Kawasaki

JET SKI® watercraft

800 SX-R

JET SKI® Watercraft Service Manual

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)	lb	pound(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celsius	r	revolution
DC	direct current	rpm	revolution(s) perminute
F	farad(s)	TDC	top dead center
°F	degree(s) Fahrenheit	TIR	total indicator reading
ft	foot,feet	V	volt(s)
g	gram(s)	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		

Read OWNER'S MANUAL before operating.

MAINTENANCE AND ADJUSTMENTS

Maintenance, replacement, or repair of the emission control devices and systems may be performed by any marine SI engine repair establishment or individual.

EMISSION CONTROL INFORMATION

Fuel Information

THIS ENGINE IS CERTIFIED TO OPERATE ON UNLEADED REGULAR GRADE GASOLINE ONLY.

A minimum of 87 octane of the antiknock index is recommended. The antiknock index is posted on service station pumps.

Emission Control Information

To protect the environment in which we all live, Kawasaki has incorporated an exhaust emission control system in compliance with applicable regulations of the United States Environmental Protection Agency.

Exhaust Emission Control System

This system reduces the amount of pollutants discharged into the atmosphere by the exhaust of this engine. The fuel, ignition and exhaust systems of this engine have been carefully designed and constructed to ensure an efficient engine with low exhaust pollutant levels.

Maintenance

Proper maintenance and repair are necessary to ensure that watercraft will continue to have low emission levels. This Service Manual contains those maintenance and repair recommendations for this engine. Those items identified by the Periodic Maintenance Chart are necessary to ensure compliance with the applicable standards.

Tampering with Emission Control System Prohibited

Federal law prohibits the following acts or the causing thereof: (1) the removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new engine for the purposes of emission control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the engine after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to consitute tampering are the acts listed below:

Do not tamper with the original emission related parts.

* CDI Ignition System
* Flame Arrester
* Fuel Filter Screen
* Spark Plugs
* Carburetor and internal parts

Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of the warranty period, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your "JET SKI" watercraft:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki "JET SKI" watercraft parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki "JET SKI" watercraft are introduced by the Special Tool Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

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 ignition 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 Ignition Coil section.

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

⚠ WARNING

This warning symbol identifies special instructions or procedures which, if not correctly followed, could result in personal injury, or loss of life.

CAUTION

This caution symbol identifies special instructions or procedures which, if not strictly observed, could result in damage to or destruction of equipment.

This manual contains four more symbols (in addition to WARNING and CAUTION) which will help you distinguish different types of information.

NOTE

o *This note symbol indicates points of particular interest for more efficient and convenient operation.*

- ● Indicates a procedural step or work to be done.
- o 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

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Before Servicing

Before starting to service a watercraft, careful reading of the applicable section is recommended to eliminate unnecessary work. Photographs, diagrams, notes, cautions, warnings, and detailed descriptions have been included wherever necessary. Nevertheless, even a detailed account has limitations, a certain amount of basic knowledge is also required for successful work.

Especially note the following:

(1) Adjustments

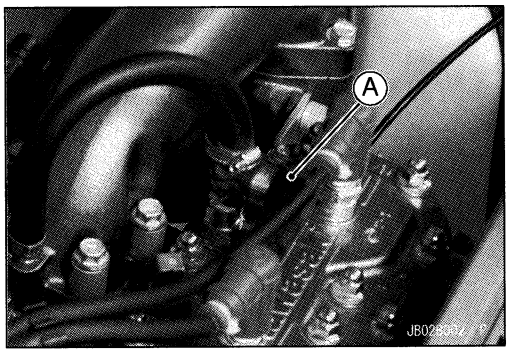
Adjustments shall be made in accordance with the Periodic Maintenance Chart or whenever troubleshooting or presence of symptoms indicate that adjustments may be required. Whenever running of the engine is required during maintenance it is best to have the watercraft in water.

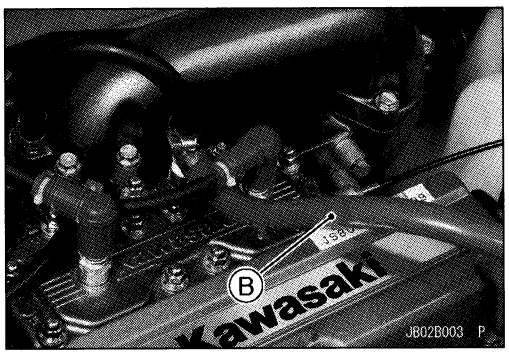
CAUTION

Do not run the engine without cooling water supply for more than 15 seconds, especially in high revolutionary speed or severe engine and exhaust system damage will occur.

(2) Auxiliary Cooling

An auxiliary cooling supply may be used if the watercraft cannot be operated in water during adjustments. If possible, always operate the watercraft in water rather than use an auxiliary cooling supply.





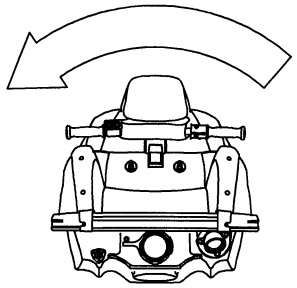
- Loosen the clamp and remove the cap [A].
- Connect the garden hose [B] to the hose fitting (see above).
- Attach the garden hose to a faucet. Do not turn on the water until the engine is running and turn it off immediately when the engine stops. The engine –requires 2.4 L/min (2.5 qts/min) at 1800 rpm and 7.0 L/min (7.4 qts/min) at 6000 rpm.

CAUTION

Insufficient cooling supply will cause the engine and/or exhaust system to overheat and severe damage will occur. Excessive cooling supply may kill the engine and flood the cylinders, causing hydraulic lock. Hydraulic lock will cause severe damage to the engine. If the engine dies while using an auxiliary cooling supply, the water must be shut off immediately.

Always turn the boat on its left side. Rolling to the right side can cause water in the exhaust system to run into the engine, with possible engine damage.

Before Servicing



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(3) Dirt

Before removal and disassembly, clean the "Jet Ski" watercraft. Any sand entering the engine will shorten the life of the watercraft. For the same reason, before installing a new part, clean off any dust or metal filings.

(4) Battery Ground

Disconnect the ground (–) wire from the battery before performing any disassembly operations on the "Jet Ski" watercraft. This prevents the engine from accidentally turning over while work is being carried out, sparks from being generated while disconnecting the wires from electrical parts, as well as damage to the electrical parts themselves. For reinstallation, first connect the positive wire to the positive (+) terminal of the battery

(5) Installation, Assembly

Generally, installation or assembly is the reverse of removal or disassembly. However, if installation or assembly sequence is given in this Service Manual, follow it. Note parts locations and cable, wire, and hose routing during removal or disassembly so they can be installed or assembled in the same way. It is preferable to mark and record the locations and routing whenever possible.

(6) Tightening Sequence

When installing bolts, nuts, or screws for which a tightening sequence is given in this Service Manual, make sure to follow the sequence. When installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit, thus ensuring that the part has been installed in its proper location. Then, tighten them to the specified torque in the tightening sequence and method indicated. If tightening sequence instructions are not given, tighten them evenly in a cross pattern. Conversely, to remove a part, first loosen all the bolts, nuts, or screws that are retaining the part a 1/4–turn before removing them.

(7) Torque

When torque values are given in this Service Manual, use them. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(8) Force

Common sense should dictate how much force is necessary in assembly and disassembly. If a part seems especially difficult to remove or install, stop and examine what may be causing the problem. Whenever tapping is necessary, tap lightly using a wooden or plastic-faced mallet. Use an impact driver for screws (particularly for the removing screws held by non-permanent locking agent) in order to avoid damaging the screw heads.

(9) Edges

Watch for sharp edges, as they could cause injury through careless handling, especially during major engine disassembly and assembly. Use a clean piece of thick cloth when lifting the engine or turning it over.

(10)High-Flash Point Solvent

A high-flash point solvent is recommended to reduce fire danger. A commercial solvent commonly available in North America is standard solvent (generic name). Always follow manufacturer and container directions regarding the use of any solvent.

Before Servicing

(11)Gasket, O-Ring

Replace a gasket or an O-ring with a new part when disassembling. Remove any foreign matter from the mating surface of the gasket or O-ring to ensure a perfectly smooth surface to prevent oil or compression leaks.

(12)Liquid Gasket, Locking Agent

Clean and prepare surfaces where liquid gasket or non-permanent locking agent will be used. Apply them sparingly. Excessive amount may block engine oil passages and cause serious damage.

(13)Press

When using a press or driver to install a part such as a drive shaft holder bearing, apply a small amount of oil to the area where the two parts come in contact to ensure a smooth fit.

(14)Ball Bearing

Do not remove a ball bearing unless it is absolutely necessary. Replace any ball bearings that were removed with new ones. Install bearings with the manufacturer and size marks facing out, applying pressure evenly with a suitable driver. Apply force only to the end of the race that contacts the press fit portion, and press it evenly over the base component.

(15)Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals. Oil or grease seals should be pressed into place using a suitable driver, applying a force uniformly to the end of seal until the face of the seal is even with the end of the hole, unless instructed otherwise. When pressing in an oil or grease seal which has manufacturer's marks, press it in with the marks facing out.

(16)Circlip, Retaining Ring, and Cotter Pin

When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more. Install the circlip with its chamfered side facing load side as well.

Replace any circlips, retaining rings, and cotter pins that were removed with new ones, as removal weakens and deforms them. If old ones are reused, they could become detached while the "Jet Ski" watercraft is driven, leading to a major problem.

(17)Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the sliding surfaces have an adequate lubricative film. During assembly, make sure to apply oil to any sliding surface or bearing that has been cleaned. Old grease or dirty oil could have lost its lubricative quality and may contain foreign particles that act as abrasives; therefore, make sure to wipe it off and apply fresh grease or oil. Some oils and greases in particular should be used only in certain applications and may be harmful if used in an application for which they are not intended.

(18)Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed.

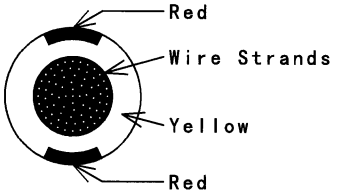
Replacement parts will be damaged or lose their original function once they are removed. Therefore, always replace these parts with new ones every time they are removed. Although the previously mentioned gasket, O-ring, ball bearing, needle bearing, grease seal, oil seal, circlip, and cotter pin have not been so designated in their respective text, they are replacement parts.

(19)Electrical Wires

All the electrical wires are either one-color or two-color. A two-color wire is identified first by the primary color and then the stripe color. For example, a yellow wire with thin red stripes is referred to as a "yellow/red" wire; it would be a "red/yellow" wire if the colors were reversed. Unless instructed otherwise, electrical wires must be connected to wires of the same color.

Before Servicing

Two-Color Electrical

Wire(cross-section)	Color Indicated on the Wire	Color Indicated on the Wiring Diagram
	Yellow/Red	Y/R

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(20)Inspection

When parts have been disassembled, visually inspect these parts for the following conditions or other damage. If there is any doubt as to the condition of them, replace them with new ones.

Abrasion	Crack	Hardening	Warp
Bent	Dent	Scratch	Wear
Color change	Deterioration	Seizure	

(21)Specifications

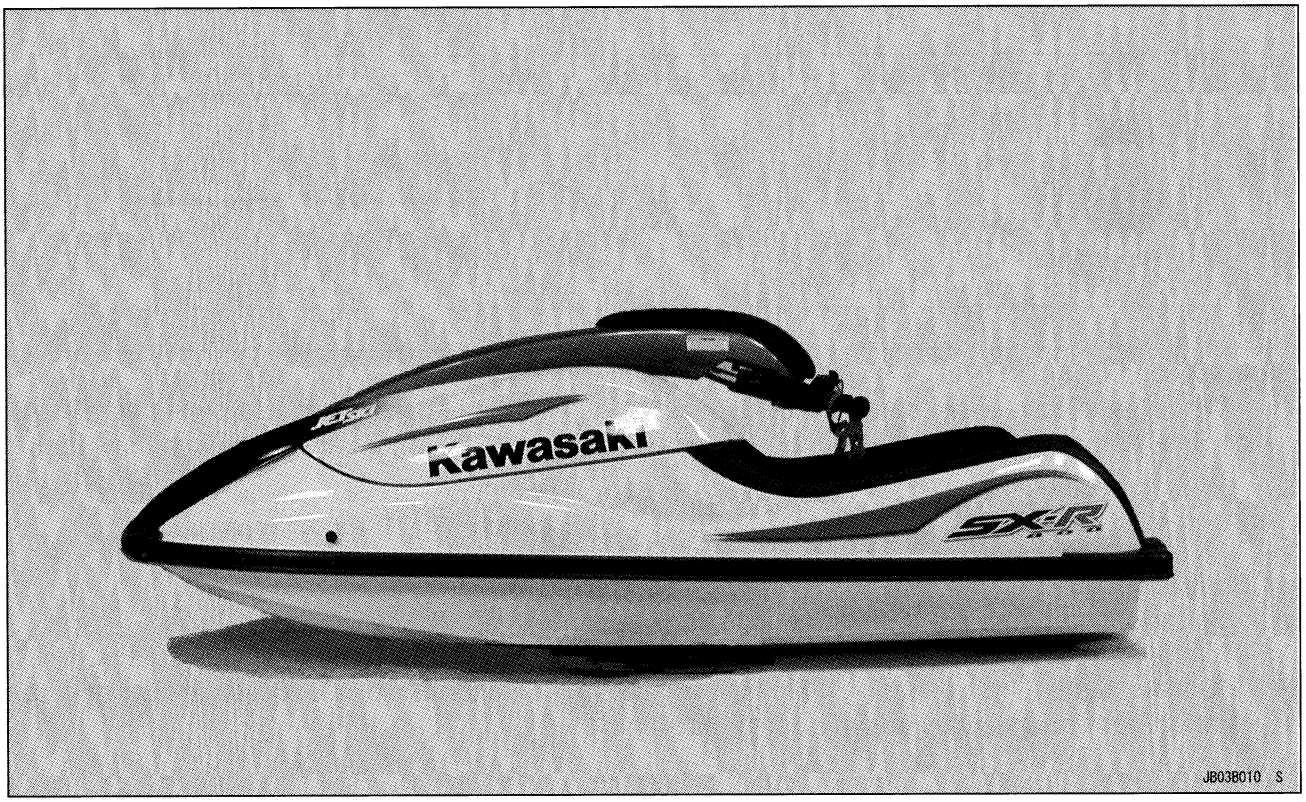
Specification terms are defined as follows:

"Standards" show dimensions or performances which brand-new parts or systems have.

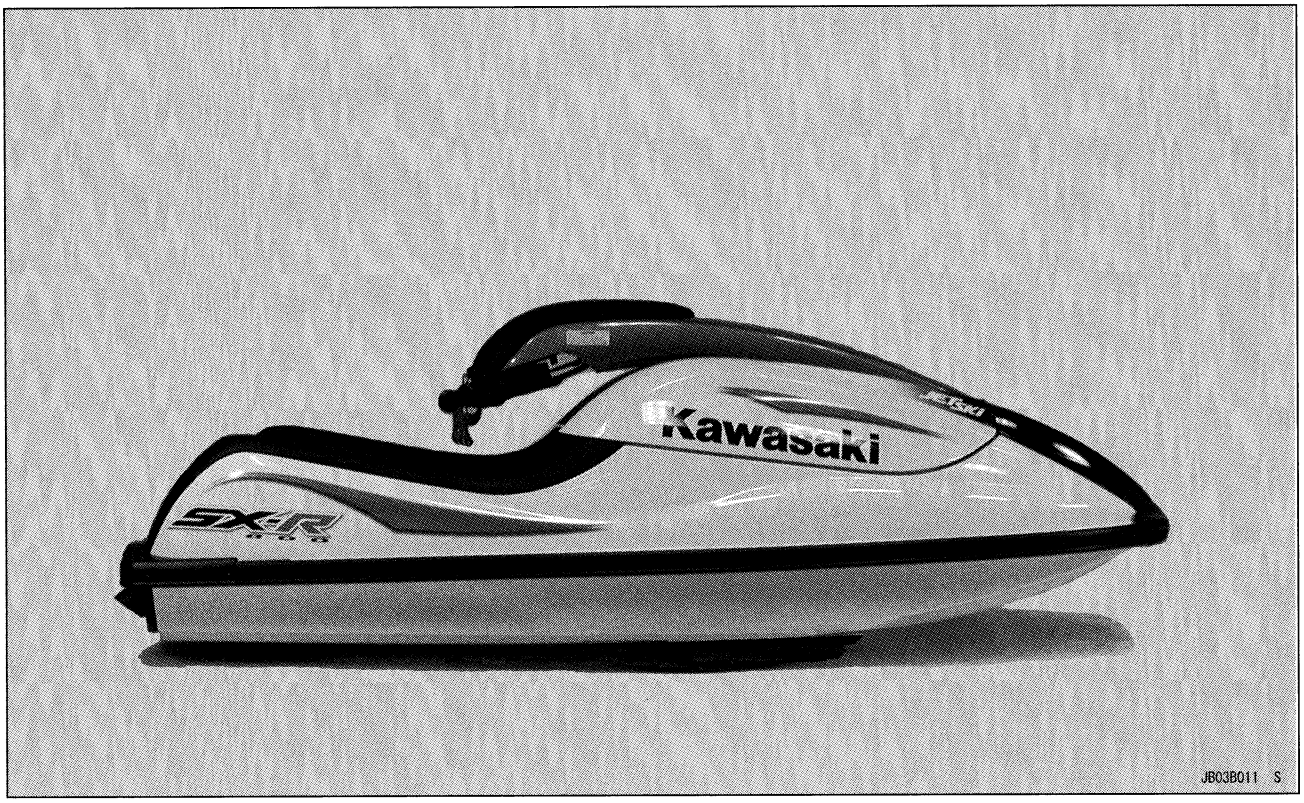
"Service Limits" indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

JS800-A1 Left Side View:



JS800-A1 Right Side View:



General Specifications

Items	JS800-A1
Engine:	
Type	2-stroke, 2-cylinder, crankcase reed valve, water cooled
Displacement	781 mL (47.7 cu in.)
Bore and stroke	82 × 74 mm (3.23 × 2.91 in.)
Compression ratio	7.2 : 1
Maximum horsepower	58.85 kW (80 PS) @6 250 r/min (rpm)
Maximum torque	94.2 N·m (9.6 kgf·m, 69.5 ft·lb) @5 750 r/min (rpm)
Ignition system	Magneto CDI (Digital)
Lubrication system	Gas/oil premix ratio 60 : 1
Carburetion system	MIKUNI BN40-38 × 2
Starting system	Electric starter
Tuning Specifications:	
Spark plug: Type	NGK BR8ES
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Terminal	Solid post
Ignition timing	13° BTDC @1 250 r/min ~ 20.2° BTDC @4 000 r/min (rpm)
Carburetor: Idle Speed	1 250 ± 100 r/min (rpm) — in water
	1 700 ± 100 r/min (rpm) — out of water
Compression pressure	892 ~ 1 373 kPa (9.1 ~ 14 kgf/cm², 129 ~ 199 psi)
	@ 490 r/min (rpm)
Drive System:	
Coupling	Direct drive from engine
Jet pump: Type	Axial flow single stage
Thrust	3 100 N (317 kgf, 697 lb)
Steering	Steerable nozzle
Braking	Water drag
Performance:	
†Minimum turning radius	3.2 m (10.5 ft)
†Fuel consumption	32 L/h (8.5 US gal/h) @ full throttle
†Cruising range	40 km (75 mile) @ full throttle 32 minutes
Dimensions:	
Overall length	2 300 mm (90.55 in.)
Overall width	730 mm (28.7 in.)
Overall height	735 mm (28.9 in.)
Dry weight	159 kg (351 lb)
Fuel tank capacity	17 L (4.5 US gal) including 3 L (0.8 US gal) reserve
Engine Oil:	
Type	2-stroke, N.M.M.A. Certified for Service TC-W3
Electrical Equipment:	
Battery	12 V 18 Ah
Maximum generator out put	6.6 A/14V @6 000 r/min (rpm)

†: This information shown here represents results under controlled conditions, and the information may not be correct under other conditions.

Specifications 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
cm Hg	×	1.333	=	kPa

Units of Speed:

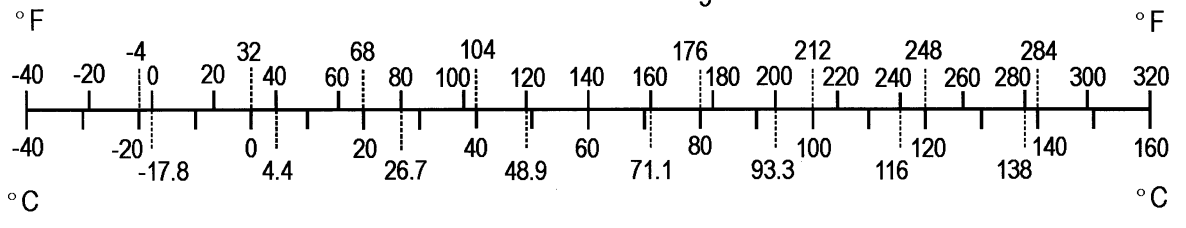
km/h	×	0.6214	=	mph

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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2-2 PERIODIC MAINTENANCE

Periodic Maintenance Chart

Frequency / Description	Initial 10 Hours	Every 25 Hours	Every 100 Hours	See Page
Check all hoses, clamps, nuts, bolts, and fasteners	●	●		2 - 23
Lubricate throttle cable fitting and choke cable fitting at carburetor		●		2 - 20
Lubricate choke cable and throttle cable and throttle cable fitting at throttle case		●		2 - 20
Clean and gap spark plugs (replace if necessary)		●		2 - 19
Inspect battery charging condition		●		2 - 18
Lubricate steering cable ball joints and steering nozzle pivots		●		2 - 20
Clean fuel filter screens		●		2 - 11
Adjust carburetor		●		2 - 8
Flush bilge line and filter		●		2 - 16
Flush cooling system (after each use in salt water)		●		2 - 15
Inspect/clean flame arrester		●		2 - 13
Inspect impeller blade for damage (remove)			●	2 - 16
Inspect/replace coupling damper			●	2 - 14
Inspect carburetor throttle shaft spring (replace carburetor if necessary)			●	2 - 14
Inspect steering cable			●	2 - 17
Lubricate handlebar pivot (disassemble)		●		2 - 18
Inspect fuel vent check valve		●		2 - 12

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.

Letters used in the "Remarks" column mean:
L: Apply a non-permanent locking agent to the threads.
SS: Apply silicone sealant to the threads.
S: Tighten the fasteners following the specified sequence.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System:				
Carburetor mounting bolts	18	1.8	13 in·lb	L
Carburetor main jet	1.8	0.18	16 in·lb	
Carburetor pilot jet	0.7	0.07	6.2 in·lb	
Carburetor float arm pin screw	0.98	0.10	8.7 in·lb	
Carburetor cover screws	3.4	0.35	30 in·lb	
Carburetor plate screws	2.0	0.20	18 in·lb	
Inlet manifold mounting nuts	9.8	1.0	87 in·lb	
Air inlet cover mounting bolts	8.8	0.9	78 in·lb	L
Flame arrester case mounting bolts	8.8	0.9	78 in·lb	L
Handle pole cover screws	1.5	0.15	13 in·lb	
Choke cable adjust nuts	20	2.0	14	
Throttle cable adjust nuts	20	2.0	14	L
Exhaust System:				
Exhaust pipe mounting bolts	29	3.0	22	L
Front muffler mounting bolts	29	3.0	22	L
Water pipe joints	11	1.1	95 in·lb	SS
Exhaust manifold mounting nuts	20	2.0	14.5	S
Expansion chamber mounting bolts	29	3.0	22	L
Muffler bracket mounting bolts	29	3.0	22	L
Water box muffler bracket mounting screws	5	0.5	43 in·lb	L
Engine Top End:				
Cylinder head nuts	29.4	3.0	22	S
Cable holder bolts	29.4	3.0	22	L
Cylinder base nuts	34	3.5	25	
Water pipe joint	7.8 ~ 14	0.8 ~ 1.4	69 ~ 122 in·lb	SS
Fitting	7.8 ~ 14	0.8 ~ 1.4	69 ~ 122 in·lb	L
Cylinder stud	—	—	—	L

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Engine Removal/Installation:				
Engine mounting bolts	36	3.7	27	L
Engine bed mounting bolts	49	5.0	36	L
Engine mount bolts	16	1.6	12	L
Engine Bottom End:				
Flywheel bolt	130	13.5	96	L
Stator mounting bolts	12	1.2	8.5	
Coupling	130	13.5	96	L
Magneto cover mounting bolts	8.8	0.9	78 in·lb	L
Crankcase bolts (6 mm dia.)	8.8	0.9	78 in·lb	L, S
Crankcase bolts (8 mm dia.)	29	3.0	22	L, S
Magneto cover cap bolts	8.8	0.9	78 in·lb	L
Set screw	8.8	0.9	78 in·lb	L
Crankshaft sensor bracket screw	8.8	0.9	78 in·lb	L
Grommet clamp screws	8.8	0.9	78 in·lb	L
Electric case cap bolts	8.8	0.9	78 in·lb	L
Cooling and Bilge Systems:				
Water pipe joint	9.8	1.0	87 in·lb	SS
Drive System:				
Coupling	39	4.0	29	L
Drive shaft holder mounting bolts	22	2.2	16.0	L
Pump and Impeller:				
Water pipe joint	9.8	1.0	87 in·lb	SS
Steering nozzle pivot bolts	8.8	0.9	78 in·lb	L
Pump outlet mounting bolts	—	—	—	L
Pump cap bolts	—	—	—	L
Impeller	98	10.0	72	
Pump mounting bolts	22	2.2	16.0	L
Pump cover mounting bolts	6.9	0.7	61 in·lb	L
Grate mounting bolts	7.8	0.8	69 in·lb	L
Steering cable ball joint	—	—	—	L
Handle Pole and Handlebar:				
Steering support bracket mounting bolts	—	—	—	L
Steering pivot stud	38	3.9	28	L (small)
Handle pole cover screws	1.5	0.15	13 in·lb	

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Handle pole pivot shaft	13	1.3	9.4	
Handle pole pivot shaft nut	33	3.4	25	
Handlebar clamp screws	18	1.8	13.0	L
Handle pole bracket bolts	19	1.9	14	L
Hull/Engine Hood:				
Front cover screws	—	—	—	L
Exhaust outlet bolts	—	—	—	L
Battery bracket bolts	—	—	—	L
Strap bolts	—	—	—	L
Strap bracket bolt	—	—	—	L
Engine hood plate bolts	—	—	—	L
Electric case bracket bolts	—	—	—	L
Electrical System:				
Electric case connector mounting bolts	8.8	0.9	78 in·lb	L
Spark plugs	27	2.8	20	
Joints	3.9	0.4	35 in·lb	
Starter relay lead mounting nuts	4.4	0.45	39 in·lb	
Electric case mounting bolts	8.8	0.9	78 in·lb	L
Temperature sensor mounting bolt	8.8	0.9	78 in·lb	L
Temperature sensor	27	2.8	20	
Regulator/rectifier mounting bolts	8.8	0.9	78 in·lb	L
CDI igniter mounting bolts	8.8	0.9	78 in·lb	L
Ignition coil mounting bolts	8.8	0.9	78 in·lb	L
Electric case bolts	8.8	0.9	78 in·lb	L
Switch housing mounting screws	3.9	0.4	35 in·lb	
Battery ground cable mounting bolt	8.8	0.9	78 in·lb	L
Starter motor cable (+) mounting nut	7.8	0.8	69 in·lb	
Starter motor mounting bolts	8.8	0.9	78 in·lb	L
Starter motor retaining bolts	6.3	0.6	56 in·lb	L

Torque and Locking Agent

This table relating tightening torque of the stainless bolt and the nut 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.

General Fasteners (stainless bolt and nut)

Threads dia. (mm)	Torque		
	N·m	kgf·m	ft·lb
6	5.9 ~ 8.8	0.60 ~ 0.90	52 ~ 78 in·lb
8	16 ~ 22	1.6 ~ 2.2	11.6 ~ 15.9
10	30 ~ 41	3.1 ~ 4.2	22 ~ 30

Specifications

Item	Standard	Service Limit
Fuel System:		
Idle speed:		
in water	1 250 ± 100 r/min (rpm)	– – –
out of water	1 700 ± 100 r/min (rpm)	– – –
Electrical System:		
Battery voltage	12.6 V or more	– – –
Spark plug gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –

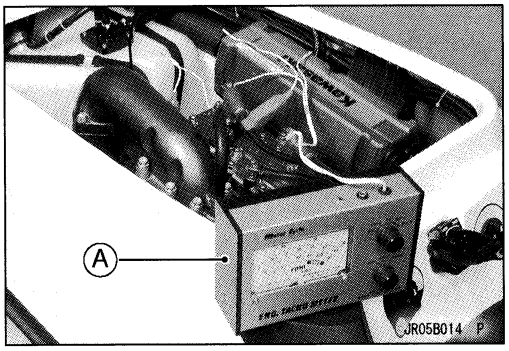
Periodic Maintenance Procedures

Fuel System:

Idle Speed Adjustment

The normal idle speed setting is the lowest stable speed.

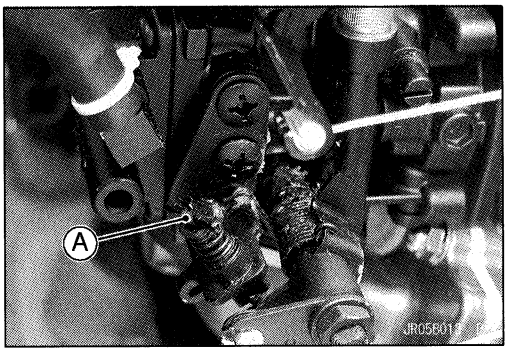
- Remove the engine hood (see Hull/Engine Hood chapter).
- Start the engine.
- Check the engine speed, using the engine revolution tester [A] for high accuracy.



- Turn the idle adjusting screw [A] as required to reach this setting.

Idle Speed

in water:	**1 250 ± 100 r/min (rpm)**
out of water:	**1 700 ± 100 r/min (rpm)**



Carburetor Synchronization

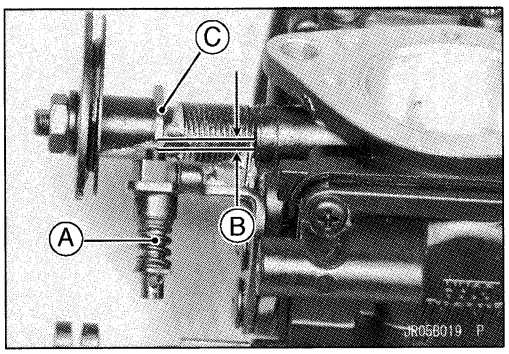
- Remove the carburetor (see Fuel System chapter).

CAUTION
Do not turn the pilot screws carelessly during synchronization. You may cause poor running at low engine speed.

- Check the mixture screws settings (see Fuel System chapter).

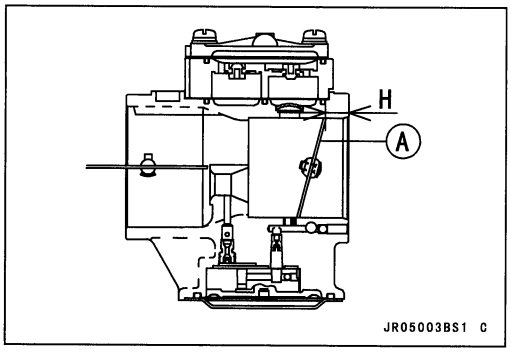
★If the setting is incorrect, adjust them (see Fuel System chapter).

- Turn out the idle adjusting screw [A] until there is a clearance [B] between the adjusting screw end and throttle shaft lever [C].
- Turn in the idle adjusting screw until the adjusting screw end just touches the throttle shaft lever.

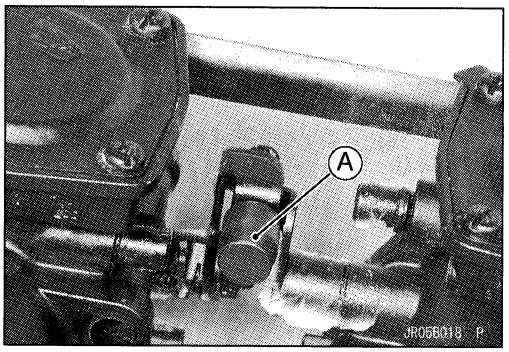


Periodic Maintenance Procedures

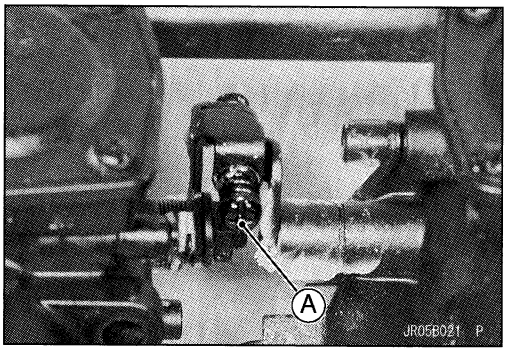
- Turn in the adjusting screw 3/4 turn from the point to keep the specified throttle valve [A] opening in the front carburetor.
- Measure the distance from the bottom of the carburetor bore lower end to the valve edge shown as "H".



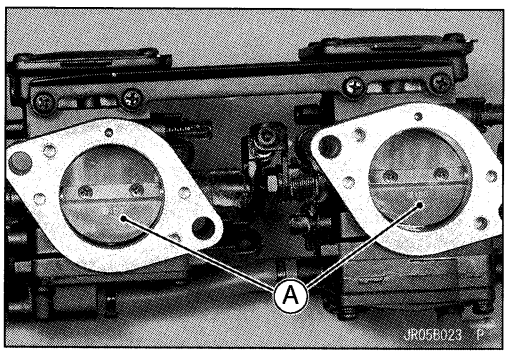
- Remove:
  Synchronizing Screw Cap [A]



- Turn the synchronizing screw [A] so that the valve edge in the rear carburetor keeps the same distance within ± 0.2 mm (0.008 in.) tolerance as in the front carburetor.



- Open and close the throttle a few times to make sure that the throttle valves [A] are synchronized. Readjust if necessary.
- Install the carburetor.
- Adjust the idle speed, throttle control and choke cables.



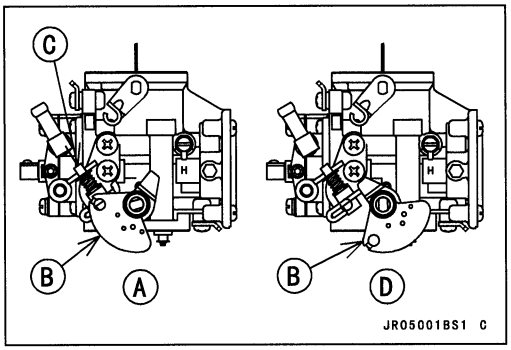
Periodic Maintenance Procedures

Throttle Cable Adjustment

- Remove the engine hood (see Hull/Engine Hood chapter).
- Check throttle cable adjustment.

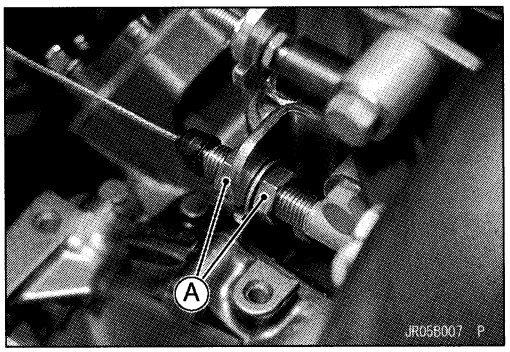
o With the throttle lever released [A], the lower stop on the shaft lever [B] should rest against the idle adjust screw [C], and there should be slight slack in the throttle cable.

o When the throttle lever is fully applied (pulled) [D], the upper stop on the shaft lever [B] should be all the way up against the stop on the carburetor.



- If necessary, adjust the throttle cable.
- Loosen and turn the locknuts [A] at the bracket until the stop on the shaft lever hits against the idle adjust screw with slight cable slack.
- Tighten the locknuts securely.

Torque - Throttle Cable Adjustment Nuts: 20 N·m (2.0 kgf·m, 25 ft·lb)



- Check that the throttle lever moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by the return spring.

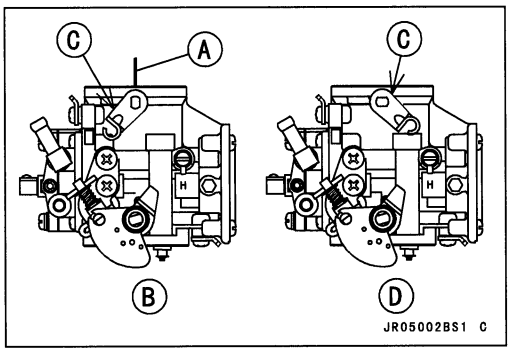
★If the throttle lever does not return properly, check the throttle cable routing, cable adjustments, and cable damage. Then lubricate the throttle cable.

- Run the engine at the idle speed, and turn the handlebar all the way to the right and left, or/and up and down to ensure that the idle speed does not change.

★If the idle speed increase, check the throttle cable adjustment and the cable routing.

Choke Cable Adjustment

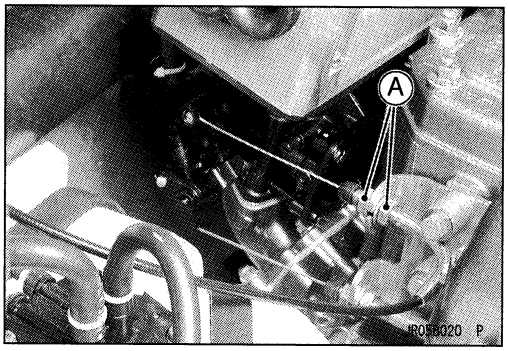
- Remove the engine hood (see Hull/Engine Hood chapter).
- When the choke knob is turned to the "OFF" position, the choke butterfly valve [A] in the carburetor should be completely open [B]. The choke pivot arm [C] should stand all the way toward the starboard side of the boat with minimal cable slack.
- When the choke knob is turned to the "ON" position, the choke butterfly valve in the carburetor should be completely closed [D]. Check that the choke pivot arm [C] stands all the way toward the port side of the boat without cable slack.



Periodic Maintenance Procedures

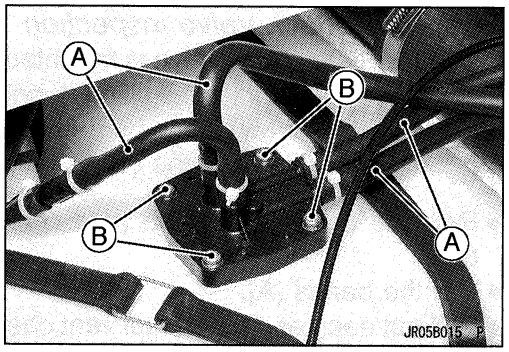
- If necessary, adjust the choke cable.
  - Turn the choke knob to the "OFF" position (counterclockwise completely).
  - Loosen the adjust nuts [A] and turn the nuts to allow a little cable slack.
  - Tighten the locknuts.

Torque - Choke Cable Adjust Nuts: 20 N·m (2.0 kgf·m, 25 ft·lb)



Fuel Filter Screen Cleaning

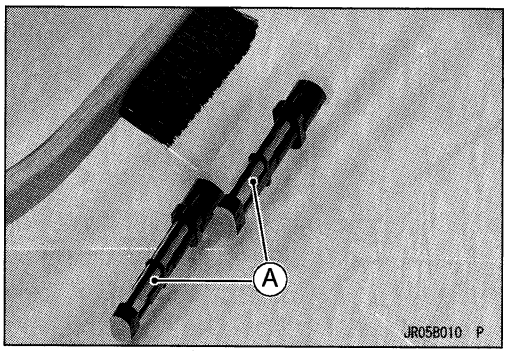
- Remove the engine hood (see Hull/Engine Hood chapter).
- Cut the bands of the fuel tubes.
- Pull out each tubes [A] from the fuel filter assembly fittings.
- Unscrew the fuel filter assembly mounting screws [B].
- Remove the fuel filter assembly.



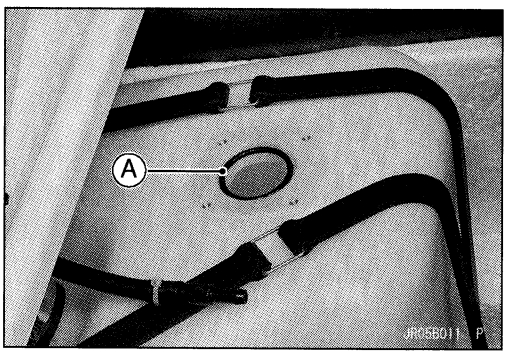
- Wash the fuel filler screens [A] in non-flammable or high flash-point solvent. Use a brush to remove any contaminants trapped in the screens.

⚠ WARNING

Clean the fuel filter screens in a well-ventilated area, and take care that there are no sparks or flame any where near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent. A fire or explosion could result.

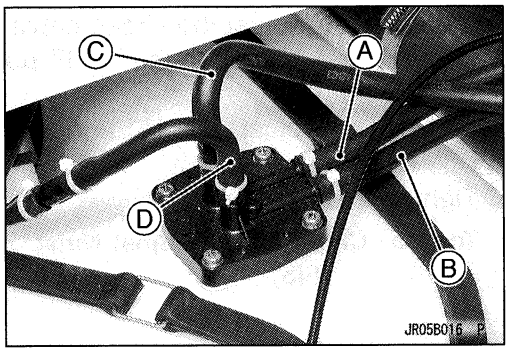


- When installing the fuel filter assembly, note the following.
  - Be sure the O-ring [A] on the fuel tank is in position.



Periodic Maintenance Procedures

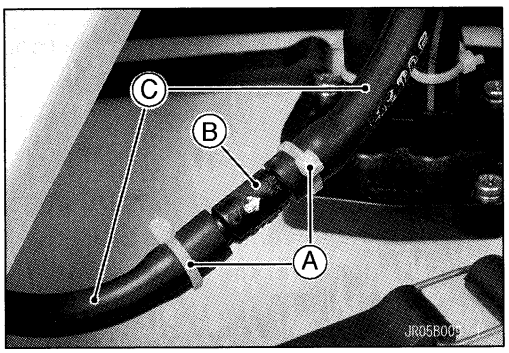
o Tighten the mounting screws.
o Be sure the hoses are connected correctly with their fittings.
Reserve Line [A]
Main (ON) Line [B]
Return Line [C]
Fuel Tank Vent Line [D]



Fuel Vent Check Valve Inspection

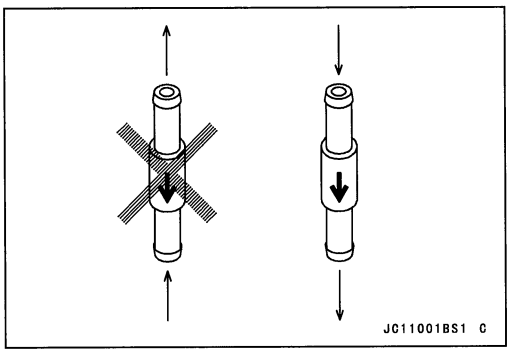
The fuel vent check valve is mounted in the fuel tank vent hose to prevent fuel from spilling during riding. Air can flow into the tank to allow fuel to be drawn out by the fuel pump, but fuel cannot flow out the check valve.

- Remove the engine hood (see Hull/Engine Hood chapter).
- Cut the bands [A].
- Pull out each end of the fuel vent check valve [B] from the vent tubes [C].

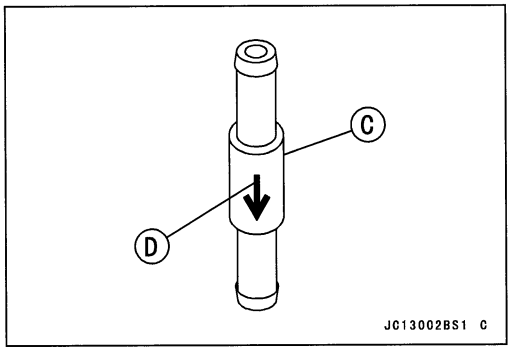


- Blow through the fuel vent check valve from catch end.

★If the check valve will allow air to flow as shown, it is OK.
★If air will flow through the check valve in both direction or in neither direction, the check valve must be replaced.



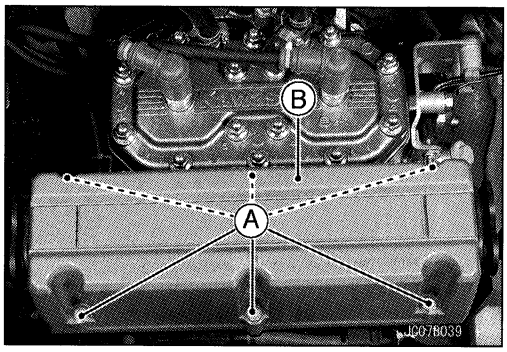
- The fuel vent check valve [C] must be mounted so that the arrow [D] on its case is pointing toward the fuel tank.



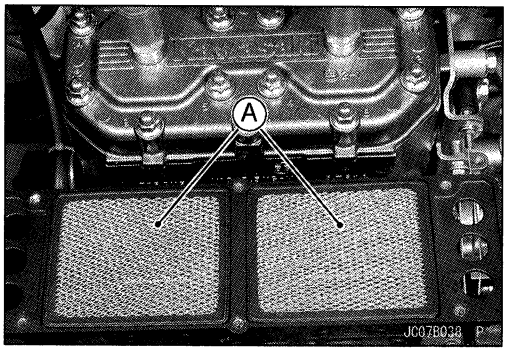
Periodic Maintenance Procedures

Flame Arrester Cleaning and Inspection

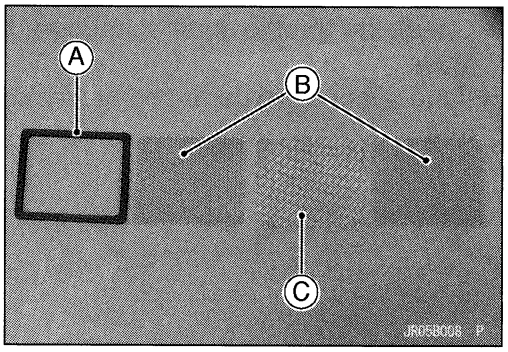
- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Air Inlet Cover Mounting Bolts [A]
  Air Inlet Cover [B]



- Remove:
  Flame Arresters [A]



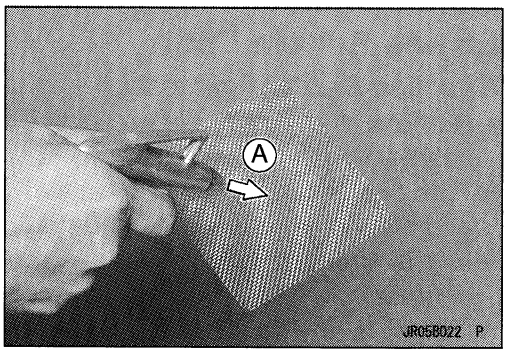
- Disassemble the flame arrester.
  Rubber Holder [A]
  Expanders [B]
  Screen [C]



- Blow each parts of the flame arrester clean with compressed air [A].

⚠ WARNING

Eye protection should be worn when compressed air is used to dry parts. Do not direct air toward anyone. Use 172 kPa (1.75 kgf/cm², 25 psi) maximum nozzle pressure.



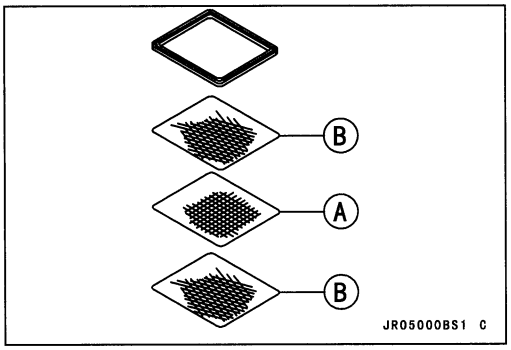
- Visually inspect the flame arrester.

★If the rubber holder, screen and expanders are broken, replace them as a set.

Periodic Maintenance Procedures

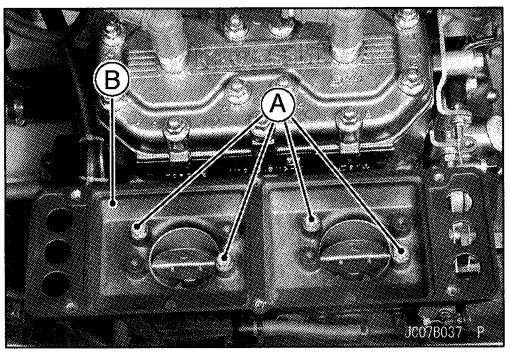
- When assembling the flame arrester, put the screen [A] between two expander [B].
- Apply a non-permanent locking agent to the threads of the air inlet cover bolts.

Torque - Air Inlet Cover Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)



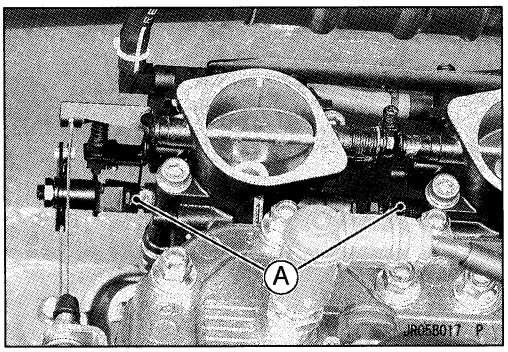
Throttle Shaft Spring Inspection

- Remove:
  Flame Arrester (see Flame Arrester Cleaning and Inspection)
  Flame Arrester Case Bolts [A]
  Flame Arrester Case [B]



- Check the throttle shaft springs [A] by pulling the throttle lever.

★If the springs are damaged or weak, replace the carburetors.



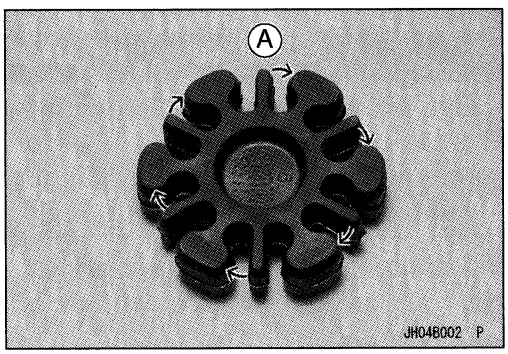
Engine Bottom End:

Coupling Damper Inspection

- Remove the engine (see Engine Removal/Installation chapter).
- With the engine removed, remove the coupling damper and inspect it for wear [A] and deterioration.

★If it is grooved or misshapen, replaced it with a new damper.

★If there is any doubt as to coupler condition, replace it.



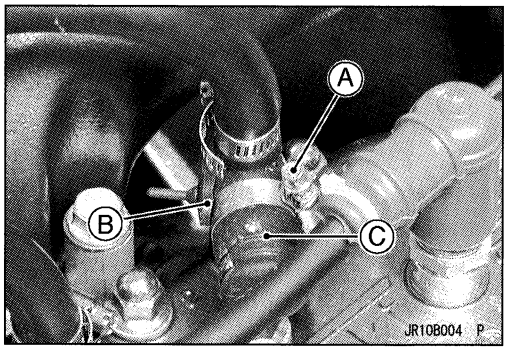
Periodic Maintenance Procedures

Cooling and Bilge Systems:

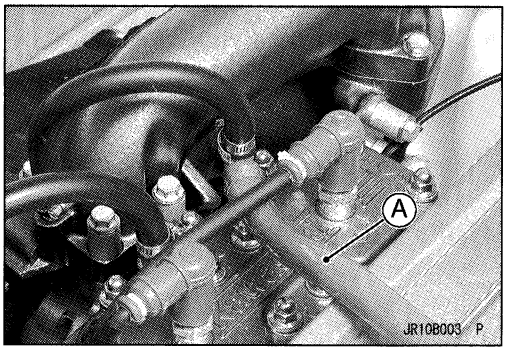
Cooling System Flushing

To prevent sand or salt deposits from accumulating in the cooling system, it must be flushed occasionally. Flush the system according to the Periodic Maintenance Chart, after each use in salt water, or whenever there is reduced water flow from the bypass outlet on the left side of the hull.

- Loosen the clamp screw [A] and pull out the rubber band [B].
- Remove the fitting cap [C] on the exhaust pipe.

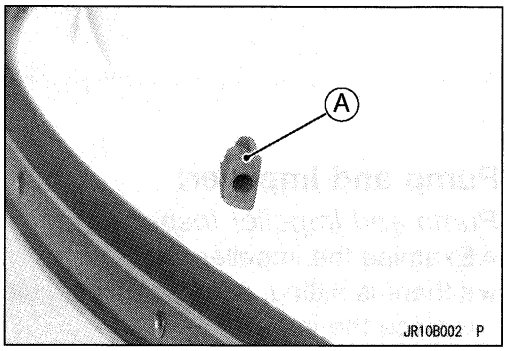


- Connect a garden hose [A] to the fitting.



- Start the engine and allow it to idle before turning on the water.

CAUTION
The engine must be running before the water is turned on or water may flow back through the exhaust pipe into the engine, resulting in the possibility of severe internal damage.



- Immediately turn on the water and adjust the flow so that a little trickle of water comes out of the bypass outlet [A] on the left side of the hull.
- Leave the engine idle for several minutes with the water running.
- Turn off the water. Leave the engine idling.
- Rev the engine a few times to clear the water out of the exhaust system.

CAUTION
Do not run the engine without cooling water supply for more than 15 seconds, especially in high revolutionary speed or severe engine and exhaust system damage will occur.

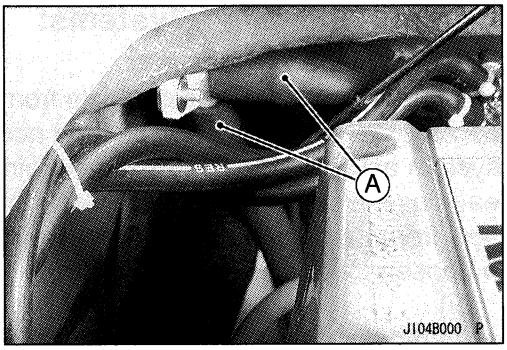
- Switch off the engine, remove the garden hose, install the fitting cap.

Periodic Maintenance Procedures

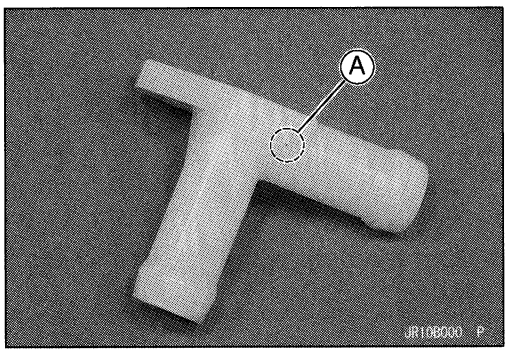
Bilge System Flushing

To prevent clogging, the bilge system should be flushed out according to the Periodic Maintenance Chart, or whenever you suspect it is blocked.

- Disconnect both bilge hoses [A] at the plastic breather fitting.
- Connect the bilge filter hoses (from the hull bottom) to the garden hoses, turn the water on, and flush it out for about a minute. During this procedure, water will flow into the engine compartment. Do not allow a large amount of water to accumulate in the engine compartment. Remove the drain screws in stern to drain the engine compartment.
- Connect the other hoses (from the hull bulkhead) to the garden hose, turn the water on, and flush it out for several minutes.



- Remove the breather fitting (see Cooling and Bilge System chapter).
- Before reconnecting the hoses to the plastic breather fitting make sure the small hole [A], on top of the breather fitting is clear.
- Reconnect the bilge hoses.



Pump and Impeller:

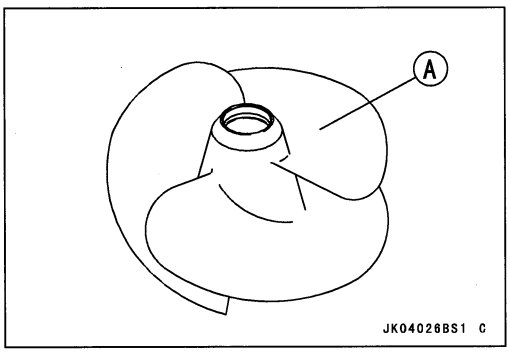
Pump and Impeller Inspection

- Examine the impeller [A].

★If there is pitting, deep scratches, nicks or other damage, replace the impeller.

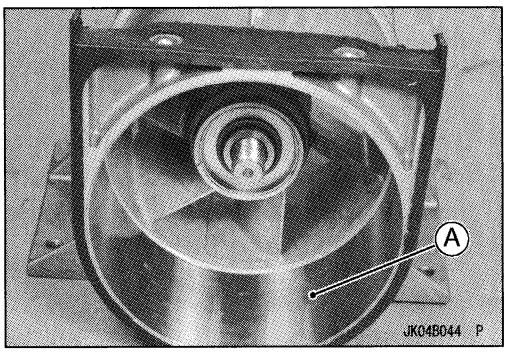
NOTE

○ *Minor nicks and gouges in the impeller blades can be removed with abrasive paper or careful filing. Smooth leading edges are especially important to avoid cavitation.*



- Examine the pump case [A].

★If there are deep scratches inside the pump case, replace it.



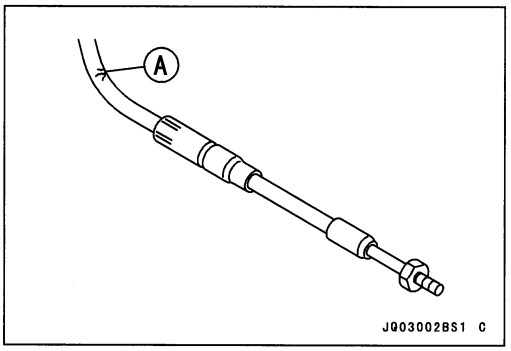
Periodic Maintenance Procedures

Steering:

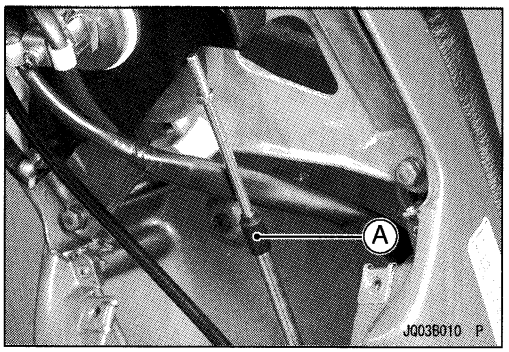
Steering Cable Inspection

- Remove the steering cable (see Steering Cable Removal in the Handle Pole and Handlebar chapter).
- Examine the steering cable.

★If the cable or cable housing is kinked [A], replace the cable.

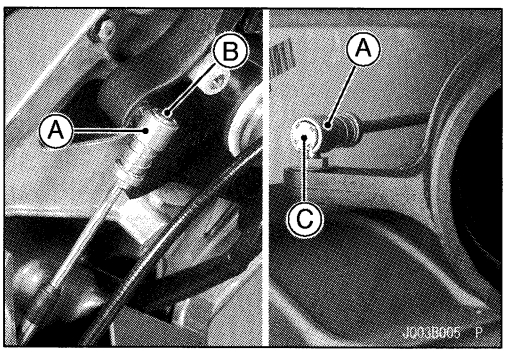


★If the seal [A] at either end of the cable is damaged in any way, replace the cable.



- Be certain that the cable moves freely in both directions.
- Disconnect the cable joint at each end of the cable.

○ Slide each outer sleeve [A] away from the ball slightly, and lift the cable from the handlebar ball joint [B] and the steering nozzle ball joint [C].



CAUTION

Never lay the watercraft on the right side. Water in the exhaust system may drain back into the engine causing serious damage.

○ Slide the inner cable back and forth in the cable housing.

★If the cable does not move freely, replace it.

Steering Cable Lubrication

NOTE

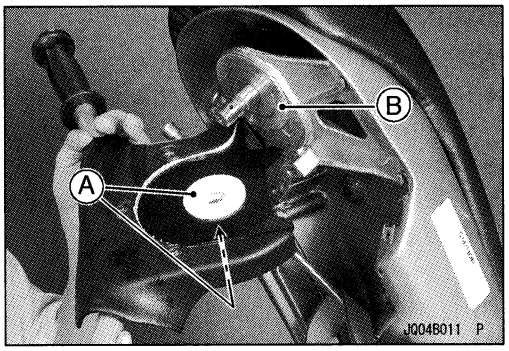
○ *The steering cable is sealed at each end and do not require lubrication. If the seal is damaged, the cable must be replaced.*

Periodic Maintenance Procedures

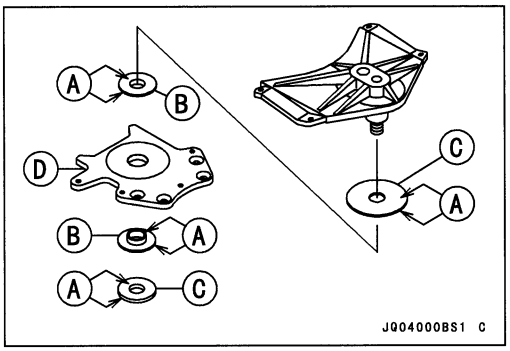
Handlebar Pivot Lubrication

- Remove the handlebar plate (see Handlebar Steering Pivot Maintenance in the Handle Pole and Handlebar chapter).
- Check the bushings [A] and washers [B] for damage and wear.

★If the bushings or washers are damaged or worn, replace them.



- Grease [A] the bushings [B] and washers [C].
  Handlebar Plate [D]



Electrical System:

Battery Charging Condition Inspection

Battery charging condition can be checked by measuring battery terminal voltage.

- Disconnect the battery cables (see Electrical System chapter).

CAUTION
Be sure to disconnect the negative (–) cable first.

Periodic Maintenance Procedures

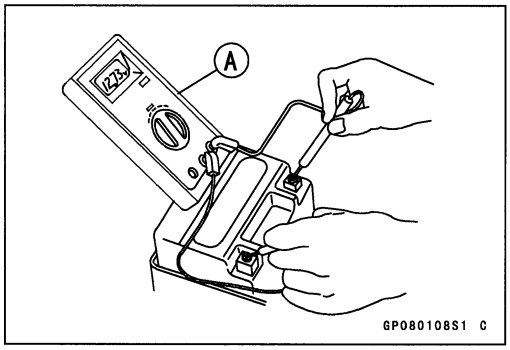
● Measure the battery terminal voltage.

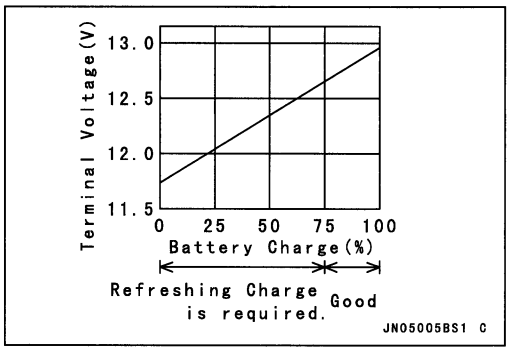
NOTE

○ *Measure with a digital voltmeter [A] which can be read one decimal place voltage.*

★If the reading is below the specified, refreshing charge is required.

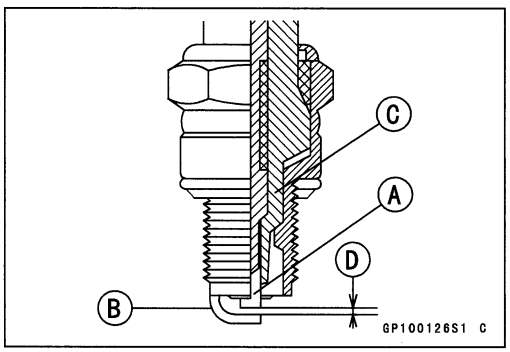
Battery Terminal Voltage
Standard: 12.6 V or more





Spark Plug Inspection

● Remove the spark plugs (see Electrical System chapter).
● Examine the ceramic insulator [C] and electrodes [A] [B].
★If the insulator appears glazed or very white, or if there are gray metallic deposits on the electrodes, combustion chamber temperatures are too high. (Refer to Troubleshooting.)
★If the insulator appears dry and sooty the fuel/air mixture is overly rich.
★If the insulator and electrodes are wet and oily, an improper oil type or an excess oil output may be the cause.
★If the ceramic insulator is cracked, replace the plug.
★If the electrodes are badly worn or burned, replace the plug.
● Examine the spark plug threads.
★If the threads are damaged, replace the plug.



Spark Plug Adjustment

● Measure the spark plug gap [D].
○ Check the distance between the electrodes with a feeler gauge or a wire gauge.

Spark Plug Gap
Standard: 0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)

★If the gap is not within specifications, adjust it.
● Adjust the gap by carefully bending the side electrode with a tool designed for this purpose.

Periodic Maintenance Procedures

Spark Plug Cleaning

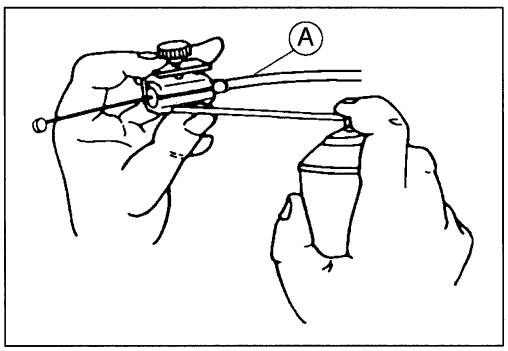
- Clean the electrodes and the ceramic insulator around the center electrode with an abrasive blasting device.
  - Be certain that all abrasive particles are removed from the plug.
- Clean the entire plug in a high flash-point solvent.

Lubrication:

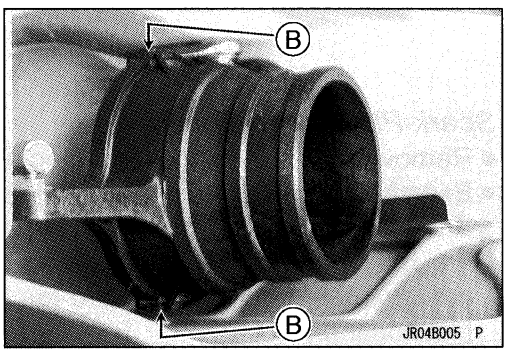
As in all marine craft, adequate lubrication and corrosion protection is an absolute necessity to provide long, reliable service. Refer to the Periodic Maintenance Chart for the frequency of the following items:

- Lubricate the following with a penetrating rust inhibitor.

Throttle Cable [A]
Choke Cable [A]



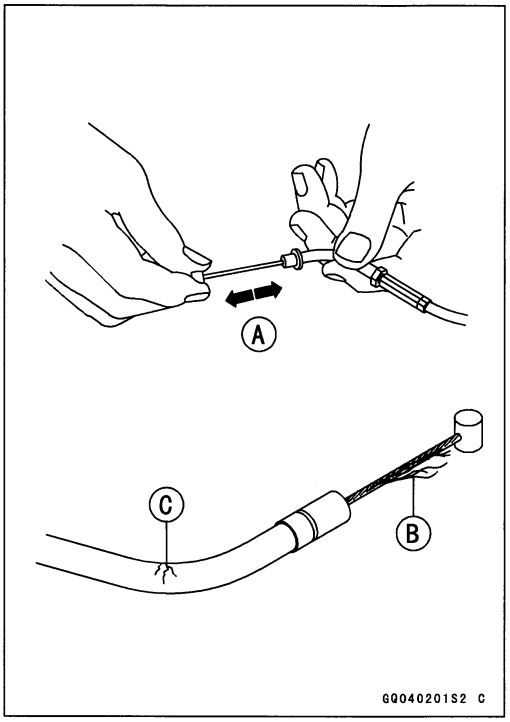
Steering Nozzle Pivots [B]



Periodic Maintenance Procedures

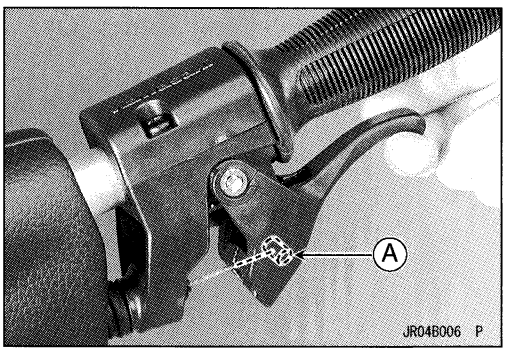
- With the cable disconnected at both ends, the cable should move freely [A] within the cable housing.

