

Kawasaki

JETSKI
watercraft

1200 STX-R



JET SKI® Watercraft Service Manual

Quick Reference Guide

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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.



1200 STX-R

JET SKI Watercraft Service Manual

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The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. See your "JET SKI" watercraft dealer for the latest information on product improvements incorporated after this publication.

All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

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) per minute
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 constitute tampering are the acts listed below:

Do not tamper with the original emission related parts.

- * CDI 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

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

- Indicates a procedural step or work to be done.
- Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.
- ★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

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

General Information

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1-2 GENERAL INFORMATION

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

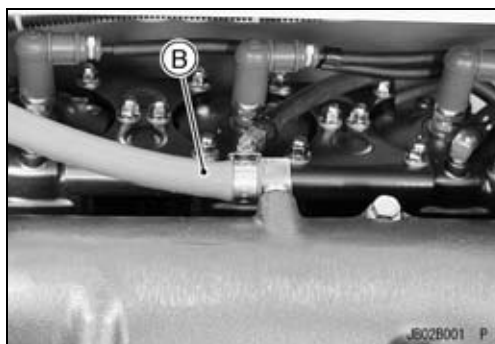
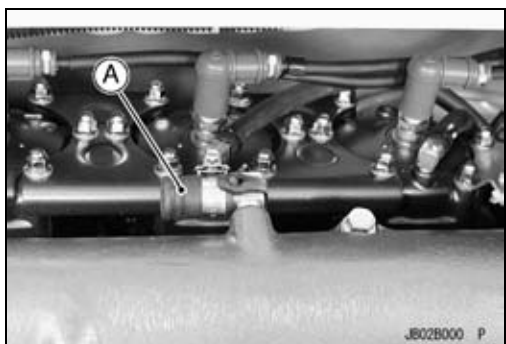
Adjustments shall be made in accordance with the Periodic Maintenance Chart or whenever troubleshooting or presence of symptoms indicate that adjustments may be required. Whenever running of the engine is required during maintenance it is best to have the watercraft in water.

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.

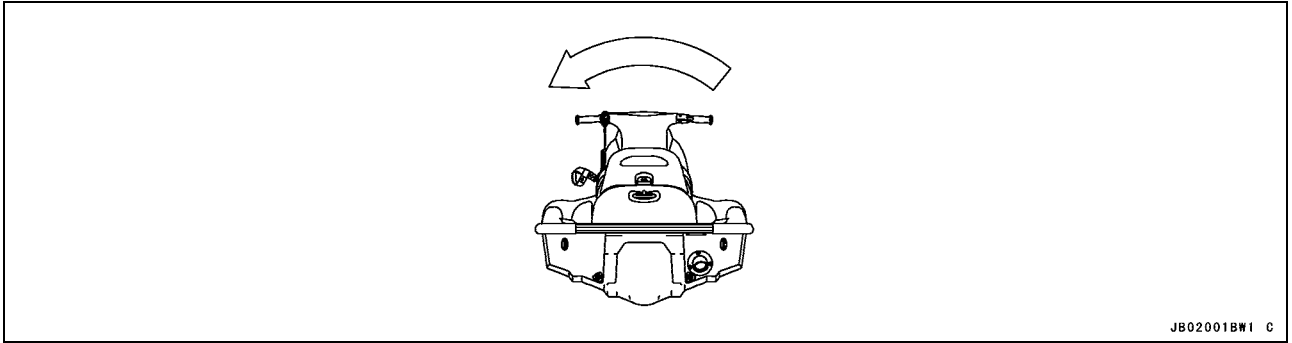


- Loosen the clamp and remove the cap [A].
- Connect the garden hose [B] to the hose fitting (see above).
- Attach the garden hose to a faucet. Do not turn on the water until the engine is running and turn it off immediately when the engine stops. The engine requires 2.4 L/min (2.5 qts/min) at 1800 rpm and 7.0 L/min (7.4 qts/min) at 6000 r/min (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**(3) Dirt**

Before removal and disassembly, clean the "Jet Ski" watercraft. Any sand entering the engine, carburetor, or other parts will work as an abrasive and 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

Remove the ground (–) lead from the battery before performing any disassembly operations on the watercraft. This prevents:

- (a) the possibility of accidentally turning the engine over while partially disassembled.
- (b) sparks at electrical connections which will occur when they are disconnected.
- (c) damage to electrical parts.

(5) Tightening Sequence

Generally, when installing a part with several bolts, nuts, or screws, they should all be started in their holes and tightened to snug fit. Then tighten them evenly in a cross pattern. This is to avoid distortion of the part and/or causing gas or oil leakage. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter of turn and then remove them.

Where there is a tightening sequence indication in this Service Manual, the bolts, nuts, or screws must be tightened in the order and method indicated.

(6) Torque

The torque values given in this Service Manual should always be adhered to. Either too little or too much torque may lead to serious damage. Use a good quality, reliable torque wrench.

(7) 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 removal of screws held by a locking agent) in order to avoid damaging the screw heads.

(8) Edges

Watch for sharp edges, especially during major engine disassembly and assembly. Protect your hands with gloves or a piece of thick cloth when lifting the engine or turning it over.

(9) 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.

(10) Gasket, O-Ring

Do not reuse a gasket or O-ring once it has been in service. The mating surfaces around the gasket should be free of foreign matter and perfectly smooth to avoid oil or compression leaks.

(11) Liquid Gasket, Non-Permanent Locking Agent

Follow manufacturer's directions for cleaning and preparing surfaces where these compounds will be used. Apply sparingly. Excessive amounts may block engine cooling passages and cause serious damage. An example of a non-permanent locking agent commonly available in North America is Loctite Lock N' Seal (Blue).

1-4 GENERAL INFORMATION

Before Servicing

(12) Press

A part installed using a press or driver, such as a seal, should first be coated with oil on its outer or inner circumference so that it will go into place smoothly.

(13) Ball Bearing

When installing a ball bearing, the bearing race which is affected by friction should be pushed by a suitable driver. This prevents severe stress on the balls and races, and prevents races and balls from being dented. Press a ball bearing until it stops at the stop in the hole or on the shaft.

(14) Oil Seal and Grease Seal

Replace any oil or grease seals that were removed with new ones, as removal generally damages seals. When pressing in a seal which has manufacturer's marks, press it in with the marks facing out. Seals should be pressed into place using a suitable driver, which contacts evenly with the side of seal, until the face of the seal is even with the end of the hole.

(15) Seal Guide

A seal guide is required for certain oil or grease seals during installation to avoid damage to the seal lips. Before a shaft passes through a seal, apply a little lubricant, preferably high temperature grease on the lips to reduce rubber to metal friction.

(16) Circlip, Retaining Ring

Replace any circlips and retaining rings that were removed with new ones, as removal weakens and deforms them. When installing circlips and retaining rings, take care to compress or expand them only enough to install them and no more.

(17) Cotter Pin

Replace any cotter pins that were removed with new ones, as removal deforms and breaks them.

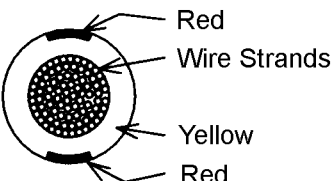
(18) Lubrication

Engine wear is generally at its maximum while the engine is warming up and before all the rubbing surfaces have an adequate lubricative film. During assembly, oil or grease (whichever is more suitable) should be applied to any rubbing surface which has lost its lubricative film. Old grease and dirty oil should be cleaned off. Deteriorated grease has lost its lubricative quality and may contain abrasive foreign particles.

Don't use just any oil or grease. 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.

(19) Electrical Wires

All the electrical wires are either single-color or two-color and, with only a few exceptions, must be connected to wires of the same color. On any of the two-color wires there is a greater amount of one color and a lesser amount of a second color, so a two-color wire is identified by first the primary color and then the secondary 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 to make red the main color.

Wire (cross-section)	Name of Wire Color
	Yellow/Red

(20) Replacement Parts

When there is a replacement instruction, replace these parts with new ones every time they are removed. These replacement parts will be damaged or lose their original function once removed.

(21) 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.

Before Servicing

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

(22)Service Data

Numbers of service data in this text have following meanings:

"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.

1-6 GENERAL INFORMATION

Model Identification

JT1200-A1 Left Side View:



JT1200-A1 Right Side View:



General Specifications

Items	JT1200-A1, A2
Engine:	
Type	2-stroke, 3-cylinder, crankcase reed valve, water cooled
Displacement	1176 mL (71.8 cu in.)
Bore and stroke	80 × 78 mm (3.15 × 3.07 in.)
Compression ratio	5.8 : 1
Maximum horsepower	106.6 kW (145 PS) @6 750 r/min (rpm)
Maximum torque	153.5 N·m (15.6 kgf·m, 113 ft·lb) @6 000 r/min (rpm)
Ignition system	DC-CDI (Digital)
Lubrication system	Superlube Oil injection (break-in period: Oil injection and fuel mixture 50 : 1)
Carburetion system	Keihin CDCV 40-35 × 3
Starting system	Electric starter
Tuning Specifications:	
Spark plug: Type	NGK BR9ES
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)
Terminal	Solid post
Ignition timing	15° BTDC @1 250 r/min ~ 22° BTDC @3 500 r/min (rpm)
Carburetor: Idle Speed	1 250 ± 100 r/min (rpm) — in water 1 800 ± 100 r/min (rpm) — out of water
Compression pressure	677 ~ 1069 kPa (6.9 ~ 10.9 kgf/cm ² , 98 ~ 155 psi)
Drive System:	
Coupling	Direct drive from engine
Jet pump: Type	Axial flow single stage
Thrust	4020 N (410 kgf, 904 lb)
Steering	Steerable nozzle
Braking	Water drag
Performance:	
†Minimum turning radius	4.0 m (13.1 ft)
†Fuel consumption	50.5 L/h (13.3 US gal/h) @full throttle
†Cruising range	102 km (63 mile) @full throttle with 3 persons/1 hour and 3 minutes
Dimensions:	
Overall length	3120 mm (122.83 in.)
Overall width	1180 mm (46.46 in.)
Overall height	1020 mm (40.16 in.)
Dry weight	290 kg (639 lb)
Fuel tank capacity	53 L (14.0 US gal) including 7 L (1.8 US gal) reserve
Engine Oil:	
Type	2-stroke, N.M.M.A. Certified for Service TC-W3
Oil tank capacity	5.0 L (1.3 US gal)
Electrical Equipment:	
Battery	12 V 18 Ah
Maximum generator out put	5.0 A/14V @6 000 r/min (rpm)

1-8 GENERAL INFORMATION

General Specifications

†: 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.

Torque and Locking Agent

The following table list the tightening torque for the major fasteners, and the parts 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.

*: Initial Torque for Temporal Tightening

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System:				
Carburetor Mounting Bolts	8.8	0.9	78 in·lb	L
Intake Manifold Mounting Nuts	9.8	1.0	87 in·lb	
Air Intake Cover Bolts	7.8	0.8	69 in·lb	L
Cable Holder Mounting Bolts	8.8	0.9	78 in·lb	L
Throttle Case Mounting Screws	3.9	0.4	35 in·lb	
Intake Air Connecting Elbow	7.8 ~ 14	0.8 ~ 1.4	69 ~ 121 in·lb	L
Engine Lubrication System:				
Air Bleeder Screw	1.0 ~ 1.5	0.1 ~ 0.15	9 ~ 13 in·lb	
Oil Pump Mounting Bolts	8.8	0.9	78 in·lb	L
Oil Pump Cable Mounting Bolt	4.9	0.5	43 in·lb	L
Exhaust System:				
Exhaust Pipe Mounting Bolts – 8 mm (0.315 in.) Dia	29	3.0	22	L
Exhaust Pipe Mounting Bolts – 10 mm (0.394 in.) Dia	49	5.0	36	L
Cable Holder Mounting Bolts	8.8	0.9	78 in·lb	L
Exhaust Manifold Mounting Nuts	34	3.5	25	S
Expansion Chamber Mounting Bolts	29	3.0	22	L
Engine Top End:				
Cylinder Head Nuts	29 (7.8*)	3.0 (0.8*)	22 (69 in·lb *)	S
Water Pipe Joint	7.8 or above	0.8 or above	69 in·lb or above	SS
Cylinder Base Nuts	49 (7.8*)	5.0 (0.8*)	36 (69 in·lb *)	S
Water Pipe Mounting Nuts	9.8	1.0	87 in·lb	S
Engine Removal/Installation:				
Engine Mounting Bolts	36	3.7	27	L
Engine Damper Mounting Bolts	16	1.6	11.5	
Engine Mount Bolts	34	3.5	25	L
Engine Bottom End:				
Flywheel Bolt	123 ~ 127	12.5 ~ 13.0	90.4 ~ 94.0	L
Stator Mounting Bolts	7.8	0.8	69 in·lb	L
Balancer Drive Gear Mounting Bolts	12	1.2	8.5	L
Grommet Mounting Screws	3.5	0.36	31 in·lb	L

1-10 GENERAL INFORMATION

Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Pickup Coil Mounting Screws	3.5	0.36	31 in·lb	L
Coupling	123 ~ 127	12.5 ~ 13.0	90.4 ~ 94.0	L
Magneto Cover Mounting Bolts	12	1.2	8.5	L
Grommet Cover Mounting Bolts	8.8	0.9	78 in·lb	L
Gauge Bolt	3.9	0.4	35 in·lb	L
Crankcase Bolts – 6 mm (0.236 in.) Dia	8.8	0.9	78 in·lb	L, S
Crankcase Bolts – 8 mm (0.315 in.) Dia	29	3.0	22	S
Cooling and Bilge Systems:				
Breather Mounting Bolt	—	—	—	L
Drive System:				
Coupling	39	4.0	29	L
Drive Shaft Holder Mounting Bolts	22	2.2	16	L
Pump and Impeller:				
Steering Nozzle Pivot Bolts	19	1.9	14	L
Cable Joint Bolts	9.8	1.0	87 in·lb	L
Pump Mounting Bolts	36	3.7	27	L
Pump Outlet Mounting Bolts	19	1.9	14	L
Pump Cap Bolts	9.8	1.0	87 in·lb	L
Impeller	98	10.0	72	
Pump Bracket Mounting Bolts (Inside Hull)	19	1.9	14	L
Pump Bracket Mounting Bolts (Pump Cover Side)	9.8	1.0	87 in·lb	L
Pump Cover Mounting Bolts	7.8	0.8	69 in·lb	L
Grate Mounting Bolts	9.8	1.0	87 in·lb	L
Steering:				
Handlebar Clamp Bolts	16	1.6	12	L
Steering Neck Mounting Bolts	16	1.6	12	L
Steering Holder Mounting Bolts	16	1.6	12	L
Steering Shaft Locknut	49 ~ 59	5.0 ~ 6.0	36 ~ 43	
Steering Cable Nuts	39	4.0	29	
Hull/Engine Hood:				
Stabilizer Mounting Bolts	9.8	1.0	87 in·lb	L
Stabilizer Base Mounting Bolts	9.8	1.0	87 in·lb	L
Crossmember Mounting Bolts	7.8	0.8	69 in·lb	L
Rear Grip Mounting Bolts	9.8	1.0	87 in·lb	L
Electrical System:				
Spark Plugs	25 ~ 29	2.5 ~ 3.0	18 ~ 22	
Water Temperature Sensor	15	1.5	11	
Starter Motor Mounting Bolts	8.8	0.9	78 in·lb	L
Starter Relay Mounting Nuts	7.8	0.8	69 in·lb	
Starter Lead Mounting Nut	7.8	0.8	69 in·lb	

Torque and Locking Agent

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

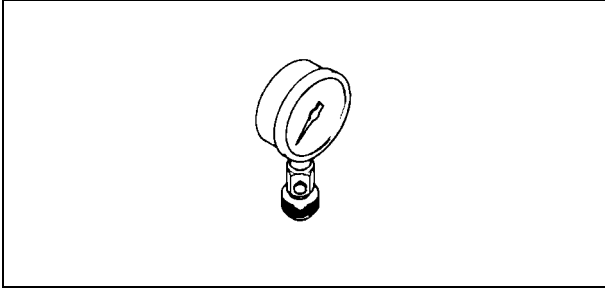
General Fasteners (stainless bolt and nut)

Threads dia. (mm)	Torque		
	N·m	kgf·m	ft·lb
6	5.9 ~ 8.8	0.6 ~ 0.9	52 ~ 78 in·lb
8	16 ~ 22	1.6 ~ 2.2	12 ~ 16
10	30 ~ 41	3.1 ~ 4.2	22 ~ 30

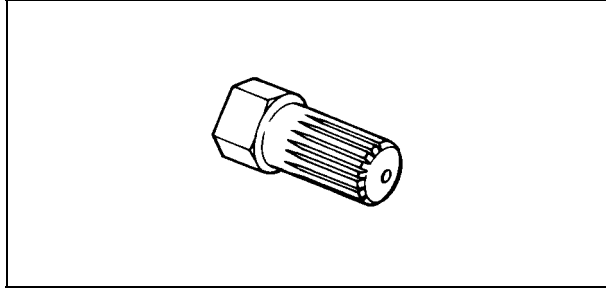
1-12 GENERAL INFORMATION

Special Tools, Sealant

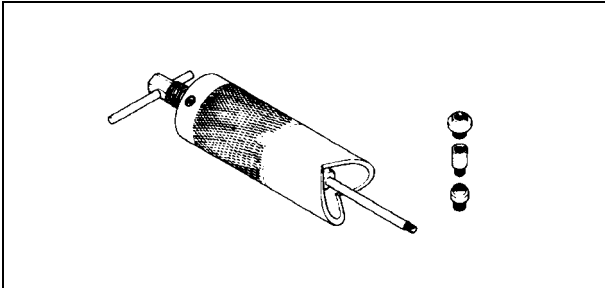
Compression Gauge: 57001-221



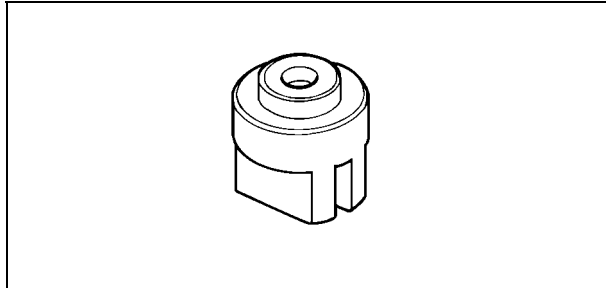
Impeller Wrench: 57001-1228



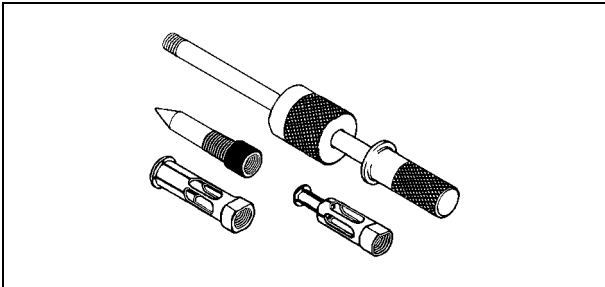
Piston Pin Puller Assembly: 57001-910



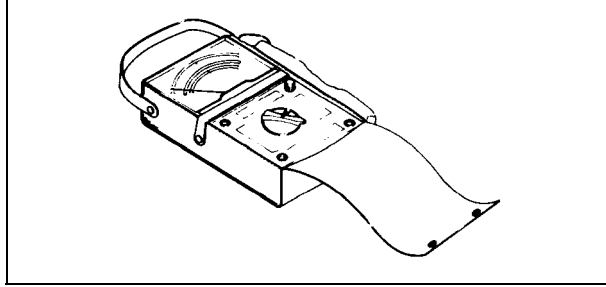
Impeller Holder: 57001-1393



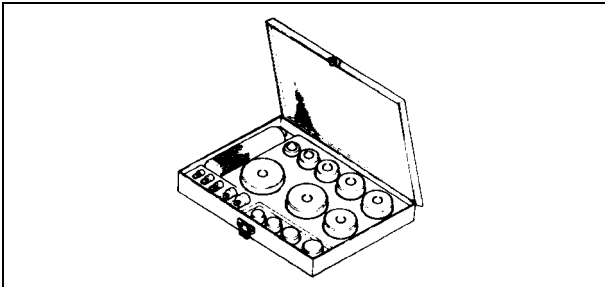
Oil Seal & Bearing Remover: 57001-1058



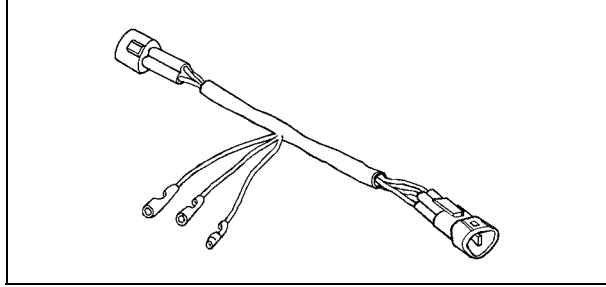
Hand Tester: 57001-1394



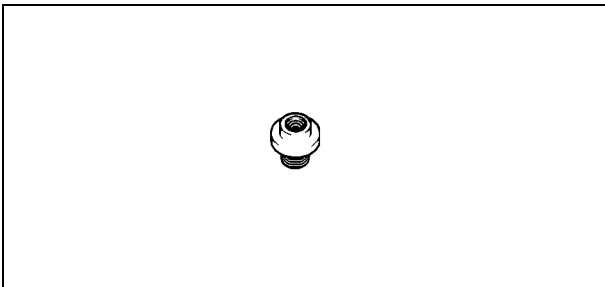
Bearing Driver Set: 57001-1129



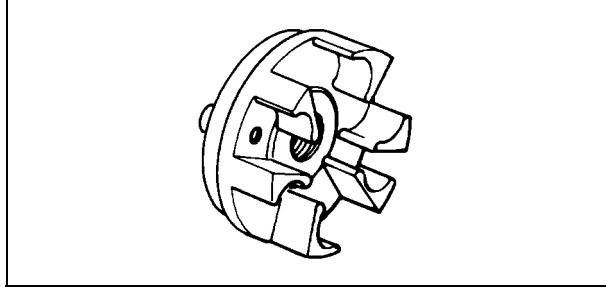
Throttle Sensor Setting Adapter: 57001-1400



Piston Pin Puller Adapter: 57001-1211

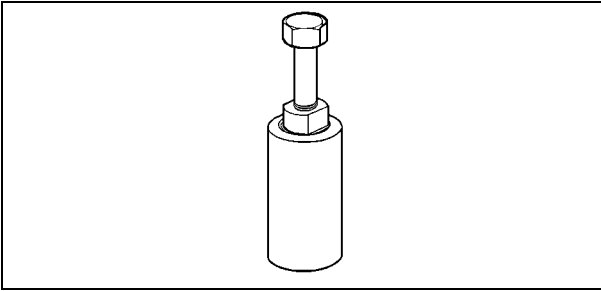


Coupling Holder: 57001-1423

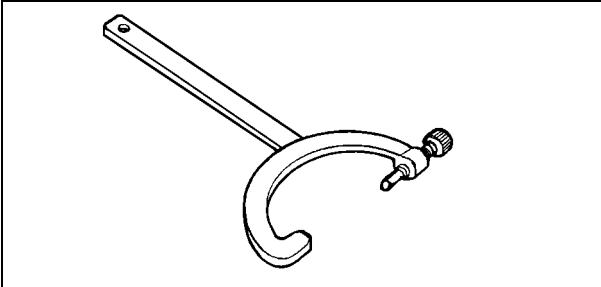


Special Tools, Sealant

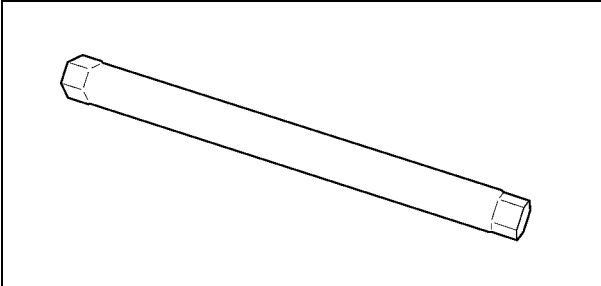
Flywheel Puller Assy: 57001-1426



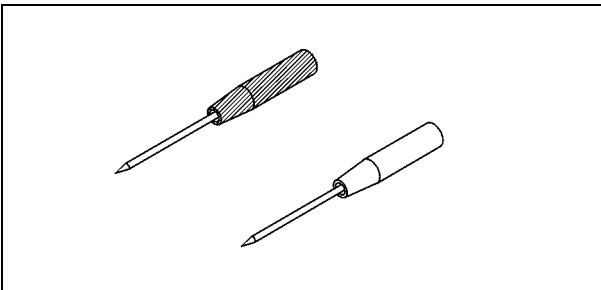
Rotor Holder: 57001-1428



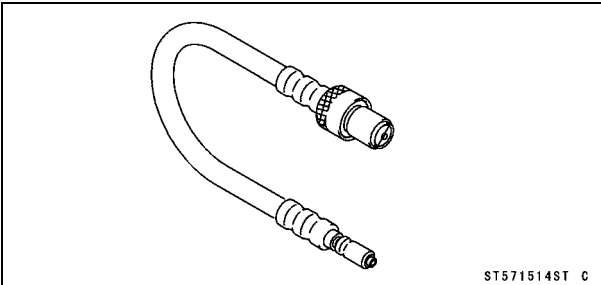
Box Wrench: 57001-1451



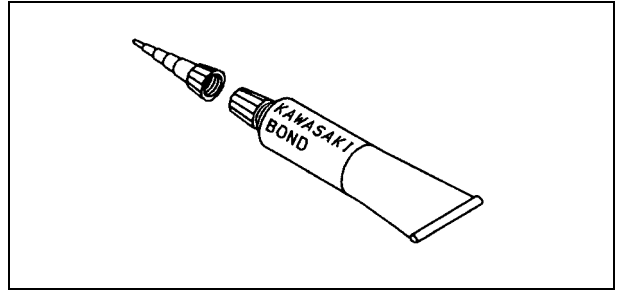
Needle Adapter Set: 57001-1457



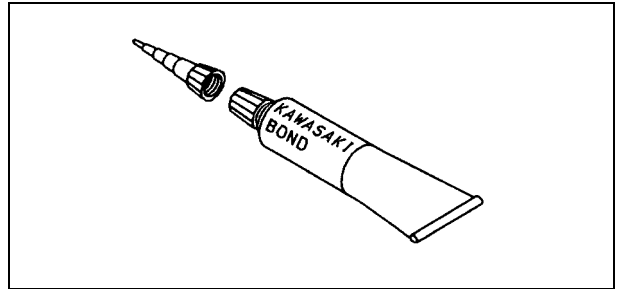
**Compression Gauge Adapter, M14 × 1.25:
57001-1514**



Kawasaki Bond (Silicon Sealant): 56019-120

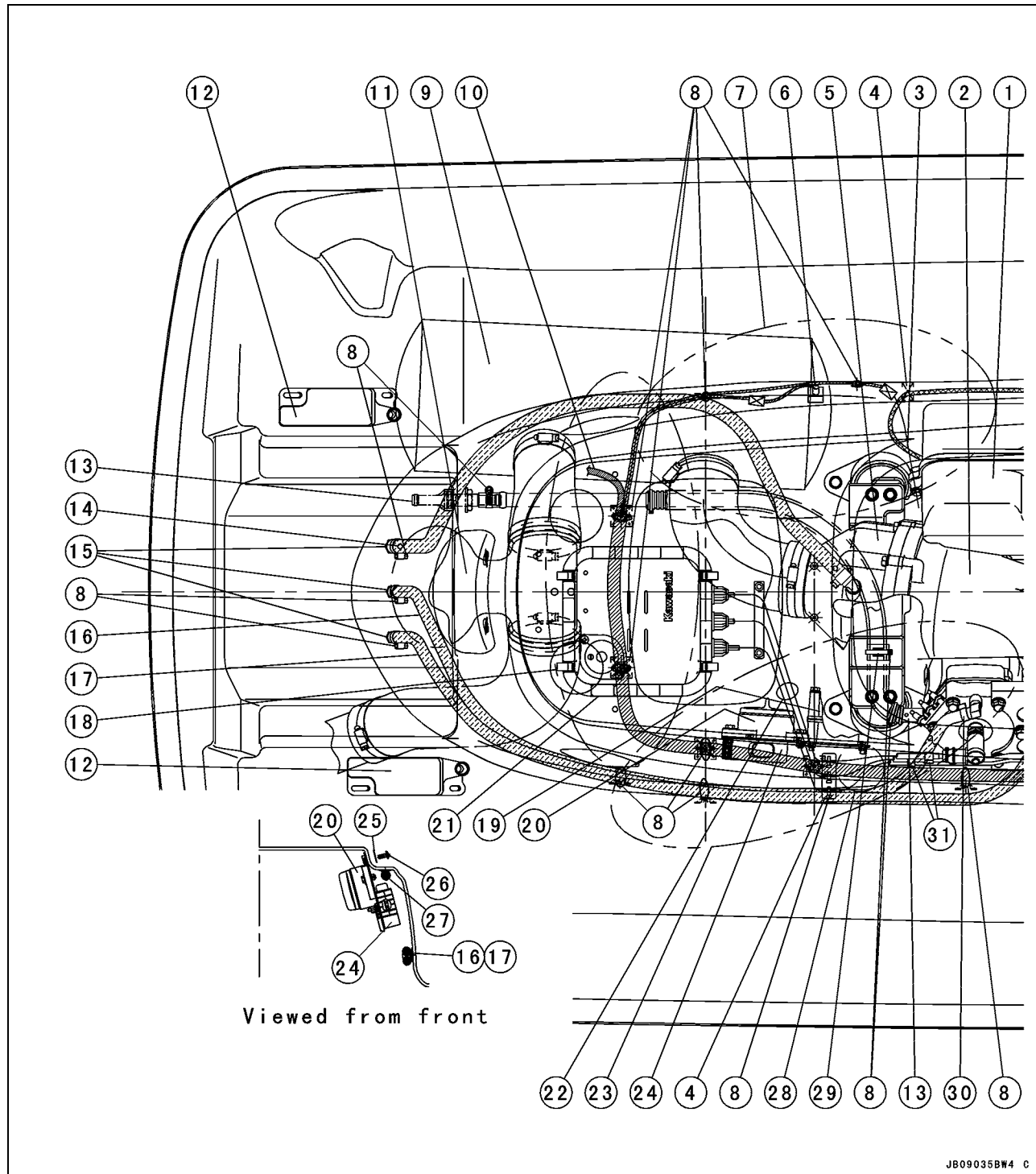


**Kawasaki Bond (Liquid Gasket-Black):
92104-1003**



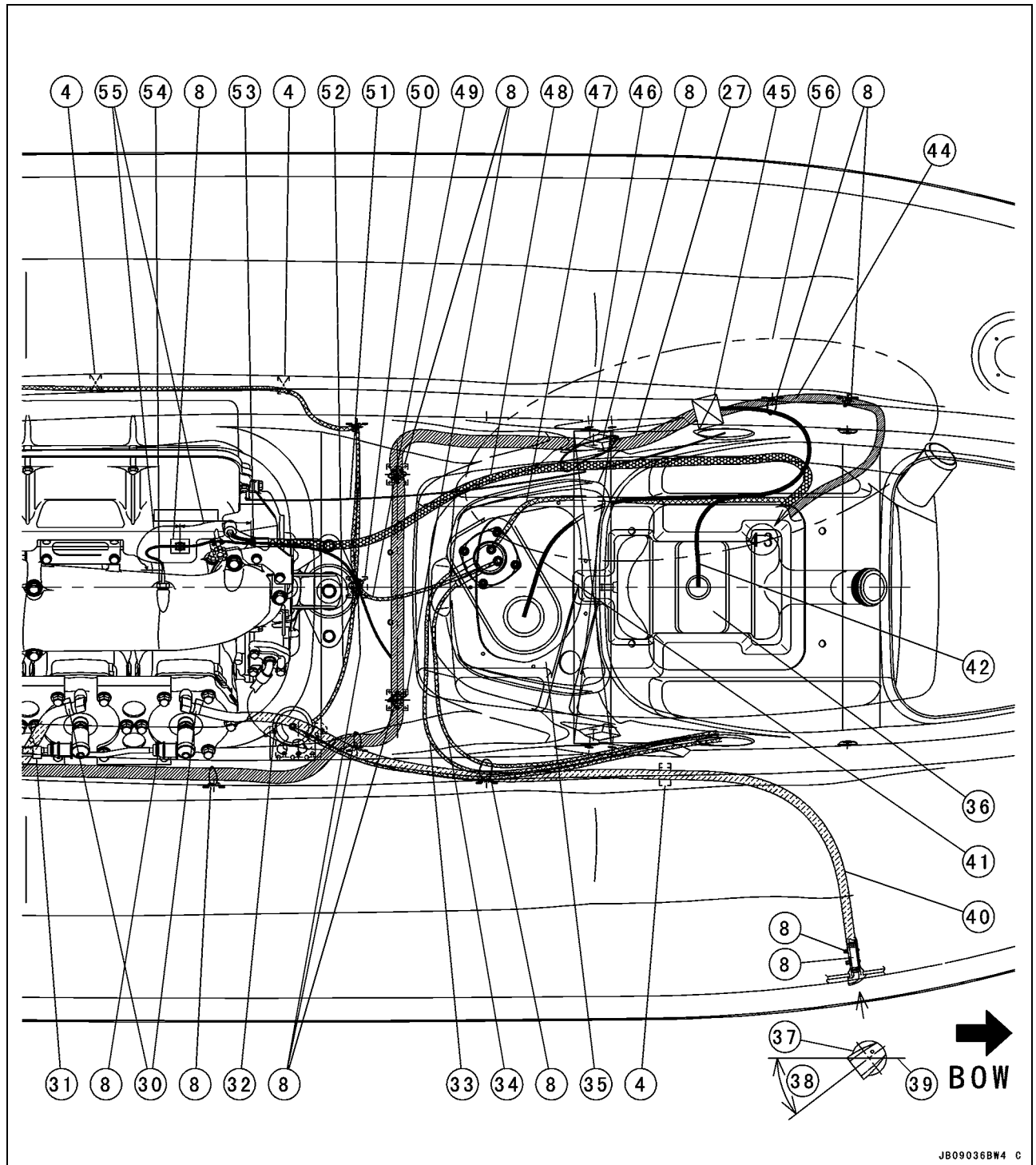
1-14 GENERAL INFORMATION

Cable, Wire and Hose Routing



1. Air Intake Cover
2. Exhaust Manifold
3. TPS
4. Detent
5. Exhaust Chamber
6. Air Temperature Sensor:
The sensor end must be out of the damper.
7. Refer to **DETAIL 1** (Page 1-16).
8. Clamp
9. Water Box Muffler
10. To Speed Sensor
11. Resonator
12. Bilge Filter
13. Inlet Cooling Hose
14. White Mark
15. Drain
16. Drain Hose for #3 Head
17. Drain Hose for #2 Head
18. Refer to **DETAIL 2** (Page 1-16).
19. Starter Relay Case
20. Fuse Case
21. Electric Case
22. Run the spark plug leads so as not to come in contact with the starter motor lead.
23. Refer to **DETAIL 3, 4** (Page 1-16).
24. Regulator/Rectifier
25. Plate
26. Screw
27. Main Harness
28. Loosen the spark plug leads remaining.
29. 8
30. 13
31. 8

Cable, Wire and Hose Routing



JB09036BW4 C

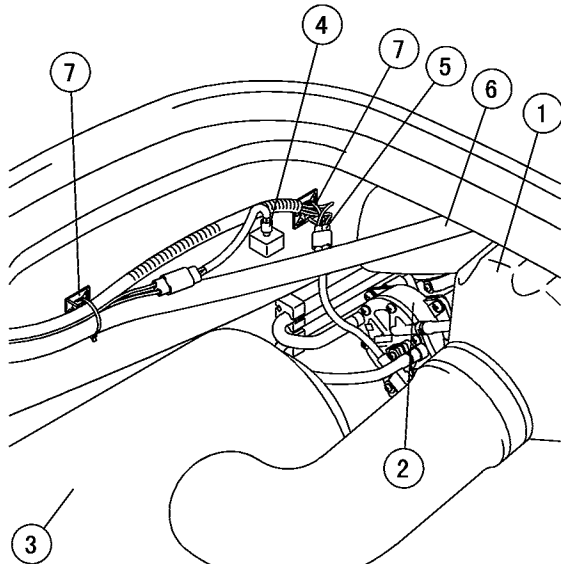
29. Loosen the inlet cooling hose remaining.
30. Cut the plastic clamps so that its cutting edges do not face upward.
31. Holder
32. Fuel Filter
33. Main Fuel Hose
34. Reserve Fuel Hose
35. Fuel Tank
36. Oil Tank
37. Bypass Outlet
38. 30°
39. Horizontal Line
40. Bypass Outlet Hose (Drain Hose for #1 Head)
41. Fuel Level Sensor Leads
42. Oil Level Sensor Leads

43. To Steering
44. Wire Leads of Start/Stop Switch and Meter
45. Connectors
46. Crossmember
47. Fuel Vent Hose
48. Throttle Cable
49. Return Fuel Hose
50. Loosen the fuel hoses remaining.
51. Choke Cable
52. Supply Fuel Hose
53. Clamp the water temperature sensor lead with the throttle cable.
54. Water Temperature Sensor
55. Loosen the sensor lead remaining.
56. Refer to **DETAIL 5** (Page 1-16).

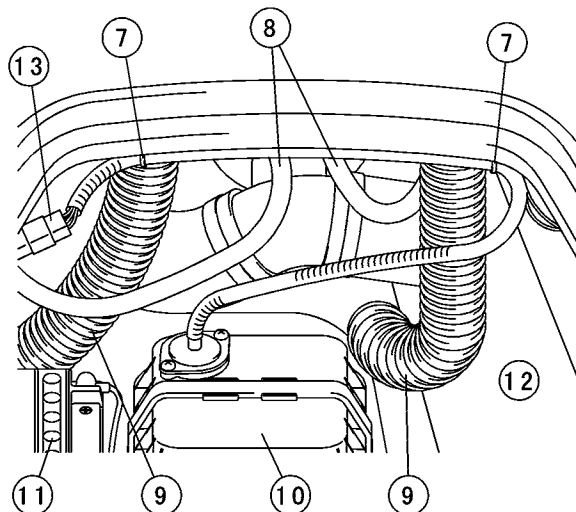
1-16 GENERAL INFORMATION

Cable, Wire and Hose Routing

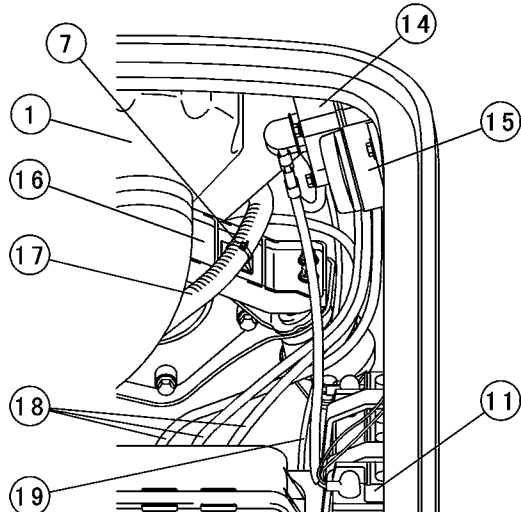
DETAIL 1 (Viewed from Right)



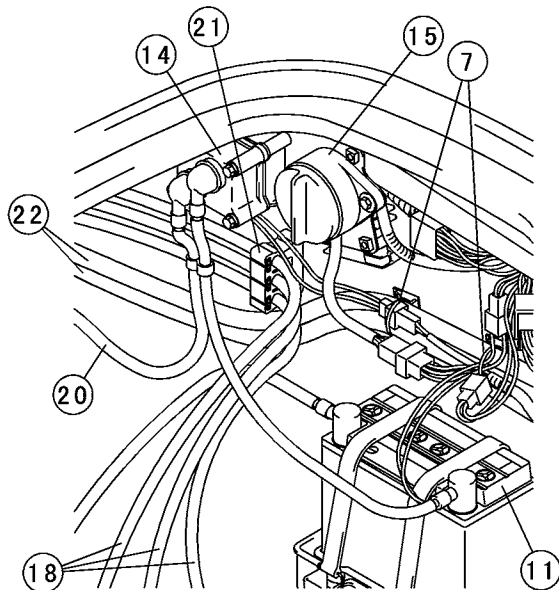
DETAIL 2 (Viewed from Top)



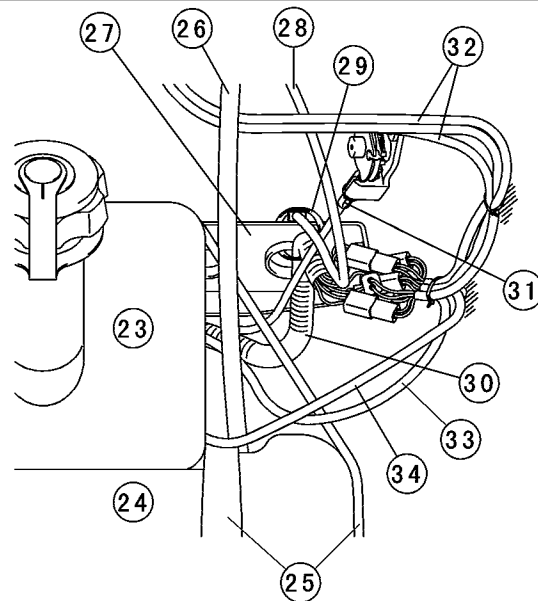
DETAIL 3 (Viewed from Rear)



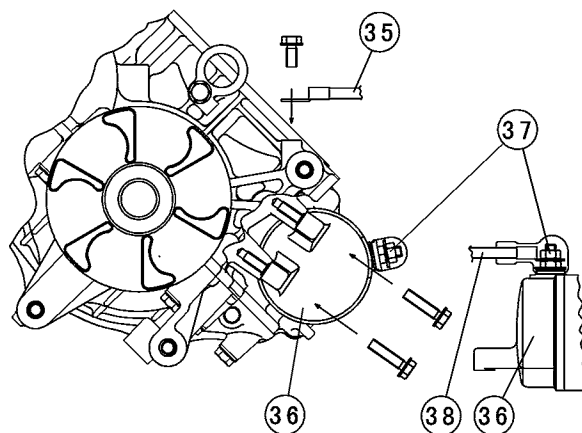
DETAIL 4 (Viewed from Rear)



DETAIL 5 (Viewed from Front)



Viewed from Rear



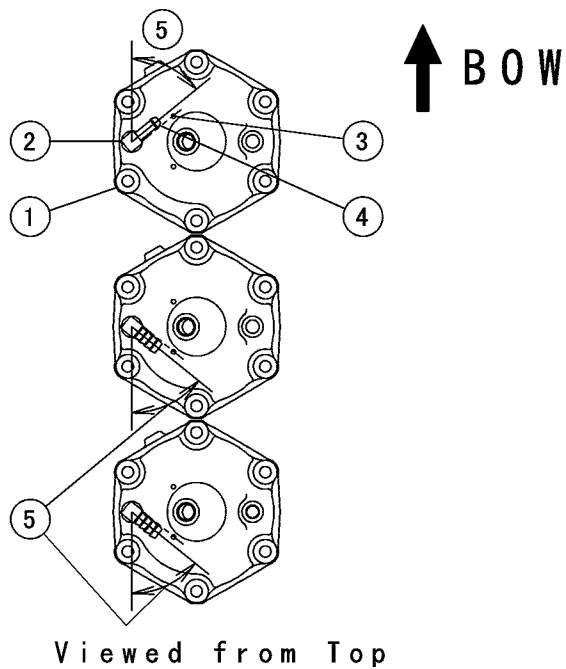
Cable, Wire and Hose Routing

1. Expansion Chamber
2. Carburetor
3. Water Box Muffler
4. Air Temperature Sensor
5. Throttle Position Sensor Leads
6. Cooling Hose (Chamber ~ Drain Fitting)
7. Clamp
8. Bilge Hoses
9. Rear Ducts
10. Electric Case
11. Battery
12. Water Box Muffler
13. Electric Case Lead Connector
14. Starter Relay
15. Fuse Case
16. Coupling Cover
17. Inlet Cooling Hose
18. Spark Plug Leads
19. Steering Cable
20. Starter Motor Cable
21. Detent
22. Drain Hoses from #2, #3 Cylinder Heads
23. Oil Tank
24. Fuel Tank
25. Rubber Straps
26. Fuel Vent Hose
27. Crossmember
28. Run the throttle cable over the crossmember.
29. Clamp the crossmember, throttle cable and main harness.
30. Main Harness
31. Choke Cable
32. Start/Stop Switch Leads and Meter Leads
33. Oil Level Sensor Leads
34. Fuel Level Sensor Leads
35. Battery Negative Cable (Ground)
36. Starter Motor
37. Starter Motor Terminal Nut
38. Starter Motor Cable

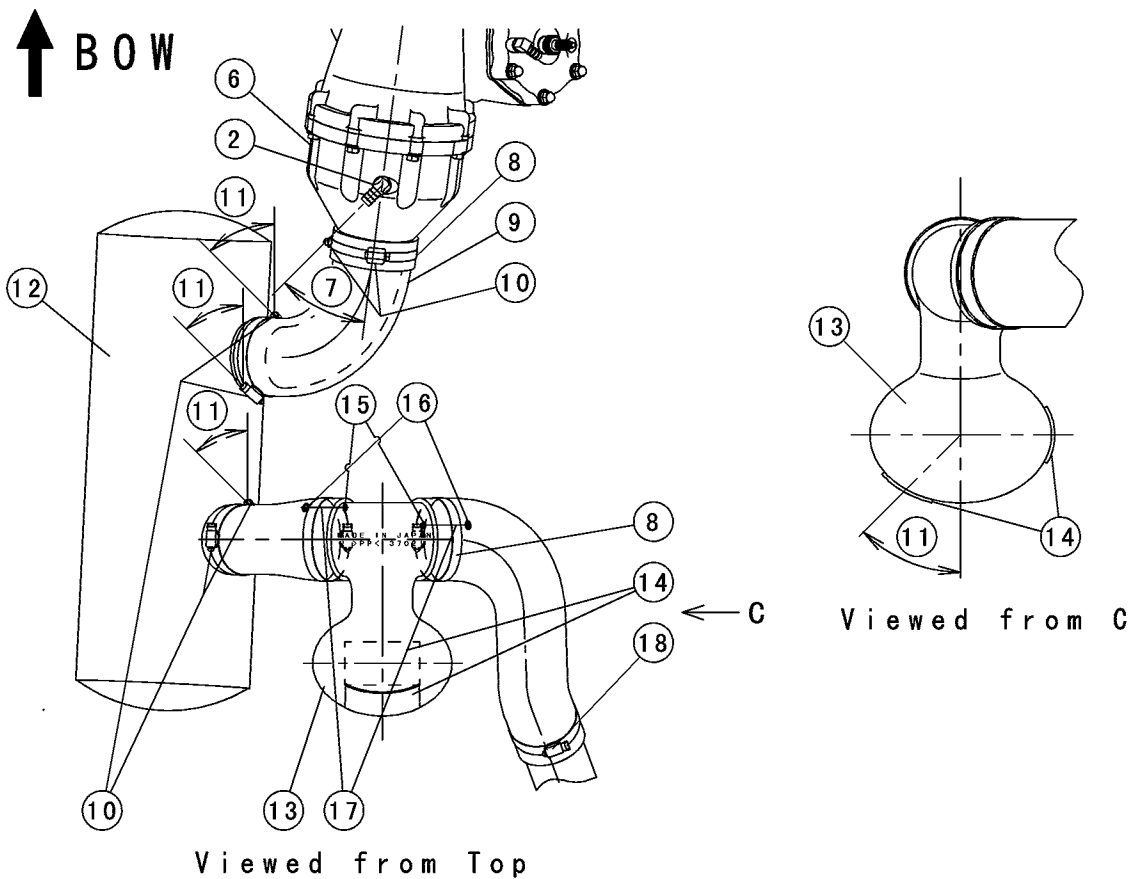
1-18 GENERAL INFORMATION

Cable, Wire and Hose Routing

WATER PIPE JOINT POSITION



EXHAUST TUBE ROUTING

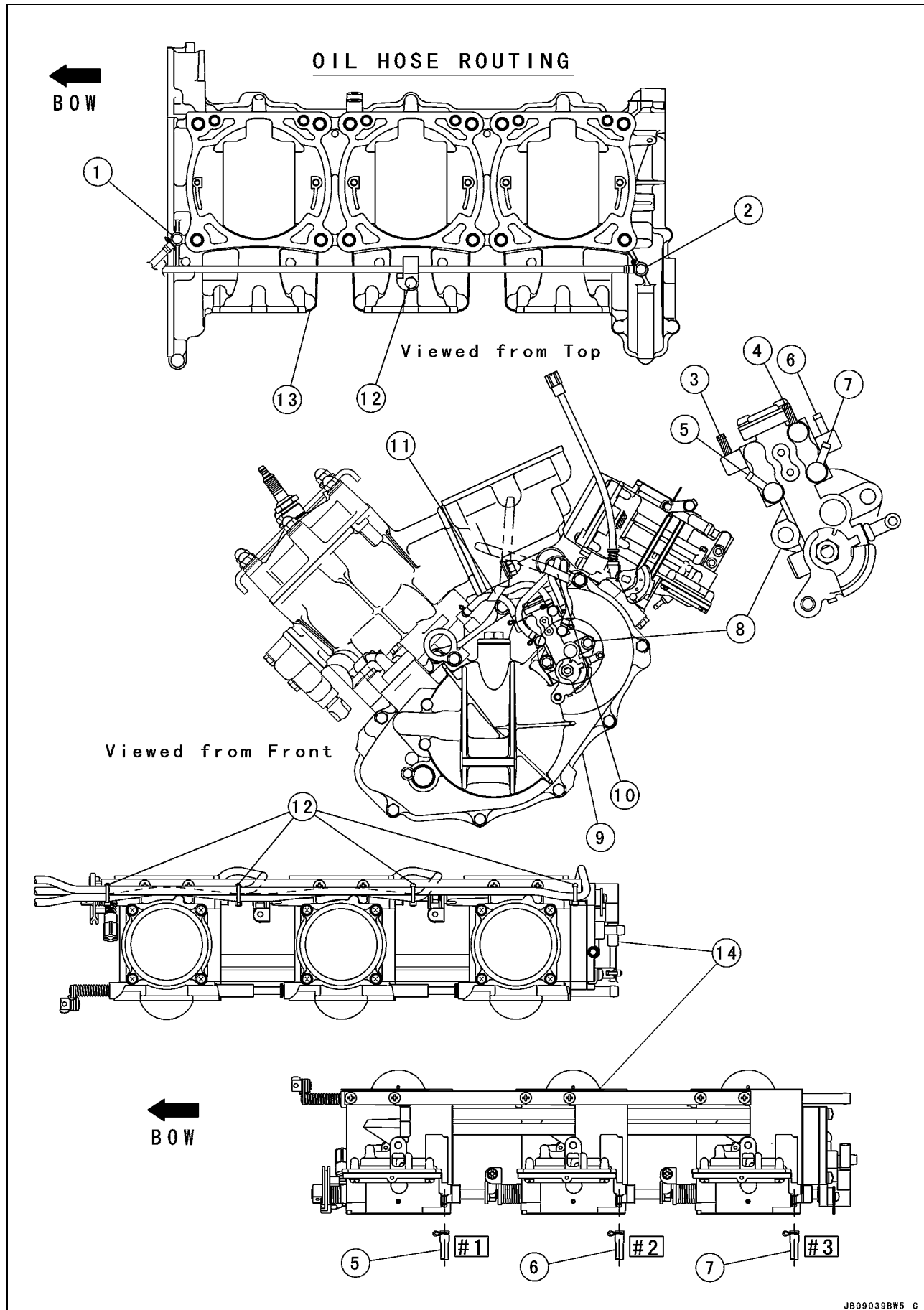


Cable, Wire and Hose Routing

1. Cylinder Head
2. Water Pipe Joint
3. Mark on Cylinder Head
4. Align the outside line of joint fitting with the mark on the cylinder head.
5. Approximately 50°
6. Exhaust Chamber
7. 38°
8. Clamp
9. Align the center line of the exhaust tube with the center line of the tail pipe.
10. Position the clamp screw at either position.
11. 45°
12. Water Box Muffler
13. Resonator
14. Dampers
15. Projection
16. White Marks
17. Align the projections on the resonator with the white marks on the exhaust tubes.
18. Position the clamp screw as shown.

1-20 GENERAL INFORMATION

Cable, Wire and Hose Routing



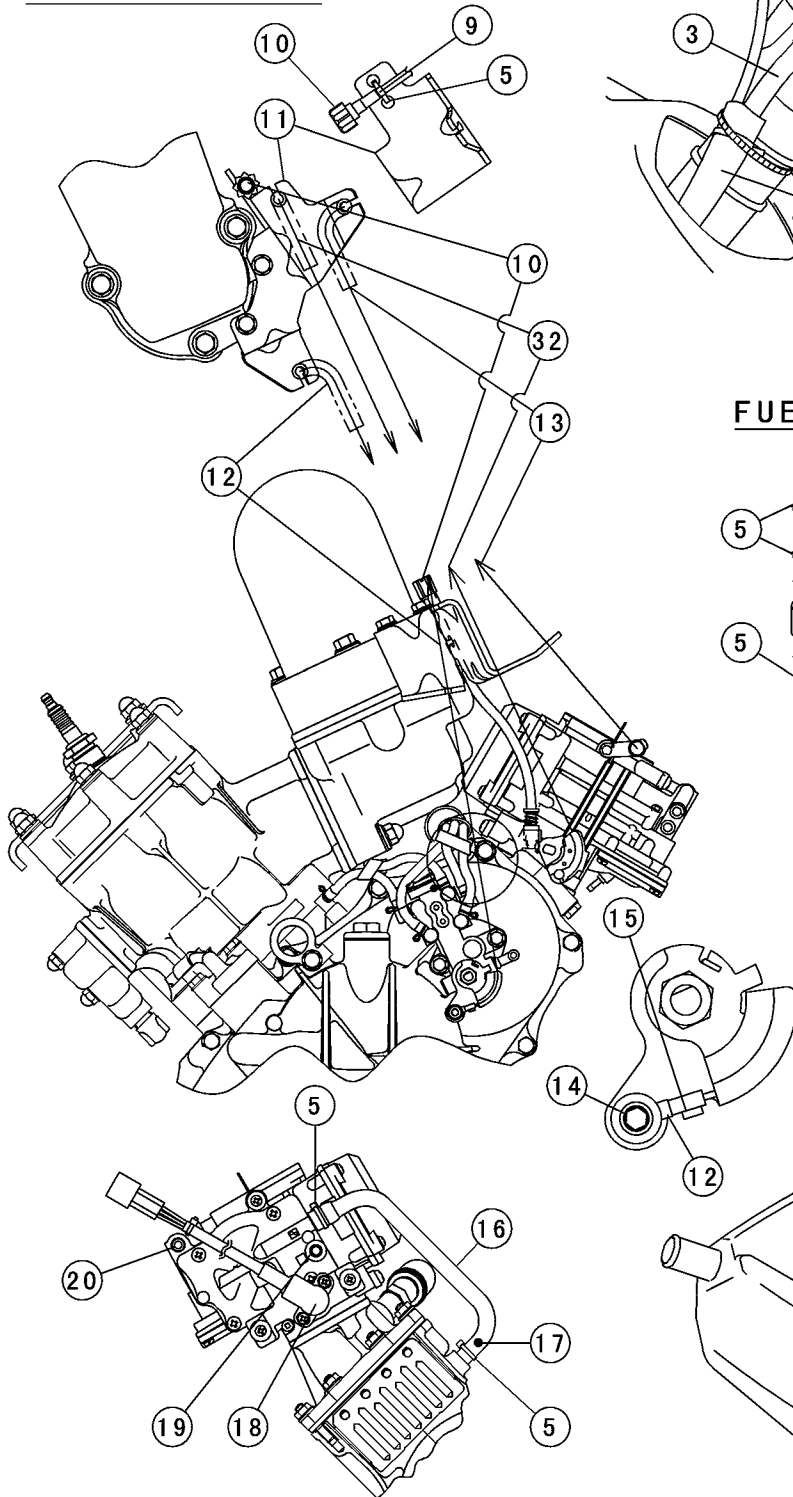
Cable, Wire and Hose Routing

1. Front Check Valve (Align the check valve nozzle with the projection on the upper crankcase half).
2. Rear Check Valve (Align the check valve nozzle with the projection on the upper crankcase half).
3. To Front Check Valve
4. To Rear Check Valve
5. To #1 Carburetor Check Valve
6. To #2 Carburetor Check Valve
7. To #3 Carburetor Check Valve
8. Oil Pump
9. Magneto Cover
10. Clamp the oil hoses which lead to the carburetors
11. Clamp the oil hoses which lead to the check valves on the upper crankcase.
12. Clamp
13. Upper Crankcase Half
14. Carburetors

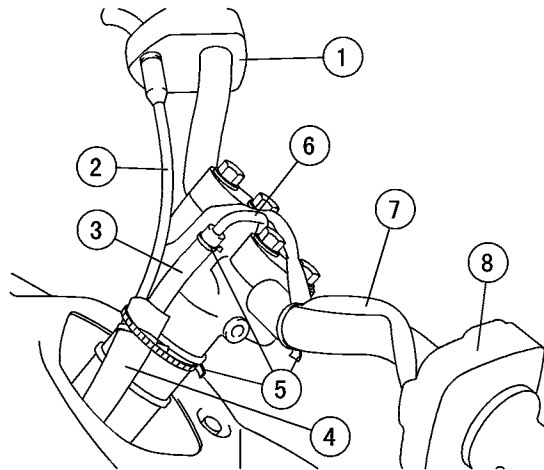
1-22 GENERAL INFORMATION

Cable, Wire and Hose Routing

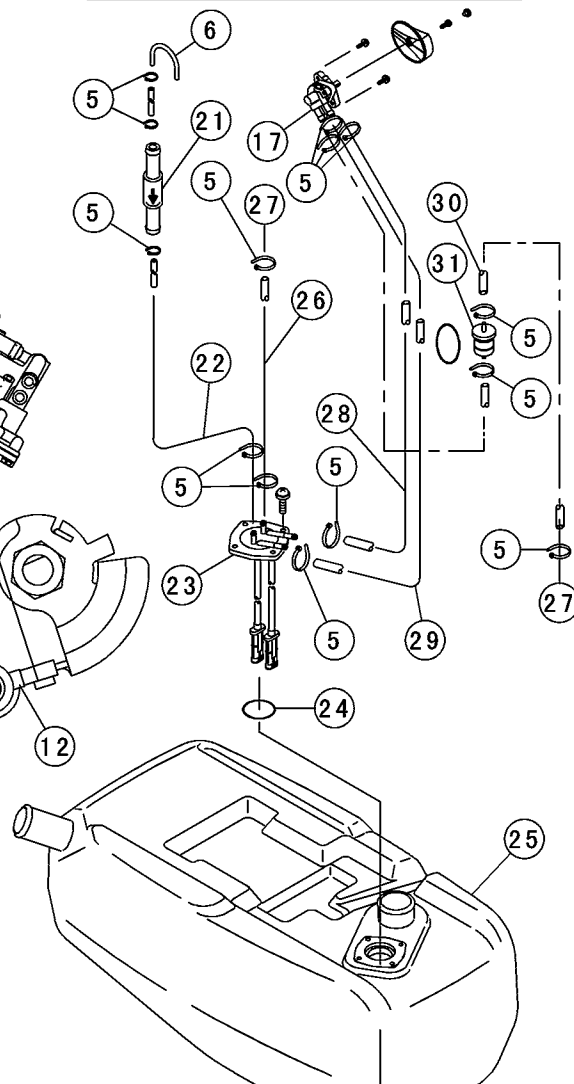
CABLE ROUTING



ROUTING AT HANDLEBAR



FUEL SYSTEM ROUTING



Cable, Wire and Hose Routing

1. Throttle Case
2. Throttle Cable
3. Fuel Vent Hose
4. Protective Tube
5. Clamp
6. Pipe
7. Start/Stop Switch Leads
8. Start/Stop Switch
9. Secure the idle adjusting screw with the clamp to the cable bracket.
10. Idle Adjusting Screw
11. Cable Bracket
12. Oil Pump Cable
13. Choke Cable
14. Oil Pump Cable Mounting Bolt with Washer
15. Be sure the cable lower end is in contact with the pulley as shown.
16. Pulse Hose
17. White Mark
18. Throttle Position Sensor
19. Supply Fuel Hose Fitting
20. Return Fuel Hose Fitting
21. Fuel Vent Check Valve : Install the valve so that the arrow is pointing toward the fuel tank.
22. Fuel Vent Hose
23. Fuel Filter Assembly
24. O-ring
25. Fuel Tank
26. Return Fuel Hose
27. To Carburetor
28. Reserve Fuel Hose
29. Main Fuel Hose
30. Supply Fuel Hose
31. Fuel Filter
32. Carburetor Cable

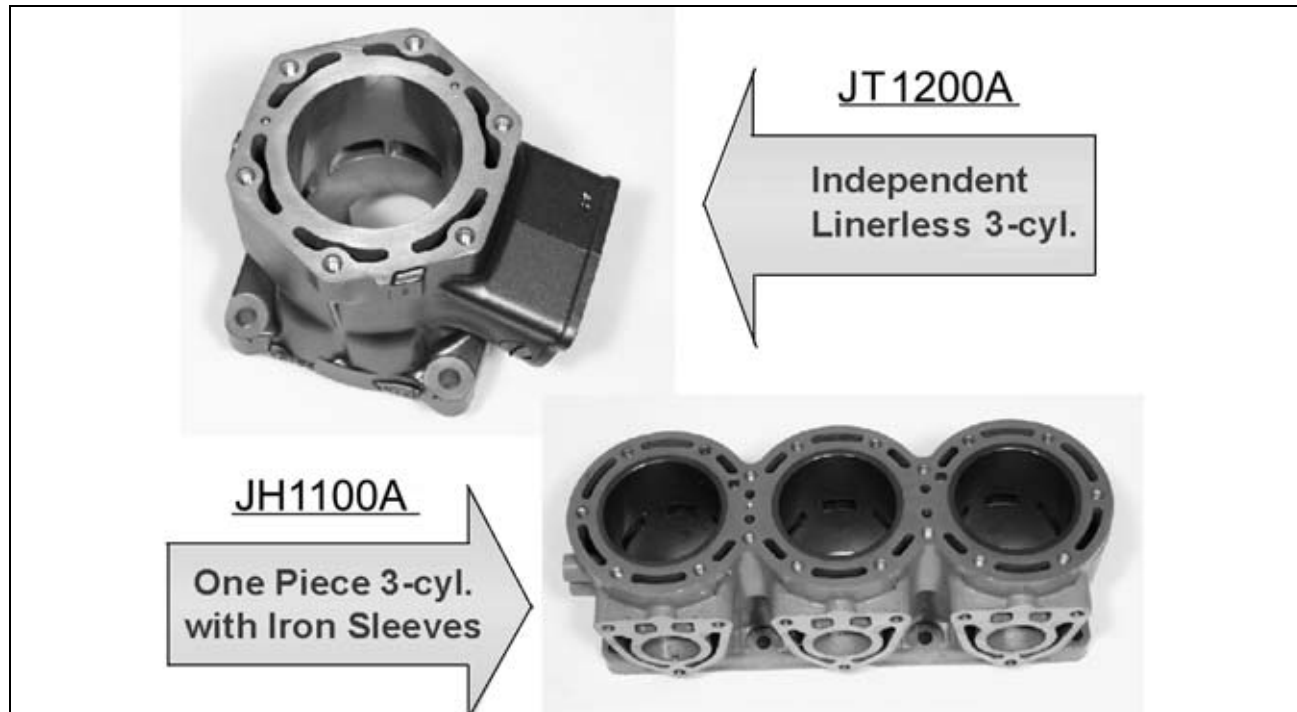
1-24 GENERAL INFORMATION

Technical Information – Engine

1. Cylinder

This large-displacement engine features independent, Nikasil plated aluminium cylinders for light weight, long wear and superb heat dispersion characteristics.

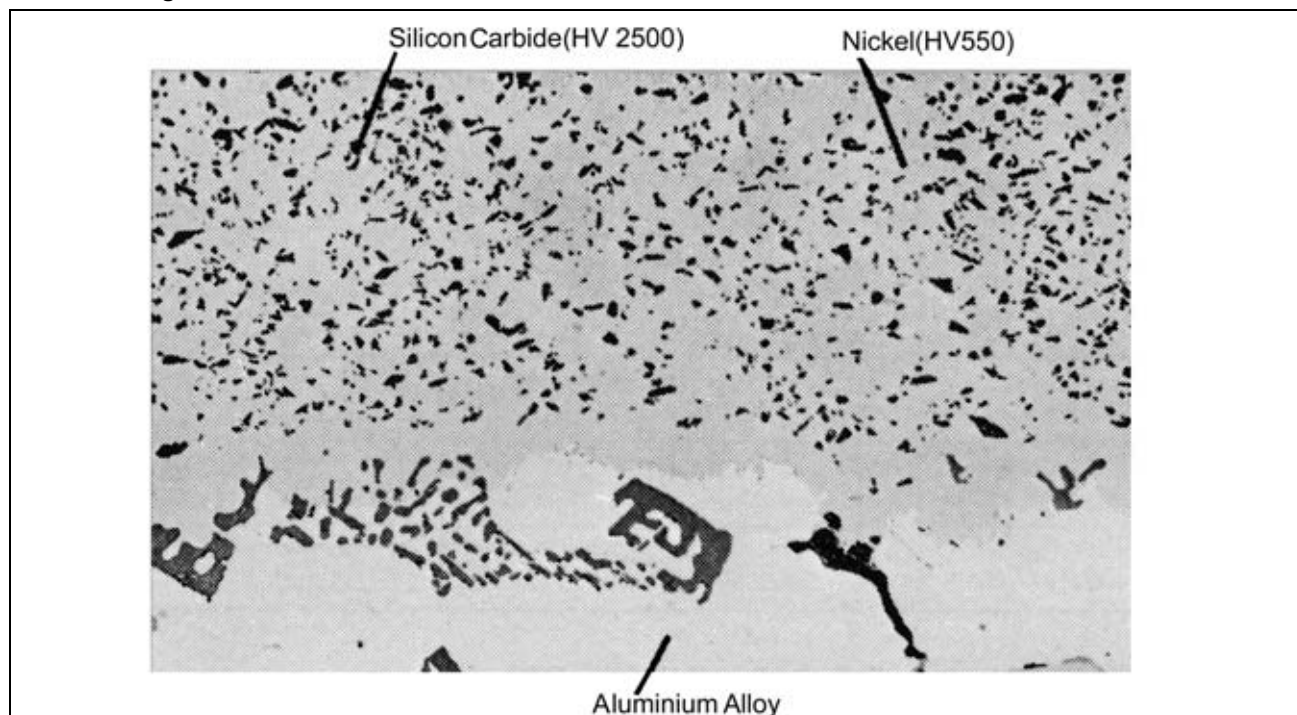
Comparison of Cylinders



Nikasil Plating : A film in which silicon carbide (SiC) is combined with nickel (Ni).

The cylinders are made from aluminium alloy for excellent heat transmission. This keeps the surface temperature of the cylinder-bore lower than is possible with a conventional aluminium cylinder with a cast-iron sleeve. Assembly and maintenance are improved with independent cylinders.

Nikasil Plating

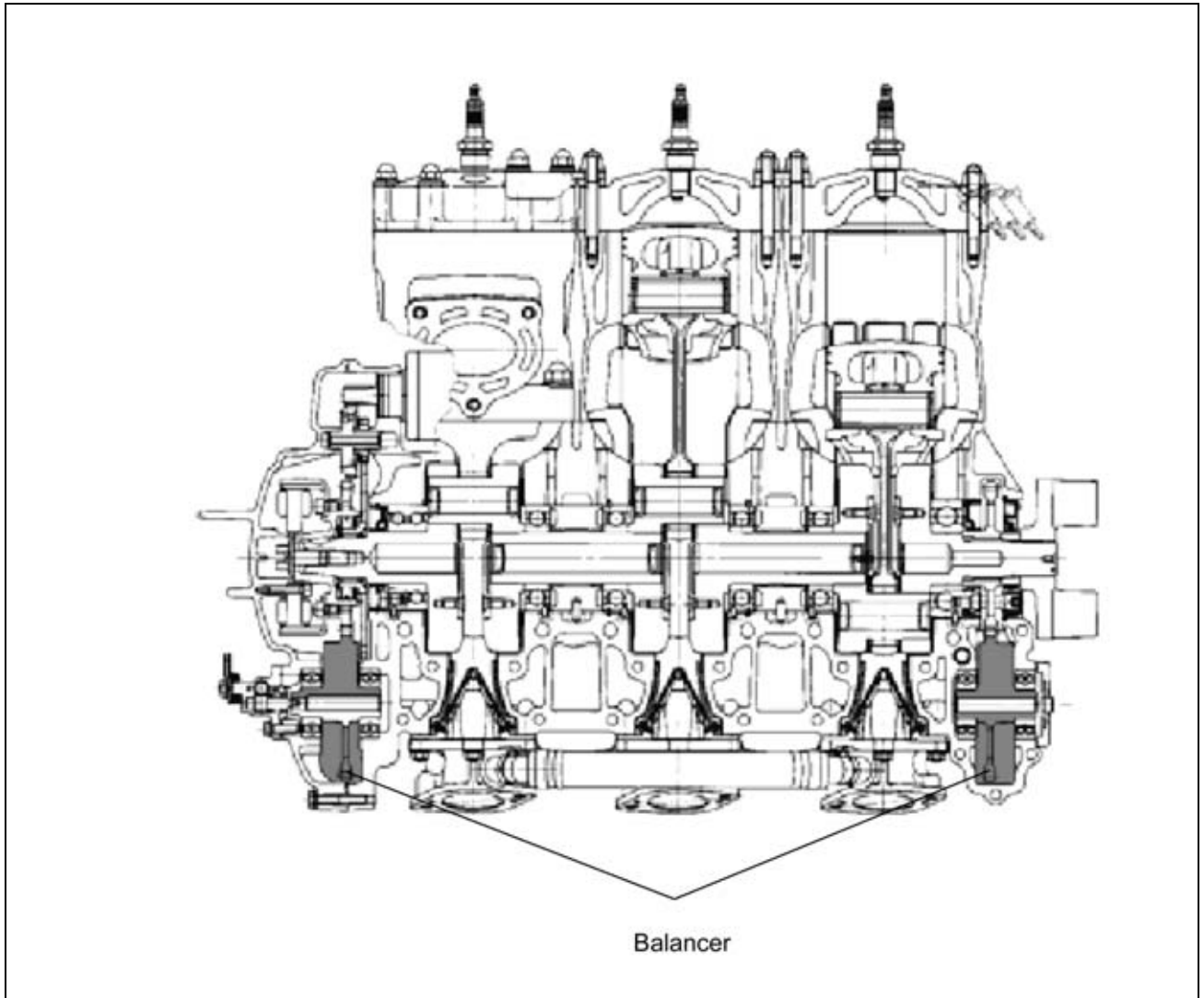


Technical Information – Engine**2. Balancer**

New counter balancers, one at each end of the crankshaft, decrease vibrations and make this the smoothest running Kawasaki triple ever produced. When reassembling, it is necessary to match the marks on the balancer gear and the balancer drive gear. After engine reassembly, the front and rear balancer oil chambers must be refilled with engine oil.

