Kawasaki

JET SKI® watercraft

1100ZXi

JET SKI® Watercraft Service Manual

Quick Reference Guide

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

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

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LIST OF ABBREVIATIONS

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

Read OWNER'S MANUAL before operating

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 preparing this manual, we divided the product into its major systems. These systems became the manual's chapters. All information for a particular system from adjustment through disassembly and inspection is located in a single chapter.

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.

The Periodic Maintenance Chart is located in the General Information chapter. The chart gives a time schedule for required maintenance operations.

If you want spark plug information, for example, go to the Periodic Maintenance Chart first. The chart tells you how frequently to clean and gap the plug. Next, 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 Spark Plug 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

1

Table of Contents

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:

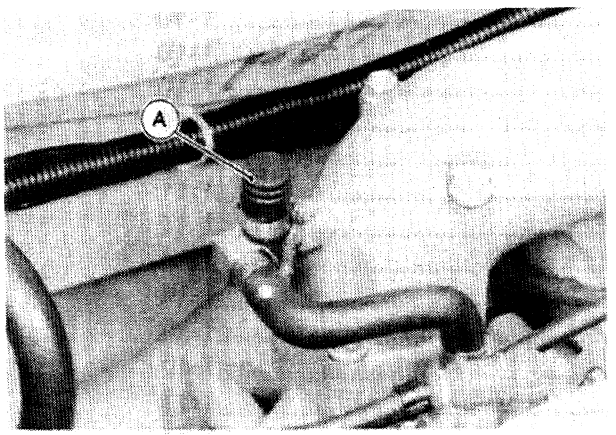
(1) Adjustments

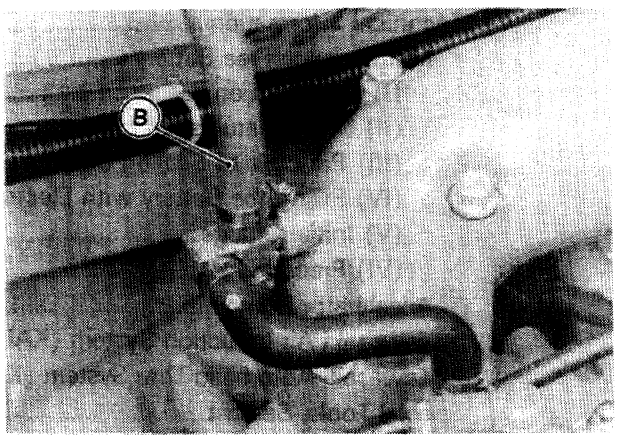
Adjustments shall be made in accordance with the Periodic Maintenance Chart or whenever trouble-shooting or presence of symptoms indicate that adjustments may be required. Whenever running of the engine is required during maintenance it is best to have the watercraft in water.

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

(2) Auxiliary Cooling

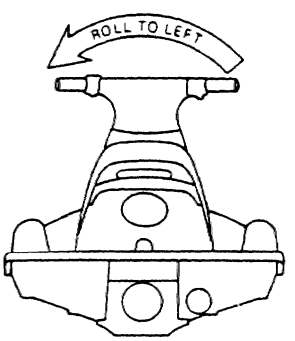
An auxiliary cooling supply may be used if the watercraft cannot be operated in water during adjustments. If possible, always operate the watercraft in water rather than use an auxiliary cooling supply.





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

CAUTION
Insufficient cooling supply will cause the engine and/or exhaust system to overheat and severe damage will occur. Excessive cooling supply may kill the engine and flood the cylinders, causing hydraulic lock. Hydraulic lock will cause severe damage to the engine. If the engine dies while using an auxiliary cooling supply, the water must be shut off immediately. **Always turn the boat on its left side. Rolling to the right side can cause water in the exhaust system to run into the engine, with possible engine damage.**



(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 Stoddard 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).

(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.

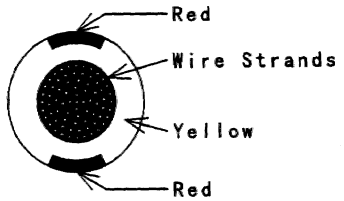
(18) Lubrication

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)	Color Indicated on the Wire	Color Indicated on the Wiring Diagram
	Yellow/Red	Y/R

GB020601W1 C

(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.

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

(22) Service Data

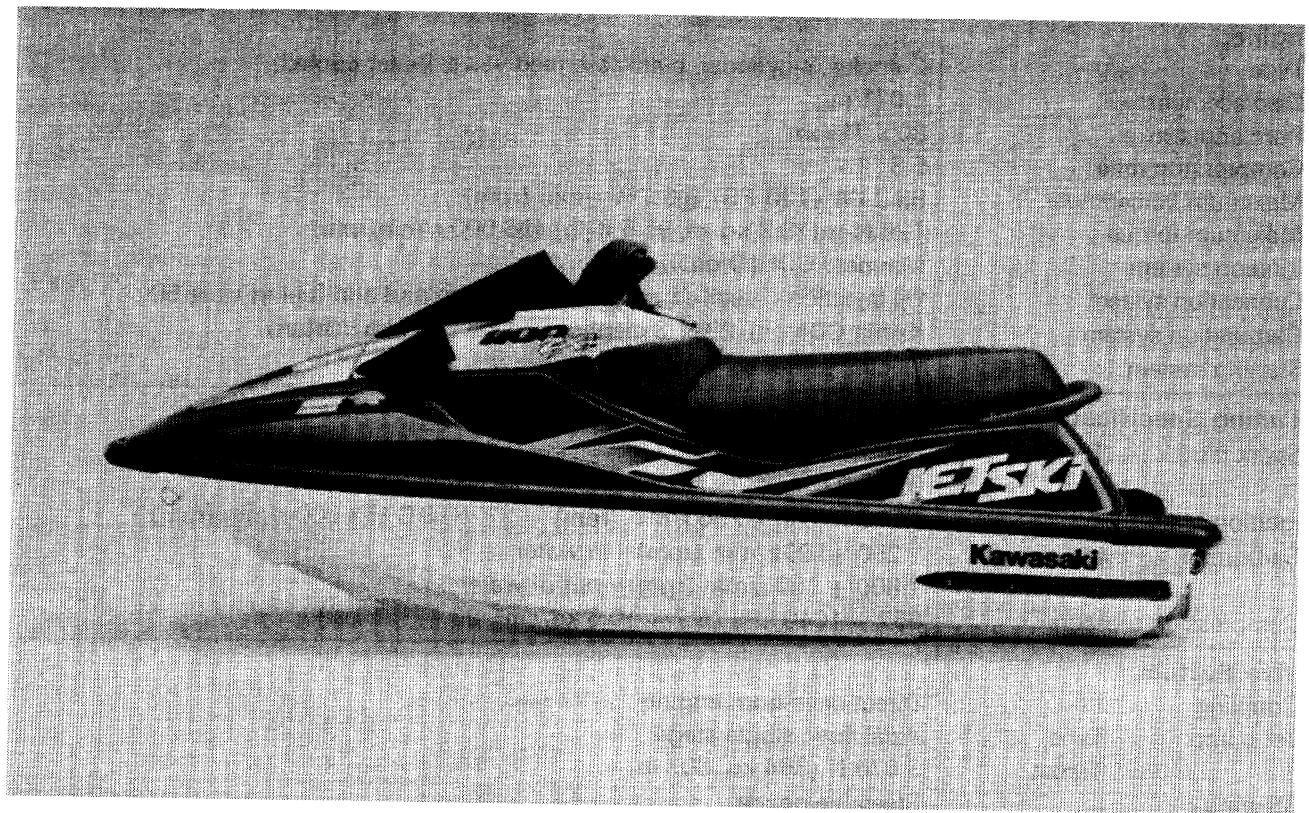
Numbers of service data in this text have following meanings:

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

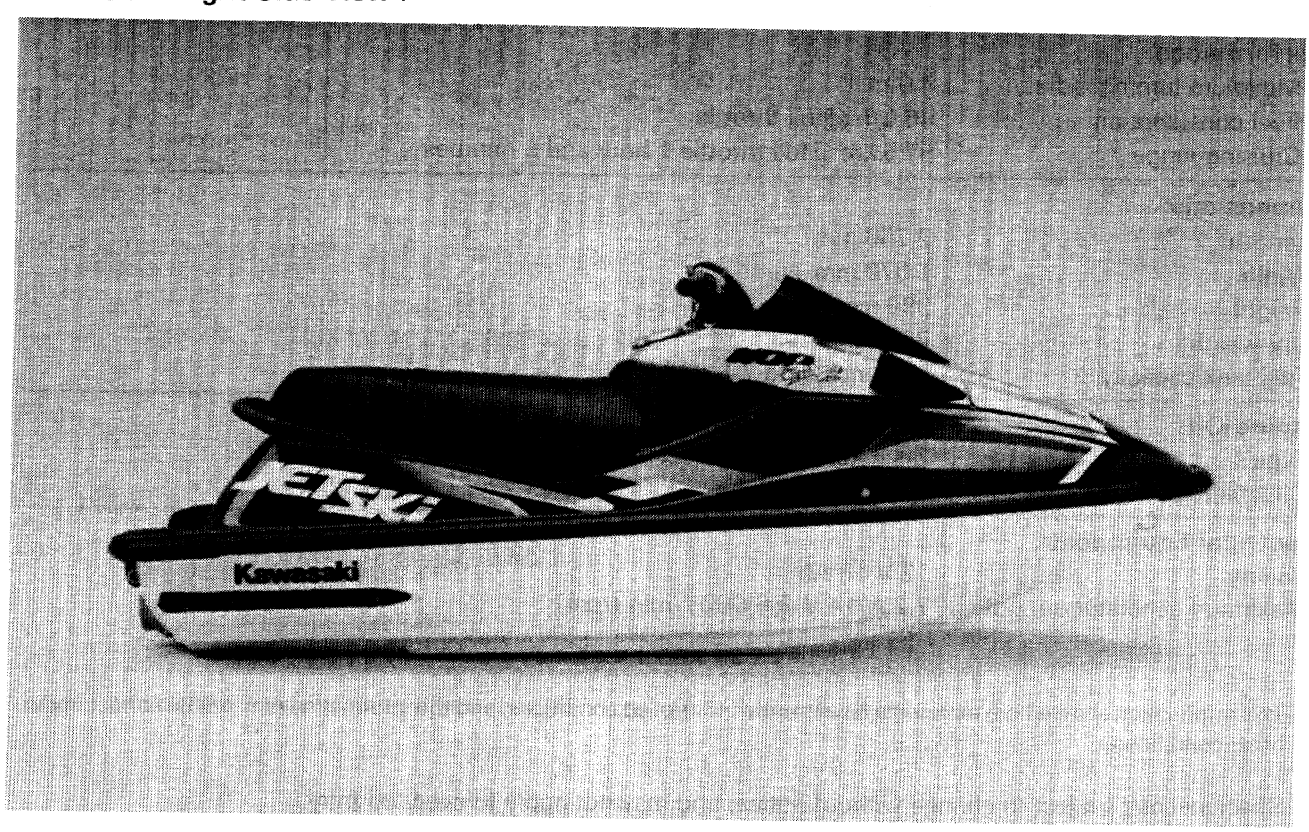
"Service Limits": Indicate the usable limits. If the measurement shows excessive wear or deteriorated performance, replace the damaged parts.

Model Identification

JH1100-A1 Left Side View :



JH1100-A1 Right Side View :



General Specifications

Items		JH1100-A1
Engine:		
Type		2-stroke, 3-cylinder, crankcase reed valve, water cooled
Displacement		1 071 mL
Bore and stroke		80 x 71 mm
Compression ratio		5.8 : 1
Maximum horsepower		88.2 kW (120 PS) @6 750 r/min (rpm)
Maximum torque		129 N-m(13.2 kg-m, 95.5 ft-lb) @6 000 r/min(rpm)
Ignition system		Magneto CDI (Digital)
Lubrication system		Oil injection (break-in period: Oil injection and and fuel mixture 50 : 1)
Carburetion system		Keihin CDK-38-29 × 3 diaphragm type (33 mm venturi)
Starting system		Electric starter
Tuning Specifications:		
Spark plug:	Type	NGK BR9ES
	Gap	0.7 ~ 0.8 mm
Ignition timing		17° BTDC @1 250 r/min (rpm) ~ 27° BTDC @3 000 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		657 ~ 1040 kPa (6.7 ~ 10.6 kg/cm², 95 ~ 151 psi)
Drive System:		
Coupling		Direct drive from engine
Jet pump:	Type	Axial flow, single stage
	Thrust	3 570 N (364 kg, 803 lb)
Steering		Steerable nozzle
Braking		Water drag
Performance:		
†Minimum turning radius		4.0 m
†Fuel consumption		46 L/h @full throttle
†Cruising range		97.5 km @full throttle 1 hour and 5 minutes
Dimensions:		
Length		2 760 mm
Width		1 070 mm
Height		999 mm
Dry weight		265 kg
Fuel tank capacity		52 L including 7 L reserve
Engine Oil:		
Type		2-stroke, N.M.M.A. Certified for Service TC-WII or TC-W3
Oil tank capacity		3.3 L
Electrical Equipment:		
Battery		12 V 18 Ah
Maximum generator out put		7.2 A/14 V @6 000 r/min (rpm)

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

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

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.

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Fuel System:				
Carburetor Mounting Bolts	8.8	0.9	78 in-lb	L
Intake Manifold Mounting Nuts	98	1.0	87 in-lb	
Air Intake Cover Bolts	7.8	0.8	69 in-lb	L
Arrester Case Stay Mounting Bolts	8.8	0.9	78 in-lb	L
Throttle Case Mounting Screws	3.9	0.4	35 in-lb	
Engine Lubrication System				
Air Bleeding Bolt	4.9	0.5	43 in-lb	
Oil Pump Mounting Bolts	8.8	0.9	78 in-lb	L
Exhaust System				
Exhaust Pipe Mounting Bolts	49	5.0	36	L
Water Pipe Joints	12	1.2	8.5	SS
Exhaust Manifold Mounting Nuts	20	2.0	14.5	S
Expansion Chamber Mounting Bolts	49	5.0	36	L
Engine Top End:				
Cylinder Head Nuts	29	3.0	22	S
Water Pipe Joint	12	1.2	8.5	SS
Cylinder Base Nuts	34	3.5	25	
Cable Holder Mounting Bolts	20	2.0	14.5	L
Engine Removal/Installation:				
Engine Mounting Bolts:	44	4.5	33	
Engine Bed Mounting Bolts	36	3.7	27	L
Engine Mount Bolts	16	1.6	11.6	L
Engine Bottom End:				
Flywheel Bolt	127	13.0	94	L
Stator Mounting Bolts	12	1.2	8.5	
Coupling	127	13.0	94	SS
Magneto Cover Mounting Bolts	8.8	0.9	78 in-lb	L
Crankcase Bolts-6 mm Dia.	8.8	0.9	78 in-lb	L,S
Crankcase Bolts-8 mm Dia.	29	3.0	22	L,S
Magneto Cooling Cover	8.8	0.9	78 in-lb	L
Magneto Cover Stud	–	–	–	L
Cooling and Bilge Systems:				
Water Pipe Joint	12	1.2	8.5	SS
Drive System:				
Coupling Cover Nuts	–	–	–	L
Coupling	39	4.0	29	SS
Drive Shaft Holder Mounting Bolts	22	2.2	16.0	L

Fastener	Torque			Remarks
	N-m	kg-m	ft-lb	
Pump and Impeller:				
Steering Nozzle Pivot Bolts	19	1.9	13.5	
Pump Outlet Mounting Bolts	–	–	–	L
Pump Cap	3.9	0.4	35 in-lb	
Impeller	98	10.0	72	
Pump Mounting Bolts	22	2.2	16.0	
Pump Cover Mounting Bolts	7.8	0.8	69 in-lb	L
Grate Mounting Bolts	–	–	–	L
Steering:				
Handlebar Clamp Bolts	16	1.6	11.5	L
Steering Neck Mounting Bolts	16	1.6	11.5	L
Steering Holder Mounting Bolts	16	1.6	11.5	
Steering Shaft Lock Nut	39 ~ 49	5 ~ 6	29 ~ 36	
Steering Cable Nuts	39	4.0	29	
Trim Cable Nut	39	4.0	29	
Hull/Engine Hood:				
Bumper Bushings	–	–	–	L
Bumper Mounting Nuts	–	–	–	L
Electrical System:				
Electric Case Bolts	7.8	0.8	69 in-lb	L
Electric Case Mounting Bolts	7.8	0.8	69 in-lb	L
Electric Case Connector Mounting Bolts	8.8	0.9	78 in-lb	L
CDI Igniter Mounting Bolts	7.8	0.8	69 in-lb	L
Spark Plugs	27	2.8	20	
Starter Motor Mounting Bolts	8.8	0.9	78 in-lb	L
Ignition Coil Mounting Bolts	7.8	0.8	69 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	
Battery Ground Lead Mounting Bolt	8.8	0.9	78 in-lb	L
Flywheel Bolt	125	13.0	94	L
Stator Mounting Bolts	12	1.2	8.5 ft-lb	

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	kg-m	ft-lb
6	5.9 ~ 8.8	0.60 ~ 0.90	52 ~ 78 in-lb
8	16 ~ 22	1.6 ~ 2.2	11.6 ~ 15.9
10	30 ~ 41	3.1 ~ 4.2	22 ~ 30

Periodic Maintenance Chart

NOTE

○ *Complete the Pre-Ride Checklist before each outing.*

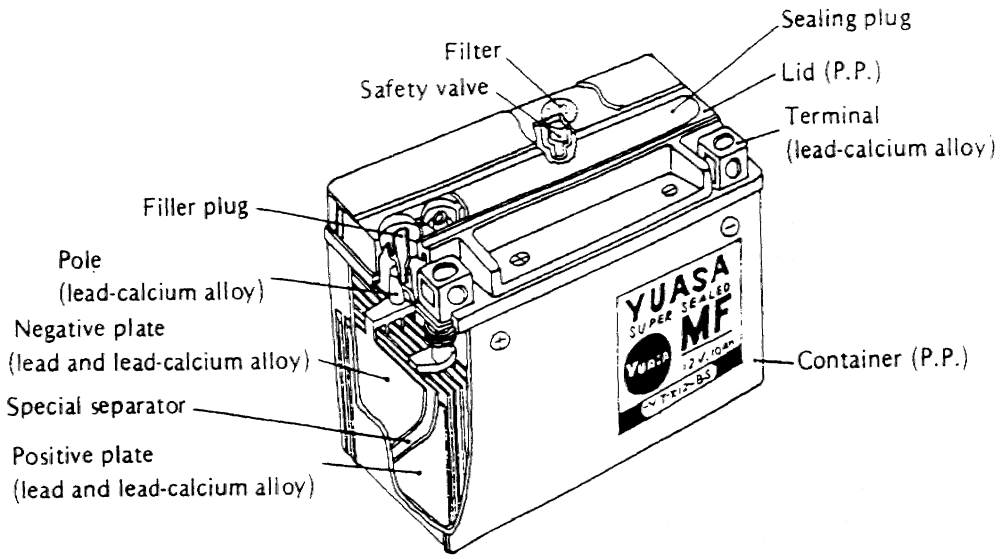
Description \ Frequency	Initial 10 Hours	Every 25 Hours	Every 100 Hours
Check all hose clamps, nuts, bolts, and fasteners	●	●	
Torque cylinder head nuts	●	●	
Lubricate throttle cable fitting and choke cable fitting at carburetor		●	
Lubricate choke cable and throttle cable and throttle cable fitting at throttle case.		●	
Clean and gap spark plugs (replace if necessary)		●	
Lubricate steering cable / trim cable ball joints and steering nozzle / trim nozzle pivots		●	
Lubricate handlebar pivot (disassemble)		●	
Clean fuel filter screens		●	
Inspect/replace fuel filter			●
Adjust carburetor		●	
Flush bilge line and filter		●	
Flush cooling system (after each use in salt water)		●	
Inspect/clean flame arrester		●	
Inspect impeller blade for damage (remove)			●
Inspect/replace coupling damper		●	
Inspect steering cable / trim cables			●

Technical Information

Maintenance Free Battery

A maintenance free battery is installed in this model. The maintenance free battery is a sealed type, and so the electrolyte level check and topping-up cannot be performed.

(I) Construction



(II) Main Features

1) Maintenance free..... It is not necessary to check the electrolyte level and top-up the electrolyte.
2) No electrolyte leakage..... As the electrolyte is retained firmly in the special separators, there is no free electrolyte in the battery.
3) Instant activation system..... It can be used instantly after filling only the electrolyte without initial charge.
4) One-push motion electrolyte filling..... It is possible to fill the electrolyte by easy one-push motion.
5) Safety construction ..... If the battery internal pressure rises abnormally high, the safety valve opens to release the gas inside the battery to restore the normal pressure and prevent the battery from rupturing. After restoring the normal pressure, the safety valve closes and the battery is sealed again. Moreover, a ceramic filter is disposed on top of the safety valve under the lid to remove risk of ignition or explosion caused by fire from outside.
6) Compact and high performance..... No presence of free electrolyte allows the battery made lower in height, thus resulting in enhanced volume efficiency. Moreover, gas being absorbed inside the battery eliminates the need for a gas exhaust tube.
7) Strong charge/discharge characteristics .... It can amply withstand deep charge/discharge cycles.

(III) Principle of Sealing Structure

A lead-acid battery operates under the following chemical reaction:

$$\underset{\substack{\text{(Lead peroxide)}\\\text{Positive active material}}}{\overset{(+)}{PbO_2}} + \underset{\substack{\text{(Sulfuric acid)}\\\text{Electrolyte}}}{2H_2SO_4} + \underset{\substack{\text{(Spongy lead)}\\\text{Negative active material}}}{\overset{(-)}{Pb}} \underset{\text{Charge}}{\overset{\text{Discharge}}{\rightleftarrows}} \underset{\substack{\text{(Lead sulfate)}\\\text{Positive active material}}}{\overset{(-)}{PbSO_4}} + \underset{\substack{\text{(water)}\\\text{Electrolyte}}}{2H_2O} + \underset{\substack{\text{(Lead sulfate)}\\\text{Negative active material}}}{\overset{(+)}{PbSO_4}}$$

Normally in an ordinary lead-acid battery when it comes to an end of a charge, where the lead sulfate being a discharge product returns to lead peroxide and spongy lead, the charge current flowing thereafter is used exclusively to decompose electrolytically water from the electrolyte, thus resulting in generation of hydrogen gas from the negative plate and oxygen gas from the positive plate. The gases so generated are released out of the battery, causing the amount of electrolyte decreased to require occasional water replenishment.

A maintenance free battery, however, is so designed that, when it is overcharged, even if the positive plate is fully charged, the negative plate remains not fully turned to spongy lead. Therefore, even when the positive plate is overcharged generating oxygen gas, the negative plate is no fully charged, hence generating no hydrogen gas.

Moreover, the oxygen gas generated from the positive plate immediately reacts with the charged active material on the negative plate, and returns to water, with the ultimate result of no water loss.

Pb Negative active material (charged state)	+	1/2 O_2 Oxygen generated from positive plate	→	(PbO) Negative active material		
(PbO)	+	H_2SO_4 Electrolyte	→	$PbSO_4$ Negative active material (charged state)	+	H_2O Water

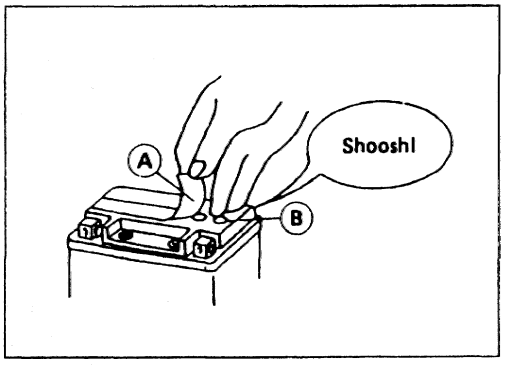
Thus, the negative plate is made as not to get fully charged. Even if the overcharge continues, the oxygen gas generated inside the battery is absorbed by the negative plate, a process called oxygen cycle, which theoretically prevents water loss, and allows the battery to be sealed.

(IV) Filling the Battery with Electrolyte

CAUTION

Do not remove the aluminum seal sheet sealing the filler ports until just before use.
Be sure to use the dedicated electrolyte container for correct electrolyte volume.

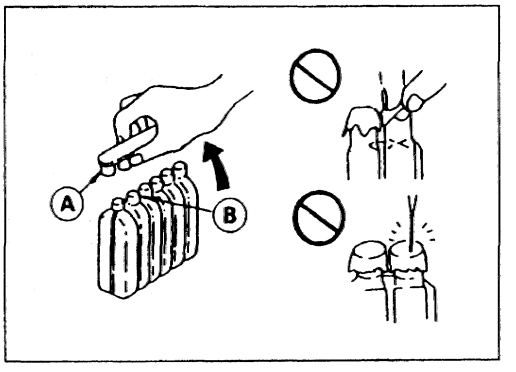
- Check to see that there is no peeling, tears or holes in the sealing sheet.
- Place the battery on a level surface.
- Remove the sealing sheet [A].
- ○When removing, check to hear an air-sucking sound "Shoosh!" from filler ports [B].



NOTE

○*A battery whose sealing sheet has any peeling, tears, holes, or from which the air-sucking sound was not heard requires a refreshing charge (initial charge).*

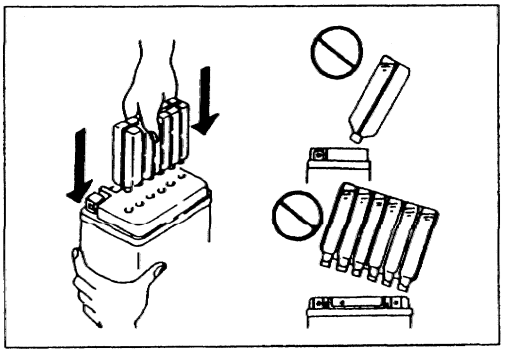
- Take the electrolyte container out of the vinyl bag.
- Detach the strip of caps [A] from the container.



NOTE

○*Do not discard the strip of caps because it is used as the battery plugs later.*
○*Do not peel back or pierce the sealed areas [B].*

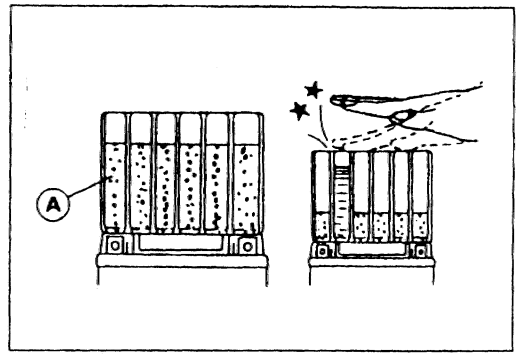
- Place the electrolyte container upside down with the six sealed areas in line with the six battery filler ports.
- Push the container down strongly enough to break the seals. Now the electrolyte should start to flow into the battery.



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.

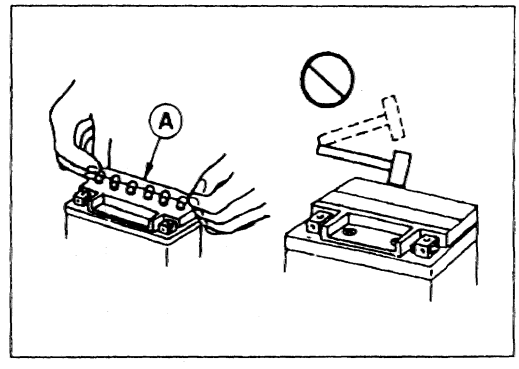


NOTE

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

CAUTION
Fill until the container is completely emptied.

●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 strip of caps [A] tightly into the filler ports until the strip is at the same level as the top of the battery.



NOTE

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

CAUTION
Once you install the strip of caps after filling the battery, never remove it, nor add any water or electrolyte.

(V) Initial Charge

While a maintenance free 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 higher than 12.5 V after 10 minutes of filling (Note 1), no initial charge is necessary.

Condition requiring initial charge	Charging method
At low temperatures (lower than 0°C)	1.8 A × 2 ~ 3 hours
Battery has been stored in high temperature and humidity.	1.8 A × 15 ~ 20 hours
Seal has been removed, or broken – peeling, tear or hole. (If you did not hear the air-sucking sound "Shoosh!" as you removed the seal.)	
Battery as old as 2 years or more after manufacture. Battery manufacturing date is printed on battery top. Example) 12 (Day) 10 (Month) 93 (Year) T1 (Mfg. location)	

Note 1 : Terminal voltage – To measure battery terminal voltage, use a digital voltmeter.

(VI) 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 sealing plug 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 the Electrical System chapter).
   When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the 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 sealing plug during refresh charge. If by chance an excessive amount of gas is generated due to overcharging, the safety valve operates to keep the battery safe.

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 vehicle'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.

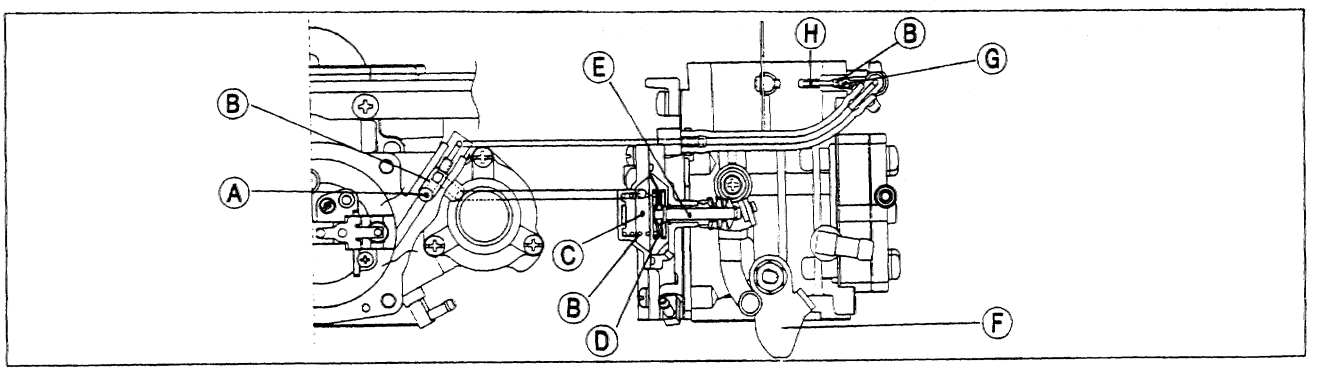
Accelerator Pump

When a throttle is opened quickly, the carburetor fuel mixture tends to momentarily become too lean. This results from the fact that the fuel is of greater weight than air, and when the throttle is opened suddenly the flow of fuel will lag behind the flow of the air, resulting in a lean mixture.

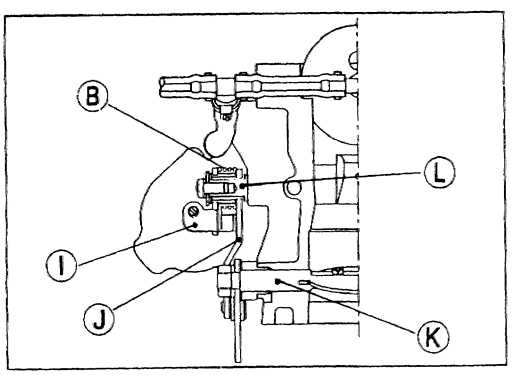
To supply the additional fuel needed to overcome this condition, a small pump is incorporated in the front carburetor.

NOTE

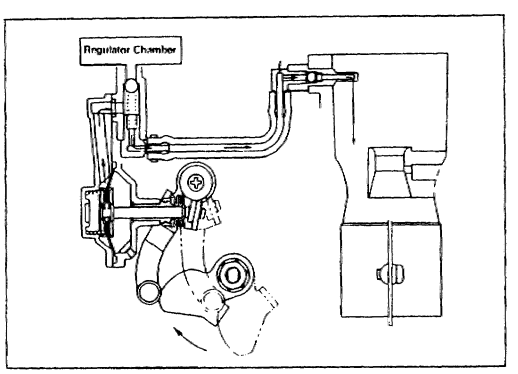
○*After the engine has started, do not repeatedly operate the throttle. The accelerator pump may foul the spark plugs with excess fuel.*



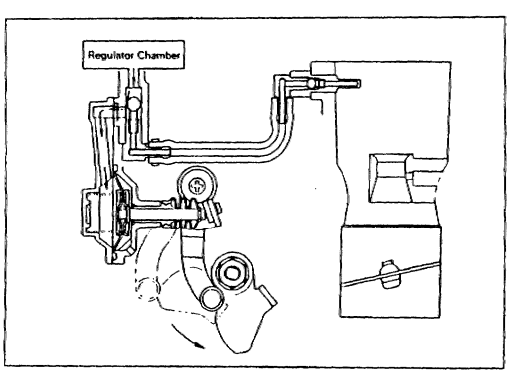
A. Inlet Check Valve
B. Spring
C. Pump Chamber
D. Pump Diaphragm
E. Pump Rod
F. Link Cam
G. Outlet Check Valve
H. Dischange Nozzle
I. Link Lever B
J. Link Lever A
K. Throttle Shaft
L. Link Shaft



When the throttle is suddenly opened, the pump rod linked to the throttle shaft pushes the pump diaphragm forcing the fuel from the pump chamber. The inlet check valve closes and the outlet check valve opens allowing fuel to spray from the discharge nozzle.



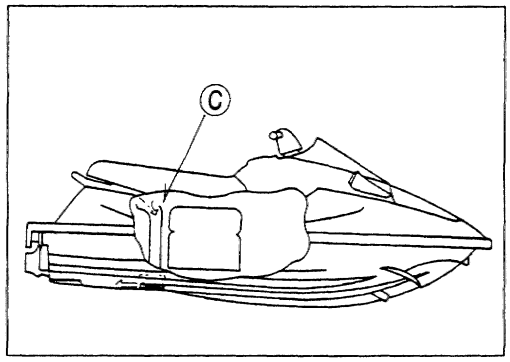
As the diaphragm relaxes, the inlet valve opens letting fuel from the regulator chamber refill the pump chamber. The outlet check valve closes as accelerator pump pressure falls stopping fuel from synphoning out the discharge nozzle.

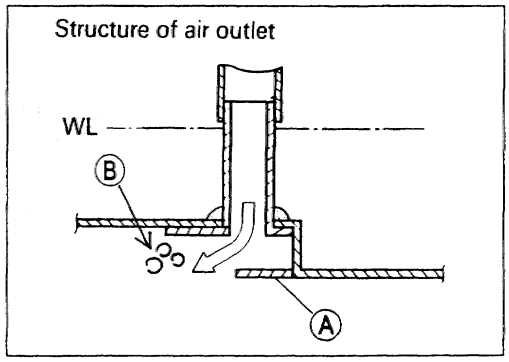


Kawasaki Air Induction System (KAIS)

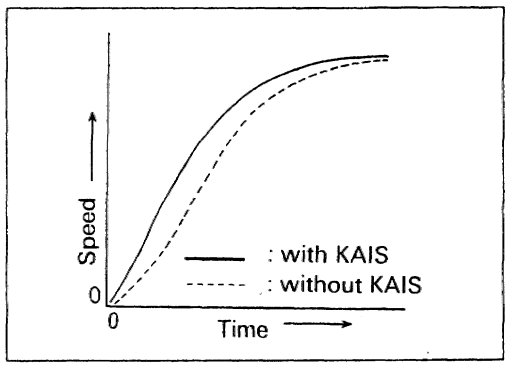
KAIS is a system to reduce the coefficient of friction or drag between the bottom surface of the hull and the water.

This system features two small air outlets [A] at the end of each inner strake. When in motion the fast flowing water will create a vacuum [B] and draw air out of the engine compartment [C] to form an air-bubble film between the hull and the water.





This aerating of the rear portion of the hull improves acceleration and top speed.

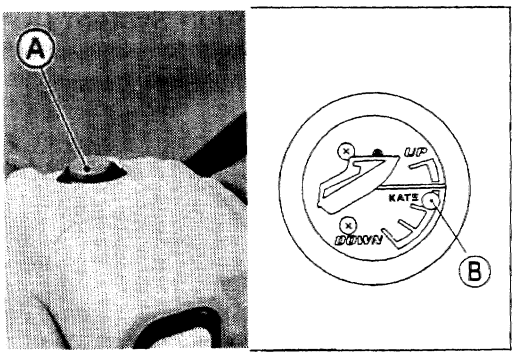


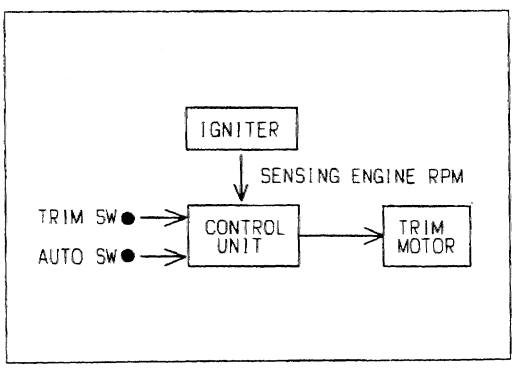
Kawasaki Automatic Trim System (KATS)

The Kawasaki Automatic Trim System (KATS) is designed for optimum low speed acceleration. With the automatic trim switch [A] set to the "ON" position, the trim control unit senses engine rpm, then controls the trim motor.

When the switch is pushed in after the ignition switch is turned on, the LED indicator light [B] in the trim indicator comes on and the steering nozzle goes all the way down. When the engine speed exceeds 2,000 rpm, the nozzle goes up to its level position and stays there. The nozzle goes down when the engine speed is lower than 2,000 rpm.

You can turn off the system either by pushing the switch in again or by operating the trim switch. The red indicator light shows that the system is functioning. If the engine is not started within three minutes after the switch is pushed in, the light goes off but the system stays on.





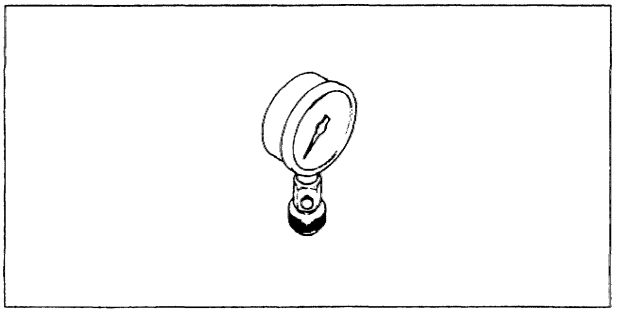
CHECK PROCESS FOR KATS

1. TURN ON IGNITION-S/W and PUSH TRIM-S/W (DOWN) → CHECK TRIM MOVE to FULL-DOWN and STOP
   (ENGINE: OFF, AUTO-TRIM-S/W: OFF)
2. PUSH TRIM-S/W (UP) → CHECK TRIM MOVE to FULL-UP and STOP
   (ENGINE: OFF, AUTO-TRIM-S/W: OFF)
3. PUSH ON AUTO-TRIM-S/W → CHECK AUTO-LED LIGHT UP, TRIM MOVE to FULL-DOWN and STOP
   (ENGINE: OFF)
4. PUSH OFF AUTO-TRIM-S/W → CHECK AUTO-LED LIGHT DOWN
   (ENGINE: OFF)
5. PUSH ON AUTO-TRIM-S/W → CHECK AUTO-LED LIGHT UP
   (ENGINE: OFF)
6. START ENGINE and KEEP over 2000 rpm (over 3 sec) → CHECK TRIM MOVE to LEVEL and STOP (MOTOR WORKING TIME is 1.5 sec)
7. KEEP under 2000 rpm (over 1 sec) → CHECK TRIM MOVE to FULL-DOWN and STOP
8. PUSH TRIM-S/W (UP) → CHECK AUTO-LED LIGHT DOWN, TRIM MOVE to FULL-UP and STOP.
9. PUSH ON AUTO-TRIM-S/W and KEEP over 2000 rpm (over 3 sec) → CHECK AUTO-LED LIGHT UP, TRIM does not MOVE (STAYS FULL-UP)
10. PUSH TRIM-S/W (DOWN) → CHECK AUTO-LED LIGHT DOWN, TRIM MOVE to FULL-DOWN and STOP
11. STOP ENGINE and TURN OFF IGNITION-S/W

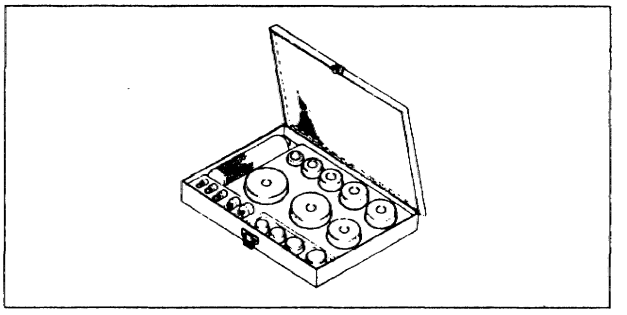
(REFER to KATS TROUBLESHOOTING in the ELECTRICAL SYSTEM CHAPTER)

Special Tools, Sealant

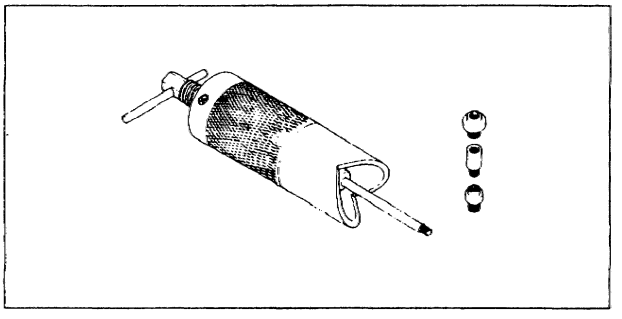
Compression Gauge: 57001-221



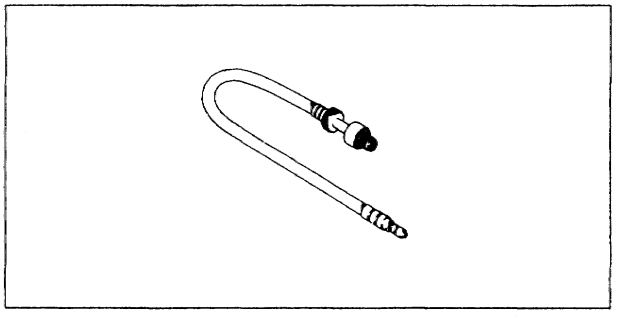
Bearing Driver Set: 57001-1129



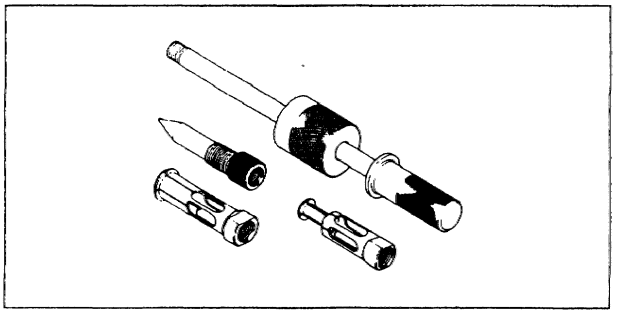
Piston Pin Puller Assembly: 57001-910



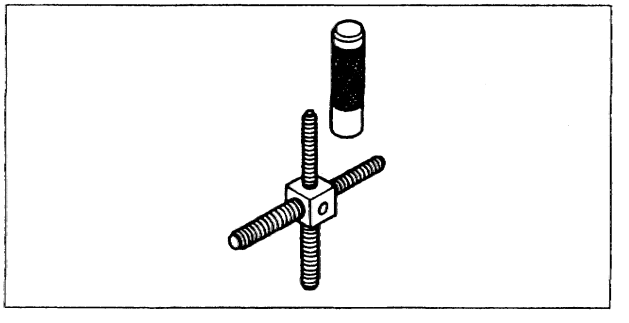
Compression Gauge Adapter, M14 x 1.25: 57001-1159



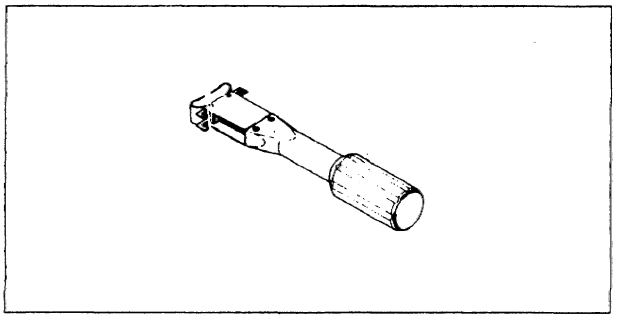
Oil Seal & Bearing Remover: 57001-1058



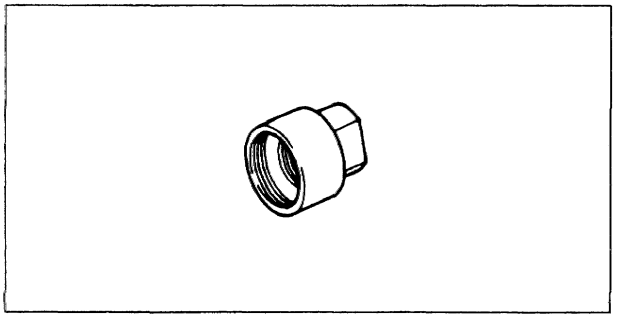
Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216



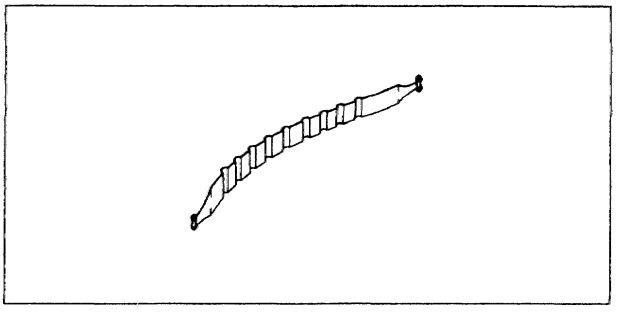
Piston Ring Compressor Grip: 57001-1095



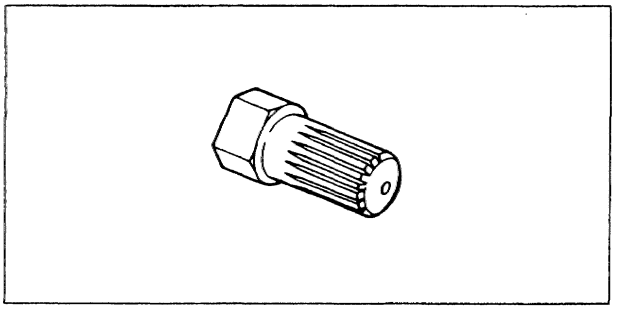
Flywheel Puller, M35 X 1.5: 57001-1223



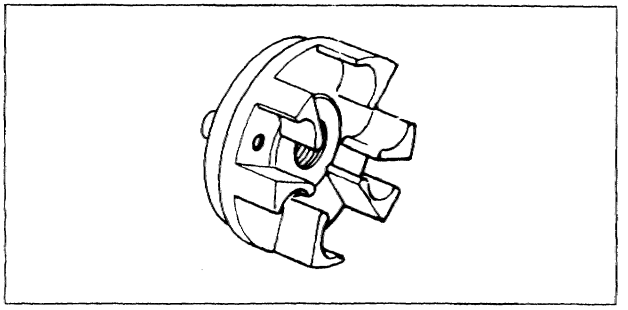
Piston Ring Compressor Belt, Φ67 ~ Φ79: 57001-1097



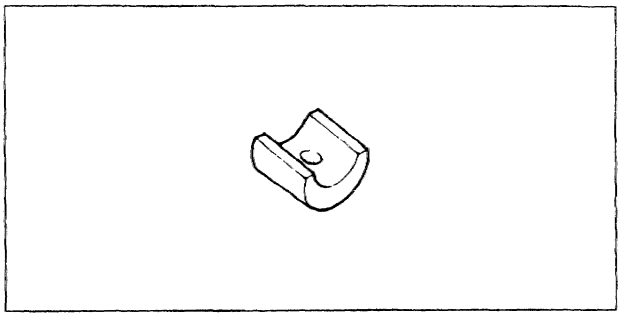
Impeller Wrench: 57001-1228



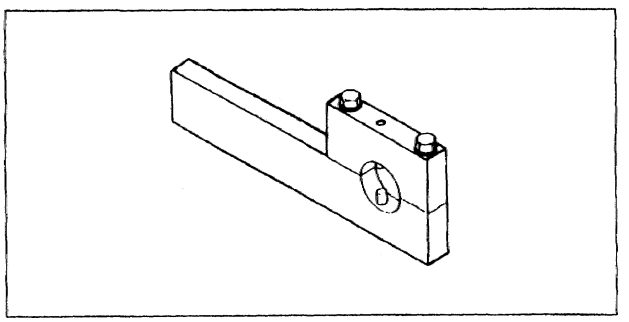
Coupling Holder: 57001-1230



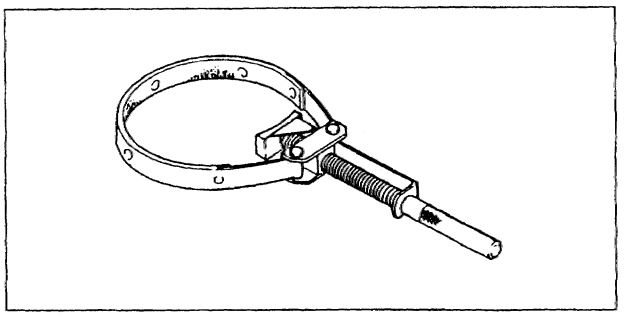
Drive Shaft Holder Adapter: 57001-1231



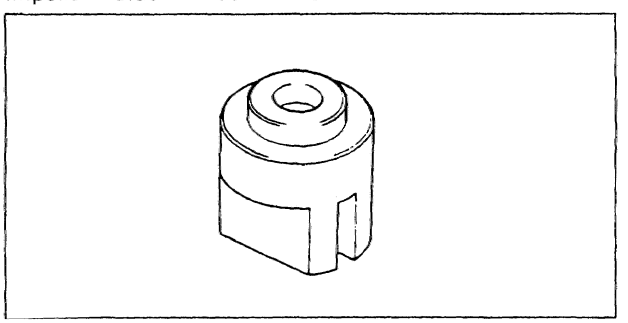
Drive Shaft Holder: 57001-1327



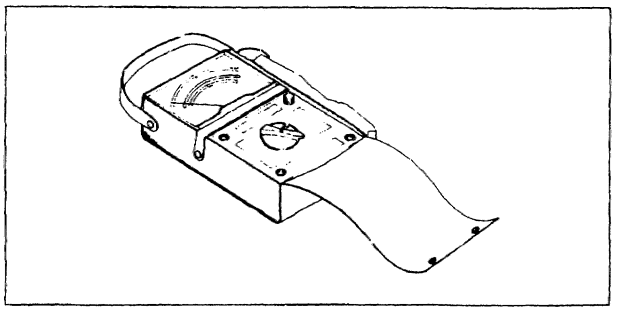
Flywheel Holder: 57001-1313



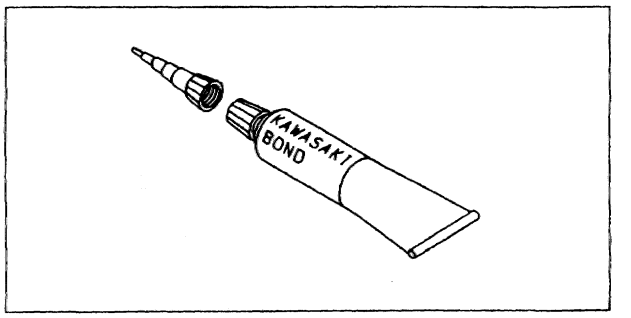
Impeller Holder: 57001-1393



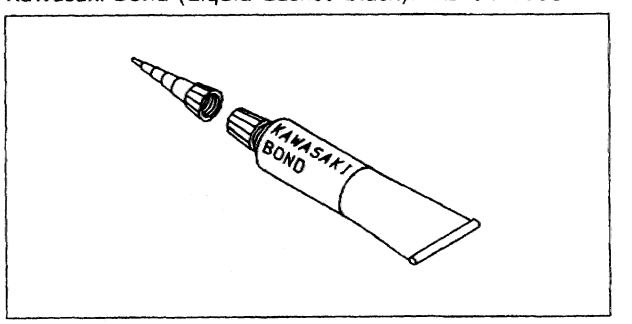
Hand Tester: 57001-1394



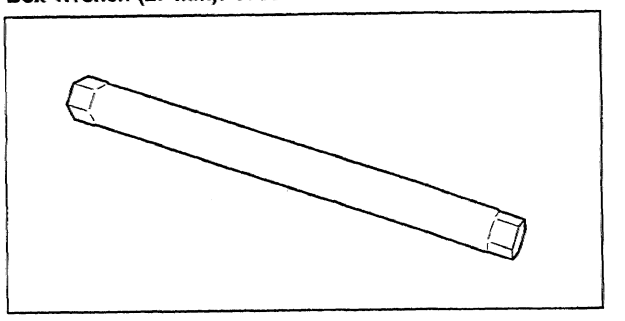
Kawasaki Bond (Silicone Sealant): 56019-120



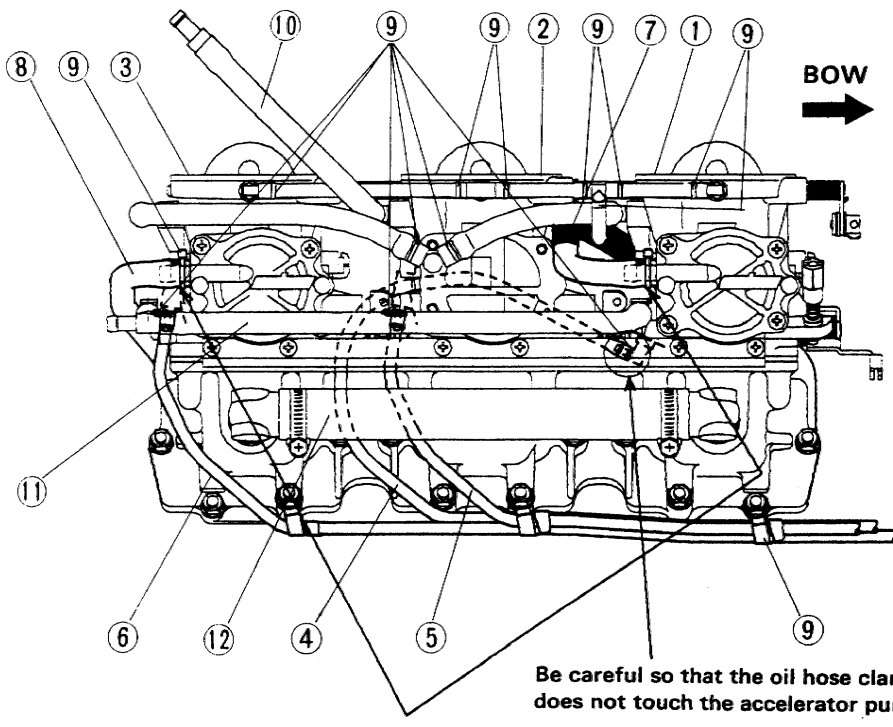
Kawasaki Bond (Liquid Gasket-Black): 92104-1003



Box Wrench (27 mm): 57001-1451



Cable, Wire and Hose Routing

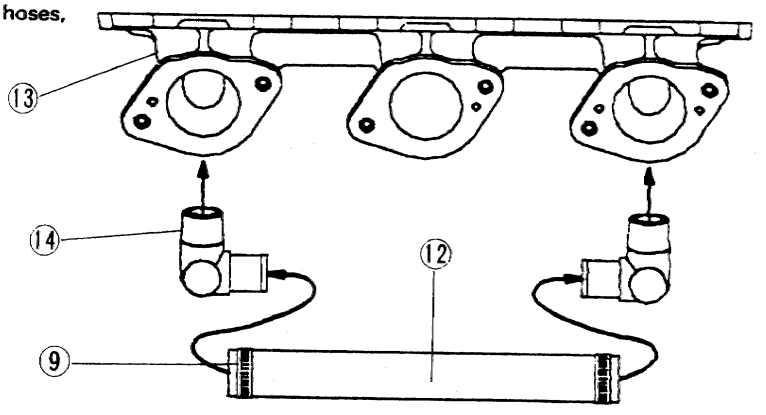


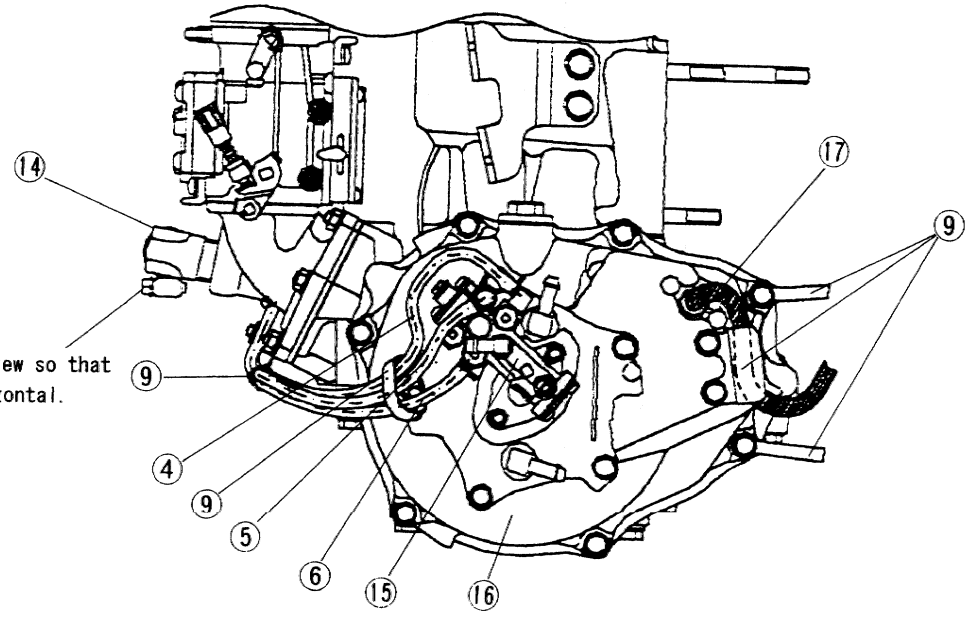
1. Front Carburetor
2. Middle Carburetor
3. Rear Carburetor
4. Oil Hose (To Front Carb.)
5. Oil Hose (To Middle Carb.)
6. Oil Hose (To Rear Carb.)
7. Pulse Hose (To Front Carb.)
8. Pulse Hose (To Rear Carb.)
9. Clamp
10. Fuel Hose (Return)
11. Fuel Hose (Supply)
12. Balance Tube
13. Intake Manifold
14. Balance Tube Fitting
15. Oil Pump
16. Magneto Cover
17. Magneto Leads

Be careful so that the oil hose clamp does not touch the accelerator pump cam.

BOW

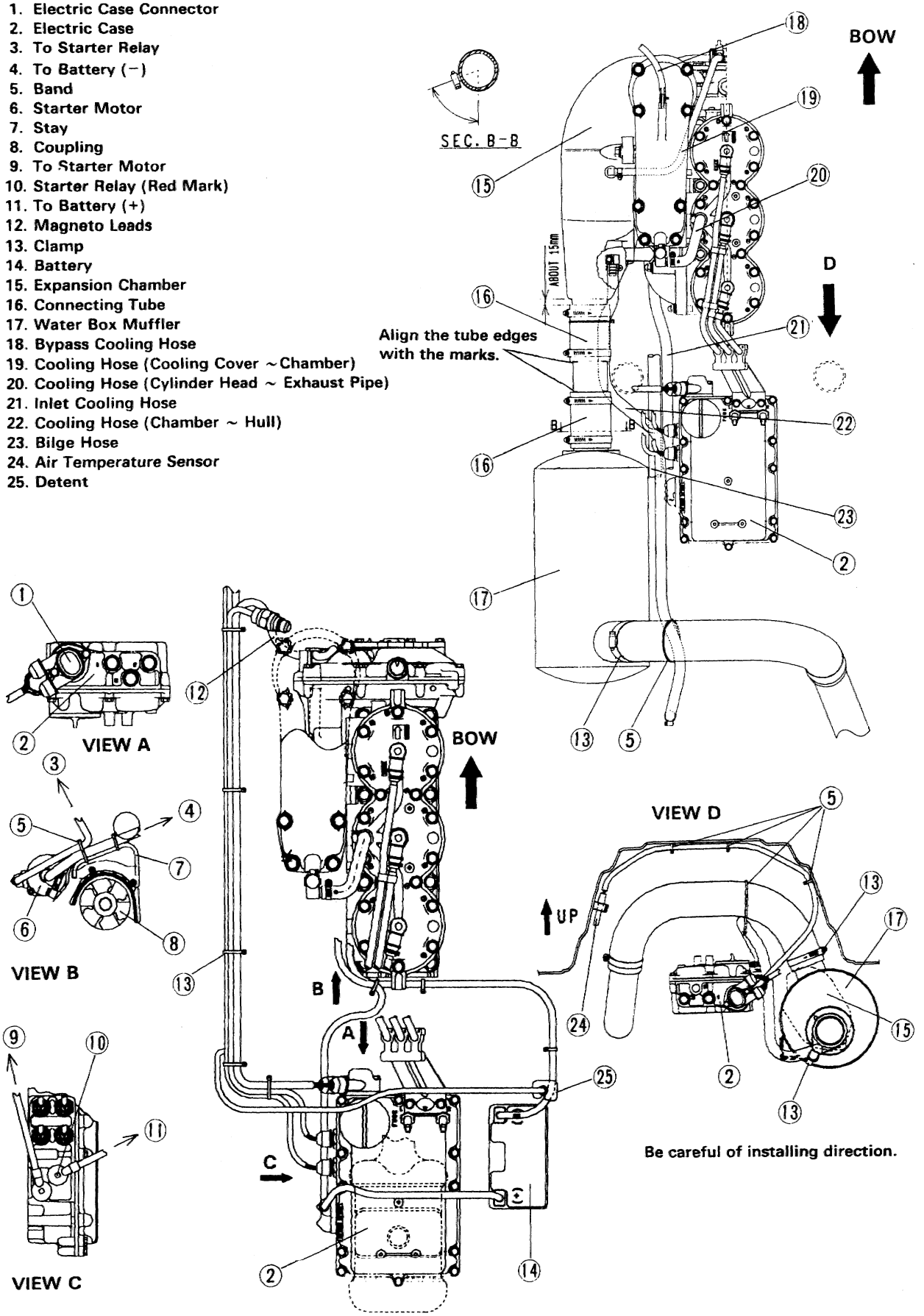
Clamp the pulse hoses, as shown.