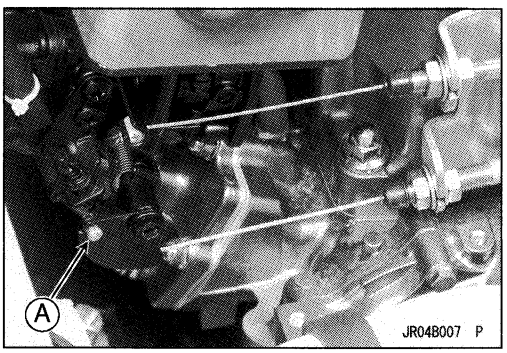
★If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



- Lubricate the following with a high quality waterproof grease.

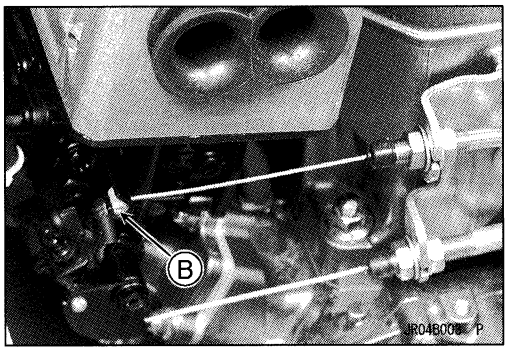
Throttle Cable Ends [A]

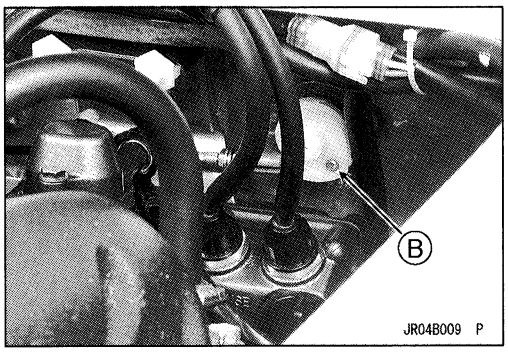




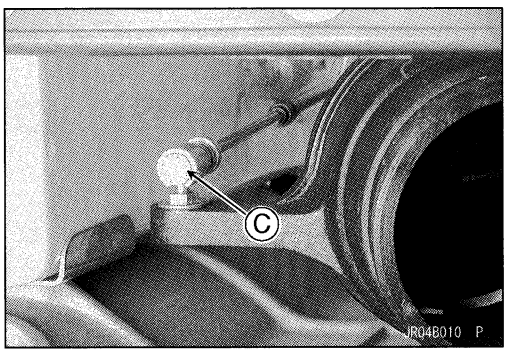
Periodic Maintenance Procedures

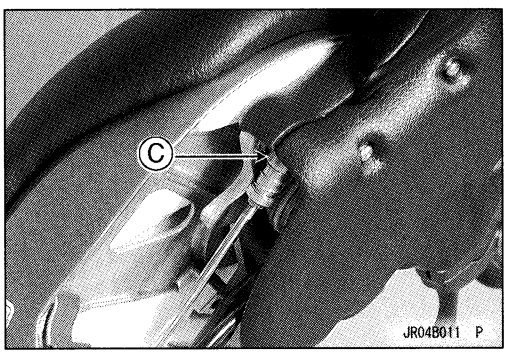
Choke Cable Ends [B]





Steering Cable Ball Joints [C]





Periodic Maintenance Procedures

All Hoses, Hose Clamps, Nuts, Bolts and Fasteners Check:

Nuts, Bolts, 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.

Nut, Bolt, and Fastener to be checked

Engine:
- Engine Bed Mounting Bolts
- Air Inlet Cover Mounting Bolts
- Carburetor Mounting Bolts
- Inlet and Exhaust Manifold Nuts
- Exhaust Pipe Mounting Bolts
- Exhaust Chamber Mounting Bolts
- Cylinder Head Nuts
- Cylinder Base Nuts

Drive Shaft and Pump:
- Drive Shaft Holder Mounting Bolts
- Pump Mounting Bolts
- Pump Cover Mounting Bolts
- Pump Grate Mounting Bolts
- Steering Nozzle Pivot Bolts

Handle Pole and Handlebar:
- Handlebar Clamp Screws
- Handle Pole Pivot Shaft Nut
- Steering Pivot Nut

Hull and Engine Hood:
- Towing Eyes
- Bumper Rivets
- All Cable Joint Balls (Threads)

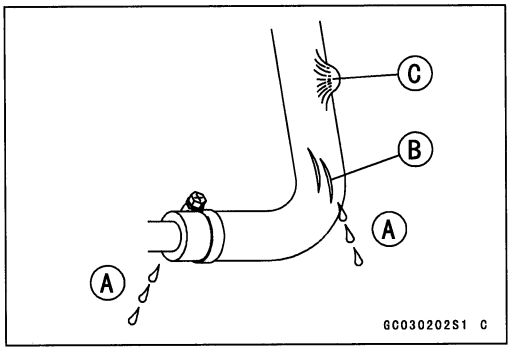
Electrical System:
- Spark Plug Caps
- Starter Motor Mounting Bolts
- Battery Terminal
- Ground Cable Mounting Nut

Periodic Maintenance Procedures

Hose and Hose Connect Inspection

- Check the following hoses for leakage [A] hardening, cracking [B], checking, cuts, abrasions, breaks and bulges [C]. And make sure the hoses are not kinked or pinched.
  Fuel Hoses
  Fuel Vent Hose
  Cooling Hoses
  Bilge Hoses

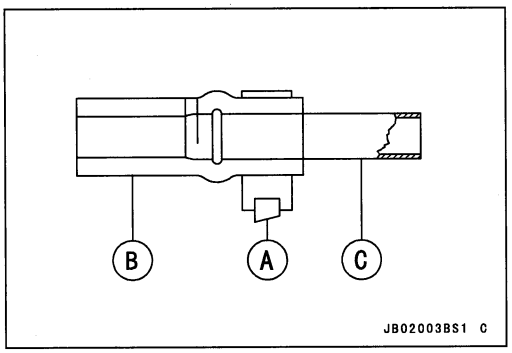
★If a hose is damaged in any way, replace it immediately and check all the others for damage.



- Make sure the above hoses are routed properly and secured with the clamps away from any moving parts and sharp edged portions.
  [A] Plastic Clamp
  [B] Hose
  [C] Hose Fitting

NOTE

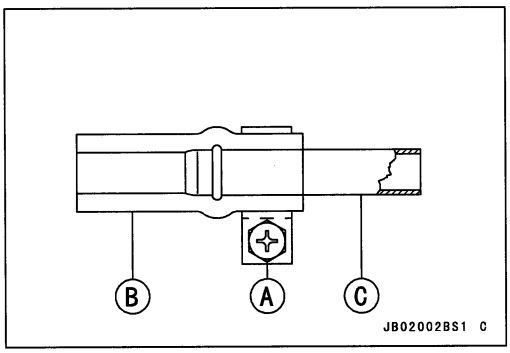
o *The majority of bilge hoses have no clamps at the hose ends.*



[A] Metal Clamp
[B] Hose
[C] Hose Fitting

NOTE

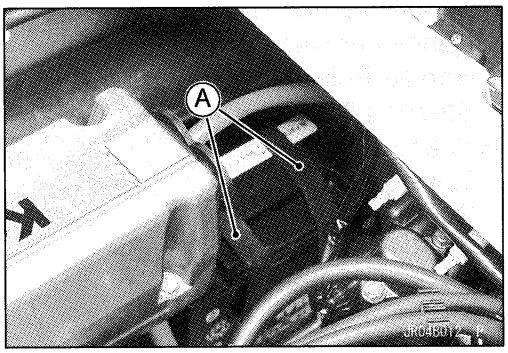
o *Check the fuel and exhaust tubes for signs of wear, deterioration, damage or leakage. Replace if necessary.*
o *Make sure the above tubes are secured with the metal gear clamps away from any parts.*



Rubber Strap Inspection

- Check the following rubber straps for any deterioration or damage. Pull on squeeze the straps and look for cracks.
  Battery Straps [A]
  Fuel Tank Straps
  Water Box Muffler Strap

★If a strap is damage in any way, replace it.



Fuel System

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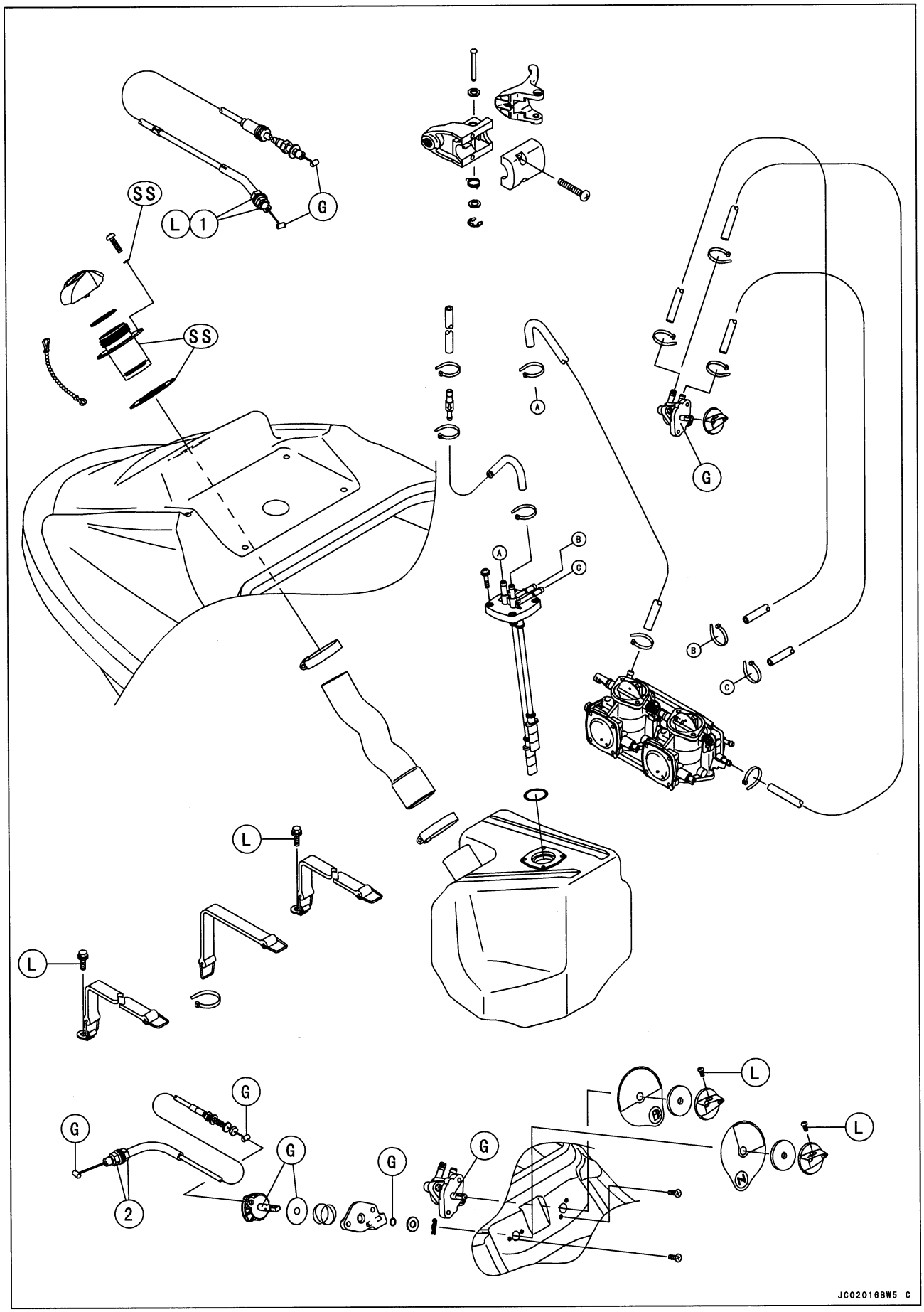
Exploded View

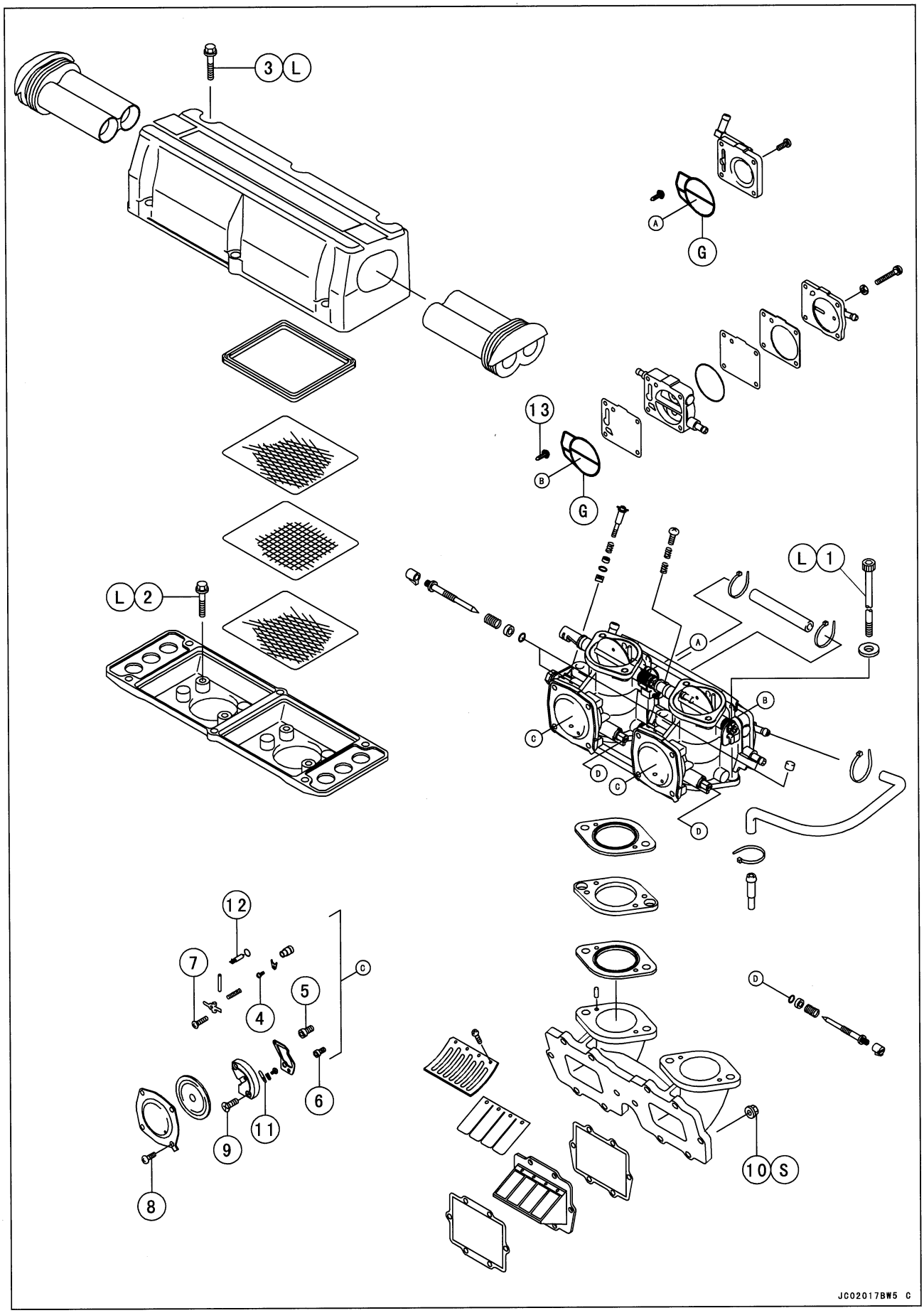


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Throttle cable adjuster locknuts	20	2.0	15	L
2	Choke cable adjuster locknuts	20	2.0	15	

G: Apply grease.
L: Apply a non-permanent locking agent.
SS: Apply silicone sealant.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Carburetor mounting bolts	18	1.8	13	L
2	Flame arrester case mounting bolts	8.8	0.9	78 in·lb	
3	Air inlet cover mounting bolts	8.8	0.9	78 in·lb	L
4	Holder plate screw	0.98	0.10	8.7 in·lb	
5	Main jet	1.8	0.18	16 in·lb	
6	Pilot jet	0.7	0.07	6.2 in·lb	
7	Float arm pin screw	0.98	0.10	8.7 in·lb	
8	Carburetor cover screws	3.4	0.35	30 in·lb	
9	Cover screws	2.0	0.20	18 in·lb	
10	Inlet manifold mounting nuts	9.8	1.0	88 in·lb	S
11	Fuel pump mounting screws	4.4	0.45	39 in·lb	

12. Check valve
13. Inlet valve
14. Fuel filter

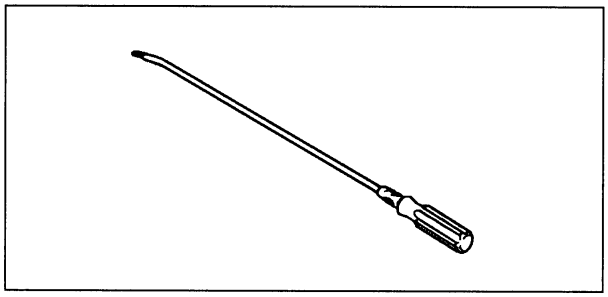
G: Apply grease.
L: Apply a non-permanent locking agent.
S: Follow the specific tightening sequence.
SS: Apply silicone sealant.

Specifications

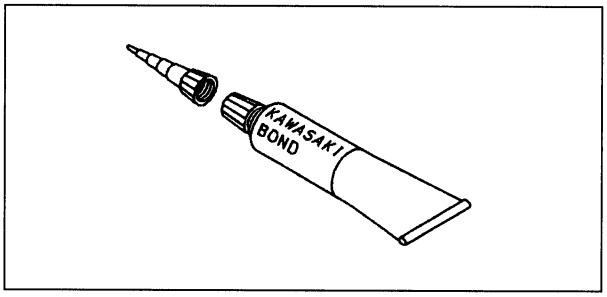
Item	Standard	Service Limit
Carburetor:		
Make, type	MIKUNI, BN40-38 × 2	– – –
Size	38 mm Venturi	– – –
Mixture screws:		– – –
Low speed	7/8 turn open	– – –
High speed	3/4 turn open	– – –
Main jet	#132.5	– – –
Pilot jet	#72.5	– – –
Inlet valve system:		
valve seat size	1.5 mm	– – –
Arm spring load	80 g	– – –
Pop-off pressure	262 kPa (2.67 kgf/cm², 38 psi)	– – –
Idle speed:		– – –
in water	1 250 ± 100 rpm	– – –
out of water	1 700 ± 100 rpm	– – –
Reed Valve:		
Reed warp	– – –	0.2 mm
Fuel Tank		
Capacity	17 L (including 3.0 L reserve)	– – –

Special Tools and Sealant

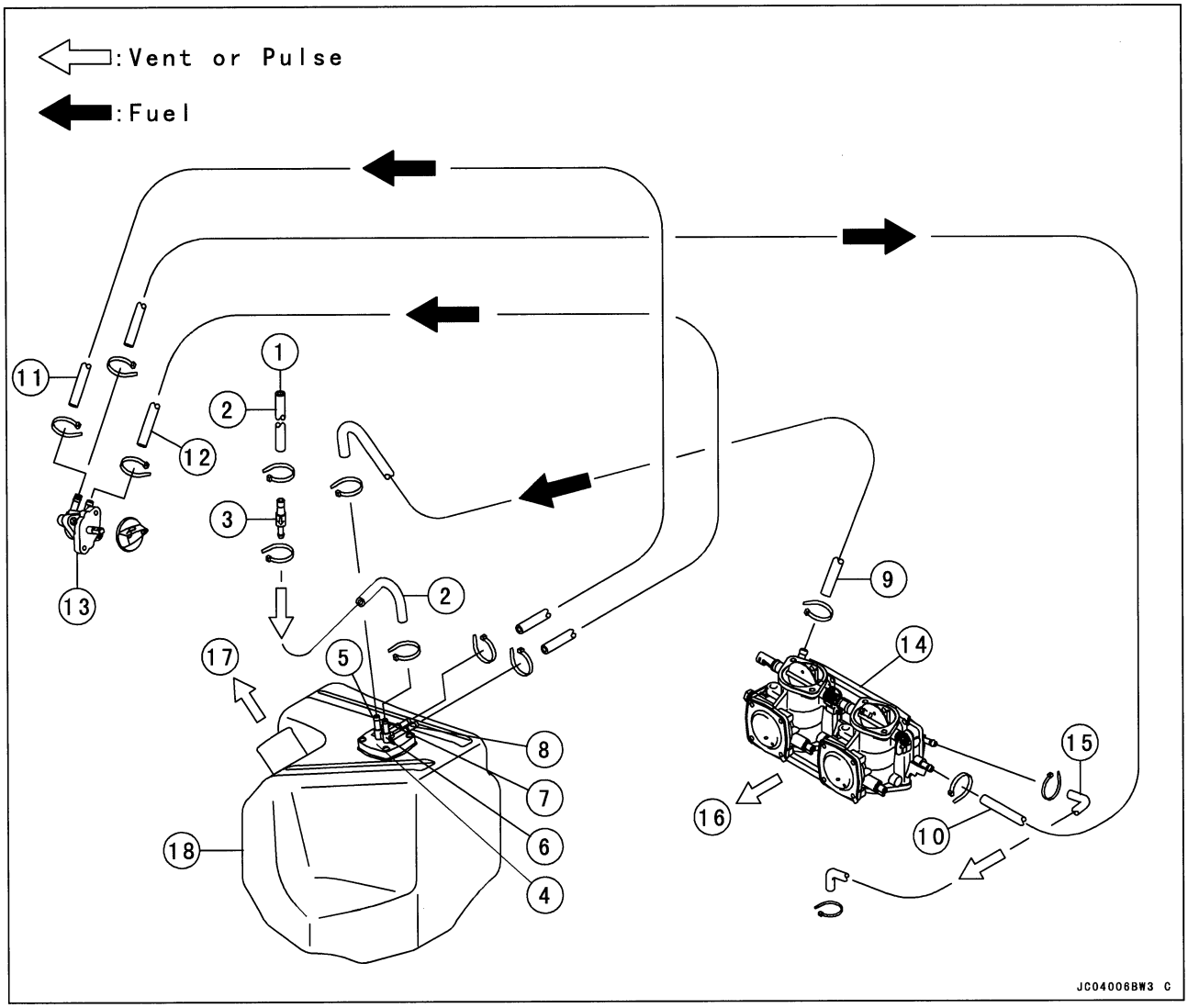
Watercraft Strap Tool:
57001-1294



Kawasaki Bond (Silicone Sealant):
56019-120



Fuel System Diagram



1. To the handle pole
2. Vent line
3. Fuel vent check valve: The fuel vent check valve must be mounted so that the arrow is pointing toward the fuel tank.
4. Fuel filter
5. RETURN
6. VENT
7. RESERVE
8. ON
9. Return line
10. Fuel supply line
11. Reserve line
12. Main line
13. Fuel tap
14. Carburetor
15. Pulse line
16. Engine side
17. Bow
18. Fuel tank

Throttle Cable and Case

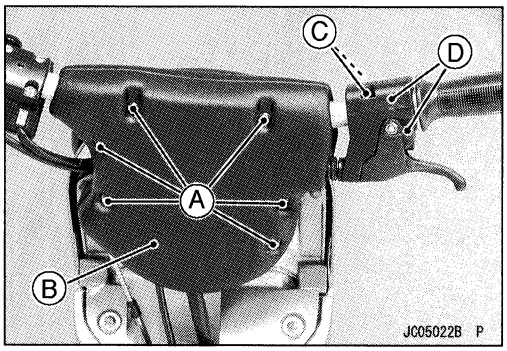
Throttle Cable Adjustment

- Refer to Throttle Cable Adjustment in the Periodic Maintenance chapter.

Throttle Case Removal/Disassembly

- Unscrew the handlebar pad screws [A] and remove the handlebar pad [B].
- Remove the throttle case.

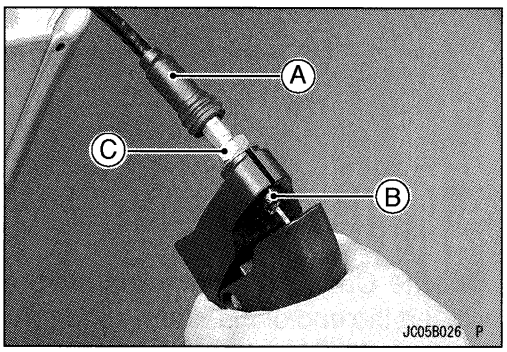
o Unscrew the throttle case screws [C] and separate the case halves [D].



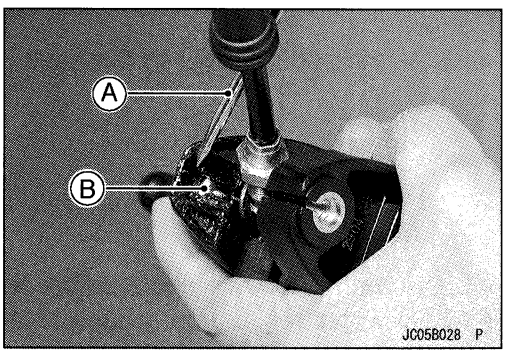
- Disconnect the throttle cable from the case.

o Slide the rubber boots [A] and rubber cap [B] out of the place.

o Unscrew the throttle cable fitting nut [C].

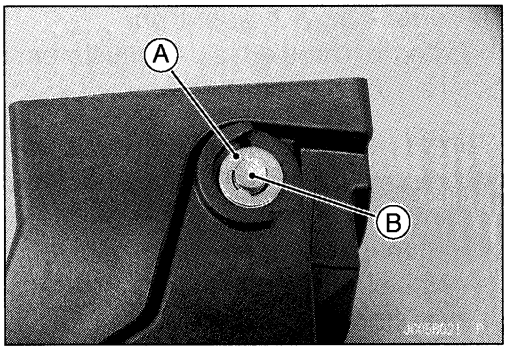


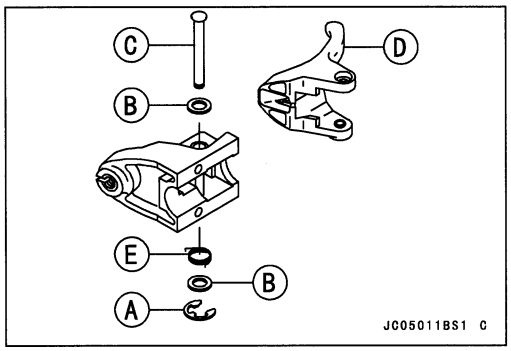
o Use a screw driver [A] to separate the tip [B] of the cable end from the case body.



Throttle Cable and Case

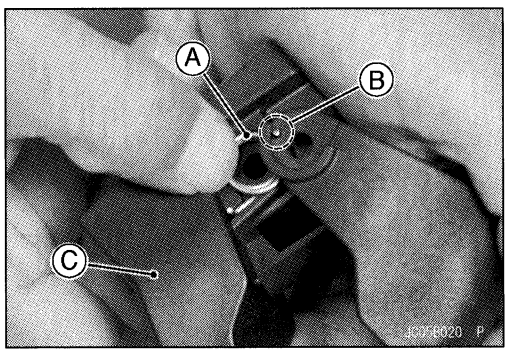
● Disassemble the throttle case.
○ Remove the circlip [A], flat washer [B], Pin [C], throttle control lever [D] and return spring [E] from the case [F].



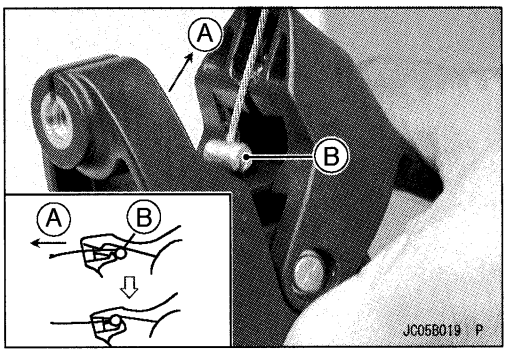


Throttle Case Assembly/Installation

● Insert the end of the return spring [A] in the throttle control lever hole [B] and set the spring in the throttle case [C] as shown.
● Install the control lever to the case.

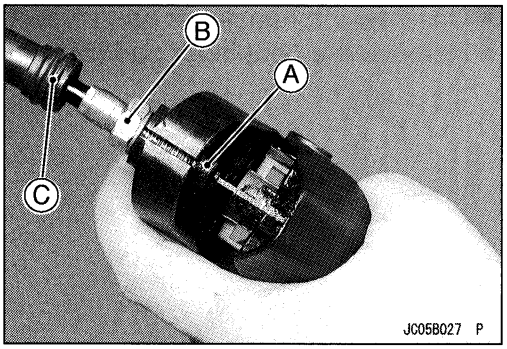


● Lubricate the throttle cable before assembly/installation.
● Apply water resistance grease to the tips of the throttle cable end.
● Pulling the throttle cable [A], position the tips [B] of the cable end as shown.
● Tighten the cable fitting nut.



Throttle Cable and Case

- Be sure the rubber cap [A] is in place on the throttle cable fitting nut end.
- Cover the cable fitting nut [B] with the rubber boot [C].



- Swing the throttle control lever so that the carburetor throttle valve is fully open.

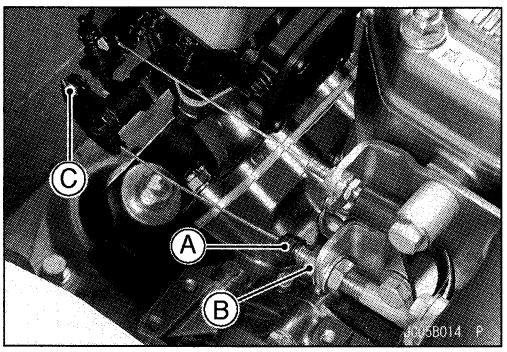
⚠ WARNING

Operation with an improperly assembled throttle case could result in an unsafe riding condition.

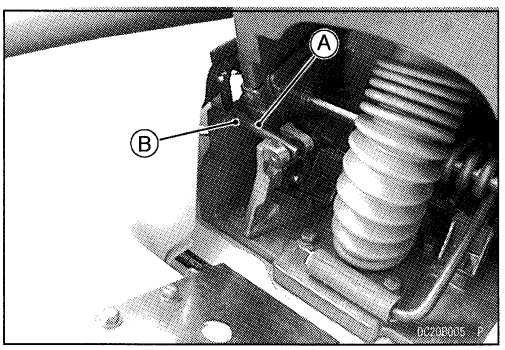
- Adjust the throttle cable (see Throttle Cable Adjustment).

Throttle Cable Removal

- Remove the engine hood (see Hull/Engine Hood chapter).
- Disconnect the throttle cable from the carburetor.
  - o Slide out the rubber cap [A].
  - o Unscrew the adjuster locknut [B] and slide the cable from the bracket.
  - o Slide the tip [C] of the cable lower end from the shaft lever.

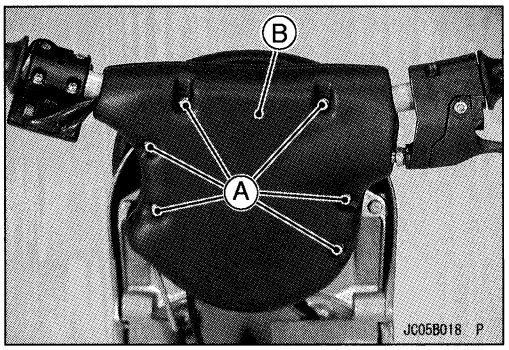


- Holding the handle pole with stopper.
  - o Set the stopper [A] to the groove [B].



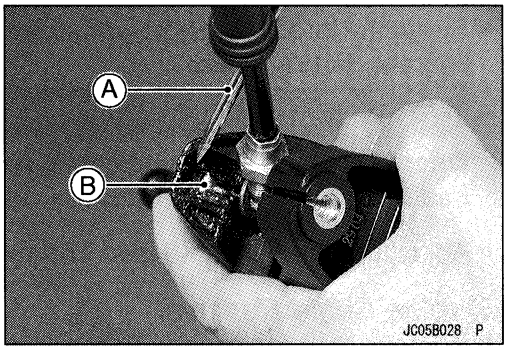
Throttle Cable and Case

- Unscrew the handlebar pad screws [A].
- Remove the handlebar pad [B].

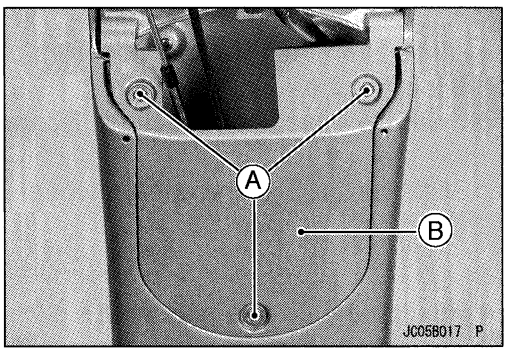


- Remove the throttle case (see Throttle Case Removal).
- Slide the rubber boot out of the place.
- Unscrew the throttle cable fitting nut.
- Remove the upper end of the cable from the case.

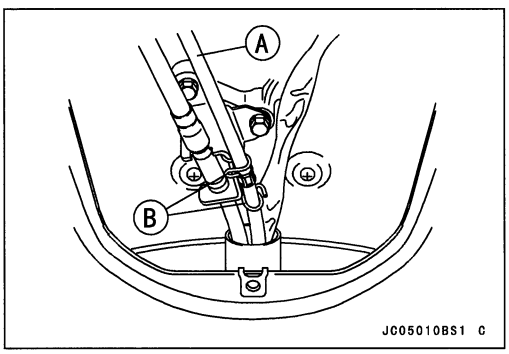
o Use a screw driver [A] to separate the cable tip [B] from the throttle lever catch.



- Unscrew the handle pole cover screws [A].
- Remove the handle pole cover [B].

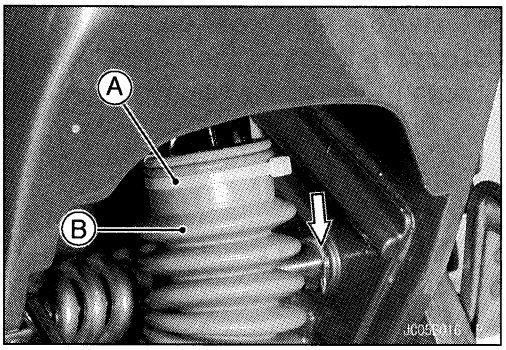


- Unfasten the throttle cable [A] from the cable holders [B].

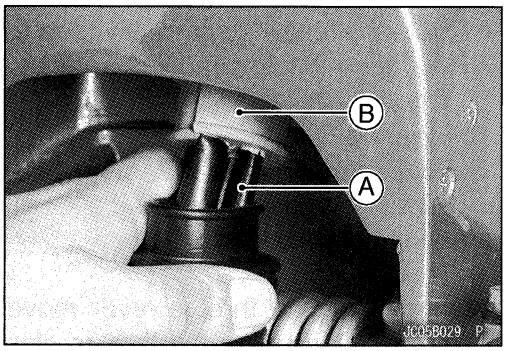


Throttle Cable and Case

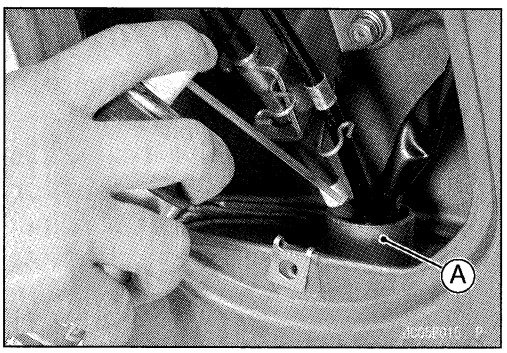
- Cut off the band [A] and pull the rubber tube [B] downward.



- Pull out the throttle cable [A] from the rubber holder [B].



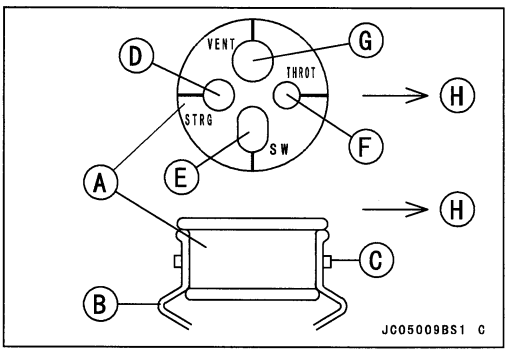
- Pull the throttle cable from the handle pole.
  - o Lubricate the cable passage [A] in the handle pole with a penetrating rust inhibitor.
  - o Reach under the front deck and pull the throttle cable from the handle pole.



Throttle Cable Installation

- Lubricate the outside of the new cable with a penetrating rust inhibitor to ease cable installation.
- Install the throttle cable to the rubber holder [A] as shown.

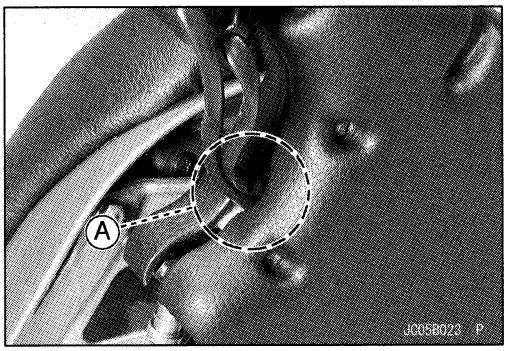
Rubber Holder [A]
Rubber Tube [B]
Band [C]
Steering Cable Passage [D]
Harness Passage [E]
Throttle Cable Passage [F]
Fuel Tank Vent Tube Passage [G]
Bow [H]



Throttle Cable and Case

- Install the handlebar pad.

o Run the leads of the switch housing through the hollow area [A] of handle pad when installing the pad.



- Route the following correctly (see Cable, Wire, and Hose Routing in the Appendix chapter).
  Throttle Cable
  Steering Cable
  Fuel Tank Vent Tube
  Switch Housing Harness
- Adjust the following.
  Throttle Cable
- Check that the throttle lever moves smoothly from full open to close, and the throttle closes quickly and completely in all steering positions by return spring.

★If the throttle lever does not return properly, check the throttle routing, cable adjustments, and cable damage. Then lubricate the throttle cable.

- Run the engine at the idle speed, and turn the handlebar all the way to the right and left, or/and up and down to ensure that the idle speed does not change.

★If the idle speed increase, check the throttle cable adjustment and the cable routing.

Throttle Case and Cable Lubrication

- Refer to the Lubrication in the Periodic Maintenance chapter.

Throttle Cable Inspection

- Refer to the Lubrication in the Periodic Maintenance chapter.

Choke Cable

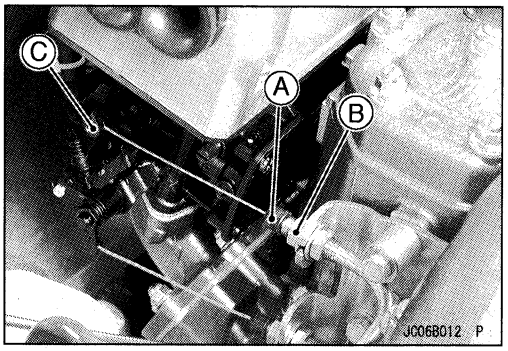
Choke Cable Adjustment

- Refer to Choke Cable Adjustment in the Periodic Maintenance chapter.

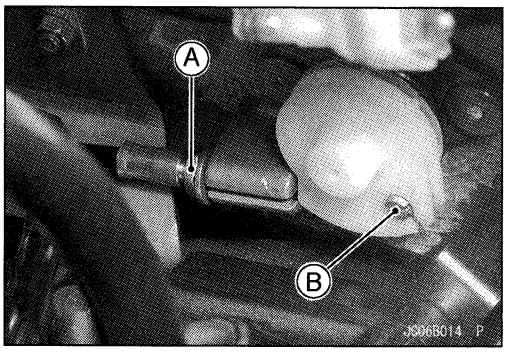
Choke Cable Removal

- Remove the engine hood (see Hull/Engine Hood Removal).
- Disconnect the choke cable from the carburetor.

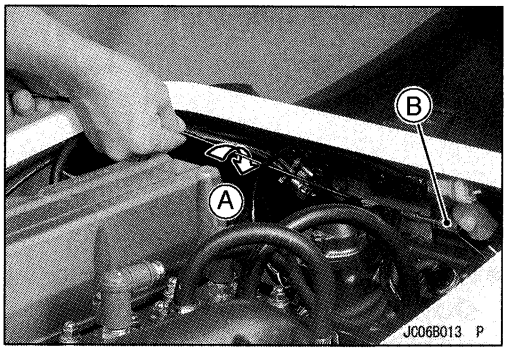
o Remove the rubber cap [A].
o Unscrew the adjuster locknut [B] and slide the cable from the bracket.
o Slide the tips [C] of the cable lower end from the pivot arm.



- Loosen the locknut [A] and disconnect the cable tip [B].
- Cut the bands.



o Turn [A] the choke cable counterclockwise and remove it from the bracket [B].



Choke Cable Inspection

- Refer to Lubrication in the Periodic Maintenance chapter.

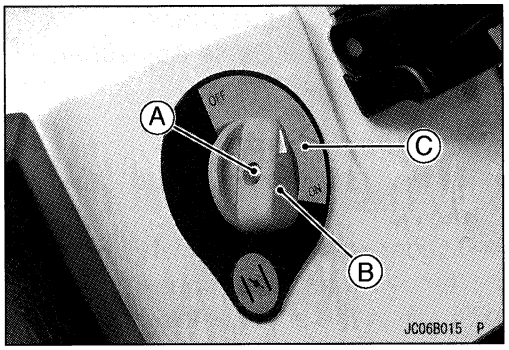
Choke Cable Lubrication

- Refer to Lubrication in the Periodic Maintenance chapter.

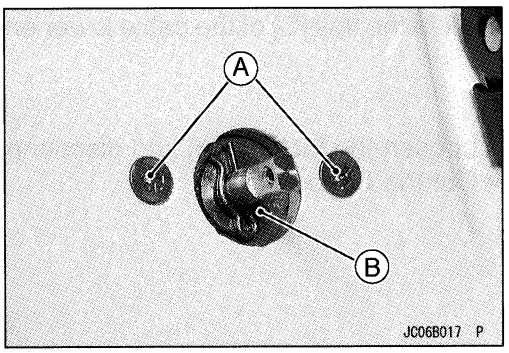
Choke Cable

Choke Knob Removal

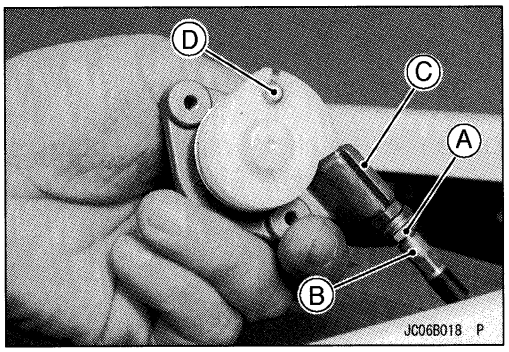
- Disconnect the choke cable end of the carburetor side (see Choke Cable Removal).
- Remove the set screw [A] and take out the choke knob [B] and damper.
- Remove the choke indicator plate [C] from the hull.



- Remove the cable holder mounting screws [A].
- Remove the choke knob shaft [B] with cable.

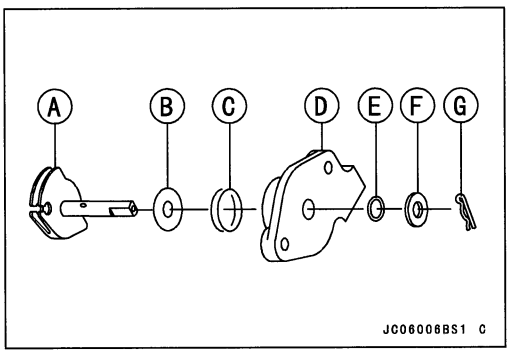


- Loosen the locknut [A] and unscrew the cable [B] from the holder [C].
- Slide the tip [D] of the choke inner cable out of the pulley on the choke knob shaft.



- Remove the pin and washer, and pull out the choke knob shaft from the cable holder.

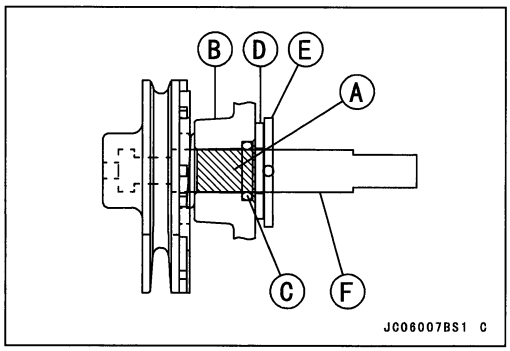
[A] Choke Knob Shaft
[B] Washer
[C] Spring
[D] Cable Holder
[E] O-ring
[F] Washer
[G] Pin



Choke Cable

Choke Knob Installation

- Grease the indicated area [A] the O-ring is installed.
  [B] Cable Holder
  [C] O-ring
  [D] Washer
  [E] Pin
  [F] Choke Knob Shaft
- Apply a non-permanent locking agent to the set screw and tighten it.
- Route the choke cable according to the Cable Routing section in the General Information chapter.
- Adjust the choke cable (see Choke Cable Adjustment).



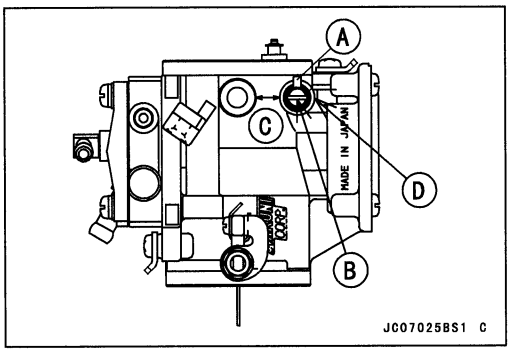
Carburetor

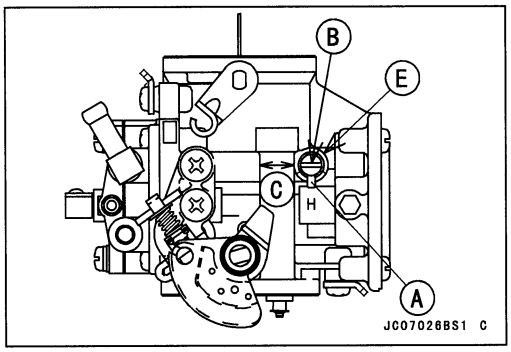
Idle Speed Adjustment

- Refer to Idle Speed Adjustment in the Periodic Maintenance chapter.

Mixture Screw Adjustment

Since every carburetor is adjusted individually at the factory using a flow meter, specific mixture screw settings cannot be given. After adjustment, a cap [A] is installed over each mixture screw head [B] with the point straight level [C] to identify proper mixture screw settings for each unit. DO NOT CHANGE THESE SETTINGS. If the carburetor is tampered with and these settings cannot be relocated, set the mixture screws to the following guide line.





- Pull out the mixture screw caps.
- To set each screw, turn it in until seats lightly, and then back it out the specified number of turns.

Mixture Screw	Turns out
Low Speed (lower) [D]	7/8
High Speed (upper) [E]	3/4

These guideline represent a "starting point" from which additional fine tuning of the carburetor may be necessary.

CAUTION

Do not force the mixture screws into their seats. You could damage the screws or the carburetor. Operating the watercraft with the high speed screw at too lean a setting (screwed in clockwise too far) could cause serious engine damage.

High Altitude Performance Adjustment

The normal carburetor settings are best for sea level (see Mixture Screw Adjustment). If the watercraft is used at the higher elevations, the lower atmospheric pressure makes the carburetion richer. To obtain the proper carburetor setting at higher elevations, turn in the high speed screw according to the following table.

Altitude m (ft)	Turn the high speed screw in the normal position
1 000 (3 300)	1/8 turn
2 000 (6 600)	1/4 turn
3 000 (10 000)	3/8 turn

NOTE

o *The adjustment of the low speed screw is not required on the actual usage.*

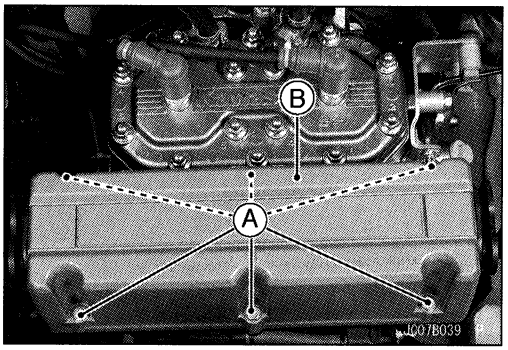
Carburetor Synchronization

- Refer to Carburetor Synchronization in the Periodic Maintenance chapter.

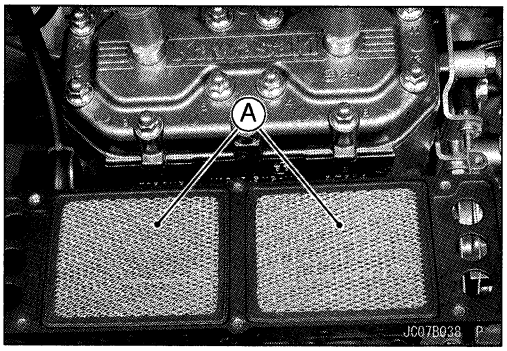
Carburetor

Carburetor Removal

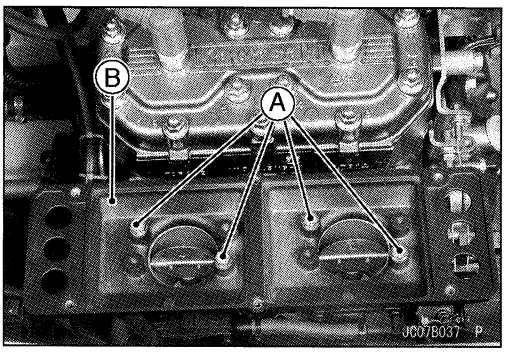
- Remove the engine hood (see Hull/Engine Hood chapter).
- Remove:
  Air Inlet Cover Mounting Bolts [A]
  Air Inlet Cover [B]



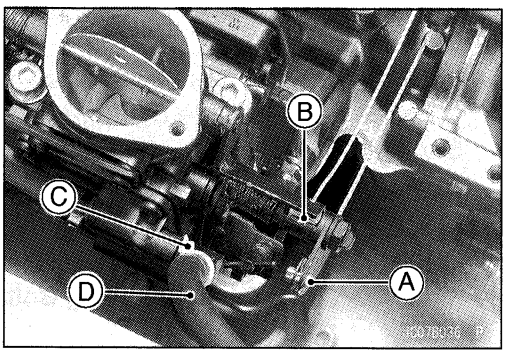
- Pull out the flame arrester [A].



- Remove:
  Flame Arrester Case Mounting Bolts [A]
  Flame Arrester Case [B]

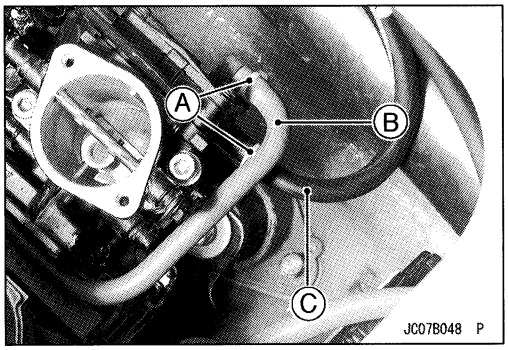


- Disconnect:
  Throttle Cable End [A]
  Choke Cable End [B]
  Band (Cut off) [C]
  Fuel Return Hoses at Carburetor (Remove) [D]

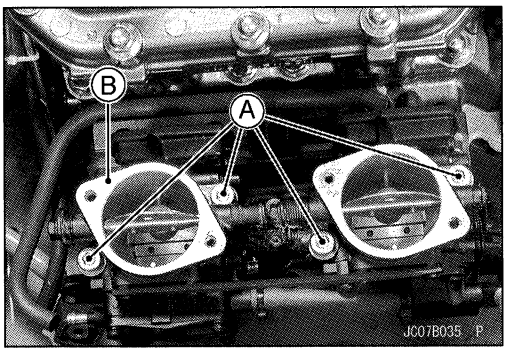


Carburetor

- Remove:
  Bands (Cut off) [A]
  Pulse Hose [B]
  Fuel Supply Hose [C]



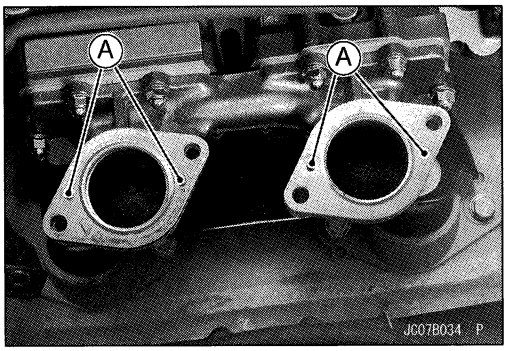
- Remove the carburetor mounting bolts [A].
- Lift the carburetor [B] off the inlet manifold.



Carburetor Installation

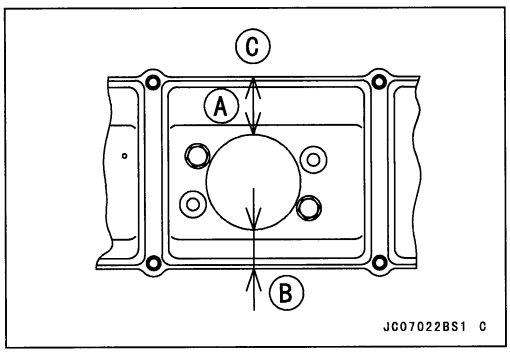
- Install a new gaskets under the carburetor.
- Fit the holes of the carburetor onto the pins [A] of the inlet manifold.
- Apply a non-permanent locking agent to the carburetor mounting bolts, flame arrester case mounting bolts and air inlet cover mounting bolts.
- Connect the fuel hoses and pulse hose correctly (see Fuel System Diagram).

Torque - Carburetor Mounting Bolts: 18 N·m (1.8 kgf·m, 13 ft·lb)



- Install the arrester case as shown.
  Long (edge to outside diameter) [A]
  Short (edge to outside diameter) [B]
  Engine Side [C]

Torque - Frame Arrester Case Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)
Air Inlet Cover Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



- Adjust the throttle and choke cables (see Throttle Cable Adjustment, Choke Cable Adjustment).

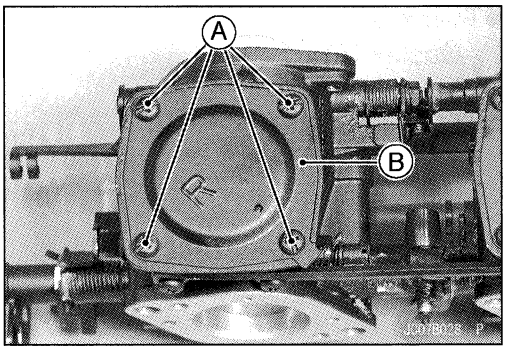
Carburetor Disassembly

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Pull the lanyard key off the stop button. 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.

Carburetor

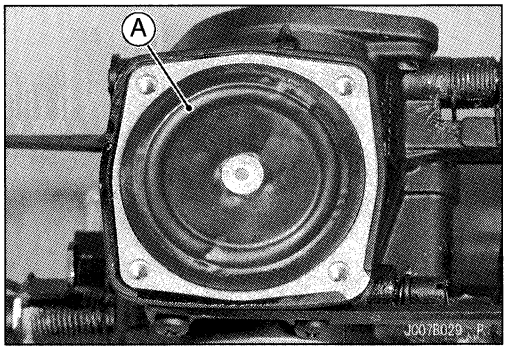
- Remove the carburetor (see Carburetor Removal).
- Unscrew the carburetor cover screws [A] and take off the carburetor cover [B].



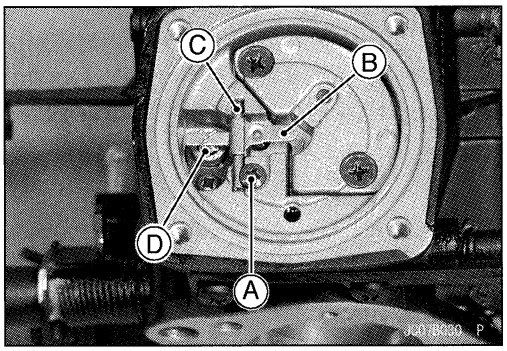
- Remove:
  Diaphragm [A]

CAUTION

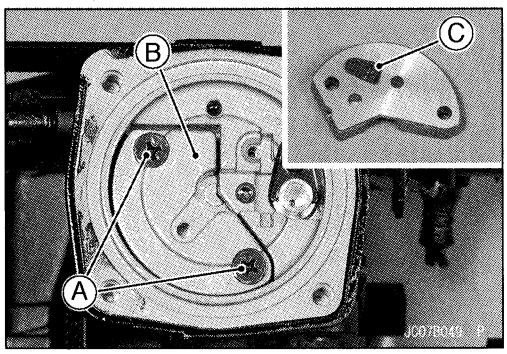
During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm.



- Unscrew the float arm set screw [A].
- Remove:
  Float Arm [B]
  Pin [C]
  Spring
  Inlet Valve [D]

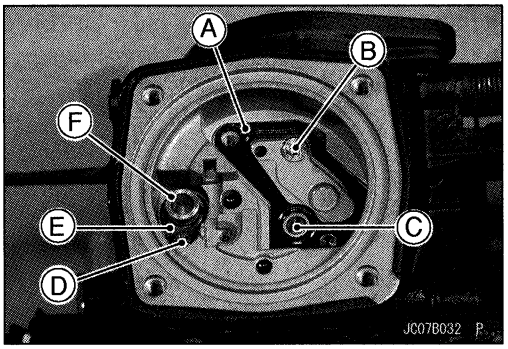


- Remove the mounting screws [A] and drop out the plate [B] with the check valve [C].



Carburetor

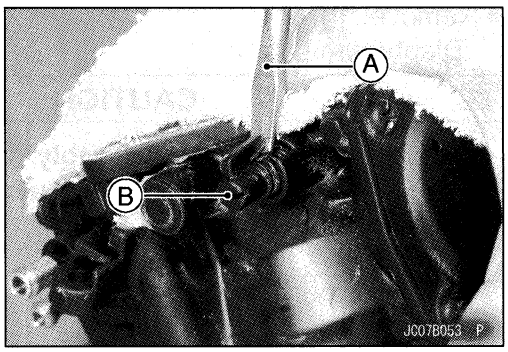
- Remove:
  Gasket [A]
  Main Jet [B]
  Pilot Jet [C]
  Screw [D]
  Plate [E]
  Inlet Valve Holder [F]



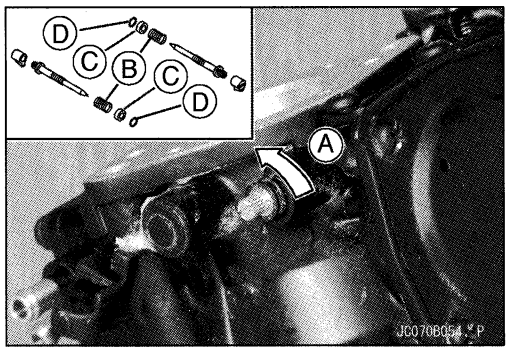
NOTE

o *If the mixture screws need to be removed, check number of return rotations of mixture screws beforehand.*

- Use a screw driver [A] to remove the cap [B] from the mixture screw.



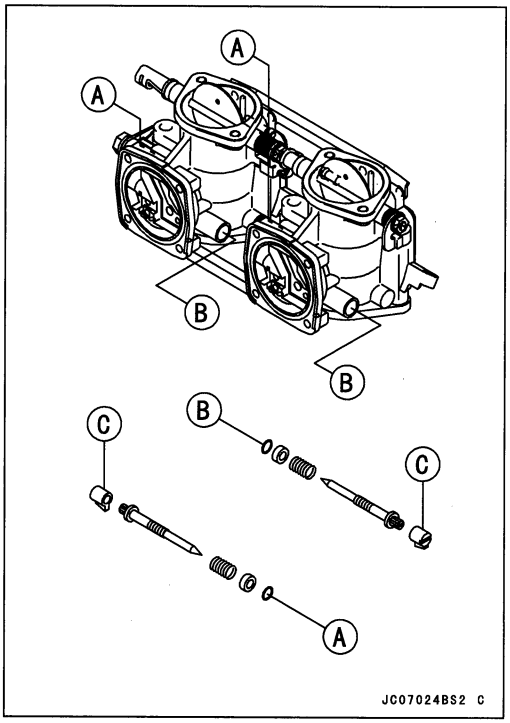
- To remove the mixture screws, turn them counterclockwise [A] until they come out. Do not lose the spring [B], washer [C], and O-ring [D] on each screw.



Carburetor

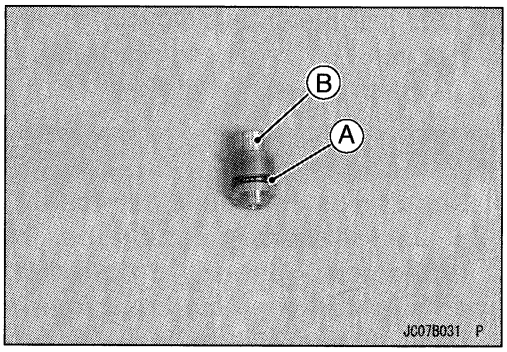
Carburetor Assembly

- If the mixture screws were removed, install them, as shown.
  [A] High Speed Screw
  [B] Low Speed Screw
- o Apply a non-permanent locking agent to the cap [C] inside.



- Apply grease to the O-ring [A] on the inlet valve holder [B].
- Install:
  Inlet Valve Holder
  Holder Plate
  Screw

Torque - Holder Plate Screw: 0.98 N·m (0.10 kgf·m, 8.7 in·lb)

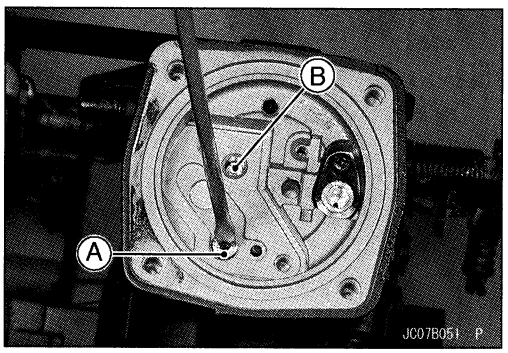


- Install:
  Main Jet [A]
  Pilot Jet [B]

Torque - Main Jet: 1.8 N·m (0.18 kgf·m, 16 in·lb)
Pilot Jet: 0.7 N·m (0.07 kgf·m, 6.2 in·lb)

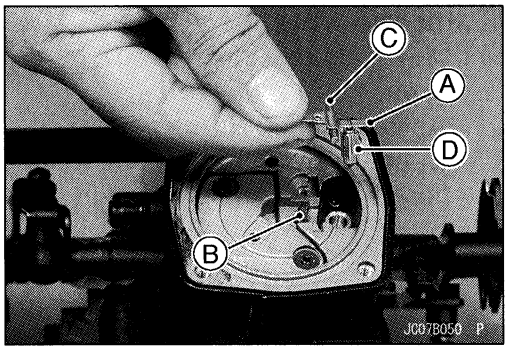
- Install the gasket and plate.
- Tighten the screws.

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



Carburetor

- Assemble the carburetor cover, as shown.
  [A] Float Arm
  [B] Spring
  [C] Pin
  [D] Inlet Valve



o Check the float arm level (see Float Arm Level Inspection and Adjustment).

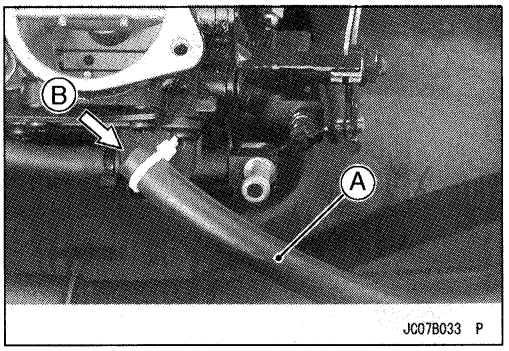
Torque - Float Arm Pin Screw: 0.98 N·m (0.10 kgf·m, 8.7 in·lb)

- Install:
  Diaphragm
  Carburetor Cover

Torque - Carburetor Cover Screws: 3.4 N·m (0.35 kgf·m, 30 in·lb)

NOTE

o *After the carburetor has been disassembled and cleaned, it should be primed before starting the engine to save the battery. Pull off the fuel return hose [A] at the carburetor, and blow [B] through it until fuel appears at the fuel return fitting on the carburetor. The fuel system in now full of fuel.*



⚠ WARNING

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Carburetor Cleaning and Inspection

- Disassemble the carburetor (see Carburetor Disassembly).

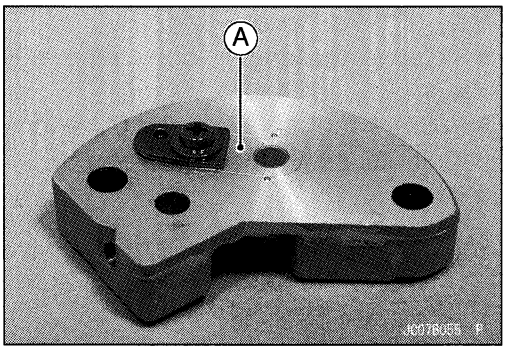
⚠ WARNING

Solvent is toxic and flammable. Avoid prolonged contact with skin and keep away from open flame. Use only in a well ventilated area. Eye protection should be worn when compressed air is used to dry parts. Do not direct air towards anyone. Use 172 kPa (1.75 kgf/cm², 25 psi) maximum nozzle pressure.

- Immerse all the metal parts in a carburetor cleaning solution.

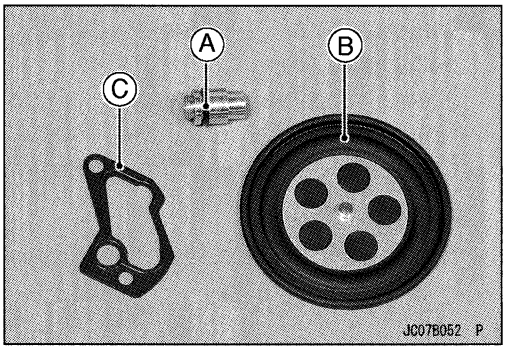
Carburetor

- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow out the air and fuel passages with compressed air.
- Inspect the check valve [A] for damage or deterioration, and replace it if necessary.



- Check these rubber parts for damage.
  O-ring [A]
  Diaphragm [B]
  Gasket [C]

★If any of these parts are not in good condition, replace them.

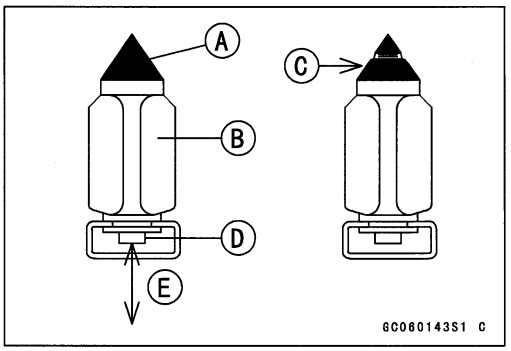


- Check the plastic tip [A] on the inlet valve needle [B]. It should be smooth, without any grooves, scratches, or tears.

