dry:
398 ±2.5 mL (13.5 ±0.08 US oz.)

- Temporary install the top plug to the outer tube.

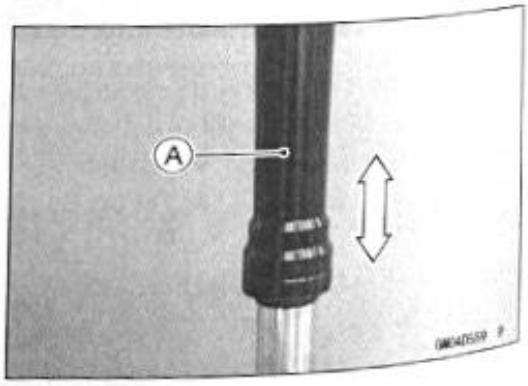
○Place a plastic bag over the top plug to protect the top plug.

Special Tool - Top Plug Wrench, 41 mm: 57001-1940

- Move the outer tube [A] up and down more than 10 times in order to expel the air from the fork oil.
- Remove the top plug from the outer tube.

○Place a plastic bag over the top plug to protect the top plug.

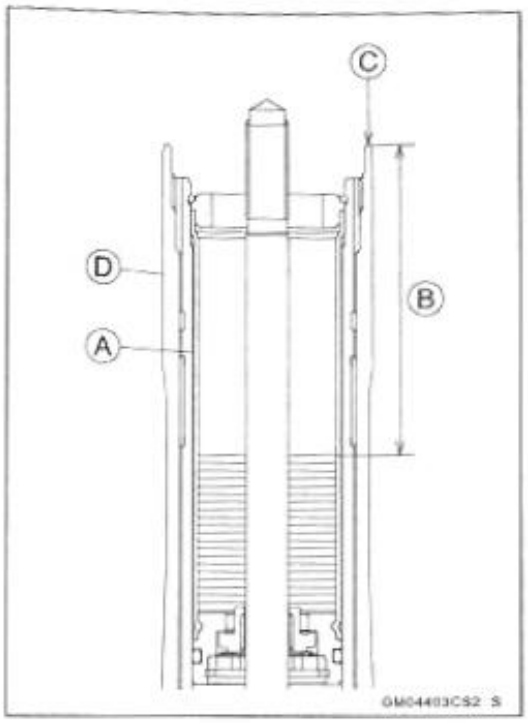
Special Tool - Top Plug Wrench, 41 mm: 57001-1940



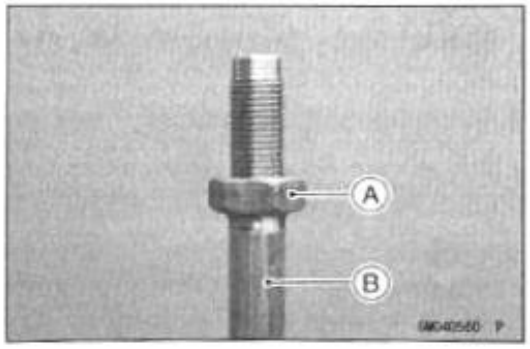
- Wait until the oil level stabilizes.
- With the fork fully compressed, insert a tape measure or rod into the piston rod guide case [A], and measure the distance [B] from the top [C] of the outer tube [D] to the oil.

Oil Level (fully compressed)
Standard: 67 ±2 mm (2.6 ±0.08 in.)

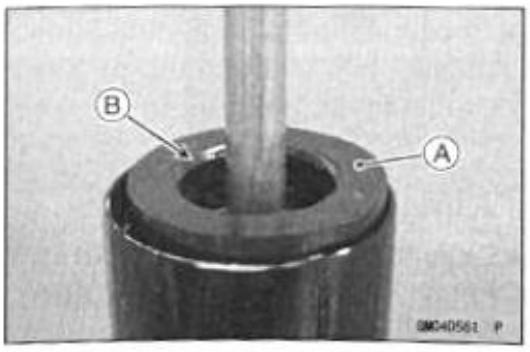
★If the oil level is too high, remove the excess oil, using a syringe or some other suitable device.
★If the oil level is too low, pour in enough oil, and pump out the excess oil as shown above.



- Screw on the locknut [A] fully to the piston rod [B].



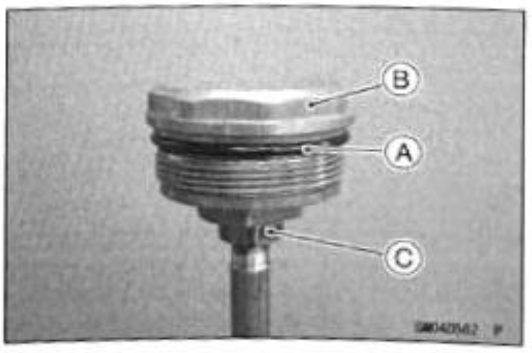
- Install the seat rubber [A] so that the corner side [B] faces upward.



- Replace the O-ring [A] with a new one.
- Install the top plug [B] to the piston rod.
- Holding the top plug with a wrench, tighten the locknut [C] against the top plug.

OPlace a plastic bag over the top plug to protect the top plug.

Special Tool - Top Plug Wrench, 41 mm: 57001-1940



Front Fork

- Temporary install the top plug to the outer tube.

○Place a plastic bag over the top plug to protect the top plug.

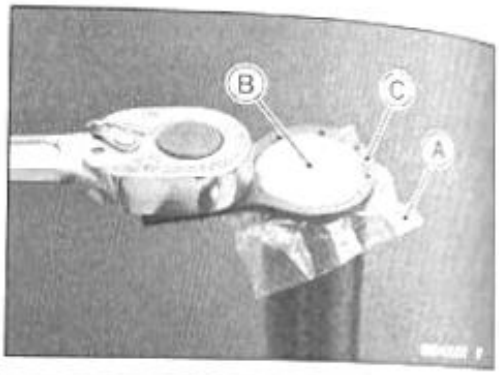
Special Tool - Top Plug Wrench, 41 mm: 57001-1940

- Install the front fork (see Front Fork Installation (Each Fork Leg)(13-15)).

Right Front Fork

- Remove the front fork (see Front Fork Removal (Each Fork Leg)(13-14)).
- Hold the inner tube lower end in a vise.
- Place a plastic bag [A] over the top plug [B] to protect the top plug.
- Unscrew the top plug out of the outer tube.

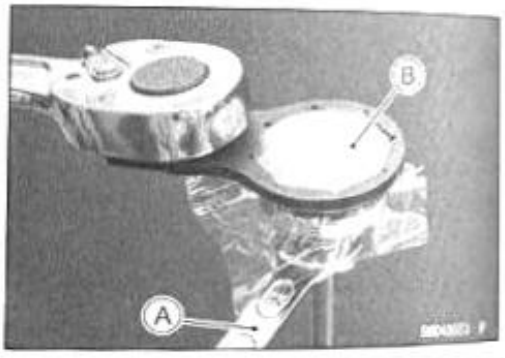
Special Tool - Top Plug Wrench, 41 mm [C]: 57001-1940



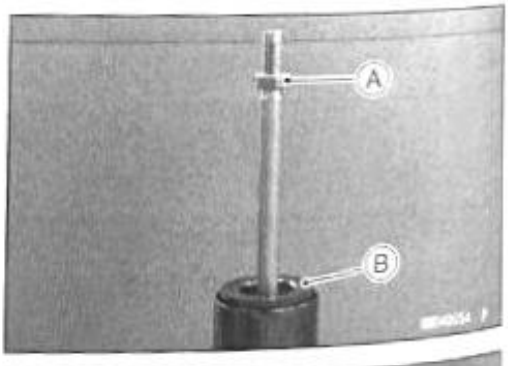
- Holding the locknut with a wrench [A], remove the top plug [B] from the joint rod.

○Place a plastic bag over the top plug to protect the top plug.

Special Tool - Top Plug Wrench, 41 mm: 57001-1940

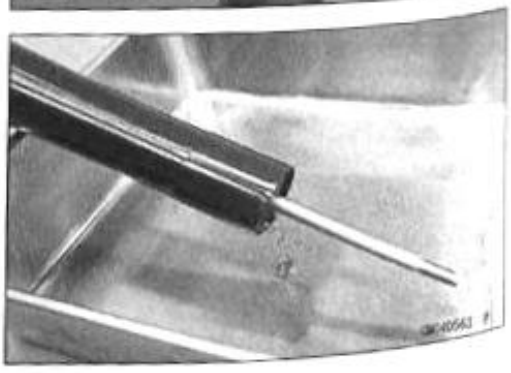


- Remove:
  Locknut [A]
  Seat Rubber [B]



- Drain the fork oil into a suitable container.

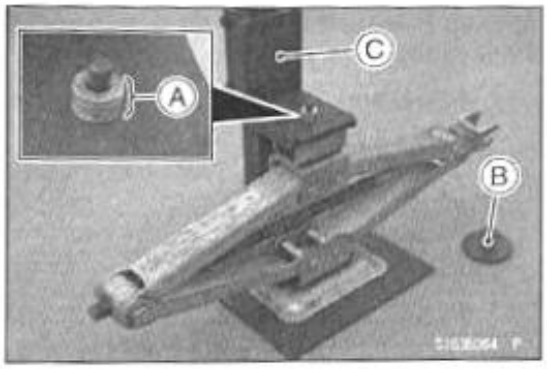
○Pump the inner tube up and down at least 10 times to expel the oil from the fork.



Front Fork

- Prepare the about 8 mm spacer [A] (ex.: P/No. 411AA0600, Qty. 8).
- Remove the protector [B] attached in the fork spring compressor [C] to install the spacer.

Special Tool - Fork Spring Compressor: 57001-1771

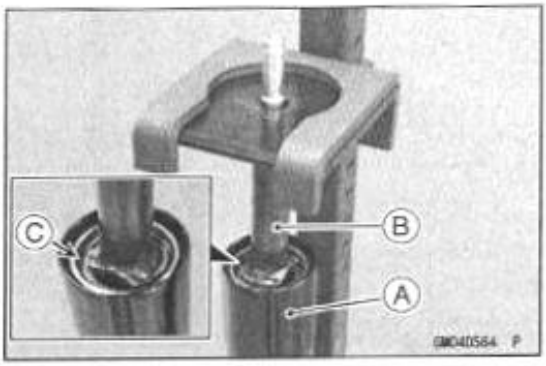


- Set the front fork [A] and adapter [B] to the fork spring compressor, and compress the fork spring with the available jack.

NOTE

ODo not push down the stopper more than 1.5 mm (0.059 in.) from the original position. The front fork may be damaged.

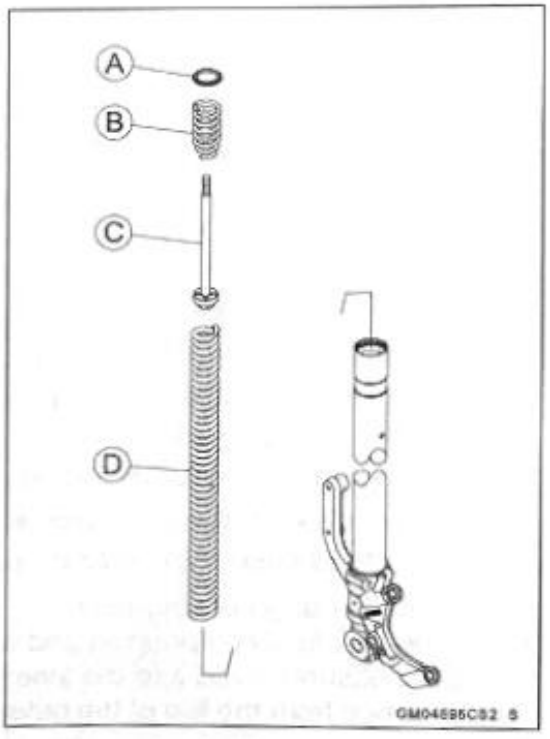
Special Tool - Fork Spring Compressor Adapter: 57001 -1959



- Remove the circlip [C] the suitable tool.

Other than Spring Preload Adjuster Equipped Models

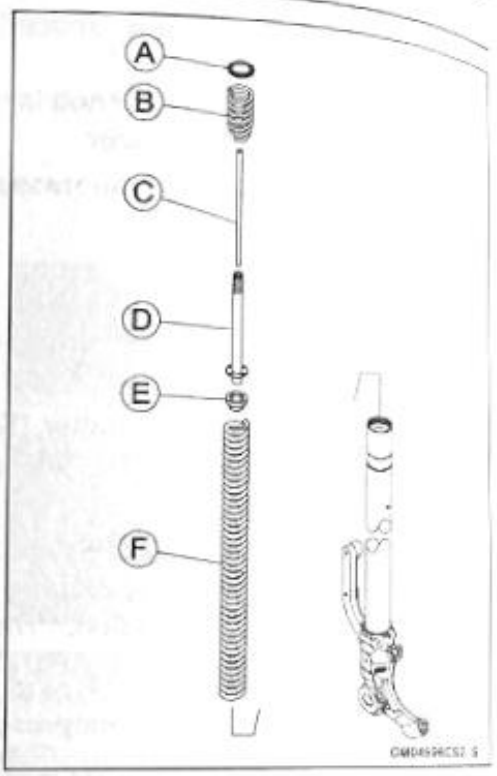
- Remove:
  Stopper [A]
  Spring [B]
  Joint Rod [C]
  Fork Spring [D]



Front Fork

Spring Preload Adjuster Equipped Models

- Remove:
  Stopper [A]
  Spring [B]
  Spring Preload Adjuster Rod [C]
  Joint Rod [D]
  Spring Seat [E]
  Fork Spring [F]



- Pour in the type and amount of fork oil specified.

OPour the fork oil until the upper of the inner tube holes [A].

Suspension Oil - SS-47 (1 L): 44091-0010

Amount:

Other than Spring Preload Adjuster Equipped Models:

When changing oil:

Approx. 355 mL (12.0 US oz.)

After disassembly and completely dry:

416 ±2.5 mL (14.1 ±0.08 US oz.)

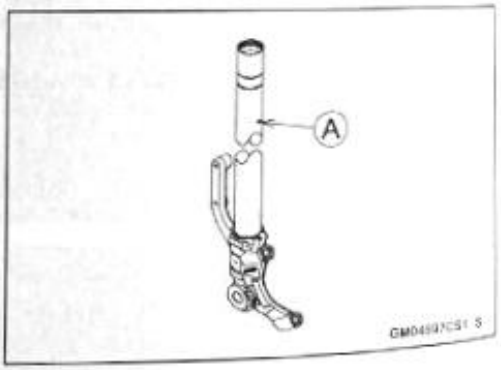
Spring Preload Adjuster Equipped Models:

When changing oil:

Approx. 345 mL (11.7 US oz.)

After disassembly and completely dry:

405 ±2.5 mL (13.7 ±0.08 US oz.)



- Wait until the oil level stabilizes.
- With the fork fully compressed and without spring, insert a tape measure or rod into the inner tube, and measure the distance from the top of the outer tube to the oil.

Front Fork

Oil Level (fully compressed, without spring)
Standard:

Other than Spring Preload Adjuster Equipped Models:

131 ±2 mm (5.2 ±0.08 in.)

Spring Preload Adjuster Equipped Models:

141 ±2 mm (5.6 ±0.08 in.)

NOTE

○*Fork oil level may also be measured using the fork oil level gauge.*

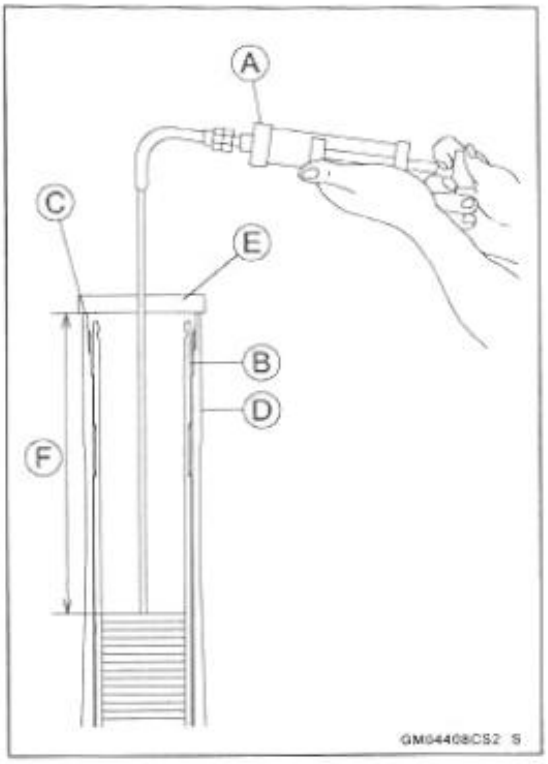
Special Tool - Fork Oil Level Gauge [A]: 57001-1290

○With the fork fully compressed, insert the gauge tube into the inner tube [B] and position the stopper across the top end [C] of the outer tube [D].

○Set the gauge stopper [E] so that its lower side shows the oil level distance specified [F].

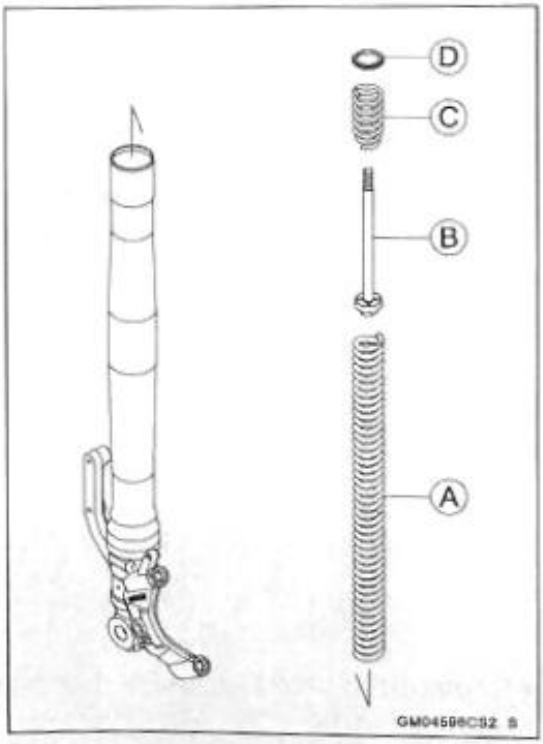
○Pull the handle slowly to pump out the excess oil until the oil no longer comes out.

★If no oil is pumped out, there is insufficient oil in the inner tube. Pour in enough oil, then pump out the excess oil as shown above.



Other than Spring Preload Adjuster Equipped Models

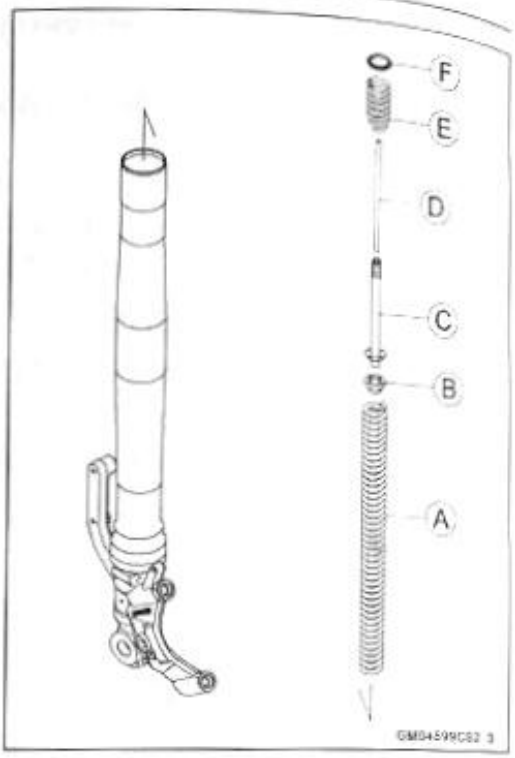
• Install:
Fork Spring [A]
Joint Rod [B]
Spring [C] (Smaller diameter faces downward.)
Stopper [D] (Corner side faces upward.)



Front Fork

Spring Preload Adjuster Equipped Models

- Install:
  Fork Spring [A]
  Spring Seat [B]
  Joint Rod [C]
  Spring Preload Adjuster Rod [D]
  Spring [E] (Smaller diameter faces downward.)
  Stopper [F] (Corner side faces upward.)

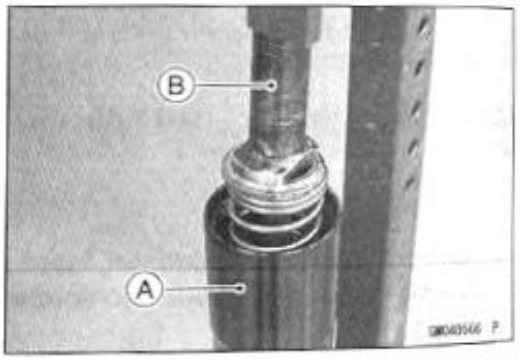


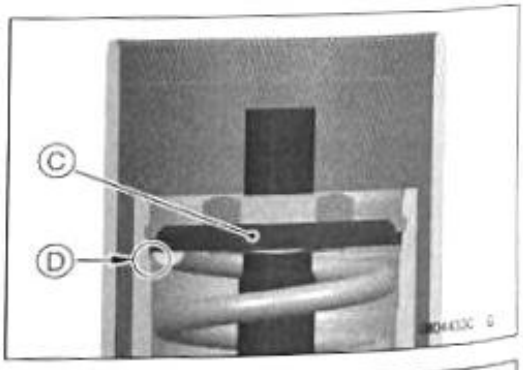
- Set the front fork [A] and adapter [B] to the fork spring compressor.
- Compress the fork spring with the available jack.

NOTE

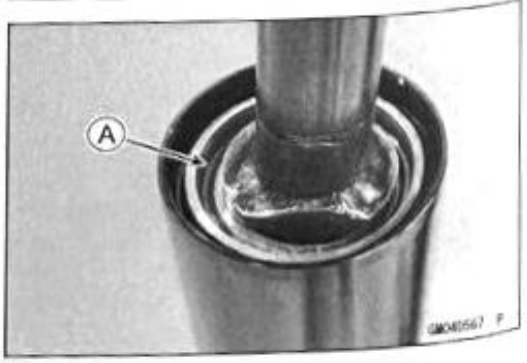
○Do not push down the stopper [C] below the steeped portion [D]. The front fork may be damaged.

Special Tools - Fork Spring Compressor: 57001-1771
Fork Spring Compressor Adapter: 57001 -1959



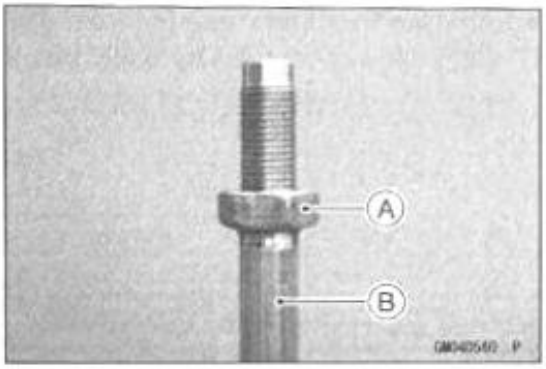


- Replace the circlip [A] with a new one, and install it.

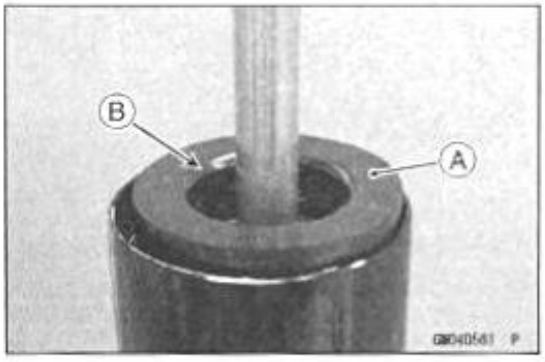


Front Fork

• Screw on the locknut [A] fully to the joint rod [B].



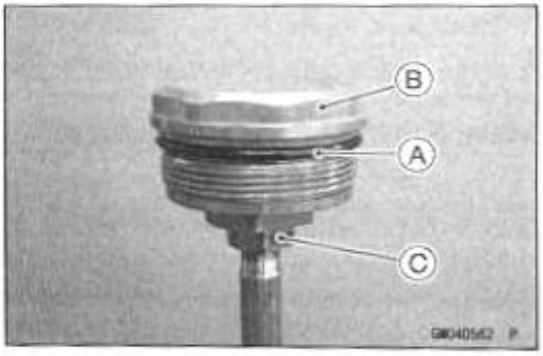
• Install the seat rubber [A] so that the corner side [B] faces upward.



• Replace the O-ring [A] with a new one.
• Install the top plug [B] to the joint rod.
• Holding the top plug with a wrench, tighten the locknut [C] against the top plug.

OPlace a plastic bag over the top plug to protect the top plug.

Special Tool - Top Plug Wrench, 41 mm: 57001-1940



• Temporary install the top plug to the outer tube.

OPlace a plastic bag over the top plug to protect the top plug.

Special Tool - Top Plug Wrench, 41 mm: 57001-1940

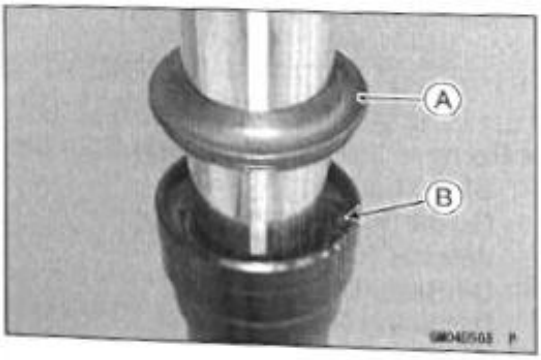
• Install the front fork (see Front Fork Installation (Each Fork Leg)(13-15)).

Front Fork Disassembly

Left Front Fork

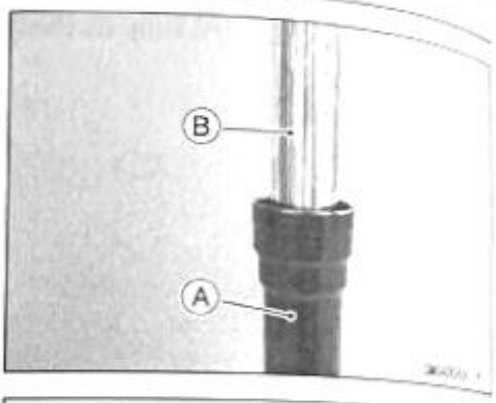
• Drain the fork oil (see Front Fork Oil Change(13-16)).
• Remove the dust seal [A] from the outer tube.
• Remove the circlip [B].

Special Tool - Inside Circlip Pliers: 57001-143

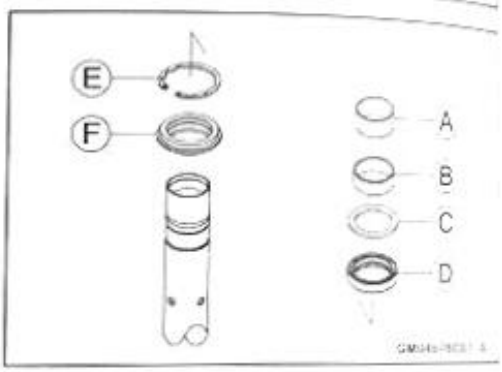


Front Fork

• Separate the outer tube [A] from the inner tube [B].
○Holding the outer tube by hand, pull the inner tube several times to pull out the outer tube.

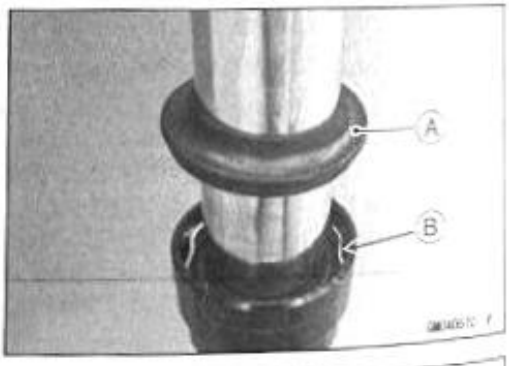


• Remove the following parts from the inner tube.
Slide Bushing [A]
Guide Bushing [B]
Washer [C]
Oil Seal [D]
Circlip [E]
Dust Seal [F]

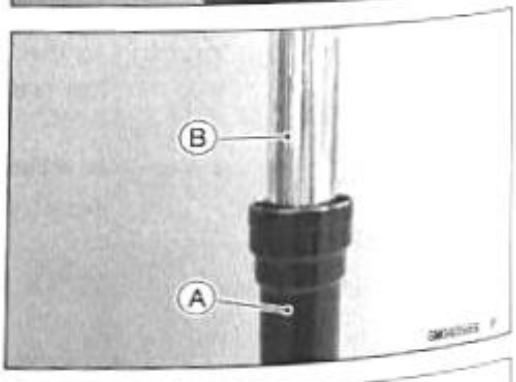


Right Front Fork

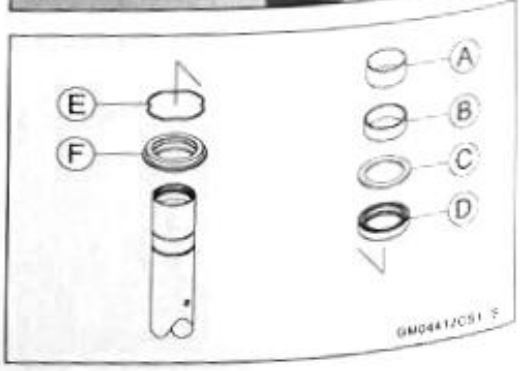
• Drain the fork oil (see Front Fork Oil Change(13-16)).
• Remove the dust seal [A] from the outer tube.
• Remove the retaining ring [B].



• Separate the outer tube [A] from the inner tube [B].
○Holding the outer tube by hand, pull the inner tube several times to pull out the outer tube.



• Remove the following parts from the inner tube.
Slide Bushing [A]
Guide Bushing [B]
Washer [C]
Oil Seal [D]
Retaining Ring [E]
Dust Seal [F]

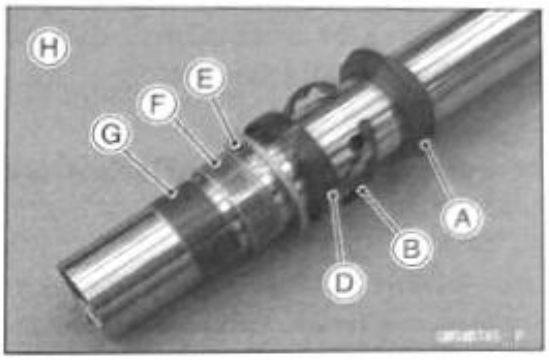


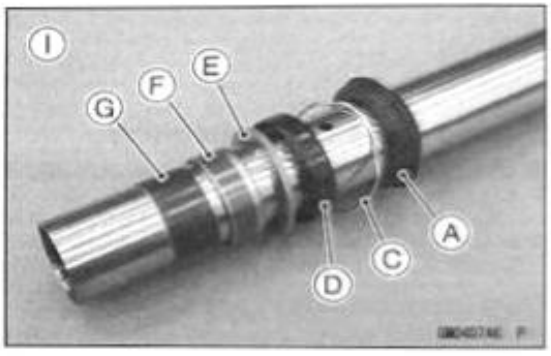
Front Fork

Front Fork Assembly

- Replace the following parts with new ones.
  - Piston Ring (Left Front Fork only)
  - Slide Bushing
  - Guide Bushing
  - Oil Seal
  - Circlip (Left Front Fork only)
  - Retaining Ring (Right Front Fork only)
  - Dust Seal

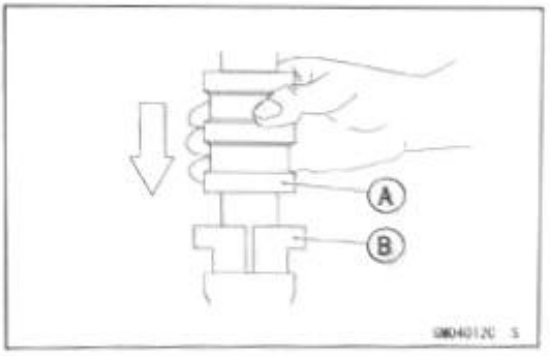
- Install the following parts onto the inner tube.
  - Dust Seal [A]
  - Circlip [B] (Left Front Fork only)
  - Retaining Ring [C] (Right Front Fork only)
  - Oil Seal [D]
  - Washer [E]
  - Guide Bushing [F]
  - Slide Bushing [G]
  - Left Front Fork [H]
  - Right Front Fork [I]
- Apply grease to the oil seal lip.





- Insert the inner tube to the outer tube.
- Press the oil seal by using the fork oil seal driver.

Special Tools - Fork Oil Seal Driver Weight, ϕ26 – ϕ46 [A]: 57001-1795
Fork Oil Seal Driver Attachment, ϕ36 – ϕ46 [B]: 57001-1798



- Install the circlip or retaining ring and dust seal.

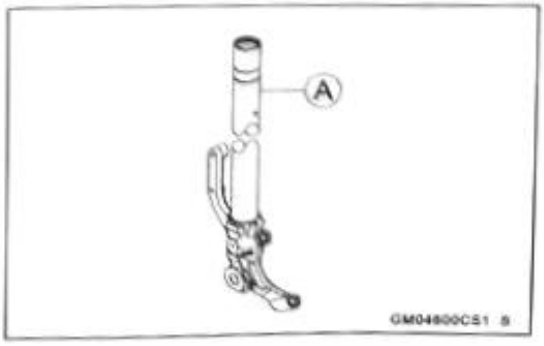
Special Tool - Inside Circlip Pliers: 57001-143

- Pour in the specified type of oil (see Front Fork Oil Change(13-16)).

Inner Tube Inspection

- Visually inspect the inner tube [A].

★If there is any damage, replace the inner tube. Since damage to the inner tube damages the oil seal and dust seal, replace the oil seal and dust seal whenever the inner tube is replaced.



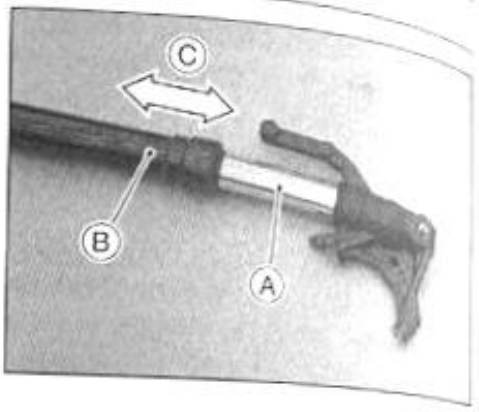
NOTICE

If the inner tube is badly bent or creased, replace it. Excessive bending, followed by subsequent straightening, can weaken the inner tube.

Front Fork

- Temporarily assemble the inner tube [A] and outer tube [B], and pump [C] them back and forth manually to check for smooth operation.

★If you feel binding or catching, the inner and outer tubes must be replaced.



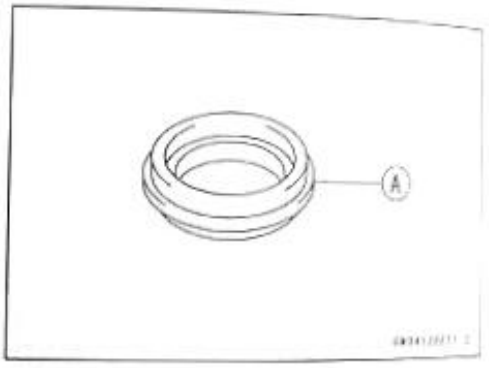
⚠ WARNING

A straightened inner or outer fork tube may fall in use, possibly causing an accident resulting in serious injury or death. Replace a badly bent or damaged inner or outer tube and inspect the other tube carefully before reusing it.

Dust Seal Inspection

- Inspect the dust seals [A] for any signs of deterioration or damage.

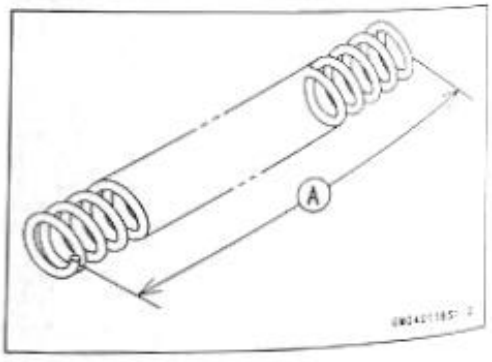
★Replace it if necessary.



Spring Tension Inspection

- Since a spring becomes shorter as it weakens, check its free length [A] to determine its condition.

★If the spring of either fork leg is shorter than the service limit, it must be replaced. If the length of a replacement spring and that of the remaining spring vary greatly, the remaining spring should also be replaced in order to keep the fork legs balanced for motorcycle stability.

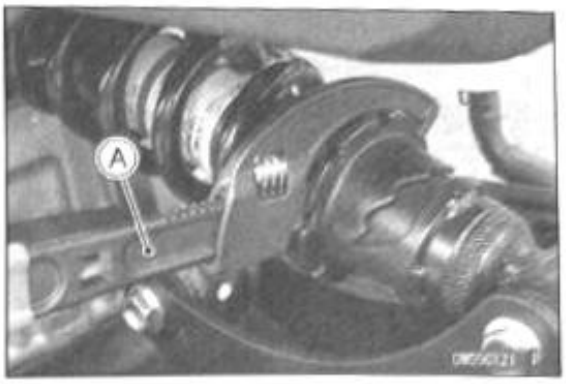


Fork Spring Free Length

Standard:	
Left	**344.8 mm (13.57 in.)**
Right:	
Other than Spring Preload Adjuster Equipped Models:	**538.8 mm (21.21 in.)**
Spring Preload Adjuster Equipped Models:	**521.5 mm (20.53 in.)**
Service Limit:	
Left	**338 mm (13.3 in.)**
Right:	
Other than Spring Preload Adjuster Equipped Models:	**529 mm (20.8 in.)**
Spring Preload Adjuster Equipped Models:	**512 mm (20.2 in.)**

Rear Shock Absorber

Spring Preload Adjustment (Other than Damping Force Adjusters Equipped Models)



- Using the adjustable hook wrench [A], turn the adjusting nut to adjust the spring preload.

○Remove the rear footpeg bracket if necessary.

○The standard adjuster setting is 2nd position.

Special Tool - Adjustable Hook Wrench: 57001-1863

Spring Preload Setting

Standard Position: **2nd position**

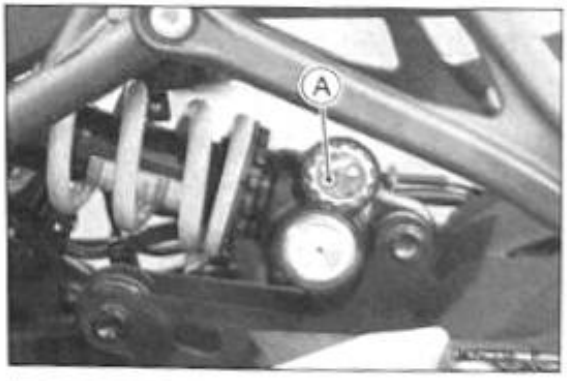
Adjustable Range: **1st – 5th position**

★If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Spring Preload Adjustment

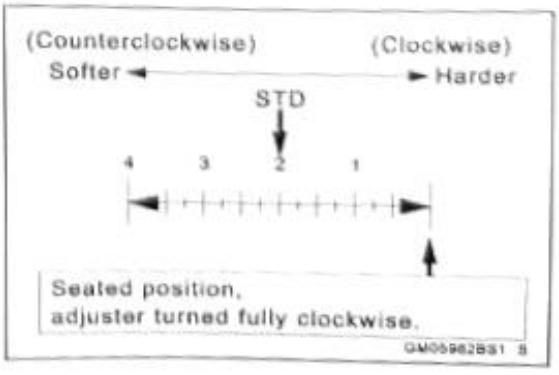
Adjuster Position	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Soft	Light	Good	Low
↑	↑	↑	↑	↑
↓	↓	↓	↓	↓
5th	Hard	Heavy	Bad	Highway

Rebound Damping Force Adjustment (Damping Force Adjusters Equipped Models)



- To adjust the rebound damping force, turn the rebound damping adjuster [A] to the desired position.

○The standard adjuster setting is the **2 turns out** from the fully clockwise position.



Rear Shock Absorber

Rebound Damping Force Adjustment

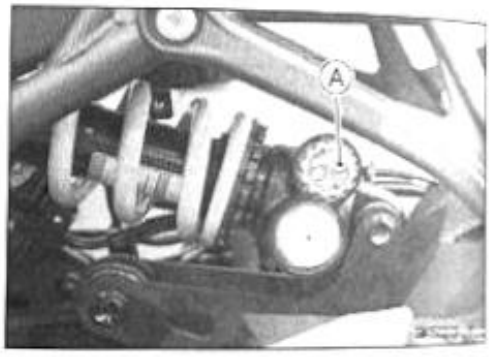
Adjuster Position	Damping Force	Setting	Load	Road	Speed
4 turns out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

NOTICE

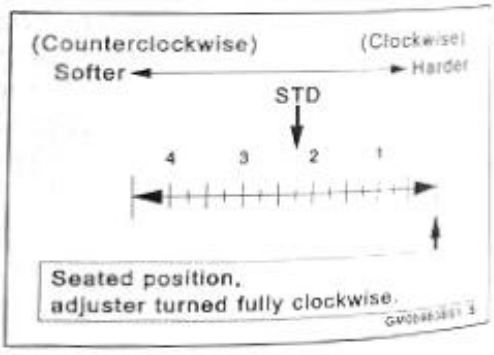
Do not force the rebound damping adjuster beyond the fully seated position, or the adjusting mechanism may be damaged.

Compression Damping Force Adjustment (Damping Force Adjusters Equipped Models)

- To adjust the compression damping force, turn the compression damping adjuster [A] to the desired position.



OThe standard adjuster setting is the **2 1/4 turn out** from the fully clockwise position.



Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road
4 1/2 turns out	Weak	Soft	Light	Good
↑	↑	↑	↑	↑
↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad

NOTICE

Do not force the compression damping adjuster beyond the fully seated position, or the adjusting mechanism may be damaged.

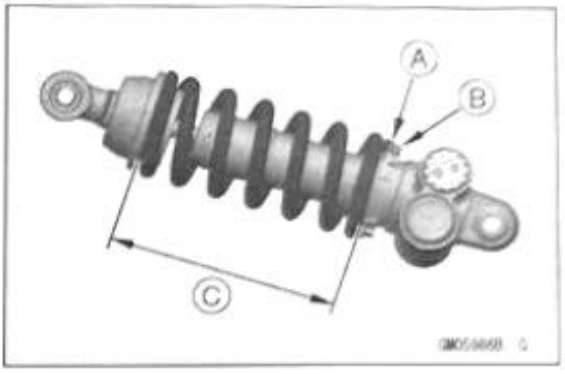
Rear Shock Absorber

Spring Preload Adjustment (Damping Force Adjusters Equipped Models)

- Remove the rear shock absorber from the frame (see Rear Shock Absorber Removal(13-31)).
- Loosen the locknut and turn out the adjusting nut to free the spring.

Special Tools - Hook Wrench T=3.2 R37: 57001-1539
Hook Wrench R=35: 57001-1580

- To adjust the spring preload, turn in the adjusting nut [A] to the desired position and tighten the locknut [B].
  Spring Length [C]



Spring Preload Setting

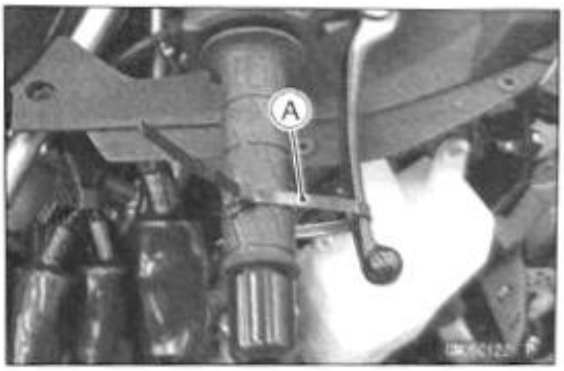
Standard:	**Spring length 162.7 mm (6.41 in.)**
Usable Range:	**Spring length 157.0 – 167.0 mm (6.181 – 6.575 in.)**

Spring Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
157.0 mm (6.181 in.)	Strong	Hard	Heavy	Bad	High
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
167.0 mm (6.575 in.)	Weak	Soft	Light	Good	Low

Rear Shock Absorber Removal

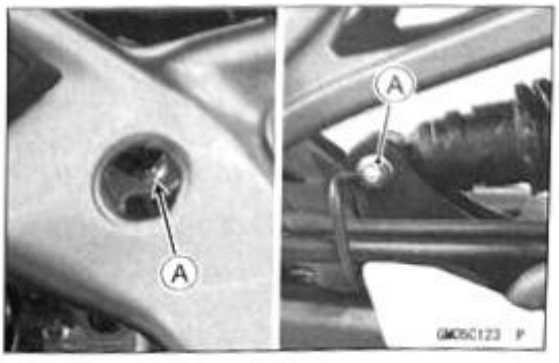
- Remove:
  Side Seat Covers (see Side Seat Cover Removal(15-28))
- Squeeze the brake lever slowly and hold it with a band [A].



⚠ WARNING

When raising the rear wheel off the ground and removing part(s) from the motorcycle, be sure to support the front of the motorcycle, or the motorcycle may fall over. It could cause an accident and injury.

- Loosen:
  Rear Shock Absorber Bolts and Nuts [A]



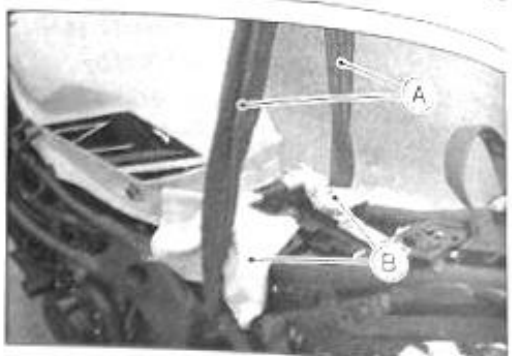
Rear Shock Absorber

- Raise the rear wheel off the ground with webbing slings [A].

○Hang the webbing slings to the frame.

○Protect the vehicle using suitable clothes [B].

- Remove:
  Upper Rear Shock Absorber Bolt and Nut
  Lower Rear Shock Absorber Bolt and Nut
  Rear Shock Absorber



Rear Shock Absorber Installation

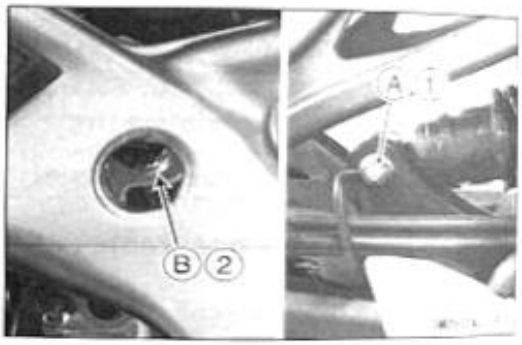
- Replace the rear shock absorber nuts with new ones.
- Install the rear shock absorber so that the warning label [A] faces leftward (Other than Damping Force Adjusters Equipped Models).
- Install the rear shock absorber so that the warning label faces downward (Damping Force Adjusters Equipped Models).
- Install the rear shock absorber bolts and nut temporarily.
- Remove the webbing slings.

NOTE

○*When tightening the rear shock absorber bolt and nut, lower the rear wheel to the ground.*

- Tighten the lower rear shock absorber bolt [A] and upper rear shock absorber nut [B] following the specified tightening sequence [1 – 2].

Torque - Lower Rear Shock Absorber Bolt: 34 N·m (3.5 kgf·m, 25 ft·lb)
Upper Rear Shock Absorber Nut: 34 N·m (3.5 kgf·m, 25 ft·lb)



- Install the removed parts.

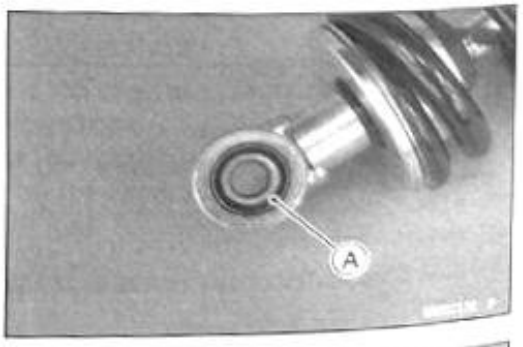
Rear Shock Absorber Inspection

- Remove the rear shock absorber (see Rear Shock Absorber Removal(13-31)).
- Visually inspect the following items.
  Oil Leakage
  Crack or Dent

★If there is any damage to the rear shock absorber, replace it.

- Visually inspect the rubber bushing [A].

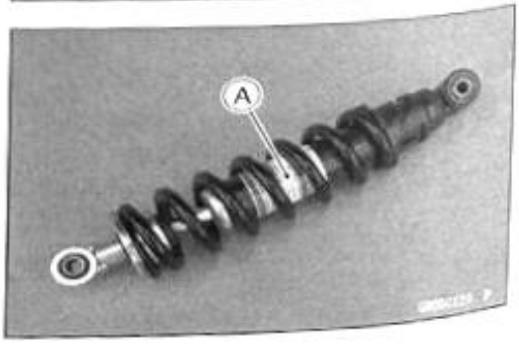
★If it show any signs of damage, replace it.



Rear Shock Absorber Scrapping

⚠ WARNING

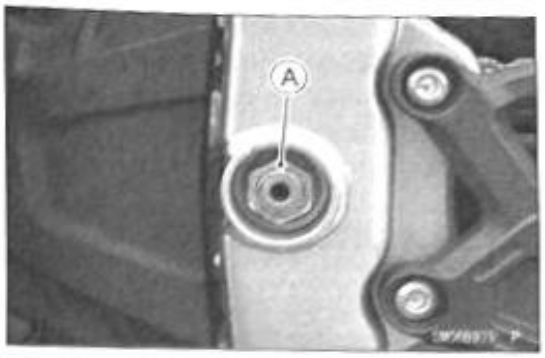
Since the rear shock absorber contains nitrogen gas, do not incinerate the rear shock absorber without first releasing the gas or it may explode. Before a rear shock absorber is scrapped, drill a hole at the point [A] shown to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



Swingarm

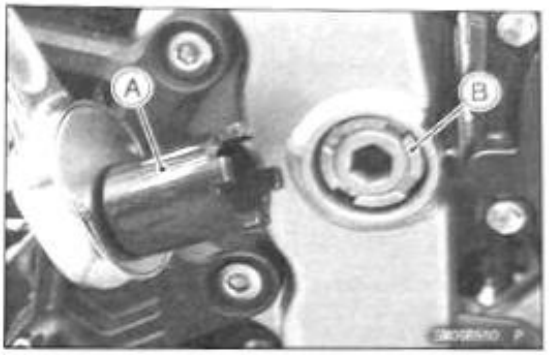
Swingarm Removal

- Loosen:
  Swingarm Pivot Shaft Nut [A]

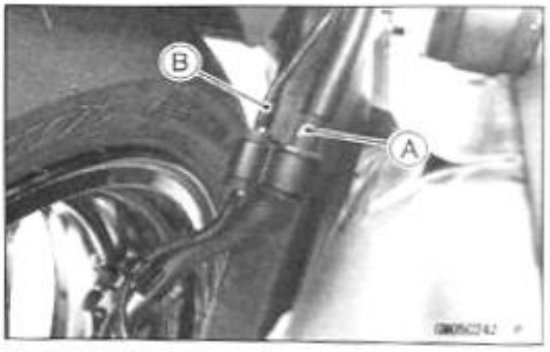


- Using the swingarm pivot nut wrench [A], loosen the swingarm pivot shaft locknut [B].

  Special Tool - Swingarm Pivot Nut Wrench: 57001-1943

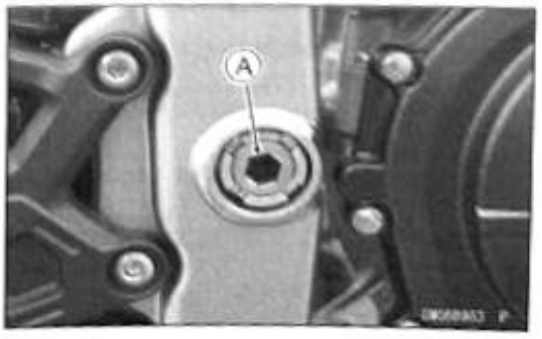


- Remove the brake hose [A] and rear wheel rotation sensor lead [B] from the swingarm.



- Remove:
  Mud Guard (see Mud Guard Removal(15-40))
  Rear Wheel (see Rear Wheel Removal(10-7))
  Rocker Arms (see Rocker Arm Removal(13-39))
  Brake Hose Clamp Bolt [A]
  Swingarm Pivot Shaft Nut

- Turn the swingarm pivot shaft [A] counterclockwise to free the swingarm pivot shaft from the adjusting collar.
  OMake the gap between the adjusting collar and swingarm.
- Pull out the swingarm pivot shaft to the right side and remove the swingarm.

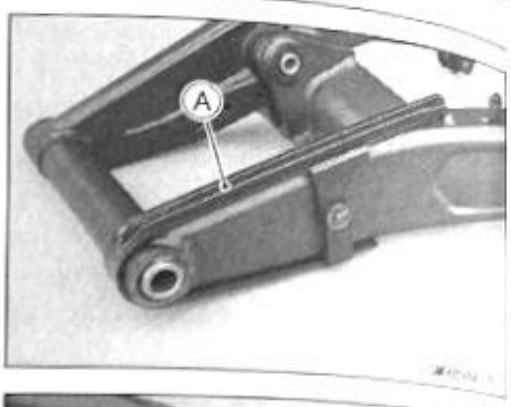


Swingarm

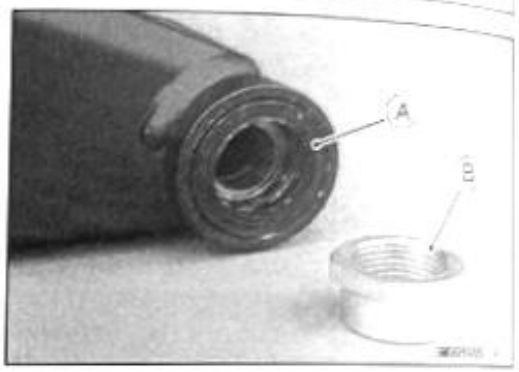
Swingarm Installation

- Visually inspect the chain guide [A].

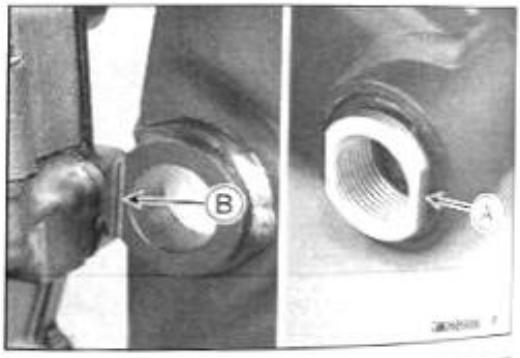
★Replace the chain guide if it shows any signs of abnormal wear or damage.



- Apply grease to the lips of the grease seals [A].
- Be sure to install the grease seals and sleeve to the swingarm.
- Fit the adjusting collar [B] on the grease seal of the right side.



- Place the flat portion [A] of the collar on the stopper [B] which is the inside of the frame.



- Insert the swingarm pivot shaft [A] from the right side.
- Tighten the swingarm pivot shaft until the clearance [B] between the adjusting collar [C] and the frame come to 0 mm.
- Loosen the swingarm pivot shaft once, and tighten the swingarm pivot shaft.

Torque - Swingarm Pivot Shaft: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Tighten the swingarm pivot shaft locknut [D], using the swingarm pivot nut wrench.

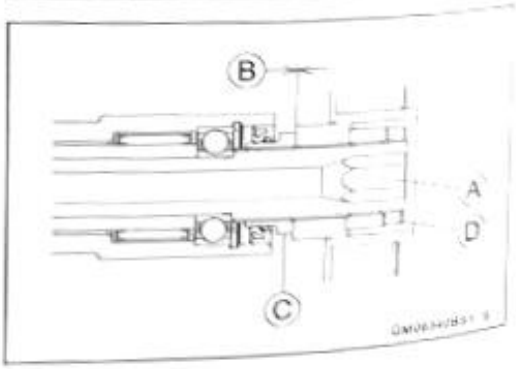
Special Tool - Swingarm Pivot Nut Wrench: 57001-1943

Torque - Swingarm Pivot Shaft Locknut: 98 N·m (10 kgf·m, 72 ft·lb)

- Tighten:

Torque - Swingarm Pivot Shaft Nut: 98 N·m (10 kgf·m, 72 ft·lb)

- Move the swingarm up and down to check for abnormal friction.



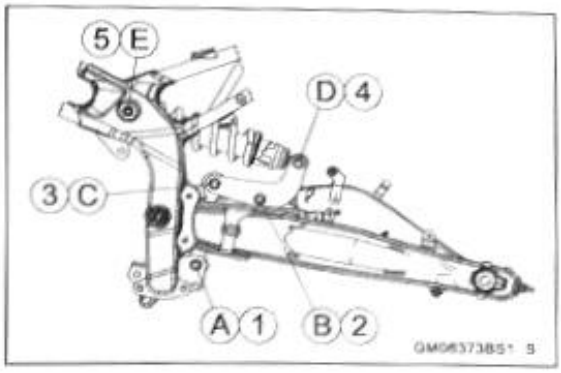
Swingarm

- If loosen or removed the following bolts and nuts, note the following.

○Replace the rear shock absorber nuts, the tie-rod nuts and the rocker arm nut with the new ones.

○Tighten the bolts and nuts following the specified tightening sequence [1 – 5].

Torque - Tie-Rod Bolt (L = 63 mm)[A]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Rocker Arm Bolt [B]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Tie-Rod Bolt (L = 70 mm)[C]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Lower Rear Shock Absorber Bolt [D]: 34 N·m (3.5 kgf·m, 25 ft·lb)
Upper Rear Shock Absorber Nut [E]: 34 N·m (3.5 kgf·m, 25 ft·lb)

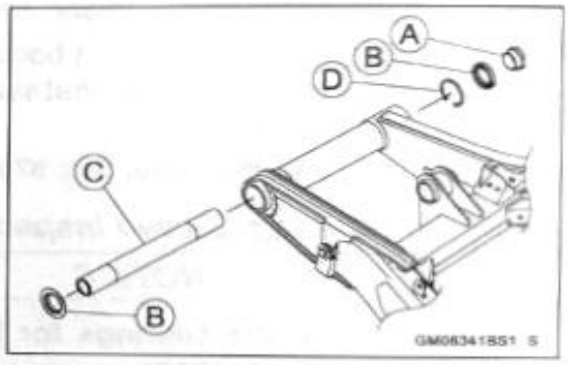


- Install the removed parts.

Swingarm Bearing Removal

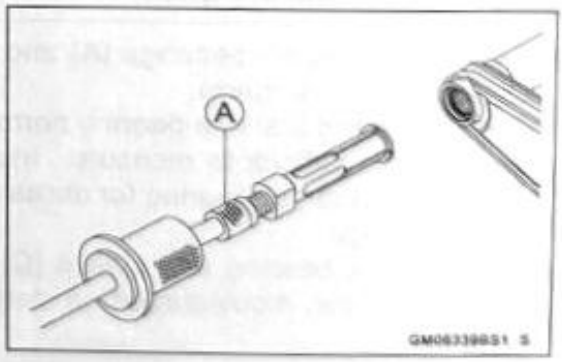
- Remove:
  Swingarm (see Swingarm Removal(13-33))
  Adjusting Collar [A]
  Grease Seals [B]
  Sleeve [C]
  Circlip [D] (Right Side)

Special Tool - Inside Circlip Pliers: 57001-143



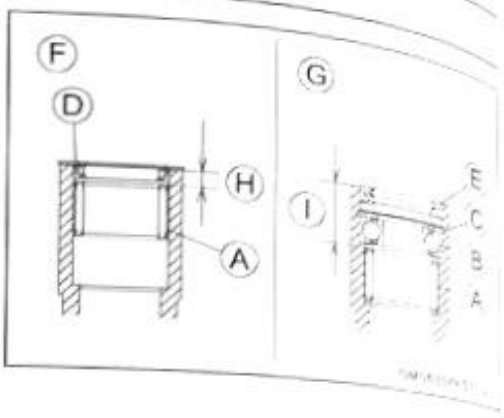
- Remove the ball bearing and needle bearings.

Special Tool - Oil Seal & Bearing Remover [A]: 57001-1058



Swingarm

Swingarm Bearing Installation



- Replace the needle bearings [A], ball bearing [B], circlip [C] and grease seals [D] [E] with new ones.
- Install the needle bearings, ball bearing, grease seals and circlip as shown.
  Left Side [F]
  Right Side [G]
  5.7 ±0.4 mm (0.22 ±0.02 in.) [H]
  22.5 ±0.4 mm (0.886 ±0.02 in.) [I]

NOTE

○*Install the needle and ball bearings so that the marked side faces out.*

○Press in the ball bearing until it bottomed.

Special Tool - Bearing Driver Set: 57001-1129

○Install the circlip.

Special Tool - Inside Circlip Pliers: 57001-143

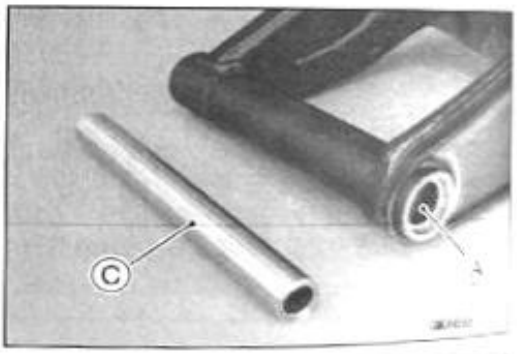
○Press the grease seal [D] until it bottomed.

○Press in the grease seal [E] so that seal surface is flushed with the end of housing.

Special Tool - Bearing Driver Set: 57001-1129

Swingarm Bearing, Sleeve Inspection

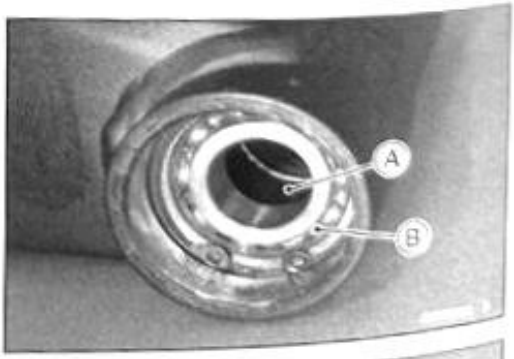
NOTICE
Do not remove the bearings for inspection. Removal may damage them.



- Inspect the needle bearings [A] and ball bearing [B] installed in the swingarm.

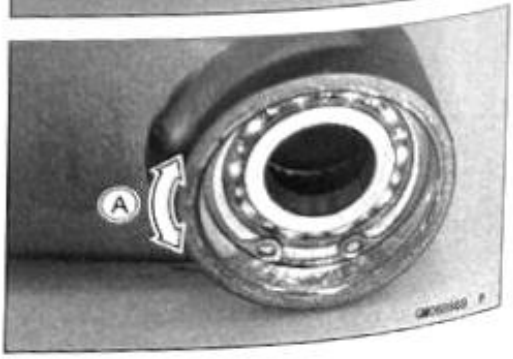
○The rollers and ball in a bearing normally wear very little, and wear is difficult to measure. Instead of measuring, visually inspect the bearing for abrasion, discoloration, or other damage.

★If the needle bearing and sleeve [C] show any signs of abnormal wear, discoloration, or damage, replace them as a set.



- Turn the bearing in the swingarm back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.



Swingarm

Swingarm Bearing Lubrication

NOTE

○Since the needle bearings are packed with grease and sealed, lubrication is not required.

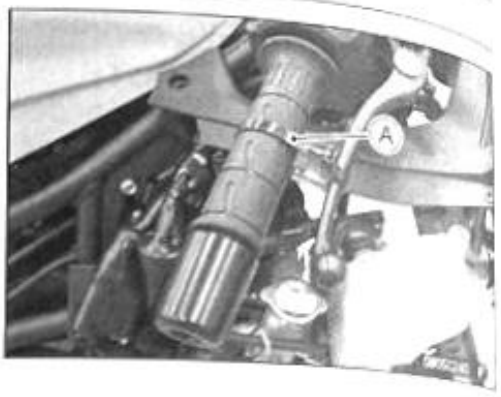
- For ball bearing, using a high flash-point solvent, clean the old grease out of the bearing.
- Apply plenty of grease to the ball bearing.

Chain Guide Inspection

- Refer to the Chain Guide Wear Inspection (see Chain Guide Wear Inspection(2-41)).

Tie-Rod, Rocker Arm

Tie-Rod Removal

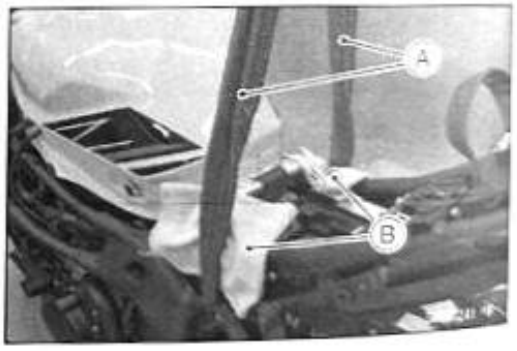


- Remove:
  Side Seat Covers (see Side Seat Cover Removal(15-28))
- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

When raising the rear wheel off the ground and removing part(s) from the motorcycle, be sure to support the front of the motorcycle, or the motorcycle may fall over. It could cause an accident and injury.

- Loosen:
  Tie-Rod Bolts [A] and Nuts



- Raise the rear wheel off the ground with webbing slings [A].

○Hang the webbing slings to the frame as shown.
○Protect the vehicle using suitable clothes [B].

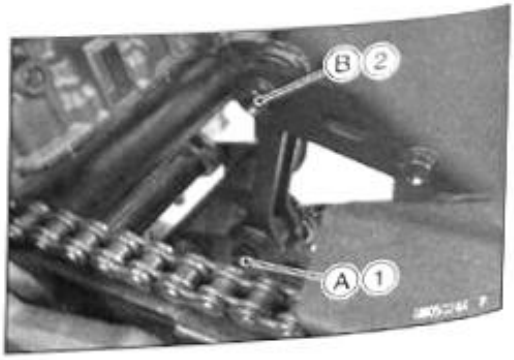
- Remove:
  Tie-Rod Bolts and Nuts
  Tie-Rod

Tie-Rod Installation

- Apply grease to the inside of the grease seals.
- Replace the tie-rod nuts with new ones.
- Install the tie-rod, bolts and nuts temporarily.
- Remove the webbing slings.

NOTE

○*When tightening the tie-rod bolts and nuts, lower the rear wheel to the ground.*



- Tighten the tie-rod bolts following the specified tightening sequence [1 – 2].

Torque - Tie-Rod Bolts (L = 63 mm) [A]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Tie-Rod Bolts (L = 70 mm) [B]: 44 N·m (4.5 kgf·m, 32 ft·lb)

Tie-Rod, Rocker Arm

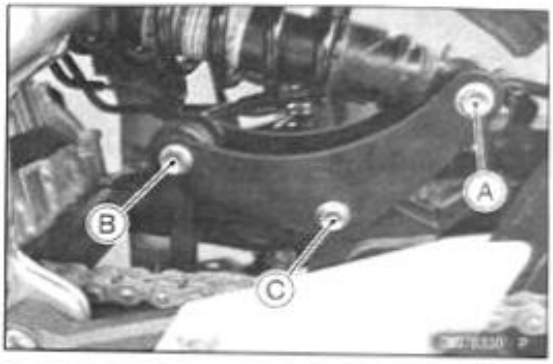
Rocker Arm Removal

- Remove:
  Side Seat Covers (see Side Seat Cover Removal(15-28))
- Squeeze the brake lever slowly and hold it with a band [A].

⚠ WARNING

When raising the rear wheel off the ground and removing part(s) from the motorcycle, be sure to support the front of the motorcycle, or the motorcycle may fall over. It could cause an accident and injury.

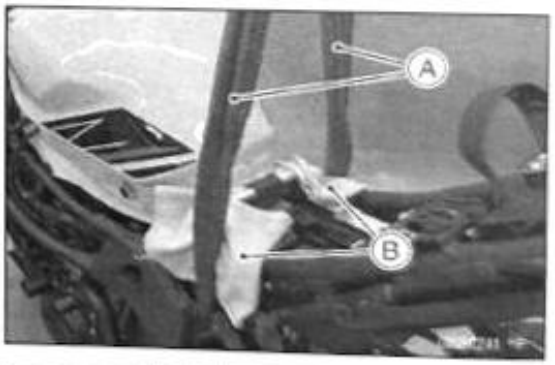
- Remove:
  Mud Guard (see Mud Guard Removal(15-40))
- Loosen:
  Lower Rear Shock Absorber Bolt [A] and Nut
  Upper Tie-Rod Bolt [B] and Nut
  Rocker Arm Bolt [C] and Nut



- Raise the rear wheel off the ground with webbing slings [A].

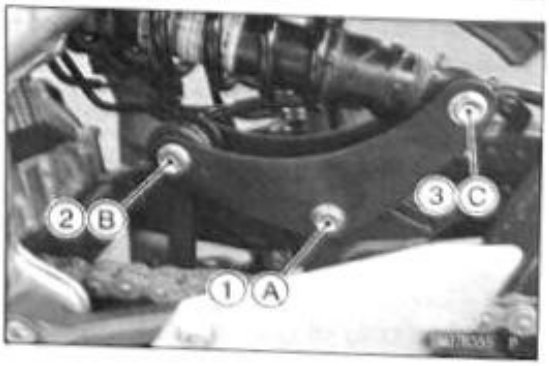
○Hang the webbing slings to the frame as shown.
○Protect the vehicle using suitable clothes [B].

- Remove:
  Lower Rear Shock Absorber Bolt and Nut
  Upper Tie-Rod Bolt and Nut
  Rocker Arm Bolt and Nut
  Rocker Arms



Rocker Arm Installation

- Apply grease to the inside of the grease seals.
- Replace the following nuts with new ones.
  Lower Rear Shock Absorber Nut
  Upper Tie-Rod Nut
  Rocker Arm Nut
- Install the rocker arms, bolts and nuts temporarily.
- Remove the webbing slings.



NOTE

○*When tightening the bolts and nuts, lower the rear wheel to the ground.*

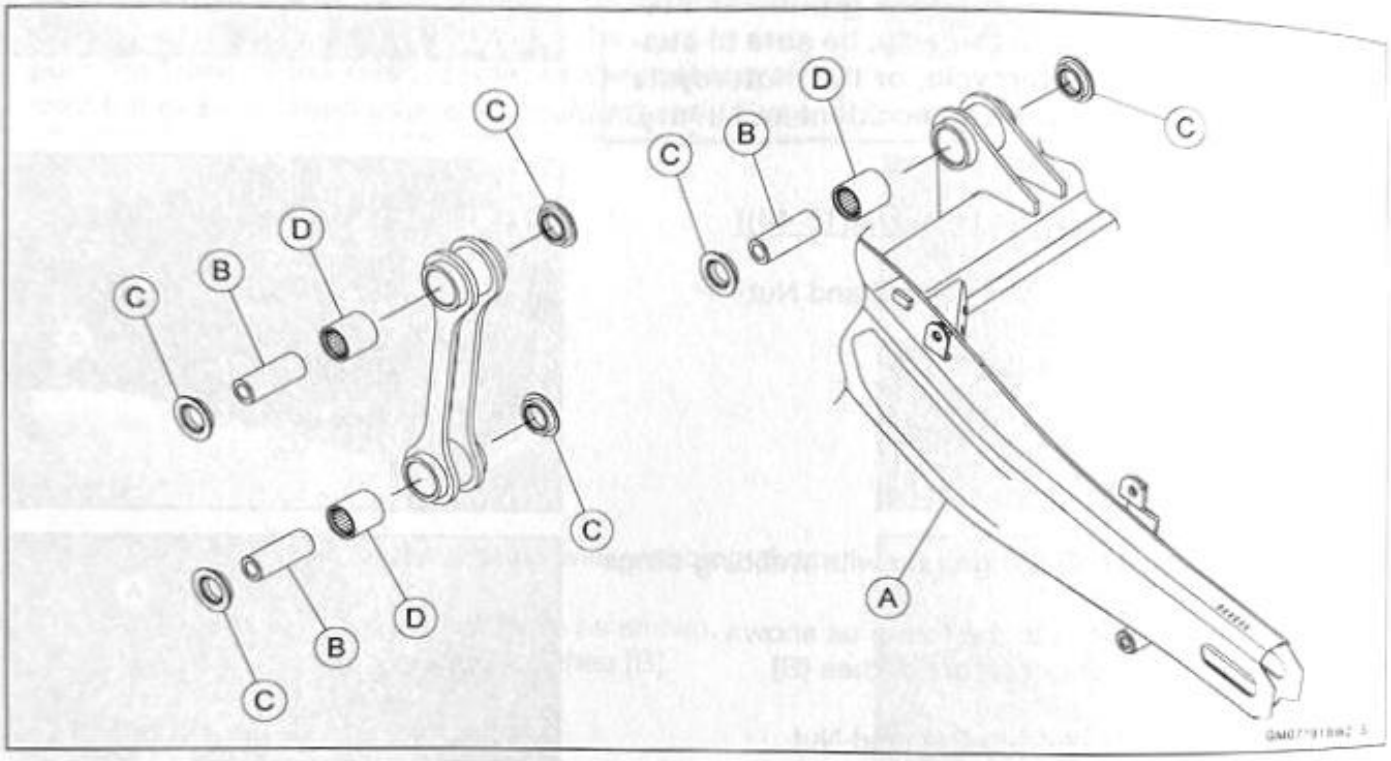
- Tighten the bolts following the specified tightening sequence [1 – 3].

Torque - Rocker Arm Bolt [A]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Tie-Rod Bolt [B]: 44 N·m (4.5 kgf·m, 32 ft·lb)
Lower Rear Shock Absorber Bolt [C]: 34 N·m (3.5 kgf·m, 25 ft·lb)

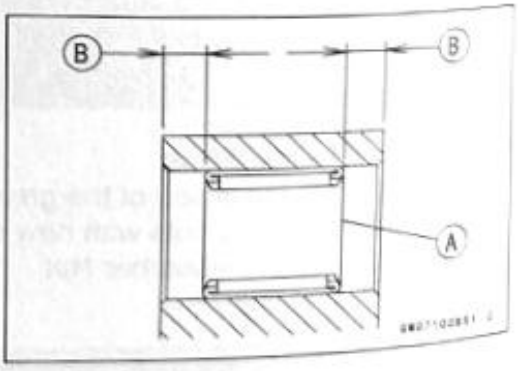
Tie-Rod, Rocker Arm

Tie-Rod and Rocker Arm Bearing Removal

- Remove:
  Tie-Rod (see Tie-Rod Removal(13-38))
  Rocker Arms (see Rocker Arm Removal(13-39))
  Swingarm [A] (see Swingarm Removal(13-33))
  Sleeves [B]
  Grease Seals [C]
- Remove the needle bearings [D], using a suitable tool.



Tie-Rod and Rocker Arm Bearing Installation



- Replace the needle bearing [A] and grease seals with new ones.
- Install the needle bearings position as shown.

○Screw the needle bearing driver into the driver holder.
○Insert the needle bearing driver into the needle bearing and press the needle bearing.
7.5 ±0.4 mm (0.30 ±0.02 in.) [B]

Special Tools - Bearing Driver Set: 57001-1129
Needle Bearing Driver, ϕ17/ϕ18: 57001-1609

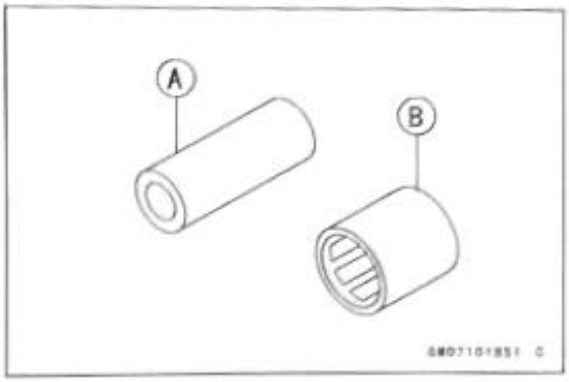
- Apply plenty of grease to the lips of the grease seals.
- Install the grease seals.

Tie-Rod, Rocker Arm

Rocker Arm/Tie-Rod Bearing, Sleeve Inspection

NOTICE

Do not remove the bearings for inspection. Removal may damage them.



- Visually inspect the rocker arm, or tie-rod sleeves [A] and needle bearings [B].
- The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of any of the needle bearings or sleeve, replace the sleeve and needle bearings as a set.

Rocker Arm/Tie-Rod Bearing Lubrication

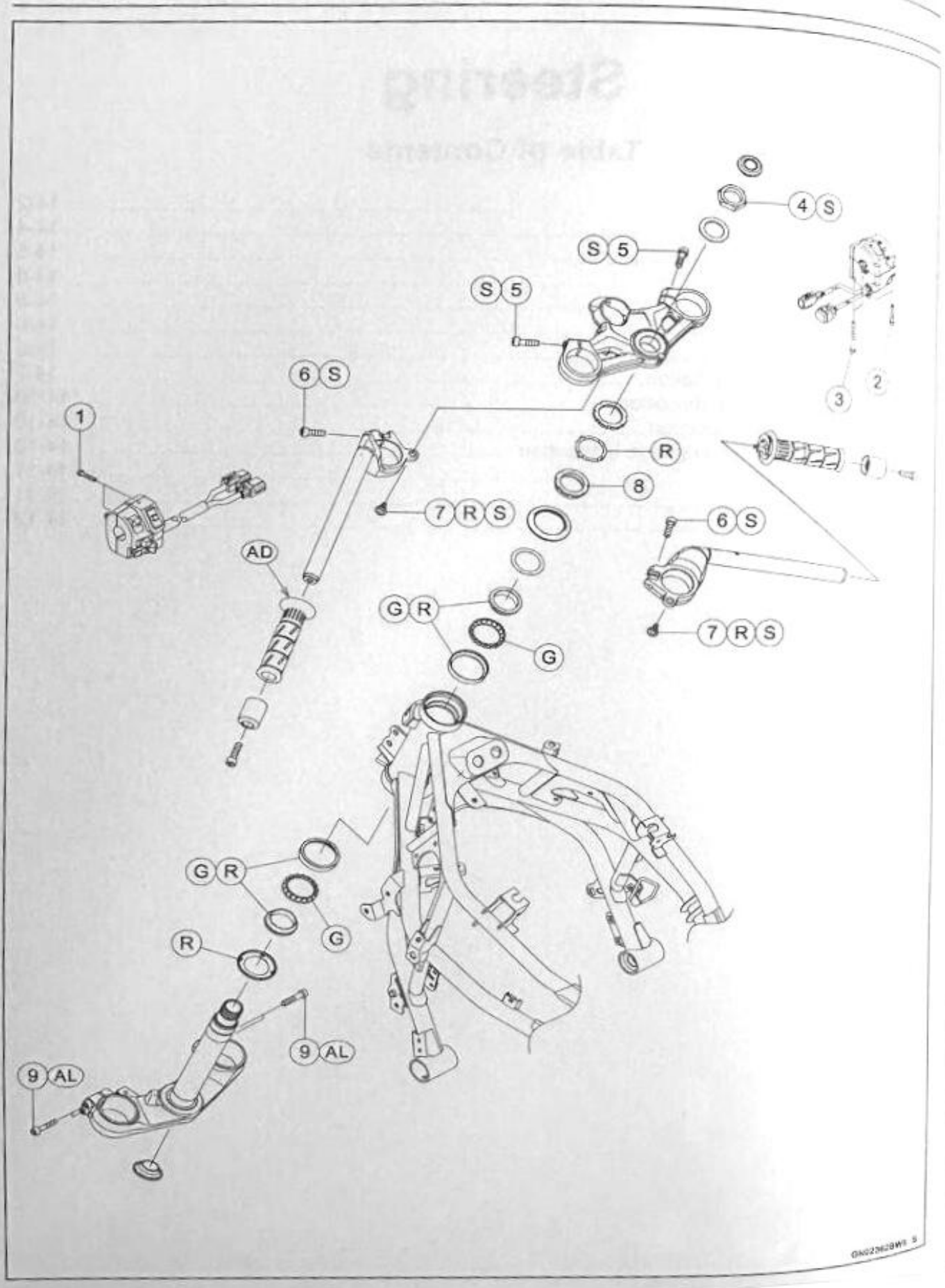
NOTE

○*Since the bearings are packed with grease, lubrication is not required.*

Steering

Table of Contents

Exploded View



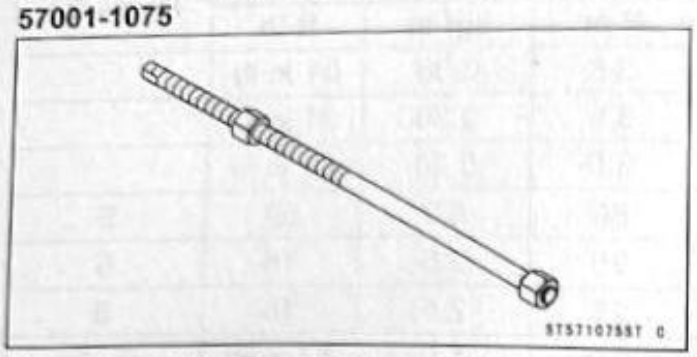
Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Switch Housing Screws	3.5	0.36	31 in·lb	
2	Switch Housing Bolt (L = 30 mm)	3.5	0.36	31 in·lb	
3	Switch Housing Bolt (L = 50 mm)	3.5	0.36	31 in·lb	
4	Steering Stem Head Nut	80	8.2	59	S
5	Upper Front Fork Clamp Bolts	25	2.5	18	S
6	Handlebar Clamp Bolts	25	2.5	18	S
7	Handlebar Positioning Bolts	9.8	1.0	87 in·lb	R, S
8	Steering Stem Nut	20	2.0	15	
9	Lower Front Fork Clamp Bolts	23	2.3	17	AL

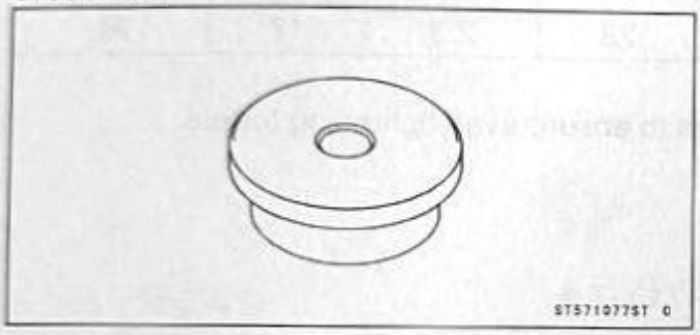
AD: Apply adhesive.
AL: Tighten the two clamp bolts alternately two times to ensure even tightening torque.
G: Apply grease.
R: Replacement Parts
S: Follow the specified tightening sequence.

Special Tools

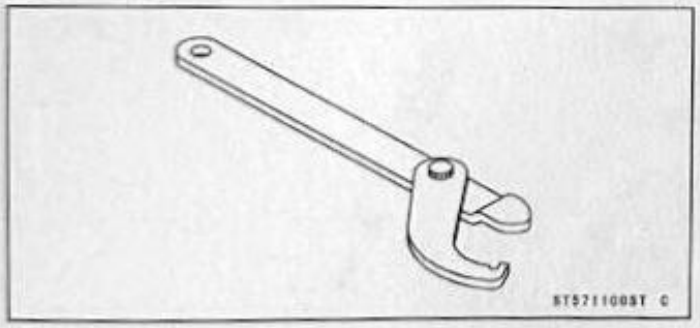
Head Pipe Outer Race Press Shaft:
57001-1075



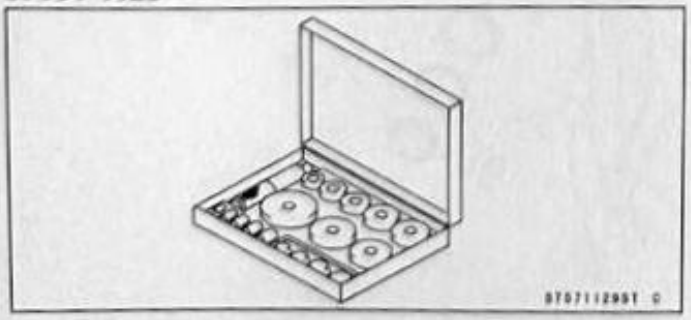
Head Pipe Outer Race Driver, φ54.5:
57001-1077



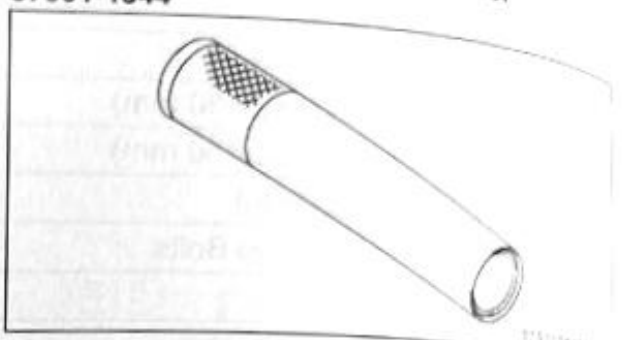
Steering Stem Nut Wrench:
57001-1100



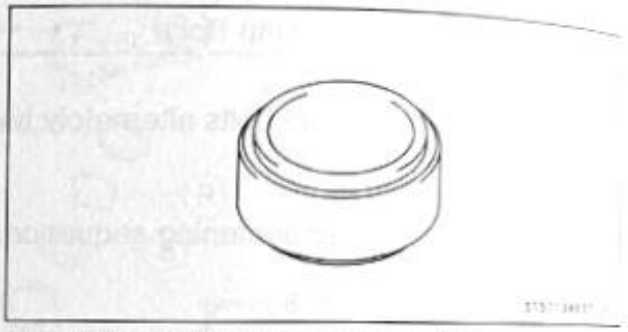
Bearing Driver Set:
57001-1129



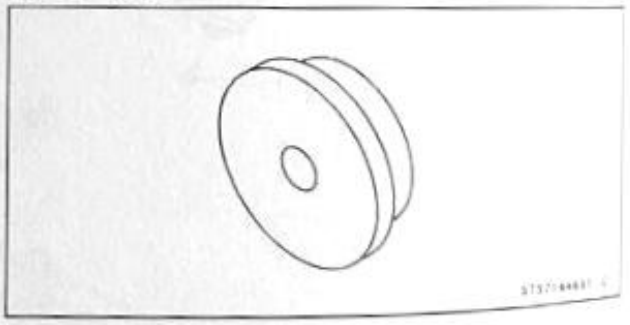
Steering Stem Bearing Driver, φ42.5:
57001-1344



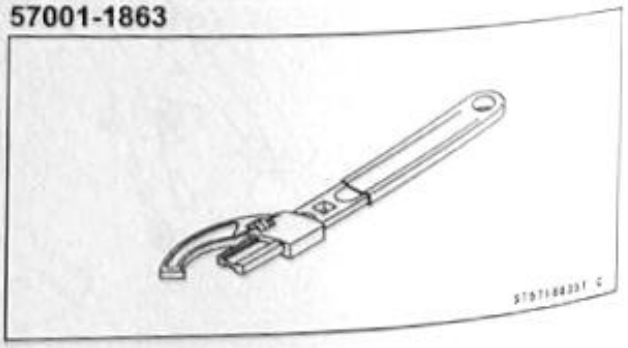
Steering Stem Bearing Driver Adapter, φ41.5:
57001-1345



Head Pipe Outer Race Driver, φ55:
57001-1446



Adjustable Hook Wrench:
57001-1863



Steering

Steering Inspection

- Refer to the Steering Play Inspection (see Steering Play Inspection(2-55)).

Steering Adjustment

- Refer to the Steering Play Adjustment (see Steering Play Adjustment(2-56)).

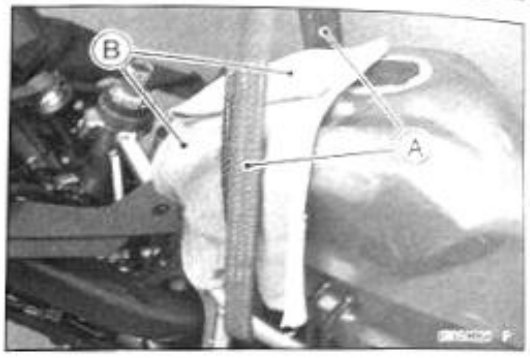
Steering Stem

Stem, Stem Bearing Removal

- Remove:
  Upper Fairing (see Upper Fairing Removal(15-21))
  Steering Stem Head with Handlebars (see Handlebar Removal(14-11))
  Front Forks (see Front Fork Removal (Each Fork Leg)(13-14))
  Brake Hose Fitting Bolt [A] (see Brake Hose and Pipe Replacement(2-46))
  Bolt [B]

- Hang the motorcycle with webbing slings [A].

○Hang the webbing slings to the frame as shown.
○Protect the vehicle using suitable clothes [B].



- Bend the claws [A] of the claw washer straight.
- Remove the steering stem locknut [B].

Special Tools - Steering Stem Nut Wrench: 57001-1100 or Adjustable Hook Wrench: 57001-1863

- Remove the claw washer.

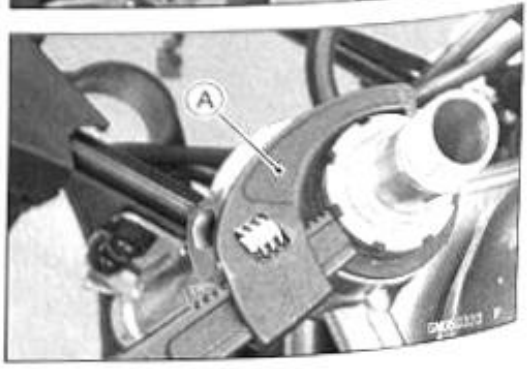
- Pushing up the stem base, and remove the steering stem nut [A].

Special Tool - Steering Stem Nut Wrench [B]: 57001-1100

○You may remove the steering stem nut using the adjustable hook wrench [A].

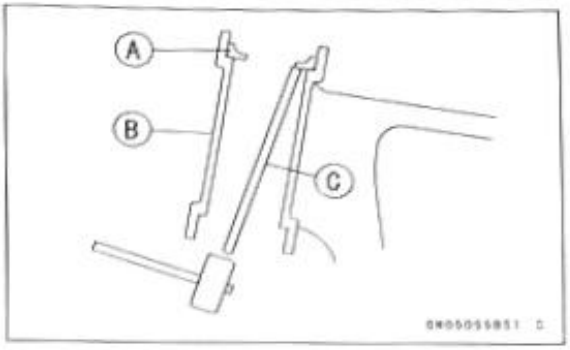
Special Tool - Adjustable Hook Wrench: 57001-1863

- Remove:
  Steering Stem
  Stem Cap
  Washer
  Upper Ball Bearing Inner Race
  Upper Ball Bearing



Steering Stem

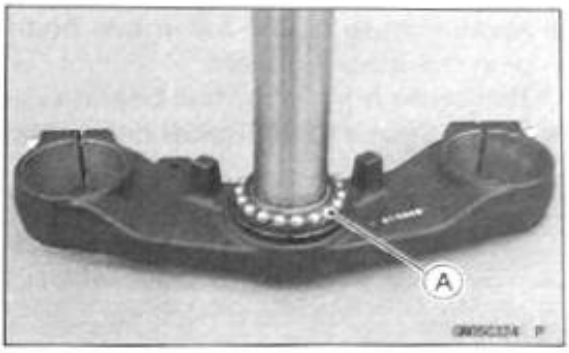
• To remove the ball bearing outer races [A] pressed into the head pipe [B], insert a bar [C] into the recesses of head pipe, and applying it to both recess alternately hammer it to drive the race out.



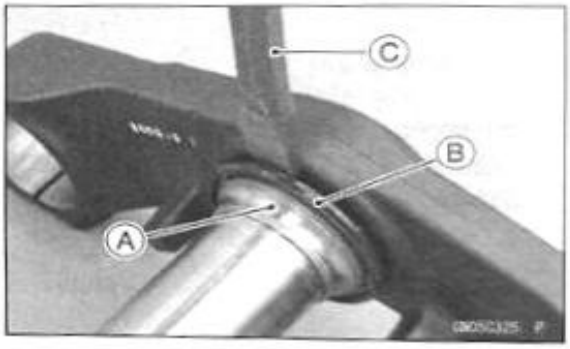
NOTE

If either steering stem bearing is damaged, it is recommended that both the upper and lower bearings (including outer races) should be replaced with new ones.

• Remove the lower ball bearing [A] from the steering stem.



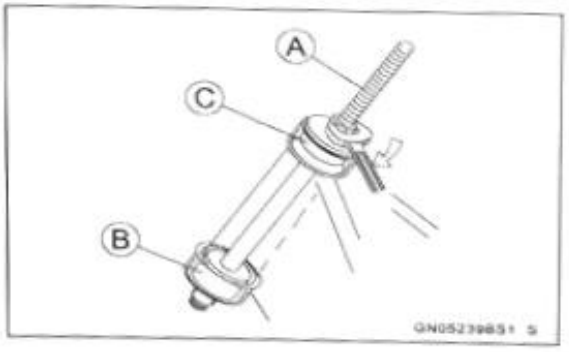
• Remove the lower bearing inner race [A] and grease seal [B] with a suitable commercially available chisel [C].



Stem, Stem Bearing Installation

• Replace the bearing outer races with new ones.
• Drive them into the head pipe at the same time.

Special Tools - Head Pipe Outer Race Press Shaft [A]: 57001-1075
Head Pipe Outer Race Driver, ϕ54.5 [B]: 57001-1077
or Bearing Driver Set: 57001-1129
Head Pipe Outer Race Driver, ϕ55 [C]: 57001 -1446

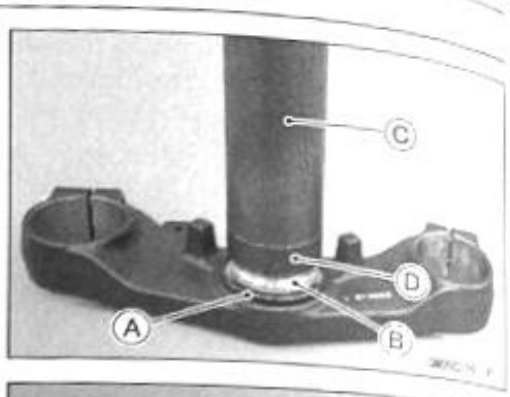


• Apply grease to the outer races.

Steering Stem

- Replace the bearing inner races and grease seal [A] with new ones.
- Install the grease seal on the steering stem, and press the lower ball bearing inner race [B] applied the grease onto the stem.

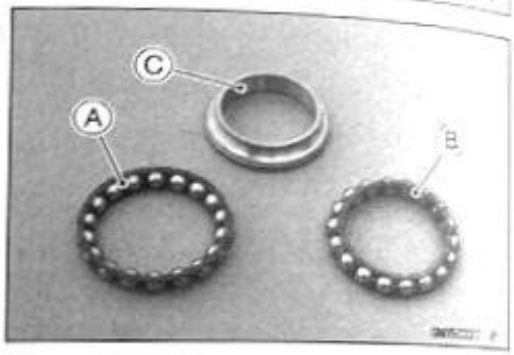
Special Tools - Steering Stem Bearing Driver, ϕ42.5 [C]: 57001-1344
Steering Stem Bearing Driver Adapter, ϕ41.5 [D]: 57001-1345



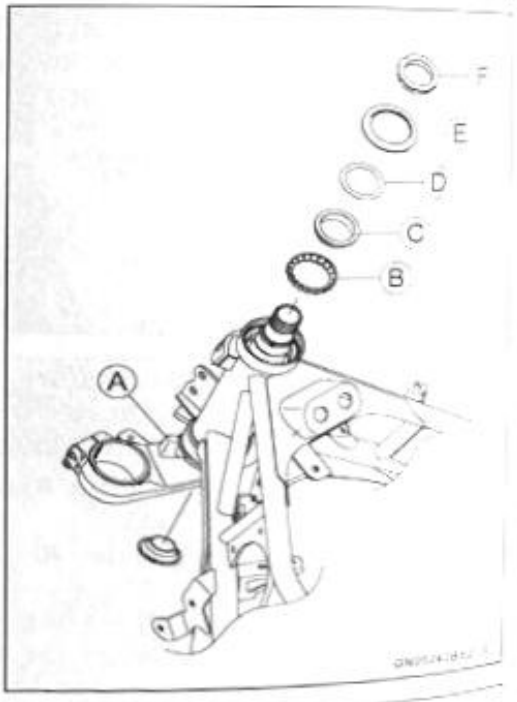
- Apply grease to the lower ball bearing [A], and install it onto the steering stem.

○The lower and upper ball bearings are identical.

- Apply grease to the upper ball bearing [B] and inner race [C].



- Install:
  Steering Stem [A]
  Upper Ball Bearing [B]
  Inner Race [C]
  Washer [D]
  Stem Cap [E]
  Steering Stem Nut [F]



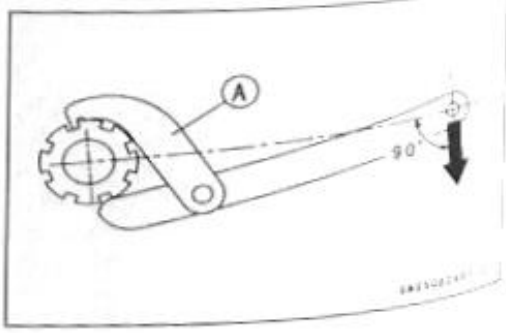
- Settle the bearings in place as follows.

○Tighten the steering stem nut with **55 N·m (5.6 kgf·m, 41 ft·lb)** of torque first, and loosen it a fraction of a turn until it turns lightly. Afterward tighten it again with specified torque using a steering stem nut wrench [A].

○Check that there is no play and the steering stem turns smoothly without rattles. If not, the steering stem bearings may be damaged.

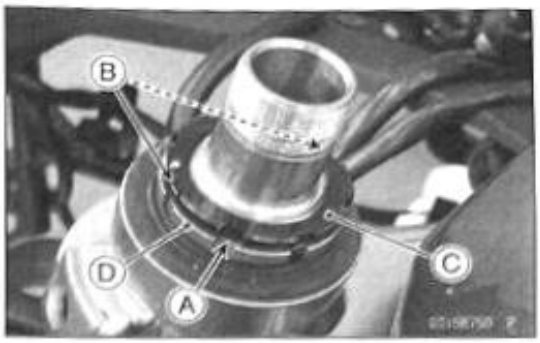
Special Tools - Steering Stem Nut Wrench: 57001-1100 or Adjustable Hook Wrench: 57001-1863

Torque - Steering Stem Nut: 20 N·m (2.0 kgf·m, 15 ft·lb)



Steering Stem

- Replace the claw washer [A] with a new one.
- Install the claw washer so that its bent claws [B] faces upward, and engage the bent claws with the grooves of steering stem locknut [C].
- Hand tighten the steering stem locknut until it contacts against the claw washer.
- Check if the grooves of the steering stem locknut aligns with the grooves of the steering stem nut [D].

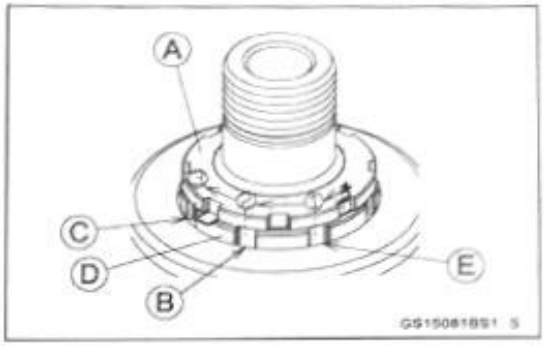


In case of the claws positioned between the grooves:

- Tighten the steering stem locknut [A] until the straight claws aligned with second [B] or 3rd groove [C] of the steering stem nut [D].

○Count the number of groove from the **first** aligned groove [E] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.

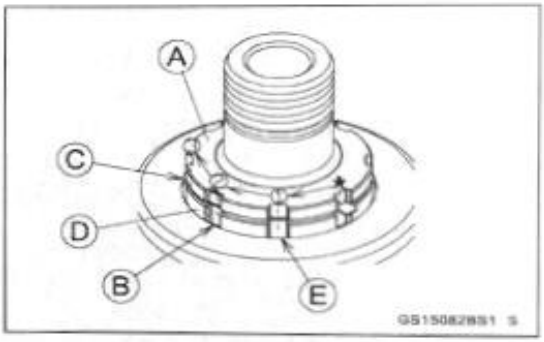


In case of the claws aligned with the grooves:

- Tighten the steering stem locknut [A] until the straight claws aligned with second [B] or 3rd groove [C] of the steering stem nut [D].

○Count the number of groove from the **next** aligned groove [E] as shown.

- Bend the two straight claws downward into the groove of the steering stem nut.



Steering Stem

- Install the stem head.
- Install the washer, and temporary tighten the stem head nut.
- Install the front forks (see Front Fork Installation (Each Fork Leg)(13-15)).

NOTE

○*Tighten the steering stem head nut first, next the upper front fork clamp bolts, last the lower front fork clamp bolts.*

○*Tighten the two lower front fork clamp bolts alternately two times to ensure even tightening torque.*

Torque - Steering Stem Head Nut: 80 N·m (8.2 kgf·m, 59 ft·lb)
Upper Front Fork Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Lower Front Fork Clamp Bolts: 23 N·m (2.3 kgf·m, 17 ft·lb)
Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

⚠ WARNING

If the handlebars do not turn to the steering stop, they may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section (18-2)).

- Install the removed parts.

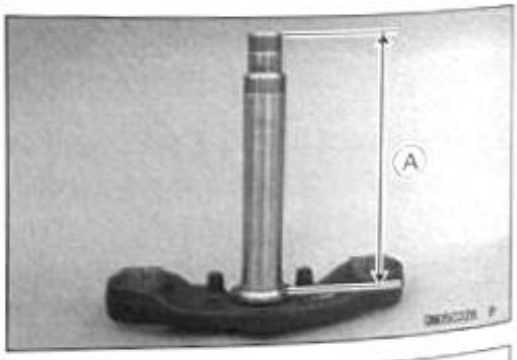
Steering Stem Bearing Lubrication

- Refer to the Steering Stem Bearing Lubrication (see Steering Stem Bearing Lubrication(2-57)).

Steering Stem Warp Inspection

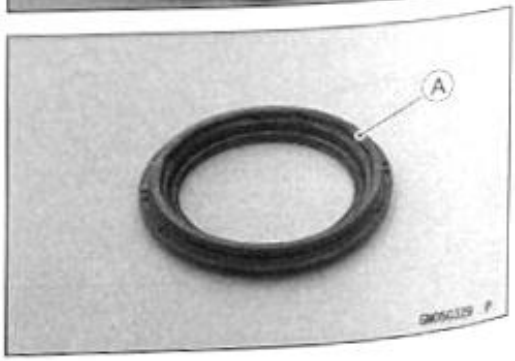
- Whenever the steering stem is removed, or if the steering can not be adjusted for smooth action, check the steering stem for straightness.

★If the steering stem [A] is bent, replace the steering stem.



Stem Cap Deterioration, Damage Inspection

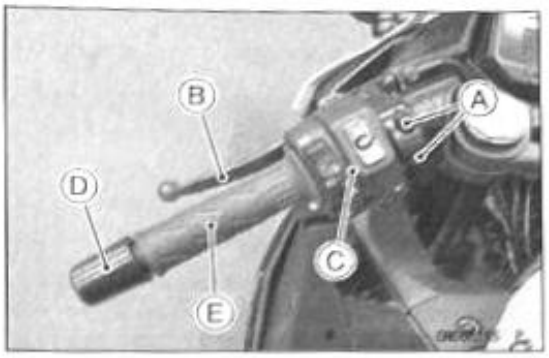
★Replace the stem cap if its oil seal [A] shows damage.



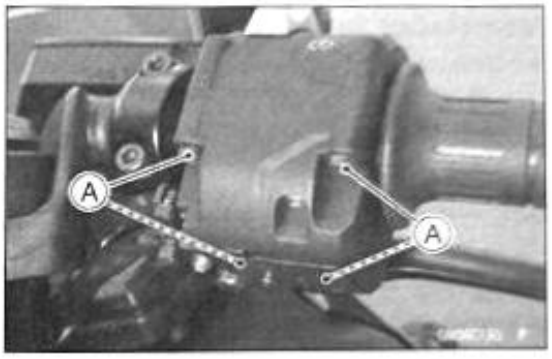
Handlebar

Handlebar Removal

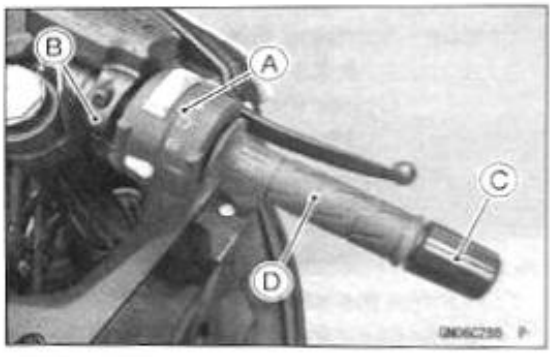
- Remove:
  Clutch Lever Clamp Bolts [A]
  Clutch Lever Assembly [B]
  Left Switch Housing [C]
  Handlebar Weight [D]
  Left Handlebar Grip [E]



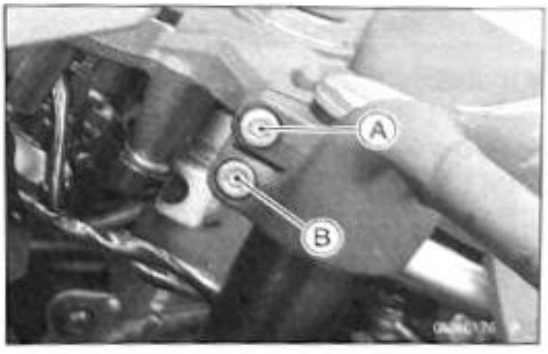
- Remove:
  Right Switch Housing Bolts [A]



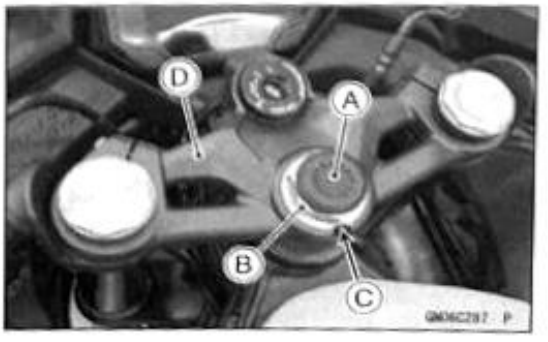
- Separate the right switch housing [A]
- Remove:
  Front Master Cylinder [B] (see Front Master Cylinder Removal(12-17))
  Handlebar Weight [C]
  Throttle Grip [D]



- Loosen:
  Upper Front Fork Clamp Bolt [A] (Both Sides)
  Handlebar Clamp Bolt [B] (Both Sides)

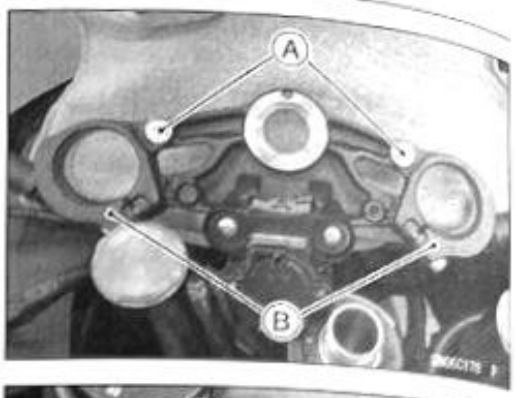


- Remove:
  Cap [A]
  Steering Stem Head Nut [B] and Washer [C]
  Steering Stem Head [D] with Handlebars



Handlebar

- Remove:
  Handlebar Positioning Bolts [A]
  Handlebars [B]



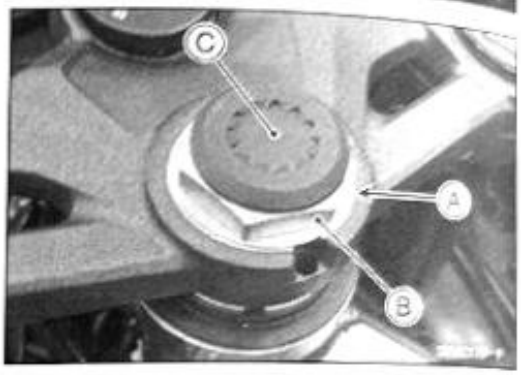
Handlebar Installation

- Replace the handlebar positioning bolts with new ones and tighten them.

Torque - Handlebar Positioning Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Run the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the steering stem head with handlebars.
- Install the washer [A] and steering stem head nut [B].
- Tighten:

Torque - Steering Stem Head Nut: 80 N·m (8.2 kgf·m, 59 ft·lb)
Upper Front Fork Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)
Handlebar Clamp Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)



NOTE

○Tighten the steering stem head nut before tightening the upper front fork clamp bolts and handlebar clamp bolts.

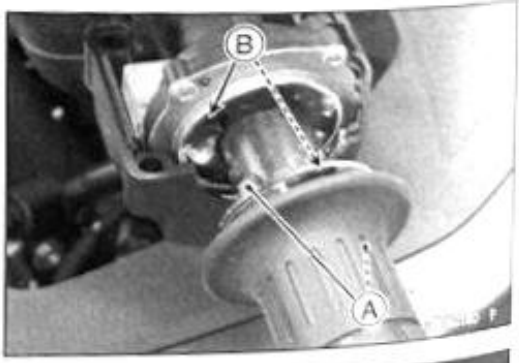
- Install the cap [C].

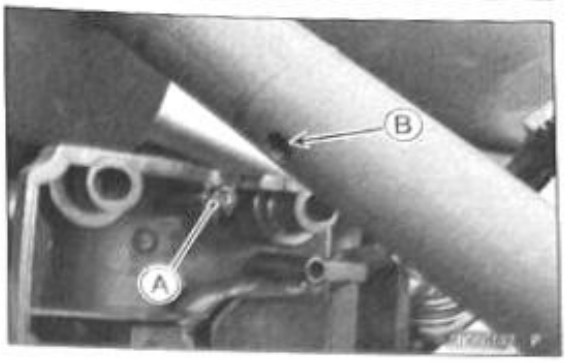
- Install:
  Right Switch Housing
  Throttle Grip

○Fit the projections [A] into the grooves [B].
○Fit the projection [C] into a hole [D] in the handlebar.

- Tighten:

Torque - Switch Housing Bolt (L = 30 mm): 3.5 N·m (0.36 kgf·m, 31 in·lb)
Switch Housing Bolt (L = 50 mm): 3.5 N·m (0.36 kgf·m, 31 in·lb)





• Install the left switch housing.
○Fit the projection [A] into a hole [B] in the handlebars.
• Tighten:
Torque - **Switch Housing Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)**
• Using a high flash-point solvent, clean off any oil or dirt that may be on the adhesive coating area. Dry them with a clean cloth.
• Apply adhesive to the inside of the left handlebar grip.
• Install the left handlebar grip until the switch housing contacts.
○Wipe off any protruding adhesive cement.
• Tighten the handlebar weight bolts.
• Install:
Clutch Lever Assembly (see Clutch Lever Assembly Installation(6-7))
Front Master Cylinder (see Front Master Cylinder Installation(12-17))
• Run the leads and hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).

⚠ WARNING

If the handlebars do not turn to the steering stop, they may cause an accident resulting in injury or death. Be sure the cables, harnesses and hoses are routed properly and do not interfere with handlebar movement (see Cable, Wire, and Hose Routing section (18-2)).

• Install the removed parts.

Frame

Table of Contents

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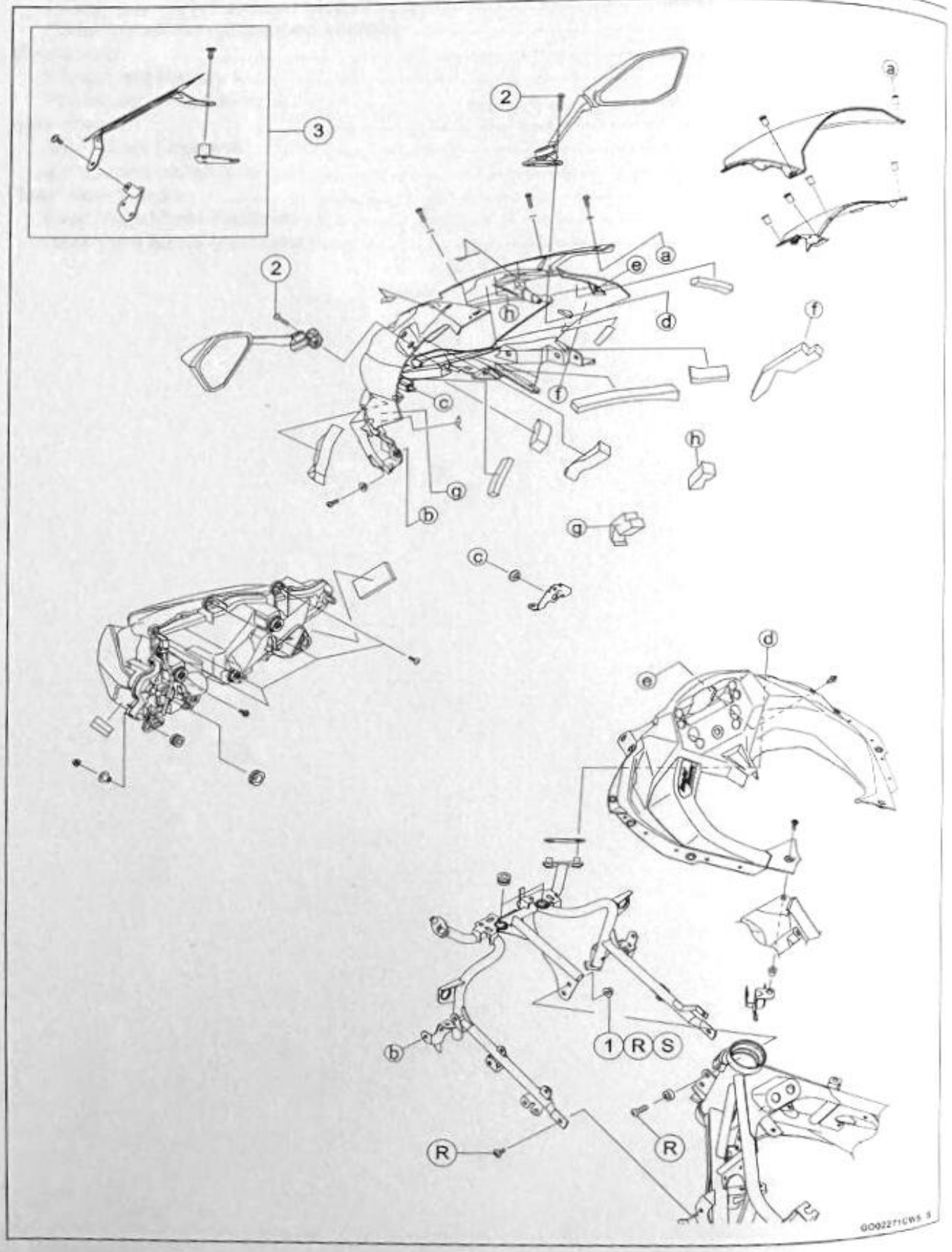
Exploded View

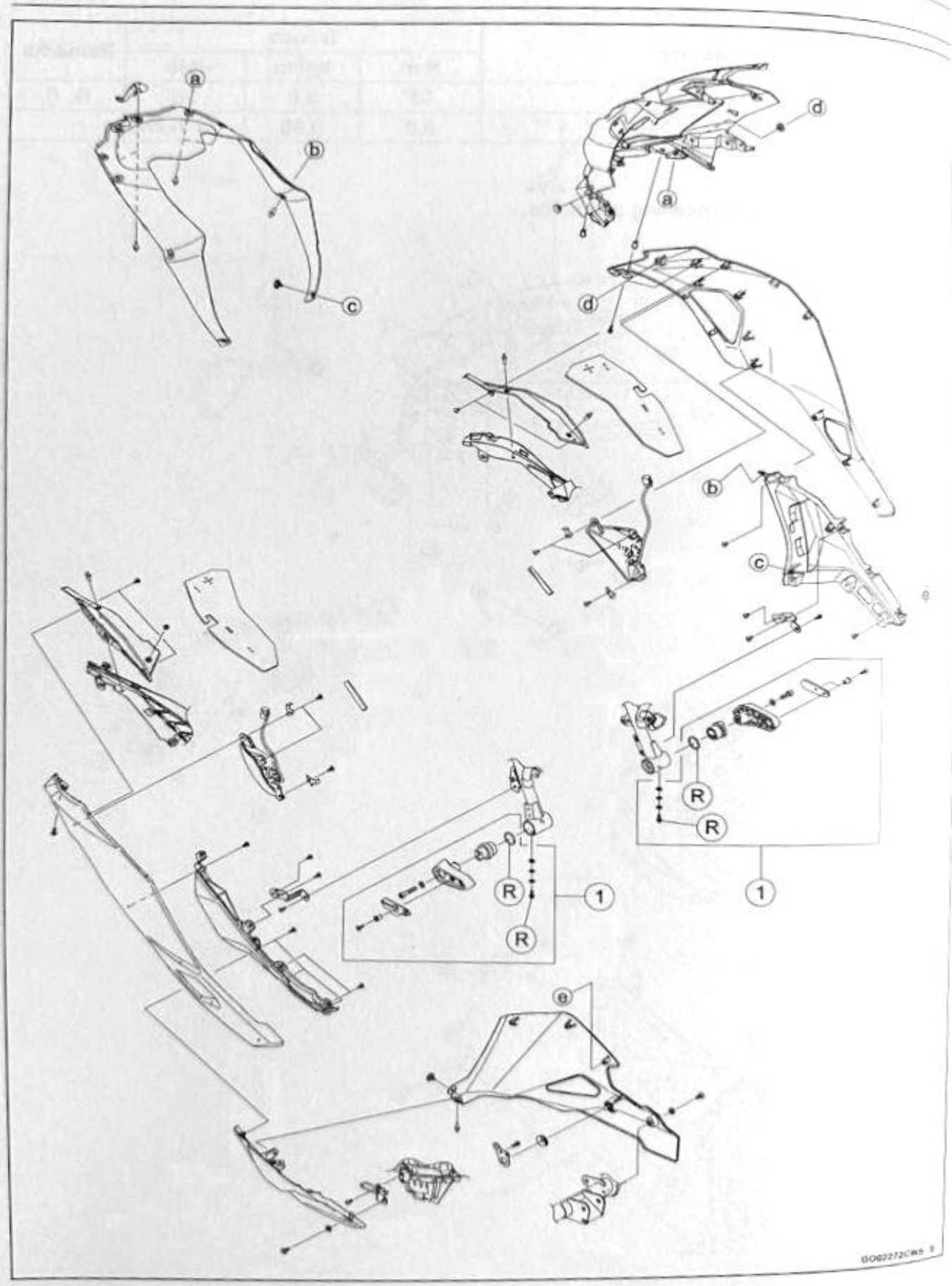


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Fairing Bracket Nuts	35	3.6	26	R, S
2	Rear View Mirror Bolts	8.8	0.90	78 in·lb	

3. ID and PH Models
R: Replacement parts
S: Follow the specified tightening sequence.

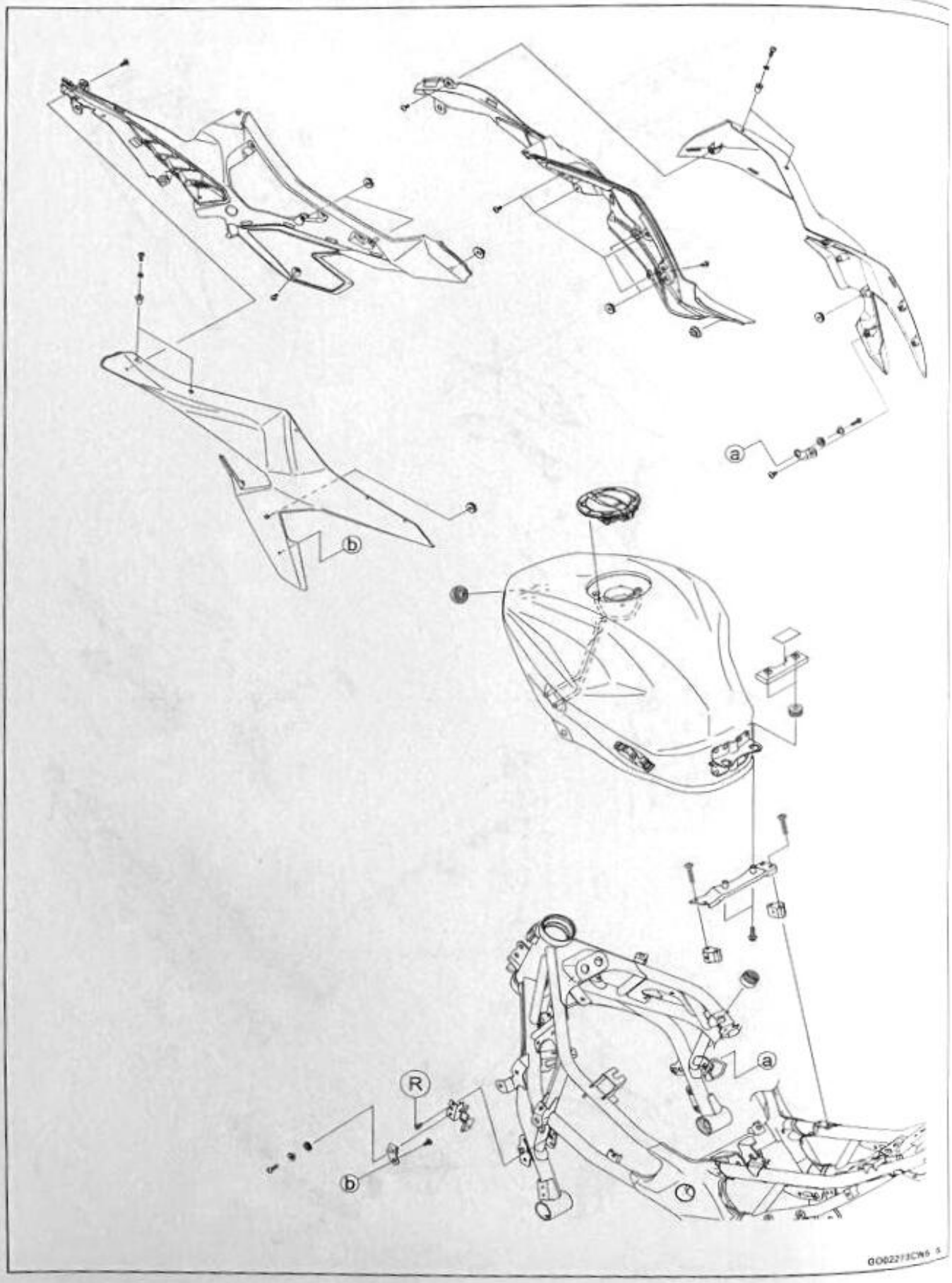
Exploded View



Exploded View

1. Equipped Models
R: Replacement Parts

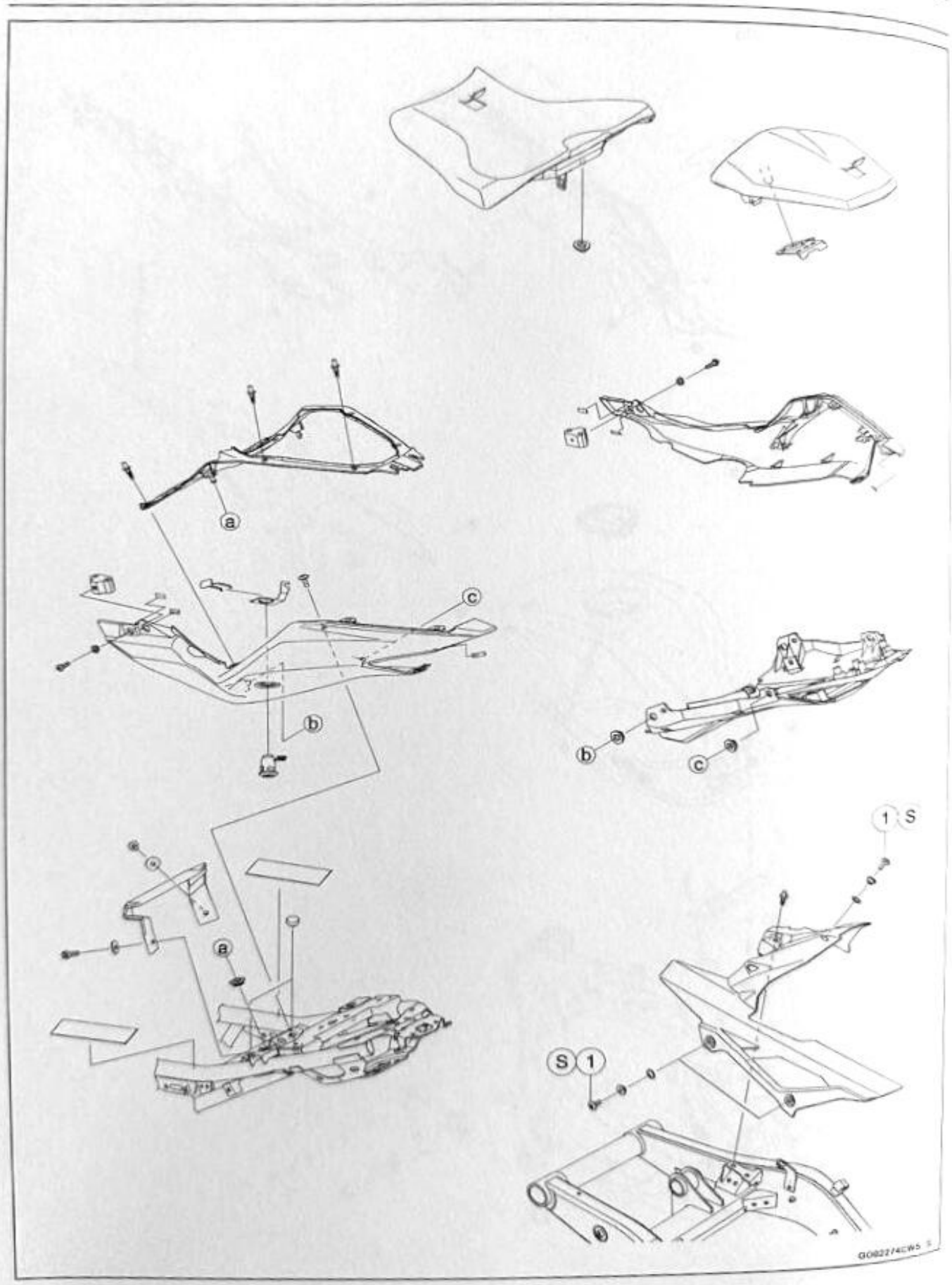
Exploded View



Exploded View

R: Replacement Parts

Exploded View

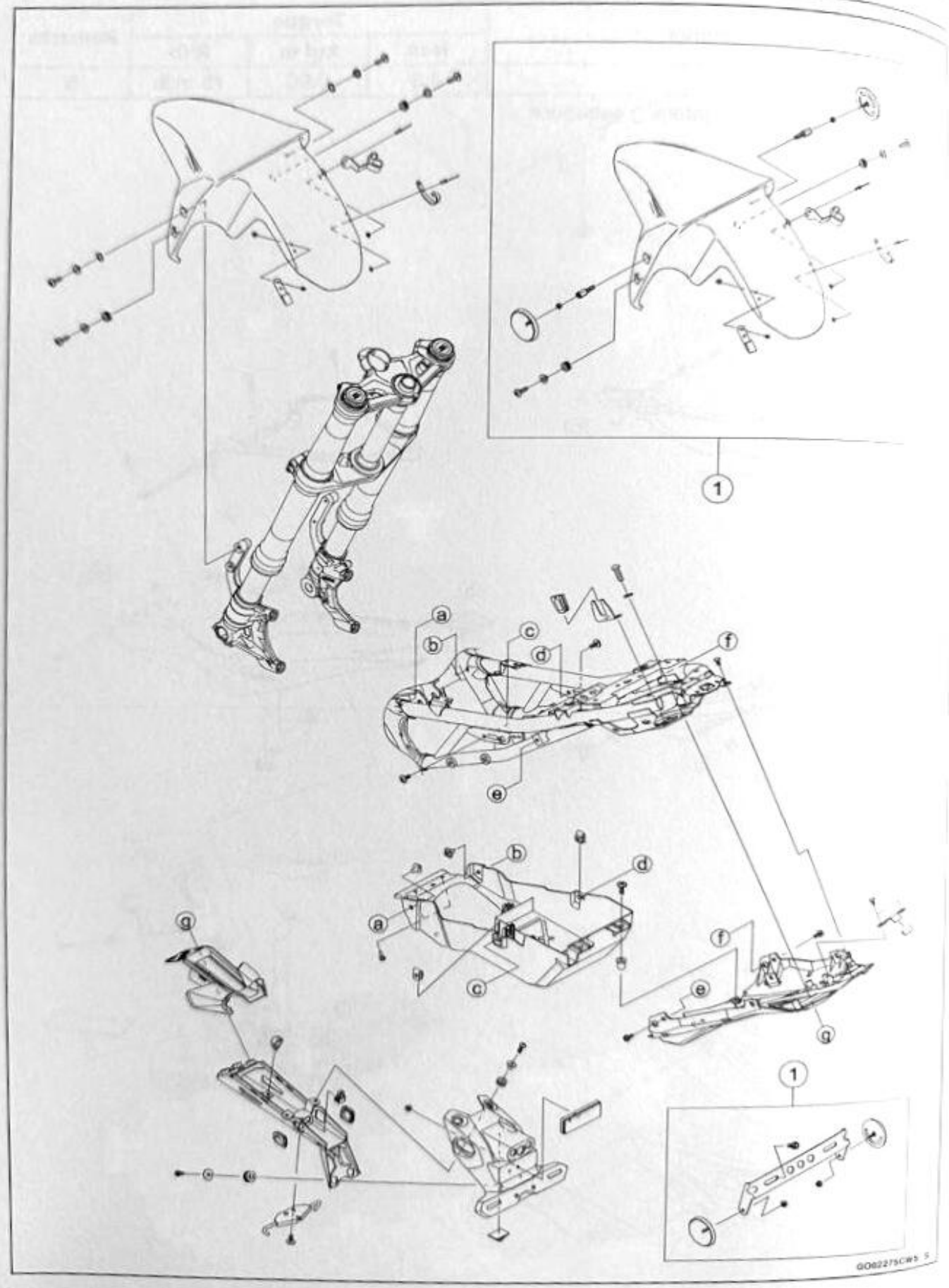


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Mud Guard Bolts	8.8	0.90	78 in·lb	S

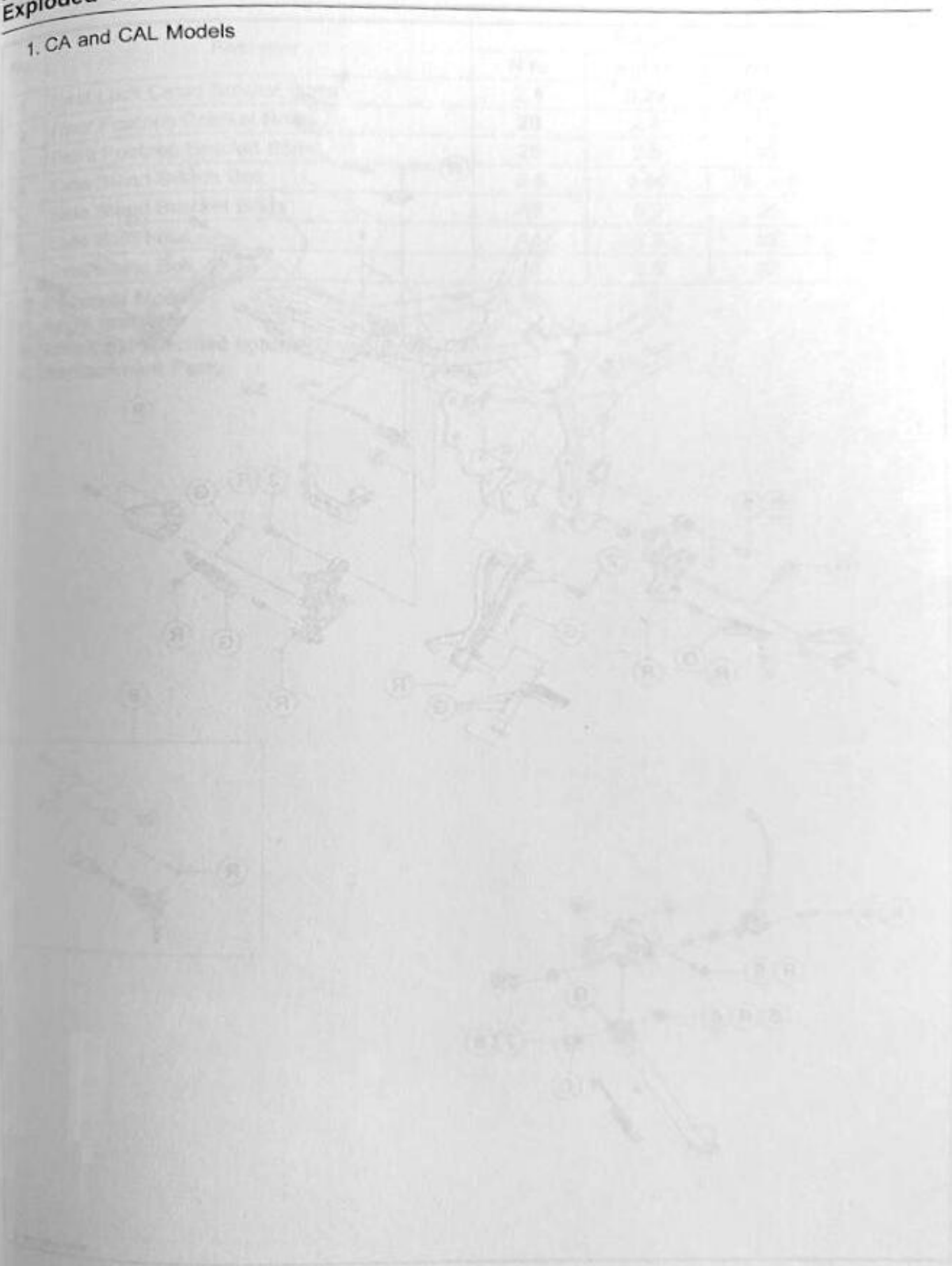
S: Follow the specified tightening sequence.