Font end: 200 mL (6.76 US oz.)

Rear end: 20 mL (0.68 US oz.)

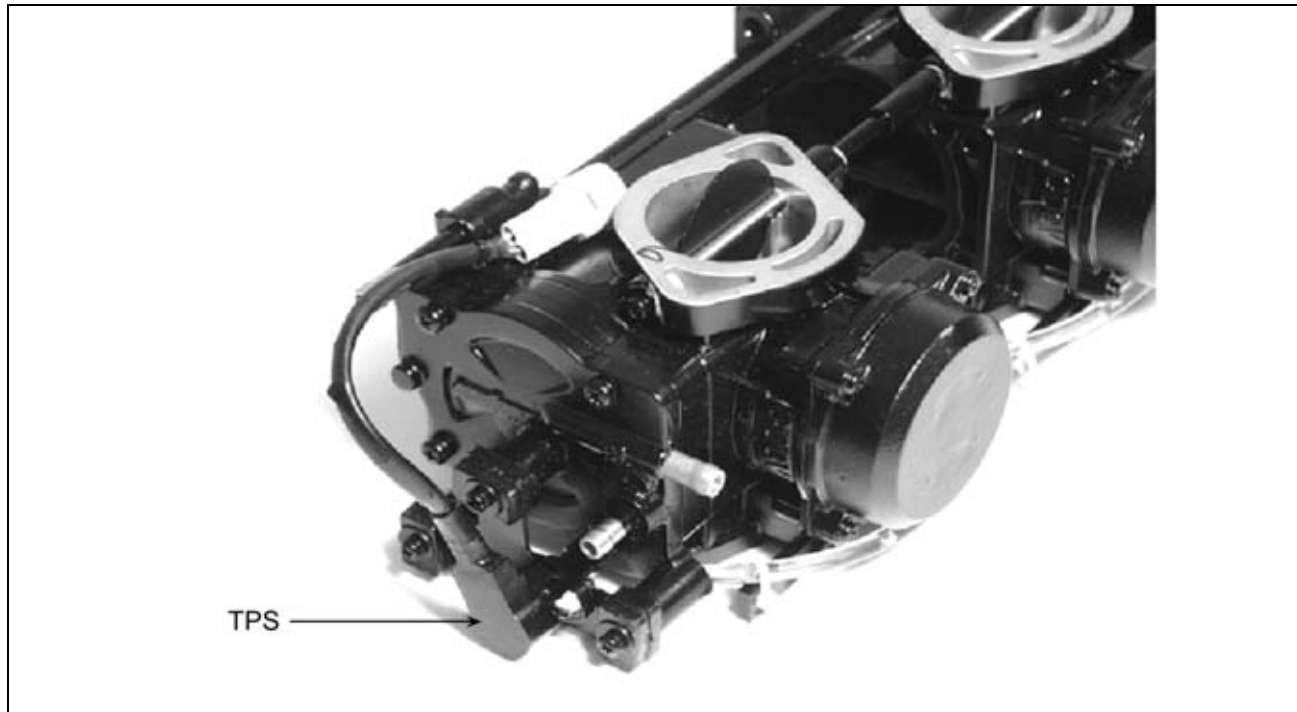
Balancer**3. Carburetor and Throttle Position Sensor**

The JT1200-A1 has CDCV 40 carburetors with a Throttle Position Sensor (TPS). The CDCV 40 carburetors deliver sharp throttle response and smooth acceleration. TPS ensures ideal ignition timing at all throttle openings, delivering improved response, harder acceleration and improved power feel at all rpm. The TPS signal goes to the igniter. The igniter computes the optimum ignition timing. (K-TRIC system)

1-26 GENERAL INFORMATION

Technical Information – Engine

Throttle Position Sensor



The Kawasaki JET SKI Watercraft Constant Velocity Carburetor

(1) Development Goals

- 1) The carburetor must allow high performance with high flexibility to match the engine's capabilities.
- 2) The carburetor must have high driveability from low to high engine speeds, responding closely to the operator's input.
- 3) The carburetor must lower exhaust emissions for less harm to the environment.

(2) Features

- 1) The watercraft CV carburetor has a variable venturi for smoother driveability through the entire speed range of the engine. It has a vacuum diaphragm which moves a slide in the venturi, and a needle jet and jet needle. The slide changes the venturi area according to the pressure in the venturi, and the needle and jet vary the amount of fuel allowed into the venturi.
- 2) The watercraft CV carburetor is a diaphragm-type carburetor (as opposed to a float bowl-type), and has all the performance features of the traditional watercraft carburetor: It can operate efficiently at any angle, it is durable, and corrosion resistant.

(3) Construction and Function

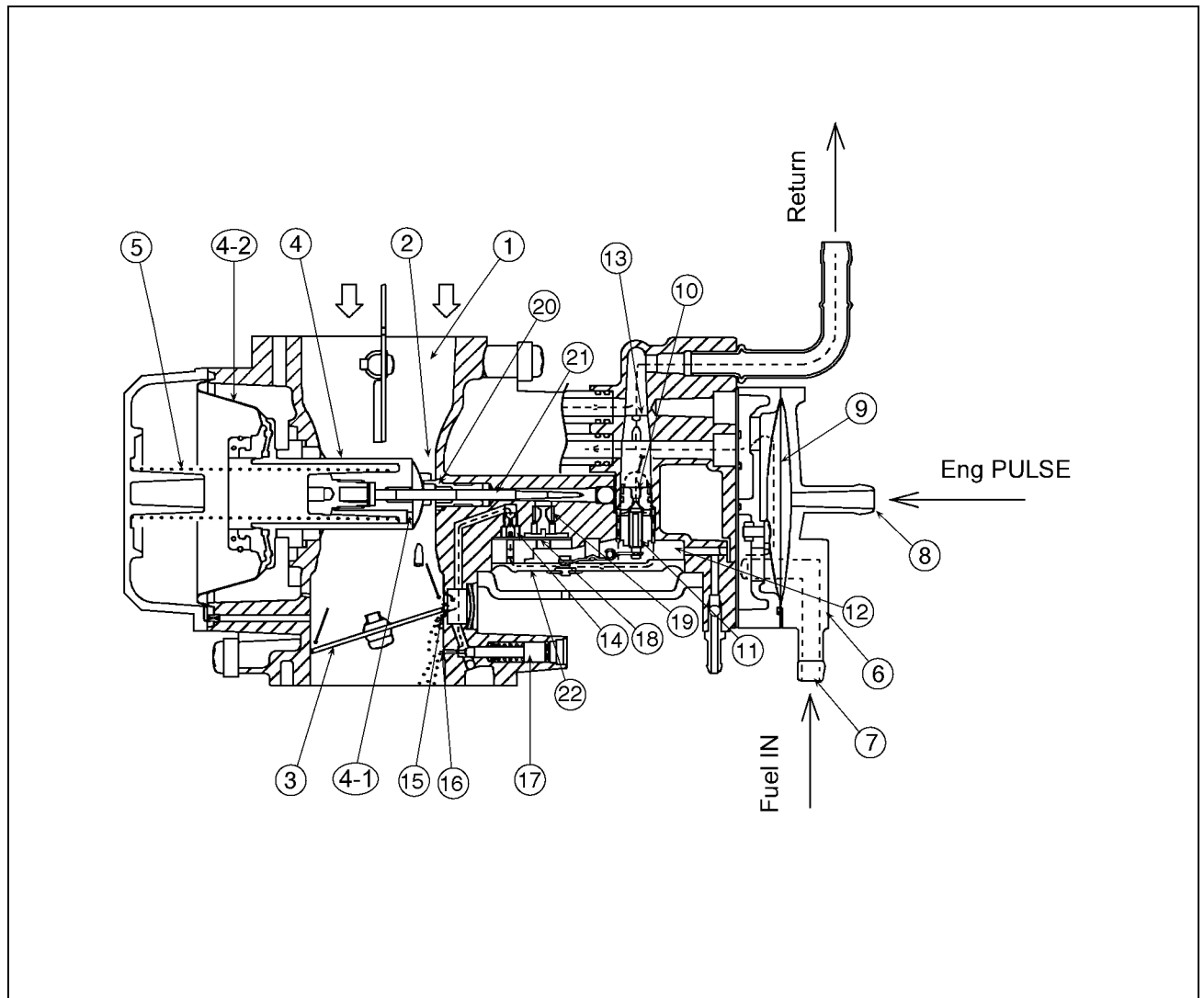
- 1) In operation, air is drawn through the intake [1], venturi opening [2], and the throttle valve [3], and into the engine's crankcase. The vacuum-actuated slide [4] projects into the venturi, and is pushed to narrow the venturi opening by the vacuum slide spring [5]. When the engine is running slowly and the amount of air down into the engine is very small, the slide [4] moves to minimize the venturi cross sectional area. This maintains the air velocity in the venturi. The bottom of the slide [4] has a hole [4-1] that goes through into the space above the diaphragm [4-2]. This hole allows the low pressure in the venturi to draw the slide, against the pressure of the spring [5], out of the venturi, enlarging the venturi area [2]. The wider the throttle opens, the lower the pressure in the venturi and the farther the slide moves, opening the venturi so that the engine can speed up. This mechanism maintains the air speed through the venturi at an even level.
- 2) The carburetor assembly has a built-in pulse-type fuel pump [6]. Fuel flows from the fuel tank to the joint [7] on the carburetor assembly and into the fuel pump. As the engine turns, pressure pulses from the crankcase travel through the pulse joint [8] and push the diaphragm [9] in the fuel pump back and forth, drawing fuel through the check valve in the joint [7] and pushing it past the needle valve [11], and into the regulator chamber [12]. The needle valve [11] serves the same purpose as

Technical Information – Engine

the float valve in a float bowl-type carburetor. If the pump supplies more fuel than the engine can use, the excess fuel escapes back to the fuel tank through the leak jet [13].

- 3) The carburetor slow system provides fuel to the engine at low speeds. The slow system consists of a slow jet [14], various bypass outlets [15], the pilot outlet [16], and the pilot screw [17]. As the throttle valve opens, fuel flows through the pilot outlet [16] and then the bypass outlets [15], one by one.
- 4) The main system consists of the check valve [18], the main jet [19], the needle jet [20], and the jet needle [21]. The jet needle [21] is fixed to the slide and moves with it. As the slide moves, powered by the diaphragm [4-2], the tapered jet needle [21] moves in and out of the needle jet [20] varying the clearance between them and thus the fuel flow out of the needle jet.
- 5) When the engine is idling, the throttle valve [3] is almost closed. The low pressure in the intake tract downstream of the throttle valve draws fuel through the pilot outlet [16] and the bypass outlets [15] from the regulator chamber [12]. Even though the pressure in the venturi [2] is higher on the upstream side of the throttle valve, almost no fuel flows through the needle jet [20] and into the regulator chamber [12], because of the check valve [18].

Idling



- 6) As the fuel in the regulator chamber [12] flows out, the pressure in the chamber drops and draws the regulator diaphragm [22] into contact with the collar [24] of the float arm [23], which in turn pulls the needle float valve [11] away from the valve seat [10]. Fuel can now flow into the regulator

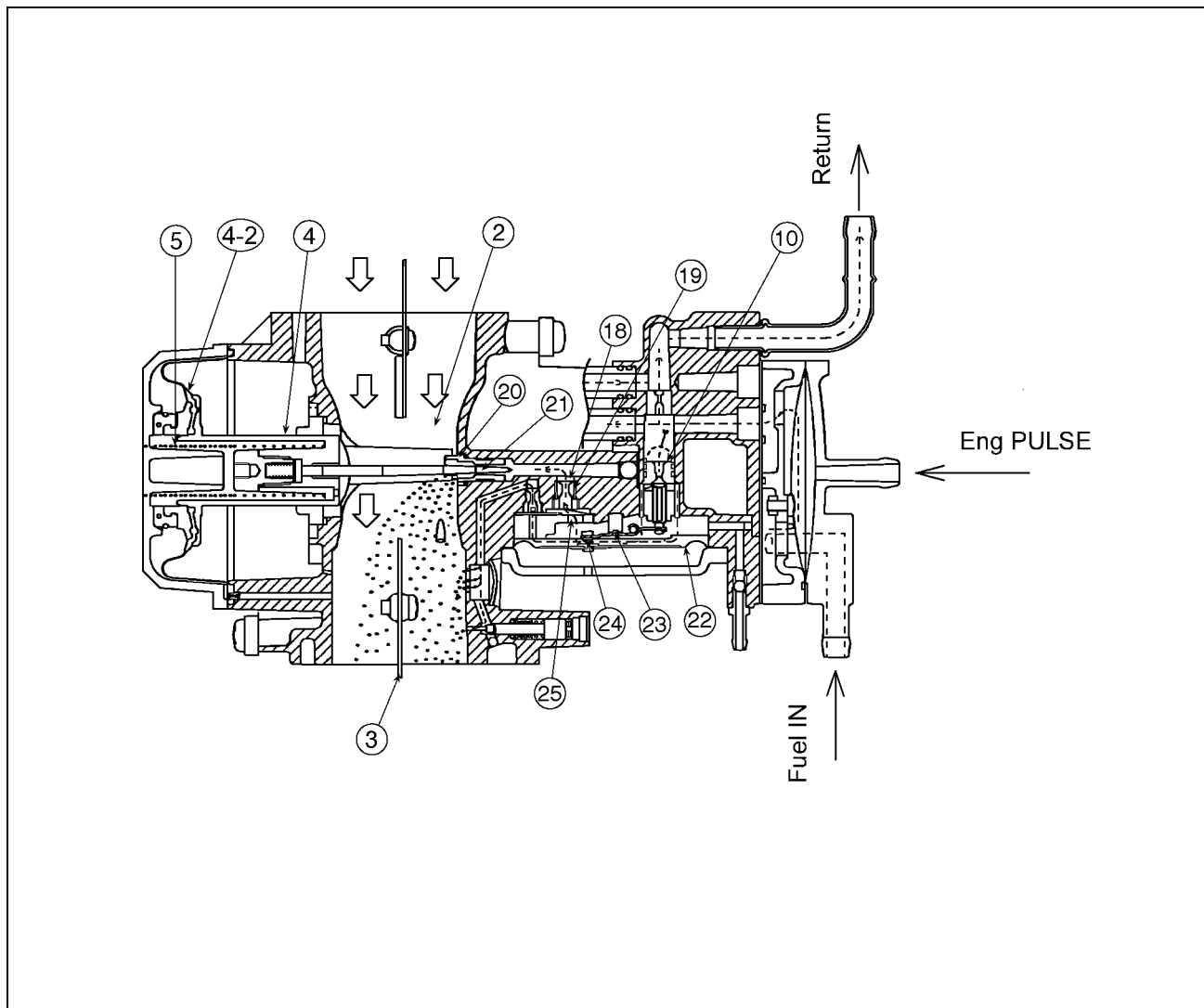
1-28 GENERAL INFORMATION

Technical Information – Engine

chamber [12] and press the diaphragm [22] away from the float arm [23]. This allows the float arm spring [25] to push the arm toward the float valve needle [11] pressing it into the seat [10], shutting off the fuel flow.

- 7) When the throttle valve [3] opens, the engine runs at mid-range or higher speeds. The pressure in the venturi [2] drops as the air flow speed through it rises. This pressure drop allows the check valve [18] to open and fuel flows through the main jet [19], the needle jet [20], past the jet needle [21], and into the venturi [2] on its way into the engine. The low pressure in the venturi [2] also acts on the diaphragm [4-2], which pulls the slide [4] increasing the area of the venturi. The diaphragm [4-2] moves the slide until the pressure of the vacuum slide spring [5] is high enough to overcome the force of the diaphragm. As the slide moves, it pulls the jet needle [21] out of the needle jet [20], increasing the clearance between the two and allowing more fuel to join the air going to the engine. The parts on the carburetor are designed to balance the air to fuel ratio for the best fuel economy, power, driveability, and lowest exhaust emissions.

Full-Open



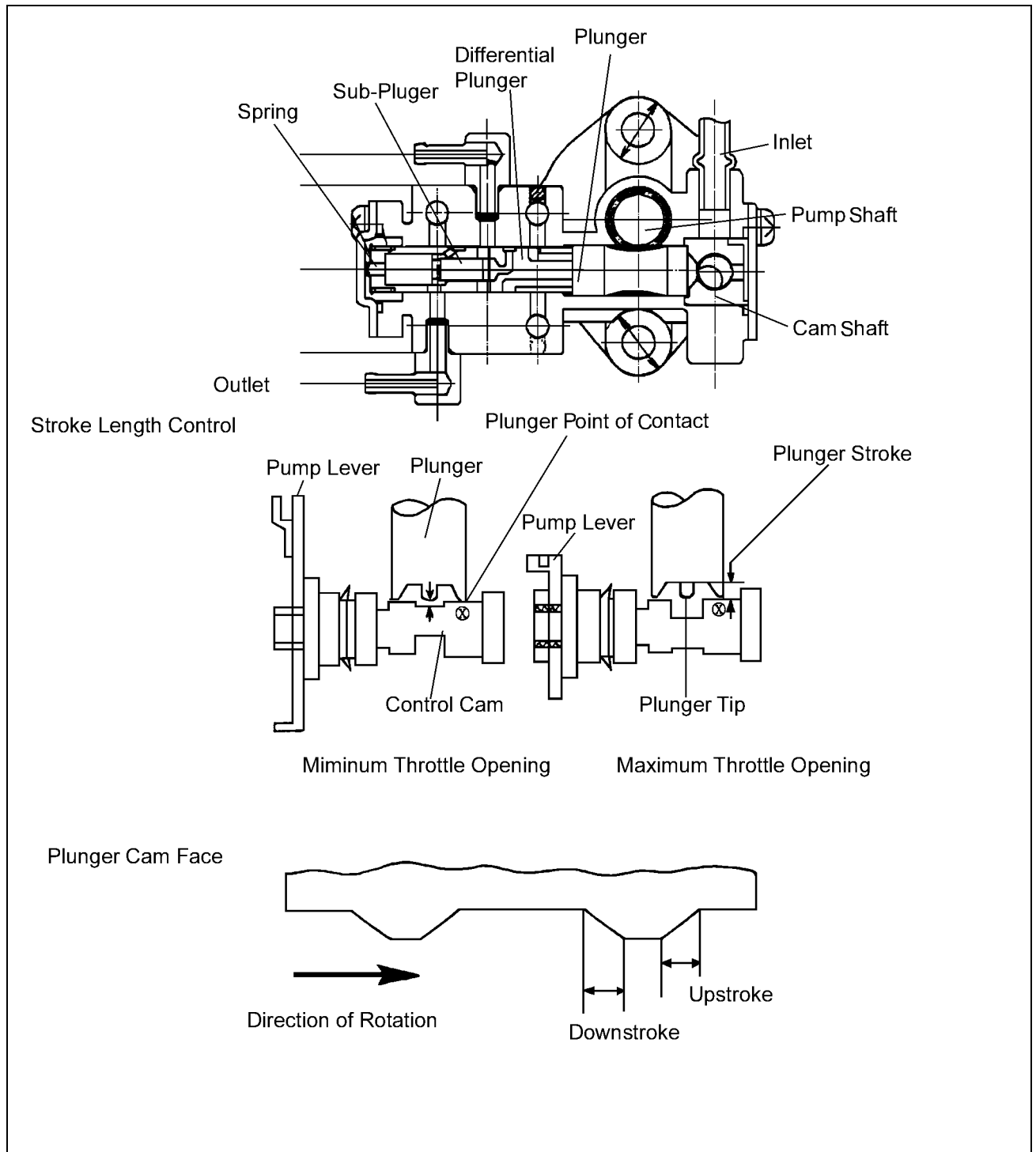
4. Oil Pump

The oil pump output is determined by both engine speed and throttle opening, reducing both oil consumption and exhaust smoke. This type of pump is often used on 2-stroke motorcycles. The oil pump has 5 outlet ports. The oil is supplied to each carburetor through 3 outlet ports and to the balancers through 2 ports for optimum lubrication. The oil pump output of the JH1100A is determined

Technical Information – Engine

by engine speed only, and the oil is supplied to each carburetor.

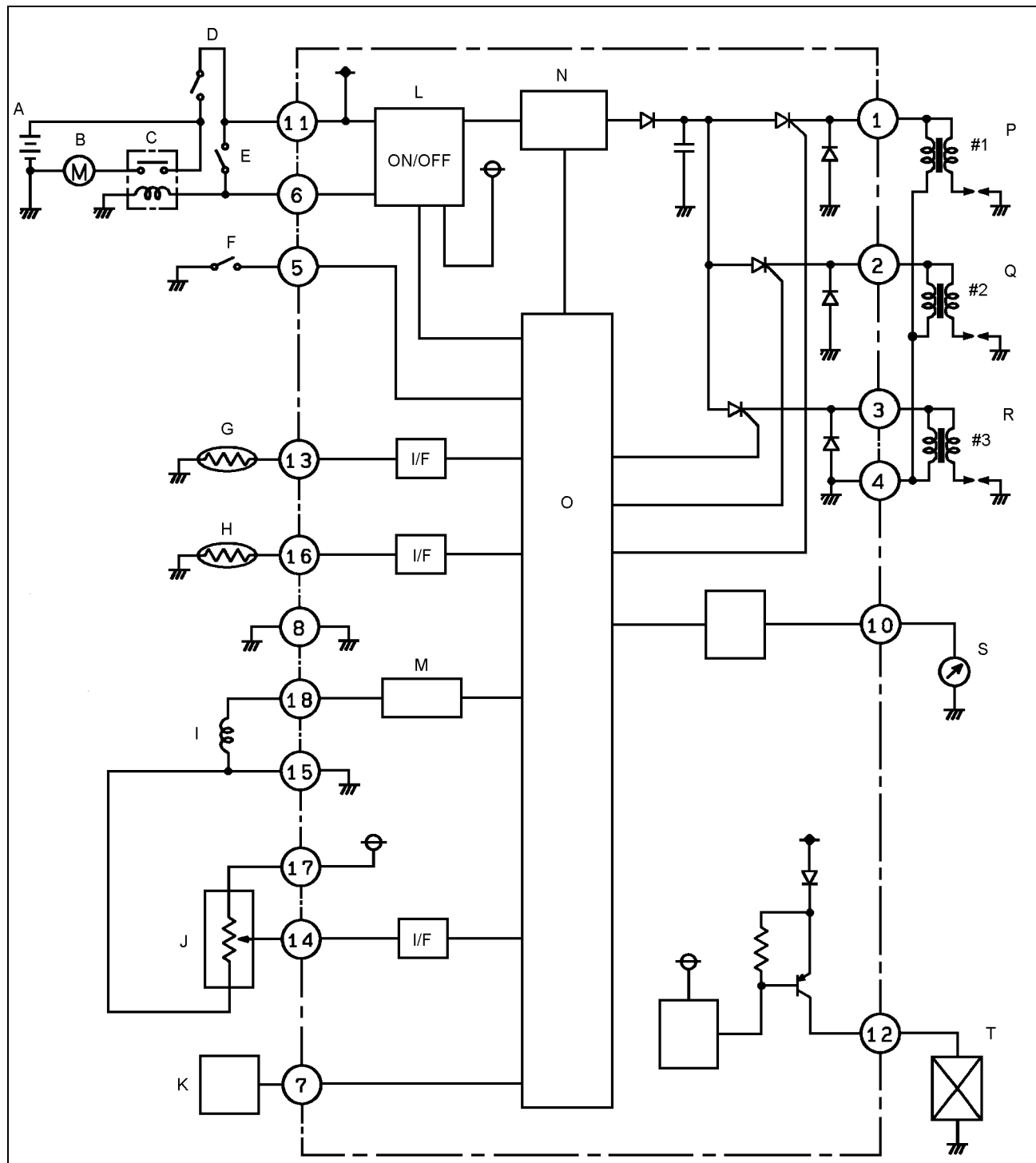
Oil Pump



1-30 GENERAL INFORMATION

Technical Information – Igniter

1. Block Diagram of Digital Igniter



A. Battery

B. Starter

C. Starter Relay

D. Ignition Switch

E. Starter Switch

F. Stop Switch

G. Heat Sensor

H. Intake Air Temperature Sensor

I. Pickup Coil

J. Throttle Position Sensor

K. Warning Monitor

L. Power-Source ON/OFF Circuit

M. Wave Shape Circuit

N. DC-DC Converter

O. Control Unit

P. Ignition Coil #1

Q. Ignition Coil #2

R. Ignition Coil #3

S. Tachometer

T. Outer Load

I/F Interface

Technical Information – Igniter

2. Functions of Digital Igniter

(1) K-TRIC

The throttle position sensor is installed on the throttle body. The output signal is sent to the igniter, which determines the optimum igniter timing. The K-TRIC system controls the independent timing maps for each cylinder based on engine speed and throttle opening for quick throttle response.

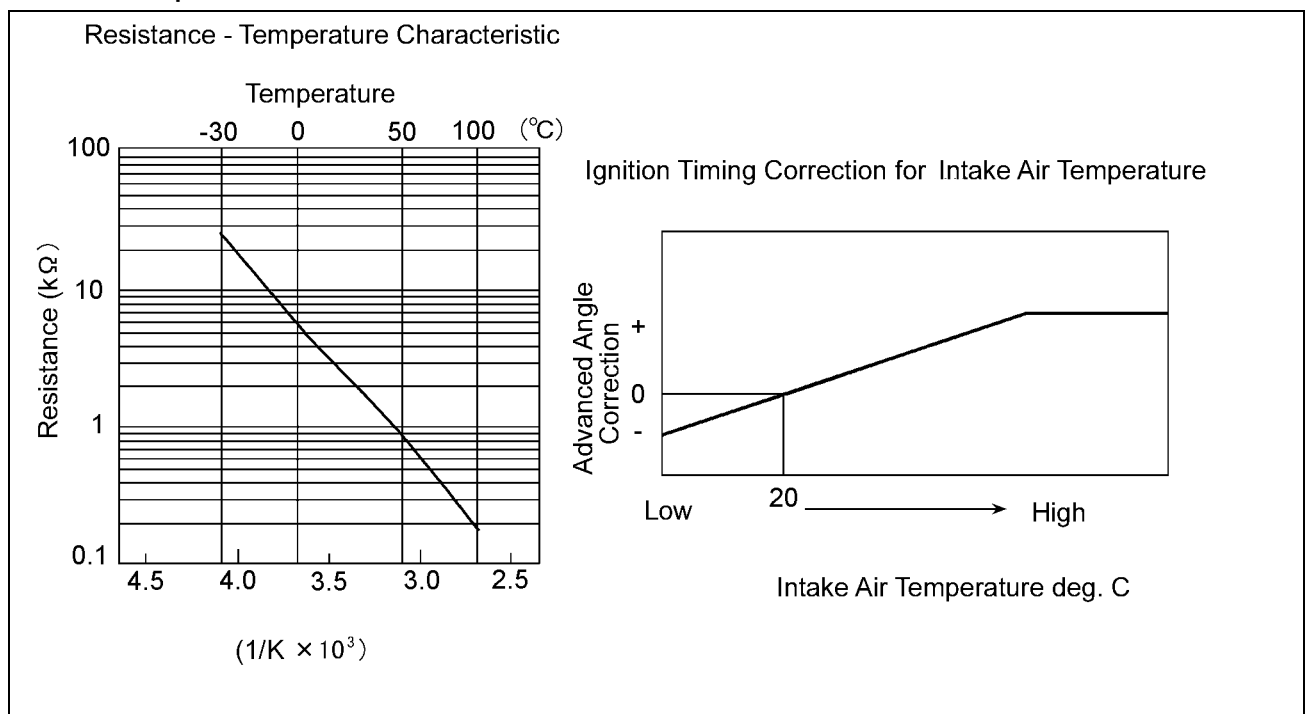
(2) Correction of Engine Acceleration

The igniter features an acceleration function which advances the timing during rapid acceleration for improved throttle response. When revs stabilise, timing returns to "normal".

(3) Intake Air Temperature Correction

The intake air temperature sensor is installed in the engine room. As the air temperature inside the hull rises, the igniter compensates by advancing ignition timing to avoid power fade.

Intake Air Temperature Correction



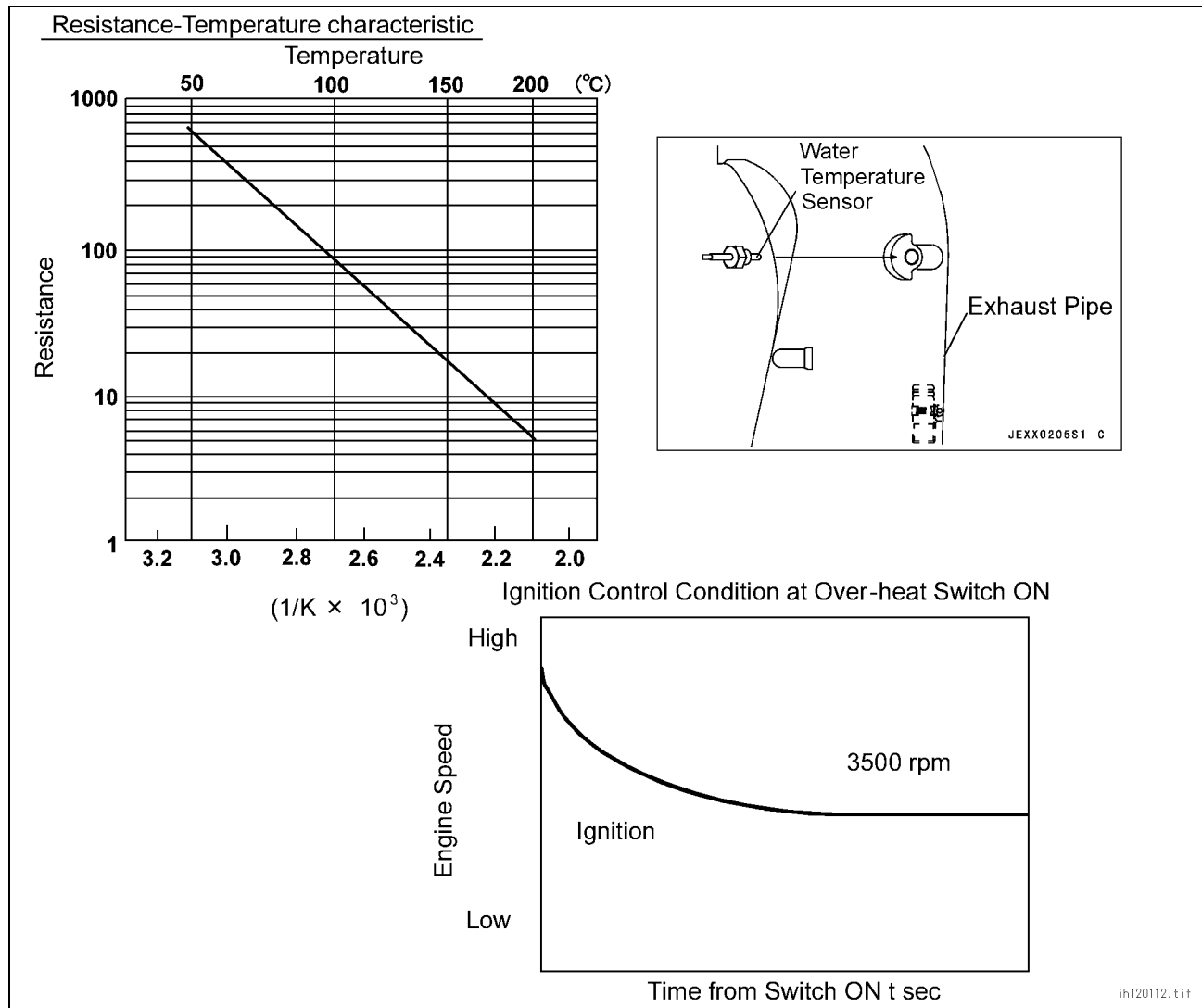
(4) Overheat Control

To protect the engine against overheating, a new, more sensitive heat-sensor constantly monitors exhaust pipe temperature. When temperature exceeds 90 degrees C or more, the igniter gradually cuts engine speed to 3500 rpm where it stays until the temperature is lowered.

1-32 GENERAL INFORMATION

Technical Information – Igniter

Overheat Control



(5) Engine Over-Rev Cut-Off

The igniter stops ignition when engine speed exceeds 7500 r/min (rpm), to protect the engine from damage. The ignition starts again when the engine speed drops below 7500 r/min (rpm).

(6) Engine Tachometer Drive

The electric tachometer is driven by the pulsing signals from the ignitor.

(7) Power Source OFF Function

Three minutes after the engine stops, the igniter shuts off the power source automatically. The power source turns on again when the starter switch turns on.

(8) Output for Outer Load Function

When the power source of unit turns on, the igniter puts out a voltage equivalent to the battery voltage on the terminal. This terminal is connected to Trim Switch and Multifunction meter.

Technical Information – Electrical Parts

1. Engine Starter

The more compact starter features a 1-way clutch with back-torque limiter to prevent starter damage caused by "kick-back" during starting.

2. Magneto

The exciter coil is eliminated by adopting DC-CDI. Rare earth metal magnets lighten the magneto and decrease the flywheel effect, improving acceleration response.

	JT1200A	JH1100A
Diameter	106 mm (1.732 in.)	131 mm (5.175 in.)
Weight	1.44 kg (3.18 lb)	2.54 kg (5.60 lb)
Flywheel effect	16.1 kg·cm ²	43.0 kg·cm ²

1-34 GENERAL INFORMATION

Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	$\times 1\,000\,000$
kilo	k	$\times 1\,000$
centi	c	$\times 0.01$
milli	m	$\times 0.001$
micro	μ	$\times 0.000001$

Units of Mass:

kg	$\times$	2.205	=	lb
g	$\times$	0.03527	=	oz

Units of Volume:

L	$\times$	0.2642	=	gal (US)
L	$\times$	0.2200	=	gal (imp)
L	$\times$	1.057	=	qt (US)
L	$\times$	0.8799	=	qt (imp)
L	$\times$	2.113	=	pint (US)
L	$\times$	1.816	=	pint (imp)
mL	$\times$	0.03381	=	oz (US)
mL	$\times$	0.02816	=	oz (imp)
mL	$\times$	0.06102	=	cu in

Units of Force:

N	$\times$	0.1020	=	kg
N	$\times$	0.2248	=	lb
kg	$\times$	9.807	=	N
kg	$\times$	2.205	=	lb

Units of Length:

km	$\times$	0.6214	=	mile
m	$\times$	3.281	=	ft
mm	$\times$	0.03937	=	in

Units of Torque:

N·m	$\times$	0.1020	=	kgf·m
N·m	$\times$	0.7376	=	ft·lb
N·m	$\times$	8.851	=	in·lb
kgf·m	$\times$	9.807	=	N·m
kgf·m	$\times$	7.233	=	ft·lb
kgf·m	$\times$	86.80	=	in·lb

Units of Pressure:

kPa	$\times$	0.01020	=	kgf/cm ²
kPa	$\times$	0.1450	=	psi
kPa	$\times$	0.7501	=	cmHg
kgf/cm ²	$\times$	98.07	=	kPa
kgf/cm ²	$\times$	14.22	=	psi
cm Hg	$\times$	1.333	=	kPa

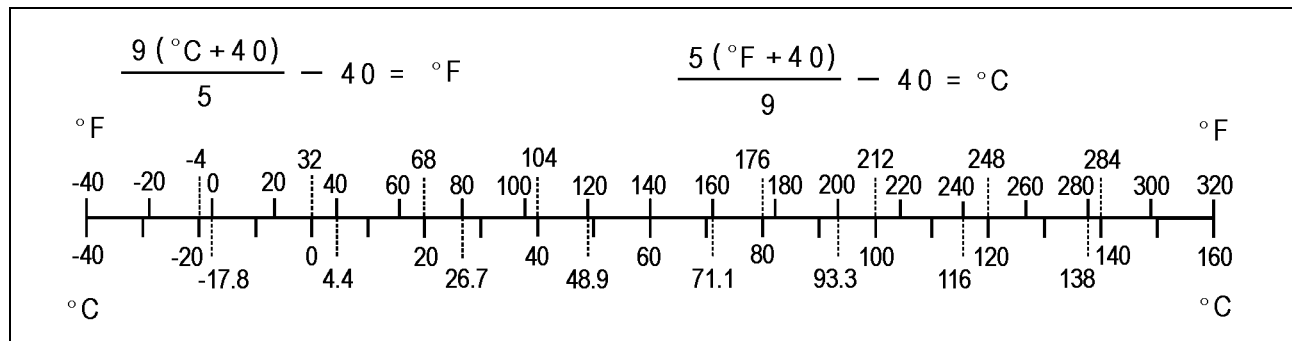
Units of Speed:

km/h	$\times$	0.6214	=	mph
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Units of Power:

kW	$\times$	1.360	=	PS
kW	$\times$	1.341	=	HP
PS	$\times$	0.7355	=	kW
PS	$\times$	0.9863	=	HP

Units of Temperature:



Periodic Maintenance

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2-2 PERIODIC MAINTENANCE

Periodic Maintenance Chart

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

Frequency Description	Initial 0 Hours	Every 25 Hours	Every 100 Hours	Reference
Check all hoses, hose clamps, nuts, bolts, and fasteners	•	•		2-4
Adjust carburetor (e)		•		2-5
Clean fuel filter screen (e)		•		2-8
Inspect fuel vent check valve		•		2-9
Inspect/clean flame arrester (e)		•		2-10
Inspect/replace fuel filter			•	2-10
Inspect throttle shaft spring (replace carburetor if necessary)			•	2-10
Inspect/replace coupling damper			•	2-10
Flush cooling system (after each use in salt water)		•		2-11
Flush bilge line and filter		•		2-11
Inspect impeller blade for damage (remove)			•	2-12
Inspect steering cable			•	2-12
Lubricate handlebar pivot (disassemble)		•		2-13
Inspect Battery Charging Condition		•		2-13
Clean and gap spark plugs (replace if necessary) (e)		•		2-14
Lubricate carburetor cable fitting and choke cable fitting at carburetor		•		2-15
Lubricate choke cable and throttle control cable and throttle cable fitting at throttle case		•		2-16
Lubricate steering cable joint at steering shaft and steering nozzle pivots		•		2-16

(e): Emission Related Items

Specifications

Item		Standard	Service Limit
Fuel System :			
Idle speed :	in water	1250 ± 100 r/min (rpm)	- - -
	out of water	1800 ± 100 r/min (rpm)	- - -
Main jet :	Front	#165 (#155 - for high altitude)	- - -
	Middle	#165 (#155 - for high altitude)	- - -
	Rear	#165 (#155 - for high altitude)	- - -
Pilot jet :	Front	#48 (#45 - for high altitude)	- - -
	Middle	#48 (#45 - for high altitude)	- - -
	Rear	#48 (#45 - for high altitude)	- - -
Electrical System :			
Spark plug gap		0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	- - -

2-4 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

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

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

Oil Hoses

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

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

[A] Metal Clamp

[B] Hose

[C] Hose Fitting

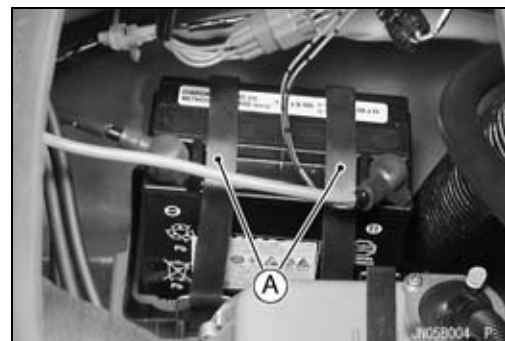
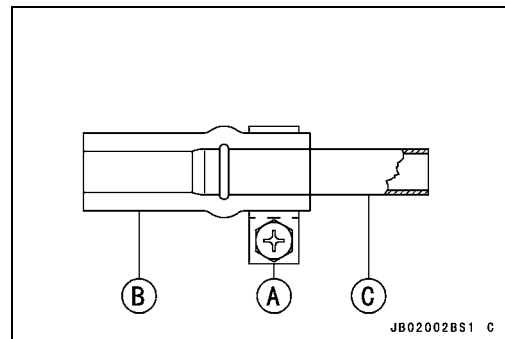
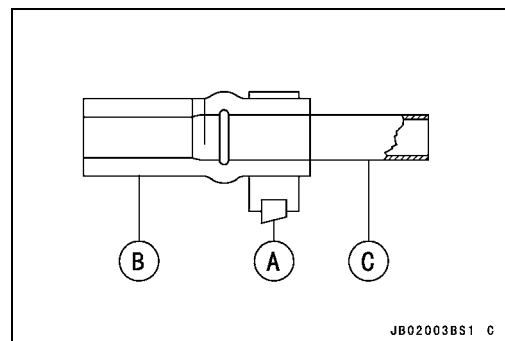
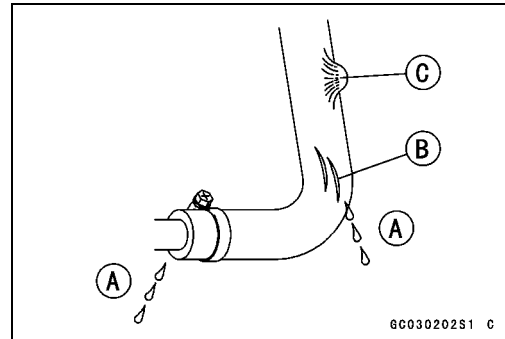
NOTE

- Check the fuel and oil filler tubes and exhaust tubes for signs of wear, deterioration, damage or leakage. Replace if necessary.
- 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 and Oil Tank Straps
 - Water Box Muffler Straps

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



Periodic Maintenance Procedures

Fuel System:

Idle Speed Adjustment

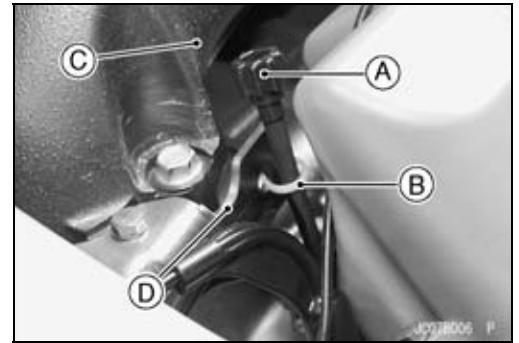
The normal idle speed is the lowest stable speed.

- 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	1,800 ± 100 r/min (rpm)

- Make sure the idle adjusting screw [A] is secured with the clamp [B] away from the exhaust pipe [C].

- ★ If the idle adjusting screw touches the exhaust pipe, resecure the idle adjusting screw with the clamp to the cable bracket [D].

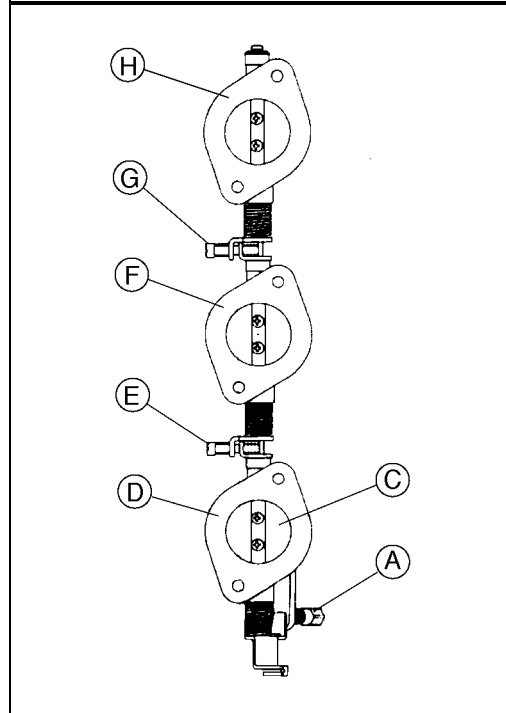
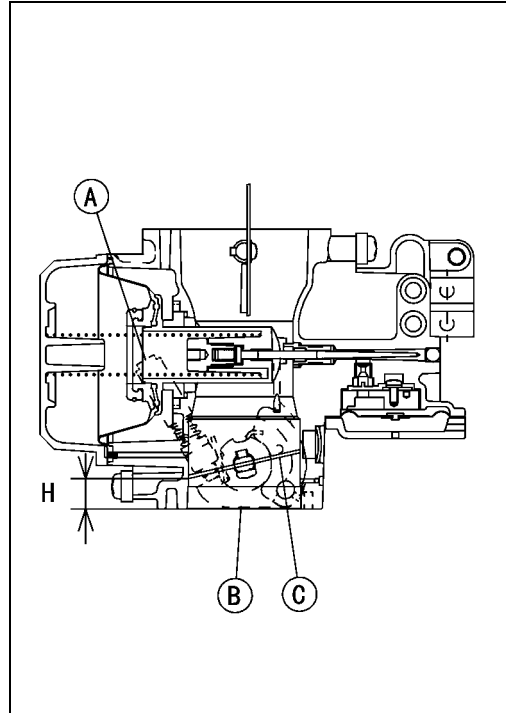


2-6 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Carburetor Synchronization

- Remove the carburetor (see Carburetor Removal in the Fuel System chapter).
- Turn out the idle adjusting screw [A] until there is a clearance between the adjusting screw end and throttle shaft lever [B].
- Turn in the idle adjusting screw until the adjusting screw end just touches the throttle shaft lever.
- Turn in the adjusting screw 3/4 turn from the point to keep the specified throttle valve [C] opening in the front carburetor [D].
- Measure the distance from the bottom of the carburetor bore lower end to the valve edge shown as "H".
- Turn the synchronizing screw [E] so that the valve edge in the middle carburetor [F] keeps the same distance within ± 0.2 mm (0.008 in.) tolerance as that in the front carburetor.
- Turn the synchronizing screw [G] so that the valve edge in the rear carburetor [H] keeps the same distance within ± 0.2 mm (0.008 in.) tolerance as in the front carburetor.
- Install the carburetor.
- Adjust the throttle control and choke cables.



Periodic Maintenance Procedures

High Altitude Performance Adjustment

The normal carburetor settings are best for sea level. If the watercraft is used at the higher elevations, the lower atmospheric pressure makes the carburetions richer. To obtain the proper carburetor setting at higher elevations, change the main and slow jets according to the table.

Altitude	Sea Level ~ 1,000 m (0 ~ 3,300 ft) STD	1,000 ~ 2,000 m (3,300 ~ 6,600 ft) STD	2,000 ~ 3,000 m (6,600 ~ 9,800 ft)
Min jet # P/No.	#165 92063-3720	#165 92063-3720	#155 92063-3723
Pilot jet # (slow jet) P/No.	#48 16158-3724	#48 16158-3724	#45 16158-3725

Carburetor Cable Adjustment

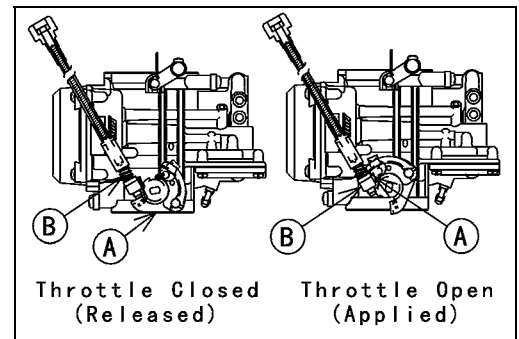
The throttle control cable is actually an assembly of three cables: the throttle cable, the carburetor cable, and the oil pump cable. The throttle cable runs from the throttle lever to the cable assembly junction where it connects to both the carburetor cable which leads to the carburetor, and the oil pump cable which leads to the oil pump.

Since the throttle lever controls both the carburetor and the oil pump simultaneously, it is important that each cable be adjusted to its designed base position so that the oil and fuel/air mixture reach the engine in the correct proportion at all throttle openings. Cable stretch creates excess play at the throttle lever and alters the base positions of the cables at the carburetor and the oil pump, necessitating periodic adjustment.

NOTE

○Be sure to inspect the remaining cable if whichever cable the carburetor the oil pump is adjusted.

- Check carburetor cable adjustment.
- With the throttle lever released, the lower stop on the throttle pivot arm [A] should rest against the idle adjust screw [B], and there should be slight slack in the throttle cable.
- When the throttle lever is fully applied (pulled), the upper stop on the pivot arm should be all the way up against the stop on the carburetor.



2-8 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

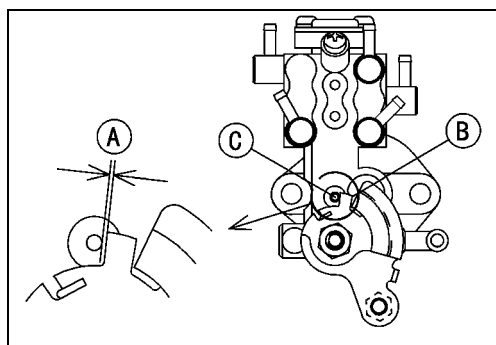
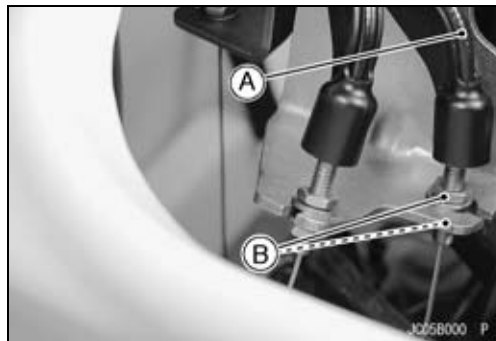
- If necessary, adjust the carburetor cable [A].
- Loosen and turn the locknuts [B] at the cable holder until the lower stop on the pivot arm hits against the idle adjust screw with slight cable slack.
- Tighten the locknuts securely.

Torque - Carburetor Cable Locknuts: 9.8N·m (1.0 kgf·m, 87 in·lb)

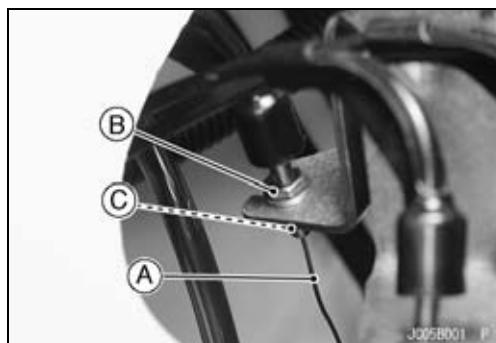
- Check the oil pump cable adjustment (see Oil Pump Cable Adjustment).
- ★ If necessary, adjust the oil pump cable.

Oil Pump Cable Adjustment

- Check carburetor cable adjustment.
- If necessary, adjust the carburetor cable.
- Check oil pump cable adjustment.
- When the throttle lever is fully applied (pulled), check to see that there is a clearance [A] (approx. 0.6 mm, 0.0236 in.) between stop [B] on the oil pump pulley and the stopper pin [C] on the oil pump body. At this time, the oil pump pulley is fully opened.



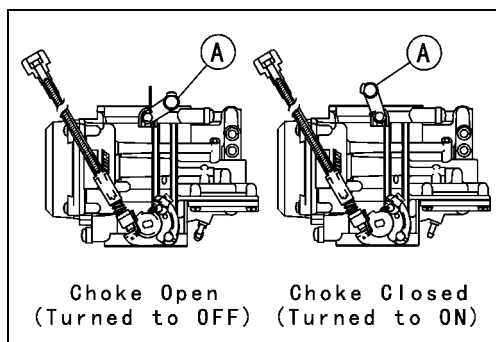
- ★ If necessary, adjust the oil pump cable [A].
- Hold the throttle lever fully applied (pulled).
- Turn the oil pump pulley till the stop on the pulley contacts to the stopper pin on the oil pump body. At this time, the oil pump pulley is fully open. And then give the oil pump cable tension by turning the upper locknut clockwise.
- Loosen the upper locknut [B] by turning counterclockwise 1/2 turn and then fix the oil pump cable by tightening the lower locknut [C] securely.



Torque - Oil Pump Cable Locknuts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Choke Cable Adjustment

- Check choke cable adjustment.
- When the choke knob is turned to the OFF position, the choke butterfly valve in the carburetor should be completely open. The choke pivot arm [A] should stand all the way toward the port side of the boat with cable slack.
- When the choke knob is turned to the ON position, the choke butterfly valve in the carburetor should be completely closed. Check that the choke pivot arm stands all the way toward the starboard side of the boat without cable slack.

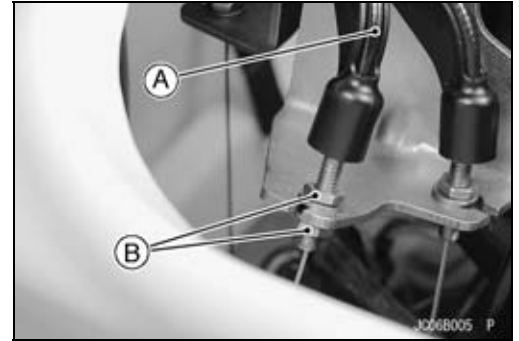


Periodic Maintenance Procedures

- ★If necessary, adjust the choke cable [A].
- Loosen the locknuts [B] at the cable holder and turn the choke knob to the OFF position.
- Check that the choke pivot arm stands all the way toward the port side of the boat with cable slack, and tighten the locknuts.

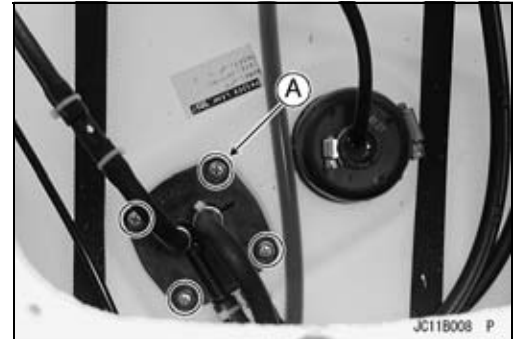
Torque - Choke Cable Locknuts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Turn the choke nob to the ON position.
- Check that the choke pivot arm stands all the way toward the starboard side of the boat without cable slack.

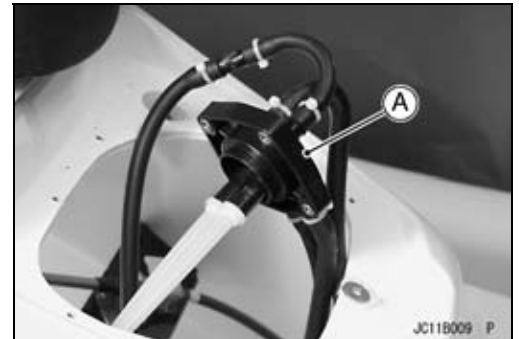


Fuel Filter Screen Cleaning

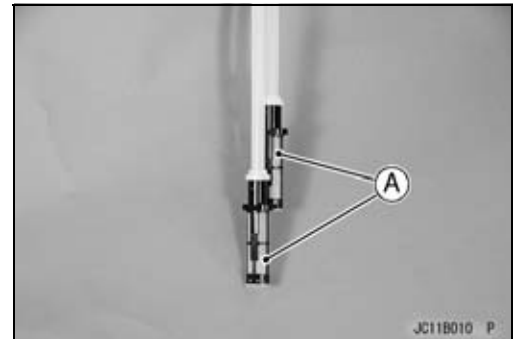
- Remove the storage pocket (see Storage Pocket Removal/Installation in the Hull/Engine Hood chapter).
- Unscrew the fuel filter assembly mounting screws [A].



- Pull the fuel filter assembly [A] out of the space after removing the storage pocket.



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



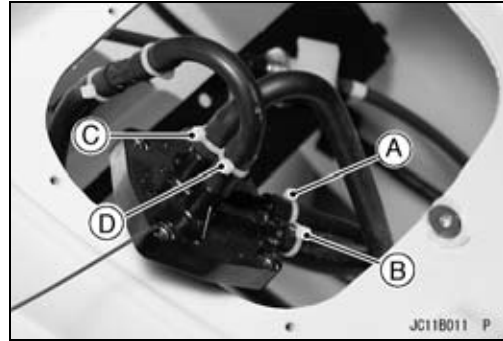
⚠ WARNING

Clean the fuel screens 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.

2-10 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

- When installing the fuel filter assembly, note the following.
- Be sure the hoses are connected correctly with their fittings.
 - Reserve Line [A]
 - Main (ON) Line [B]
 - Return Line [C]
 - Fuel Vent Line [D]



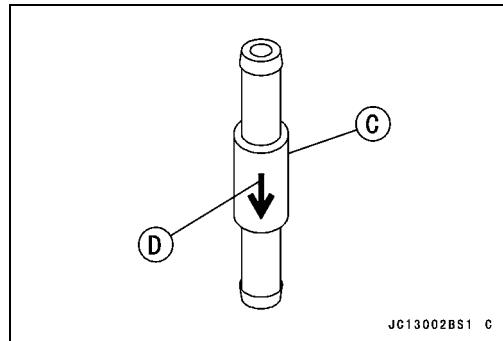
- Be sure the O-ring [A] on the fuel tank is in position.



Fuel Vent Check Valve Mounting

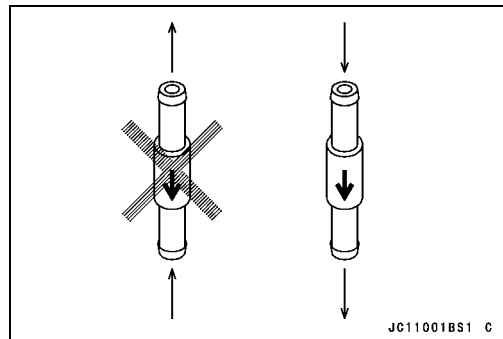
The fuel vent check valve is mounted in the fuel tank vent hose to prevent fuel from spilling during riding. Air can flow into the tank to allow fuel to be drawn out by the fuel pump, but fuel cannot flow out the check valve.

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



Fuel Vent Check Valve Inspection

- Remove the check valve and blow through it from each 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.



Periodic Maintenance Procedures

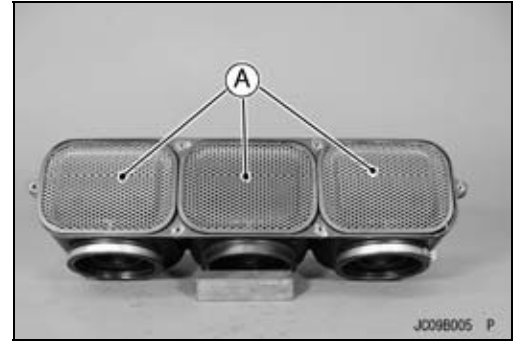
Flame Arrester Cleaning

- Remove the flame arrester [A] (see Flame Arrester Removal in the Fuel System chapter).
- Blow the flame arrester clean with compressed air.

⚠ 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.

- Install the flame arrester (see Flame Arrester Installation Notes in the Fuel System chapter).



Fuel Filter Inspection

- Inspect and replace the fuel filter [A] in accordance with the Periodic Maintenance Chart, or whenever you find from outside any foreign material or water trapped in the fuel filter.
- Check the fuel filter body for cracks and damage.
- ★ If necessary, replace the fuel filter.



Throttle Shaft Spring Inspection

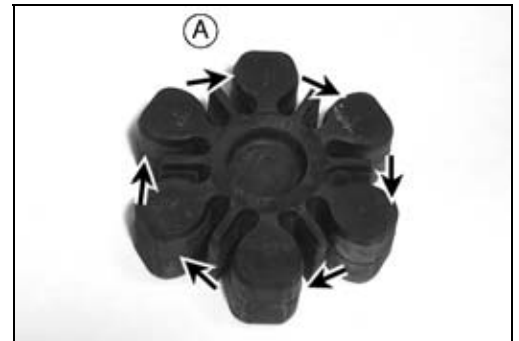
- Check the throttle shaft springs [A] by pulling the throttle lever.
- ★ If the springs are damaged or weak, replace the carburetors.



Engine Bottom End

Coupling Damper Inspection

- With the engine removed, 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.



2-12 PERIODIC MAINTENANCE

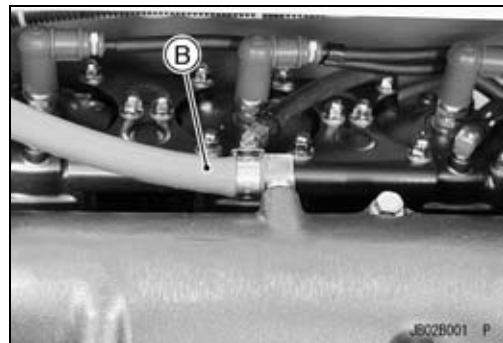
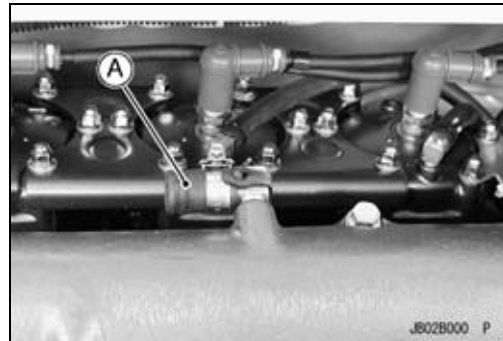
Periodic Maintenance Procedures

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.

- Remove the fitting cap [A] on the exhaust pipe.
- Connect a garden hose [B] 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 right 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.

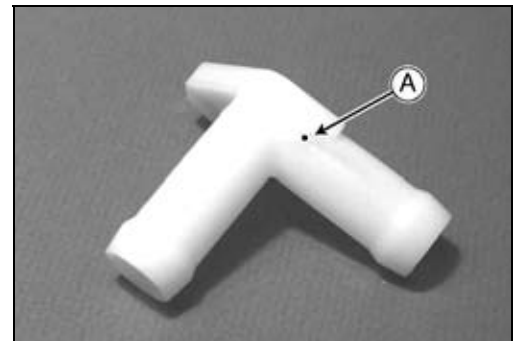
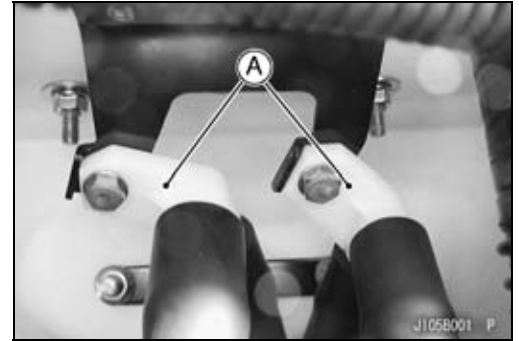
- Switch off the engine, remove the garden hose, install the fitting cap.

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 at the plastic breather fitting [A].
- 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 the 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.
- 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.



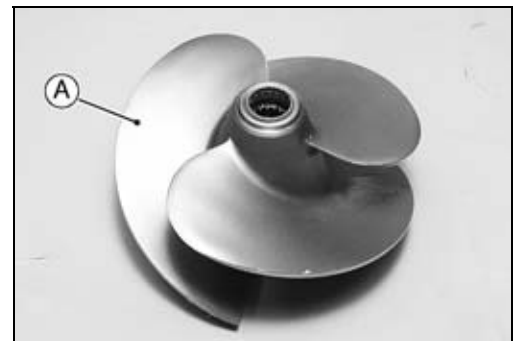
Pump and Impeller

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.



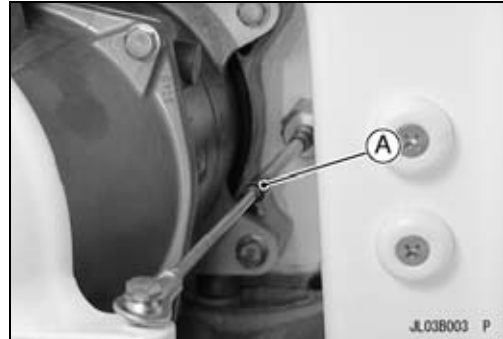
2-14 PERIODIC MAINTENANCE

Periodic Maintenance Procedures

Steering

Steering Cable Inspection

- Examine the steering cable.
- ★ If the cable or cable housing is kinked or frayed, replace the cable.
- ★ If the seal [A] at either end of the cable is damaged in any way, replace the cable.



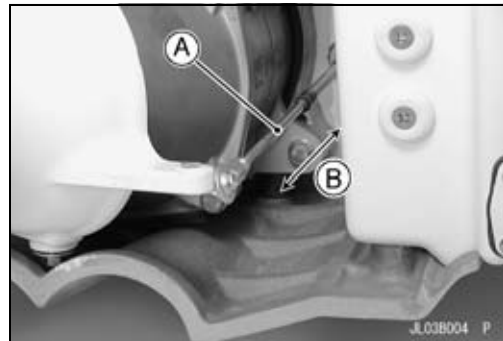
- Be certain that the cable moves freely in both directions.
- Disconnect the cable joint at each end of the cable.

CAUTION

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

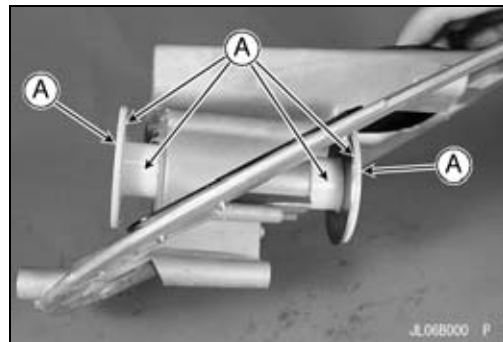
- Slide the inner cable [A] back and forth [B] in the cable housing.

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



Handlebar Pivot Lubrication

- Check the bushings for damage and wear.
- ★ If the bushings are damaged or worn, replace them.
- Grease:
 - Bushings [A]



Steering Shaft [B]



Periodic Maintenance Procedures

Electrical System

Battery Charging Condition Inspection

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

- Disconnect the battery terminal leads (see Battery Removal in the Electrical System chapter).

CAUTION

Be sure to disconnect the negative terminal lead first.

- Measure the battery terminal voltage.

NOTE

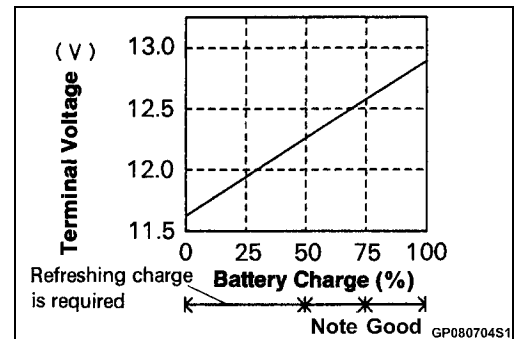
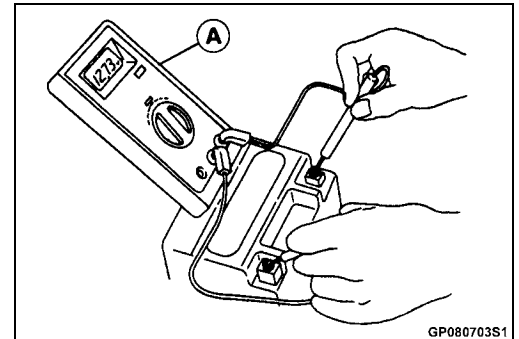
○ Measure with a digital voltmeter [A] which can be read one decimal place voltage.

- ★ If the reading is below the specified, refreshing charge is required (see Refreshing Charge in the Electrical System chapter).

Battery Terminal Voltage

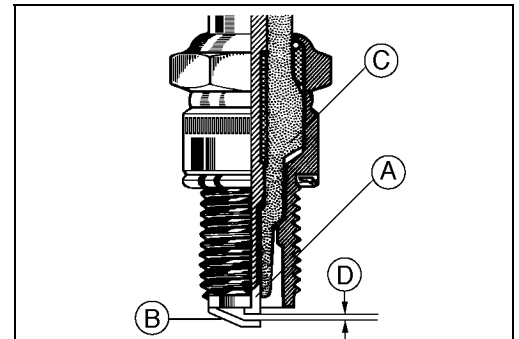
Standard: 12.6 V or more

- Connect the battery leads, positive first.



Spark Plug Inspection

- Remove the spark plugs (see Spark Plug Removal in the Electrical System).
- 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 (see Carburetor Adjustments in the Fuel System chapter).
- 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.

2-16 PERIODIC MAINTENANCE

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.

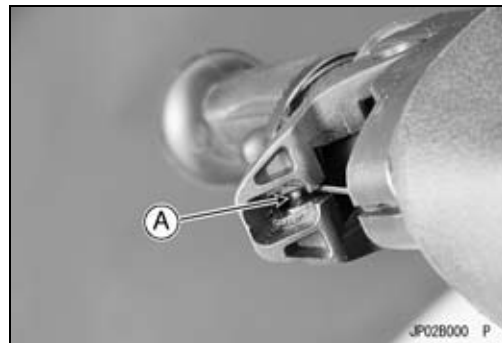
General Lubrication

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:

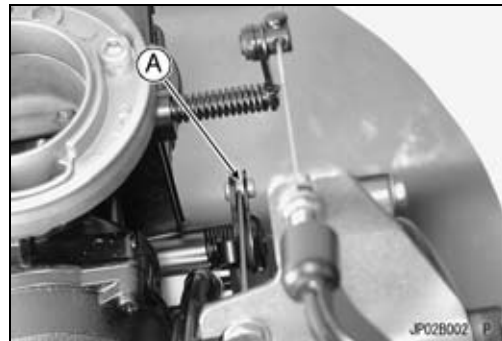
Lubrication

- Lubricate the following with a high quality waterproof grease.

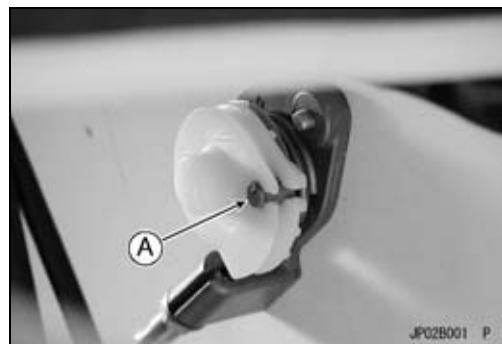
Throttle Cable End [A]



Carburetor Cable End [A]



Choke Cable End [A]



Periodic Maintenance Procedures

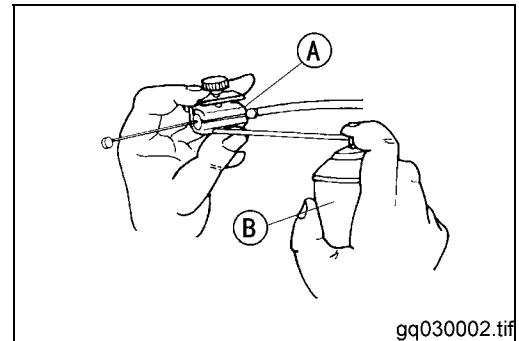
Choke Pivot Arm [A]



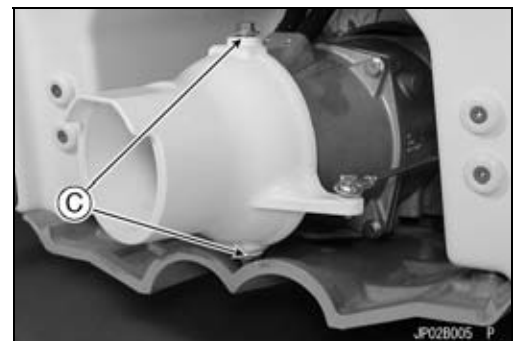
Steering Cable Ball Joint [A] at Steering Shaft



- Lubricate the following with a penetrating rust inhibitor [B].
Throttle Control Cable [A]
Choke Cable [A]



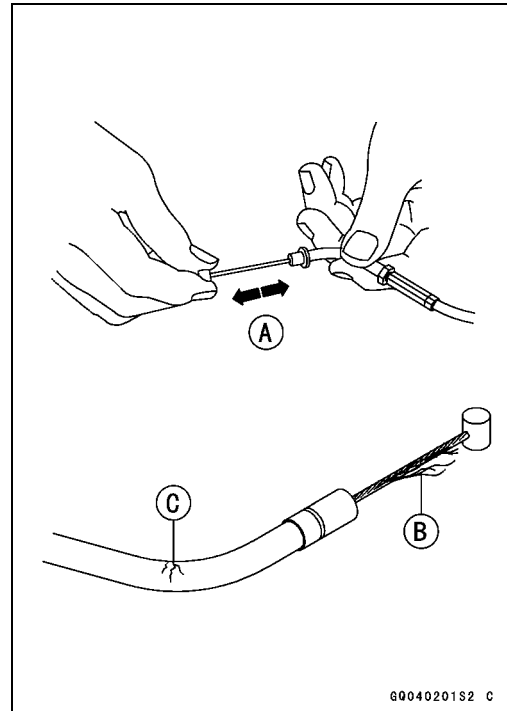
Steering Nozzle Pivots [C]



2-18 PERIODIC MAINTENANCE

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.