★If the plastic tip is damaged [C], replace the valve.

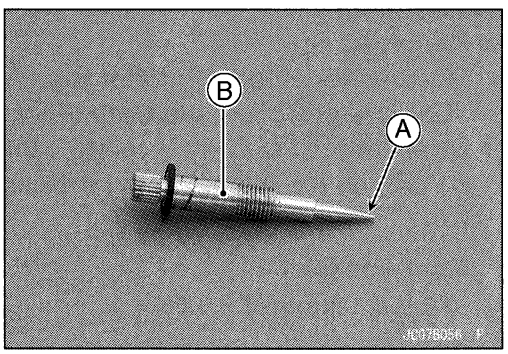
- Push the rod [D] in the other end of the inlet valve needle, and then release it [E].

★If the rod does not spring out, replace the inlet valve needle.



- Check the tapered portion [A] of the mixture screw [B] for wear or damage.

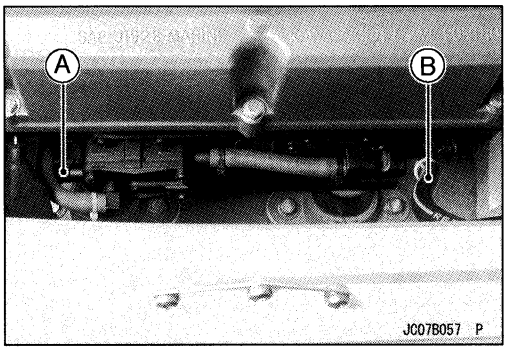
★If the pilot screw is worn or damaged on the tapered portion, it will prevent the engine from idling smoothly. Replace it.



Carburetor

Pop-off Pressure Inspection

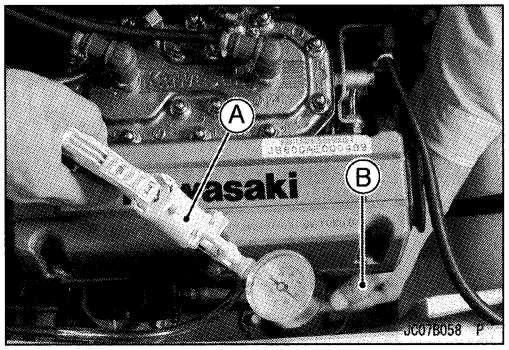
- Remove the engine hood (see Hull/Engine Hood chapter).
- Pull the fuel supply hose [A] and return hose [B] out of their fittings on the carburetor.



- Connect the hose of the air-pump gauge tester [A] to the fuel supply fitting.
- Obstruct the fuel return fitting [B] securely with a finger.
- Pump the tester until the supply release pressure is reached (see by a sudden pressure drop).

Pop-off Pressure

Standard: 262 kPa (2.67 kgf/cm², 38.0 psi)



NOTE

○ *Pressure inspection should be performed three times to obtain a valid reading.*

★If the pop-off pressure value is not specified, inspect the float arm level (see Float Arm Level Inspection and Adjustment).

NOTE

○ *Do not stretch or cut the float arm spring.*

- Inspect other carburetor.

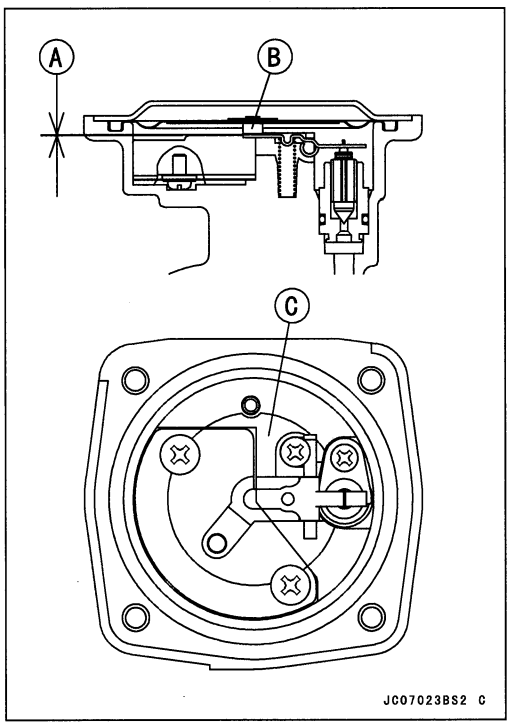
Float Arm Level and Diaphragm Inspection and Adjustment

- Remove:
  Carburetor (see Carburetor Removal)
  Carburetor Cover (see Carburetor Disassembly)
- Measure the float arm level [A] between the contact portion [B] on the float arm and the carburetor case surface [C].

Float Arm Level

0.0 ~ 0.2 mm (0.0 ~ 0.08 in.)

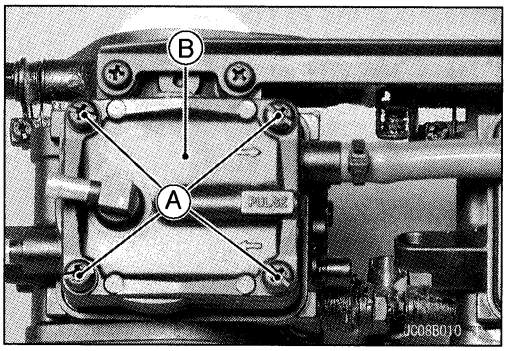
★If the float arm level is incorrect, bend the float arm very slightly to change the float arm level.



Fuel Pump

Fuel Pump Removal

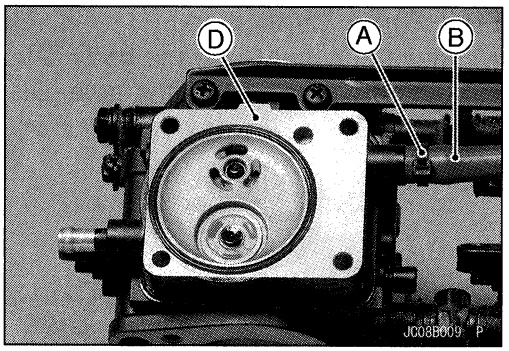
- Remove the carburetor (see Carburetor Removal).
- Remove the fuel pump body screws [A], and take the fuel pump cover [B] off the carburetor.

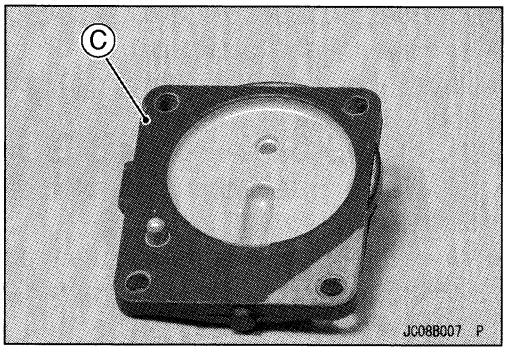


- Cut the band [A] and pull out the bypass hose [B].

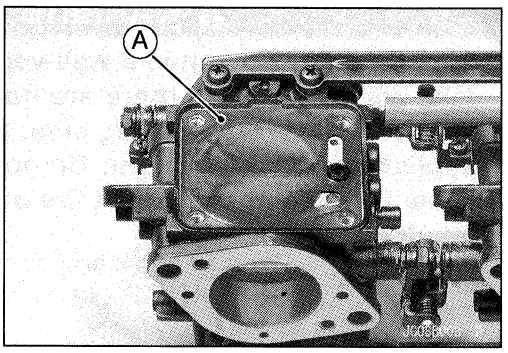
CAUTION

The fuel pump cover and fuel pump body should not be disassembled.
If leakage is evident or internal damage is suspected, replace the fuel pump cover [C] and body [D].



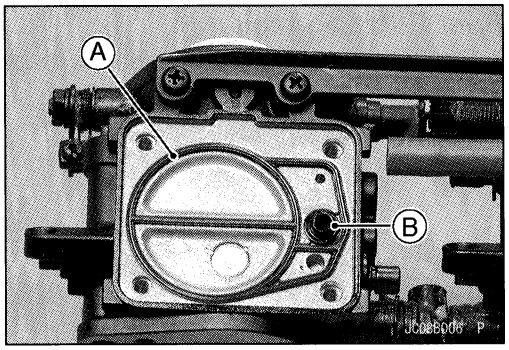


- Remove the diaphragm [A].



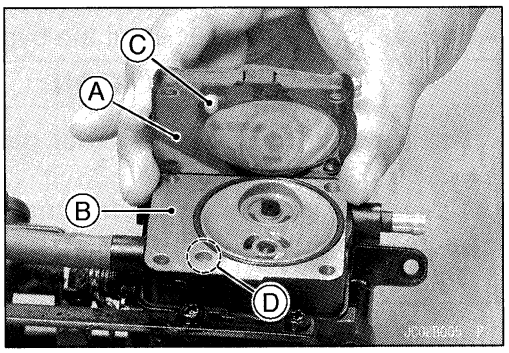
Fuel Pump

- Remove the O-ring [A].
- Pull out the fuel filter [B].



Fuel Pump Installation

- Install the cover [A] to the body [B].
- Fit the projection [C] in the hole [D].

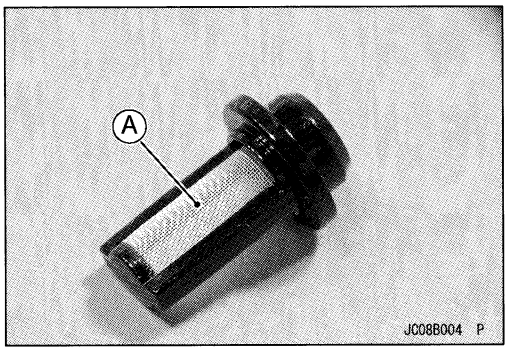


Fuel Filter Inspection and Cleaning

- Remove the fuel filter (see Fuel Pump Removal).
- Check the fuel filter screen [A] for any break or deterioration.

★If the screen has any break or is deteriorated, they may allow dirt to reach the carburetor, causing poor running. Replace the fuel filter.

- Wash the fuel filter screen in non-flammable or high-point solvent. Use a brush to remove any contaminants strapped in the screen.



⚠ WARNING

Clean the fuel screen in a well-ventilated area, and take ample 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. A fire or explosion could result.

Flame Arrester

Flame Arrester Removal

- Refer to Flame Arrester Cleaning in the Periodic Maintenance chapter.

Flame Arrester Installation

- Refer to Flame Arrester Cleaning in the Periodic Maintenance chapter.

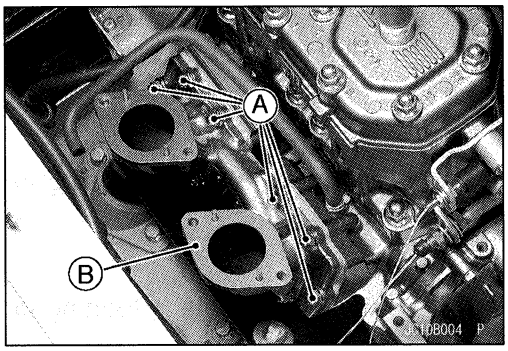
Flame Arrester Cleaning

- Refer to Flame Arrester Cleaning in the Periodic Maintenance chapter.

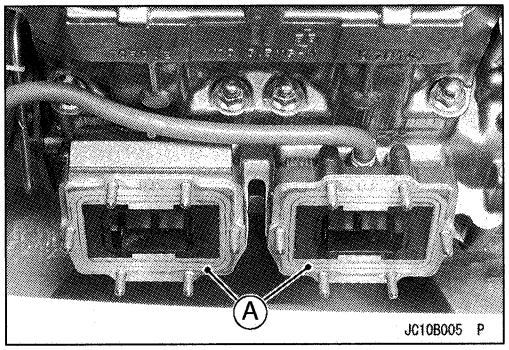
Inlet Manifold, Reed Valves

Inlet Manifold and Reed Valve Removal

- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Air Inlet Cover (see Carburetor Removal)
  Flame Arrester Case (see Carburetor Removal)
  Carburetor (see Carburetor Removal)
- Remove the inlet manifold mounting nuts [A] and remove the inlet manifold [B].

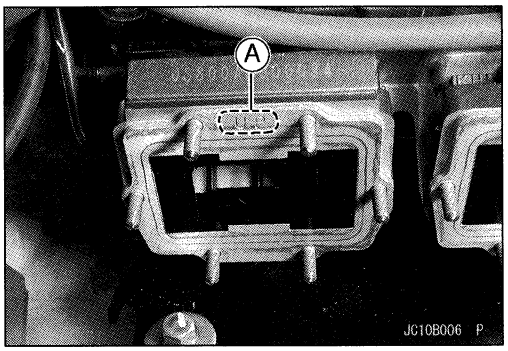


- Pull out the gaskets and the reed valves [A].

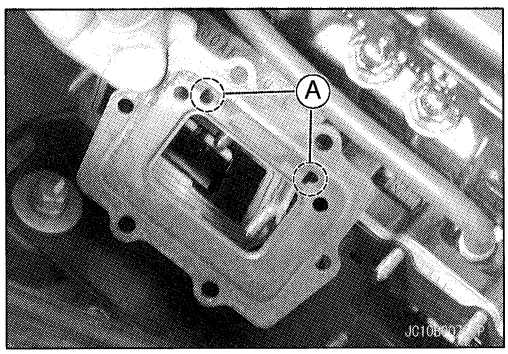


Inlet Manifold and Reed Valve Installation

- Replace the gaskets with new ones.
- Install the reed valves so that the “UP” mark [A] is up.



- Install the inlet manifold gasket so that the “UP” mark [A] facing is up.



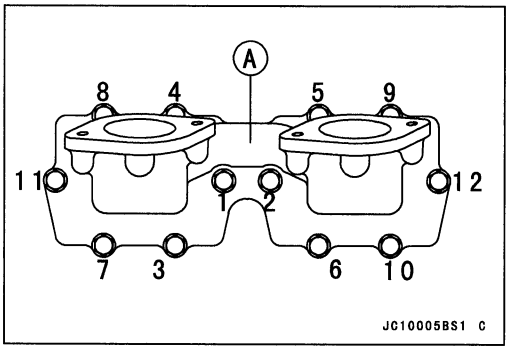
Inlet Manifold, Reed Valves

- Install the inlet manifold [A]

○ Torque the mounting nuts, following the sequence indicated in the figure

Torque - Inlet Manifold Mounting Nuts: 9.8 N·m (1.0 kgf·m, 88 in·lb)

- Install the removed parts.

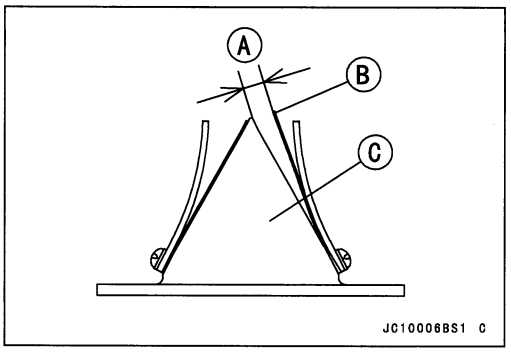


Reed Valve Inspection

- Check reed warp by measuring the clearance [A] between each reed [B] and the valve holder [C].

★If any one of the clearance measurements exceeds the service limit, replace the reed valve assembly with a new one.

Reed Warp
Service Limit: 0.2 mm (0.008 in.)



- Check the mounting screw tightness.
- Visually inspect the reeds for cracks, folds, or other damage.

★If there is any doubt as to the condition of a reed, replace the reed valve assembly.

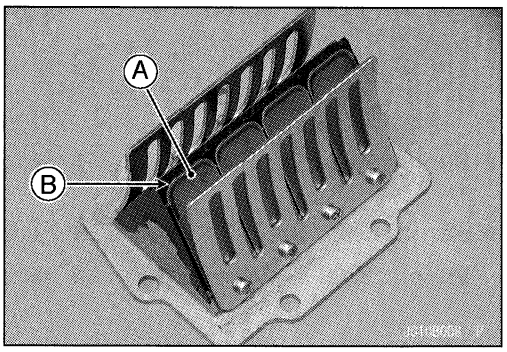
★If a reed becomes wavy, replace the reed valve assembly with a new one even if reed warp is less than there service limit.

○ Install the reed and stop onto the reed valve holder, aligning the chamfered corner of the reed with that of the reed stop.

Reed Valve Holder Inspection

- Check the reed [A] contact areas of the valve holder for grooves, scratches, or other damage.
- Check that the rubber coating [B] on the valve holder does not show any signs of separation from the holder.

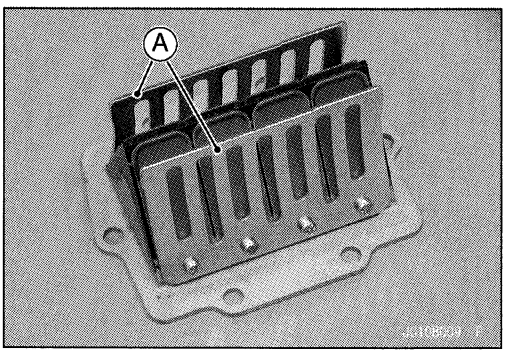
★If there is any doubt as to the condition of the rubber coating, replace the reed valve assembly with a new one.



Reed Valve Stop Inspection

- Check the valve stops [A] for deformation, cracks, or other damage.

★If there is any doubt as to the condition of a stop, replace the reed valve assembly with a new one.



Fuel Tank

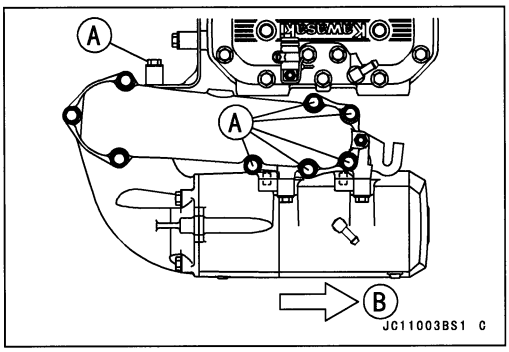
Fuel Tank Removal

- Remove the engine hood (see Hull/Engine Hood chapter).
- If the level of the fuel is above the inlet neck, siphon some fuel out to prevent spilling it.

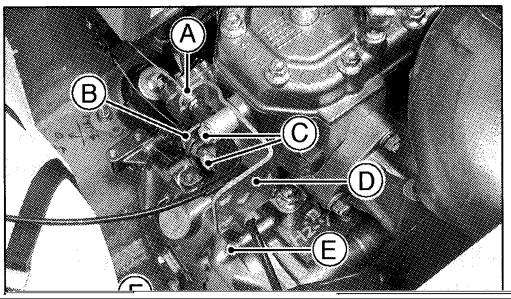
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Pull the lanyard key off the stop button. 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.

- Remove:
  Cooling Hose End (Exhaust pipe side)
  Bolts [A]
  Clamp (Loosen)
- Pull the exhaust pipe and exhaust chamber backward [B].

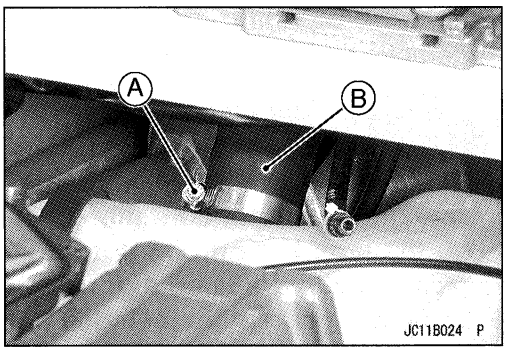


- Remove:
  Choke Cable Adjuster Nut [A]
  Throttle Cable Adjuster Lock Nut [B]
  Cable Bracket Bolts [C]
  Cable Bracket [D]
  Alternator Cover Bolts [E]
- Pull out the magneto cover [F] frontward.



Fuel Tank

- Loosen the clamp bolt [A] and remove the fuel inlet pipe [B] from the fuel tank.



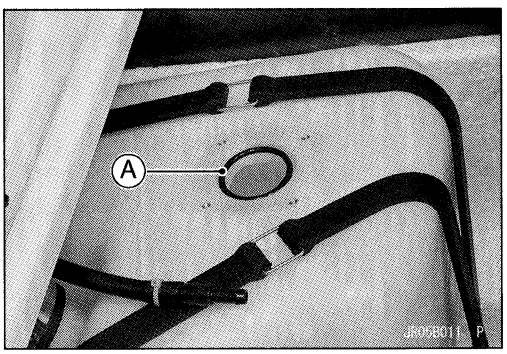
- Turn the fuel tank as shown.

- Clear the fuel tank to the engine and hull.

Fuel Tank Installation

- Fuel tank installation is revers of removal.
- Be sure the O-ring [A] is on the fuel tank.
- Apply a non-permanent locking agent to the magneto cover mounting bolts, cable holder bolts and inlet pipe bolts and tighten them securely.

Torque - Cable Holder Bolts: 30 N·m (3.0 kgf·m, 22 ft·lb)
Exhaust Pipe Bolts: 30 N·m (3.0 kgf·m, 22 ft·lb)
Magneto Cover Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



Fuel Tank

Fuel Tank Cleaning

- Remove the fuel tank (see Fuel Tank Removal).
- Drain the tank into a suitable container.

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Pull the lanyard key off the stop button. 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.

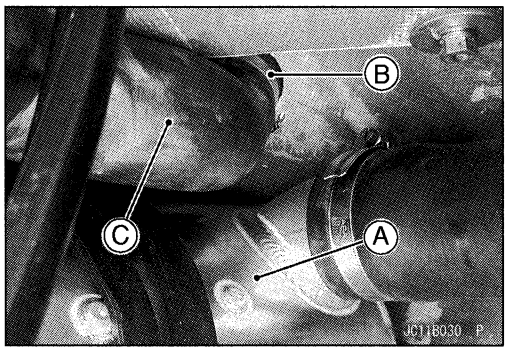
- Flush the tank repeatedly with high flash-point solvent until it is clean. It may be necessary to put a few marbles or pieces of clean gravel into the tank and shake it, to knock loose any foreign matter in the bottom.

⚠ WARNING

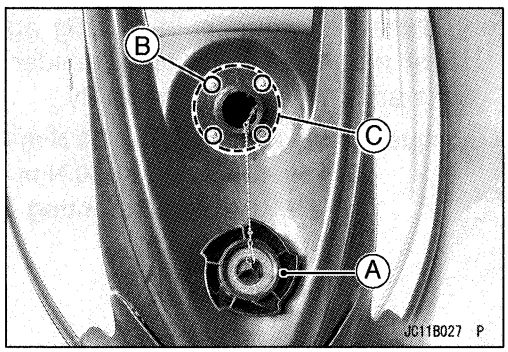
Clean the tank in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the tank. A fire or explosion could result.

Fuel Filler and Tube Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal)
  Water Box Muffler [A] (see Exhaust System chapter)
- Loosen the clamp [B] and twist the filler tube [C] off the bottom of the filler.



- Unscrew the fuel cap [A].
- Take out the screws [B] in the filler flange, cut the sealant [C], and pull the filler away from the hull.



Fuel Tank

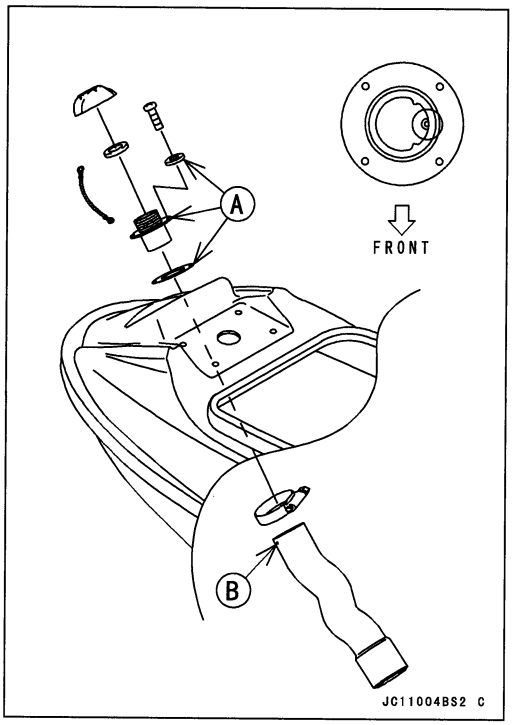
Fuel Filler and Tube Installation

- Clean the hull and the filler on their mating surfaces with a graceless, high flash-point solvent.

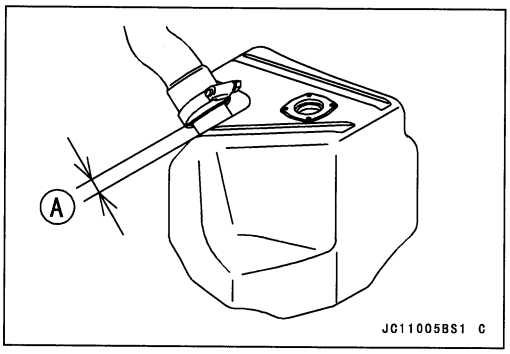
⚠ WARNING

Clean the parts in a well ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with pilot light. Do not use gasoline or a low flash-point solvent. A fire or explosion could result.

- Apply an even layer of silicone sealant to the mating surfaces of the washer, filler and gasket.
- Put the tube onto the filler fully with the white mark [B] faced bow.



- Put the tube onto the tank as shown.
  10 mm (0.39 in.) [A]



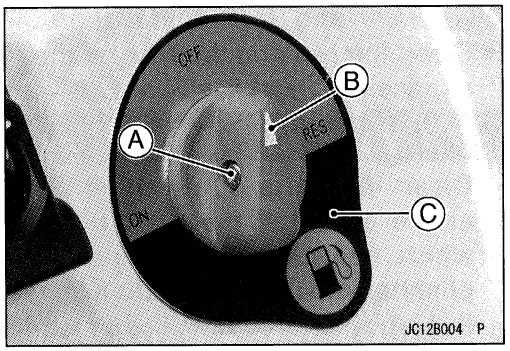
Fuel Filter Screen Cleaning

- Refer to Fuel Filter Screen Cleaning in the Periodic Maintenance chapter.

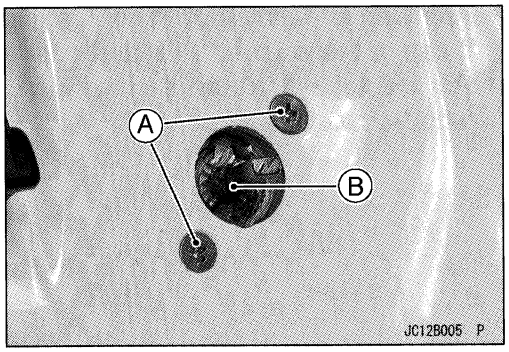
Fuel Tap

Fuel Tap Removal

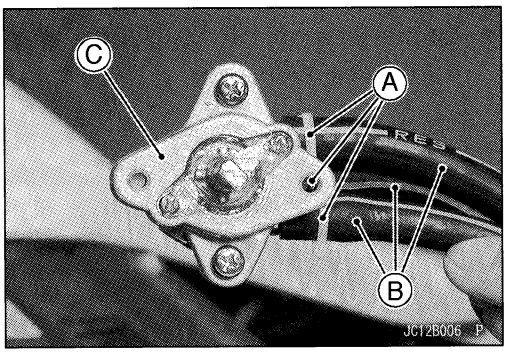
- Unscrew the set screw [A] and take out the fuel tap knob [B].
- Remove the indicate plate [C] from the hull.



- Unscrew the mounting screws [A] and take out the fuel tap [B].

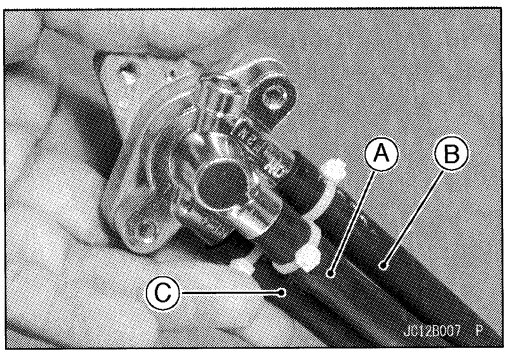


- Cut the band [A].
- Pull the fuel hoses [B] off the fuel tap [C].



Fuel Tap Installation

- Connect the fuel hoses to the fuel tap correctly.
  ON [A]
  Fuel Supply [B]
  Reserve [C]
- Apply a non-permanent locking agent to the fuel tap mounting screws and tighten them securely.



Fuel Tap

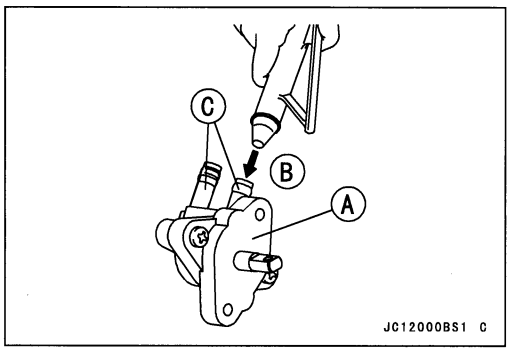
Fuel Tap Cleaning

If the fuel tap becomes clogged with foreign matter, it must be cleaned.

- Remove the fuel tap [A] (see Fuel Tap Removal).
- Use compressed air to blow [B] through supply hose fitting [C], while switching the fuel tap right and left between the "ON" and "RES" positions.
- Do this until only blockage is forced out.

NOTE

o *Do not use too high air pressure (172 kPa, 18 kgf/cm², 25 psi max.).*



Exhaust System

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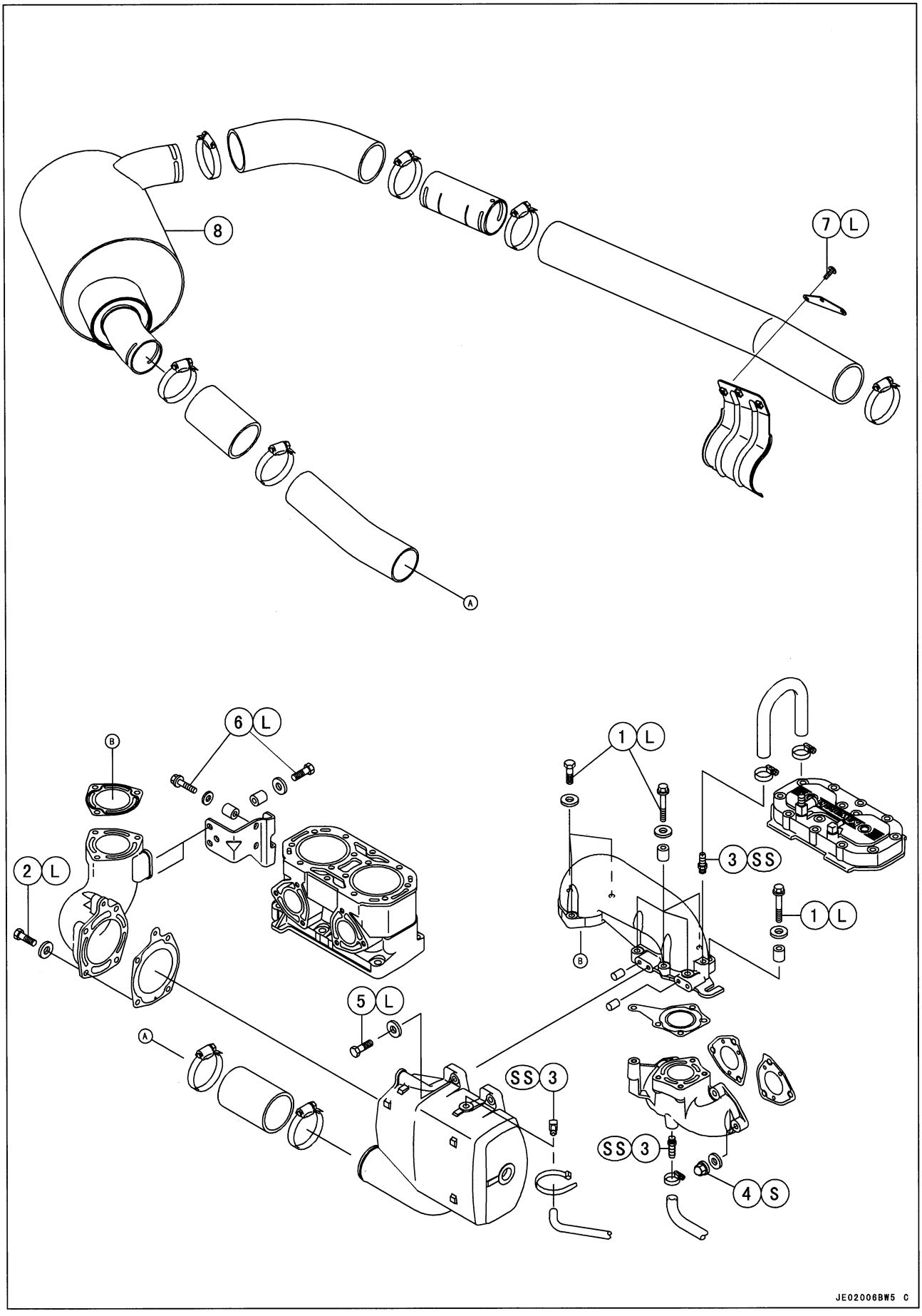
4-2 EXHAUST SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust pipe mounting bolts	29	3.0	22	L
2	Front muffler mounting bolts	29	3.0	22	L
3	Water pipe joints	11	1.1	95 in·lb	SS
4	Exhaust manifold mounting nuts	20	2.0	14.5	S
5	Expansion chamber mounting bolts	29	3.0	22	L
6	Muffler bracket mounting bolts	29	3.0	22	L
7	Water box muffler bracket mounting screws	5	0.5	43 in·lb	L

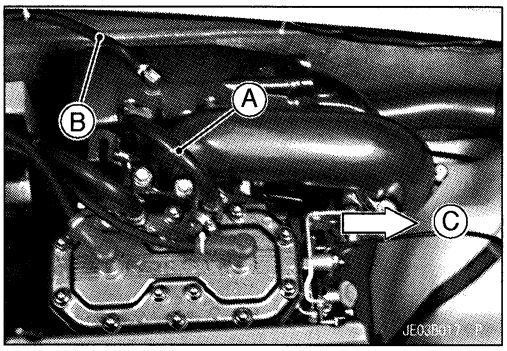
8. Water box muffler
L: Apply a non-permanent locking agent.
S: Follow the specified tightening sequence.
SS: Apply silicone sealant.

4-4 EXHAUST SYSTEM

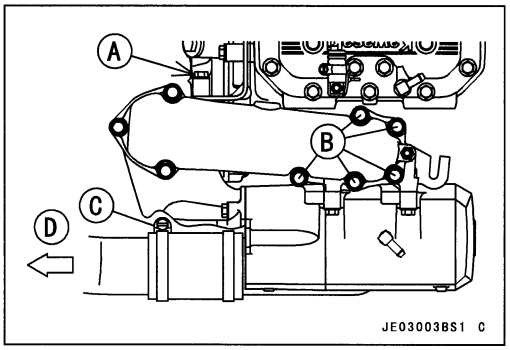
Expansion Chamber

Removal

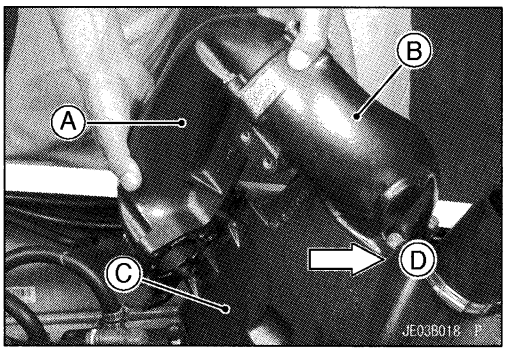
- Remove or disconnect:
  Engine Hood (see Hull/Engine Hood chapter)
  Cooling Hose [A]
  Bypass Hose [B]
  Bow [C]



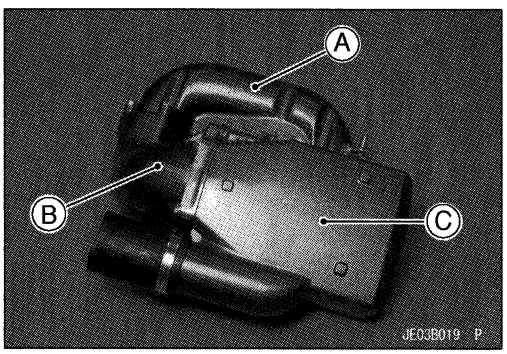
- Remove:
  Two Muffler Bracket Mounting Bolts [A]
  Five Exhaust Pipe Mounting Bolts [B]
- Loosen the inlet tube clamp bolt [C].
  Bow [D]



- Remove the exhaust pipe [A], the front muffler [B] and the expansion chamber [C] as a set.
  Bow [D]



- Unscrew the bolts and remove the following:
  Exhaust Pipe [A]
  Front Muffler [B]
  Expansion Chamber [C]



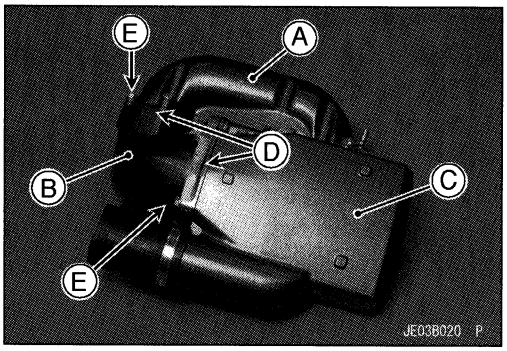
Expansion Chamber

Installation

- Assemble provisionally the exhaust pipe [A], the front muffler [B] and the expansion chamber [C] with the new gaskets [D].

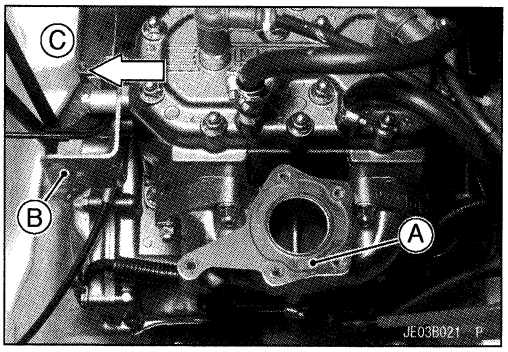
o Apply a non-permanent locking agent to the assembly bolts [E] and tighten them to the specified torque.

Torque - Expansion Chamber Assembly Bolts: 29 N·m (3.0 kgf·m, 22 ft·lb)



- Install the new gasket [A].
- Install provisionally the muffler bracket [B] between the cylinder and the front muffler.

Bow [C]

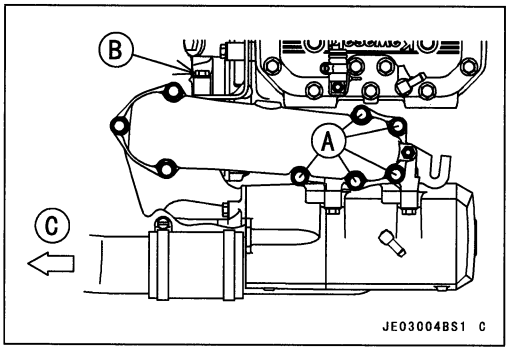


- Install the above assembly on the engine.
- Apply a non-permanent locking agent to the bolts and torque them in the following order.

Torque - Exhaust Pipe Mounting Bolts [A] and Muffler Bracket Mounting Bolts [B]: 29 N·m (3.0 kgf·m, 22 ft·lb)

Bow [C]

- Install the engine hood (see Hull/Engine Hood chapter).



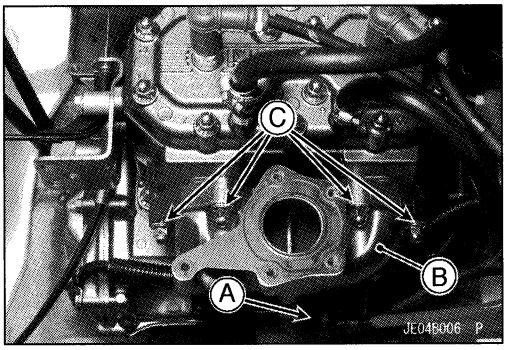
Expansion Chamber Cleaning and Inspection

- Remove the expansion chamber (see Expansion Chamber Removal).
- Scrape any carbon deposits out of the expansion chamber with a blunt, or roundedged tool. Excessive deposits will cause the engine to run poorly.
- Check the expansion chamber carefully for cracks. Also look for corrosion both inside and out.

Exhaust Manifold

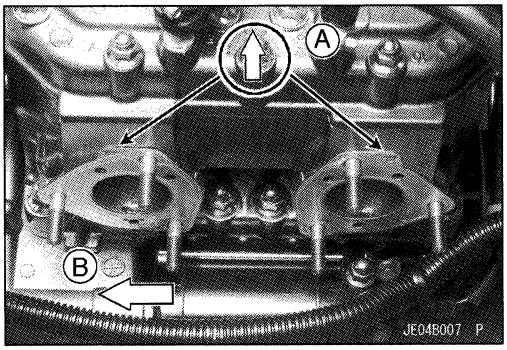
Removal

- Remove the exhaust pipe, the front muffler and the expansion chamber as a set (see Expansion Chamber Removal).
- Disconnect the inlet cooling hose [A] from the lower part of the exhaust manifold [B].
- Remove the exhaust manifold mounting nuts [C].
- Take the exhaust manifold off the cylinder.



Installation

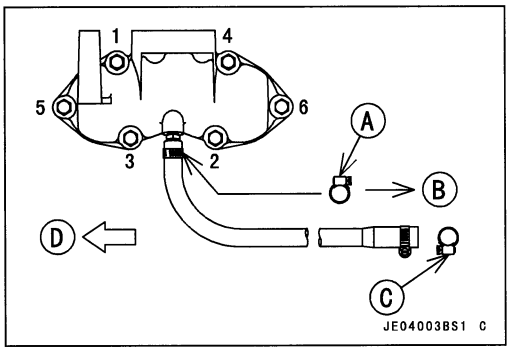
- Install the exhaust manifold gaskets so that each arrow [A] points upwards and is on the outside of the flange.
  Bow [B]



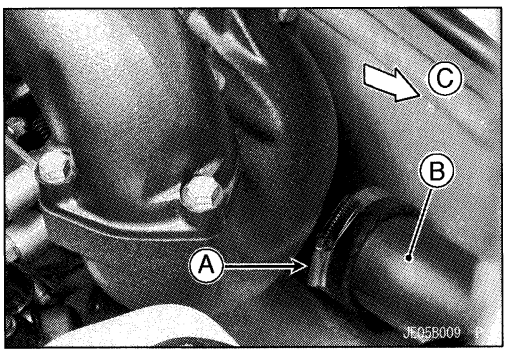
- The cooling hose clamp bolt [A] should face toward cylinder [B] and another hose clamp bolt [C] outside.
- Torque the exhaust manifold mounting nuts, following the specified tightening sequence.

  Torque - Exhaust Manifold Mounting Nuts: 20 N·m (2.0 kgf·m, 14.5 ft·lb)

  Bow [D]



- The clamp bolt [A] of the inlet tube [B] should be inside as shown.
  Bow [C]



Exhaust Manifold Cleaning and Inspection

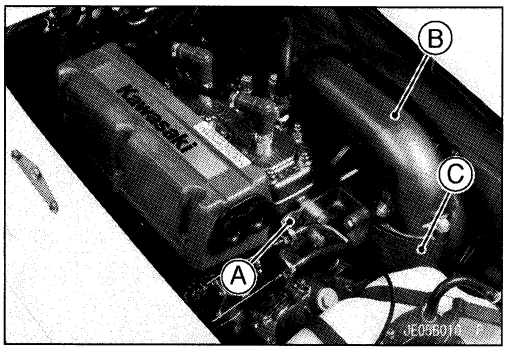
- Remove the exhaust manifold parts (see Exhaust Manifold Removal).
- Clean the carbon deposits out of the exhaust passage with a blunt, or roundedged tool.
- Check the insides of the water passages for corrosion.

★If there is excessive corrosion, flush foreign matter out of the water passages with fresh water.

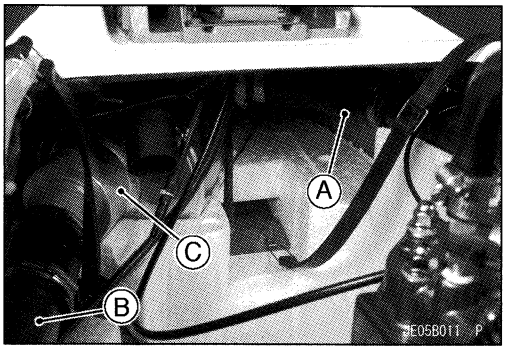
Water Box Muffler

Removal

- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Muffler Bracket [A]
  Exhaust Pipe [B], Front Muffler [C], and Expansion Chamber as a set (see Expansion Chamber Removal)



- Remove or disconnect:
  Magneto Cover (see Magneto Flywheel Removal in the Engine Bottom End chapter)
  Fuel Tank (see Fuel System chapter)
  Outlet Tube [A]
  Inlet Tube [B]
- Take the water box muffler [C] out of the hull.



Water Box Muffler Inspection

- Remove the water box muffler (see Water Box Muffler Removal).
- Empty water out of the water box.
- Check the inlet spigot for damage caused by excessive heat.

★If there is heat damage to the inlet spigot, check the cooling system for blockage (see Cooling System Flushing).

Engine Top End

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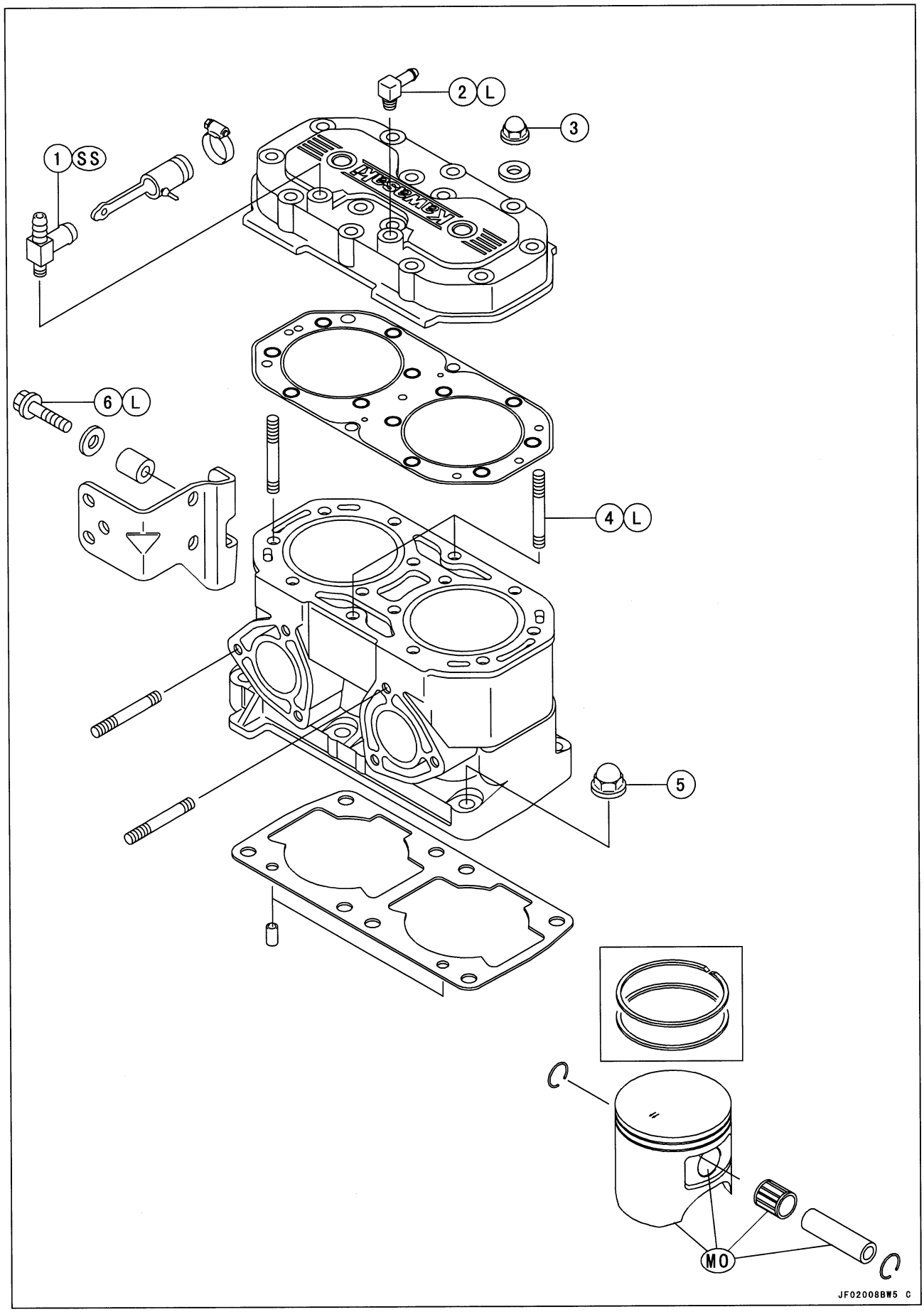
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water pipe joint	7.8 ~ 14	0.8 ~ 1.4	69 ~ 122 in·lb	SS
2	Fitting	7.8 ~ 14	0.8 ~ 1.4	69 ~ 122 in·lb	L
3	Cylinder head nuts	29.4	3.0	22	S
4	Cylinder stud	–	–	–	L
5	Cylinder base nuts	34	3.5	25	
6	Cable holder bolts	29.4	3.0	22	L

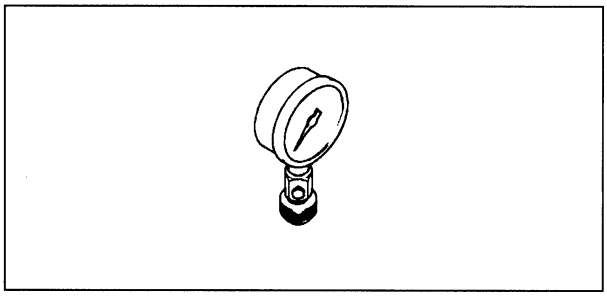
L: Apply a non-permanent locking agent.
MO: Apply molybdenum disulfide oil.
SS: Apply silicone sealant.

Specifications

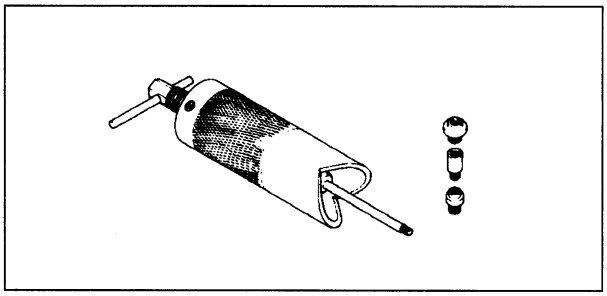
Item	Standard	Service Limit
Cylinder Head:		
Cylinder compression	(Usable range) 892 ~ 1 372 kPa (9.1 ~ 14 kgf/cm², 129 ~ 199 psi) (Open throttle)	– – –
Cylinder head warp	– – –	0.05 mm (0.002 in.)
Cylinder, Piston:		
Cylinder inside diameter	82.000 ~ 82.015 mm (3.228 ~ 3.229 in.)	82.10 mm (3.232 in.)
Piston diameter (16.9 mm up from bottom of skirt)	81.900 ~ 81.915 mm (3.224 ~ 3.225 in.)	81.75 mm (3.219 in.)
Piston/cylinder clearance	0.085 ~ 0.115 mm (0.0033 ~ 0.0045 in.)	– – –
Oversize piston and rings	+ 0.5 mm (0.02 in.) and + 1.0 mm (0.04 in.)	– – –
Piston ring/groove clearance:		
Top (keystone)	– – –	– – –
Second (keystone)	– – –	– – –
Piston ring groove width:		
Top (keystone)	– – –	– – –
Second (keystone)	– – –	– – –
Piston ring thickness:		
Top (keystone)	– – –	– – –
Second (keystone)	– – –	– – –
Piston ring end gap:		
Top	0.25 ~ 0.40 mm (0.0098 ~ 0.0157 in.)	0.7 mm (0.028 in.)
Second	0.25 ~ 0.40 mm (0.0098 ~ 0.0157 in.)	0.7 mm (0.028 in.)

Special Tools

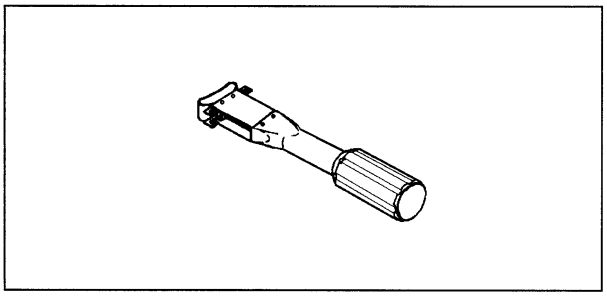
Compression Gauge:
57001-221



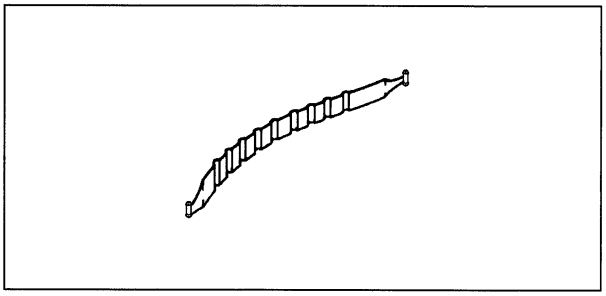
Piston Pin Puller Assembly:
57001-910



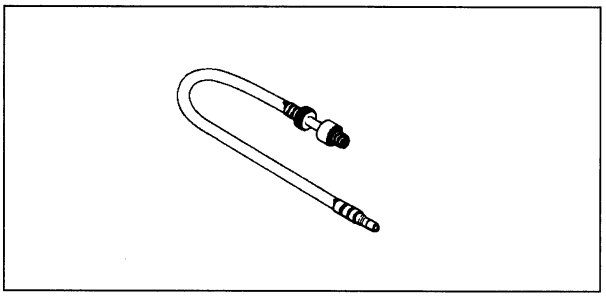
Piston Ring Compressor Grip:
57001-1095



Piston Ring Compressor Belt, ϕ67 ~ ϕ79:
57001-1097



Compression Gauge Adapter:
57001-1159

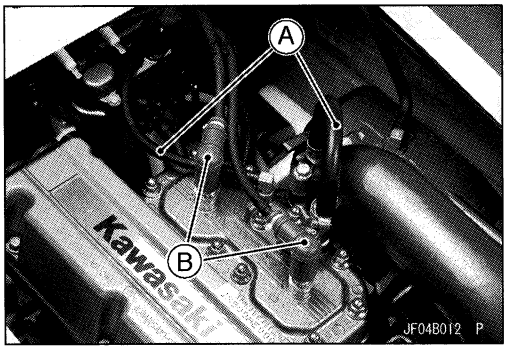


Engine Top End

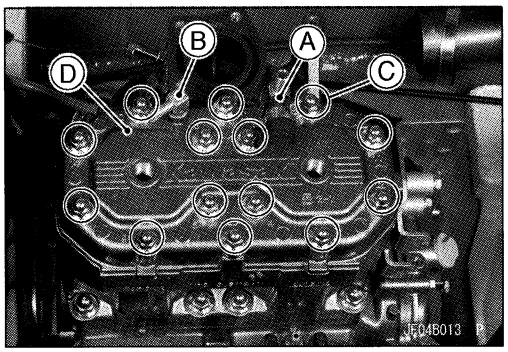
Disassembly and Assembly:

Disassembly

- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Water Hoses [A]
  Spark Plug Caps and Spark Plugs [B]
  Carburetor (see Carburetor Removal in the Fuel System chapter)
  Exhaust Pipe, Front Muffler and Expansion Chamber as a set (see Exhaust System chapter)

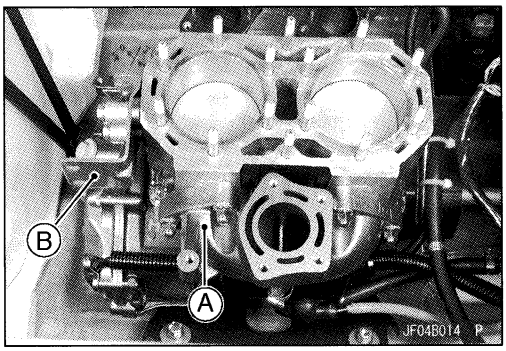


- Remove the water pipe joint [A] and fitting [B].
- Remove the cylinder head nuts [C], and lift off the cylinder head [D].

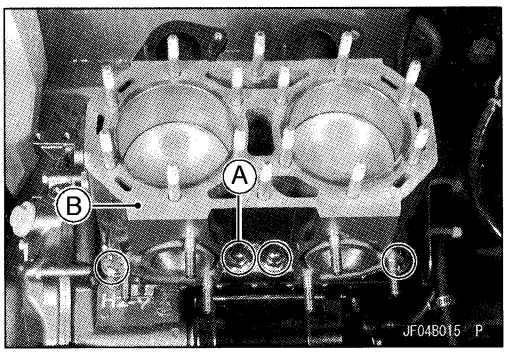


- Remove:
  Exhaust Manifold [A]
  Cable Holder [B]

  Torque - Cable Holder Bolts: 29.4 N·m (3.0 kgf·m, 22 in·lb)



- Remove the cylinder base nuts [A], and lift off the cylinder [B].

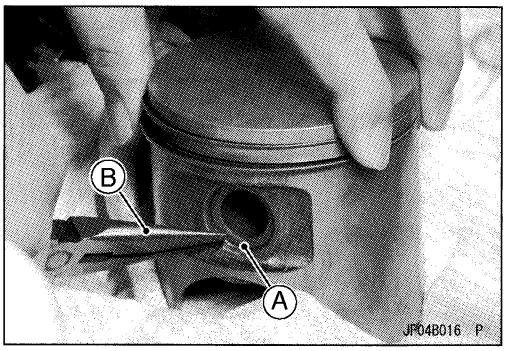


Engine Top End

- Stuff clean rags into the crankcase opening to prevent dirt or foreign objects from falling into the crankcase.
- Remove the piston pin snap ring [A] with a pliers [B].
- Remove the piston.

★Use a piston pin puller assembly, if the pin is tight.

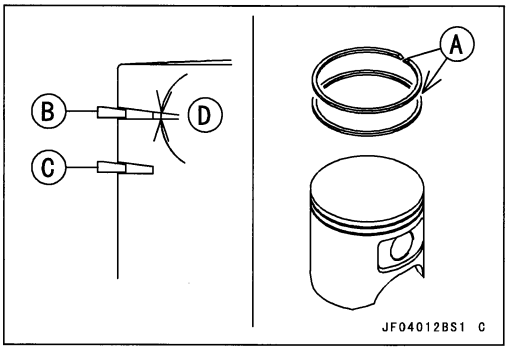
Special Tool - Piston Pin Puller Assembly: 57001-910



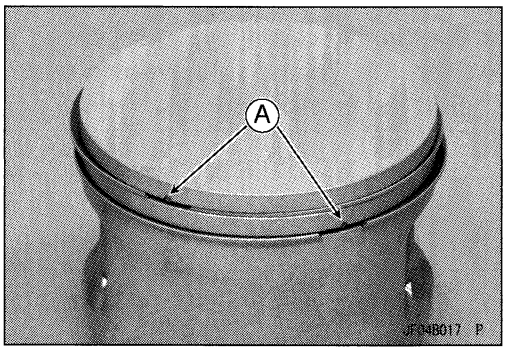
Assembly

- If any parts in the piston assemblies require replacement, or if the cylinder is honed or replaced, be sure to check the critical clearances of the new parts against the values given in Specifications.
- Install the piston rings so that the "R" mark [A] faces upwards as shown.

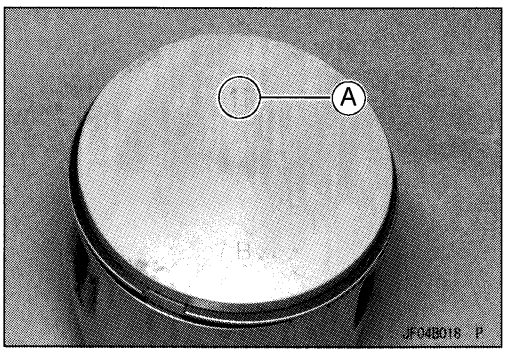
[B] Top Ring
[C] Second Ring
[D] 7°



- When installing the piston rings by hand, first fit one end of the piston ring against the pin in the ring groove, spread the ring opening with the other hand and then slip the ring into the groove.
- Check to see that the pin [A] in each piston ring groove is between the ends of the piston ring.



- Apply engine oil to the surface of each piston pin.
- Mount the piston on the connecting rod with the arrow [A] on its crown pointing to the left (exhaust) side of the engine.

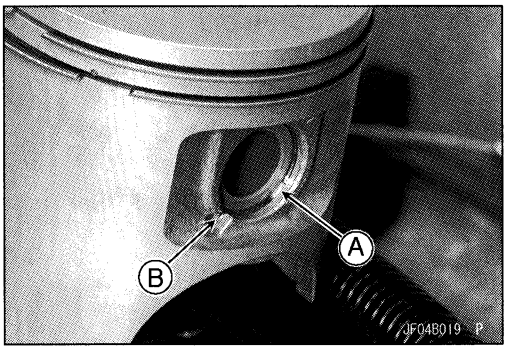


Engine Top End

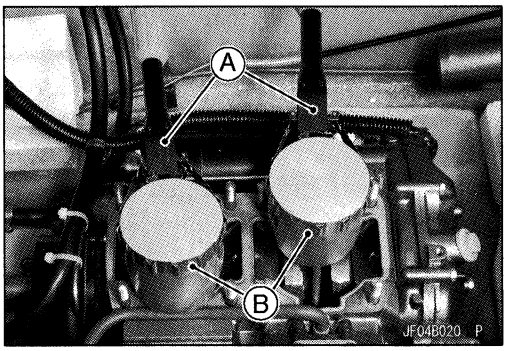
- When installing a piston pin snap ring, compress it only enough to install it and no more.

CAUTION

Do not reuse rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.



- Fit a new piston pin snap ring into the side of each piston so that the snap ring opening [A] does not coincide with the slits [B] of the piston pin hole.



- Set the new cylinder base gasket in place on the crankcase.
- Apply engine oil to the surface of the pistons.
- Compress the piston rings.

Special Tools - Piston Ring Compressor Grip: 57001-1095 [A]
Piston Ring Compressor Belt, ϕ67 ~ 79: 57001-1097 [B]

- Thoroughly oil the cylinder bores.
- Slide the cylinder block down over the crankcase studs onto the crankcase.

CAUTION

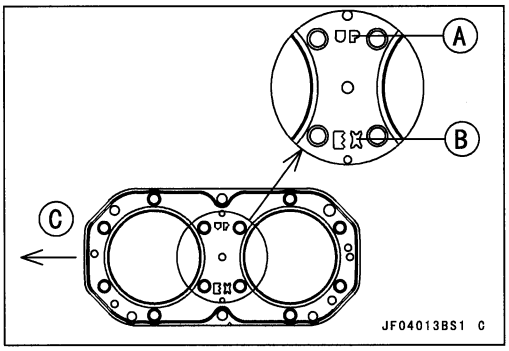
Do not force the cylinder block. Make sure the rings are in position.

- Install the cylinder base nuts, and cross-tighten them.

Torque - Cylinder Base Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Place a new cylinder head gasket on the cylinder head.

○ The "UP" mark [A] of the gasket must face upward and "EX" mark [B] must face toward the exhaust side of the engine.
[C] Front

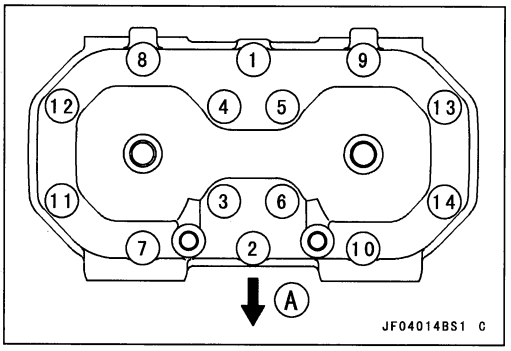


Engine Top End

- Install the cylinder head.

Torque - Cylinder Head Nut: 29 N·m (3.0 kgf·m, 22 ft·lb)

○ The tightening sequence numbers are marked on the cylinder head.

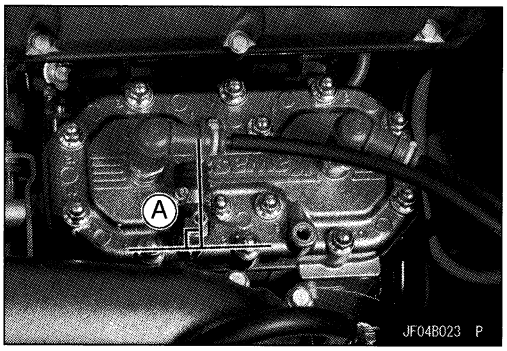


- Install the water pipe joint as follows.

[A]: 90°

Torque - Water Pipe Joint: 7.8 ~ 14 N·m (0.8 ~ 1.4 kgf·m, 69 ~ 122 in·lb)

- Install the water hose.

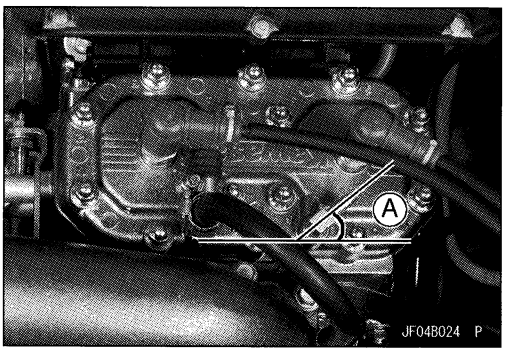


- Install the fitting as follows.

[A]: 30°

Torque - Fitting: 7.8 ~ 14 N·m (0.8 ~ 1.4 kgf·m, 69 ~ 122 in·lb)

- Install the water hose.



- Start the engine to check for fuel and oil leaks, exhaust leaks, and excessive vibration.

⚠ WARNING

Do not run the engine in a closed area. Exhaust gases contain carbon monoxide, a colorless, odorless, poisonous gas which can be lethal.

CAUTION

Do not run the engine for more than 15 seconds without cooling water.

Engine Top End

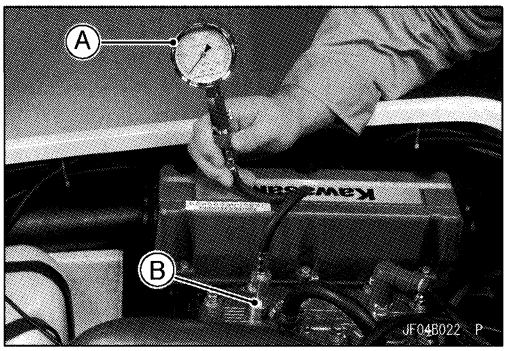
Maintenance and Inspection:

Compression Measurement

- Thoroughly warm up the engine, while checking that there is no compression leakage from around the spark plugs or the cylinder head gasket.

CAUTION
Do not run the engine for more than 15 seconds without cooling water.

- Stop the engine.
- Remove the engine hood (see Hull/Engine Hood chapter).



- Remove the spark plugs and screw a compression gauge firmly into the spark plug hole.

Special Tools - Compression Gauge: 57001-221 [A]
Compression Gauge Adapter: 57001-1159 [B]

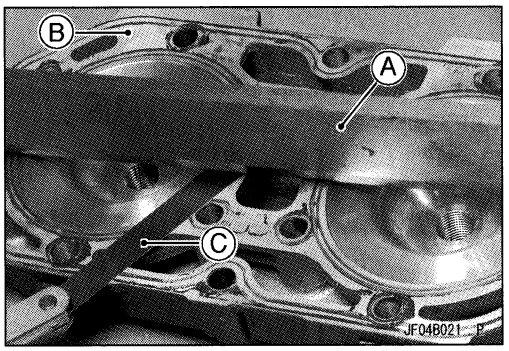
- Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.
- Repeat the measurement for the other cylinder.