Exploded View

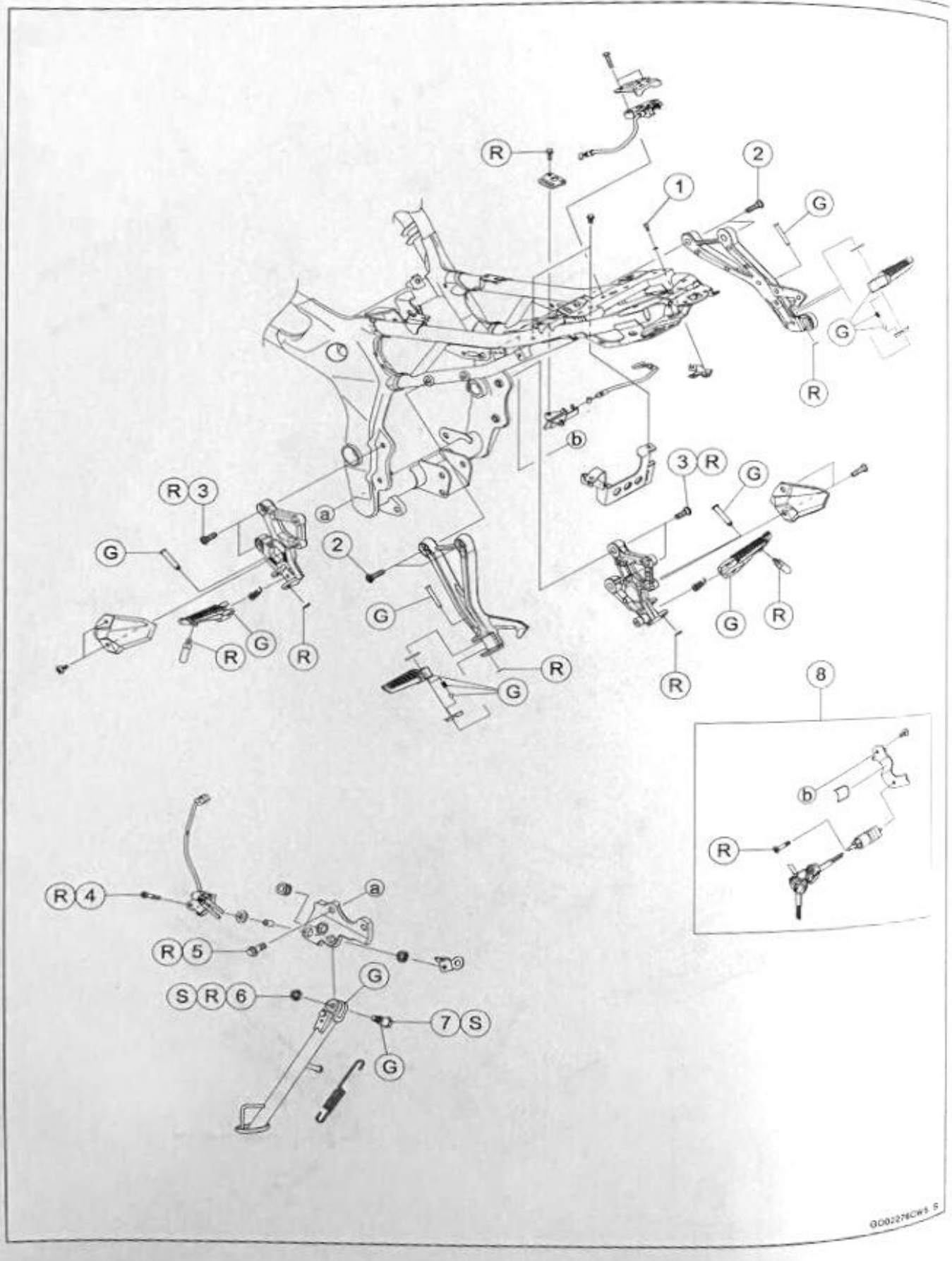


Exploded View

1. CA and CAL Models



Exploded View



Exploded View

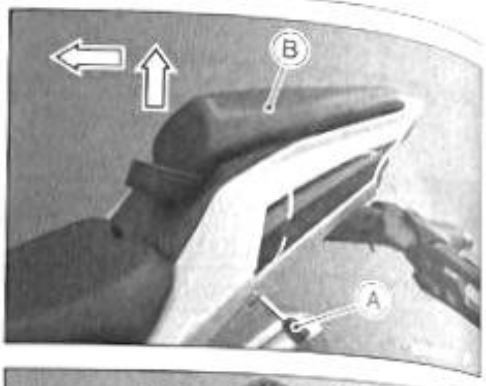
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Seat Lock Cable Bracket Bolts	2.8	0.29	25 in·lb	
2	Rear Footpeg Bracket Bolts	25	2.5	18	
3	Front Footpeg Bracket Bolts	25	2.5	18	R
4	Side Stand Switch Bolt	8.8	0.90	78 in·lb	R
5	Side Stand Bracket Bolts	49	5.0	36	R
6	Side Stand Nut	44	4.5	32	R, S
7	Side Stand Bolt	44	4.5	32	S

8. Equipped Models
G: Apply grease.
S: Follow the specified tightening sequence.
R: Replacement Parts

Seats

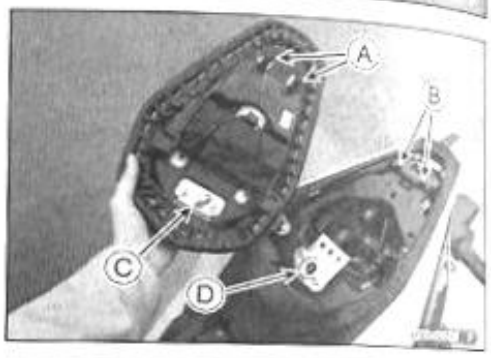
Rear Seat Removal

- Insert the ignition key [A] into the seat lock.
- Turn the key clockwise, and pull up the front part of rear seat [B].
- Remove the rear seat forward.



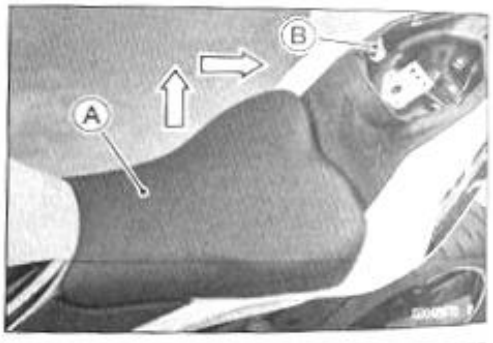
Rear Seat Installation

- Insert the hooks [A] into the slots [B] on the frame.
- Insert the seat lock projection [C] into the latch hole [D].
- Push down the front part of the rear seat until the lock clicks.



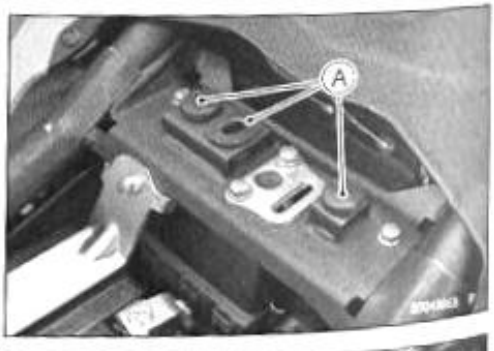
Front Seat Removal

- Remove the rear seat (see Rear Seat Removal(15-16)).
- Pull up the rear part of front seat [A] while pulling the seat lock cable [B] backward.
- Remove the front seat backward.

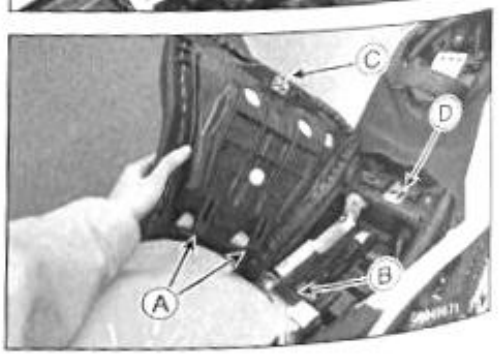


Front Seat Installation

- Check that the dampers [A] are in place.



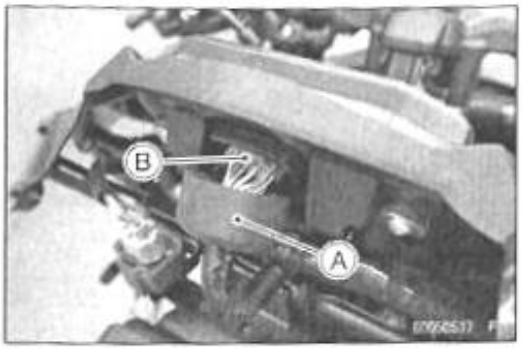
- Insert the hooks [A] under the fuel tank bracket [B].
- Insert the seat lock projection [C] into the latch hole [D].
- Push down the rear part of the front seat until the lock clicks.
- Install the rear seat (see Rear Seat Installation(15-16)).



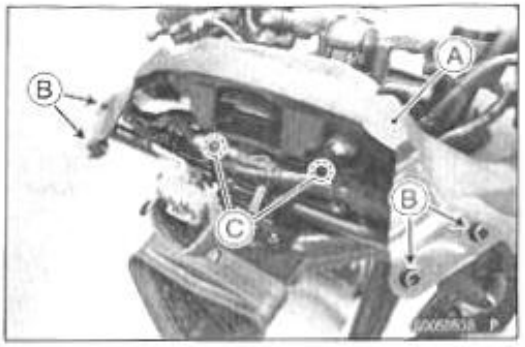
Fairings

Upper Inner Fairing Removal

- Remove:
  Upper Fairing (see Upper Fairing Removal(15-21))
- Slide the dust cover [A], and disconnect the meter unit connector [B].

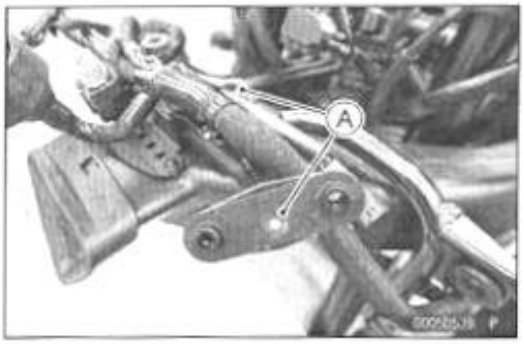


- Remove the upper inner fairing [A] from the projections [B] of the upper fairing bracket.
- Clear the projections [C] on the upper inner fairing by pulling up the center part of the upper inner fairing.

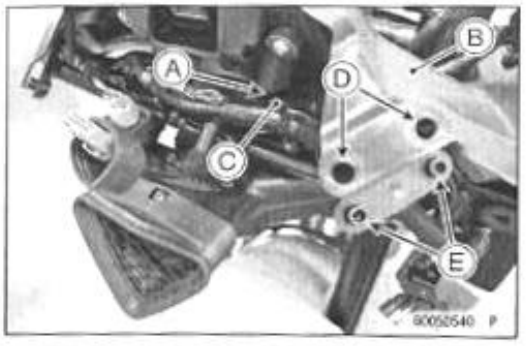


Upper Inner Fairing Installation

- Installation is the reverse of removal.
- Be sure to install the dampers [A] on the bracket (both sides).

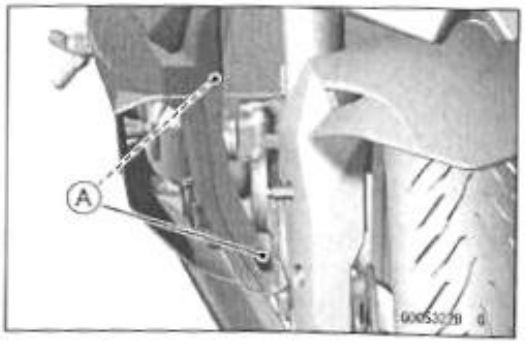


- Insert the projection [A] on the upper inner fairing [B] into the damper [C] (both sides).
- Fit the holes [D] of the upper inner fairing to the projections [E] of the upper fairing bracket (both sides).



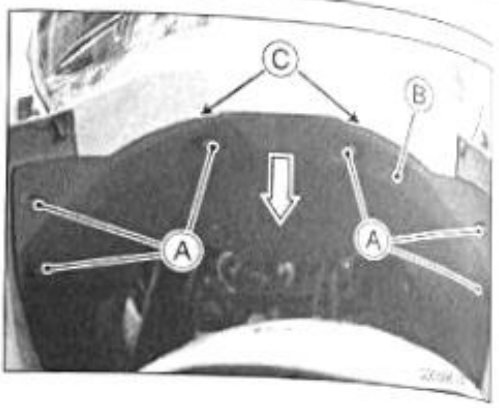
Lower Inner Fairing Removal

- Remove:
  Quick Rivets [A] (Both Sides)



Fairings

- Remove:
  Quick Rivets [A]
- Pull the lower inner fairing [B] backward to clear the tabs [C].

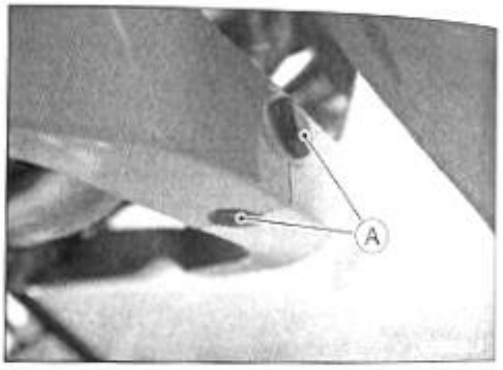


Lower Inner Fairing Installation

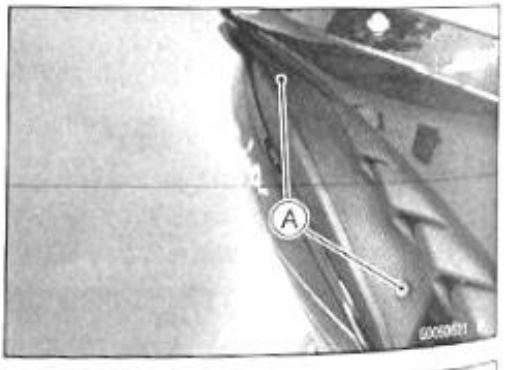
- Installation is the reverse of removal.

Lower Fairing Removal

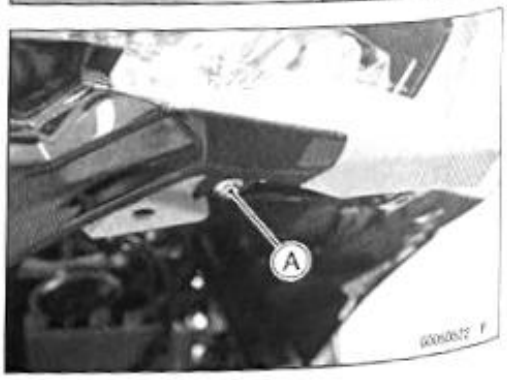
- Remove:
  Lower Inner Fairing (see Lower Inner Fairing Removal(15-17))
  Slider (Equipped Models) (see Slider Removal (Equipped Model)(15-40))
  Quick Rivets [A]



- Remove:
  Quick Rivets [A]

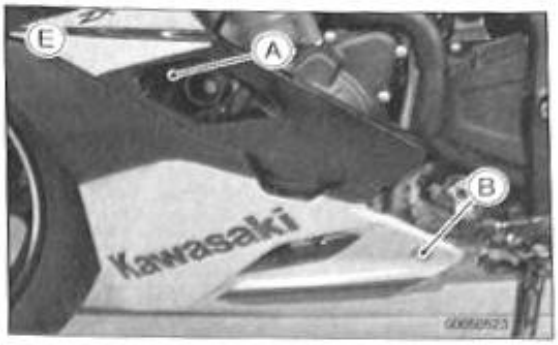


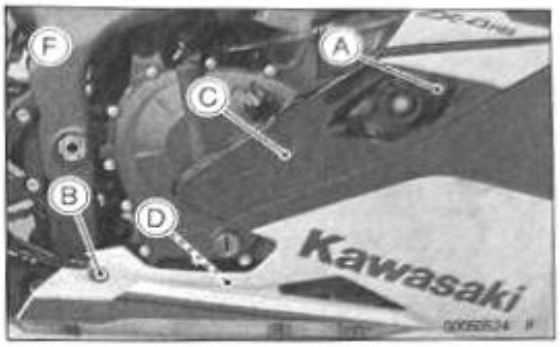
- Remove:
  Bolt [A]



Fairings

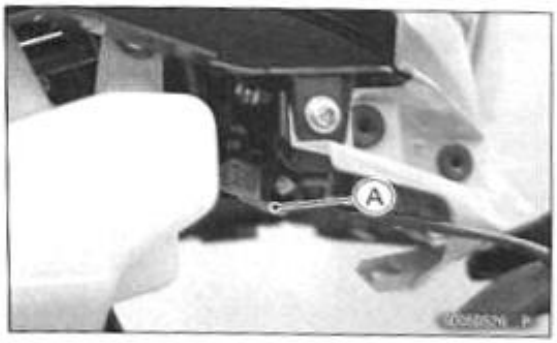
- Remove:
  Bolts [A]
  Bolts [B] and Collars
- Pull the right lower fairing [C] outward to clear the projection [D].
  Left Side [E]
  Right Side [F]





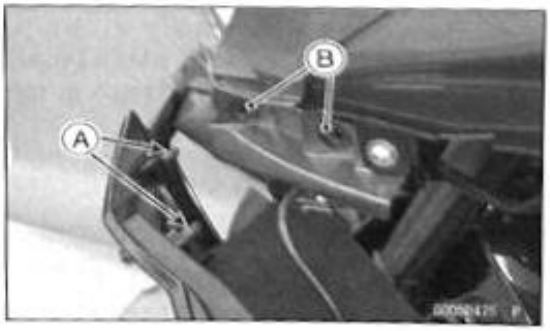
- Pull the lower fairing [A] outward to clear the projections [B].

- Disconnect:
  Front Turn Signal Light Connector [A]



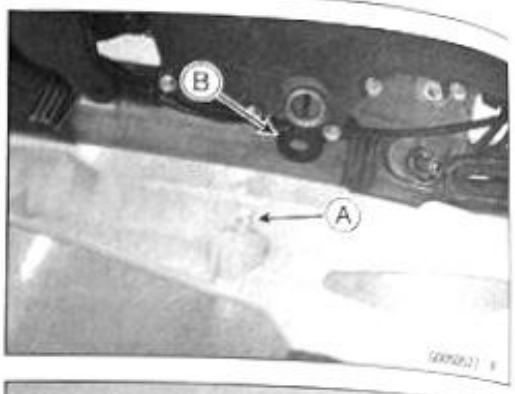
Lower Fairing Installation

- Installation is the reverse of removal.
- Insert the projections [A] of the lower fairing into the grommets [B].



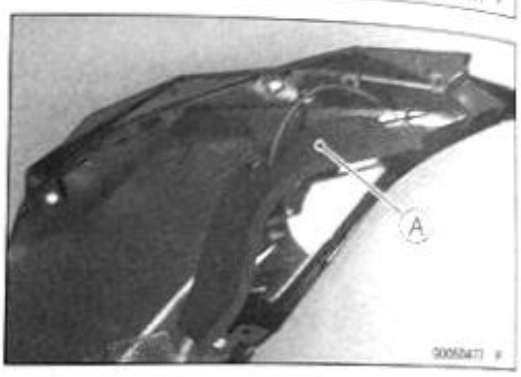
Fairings

- Insert the projection [A] of the right lower fairing into the grommet [B].

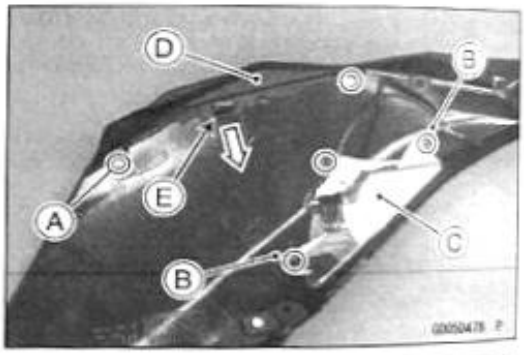


Lower Fairing Disassembly

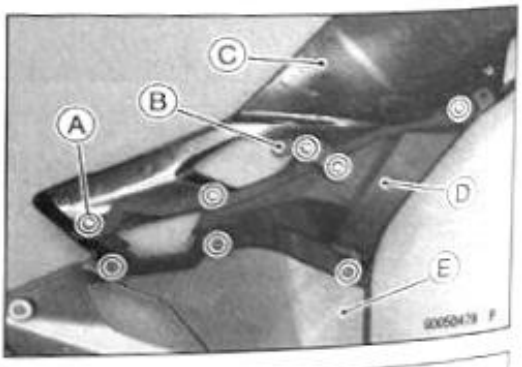
- Remove:
  Lower Fairing (see Lower Fairing Removal(15-18))
  Pad [A]



- Remove:
  Screws [A]
  Brackets [B]
  Front Turn Signal Light [C]
- Slide the lower fairing (upper cover) [D] downward to clear the hook [E] of the lower fairing (upper).

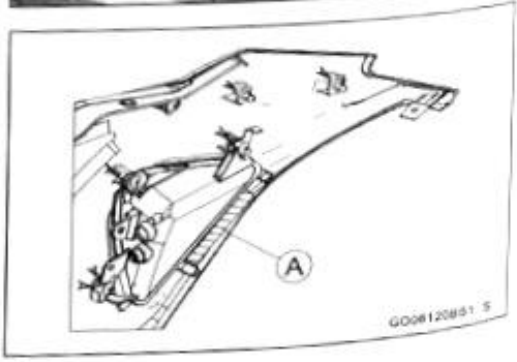


- Remove:
  Screws [A]
  Bracket [B]
  Lower Fairing (Upper) [C]
  Lower Fairing (Middle) [D]
  Lower Fairing (Lower) [E]

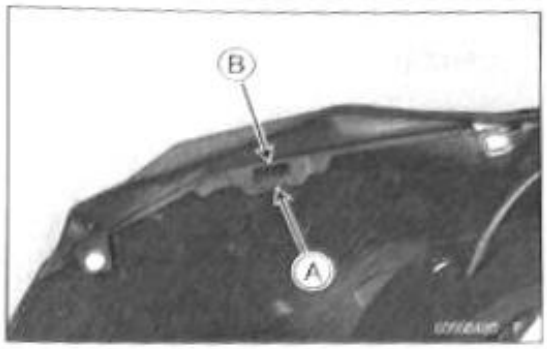


Lower Fairing Assembly

- Assembly is the reverse of disassembly.
- Check that the damper [A] are in place on the lower fairing.

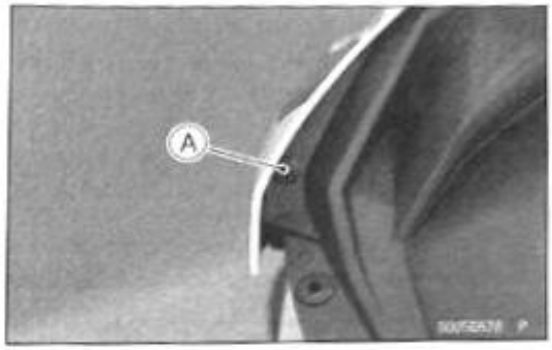


- Insert the hook [A] of the lower fairing (upper) into the slot [B] of the lower fairing (upper cover).

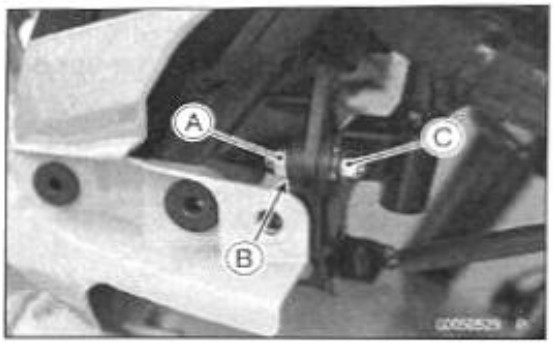


Upper Fairing Removal

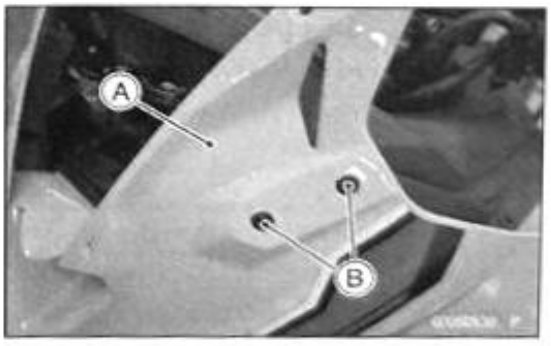
- Remove:
  Windshield (see Windshield Removal(15-42))
  Side Covers (see Side Cover Removal(15-26))
  Rear View Mirrors (see Rear View Mirror Removal(15-44))
  Quick Rivet [A] (Both Sides)



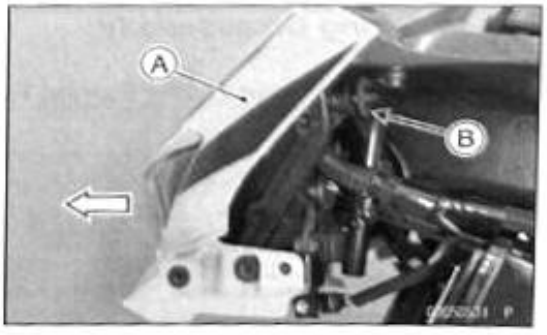
- Remove:
  Nut [A] (Both Sides)
  Collar [B] (Both Sides)
  Bolt [C] (Both Sides)



- Pull the upper fairing [A] upward to clear the projections [B] on both sides.

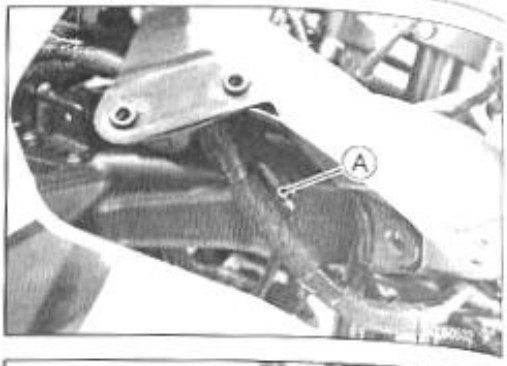


- Move the upper fairing [A] forward to remove it from the grommet [B] on both sides.



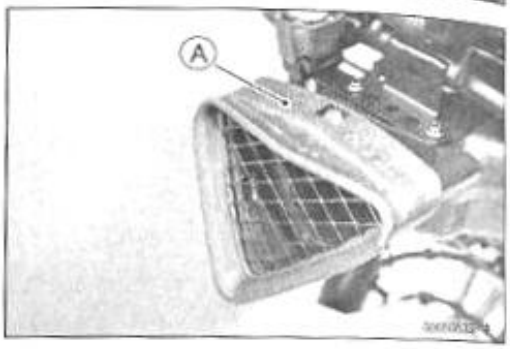
Fairings

- Disconnect:
  Headlight Connector [A]

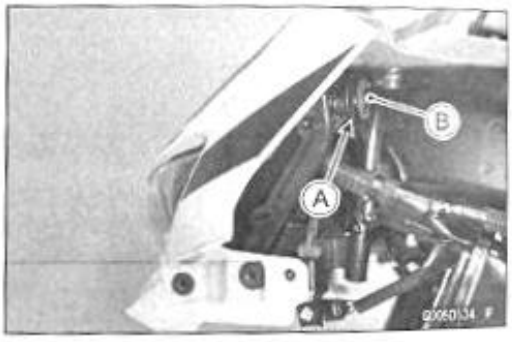


Upper Fairing Installation

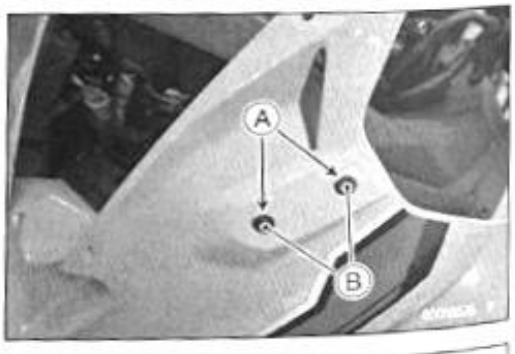
- Installation is the reverse of removal.
- Check that the seal [A] is in place on the intake duct.



- Check that the grommet [A] is in place on both sides.
- Insert the projection [B] of the upper fairing into the grommet on both sides.

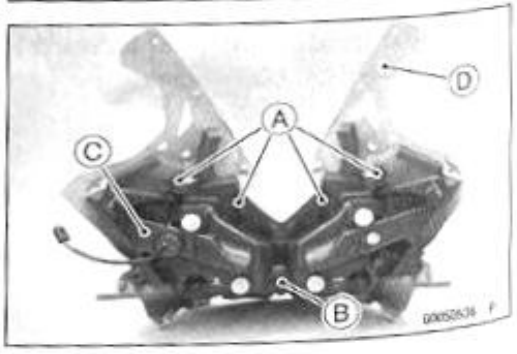


- Hang the holes [A] of the upper fairing to the projections [B] of the upper fairing bracket on both sides.



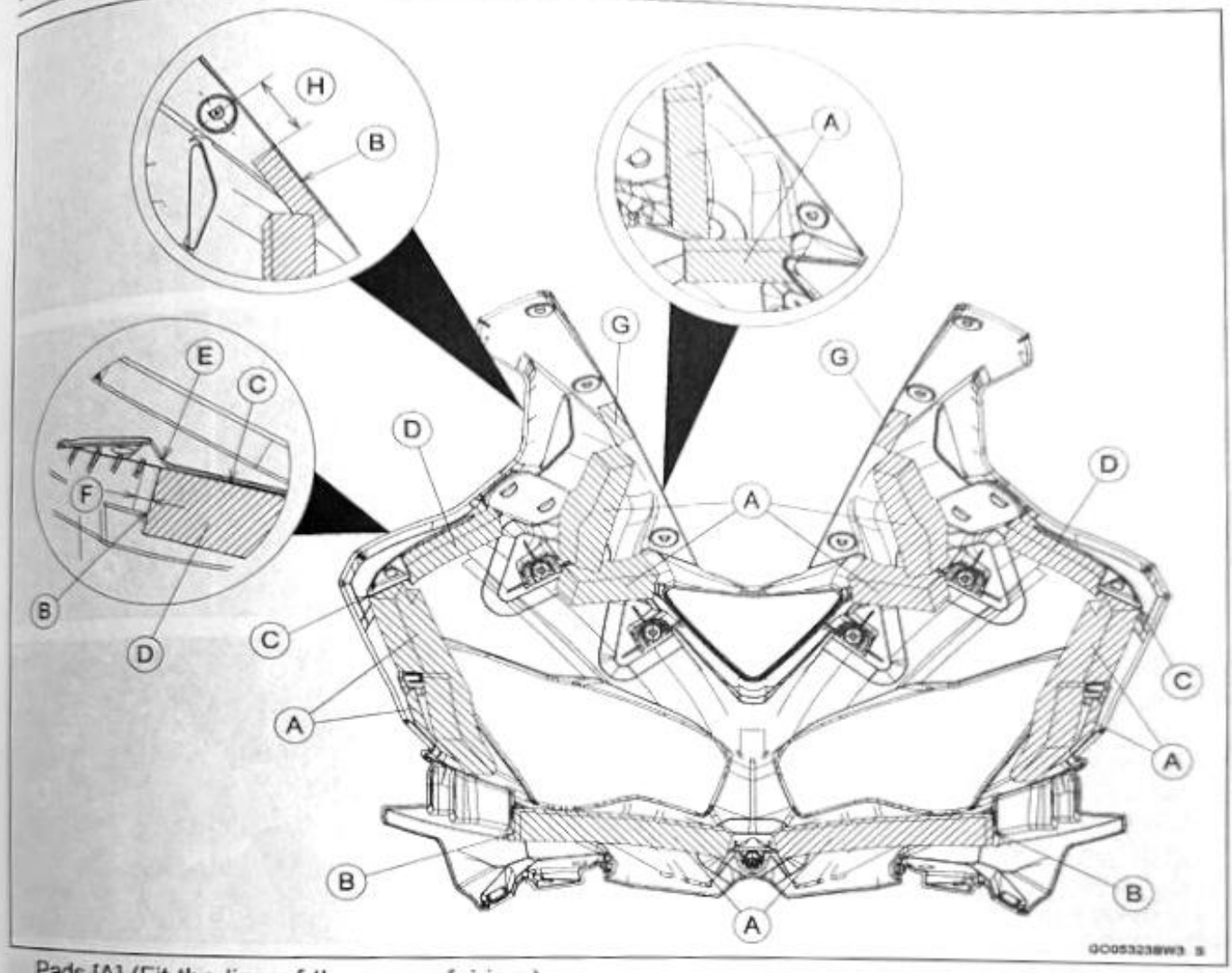
Upper Fairing Disassembly

- Remove:
  Upper Fairing (see Upper Fairing Removal(15-21))
  Screws [A]
  Bolt [B]
  Headlight [C]
  Upper Fairing [D]



Upper Fairing Assembly

- Assembly is the reverse of disassembly.
- Check the pads are in place on the upper fairing.

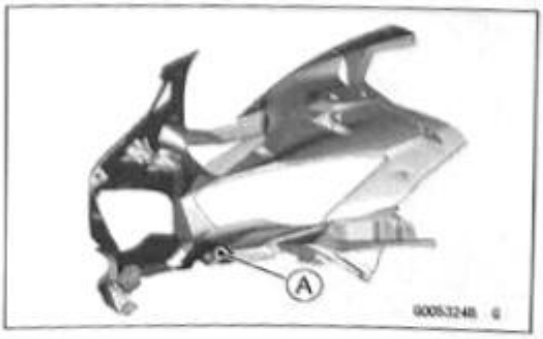


Pads [A] (Fit the line of the upper fairing.)
Fit the pad to the rounded end [B] of the upper fairing.
Fit [C] the pad to the rib of the upper fairing.
Pads [D]
Rounded End [E]
About 5 mm (0.2 in.) [F]
Pads [G]
25 – 35 mm (0.98 – 1.38 in.) [H]

NOTE

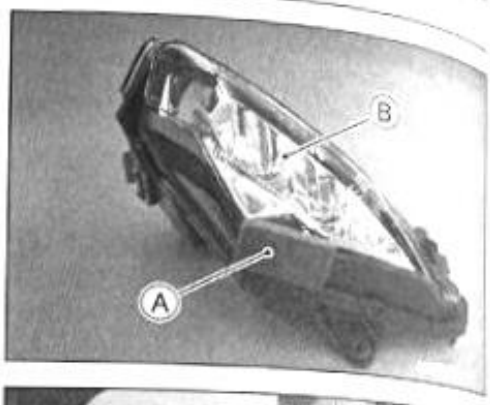
○*Install the pads [G] first.*

• Check the bracket [A] are in place on the upper fairing.

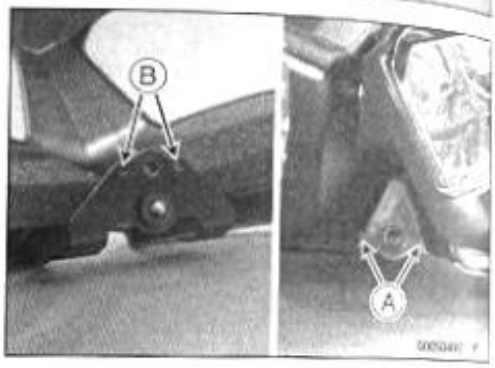


Fairings

- Check that the pad [A] is in place on the headlight [B] on both sides.

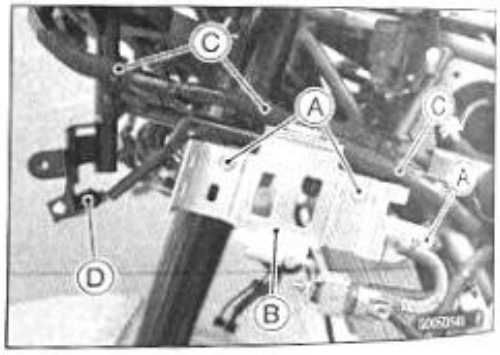


- Insert the projections [A] of the headlight into the holes [B] of the bracket.

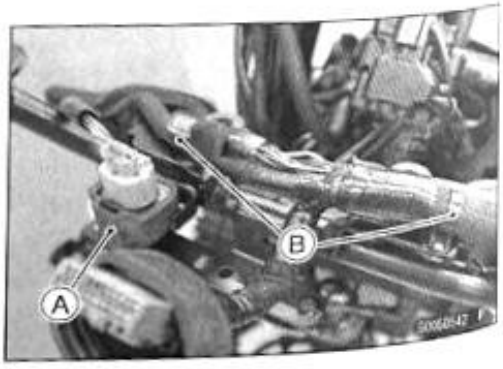


Upper Fairing Bracket Removal

- Remove:
  Upper Inner Fairing (see Upper Inner Fairing Removal(15-17))
  Intake Duct (see Intake Duct Removal(3-33))
  Canister (see Evaporative Emission Control System Inspection(2-23))
  Bolt [A]
  Bracket [B]
- Open the clamps [C].
- Remove the front turn signal light connector [D] from the upper fairing bracket.

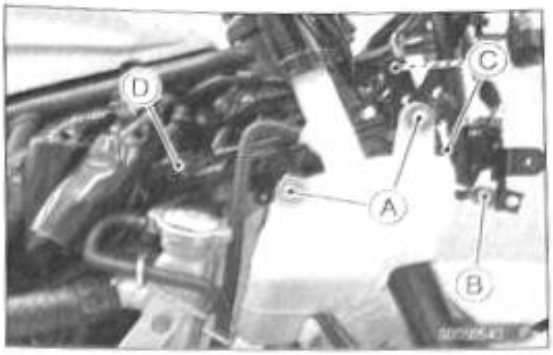


- Remove the vehicle-down sensor [A] from the bracket.
- Open the clamps [B].



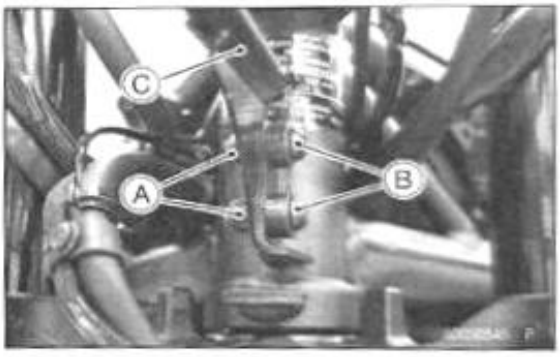
Fairings

- Remove the coolant reserve tank bolts [A].
- Remove the front turn signal light connector [B] from the bracket.
- Open the clamps [C].
- For immobilizer system equipped models, remove the immobilizer antenna connector [D] from the upper fairing bracket.



- Remove the heat insulation rubber plate [A] from the upper fairing bracket [B] on both sides.
- Remove the bolt [C] on both sides.

- Remove:
  Upper Fairing Bracket Nuts [A]
  Bolts [B] and Collar
  Upper Fairing Bracket [C]

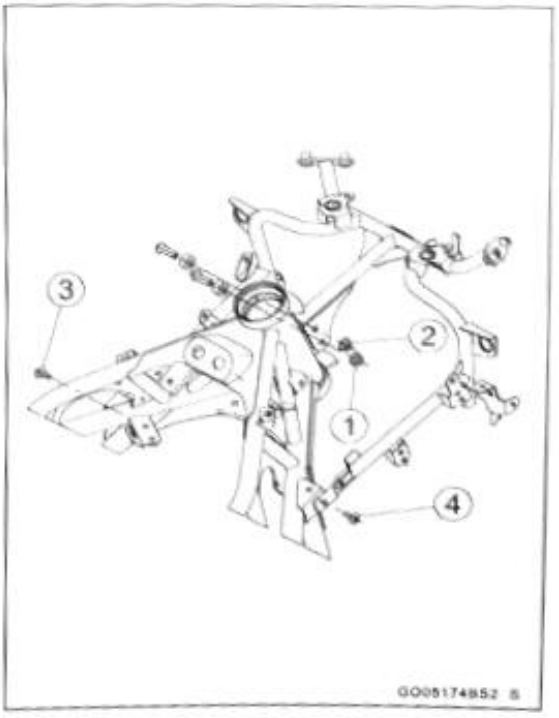


Upper Fairing Bracket Installation

- Installation is the reverse of removal.
- Replace the bolts and upper fairing bracket nuts with new ones.
- Tighten the bolts and upper fairing bracket nuts following the specified tightening sequence [1 – 4].

Torque - Upper Fairing Bracket Nuts: 35 N·m (3.6 kgf·m, 26 ft·lb)

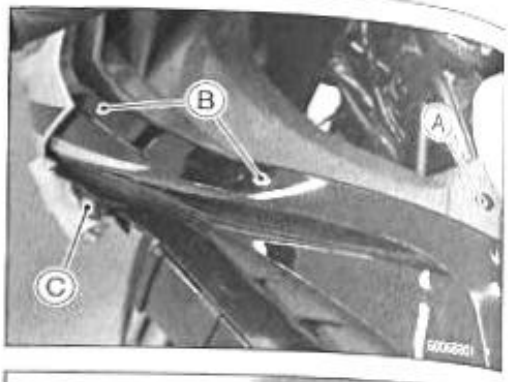
- Run the leads, cables and hose correctly (see Cable, Wire, and Hose Routing section (18-2)).



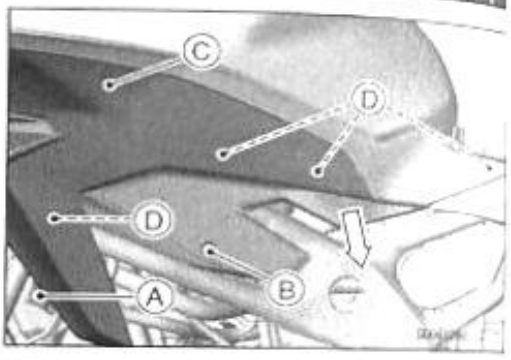
Covers

Side Cover Removal

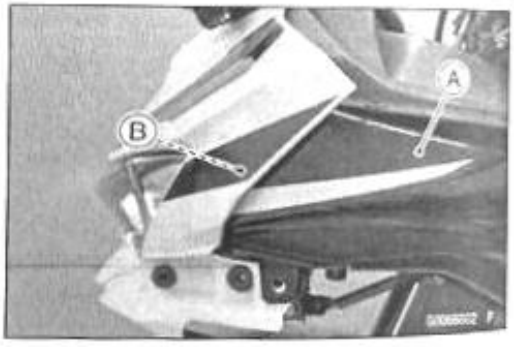
- Remove:
  Front Seat (see Front Seat Removal(15-16))
  Lower Fairing (see Lower Fairing Removal(15-18))
  Bolt [A]
  Bolts [B] and Washers
  Bolt [C] and Collar



- Remove:
  Bolt [A], Collar and Damper
  Bolt [B]
- Pull the side cover [C] outward to clear the projections [D].

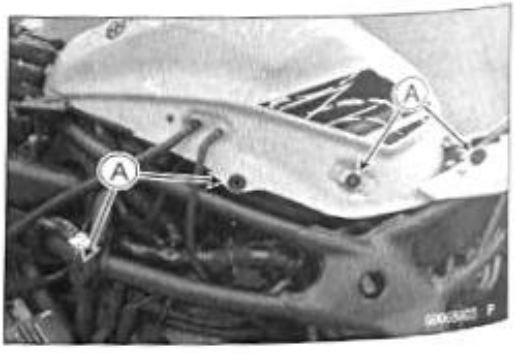


- Pull the side cover [A] rearward to clear the hook [B].

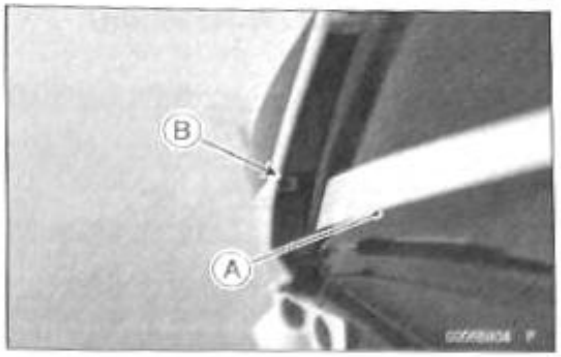


Side Cover Installation

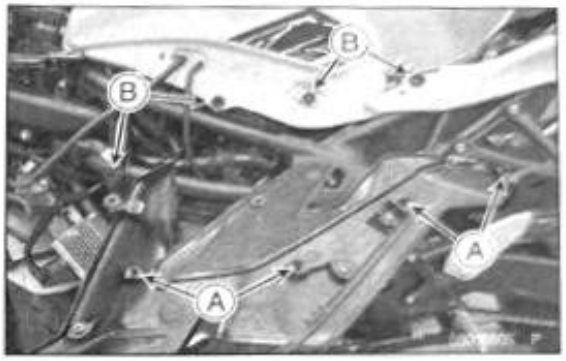
- Installation is the reverse of removal.
- Check that the grommets [A] are in place.



• Insert the side cover [A] into the hook [B] of the upper fairing.

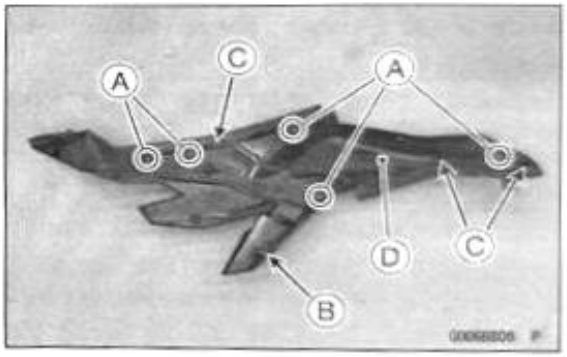


• Insert the projections [A] of the side cover into the grommets [B].



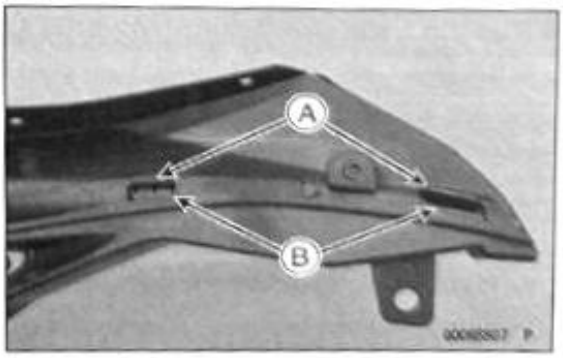
Side Cover Disassembly

• Remove:
Side Cover (see Side Cover Removal(15-26))
Screws [A]
Bracket [B]
• Clear the hooks [C] of the side cover (outer) from the side cover (inner) [D].

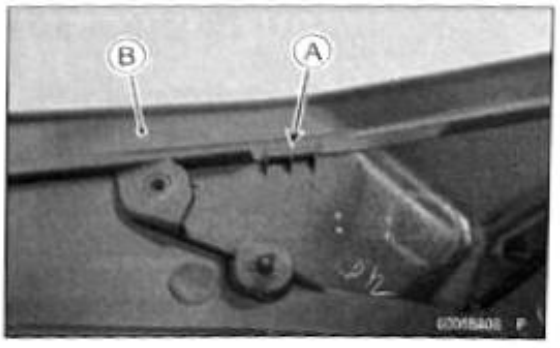


Side Cover Assembly

• Assembly is the reverse of disassembly.
• Insert the hooks [A] of the side cover (outer) into the slots [B] of the side cover (inner).



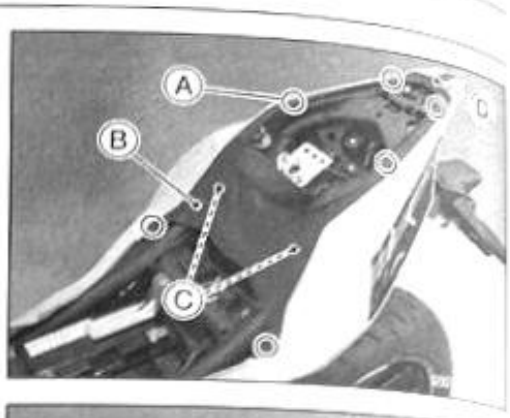
• Hang the hook [A] of the side cover (outer) to the side cover (inner) [B].



Covers

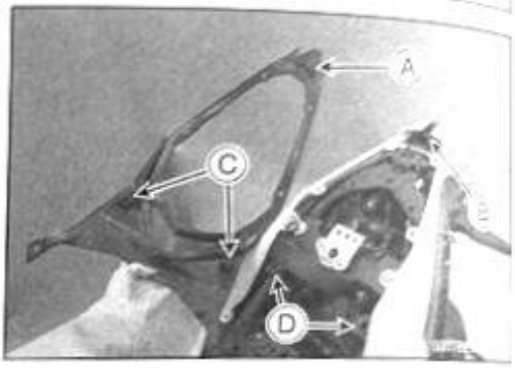
Center Seat Cover Removal

- Remove:
  Front Seat (see Front Seat Removal(15-16))
  Quick Rivets [A]
- Pull up the center seat cover [B] to clear the projections [C] of the center seat cover.
- Pull the center seat cover forward to clear the hook [D].



Center Seat Cover Installation

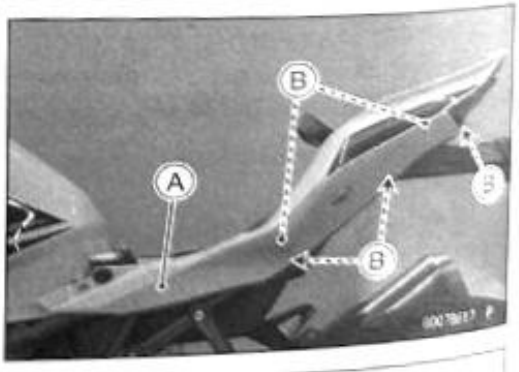
- Installation is the reverse of removal.
- Insert the slot [A] of the center seat cover into the hook [B] of the rear fender.
- Insert the projections [C] of the center seat cover into the grommets [D].



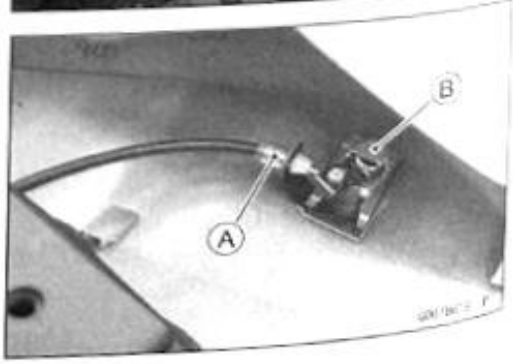
Side Seat Cover Removal

- Remove:
  Center Seat Cover (see Center Seat Cover Removal(15-28))
  Bolt [A] and Collar
  Bolt [B]

- Pull the side seat cover [A] outward to clear the projections [B].

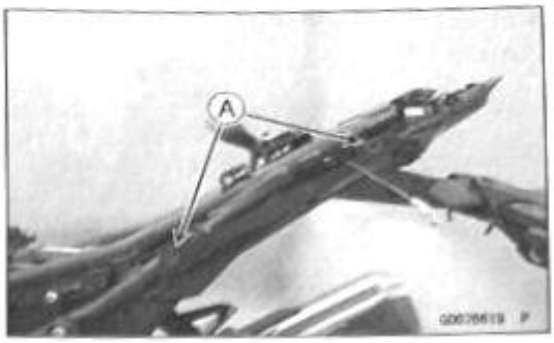


- Free the seat lock cable [A] from the seat lock [B] (left side only).

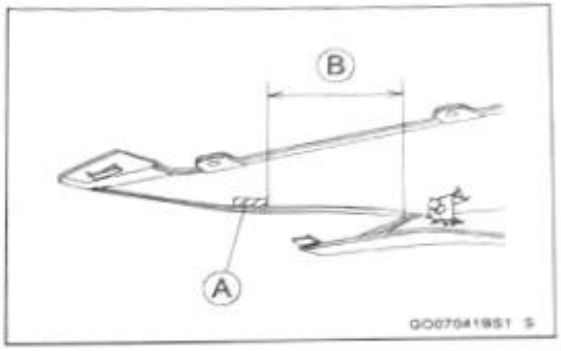


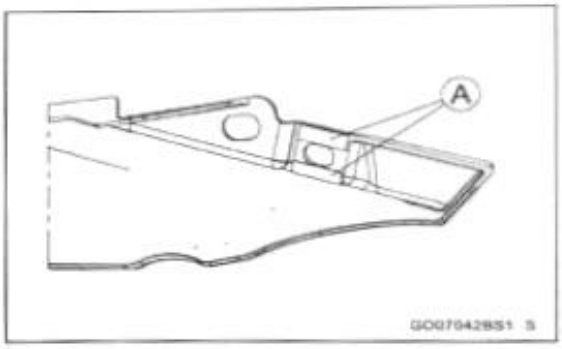
Side Seat Cover Installation

- Installation is the reverse of removal.
- Check that the dampers [A] are in place.

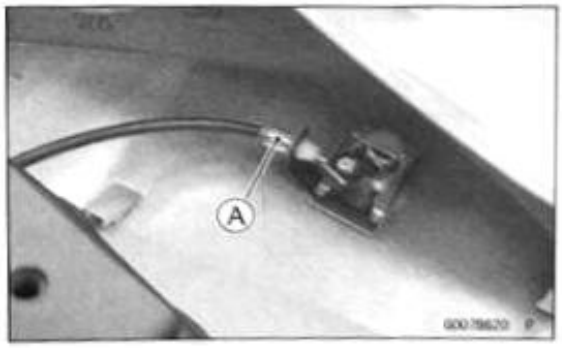


- Check that the dampers [A] are in place on the side seat cover.
  82 mm (3.2 in.) [B]





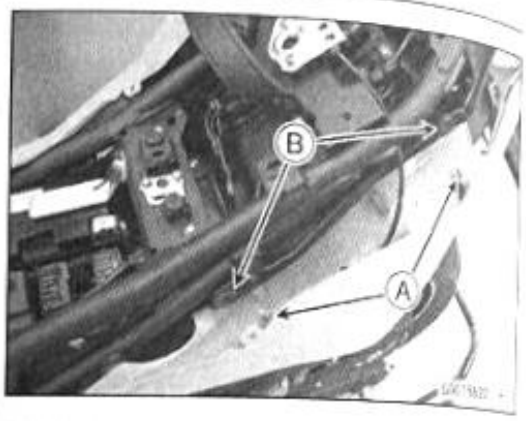
- Connect the seat lock cable [A] (left side only).



- Insert the projection [A] of the lower fairing into the hole [B].

Covers

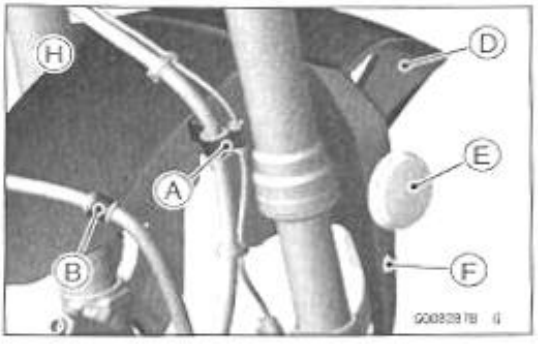
- Insert the projections [A] of the lower fairing into the grommets [B].



Fenders

Front Fender Removal

- Remove:
  Front Wheel
- Clear the brake hose and front wheel rotation sensor lead from the clamp [A].
- Clear the brake hose from the clamp [B] on the both sides.
- Remove (Front Reflector unequipped models):
  Bolts [C], Collars and Washers (Both Sides)
  Front Fender [D]
- Remove (Front Reflector equipped models):
  Front Reflector [E], Nut, Bolt, Collar and Washer (Both Sides), Bolt [F], Collar and Washer (Both Sides)
  Front Fender
  Front Reflector Unequipped Models [G]
  Front Reflector Equipped Models [H]

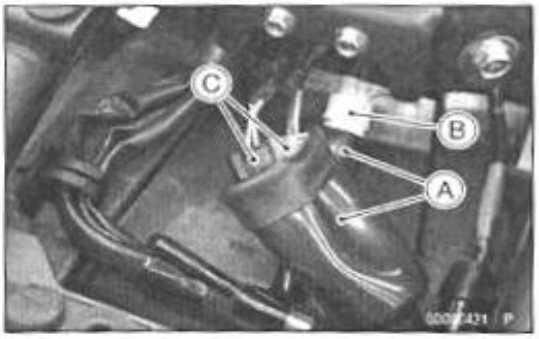


Front Fender Installation

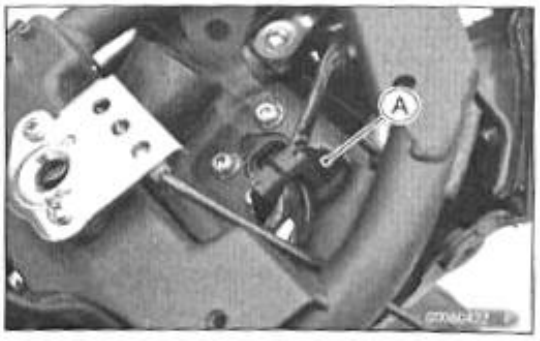
- Installation is the reverse of removal.
- Run the brake hoses and front wheel rotation sensor lead correctly (see Cable, Wire, and Hose Routing section (18 -2)).

Flap Removal

- Remove:
  Side Seat Covers (see Side Seat Cover Removal(15 -28))
- Slide the dust cover [A].
- Disconnect:
  License Plate Light Connector [B]
  Rear Turn Signal Light Connectors [C]

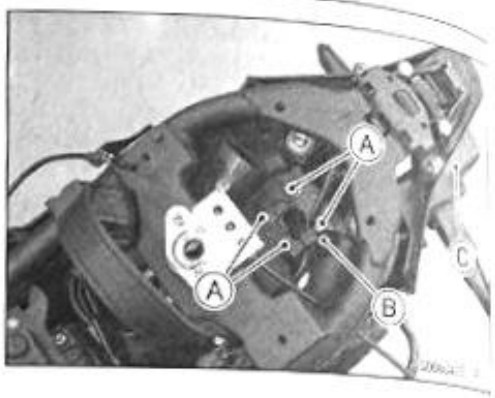


- Free the leads from the bracket [A].



Fenders

- Remove:
  Bolts [A] and Spring Washers
  Bracket [B] with Damper
  Flap [C]

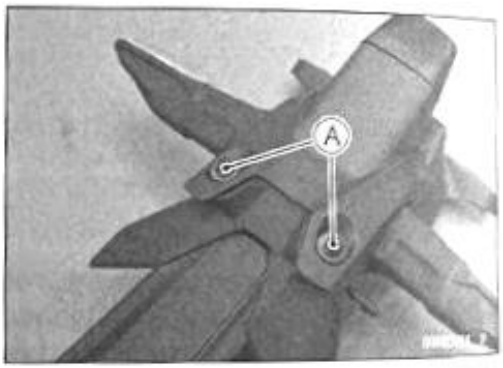


Flap Installation

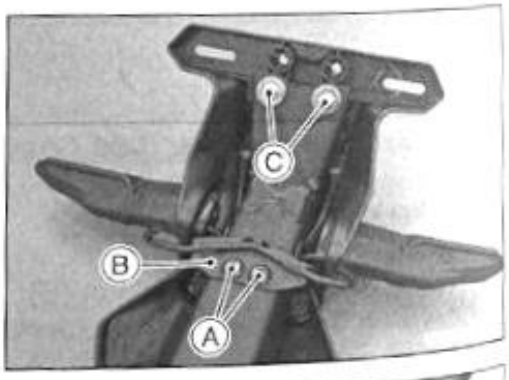
- Installation is the reverse of removal.
- Run the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).

Flap Disassembly

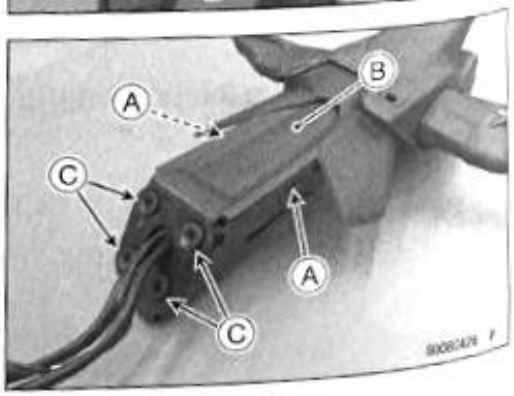
- Remove:
  Flap (see Flap Removal(15-31))
  Bolts [A] and Collars



- Remove:
  Bolts [A]
  Bracket [B]
  Screws [C] and Washers

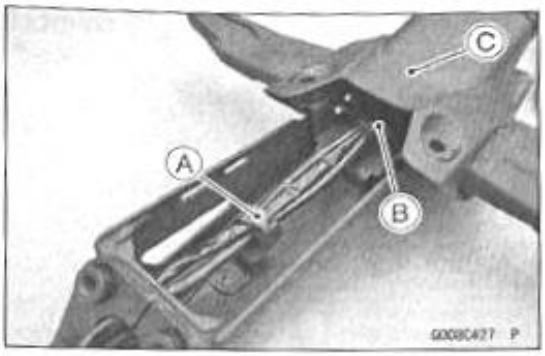


- Clear the hooks [A] of the cover from the slot of the bracket.
- Pull the cover [B] forward to clear the projections [C].

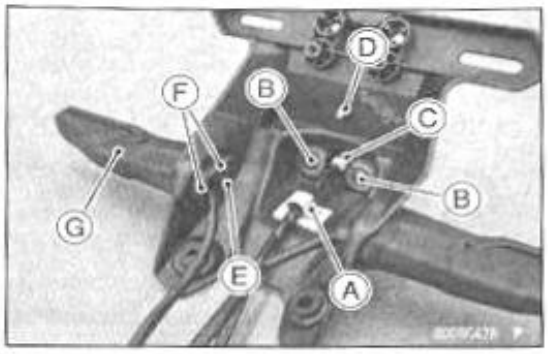


Fenders

- Open the clamp [A].
- Cut the band [B].
- Remove the flap [C].



- Free the license plate light lead from the clamp [A].
- Remove:
  Screws [B] and Washers
  License Plate Light [C]
  Reflector Nut [D] and Reflector
  Screw [E] (Both Sides)
  Washers [F] (Both Sides)
  Rear Turn Signal Light [G] (Both Sides)

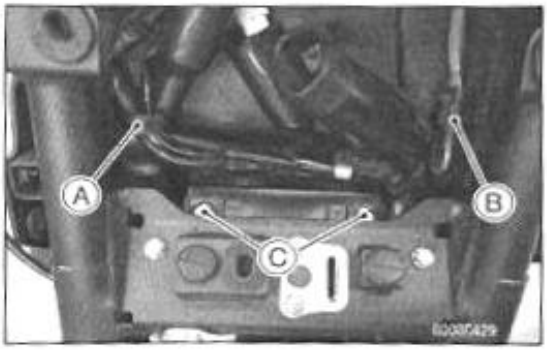


Flap Assembly

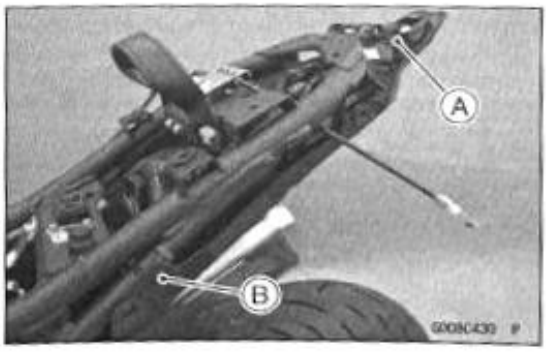
- Assembly is the reverse of disassembly.

Rear Fender Removal

- Remove:
  Flap (see Flap Removal(15-31))
- Open the clamp [A].
- Disconnect:
  Brake/Tail Light Connector [B]
- Remove the bolts [C].

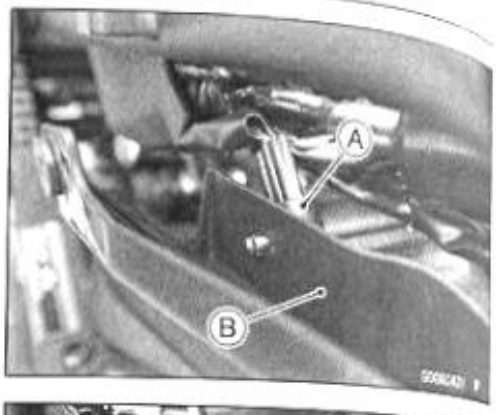


- Remove:
  Screw [A] (Both Sides)
  Bolt [B] (Both Sides)



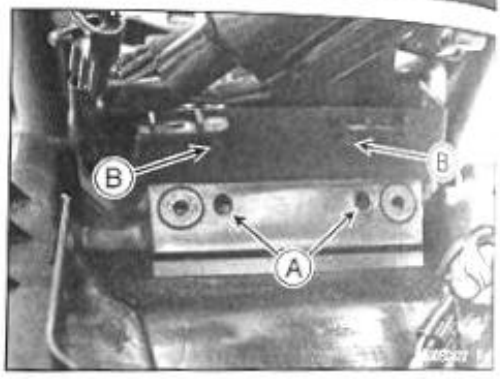
Fenders

- Remove the brake/tail light connector [A] from the rear fender [B].
- Remove the rear fender.



Rear Fender Installation

- Installation is the reverse of removal.
- Run the leads and cables correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Insert the holes [A] of the rear fender into the projections [B] of the battery case.



Frame Inspection

- Visually inspect the frame for cracks, dents, bending or warp.

★If there is any damage to the frame, replace it.

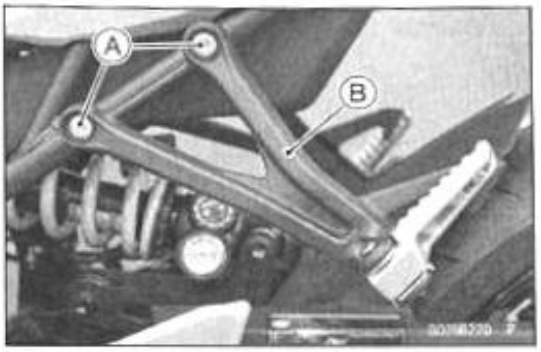
⚠ WARNING

A repaired frame may fail in use, possibly causing an accident resulting in injury or death. If the frame is bent, dented, cracked, or warped, replace it.

Rear Footpeg Bracket Removal

- Removal:

Muffler Body (Right Side Only) (see Muffler Body Removal(5-42))
Rear Footpeg Bracket Bolts [A]
Rear Footpeg Bracket [B]



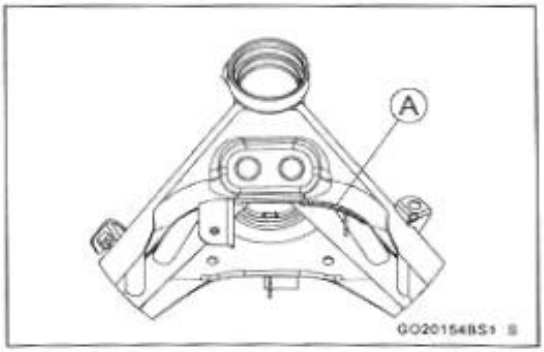
Rear Footpeg Bracket Installation

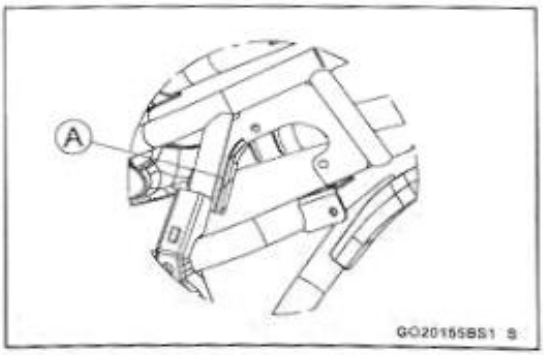
- Installation is the reverse of removal.
- Tighten:

Torque - Rear Footpeg Bracket Bolts: 25 N·m (2.5 kgf·m, 18 ft·lb)

Pad and Trim Installation

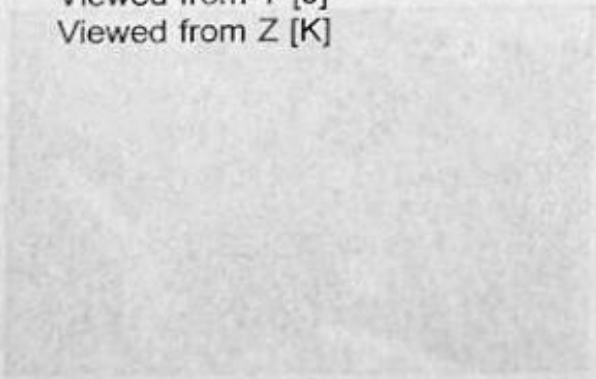
- Install the trims [A] are in place on the frame.

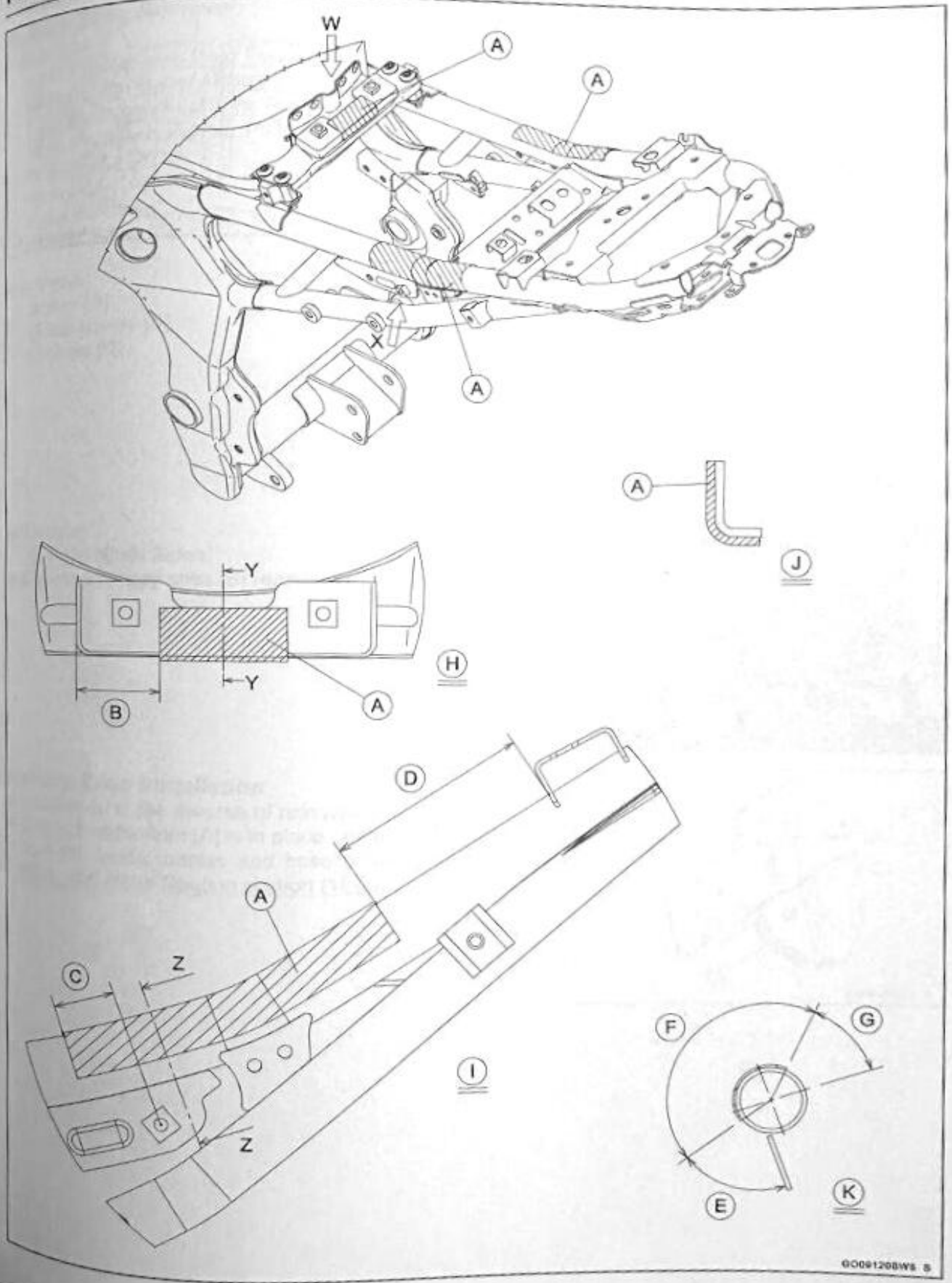




Frame

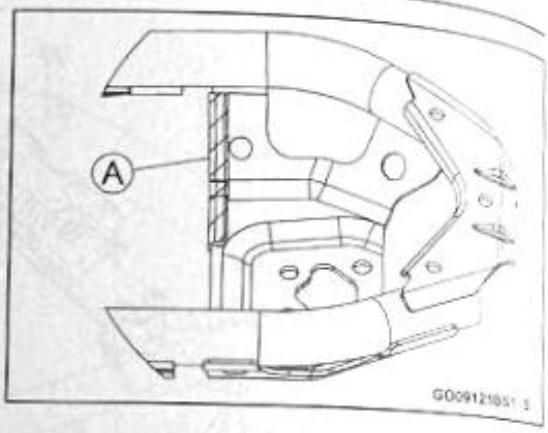
- Install the pads [A] are in place on the frame.
  30 mm (1.2 in.) [B]
  25 mm (0.98 in.) [C]
  74.5 mm (2.93 in.) [D]
  73° [E]
  151° [F]
  46° [G]
  Viewed from W [H]
  Viewed from X [I]
  Viewed from Y [J]
  Viewed from Z [K]




W
A
A
X
A
A
J
Y
Y
B
A
H
D
A
C
Z
Z
I
F
G
E
K
GD091208WS 5

Frame

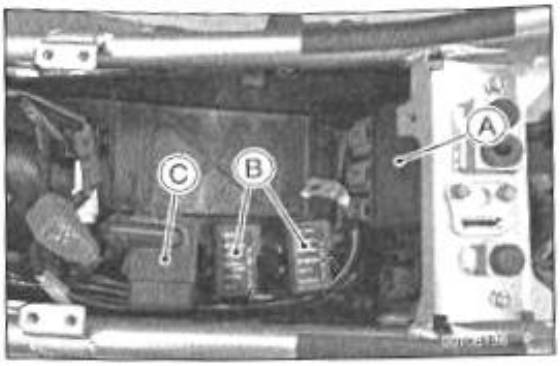
- Install the trim [A] is in place on the frame (USB Socket Equipped Models).



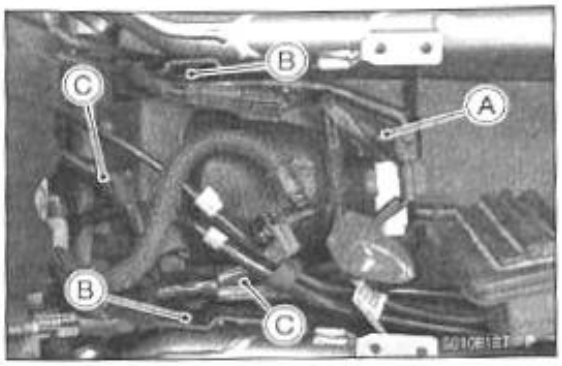
Battery Case

Battery Case Removal

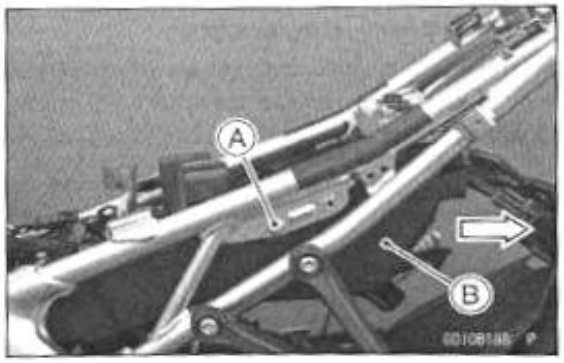
- Remove:
  Rear Fender (see Rear Fender Removal(15-33))
  Battery (see Battery Removal(16-20))
  Fuel Tank (see Fuel Tank Removal(3-35))
  Heat Insulation Rubber Plate (see Air Cleaner Housing Removal(3-31))
  Relay Box [A]
  Fuse Boxes [B]
  Starter Relay [C]



- Remove:
  Screw [A]
  Quick Rivets [B]
  Clamps [C]

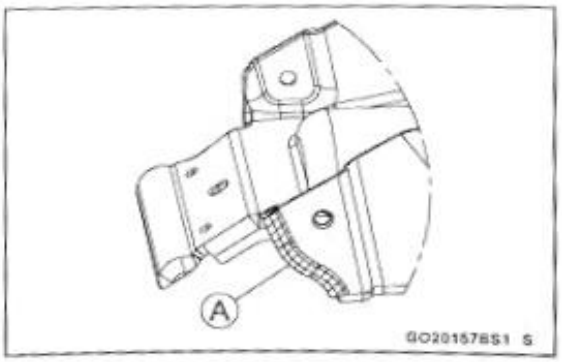


- Remove:
  Bolt [A] (Both Sides)
- Slide the battery case [B] rearward to remove it.



Battery Case Installation

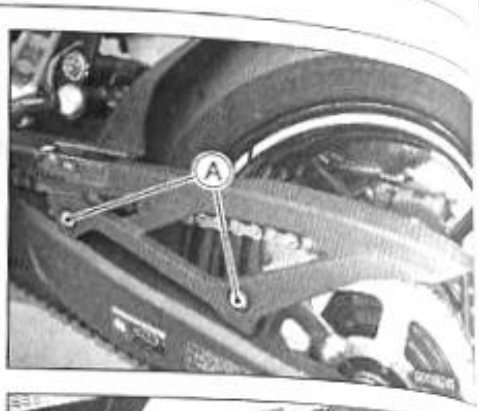
- Installation is the reverse of removal.
- Check that the trim [A] is in place on the battery case.
- Run the leads, cables and hose correctly (see Cable, Wire, and Hose Routing section (18-2)).



Guard

Mud Guard Removal

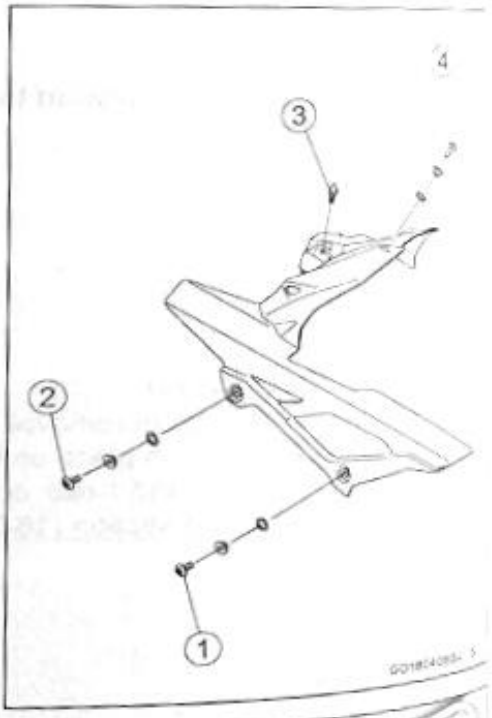
- Remove:
  Bolts [A], Collars and Washers
  Quick Rivet [B]
  Mud Guard [C]



Mud Guard Installation

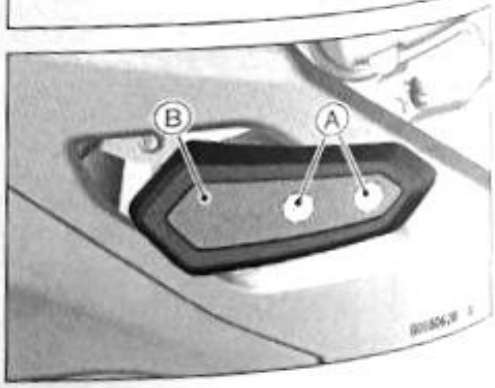
- Installation is the reverse of removal.
- Install the mud guard bolts and quick rivet in the specified sequence [1 – 4].

Torque - Mud Guard Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



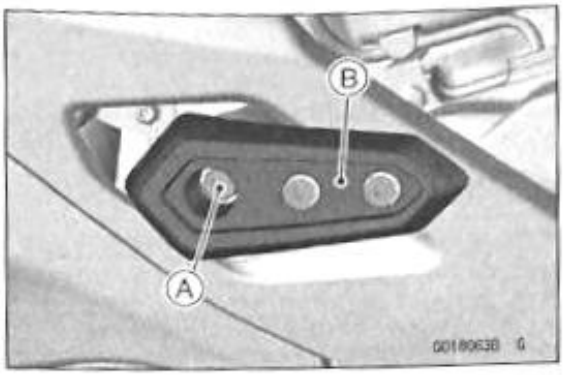
Slider Removal (Equipped Model)

- Remove:
  Bolts [A]
  Cover [B]

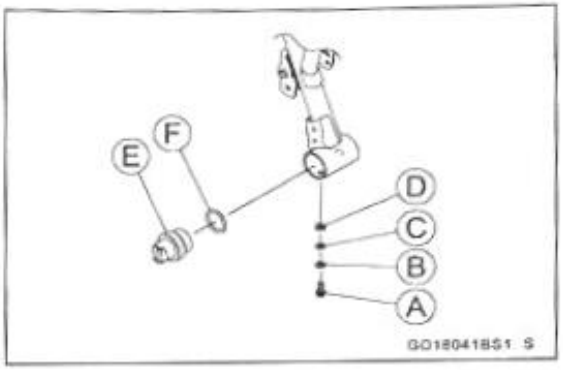


Guard

- Remove:
  Bolt [A] and Washer
  Slider [B]

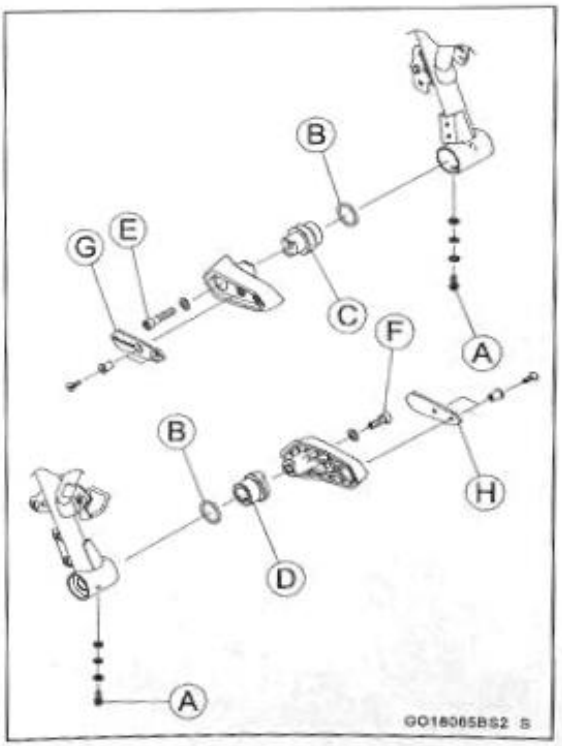


- Remove:
  Lower Fairing (see Lower Fairing Removal(15-18))
  Bolt [A]
  Spring Washer [B]
  Washer [C]
  Collar [D]
  Boss [E]
  O-ring [F]



Slider Installation (Equipped Models)

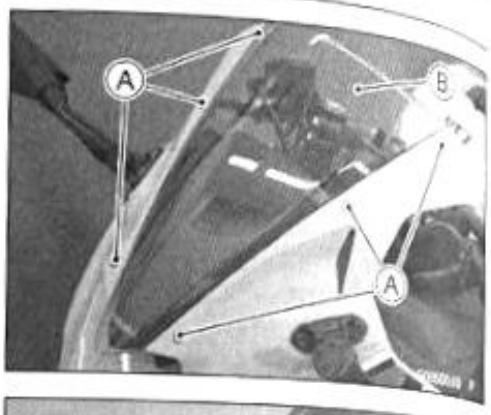
- Installation is the reverse of removal.
- Replace the bolts [A] and O-rings [B] with new ones.
- The following parts are different for left and right.
  Boss (Left) [C]
  Boss (Right) [D]
  Bolt (L = 40 mm) [E]
  Bolt (L = 22 mm) [F]
  Cover (Left) [G]
  Cover (Right) [H]



Windshield

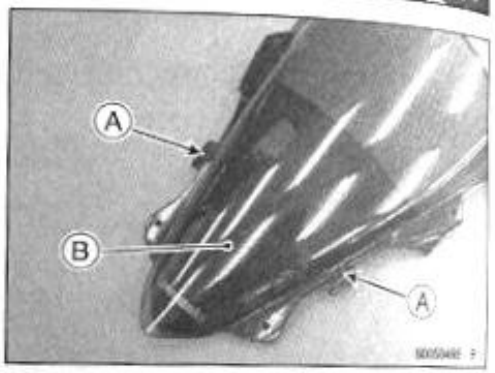
Windshield Removal

- Remove:
  Bolts [A] and Washers
  Windshield [B] with Windshield cover



Windshield Installation

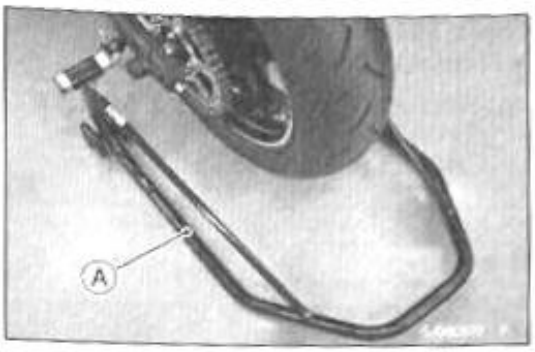
- Installation is the reverse of removal.
- Hang the hooks [A] of the windshield cover on the windshield [B].



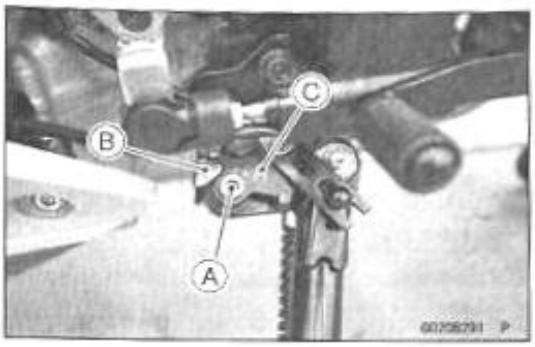
Side Stand

Side Stand Removal

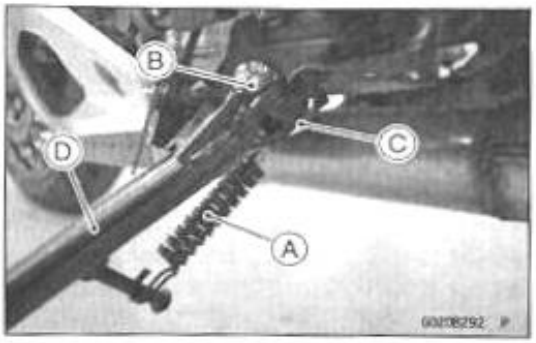
- Raise the rear wheel off the ground using a stand [A].



- Remove:
  Side Stand Switch Bolt [A]
  Bracket [B]
  Collar
  Damper
- Free the side stand switch [C].



- Remove:
  Spring [A]
  Side Stand Nut [B]
  Side Stand Bolt [C]
  Side Stand [D]



Side Stand Installation

- Apply grease to the sliding area [A] of the side stand [B].
- Replace the side stand nut [C] with a new one.
- Tighten the side stand bolt [D], and then lock it with the side stand nut.

Torque - Side Stand Bolt: 44 N·m (4.5 kgf·m, 32 ft·lb)
Side Stand Nut: 44 N·m (4.5 kgf·m, 32 ft·lb)

- Hook the spring [E] so that the long spring end faces upward.

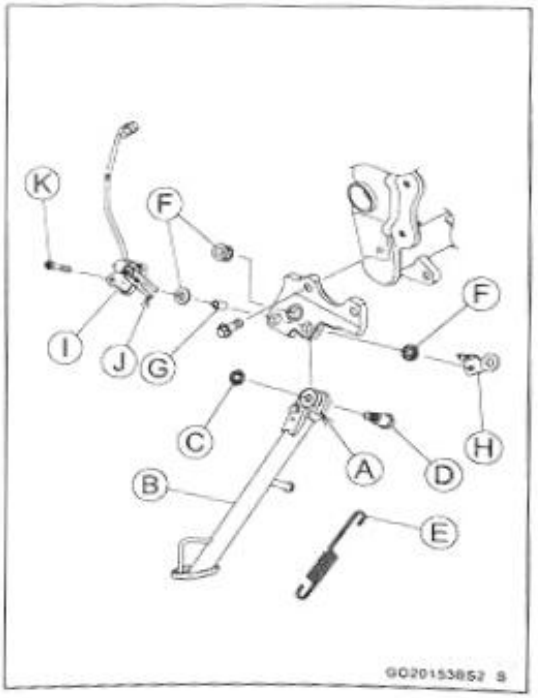
Install the spring hook direction as shown.

- Install:
  Dampers [F]
  Collar [G]
  Bracket [H]
  Side Stand Switch [I]

Insert the side stand switch arm [J] to the pin on the side stand.

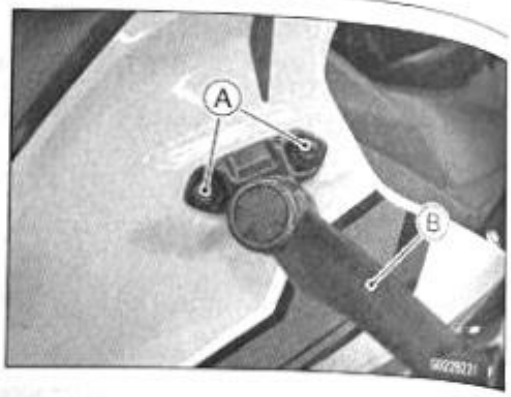
- Replace the side stand switch bolt [K] with a new one, and tighten it.

Torque - Side Stand Switch Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



Rear View Mirrors

Rear View Mirror Removal



- Remove:
  Rear View Mirror Bolts [A]
  Rear View Mirror [B]
  Bracket (ID and PH Models)

Rear View Mirror Installation

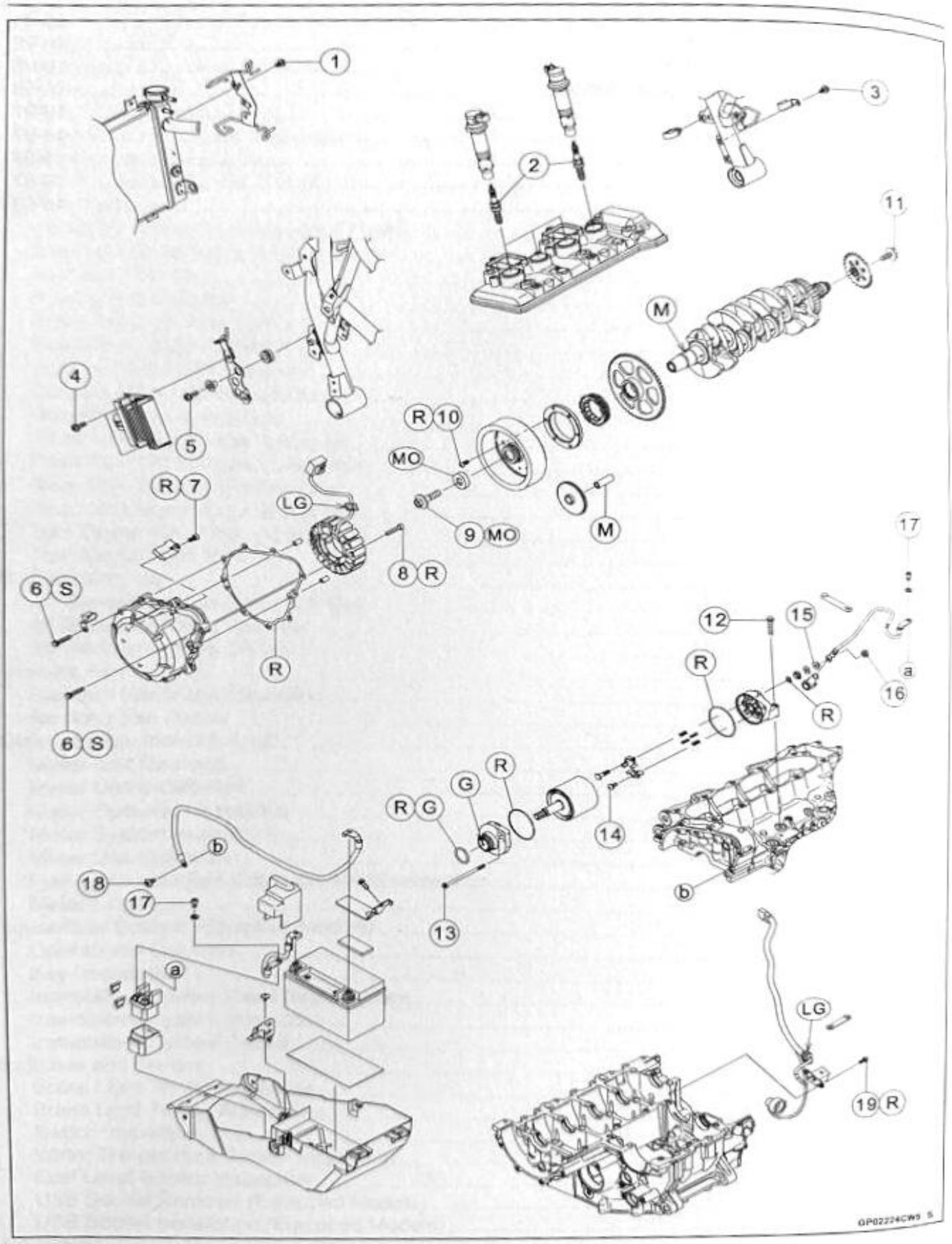
- Installation is the reverse of removal.
- Tighten:

Torque - Rear View Mirror Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

Electrical System

Table of Contents

Exploded View

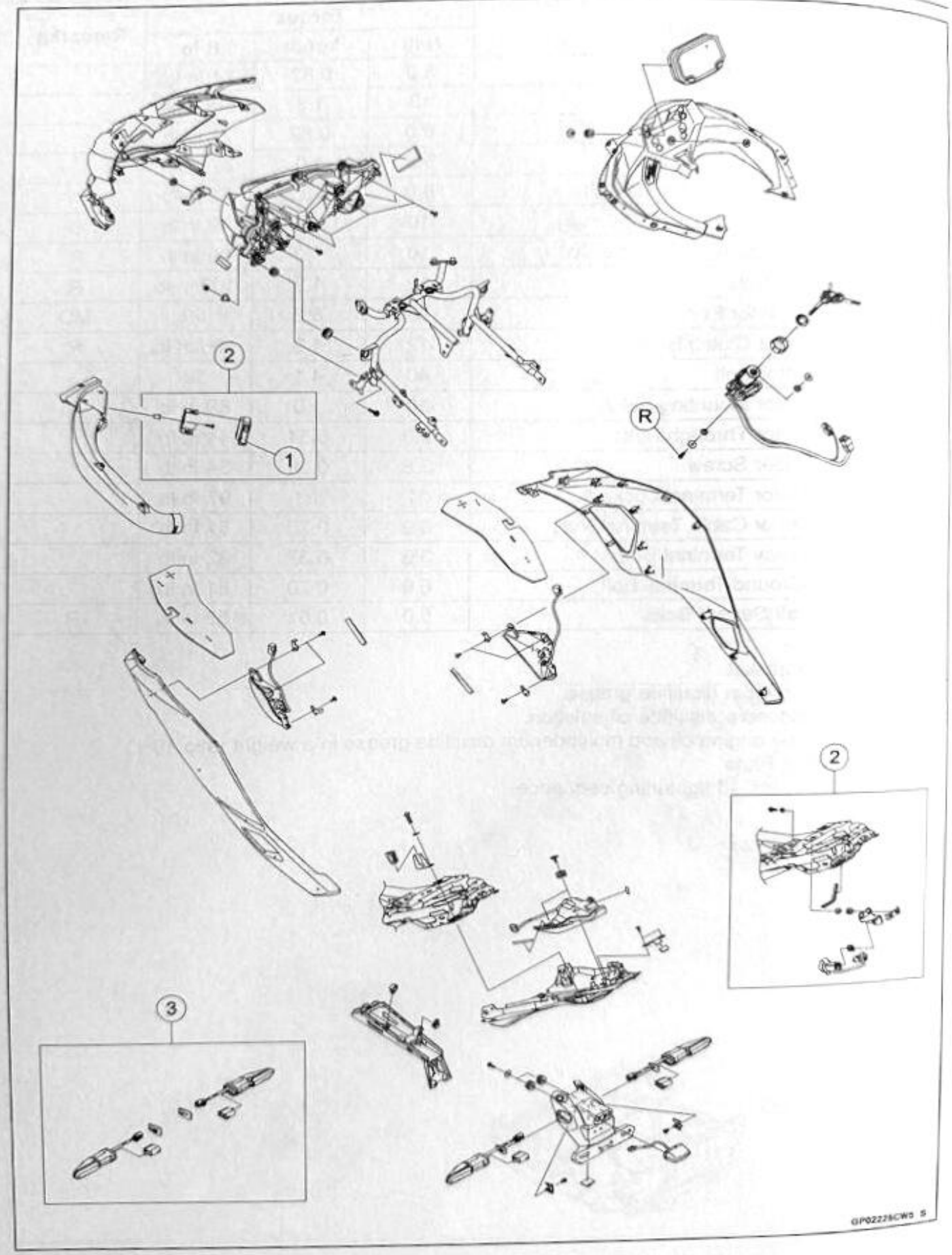


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connector Bracket Bolts	8.0	0.82	71 in·lb	
2	Spark Plugs	13	1.3	115 in·lb	
3	Clamp Mounting Bolt	8.0	0.82	71 in·lb	
4	Regulator/Rectifier Bolts	9.8	1.0	87 in·lb	
5	Regulator/Rectifier Bracket Bolts	8.0	0.82	71 in·lb	
6	Alternator Cover Bolts	10	1.0	89 in·lb	S
7	Alternator Lead Holding Plate Bolt	10	1.0	89 in·lb	R
8	Stator Coil Bolts	12	1.2	106 in·lb	R
9	Alternator Rotor Bolt	80	8.2	59	MO
10	Starter Motor Clutch Bolts	12	1.2	106 in·lb	R
11	Timing Rotor Bolt	40	4.1	30	
12	Starter Motor Mounting Bolts	10	1.0	89 in·lb	
13	Starter Motor Through Bolts	5.0	0.51	44 in·lb	
14	Brush Holder Screw	3.8	0.39	34 in·lb	
15	Starter Motor Terminal Locknut	11	1.1	97 in·lb	
16	Starter Motor Cable Terminal Nut	6.9	0.70	61 in·lb	
17	Starter Relay Terminal Bolts	3.6	0.37	32 in·lb	
18	Engine Ground Terminal Bolt	6.9	0.70	61 in·lb	
19	Crankshaft Sensor Bolts	6.0	0.61	53 in·lb	R

G: Apply grease.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution.
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1)
R: Replacement Parts
S: Follow the specified tightening sequence.

Exploded View

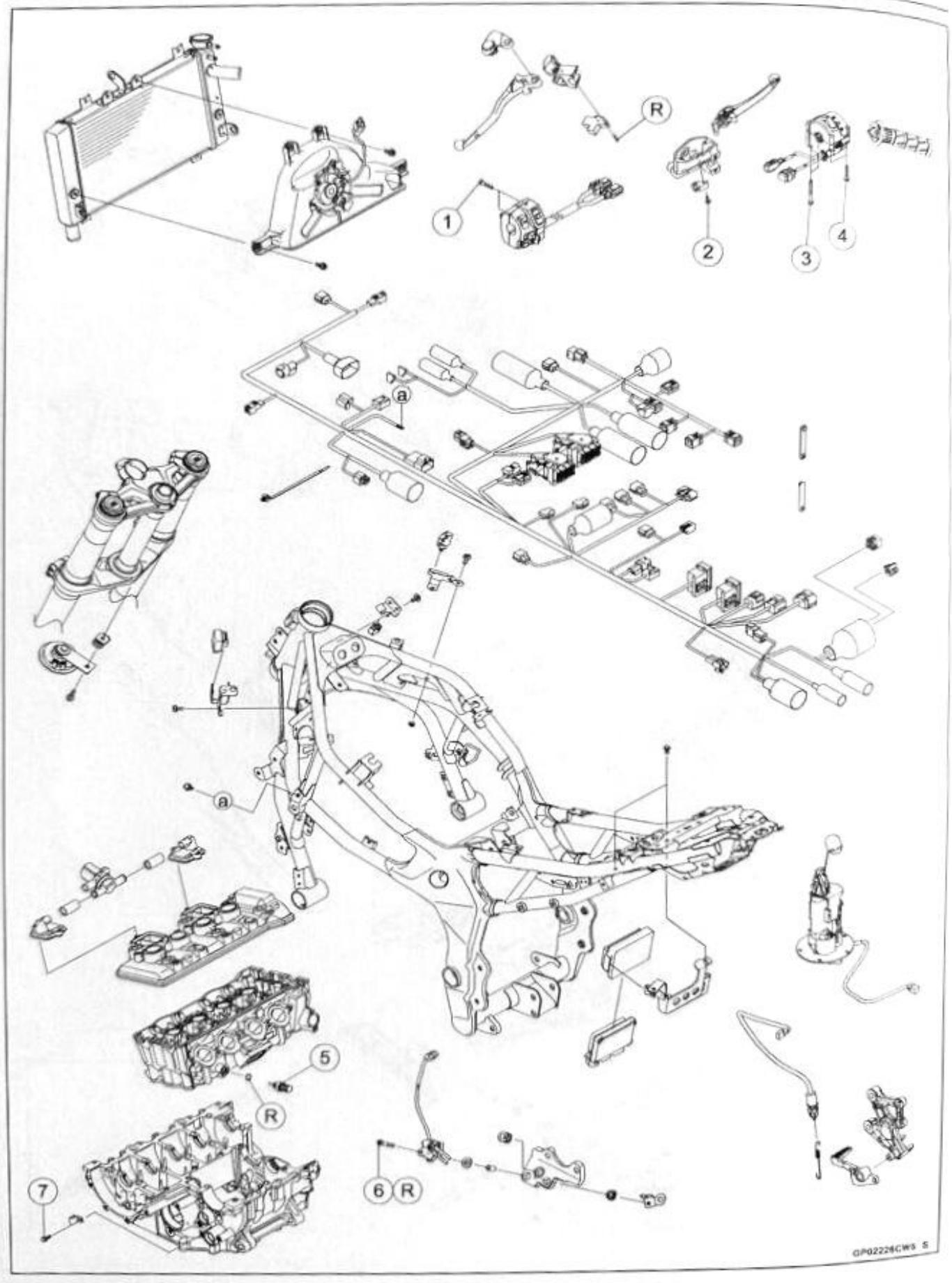


Exploded View

1. Immobilizer Amplifier (Equipped Models)
2. Equipped Models
3. CA and CAL Models

R: Replacement Parts

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Switch Housing Screws	3.5	0.36	31 in·lb	
2	Front Brake Light Switch Screw	1.2	0.12	11 in·lb	
3	Switch Housing Bolts (L = 50 mm)	3.5	0.36	31 in·lb	
4	Switch Housing Bolts (L = 30 mm)	3.5	0.36	31 in·lb	
5	Water Temperature Sensor	12	1.2	106 in·lb	
6	Side Stand Switch Bolt	8.8	0.90	78 in·lb	R
7	Side Stand Switch Lead Clamp Bolt	6.9	0.70	61 in·lb	

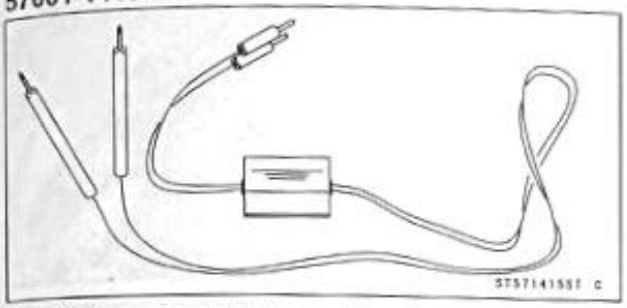
R: Replacement Parts

Specifications

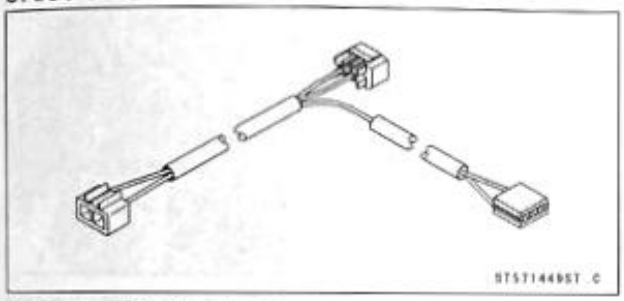
Item	Standard
Battery	
Type	Sealed Battery
Model Name	YTZ10
Capacity	12 V 8.6 Ah
Voltage	12.8 V or more
Gross Weight	3.2 kg (7.1 lb)
Electrolyte Volume	0.45 L (27 cu in.)
Charging System	
Alternator Type	Three-phase AC
Charging Voltage (Regulator/Rectifier Output Voltage)	14.5 – 14.9 V @25°C (77°F)
Alternator Output Voltage	AC 37.1 – 55.7 V @4 000 r/min (rpm)
Stator Coil Resistance	0.173 – 0.259 Ω @20°C (68°F)
Ignition System	
Crankshaft Sensor:	
Resistance	376 – 564 Ω @20°C (68°F)
Peak Voltage	3.2 V or more
Stick Coil:	
Primary Winding Resistance	1.19 – 1.61 Ω @20°C (68°F)
Secondary Winding Resistance	10.2 – 13.8 kΩ @20°C (68°F)
Primary Peak Voltage	140 V or more
Spark Plug:	
Type	NGK LMAR9G
Gap	0.7 – 0.8 mm (0.028 – 0.031 in.)
Electric Starter System	
Starter Motor:	
Brush Length	12.0 mm (0.47 in.) (Service Limit: 6.5 mm (0.26 in.))
Air Switching Valve	
Resistance	20 – 24 Ω @20°C (68°F)
Switches and Sensors	
Brake Light Switch Timing	ON after about 7 mm (0.28 in.) of pedal travel
Engine Oil Pressure Switch Connections	When engine is stopped: ON When engine is running: OFF
Water Temperature Sensor Resistance	in the text
Fuel Level Sensor Resistance:	
Full Level Position	9 – 11 Ω
Empty Level Position	213 – 219 Ω

Special Tools and Sealant

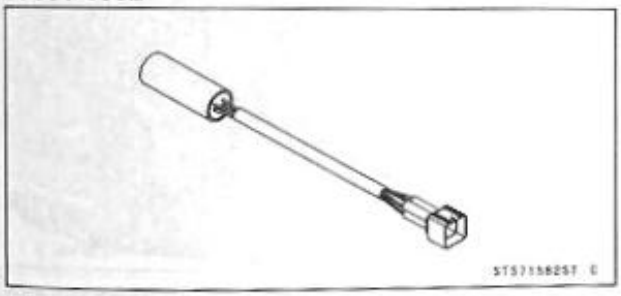
Peak Voltage Adapter:
57001-1415



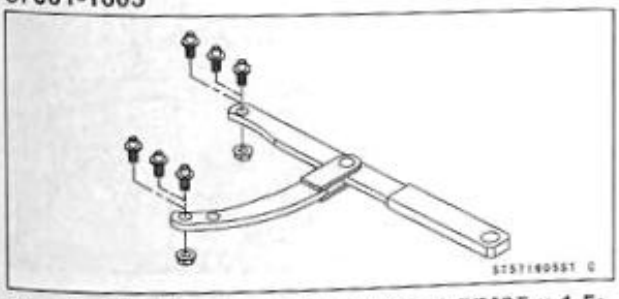
Lead Wire - Peak Voltage Adapter:
57001-1449



Key Registration Unit:
57001-1582

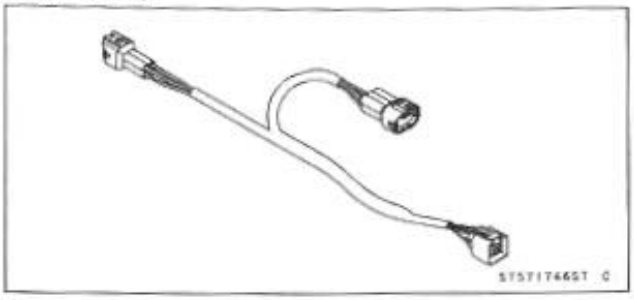


Flywheel & Pulley Holder:
57001-1605

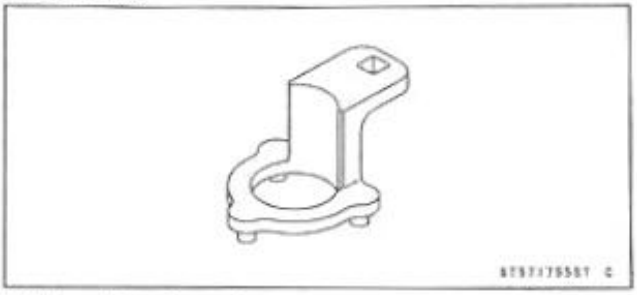


Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1615

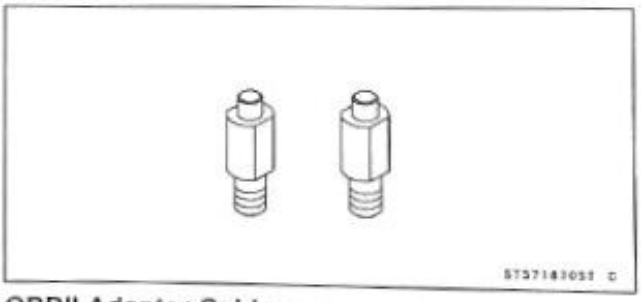
Key Registration Adapter:
57001-1746



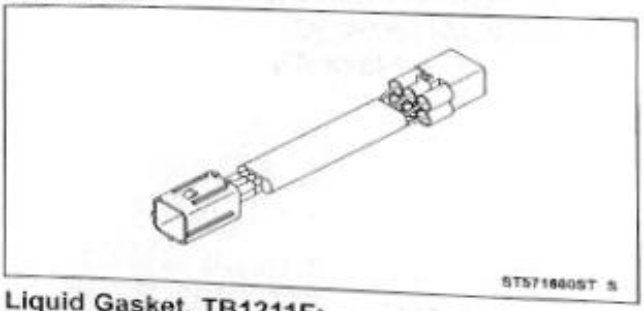
Rotor Holder:
57001-1755



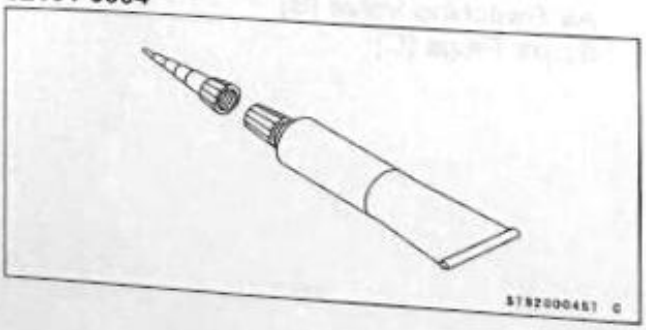
Holder Attachment:
57001-1870



OBDII Adapter Cable:
57001-1880

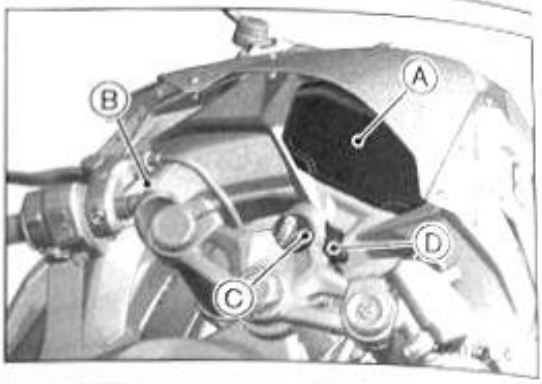


Liquid Gasket, TB1211F:
92104-0004

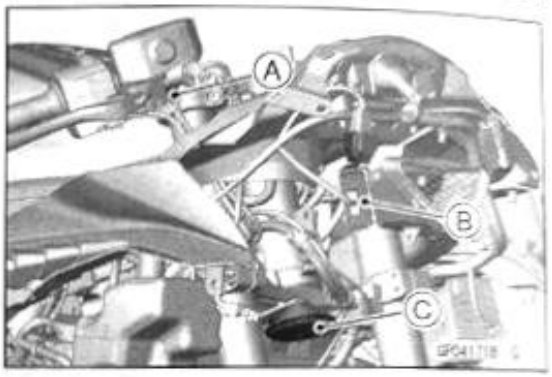


Parts Location

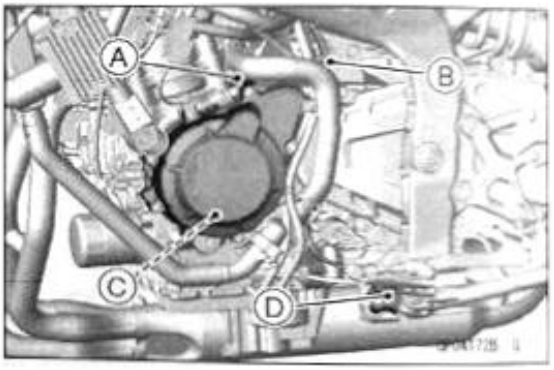
Meter Unit [A]
Starter Lockout Switch [B]
Immobilizer Antenna [C] (Equipped Models, included in Ignition Switch)
Ignition Switch [D]



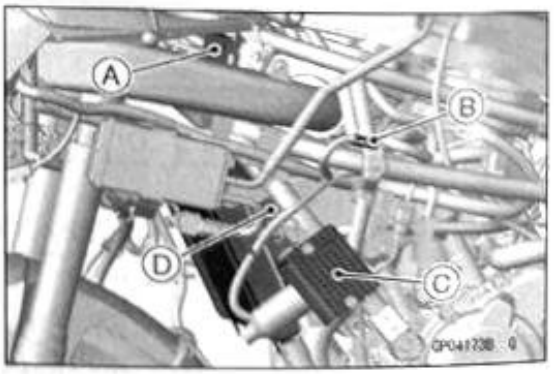
Front Brake Light Switch [A]
Immobilizer Amplifier [B] (Equipped Models)
Horn [C]



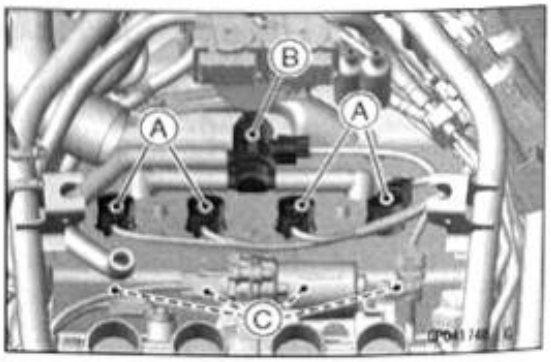
Starter Motor [A]
Engine Ground Terminal [B]
Alternator [C]
Side Stand Switch [D]



Turn Signal Relay [A]
Frame Ground Terminal [B]
Regulator/Rectifier [C]
Radiator Fan Motor [D]

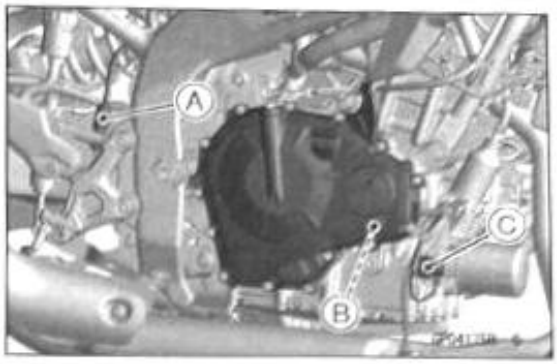


Stick Coils [A]
Air Switching Valve [B]
Spark Plugs [C]

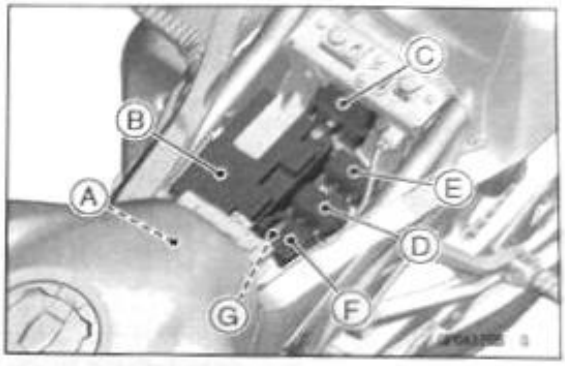


Parts Location

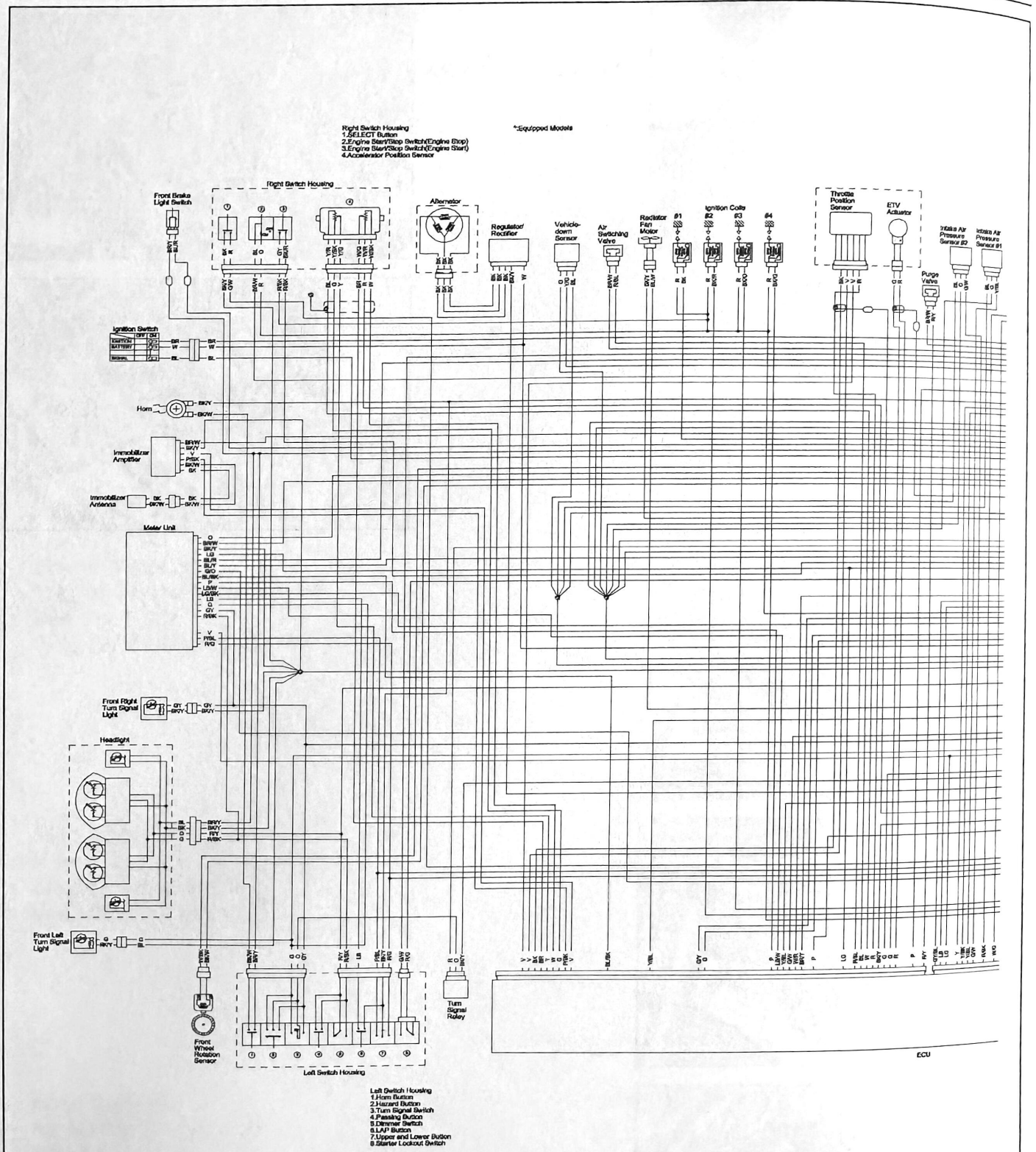
Rear Brake Light Switch [A]
Crankshaft Sensor [B]
Oil Pressure Switch [C]



Fuel Level Sensor [A]
Battery [B]
Relay Box [C]
Fuse Box (1) [D]
Fuse Box (2) [E]
Starter Relay [F]
Main Fuse 30 A [G] (in Starter Relay)



Wiring Diagram (with Immobilizer)



Left Switch Housing
1.Horn Button
2.Hazard Button
3.Turn Signal Switch
4.Passing Button
5.Dimmer Switch
6.LAP Button
7.Upper and Lower Button
8.Starter Lockout Switch

LEFT SWITCH HOUSING CONNECTIONS

Horn Button			Hazard Switch				Turn Signal Switch				Passing Button			Dimmer Switch			LAP Button			Upper and Lower Button				Starter Lockout Switch		
Color	BR/W	BK/W	Color	G	O	GY	Color	G	O	GY	Color	R/Y	BK/R	Color	R/Y	BK/R	Color	G/BK	BK/Y	Color	P	BK/Y	Y/R	Color	BK	R
Free			OFF				Left				OFF			HI			Free			Upper				Clutch Lever		
Push			ON(Push)				OFF(Push)				ON(Push)						Push			Free				Released		
Released							Right							LO						Lower				Pulled In		

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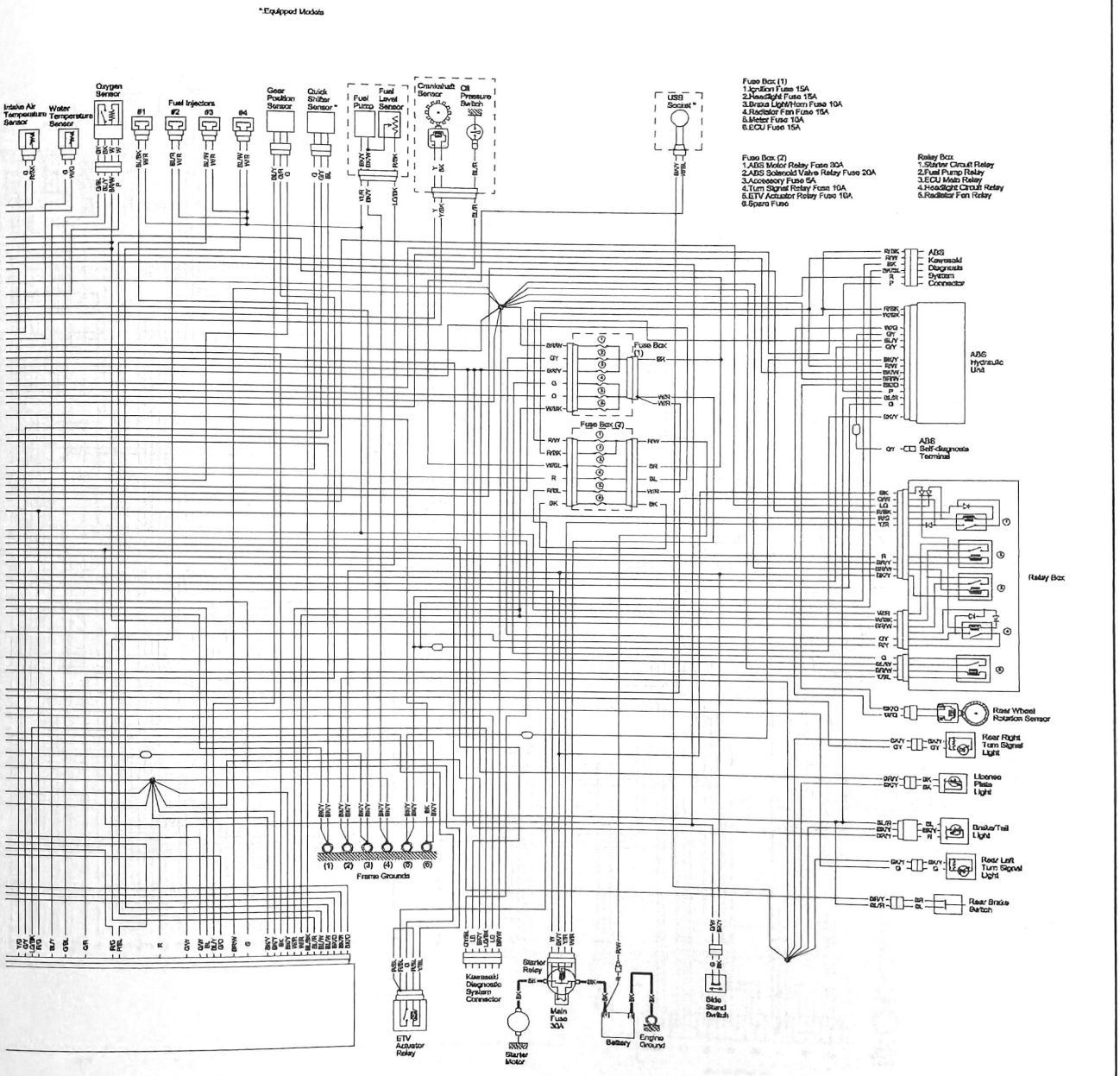
Wiring Diagram (with Immobilizer)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF/LOCK			
ON			

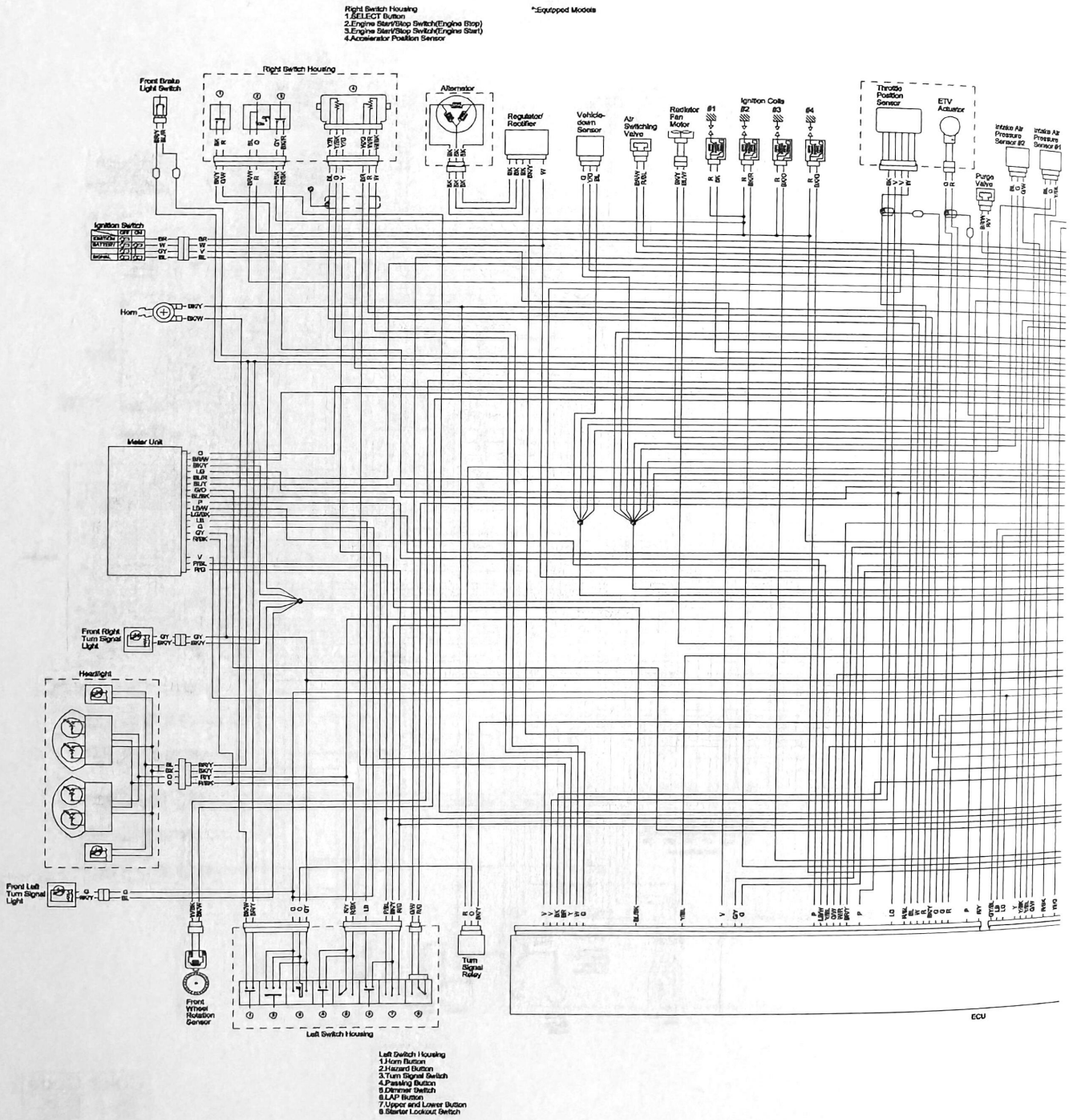
RIGHT SWITCH HOUSING CONNECTIONS							
SELECT Button			Engine Start/Stop Switch				
Color	BK	R		Stop		Start	
Free			Color	BL	O	GY	BK/R
Push			OFF				
			ON				

Color Code	
BE	Beige
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

(98052-1641B)

W2R1641ZW5 S

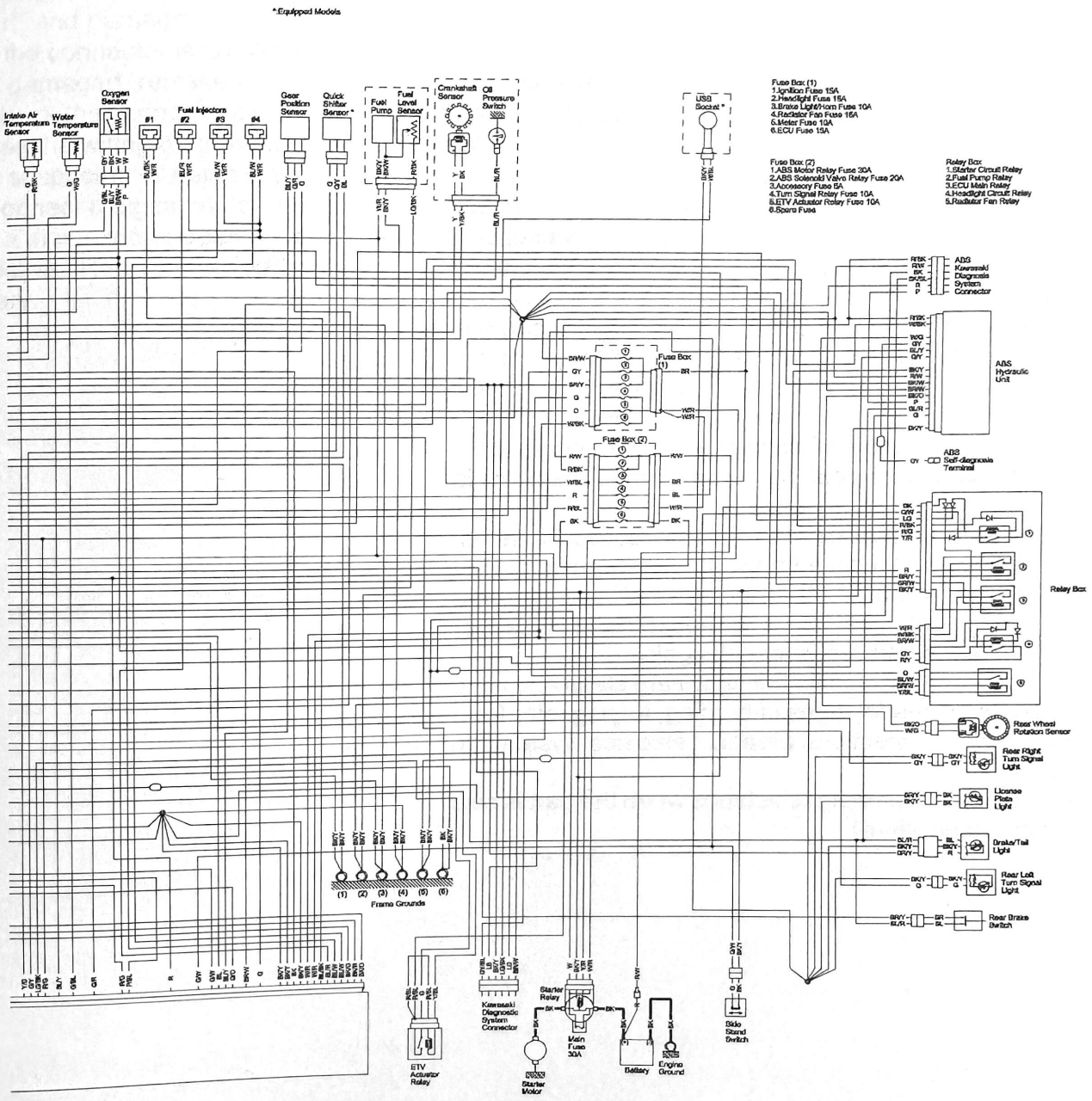
Wiring Diagram (without Immobilizer)



LEFT SWITCH HOUSING CONNECTIONS

Horn Button				Hazard Switch				Turn Signal Switch				Passing Button			Dimmer Switch			LAP Button			Upper and Lower Button				Starter Lockout Switch		
Color	BR/W	BK/W		Color	G	O	GY	Color	G	O	GY	Color	R/Y	BK/R	Color	R/Y	BK/R	Color	G/BK	BK/Y	Color	P	BK/Y	Y/R	Color	BK	R
Free				OFF				Left				OFF			HI			Free			Upper				Clutch Lever		
Push				ON(Push)				OFF(Push)				ON(Push)						Push			Free				Released		
Released								Right							LO						Lower				Pulled In		

Wiring Diagram (without Immobilizer)



IGNITION SWITCH CONNECTIONS			
	Battery	Ignition	Signal
Color	W	BR	BL
OFF/LOCK			
ON	●	●	●

RIGHT SWITCH HOUSING CONNECTIONS							
SELECT Button			Engine Start/Stop Switch				
Color	BK	R		Stop		Start	
Free			Color	BL	O	GY	BK/R
Push	●	●	OFF				
			ON	●	●	●	●

Color Code	
BE	Beige
BK	Black
BL	Blue
BR	Brown
G	Green
GY	Gray
LB	Light Blue
LG	Light Green
O	Orange
P	Pink
PU	Purple
R	Red
V	Violet
W	White
Y	Yellow

(98052-1690B)

W2R1690BW5 S

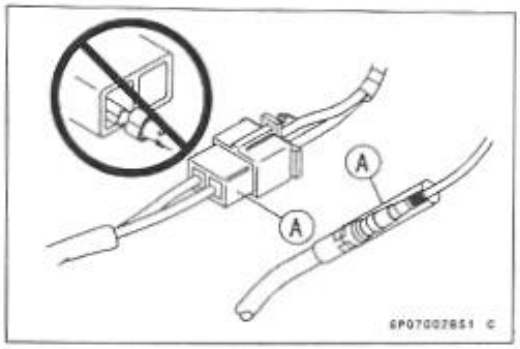
Precautions

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

- ○Do not reverse the battery cable connections. This will burn out the diodes on the electrical parts.
- ○Always check battery condition before condemning other parts of an electrical system. A fully charged battery is a must for conducting accurate electrical system tests.
- ○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.
- ○To prevent damage to electrical parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.
- ○Because of the large amount of current, never keep the engine start/stop switch slided when the starter motor will not turn over, or the current may burn out the starter motor windings.
- ○Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- ○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 or items, they 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 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.