Periodic Maintenance Procedures

All 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 faster, 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
Engine Mounting Bolts
Engine Mount Bolts
Air Intake Cover Bolts
Carburetor Mounting Bolts
Intake and Exhaust Manifold Nuts
Exhaust Pipe Mounting Bolts
Exhaust Chamber Mounting Bolts
Cylinder Head Nuts
Cylinder Base Nuts

Drive Shaft, Pump, and Impeller:

Drive Shaft Coupling
Drive Shaft Holder Mounting Bolts
Pump Mounting Bolts
Pump Cover Mounting Bolts
Pump Grate Mounting Bolts
Impeller
Steering Nozzle Pivot Bolts

Steering:

Handlebar Clamp Bolts
Throttle Case Screws
Switch Case Screws
Steering Neck Mounting Bolts
Steering Cover Mounting Bolts
Handlebar Cover and Bracket Mounting Bolts

Hull and Engine Hood:

Towing Eyes
Bumper Nut or Rivets
All Cable Joint Balls (Threads) and Joint Bolts

Electrical System:

Spark Plugs
Starter Motor Mounting Bolts
Battery Terminal
Ground Cable Mounting Bolts

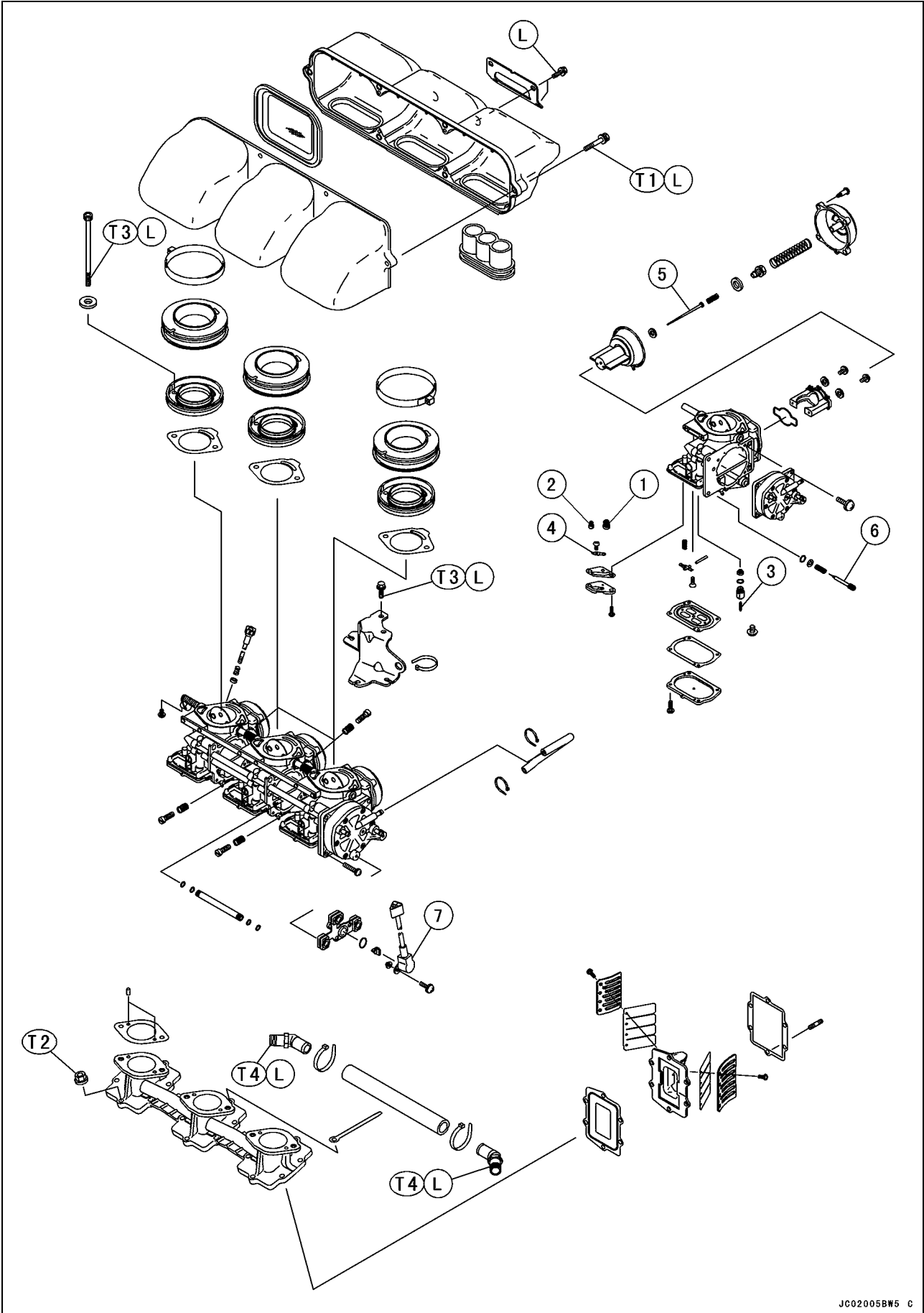
Fuel System

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3-2 FUEL SYSTEM

Exploded View

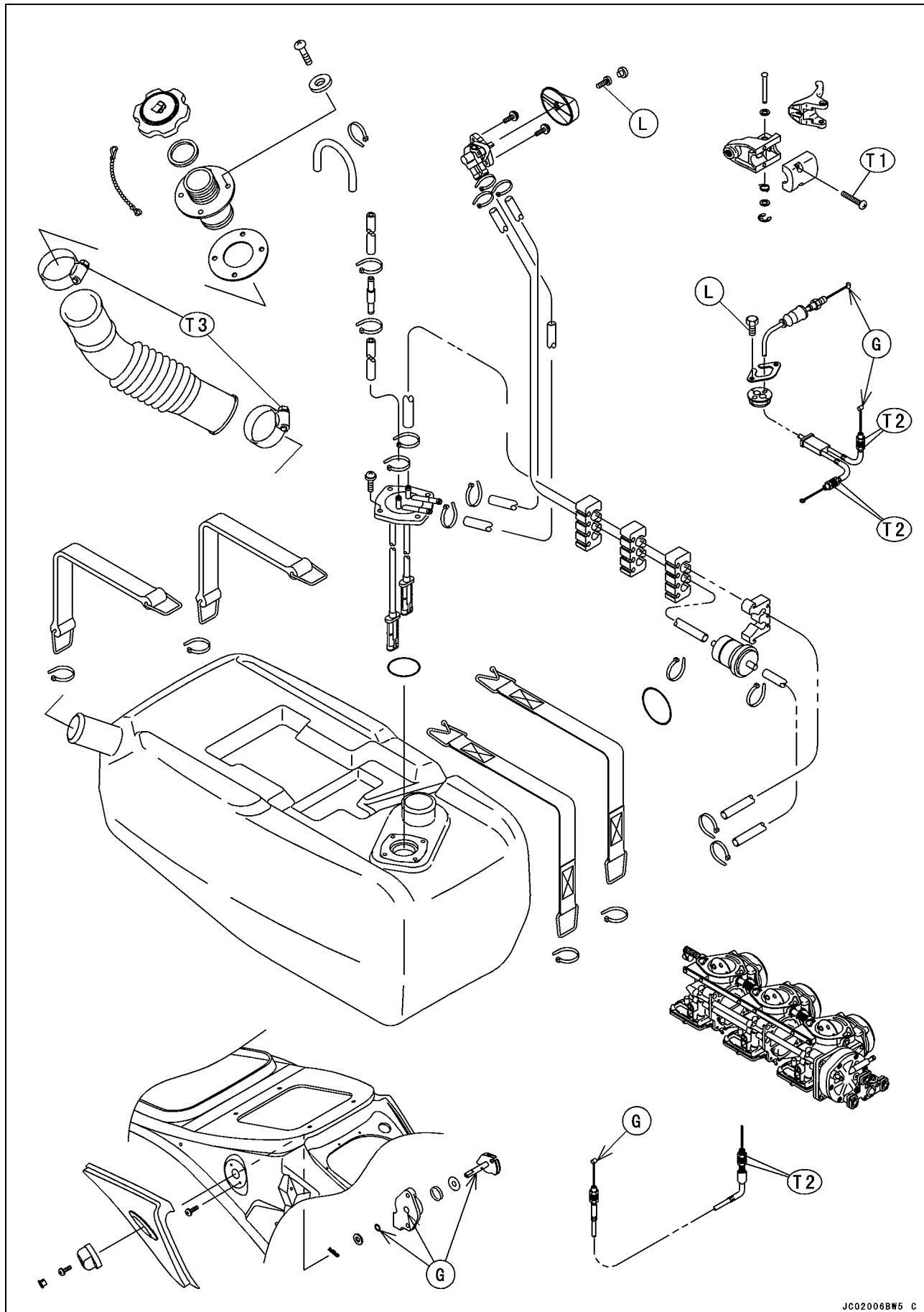


Exploded View

1. Main Jet
 2. Pilot Jet
 3. Inlet Valve
 4. Check Valve
 5. Jet Needle
 6. Pilot Screw
 7. Throttle Position Sensor (TPS)
- T1: 7.8 N·m (0.8 kgf·m, 69 in·lb)
T2: 9.8 N·m (1.0 kgf·m, 87 in·lb)
T3: 8.8 N·m (0.9 kgf·m, 78 in·lb)
T4: 7.8 ~ 14 N·m (0.8 ~ 1.4 kgf·m, 69 ~ 121 in·lb)
L: Apply a non-permanent locking agent.

3-4 FUEL SYSTEM

Exploded View



Exploded View

T1: 3.9 N·m (0.4 kgf·m, 35 in·lb)

T2: 9.8 N·m (1.0 kgf·m, 87 in·lb)

T3: 2.9 N·m (0.3 kgf·m, 26 in·lb)

G: Apply grease.

L: Apply a non-permanent locking agent.

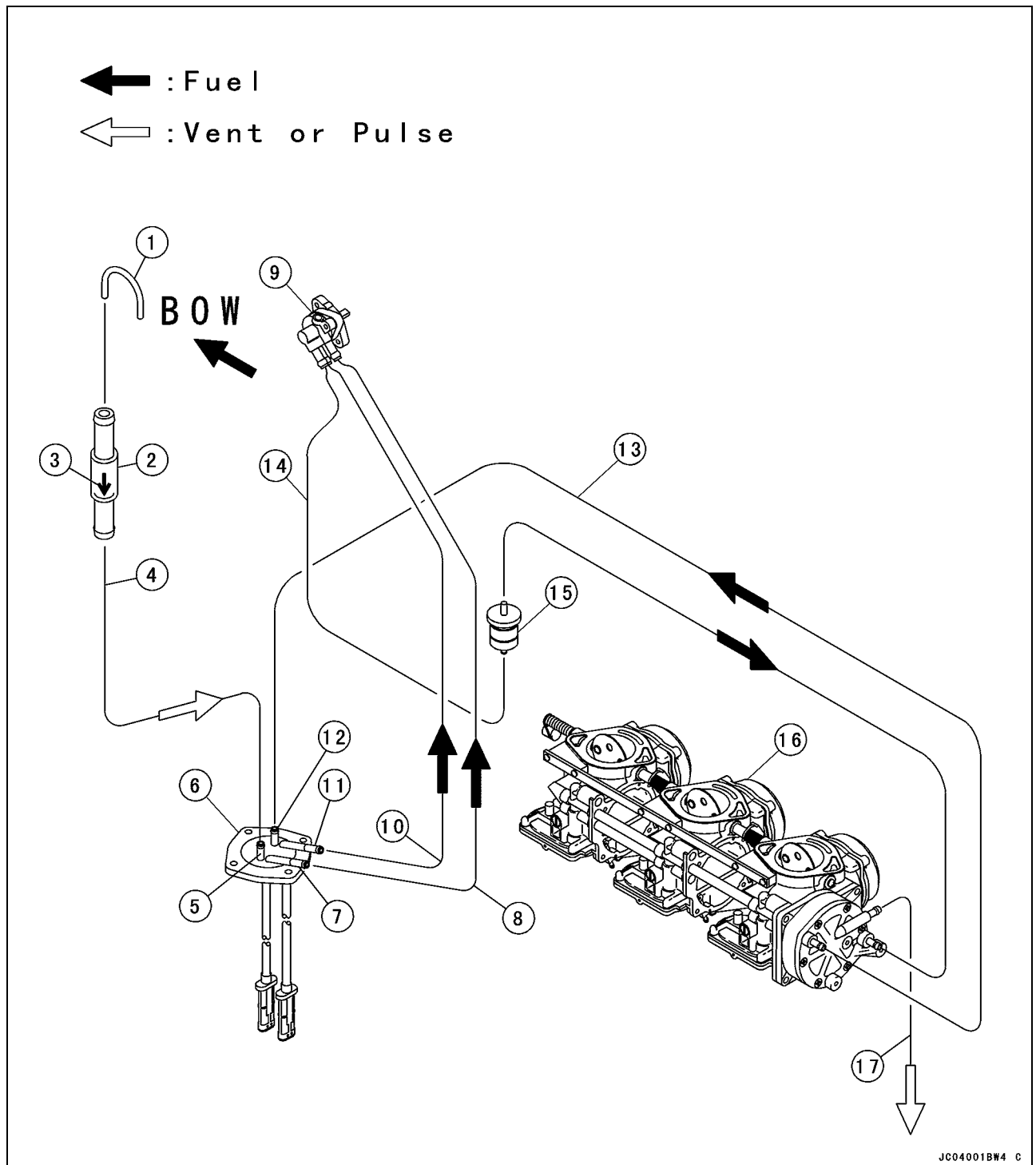
3-6 FUEL SYSTEM

Specifications

Item	Standard	Service Limit
Carburetor:		
Make, type	Keihin, CDCV 40-35 × 3	— — —
Size	35 mm (1.378 in.) Venturi	— — —
Main Jet:		
Front	#165 (#155 - for high altitude)	— — —
Middle	#165 (#155 - for high altitude)	— — —
Rear	#165 (#155 - for high altitude)	— — —
Pilot Jet:		— — —
Front	#48 (#45 - for high altitude)	
Middle	#48 (#45 - for high altitude)	— — —
Rear	#48 (#45 - for high altitude)	— — —
Pilot screw	1 1/4 ± 1/2 turn open	— — —
Jet needle mark	N8DC	— — —
Inlet valve system:		— — —
Valve seat size	1.6 mm (0.063 in.)	
Arm spring load	0.18 N (18 g)	— — —
Pop-off pressure	108 kPa (1.10 kgf/cm ² , 15.6 psi)	— — —
Idle speed:		— — —
in water	1 250 ± 100 r/min (rpm)	
out of water	1 800 ± 100 r/min (rpm)	— — —
Reed Valve:		
Reed warp	— — —	0.2 mm (0.008 in.)
Fuel Tank:		
Capacity	53 L (14.0 US gal) including 7 L (1.85 US gal) reserve	— — —

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

Fuel System Diagram



1. Fuel Vent Pipe
2. Fuel Vent Check Valve: The fuel vent check valve must be mounted so that the arrow is pointing toward the fuel tank.
3. Arrow Mark
4. Fuel Vent Line
5. VENT
6. Fuel Filter/Pipe
7. ON
8. Main Line

9. Fuel Tap
10. Reserve Line
11. RESERVE
12. RETURN
13. Return Line
14. Supply Line
15. Fuel Filter
16. Carburetor
17. Pulse Line

3-8 FUEL SYSTEM

Throttle Control Cable

Carburetor Cable Adjustment

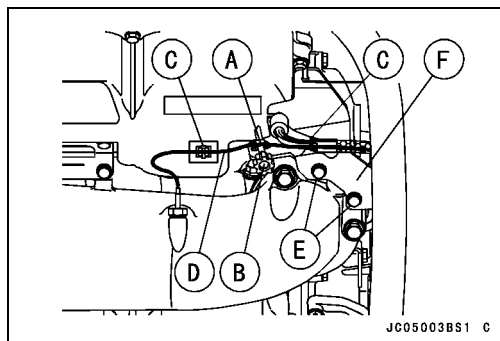
○Refer to Carburetor Cable Adjustment in the Periodic Maintenance chapter.

Oil Pump Cable Adjustment

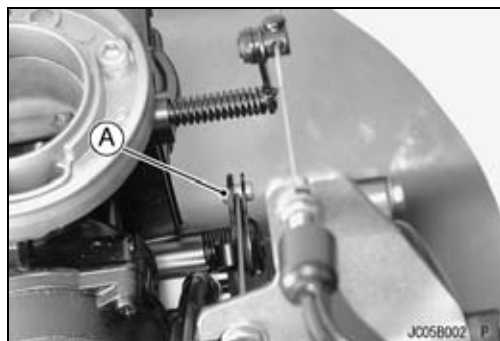
Refer to Oil Pump Cable Adjustment in the Periodic Maintenance chapter.

Throttle Case and Throttle Control Cable Removal

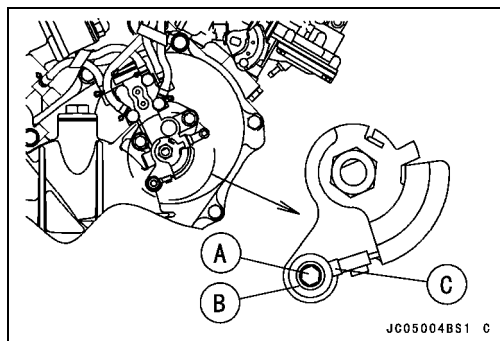
- Cut off the clamp [A] securing the idle adjusting screw [B].
- Cut off the clamps [C] securing the water temperature [D] sensor lead.
- Loosen the adjuster locknuts of the carburetor and oil pump cables.
- Take out the bolts [E] of the cable holder [F] and move the holder with the control cables to port side to make the service easier.



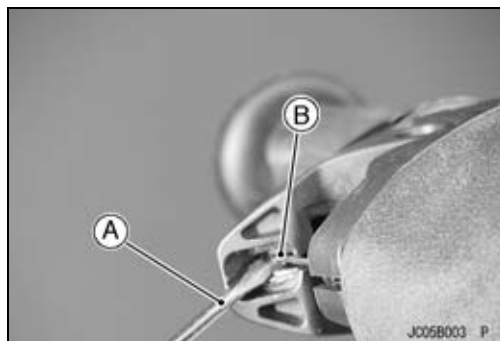
- Disconnect the carburetor cable from the carburetor.
- Unscrew the adjuster locknuts and slide the cable from the cable holder.
- Slide the cable tip [A] from the throttle shaft lever.



- Disconnect the oil pump cable from the oil pump cable.
- Unscrew the adjuster locknuts and slide the cable from the cable holder.
- Take out the bolt [A] and washer [B], and disconnect the oil pump cable end [C].



- Disconnect the throttle cable from case.
- Use a screw driver [A] to separate the tip of the cable end [B] from the case body.
- Slide the rubber boot out of the place.
- Unscrew the throttle cable fitting nut.
- Remove:
 - Handlebar (see Handlebar Removal in the Steering Chapter.)
 - Steering Cover (see Steering Removal in the Steering Chapter.)
 - Grommet Mounting Plate
- Pull down the throttle control cable.



Throttle Control Cable

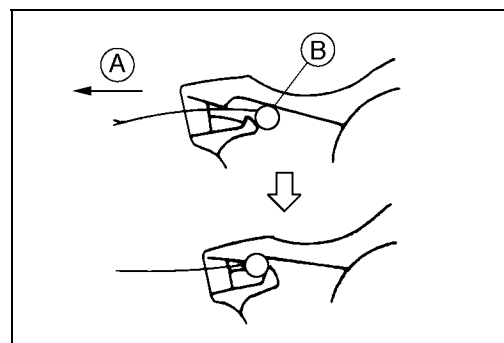
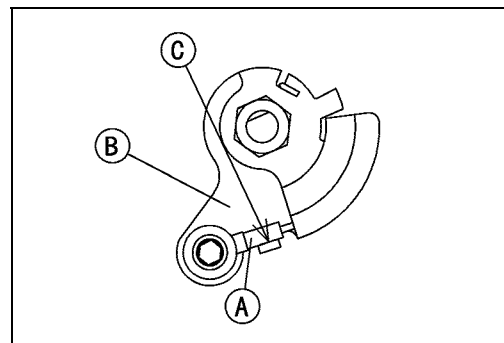
Throttle Case and Throttle Control Cable Installation

- Install the oil pump cable [A] on the pulley [B].
- Put the washer on the oil pump cable mounting bolt.
- Apply a non-permanent locking agent to the oil pump cable mounting bolt and torque it.

Torque - Oil Pump Cable Mounting Bolt: 4.9 N·m (0.5 kgf·m, 43 in·lb)

- Be sure the cable portion indicated in the illustration is in contact [C] with the pulley portion indicated in the illustration.

- Pulling the throttle cable [A], position the tips of the cable end [B] as shown.



- Route the following correctly (see Cable, Wire, and Hose Routing in the General Information chapter).

Throttle Cable
Carburetor Cable
Oil Pump Cable
Choke Cable
Idle Adjusting Screw
Water Temperature Sensor Leads

- Adjust the following.

Throttle Cable
Carburetor Cable
Oil Pump Cable
Choke Cable (if necessary)

- 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 control cable routing, cable adjustments, and cable damage. Then lubricate the throttle control cable.
- Run the engine at the idle speed, and turn the handlebar all the way to the right and left to ensure that the idle speed does not change.
- ★ If the idle speed increase, check the throttle control cable adjustment and the cable routing.

Throttle Control Cable Lubrication

- Refer to General Lubrication in the Periodic Maintenance chapter.

Throttle Control Cable Inspection

- Refer to General Lubrication in the Periodic Maintenance chapter.

3-10 FUEL SYSTEM

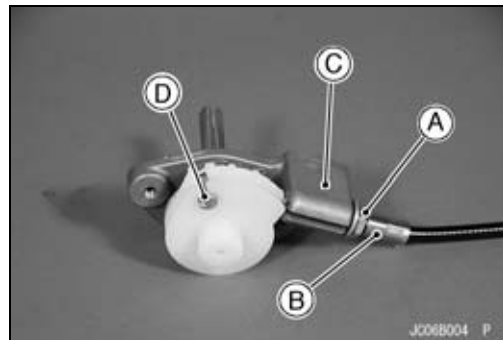
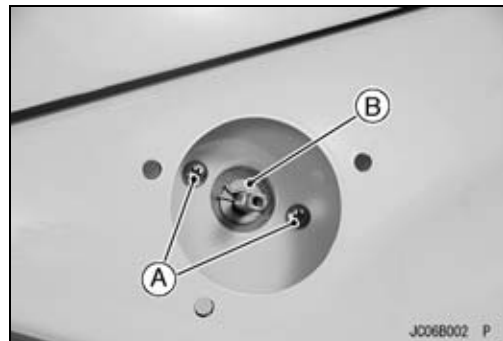
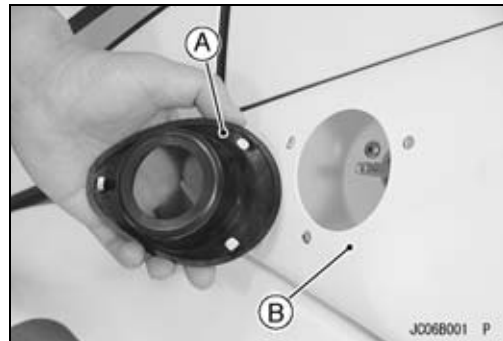
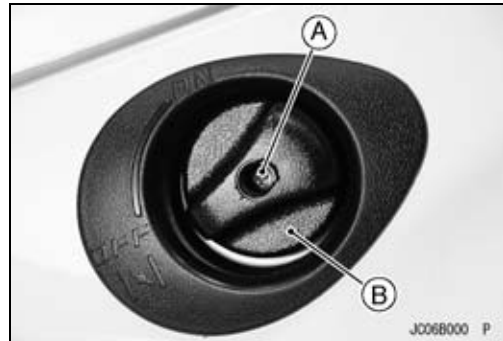
Choke Cable

Choke Cable Adjustment

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

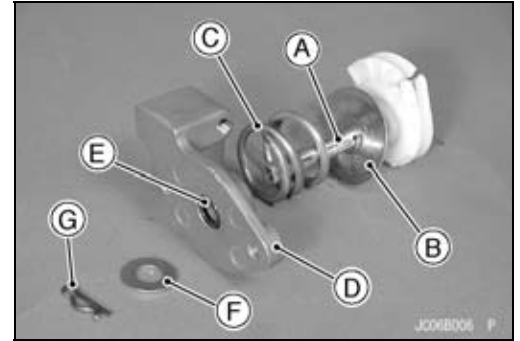
Choke Knob and Cable Removal

- Disconnect the choke cable from the carburetor.
 - Remove the plug.
 - Remove the set screw [A] and take out the choke knob [B].
-
- Pull out the choke knob cover [A] from the left side cover [B].
-
- Remove the cable holder mounting screws [A].
 - Pull the choke knob shaft [B] with cable holder out of the hull.
-
- Loosen the locknut [A] and unscrew the cable housing [B] from the holder [C].
 - Slide the tip [D] of the choke inner cable out of the pulley on the choke knob shaft.



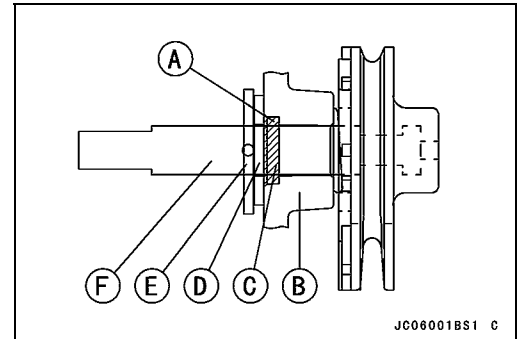
Choke Cable

- 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 Knob and Cable Installation Notes

- Grease the indicated area [A] the O-ring is installed.
 - [B] Cable Holder
 - [C] O-ring
 - [D] Washer
 - [E] Pin
 - [F] Choke Knob Shaft
- Route the choke cable according to the Cable Routing section in the General Information chapter.
- Adjust the choke cable (see Choke Cable Adjustment).



Choke Cable Inspection

- Refer to General Lubrication in the Periodic Maintenance chapter.

Choke Cable Lubrication

- Refer to General Lubrication in the Periodic Maintenance chapter.

3-12 FUEL SYSTEM

Carburetor/Fuel Pump

Idle Speed Adjustment

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

Synchronization

○Refer to Carburetor Synchronization in the Periodic Maintenance chapter.

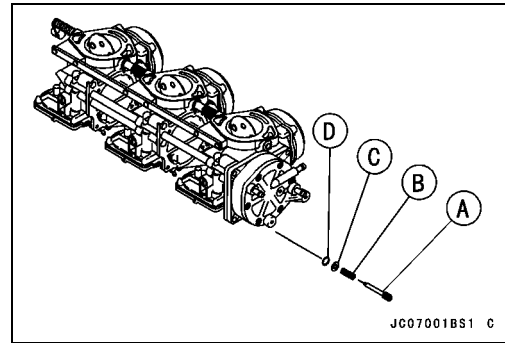
Pilot Screw Removal/Installation

- Turn in the pilot screw [A] and count the amount of turns until it seats thoroughly and then remove the screw. The purpose is to set the screw to its original position when installing.

Spring [B]

Washer [C]

O-ring [D]

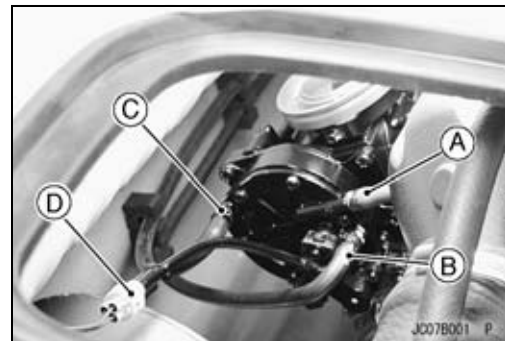


★If the carburetor is tampered with or counting the amount of turns is not performed, set the pilot screw to the specified amount of turns.

Pilot Screw 1 1/4 ± 1/2 turn open

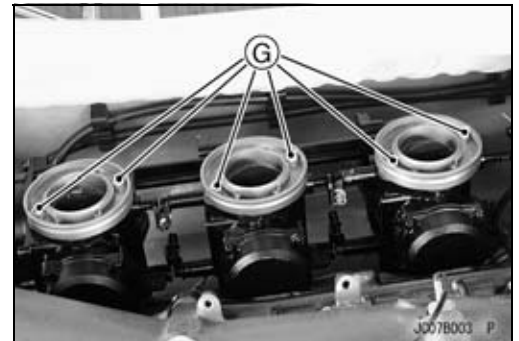
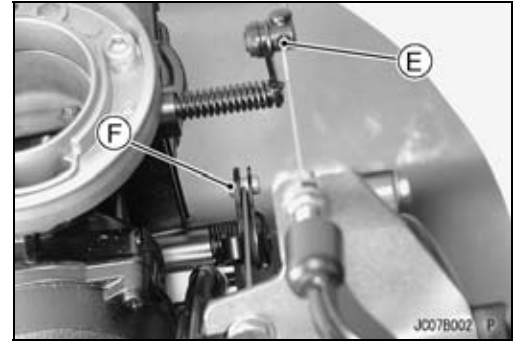
Carburetor Removal

- Remove or Disconnect:
 - Air Intake Cover Assembly (see Flame Arrester Removal)
 - Pulse Hose [A]
 - Fuel (Supply) Hose [B]
 - Fuel (Return) Hose [C]
 - TPS Lead Connector [D]

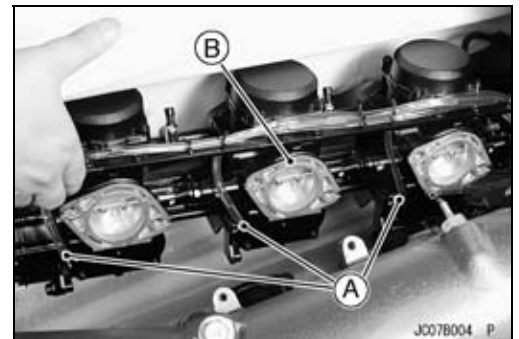


Carburetor/Fuel Pump

- Choke Cable [E]
- Carburetor Cable [F]
- Carburetor Mounting Bolts [G]

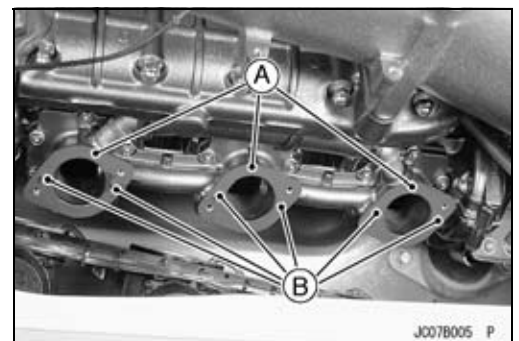


- Remove the clamps on the stay.
- Disconnect the inlet oil hoses [A] which lead to the carburetors, lifting the carburetor assembly [B].
- Lift the carburetor assembly off the intake manifold.



Carburetor Installation

- Install new gaskets [A] under the carburetors.
- Be sure the dowel pins [B] are in place.

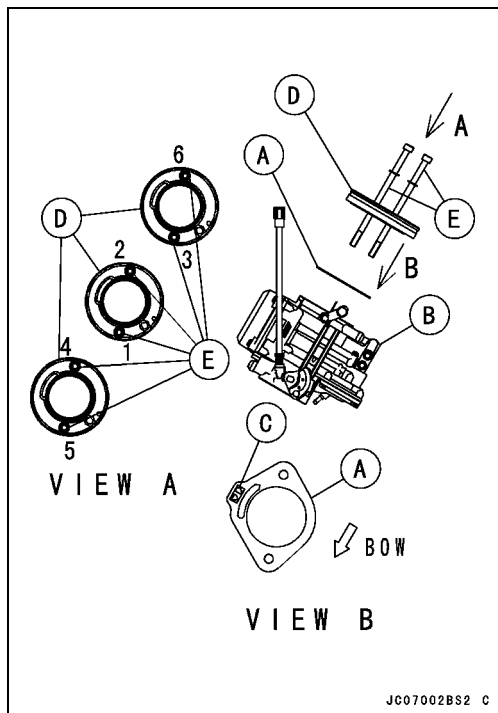


3-14 FUEL SYSTEM

Carburetor/Fuel Pump

- Connect the oil inlet hose correctly (see Cable, Wire and Hose Routing in the General Information).
- Install the gaskets [A] on the carburetors [B] so that its "UP" letter [C] faces upward.
- Install the cases [D] on the carburetors noting its installing direction indicated in the figure.
- Apply a non-permanent locking agent to the carburetor mounting bolts [E] and torque them following the sequence shown.

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



- Connect the fuel and pulse hoses correctly (see Cable, Wire and Hose Routing in the General Information).
- Adjust the throttle control and choke cables (see Throttle Control and Choke Cable Adjustment).

Carburetor Disassembly

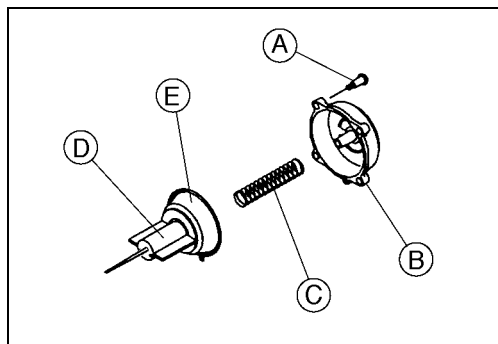
⚠ WARNING

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.

- Remove the carburetor (see Carburetor Removal).
- Unscrew the carburetor cap screws [A] and take off the carburetor cap [B].
- Remove:
 - Cap Spring [C]
 - Vacuum Piston [D] and Diaphragm [E]

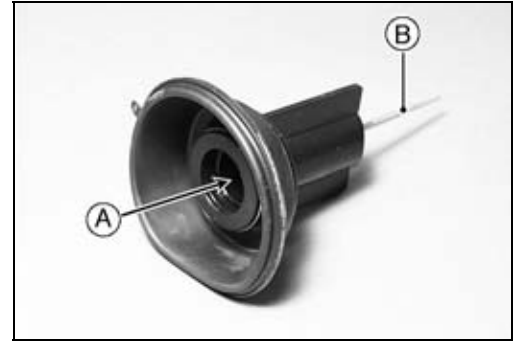
CAUTION

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

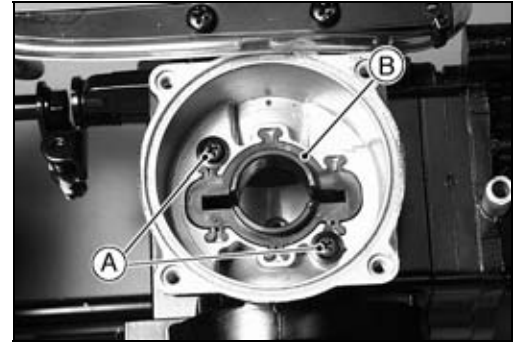


Carburetor/Fuel Pump

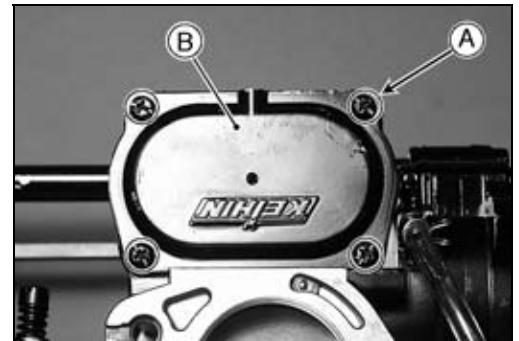
- Unscrew the jet needle holder bolt [A] and take off the holder spring and jet needle [B].



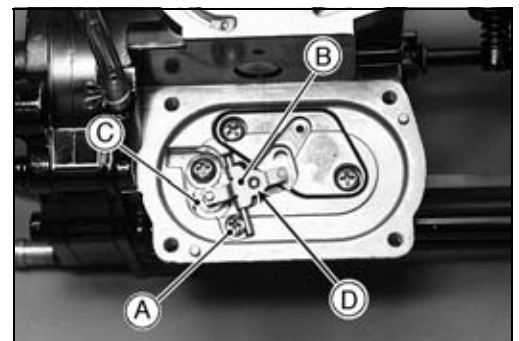
- Unscrew the vacuum piston holder screws [A] and take off the vacuum piston holder [B].



- Unscrew the carburetor cover screws [A] and take off the carburetor cover [B].



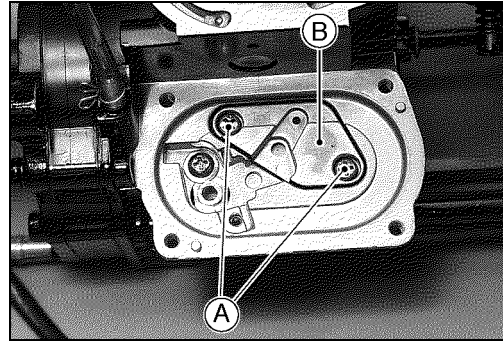
- Unscrew the float arm set screw [A].
- Remove:
 Float Arm [B] and Pin
 Inlet Valve [C]
 Spring [D]



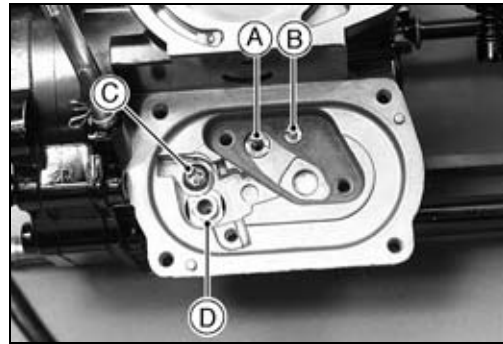
3-16 FUEL SYSTEM

Carburetor/Fuel Pump

- Unscrew the check valve body screws [A] and take off the check valve body [B].

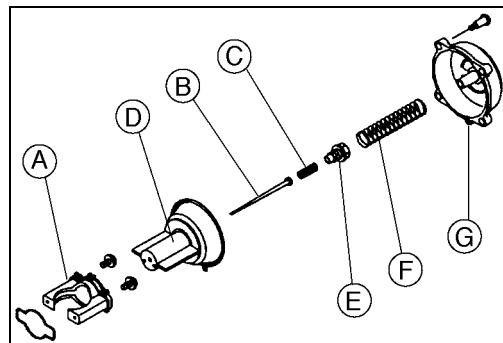
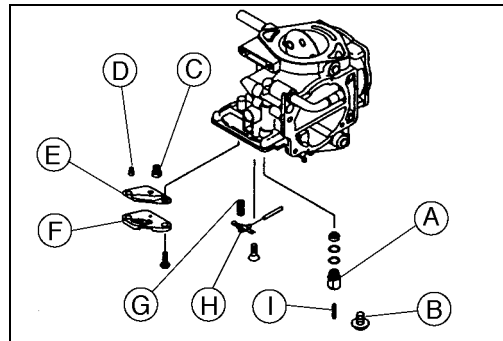


- Remove:
 - Main Jet [A]
 - Pilot Jet [B]
 - Screw [C]
 - Valve Seat [D]



Carburetor Assembly

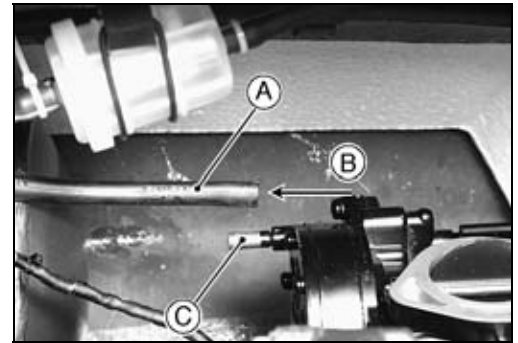
- Install:
 - Valve Seat [A] and Screw [B]
 - Main Jet [C]
 - Pilot Jet [D]
 - Gasket [E]
- Apply a non-permanent locking agent to the check valve body screws.
 - Check Valve Body [F] and Screws
 - Spring [G]
 - Float Arm [H] and Inlet Valve [I]
- Install the vacuum piston holder [A].
- Install the jet needle [B] and holder spring [C] in the vacuum piston [D], and tighten the jet needle holder bolt [E].
- Install:
 - Cap Spring [F]
 - Carburetor Cap [G]



Carburetor/Fuel Pump

NOTE

○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 [C] on the carburetor. The fuel system is now full of fuel.



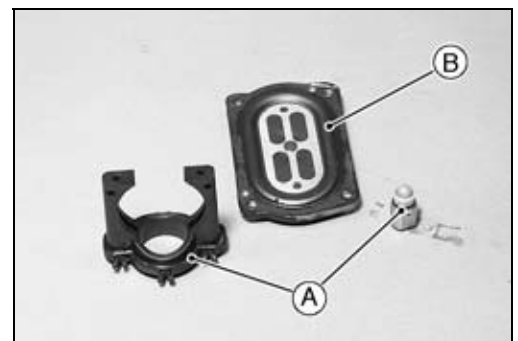
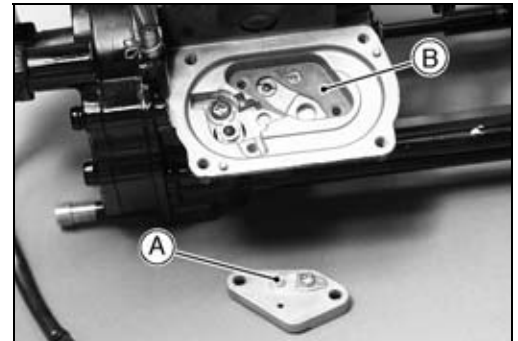
Carburetor Cleaning and Inspection

- 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 toward anyone. Use 172 kPa (1.75 kgf/cm², 25 psi) maximum nozzle pressure.

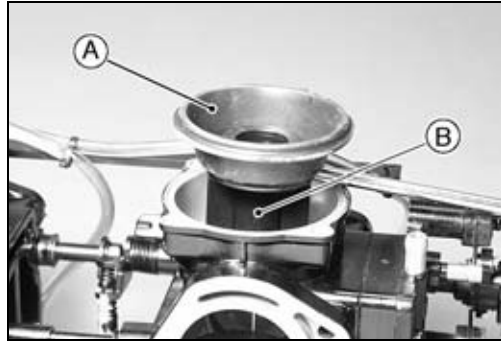
- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow out the air and fuel passages with compressed air.
- Inspect the check valve [A] for damage or deterioration, and replace it if necessary.
- ★ If the gasket [B] under the check valve appears damaged, it may leak and must be replaced.
- Check these rubber parts for damage.
 - O-ring [A]
 - Diaphragm [B]
- ★ If any of these parts are not in good condition, replace them.



3-18 FUEL SYSTEM

Carburetor/Fuel Pump

- Check the vacuum piston diaphragm [A] for damage.
- ★ If it is not in good condition, replace it.
- Check that the vacuum piston [B] moves smoothly in the carburetor body. The surface of the piston must not be excessively worn.
- ★ If the vacuum piston does not move smoothly, or if it is very loose in vacuum piston holder, replace the piston and/or the holder.

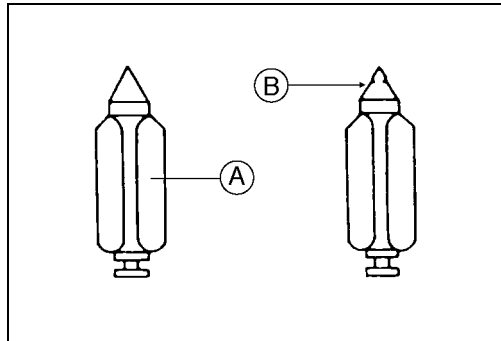


- Check the plastic tip on the diaphragm valve needle. It should be smooth, without any grooves, scratches, or tears.

Inlet Valve [A]

Inlet Valve Wear [B]

- ★ If the plastic tip is damaged, replace the needle.

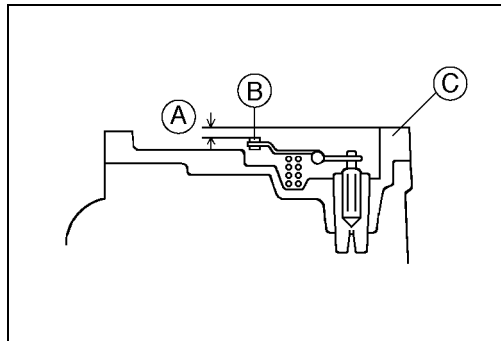


Float Arm Level Inspection and Adjustment

- Check the float arm level [A].
- Measure from the plastic tip [B] on the float arm to the carburetor case [C].

Float Arm Level 1.0 ~ 2.0 mm (0.039 ~ 0.079 in.)

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



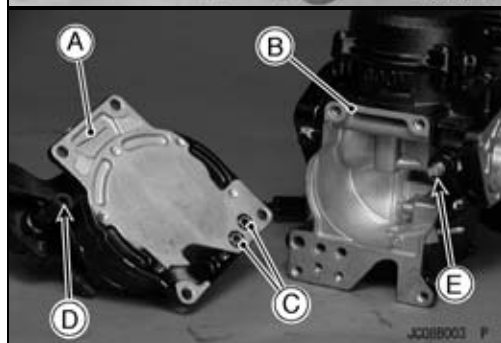
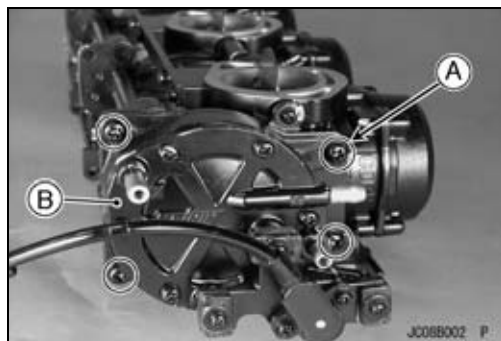
Fuel Pump Removal/Installation Note

- Remove the carburetor.
- Remove the fuel pump body screws [A], and take the fuel pump unit [B] off the carburetor.

CAUTION

The fuel pump should not be disassembled. If leakage is evident or internal damage is suspected, replace the fuel pump unit [B].

- Note the following when installing the pump unit [A] to the carburetor assembly [B].
- Check the O-rings [C] for damage and if necessary, replace them.
- Align the slot [D] on the pump body with the shaft [E] on the carburetor assembly.



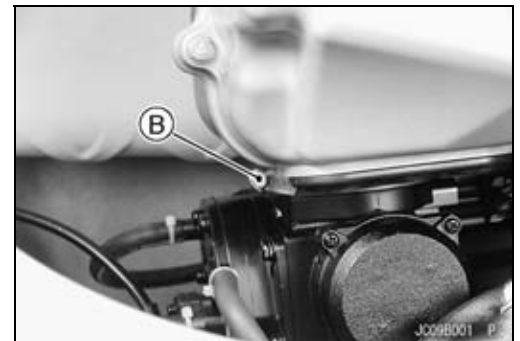
Flame Arrester

Removal

- Remove the bracket [A] holding the air intake cover.
- Cut off the clamp [B] on the air intake cover.



- Loosen the #1 clamp [A] and #3 clamp [B] on the duct.



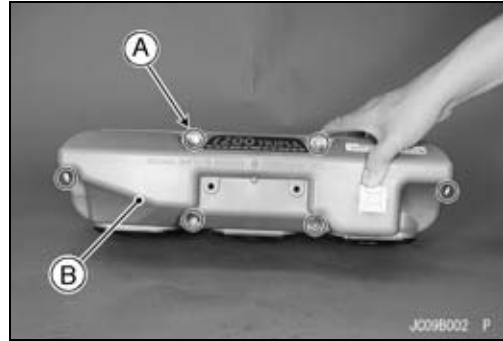
- Pull out the air intake cover assembly [A].



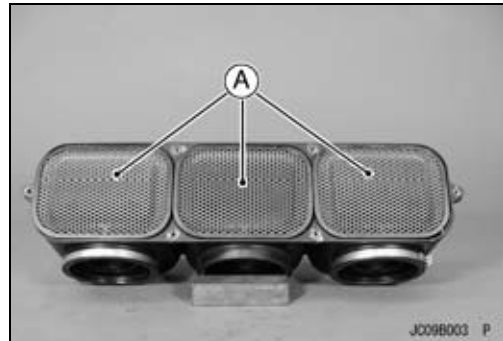
3-20 FUEL SYSTEM

Flame Arrester

- Remove the air intake cover mounting bolts [A] and separate the air intake cover [B] from the arrester case.

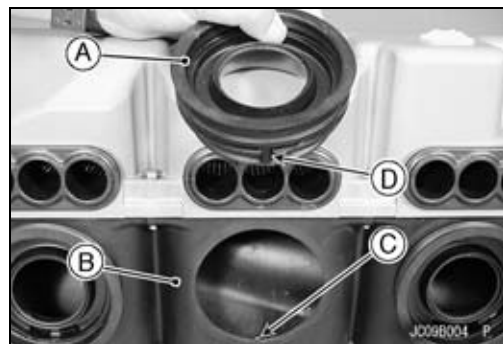


- Take out the flame arresters [A].



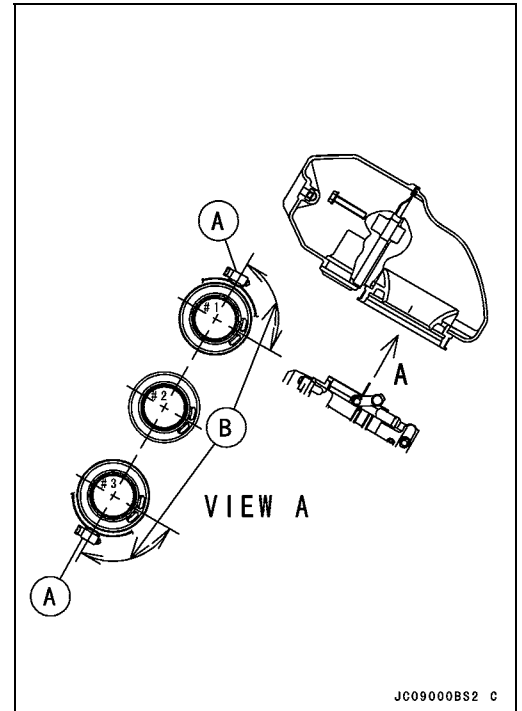
Installation

- When installing the duct [A] into the arrester case [B], align the rib [C] on the case with the groove [D] on the duct.



Flame Arrester

- Tighten the clamp screws [A] within the range [B] indicated in the figure.
- The #2 duct has no clamp.



- Apply a non-permanent locking agent to the air intake cover mounting bolts and torque them.

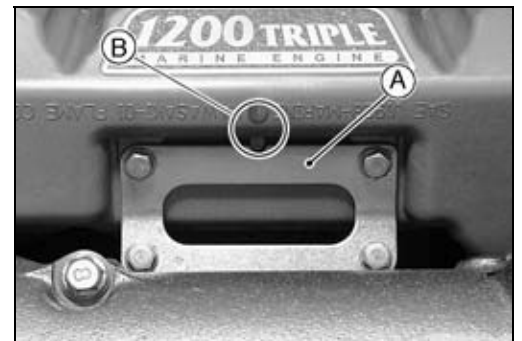
Torque - Air Intake Cover Mounting Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)

NOTE

- Be careful not to drop the bolts into the hull bottom when installing.
- Install the bracket [A] aligning the groove on the bracket with the project on the air intake cover [B].

Flame Arrester Cleaning

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

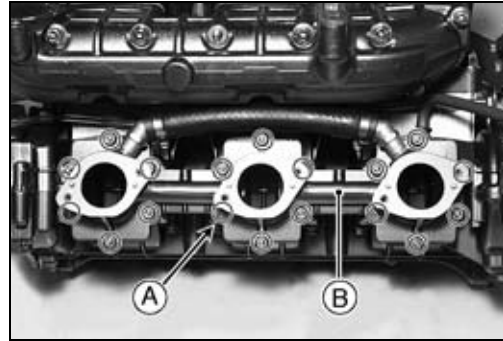


3-22 FUEL SYSTEM

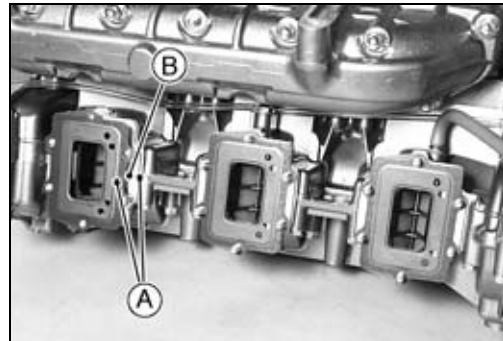
Intake Manifold, Reed Valves

Intake Manifold Removal

- Remove:
 - Air Intake Cover Assembly
 - Carburetor
- Remove the intake manifold mounting nut [A] and remove the intake manifold [B].

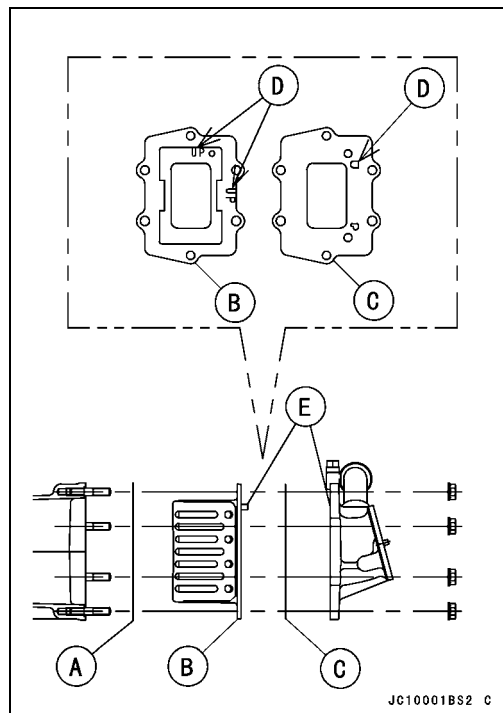


- Pull out the gaskets [A] and the reed valves [B].



Intake Manifold Installation

- Replace the gaskets with new ones.
- As for the base gaskets [A], installation either obverse or reverse side is available.
- As for the reed valve assemblies [B] and the gasket [C], install them noting the direction of “UP” [D] letters.
- Align [E] the projections on the reed valve assemblies with the holes on the intake manifold. The projections on the reed valve assemblies must be upward.



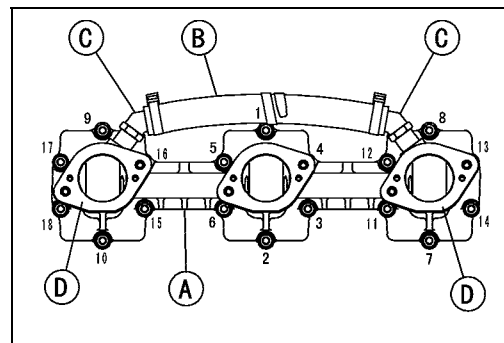
Intake Manifold, Reed Valves

- Install the intake manifold [A].
- Torque the mounting nuts, following the sequence indicated in the figure.

Torque - Intake Manifold Mounting Nuts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- When the balance tube [B] and intake air connecting elbows [C] were removed, noting the following.
- Apply a non-permanent locking agent to the threads of the elbows and torque the elbows, and then turn them inside so that they are parallel to the flange portion [D] of the intake manifold.

Torque - Connecting Elbow: 7.8 ~ 14 N·m (0.8 ~ 1.4 kgf·m, 69 ~ 121 in·lb)



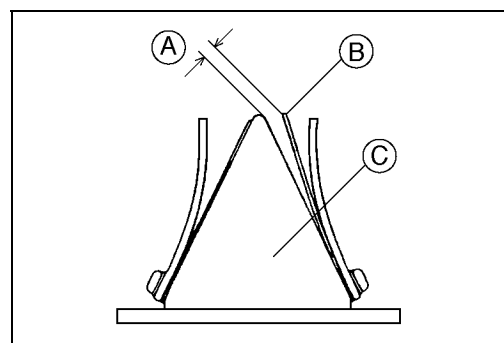
Reed Valve Inspection

- 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 limits, replace the reed with a new one.
- ★ Check reed warp after installing a new reed.
- ★ If the clearance is correct, tight the mounting screws securely.

Reed Warp

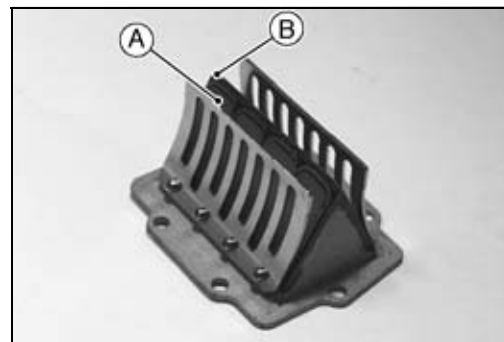
Service Limit: 0.2 mm (0.008 in.)

- 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.
- ★ If a reed becomes wavy, replace the reed with a new one even if reed warp is less than the 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.



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 holder with a new one.

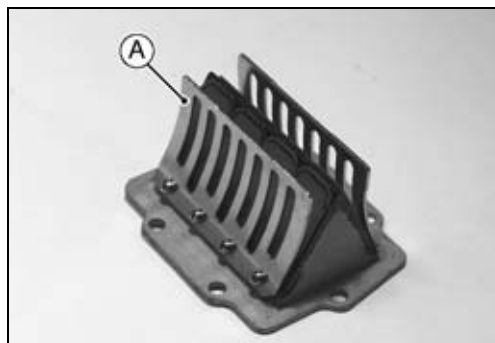


3-24 FUEL SYSTEM

Intake Manifold, Reed Valves

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

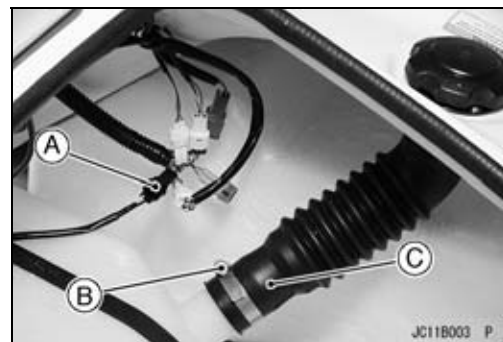
Fuel Tank Removal

- Siphon fuel out completely.

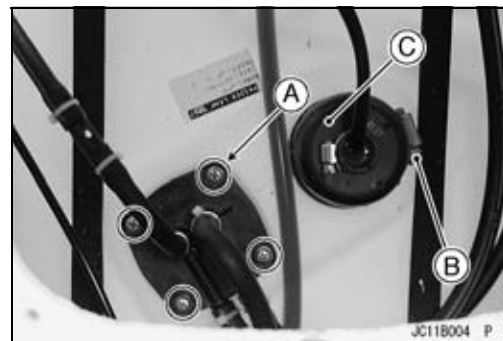
⚠ WARNING

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.

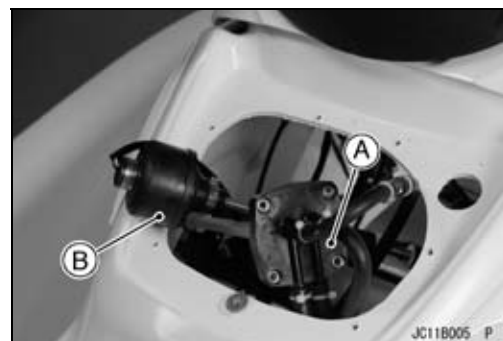
- Remove the engine (see Engine Removal in the Engine Removal/Installation chapter).
- Remove the oil tank with the oil level sensor (see Oil Tank Removal in the Engine Lubrication System chapter).
- Disconnect the fuel level sensor lead connector [A].
- Unscrew the calmp [B] and pull the fuel filler tube [C].



- Remove the storage pocket (see Storage Pocket Removal/Installation in the Hull/Engine Hood chapter).
- Unscrew the fuel filter assembly mounting screws [A].
- Loosen the clamp [B] on the fuel level sensor [C].



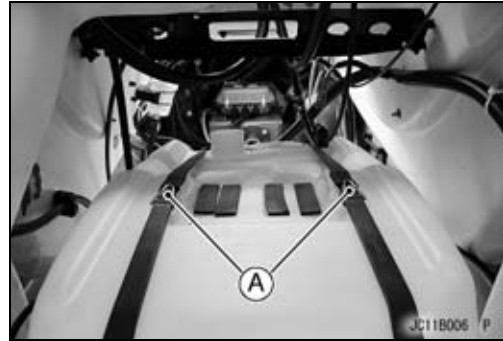
- Pull the fuel filter assembly [A] and fuel level sensor [B] out of the space after removing the storage pocket.



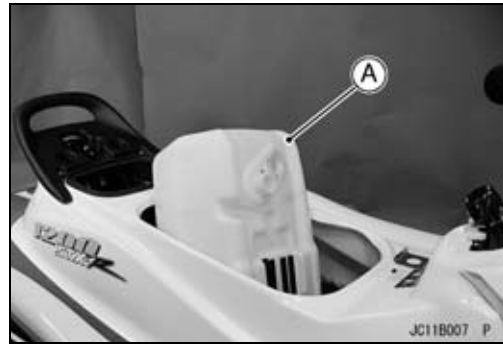
3-26 FUEL SYSTEM

Fuel Tank

- Unhook the rubber straps [A].

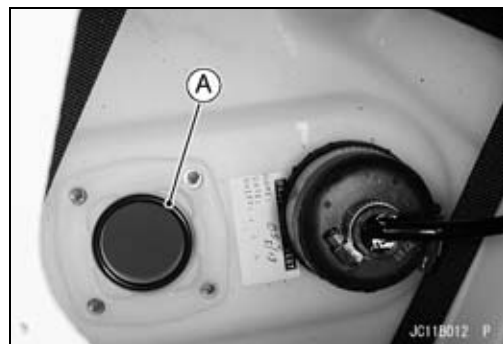


- Remove the fuel tank [A] out of the hull.



Fuel Tank Installation

- Be sure the O-ring [A] is in position.
- Connect them correctly (see Cable, Wire and Hose Routing in the General Information).
 - Fuel Hoses
 - Fuel Vent Hose
 - Fuel Level Sensor Lead Connector
 - Other Wire and Harness.



Fuel Tank

Fuel Tank Cleaning

- 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 spark; this includes any appliance with a pilot light.

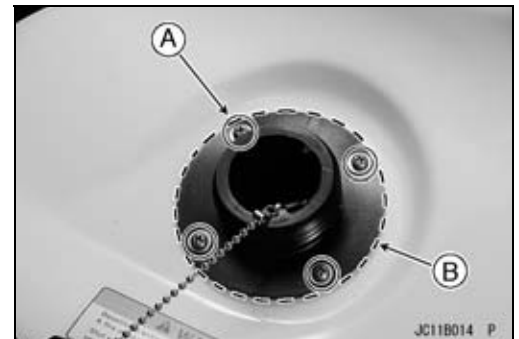
- Flush the tank repeatedly with high flash-point solvent until it is clean. It may be necessary to put a few marbles or pieces of clean gravel into the tank and shake it, to knock loose any foreign matter in the bottom.

⚠ WARNING

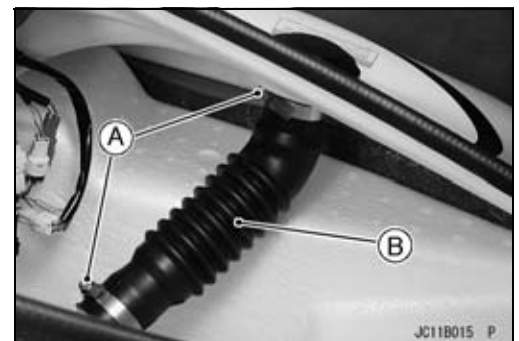
Clean the tank in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the tank. A fire or explosion could result.

Fuel Filler and Tube Removal

- Take out the screws [A] in the filler flange, and cut the sealant [B].



- Loosen the tube clamps [A] and pull the filler [B] from the hull.



3-28 FUEL SYSTEM

Fuel Tank

Fuel Filler and Tube Installation Notes

- Clean the hull and the filler on their mating surfaces with a greaseless, 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 a 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 filler and hull.

Fuel Filter Screen Cleaning

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

Fuel Filter Inspection

- Refer to Fuel Filter Inspection in the Periodic Maintenance chapter.

Fuel Vent Check Valve

Fuel Vent Check Valve Mounting

- Refer to Fuel Vent Check Valve Mounting in the Periodic Maintenance chapter.

Fuel Vent Check Valve Inspection

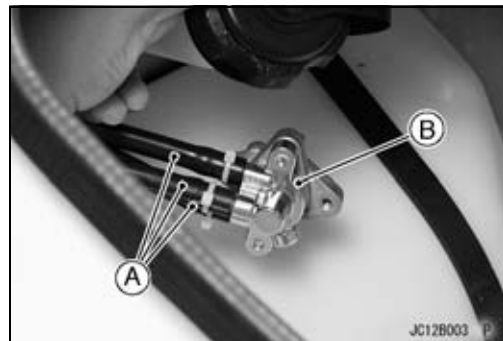
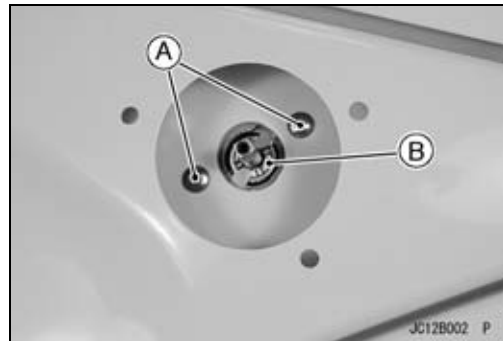
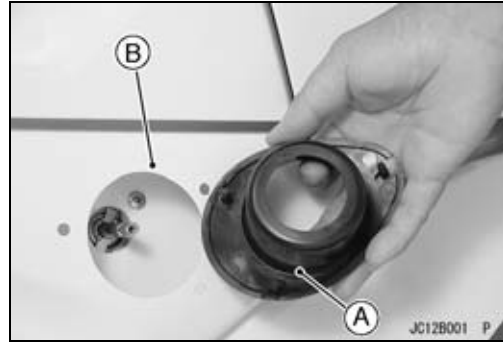
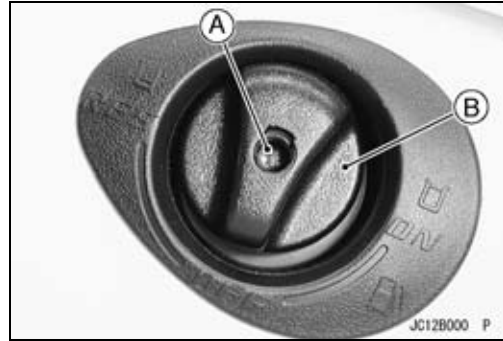
- Refer to Fuel Vent Check Valve Inspection in the Periodic Maintenance chapter.

3-30 FUEL SYSTEM

Fuel Tap

Removal

- Take out the plug.
 - Unscrew the set screw [A] and take out the fuel tap knob [B]
-
- Remove the fuel tap knob cover [A] from the right side cover [B].
-
- Unscrew the mounting screws [A] and take out the fuel tap [B].
-
- Pull the fuel hoses [A] off the fuel tap [B].



Installation Notes

- Connect the fuel hoses to the fuel tap correctly (see Cable, Wire and Hose Routing section in the General Information chapter).
- Apply a non-permanent locking agent to the fuel tap mounting screws and tighten them securely.