Cylinder Compression (Usable Range)
892 ~ 1 372 kPa (9.1 ~ 14 kgf/cm², 129 ~ 199 psi)
(open throttle)

★If the cylinder compression is higher than the usable range, check the following.
o Carbon buildup on the piston head and cylinder head – clean off any carbon on the piston head and cylinder head.
o Cylinder head gasket, cylinder base gaskets – use only the proper gaskets. The use of a gasket of incorrect thickness will change the compression.
★If cylinder compression is lower than the usable range, check the following:
o Gas leakage around the cylinder head – replace the damaged gasket and check the cylinder head for warp.
o Piston/cylinder clearance, piston seizure.
o Piston rings, piston ring groove wear.

Engine Top End

Cylinder Head Warp Inspection



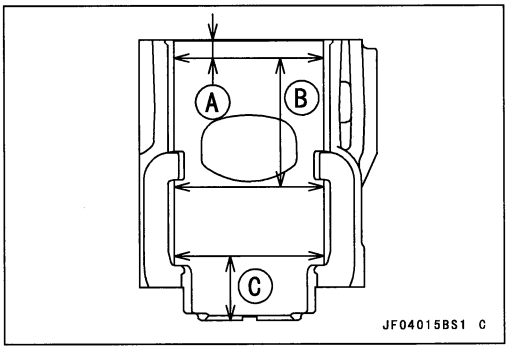
- Lay a straightedge [A] across the lower surface of the head [B] at several different points, and measure warp by inserting a thickness gauge [C] between the straightedge and the head.

★If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.

Cylinder Head Warp

Service Limit: 0.05 mm (0.002 in.)

Cylinder Wear Inspection



- Inspect the inside of the cylinder for scratches and abnormal wear.

★If the cylinder is damaged or badly worn, replace it with a new one.

- 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 3 locations (total of 6 measurements) shown in the figure.

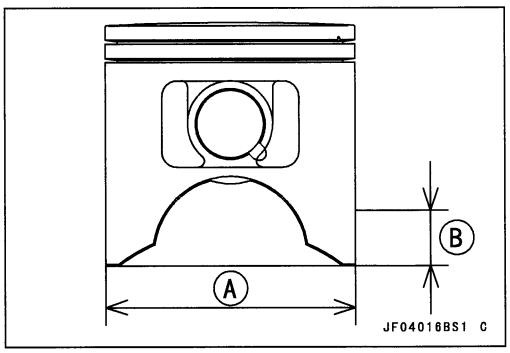
[A] 10 mm (0.39 in.)
[B] 80 mm (3.15 in.)
[C] 35 mm (1.38 in.)

★If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored oversize and then honed.

Cylinder Inside Diameter

Standard:	**82.000 ~ 82.015 mm (3.228 ~ 3.229 in.) and less than 0.01 mm (0.004 in.) difference between any two measurements**
Service Limit:	**82.10 mm (3.232 in.), or more than 0.05 mm (0.002 in.) difference between any two measurements**

Piston Diameter Measurement



- Measure the outside diameter [A] of the piston 16.9 mm up [B] from the bottom of the piston at a ring angle to the direction of the piston pin.

Piston Diameter

Standard:	**81.900 ~ 81.915 mm (3.224 ~ 3.225 in.)**
Service Limit:	**81.75 mm (3.219 in.)**

○ If the measurement is less than the service limit, replace the piston.

NOTE

○ *Abnormal wear such as a marked diagonal pattern across the piston skirt any mean a bent connecting rod or a misaligned crankshaft.*

Engine Top End

Piston/Cylinder Clearance

The piston-to-cylinder clearance must be checked, and the standard value maintained anytime a piston or the cylinder block are replaced with new parts, or whenever the cylinder is rebored and oversize pistons installed.

- The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values.
- Measure the piston diameter as just described, and subtract this value from the measurement. The difference is the piston clearance.

Piston/Cylinder Clearance
0.085 ~ 0.115 mm (0.0033 ~ 0.0045 in.)

Boring and Honing

When boring and honing a cylinder, note the following:

o There are two sizes of oversize pistons available.

Oversize Pistons and Rings
0.5 mm (0.02 in.) oversize
1.0 mm (0.04 in.) oversize

o Before boring a cylinder, first measure the exact diameter of the oversize piston, and then, according to the standard clearance in the Service Date Section, determine the rebore diameter. However, if the amount of boring necessary would make the inside diameter greater than 1.0 mm oversize, the cylinder block must be replaced.

o Cylinder inside diameter must not vary more than 0.01 mm at any point.

o Be wary of measurements taken immediately after boring since the heat affects cylinder diameter.

o In the case of a rebored cylinder and oversize piston, the service limit for the cylinder is the diameter that the cylinder was bored to plus 0.1 mm and the service limit for the piston is the oversize piston original diameter minus 0.15 mm. If the exact figure for the rebored diameter is unknown, it can be roughly determined by measuring the diameter at the base of the cylinder.

Piston Ring, Piston Ring Groove Inspection

- Visually inspect the piston rings and the piston ring grooves.

★If the rings are worn unevenly or damaged, they must be replaced.

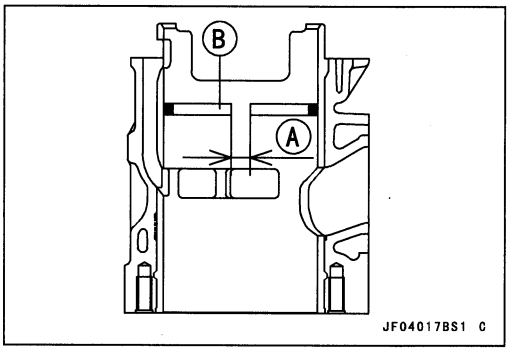
★If the piston ring groove are worn unevenly or damaged, the piston must be replaced and fitted with new rings.

Engine Top End

Piston Ring End Gap

- Place the piston ring 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 [A] between the ends of the ring [B] with a thickness gauge.

★If the gap is wider than the service limit, the ring is worn excessively and must be replaced.



Piston Ring End Gap

	Top	Second
Standard:	**0.25 ~ 0.40 mm (0.0098 ~ 0.0157 in.)**	**0.25 ~ 0.40 mm (0.0098 ~ 0.0157 in.)**
Service Limit:	**0.70 mm (0.028 in.)**	**0.7 mm (0.028 in.)**

Engine Removal/Installation

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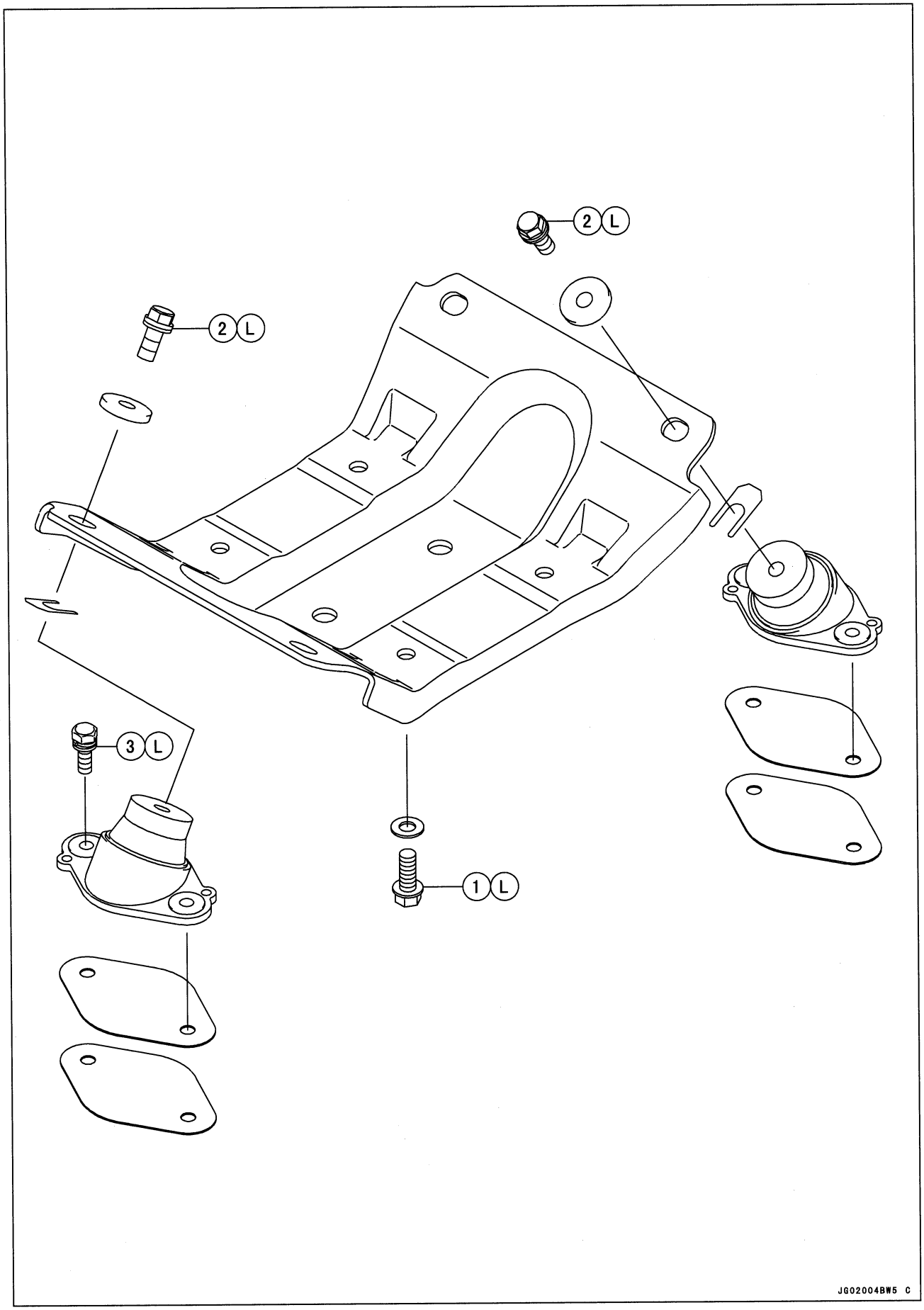
Exploded View



Exploded View

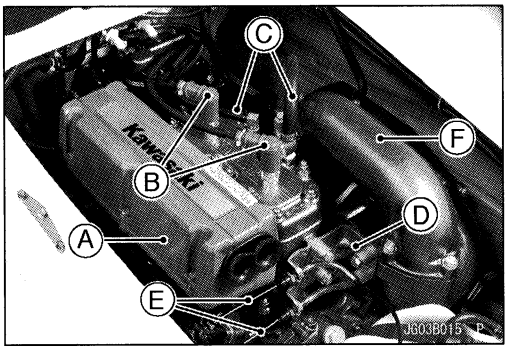
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine mounting bolts	36	3.7	27	L
2	Engine bed mounting bolts	49	5.0	36	L
3	Engine mount bolts	16	1.6	12	L

L: Apply a non-permanent locking agent.

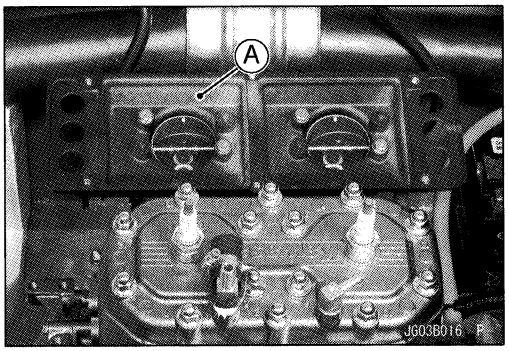
Engine Removal/Installation

Engine Removal

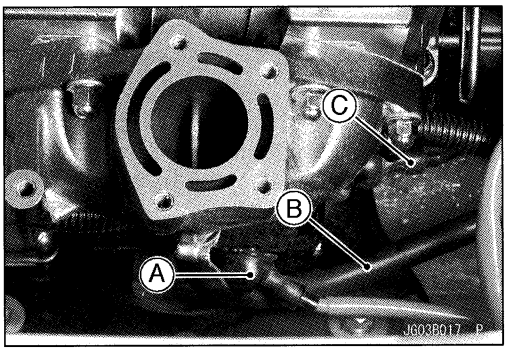
- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Air Inlet Cover [A]
  Spark Plug Caps [B]
  Muffler Bracket [C]
  Hoses [D]
  Throttle Cable and Choke Cable Ends [E]
  Exhaust Pipe [F], Front Muffler and Expansion Chamber as a set (see Exhaust System chapter)



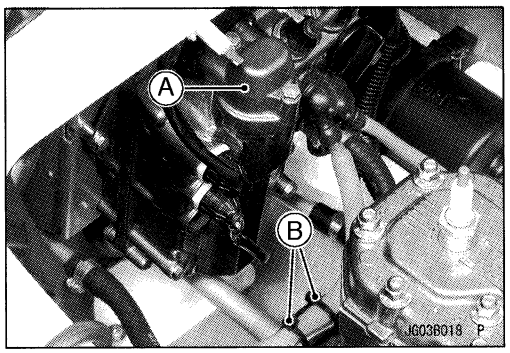
- Remove:
  Arrester Case [A] and Carburetor (see Fuel System chapter)



- Remove:
  Starter Cable (+) [A]
  Cooling Hose [B]
  Battery Ground Cable [C]

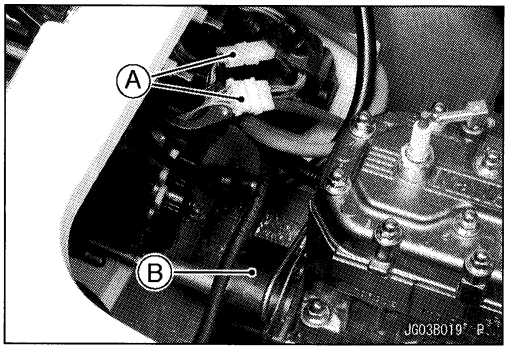


- Remove:
  Electric Case Connector [A] (see Electrical System chapter)
  Bands [B]

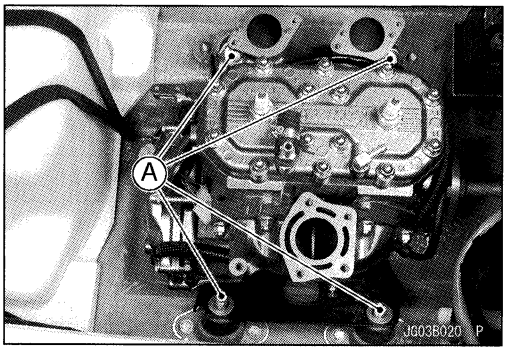


Engine Removal/Installation

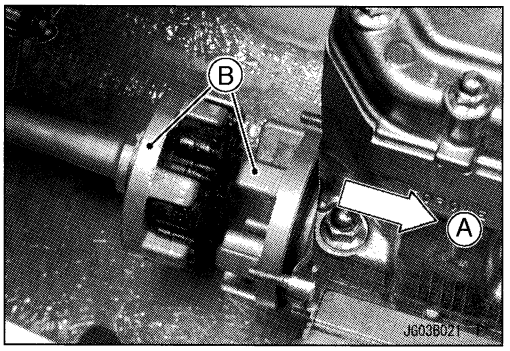
- Remove:
  Connectors [A]
  Coupling Cover [B]



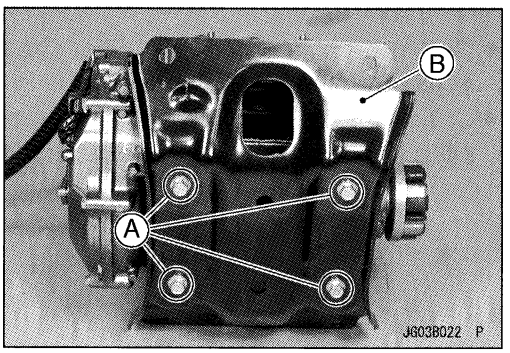
- Remove:
  Engine Bed Mounting Bolts [A]



- Slide the engine toward the front [A] to disengage the couplings [B], and then lift the engine out of the hull.



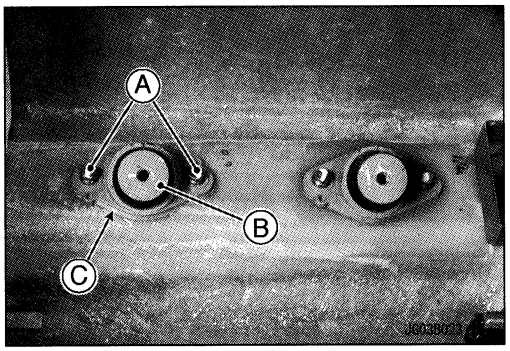
- Remove:
  Engine Mounting Bolts [A]
  Engine Bed [B]



Engine Removal/Installation

Engine Mount Removal

- Remove:
  Engine Mount Bolts [A]
  Engine Mounts [B]
  Shim [C]
- Record the number of the shims as installed to the original position.

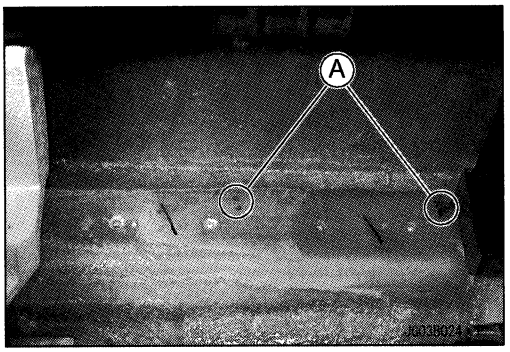


Engine Mount Installation

- Install the shim(s) of the same number.

★If the shim numbers are unknown, refer to the following table.

Numerical Letters [A]	Numbers of Shim
0.0 ~ 0.5	None
0.6 ~ 1.5	1 Shim
1.6 ~ 2.0	2 Shims



NOTE

o *The amount of original shims should be recorded prior to installation. The contents of the above table are for reference.*

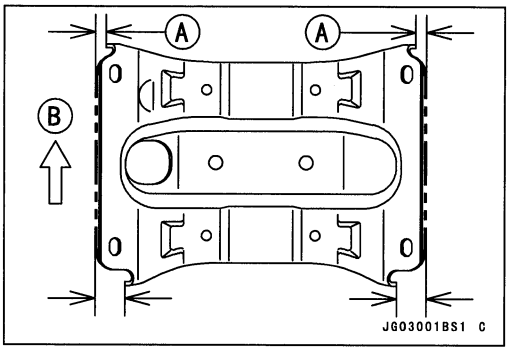
- Apply a non-permanent locking agent to the engine mount bolts, and tighten them.

Torque - Engine Mount Bolts: 16 N·m (1.6 kgf·m, 12 ft·lb)

Engine Installation

- Be sure there are no foreign objects and parts inside of the hull.
- Clean the bilge filter (see Filter Cleaning and Inspection in the Cooling and Bilge Systems chapter).
- Check the coupling damper for wear damage (see Coupling Damper Inspection in the Engine Bottom End chapter).

Engine Removal/Installation



- Install the engine bed so that small notches [A] are on the magneto end of the engine as shown.
  [B] Front Side

- Apply a non-permanent locking agent to the following bolts, and tighten them.

  Torque - Engine Mounting Bolts: 36 N·m (3.7 kgf·m, 27 ft·lb)
  Engine Bed Mounting Bolts: 36 N·m (3.7 kgf·m, 27 ft·lb)

- Check the gap between the engine bed and the dampers by rocking the engine.

★If there is a gap, inspect a suitable shim between the engine bed and the damper to achieve a good fit.

Shim Selection

Part Number of Shim	Thickness
92025-3705	0.3 mm (0.012 in.)
92025-3706	0.5 mm (0.020 in.)
92025-3707	1.0 mm (0.039 in.)
92025-3708	1.5 mm (0.059 in.)

- After installing the engine in the hull, check the following.
  Throttle Cable
  Choke Cable
  Oil Pump Bleeding
  Fuel and Exhaust Leaks

⚠ WARNING

Do not run the engine in a closed area. Exhaust gases contain carbon monoxide, a colorless, odorless, poisonous gas which can be lethal.

CAUTION

Operate the engine only for short periods without cooling water. Stop the engine immediately if the temperature warning buzzer goes on. Overheating will cause severe engine and exhaust system damage.

Engine Bottom End

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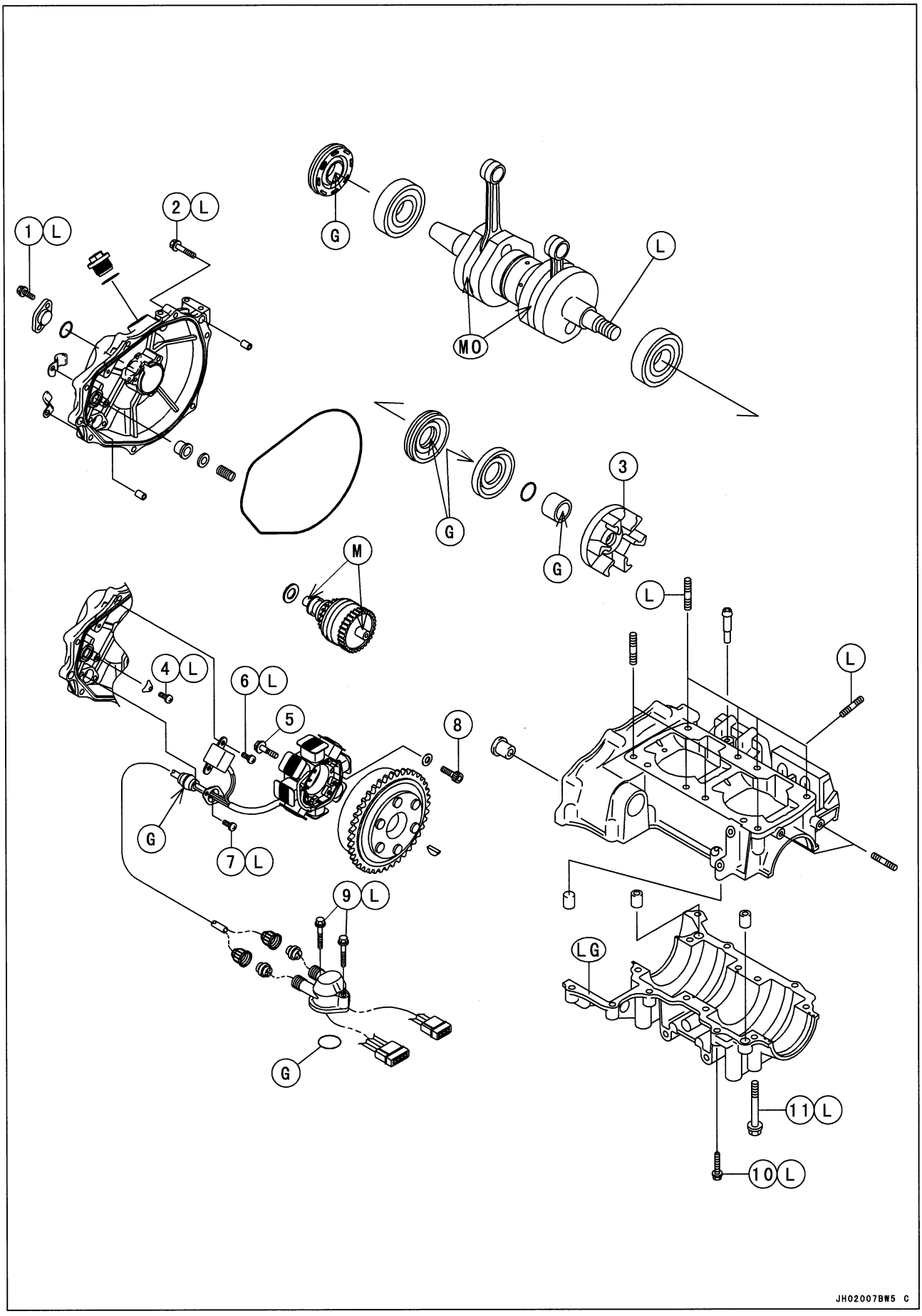
7-2 ENGINE BOTTOM END

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Magneto cover cap bolts	8.8	0.9	78 in·lb	L
2	Magneto cover mounting bolts	8.8	0.9	78 in·lb	L
3	Coupling	130	13.5	96	L
4	Set screw	8.8	0.9	78 in·lb	L
5	Flywheel bolt	130	13.5	96	L
6	Crankshaft sensor bracket screw	8.8	0.9	78 in·lb	L
7	Grommet clamp screws	8.8	0.9	78 in·lb	L
8	Startor mounting bolts	12	1.2	8.5	
9	Electric case cap bolts	8.8	0.9	78 in·lb	L
10	Crankcase bolts (6 mm dia.)	8.8	0.9	78 in·lb	L, S
11	Crankcase bolts (8 mm dia.)	29	3.0	22	L, S

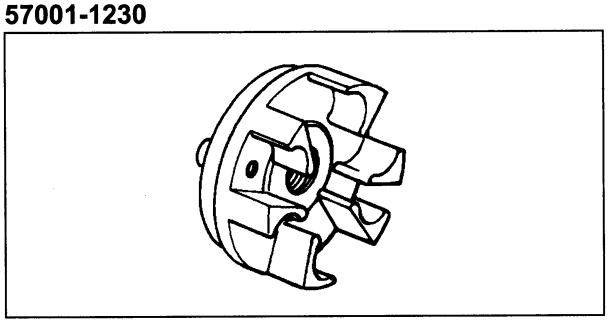
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket.
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil.
S: Follow the specific tightening sequence.

Specifications

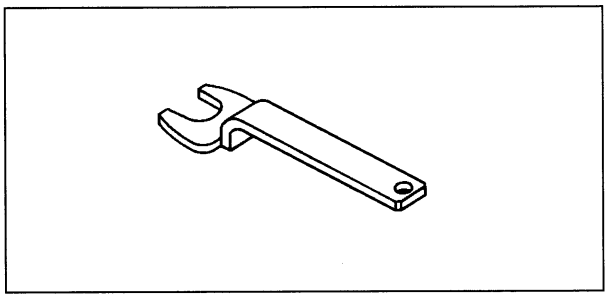
Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Crankshaft runout	0.04 mm (0.0016 in.)	0.10 mm (0.0039 in.) TIR
Connecting rod side clearance	0.45 ~ 0.55 mm	0.8 mm
	(0.018 ~ 0.022 in.)	(0.0315 in.)
Connecting rod radial clearance	0.038 ~ 0.049 mm	0.10 mm
	(0.0015 ~ 0.0193 in.)	(0.0039 in.)
Connecting rod bend	0.05 mm/100 mm	0.2 mm/100 mm
	(0.002 in./3.937 in.)	(0.008 in./3.937 in.)
Connecting rod twist	0.15 mm/100 mm	0.2 mm/100 mm
	(0.006 in./3.937 in.)	(0.008 in./3.937 in.)

Special Tools and Sealant

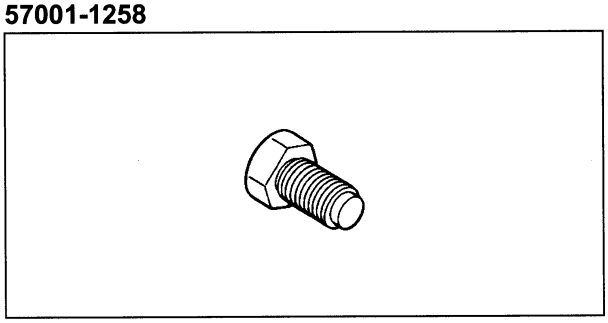
Coupling Holder:
57001-1230



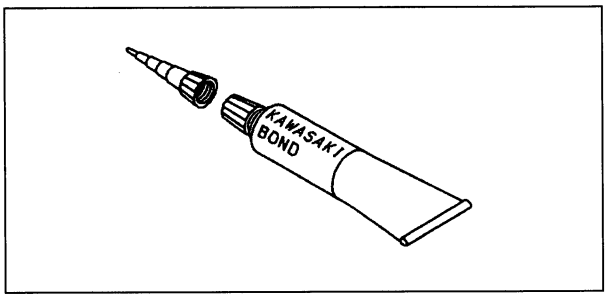
Flywheel Holder:
57001-1368



Rotor Puller, M18 × 1.5:
57001-1258



Kawasaki Bond (Liquid Gasket - Black):
92104-1003

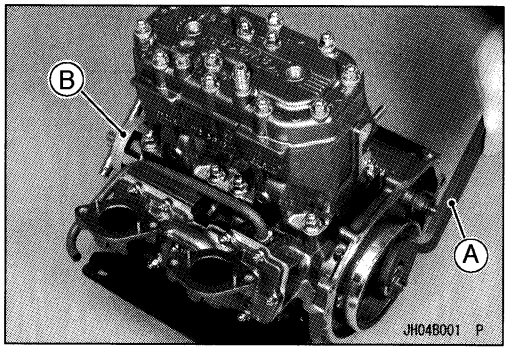


Coupling

Removal

- Remove:
  Engine (see Engine Removal/Installation chapter)
  Coupling Damper
  Magneto Cover
- Holding the flywheel, unscrew the coupling.

Special Tools - Flywheel Holder: 57001-1368 [A]
Coupling Holder: 57001-1230 [B]



Installation

- Apply a non-permanent locking agent to the coupling threads.

Sealant - Kawasaki Bond (Silicone Sealant): 56019-120

- Screw the coupling onto the crankshaft and tighten it.

Torque - Coupling: 98 N·m (10.0 kgf·m, 72 ft·lb)

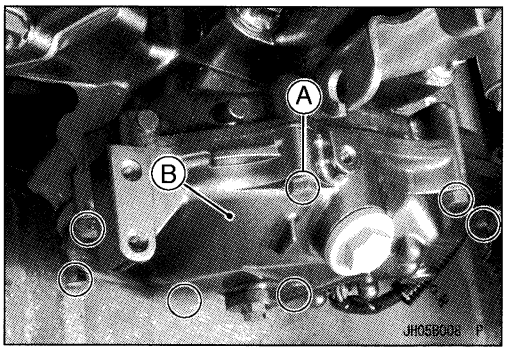
Coupling Damper Inspection

- Refer to the Periodic Maintenance chapter.

Magneto Flywheel

Removal

- Remove the engine hood (see Hull/Engine Hood chapter).
- Remove the mounting bolts [A], and take off the magneto cover [B].



NOTE

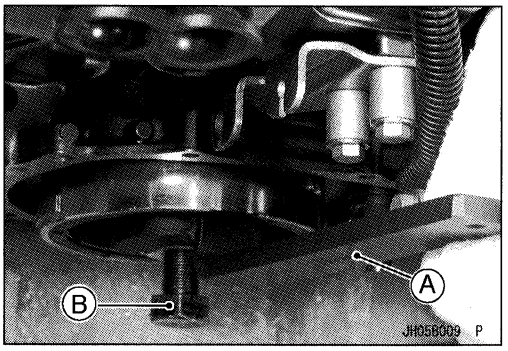
o *The flywheel can be removed without removing the fuel tank if the rotor puller (57001-1258) is used.*

- Holding the flywheel, remove the flywheel bolt.

Special Tool - Flywheel Holder: 57001-1368 [A]

- Pull the flywheel off the crankshaft.

Special Tool - Rotor Puller, M18 × 1.5: 57001-1258 [B]

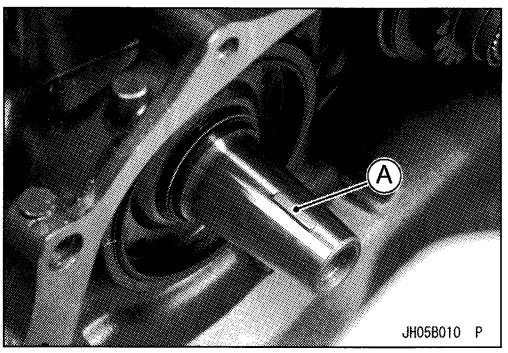


CAUTION

Do not strike the flywheel with a hammer as the magnets may be damaged.

Installation

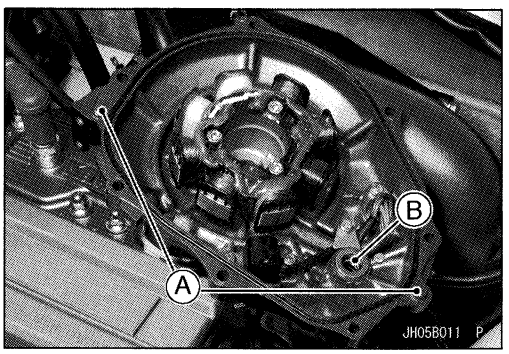
- Using a high flash-point solvents, clean off any oil or dirt that may be on the flywheel bolt, the crankshaft taper, or in the tapered hole in the flywheel.
- Fit the woodruff key [A] securely in the crankshaft, before installing the magneto flywheel.



- Apply a thin coat of engine oil to the flanged portion of flywheel bolt.
- Install the flywheel.

Torque - Flywheel Bolt: 125 N·m (13.0 kgf·m, 94 ft·lb)

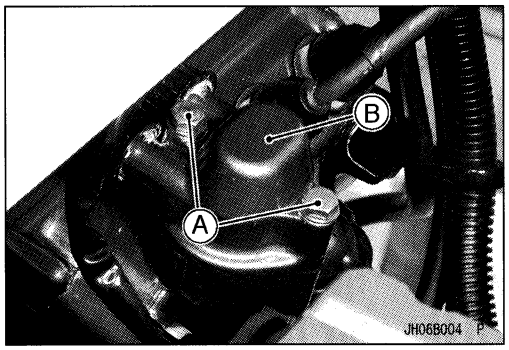
- Check that the knock pins [A] and the spring [B] are in place and replace the O-ring.
- Apply a non-permanent locking agent to the threads of the magneto cover mounting bolts, and tighten them securely.



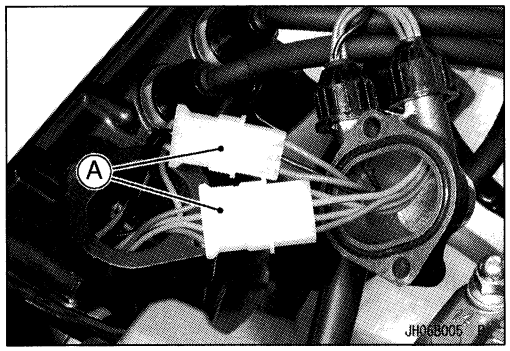
Stator

Removal

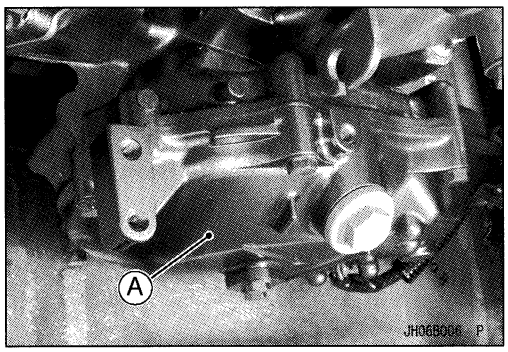
- Remove the engine hood (see Hull/Engine Hood chapter).
- Remove the bolts [A] and electric case cap [B].



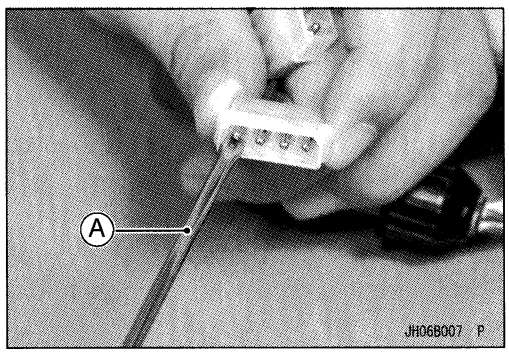
- Disconnect the connectors [A].



- Remove:
  Intake Silencer
  Magneto Cover [A]

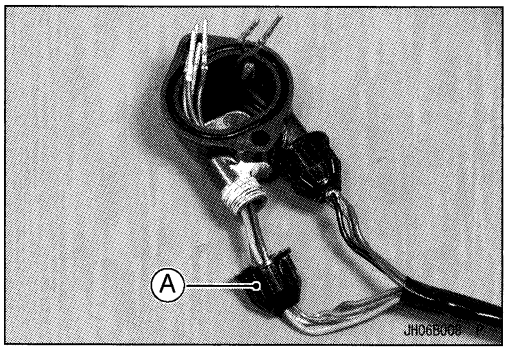


- Slide the pins out of the connectors.
  - Use a screw driver [A] to depress the pin latches.



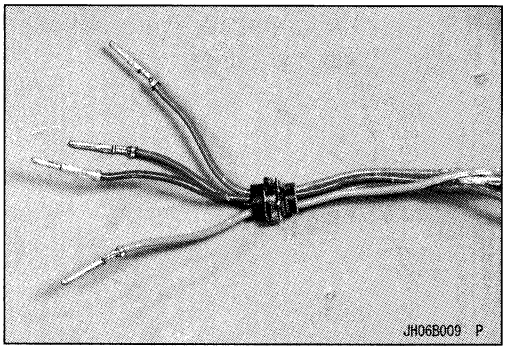
Stator

- Unscrew the grommet cap [A] from the electric case cap.

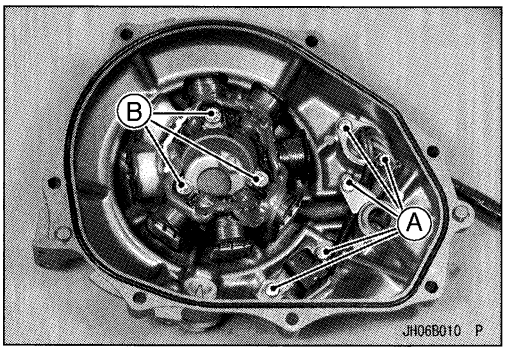


- Pull the leads, one at a time, through the grommet and cap.

o Lubricate the grommet with a penetrating rust inhibitor.

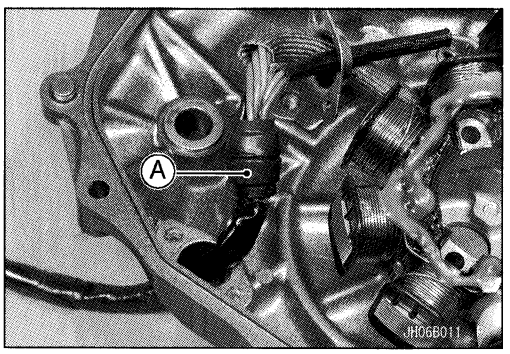


- Unscrew the set screws [A] and bolts [B], and remove the stator assembly.



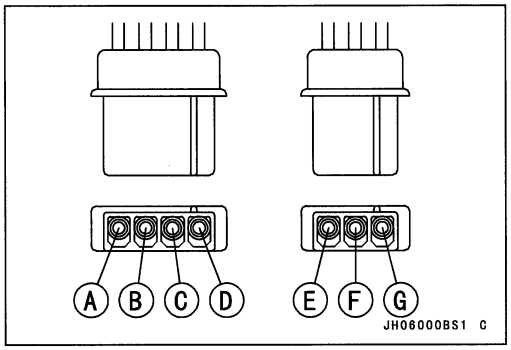
Installation

- Coat the grommets [A] with water resistant grease.

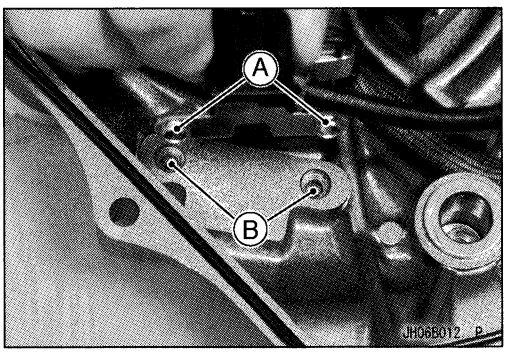


Stator

- Insert the connector pins onto the connector, as shown.
  [A] PU
  [B] R
  [C] G
  [D] BL
  [E] BR
  [F] BK
  [G] BR



- Slip the crankshaft sensor bracket projections [A] into the holes [B] on the cover.



Crankcase

Splitting

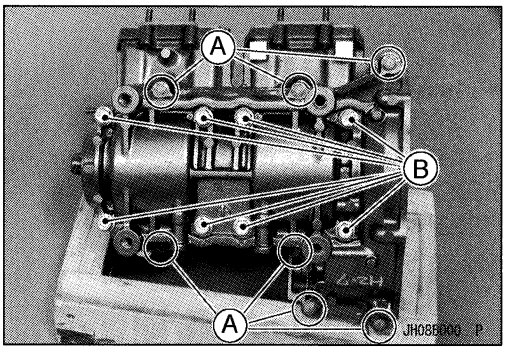
- Remove the engine (see Engine Removal/Installation chapter).
- Remove the following from the engine.

Exhaust Manifold
Stater Motor
Carburetor
Inlet Manifold
Cylinder Head
Cylinder Block
Pistons
Coupling
Magneto Flywheel
Reduction Gear

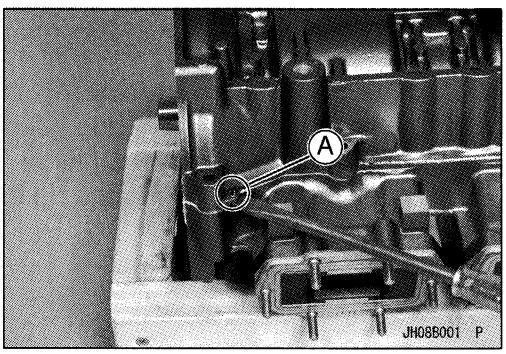
NOTE

o *Always remove the coupling before removing the magneto flywheel, or there won't be any way to hold the crankshaft while unscrewing the coupling.*

- Remove the 6 mm (0.236 in.) crankcase bolts [A] first and the 8 mm (0.315 in.) bolts [B].



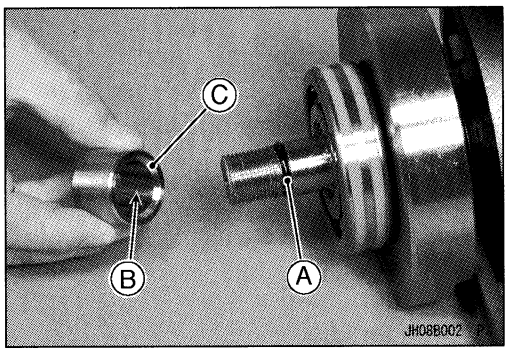
- Pry the point [A] indicated in the figure to split the crankcase halves apart, and then remove the lower crankcase half.
- Lift the crankshaft assembly out of the upper crankcase half.



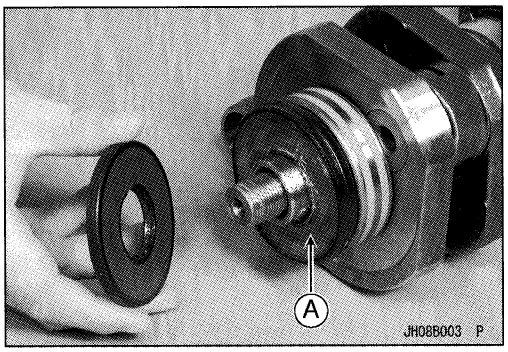
Crankcase

Assembly

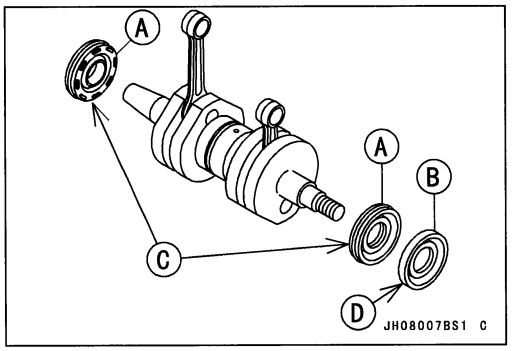
- Visually inspect the crankshaft O-ring [A], and replace it.
- Grease the inner surface of the collar [B].
- Taper [C] of collar is adjusted to the inside and attaches to shaft.



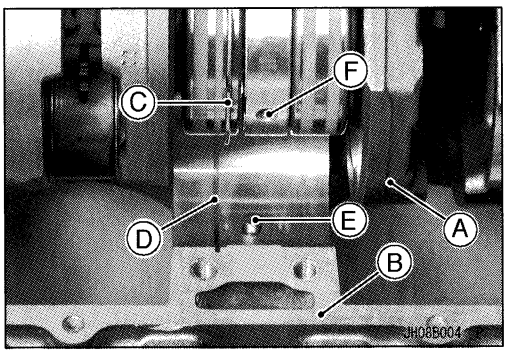
- Grease the lips of the oil seals.
- Pack grease [A] between the rear oil seals (coupling side).



- Install the oil seal as shown.
  [A] Double Lips Seals
  [B] Single Lip Seal
  [C] Projection Side
  [D] Flat Surface

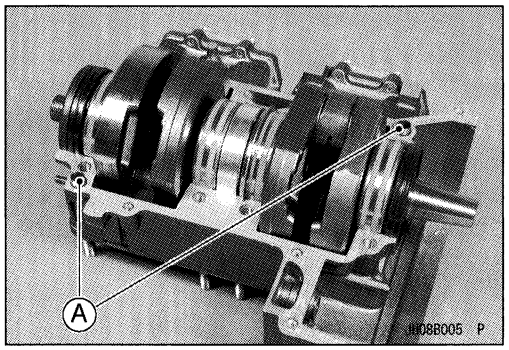


- Place the crankshaft assembly [A] in the upper crankcase [B] half so that the position ring [C] on the crankshaft assembly fits into the groove [D] in the crankcase.
- Insert the knock pin [E] into the hole [F].



Crankcase

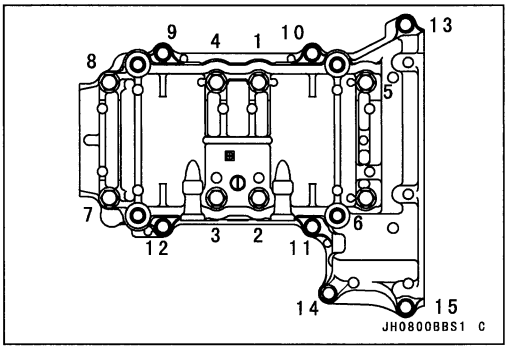
- Check that the knock pins [A] are in place.
- With a high flash-point solvent, clean off the mating surface of the crankcase halves and wipe dry.
- Apply liquid gasket to the mating surface of the lower crankcase half.
- Install the lower crankcase half onto the upper half.



- Apply a non-permanent locking agent to the crankcase bolts, and tighten them.

Torque - Crankcase M8 Bolts: 29 N·m (3.0 kgf·m, 22 ft·lb)
Crankcase M6 Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)

○ The tightening sequence numbers are marked on the lower crankcase half.



Crankshaft Maintenance

The crankshaft changes the reciprocating motor of the piston into rotating motion to drive the jet pump. Crankshaft trouble, such as excessive play or runout, will multiply the stress caused by the intermittent force on the piston and will result in not only rapid crankshaft bearing wear, but also noise, power loss, vibration, and shorted engine life. A defective crankshaft should always be detected at an early stage and repaired immediately.

The following explanation concerns the most common crankshaft problems and the method for measuring play, runout, and con-rod alignment, it does not cover crankshaft disassembly because of the highly specialized equipment that is required. If crankshaft components become damaged or worn, the entire shaft should be replaced as an assembly, or rebuilt by a properly equipped shop.

Connecting Rod Bend/Twist

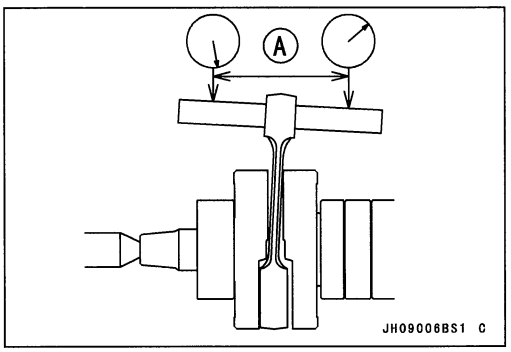
o Set the crankshaft in an alignment jig or in V blocks on a surface plate.

o Select an arbor of the same diameter as the connecting rod small end and at least 100 mm long, and insert the arbor through the connecting rod small end.

o 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 length to determine the amount of connect rod bend.

★If connecting rod bend exceeds the service limit, the connecting rod or crankshaft must be replaced.

[A] 100 mm (3.937 in.)



Connecting Rod Bend

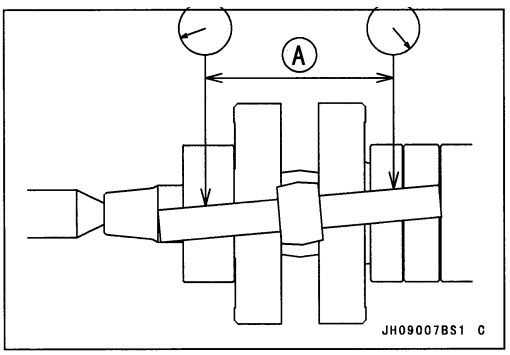
Standard:	**Under 0.05/100 mm (0.002/3.937 in.)**
Service Limit:	**0.2/100 mm (0.008/3.937 in.)**

• Measure connecting rod twist.

o With the crankshaft still in the alignment jig, hold the connecting rod horizontally and measure the amount that the arbor varies from being parallel with the crankshaft over a 100 length of the arbor to determine the amount of connecting rod twist.

★If connecting rod twist exceeds the service limit, the connecting rod or crankshaft must be replaced.

[A] 100 mm (3.937 in.)

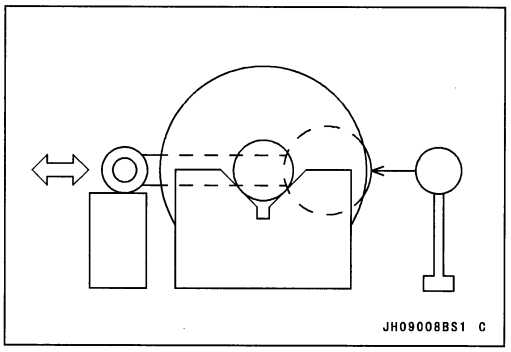


Connecting Rod Twist

Standard:	**Under 0.15/100 mm (0.006/3.937 in.)**
Service Limit:	**0.2/100 mm (0.008/3.937 in.)**

Crankshaft Maintenance

Connecting Rod Big End Radial Clearance



- Check big end radial clearance.

o Set the crankshaft in an alignment jig or on V blocks, and place a dial gauge against the connecting rod big end.

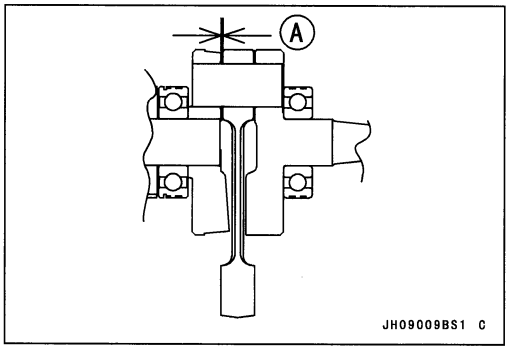
o Push the connecting rod first towards the gauge and then in the opposite directions. The difference between the two gauge readings is the radial clearance.

★If the radial clearance exceeds the service limit, the crankshaft assembly must be replaced or disassembled and the crankpin, needle bearing, and connecting rod big end examined for wear.

Connecting Rod Big End Radial Clearance

Standard:	**0.038 ~ 0.049 mm (0.0015 ~ 0.0193 in.)**
Service Limit:	**0.10 mm (0.0039 in.)**

Connecting Rod Big End Side Clearance



- Measure big end side clearance [A].

o Insert feeler gauges between the big end and either crank half to determine clearance.

★If the measured value exceeds the service limit, the crankshaft should be either replaced or rebuilt.

Connecting Rod Big End Side Clearance

Standard:	**0.45 ~ 0.55 mm (0.018 ~ 0.022 in.)**
Service Limit:	**0.8 mm (0.0315 in.)**

Crankshaft Main Bearing Wear

- Wash the bearings in high flash-point solvent, blow them dry (DO NOT SPIN THEM), and lubricate them with engine oil.

⚠ WARNING

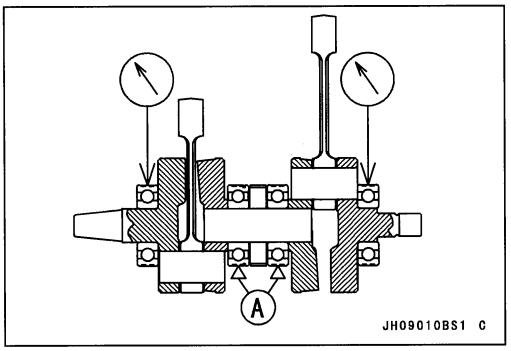
Solvent is toxic and flammable. Avoid prolonged contact with skin and keep away from open flame. Use only in a well-ventilated area. Eye protection should be worn when compressed air is used to dry parts. Do not direct air towards anyone. Use 172 kPa (1.75 kgf/cm², 25 psi) maximum nozzle pressure.

- Turn each bearing over by hand and see that it makes no noise, turns smoothly, and has no rough spots.

★If any of the bearings are defective, replace them.

Crankshaft Maintenance

Crankshaft Runout



● Check crankshaft alignment by measuring runout.

○ With the crankshaft on V blocks [A], rotate the crankshaft slowly and measure runout at each of the locations shown.

★ If the runout at any point exceeds the service limit, the crankshaft must be either replaced or rebuilt.

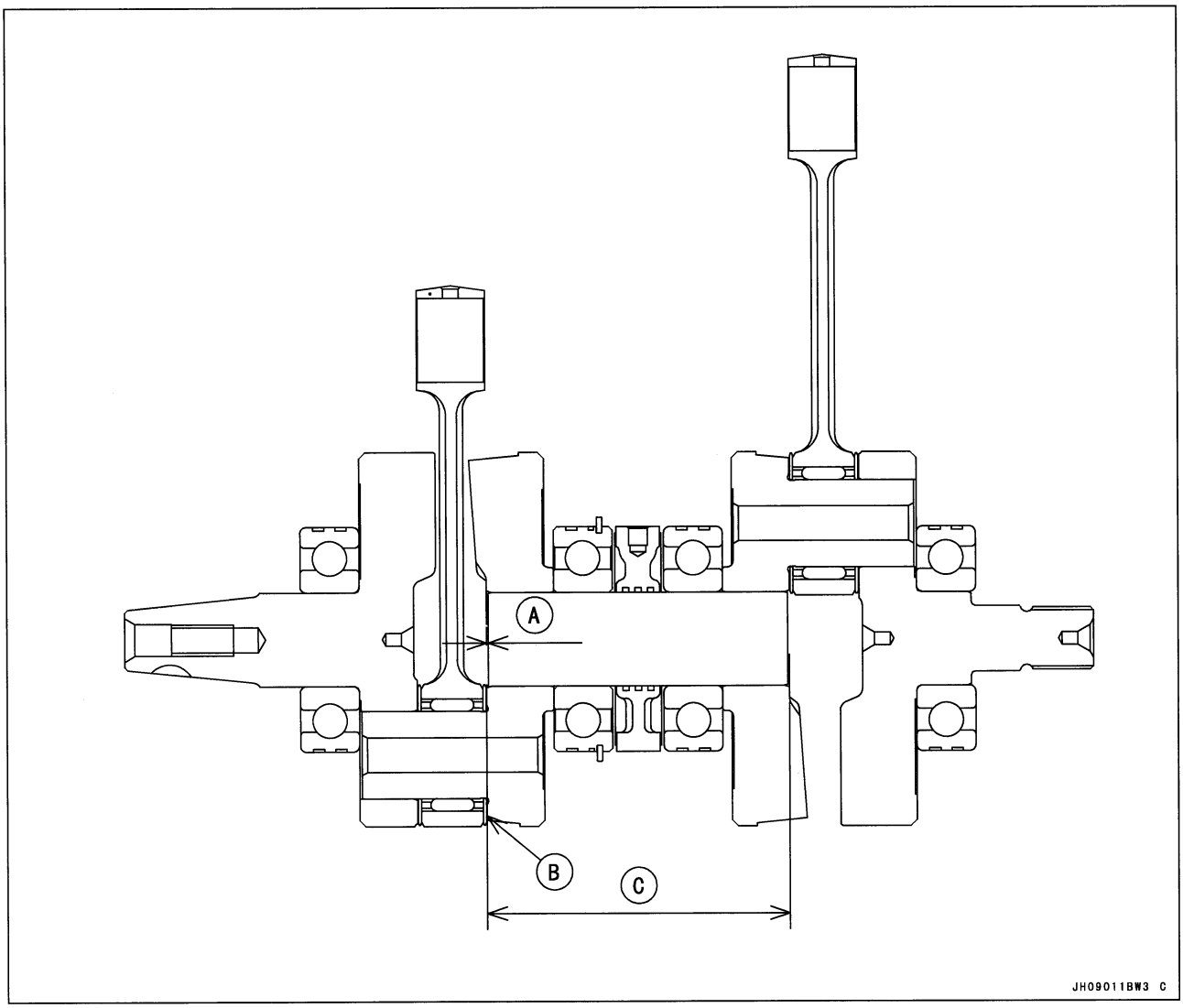
Crankshaft Runout (Either Location)

Standard:	**Under 0.04 mm (0.0016 in.) TIR**
Service Limit:	**0.10 mm (0.0039 in.) TIR**

Crankshaft Assembly Specifications

If the crankshaft is disassembled, use these specifications during rebuilding.

[A] 0.5 mm (0.02 in.)
[B] 0.45 ~ 0.55 mm (0.018 ~ 0.022 in.)
[C] 97.5 mm (3.84 in.)



Cooling and Bilge Systems

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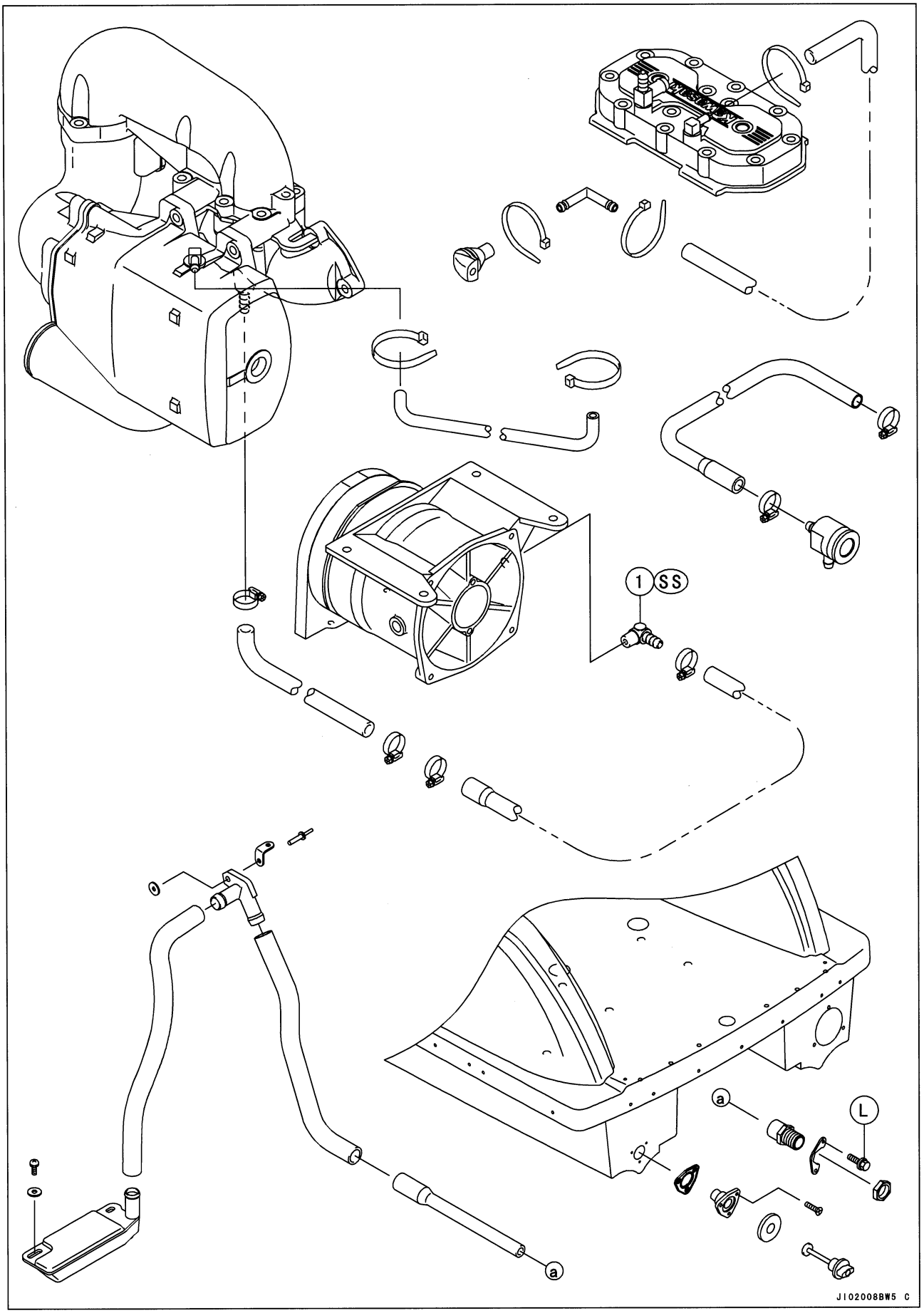


Exploded View

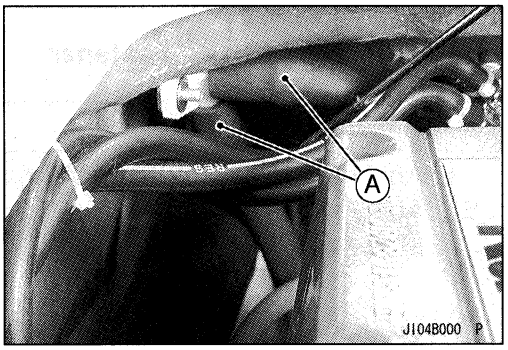
No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fittings	9.8	1.0	87 in·lb	SS

L: Apply a non-permanent locking agent.
SS: Apply silicone sealant.

Bilge System

Breather Removal

- Remove the engine hood (see Hull/Engine Hood chapter).
- Pull the hoses [A] off the breather.

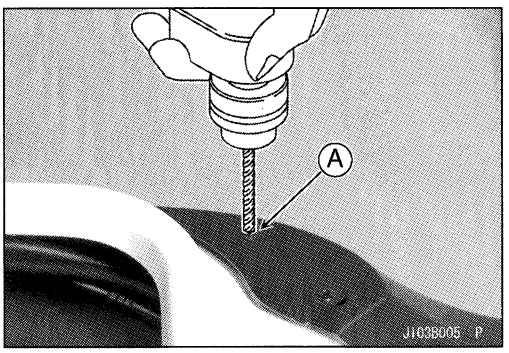


- Drill out the pop rivet with a drill bit of the correct size.

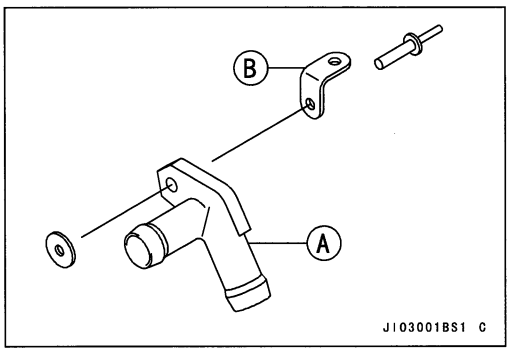
Pop Rivet Removal Drill Bit Size
5.0 mm (0.2 in.)

NOTE

- *Stop drilling when the rivet head [A] starts to turn with drill bit.*
- *Tap the rivet out of the hull with a suitable punch and hammer.*

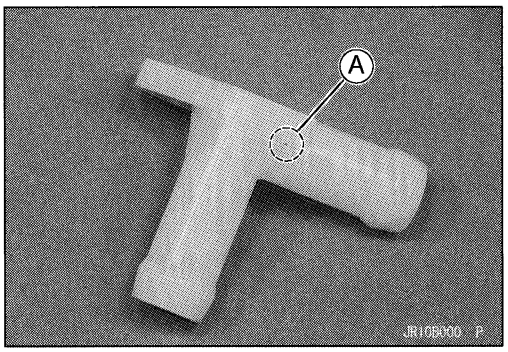


- Remove the breather with bracket [B].
- Separate the breather [A] from the bracket.



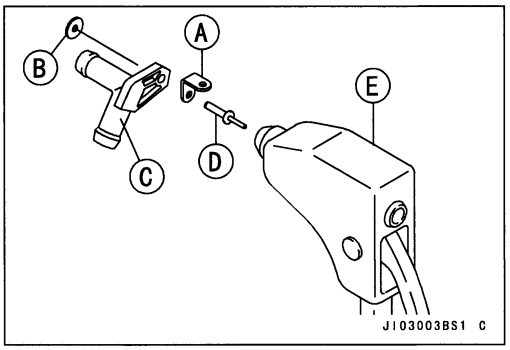
Breather Installation

- Be sure the small hole [A] in the breather is open before installing it.

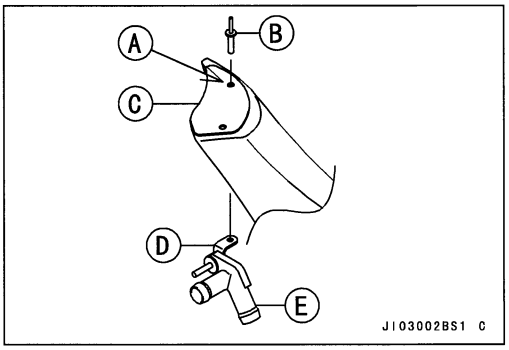


Bilge System

- Align the holes on the bracket [A], and the washer [B] with the mounting hole on the breather [C].
- Secure the bracket and the washer to the breather with a pop rivet [D].
  Reveter [E]



- Apply silicone sealant to the hole [A] for pop rivet.
- Use the long pop rivet [B] securing the plate [C] with the bracket [D] of the bilge breather [E].



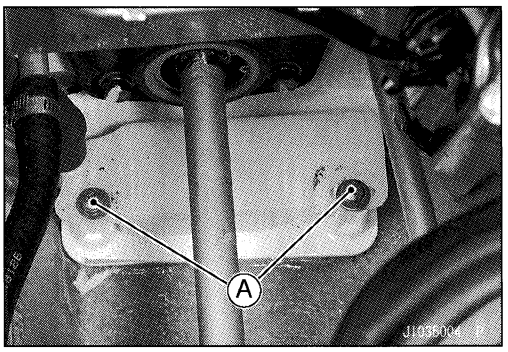
Breather Cleaning and Inspection

- Check that the small hole in the top of the breather is open by blowing in one end of the breather and plugging the other.

★If the hole is plugged, clean it with compressed air. Do not open it with a pointed object (like a needle or a piece of wire), because the hole may be enlarged. If the hole is too large, the bilge system may not suck water out of the hull as well as it should.

Bilge Filter Removal

- Remove the electric case (see the Electrical System).
- Remove the mounting screws [A] and take out the filter.



Bilge Filter Cleaning and Inspection

- Wash the filter thoroughly with fresh water and shake it dry.

○ Use a brush to remove any contaminants trapped in the filter.

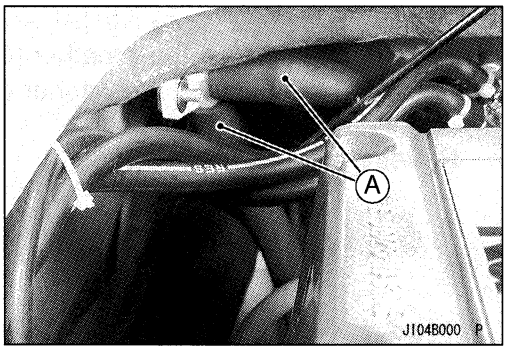
- Water must flow freely through the filter, but large debris must not.