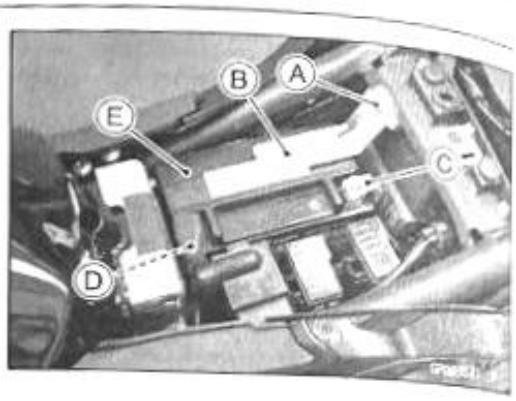
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect a digital meter between the ends of the leads.

★If a digital meter does not read about 0 Ω, the lead is defective. Replace the lead or the wiring harness if necessary.

Battery

Battery Removal

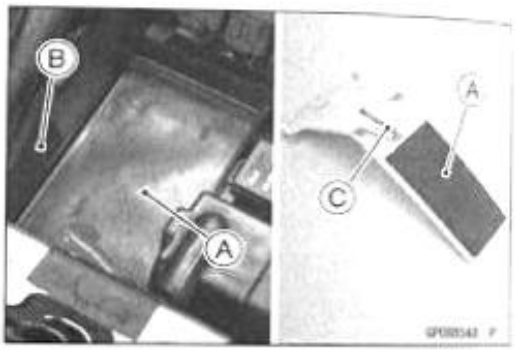


- Turn the ignition switch off.
- Remove:
  Front Seat (see Front Seat Removal(15-16))
  Bolt [A]
  Holder [B]
- Disconnect the negative (–) cable [C].

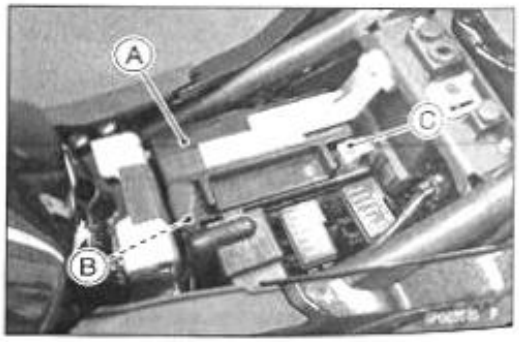
NOTICE
Be sure to disconnect the negative (–) cable first.

- Slide the red cap and disconnect the positive (+) cable [D].
- Remove the battery [E].

Battery Installation



- Be sure that the ignition switch is turned off.
- Check that the pads [A] are in place.
  Battery Case [B]
  Holder [C]



- Put the battery [A] into the battery case.
- Install the positive (+) cable [B] first.
- Install the negative (–) cable [C].

NOTE

○*When connecting the battery negative (–) cable, be sure to tighten the terminal bolt while pressing the battery cable terminal against the battery terminal.*

- Apply a light coat of grease on the terminals to prevent corrosion.
- Cover the positive (+) terminal with the cap.
- Install the removed parts.

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
   If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge(16-21)).
   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 store it with the negative cable removed. Give a refresh charge **once a month** during storage.

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).

⚠ DANGER

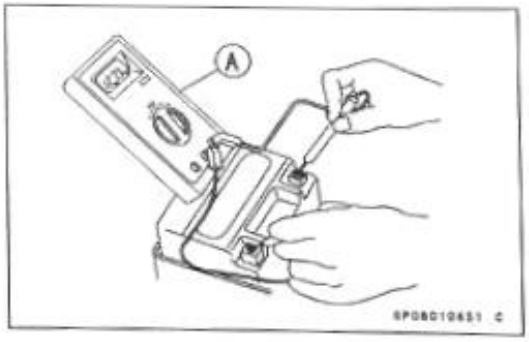
Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents 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



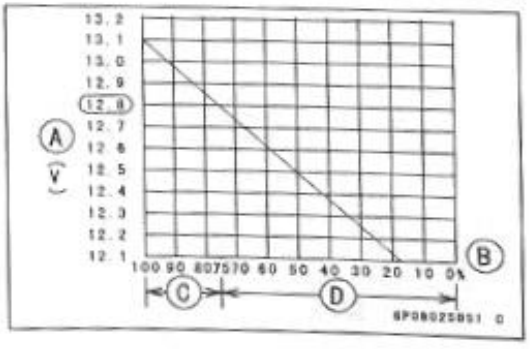
OBattery charging condition can be checked by measuring battery terminal voltage with a digital meter [A].

- Remove:
  Battery (see Battery Removal(16-20))
- Measure the battery terminal voltage.

NOTE

O*Measure with a digital voltmeter which can be read one decimal place voltage.*

★If the reading is 12.8 V or more, no refresh charge is required, however, if the read is below the specified, refresh charge is required.



Battery Terminal Voltage
Standard: 12.8 V or more

Terminal Voltage (V) [A]
Battery Charge Rate (%) [B]
Good [C]
Refresh charge is required [D]

Refreshing Charge

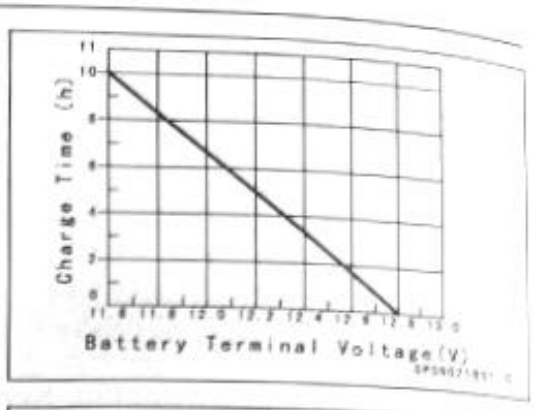
- Remove the battery (see Battery Removal(16-20)).
- Do refresh charge by following method according to the battery terminal voltage.

⚠ WARNING

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

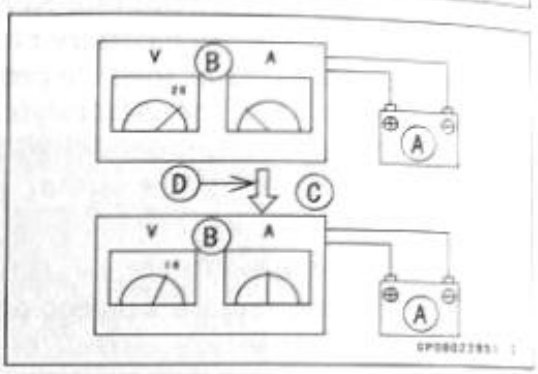
Battery

Terminal Voltage: 11.5 – less than 12.8 V
Standard Charge
(see following chart): 0.9 A × 5 – 10 h
Quick Charge: 4.5 A × 1 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: 0.9 A × 20 h



NOTE

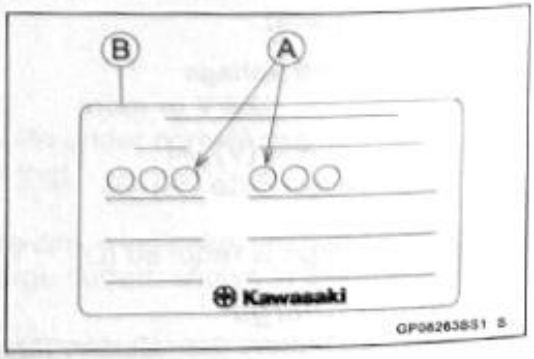
○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current decrease the voltage and charge by the standard charging 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]

• 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.

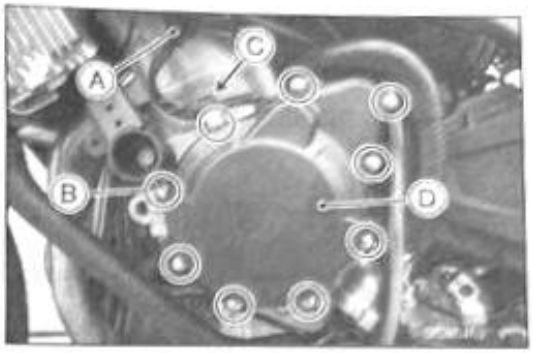
Criteria	Judgement
12.8 V or higher	Good
12.0 – lower than 12.8 V	Charge insufficient → Recharge
lower than 12.0 V	Unserviceable → Replace

• After recharging, record [A] the charging date and the name of person in charge of this job to the battery recharging record label [B] if necessary.



Alternator Cover Removal

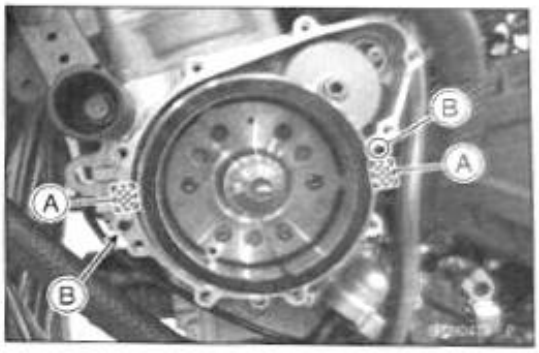
- Drain:
  Engine Oil (see Engine Oil Change(2-35))
- Remove:
  Left Lower Fairing (see Lower Fairing Removal(15-18))
- Disconnect the alternator connector [A].
- Place a suitable container under the alternator cover.
- Remove:
  Alternator Cover Bolts [B]
  Clamp [C]
  Alternator Cover [D]



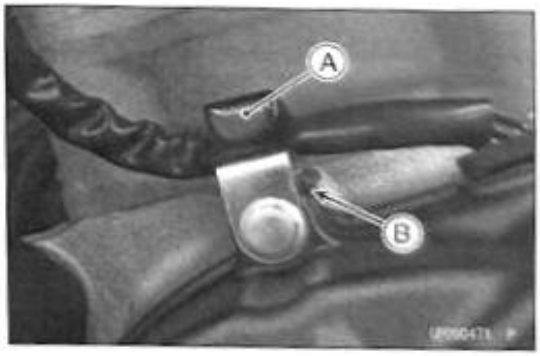
Alternator Cover Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the mating surface. Dry them with a clean cloth.
- Apply liquid gasket to the alternator lead grommet and crankcase halves mating surface [A] on the front and rear sides of the cover mount.

  Sealant - Liquid Gasket, TB1211F: 92104-0004
- Check that the dowel pins [B] are in place on the crankcase.
- Replace the alternator cover gasket with a new one.

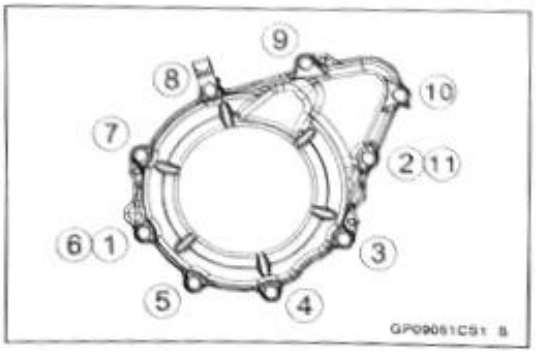


- Install the alternator cover.
- When installing the clamp [A], fit them to the projection [B] of the alternator cover.



- Tighten the alternator cover bolts following the specified tightening sequence [1 – 11].

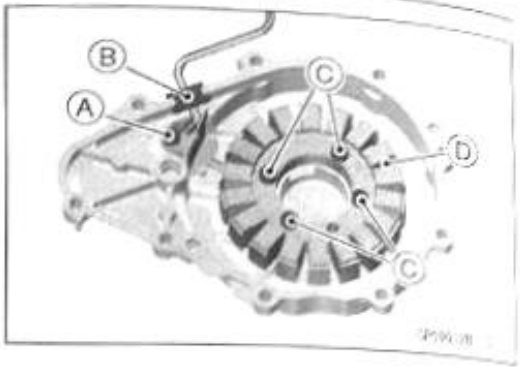
  Torque - Alternator Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)



- Run the alternator lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

Charging System

Stator Coil Removal

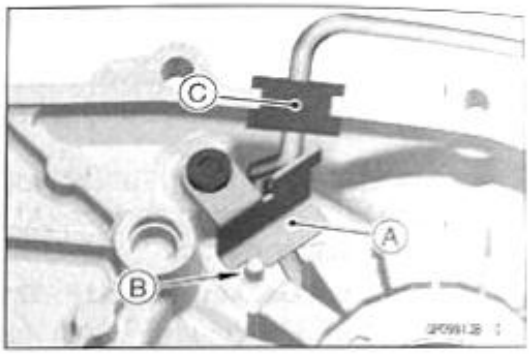


- Remove:
  Alternator Cover (see Alternator Cover Removal(16-23))
  Alternator Lead Holding Plate Bolt [A] and Plate
  Alternator Lead Grommet [B]
  Stator Coil Bolts [C]
- Remove the stator coil [D] from the alternator cover.

Stator Coil Installation

- Replace the stator coil bolts with new ones and tighten them.

  Torque - Stator Coil Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



- Secure the alternator lead with the holding plate [A].

OFit the notch of the holding plate in the boss [B] on the alternator cover.

- Replace the alternator lead holding plate bolt with a new one and tighten it.

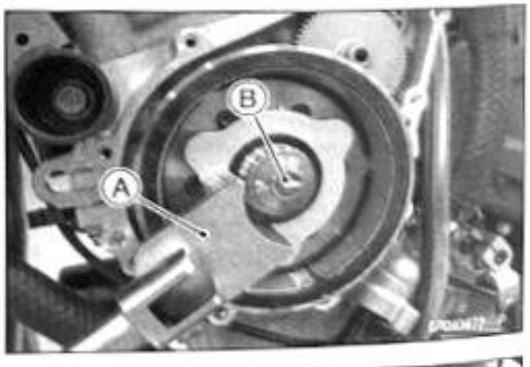
  Torque - Alternator Lead Holding Plate Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket to the circumference of the alternator lead grommet [C], and fit the grommet into the notch of the cover securely.

  Sealant - Liquid Gasket, TB1211F: 92104-0004

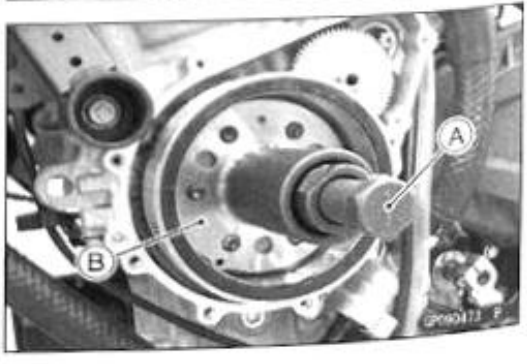
- Install the removed parts.

Alternator Rotor Removal



- Remove:
  Alternator Cover (see Alternator Cover Removal(16-23))
- Hold the alternator rotor steady with the rotor holder [A].
- Remove the rotor bolt [B] and washer.

  Special Tool - Rotor Holder: 57001-1755



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

  Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1615

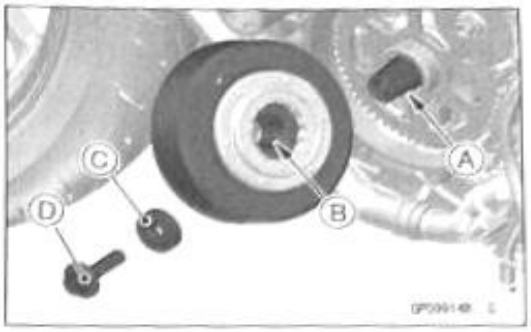
NOTICE

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

Alternator Rotor Installation

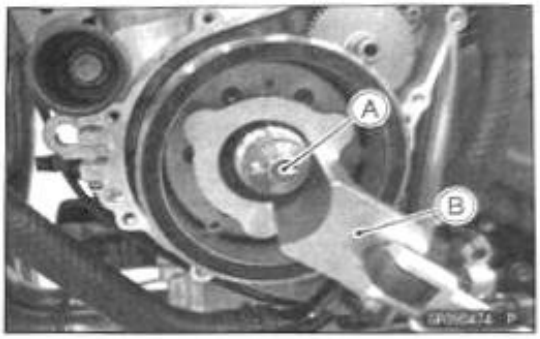
- Using a high flash-point solvent, clean off any oil or dirt on the following parts and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
  Washer [C]
  Alternator Rotor Bolt [D]
- Apply molybdenum disulfide oil solution to the bolt threads and the washer.
- Install:
  Alternator Rotor
  Washer
  Alternator Rotor Bolt

○The washer faces with its chamfered side outward.



- Tighten the alternator rotor bolt [A] with 80 N·m (8.2 kgf·m, 59 ft·lb) of torque.

Special Tool - Rotor Holder [B]: 57001-1755



- Remove the rotor bolt and washer.
- Check the tightening torque using the flywheel puller [A].

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1615

★If the rotor is not pulled out with 10 N·m (1.0 kgf·m, 89 in·lb) of drawing torque, it is installed correctly.

★If the rotor is pulled out with under 10 N·m (1.0 kgf·m, 89 in·lb) of drawing torque, clean off any oil dirt or flaw of the crankshaft and rotor tapered portion, and dry them with a clean cloth. Then reinstall it, and confirm that it cannot pulled out with above torque.

- Install the washer and the alternator rotor bolt [A].

○The washer faces with its chamfered side outward.

- Tighten the alternator rotor bolt.

Special Tool - Rotor Holder [B]: 57001-1755

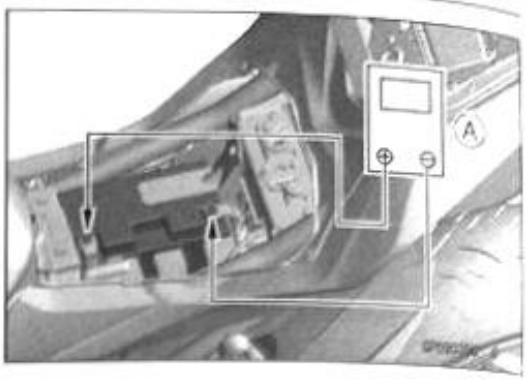
Torque - Alternator Rotor Bolt: 80 N·m (8.2 kgf·m, 59 ft·lb)

- Install the removed parts.

Charging System

Charging Voltage Inspection

- Check the battery condition (see Charging Condition Inspection(16-21)).
- Warm up the engine to obtain actual alternator operating conditions.
- Remove the front seat (see Front Seat Removal(15-16)).
- Check that the ignition switch is turned off, and connect a digital meter [A] to the battery terminals.



- Start the engine, and note the voltage readings at various engine speeds (except idling engine speed) with the headlight turned on and then turned off (To turn off the headlight, disconnect the headlight connector on the headlight unit.). 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.

Charging Voltage **@25°C (77°F)**

Connections		Reading
Digital Meter (+) to	Digital Meter (–) to	
Battery (+)	Battery (–)	DC 14.5 – 14.9 V

- Turn off the ignition switch to stop the engine, and disconnect a 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, then 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.

Alternator Inspection

There are three types of alternator failures: 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 alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.

Charging System

• To check the alternator output voltage, do the following procedures.
○Turn the ignition switch off.
○Disconnect the alternator connector [A].
○Connect a digital meter as shown in the table 1.
○Start the engine.
○Run it at the rpm given in the table 1.
○Note the voltage readings (total 3 measurements).

Table 1 Alternator Output Voltage **@4 000 r/min (rpm)**

Connections		Reading
Digital Meter (+) to	Digital Meter (–) to	
One Black Lead	Another Black Lead	AC 37.1 – 55.7 V

★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, stop the engine and inspect the stator coil resistance.

• Check the stator coil resistance as follows.
○Stop the engine.
○Connect a digital meter as shown in the table 2.
○Note the readings (total 3 measurements).

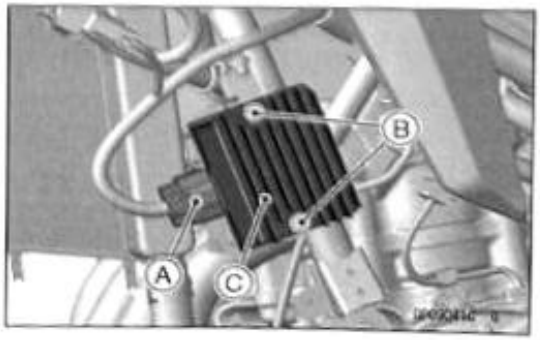
Table 2 Stator Coil Resistance **@20°C (68°F)**

Connections		Reading
Digital Meter (+) to	Digital Meter (–) to	
One Black Lead	Another Black Lead	0.173 – 0.259 Ω

○Use a digital meter that can measure the standard value.

★If there is more resistance than shown in the table, or no digital meter reading (infinity) for any two leads, the stator has an open lead and must be replaced. Much less than this resistance means the stator is shorted, and must be replaced.
• Measure the resistance between each of the white leads and chassis ground.
★Any digital meter 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 magnets have probably weakened, and the rotor must be replaced.

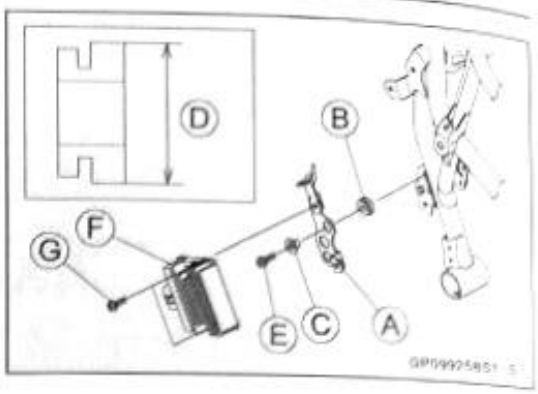
Regulator/Rectifier Removal



• Remove:
Left Lower Fairing (see Lower Fairing Removal(15-18))
• Disconnect the connector [A].
• Remove:
Regulator/Rectifier Bolts [B]
Regulator/Rectifier [C]

Charging System

Regulator/Rectifier Installation



- When installing the regulator/rectifier bracket [A], note the followings.
  Grommets [B]
  Collars [C]

○The grommets are installed with the large diameter side [D] facing inward.

- Tighten:

Torque - Regulator/Rectifier Bracket Bolts [E]: 8.0 N·m (0.82 kgf·m, 71 in·lb)

- Install:
  Regulator/Rectifier [F]
- Tighten:

Torque - Regulator/Rectifier Bolts [G]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Install the removed parts.

Regulator/Rectifier Inspection

- Follow the Charging System Troubleshooting shown below.

Charging System Troubleshooting

- Before inspection, remove all accessories that consume electrical power.

NOTE

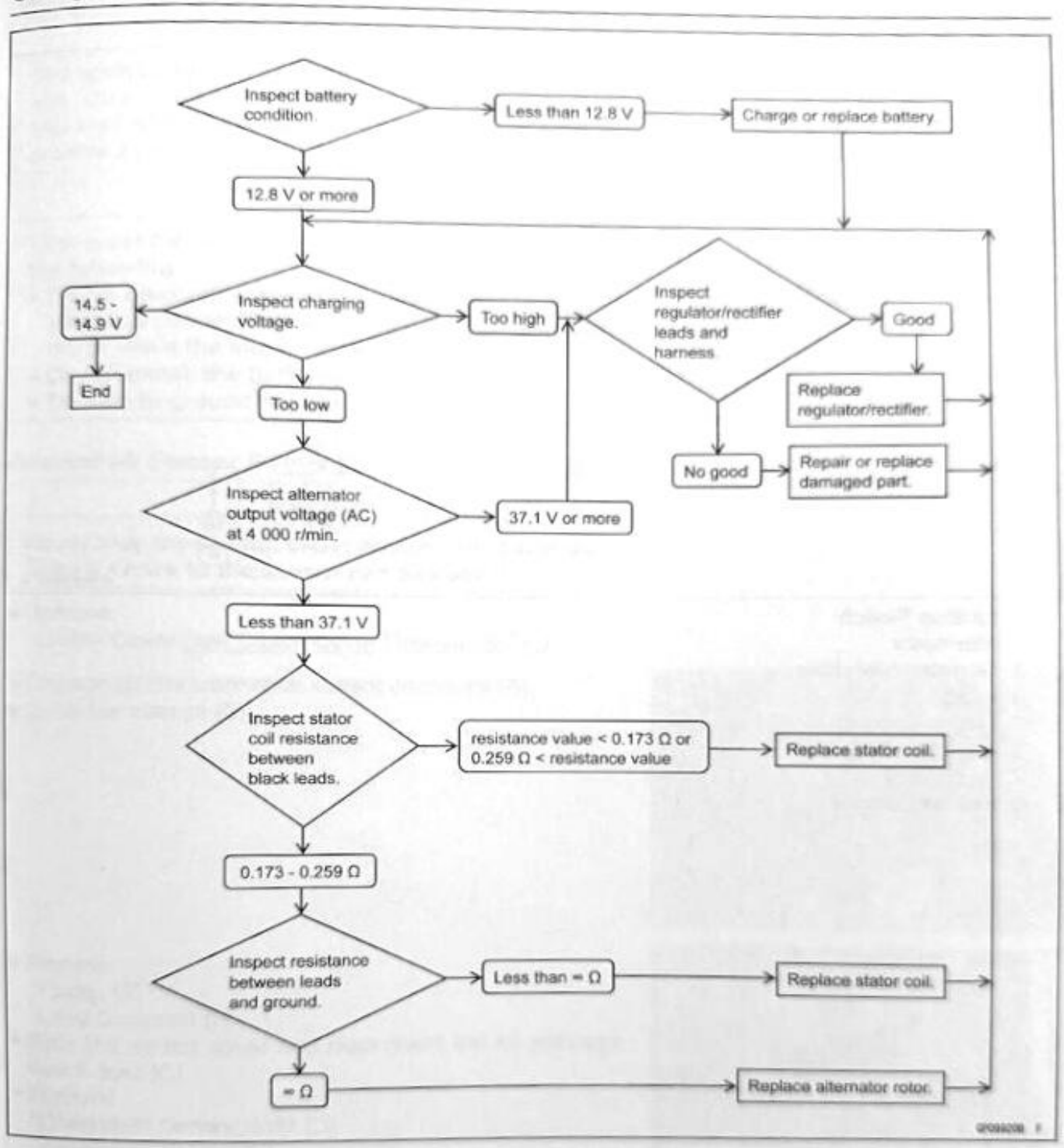
○*Even when the charging system is working properly, the battery may discharge if the motorcycle is equipped with too many accessories.*

- Pay attention to riding conditions and the customer's riding habits which could affect the charging system such as:

Frequent use at low engine speed
Frequent and unnecessary brake pedal dragging
→ Battery Discharged

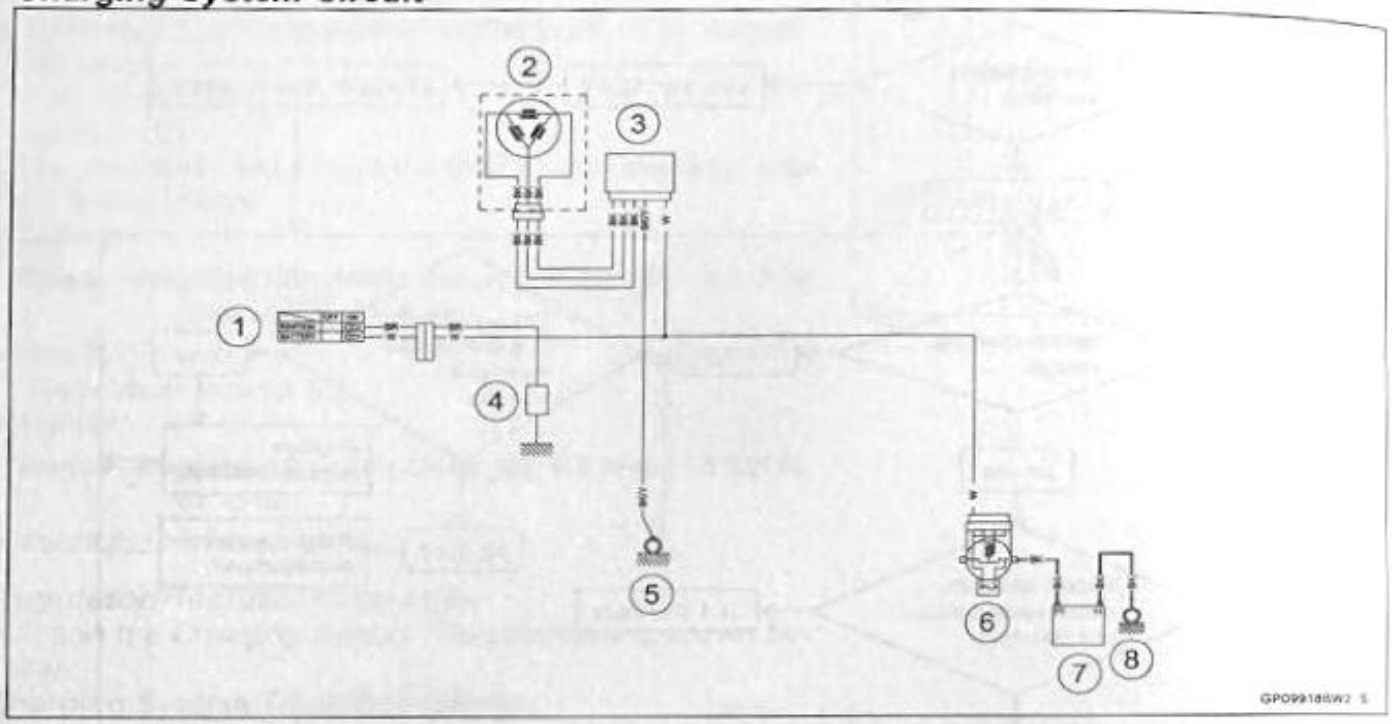
- Recharge the battery if it is discharged (see Refreshing Charge(16-21)).

Charging System



Charging System

Charging System Circuit



1. Ignition Switch
2. Alternator
3. Regulator/Rectifier
4. Load
5. Frame Ground
6. Main Fuse 30 A
7. Battery
8. Engine Ground

⚠ WARNING

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

NOTICE

To prevent the electrical components damage, note the following.

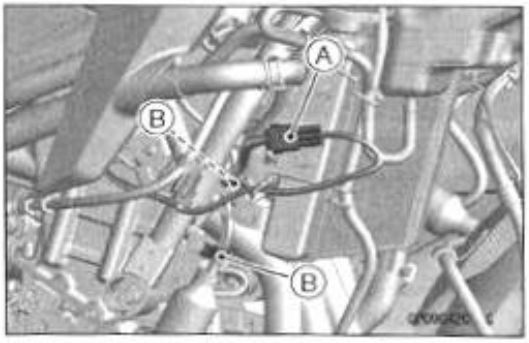
- **Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running.**
- **Do not install the battery backwards.**
- **Be sure to ground the negative cable.**

Crankshaft Sensor Removal

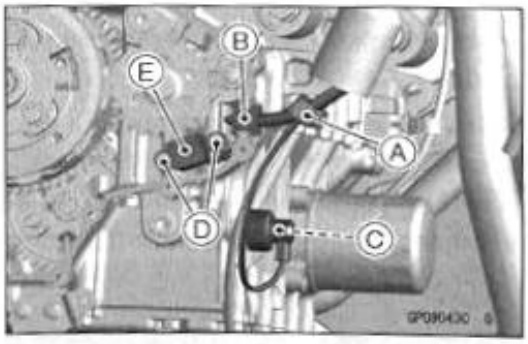
NOTICE

Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.

- Remove:
  Clutch Cover (see Clutch Cover Removal(6-10))
- Disconnect the crankshaft sensor connector [A].
- Open the clamps [B].



- Remove:
  Clamp [A]
  Lead Grommet [B]
- Slide the switch cover and disconnect the oil pressure switch lead [C].
- Remove:
  Crankshaft Sensor Bolts [D]
  Crankshaft Sensor [E]



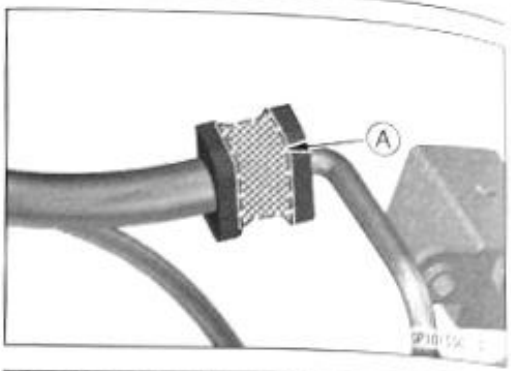
Ignition System

Crankshaft Sensor Installation

- Using a high flash-point solvent, clean off any oil or dirt that may be on the liquid gasket coating area. Dry them with a clean cloth.
- Apply liquid gasket [A] to whole periphery of the crankshaft sensor lead grommet groove.

Sealant - Liquid Gasket, TB1211F: 92104-0004

- Install the grommet to the groove on the crankcase.



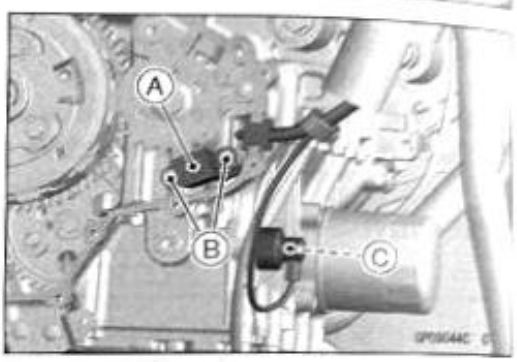
- Install the crankshaft sensor [A].

○When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

- Replace the crankshaft sensor bolts [B] with new ones and tighten them.

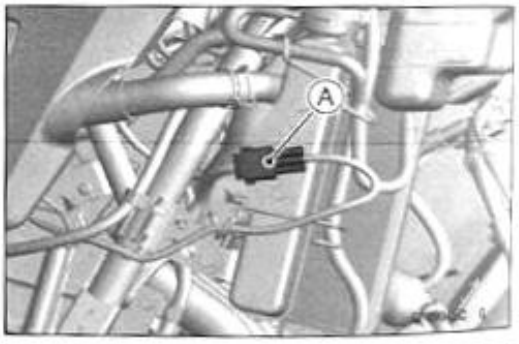
Torque - Crankshaft Sensor Bolts: 6.0 N·m (0.61 kgf·m, 53 in·lb)

- Apply grease to the terminal and connect the oil pressure switch lead [C].
- Run the crankshaft sensor lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.



Crankshaft Sensor Inspection

- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
- Disconnect the crankshaft sensor connector [A].



- Set a digital meter [A], and connect it to the crankshaft sensor connector [B].

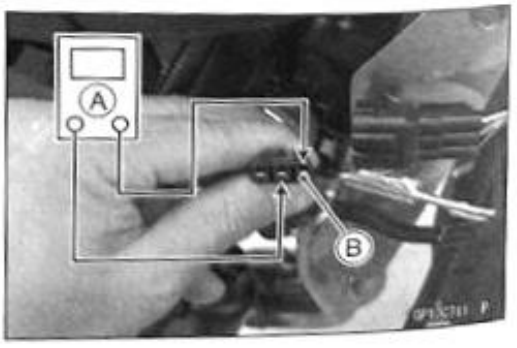
Crankshaft Sensor Resistance

Connections:	**Y lead ←→ BK lead**
Standard:	**376 – 564 Ω @20°C (68°F)**

★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 coil is shorted, and must be replaced.

- Measure the resistance between the crankshaft sensor leads and chassis ground.

★Any digital meter reading less than infinity (∞) indicates a short, necessitating replacement of the crankshaft sensor.



Ignition System

Crankshaft Sensor Peak Voltage Inspection

NOTE

○Be sure the battery is fully charged.
○Using the peak voltage adapter is more reliable way to determine the condition of the crankshaft sensor than crankshaft sensor internal resistance measurements.

- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
- Disconnect the crankshaft sensor connector [A].

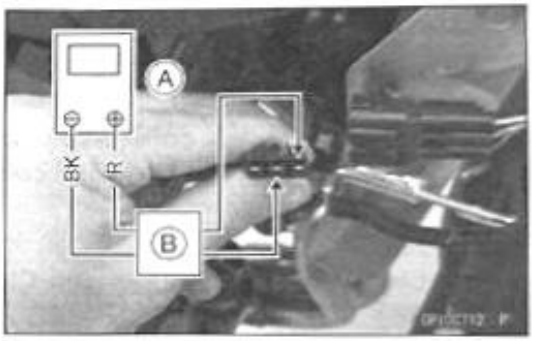
- Set a digital meter [A], and connect it to the peak voltage adapter [B].

Special Tool - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B

- Connect the adapter to the terminals of the crankshaft sensor connector.

Connections:

Crankshaft Sensor Connector		Peak Voltage Adapter		Digital Meter
Y lead	←	R lead	→	(+)
BK lead	←	BK lead	→	(–)



- Turn the ignition switch on.
- Slide the engine start/stop switch, turn the engine 4 – 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.
- Repeat the measurements 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 3.2 V or more

★If the reading is less than the standard, inspect the crankshaft sensor (see Crankshaft Sensor Inspection(16-32)).

Timing Rotor Removal

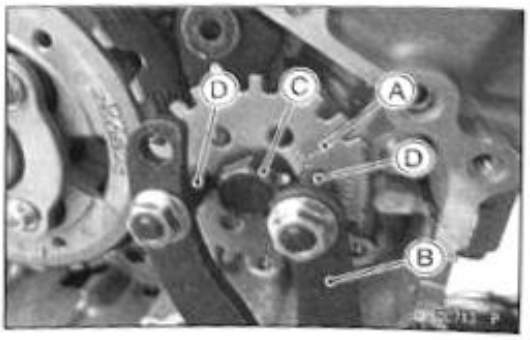
- Remove the crankshaft sensor (see Crankshaft Sensor Removal(16-31)).

○No need to disconnect the connector, and no need to clear the lead from the clamps.

- Holding the timing rotor [A] with the flywheel & pulley holder [B], remove the timing rotor bolt [C].

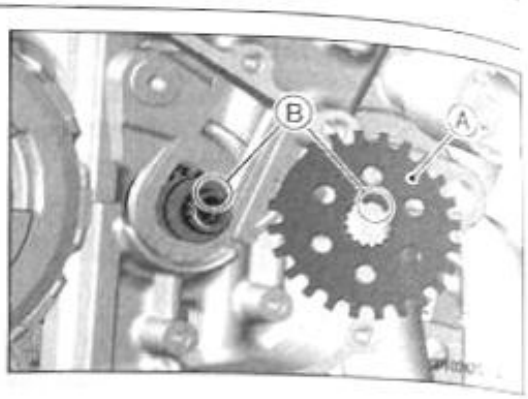
Special Tools - Flywheel & Pulley Holder: 57001-1605
Holder Attachment [D]: 57001-1870

- Remove the timing rotor.



Ignition System

Timing Rotor Installation



- Install:
  Timing Rotor [A]

○Align the wide teeth [B] on the shaft and the rotor.

- Holding the timing rotor with the flywheel & pulley holder and tighten the timing rotor bolt.

Special Tools - Flywheel & Pulley Holder: 57001-1605
Holder Attachment :57001-1870

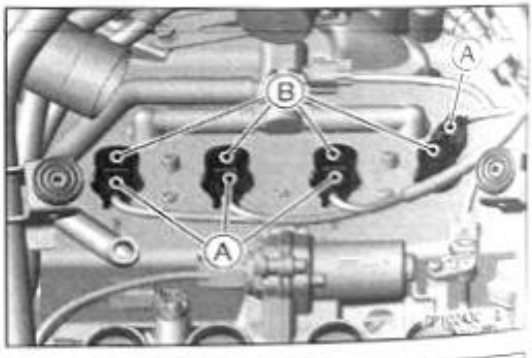
Torque - Timing Rotor Bolt: 40 N·m (4.1 kgf·m, 30 ft·lb)

- Install the removed parts.

Stick Coil Removal

NOTICE
Never drop the stick coils, especially on a hard surface. Such a shock to the stick coils can damage it.

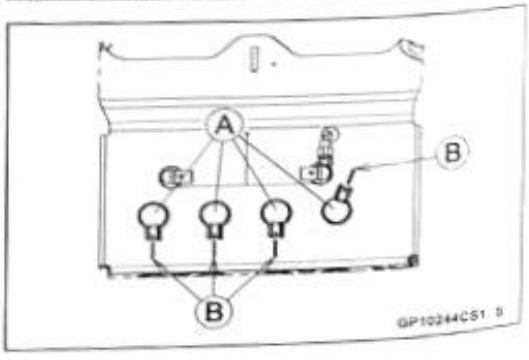
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))



- Disconnect:
  Stick Coil Connectors [A]
- Remove:
  Stick Coils [B]

NOTICE
Do not pry the connector part of the coil while removing the coil.

Stick Coil Installation



- Install the stick coils [A] with their connectors facing to the specified angles [B] as shown.

NOTE

○*The specified angels are indicated on the cylinder head cover and the heat insulation rubber plate.*

NOTICE
Do not tap the coil head while installing the coil.

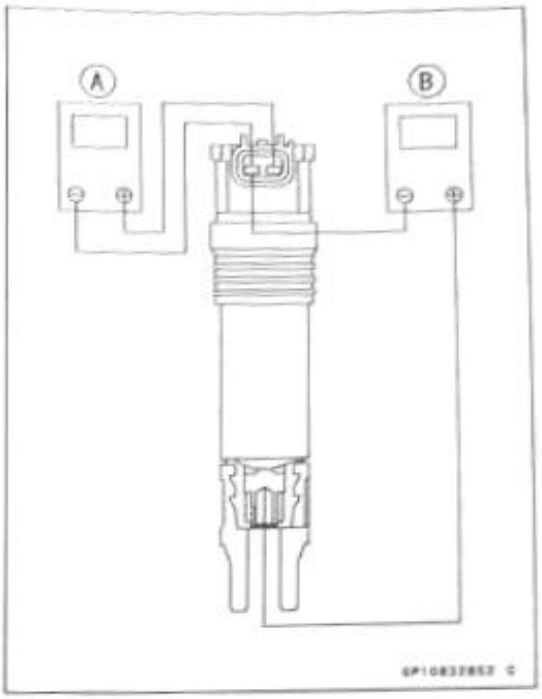
- After installation, be sure the stick coils are installed securely by pulling up them lightly.
- Run the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

Stick Coil Inspection

• Remove the stick coils (see Stick Coil Removal(16-34)).
• Measure the primary winding resistance [A] as follows.
○Connect a digital meter between the coil terminals.
• Measure the secondary winding resistance [B] as follows.
○Connect a digital meter between the plug terminal and (–) coil terminal.

Stick Coil Winding Resistance
Primary Windings: 1.19 – 1.61 Ω @20°C (68°F)
Secondary Windings: 10.2 – 13.8 kΩ @20°C (68°F)

★If a digital meter does not read as specified, replace the coil.



Stick Coil Primary Peak Voltage Inspection

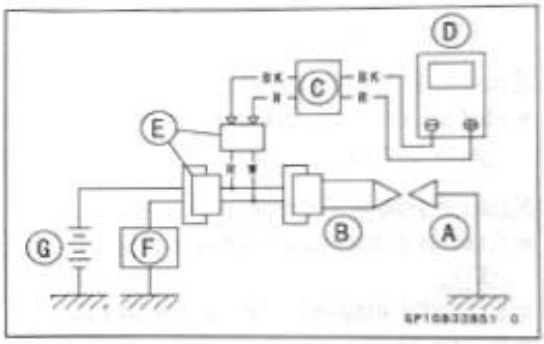
NOTE

○*Be sure the battery is fully charged.*

• Remove the stick coils (see Stick Coil Removal(16-34)).
○No need to remove the spark plugs.
• Measure the primary peak voltage as follows.
○Install the new spark plug [A] into each stick coil [B], and ground them onto the engine.
○Connect the peak voltage adapter [C] into a digital meter [D].
○Connect the adapter to the lead wire - peak voltage adapter [E] which is connected between the stick coil connector and stick coil.
ECU [F]
Battery [G]

Special Tools - Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B
Lead Wire - Peak Voltage Adapter: 57001 -1449

Primary Lead Connection
Adapter (R, +) to lead wire-peak voltage adapter (W)
Adapter (BK, –) to lead wire-peak voltage adapter (R)



Ignition System

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or digital meter connections.

- Turn the ignition switch on.
- Slide the engine start/stop switch, turn the engine 4 – 5 seconds with the transmission gear in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one stick coil.

Stick Coil Primary Peak Voltage
Standard: 140 V or more

- Repeat the test for the other stick coil.

★If the reading is less than the specified value, check the following.
Stick Coils (see Stick Coil Inspection(16-35))
Crankshaft Sensor (see Crankshaft Sensor Inspection(16-32))
ECU (see ECU Power Supply Inspection(3-13))

Spark Plug Removal

- Refer to the Spark Plug Replacement (see Spark Plug Replacement(2-62)).

Spark Plug Installation

- Refer to the Spark Plug Replacement (see Spark Plug Replacement(2-62)).

Spark Plug Condition Inspection

- Remove the spark plugs (see Spark Plug Replacement(2-62)).
- Visually inspect the spark plugs.

★If the spark plug center electrode [A] and/or side electrode [B] are corroded or damaged, or if the insulator [C] is cracked, replace the plug.

★If the spark plug is dirtied or the carbon is accumulated, replace the spark plug.

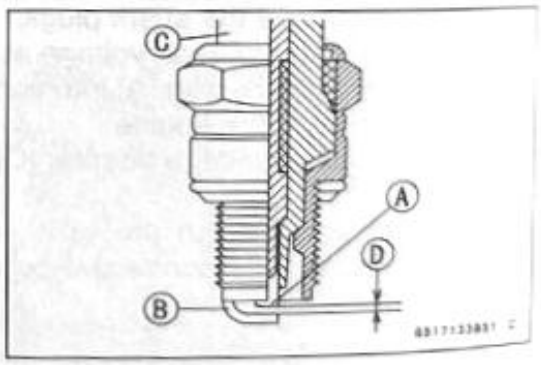
- Measure the gap [D] with a wire-type thickness gauge.

★If the gap is incorrect, replace the spark plug.

Spark Plug Gap: 0.7 – 0.8 mm (0.028 – 0.031 in.)

- Use the standard spark plug or its equivalent.

Spark Plug: NGK LMAR9G



Ignition System

Interlock Operation Inspection

• Raise the rear wheel off the ground with the stand.

1st Check

• Start the engine under the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Release

Side Stand → Down or Up

○Turn the ignition switch on and slide the engine start/stop switch.

○Then the starter motor should not turn when the starter system circuit is normality.

★If the engine is start, inspect the starter lockout switch, gear position sensor and relay box.

2nd Check

• Start the engine under the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Pulled in

Side Stand → Up

○Turn the ignition switch on and slide the engine start/stop switch.

○Then the starter motor should turn when the starter system circuit is normality.

★If the starter motor is not turn, inspect the starter lockout switch, side stand switch, relay box and starter relay.

3rd Check

• Inspect the engine for its secure stop after the following operations are completed.

• Run the engine under the following conditions.

Condition:

Transmission Gear → 1st Position

Clutch Lever → Release

Side Stand → Up

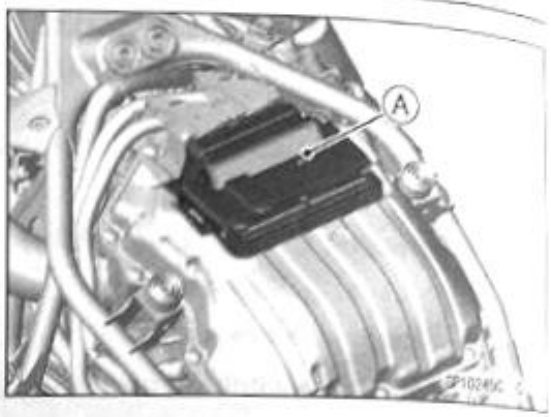
• Set the side stand on the ground, then the engine will stop.

★If the engine does not stop, inspect the gear position sensor, side stand switch and relay box.

★If their parts are normality, replace the ECU.

Ignition System

IC Igniter Inspection



○The IC igniter is built in the ECU [A].

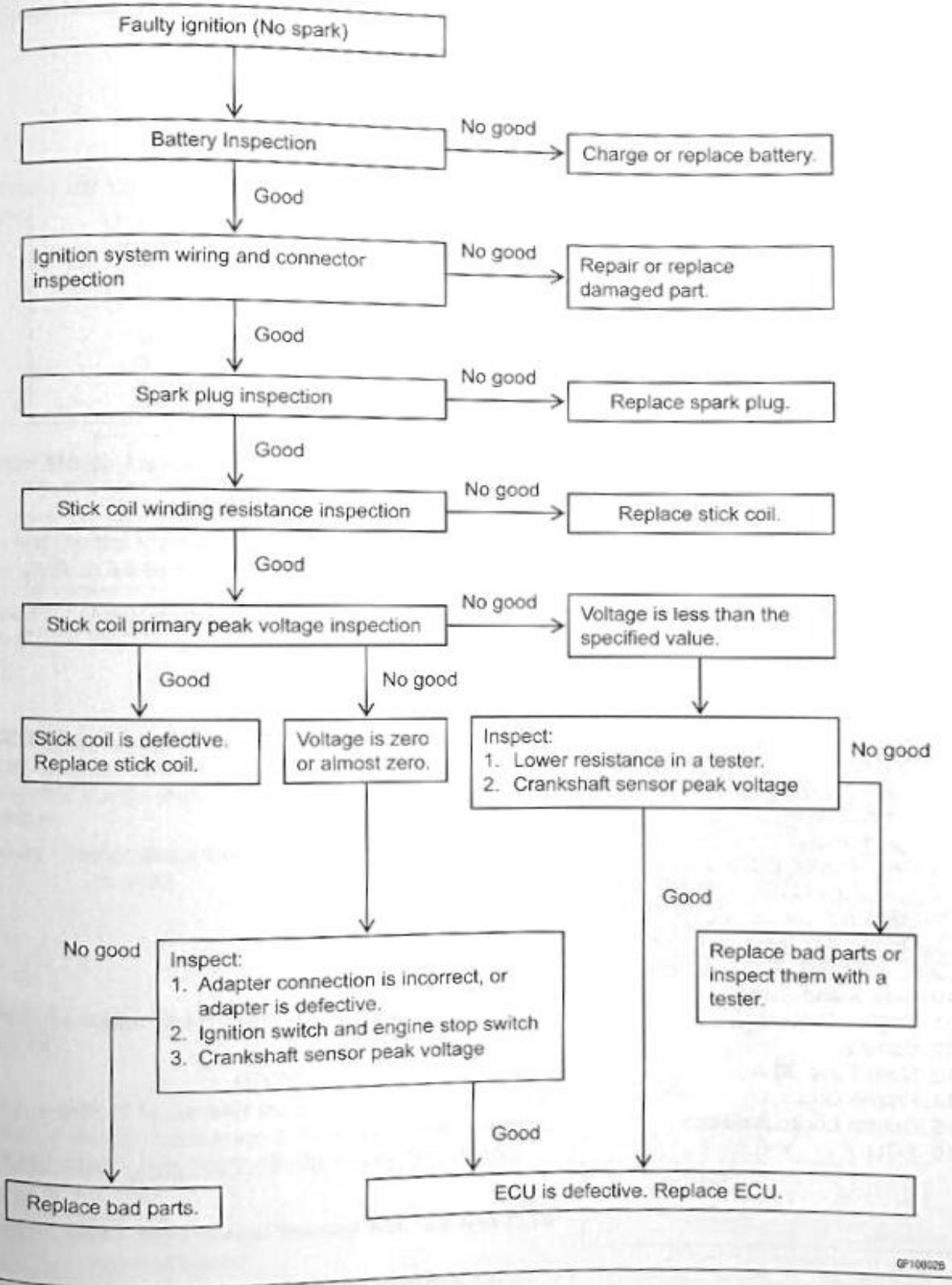
- Refer to the following items.

  ECU Power Supply Inspection (see ECU Power Supply Inspection(3-13))

  Interlock Operation Inspection (see Interlock Operation Inspection(16-37))

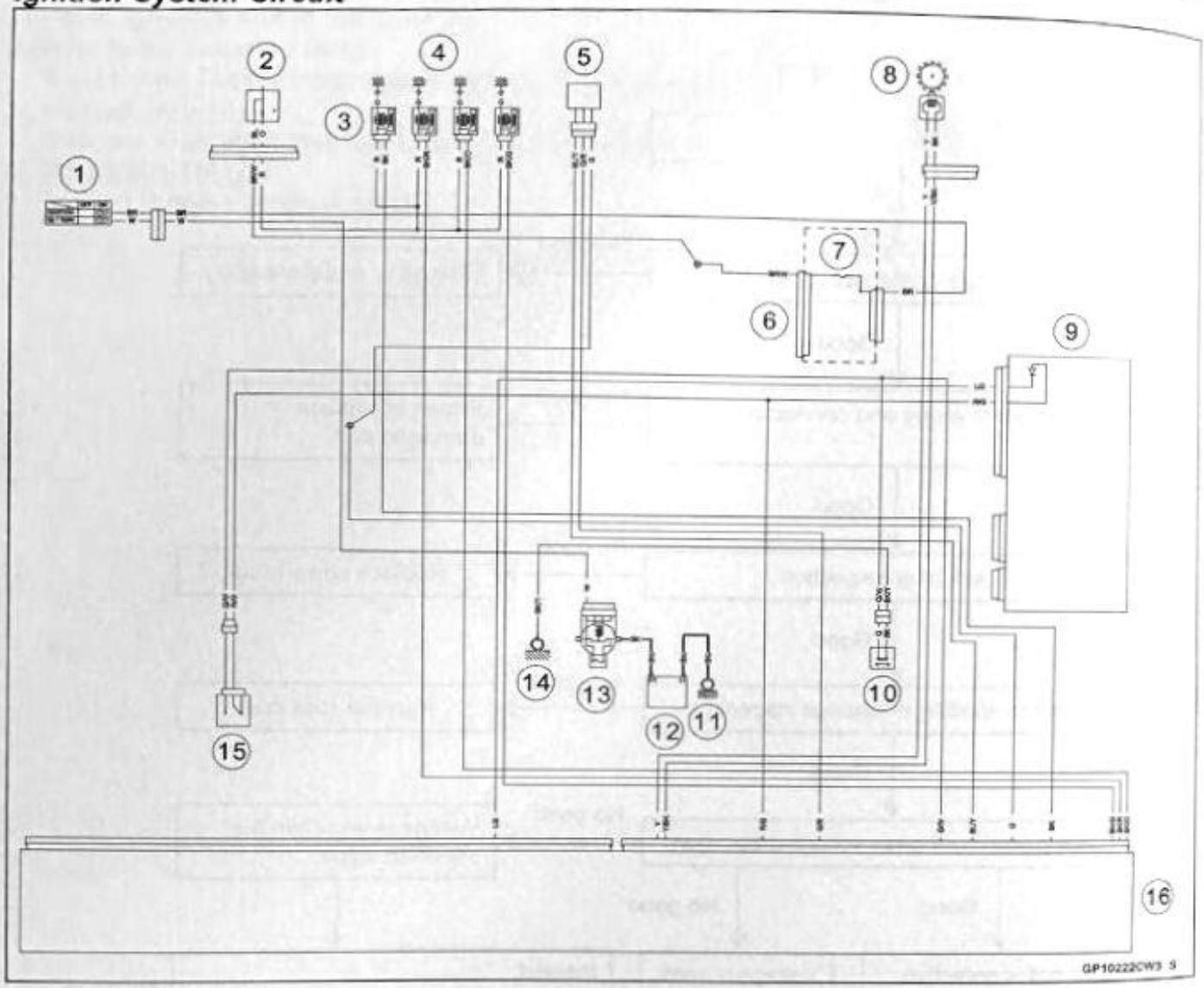
  Ignition System Troubleshooting

Ignition System Troubleshooting



Ignition System

Ignition System Circuit

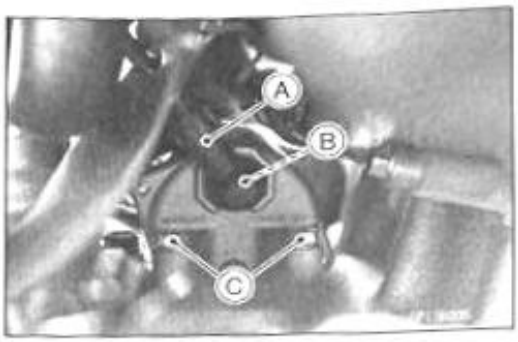


1. Ignition Switch
2. Engine Start/Stop Switch (Engine Stop)
3. Stick Coils
4. Spark Plugs
5. Gear Position Sensor
6. Fuse Box (1)
7. Ignition Fuse 15 A
8. Crankshaft Sensor
9. Relay Box
10. Side Stand Switch
11. Engine Ground
12. Battery
13. Main Fuse 30 A
14. Frame Ground
15. Starter Lockout Switch
16. ECU

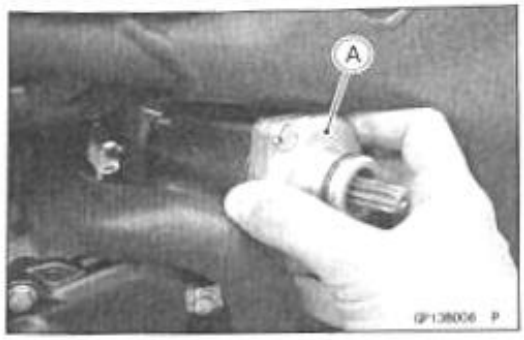
Electric Starter System

Starter Motor Removal

- Slide out the rubber cap [A].
- Remove:
  Starter Motor Cable Terminal Nut [B]
  Starter Motor Mounting Bolts [C]



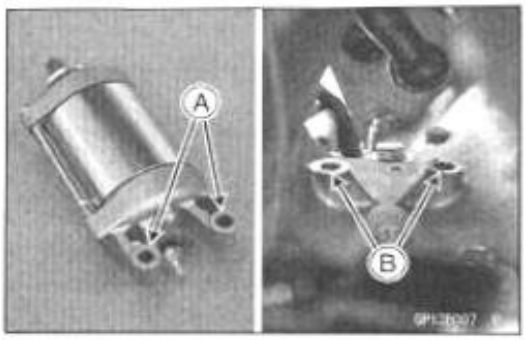
- Remove the starter motor [A] from the left side of the vehicle.



Starter Motor Installation

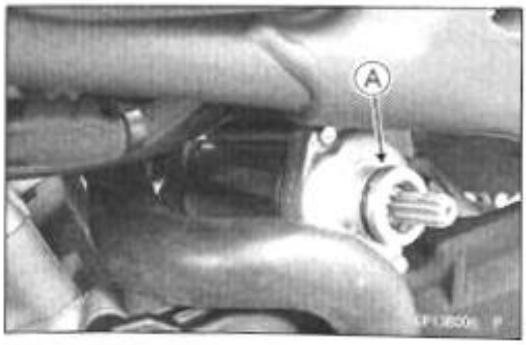
NOTICE
Do not tap the starter motor shaft or body. Tapping the shaft or body could damage the motor.

- Clean the starter motor legs [A] and crankcase [B] where the starter motor is ground.



- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the starter motor.
- Tighten:

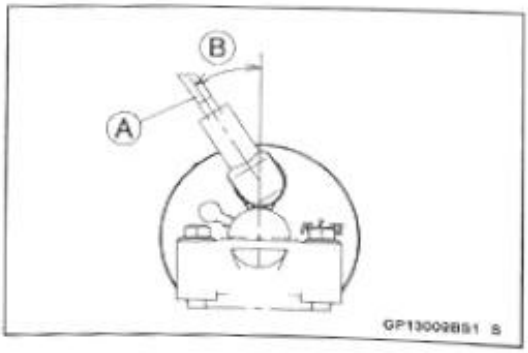
Torque - Starter Motor Mounting Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)



- Install the starter motor cable [A] as shown.
  33° [B]

NOTE

If it is difficult to connect the starter motor cable to the starter motor, disconnect it from the starter relay to make a slack (see Starter Relay Inspection(16-45)).



- Tighten:

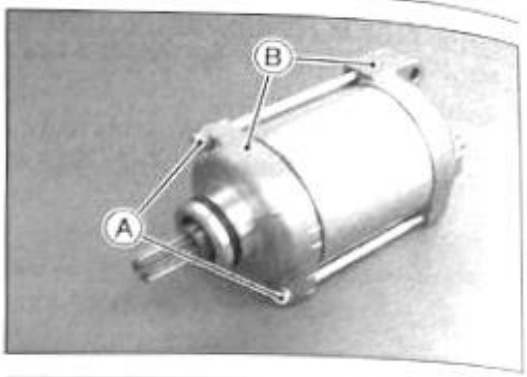
Torque - Starter Motor Cable Terminal Nut: 6.9 N·m (0.70 kgf·m, 61 in·lb)

- Apply grease to the starter motor cable terminal nut.
- Slide back the rubber cap to the original position.

Electric Starter System

Starter Motor Disassembly

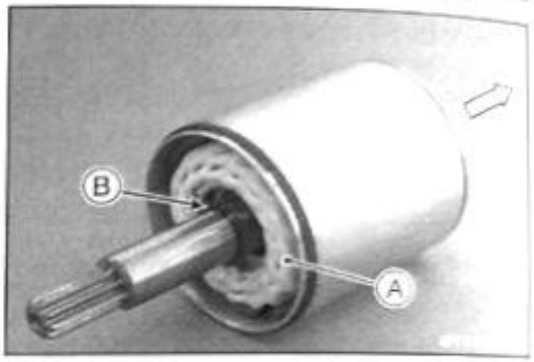
- Remove:
  Starter Motor (see Starter Motor Removal(16-41))
  Starter Motor Through Bolts [A]
  End Covers [B]



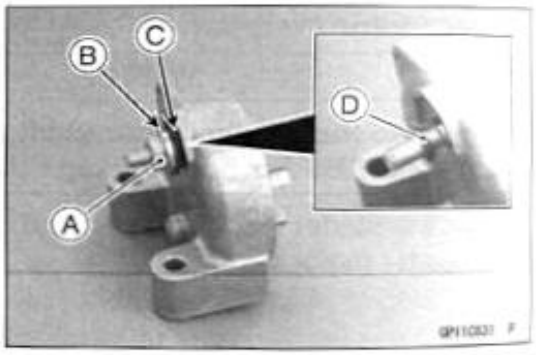
- Remove the armature [A] from the commutator side.

NOTE

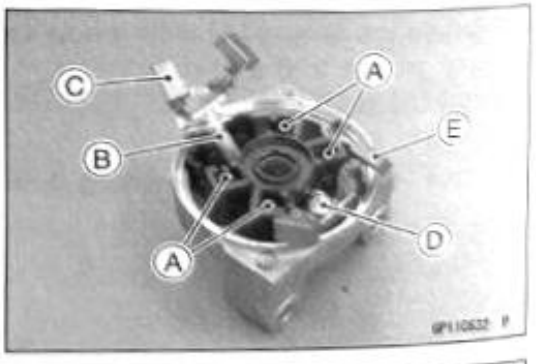
ODo not remove the circlip [B] from the shaft.



- Remove:
  Starter Motor Terminal Locknut [A]
  Washer [B]
  Collar [C]
  O-ring [D]

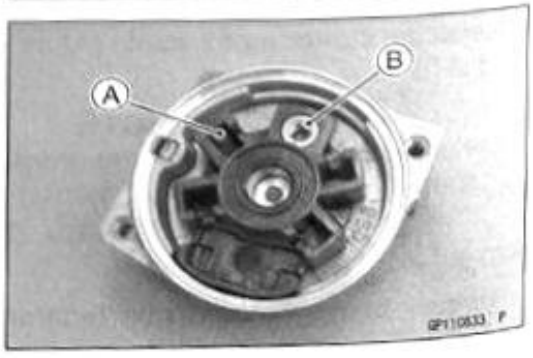


- Pull out the brushes from the brush holder.
- Remove:
  Brush Springs [A]
  Starter Motor Terminal [B]
  Positive Brush Assy [C]
  Brush Holder Screw [D]
  Negative Brush Assy [E]
  Brush Holder



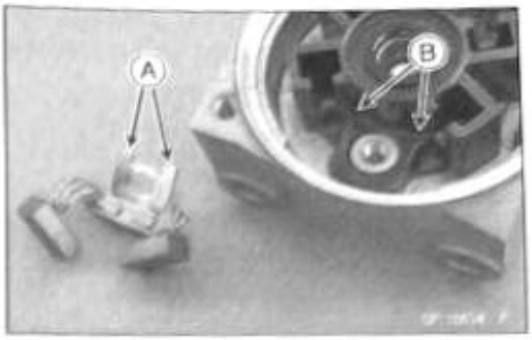
Starter Motor Assembly

- Align the hole of the brush holder [A] to the boss [B] of the right-hand end cover.

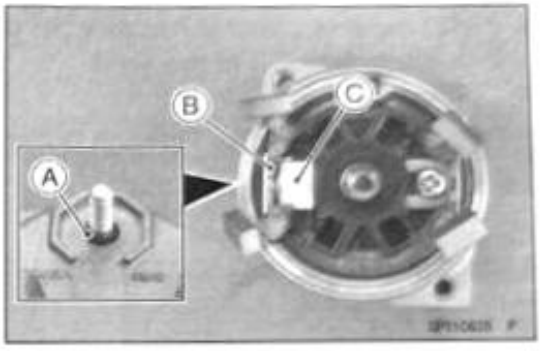


- Align the stoppers [A] of the negative brush assy to the grooves [B] of the brush holder.
- Tighten:

Torque - Brush Holder Screw: 3.8 N·m (0.39 kgf·m, 34 in·lb)



- Replace the O-ring [A] with a new one.
- Install:
  Positive Brush Assy [B]
  Starter Motor Terminal [C]
  O-ring

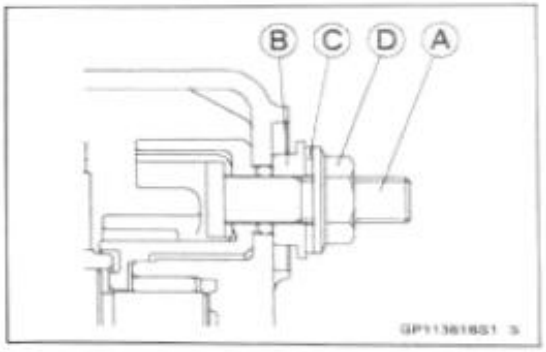


- Install the following parts to the starter motor terminal [A].
  Collar [B]
  Washer [C]

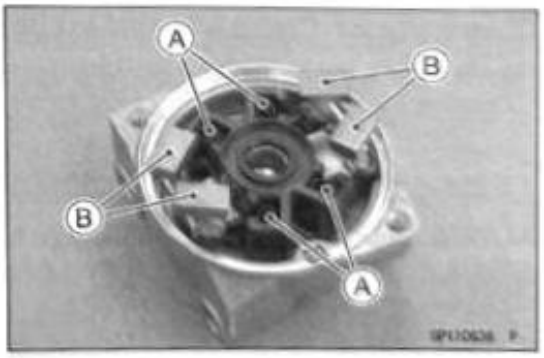
OInstall the collar so that flanged side faces outward.

- Tighten:

Torque - Starter Motor Terminal Locknut [D]: 11 N·m (1.1 kgf·m, 97 in·lb)

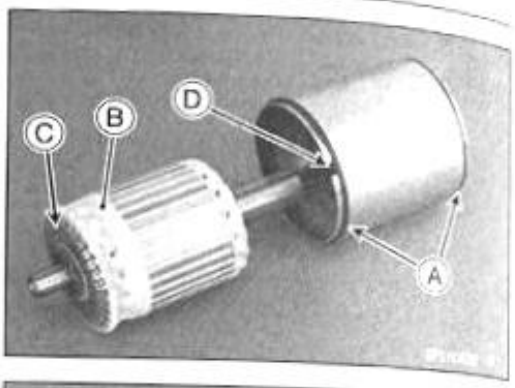


- Install the brush springs [A] and insert the brushes [B].



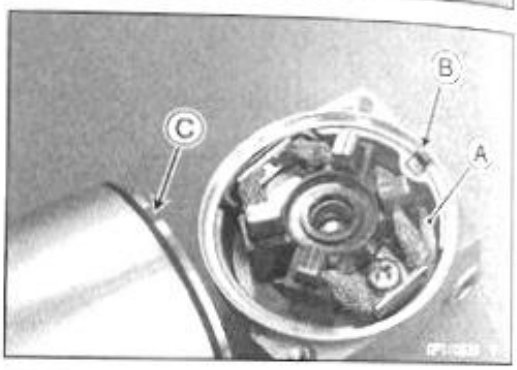
- Apply thin coat of grease to the oil seal [A].

- Replace the O-rings [A] with new ones.
- Insert the armature [B] so that commutator side [C] faces hollow side [D] of the yoke.



- Install the end cover [A] so that the stopper [B] is aligned with the hollow [C] of the yoke.
- Tighten:

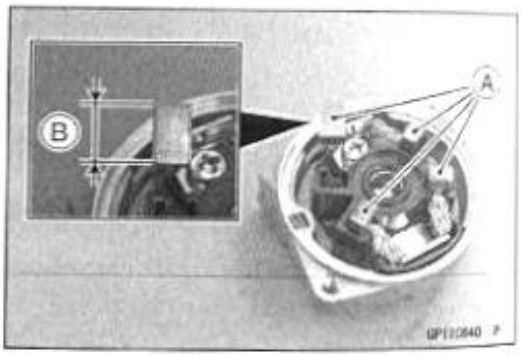
Torque - Starter Motor Through Bolts: 5.0 N·m (0.51 kgf·m, 44 in·lb)



Brush Inspection

- Measure the length of each brush [A].
★If any is worn down to the service limit, replace the brush assy.

Starter Motor Brush Length [B]
Standard: 12.0 mm (0.47 in.)
Service Limit: 6.5 mm (0.26 in.)



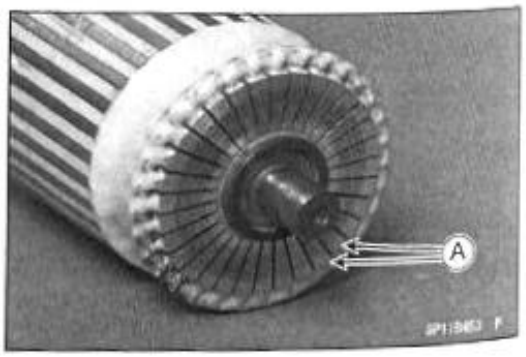
Commutator Cleaning and Inspection

- Clean the metallic debris off the between commutator segments [A].

NOTE

○*Do not use emery or sand paper on the commutator.*

- Check the commutator for damage or abnormal wear.
★Replace the starter motor with a new one if there is any damage or wear.
- Visually inspect the commutator segments for discoloration.
★Replace the starter motor with a new one if discoloration is noticed.



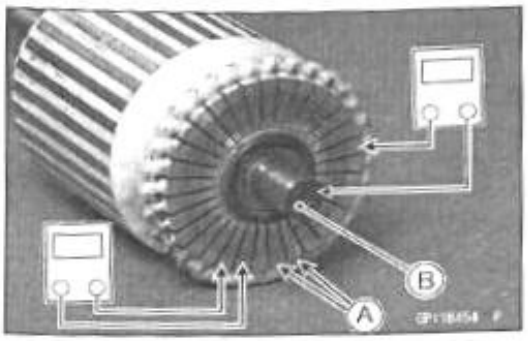
Armature Inspection

- 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.



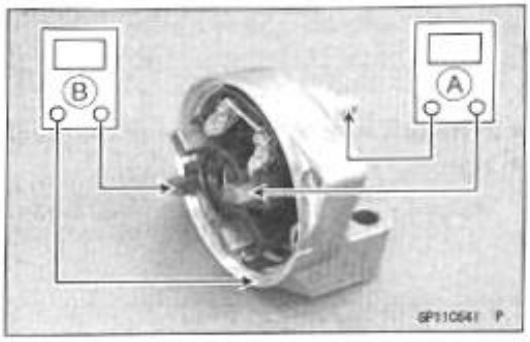
NOTE

○Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with a 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.

Brush Lead Inspection

- Using a digital meter, measure the resistance as shown.
  Terminal Bolt and Positive Brushes [A]
  Right-hand End Cover and Negative Brushes [B]

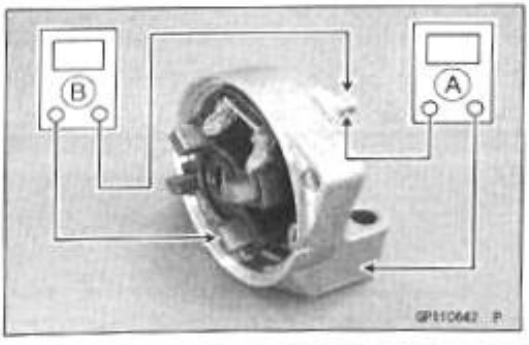
★If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assy.



Right-hand End Cover Inspection

- Using a digital meter, measure the resistance as shown.
  Terminal Bolt and Right-hand End Cover [A]
  Terminal Bolt and Negative Brushes [B]

★If there is any reading, the brush assy and/or terminal bolt assy have a short. Replace the starter motor.

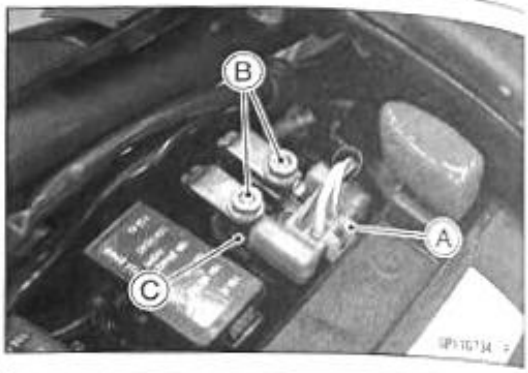


Starter Relay Inspection

- Remove:
  Front Seat (see Front Seat Removal(15-16))
  Cover [A]

Electric Starter System

- Disconnect:
  Connector [A]
- Remove:
  Cable Terminal Bolts [B] and Washers
  Starter Relay [C]

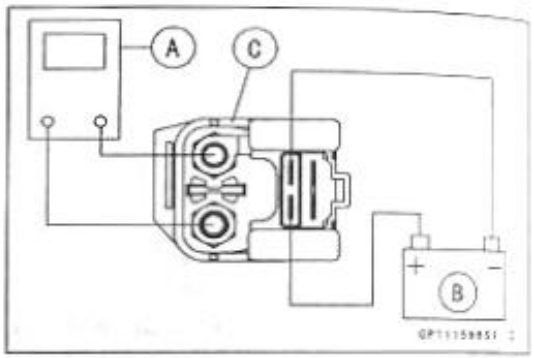


- Connect a digital meter [A] and 12 V battery [B] to the starter relay [C] as shown.

★If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

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

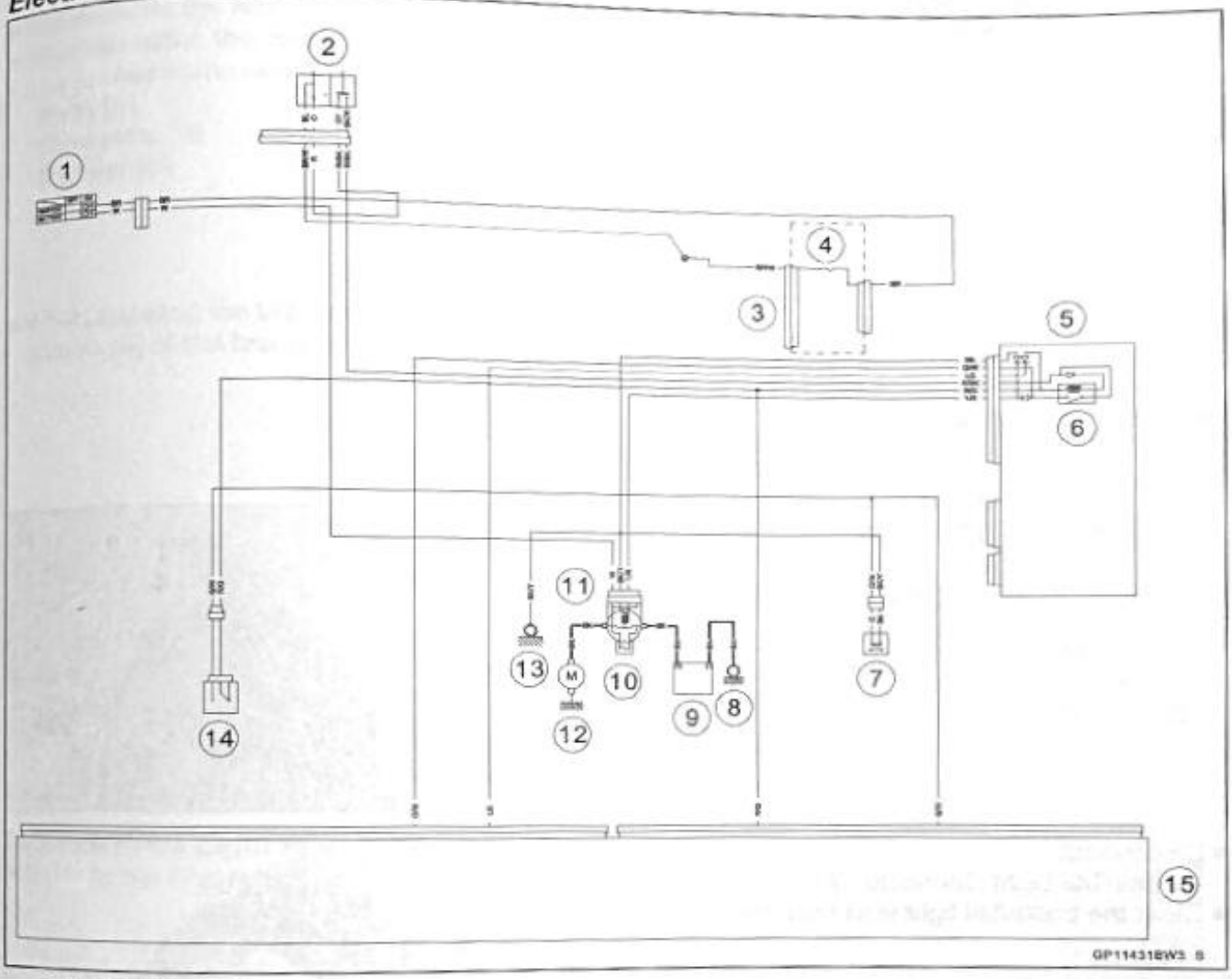


- Installation is the reverse of removal.
- Tighten:

Torque - Starter Relay Terminal Bolts: 3.6 N·m (0.37 kgf·m, 32 in·lb)

Electric Starter System

Electric Starter System Circuit



1. Ignition Switch
2. Engine Start/Stop Switch
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. Relay Box
6. Starter Circuit Relay
7. Side Stand Switch
8. Engine Ground
9. Battery
10. Main Fuse 30 A
11. Starter Relay
12. Starter Motor
13. Frame Ground
14. Starter Lockout Switch
15. ECU

Lighting System

Headlight Beam Horizontal Adjustment

- Refer to the Headlight Aiming Inspection (see Headlight Aiming Inspection(2-60)).

Headlight Beam Vertical Adjustment

- Refer to the Headlight Aiming Inspection (see Headlight Aiming Inspection(2-60)).

Headlight Removal

- Refer to the Upper Fairing Disassembly (see Upper Fairing Disassembly(15-22)).

NOTE

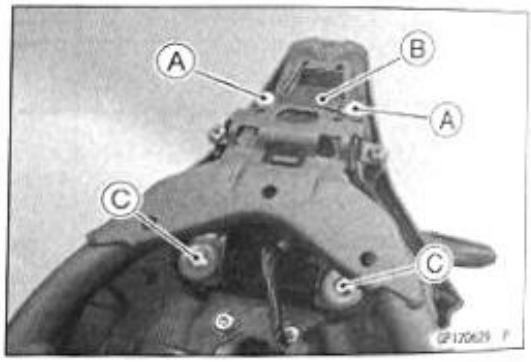
○*Do not try to disassemble the headlight unit.*

Headlight Installation

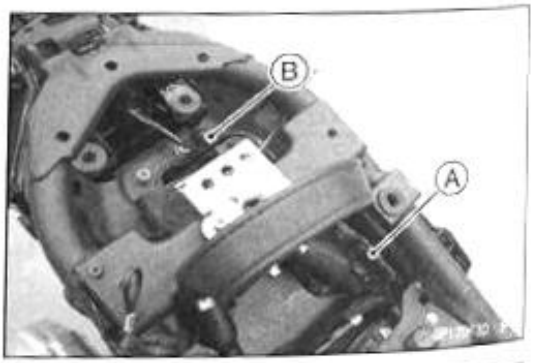
- Refer to the Upper Fairing Assembly (see Upper Fairing Assembly(15-22)).

Brake/Tail Light Removal

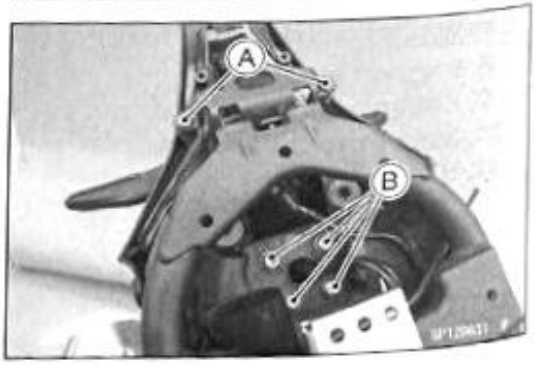
- Remove:
  Side Seat Covers (see Side Seat Cover Removal(15-28))
  Screws [A]
  Bracket [B]
  Screws [C]



- Disconnect:
  Brake/Tail Light Connector [A]
- Clear the brake/tail light lead from the bracket [B].



- Remove:
  Screws [A]
  Bolts [B] and Spring Washers
- Bring down the flap assembly and the rear fender.
- Remove:
  Brake/Tail Light



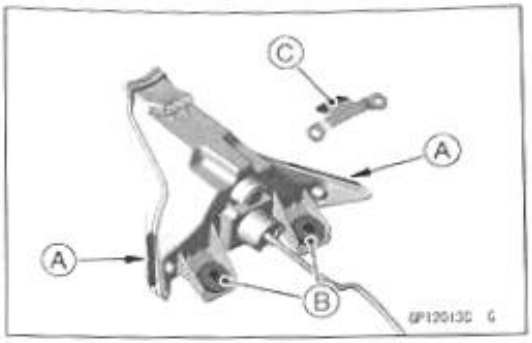
NOTE

○*Do not try to disassemble the brake/tail light unit.*

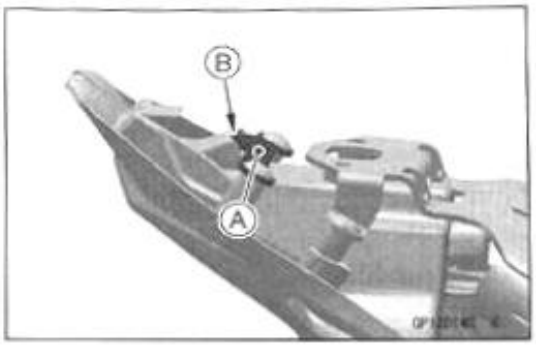
Brake/Tail Light Installation

- Installation is the reverse of removal.
- When installing the removed parts on the brake/tail light and related parts, note the followings.

  Pads [A]
  Grommets [B]
  Damper [C]



- When installing the bracket [A], insert the damper into the groove [B] of the brake/tail light.



License Plate Light Removal

- Refer to the Flap Disassembly (see Flap Disassembly(15-32)).

NOTE

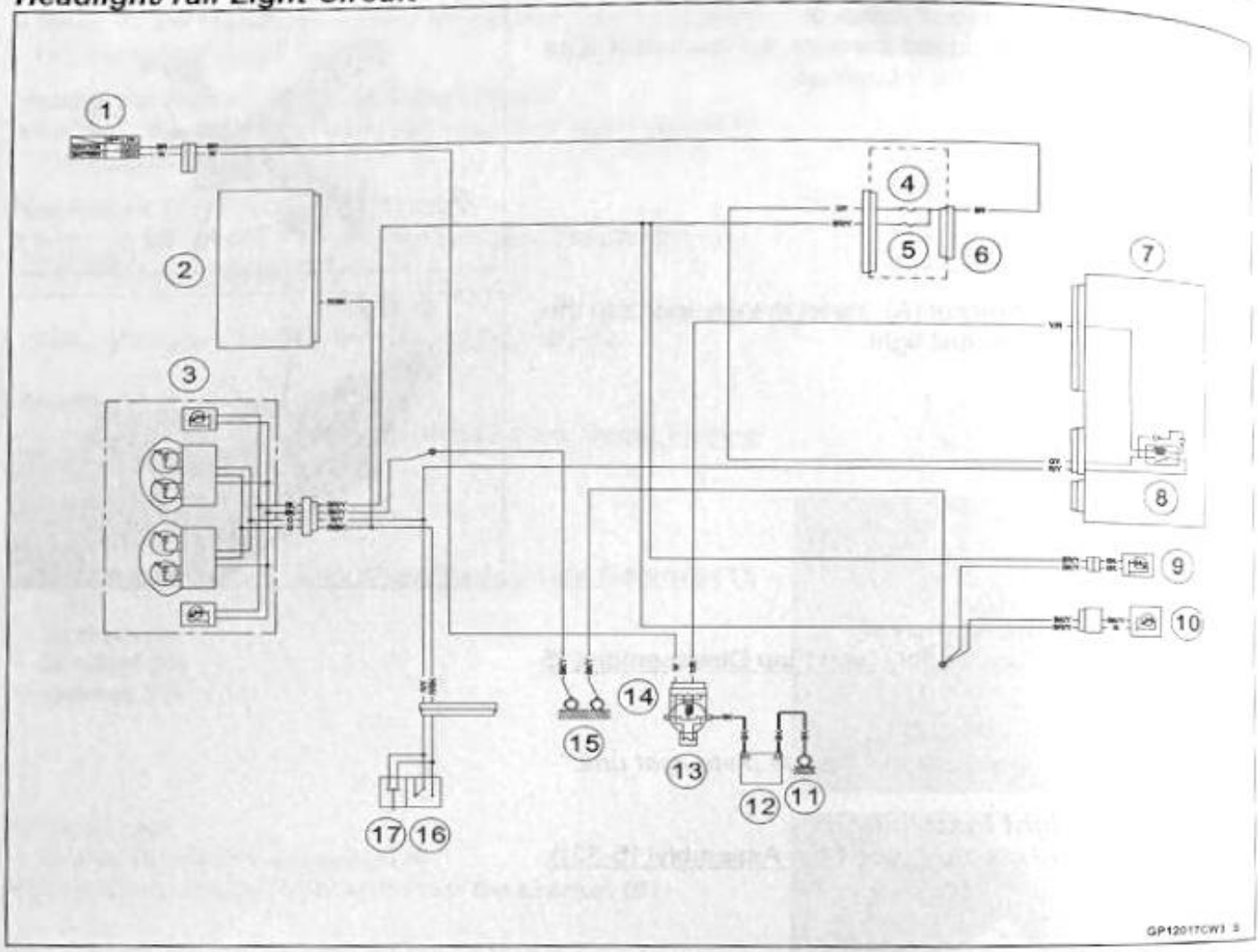
○*Do not try to disassemble the license plate light unit.*

License Plate Light Installation

- Refer to the Flap Assembly (see Flap Assembly(15-33)).

Lighting System

Headlight/Tail Light Circuit



1. Ignition Switch
2. Meter Unit
3. Headlight Unit
4. Headlight Fuse 15 A
5. Brake Light/Horn Fuse 10 A
6. Fuse Box (1)
7. Relay Box
8. Headlight Circuit Relay
9. License Plate Light
10. Brake/Tail Light
11. Engine Ground
12. Battery
13. Main Fuse 30 A
14. Starter Relay
15. Frame Grounds
16. Dimmer Switch
17. Passing Button

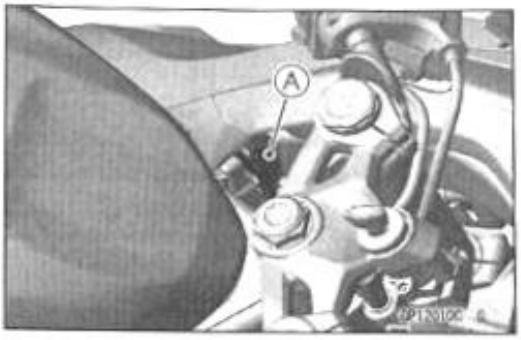
Front Turn Signal Light Removal
- Refer to the Lower Fairing Disassembly (see Lower Fairing Disassembly(15-20)).

Front Turn Signal Light Installation
- Refer to the Lower Fairing Assembly (see Lower Fairing Assembly(15-20)).

Rear Turn Signal Light Removal
- Refer to the Flap Disassembly (see Flap Disassembly(15-32)).

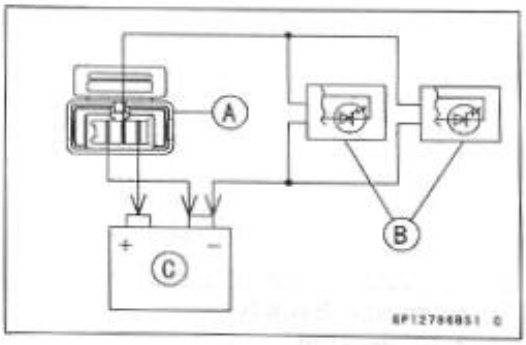
Rear Turn Signal Light Installation
- Refer to the Flap Assembly (see Flap Assembly(15-33)).

Turn Signal Relay Inspection
- Bring the turn signal relay [A] up to free it from the bracket.
- Disconnect the turn signal relay connector.



- Connect one 12 V battery and turn signal lights as indicated, and count how many times the lights blink for one minute.
  Turn Signal Relay [A]
  Turn Signal Lights [B]
  12 V Battery [C]

★If the lights do not blink as specified, replace the turn signal relay.



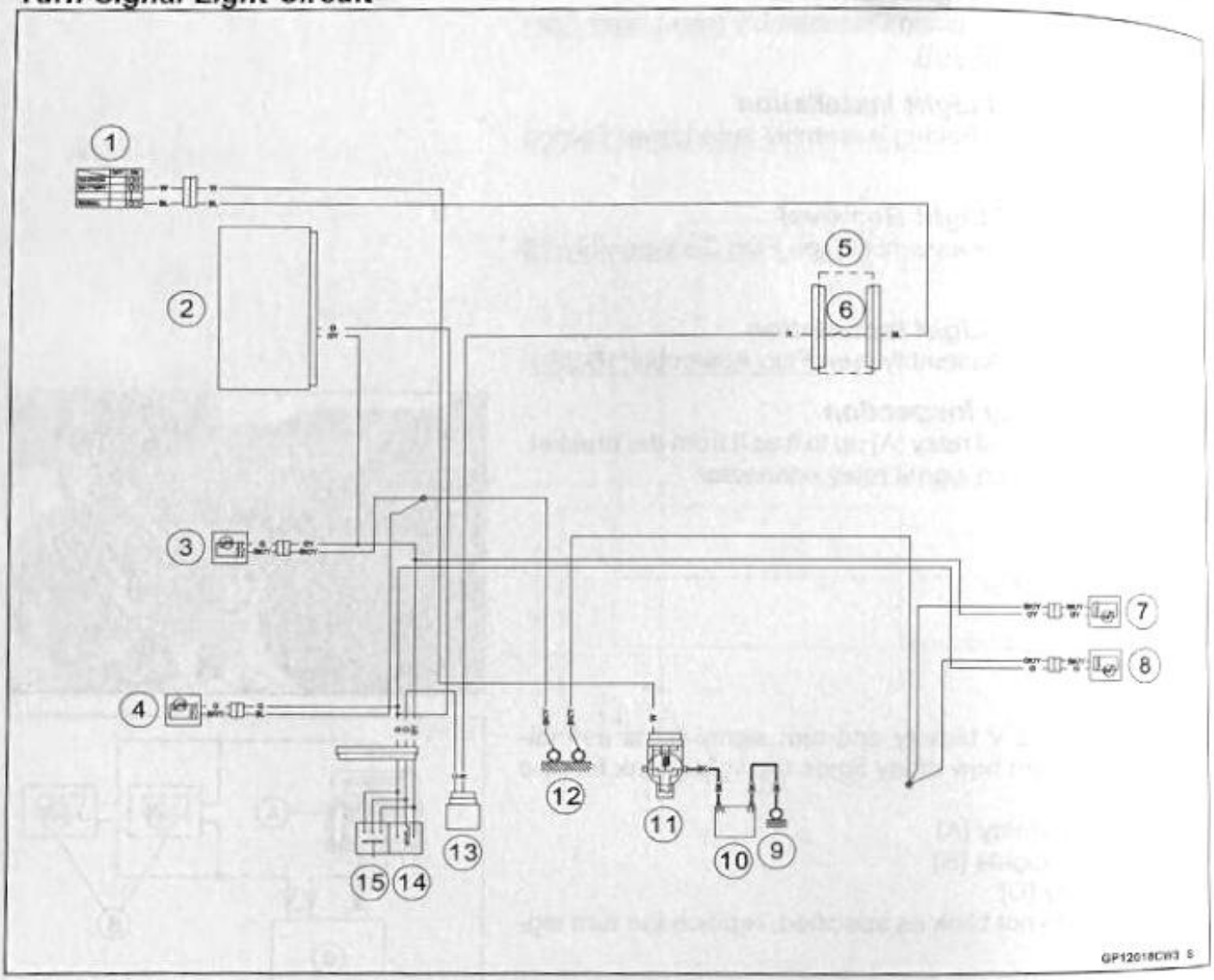
Testing Turn Signal Relay

Load		Blinking Times (c/m*)
The Number of Turn Signal Lights	Wattage (W)	
1**	3.5	150 – 250
2	7	75 – 95

(*): Cycle(s) per minute
(**): Correspond to "one light burned out."

Lighting System

Turn Signal Light Circuit



1. Ignition Switch
2. Meter Unit
3. Front Right Turn Signal Light
4. Front Left Turn Signal Light
5. Fuse Box (2)
6. Turn Signal Relay Fuse 10 A
7. Rear Right Turn Signal Light
8. Rear Left Turn Signal Light
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Frame Grounds
13. Turn Signal Relay
14. Turn Signal Switch
15. Hazard Button

Air Switching Valve Operation Test

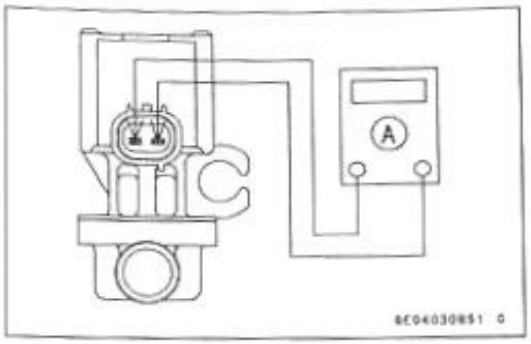
- Refer to the Air Suction System Damage Inspection (see Air Suction System Damage Inspection(2-33)).

Air Switching Valve Unit Test

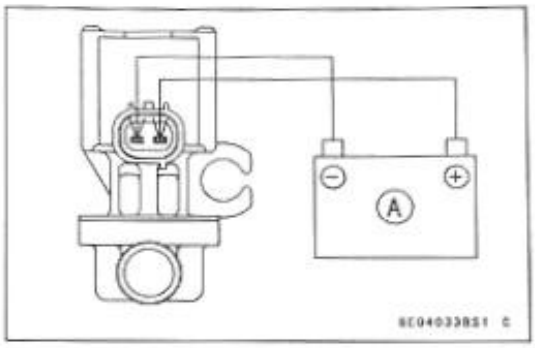
- Remove the air switching valve (see Air Switching Valve Removal(5-12)).
- Connect a digital meter [A] to the air switching valve terminals as shown.

Air Switching Valve Resistance
Standard: 20 – 24 Ω @20°C (68°F)

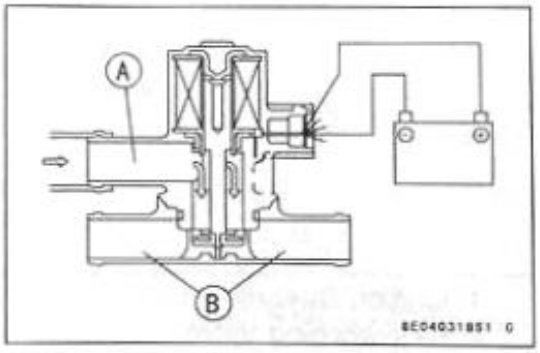
★If the resistance reading is out of the specified value, replace it with a new one.



- Connect the 12 V battery [A] to the air switching valve terminals as shown.

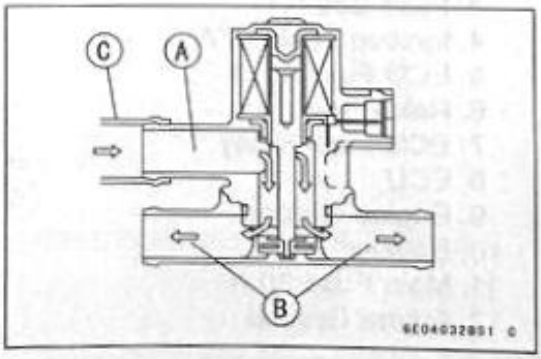


- Blow the air to the intake air duct [A], and make sure does not flow the blown air from the outlet air ducts [B].



- Disconnect the 12 V battery.
- Blow the air to the intake air duct [A] again, and make sure flow the blown air from the outlet air ducts [B].

★If the air switching valve does not operate as described, replace it with a new one.

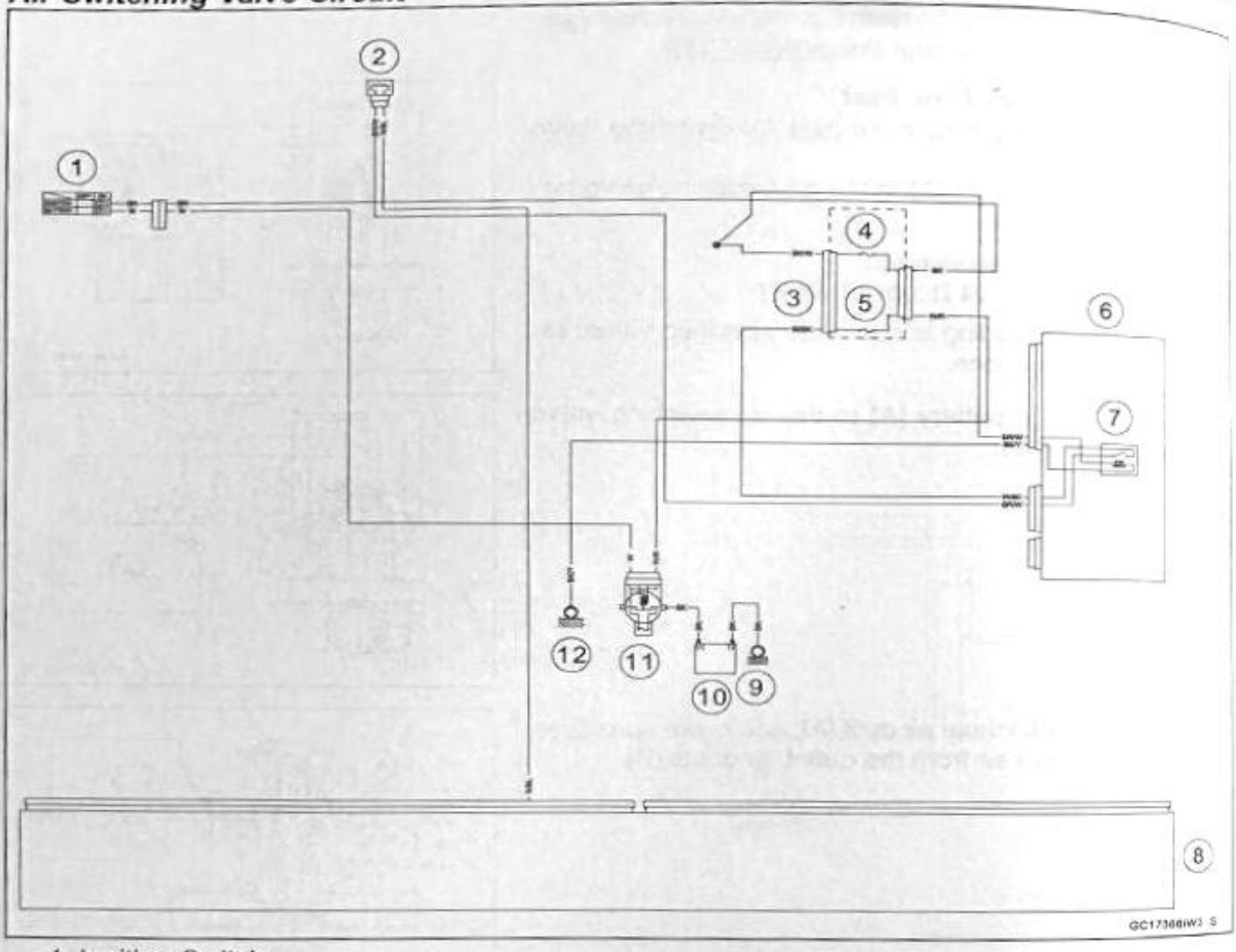


NOTE

○*To check air flow through the air switching valve, just blow through the air switching valve hose (intake side) [C].*

Air Switching Valve

Air Switching Valve Circuit



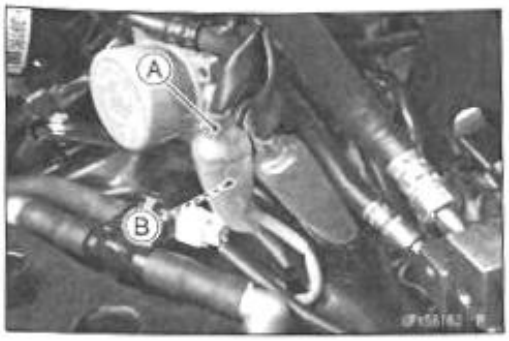
1. Ignition Switch
2. Air Switching Valve
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. ECU Fuse 15 A
6. Relay Box
7. ECU Main Relay
8. ECU
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Frame Ground

Radiator Fan Motor Inspection

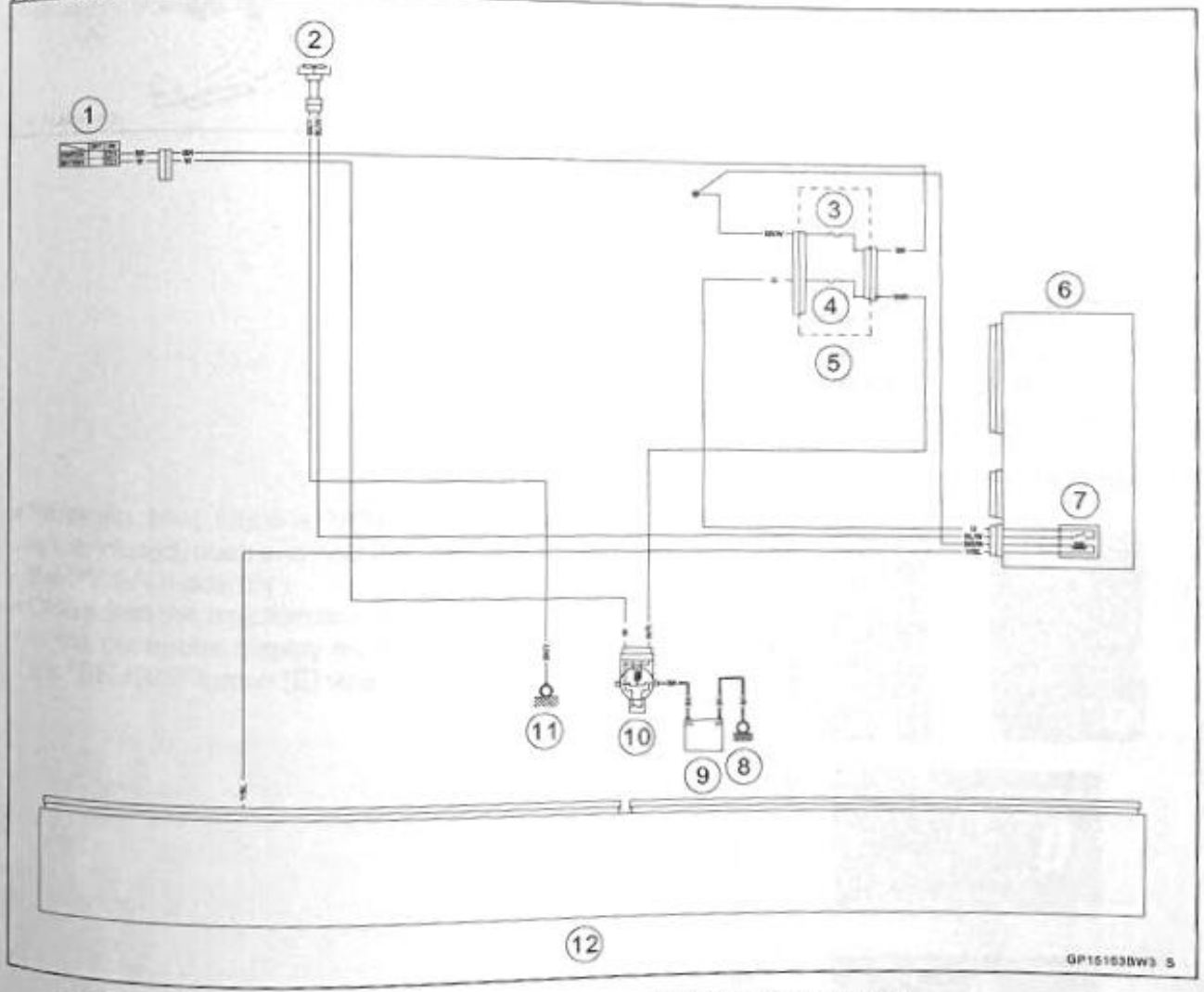
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))

- Slide the dust cover [A] and disconnect the radiator fan motor connector [B].
- Using an auxiliary leads, supply battery power to the radiator fan motor.

★If the radiator fan does not rotate, the radiator fan motor is defective and must be replaced.



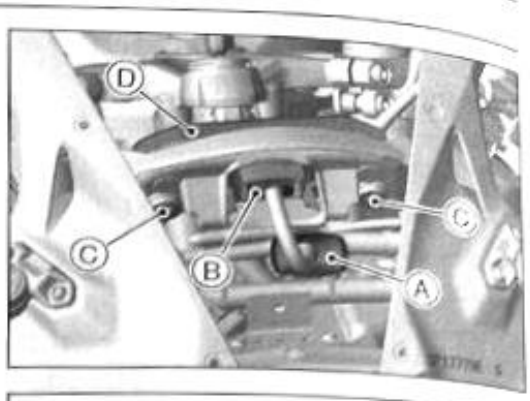
Radiator Fan Circuit



1. Ignition Switch
2. Radiator Fan Motor
3. Ignition Fuse 15 A
4. Radiator Fan Fuse 15 A
5. Fuse Box (1)
6. Relay Box
7. Radiator Fan Relay
8. Engine Ground
9. Battery
10. Main Fuse 30 A
11. Frame Ground
12. ECU

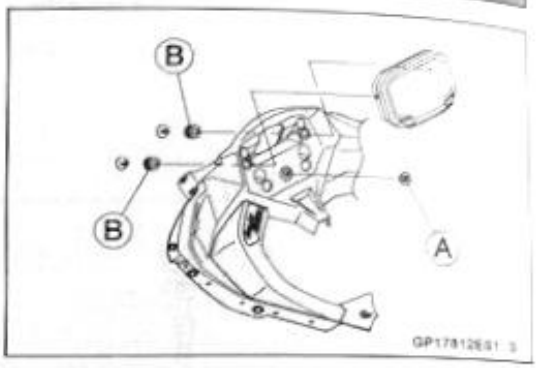
Meter, Gauge, Indicator Unit

Meter Unit Removal



- Remove:
  Windshield (see Windshield Removal(15-42))
- Slide the dust cover [A], and disconnect the meter unit connector [B].
- Remove:
  Screws [C] and Washers
  Meter Unit [D]

Meter Unit Installation



- Installation is the reverse of removal.
- When installing the removed parts on the meter unit and related parts, note the followings.