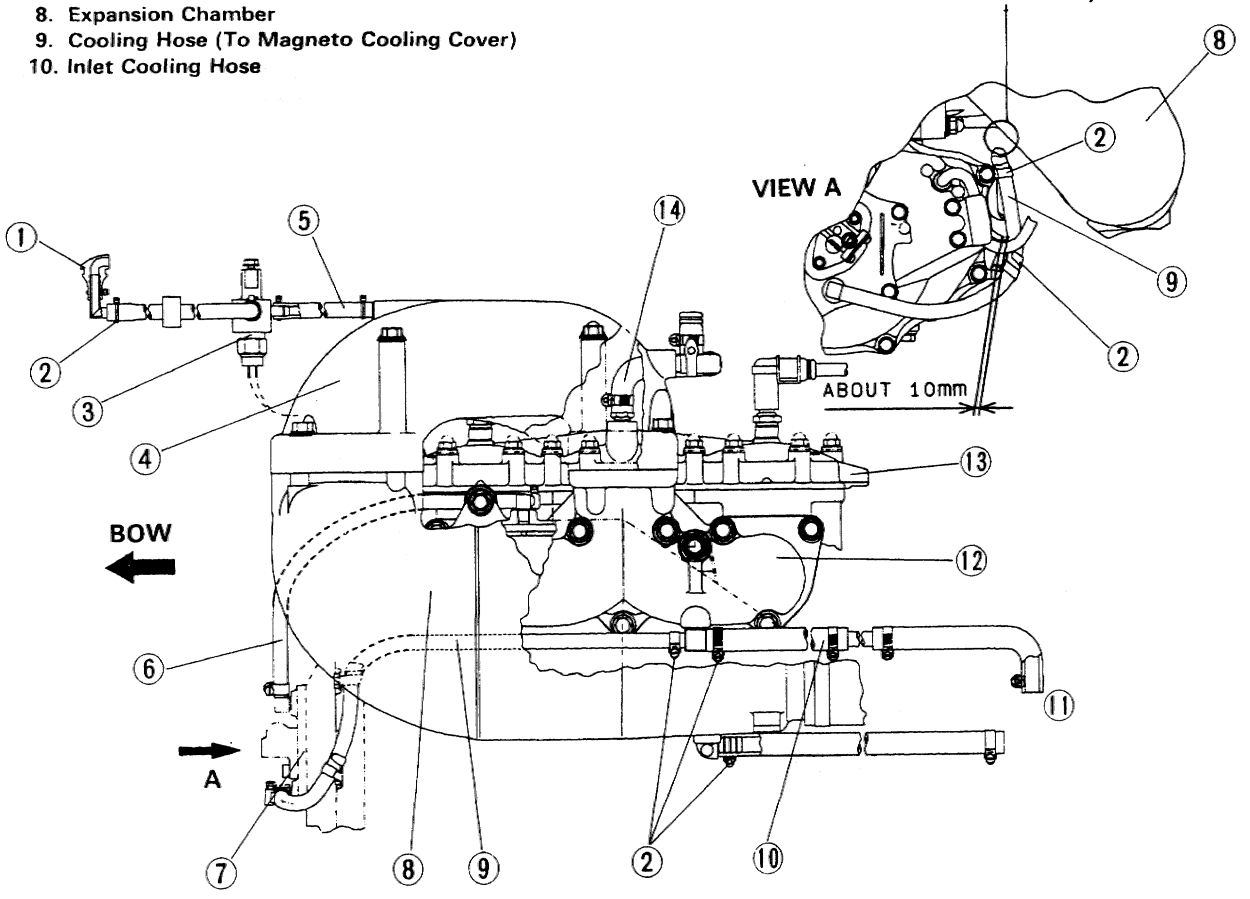
Tighten the clamp screw so that its position is horizontal.

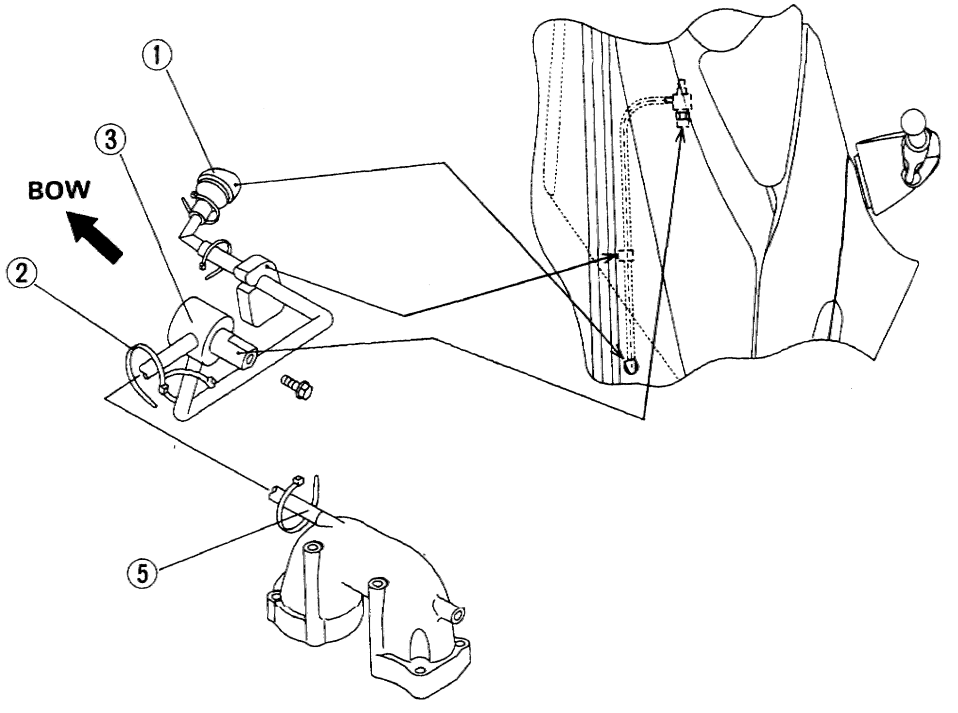
1. Electric Case Connector
2. Electric Case
3. To Starter Relay
4. To Battery (−)
5. Band
6. Starter Motor
7. Stay
8. Coupling
9. To Starter Motor
10. Starter Relay (Red Mark)
11. To Battery (+)
12. Magneto Leads
13. Clamp
14. Battery
15. Expansion Chamber
16. Connecting Tube
17. Water Box Muffler
18. Bypass Cooling Hose
19. Cooling Hose (Cooling Cover ~ Chamber)
20. Cooling Hose (Cylinder Head ~ Exhaust Pipe)
21. Inlet Cooling Hose
22. Cooling Hose (Chamber ~ Hull)
23. Bilge Hose
24. Air Temperature Sensor
25. Detent



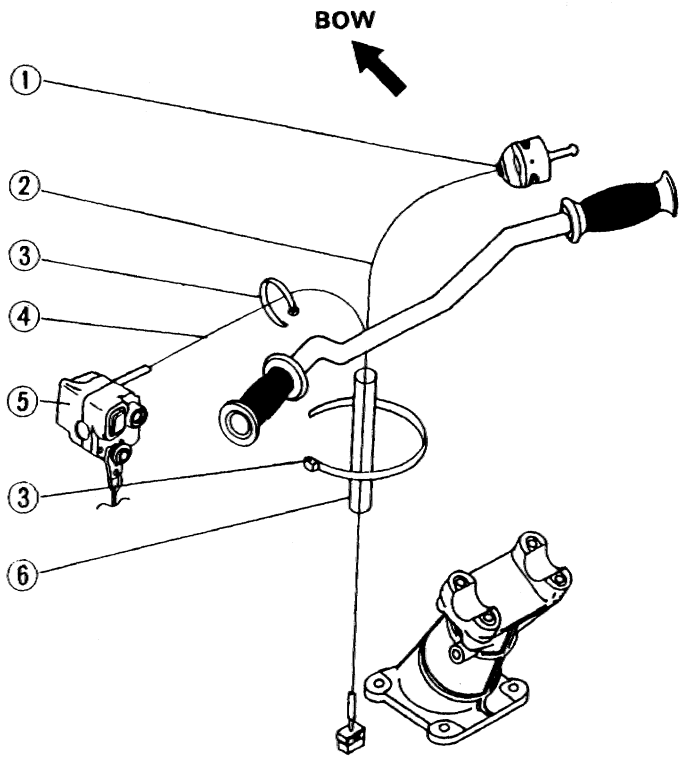
1. Bypass Outlet
2. Clamp
3. Water Temperature Sensor
4. Exhaust Pipe
5. Bypass Cooling Hose
6. Cooling Hose (Cooling Cover ~ Chamber)
7. Magneto Cooling Cover
8. Expansion Chamber
9. Cooling Hose (To Magneto Cooling Cover)
10. Inlet Cooling Hose
11. To Jet Pump
12. Exhaust Manifold
13. Cylinder Head
14. Cooling Hose (Cylinder Head ~ Exhaust Pipe)

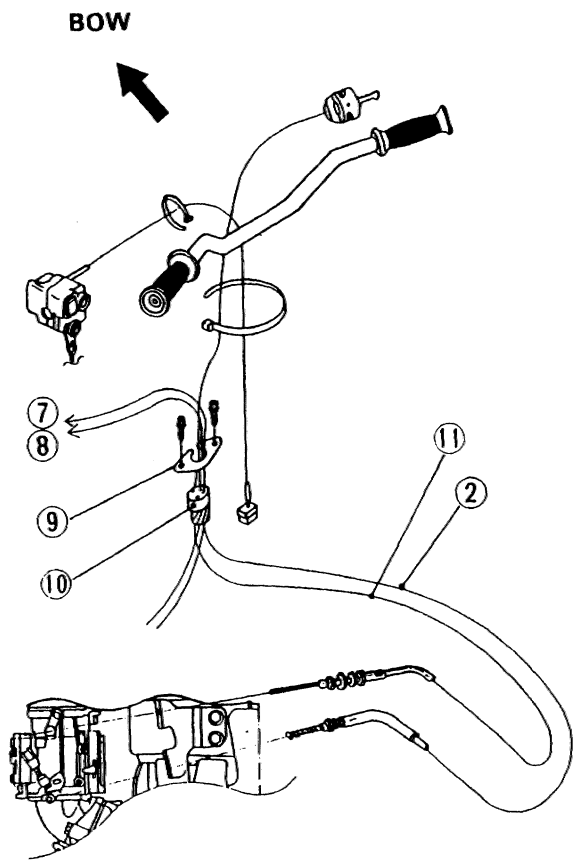
Run the cooling hose near the magneto cover so that the hose does not touch the chamber body and manifold.

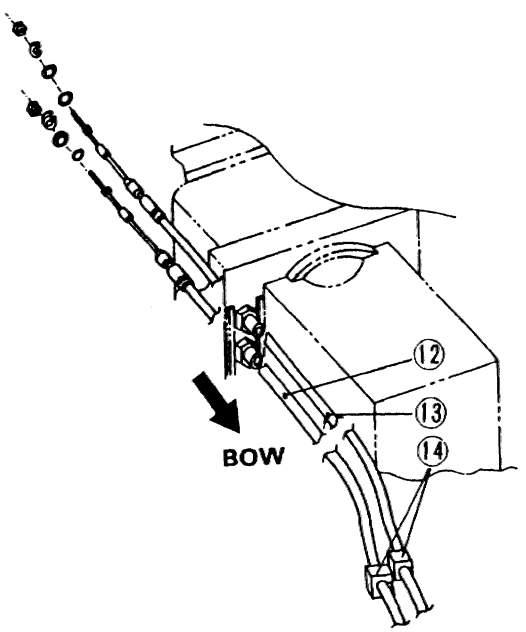




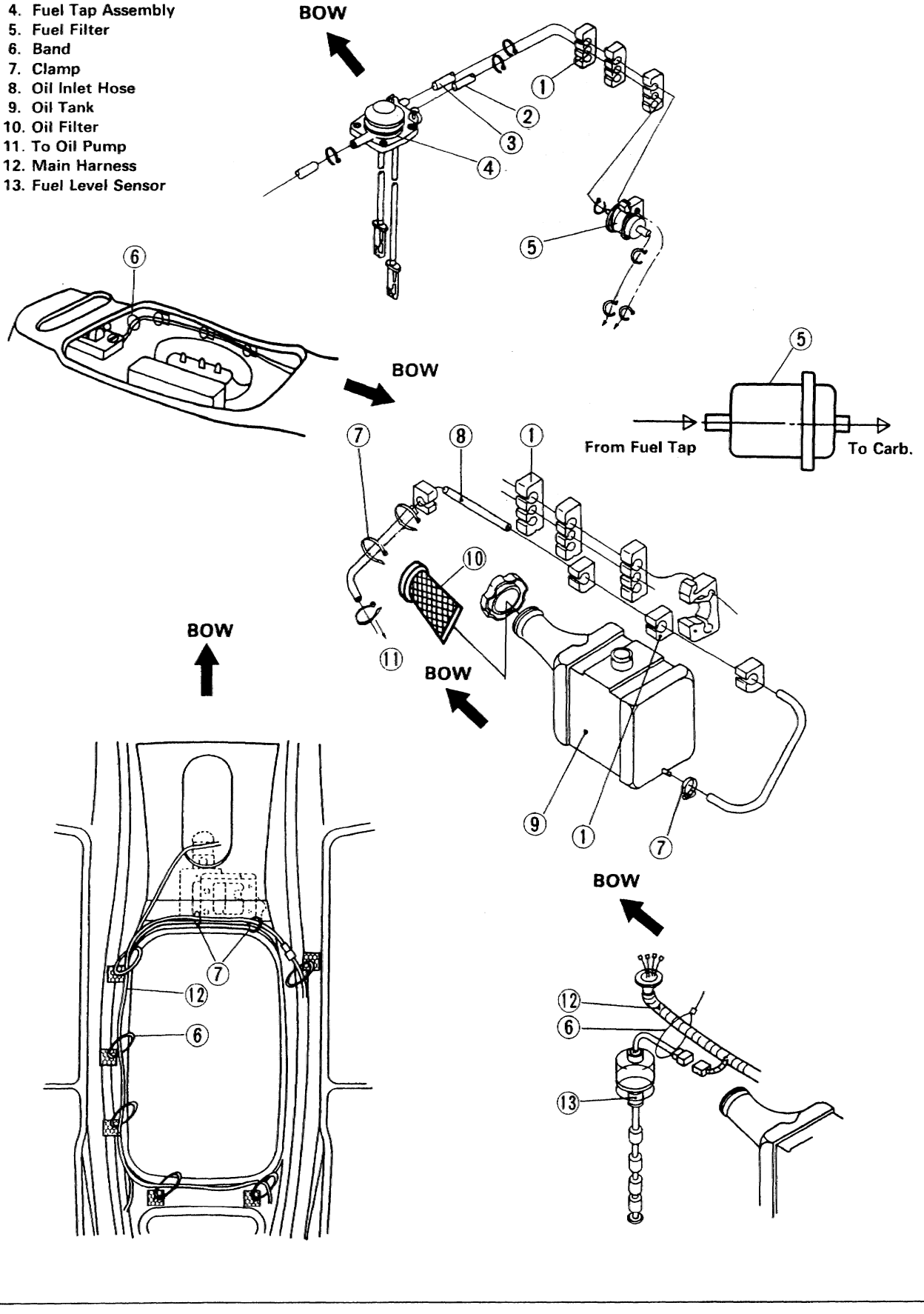
1. Throttle Lever
2. Throttle Cable
3. Clamp
4. Start/Stop Switch Leads
5. Start/Stop Switch
6. Protective Tube
7. To Fuel Knob
8. To Choke Knob
9. Grommet Plate
10. Grommet
11. Choke Cable
12. Trim Cable
13. Steering Cable
14. Detent



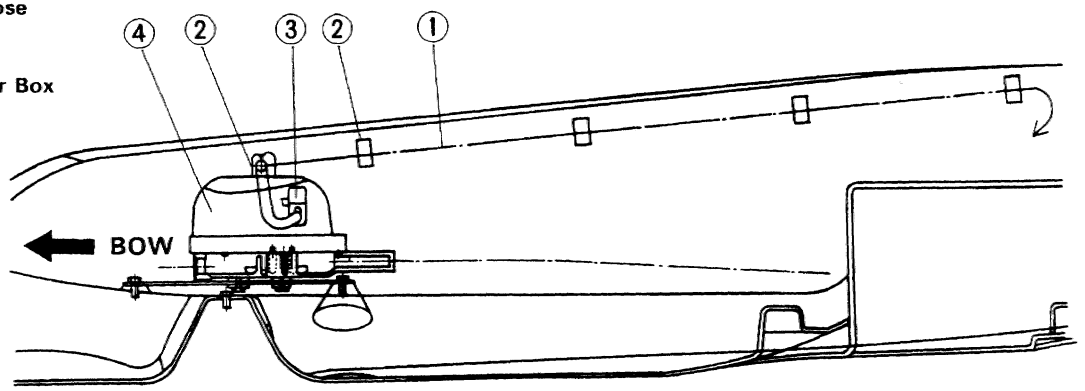




1. Detent
2. Fuel Hose (Supply)
3. Fuel Hose (Return)
4. Fuel Tap Assembly
5. Fuel Filter
6. Band
7. Clamp
8. Oil Inlet Hose
9. Oil Tank
10. Oil Filter
11. To Oil Pump
12. Main Harness
13. Fuel Level Sensor



1. Oil Inlet Hose
2. Detent
3. Oil Pump
4. Trim Motor Box



Fuel System

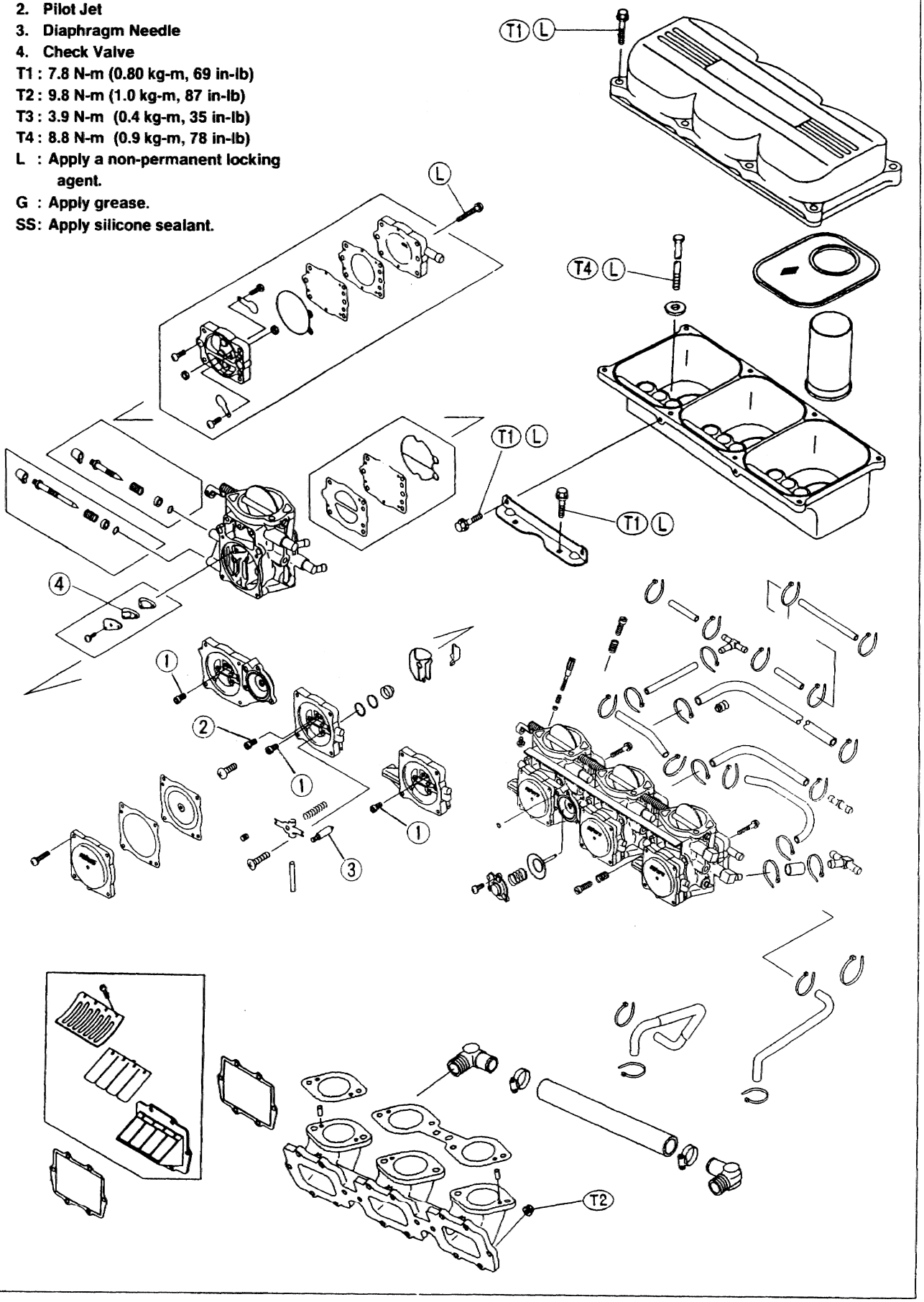
2

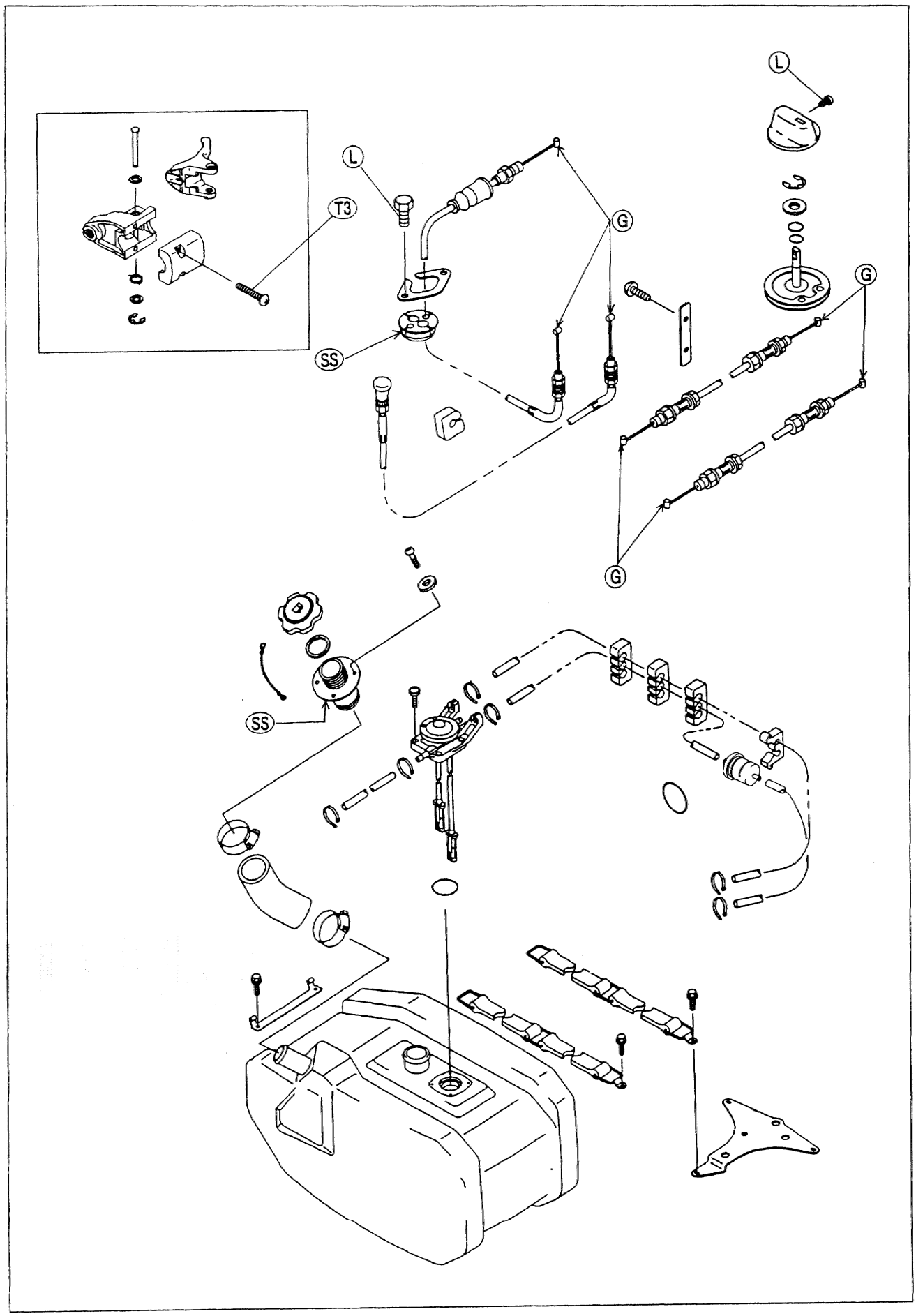
Table of Contents

Exploded View

1. Main Jet
2. Pilot Jet
3. Diaphragm Needle
4. Check Valve

T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T2 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T3 : 3.9 N-m (0.4 kg-m, 35 in-lb)
T4 : 8.8 N-m (0.9 kg-m, 78 in-lb)
L : Apply a non-permanent locking agent.
G : Apply grease.
SS: Apply silicone sealant.



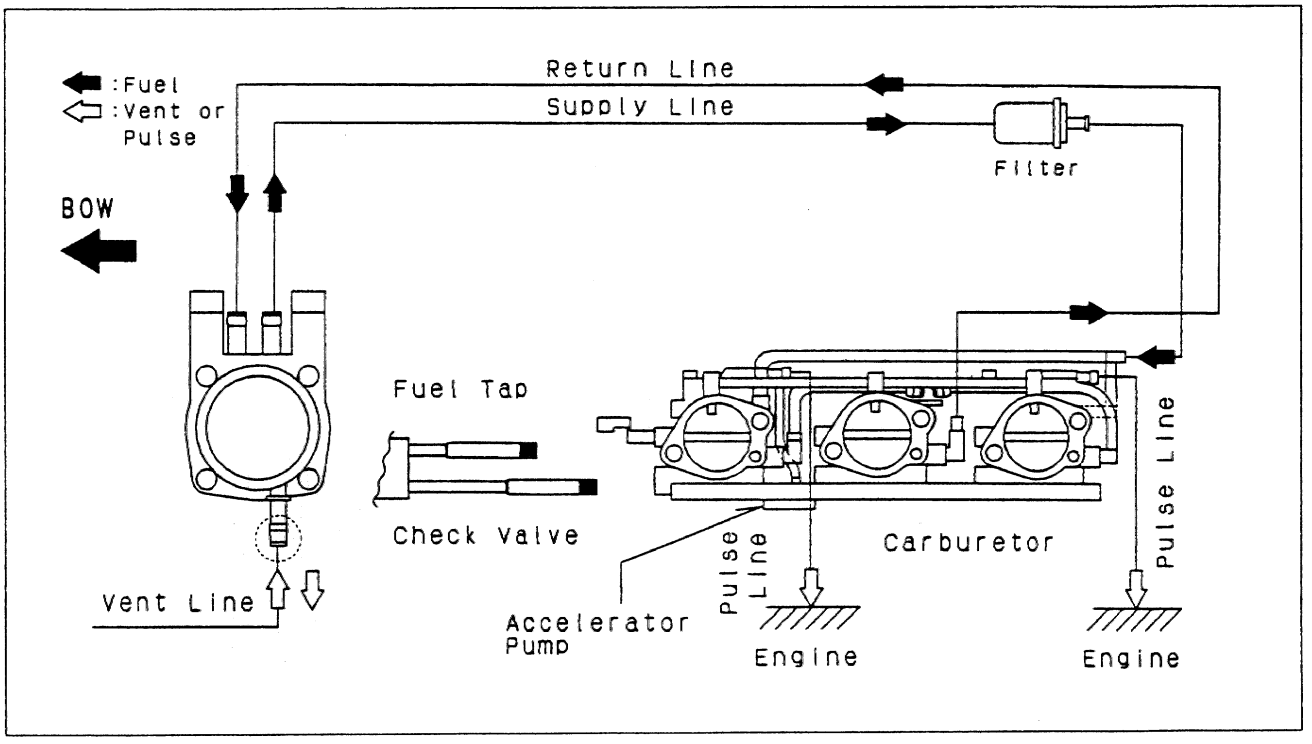

L
T3
L
G
SS
G
G
SS

Specifications

Item	Standard	Service Limit
Carburetor		
Make, type	Keihin, CDK II 38-29	– – –
Size	33 mm Venturi	– – –
Mixture screws:		
Low speed	1 1/8 ± 1/4 turn open	– – –
High speed	1 ± 1/4 turn open	– – –
Main jet:		
Front	#125	
Middle	#120	
Rear	#120	
Pilot jet	#78	
Float arm level	1.0 ~ 2.0 mm	– – –
Idle speed:		
in water	1 250 ± 100 rpm	– – –
out of water	1 800 ± 100 rpm	– – –
Reed Valve		
Reed warp	– – –	0.2 mm
Fuel Tank		
Capacity	52 L (including 7 L reserve)	– – –

Special Tool – Pressure Cable Luber: K56019-021
Sealant – Kawasaki Bond (Silicone Sealant): 56019-120

Fuel System Diagram



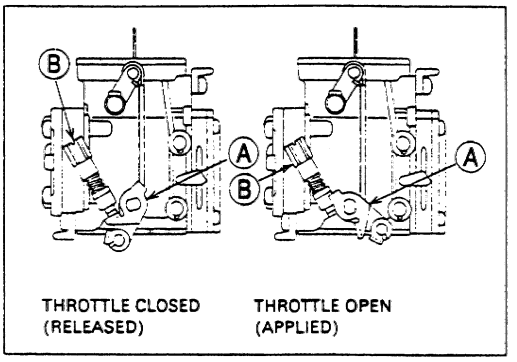
Throttle Cable

Throttle Cable Adjustment

● Check throttle 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.

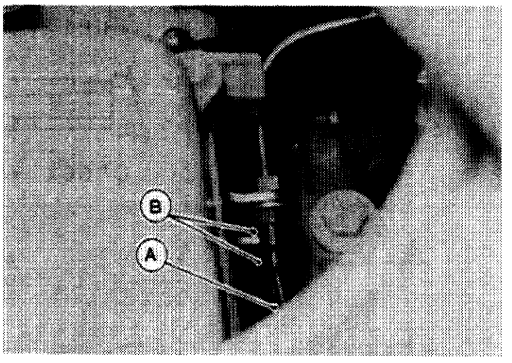
○ When the throttle lever is fully applied (pulled), the upper stop on the pivot arm should be all the way up against the stop on the carburetor.



● If necessary, adjust the throttle 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.

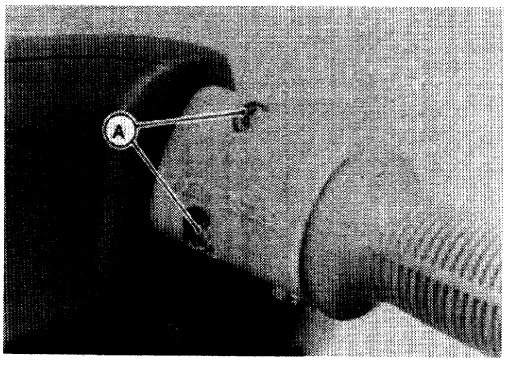
○ Tighten the locknuts securely.



Throttle Case and Cable Removal

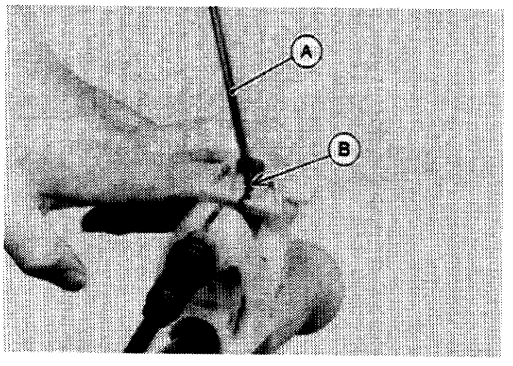
● Disconnect the throttle cable from carburetor.

● Remove:
Handlebar Pad
Throttle Case Mounting Screws [A]
Start/Stop Switch
Handlebar
Steering Cover



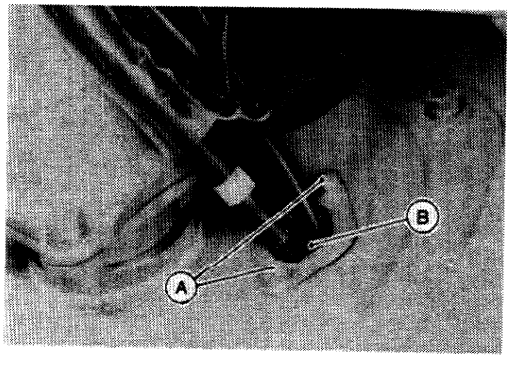
● Disconnect the throttle cable from case.

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



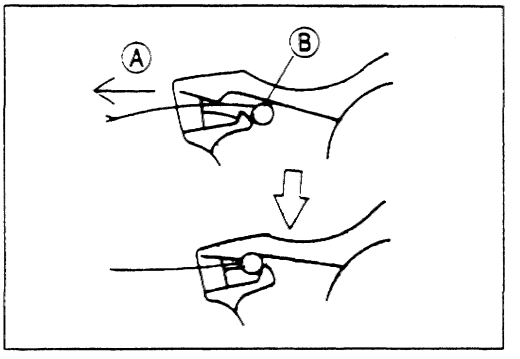
● Take out the bolts [A] and remove the grommet [B].

● Remove the throttle cable by carefully pulling the cable through the hull.

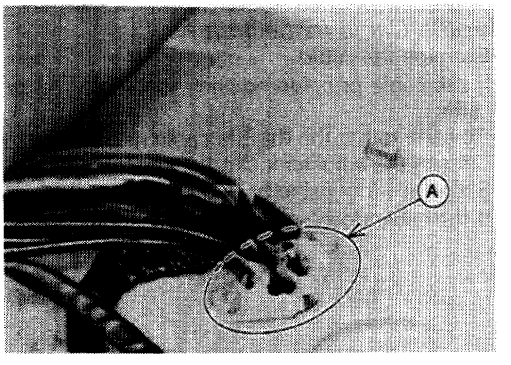


Throttle Case and Cable Installation Notes

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



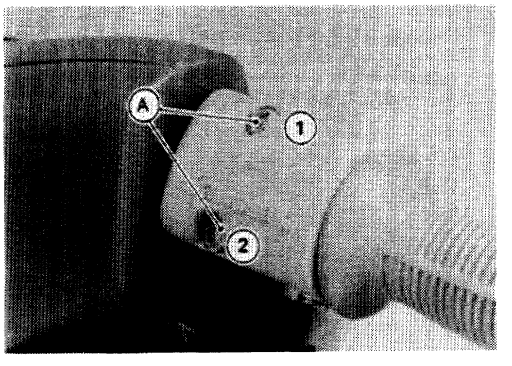
● Apply silicone sealant to the grommet [A].
● Route the throttle cable correctly (see Cable Routing section in the General Information chapter).
● Adjust the throttle cable (see Throttle Cable Adjustment).



● Following the sequence shown, torque the mounting screws.

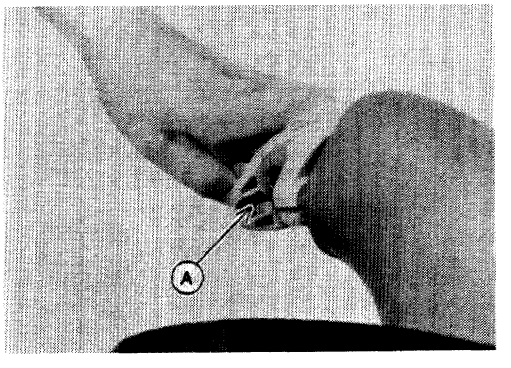
Torque – Throttle Case Mounting Screws:
3.9 N-m (0.4 kg-m, 35 in-lb) [A]

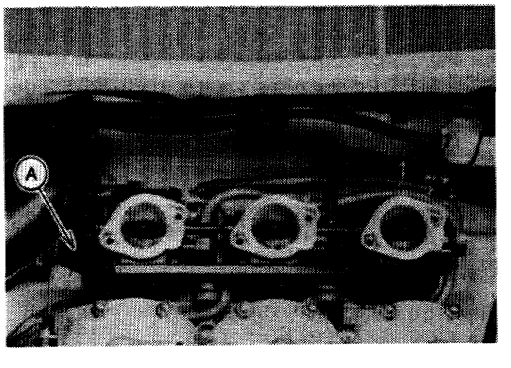
CAUTION
Do not overtighten the mounting screws.



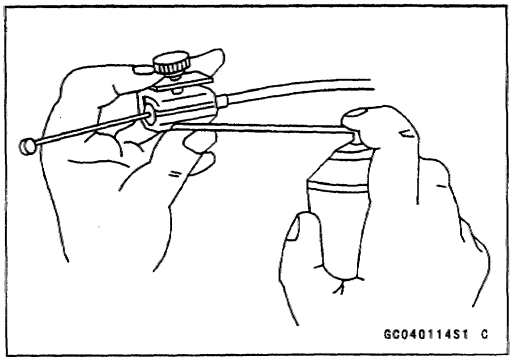
Throttle Case and Cable Lubrication

● Apply water resistant grease [A] to the tips of the throttle cable ends.





● Lubricate the cable by seeping oil between the cable and cable housing.



Throttle Cable Inspection

● Examine the cable.

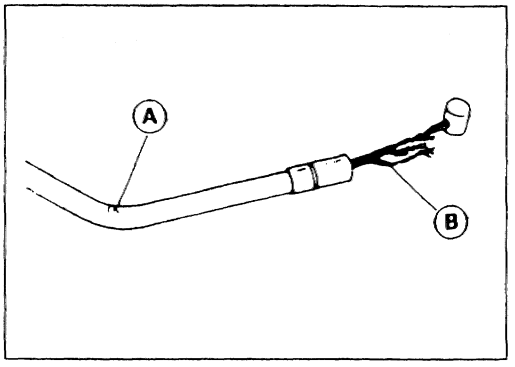
★If the cable or cable housing is kinked [A] or frayed [B], replace the cable.

● Be certain that the throttle cable moves freely in both directions.

○ Loosen the adjuster locknuts, and slide the cable from the pulley.

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

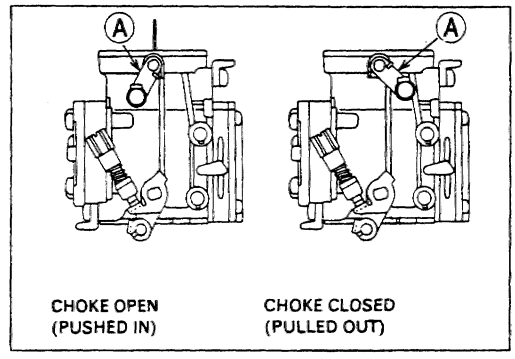
★If the cable does not move freely, replace it.



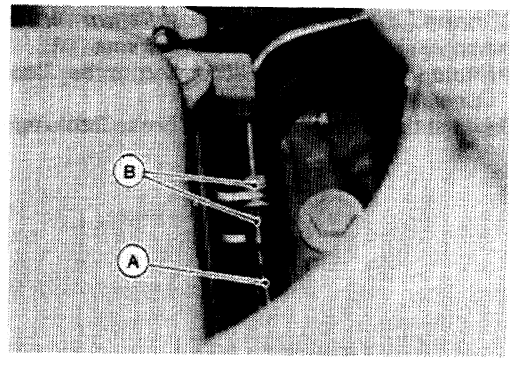
Choke Cable

Choke Cable Adjustment

●When the choke knob is pushed in (off), the choke butterfly valve in the carburetor should be completely open. Check that the choke pivot arm [A] stands all the way toward the right side of the boat with minimum cable slack.

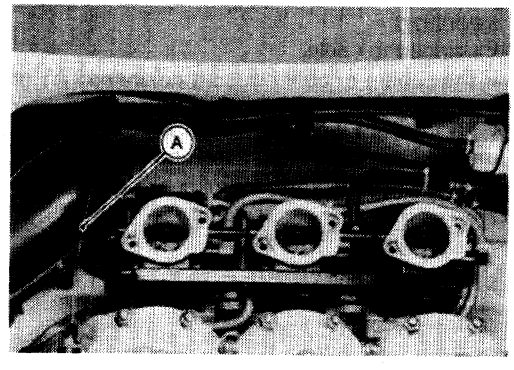


●If necessary, adjust the choke cable [A].
○Push the choke knob in completely.
○Loosen and turn the locknuts [B] at the cable holder to allow a little cable slack.
○Tighten the locknuts securely.

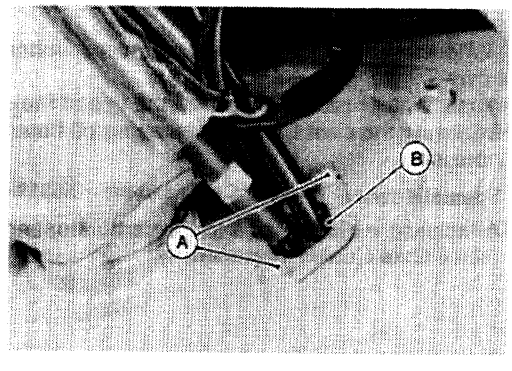


Choke Knob and Cable Removal

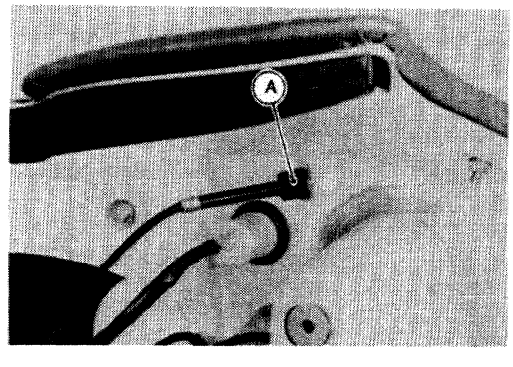
●Disconnect the choke cable from the carburetor.
○Loosen the set screw [A].
○Loosen the adjuster locknuts and slide the cable from the cable holder.



●Remove the steering cover.
●Take out the bolts [A] and remove the grommet [B].



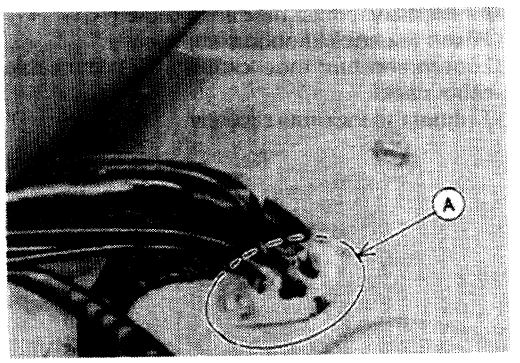
●Unscrew the large nut [A] on the inside of the control panel.



● Remove the choke cable by carefully pulling the cable through the hull.

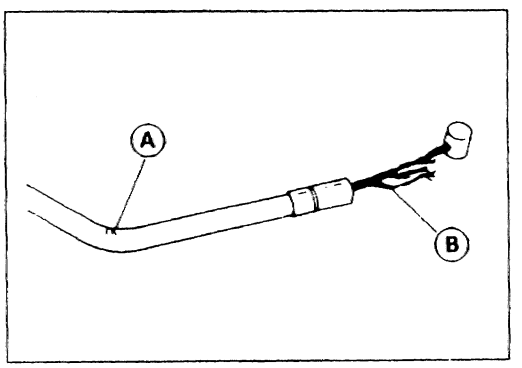
Choke Cable and Knob Installation Notes

● Apply silicone sealant to the grommet [A].
● Route the choke cable according to the Cable Routing section in the General Information chapter.
● Adjust the choke cable (see Choke Cable Adjustment).



Inspection

● Examine the cable.
★ If the cable or cable housing is kinked [A] or frayed [B], replace the cable.
● With the choke cable disconnected at the both ends, the cable should move freely within the cable housing.
★ If the cable does not move freely, replace it.



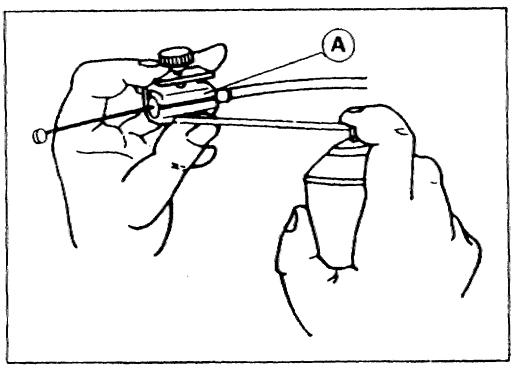
Lubrication

Whenever the choke cable removed, lubricate the choke cable as follows.

● Apply water resistant grease to the tips of the choke cable ends.
● Lubricate the choke cable by seeping oil between the cable and cable housing.

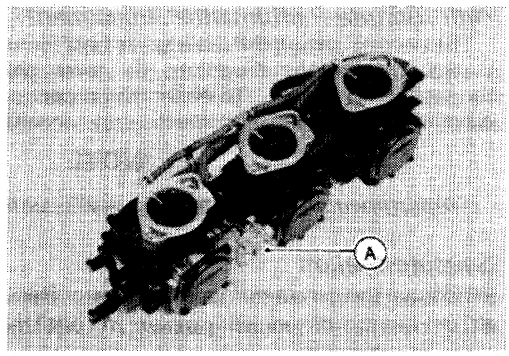
Special Tool – Pressure Cable Luber: K56019-021 [A]

● Attached the choke cable to the carburetor and adjust the choke cable (see Choke Cable Adjustment).



Carburetor/Fuel Pump

CAUTION
Do not open and close the throttle excessively when engine is running. The accelerator pump [A] can flood the engine, and cause the spark plug fouling.

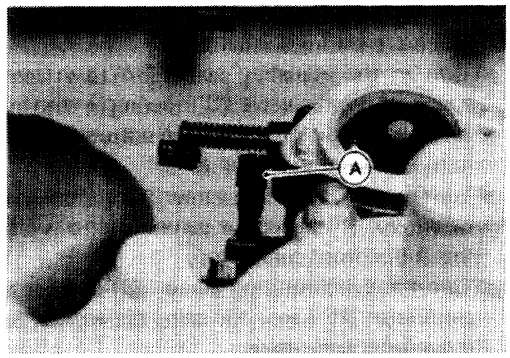


Idle Speed Adjustment

The normal idle speed setting is the lowest at which the watercraft will run reliable while still producing enough thrust to circle back to the rider after spill.

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

Idle Speed **1,250 ±100 rpm (in water)**
1,800 ±100 rpm (out of water)



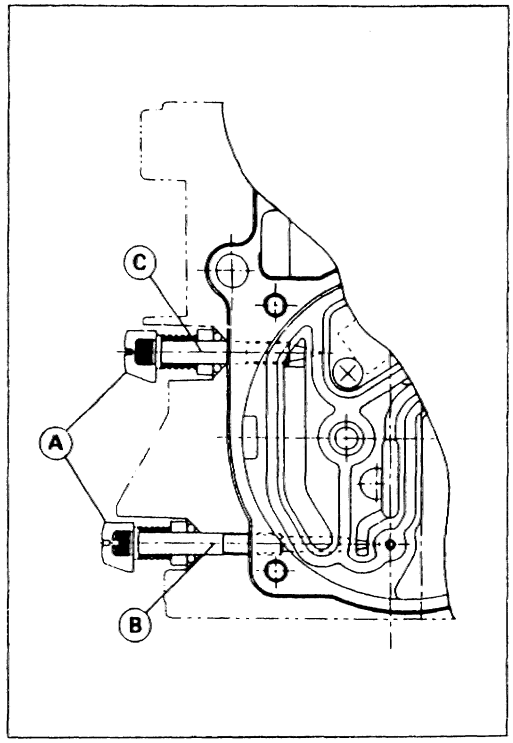
Mixture Screw Adjustment

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

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

Mixture Screw	Turns out
Low Speed (lower) [B]	1 1/8 ±¼
High Speed (upper) [C]	1 ±¼

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



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

High Altitude Performance Adjustment

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

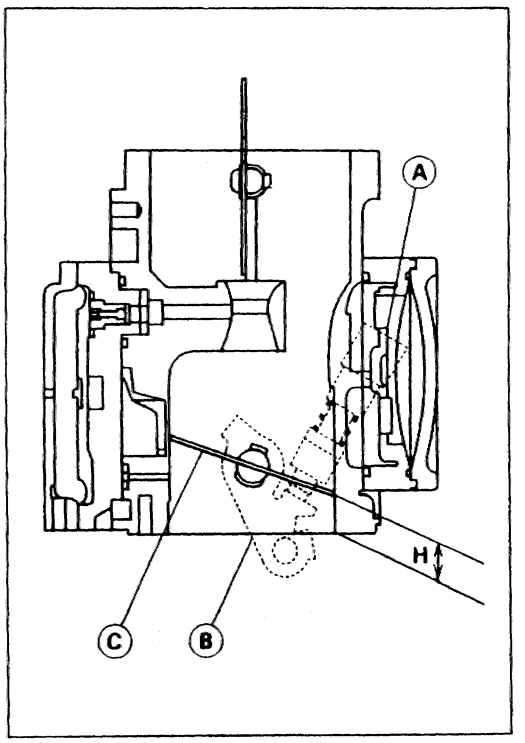
Altitude m (f)	Turn the high speed screw in the normal position
1000 (3300)	1/8 turn
2000 (6600)	1/4 turn
3000 (10000)	3/8 turn

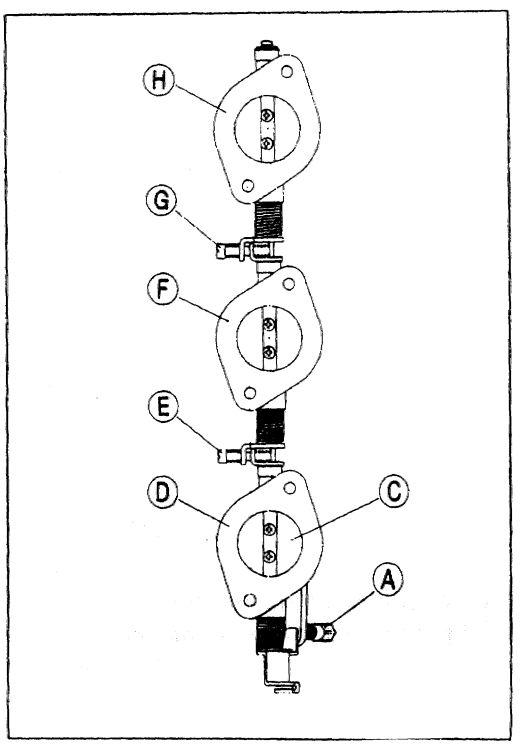
NOTE

○ *Adjustment of the low speed screw is not required in actual usage.*

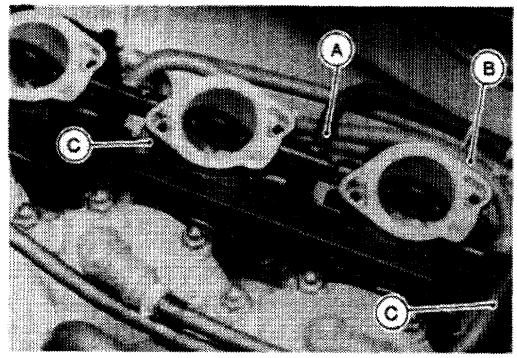
Synchronization

- Remove the carburetor (see Carburetor Removal).
- 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 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 tolerance as in the front carburetor.
- Install the carburetor.
- Adjust the throttle and choke cables.



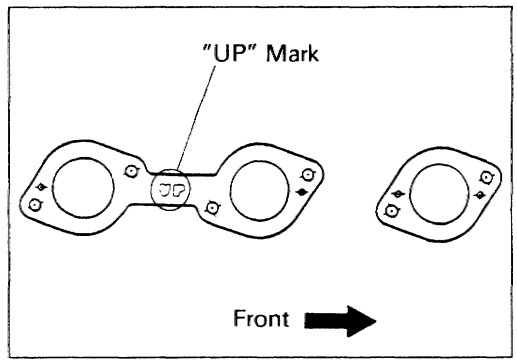


Carburetor Removal



- Remove:
  - Air Intake Cover (see Flame Arrester Removal)
  - Arrester Case (see Flame Arrester Removal)
- Disconnect:
  - Throttle Cable
  - Choke Cable
  - Return Hose [A]
  - Inlet (Supply) Hose [B]
  - Pulse Hose [C]
  - Oil Hoses
- Lift the carburetor off the intake manifold.

Carburetor Installation Notes

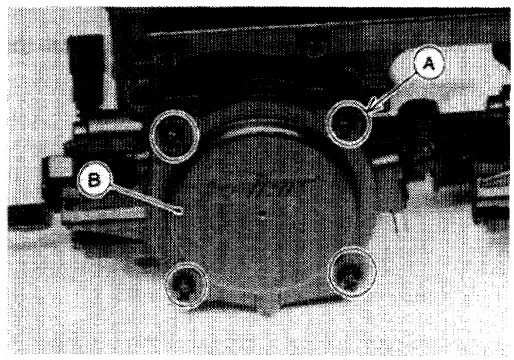


- Connect the fuel hoses and pulse hose correctly (see Fuel System Diagram).
- Install a new gasket under the carburetor as shown.
- Apply a non-permanent locking agent to the carburetor and air intake cover bolts.

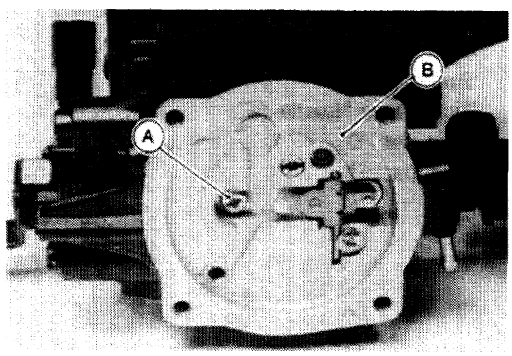
Torque – Carburetor Mounting Bolts: 8.8 N-m (0.9 kg-m, 78 in-lb)
Air Intake Cover Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)

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

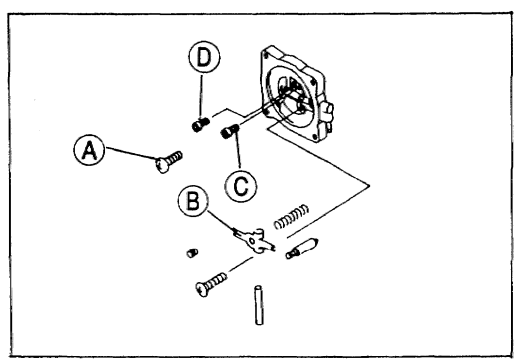
Carburetor Disassembly



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

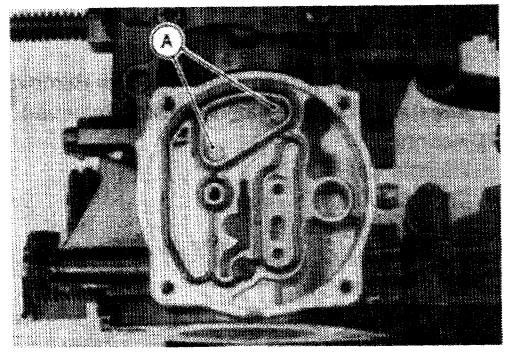


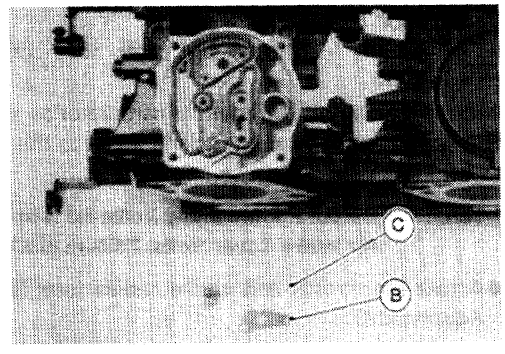
- Unscrew the carburetor case screw [A] and separate the carburetor case [B] from the carburetor body.



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

●Remove the mounting screws [A] and drop out the plates [B] and check valves [C].

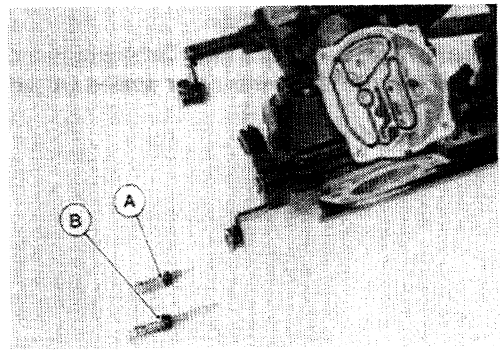




Carburetor Assembly Notes

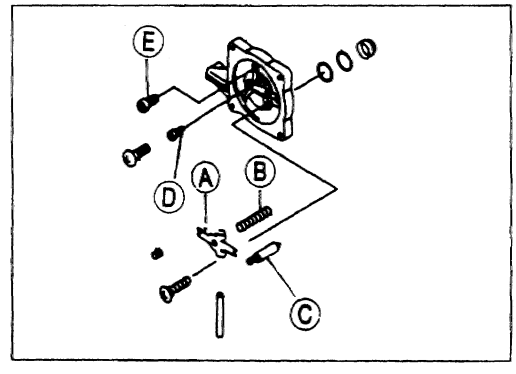
●If the mixture screws were removed, install then, as shown.

High Speed Screw [A]
Low Speed Screw [B]



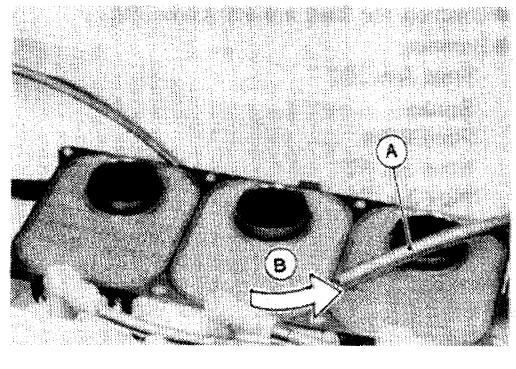
●Assemble the carburetor cover, as shown.

Float Arm [A]
Spring [B]
Diaphragm Needle [C]
Main Jet [D]
Pilot Jet [E]



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 on the carburetor. The fuel system in now full of fuel.*



⚠WARNING

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

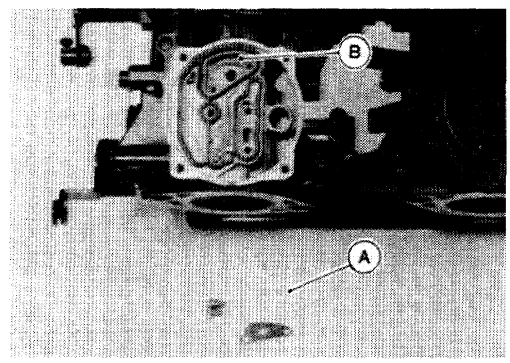
Carburetor Cleaning and Inspection

● Disassemble the carburetor (see Carburetor Disassembly).