★If the filter cannot be cleaned, or if it is broken and allows debris to pass through, replace it.

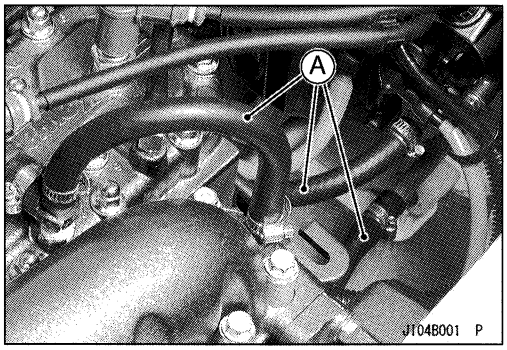
Cooling and Bilge System Hoses

Hose Removal

- None of the bilge system hoses [A] has a clamp. To remove this hose, remove the filter (see Filter Removal). The bilge system hoses without clamps may be simply pulled off their fittings.



- All the cooling system hoses [A] are clamped at both ends. Loosen the clamps and pull the hoses off.



Hose Installation

- To install the bilge filter hose, push the hose over the end of the filter.
- When installing the cooling system hoses, be sure to use the same kind of clamp as the original. Some of the clamps are metal for tighter clamping ability (required when smooth fitting are used). Plastic clamps are used where tight clamping is not required.

Hose Inspection

- Refer to All Hoses, Hose Clamps, Nuts, Bolts, and Fasteners Check in the Periodic Maintenance chapter.

Cooling and Bilge System Flushing

Cooling System Flushing

- Refer to Cooling System Flushing in the Periodic Maintenance chapter.

Bilge System Flushing

- Refer to Bilge System Flushing in the Periodic Maintenance chapter.

Drive System

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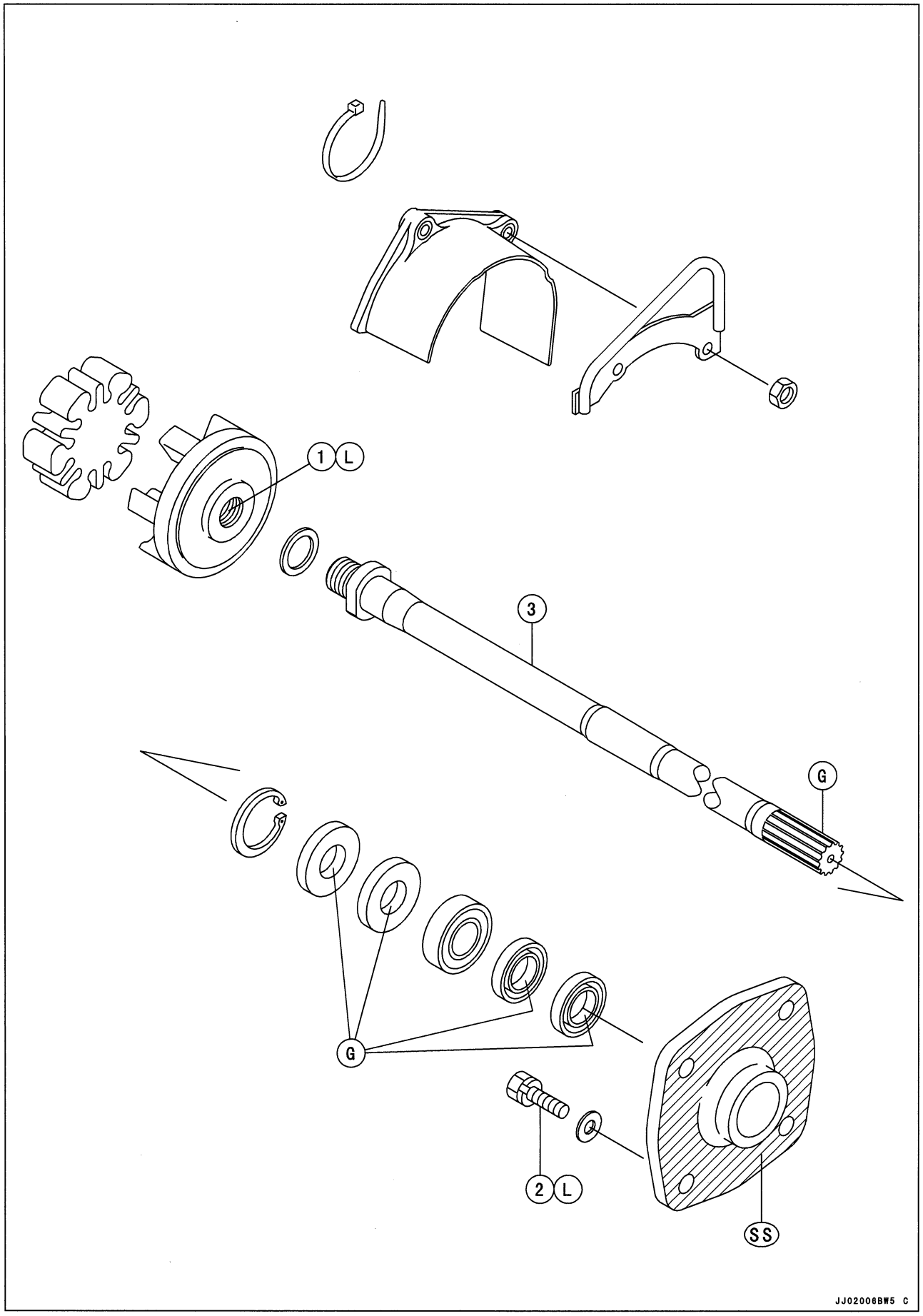


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Coupling	39	40	29	L
2	Drive shaft holder mounting bolts	22	2.2	16	L

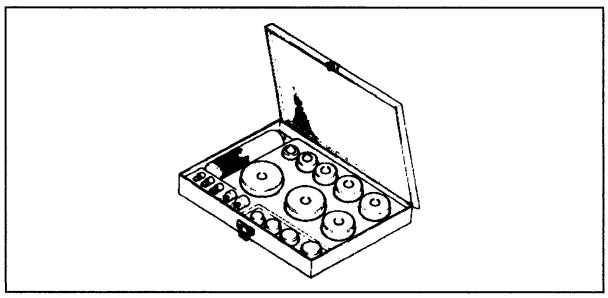
3. Drive shaft
G: Apply grease.
L: Apply a non-permanent locking agent.
SS: Apply silicone sealant.

Specifications

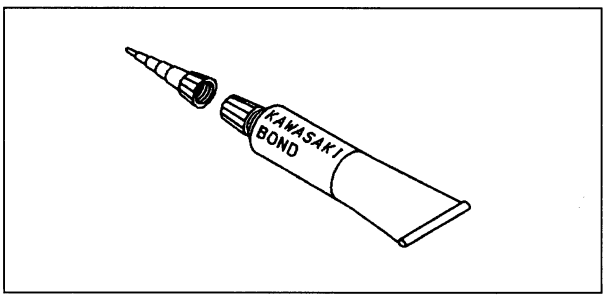
Item	Standard	Service Limit
Drive Shaft:		
Runout (Refer to page 8.)	[A] less than 0.1 mm (0.004 in.)	0.2 mm (0.008 in.)
	[B] less than 0.2 mm (0.008 in.)	0.6 mm (0.024 in.)

Special Tools

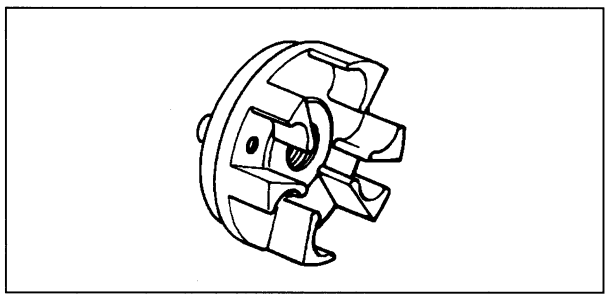
Bearing Driver Set:
57001-1129



Kawasaki Bond (Silicone Sealant):
56019-120



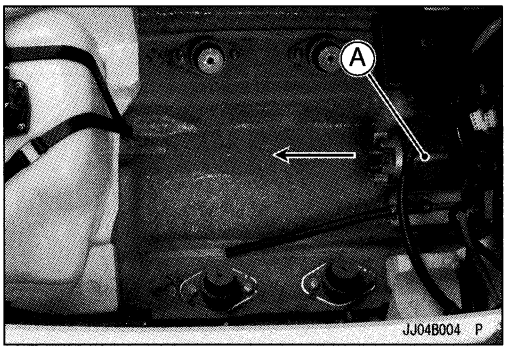
Coupling Holder:
57001-1423



Drive Shaft/Drive Shaft Holder

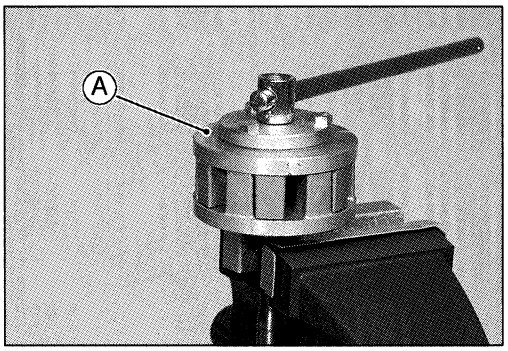
Drive Shaft Removal/Installation

- Remove the engine (see Engine Removal/Installation chapter).
- Pull the drive shaft [A] out of the hull.



- Hold the drive shaft in a vice, and unscrew the coupling.

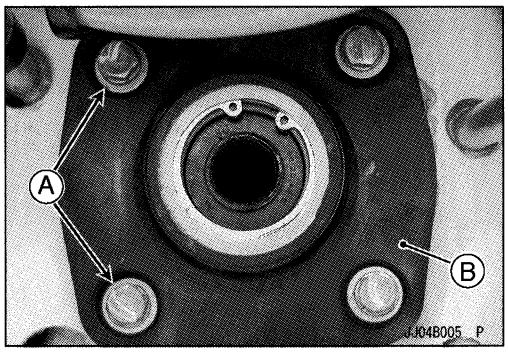
Special Tool - Coupling Holder : 57001-1423 [A]



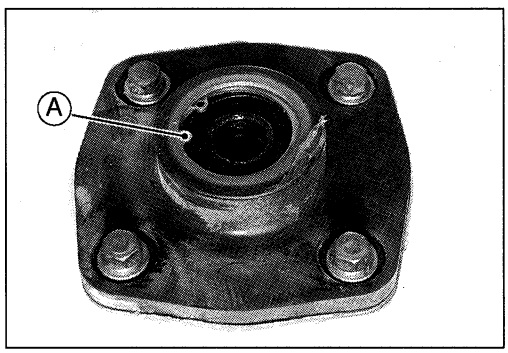
- When installing the drive shaft, be careful of the following items.
  - Apply a non-permanent locking agent to the coupling threads and tighten it.
  - Apply grease to the grease seal lips and the drive shaft spline.

Drive Shaft Holder Removal/Disassembly

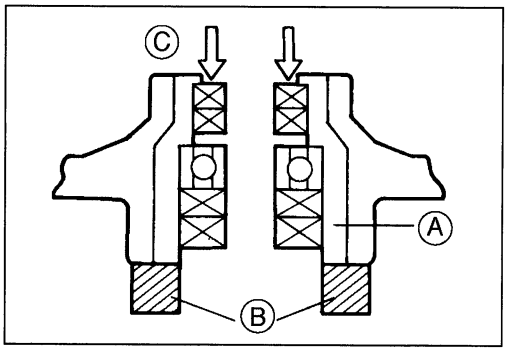
- Remove the drive shaft.
- Unscrew the mounting bolts [A] and remove the drive shaft holder [B] from the bulkhead.



- Disassemble the drive shaft holder.
  - Remove the circlip [A].



Drive Shaft/Drive Shaft Holder



o Press the small grease seal, and the large grease seals, bearing, and small grease seals come out of the holder.
[A] Sleeve
[B] Blocks
[C] Press

Special Tool - Bearing Driver Set: 57001-1129

Drive Shaft Holder Assembly/Installation

- Replace the grease seals with new ones.
- Press the bearing and grease seals into the drive shaft holder, noting the following.

o Install the parts in this order.
Two Small Grease Seals [A]
One Bearing [B]
Two Large Grease Seals [C]
Bow [D]

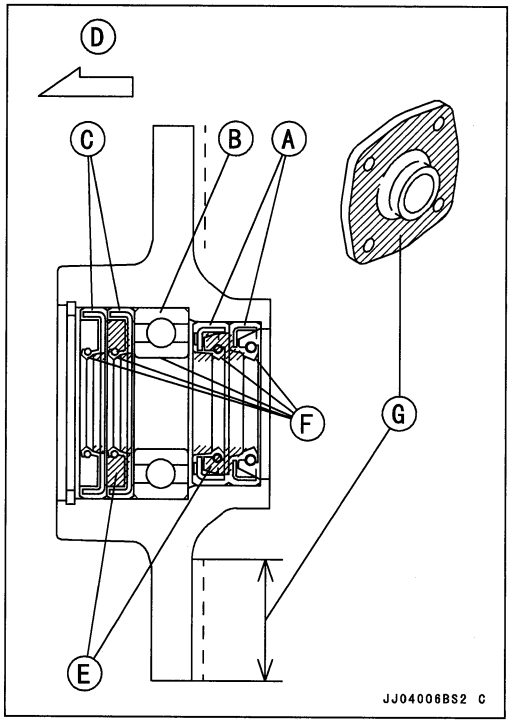
Special Tool - Bearing Driver Set: 57001-1129

o Install the seals so that the sides with the spring face outward.
o Fill the gaps between the seals with grease [E].

- Install the circlip.
- Grease [F] the bearing inner surface and grease seal lips.
- Apply [G] silicone sealant to the back of the flange as shown.

Sealant - Kawasaki Bond (Silicone Sealant): 56019-120

o Tighten the drive shaft holder mounting bolts within 15 mm minutes after application of the silicone sealanat.



- Install the drive shaft holder on the bulkhead so that the circlip side face toward the front.
- Apply a non-permanent locking agent to the drive shaft holder mounting bolts, tighten them loosely.
- Install the drive shaft.
- After installing the engine, tighten the drive shaft holder mounting bolts to the specified torque to give proper coupling alignment.

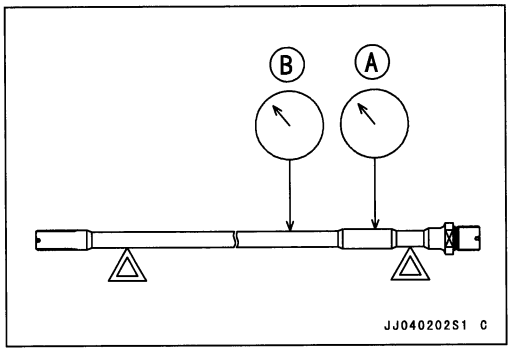
Torque - Drive Shaft Holder Mounting Bolts: 22 N·m (2.2 kgf·m, 16.0 ft·lb)

Drive Shaft/Drive Shaft Holder

Drive Shaft Runout

- Measure drive shaft runout by supporting the shaft on V blocks and setting a dial gauge against the shaft at each point shown.
- Turn the drive shaft slowly. The difference between the highest and lowest dial gauge reading is the runout.

★If any measurement exceeds the service limit, replace the shaft.



Drive Shaft Runout

Standard:	**Less than 0.1 mm (0.004 in.) [A]**
	Less than 0.2 mm (0.008 in.) [B]
Service Limit:	**0.2 mm (0.008 in.) [A]**
	0.6 mm (0.024 in.) [B]

Pump and Impeller

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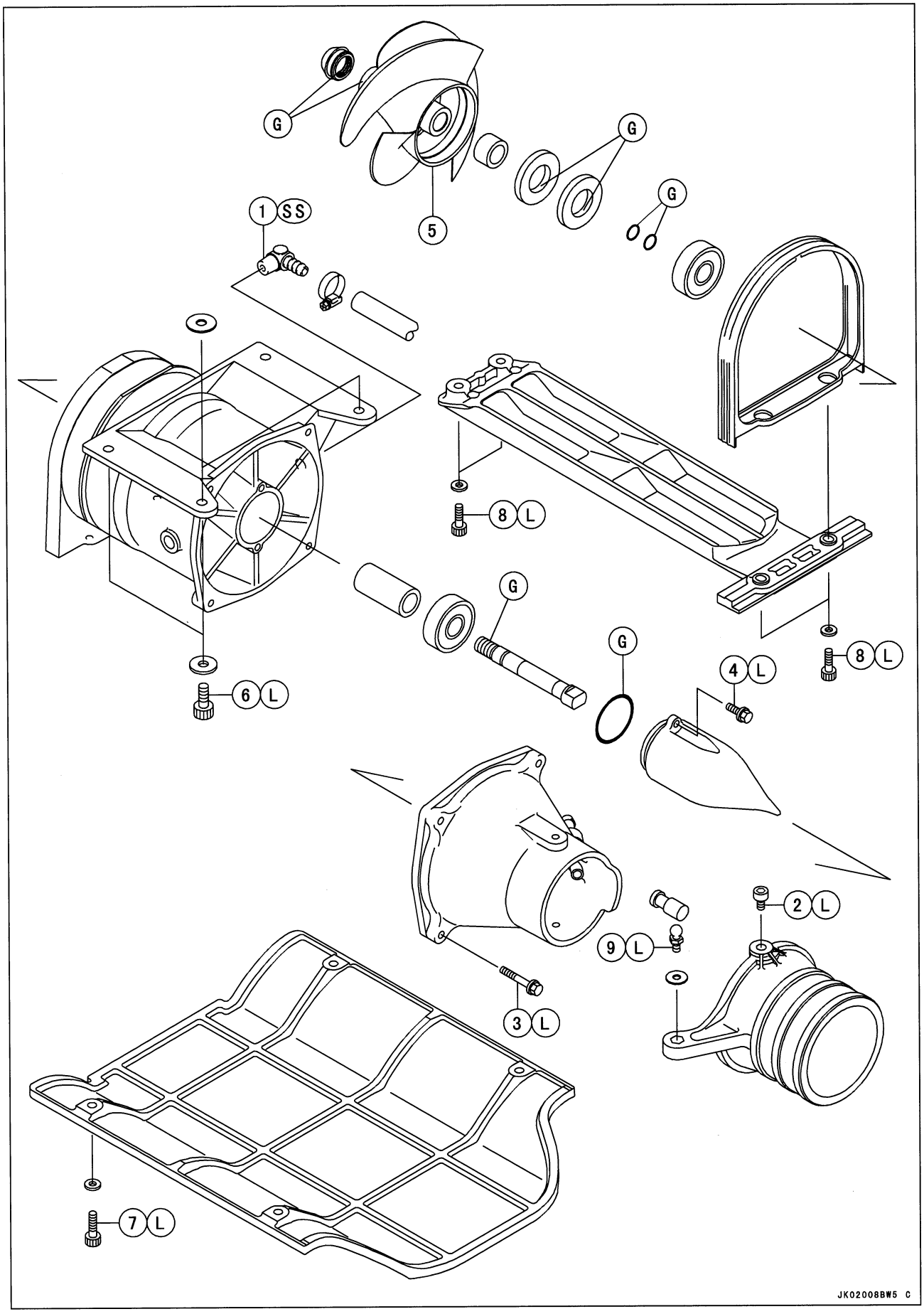
Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water pipe joint	9.8	1.0	87 in·lb	SS
2	Steering nozzle pivot bolts	8.8	0.9	78 in·lb	L
3	Pump outlet mounting bolts	–	–	–	L
4	Pump cap bolts	–	–	–	L
5	Impeller	98	10.0	72	
6	Pump mounting bolts	22	2.2	16	L
7	Pump cover mounting bolts	6.9	0.7	61 in·lb	L
8	Grate mounting bolts	7.8	0.8	69 in·lb	L
9	Steering cable ball joint	–	–	–	L

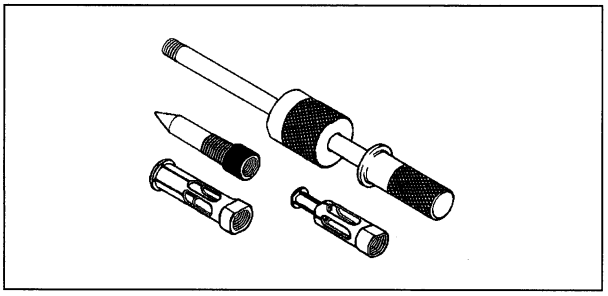
G: Apply grease.
L: Apply a non-permanent locking agent.
SS: Apply silicone sealant.

Specifications

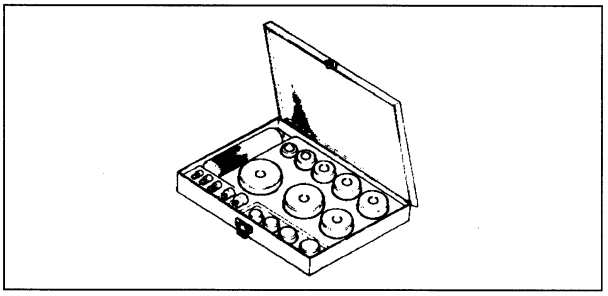
Item	Standard	Service Limit
Jet Pump:		
Impeller outside diameter	139.5 ~ 139.7 mm (5.492 ~ 5.500 in.)	138.5 mm (5.453 in.)
Pump case inside diameter	140.0 ~ 140.1 (5.512 ~ 5.516 in.)	141.1 mm (5.555 in.)
Impeller clearance	0.15 ~ 0.3 mm (0.0059 ~ 0.012 in.)	0.6 mm (0.024 in.)

Special Tools

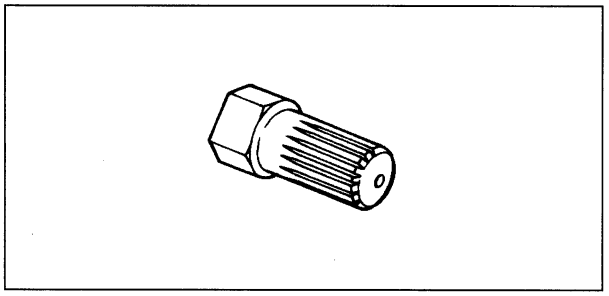
Oil Seal & Bearing Remover:
57001-1058



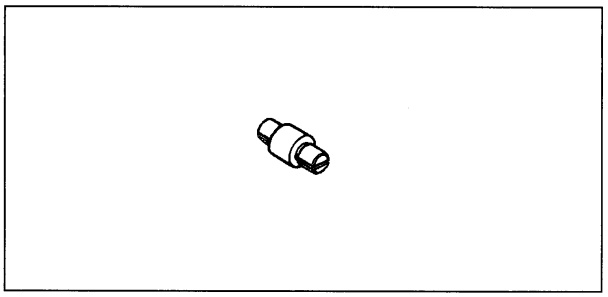
Bearing Driver Set:
57001-1129



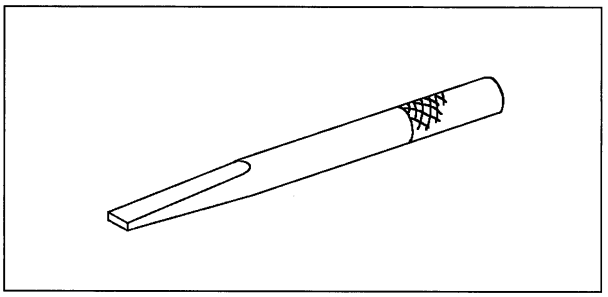
Impeller Wrench:
57001-1228



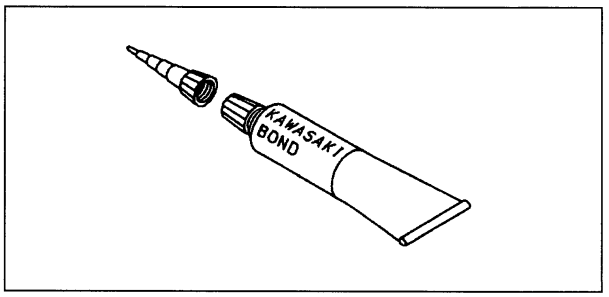
Bearing Remover Head, ϕ15 × ϕ17:
57001-1267



Bearing Remover Shaft, ϕ13:
57001-1377



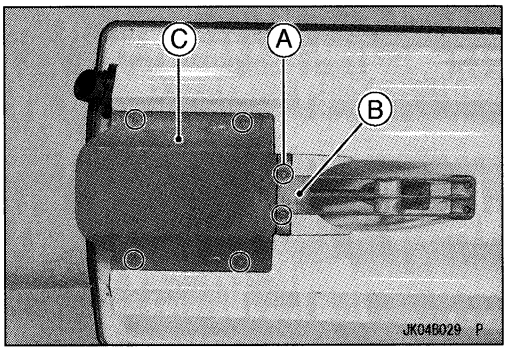
Kawasaki Bond (Silicone Sealant):
56019-120



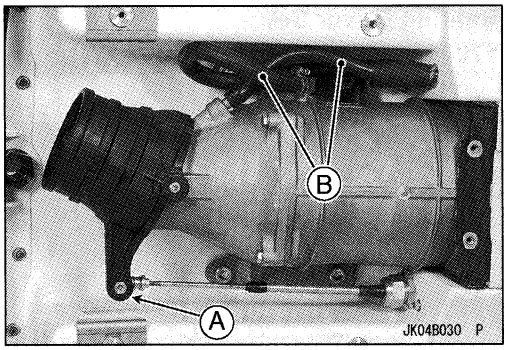
Pump and Impeller

Pump Removal

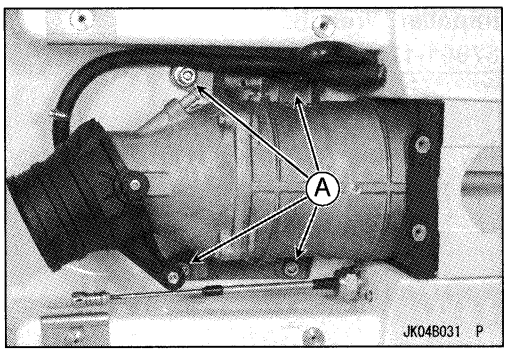
- Turn the craft on its left side.
- Unscrew the mounting bolts [A], and remove the grate [B] and the pump cover [C].



- Slip the steering cable connector [A] off the ball.
- Loosen the clamp, and pull off the hoses [B].

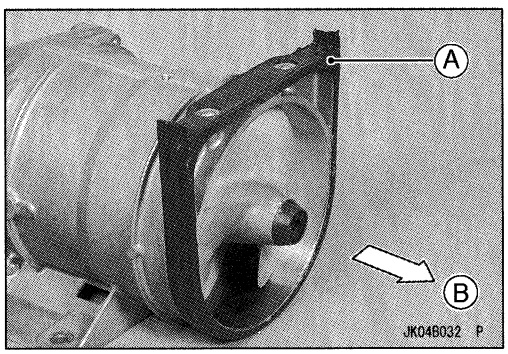


- Unscrew the pump mounting bolts [A].
- Slide the pump to the rear to disengage the drive shaft, and remove it from the hull.



Pump Installation

- Grease the splines on the drive shaft with water resistant grease, and be sure the O-ring is in place inside the pump shaft.
- Be sure the trim seal [A] is in place.
  Bow [B]

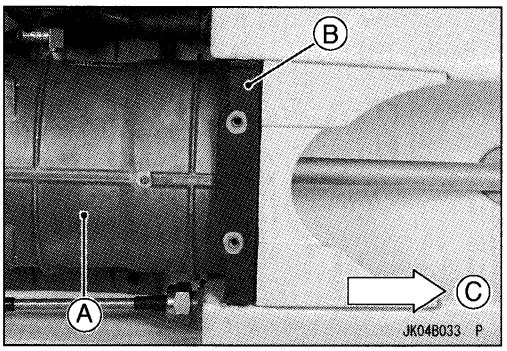


Pump and Impeller

- When installing the pump case [A], be careful that the trim seal [B] is stayed in place.
  Bow [C]
- If necessary, apply water or oil to the surface of the trim seal.

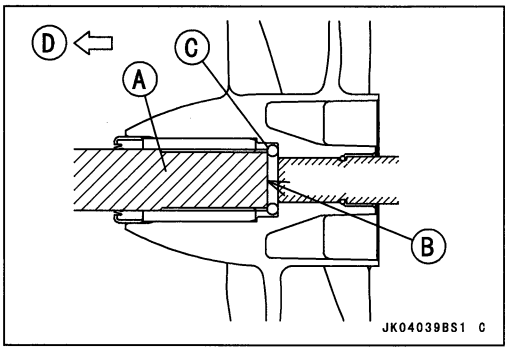
NOTE

- *No need to apply silicone sealant between the pump (trim seal) and the hull.*



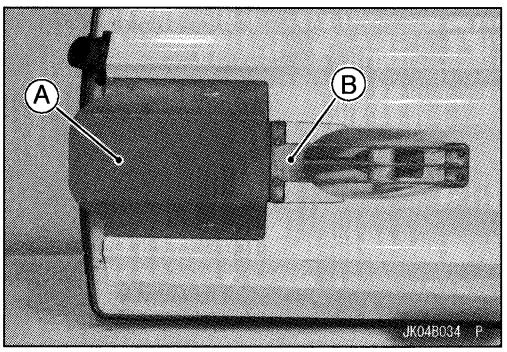
- When installing the drive shaft [A], fit the drive shaft into the spline of the impeller such that no clearances [B] exist between the shaft end and the O-ring [C].
  Bow [D]
- Apply a non-permanent locking agent to the pump mounting bolts and torque them.

  Torque - Pump Mounting Bolts: 22 N·m (2.2 kgf·m, 16 ft·lb)
- Connect the hose and steering cable.



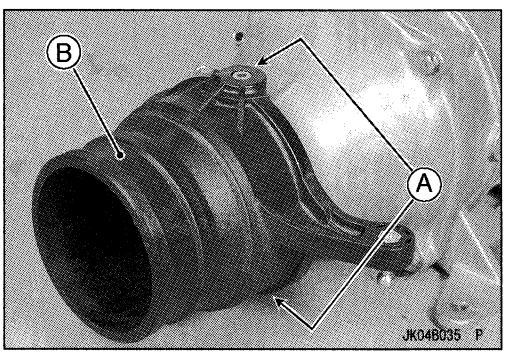
- Install the pump cover [A] and the pump grate [B].
- Apply a non-permanent locking agent to the following bolts and torque them.

  Torque - Pump Cover Mounting Bolts: 6.9 N·m (0.7 kgf·m, 61 in·lb)
  Grate Mounting Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)



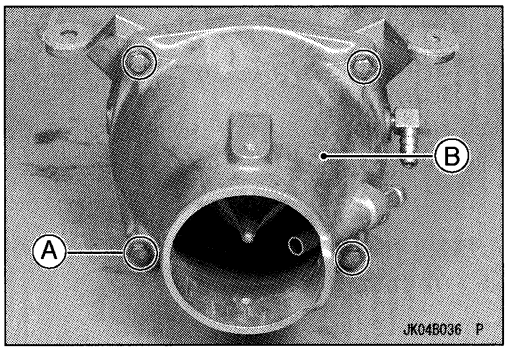
Pump Disassembly

- Unscrew the mounting bolts [A], and remove the steering nozzle [B].

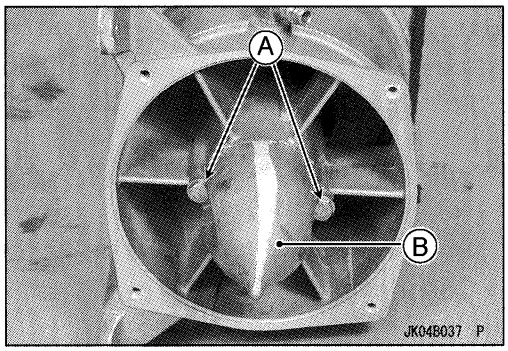


Pump and Impeller

- Unscrew the mounting bolts [A], and remove the pump outlet [B].

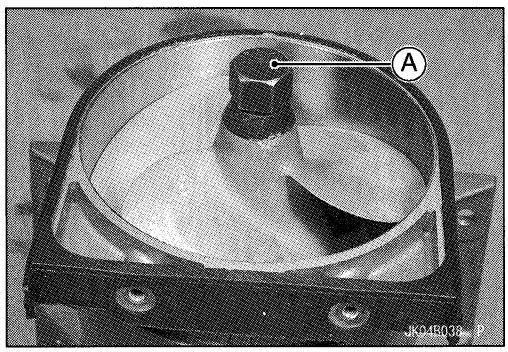


- Unscrew the cap bolts [A], and remove the pump cap [B].

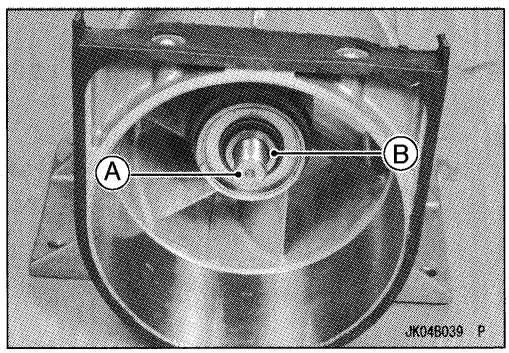


- Hold the shaft in a vise, taking care not to damage it.
- Remove the impeller from the pump shaft.

  Special Tool - Impeller Wrench: 57001-1228 [A]



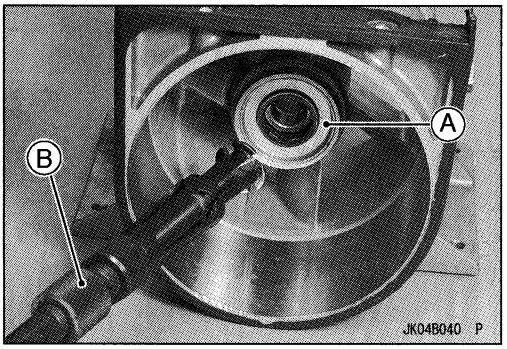
- Pull out the pump shaft [A], and then the bushing [B].



Pump and Impeller

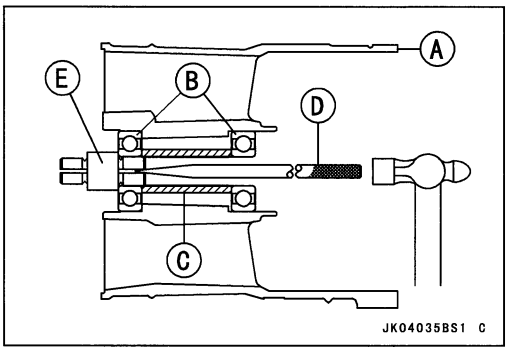
- Remove the grease seals [A].

Special Tool - Oil Seal & Bearing Remover: 57001-1058 [B]



- Use the bearing remover (special tools) to remove the pump bearings.
  Pump Case [A]
  Pump Bearings [B]
  Collar [C]

Special Tools - Bearing Remover Shaft, ϕ13: 57001-1377 [D]
Bearing Remover Head, ϕ15 × ϕ17: 57001 -1267 [E]



Pump Assembly

- Before installing the pump bearings, blow any dirt or foreign particles out of the pump case with compressed air.

NOTE

○ *Install the pump bearings so that the marked side faces out.*

- Install the new bearings in the order listed by pushing the outer race with the bearing drivers [A].
  Rear Pump Bearing (until it bottoms out) [B]
  Collar [C]
  Front Pump Bearing (impeller side) [D]

○ When installing the front pump bearing, support both inner and outer races of the rear pump bearing with a bearing driver.

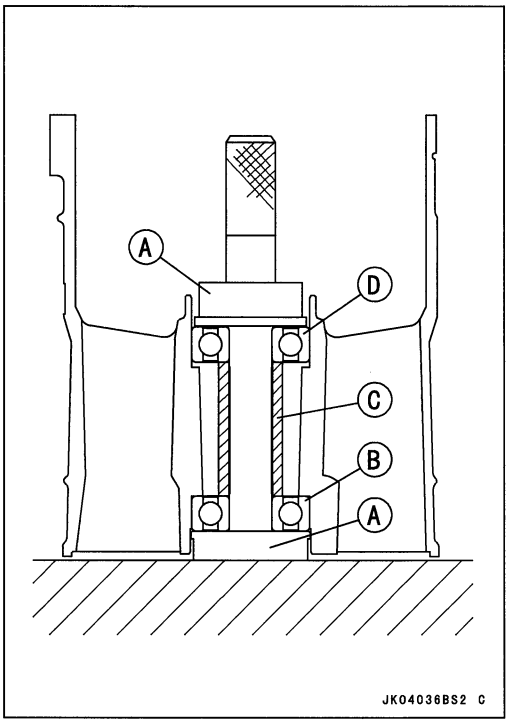
Special Tool - Bearing Driver Set: 57001-1129

- Install the grease seals, using the same special tool used for bearing installation.

○ Press each seal into the pump case so that the side with the spring faces outward. Fill the gap of the seal with grease.

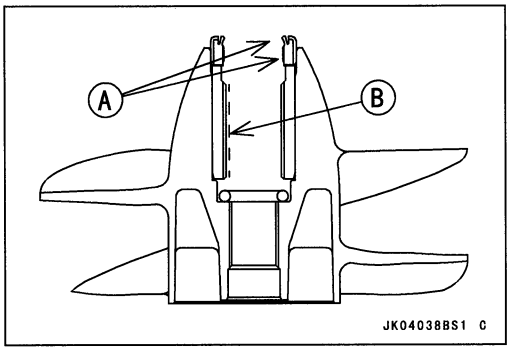
- Push the bushing onto the pump shaft.
- Grease the pump shaft O-rings, and the pump shaft and insert the shaft from the rear of the pump case.
- Screw the impeller on the pump shaft.

Torque - Impeller: 98 N·m (10.0 kgf·m, 72 ft·lb)



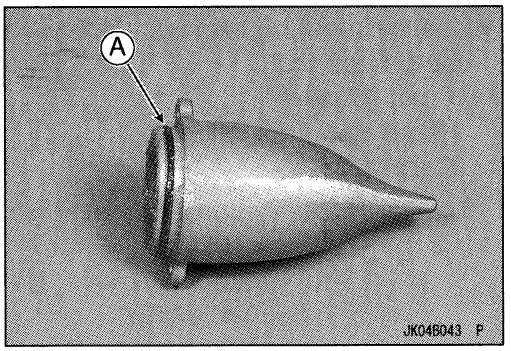
Pump and Impeller

- Grease:
  Lips [A] of Impeller Grease Seal
  Bore [B] of Impeller



- Install the new O-ring [A] in place on the pump cap.
- Install:
  Pump Cap
  Pump Outlet
  Steering Nozzle
- Apply a non-permanent locking agent to the thread of the following.
  Pump Cap Bolts
  Pump Outlet Mounting Bolts
  Steering Nozzle Pivot Bolts

Torque - Steering Nozzle Pivot Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



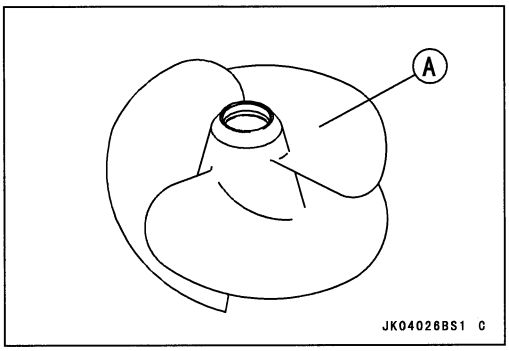
Pump and Impeller Inspection

- Examine the impeller [A].

★If there is pitting, deep scratches, nicks or other damage, replace the impeller.

NOTE

○ *Minor nicks and gouges in the impeller blades can be removed with abrasive paper or careful filing. Smooth leading edges are especially important to avoid cavitation.*



○ Measure the impeller outside diameter.

★If the impeller is worn smaller than the service limit, replace it.

Impeller Outside Diameter

Standard:	**139.5 ~ 139.7 mm (5.492 ~ 5.500 in.)**
Service Limit:	**138.5 mm (5.453 in.)**

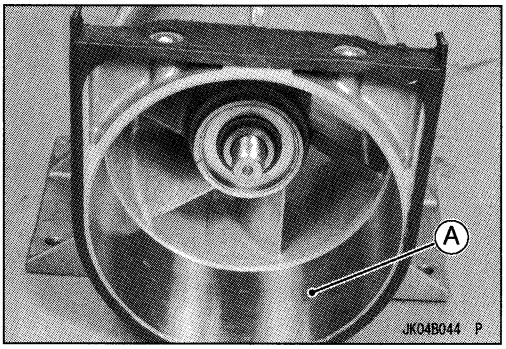
Pump and Impeller

- Examine the pump case [A].

★If there are deep scratches inside the pump case, replace it.

○Measure the inside diameter of the pump case.

★If the pump case is worn beyond the service limit, replace it.

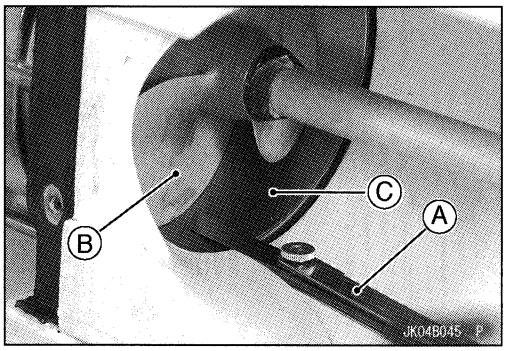


Pump Case Inside Diameter

Standard:	**140.0 ~ 140.1 mm (5.512 ~ 5.516 in.)**
Service Limit:	**141.1 mm (5.555 in.)**

Impeller Clearance

- Impeller clearance is critical to proper performance. If the pump case and impeller are not visibly damaged, poor performance may be caused by too much impeller clearance.
- To check impeller clearance, remove the grate and insert a feeler gauge [A] between the tip of the impeller blade [B] and the pump case [C].



Impeller Clearance

Standard:	**0.15 ~ 0.3 mm (0.0059 ~ 0.012 in.)**
Service Limit:	**0.6 mm (0.024 in.)**

★If impeller clearance is incorrect, determine if it is due to wear or damage (see Pump and Impeller Inspection).

Handle Pole and Handlebar

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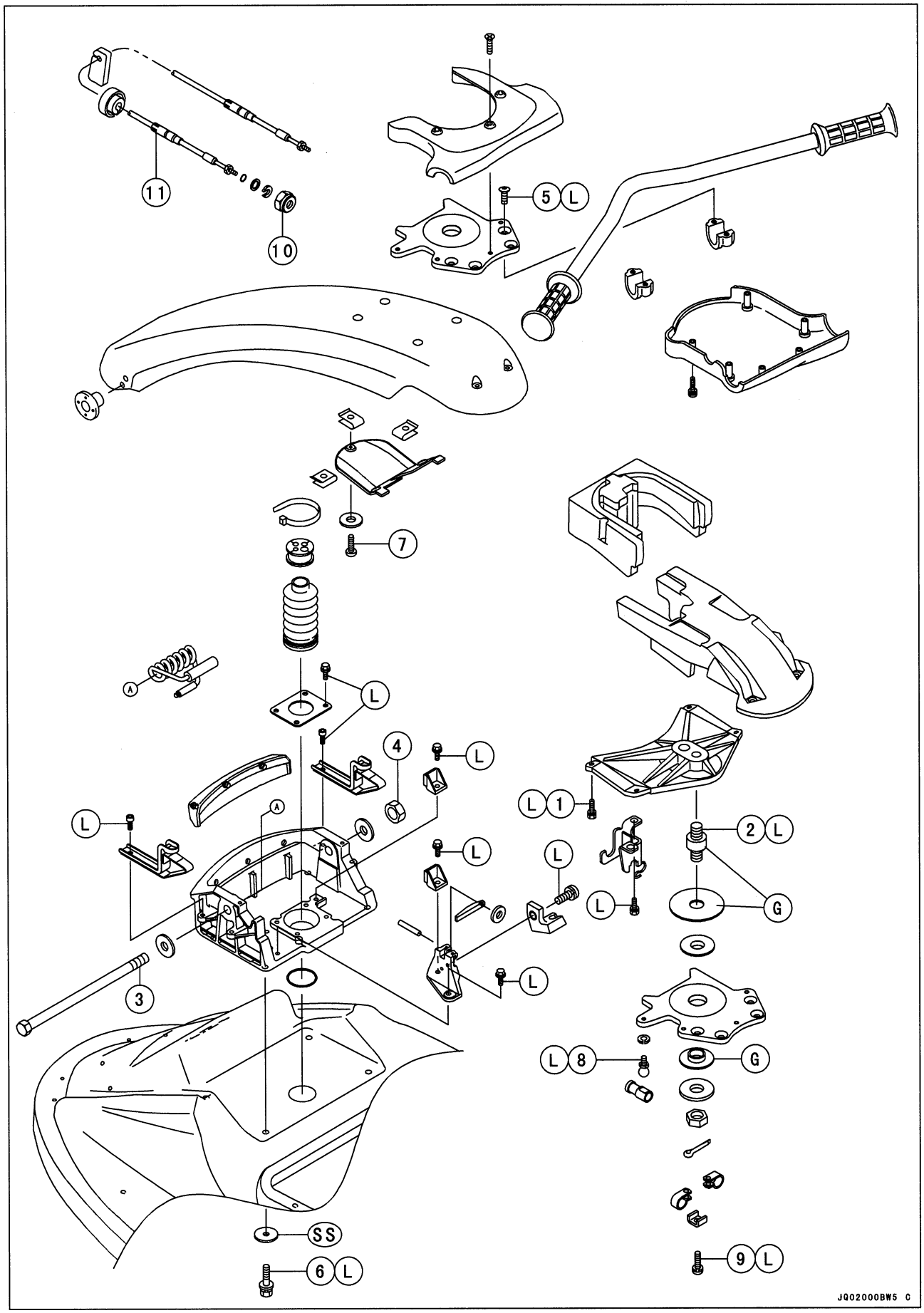
11-2 HANDLE POLE AND HANDLEBAR

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Steering support bracket mounting bolts	–	–	–	L
2	Steering pivot stud (smaller threads)	38	3.9	28	L
3	Handle pole pivot shaft	13	1.3	9.4	
4	Handle pole pivot shaft nut	33	3.4	25	
5	Handlebar clamp screws	18	1.8	13	L
6	Handle pole bracket bolts	19	1.9	14	L
7	Handle pole cover screws	1.5	0.15	13 in·lb	
8	Handlebar plate pivot bolt	7	0.7	60 in·lb	L
9	Wiring clamp screw	2.9	0.3	26 in·lb	L
10	Steering cable nut	49	5.0	36	

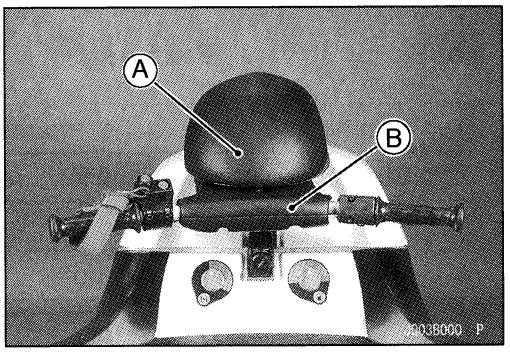
11. Steering cable
G: Apply grease.
L: Apply a non-permanent locking agent.
SS: Apply silicone sealant.

Steering Cable

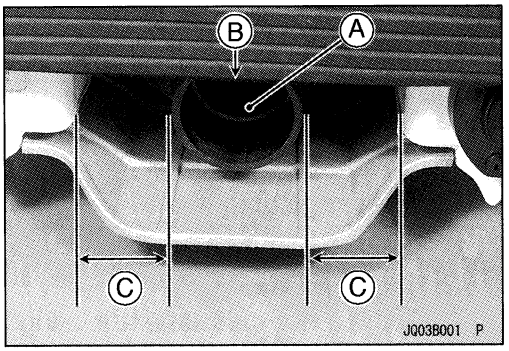
Adjustment

- Check steering cable adjustment.

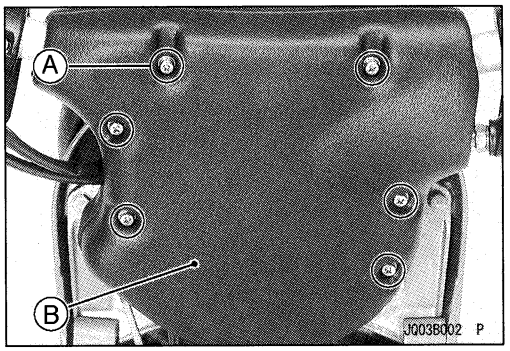
○ Lower the handle pole [A] and center the handlebar [B] in the straight-ahead position.



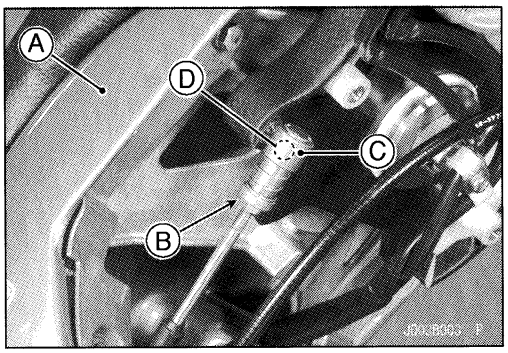
- Check that the steering nozzle [A] is centered [B] in the pump cavity.
  Nearly Same Length [C]



- If necessary, adjust the steering cable.
- Unscrew the mounting screws [A] and remove the handlebar pad [B].

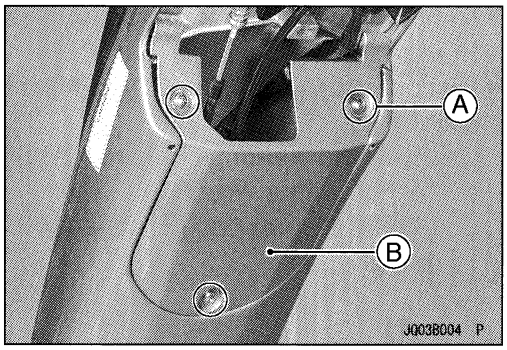


○ Raise the handle pole [A] and loosen the locknut [B] on the steering cable.
○ Disconnect the ball joint by sliding the outer sleeve [C] away from the ball [D] slightly, and lifting the cable from the ball.
○ Turn the ball joint on the cable to adjust the steering.
○ Connect the ball joint and check cable adjustment again.
○ When adjustment is correct, tighten the steering cable locknut.



Steering Cable

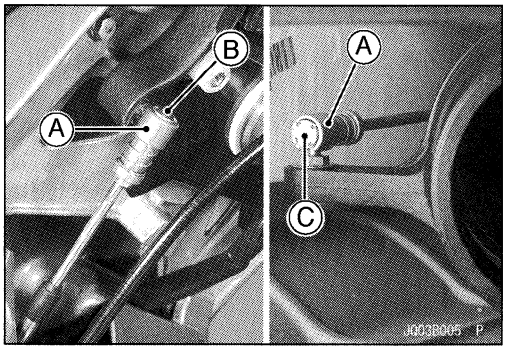
● Remove:
Handlebar Pad
Screws [A] and Handlebar Pole Cover [B]



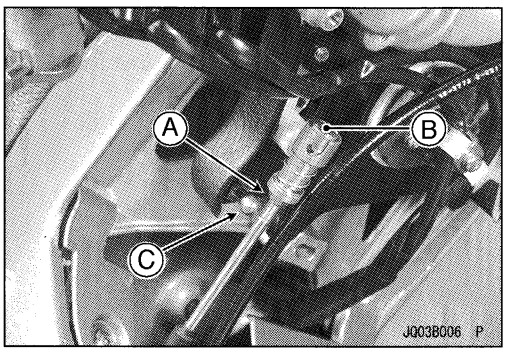
● Disconnect the ball joint at each end of the steering cable.
○ Slide each outer sleeve [A] away from the ball slightly, and lift the cable from the handlebar ball joint [B] and the steering nozzle ball joint [C].

CAUTION

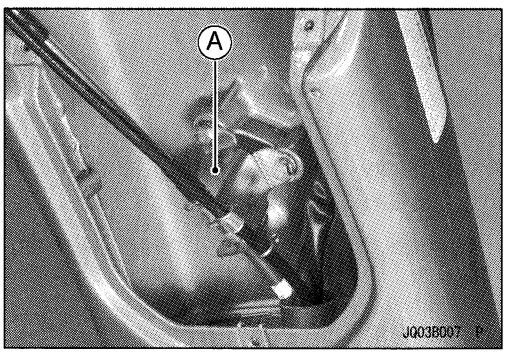
Never lay the watercraft on the right side. Water in the exhaust system may drain back into the engine, causing serious damage.



● Loosen the locknut [A], and then remove the handlebar ball joint [B] from the ball [C] and the locknut from the cable end.

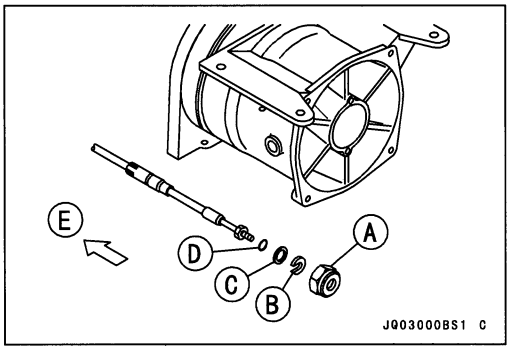


● Disconnect the steering cable from the cable holder on the handle pole.
○ Unbolt the cable holder [A].

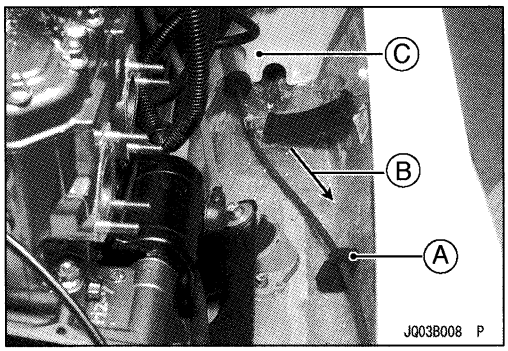


Steering Cable

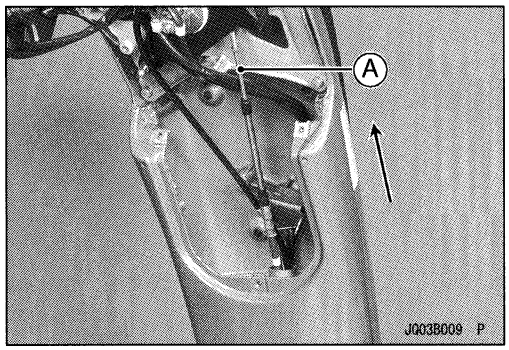
- Remove the pump cover (see Pump Removal in the Pump/Impeller chapter).
- Disconnect the steering cable from the fitting at the rear of the hull.
  - o Unscrew the steering cable nut [A] while holding the fitting in the hull with a wrench.
  - o Slide off the snap ring [B], washer [C], and O-ring [D].
    Bow [E]



- Remove:
  Exhaust Manifold (see Engine Top End chapter)
- Pull the cable from cable detent [A] in the engine compartment.
- Remove the cable by carefully pulling [B] rear section of the cable through the hull [C].



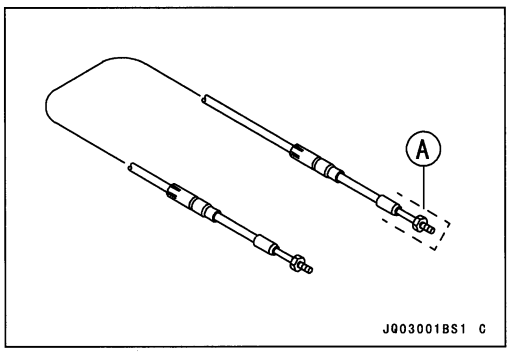
- Lay the handle pole a little rearwards, and remove the cable by carefully pulling the front section of the cable [A] through the handle pole.



Installation

- Install the plastic or rubber hose [A] on the front end of the steering cable to protect the cable when putting into the handle pole.
- Lubricate the outside of the new cable to ease cable installation.

Torque - Handle Pole Cover Screws: 1.5 N·m (0.15 kgf·m, 13 in·lb)



Inspection

- Refer to the Steering section in the Periodic Maintenance chapter.

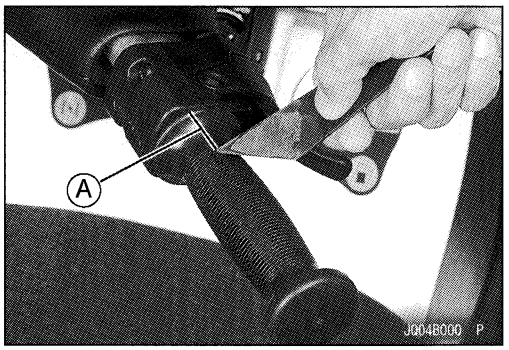
Lubrication

- Refer to the Steering section in the Periodic Maintenance chapter.

Handlebar

Hand Grip Removal/Installation

- The hand grips are bonded to the handlebar. To remove them, cut the grips lengthwise with a sharp knife and peel [A] them off the bar.



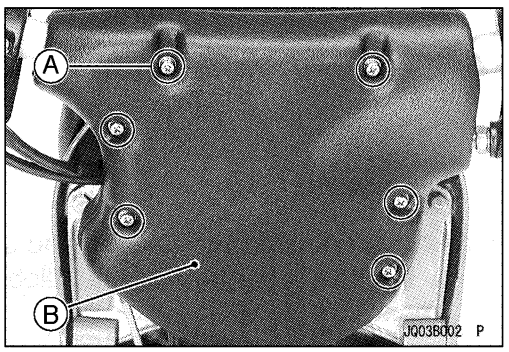
⚠ WARNING

Read all warnings and cautions on any solvents and adhesives used. Many of these products are flammable, may be harmful to the skin and eyes, and may give off harmful vapors. Use these solvents and adhesives only in a well-ventilated area and never near an open flame.

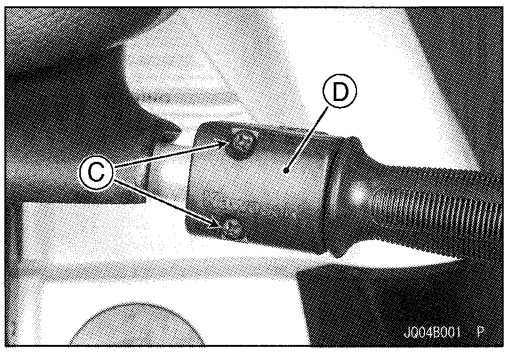
- Apply an adhesive to the inside of grip.
- Slide the grip into position on the handlebar.

Handlebar Removal

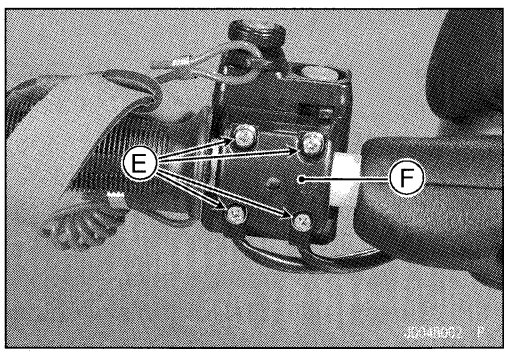
- Remove:
  Handlebar Pad Mounting Screws [A]
  Handlebar Pad [B]



- Remove:
  Throttle Case Screws [C]
  Throttle Cases [D]

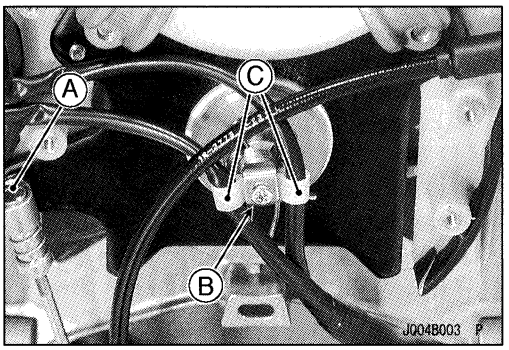


- Remove:
  Switch Case Screws [E]
  Switch Cases [F]

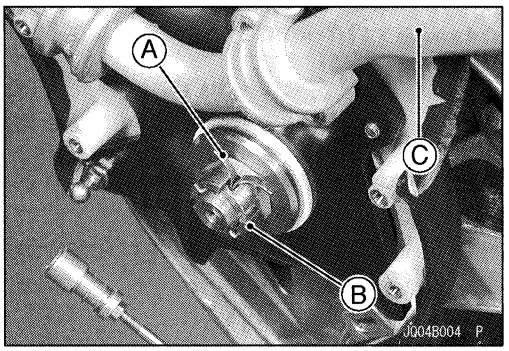


Handlebar

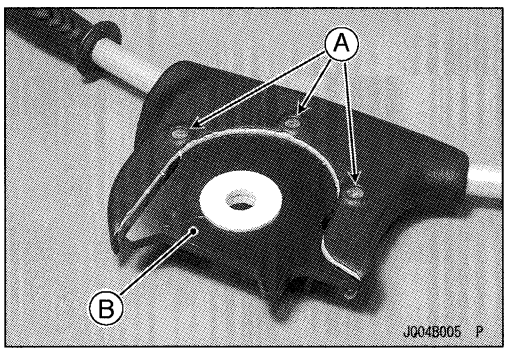
- Remove:
  Steering Cable Ball Joint [A]
  Wiring Clamp Screw [B]
  Wiring Clamps [C]



- Remove the cotter pin [A] and take the steering pivot nut [B] off the steering pivot stud.
- Remove the handlebar [C] with the handlebar plate from the handle pole.



- Remove the pad, and take out the screws [A] and separate the handlebar from the handlebar plate [B].



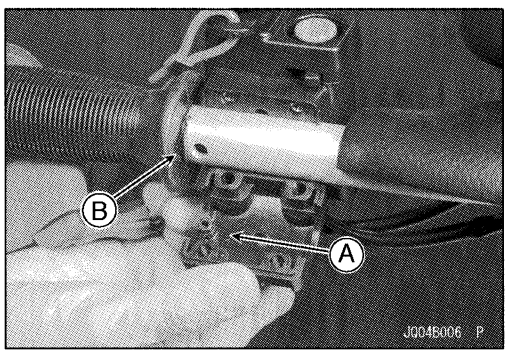
Handlebar Installation

- Apply a non-permanent locking agent to the handlebar clamp screws and torque them.

  Torque - Handlebar Clamp Screws: 18 N·m (1.8 kgf·m, 13 ft·lb)

- Grease the steering pivot thoroughly, and tighten the steering pivot nut to allow the handlebar turn smoothly without play. Use a new cotter pin.
- Apply a non-permanent locking agent to the following and tighten them to the specified torque.
  Wiring Clamp Screw
  Handlebar Clamp Screws
- Fit the projection [A] of the switch case into the hole [B] of the handlebar.

  Torque - Wiring Clamp Screw: 2.9 N·m (0.3 kgf·m, 26 in·lb)
  Throttle Case Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)
  Switch Case Screws: 3.8 N·m (0.39 kgf·m, 34 in·lb)

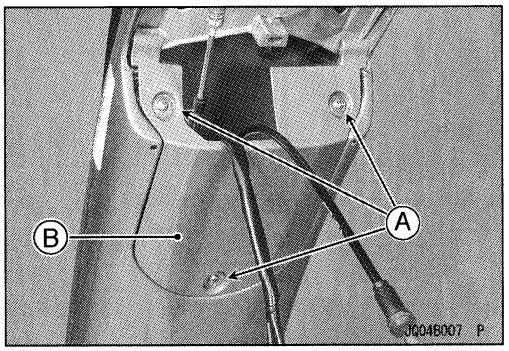


Handlebar

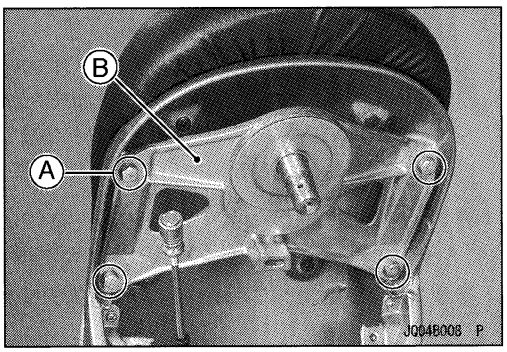
Handlebar Steering Pivot Maintenance

- If the steering pivot feels loose or overtight, the pivot may need lubrication or the bushings may need to be replaced.
- Remove the handlebar (see Handlebar Removal in this section).

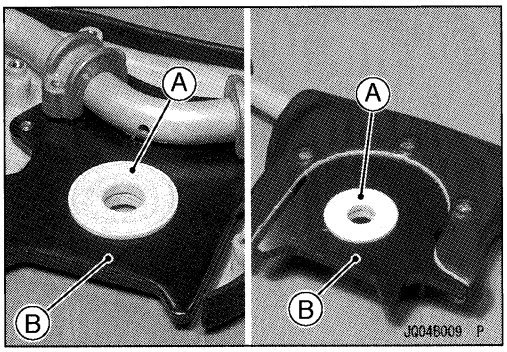
- Take out the screws [A], and remove the handle pole cover [B].



- Take out the mounting bolts [A], and remove the steering support bracket [B].



- Separate the plastic bushings [A] from the handlebar plate [B].



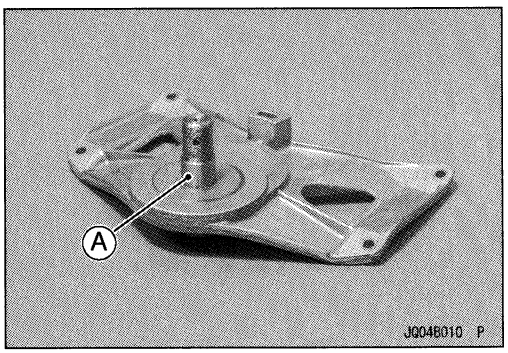
- Clean the steering pivot stud [A] and check the surface for corrosion and wear.

★If the stud is corroded or noticeably worn, replace the stud.

- Remove the stud from the steering support bracket

NOTE

o *The stud is installed with a locking agent. If necessary, heat the stud with a torch to make removal easier.*



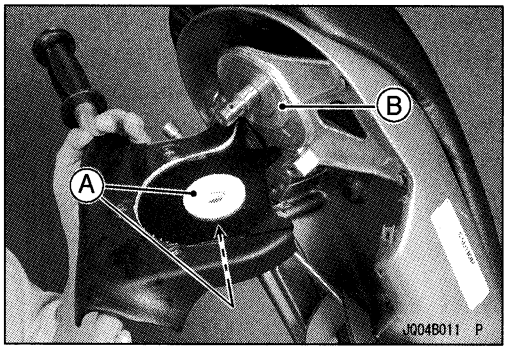
- Clean the threads in the support bracket thoroughly, apply a non-permanent locking agent to the smaller threads of the new stud and tighten it to the specified torque.

Torque - Steering Pivot Stud: 38 N·m (3.9 kgf·m, 28 ft·lb)

Handlebar

- Check the plastic bushings [A] and steel washers [B] for damage and wear.

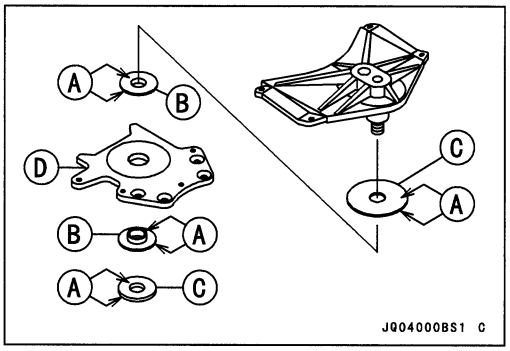
★If the bushings or washers are damaged or worn, replace them.



- When reassembling the steering pivot, be sure to grease [A] the new bushings [B] and washers [C] well.
  Handlebar Plate [D]
- Tighten the steering pivot nut so that the steering action is smooth not loose.