○Check that the grommet [A] and the dampers [B] have not come off.

Meter Operation Inspection

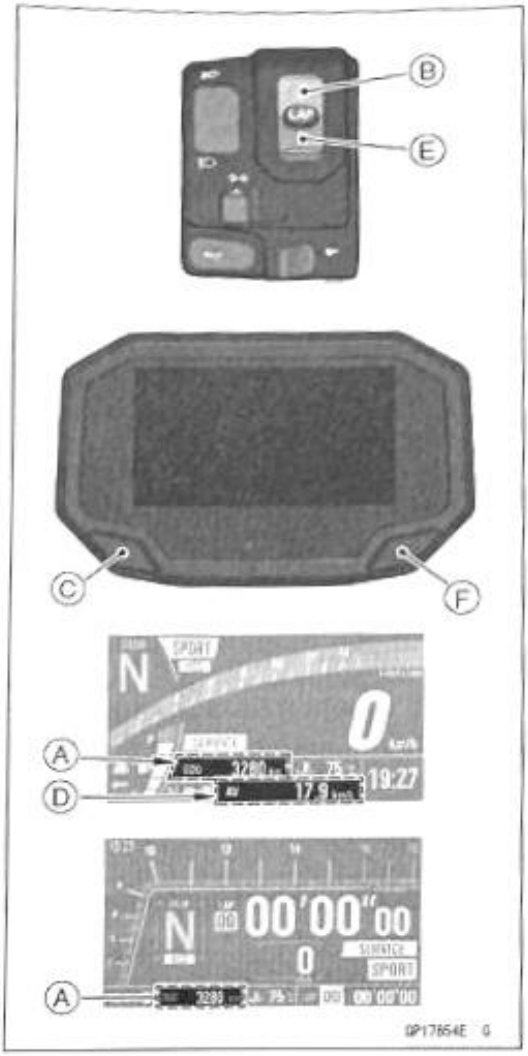
NOTE

○*The procedures in this section are explained on the assumption that the wiring continuity of the handlebar switches are in good condition. Check that the wiring continuity of the handlebar switch is normal before inspect the meter unit using the wiring diagrams.*

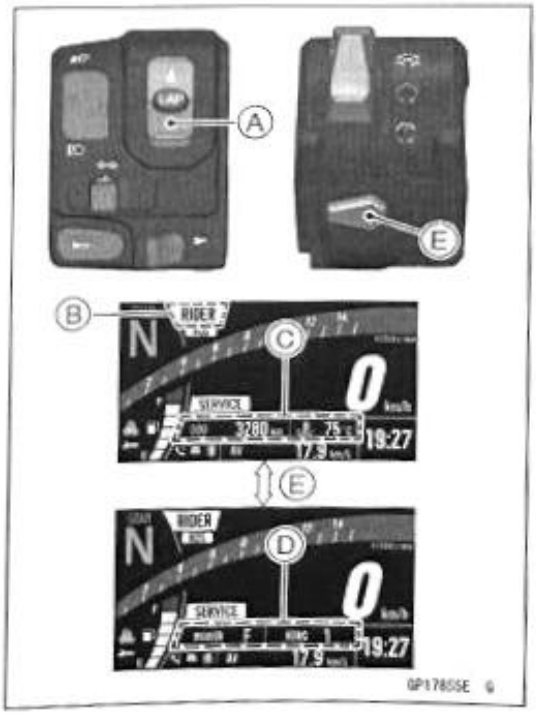
○*There are two different screen types in this display screen. To simplify the instructions, only one screen type is shown.*

Check 1: Meter Unit Switching Inspection

- Turn the ignition switch on.
- Switch to other than RIDER modes.
- Check that the display item of the multifunction display [A] is switched by pushing the upper button [B] or the left meter button [C] each time.
  - Odometer
  - Trip Meter A/B
- In the display layout type 1, check that the display item of the multifunction display [D] is switched by pushing the lower button [E] or the right meter button [F] each time.
  - Current Mileage
  - Average Mileage
  - Cruising Range
  - Average Speed
  - Total Time
  - Battery Voltage



- While the riding mode is RAIN mode, and the throttle grip is fully closed, push and hold the lower button [A] to select the RIDER mode [B].
- Check that the multifunction display [C] can be changed to the parameter display mode [D] by pushing and hold the "SELECT" button [E] when the RIDER mode.



Meter, Gauge, Indicator Unit

Meter System Inspection

Check 2-1: Gear Position Indicator Inspection

- Turn the ignition switch on and shift the transmission gear into neutral position.

○The green neutral indicator light [A] goes on, and the gear position indicator is displayed the "N" mark [B].

- Set the low gear position, and check that the display changes from "N" to "1" mark [A] and the green neutral indicator light goes off.
- Using the rear stand, raise the rear wheel off the ground.
- Rotate the rear wheel by hand or start the engine, and change the gear position.
- Check that the display corresponding to each gear position (1, N, 2, 3, 4, 5 or 6) appears.

★If the display function does not work, check the following parts.

Gear Position Sensor (see DTC P0914(17-80)) (see DTC P0915(17-80)) (see DTC P0916(17-81))
Wiring (see Meter Circuit(16-67))

★If the above parts are good, replace the meter assembly and/or ECU.

Check 2-2: Ambient Brightness Sensor Inspection

NOTE

○*This meter unit has the automatically tachometer brightness function by the sensor in addition to the manual brightness setting.*

- Turn the ignition switch on.
- Check if the meter brightness [A] should change by shining a light on the sensor [B] with a penlight or covering the sensor with your finger.

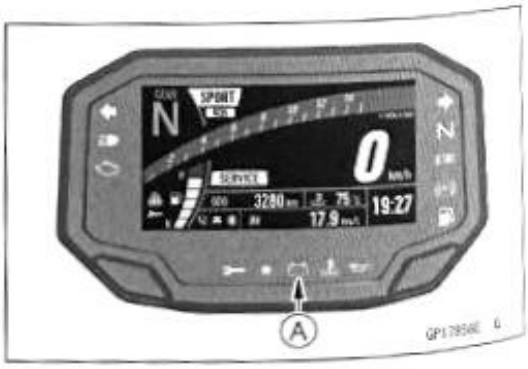
★If the meter does not work properly, replace the meter assembly.

Check 2-3: Red Battery Warning Indicator Light Inspection

- When the battery condition is low voltage (10.8 – 11.2 V or less) or high voltage (15.5 – 16.5 V or more), the red battery warning indicator light [A] goes on.

★If the red battery warning indicator light goes on, inspect the charging voltage (see Charging Voltage Inspection(16-26)).

★If the charging voltage is good, replace the meter assembly.

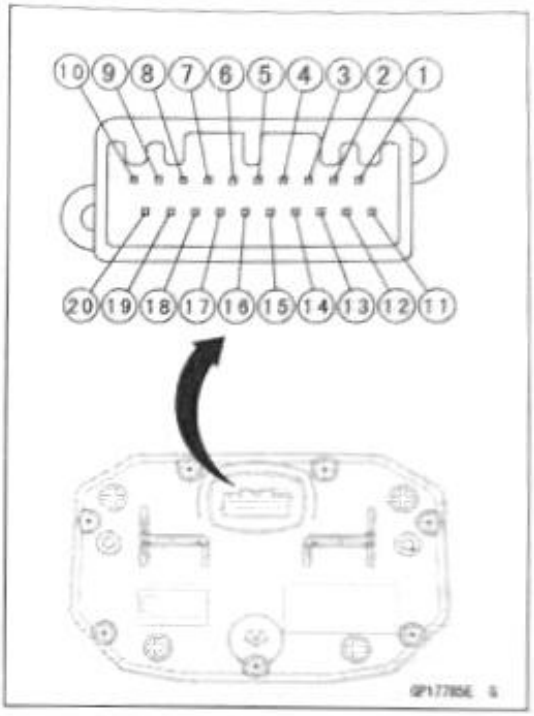


Check 2-4: Clock Inspection
- Turn the ignition switch on.
- Change the multifunction display to the clock.
- Record the time.
- Turn the ignition switch off, and then turn the ignition switch on after a few minutes.
- Check that the clock was counting time while turning the ignition switch off.

★If the meter does not work, replace the meter assembly.

Meter Unit Inspection
- Remove the meter unit (see Meter Unit Removal(16-56)).

[1] Battery (+)
[2] Ignition (+)
[3] Ground (–)
[4] Green Neutral Indicator (–)
[5] Red Oil Pressure Warning Indicator (–)
[6] Yellow ABS Indicator (–)
[7] Yellow KTRC Indicator (–)
[8] ECU Communication Line
[9] Speed Sensor Signal
[10] Tachometer Signal
[11] Fuel Level Sensor
[12] Left Switch Housing LAP Button (–)
[13] Green Left Turn Signal Indicator (+)
[14] Green Right Turn Signal Indicator (+)
[15] Blue High Beam Indicator (+)
[16] Unused
[17] Unused
[18] External Communication Line (for Diagnostic System)
[19] Left Switch Housing Upper Button (–)
[20] Left Switch Housing Lower Button (–)

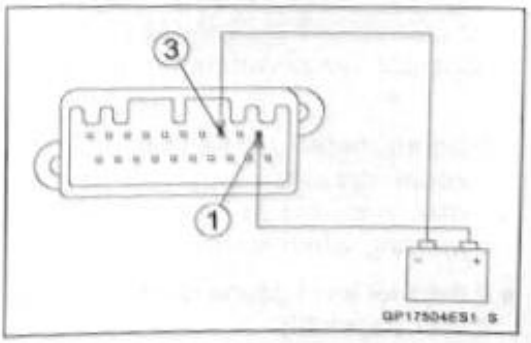


NOTICE

Do not drop the meter unit. Place the meter unit so that it faces upward. If the meter assembly is left upside down or sideways for a long time or dropped, it will malfunction. Do not short each terminal.

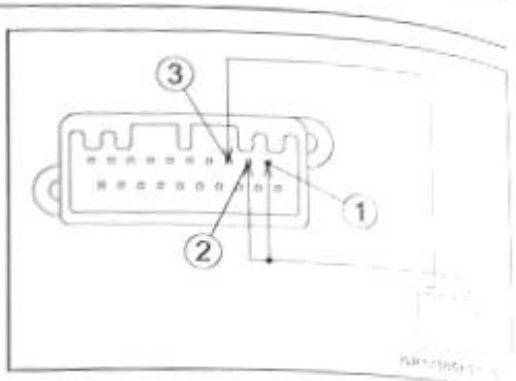
Check 3-1: Meter Unit Primary Operation Check
- Using the auxiliary leads, connect the 12 V battery to the meter unit connector as follows.

○Connect the battery positive (+) terminal to the terminal [1].
○Connect the battery negative (–) terminal to the terminal [3].



Meter, Gauge, Indicator Unit

• Connect the terminal [2] to the battery (+) terminal.



• Check the following items.

○Following indicator lights are go on for few seconds, then turn off.

Red Immobilizer Warning Indicator Light [A]
Red Battery Warning Indicator Light [B]
Red Coolant Temperature Warning Light [C]
Yellow KTRC Indicator Light [D]

○Following indicators are remains on.

Yellow Engine Warning Indicator Light [E]
Yellow ABS Warning Indicator Light [F]

○The fuel level warning indicator light [G] will start blinking after few seconds.

★If the meter unit does not work properly, replace the meter assembly.

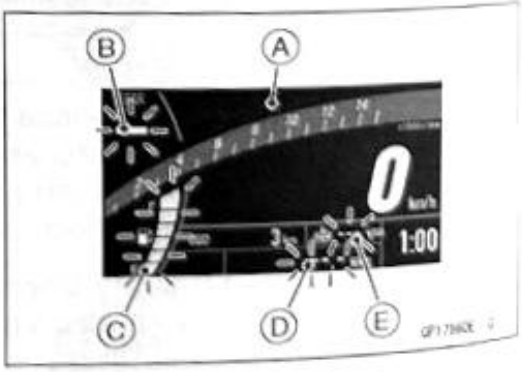
NOTE

○*This meter unit has a failure detection function of the communication. When the communication error was detected, the meter unit alerts the rider by the yellow engine warning indicator light and yellow ABS indicator light remains on.*

• The meter display [A] should turns on after few seconds later from turning on the meter unit.

○Some meters display such as followings will blinking to tell the error which have missing the input signals by removing the meter.

Gear Position Indicator Display with "-" [B]
Fuel Level Gauge Segments [C]
Multifunction Display with "- -" [D]
Coolant Temperature Meter with "- -" [E]

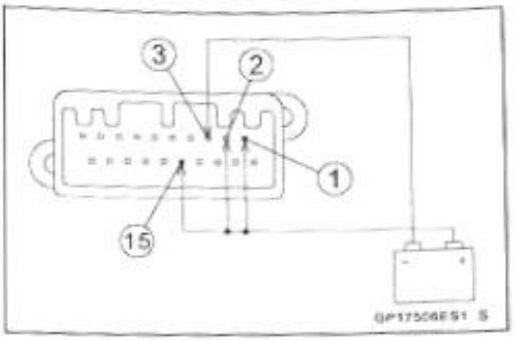


NOTE

○*Some meter display will show alarts with blinking the segments or blinking "-" in spite of the meter unit is normal, because the input signals to the meter unit are missing when the meter unit has been removed.*

★If the fuel level gauge does not work properly, replace the meter assembly.

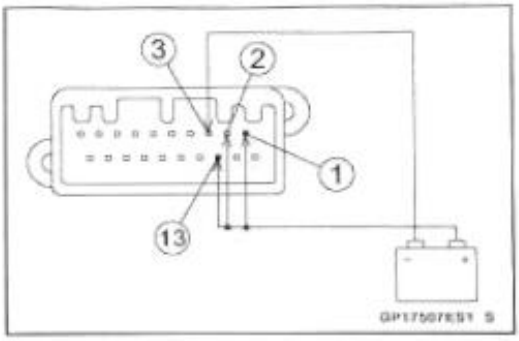
Check 3-2: Blue High Beam Indicator Light Inspection
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [15] to the battery (+) terminal.



- Check that the blue high beam indicator light [A] goes on.

★If the indicator light does not go on, replace the meter assembly.

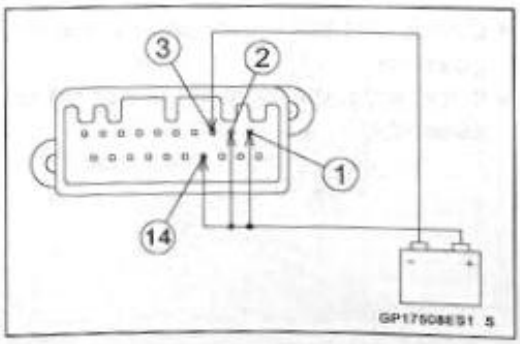
Check 3-3: Green Turn Signal Indicator Lights Inspection
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [13] to the battery (+) terminal.



- Check that the green left turn signal indicator light [A] goes on.

★If the indicator light does not go on, replace the meter assembly.

- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [14] to the battery (+) terminal.



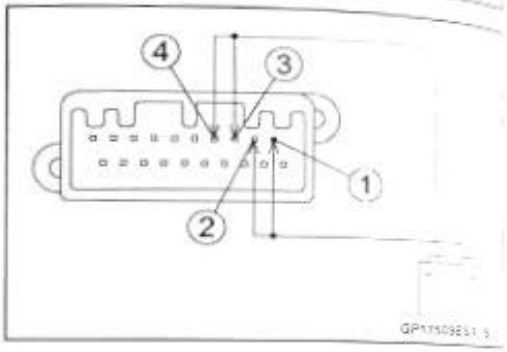
Meter, Gauge, Indicator Unit

- Check that the green right turn signal indicator light [A] goes on.

★If the indicator light does not go on, replace the meter assembly.

Check 3-4: Green Neutral Indicator Light Inspection

- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [4] to the battery (–) terminal.

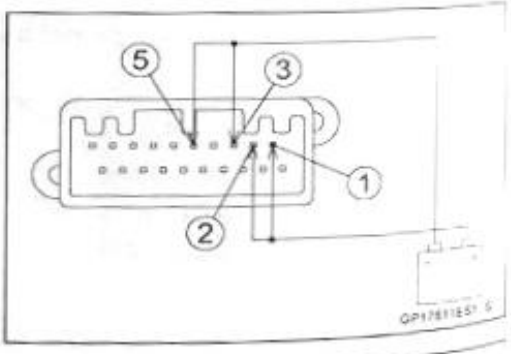


- Check that the green neutral indicator light [A] goes on.

★If the indicator light does not go on, replace the meter assembly.

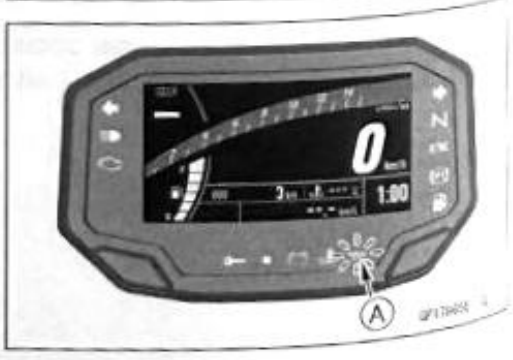
Check 3-5: Red Oil Pressure Warning Indicator Light Inspection

- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [5] to the battery (–) terminal.



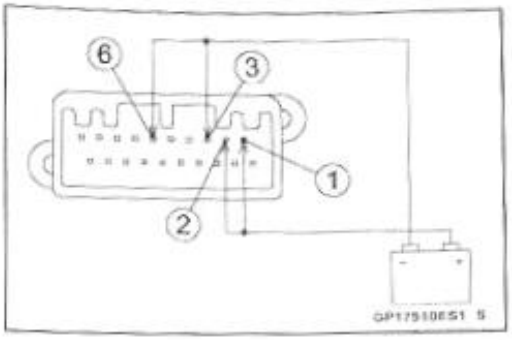
- Check that the red oil pressure warning indicator light [A] goes on.

★If the indicator light does not go on, replace the meter assembly.



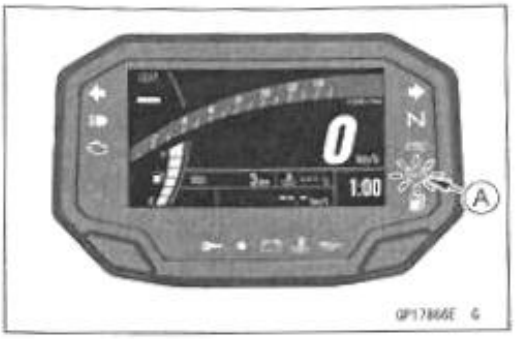
Check 3-6: Yellow ABS Indicator Light Inspection
- Connect the leads in the same circuit as Check 3-1.

OThe yellow ABS indicator light goes on.
- Connect the terminal [6] to the battery (–) terminal.

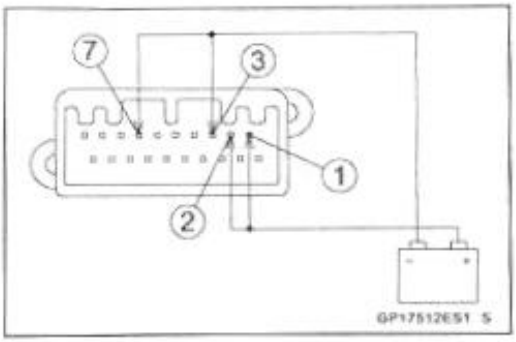


- Check that the yellow ABS indicator light [A] goes off.

★If the indicator light does not go off, replace the meter assembly.



Check 3-7: Yellow KTRC Indicator Light Inspection
- Connect the leads in the same circuit as Check 3-1.
- Connect the terminal [7] to the battery (–) terminal.

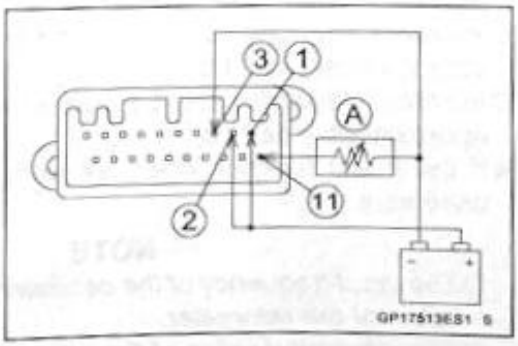


- Check that the yellow KTRC indicator [A] go on.

★If the indicator does not go on, replace the meter assembly.

Check 3-8: Fuel Gauge Inspection
- Connect the leads in the same circuit as Check 3-1.

OThe all segments of the fuel gauge in the display will blink.
- Connect the variable rheostat [A] between the terminal [11] and the battery (–) terminal.



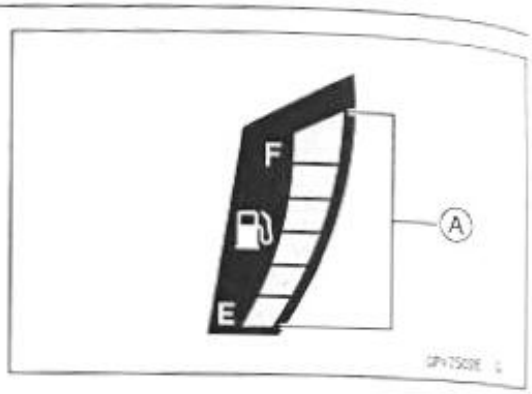
Meter, Gauge, Indicator Unit

- Check that the number of segments [A] on the fuel gauge matches the resistance value of the variable rheostat.

○After changing the resistance between the terminal [11] and ground, the segment(s) in the fuel gauge should change after 15 seconds.

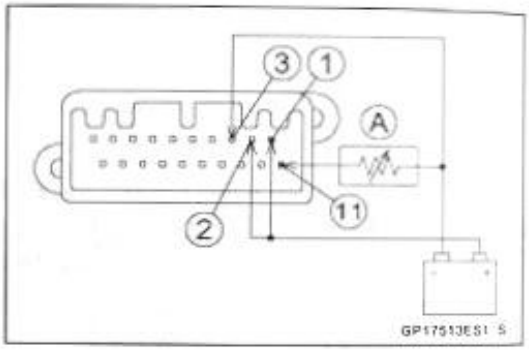
Variable Rheostat Resistance (Ω)	Display Segments
50	6 segments go on
75	5 segments go on
90	4 segments go on
130	3 segments go on
160	2 segments go on
190	1 segment goes on

★If the display function does not work properly, replace the meter assembly.



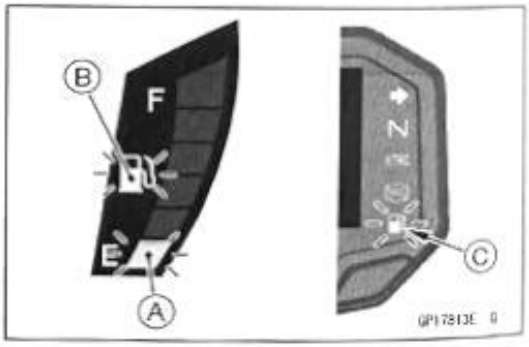
Check 3-9: Fuel Level Warning Indicator Inspection

- Connect the leads in the same circuit as Check 3-8.
- Increase the resistance to above 220 Ω of the variable rheostat [A] connected between the terminal [11] and the battery (–) terminal.



- Check that the lowest segment [A] and fuel level warning indicator [B] blink and yellow fuel level warning indicator light [C] go on.

★If the display function does not work properly and/or indicator light does not go on, replace the meter assembly.



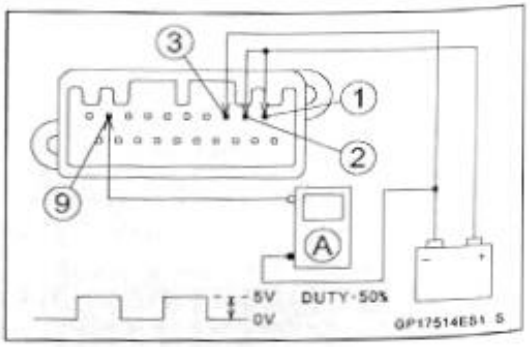
Check 3-10: Speedometer Inspection

- Connect the leads in the same circuit as Check 3-1.
- The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [9].

○Indicates approximately 60 km/h if the input frequency is approximately 434 Hz.

○Indicates approximately 50 mph if the input frequency is approximately 582 Hz.

★If the meter function does not work, replace the meter assembly.



NOTE

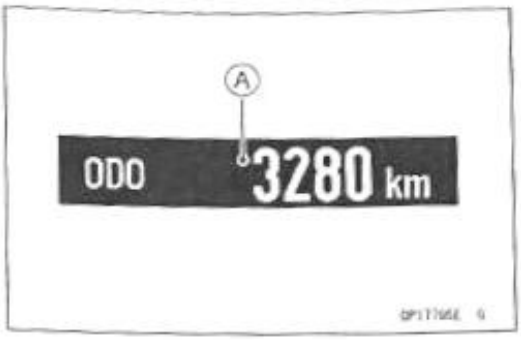
○*The input frequency of the oscillator adds the integrated value of the odometer.*

○*The integrated value of the odometer cannot be reset.*

Check 3-11: Odometer Check

- Check the odometer [A] with the speedometer check in the same way.

★If value indicated in the odometer is not added, replace the meter assembly.



NOTE

○The data is maintained even if the battery is disconnected.
○When the figures come to 999999, they are stopped and locked.
○The integrated value of the odometer cannot be reset.

Check 3-12: Trip A/B Meter Check

- Check the trip meters [A] with the speedometer in the same way.

★If value indicated in the trip meter is not added, replace the meter assembly.

NOTE

○The integrated value of the odometer cannot be reset.

- Check that when the left meter button is pushed for more than two seconds, the figure display turns to 0.0.

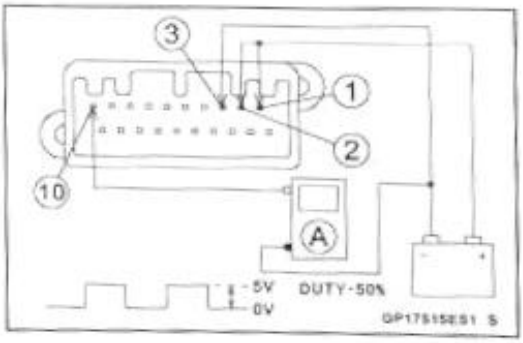
★If the figure display does not indicate 0.0, replace the meter assembly.

Check 3-13: Tachometer Inspection

- Connect the leads in the same circuit as Check 3-1.
- The engine speed (rpm) equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [10].

○Indicates approximately 6 000 rpm if the input frequency is approximately 200 Hz.

★If the meter function does not work, replace the meter assembly.



Check 3-14: Other Inspection

○The following items are displayed while running.
Current Mileage
Average Mileage
Cruising Range
Average Speed
Total Time
ECO Mark

- When the above item is faulty indication, check the following items.
Wiring (see Wiring Inspection(16-19))
ECU Communication Line (see ECU Communication Line Inspection (Service Code 39)(17-93))
Fuel Injectors (see DTC P0201, P0202, P0203, P0204(17-100))
Rear Wheel Rotation Sensor (see Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44)(17-127))
Crankshaft Sensor (see Crankshaft Sensor Inspection(16-32))

★If the above items are good, replace the meter assembly and/or ECU.

Meter, Gauge, Indicator Unit

Fuel Level Line Self-Diagnosis Mode Inspection

NOTE

○*Usually when the open or short of the fuel level circuit is detected, it becomes the Fuel Level Line Self-Diagnosis Mode.*

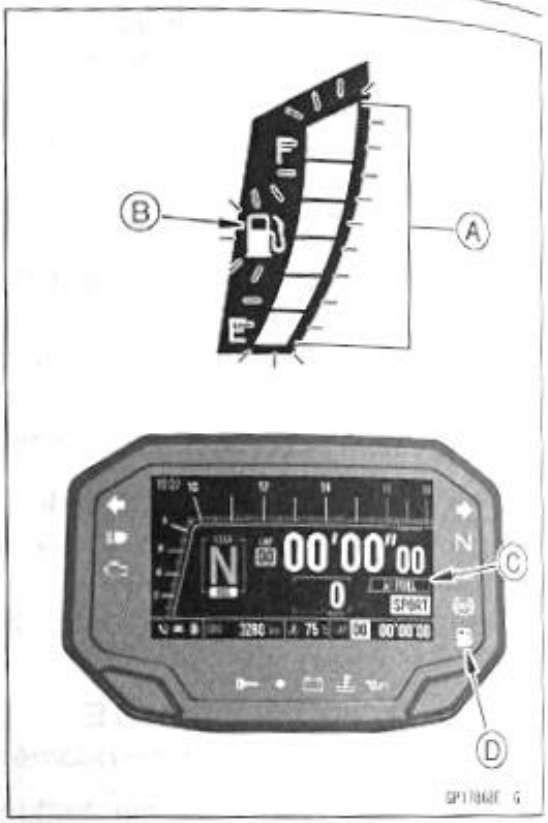
○The all segments [A] of the fuel gauge and fuel level warning indicator [B] (display layout type 1) or the fuel level warning message [C] (display layout type 2) and the yellow fuel level warning indicator light [D] will blink. (This function is Fuel Level Line Self-Diagnosis Mode.)

★If the meter enters the self-diagnosis mode when the meter is installed in the motorcycle, check the following items.

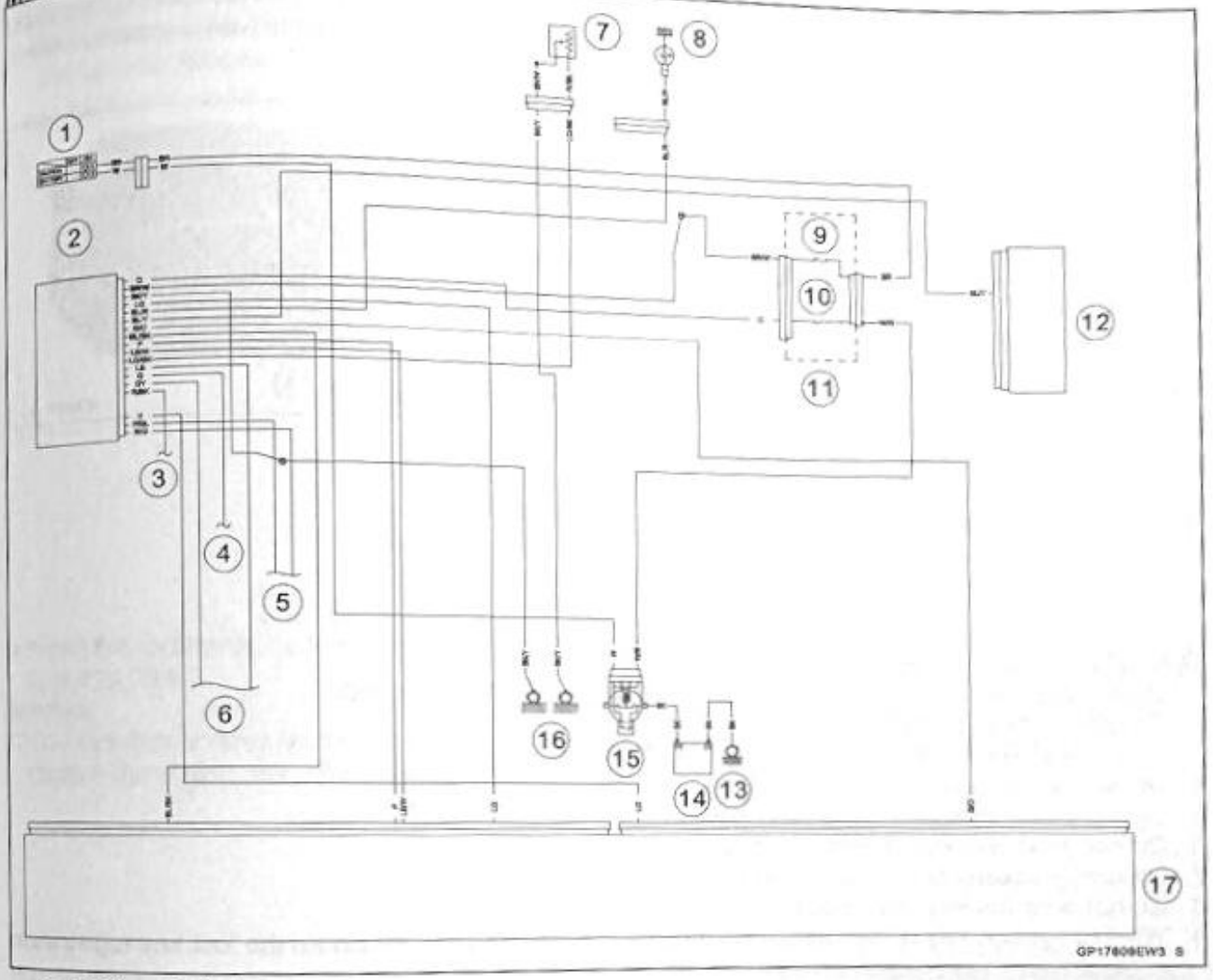
Fuel Level Sensor (see Fuel Level Sensor Inspection(16-91))

Wiring (see Wiring Inspection(16-19))

★If the above items are good, replace the meter assembly.



Meter Circuit



1. Ignition Switch
2. Meter Unit
3. to Headlight (High Beam)
4. to LAP Button
5. to Multifunction Buttons
6. to Turn Signal Switch
7. Fuel Level Sensor
8. Oil Pressure Switch
9. Ignition Fuse 15 A
10. Meter Fuse 10 A
11. Fuse Box (1)
12. ABS Hydraulic Unit
13. Engine Ground
14. Battery
15. Main Fuse 30 A
16. Frame Grounds
17. ECU

Immobilizer System (Equipped Models)

This motorcycle is equipped with an immobilizer system to protect the motorcycle from theft. This system provides a theft proof device by means of matching a code between the inbuilt key transponder and ECU. If the code does not match, ignition system, injectors and subthrottle valve actuator will not operate and the engine will not start.

Abstract

- Do not keep more than one immobilizer key of any system on a key ring. Jamming of the key code signal may occur and the operation of the system may be affected.
- The red immobilizer warning indicator light [A] will blink for a period of 24 hours once the ignition switch has been switched off and the key removed. This blinking can be set to on or off as desired by holding the upper and lower buttons on the left switch housing down for 2 seconds within 20 seconds of switching the ignition off.
- If all coded keys are lost the ECU and ignition switch will have to be replaced.
- The immobilizer system can not function until the ignition key code is registered in the ECU.
- A total of five keys can be registered in the ECU at any one time.

Operational Cautions

1. Do not put two keys of any immobilizer system on the same key ring.
2. Do not submerge any key in water.
3. Do not expose any key to excessively high temperature.
4. Do not place any key close to magnet.
5. Do not place a heavy item on any key.
6. Do not grind any key or alter its shape.
7. Do not disassemble the plastic part of any key.
8. Do not drop the key and/or apply any shocks to the key.
9. When a ignition key is lost, the user should go to his dealer to invalidate the lost key registration in the ECU.
10. When the all ignition keys are lost, the user should go to his dealer and have a new ECU installed and register the ignition keys.

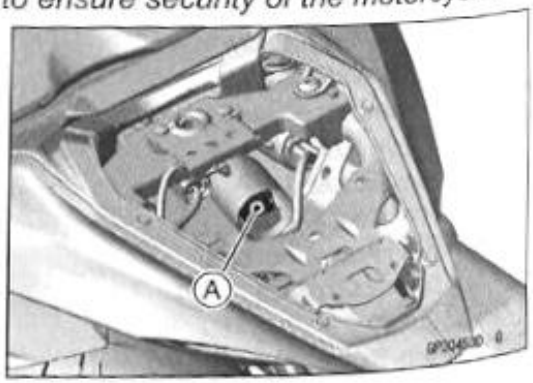
NOTE

○No.9 and 10 are strongly recommended to the customer to ensure security of the motorcycle.

Key Registration

Case 1: When the ignition key has been lost or additional spare ignition key is required.

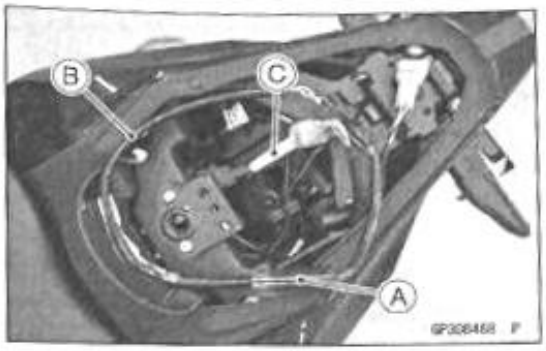
- Prepare a new spare ignition key.
- Cut the key in accordance with the shape of the current ignition key.
- Remove the rear seat (see Rear Seat Removal(15-16)).
- Remove the cap from the immobilizer/Kawasaki diagnostic system connector [A].

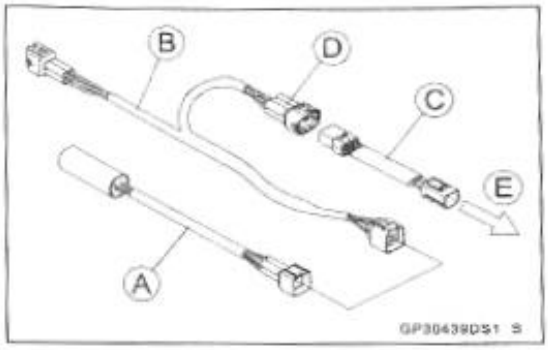


Immobilizer System (Equipped Models)

• Connect the key registration unit [A], key registration adapter [B] and OBDII adapter cable [C] as shown.
6 Pins Connector [D]
To the main harness [E]

Special Tools - Key Registration Unit: 57001-1582
Key Registration Adapter: 57001-1746
OBDII Adapter Cable: 57001-1880

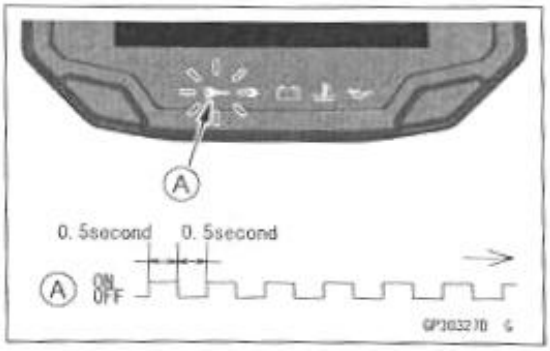




• Insert the registered ignition key to the ignition switch and turn it to "ON."

Verified

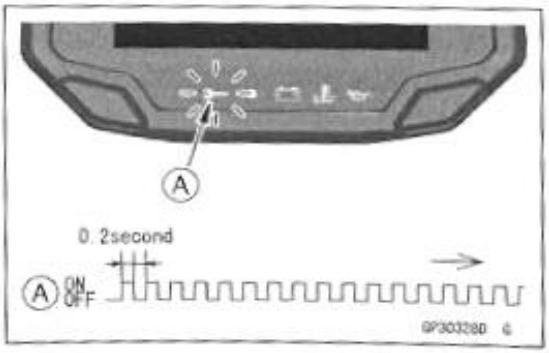
OThe red immobilizer warning indicator light [A] blinks to display the registration mode (go to the next step).



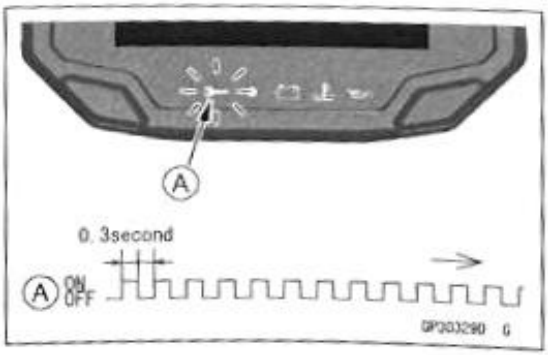
Not Verified

OThe red immobilizer warning indicator light [A] blinks to display the collation error (refer to the following failure illustrations).

Immobilizer Amplifier Failure



Registered Ignition Key Collation Error

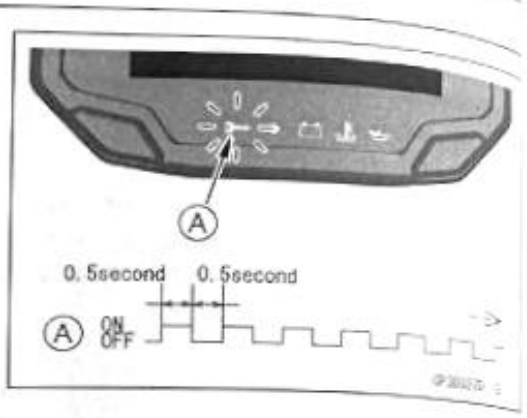


Immobilizer System (Equipped Models)

- Turn the registered ignition key to "OFF" and remove the registered ignition key.

★If there are other registered ignition keys, they should all do the procedure above.

○The red immobilizer warning indicator light [A] blinks continuously to display that the ECU is in the registration mode for 15 seconds.



NOTE

○Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF" and removed otherwise registration mode will be ended and the red immobilizer warning indicator light stops blinking.

○To return to the registration mode start the registered ignition key(s) verification procedure. This applies to all ignition key registration.

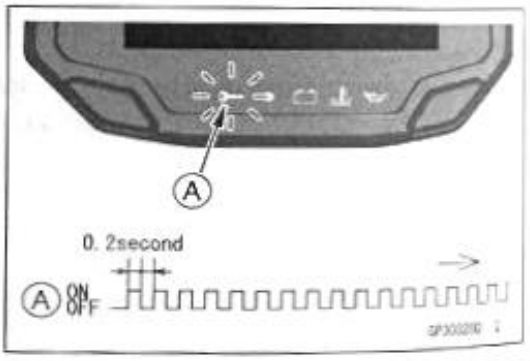
- Insert the ignition key 1 to the ignition switch and turn it to "ON."

NOTE

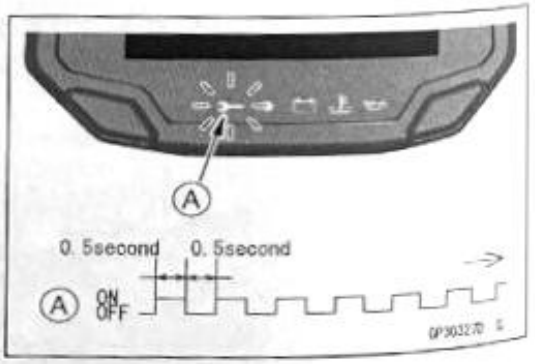
○Keep the other ignition key away from the immobilizer antenna.

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

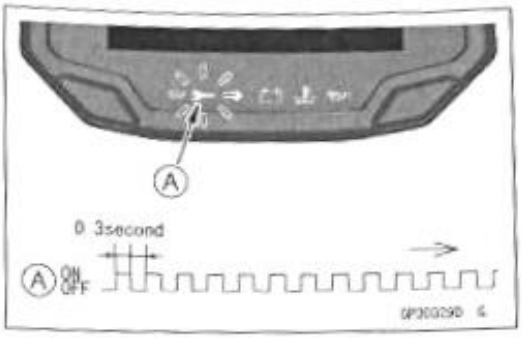
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

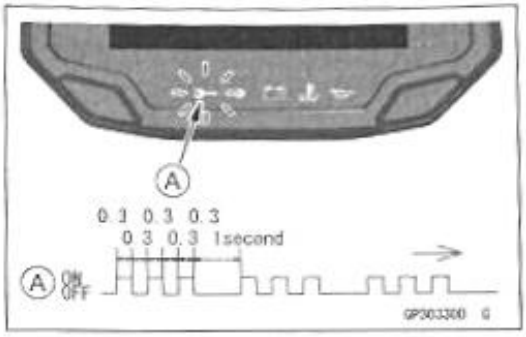


Ignition Key Collation Error



- The ignition key 1 is successfully registered in the ECU.

○The red immobilizer warning indicator light [A] blinks 3 times and stops for 1 second and then repeats this cycle.



- Turn the ignition key 1 to "OFF" and remove the ignition key 1.

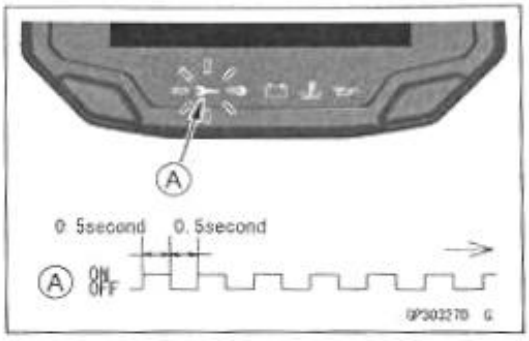
○The red immobilizer warning indicator light [A] blinks to display the registration mode.

NOTE

○*Turn to "OFF" the ignition switch and wait for the period of 15 seconds or more. The registration mode automatically finishes and the red immobilizer warning indicator light will switch off.*

○*This procedure registered the registered ignition key and one ignition key.*

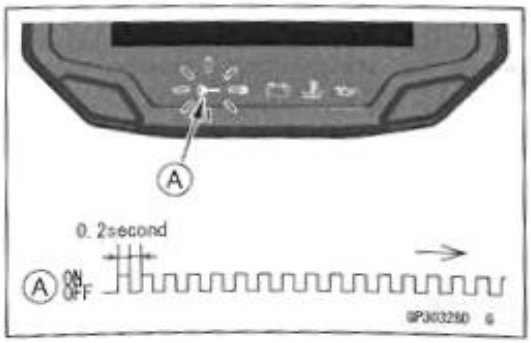
○*Continue with the procedure to register the second and later keys before the 15 seconds period has elapsed.*



- Insert the ignition key 2 to the ignition switch and turn it to "ON."

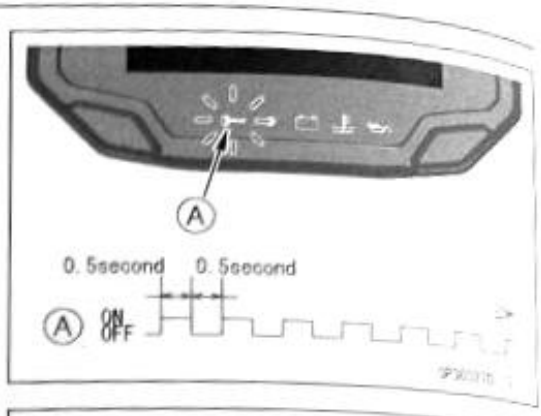
○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

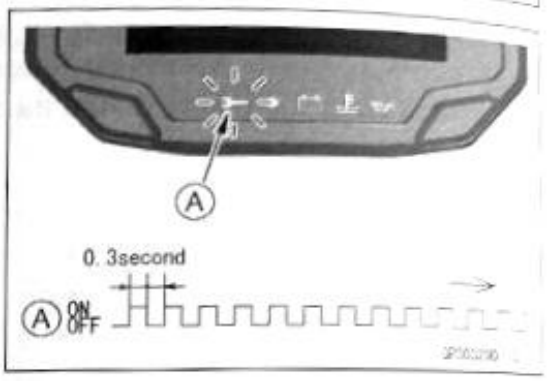


Immobilizer System (Equipped Models)

When Registered Ignition Key is Inserted.



Ignition Key Collation Error

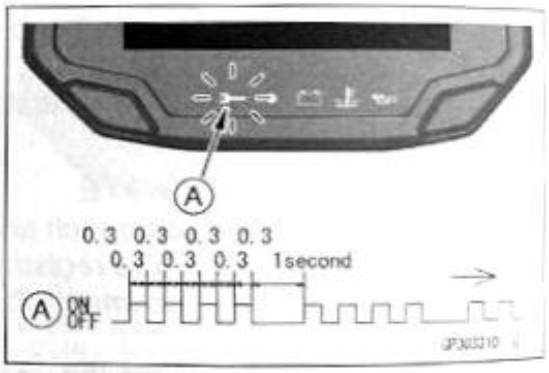


- The ignition key 2 is registered in the ECU.

○The red immobilizer warning indicator light [A] blinks 4 times and stops for 1 second and then repeats this cycle.

○This procedure has registered the 2 ignition keys.

- Continue with the procedure to register an additional one ignition key.



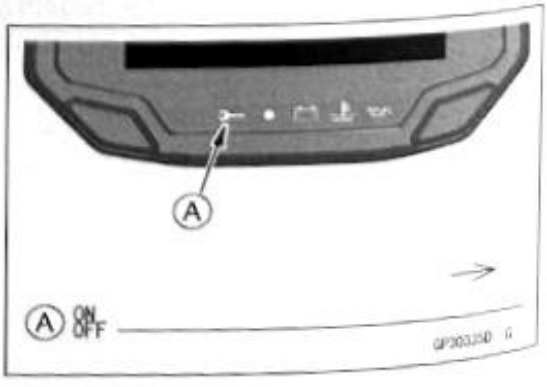
NOTE

○The ECU can store up the five key codes.

Red Immobilizer Warning Indicator Light Blink

	Indicator Blinks	Indicator Stop	Remarks
Ignition Key 3	5 times	1 second	Repeat

- Turn to "OFF" the ignition switch and wait for period of more than 15 seconds.
- The registration mode automatically ends.
- The red immobilizer warning indicator light [A] goes off .



Immobilizer System (Equipped Models)

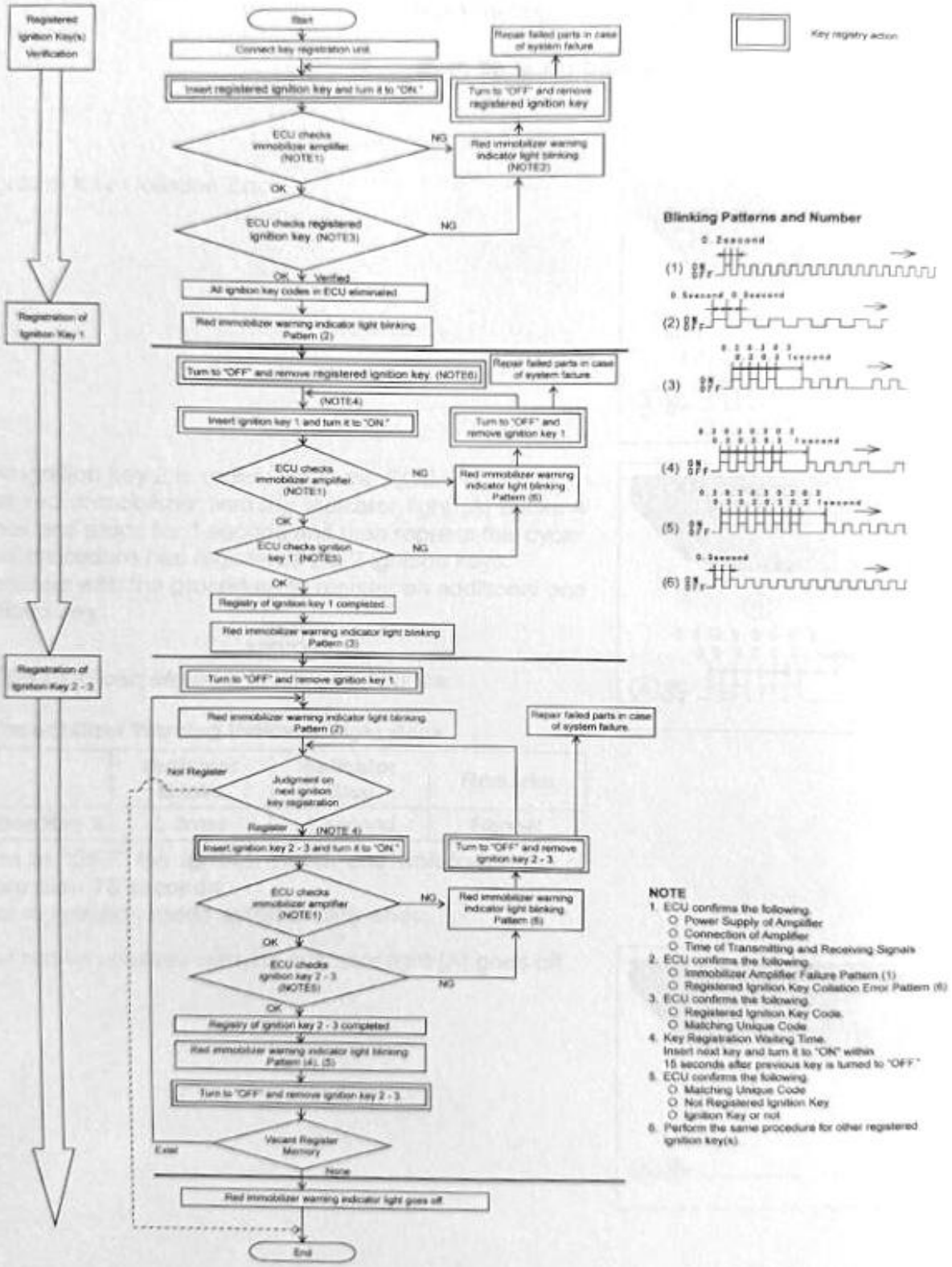
- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

NOTE

○Turn the ignition switch to "ON" with the registered ignition key.
○Check that the engine can be started using all registered ignition keys.

Immobilizer System (Equipped Models)

Spare Ignition Key Registration Flow Chart



Blinking Patterns and Number

NOTE

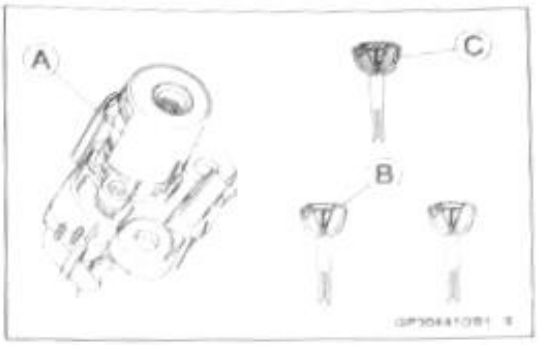
1. ECU confirms the following.
   - O Power Supply of Amplifier
   - O Connection of Amplifier
   - O Time of Transmitting and Receiving Signals
2. ECU confirms the following.
   - O Immobilizer Amplifier Failure Pattern (1)
   - O Registered Ignition Key Collation Error Pattern (6)
3. ECU confirms the following.
   - O Registered Ignition Key Code.
   - O Matching Unique Code
4. Key Registration Waiting Time.
   Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF."
5. ECU confirms the following.
   - O Matching Unique Code
   - O Not Registered Ignition Key
   - O Ignition Key or not
6. Perform the same procedure for other registered ignition key(s).

Immobilizer System (Equipped Models)

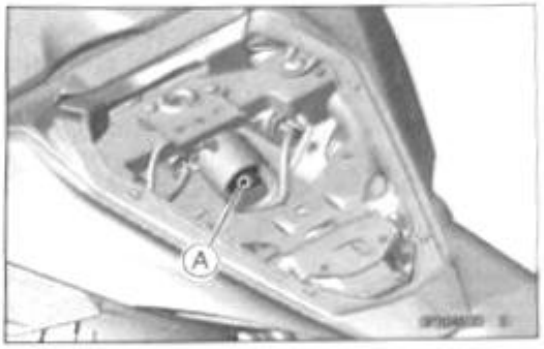
Case 2: When the ignition switch is faulty and to be replaced.

- Prepare a new ignition switch [A] and two new ignition keys [B].

○These parts are available as a set. Prepare the current registered ignition key [C].

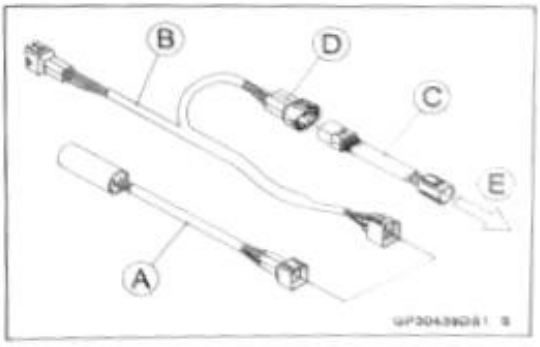


- Remove:
  Ignition Switch (see Immobilizer System Parts Replacement(16-87))
  Center Seat Cover (see Center Seat Cover Removal(15-28))
- Remove the immobilizer/Kawasaki diagnostic system connector cap [A].



- Connect the key registration unit [A], key registration adapter [B] and OBDII adapter cable [C] as shown.
  6 Pins Connector [D]
  To the main harness [E]

Special Tools - Key Registration Unit: 57001-1582
Key Registration Adapter: 57001-1746
OBDII Adapter Cable: 57001-1880

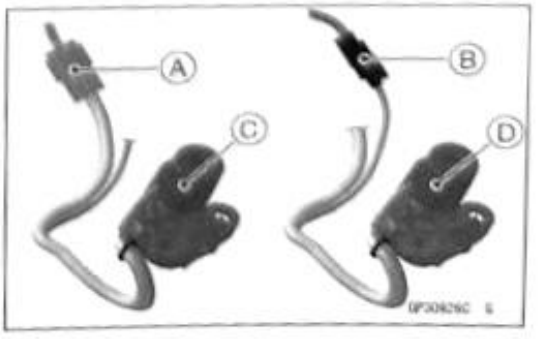


- Connect:
  New Ignition Switch Connector [A]
  Current Immobilizer Antenna Connector [B]

NOTE

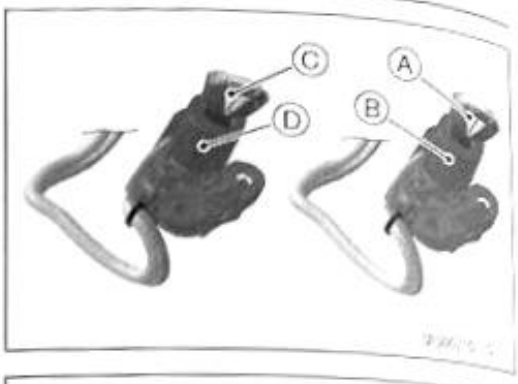
○*Keep the ignition switches more than 15 cm (5.9 in.).*

New Ignition Switch [C]
Current Ignition Switch [D]

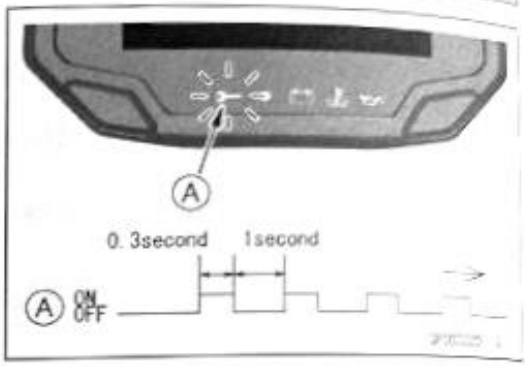


Immobilizer System (Equipped Models)

- Insert the current registered ignition key [A] at the current ignition switch [B].
- Insert the new ignition key 1 [C] to the new ignition switch [D] and turn it to "ON."

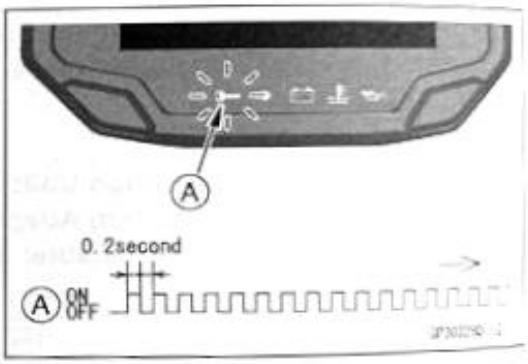


○The red immobilizer warning indicator light [A] blinks 1 time and stops for 1 second and repeats this cycle.

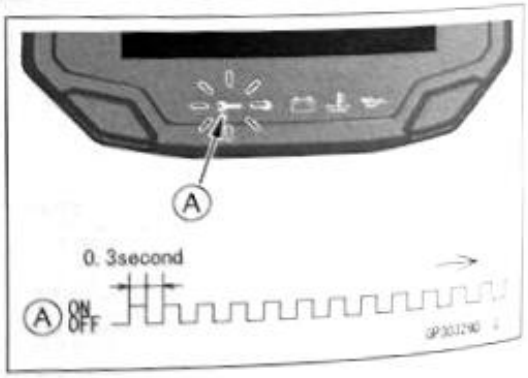


Not Verified

○The red immobilizer warning indicator light [A] blinks to display the collation error.
Immobilizer Amplifier Failure



Registered Ignition Key Collation Error



- Turn to "OFF" and remove the new ignition key 1.

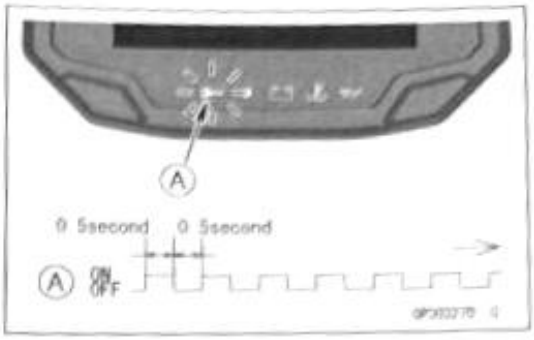
NOTE

○*Insert the next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF" and removed otherwise registration mode will be ended and the red immobilizer warning indicator light stops blinking.*

Immobilizer System (Equipped Models)

Verified

○The red immobilizer warning indicator light [A] blinks to display the ECU is in the registration mode (go to the next step).



- Disconnect the immobilizer antenna connector, then connect the antenna connector of the new ignition switch.
- Insert the ignition key 1 [A] again into the new ignition switch and turn it to "ON."

NOTE

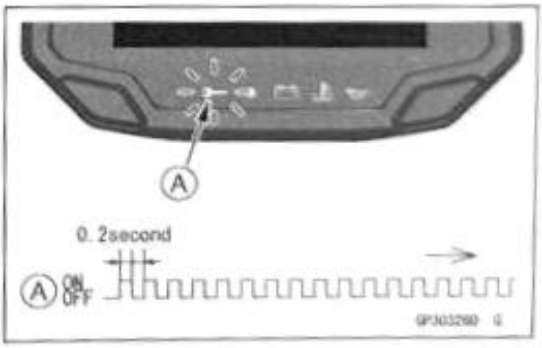
○*Insert the next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF" and removed otherwise registration mode will be ended and the red immobilizer warning indicator light stops blinking.*

○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*

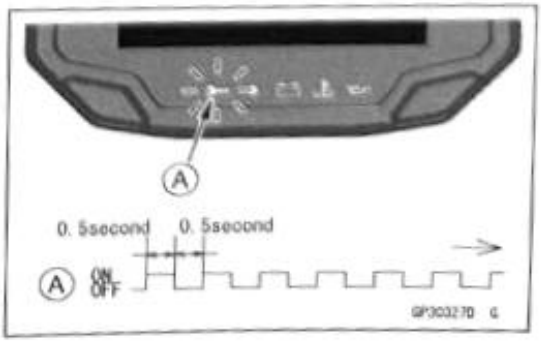
○*Keep other ignition keys away from the ignition switch.*

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

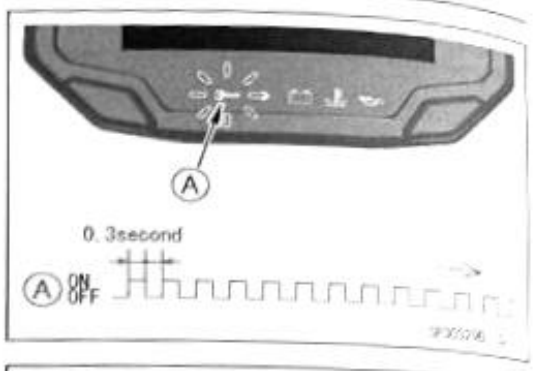


When Registered Ignition Key is Inserted.



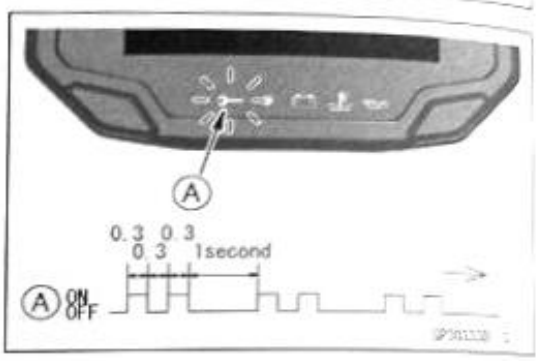
Immobilizer System (Equipped Models)

Ignition Key Collation Error



- The ignition key 1 is successfully registered in the ECU.

○The red immobilizer warning indicator light [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registering of ignition key 1.



- Turn to "OFF" and remove ignition key 1.

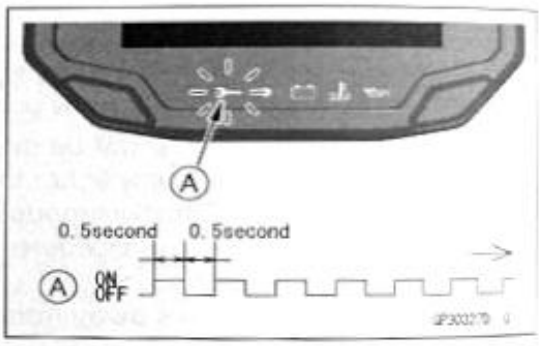
○The red immobilizer warning indicator light [A] blinks to display the registration mode.

NOTE

○*Turn to "OFF" the ignition switch and wait for the period more than 15 seconds. The registration mode automatically ends and red immobilizer warning indicator light goes off.*

○*This procedure has , registered the registered ignition key and one ignition key.*

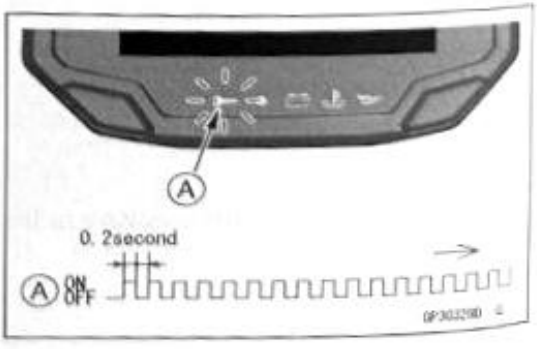
○*Continue the procedure to program the second and later keys.*



- Insert the ignition key 2 to the ignition switch and turn it to "ON."

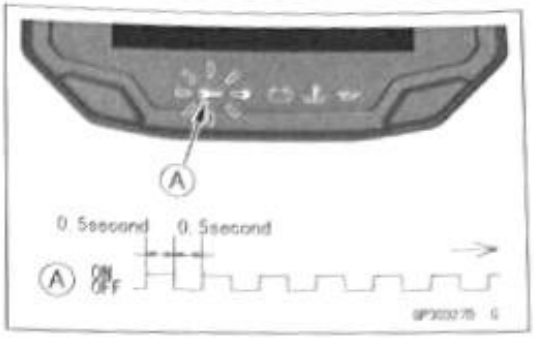
○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

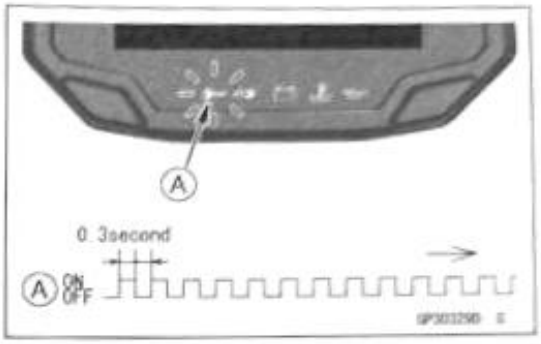


Immobilizer System (Equipped Models)

When Registered Ignition Key is Inserted.



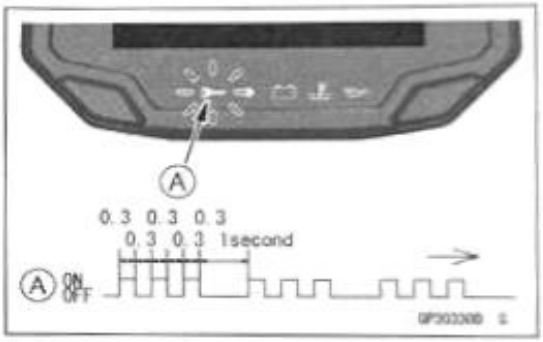
Ignition Key Collation Error



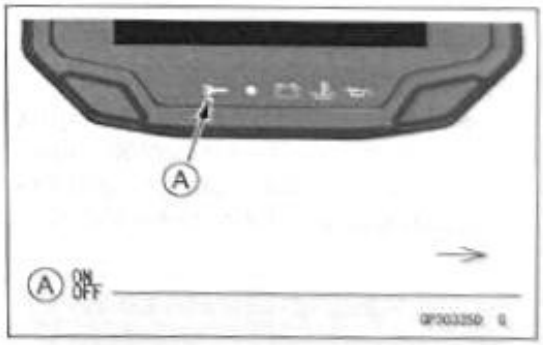
- The ignition key 2 is successfully registered in the ECU.

○The red immobilizer warning indicator light [A] blinks 3 times and stops for 1 second and then repeat this cycle to indicate successful programming of ignition key 2.

- Turn to "OFF" the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.



- The red immobilizer warning indicator light [A] goes off.



- Remove the key registration unit, key registration adapter and install the immobilizer/Kawasaki diagnostic system connector cap.

NOTE

○*Turn the ignition switch to "ON" with the registered ignition key.*

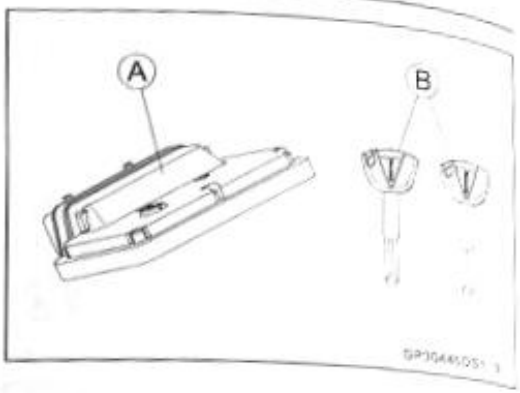
○*Check that the engine can be started using all registered ignition keys.*

- Install the new ignition switch (see Immobilizer System Parts Replacement(16-87)).

Immobilizer System (Equipped Models)

Case 3: When the ECU is faulty and has to be replaced.

- Prepare a new ECU [A] and current registered ignition key(s) [B].



NOTE

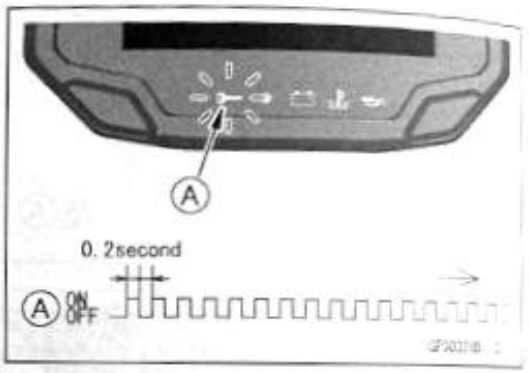
○The key registration unit is not required.
○After replacing the ECU, be sure to register the 2 ignition keys. If the 2 keys are not registered, the engine can not be started.

- Replace the ECU (see ECU Removal(3-12)).

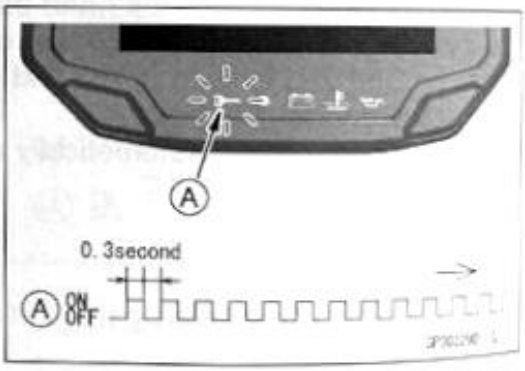
- Insert the current registered ignition key into the ignition switch and turn it to "ON."

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

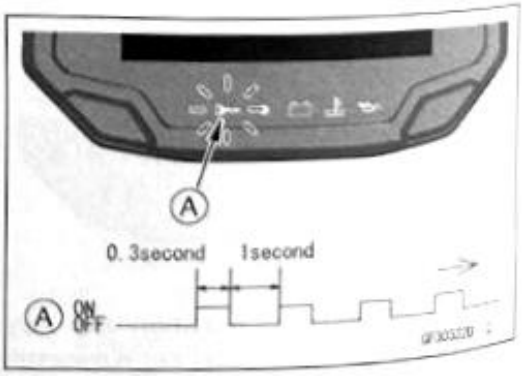


Registered Ignition Key Collation Error



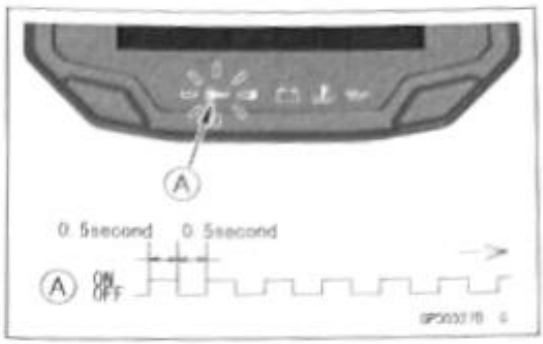
- The registered ignition key is registered in the ECU.

○The red immobilizer warning indicator light [A] blinks 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the registered ignition key.



Immobilizer System (Equipped Models)

• Turn to "OFF" the registered ignition key and remove it.
○The red immobilizer warning indicator light [A] blinks to display the registration mode.



NOTE

○*Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF" and removed otherwise registration mode will be ended and the red immobilizer warning indicator light goes off.*
○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*

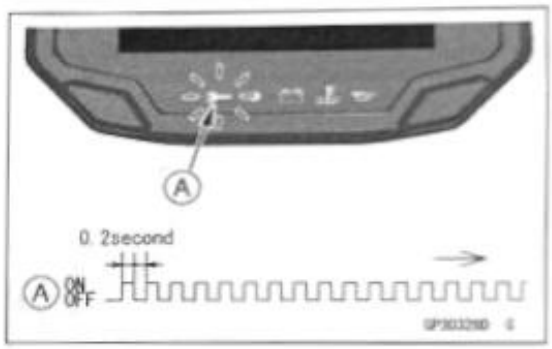
• Insert the other remaining registered ignition key to the ignition switch and turn it to "ON."

NOTE

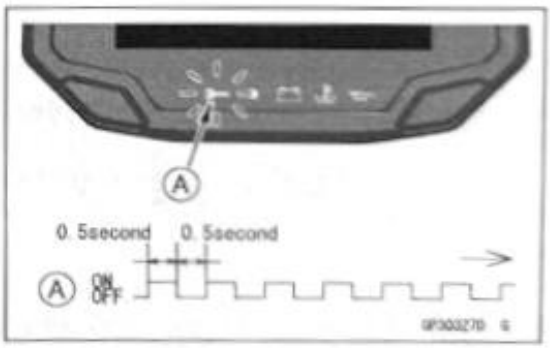
○*Keep the other ignition keys away from the immobilizer antenna.*

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

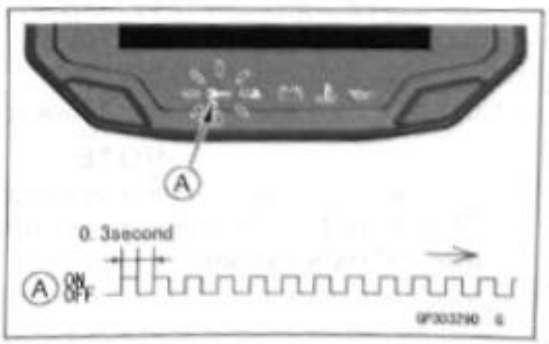
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted.

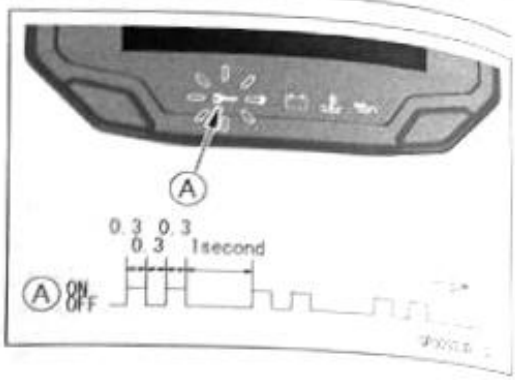


Ignition Key Collation Error

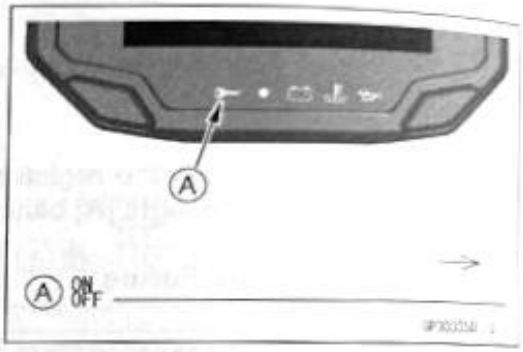


Immobilizer System (Equipped Models)

• The other remaining ignition key is registered in the ECU.
○The red immobilizer warning indicator light [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of ignition key.



• Turn to "OFF" the ignition switch and wait for period more than 15 seconds.
• The registration mode automatically ends.
• The red immobilizer warning indicator light [A] goes off.



NOTE

○*Turn the ignition switch to "ON" with the registered ignition key.*
○*Check that the engine can be started using all registered ignition keys.*

Case 4: When all registered ignition keys are faulty or lost.

The all registered ignition keys replacement is considered very rare case. However if it is required, the following is necessary.

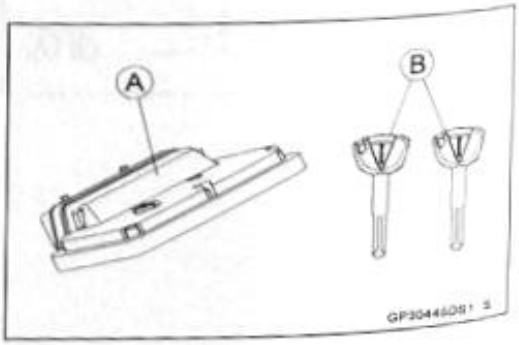
NOTE

○*The ECU must be replaced with a new one because the registered ignition key code that is registered in the current ECU can not be rewritten.*

• Prepare a new ECU [A] and 2 new ignition keys [B].

NOTE

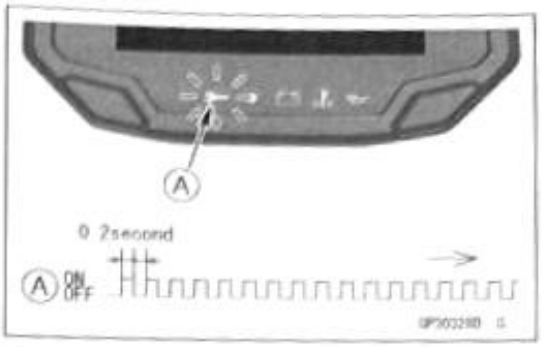
○*The key registration unit is not required.*
○*The key registration process is same as the electric control unit replacement.*



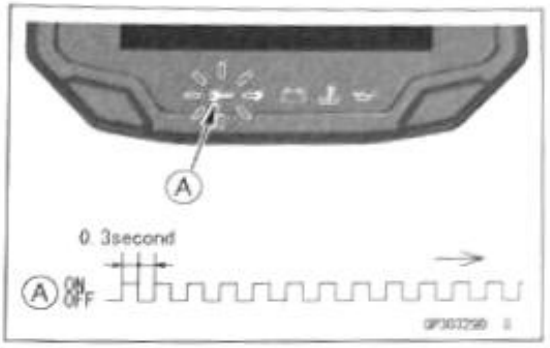
• Insert the first ignition key into the ignition switch and turn it to "ON."

○If there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

Immobilizer Amplifier Failure

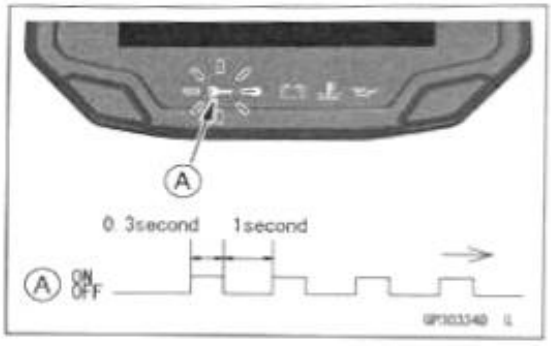


Ignition Key Collation Error



- The first ignition key is registered in the ECU.

○The red immobilizer warning indicator light [A] blinks 1 time and stops for 1 second and the repeats this cycle to indicate successful registration of the first ignition key.

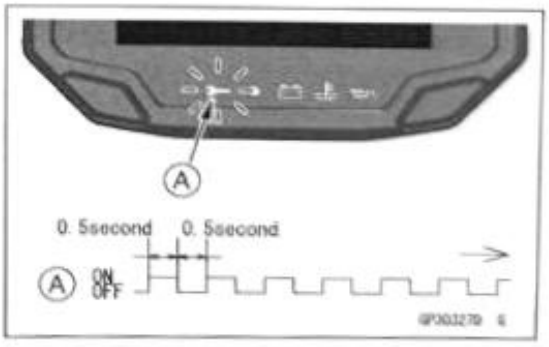


- Turn to "OFF" the first ignition key and remove it.
- The red immobilizer warning indicator light [A] blinks to display the registration mode.

NOTE

○*Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF" and removed otherwise registration mode will be ended and the red immobilizer warning indicator light goes off.*

○*To return to the registration mode start the registered ignition key verification procedure. This applies to all ignition key registration.*



- Insert the second ignition key to the ignition switch and turn it to "ON."

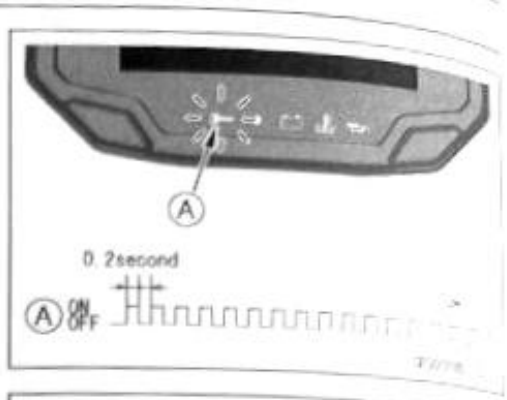
NOTE

○*Keep the other ignition keys away from the immobilizer antenna.*

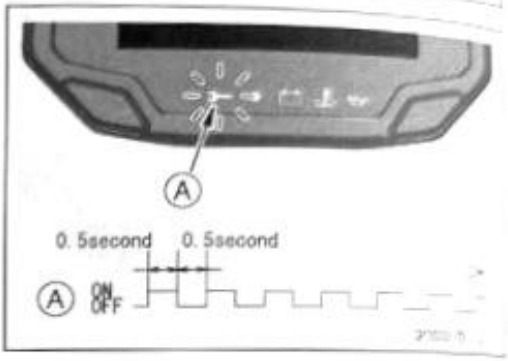
Immobilizer System (Equipped Models)

OIf there is any problem in the registration, the red immobilizer warning indicator light [A] blinks to display the collation error.

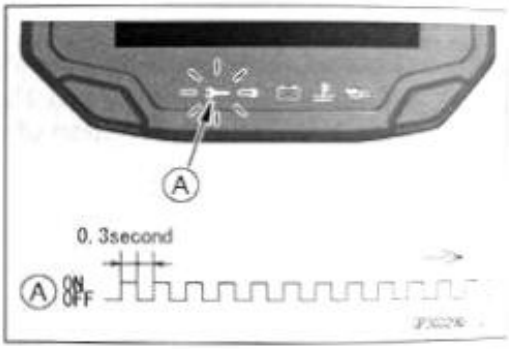
Immobilizer Amplifier Failure



When Registered Ignition Key is Inserted



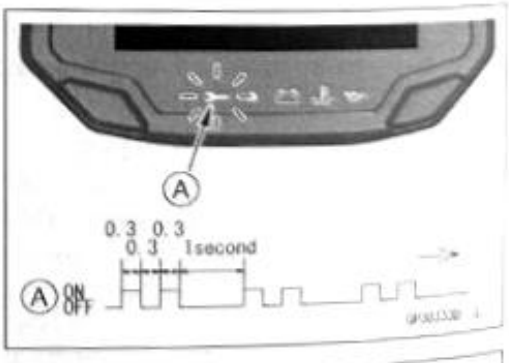
Ignition Key Collation Error



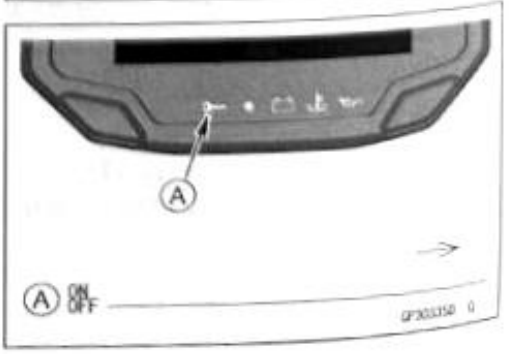
- The second ignition key is registered in the ECU.

OThe red immobilizer warning indicator light [A] blinks 2 times and stops for 1 second and then repeats this cycle to indicate successful registration of second ignition key.

- Turn to "OFF" the ignition switch and wait for period more than 15 seconds.
- The registration mode automatically ends.



- The red immobilizer warning indicator light [A] goes off.



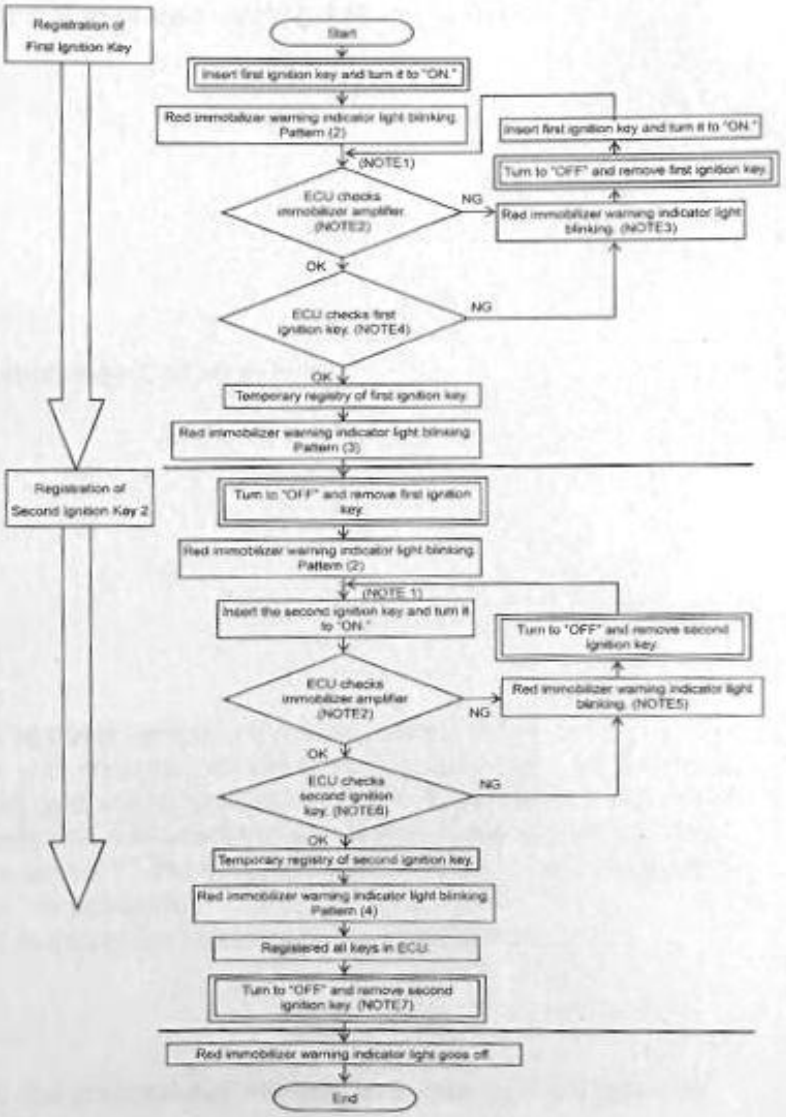
Immobilizer System (Equipped Models)

NOTE

- *Turn the ignition switch to "ON" with the registered ignition key.*
- *Check that the engine can be started using all registered ignition keys.*

Immobilizer System (Equipped Models)

All Keys Initial Registration Flow Chart



NOTE

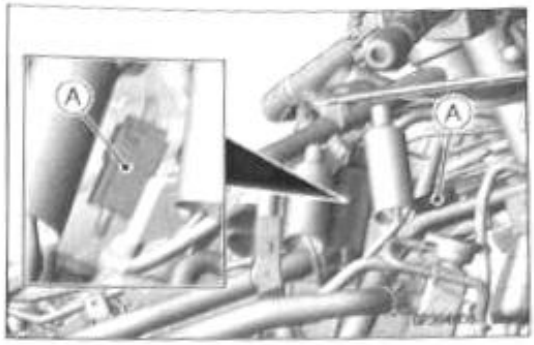
1. Key Substitute Time
   Insert next key and turn it to "ON" within 15 seconds after previous key is turned to "OFF."
2. ECU confirms the following.
   - O Power Supply of Amplifier
   - O Connection of Amplifier
   - O Time of Transmitting and Receiving Messages
3. ECU confirms the following.
   - O Immobilizer Amplifier Failure Pattern (1)
   - O Ignition Key Collation Error Pattern (5)
4. ECU confirms the following.
   - O Ignition Key or Not
   - O Match the Unique Code
5. ECU confirms the following.
   - O Immobilizer Amplifier Failure Pattern (1)
   - O Second Ignition Key Collation Error Pattern (5)
   - O Registered Ignition Key is Inserted Pattern (2)
6. ECU confirms the following.
   - O Ignition Key or Not
   - O Match the Unique Code
   - O Not Registered Ignition Key
7. When the ECU-registered key is turned to "OFF", ECU keeps the power on for two seconds. And then, in two seconds after the key is turned to "OFF", ECU turns the power off.

Immobilizer System (Equipped Models)

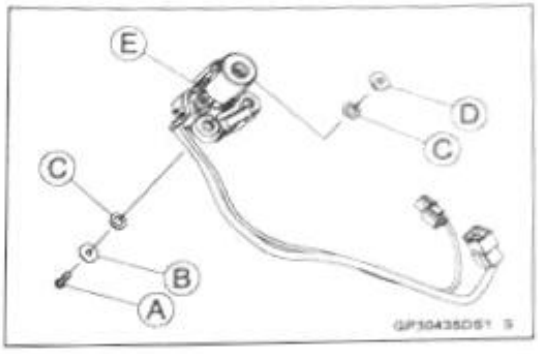
Immobilizer System Parts Replacement

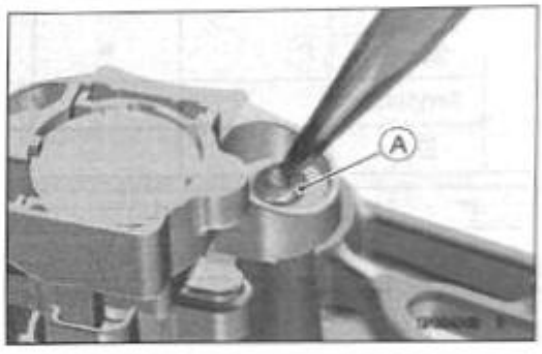
Ignition Switch Replacement

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Disconnect the connectors [A].



- Remove:
  Steering Stem Head and Handlebars (see Handlebar Removal(14-11))
- Remove the ignition switch bolts [A] by turning them using a small chisel or punch.
- Remove:
  Washers [B]
  Dampers [C]
  Collars [D]
  Ignition Switch [E]
- Replace the ignition switch and the ignition switch bolts with new ones.

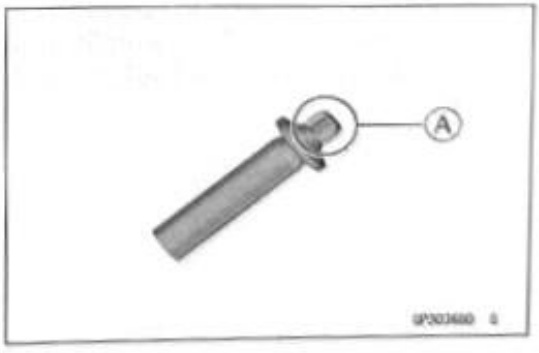




- Register the more than two ignition keys (see Key Registration(16-68)).
- Installation is the reverse of removal.

OWhen installing a new Torx bolt, tighten it until the bolt head [A] is broken.

ORun the leads correctly (see Cable, Wire, and Hose Routing section (18-2)).

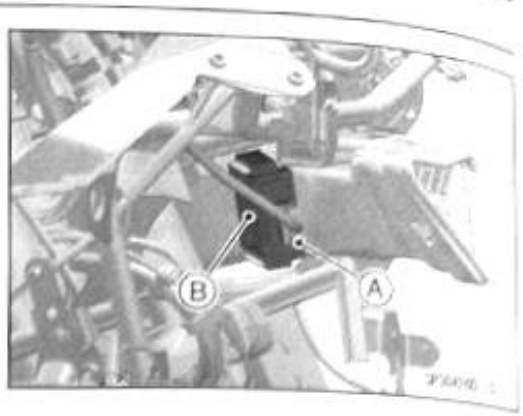


Immobilizer Amplifier Replacement

- Remove:
  Upper Fairing (see Upper Fairing Removal(15-21))

Immobilizer System (Equipped Models)

- Disconnect:
  Immobilizer Amplifier Connector [A]
- Pull out the immobilizer amplifier [B] together with the rubber protector from the intake duct.



ECU Replacement

- Refer to the ECU Removal/Installation (see ECU Removal(3-12)) (see ECU Installation(3-13)).

Immobilizer Relational Parts Replacement Chart

		Failed or Lost Part			
		Ignition Key	Ignition Switch	Amplifier	ECU
*	Ignition Key	●	○		
	Ignition Switch		●		
	Amplifier			●	
	ECU	○			●

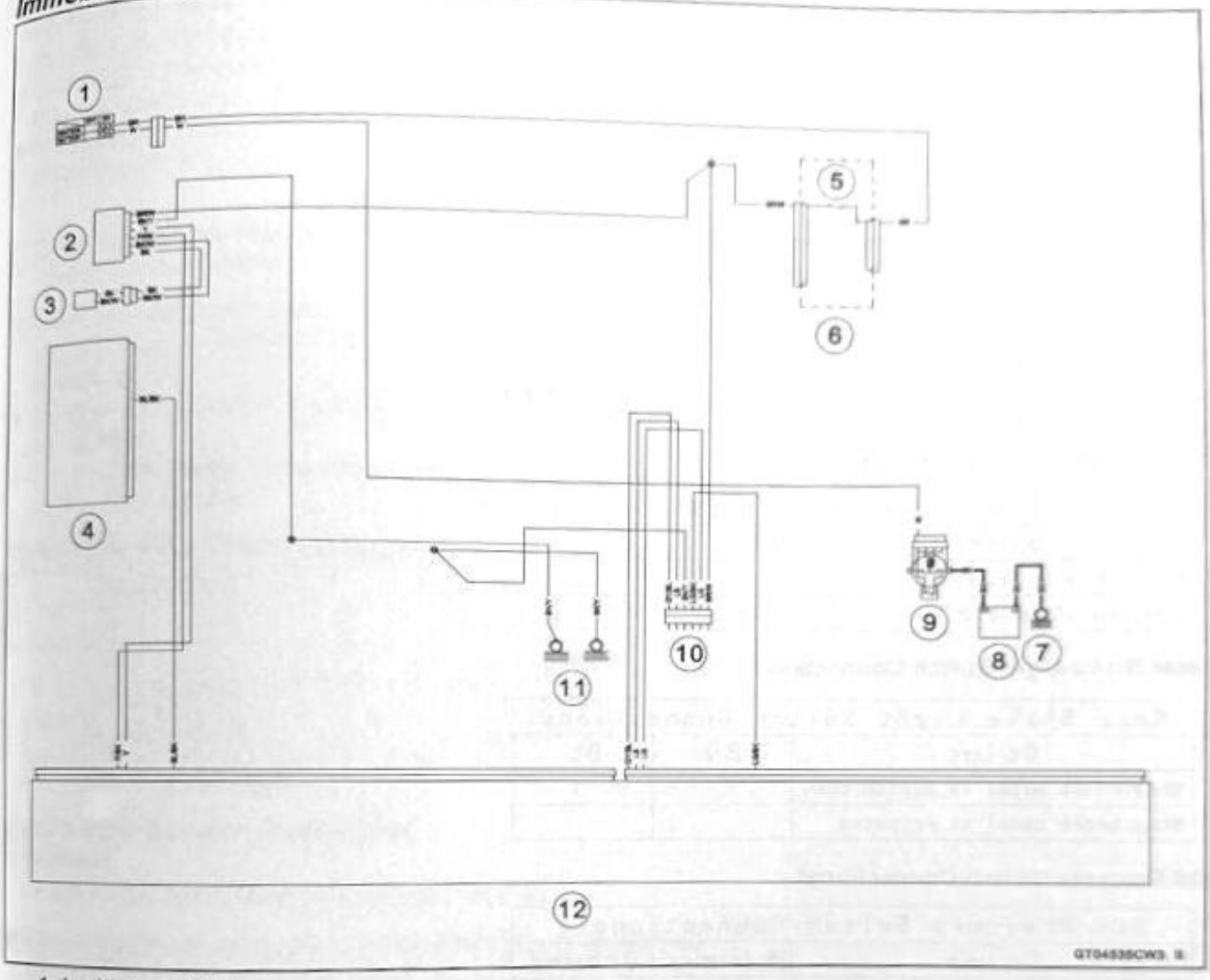
*	Replacement Part
●	Main Replacement Part
○	Additional Replacement Part

Immobilizer System Inspection

- Refer to the Immobilizer Amplifier and Blank Key Detection section (see DTC P1507(17-91)) (see DTC P1508(17-92)).

Immobilizer System (Equipped Models)

Immobilizer System Circuit



1. Ignition Switch
2. Immobilizer Amplifier
3. Immobilizer Antenna
4. Meter Unit
5. Ignition Fuse 15 A
6. Fuse Box (1)
7. Engine Ground
8. Battery
9. Main Fuse 30 A
10. Immobilizer/Kawasaki Diagnostic System Connector
11. Frame Grounds
12. ECU

Switches and Sensors

Brake Light Timing Inspection

- Refer to the Brake Light Switch Operation Inspection (see Brake Light Switch Operation Inspection(2-53)).

Brake Light Timing Adjustment

- Refer to the Brake Light Switch Operation Inspection (see Brake Light Switch Operation Inspection(2-53)).

Switch Inspection

- Using a digital meter, check to see that only the connections shown in the table have continuity (about zero ohms).

○For the switch housings and the ignition switch, refer to the tables in the Wiring Diagram.

★If the switch has an open or short, repair it or replace it with a new one.

Side Stand Switch Connections

Side Stand Switch Connections		
Color	BK	G
When side stand is down		
When side stand is up	○	○

Rear Brake Light Switch Connections

Rear Brake Light Switch Connections		
Color	BR	BL
When brake pedal is pushed down	○	○
When brake pedal is released		

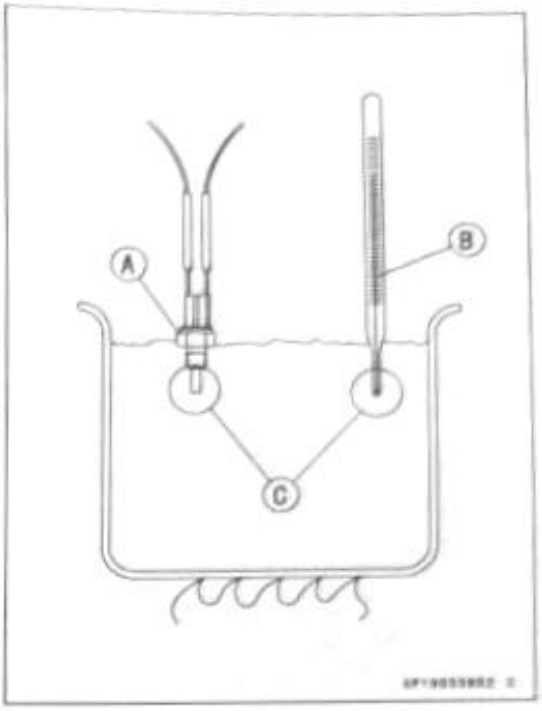
Oil Pressure Switch Connections*

Oil Pressure Switch Connections *		
Color	SW. Terminal	Ground
When engine is stopped	○	○
When engine is running		

*: Engine lubrication system is in good condition.

Water Temperature Sensor Inspection

- Remove the water temperature sensor (see Water Temperature Sensor Removal(17-64)).
- Suspend the sensor [A] in a container of coolant so that the threaded portion is submerged.
- Suspend an accurate thermometer [B] with temperature sensing portions [C] located in almost the same depth.



NOTE

○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the coolant while stirring the coolant gently.
- Using a digital meter, measure the internal resistance of the sensor.

★If the digital meter does not show the specified values, replace the sensor.

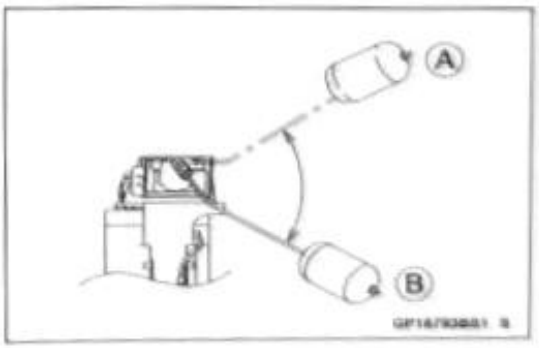
Water Temperature Sensor Resistance

Temperature	Resistance (kΩ)
–20°C (–4°F)	*18.80 ±2.37
0°C (32°F)	*(about 6.544)
40°C (104°F)	1.136 ±0.095
100°C (212°F)	0.1553 ±0.0070

*: Reference Information

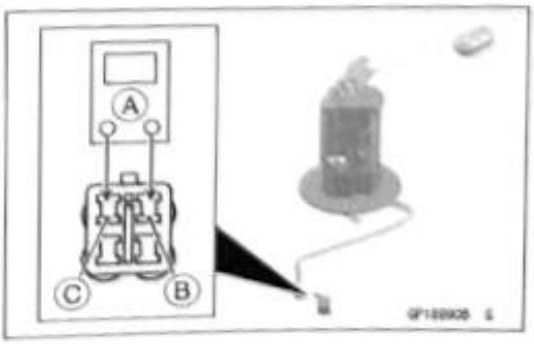
Fuel Level Sensor Inspection

- Remove:
  Fuel Pump (see Fuel Pump Removal(3-22))



- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

★If the float does not move smoothly, replace the fuel pump.
Float in Full Position [A]
Float in Empty Position [B]



- Using a digital meter [A], measure the resistance across the terminals in the fuel level sensor connector.

Connections:

R/BK lead [B] ← Digital Meter → BK/W lead [C]

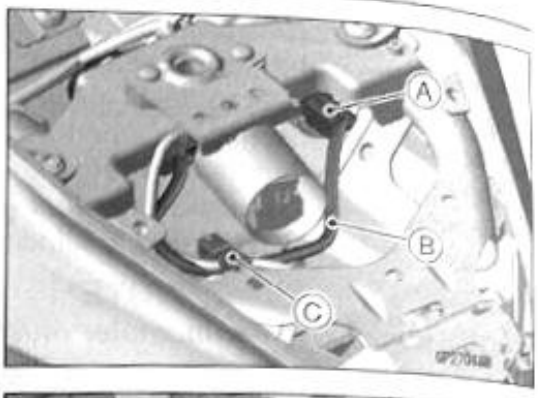
★If the digital meter readings are not as specified, or do not change smoothly according as the float moves up and down, replace the fuel pump.

Fuel Level Sensor Resistance
Standard: Full Position: 9 – 11 Ω
Empty Position: 213 – 219 Ω

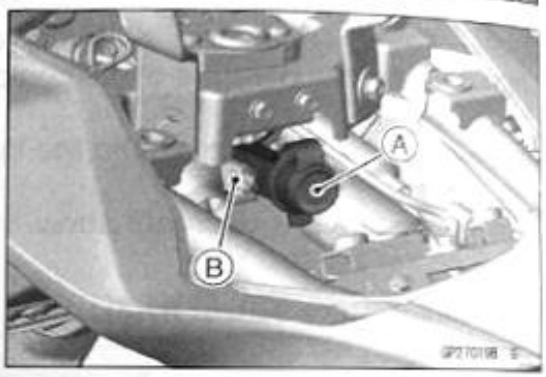
Switches and Sensors

USB Socket Removal (Equipped Models)

- Remove:
  Center Seat Cover (see Center Seat Cover Removal(15-28))
- Disconnect:
  USB socket connector [A]
- Clear the lead [B] from the bracket [C].



- Remove the USB socket [A] from the bracket [B].



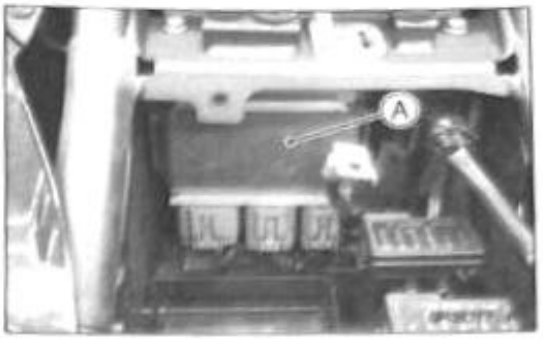
USB Socket Installation (Equipped Models)

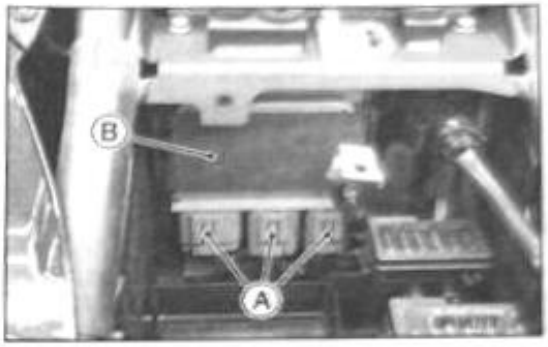
- Installation is the reverse of the removal.
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).

Relay Box

NOTE

○The relay box [A] has relays and diodes. The relays and diodes can not be removed.





Relay Box Removal

NOTICE

Never drop the relay box especially on a hard surface. Such a shock to the relay box can damage it.

- Remove:
  Battery (see Battery Removal(16-20))
- Disconnect:
  Relay Box Connectors [A]
- Remove:
  Relay Box [B]

Relay Box Installation

- Installation is the reverse of removal.

Relay Circuit Inspection

- Remove the relay box (see Relay Box Removal(16-93)).
- Check conductivity of the following numbered terminals by connecting a digital meter and one 12 V battery to the relay box as shown (see Relay Box Internal Circuit(16-95)).

★If the digital meter does not read as specified, replace the relay box.

Relay Circuit Inspection (with the battery disconnected)

	Digital Meter Connection	Digital Meter Reading (Ω)
Headlight Circuit Relay	1-3	∞
ECU Main Relay	7-6	∞
	4-5	Not ∞*
Fuel Pump Relay	7-8	∞
	9-10	Not ∞*
Starter Circuit Relay	16-11	∞
Radiator Fan Relay	17-20	∞
	18-19	Not ∞*

*: The actual reading varies with the digital meter used.

Relay Box

Relay Circuit Inspection (with the battery connected)

	Battery Connection (+) (–)	Digital Meter Connection	Digital Meter Reading (Ω)
Headlight Circuit Relay	1-11	1-3	0
ECU Main Relay	4-5	7-6	0
Fuel Pump Relay	9-10	7-8	0
Radiator Fan Relay	18-19	17-20	0

	Battery Connection (+) (–)	Digital Meter Connection DC 25 V Range (+) (–)	Digital Meter Reading (V)
Starter Circuit Relay	16-12	14-12	Nearly Battery Voltage*

(+): Apply positive lead.
(–): Apply negative lead.
*: The voltage goes down slightly by the diode.

Diode Circuit Inspection

- Remove the relay box (see Relay Box Removal(16-93)).
- Check conductivity of the following pairs of terminals (see Relay Box Internal Circuit(16-95)).

Diode Circuit Inspection

Digital Meter Connection	1-11, 12-15, 13-11, 14-11, 16-12

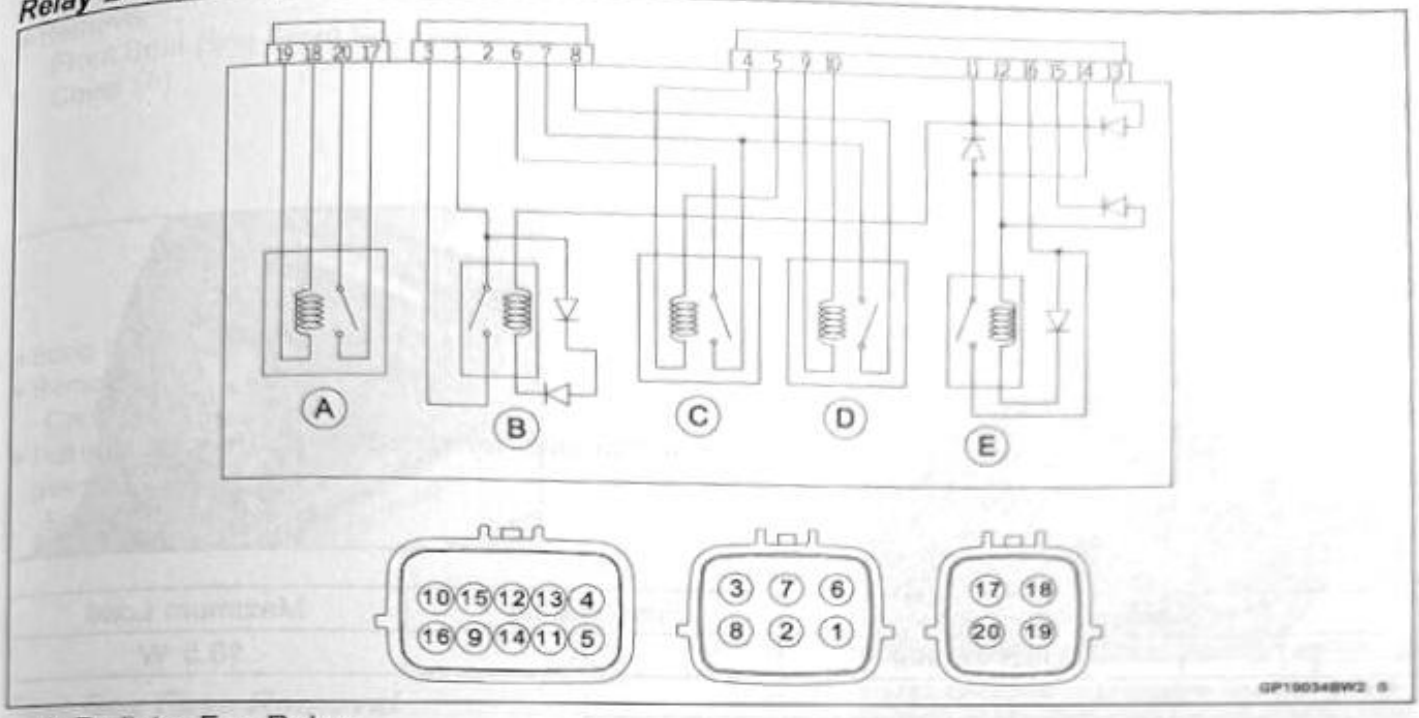
★The resistance should be low in one direction and more than 10 times as much in the other direction. If any diode shows low or high in both directions, the diode is defective and the relay box must be replaced.

NOTE

○*The actual meter reading varies with the digital meter used and the individual diodes, but generally speaking, the lower reading should be from zero to one half the scale.*

Relay Box

Relay Box Internal Circuit



A: Radiator Fan Relay
B: Headlight Circuit Relay
C: ECU Main Relay
D: Fuel Pump Relay
E: Starter Circuit Relay

Electrical Accessory Connector

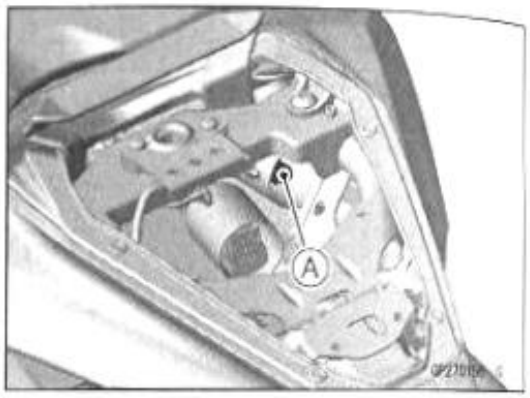
Electrical Accessory Connector Outline

The electric power of the battery can be used through the electrical accessory connectors.

NOTE

○*Some models require a relay to use the electrical accessory connectors.*

For Genuine USB Socket (Under Rear Seat) [A]



Accessory Connectors		Fuse Rating	Maximum Load
[A]	USB Socket	5 A	10.5 W

NOTICE

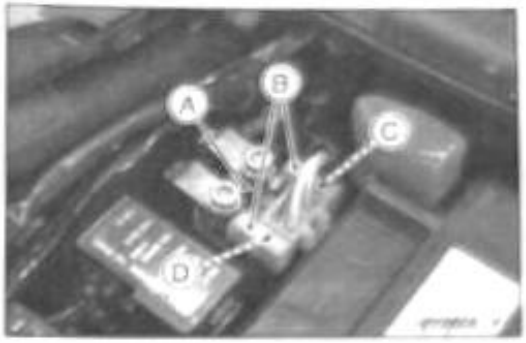
Do not install a fuse of a higher rating than that specified. Do not connect a load that exceeds the maximum load to this accessory circuit or the battery may become discharged, even with the engine running.

Fuse

30 A Main Fuse Removal

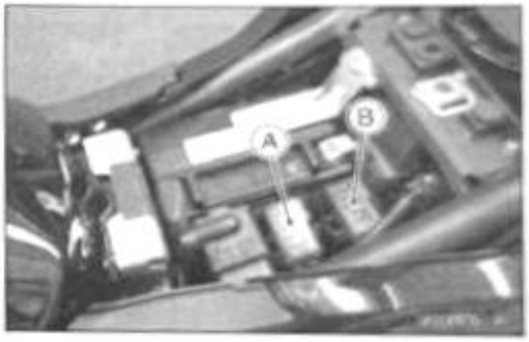
- Remove:
  Front Seat (see Front Seat Removal(15-16))
  Cover [A]

- Bring the starter relay [A] up.
- Remove:
  Caps [B]
- Pull out the fuse [C] from the starter relay with needle nose pliers.
  Spare Fuse [D]



Fuse Box Fuse Removal

- Remove:
  Front Seat (see Front Seat Removal(15-16))
- Open the lid.
  Fuse Box (1) [A]
  Fuse Box (2) [B]
- Pull the fuses straight out of the fuse box with needle nose pliers.



Fuse Installation

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

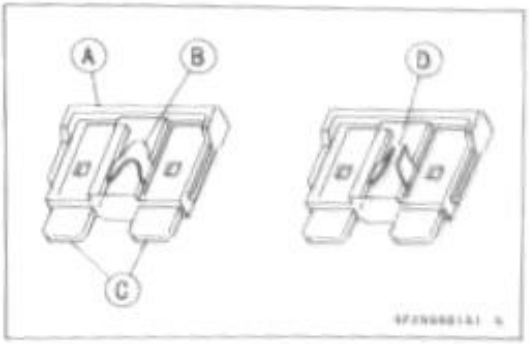
- Install the fuse box fuses on the original position as specified on the lid.

Fuse Inspection

- Remove the fuse (see 30 A Main Fuse Removal(16-97)) (see Fuse Box Fuse Removal(16-97)).
- Inspect the fuse element.

★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]
Fuse Element [B]
Terminals [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.

Self-Diagnosis System

Table of Contents

Specifications

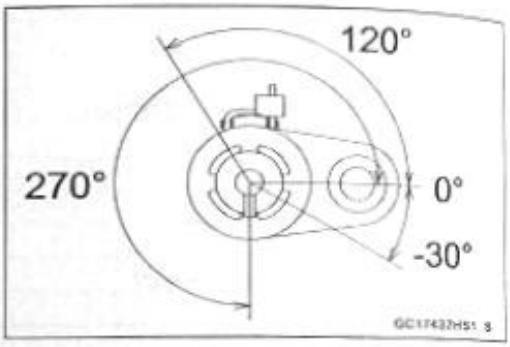
Item	Standard
Digital Fuel Injection System	
Throttle Position Sensor:	
Input Voltage	DC 4.75 – 5.25 V
Output Voltage (1)	DC 0.48 – 0.52 V at idle throttle opening (for reference)
Output Voltage (2)	DC 4.44 – 4.56 V at idle throttle opening (for reference)
Intake Air Pressure Sensor #1/#2:	
Input Voltage	DC 4.75 – 5.25 V
Output Voltage	DC 3.80 – 4.20 V at standard atmospheric pressure (101.32 kPa, 76 cmHg)
Intake Air Temperature Sensor:	
Output Voltage	About DC 2.25 – 2.50 V @ 20°C (68°F)
Resistance	5.4 – 6.6 kΩ @ 0°C (32°F)
	0.29 – 0.39 kΩ @ 80°C (176°F)
Water Temperature Sensor:	
Output Voltage	About DC 2.80 – 2.97 V @ 20°C (68°F)
Accelerator Position Sensor:	
Output Voltage (1)	DC 0.80 – 1.20 V at ordinary throttle opening
Output Voltage (2)	DC 0.80 – 1.20 V at ordinary throttle opening
Input Voltage	DC 4.88 – 5.13 V
Gear Position Sensor:	
Input Voltage	DC 4.75 – 5.25 V
Output Voltage	see below table
Vehicle-down Sensor:	
Input Voltage	DC 4.75 – 5.25 V
Output Voltage	With sensor tilted 60 – 70° or more right or left: DC 0.65 – 1.35 V
	With sensor arrow mark pointed up: DC 3.55 – 4.45 V
Front Oxygen Sensor:	
Output Voltage (Rich)	DC 0.8 V or more
Output Voltage (Lean)	DC 0.24 V or less
Heater Resistance	13 – 18.5 Ω @ 20°C (68°F)
Fuel Injectors:	
Nozzle Type	Fine atomizing type with 8 holes
Resistance	About 11.5 – 12.5 Ω @ 20°C (68°F)
Immobilizer Antenna (Equipped Models):	
Resistance	About 3.0 – 4.6 Ω
Purge Valve:	
Resistance	30 – 34 Ω @ 20°C (68°F)
Quick Shifter Sensor (Equipped Models):	
Input Voltage	DC 4.75 – 5.25 V
Output Voltage	DC 0.35 – 4.65 V
ETV actuator:	
Input Voltage	About DC 1 to 2 V or –1 to –2 V

Specifications

Item	Standard
ABS	
ABS Hydraulic Unit:	
Make	NISSIN (Hitachi astemo)
Wheel Rotation Sensor Air Gap:	
Front	0.552 – 1.228 mm (0.02 – 0.05 in.)
Rear	0.537 – 1.343 mm (0.02 – 0.05 in.)