Fuel Tap

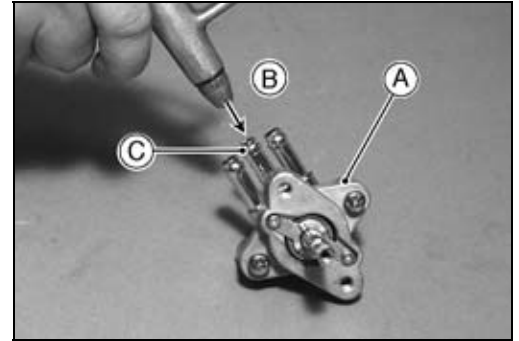
Cleaning

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

- Remove the fuel tap [A].
- Use compressed air to blow [B] through the supply fuel 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

- *Do not use too high air pressure (172 kPa, 1.8 kgf/m², 25 psi max.).*



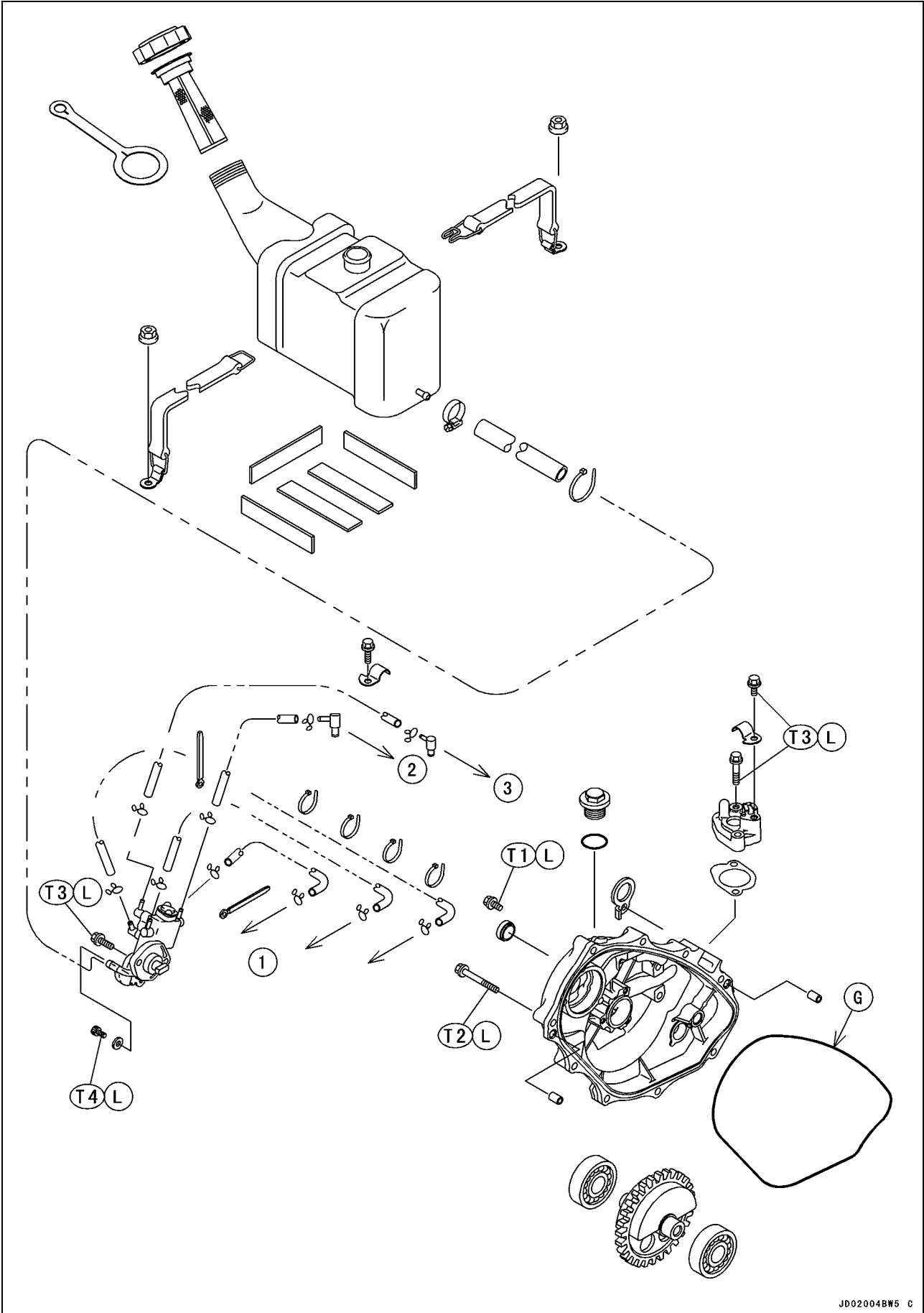
Engine Lubrication System

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4-2 ENGINE LUBRICATION SYSTEM

Exploded View



Exploded View

1. To Carburetor Check Valves
 2. To Front Check Valve on Upper Crankcase Half
 3. To Rear Check Valve on Upper Crankcase Half
- T1: 3.9 N·m (0.4 kgf·m, 35 in·lb)
T2: 12 N·m (1.2 kgf·m, 8.5 ft·lb)
T3: 8.8 N·m (0.9 kgf·m, 78 in·lb)
T4: 4.9 N·m (0.5 kgf·m, 43 in·lb)
- L: Apply a non-permanent locking agent.
G: Apply grease.

4-4 ENGINE LUBRICATION SYSTEM

Specifications

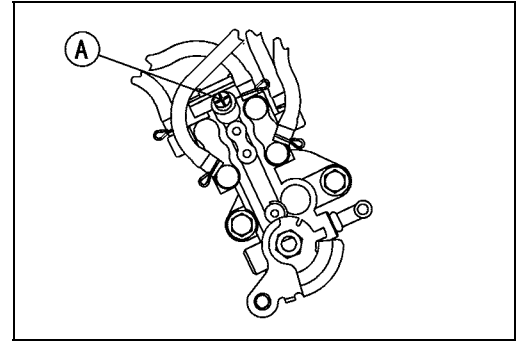
Item	Standard
Engine: Type Capacity	2-stroke, N.M.M.A. Certified for Service TC-W3 5.0 L (1.3 US gal)
Engine Oil Pump: Oil pump output when oil pump pulley is fully opened @3 000 r/min (rpm), 2 min, per one line:	
Output for # 1 Carburetor	3.83 mL (0.129 US oz) ± 10%
Output for # 2 Carburetor	4.00 mL (0.135 US oz) ± 10%
Output for # 3 Carburetor	3.83 mL (0.129 US oz) ± 10%
Output for Front Balancer	1.33 mL (0.045 US oz)± 10%
Output for Rear Balancer	1.33 mL (0.045 US oz) ± 10%

Oil Pump

Oil Pump Bleeding

- Make sure that there is plenty of engine oil in the oil tank and that oil flow is not restricted.
- Place a container under the oil pump.
- Loosen the air bleeder screw [A] on the oil pump a couple of turns, wait until oil flows out, and then tighten the bleeder screw securely.

Torque - Air Bleeder Screw: 1.0 ~ 1.5 N·m (0.1 ~ 0.15 kgf·m, 9 ~ 13 in·lb)



CAUTION

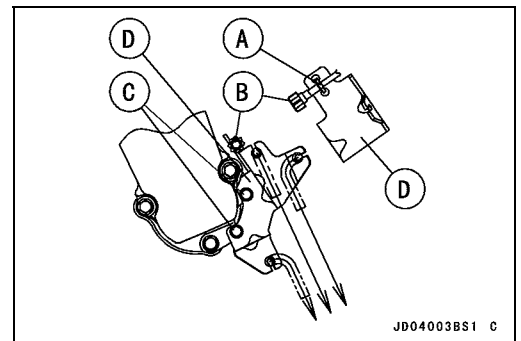
**Use a 50 : 1 mixture of gasoline to oil in the fuel tank in place of the gasoline normally used.
Do not turn on the water until the engine is running and turn it off immediately when the engine stops.**

- Supply the cooling system with water (see Auxiliary Cooling in the General Information chapter).
- Start the engine, keep it at idling speed and check the oil flow through the transparent outlet hoses.
- Keep the engine running until any air bubbles in the outlet hoses disappear.

Oil Pump Performance Test

If a drop in oil pump performance is suspected, check the rate at which the oil is being pumped.

- Cut off the clamp [A] securing the idle adjusting screw [B].
- Take out the bolt [C] of the cable holder [D] and move the holder with the control cables to portside to make the service easier.

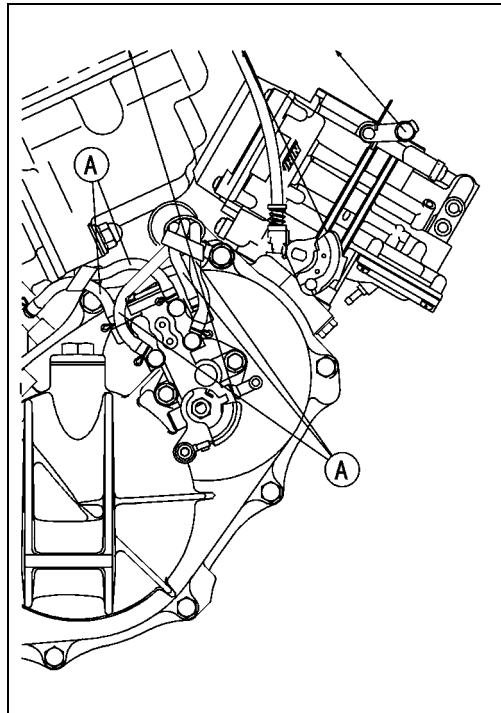


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4-6 ENGINE LUBRICATION SYSTEM

Oil Pump

- Disconnect the oil pump outlet hoses [A] at the pump body.



- Plug the ends of the oil pump outlet hoses.
- Reserve suitable transparent hoses and connect them with the oil pump outlets.
- Inject oil into the transparent hoses.
- Run each hose into a measuring glass.
- Reinstall the cable holder. If necessary, adjust control cables.

CAUTION

For this test use a 50:1 mixture of gasoline to oil instead the gasoline normally used.

Oil Pump

- Supply the cooling system with water (see Auxiliary Cooling in the General Information chapter).
- Hold the oil pump pulley fully opened.
- Start the engine, and run it at a steady 3,000 r/m (rpm).
- Collect the oil that is being pumped for 2 minutes. If the quantity of oil collected is within the specification, the oil pump is operating properly.

**Oil Pump Output when oil pump pulley is fully opened
(3,000 r/m (rpm) for 2 minutes)**

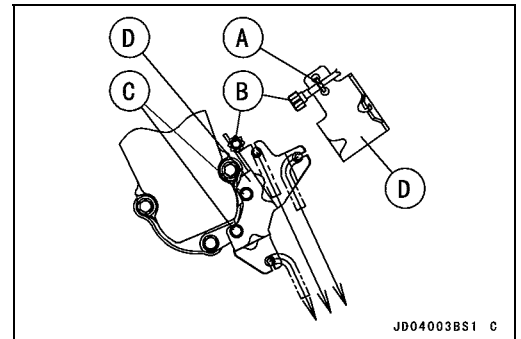
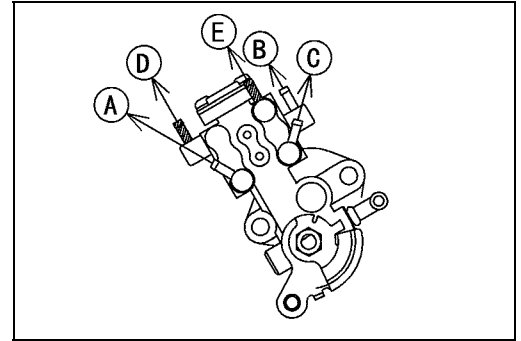
Standard:

Output for # 1 Carburetor [A]	3.83 mL (0.129 US oz.) ± 10%
Output for # 2 Carburetor [B]	4.00 mL (0.135 US oz.) ± 10%
Output for # 3 Carburetor [C]	3.83 mL (0.129 US oz.) ± 10%
Output for Front Balancer [D]	1.33 mL (0.045 US oz.) ± 10%
Output for Rear Balancer [E]	1.33 mL (0.045 US oz.) ± 10%

- ★ If the oil pump output is subnormal, inspect the oil pump, and the inlet and output hoses for oil leaks.
- ★ If oil leaks are not found, replace the oil pump.

Oil Pump Removal

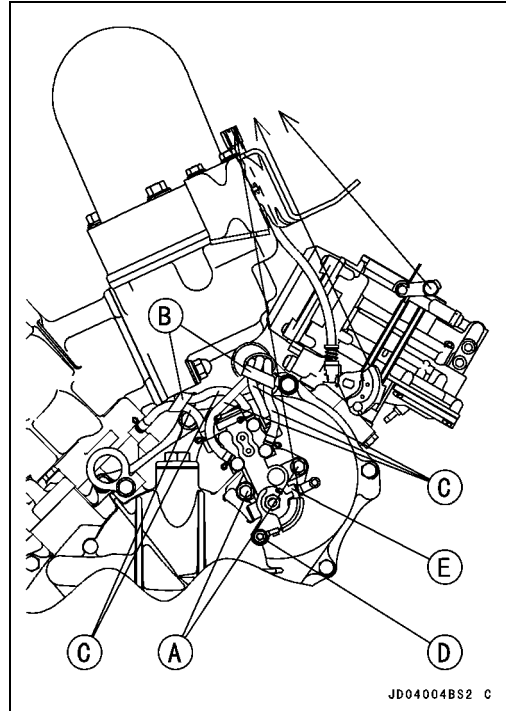
- Cut off the clamp [A] securing the idle adjusting screw [B].
- Take out the bolt [C] of the cable holder [D] and move the holder with the control cables to port side to make the service easier.



4-8 ENGINE LUBRICATION SYSTEM

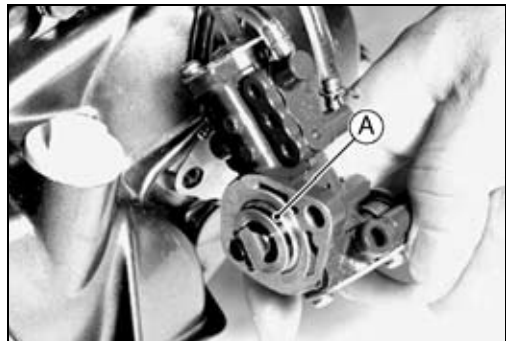
Oil Pump

- Disconnect the oil inlet hose at the oil pump body.
- Unscrew the oil pump mounting bolts [A].
- Loosen the clamps [B] to let the oil outlet hoses [C] move freely.
- Pull up the oil pump body remaining connected with the hoses and cable.
- Disconnect the oil hoses [C].
- Take out the bolt [D] and washer, and disconnect the oil pump cable from the oil pump body.
- Remove the oil pump [E].



Oil Pump Installation

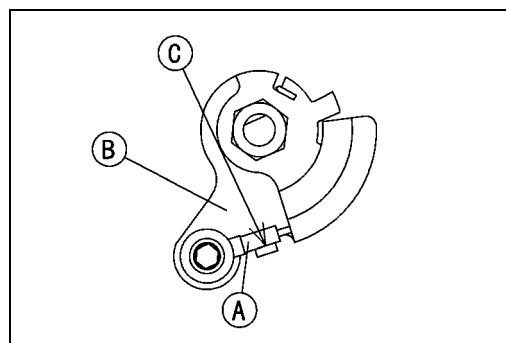
- Be sure the O-ring [A] is in place.



- Install the oil pump cable [A] on the pulley [B].
- Put the washer on the oil pump cable mounting bolt.
- Apply a non-permanent locking agent to the oil pump cable mounting bolt and torque it.

Torque - Oil Pump Cable Mounting Bolt: 4.9 N·m (0.5 kgf·m, 43 in·lb)

- Be sure the cable portion indicated in the illustration is in contact [C] with the pulley portion indicated in the illustration.



Oil Pump

- Initially inject oil into the oil pump body and the hoses, and connect the hoses with the oil pump as shown.

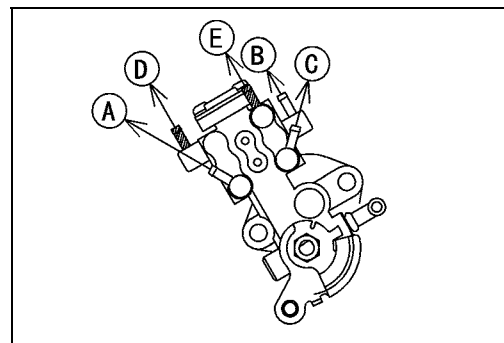
To # 1 Carburetor [A]

To # 2 Carburetor [B]

To # 3 Carburetor [C]

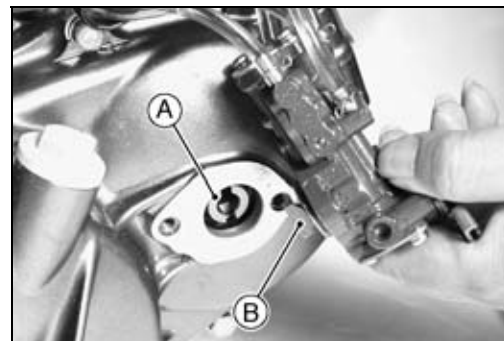
To Front Check Valve for Balancer Lubrication [D]

To Rear Check Valve for Balancer Lubrication [E]

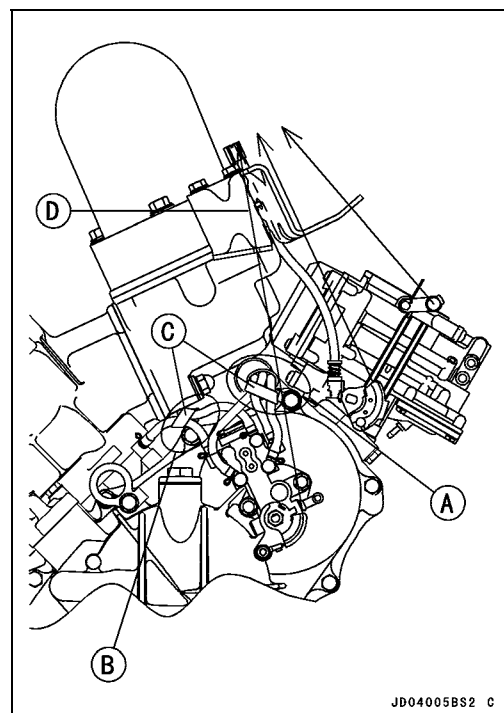


- Install the oil pump on the magneto cover.
- When mounting the oil pump, note the position of the slot [A] in the front balancer shaft, and then turn oil pump shaft [B] so that it will fit into the slot.
- Apply a non-permanent locking agent to the oil pump mounting bolts and torque them.

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



- Route the oil hoses correctly (see Cable, Wire and Hose Routing in the General Information chapter).
 - To Carburetors [A]
 - To Check Valves for Balancer Lubrication [B]
 - Clamps [C]
- Bleed the air from the system (see Oil Pump Bleeding).
- Adjust the oil pump cable [D] (see Oil Pump Cable Adjustment in the Fuel System).
- Fix the idle adjusting screw correctly (see Cable, Wire and Hose Routing in the General Information chapter).

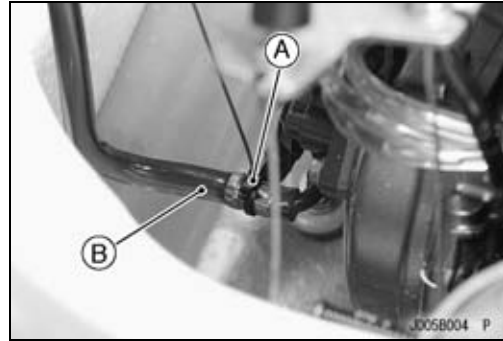


4-10 ENGINE LUBRICATION SYSTEM

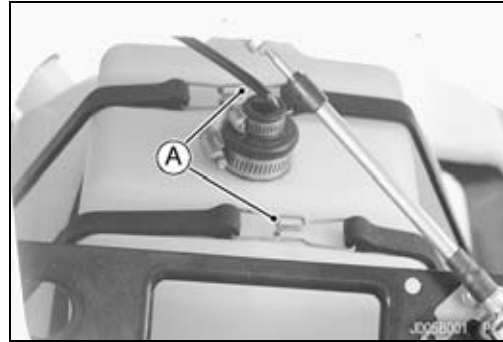
Oil Tank

Oil Tank Removal

- Drain the engine oil.
- Loosen the lower clamp [A] and pull off the oil hose [B].



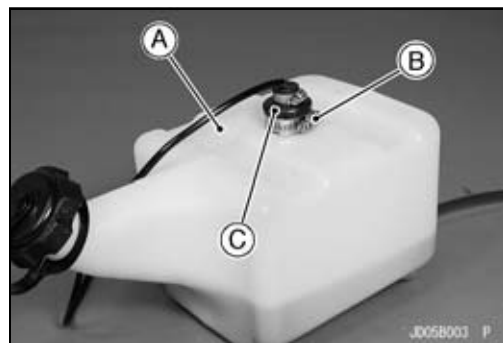
- Unhook the rubber straps [A].



- Disconnect the oil level sensor lead connector [A].



- Remove the oil tank [A] with the oil level sensor out of the hull.
- Loosen the clamp [B] and pull up the oil level sensor [C].



Oil Tank Installation

- Initially inject oil into the oil inlet hose.

Oil Tank

Oil Tank Cleaning

- Flush the tank repeatedly with high flash-point solvent until it is clean.

⚠ WARNING

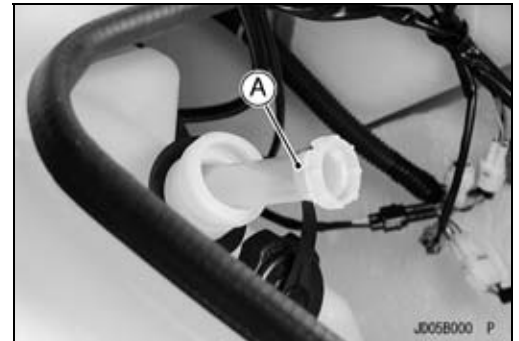
Clean the tank in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the tank. A fire or explosion could result.

Oil Filter Cleaning

- Take out the oil filter [A].
- Wash the oil filter in a non-flammable or high flash-point solvent. Use a brush to remove any contaminants trapped in the filter.

⚠ WARNING

Clean the oil filter 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 filter. A fire or explosion could result.

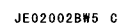


Exhaust System

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Exploded View



Exploded View

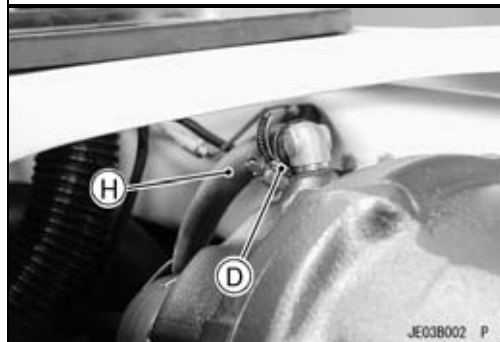
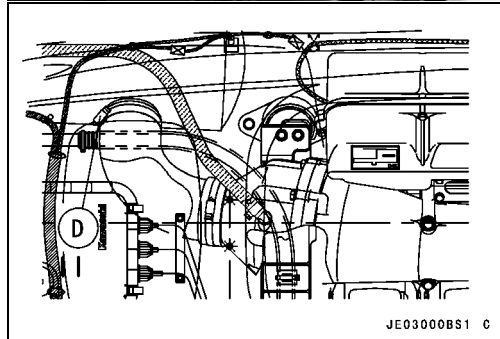
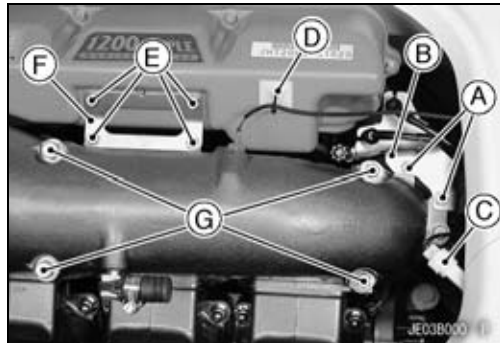
- T1: 8.8 N·m (0.9 kgf·m, 78 in·lb)
- T2: 29 N·m (3.0 kgf·m, 22 ft·lb)
- T3: 49 N·m (5.0 kgf·m, 36 ft·lb)
- T4: 34 N·m (3.5 kgf·m, 25 ft·lb)
- T5: 7.7 ~ 14 N·m (0.8 ~ 1.4 kgf·m, 68 in·lb ~ 10 ft·lb)
- T6: 15 N·m (1.5 kgf·m, 11 ft·lb)
- L: Apply a non-permanent locking agent.
- SS: Apply silicone sealant.

5-4 EXHAUST SYSTEM

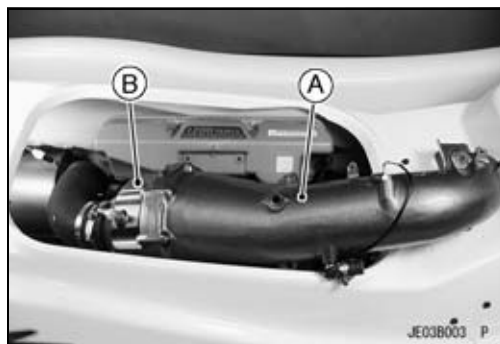
Expansion Chamber

Removal

- Remove or disconnect:
 - Cable Holder Bolts [A]
 - Cable Holder [B]
 - Water Temperature Sensor Lead Connector [C] (Disconnect)
 - Clamp [D]
 - Bracket Mounting Bolts [E]
 - Bracket [F]
 - Exhaust Pipe Mounting Bolts [G]
 - Cooling Hose [H]

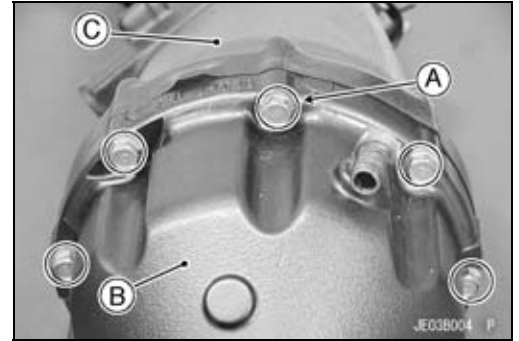


- Remove the exhaust pipe [A] and expansion chamber [B] as a set.



Expansion Chamber

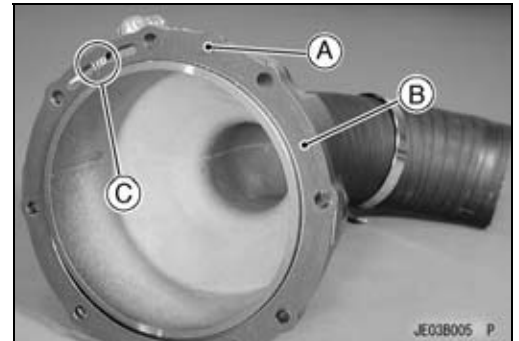
- Unscrew the mounting bolts [A] and separate the exhaust chamber [B] from the exhaust pipe [C].



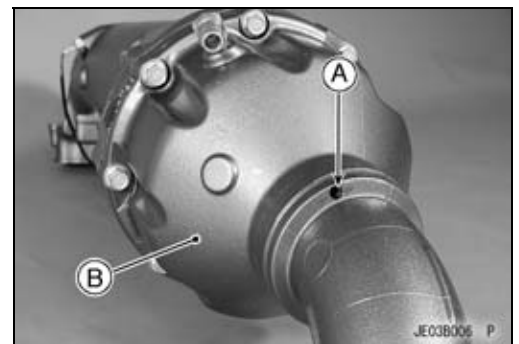
Installation

- Install the expansion chamber on the exhaust pipe.
 - Be sure the dowel pin [A] is in place.
 - Install the new gasket [B] on the expansion chamber so that its "UP" letter [C] faces upward.
 - Apply a non-permanent locking agent to the expansion chamber mounting bolts and torque them.

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



- Be sure the water passage on the expansion chamber [B] hole [A] is not obstructed by foreign matter.

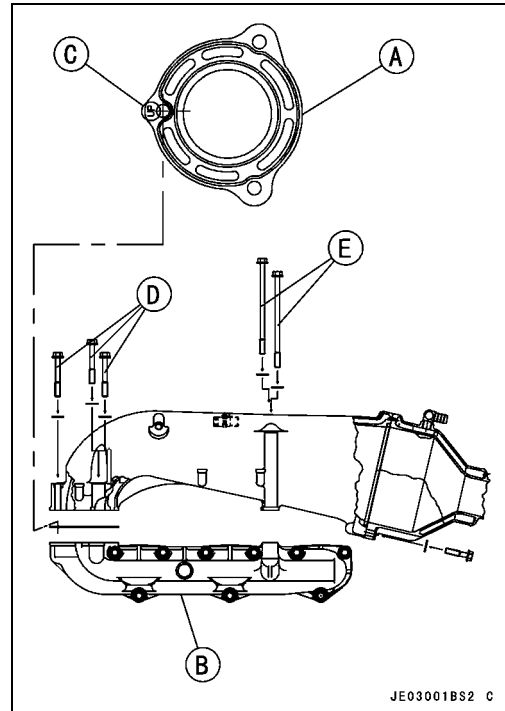


5-6 EXHAUST SYSTEM

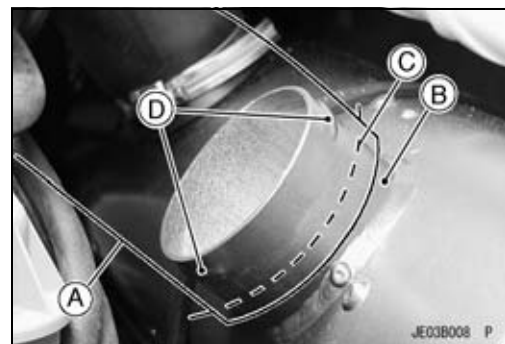
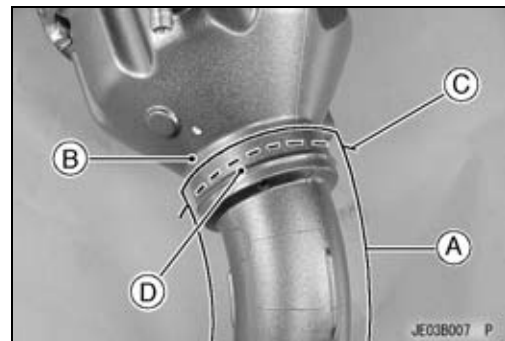
Expansion Chamber

- Install the pipe and the chamber as a set on the manifold.
- Install the new gasket [A] on the exhaust manifold [B] so that its "UP" letter [C] faces upward.
- Apply a non-permanent locking agent to the exhaust pipe mounting bolts and torque them.

Torque - Exhaust Pipe Mounting Bolts - 8 mm (0.315 in.)
Dia: 29 N·m (3.0 kgf·m, 22 ft·lb) [D]
Exhaust Pipe Mounting Bolts - 10 mm (0.394 in.)
Dia: 49 N·m (5.0 kgf·m, 36 ft·lb) [E]



- When installing the exhaust tubes [A] on their fittings [B], be sure the clamp positions [C] are over the fitting projections [D].

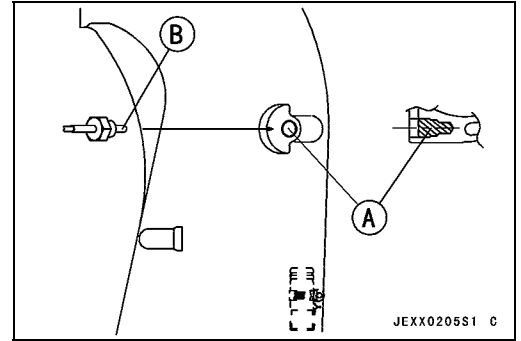


Expansion Chamber

- Fill the hollow of the exhaust pipe with transmission oil [A], if the heat sensor [B] is removed.

Oil Viscosity: 5W30 or 40

Oil Capacity: 0.8 mL (0.027 US oz)



Exhaust Pipe/Exhaust Chamber Cleaning and Inspection

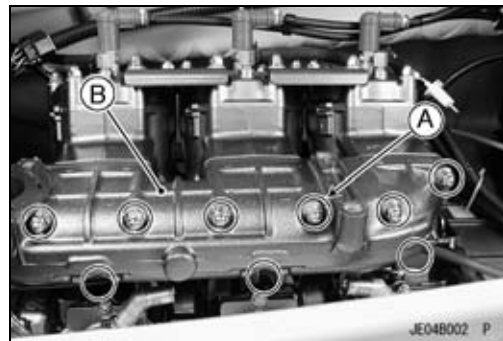
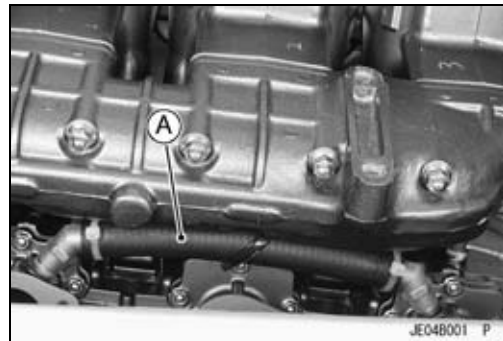
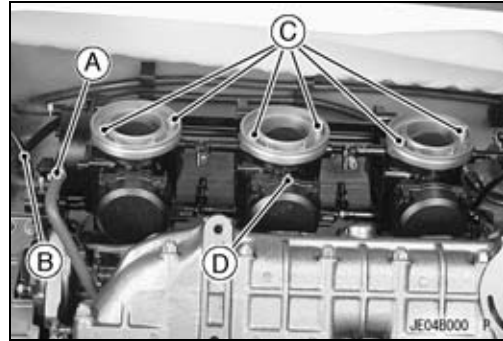
- Remove the exhaust pipe and chamber.
- Clean the carbon deposits out of the exhaust passages with a blunt, rounded tool.
- Flush foreign matter out of the water passages with fresh water.
- Check the insides of the water passages for corrosion. Check the gasket surfaces for nicks or other damage.
- ★ If there is excessive corrosion or if the gasket surfaces are so badly damaged that they will not seal properly, replace the part.

5-8 EXHAUST SYSTEM

Exhaust Manifold

Removal

- Remove the exhaust pipe and the exhaust chamber as a set (see Expansion Chamber Removal in this chapter).
- Remove the air intake cover assembly (see Frame Arrestor Removal in the Fuel System chapter).
- Disconnect the pulse hose [A] and TPS lead [B] connector.
- Remove the carburetor mounting bolts [C].
- Remove the carburetor assembly [D] remaining connected the fuel hoses, oil hoses and control cables, and place it on the hull bottom.
- Remove the balance tube [A] to make the service easier.
- Unscrew the mounting nuts [A] and remove the exhaust manifold [B].

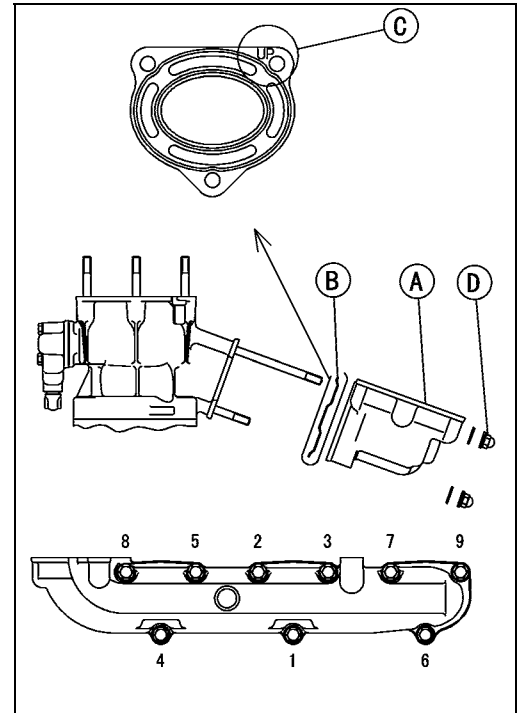


Exhaust Manifold

Installation

- Install the exhaust manifold [A] on the cylinder.
- Place the new gaskets [B] on the cylinders so that “UP” letter [C] faces upward as shown.
- Tighten the exhaust manifold nuts [D] following the sequence shown.

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



Cleaning and Inspection

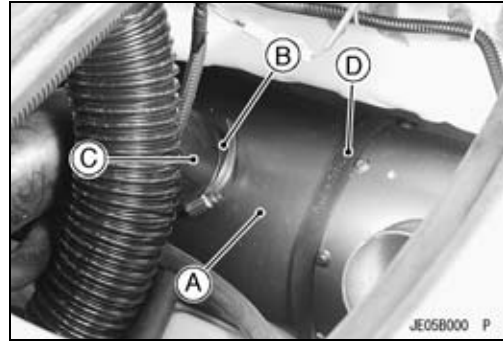
- Remove the exhaust manifold parts.
- Clean the carbon deposits out of the exhaust passages with a blunt, rounded tool.
- Flush foreign matter out of the water passages with fresh water.
- Check the insides of the water passages for corrosion. Check the gasket surfaces for nicks or other damage.
- ★ If there is excessive corrosion or if the gasket surfaces are so badly damaged that they will not seal properly, replace the part.

5-10 EXHAUST SYSTEM

Water Box Muffler

Removal

- Remove the engine (see Engine Removal/Installation).
- Remove the water box muffler [A] out of the hull.
- Loosen the clamp [B] and pull out the exhaust tube [C].
- Unhook the rubber strap [D].



Installation

- Be sure the dampers [A] on the hull bottom and muffler body are in place.
- Install the clamp [B] securing the exhaust tube, noting its screw position (see Cable, Wire and Hose Routing in the General Information chapter).



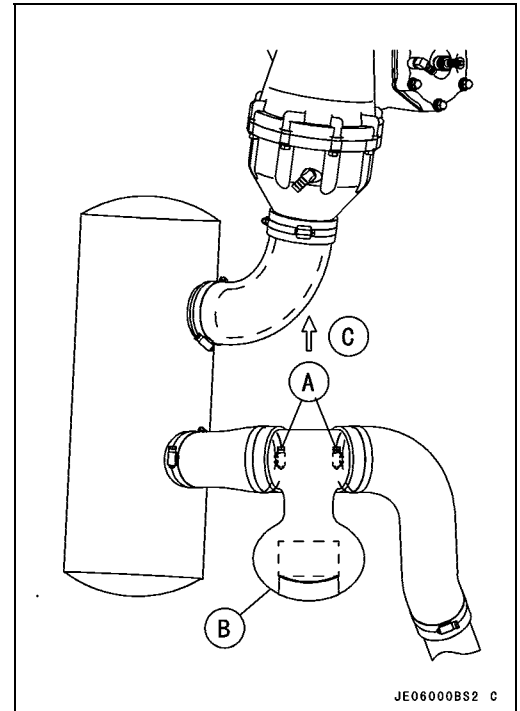
Inspection

- Remove the water box muffler.
- 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 Cleaning and Inspection) and the carburetor for proper adjustment (see Fuel System chapter).

Resonator

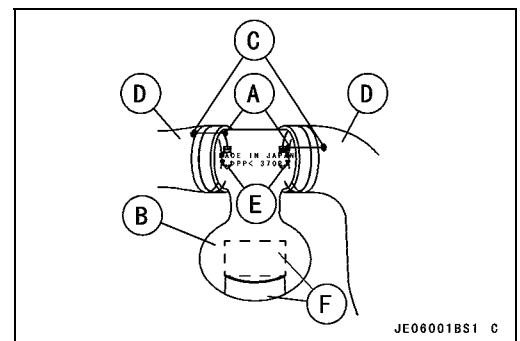
Resonator Removal

- Pull the bilge hoses off the bilge breather.
- Loosen the clamps [A] on both ends of the resonator [B].
- Pull out the resonator [B] to the front [C].



Resonator Installation

- Align the projections [A] on the resonator [B] with the white mark [C] on the exhaust tubes [D].
- Position the clamp screws [E] underneath.
- Position the dampers [F] as shown (see Cable, Wire and Hose Routing in the General Information chapter).

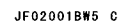


Engine Top End

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Piston Ring, Piston Ring Groove Inspection	6-12
Piston Ring End Gap	6-12

Exploded View



Exploded View

T1: 7.8 N·m (0.8 kgf·m, 69 in·lb) or above

T2: 29 N·m (3.0 kgf·m, 22 ft·lb)

Initial Torque for Temporal Tightening: 7.8 N·m (0.8 kgf·m, 69 in·lb)

T3: 49 N·m (5.0 kgf·m, 36 ft·lb)

Initial Torque for Temporal Tightening: 7.8 N·m (0.8 kgf·m, 69 in·lb)

T4: 9.8 N·m (1.0 kgf·m, 87 in·lb)

L: Apply a non-permanent locking agent.

SS: Apply silicone sealant.

MO: Apply molybdenum disulfide oil: a mixture of 4-st engine oil and molybdenum disulfide grease with a weight ratio (10:1).

6-4 ENGINE TOP END

Specifications

Item	Standard	Service Limit
Cylinder Head:		
Cylinder compression	(Usable range) 677 ~ 1069 kPa (6.9 ~ 10.9 kgf/cm ² 98 ~ 155 psi) (Open throttle)	— — —
Cylinder head warp	— — —	0.05 mm (0.002 in.)
Cylinder, Piston:		
Cylinder inside diameter	80.000 ~ 80.015 mm (3.1496 ~ 3.1502 in.)	80.10 mm (3.1535 in.)
Piston diameter-26.9 mm (1.0591 in.) up from bottom of skirt	79.865 ~ 79.880 mm (3.1443 ~ 3.1449 in.)	79.72 mm (3.1386 in.)
Piston/cylinder clearance	0.130 ~ 0.140 mm (0.0051 ~ 0.0055 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 (0.0276 in.)
Second	0.25 ~ 0.40 mm (0.0098 ~ 0.0157 in.)	0.7 mm (0.0276 in.)

Special Tools - Piston Pin Puller Assembly: 57001-910

Piston Pin Puller Adapter: 57001-1211

Compression Gauge: 57001-221

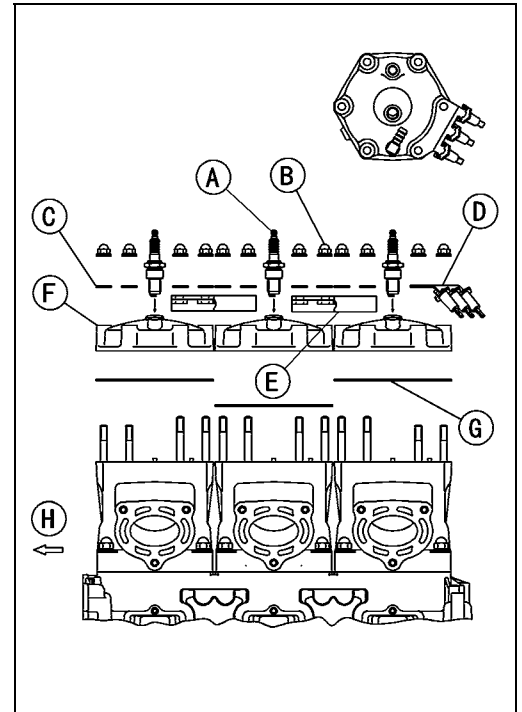
Compression Gauge Adapter, M14 × 1.25: 57001-1514

Engine Top End

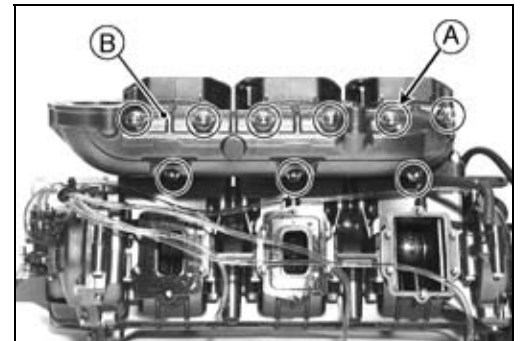
Disassembly and Assembly:

Disassembly

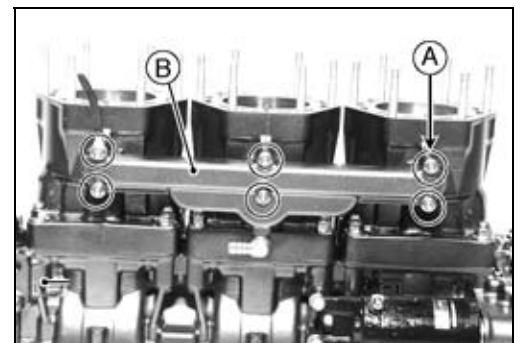
- Remove the engine (see Engine Removal/Installation chapter).
- Remove:
 - Spark Plugs [A]
 - Cylinder Head Nuts [B] and Washers [C]
 - Spark Plug Holder [D]
 - Reinforce [E]
 - Cylinder Head [F]
 - Cylinder Head Gasket [G]
 - Front [H]



- Remove:
 - Exhaust Manifold Mounting Nuts [A]
 - Exhaust Manifold [B]



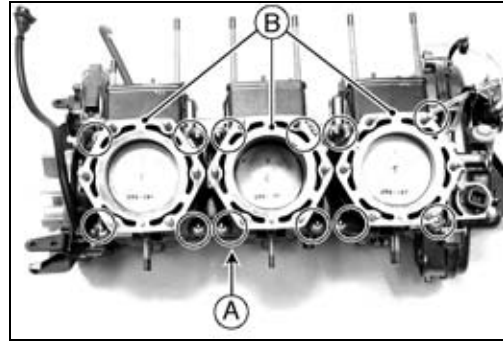
- Remove:
 - Water Pipe Mounting Nuts [A]
 - Water Pipe [B]



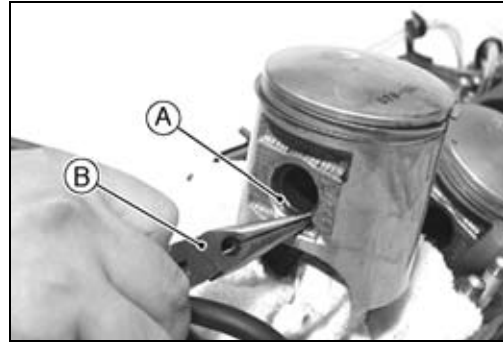
6-6 ENGINE TOP END

Engine Top End

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



- 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 by pushing its pin out the side that the circlip was removed. Use a piston pin puller assembly, if the pin is tight.

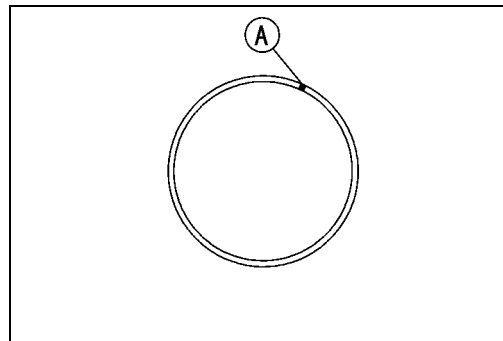
Special Tool - Piston Pin Puller Assembly: 57001-910
Piston Pin Puller Adapter: 57001-1211

- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.



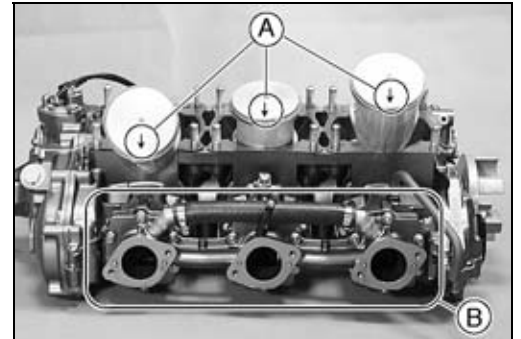
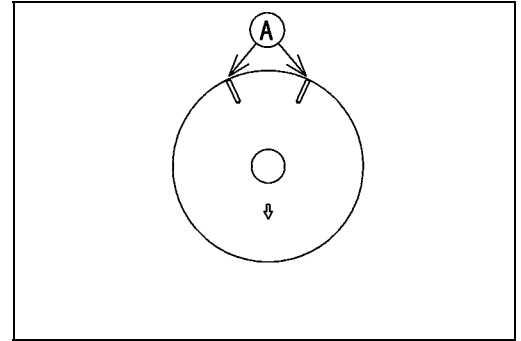
Assembly Notes

- If any parts in the piston assemblies require replacement, or if the cylinder is 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 upward as shown.
- When the piston rings are reinstalled to the piston ring grooves reinstall them as follows for fitting.
- Top Piston Ring → Top Piston Ring Groove
Second Piston Ring → Second Piston Ring Groove



Engine Top End

- 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.
- Using molybdenum disulfide oil, lubricate the small end bearing and insert into the connecting rod eye.
- Using molybdenum disulfide oil, lubricate the piston pin and the pin holes.
- Mount the pistons on the connecting rods with the arrows [A] on their crown pointing to the reed valves side [B] of engine.

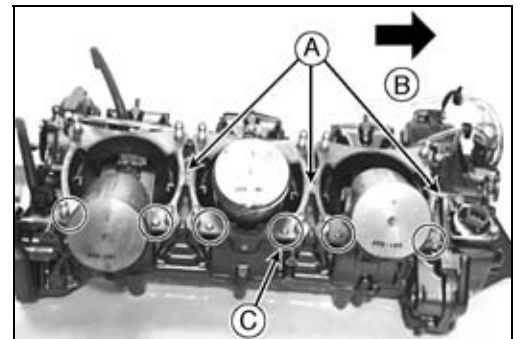
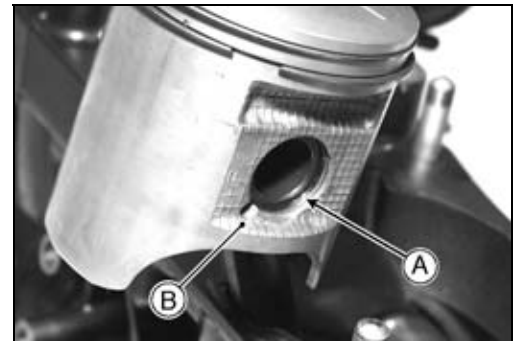


- When installing a piston pin snap ring, compress it only enough to install it and no more.

CAUTION

Do not reuse snap 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.
- The tab [A] of gasket must face forward [B] and align the knock pin hole [C] of gasket with the knock pin on the cylinder.



6-8 ENGINE TOP END

Engine Top End

- Apply molybdenum disulfide oil:
 - Small End Bearings
 - Piston Pins and Piston Pin Holes
 - Pistons and Cylinder Bores
- Slide the cylinder block down over the crankcase studs onto the crankcase compressing the piston rings.

CAUTION

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

- Install the cylinder base nuts.
- Temporarily torque the cylinder base nuts in a cross pattern and torque them in the same order.

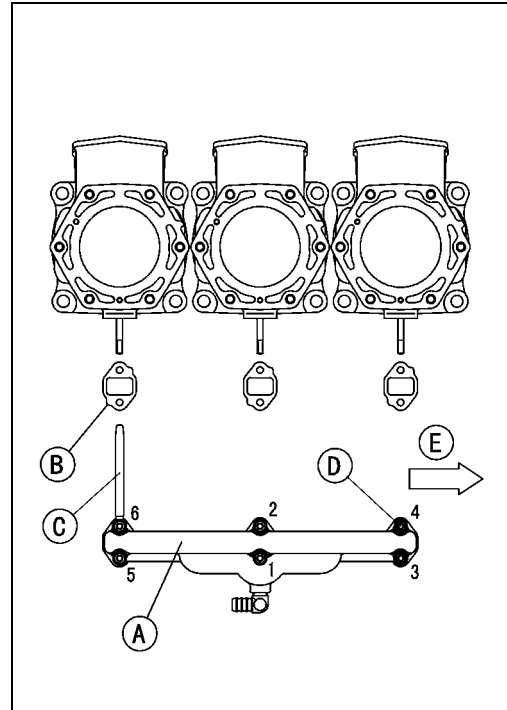
Initial Torque for Temporal Tightening -

Cylinder Base Nuts: 7.8 N·m (0.8 kgf·m, 69 in·lb)

Torque - Cylinder Base Nuts: 49 N·m (5.0 kgf·m, 36 ft·lb)

- Install the water pipe [A] on the cylinder.
 - Place new water pipe gaskets [B] on the cylinder as shown.
 - Set the clamp [C] on the water pipe as shown.
 - Tighten the water pipe nuts [D] following the sequence shown.
- Front [E]

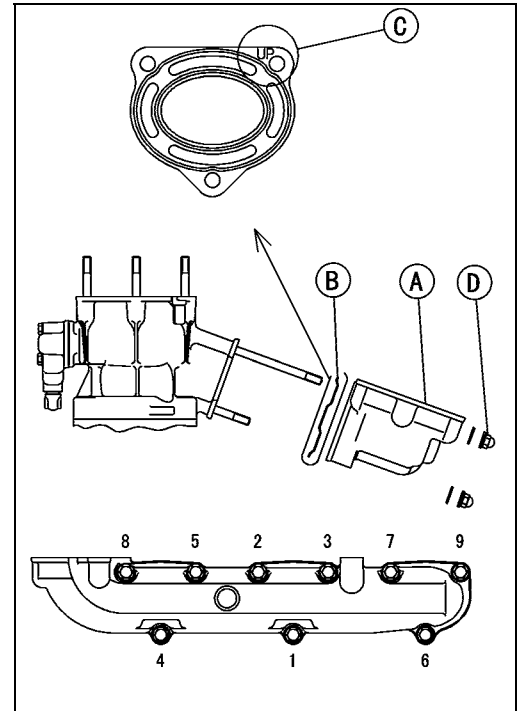
Torque - Water Pipe Mounting Nuts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



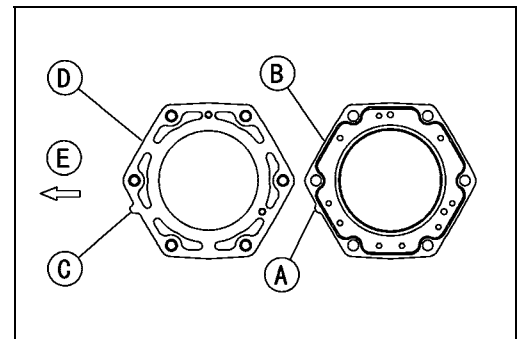
Engine Top End

- Install the exhaust manifold [A] on the cylinder.
- Place new gaskets [B] on the cylinders so that “UP” letter [C] faces upward as shown.
- Tighten the exhaust manifold nuts [D] following the sequence shown.

Torque - Exhaust Manifold Mounting Nuts: 34 N·m (3.5 kgf·m, 25 ft·lb)



- Place a new cylinder head gasket on the cylinder head.
 - Align the tab [A] of head gasket [B] with that [C] of the cylinder block [D].
 - Align the dowel pins on the cylinder block with the holes of the head gaskets.
- Front [E]



6-10 ENGINE TOP END

Engine Top End

- Install the cylinder head in this order.
#2 → #3 → #1
- Temporarily torque the cylinder head nuts in a cross pattern and torque them in the same order.

Initial Torque for Temporal Tightening -
Cylinder Head Nut: 7.8 N·m (0.8 kgf·m, 69 in·lb)

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

- 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 without cooling water supply for more than 15 seconds, especially in high revolutionary speed or severe engine and exhaust system damage will occur.

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 without cooling water supply for more than 15 seconds, especially in high revolutionary speed or severe engine and exhaust system damaged will occur.

- Stop the engine.
- Pull all the spark plug caps from the spark plugs and push the caps fully onto the spark plug cap holder (see Igniter Inspection in the Electrical System chapter).

- Screw a compression gauge firmly into the spark plug hole.

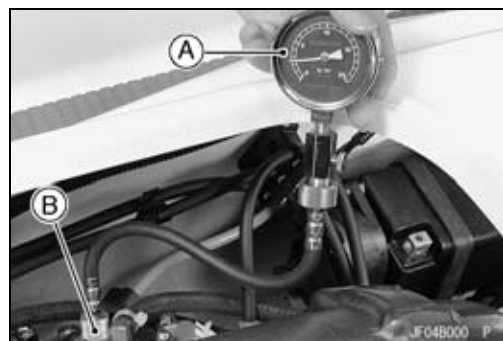
Special Tools - Compression Gauge: 57001-221 [A]
Compression Gauge Adapter, M14 × 1.25: 57001-1514 [B]

- 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 two cylinders.

Cylinder Compression (Usable Range)

675 ~ 1070 kPa (6.9 ~ 10.9 kg/cm², 98 ~ 155 psi)

(open throttle)



Engine Top End

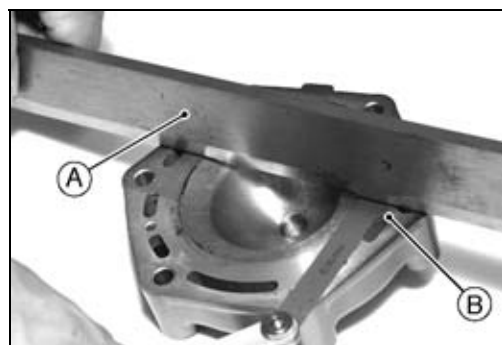
- ★If the cylinder compression is higher than the usable range, check the following.
 - Carbon buildup on the piston head and cylinder head - clean off any carbon on the piston head and cylinder head.
 - Cylinder head gasket, cylinder base gaskets - use only the proper gaskets. The use of a gasket of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

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 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.)



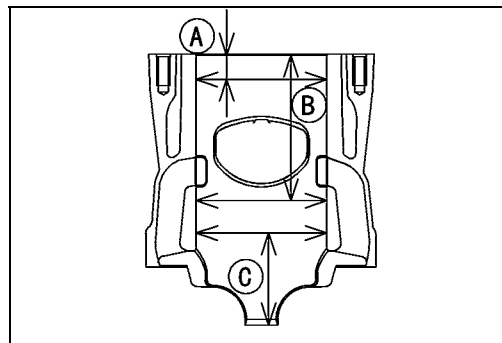
Cylinder Wear Inspection

- 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 (0.3937 in.)

[B] 90 mm (3.5433 in.)

[C] 60 mm (2.3622 in.)



- ★ If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be replaced with a new one.

Cylinder Inside Diameter

Standard: 80.000 ~ 80.015 mm (3.1496 ~ 3.1502 in.)
and less than 0.01 mm (0.0004 in.)
difference between any two
measurements

Service Limit: 80.10 mm (3.1535 in.) , or more than
0.05 mm (0.002 in.) difference between
any two measurements

6-12 ENGINE TOP END

Engine Top End

Piston Diameter Measurement

- Measure the outside diameter [A] of the piston 26.9 mm (1.0591 in.) up [B] from the bottom of the piston at a right angle to the direction of the piston pin.

Piston Diameter

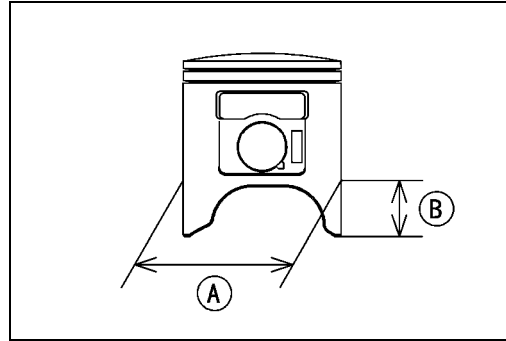
Standard: 79.865 ~ 79.880 mm (3.1443 ~ 3.1449 in.)

Service Limit: 79.2 mm (3.1386 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 may mean a bent connecting rod or a misaligned crankshaft.



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.

- 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 cylinder inside diameter measurement. The difference is the piston clearance.

Piston/Cylinder Clearance

0.130 ~ 0.140 mm (0.0051 ~ 0.0055 in.)

Piston Ring, Piston Ring Groove Inspection

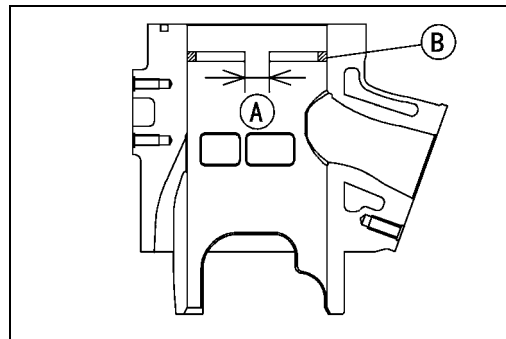
- Visually inspect the piston rings and the piston ring grooves.
- ★ If the rings are worn unevenly or damaged, they must be replaced.
- ★ If the piston ring groove are worn unevenly or damaged, the piston must be replaced and fitted with new rings.

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 (0.0276 in.)	0.70 mm (0.0276 in.)



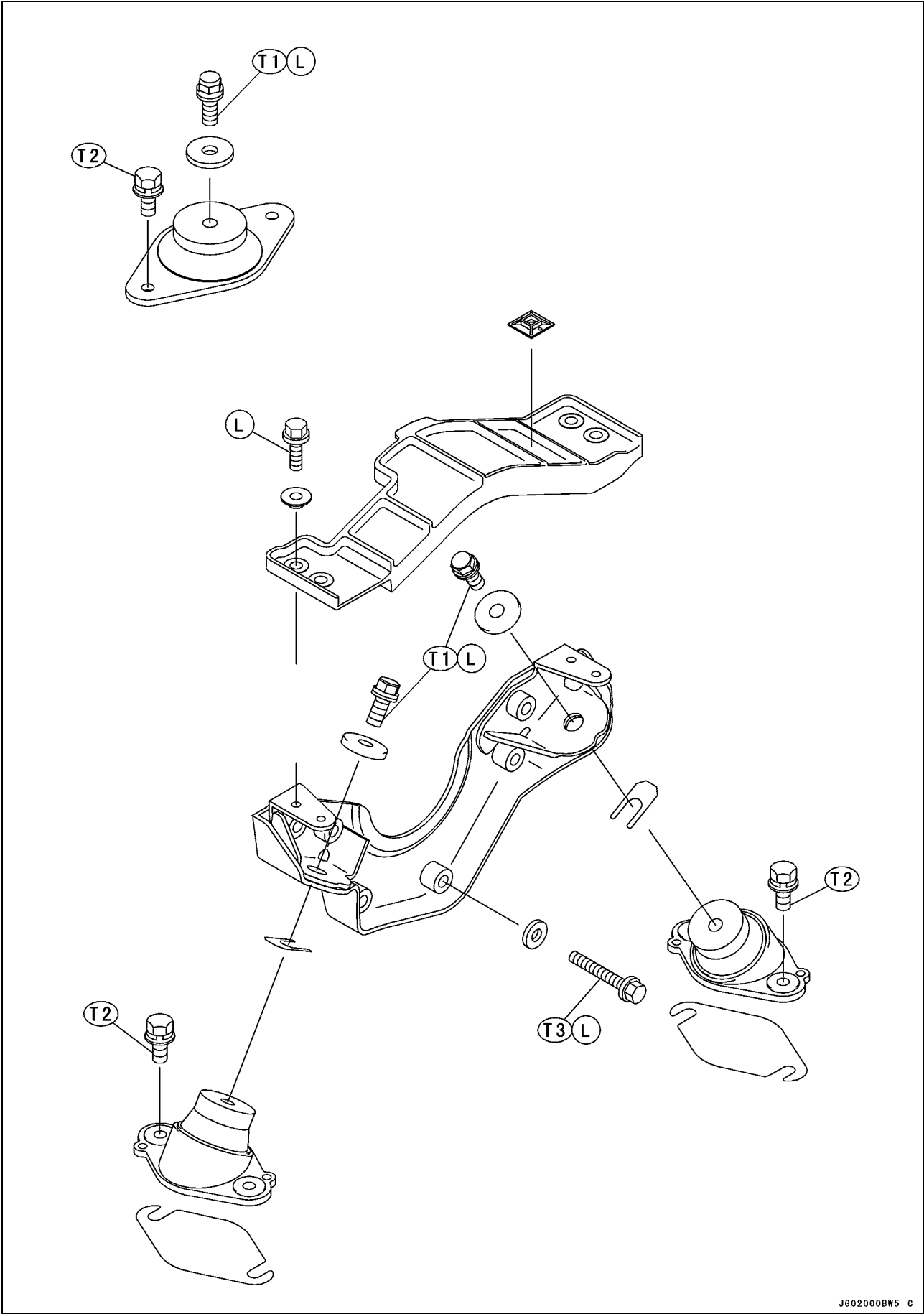
Engine Removal/Installation

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7-2 ENGINE REMOVAL/INSTALLATION

Exploded View



Exploded View

T1: 36 N·m (3.7 kgf·m, 27 ft·lb)

T2: 16 N·m (1.6 kgf·m, 11.5 ft·lb)

T3: 34 N·m (3.5 kgf·m, 25 ft·lb)

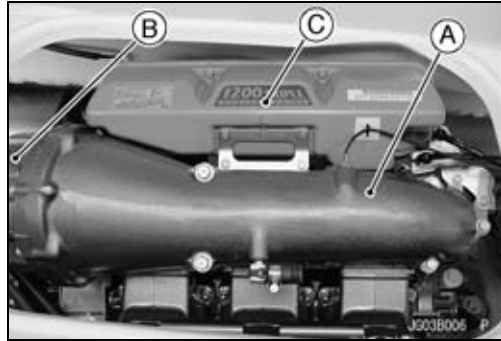
L: Apply a non-permanent locking agent.

7-4 ENGINE REMOVAL/INSTALLATION

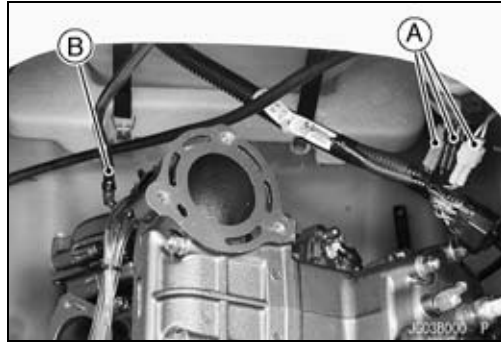
Engine Removal/Installation

Removal

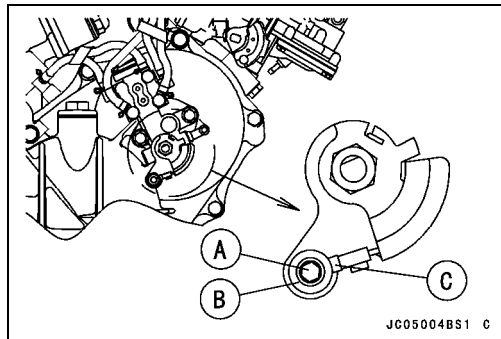
- Remove:
 - Exhaust Pipe [A] and Chamber [B] as a set (see Exhaust System chapter.)
 - Air Intake Cover Assembly [C] (see Flame Arrester Removal in the Fuel System chapter)
 - Carburetors (see Fuel System chapter)



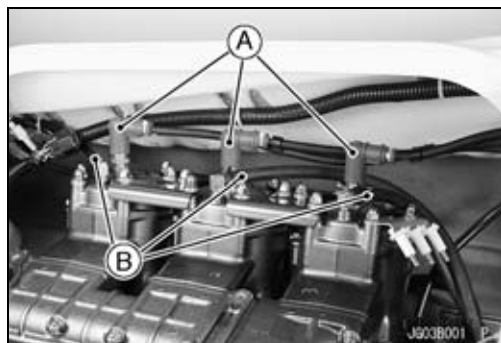
- Disconnect:
 - Magneto Lead Connectors [A]
 - Oil Tank Inlet Hose [B]



- Take out the bolt [A] and washer [B], and disconnect the oil pump cable end [C].

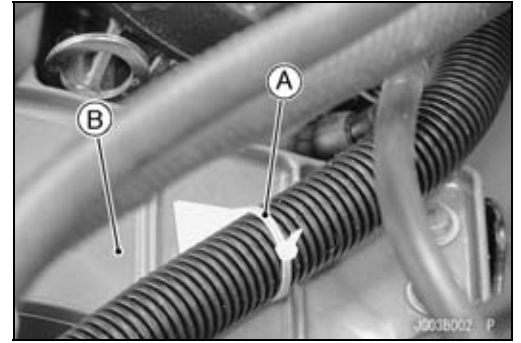


- Remove:
 - Spark Plug Caps [A]
 - Cooling Hoses on Cylinder Heads [B]

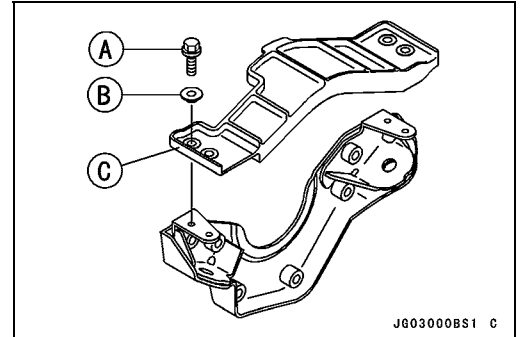


Engine Removal/Installation

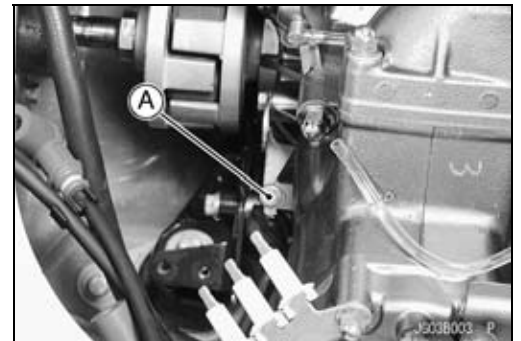
- Remove the calmp [A] on the coupling cover [B].



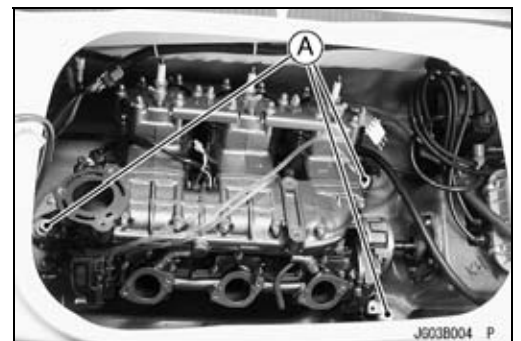
- Unscrew the mounting bolts [A] and collars [B], and remove the coupling cover [C].



- Disconnect the ground terminal [A].



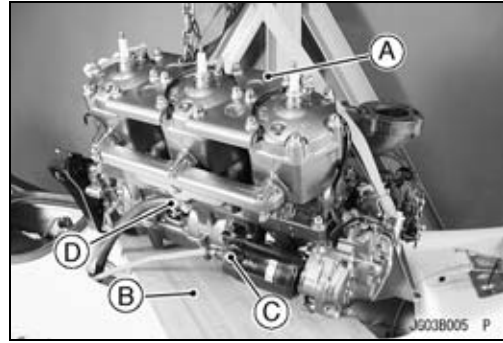
- Unscrew the engine mounting bolts [A].



7-6 ENGINE REMOVAL/INSTALLATION

Engine Removal/Installation

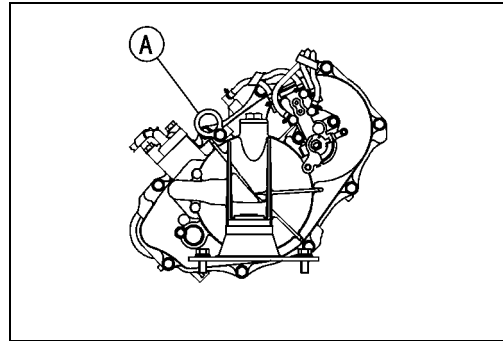
- Slide the engine toward the front to disengage the couplings, and then lift the engine [A] out of the hull.
- Place a wooden board [B] under the engine as shown, and then disconnect the starter motor cable terminal [C] and inlet cooling hose [D].



NOTE

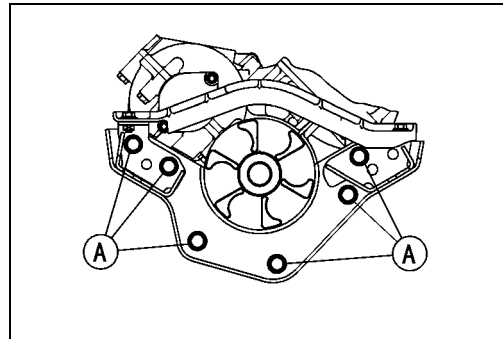
○Lift the engine by using the plates [A].

- Remove the engine mount.



Installation Notes

- 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 and damage (see Coupling Damper Inspection in the Engine Bottom End chapter).
- Apply a non-permanent locking agent to the engine mount bolts [A] and torque them.



Torque - Engine Mount Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)

- Check the gap between the engine mount and the dampers by rocking the engine.
- If there is a gap, insert a suitable shim between the engine mount and the damper to achieve a good fit.

Shim Selection

Shim No.	Thickness
92025-3705	t 0.3 mm
92025-3706	t 0.5 mm
92025-3707	t 1.0 mm
92025-3708	t 1.5mm

Apply a non-permanent locking agent to the engine mounting bolts and torque them.

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

Engine Removal/Installation

- After installing the engine in the hull, check the following.
 - Throttle Control 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.