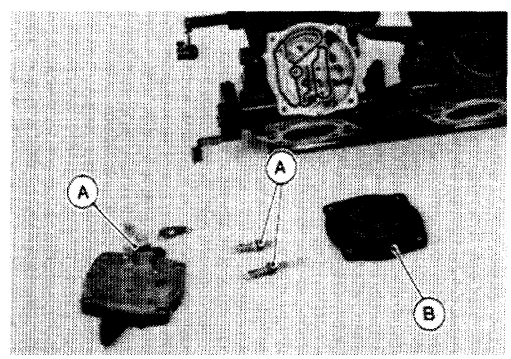
⚠WARNING

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 kg/cm², 25 psi) maximum nozzle pressure.

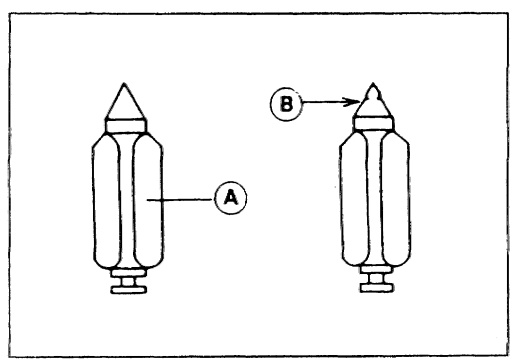
● Immerse all the metal parts in a carburetor cleaning solution.
● Rinse the parts in water.
● When the parts are clean, dry them with compressed air.
● Blow out the air and fuel passages with compressed air.
● Inspect the check valve [A] for damage or deterioration, and replace it if necessary.
★ If the gasket [B] under the check valve appears damaged, it may leak and must be replaced.



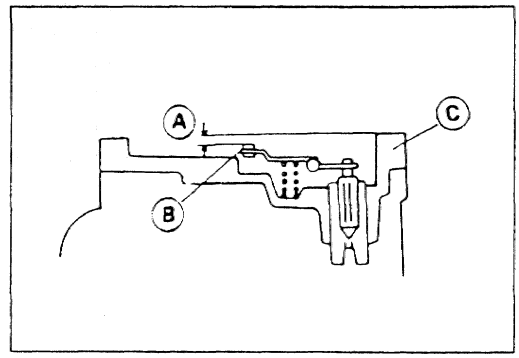
● Check these rubber parts for damage.
O-ring [A]
Diaphragm [B]
★ If any of these parts are not in good condition, replace them.



● Check the plastic tip on the diaphragm valve needle. It should be smooth, without any grooves, scratches, or tears.
Diaphragm Needle [A]
Diaphragm Needle Wear [B]
★ If the plastic tip is damaged, replace the needle.



Float Arm Level Inspection and Adjustment



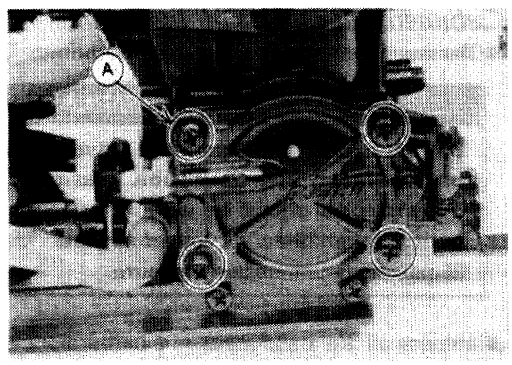
● Check the float arm level [A].

○ Measure from the plastic tip [B] on the float arm to the carburetor case [C].

Float Arm Level 1.0 ~ 2.0 mm

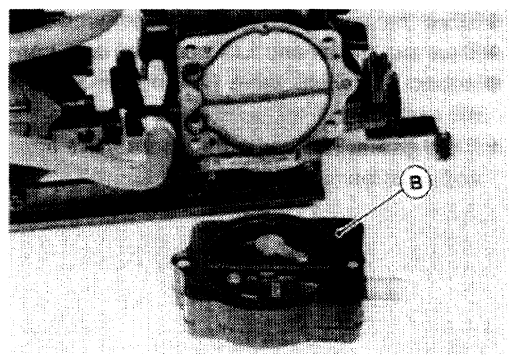
★ If the float arm level is incorrect, bend the float arm very slightly to changed the float arm level.

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.

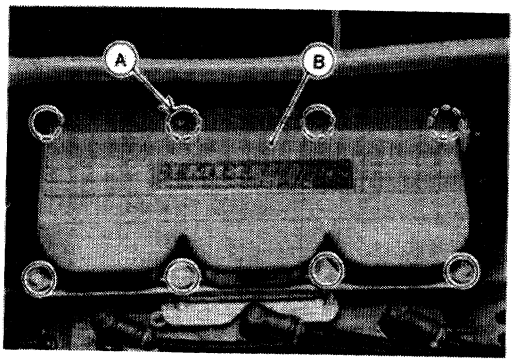


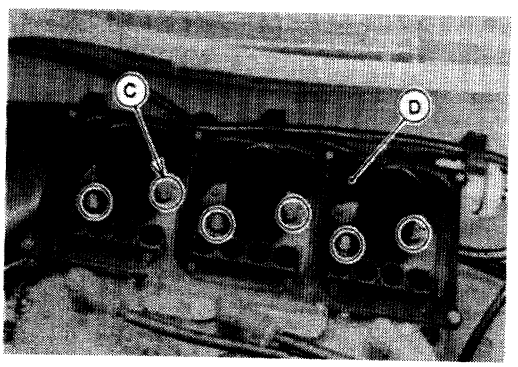
CAUTION
The fuel pump should not be disassembled. **If leakage is evident or internal damage is suspected, replace the fuel pump unit [B].**

Flame Arrester

Removal

● Remove:
Air Intake Cover Mounting Bolts [A]
Air Intake Cover [B]
Flame Arrester
Carburetor Mounting Bolts [C]
Arrester Case [D]

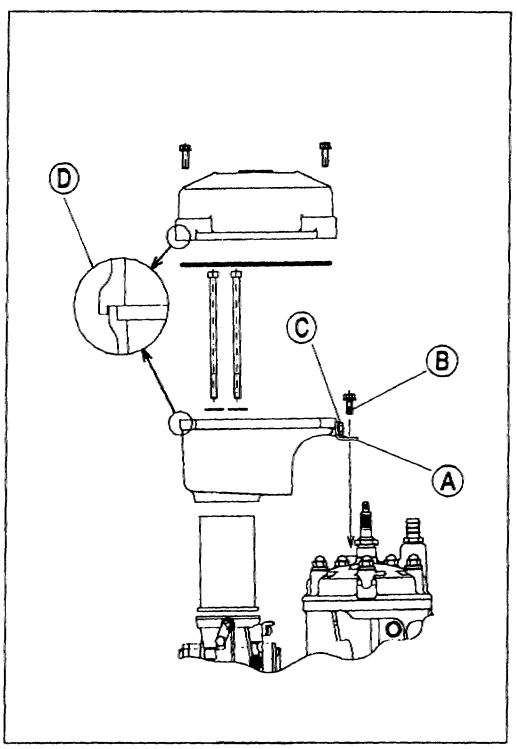




Installation Notes

● Fix the stay [A] to the case temporarily.
● Torque the bolt (cylinder head side) [B] and then torque the bolt (arrester case side) [C].
● Insert the air intake cover into the arrester case [D].
● Apply a non-permanent locking agent to the following.

Torque – Stay Mounting Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)
Carburetor Mounting Bolts: 8.8 N-m (0.9 kg-m, 78 in-lb)
Air Intake Cover Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)



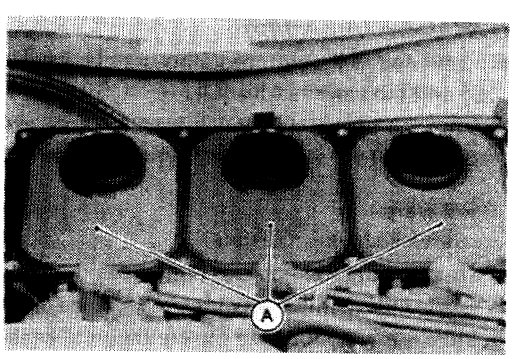
Cleaning

● Remove the flame arrester [A] (see Flame Arrester Removal).
● 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 kg/cm², 25 psi) maximum nozzle pressure.

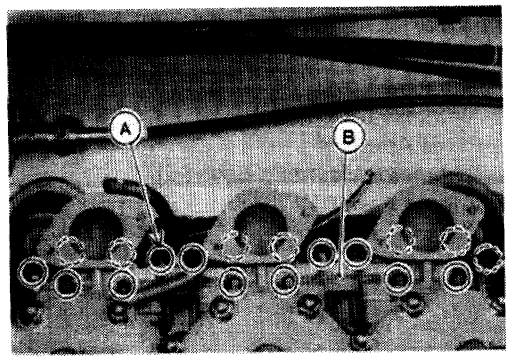
● Install the flame arrester (see Flame Arrester Installation Notes).



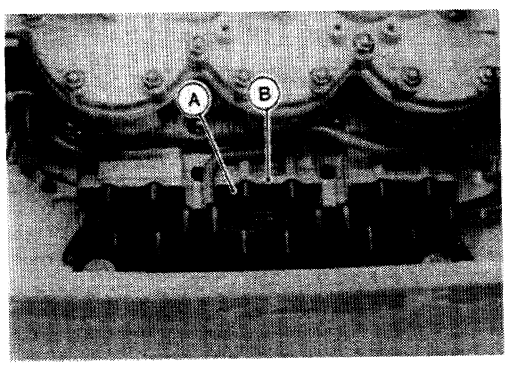
Intake Manifold, Reed Valves

Removal

- Remove:
  Air Intake Cover
  Carburetor (see Carburetor Removal)
- Remove the intake manifold mounting nut [A] and remove the intake manifold [B].

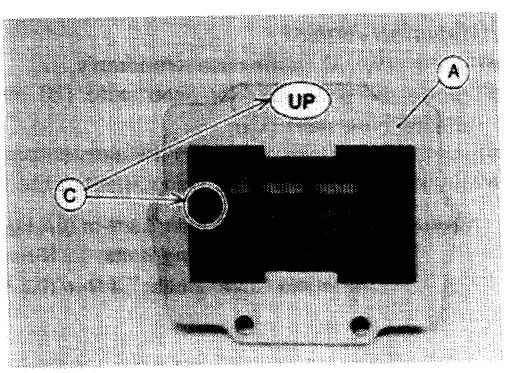


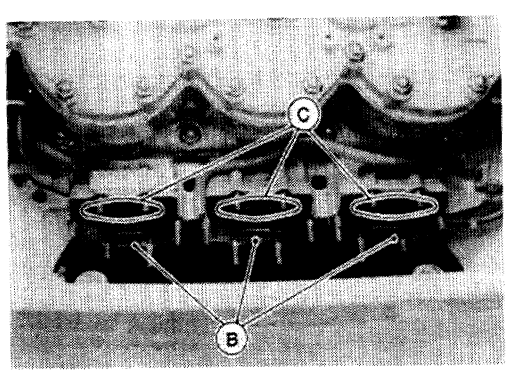
- Pull out the gaskets [A] and the reed valves [B].



Installation Notes

- Replace the gaskets with new ones.
- Install the reed valves [A] and gaskets [B] so that the "UP" mark [C] is up.





Reed Valve Inspection

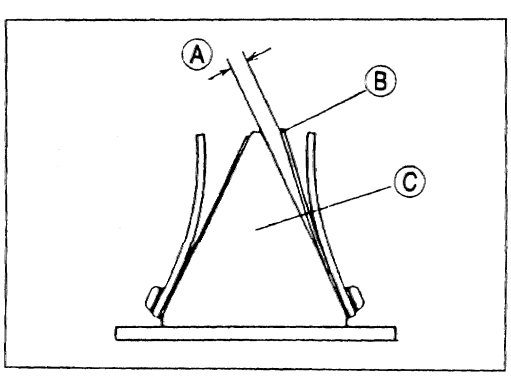
- Check reed warp by measuring the clearance [A] between each reed [B] and the valve holder [C].

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

Reed Warp
Service Limit: 0.2 mm

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

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

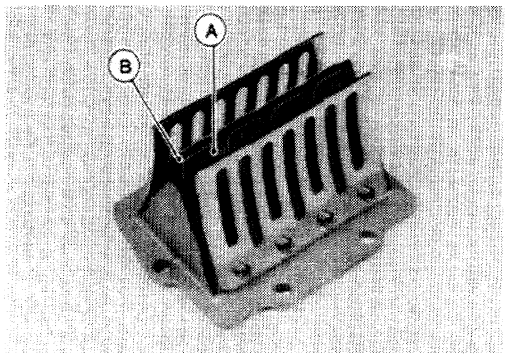


★If a reed becomes wavy, replace the reed valve assembly with a new one even if reed warp is less than the service limit.

Valve Holder Inspection

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

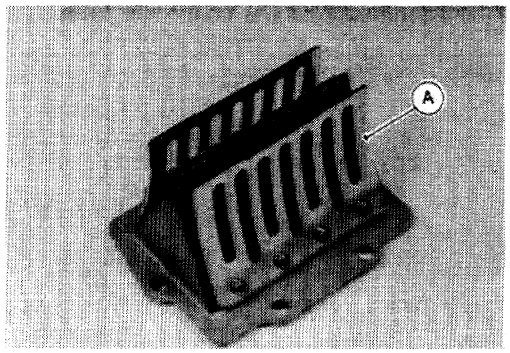
★If there is any doubt as to the condition of the rubber coating, replace the reed valve assembly with a new one.



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

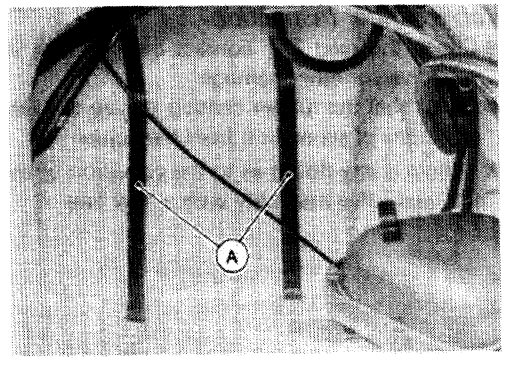
Fuel Tank Removal

● If the level of the fuel is above the filler neck, siphon some fuel out to prevent spilling it.

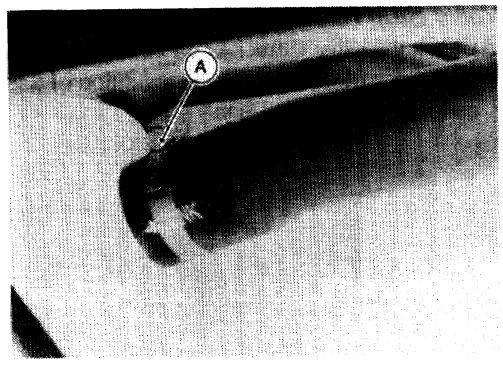
⚠WARNING

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

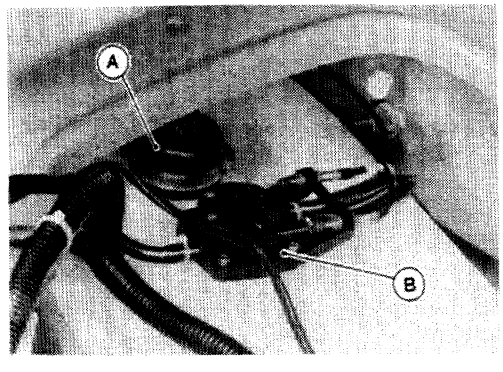
● Remove or disconnect:
Engine
Fuel Tank Straps [A]



● Loosen the clamps [A] on the filler tube.

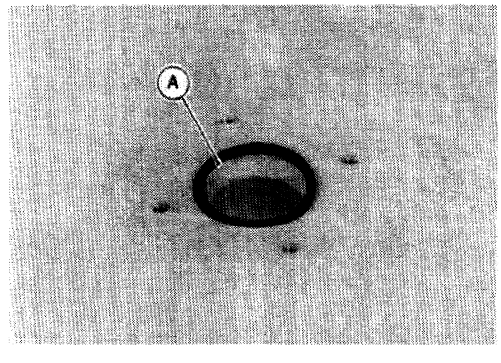


● Remove the fuel level sensor [A] and the fuel filter assembly [B] and remove the fuel tank.



Fuel Tank Installation Notes

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



Fuel Tank Cleaning

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

⚠WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Pull the lanyard key off the stop button. Do not smoke. Make sure the area is well ventilated and free from any source of flame or spark; this includes any appliance with a pilot light.

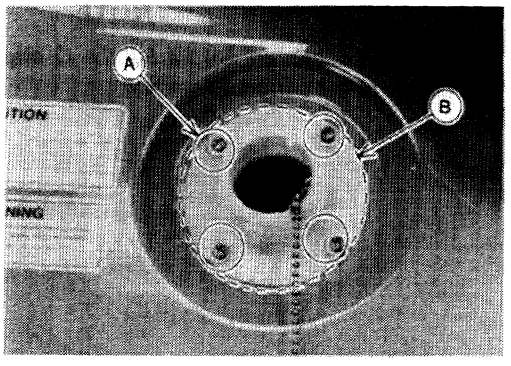
- Flush the tank repeatedly with high flash-point solvent until it is clean. It may be necessary to put a few marbles or pieces of clean gravel into the tank and shake it, to knock loose any foreign matter in the bottom.

⚠WARNING

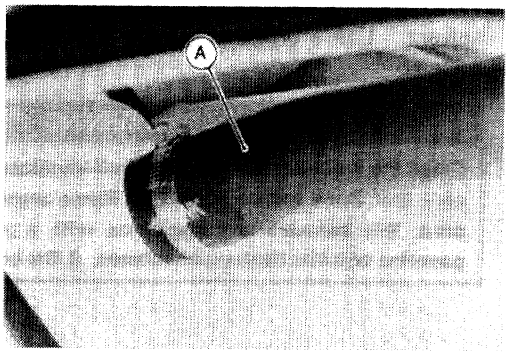
Clean the tank in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the tank. A fire or explosion could result.

Fuel Filler and Tube Removal

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



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



Fuel Filler and Tube Installation Notes

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

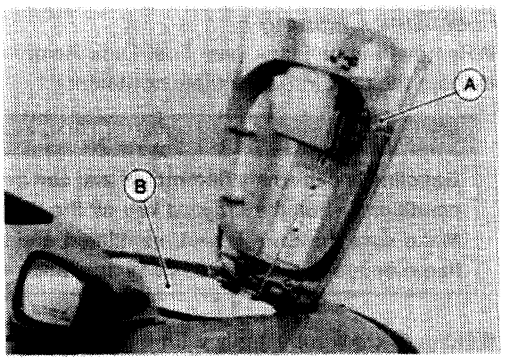
⚠WARNING

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.

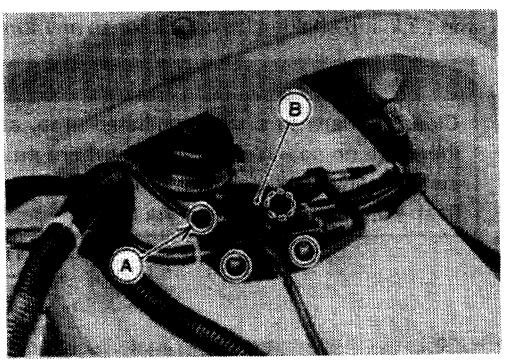
- Apply an even layer of silicone sealant to the mating surfaces of the filler and hull.

Fuel Filter Screen Cleaning

- Clean the fuel filter screens in accordance with the Periodic Maintenance Chart (see General Information chapter).
- Open the hatch cover [A] and take out the storage case [B].

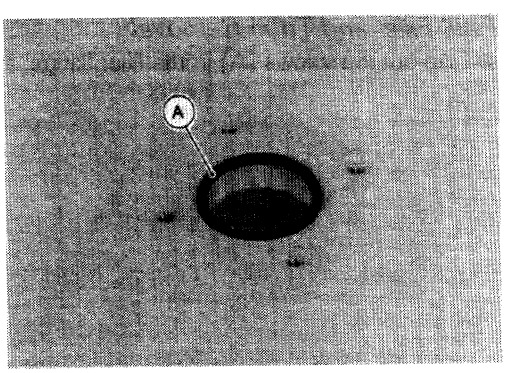


- Unscrew the mounting screws [A], and remove the fuel filter assembly [B].

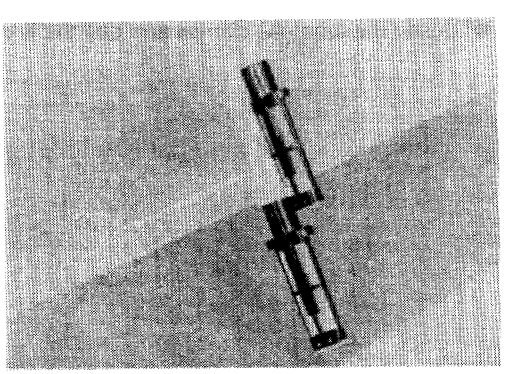


NOTE

○ *When servicing, do not let fall the O-ring [A] and the mounting screws in the bottom of the hull.*



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



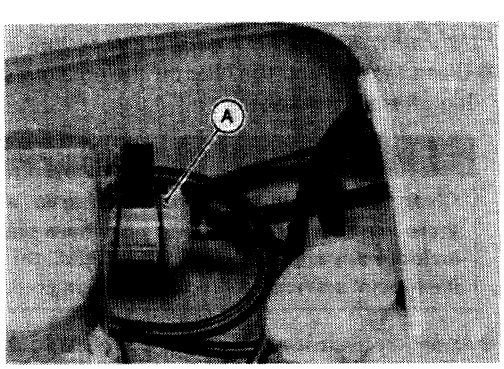
⚠WARNING

Clean the fuel filter screens in a well-ventilated area, and take 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.

Fuel Filter Inspection

The watercraft is equipped with a fuel filter [A] at the middle of the fuel line to prevent dirt or other foreign material from entering the carburetor.

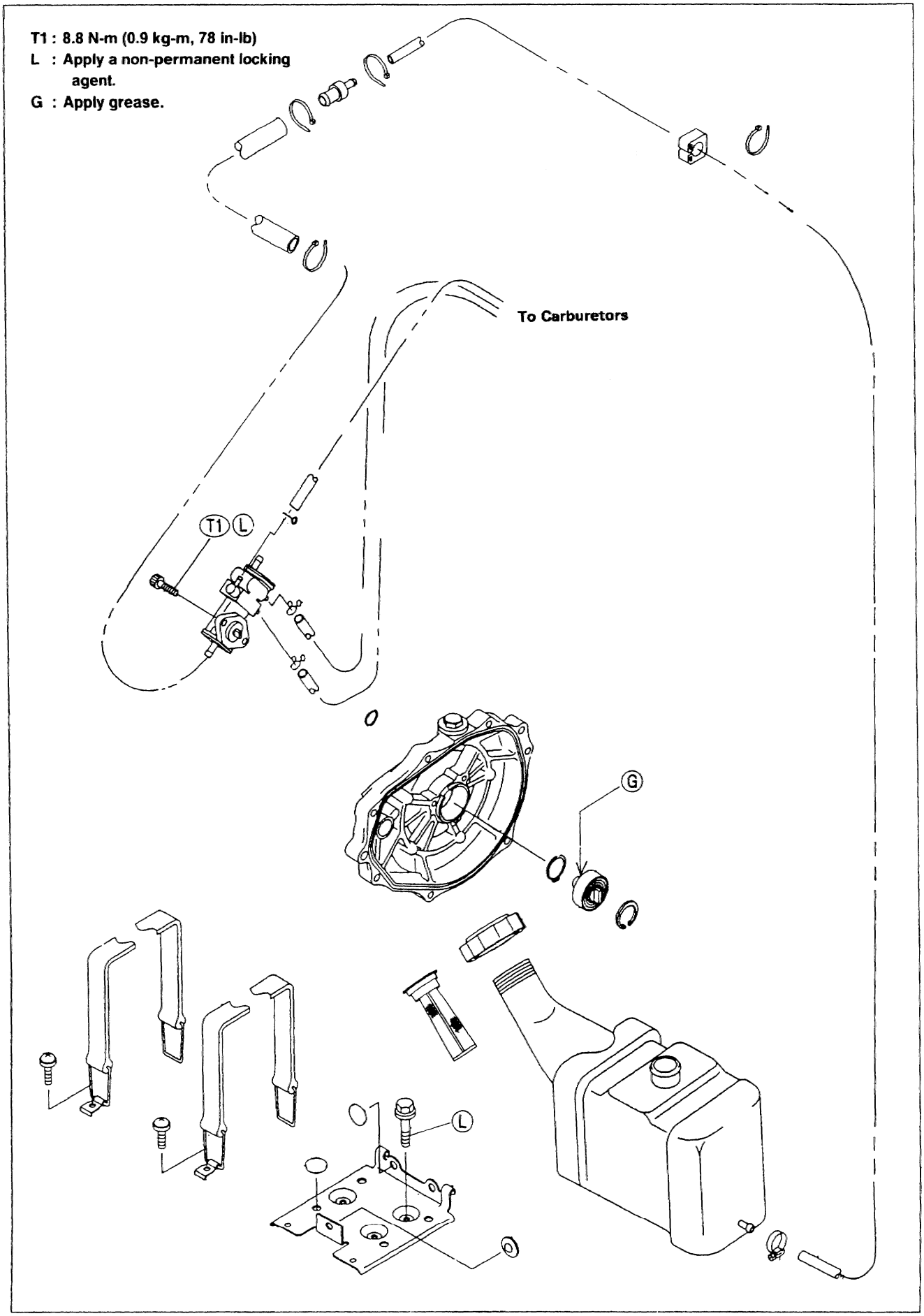
- Inspect and replace the fuel filter in accordance with the Periodic Maintenance Chart, or whenever you find from outside any foreign material or water trapped in the fuel filter.



Engine Lubrication System

Table of Contents

Exploded View



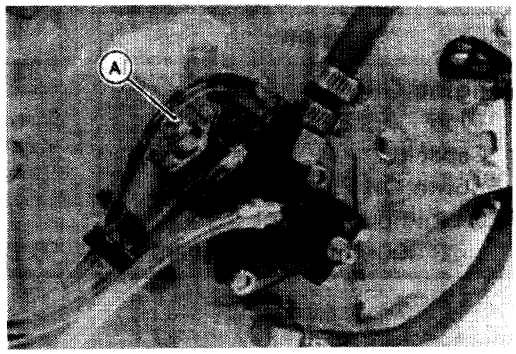
Specifications

Item	Standard
Engine Oil:	
Type	2-stroke, N.M.M.A. Certified for Service TC-WII or TC-W3
Capacity	3.3 L
Engine Oil Pump:	
Oil Pump output	
@3 000r/min (rpm), 2 min:	10.1 ~ 12.3 mL

Oil Pump

Oil Pump Bleeding

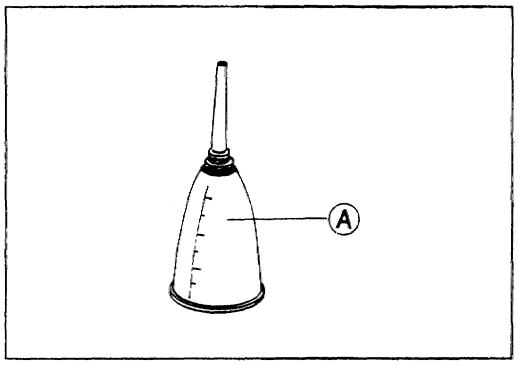
- Make sure that there is plenty of engine oil in the oil tank and that oil flow is not restricted.
- Loosen the air bleeder bolt [A] on the oil pump a couple of turns, wait until oil flows out, and then tighten the bleeder bolt securely.



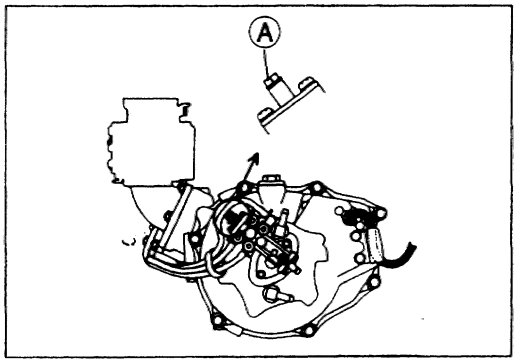
★If the air bubbles remain through the transparent oil inlet hose, follow the next procedure.

A: Pressure Bleeding

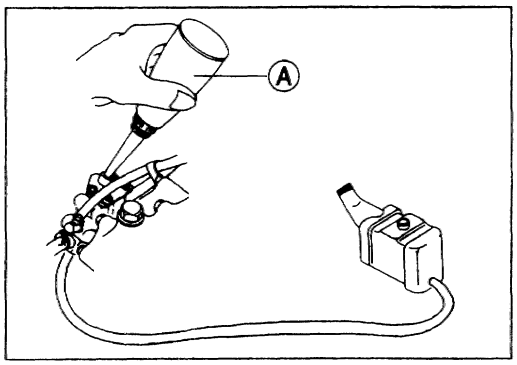
- Prepare a container [A] which is soft enough to be squeezed by hand and also a nozzle suitable for the oil pump bleed fitting.
- Fill the container with about 100 ml of the recommended engine oil.



- Remove the air bleeder bolt [A].



- Loosen the oil tank cap.
- Inject oil [A] slowly through the oil pump bleed fitting by squeezing the container with one continuous motion. Do not stop halfway. This amount of oil is sufficient to fill the line from the oil pump to the oil tank, so it can both remove air trapped in the oil pump and expel air from the line.



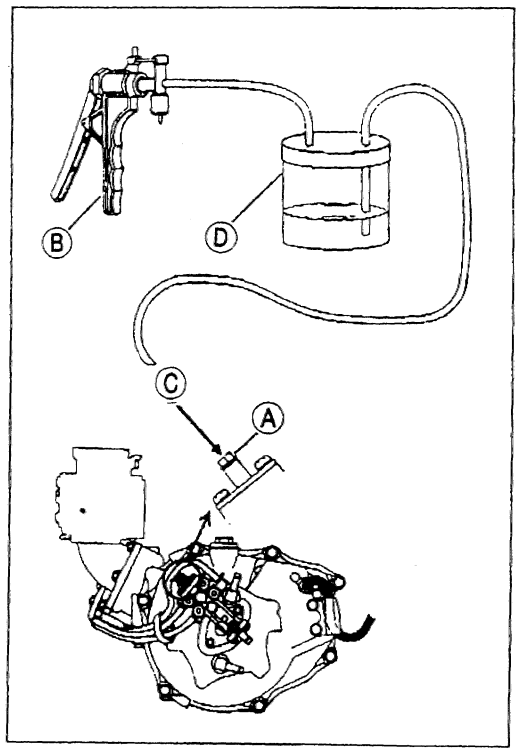
CAUTION
Squeezing the container intermittently may allow air to enter the oil line, causing obstruction of oil flow and subsequent engine damage.

- Reinstall the air bleeder bolt.
- Tighten the oil tank cap.

B: Vacuum Bleeding

- Remove the air bleeder bolt [A].
- Attach a hand-operated vacuum pump [B] (like a Mityvac, P/N T96000-001) to the oil pump bleed fitting [C] and draw oil through the injection pump.
- Continue to draw oil through the injection system until no more air bubbles come through the suction line.
- Replace the air bleeder bolt.

Reservoir [D]



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.**

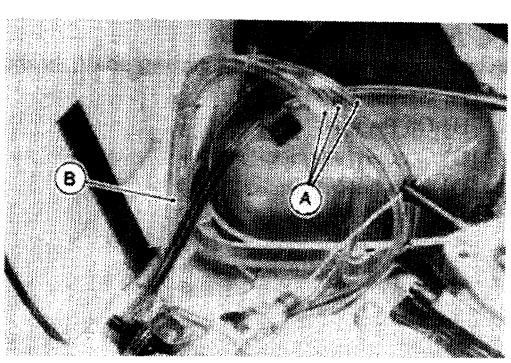
- Supply the cooling system with water (see Auxiliary Cooling in the General Information chapter).
- Start the engine, keep it at idling speed and check the oil flow through the transparent outlet hose.
- Keep the engine running until any air bubbles in the outlet hoses disappear.

Oil Pump Performance Test

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

- Disconnect the oil pump outlet hoses at the oil injection nozzle and run the hoses [A] into a measuring glass [B].

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



- Supply the cooling system with water (see Auxiliary Cooling in the General Information chapter).
- Start the engine, and run it at a steady 3,000 rpm (use a tachometer).
- 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 (3,000 rpm for 2 minutes)
Standard: 10.1 ~ 12.3 mL

★If the oil pump output is subnormal, inspect the oil pump, and the inlet and outlet hoses for oil leaks.

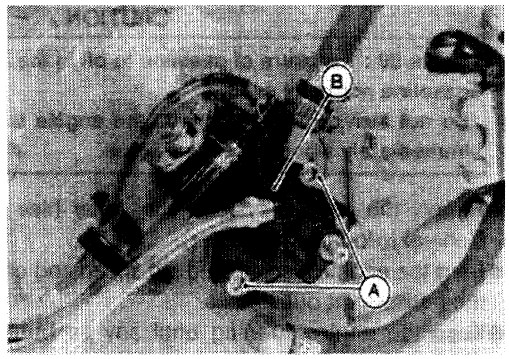
★If oil leaks are not found, replace the oil pump.

NOTE

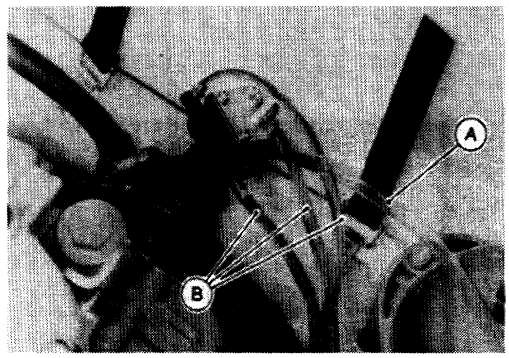
○*A check valve is built into the oil pump and can not be removed.*

Oil Pump Removal

- Remove the mounting bolts [A] and take off the oil pump [B] and the O-ring.

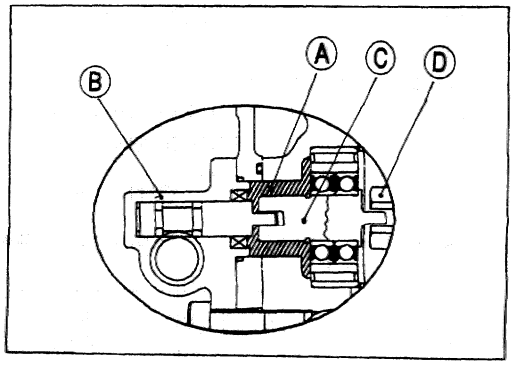


- Squeeze the inlet hose [A] to restrict oil flow and disconnect it from the oil pump, and pull off the outlet hoses [B].



Oil Pump Installation

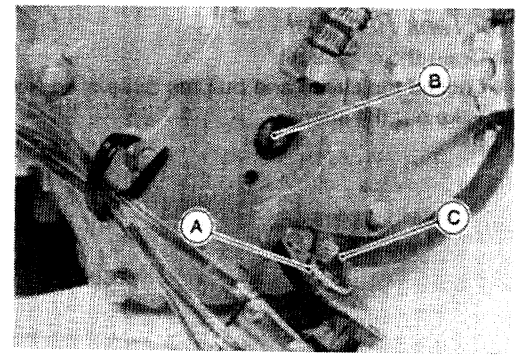
- Grease the hole of the connecting shaft, as shown.
  [A] Grease Hole
  [B] Oil Pump
  [C] Connecting Shaft
  [D] Flywheel Bolt



● Be sure the O-ring [A] is in place.
● Inject the oil into the oil hoses, and then connect the hose to the oil pump.
● Install the oil pump on the magneto cover.
○ When mounting the oil pump, note the position of the slot [B] in the connecting shaft, and then turn oil pump shaft [C] so that it will fit into the slot.

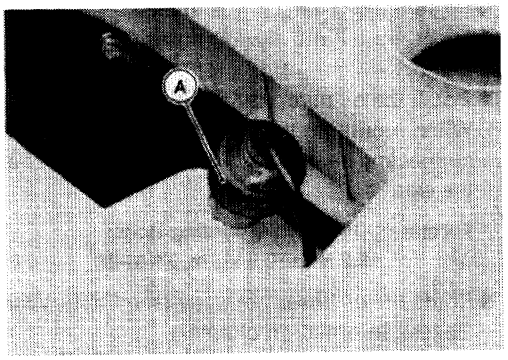
Torque – Oil Pump Mounting Bolts:
8.8 N-m (0.9 kg-m, 78 in-lb)

● Route the oil hoses correctly (see Cable, Wire and Hose Routing in the General Information chapter).
● Bleed the air from the system (see Oil Pump Bleeding).

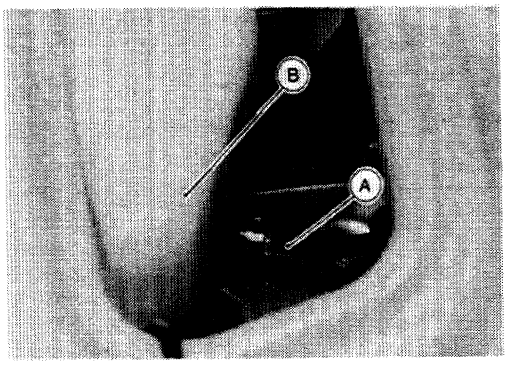


Oil Tank

Oil Tank Removal



- Drain the engine oil.
- Loosen the clamp and pull the oil level sensor [A] out of the oil tank.
- Take out the straps.



- Disconnect the oil pump inlet hose [A] and remove the oil tank [B].

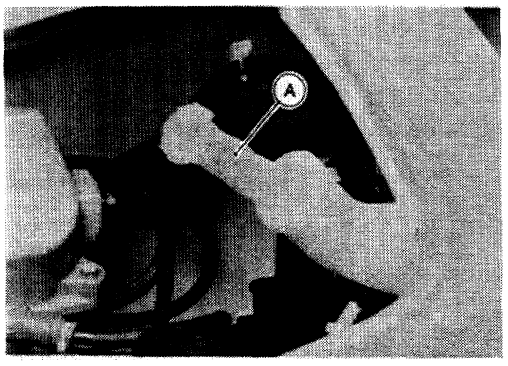
Oil Tank Cleaning

- 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



Check the oil filter [A] for foreign particles every time you add the oil. If there are any foreign particles, the oil filter must be cleaned.

- Take out the oil filter out of the oil filter.
- Wash the oil filter in a non-flammable or high flash-point solvent. Use a brush to remove any contaminates trapped in the filter.

⚠WARNING

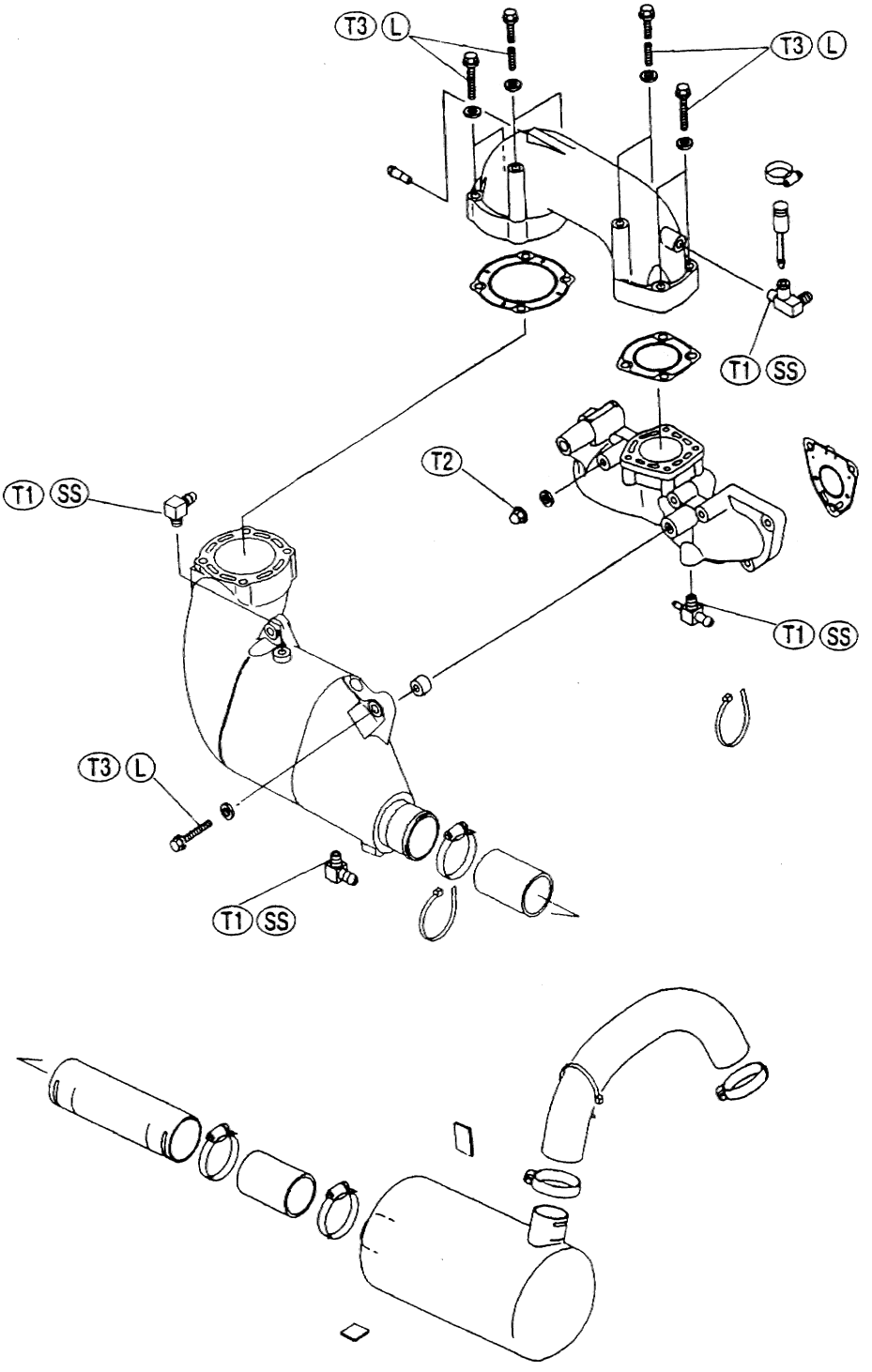
Clean the oil filter in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the filter. A fire or explosion could result.

Exhaust System

Table of Contents

Exploded View

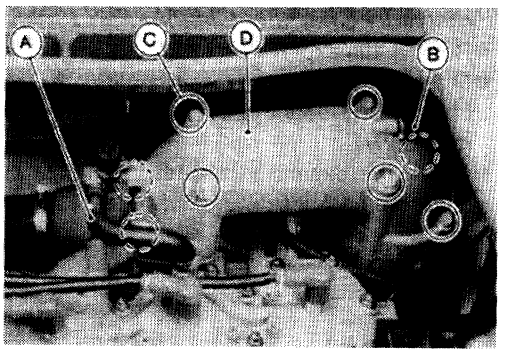
T1 : 12 N-m (1.2 kg-m, 8.5 ft-lb)
T2 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T3 : 49 N-m (5.0 kg-m, 36 ft-lb)
L : Apply a non-permanent locking agent.
SS: Apply silicone sealant.

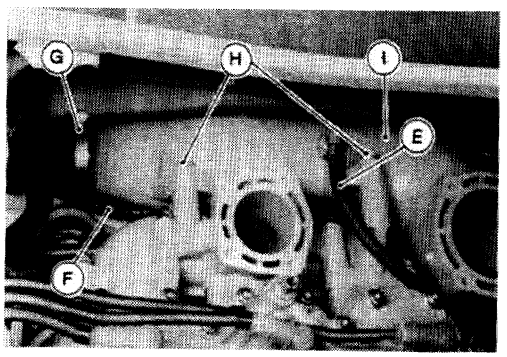


Expansion Chamber

Removal

● Remove or disconnect:
Cooling Hose [A]
Bypass Hose [B]
Exhaust Pipe Mounting Bolts [C]
Exhaust Pipe [D]
Magneto Cooling Hose [E]
Cooling Hose (Chamber ~ Hull) [F]
Connecting Tube Clamps [G]
Expansion Chamber Mounting Bolts [H]
Expansion Chamber [I]

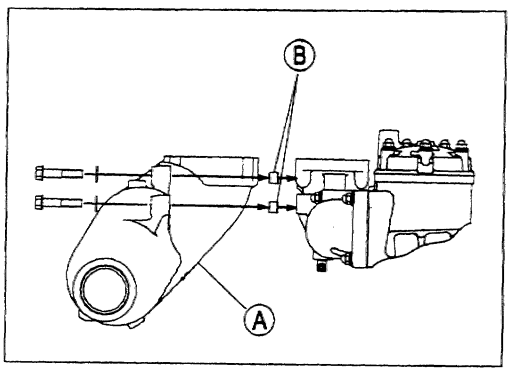




Installation

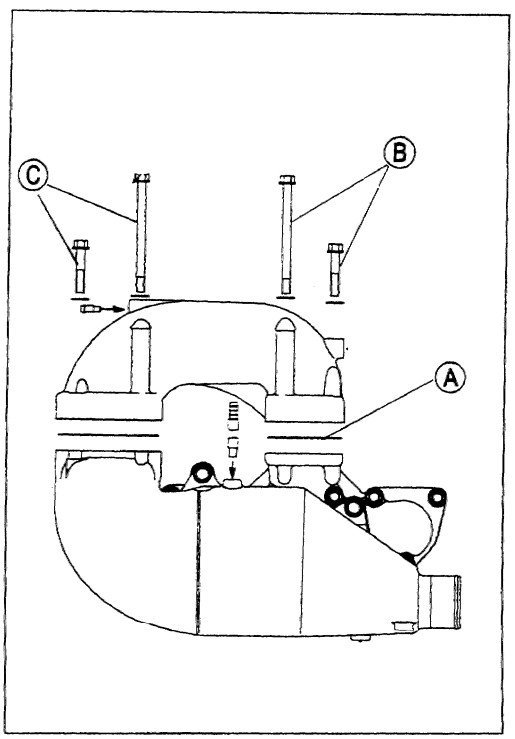
● Install the expansion chamber [A] on the engine with the pins [B].
● Apply a non-permanent locking agent to the expansion chamber mounting bolts.

Torque – Expansion Chamber Mounting Bolts: 49 N-m (5.0 kg-m, 36 ft-lb)



● Fix the gasket [A] so that "UP"-mark faces upward.
● Install the exhaust pipe on the expansion chamber.
○ Apply a non-permanent locking agent to the exhaust pipe mounting bolts.

Torque – Exhaust Pipe Mounting Bolts: 49 N-m (5.0 kg-m, 36 ft-lb)



● Install the exhaust pipe with the gasket and apply a non-permanent locking agent to the following bolts and torque them in the following order.

Torque – (1) Exhaust Pipe Mounting Bolts (Manifold Side): 49 N-m (5.0 kg-m, 36 ft-lb) [B]
(2) Exhaust Pipe Mounting Bolts (Chamber Side): 49 N-m (5.0 kg-m, 36 ft-lb) [C]

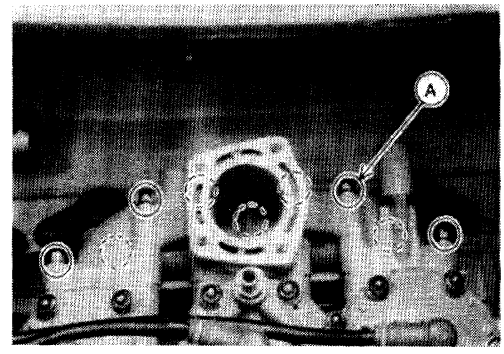
Expansion Chamber Cleaning and Inspection

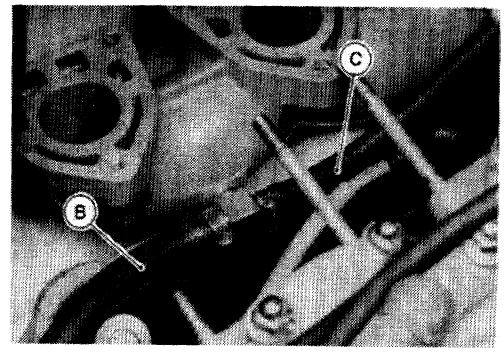
- Remove the expansion chamber (see Expansion Chamber Removal).
- Scrape any carbon deposits out of the expansion chamber with a blunt, round-edged tool. Excessive deposits will cause the engine to run poorly.
- Check the expansion chamber carefully for cracks. Also look for corrosion both inside and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

Exhaust Manifold

Removal

- Remove or disconnect:
  Expansion Chamber (see Expansion Chamber Removal)
  Exhaust Manifold Mounting Nuts [A]
  Inlet Cooling Hose [B]
  Magneto Cooling Hose (Manifold ~ Magneto Cooling Cover) [C]
  Exhaust Manifold

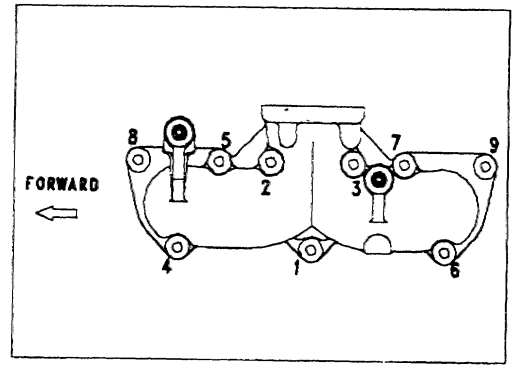




Installation

- Install the exhaust manifold gasket and torque the exhaust manifold mounting nuts, following the specified tightening sequence.

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



Exhaust Manifold Cleaning and Inspection

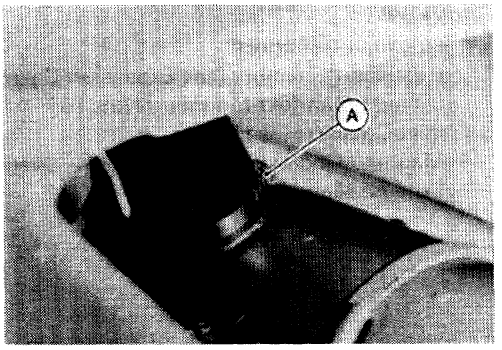
- Remove the exhaust manifold parts.
- Clean the carbon deposits out of the exhaust passages with a blunt, roundedged tool.
- Flush foreign matter out of the water passages with fresh water.
- Check the insides of the water passage for corrosion. Check the gasket surfaces for nicks or other damage.

★If there is excessive corrosion or if the gasket surfaces are so badly damaged that they will not seal properly, replace the part.

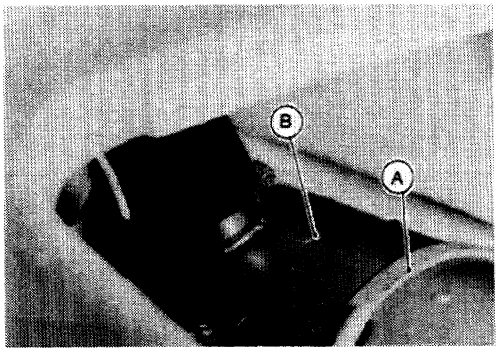
Water Box Muffler

Removal

- Remove the expansion chamber (see Expansion Chamber Removal).
- Loosen the clamp [A] on the exhaust tube and pull off it.

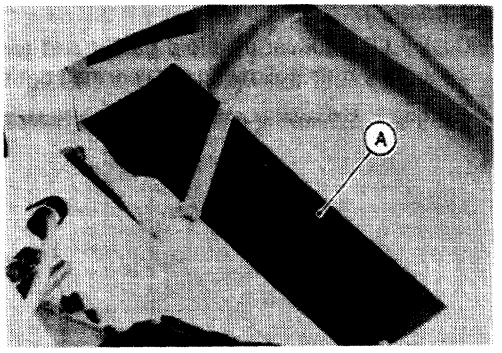


- Remove the straps [A], and slide off the water box muffler [B] toward the front.



Installation

- Be sure the damper [A] is in the position.



Inspection

- Remove the water box muffler.
- Empty any water out of the water box.
- Check the inlet spigot for damage caused by excessive heat.

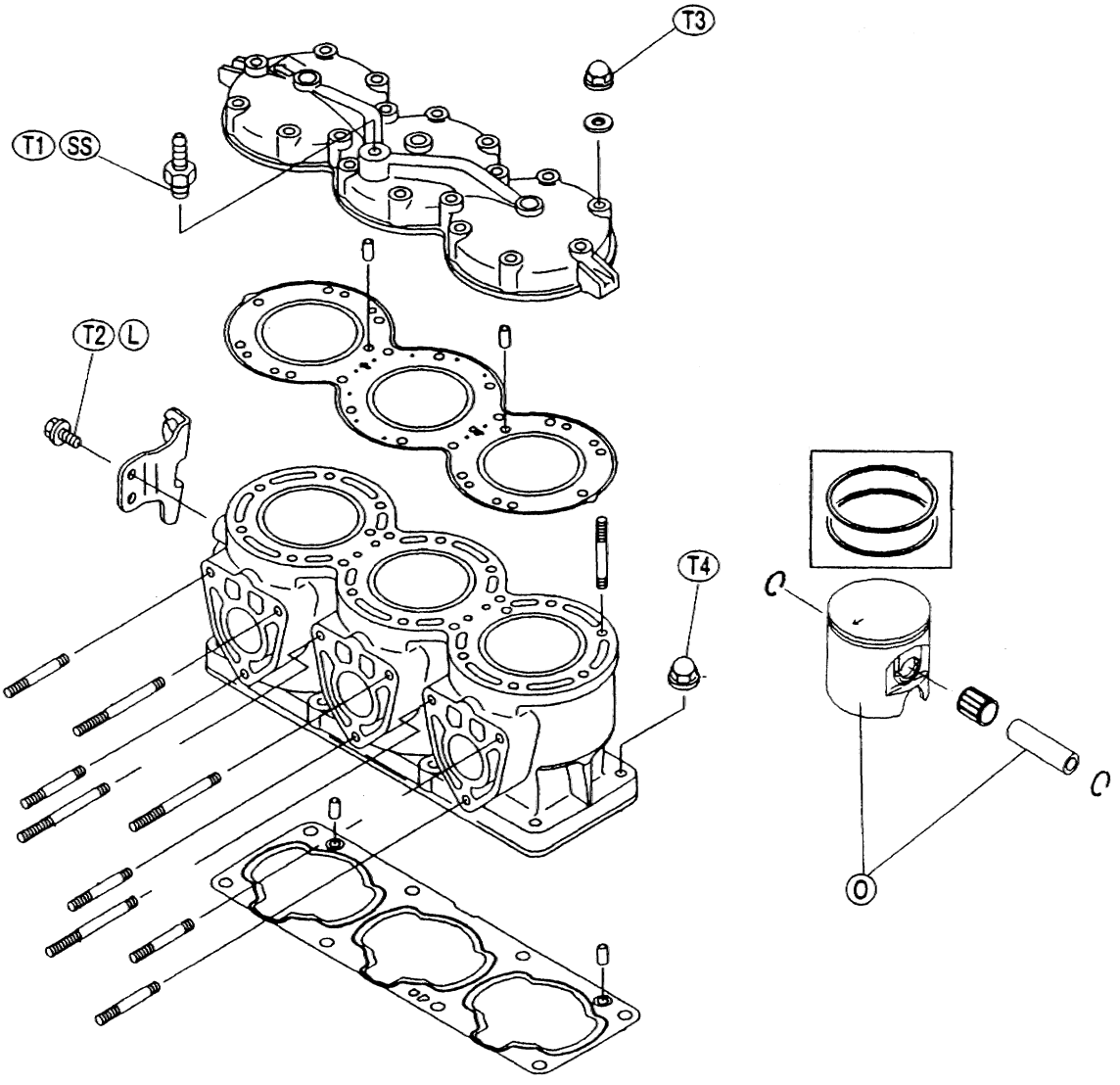
★If there is heat damage to the inlet spigot, check the cooling system for blockage (see Cooling System Cleaning and Inspection) and the carburetor for proper mixture needle adjustment (see Mixture Screw Adjustment in the Fuel System chapter).

Engine Top End

Table of Contents

Exploded View

T1 : 12 N-m (1.2 kg-m, 8.5 ft-lb)
T2 : 20 N-m (2.0 kg-m, 14.5 ft-lb)
T3 : 29 N-m (3.0 kg-m, 22 ft-lb)
T4 : 34 N-m (3.5 kg-m, 25 ft-lb)
L : Apply a non-permanent locking agent.
SS: Apply silicone sealant.
O : Apply engine oil.



Specifications

Item		Standard	Service Limit
Cylinder Head:			
Cylinder compression		(Usable range) 657 ~ 1040 kPa (6.7 ~ 10.6 kg/cm², 95 ~ 151 psi) (Open throttle)	---
Cylinder head warp		---	0.05 mm
Cylinder, Piston:			
Cylinder inside diameter		80.000 ~ 80.015 mm	80.10 mm
Piston diameter (16.9 mm up from bottom of skirt)		79.865 ~ 79.880 mm	79.72 mm
Piston/cylinder clearance		0.130 ~ 0.140 mm	---
Oversize piston and rings		+0.5 mm and +1.0 mm	---
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	0.7 mm
	Second	0.25 ~ 0.40 mm	0.7 mm

Special Tools – Piston Pin Puller Assembly: 57001-910
Piston Ring Compressor Grip: 57001-1095
Piston Ring Compressor Belt, Φ67 ~ Φ79: 57001-1097
Compression Gauge: 57001-221
Compression Gauge Adapter, M14 x 1.25: 57001-1159

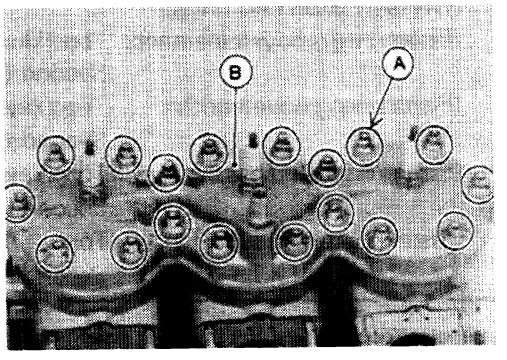
Engine Top End

Disassembly and Assembly:

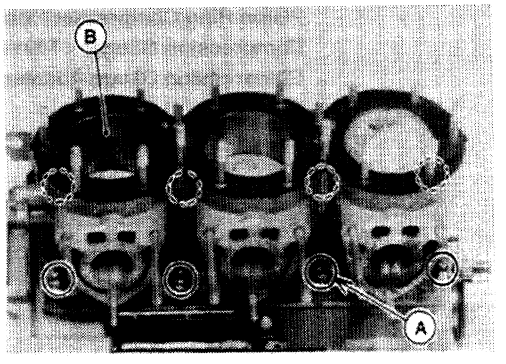
Disassembly

- Pull the bilge hoses out.
- Remove:
  - Spark Plugs
  - Cable Holder
  - Carburetor
  - Expansion Chamber
  - Exhaust Manifold with Cooling Hose
- Remove the engine.

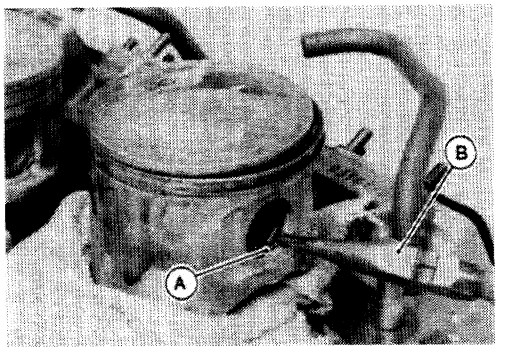
- Remove the cylinder head nut [A], and take off the cylinder head [B].



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

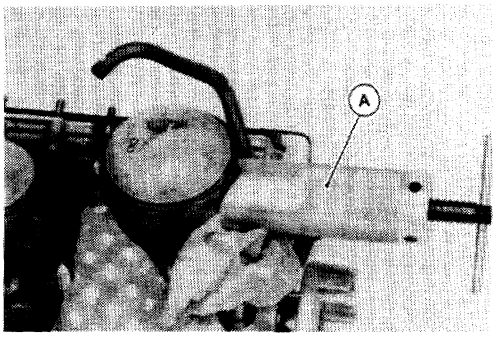


- Stuff clean rags into the crankcase opening to prevent dirt or foreign objects from falling into the crankcase.
- Remove the piston pin snap ring [A] with a pliers [B].