Gear Position Sensor Output Voltage

Angle	Output Voltage (V)
–30°	0.4 – 0.6
120°	2.4 – 2.6
270°	4.4 – 4.6

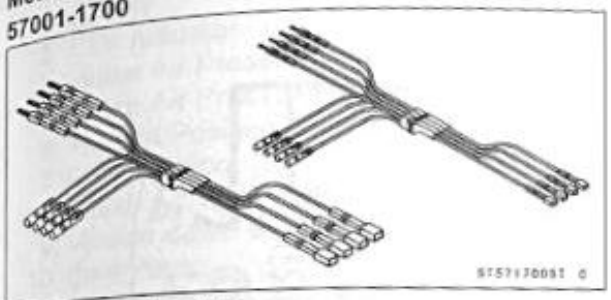


NOTE

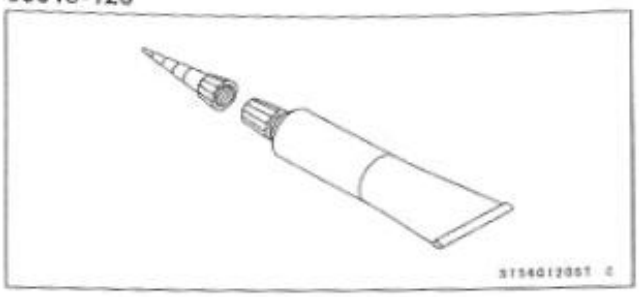
- *This figure shows 270°.*
- *Rotate the gear position sensor, confirm the output voltage will be raise or lower.*

Special Tools and Sealant

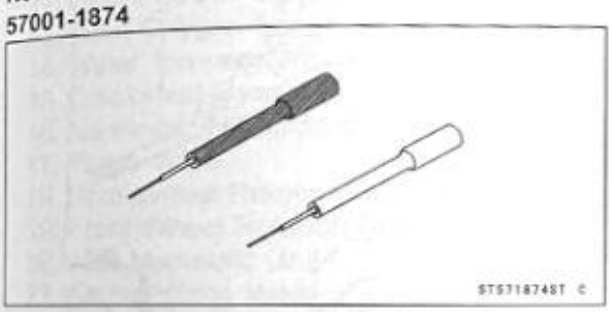
Measuring Adapter:
57001-1700



Liquid Gasket, TB1211:
56019-120

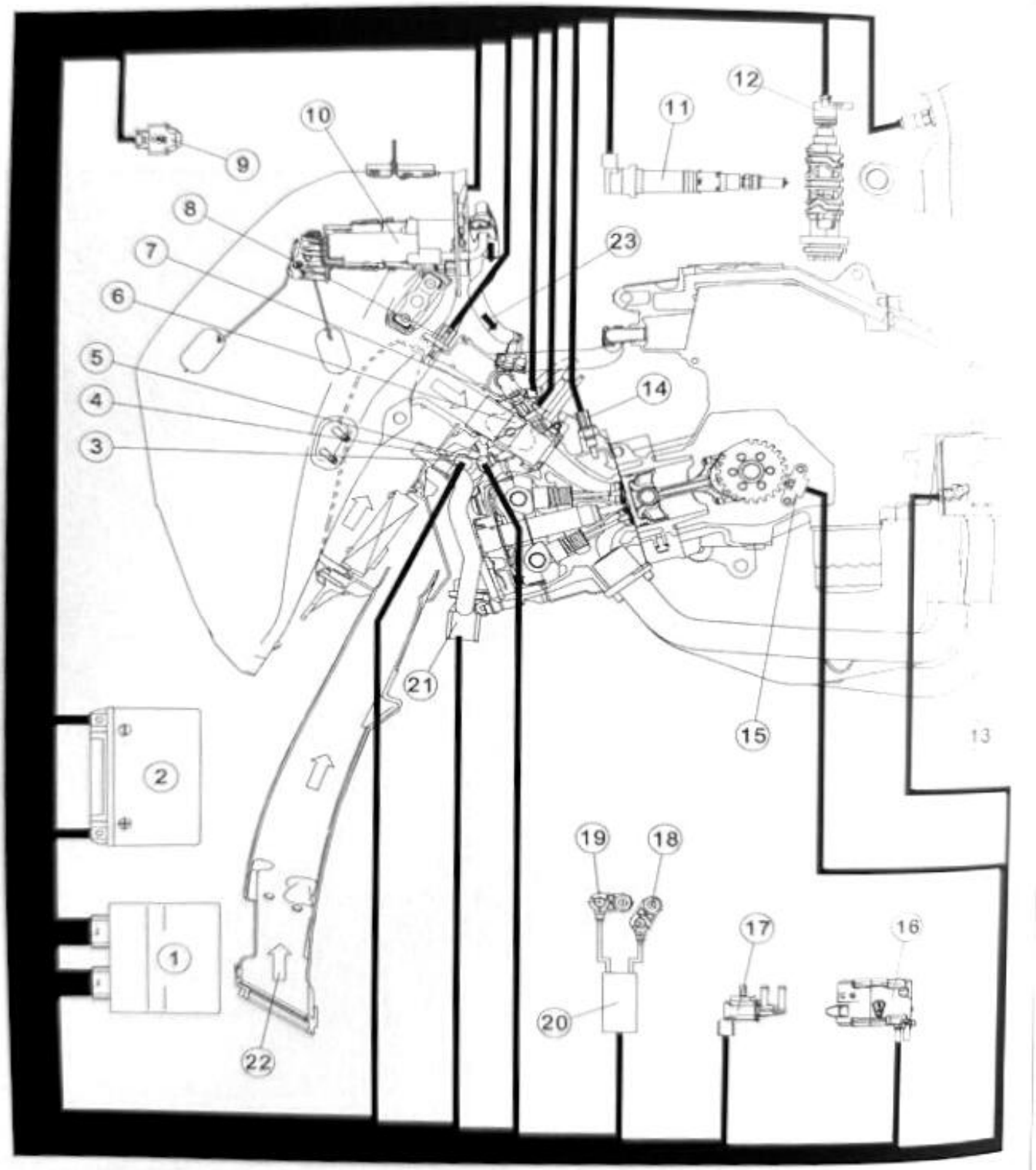


Needle Adapter Set:
57001-1874



Self-Diagnosis System

DFI System

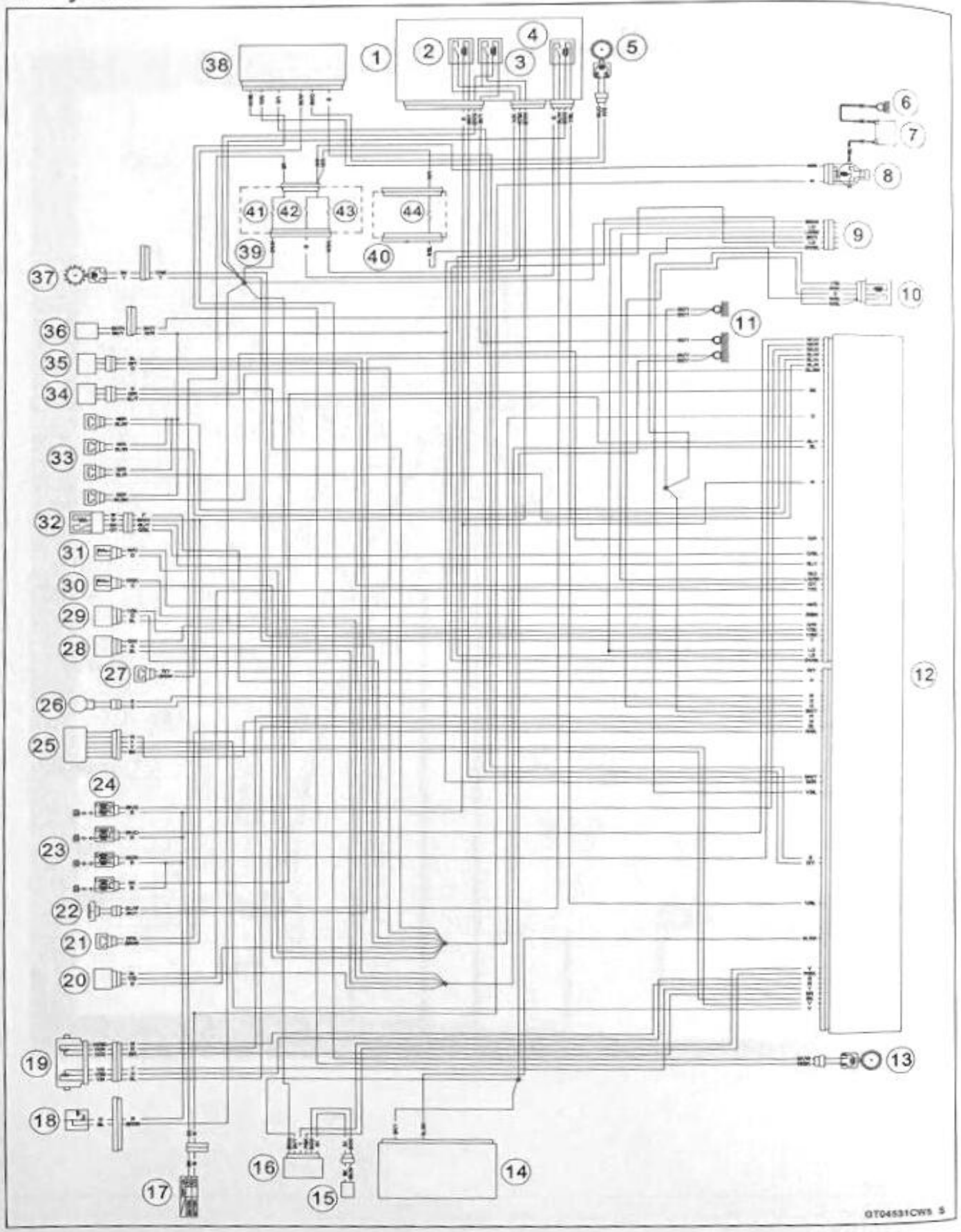


Self-Diagnosis System

1. ECU
2. Battery
3. ETV Actuator
4. Intake Air Pressure Sensor #1
5. Intake Air Pressure Sensor #2
6. Throttle Position Sensor
7. Fuel Injectors
8. Intake Air Temperature Sensor
9. Vehicle-down Sensor
10. Fuel Pump
11. Stick Coils
12. Gear Position Sensor
13. Front Oxygen Sensor
14. Water Temperature Sensor
15. Crankshaft Sensor
16. Accelerator Position Sensor
17. Purge Valve
18. Rear Wheel Rotation Sensor
19. Front Wheel Rotation Sensor
20. ABS Hydraulic Unit
21. Air Switching Valve
22. Air Flow
23. Fuel Flow

Self-Diagnosis System

Self-Diagnosis System Wiring Diagram
DFI System



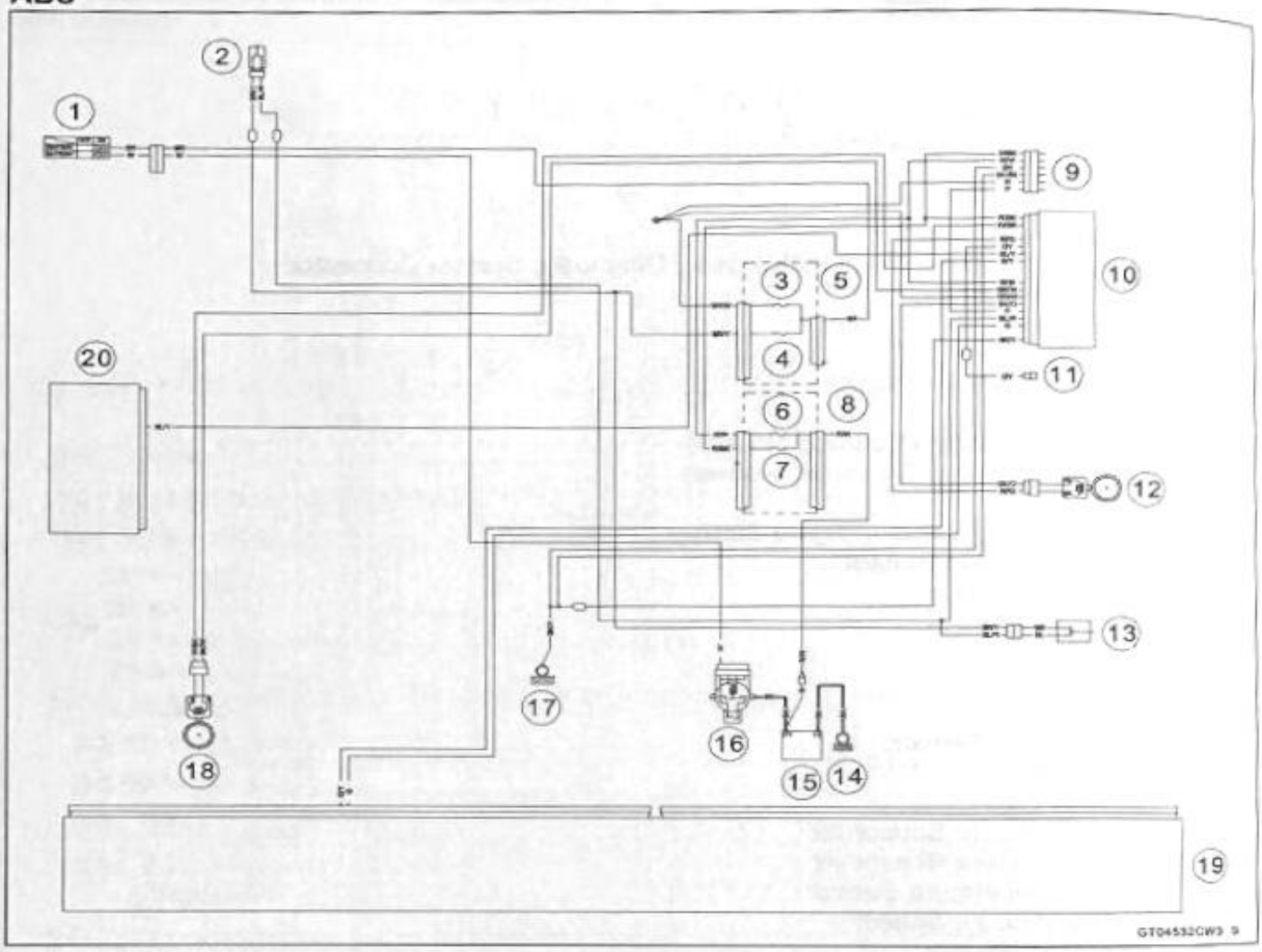
Self-Diagnosis System

Part Names

1. Relay Box
2. Fuel Pump Relay
3. ECU Main Relay
4. Radiator Fan Relay
5. Rear Wheel Rotation Sensor
6. Engine Ground
7. Battery
8. Main Fuse 30 A
9. Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector
10. ETV Actuator Relay
11. Frame Grounds
12. ECU
13. Front Wheel Rotation Sensor
14. Meter Unit
15. Immobilizer Antenna (Equipped Models)
16. Immobilizer Amplifier (Equipped Models)
17. Ignition Switch
18. Engine Start/Stop Switch (Engine Stop)
19. Accelerator Position Sensor
20. Vehicle-down Sensor
21. Air Switching Valve
22. Fan Motor
23. Spark Plugs
24. Stick Coils
25. Throttle Position Sensor
26. ETV Actuator
27. Purge Valve
28. Intake Air Pressure Sensor #2
29. Intake Air Pressure Sensor #1
30. Intake Air Temperature Sensor
31. Water Temperature Sensor
32. Front Oxygen Sensor
33. Fuel Injectors
34. Gear Position Sensor
35. Quick Shifter Sensor (Equipped Models)
36. Fuel Pump
37. Crankshaft Sensor
38. ABS Hydraulic Unit
39. Fuse Box (1)
40. Fuse Box (2)
41. Ignition Fuse 15 A
42. Fan Fuse 15 A
43. ECU Fuse 15 A
44. ETV Actuator Relay Fuse 10 A

Self-Diagnosis System

ABS



1. Ignition Switch
2. Front Brake Light Switch
3. Ignition Fuse 15 A
4. Brake/Horn Fuse 10 A
5. Fuse Box (1)
6. ABS Motor Relay Fuse 30 A
7. ABS Solenoid Valve Relay Fuse 20 A
8. Fuse Box (2)
9. ABS Kawasaki Diagnostic System Connector
10. ABS Hydraulic Unit
11. ABS Self-diagnosis Terminal
12. Rear Wheel Rotation Sensor
13. Rear Brake Light Switch
14. Engine Ground
15. Battery
16. Main Fuse 30 A
17. Frame Ground
18. Front Wheel Rotation Sensor
19. ECU
20. Meter Unit

Self-Diagnosis System

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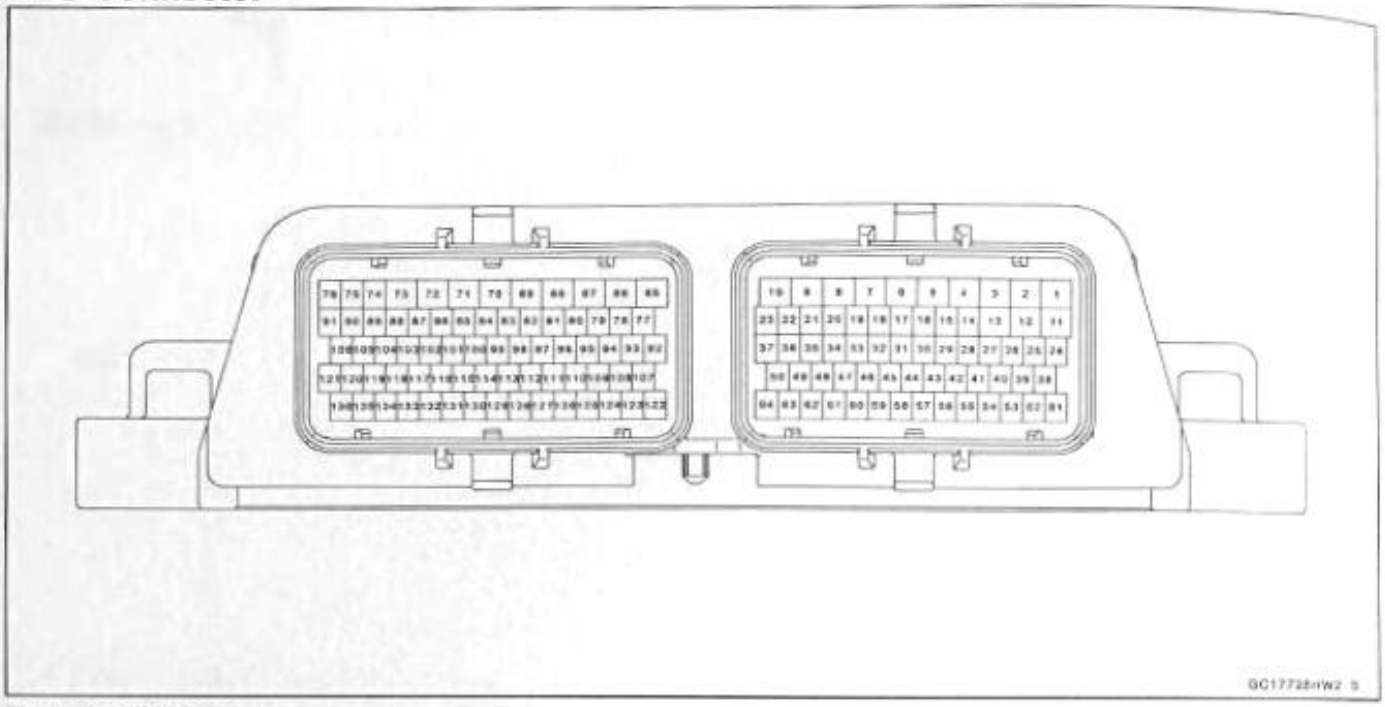
Self-Diagnosis System

Terminal Numbers of Connector

ECU Connector



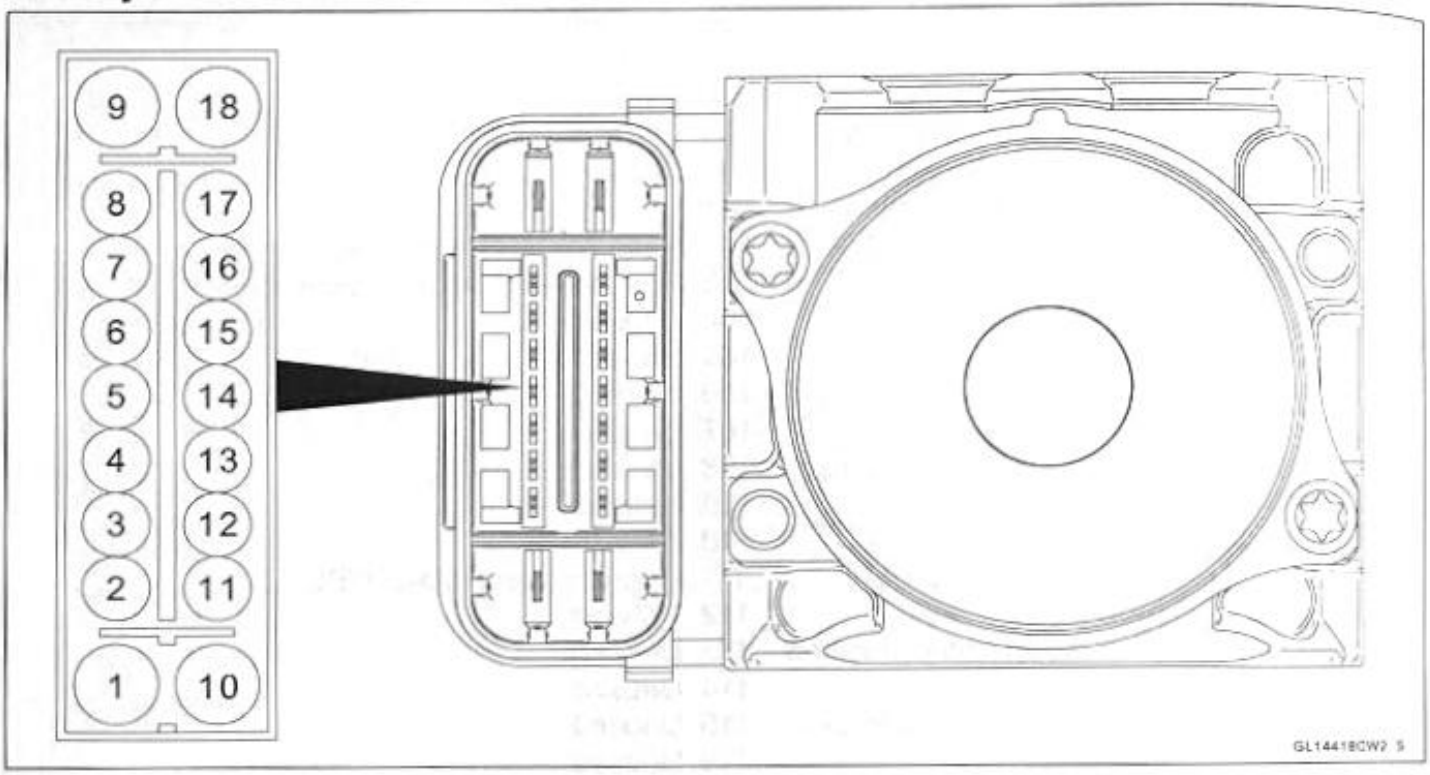
Terminal Names

1. Stick Coil #3: BK/O
2. Stick Coil #2: BK/R
3. Stick Coil #4: BK/G
4. Fuel Injector #4: BL/W
5. Fuel Injector #3: BL/W
6. Fuel Injector #2: BL/R
7. Fuel Injector #1: BL/BK
8. Power Supply to ECU (from Battery): W/R
9. Power Supply to ECU (from Battery): W/R
10. Ground for Control System: BK/Y
11. Stick Coil #1: BK
12. Engine Ground: BK/Y
13. Engine Ground: BK/Y
14. Unused
15. Unused
16. Ground for Sensors: G
17. Unused
18. Ignition Switch: BR/W
19. Unused
20. Yellow KTRC Indicator Light: G/O
21. Power Supply to Gear Position Sensor: BL/Y
22. Power Supply to Sensors: BL
23. SELECT Button: G/W
24. Unused
25. Side Stand Switch: G/W
26. Unused
27. Unused
28. Unused
29. Engine Start/Stop Switch (Engine Stop): R
30. Unused
31. Unused
32. Unused
33. Unused
34. Unused
35. Upper Button: P/BL
36. Lower Button: R/G
37. Unused
38. Unused
39. Unused
40. Gear Position Sensor: G/R
41. Unused
42. Unused
43. Front Oxygen Sensor (–): G/BL
44. Unused
45. Fornt Oxygen Sensor (+): BL/Y
46. Unused
47. Starter Lockout Switch: R/G
48. External Communication Line (Immobilizer System (Equipped Models)/Kawasaki Diagnostic System): LG/BK
49. Quick Shifter Sensor (Equipped Models): G/Y
50. Vehicle-down Sensor: Y/G
51. Unused
52. Unused
53. Water Temperature Sensor: W/G
54. Unused
55. Intake Air Temperature Sensor: R/BK
56. Unused
57. Intake Air Pressure Sensor #2: G/W
58. Intake Air Pressure Sensor #1: Y/BL

59. Crankshaft Sensor (–): Y/BK
60. Crankshaft Sensor (+): Y
61. Unused
62. External Communication Line (Immobilizer System (Equipped Models)/Kawasaki Diagnostic System): LG
63. CAN Communication Line (Low): LB
64. CAN Communication Line (High): GY/BL
65. Purge Valve: R/Y
66. Unused
67. Front Oxygen Sensor Heater: P
68. Unused
69. Unused
70. ETV Actuator (+): R
71. ETV Actuator (–): G
72. Power Supply to ETV Actuator: G
73. Ground for ETV Actuator: BK/Y
74. Power Supply to Accelerator Position Sensor 1: R
75. Power Supply to Throttle Position Sensor: W
76. Power Supply to Accelerator Position Sensor 2: BL
77. Air Switching Valve: R/BL
78. Unused
79. Green Neutral Indicator Light: LG
80. Unused
81. Unused
82. Unused
83. Unused
84. Frame Ground: P
85. Unused
86. Fuel Pump Relay: BR/Y
87. Battery Monitor Voltage Line: W/R
88. Engine Start/Stop Switch (Engine Start): G/W
89. ETV Actuator Relay: Y/BL
90. Meter Unit (Tachometer): LB/W
91. Rear Wheel Rotation Sensor Output: P
92. Unused
93. Unused
94. Unused
95. Unused
96. Unused
97. Unused
98. Unused
99. Unused
100. Unused
101. Unused
102. Rear Wheel Rotation Sensor: G
103. Front Wheel Rotation Sensor: G/Y
104. Unused
105. Unused
106. Unused
107. Unused
108. Unused
109. Unused
110. Unused
111. Radiator Fan Relay: Y/BL
112. Unused
113. Unused
114. Unused
115. Unused
116. Unused
117. Unused
118. Meter Communication Line: BL/BK
119. Unused
120. Unused
121. Unused
122. Unused
123. Unused
124. Immobilizer Amplifier (Equipped Models): V
125. Immobilizer Amplifier (Equipped Models): P/BK
126. Ground for Accelerator Position Sensor 2: G
127. Ground for Accelerator Position Sensor 1: W
128. Accelerator Position Sensor 2: Y
129. Accelerator Position Sensor 1: BR
130. Ground for Throttle Position Sensor: BK
131. Throttle Position Sensor 2: V
132. Throttle Position Sensor 1: V
133. Unused
134. Unused
135. Unused
136. Unused

Self-Diagnosis System

ABS Hydraulic Unit Connector



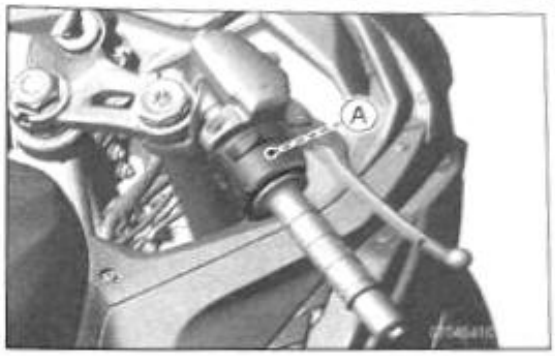
Terminal Names

1. Ground: BK/Y
2. Unused
3. Rear Wheel Rotation Sensor Signal Output: G
4. Front and Rear Brake Light Switch Signal: BL/R
5. ABS Kawasaki Diagnostic System Terminal: P
6. Power Supply to Rear Wheel Rotation Sensor: BK/O
7. Power Supply: BR/W
8. Power Supply to Front Wheel Rotation Sensor: BK/W
9. Power Supply to ABS Motor Relay: R/W
10. Ground: BK/Y
11. Unused
12. Front Wheel Sensor Signal Output: GY/Y
13. Yellow ABS Indicator Light: BL/Y
14. ABS Self-Diagnosis Terminal: GY
15. Rear Wheel Rotation Sensor Signal Input: W/G
16. Unused
17. Front Wheel Rotation Sensor Signal Input: W/BK
18. Power Supply to ABS Solenoid Valve Relay: R/BK

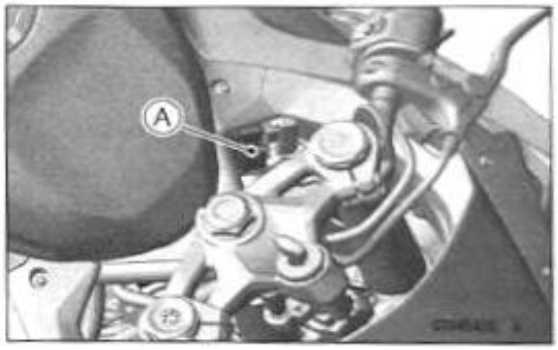
Parts Location

Ignition Key [A]
Immobilizer Antenna [B] (Equipped Models)
Ignition Switch [C]
Vehicle-down Sensor [D]

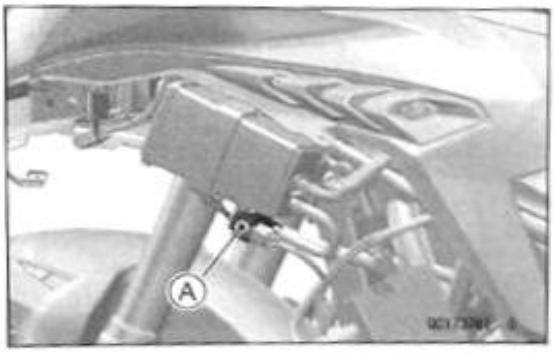
Accelerator Position Sensor [A]



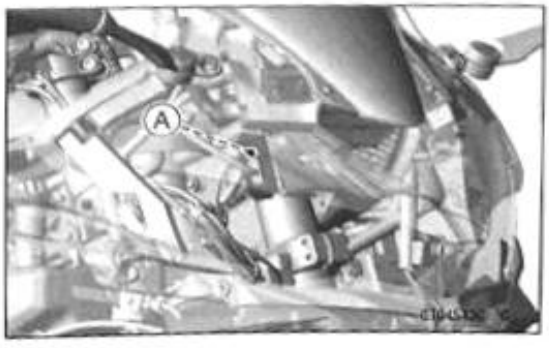
ETV Actuator Relay [A]



Purge Valve [A]

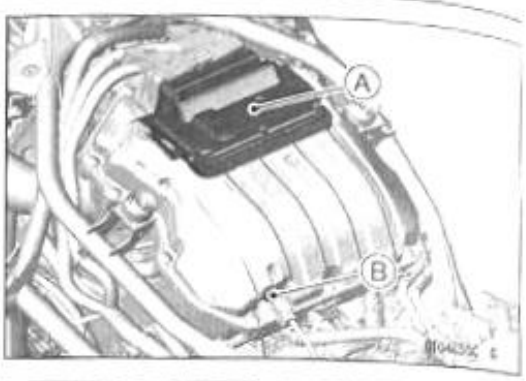


Immobilizer Amplifier [A] (Equipped Models)

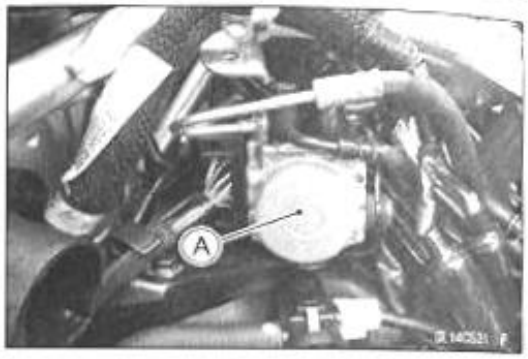


Parts Location

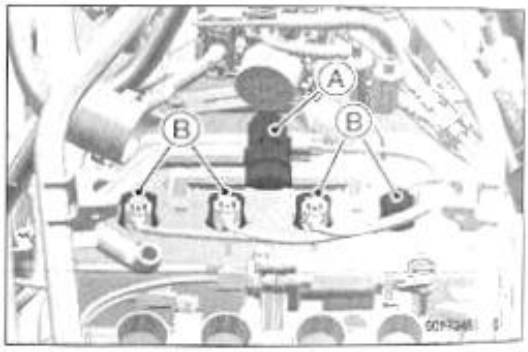
ECU [A]
Intake Air Temperature Sensor [B]



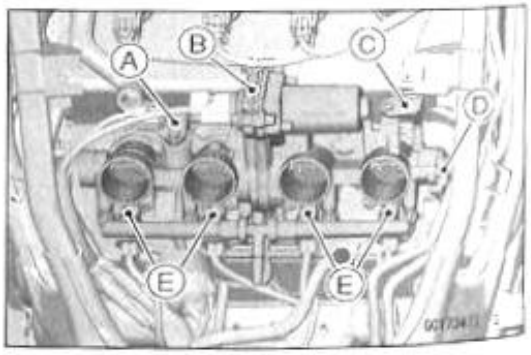
ABS Hydraulic Unit [A]



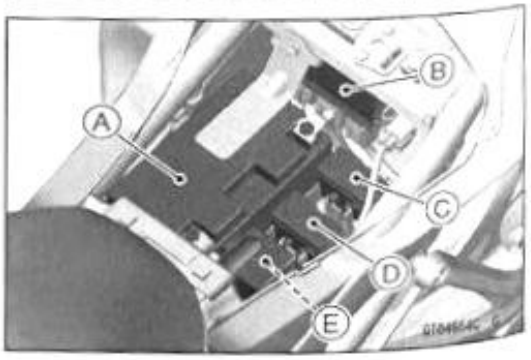
Air Switching Valve [A]
Stick Coils [B]



Intake Air Pressure Sensor #1 [A]
ETV Actuator [B]
Intake Air Pressure Sensor #2 [C]
Throttle Position Sensor [D]
Fuel Injectors [E]

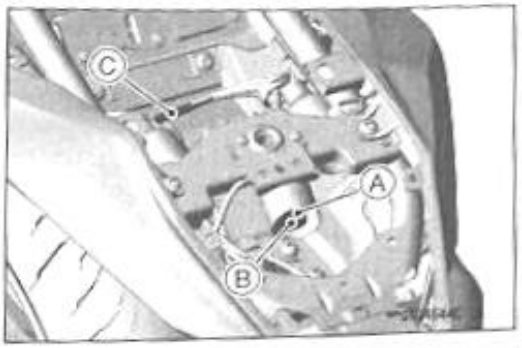


Battery [A]
Relay Box [B]
Fuse Box (2) [C]
Fuse Box (1) [D]
Main Fuse 30 A [E] (in Starter Relay)

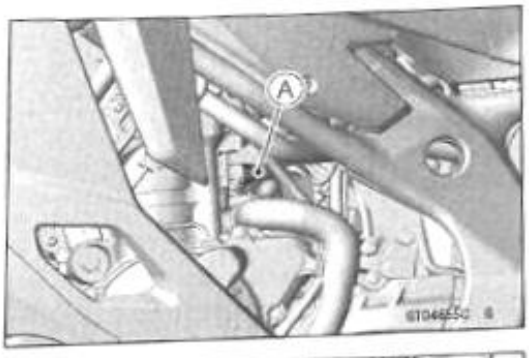


Parts Location

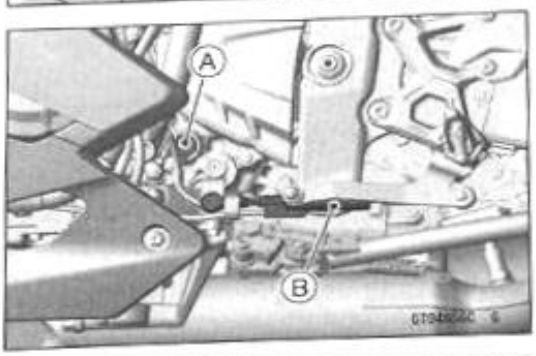
Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector [A]
ABS Kawasaki Diagnosis System Connector [B]
ABS Self-diagnosis Terminal [C]



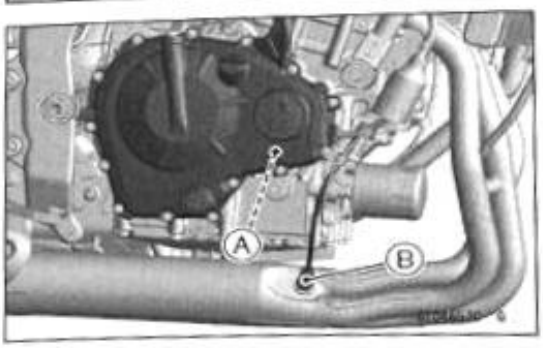
Water Temperature Sensor [A]



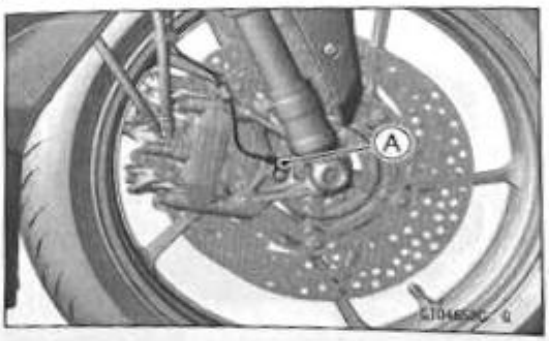
Gear Position Sensor [A]
Quick Shifter Sensor [B] (Equipped Models)



Crankshaft Sensor [A]
Front Oxygen Sensor [B]

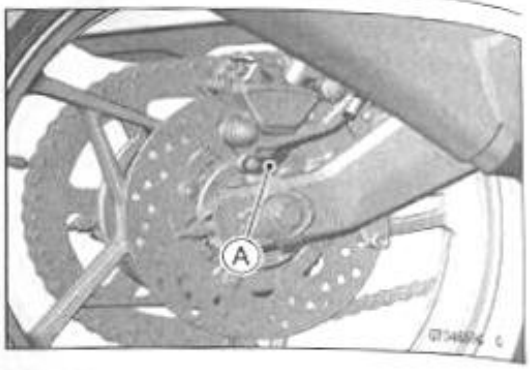


Front Wheel Rotation Sensor [A]



Parts Location

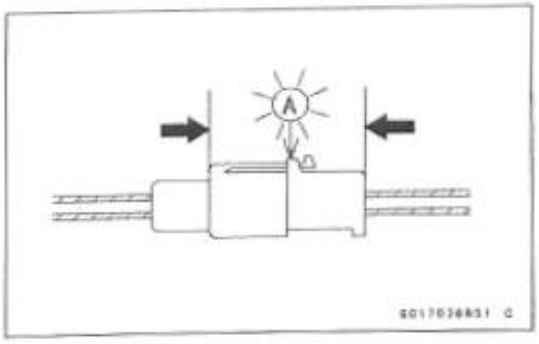
Rear Wheel Rotation Sensor [A]



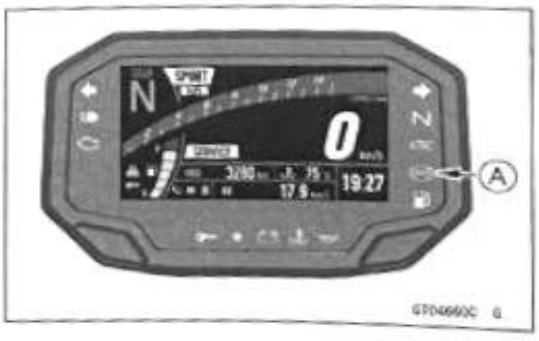
Servicing Precautions

There are a number of important precautions that should be followed servicing the self-diagnosis system.

- This self-diagnosis system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the self-diagnosis system parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the motorcycle. This is to prevent ECU damage by excessive voltage.
- Do not turn the ignition switch on while any of the electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, connectors, leads, and wiring.
- Whenever the electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].



- If a transceiver is installed on the motorcycle, make sure that the operation of the self-diagnosis system is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.
- The self-diagnosis system parts can not be disassembled. Even if a fault is found, do not try to disassemble and repair the self-diagnosis system parts, replace it.
- The yellow ABS indicator light [A] may come on if the tire pressure is incorrect, a non-recommended tire is installed, or the wheel is deformed. If the indicator light comes on, remedy the problem and clear the service code.



⚠ WARNING

Use of non-recommended tires may cause malfunctioning of ABS and can lead to extended braking distance resulting in an accident causing serious injury or death. Always use recommended standard tires for this motorcycle.

Servicing Precautions

- The yellow ABS indicator light may come on if the engine is run with the motorcycle on its stand and the transmission in gear. If the indicator light comes on, just turn the ignition switch off, then clear service code.
- Test run the motorcycle at a speed of more than 20 km/h (12 mph) to see that the yellow ABS indicator light does not come on. Finally, test run the motorcycle at a speed of more than 30 km/h (19 mph) and brake suddenly to see that the motorcycle stops without loss of steering control and the ABS operates normally (the reaction force generated is felt in the brake lever and pedal). This completes the final inspection.

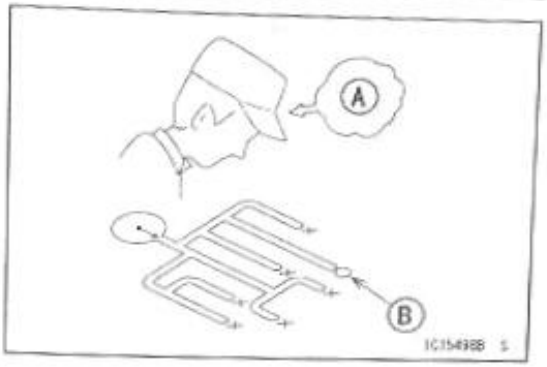
Troubleshooting

Outline

When a problem occurs with self-diagnosis system, the appropriate indicator light goes on or blinks to alert the rider.

When the indicator light remains on, for first ask the rider about the conditions [A] of trouble, and then start to determine the cause [B] of problem.

Don't rely solely on the self-diagnosis function, use common sense.



When the repair has been done, erase the service code.

When the motorcycle is down, the vehicle-down sensor operates and the engine stops. The ignition switch is left on. If the engine start/stop switch is slid, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then on.

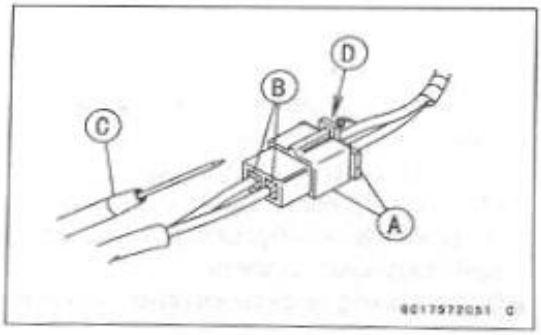
- When checking the self-diagnosis system parts, use a digital meter which can be read two decimal place voltage or resistance.

OThe self-diagnosis system part connectors [A] have seals [B].

- When measuring the input or output voltage with the connector joined, use the needle adapter set [C].

Special Tool - Needle Adapter Set: 57001-1874

- Insert the needle adapters inside the seals from behind the connector until the adapter reaches the terminal.



NOTICE
Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.

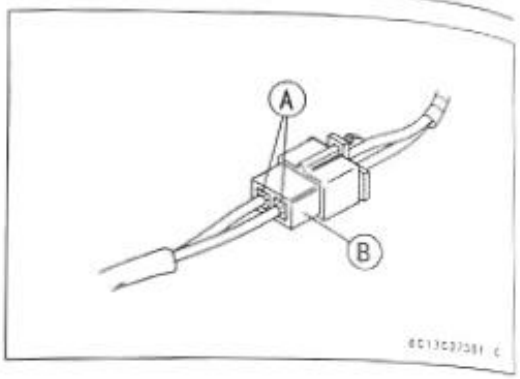
- Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of a digital meter.
- Be careful not to short-circuit the leads of the electrical system parts by contact between adapters.
- Turn the ignition switch on and measure the voltage with the connector joined.

NOTICE
Incorrect, reverse connection or short circuit by needle adapters could damage the electrical system parts.

Troubleshooting

○After measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.

Sealant - Liquid Gasket, TB1211: 56019-120



- Always check battery condition before replacing the self-diagnosis system parts. A fully charged battery is a must for conducting accurate tests of the self-diagnosis system.
- Trouble may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.
- Measure the coil winding resistance when the self-diagnosis system part is cold (at room temperature).
- Make sure all connectors in the circuit are clean and tight, and examine leads for signs of burning, fraying, short, etc. Deteriorated leads and bad connections can cause reappearance of problems and unstable operation of the self-diagnosis system.

★If any wiring is deteriorated, replace the wiring.

- Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.

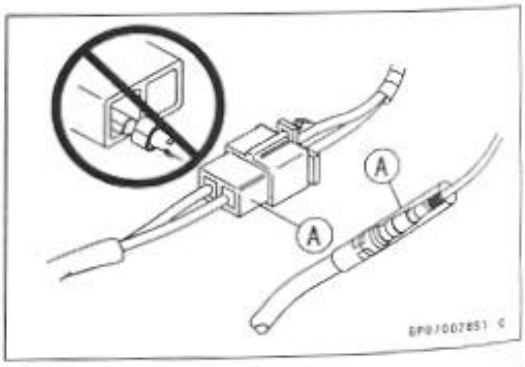
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.

- Check the wiring for continuity.

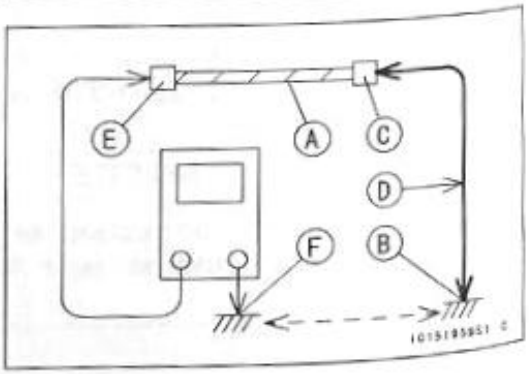
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect a tester between the ends of the leads.

★If the tester does not read about 0 Ω, the lead is defective. Replace the lead or the main harness.

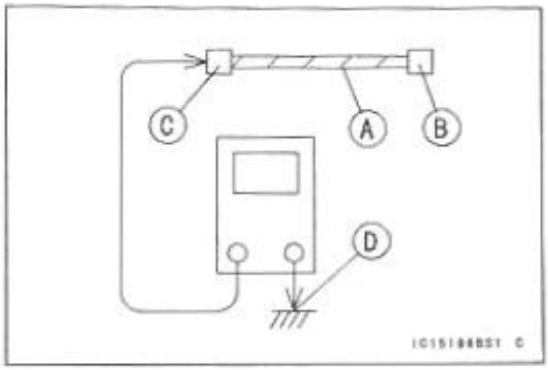


○If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



Troubleshooting

○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



- Narrow down suspicious locations by repeating the continuity tests.

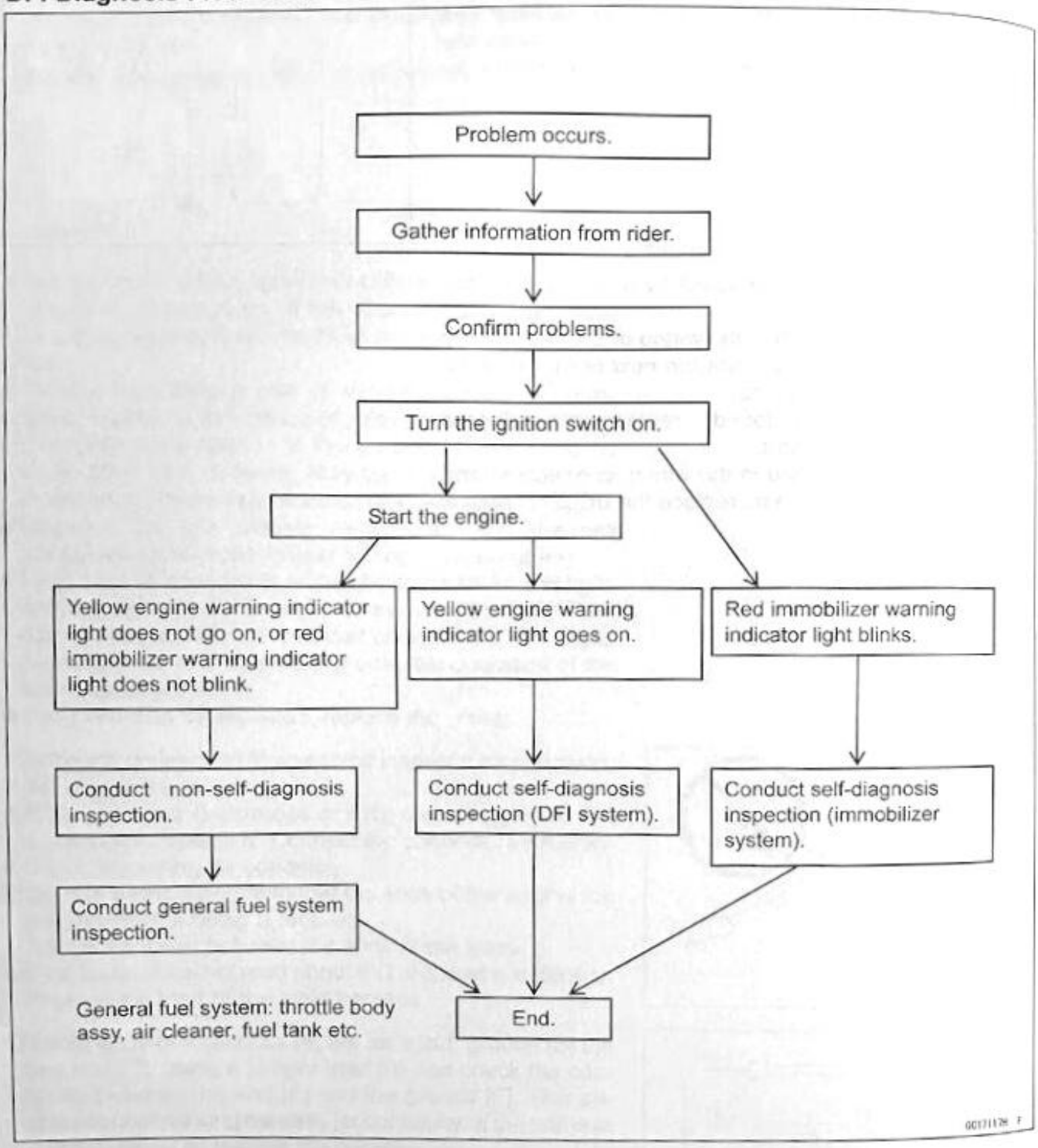
★If no abnormality is found in the wiring or connectors, the self-diagnosis system parts are the next likely suspects. Check each part one by one.

★If an abnormality is found, replace the affected self-diagnosis system part.

★If no abnormality is found in the wiring, connectors, and self-diagnosis system parts, replace the ECU.

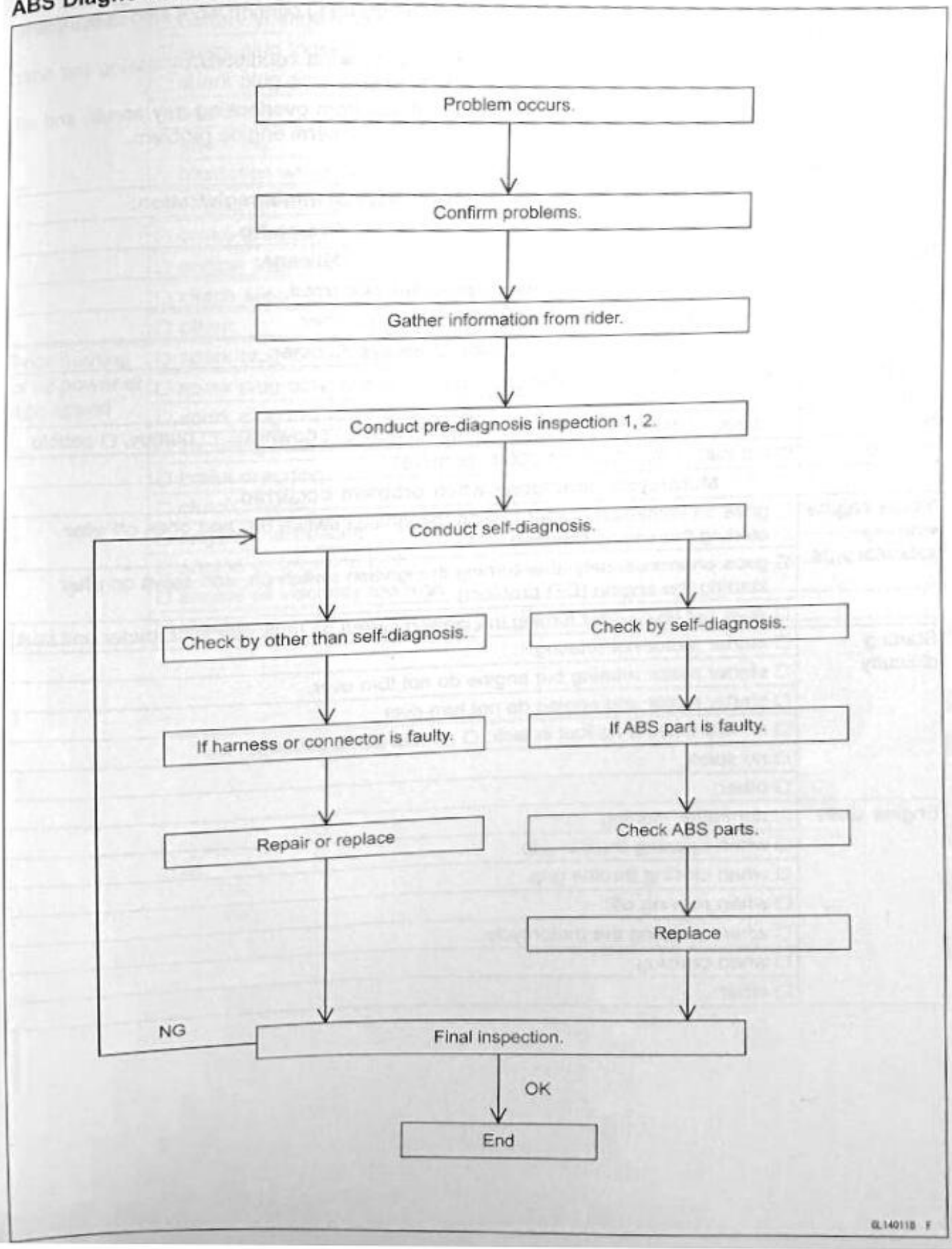
Troubleshooting

DFI Diagnosis Flow Chart



Troubleshooting

ABS Diagnosis Flow Chart



Troubleshooting

Inquiries to Rider

OEach rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.

OTry to find out exactly what problem occurred under exactly what conditions by asking the rider. knowing this information may help you reproduce the problem.

OThe following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is a self-diagnosis system problem, or a general engine problem.

Sample Diagnosis Sheet (DFI System)

Rider name:	**Registration No. (license plate No.):**	**Year of initial registration:**
Model:	**Engine No.:**	**Frame No.:**
Date problem occurred:		**Mileage:**
Environment when problem occurred.		
Weather	☐ fine, ☐ cloudy, ☐ rain, ☐ snow, ☐ always, ☐ other:	
Temperature	☐ hot, ☐ warm, ☐ cold, ☐ very cold, ☐ always, ☐ other:	
Problem frequency	☐ chronic, ☐ often, ☐once	
Road	☐ street, ☐ highway, ☐ mountain road (☐ uphill, ☐ downhill), ☐ bumpy, ☐ pebble	
Altitude	☐ normal, ☐ high (about 1 000 m or more)	
Motorcycle conditions when problem occurred.		
Yellow engine warning indicator light	☐ goes on immediately after turning the ignition switch on, and goes off after starting the engine (normal)	
	☐ goes on immediately after turning the ignition switch on, and stays on after starting the engine (DFI problem)	
	☐ does not go on after turning the ignition switch on (indicator light, meter unit fault)	
Starting difficulty	☐ starter motor not rotating.	
	☐ starter motor rotating but engine do not turn over.	
	☐ starter motor and engine do not turn over.	
	☐ no fuel flow (☐ no fuel in tank, ☐ no fuel pump sound).	
	☐ no spark.	
	☐ other:	
Engine stalls	☐ right after starting.	
	☐ when opening throttle grip.	
	☐ when closing throttle grip.	
	☐ when moving off.	
	☐ when stopping the motorcycle.	
	☐ when cruising.	
	☐ other:	

Troubleshooting

Poor running at low speed	☐ very low idle speed, ☐ very high idle speed, ☐ rough idle speed.
	☐ battery voltage is low (charge the battery).
	☐ spark plug loose (tighten it).
	☐ spark plug dirty, broken or gap maladjusted.
	☐ backfiring.
	☐ afterfiring.
	☐ hesitation when acceleration.
	☐ engine oil viscosity too high.
	☐ brake dragging.
	☐ engine overheating.
	☐ clutch slipping.
	☐ other:
Poor running or no power at high speed	☐ spark plug loose (tighten it).
	☐ spark plug dirty, broken or gap maladjusted.
	☐ spark plug incorrect (replace it).
	☐ knocking (fuel poor quality or incorrect).
	☐ brake dragging.
	☐ clutch slipping.
	☐ engine overheating.
	☐ engine oil level too high.
	☐ engine oil viscosity too high.
	☐ other:

Inquiries to Rider

- Each rider reacts to problems in different ways, so it is important to confirm what kind of problem the rider is experiencing.
- Try to find out exactly what problem occurs under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem in the workshop.
- The diagnosis sheet will help prevent you from overlooking any key information, so always use it.

Sample Diagnosis Sheet 1

Rider Name: ..... Registration No. (license plate No.): .....
Date of registration: ..... Model: .....
Vin No.: ..... Odometer reading: ..... km or miles
Engine No.: ..... Odometer reading when problem first occured: ..... km or miles

Question	Description			Answer	Advice to customer
Which statement/s best describes the fault with the ABS system?	*Yellow ABS indicator light illuminated?*	*Flashing*			A fault has been detected with the ABS system.
		Continuous			
		Not working			
	ABS not working				Further inspection by technician required.
	ABS operates too frequently				Continuous riding on rough or un-even surfaces can cause the ABS to operate more frequently.
	Stopping distance too long				
	Does the wheel lock when you apply the brakes				Further inspection by technician required.
	Brake can't be released				
	Other				
Do the front and rear brake levers feel normal during application?	*Normal*				Further inspection by technician required.
	Abnormal	*Long stroke (lever feels soft and moves back close to the handle bar)*			This indicates a probable fault with the braking system and should be inspected immediately.
		Limited stroke (lever feels hard and has little movement)			
		Pulsing/vibrating			
	Which lever? (front, rear or both)				
When does the fault occur?	*During start up / stationary*	*(Is a centre stand or service stand used)*			If the motorcycle engine is left running whilst on its centre or service stand, mechanical drag can cause the rear wheel to rotate. If the rear wheel rotates the ABS system may detect a fault. Turning off the ignition switch and restarting should reset the yellow ABS indicator light if no problems are detected. However the service code will be stored in the ABS ECU and should be reset by the dealer.
	Driving below 6 km/h (4mph) (Speeds vary depending on model)				The ABS system is not active at these speeds.
	Driving above 6 km/h (4mph) (Speeds vary depending on model)				This may be normal ABS operation if the road conditions are poor.
	When slowing or stopping (Rate of brake application)	*Gradual braking*	*front only*		
			rear only		
			both brakes		
		During abrupt braking	*front only*		Abrupt braking may cause the ABS to function early as the suspension may not have had enough time to react to the situation.
			rear only		
			both brakes		
		There is no specific pattern			
	Other				

Question	Description	Answer	Advice to customer
How often does the fault occur?	*Every time ignition is switched on*		Further inspection by technician required.
	Every time the brakes are used (Continually)		
	No regularity (Intermittent)		
	Other		
During which riding conditions does the fault occur?	*Highway riding*		Braking and handling characteristics can vary with vehicle speed, therefore ABS operation during braking at highway speed may be more frequent.
	City riding		Accelerating abruptly between traffic signals so that the front wheel leaves the ground can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light to reset automatically.
	Minor/country roads riding	*Any comment on riding style maybe applicable*	Continuous riding on rough or uneven surfaces can cause the ABS to operate more frequently.
	Cross country riding		Continuous riding on loose or off road surfaces can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light to reset automatically.
	Track/closed circuit riding		Excessive use of the ABS system due to continuous fast riding can trigger the ABS warning indicator. Normal riding on good condition roads should allow the yellow ABS indicator light to reset automatically.
	All		Further inspection by technician required.
In what road conditions does the problem occur?	*Dry*		Further inspection by technician required
	Wet		In wet conditions it is possible that the ABS is operating normally
	Snow/ice		In snow/icy conditions it is possible that the ABS is operating normally
	Loose/rough surface (gravel)		On loose/rough surfaces it is possible that the ABS is operating normally
Motorcycle condition	*Has the machine been regularly serviced according to the periodic maintenance schedule?*		If the service history is incomplete it is possible that a fault may become apparent. For example, failure to replace the brake fluid during periodic maintenance can cause the hydraulic unit to become internally damaged.
	Have there been any previous braking problems?		Any previous braking problems may be related to the ABS complaint. It is important that the customer provides as much information as possible so that diagnosis can be made as quickly as possible.
	Have any aftermarket parts been fitted?	*OE Tires and brakes?*	Further inspection by technician required
	Have the daily safety checks been carried out? (tire pressures / condition etc.)		Worn tires or tires with incorrect pressures can cause an ABS fault. It is important to regularly check both tire condition and pressure

Troubleshooting

Dealer Findings

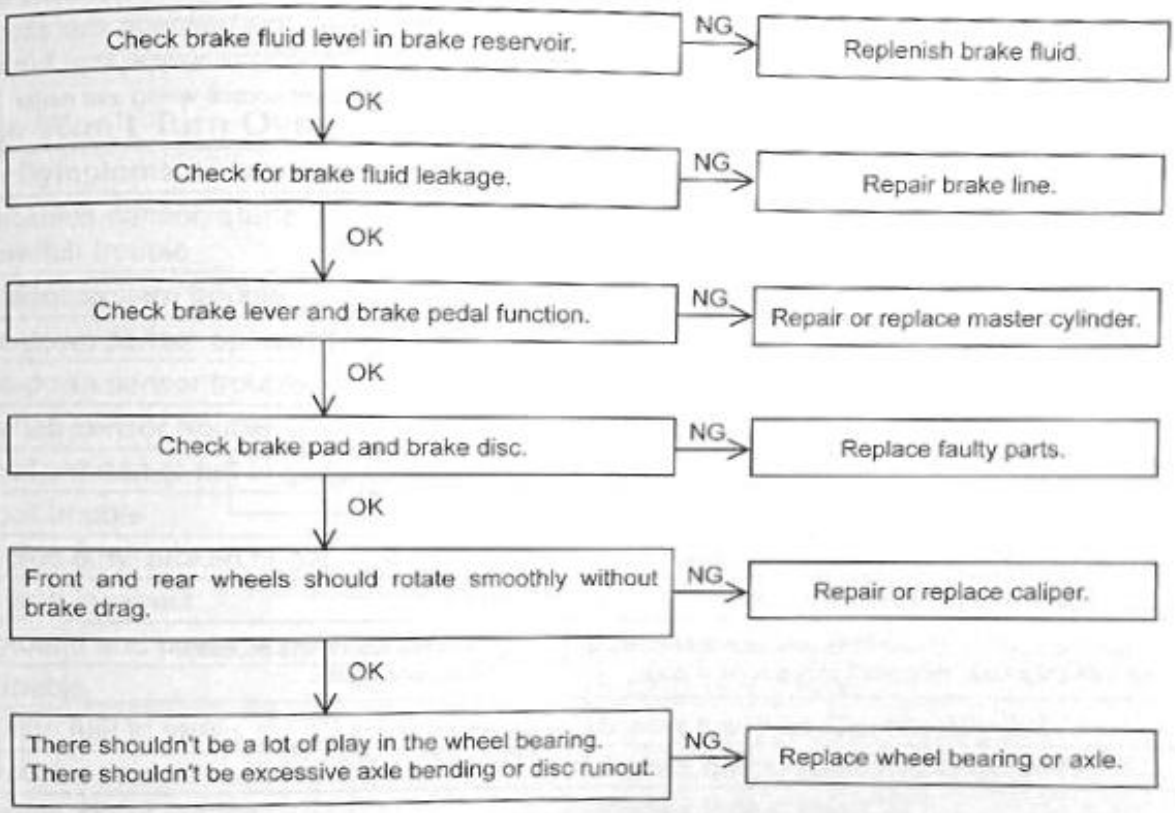
Sample Diagnosis Sheet 2

Question/Action	Description		Answer	Advice to technician
Review customer feedback information	*Carefully analyze the information that has been collected from the customer. Use this information to help you perform your initial diagnosis.*			
Check to see if any diagnostic codes are present	*1*			If codes are present refer to service manual.
	2			
	3			
	4			
	5			
Inspect the following	*Battery voltage*			The ABS is designed to be used with a 12 V sealed battery as its power source. Only use the battery specified by the service manual as a power source. If low battery voltage is detected service codes: B52 or B53 will be displayed.
	Tires type/size		Front ..... Rear	Refer to service manual.
	Tire pressures		Front ..... Rear	
	Tire condition		Front ..... Rear	Excessive or abnormal wear can be recognized as an ABS fault.
	Wheel rotation sensor air gap		Front ..... Rear	Refer to service manual. Also check that the wheel orientation is correct.
	Wheel condition (damaged or deformed)		Front ..... Rear	Refer to service manual.
	Brake system general condition		Front ..... Rear	Pad wear/Front and rear operation/Condition of hoses etc.
	Brake disc run-out		Front ..... Rear	Refer to service manual.
Additional information on the yellow ABS indicator light	*Continuous*	*Stays on all the time while ignition on*		Check for diagnostic trouble codes
		Turns off when first moving off but turns on again and stays on		
		Turns on when brake(s) are operated		
		Other:		
	Not working	*Turns off soon after moving off*		Test the operation of the light by turning on the ignition. If the light fails to illuminate ensure that the bike is equipped with ABS before inspecting the meter panel for faults as per the service manual.
		Turns off after riding for a while		
		Other:		
	How many times does it flash per 10 seconds?		5, 15, or 20	By flashing the ABS unit is indicating additional fault codes that may not be listed in the service manual. Please carefully count the number of flashes per 10 seconds before contacting Kawasaki. *(Kawasaki may request a video of the flashing sequence)*
			Other: ..... times	

Troubleshooting

ABS Pre-Diagnosis Inspection

Pre-Diagnosis Inspection 1



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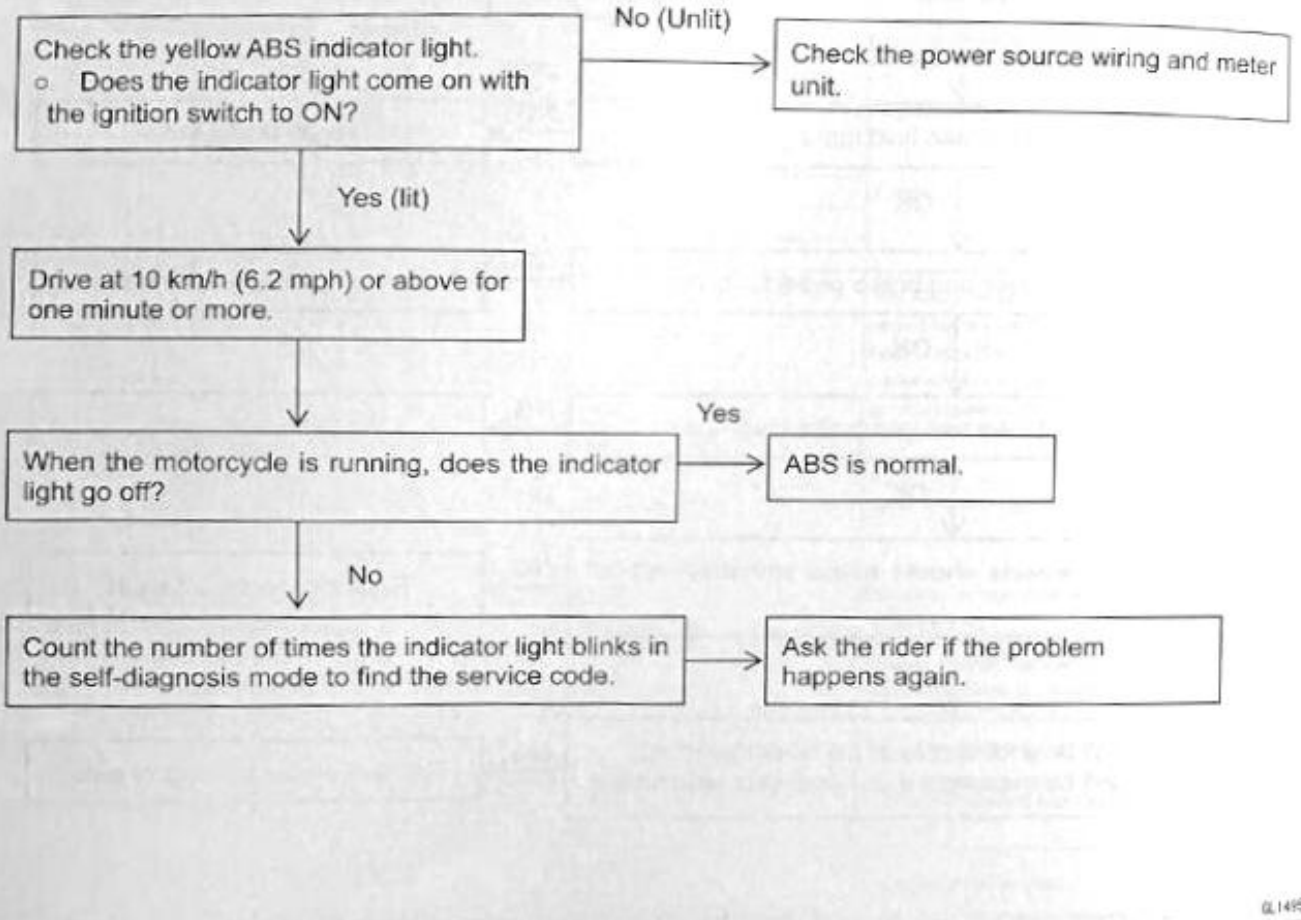
Troubleshooting

Pre-Diagnosis Inspection 2



Troubleshooting

Troubleshooting Guide

NOTE

OThis is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties in DFI system.

OThe ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.

Engine Won't Turn Over

Symptoms or possible Causes	Actions (chapter)
Gear position sensor, starter lockout or side stand switch trouble	Inspect each switch or sensor (see chapter 16 or 17).
Immobilizer system trouble	Inspect (see chapter 17).
Vehicle-down sensor operated	Turn ignition switch off (see chapter 17).
Vehicle-down sensor trouble	Inspect (see chapter 17).
Crankshaft sensor trouble	Inspect (see chapter 16).
Stick coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU ground and power supply trouble	Inspect (see chapter 3).
ECU trouble	Inspect (see chapter 3).
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel injector trouble	Inspect and replace (see chapter 17).
Fuel pump not operating	Inspect (see chapter 3).
Fuel pump relay trouble	Inspect and replace (see chapter 17).
Fuel filter clogged	Replace fuel filter (see chapter 2).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).

Poor Running at Low Speed

Symptoms or Possible Causes	Actions (chapter)
Spark weak:	
Stick coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Little fuel in tank	Supply fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 17).

Troubleshooting

Symptoms or Possible Causes	Actions (chapter)
Fuel filter clogged	Replace fuel filter (see chapter 2).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Accelerator position sensor trouble	Inspect (see chapter 17).
Throttle position sensor trouble	Inspect (see chapter 17).
ETV actuator trouble	Inspect (see chapter 17).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 17).
Accelerator position sensor trouble	Inspect (see chapter 17).
Throttle position sensor trouble	Inspect (see chapter 17).
ETV actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Accelerator position sensor trouble	Inspect (see chapter 17).
Throttle position sensor trouble	Inspect (see chapter 17).
ETV actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 17).
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter clogged	Replace fuel filter (see chapter 2).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 17).
Accelerator position sensor trouble	Inspect (see chapter 17).
Throttle position sensor trouble	Inspect (see chapter 17).
ETV actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).

Troubleshooting

Symptoms or Possible Causes	Actions (chapter)
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 17).
Accelerator position sensor trouble	Inspect (see chapter 17).
Throttle position sensor trouble	Inspect (see chapter 17).
ETV actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Surge:	
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and replace fuel pump) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Accelerator position sensor trouble	Inspect (see chapter 17).
Throttle position sensor trouble	Inspect (see chapter 17).
ETV actuator trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).
After fire:	
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 17).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Other:	
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).

Troubleshooting

Poor Running or No Power at High Speed:

Symptoms or Possible Causes	Actions (chapter)
Firing incorrect:	
Stick coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Stick coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Throttle body assy dust seal damage	Replace (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 17).
Fuel injector clogged	Inspect and repair (see chapter 17).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often DFI fuse blows.	Fuel pump bearings may wear. Replace the fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Cracked or obstructed intake air pressure sensor #1 or #2 vacuum hose	Inspect and repair or replace (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 3).
Intake air temperature sensor trouble	Inspect (see chapter 3).
Accelerator position sensor trouble	Inspect (see chapter 3).
Throttle position sensor trouble	Inspect (see chapter 3).
ETV actuator trouble	Inspect (see chapter 3).
Knocking:	
Fuel poor quality or incorrect	Fuel change (Use the gasoline recommended in the chapter 1 General Specifications).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
Stick coil trouble	Inspect (see chapter 16).
ECU trouble	Inspect (see chapter 3).
Engine vacuum not synchronizing	Inspect and adjust (see chapter 2).
Intake air pressure sensor #1 or #2 trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
Miscellaneous:	
Throttle valves will not fully open	Inspect ETV system (see chapter 17).
Engine overheating - Water temperature sensor or crankshaft sensor trouble	(see Overheating of Troubleshooting Guide in chapter 17)
Air switching valve trouble	Inspect and replace (see chapter 16).
Air suction valve trouble	Inspect and replace (see chapter 5).

Troubleshooting

Symptoms or Possible Causes	Actions (chapter)
Exhaust Smokes Excessively:	
(Black smokes)	
Air cleaner element clogged	Clean element (see chapter 2).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 17).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).
(Brown smoke)	
Air duct loose	Reinstall (see chapter 3).
Fuel pressure too low	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 17).
Intake air temperature sensor trouble	Inspect (see chapter 17).

Self-Diagnosis

Self-Diagnosis Outline (DFI System)

The self-diagnosis system has two modes and can be switched to another mode by operating the meter unit.

User Mode

The ECU notifies the rider of troubles by lighting or blinking the appropriate indicators when the system parts are faulty, and initiates fail-safe function. In case of serious troubles, ECU stops the injection and ignition operations.

Dealer Mode

The LCD displays the service code(s) to show the problem(s) which the each system has at the moment of diagnosis.

Self-Diagnosis Outline (ABS)

When the yellow ABS indicator light has blinked or come on, the ABS hydraulic unit memorizes and stores the service code for the service person to troubleshoot easily. The service code memory is powered directly by the battery and cannot be canceled by the ignition switch.

The ABS hydraulic unit can memorize up to all service codes. Further service codes are memorized after erasing the preceding all service codes. If there is no fault, the yellow ABS indicator light lights, indicating that "The ABS is normal."

Self-Diagnosis Procedures (DFI System)

NOTE

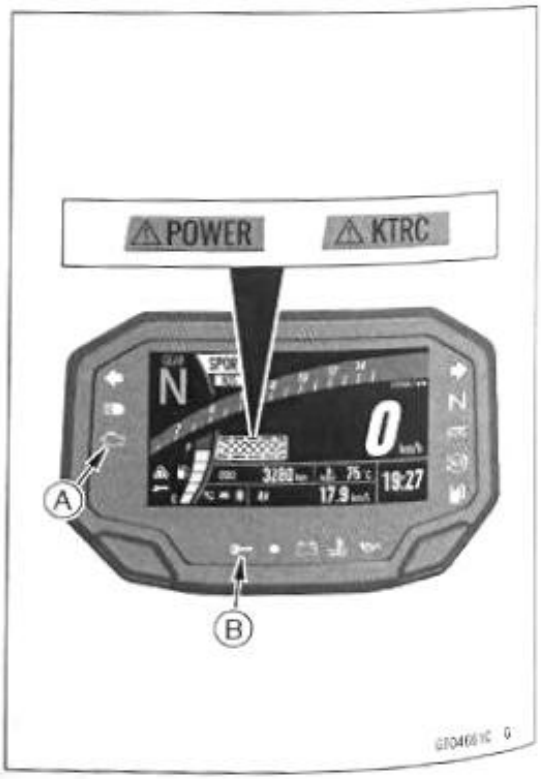
○Use a fully charged battery when conducting self-diagnosis. Otherwise, the yellow engine warming indicator light do not light or blink.

- Turn the ignition switch on and start the engine.

○When a problem occurs with DFI system and ignition system, the yellow engine warning indicator light [A] stays on after starting the engine to alert the rider.

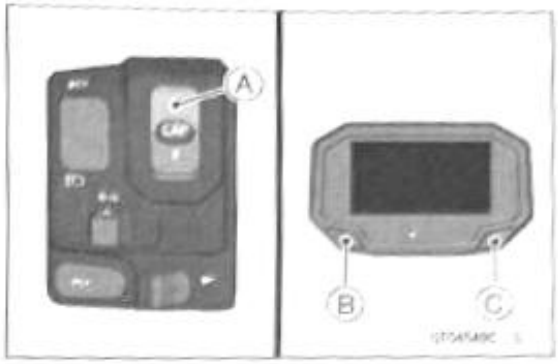
○When a problem occurs with power mode, KTRC or KQS system, the warning message appear.

○When a problem occurs with immobilizer system, the red immobilizer warning indicator light [B] blinks.

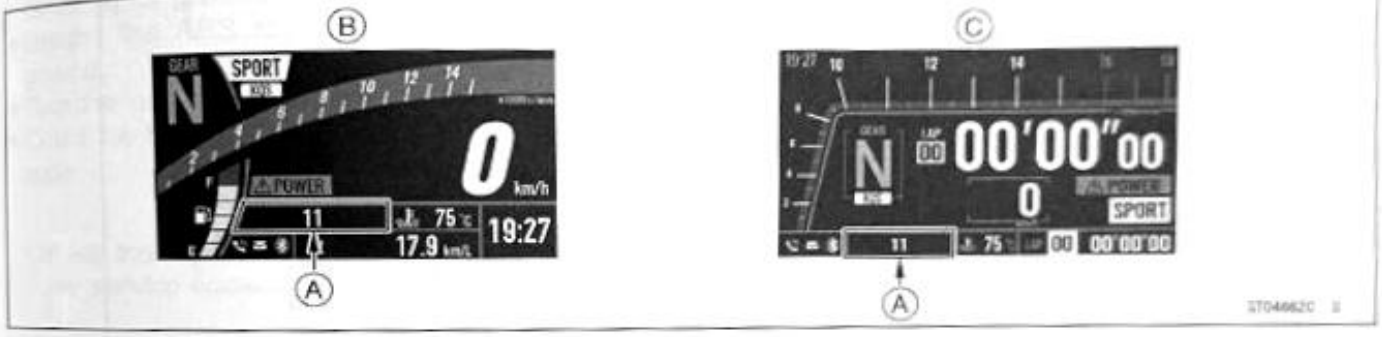


Self-Diagnosis

- Push the upper button [A] or left meter button [B] to display the odometer.
- Push and hold the left meter button and right meter button [C].



- The service code [A] is displayed on the LCD.
  Type 1 Display [B]
  Type 2 Display [C]



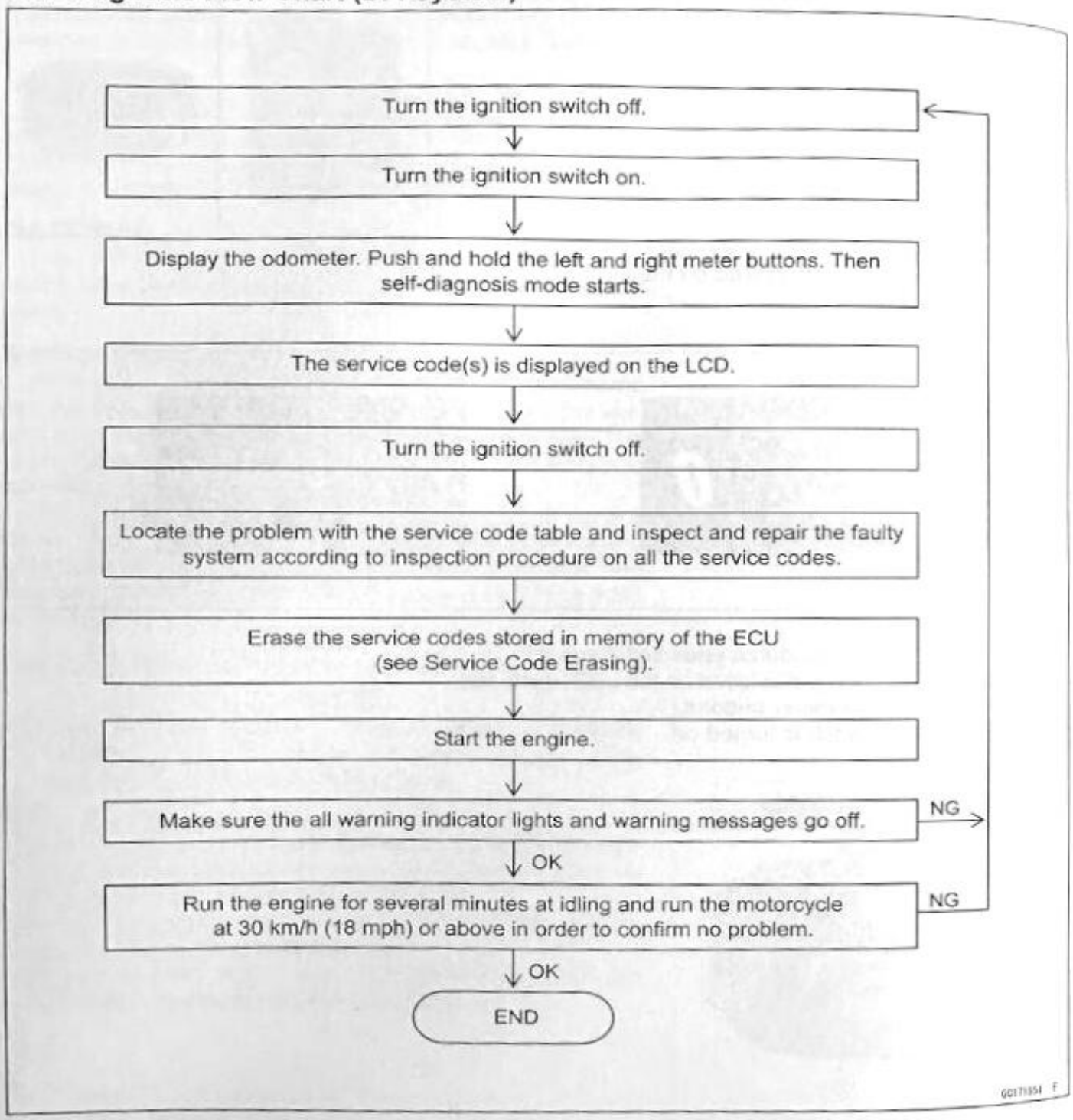
- Any of the following procedures ends self-diagnosis.

○When the service code is displayed on the LCD, push and hold the left and right meter buttons.

○When the ignition switch is turned off.

Self-Diagnosis

Self-Diagnosis Flow Chart (DFI System)



Self-Diagnosis

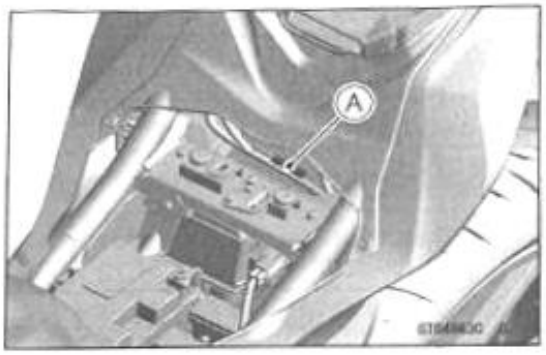
Self-diagnosis Procedures (ABS)

○When a problem occurs with the ABS, the yellow ABS indicator light [A] come on.

NOTE

○Use a fully charged battery when conducting self-diagnosis. Otherwise, the indicator light blinks very slowly or doesn't blink.

- Remove:
  Front Seat (see Front Seat Removal(15-16))
- Connect an auxiliary lead to the ABS self-diagnosis terminal [A] for grounding.
- Ground the ABS self-diagnosis terminal to the frame ground.
- Turn the ignition switch on.
- Count the blinks of the indicator light to read the service code.

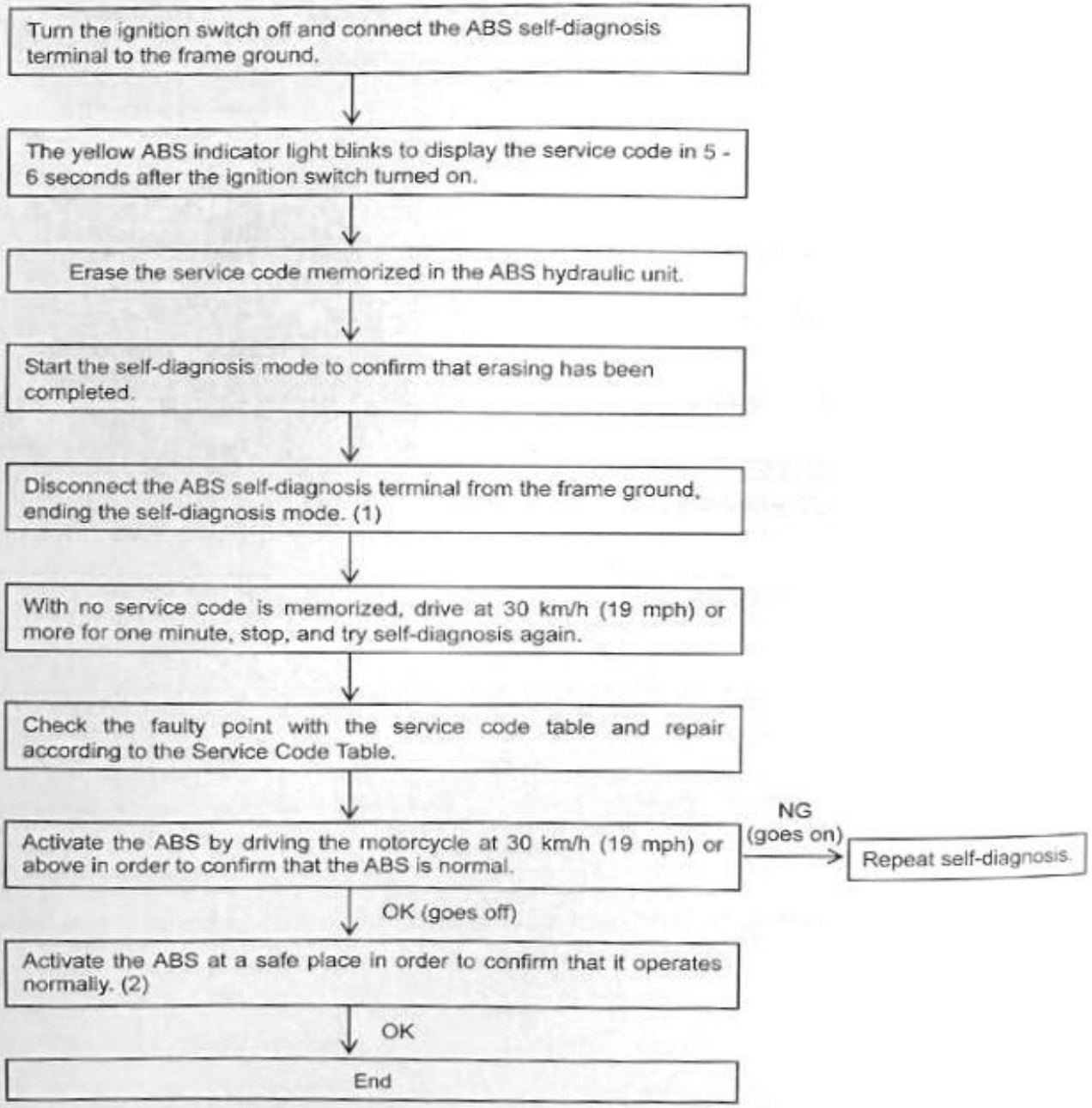


NOTE

○Keep the auxiliary lead ground until you finish reading the service code.

Self-Diagnosis

Self-diagnosis Flow Chart (ABS)



(1): The self-diagnosis mode ends following.
When the ignition switch is OFF.
When the motorcycle is driven while in the self-diagnosis mode.
When the self-diagnosis terminal disconnects.

(2): Apply brake suddenly at 30 km/h (19 mph) or more to confirm that the motorcycle stops smoothly and steady with pulsation on the brake lever and pedal.

Self-Diagnosis

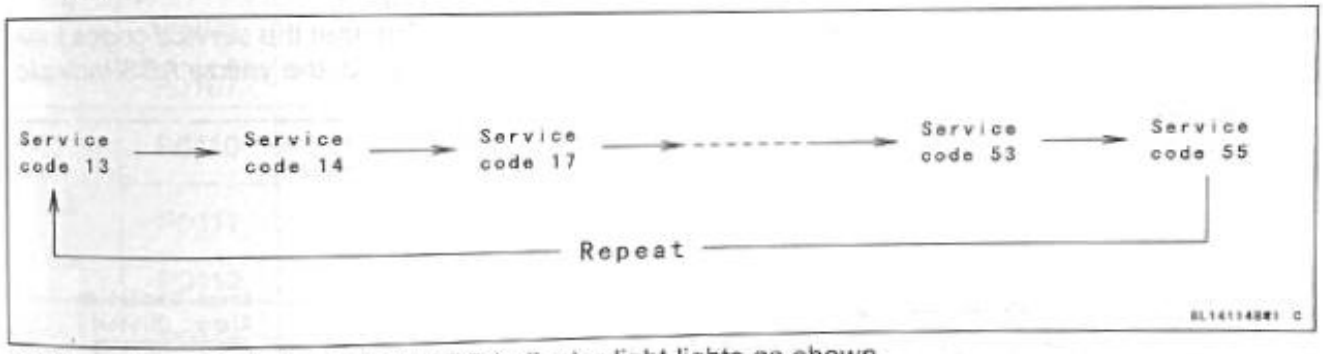
Service Code Reading

DFI System

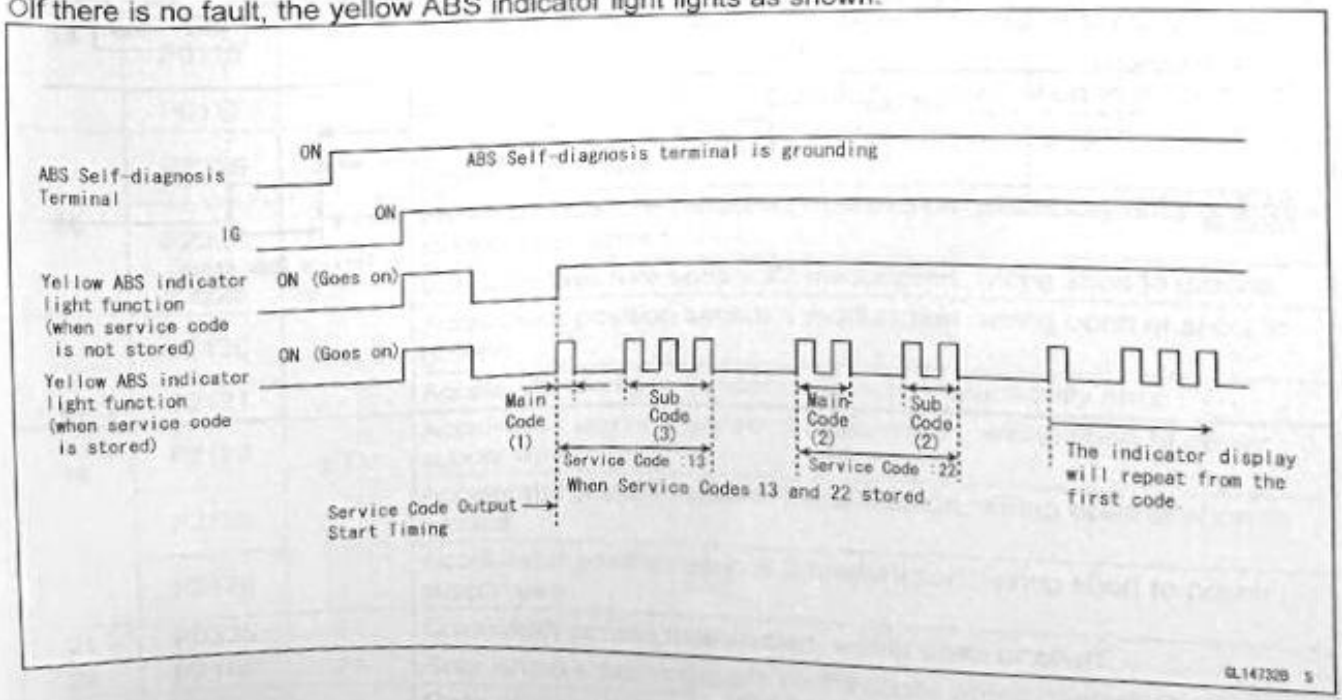
○The service code(s) is displayed on the LCD by the number of two digits.
○When there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order.
○Then after completing all codes, the display is repeated until the ignition switch is turned off or push and hold the left and right meter buttons.
○For example, if three problems occurred in the order of 56, 11, 24, the service codes are displayed from the lowest number in the order listed as shown below.
(11 → 24 → 56) → (11 → 24 → 56) → · · · (repeated)

ABS

○Service codes are shown by a series of long and short blinks of the yellow ABS indicator light as shown below.
○Read 10th digit and unit digit as the yellow ABS indicator light blinks.
○When there are a number of faults, a maximum of all service codes can be stored.
○For the display pattern, the display will begin starting from the small number code entered, then the display is repeated from the smallest number code once again.



○If there is no fault, the yellow ABS indicator light lights as shown.



Self-Diagnosis

Service Code Erasing

DFI System

• The service codes stored in memory of the ECU can be erased using Kawasaki Diagnosis System.

NOTE

○*When erasing the stored service code memory, the accelerator position and throttle position initial data of the throttle body are erased. Therefore, you must register the initial data to the ECU. Wait the 10 seconds at the idle speed and the coolant temperature 40°C (104°F) or more to register the initial data of the sensor position to the ECU.*

ABS

• Start the service code erase mode with the following procedure.

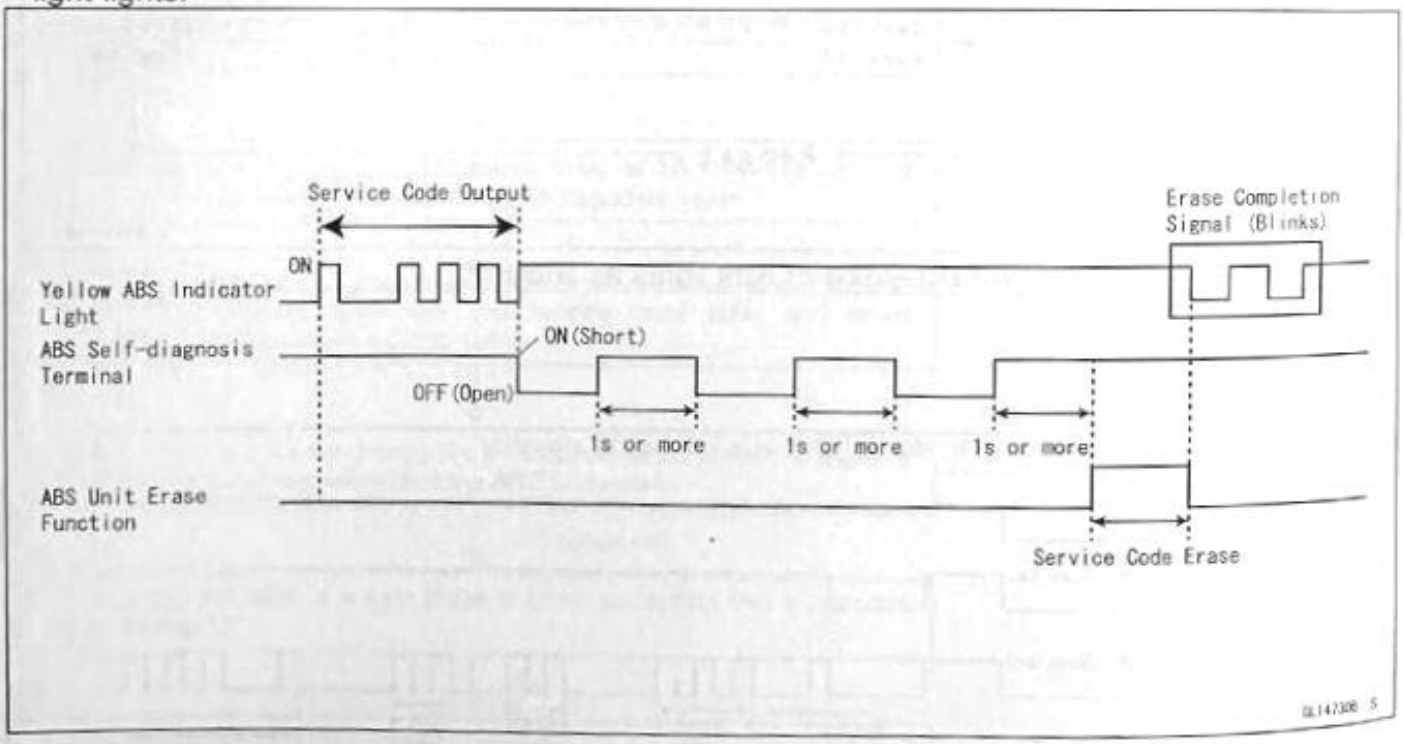
○The erase mode starts when the ABS self-diagnosis terminal is disconnected from the frame ground after starting the self-diagnosis mode.

○The service code can be erased by grounding (time for at least one second) and ungrounding the ABS self-diagnosis terminal three times or more within about 12.5 seconds after starting the erase mode and grounding it.

○The yellow ABS indicator light remains lit during the erase mode.

○After erasing, the yellow ABS indicator light blinks two times and lights.

○Once erasing is finished, enter the self-diagnosis mode again to confirm that the service codes have been erased. If the ABS has been reset and all codes have been erased, the yellow ABS indicator light lights.



Self-Diagnosis

Service Code Table

○Some service codes appear on models equipped with a certain system or part.
○DTC: Diagnostic trouble code

Service Code	DTC	System	Problems
11	P0120	ETV	Throttle position sensor 1 malfunction, wiring open or short to power supply wire, power supply voltage incorrect
	P0121		Throttle position sensor malfunction, plausibility error
	P0122		Throttle position sensor 1 malfunction, wiring short to ground
	P0220		Throttle position sensor 2 malfunction, wiring open or short to ground
	P0223		Throttle position sensor 2 malfunction, wiring short to power supply wire
12	P0105	FI	Intake air pressure sensor #1 malfunction, wiring open or short to power supply wire
	P0106		Intake air pressure sensor #1 malfunction, the signal is out of the usable range or stuck
	P0107		Intake air pressure sensor #1 malfunction, wiring short to ground
13	P0110	FI	Intake air temperature sensor malfunction, wiring open or short to power supply wire
	P0111		Intake air temperature sensor malfunction, the signal is out of the usable range or stuck
	P0112		Intake air temperature sensor malfunction, wiring short to ground
14	P0115	FI	Water temperature sensor malfunction, wiring open or short to power supply wire
	P0116		Water temperature sensor malfunction, the signal is out of the usable range or stuck
	P0117		Water temperature sensor malfunction, wiring short to ground
16	P2226	FI	Intake air pressure sensor #2 malfunction, wiring open or short to power supply wire
	P2227		Intake air pressure sensor #2 malfunction, plausibility error or stroke identification error
	P2228		Intake air pressure sensor #2 malfunction, wiring short to ground
18	P2120	ETV	Accelerator position sensor 1 malfunction, wiring open or short to ground
	P2121		Accelerator position sensor malfunction, plausibility error
	P2123		Accelerator position sensor 1 malfunction, wiring short to power supply wire
	P2125		Accelerator position sensor 2 malfunction, wiring open or short to ground
	P2128		Accelerator position sensor 2 malfunction, wiring short to power supply wire
21	P0335	FI	Crankshaft sensor malfunction, wiring open or short
24	P2158	FI	Rear wheel rotation sensor malfunction, wiring open or short
25	P0914	FI	Gear position sensor malfunction, wiring open or short to power supply wire
	P0915		Gear position sensor malfunction, the signal is out of the usable range or stuck
	P0916		Gear position sensor malfunction, wiring short to ground

Self-Diagnosis

Service Code	DTC	System	Problems
27	P0500	FI	Front wheel rotation sensor malfunction, wiring open or short
31	C0064	FI	Vehicle-down sensor malfunction, wiring open, short to ground or power supply wire
33	P0130	FI	Front oxygen sensor malfunction or inactivate, wiring open or short to ground
	P0132		Front oxygen sensor malfunction or inactivate, wiring short to power supply wire
	P0133		Front oxygen sensor malfunction or inactivate, plausibility error
	P2A00		Front oxygen sensor malfunction or inactivate, the signal is out of the usable range
35	P1507	Immobilizer	Immobilizer amplifier malfunction
36	P1508	Immobilizer	Blank key detection
39	–	FI	ECU communication error
3A	P0444	FI	Purge valve malfunction, wiring open
	P0458		Purge valve malfunction, wiring short to ground
	P0459		Purge valve malfunction, wiring short to power supply wire
3E	P0826	FI	Quick shifter sensor malfunction, wiring open, short to ground or power supply wire, plausibility error
41	P0201	FI	Fuel injector #1 malfunction, wiring open or short
42	P0202	FI	Fuel injector #2 malfunction, wiring open or short
43	P0203	FI	Fuel injector #3 malfunction, wiring open or short
44	P0204	FI	Fuel injector #4 malfunction, wiring open or short
46	P0627	FI	Fuel pump relay malfunction, relay is stuck
49	P2119	ETV	Return spring malfunction
4E	P0300	FI	Multiple cylinders are misfire
	P0301		Cylinder #1 is misfire
	P0302		Cylinder #2 is misfire
	P0303		Cylinder #3 is misfire
	P0304		Cylinder #4 is misfire
51	P0351	FI	Stick coil #1 malfunction, wiring open or short
52	P0352	FI	Stick coil #2 malfunction, wiring open or short
53	P0353	FI	Stick coil #3 malfunction, wiring open or short
54	P0354	FI	Stick coil #4 malfunction, wiring open or short
56	P0480	FI	Radiator fan relay malfunction, wiring open, short to ground or power supply wire
58	P2100	ETV	ETV actuator malfunction, wiring open or short, plausibility error
64	P0418	FI	Air switching valve malfunction, wiring open
	P2257		Air switching valve malfunction, wiring short to ground
	P2258		Air switching valve malfunction, wiring short to power supply wire

Self-Diagnosis

Service Code	DTC	System	Problems
67	P0030	FI	Front oxygen sensor heater malfunction, wiring open
	P0031		Front oxygen sensor heater malfunction, wiring short to ground
	P0032		Front oxygen sensor heater malfunction, wiring short to power supply wire
	P0053		Front oxygen sensor heater malfunction, plausibility error
6D	P0704	FI	Starter lockout switch malfunction, the signal is stuck
97	P0562	ETV	Battery voltage is low
98	P0607	ETV	ECU/ETV internal circuit malfunction, wiring open or short

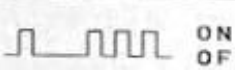
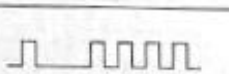
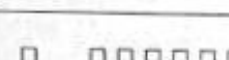
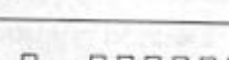
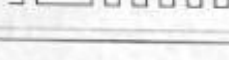
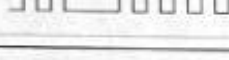
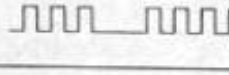
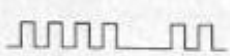
Some DFI error has an effect on the Power Mode, KTRC, KQS function.

Notes:

- The ECU may be involved in these problems. If all the parts and circuits checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.
- When no service code is displayed, the electrical parts of the DFI system has no fault, and the mechanical parts of the DFI system and the engine are suspect.
- DTC (Diagnostic Trouble Code) is displayed on the Kawasaki Diagnostic System and the Generic Scan Tool (GST).

Self-Diagnosis

Service Code Table (ABS)

Service Code	Yellow ABS Indicator Light	Problems	Light State
–	Stays on* (Error function after the ignition switch turned on)	Main harness, meter unit, wheel rotation sensor(s) or ABS unit abnormal	ON
–	Does not go on (When the ignition switch turned on)	Main harness, meter unit or ABS unit abnormal	OFF
13		Rear intake solenoid valve trouble (wiring shorted or open)	ON
14		Rear outlet solenoid valve trouble (wiring shorted or open)	ON
17		Front intake solenoid valve trouble (wiring shorted or open)	ON
18		Front outlet solenoid valve trouble (wiring shorted or open)	ON
19		ABS solenoid valve relay trouble [stuck relay (ON or OFF)]	ON
25		Front, rear wheel rotation difference abnormal (substandard tire)	ON
35		ABS motor trouble (mechanical stuck)	ON
42		Front wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
43		Front wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
44		Rear wheel rotation sensor signal abnormal (sensor or rotor missing, too large clearance, rotor tooth worn or missing)	ON
45		Rear wheel rotation sensor wiring (wiring shorted or open, connector bad connection)	ON
52		Power supply voltage abnormal (low-voltage)	ON
53		Power supply voltage abnormal (high-voltage)	ON
55		ABS Hydraulic Unit Internal Error (ECU operation abnormal)	ON

*: In spite of the service code is not stored, the yellow ABS Indicator Light does not go off when the 2 seconds later from the ignition switch turned on.

Self-Diagnosis

Fail-safe

○The ECU takes the following measures to prevent damage to the engine.

Service Code	Parts or Function	Fail-safe/Symptom Function
11	Throttle Position Sensor	If one of the throttle position sensor fails, the ECU sets as follows. 1. Limit the engine power. 2. Deactives the auxiliary controls (KTRC etc.). If both throttle sensors fail, the ECU sets as follows. 1. The quantity of fuel to be injected is calculated from engine speed and the intake air pressure. 2. The throttle position sensor value is set to the default value. 3. Air switching valve solenoid will be on. 4. Stops controlling the ETV and manages engine output by controlling fuel injection and ignition timing. 5. Limits the engine power. 6. Deactives the auxiliary controls (KTRC etc.).
12	Intake Air Pressure Sensor #1	The ECU sets as follows. 1. The quantity of fuel to be injected is determined by engine speed and the throttle opening value. 2. The intake air pressure sensor value is set to the default value. 3. Air switching valve solenoid will be on. 4. Deactives the auxiliary controls (KTRC etc.).
13	Intake Air Temperature Sensor	The ECU sets the intake air temperature to default value.
14	Water Temperature Sensor	The ECU sets the water temperature to default value and operates the radiator fan.
16	Intake Air Pressure Sensor #2	The ECU sets as follows. 1. The intake air pressure sensor value is set to the default value. 2. Deactives the auxiliary controls (KTRC etc.).
18	Accelerator Position Sensor	If one of the accelerator position sensor fails, the ECU sets as follow. 1. Limit the engine power. 2. Deactives the auxiliary controls (KTRC etc.). If both accelerator position sensors fail, the ECU sets as follows. 1. The ECU does not accept throttle operation signals and maintains the idling. 2. Deactives the auxiliary controls (KTRC etc.).
21	Crankshaft Sensor	The engine stops by itself.
24	Rear Wheel Rotation Sensor	The ECU deactives the auxiliary controls (KTRC etc.).
25	Gear Position Sensor	The ECU sets as follows. 1. Sets the gear position to the default value. 2. Deactives the auxiliary controls (KTRC etc.).
27	Front Wheel Rotation Sensor	The ECU deactives the auxiliary controls (KTRC etc.).
31	Vehicle-down Sensor	The ECU shuts off the fuel system.
33	Front Oxygen Sensor	The ECU stops the current to the front oxygen sensor heater.
35	Immobilizer Amplifier	The engine does not start.
36	Ignition Key	The engine does not start.
3A	Purge Valve	The ECU stops the current to the purge valve.
3E	Quick Shifter Sensor	The ECU deactives the KQS.
41	Fuel Injector #1	The ECU deactives the auxiliary controls (KTRC etc.).

Self-Diagnosis

Service Code	Parts or Function	Fail-safe/Symptom Function
42	Fuel Injector #2	The ECU deactives the auxiliary controls (KTRC etc.).
43	Fuel Injector #3	The ECU deactives the auxiliary controls (KTRC etc.).
44	Fuel Injector #4	The ECU deactives the auxiliary controls (KTRC etc.).
46	Fuel Pump Relay	The ECU deactives the auxiliary controls (KTRC etc.).
49	Return Spring	The ECU deactives the auxiliary controls (KTRC etc.).
51	Stick Coil #1	The ECU sets as follows. 1. Shuts off the fuel injector #1. The engine keeps running. 2. Deactives the auxiliary controls (KTRC etc.).
52	Stick Coil #2	The ECU sets as follows. 1. Shuts off the fuel injector #2. The engine keeps running. 2. Deactives the auxiliary controls (KTRC etc.).
53	Stick Coil #3	The ECU sets as follows. 1. Shuts off the fuel injector #3. The engine keeps running. 2. Deactives the auxiliary controls (KTRC etc.).
54	Stick Coil #4	The ECU sets as follows. 1. Shuts off the fuel injector #4. The engine keeps running. 2. Deactives the auxiliary controls (KTRC etc.).
56	Radiator Fan Relay	The stops the radiator fan relay control.
58	ETV Actuator	The ECU sets as follows. 1. Stops controlling the ETV and manages engine output by controlling fuel injection and ignition timing. 2. Limits the engine power. 3. Deactives the auxiliary controls (KTRC etc.).
64	Air Switching Valve	The ECU stops the current to the air switching valve.
67	Front Oxygen Sensor Heater	The ECU stops the current to the front oxygen sensor heater.
97	Battery	The ECU sets as follows. 1. Stops controlling the ETV and manages engine output by controlling fuel injection and ignition timing. 2. Limits the engine power. 3. Deactives the auxiliary controls (KTRC etc.).
98	ETV Control Circuit	The ECU sets as follows. 1. Stops controlling the ETV and manages engine output by controlling fuel injection and ignition timing. 2. Limits the engine power. 3. Deactives the auxiliary controls (KTRC etc.).

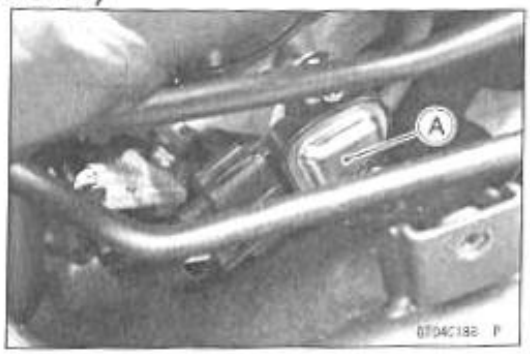
Throttle Position Sensor

Throttle Position Sensor Inspection (Service Code 11)

Throttle Position Sensor Removal

NOTICE

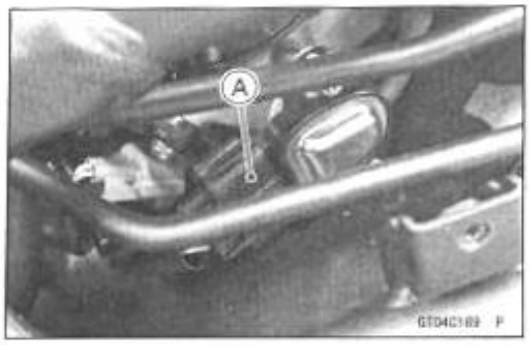
Do not remove the throttle position sensor [A] since it has been adjusted and set with precision at the factory. Never drop the throttle body assy especially on a hard surface. Such a shock to the throttle sensor can damage it.



DTC P0120

(Checking input voltage for sensor)

- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Disconnect:
  Throttle Position Sensor Connector [A]



- Connect the measuring adapter [A] to the throttle position sensor connectors as shown.
  Main Harness [B]
  Throttle Position Sensor [C]

  Special Tool - Measuring Adapter: 57001-1700
- Connect a digital meter [D] to the measuring adapter leads.

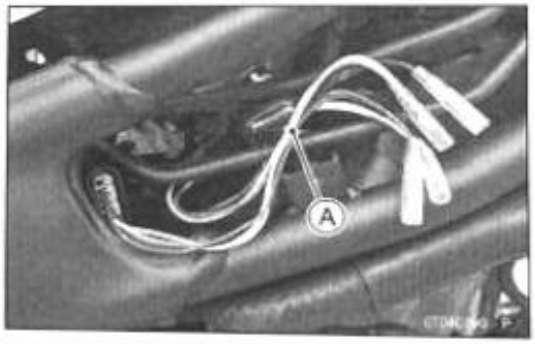
  Throttle Position Sensor Input Voltage
  Connections to Adapters:
  Digital Meter (+) → Y (main harness W) lead
  Digital Meter (–) → BK (main harness BK) lead
- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

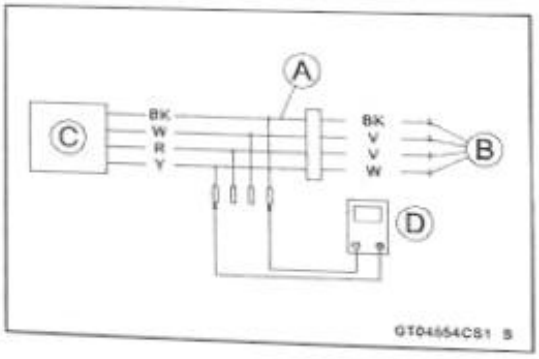
  Input Voltage
  Standard: DC 4.75 – 5.25 V
- Turn the ignition switch off.

★If the reading is within the standard, go to next check.

★If the reading is out of the standard, check the throttle position sensor wirings (see Throttle Position Sensor Circuit(17-57)).

★If there is no continuity, repair or replace the main harness.





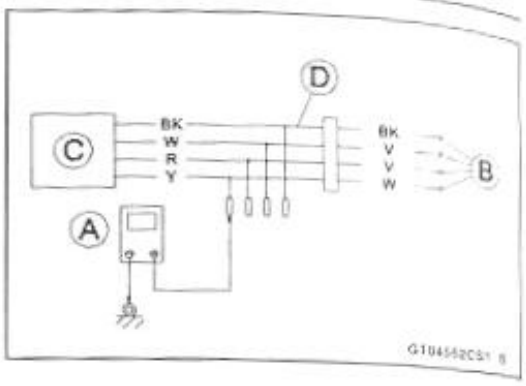
Throttle Position Sensor

(Checking wire for short circuit to power supply wire)

- Connect the digital meter [A] to the measuring adapter lead.

Main Harness [B]
Throttle Position Sensor [C]

Special Tool - Measuring Adapter [D]: 57001-1700



Measuring Voltage
Connection to Adapter:
Digital Meter (+) → Y (main harness W) lead
Digital Meter (–) → Frame Ground Terminal

- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.

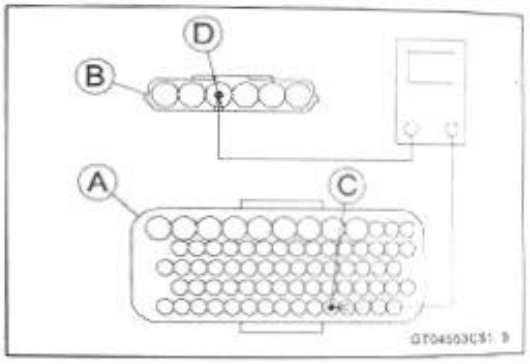
★If the reading is less than DC 5 V, go to next check.

(Checking wire for open circuit)

- Remove the measuring adapter.
- Disconnect:

ECU Connectors (see ECU Removal(3-12))

- Check the wiring for continuity between harness connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Throttle Position Sensor Connector [B]
ECU Terminal 132 [C] ←→ Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.

★If there is continuity, first check the throttle position sensor wirings (see Throttle Position Sensor Circuit(17-57)).

★If there is no continuity, repair or replace the main harness.

★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.

★If the terminals are corroded or bent, replace the throttle body assy and/or ECU.

★Even if all checks are good, the problem still exists, replace the ECU.

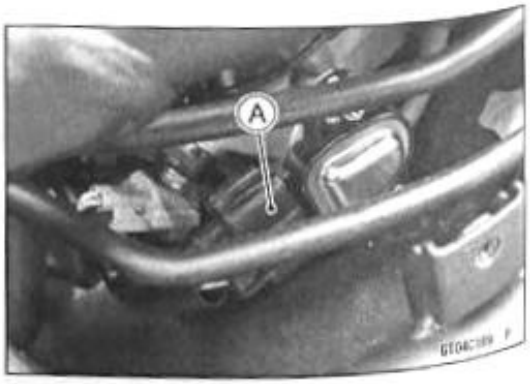
DTC P0121

- Remove:

Right Side Cover (see Side Cover Removal(15-26))

- Disconnect:

Throttle Position Sensor Connector [A]
ECU Connectors (see ECU Removal(3-12))



Throttle Position Sensor

- Check the terminals of the sensor and ECU for corrosion or bent.

★If the terminals are corroded or bent, replace the throttle body assy and/or ECU.

★If the terminals are good, check the throttle position sensor wirings (see Throttle Position Sensor Circuit(17-57)).

★If there is no continuity, repair or replace the main harness.

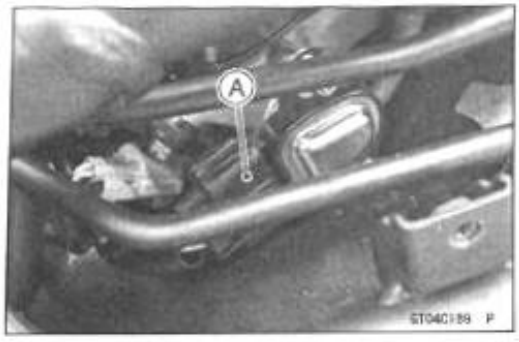
★If there is continuity, replace the throttle body assy and/or ECU.

★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0122

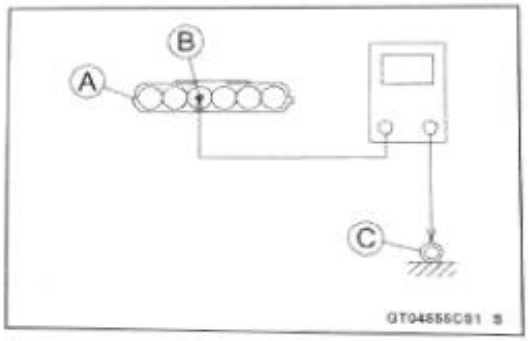
(Checking wire for short circuit to ground)

- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Disconnect:
  Throttle Position Sensor Connector [A]
  ECU Connectors (see ECU Removal(3-12))



- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

Wiring Continuity Inspection
V lead [B] ⟷ Frame Ground Terminal [C]



★If there is continuity, repair or replace the main harness.

★If there is no continuity, replace the throttle body assy.

★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0220

(Checking wire for short circuit to ground)

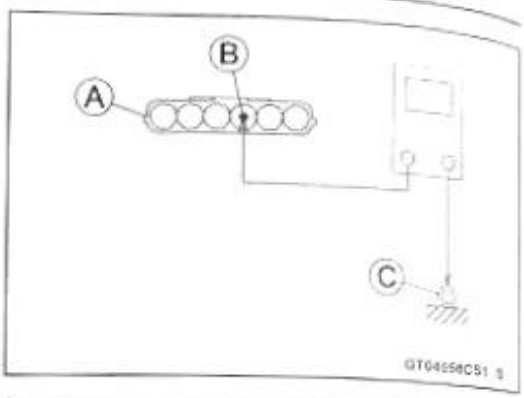
- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Disconnect:
  Throttle Position Sensor Connector [A]
  ECU Connectors (see ECU Removal(3-12))

Throttle Position Sensor

- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

Wiring Continuity Inspection
V lead [B] ⟷ Frame Ground Terminal [C]

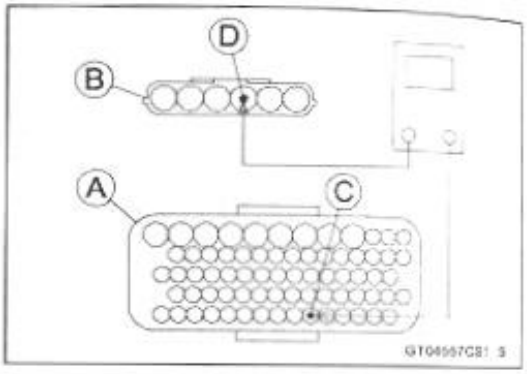
★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.



(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

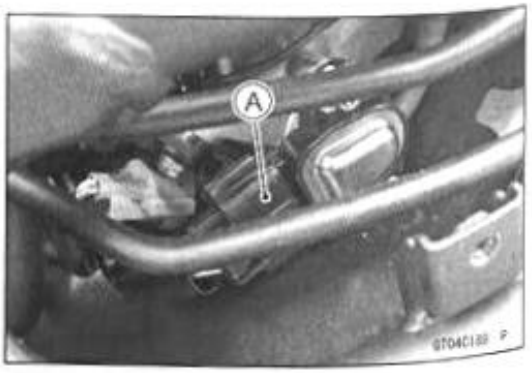
Wiring Continuity Inspection
ECU Connector [A] ⟷
Throttle Position Sensor Connector [B]
ECU Terminal 131 [C] ⟷ Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the throttle position sensor wirings (see Throttle Position Sensor Circuit(17-57)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the throttle body assy and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.



DTC P0223

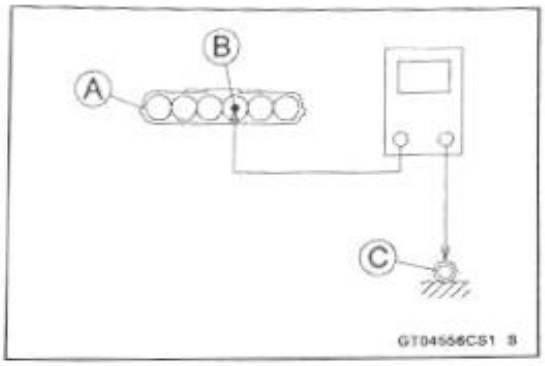
(Checking wire for short circuit to power supply wire)
- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Disconnect:
  Throttle Position Sensor Connector [A]



Throttle Position Sensor

- Connect the digital meter to the connector [A].

Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → V lead [B]
Digital Meter (–) → Frame Ground Terminal [C]



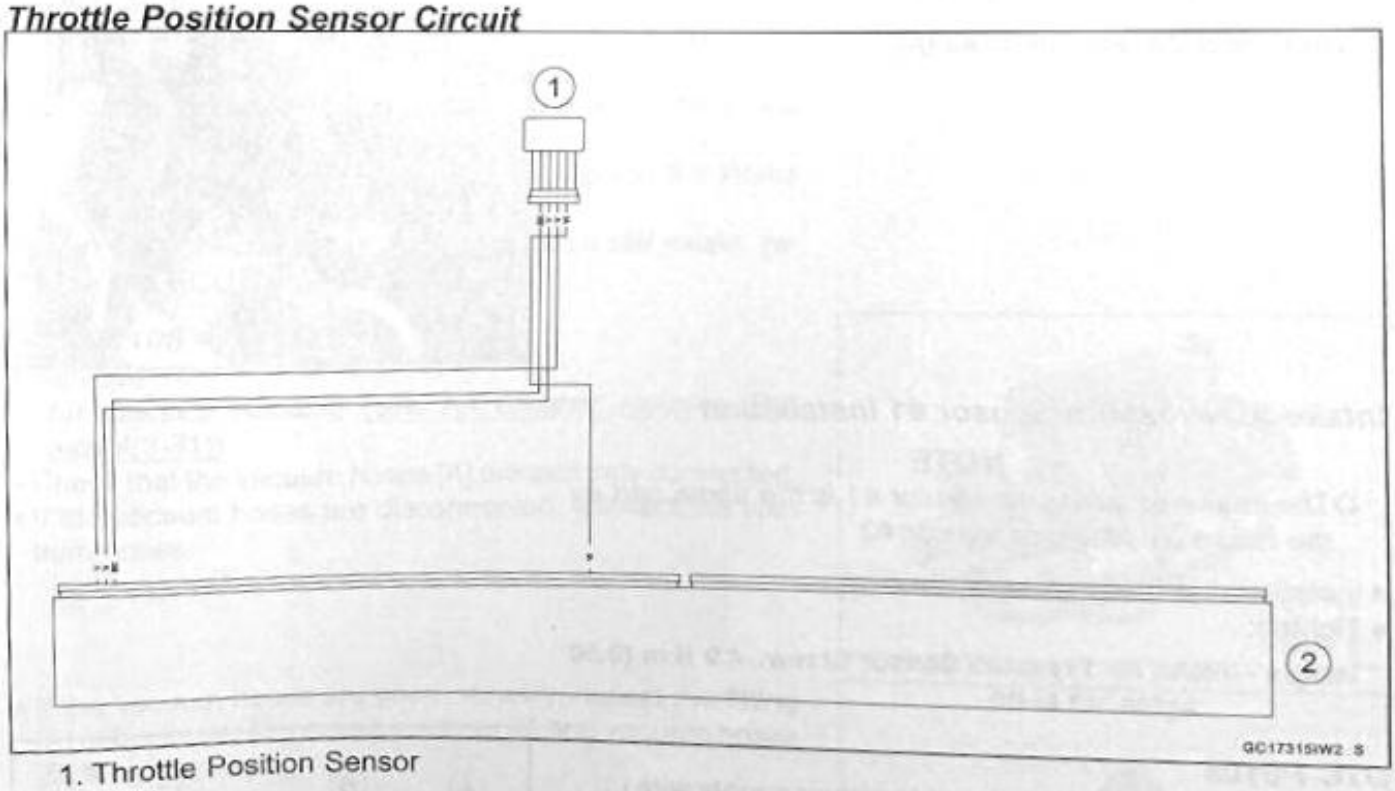
- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, replace the throttle body assy.

★Even if all checks are good, the problem still exists, replace the ECU.

Throttle Position Sensor Circuit



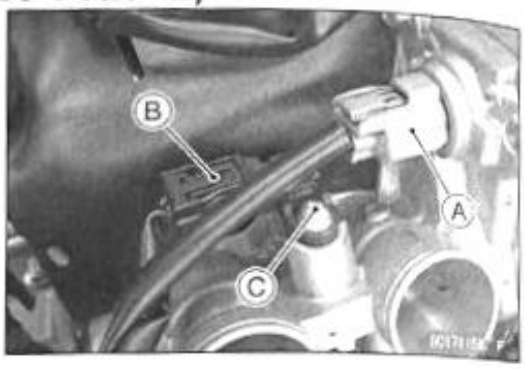
1. Throttle Position Sensor
2. ECU

Intake Air Pressure Sensor #1

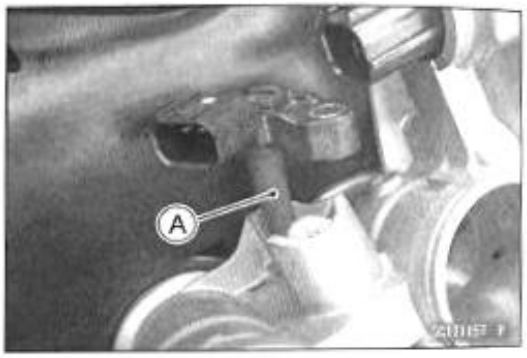
Intake Air Pressure Sensor #1 Inspection (Service Code 12)

Intake Air Pressure Sensor #1 Removal

NOTICE
Never drop the intake air pressure sensor #1 especially on a hard surface. Such a shock to the sensor can damage it.



- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Disconnect:
  ETV Actuator Connector [A]
  Intake Air Pressure Sensor #1 Connector [B]
- Remove the intake air pressure sensor screw [C].
- Disconnect the vacuum hose [A].



Intake Air Pressure Sensor #1 Installation

NOTE

○*The intake air pressure sensor #1 is the same part as the intake air pressure sensor #2.*

- Installation is the reverse of removal.
- Tighten:

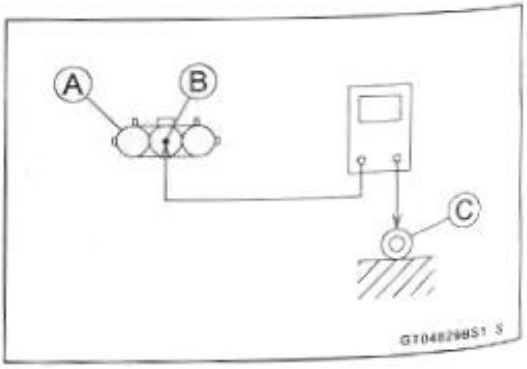
Torque - Intake Air Pressure Sensor Screw: 4.9 N·m (0.50 kgf·m, 43 in·lb)

DTC P0105

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Intake Air Pressure Sensor #1 Connector (see Intake Air Pressure Sensor #1 Removal(17-58))
- Connect the digital meter to the connector [A].

Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → Y/BL lead [B]
Digital Meter (–) → Frame Ground Terminal [C]



- Measure the measuring voltage.
- Turn the ignition switch on.

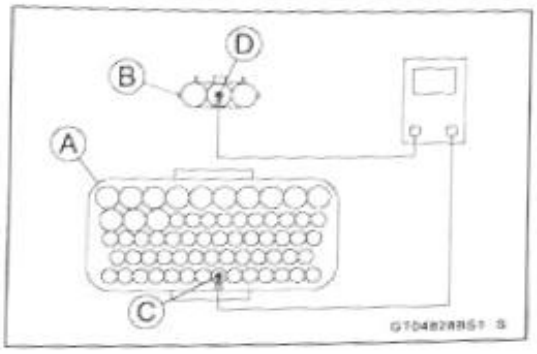
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

Intake Air Pressure Sensor #1

(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ⟷
Intake Air Pressure Sensor #1 Connector [B]
ECU Terminal 58 [C] ⟷ Sensor Terminal [D]

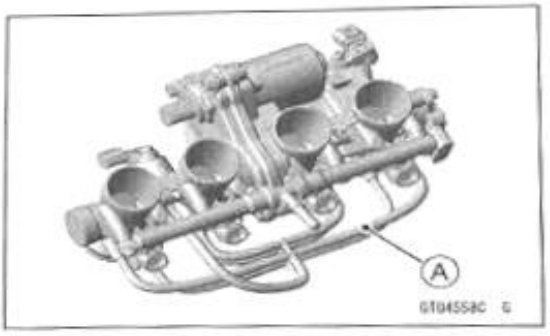


★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the intake air pressure sensor #1 wirings (see Intake Air Pressure Sensor #1 Circuit(17-60)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the intake air pressure sensor #1 and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0106

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Check that the vacuum hoses [A] are securely connected.

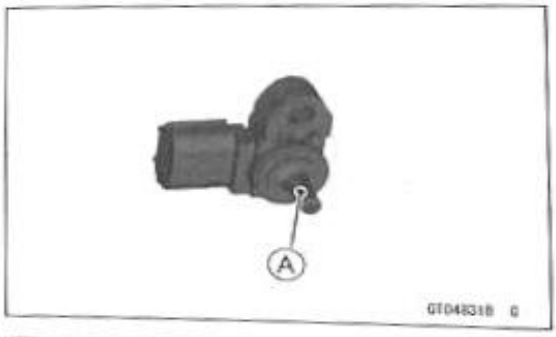
★If the vacuum hoses are disconnected, connect the vacuum hoses.



★If the vacuum hoses are good, visually inspect the fitting [A] of the intake air pressure sensor #1 and vacuum hoses [B] for clogged.