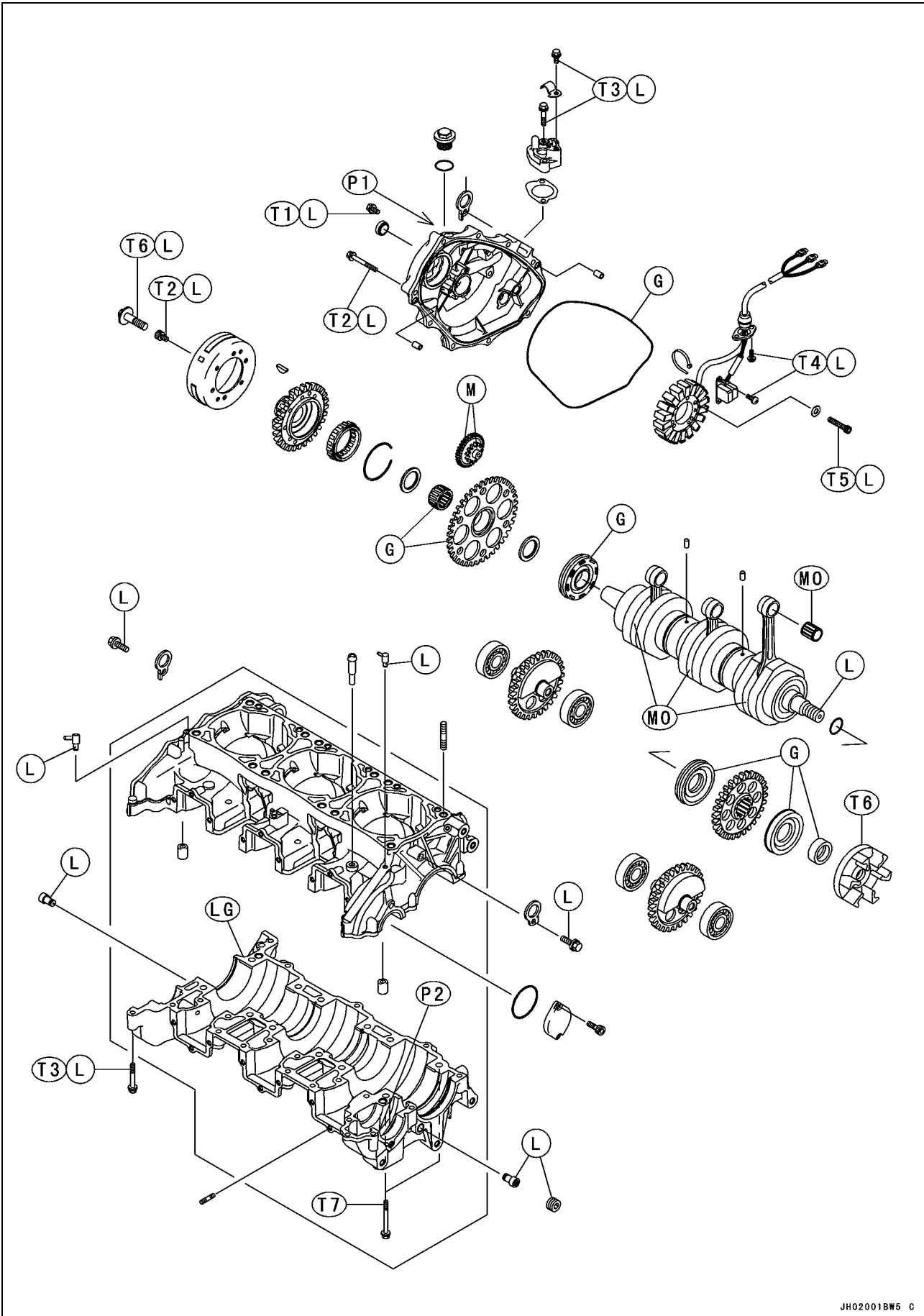
Engine Bottom End

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8-2 ENGINE BOTTOM END

Exploded View



Exploded View

- L: Apply a non-permanent locking agent.
- M: Apply molybdenum disulfide grease.
- LG: Apply liquid gasket.
- MO: Apply molybdenum disulfide oil: a mixture of 4-st engine oil and molybdenum disulfide grease with a weight ratio (10:1)
- G: Apply grease.
- P1: Pour 200 mL (6.76 US oz) of 2 - stroke oil.
- P2: Pour 20 mL (0.68 US oz) of 2 - stroke oil.
- T1: 3.9 N·m (0.4 kgf·m, 35 in·lb)
- T2: 12 N·m (1.2 kgf·m, 8.5 ft·lb)
- T3: 8.8 N·m (0.9 kgf·m, 78 in·lb)
- T4: 3.5 N·m (0.36 kgf·m, 31 in·lb)
- T5: 7.8 N·m (0.8 kgf·m, 69 in·lb)
- T6: 123 ~ 127 N·m (12.5 ~ 13.0 kgf·m, 90.4 ~ 94.0 ft·lb)
- T7: 29 N·m (3.0 kgf·m, 22 ft·lb)

8-4 ENGINE BOTTOM END

Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Crankshaft runout	see page 8-22.	
Connecting rod side clearance	0.45 ~ 0.55 mm (0.0177 ~ 0.0217 in.)	0.8 mm (0.0315 in.)
Connecting rod radial clearance	0.025 ~ 0.037 mm (0.001 ~ 0.0015 in.)	0.087 mm (0.0034 in.)
Connecting rod bent	0.05 mm/100 mm (0.002 in./3.937 in.)	0.2 mm/100 mm (0.0079 in./3.937 in.)
Connecting rod twist	0.15 mm/100 mm (0.0059 in./3.937 in.)	0.2 mm/100 mm (0.0079 in./3.937 in.)

Special Tools - Flywheel Puller Assy: 57001-1426

Rotor Holder: 57001-1428

Coupling Holder: 57001-1423

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

Oil Pouring

Oil Pouring

- Take out the plug [A] on the magneto cover and pour 200 mL (6.76 US oz) of 2-stroke oil [B] into the front balancer room (inside the magneto cover) after the following service procedures.

Coupling Removal

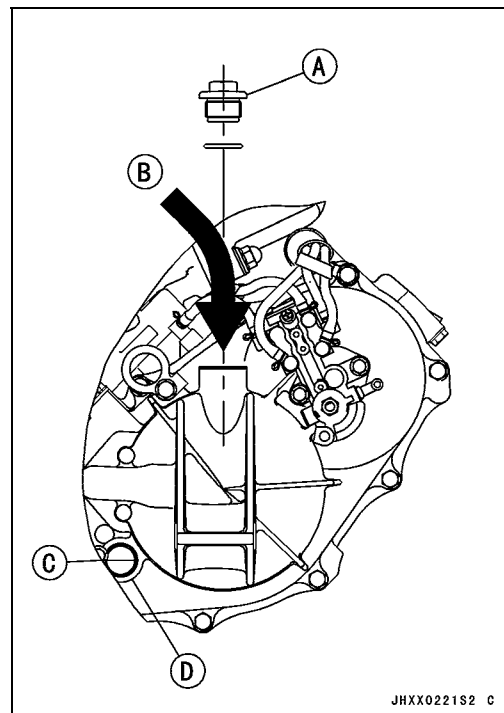
Magneto Flywheel Removal

Starter Clutch Gear and Torque Limiter Removal

Stator Removal

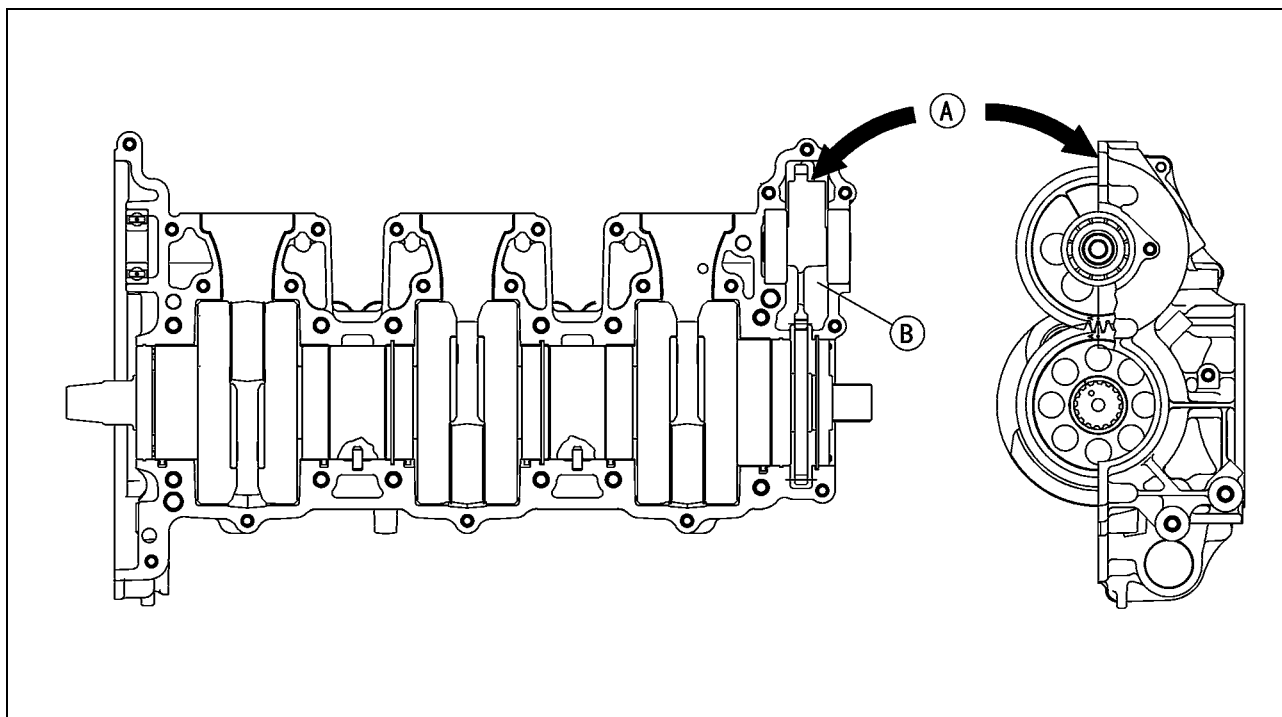
NOTE

- Oil level is approx the middle line [C] of the gauge [D] under the state that the engine is mounted on the hull after pouring 200 mL (6.76 US oz).



JHXX0221S2 C

- Pour 20 mL (0.68 US oz) of 2-stroke oil [A] into the rear balancer room [B] after splitting the crankcase.



8-6 ENGINE BOTTOM END

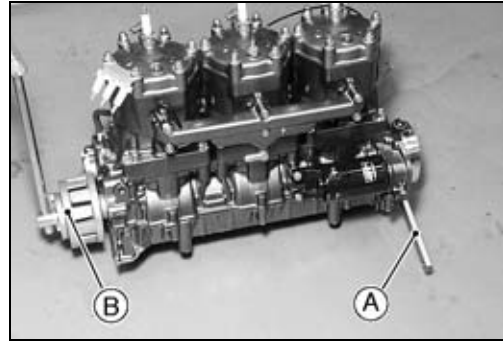
Coupling

Removal

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

Special Tools - Rotor Holder: 57001-1428 [A]

Coupling Holder: 57001-1423 [B]

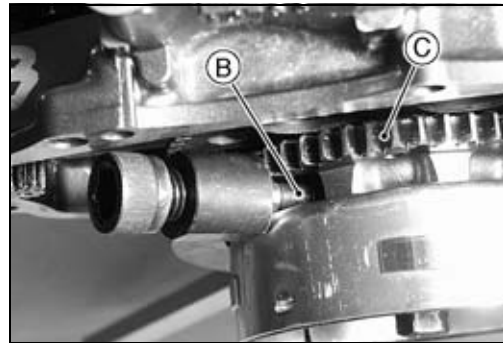


NOTE

○Hold the boss [B] of the front balancer gear [C] with the rotor holder.

CAUTION

Do not hold the teeth of the front balancer drive gear or magneto flywheel with the rotor holder. The gear teeth or the flywheel could be damaged.



Installation

- Apply a non-permanent locking agent to the crankshaft threads.
 - Screw the coupling onto the crankshaft and tighten it.
- Torque - Coupling: 123 ~ 127 N·m (12.5 ~ 13.0 kgf·m, 90.4 ~ 94.0 ft·lb)**

Coupling Damper Inspection

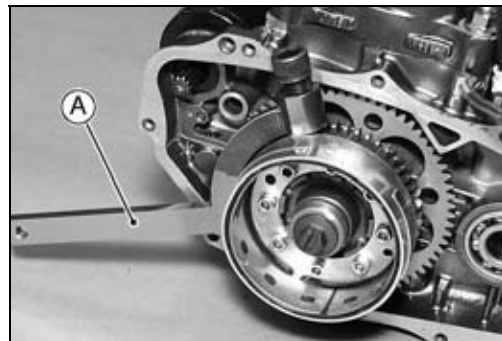
○Refer to Coupling Damper Inspection in the Periodic Maintenance chapter.

Magneto Flywheel

Magneto Flywheel Removal

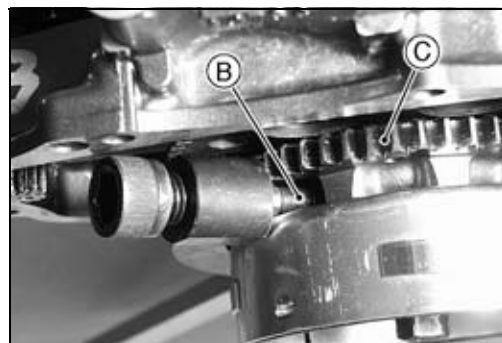
- Remove:
 - Engine (see Engine Removal/Installation chapter.)
 - Magneto Cover
 - Torque Limiter
- Holding the boss [B] of the front balancer gear [C] with the rotor holder [A], remove the flywheel bolt.

Special Tool - Rotor Holder: 57001-1428 [A]



CAUTION

Do not hold the teeth of the front balancer drive gear or magneto flywheel with the rotor holder. The gear teeth or the flywheel could be damaged.



○ Using the special tool, pull off the flywheel.

Special Tool - Flywheel Puller Assy : 57001- 1426 [A]

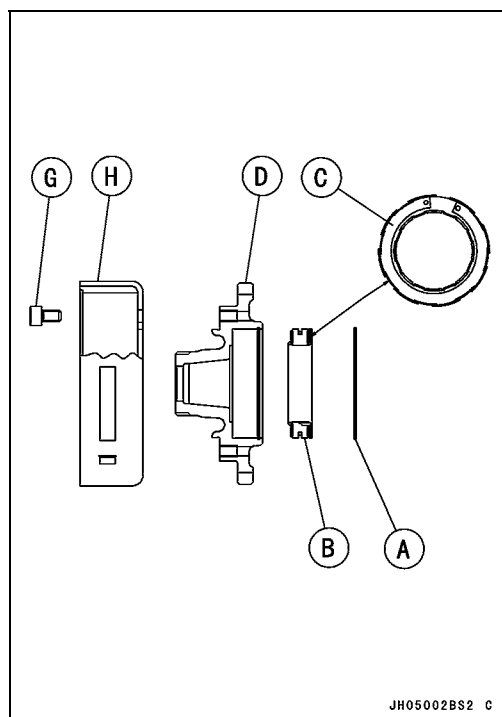
CAUTION

Do not hit the head of the flywheel puller assy. A loss in rotor magnetism may be caused.



Magneto Flywheel Disassembly

- Remove the snap ring [A].
- Remove the oneway clutch [B] compressing the friction ring [C] from the balancer drive gear [D].
- When compressing the friction ring, be careful that its projections does not get out of the side plate.
- Remove the balancer drive gear mounting bolts [G] and take out the magneto flywheel [H].

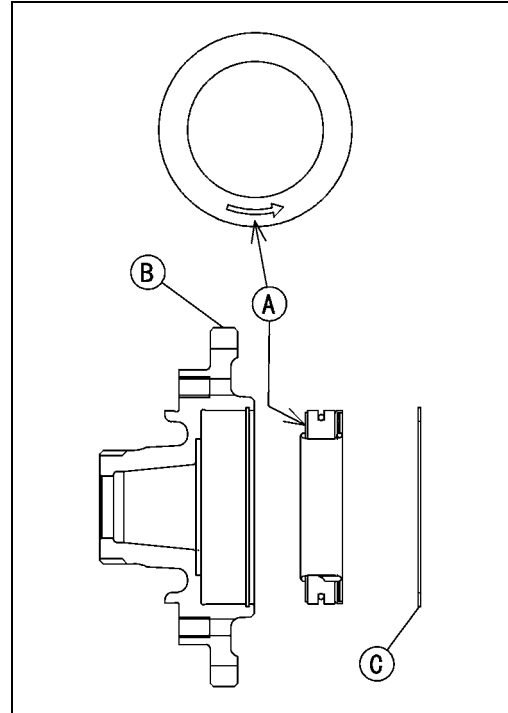


8-8 ENGINE BOTTOM END

Magneto Flywheel

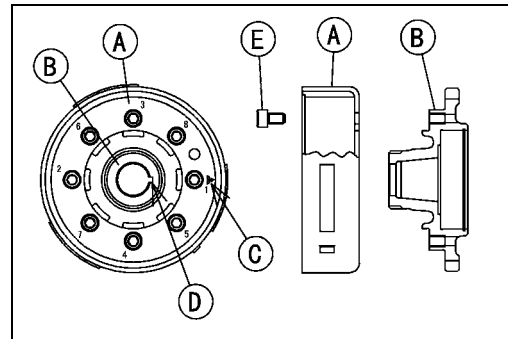
Magneto Flywheel Assembly

- Install the oneway clutch compressing the friction ring on the balancer drive gear.
- When installing the oneway clutch, be careful that its rotating mark [A] faces toward the balancer gear [B] side.
- When compressing the friction ring, be careful that its projections does not get out of the side plate.
- Replace the snap ring [C] with new one and install it.



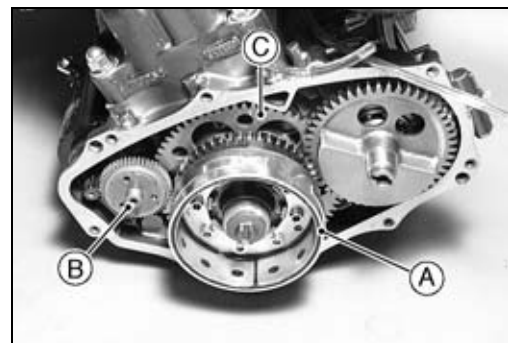
- Install the magnet flywheel [A] on the balancer drive gear [B].
- Align the maker mark [C] on the magneto flywheel [A] with the woodruff key groove [D] on the gear [B].
- Apply a non permanent locking agent to the balancer drive gear mounting bolts [E] and tighten them following the sequence shown.

Torque - Balancer Drive Gear Mounting Bolts: 12 N·m (1.2 kgf·m, 8.5 ft·lb)



Stater Clutch Gear and Torque Limiter Removal

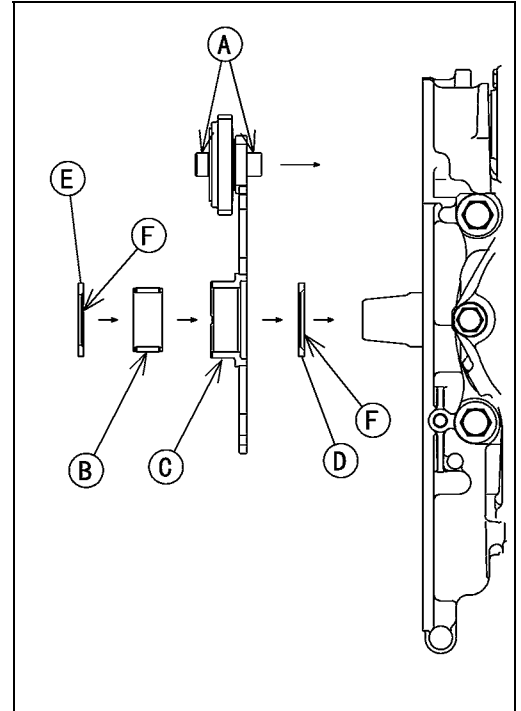
- Remove:
 - Magneto Cover
 - Magneto Flywheel [A]
 - Torque Limiter [B]
 - Starter Clutch Gear [C]



Magneto Flywheel

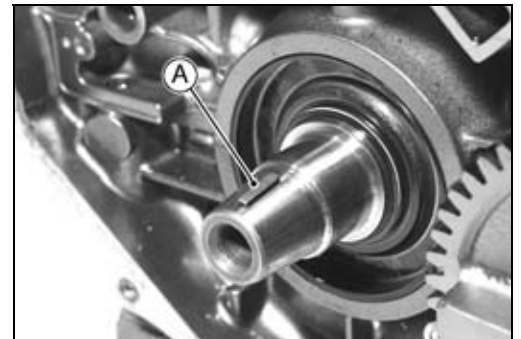
Starter Clutch Gear and Torque Limiter Installation

- Apply molybdenum disulfide grease to the torque limiter shaft [A].
- Grease slightly the needle bearing [B] and the starter clutch gear [C] as shown.
- Install the spacers noting the following.
 - Thickness of the cylinder side spacer [D] is 3 mm and that of the magneto side spacer [E] is 2.5 mm.
 - Both spacers are installed that the chamfer sides [F] face toward cylinder side.



Magneto flywheel Installation

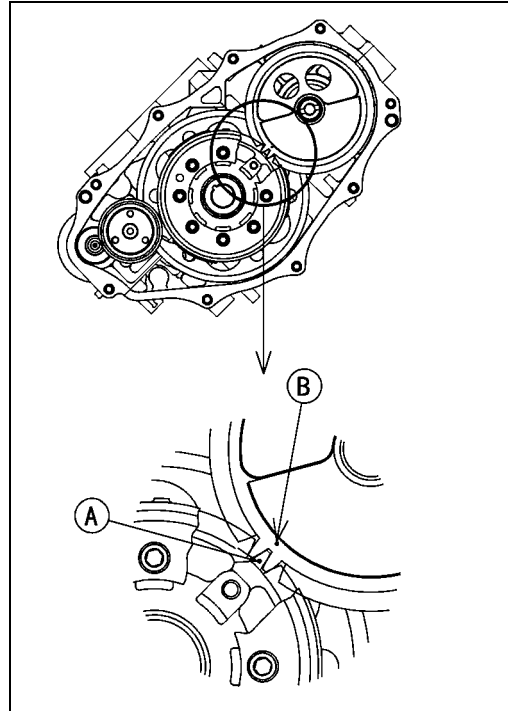
- Using a high flash-points solvents, clean off any oil or dirt that may be on the flywheel bolt, the crankshaft taper, or in the tapered hole in the flywheel.
- Fit the woodruff key [A] securely in the crankshaft, before installing the magneto flywheel.



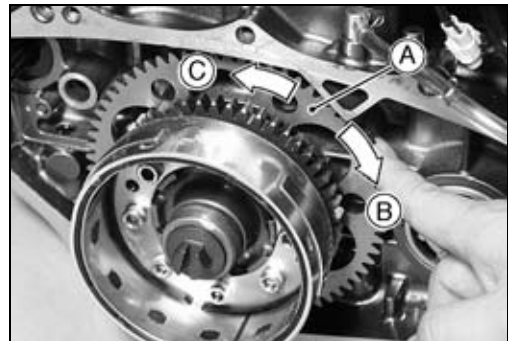
8-10 ENGINE BOTTOM END

Magneto Flywheel

- Install the magneto flywheel aligning a mark [A] on the balancer drive gear with a mark [B] on the balancer driven gear.



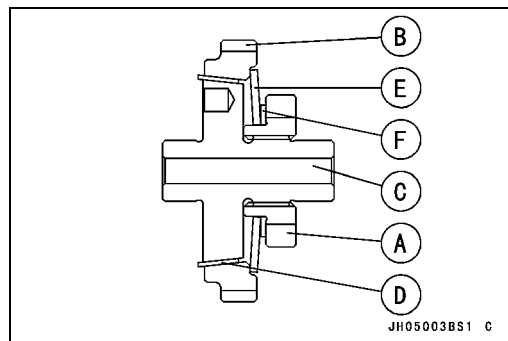
- Inspect the starter motor clutch.
 - Turn the starter motor clutch gear [A] by hand. The starter motor clutch gear should turn counterclockwise [C] freely, but should not turn clockwise [B].
 - ★ If the clutch does not operate as it should or if it makes noise, disassemble the starter motor clutch, examine each part visually, and replace any worn or damaged parts.



NOTE

○ Leave the torque limiter removed when inspecting.

- Inspect the torque limiter.
 - ★ If the limiter has wear, discoloration, or other damage, replace it as a unit.
 - Gear (12T) [A]
 - Gear (50T) [B]
 - Shaft [C]
 - Bushing [D]
 - Spring [E]
 - Shim [F]



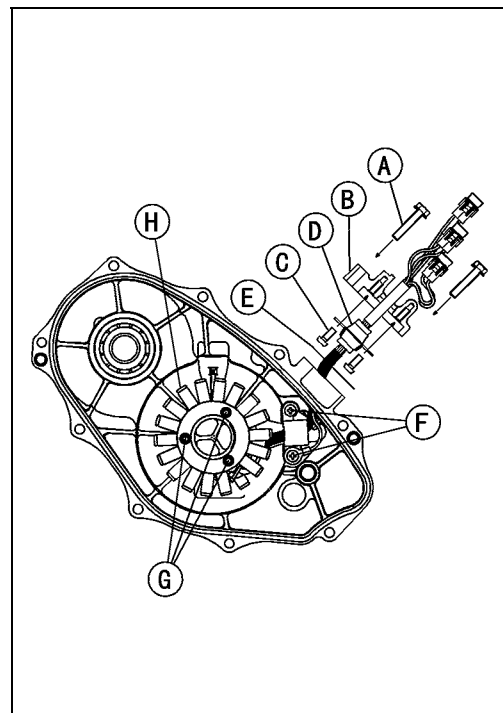
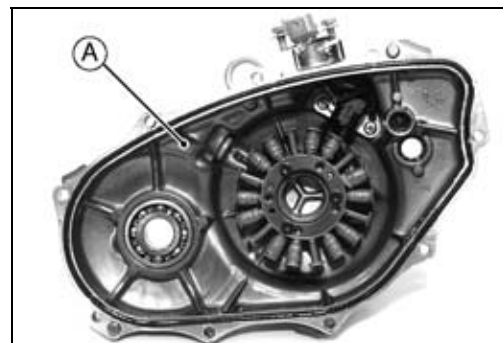
JH05003BS1 C

Stator

Removal

- Remove:
 - Engine
 - Magneto Cover [A]

- Remove:
 - Grommet Cover Mounting bolts [A]
 - Grommet Cover [B]
 - Stator Grommet Mounting Screws [C]
 - Grommet [D]
 - Gasket [E]
 - Pickup Coil Mounting Screws [F]
 - Stator Mounting Bolts with Washers [G]
 - Stator Assembly [H]

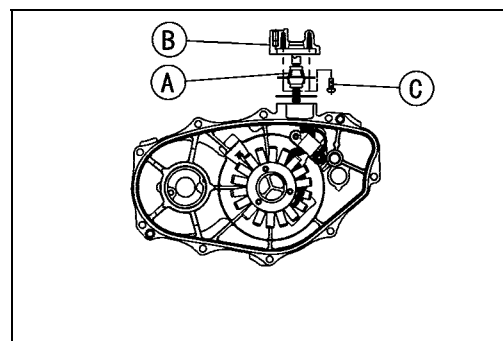


Installation

NOTE

- *Install the grommet and grommet cover before installing the stator assembly.*
- Run the gasket through the stator lead.
- Install the grommet [A] on the grommet cover [B].
- Apply water resistant grease to the grommet
- Apply a non permanent locking agent to the grommet mounting screws [C]

Torque - Grommet Mounting Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)



8-12 ENGINE BOTTOM END

Stator

- Install the grommet cover on the magneto cover.
- Install the new gasket [A] so that its "UP" letter [B] faces upward.
- Note the install direction for the cover [C] and clamp [D].
- Apply a non-permanent locking agent to the grommet cover mounting bolts [E] and clamp mounting bolt [F].

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

Clamp Mounting Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)

- Keep the magneto lead [G] loose when tightening the clamp mounting bolt [E].

- Install the stator and pickup coil on the magneto cover.
- Run the pickup coil leads [A] to the left [C] under the stator leads [B] as shown.
- Apply a non-permanent locking agent to the stator mounting bolts and put the washers.

Torque - Stator Mounting Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)

- Apply a non-permanent locking agent to the pickup coil mounting screws and install the pickup coil [A] together with the ground lead [B] so that the stator leads [C] have to be pressed by the pickup coil.

Torque - Pickup Coil Mounting Screws: 3.5 N·m (0.36 kgf·m, 31 in·lb)

NOTE

- While pressing the pickup coil outward, torque the pickup coil mounting screws.

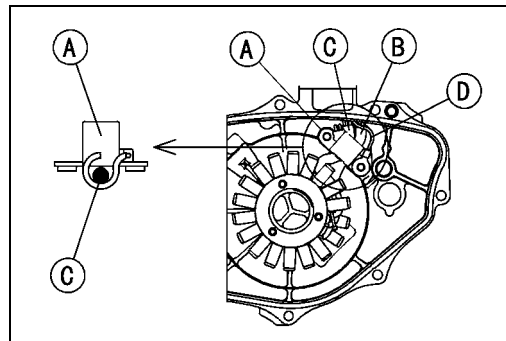
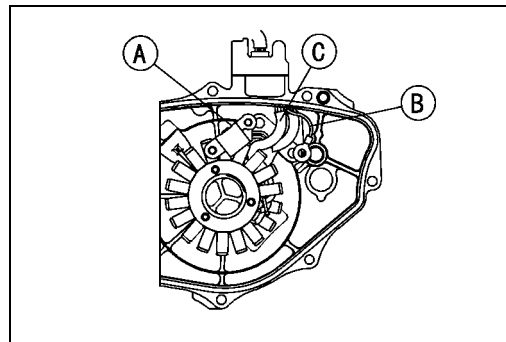
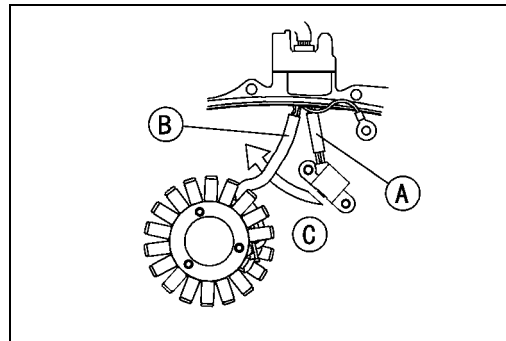
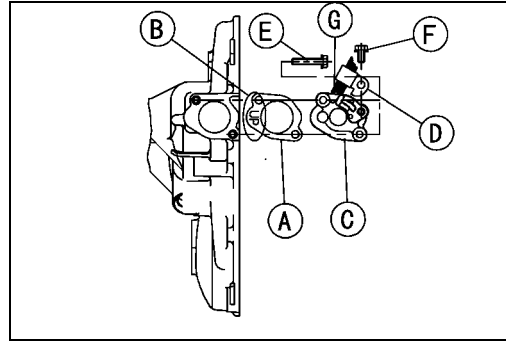
Pickup Coil Air Gap

(Clearance between the rotor projection and pickup core)

Standard: 0.75 ~ 0.95 mm (0.0295 ~ 0.0374 in.)

NOTE

- When installing the pickup coil [A], fix the pickup leads [B] between the stator leads [C] and the inside wall [D] of the magneto cover.
- Be sure the stator and pickup leads have no slack and bite.



Crankcase

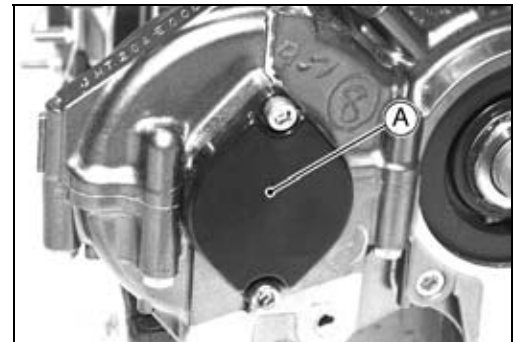
Splitting

- Remove the engine (see Engine Removal/Installation chapter).
- Remove the following from the engine.
 - Starter Motor
 - Intake Manifold
 - Cylinder Head
 - Cylinder Block
 - Pistons
 - Oil Pump
 - Coupling
 - Magneto Flywheel
 - Balancer Gear
 - Torque Limiter
 - Starter Clutch Gear

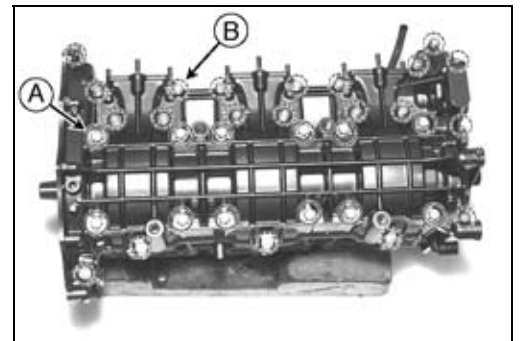
NOTE

○ *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 bearing cap [A].



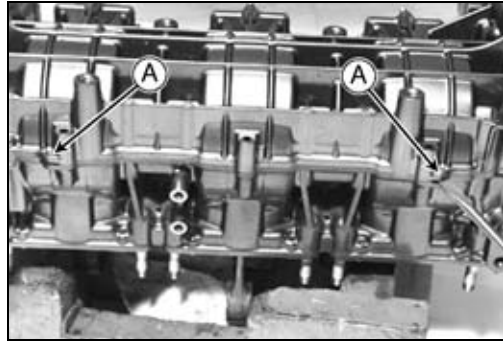
- Remove the 6 mm (0.236 in.) crankcase bolts [A] first and the 8 mm (0.315 in.) bolts [B].



8-14 ENGINE BOTTOM END

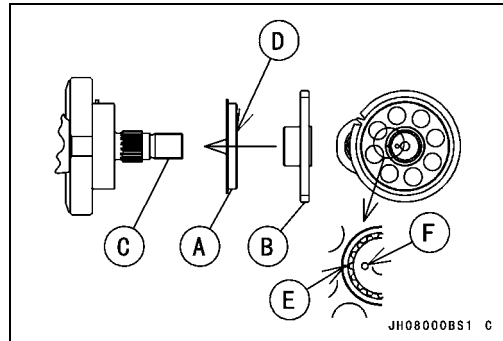
Crankcase

- 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.

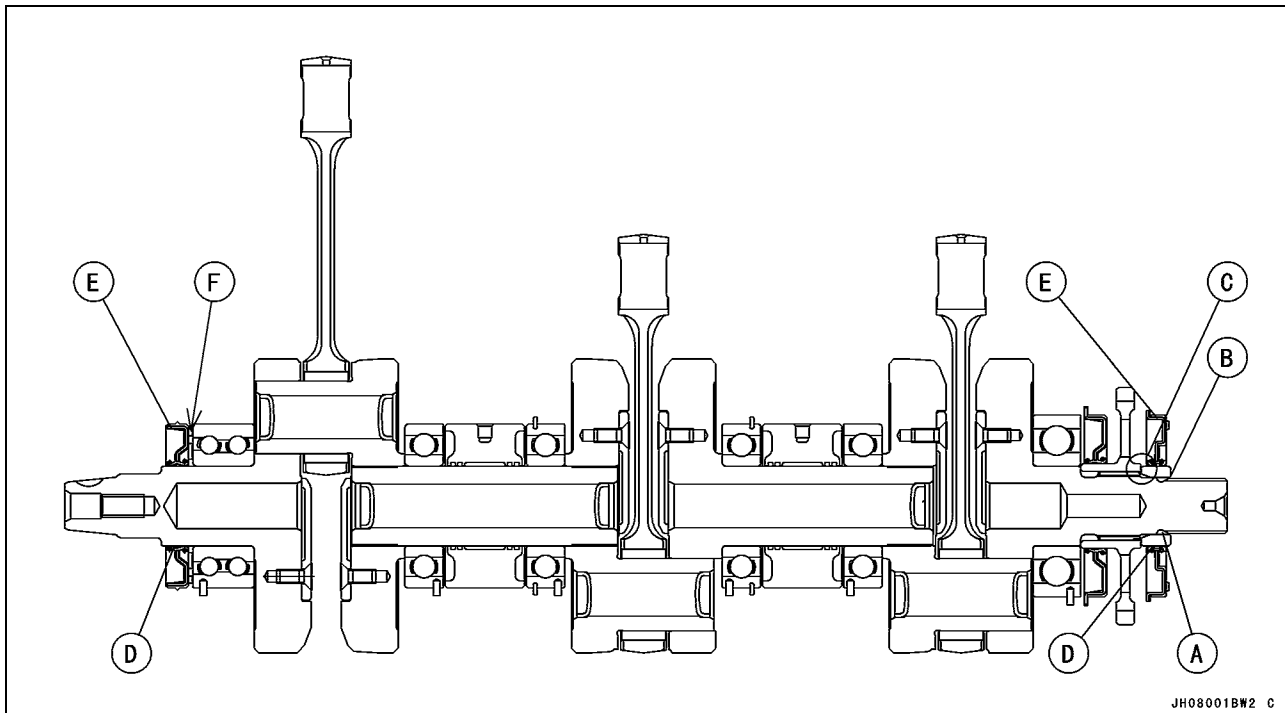


Assembly

- Install the oil seal [A] and the balancer drive gear [B] on the crankshaft [C].
- Slightly apply high temperature grease [D] to the lip of the oil seal and install it noting the install direction indicated in the figure.
- Align a mark [E] on the balancer drive gear with a mark [F] on the crankshaft.

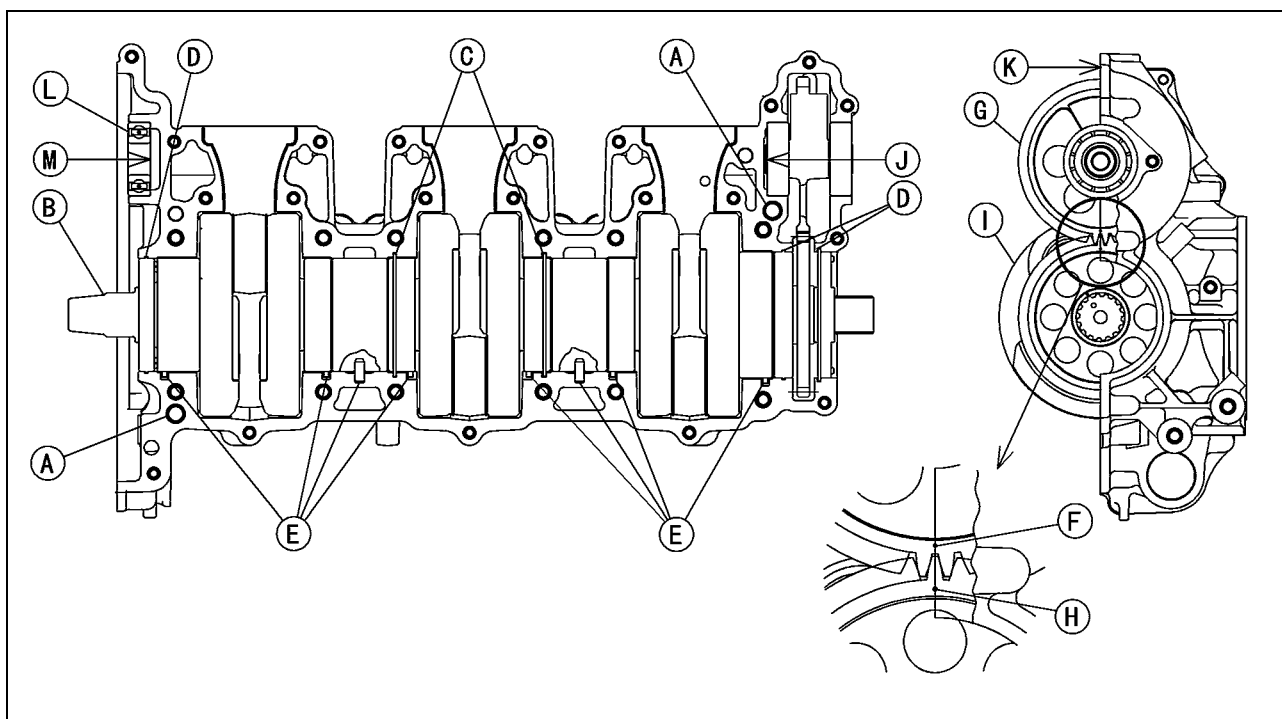


- Visually inspect the crankshaft O-ring [A] and replace it if necessary.
- Grease the inner surface of the collar [B] and install it so that its chamfer side [C] faces toward the balancer drive gear.
- Slightly grease [D] the lips of the oil seals [E] and install them noting the install directions indicated in the figure. Attach the projections on the oil seal to the bearing.



Crankcase

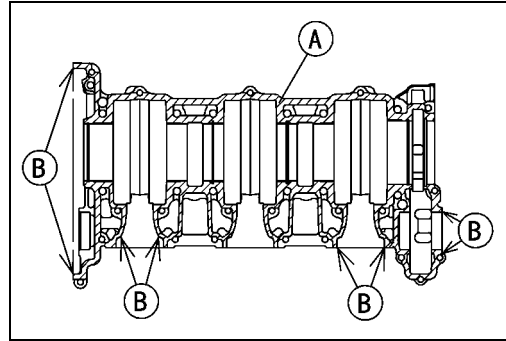
- Apply molybdenum disulfide oil to the connecting rod big end bearings and the side washers.
- With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
- Check that the knock pins [A] are in place.
- Place the crankshaft assembly [B] in the upper crankcase half.
- The position rings [C] and the projected outer circumference [D] of the oil seals on the crankshaft assembly fit into the grooves in the crankcase.
- The pins [E] on the bearings and labyrinth packings on the crankshaft assembly fit into the grooves in the crankcase.
- Install the rear balancer gear [G], aligning a mark [F] on the balancer gear [G] with a mark [H] on the balancer drive gear [I]. At this time, push the bearing toward bow side [J].
- **Pour 20 mL (0.68 US oz) of 2 - stroke oil into rear balancer room [K].**
- Set the bearing [L] for the front blancer gear pushing it toward stern side [M].



8-16 ENGINE BOTTOM END

Crankcase

- Apply liquid gasket to the mating surface [A] of the lower crankcase half.
- Wipe off any excess liquid gasket at the portions [B] indicated in the figure.
- Install the lower crankcase half on to the upper half.

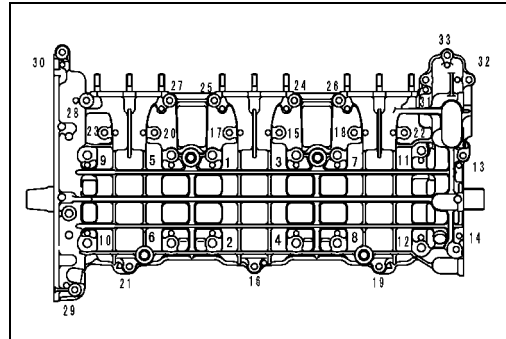


- Apply a non-permanent locking agent to the crankcase M6 bolts, and tighten them.

Torque - Crankcase M8 Bolts: 29 N·m (3.0 kgf·m, 22 ft·lb)

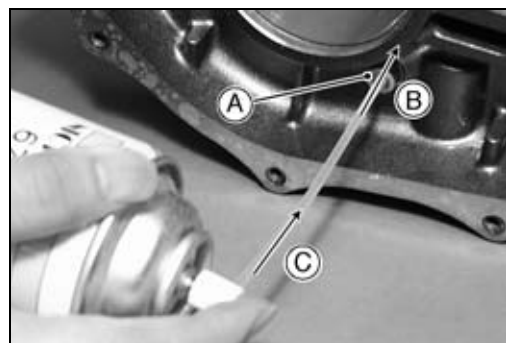
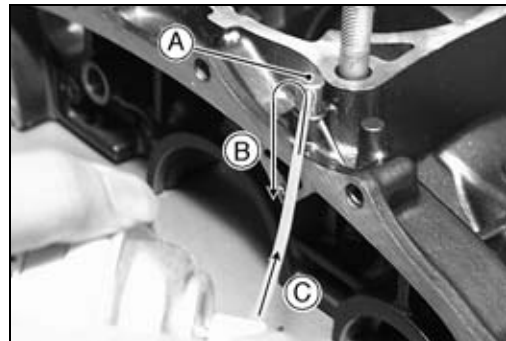
Crankcase M6 Bolts: 8.8 N·m (0.9 kgf·m, 78 in·lb)

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



Crankcase Check Valves Inspection.

- Split the crankcase.
- Inspect the check valves.
- The check valve [A] allows oil flow in the direction of the arrow [B].
- Inspect the normal oil flow by injecting [C] a high flash point solvent in a squirt can or syringe.
- ★ In the following case, replace the check valves.
 1. Oil will not pass through the check valve in the normal direction.
 2. Oil will pass through the check valve in both direction.



CAUTION

Do not use compressed air on the valve since doing so would damage the valve spring

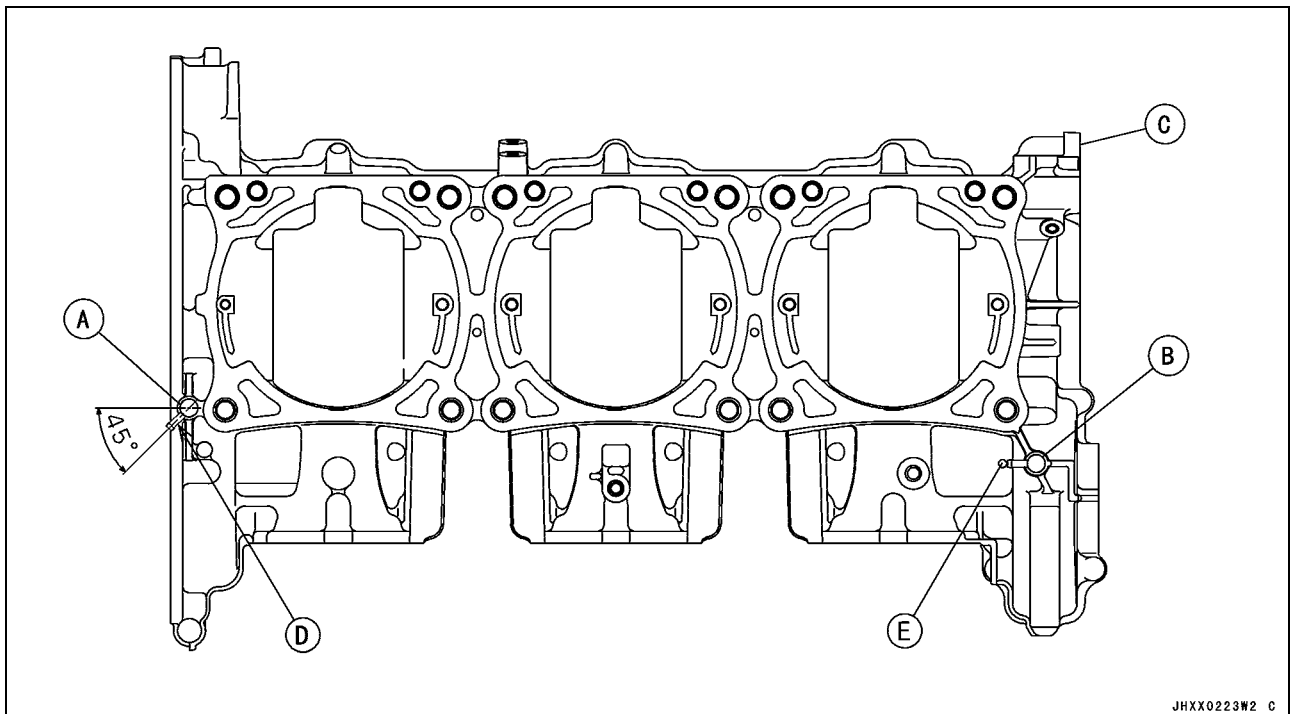
Crankcase

Check Valves on Upper Crankcase Half Removal Installation

- Remove the front [A] and rear [B] check valves on the upper crankcase half [C] with pliers.
- Note the following when installing.
 - Apply a non-permanent locking agent to the check valves.
 - Press the check valves until they are bottomed. At this time, do not plug up the holes of the check valves with a locking agent.
- Install the check valves [A] [B] as shown.

NOTE

- Align the oil hose fitting of the front check valve [A] with a rib [D] on the upper crankcase half.
- Align the oil hose fitting of the rear check valve [B] with a mark [E] on the upper crankcase half.

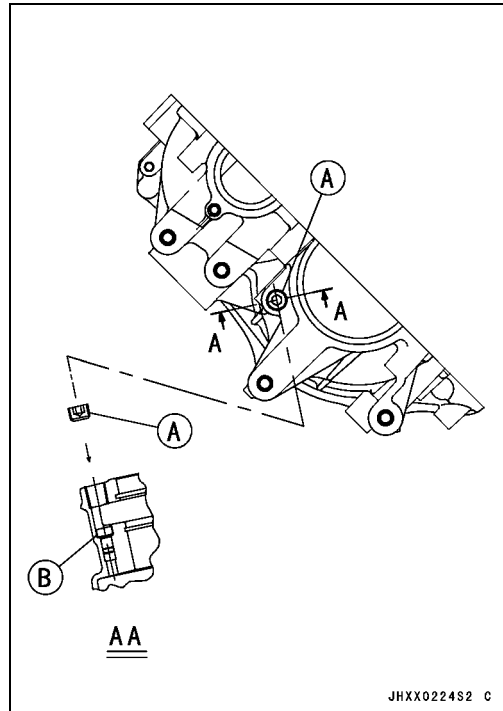


8-18 ENGINE BOTTOM END

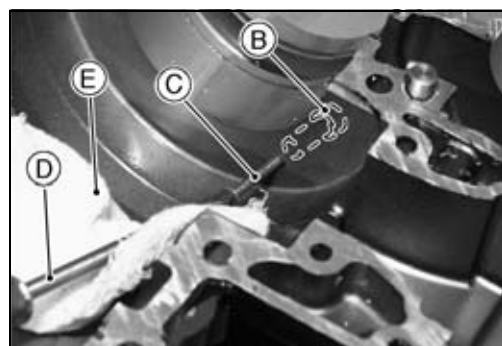
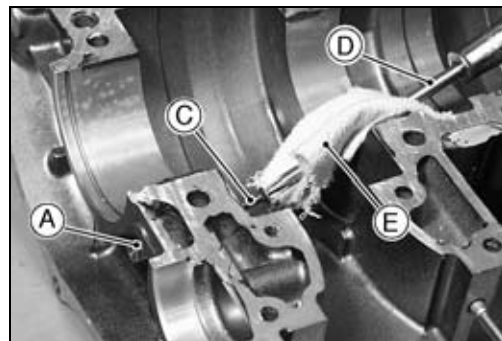
Crankcase

Check Valves on Lower Crankcase Half Removal/Installation

- Split the crankcase.
- Take out the plug [A] to remove the rear check valve [B].



- Tap the front [A] and rear [B] check valves out of the lower crankcase half with a suitable screw [C] and driver [D].
- Place a rug [E] on the crankcase half to prevent it from damage.

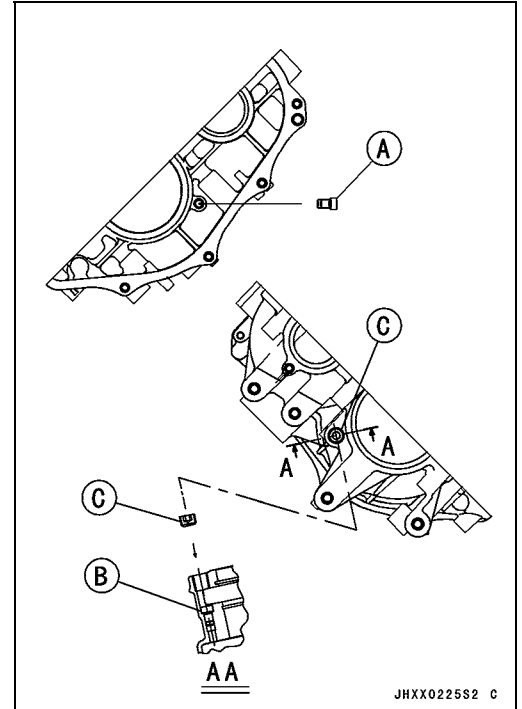


Crankcase

- Note the following when installing.
- Apply a non-permanent locking agent to the front [A] and rear [B] check valves.
- Press the check valves until their flange portions are bottomed. At this time, do not plug up the holes of check valves with a locking agent.
- Apply a non-permanent locking agent to the plug [C] for the rear check valve, install it.

NOTE

- In case that the check valves were installed aslant, replace the check valves.



8-20 ENGINE BOTTOM END

Crankshaft Maintenance

The crankshaft changes the reciprocating motion 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 shortened 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 crankshaft should be replaced as an assembly, or rebuilt by a properly equipped shop.

Connecting Rod Bend/Twist

- Set the crankshaft in an alignment jig or in V blocks on a surface plate.
- Select an arbor of the same diameter as the connecting rod small end and at least 100 mm (3.937 in.) long, and insert the arbor through the connecting rod small end.
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.937 in.) length to determine the amount of connecting rod bend.
- ★If connecting rod bend exceeds the service limit, the crankshaft must be replaced.

Connecting Rod Bend

Standard: Under 0.05/100 mm (0.002/3.937 in.)

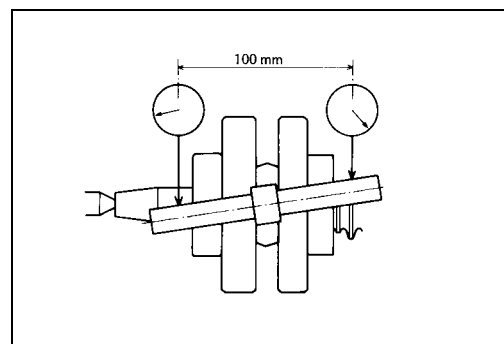
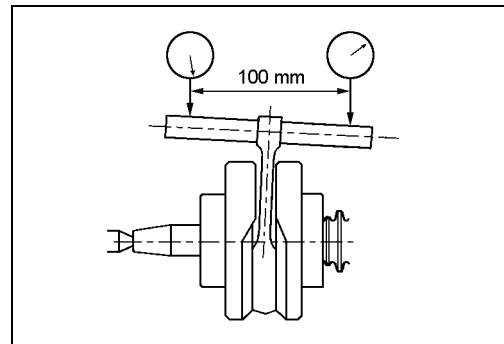
Service Limit: 0.2/100 mm (0.0079/3.937 in.)

- Measure connecting rod twist.
- 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 mm (3.937 in.) length of the arbor to determine the amount of connecting rod twist.
- ★If connecting rod twist exceeds the service limit, the crankshaft must be replaced.

Connecting Rod Twist

Standard: Under 0.15/100 mm (0.0059/3.937 in.)

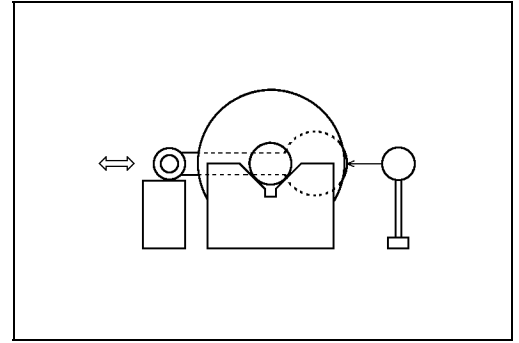
Service Limit: 0.2/100 mm (0.0079/3.937 in.)



Crankshaft Maintenance

Connecting Rod Big End Radial Clearance

- Check big end radial clearance.
- Set the crankshaft in an alignment jig or on V blocks, and place a dial gauge against the connecting rod big end.
- Push the connecting rod first towards the gauge and then in the opposite direction. 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: 0.025 ~ 0.037 mm (0.001 ~ 0.0015 in.)

Service Limit: 0.087 mm (0.0034 in.)

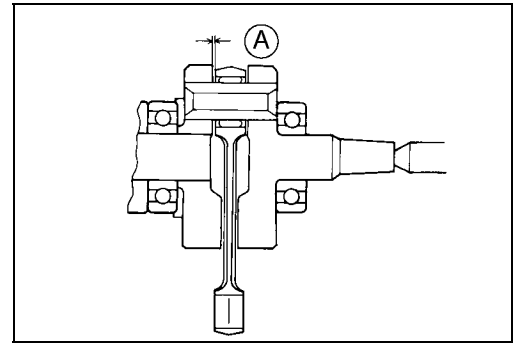
Connecting Rod Big End Side Clearance

- Measure big end side clearance [A].
- 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 (0.0177 ~ 0.0217 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.

CAUTION

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 kg/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 the crankshaft.

8-22 ENGINE BOTTOM END

Crankshaft Maintenance

Crankshaft Runout

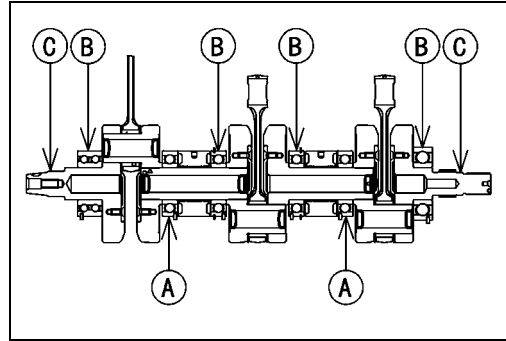
- Check crankshaft alignment by measuring runout.
- With the crankshaft on V blocks [A], rotate the crankshaft slowly and measure runout at each of the locations shown.
- ★ If the runout at any point exceeds the service limit, the crankshaft must be either replaced or rebuilt.

Crankshaft Runout [B]

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

Crankshaft Runout [C]

Standard: Under 0.10 mm (0.0039 in.) TIR
Service Limit: 0.25 mm (0.0098 in.) TIR



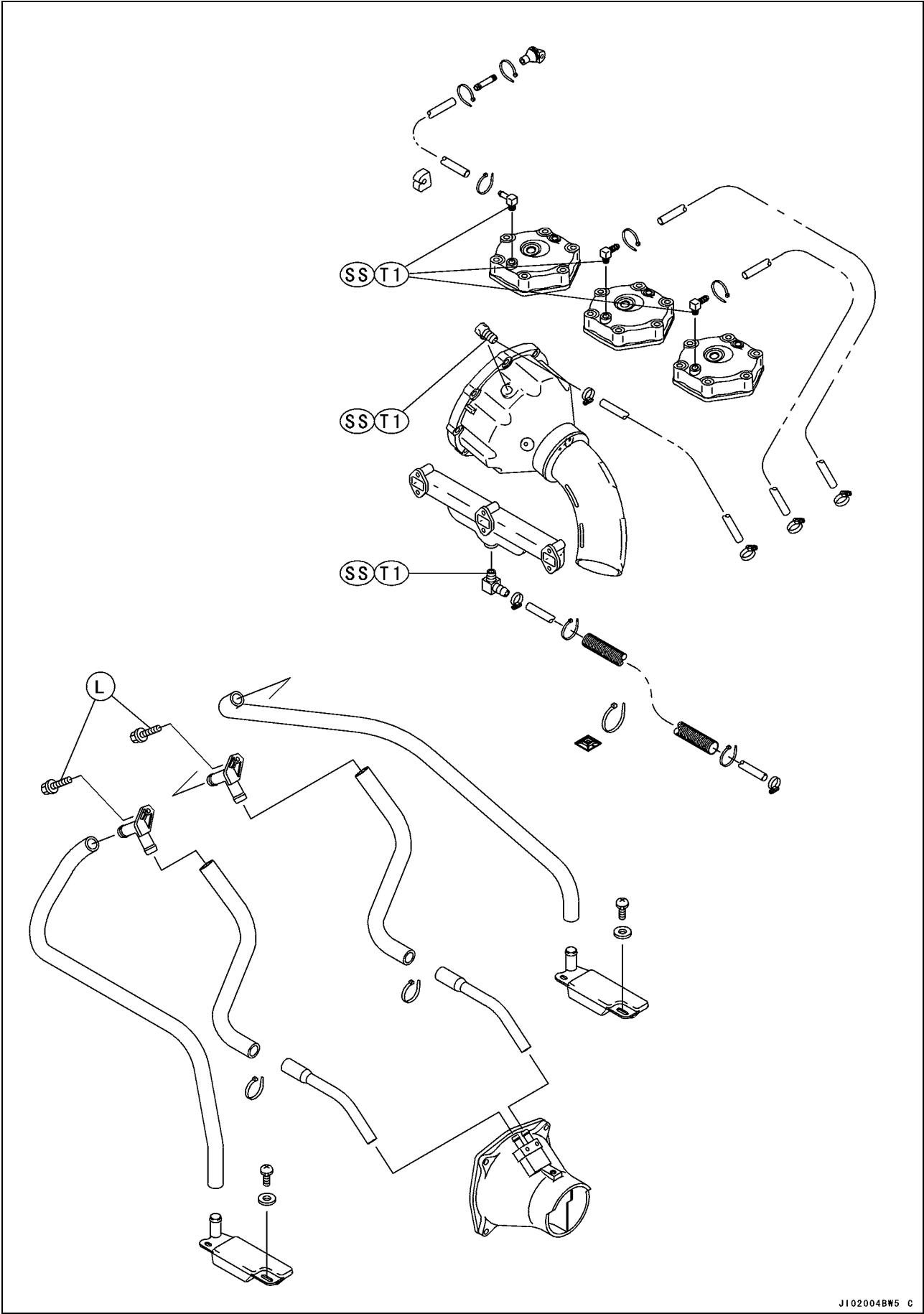
Cooling and Bilge Systems

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9-2 COOLING AND BILGE SYSTEMS

Exploded View



Exploded View

T1: 7.8 N·m (0.8 kgf·m, 69 in·lb) or above

L: Apply a non-permanent locking agent.

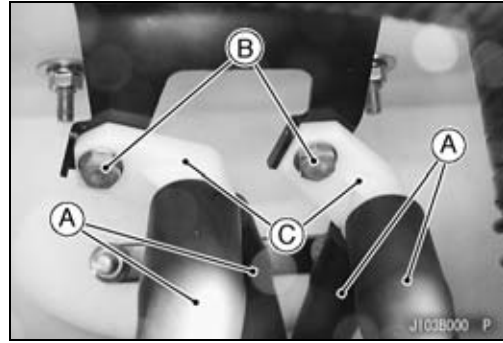
SS: Apply silicone sealant.

9-4 COOLING AND BILGE SYSTEMS

Bilge System

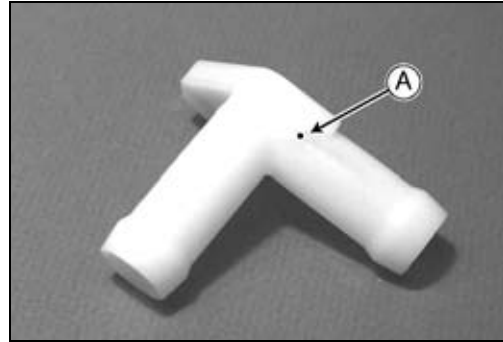
Breather Removal

- Pull the hoses [A] off the breather.
- Unscrew the mounting bolts [B], and remove the breathers [C].



Breather Installation

- Be sure the small hole [A] in the breather is open before installing it.
- Apply a non-permanent locking agent to the breather mounting bolts and tighten them.

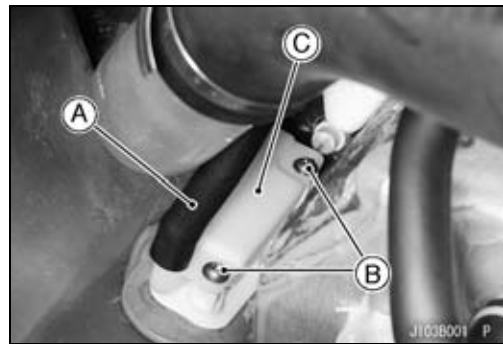


Breather Cleaning and Inspection

- 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 it should.

Filter Removal/Installation

- Pull the hose [A] off the filter.
 - Unscrew the mounting screws [B], and remove the filter [C].
- To remove the left side filter, remove the water box muffler.



Filter Cleaning and Inspection

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

- The majority of bilge hoses have no clamps at the hose ends. The majority of bilge system hoses may be simply pulled off their fittings.

NOTE

○ *Some of the bilge system hoses have plastic clamps at hose ends.*

- All the cooling system hoses 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.

NOTE

○ *Some of the bilge system hoses have plastic clamps at hose ends.*

- 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 fittings are used). Plastic clamps are used where tight clamping is not required.

Hose Inspection

- Refer to Hose and Hose Connect Inspection in the Periodic Maintenance chapter.

9-6 COOLING AND BILGE SYSTEMS

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.

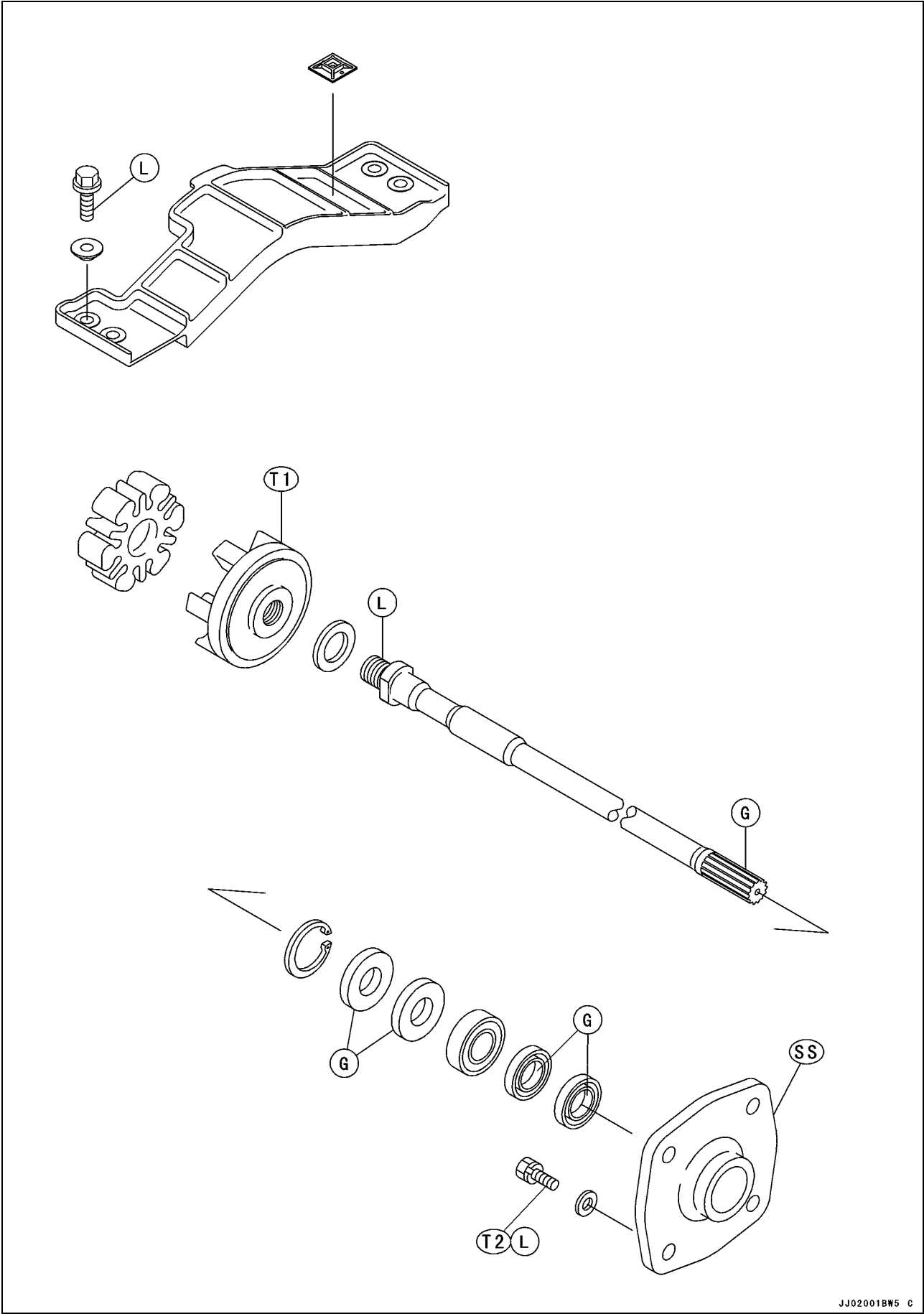
Drive System

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10-2 DRIVE SYSTEM

Exploded View



Exploded View

T1: 39 N·m (4.0 kgf·m, 29 ft·lb)

T2: 22 N·m (2.2 kgf·m, 16 ft·lb)

L: Apply a non-permanent locking agent.

G: Apply grease.

SS: Apply silicone sealant.

10-4 DRIVE SYSTEM

Specification

Item	Standard	Service Limit
Drive Shaft Runout (see page 10-7)	[A] less than 0.1 mm (0.0039 in.) [B] less than 0.2 mm (0.0079 in.)	0.2 mm (0.0079 in.) 0.6 mm (0.0236 in.)

Special Tools - Coupling Holder: 57001-1423

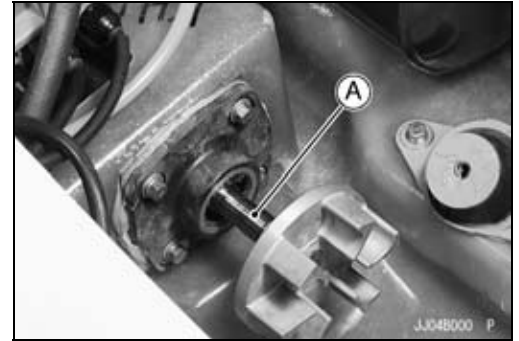
Bearing Driver Set: 57001-1129

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

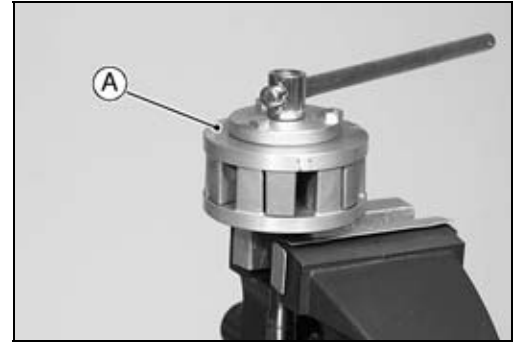
Drive Shaft/Drive Shaft Holder

Drive Shaft Removal/Installation

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



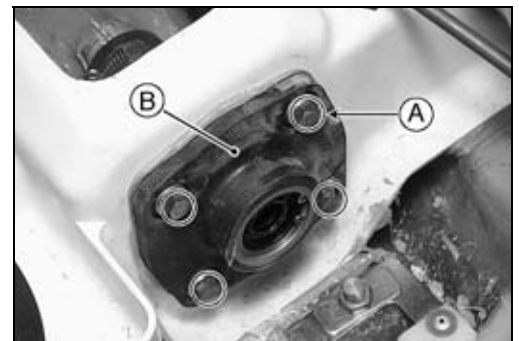
- Hold the drive shaft in a vice, and unscrew the coupling.
Special Tool - Coupling Holder : 57001-1423 [A]



- When installing the drive shaft, be careful of the following items.
- Apply a non-permanent locking agent to the drive shaft threads and tighten the coupling.
Torque - Coupling: 39 N·m (4.0 kgf·m, 29 ft·lb)
- 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.