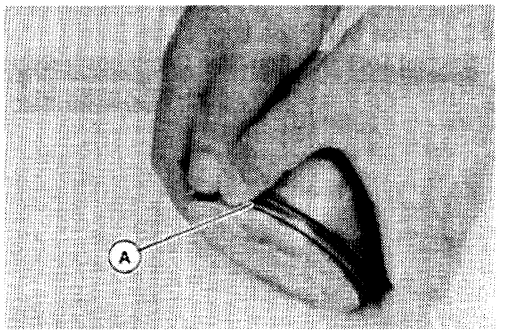


- Remove the piston by pushing its pin out the side that the circlip was removed. Use a piston pin puller assembly [A], if the pin is tight.

Special Tool – Piston Pin Puller Assembly: 57001-910



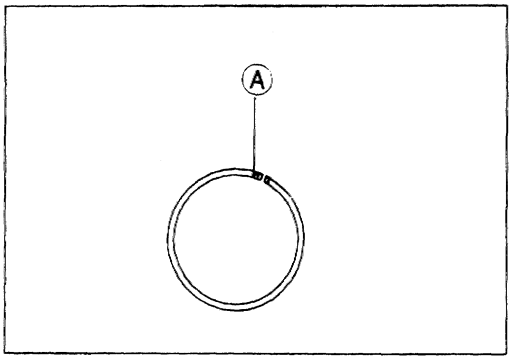
● Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.



Assembly Notes

● If any parts in the piston assemblies require replacement, or if the cylinder is honed or replaced, be sure to check the critical clearances of the new parts against the values given in Specifications.

● Install the piston rings so that the "R" mark [A] faces upward as shown.



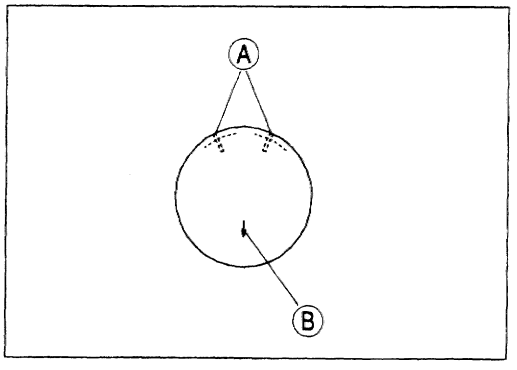
● When installing the piston rings by hand, first fit one end of the piston ring against the pin in the ring groove, spread the ring opening with the other hand and then slip the ring into the groove.

● Check to see that the pin [A] in each piston ring groove is between the ends of the piston ring.

● Using engine oil, lubricate the small end bearing and insert into the connecting rod eye.

● Using engine oil, lubricate the piston pin and the pin holes.

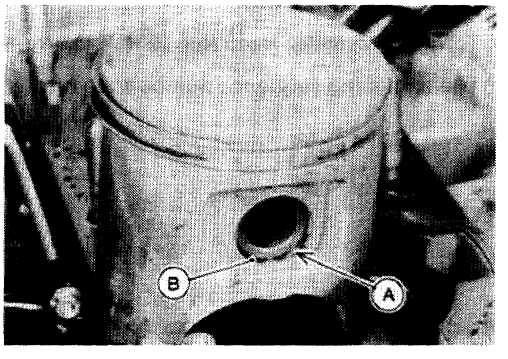
● Mount the piston on the connecting rod with the arrow [B] on its crown pointing to the left (exhaust) side of the engine.



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

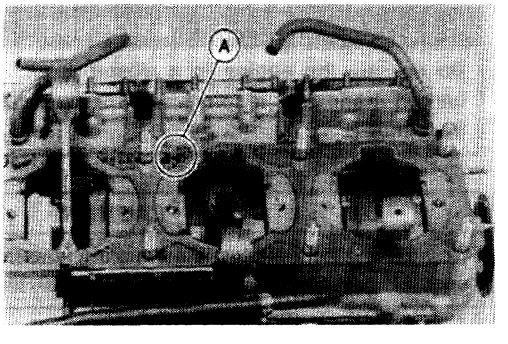
CAUTION
Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

● 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.



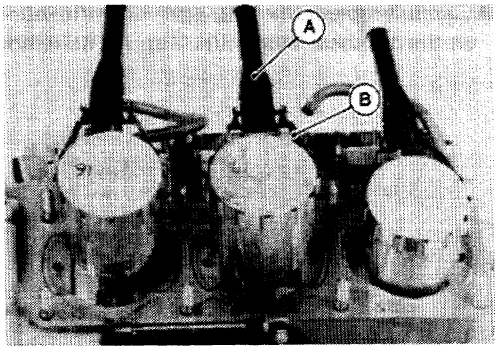
● Set the new cylinder base gasket in place on the crankcase.

○ The "UP" mark [A] must face upward.



●Apply engine oil to the surface of the pistons.
●Compress the piston rings.

Special Tool – Piston Ring Compressor Grip: 57001-1095 [A]
Piston Ring Compressor Belt, Φ67 ~ Φ79: 57001-1097 [B]



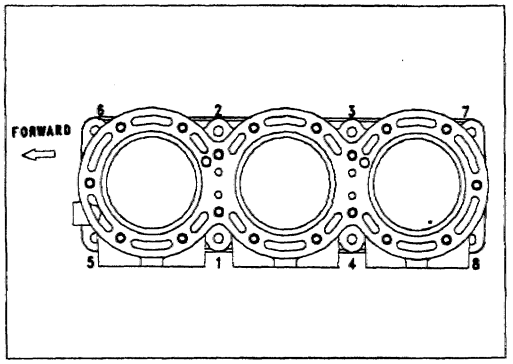
●Thoroughly oil the cylinder bores.
●Slide the cylinder block down over the crankcase studs onto the crankcase.

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

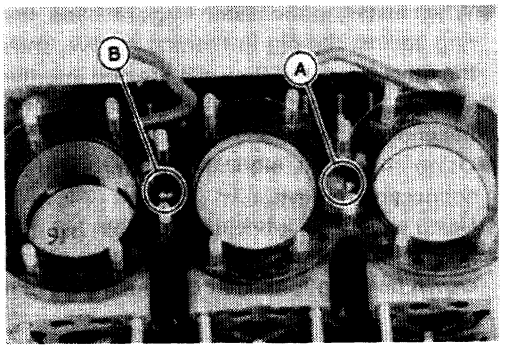
●Install the cylinder base nuts.

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

○The tightening sequence numbers are marked on the cylinder.



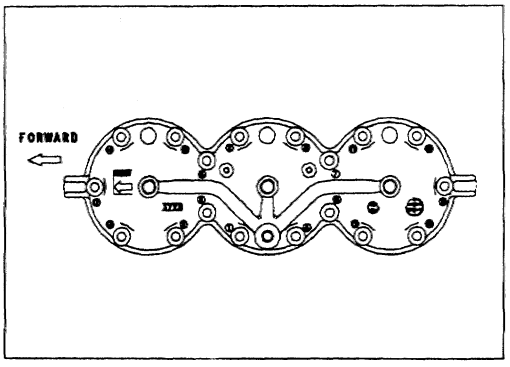
●Place a new cylinder head gasket on the cylinder head.
○The "UP" mark [A] of the gasket must face upward and arrow mark [B] must face forward.



●Install the cylinder head.

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

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



●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 or severe engine and exhaust system damage will occur.

Maintenance and Inspection:

Compression Measurement

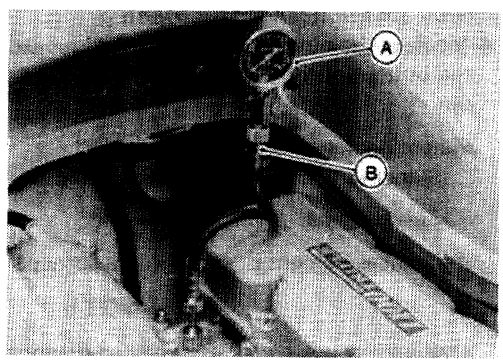
● Thoroughly warm up the engine, while checking that there is no compression leakage from around the spark plugs or the cylinder head gasket.

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

● Stop the engine.

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

Special Tools – Compression Gauge: 57001-221 [A]
Compression Gauge Adapter, M14 x 1.25: 57001-1159 [B]



● Using the starter motor, turn the engine over with the throttle fully open until the compression gauge stops rising; the compression is the highest reading obtainable.

● Repeat the measurement for the other two cylinders.

Cylinder Compression (Usable Range)
657 ~ 1040 kPa (6.7 ~ 10.6 kg/cm², 95 ~ 151 psi) (open throttle)

★ 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.

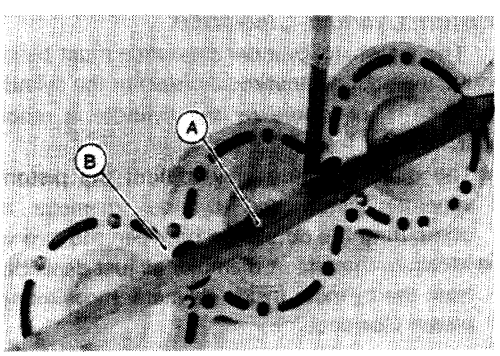
○ Piston rings, piston ring grooves wear.

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



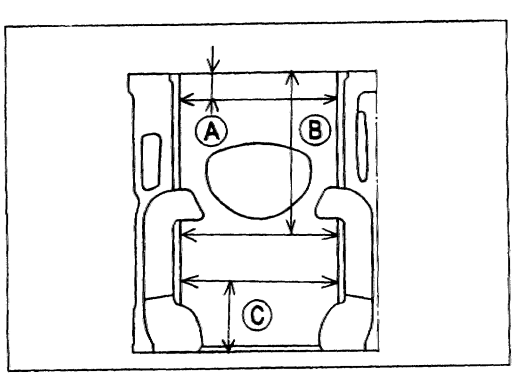
Cylinder Wear Inspection

● 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
[B] 80 mm
[C] 35 mm



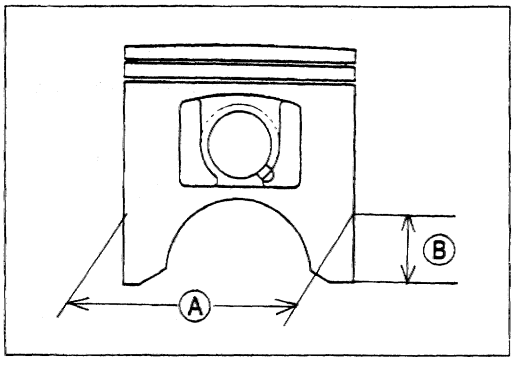
★If any of the cylinder inside diameter measurements exceeds the service limit, the cylinder will have to be bored oversize and then honed.

Cylinder Inside Diameter

Standard: **80.000 ~ 80.015 mm and less than 0.01 mm difference between any two measurements**

Service Limit: **80.10 mm, or more than 0.05 mm difference between any two measurements**

Piston Diameter Measurement



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

Piston Diameter

Standard: **79.865 ~ 79.880 mm**

Service Limit: **79.72 mm**

○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, or whenever the cylinder is rebored and oversize pistons installed.

●The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values.

●Measure the piston diameter as just described, and subtract this value from the cylinder inside diameter measurement. The difference is the piston clearance.

Piston/Cylinder Clearance

0.130 ~ 0.140 mm

Boring and Honing

When boring and honing a cylinder, note the following:

○There are two sizes of oversize pistons available. Oversize pistons require oversize rings.

Oversize Piston and Rings
0.5 mm Oversize
1.0 mm Oversize

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

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

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

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

Piston Ring, Piston Ring Groove Inspection

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

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

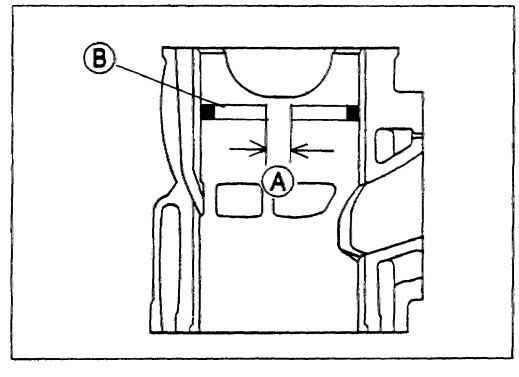
★It the piston ring groove are worn unevenly or damaged, the piston must be replaced and fitted with new rings.

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 replace.



Piston Ring End Gap

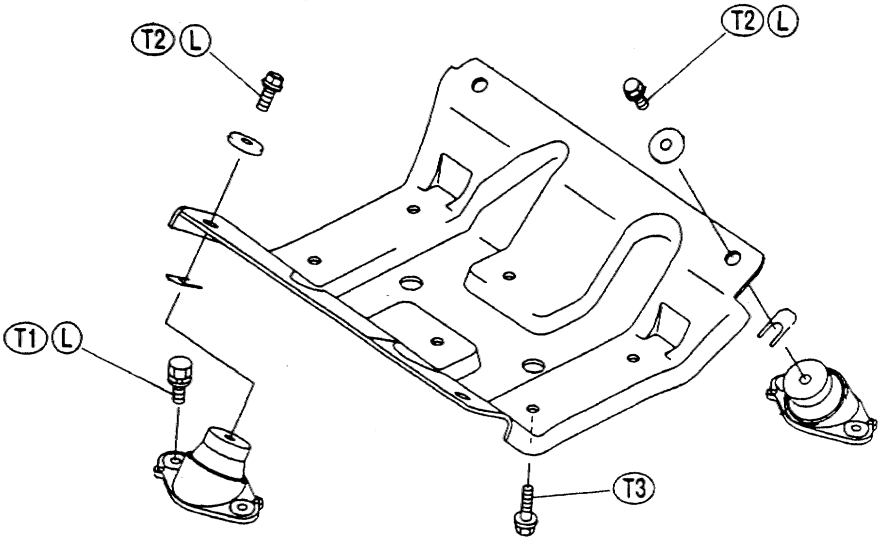
	Standard	Service Limit
Top	**0.25 ~ 0.40 mm**	**0.70 mm**
Second	**0.25 ~ 0.40 mm**	**0.70 mm**

Engine Removal/Installation

Table of Contents

Exploded View

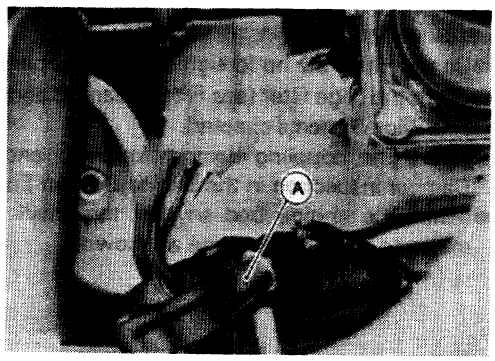
T1 : 16 N-m (1.6 kg-m, 11.6 ft-lb)
T2 : 36 N-m (3.7 kg-m, 27 ft-lb)
T3 : 44 N-m (4.5 kg-m, 33 ft-lb)
L : Apply a non-permanent locking agent.

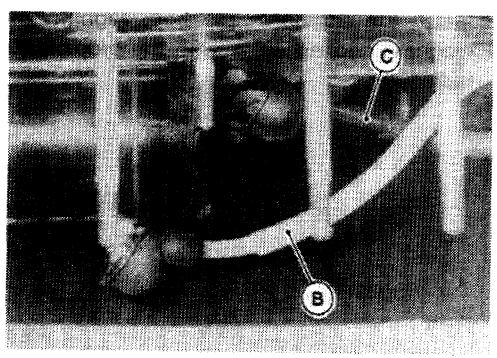


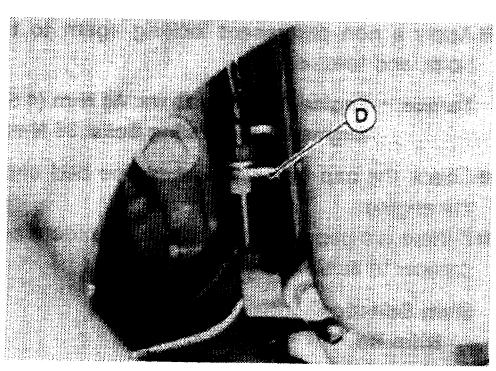
Engine Removal/Installation

Removal

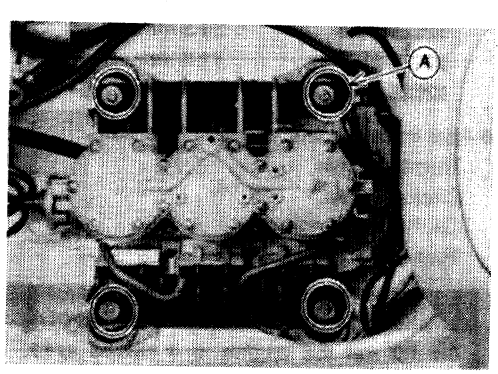
● Remove or disconnect:
Battery
Spark Plug Cap
Electric Case Connector [A]
Starter Motor Cable [B]
Battery (−) Cable [C]
Wiring Clamps
Expansion Chamber
Cable Holder [D]
Carburetor
Coupling Cover
Oil Inlet Hose
Intake Manifold
Exhaust Manifold
Bilge Breather



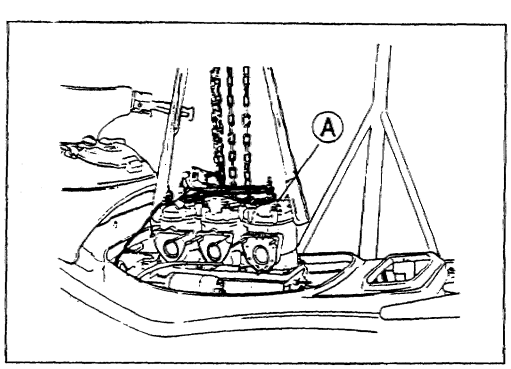




● Remove the engine bed mounting bolts [A].

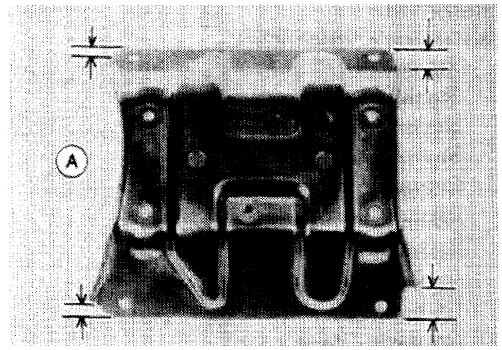


● Slide the engine toward the front to disengage the couplings, and then lift [A] the engine out of the hull.
● Remove the engine mounting bolts and separate the engine bed and the engine.

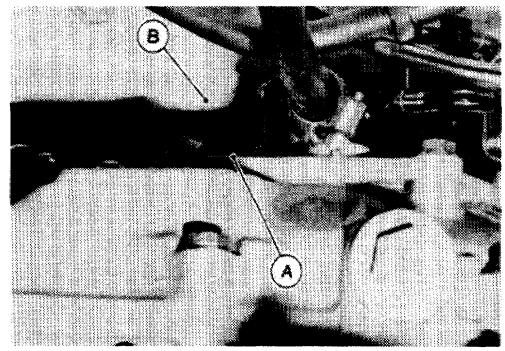


Installation

- Be sure there are no foreign objects and parts inside of the hull.
- Clean the bilge filter (see Filter Cleaning and Inspection in the Cooling and Bilge Systems chapter).
- Check the coupling damper for wear and damage (see Coupling Damper Inspection in the Engine Bottom End chapter).
- Install the engine bed so that the small notches [A] are on the magneto end of the engine as shown.



- Install the engine in the hull, aligning the projection [A] on the magneto cooling cover with the projection [B] in the bottom of the hull.



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

Torque – Engine Mounting Bolts: 44 N-m (4.5 kg-m, 33 ft-lb)
Engine Bed Mounting Bolts: 36 N-m (3.7 kg-m, 27 ft-lb)

- Check the gap between the engine bed and the dampers by rocking the engine.
- If there is a gap, insert a suitable shim between the engine bed 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 1.5 mm

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

⚠WARNING

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

CAUTION

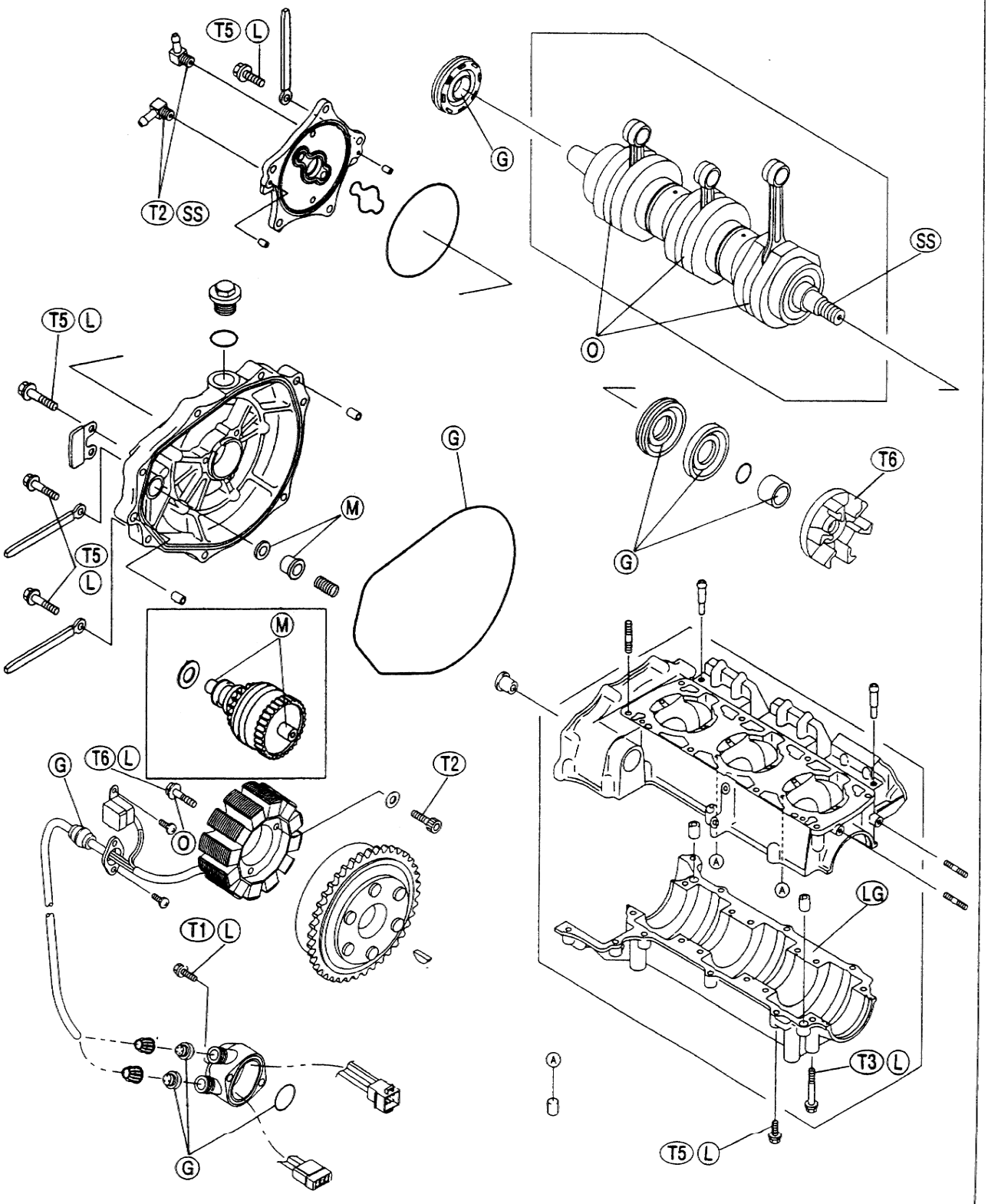
Do not run the engine without cooling water supply for more than 15 seconds or severe engine and exhaust system damage will occur.

Engine Bottom End

Table of Contents

Exploded View

T1 : 7.8 N-m (0.8 kg-m, 69 in-lb)
T2 : 12 N-m (1.2 kg-m, 8.5 ft-lb)
T3 : 29 N-m (3.0 kg-m, 22 ft-lb)
T3 : 130 N-m (13.5 kg-m, 98 ft-lb)
T5 : 8.8 N-m (0.9 kg-m, 78 in-lb)
T6 : 125 N-m (13.0 kg-m, 94 ft-lb)
L : Apply a non-pemanent locking agent.
M : Apply molybdenum disulfide grease.
LG : Apply liquid gasket.
O : Apply oil to the flanged portion.
SS : Apply silicone sealant.
G : Apply grease.



Specifications

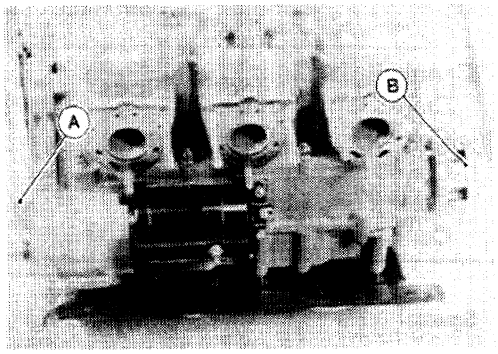
Item	Standard	Service Limit
Crankshaft, Connecting Rods:		
Crankshaft runout	0.04mm	0.10 mm TIR
Connecting rod side clearance	0.45 ~ 0.55 mm	0.8 mm
Connecting rod radial clearance:	0.018 ~ 0.030 mm	0.080 mm
Connecting rod bend	0.05 mm/100 mm	0.2 mm/100 mm
Connecting rod twist	0.15 mm/100 mm	0.2 mm/100 mm

Special Tools – **Flywheel Puller, M35 X 1.5: 57001-1223**
Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216
Flywheel Holder: 57001-1313
Coupling Holder: 57001-1230

Sealant – **Kawasaki Bond (Liquid Gasket-Black): 92104-1003**
Kawasaki Bond (Silicone Sealant): 56019-120

Coupling

Removal



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

Special Tools – Flywheel Holder: 57001-1313 [A]
Coupling Holder: 57001-1230 [B]

Installation

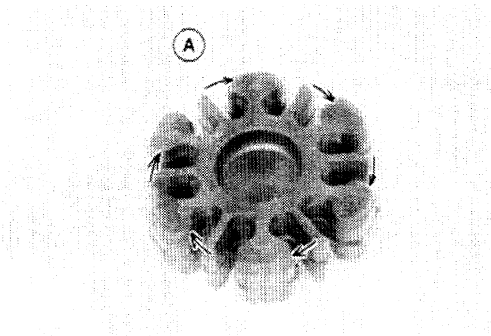
- Apply a thin coat of silicone sealant to the coupling threads.

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

- Screw the coupling onto the crankshaft and tighten it.

Torque – Coupling: 125 N-m (13.0 kg-m, 94 ft-lb)

Coupling Damper Inspection



- With the engine removed, remove the coupling damper and inspect it for wear [A] and deterioration.

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

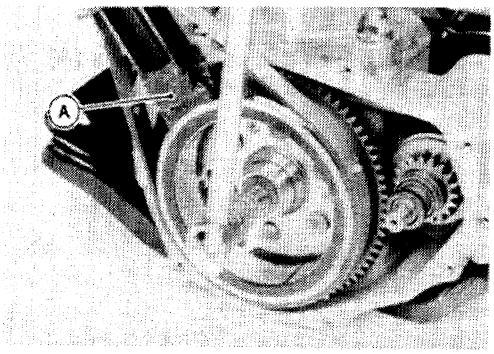
★If there is any doubt as to coupler condition, replace it.

Magneto Flywheel

Removal

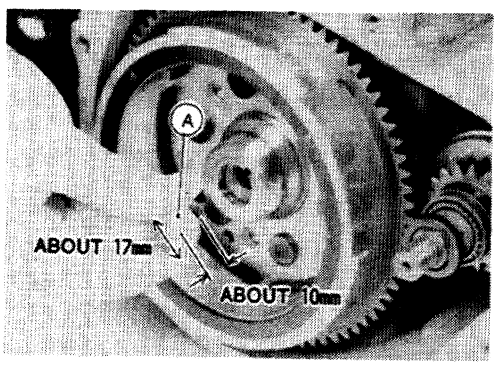
- Remove:
  Engine
  Magneto Cover
- Holding the flywheel, remove the flywheel bolt.

Special Tool – Flywheel Holder: 57001-1313 [A]



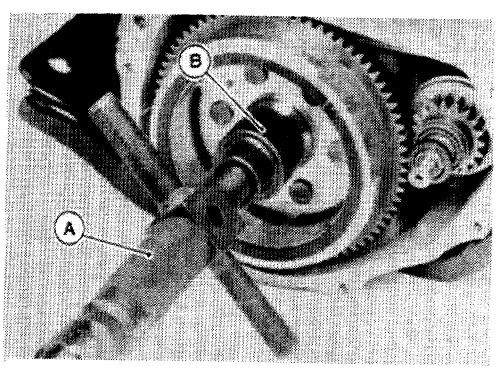
- Pull the flywheel off the crankshaft.

○ Prepare the bolt [A] as shown.



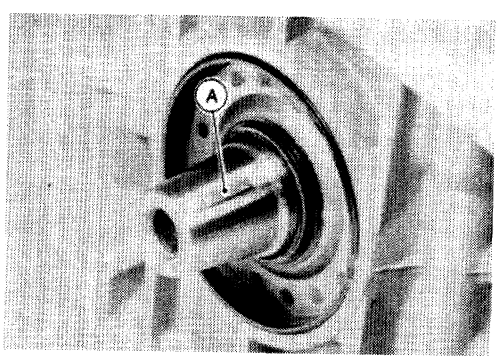
○ Using the special tools, pull off the flywheel.

Special Tools – Rotor Puller, M16/M18/M20/M22 x 1.5: 57001-1216 [A]
Flywheel Puller, M35 X 1.5: 57001-1223 [B]



Installation

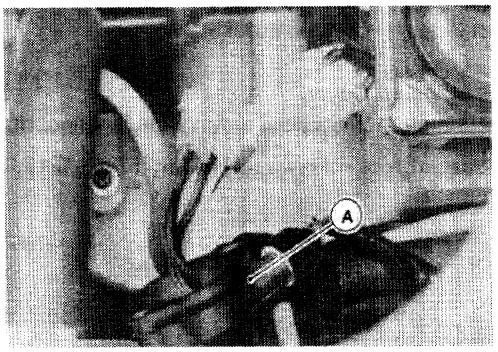
- Using a high flash-points solvents, clean off any oil or dirt that may be on the flywheel bolt, the crankshaft taper, or in the tapered hole in the flywheel.
- Fit the woodruff key [A] securely in the crankshaft, before installing the magneto flywheel.



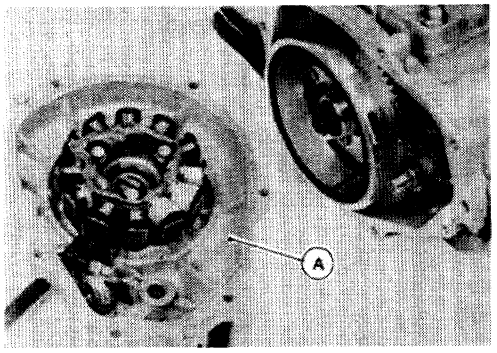
Stator

Removal

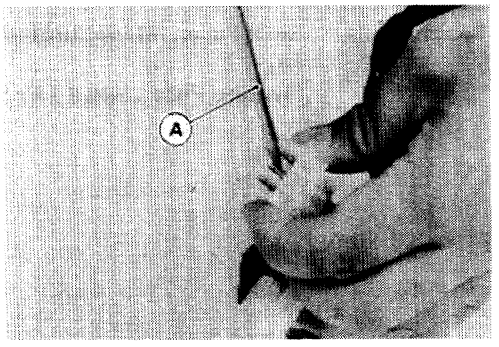
● Remove the electric case connector [A], and disconnect the connectors.



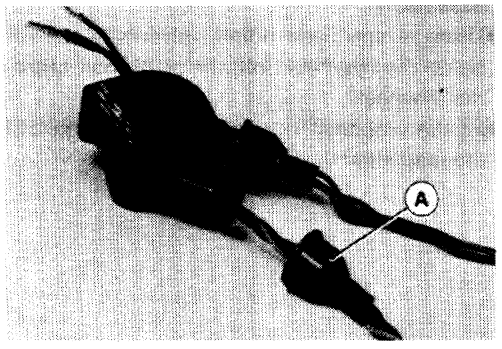
● Remove:
Magneto Cover [A] (see Magneto Flywheel Removal)



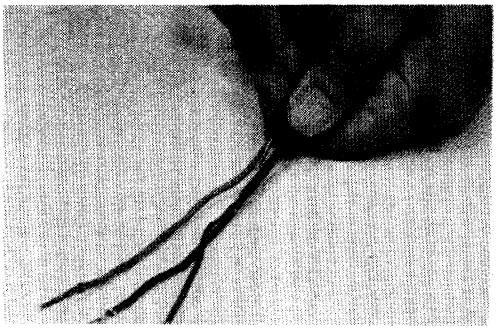
● Slide the pins out of the connectors.
○ Use a screw driver [A] to depress the pin latches.



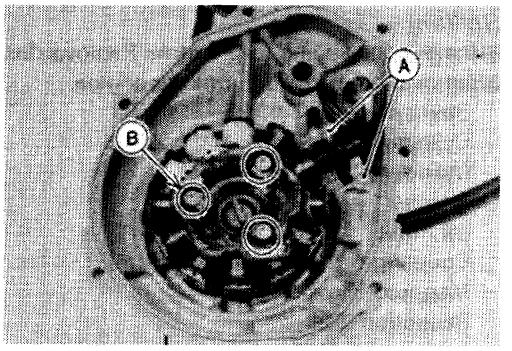
● Unscrew the grommet cap [A] from the electric case connector.



● Pull the leads, one at a time, through the grommet and cap.
○ Lubricate the grommet with a penetrating rust inhibitor.

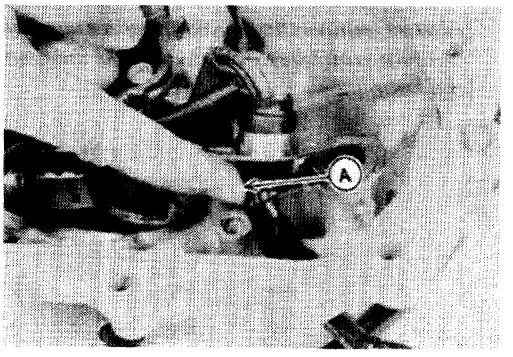


● Unscrew the set screws [A] and bolts [B], and remove the stator assembly.

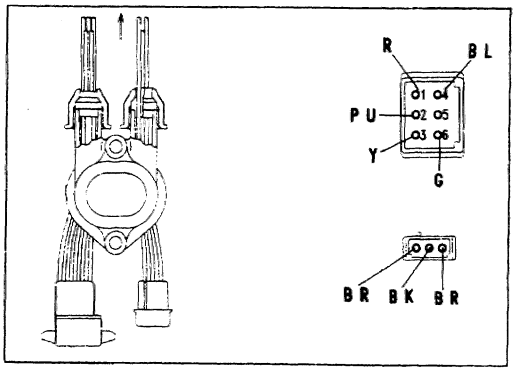


Installation

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



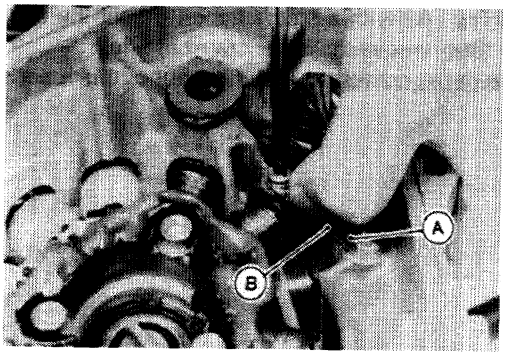
● Insert the connector pins onto the connector, as shown.



● While pushing the pickup coil bracket [A] as shown, install the pickup coil [B].

Pickup Coil Air Gap
(Clearance between the rotor projection and pickup core)

Standard: **0.8 ~ 1.0 mm**



Crankcase

Splitting

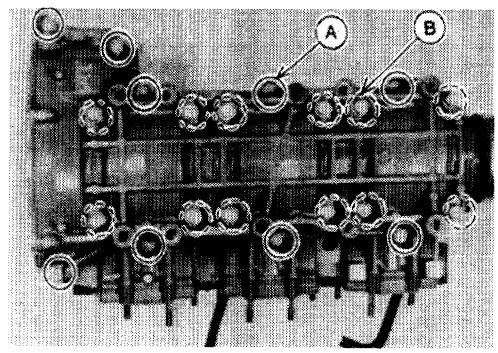
- Remove the engine (see Engine Removal/Installation chapter).
- Remove the following from the engine.

Starter Motor
Cylinder Head
Cylinder Block
Pistons
Oil Pump
Coupling
Magneto Flywheel
Reduction Gear

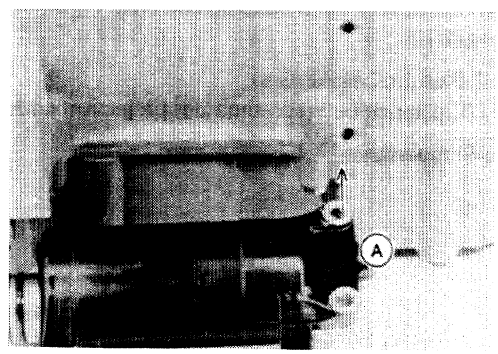
NOTE

○*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 6 mm crankcase bolts [A] first and the 8 mm bolts [B].

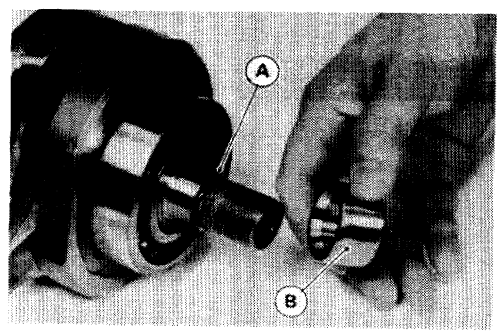


- Tap [A] with a soft hammer to split the crankcase halves apart, and then remove the lower crankcase half.
- Lift the crankshaft assembly out of the upper crankcase half.

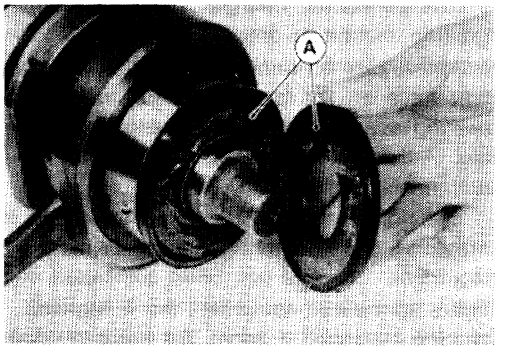


Assembly

- Visually inspect the crankshaft O-ring [A], and replace it if necessary.
- Grease the inner surface of the collar [B].

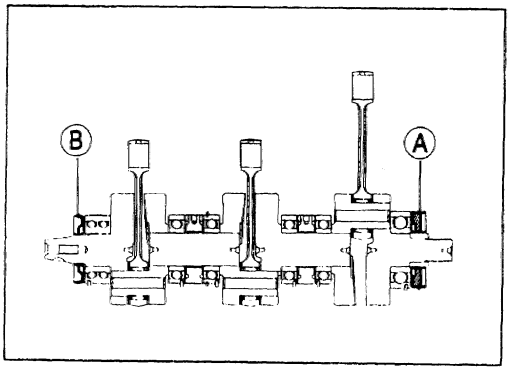


● Grease the lips of the oil seals.
● Pack grease [A] between the rear oil seals (coupling side).

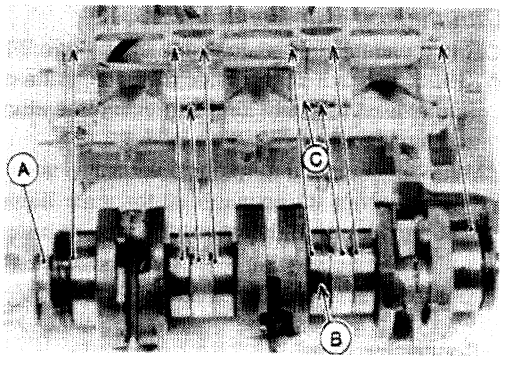


● Install the oil seals as shown.

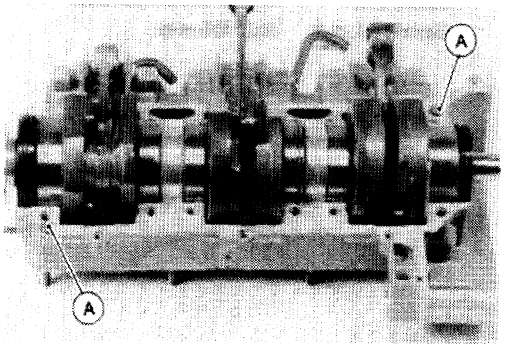
Double Lips Seals [A]
Single Lip Seals [B]



● Place the crankshaft assembly [A] in the upper crankcase half so that the position ring [B] on the crankshaft assembly fits into the groove [C] in the crankcase.



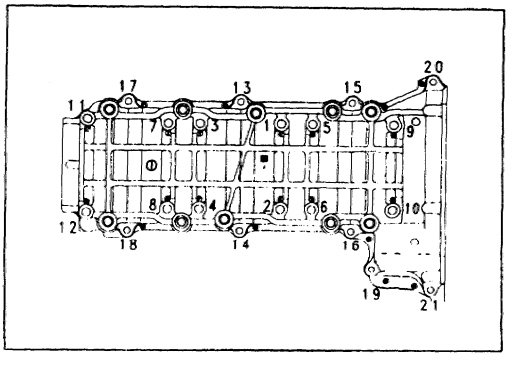
● Check that the knock pins [A] are in place.
● With a high flash-point solvent, clean off the mating surfaces of the crankcase halves and wipe dry.
● Apply liquid gasket to the mating surface of the lower crankcase half.
● Install the lower crankcase half onto the upper half.



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

Torque – Crankcase M8 Bolts: 29 N-m (3.0 kg-m, 22 ft-lb)
Crankcase M6 Bolts: 8.8 N-m (0.9 kg-m, 78 in-lb)

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

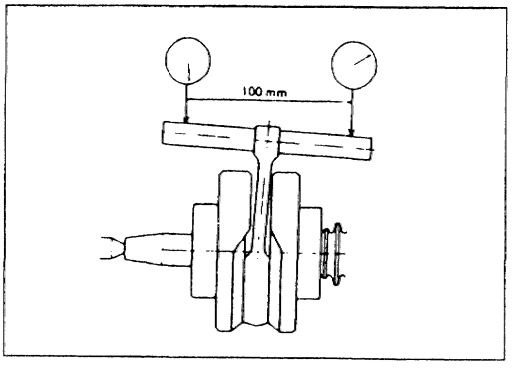


Crankshaft Maintenance

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.

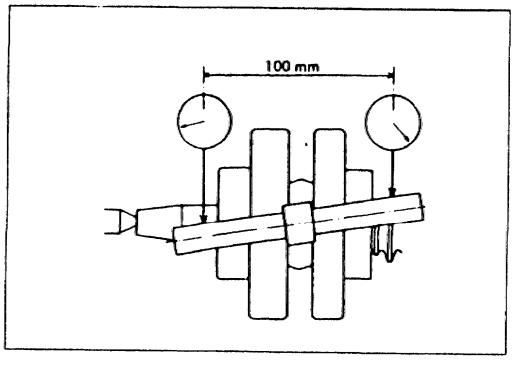
Connecting Rod Bend/Twist



- ○ 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 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 100mm length to determine the amount of connecting rod bend.
- ★ If connecting rod bend exceeds the service limit, the connecting rod or crankshaft must be replaced.

Connecting Bend

Standard:	**Under 0.05/100 mm**
Service Limit:	**0.2/100 mm**

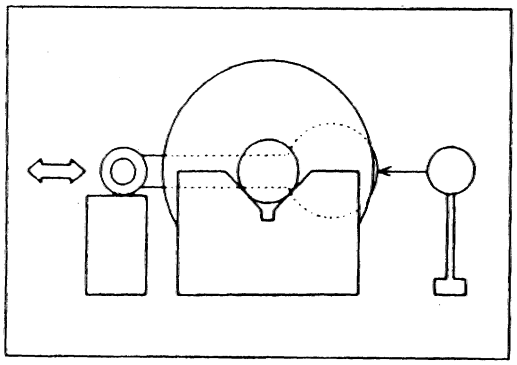


- ● Measure connecting rod twist.
- ○ With the crankshaft still in the alignment jig, hold the connecting rod horizontally and measure the amount that the arbor varies from being parallel with the crankshaft over a 100 length of the arbor to determine the amount of connecting rod twist.
- ★ If connecting rod twist exceeds the service limit, the connecting rod or crankshaft must be replaced.

Connecting Rod Twist

Standard:	**Under 0.15/100 mm**
Service Limit:	**0.2/100 mm**

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.

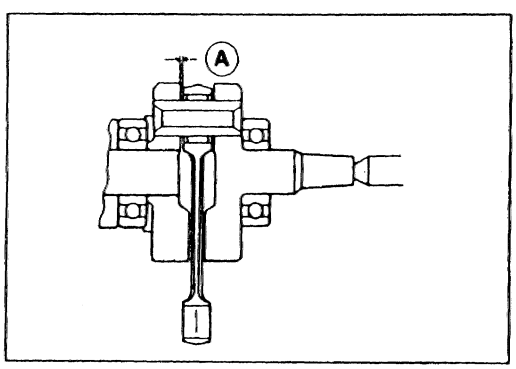
○Push the connecting rod first towards the gauge and then in the opposite direction. The difference between the two gauge readings is the radial clearance.

★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:	**0.018 ~ 0.030mm**
Service Limit:	**0.080 mm**

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**
Service Limit:	**0.8 mm**

Crankshaft Main Bearing Wear

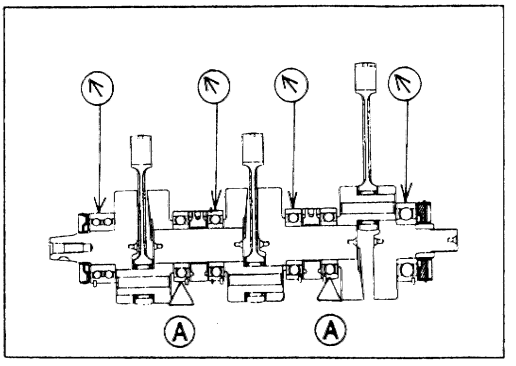
●Wash the bearings in high flash-point solvent, blow them dry (DO NOT SPIN THEM), and lubricate them with engine oil.

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/cm^2, 25 psi) maximum nozzle pressure.

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

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

Crankshaft Runout



● Check crankshaft alignment by measuring runout.

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

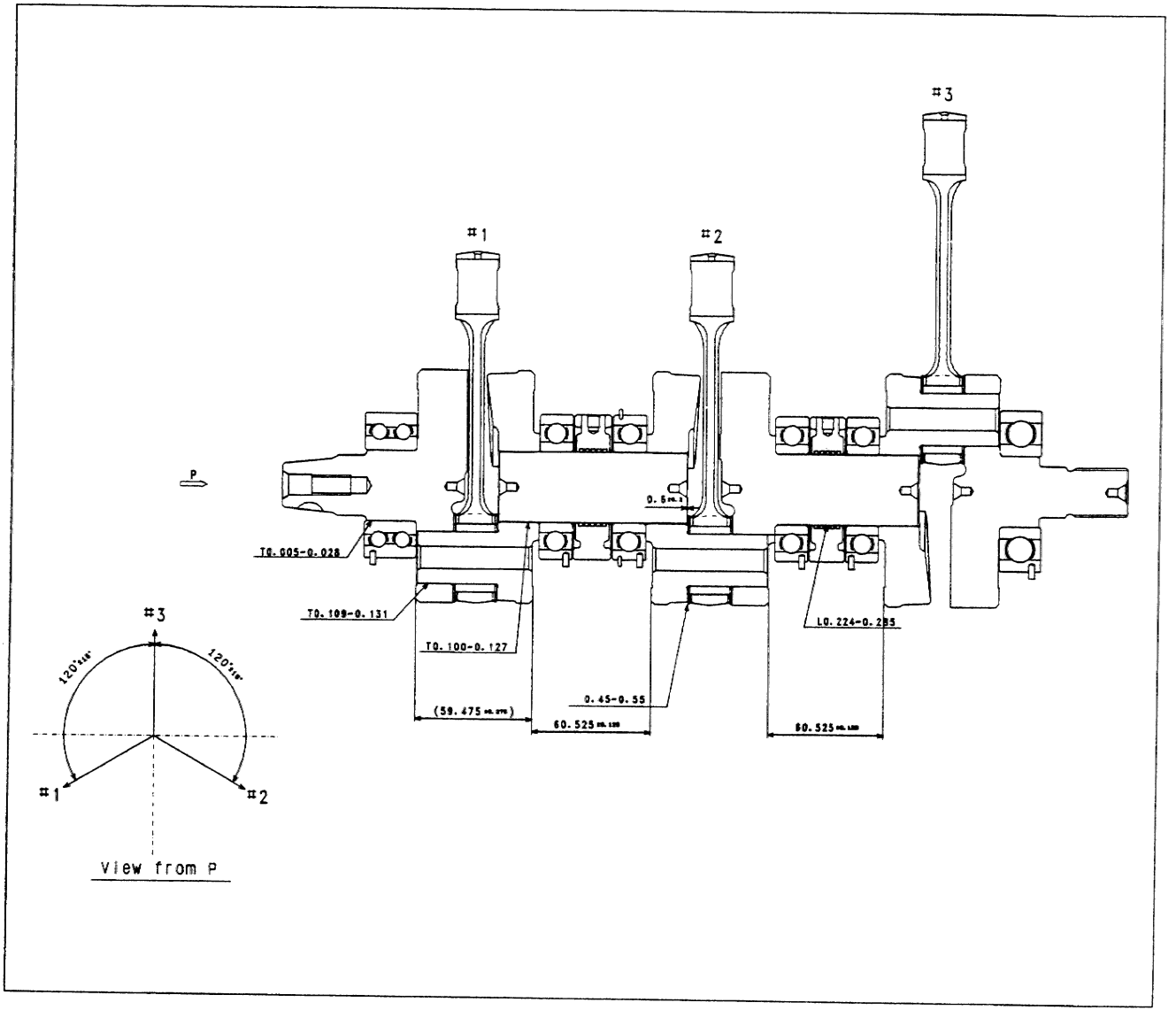
★ If the runout at any point exceeds the service limit, the crankshaft must be either replaced or rebuilt.

Crankshaft Runout (Either Location)

Standard:	**Under 0.04 mm TIR**
Service Limit:	**0.10 mm TIR**

Crankshaft Assembly Specifications

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

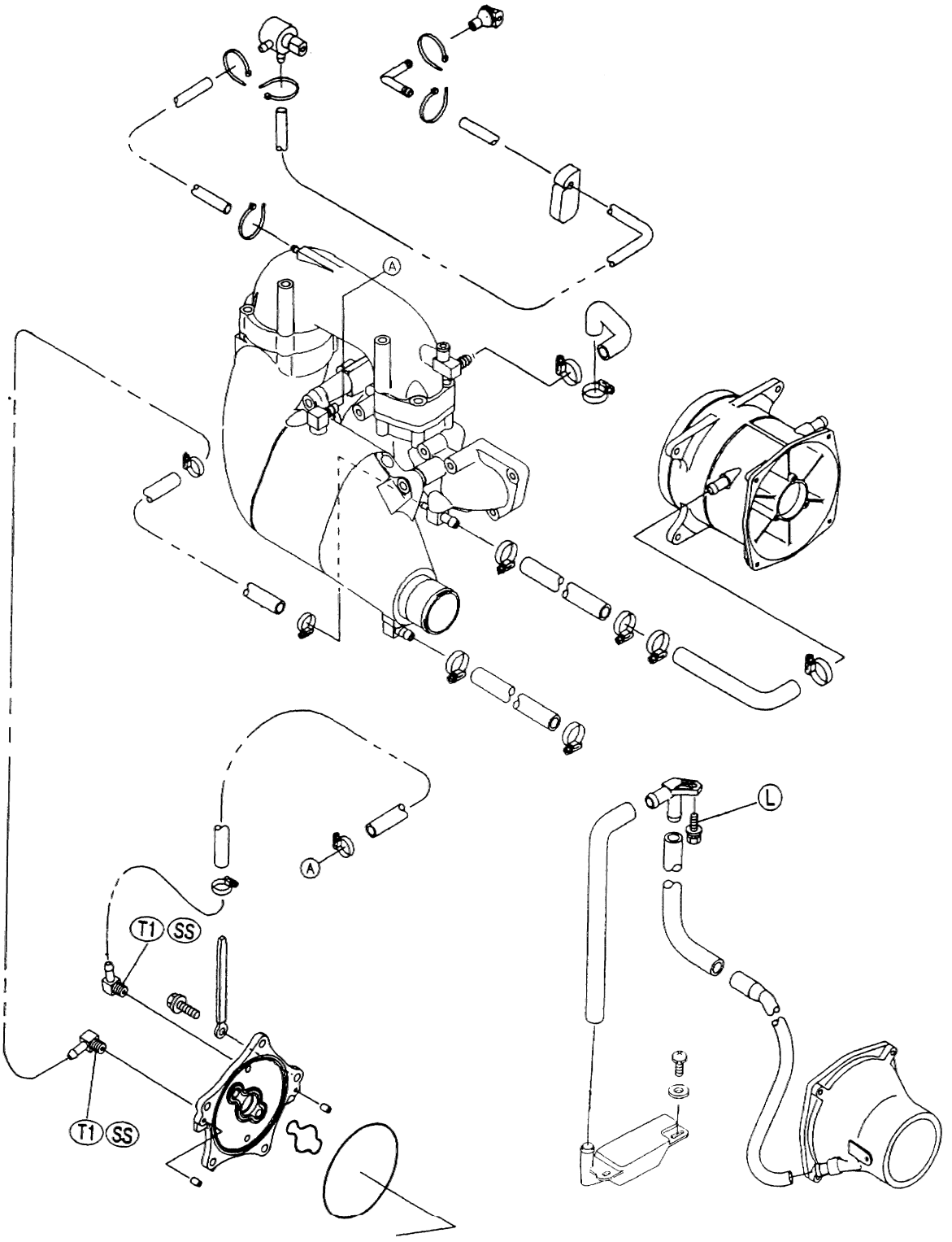


Cooling and Bilge Systems

Table of Contents

Exploded View

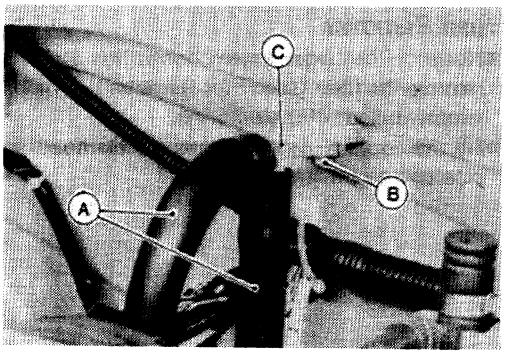
T1 : 12 N-m (1.2 kg-m, 8.5 ft-lb)
L : Apply a non-permanent locking agent.
SS: Apply silicone sealant.



Bilge System

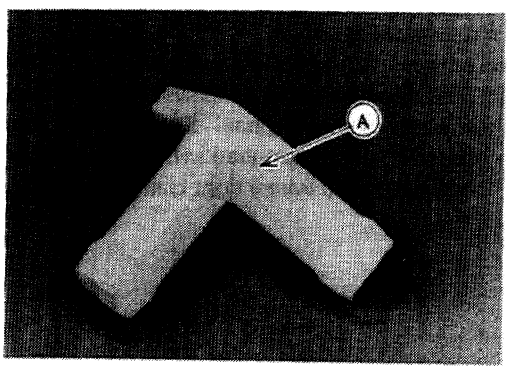
Breather Removal

- Pull the hoses [A] off the breather.
- Unscrew the mounting bolt [B], and remove the breather [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 bolt and tighten it.



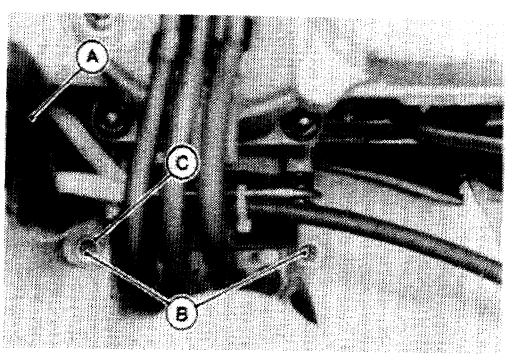
Breather Cleaning and Inspection

- 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

- Pull the hose [A] off the filter.
- Unscrew the mounting screws [B], and remove the filter [C].



Filter Cleaning and Inspection

- Flush the filter thorough 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

- None of the bilge system hoses has a clamp. To remove this hose, remove the filter (see Filter Removal). The bilge system hoses may be simply pulled off their fittings.
- 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.
- 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

- Check the hoses for hardening, cracking, checking, cuts, abrasions, and breaks.

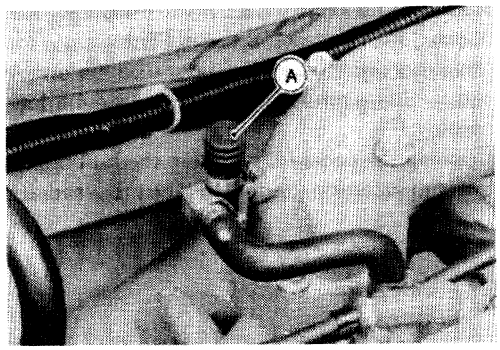
★If a hose is damaged in any way, replace it immediately and check all the others for damage.

Cooling and Bilge System Flushing

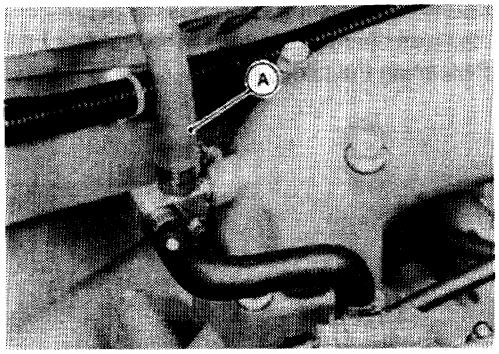
Cooling System Flushing

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 cylinder head.

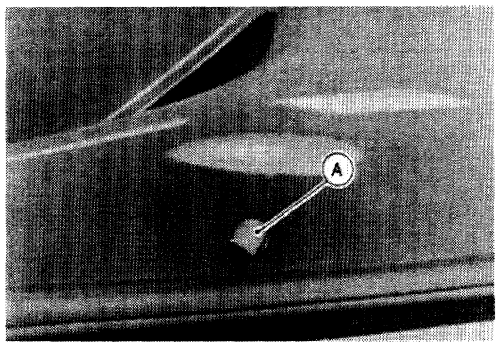


● Connect a garden hose [A] to the fitting.



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

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



● Immediately turn on the water an adjust the flow so that a little trickle of water comes out of the bypass outlet [A] on the left side of the hull.

● Left 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.

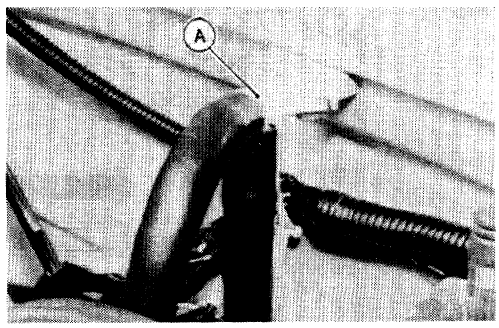
CAUTION
Do not run the engine without cooling water supply for more than 15 seconds or severe engine and exhaust system damage will occur.

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

Bilge System Flushing

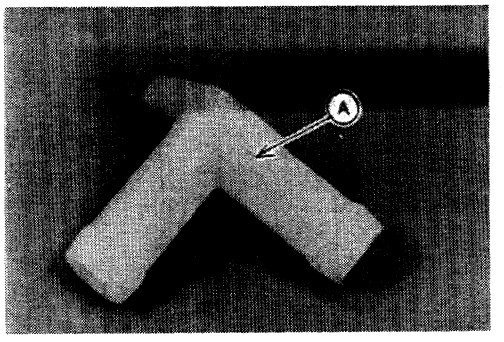
To prevent clogging, the bilge system should be flushed out according to the Periodic Maintenance Chart, or whenever you suspect it is blocked.