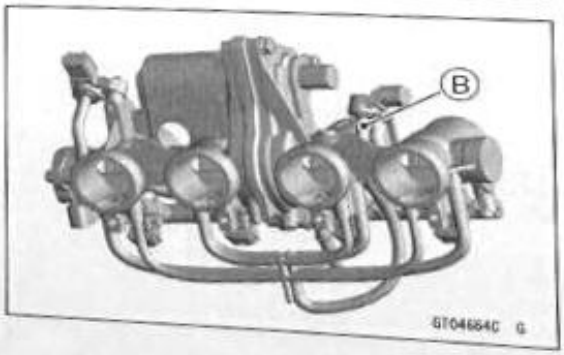
○Remove:
  Intake Air Pressure Sensor #1 (see Intake Air Pressure Sensor #1 Removal(17-58))

★If the sensor and hose are clogged, replace the intake air pressure sensor and/or clean the vacuum hose.
★If the sensor and hose are good, check the terminals of the sensor and ECU for corrosion or bent.



○Remove:
  ECU (see ECU Removal(3-12))

★If the terminals are corroded or bent, replace the intake air pressure sensor #1 and/or ECU.
★If the terminals are good, check the intake air pressure sensor #1 wirings (see Intake Air Pressure Sensor #1 Circuit(17-60)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

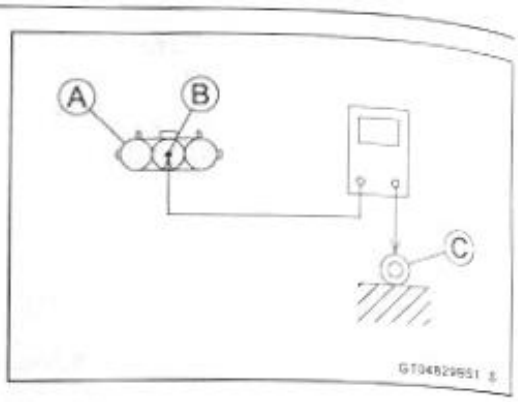


Intake Air Pressure Sensor #1

DTC P0107

(Checking wire for short circuit to ground)

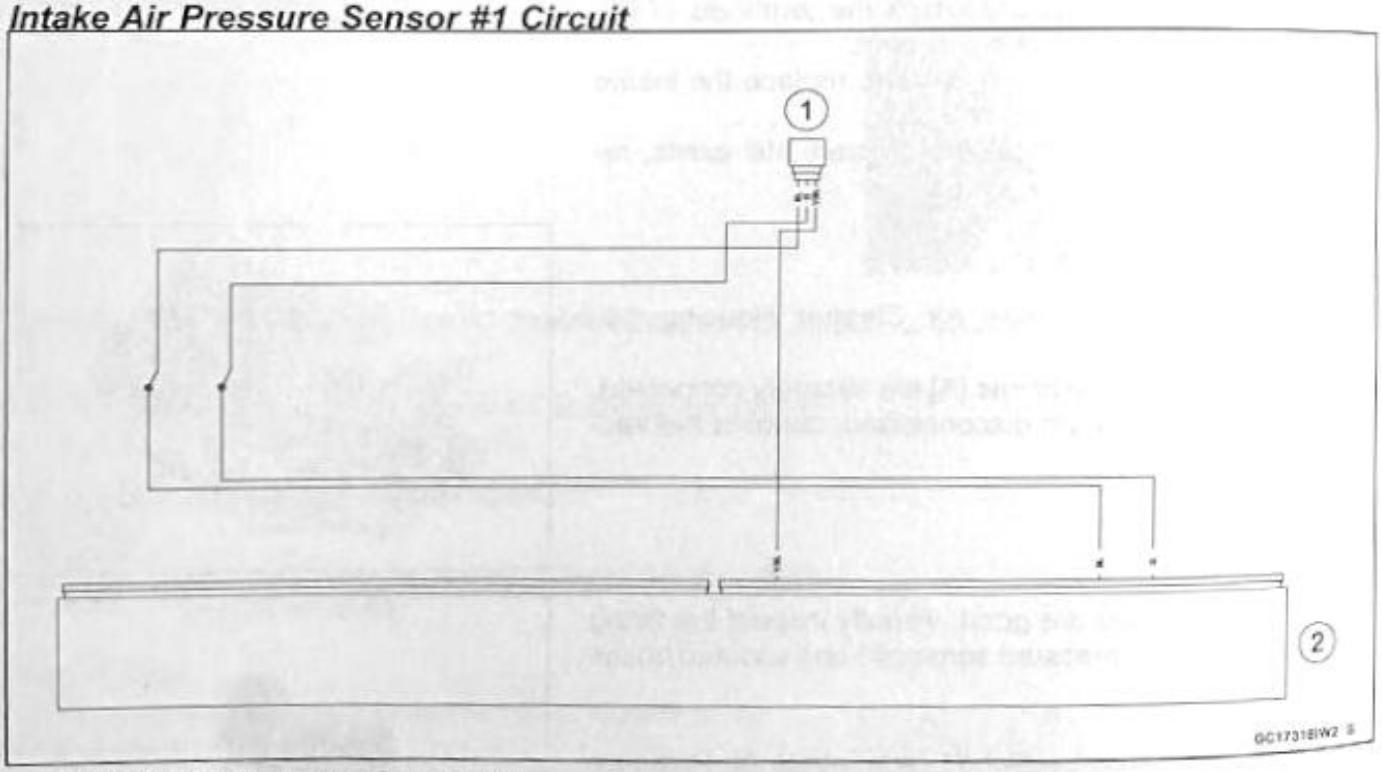
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Intake Air Pressure Sensor #1 Connector (see Intake Air Pressure Sensor #1 Removal(17-58))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



Wiring Continuity Inspection
Y/BL lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the intake air pressure sensor #1.
★Even if all checks are good, the problem still exists, replace the ECU.

Intake Air Pressure Sensor #1 Circuit



1. Intake Air Pressure Sensor #1
2. ECU

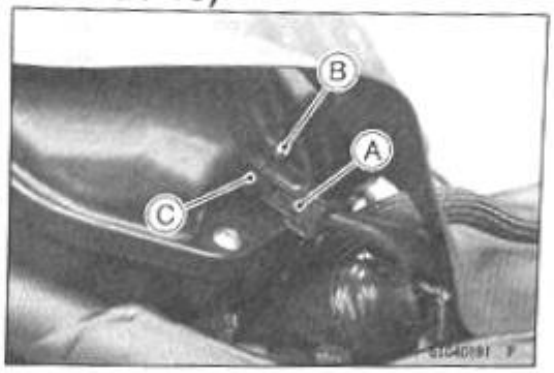
Intake Air Temperature Sensor

Intake Air Temperature Sensor Inspection (Service Code 13)

Intake Air Temperature Sensor Removal

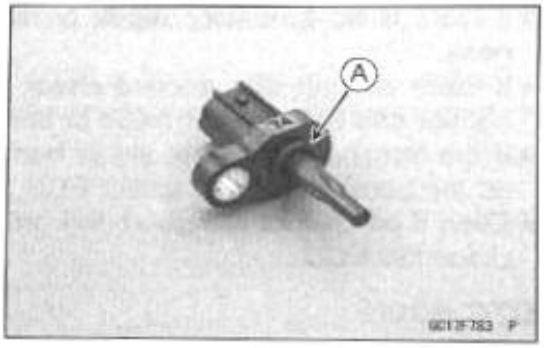
NOTICE

Never drop the intake air temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.



- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
- Disconnect:
  Intake Air Temperature Sensor Connector [A]
- Remove:
  Intake Air Temperature Sensor Screw [B]
  Intake Air Temperature Sensor [C]

Intake Air Temperature Sensor Installation



- Be sure to install the O-ring [A].
- Install the intake air temperature sensor.

○When installing the sensor which is fastened by screw, tighten the screw after placing the sensor on the bottom surface completely.

- Tighten:

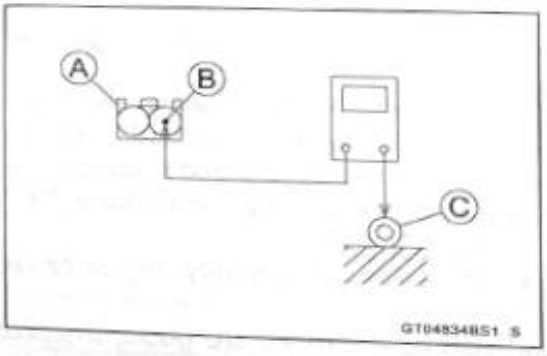
Torque - Intake Air Temperature Sensor Screw: 1.2 N·m (0.12 kgf·m, 11 in·lb)

- Connect:
  Intake Air Temperature Sensor Connector
- Install the removed parts.

DTC P0110

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Intake Air Temperature Sensor Connector (see Intake Air Temperature Sensor Removal(17-61))
- Connect the digital meter to the connector [A].



Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → R/BK lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

- Measure the measuring voltage.
- Turn the ignition switch on.

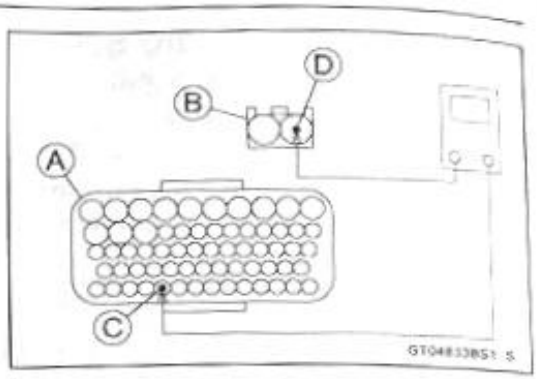
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

Intake Air Temperature Sensor

(Checking wire for open circuit)
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ⟷
Intake Air Temperature Sensor Connector [B]
ECU Terminal 55 [C] ⟷ Sensor Terminal [D]



★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the intake air temperature sensor wirings (see Intake Air Temperature Sensor Circuit(17-63)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the intake air temperature sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0111

- Remove:
  ECU Connectors (see ECU Removal(3-12))
  Intake Air Temperature Sensor (see Intake Air Temperature Sensor Removal(17-61))
- Check the terminals of the sensor and ECU for corrosion or bent.

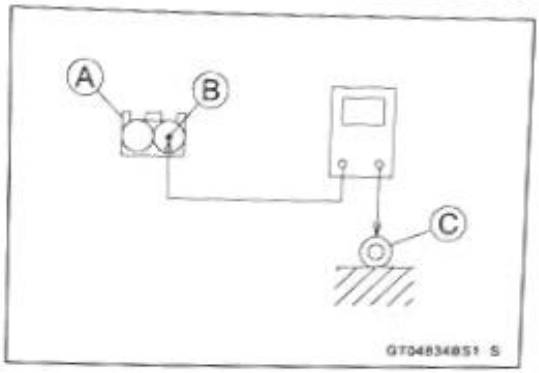
★If the terminals are corroded or bent, replace the intake air temperature sensor and/or ECU.
★If the terminals are good, check the intake air temperature sensor wirings (see Intake Air Temperature Sensor Circuit(17-63)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

Intake Air Temperature Sensor

DTC P0112

(Checking wire for short circuit to ground)

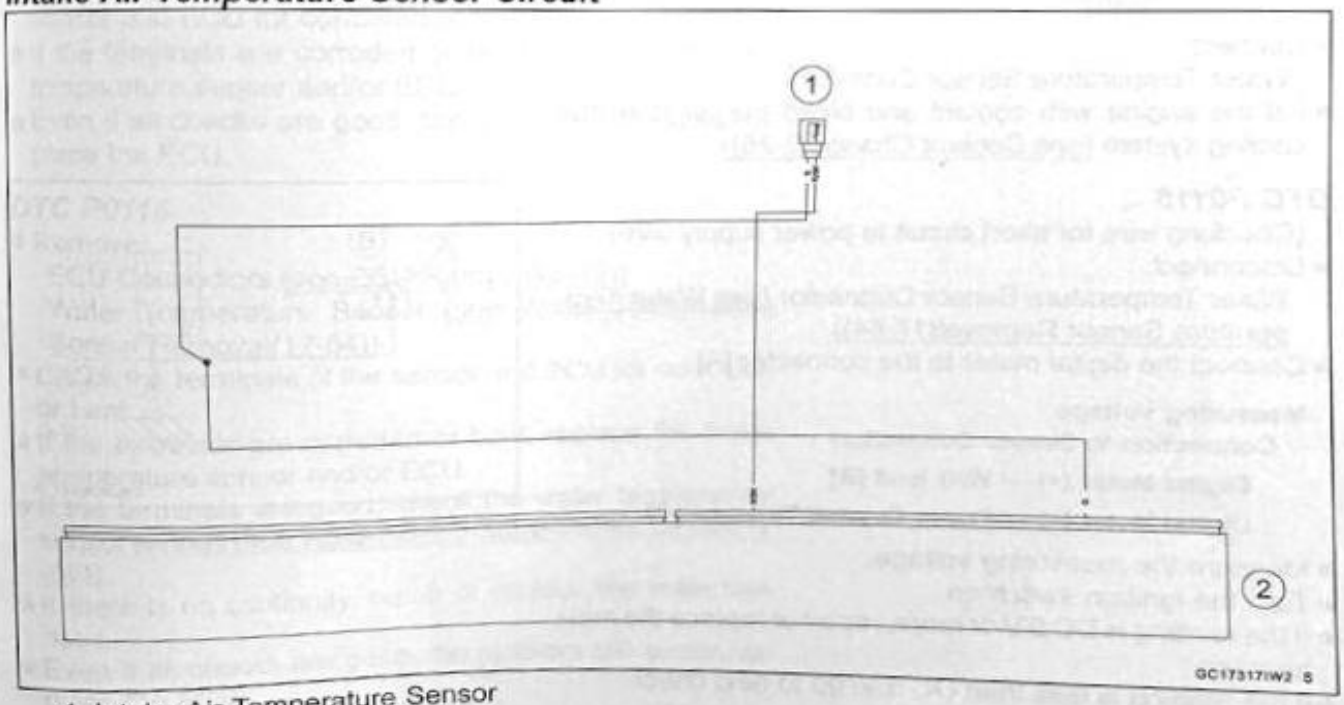
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Intake Air Temperature Sensor Connector (see Intake Air Temperature Sensor Removal(17-61))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



Wiring Continuity Inspection
R/BK lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the intake air temperature sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

Intake Air Temperature Sensor Circuit

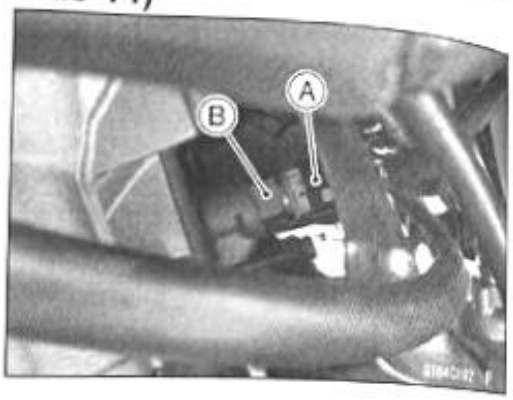


1. Intake Air Temperature Sensor
2. ECU

Water Temperature Sensor

Water Temperature Sensor Inspection (Service Code 14)

Water Temperature Sensor Removal



NOTICE

Never drop the water temperature sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Drain the coolant (see Coolant Change(2-25)).
- Disconnect:
  Water Temperature Sensor Connector [A]
- Remove:
  Water Temperature Sensor [B] with O-ring

Water Temperature Sensor Installation

- Replace the O-ring with a new one.
- Tighten:

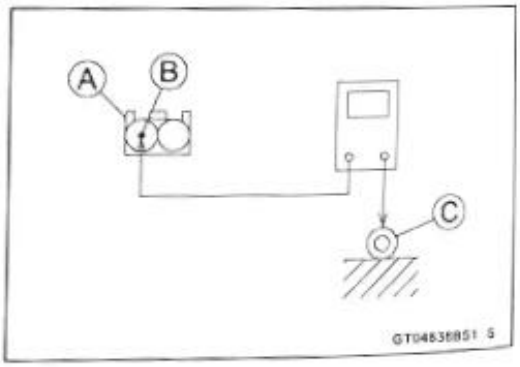
Torque - Water Temperature Sensor: 12 N·m (1.2 kgf·m, 106 in·lb)

- Connect:
  Water Temperature Sensor Connector
- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change(2-25)).

DTC P0115

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal(17-64))
- Connect the digital meter to the connector [A].



Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → W/G lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.

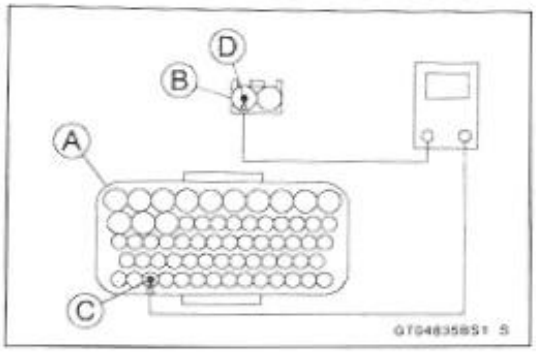
★If the reading is less than DC 5 V, go to next check.

Water Temperature Sensor

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ⟷
Water Temperature Sensor Connector [B]
ECU Terminal 53 [C] ⟷ Sensor Terminal [D]



★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the water temperature sensor wirings (see Water Temperature Sensor Circuit(17-66)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the water temperature sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0116

- Remove:
  ECU Connectors (see ECU Removal(3-12))
  Water Temperature Sensor (see Water Temperature Sensor Removal(17-64))
- Check the terminals of the sensor and ECU for corrosion or bent.

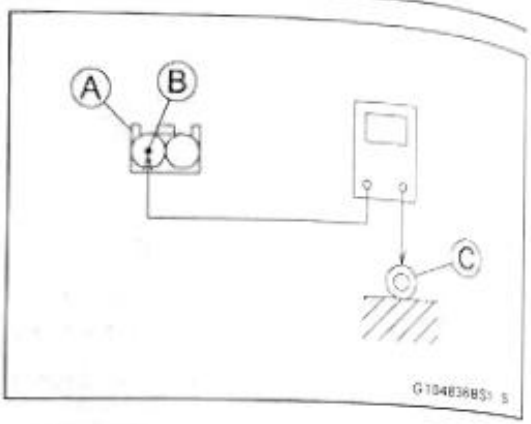
★If the terminals are corroded or bent, replace the water temperature sensor and/or ECU.
★If the terminals are good, check the water temperature sensor wirings (see Water Temperature Sensor Circuit(17-66)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

Water Temperature Sensor

DTC P0117

(Checking wire for short circuit to ground)

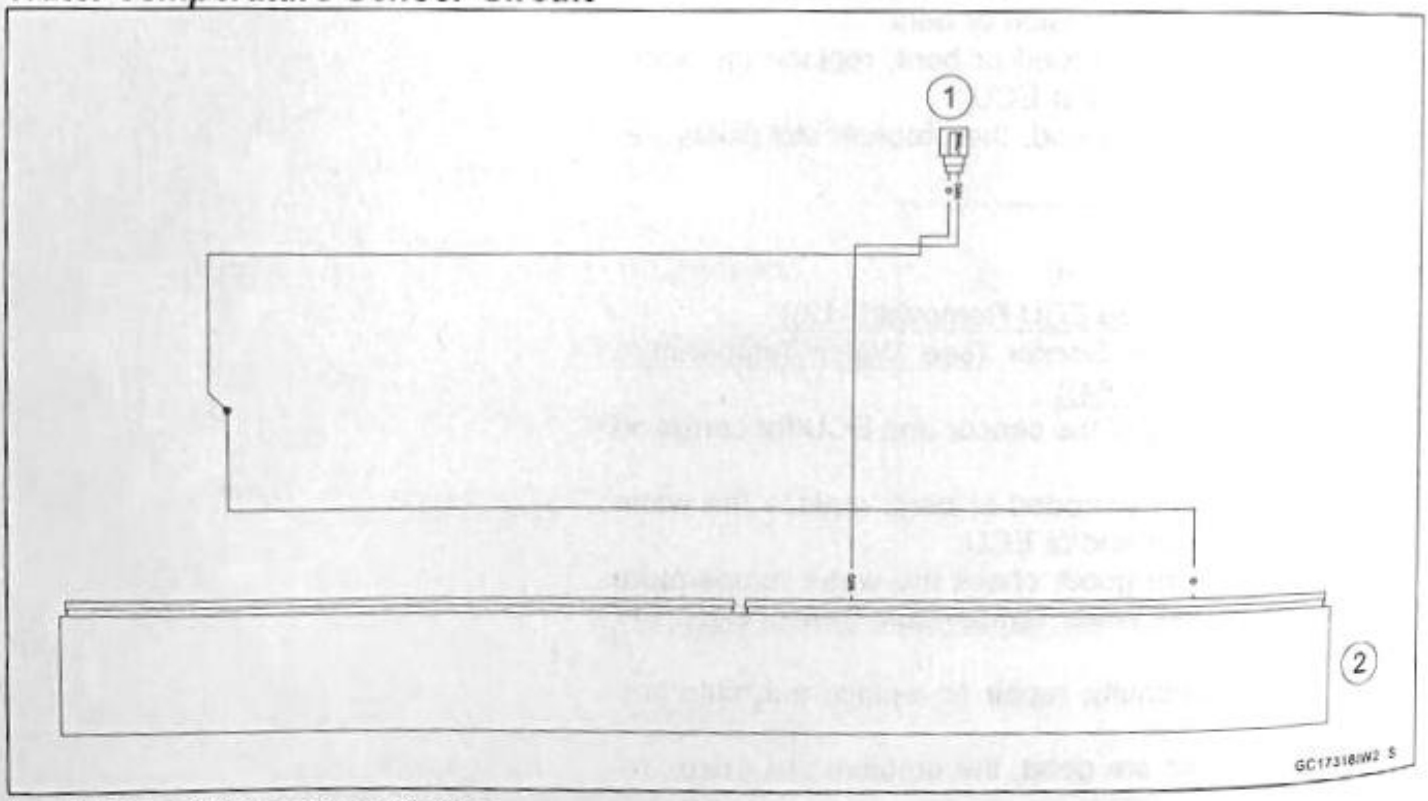
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Water Temperature Sensor Connector (see Water Temperature Sensor Removal(17-64))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



Wiring Continuity Inspection
W/G lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the water temperature sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

Water Temperature Sensor Circuit



1. Water Temperature Sensor
2. ECU

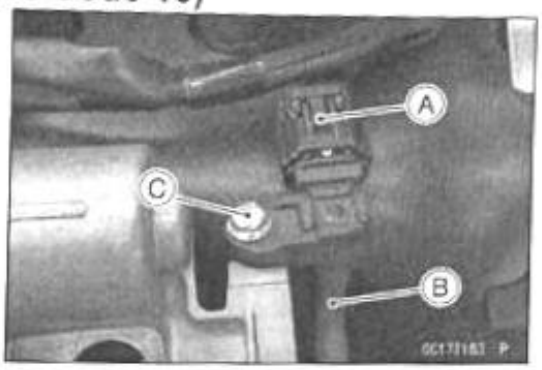
Intake Air Pressure Sensor #2

Intake Air Pressure Sensor #2 Inspection (Service Code 16)

Intake Air Pressure Sensor #2 Removal

NOTICE

Never drop the intake air pressure sensor #2 especially on a hard surface. Such a shock to the sensor can damage it.



- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Disconnect:
  Intake Air Pressure Sensor #2 Connector [A]
  Vacuum Hose [B]
- Remove the intake air pressure sensor screw [C].

Intake Air Pressure Sensor #2 Installation

NOTE

○*The intake air pressure sensor #2 is the same part as the intake air pressure sensor #1.*

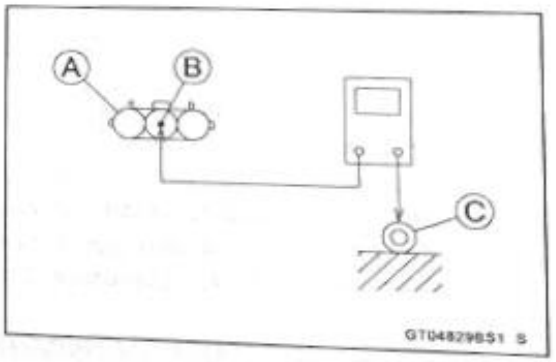
- Installation is the reverse of removal.
- Tighten:

Torque - Intake Air Pressure Sensor Screw: 4.9 N·m (0.50 kgf·m, 43 in·lb)

DTC P2226

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Intake Air Pressure Sensor #2 Connector (see Intake Air Pressure Sensor #2 Removal(17-67))
- Connect the digital meter to the connector [A].



Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → G/W lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.

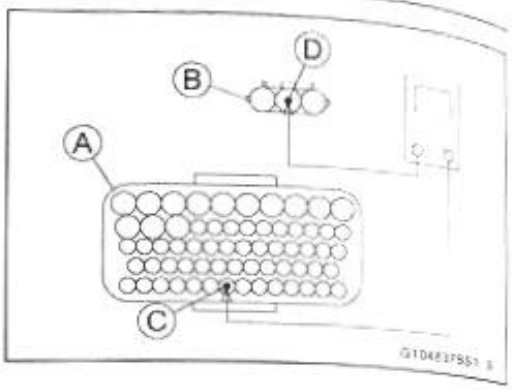
★If the reading is less than DC 5 V, go to next check.

Intake Air Pressure Sensor #2

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ⟷
Intake Air Pressure Sensor #2 Connector [B]
ECU Terminal 57 [C] ⟷ Sensor Terminal [D]



★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the intake air pressure sensor #2 wirings (see Intake Air Pressure Sensor #2 Circuit(17-69)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the intake air pressure sensor #2 and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

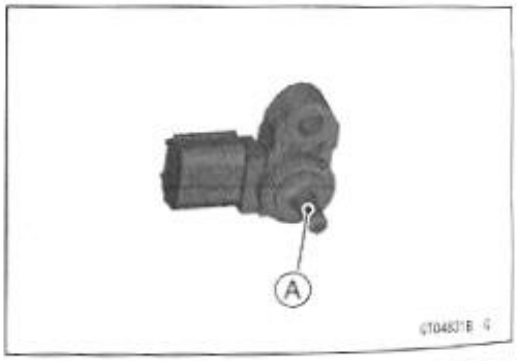
DTC P2227

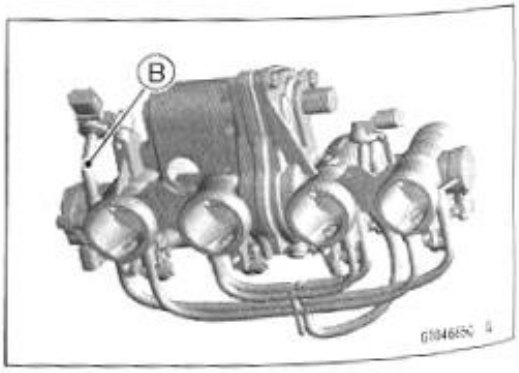
- Remove:
  Intake Air Pressure Sensor #2 (see Intake Air Pressure Sensor #2 Removal(17-67))
- Visually inspect the fitting [A] of the intake air pressure sensor #2 and vacuum hose [B] for clogged.

★If the sensor and hose are clogged, replace the intake air pressure sensor and/or clean the vacuum hose.
★If the sensor and hose are good, check the terminals of the sensor and ECU for corrosion or bent.

○Remove:
ECU Connectors (see ECU Removal(3-12))

★If the terminals are corroded or bent, replace the intake air pressure sensor #2 and/or ECU.
★If the terminals are good, check the intake air pressure sensor #2 wirings (see Intake Air Pressure Sensor #2 Circuit(17-69)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.



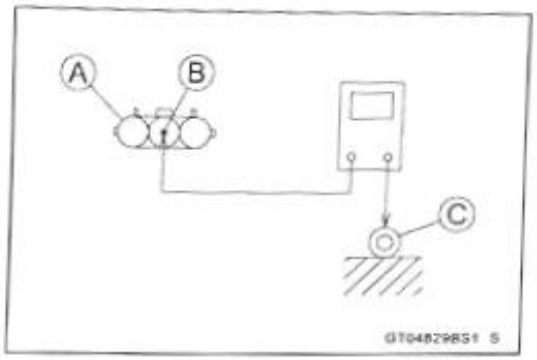


Intake Air Pressure Sensor #2

DTC P2228

(Checking wire for short circuit to ground)

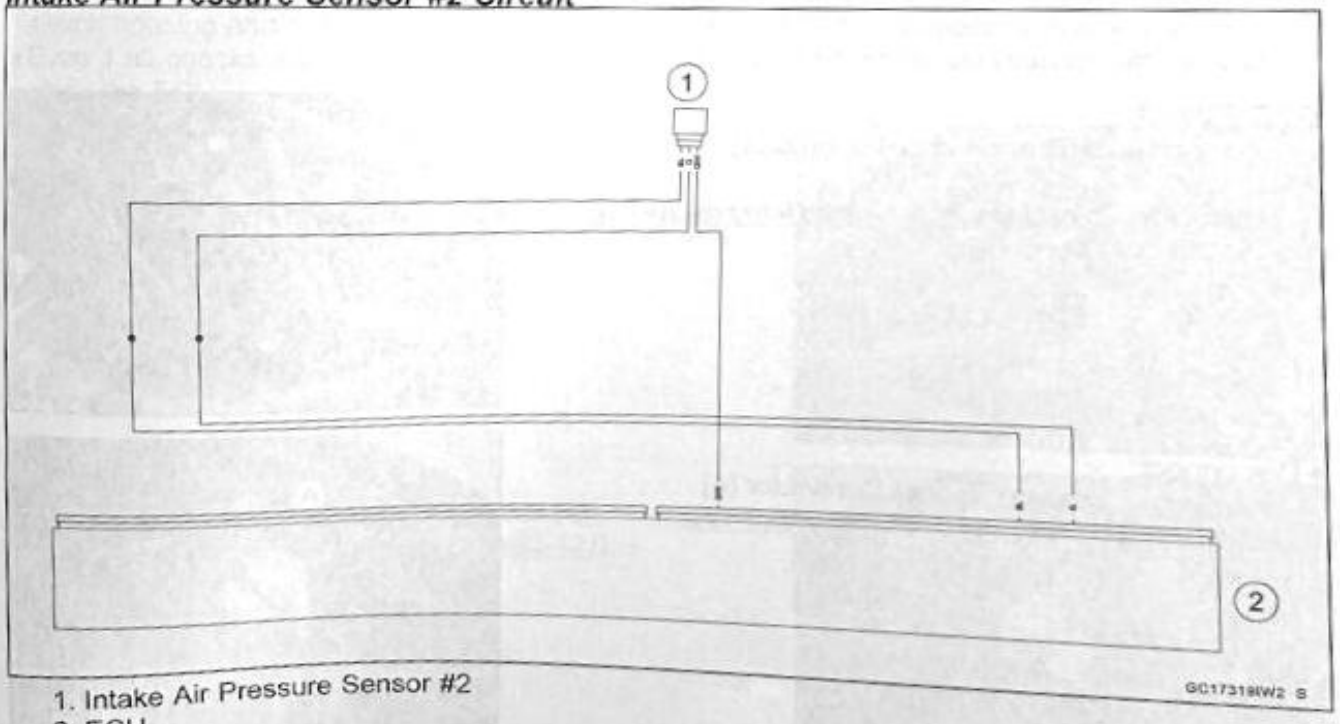
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Intake Air Pressure Sensor #2 Connector (see Intake Air Pressure Sensor #2 Removal(17-67))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



Wiring Continuity Inspection
G/W lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the intake air pressure sensor #2.
★Even if all checks are good, the problem still exists, replace the ECU.

Intake Air Pressure Sensor #2 Circuit



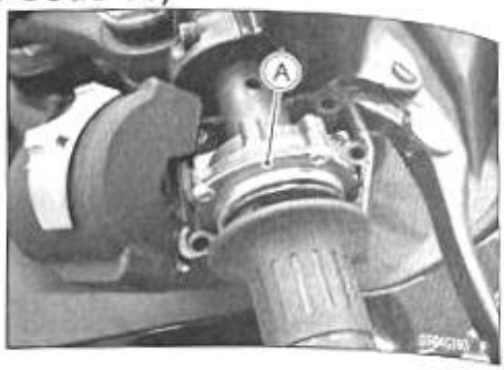
1. Intake Air Pressure Sensor #2
2. ECU

Accelerator Position Sensor

Accelerator Position Sensor Inspection (Service Code 18)

Accelerator Position Sensor Removal

The accelerator position sensor is built in the right switch housing. So, the sensor itself cannot be removed. If replace the accelerator position sensor, replace the right switch housing.



NOTICE
Do not disassemble the accelerator position sensor [A] since it has been adjusted and set with precision at the factory.

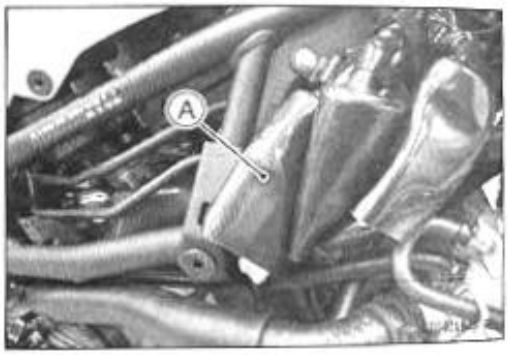
NOTE

○*When replace the right switch housing with a new one or reused one from another motorcycle, you must register the accelerator position data to the ECU. Erase the stored service code memory using Kawasaki Diagnostic System, and wait the 10 seconds at the idle speed and the coolant temperature 40°C (104°F) or more to register the sensor position to the ECU.*

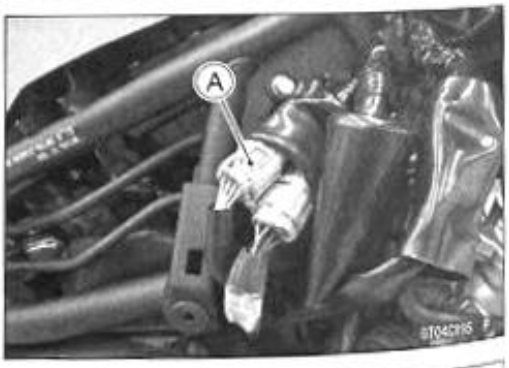
DTC P2120

(Checking wire for short circuit to ground)

- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Slide the dust cover [A].



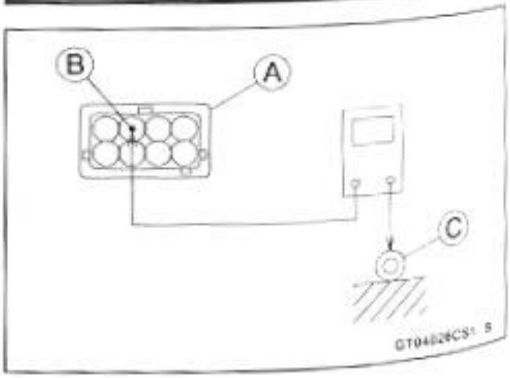
- Disconnect:
  Accelerator Position Sensor Connector [A]
  ECU Connectors (see ECU Removal(3-12))



- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

Wiring Continuity Inspection
BR lead [B] ←→ Frame Ground Terminal [C]

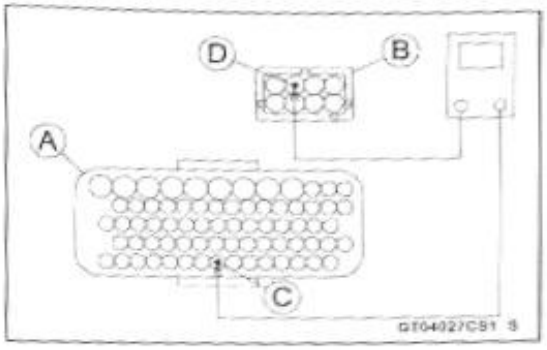
★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.



Accelerator Position Sensor

(Checking wire for open circuit)
• Check the wiring for continuity between harness connectors.

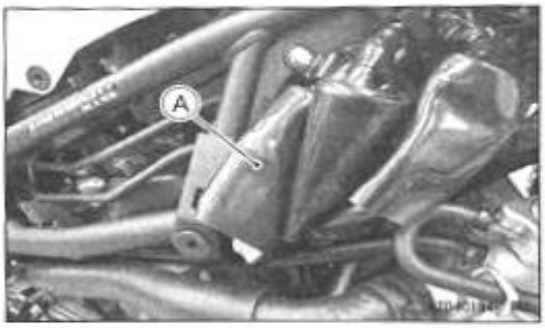
Wiring Continuity Inspection
ECU Connector [A] ←→
Accelerator Position Sensor Connector [B]
ECU Terminal 129 [C] ←→ Sensor Terminal [D]



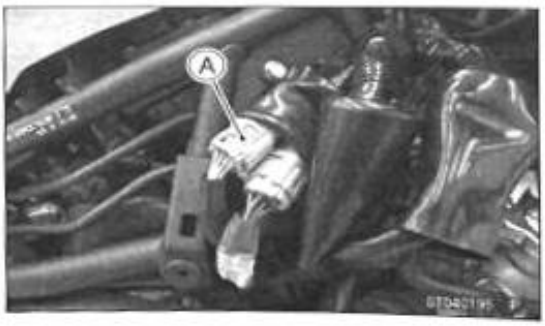
★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the accelerator position sensor wirings (see Accelerator Position Sensor Circuit(17-75)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the right switch housing and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P2121

• Remove:
Right Side Cover (see Side Cover Removal(15-26))
• Slide the dust cover [A].



• Disconnect:
Accelerator Position Sensor Connector [A]
ECU Connectors (see ECU Removal(3-12))



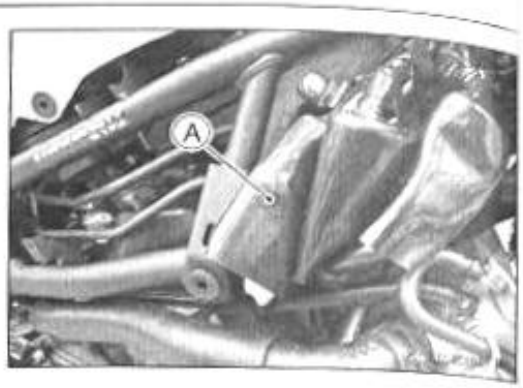
• Check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the right switch housing and/or ECU.
★If the terminals are good, check the accelerator position sensor wirings (see Accelerator Position Sensor Circuit(17-75)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the right switch housing.
★Even if all checks are good, the problem still exists, replace the ECU.

Accelerator Position Sensor

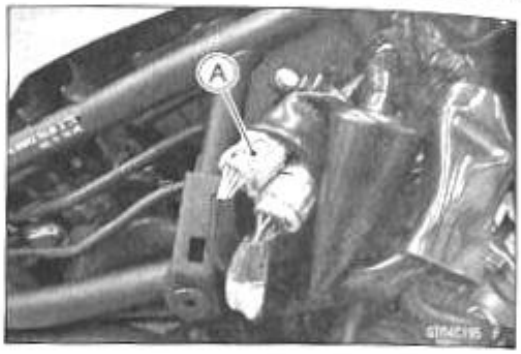
DTC P2123

(Checking wire for short circuit to power supply wire)

- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Slide the dust cover [A].

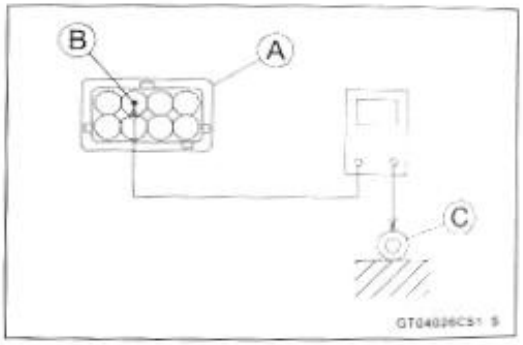


- Disconnect:
  Accelerator Position Sensor Connector [A]



- Connect the digital meter to the connector [A].

Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → BR lead [B]
Digital Meter (–) → Frame Ground Terminal [C]



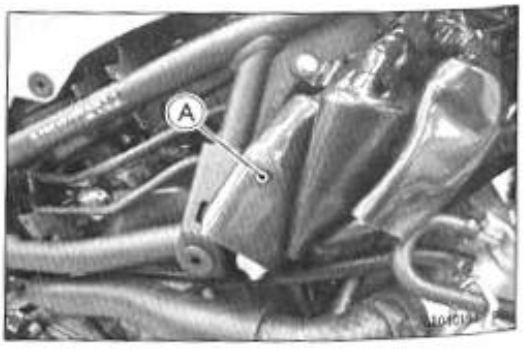
- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, replace the right switch housing.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P2125

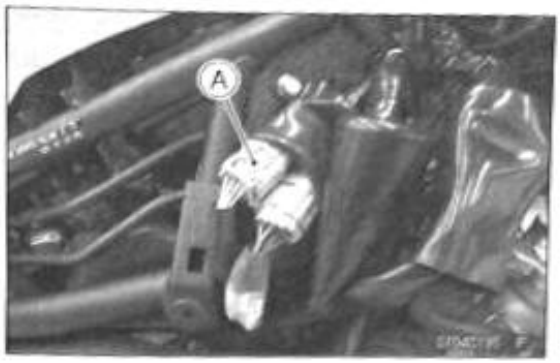
(Checking wire for short circuit to ground)

- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Slide the dust cover [A].



Accelerator Position Sensor

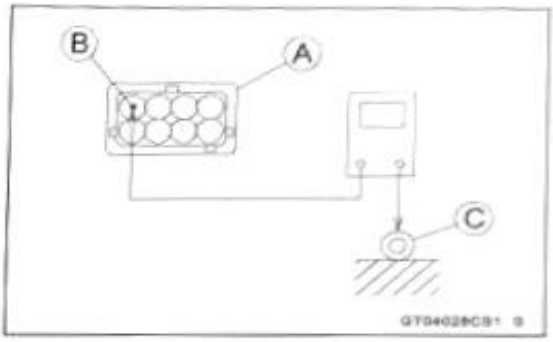
• Disconnect:
Accelerator Position Sensor Connector [A]



• Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

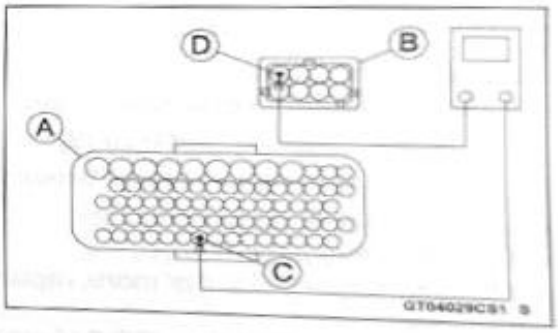
Wiring Continuity Inspection
Y lead [B] ←→ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.



(Checking wire for open circuit)
• Disconnect:
ECU Connectors (see ECU Removal(3-12))
• Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ←→
Accelerator Position Sensor Connector [B]
ECU Terminal 128 [C] ←→ Sensor Terminal [D]



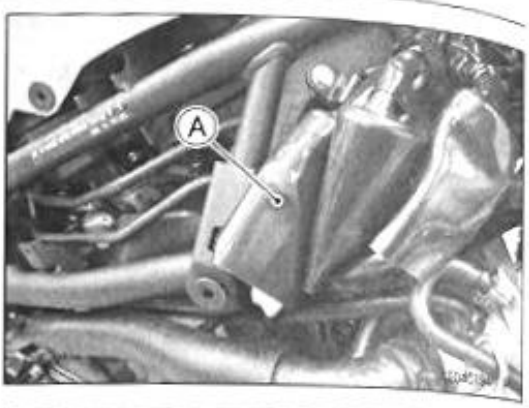
★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the accelerator position sensor wirings (see Accelerator Position Sensor Circuit(17-75)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the right switch housing and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

Accelerator Position Sensor

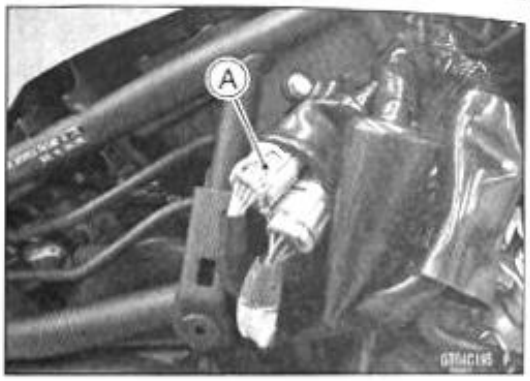
DTC P2128

(Checking wire for short circuit to power supply wire)

- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Slide the dust cover [A].



- Disconnect:
  Accelerator Position Sensor Connector [A]



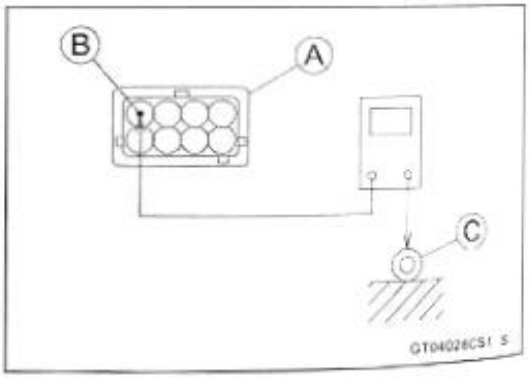
- Connect the digital meter to the connector [A].

Measuring Voltage

Connection to Sensor Connector:

Digital Meter (+) → Y lead [B]

Digital Meter (–) → Frame Ground Terminal [C]



- Measure the measuring voltage.
- Turn the ignition switch on.

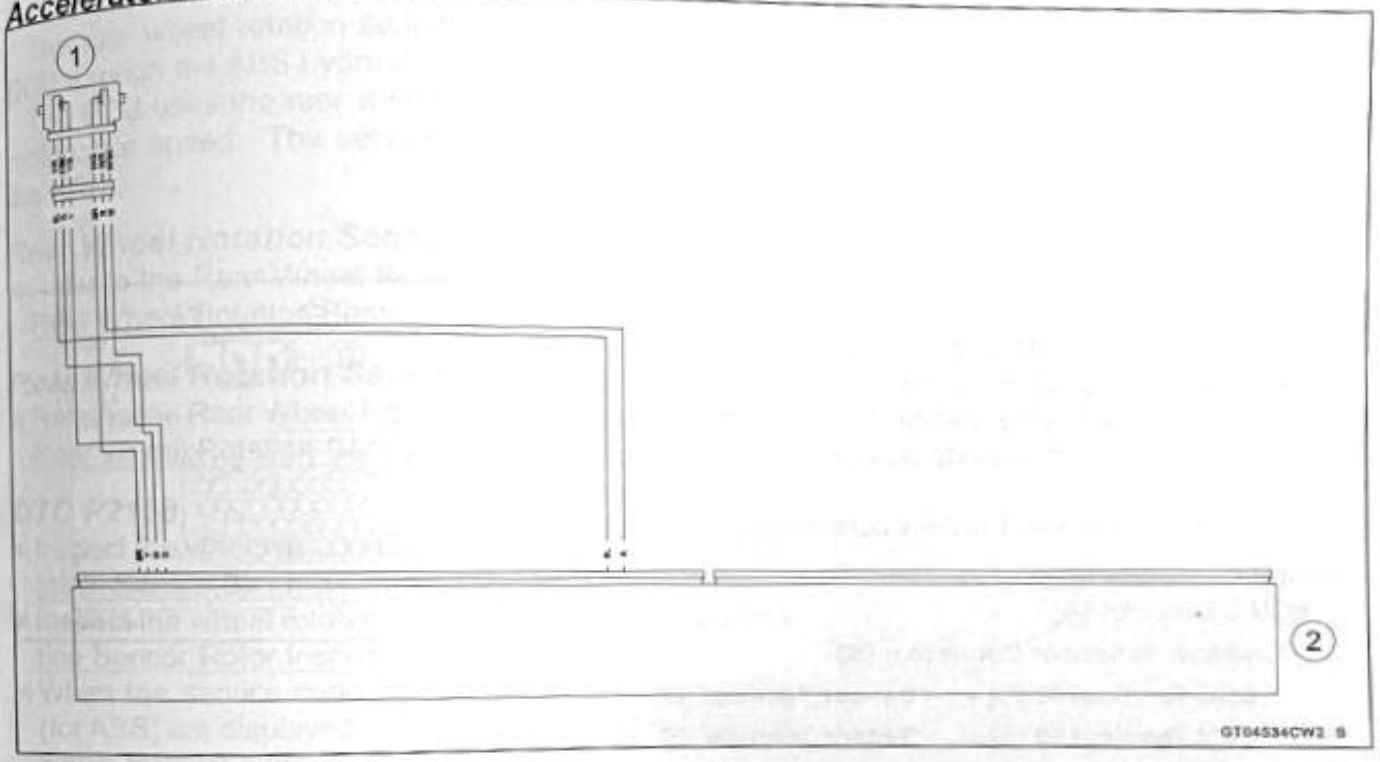
★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, replace the right switch housing.

★Even if all checks are good, the problem still exists, replace the ECU.

Accelerator Position Sensor

Accelerator Position Sensor Circuit



1. Accelerator Position Sensor
2. ECU

Crankshaft Sensor

Crankshaft Sensor Inspection (Service Code 21)

Crankshaft Sensor Removal

- Refer to the Crankshaft Sensor Removal (see Crankshaft Sensor Removal(16-31)).

Crankshaft Sensor Installation

- Refer to the Crankshaft Sensor Installation (see Crankshaft Sensor Installation(16-32)).

DTC P0335

- Refer to the Crankshaft Sensor Peak Voltage Inspection (see Crankshaft Sensor Peak Voltage Inspection(16-33)).

★If the reading is within the standard, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and sensor connectors.

Wiring Continuity Inspection

ECU Connector [A] ⟷

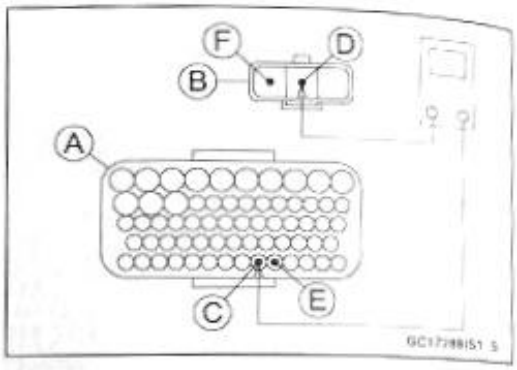
Crankshaft Sensor Connector [B]

ECU Terminal 59 [C] ⟷ Sensor Terminal [D]

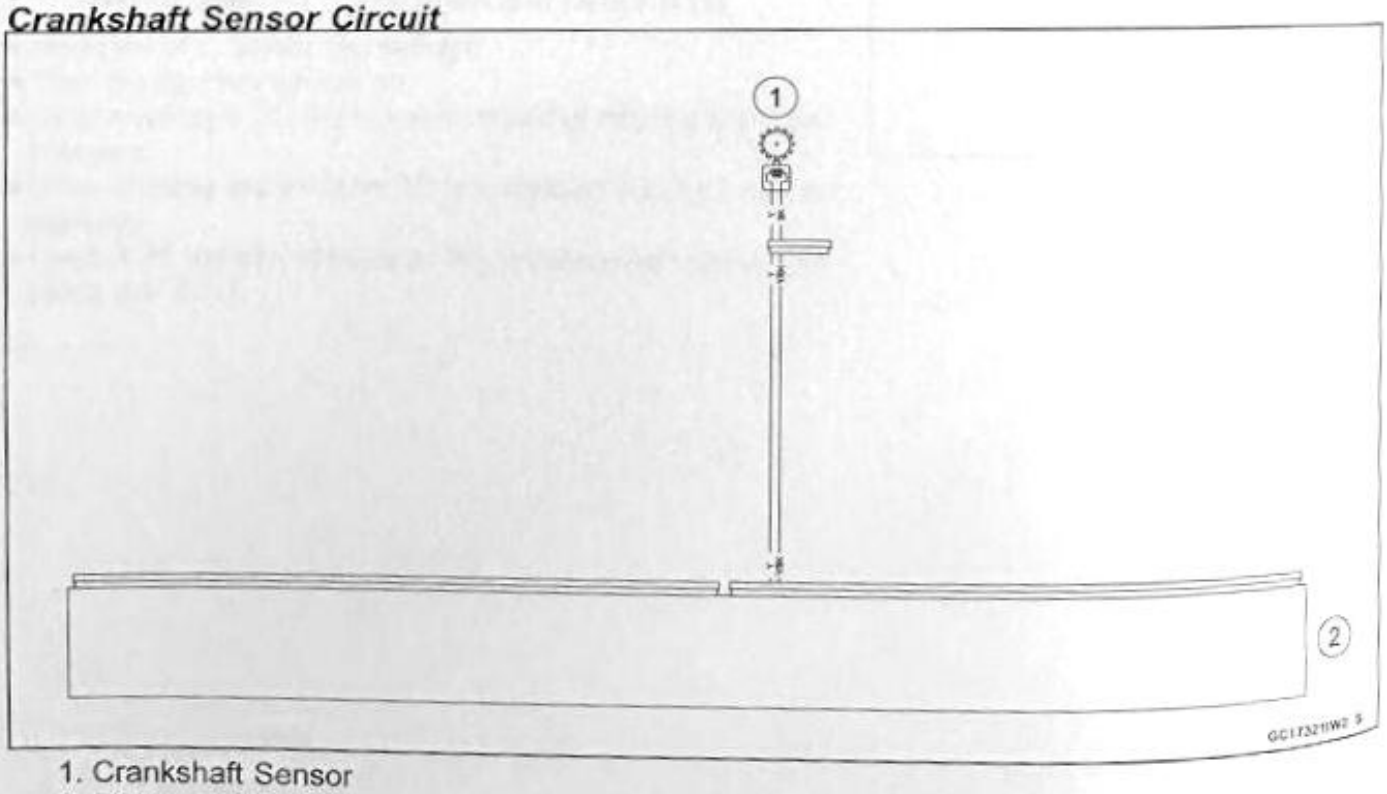
ECU Terminal 60 [E] ⟷ Sensor Terminal [F]

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.



Crankshaft Sensor Circuit



1. Crankshaft Sensor
2. ECU

Rear Wheel Rotation Sensor Signal

Rear Wheel Rotation Sensor Inspection (Service Code 24)

The rear wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit.

The ECU uses the rear wheel rotation sensor signal for motorcycle speed. The service code 24 is detected with the ECU.

Rear Wheel Rotation Sensor Removal

- Refer to the Rear Wheel Rotation Sensor Removal (see Rear Wheel Rotation Sensor Removal(12-33)).

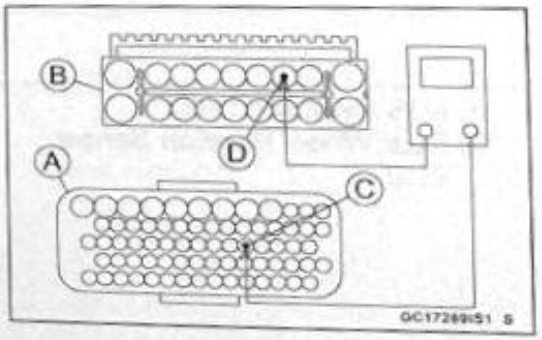
Rear Wheel Rotation Sensor Installation

- Refer to the Rear Wheel Rotation Sensor Installation (see Rear Wheel Rotation Sensor Installation(12-34)).

DTC P2158

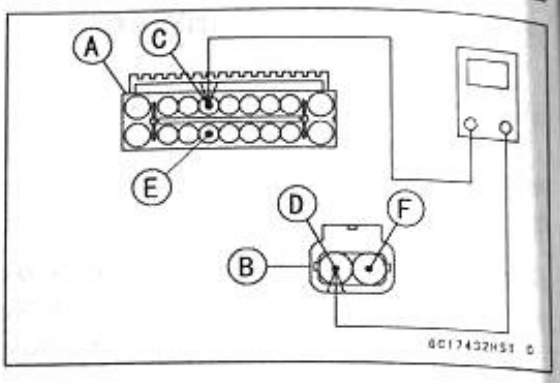
- Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection(12-35)).
- Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection(12-36)).
- When the service code 24 and following service codes (for ABS) are displayed at the same time, inspect the rear wheel rotation sensor.
  Service Code B44 (see Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44)(17-127))
  Service Code B45 (see Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)(17-130))
- When only service code 24 is displayed, do the following inspection procedures.
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Rear Wheel Rotation Sensor Connector (see Rear Wheel Rotation Sensor Removal(12-33))
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal(12-29))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
ABS Hydraulic Unit Connector [B]
ECU Terminal 102 [C] ← →
ABS Hydraulic Unit Terminal 3 [D]



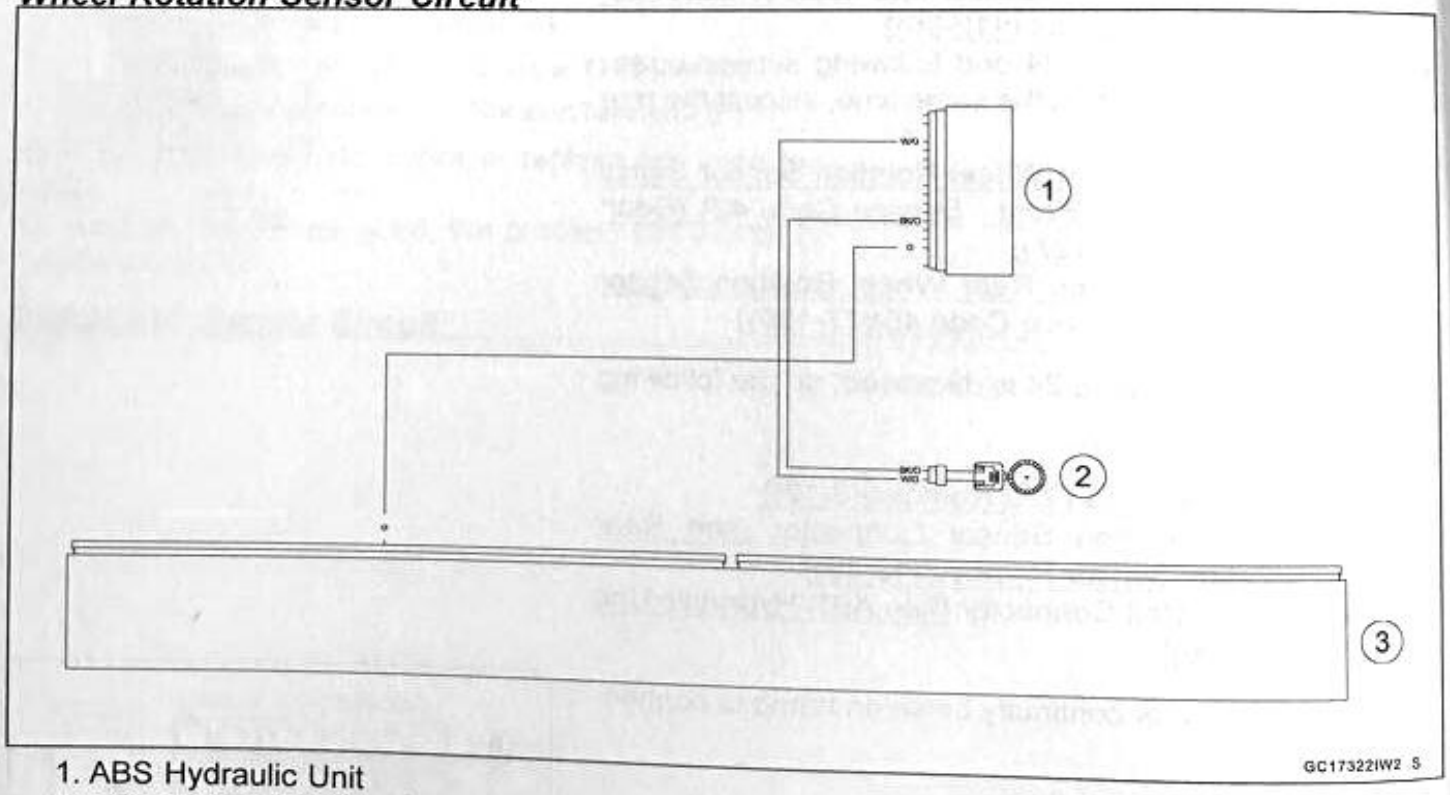
Rear Wheel Rotation Sensor Signal

Wiring Continuity Inspection
ABS Hydraulic Unit Connector [A] ← →
Rear Wheel Rotation Sensor Connector [B]
ABS Hydraulic Unit Terminal 6 [C] ← →
Sensor Terminal [D]
ABS Hydraulic Unit Terminal 15 [E] ← →
Sensor Terminal [F]



★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the rear wheel rotation sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

Wheel Rotation Sensor Circuit



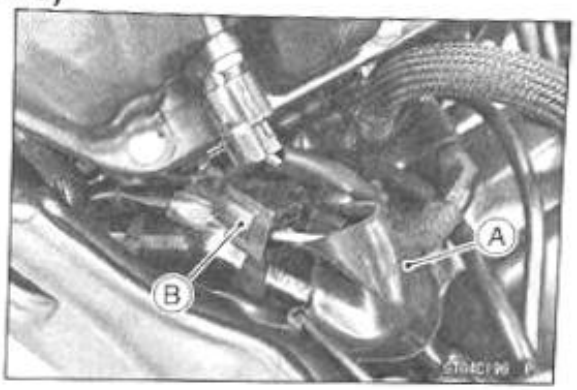
1. ABS Hydraulic Unit
2. Rear Wheel Rotation Sensor
3. ECU

Gear Position Sensor

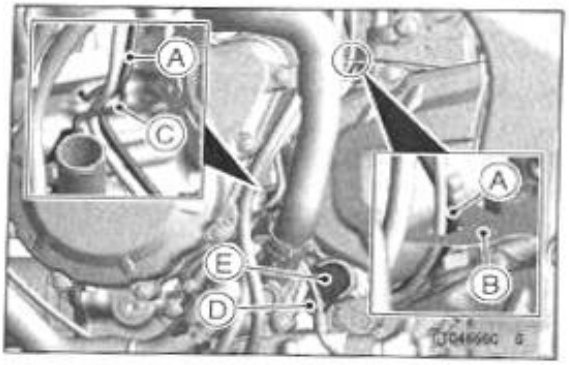
Gear Position Sensor Inspection (Service Code 25)

Gear Position Sensor Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal(3-35))
  Heat Insulation Rubber Plate
- Slide the dust cover [A].
- Disconnect the gear position sensor connector [B].

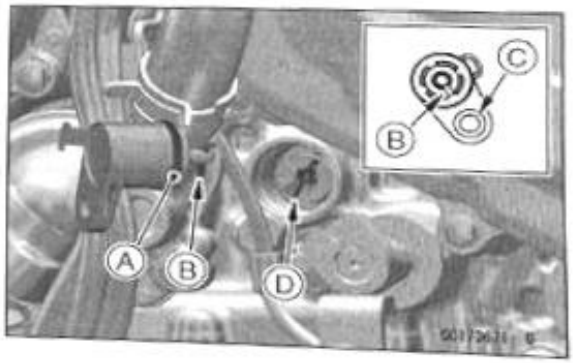


- Clear the gear position sensor lead [A] from the heat insulation plate [B] and the clamp [C].
- Remove:
  Gear Position Sensor Bolt [D] and Washer
  Gear Position Sensor [E]



Gear Position Sensor Installation

- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring and install it.
- Face the pin [B] of the gear position sensor to the bolt hole [C] as shown.
- Make sure that the transmission is shifted into the neutral.
- Fit the pin to the groove [D] of the shift drum.



- Tighten the gear position sensor bolt with washer.

○When installing the sensor which is fastened by bolt, tighten the bolt after placing the sensor on the bottom surface completely.

Torque - Gear Position Sensor Bolt: 10 N·m (1.0 kgf·m, 89 in·lb)

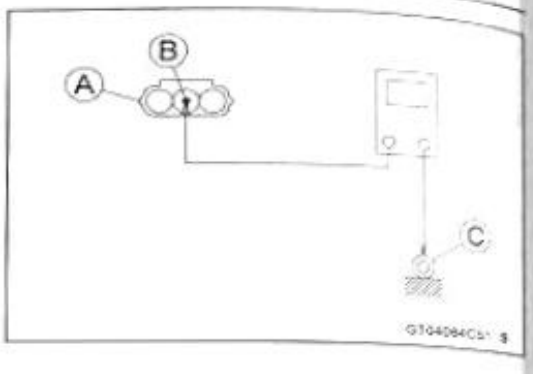
- Run the lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

Gear Position Sensor

DTC P0914

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Gear Position Sensor Connector (see Gear Position Sensor Removal(17-79))
- Connect the digital meter to the connector [A].



Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → G/R lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

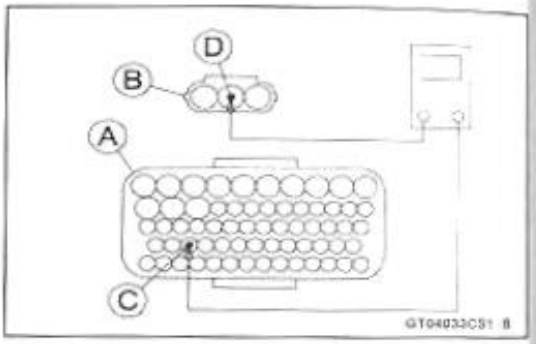
- Measure the voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.

★If the reading is less than DC 5 V, go to next check.

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.



Wiring Continuity Inspection
ECU Connector [A] ←→
Gear Position Sensor Connector [B]
ECU Terminal 40 [C] ←→ Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.

★If there is continuity, first check the other wirings of the gear position sensor (see Gear Position Sensor Circuit(17-81)).

★If there is no continuity, repair or replace the main harness.

★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.

★If the terminals are corroded or bent, replace the gear position sensor and/or ECU.

★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0915

- Disconnect:
  Gear Position Sensor Connector (see Gear Position Sensor Removal(17-79))
  ECU Connectors (see ECU Removal(3-12))
- Check the terminals of the sensor and ECU for corrosion or bent.

★If the terminals are corroded or bent, replace the gear position sensor and/or ECU.

★If the terminals are good, check the gear position sensor wirings (see Gear Position Sensor Circuit(17-81)).

★If there is no continuity, repair or replace the main harness.

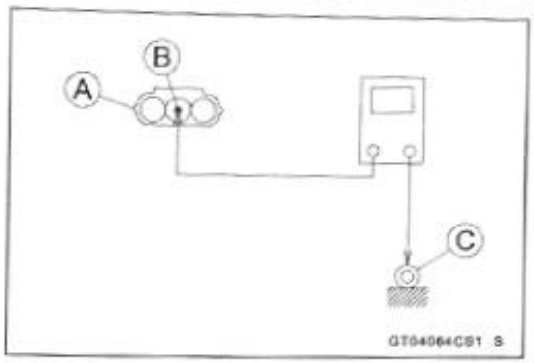
★Even if all checks are good, the problem still exists, replace the ECU.

Gear Position Sensor

DTC P0916

(Checking wire for short circuit to ground)

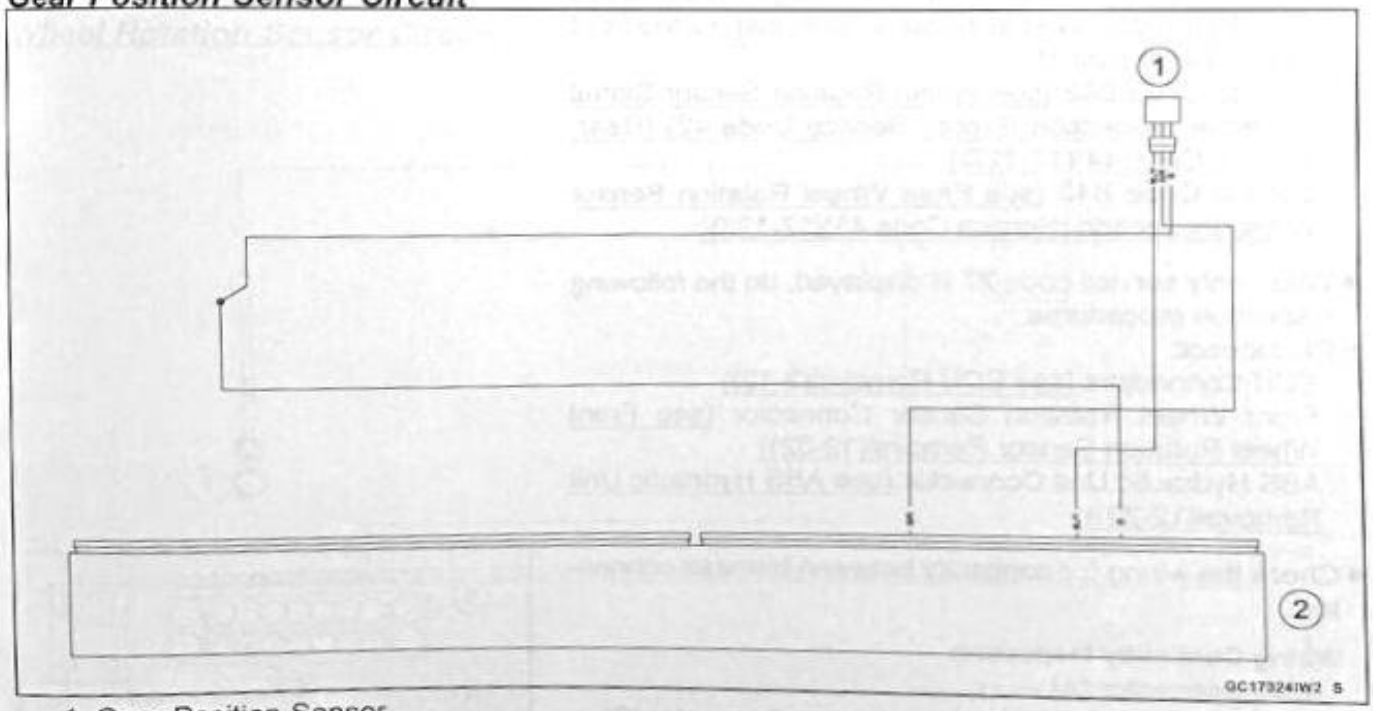
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Gear Position Sensor Connector (see Gear Position Sensor Removal(17-79))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



Wiring Continuity Inspection
G/R lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the gear position sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

Gear Position Sensor Circuit



1. Gear Position Sensor
2. ECU

Front Wheel Rotation Sensor Signal

Front Wheel Rotation Sensor Inspection (Service Code 27)

The front wheel rotation sensor sends the signal to the ECU through the ABS hydraulic unit.

Front Wheel Rotation Sensor Removal

- Refer to the Front Wheel Rotation Sensor Removal (see Front Wheel Rotation Sensor Removal(12-32)).

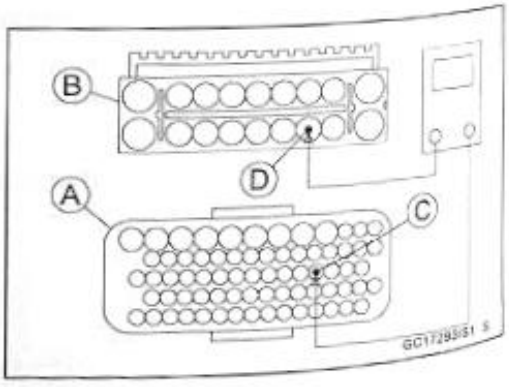
Front Wheel Rotation Sensor Installation

- Refer to the Front Wheel Rotation Sensor Installation (see Front Wheel Rotation Sensor Installation(12-33)).

DTC P0500

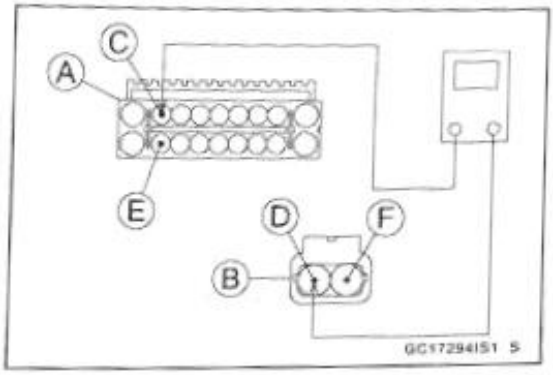
- Inspect the wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection(12-35)).
- Inspect the wheel rotation sensor rotor (see Wheel Rotation Sensor Rotor Inspection(12-36)).
- When the service code 27 and following service codes (for ABS) are displayed at the same time, inspect the front wheel rotation sensor.
  Service Code B42 (see Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44)(17-127))
  Service Code B43 (see Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)(17-128))
- When only service code 27 is displayed, do the following inspection procedures.
- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Front Wheel Rotation Sensor Connector (see Front Wheel Rotation Sensor Removal(12-32))
  ABS Hydraulic Unit Connector (see ABS Hydraulic Unit Removal(12-29))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
ABS Hydraulic Unit Connector [B]
ECU Terminal 103 [C] ← →
ABS Hydraulic Unit Terminal 12 [D]



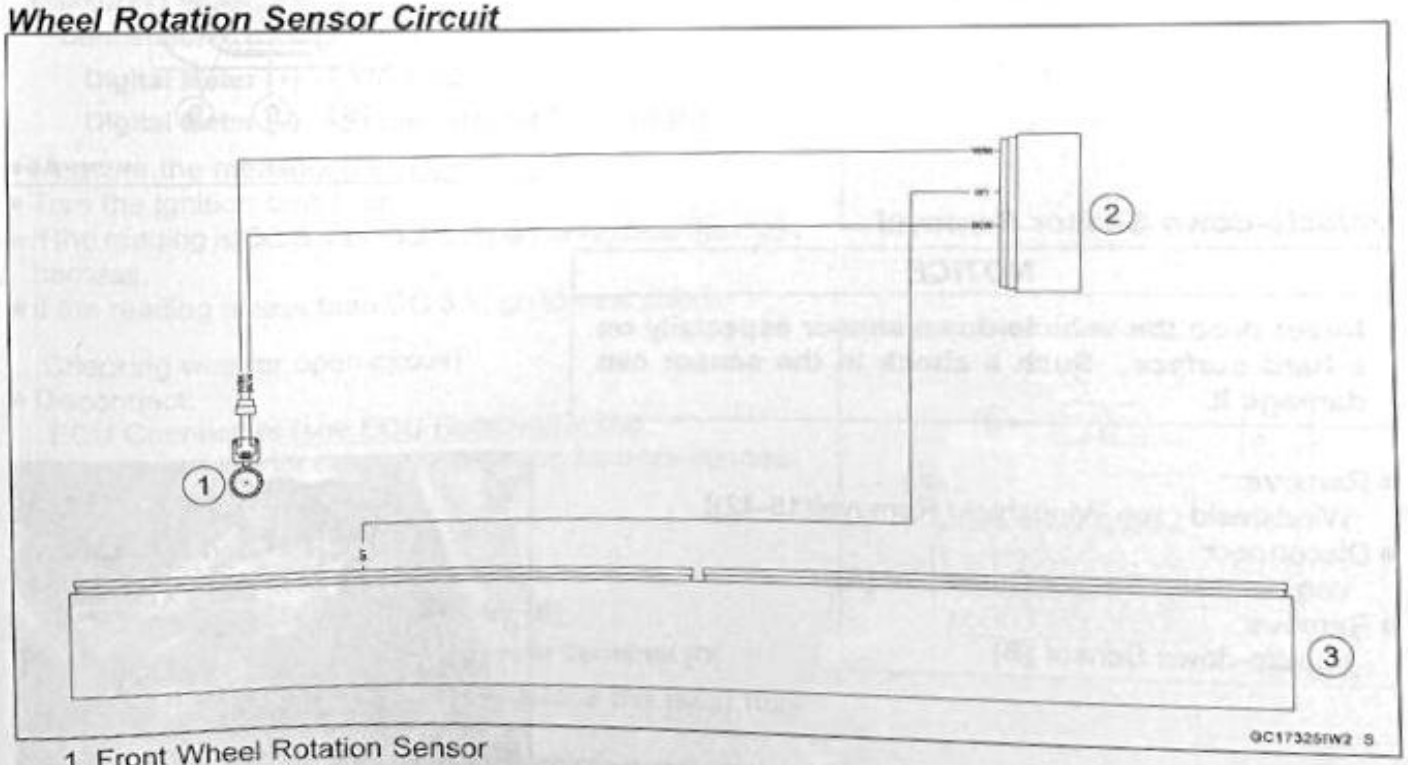
Front Wheel Rotation Sensor Signal

Wiring Continuity Inspection
ABS Hydraulic Unit Connector [A] ← →
Front Wheel Rotation Sensor Connector [B]
ABS Hydraulic Unit Terminal 8 [C] ← →
Sensor Terminal [D]
ABS Hydraulic Unit Terminal 17 [E] ← →
Sensor Terminal [F]



★If there is no continuity, repair or replace the main harness.
★If there is continuity, replace the front wheel rotation sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

Wheel Rotation Sensor Circuit



1. Front Wheel Rotation Sensor
2. ABS Hydraulic Unit
3. ECU

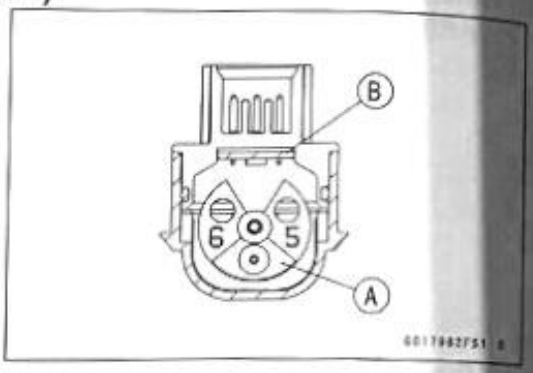
Vehicle-down Sensor

Vehicle-down Sensor Inspection (Service Code 31)

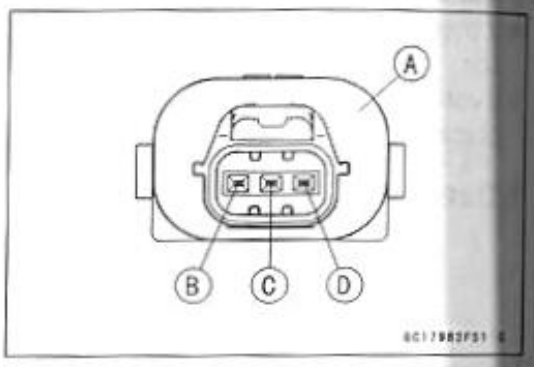
This sensor has a weight [A] with two magnets inside, and sends a signal to the ECU. But when the motorcycle banks 60 – 70° or more to either side (in fact falls down), the weight turns and the signal changes. The ECU senses this change, and stops the fuel pump relay.

Hall IC [B]

When the motorcycle is down, the ignition switch is left on. If the engine start/stop switch is slid, the electric starter turns but the engine does not start. To start the engine again, raise the motorcycle, turn the ignition switch off, and then turn it on.



Vehicle-down Sensor [A]
Ground Terminal [B]: G
Output Terminal [C]: Y/G
Power Source Terminal [D]: BL

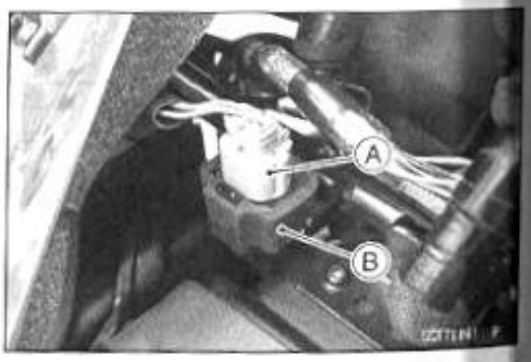


Vehicle-down Sensor Removal

NOTICE

Never drop the vehicle-down sensor especially on a hard surface. Such a shock to the sensor can damage it.

- Remove:
  Windshield (see Windshield Removal(15-42))
- Disconnect:
  Vehicle-down Sensor Connector [A]
- Remove:
  Vehicle-down Sensor [B]

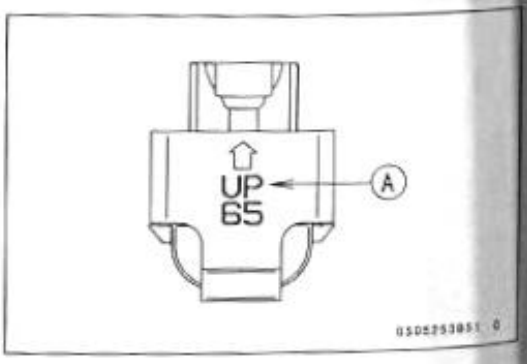


Vehicle-down Sensor Installation

- Installation is the reverse of removal.
- The UP mark [A] of the sensor should face upward.

⚠ WARNING

Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations for an accident resulting in injury or death. Ensure that the vehicle-down sensor is held in place by the battery case.

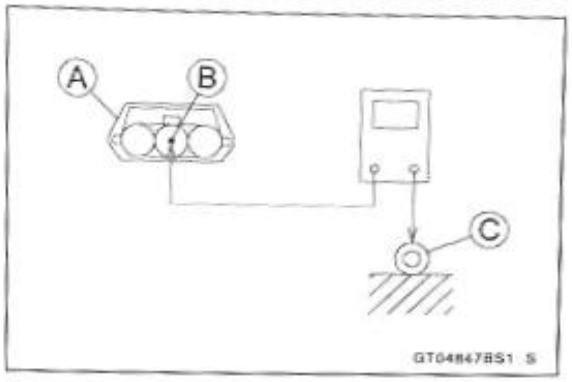


Vehicle-down Sensor

DTC C0064

(Checking wire for short circuit to ground)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Vehicle-down Sensor Connector (see Vehicle-down Sensor Removal(17-84))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



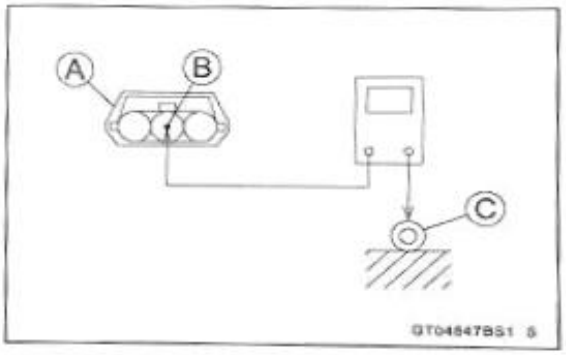
Wiring Continuity Inspection
Y/G lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.

(Checking wire for short circuit to power supply wire)

- Connect the digital meter to the connector [A].

Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → Y/G lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

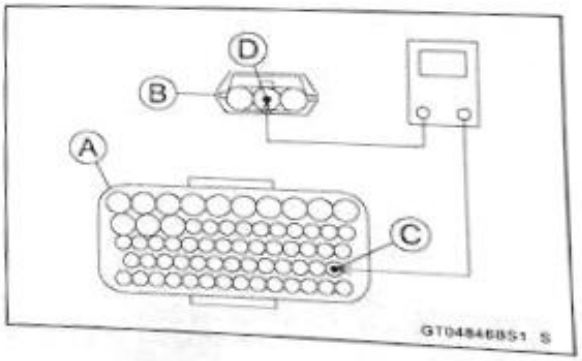


- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, go to next check.

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

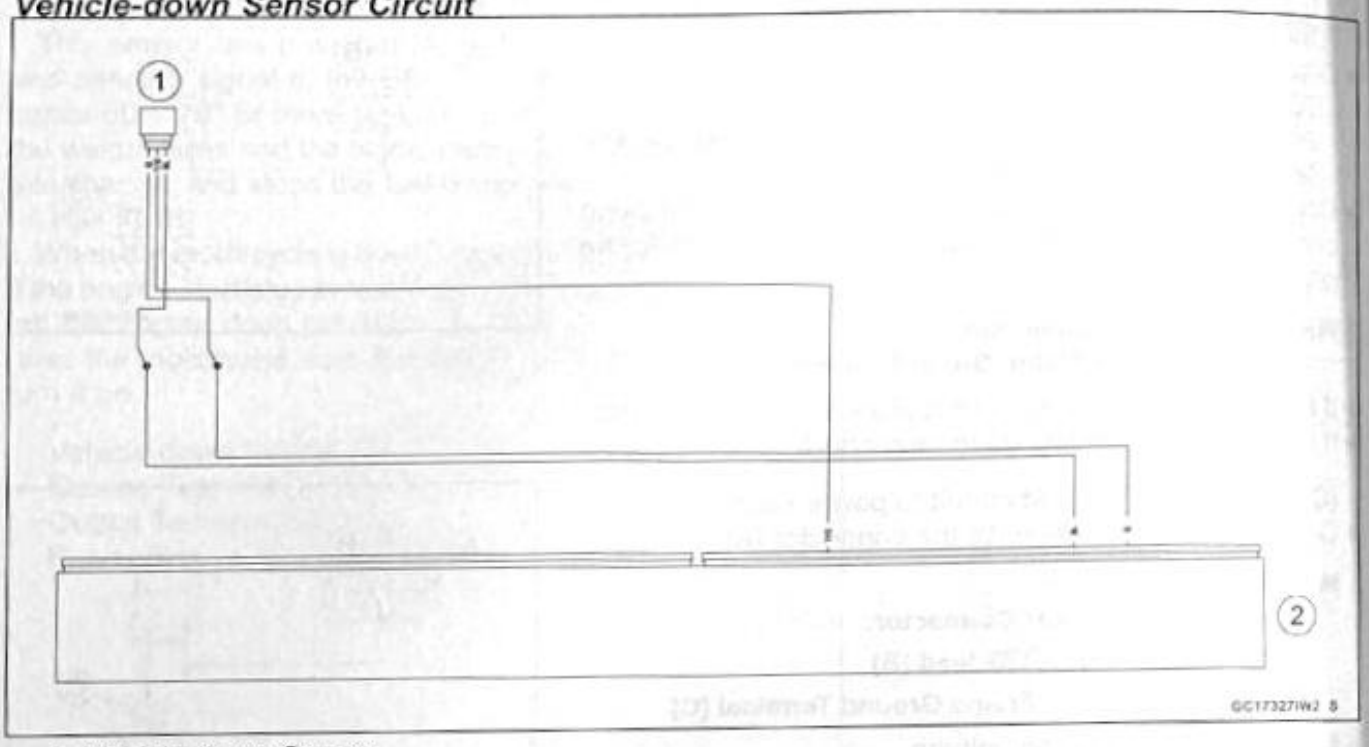


Wiring Continuity Inspection
ECU Connector [A] ← →
Vehicle-down Sensor Connector [B]
ECU Terminal 50 [C] ← → Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the vehicle-down sensor wirings (see Vehicle-down Sensor Circuit(17-86)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the vehicle -down sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

Vehicle-down Sensor

Vehicle-down Sensor Circuit



1. Vehicle-down Sensor
2. ECU

Front Oxygen Sensor

Front Oxygen Sensor Inspection (Service Code 33)

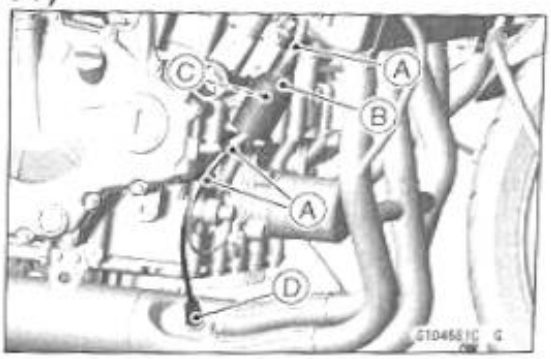
Front Oxygen Sensor Removal

NOTICE

Never drop the sensor especially on a hard surface. Such a shock to the sensor can damage it.

NOTICE

Do not pull strongly, twist, or bend the oxygen sensor lead. This may cause the wiring open.

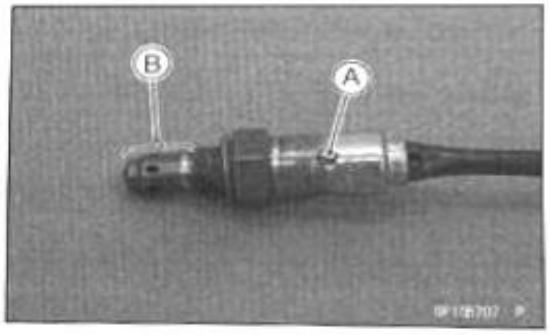


- Remove:
  Right Lower Fairing (see Lower Fairing Removal(15-18))
- Open the clamps [A].
- Slide the dust cover [B].
- Disconnect the front oxygen sensor connector [C].
- Remove:
  Front Oxygen Sensor [D]

Front Oxygen Sensor Installation

NOTICE

Never drop the oxygen sensor [A] especially on a hard surface. Such a shock to the unit can damage it. Do not touch the sensing part [B] to prevent oil contact. Oil contamination from hands can reduce sensor performance.



- Tighten:

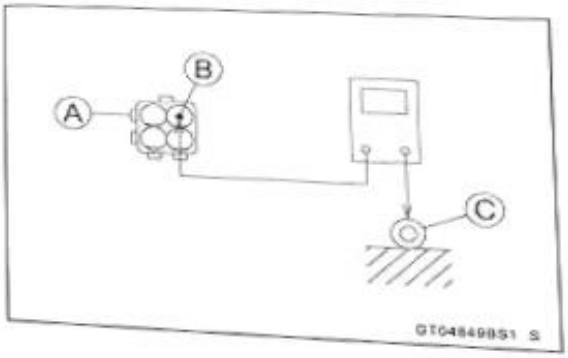
Torque - Front Oxygen Sensor: 25 N·m (2.5 kgf·m, 18 ft·lb)

- Run the front oxygen sensor lead correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.

DTC P0130

(Checking wire for short circuit to ground)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Front Oxygen Sensor Connector (see Front Oxygen Sensor Removal(17-87))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



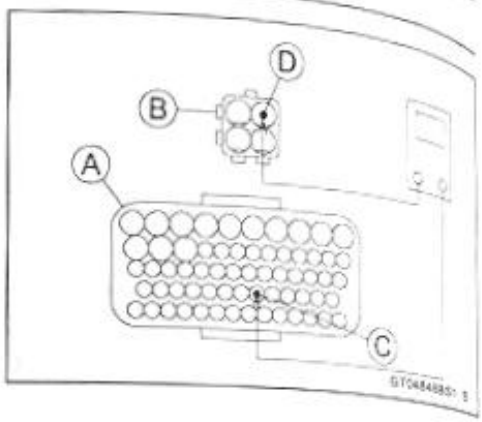
Wiring Continuity Inspection
BL/Y lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.

Front Oxygen Sensor

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.



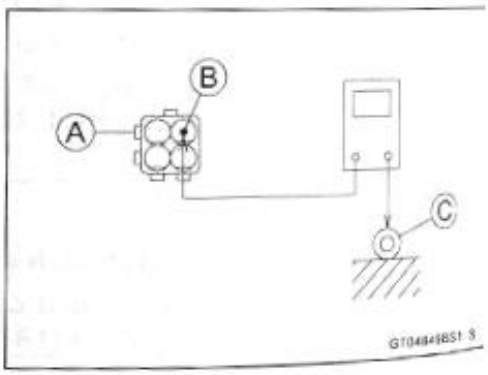
Wiring Continuity Inspection
ECU Connector [A] ← →
Front Oxygen Sensor Connector [B]
ECU Terminal 45 [C] ← → Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the front oxygen sensor wirings (see Front Oxygen Sensor Circuit(17-90)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0132

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Front Oxygen Sensor Connector (see Front Oxygen Sensor Removal(17-87))
- Connect the digital meter to the connector [A].



Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → BL/Y lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, replace the front oxygen sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0133

- When this code is displayed, replace the front oxygen sensor.

Front Oxygen Sensor

DTC P2A00

- Disconnect:
  Front Oxygen Sensor Connector (see Front Oxygen Sensor Removal(17-87))
  ECU Connectors (see ECU Removal(3-12))
- Check the terminals of the sensor and ECU for corrosion or bent.

★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.

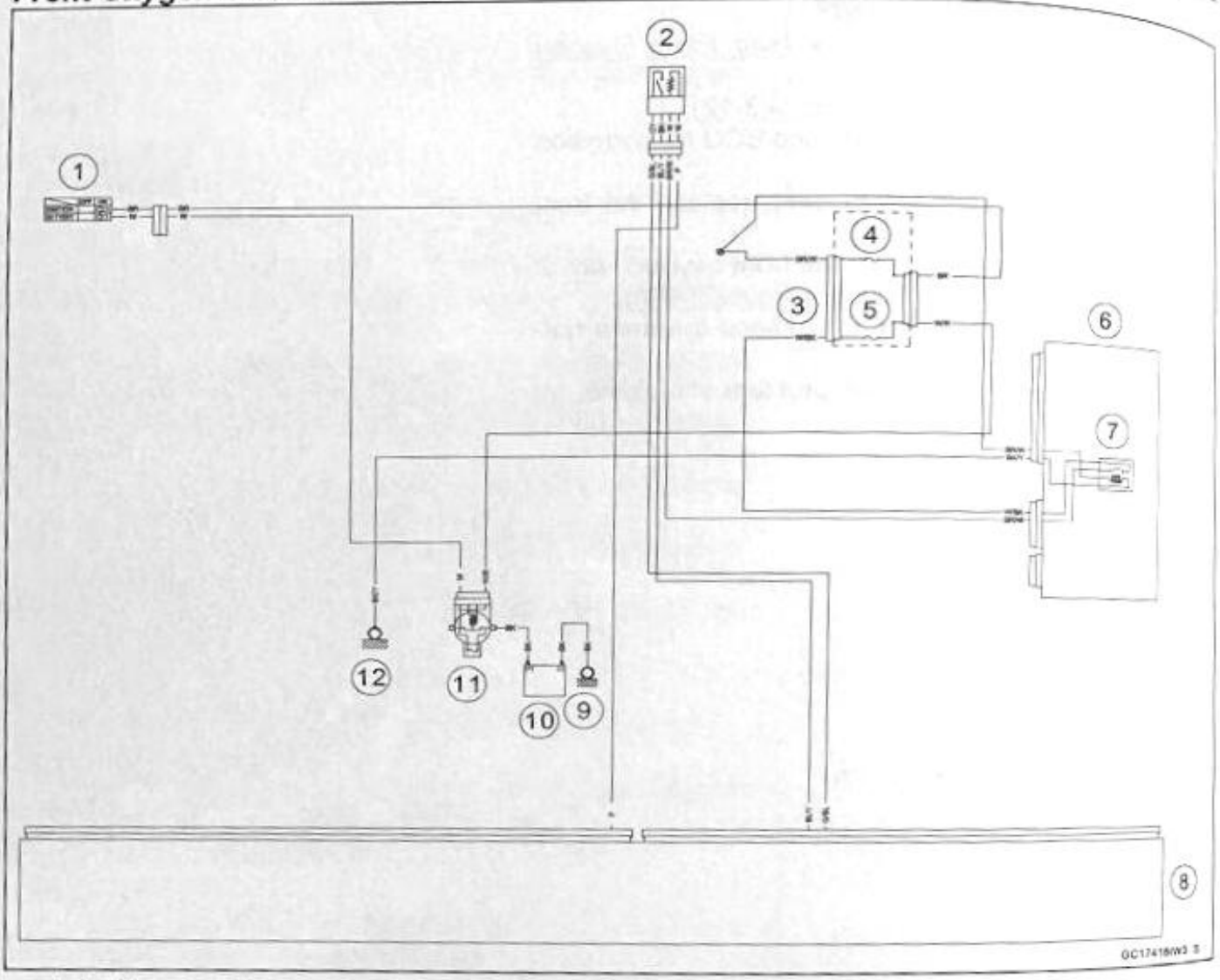
★If the terminals are good, check the front oxygen sensor wirings (see Front Oxygen Sensor Circuit(17-90)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

Front Oxygen Sensor

Front Oxygen Sensor Circuit



1. Ignition Switch
2. Front Oxygen Sensor
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. ECU Fuse 15 A
6. Relay Box
7. ECU Main Relay
8. ECU
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Frame Ground

Immobilizer Amplifier (Equipped Models)

Immobilizer Amplifier Inspection (Service Code 35)

DTC P1507

Antenna Resistance Inspection

- Turn the ignition switch off.
- Remove:
  Right Side Cover (see Side Cover Removal(15-26))
- Disconnect the antenna connector [A].
- Measure the antenna resistance.

Antenna Resistance
Connections: BK lead ←→ BK/W lead
Standard: About 3.0 – 4.6 Ω

★If the reading is out of the standard, replace the ignition switch (see Immobilizer System Parts Replacement(16-87)).
★If the reading is within the standard, check the wiring to the amplifier (see Immobilizer System Circuit(17-92)).
★If the wiring is good, check the input voltage of the amplifier.

Amplifier Input Voltage Inspection

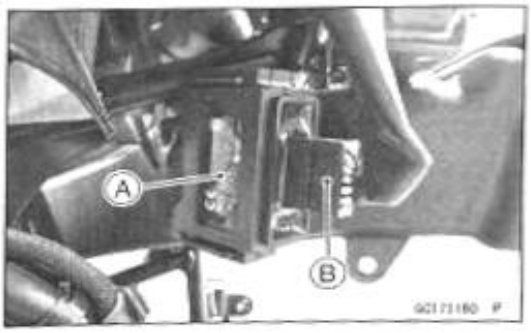
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Upper Fairing (see Upper Fairing Removal(15-21))
- Remove the immobilizer amplifier [A] from the bracket.

○Do not disconnect the immobilizer amplifier connector [B].

- Connect a digital meter to the amplifier connector with needle adapter set.



Special Tool - Needle Adapter Set: 57001-1874

Amplifier Input Voltage
Connections to Amplifier Connector:
Digital Meter (+) → BR/W lead
Digital Meter (–) → BK/Y lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Input Voltage
Standard: Battery Voltage

- Turn the ignition switch off.

★If the reading is out of the standard, check the wiring (see Immobilizer System Circuit(17-92)).
★If the reading is within the standard, check the wiring to ECU (see Immobilizer System Circuit(17-92)).
★If the wiring is good, replace the immobilizer amplifier (see Immobilizer System Parts Replacement(16-87)).

Blank Key Detection (Equipped Models)

Ignition Key Inspection (Service Code 36)

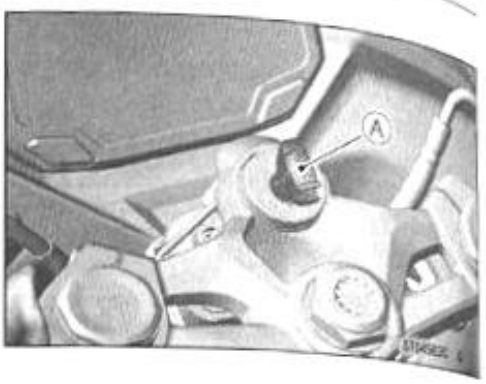
DTC P1508

- This code appears in the following conditions.

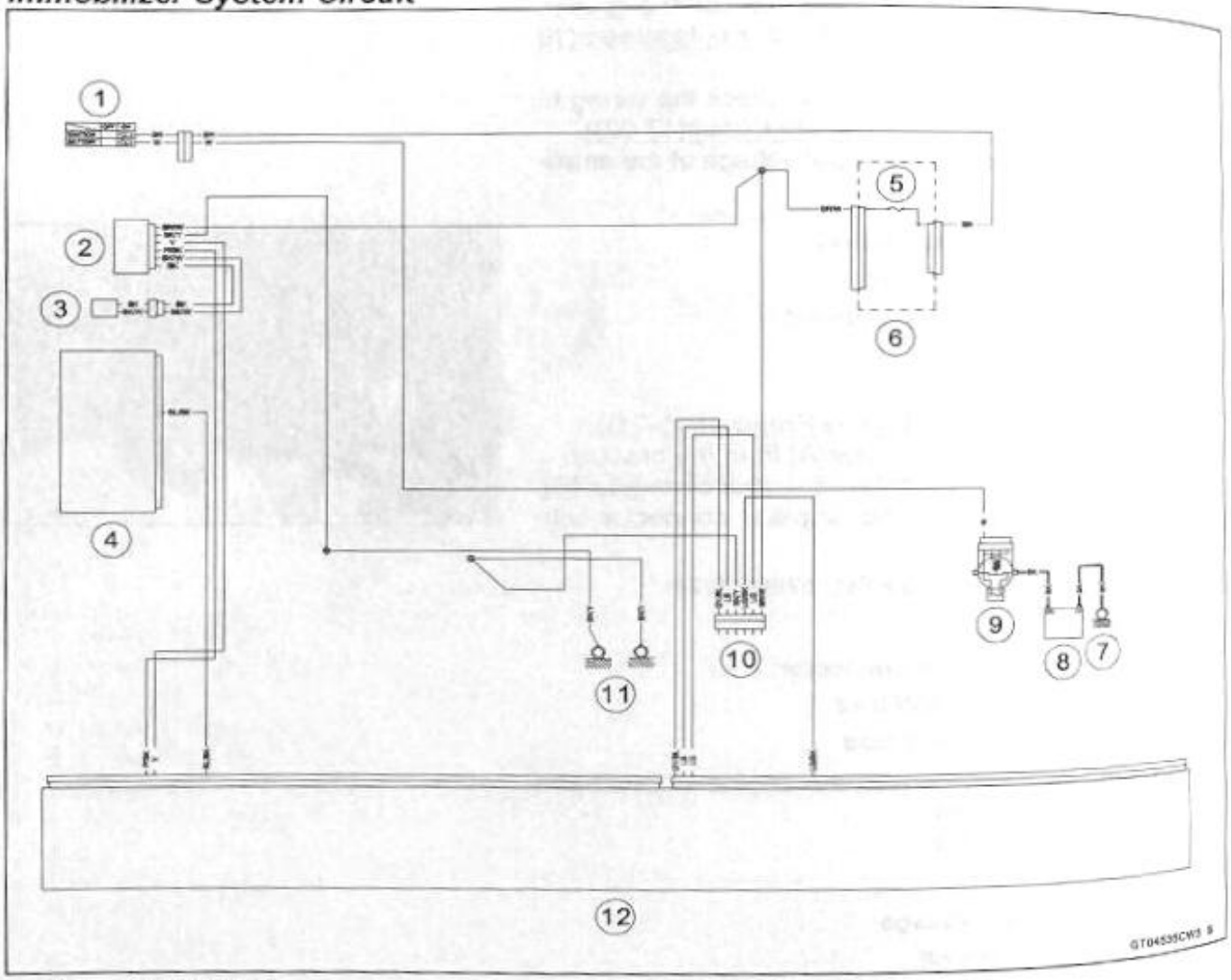
○The transponder [A] in the ignition key is malfunction.
○When the spare key of unregistration is used.
○When the ignition key is registered in the registered ECU.

- Register the ignition key correctly (see Key Registration(16-68)).

★If the service code 36 appears again, the transponder in the key is malfunction, replace it.



Immobilizer System Circuit



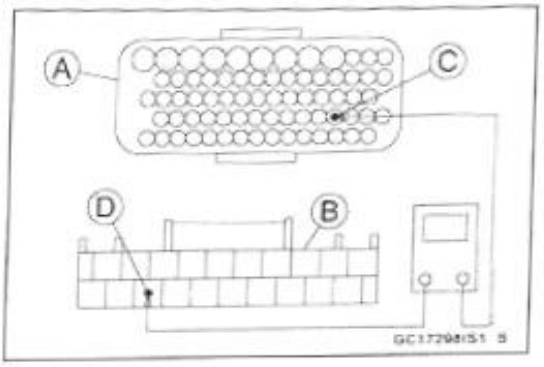
1. Ignition Switch
2. Immobilizer Amplifier
3. Immobilizer Antenna
4. Meter Unit
5. Ignition Fuse 15 A
6. Fuse Box (1)
7. Engine Ground
8. Battery
9. Main Fuse 30 A
10. Immobilizer/Kawasaki Diagnostic System Connector
11. Frame Grounds
12. ECU

ECU Communication Error

ECU Communication Line Inspection (Service Code 39)

OWhen the data is not sent from the ECU to the meter unit, the service code 39 is displayed.
OThe data is sent through the CAN communication line.
OThe service code 39 is detected with the meter unit.

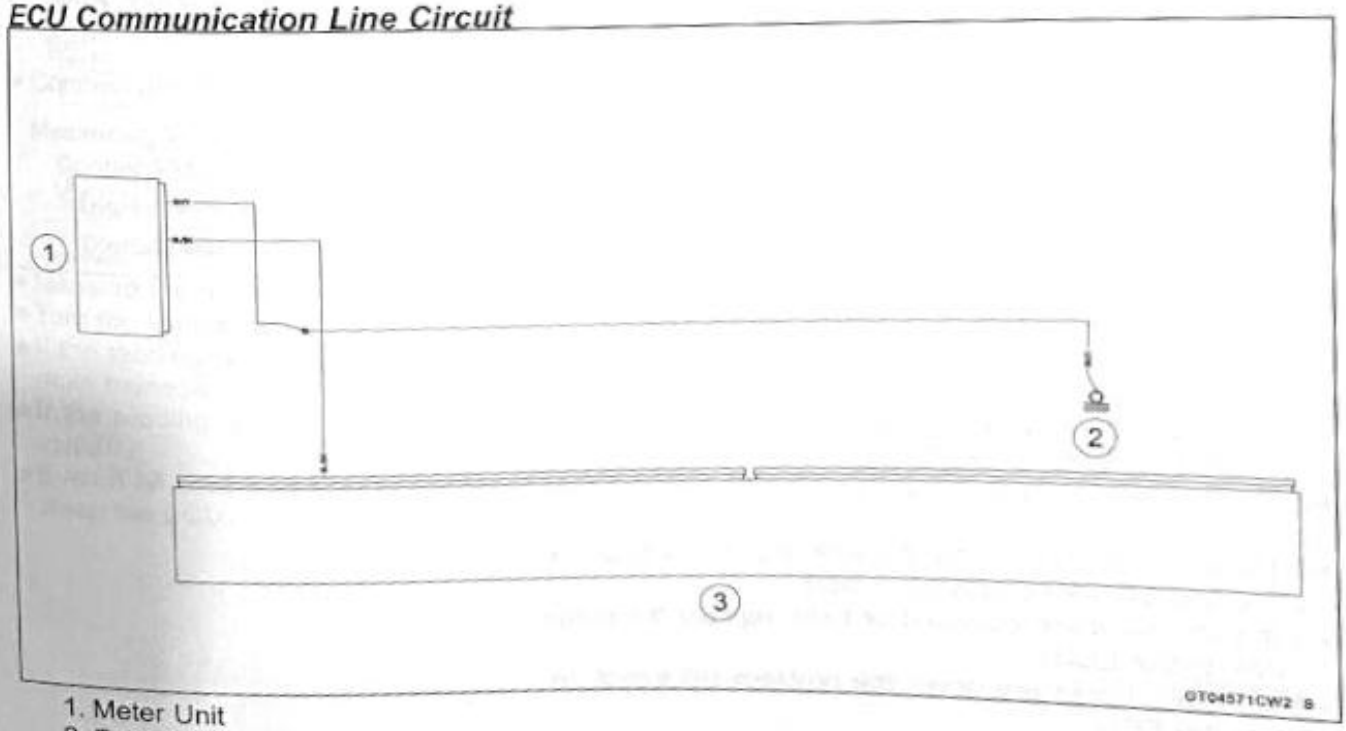
• Remove the ECU and meter unit, and check the wiring for continuity between harness connectors.
ODisconnect the ECU and meter unit connectors.



Wiring Continuity Inspection
ECU Connector [A] ⟷ Meter Unit Connector [B]
ECU Terminal 118 [C] ⟷ Meter Unit Terminal [D]

★If there is no continuity, repair or replace the main harness.
★If there is continuity, check the meter unit (see Meter Unit Inspection(16-59)).
★Even if all checks are good, the problem still exists, replace the ECU.

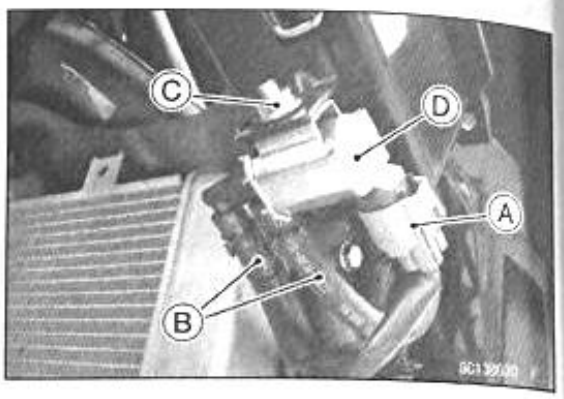
ECU Communication Line Circuit



1. Meter Unit
2. Frame Ground
3. ECU

Purge Valve

Purge Valve Inspection (Service Code 3A)



Purge Valve Removal

- Remove:
  Left Lower Fairing (see Lower Fairing Removal(15-18))
- Disconnect the purge valve connector [A].
- Slide the clamps and disconnect the hoses [B].
- Remove:
  Purge Valve Nut [C]
  Purge Valve [D]

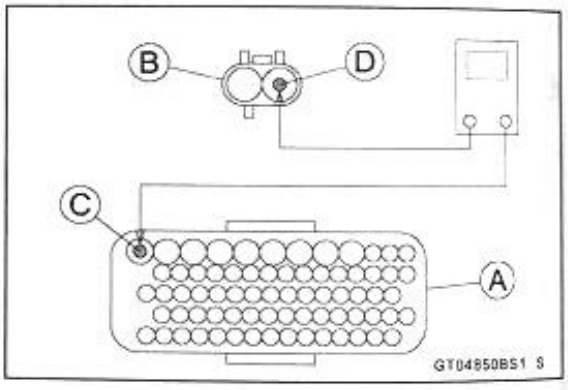
Purge Valve Installation

- Installation is the reverse of removal.
- Tighten:

Torque - Purge Valve Nut: 7.0 N·m (0.71 kgf·m, 62 in·lb)

- Run the hoses correctly (see Cable, Wire, and Hose Routing section (18-2)).

DTC P0444



(Checking wire for open circuit)

- Disconnect:
  Purge Valve Connector (see Purge Valve Removal(17-94))
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← → Purge Valve Connector [B]
ECU Terminal 65 [C] ← → Sensor Terminal [D]

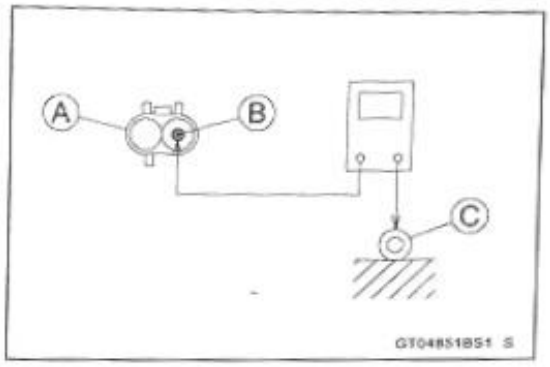
★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the purge valve wirings (see Purge Valve Circuit(17-96)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the valve and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the purge valve and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

Purge Valve

DTC P0458

(Checking wire for short circuit to ground)

- Disconnect:
  Purge Valve Connector (see Purge Valve Removal(17-94))
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for short circuit to ground by checking continuity between the valve connector [A] and frame ground terminal.



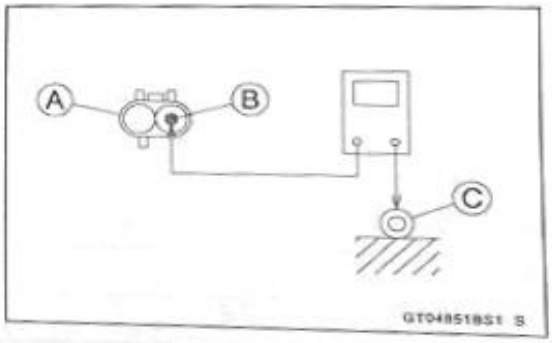
Wiring Continuity Inspection
R/Y lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the purge valve.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0459

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Purge Valve Connector (see Purge Valve Removal(17-94))
- Connect the digital meter to the connector [A].



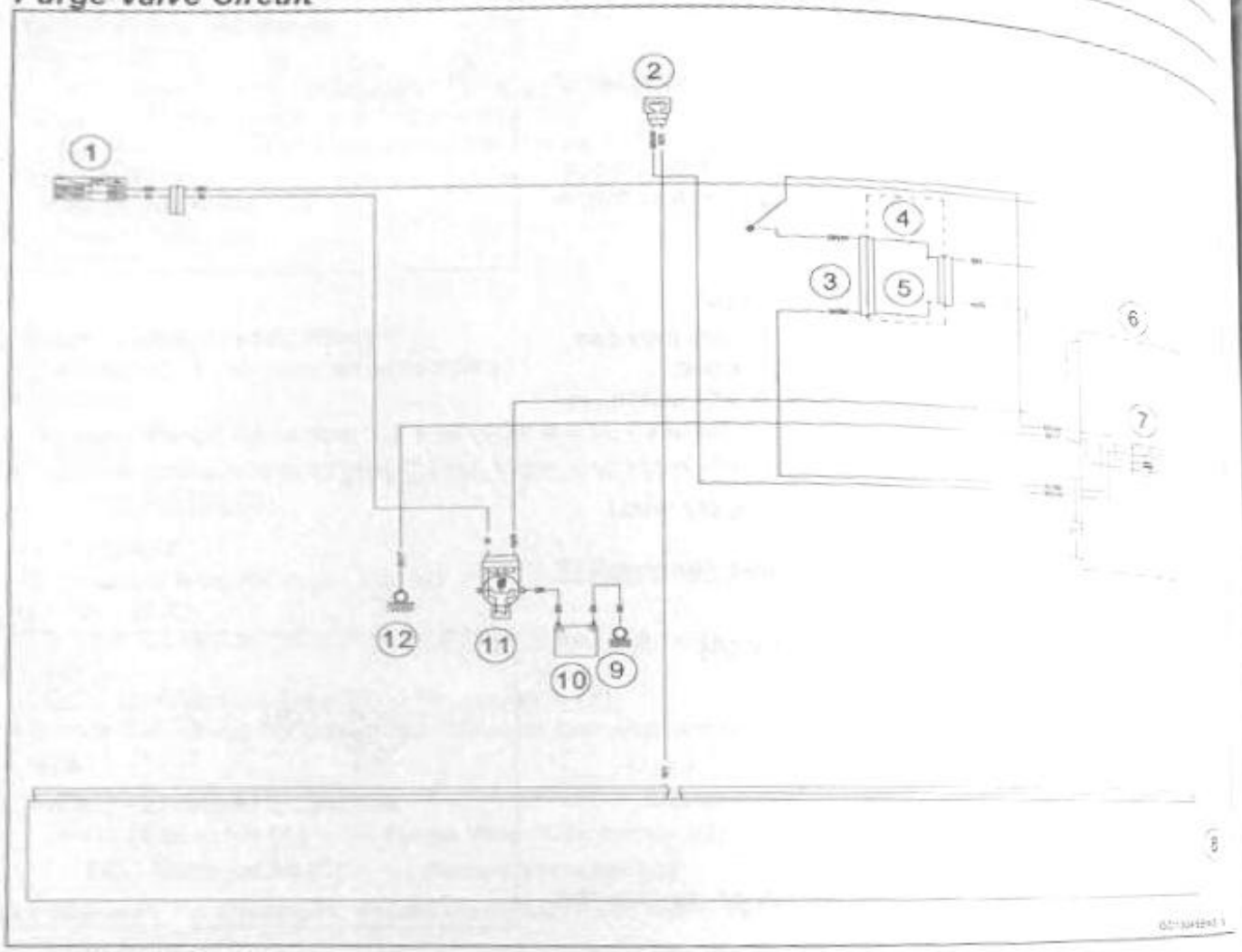
Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → R/Y lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 12 V or more, repair or replace the main harness.
★If the reading is less than DC 12 V, replace the purge valve.
★Even if all checks are good, the problem still exists, replace the ECU.

Purge Valve

Purge Valve Circuit



1. Ignition Switch
2. Purge Valve
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. ECU Fuse 15 A
6. Relay Box
7. ECU Main Relay
8. ECU
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Frame Ground

Quick Shifter Sensor (Equipped Models)

Quick Shifter Sensor Inspection (Service Code 3E)

Quick Shifter Sensor Removal

• Refer to the Shift Pedal Removal (see Shift Pedal Removal(9-28)).

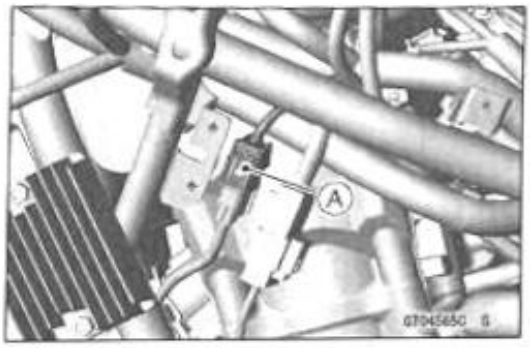
Quick Shifter Sensor Installation

• Refer to the Shift Pedal Installation (see Shift Pedal Installation(9-28)).

DTC P0826

(Checking wire for short circuit to ground)

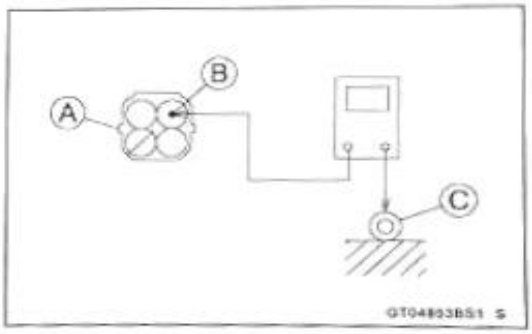
• Disconnect:
ECU Connectors (see ECU Removal(3-12))
Quick Shifter Sensor Connector [A] (see Shift Pedal Removal(9-28))



• Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.

Wiring Continuity Inspection
G/Y lead [B] ⟷ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, go to next check.

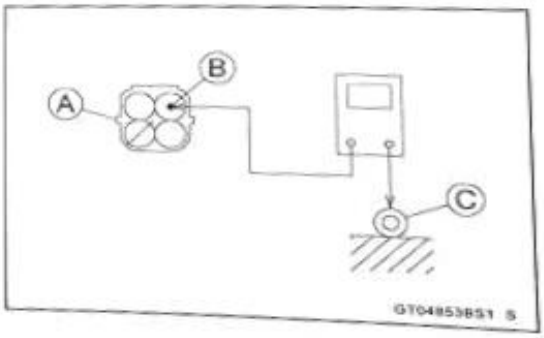


(Checking wire for short circuit to power supply wire)

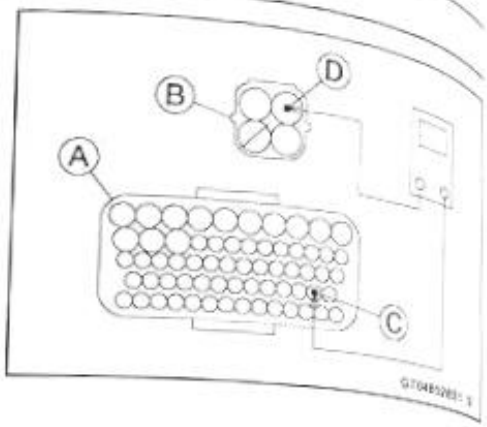
• Connect the digital meter to the connector [A].

Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → G/Y lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

• Measure the measuring voltage.
• Turn the ignition switch on.
★If the reading is DC 5 V or more, repair or replace the main harness.
★If the reading is less than DC 5 V, go to next check.



Quick Shifter Sensor (Equipped Models)



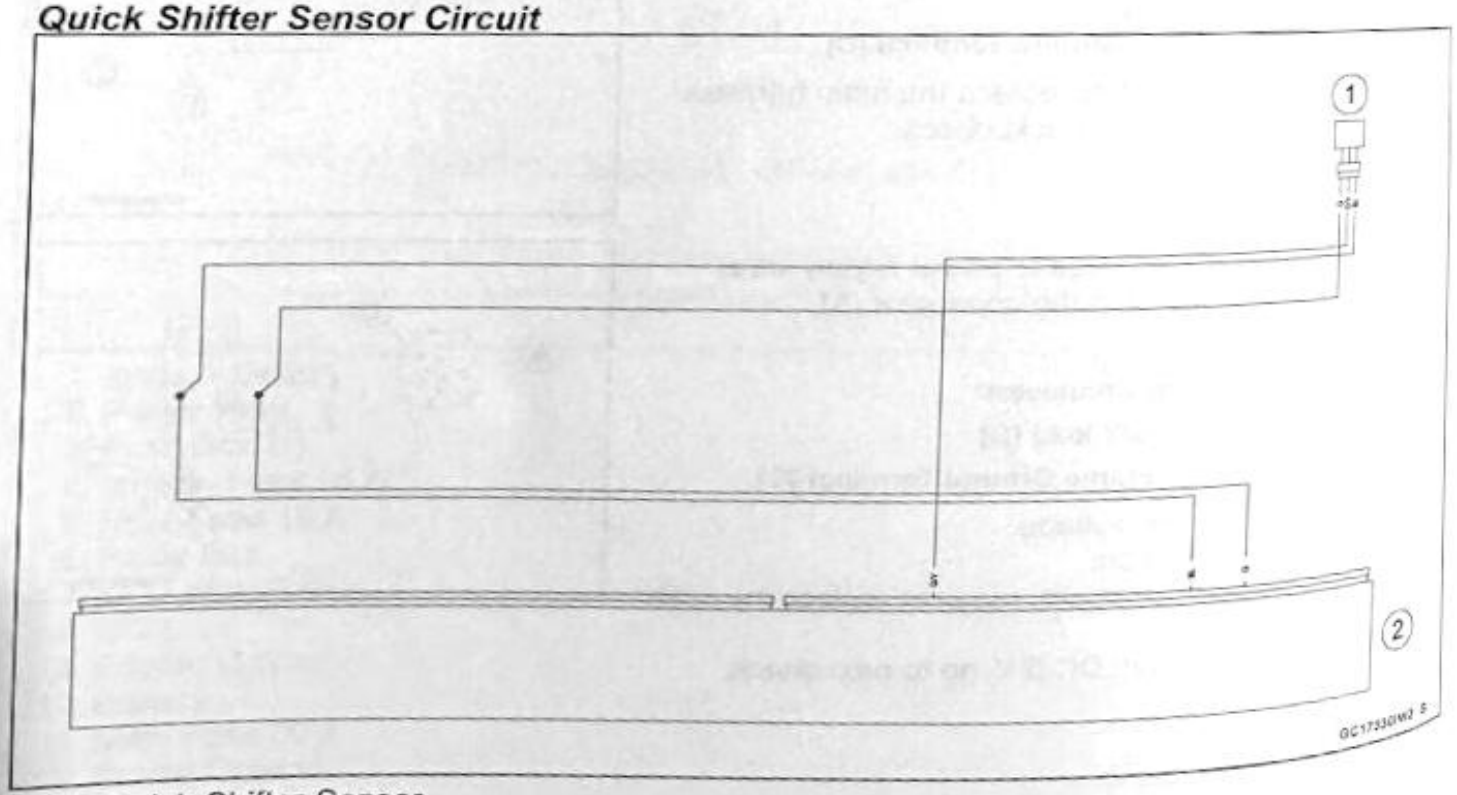
(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.

Wiring Continuity Inspection
ECU Connector [A] ← →
Quick Shifter Sensor Connector [B]
ECU Terminal 49 [C] ← → Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the quick shifter sensor wirings (see Quick Shifter Sensor Circuit(17-98)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the quick shifter sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

Quick Shifter Sensor Circuit



1. Quick Shifter Sensor
2. ECU

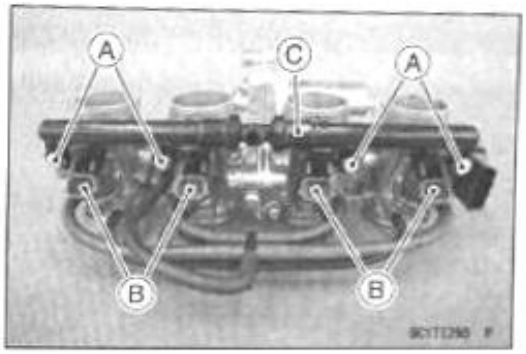
Fuel Injectors #1, #2, #3, #4

Fuel Injector Inspection (Service Code 41, 42, 43, 44)

Fuel Injector #1: Service Code 41 (DTC P0201)
Fuel Injector #2: Service Code 42 (DTC P0202)
Fuel Injector #3: Service Code 43 (DTC P0203)
Fuel Injector #4: Service Code 44 (DTC P0204)

Fuel Injector Removal

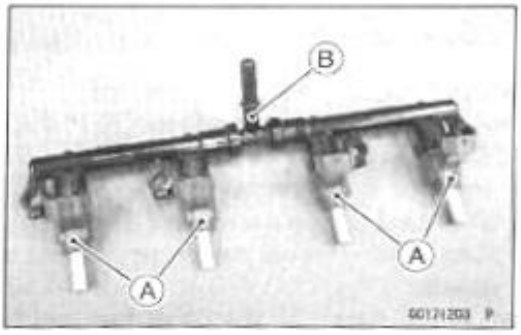
- Remove the throttle body assy (see Throttle Body Assy Removal(3-27)).
- Remove the delivery pipe assy screws [A] to pull out the fuel injectors [B] from the throttle body assy together with the delivery pipe assy [C].



NOTE

ODo not damage the insertion portions of the injectors when they are pulled out from the throttle body assy.

- Remove the fuel injectors [A] from the delivery pipe assy [B].



NOTE

ODo not damage the insertion portions of the injectors when they are pulled out from the delivery pipe assy.

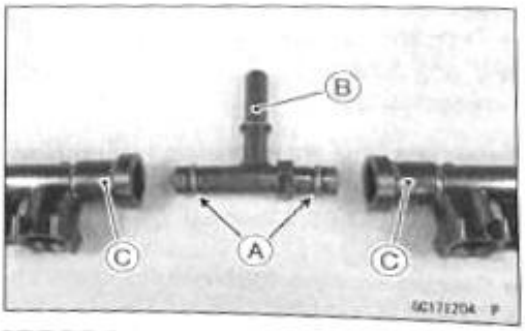
NOTICE

Never drop the fuel injector especially on a hard surface. Such a shock to the injector can damage it.

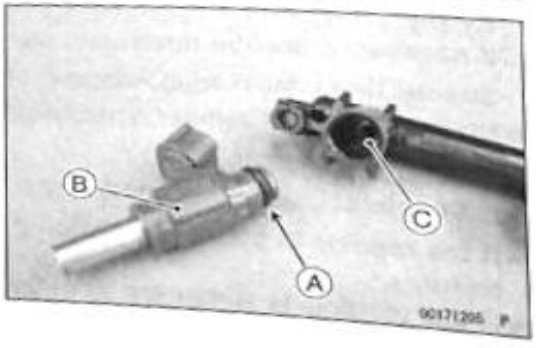
Fuel Injector Installation

- Before assembling, blow away dirt or dust from the throttle body and delivery pipe assy by applying compressed air.
- Replace the O-rings [A] of the joint pipe [B] with new ones.
- Apply engine oil to the new O-rings, and insert the joint pipe to the delivery pipes [C].