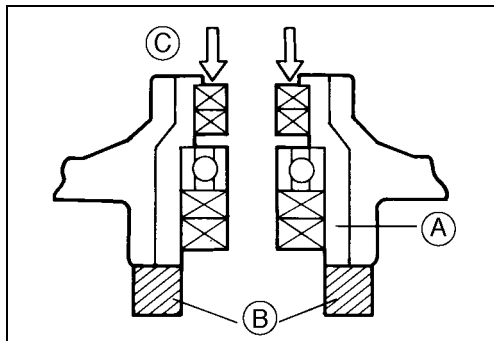
10-6 DRIVE SYSTEM

Drive Shaft/Drive Shaft Holder

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



- 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

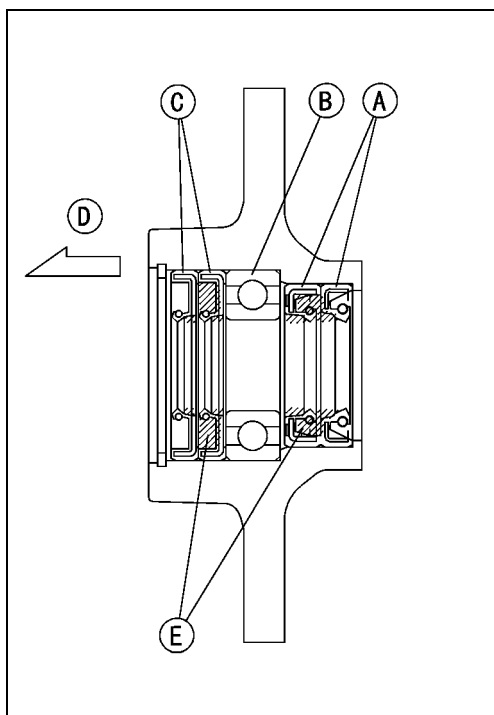


Drive Shaft Holder Assembly/Installation

- Replace the grease seals with new ones.
 - Press the bearing and grease seals into the drive shaft holder, noting the following.
- Install the parts in this order.
Two Small Grease Seals [A]
One Bearing [B]
Two Large Grease Seals [C]
Front [D]

Special Tool - Bearing Driver Set: 57001-1129

- Install the seals so that the sides with the spring face outward.
- Fill the gaps between the seals with grease [E].
- Install the circlip.
- Grease to the bearing inner surface and grease seal lips.

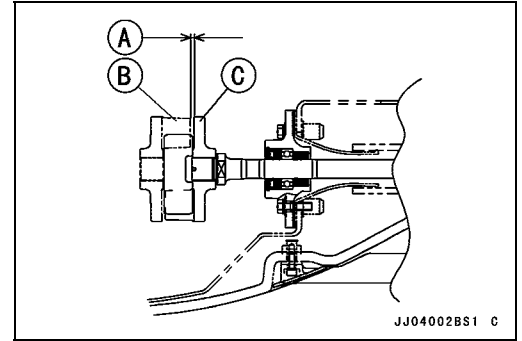


Drive Shaft/Drive Shaft Holder

- 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 ft·lb)

- Make sure the clearance [A] between the engine coupling [B] and the drive shaft coupling [C] is 3 ~ 5 mm (0.12 ~ 0.20 in.).



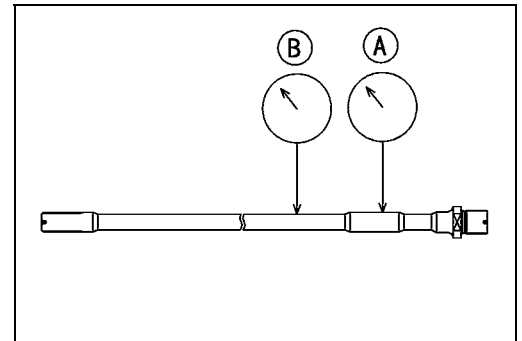
Drive Shaft Runout

- 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 (0.0039 in.) [A]
Less than 0.2 mm (0.0079 in.) [B]

Service Limit: 0.2 mm (0.0079 in.) [A]
0.6 mm (0.0236 in.) [B]

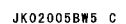


Pump and Impeller

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Exploded View



Exploded View

1. JT1200–A2 Model

T1: 3.9 N·m (0.4 kgf·m, 35 in·lb)

T2: 19 N·m (1.9 kgf·m, 14 ft·lb)

T3: 36 N·m (3.7 kgf·m, 27 ft·lb)

T4: 98 N·m (10 kgf·m, 72 ft·lb)

T5: 7.8 N·m (0.8 kgf·m, 69 in·lb)

T6: 9.8 N·m (1.0 kgf·m, 87 in·lb)

L: Apply a non-permanent locking agent.

G: Apply grease.

SS: Apply silicone sealant.

11-4 PUMP AND IMPELLER

Specifications

Item	Standard	Service Limit
Jet Pump:		
Impeller Outside Diameter	147.5 ~ 147.7 mm (5.8071 ~ 5.8149 in.)	146.5 mm (5.7677 in.)
Pump Case Inside Diameter	148.0 ~ 148.1 mm (5.8268 ~ 5.8307 in.)	149.1 mm (5.8701 in.)
Impeller Clearance	0.15 ~ 0.3 mm (0.0059 ~ 0.0118 in.)	0.6 mm (0.0236 in.)

Special Tools - Impeller Wrench: 57001-1228

Impeller Holder : 57001-1393

Oil Seal & Bearing Remover: 57001-1058

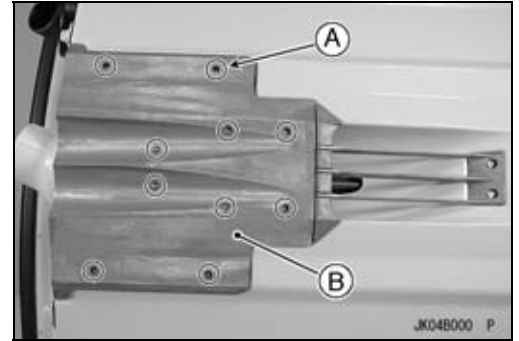
Bearing Driver Set: 57001-1129

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

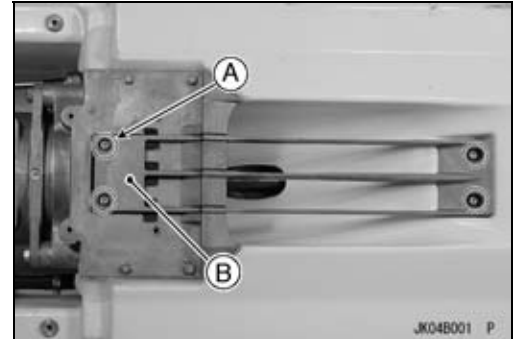
Pump and Impeller

Pump Removal

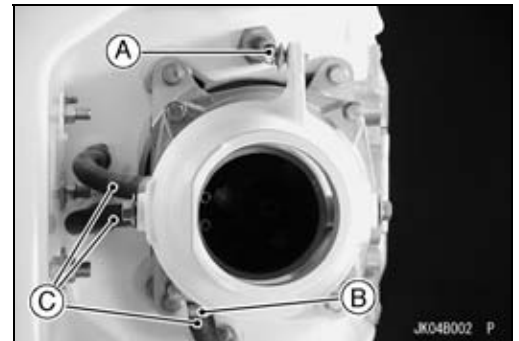
- Turn the craft on its left side.
- Unscrew the mounting bolts [A], and remove the pump cover [B].



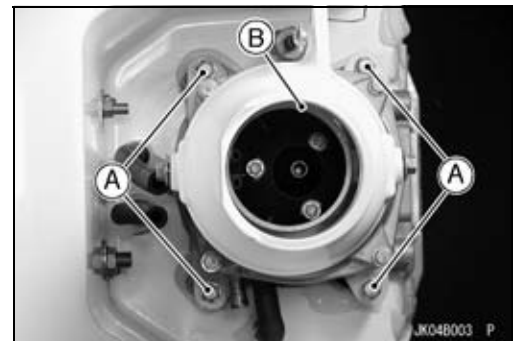
- Unscrew the mounting bolts [A] and remove the grate [B].



- Remove the bolts [A] and take off the steering cable joint.
- Loosen the clamp [B] on the inlet cooling hose, and pull of the hoses [C].



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

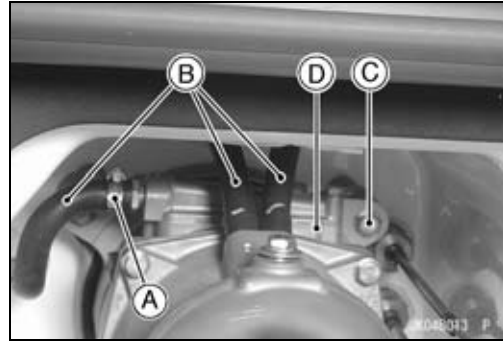


11-6 PUMP AND IMPELLER

Pump and Impeller

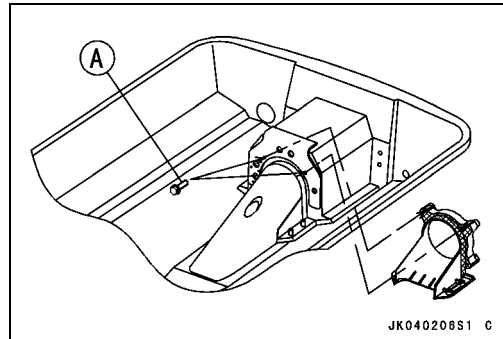
JT1200-A2:

- Remove the steering cable joint bolt and take off the steering cable joint.
- Loosen the clamp [A] on the hose and pull off the hoses [B].
- Unscrew the pump mounting bolts [C].
- Slide the pump [D] to the rear to disengage the drive and remove it from the hull.

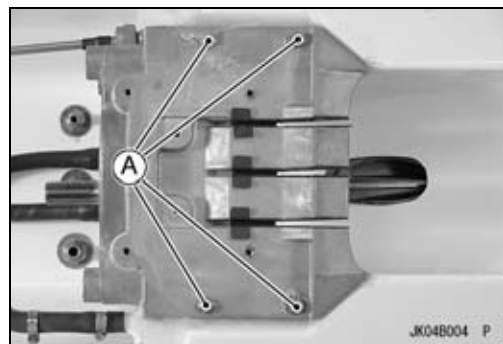


- To remove the pump bracket, perform the following procedures.

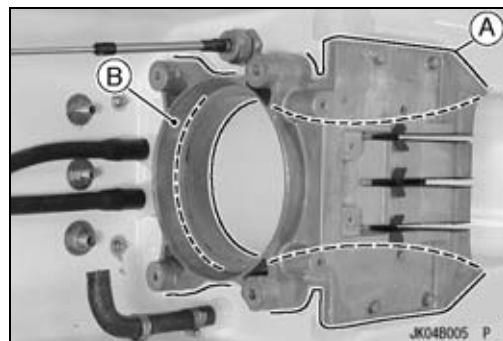
○ Take out the mounting bolts [A] in the hull.



○ Take out the mounting bolts [A].



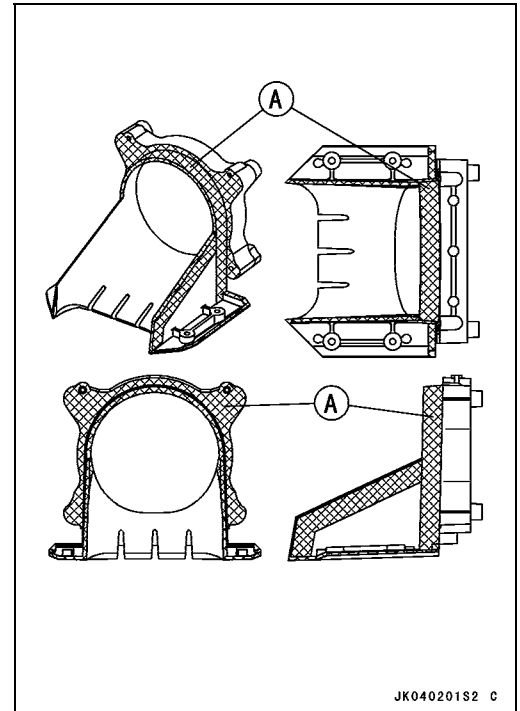
○ Cut the sealant at the indicated area [A] in the figure and remove the pump bracket [B].



Pump and Impeller

Pump Installation

- Strip off all the old sealant around the pump intake.
- Liberally coat the outside edge of the pump bracket with silicon sealant [A] to form a seal between the bracket and the hull.

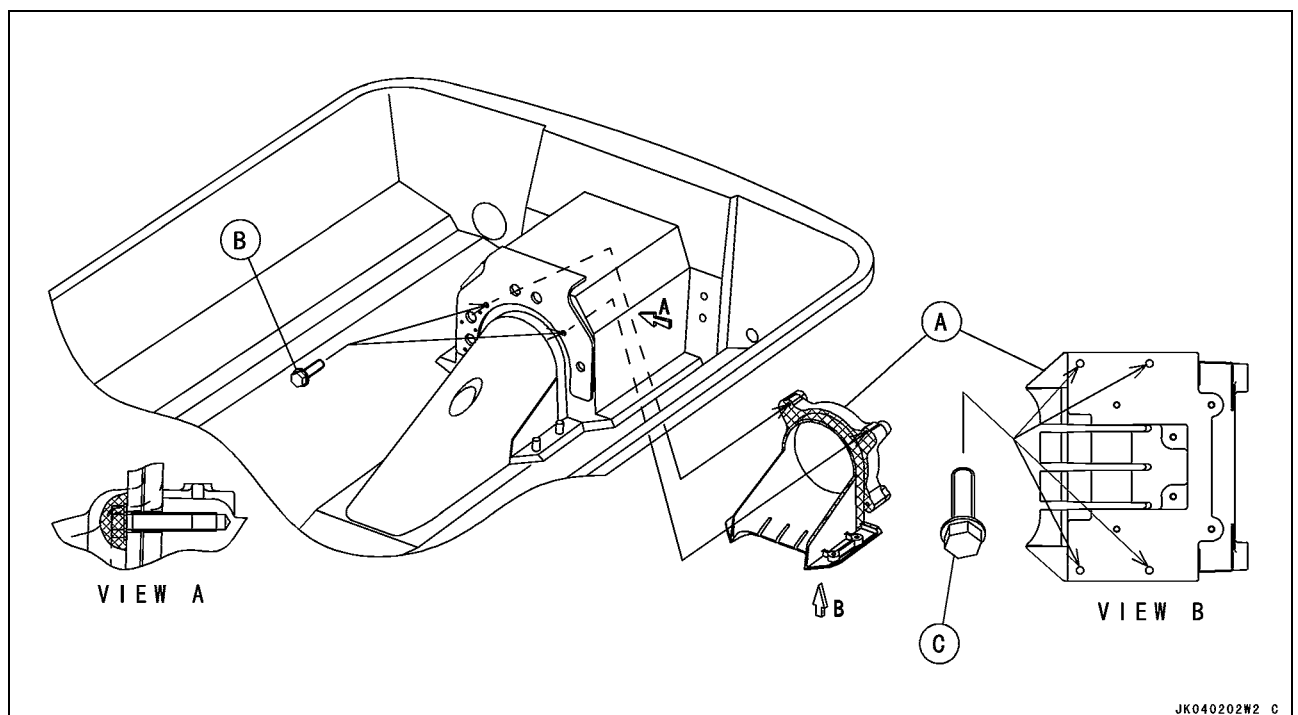


- Install the pump bracket [A] to the hull.
- Apply a non-permanent locking agent to the following bolts and torque them.

Torque - Pump Bracket Mounting Bolts (2) [B] : 19 N·m (1.9 kgf·m, 14 ft·lb)

Pump Bracket Mounting Bolts (4) [C] : 9.8 N·m (1.0 kgf·m, 87 in·lb)

- As for the pump bracket mounting bolts (2) in the hull, the bolt heads should be wrapped in silicone sealant.



11-8 PUMP AND IMPELLER

Pump and Impeller

- Be sure trim seal [A] is in place.

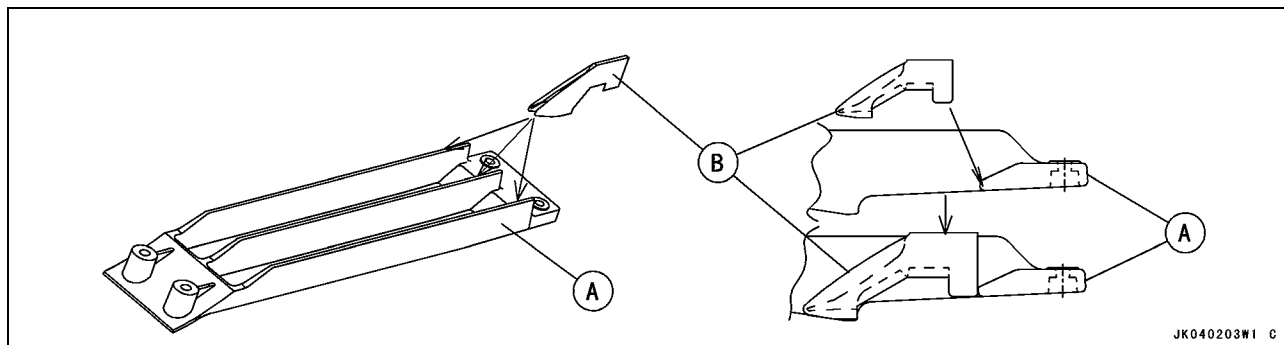


- Grease the splines on the drive shaft with water resistant grease.
- Install the pump case.
- Apply a non-permanent locking agent to the pump mounting bolts and torque them.

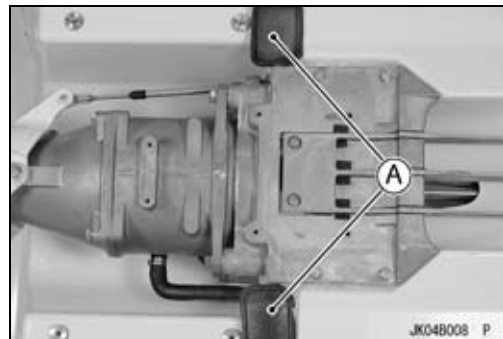
Torque - Pump Mounting Bolts: 36 N·m (3.7 kgf·m, 27 ft·lb)

- Install the grate [A].
- Be sure the trim seals [B] are in the position.
- Apply a non-permanent locking agent to the grate mounting bolts and torque them.

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

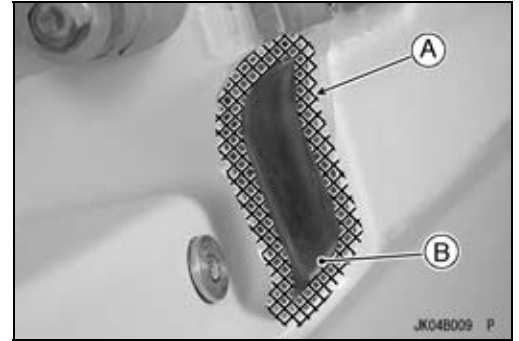


- Be sure the seals [A] on the hull are in the position.



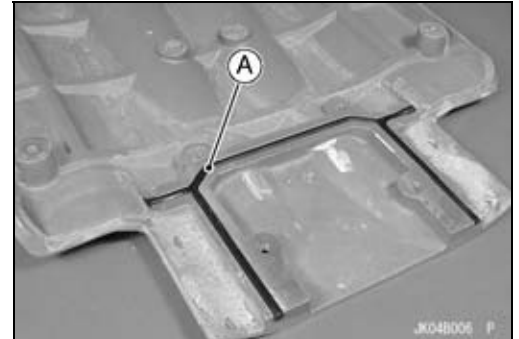
Pump and Impeller

- Coat the outside edge [A] of the seal [B] with silicone sealant to form a seal between the hull and seal.



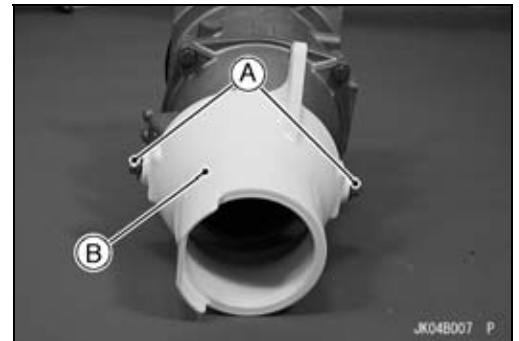
- Install the pump cover.
- Be sure the seal [A] is in the position.
- Apply a non-permanent locking agent to the pump cover mounting bolts and torque them.

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

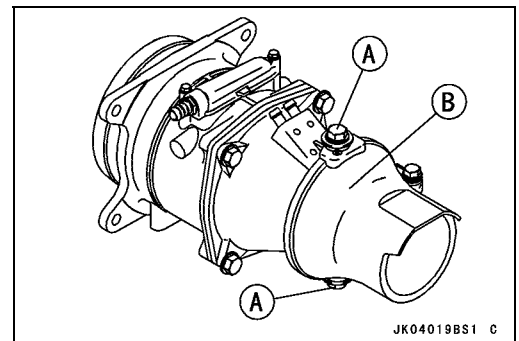


Pump Disassembly

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



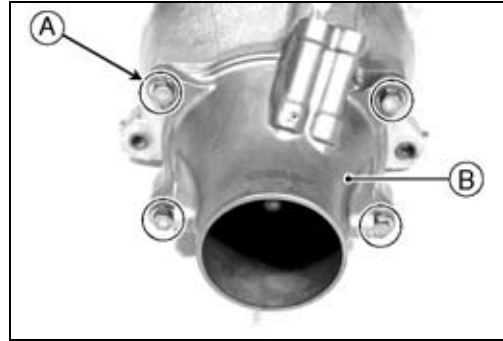
JT1200-A2:



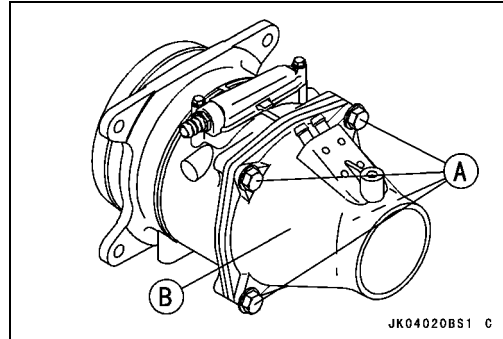
11-10 PUMP AND IMPELLER

Pump and Impeller

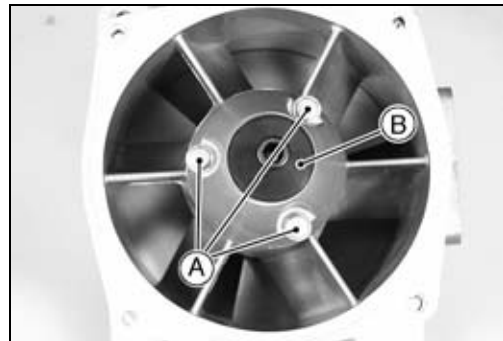
- Unscrew the mounting bolts [A], and remove the pump outlet [B].



JT1200-A2:



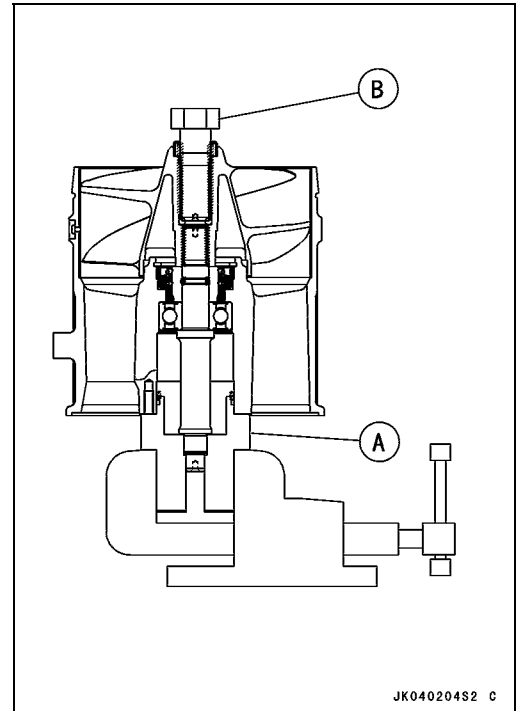
- Unscrew the cap bolts [A], and remove the pump cap [B].



Pump and Impeller

- Hold the shaft in the impeller holder, taking care not to damage it. Remove the impeller from the pump shaft and then pull out the pump shaft.

Special Tools - Impeller Holder: 57001-1393 [A]
Impeller Wrench: 57001-1228 [B]



- Pull out the bushing [A].



- Remove the circlip.
- Remove the grease seals.

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

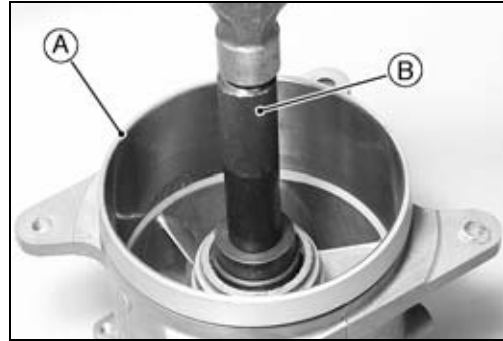


11-12 PUMP AND IMPELLER

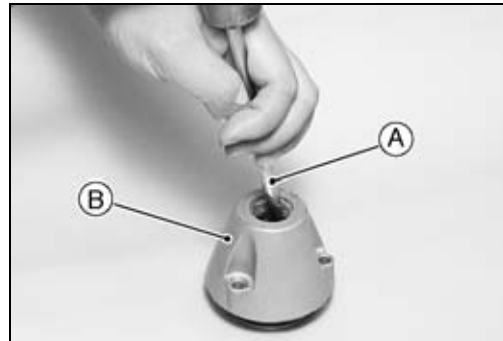
Pump and Impeller

- Remove the bearing by tapping evenly around the bearing inner race from the front end of the pump case [A].

Special Tool - Bearing Driver Set: 57001–1129 [B]



- Insert a metal rod [A] into the pump cap [B] from the rear end, remove the bearing by tapping evenly around the bearing inner race from the rear end of the pump cap.

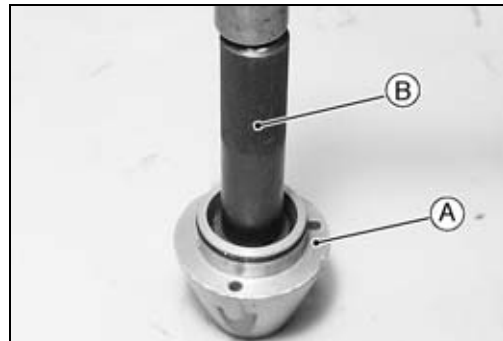


Pump Assembly

- Before installing the cap bearing, blow any dirt or foreign particles out of the pump cap [A] with compressed air.

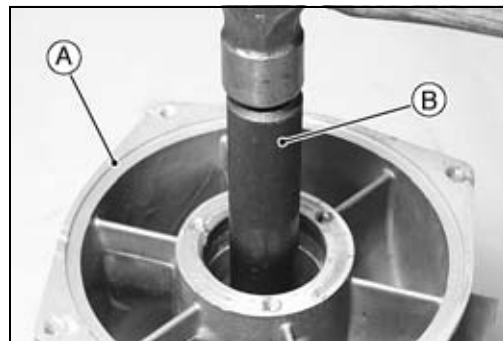
Install new bearing into the cap as far as it will go.

Special Tool - Bearing Driver Set: 57001–1129 [B]



- Before installing the pump bearing, blow any dirt or foreign particles out of the pump case with compressed air.
- Install new bearing into the pump case [A] as far as it will go.

Special Tool - Bearing Driver Set: 57001–1129 [B]

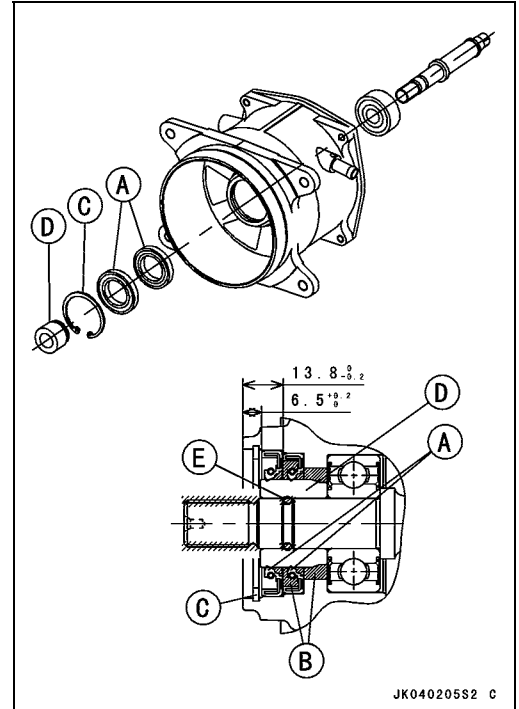


Pump and Impeller

- Replace the grease seals with new ones, if necessary, and install them.

Special Tool - Bearing Driver Set: 57001-1129

- Press each seal [A] into the pump case so that the side with the spring faces outward. Fill [B] the gap between the seals, and between the seal and the bearing with grease.
- Install the circlip [C].
- Push the bushing [D] into the pump case.
- Visually inspect into the pump shaft O-rings [E], and replace them if necessary.
- Grease the pump shaft and insert it from rear of the pump case.



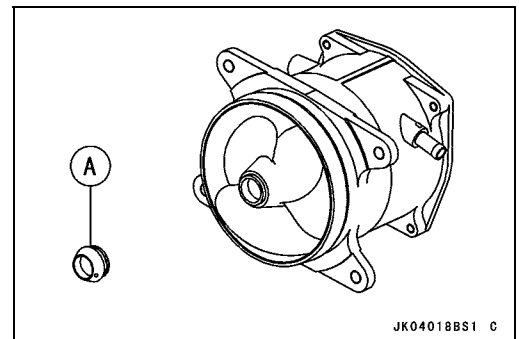
- Screw on the impeller and torque.

Special Tools - Impeller Holder: 57001-1393

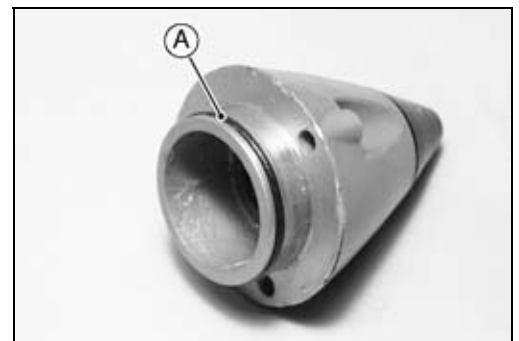
Impeller Wrench: 57001-1228

Torque - Impeller: 98 N·m (10 kgf·m, 72 ft·lb)

- Visually inspect impeller seal [A], and replace it if necessary.



- Be sure the O-ring [A] is in place on the pump cap.



11-14 PUMP AND IMPELLER

Pump and Impeller

- Install the following.
 - 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 - Pump Cap Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)**
Pump Outlet Mounting Bolts: 19 N·m (1.9 kgf·m, 14 ft·lb)
Steering Nozzle Pivot Bolts: 19 N·m (1.9 kgf·m, 14 ft·lb)
- Be sure the pump seal [A] is in place on the pump case.

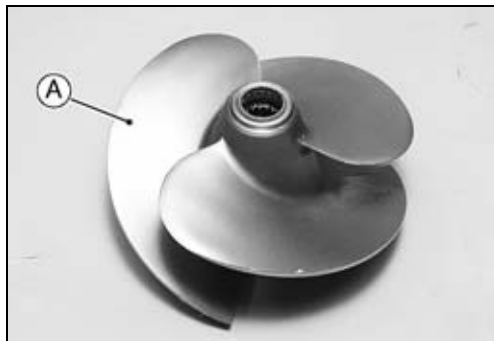


Pump and Impeller Inspection

- 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.

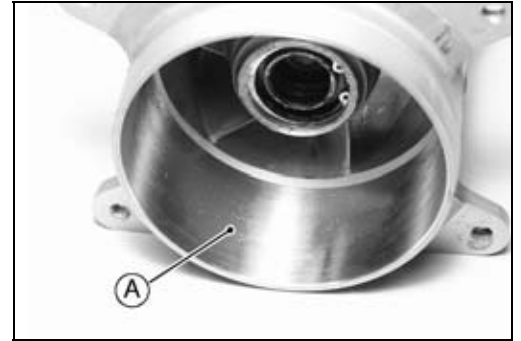
Impeller Outside Diameter

Standard: 147.5 ~ 147.7 mm (5.8071 ~ 5.8149 in.)

Service Limit: 146.5 mm (5.7677 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.

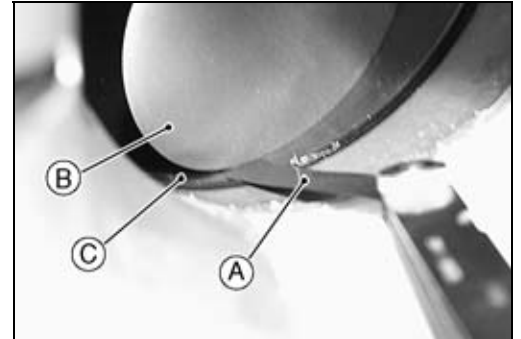
Pump Case Inside Diameter

Standard: 148.0 ~ 148.1 mm (5.8268 ~ 5.8307 in.)

Service Limit: 149.1 mm (5.8701 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

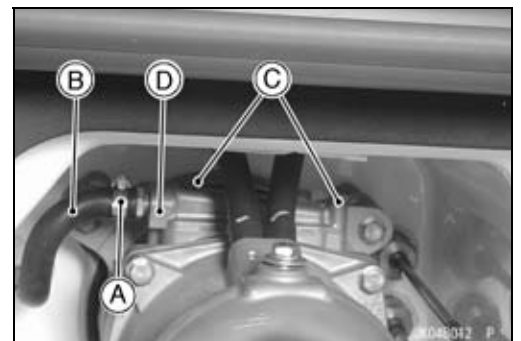
Standard: 0.15 ~ 0.3 mm (0.0059 ~ 0.0118 in.)

Service Limit: 0.6 mm (0.0236 in.)

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

Water Filter Cover Removal/Installation

- Loosen the clamp [A] and pull off the hose [B].
- Remove the filter cover mounting bolts [C].
- Take out the filter cover [D].
- Replace the gasket with a new one.
- Installation is the reverse order of removal.

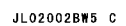


Steering

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Exploded View



Exploded View

- T1: 16 N·m (1.6 kgf·m, 12 ft·lb)
- T2: 39 N·m (4.0 kgf·m, 29 ft·lb)
- T3: 49 ~ 59 N·m (5.0 ~ 6.0 kgf·m, 36 ~ 43 ft·lb)
- T4: Hand-Tight
 - L: Apply a non-permanent locking agent.
 - G: Apply grease.

12-4 STEERING

Specifications

Special Tool - Box Wrench: 57001–1451

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

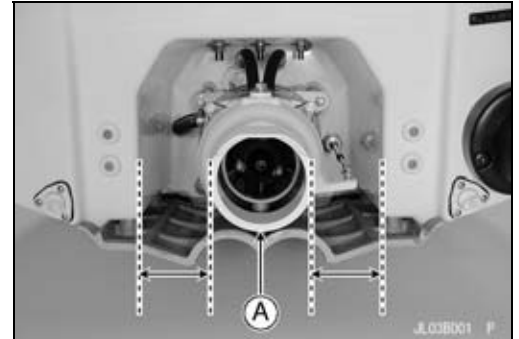
Steering Cable

Steering Cable Adjustment

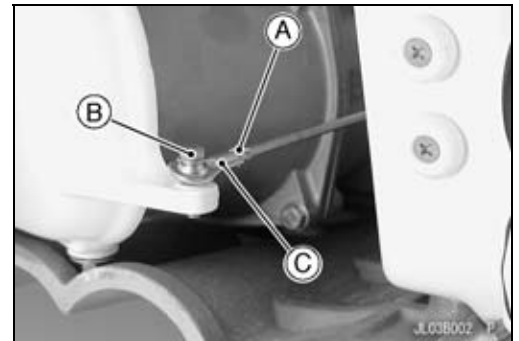
- Check the steering cable adjustment.
- Center the handlebar in the straight-ahead position.



- Check that the steering nozzle [A] is centered in the pump cavity.



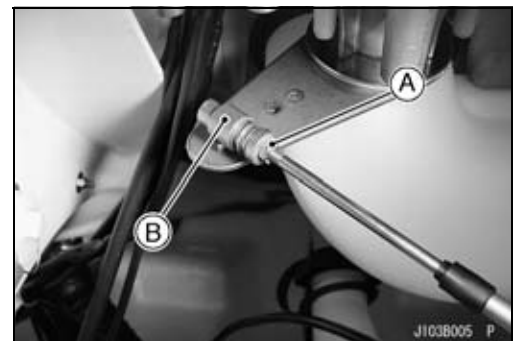
- If necessary adjust the steering cable.
- Loosen the locknut [A] on the steering cable.
- Take out the cable joint bolt [B] and disconnect the cable joint [C] from the steering nozzle.
- Turn the joint on the cable to adjust the steering.
- Temporarily tightening the cable joint bolt, connect the joint with the nozzle and check cable adjustment again.
- When adjustment is correct, unscrew the cable joint bolt and apply a non-permanent locking agent to it. And tighten the cable joint bolt and the steering cable locknut securely.



Torque - Cable Joint Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Steering Cable Removal

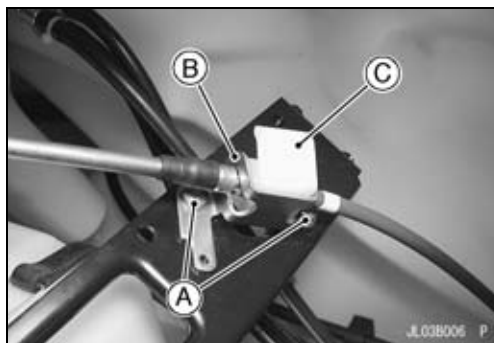
- Remove the storage pocket (see Storage Pocket Removal/Installation in the Hull/Engine Hood chapter).
- Loosen the locknut [A], and remove the ball joint [B] and locknut from the cable front end.



12-6 STEERING

Steering Cable

- Unscrew the mounting bolts [A], and remove the cable bracket [B].
- Pull the holder [C] off the cable bracket.
- Remove the cable bracket out of the cable front end.

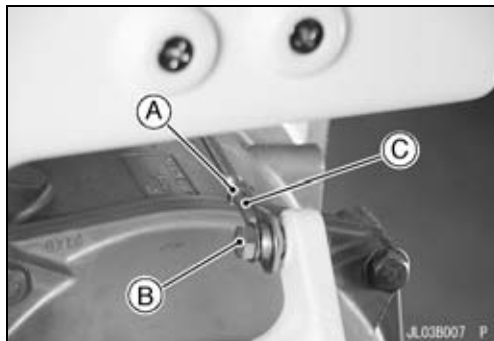


- Turn the watercraft on its left side and remove the pump cover (see Pump Removal in the Pump/Impeller chapter)

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] at the rear end of the steering cable, and remove the joint bolt [B].
- Remove the joint [C] and locknut from the cable end.

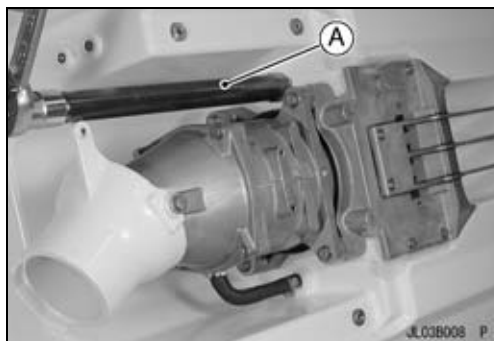


- Disconnect the steering cable from the fitting at the rear of the hull.

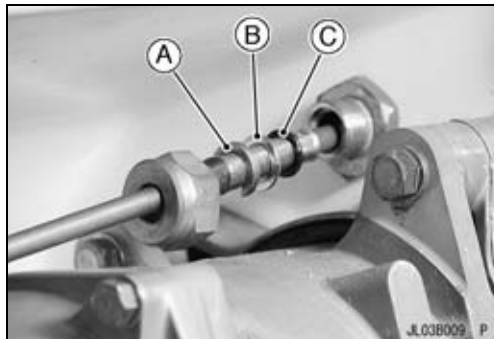
○ Unscrew the large nut in the hull with a wrench.

○ Special tool, box wrench [A] is useful to remove the large nut (steering cable nut).

Special Tool - Box Wrench: 57001-1451



○ Slide off the snap ring [A], washer [B], and O-ring [C].



- Pull the steering cable from the cable detent in the engine compartment.
- Pull out the steering cable toward the front.

Steering Cable

Steering Cable Installation

- Slide a short piece of rubber or plastic tubing over the rear cable end to guide the cable through the hull.
- Lubricate the outside of the new cable to ease cable installation.
- Torque:

Torque - Steering Cable Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)

- Apply a non-permanent locking agent to the cable joint bolt and the steering cable bracket mounting bolts.

Torque - Cable Joint Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Adjust the steering cable (see Steering Cable Adjustment).

Steering Cable Inspection

- Refer to Steering Cable Inspection in the Periodic Maintenance chapter.

Steering Cable Lubrication

NOTE

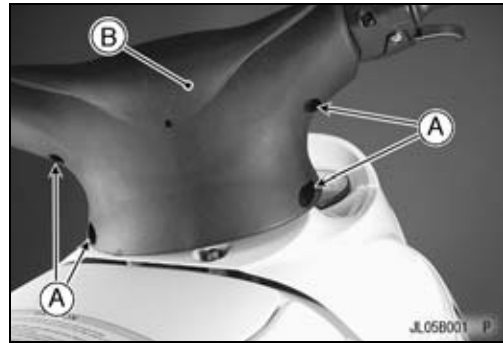
- *The steering cable is sealed at each end and do not require lubrication. If the seal is damaged, the cable must be replaced.*

12-8 STEERING

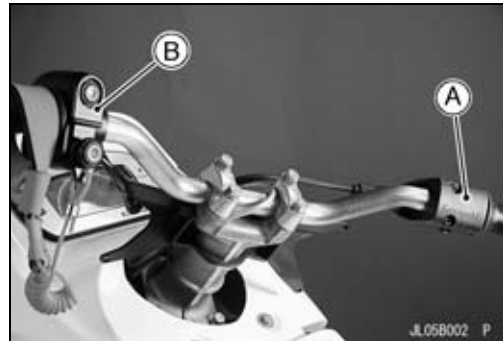
Handlebar

Handlebar Removal

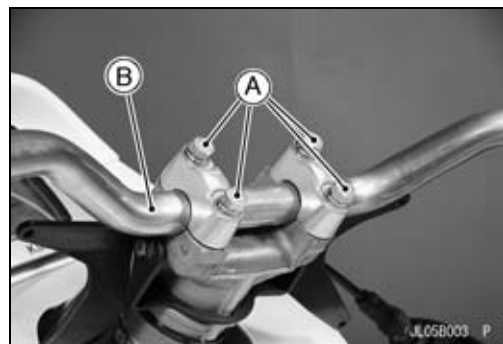
- Unscrew the mounting screws [A] and remove the handlebar pad [B].
- Take out the inner pad.



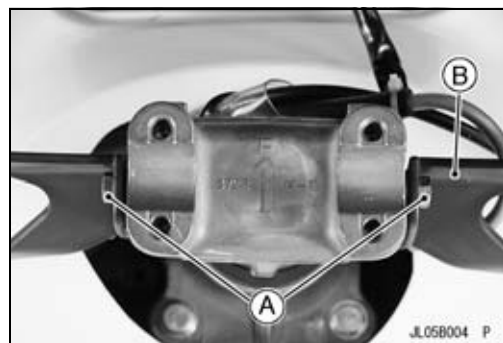
- Take out the throttle case clamp screws and remove the throttle case [A].
- Take out the switch case clamp screws and remove the switch case [B].



- Take out the handle clamp bolts [A] and remove the handlebar [B].



- Unscrew the mounting bolts [A] and remove the handlebar pad bracket [B].



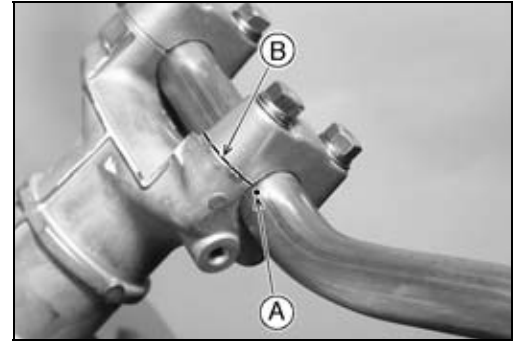
Handlebar Installation Note

- Apply a non-permanent locking agent to the handlebar clamp bolts.
- Install the handlebar on the holders of the steering neck with clamp bolts.

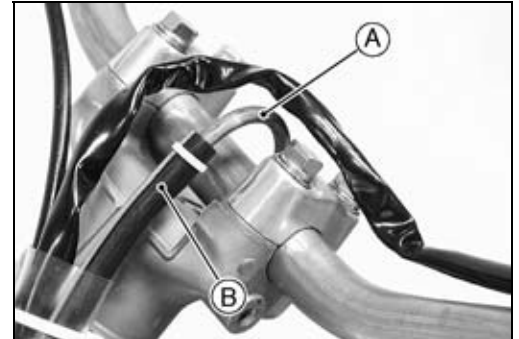
Handlebar

- Align the punch mark [A] on the left side of the handlebar with the parting line [B].
- Tighten the front and then rear handlebar clamp bolts to the specified torque.

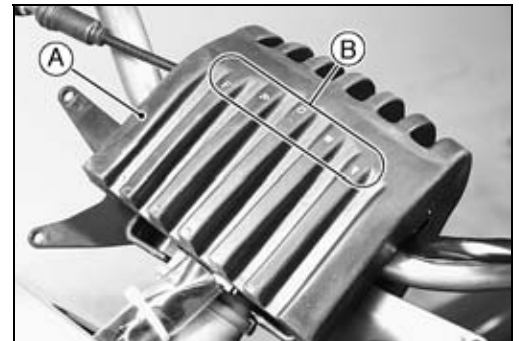
Torque - Handlebar Clamp Bolts: 16 N·m (1.6 kgf·m, 12 ft·lb)



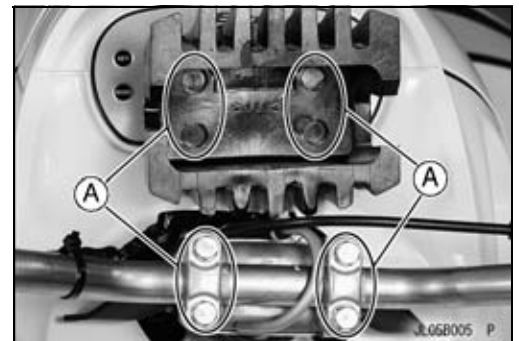
- Be sure the pipe [A] is installed on the top end of the fuel vent hose [B].



- Install the inner pad [A] so that its raised letters "FRONT" [B] faces frontward.



- Align [A] the handlebar clamp bolt heads with the hollows on the inner pad.

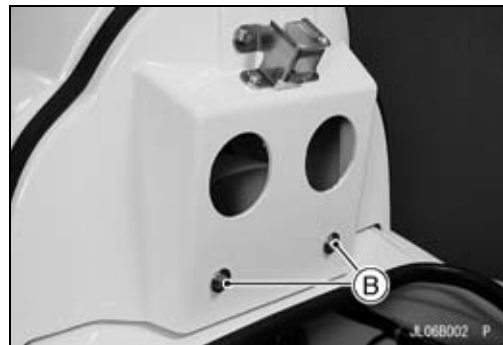


12-10 STEERING

Steering

Removal

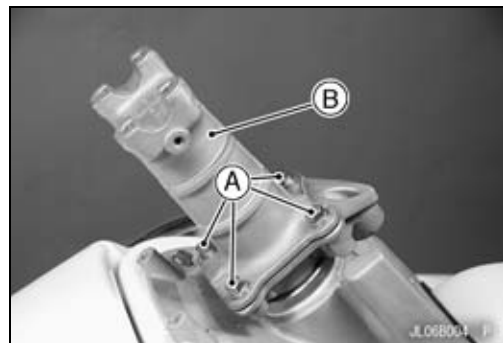
- Unscrew the mounting bolts [A] [B] and lift up the steering cover.



- Disconnect:
Multifunction Meter Lead Connectors
Steering Cable Ball Joint at Upper End
Take out the grommet mounting plate [A], and pull out the multifunction meter leads.
- Remove the steering cover [B].

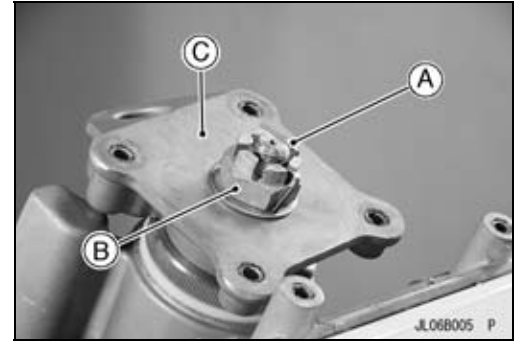


- Unscrew the mounting bolts [A] and remove the steering neck [B].

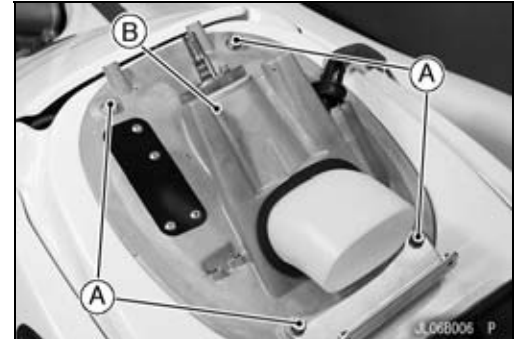


Steering

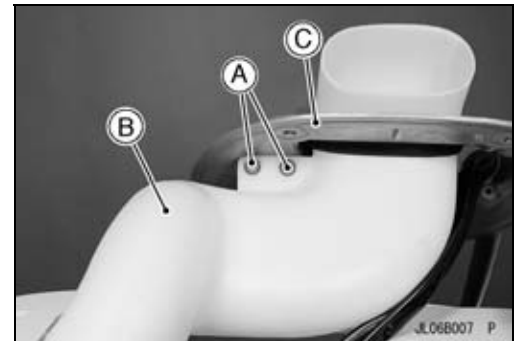
- Remove the cotter pin [A] and locknut [B].
- Take out the holder [C].



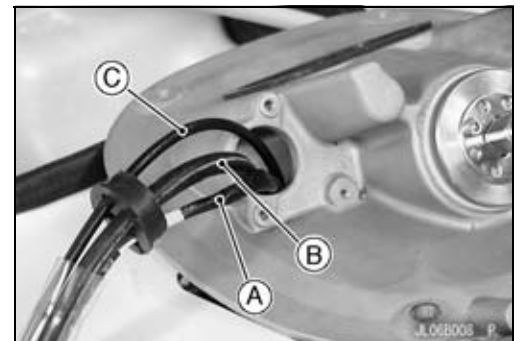
- Unscrew the mounting bolts [A], nut washers, and remove the steering holder [B].



- Take out the mounting bolts [A] and remove the air intake duct [B] from the steering holder [C].



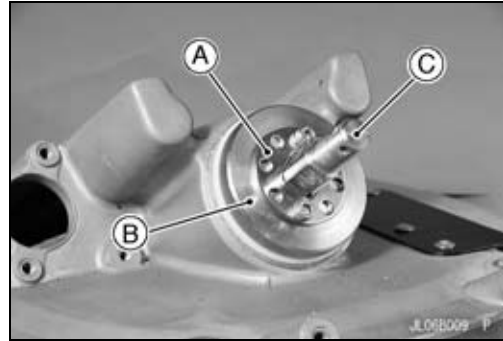
- Disconnect the start/stop switch lead connector and pull the leads [A] out of the hull.
- Disconnect the pipe at the fuel vent hose upper end and pull down the fuel vent hose [B].
- Disconnect the throttle cable upper end at the throttle case [B] and pull down the throttle cable [C].



12-12 STEERING

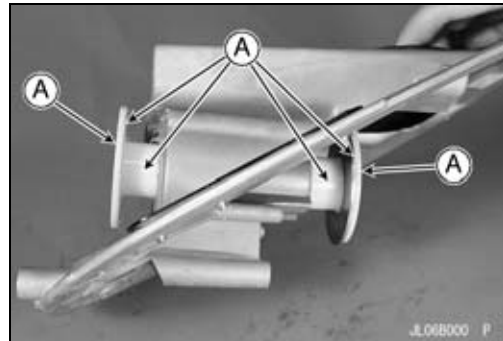
Steering

- Remove the lock plate [A].
- Take out the nut [B] and pull down the steering shaft [C].



Installation Notes

- Check the bushings for damage and wear.
★ If the bushings are damaged or worn, replace them.
- Grease:
Bushings [A]



Steering Shaft [B]



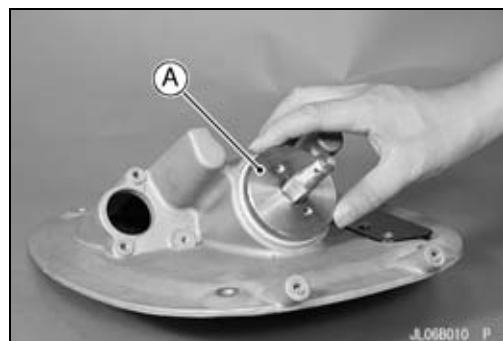
- Apply a non-permanent locking agent to the steering holder mounting bolts and torque them.

Torque - Steering Holder Mounting Bolts: 16 N·m (1.6 kgf·m, 12 in·lb)

- Install the steering shaft nut (Hand-Tighten) [A].
- If steering is too tight, turn the steering shaft nut counter-clockwise to loosen.
- If steering is too loose, turn the steering shaft nut clockwise to tighten.

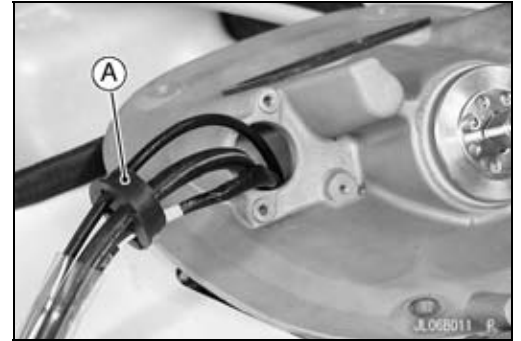
NOTE

- The steering shaft must be turned smoothly when the cable is connected. Turn the steering shaft nut 1/6 or less turn at a time.



Steering

- Apply silicone sealant to the grommet [A].
Sealant - Kawasaki Bond (silicone sealant): 56019-120

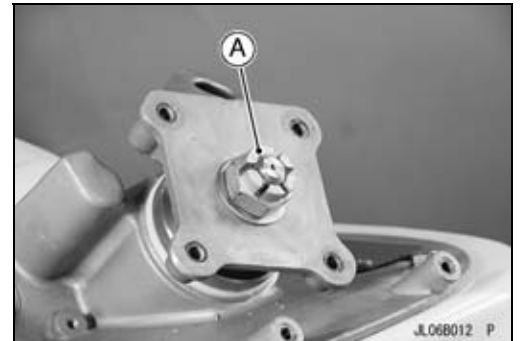


- Torque the steering shaft locknut [A].
Torque - Steering Shaft Locknut: 49 ~ 59 N·m (5.0 ~ 6.0 kgf·m, 36 ~ 43 ft·lb)

Replace the cotter pin with a new one.

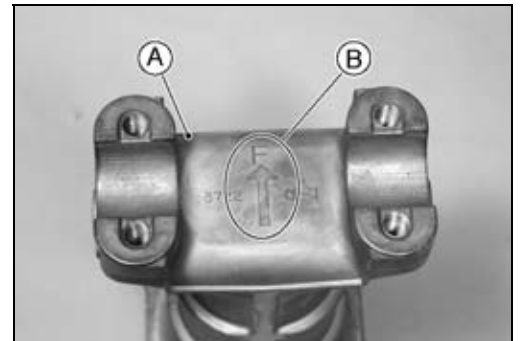
NOTE

○When inserting the cotter pin, if the slots in the locknut do not align with the cotter pin hole in the steering shaft, tighten the locknut clockwise up to next alignment.

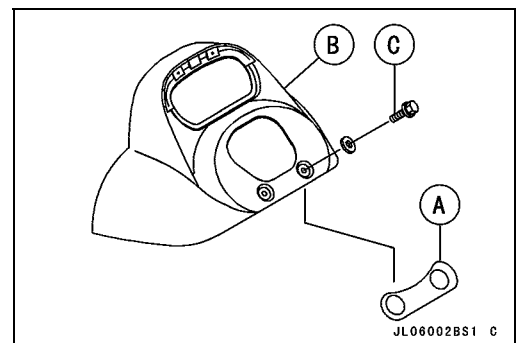


- Install the steering neck [A] so that its arrow mark [B] points toward the front.
- Apply a non permanent locking agent to the steering neck mounting bolts and torque them.

Torque - Steering Neck Mounting Bolts: 16 N·m (1.6 kgf·m, 12 ft·lb)



- Be sure the plate [A] is inside the steering cover [B] when installing the steering cover mounting bolts [C].

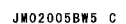


Hull/Engine Hood

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Exploded View



Exploded View

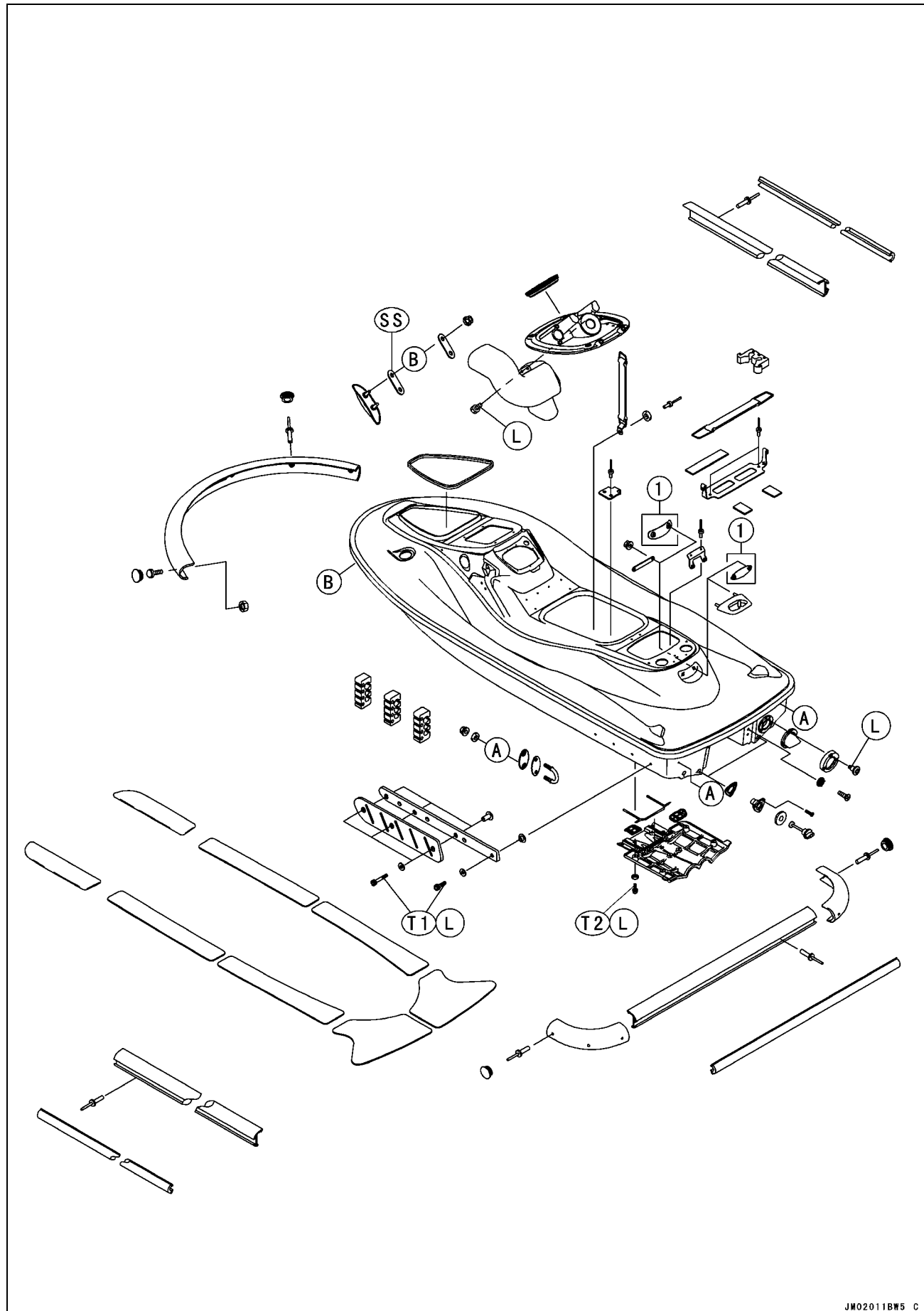
T1: 7.8 N·m (0.8 kgf·m, 69 in·lb)

T2: 9.8 N·m (1.0 kgf·m, 87 in·lb)

L : Apply a non-permanent locking agent.

13-4 HULL/ENGINE HOOD

Exploded View



Exploded View

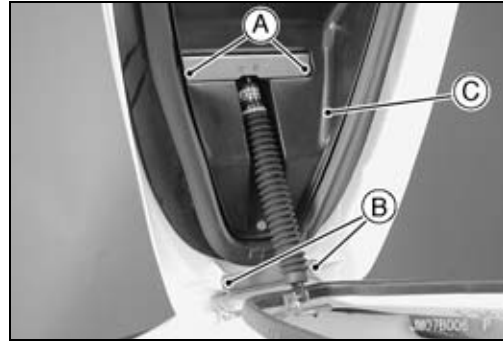
- 1. JT1200–A2 Model
- T1: 9.8 N·m (1.0 kgf·m, 87 in·lb)
- T2: 7.8 N·m (0.8 kgf·m, 69 in·lb)
- L: Apply a non-permanent locking agent.
- SS: Apply silicone sealant.

13-6 HULL/ENGINE HOOD

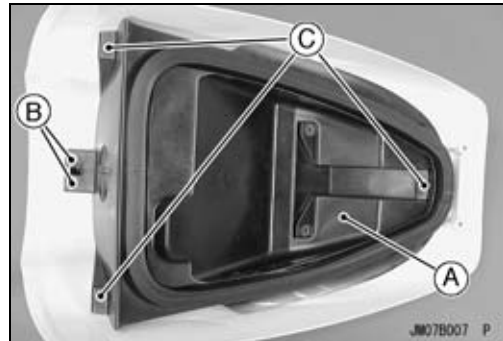
Fittings

Front Storage Compartment Cover Removal

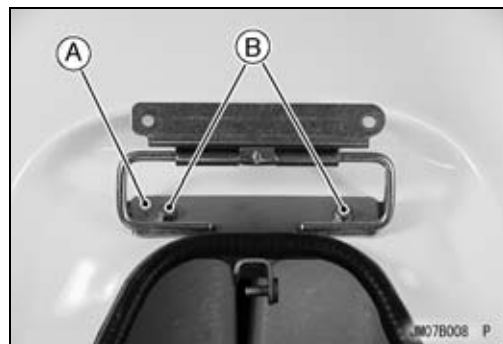
- Remove:
 - Damper Bracket Mounting Bolts [A]
 - Front Storage Compartment Cover Bracket Mounting Bolts [B]
 - Front Storage Compartment Cover Assembly [C]



- To remove the inner cover [A], unscrew the mounting screws [B] and bolts [C].



- To remove the hinge assembly [A], remove the following.
 - Damper Lower End (Disconnect)
 - Hinge Mounting Bolts [B]



Front Storage Compartment Cover Installation

- Apply a non-permanent locking agent to the all the removed bolts and screws.

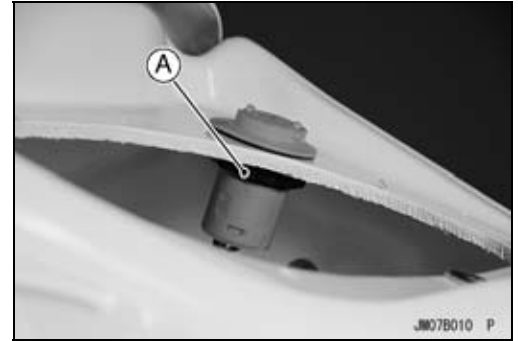
Storage Pocket Removal/Installation

- Remove the storage pocket mounting screws [A].



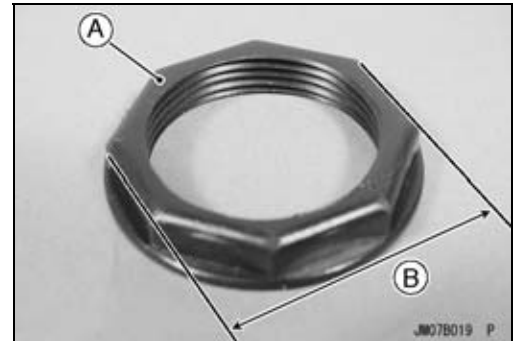
Fittings

- Disconnect the ignition switch lead connector from the main harness.
- Remove the ignition switch nut [A] in the hull.
- The right photo is taken after removing the storage pocket.



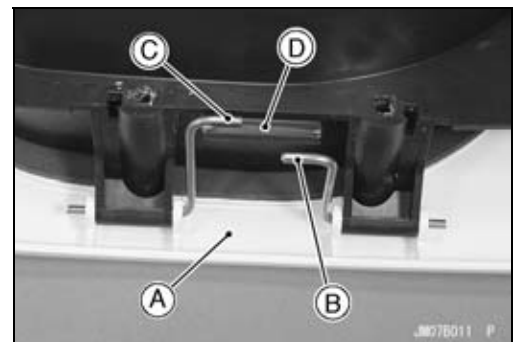
Ignition Switch Nut [A]
36 mm (1.4 in) [B]

- Remove the storage pocket with the ignition switch.
- Installation is the reverse of removal.

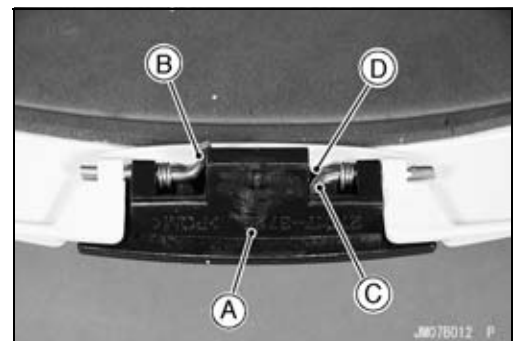


Storage Pocket Disassembly/Assembly

- To remove the storage pocket cover [A], turn and pull out the shaft [B] (both side).
- When installing the shafts, put the shaft end [C] (both side) into the hollow [D] on the storage pocket.



- To remove the rock [A], turn and pull out the shaft [B] (both side).
- When installing the shafts, push the shaft end [C] (both side) into the hollow [D] on the rock.



13-8 HULL/ENGINE HOOD

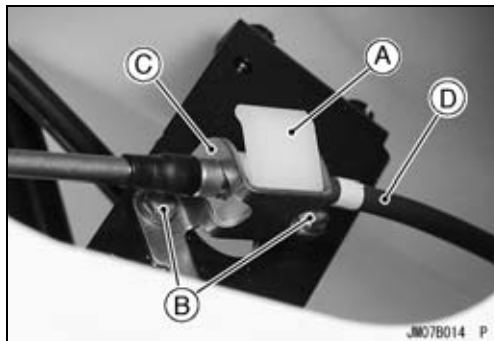
Fittings

Crossmember Removal/Installation

- Remove the storage pocket (see Storage Pocket Removal/Installation in this chapter).
- Disconnect the steering cable upper end [A].



- Pull out the holder [A].
- Unscrew the mounting bolts [B] and remove the cable bracket [C] with the cable [D].

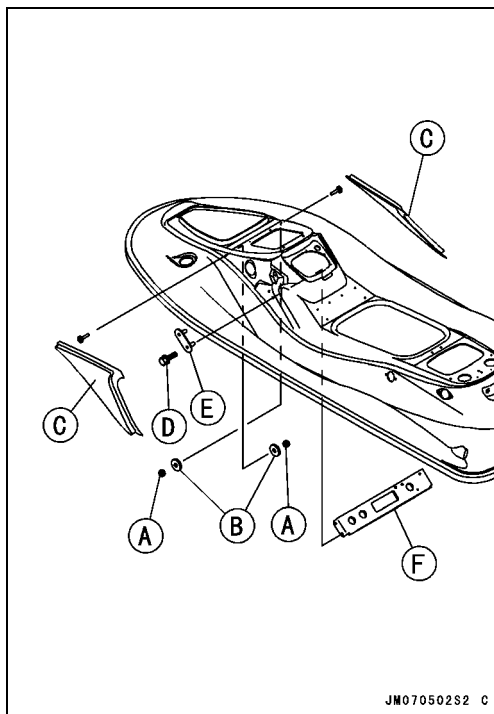


- Remove:
 - Fuel Tap Knob and Cover (see Fuel Tap Removal in the Fuel System chapter).
 - Choke Knob and Cover (see Choke Knob and Cable Removal in the Fuel System chapter).

- Remove the oil tank (see Oil Tank Removal in Engine Lubrication chapter).
- Unscrew the mounting nuts [A] and washers [B], and remove the side covers [C].
- Unscrew the mounting bolts [D] and bracket [E], and remove the crossmember [F].
- When installing the crossmember to the hull, note the following.

- Apply a non-permanent locking agent to the crossmember mounting bolts and torque them.

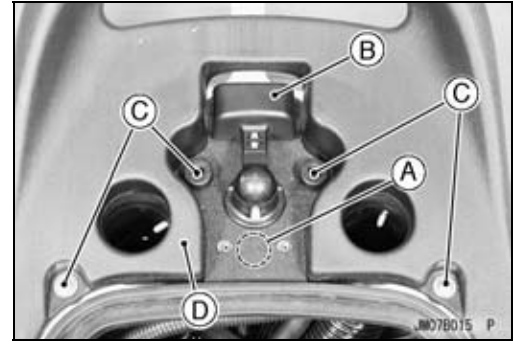
Torque - Crossmember Mounting Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)



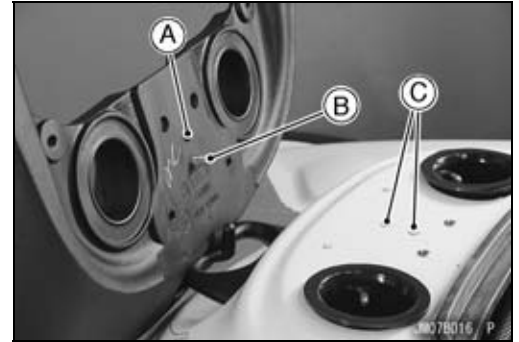
Fittings

Handrail Removal/Installation

- Unscrew the mounting nuts [A] and washer inside the full, and remove the lock assembly [B].
- Holding the nut inside hull, unscrew the mounting bolts [C], and remove the handrail [D].