NOTE

o *The steering pivot nut usually needs to be readjusted after the first few hours of use after lubricating the steering bushings. The grease squeezes out of the bushings a little, and the steering feels loose.*



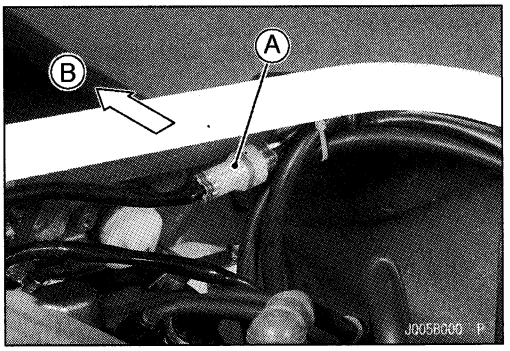
- Apply a non-permanent locking agent to wiring clamp screw and tighten it to the specified torque.

Torque - Wiring Clamp Screw: 2.9 N·m (0.3 kgf·m, 26 in·lb)

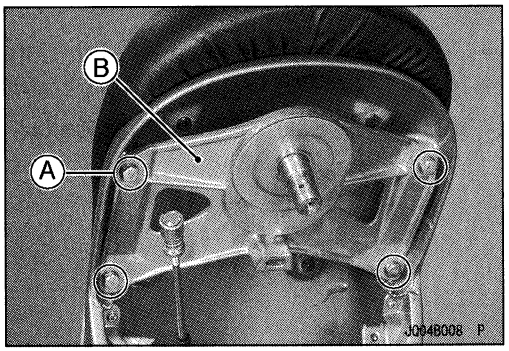
Handle Pole and Bracket

Removal

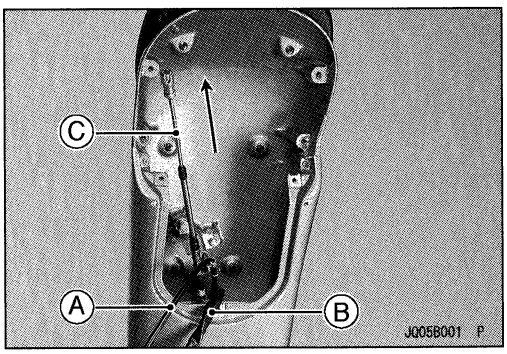
- Remove:
  Engine Hood (see Hull/Engine Hood Removal)
  Handlebar Switch Lead Connector [A] (in rear of engine compartment)
  Handlebar (see Handlebar Removal in this chapter)
  Handle Pole Cover (see Handlebar Steering Pivot Maintenance)
  Stern [B]



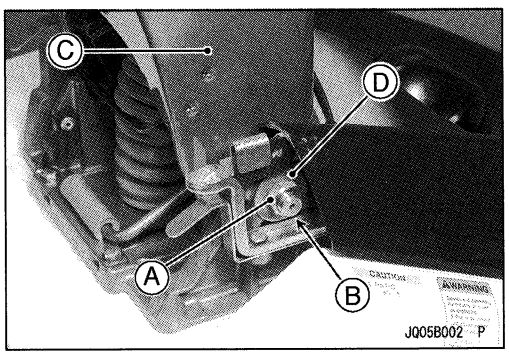
- Take out the mounting bolts [A], and remove the steering support bracket [B].



- Remove the throttle cable lower end from the carburetor assembly.
- Pull out from the steering pole.
  Throttle Cable [A]
  Handlebar Switch Lead [B]
  Steering Cable [C]



- Remove:
  Handle Pole Pivot Shaft Nut [A]
  Handle Pole Pivot Shaft [B]
- Lift the handle pole [C] out of the bracket. Two washers [D] fall out.
- Remove the handle pole spring.



Handle Pole and Bracket

Installation

- Grease the washers with water resistant grease.
- Install the handle pole pivot shaft and tighten to the specified torque before putting on the pivot shaft nut. Be sure the handle pole moves up and down smoothly before continuing. If it does not, decrease the pivot shaft torque slightly.

Torque - Handle Pole Pivot Shaft: 13 N·m (1.3 kgf·m, 9.4 ft·lb)
Handle Pole Pivot Shaft Nut: 33 N·m (3.4 kgf·m, 25 ft·lb)

- Clean the mating surfaces of the bracket and hull.
- Torque the handle pole bracket bolts.

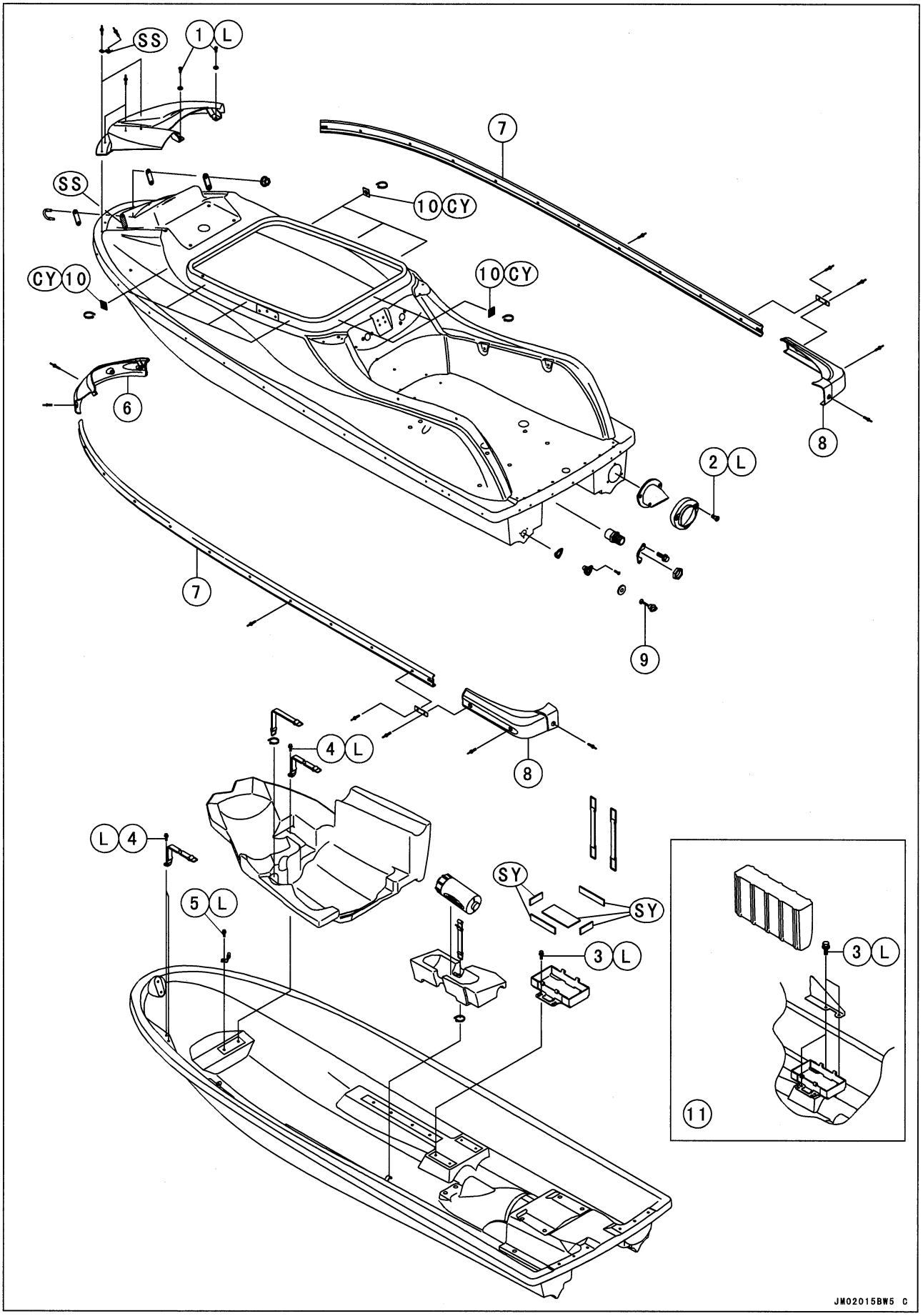
Torque - Handle Pole Bracket Bolts: 19 N·m (1.9 kgf·m, 14 ft·lb)

Hull/Engine Hood

TABLE OF CONTENTS

12-2 HULL/ENGINE HOOD

Exploded View

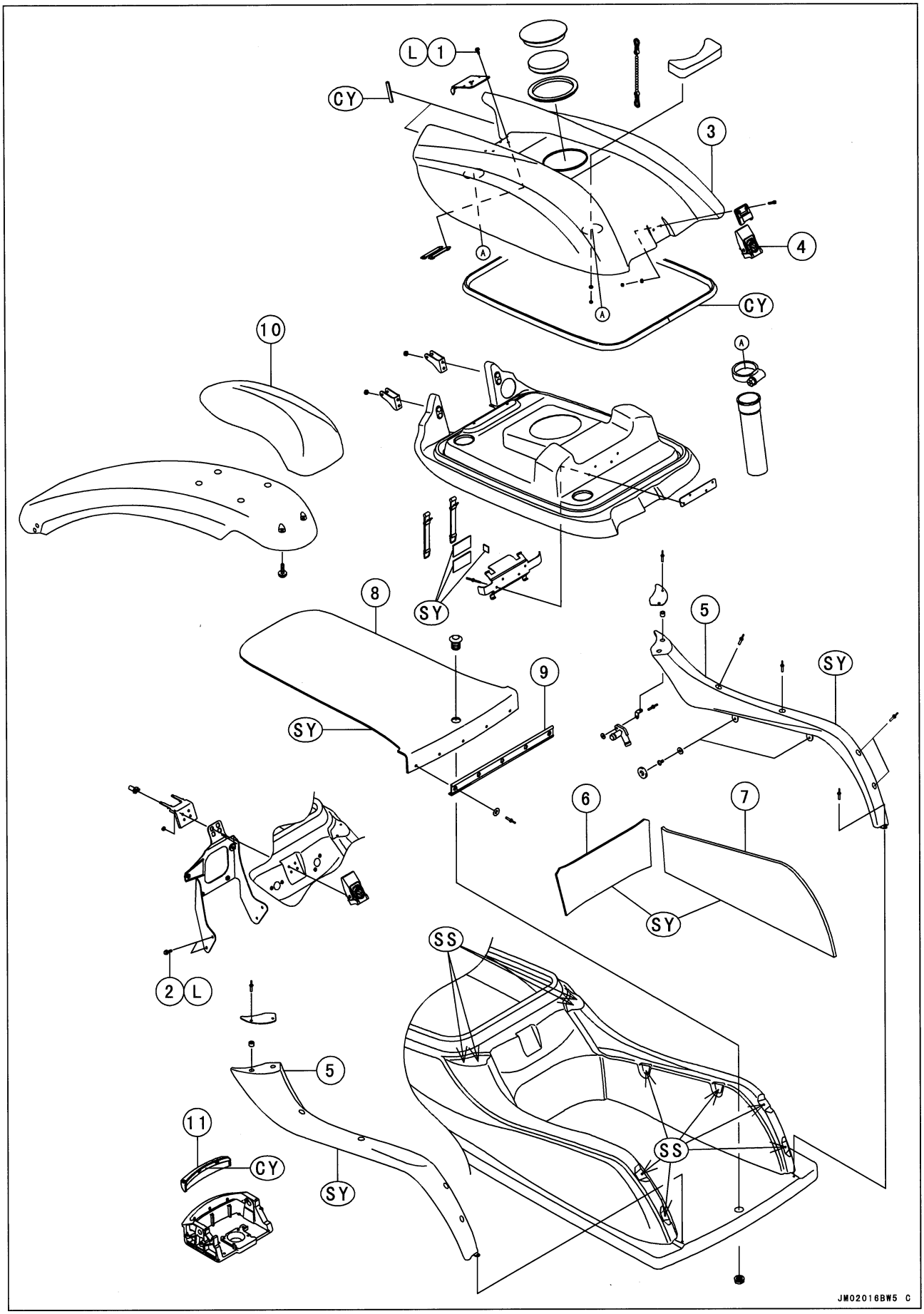


Exploded View

1. Front cover screws
2. Exhaust outlet bolts
3. Battery bracket bolts
4. Strap bolts
5. Strap bracket bolt
6. Front bumper
7. Side bumper
8. Corner bumper
9. Drain plug
10. Holder
11. French model

CY: Apply cyanoacrylate cement.
SS: Apply silicone sealant.
SY: Apply synthetic rubber adhesive.
L: Apply a non-permanent locking agent

Exploded View



Exploded View

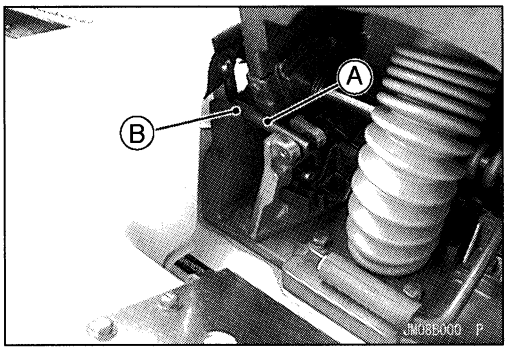
1. Engine hood plate bolts
2. Electric case bracket bolts
3. Engine hood
4. Engine hood latch
5. Deck fin pads
6. Front side mat
7. Side deck mat
8. Deck floor mat
9. Rear bumper
10. Handle pole pad
11. Handle pole bracket damper

CY: Apply cyanoacrylate cement.
L: Apply a non-permanent locking agent.
SS: Apply silicone sealant.
SY: Apply synthetic rubber adhesive.

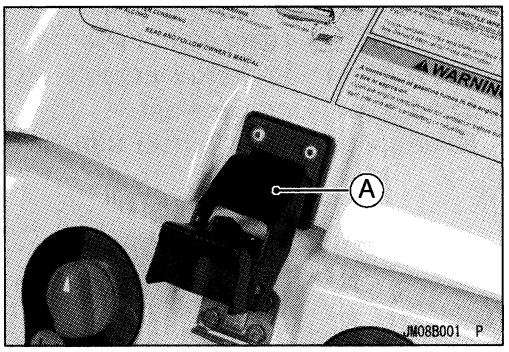
Engine Hood

Engine Hood Removal

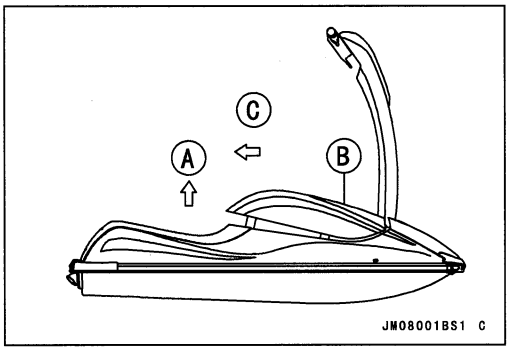
- Raise the handle pole all the way up and while holding it swing up the handle pole stopper pin [A] and hook its end into the rest [B] in the handle pole bracket.

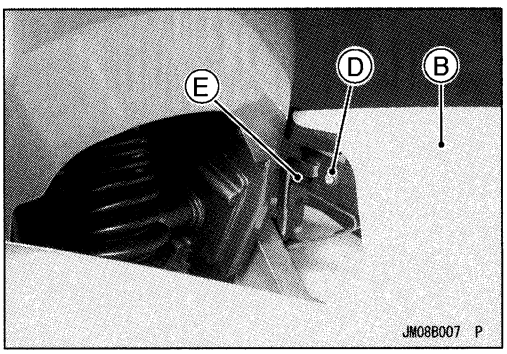


- Turn the latch lock knob clockwise, pull the latch all the way up and unhook its upper portion [A].



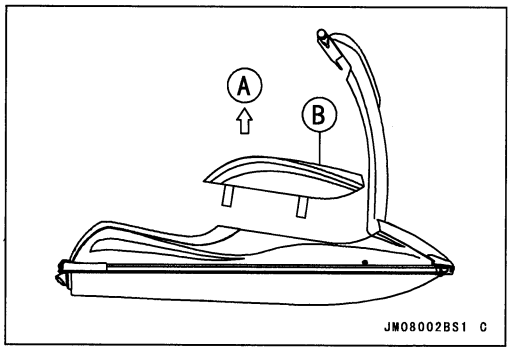
- Pull up [A] the rear portion of engine hood [B] a little and slide [C] it rearward, disengaging the hood hooks [D] from the brackets [E] at the handle pole pivot.





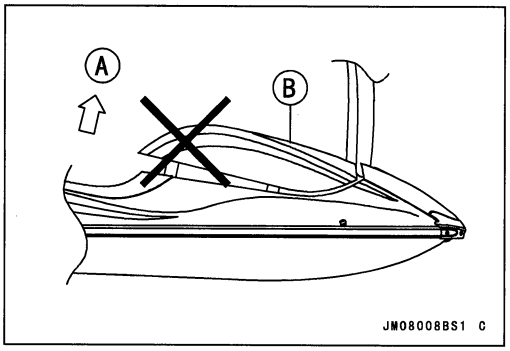
Engine Hood

- Pull up [A] the engine hood [B] and remove it.



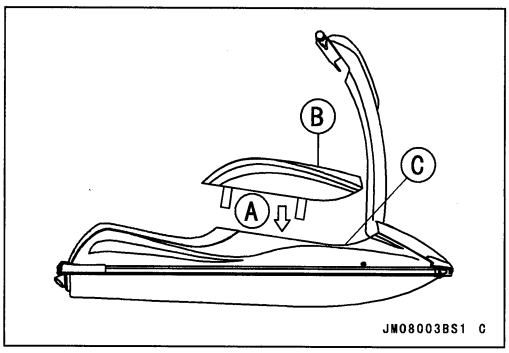
CAUTION

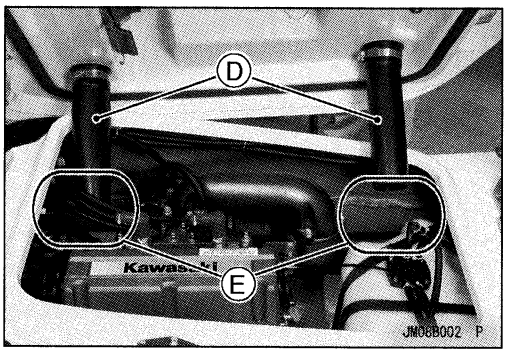
Do not lift up [A] the rear portion of engine hood [B] before disengage the hood hooks from the bracket at the handle pole pivot or engine hood inside will be damaged.



Engine Hood Installation

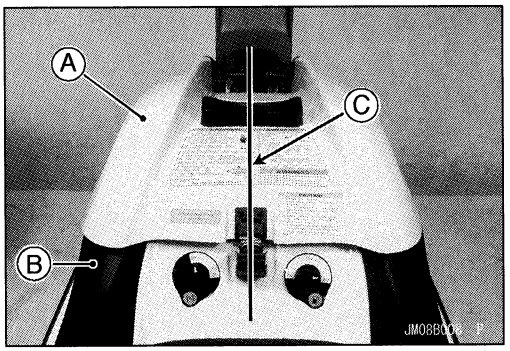
- Put down [A] the engine hood [B] parallel with the engine opening [C], positioning the ducts [D] into the engine room spaces [E].



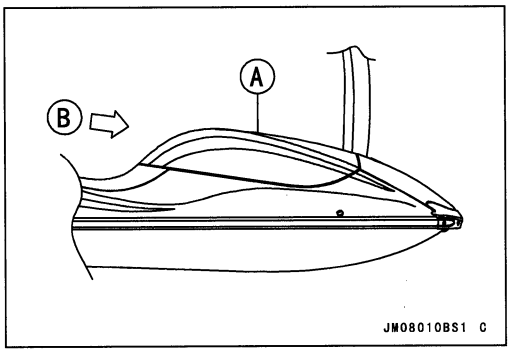


Engine Hood

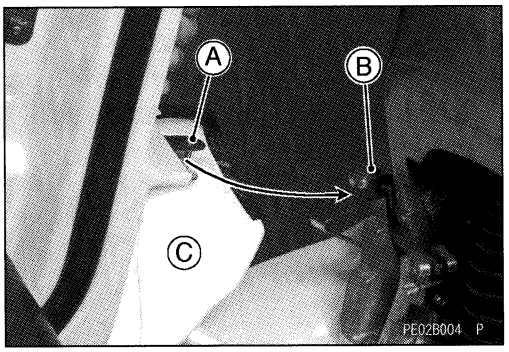
- Put the engine hood [A] on the deck [B] and line up [C] the hood and deck in center.



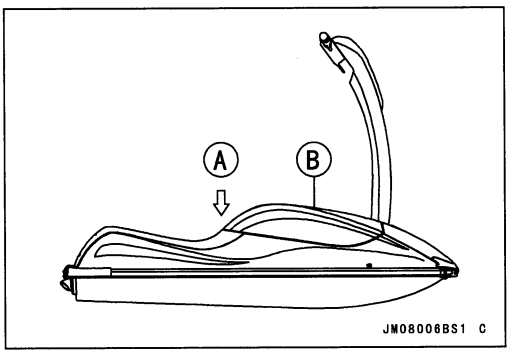
- Push the engine hood [A] forward [B].



- Make sure the hood hooks [A] engage into the brackets [B] at the handle pole pivot.
  Engine Hood [C]



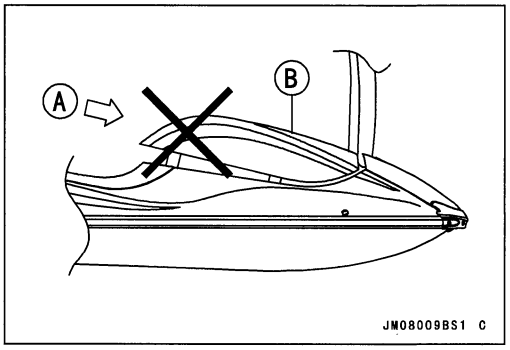
- Push down [A] the rear side of engine hood [B].
- Push the latch down and turn the latch lock knob counter-clockwise.



Engine Hood

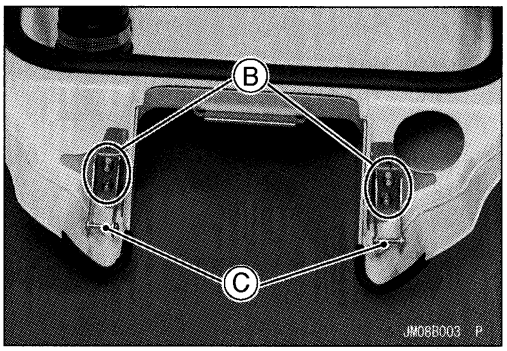
CAUTION

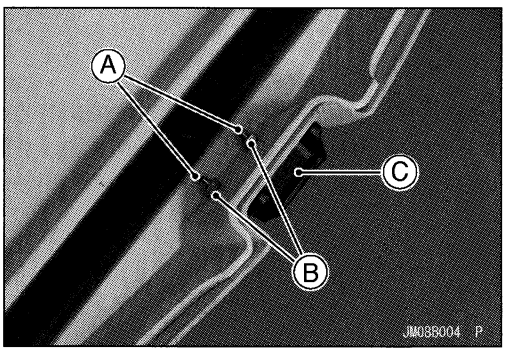
Do not install [A] the engine hood [B] with an angle like the JS750 or engine hood inside will be damaged.



Engine Hood Hook Removal

- Remove the engine hood (see this chapter).
- Unscrew the mounting bolt [A] and/or nuts [B], and remove the engine hood hook [C].



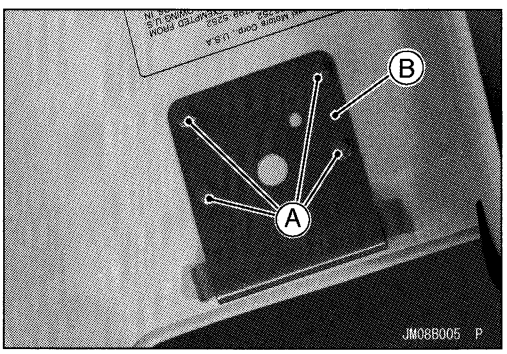


Engine Hood Hook Installation

- Installation is the reverse of removal.

Engine Hood Plate Removal

- Remove the engine hood (see this chapter).
- Unscrew the mounting bolts [A] and remove the engine hood plate [B].



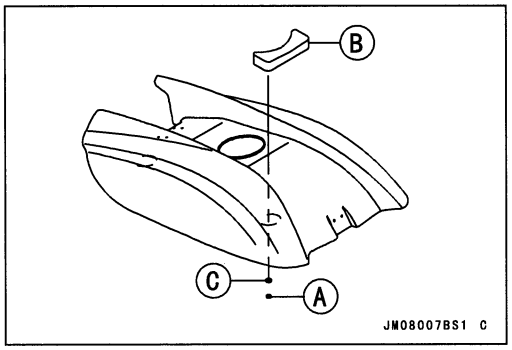
Engine Hood Plate Installation

- Installation is the reverse of removal.

Engine Hood

Engine Hood Damper Removal

- Remove the engine hood (see this chapter).
- Unscrew the mounting nuts [A] and remove the engine hood damper [B].

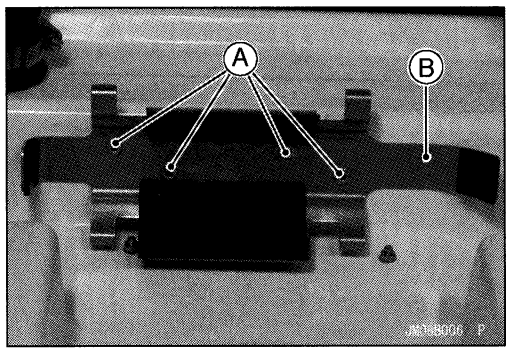


Engine Hood Damper Installation

- Install the washers [C] before tightening mounting nuts.

Fire Extinguisher Holder Removal

- Remove the engine hood (see this chapter).
- Drill out the pop rivets [A] (see Rivet Removal in this chapter).
- Remove the extinguisher holder [B].



Fire Extinguisher Holder Installation

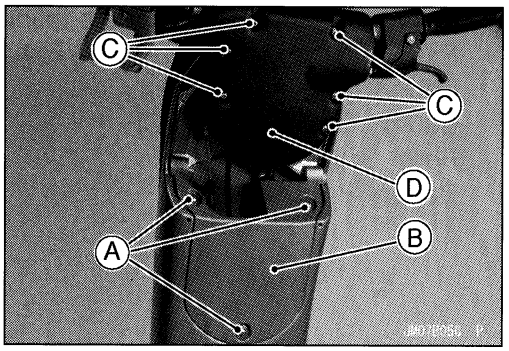
- Secure the fire extinguisher to the engine hood with rivets (see Rivet Installation in this chapter).

Fittings

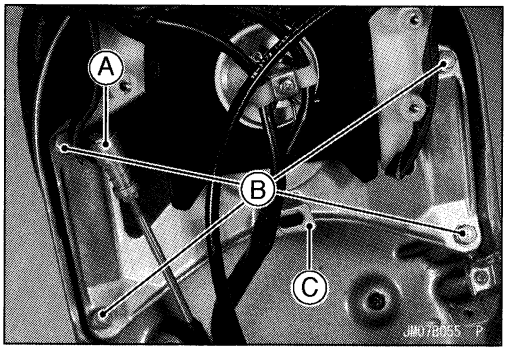
Handle Pole Pad Removal

CAUTION

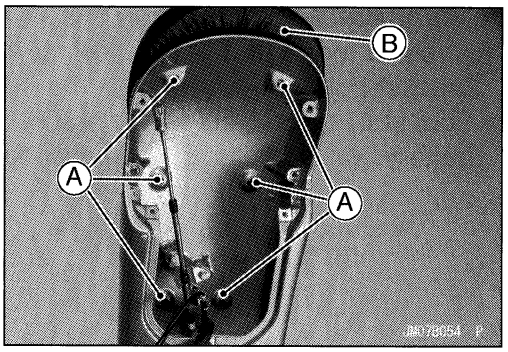
Do not remove the handle pole pad unless it is absolutely necessary, because the screw holes in the handle pole may be damaged by removal.



- Unscrew the handle pole cover screws [A] and remove the handle pole cover [B].
- Unscrew the handlebar pad mounting screws [C] and remove the handlebar pad[D].



- Disconnect the ball joint at upper end of steering cable.
  - Slide the outer sleeve [A] away from the ball slightly, and lift the cable from the ball.
- Unscrew the steering support bracket bolts [B] and remove the steering support bracket [C] with the handlebar.



- Unscrew the handle pole pad screws [A] and remove the handle pole pad [B].

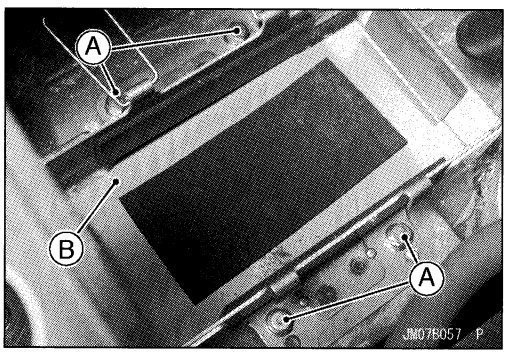
Handle Pole Pad Installation

- Apply a non-permanent locking agent to the steering support bracket mounting bolts and tighten them securely.
- Torque the lower handle pole cover screws.

Torque - Handle Pole Cover Screws: 15 N·m (0.15 kgf·m, 13 in·lb)

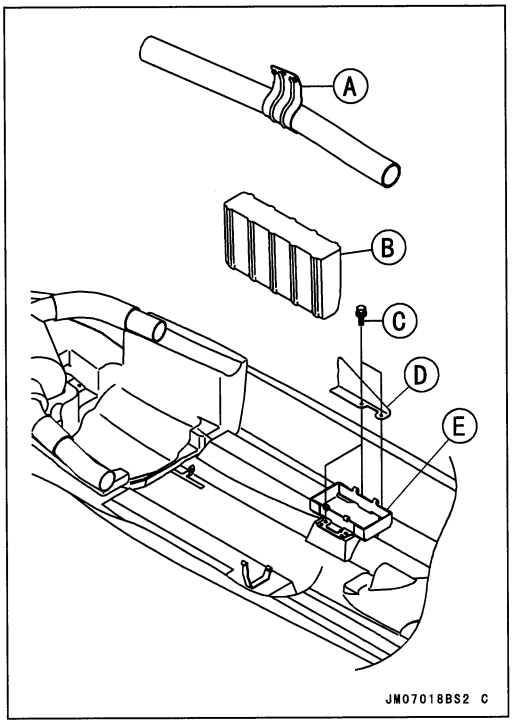
Battery Bracket Removal

- Remove the battery (see Electrical System chapter).
- Unscrew the battery bracket bolts [A] and remove the battery bracket [B].



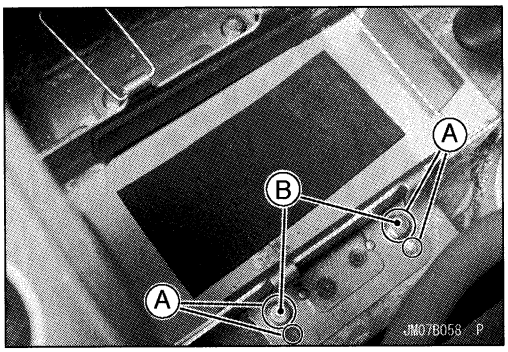
Fittings

- For French model, remove the following.
  Exhaust Tube Bracket [A] (see Exhaust System chapter)
  Form [B]
  Battery Bracket Bolts [C]
  Form Bracket [D]
  Battery Bracket [E]



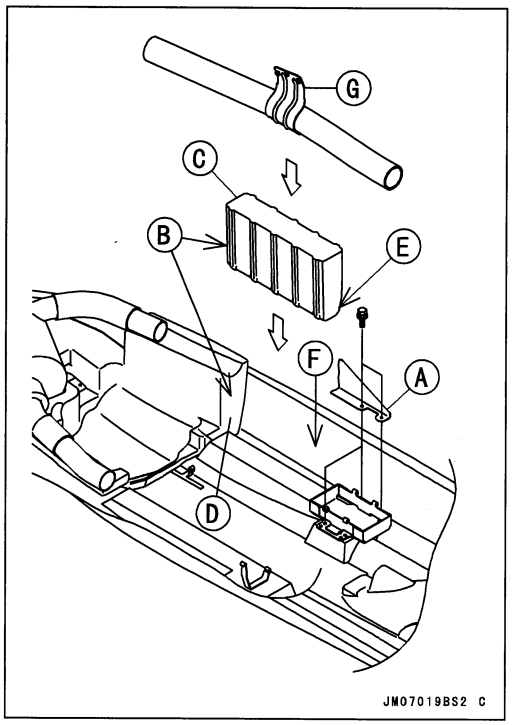
Battery Bracket Installation

- Apply a non-permanent locking agent to the battery bracket bolts.
- Four bolt holes [A] are on the bracket left side. Tighten the battery bracket bolts [B] securely noting the bolt positions.



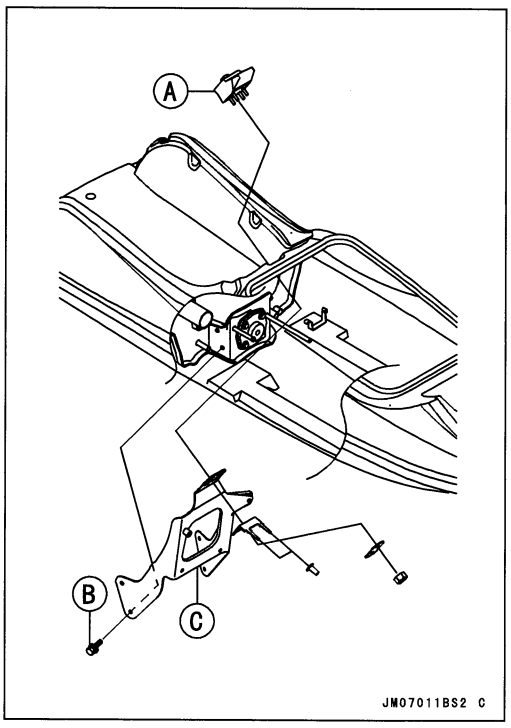
Fittings

- For French model, note the following.
  - Install the form bracket [A].
  - Align [B] the front portion of form [C] with the rear portion of front form [D].
  - Insert the form [C] to the form bracket [A] so that its chamfer side [E] faces the side wall [F] and position the form closely to the side wall.
  - Fix the form top with the exhaust tube bracket [G].
  - Be sure that the form is away from the carburetors and fuel hoses.



Electric Case Bracket Removal

- Remove the electric case (see Electrical System chapter).
- Remove the engine hood latch [A] (see this chapter).
- Unscrew the electric case bracket bolts [B] and remove the electric case bracket [C].



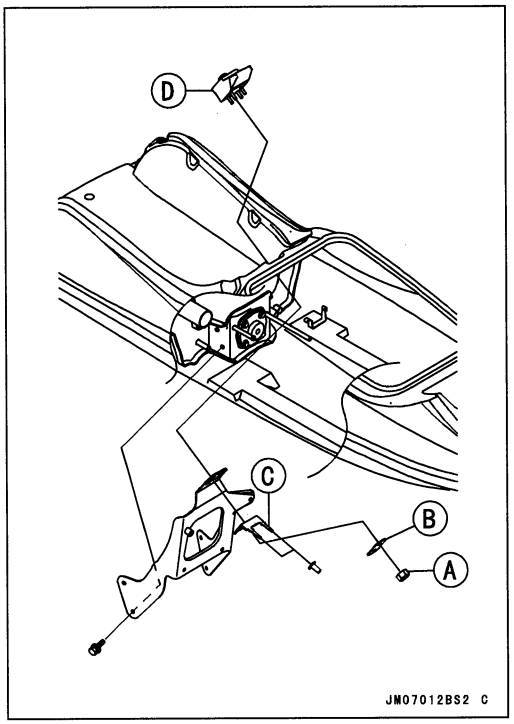
Electric Case Bracket Installation

- Apply a non-permanent locking agent to the electric case bracket bolts and tighten them securely.

Fittings

Engine Hood Latch Removal

- Remove the engine hood (see this chapter).
- Remove:
  Engine Hood Latch Nuts [A]
  Plate [B]
  Spark Plug Cap Holder [C]
  Engine Hood Latch [D]

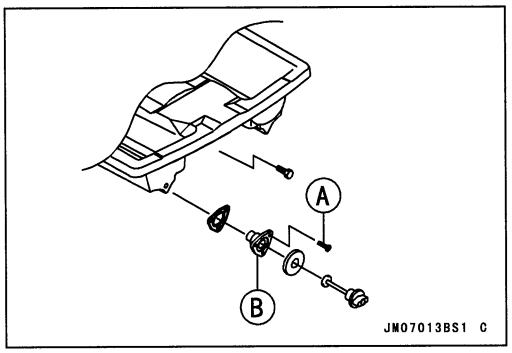


Engine Hood Latch Installation

- Installation is the reverse of removal.

Drain Plug Housing Removal

- Unscrew the screws [A] and remove the drain plug housing [B].

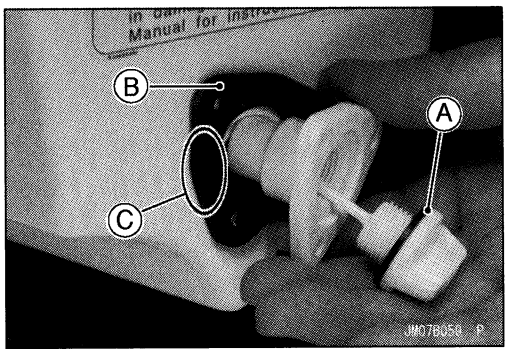


Drain Plug Housing Installation

- Check the seal [A] for damage.

★If necessary, replace new one.

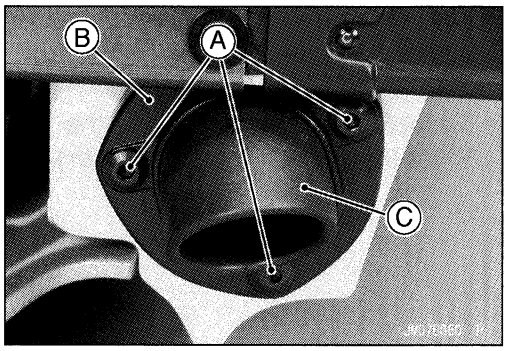
- Install the new gasket [B] so that its "OUT" mark [C] faces outwards.



Fittings

Exhaust Outlet Removal

- Unscrew the mounting bolts [A] and remove the holder [B] and exhaust outlet [C].



Exhaust Outlet Installation

- Apply a non-permanent locking agent to the mounting bolts and tighten them securely.

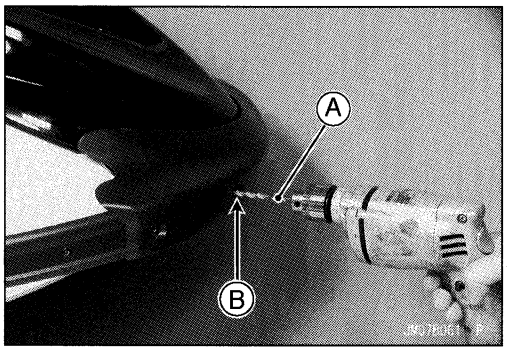
Rivet Removal

- Drill out the pop rivet with a drill bit [A] of the correct size.

Pop Rivet Removal Drill Bit Size
5.0 mm (0.2 in.)

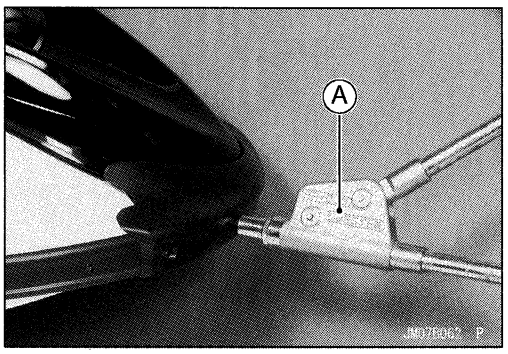
NOTE

- *Stop drilling when the rivet head [B] starts to turn with drill bit.*
- *Tap the rivet out with a suitable punch and hammer.*



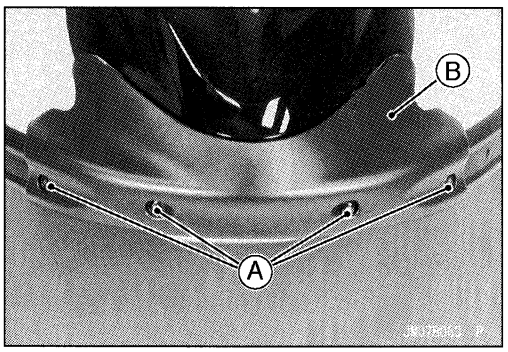
Rivet Installation

- Secure the parts to the hull with the rivets using a riveter [A].



Front Bumper Removal

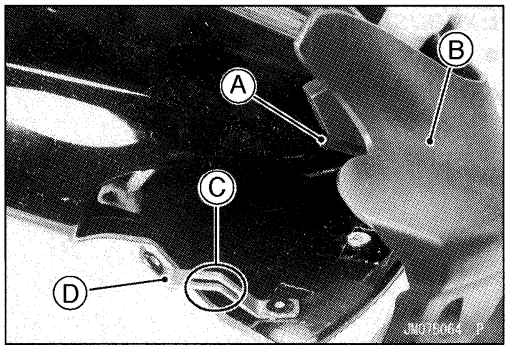
- Drill out the pop rivets [A] (see Rivet Removal in this chapter).
- Remove the front bumper [B].



Fittings

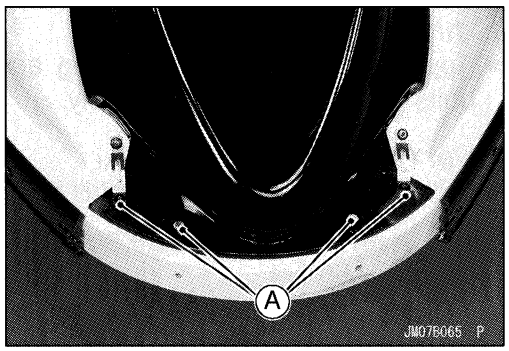
Front Bumper Installation

- Insert the projection [A] on the front bumper [B] into the hole [C] of bracket [D].
- Secure the front bumper to the hull with the rivets (see Rivet Installation in this chapter).

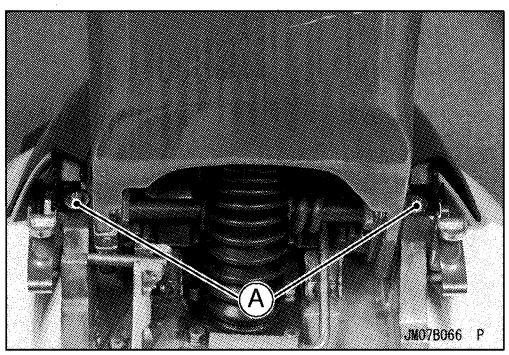


Front Cover Removal

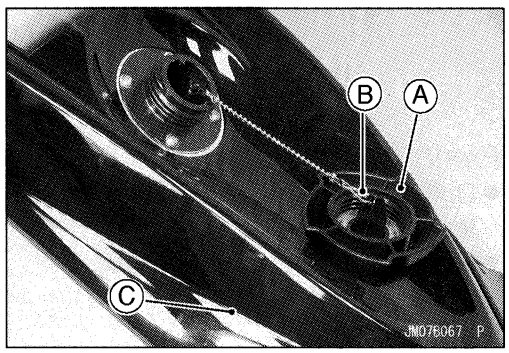
- Remove the front bumper (see this chapter).
- Drill out the pop rivets [A] (see Rivet Removal in this chapter).



- Remove the engine hood (see this chapter).
- Unscrew the front cover screws and washers [A].



- Separate the fuel filler cap [A] from the chain clip [B].
- Remove the front cover [C].



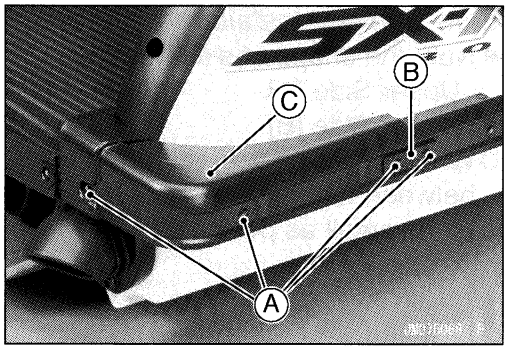
Front Cover Installation

- Secure the front cover to the hull with the rivets (see Rivet Installation in this chapter).

Fittings

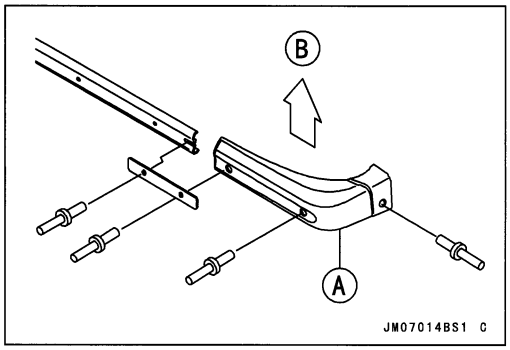
Corner Bumper Removal

- Drill out the pop rivets [A] (see Rivet Removal in this chapter).
- Remove the plate [B] and the corner bumper [C].

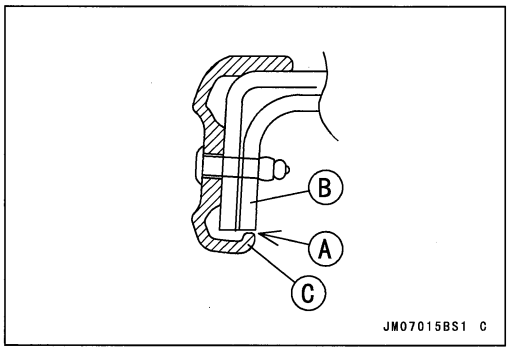


Corner Bumper Installation

- Secure the corner bumper [A] to the hull with the rivets, pushing up [B] the corner bumper (see Rivet Installation in this chapter).

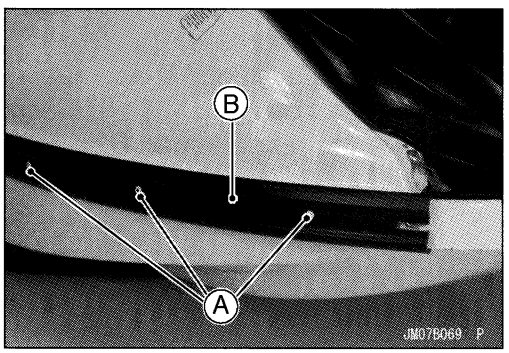


o When installing the corner bumper, the clearance [A] between the flange [B] and the bumper bottom end [C] must be as small as possible.



Side Bumper Removal

- Remove the front bumper (see this chapter).
- Remove the corner bumpers (see this chapter).
- Drill out the pop rivets [A] (see Rivet Removal in this chapter).
- Remove the side bumper [B].

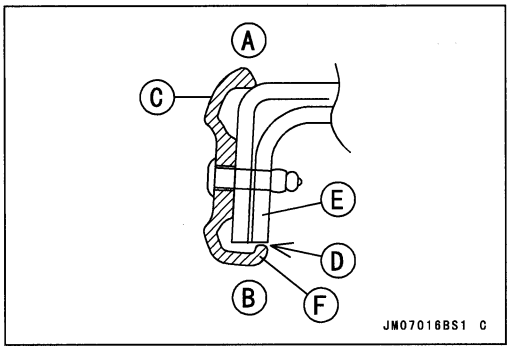


Fittings

Side Bumper Installation

- Note the shape of side bumper.
  Upper Side [A]
  Lower Side [B]

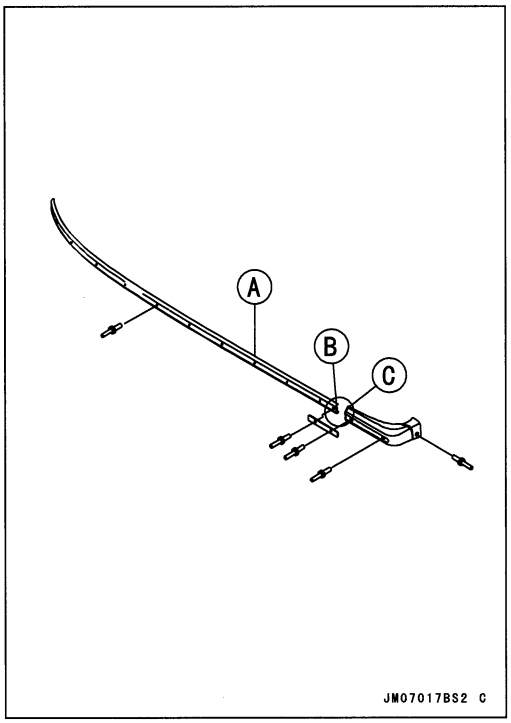
○ When installing the side bumper [C], the clearance [D] between the flange [E] and bumper bottom end [F] must be as small as possible.



- Install the side bumper [A] from rearward.

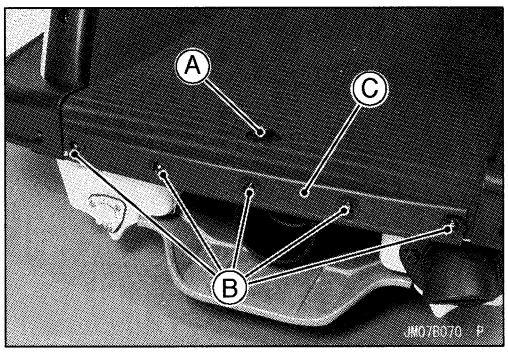
○ Make sure that the rear end [B] of side bumper touches the front end [C] of corner bumper.

- Secure the side bumper to the hull with the rivets (see Rivet Installation in this chapter).



Rear Bumper Removal

- Unscrew the bushing [A] and nut.
- Drill out the pop rivets [B] and washer.
- Remove the rear bumper [C].



Rear Bumper Installation

- Secure the rear bumper to the hull with the rivets (see Rivet Installation in this chapter).

Hull Replacement

- To replace the hull, remove the various parts in the following suggested order.
  - Battery and Bracket
  - Pump and Hoses
  - Handle Pole with Bracket
  - Air Intake Cover
  - Carburetor
  - Exhaust Pipe and Expansion Chamber
  - Electric Case and Bracket
  - Water Box Muffler
  - Engine and Mounts
  - Fuel Tank
  - Drive Shaft and Shaft Holder
  - Control Cables
  - Engine Hood Latch
  - Bilge Breather
  - Bilge and Cooling Hose
  - Fuel Filler Assembly
  - Bypass Hose and Outlet
  - Cable Detents
  - Hose Holder and Bracket
  - Bumpers and Pads

The following parts cannot be removed from the hull and must be replaced.

- Decals
- Labels
- Registration Number (if any)

If the new hull is to be painted, do that first. Then install the parts removed in the reverse order of their removal. Finally, install the labels, decals, mats and the registration numbers.

Rubber Parts

NOTE

o *The rubber parts on the watercraft are fastened in place with various adhesives. To replace a rubber part, use a cement in the following table, or an equivalent.*

⚠ WARNING

Read all warnings and cautions on any solvents and adhesives used. Many of these products are flammable, may be harmful to the skin and eyes, and may give off harmful vapors. Use these solvents and adhesives only in a well-ventilated area and never near an open flame.

For this Application:	Type
Mats Water Box Muffler Damper	Synthetic Rubber Adhesive (P/N: 92104-3701)
Engine Hood Gasket Detents Handlebar Grips Handle Pole Bracket Damper	Cyanoacrylate Cement

CAUTION

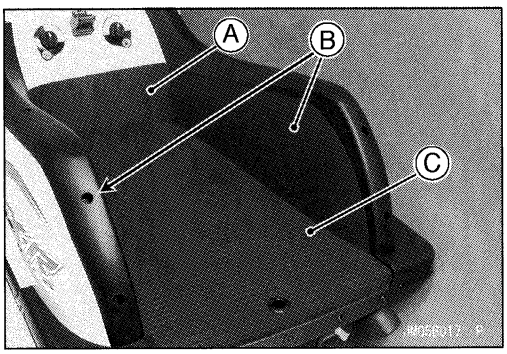
Be very careful that the part is positioned correctly when you apply the cement. It may be impossible to reposition the part.

⚠ WARNING

Do not get any cyanoacrylate cement in your eyes or on your skin. If you do get some in your eyes, do not try to wash it out. Contact a physician immediately! If you do get some on your fingers, do not touch any other part of your body; your fingers will stick to anything they touch. Allow the cement to cure and it will eventually wear off.

Rubber Parts Location

Front Side Mat [A]
Side Deck Mats [B]
Deck Floor Mat [C]

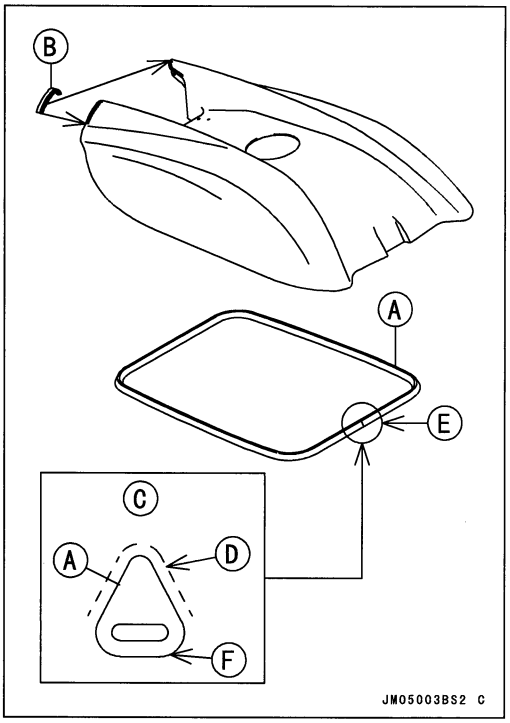


Rubber Parts

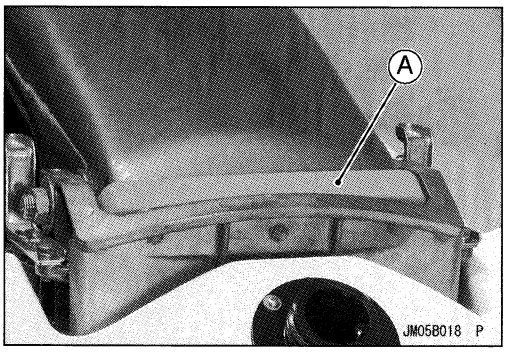
Engine Hood Gasket [A]
Trim Seal [B]
Upper Side of Engine Hood Gasket [C]
Bonding Area [D]

NOTE

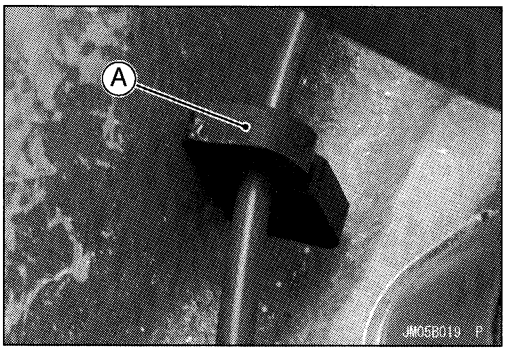
o *Joint [E] the both ends of gasket with cyanoacrylate cement at the center of rear. Be sure cyanoacrylate cement doesn't come out [F] from bottom of gasket.*



Handle Pole Bracket Damper [A]



Detent [A]

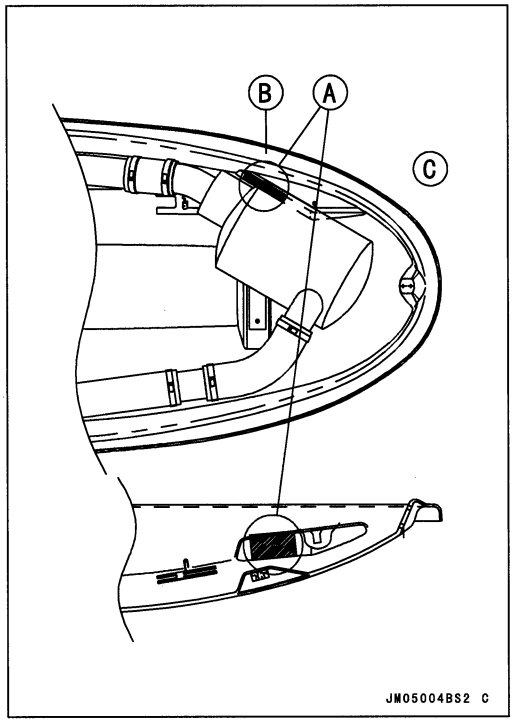


Rubber Parts

Water Box Muffler Damper [A]

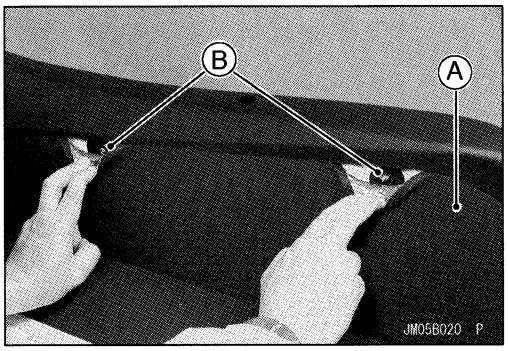
NOTE

o *Water box muffler damper [A] protect the hull [B] against the edge of water box muffler [C].*

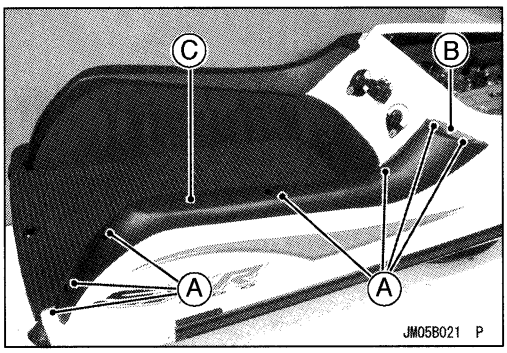


Deck Fin Pad Removal

- Pull down the side deck mat [A] and unscrew the screws [B].



- Remove the engine hood (see this chapter).
- Remove the corner bumper (see this chapter).
- Drill out the pop rivets [A] (see Rivet Removal in this chapter).
- Remove:
  Plate [B]
  Collar
  Deck Fin Pad [C]



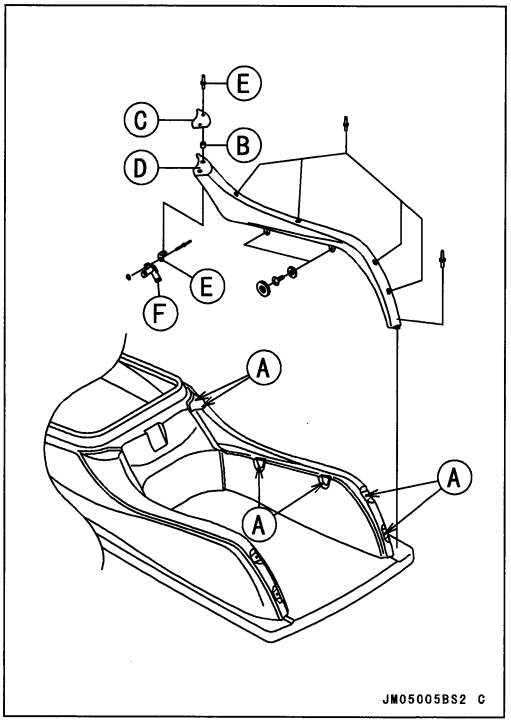
Rubber Parts

Deck Fin Pad Installation

- Apply silicone sealant [A] to the holes for rivets.
- Install the collars [B] and plate [C] on the front [D] of deck fin pad, and use the long rivets [E] securing the plate [C].

NOTE

o *For the right side rivets [E], secure the plate with the bracket [F] of bilge breather [F].*



Electrical System

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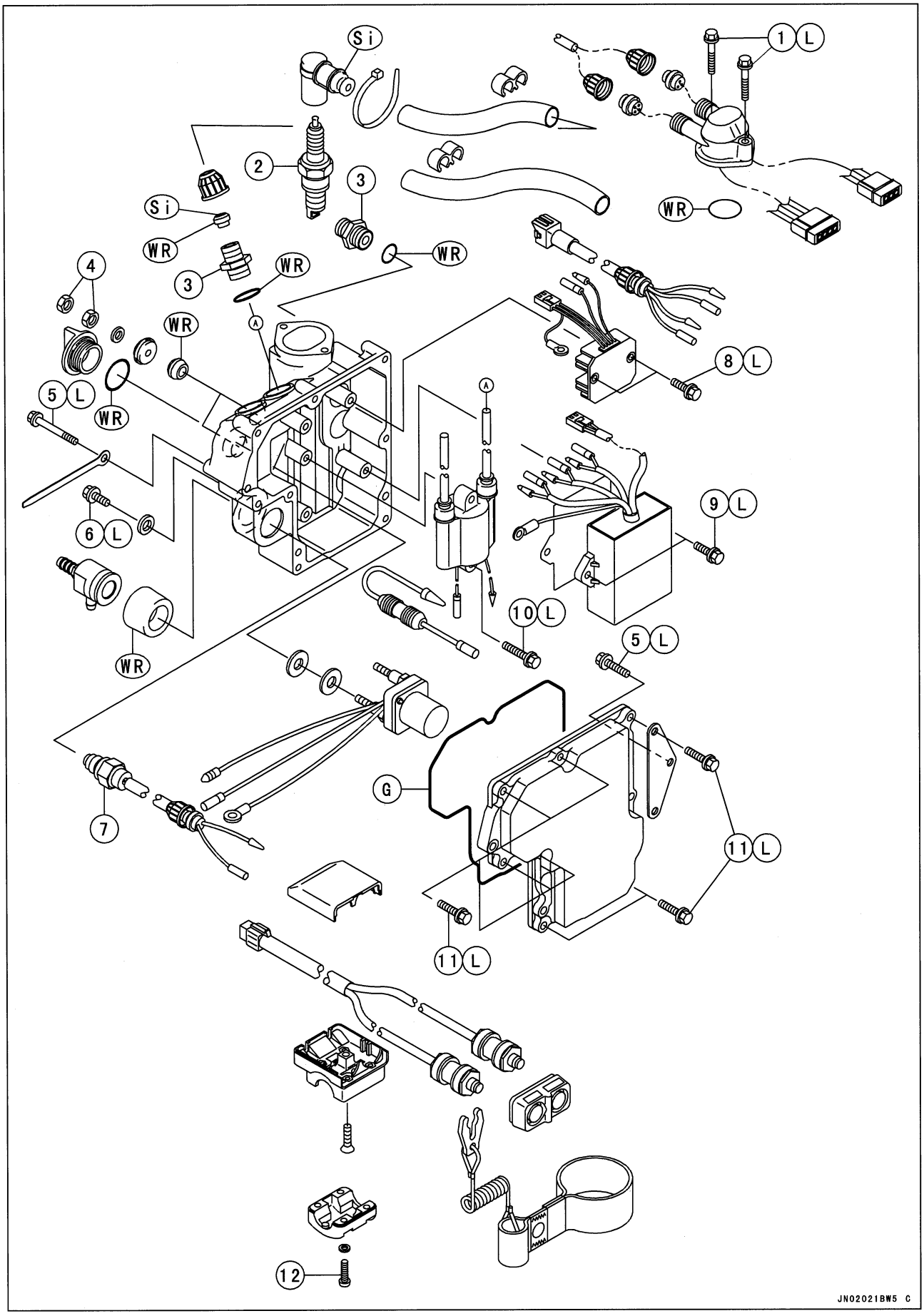
Exploded View

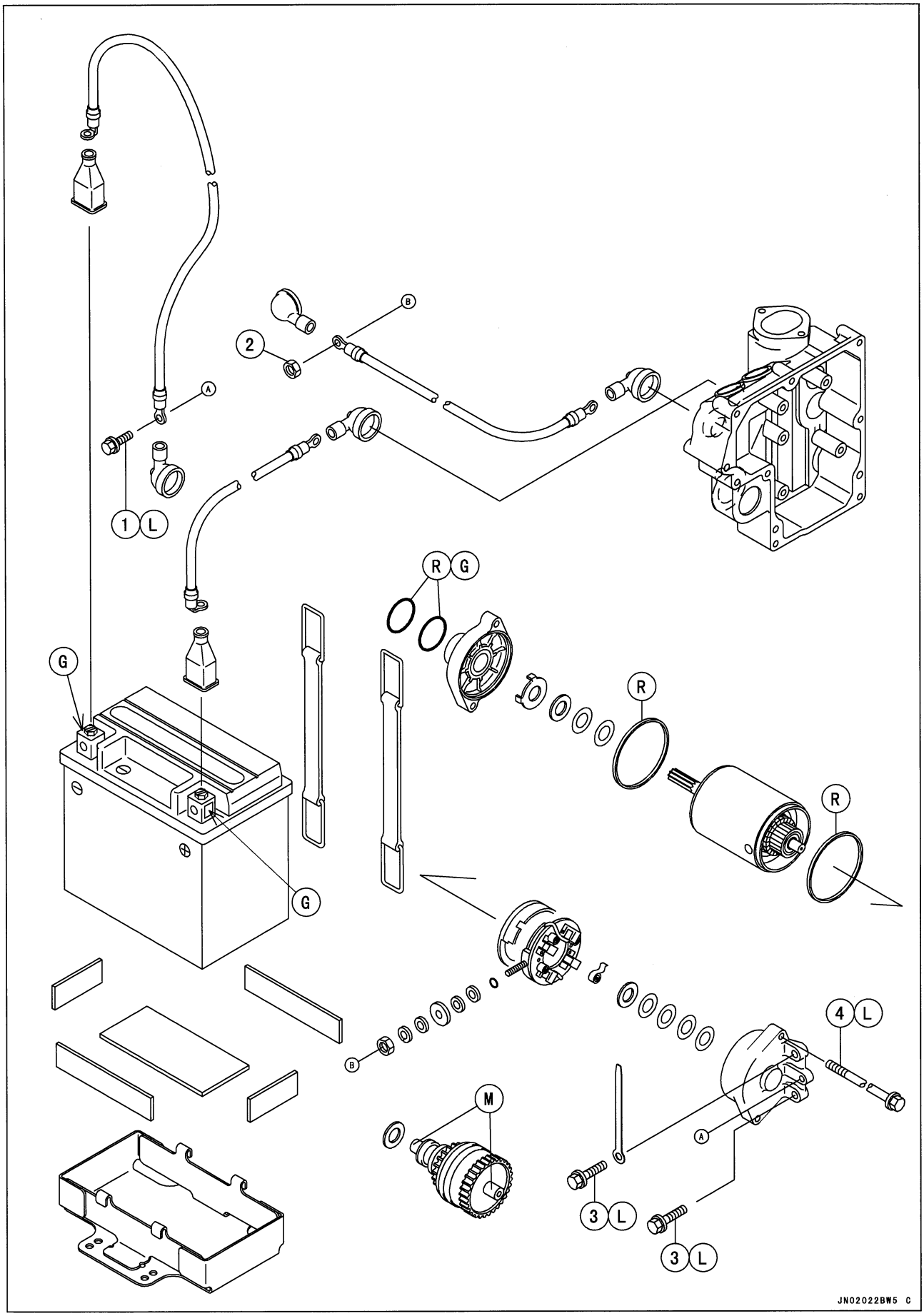


Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Electric case connector mounting bolts	8.8	0.9	78 in·lb	L
2	Spark plugs	27	2.8	20	
3	Joints	3.9	0.4	35 in·lb	
4	Starter relay lead mounting nuts	4.4	0.45	39 in·lb	
5	Electric case mounting bolts	8.8	0.9	78 in·lb	L
6	Temperature sensor mounting bolts	8.8	0.9	78 in·lb	L
7	Temperature sensor	27	2.8	20	
8	Regulator/rectifier mounting bolts	8.8	0.9	78 in·lb	L
9	CDI igniter mounting bolts	8.8	0.9	78 in·lb	L
10	Ignition coil mounting bolts	8.8	0.9	78 in·lb	L
11	Electric case bolts	8.8	0.9	78 in·lb	L
12	Switch housing mounting screws	3.9	0.4	35 in·lb	

G: Apply grease.
L: Apply a non-permanent locking agent.
Si: Apply silicone grease.
WR: Apply water resistance grease.