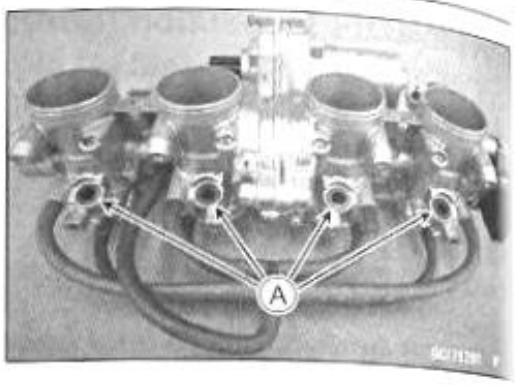
OLeft and right delivery pipes are identical.



- Replace the O-ring [A] of each fuel injector [B] with new ones.
- Apply engine oil to the new O-rings, insert the injectors to the delivery pipe assy [C] and confirm whether the injectors turn smoothly or not.



Fuel Injectors #1, #2, #3, #4



- Replace the dust seals [A] with new ones.
- Apply engine oil to the new dust seals.
- Install the fuel injectors along with the delivery pipe assy to the throttle body assy.
- Tighten:

Torque - Delivery Pipe Assy Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)

- Install the throttle body assy (see Throttle Body Assy Installation(3-28)).

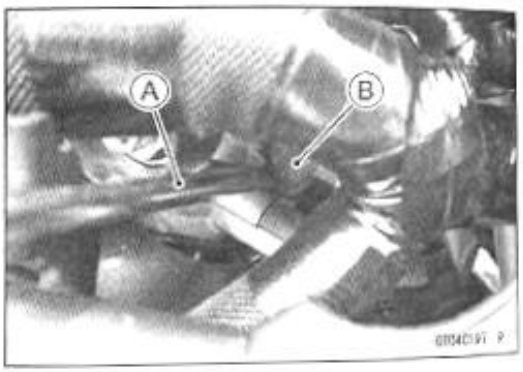
DTC P0201, P0202, P0203, P0204

Fuel Injector Audible Inspection

NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Side Covers (see Side Cover Removal(15-26))



- Start the engine, and let it idle.
- Apply a flat tip screwdriver [A] to the fuel injector [B].

○Put the grip end onto your ear, and listen whether the fuel injector is clicking or not.

○A sound scope can also be used.

○The click interval becomes shorter as the engine speed rises.

- Do the same for the other fuel injectors.

★If all the fuel injectors click at a regular intervals, the fuel injectors are normal.

- Turn the ignition switch off.

★If any fuel injector does not click, check the fuel injector resistance.

Fuel Injector Resistance Inspection

- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Disconnect the fuel injector connectors.
- Connect a digital meter to the terminals in each fuel injector [A].

○If necessary, use the measuring adapter.

Special Tool - Measuring Adapter: 57001-1700

- Measure the fuel injector resistance.

Fuel Injector Resistance
Standard: About 11.5 – 12.5 Ω @20°C (68°F)

★If the reading is out of the standard, replace the fuel injector.

★If the reading is within the standard, check the power source voltage.

Fuel Injectors #1, #2, #3, #4

Fuel Injector Power Source Voltage Inspection

NOTE

OBe sure the battery is fully charged.

- Turn the ignition switch off.
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Disconnect the fuel injector connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Injector #1 [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.

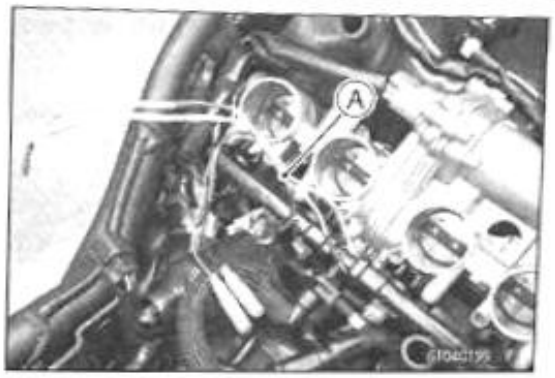
Fuel Injector Power Source Voltage
Connections to Adapter:
For Fuel Injector #1, #2, #3, #4
Digital Meter (+) → R (injector W/R) lead
Digital Meter (–) → Battery (–) Terminal

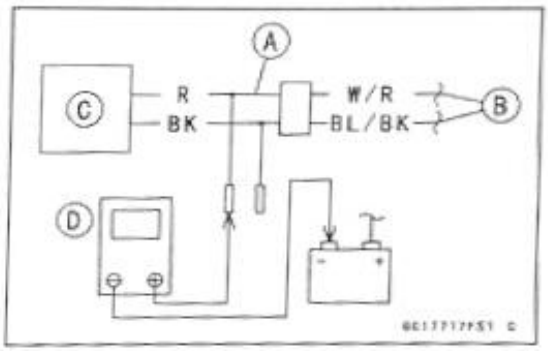
- Measure the power source voltage with the engine stopped and with the connector jointed.
- Slide the engine start/stop switch to run position.
- Turn the ignition switch on.

Power Source Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.

★If the reading is in specification, check the output voltage.
(When power is detected but out of specification)
★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Circuit Inspection(16-93)).
(When power is not detected)
★If there is still no battery voltage, check the fuel pump relay (see Relay Circuit Inspection(16-93)).
★If the fuel pump relay is normal, check the power source wiring (see Fuel Injector Circuit(17-104)).
★If there is no continuity, repair or replace the main harness.





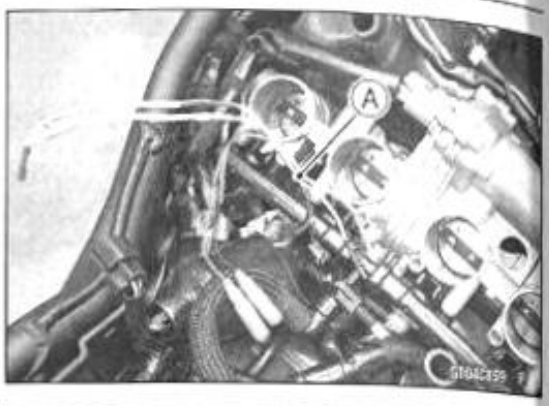
Fuel Injectors #1, #2, #3, #4

Fuel Injector Output Voltage Inspection

NOTE

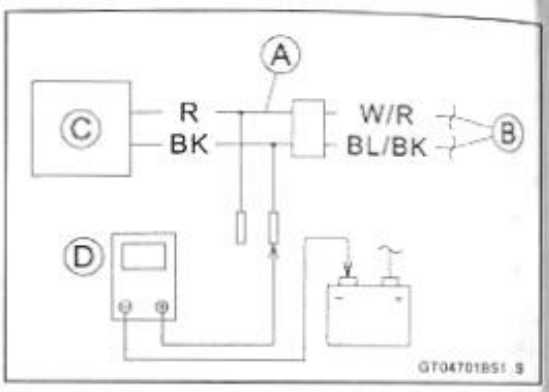
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Disconnect the fuel injector connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Fuel Injector #1 [C]



Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.



Fuel Injector Output Voltage
Connections to Adapter:
For Fuel Injector #1
Digital Meter (+) → BK (injector BL/BK)
Digital Meter (–) → Battery (–) Terminal
For Fuel Injector #2
Digital Meter (+) → BK (injector BL/R)
Digital Meter (–) → Battery (–) Terminal
For Fuel Injector #3, #4
Digital Meter (+) → BK (injector BL/W)
Digital Meter (–) → Battery (–) Terminal

- Measure the output voltage with the engine stopped and with the connector joined.
- Slide the engine start/stop switch to run position.
- Turn the ignition switch on.

Output Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch off.

Fuel Injectors #1, #2, #3, #4

★If the reading is out of the specification, remove the ECU and check the wiring for continuity between harness connectors.

○Disconnect the ECU and injector connectors.

Wiring Continuity Inspection

ECU Connector [A] ⟷ Fuel Injector Connector [B]

For Fuel Injector #1

ECU Terminal 7 [C] ⟷ Fuel Injector #1 Terminal [D]

For Fuel Injector #2

ECU Terminal 6 [E] ⟷ Fuel Injector #2 Terminal [D]

For Fuel Injector #3

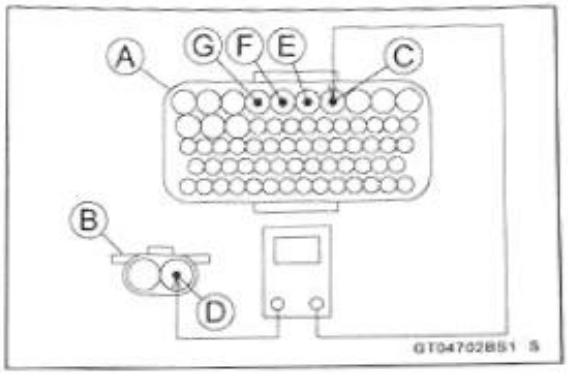
ECU Terminal 5 [F] ⟷ Fuel Injector #3 Terminal [D]

For Fuel Injector #4

ECU Terminal 4 [G] ⟷ Fuel Injector #4 Terminal [D]

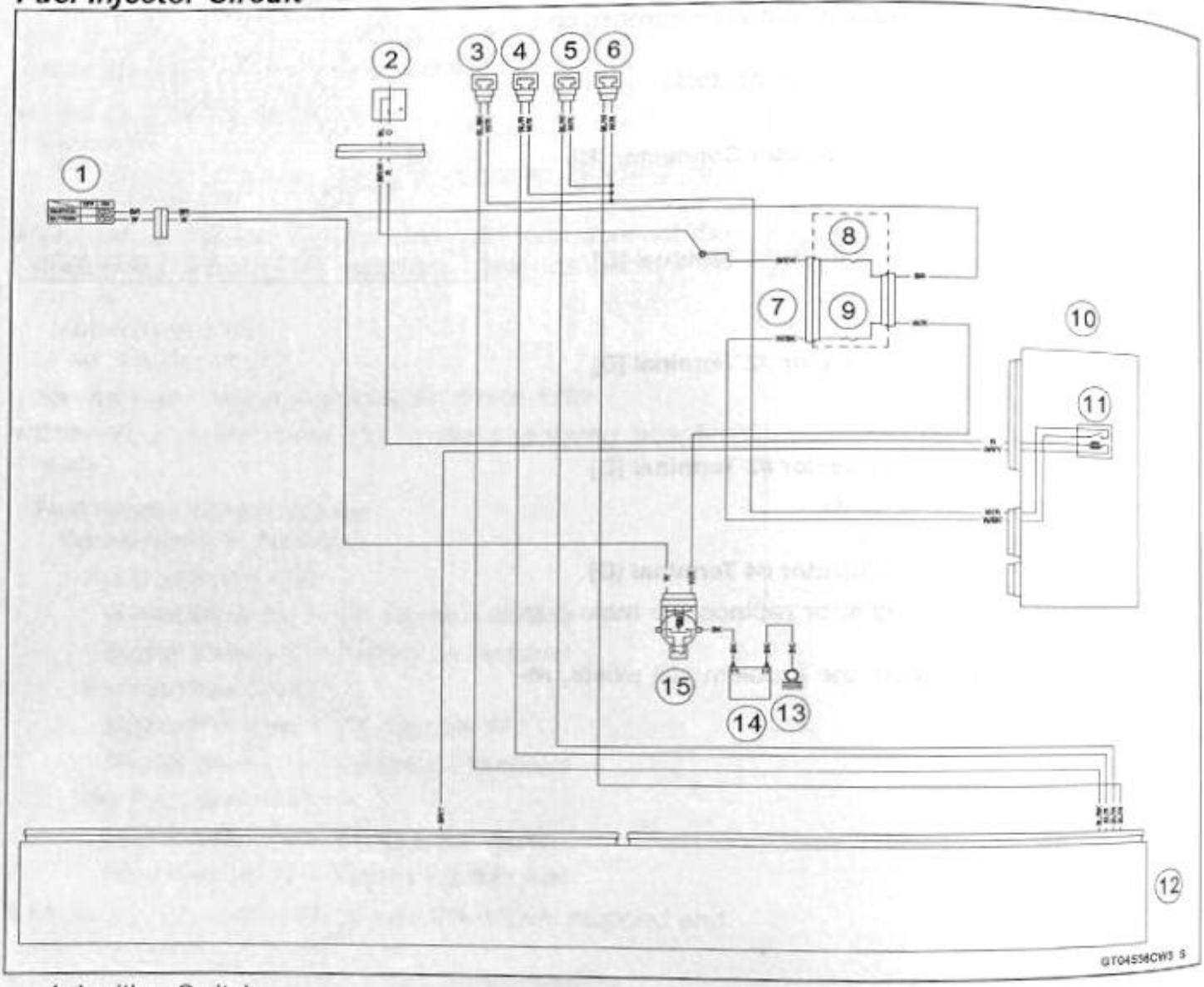
★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.



Fuel Injectors #1, #2, #3, #4

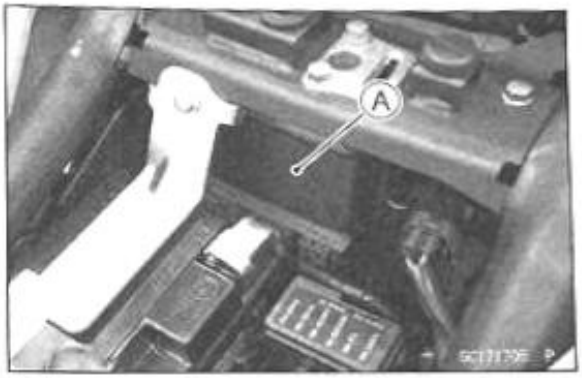
Fuel Injector Circuit



1. Ignition Switch
2. Engine Start/Stop Switch (Engine Stop)
3. Fuel Injector #1
4. Fuel Injector #2
5. Fuel Injector #3
6. Fuel Injector #4
7. Fuse Box (1)
8. Ignition Fuse 15 A
9. ECU Fuse 15 A
10. Relay Box
11. Fuel Pump Relay
12. ECU
13. Engine Ground
14. Battery
15. Main Fuse 30 A

Fuel Pump Relay Inspection (Service Code 46)

Fuel Pump Relay Removal



OThe fuel pump relay is built in the relay box [A].

- Refer to the Relay Box Removal (see Relay Box Removal(16-93)).

DTC P0627

- Refer to the Relay Circuit Inspection (see Relay Circuit Inspection(16-93)).

★If the fuel pump relay is normal, check the wiring to the fuel pump relay (see Fuel Pump Circuit(3-26)).

★If there is no continuity, repair or replace the main harness.

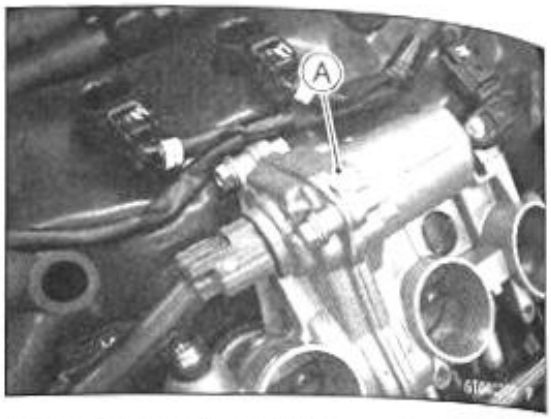
★Even if all checks are good, the problem still exists, replace the ECU.

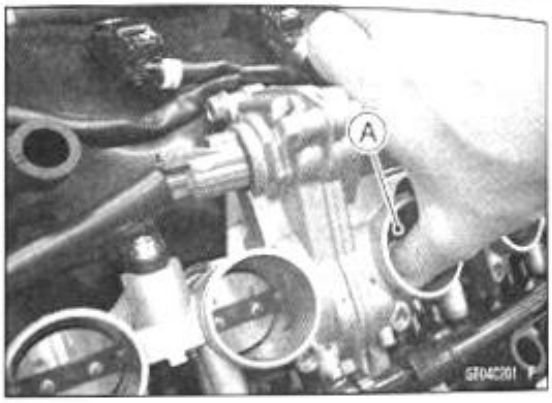
Return Spring

Return Spring Inspection (Service Code 49)

Return Spring Removal

NOTICE
Do not remove return spring in the gear case [A] since it has been set with precision at the factory.





DTC P2119

- Turn the ignition switch off.
- Remove
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Check that the throttle valves [A] move lightly by pushing finger without the spring force.

★If the throttle valves move lightly, the return spring is broken, replace the throttle body assy.

★If the throttle valves move hardly and return them by the return spring, check the throttle position sensor (see DTC P0120(17-53)) (see DTC P0121(17-54)) (see DTC P0122(17-55)) (see DTC P0220(17-55)) (see DTC P0223(17-56)).

★If the throttle position sensor is good, replace the ECU.

Misfire

Misfire Inspection (Service Code 4E)

Multiple Cylinders are Misfire: DTC P0300
Cylinder #1 is Misfire: DTC P0301
Cylinder #2 is Misfire: DTC P0302
Cylinder #3 is Misfire: DTC P0303
Cylinder #4 is Misfire: DTC P0304

DTC P0300, P0301, P0302, P0303, P0304

• Inspect the following items.
Low Fuel
Spark Plugs (see Spark Plug Condition Inspection(16-36))
Stick Coils (see DTC P0351, P0352, P0353, P0354(17-108))
Fuel Pressure (see Fuel Pressure Inspection(3-18))
Fuel Injectors (see DTC P0201, P0202, P0203, P0204(17-100))
Cylinder Compression (see Cylinder Compression Measurement(5-25))
Valve Clearance (see Valve Clearance Inspection(2-28))
Intake Air System (intake air from other than standard intake route, etc.)
Engine Vacuum Synchronization (see Engine Vacuum Synchronization Inspection(2-16))
Intake Air Pressure Sensor #1 (see DTC P0105(17-58)) (see DTC P0106(17-59)) (see DTC P0107(17-60))
Intake Air Pressure Sensor #2 (see DTC P2226(17-67)) (see DTC P2227(17-68)) (see DTC P2228(17-69))
Crankshaft Sensor (see Crankshaft Sensor Inspection(16-32))
Timing Rotor (visually inspect)
ECU (see ECU Power Supply Inspection(3-13))
Exhaust System (leakage, tampering)
Final Drive System (drive chain, etc.)
Fuel Quality
★Even if all checks are good, the problem still exists, replace the ECU.

Stick Coils #1, #2, #3, #4

Stick Coil Inspection (Service Code 51, 52, 53, 54)

Stick Coil #1: Service Code 51 (DTC P0351)
Stick Coil #2: Service Code 52 (DTC P0352)
Stick Coil #3: Service Code 53 (DTC P0353)
Stick Coil #4: Service Code 54 (DTC P0354)

Stick Coil Removal

- Refer to the Stick Coil Removal (see Stick Coil Removal(16-34)).

Stick Coil Installation

- Refer to the Stick Coil Installation (see Stick Coil Installation(16-34)).

DTC P0351, P0352, P0353, P0354

Stick Coil Primary Winding Resistance Inspection

- Refer to the Stick Coil Inspection (see Stick Coil Inspection(16-35)).

★If the reading is within the standard, check the input voltage.

Stick Coil Input Voltage Inspection

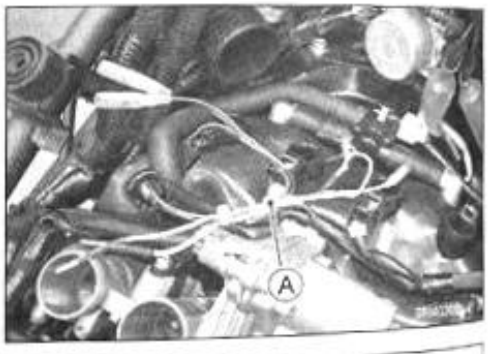
NOTE

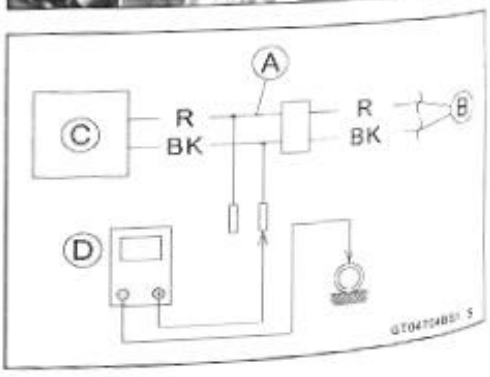
○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Remove:
  Air Cleaner Housing (see Air Cleaner Housing Removal(3-31))
- Disconnect the stick coil connector and connect the measuring adapter [A] between these connectors as shown.
  Main Harness [B]
  Stick Coil [C]

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter [D] to the measuring adapter leads.





Stick Coil Input Voltage
Connections to Adapter:

For Stick Coil #1
Digital Meter (+) → BK (stick coil BK)
Digital Meter (–) → Frame Ground Terminal

For Stick Coil #2
Digital Meter (+) → BK (stick coil BK/R)
Digital Meter (–) → Frame Ground Terminal

For Stick Coil #3
Digital Meter (+) → BK (stick coil BK/O)
Digital Meter (–) → Frame Ground Terminal

For Stick Coil #4
Digital Meter (+) → BK (stick coil BK/G)
Digital Meter (–) → Frame Ground Terminal

Stick Coils #1, #2, #3, #4

- Measure the input voltage to each primary winding of the stick coils with the engine stopped and with the connectors joined.
- Slide the engine start/stop switch to run position.
- Turn the ignition switch on.

Input Voltage
Standard: Battery Voltage

- Turn the ignition switch off.

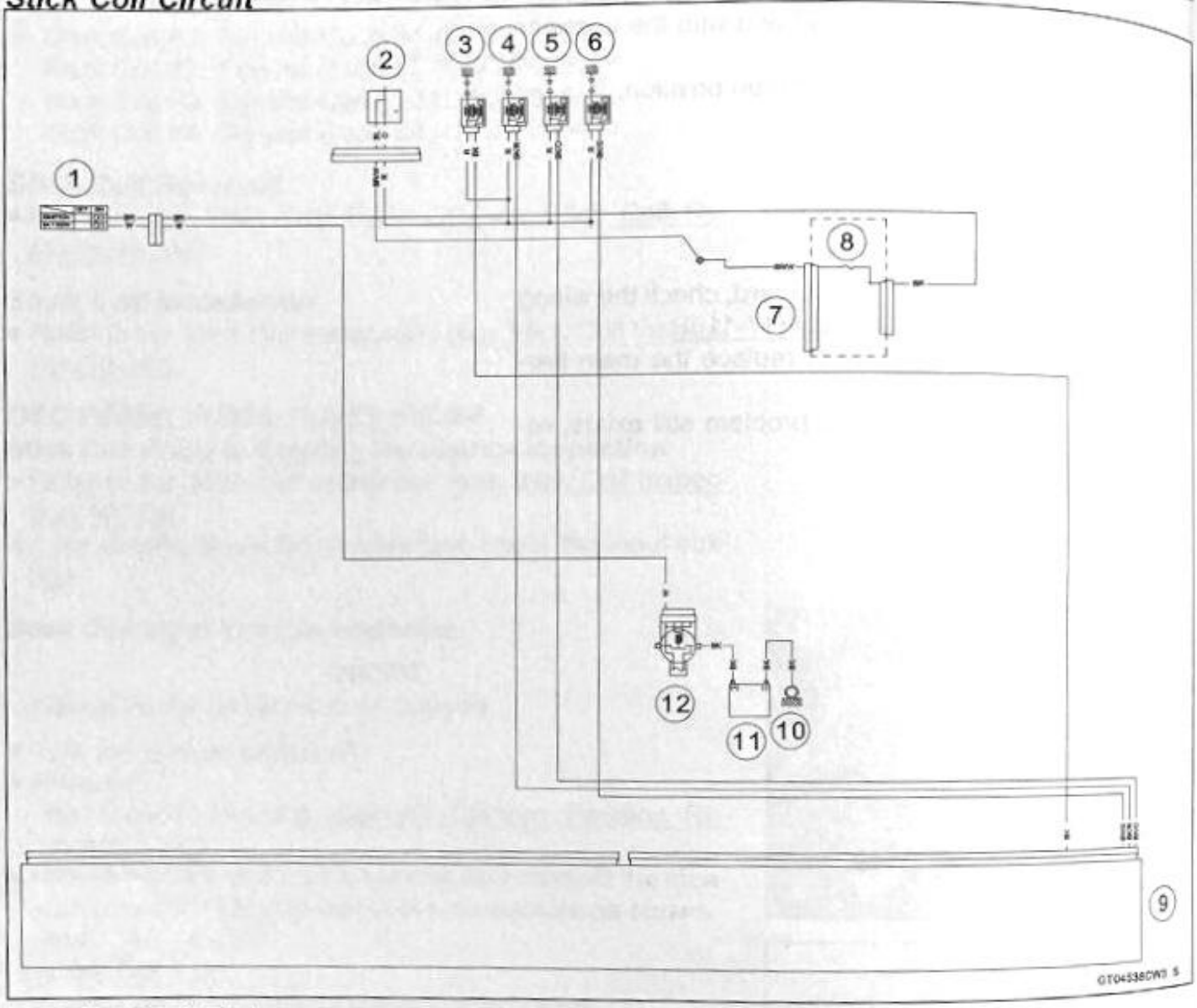
★If the input voltage is out of the standard, check the wiring for continuity (see Stick Coil Circuit(17-110)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

Stick Coils #1, #2, #3, #4

Stick Coil Circuit



1. Ignition Switch
2. Engine Start/Stop Switch (Engine Stop)
3. Stick Coil #1
4. Stick Coil #2
5. Stick Coil #3
6. Stick Coil #4
7. Fuse Box (1)
8. Ignition Fuse 15 A
9. ECU
10. Engine Ground
11. Battery
12. Main Fuse 30 A

Radiator Fan Relay Inspection (Service Code 56)

Radiator Fan Relay Removal

OThe radiator fan relay is built in the relay box [A].

- Refer to the Relay Box Removal (see Relay Box Removal(16-93)).

DTC P0480

- Refer to the Relay Inspection (see Relay Circuit Inspection(16-93)).

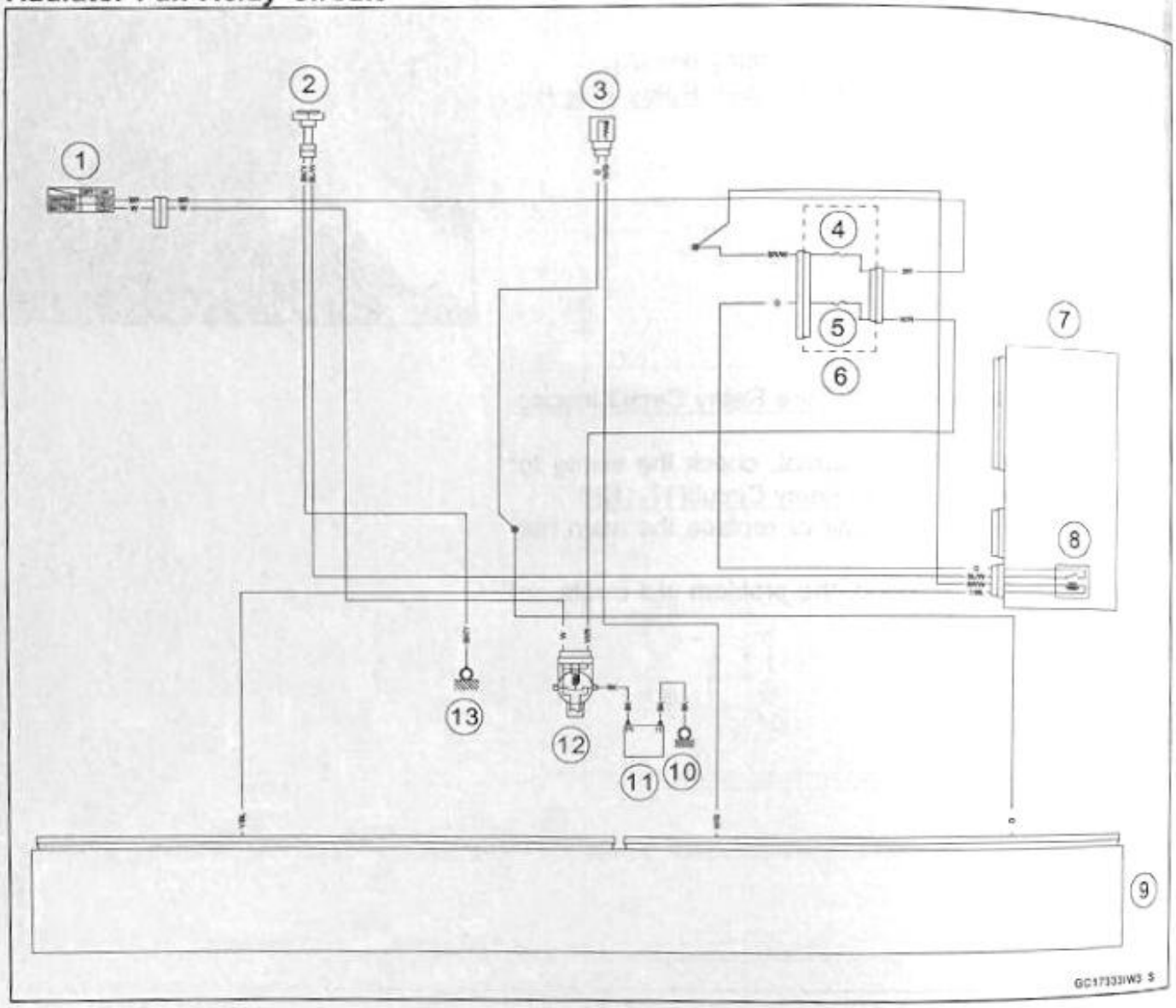
★If the radiator fan relay is normal, check the wiring for continuity (see Radiator Fan Relay Circuit(17-112)).

★If there is no continuity, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

Radiator Fan Relay

Radiator Fan Relay Circuit



1. Ignition Switch
2. Radiator Fan Motor
3. Water Temperature Sensor
4. Ignition Fuse 15 A
5. Radiator Fan Fuse 15 A
6. Fuse Box (1)
7. Relay Box
8. Radiator Fan Relay
9. ECU
10. Engine Ground
11. Battery
12. Main Fuse 30 A
13. Frame Ground

ETV Actuator

ETV Actuator Inspection (Service Code 58)

ETV Actuator Removal

NOTICE

Do not remove ETV actuator in the gear case [A] since it has been set with precision at the factory.

DTC P2100

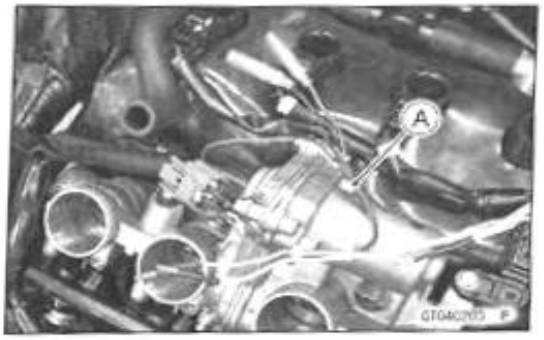
ETV Actuator Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

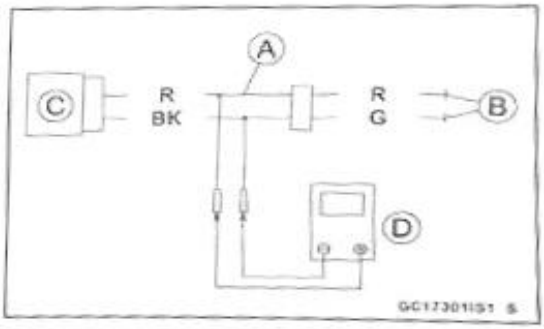
- Turn the ignition switch off.
- Remove:
  Air Cleaner Housing
- Connect the measuring adapter [A] to the ETV actuator connectors as shown.
  Main Harness [B]
  ETV Actuator [C]

Special Tool - Measuring Adapter: 57001-1700



- Connect a digital meter [D] to the measuring adapter leads.

ETV Actuator Input Voltage
Connections to Adapter:
Digital Meter (+) → R (actuator R)
Digital Meter (–) → BK (actuator G)



- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch on.

Input Voltage
Standard: **About DC 1 to 2 V or – 1 to – 2 V**

- Turn the ignition switch off.

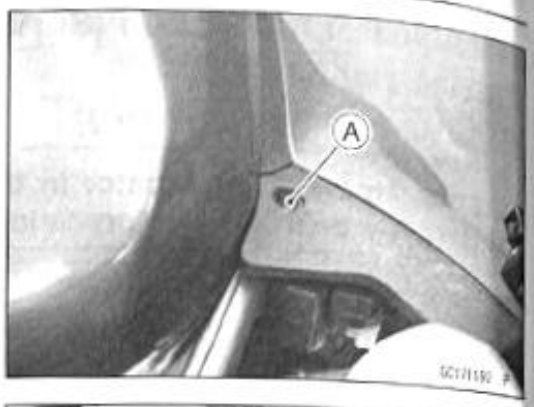
★If the reading is out of the standard, check the following items.
ETV Actuator Relay
Wiring (see ETV Actuator Circuit(17-115))

★If the above items are good, replace the throttle body assy and/or the ECU.

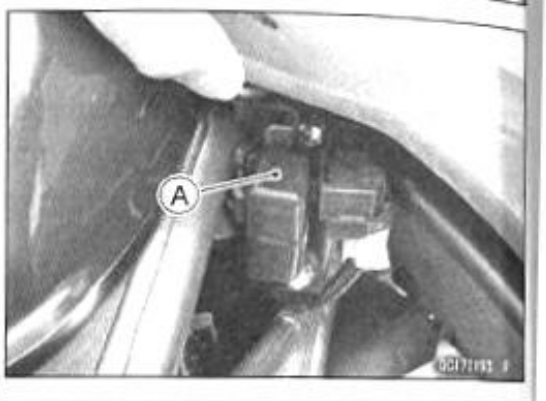
ETV Actuator

ETV Actuator Relay Inspection

- Remove:
  Bolt [A]



- Remove:
  ETV Actuator Relay [A]



- Connect a tester [A] and a 12 V battery [B] to the relay [C] as shown.

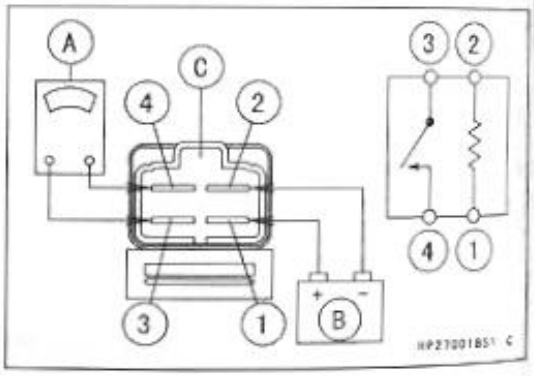
★If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay

Criteria: When battery is connected ⇒ 0 Ω
When battery is disconnected ⇒ ∞Ω

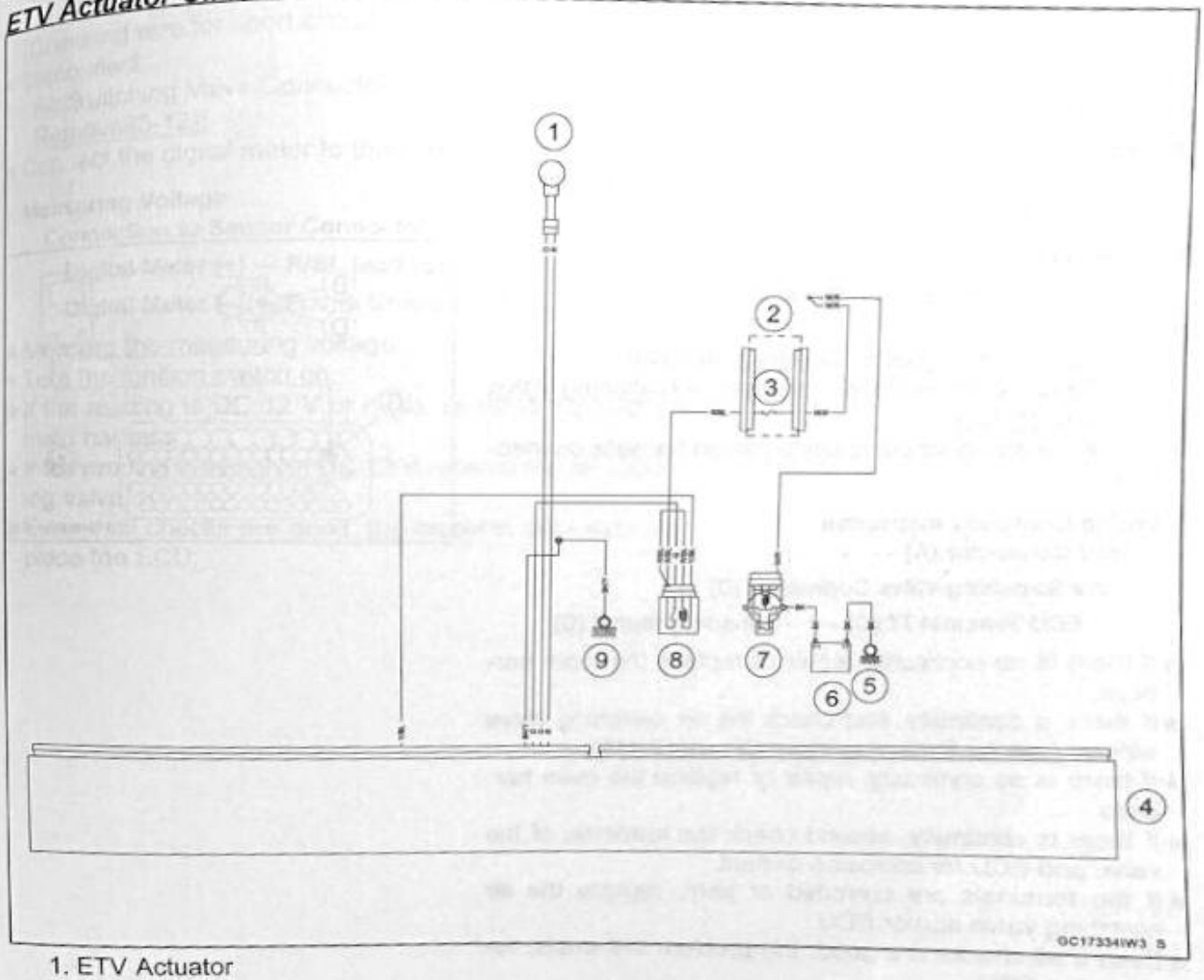
Relay Coil Terminals: [1] and [2]

Relay Switch Terminals: [3] and [4]



ETV Actuator

ETV Actuator Circuit



1. ETV Actuator
2. Fuse Box (2)
3. ETV Actuator Relay Fuse 10 A
4. ECU
5. Engine Ground
6. Battery
7. Main Fuse 30 A
8. ETV Actuator Relay
9. Frame Ground

Air Switching Valve

Air Switching Valve Inspection (Service Code 64)

Air Switching Valve Removal

- Refer to the Air Switching Valve Removal (see Air Switching Valve Removal(5-12)).

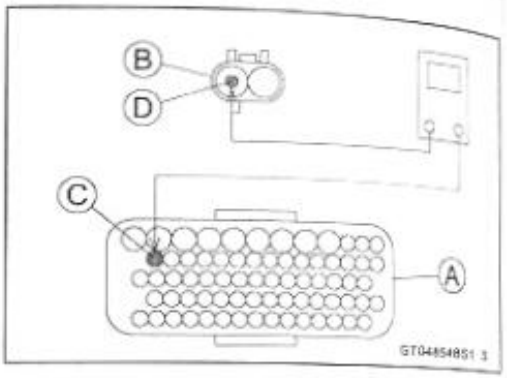
Air Switching Valve Installation

- Refer to the Air Switching Valve Installation (see Air Switching Valve Installation(5-12)).

DTC P0418

(Checking wire for open circuit)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Air Switching Valve Connector (see Air Switching Valve Removal(5-12))
- Check the wiring for continuity between harness connectors.



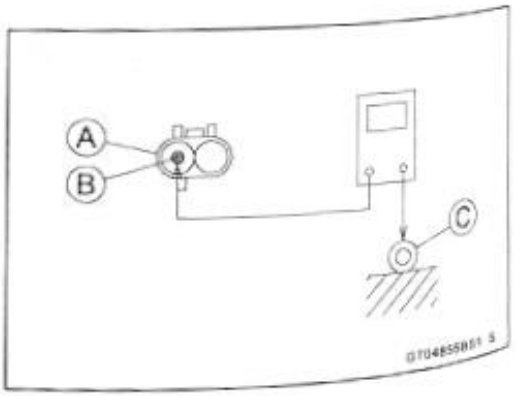
Wiring Continuity Inspection
ECU Connector [A] ← →
Air Switching Valve Connector [B]
ECU Terminal 77 [C] ← → Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the air switching valve wirings (see Air Switching Valve Circuit(17-118)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the valve and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the air switching valve and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P2257

(Checking wire for short circuit to ground)

- Disconnect:
  ECU Connectors (see ECU Removal(3-12))
  Air Switching Valve Connector (see Air Switching Valve Removal(5-12))
- Check the wiring for short circuit to ground by checking continuity between the valve connector [A] and frame ground terminal.



Wiring Continuity Inspection
R/BL lead [B] ←→ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the air switching valve.
★Even if all checks are good, the problem still exists, replace the ECU.

Air Switching Valve

DTC P2258

(Checking wire for short circuit to power supply wire)

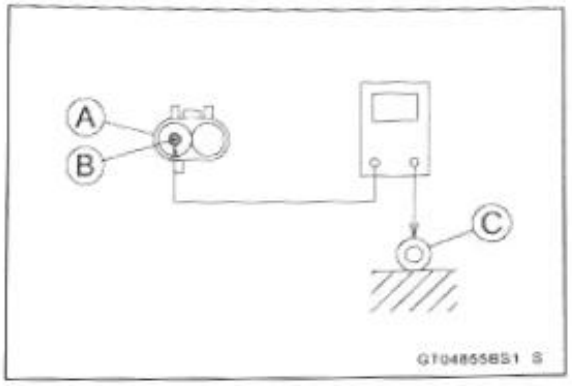
- Disconnect:
  Air Switching Valve Connector (see Air Switching Valve Removal(5-12))
- Connect the digital meter to the connector [A].

Measuring Voltage

Connection to Sensor Connector:

Digital Meter (+) → R/BL lead [B]

Digital Meter (–) → Frame Ground Terminal [C]



- Measure the measuring voltage.
- Turn the ignition switch on.

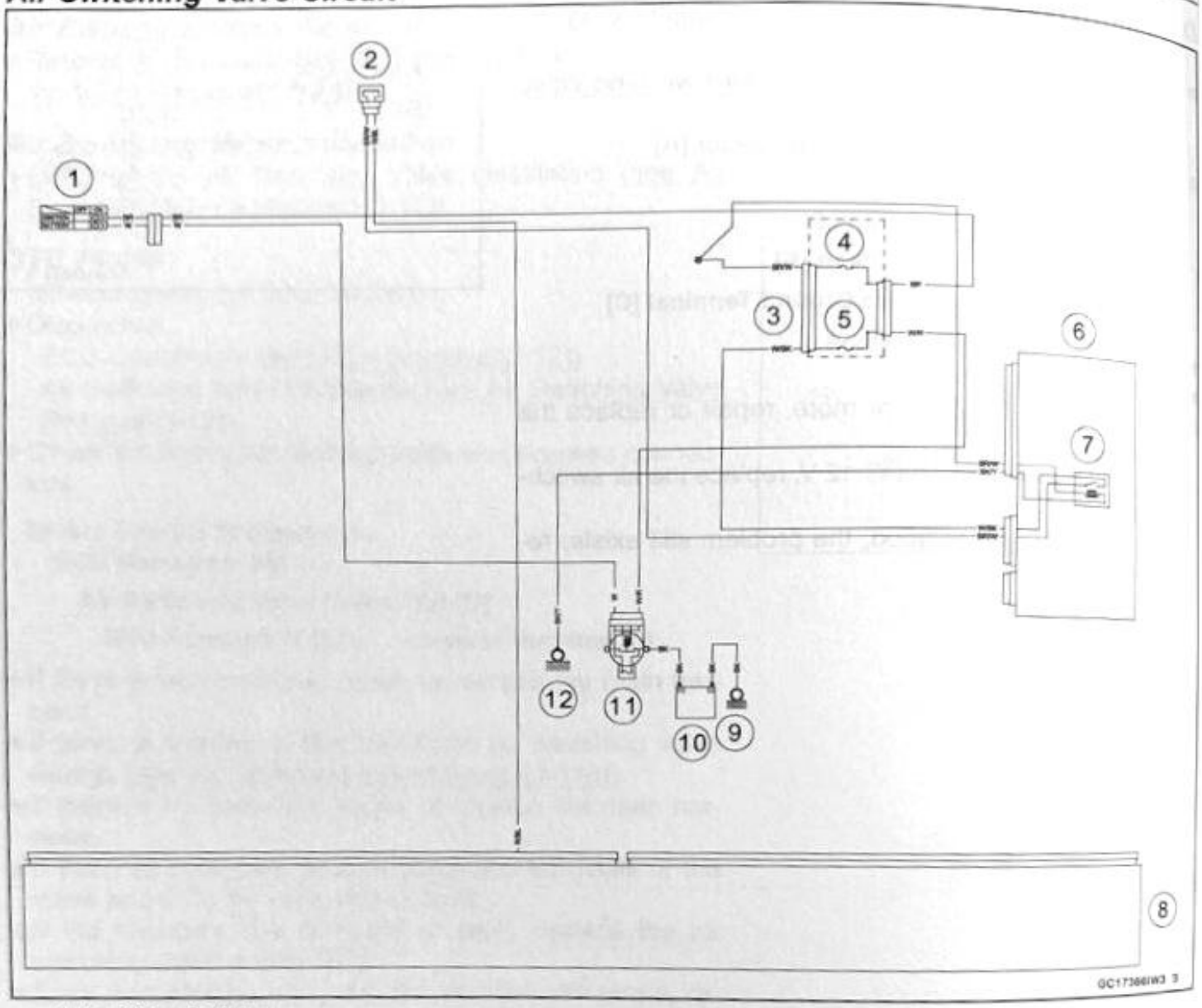
★If the reading is DC 12 V or more, repair or replace the main harness.

★If the reading is less than DC 12 V, replace the air switching valve.

★Even if all checks are good, the problem still exists, replace the ECU.

Air Switching Valve

Air Switching Valve Circuit



1. Ignition Switch
2. Air Switching Valve
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. ECU Fuse 15 A
6. Relay Box
7. ECU Main Relay
8. ECU
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Frame Ground

Front Oxygen Sensor Heater

Front Oxygen Sensor Heater Inspection (Service Code 67)

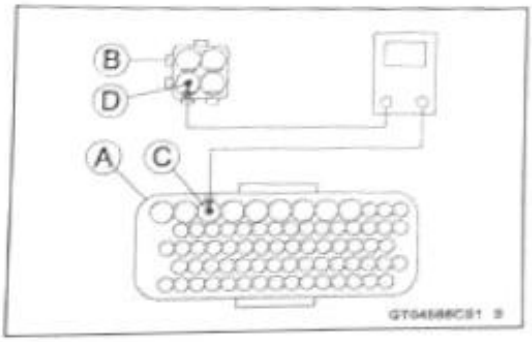
Front Oxygen Sensor Heater Removal

The front oxygen sensor heater is built in the front oxygen sensor. So, the heater itself can not be removed. Remove the front oxygen sensor (see Front Oxygen Sensor Removal(17-87)).

DTC P0030

(Checking wire for open circuit)

- Disconnect:
  Front Oxygen Sensor Connector (see Front Oxygen Sensor Removal(17-87))
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for continuity between harness connectors.



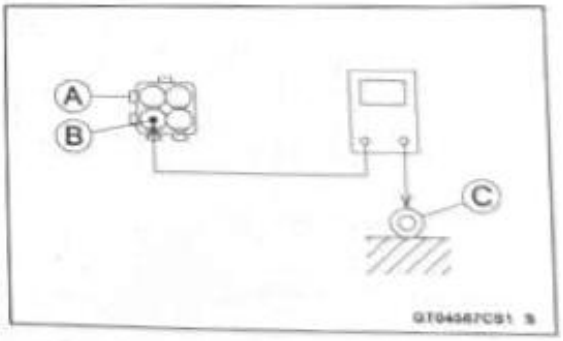
Wiring Continuity Inspection
ECU Connector [A] ← →
Front Oxygen Sensor Connector [B]
ECU Terminal 67 [C] ← → Sensor Terminal [D]

★If there is no continuity, repair or replace the main harness.
★If there is continuity, first check the front oxygen sensor wirings (see Front Oxygen Sensor Circuit(17-122)).
★If there is no continuity, repair or replace the main harness.
★If there is continuity, second check the terminals of the sensor and ECU for corrosion or bent.
★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0031

(Checking wire for short circuit to ground)

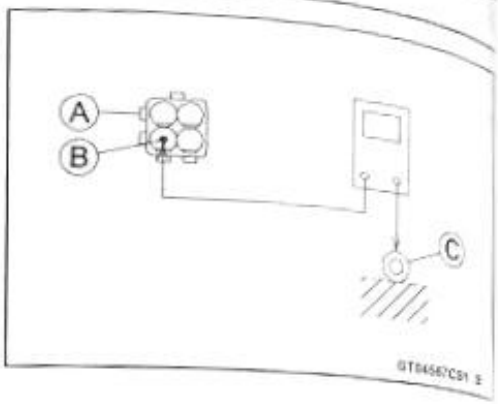
- Disconnect:
  Front Oxygen Sensor Connector (see Front Oxygen Sensor Removal(17-87))
  ECU Connectors (see ECU Removal(3-12))
- Check the wiring for short circuit to ground by checking continuity between the sensor connector [A] and frame ground terminal.



Wiring Continuity Inspection
P lead [B] ⟶ Frame Ground Terminal [C]

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the front oxygen sensor.
★Even if all checks are good, the problem still exists, replace the ECU.

Front Oxygen Sensor Heater



DTC P0032

(Checking wire for short circuit to power supply wire)

- Disconnect:
  Front Oxygen Sensor Connector (see Front Oxygen Sensor Removal(17-87))
- Connect the digital meter to the connector [A].

Measuring Voltage
Connection to Sensor Connector:
Digital Meter (+) → P lead [B]
Digital Meter (–) → Frame Ground Terminal [C]

- Measure the measuring voltage.
- Turn the ignition switch on.

★If the reading is DC 12 V or more, repair or replace the main harness.
★If the reading is less than DC 12 V, replace the front oxygen sensor.
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.

DTC P0053

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch off.
- Disconnect the front oxygen sensor connector (see Front Oxygen Sensor Removal(17-87)).

Front Oxygen Sensor Heater

• Connect the measuring adapter [A] between these connectors.
Main Harness [B]
Front Oxygen Sensor [C]
Special Tool - Measuring Adapter: 57001-1700

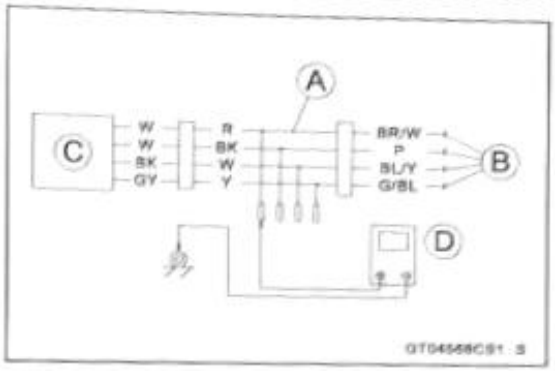
• Connect a digital meter [D] to the measuring adapter leads.

Front Oxygen Sensor Power Source Voltage
Connection to Adapter:
Digital Meter (+) → R (main harness BR/W) lead
Digital Meter (–) → Frame Ground Terminal

• Measure the power source voltage with the engine stopped and with the connector joined.
• Turn the ignition switch on.

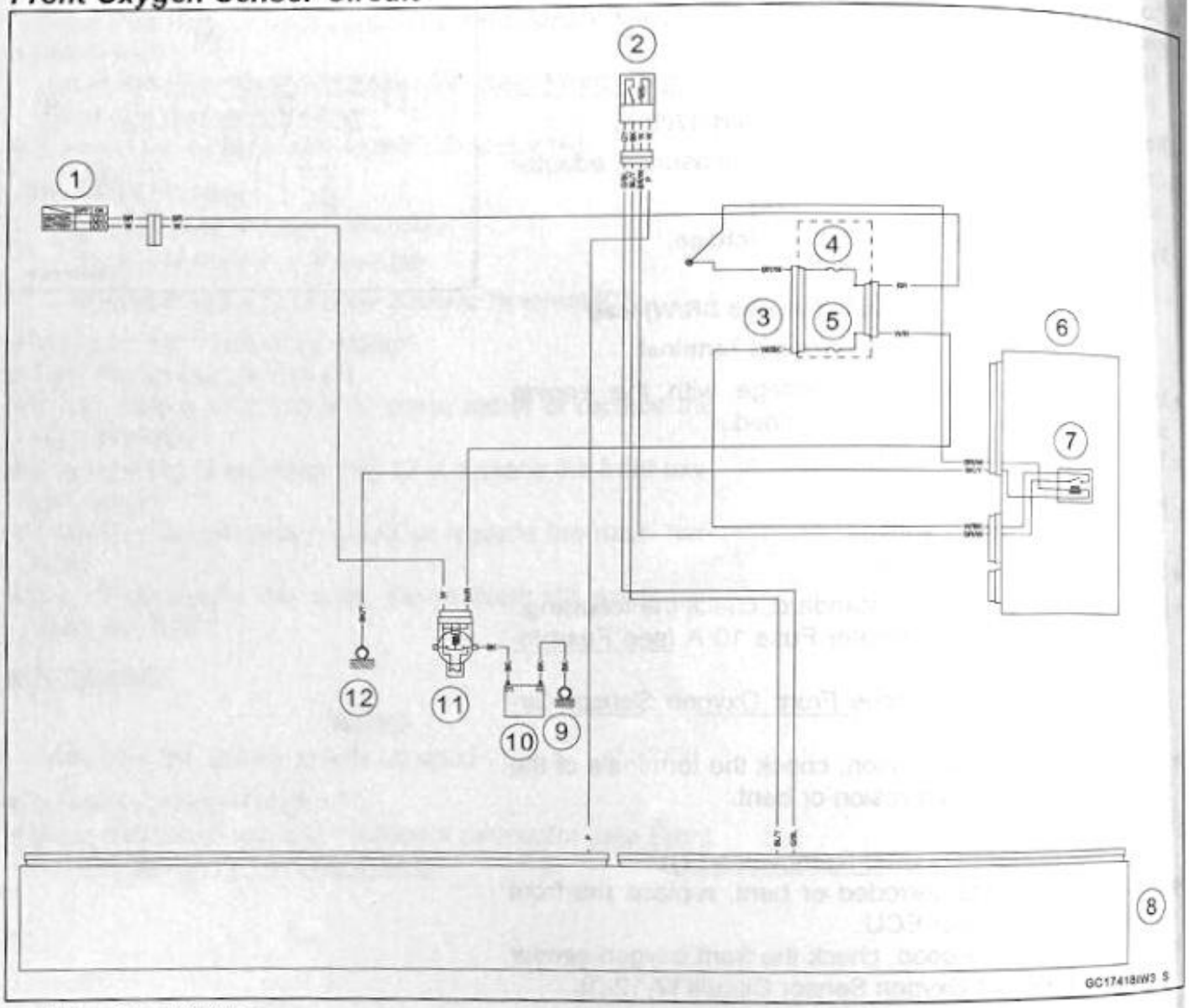
Power Source Voltage
Standard: Battery Voltage

• Turn the ignition switch off.
★If the reading is out of the standard, check the following.
Front Oxygen Sensor Heater Fuse 10 A (see Fuse Inspection(16-97))
Power Source Wiring (see Front Oxygen Sensor Circuit(17-122))
★If the reading is specification, check the terminals of the sensor and ECU for corrosion or bent.
○Remove:
ECU Connector (see ECU Removal(3-12))
★If the terminals are corroded or bent, replace the front oxygen sensor and/or ECU.
★If the terminals are good, check the front oxygen sensor wirings (see Front Oxygen Sensor Circuit(17-122)).
★If there is no continuity, repair or replace the main harness.
★Even if all checks are good, the problem still exists, replace the ECU.



Front Oxygen Sensor Heater

Front Oxygen Sensor Circuit



1. Ignition Switch
2. Front Oxygen Sensor
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. ECU Fuse 15 A
6. Relay Box
7. ECU Main Relay
8. ECU
9. Engine Ground
10. Battery
11. Main Fuse 30 A
12. Frame Ground

Starter Lockout Switch Inspection (Service Code 6D)

DTC P0704

- Inspect the starter lockout switch (see Switch Inspection(16-90)).

★If the starter lockout switch is bad condition, replace it.

★If the starter lockout switch is good condition, repair or replace the main harness.

★Even if all checks are good, the problem still exists, replace the ECU.

Battery Voltage

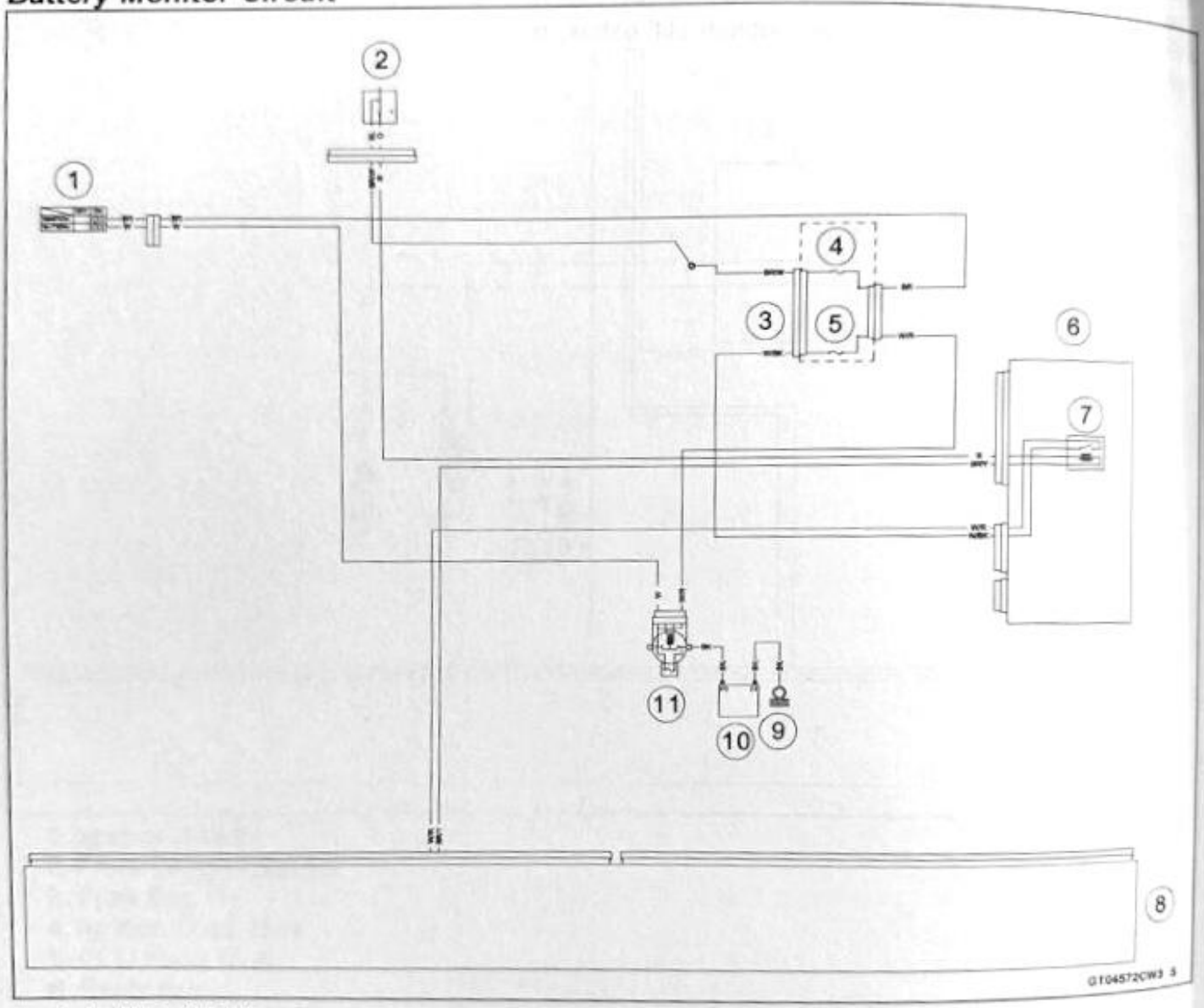
Battery Voltage Inspection (Service Code 97)

DTC P0562

- Refer to the Charging Condition Inspection (see Charging Condition Inspection(16-21)).

★If the battery voltage is good condition, replace the ECU.

Battery Monitor Circuit



1. Ignition Switch
2. Engine Start/Stop Switch (Engine Stop)
3. Fuse Box (1)
4. Ignition Fuse 15 A
5. ECU Fuse 15 A
6. Relay Box
7. Fuel Pump Relay
8. ECU
9. Engine Ground
10. Battery
11. Main Fuse 30 A

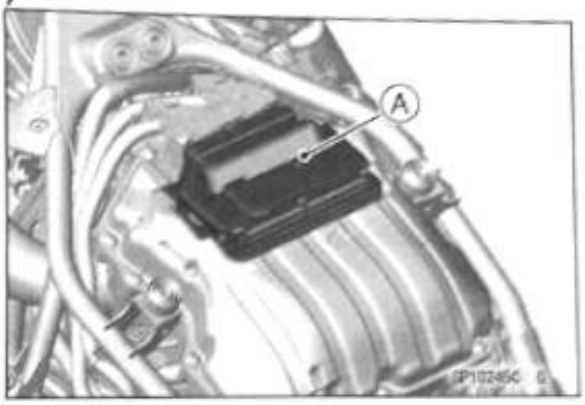
ETV Control Circuit

ETV Control Circuit Inspection (Service Code 98)

DTC P0607

○The ETV control circuit is controlled in the ECU [A].
So, the ETV control circuit cannot be inspected.

• When this code 98 is displayed, replace the ECU.



Anti-Lock Brake System

ABS Unit Solenoid Valve Inspection (Service Code 13, 14, 17, 18)

○These codes indicate there is a problem in the solenoid valves, which integrated into the ABS Hydraulic Unit. Therefore the solenoid valves cannot be checked directly.

- Check the system connectors for loose or poorly contact.
- In order to confirm a existing problem in the system, erase the service code (see Service Code Erasing(17-46)) and then perform the pre-diagnosis inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).

★If same service code is indicated again, faulty solenoid valve in the ABS hydraulic unit. Replace the ABS hydraulic unit.

★If the service code does not indicate, ABS system is normal (service code is not stored; temporary failure).

ABS Solenoid Valve Relay Inspection (Service Code 19)

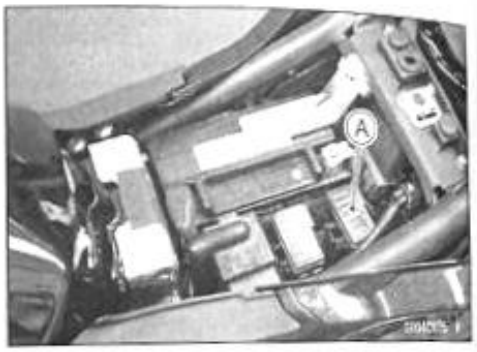
- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.

Step 1

- Check the ABS solenoid valve relay fuse 20 A in the fuse box (2) [A] for blown.

★If the ABS solenoid valve relay fuse is blown, replace the fuse.

★If the fuse is not blown, go to next step.

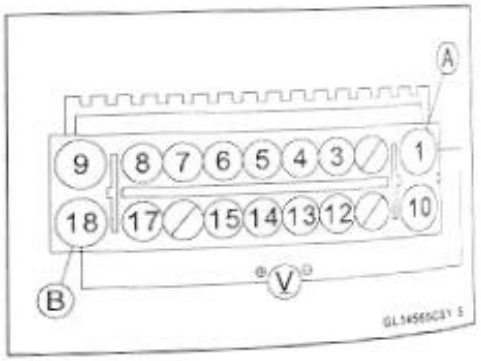


Step 2

- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 18 (R/BK) (+) [B] of the ABS hydraulic unit connector while the ignition switch turned on.

★If the battery voltage (10 – 16 V) does not appear, repair or replace the main harness.

★If the battery voltage (10 – 16 V) appeared, replace the ABS hydraulic unit.



Front, Rear Wheel Rotation Difference Abnormal Inspection (Service Code 25)

- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).

Step 1

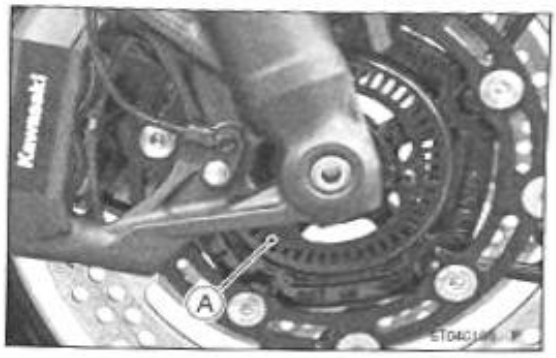
- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels and Tires Inspection(2-36)).

★If the tire and/or wheel are in bad condition, correct them to the normal condition.

★If there is no problem, go to next step.

Step 2
- Visually inspect the sensor rotor [A] for missing teeth or clogging with foreign matter (see Wheel Rotation Sensor Rotor Inspection(12-36)).

★Clean or correct the parts if necessary.
★If the all parts correct, go to next step.



Step 3
- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection(12-35)).

★If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.
★If the air gap is within the specification, replace the ABS hydraulic unit.

ABS Motor Inspection (Service Code 35)
- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.
- In order to confirm a existing problem in the system, erase the service code and then recheck the yellow ABS indicator light.

★If same service code is indicated again, faulty ABS Motor in the ABS hydraulic unit. Replace the ABS hydraulic unit.
★If the service code does not indicate, ABS system is normal (service code is not stored; temporary failure).

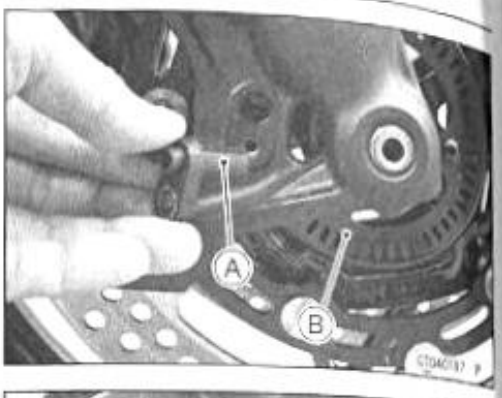
Wheel Rotation Sensor Signal Abnormal Inspection (Front: Service Code 42) (Rear: Service Code 44)
- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.

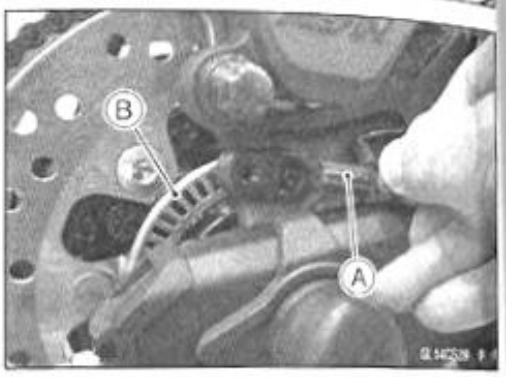
Step 1
- Measure the front or rear wheel rotation sensor air gap (see Wheel Rotation Sensor Air Gap Inspection(12-35)).

★If the air gap is not within the specification, recheck the hub bearing, sensor, sensor rotor and sensor installation condition.
★If the air gap is within the specification, go to next step.

Step 2
- Check that there is iron or other magnetic deposits between the front or rear wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.
★If all items are correct, go to next step.





Step 3
- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels and Tires Inspection(2-36)).

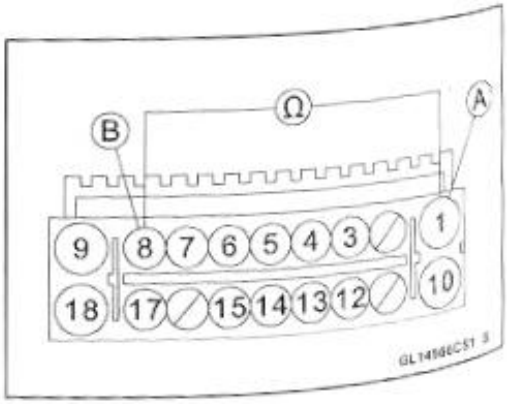
★If the tire and/or wheel are in bad condition, correct them if necessary and recheck.
★If all items are good condition, replace the ABS hydraulic unit.

Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)

OHowever the rear wheel rotation sensor inspection should be performed if this code is indicated (see Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)(17-130)).
- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.

Step 1
- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 8 (BK/W) [B] of the ABS hydraulic unit connector.

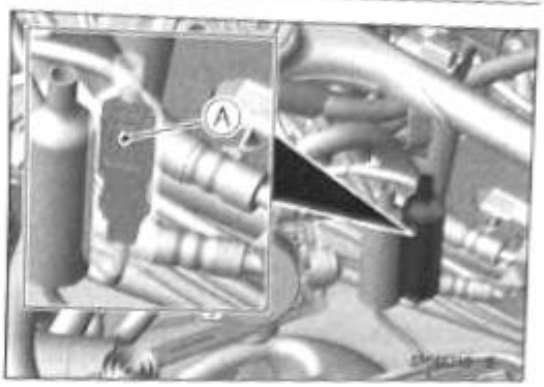
★If there is continuity, go to next step.
★If there is no continuity, inspect the rear wheel rotation sensor wiring (see Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)(17-130)). If the rear wheel rotation sensor wiring is good, go to step 2.



Anti-Lock Brake System

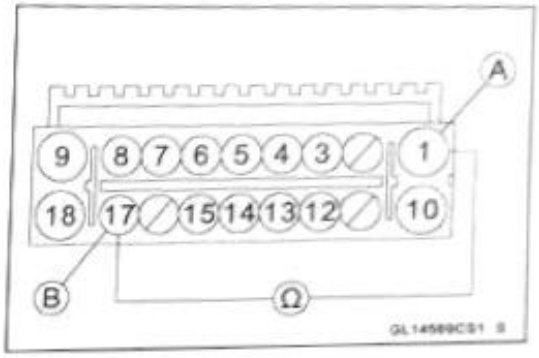
Step 1-1
- Disconnect the front wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 1 (BK/Y) and terminal 8 (BK/W) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the front wheel rotation sensor.



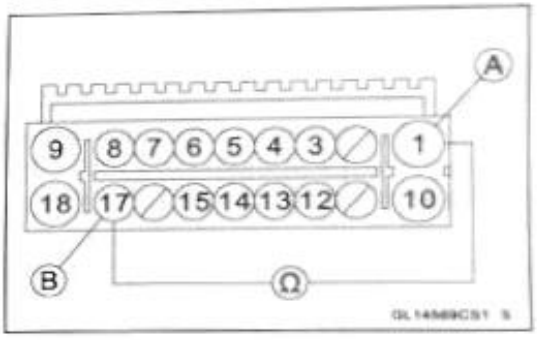
Step 2
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 17 (W/BK) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 3.



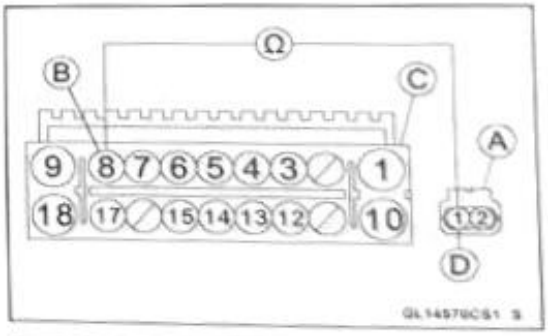
Step 2-1
- Disconnect the front wheel rotation sensor connector.
- Recheck the continuity between the terminal 1 (BK/Y) [A] and terminal 17 (W/BK) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the front wheel rotation sensor.



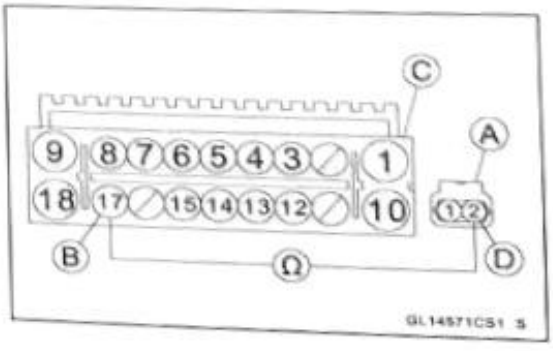
Step 3
- Disconnect the front wheel rotation sensor connector [A].
- Check for continuity between the terminal 8 (BK/W) [B] of the ABS hydraulic unit connector [C] and terminal 1 (BK/W) [D] of the front wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



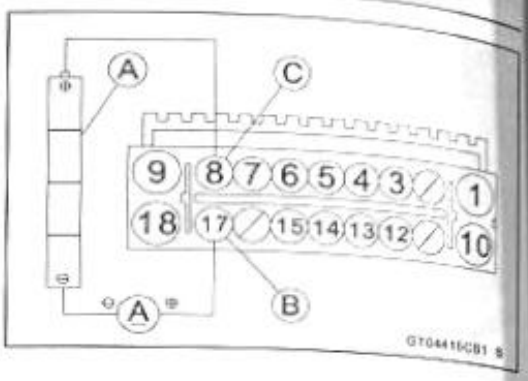
Step 4
- With disconnecting the front wheel rotation sensor connector [A], check for continuity between the terminal 17 (W/BK) [B] of the ABS hydraulic unit connector [C] and the 2 (W/BK) terminal [D] of the front wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Step 5
- Connect the front wheel rotation sensor connector.
- Connect the 4.5 – 16 V DC power (e.g. three AA dry battery in series [A]) between the terminal 17 (W/BK) (–) [B] and terminal 8 (BK/W) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

○Be careful not to reverse connection of the DC power polarity.
○The measured DC amperage should be within 3 – 17 mA.
★If measurement is abnormal, replace the front wheel rotation sensor.
★If measurement is normal, replace the ABS hydraulic unit.

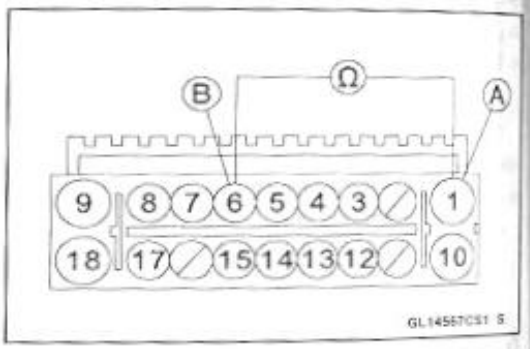


Rear Wheel Rotation Sensor Wiring Inspection (Service Code 45)

○However the front wheel rotation sensor inspection should be performed if this code is indicated (see Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)(17-128)).
- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.

Step 1
- Disconnect the ABS hydraulic unit connector.
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 6 (BK/O) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, inspect the front wheel rotation sensor wiring (see Front Wheel Rotation Sensor Wiring Inspection (Service Code 43)(17-128)). If the front wheel rotation sensor wiring is good, go to step 2.

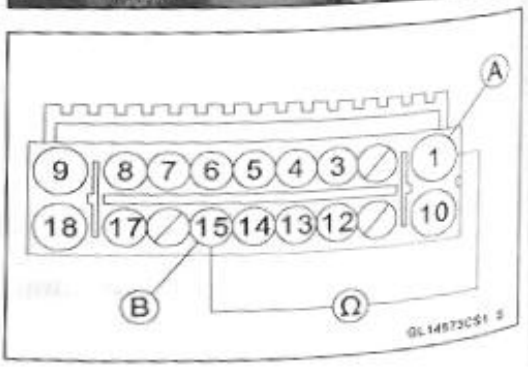


Step 1-1
- Disconnect the rear wheel rotation sensor connector [A].
- Recheck the continuity between the terminal 1 (BK/Y) and terminal 6 (BK/O) of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.

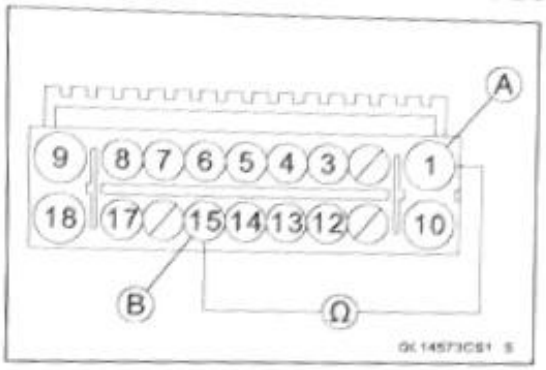
Step 2
- Check for continuity between the terminal 1 (BK/Y) [A] and terminal 15 (W/G) [B] of the ABS hydraulic unit connector.

★If there is continuity, go to next step.
★If there is no continuity, go to step 3.



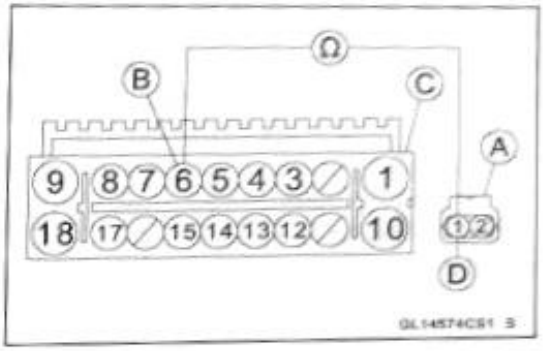
Step 2-1
- Disconnect the rear wheel rotation sensor connector.
- Recheck the continuity between the terminal 1 (BK/Y) [A] and terminal 15 (W/G) [B] of the ABS hydraulic unit connector.

★If there is continuity, repair or replace the main harness.
★If there is no continuity, replace the rear wheel rotation sensor.



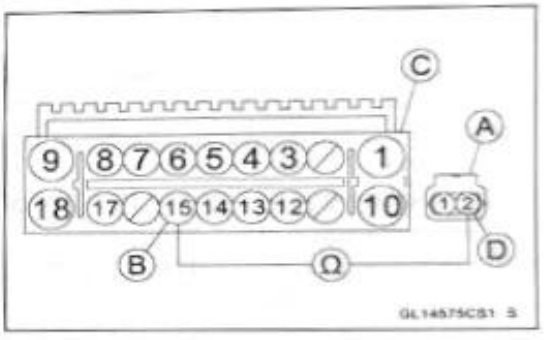
Step 3
- Disconnect the rear wheel rotation sensor connector [A].
- Check for continuity between the terminal 6 (BK/O) [B] of the ABS hydraulic unit connector [C] and terminal 1 (BK/O) [D] of the rear wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



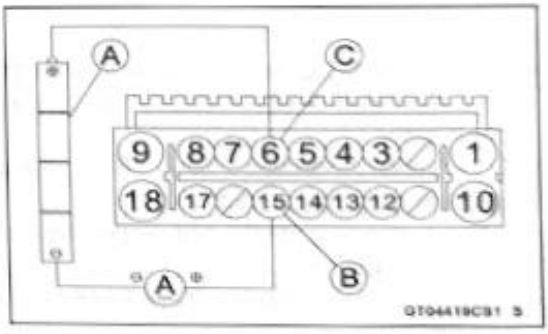
Step 4
- With disconnecting the rear wheel rotation sensor connector [A], check for continuity between the terminal 15 (W/G) [B] of the ABS hydraulic unit connector [C] and terminal 2 (W/G) [D] of the rear wheel rotation sensor connector (main harness side).

★If there is no continuity, repair or replace the main harness.
★If there is continuity, go to next step.



Step 5
- Connect the rear wheel rotation sensor connector.
- Connect the 4.5 – 16 V DC power (e.g. three AA dry battery in series [A]) between the terminal 15 (W/G) (–) [B] and terminal 6 (BK/O) (+) [C] of the ABS hydraulic unit connector to measure DC amperage.

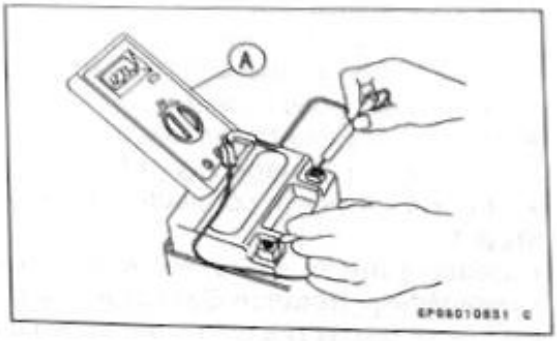
○Be careful not to reverse connection of the DC power polarity.
○The measured DC amperage should be within 3 – 17 mA.
★If measurement is abnormal, replace the rear wheel rotation sensor.
★If measurement is normal, replace the ABS hydraulic unit.



Power Supply Voltage Abnormal Inspection (Service Code 52: Low Voltage) (Service Code 53: High Voltage)

Step 1
- Measure the battery terminal voltage using a voltmeter [A].

○The battery voltage should be within 10 – 16 V.
★If the voltage is not within the specifications, recharge or replace the battery.
★If the voltage within the specifications, go to next step.



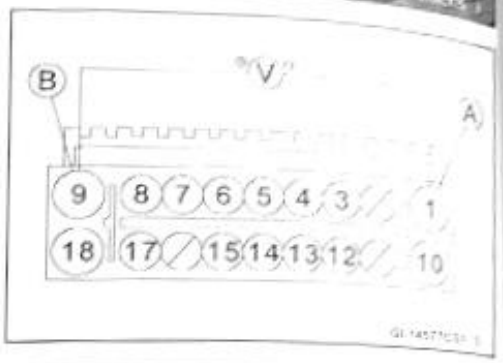
Anti-Lock Brake System

Step 2
- Check the ABS motor relay fuse 30 A and ABS solenoid valve relay fuse 20 A in the fuse box (2) [A] for blown.

★If the fuse(s) is blown, replace the fuse(s).
★If the fuse(s) is not blown, go to next step.

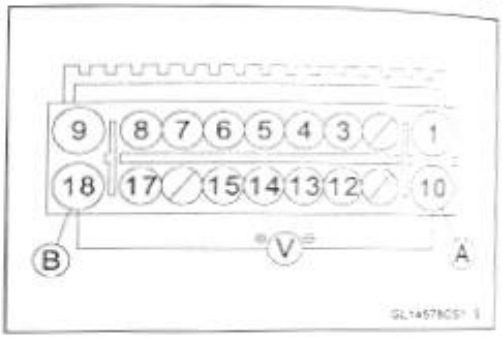
Step 3
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 9 (R/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 – 16 V) should appear while the ignition switch turned on.
★If the battery voltage does not appear, repair or replace the main harness.
★If the battery voltage appeared, go to next step.



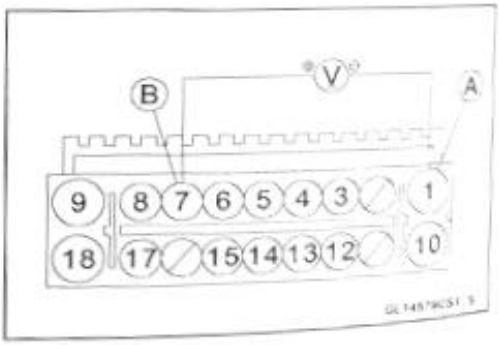
Step 4
- Disconnect the ABS hydraulic unit connector.
- Check the voltage between the terminal 10 (BK/Y) (–) [A] and terminal 18 (R/BK) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 – 16 V) should appear while the ignition switch turned on.
★If the battery voltage does not appear, repair or replace the main harness.
★If the battery voltage appeared, go to next step.



Step 5
- Check the voltage between the terminal 1 (BK/Y) (–) [A] and terminal 7 (BR/W) (+) [B] of the ABS hydraulic unit connector.

○The battery voltage (10 – 16 V) should appear while the ignition switch turned on.
★If the battery voltage not appeared, repair or replace the main harness.
★If the battery voltage does appear, replace the ABS hydraulic unit.



ABS Hydraulic Unit Internal Error Inspection (Service Code 55)

○This service code indicates there is an internal error for the ECU integrated with the ABS hydraulic unit regarding the wheel speed detection.
- Perform the Pre-Diagnosis Inspection 1 and 2 (see ABS Pre-Diagnosis Inspection(17-33)).
- Check the system connectors for loose or poorly contact.

Step 1
- Measure the front and rear wheel rotation sensor air gaps (see Wheel Rotation Sensor Air Gap Inspection(12-35)).

★If the air gap is not within the specification, correct the air gap accordingly.
★If the air gap is within the specification, go to next step.

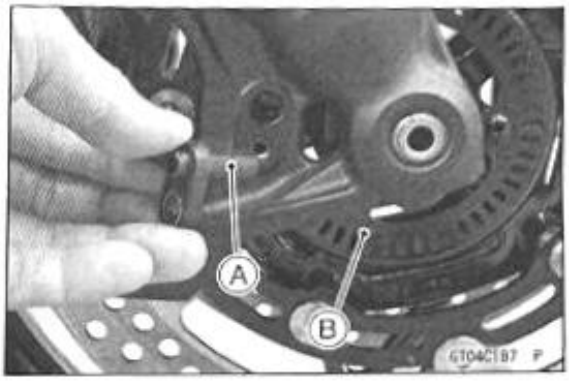
Anti-Lock Brake System

Step 2

- Check that there is iron or other magnetic deposits between the both wheel rotation sensor [A] and sensor rotor, and the sensor rotor slots [B] for obstructions.
- Check the installation condition of the sensor for looseness.
- Check the sensor tip and sensor rotor slots for deformation or damage (e.g. chipped sensor rotor teeth).

★If the sensor and sensor rotor in bad condition, clean or replace the faulty parts.

★If all items are correct, go to next step.



Step 3

- Check the front and rear tire/wheel conditions for tire pressure, tire size/types, abnormal wear and deformations (see Wheels and Tires Inspection(2-36)).

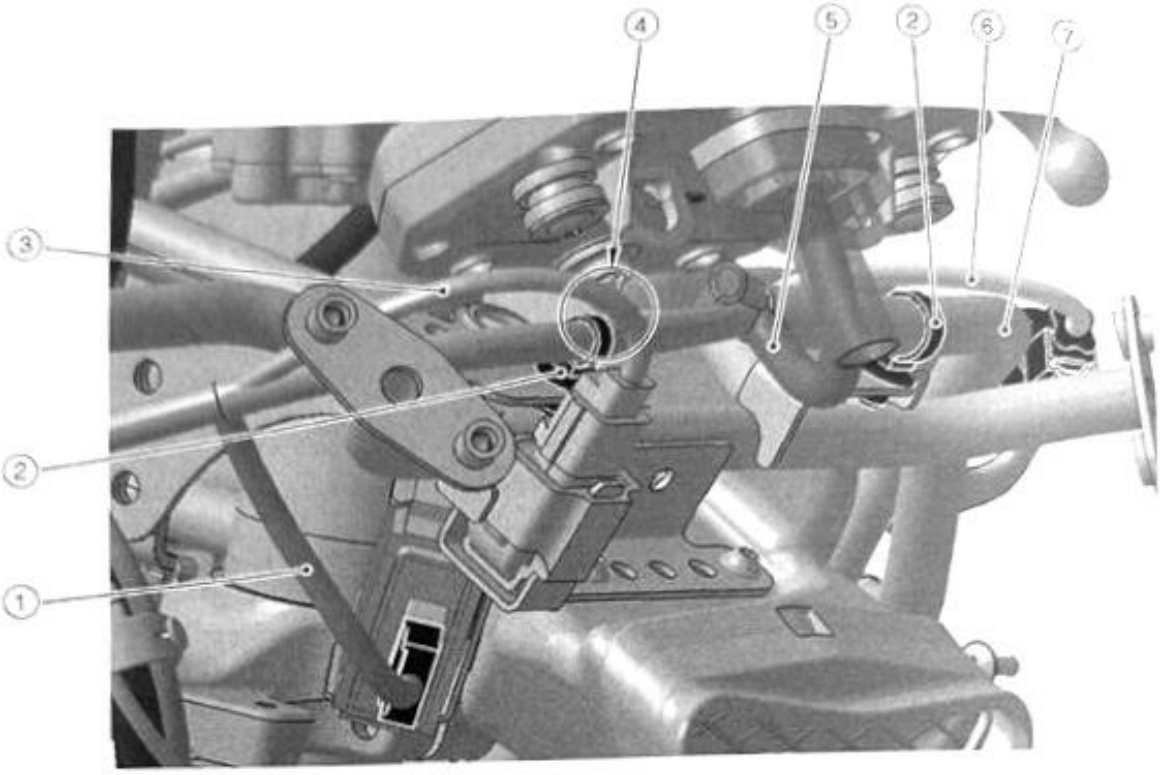
★If the tire and/or wheel are in bad condition, correct them to the normal condition.

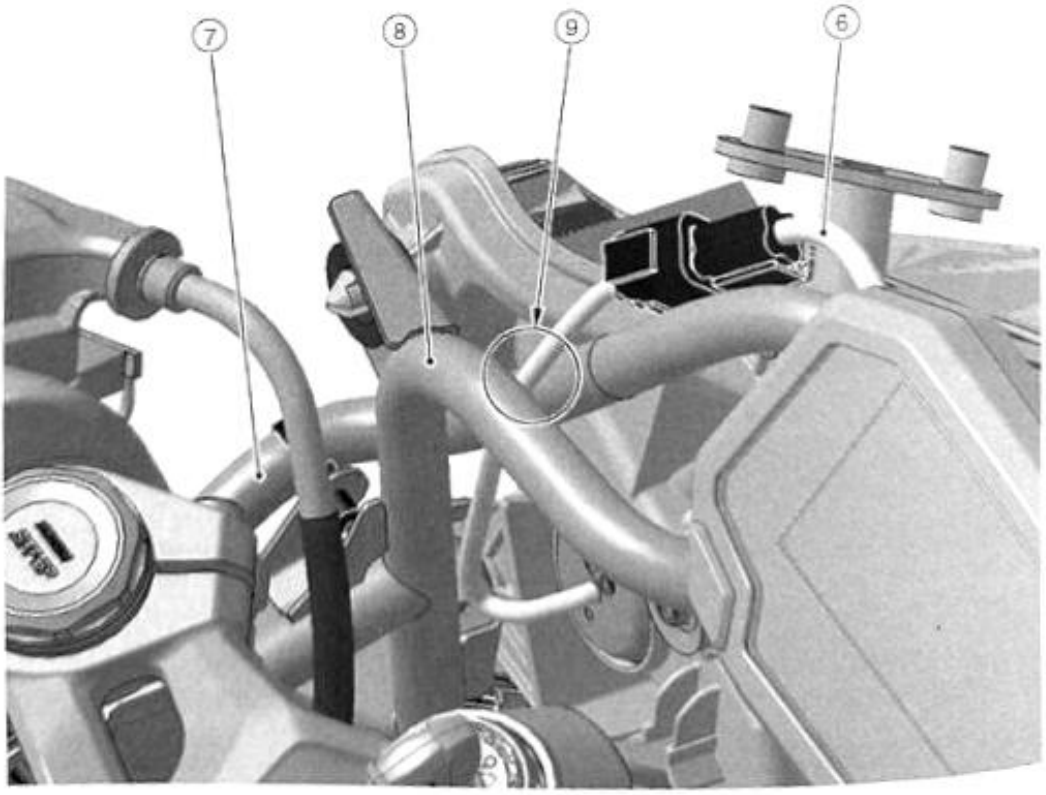
★If there is no problem, replace the ABS hydraulic unit.

Appendix

Table of Contents

Cable, Wire, and Hose Routing

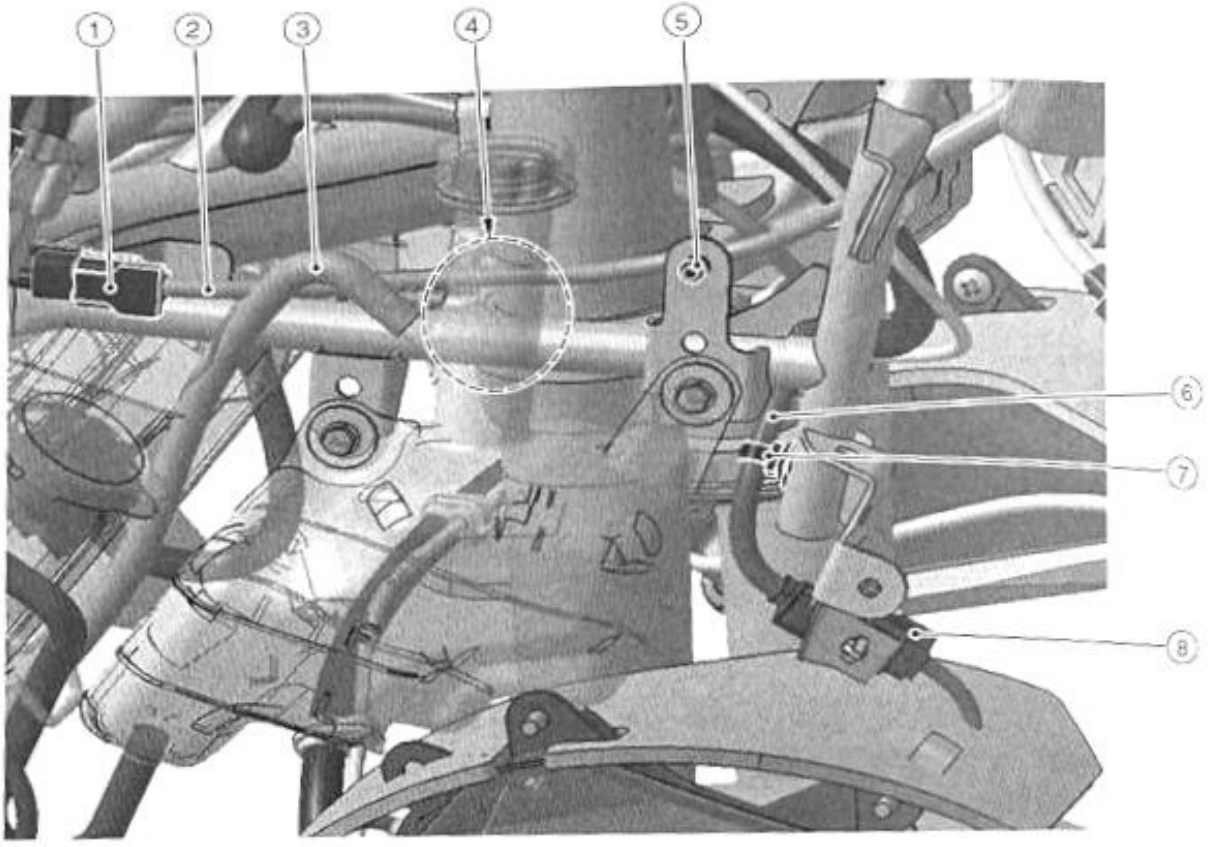


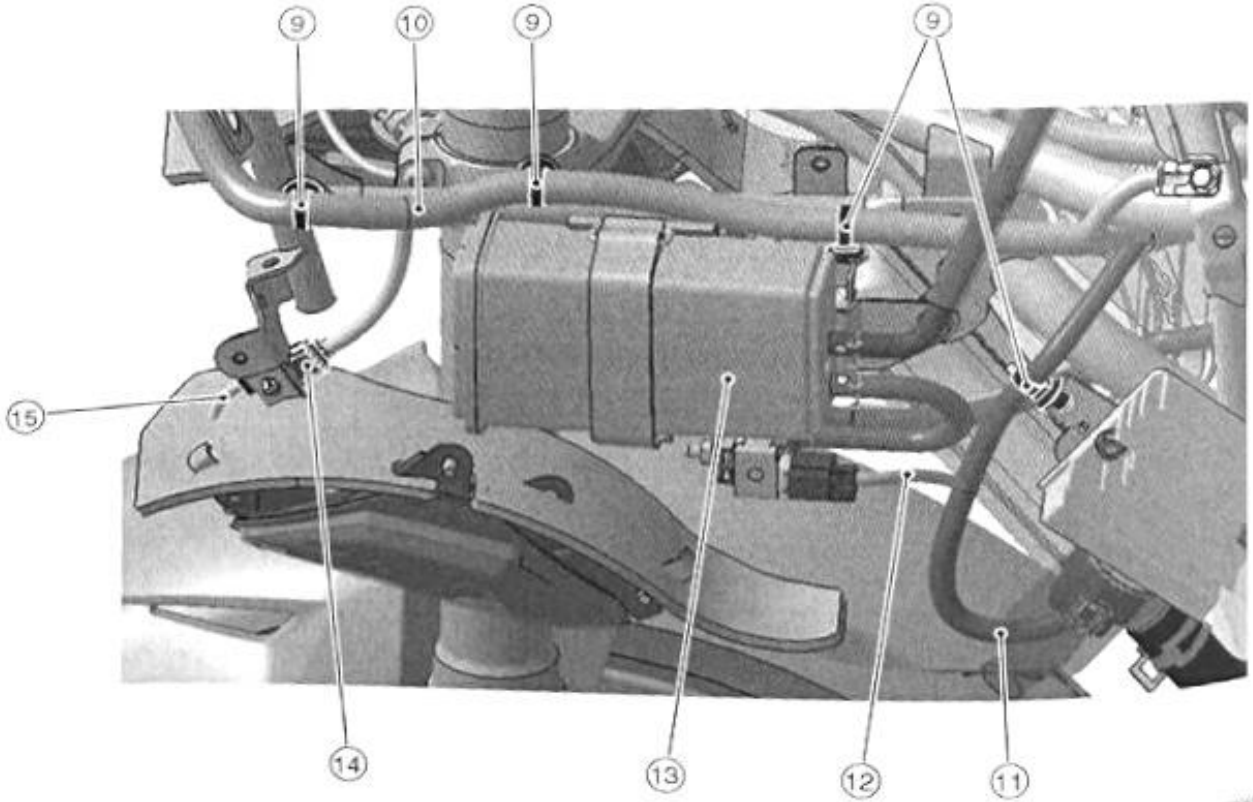


Cable, Wire, and Hose Routing

1. Immobilizer Amplifier Lead (Equipped Models)
2. Clamps (Hold the main harness. Install them to the bracket.)
3. Vehicle-down Sensor Lead
4. Run the vehicle-down sensor lead to the upside of the main harness.
5. Meter Lead
6. Headlight Lead
7. Main Harness
8. Upper Fairing Bracket
9. Run the headlight lead between the main harness and upper fairing bracket.

Cable, Wire, and Hose Routing

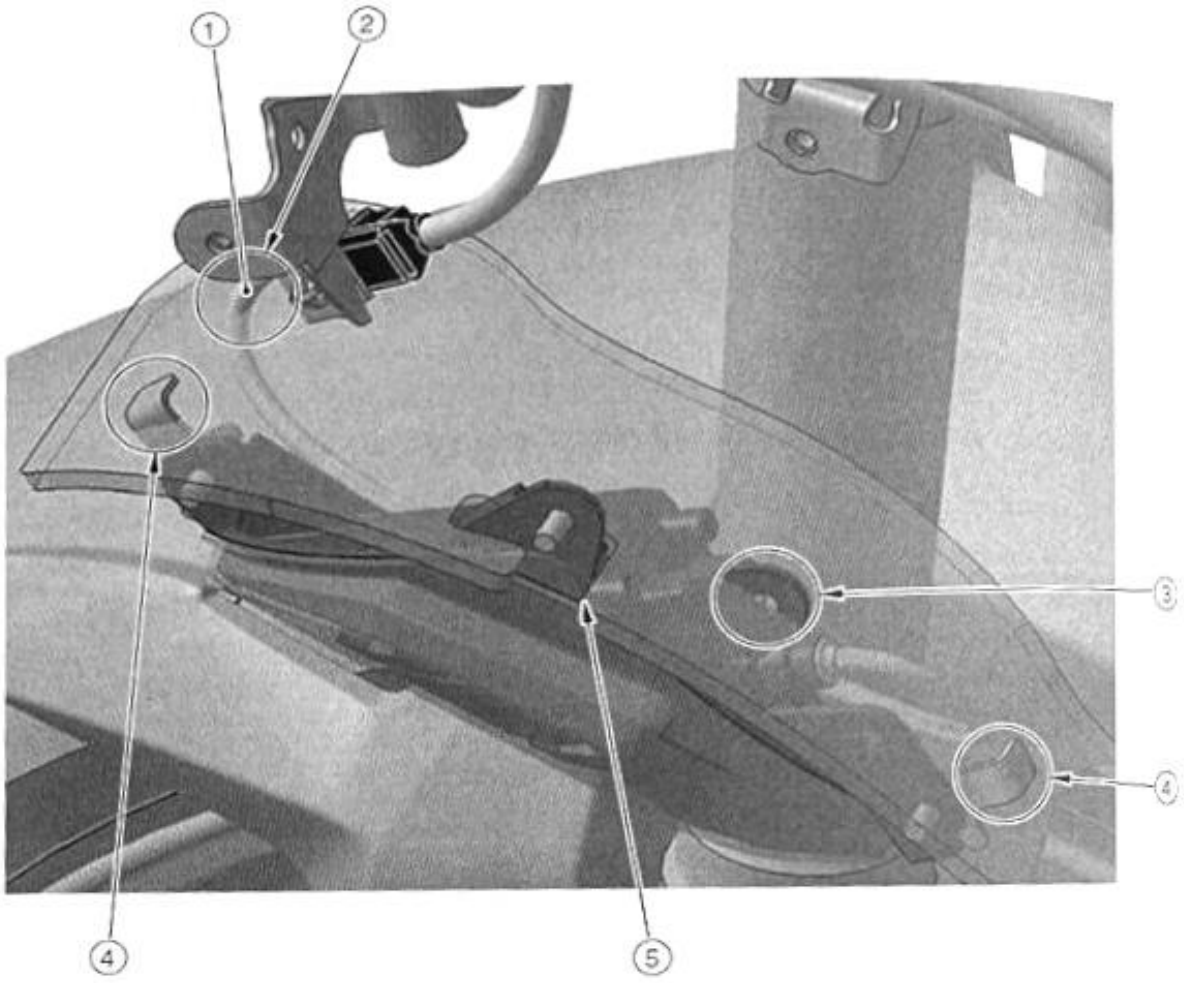




Cable, Wire, and Hose Routing

1. Immobilizer Antenna Connector (Install it to the bracket.) (Equipped Models)
2. Immobilizer Antenna Lead (Equipped Models)
3. Reserve Tank Overflow Hose
4. Do not pinch the immobilizer antenna lead between the upper fairing pipe and inlet of the reserve tank. (Equipped Models)
5. Clamp (Hold the immobilizer antenna lead. Install it to the bracket.) (Equipped Models)
6. Front Right Turn Signal Light Lead
7. Clamp (Hold the front right turn signal light lead. Install it to the bracket.)
8. Front Right Turn Signal Light Connector (Install it to the bracket.)
9. Clamps (Hold the main harness. Install them to the brackets.)
10. Main Harness
11. Regulator/Rectifier Lead
12. Purge Valve Lead
13. Canister
14. Front Left Turn Signal Light Connector (Install it to the bracket.)
15. Front Left Turn Signal Light Lead

Cable, Wire, and Hose Routing



1. Front Left or Right Turn Signal Light Lead
2. Insert the front turn signal light lead into the slit of the pad before installing the pad.
3. Insert the front turn signal light into the pad hole.
4. Insert the brackets into the slits of the pad.
5. Insert the front turn signal light into the pad.

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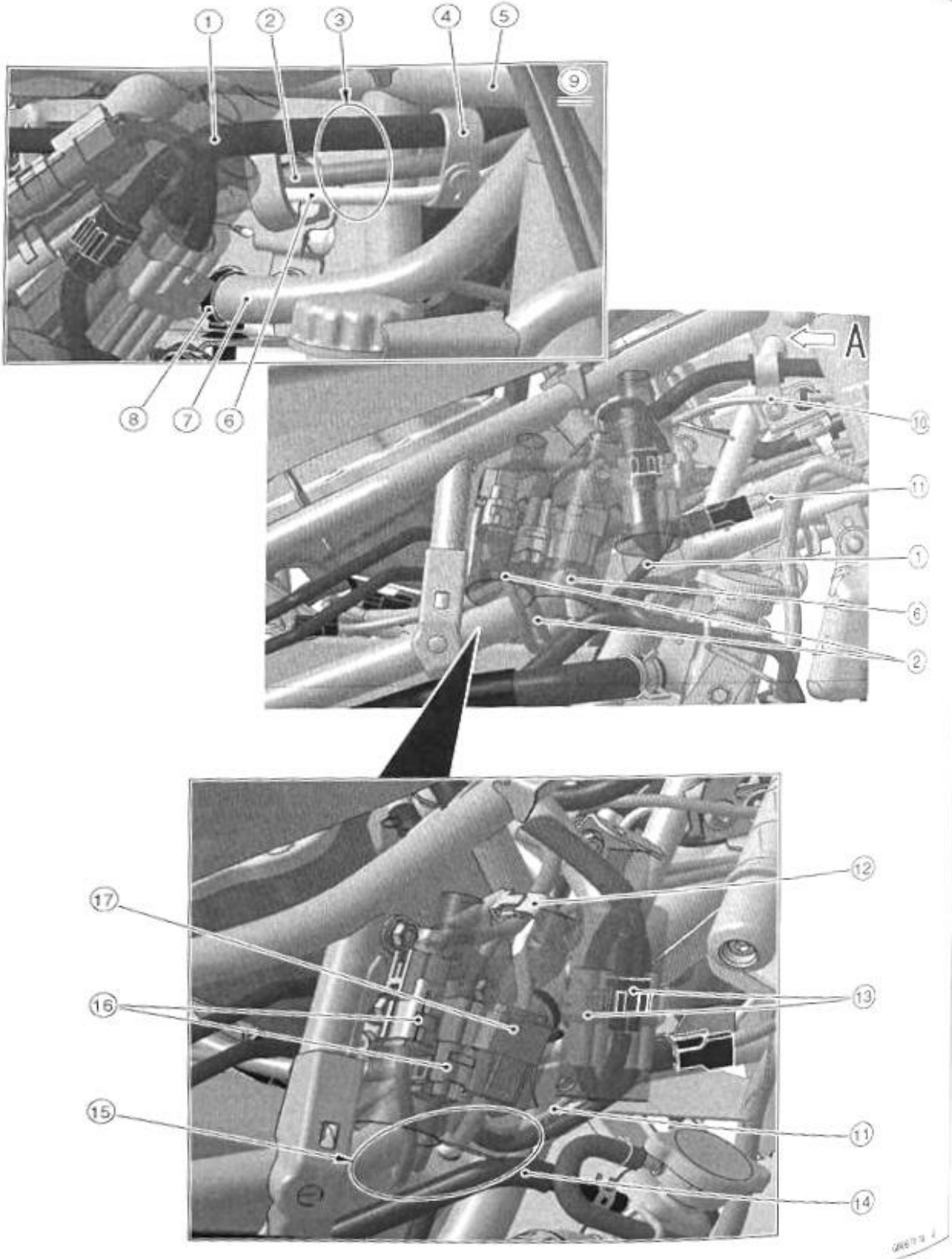
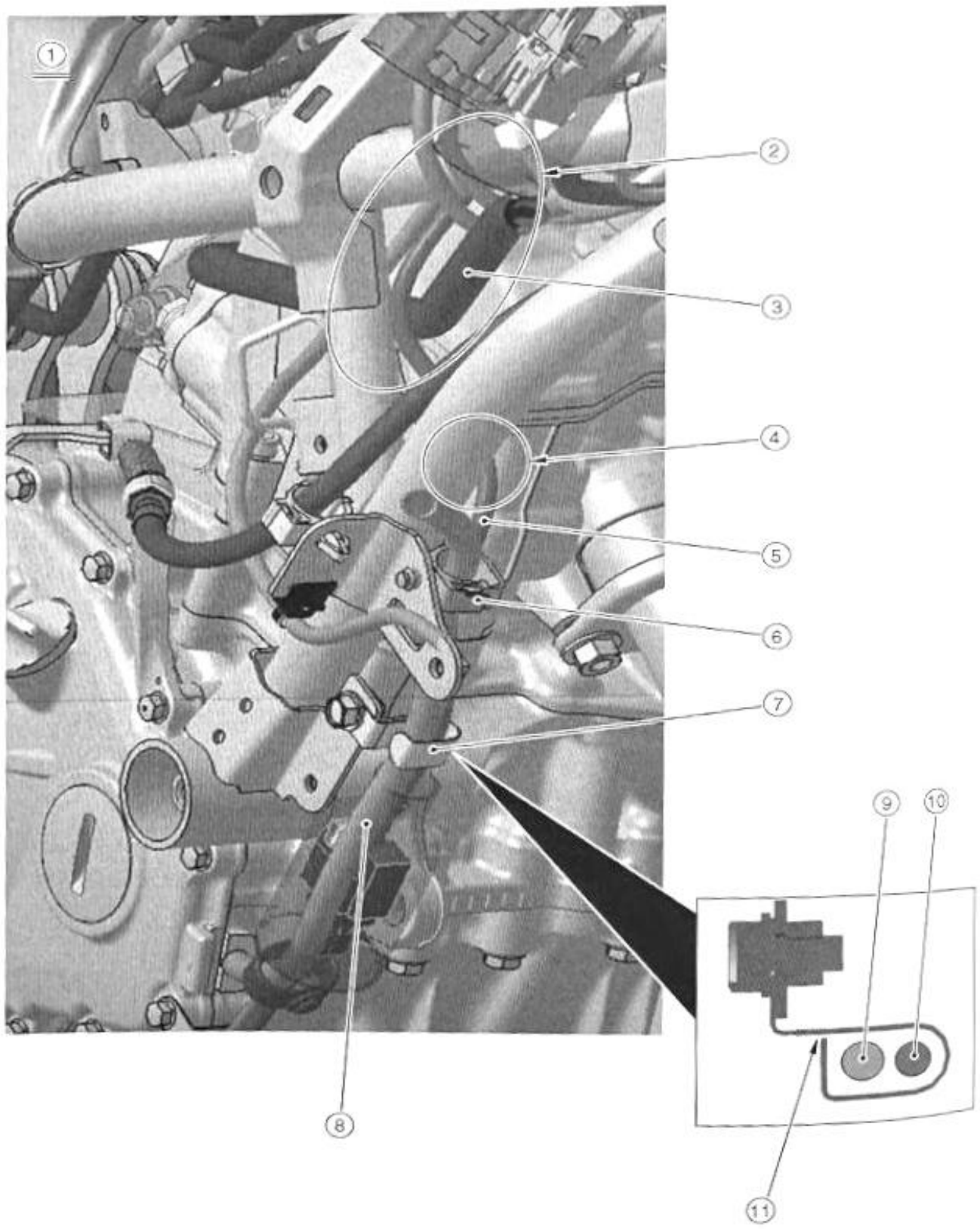
Cable, Wire, and Hose Routing



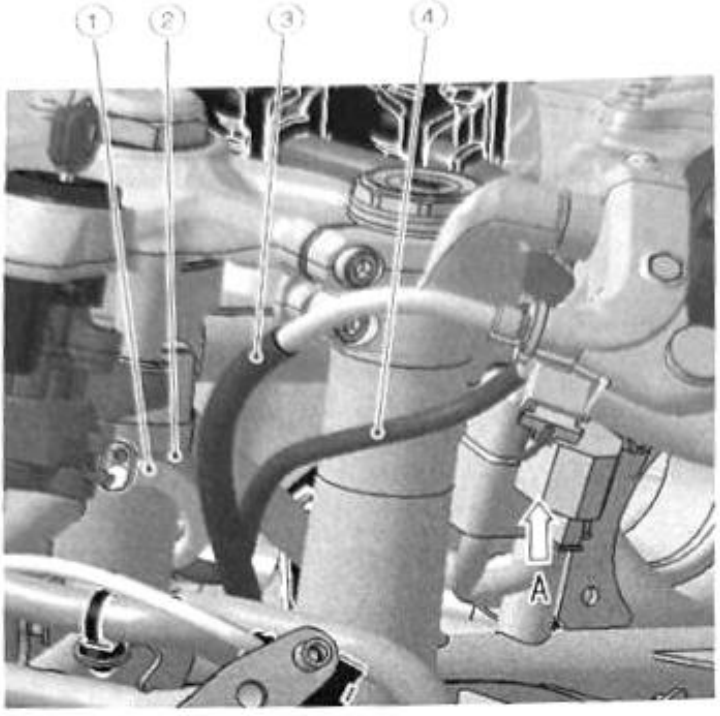
Cable, Wire, and Hose Routing

1. Left Switch Housing Lead
2. Right Switch Housing Leads
3. Run the left switch housing lead to the upside of the other leads.
4. Clamp (Hold the left and right switch housing leads and ignition switch lead at under the frame pipe.)
5. Frame Pipe
6. Ignition Switch Lead
7. Main Harness
8. Clamp (Hold the main harness. Install it to the frame bracket.)
9. Viewed from A
10. Horn Lead
11. Immobilizer Antenna Lead (Equipped Models)
12. Clamp (Hold the right switch housing leads and ignition switch lead at the tape position on the leads. Face the clamp opening upward.)
13. Left Switch Housing Connectors
14. Air Bleeder Hose
15. Run the switch housing leads, ignition switch lead and immobilizer antenna lead (equipped models) between the frame pipe and air bleeder hose.
16. Right Switch Housing Connectors
17. Ignition Switch Connector

Cable, Wire, and Hose Routing



1. Viewed from Front Right Side
2. Run the front oxygen sensor lead between frame pipe and air bleeder hose.
3. Air Bleeder Hose
4. Run the front oxygen sensor lead inside the frame pipe.
5. Front Oxygen Sensor Lead
6. Clamp (Hold the crankshaft sensor/oil pressure switch lead and front oxygen sensor. Install it to the frame.)
7. Clamp (Hold the crankshaft sensor/oil pressure switch lead and front oxygen sensor.)
8. Crankshaft Sensor/Oil Pressure Switch Lead
9. Crankshaft Sensor/Oil Pressure Switch Lead (Position it outside in the clamp.)
10. Front Oxygen Sensor Lead (Position it inside in the clamp.)
11. Bend the clamp until clamp opening close.


1
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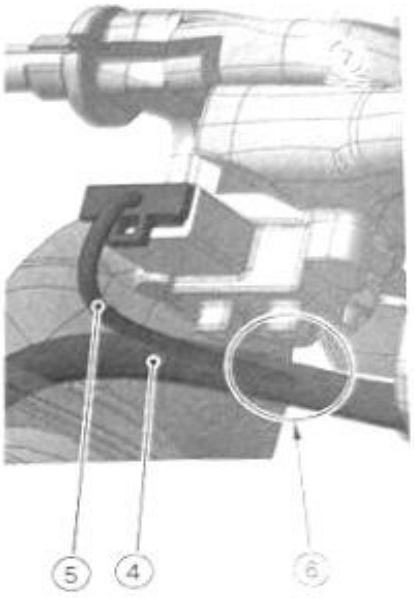
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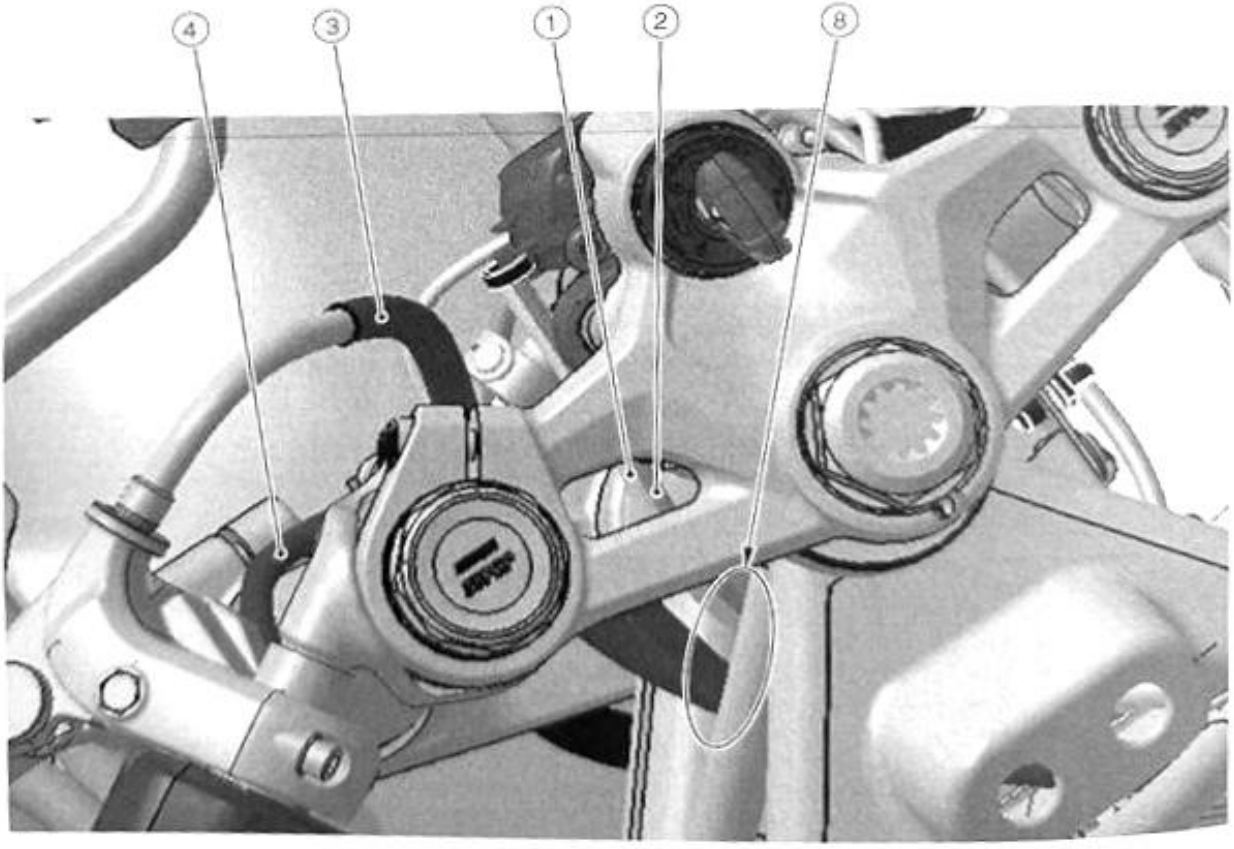
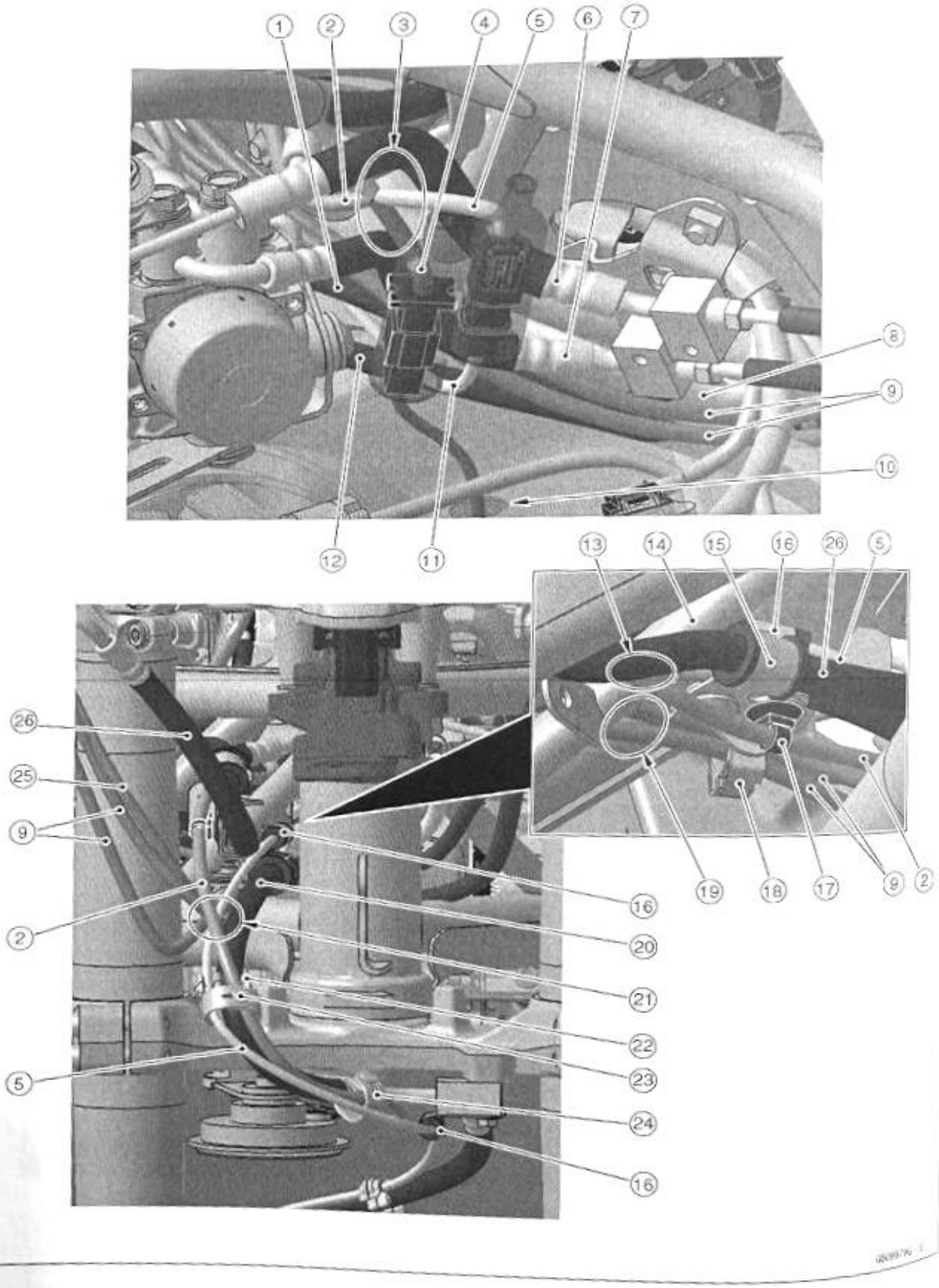

4
3
1
2
8

Cable, Wire, and Hose Routing

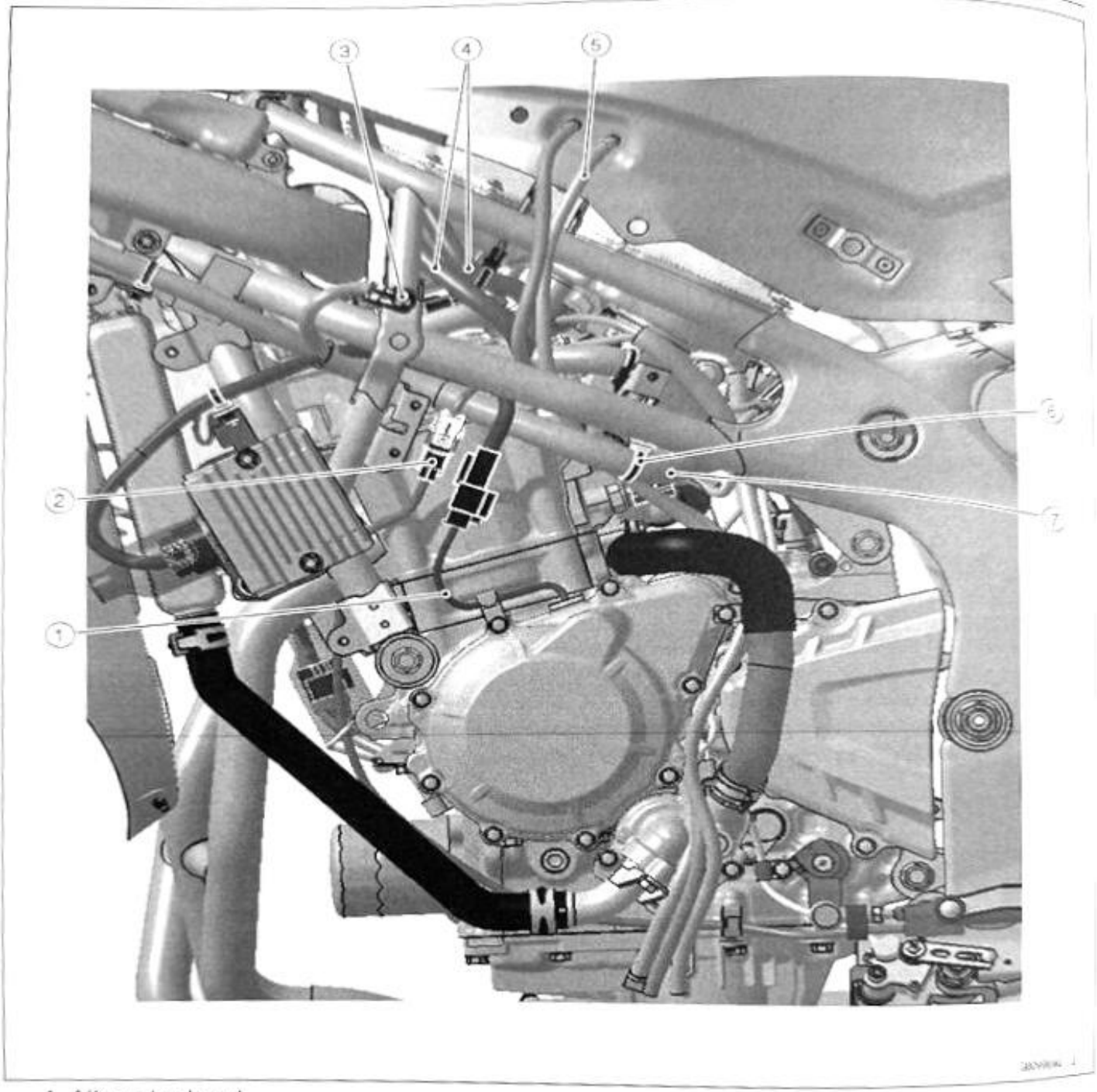
1. Ignition Switch Lead
2. Immobilizer Antenna Lead (Equipped Models)
3. Clutch Cable
4. Left Switch Housing Lead
5. Starter Lockout Switch Lead
6. Do not twist the left switch housing lead and starter lockout switch lead.
7. Viewed from A
8. Run the ignition switch lead, clutch cable, left switch housing lead and immobilizer antenna lead (equipped models) between the frame pipes.