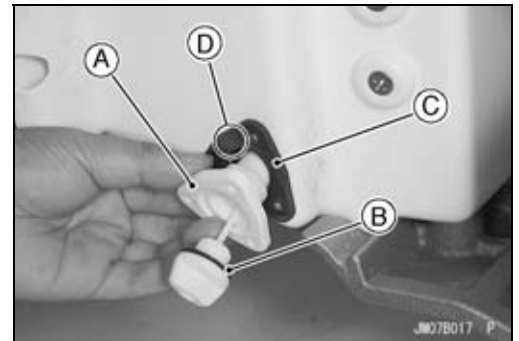


- When installing the lock assembly and handrail, align the projection [A] and stud bolt [B] on the lock assembly with holes [C] on the hull.



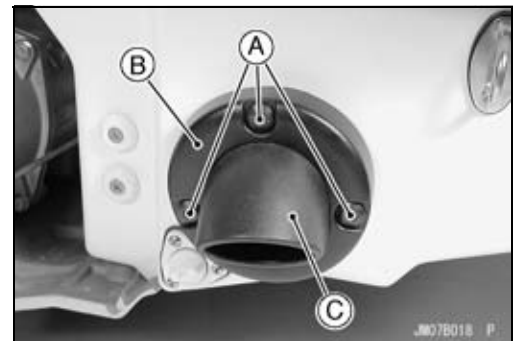
Drain Plug Housing Removal/Installation

- Unscrew the screws and remove the drain plug housing [A].
- Installation is the reverse of removal. Note the following.
 - Check the seal [B] for damage.
 - ★ If necessary, replace new ones.
 - Install the new gasket [C] so that its “OUT” mark [D] faces outwards.



Exhaust Outlet Removal/Installation

- Unscrew the mounting bolts [A] and remove the holder [B] and exhaust outlet [C].
- Installation is the reverse of removal. Note the following.
 - Apply a non-permanent locking agent to the mounting bolts [A] and tighten them securely.

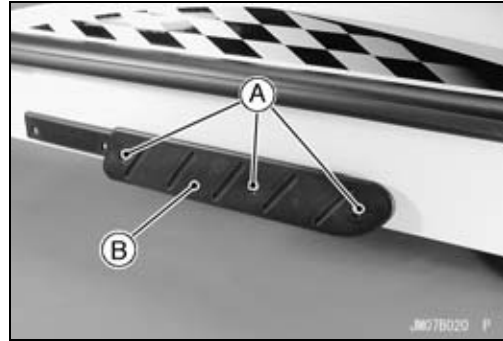


13-10 HULL/ENGINE HOOD

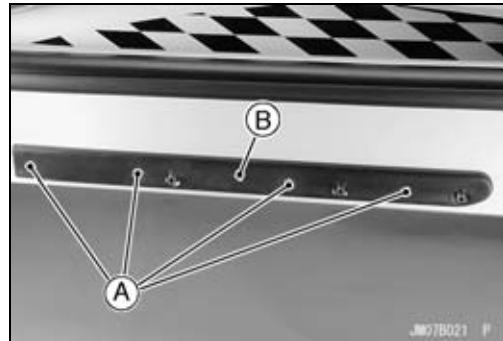
Fittings

Stabilizer Removal

- Unscrew the mounting bolts [A] and remove the stabilizer [B].



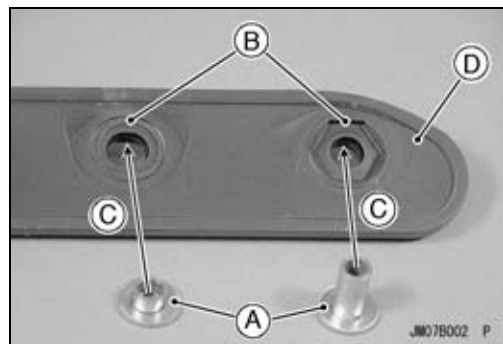
- Unscrew the mounting bolts [A] and remove the stabilizer base [B].



Stabilizer Installation

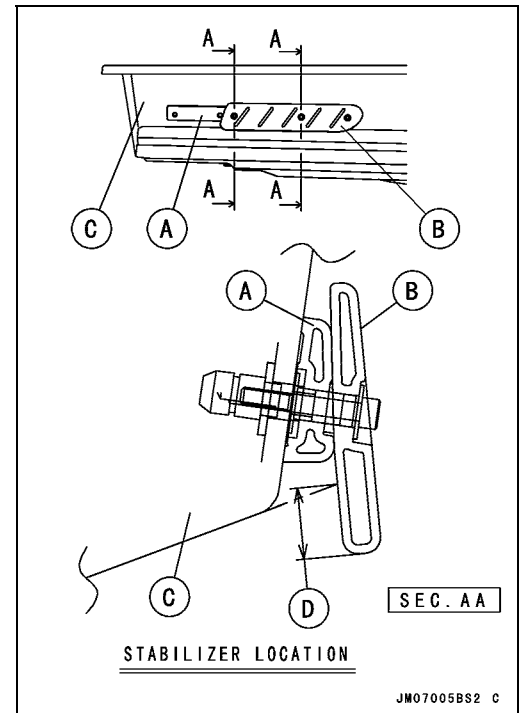
- Insert [C] the collars [A] into the holes [B] of stabilizer base as shown.

Reverse Side of Stabilizer Base [D]



Fittings

- Install the stabilizer base and stabilizer as shown.
 Stabilizer Base [A]
 Stabilizer [B]
 Hull [C]
 $16.5 \pm 2 \text{ mm}$ ($0.65 \pm 0.08 \text{ in.}$) [D]
- Apply a non-permanent locking agent to the following and torque them.
Torque - Stabilizer Base Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
Stabilizer Mounting Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)



13-12 HULL/ENGINE HOOD

Hull Replacement

To replace the hull, remove the various parts in the following suggested order.

- Battery and Pad
- Exhaust Pipe and Expansion Chamber
- Carburetor
- Engine and Mounts
- Oil Tank
- Electric Case
- Water Box Muffler
- Drive Shaft and Shaft Holder
- Pump and Hoses
- Steering Cover
- Handlebar and Steering
- Fuel Tap
- Choke Assembly
- Steering Cable
- Crossmember
- Fuel Tank and Filler
- Bilge and Cooling System Hose
- Bypass Hose and Outlet
- Bumpers
- Engine Hood Latch
- Front Storage Compartment Cover and Brackets
- Handgrip

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

- Decals
- Labels
- Mats
- Registration Number (if any)

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

Rubber Parts

NOTE

○ 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 Engine Hood Gasket Front Storage Compartment Cover Trim Seal	Synthetic Rubber Adhesive (P/N: 92104-3701)
Detents Handlebar Grips	Cyanoacrylate Cement

CAUTION

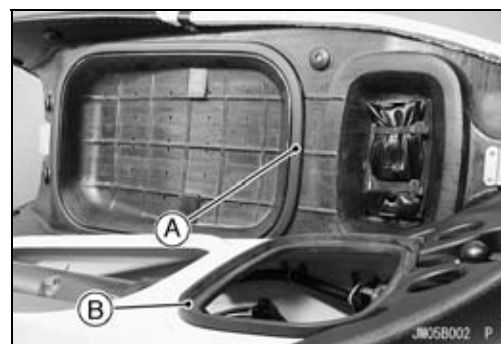
Be very careful that the part is positioned correctly when you apply the cement. It may be impossible to reposition the part.

⚠ 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

- Engine Hood Gasket [A]
- Rear Storage Trim Seal [B]



13-14 HULL/ENGINE HOOD

Rubber Parts

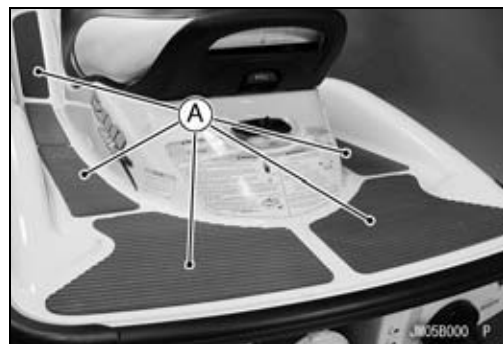
Front Storage Trim Seal [A]



Detent [A]



Mats [A]



Front Bumper Removal/Installation

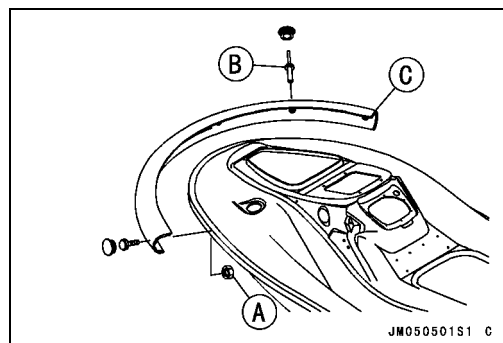
- Take out the mounting nuts [A].
- Drill out the pop rivets [B] with a drill bit of the correct size.

Pop Rivet Removal Drill Bit Size

5.0 mm (0.1969 in.)

NOTE

- Stop drilling when the rivet head starts to turn with drill bit.
- Tap the rivet out of the hull flange with a suitable punch and hammer.
- Remove the front bumper [C].
- When installing the front bumper, noting following.
- Secure the bumper to the hull flange with a pop rivet.



Rubber Parts

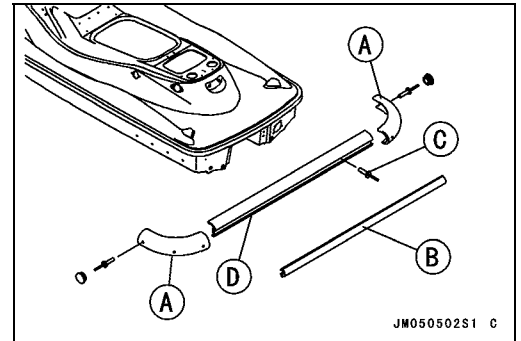
Rear Bumper Removal/Installation

- Remove the corner bumpers [A] and trim strip [B].
- Drill out the pop rivets [C] with a drill bit of the correct size.

Pop Rivet Removal Drill Bit Size
5.0 mm (0.1969 in.)

NOTE

- Stop drilling when the rivet head starts to turn with drill bit.
- Tap the rivet out of the hull flange with a suitable punch and hammer.
- Remove the rear bumper [D].
- When installing the rear bumper, noting following.
- Secure the bumper to the hull flange with a pop rivet.



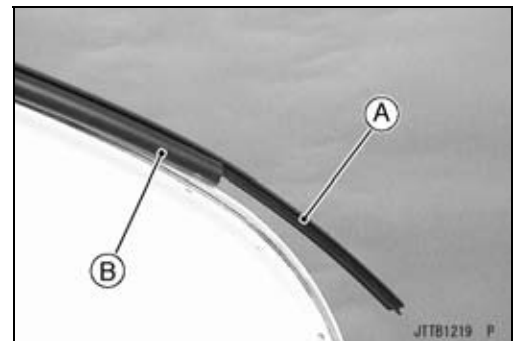
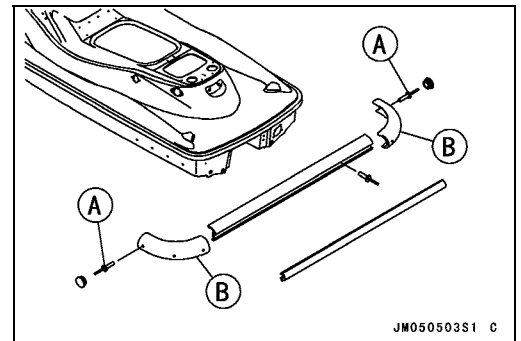
Side Bumper Removal

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

Pop Rivet Removal Drill Bit Size
5.0 mm (0.1969 in.)

NOTE

- Stop drilling when the rivet head [A] starts to turn with drill bit.
- Tap the rivet out of the hull flange with a suitable punch and hammer.
- Remove the corner bumper [B].
- Remove the trim strip [A] from the side bumper [B].

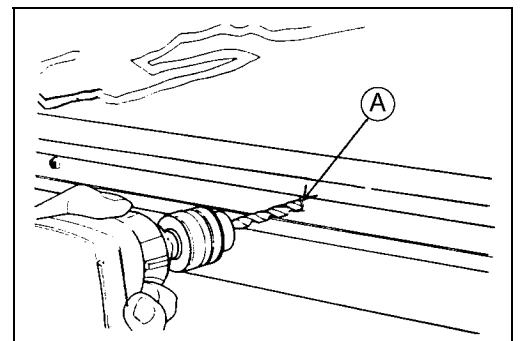


- Drill out the pop rivets with a drill bit of the correct size.

Pop Rivet Removal Drill Bit Size
5.0 mm (0.1969 in.)

NOTE

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

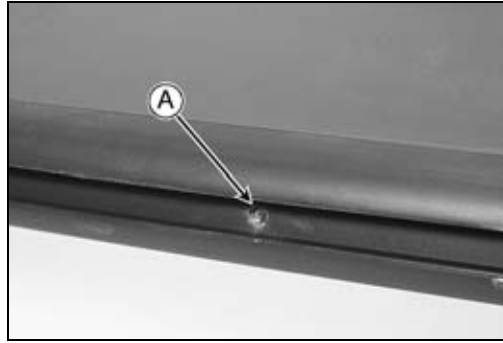


13-16 HULL/ENGINE HOOD

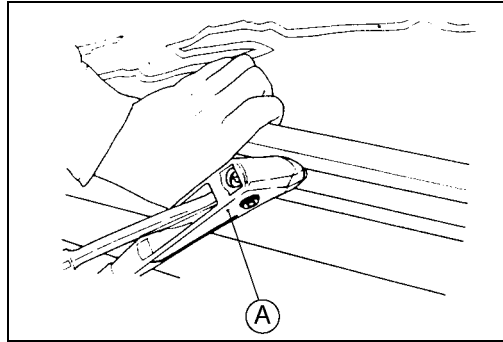
Rubber Parts

Side Bumper Installation

- Align [A] the hole on the bumper with the mounting hole on the hull.



- Secure [A] the bumper to the hull flange with a riveter.
- Install the trim strip pushing on the both sides of the strip.



Electrical System

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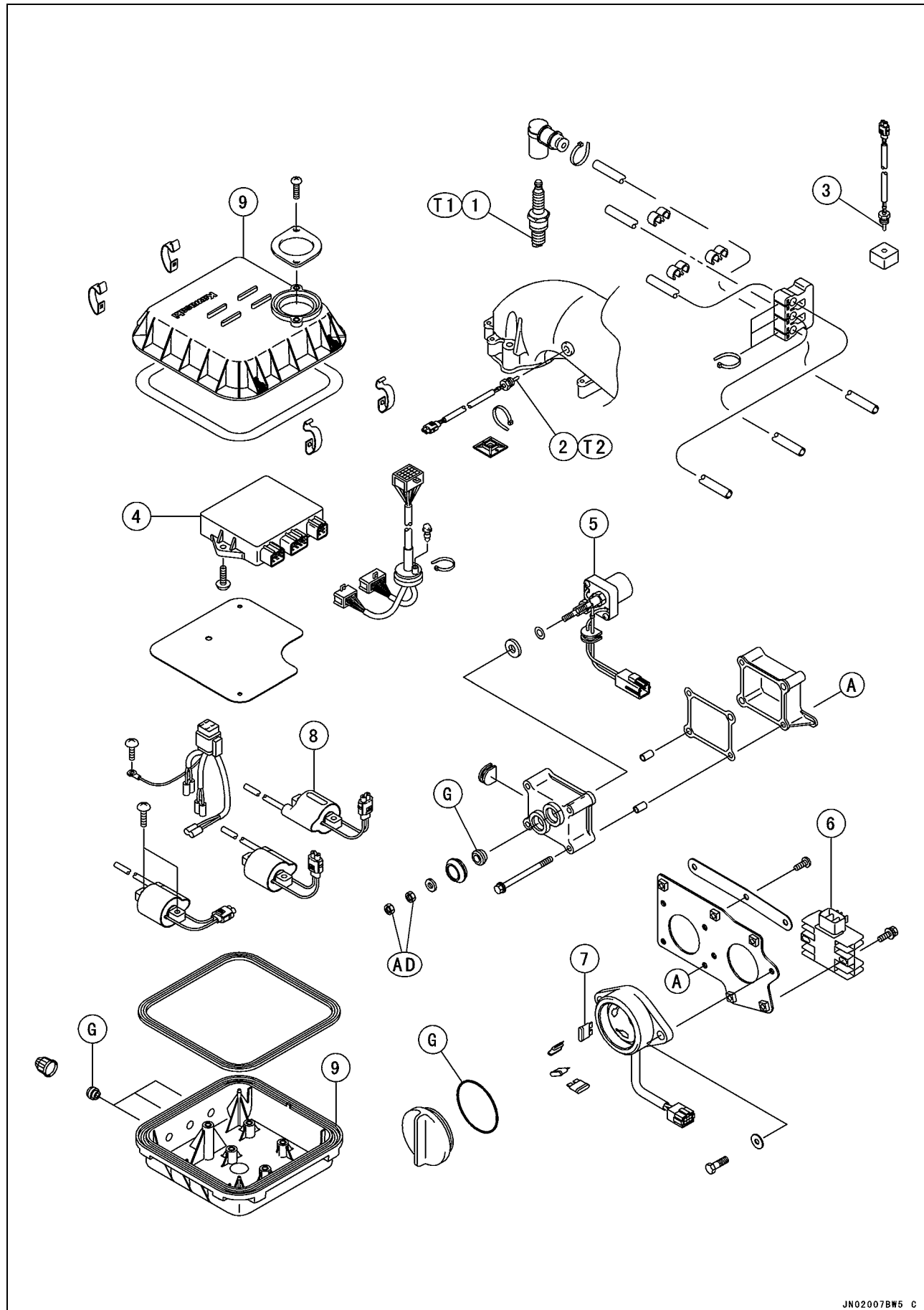
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14-2 ELECTRICAL SYSTEM

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14-4 ELECTRICAL SYSTEM

Exploded View

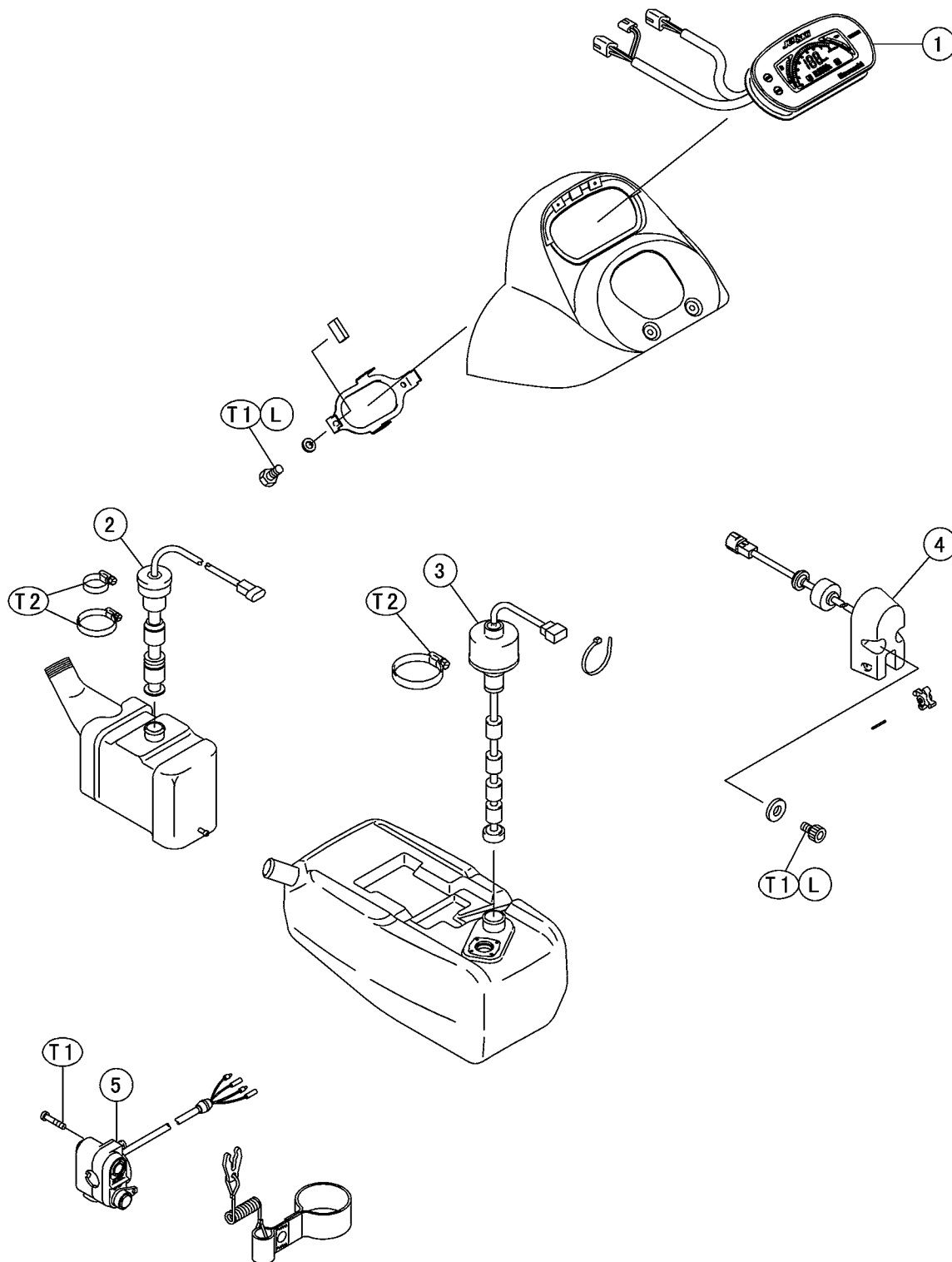


Exploded View

1. Spark Plug
 2. Water Temperature Sensor
 3. Intake Air Temperature Sensor
 4. Igniter
 5. Starter Relay
 6. Regulator/Rectifier
 7. Fuse
 8. Ignition Coil
 9. Electric Case
 - G: Apply grease.
- AD: Apply adhesive (3M DP-270BLACK) to prevent the terminals from galvanic corrosion.
- T1: 25 ~ 29 N·m (2.5 ~ 3.0 kgf·m, 18 ~ 22 ft·lb)
- T2: 15 N·m (1.5 kgf·m, 11 ft·lb)

14-6 ELECTRICAL SYSTEM

Exploded View

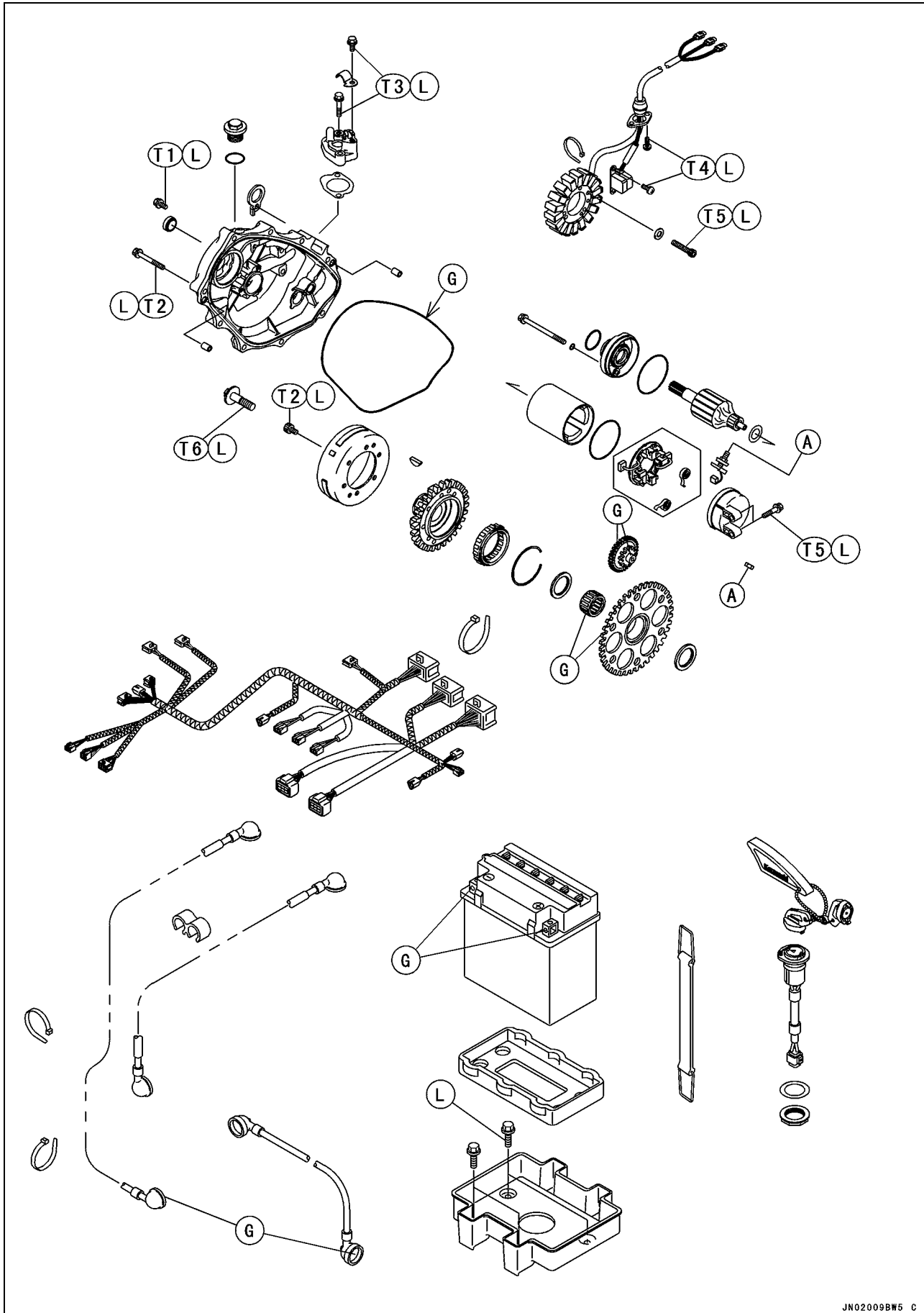


Exploded View

1. Multifunction Meter
 2. Oil Level Sensor
 3. Fuel Level Sensor
 4. Speed Sensor
 5. Start/Stop Switch
- T1: 3.9 N·m (0.4 kgf·m, 35 in·lb)
T2: 2.9 N·m (0.3 kgf·m, 26 in·lb)

14-8 ELECTRICAL SYSTEM

Exploded View



Exploded View

T1: 3.9 N·m (0.4 kgf·m, 35 in·lb)

T2: 12 N·m (1.2 kgf·m, 8.5 ft·lb)

T3: 8.8 N·m (0.9 kgf·m, 78 in·lb)

T4: 3.5 N·m (0.36 kgf·m, 31 in·lb)

T5: 7.8 N·m (0.8 kgf·m, 69 in·lb)

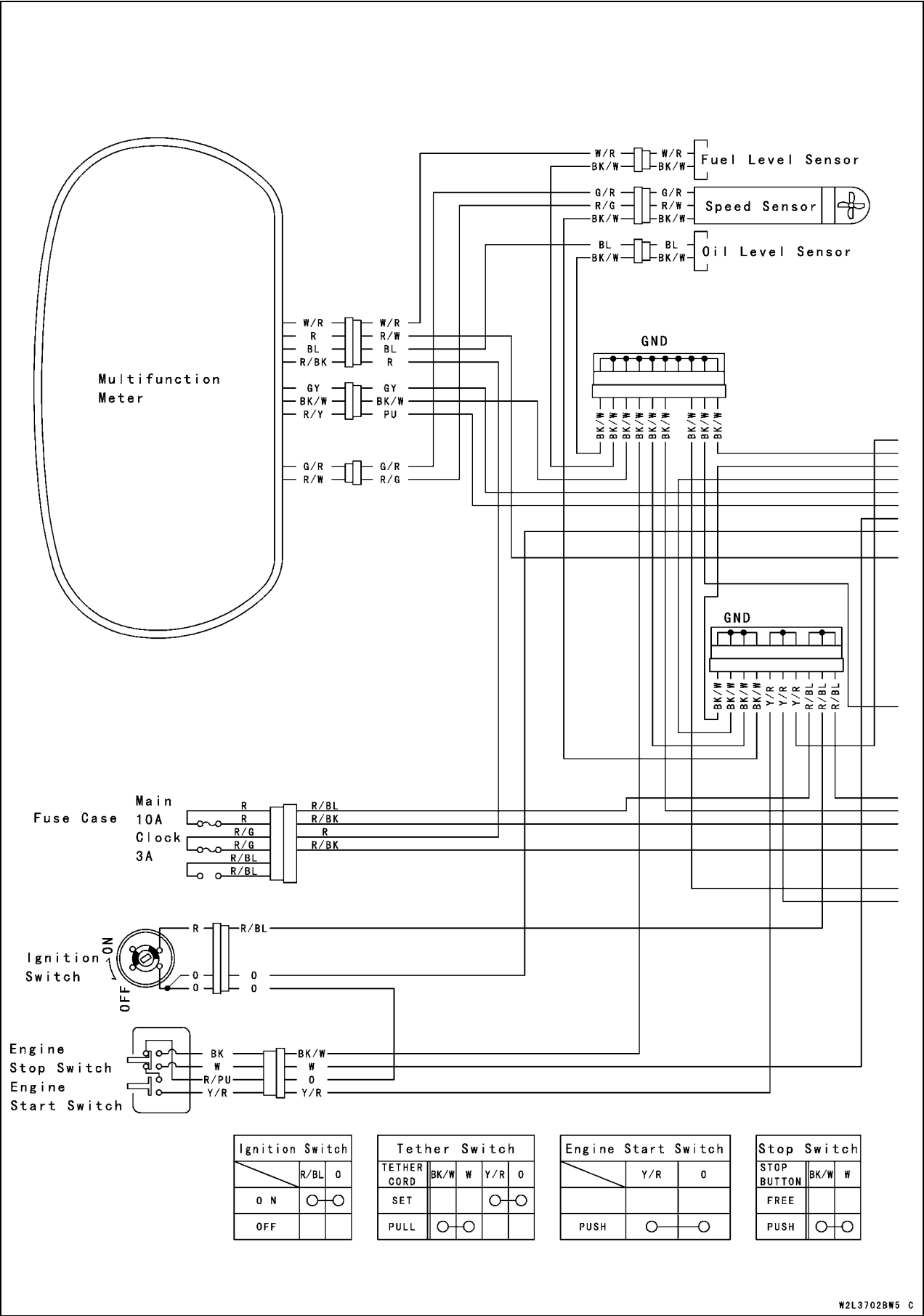
T6: 123 ~ 127 N·m (12.5 ~ 13.0 kgf·m, 90.4 ~ 94.0 ft·lb)

G: Apply grease.

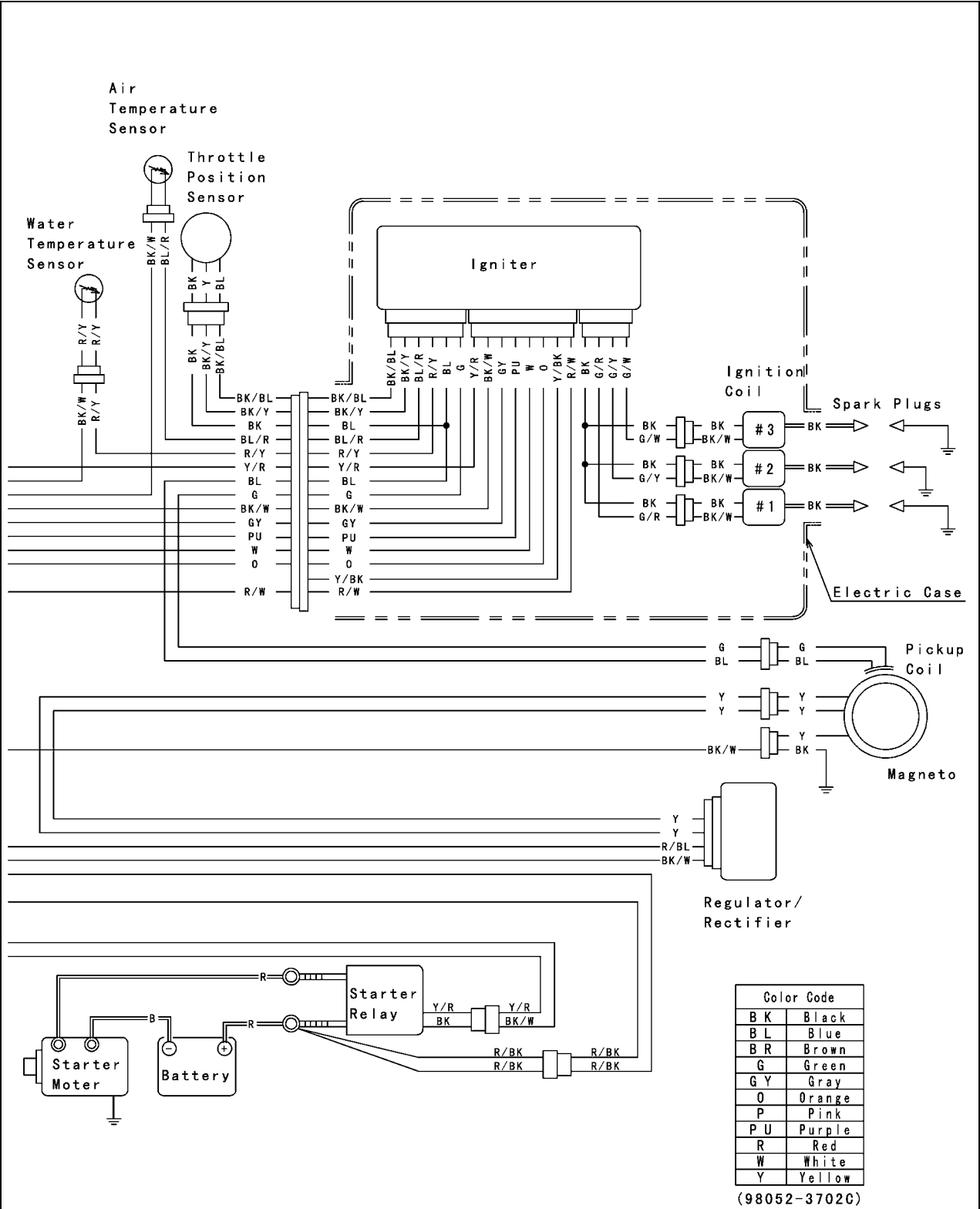
M: Apply molybdenum disulfide grease.

14-10 ELECTRICAL SYSTEM

Wiring Diagram



Wiring Diagram



14-12 ELECTRICAL SYSTEM

Specifications

Item	Standard	Service Limit
Battery:		
Type	12 V 18 Ah	— — —
Electric Starter System:		
Starter motor:		
Brush length	12 mm (0.4724 in.)	6.5 mm (0.2559 in.)
Commutator diameter	28 mm (1.1024 in.)	27 mm (1.063 in.)
Charging System:		
Regulator/rectifier output voltage	Battery voltage -14.5 ± 0.5 V	— — —
Charging coil output voltage	32 ~ 48 V @3 000 r/min (rpm)	— — —
Charging coil resistance:		
Yellow ← → Yellow	0.64 ~ 0.96 Ω	— — —
Ignition System:		
Ignition timing	15° BTDC @1 250 r/min (rpm) ~ 22° BTDC @3 500 r/min (rpm)	— — —
Ignition coil:		
Primary winding resistance	0.33 ~ 0.43 Ω	— — —
Secondary winding resistance	5.44 ~ 7.36 kΩ	— — —
Spark plug:		
Type	NGK BR9ES	— — —
Gap	0.7 ~ 0.8 mm (0.0276 ~ 0.0315 in.)	— — —
Terminal	Solid post	— — —
Pickup coil resistance	396 ~ 594 Ω	— — —
Pickup coil air gap (Clearance between the rotor projection and pickup core)	0.75 ~ 0.95 mm (0.0295 ~ 0.0374 in.)	— — —

Special Tool - Hand Tester: 57001-1394

Throttle Sensor Setting Adapter: 57001-1400

Battery

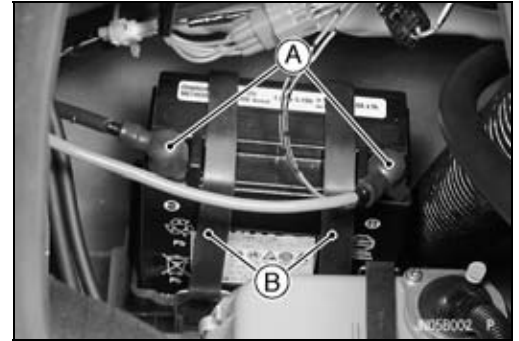
Removal

- Disconnect the battery cables [A].

⚠ 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 from the engine compartment.

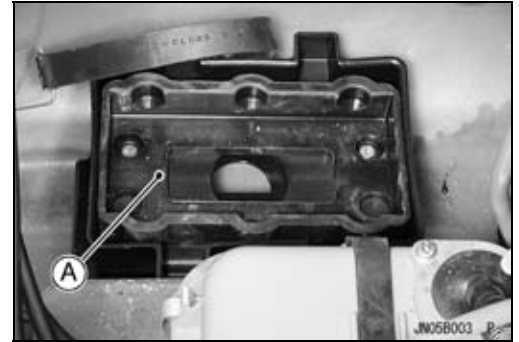


Installation

- Be sure the battery damper [A] is 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.

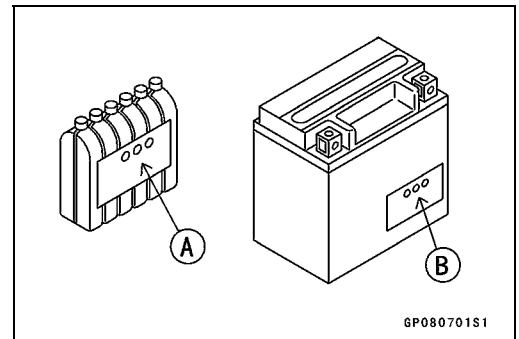
Electrolyte Filling

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

Battery Model Name for JT1200-A1: YTX20L-BS

CAUTION

Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type. This is to prevent overfilling of the electrolyte, shorting the battery life, and deterioration of the battery performance.



GP080701S1

14-14 ELECTRICAL SYSTEM

Battery

- Check to see that there is no peeling, tears or holes in the seal sheet on the top of the battery.
- Place the battery on a level surface.
- Remove the seal sheet [A].

CAUTION

Do not remove the seal sheet sealing the filler ports [B] until just before use.

NOTE

○A battery whose seal sheet has any peeling, tears, or holes, requires a refreshing charge (initial charge).

- Take the electrolyte container out of the plastic bag.
- Detach the seal cap [A] from the container.

NOTE

○Do not discard the seal cap because it is used as the battery plugs later.

○Do not peel back or pierce the seals [B] on the container.

- Place the electrolyte container upside down aligning the six seals with the six battery filler ports.
- Push the container down strongly enough to break the seals. Now the electrolyte should start to flow into the battery.

NOTE

○Do not tilt the container as the electrolyte flow may be interrupted.

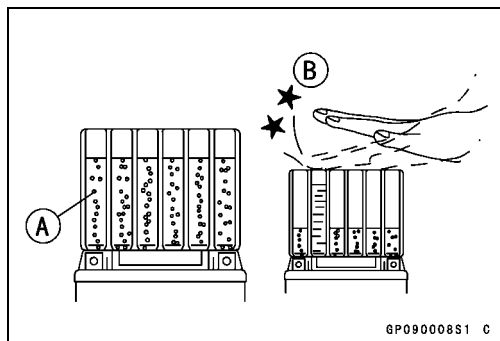
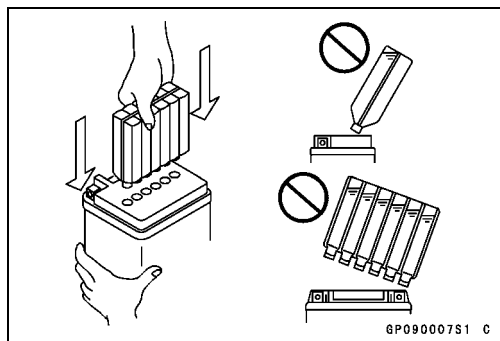
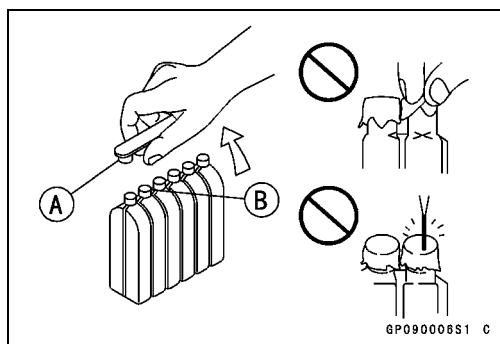
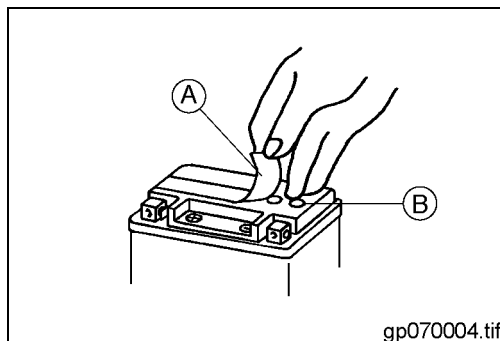
- Make sure air bubbles [A] are coming up from all six filler ports.
- Leave the container this way for 5 minutes or longer.

NOTE

○If no air bubbles are coming up from a filler port, tap [B] the bottom of the container two or three times. Never remove the container from the battery.

CAUTION

Fill the electrolyte into the battery until the container is completely emptied.

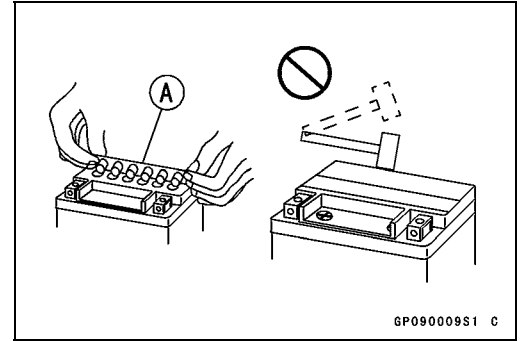


Battery

- Be certain that all the electrolyte has flowed out.
- Tap the bottom the same way as above if there is any electrolyte left in the container.
- Now pull the container gently out of the battery.
- Let the battery sit for **20** minutes. During this time, the electrolyte permeates the special separators and the gas generated by chemical reaction is released.
- Fit the seal cap [A] tightly into the filler ports until the seal cap is at the same level as the top of the battery.

NOTE

○ Do not hammer. Press down evenly with both hands.



⚠ WARNING

Once you installed the seal cap after filling the battery, never remove it, nor add any water or electrolyte.

Initial Charge

While a sealed battery can be used after only filling with electrolyte, a battery may not be able to sufficiently move a starter motor to start an engine in the cases shown in the table below, where an initial charge is required before use. However, if a battery shows a terminal voltage of 12.6 V or more, using a digital volt meter, after 10 minutes of filling, no initial charge is necessary.

NOTE

○ To measure battery terminal voltage, use a digital voltmeter which can be read one decimal place voltage.

Condition requiring initial charge	Charging method
At low temperature (lower than 0°C)	1.8 A × 2 ~ 3 hours
Battery has been stored under high temperature and humidity.	1.8 A × 15 ~ 20 hours
Seal sheet has been removed, or broken – peeling, tear or hole.	
Battery two or more years old from date of manufacture.	
Battery manufacturing date is printed on battery top. Example) <u>R2</u> <u>08</u> <u>H</u> <u>V</u> Mfg. location Day Month Year Year/Month 01 02 03 04 05 06 07 08 09 10 11 12 1999 AV BV CV DV EV FV GV <u>HV</u> JV KV LV MV 2000 AW BW CW DW EW FW GW HW JW KW LW MW 2001 AX BX CX DX EX FX GX HX JX KX LX MX 2002 AY BY CY DY EY FY GY HY JY KY LY MY	

Precautions

1) No need of topping-up

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

2) Refreshing charge

If an engine will not start, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see this chapter).

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

14-16 ELECTRICAL SYSTEM

Battery

CAUTION

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

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

- 3) When you do not use the watercraft for months:

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.

- 4) Battery life:

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

WARNING

Keep the battery away from sparks and open flames during charging, since the battery gives off an explosive gas mixture of hydrogen and oxygen. When using a battery charger, connect the battery to the charger before turning on the charger.

This procedure prevents sparks at the battery terminals which could ignite any battery gases.

No fire should be drawn near the battery, or no terminals should have the tightening loosened.

The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water. Get medical attention if severe.

Interchange

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

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

Charging Condition Inspection

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

Battery

Refreshing Charge

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

⚠ WARNING

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

Terminal Voltage: 11.5 ~ less than 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 A × 20 h

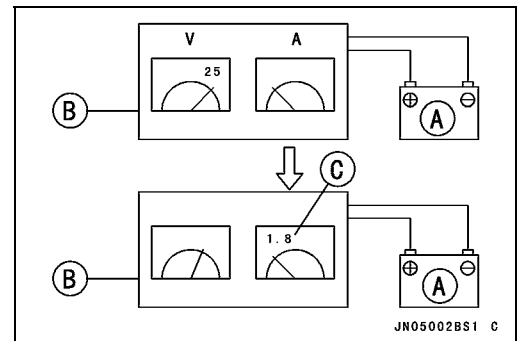
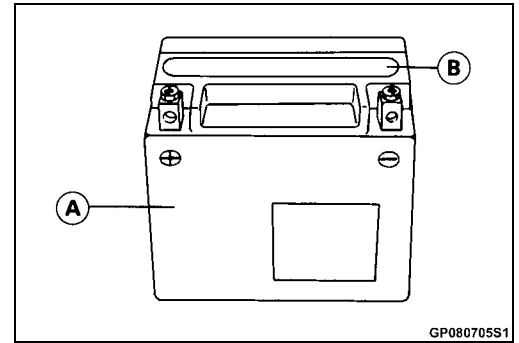
NOTE

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

Battery [A]

Battery Charger [B]

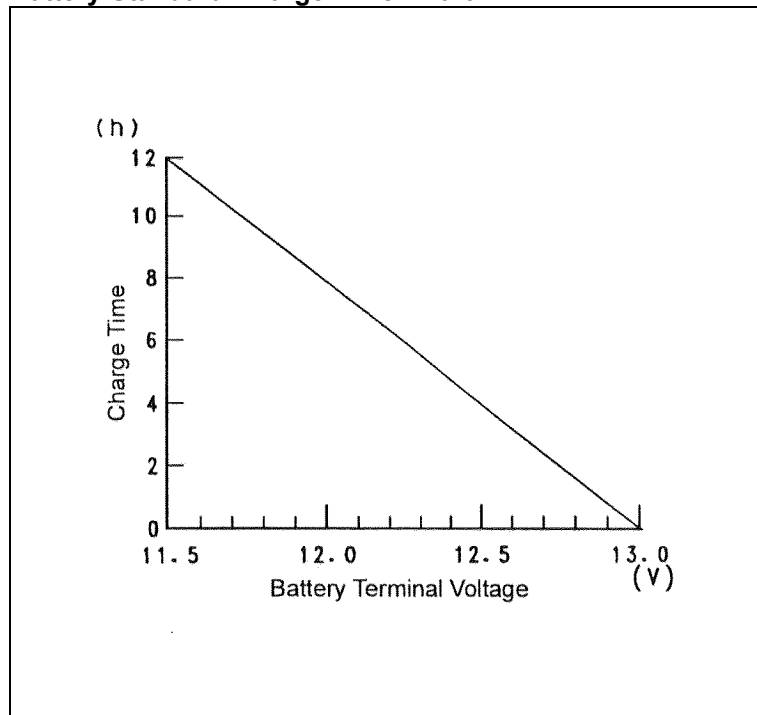
Standard Value [C]



14-18 ELECTRICAL SYSTEM

Battery

Battery Standard Charge Time Chart



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

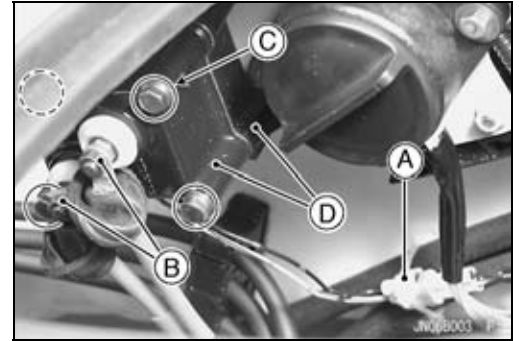
Criteria	Judgement
12.6 V or more	Good
12.0 ~ less than 12.6 V	Charge insufficient → Recharge
less than 12.0 V	Unserviceable → Replace

Electric Starter System

Starter Relay:

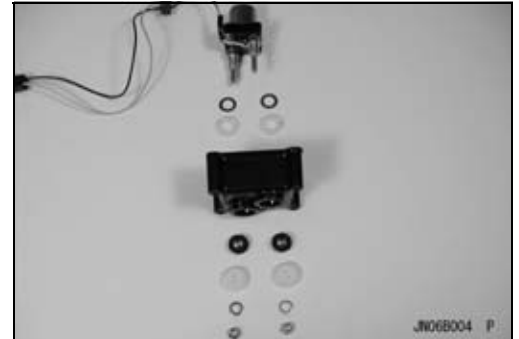
Removal

- Disconnect the battery cables (see Battery Removal in this chapter).
- Disconnect the starter relay wire connector [A].
- Remove the nuts [B] from the battery and starter terminals on the starter relay switch.
- Remove the mounting bolts [C] and slide the starter relay switch from the relay case [D], being careful not to lose any of the insulating washers or grommets.

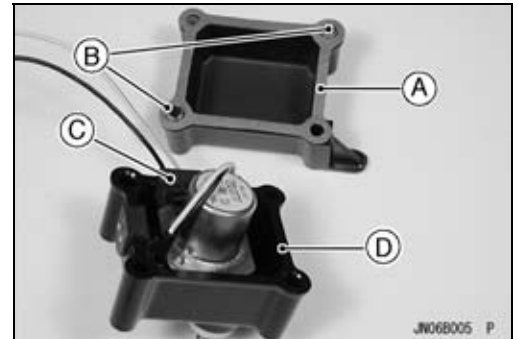


Installation

- Mount the starter relay switch in the relay case.
- Coat the insulating washers and grommets with water-proof grease.
- Be certain all insulating washers and grommets are in position.
- Tighten the terminal nuts securely.

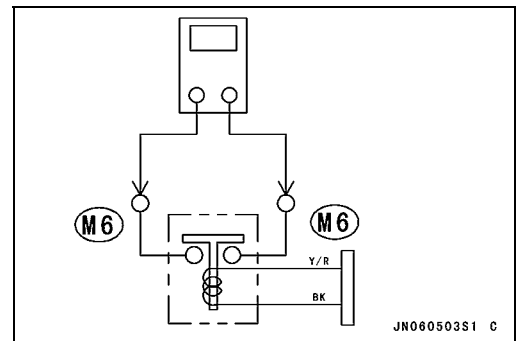


- Replace the gasket [A] with new one.
- Be sure the dowel pins [B] are in position.
- Be sure the grommet [C] is installed on the relay case [D].
- Be sure the battery cable is connected to the battery terminal having red mark.



Inspection

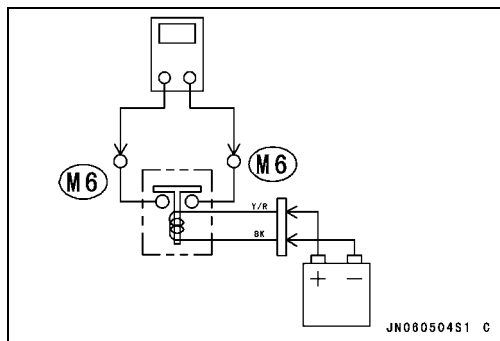
- Set ohmmeter to $R \times 1 \Omega$ scale.
- Connect meter leads to starter relay as shown.
- ★ If resistance is less than infinite, the starter relay switch is not returning and must be replaced.



14-20 ELECTRICAL SYSTEM

Electric Starter System

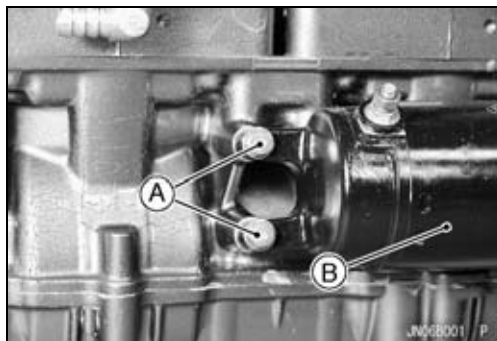
- Set ohmmeter to $R \times 1 \Omega$ scale.
- Connect meter leads to starter relay as shown.
- Activate starter relay switch by connecting a 12 V battery as shown.
- ★ If the starter relay switch clicks and the ohmmeter indicates zero resistance, the starter relay switch is good.
- ★ If the meter indicates high or infinite (∞) resistance, the starter relay switch is defective and must be replaced.



Starter Motor:

Starter Motor Removal

- Remove the engine (see Engine Removal/Installation chapter).
- Remove the mounting bolts [A].
- Pull out the starter motor [B].

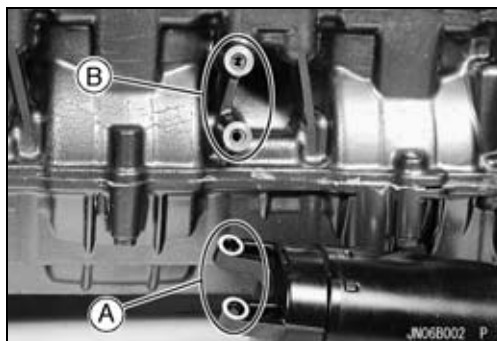


Starter Motor Installation

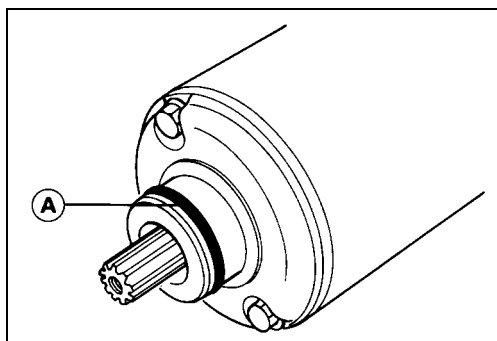
CAUTION

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

- When installing the starter motor, clean the starter motor legs [A] and crankcase [B] where the starter motor is grounded.



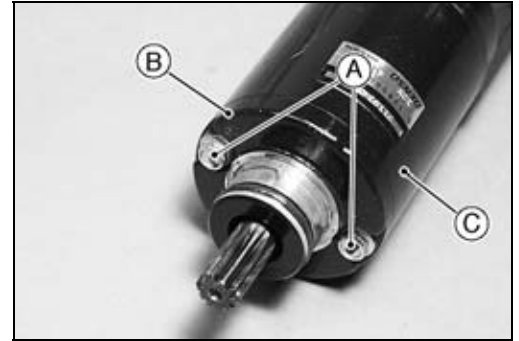
- Apply grease to the O-ring [A].
 - Install the starter motor and tighten the mounting bolts.
- Torque - Starter Motor Mounting Bolts: 7.8 N·m (0.8 kgf·m, 69 in·lb)**



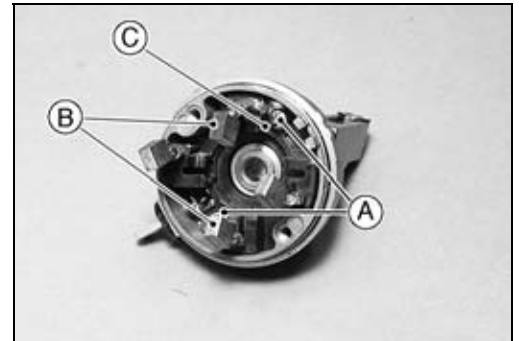
Electric Starter System

Starter Motor Disassembly

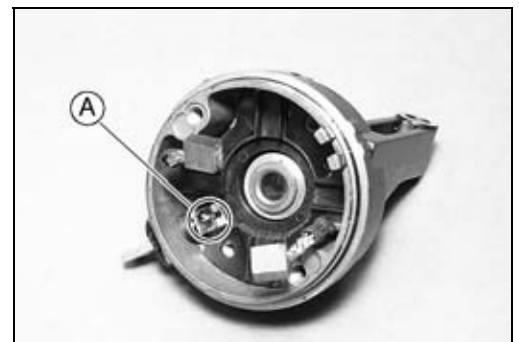
- Take off the starter motor through bolts [A] and remove both end covers [B] and pull the armature out of the yoke [C].



- Remove:
 - Brush Springs
 - Brush Holder Plate Screws [A]
 - Negative Brushes [B]
 - Brush Holder Plate [C]

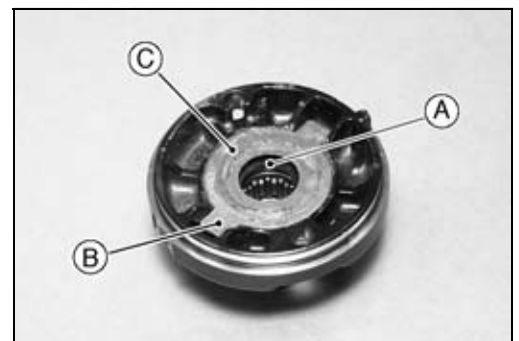


- Unsolder the terminal [A] on the positive brush plate and remove it.



Starter Motor Assembly

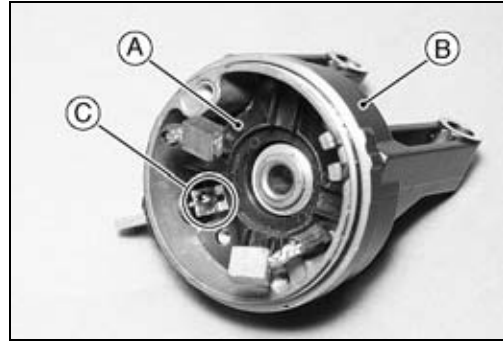
- Apply a thin coat of grease to the oil seal [A].
- Set the plate [B] and the washer [C] into the right-hand end cover.



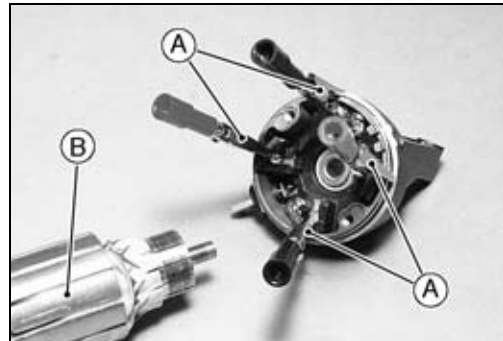
14-22 ELECTRICAL SYSTEM

Electric Starter System

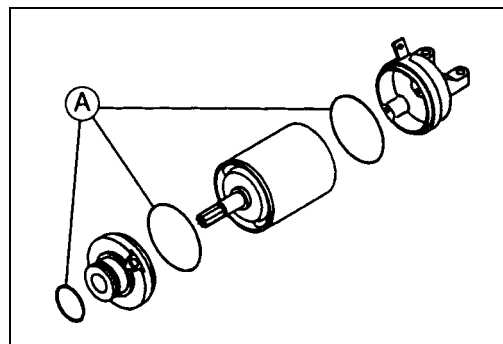
- Install the positive brush plate [A] in the left-hand end cover [B] and solder the terminals [C].



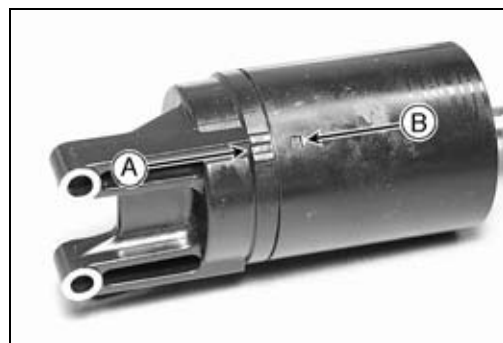
- Press the springs and holding the brush leads with suitable clips [A] as shown.
- Put the armature [B] among the brushes.



- Install the O-rings [A] as shown.

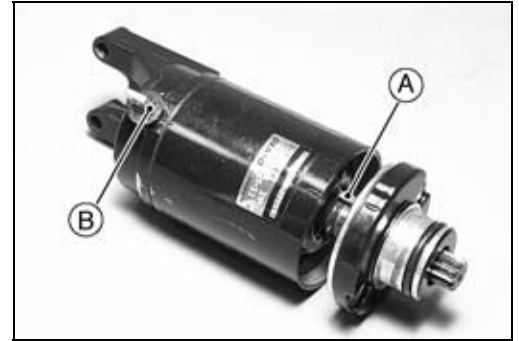


- Align the groove [A] in the left-hand end cover and the mark [B] on the yoke.



Electric Starter System

- Align the tongue [A] on the right-hand end cover and the terminal [B] on the left-hand end cover.



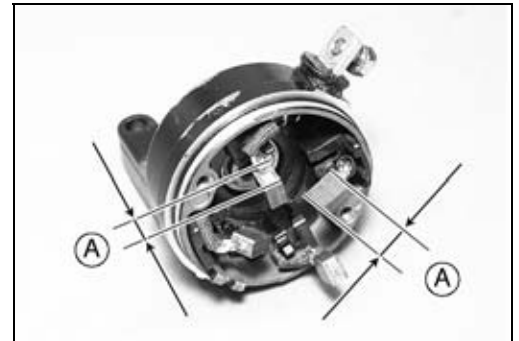
Brush Inspection

- Measure the length [A] of each brush.
- ★ If any is worn down to the service limit, replace the carbon brushes.

Starter Motor Brush Length

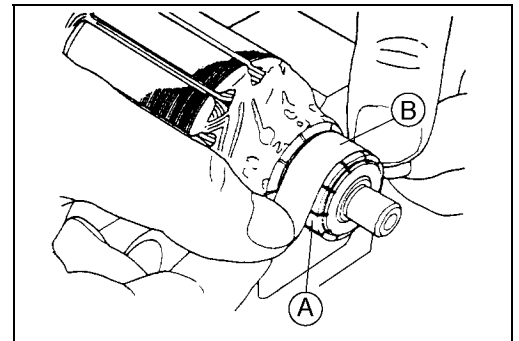
Standard: 12 mm (0.4724 in.)

Service Limit: 6.5 mm (0.2559 in.)



Commutator Cleaning and Inspection

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

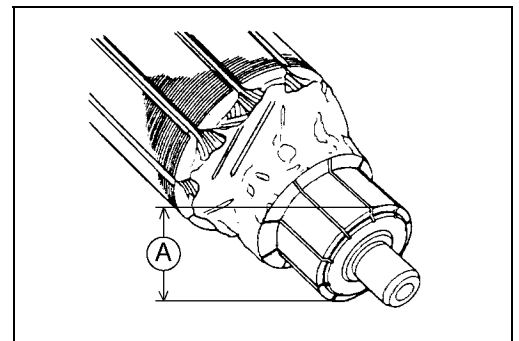


- Measure the diameter [A] of the commutator .
- ★ Replace the starter motor with a new one if the commutator diameter is less than the service limit.

Commutator Diameter

Standard: 28 mm (1.1024 in.)

Service Limit: 27 mm (1.063 in.)

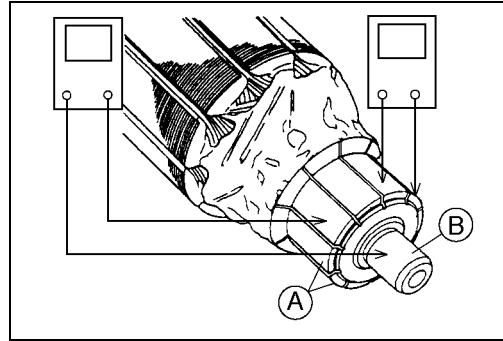


14-24 ELECTRICAL SYSTEM

Electric Starter System

Armature Inspection

- Using the $\times 1 \Omega$ hand tester 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 hand tester range, measure the resistance between the segments and the shaft [B].
- ★ If there is any reading at all, the armature has a short and the starter motor must be replaced.

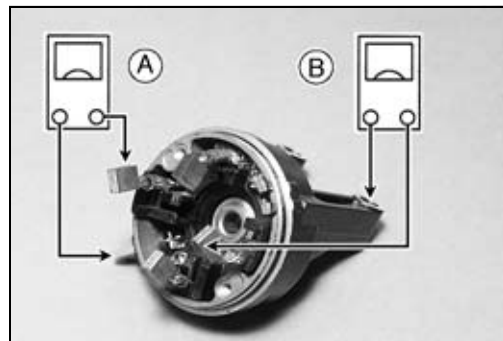


NOTE

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

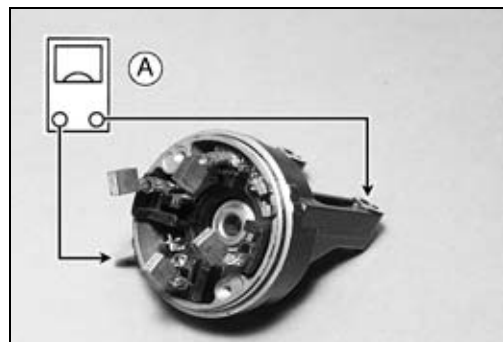
Brush Assembly Inspection

- Using the $\times 1 \Omega$ hand tester range, measure the resistance as shown.
 - [A] Terminal and Positive Brush
 - [B] Left-hand End Cover and Negative Brush
- ★ If there is not close to zero ohms, the brush lead has an open. Replace the positive brush assembly and/or the negative brush subassembly.



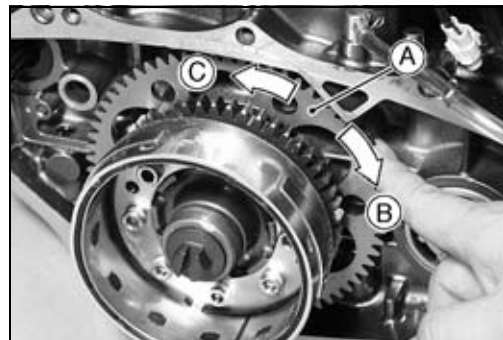
Left-hand End Cover Assembly Inspection

- Using the highest hand tester range, measure the resistance as shown.
 - [A] Terminal and Left-hand End Cover
- ★ If there is any reading, the left-hand end cover assembly have a short. Replace the left-hand end cover assembly.



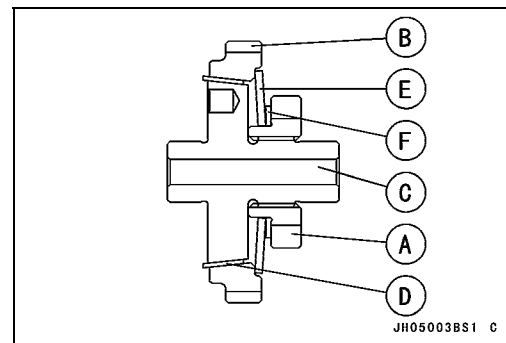
Starter Clutch Inspection

- Remove:
 - Magneto Cover
 - Torque Limiter
- Turn the starter clutch gear [A] by hand. The starter clutch gear should turn counterclockwise [C] freely, but should not turn clockwise [B].
- ★ If the clutch does not operate as it should or if it makes noise, disassemble the starter clutch, examine each part visually, and replace any worn or damaged parts.



Electric Starter System

- Inspect the torque limiter.
- ★ If the limiter has wear, discoloration, or other damage, replace it as a unit.
 - Gear (12T) [A]
 - Gear (50T) [B]
 - Shaft [C]
 - Bushing [D]
 - Spring [E]
 - Shim [F]



14-26 ELECTRICAL SYSTEM

Charging System

Charging Coil Testing

- Disconnect the 2-pin charging coil leads connector (Yellow) [A].



- With a multimeter, check the charging coil output (in circuit) according to the following table with the engine running at approximately 3,000 rpm.

⚠ WARNING

To avoid electrical shock, do not perform this test with the watercraft in the water.

CAUTION

Do not run the engine over 15 seconds without cooling water.

Charging Coil Output Test

Meter Setting	Connections		Standard Value
	Meter (+) to	Meter (–) to	
250 VAC	Yellow lead	Yellow lead	32 ~ 48V

- ★ If the charging coil output voltage is correct, check the regulator according to the regulator test procedure.
- ★ If the charging coil output voltage is low, check the charging coil resistance with a multimeter according to the following table.

Charging Coil Resistance Test

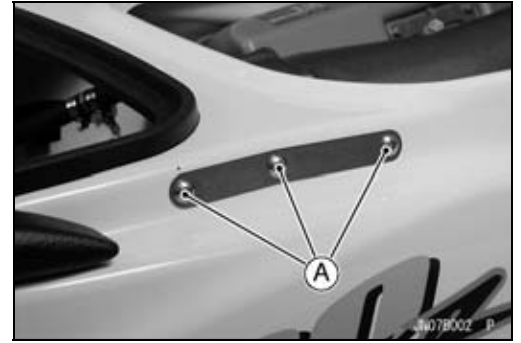
Meter Setting	Connections		Standard Value
	Meter (+) to	Meter (–) to	
$R \times 1 \Omega$	Yellow lead	Yellow lead	0.64 ~ 0.96 Ω

- ★ If the coil has normal resistance, but the voltage check shows the charging system to be defective, then the permanent magnets in the flywheel have probably weakened, necessitating flywheel replacement.

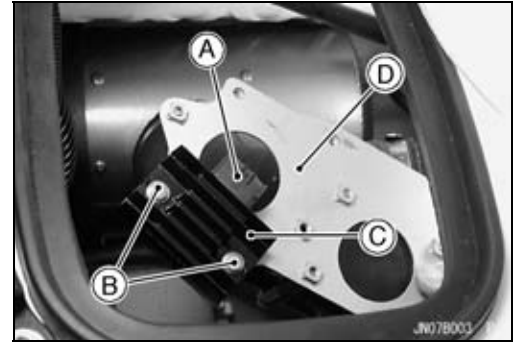
Charging System

Regulator/Rectifier Removal/Installation

- Disconnect the battery cables (see Battery Removal in this chapter).
- Unscrew the bracket mounting screws [A] on the hull and remove the bracket with the electrical parts.



- Disconnect the wire connector [A].
- Unscrew the mounting bolts [B] and remove the regulator/rectifier [C] from the bracket [D].



- When installing the bracket, apply a non permanent locking agent to the bracket mounting screws and tighten them securely.

Regulator/Rectifier Inspection

- With the hand tester set to the $R \times 1 \text{ k}\Omega$ range, test the regulator/rectifier according the following table.

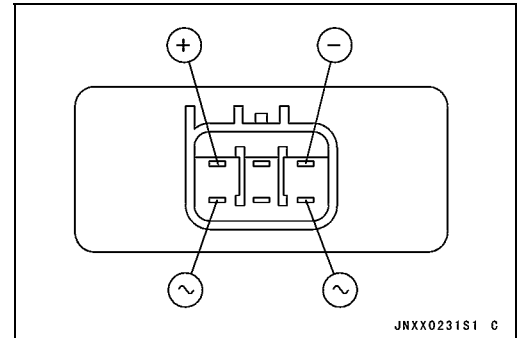
Special Tool - Hand Tester: 57001-1394

Regulator/Rectifier Inspection

Unit: $\text{k}\Omega$

	Tester (+) Lead Connection				
	Terminal	+	~	~	—
(-)*	+	—	∞	∞	∞
	~	2 ~ 20	—	∞	∞
	~	2 ~ 20	∞	—	∞
	—	3 ~ 30	2 ~ 20	2 ~ 20	—

(-)*: Tester (-) lead Connection



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

14-28 ELECTRICAL SYSTEM

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.