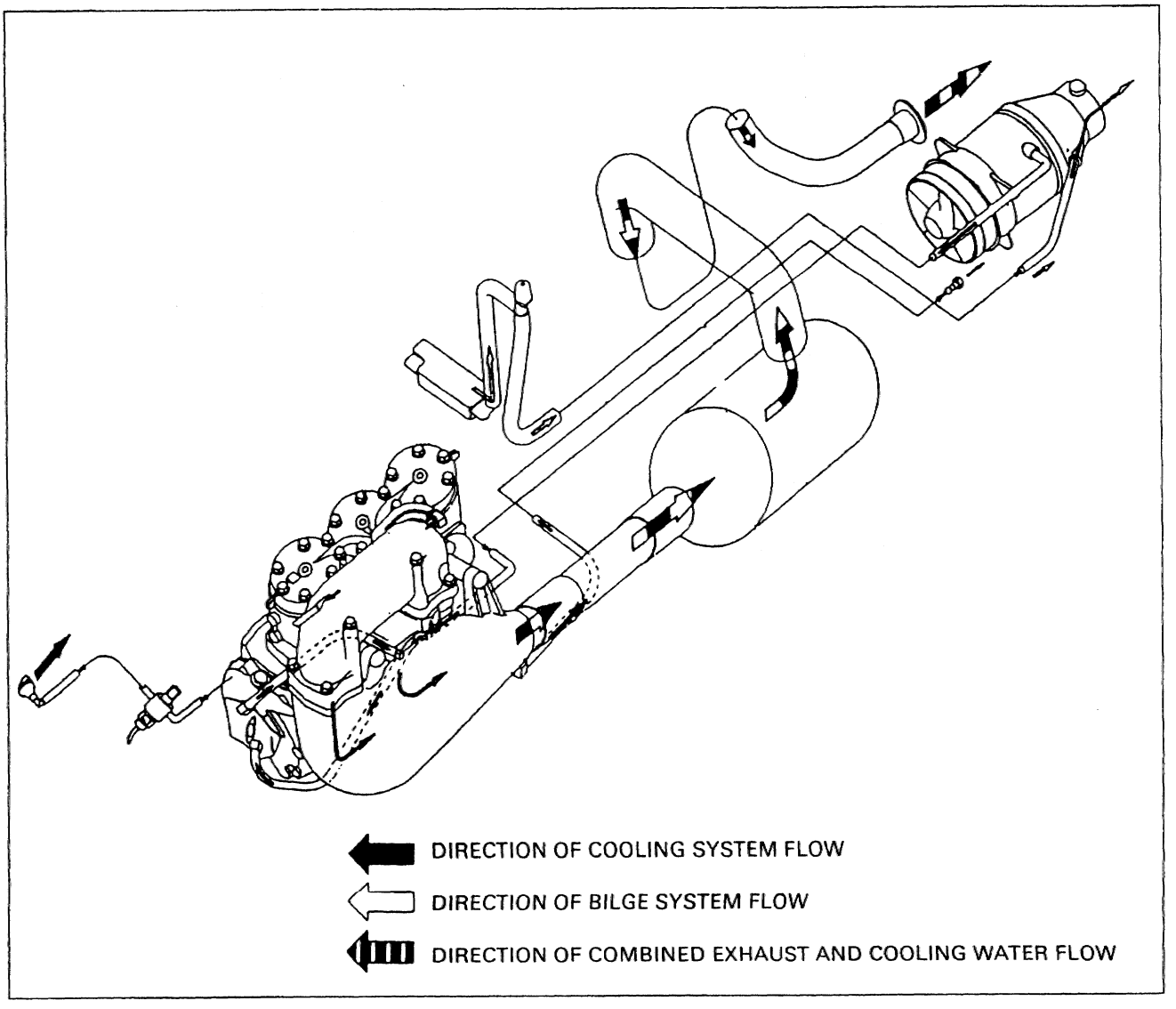
● Disconnect both bilge hoses at the plastic breather fitting [A].



- Connect the bilge filter hose (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.
- 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.



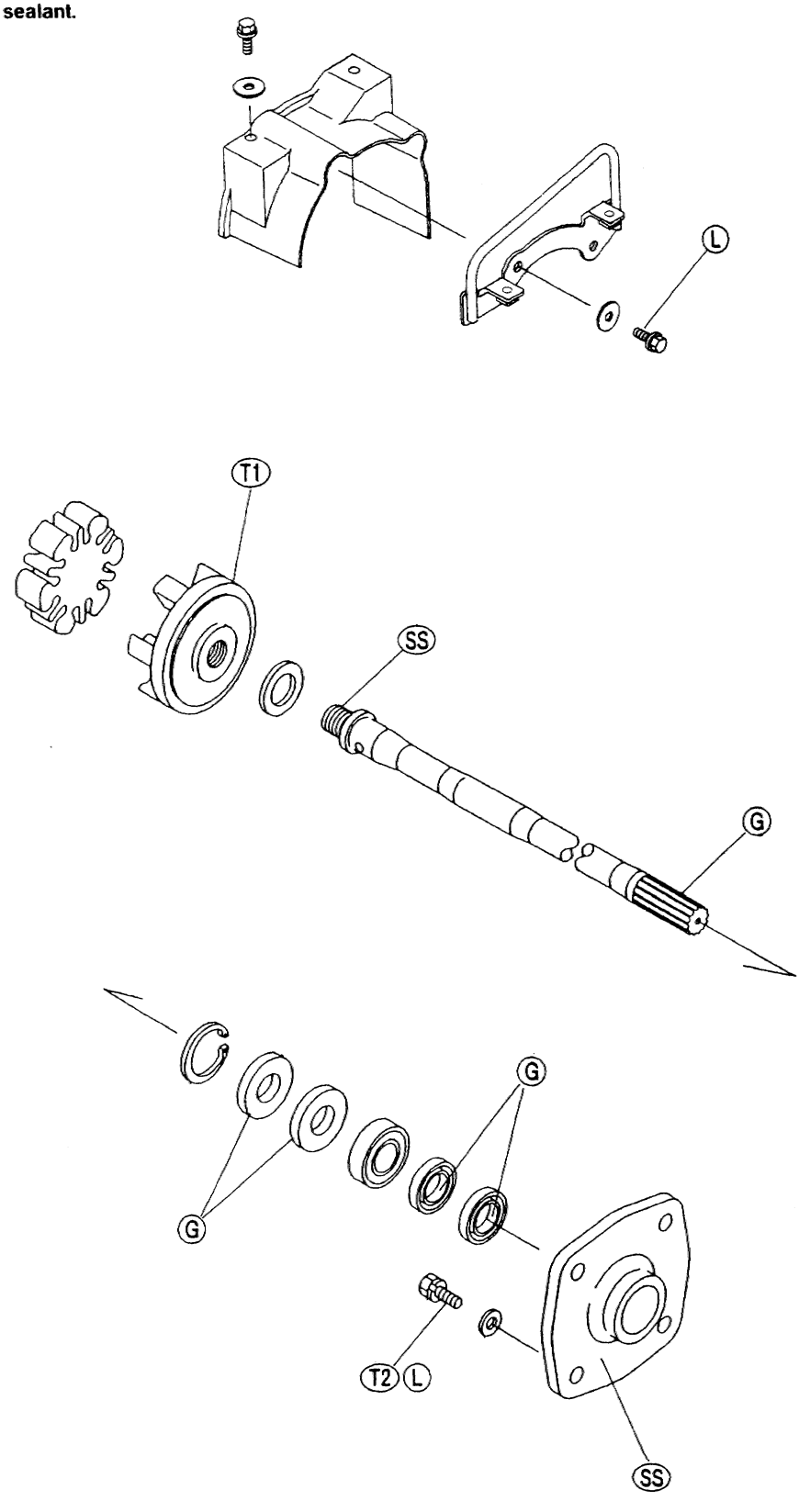


Drive System

Table of Contents

Exploded View

T1 : 39 N-m (4.0 kg-m, 29 ft-lb)
T2 : 22 N-m (2.2 kg-m, 16.0 ft-lb)
L : Apply a non-permanent locking agent.
G : Apply grease.
SS: Apply silicone sealant.



Specifications

Item	Standard	Service Limit
Drive Shaft:		
Runout (Refer to Page 6)	[A] less than 0.1 mm [B] less than 0.2 mm	0.2 mm 0.6 mm

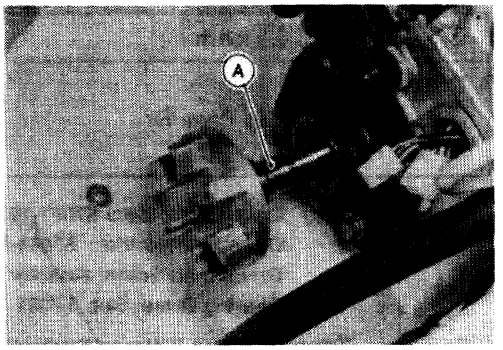
Special Tools – **Coupling Holder: 57001-1230**
Drive Shaft Holder: 57001-1327
Drive Shaft Holder Adapter: 57001-1231
Bearing Driver Set: 57001-1129

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

Drive Shaft/Drive Shaft Holder

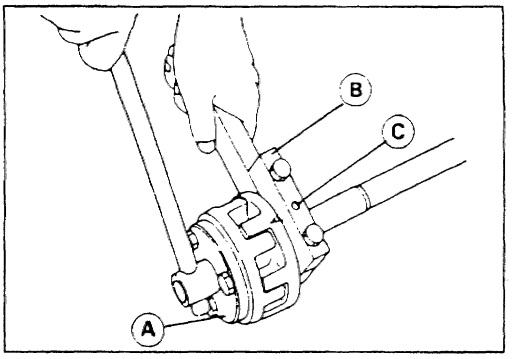
Drive Shaft Removal/Installation

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



- Clamp the drive shaft, and unscrew the coupling.

Special Tools – Coupling Holder: 57001-1230 [A]
Drive Shaft Holder: 57001-1327 [B]
Drive Shaft Holder Adapter: 57001-1231 [C]



- When installing the drive shaft, be careful of the following items.

○ Apply a thin coat to the coupling threads and tighten it.

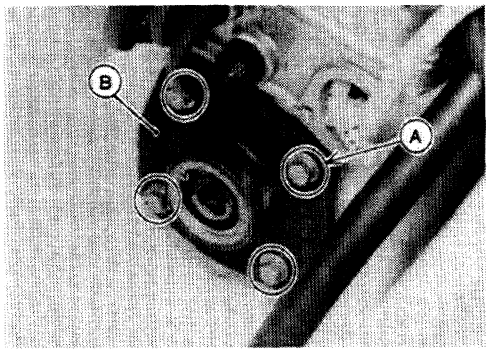
Sealant – Kawasaki Bond (Silicone Sealant): 56019-120

Torque – Coupling: 39 N-m (4.0 kg-m, 29 ft-lb)

○ Apply grease to the grease seal lips and the drive shaft spline.

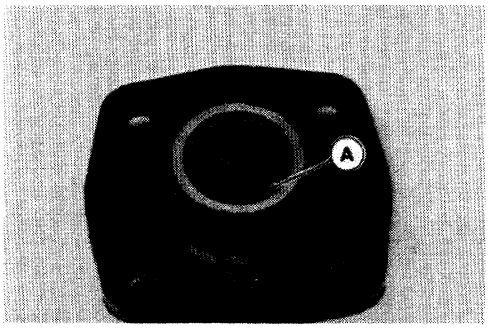
Drive Shaft Holder Removal/Disassembly

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



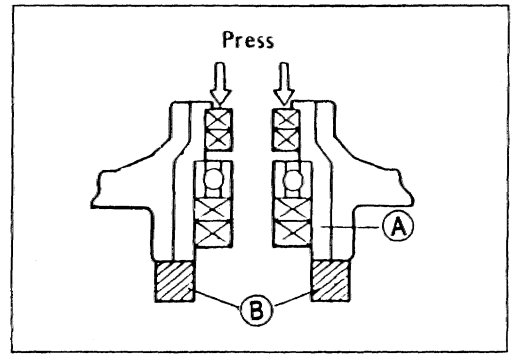
- Disassemble the drive shaft holder.

○ 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

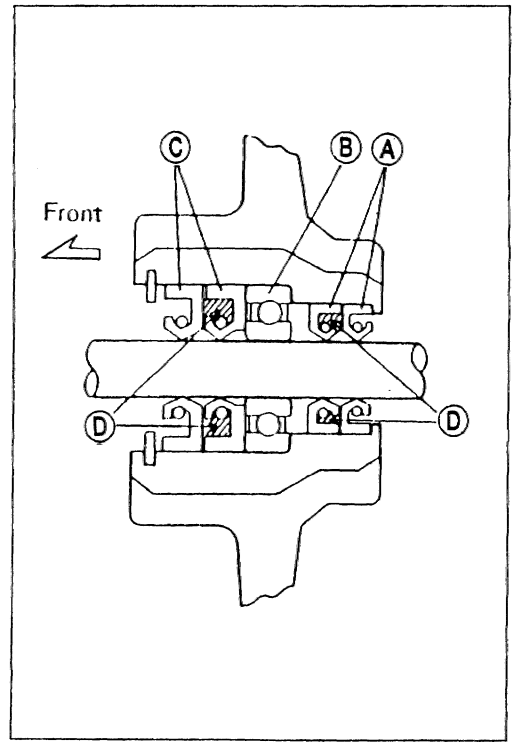


Drive Shaft Holder Assembly/Installation

●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]

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 [D].
●Install the circlip.
●Grease to the bearing inner surface and grease seal lips.



●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.

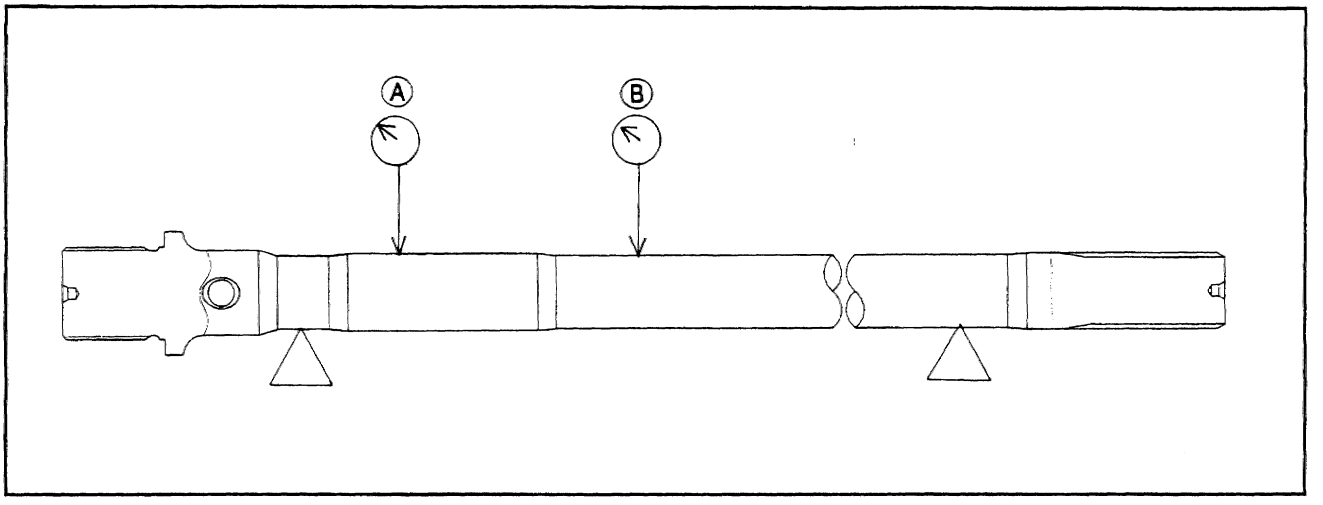
Torque – Drive Shaft Holder Mounting Bolts: 22 N-m (2.2 kg-m, 16.0 ft-lb)

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 [A]**
	Less than 0.2 mm [B]
Service Limit:	**0.2 mm [A]**
	0.6 mm [B]

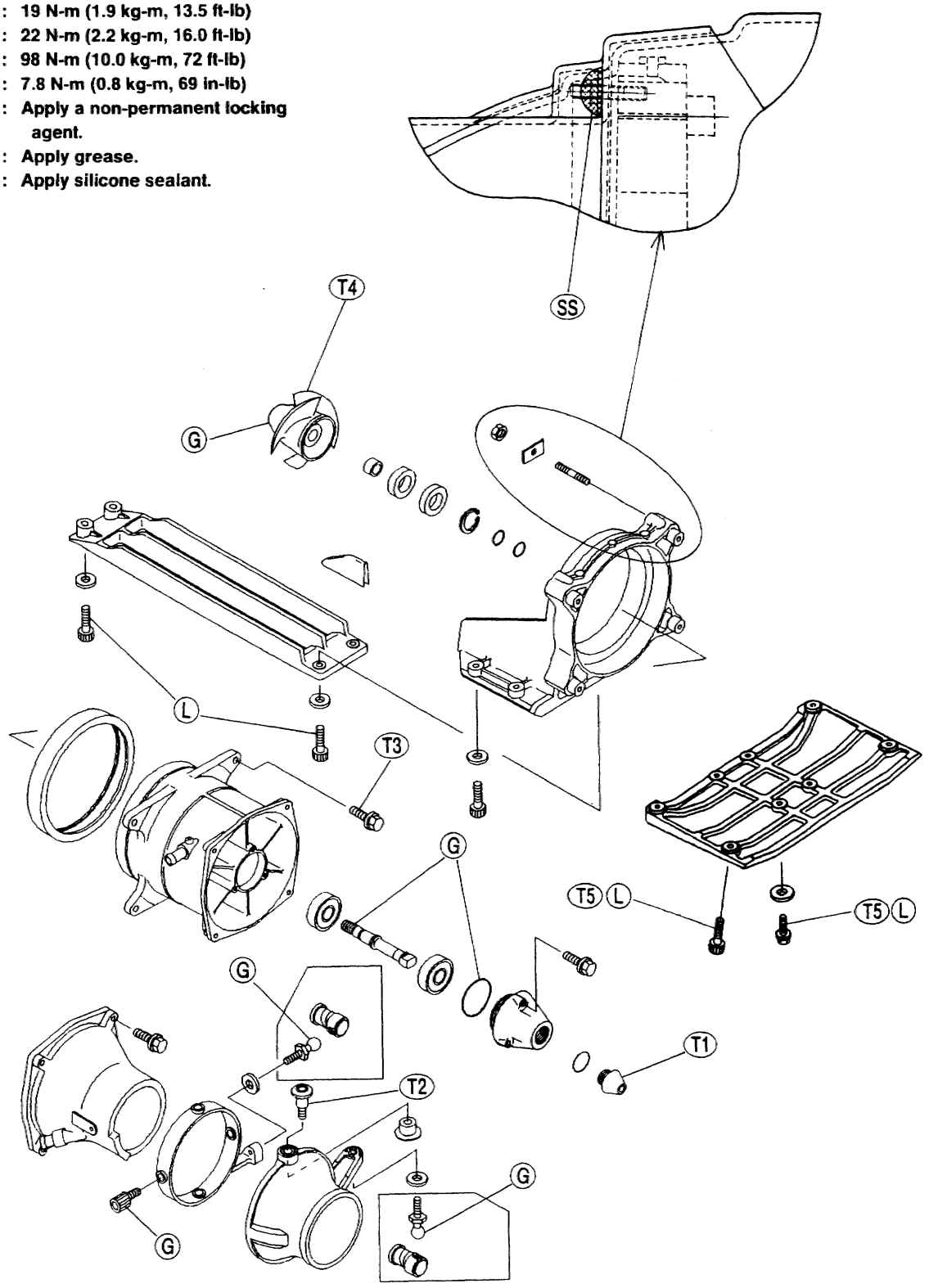

A
B

Pump and Impeller

Table of Contents

Exploded View

T1 : 3.9 N-m (0.4 kg-m, 35 in-lb)
T2 : 19 N-m (1.9 kg-m, 13.5 ft-lb)
T3 : 22 N-m (2.2 kg-m, 16.0 ft-lb)
T4 : 98 N-m (10.0 kg-m, 72 ft-lb)
T5 : 7.8 N-m (0.8 kg-m, 69 in-lb)
L : Apply a non-permanent locking agent.
G : Apply grease.
SS: Apply silicone sealant.



Specifications

Item	Standard	Service Limit
Jet Pump:		
Impeller Outside Diameter	147.5 ~ 147.7 mm	146.5 mm
Pump Case Inside Diameter	148.0 ~ 148.1 mm	149.1 mm
Impeller Clearance	0.15 ~ 0.3 mm	0.6 mm

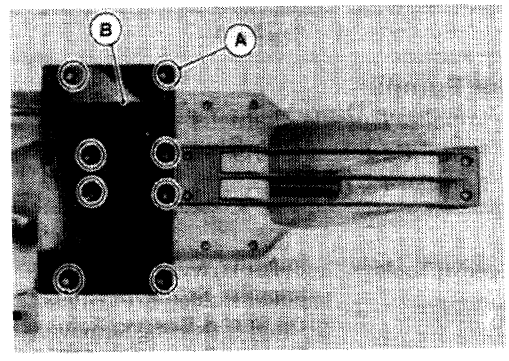
Special Tools – **Impeller Wrench: 57001-1228**
Impeller Holder: 57001-1393
Oil Seal & Bearing Remover: 57001-1058
Bearing Driver Set: 57001-1129

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

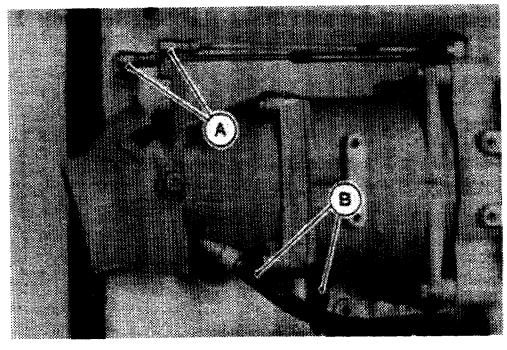
Pump and Impeller

Pump Removal

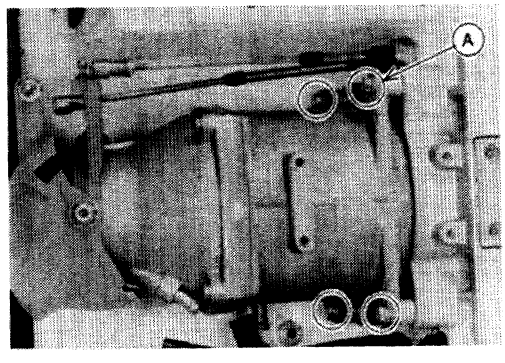
- Turn the craft on its left side.
- Unscrew the mounting bolts [A], and remove the pump cover [B].



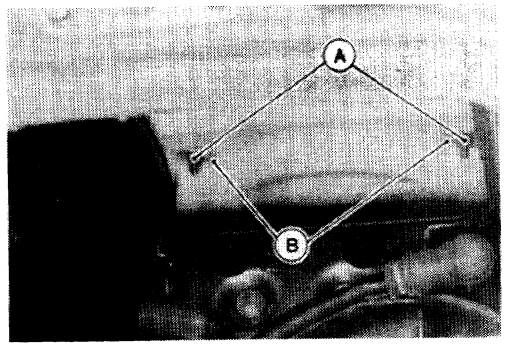
- Slip the cable connectors [A] off the ball.
- Loosen the clamp, and pull off the hoses [B].



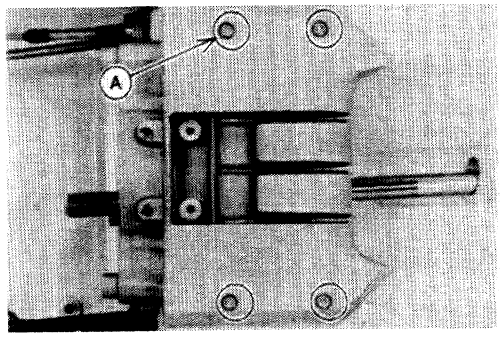
- Unscrew the pump mounting bolts [A].
- Slide the pump to the rear to disengage the drive shaft, and remove it from the hull.



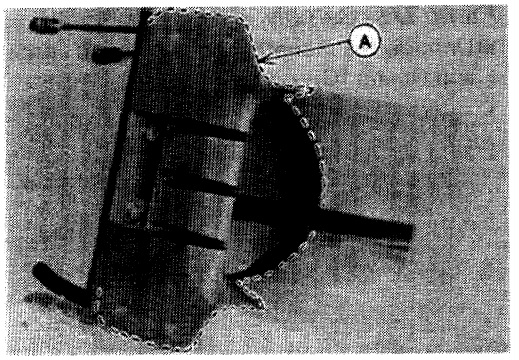
- To remove the pump bracket, remove the following.
- Remove the nut [A] and washer [B] in the hull.



- Remove the grate.
- Unscrew the pump bracket mounting bolts [A].

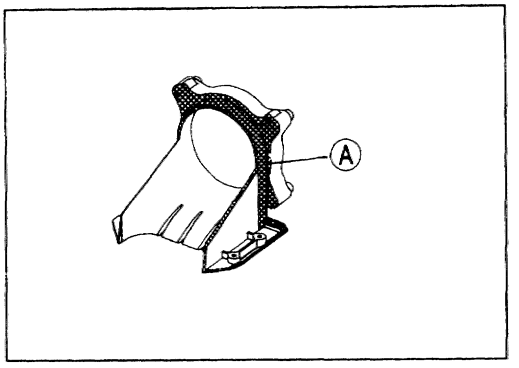


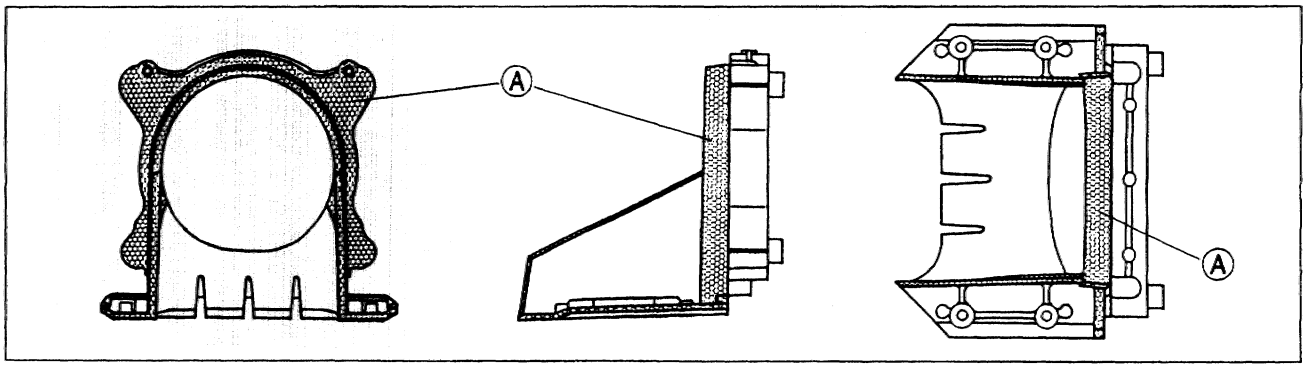
● Cut the sealant [A] at the intake area, and remove it from the hull.



Pump Installation

● Strip off all the old sealant around the pump intake.
● Liberally coat the outside edge of the pump bracket [A] with silicone sealant to form a seal between the bracket and the hull.
● Install the pump bracket, and wipe off any excess sealant and smooth the joint.



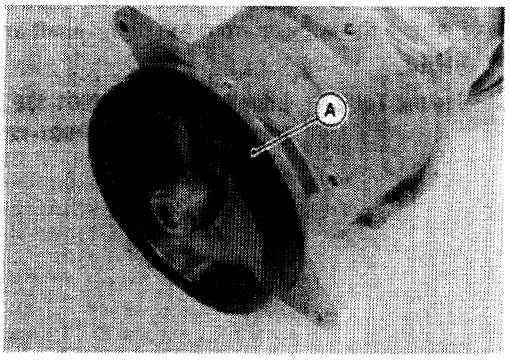


● Be sure trim seal [A] is in place.
● Grease the splines on the drive shaft with water resistant grease, and be sure the O-ring is in place inside the pump shaft.
● Install the pump case [A].

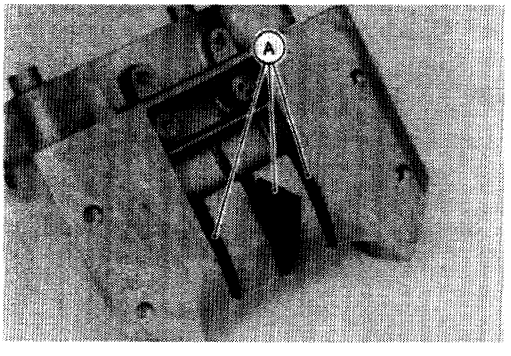
Torque – Pump Mounting Bolts: 22 N-m (2.2 kg-m, 16 ft-lb)

● Install the pump cover.
○ Apply a non-permanent locking agent to the pump cover mounting bolts and torque them.

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

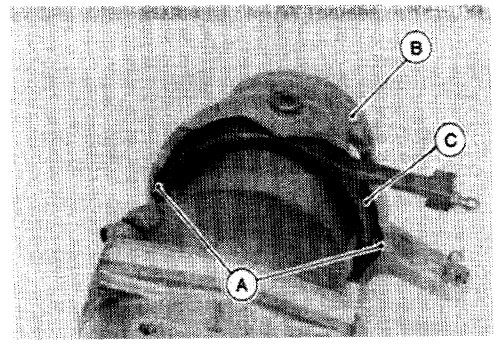


● To install the grate to the hull, be sure the trim seal [A] is in the position.
● Apply a non-permanent locking agent to the grate mounting bolts and tighten them with washers.

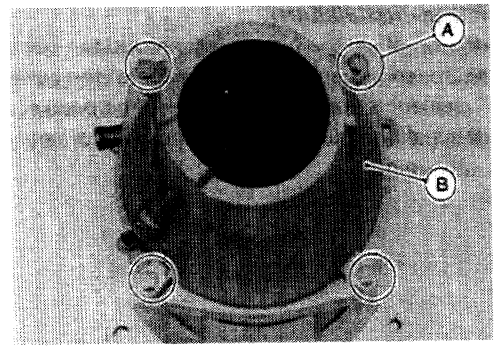


Pump Disassembly

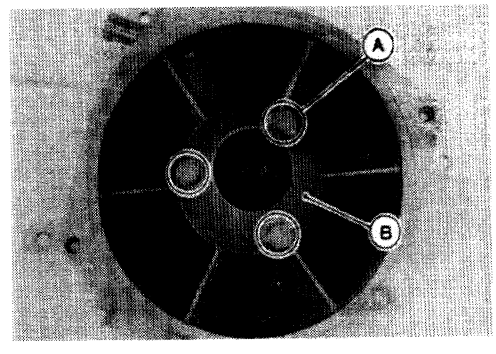
● Unscrew the mounting bolts [A], and remove the steering nozzle [B] and tilt ring [C].



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

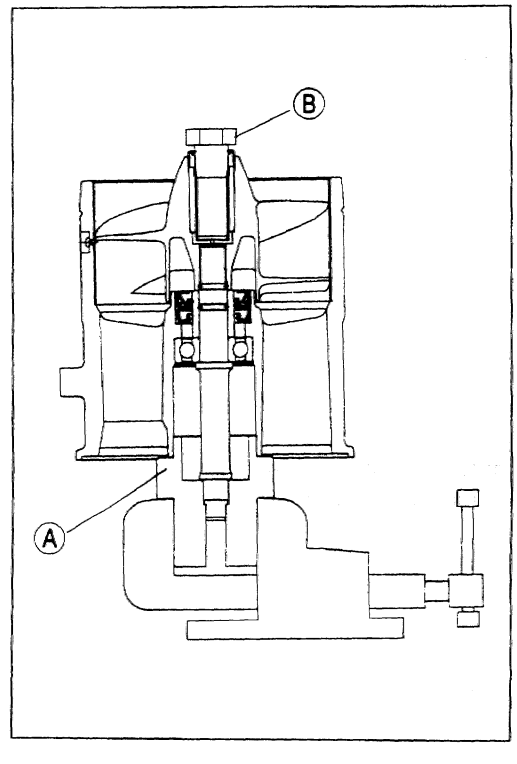


● Unscrew the cap bolts [A], and remove the pump cap [B].

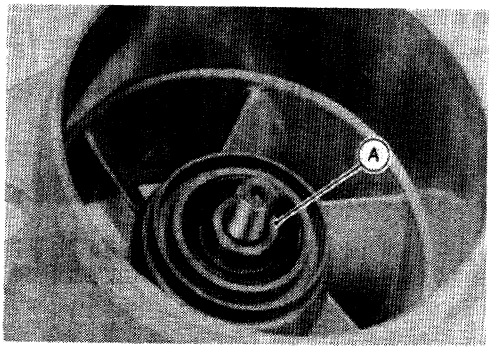


● Hold the shaft in the impeller holder, taking care not to damage it. Remove the impeller from the pump shaft and then pull out the pump shaft.

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

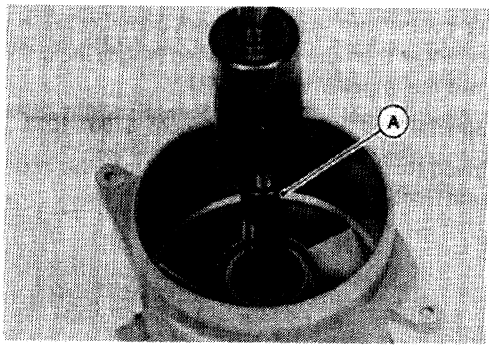


● Pull out the bushing [A].



● Remove the grease seals.

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



Pump Assembly

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

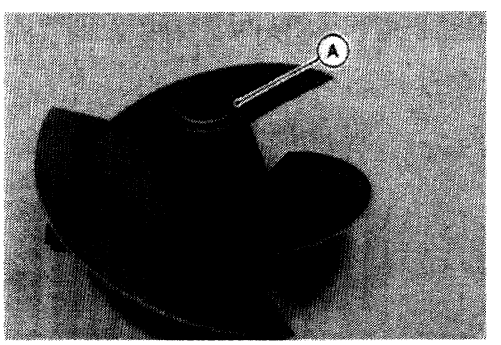
Special Tool – Bearing Driver Set: 57001-1129

○ Press the rear pump bearing into the pump case as far as it will go.
○ Insert the collar and install the front pump bearing.

● Replace the grease seals with new ones, if necessary, and install them using the same special tool used for bearing installation.
○ Press each seal into the pump case so that the side with the spring faces outward. Fill the gap between the seal with grease.
● Push the bushing into the pump case.
● Visually inspect the pump shaft O-rings, and replace them if necessary.
● Grease the pump shaft and insert it from rear of the pump case.
● Screw on the impeller.

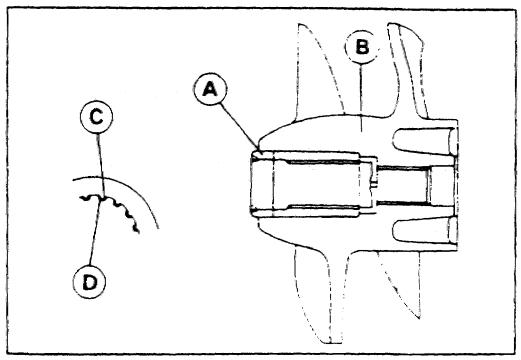
Torque – Impeller: 98 N-m (10.0 kg-m, 72 ft-lb)

● Visually inspect impeller grease seal [A], and replace if necessary.



●When installing the grease seal, follow this procedure.

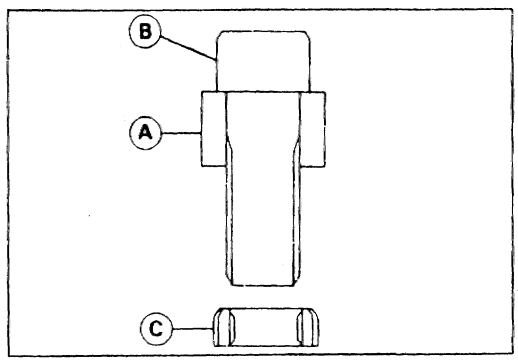
○Press the grease seal [A] into the impeller [B], aligning the seal teeth [C] with the sleeve teeth [D].



○To protect the seal teeth from damage, insert a suitable collar [A] that is longer than the non-splined length including the spline starting area into the impeller wrench [B].

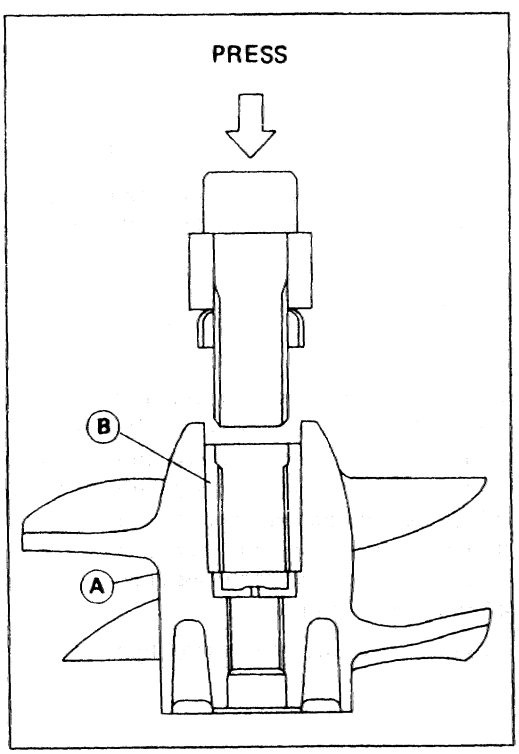
Special Tool – Impeller Wrench: 57001-1228

○Insert the grease seal [C] deeply into the impeller wrench, aligning the seal teeth with the wrench teeth.

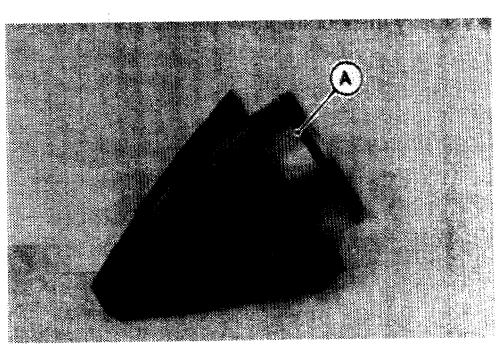


○Push the above wrench assembly into the impeller [A], and then lightly press the wrench assembly to seat the grease seal into the impeller sleeve [B].

CAUTION
Do not press the grease seal heavily. You could damage the grease seal.



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

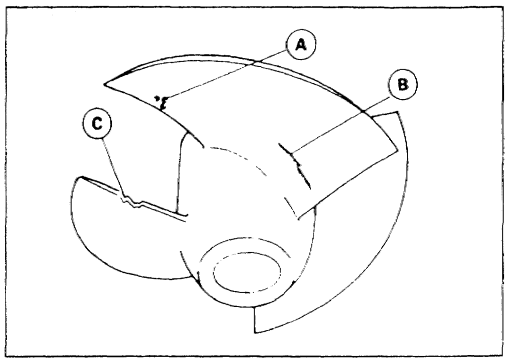


● Install:
Pump Cap
Pump Outlet
Steering Nozzle
● Apply a non-permanent locking agent to the thread of the following.
Pump Cap Bolts
Pump Outlet Mounting Bolts
Steering Nozzle Pivot Bolts

Torque – Steering Nozzle Pivot Bolts: 9.8 N-m (1.0kg-m, 87 in-lb)

Pump and Impeller Inspection

● Examine the impeller.
★ If there is pitting [A], deep scratches [B], nicks [C] or other damage, replace the impeller.



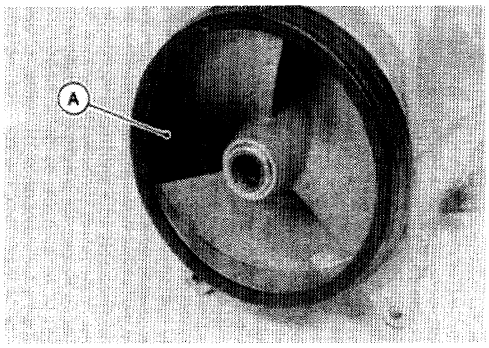
NOTE

○ *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
Service Limit: 146.5 mm

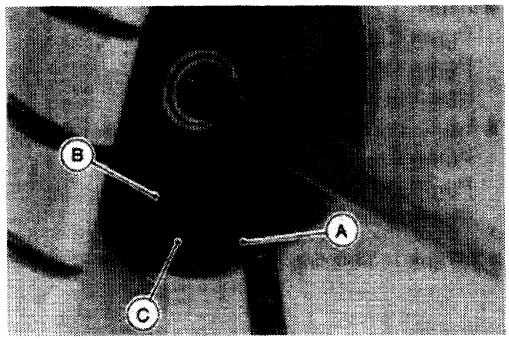
● Examine the pump case [A].
★ If there are deep scratches inside the pump case, replace it.



○ 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
Service Limit: 149.1 mm

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**

Service Limit: **0.6 mm**

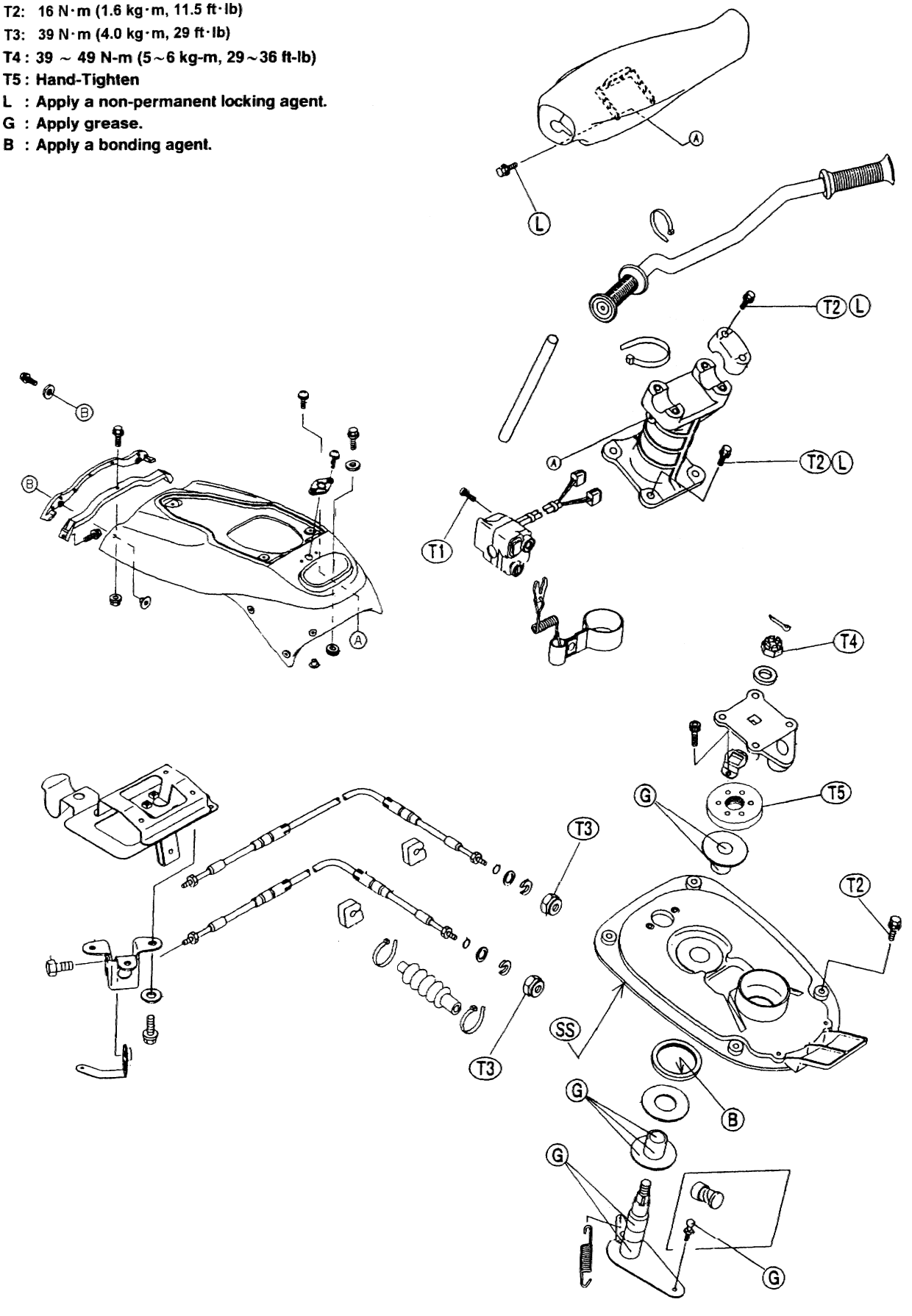
★If impeller clearance is incorrect, determine if it is due to wear or damage (see Pump and Impeller Inspection).

Steering

Table of Contents

Exploded View

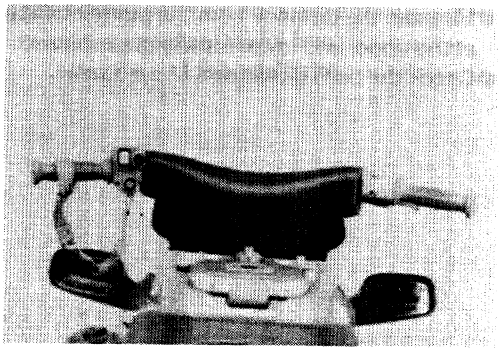
T1: 3.9 N·m (0.4 kg·m, 35 in·lb)
T2: 16 N·m (1.6 kg·m, 11.5 ft·lb)
T3: 39 N·m (4.0 kg·m, 29 ft·lb)
T4 : 39 ~ 49 N-m (5~6 kg-m, 29~36 ft-lb)
T5 : Hand-Tighten
L : Apply a non-permanent locking agent.
G : Apply grease.
B : Apply a bonding agent.



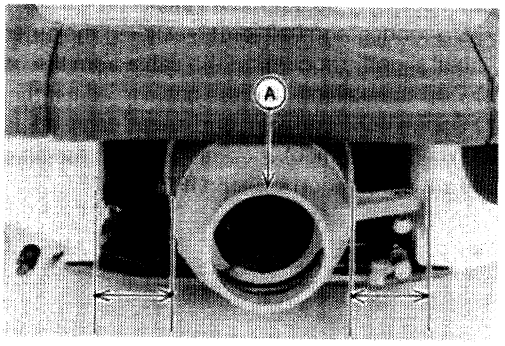
Steering Cable/Trim Cable

Steering Cable Adjustment

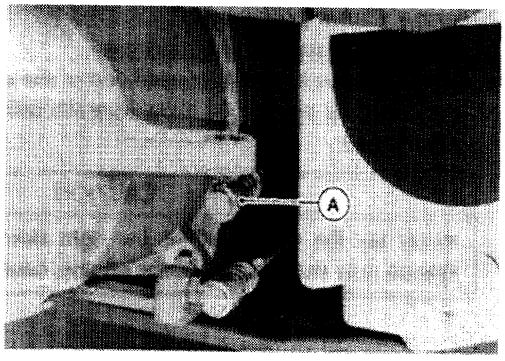
● Check steering cable adjustment.
○ Center the handlebar in the straight-ahead position.



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

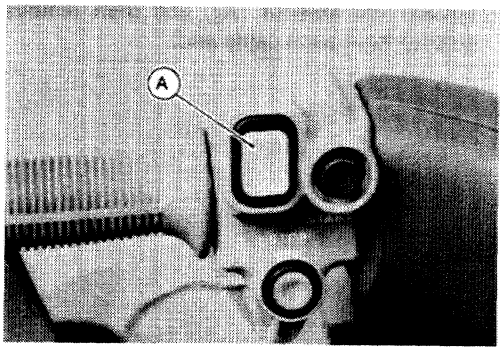


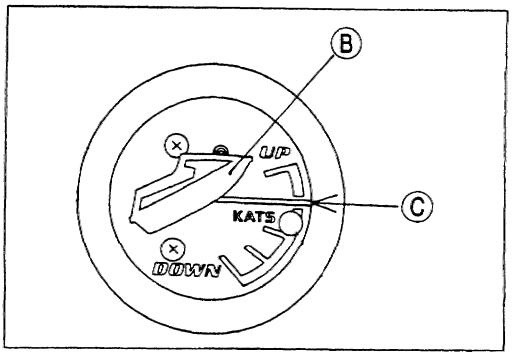
● If necessary adjust the steering cable.
○ Loosen the locknut on the steering cable.
○ Disconnect the ball joint by sliding the outer sleeve [A] away from the ball slightly, and lifting the cable from the ball.
○ Turn the ball joint on the cable to adjust the steering.
○ Connect the ball joint and check cable adjustment again.
○ When adjustment is correct, tighten the steering cable locknut.



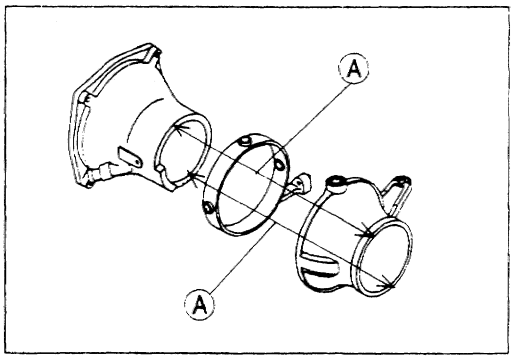
Trim Cable Adjustment

● Check trim cable adjustment.
○ Turn the ignition switch ON.
○ Adjust the trim switch [A] until the trim meter needle [B] points the level position [C].

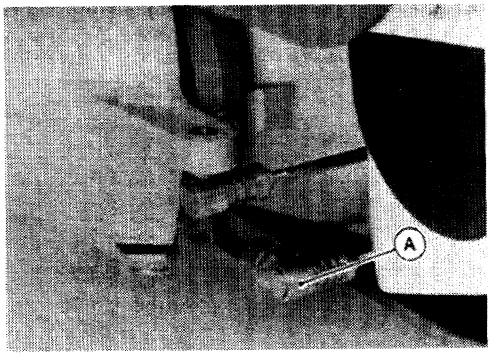




● Measure the distance from the pump outlet end to steering nozzle end at the upper and lower locations as shown.
● Check the both distances [A] are same.



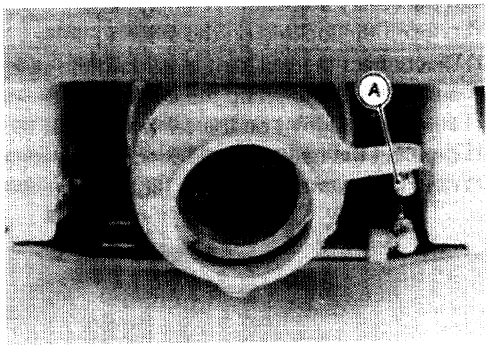
● If necessary adjust the tilt cable.
○ Disconnect the ball joint by sliding the outer sleeve [A] away from the ball slightly, and lifting the cable from the ball.
○ Turn the ball joint on the cable to adjust the tilt angle.
○ Connect the ball joint and check cable adjustment again.
○ When adjustment is correct, tighten the tilt cable locknut.
● Turn the ignition switch OFF.



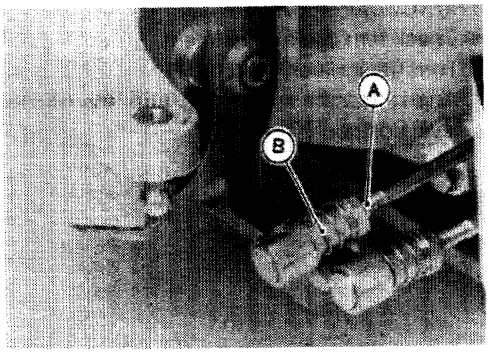
Steering Cable Removal

● Remove the battery and battery case.
● Disconnect the ball joint at each end of the steering cable.
○ Slide the outer sleeve [A] away from the ball slightly, and lift the cable from the ball.

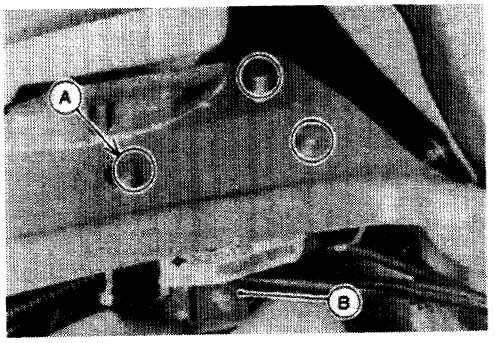
CAUTION
Never lay the watercraft on the right side. Water in the exhaust system may drain back into the engine, causing serious damage.



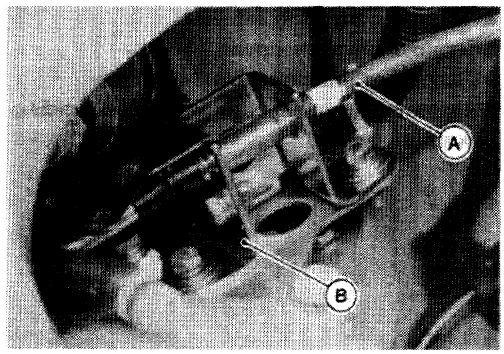
○ Loosen the locknut [A], and then remove the ball joint [B] and locknut from each cable end.



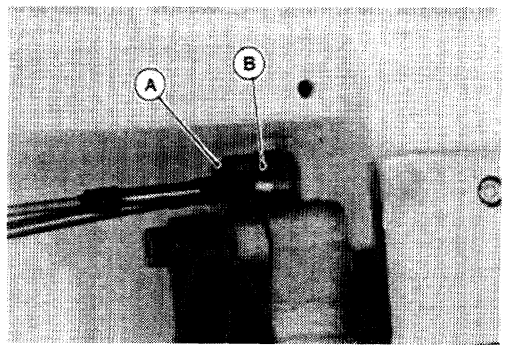
● Disconnect the steering cable from the holder.
○ Unscrew the mounting bolts [A], and remove the holder [B].



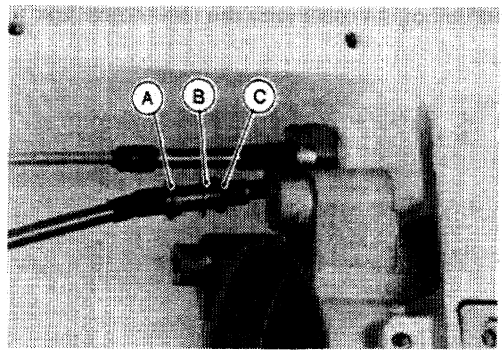
● Separate the cable [A] from the cable holder [B].



● Remove the pump (see Pump Removal in the Pump/Impeller chapter).
● Disconnect the steering cable from the fitting at the rear of the hull.
○ Unscrew the large nut [A] while holding the fitting [B] in the hull with a wrench.



○ Slide off the E-ring [A], washer [B], and O-ring [C].
● Pull the cable from the cable detent in the engine compartment.
● Pull out the steering cable toward the front.



Steering Cable Installation

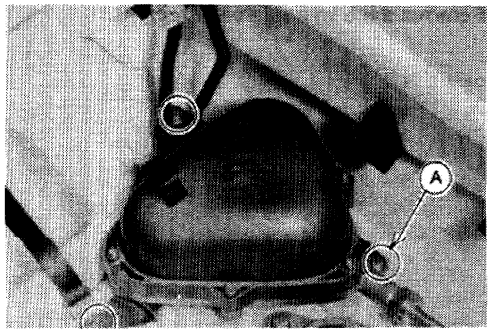
● Lubricate the outside of the new cable to ease cable installation.
● Torque:

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

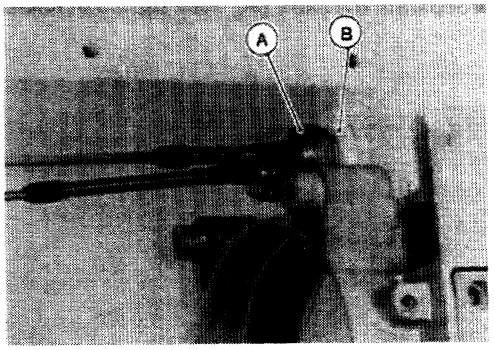
● Adjust the steering cable (see Steering Cable Adjustment).

Trim Cable Removal

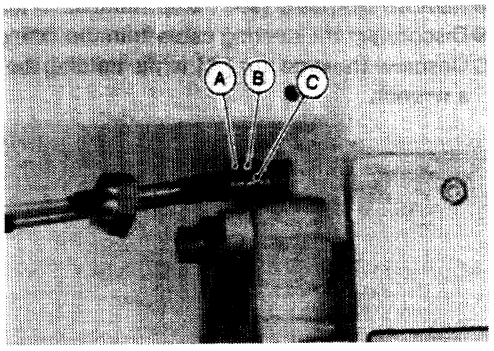
● Remove:
Arrester Case
Battery and Battery Case
Trim Motor Box Mounting Bolts [A]



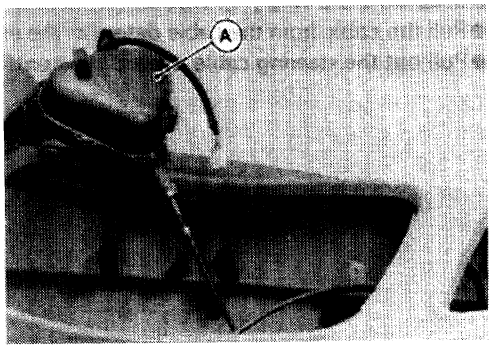
- Turn the craft on its left side.
- Remove the pump cover.
- Disconnect the trim cable ball joint.
- Unscrew the cable nut [A] while holding the fittings [B] with a wrench.



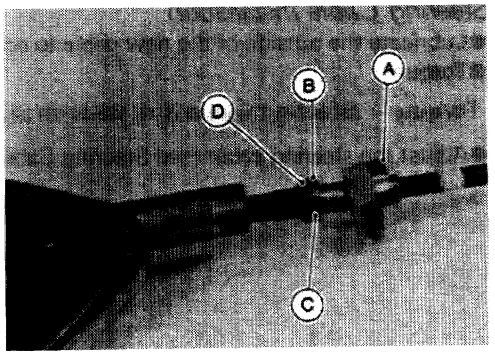
- Slide off the E-ring [A], washer [B] and O-ring [C].



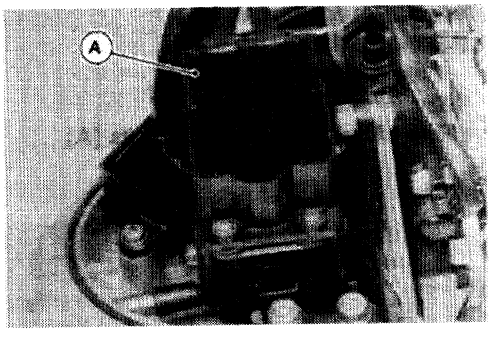
- Pull out the cable with the trim motor box [A].



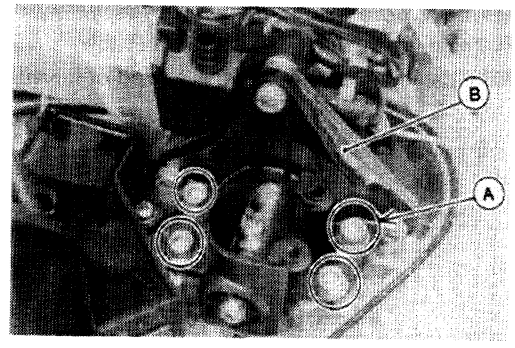
- Unscrew the cable nut [A] and slide off the E-ring [B], washer [C] and O-ring [D].
- Remove the trim motor box cover.



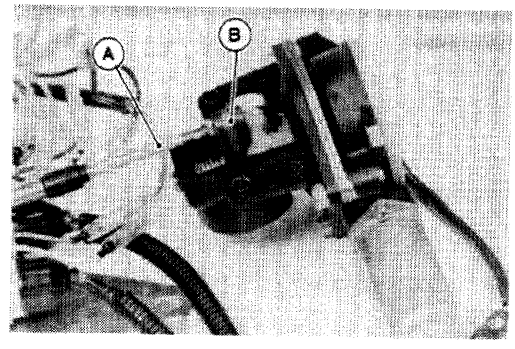
- Remove the trim angle sensor [A].



● Unscrew the mounting bolts [A] and remove the motor assembly [B].

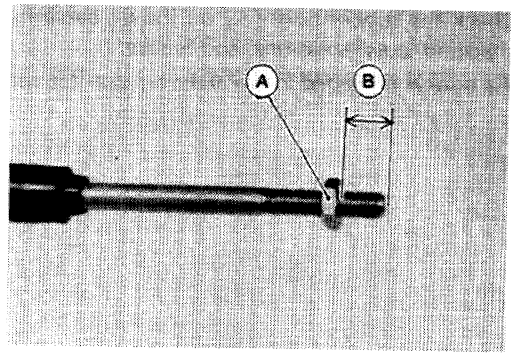


● Disconnect the trim cable [A] from the lever [B].