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Battery ground cable mounting bolt	8.8	0.9	78 in·lb	L
2	Starter motor cable (+) mounting nut	7.8	0.8	69 in·lb	
3	Starter motor mounting bolts	8.8	0.9	78 in·lb	L
4	Starter motor retaining bolts	6.3	0.6	56 in·lb	L

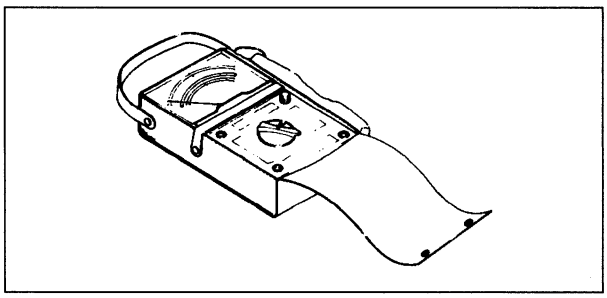
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum disulfide grease.
R: Replacement Parts

Specifications

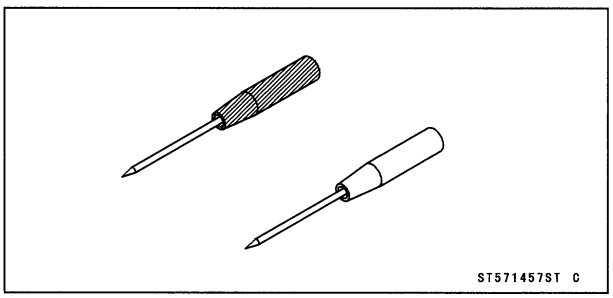
Item	Standard	Service Limit
Battery:		
Type	12 V 18 Ah, Sealed battery	– – –
Electric Starter System:		
Starter motor:		
Brush length	12.5 mm (0.49 in.)	6.5 mm (0.26 in.)
Commutator diameter	28 mm (1.10 in.)	27 mm (1.06 in.)
Charging System:		
Regulator/rectifier output voltage	14.0 ~ 15.0 V (Battery voltage)	– – –
Charging coil output voltage	20 V	– – –
Charging coil resistance:		
Brown ←→ Brown	0.7 ~ 1.1 Ω	– – –
Regulator/rectifier resistance	in the text	– – –
Ignition System:		
Ignition timing	13° BTDC @1 250 r/min (rpm) ~ 20.2° @4 000 r/min (rpm)	– – –
Crankshaft sensor resistance	396 ~ 594 Ω	– – –
Ignition coil:		
3 Needle arcing distance	7 mm (0.28 in.) or more	– – –
Primary winding resistance	0.08 ~ 0.1 Ω	– – –
Secondary winding resistance	3.5 ~ 4.7 kΩ	– – –
Ignition coil primary peak voltage	150 V or more	– – –
Crankshaft sensor peak voltage	3.0 V or more	– – –
Spark plug:		
Type	NGK BR8ES	– – –
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –
Start/Stop Switch:		
Start button:		
Released	∞ Ω	– – –
Depressed	Almost 0 Ω	– – –
Stop button:		
Released	∞ Ω	– – –
Depressed	Almost 0 Ω	– – –
Temperature Sensor:		
Temperature sensor resistance	in the text	– – –

Special Tools

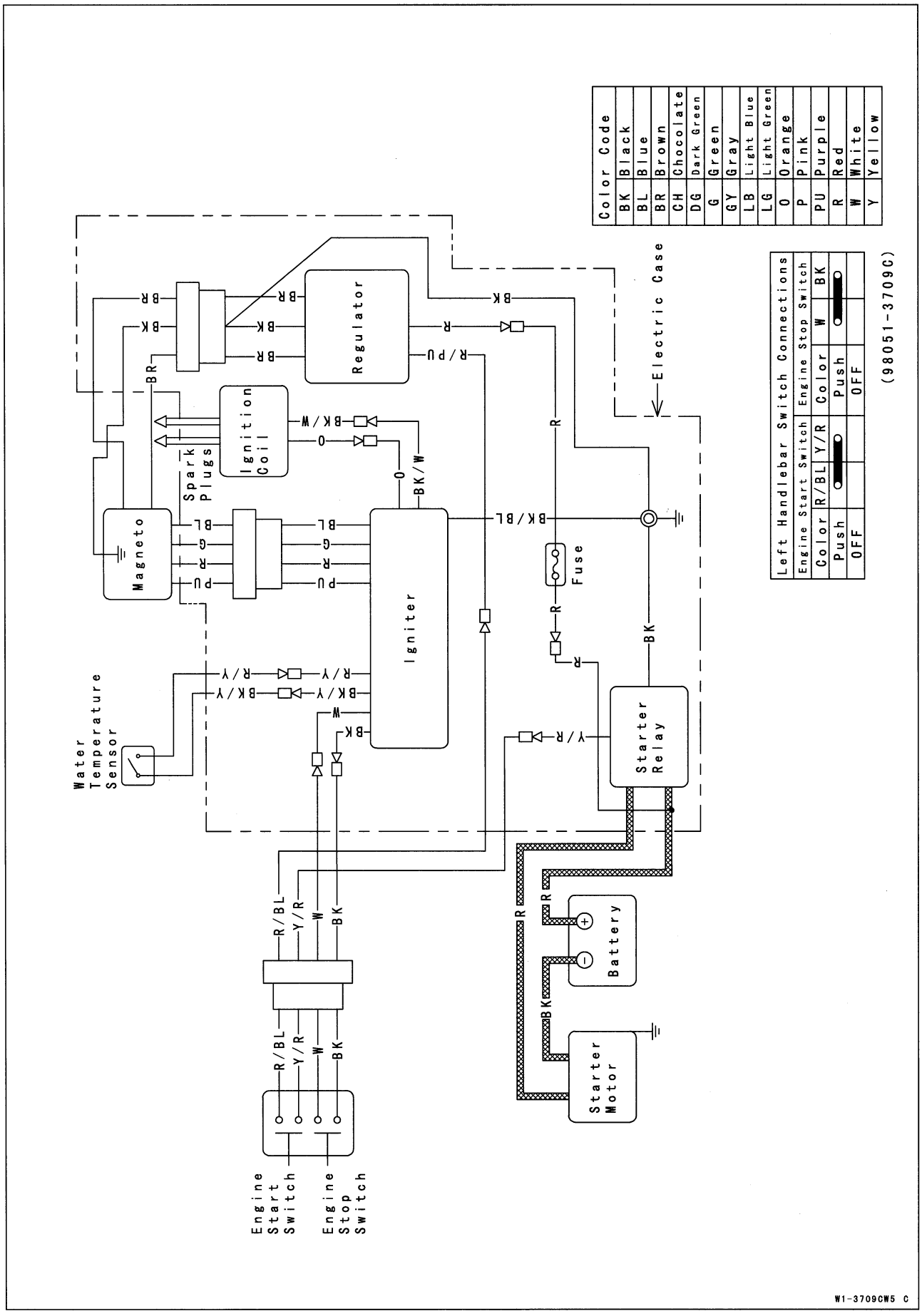
Hand Tester:
57001-1394



Needle Adapter Set:
57001-1457



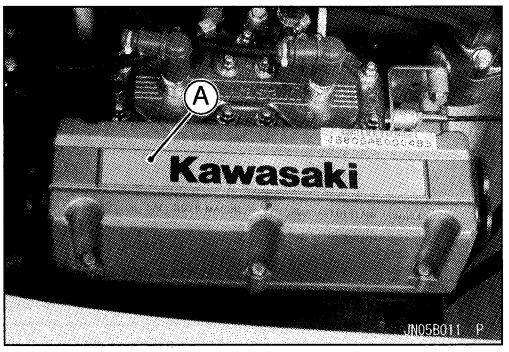
Wiring Diagram



Battery

Battery Removal

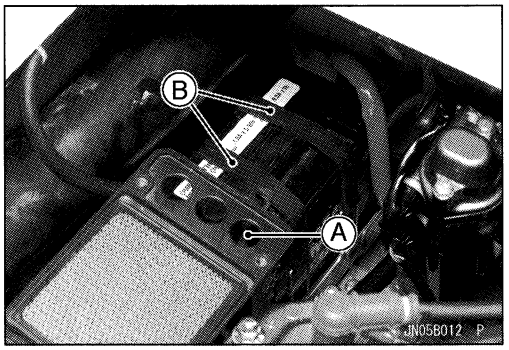
- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Air Inlet Cover [A] (see Frame Arrester section in Fuel System chapter)



- Disconnect the battery negative (–) cable [A] first, and then the positive (+) cable.

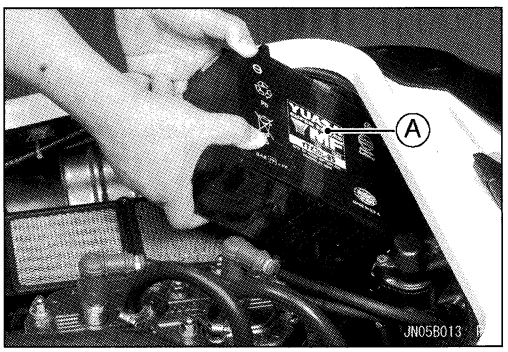
⚠ WARNING

To prevent possible personal injury and damage to electrical components, always disconnect the grounded cable first.



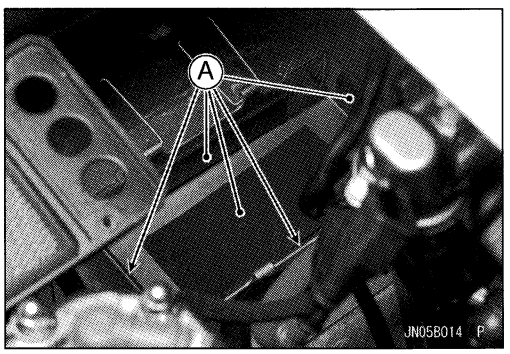
- Unhook the battery straps [B].

- Carefully lift the battery [A] from the engine compartment as shown.



Battery Installation

- Be sure the battery dampers [A] are in position in the battery compartment.
- Hook the battery straps.
- Connect the battery cables, positive first.
  - After attaching both cables, coat the terminals and cable ends with grease to prevent corrosion.
  - Slide the protective boot over each terminal.



⚠ WARNING

Loose battery cables can create sparks which can cause a fire or explosion resulting in injury or death. Make sure the battery terminal screws are tightened securely and the covers are installed over the terminals.

CAUTION

Do not reverse the battery connections.

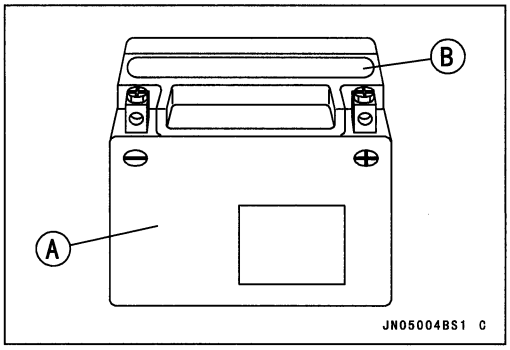
Charging Condition Inspection

- Refer to the Battery in the Periodic Maintenance chapter.

Battery

Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Refresh-charge by following method according to the battery terminal voltage.



CAUTION
This battery is sealed type. Never remove sealing caps [B] even at charging. Never add water. Charge with current and time as stated below.

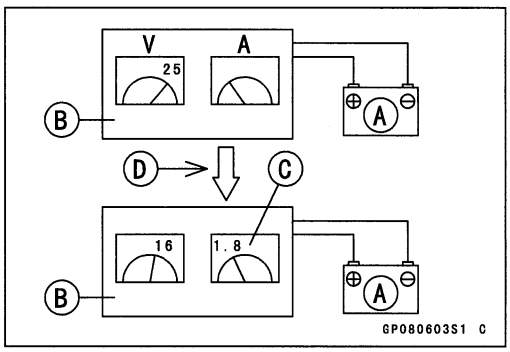
Terminal Voltage: 11.5 ~ 12.6 V
Standard Charge: 1.8 A × 5 ~ 10 h
(see following chart)
Quick Charge: 9.0 A × 1.0 h

CAUTION
If possible, do not quick charge. If the quick charge is done due to unavoidable circumstances, do standard charge later on.

Terminal Voltage: less than 11.5 V
Charging Method: 1.8 × 20 h

NOTE

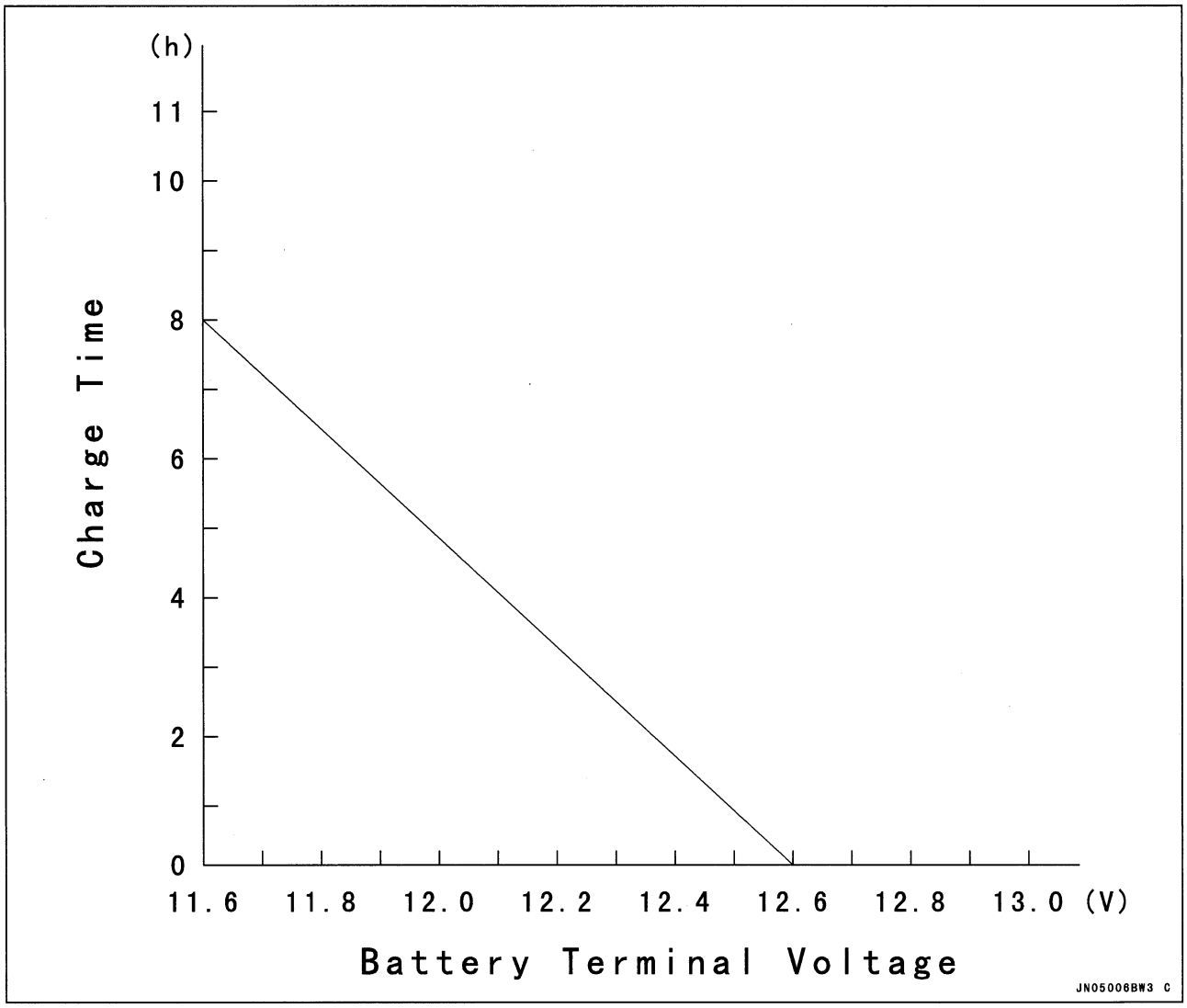
o *Raise the voltage initially (25 V as maximum), and charge for about 5 minutes as a yardstick. (If ammeter shows no change in current after 5 minutes, you need a new battery.) The current, if it can flow into the battery, tends to become excessive. Adjust the voltage as often as possible to keep the current at standard value (1.8 A).*



[A] Battery
[B] Battery Charger
[C] Standard Value
[D] Current Starts to flow

Battery

Battery Standard Charge Time Chart for Reference



- Determine battery condition after refreshing charge.

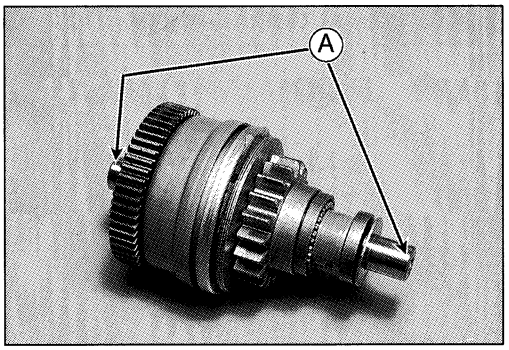
o Determine the condition of the battery 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

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

Electric Starter System

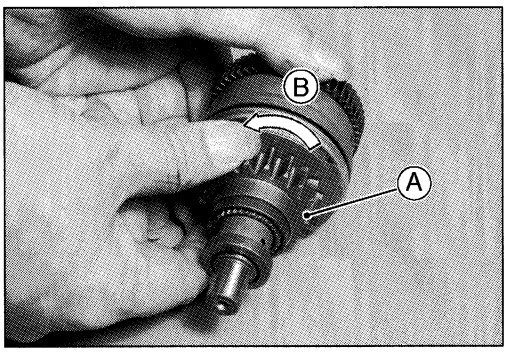
Reduction Gear Removal/Installation

- Before removing the reduction gear, remove the magneto flywheel (see Engine Bottom End chapter).
- When installing the reduction gear, apply a molybdenum disulfide grease [A] to both ends of its shaft.



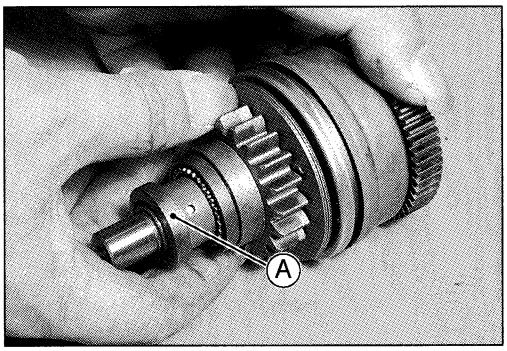
Reduction Gear Inspection

- Rotate the pinion gear [A] counterclockwise. The gear must rotate freely [B].



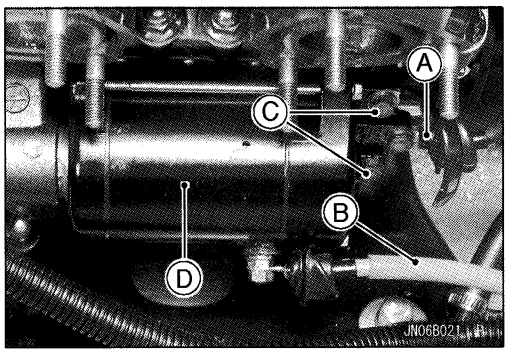
- Rotate the pinion gear clockwise all the way. The pinion gear will be advanced along the reduction gear shaft, and stopped against the stopper [A].
- Release the pinion gear. The pinion gear must return to the initial position rapidly.

★If the pinion gear does not function properly, replace it.



Starter Motor Removal

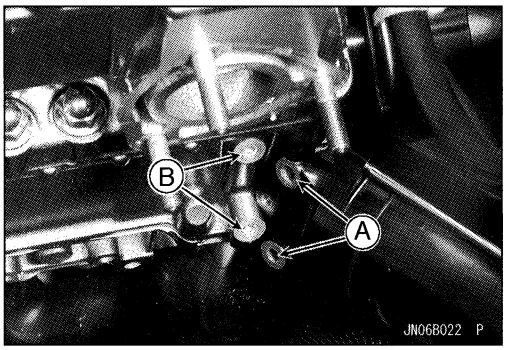
- Disconnect:
  Exhaust Manifold (see Exhaust System chapter)
  Battery Ground Cable [A]
  Starter Motor Cable [B]
- Remove the starter motor mounting bolts [C] and pull off the starter motor [D].



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

Electric Starter System

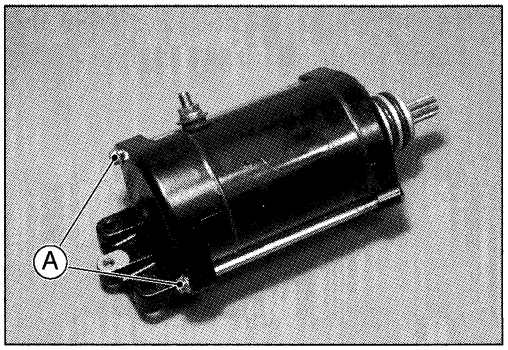
Starter Motor Installation



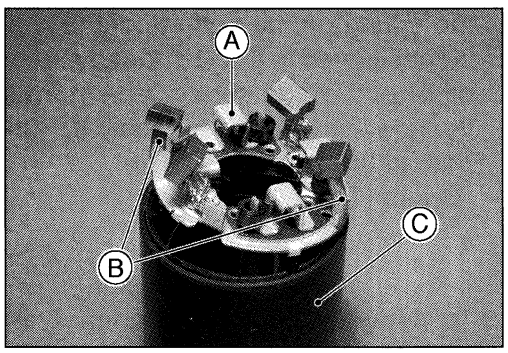
- Clean the starter motor lugs [A] and crankcase [B] where the starter motor is grounded.
- Apply a small amount of engine oil to the O-ring .
- Apply a non-permanent locking agent to the starter motor mounting bolt and the battery ground cable mounting bolt.
- Connect the battery ground cable.
- Tighten:

Torque - Starter Motor Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)
Battery Ground Cable Mounting Bolt: 8.8 N·m (0.9 kgf·m, 78 in·lb)

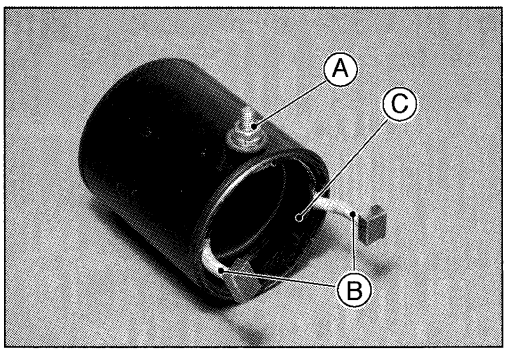
Starter Motor Disassembly



- Unscrew the retaining bolts [A] and remove the both end covers.



- Pull the armature out the pinion gear end.
- Remove the brush plate [A] from the leads [B].
  Yoke [C]



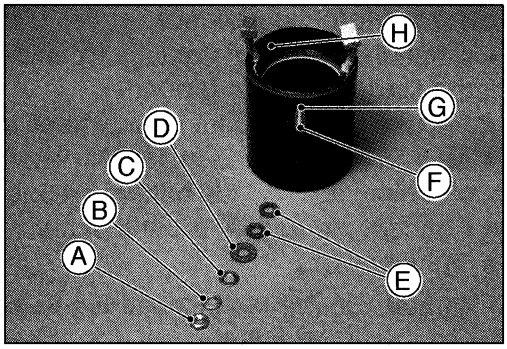
- Remove the nut and terminal bolt [A], and then remove the brush [B] and the plastic holder [C].

Electric Starter System

Starter Motor Assembly

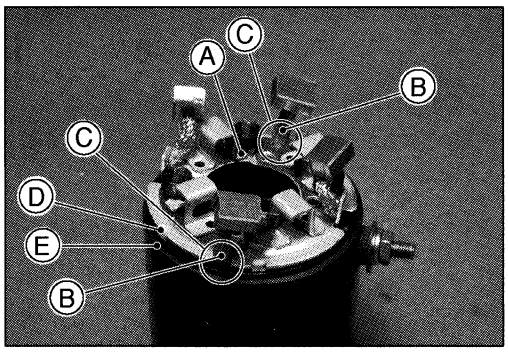
- Install the terminal bolt as shown.

Nut [A]
Spring Washer [B]
Washer [C]
Large Insulator [D]
Small Insulators [E]
Terminal Bolt [F]
O-ring [G]
Plastic Holder [H]



- Install the brush plate as follows.

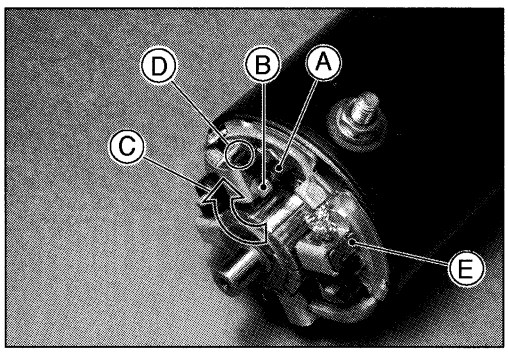
o Install the brush plate [A] on the yoke fitting and the brush leads [B] into the notches [C] in the plate. Fit the brush plate tongue [D] into the yoke notch [E].



o Insert the armature into the yoke.

o Keeping the motor upright, install the brush spring [A]. Fit the spring on the spring post [B] halfway; the post must be positioned in the D-shaped end of the spring. Turn the other end of the spring a half turn clockwise [C], and fit the end in the brush groove [D]. Push the spring onto the post to the stepped portion.

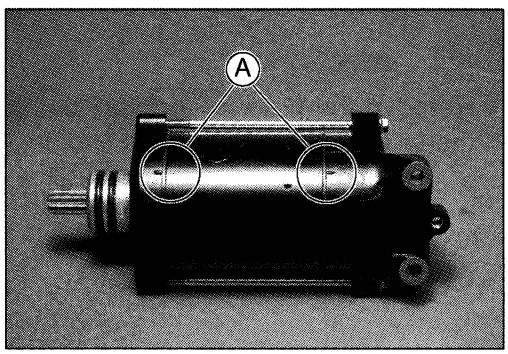
Brush [E]



o To install the end covers on the yoke, align [A] the mark on the each end cover with the marks on the yoke.

o Apply a non-permanent locking agent to the starter motor retaining bolts, and tighten them.

Torque - Starter Motor Retaining Bolts: 6.3 N·m (0.6 kgf·m, 56 in·lb)

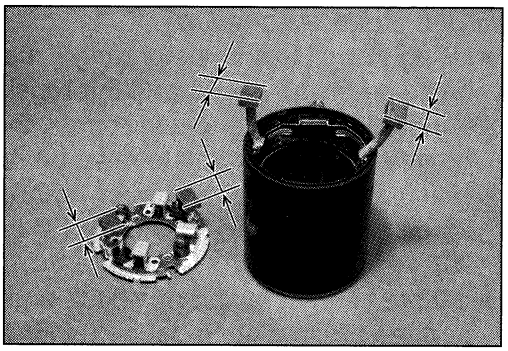


Electric Starter System

Brush Inspection

- Measure the length of each brush.

★If any is worn down to the service limit, replace all the brushes.



Starter Motor Brush Length

Standard:	**12.5 mm (0.49 in.)**
Service Limit:	**6.5 mm (0.26 in.)**

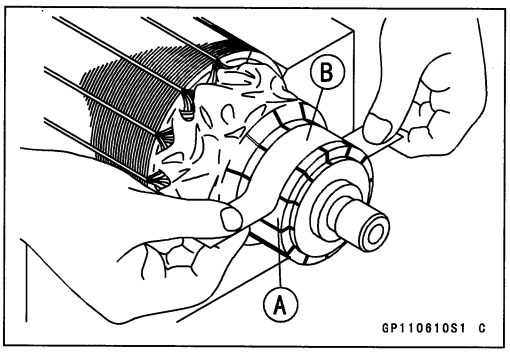
Brush Spring Inspection

- Check that the brush springs are in place and will snap the brushes firmly into place.

★If not, reinstall or replace the spring.

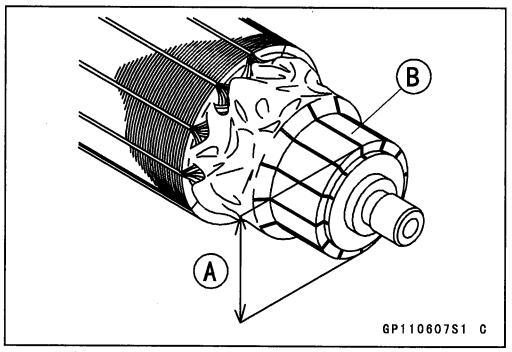
Commutator Cleaning and Inspection

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



- Measure the diameter [A] of the commutator [B].

★Replace the starter motor with a new one if the commutator diameter is less than the service limit.



Commutator Diameter

Standard:	**28 mm (1.10 in.)**
Service Limit:	**27 mm (1.06 in.)**

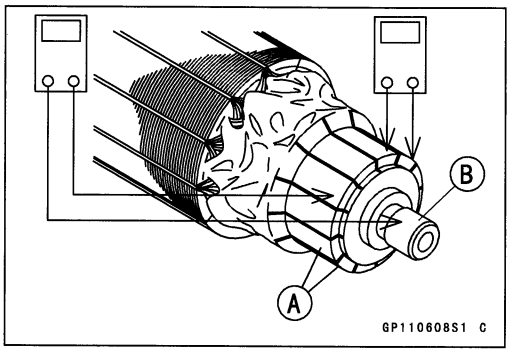
Armature Inspection

- Using the × 1 Ω ohmmeter range, 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 highest ohmmeter range, measure the resistance between the commutator and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.



Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with an ohmmeter. 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.

Electric Starter System

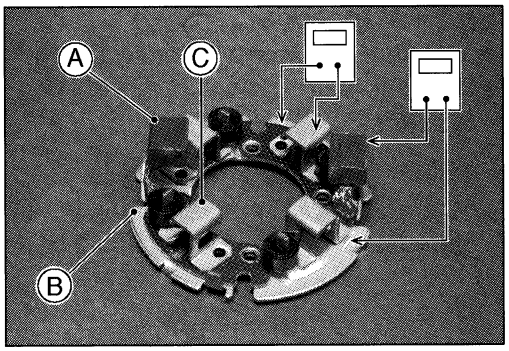
Brush Plate Inspection

- Using the × 1 Ω ohmmeter range, measure the resistance between the brush [A] and the brush plate [B].

★If there is not close to zero ohms, the brush plate has an open and the brush plate must be replaced.

- Using the highest ohmmeter range, measure the resistance between the brush plate [B] and the brush holders [C].

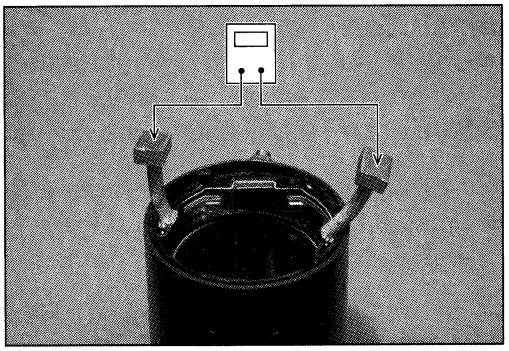
★If there is any reading at all, the brush holder has a short and the brush plate must be replaced.



Brush and Lead Assembly Inspection

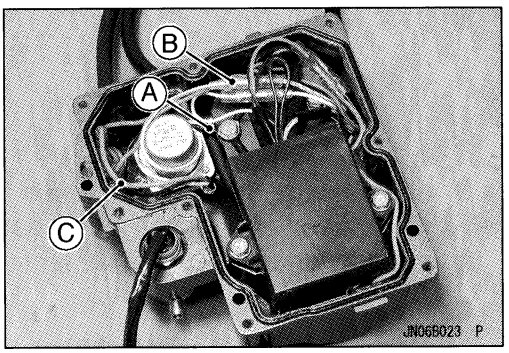
- Using the × 1Ω ohmmeter range, measure the resistance between the brushes.

★If there is high resistance or no reading (∞), a lead is open and the brush and lead assembly must be replaced.

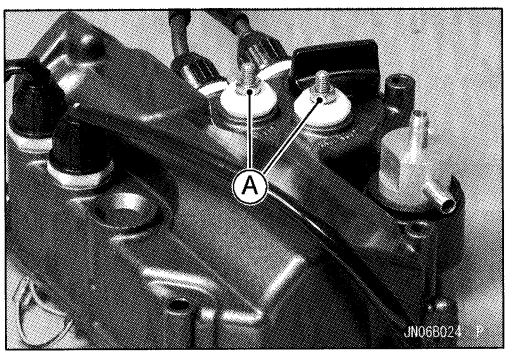


Starter Relay Removal

- Open the electric case (see Electric Case Disassembly).
- Disconnect:
  Ground Lead [A]
  Y/R Lead [B]
  R Lead [C]



- Remove the nuts [A] from the battery and starter terminals on the starter relay.

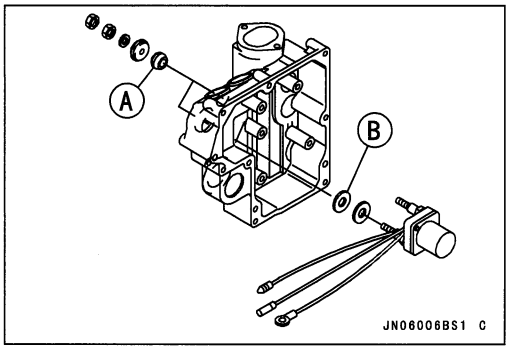


- Slide the starter relay from the electric case being careful not to lose any of the insulating washers or grommets.

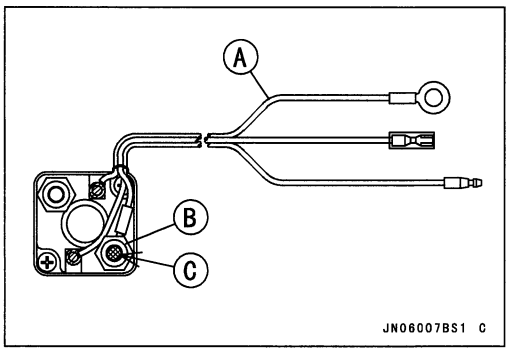
Electric Starter System

Starter Relay Installation

- Coat the grommets [A] with water resistance grease.
- Be certain all insulating washers [B] and grommets are in position.



- Connect the ground lead (black) [A] to the ground mounting bolt.
- Connect the battery (+) cable to the relay (+) terminal [B] having red lead and red color of the thread end [C].



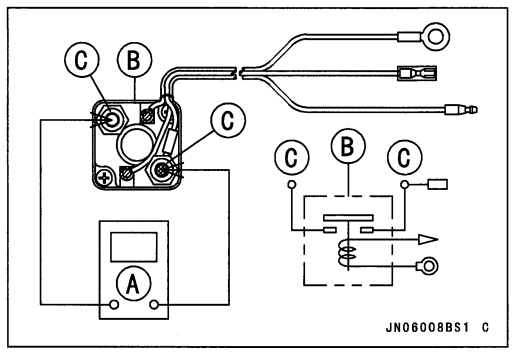
Starter Relay Inspection

- Set the hand tester [A] to × 1 Ω range.

  Special Tool - Hand Tester: 57001-1394

- Connect tester leads to starter relay [B] as shown.
  [C] M6 Terminals

★If resistance is less than infinite, the starter relay is not returning and must be replaced.



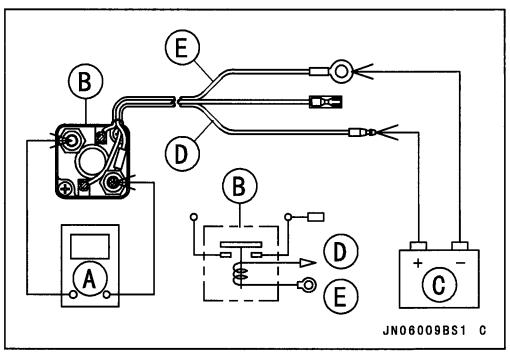
- Set the hand tester [A] to × 1 Ω range.

  Special Tool - Hand Tester: 57001-1394

- Connect tester leads to starter relay [B] as shown.
- Activate starter relay by connecting a 12 V battery [C] as shown.
  [D] Y/R Lead
  [E] BK Lead

★If the starter relay clicks and the tester indicates zero resistance, the starter relay is good.

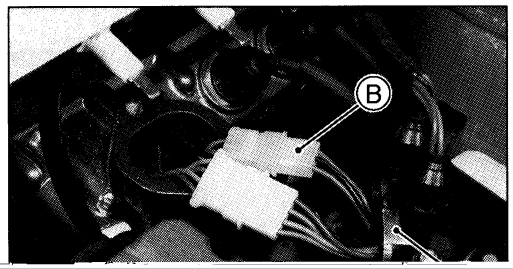
★If the tester indicates high or infinite (∞) resistance, the starter relay is defective and must be replaced.



Charging System

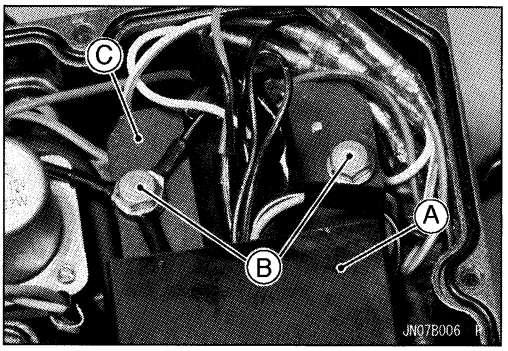
Charging System Inspection

- Remove:
  Electric Case Connector [A]
  3-pin Connector [B]



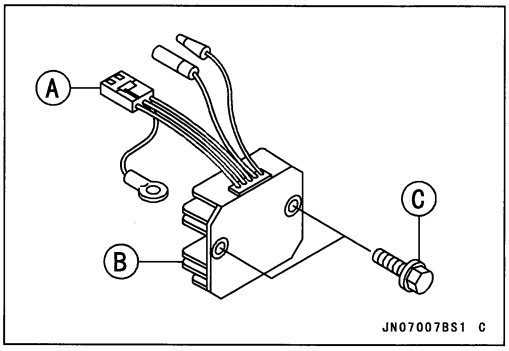
Charging System

Regulator/Rectifier Removal



- Remove the electric case (see Electric Case Removal) and open the case (see Electric Case Disassemble).
- Remove:
  CDI Igniter [A]
  Regulator/Rectifier Mounting Bolts [B]
  Regulator/Rectifier [C]
- Disconnect:
  Regulator/Rectifier Lead Connectors

Regulator/Rectifier Installation



- Run the regulator/rectifier lead connector [A] and CDI igniter lead connector through the electric case hole, before installing the regulator/rectifier [B].
- Apply a non-permanent locking agent to the following bolts, and tighten them.

Torque - Regulator/Rectifier Mounting Bolts [C]: 8.8 N·m (0.9 kgf·m, 78 in·lb)
Electric Case Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)

Regulator/Rectifier Inspection

- With a multimeter set to the × 1 kΩ range, test the regulator/rectifier according the following table.

Regulator/Rectifier Resistance

	Tester (+) Lead Connection						
(–)*	Terminal	Red	Red/Purple	Brown	Brown	Black	Black
	Red	—	0	18 ~ 110	18 ~ 110	15 ~ 80	15 ~ 80
	Red/Purple	0	—	18 ~ 110	18 ~ 110	15 ~ 80	15 ~ 80
	Brown	1.0 ~ 6.0	1.0 ~ 6.0	—	30 ~ 160	18 ~ 110	18 ~ 110
	Brown	1.0 ~ 6.0	1.0 ~ 6.0	30 ~ 160	—	18 ~ 110	18 ~ 110
	Black	2.0 ~ 12	2.0 ~ 12	1.0 ~ 6.0	1.0 ~ 6.0	—	0
	Black	2.0 ~ 12	2.0 ~ 12	1.0 ~ 6.0	1.0 ~ 6.0	0	—

(–)*: Tester (–) Lead Connection

★If any of the values obtained do not agree with the above table, the regulator/rectifier must be replaced.

Ignition System

⚠ WARNING

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

CAUTION

Do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent CDI igniter.

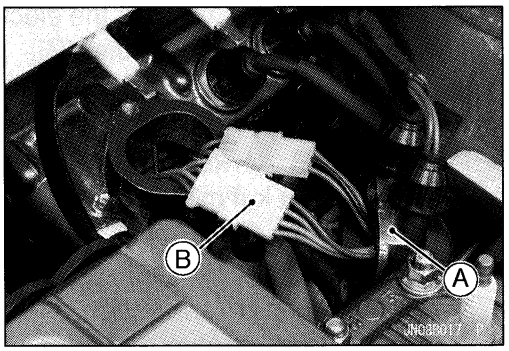
Crankshaft Sensor Inspection

- Remove the electric case connector [A].
- Disconnect the 4-pin connector [B].
- Set the hand tester to the × 100 Ω range, zero it, and connect it to the crankshaft sensor lead terminals (Green and Blue) in the connector.

Special Tool - Hand Tester: 57001-1394

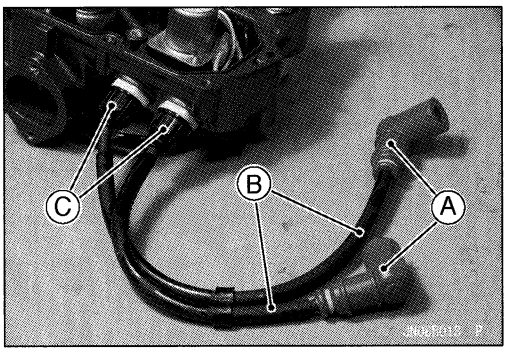
★If there is more resistance than the specified value, the coil has an open lead and must be replaced. Much less than this resistance means the coil is shorted, and must be replaced.

Crankshaft Sensor Resistance
Standard: 396 ~ 594 Ω

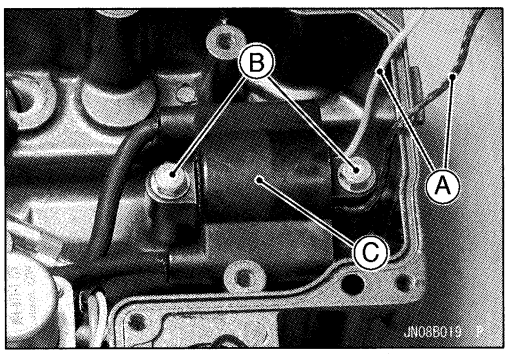


Ignition Coil Removal

- Open the electric case (see Electric Case Disassembly).
- Pull the spark plug cap [A], and slide off the protector tubes [B].
- Unscrew the grommet caps [C] and slide off the grommets. Lubricate the leads with a penetrating rust inhibitor.



- Disconnect the ignition coil primary lead connectors [A].
- Unscrew the ignition coil mounting bolts [B] and remove the ignition coil [C].



Ignition System

Ignition Coil Installation

- Apply a non-permanent locking agent to the ignition coil mounting bolts and tighten them.

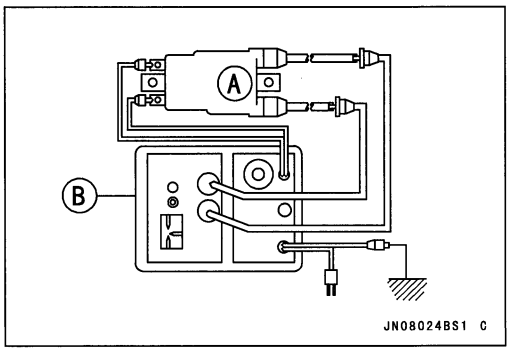
Torque - Ignition Coil Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)

Ignition Coil Inspection

Measuring arcing distance:

The most accurate test for determining the condition of the ignition coil is made by measuring arcing distance.

- Remove the ignition coil.
- Connect the ignition coil [A] (with the spark plug cap left installed on the spark plug lead) to the tester [B], and measure the arcing distance.



⚠ WARNING

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

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

3 Needle Arcing Distance
Standard: 7 mm (0.28 in.) or more

- To determine which part is defective, measure the arcing distance again with the spark plug caps removed from the ignition coil.

★If the arcing distance is subnormal as before, the trouble is with the ignition coil itself. If the arcing distance is now normal, the trouble is with the spark plug caps.

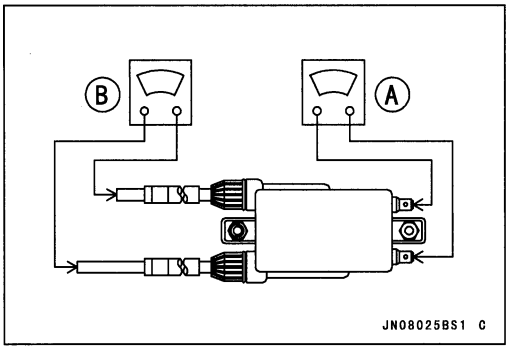
Ignition System

Measuring coil resistance:

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

- Disconnect the primary leads from the coil terminals.
- Measure the primary winding resistance as follows [A].
  - Connect the tester between the coil terminals.
  - Set the tester to the × 1 Ω range, and read the tester.
- Measure the secondary winding resistance as follows [B].
  - Remove the plug caps by turning them counterclockwise.
  - Connect the tester between the spark plug leads.
  - Set the tester to the × 100 Ω range, and read the tester.

★If the hand tester does not read as specified, replace the coil.



Winding Resistance

Standard: Primary windings 0.08 ~ 0.1 Ω
Secondary windings 3.5 ~ 4.7 kΩ

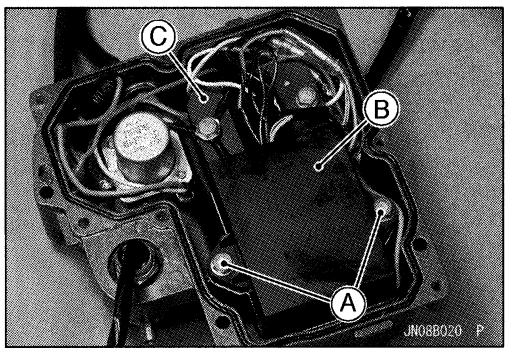
★If the tester reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.

- Check the spark plug lead for visible damage.

★If the spark plug lead is damaged, replace the coil.

CDI Igniter Removal

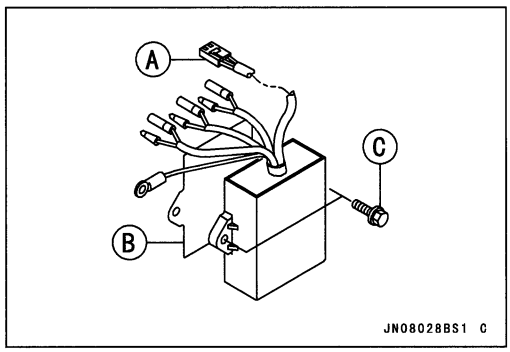
- Remove the electric case (see Electric Case Removal) and open the case (see Electrical Case Disassembly).
- Remove:
  CDI Igniter Mounting Bolts [A]
  CDI Igniter [B] and Plate
  Regulator/Rectifier [C]
- Disconnect:
  CDI Igniter Lead Connectors



CDI Igniter Installation

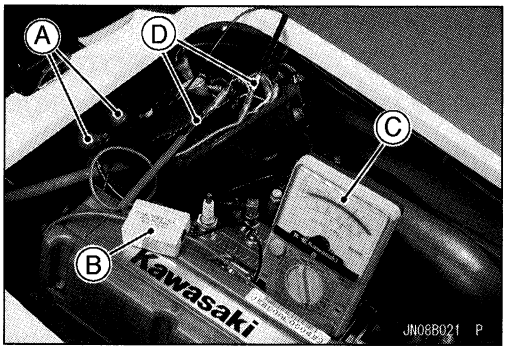
- Run the CDI igniter lead connector [A] and regulator/rectifier lead connector through the electric case hole, before installing the regulator/recifier.
- Install:
  Plate [B]
- Apply a non-permanent locking agent to the following bolts, and tighten them.

Torque - CDI Igniter Mounting Bolts [C]: 8.8 N·m (0.9 kgf·m, 78 in·lb)
Electric Case Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



Ignition System

Ignition Coil Primary Peak Voltage Inspection



NOTE

o *Be sure the battery is fully charged.*

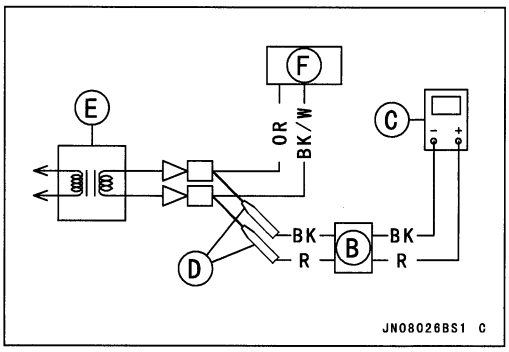
- Remove the electric case (see Electric Case Removal) and open the case (see Electric Case Disassembly).
- Pull all the spark plug caps from the spark plugs and push the caps [A] fully onto the spark plug cap holder.

NOTE

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

- Install a commercially available peak voltage adapter [B] to the hand tester [C] and needle adapter set [D].
- Connect the adapter between the BK/W and R leads in the ignition coil primary lead connector.

[E] Ignition Coil
[F] CDI Igniter



Recommended Tool: Peak Voltage Adapter
Type: KEK-54-9-B
Brand: KOWA SEIKI

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

Hand Tester Range: 250 V DC

Primary Lead Connections:

Ignition Coil		Adapter		Tester
BK/W	←→	R	←→	(+)
OR	←→	BK	←→	(–)

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Push the lanyard key under the stop switch and position the starter interlock switch to the right.
- Pushing the starter switch, crank the engine 4 ~ 5 seconds to measure the primary peak voltage.

o Do not operate the starter for longer than 5 seconds. Wait 15 seconds before using it again.

- Repeat the measurements 5 or more times.

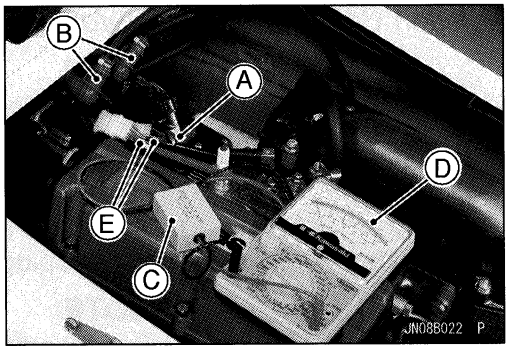
Ignition Coil Primary Peak Voltage
Standard: 150 V or more

★If the reading is less than the specified value, check the following.
Ignition Coil (see Ignition Coil Inspection)
Crankshaft Sensor (see Crankshaft Sensor Inspection)

★If the ignition coil and crankshaft sensor are good condition, replace the CDI igniter.

Ignition System

Crankshaft Sensor Peak Voltage Inspection



NOTE

o *Be sure the battery is fully charged.*

- Remove:
  Electric Case Connector [A]
- Pull all the spark plug caps from the spark plugs and push the caps [B] fully onto the spark plug cap holders.

NOTE

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

- Connect a commercially available peak voltage adapter [C] to the hand tester [D] and needle adapter set [E].

Recommended Tool: Peak Voltage Adapter
Type: KEK-54-9-B
Brand: KOWA SEIKI

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

Hand Tester Range: 10 V DC

- Connect the adapter between the G and BL leads in the crankshaft sensor lead connector.

Crankshaft Sensor		Adapter		Tester
G	←→	BK	←→	(–)
BL	←→	R	←→	(+)

- Push the lanyard key under the stop switch and position the starter interlock switch to the right.
- Pushing the starter switch, crank the engine 4 ~ 5 seconds to measure the crankshaft sensor peak voltage.

o Do not operate the starter for longer than 5 seconds. Wait 15 seconds before using it again.

- Repeat the measurements 5 or more times.

Crankshaft Sensor Peak Voltage
Standard: 3.0 V or more

★If the reading is less than the specified value, check the crankshaft sensor (see crankshaft sensor Inspection).

Spark Plug Removal

- Pull off the spark plug caps.
- Unscrew the spark plugs.

o Be careful to avoid breaking the ceramic on the spark plugs.

Spark Plug Installation

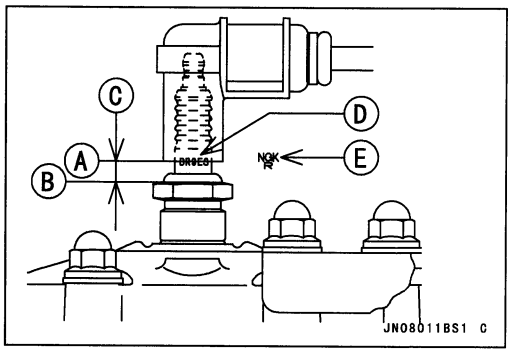
- Be sure the spark plug threads are clean and dry.
- Tighten:

Torque - Spark Plugs: 27 N·m (2.8 kgf·m, 20 ft·lb)

o Be careful to avoid breaking the ceramic on the spark plugs.

Ignition System

- Install the spark plug cap onto the spark plug securely.
  - Push the cap onto the plug so that the distance between the lower end [A] of the cap and the upper surface [B] of the plug hexagonal nut is 6 mm (0.24 in.) [C].



NOTE

- *For easier correct installation of the spark plug cap, push the cap onto the plug until the figures "BR8ES" [D] printed on the plug are half covered with the cap or the figures "NGK" [E] of "NGK/R" are completely covered.*

Spark Plug Inspection

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

Spark Plug Adjustment

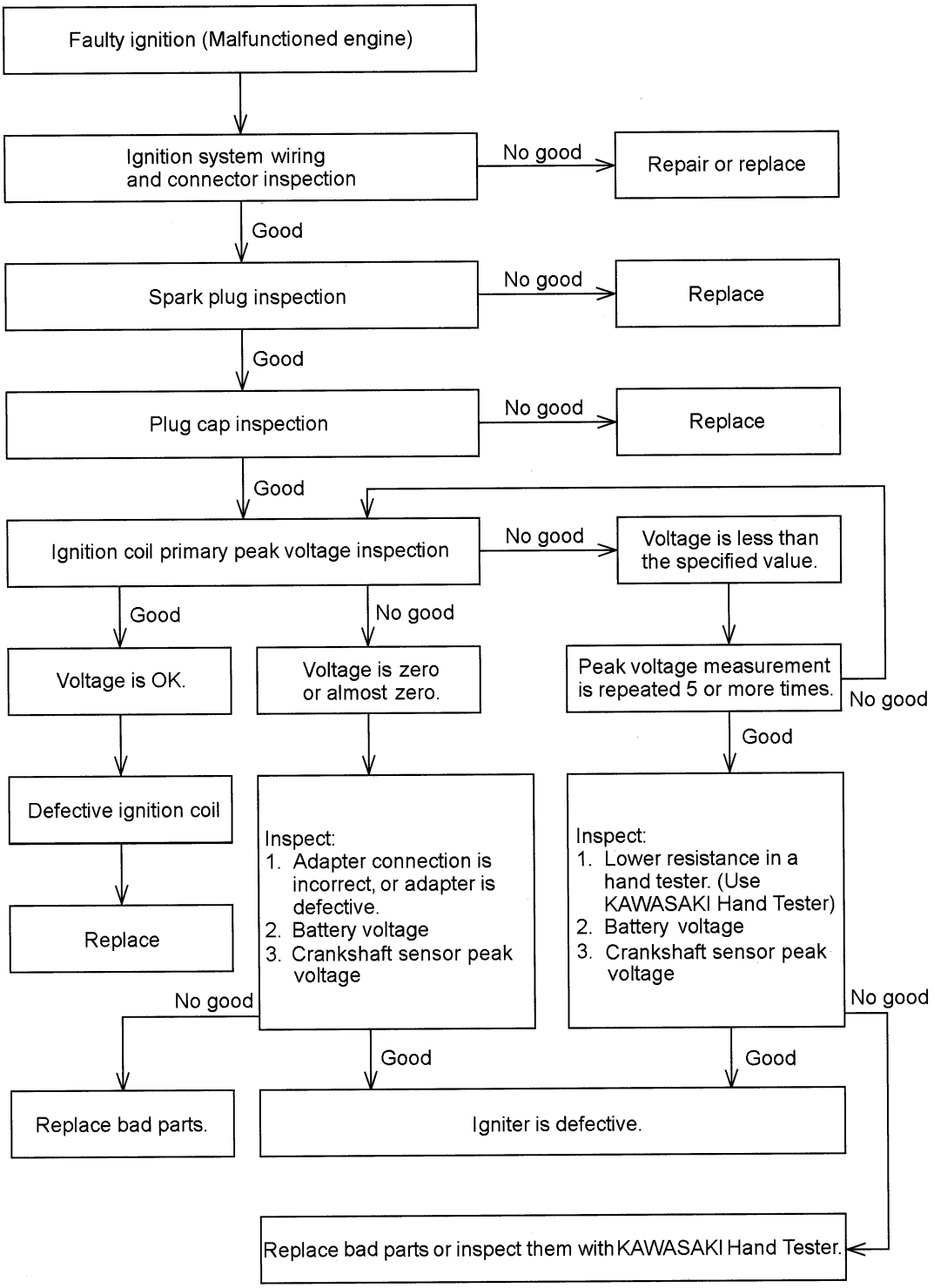
- Refer to the Spark Plug Adjustment in the Periodic Maintenance chapter.

Spark Plug Cleaning

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

Ignition System

Ignition System Troubleshooting

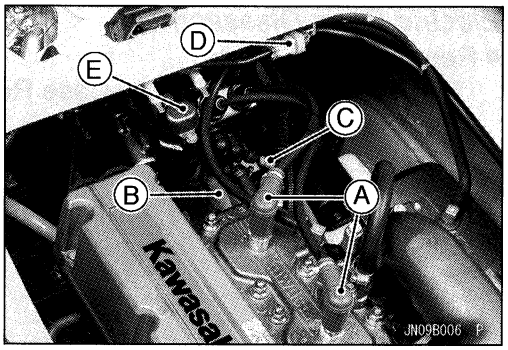


JN08027B F

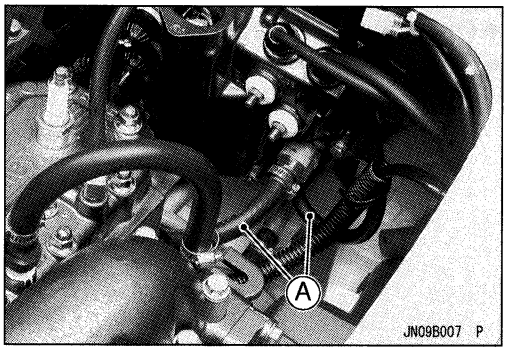
Electric Case

Electric Case Removal

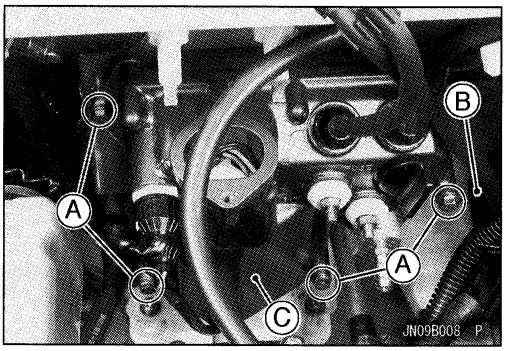
- Remove:
  Battery Cable (–) (see Battery Removal)
  Spark Plug Caps [A]
  Battery Cable (+) [B]
  Starter Motor Cable [C]
  Starter and Stop Switch Lead Connector [D]
  Electric Case Connector [E]
  4-pin and 3-pin Connectors



- Remove:
  Temperature Sensor Hoses [A]



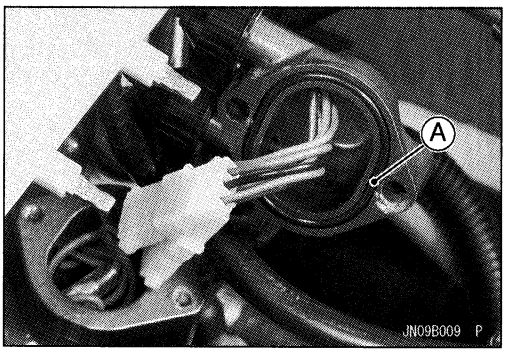
- Remove:
  Electric Case Mounting Bolts [A] and Clamp [B]
  Electric Case [C]



Electric Case Installation

- Apply a light coating of water resistance grease to the electric case connector O-ring [A].
- Apply a non-permanent locking agent to the electric case mounting bolts and tighten them.

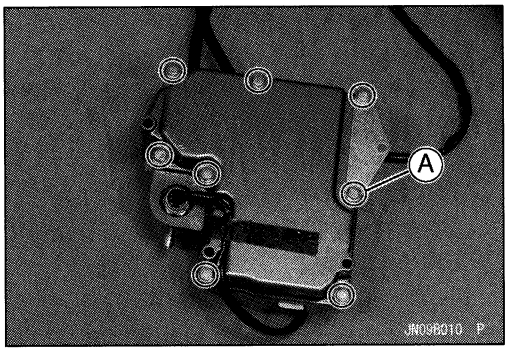
Torque - Electric Case Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



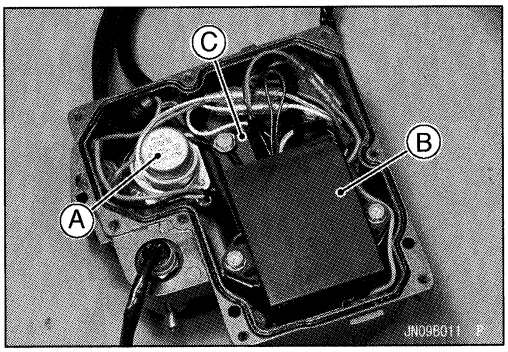
Electric Case

Electric Case Disassembly

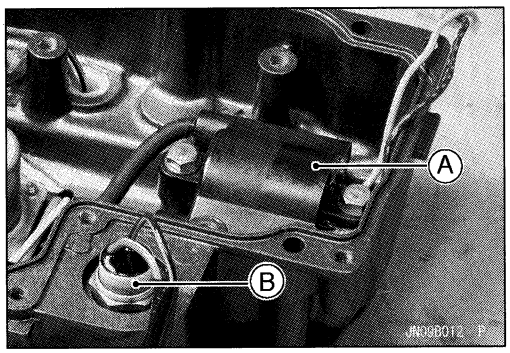
- Remove:
  Electric Case (see Electric Case Removal)
  Electric Case Bolts [A]



- Open the electric case.
- Remove:
  Starter Relay [A]
  CDI Igniter [B]
  Regulator/Rectifier [C]



- Remove:
  Ignition Coil [A]
  Temperature Sensor [B] (see Temperature Sensor Removal)



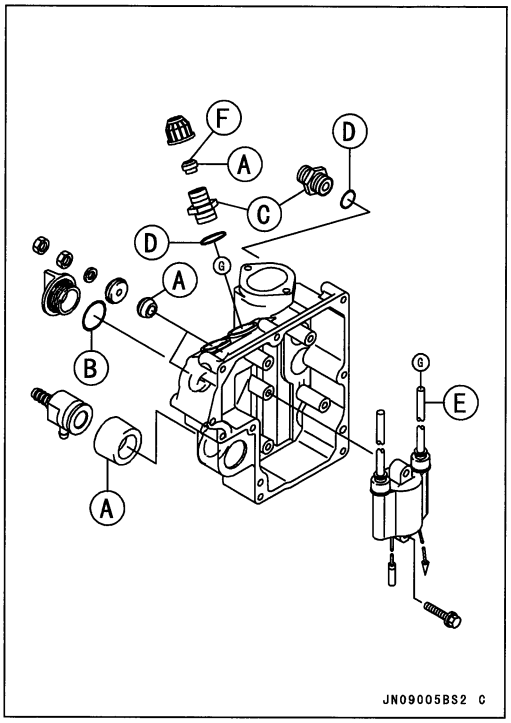
Electric Case

Electric Case Assembly

- Apply water resistance grease to the grommets [A] and O-ring [B].
- When installing the joints [C], apply water resistance grease to the O-ring [D] and tighten it.

  Torque - Joints: 3.9 N·m (0.4 kgf·m, 35 in·lb)

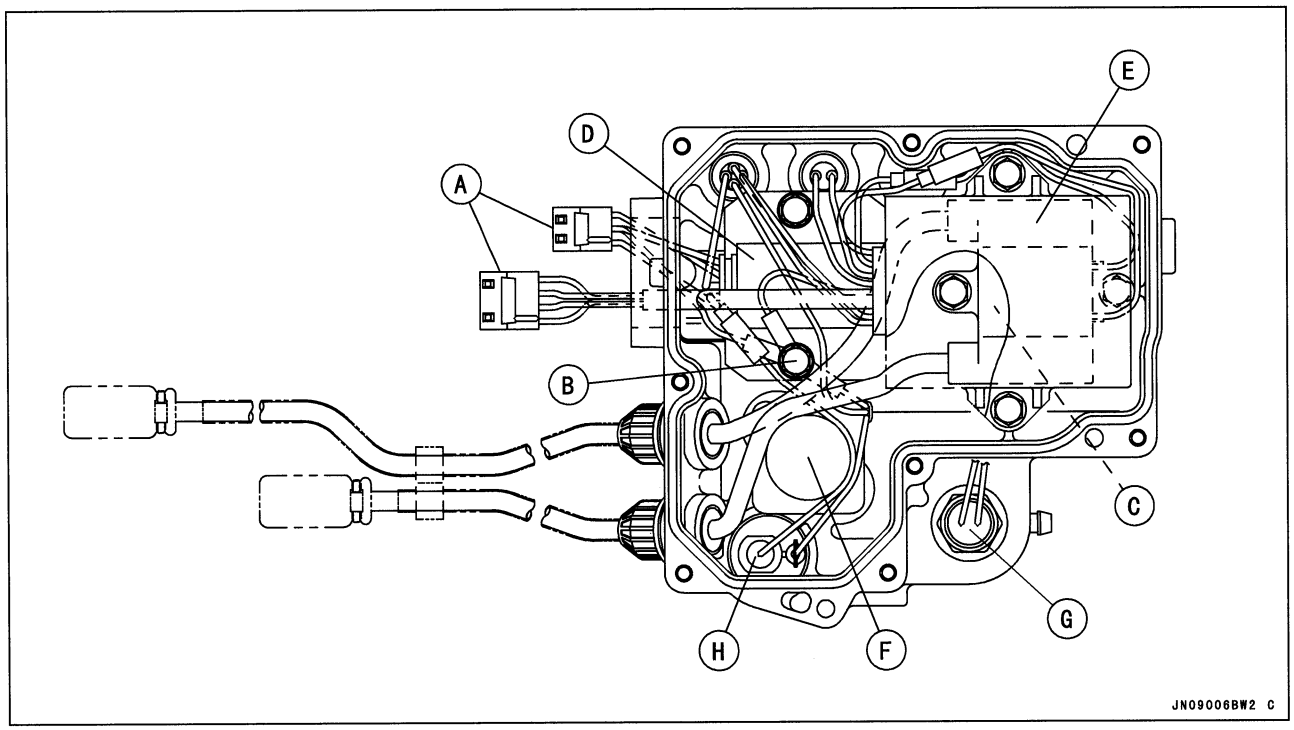
- When inserting the spark plug leads [E] of ignition coil into the grommets, apply silicone grease to the inside [F] of the grommets.



Electric Case

- Run the lead connectors [A] of the igniter and regulator/rectifier through the electric case hole, before installing the regulator/rectifier.
- Connect the ground lead (black) terminals of the regulator/rectifier, igniter and starter relay to the regulator/rectifier mounting bolt [B].
- Install:
  Ignition Coil [C] (see Ignition Coil Installation)
  Regulator/Rectifier [D] (see Regulator/Rectifier Installation)
  CDI Igniter [E] (see CDI Igniter Installation)
  Starter Relay [F] (see Starter Relay Installation)
  Temperature Sensor [G] (see Temperature Sensor Installation)
  Fuse Assembly [H]
- Apply a non-permanent locking agent to the following bolts and tighten them.