Pickup Coil Inspection

- Disconnect the 2-pin pickup coil leads connector (Blue) [A].
- Set the hand tester to the $\times 100 \Omega$ range, zero it, and connect it to the pickup coil lead terminals (G and BL) in the connector.
- ★ 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.

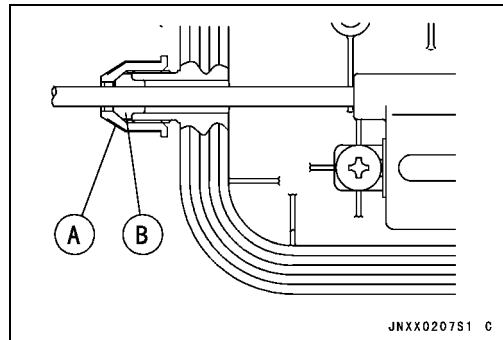
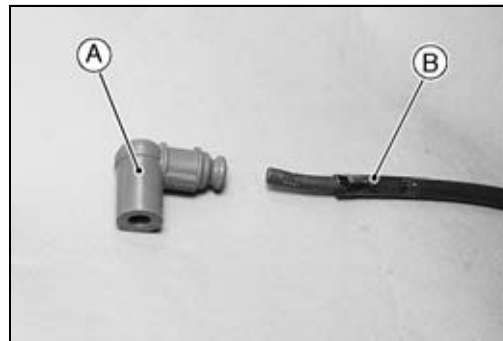


Pickup Coil Resistance

Standard: 396 ~ 594 Ω

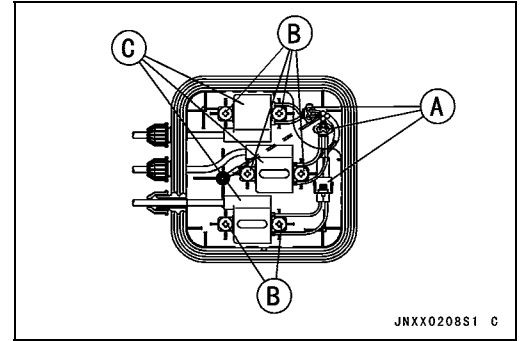
Ignition Coil Removal

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



Ignition System

- Disconnect the ignition coil primary lead connectors [A], and unscrew the ignition coil mounting screws [B].
- Remove the ignition coils [C].



Ignition Coil Installation Notes

- Fix the each coil and connect the primary lead connectors as follows.
 - #1 Coil → Black Connector
 - #2 Coil → Green Connector
 - #3 Coil → White Connector

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.

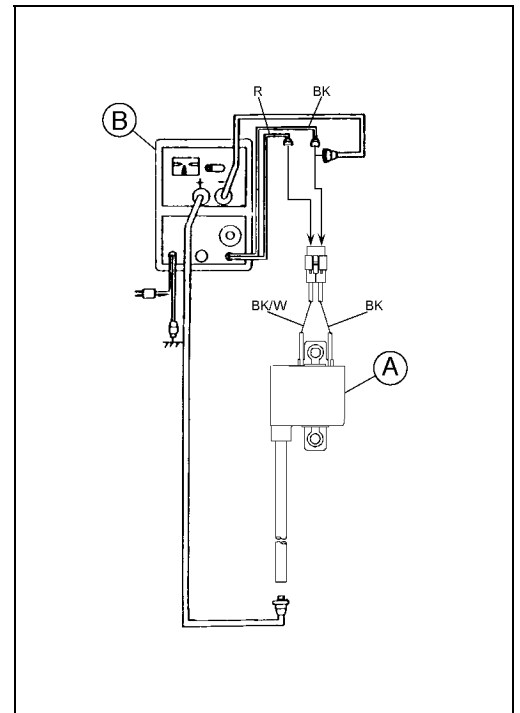
⚠ WARNING

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.

14-30 ELECTRICAL SYSTEM

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 $\times 1 \Omega$ 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 $\times 1 \text{ k}\Omega$, and read the tester.
- ★ If the hand tester does not read as specified, replace the coil.

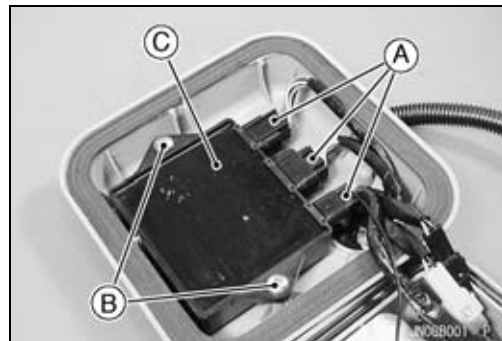
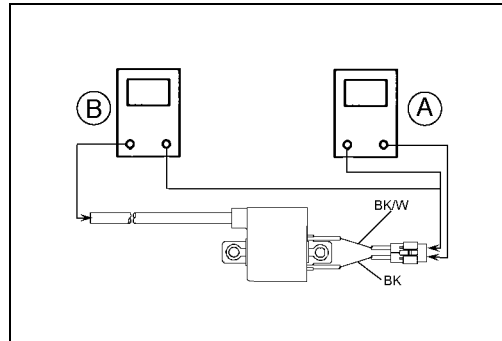
Winding Resistance

Standard: **Primary windings** $0.33 \sim 0.43 \Omega$
 Secondary windings $5.44 \sim 7.36 \text{ k}\Omega$

- ★ 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.

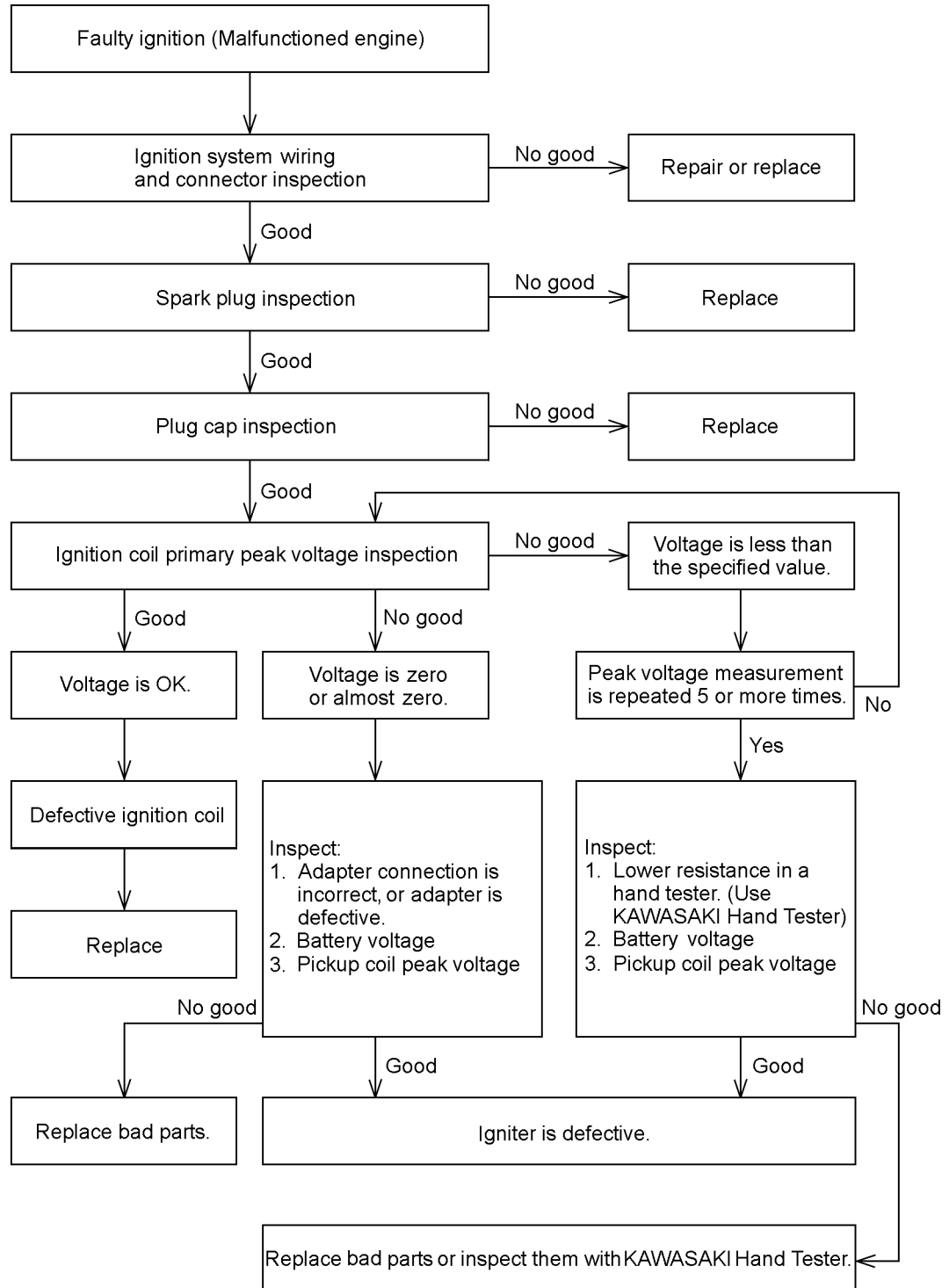
Igniter Removal/Installation

- Remove the electric case and open it (see Electric Case Removal/Disassembly).
- Disconnect the connectors [A] and unscrew the mounting screws [B].
- Remove the igniter [C] from the electric case.
- Installation is the reverse of removal.



Ignition System

Ignition System Troubleshooting



14-32 ELECTRICAL SYSTEM

Ignition System

Igniter Inspection

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 igniter damage.

Ignition Coil Primary Peak Voltage Check:

NOTE

○Be sure the battery is fully charged.

- Remove the electric case and open it (see Electric Case Removal/Disassembly).
- Pull all the spark plug caps from the spark plugs and push the caps [A] fully onto the spark plug cap holder [B].

NOTE

○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 [A] into the hand tester [B].
- Connect the adapter [A] to the ignition coil primary lead connector [D], using the needle adapter ser [C].

Special Tool - Needle Adapter Set: 57001-1457

Recommended Tool: Peak Voltage Adapter

Type: KEK-54-9-B

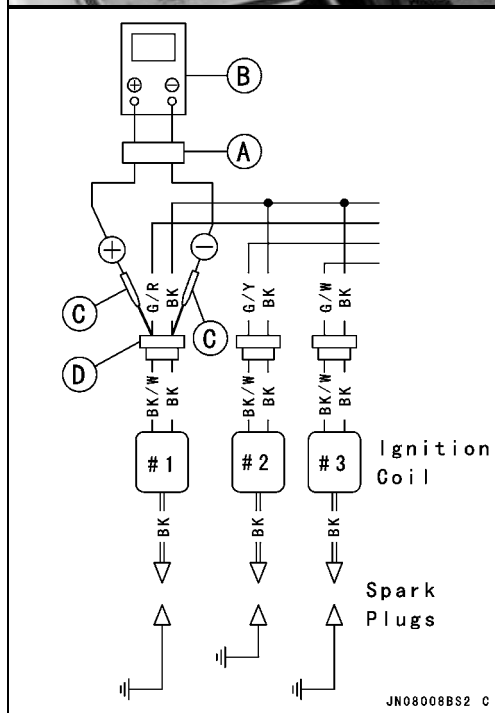
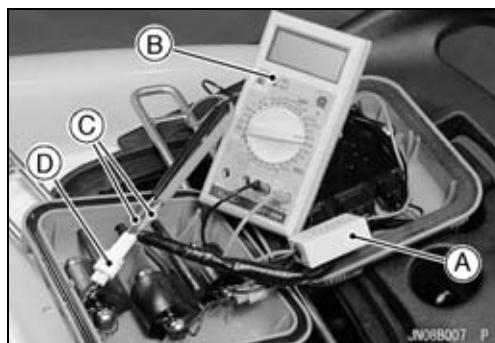
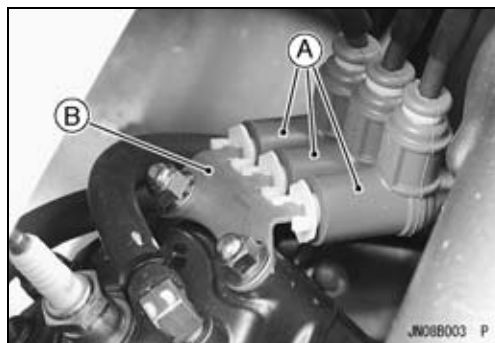
Brand: KOWA SEIKI

Special Tool - Hand Tester: 57001-1394

Hand Tester Range: × DC 250 V

Primary Lead Connections:

	Adapter (R, +)		Adapter (BK, -)
#1 Coil:	G/R	↔	BK (Ground)
#2 Coil:	G/Y	↔	BK (Ground)
#3 Coil:	G/W	↔	BK (Ground)



Ignition System

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch on and push the lanyard key under the stop button.
- Pushing the starter button, crank the engine 4 ~ 5 seconds to measure the primary peak voltage.
- Do not operate the starter for longer than 5 seconds. Wait 15 seconds before using it again.
- Repeat the measurements 5 or more times for one ignition coil.

Ignition Coil Primary Peak Voltage

Standard: 140 V or more

- Repeat the test for the other ignition coil.
- ★ If the reading is less than the specified value, see "Ignition System Troubleshooting" table to determine whether Igniter is good or no good.

Pickup Coil Peak Voltage Check:

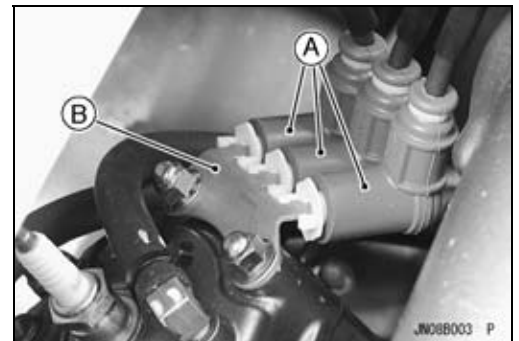
NOTE

○ Be sure the battery is fully charged.

- Disconnect the pickup coil lead connector.
- Pull all the spark plug caps from the spark plugs and push the caps [A] fully onto the spark plug cap holder [B].

NOTE

○ 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).



14-34 ELECTRICAL SYSTEM

Ignition System

- Connect a commercially available peak voltage adapter [A] to the hand tester [B].

Recommended Tool: Peak Voltage Adapter

Type: KEK-54-9-B

Brand: KOWA SEIKI

- Insert the adapter probes into the connector [C] of the magneto cover side for the pickup coil as shown.

Special Tool - Hand Tester: 57001-1394

Connections:

Adapter (R, +) **Adapter (BK, -)**
Pickup Coil: G **BL**

Hand Tester Range: × DC 10 V

- Turn the ignition switch on and push the lanyard key under the stop button.
- Pushing the starter button, crank the engine 4 ~ 5 seconds to measure the pickup coil peak voltage.
- Do not operate the starter for longer than 5 seconds. Wait 15 seconds before using it again.
- Repeat the measurements 5 or more times.

Pickup Coil Peak Voltage

Standard: 3.7 V or more

- ★ If the reading is less than the specified value, check the pickup coil (see Pickup Coil Inspection).



TPS (Throttle Position Sensor) Input Voltage Check:

- Remove the TPS [A] lead connector.
- Set the tester [B] to the DC 10 V range, and connect it to the connector [C] of the main harness.

Special Tool - Hand Tester: 57001-1394

Hand Tester (+) → Black/Blue Lead

Hand Tester (-) → Black Lead

- Turn the ignition switch on.
- Check the TPS input voltage.

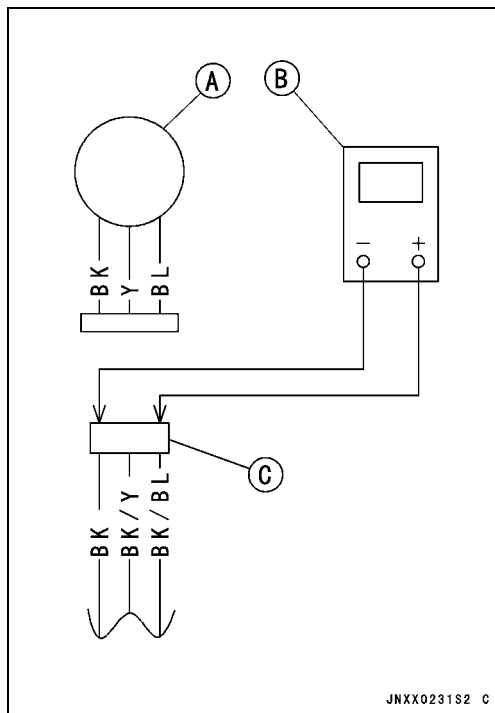
TPS Input Voltage

Standard: around DC 5 V

NOTE

○ Check the above process within three minutes.

- ★ If it is not the specified voltage, check the igniter input voltage between Orange lead and Black/White lead.
- ★ If there is battery voltage between the leads, igniter is defective.
- To check the TPS output voltage, see TPS Inspection.



Ignition System

Intake Air Temperature Sensor Input Voltage Check:

- Disconnect the intake air temperature sensor [A] connector.
- Set the tester [B] to the DC 10 V range, and connect it to the sensor connector [C] of the main harness side.

Special Tool - Hand Tester: 57001-1394

Connections:

Tester Positive → **Blue/Red**

Tester Negative → **Black/White**

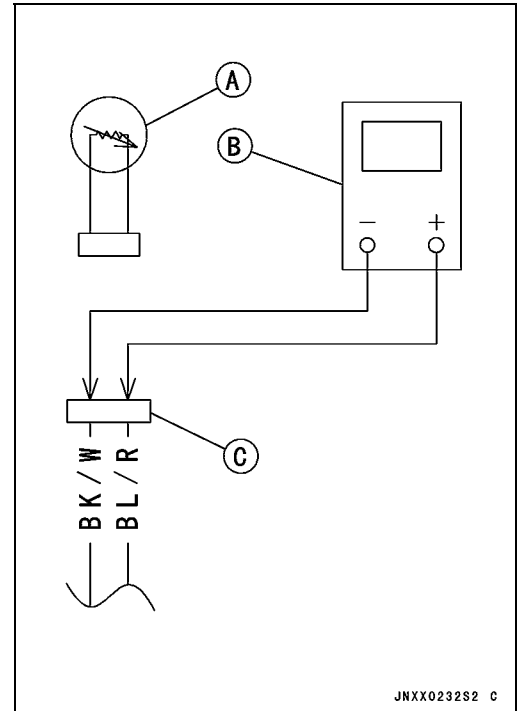
- Turn the ignition switch on.
- Check the tester reading.

Intake Air Temperature Sensor Input Voltage:
around DC 5 V

NOTE

○ Check the above process within three minutes.

- ★ If the tester reading does not show specified voltage, check the igniter input voltage between Orange lead and Black/White lead.
- ★ If there is battery voltage between the leads, igniter is defective.



Water Temperature Sensor Input Voltage Check:

- Disconnect the water temperature sensor [A] lead connector.
- Set the tester [B] to the DC 10 V range, and connect it to the sensor connector [C] of the main harness side.

Connections:

Tester Positive → **Red/Yellow Lead**

Tester Negative → **Black/White Lead**

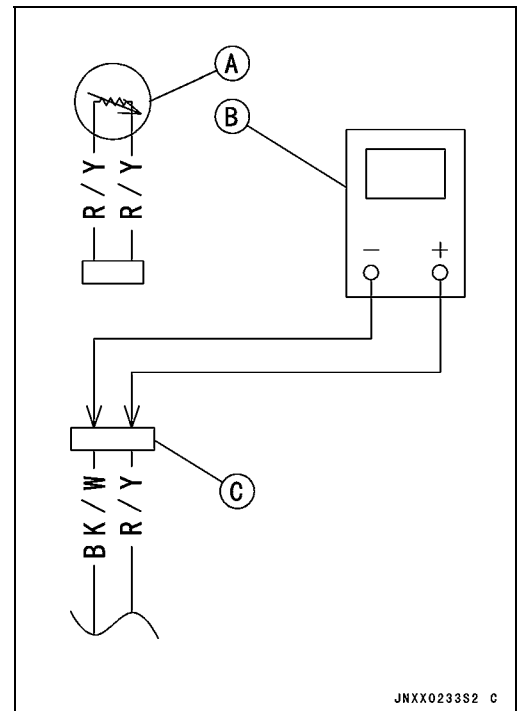
- Turn the ignition switch on.
- Check the tester reading.

Heat Sensor Input Voltage:
around DC 5 V

NOTE

○ Check the above process within three minutes.

- ★ If the tester reading does not show specified voltage, check the igniter input voltage between Orange lead and Black/White lead.
- ★ If there is battery voltage between the leads, igniter is defective.



14-36 ELECTRICAL SYSTEM

Ignition System

Overheat Diagnosis Output Voltage Check:

- Disconnect the 3-pin connector of the multifunction meter [A].
- Set the tester [B] to the DC 10 V range, connect it to the 3-pin connector [C] of the main harness side.

Hand Tester (+) → Purple Lead

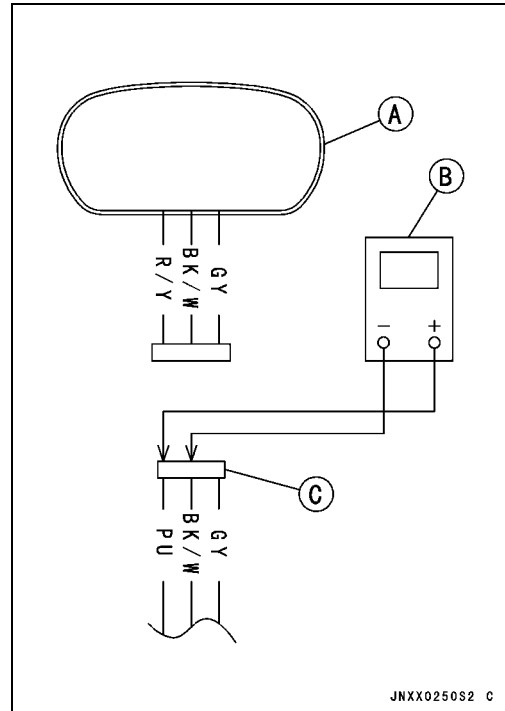
Hand Tester (−) → Black/White Lead

- Turn the ignition switch on.
- Check the tester reading.

Overheat Diagnosis Output Voltage:
around DC 5 V

(When the engine is not in overheat mode)

- ★ If the tester reading does not show specified voltage, igniter is defective.



Spark Plug Removal

- Pull off the spark plug caps.
- Unscrew the spark plugs
- Be careful to avoid breaking the ceramic on the spark plugs.

Spark Plug Installation

- Be sure the spark plug threads are clean and dry.
- Torque the spark plugs.

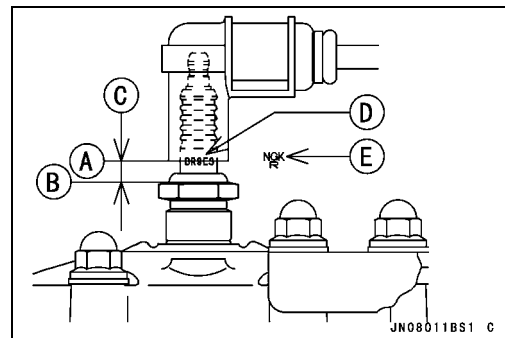
Torque - Spark Plugs: 25 ~ 29 N·m (2.5 ~ 3.0 kgf·m, 18 ~ 22 ft·lb)

- Be careful to avoid breaking the ceramic on the spark plugs.

- 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 "BR9ES" [D] printed on plug are half covered with the cap or the figures "NGK" [E] of "NGK/R" are completely covered.



Spark Plug Inspection

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

Spark Plug Adjustment

- Refer to Spark Plug Adjustment in the Periodic Maintenance chapter.

Ignition System

Spark Plug Cleaning

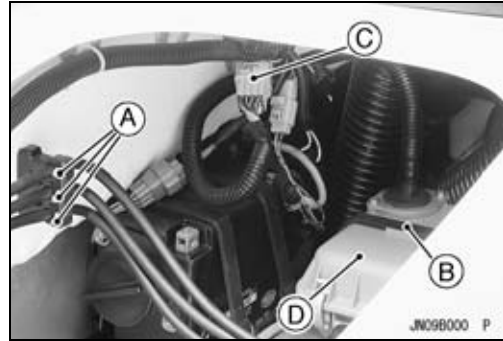
○Refer to Spark Plug Cleaning in the Periodic Maintenance chapter.

14-38 ELECTRICAL SYSTEM

Electric Case

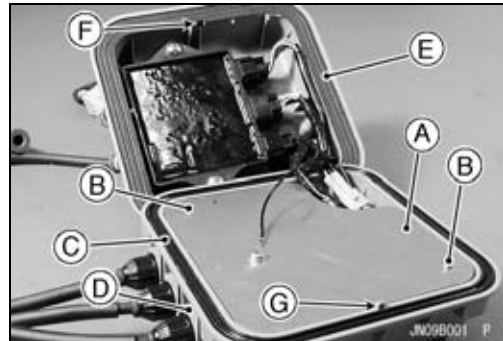
Electric Case Removal/Disassembly

- Remove or disconnect:
 - Spark Plug Caps
 - Clamps [A]
 - Strap [B]
 - Wire Lead Connectr [C]
- Remove the electric case assembly [D] out of the hull.
- Take out the clamps and open the case.
- Remove the electric components.
- Note wire routing and ground terminal location.

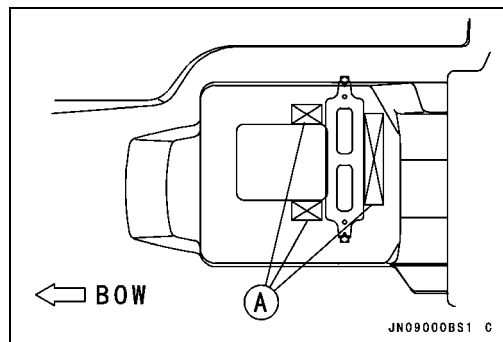


Electric Case Assembly/Installation

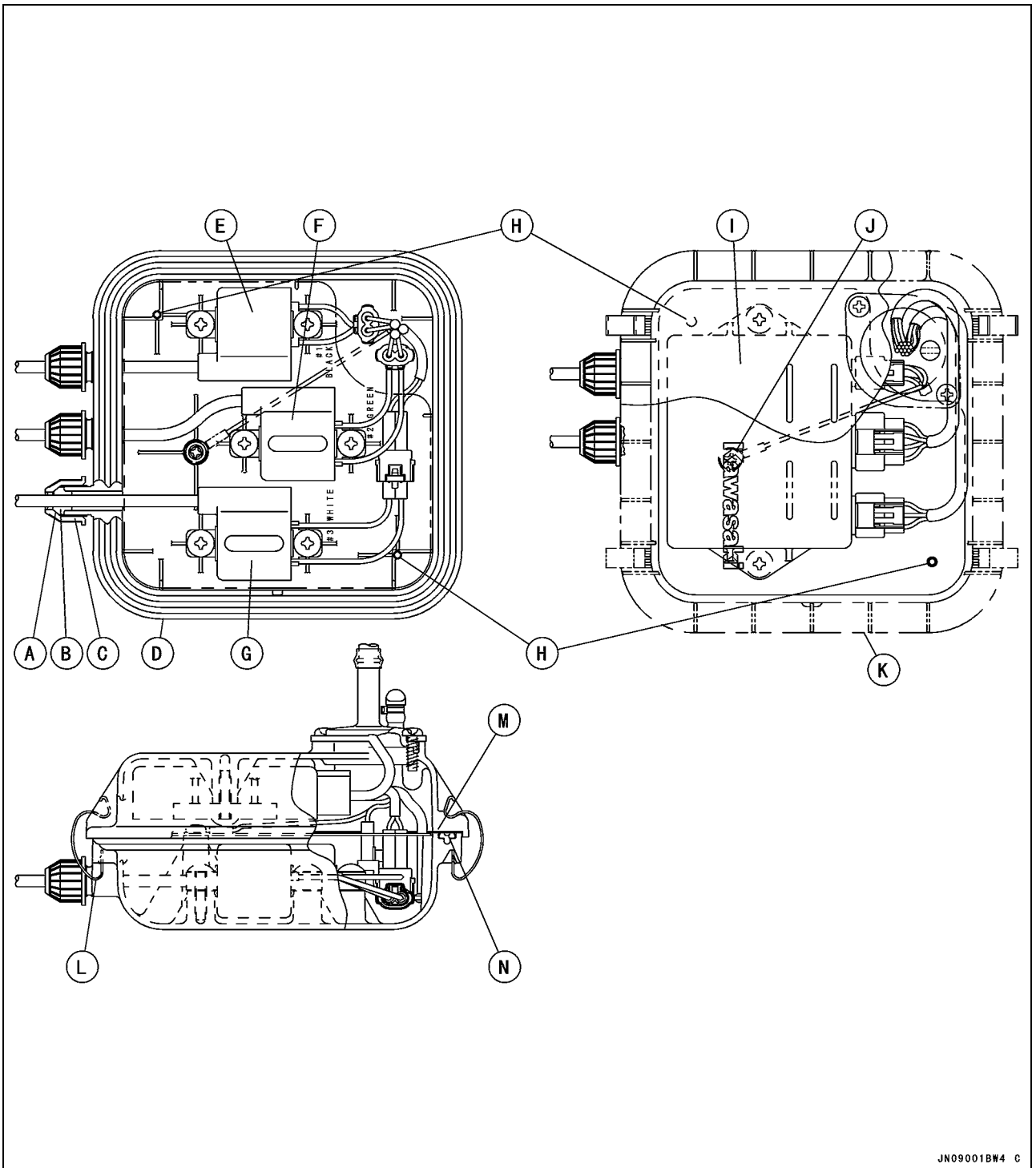
- Install the plate [A] aligning the holes on the plate with the projections [B] on the lower case.
- Install the seal [C] on the lower case [D].
- **Install the gasket [E] on the seal aligning the recess [F] in the gasket with the projection [G] on the lower case.**



- Be sure the dampers [A] are on the hull, as shown.



Electric Case



JN09001BW4 C

- [A] Apply grease.
- [B] Grommet
- [C] Grommet Cap
- [D] Lower Electric Case
- [E] #1 Ignition Coil
- [F] #2 Ignition Coil
- [G] #3 Ignition Coil

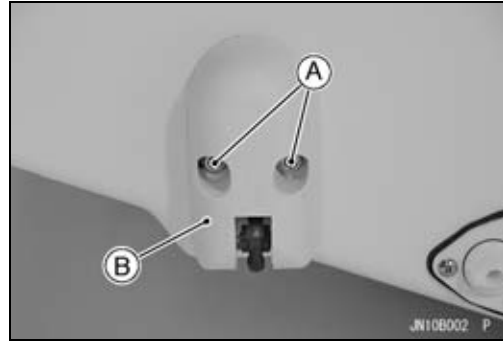
- [H] Align the projection with the hole.
- [I] Igniter
- [J] BK Lead
- [K] Upper Electric Case
- [L] Clamp
- [M] Gasket
- [N] Seal

14-40 ELECTRICAL SYSTEM

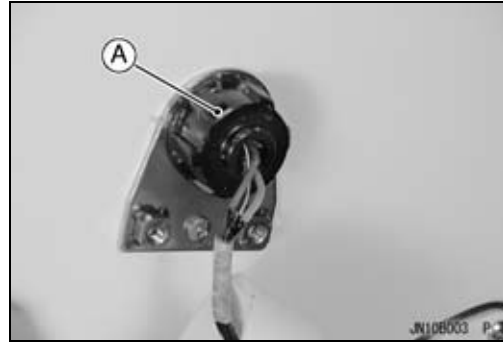
Sensors

Speed Sensor Removal/Installation

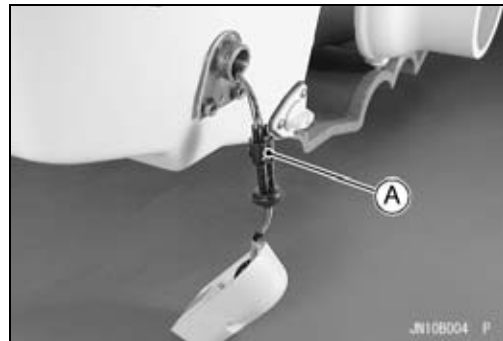
- Unscrew the mounting bolts [A] and remove the speed sensor assembly [B].



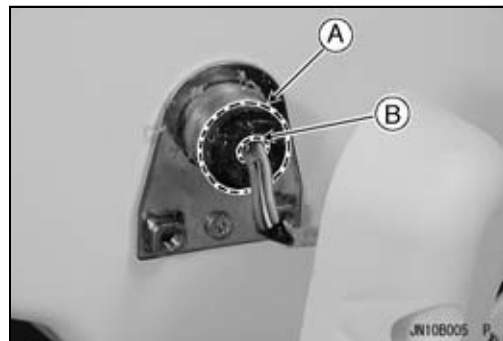
- Unscrew the cap [A].



- Pull out the speed sensor connector [A] and disconnect it.



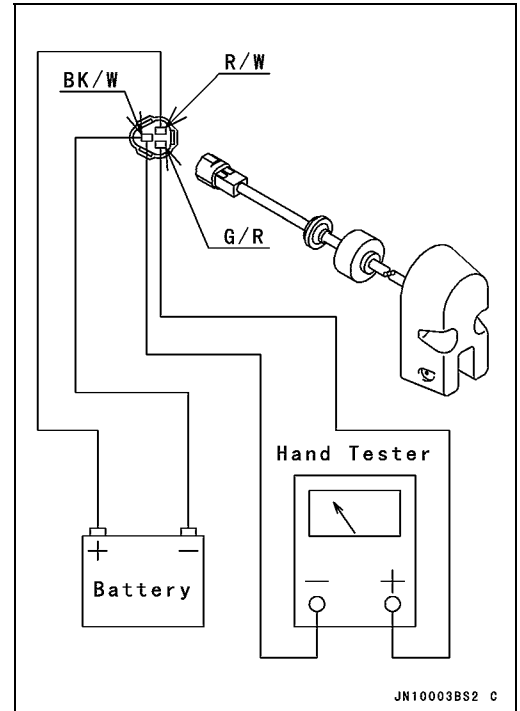
- When installing the speed sensor assembly, note the following.
 - Apply silicone sealant around the grommet [A] and lead wires [B].



Sensors

Speed Sensor Inspection

- Remove the speed sensor.
- Connect the battery and tester leads to the sensor as shown.



- Rotate the waterwheel by hand slowly.
- Measure the output voltage of a speed sensor.
G/R (+), BK/W (-) → 0 ~ 10 V; twice a rotation (Rotate it slowly.)
 - ★ If the voltage does not rise from zero to about 10 volts twice a rotation, replace the sensor.



- Measure the output voltage of the sensor at higher speeds.
- Rotate the waterwheel in a fair speed by air.
G/R (+), BK/W (-) → approx. 5 V
 - ★ If the sensor voltage does not reach 5 volts when spun with compressed air, replace the sensor.



14-42 ELECTRICAL SYSTEM

Sensors

Oil Level Sensor Inspection

- Disconnect the oil level sensor 2-pin connector.
- Remove the oil level sensor out of the oil tank.
- Set the hand tester (ohmmeter) to the $\times 1 \text{ k}\Omega$ range.

Special Tool - Hand Tester: 57001-1394

- Connect the tester leads to the BK/W and BL leads to check the switching operation of the float.

Meter Reading

When the two floats are held downward [A]:

approx. $4 \text{ k}\Omega$

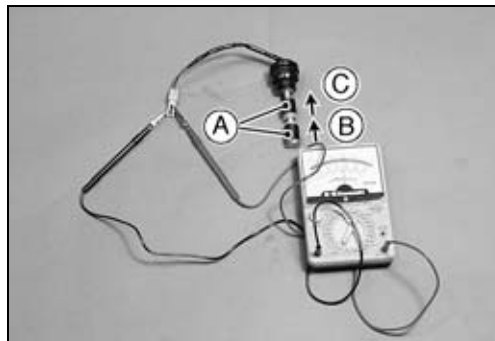
When one float is held upward [B]:

approx. $2 \text{ k}\Omega$

When the two floats are held upward [C]:

approx. 0Ω

- ★ The meter should read as specified. If it does not, replace the oil level sensor.



Fuel Level Sensor Inspection

- Open the front storage compartment cover.
- Disconnect the fuel level sensor 2-pin connector.
- Loosen the clamp, and remove the fuel level sensor out of the fuel tank.
- Set the hand tester (ohmmeter) to the $\times 1 \text{ k}\Omega$ range.

Special Tool - Hand Tester: 57001-1394

- Connect the tester leads the W/R and BK/W leads to check the switching operation of the float.

Meter Reading

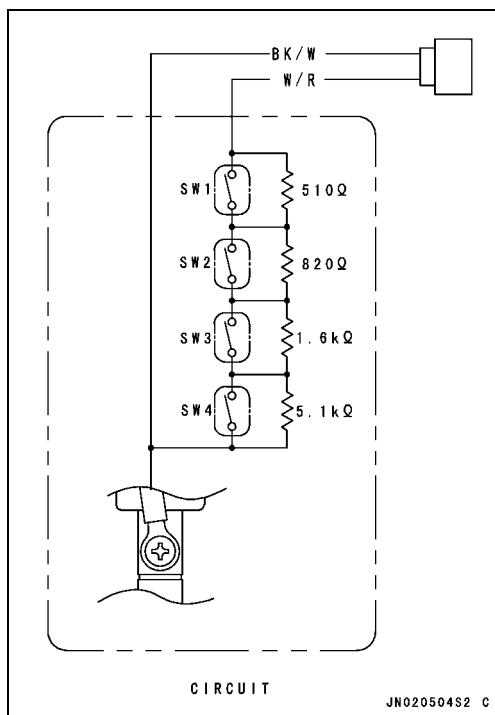
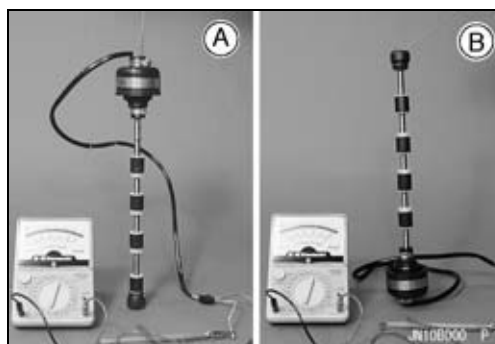
When sensor is held upright [A]:

approx. $8.03 \text{ k}\Omega$

When sensor is held upside down [B]:

approx. 0Ω

- ★ The meter should read as specified. If it does not, replace the fuel level sensor.



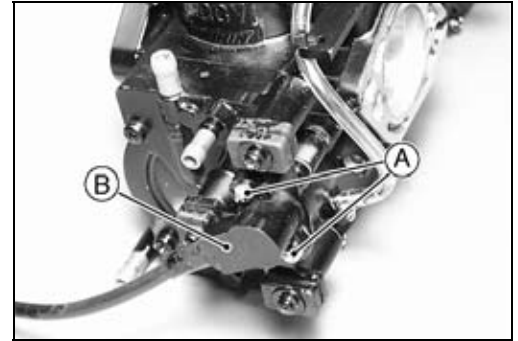
Sensors

Throttle Position Sensor Removal/Installation

CAUTION

Do not remove the throttle position sensor [B] unnecessarily.

- Remove the carburetor (see Fuel System).
- Unscrew the mounting screws [A] and remove the throttle position sensor [B].
- Be sure to adjust the throttle position sensor when installing (see Throttle Position Sensor Adjustment).



Throttle Position Sensor Inspection

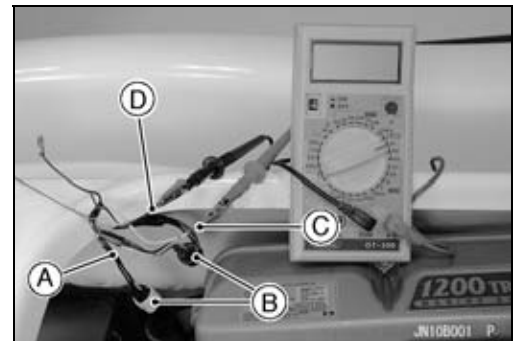
- Start the engine and warm it up thoroughly.

CAUTION

Do not run the engine without cooling water supply for more than 15 seconds or severe engine and exhaust system damage will occur.

- Check:
 - Idle Speed (see Fuel System chapter)
 - Battery Charging Condition (see this chapter)
- Turn the ignition switch off.
- Remove the throttle position sensor lead connector.
- Connect the adapter [A] between the connectors [B].

Special Tool - Throttle Sensor Setting Adapter: 57001-1400
- Connect the hand tester to the adapter.
 - Hand Tester (+) → Y Lead [C] (Wire Color of TPS)
 - Hand Tester (-) → BK Lead [D] (Wire Color of TPS)
- Start the engine.



CAUTION

Do not run the engine without cooling water supply for more than 15 seconds or severe engine and exhaust system damage will occur.

14-44 ELECTRICAL SYSTEM

Sensors

- Check the sensor output voltage with the engine idling.

Throttle Position Sensor Output Voltage

Standard: 0.73 ~ 0.83 V (When engine is idling.)

- ★ If it is not within the specified voltage, adjust the throttle position sensor position (see Throttle Position Sensor Adjustment).
- ★ If it is specified voltage, go to next test.
- Stop the engine.
- Turn on the ignition switch.
- Check the sensor output voltage with the throttle fully open.

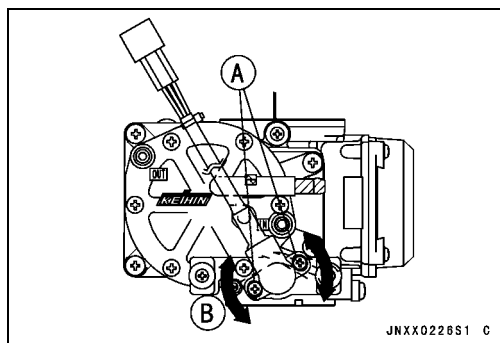
Throttle Position Sensor Output Voltage

Standard: 3.57 ~ 3.94 V
(When throttle is fully opened.)

- ★ If it is not within the specified voltage, adjustment the sensor (see Throttle Position Sensor Adjustment).
- ★ If the sensor cannot be adjusted, replace sensor.

Throttle Position Sensor Adjustment

- Check the throttle position sensor output voltage (see Throttle Position Sensor Inspection).
- ★ If the output voltage is out of the range, adjust it as follows.
- Loosen the sensor mounting screws [A].
- Adjust [B] the position of the sensor until the output voltage is within the specified range.



Water Temperature Sensor Inspection

- Remove the water temperature sensor.
- Suspend the sensor [A] in a container of water so that the temperature-sensing projection is submerged.
- Suspend an accurate thermometer [B] in the water.

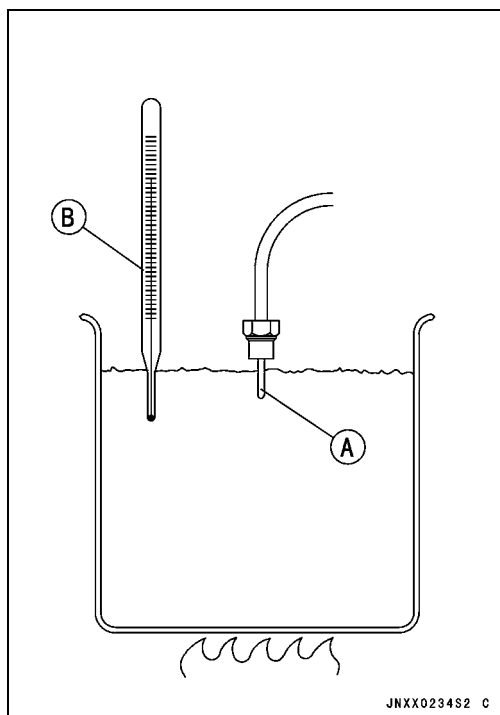
NOTE

○ The sensor and thermometer must not touch the container side or bottom.

- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using the hand tester, measure the internal resistance of the sensor at the temperatures shown in the table.
- ★ If the hand tester does not show the specified values, replace the sensor.

Water Temperature Sensor Resistance

Water Temperature	Sensor Resistance
20° C (68° F)	approx. 2759 kΩ
50° C (122° F)	approx. 635 kΩ
90° C (194° F)	approx. 121.9 kΩ
100° C (212° F)	approx. 85.3 kΩ



Sensors

Intake Air Temperature Sensor Inspection

- Remove the intake air temperature sensor.
- Suspend the sensor [A] in a container of water.
- Suspend an accurate thermometer [B] in the water.

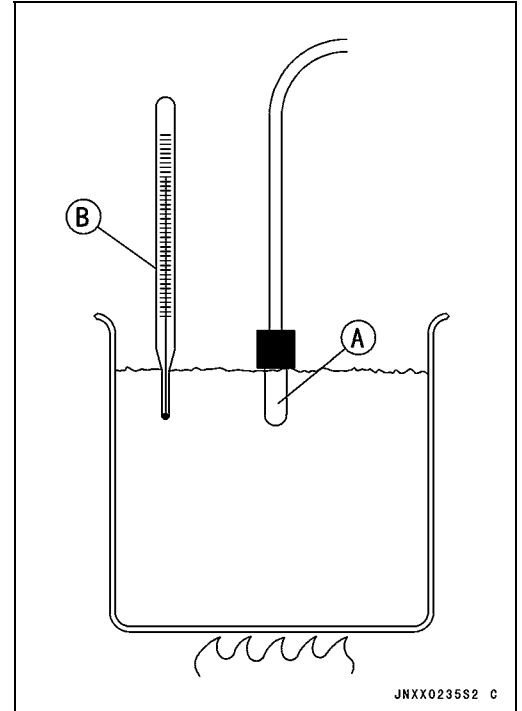
NOTE

○ *The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.
- Using the hand tester, measure the internal resistance of the sensor at the temperatures shown in the table.
- ★ If the hand tester does not show the specified values, replace the sensor.

Intake Air Temperature Sensor Resistance

Water Temperature	Sensor Resistance
10° C (50° F)	approx. 3.74 kΩ
20° C (68° F)	approx. 2.47 kΩ
50° C (122° F)	approx. 0.833 kΩ
70° C (158° F)	approx. 0.448 kΩ



14-46 ELECTRICAL SYSTEM

Multifunction Meter

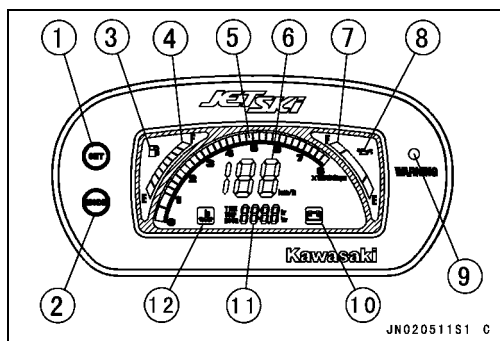
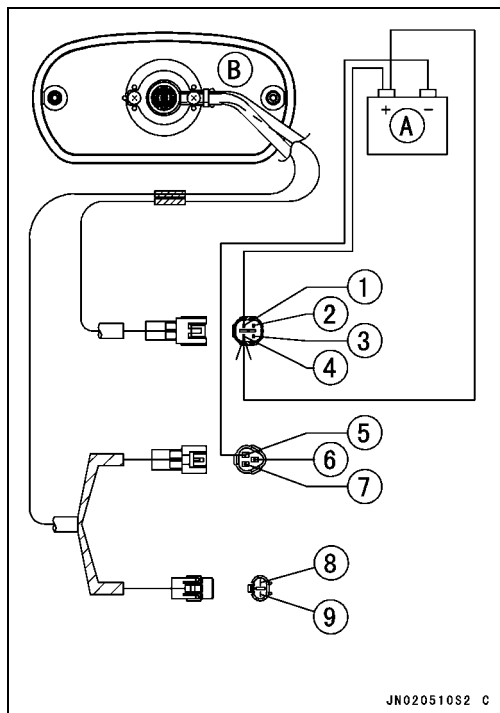
Display Function Inspection

- Using the auxiliary wires, connect the 12 V battery [A] to the meter unit [B] connector as follows.
 - Connect the battery positive terminal to the terminal [1].
 - Connect the battery negative terminal to the terminal [5].
- [1] R/BK, Battery (+)
- [2] BL, Oil Level Sensor
- [3] W/R, Fuel Level Sensor
- [4] R, Ignition Switch (+)
- [5] BK/W, Ground (-)
- [6] R/Y, Water Temperature Sensor
- [7] GY, Tachometer Pulse
- [8] G/R, Speed Sensor
- [9] R/W, Speed Sensor Power Source (+)

Battery Voltage Range: 10 ~ 16 V

- Check that when the battery positive terminal is connected to the terminal [4] using the auxiliary wire, all the LCD segments and LED warning light appear for seconds.
- Check that when the terminals are disconnected, all the LCD segments and LED warning light disappear.
- ★ If the LCD segments and LED warning light will not appear, replace the meter assembly.

- [1] SET Button
- [2] MODE Button
- [3] Fuel Symbol
- [4] Fuel Level Gauge
- [5] Tachometer
- [6] Speedometer
- [7] Oil Level Gauge
- [8] Engine Oil Symbol
- [9] LED Warning Light
- [10] Battery Symbol
- [11] Clock/Time/Trip/Hour Meter
- [12] Heat Symbol



CAUTION

Do not drop the meter unit. Do not short the terminals.

If the multifunction meter displays incorrectly while the engine is running, first disconnect the (-) battery terminal lead and reconnect it again to recover the meter display.

Then, check to see that the standard plugs and/or plug caps are installed. Install only the standard plugs and/or plug caps. The resistors are embedded in both parts.

Multifunction Meter

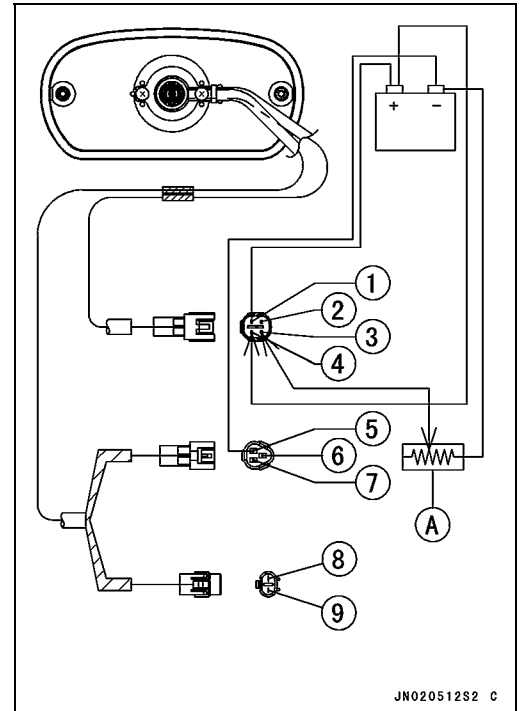
Fuel Level Gauge/Symbol/FUEL Characters/Warning Light Inspection

- Connect the 12 V battery and terminals in the same manner as specified in the "Display Function Inspection".
- Connect the variable rheostat [A] to the terminal [3] as shown.
- Check that the number of segments matches the resistance value of the variable rheostat.

Resistance Value (Ω)	Display Segments
8030	0*
2930	1 ~ 2
1330	3 ~ 4
510	5 ~ 6
0	7 ~ 8

*: The LED warning light, fuel symbol and FUEL characters flash at the same time.

- If any display function does not work, replace the meter assembly.



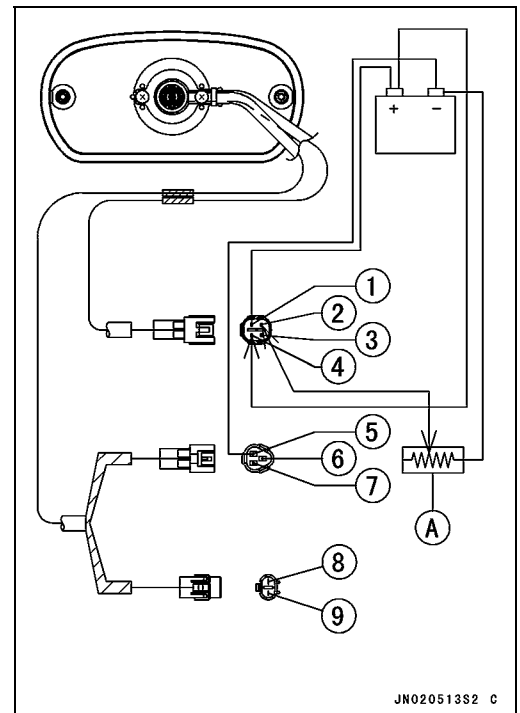
Oil Level Gauge/Symbol/OIL Characters/Warning Light Inspection

- Connect the 12 V battery and terminals in the same manner as specified in the "Display Function Inspection".
- Connect the variable rheostat [A] to the terminal [2] as shown.
- Check that the number of segments matches the resistance value of the variable rheostat.

Resistance Value (Ω)	Display Segments
4000	1*
2000	2
0	3

*: The LED warning light oil symbol, OIL characters and one segment flash at the same time.

- If any display function does not work, replace the meter assembly.

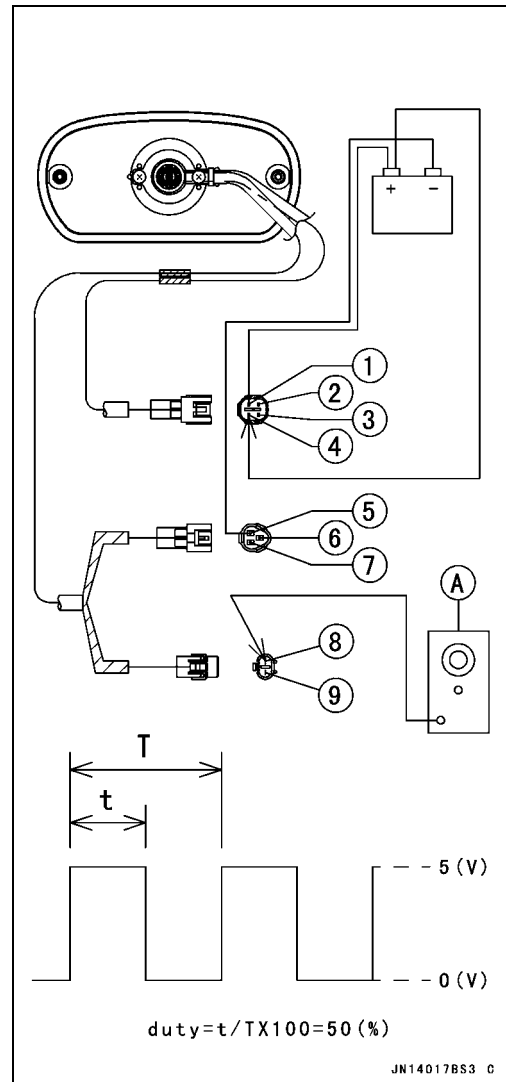


14-48 ELECTRICAL SYSTEM

Multifunction Meter

Speedometer Inspection

- Connect the 12 V battery and terminals in the same manner as specified in the “Display Function Inspection”.
- The speed equivalent to the input frequency is indicated in the oscillator [A] if the square wave (illustrated as shown) would be input into the terminal [8].
- Indicates approximately 60 mph in case the input frequency would be approximately 280 Hz.
- Indicates approximately 60 km/h in case the input frequency would be approximately 175 Hz.

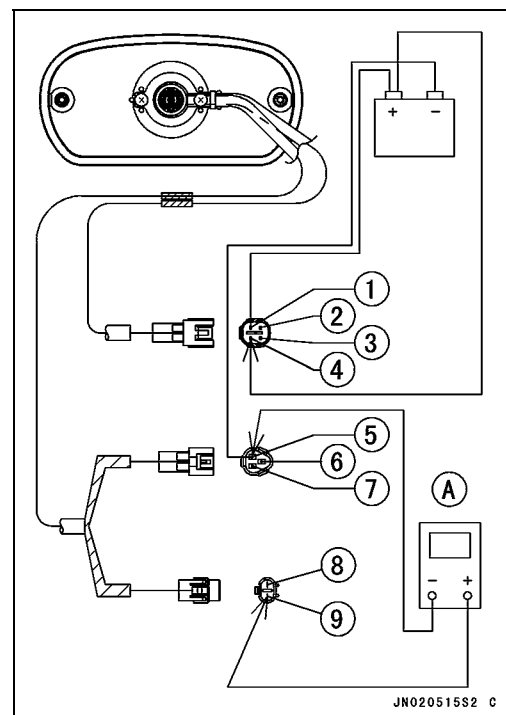


- If the oscillator is not available, the speedometer can be checked as follows.
- Install the meter unit.
- Turn on the ignition switch.
- Rotate the waterwheel by hand.
- Check that the speedometer shows the speed.
- ★ If the speedometer does not work, check the speed sensor electric source voltage and speed sensor.



Multifunction Meter*Speed Sensor Electric Source Inspection*

- Connect the 12 V battery and terminals in the same manner as specified in the “Display Function Inspection”.
- Set the hand tester [A] to the DC25 V range and connect it to the terminals [5] and [9].
- ★ If the voltage is less than 7 V, replace the meter assembly.

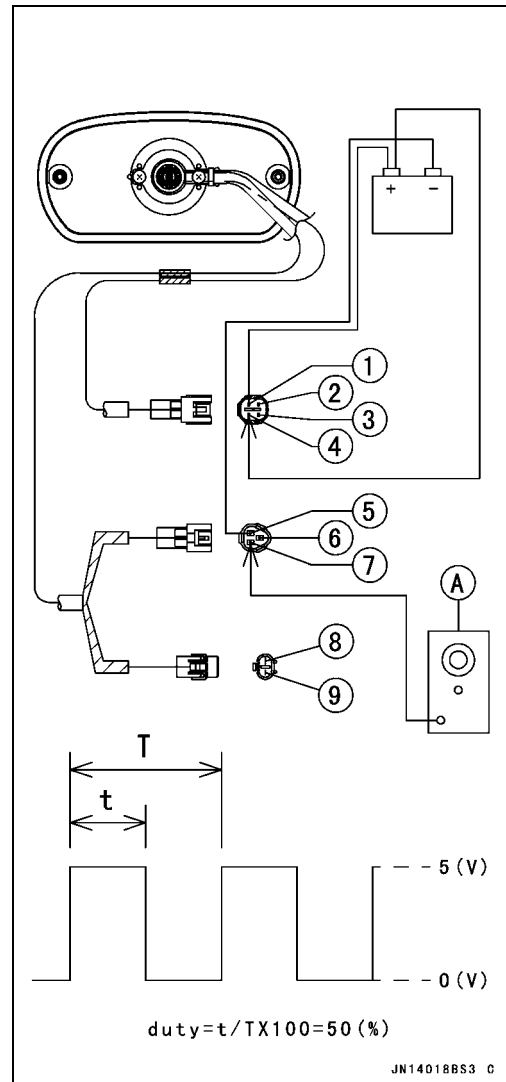


14-50 ELECTRICAL SYSTEM

Multifunction Meter

Tachometer Inspection

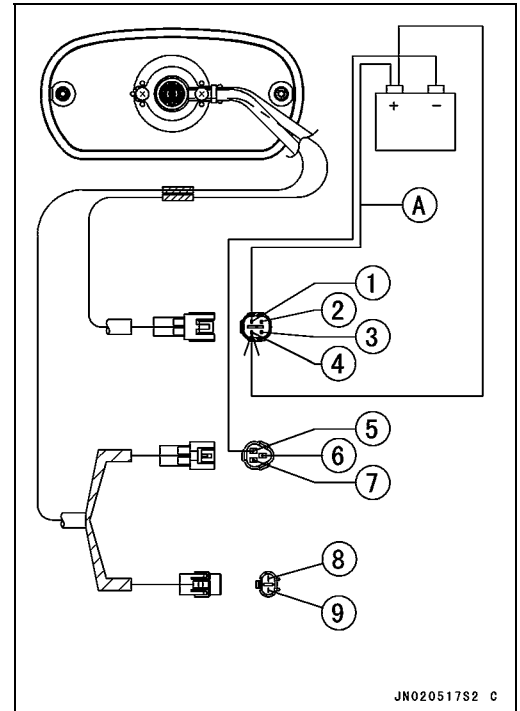
- Connect the 12 V battery and terminals in the same manner as specified in the “Display Function Inspection”.
- The revolutions per minute (rpm) equivalent to the input frequency is indicated in the oscillator [A] if the square wave (illustrated as shown) would be input into the terminal [7].
- The tachometer indicates approximately 3000 r/min (rpm) in case the input frequency would be approximately 100 Hz.
- ★ If the tachometer does not work normally, replace the meter assembly.



Multifunction Meter

Battery Inspection	Symbol/bAt	Characters/Warning	Light

- Connect the 12 V battery and terminals in the same manner as specified in the “Display Function Inspection”.
 - Check that the battery symbol/bAt characters/warning light flash when the input voltage to the terminal [A] is lowered to 12 ± 0.1 volts or less. And check that the meter returns in the state of normality when the input voltage to the black lead terminal is raised to 12.5 V or more.
- ★If any display function does not work, replace meter assembly.

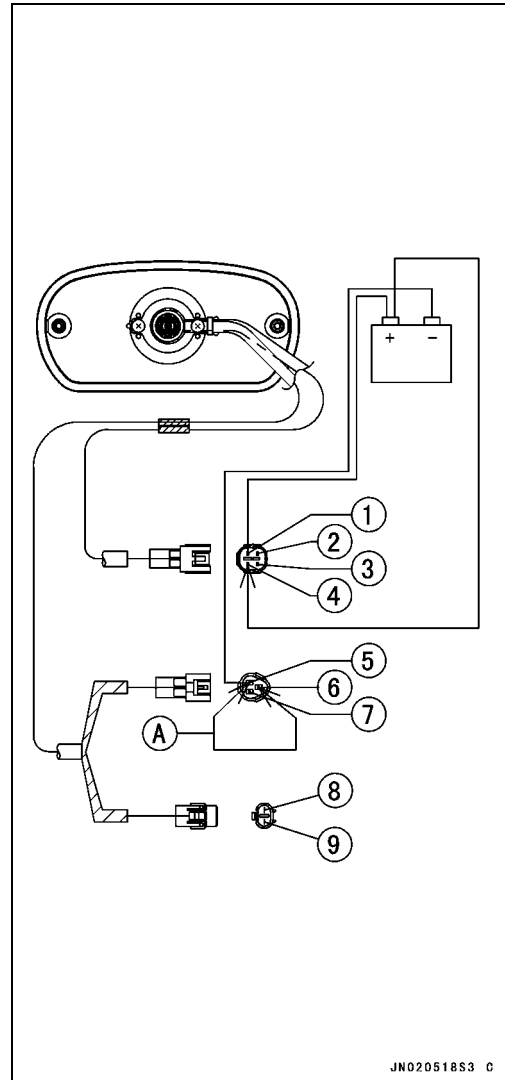


14-52 ELECTRICAL SYSTEM

Multifunction Meter

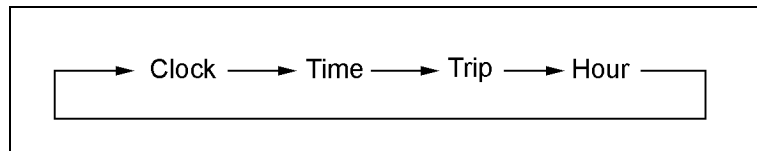
Heat Symbol/HEAt Characters/Warning Light Inspection

- Connect the 12 V battery and terminals in the same manner as specified in the “Display Function Inspection”.
 - Check that the heat symbol/HEAt characters/warning light flash when the water temperature sensor terminal [6] is connected to the ground terminal [5] using auxiliary wire [A] as shown.
 - Check that the heat symbol/HEAt characters/warning light disappear when the terminals are disconnected.
- ★If any display function does not work, replace meter assembly.



MODE/SET Button Inspection

- Check that when the MODE button is pushed and held continuously, the display rotates through the four modes.



- Indicate the clock mode.
 - Check that when the SET button is pushed for more than two seconds, the meter display turns to the clock set mode.
- ★If the display function does not work, replace the meter assembly.
- Indicate the time mode.
 - Check that when the SET button is pushed for more than two seconds, the meter display turns to “00:00”.
- ★If the display function does not work, replace the meter assembly.

Multifunction Meter

- Indicate the trip mode.
- Check that when the SET button is pushed for more than two seconds, the meter display turns to “000.0”.
- ★ If the display function does not work, replace the meter assembly.

14-54 ELECTRICAL SYSTEM

Switches

Switch Inspection

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

Ignition Switch

	R/BL	○
ON	○ ————— ○	○
OFF		

Start Switch

	Y/R	○
PUSH	○ ————— ○	○

Stop Switch

	BK/W	W
FREE		
PUSH	○ ————— ○	○

Tether Switch

TETHER CORD	BK/W	W	Y/R	○
SET			○ ————— ○	○
PULL	○ ————— ○			

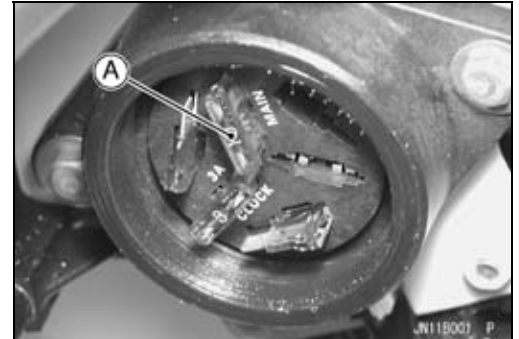
Fuse

Inspection

- Remove the fuse plug [A].



- Take out the fuse [A].



- Inspect the fuse element.

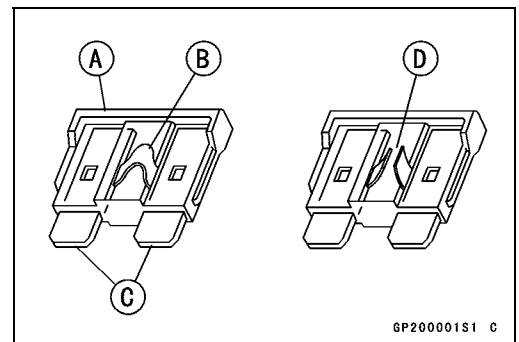
★ If it blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]

Fuse Element [B]

Terminals [C]

Blown Element [D]



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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15-2 STORAGE

Preparation for Storage

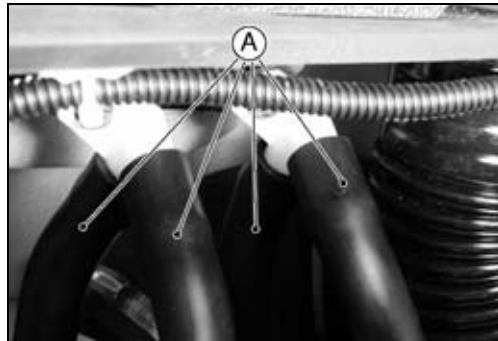
During the winter, or whenever the watercraft will not be in use for a long period of time, proper storage is essential. It consists of checking and replacing missing or worn parts; lubricating parts to ensure that they do not become rusted; and, in general, preparing the watercraft so that when the time comes to use it again, it will be in top condition.

Cooling System

- Clean the cooling system (see Cooling System Flushing in the Cooling and Bilge Systems chapter).

Bilge System

- Clean the bilge system (see Bilge System Flushing in the Cooling and Bilge Systems 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.
[A] Siphon Hose
- Clean the fuel filter screen (see Fuel Filter Screen Cleaning in the Periodic Maintenance chapter).



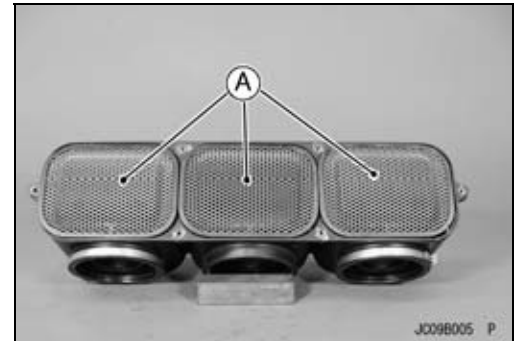
Preparation for Storage

- Inspect/replace the fuel filter (see Fuel Filter Inspection in the Periodic Maintenance chapter).
- 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 seconds running periods.
- Pull the lanyard key off the stop button and turn the ignition switch off.
- Leave the fuel filler cap loose to prevent condensation in the tank.

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 intake cover assembly from the carburetor (see Flame Arrester Removal in the Fuel System chapter).
- 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 arrester.
- Reinstall the air intake cover assembly (see Flame Arrester Installation in the Fuel System chapter).



Engine

- Remove the spark plugs and push the plug caps fully onto the plug cap holder on the cylinder head.
- 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.

15-4 STORAGE

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.

CAUTION

Do not allow any soda solution to enter the battery.

- 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 General Lubrication in the Periodic Maintenance chapter).

General

- Wash the engine compartment with fresh water and remove the drain screw 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 seat, or block the seat up with 10 mm (0.39 in.) 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 General 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 source of flame or spark; this includes any appliance with a pilot light.

- After refueling and before starting the engine, tilt the seat 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.

15-6 STORAGE

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 seat making sure it is locked.

Troubleshooting

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16-2 TROUBLESHOOTING

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
- Pluse line leaking or clogged
- Fuel filter screen clogged
- Vent line clogged
- Faulty fuel pump

Inside Carburetor

- Carburetor diaphragm damaged
- Water in carburetor
- Float arm not adjusted

Battery/Starter System

- Faulty magneto solenoid switch
- Battery voltage low
- Starter motor brushes worn
- Faulty starter motor clutch
- Ignition switch turned OFF 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
- Float arm not adjusted

Electrical System

- Faulty or fouled spark plug
- Poor wiring connection
- Faulty magneto

Troubleshooting

Engine misfires, does not run smoothly**Fuel System****Fuel mixture too lean****Fault in Carburetor**

- 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

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

Engine Lubrication System

- Oil line clogged
- Faulty oil pump

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

16-4 TROUBLESHOOTING

Troubleshooting

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
- Main jet 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 or engine oil
- Exhaust gas leak in engine compartment

Overheating

- Ignition wrong
- Carburetor not adjusted
- Flame arrester or exhaust system clogged
- Carbon accumulation in combustion chamber
- Wrong type of gasoline or oil
- Obstruction in oil pump hoses
- 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

- Intake 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

- Steering maladjusted
- Bushings damaged or cracked
- Steering shaft bent
- No lubricant on steering pivot
- Steering cable damaged or improperly routed

MODEL APPLICATION

Year	Model	Beginning Hull No.
2002	JT1200-A1	KAW50001□202
2003	JT1200-A2	KAW10001□203

□ : This digit in the hull number changes from one machine to another.



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