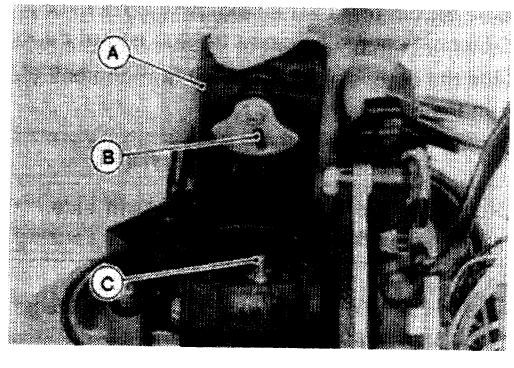


Trim Cable Installation

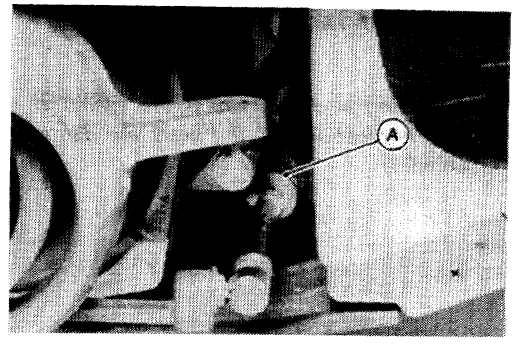
● Turn in the locknut [A] to about 7 mm distance [B] of the rod thread.



● Install the trim angle sensor [A] on the bracket, aligning the slit [B] with the pin [C] on the slide lever.



● Apply a non-permanent locking agent to the motor assembly mounting bolts and the trim angle sensor mounting screws.
● Position the rubber boot [A] over the trim cable seal and tighten the clamps securely.
● Adjust the trim cable (see Trim Cable Adjustment).

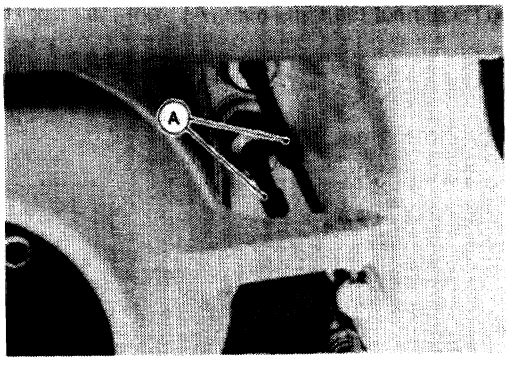


Steering Cable and Trim Cable Inspection

● Examine the steering cable and trim cable.

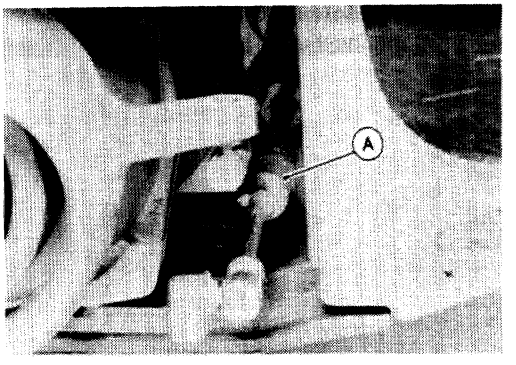
★ If the cable or cable housing is kinked or frayed, replace the cable.

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



● Check the rubber boot [A] on the tilt cable for hardening, cracking, checking, cuts, abrasions, and breaks.

★ If a boot is damaged in any way, replace it immediately.

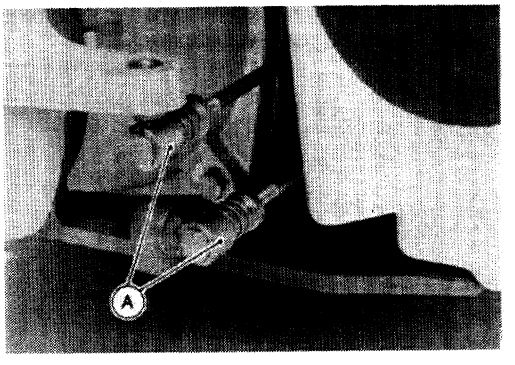


● Be certain that the cable moves freely in both directions.

○ Disconnect the ball joint at each end of the cable.

○ Slide the outer sleeve [A] away from the ball slightly, and lift the cable from the ball.

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



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

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

Steering and Trim Cable Lubrication

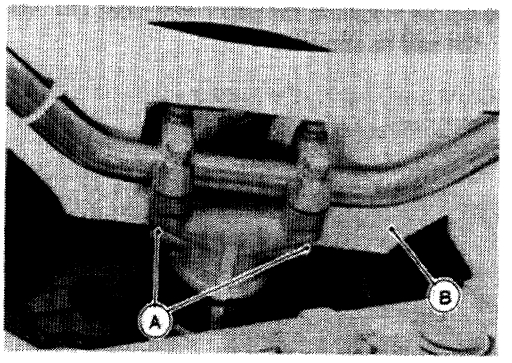
NOTE

○ *The steering and trim cables are sealed at each end and do not require lubrication. If the seals are damaged, the cable must be replaced.*

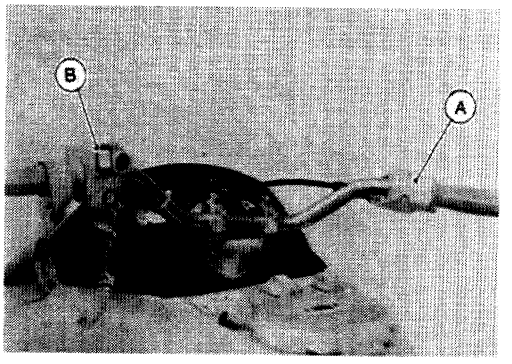
Handlebar

Removal

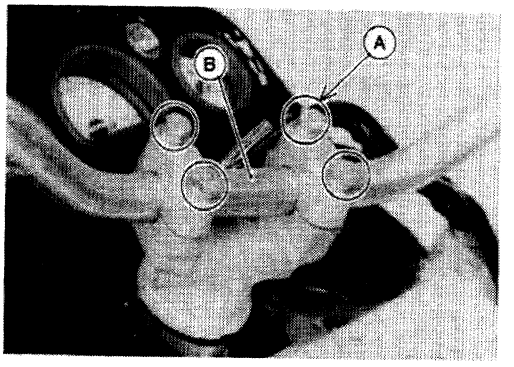
- Remove the handle cover.
- Unscrew the mounting bolts [A] and remove the pad [B].



- 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].

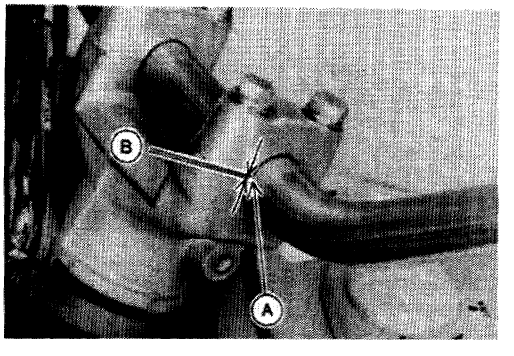


Installation

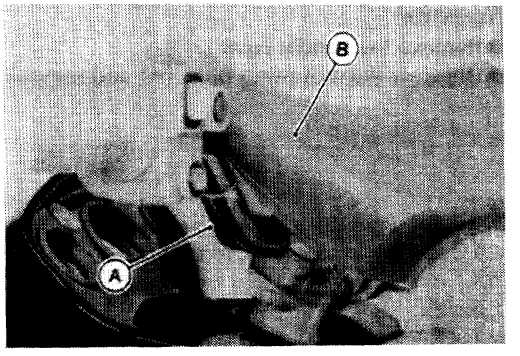
- Apply a non-permanent locking agent to the handlebar clamp bolts.
- Install the handlebar on the holders of the steering neck with clamp bolts.

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

Torque – Handlebar Clamp Bolts: 16 N-m (1.6 kg-m, 11.5 ft-lb)



● Before installing the pad (front side) [A], set the handle cover [B] on the pad as shown.

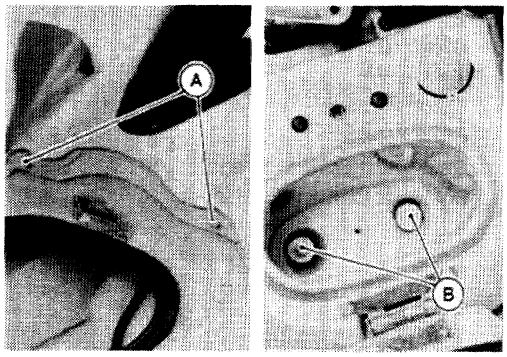


Steering

Removal

● Remove the handlebar (see Handlebar Removal).

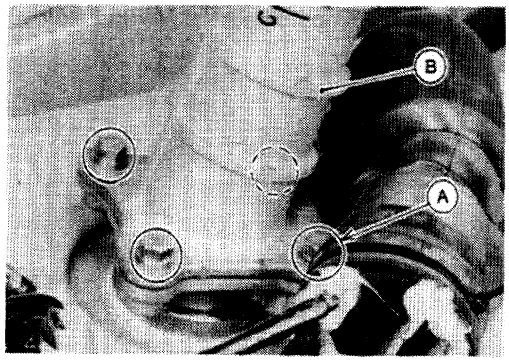
● Unscrew the mounting bolts [A], [B] and take out the steering cover.



● Disconnect.

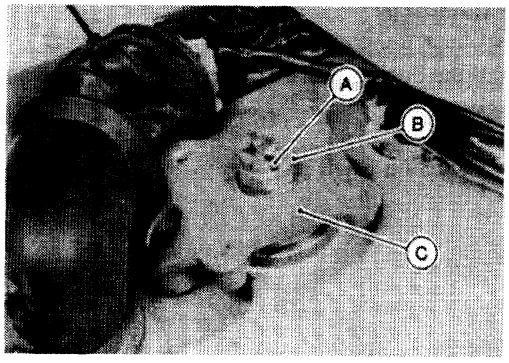
Steering Cable Connector
Return Spring

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



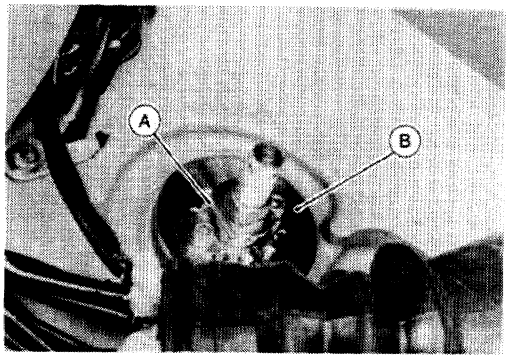
● Remove the cotter pin [A] and locknut [B].

● Take out the holder [C].

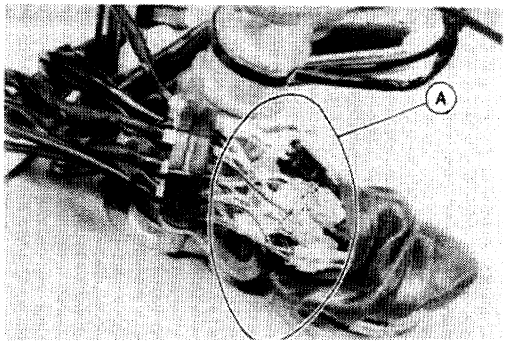


● Remove the lock plate [A] and unscrew the steering shaft nut [B].

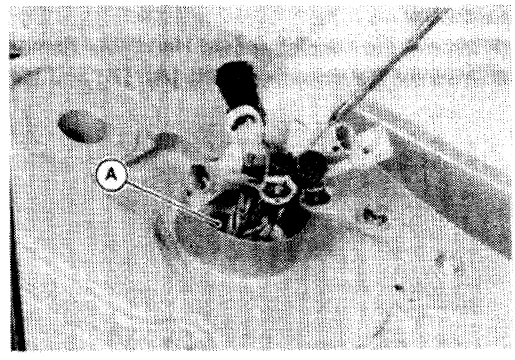
● Pull out the steering shaft.



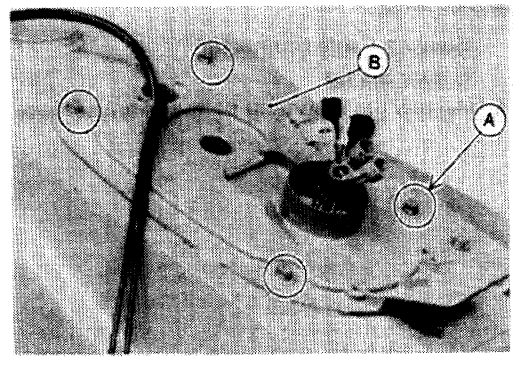
● Disconnect electric connectors [A].



● Remove:
Grommet [A]
Vent Hose
Throttle Cable
Choke Cable
Start/Stop Switch Leads
Fuel Tap Control Cables



● Unscrew the mounting bolts [A] and remove the steering holder [B].

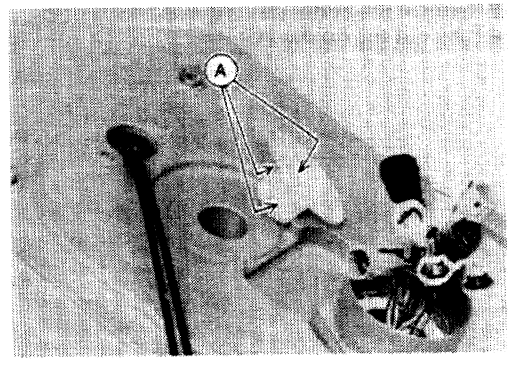


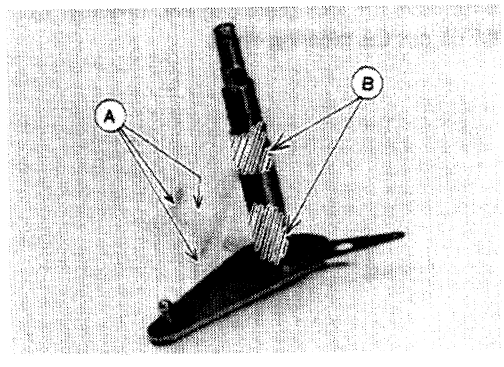
Installation

● Check the bushings for damage and wear.

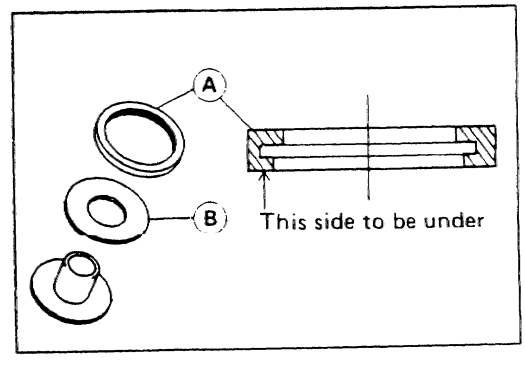
★ If the bushings are damaged or worn, replace them.

● Grease:
Bushings [A]
Steering Shaft [B]





● Be sure the grommet [A] is installed around the washer [B].

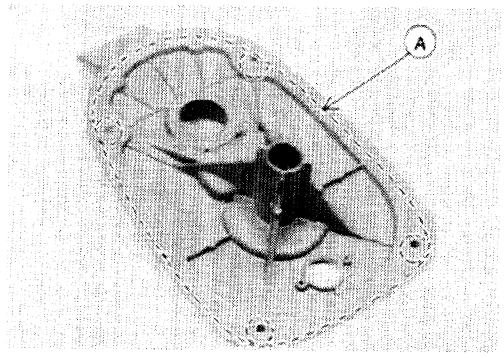


- Clean the mating surfaces of the steering holder and hull.
- Coat the steering holder bottom with silicone sealant [A], and fit the steering holder to the hull.

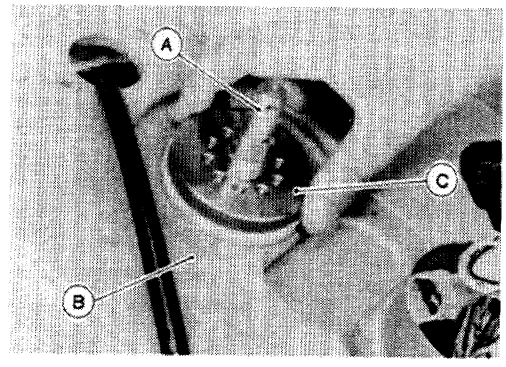
  ***Sealant* – Kawasaki Bond (Silicone Sealant): 56019-120**

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

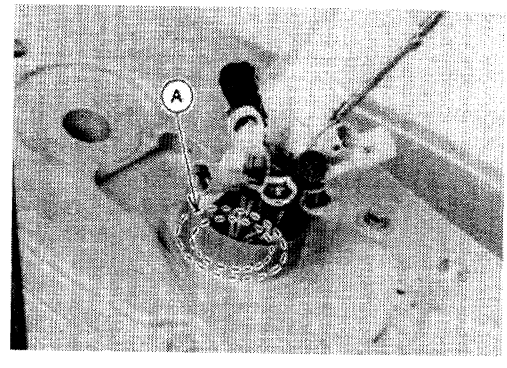
  Torque – Steering Holder Mounting Bolts: 16 N-m (1.6 kg-m, 11.5 ft-lb)



- Install the steering shaft [A] into the steering holder [B] and hand tighten the nut [C].



- Apply silicone sealant [A] around the grommets, as shown.



Hull/Engine Hood

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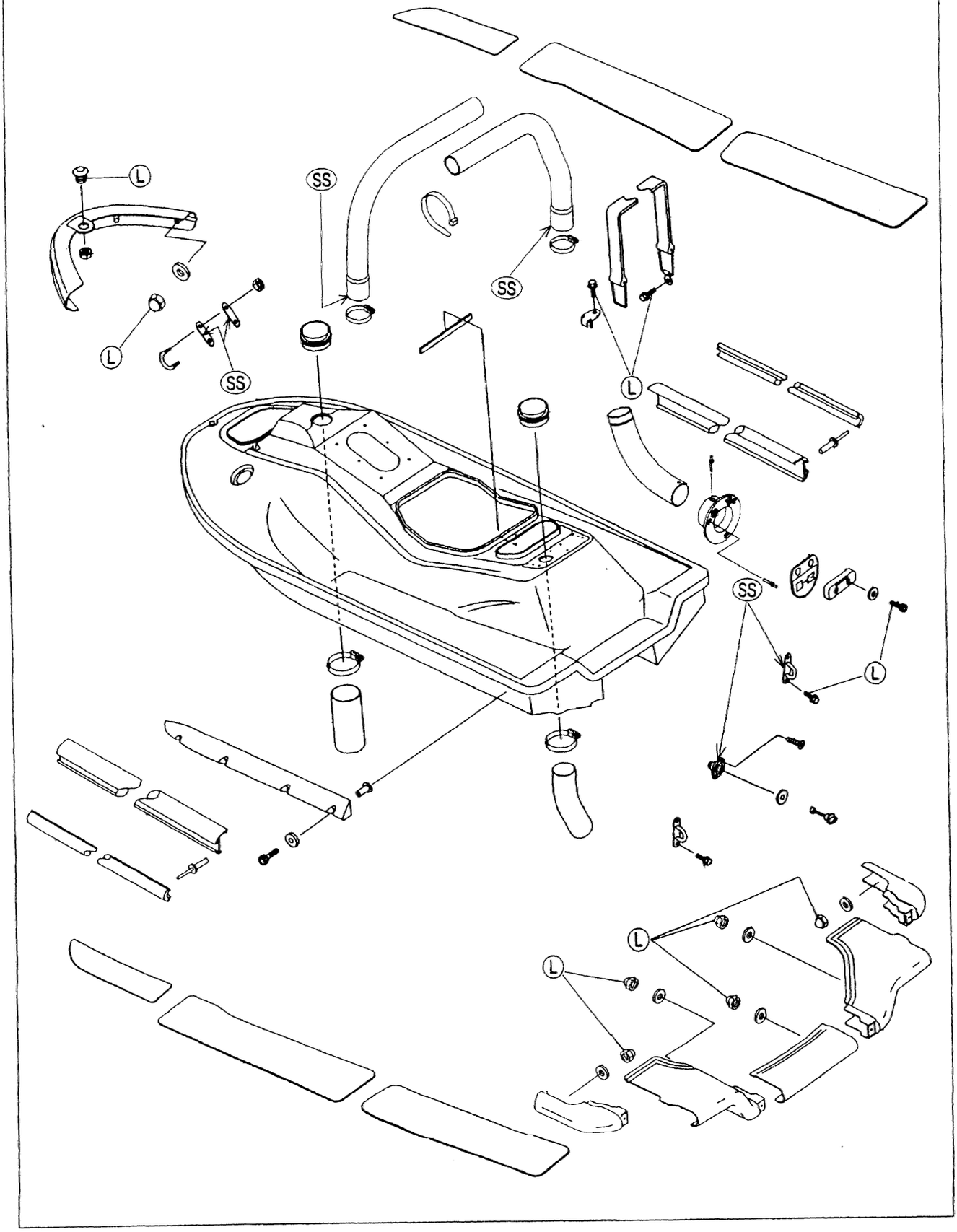
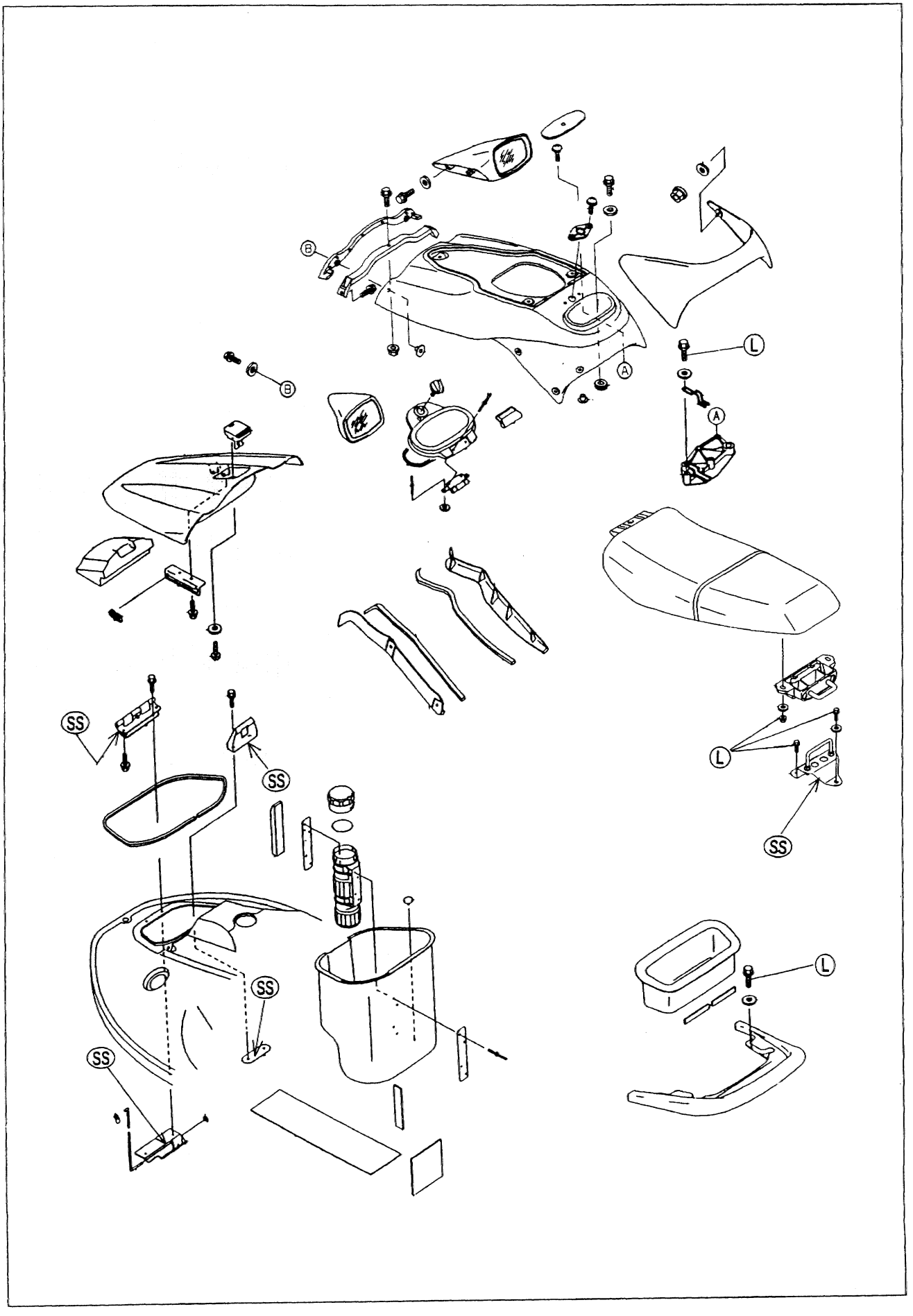
Exploded View

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

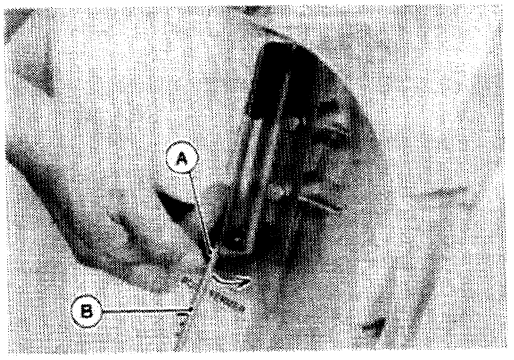



B
B
A
A
L
L
L
SS
SS
SS
SS
SS

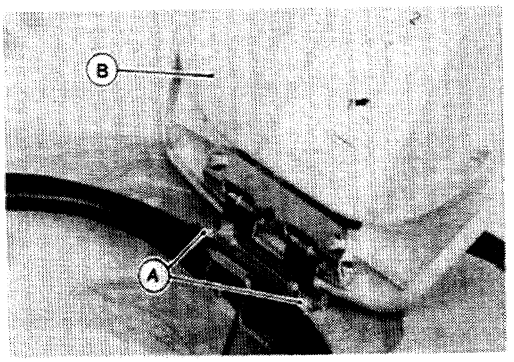
Fittings

Hatch Cover Removal/Installation

● Pushing the joint [A], disconnect the rod [B] from the joint.

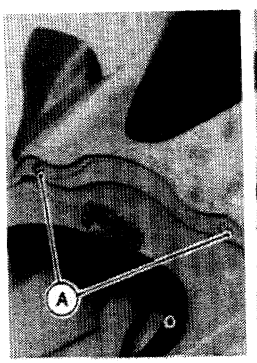


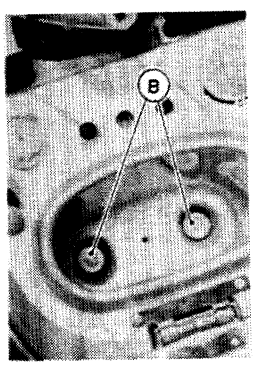
● Take out the bolt [A] and remove the hatch cover [B].



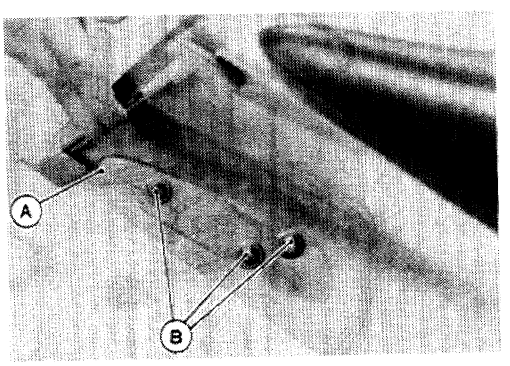
Rear View Mirror Removal/Installation

● Remove the steering cover mounting bolts [A], [B].





● Lifting the steering cover [A], unscrew the mirror mounting bolts [B].
● Remove the mirrors.



Hull Replacement

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

Battery and Pad
Air Intake Ducts
Oil Tank
Electric Case
Exhaust Pipe, and Expansion Chamber
Carburetor and Fuel Filter
Engine and Mounts
Water Box Muffler
Drive Shaft and Shaft Holder
Steering Cover
Fuel Tank and Filler
Fuel Tap
Choke Assembly
Pump and Hoses
Steering Cable
Tilt Cable
Handlebar and Steering
Bilge and Cooling System Hose
Bypass Hose and Outlet
Bumpers
Engine Hood Latch
Hatch Cover and Hinge
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 Hatch Cover Trim Seal	Synthetic Rubber Adhesive P/N: 92104-3701
Detents Handlebar Grips	Cyanoacrylate cement

CAUTION

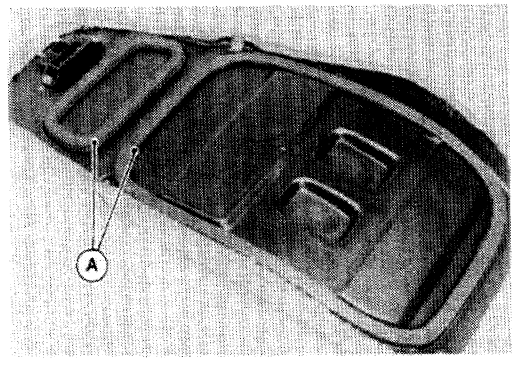
Be very careful that the part is positioned correctly when you apply the cement. It may be impossible to reposition the part.

⚠WARNING

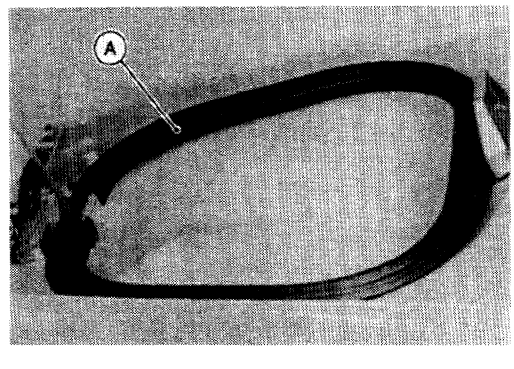
Do not get any cyanoacrylate cement in your eyes or on your skin. If you do get some in your eyes, do not try to wash it out. Contact a physician immediately! If you do get some on your fingers, do not touch any other part of your body; your fingers will stick to anything they touch. Allow the cement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

Rubber parts Location

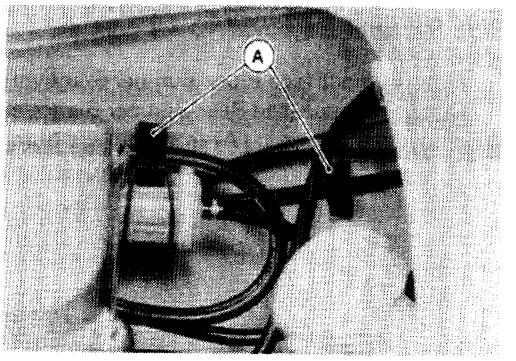
Engine Hood Gasket [A]



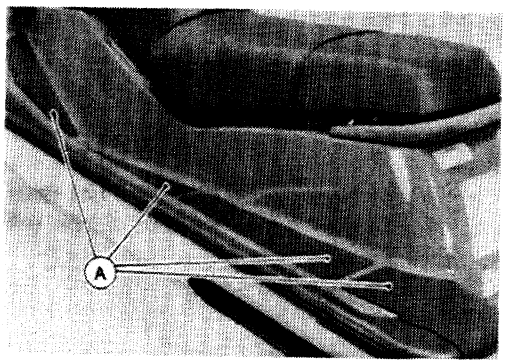
Trim Seal [A]



Detent [A]



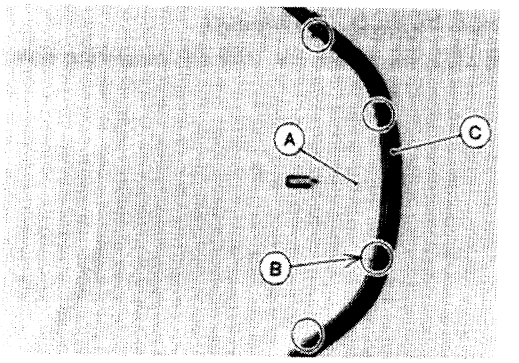
Mat [A]



Front Bumper Removal/Installation

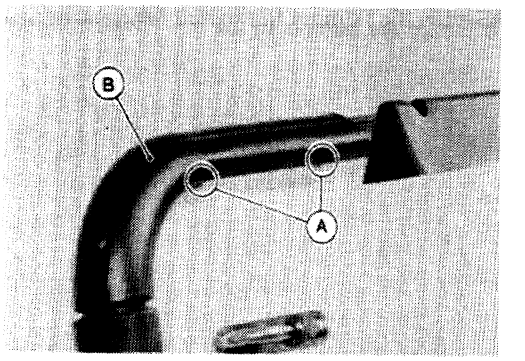
- Unscrew the bushing [A] and the mounting nuts [B], and remove the front bumper [C].
- Installation is the reverse of removal. Note the following.
- Apply a non-permanent locking agent to the following.

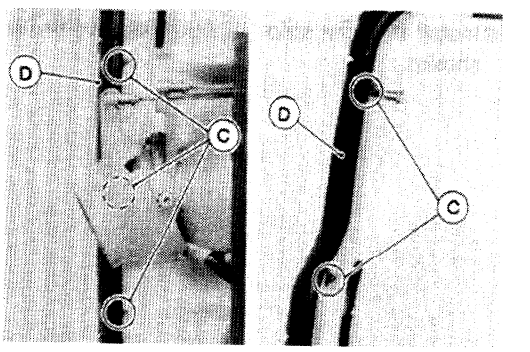
  Front Bumper Mounting Nuts
  Bushing Nut



Rear Bumper Removal/Installation

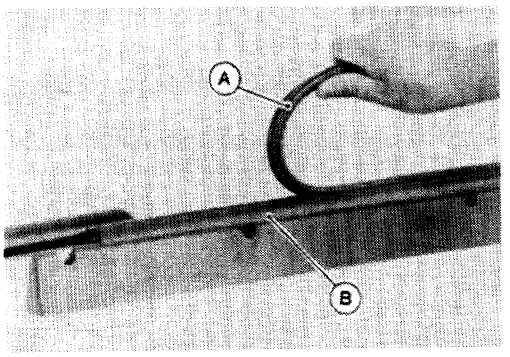
- Remove:
  Corner Bumper Mounting Nuts [A]
  Corner Bumpers [B]
  Rear Bumper Mounting Nuts [C]
  Rear Bumper [D]
- Installation is the reverse of removal. Note the following.
- Apply a non-permanent locking agent to the following.
  Corner Bumper Mounting Nuts
  Rear Bumper Mounting Nuts





Side Bumper Removal

● Remove:
Front Bumper (see Front Bumper Removal)
Corner Bumper (see Rear Bumper Removal)
● Remove the trim strip [A] from the side bumper [B].

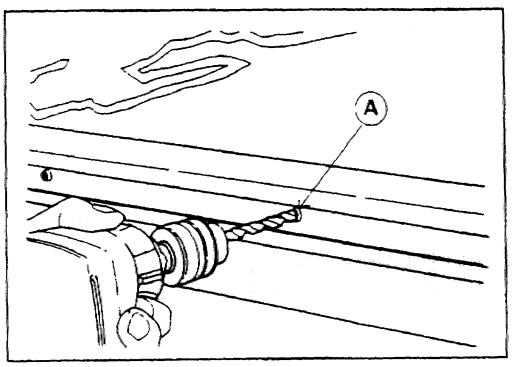


● Drill out the pop rivets with a drill bit of the correct size.

Pop Rivet Removal Drill Bit Size
6.5mm

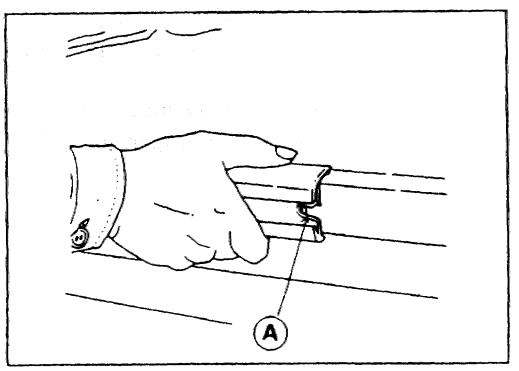
NOTE

○ *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.*

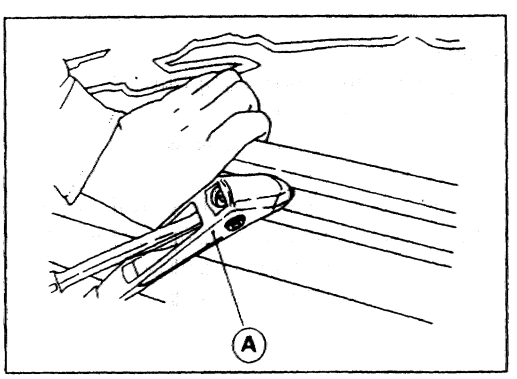


Side Bumper Installation

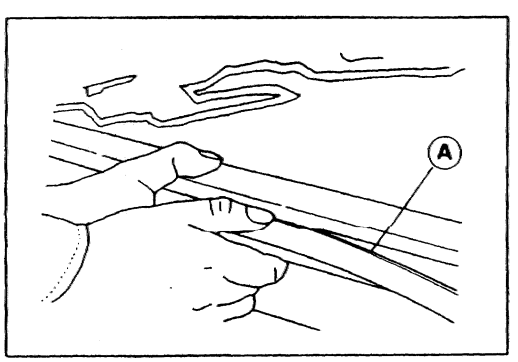
● Align the recess [A] with the mounting hole for corner bumper.



● Secure the bumper to the hull flange with a pop rivet [A].

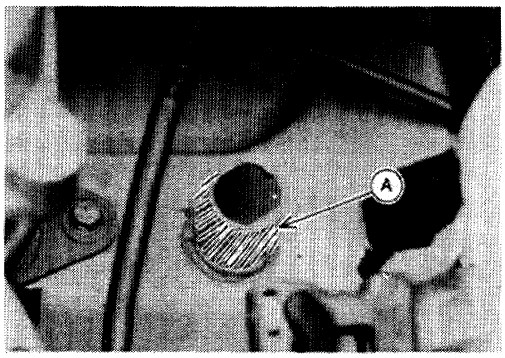


● Install the trim strip [A], pushing on the both sides of the strip as shown.

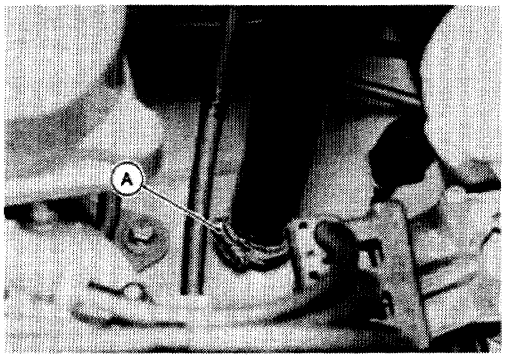


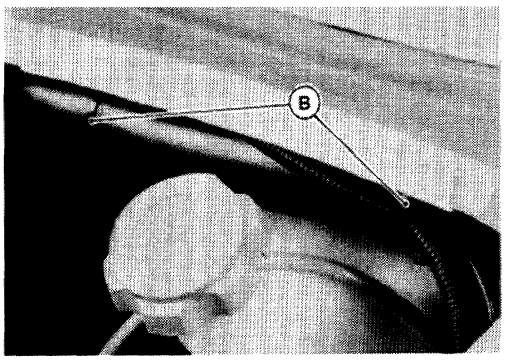
Air Intake Duct Installation

- Apply silicone sealant to the mating surfaces of the air intake duct and fitting [A].



- Insert the duct into the fitting.
- Tighten the duct clamp [A] securely.
- Fix the duct with clamp [B].



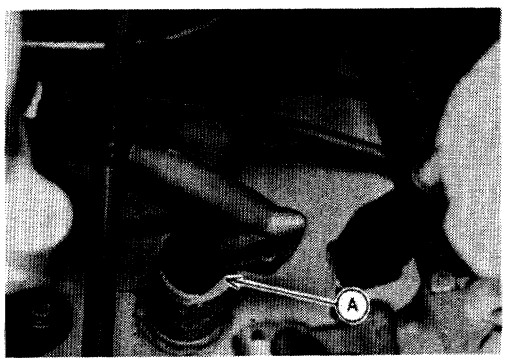


Kawasaki Air Induction System (KAIS) Inspection

- Whenever you suspect this system is blocked, blow air [A] through both duct fittings.
- Check the duct for hardening, cracking, checking, cuts, abrasions, and breaks.

★If a duct is damaged in any way, replace it immediately.

CAUTION
If a duct is damaged, water could flow into the engine compartment, causing damage to the engine and electrical components.



Electrical System

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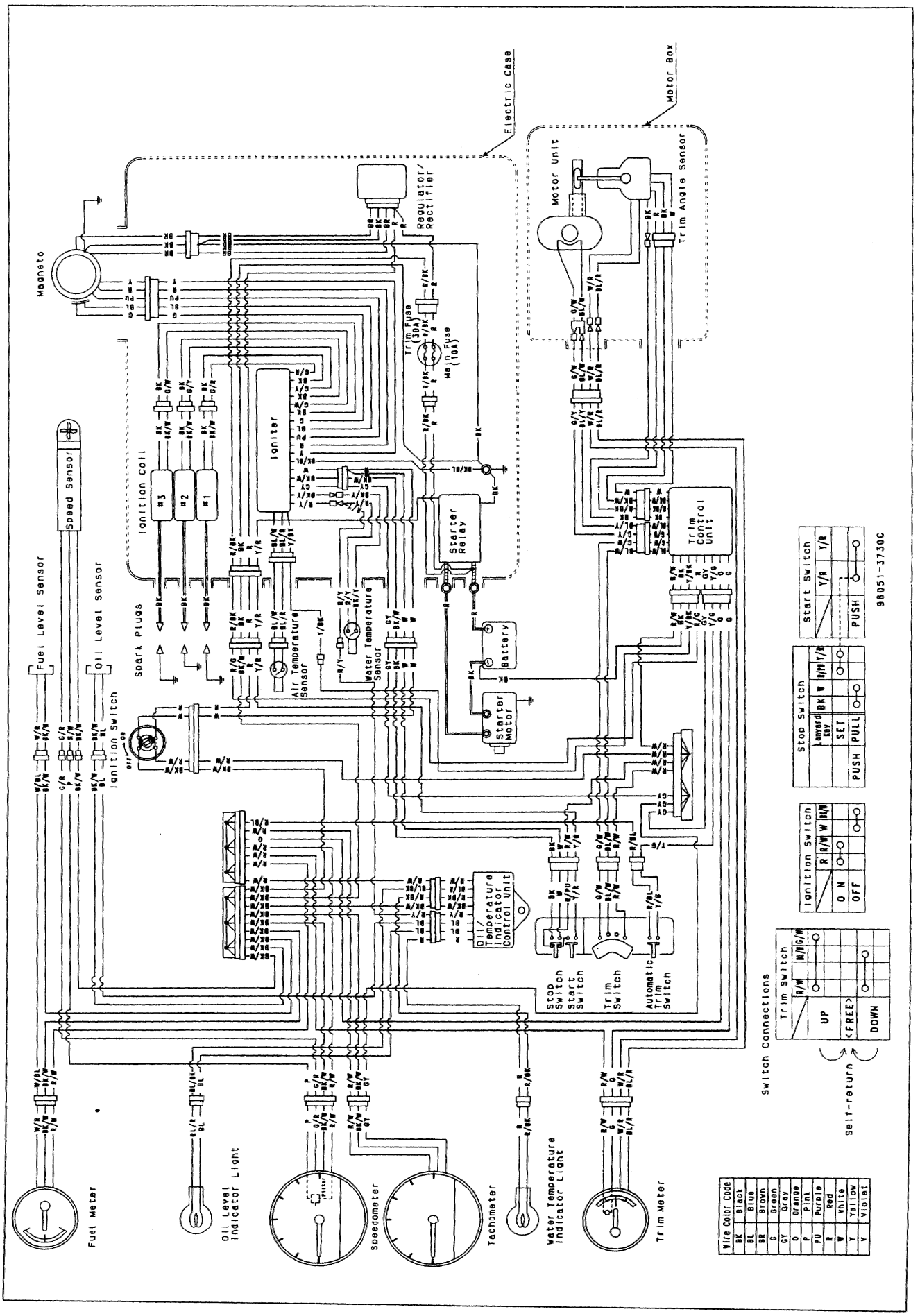
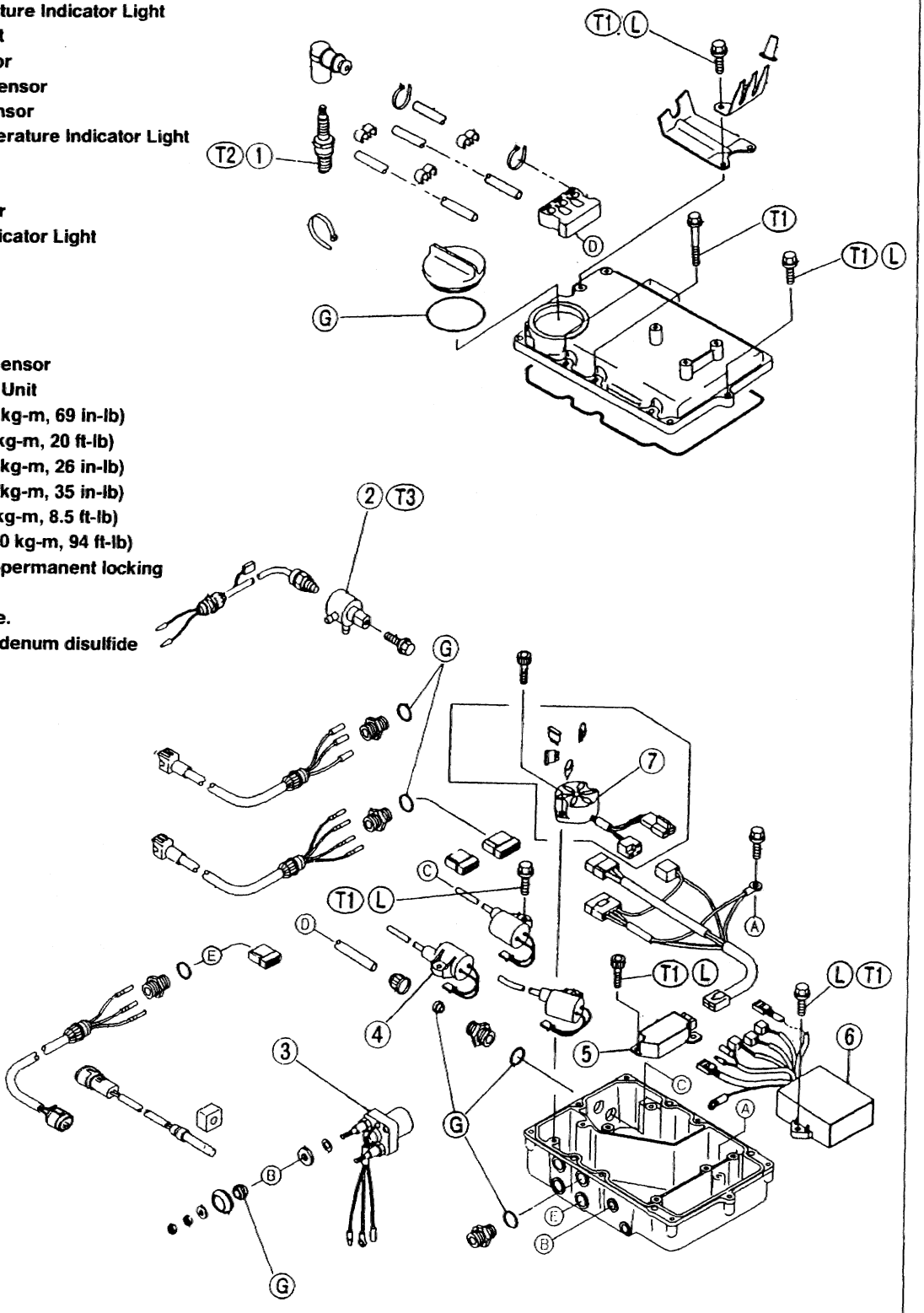
Wiring Diagram

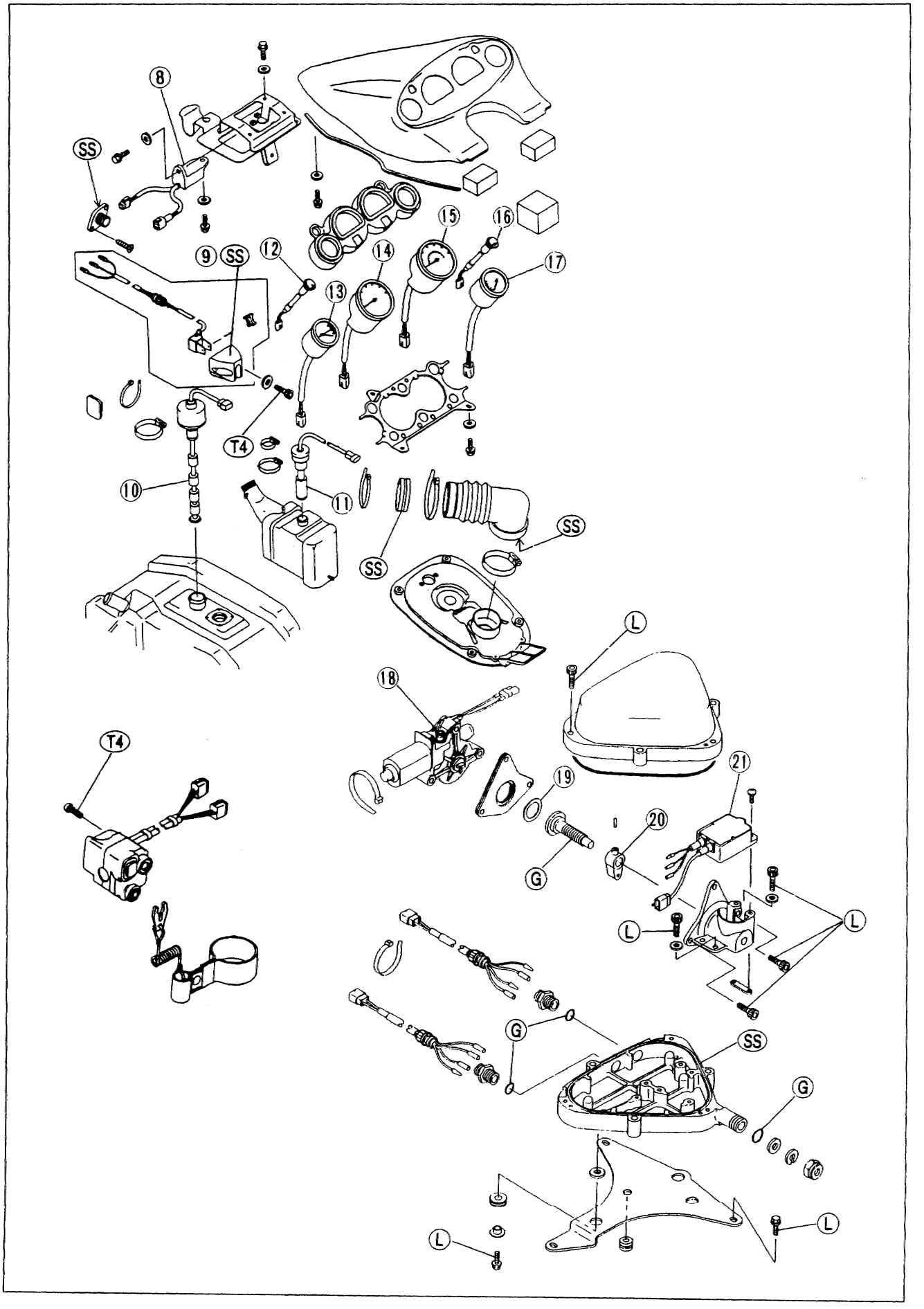


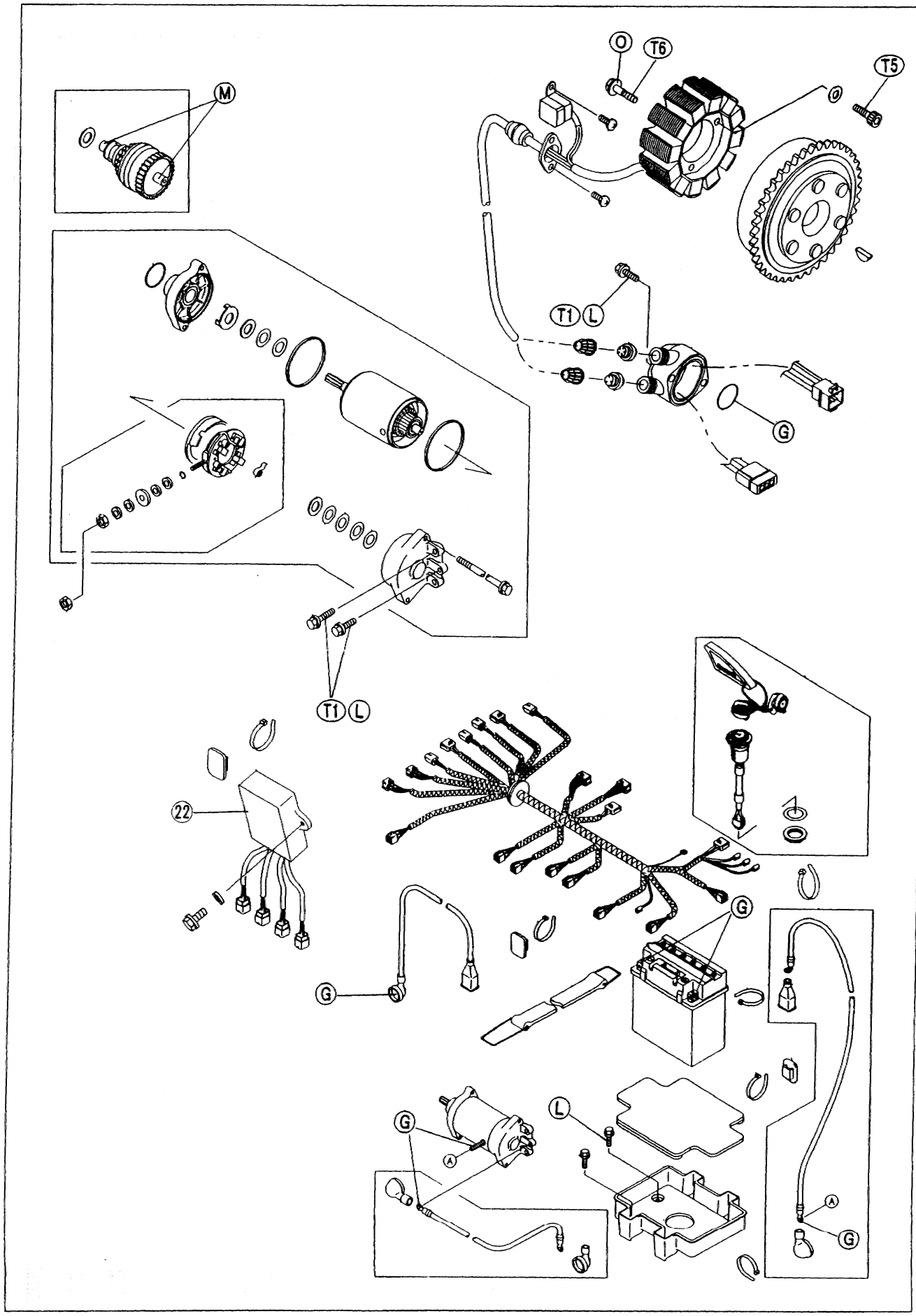
Exploded View

1. Spark Plug
2. Temperature Sensor
3. Starter Relay
4. Ignition Coil
5. Regulator/Rectifier
6. Igniter
7. Fuse Assy
8. Oil/Temperature Indicator Light Control Unit
9. Speed Sensor
10. Fuel Level Sensor
11. Oil Level Sensor
12. Water Temperature Indicator Light
13. Trim Meter
14. Tachometer
15. Speedometer
16. Oil Level Indicator Light
17. Fuel Meter
18. Motor Unit
19. Shaft
20. Slide Lever
21. Trim Angle Sensor
22. Trim Control Unit

T1 : 7.8 N-m (0.8 kg-m, 69 in-lb)
T2 : 27 N-m (2.8 kg-m, 20 ft-lb)
T3 : 2.9 N-m (0.3 kg-m, 26 in-lb)
T4 : 3.9 N-m (0.4 kg-m, 35 in-lb)
T5 : 12 N-m (1.2 kg-m, 8.5 ft-lb)
T6 : 125 N-m (13.0 kg-m, 94 ft-lb)
L : Apply a non-permanent locking agent.
G : Apply grease.
M : Apply molybdenum disulfide




8
SS
9
SS
12
13
14
15
16
17
T4
10
11
SS
SS
L
18
T4
19
21
20
G
L
L
G
SS
G
L
L


O
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A

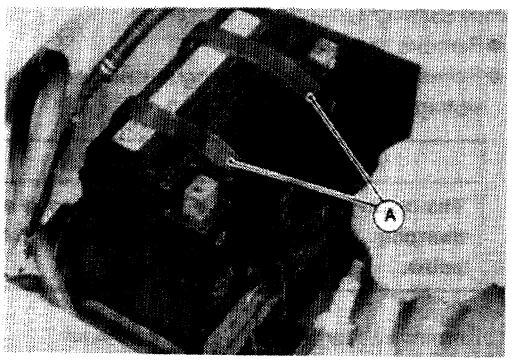
Specifications

Item	Standard	Service Limit
Battery:		
Type	12 V 18 Ah	---
Electric Starter System:		
Starter motor:		
Brush length	12.5 mm	6.5 mm
Commutator diameter	28 mm	27 mm
Charging System:		
Regulator/rectifier output voltage	Battery voltage −14.5 ±0.5 V	---
Charging coil output voltage	50 V	---
Charging coil resistance:		
Brown ←→ Brown	0.7 ~ 1.1 Ω	---
Exciter Coil resistance:		
Purple ← → Red	348.8 ~ 523.2 Ω	---
Yellow ← → Black	21.6 ~ 32.4 Ω	---
Ignition System:		
Ignition timing	17° BTDC @1 250 r/min (rpm) ~ 27° BTDC @3 000 r/min (rpm)	---
Ignition coil:		
Primary winding resistance	0.18 ~ 0.24 Ω	---
Secondary winding resistance	2.7 ~ 3.7 Ω	---
Spark plug:		
Type:	NGK BR9ES	---
Gap:	0.7 ~ 0.8 mm	---
Pickup coil resistance	396 ~ 594 Ω	---
Pickup coil air gap (Clearance between the rotor projection and pickup core)	0.8 ~ 1.0 mm	---

Special Tools – Hand Tester: 57001-1394

Battery

Removal



● Disconnect the battery cables.

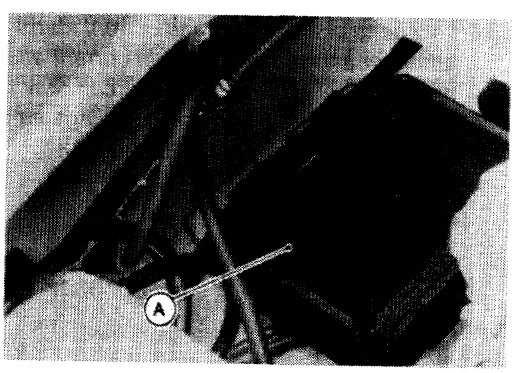
⚠WARNING

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

● Unhook the battery straps [A].

● Carefully lift the battery from the engine compartment.

Installation



● Be sure the battery damper [A] is in position in the battery compartment.
● Place the battery in position.
● 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.

Charging Condition Inspection

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

● Disconnect the battery terminal leads.

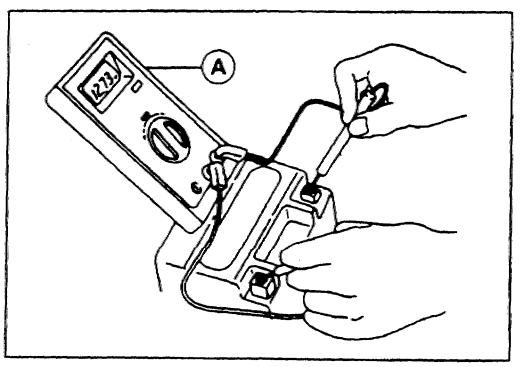
CAUTION

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 to one decimal place.*



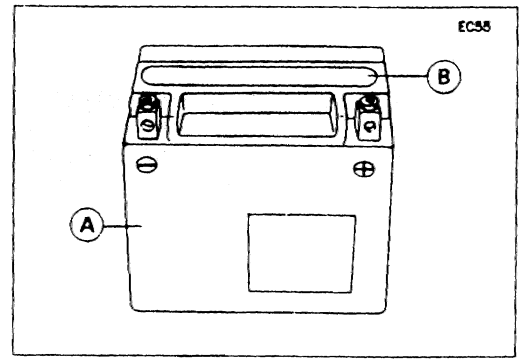
★ If the reading is below the specified, refreshing charge is required.

Battery Terminal Voltage
Standard: 12.8 V or more

Refreshing Charge

● Remove the battery [A].

● Refresh-charge by following method according to the battery terminal voltage.



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

○ Terminal Voltage: **11.5 ~ 12.8 V or less**

Standard Charge: **1.8 A x 5 ~ 10 h (see following chart)**
Quick Charge: **9.0 A x 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.