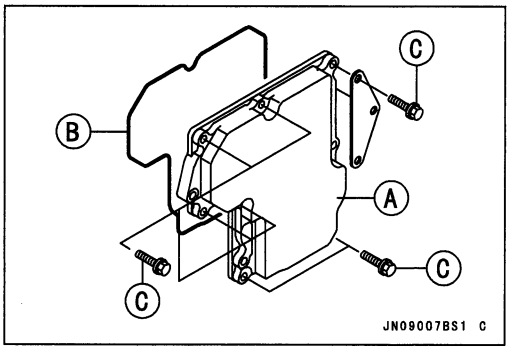
Torque - Regulator/Rectifier Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)
CDI Igniter Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)
Ignition Coil Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)



Electric Case

- When assembling the electric case [A], be careful not to pinch leads between electric cases. At this time, apply grease to the O-ring [B] to assemble easily.

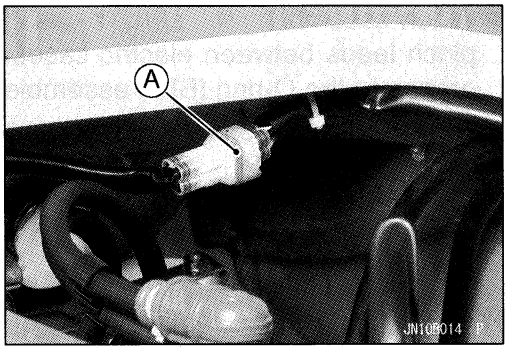
  Torque - Electric Case Bolts [C]: 8.8 N·m (0.9 kgf·m, 78 in·lb)



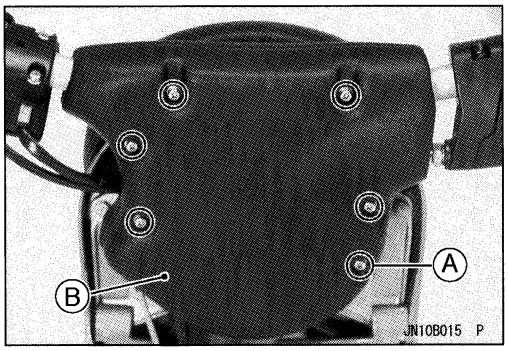
Switches

Start/Stop Switch Removal

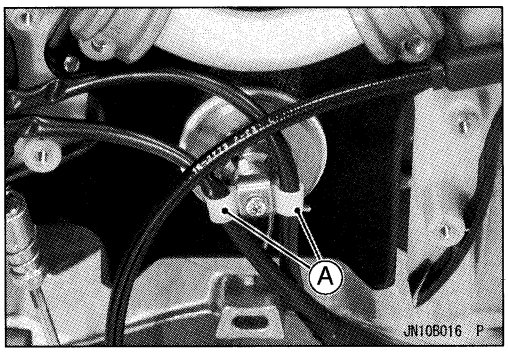
- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Start/Stop Switch Lead Connector [A]



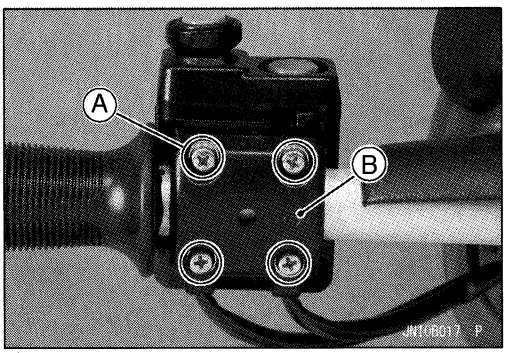
- Remove:
  Handlebar Pad Screws [A]
  Handlebar Pad [B]



- Remove:
  Wiring Clamps [A]

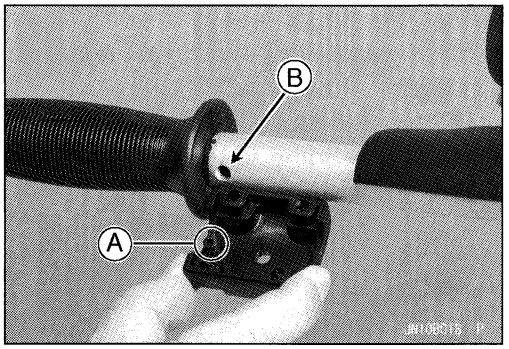


- Carefully pull the start/stop switch wiring up through the handle pole.
- Remove:
  Switch Case Mounting Screws [A]
  Switch Case [B]



Switches

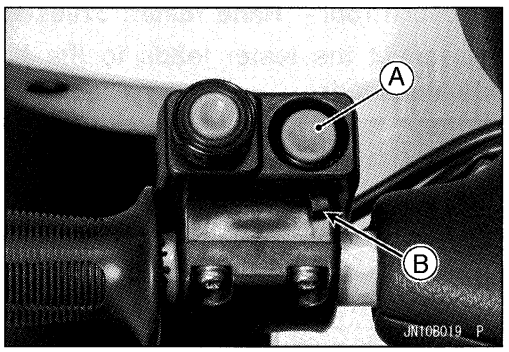
Start/Stop Switch Installation



o The switch case mounting clamp has an indexing dowel [A].
● Position the dowel in the handlebar hole [B].

● Be certain the start/stop switch winding does not interfere with throttle cable or choke cable movement when the handlebar is moved.

Start/Stop Switch Inspection



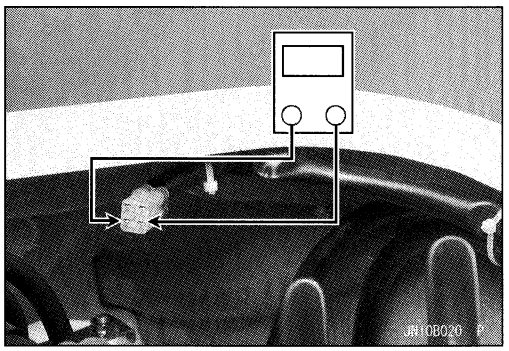
● Examine the start/stop switch case and wiring.
★If the switch case is broken or damaged in any way, replace the switch assembly.
★If the wiring is damaged, repair it or replace the switch assembly.
● Test the start switch [A].
o Set a hand tester to the × 1 Ω range.

Special Tool - Hand Tester: 57001-1394

o Connect the tester leads to the red/blue and yellow/red start switch leads.
o Position the starter interlock switch [B] to the right.
o Check switch resistance with the start button released, and with the start button depressed.

Start Switch Resistance

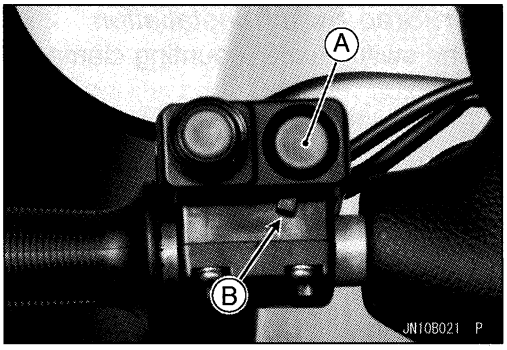
Start Button	Reading
Released	∞ Ω
Depressed	Almost 0 Ω



★If either meter reading is incorrect, replace the start/stop switch.

Switches

● Test the starter interlock switch.
○ Repeat the start switch [A] test with the starter interlock switch [B] to the left.
○ Both meter readings should be ∞ Ω.
★ If either reading is less than ∞ Ω, replace the start/stop switch.



● Test the stop switch [A].
○ Push the lanyard key [B] under the stop switch.
○ Set a hand tester to the × 1 Ω range.

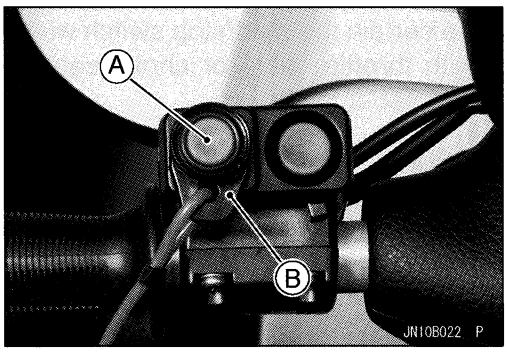
Special Tool - Hand Tester: 57001-1394

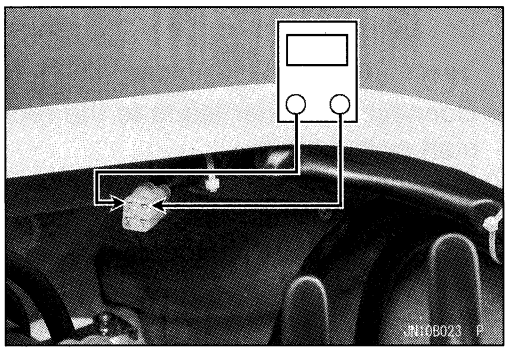
○ Connect the tester leads to the black and white stop switch leads.
○ Check switch resistance with the stop button released, and with the stop button depressed.

Stop Switch Resistance

Stop Button	Reading
Released	∞ Ω
Depressed	Almost 0 Ω

★ If either meter reading is incorrect, replace the start/stop switch.





Temperature Sensor

A temperature sensor is installed on the bypass hose. Whenever the cooling water temperature rises to 95 °C (203 °F) or higher, the contacts in the temperature sensor does and the igniter works to cut spark intermittently. The engine speed decreases to 3 500 rpm.

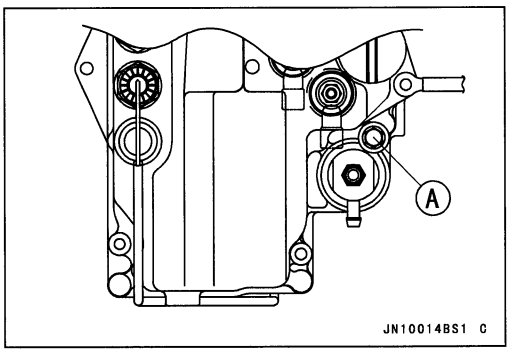
If the watercraft slows down even with the throttle on and the engine running, return to shore immediately and check the cooling system for clogging.

CAUTION

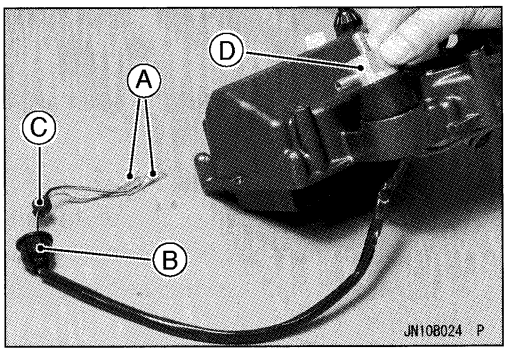
If the watercraft slows down while running, return to the shore immediately. Overheating will cause severe engine and exhaust system damage. Do not operate the craft until the source of the problem is found and correct.

Temperature Sensor Removal

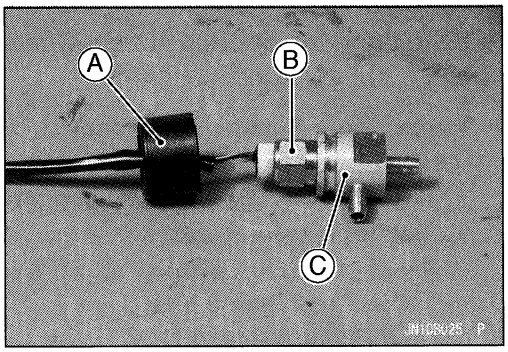
- Open the electric case (see Electric Case Removal/Disassembly).
- Remove:
  Temperature Sensor Mounting Bolt [A] and Washer



- Disconnect the temperature sensor leads [A] (B/Y and R/Y).
- Unscrew the grommet cap [B], and slide off the grommet [C].
- Pull off the temperature sensor assembly [D] out of the electric case.



- Slide off the rubber cap [A], and unscrew the temperature sensor [B] from the holder [C].

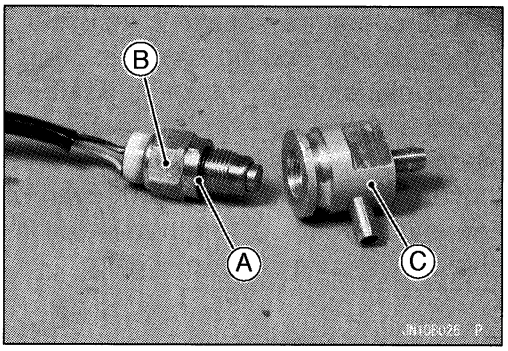


Temperature Sensor

Temperature Sensor Installation

- Be sure the O-ring [A] is in place.
- Install the temperature sensor [B] in the holder [C].
- Tighten:

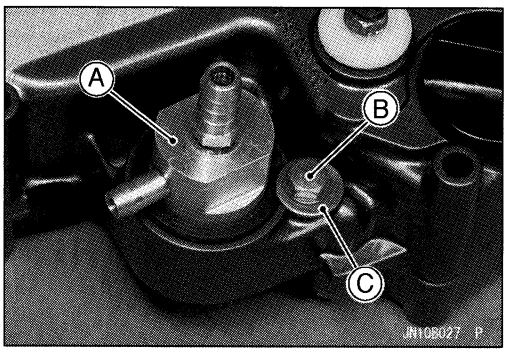
Torque - Temperature Sensor: 27 N·m (2.8 kgf·m, 20 ft·lb)



- Be sure holder assembly [A] is in the position, as shown.
- Apply a non-permanent locking agent to the temperature sensor mounting bolt [B], and tighten it.

[C] Washer

Torque - Temperature Sensor Mounting Bolt: 8.8 N·m (0.9 kgf·m, 78 in·lb)



Temperature Sensor Inspection

- Remove the temperature sensor (see Temperature Sensor Removal).
- Suspend the sensor [A] in a container of water so that the temperature sensing protection is submerged.
- Suspend a thermometer [B] in the water.

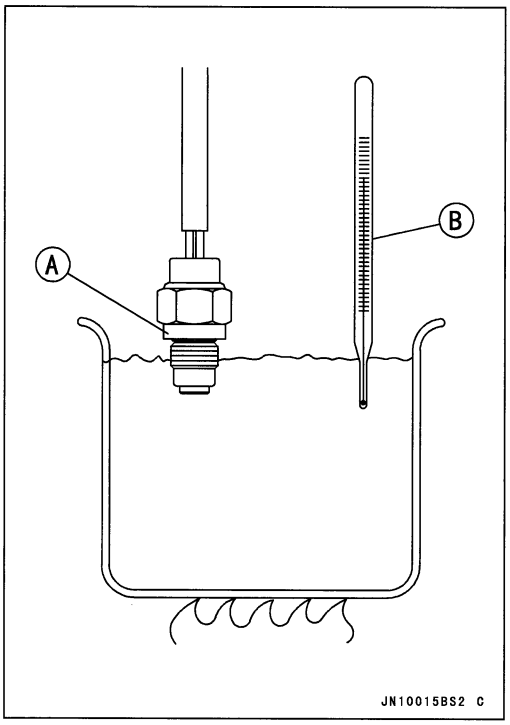
NOTE

○ *The sensor and thermometer must not touch the container sides or bottom.*

- Place the container over a source of heat and gradually rise the temperature of the water while stirring gently.
- Using the hand tester, measure the internal resistance of the switch across the connectors at the temperatures shown in the table.

Special Tool - Hand Tester: 57001-1394

★If the hand tester does not show the specified values, replace the sensor.



Temperature Sensor Resistance

○ **Rising temperature:**

From OFF to ON at 90 ~ 100°C (194 ~ 212°F)

○ **Falling temperature:**

From ON to OFF within 7°C (45°F) of "ON" temperature

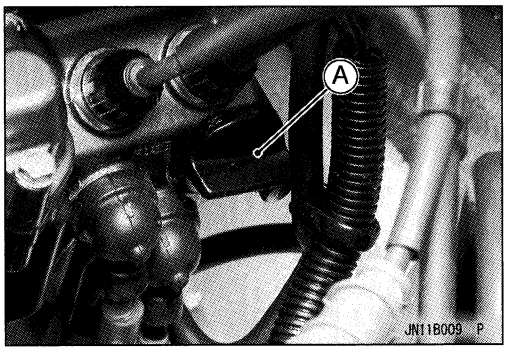
ON: Less than 0.5 Ω

OFF: More than 1 MΩ

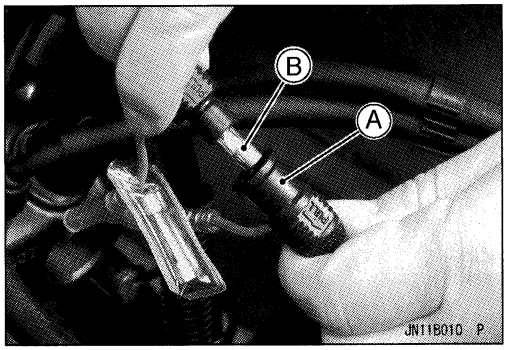
Fuse

Fuse Inspection

- Remove:
  Engine Hood (see Hull/Engine Hood chapter)
  Fuse Plug [A]



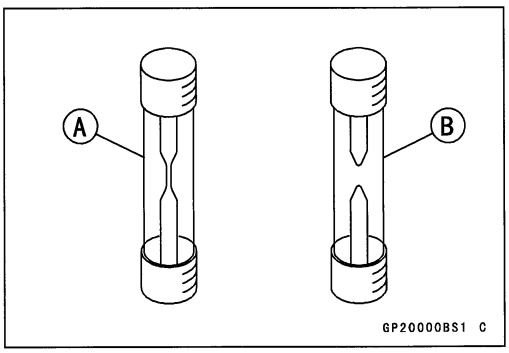
- Pull the cap [A], and take out the fuse [B] (10 A).



- Inspect the fuse element.

★If it 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.

[A] Normal
[B] Failed



CAUTION

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.

Storage

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Preparation for Storage

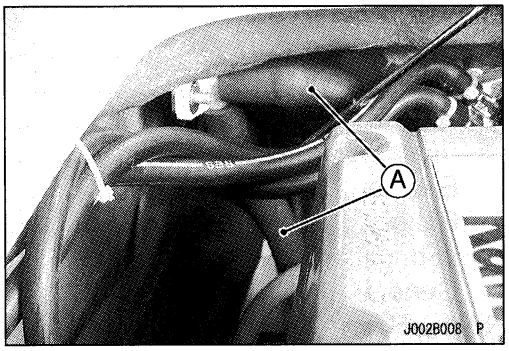
During the winter, or whenever the watercraft will not be in use for a long period of time, proper storage is essential. It consists of checking and replacing missing or worn parts; lubricating parts to ensure that they do not become rusted; and, in general, preparing the watercraft so that when the time comes to use it again, it will be in top condition.

Cooling System

- Clean the cooling system (see Cooling System Flushing in the Periodic Maintenance chapter).

Bilge System

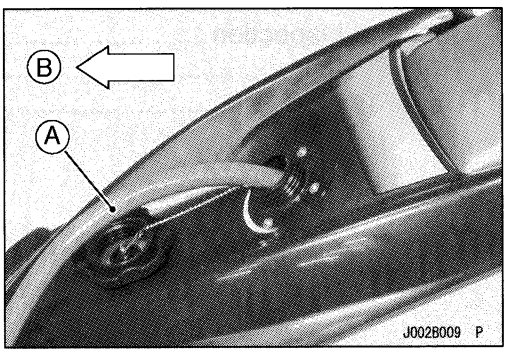
- Clean the bilge system (see Bilge System Flushing in the Periodic Maintenance chapter). Before reconnecting the hoses to the plastic breather fitting, blow air through both hoses [A] to force all water out of the bilge system.



Fuel System

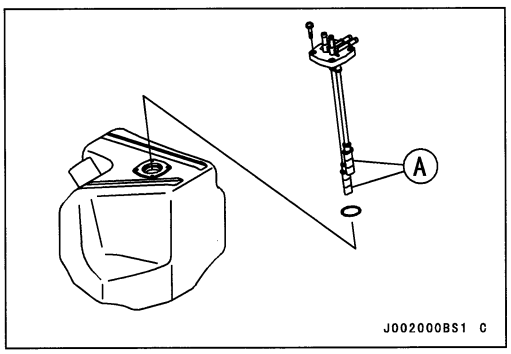
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Pull the lanyard key off the stop button. 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.



- Drain the fuel tank. This should be done with a siphon or pump.
  Siphon Hose [A]
  Bow [B]

- Clean the filter screens [A] (see Fuel Filter Screen Cleaning in the Periodic Maintenance chapter).
- Inspect/replace the fuel filters (see Fuel Filter Inspection in the Periodic Maintenance chapter).
- Leave the fuel filter cap loose to prevent condensation in the tank.



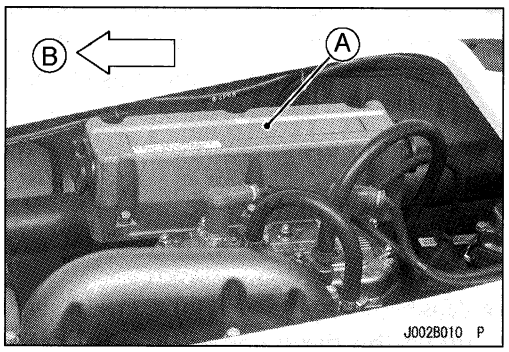
Preparation for Storage

- Turn the ignition switch on.
- Push the lanyard key under the stop button, and start the engine and run it in 15 second periods until all fuel in the carburetor is used up. Wait 5 minutes between 15 second running periods.
- Pull the lanyard key off the stop button and turn the ignition switch off.

CAUTION

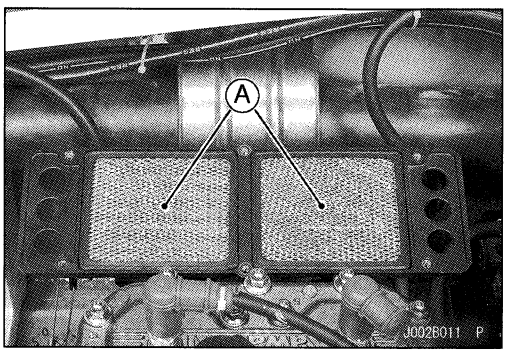
Do not run the engine without cooling water supply for more than 15 seconds, especially in high revolutionary speed, or severe engine and exhaust system damage will occur.

- Remove the air inlet cover [A] from the carburetor assembly.
  Bow [B]



- Lift out the flame arresters [A] and clean them, if necessary (see Flame Arrester Cleaning in the Periodic Maintenance chapter).
- Spray a penetrating rust inhibitor down the carburetor bore.
- Install the flame arresters.
- Reinstall the cover, apply a non-permanent locking agent to the threads of the air inlet cover bolts.

Torque - Air Inlet Cover Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)

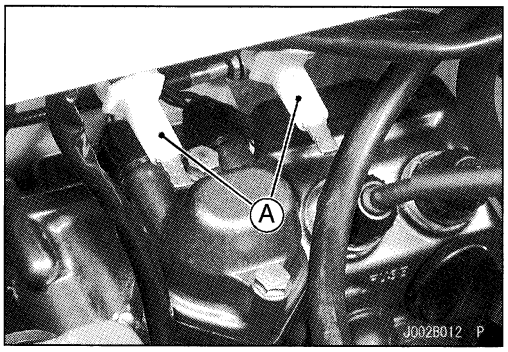


Engine

- Remove the spark plugs and push the plug caps fully onto the plug cap holders [A] on the rear of the engine compartment.
- Pour one ounce of motor oil into each cylinder.

CAUTION

Do not use too much oil, or the crank seals may be damaged when the engine is next started.



- Turn the ignition switch on.
- Push the lanyard key under the stop button. Turn the engine over several times with the start button to coat the cylinder walls with oil.
- Pull the lanyard key off the stop button and turn the ignition switch off.
- Reinstall the spark plugs and caps.

Preparation for Storage

Battery

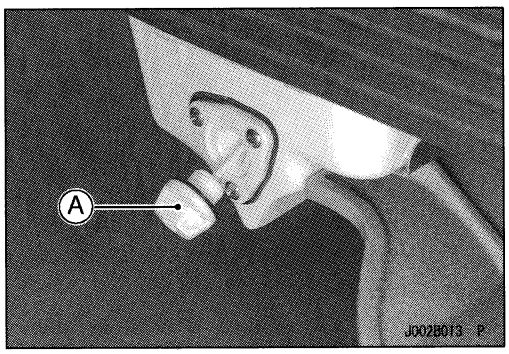
- Give a refresh charge before you store the watercraft and store it with the negative lead removed. Give a refresh charge once a month during storage.
- Remove the battery (see Battery Removal in the Electrical System chapter).
- Clean the exterior with a solution of baking soda and water (one heaping tablespoon of baking soda in one cup of water). Rinse thoroughly with water.
- Cover both battery terminals with grease.
- Store the battery in a cool, dry place. Do not expose it to freezing temperatures.

Lubrication

- Carry out all recommended lubrication procedures (see Lubrication in the Periodic Maintenance chapter).
- During the storage, lubricate the following with penetrating rust inhibitor as well.
  Steering Cable Joint Connector at Steering Nozzle

General

- Remove the engine hood (see Hull/Engine Hood chapter).
- Wash the engine compartment with fresh water and remove the drain screw [A] in the stern to drain the water. Wipe up any water left in the compartment.



CAUTION

Use only a mild detergent in water to wash the hull. Harsh solvents may attack the surface or smear the colors.

- Apply a good grade of wax to all exterior hull surfaces.
- Lightly spray all exposed metal parts with a penetrating rust inhibitor.
- Remove the engine hood or block the engine hood up with 10 mm spacers to insure adequate ventilation, and prevent corrosion.
- Cover the watercraft and store it in a clean, dry place.

Removal from Storage

Lubrication

- Carry out all recommended lubrication procedures (see Lubrication in the Periodic Maintenance chapter).

General Inspection

- Check for binding or sticking throttle, choke or steering mechanism. The throttle lever must return fully when released.
- Clean and gap spark plugs (see Spark Plug Cleaning and Spark Plug Adjustment in the Periodic Maintenance chapter).
- Check all rubber hoses for weathering a cracking or looseness.
- Check that the drain screw in the stern is securely tightened.
- Check the fire extinguisher for a full charge.
- Check the battery, charge if necessary, and clean the terminals.
- Install the battery (see Battery Installation in the Electrical System chapter).

Fuel System

- Check and clean or replace the fuel filter screens as necessary (see Fuel Filter Screen Cleaning in the Periodic Maintenance chapter).

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Pull the lanyard key off the stop button. Do not smoke. Make sure the area is well ventilated and free from any source of flame or spark; this includes any appliance with a pilot light.

- After refueling and before starting the engine, tilt the engine hood to the rear for several minutes to ventilate the engine compartment.

⚠ WARNING

A concentration of gasoline fumes in the engine compartment can cause a fire or explosion.

- Check for fuel leaks. Repair if necessary.
- Check the engine oil level. Fill the oil tank with the specified oil.

Removal from Storage

Test Run

⚠ WARNING

Do not run the engine in a closed area. Exhaust gases contain carbon monoxide, a colorless, odorless, poisonous gas. Breathing exhaust gas leads to carbon monoxide poisoning, asphyxiation, and death.

- Start the engine and run it only for 15 seconds. Check for fuel, oil and exhaust leaks. Any leaks must be repaired.

CAUTION

Do not run the engine without cooling water supply for more than 15 seconds, or severe engine and exhaust system damage will occur.

- Install the engine hood (see Hull/Engine Hood chapter), making sure it is locked.

Appendix

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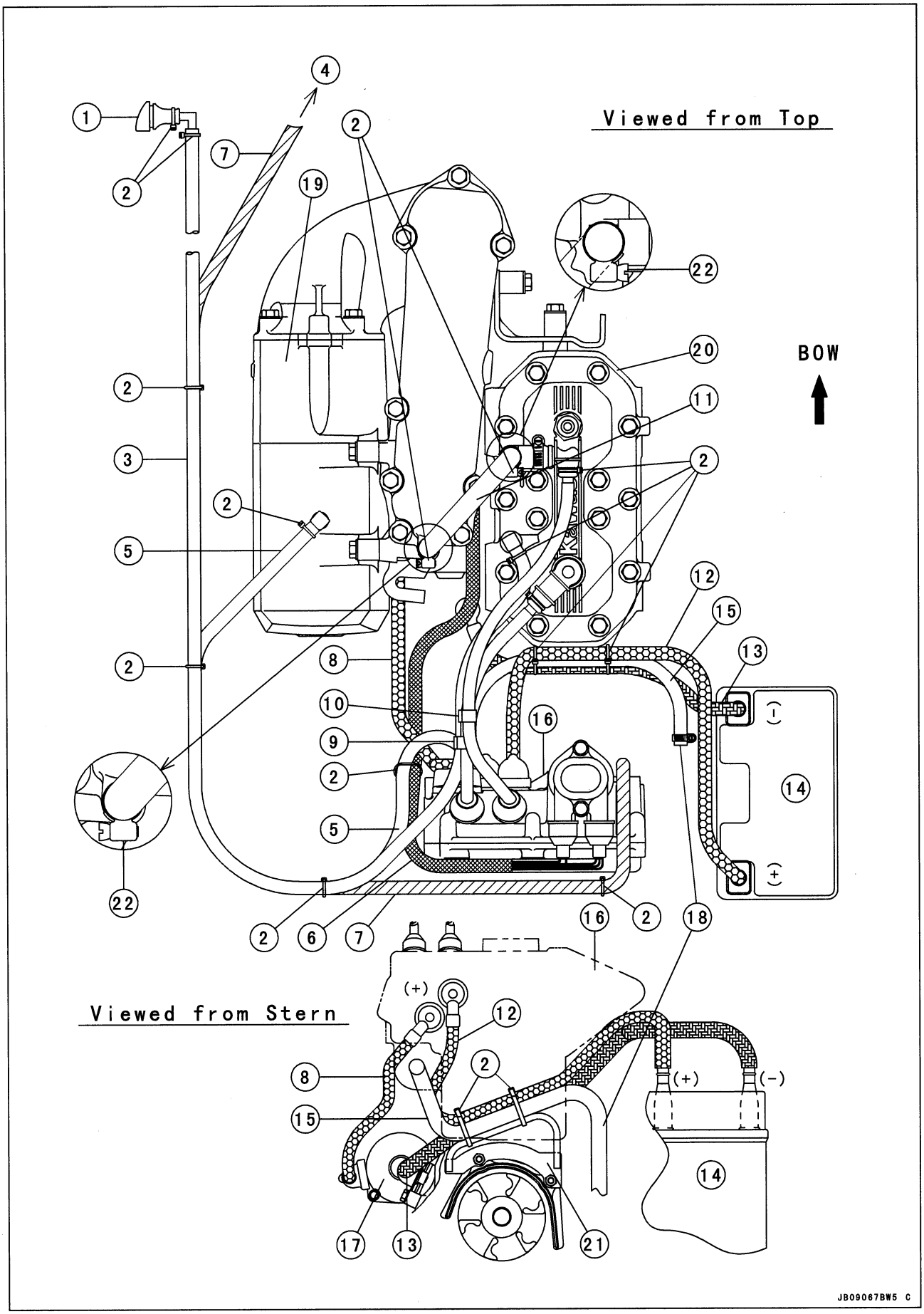
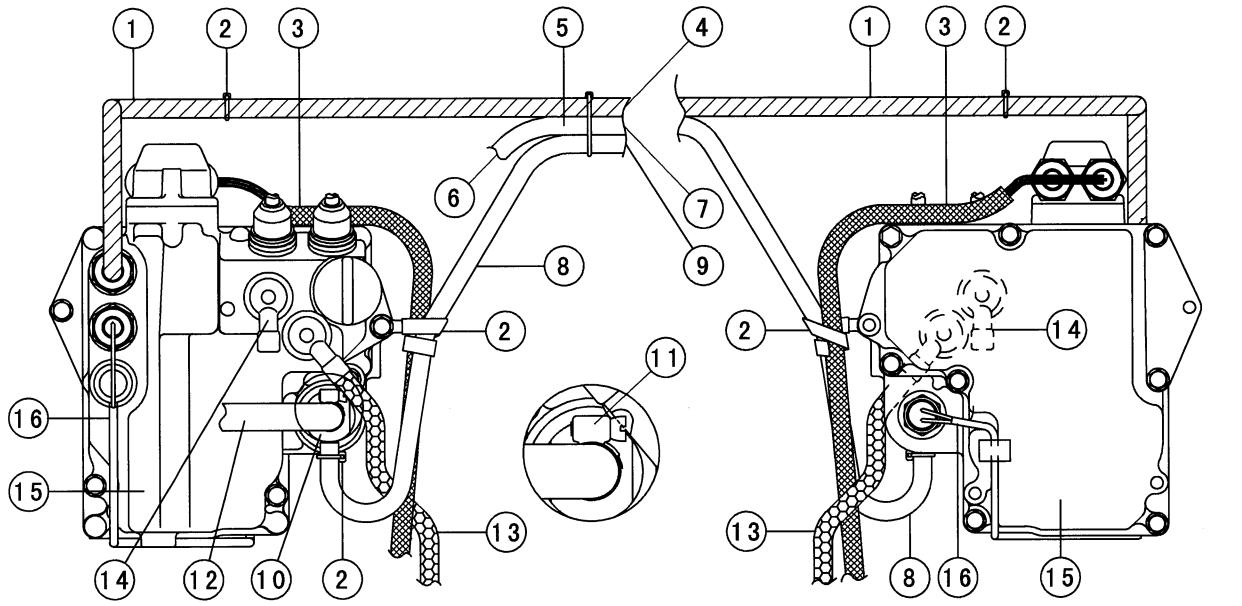
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

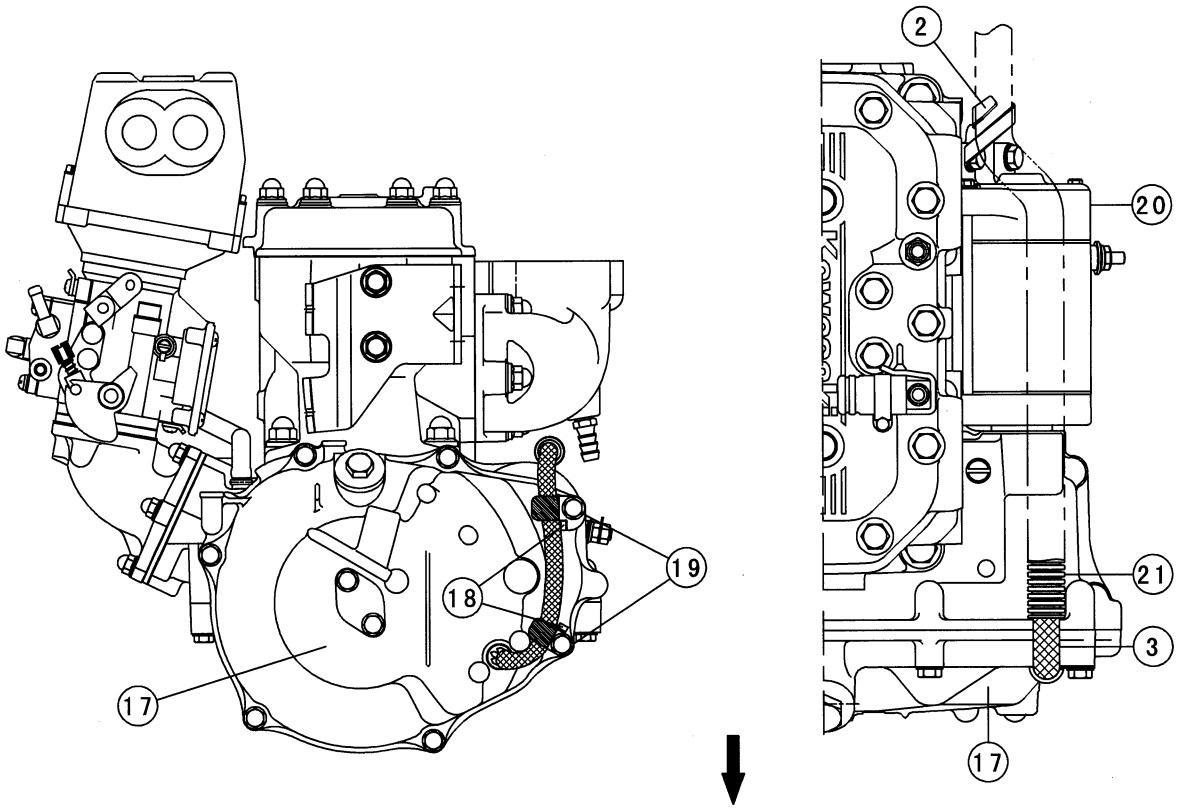
1. Bypass outlet
2. Clamp
3. Bypass cooling hose (Cylinder head ~ Bypass outlet)
4. To start/stop switch
5. Cooling hose (Water box muffler ~ Water temperature sensor)
6. Magneto leads
7. Start/stop switch leads
8. Starter motor cable
9. Clamp the bypass cooling hose and #2 spark plug lead.
10. Clamp the #1 and #2 spark plug leads.
11. Cooling hose (Cylinder head ~ Exhaust pipe)
12. Battery (+) cable
13. Battery (–) cable
14. Battery
15. Cooling hose (Water temperature sensor ~ Hull)
16. Electric case
17. Starter motor
18. To hull
19. Exhaust chamber
20. Cylinder head
21. Coupling cover
22. Position the clamp screws as shown.

Cable, Wire, and Hose Routing



Viewed from Bow

Viewed from Stern



Viewed from Bow

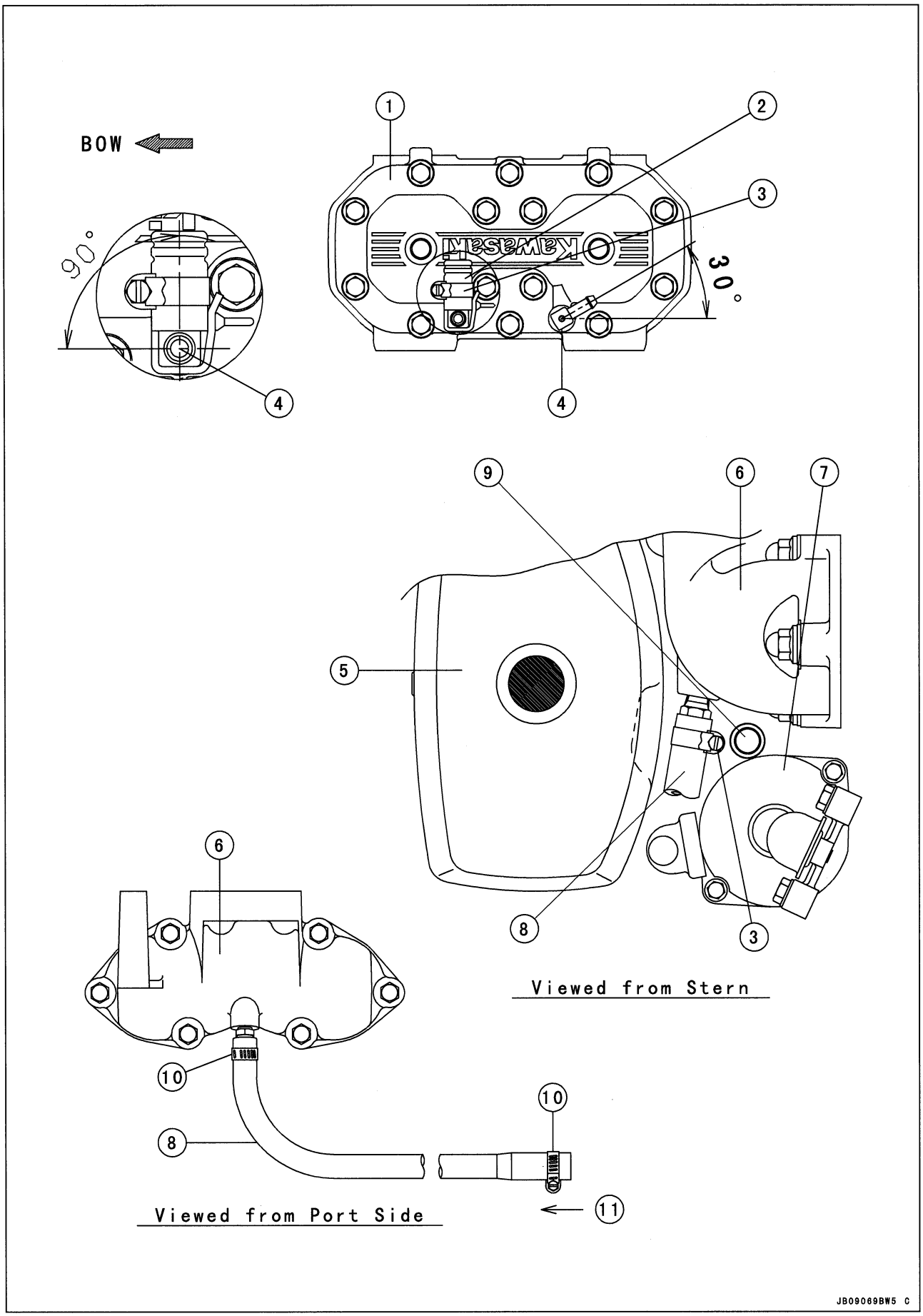
BOW

JB09068BW5 C

Cable, Wire, and Hose Routing

1. Start/stop switch leads
2. Clamp
3. Magneto leads
4. To start/stop switch
5. Bypass cooling hose
6. From cylinder head
7. To bypass outlet
8. Cooling hose
9. From water box muffler
10. Water temperature sensor
11. Position the clamp screw as shown.
12. To hull
13. Starter motor cable
14. Battery (+) cable
15. Electric case
16. Water temperature sensor leads
17. Magneto cover
18. Stopper
19. Be sure that the clamps touch the stoppers.
20. Starter motor
21. Protect tube

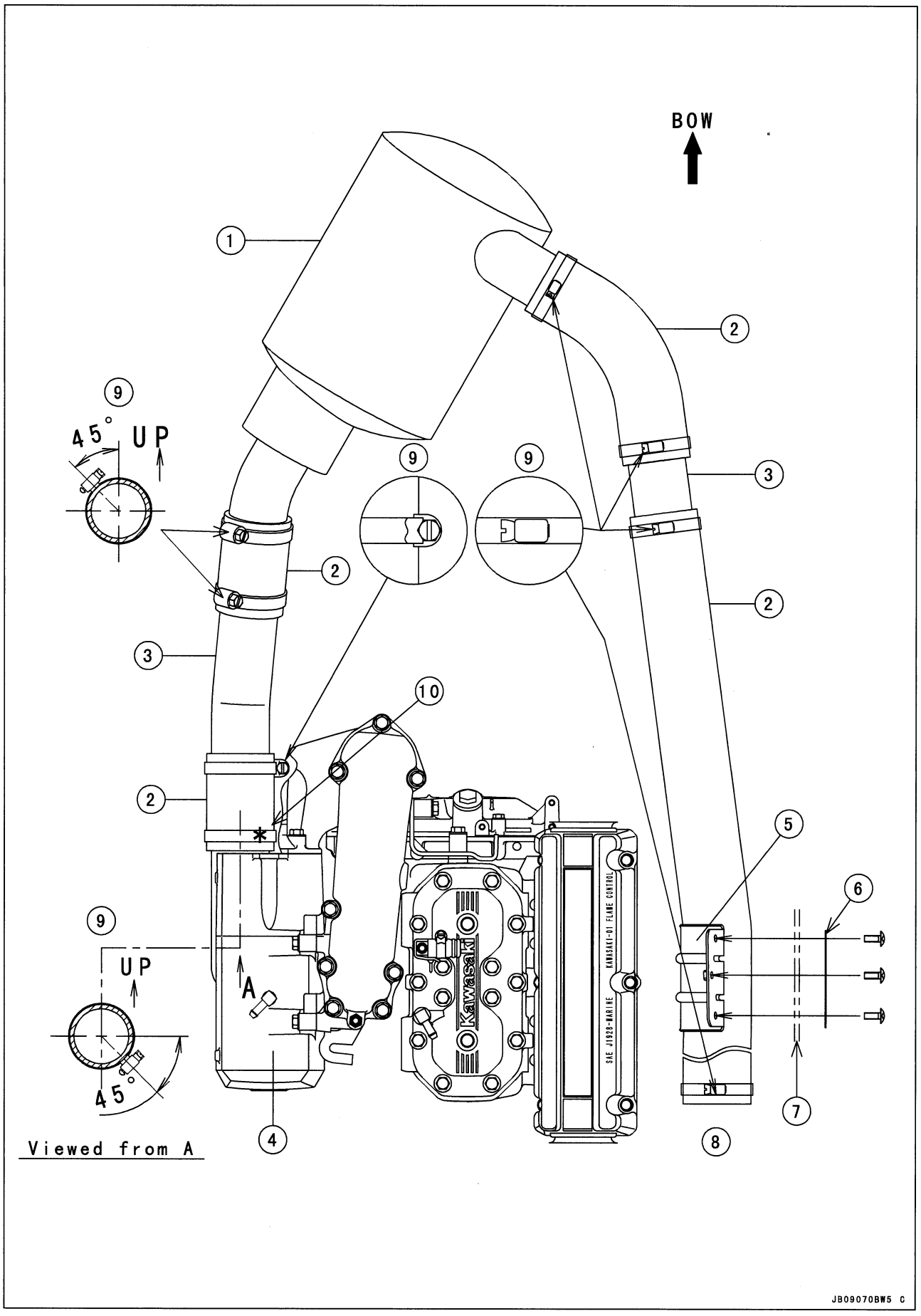
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Cylinder head
2. Cap
3. Position the clamp screw as shown.
4. Water pipe joint (Position as shown.)
5. Exhaust chamber
6. Exhaust manifold
7. Starter motor
8. Inlet cooling hose
9. Magneto leads
10. Clamp
11. Inlet cooling water from the pump

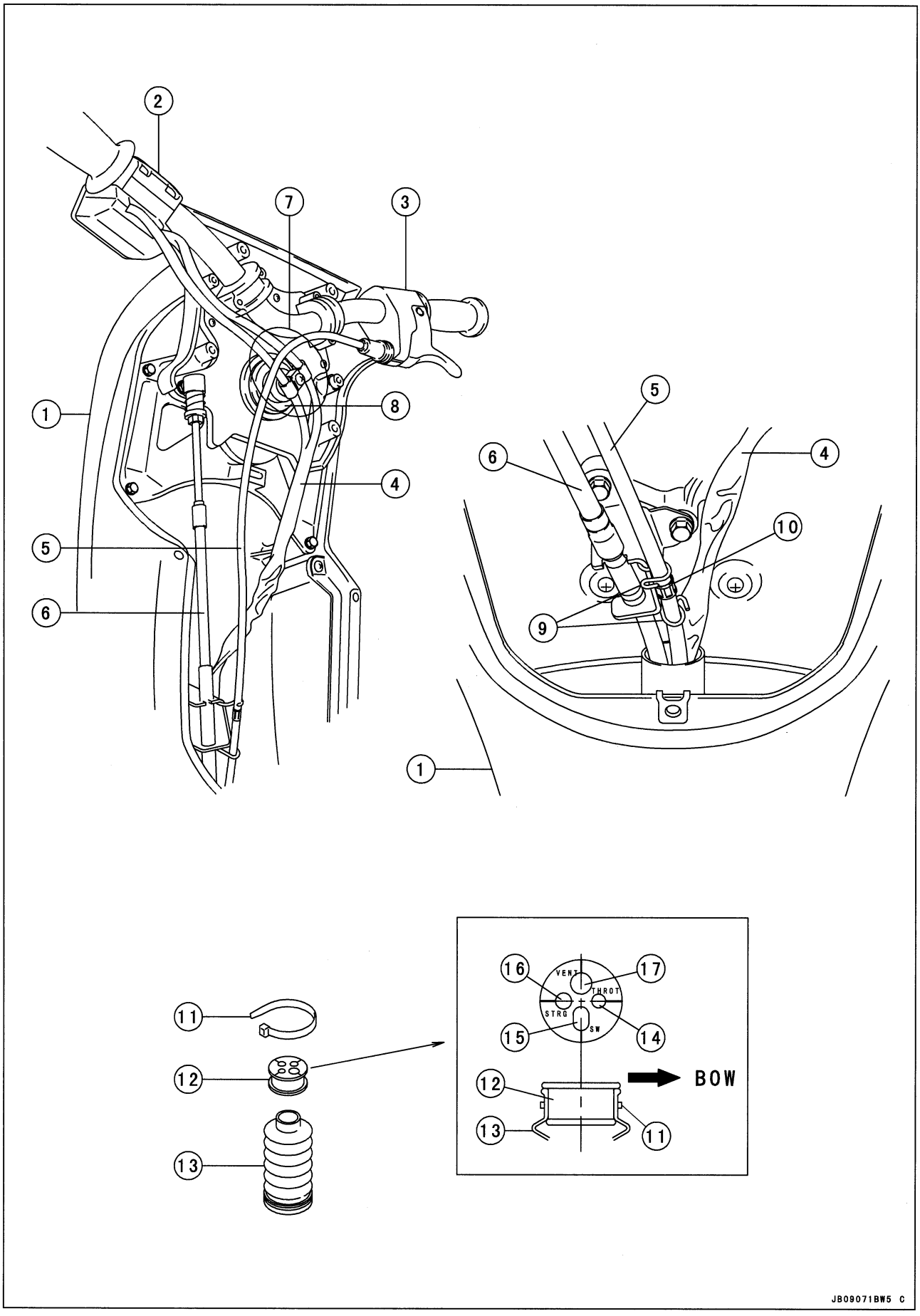
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Water box muffler
2. Exhaust tube
3. Exhaust pipe
4. Exhaust chamber
5. Bracket
6. Plate
7. Deck
8. To tail pipe
9. Position the clamp screw as shown.
10. Position the clamp screw to the mark.

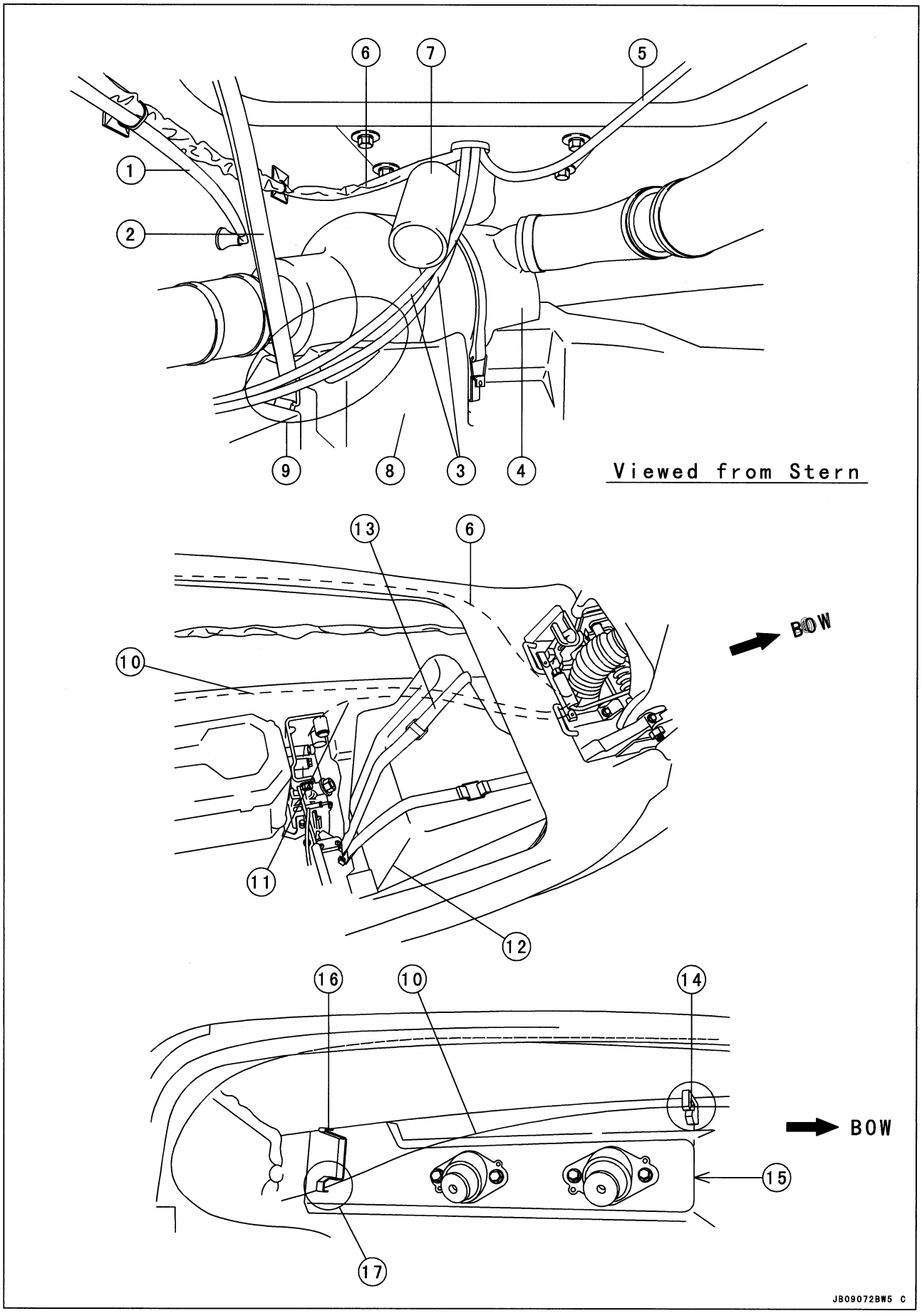
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Handle pole
2. Start/stop switch
3. Throttle case
4. Start/stop switch leads
5. Throttle cable
6. Steering cable
7. Run the throttle cable over the start/stop switch leads and to the left of the handlebar pivot.
8. Handlebar pivot
9. Clips
10. Run the throttle cable through the clips and make sure the brass clamp is positioned between two clips.
11. Clamp
12. Grommet
13. Cap
14. Throttle cable
15. Start/stop switch leads
16. Steering cable
17. Fuel vent hose

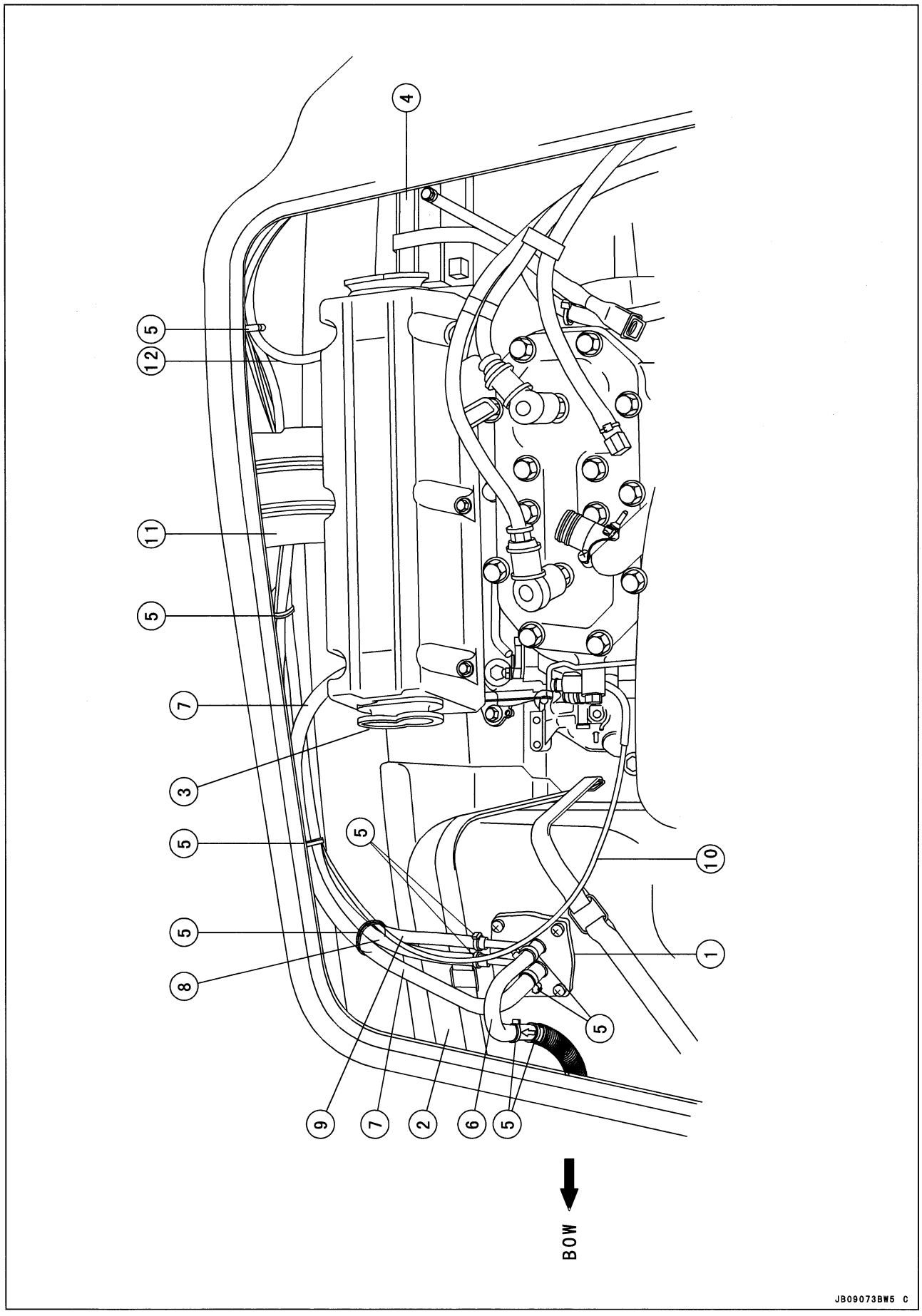
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Bypass cooling hose
2. Fuel tank strap
3. Steering cable and throttle cable
4. Water box muffler
5. Fuel vent hose
6. Start/stop switch leads: Run the leads above the fuel filler tube.
7. Fuel filler tube
8. Form
9. Fit the cables to the form recess and run the cables between the fuel tank and the strap.
10. Steering cable
11. Throttle cable
12. Fuel tank
13. Fuel tank strap
14. Install the detent to the end of engine mount surface.
15. Engine mount surface end
16. Bracket
17. Run the steering cable to the right of the bracket.

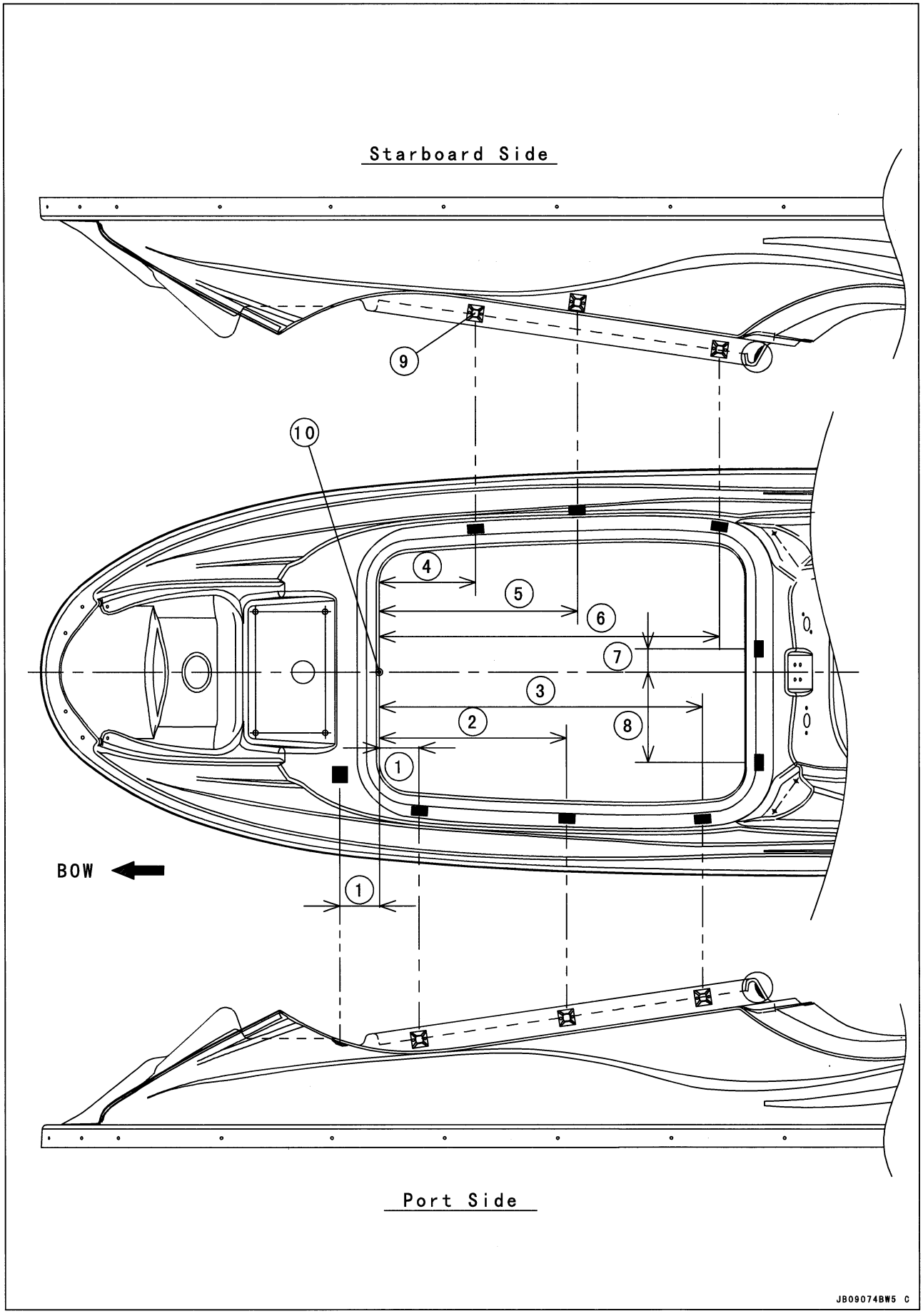
Cable, Wire, and Hose Routing



Cable, Wire, and Hose Routing

1. Fuel filter assembly
2. Fuel tank
3. Air intake cover
4. Battery
5. Clamp
6. Fuel vent hose
7. Fuel hose (Return)
8. Fuel hose (Main)
9. Fuel hose (Reserve)
10. Choke cable
11. Bracket: Run all the cables, wires, and hoses behind the bracket.
12. Fuel hose (Supply)

Cable, Wire, and Hose Routing



1. 70 mm (2.8 in.)
2. 330 mm (13.0 in.)
3. 570 mm (22.4 in.)
4. 170 mm (6.69 in.)
5. 350 mm (13.8 in.)
6. 600 mm (23.6 in.)
7. 40 mm (1.6 in.)
8. 160 mm (6.30 in.)
9. Holder
10. Standard point

Troubleshooting

Starting difficulty or failure to start

Ignition System

Ignition Spark Present

- Fault in fuel system
- Lack of compression

No Spark

- Faulty or fouled spark plug
- Faulty plug wire insulation
- Faulty CDI igniter
- Faulty ignition coil
- Faulty magneto
- Battery voltage low

Fuel System (check that fuel tank contains fuel)

Outside Carburetor

- Fuel feed line leaking or clogged
- Pulse line leaking or clogged
- Fuel filter screen clogged
- Vent line clogged
- Faulty fuel pump

Inside Carburetor

- Carburetor diaphragm damaged
- Mixture screw not adjusted
- Water in carburetor
- Float arm not adjusted

Battery/Starter System

- Faulty magneto solenoid switch
- Battery voltage low
- Starter motor brushes worn
- Faulty reduction gear
- Faulty starter lockout switch and/or lanyard key not pushed under stop button

Engine starts but stops right away

Compression

- Faulty crankshaft oil seal
- Crankcase joint leak
- Worn piston and rings
- Head gasket leak
- Spark plug leak

Fuel System

Outside Carburetor

- Misuse of choke
- Fuel filter screen clogged
- Fuel feed line leaking or clogged
- Pulse line leaking or clogged
- Vent line clogged
- Faulty fuel pump

Inside Carburetor

- Water in carburetor
- Carburetor diaphragm damaged
- Mixture screw not adjusted
- Float arm not adjusted

Electrical System

- Faulty or fouled spark plug

Troubleshooting

- Poor wiring connection
- Faulty magneto

Engine misfires, does not run smoothly

Fuel System

Fuel mixture too lean

Fault in Carburetor

- Wrong mixture screw
- Obstruction in fuel passage or outlet
- Diaphragm leaking or damaged
- Float arm not adjusted

Other

- Poor fuel supply (fuel filter screens, hoses, or vent line clogged)
- Carburetor mounting loose
- Faulty fuel pump

Fuel mixture too rich

Fault in Carburetor

- Diaphragm needle dirty or damaged
- Float arm not adjusted
- Choke not adjusted
- Mixture screw not adjusted

Other

- Flame arrester clogged

Electrical System

Other

- Ignition timing wrong

Weak Spark

- Reduced ignition coil output
- High voltage insulation breakdown
- Spark plug fouled
- Spark plug gap wrong
- Poor wiring connection, spark plug cap
- Faulty CDI igniter
- Faulty magneto
- Battery voltage low

Abnormal engine sound

During normal cruising

- Slight piston seizure
- Piston ring broken or sticking
- Main bearing worn or damaged

During sudden acceleration

- Excessive clearance between connecting rod small end and piston pin, or between pin and piston
- Excessive connecting rod big end clearance

Pinging

- Ignition timing too advanced
- Carbon accumulation in cylinder head
- Poor quality gasoline
- Spark plug wrong heat range

When the engine is idling while cold

- Excessive piston clearance
- Piston rings worn

- Piston worn
- Connecting rod bent, twisted

Low engine power (This trouble often has more than one cause, and trouble symptoms may not be clear)

Ignition System

- Spark plug gap or heat range wrong
- Ignition timing wrong
- Reduced ignition coil output
- Loose wiring connection in ignition circuit

Fuel System

- Insufficient fuel supply to carburetor
- Carburetor diaphragm damaged
- Pulse line leaking or clogged
- High speed nozzle clogged
- Throttle valve does not fully open
- Fuel filter screen clogged
- Faulty fuel pump

Other

- Flame arrester clogged
- Muffler or exhaust system clogged
- Water or foreign matter in gasoline
- Exhaust gas leak in engine compartment

Overheating

- Ignition wrong
- Carburetor not adjusted
- Carbon accumulation in combustion chamber
- Wrong type of gasoline or oil
- Wrong gas/oil mixture
- Cooling water line leaking or clogged

Heavy Fuel Consumption

- Carburetor not adjusted
- Flame arrester clogged
- Muffler or exhaust system clogged
- Worn cylinder, piston or piston ring
- Fuel feed line leaking
- Carburetor diaphragm needle dirty or damaged

Poor performance though engine runs properly

Jet Pump

- Inlet area obstructed
- Impeller or pump case damaged
- Excessive clearance between impeller and pump case

Poor steering control (Since faulty steering is dangerous, this problem should be examined by an authorized Jet Ski dealer)

Handlebar hard to turn

- Handlebar pivot nut too tight
- Bushings damaged or cracked
- Handlebar plate or pivot bent
- No lubricant on steering pivot
- Steering cable damaged or improperly routed

BERT'S MEGA MALL
Part #: 99924-1314-01
Desc: S/M JS800-A1
Cust: SMITH, MARTIN
S/O #: 50356

MODEL APPLICATION

Year	Model	Beginning Hull No.
2003	JS800-A1	KAW60001□203

□ : This digit in the hull number changes from one machine to another.

Kawasaki
KAWASAKI HEAVY INDUSTRIES, LTD.
Consumer Products & Machinery Company

Part No. 99924-1314-01

Printed in Japan