Cable, Wire, and Hose Routing



1. Left Switch Housing Lead
2. Horn Lead
3. Run the radiator fan motor lead and front wheel rotation sensor lead between the rear brake hoses.
4. Radiator Fan Motor Lead
5. Front Wheel Rotation Sensor Lead
6. Rear Brake Hose (ABS Hydraulic Unit – Rear Brake Caliper)
7. Rear Brake Hose (ABS Hydraulic Unit – Rear Master Cylinder)
8. Ignition Switch Lead
9. Right Switch Housing Leads
10. Run the radiator fan motor lead through the hole in the heat insulation rubber plate.
11. Run the front wheel rotation sensor lead to the upside of the clutch cable. Run the front wheel rotation sensor lead under the other leads.
12. Clutch Cable
13. Run the horn lead between the front brake hose [26] and frame pipe.
14. Frame Pipe
15. Bracket (Hold the front brake hoses.)
16. Brackets (Hold the front wheel rotation sensor lead.)
17. Clamp (Hold the horn lead. Install it to the bracket.)
18. Clamp (Hold the right switch housing leads and front brake light switch lead. Install it to the bracket.)
19. Run the right switch housing leads and front brake light switch lead between the frame pipes.
20. Front Brake Hose (ABS Hydraulic Unit – Front Brake Caliper)
21. Run the horn lead to the upside of the front wheel rotation sensor lead.
22. Clamp (Hold the front brake hose [20] and front wheel rotation sensor lead at the mark position of the sensor lead. Face the clamp opening forward.)
23. Clamp (Hold the front brake hose [20], front wheel rotation sensor lead and horn lead. Position it under the clamp [22].)
24. Clamp (Hold the front brake hose [20] and horn lead at the position of the metal part on the front brake hose and the tape on the horn lead.)
25. Front Brake Light Switch Lead
26. Front Brake Hose (Front Master Cylinder – ABS Hydraulic Unit)

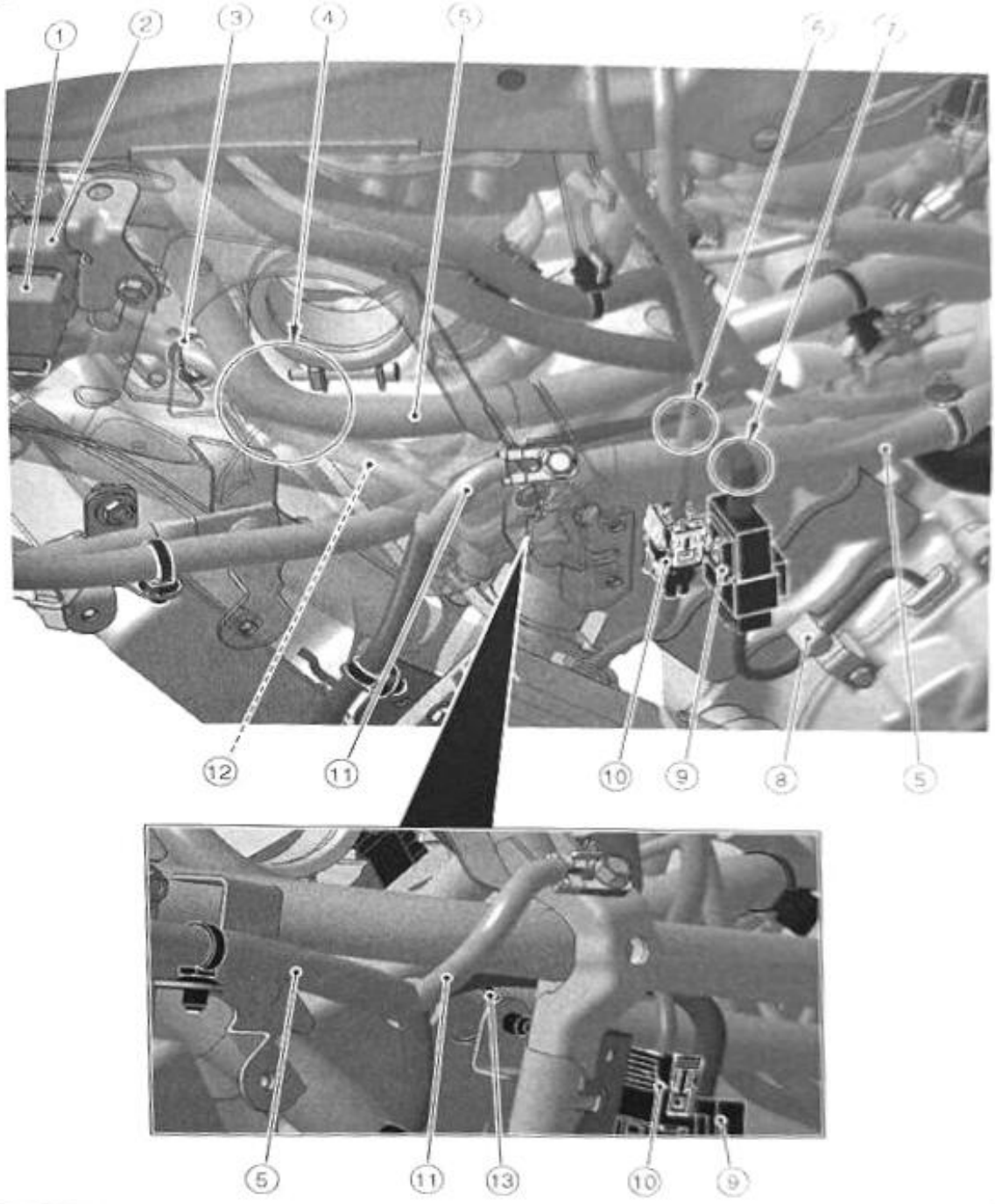
Cable, Wire, and Hose Routing



1. Alternator Lead
2. Quick Shifter Sensor Connector
3. Frame Ground Terminal
4. ECU Leads
5. Fuel Tank Drain Hose
6. Clamp (Hold the main harness.)
7. Main Harness

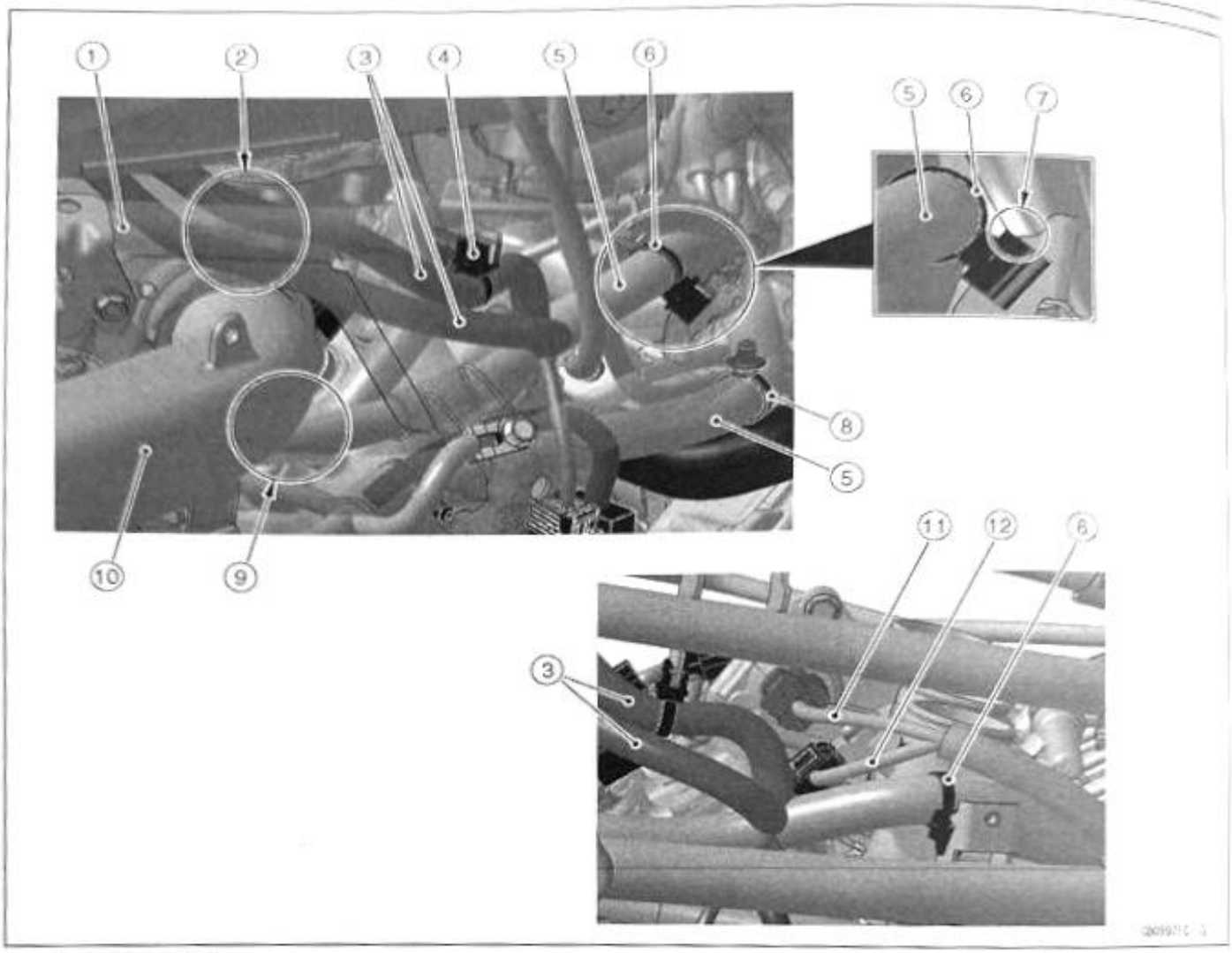
NOTE

○*When replacing the harness, attach the clamp [6] to the frame first.*



1. Turn Signal Relay
2. ETV Actuator Relay
3. Clamp (Hold the main harness (to relays). Install it to the frame.)
4. Run the main harness (to relays) under the main harness.
5. Main Harness
6. Run the quick shifter lead between the alternator lead and frame.
7. Run the alternator lead between the main harness and frame.
8. Clamp (Hold the alternator lead.)
9. Alternator Connector (Install it to the bracket.)
10. Quick Shifter Sensor Connector (Install it to the bracket.)
11. Frame Ground Lead
12. Main Harness (to Relays)
13. Clamp (Hold the main harness.)

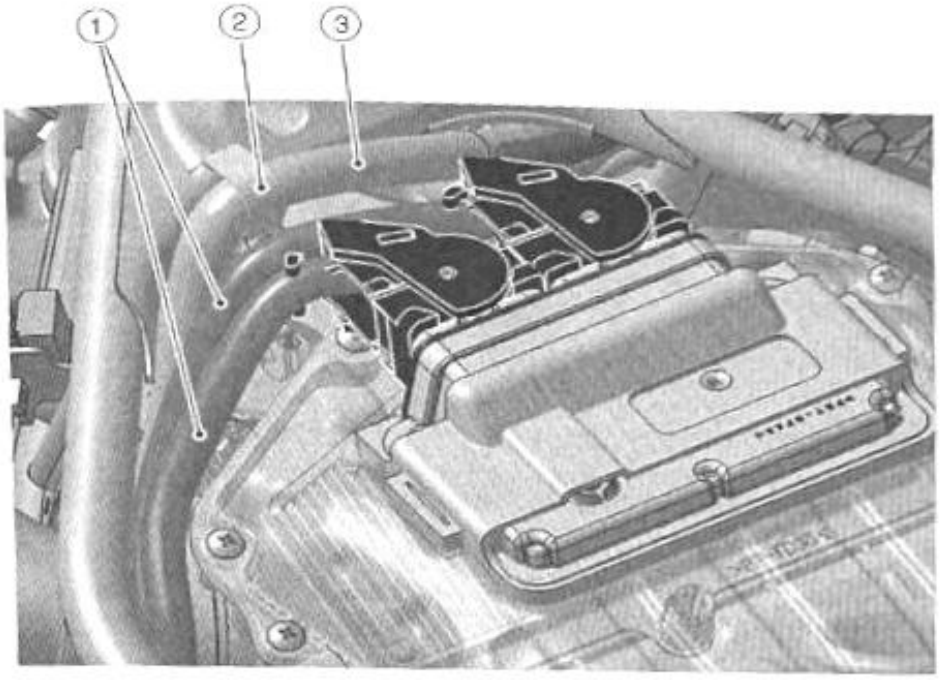
Cable, Wire, and Hose Routing

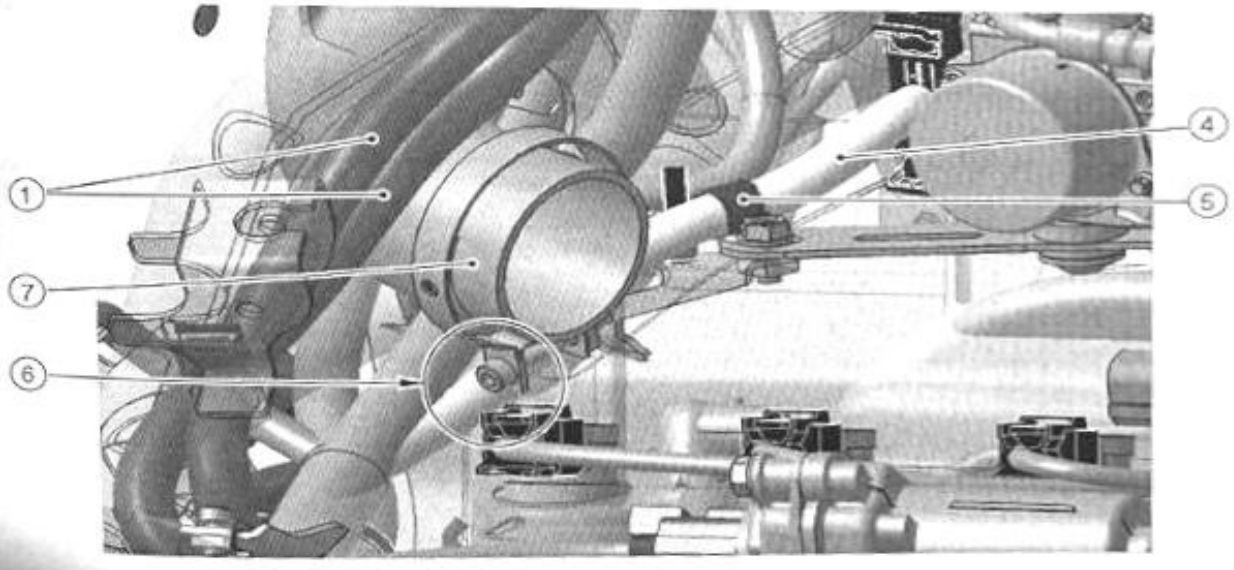


1. Frame Pipe
2. Run the ECU lead to the upside of the intake duct.
3. ECU Leads
4. Clamp (Hold the ECU lead. Install it to the frame.)
5. Main Harness
6. Clamp (Hold the main harness, and install it to the frame.)
7. Align the clamp end with the edge of frame as shown.
8. Clamp (Hold the main harness.)
9. Run the main harness under the intake duct.
10. Intake Duct
11. ETV Actuator Lead
12. Intake Air Pressure Sensor Lead

NOTE

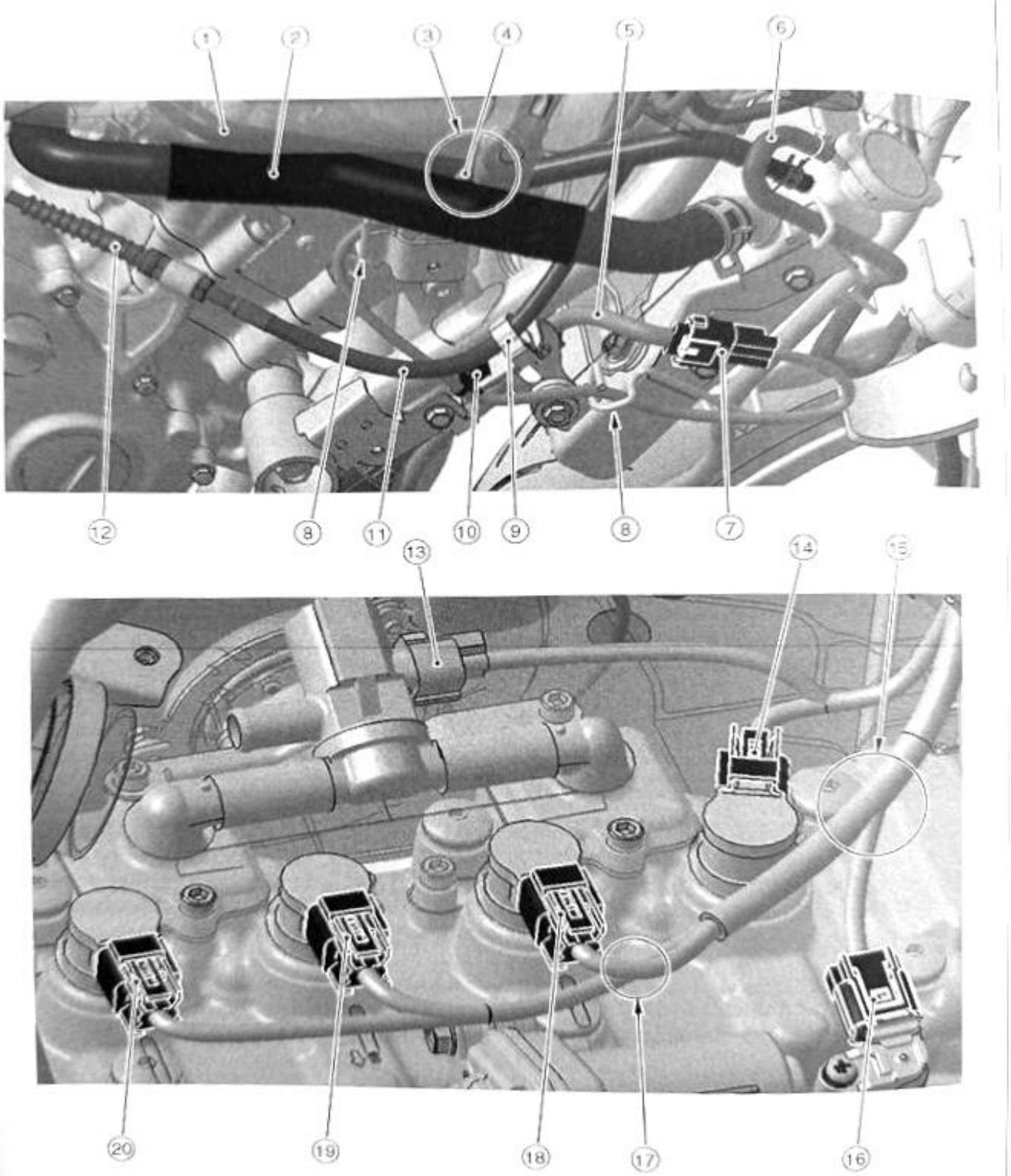
○*When replacing the harness, attach the clamp [8] to the frame first.*





1. ECU Leads (Do not twist leads.)
2. Clamp (Hold the main harness at the position of the tape.)
3. Main Harness
4. ABS Hydraulic Unit Lead
5. Clamp (Hold the ABS hydraulic unit lead.)
6. Run the ABS hydraulic unit lead under the intake duct.
7. Intake Duct

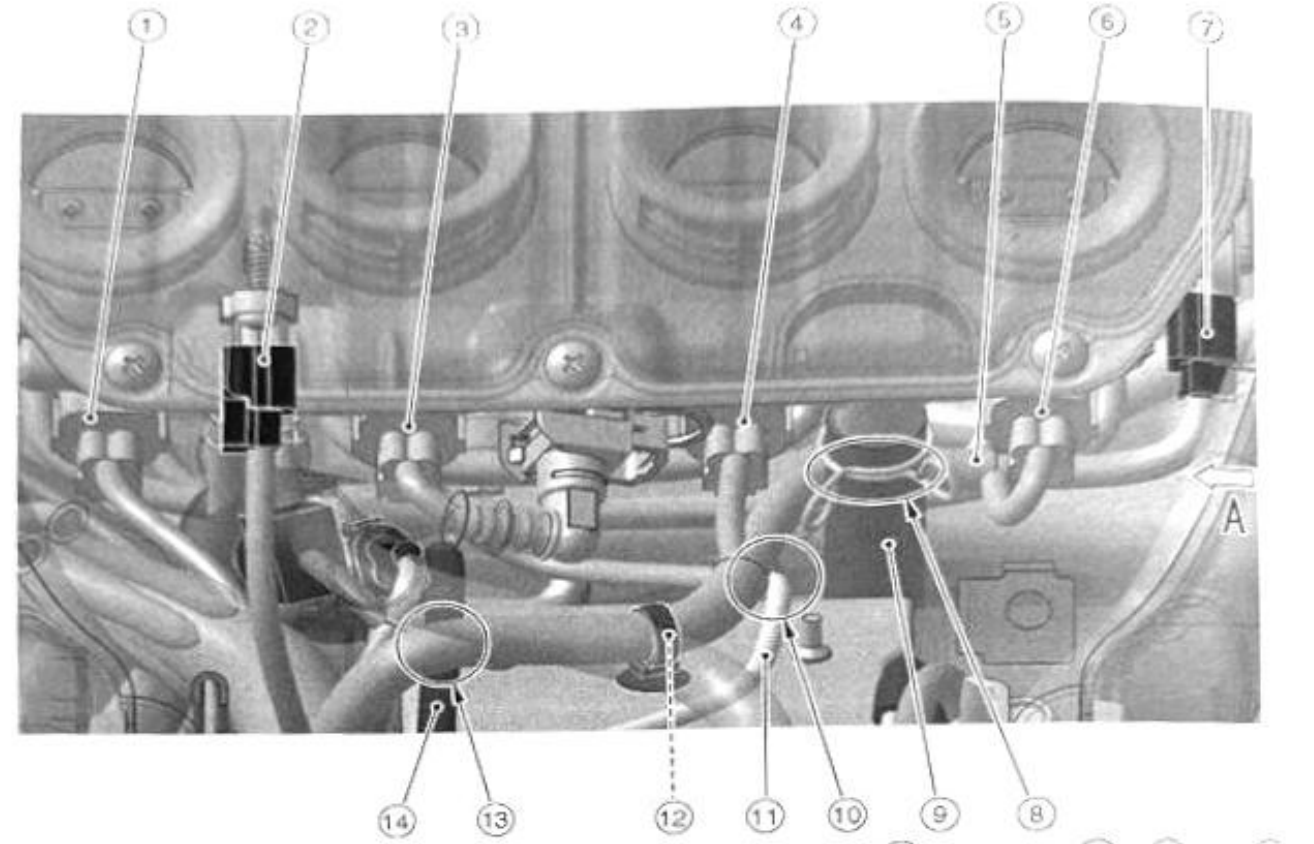
Cable, Wire, and Hose Routing

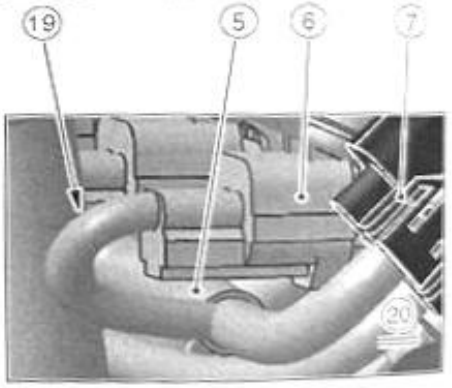


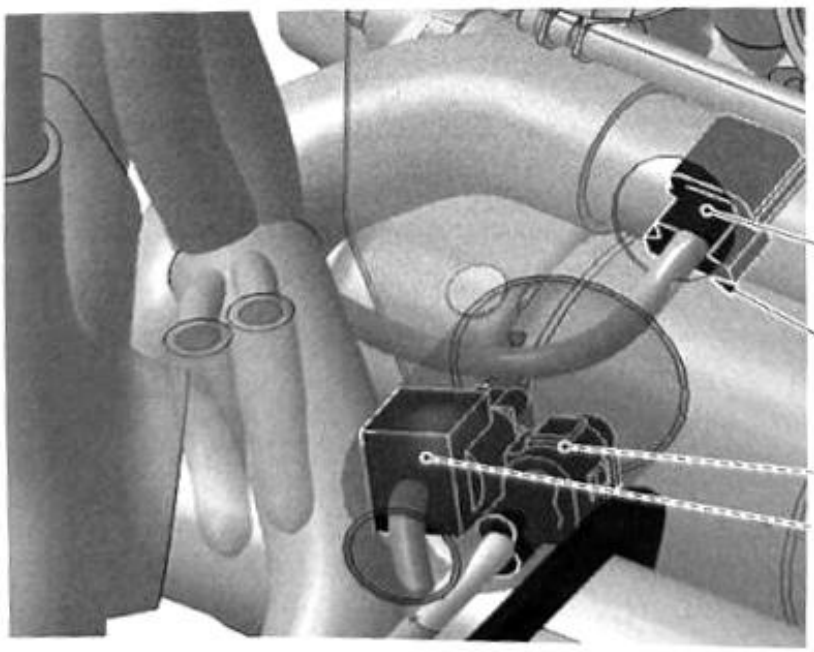
Cable, Wire, and Hose Routing

1. Air Bleeder Hose
2. Water Hose
3. Run the main harness between the air bleeder hose and water hose.
4. Main Harness
5. Crankshaft Sensor/Oil Pressure Switch Lead
6. Reserve Tank Overflow Hose
7. Crankshaft Sensor/Oil Pressure Switch Connector (Install it to the bracket.)
8. Run the main harness through the clamps.
9. Clamp (Hold the clutch cable.)
10. Clamp (Hold the main harness. Install the clamp to the frame.)
11. Clutch Cable
12. Dust Cover (Cover the screw part of the clutch cable.)
13. Air Switching Valve Connector
14. Stick Coil #4 Connector
15. Do not run the atmospheric pressure sensor lead to the upside of the main harness (to stick coils). Do not twist the atmospheric pressure sensor lead with the main harness (to stick coils).
16. Atmospheric Pressure Sensor Connector
17. Run the stick coil #3 lead to the upside of the main harness (to stick coil #1 and #2).
18. Stick Coil #3 Connector
19. Stick Coil #2 Connector
20. Stick Coil #1 Connector

Cable, Wire, and Hose Routing



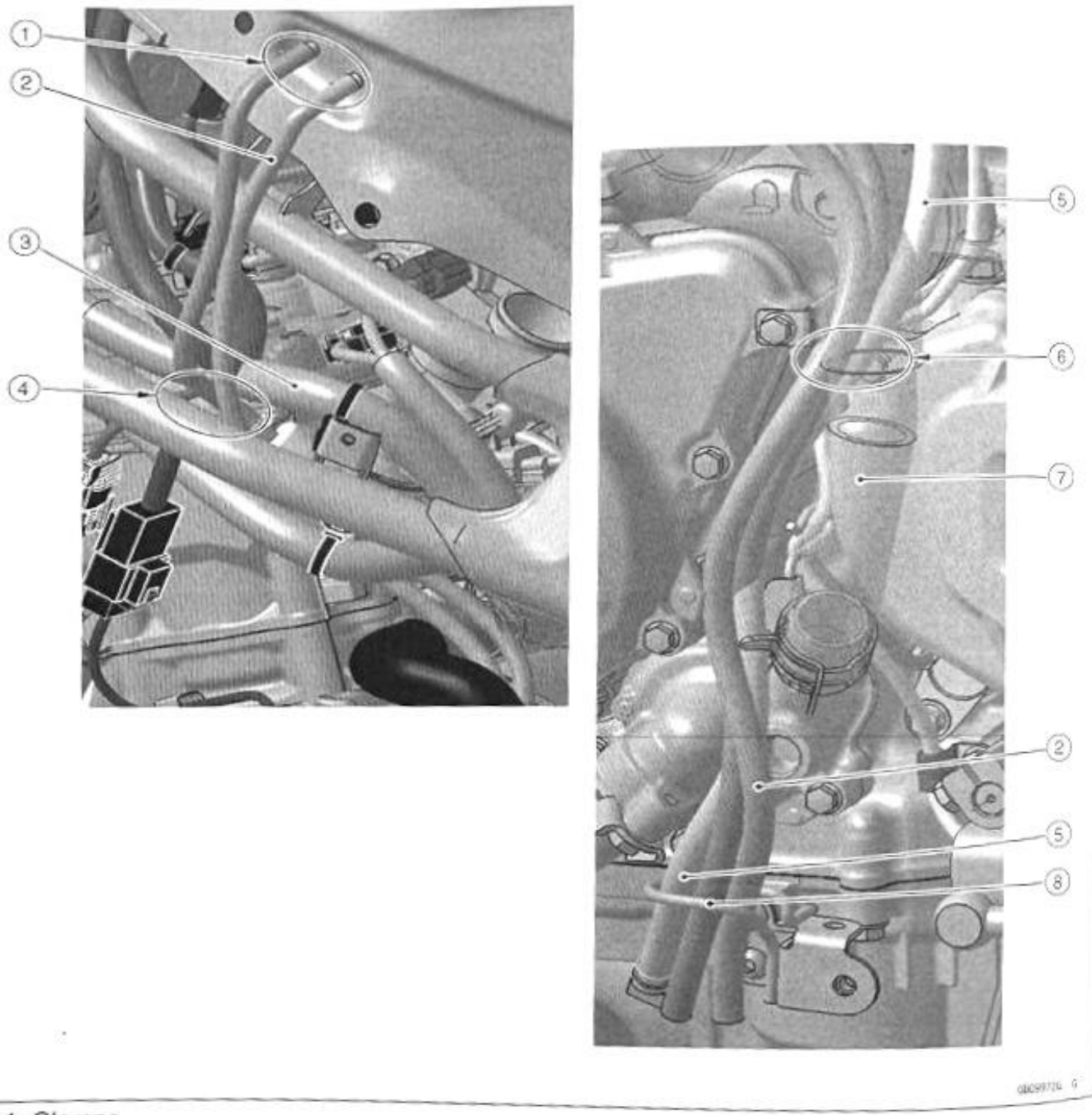




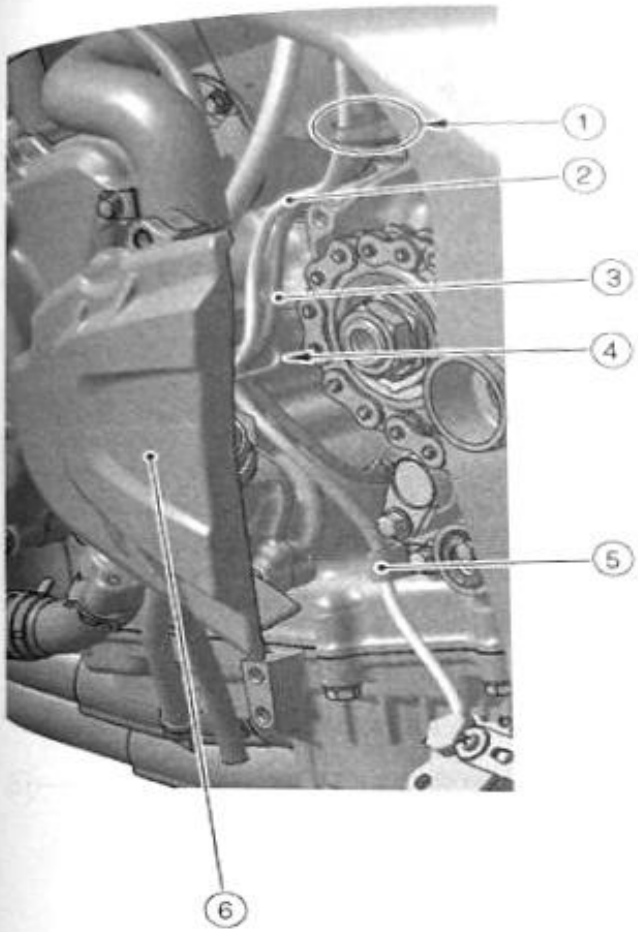
Cable, Wire, and Hose Routing

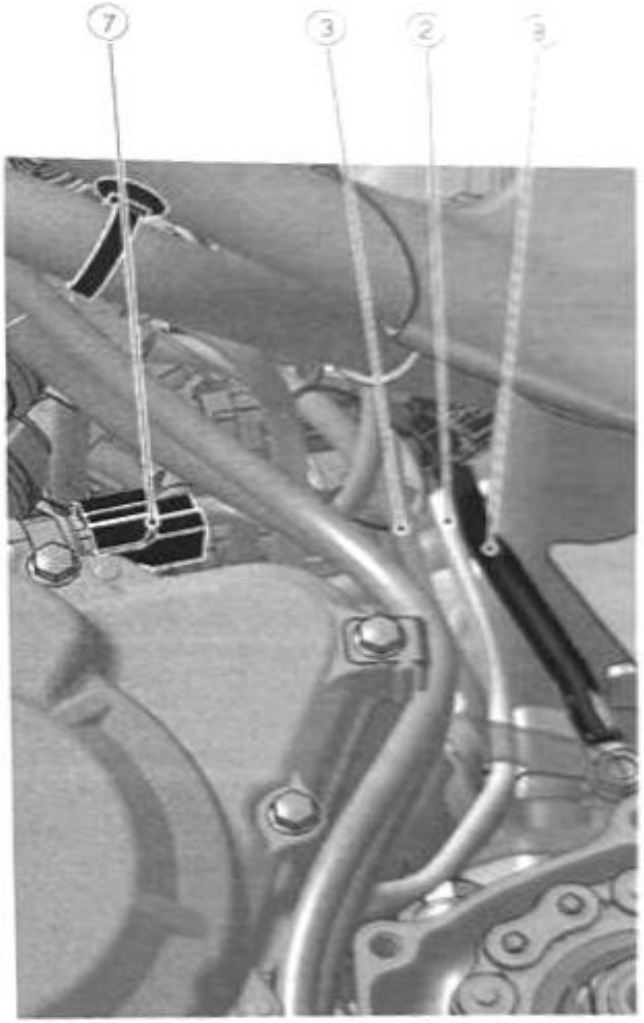
1. Fuel Injector #1 Connector
2. Intake Air Temperature Sensor Connector
3. Fuel Injector #2 Connector
4. Fuel Injector #3 Connector
5. Main Harness
6. Fuel Injector #4 Connector
7. Throttle Position Sensor Connector
8. Run the main harness to the front side of the breather hose.
9. Breather Hose
10. Run the starter motor cable under the main harness.
11. Starter Motor Cable
12. Clamp (Hold the main harness. Install the clamp to the rear fender.)
13. Run the battery negative (–) cable under the main harness.
14. Battery Negative (–) Cable
15. Water Temperature Sensor Connector
16. Run the water temperature sensor lead through the hole in the heat insulation rubber plate.
17. Side Stand Switch Connector
18. Gear Position Sensor Connector
19. Run the fuel injector #4 lead behind the main harness.
20. Viewed from A

Cable, Wire, and Hose Routing



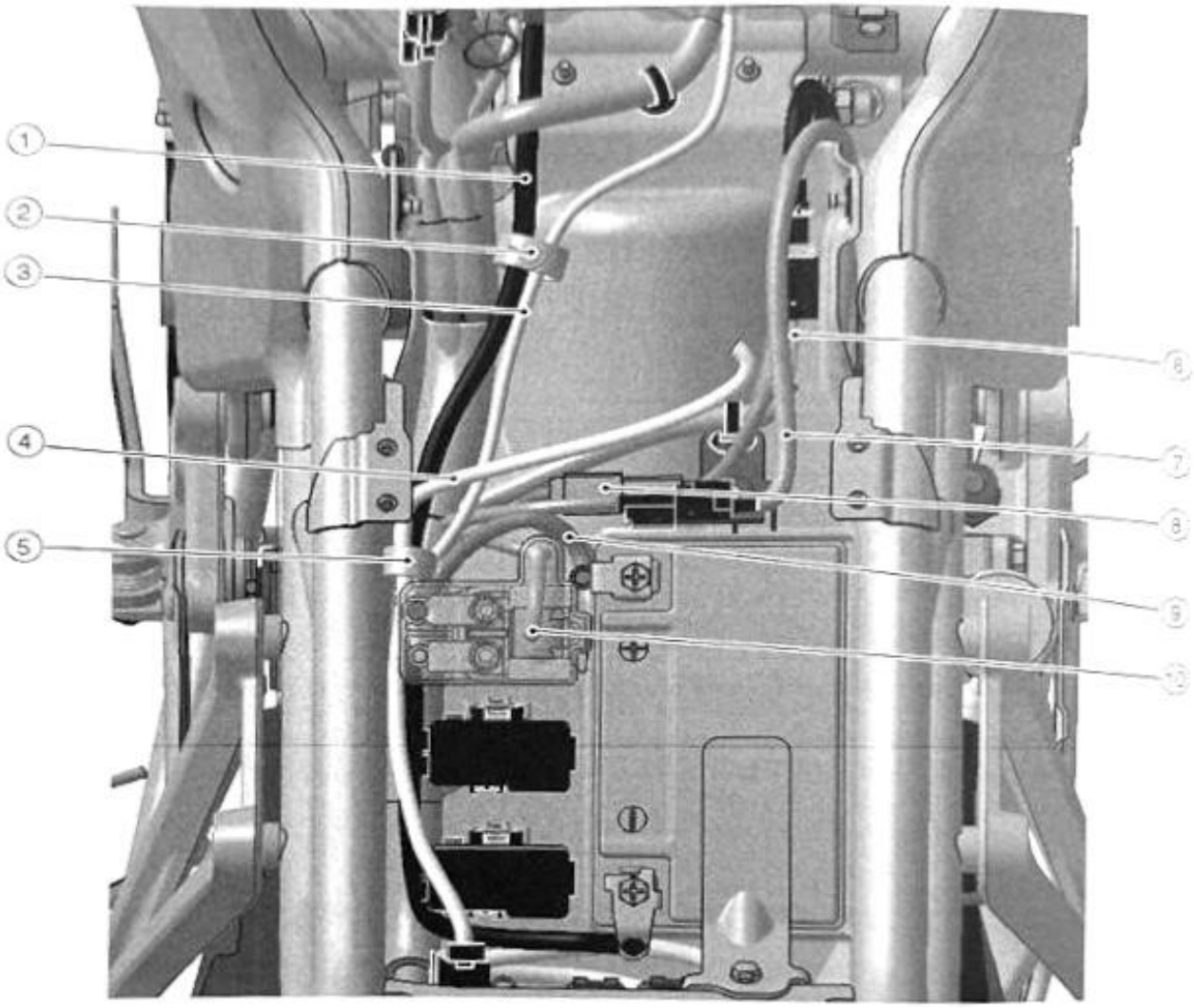
1. Clamps
2. Fuel Tank Drain Hose
3. Main Harness
4. Run the fuel tank drain hose between the main harness and frame pipe.
5. Air Cleaner Housing Drain Hose
6. Run the fuel tank drain hose and air cleaner housing drain hose between the water hose and alternator cover.
7. Water Hose
8. Run the air cleaner housing drain hose and fuel tank drain hose through the clamp.





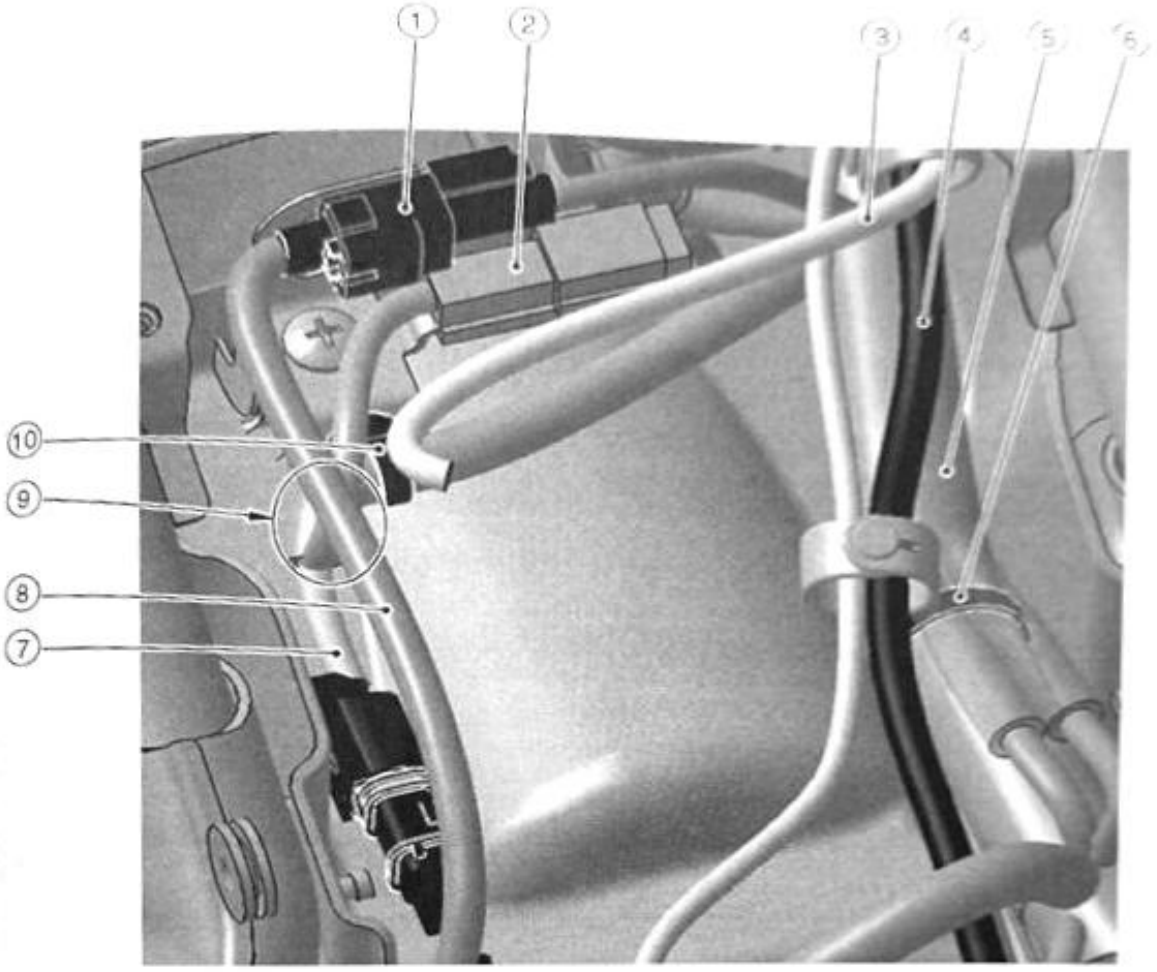
1. Run the side stand switch lead and gear position sensor lead through the hole in the heat insulation rubber plate.
2. Side Stand Switch Lead
3. Gear Position Sensor Lead
4. Run the side stand switch lead and gear position sensor lead through the clamp.
5. Clamp (Hold the side stand switch lead.)
6. To prevent the side stand switch lead and gear position sensor lead biting, install the engine sprocket cover while pulling up the leads.
7. Water Temperature Sensor Connector
8. Battery Negative (–) Cable

Cable, Wire, and Hose Routing



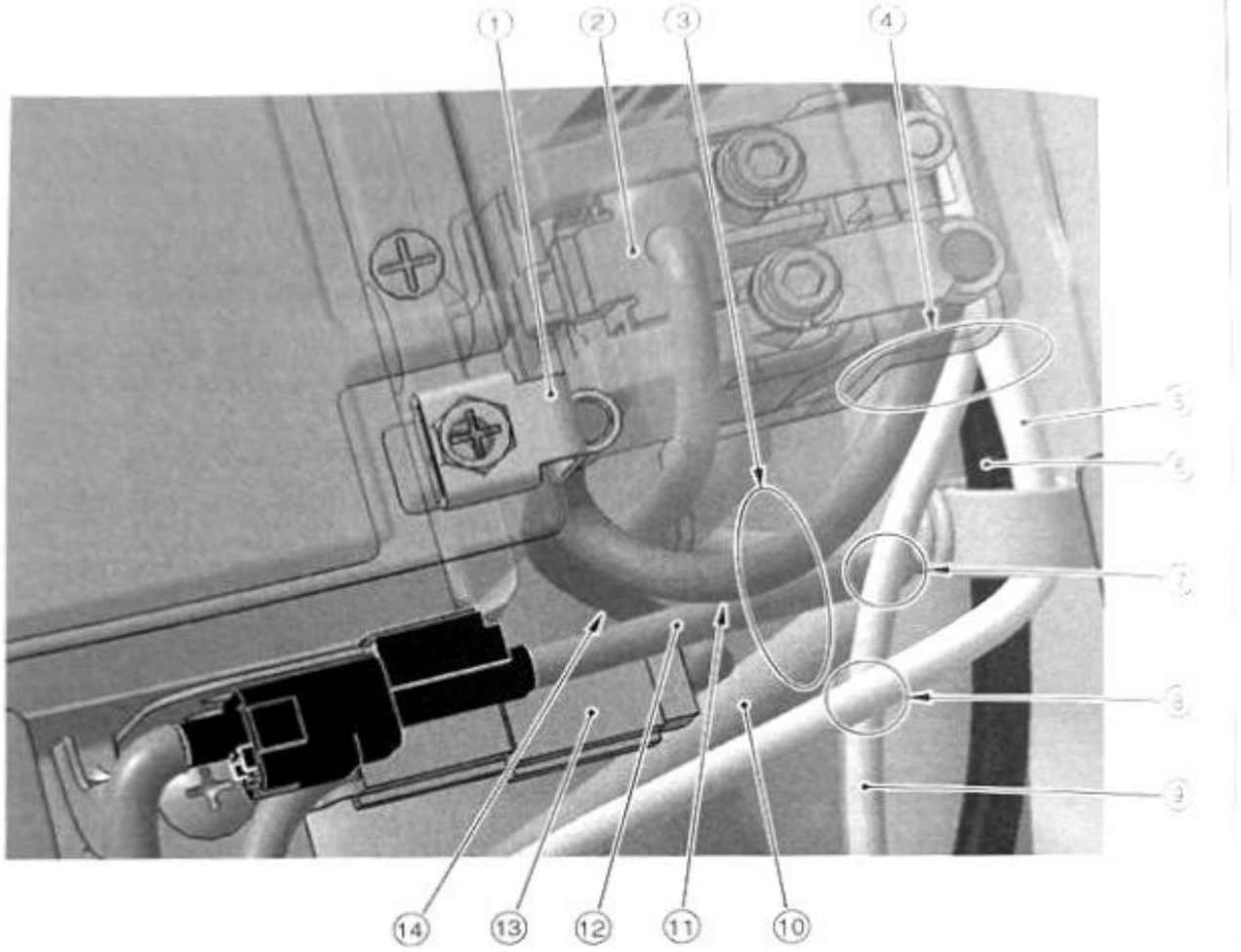
1. Battery Negative (–) Cable
2. Clamp (Hold the battery negative (–) cable and starter motor lead at the tape position on the starter motor lead.)
3. Starter Motor Lead
4. Fuel Pump Lead
5. Clamp (Hold the fuel pump lead and battery negative (–) cable at the tape position on the battery negative (–) cable.)
6. Rear Wheel Rotation Sensor Lead
7. Rear Brake Light Switch Lead
8. Battery Positive (+) Cable Connector
9. Battery Positive (+) Cable
10. Starter Relay Lead

Cable, Wire, and Hose Routing



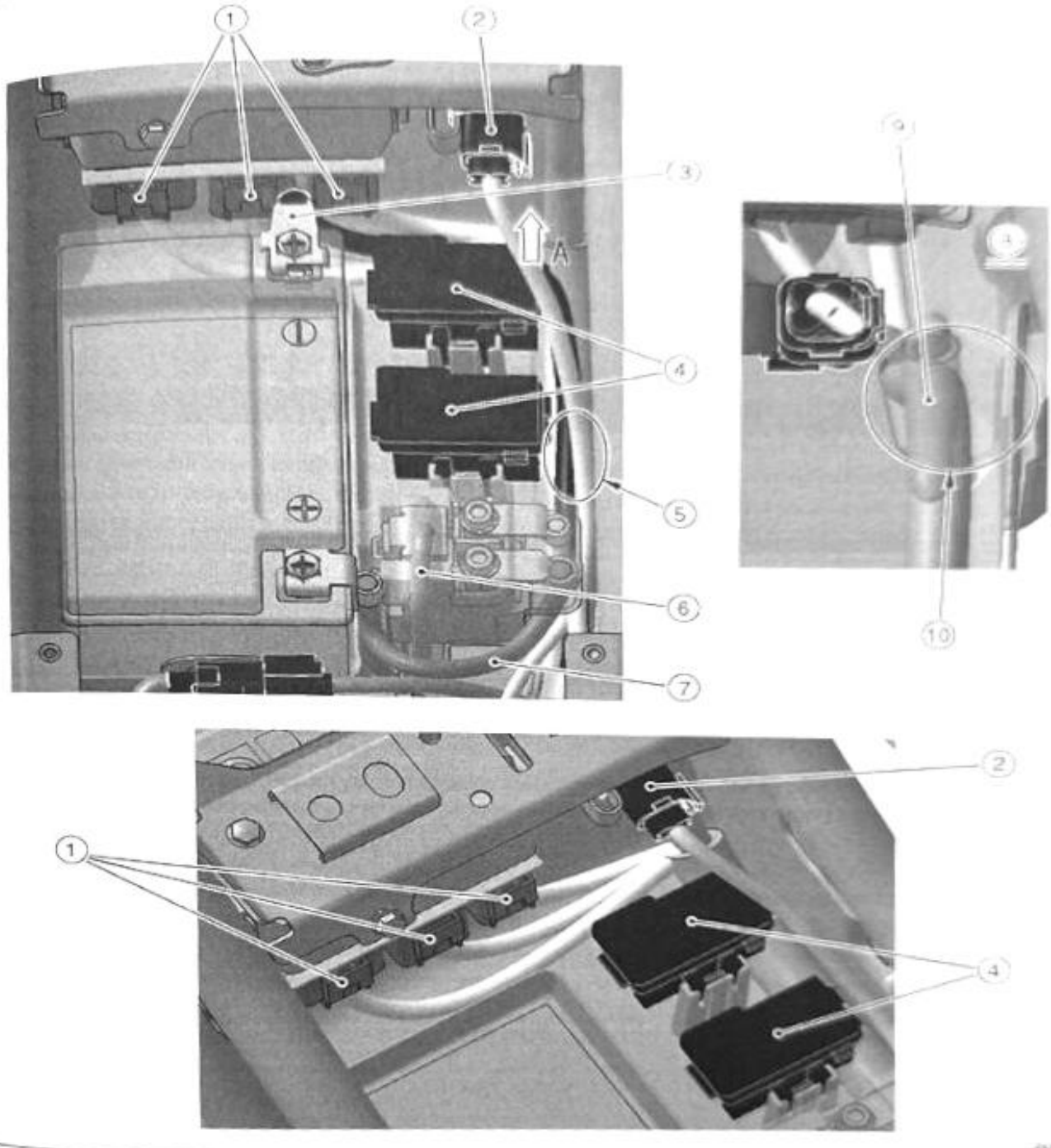
1. Rear Brake Light Switch Connector (Install it to the bracket.)
2. Battery Positive (+) Cable Connector (Install it to the bracket.)
3. Fuel Pump Lead
4. Battery Negative (–) Cable
5. Main Harness
6. Clamp (Hold the main harness. Install the clamp to the rear fender.)
7. Rear Wheel Rotation Sensor Lead
8. Rear Brake Light Switch Lead
9. Run the battery positive (+) cable under the rear brake light switch lead.
10. Clamp (Hold the main harness. Install the clamp to the bracket.)

Cable, Wire, and Hose Routing



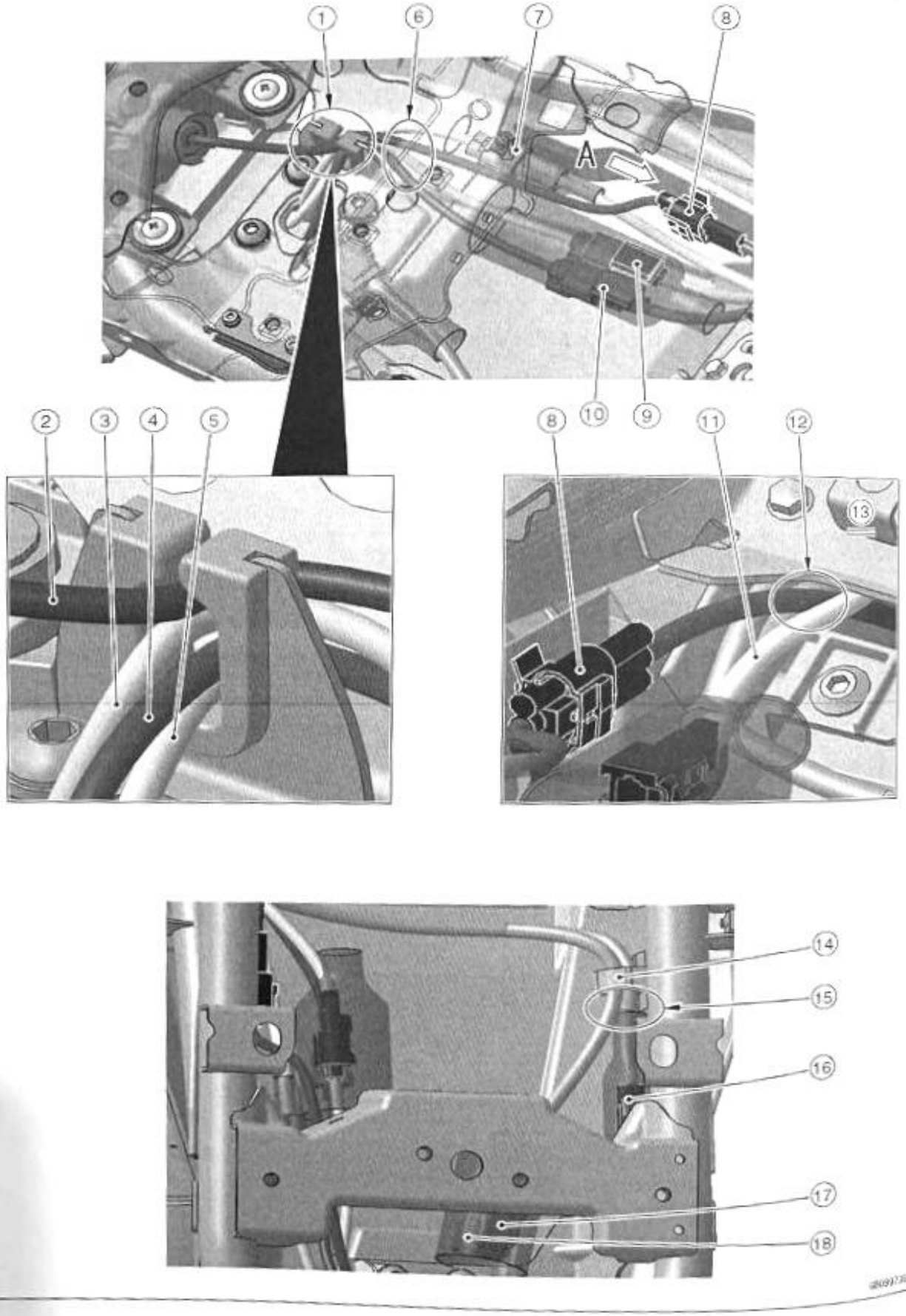
1. Battery Positive (+) Terminal
2. Starter Relay Connector
3. Do not twist the starter relay lead, rear brake light switch lead and main harness branch.
4. Run the battery negative (–) cable, battery positive (+) cable, starter motor cable, fuel pump lead and main harness under the cover.
5. Fuel Pump Lead
6. Battery Negative (–) Cable
7. Run the rear brake light switch lead under the starter motor cable.
8. Run the fuel pump lead to the upside of the starter motor cable.
9. Starter Motor Cable
10. Main Harness Branch
11. Run the battery positive (+) cable to the upside of the rear brake light switch lead.
12. Rear Brake Light Switch Lead
13. Battery Positive (+) Cable Connector
14. Run the battery positive (+) cable under the rear brake light switch lead.

Cable, Wire, and Hose Routing



1. Relay Box Connectors
2. Fuel Pump Connector (Install it to the bracket.)
3. Battery Negative (–) Cable
4. Fuse Boxes (Install them to the rear fender.)
5. Run the fuel pump lead above the battery negative (–) cable.
6. Starter Relay Lead
7. Battery Positive (+) Cable
8. Viewed from A
9. Water Proof Joint (Position it above the main harness.)
10. Insert the main harness into the guide of the rear fender.

Cable, Wire, and Hose Routing

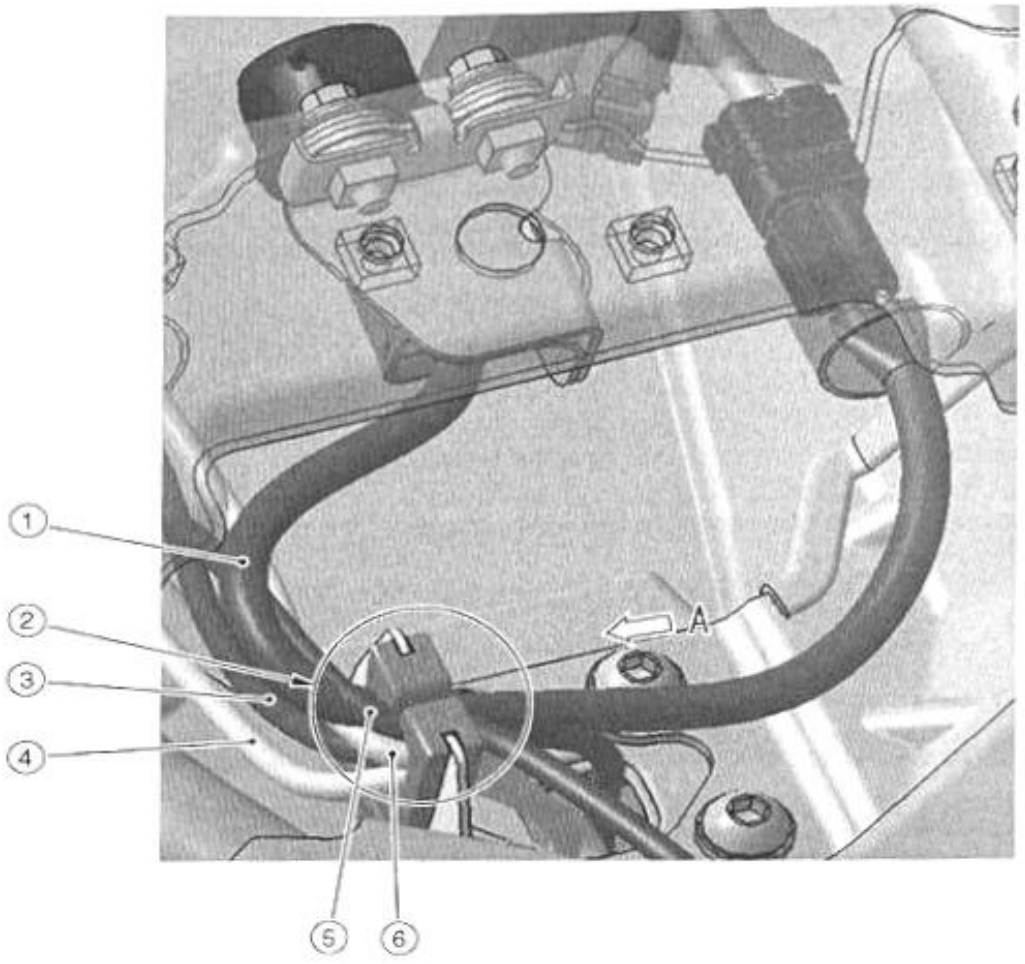


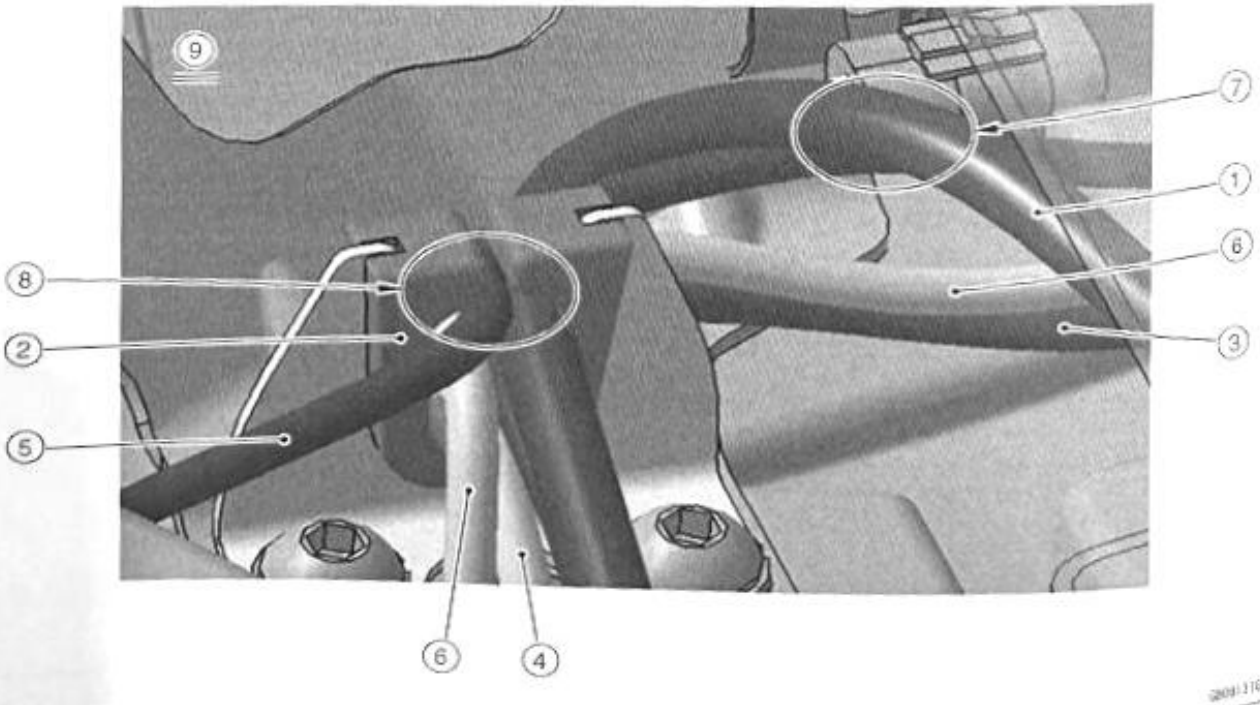
Cable, Wire, and Hose Routing

1. Run the brake/tail light lead, rear turn signal light leads and license plate light lead through the damper. Run the brake/tail light lead to the upside of the other leads.
2. Brake/Tail Light Lead
3. Rear Left Turn Signal Light Lead
4. Rear Right Turn Signal Light Lead
5. License Plate Light Lead
6. Run the brake/tail light lead to the upside of the license plate light lead and rear turn signal light leads.
7. License Plate Light Connector
8. Brake/Tail Light Connector (Install it to the rear fender.)
9. Rear Left Turn Signal Light Connector
10. Rear Right Turn Signal Light Connector
11. Fuel Pump Lead
12. Run the brake/tail light lead between the fuel pump lead and main harness.
13. Viewed from A
14. Clamp (Hold the immobilizer (equipped models)/Kawasaki diagnostic system lead, ABS Kawasaki diagnosis system lead and USB socket lead.)
15. Run the immobilizer (equipped models)/Kawasaki diagnostic system connector and ABS Kawasaki diagnosis system connector to the inside of the USB socket lead.
16. USB Socket Connector
17. Immobilizer (Equipped Models)/Kawasaki Diagnostic System Connector
18. ABS Kawasaki Diagnosis System Connector

Cable, Wire, and Hose Routing

USB Socket Equipped Models

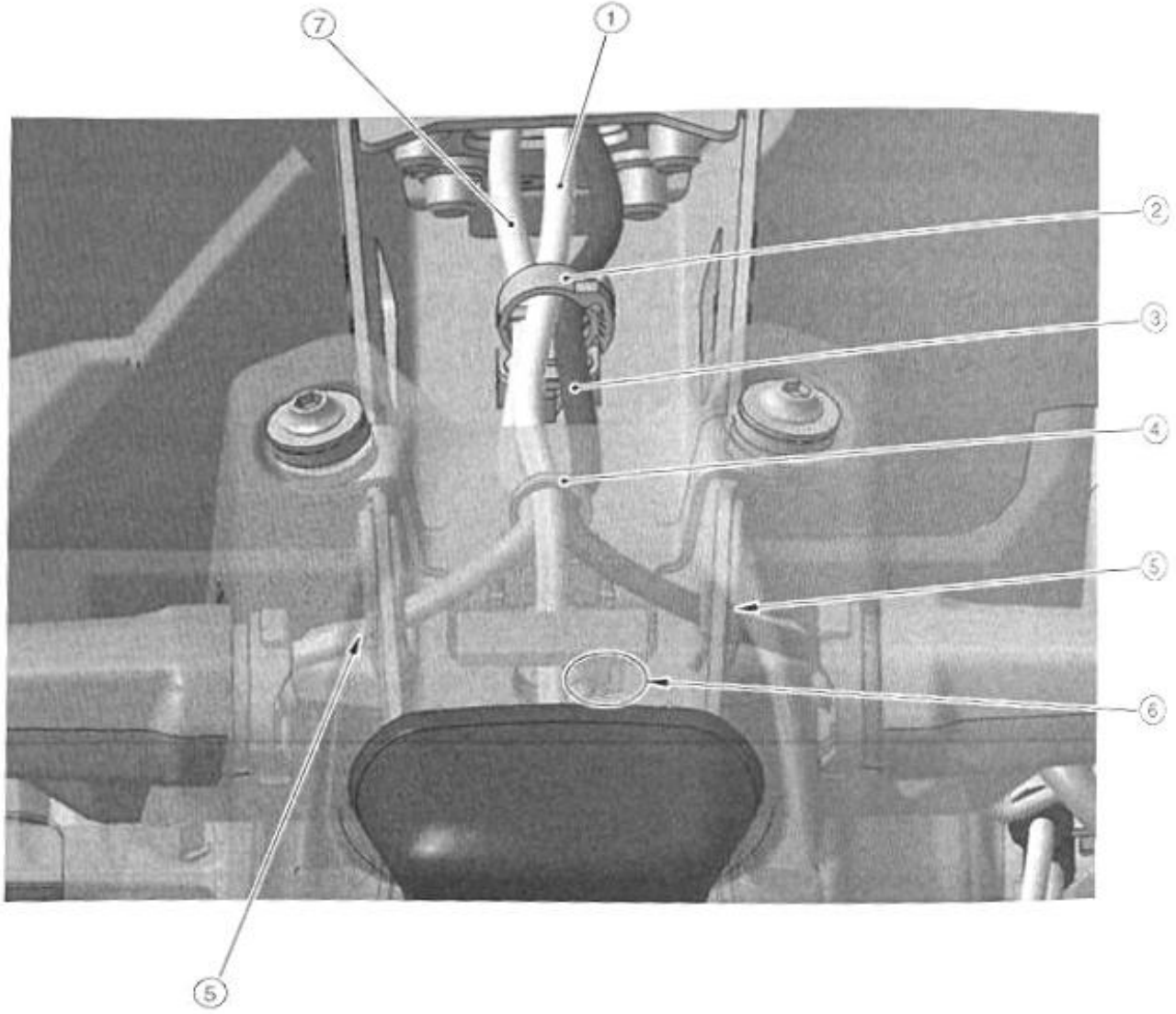




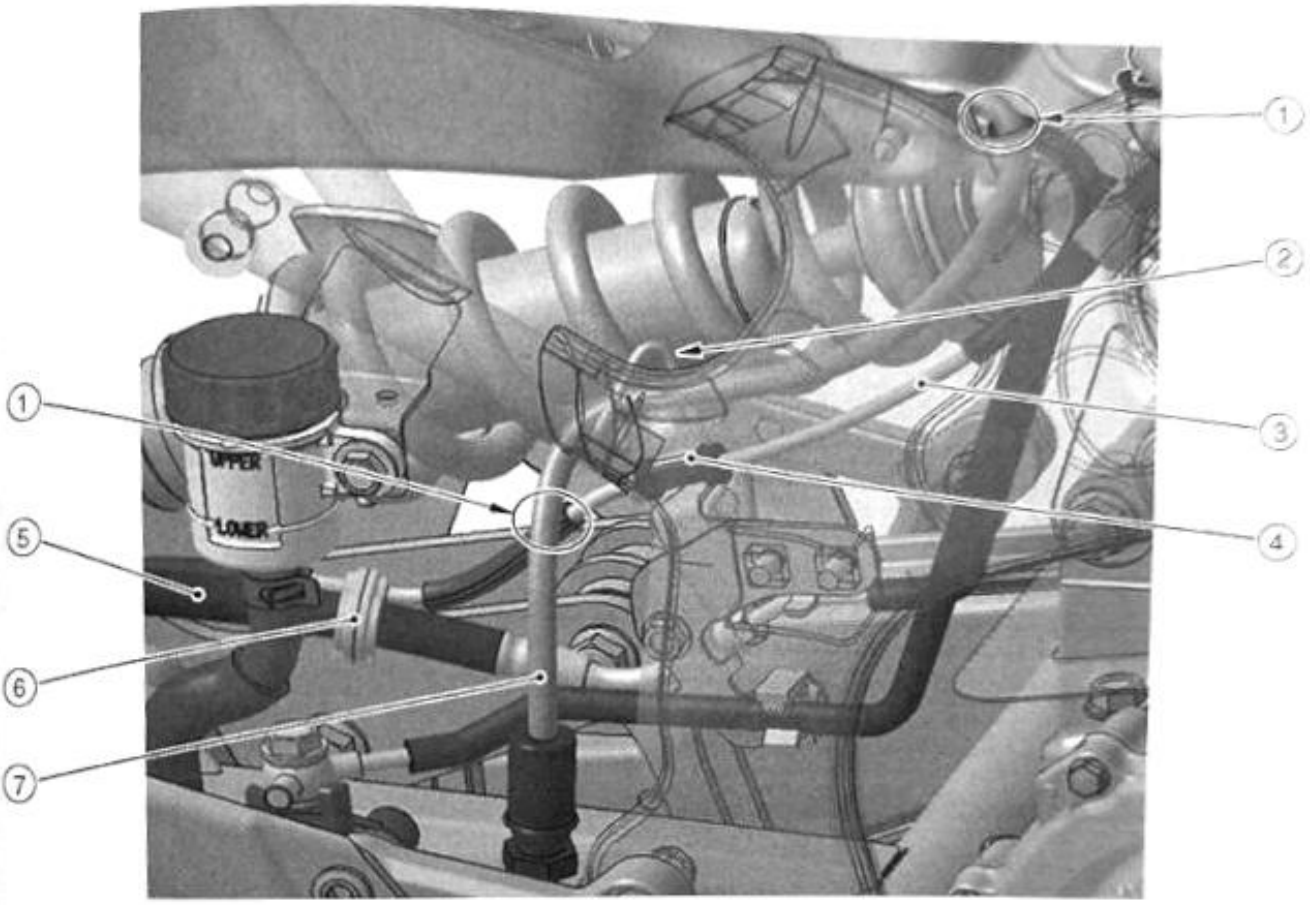
Cable, Wire, and Hose Routing

1. USB Socket Lead
2. Damper (Run the USB socket lead, brake/tail light lead, rear turn signal light leads and license plate light lead through the damper.)
3. Rear Right Turn Signal Light Lead
4. License Plate Light Lead
5. Brake/Tail Light Lead
6. Rear Left Turn Signal Light Lead
7. Run the USB socket lead above the brake/tail light lead.
8. Run the brake/tail light lead above the other leads.
9. Viewed from A

Cable, Wire, and Hose Routing

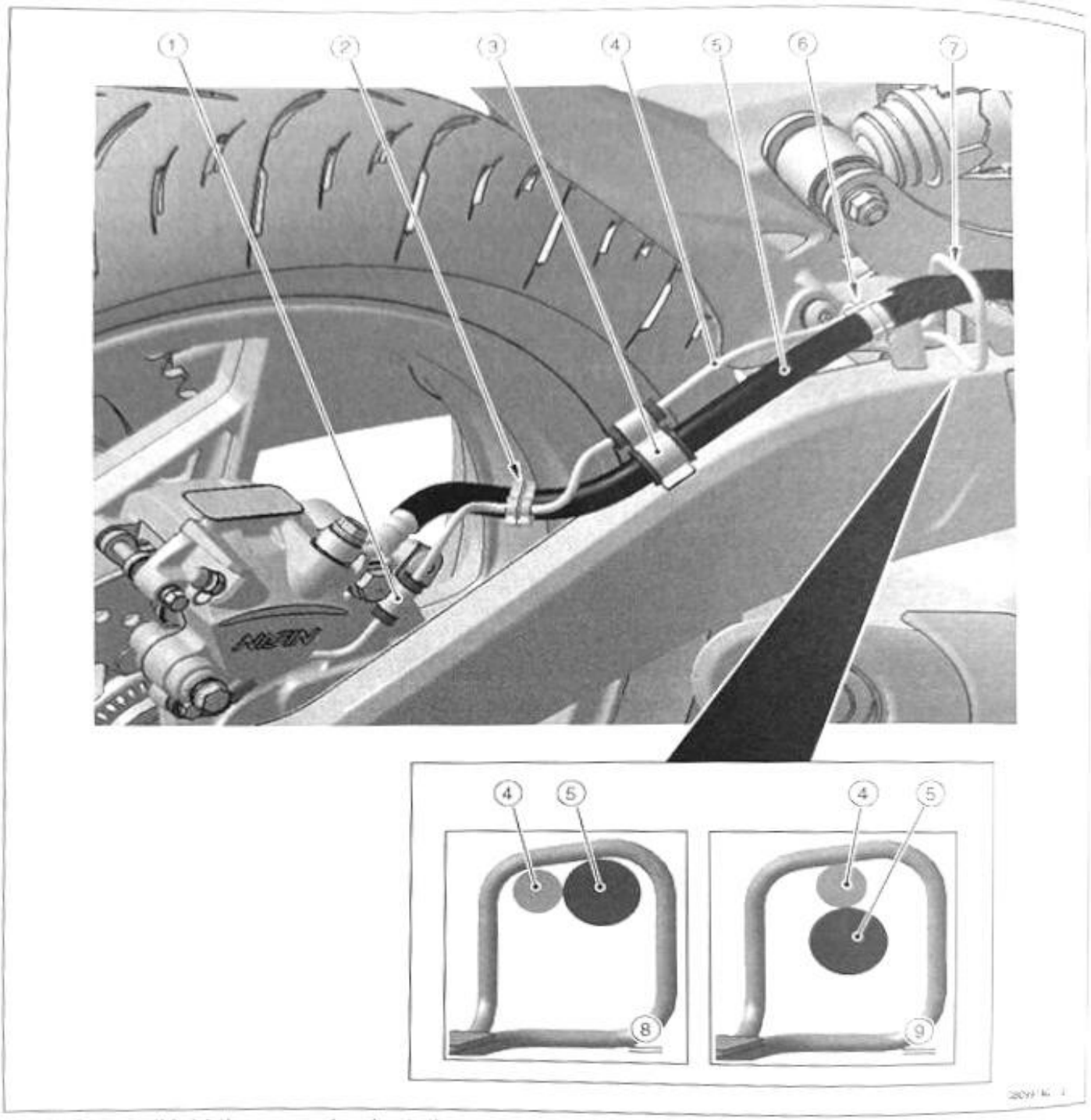


1. License Plate Light Lead
2. Clamp (Hold the license plate light lead and rear turn signal light leads.)
3. Rear Right Turn Signal Light Lead
4. Clamp (Hold the license plate light lead and rear turn signal light leads.)
5. Run the rear turn signal light leads through the dampers.
6. Clamp (Hold the license plate light lead. Face the clamp opening rightward.)
7. Rear Left Turn Signal Light Lead



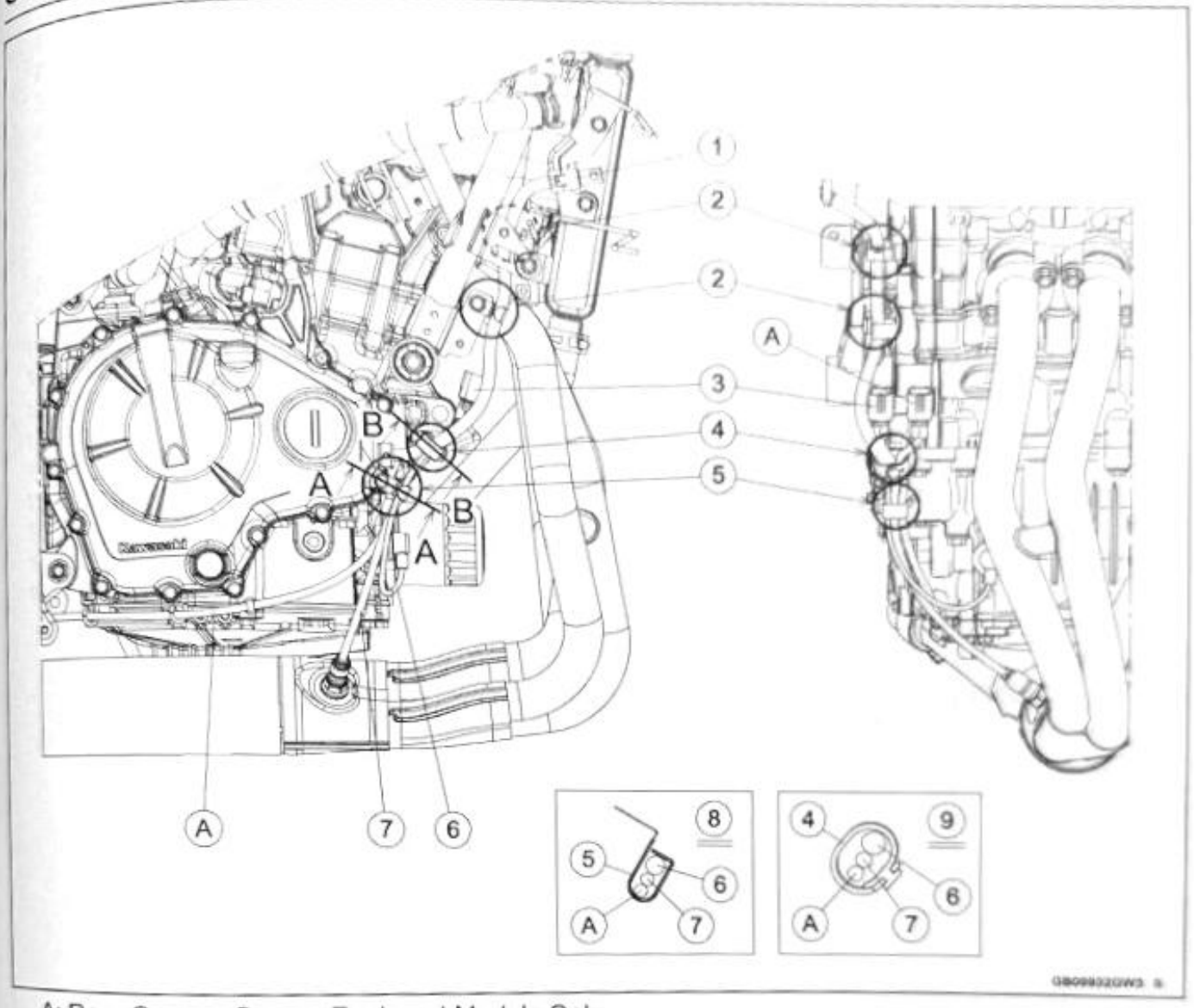
1. Run the rear brake light switch lead to the outside of the rear wheel rotation sensor lead.
2. Run the rear brake light switch lead through the clamp.
3. Rear Wheel Rotation Sensor Lead
4. Clamp (Hold the rear wheel rotation sensor lead.)
5. Rear Brake Hose
6. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the mark position of the sensor lead. Position the sensor lead inside. Face the clamp opening downward.)
7. Rear Brake Light Switch Lead

Cable, Wire, and Hose Routing



1. Clamp (Hold the rear wheel rotation sensor lead.)
2. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the mark position of the sensor lead. Position the sensor lead outside. Face the clamp opening downward.)
3. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead.)
4. Rear Wheel Rotation Sensor Lead
5. Rear Brake Hose
6. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the mark position of the sensor lead. Position the sensor lead inside. Face the clamp opening downward.)
7. Run the rear brake hose and rear wheel rotation sensor lead through the clamp.
8. Correct (Align the rear brake hose and rear wheel rotation sensor lead horizontally.)
9. Wrong (Do not pinch the rear wheel rotation sensor lead between the clamp and rear brake hose.)

Cable, Wire, and Hose Routing

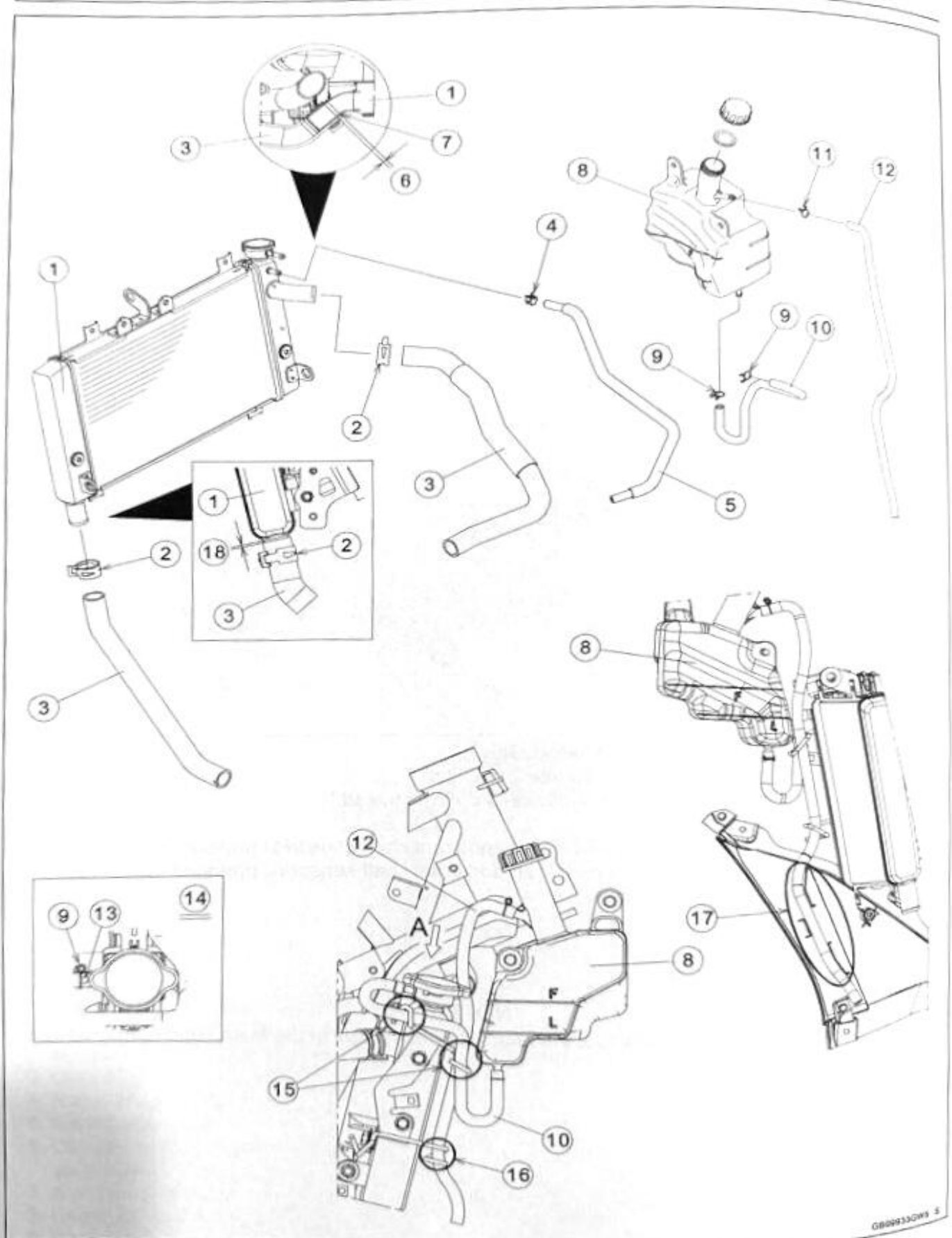


A: Rear Oxygen Sensor Equipped Models Only
1. Crankshaft Sensor/Oil Pressure Switch Connector
2. Clamp (Hold the crankshaft sensor/oil pressure switch lead.)
3. Front Oxygen Sensor Connector
4. Clamp (Hold the front oxygen sensor lead and crankshaft sensor/oil pressure switch lead.)
5. Clamp (Hold the front oxygen sensor lead and crankshaft sensor/oil pressure switch lead.)
6. Oil Pressure Switch Lead
7. Front Oxygen Sensor Lead
8. Section A – A
9. Section B – B

NOTE

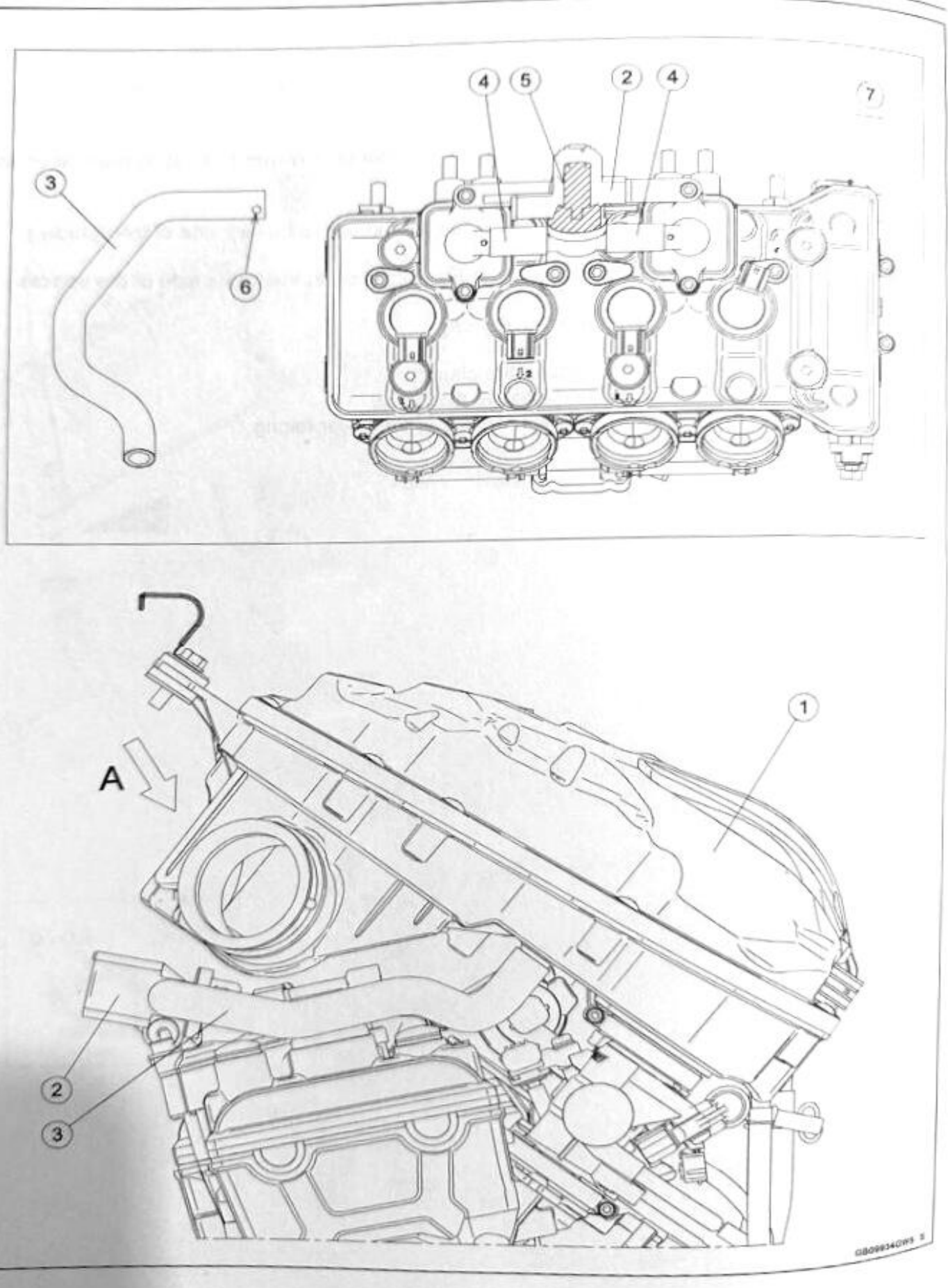
If the leads are not inside the clamps, the leads may be caught in the fairing and damaged during fairing assembly.

Cable, Wire, and Hose Routing



1. Radiator
2. Clamps (Hold the water hoses. Face their knobs to front side of the vehicle.)
3. Water Hoses
4. Clamp (Hold the air bleeder hose. Face its knob to the upper side of the vehicle.)
5. Air Bleeder Hose
6. About 3 mm (0.12 in.)
7. Insert the water hose up to the projection of the radiator pipe (water hose shall not ride on the projection shape).
8. Reserve Tank
9. Clamps (Hold the radiator overflow hoses. Face their knobs to the left side of the vehicle.)
10. Radiator Overflow Hose
11. Clamp (Hold the reserve tank overflow hose. Face its knob to the upper side of the vehicle.)
12. Reserve Tank Overflow Hose
13. Paint Mark (Align the mark with the radiator cap.)
14. Viewed from A
15. Run the radiator overflow hose through the clamps.
16. Run the reserve tank overflow hose through the clamp.
17. Hold the reserve tank overflow hose on the ribs of the lower fairing.
18. 6 mm (0.24 in.) or less.

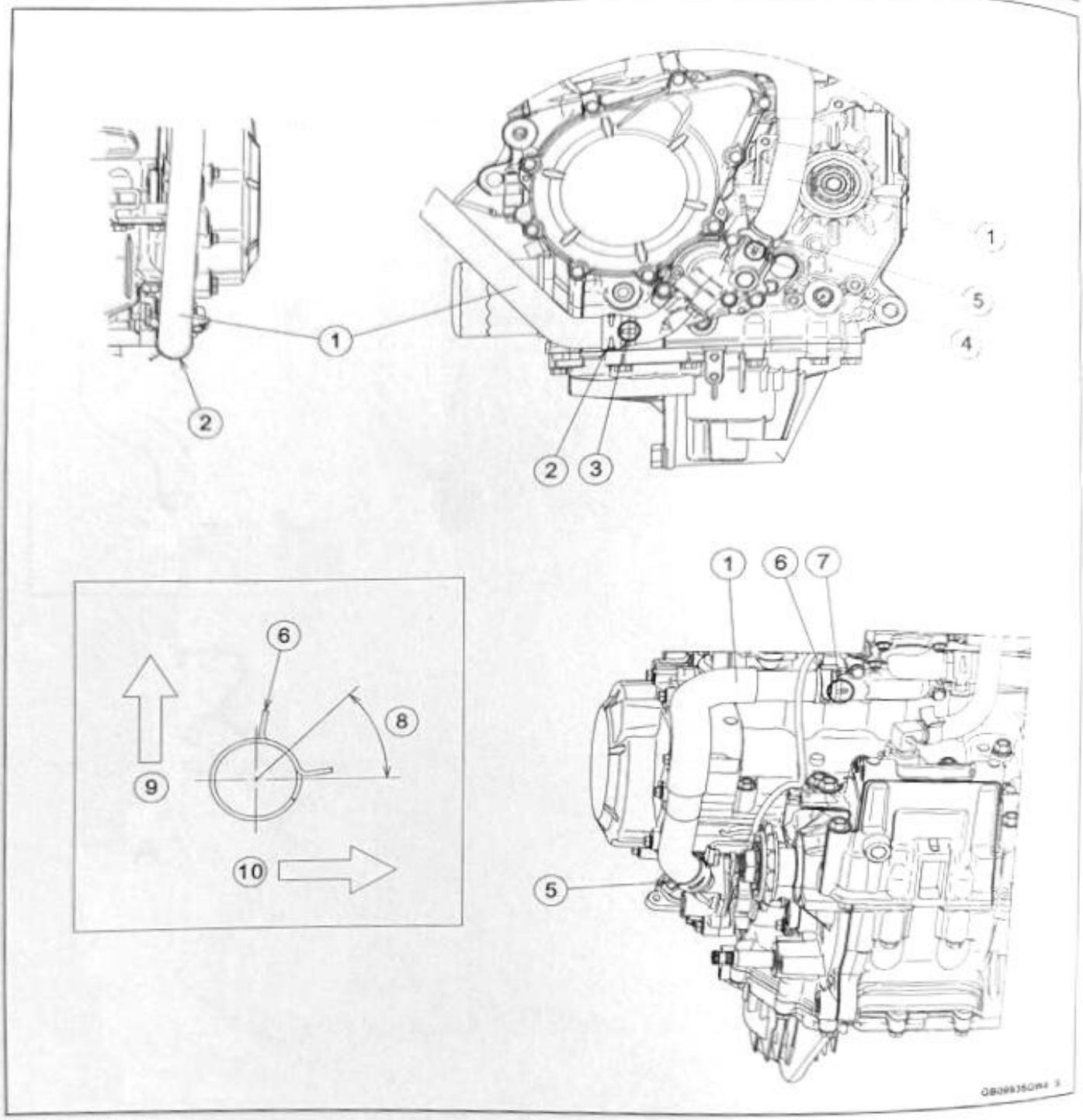
Cable, Wire, and Hose Routing



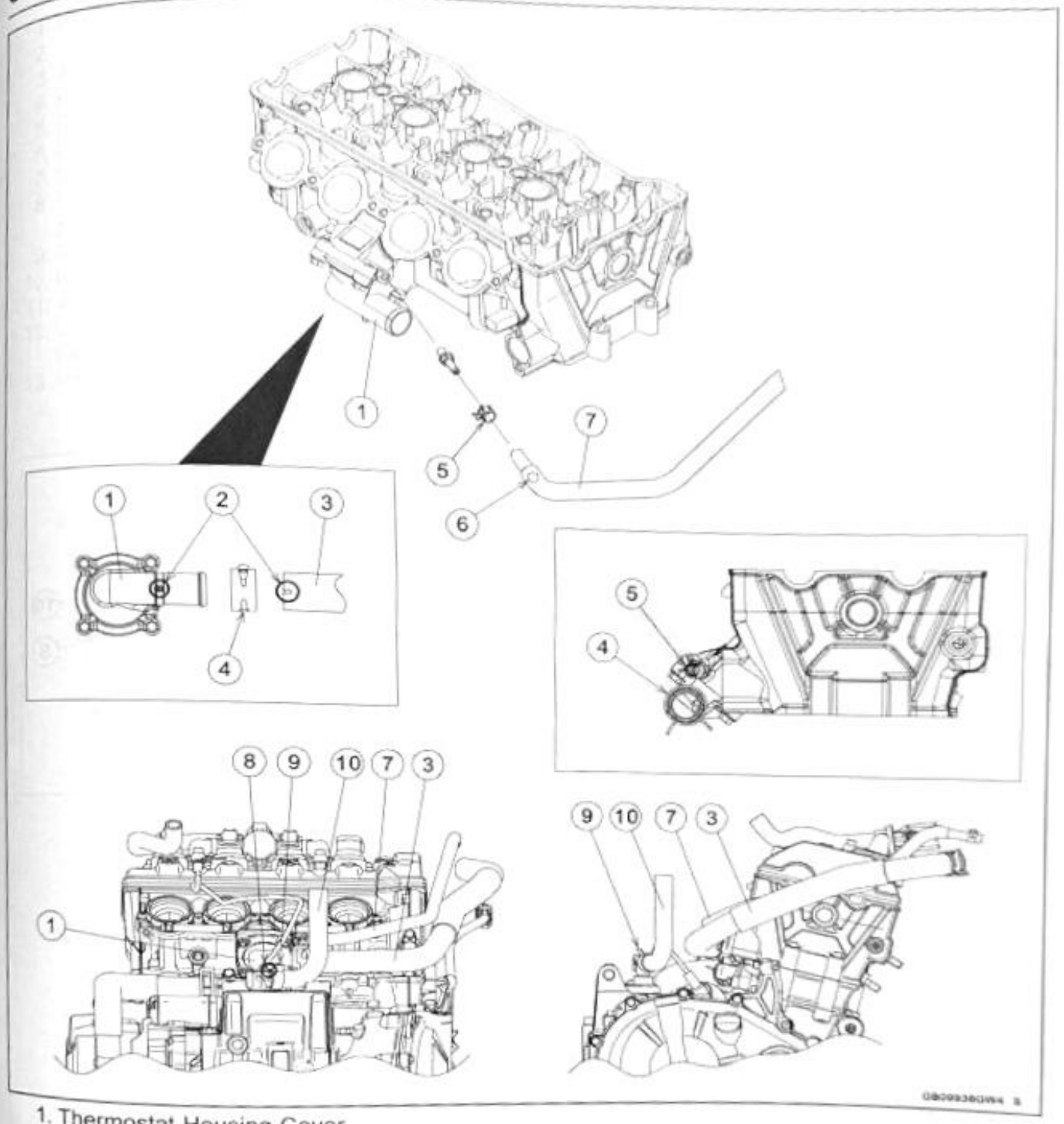
Cable, Wire, and Hose Routing

1. Air Cleaner Housing
2. Air Switching Valve
3. Air Switching Valve Hose
4. Hoses
5. Install the air switch valve surface and the air switch valve hose paint mark in parallel.
6. Paint Mark
7. Viewed from A

Cable, Wire, and Hose Routing

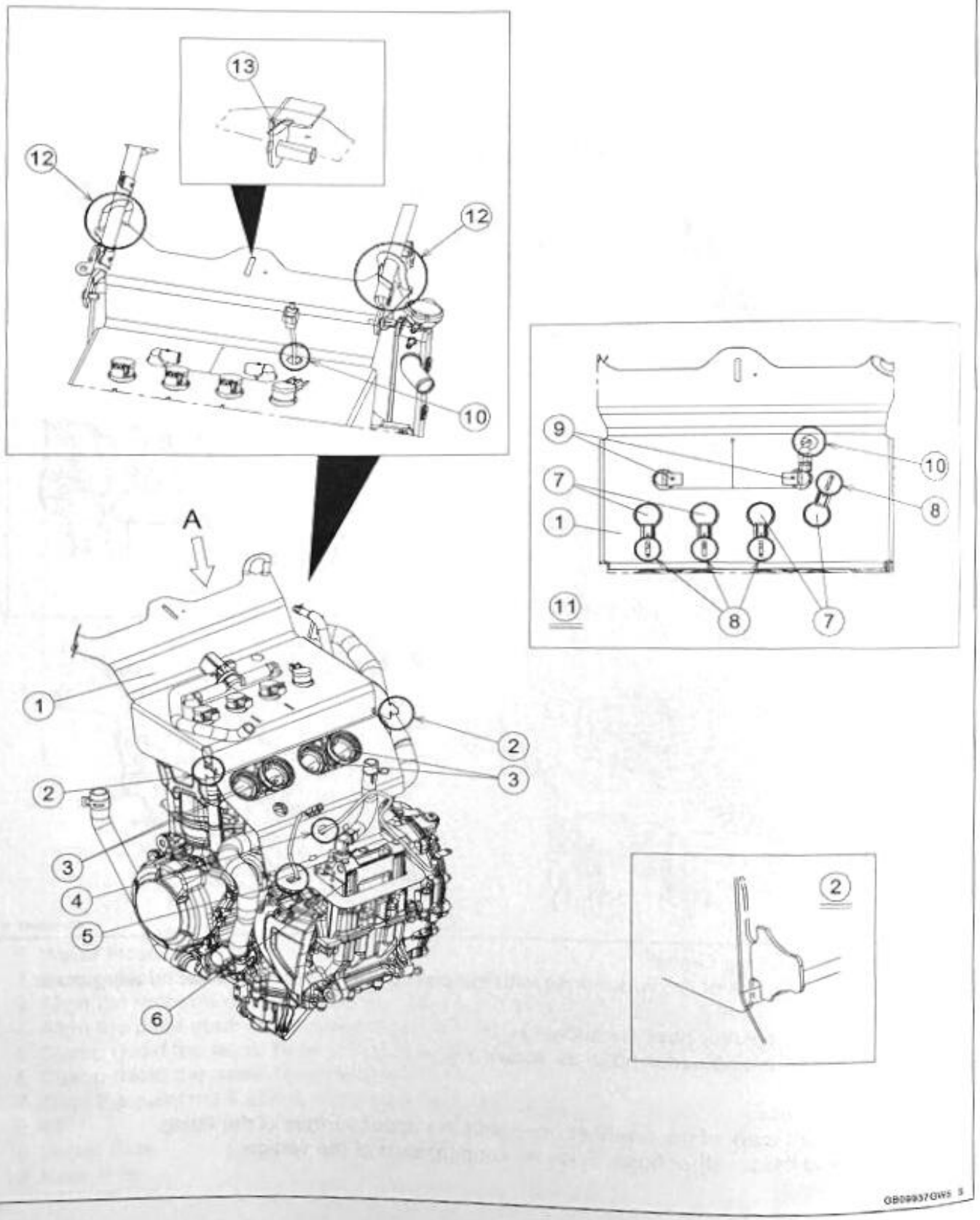


1. Water Hoses
2. Clamp (Hold the water hose. Face its knob to inside of the vehicle.)
3. Align the paint mark of the water hose with the mark of the water pipe.
4. Align the paint mark of the water hose with the projection of the water pump cover.
5. Clamp (Hold the water hose. Face its knob to outside of the vehicle.)
6. Clamp (Hold the water hose as shown.)
7. Align the paint mark of the water hose with the projection of the water hose fitting cover.
8. 45°
9. Upper Side
10. Rear Side



1. Thermostat Housing Cover
2. Align the paint mark of the water hose with the projection of the thermostat housing cover.
3. Water Hose
4. Clamp (Hold the water hose as shown.)
5. Clamp (Hold the air bleeder hose as shown.)
6. Paint Mark
7. Air Bleeder Hose
8. Align the paint mark of the breather hose with the upper surface of the fitting.
9. Clamp (Hold the breather hose. Face its knob upward of the vehicle.)
10. Breather Hose

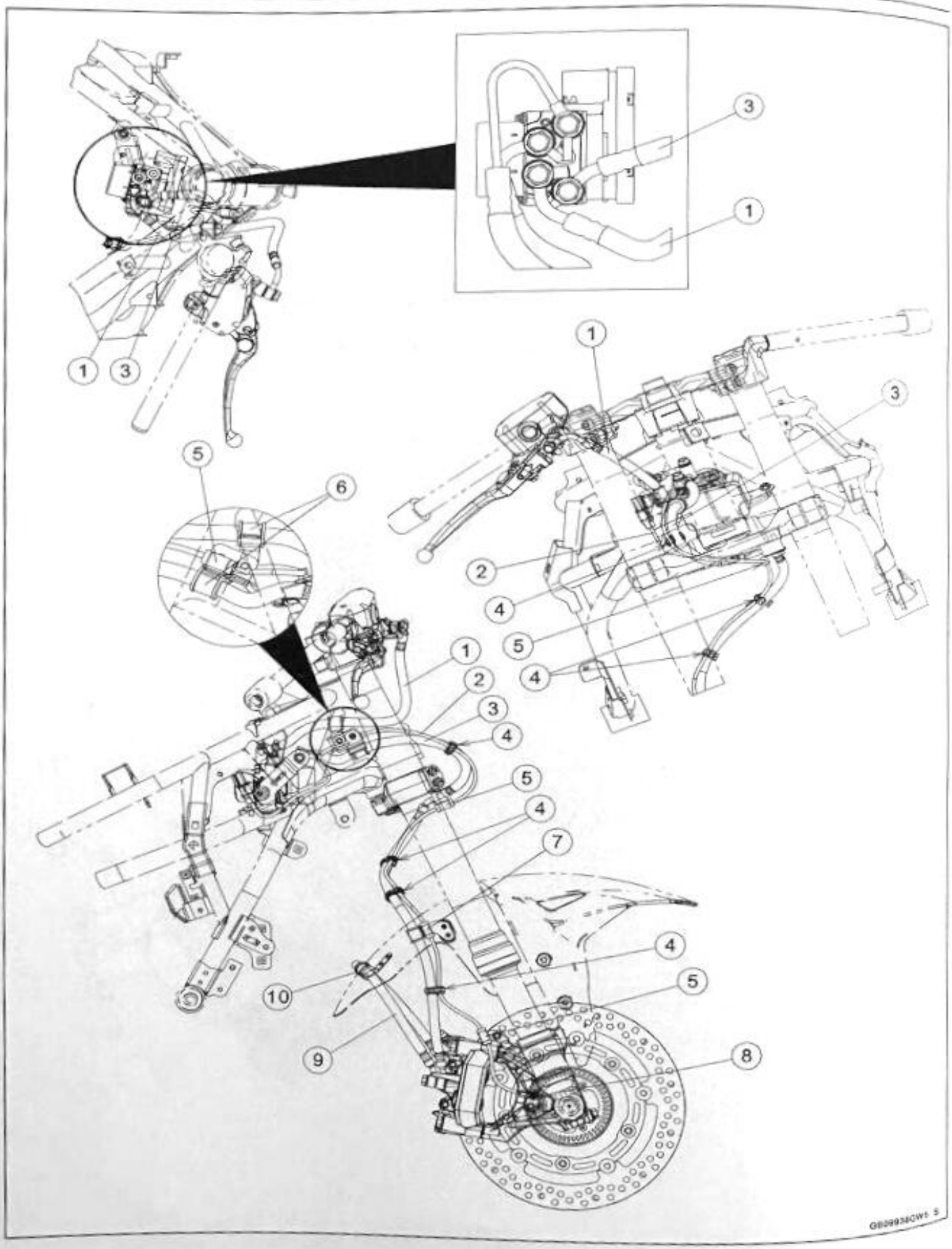
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Heat Insulation Rubber Plate
2. Insert the tags into the holes from the front side of the vehicle as shown.
3. Throttle Body Assy Holders
4. Run the starter motor cable to the hole.
5. Run the gear position sensor lead to the hole.
6. Upper Crankcase
7. Stick Coils
8. Insert the stick coils so that the coil heads align with the marks on the heat insulation rubber plate.
9. Air Suction Valves
10. Run the radiator fan motor lead to the hole.
11. Viewed from A
12. Loop the heat insulation rubber plate the upper fairing bracket, and insert the arrow shapes into the holes as shown.
13. Insert the heat insulation rubber plate hole through the frame bracket.

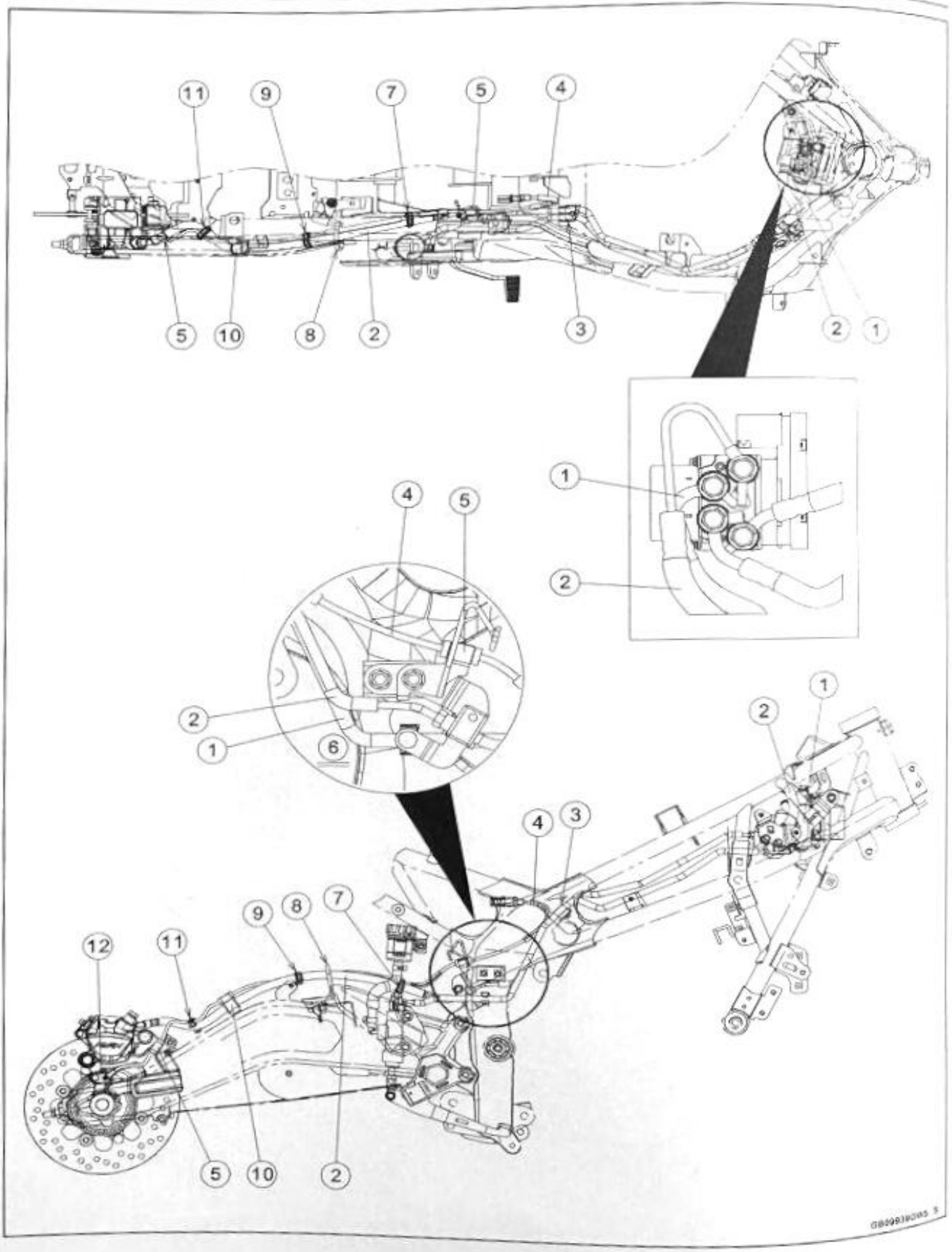
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Front Brake Hose (Front Master Cylinder – ABS Hydraulic Unit)
2. Front Wheel Rotation Sensor Lead
3. Front Brake Hose (ABS Hydraulic Unit – Front Brake Caliper)
4. Clamps (Hold the front brake hose and front wheel rotation sensor lead at the mark position of the sensor lead.)
5. Clamps (Hold the front wheel rotation sensor lead.)
6. Clamp (Hold the front brake hoses.)
7. Clamp (Hold the front wheel rotation sensor lead and front brake hose.)
8. Front Wheel Rotation Sensor
9. Front Brake Hose (Front Brake Calipers)
10. Clamps (Hold the front brake hose.)

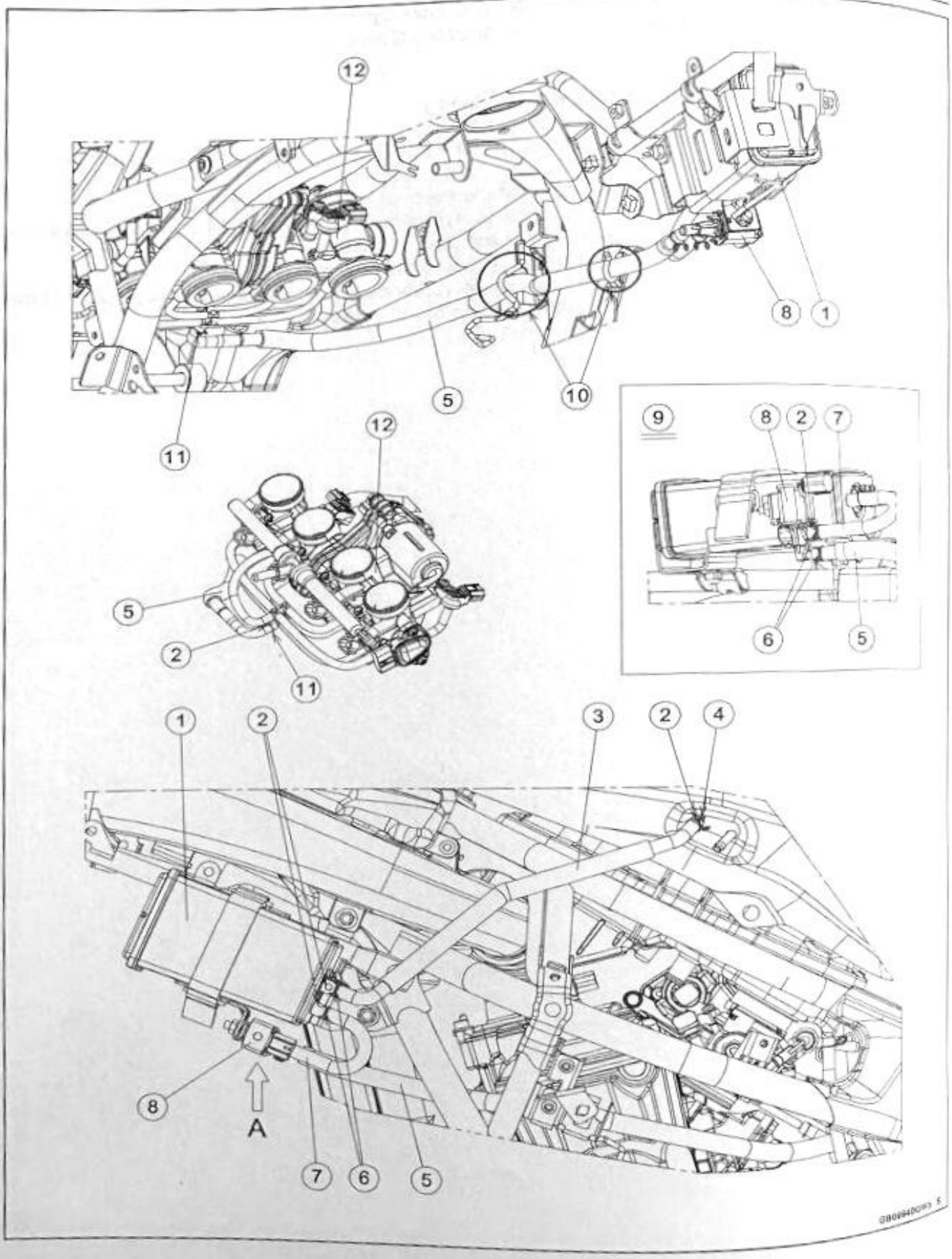
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Rear Brake Hose (ABS Hydraulic Unit – Rear Master Cylinder)
2. Rear Brake Hose (ABS Hydraulic Unit – Rear Brake Caliper)
3. Clamp (Hold the rear brake hoses.)
4. Rear Wheel Rotation Sensor Lead
5. Clamps (Hold the rear wheel rotation sensor lead.)
6. Viewed from Inside
7. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the mark position of the sensor lead.)
8. Run the rear brake hose and rear wheel rotation sensor lead through the clamp.
9. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the mark position of the sensor lead. Run the sensor lead to the inside of the vehicle.)
10. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead.)
11. Clamp (Hold the rear brake hose and rear wheel rotation sensor lead at the mark position of the sensor lead. Run the sensor lead to the outside of the vehicle.)
12. Rear Wheel Rotation Sensor

Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Canister
2. Paint Marks
3. Fuel Tank Breather Hose
4. Install the clamp as shown.
5. Purge Hose (Purge Valve – Throttle Body Assy)
6. Clamps (Face their knobs to the left side of the vehicle.)
7. Purge Hose (Canister – Purge Valve)
8. Purge Valve
9. Viewed from A
10. Run the purge hose [5] through the clamps.
11. Clamp (Face its knob to the lower side of the vehicle.)
12. Throttle Body Assy

Troubleshooting Guide

NOTE

○Refer to the Self-Diagnosis System chapter for most of DFI trouble shooting guide.

○This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Ignition switch not on and engine start/stop switch to engine stop position
- Starter lockout switch or gear position sensor trouble
- Starter motor trouble
- Battery voltage low
- Starter relay not contacting or operating
- Engine start/stop switch not contacting
- Starter system wiring shorted or open
- Ignition switch trouble
- Engine start/stop switch trouble
- Main or ignition fuse blown

Starter motor rotating but engine doesn't turn over:
- Vehicle-down sensor (DFI) coming off
- Immobilizer system trouble (Equipped Models)
- Starter clutch trouble
- Starter idle gear trouble

Engine won't turn over:
- Valve seizure
- Valve lifter seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure
- Starter idle gear seizure

No fuel flow:
- No fuel in tank
- Fuel pump trouble
- Fuel tank air vent obstructed
- Fuel filter clogged
- Fuel line clogged

No spark; spark weak:
- Vehicle-down sensor (DFI) coming off
- Ignition switch not on
- Clutch lever not pulled in or gear not in neutral
- Battery voltage low
- Immobilizer system trouble (Equipped Models)
- Spark plug dirty, broken, or gap maladjusted
- Spark plug incorrect
- Stick coil shorted or not in good contact
- Stick coil trouble
- ECU trouble
- Gear position sensor, starter lockout, or side stand switch trouble
- Crankshaft sensor trouble
- Ignition switch or engine start/stop switch shorted
- Starter system wiring shorted or open
- Main or ignition fuse blown

Fuel/air mixture incorrect:
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Leak from oil filler plug, crankcase breather hose or air cleaner drain hose

Compression Low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- No valve clearance
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Poor Running at Low Speed:

Spark weak:
- Battery voltage low
- Immobilizer system trouble (Equipped Models)
- Stick coil trouble
- Stick coil shorted or not in good contact
- Spark plug dirty, broken, or maladjusted
- Spark plug incorrect
- ECU trouble
- Crankshaft sensor trouble

Fuel/air mixture incorrect:
- Air passage clogged
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Fuel to injector insufficient
- Fuel line clogged
- Throttle body assy holder loose
- Air cleaner housing holder loose

Compression low:
- Spark plug loose

Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
Camshaft cam worn

Other:
ECU trouble
Engine oil viscosity too high
Drive train trouble
Brake dragging
Clutch slipping
Engine overheating
Air suction valve trouble
Air switching valve trouble

Poor Running or No Power at High Speed:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
Stick coil shorted or not in good contact trouble
Stick coil trouble
ECU trouble

Fuel/air mixture incorrect:
Air cleaner clogged, poorly sealed, or missing
Air cleaner housing holder loose
Water or foreign matter in fuel
Throttle body assy holder loose
Fuel to injector insufficient
Fuel tank air vent obstructed
Fuel line clogged
Fuel pump trouble

Compression low:
Spark plug loose
Cylinder head not sufficiently tightened down
No valve clearance
Cylinder, piston worn
Piston ring bad (worn, weak, broken, or sticking)
Piston ring/groove clearance excessive
Cylinder head gasket damaged
Cylinder head warped
Valve spring broken or weak
Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)

Knocking:
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
ECU trouble

Miscellaneous:
Throttle valve won't fully open
Brake dragging
Clutch slipping
Engine overheating
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Camshaft cam worn
Air suction valve trouble
Air switching valve trouble
Muffler overheating

Overheating:

Firing incorrect:
Spark plug dirty, broken, or maladjusted
Spark plug incorrect
ECU trouble

Muffler overheating:
Do not run the engine even if with only one cylinder misfiring or poor running (Request the nearest service facility to correct it)
Do not push-start with a dead battery (Connect another full-charged battery with jumper cables, and start the engine using the electric starter)
Do not start the engine under misfire due to spark plug fouling or poor connection of the stick coil
Do not coast the motorcycle with the ignition switch off (Turn the ignition switch on and run the engine)
ECU trouble

Fuel/air mixture incorrect:
Throttle body assy holder loose
Air cleaner housing holder loose
Air cleaner poorly sealed, or missing
Air cleaner clogged

Compression high:
Carbon built up in combustion chamber

Engine load faulty:
Clutch slipping
Engine oil level too high
Engine oil viscosity too high
Drive train trouble
Brake dragging

Lubrication inadequate:
Engine oil level too low

Engine oil poor quality or incorrect
Water Temperature meter incorrect:
Water temperature meter broken
Water temperature sensor broken
Coolant incorrect:
Coolant level too low
Coolant deteriorated
Wrong coolant mixed ratio
Cooling system component incorrect:
Radiator fin damaged
Radiator clogged
Thermostat trouble
Radiator cap trouble
Radiator fan relay trouble
Fan motor broken
Fan blade damaged
Water pump not turning
Water pump impeller damaged

Over Cooling:

Water Temperature meter incorrect:
Water temperature meter broken
Water temperature sensor broken
Cooling system component incorrect:
Thermostat trouble

Clutch Operation Faulty:

Clutch slipping:
Friction plate worn or warped
Steel plate worn or warped
Clutch spring broken or weak
Clutch hub or housing unevenly worn
No clutch lever play
Clutch inner cable trouble
Clutch release mechanism trouble
Clutch not disengaging properly:
Clutch plate warped or too rough
Clutch spring compression uneven
Engine oil deteriorated
Engine oil viscosity too high
Engine oil level too high
Clutch housing frozen on drive shaft
Clutch hub nut loose
Clutch hub spline damaged
Clutch friction plate installed wrong
Clutch lever play excessive
Clutch release mechanism trouble

Gear Shifting Faulty:

Doesn't go into gear; shift pedal doesn't return:
Clutch not disengaging
Shift fork bent or seized
Gear stuck on the shaft
Gear positioning lever binding
Shift return spring weak or broken
Shift return spring pin loose
Shift mechanism arm spring broken
Shift mechanism arm broken
Shift pawl broken
Jumps out of gear:
Shift fork ear worn, bent
Gear groove worn
Gear dogs and/or dog holes worn
Shift drum groove worn
Gear positioning lever spring weak or broken
Shift fork guide pin worn
Drive shaft, output shaft, and/or gear splines worn
Overshifts:
Gear positioning lever spring weak or broken
Shift mechanism arm spring broken

Abnormal Engine Noise:

Knocking:
ECU trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating
Piston slap:
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston pin hole worn
Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Valve lifter worn
Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring/groove clearance excessive
Piston ring worn, broken, or stuck
Piston ring groove worn
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mount loose
Crankshaft bearing worn
Primary gear worn or chipped
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guide worn
Air suction valve damaged
Air switching valve damaged
Alternator rotor loose

Muffler overheating

Abnormal Drive Train Noise:

Clutch noise:
- Clutch housing/friction plate clearance excessive
- Clutch housing gear worn
- Wrong installation of outside friction plate

Transmission noise:
- Bearings worn
- Transmission gear worn or chipped
- Metal chips jammed in gear teeth
- Engine oil insufficient

Drive line noise:
- Drive chain adjusted improperly
- Drive chain worn
- Rear and/or engine sprocket worn
- Chain lubrication insufficient
- Rear wheel misaligned

Abnormal Frame Noise:

Front fork noise:
- Oil insufficient or too thin
- Spring weak or broken

Rear shock absorber noise:
- Shock absorber damaged

Disc brake noise:
- Pad installed incorrectly
- Pad surface glazed
- Disc warped
- Caliper trouble

Other noise:
- Bracket, nut, bolt, etc. not properly mounted or tightened

Red Oil Pressure Warning Indicator Light Doesn't Go OFF:

- Engine oil pump damaged
- Engine oil screen clogged
- Engine oil filter clogged
- Engine oil level too low
- Engine oil viscosity too low
- Camshaft bearing worn
- Crankshaft bearing worn
- Oil pressure switch damaged
- Wiring faulty
- Relief valve stuck open
- O-ring at the oil passage in the crankcase damaged

Exhaust Smokes Excessively:

White smoke:
- Piston oil ring worn
- Cylinder worn
- Valve oil seal damaged
- Valve guide worn
- Engine oil level too high

Black smoke:
- Air cleaner clogged

Brown smoke:
- Air cleaner housing holder loose
- Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory:

Handlebars hard to turn:
- Cable routing incorrect
- Hose routing incorrect
- Wiring routing incorrect
- Steering stem nut too tight
- Steering stem bearing damaged
- Steering stem bearing lubrication inadequate
- Steering stem bent
- Tire air pressure too low

Handlebars shakes or excessively vibrates:
- Tire worn
- Swingarm pivot bearing worn
- Rim warped, or not balanced
- Wheel bearing worn
- Handlebar holder bolt loose
- Steering stem nut loose
- Front, rear axle runout excessive
- Engine mounting bolt loose

Handlebars pulls to one side:
- Frame bent
- Wheel misalignment
- Swingarm bent or twisted
- Swingarm pivot shaft runout excessive
- Steering maladjusted
- Front fork bent
- Right and left front fork oil level improper amount

Shock absorption unsatisfactory:
- (Too hard)
- Front fork oil excessive
- Front fork oil viscosity too high
- Rear shock absorber adjustment too hard
- Tire air pressure too high
- Front fork bent
- (Too soft)
- Tire air pressure too low
- Front fork oil insufficient and/or leaking
- Front fork oil viscosity too low
- Rear shock adjustment too soft
- Front fork, rear shock absorber spring weak
- Rear shock absorber oil leaking

Troubleshooting Guide

Brake Doesn't Hold:

Air in the brake line
Pad or disc worn
Brake fluid leakage
Disc warped
Contaminated pad
Brake fluid deteriorated
Primary or secondary cup damaged in master cylinder
Master cylinder scratched inside

Battery Trouble:

Battery discharged:
Charge insufficient
Battery faulty (too low terminal voltage)
Battery cable making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Alternator trouble
Wiring faulty
Regulator/rectifier trouble

Battery overcharged:
Alternator trouble
Regulator/rectifier trouble
Battery faulty

MODEL APPLICATION

□:This digit in the frame number changes from one machine to another.

Year	Model	Beginning Frame No.
2023	ZX400PP	ML5ZXCP1□PDA00001
2023	ZX400RP	
2023	ZX400SP	ML5ZXCS1□PDA00001

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