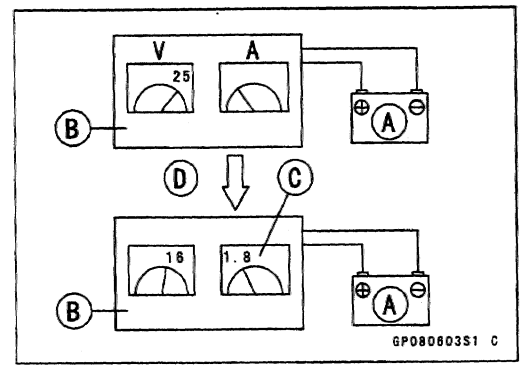
○ Terminal Voltage: **11.5 V or less**

Charging Method: **1.8 A x 20 h**

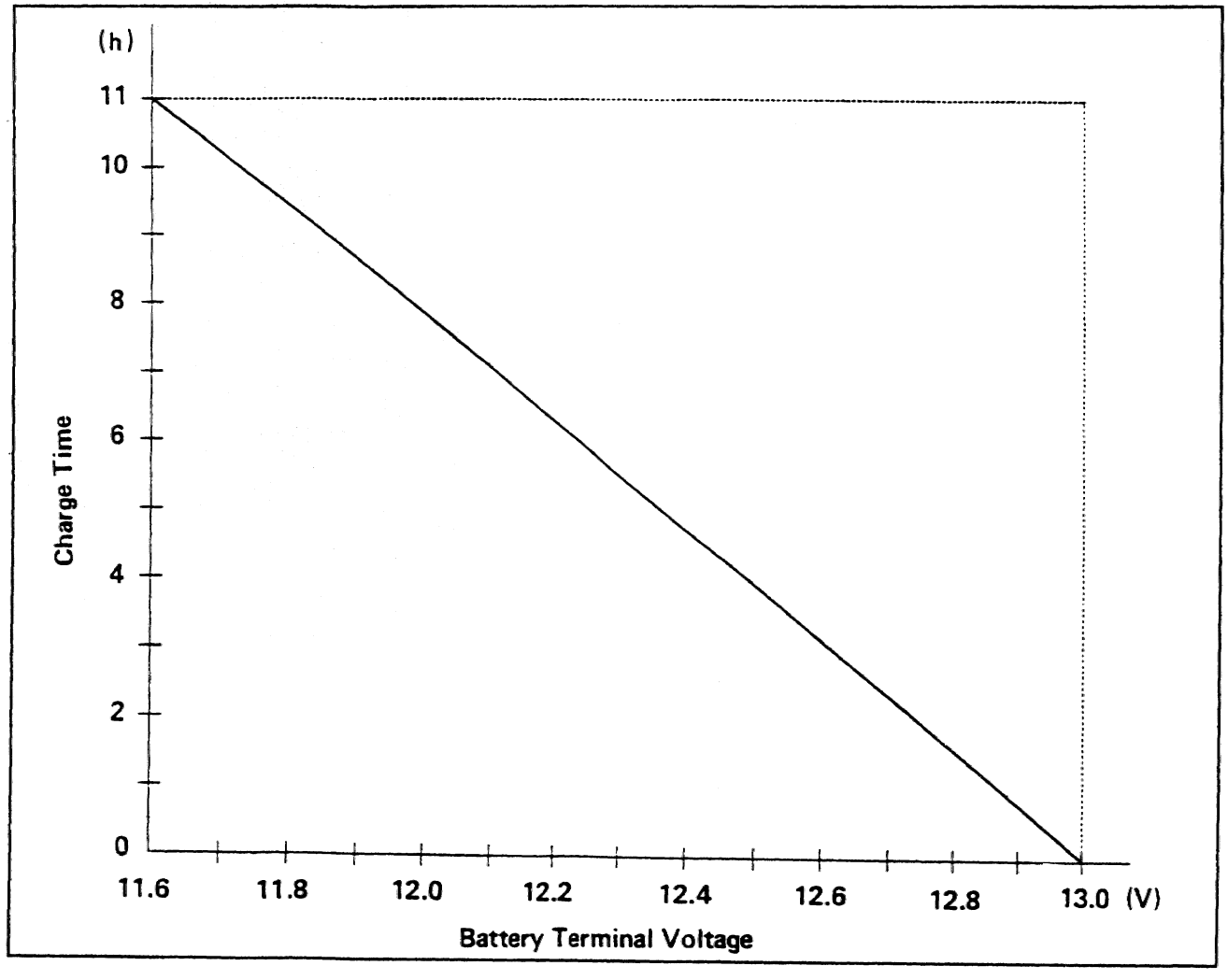
NOTE

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

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



Battery Standard Charge Time Chart – For Reference



● 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.

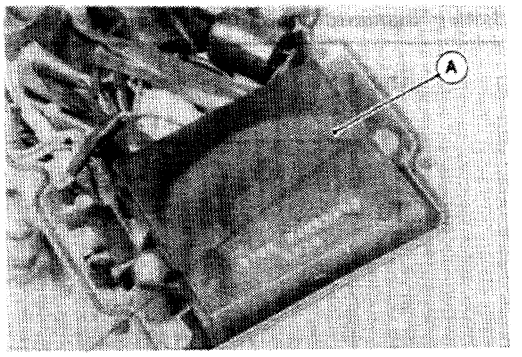
Criteria	Judgement
12.8 V or higher	Good
12.0 less than 12.8 V	Charge Insufficient ← Recharge.
less than 12.0 V	Unserviceable ← Replace

Electric Starter System

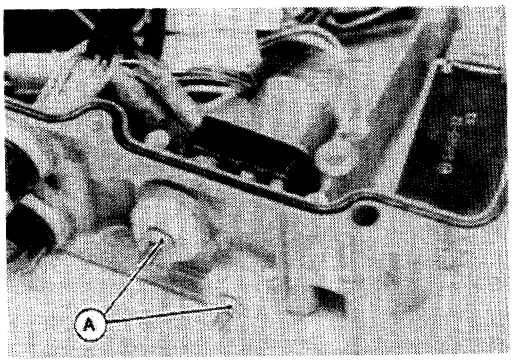
Starter Relay:

Removal

- Open the electric case (see Electric Case Disassembly).
- Remove the CDI Ignitor [A].



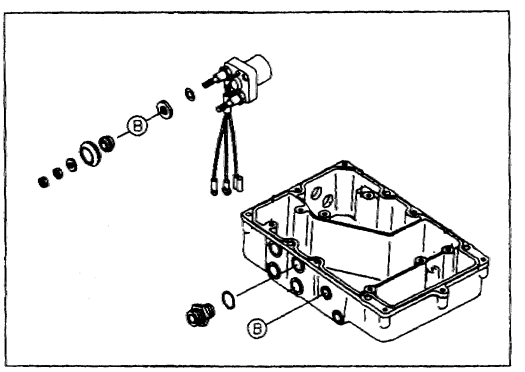
- Remove the nuts [A] from the battery and starter terminals on the starter relay switch.



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

Installation

- Coat the insulating washers and grommets with waterproof grease.
- Be certain all insulating washers and grommets are in position.

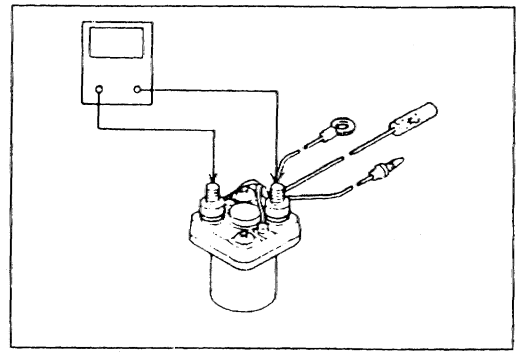


- Connect the ground lead (black) to the ground mounting bolt.
- Connect the battery cable to the relay (+) terminal having red lead.

Inspection

- Set ohmmeter to R x 1 Ω scale.
- Connect meter leads to starter relay as shown.

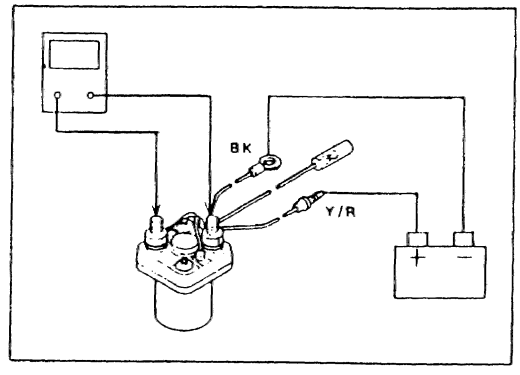
★If resistance is less than infinite, the starter relay switch is not returning and must be replaced.



- Set ohmmeter to R x 1 Ω 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.

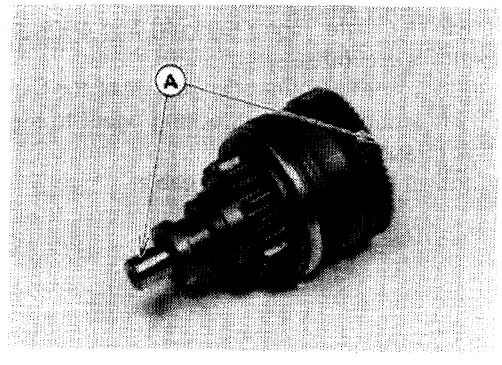
★If the meter indicates high or infinite (∞) resistance, the starter relay switch is defective and must be replaced.



Reduction Gear:

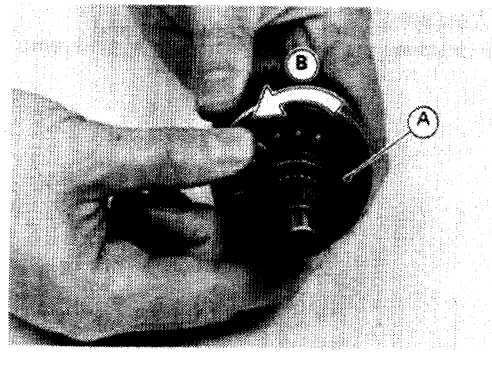
Removal/Installation Notes

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



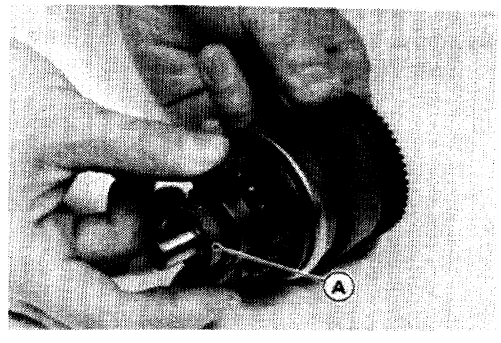
Inspection

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



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

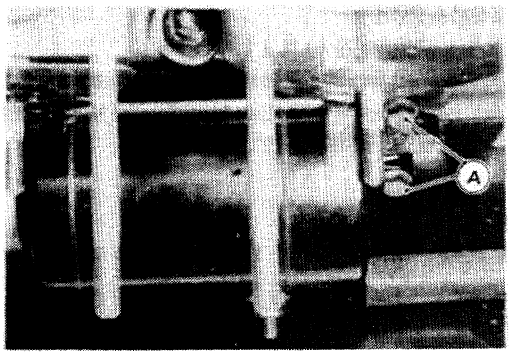
★If the pinion gear does not function properly, replace it.



Starter Motor:

Removal

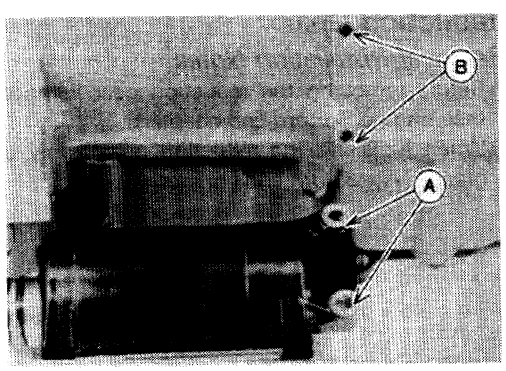
- Disconnect:
  - Battery Ground Cable
  - Exhaust Pipe
  - Expansion Chamber
  - Exhaust Manifold
  - Starter Motor Cable
- Remove the starter mounting bolts [A] and pull off the starter motor.



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

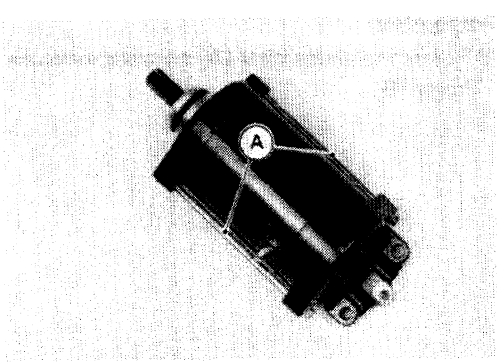
Installation Notes

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

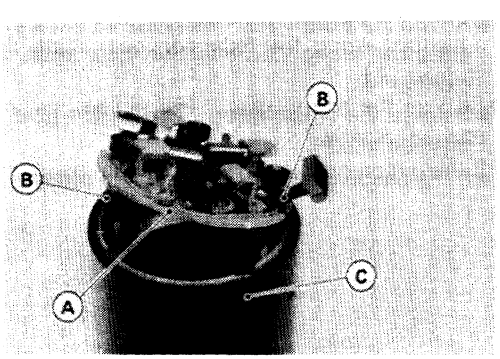


Disassembly

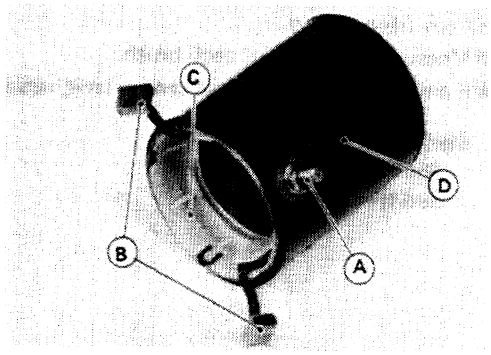
- Unscrew the retaining screws [A] and remove the both end covers.



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

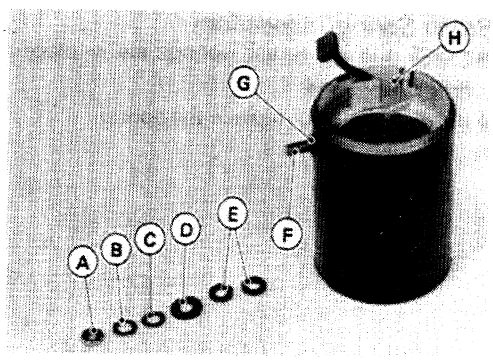


● Remove the nut and terminal bolt [A], and then remove the brush [B] and the plastic holder [C].
Yoke [D]

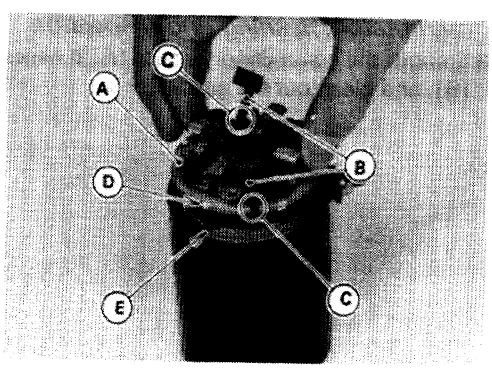


Assembly

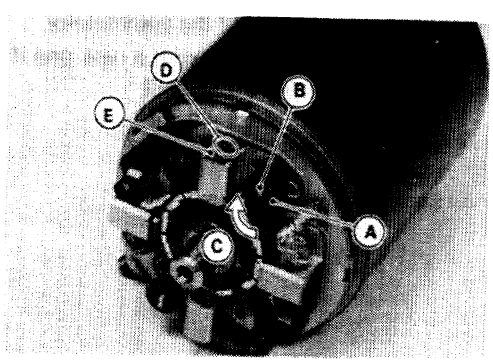
● Install the terminal bolt as shown.
Nut [A]
Spring Washer [B]
Washer [C]
Large Insulator [D]
Small Insulator [E]
Terminal Bolt [F]
O-ring [G]
Plastic Holder [H]



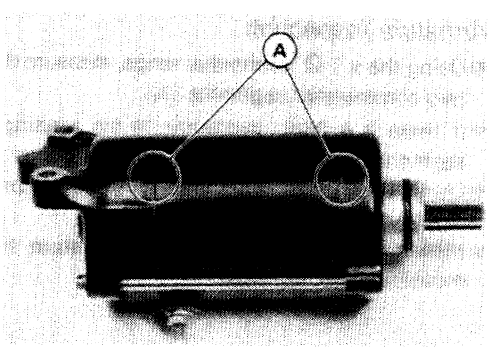
● Install the brush plate as follows.
○ Install the brush plate [A] on the yoke fitting the brush leads [B] into the notches [C] in the plate. Fit the brush plate tongue [D] into the yoke notch [E].



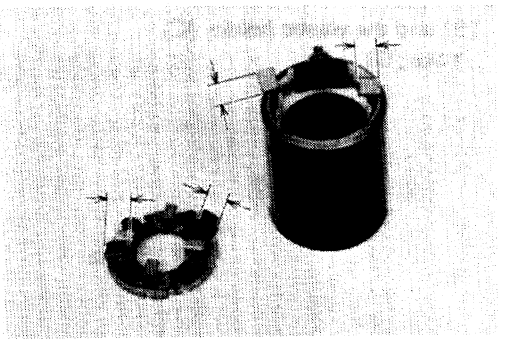
○ Insert the armature into the yoke.
○ Keeping the motor upright, install the brush springs [A]. Fit the spring on the spring post [B] halfway; the post must be positioned in the D-shaped end of the spring. Turn the other end of the spring a half turn clockwise [C], and fit the end in the brush groove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



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



Brush Inspection



- Measure the length of each brush.

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

Starter Motor Brush Length

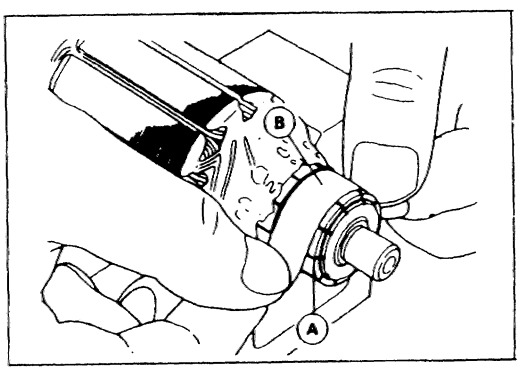
Standard:	**12.5 mm**
Service Limit:	**6.5 mm**

Brush Spring Inspection

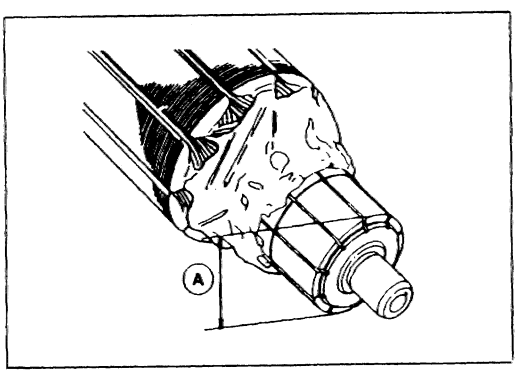
- Check that the brush springs are in place and will snap the brushes firmly into place.

★If not, reinstall or replace the spring.

Commutator Cleaning and Inspection



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



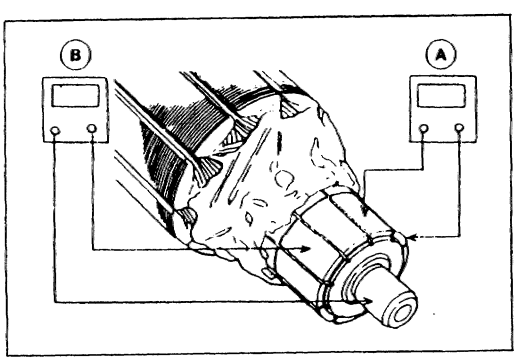
- Measure the diameter of the commutator.

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

Commutator Diameter

Standard:	**28 mm**
Service Limit:	**27 mm**

Armature Inspection



- Using the x 1 Ω ohmmeter range, measure the resistance between any two commutator segments [A].

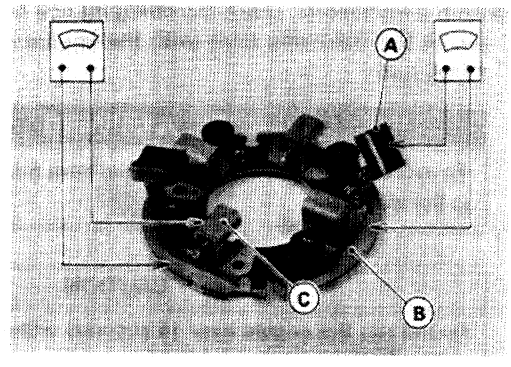
★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

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

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

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

Brush Plate Inspection



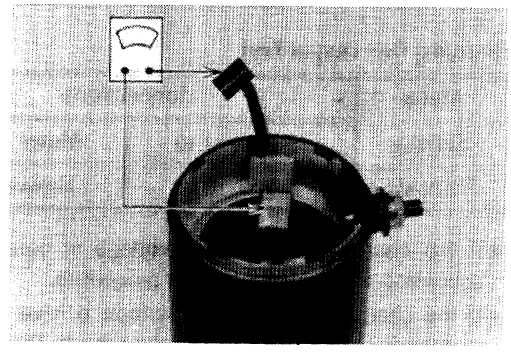
- Using the x 1 Ω ohmmeter range, measure the resistance between the brush [A] an and the brush plate [B].

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

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

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

Brush and Lead Assembly Inspection

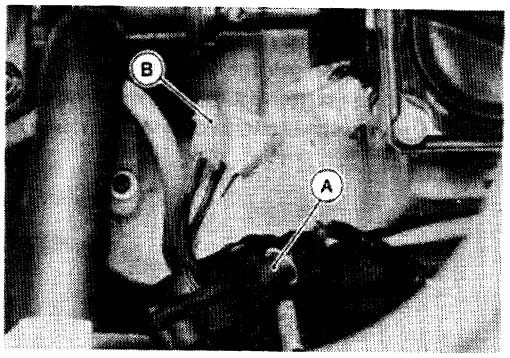


- Using the x 1 Ω ohmmeter range, measure the resistance between the brushes.

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

Charging System

Charging Coil Testing



- Remove the electric case connector [A].
- Disconnect the 3-pin connector [B].
- Temporarily connect the magneto leads except the charging coil leads (brown).
- With a multimeter, check the charging coil output (in circuit) according to the following table with the engine running at approximately 6,000 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. Take care not over-rev the engine while running it with no load.

Charging Coil Output Test

Meter Setting	Connections		Standard Value
	Meter (+) to	Meter (−) to	
250VAC	Brown lead	Brown lead	50 V

★If the charging coil output voltage is correct, check the regulator according to the regulator test procedure.

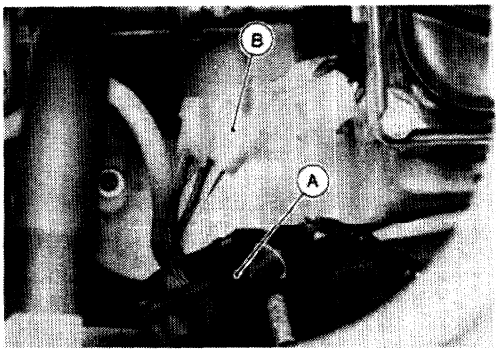
★If the charging coil output voltage is low, check the charging coil resistance with a multimeter according to the following table.

Charging Coil Resistance Test

Meter Setting	Connections		Standard Value
	Meter (+) to	Meter (−) to	
R x 1Ω	Brown lead	Brown lead	0.7 ~ 1.1 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, necessitation flywheel replacement.

Exciter Coil Inspection



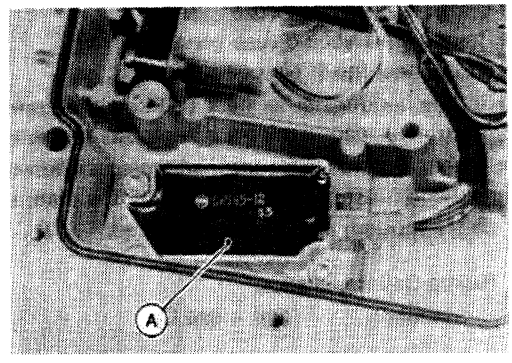
- Remove the electric case connector [A].
- Disconnect the 6-pin connector [B].
- With a multimeter set to the R x 1 Ω range, test the exciter coil according the following table.

Exciter Coil Resistance Test

Purple ← → Red	**348.8 ~ 523.2 Ω**
Yellow ← → Black	**21.6 ~ 32.4 Ω**

Regulator/Rectifier Removal

- Disconnect the battery ground cable.
- Remove the electric case and open it.
- Remove the CDI Ignitor.
- Remove the regulator/rectifier [A]



Regulator/Rectifier Installation Notes

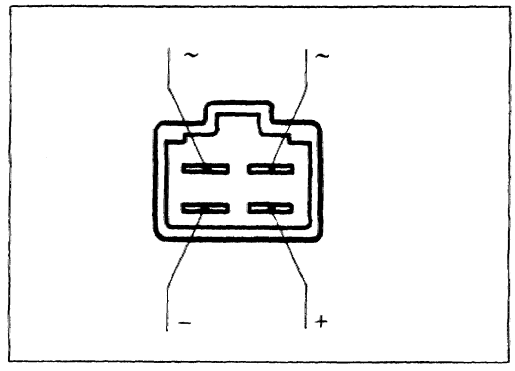
- Apply a non-permanent locking agent to the following bolts.

Torque – Regulator/Rectifier Mounting Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)
Electric Case Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)

Regulator/Rectifier Inspection

- With the hand tester set to the R x 1 kΩ range, test the regulator/rectifier according the following table.

Special Tool – Hand Tester: 57001-1394



Regulator/Rectifier Inspection

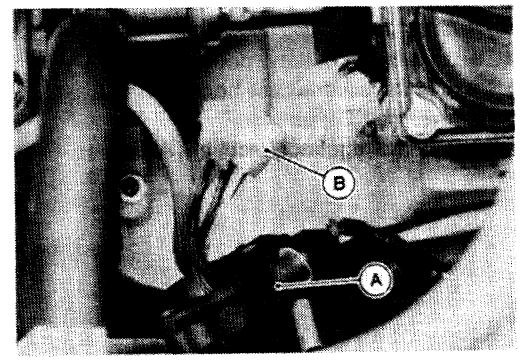
	Tester (+) Lead Connection				
	Terminal	+	~	~	–
(–)*	+	–	10 ~ 200	10 ~ 200	20 ~ 80
	~	1 ~ 10	–	30 ~ 600	20 ~ 200
	~	1 ~ 10	30 ~ 600	–	20 ~ 200
	–	1 ~ 20	1 ~ 10	1 ~ 10	–

(–)*: Tester (–) Lead Connection

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

Ignition System

Pickup Coil Inspection



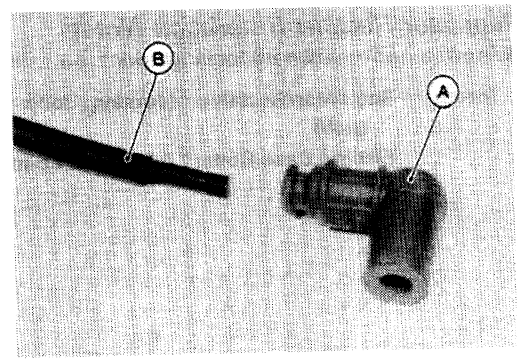
- Remove the electric case connector [A].
- Disconnect the 6-pin connector [B].
- Set the hand tester to the x 100 Ω range, zero it, and connect it to the pickup coil lead terminals (G and BL) in the connector.

★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

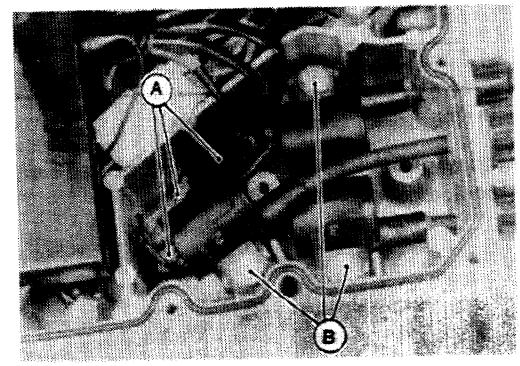
Standard: **396 ~ 594 Ω**

Ignition Coil Removal

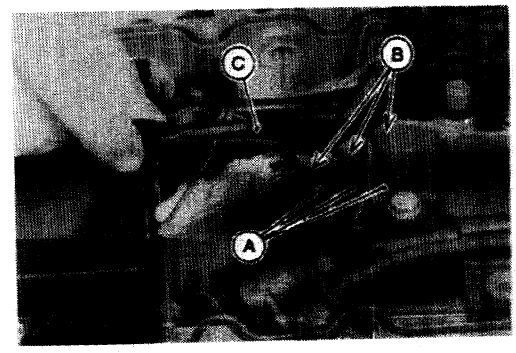


- Open the electric case (see Electric Case Removal/Disassembly).
- Pull the spark plug caps [A], and slide off the protector tubes [B].
- Unscrew the grommet caps and slide off the grommets. Lubricate the leads with penetrating rust inhibitor.

- Disconnect the ignition coil primary lead connector [A], and unscrew the ignition coil mounting bolts [B].



Ignition Coil Installation Note



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

Torque – Ignition Coil Mounting Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)

- Route the ignition coil primary lead [A] into the recess [B] and put the vinyl tape [C] on, as shown.

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 (with the spark plug cap left installed on the spark plug lead) to the tester, and measure the arcing distance.

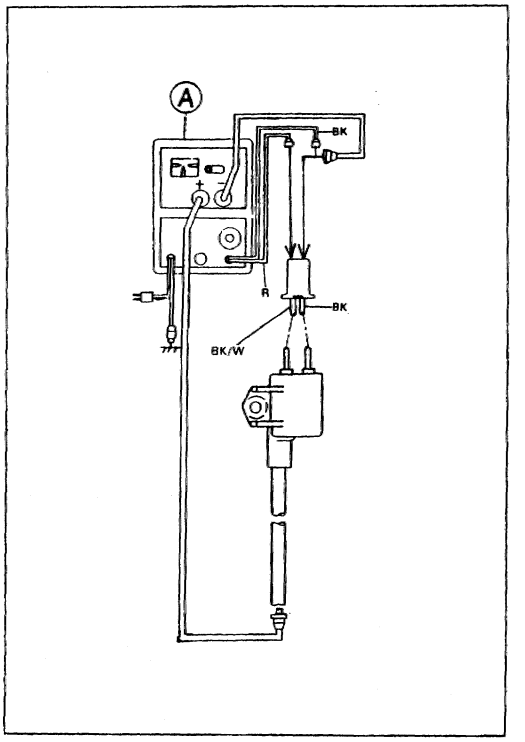
⚠WARNING

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 or more



- To determine which part is defective, measure the arcing distance again with the park 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.

Measuring coil resistance:

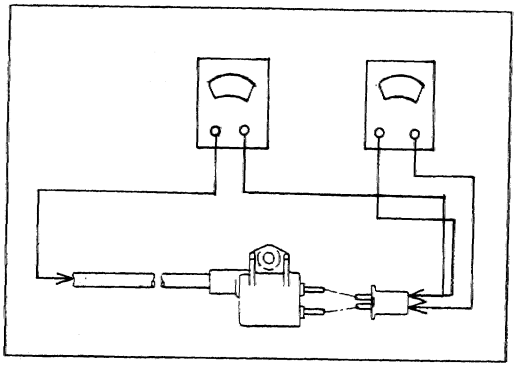
If the Coil Tester is not available, the coil can be checked for a broken or badly shorted winding with a hand tester. However, a hand tester cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.

- 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 x 1 Ω range, and read the tester.
- Measure the secondary winding resistance as follows [B].
  - Remove the plug caps by turning them counterclockwise.
  - Connect the tester between the spark plug leads.
  - Set the tester to the x 1 kΩ, and read the tester.

★If the hand tester does not read as specified, replace the coil.

Winding Resistance

Standard: Primary windings 0.18 ~ 0.24 Ω
Secondary windings 2.7 ~ 3.7 kΩ



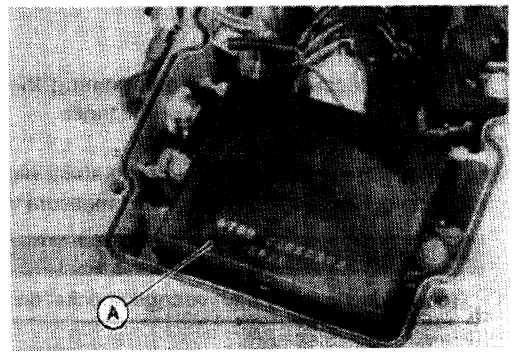
★If the tester reads as specified, the ignition coil windings are probably good. However, if the ignition system still does not perform as it should after all other components have been checked, test replace the coil with one known to be good.

- Check the spark plug lead for visible damage.

★If the spark plug lead is damaged, replace the coil.

CDI Igniter Removal

- Remove the electric case and open it.
- Remove the igniter [A] and disconnect the connectors.



CDI Igniter Installation Note

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

Torque – CDI Igniter Mounting Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)

CDI Igniter Inspection

- Remove the CDI igniter.
- Set the hand tester to the x 1 kΩ range, zero it, and make the measurements shown in the table.

★If the tester readings are not as specified, replace the CDI igniter.

Special Tool – Hand Tester: 57001-1394

CAUTION
Use only Hand Tester (special tool: 57001-1394) for this test. A multi-meter other than the Kawasaki hand Tester may show different readings. **If a megger or a meter with a large-capacity battery is used, the CDI igniter will be damaged.**

CDI Igniter Internal Resistance — Unit : kΩ

		Tester (+) Lead Connection					
	Lead Color	R	PU	Y	BL	G	G/W
(−)*	R	–	15 ~ 500	∞	9.5 ~ 100	18 ~ 200	60 ~ 500
	PU	more than 100	–	∞	90 ~1000	90 ~ 1000	more than 100
	Y	more than 100	more than 100	–	90 ~ 1000	90 ~ 1000	more than 100
	BL	1.6 ~ 10	1.6 ~ 10	∞	–	4.8 ~ 35	1.6 ~ 10
	G	9.5 ~ 40	9.5 ~ 40	∞	3.8 ~ 22	–	9.5 ~ 40
	G/W	∞	∞	∞	∞	∞	–
	BK	1.6 ~ 10	1.6 ~ 10	∞	0	4.8 ~ 35	1.6 ~ 10
	G/Y	∞	∞	∞	∞	∞	∞
	G/R	∞	∞	∞	∞	∞	∞
	R/Y	∞	∞	∞	∞	∞	∞
	BK/Y	1.6 ~ 10	1.6 ~ 10	∞	0	4.8 ~ 35	1.6 ~ 10
	W	15 ~ 500	45 ~ 500	∞	8.5 ~ 200	22 ~ 200	45 ~ 300
	BK/W	1.6 ~ 10	1.6 ~ 10	∞	0	4.8 ~ 35	1.6 ~ 10
	GY	22 ~ 300	28 ~ 300	∞	14 ~ 200	20 ~ 200	22 ~ 300
	Y/BK	22 ~ 300	28 ~ 300	∞	14 ~ 200	20 ~ 200	22 ~ 200
	BL/W	∞	∞	∞	∞	∞	∞
	BL/R	1.6 ~ 10	1.6 ~ 10	∞	0	4.8 ~ 35	1.6 ~ 10
	BK/BL	1.6 ~ 10	1.6 ~ 10	∞	0	4.8 ~ 35	1.6 ~ 10

(−)*: Tester (−) Lead Connection

CDI Igniter Internal Resistance

Unit : kΩ

		Tester (+) Lead Connection					
	Lead Color	BK	G/Y	G/R	R/Y	BK/Y	W
(−)*	R	9.5 ~ 100	60 ~ 500	60 ~ 500	28 ~ 400	9.5 ~ 100	7.5 ~ 70
	PU	90 ~ 1000	more than 100	more than 100	more than 100	90 ~ 1000	more than 90
	Y	90 ~ 1000	more than 100	more than 100	more than 100	90 ~ 1000	more than 90
	BL	0	1.6 ~ 10	1.6 ~ 10	9 ~ 40	0	2.2 ~ 10
	G	3.8 ~ 22	9.5 ~ 40	9.5 ~ 40	17 ~ 70	3.8 ~ 22	8 ~ 35
	G/W	∞	∞	∞	∞	∞	∞
	BK	–	1.6 ~ 10	1.6 ~ 10	9 ~ 40	0	2.2 ~ 10
	G/Y	∞	–	∞	∞	∞	∞
	G/R	∞	∞	–	∞	∞	∞
	R/Y	∞	∞	∞	–	∞	∞
	BK/Y	0	1.6 ~ 10	1.6 ~ 10	9 ~ 40	–	2.2 ~ 10
	W	8.5 ~ 200	45 ~ 300	45 ~ 300	5.5 ~ 24	8.5 ~ 200	–
	BK/W	0	1.6 ~ 10	1.6 ~ 10	9 ~ 40	0	2.2 ~ 10
	GY	14 ~ 200	28 ~ 300	28 ~ 300	9 ~ 40	14 ~ 200	2.2 ~ 22
	Y/BK	14 ~ 200	28 ~ 300	28 ~ 300	9 ~ 40	14 ~ 200	2.2 ~ 22
	BL/W	∞	∞	∞	∞	∞	∞
	BL/R	0	1.6 ~ 10	1.6 ~ 10	9 ~ 40	0	2.2 ~ 10
	BK/BL	0	1.6 ~ 10	1.6 ~ 10	9 ~ 40	0	2.2 ~ 10

(−)*: Tester (−) Lead Connection

CDI Igniter Internal Resistance

Unit : kΩ

		Tester (+) Lead Connection					
	Lead Color	BK/W	GY	Y/BK	BL/W	BL/R	BK/BL
(−)*	R	9.5 ~ 100	14 ~ 60	14 ~ 60	28 ~ 400	9.5 ~ 100	9.5 ~ 100
	PU	90 ~ 1000	more than 90	more than 90	more than 100	90 ~ 1000	90 ~ 1000
	Y	90 ~ 1000	more than 90	more than 90	more than 100	90 ~ 1000	90 ~ 1000
	BL	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	G	3.8 ~ 22	10 ~ 45	10 ~ 45	17 ~ 70	3.8 ~ 22	3.8 ~ 22
	G/W	∞	∞	∞	∞	∞	∞
	BK	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	G/Y	∞	∞	∞	∞	∞	∞
	G/R	∞	∞	∞	∞	∞	∞
	R/Y	∞	∞	∞	∞	∞	∞
	BK/Y	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	W	8.5 ~ 200	4.2 ~ 17	4.2 ~ 17	5.5 ~ 24	8.5 ~ 200	8.5 ~ 200
	BK/W	–	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	GY	14 ~ 200	–	4.8 ~ 45	9 ~ 40	14 ~ 200	14 ~ 200
	Y/BK	14 ~ 200	4.8 ~ 45	–	9 ~ 40	14 ~ 200	14 ~ 200
	BL/W	∞	∞	∞	–	∞	∞
	BL/R	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	–	0
	BK/BL	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	–

(−)*: Tester (−) Lead Connection

* Some readings indicate deflection of needle and return.

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

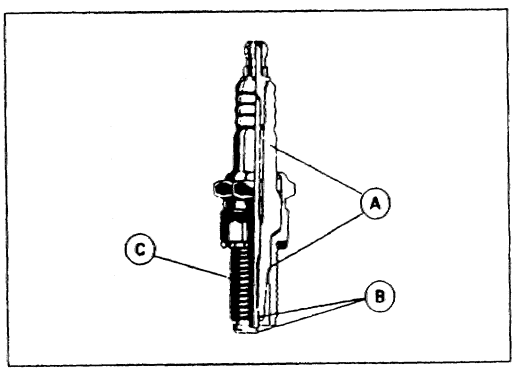
- Be sure the spark plug threads are clean and dry.
- Torque the spark plugs.

Torque – Spark Plugs: 27 N-m (2.8 kg-m, 20 ft-lb)

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

- Connect the spark plug caps.

Spark Plug Inspection



- Remove the spark plugs (see Spark Plug Removal).
- Examine the ceramic insulator [A] and electrodes [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 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 [C].

★ If the threads are damaged, replace the plug.

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.

Spark Plug Adjustment

● Measure the spark plug gap.

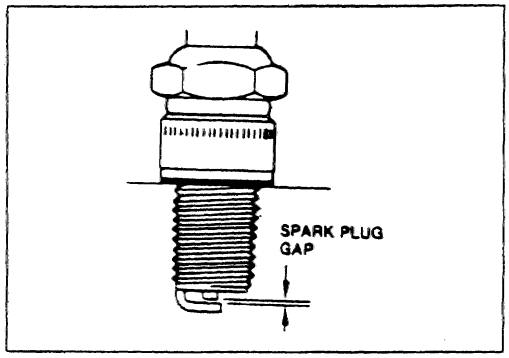
○ Check the distance between the electrodes with a feeler gauge or a wire gauge.

Spark Plug Gap

Standard: 0.7 ~ 0.8 mm

★ If the gap in not within specifications, adjust it.

● Adjust the gap by carefully bending the side electrode with a tool designed for this purpose.



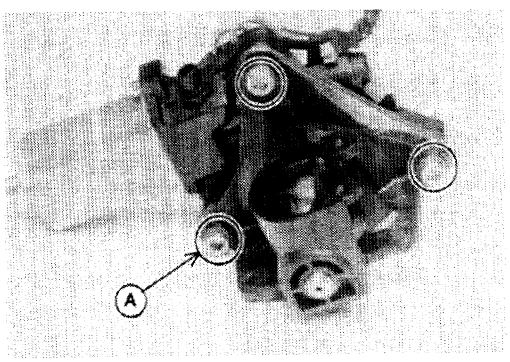
Electric Trim System

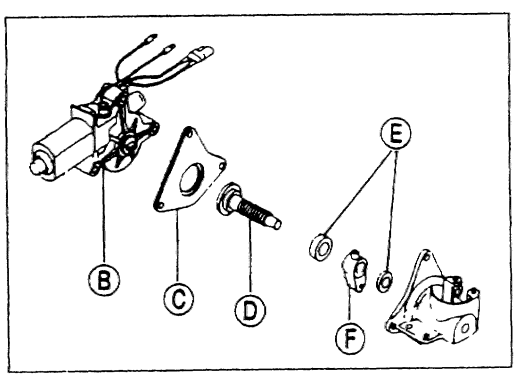
Removal

● Remove the trim cable with the motor box, and disconnect the cable from the box (see Steering chapter).

Disassembly

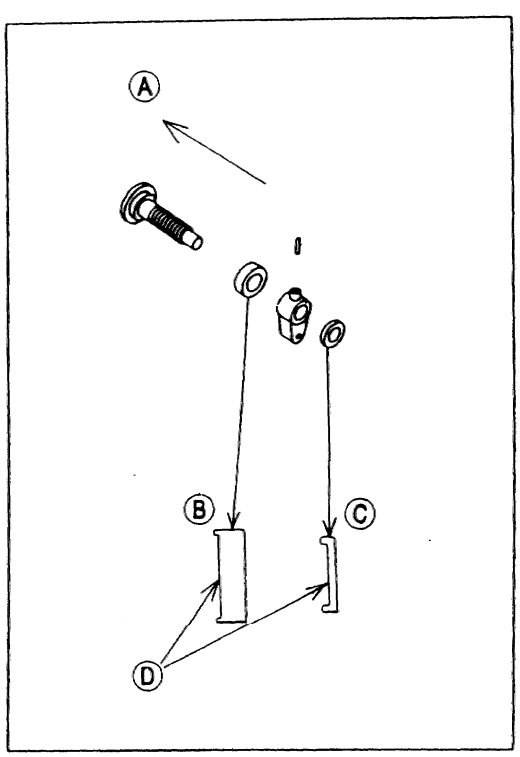
● Unscrew the bracket mounting bolts [A] and remove the following.
Motor Unit [B]
Motor Mount Plate [C]
Shaft [D]
Collar [E]
Slide Lever [F]



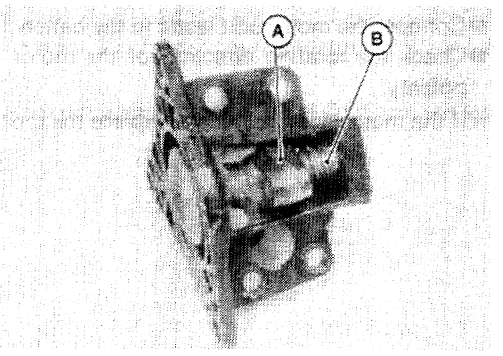


Assembly Notes

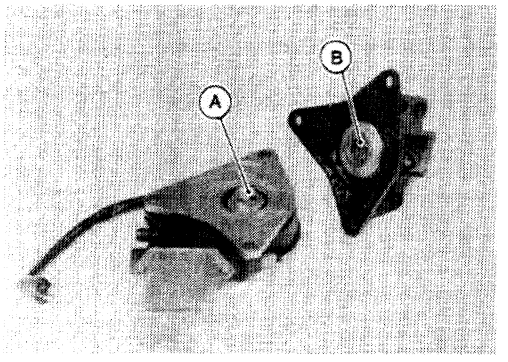
● Install the collars, as shown.
Motor Unit Side [A]
Large Collar [B]
Small Collar [C]
Stepped Edge Side [D]



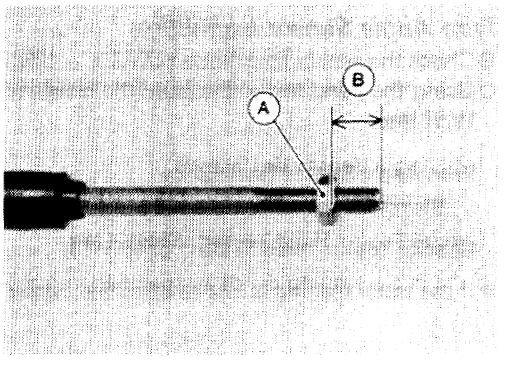
● Insert the slide lever [A] into the shaft [B] in the any position.



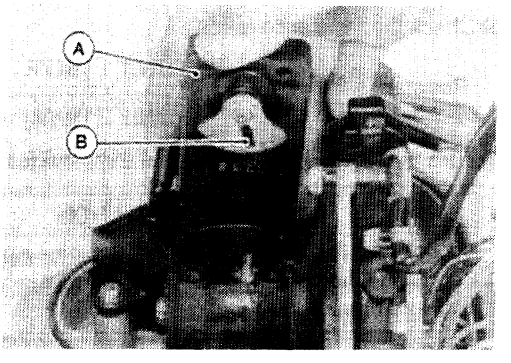
● Align the projection [A] on the motor unit with the hole [B] on the bracket.



● Turn in the locknut [A] to about 7 mm distance [B] of the rod thread.

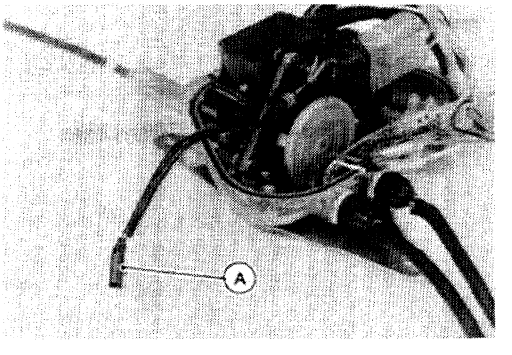


● Install the trim angle sensor [A] on the bracket, aligning the slit [B] with the pin [C] on the slide lever.

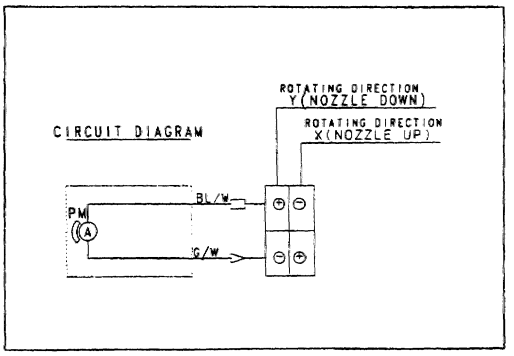


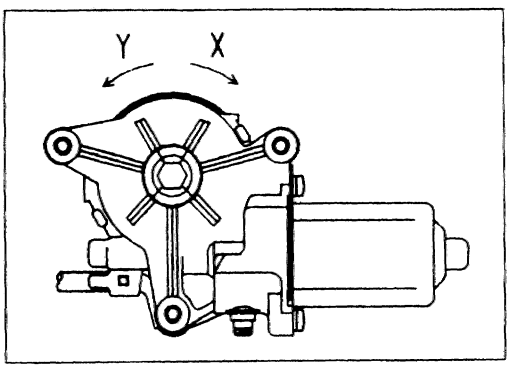
Trim Motor Inspection

● Disconnect the motor unit leads [A].



●Connect the motor unit leads to the battery, as shown.
●Check the rotating direction of the motor unit by changing battery polarity.
★If the motor does not rotate, replace the motor unit with a new one.





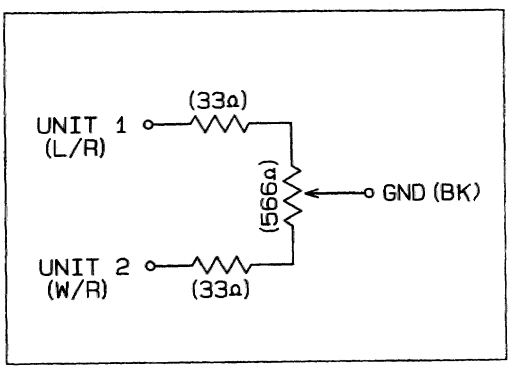
Trim Angle Sensor Inspection

●Check the sensor resistance (UNIT 1 ~ UNIT 2).
○Using the hand tester, measure the resistance between the BL/R and W/R lead.

Trim Angle Sensor Resistance
Standard: 479 Ω ~ 718 Ω (UNIT 1 ~ UNIT 2)

Special Tool – Hand Tester: 57001-1394

★If the tester reading is not as specified, replace the sensor.



●Check the resistance ratios.

$$\text{Resistance Ratio} = \frac{\text{R (UNIT 1 [BL/R] ~ GND [BK])}}{\text{R (UNIT 2 [W/R] ~ GND [BK])}}$$

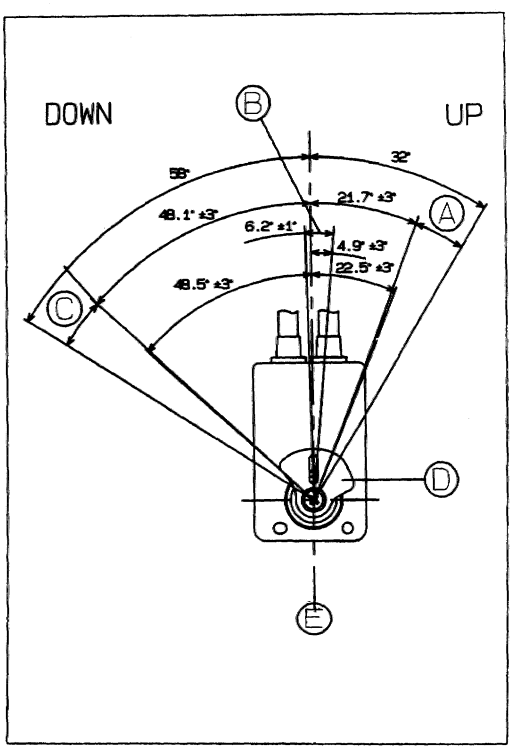
○Turn the sensor plate [D] within three ranges [A], [B], [C], as shown.

CAUTION
Do not turn the sensor plate beyond 58 degrees to the left and 32 degrees to the right from the center line [E], or the trim angle sensor could be damaged.

○Using the hand tester, measure the following resistances within three ranges.

BL/R – BK (UNIT 1)
W/R – BK (UNIT 2)

Special Tool – Hand Tester: 57001-1394

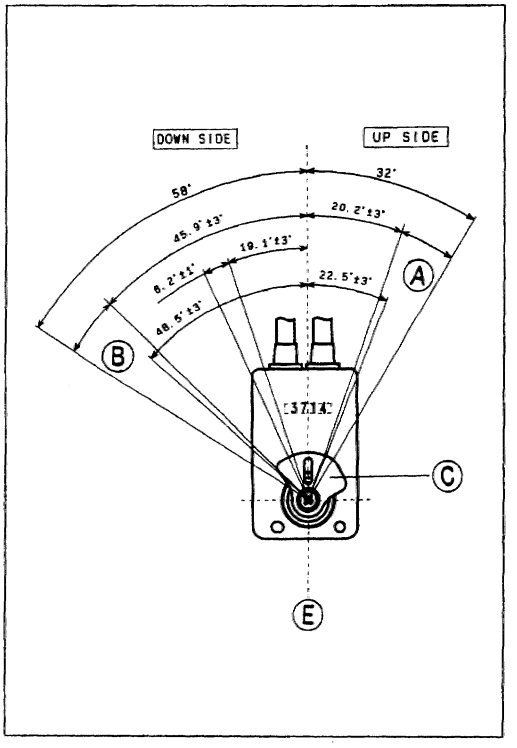


	C	B	A
Resistance Ratio	0.02 ~ 0.1	1.8 ~ 2.3	12 ~ 25

● Check the trim limit switch.
○ Turn the sensor plate [C] within two ranges [A], [B], as shown.

CAUTION

Do not turn the sensor plate beyond 58 degrees to the left and 32 degrees to the right from the center line [E], or the trim angle sensor could be damaged.

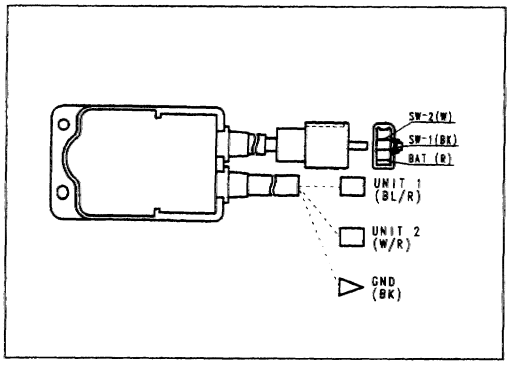


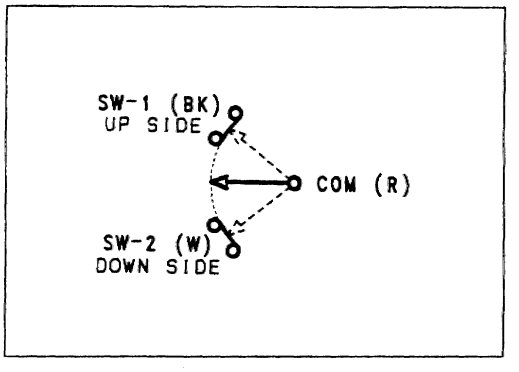
● Using the hand tester, check to see that only the connections shown in the table have continuity (about zero ohms).

Special Tool – Hand Tester: 57001-1394

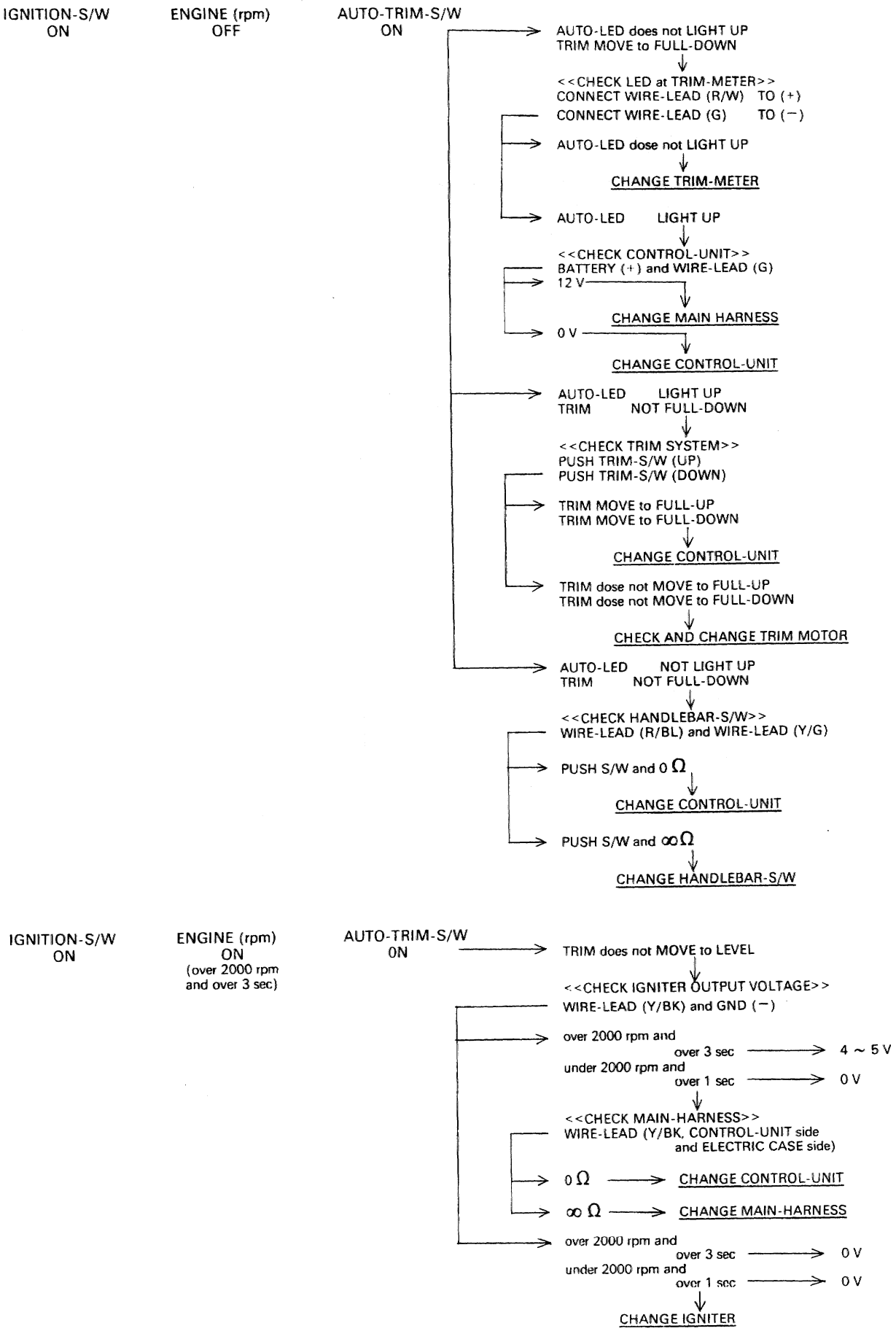
● If the limit switch has an open or short, replace it with new one.

	R	BK	W
UP (Switch 1) [A]	○———	———○	
DOWN (Switch 2) [B]	○———	———	———○





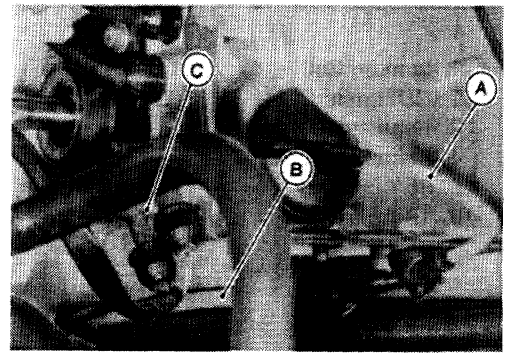
Kawasaki Automatic Trim System (KATS) Troubleshooting



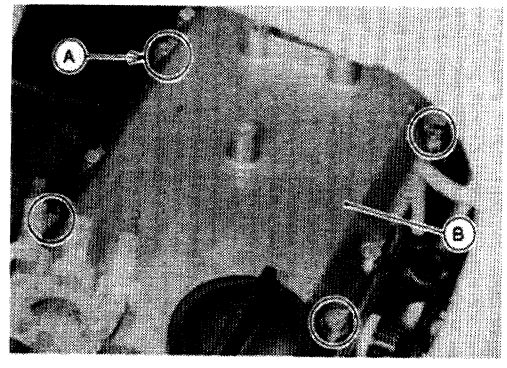
Electric Case

Removal

- Remove:
  - Oil Tank
  - Oil Tank Mounting Plate
  - Battery (−) Cable
  - Spark Plug Caps
  - Battery (+) Cable [A]
  - Starter Motor Cable [B]
  - Electric Case Connector [C]
  - Temperature Sensor Leads
  - Starter/Stop Switch Connector
  - Main Switch Harness



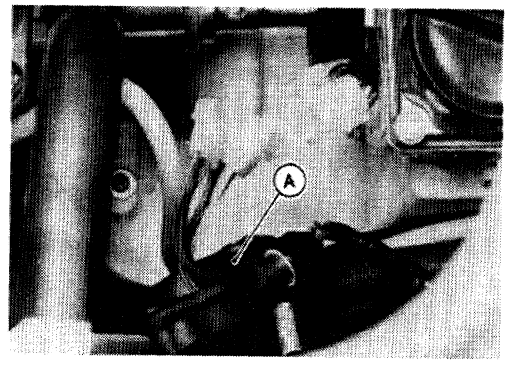
- Unscrew the mounting bolts [A], and remove the electric case [B].



Installation Notes

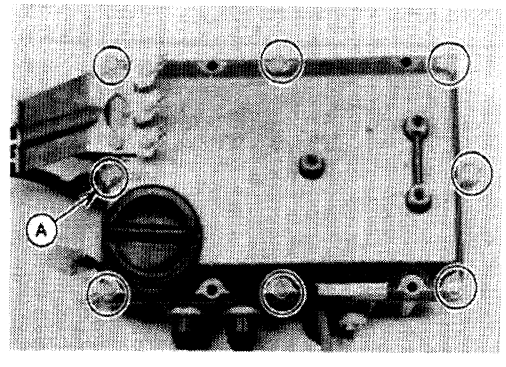
- Apply water resistant grease to the O-ring [A] of electric case connector.
- Apply a non-permanent locking agent to the electric case mounting bolts and torque them.

Torque − Electric Case Mounting Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)



Disassembly

- Remove the electric case (see Electric Case Removal).
- Remove the electric case bolts [A], and open the electric case.
- Remove the electric box compartments.
- ○ Note wire routing and ground terminal location.



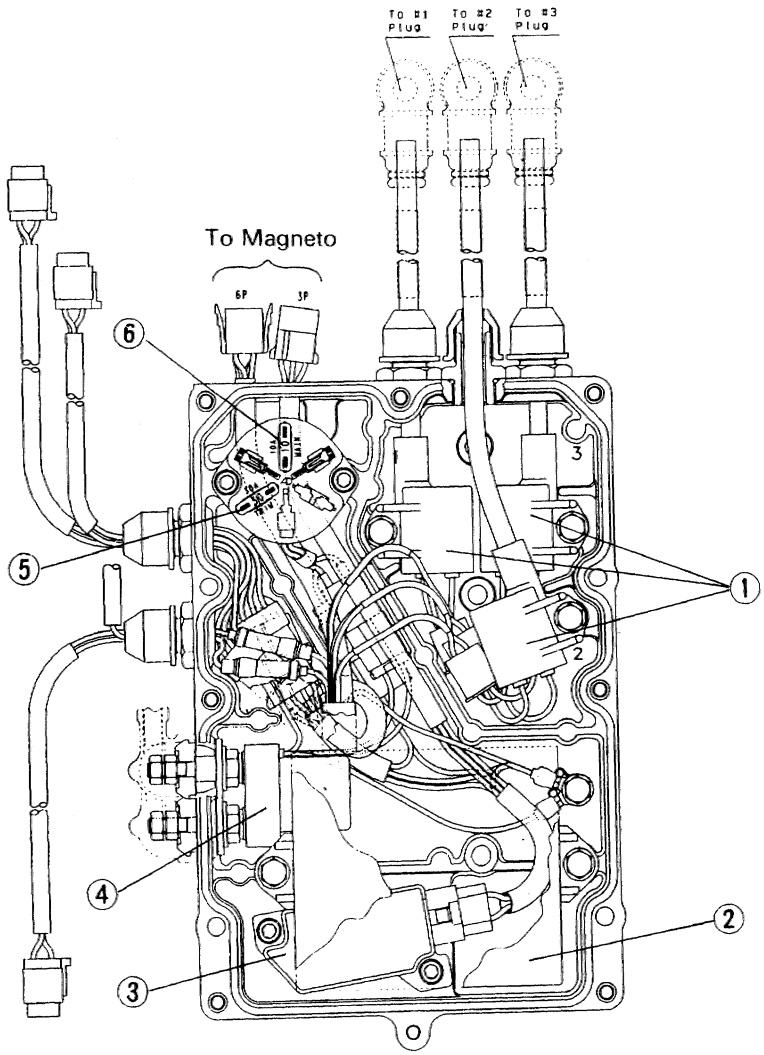
Assembly Notes

- Connect the battery cable to the relay (+) terminal having red lead.
- Run the charge wires of igniter and regulator through the electric case hole, before installing regulator.
- Connect the ground leads (black) to the regulator/rectifier mounting bolts.
- Apply a non-permanent locking agent to all the removed bolts, and torque them.

Torque − All Removed Bolts: 7.8 N-m (0.8 kg-m, 69 in-lb)

- Apply water resistant grease to the O-ring of electric case.

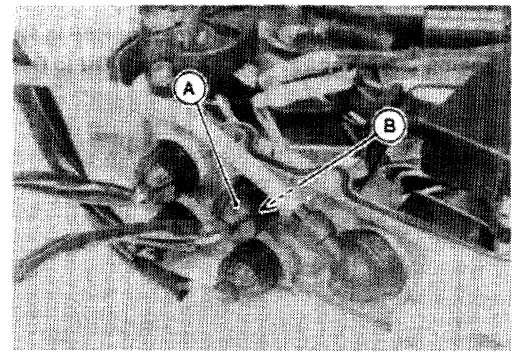
1. Ignition Coil
2. CDI Igniter
3. Regulator/Rectifier
4. Starter Relay
5. 30 A Fuse
6. 10 A Fuse



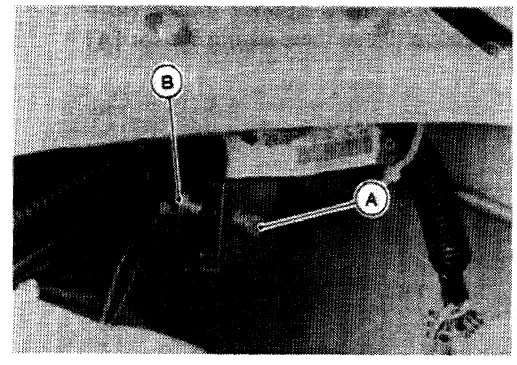
Sensors

Water Temperature Sensor Removal

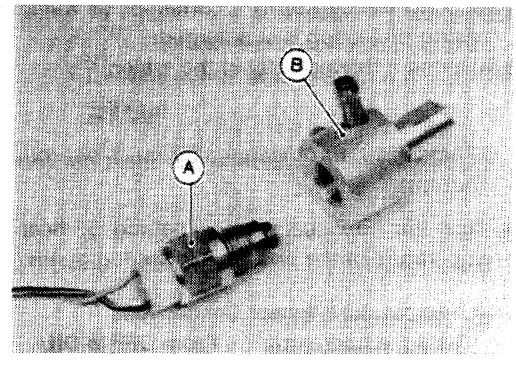
- Open the electric case (see Electric Case Removal/Disassembly).
- Disconnect the temperature sensor leads (BK/Y and R/Y).
- Unscrew the grommet cap [A], and slide off the grommet [B].



- Pull off the bypass hoses and unscrew the mounting bolt [A] and remove the water temperature sensor [B].



- Remove the sensor [A] from the holder [B].



Water Temperature Sensor Inspection

A water temperature sensor is installed on the bypass hose. Whenever the cooling water temperature rises to 95°C (203°F) or higher, the contacts in the water temperature sensor close and the igniter works to cut spark intermittently. The engine speed decreases to 3,500 rpm.

If the watercraft slows down even with the throttle on and the engine running, return to shore immediately and check the cooling system for clogging.

CAUTION

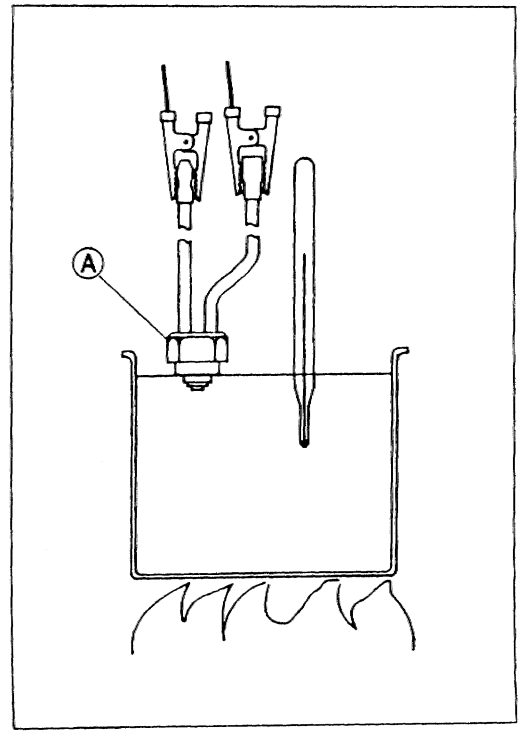
If the watercraft slows down while running, return to the shore immediately. Overheating will cause severe engine and exhaust system damage. Do not operate the craft until the source of the problem is found and correct.

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

NOTE

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

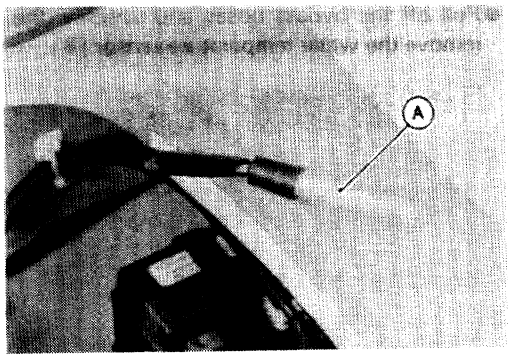
- Place the container over a source of heat and gradually raise the temperature of the water while stirring gently.



Temperature Sensor Connections
Rising temperature: **From OFF to ON at 95°C (203°F)**
Falling temperature: **From ON to OFF at 88°C (190°F)**

Air Temperature Sensor Inspection

● Remove the air temperature sensor [A].

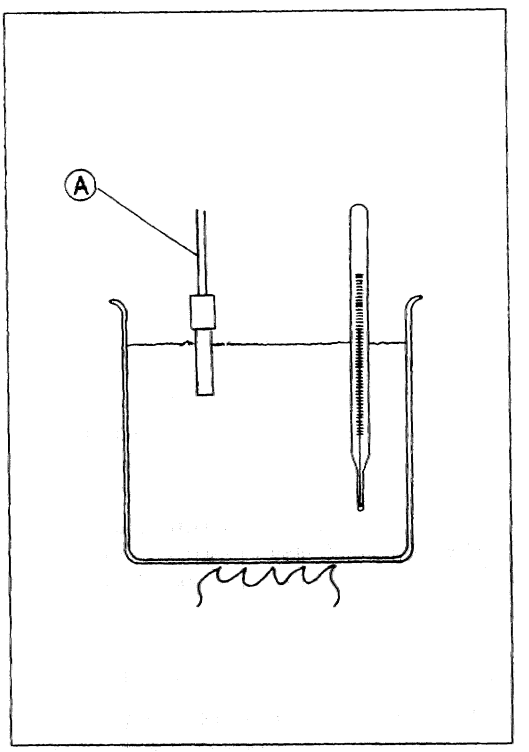


● Suspend the sensor in a container of water so that the temperature sensing projection is submerged.
● Suspend a thermometer in the water.

NOTE

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

● Place the container over a source of heat and gradually rise the temperature of the water while stirring gently.

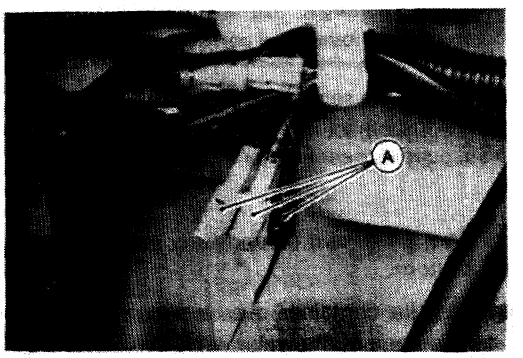


Air Temperature Sensor Connections
Rising temperature: **From OFF to ON at 30°C ~ 40°C (70°F ~ 104°F)**
Failing temperature: **From ON to OFF below 34°C (77°F)**

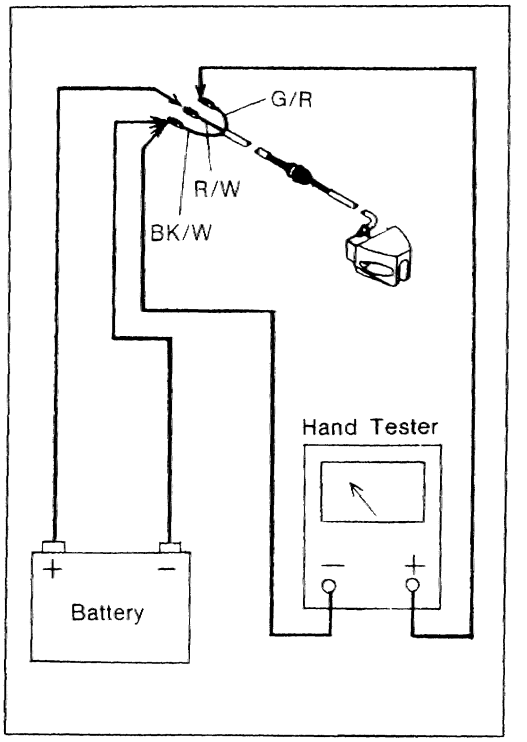
Speed Sensor Inspection

The waterwheel at the rear of the hull rotates in proportion to hull speed. Magnets in the wheel activate a sensor which sends a signal to speedometer. The speedometer indicates the watercraft speed over the water.

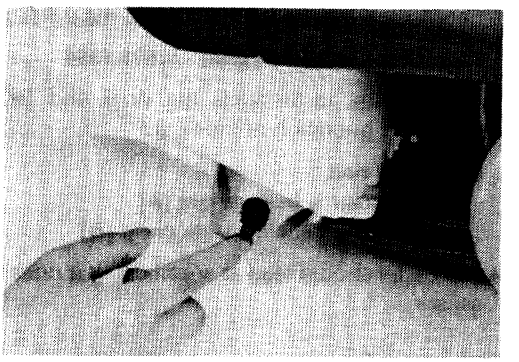
● Disconnect the speed sensor connectors [A] (see Wiring Diagram).



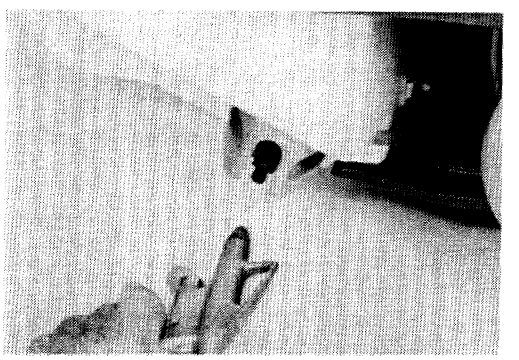
● Connect the battery and tester leads to the sensor as shown.



● Rotate the waterwheel by hand slowly.
● Measure the output voltage of a speedosensor.
G / R (+), BL/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.

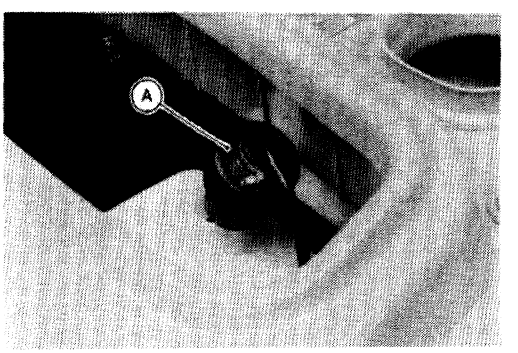


● Measure the output voltage of the sensor at higher speeds
approx. 5 V; Rotate the waterwheel in a fair speed by air.
★ If the sensor voltage does not reach 5 volts when spun with compressed air, replace the sensor.



Oil Level Sensor Inspection

● Disconnect the oil level sensor − 2 pin connector.
● Loosen the clamp, and remove the oil level sensor [A] out of the oil tank [B].



● Set the hand tester (ohmmeter) to the x 1 Ω range.

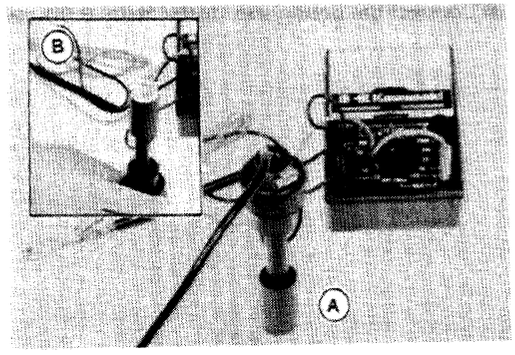
Special Tool – Hand Tester: 57001-1394

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

Meter Reading

When sensor is held upright [A]	**0 Ω**
When sensor is held upside down [B]	**∞**

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



Fuel Level Sensor Inspection

● Open the hatch 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 x 1 Ω range.

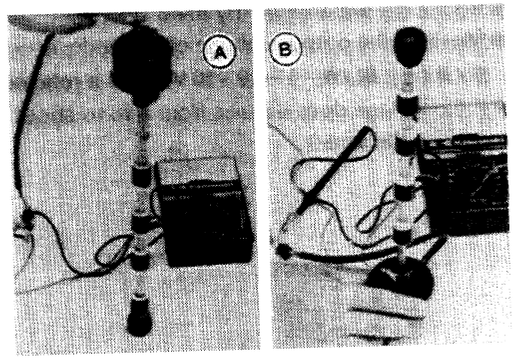
Special Tool – Hand Tester: 57001-1394

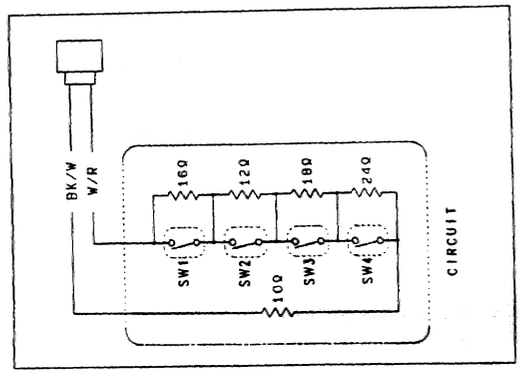
● Connect the tester leads the W/R and BK/W leads to check the switching operation of the float.

Meter Reading

When sensor is held upright [A]	**About 84 Ω**
When sensor is held upside down [B]	**About 10 Ω**

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





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	R/W	W	BK/W
ON	○———	———○		
OFF			○———	———○

Stop/Start Switch

STOP SWITCH						START SWITCH		
	LANYARD	BK	W	R/PU	Y/R		Y/R	Y/R
	SET			○———	———○ - -	- - - - - - - -	- - - - ┐	
PUSH	PULL	○———	———○			PUSH	○———	———○

Trim Switch

		R/W		BL/W	G/W
SELF ↓	UP	○———	———	———	———○
RETURN ↑	FREE				
	DOWN	○———	———	———○	

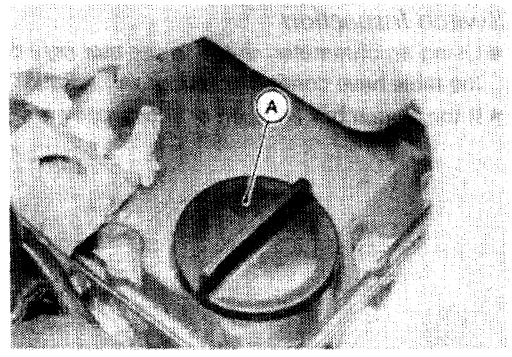
Auto Trim Switch

	R/BL	Y/G
FREE		
PUSH	○———	———○

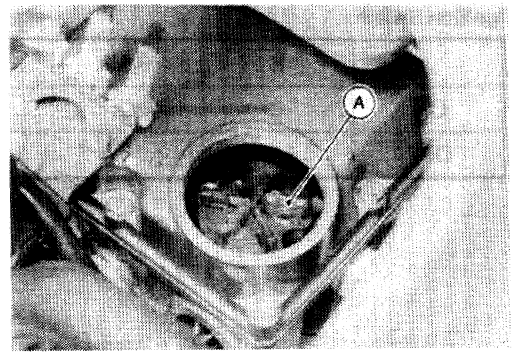
Fuse

Inspection

● Remove the fuse plug [A].



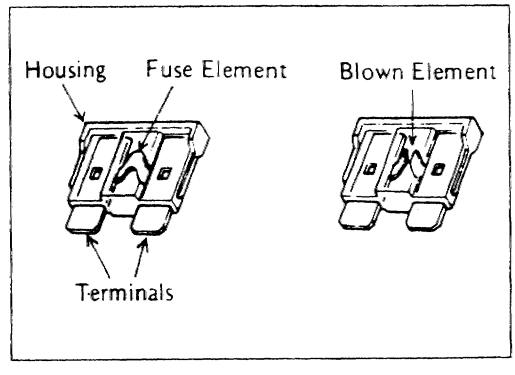
● Take out the fuse [A].



● Inspect the fuse element.

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

CAUTION
When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.



Storage

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Preparation for Storage

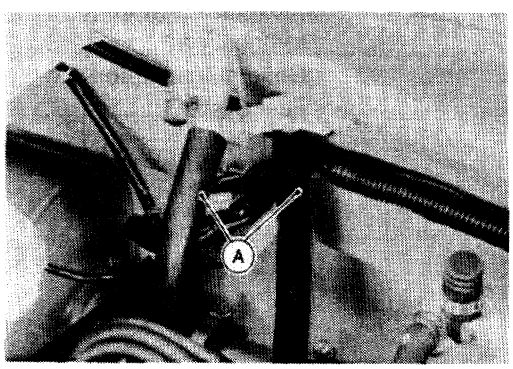
During the winter, or whenever the watercraft will not be in use for a long period of time, proper storage is essential. It consists of checking and replacing missing or worn parts; lubricating parts to ensure that they do not become rusted; and, in general, preparing the watercraft so that when the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

Cooling System

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

Bilge System

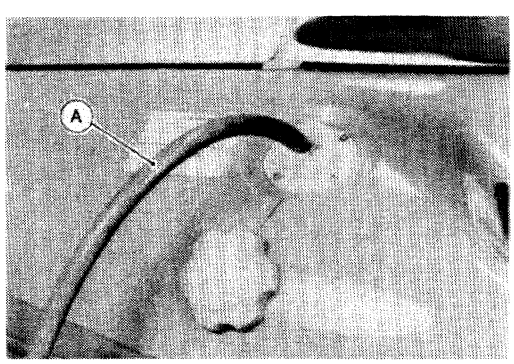
- Clean the bilge system (see Bilge System Flushing in the Cooling and Bilge Systems chapter). Before reconnecting the hoses to the plastic breather fitting, blow air through both hoses [A] to force all water out of the bilge system.



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.

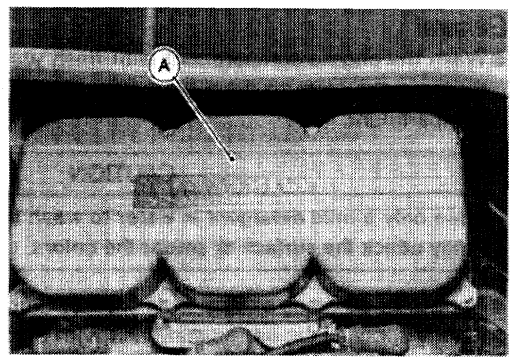
  [A] Siphon Hose

- Clean the filter screens (see Fuel Filter Screen Cleaning in the Fuel System chapter).
- Inspect/replace the fuel filter (see Fuel Filter Inspection in the Fuel System chapter).
- Leave the fuel filler cap loose to prevent condensation in the tank.

- Start the engine and run it in 15 second periods until all fuel in the carburetor is used up. Wait 5 minutes between 15 second running periods.

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

- Remove the air intake cover [A] from the carburetor.
- Lift out the flame arrester and clean it, if necessary (see Flame Arrester Cleaning in the Fuel System chapter).
- Spray a penetrating rust inhibitor down the carburetor bore.
- Install the flame arrester.
- Reinstall the cover, apply a non-permanent locking agent to the threads of the air intake cover bolts and tighten securely.



Engine

- Remove the spark plugs and push the plug caps fully onto the plug cap holder on the electric case.
- 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.

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 Lubrication in the Appendix 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 spacers to insure adequate ventilation, and prevent corrosion.
- Cover the watercraft and store it in a clean, dry place.

Removal from Storage

Lubrication

- Carry out all recommended lubrication procedures (see Lubrication in the Appendix chapter).

General Inspection

- Check for binding or sticking throttle, choke, or steering or trim mechanism. The throttle lever must return fully when released.
- Clean and gap spark plugs (see Spark Plug Cleaning and Spark Plug Adjustment in the Electrical System chapter).
- Check all rubber hoses for weathering, a cracking, or looseness.
- Turn the watercraft on its left side on protective pad, and remove the jet pump cover. Check the cooling hoses for weathering, cracking or looseness.
- Replace them if necessary. Replace the cover and tighten securely.
- 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 Fuel System 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.

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.

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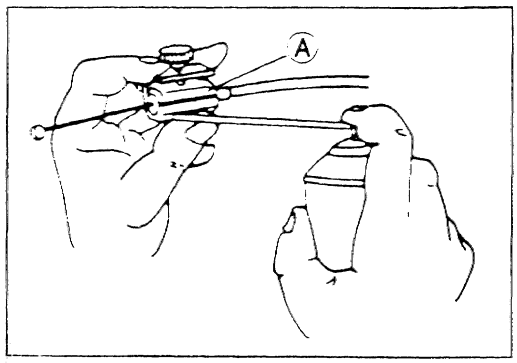
Lubrication

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

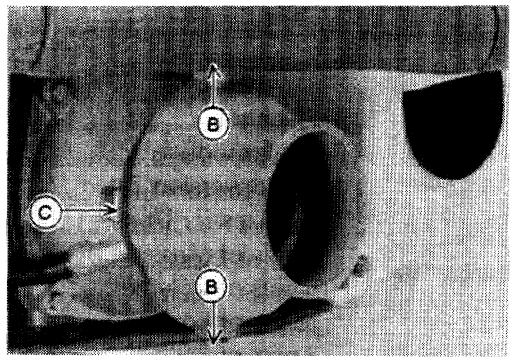
● Lubricate the following with a penetrating rust inhibitor.

Throttle Cable
Choke Cable

Special Tool – Pressure Cable Luber: K56019-021 [A]

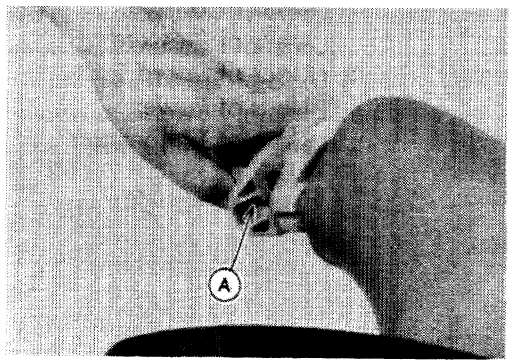


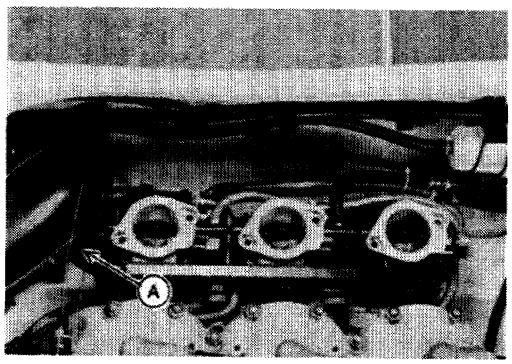
Steering Nozzle Pivots [B]
Tilt Ring Pivots [C]



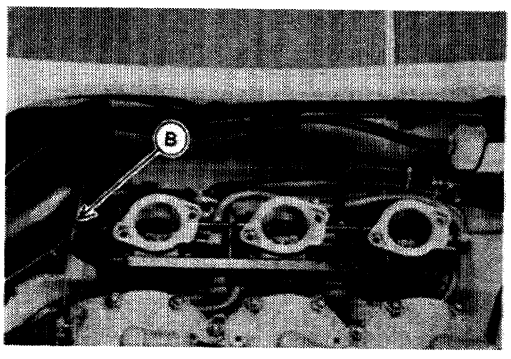
● Lubricate the following with a high quality waterproof grease.

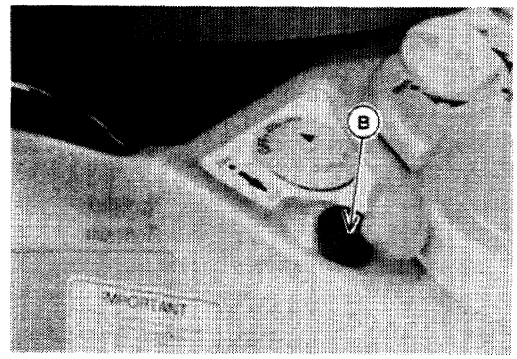
Throttle Cable Ends [A]



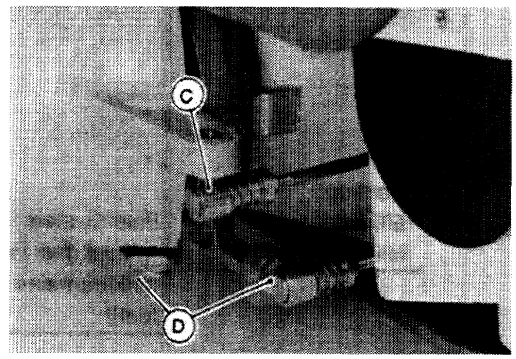


Choke Cable Ends [B]

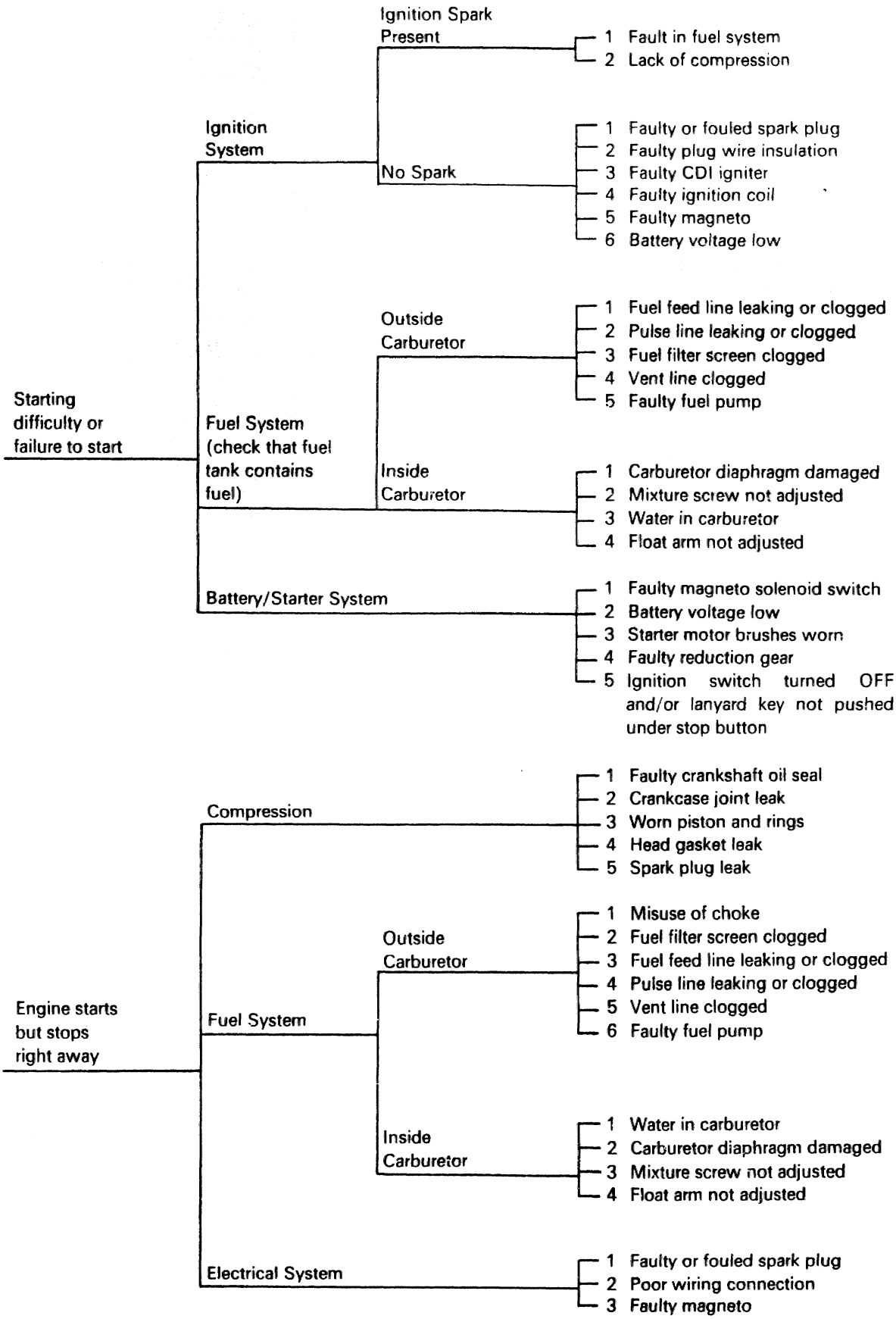


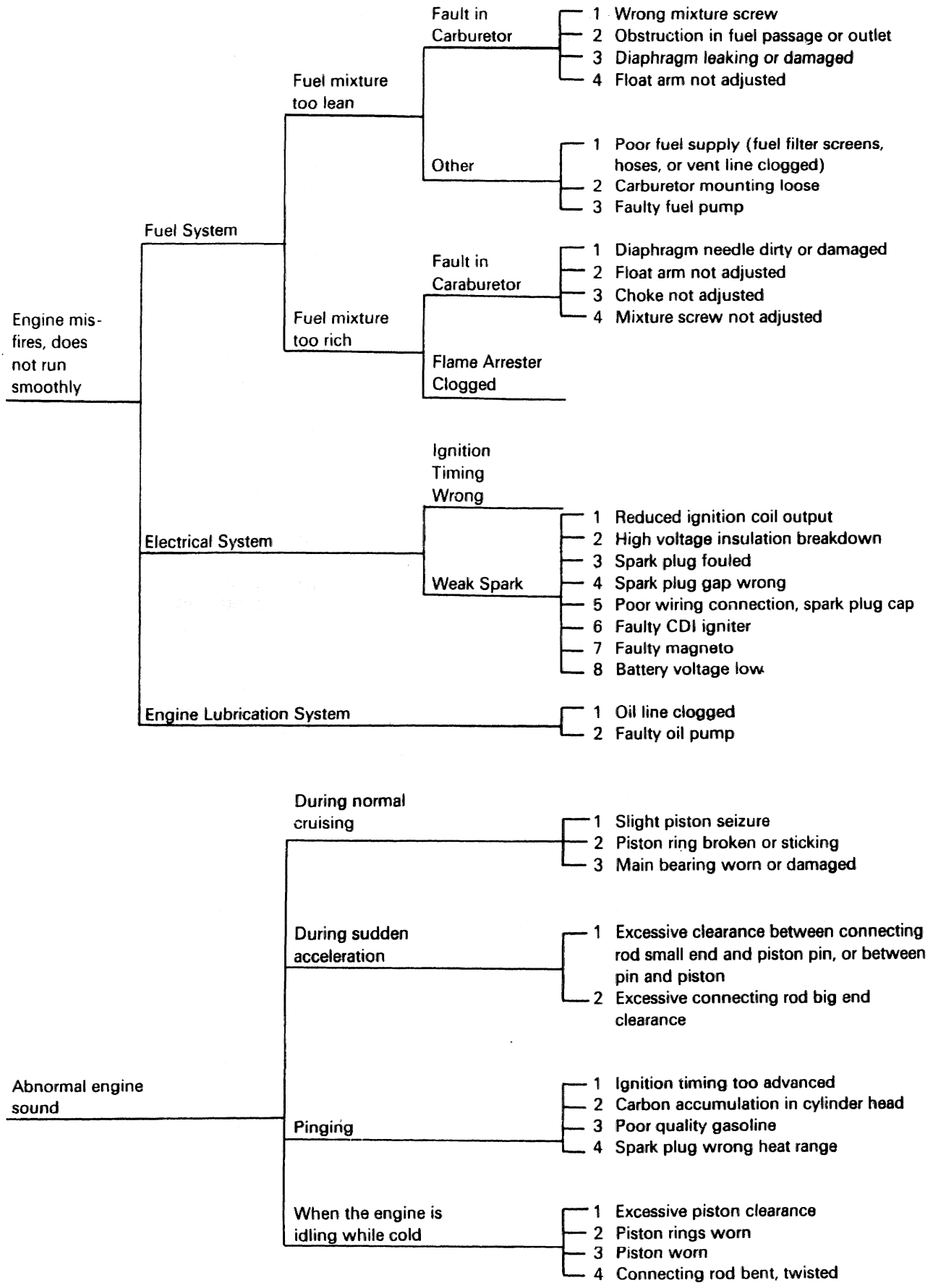


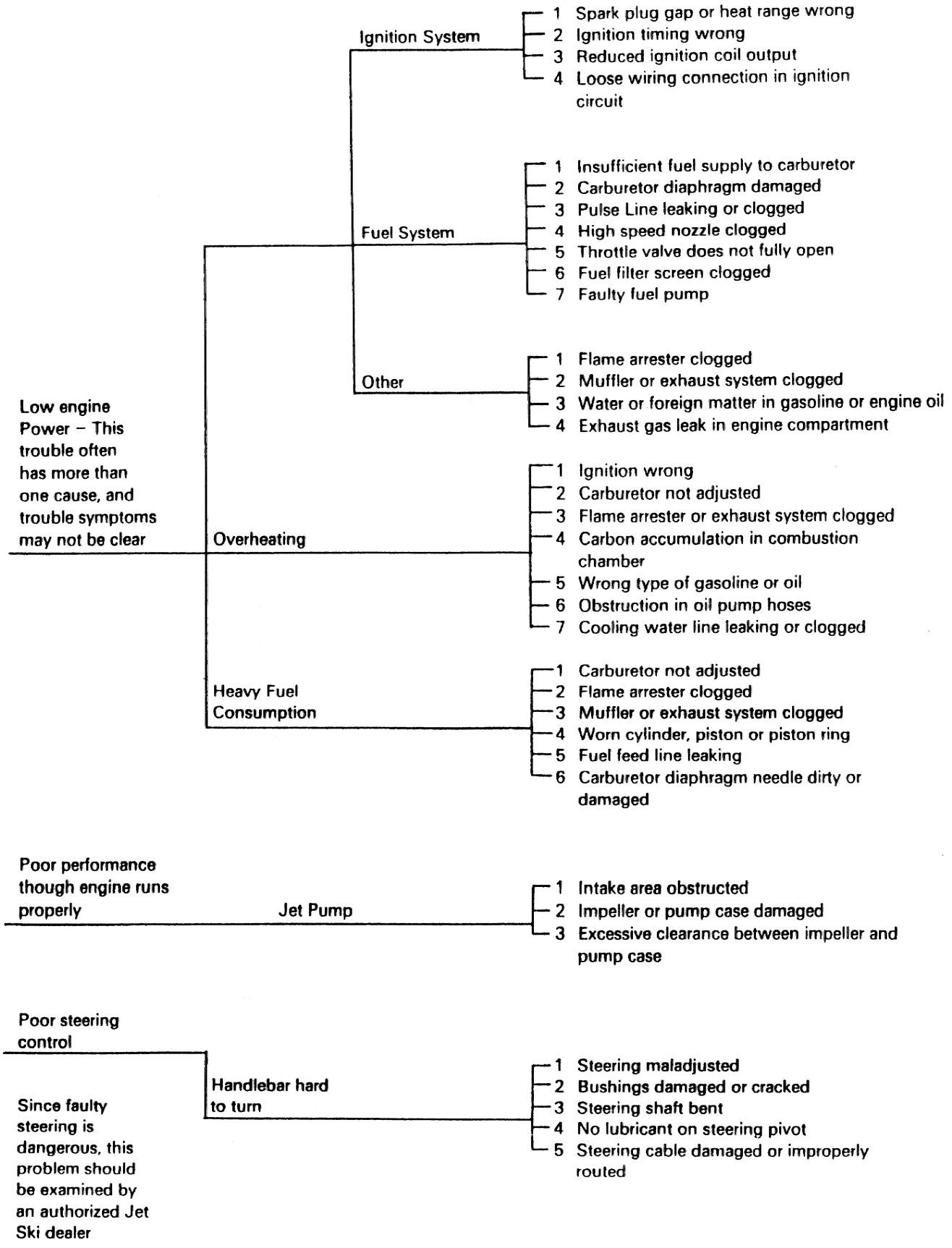
Steering Cable Ball Joints [C]
Tilt Ring Ball Joints [D]



Troubleshooting




Engine mis-fires, does not run smoothly
Fuel System
Fuel mixture too lean
Fault in Carburetor
1 Wrong mixture screw
2 Obstruction in fuel passage or outlet
3 Diaphragm leaking or damaged
4 Float arm not adjusted
Other
1 Poor fuel supply (fuel filter screens, hoses, or vent line clogged)
2 Carburetor mounting loose
3 Faulty fuel pump
Fuel mixture too rich
Fault in Caraburetor
1 Diaphragm needle dirty or damaged
2 Float arm not adjusted
3 Choke not adjusted
4 Mixture screw not adjusted
Flame Arrester Clogged
Electrical System
Ignition Timing Wrong
Weak Spark
1 Reduced ignition coil output
2 High voltage insulation breakdown
3 Spark plug fouled
4 Spark plug gap wrong
5 Poor wiring connection, spark plug cap
6 Faulty CDI igniter
7 Faulty magneto
8 Battery voltage low
Engine Lubrication System
1 Oil line clogged
2 Faulty oil pump
Abnormal engine sound
During normal cruising
1 Slight piston seizure
2 Piston ring broken or sticking
3 Main bearing worn or damaged
During sudden acceleration
1 Excessive clearance between connecting rod small end and piston pin, or between pin and piston
2 Excessive connecting rod big end clearance
Pinging
1 Ignition timing too advanced
2 Carbon accumulation in cylinder head
3 Poor quality gasoline
4 Spark plug wrong heat range
When the engine is idling while cold
1 Excessive piston clearance
2 Piston rings worn
3 Piston worn
4 Connecting rod bent, twisted


Low engine Power – This trouble often has more than one cause, and trouble symptoms may not be clear
Ignition System
1 Spark plug gap or heat range wrong
2 Ignition timing wrong
3 Reduced ignition coil output
4 Loose wiring connection in ignition circuit
Fuel System
1 Insufficient fuel supply to carburetor
2 Carburetor diaphragm damaged
3 Pulse Line leaking or clogged
4 High speed nozzle clogged
5 Throttle valve does not fully open
6 Fuel filter screen clogged
7 Faulty fuel pump
Other
1 Flame arrester clogged
2 Muffler or exhaust system clogged
3 Water or foreign matter in gasoline or engine oil
4 Exhaust gas leak in engine compartment
Overheating
1 Ignition wrong
2 Carburetor not adjusted
3 Flame arrester or exhaust system clogged
4 Carbon accumulation in combustion chamber
5 Wrong type of gasoline or oil
6 Obstruction in oil pump hoses
7 Cooling water line leaking or clogged
Heavy Fuel Consumption
1 Carburetor not adjusted
2 Flame arrester clogged
3 Muffler or exhaust system clogged
4 Worn cylinder, piston or piston ring
5 Fuel feed line leaking
6 Carburetor diaphragm needle dirty or damaged
Poor performance though engine runs properly
Jet Pump
1 Intake area obstructed
2 Impeller or pump case damaged
3 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
1 Steering maladjusted
2 Bushings damaged or cracked
3 Steering shaft bent
4 No lubricant on steering pivot
5 Steering cable damaged or improperly routed

Unit Conversion Table

Prefixes for Units:

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

Units of Mass:

kg	x	2.205	=	lb
g	x	0.03527	=	oz

Units of Volume:

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

Units of Force:

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

Units of Length:

km	x	0.6214	=	mile
m	x	3.281	=	ft
mm	x	0.03937	=	in

Units of Torque:

N-m	x	0.1020	=	kg-m
N-m	x	0.7376	=	ft-lb
N-m	x	8.851	=	in-lb
kg-m	x	9.807	=	N-m
kg-m	x	7.233	=	ft-lb
kg-m	x	86.80	=	in-lb

Units of Pressure:

kPa	x	0.01020	=	kg/cm²
kPa	x	0.1450	=	psi
kPa	x	0.7501	=	cm Hg
kg/cm²	x	98.07	=	kPa
kg/cm²	x	14.22	=	psi
cm Hg	x	1.333	=	kPa

Units of Speed:

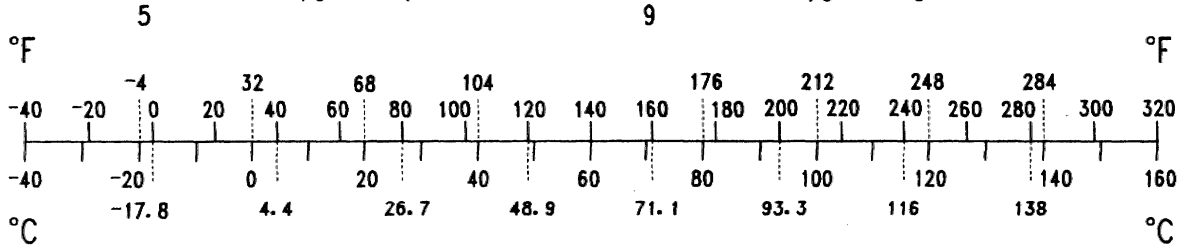
km/h	x	0.6214	=	mph

Units of Power:

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

Units of Temperature:

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



Supplement - 1997 - 1999 Models

This "Supplement - 1997 - 1999 models" chapter is designed to be used in conjunction with the front part of this manual (up to 15-7). The maintenance and repair procedures described in this chapter are only those that are unique to the 1997 through 1999 models.

Complete and proper servicing of the 1996 through 1999 model, these requires mechanics to read both this chapter and the text in front of this chapter.

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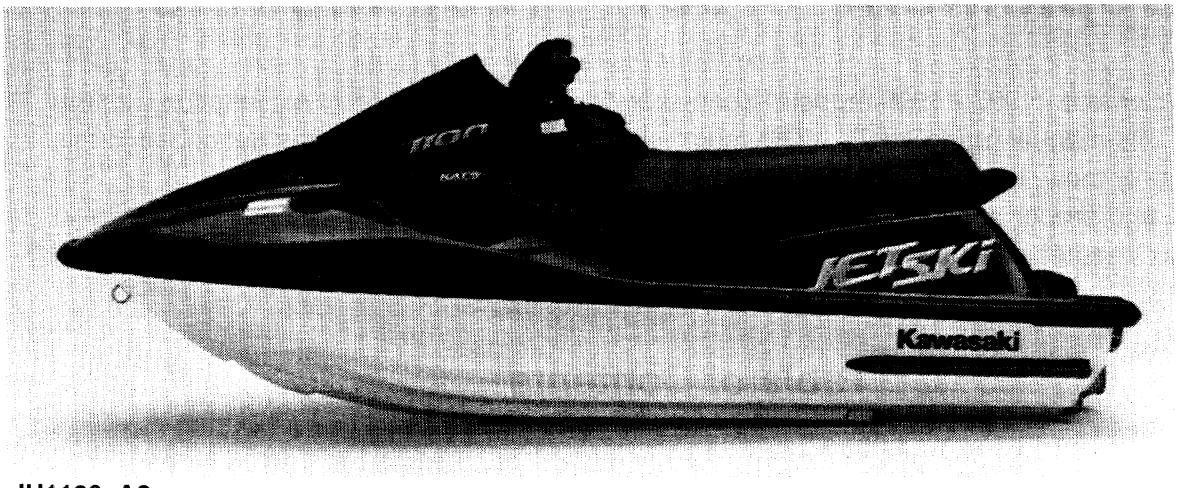
General Information

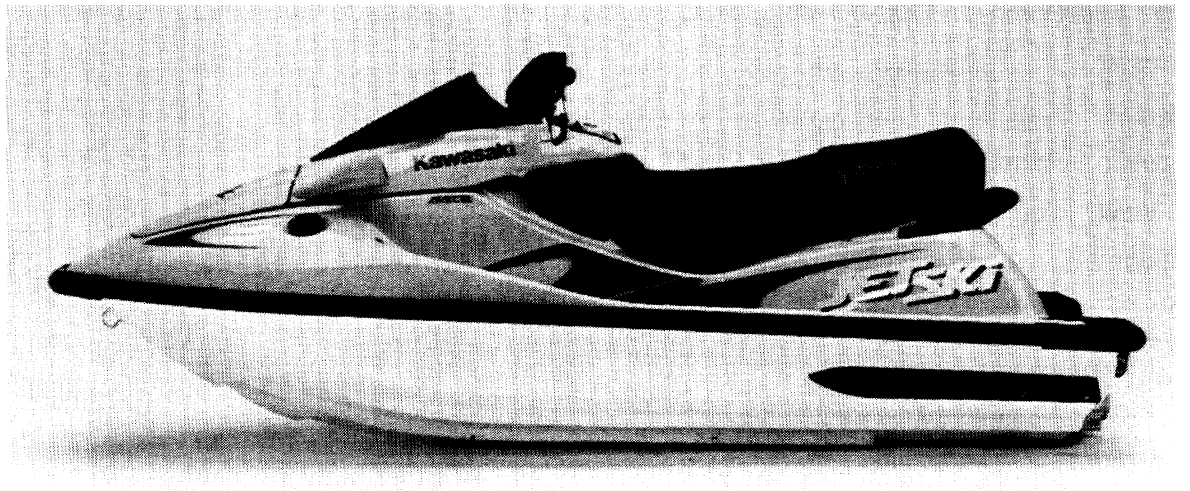
Model Identification

JH1100–A2



JH1100–A3

JH1100–A4



General Specifications

Items		JH1100–A2	JH1100-A3, A4
Engine:			←
Type		2-stroke, 3-cylinder, crankcase reed valve, water cooled	←
Displacement		1 071 mL	←
Bore and stroke		80 x 71 mm	←
Compression ratio		5.8 : 1	←
Maximum horsepower		88.2 kW (120 PS) @6 750 r/min (rpm)	←
Maximum torque		129 N·m(13.2 kg·m, 95.5 ft·lb) @6 000 r/min(rpm)	←
Ignition system		Magneto CDI (Digital)	←
Lubrication system		Oil injection (break-in period: Oil injection and fuel mixture 50 : 1)	←
Carburetion system		Keihin CDK-38-29 × 3 diaphragm type (33 mm venturi)	Keihin CDCV 38 x 3 diaphragm type (33 mm venturi)
Starting system		Electric starter	←
Tuning Specifications:			
Spark plug:	Type	NGK BR9ES	←
	Gap	0.7 ~ 0.8 mm	←
Ignition timing		17° BTDC @1 250 r/min (rpm) ~ 27° BTDC @3 000 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		657 ~ 1 040 kPa (6.7 ~ 10.6 kg/cm^2, 95 ~ 151 psi)	←
Drive System:			
Coupling		Direct drive from engine	←
Jet pump:	Type	Axial flow, single stage	←
	Thrust	3 570 N (364 kg, 803 lb)	←
Steering		Steerable nozzle	←
Braking		Water drag	←
Performance:			
†Minimum turning radius		4.0 m	←
†Fuel consumption		46 L/h @full throttle	←
†Cruising range		97.5 km @full throttle 1 hour and 5 minutes	←
Dimensions:			
Overall length		2 760 mm	←
Overall width		1 070 mm	←
Overall height		999 mm	←
Dry weight		267 kg	←
Fuel tank capacity		52 L including 7 L reserve	←
Engine Oil:			
Type		2-stroke, N.M.M.A. Certified for Service TC-W3	←
Oil tank capacity		3.8 L	←
Electrical Equipment:			
Battery		12 V 18 Ah	←
Maximum generator output		7.2 A/14 V @6 000 r/min (rpm)	←

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

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

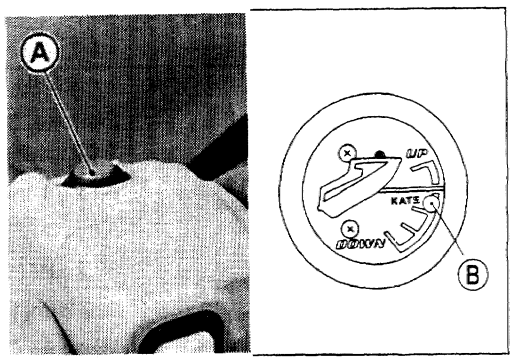
Kawasaki Automatic Trim System (KATS)

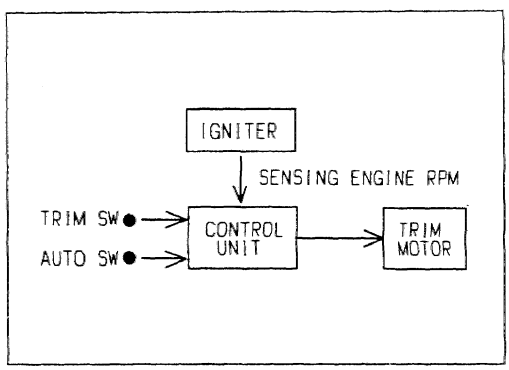
The Kawasaki Automatic Trim System (KATS) is designed for optimum low speed acceleration. With the automatic trim switch [A] set to the "ON" position, the trim control unit senses engine rpm, then controls the trim motor.

When the switch pushed in after the ignition switch is turned on, the LED indicator light [B] in the trim indicator comes on and the steering nozzle goes all the way down. When the engine speed exceeds 4 000 rpm, the nozzle goes up to its level position and stays there. The nozzle goes down when the engine speed is lower than 4 000 rpm.

You can turn off the system either by pushing the switch in again or by operating the trim switch. The red indicator light shows that the system is functioning. If the engine is not started within three minutes after the switch is pushed in, the light goes off but the system stays on.

The level sensing switch is added to the trim switch to ensure its level position.





CHECK PROCESS FOR KATS

	ACTION FOR CHECK		CHECK ITEM
1.	WHEN STEERING NOZZLE RESTS at POSITION over LEVEL: TURN ON IGNITION-S/W AND PUSH TRIM-S/W (DOWN)(ENGINE: OFF, AUTO TRIM-S/W: OFF)	→	CHECK TRIM MOVES to LEVEL and STOPS ↓ RELEASE TRIM S/W over 0.2 sec ONCE and PUSH TRIM S/W (DOWN) AGAIN and CHECK TRIM MOVES to FULL-DOWN and STOPS <CHECK TRIM MOVES to FUELL-UP WHEN TRIM S/W (UP) IS PUSHED at LEVEL POSITION MENTIONED ABOVE AS WELL>
2	WHEN STEERING NOZZLE RESTS at POSITION below LEVEL: TURN ON IGNITION-S/W and PUSH TRIM-S/W(UP) (ENGINE: OFF, AUTO-TRIM S/W: OFF)	→	CHECK TRIM MOVES to LEVEL and STOPS ↓ RELEASE TRIM S/W over 0.2 sec ONCE and PUSH TRIM S/W (UP) AGAIN and CHECK TRIM MOVE to FULL-UP and STOP <CHECK TRIM MOVES to FULL-DOWN WHEN TRIM S/W (DOWN) IS PUSHED at LEVEL POSITION MENTIONED ABOVE AS WELL>
3.	PUSH ON AUTO TRIM S/W (ENGINE: OFF)	→	CHECK AUTO-LED LIGHTS UP, TRIM MOVES to FULL-DOWN and STOPS
4.	PUSH OFF AUTO-TRIM-S/W (ENGINE: OFF)		↓ CHECK AUTO-LED LIGHTS DOWN
5.	PUSH ON AUTO TRIM S/W (ENGINE: OFF)	→	CHECK AUTO-LED LIGHTS UP
6.	START ENGINE and KEEP over 4 000 rpm (over 3 sec)	→	CHECK TRIM MOVES to LEVEL and STOPS
7.	KEEP under 4 000 rpm (over 1 sec)	→	CHECK TRIM MOVES to FULL-DOWN and STOPS

8. PUSH TRIM-S/W (UP)	→	CHECK AUTO-LED LIGHTS DOWN, TRIM MOVES to LEVEL and STOPS
9. START ENGINE, and PUSH ON AUTO-TRIM-S/W after KEEPING over 4 000 rpm (over 3 sec)	→	CHECK AUTO-LED LIGHTS UP, TRIM DOES NOT MOVE (STAYS LEVEL)
10. PUSH TRIM-S/W (DOWN)	→	CHECK AUTO-LED LIGHTS DOWN, TRIM MOVES to FULL-DOWN and STOPS

11. STOP ENGINE and TURN OFF IGNITION-S/W

(REFER to KATS TROUBLESHOOTING in the ELECTRICAL SYSTEM CHAPTER)

The Kawasaki JET SKI Watercraft Constant Velocity Carburetor (JH1100–A3 & A4)

(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

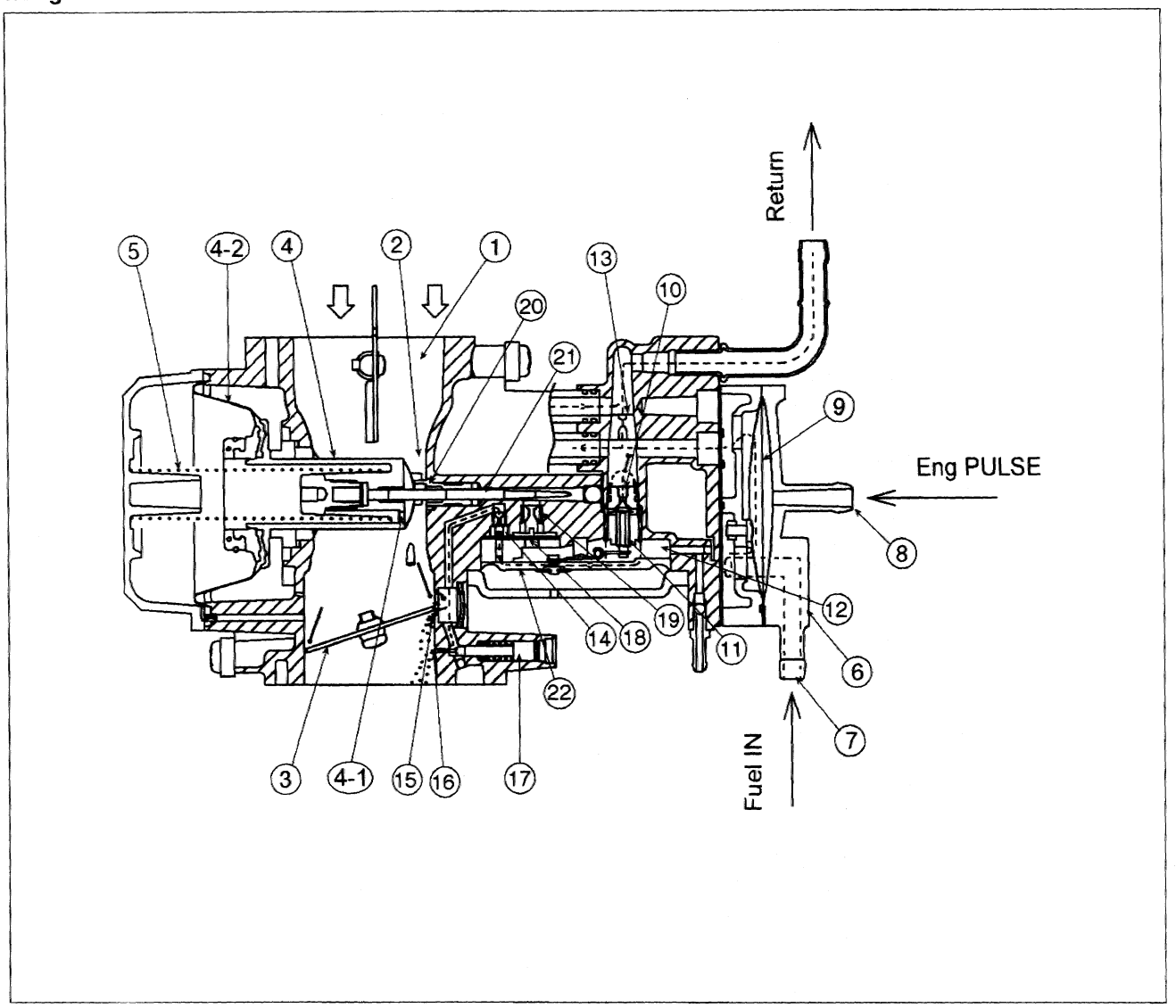
1) The watercraft CV carburetor has a variable venturi for smoother driveability through the entire speed range of the engine. It has a vacuum diaphragm which moves a slide in the venturi, and a needle jet and jet needle. The slide changes the venturi area according to the pressure in the venturi, and 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, corrosion resistant, and salt water proof.

(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 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 then 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

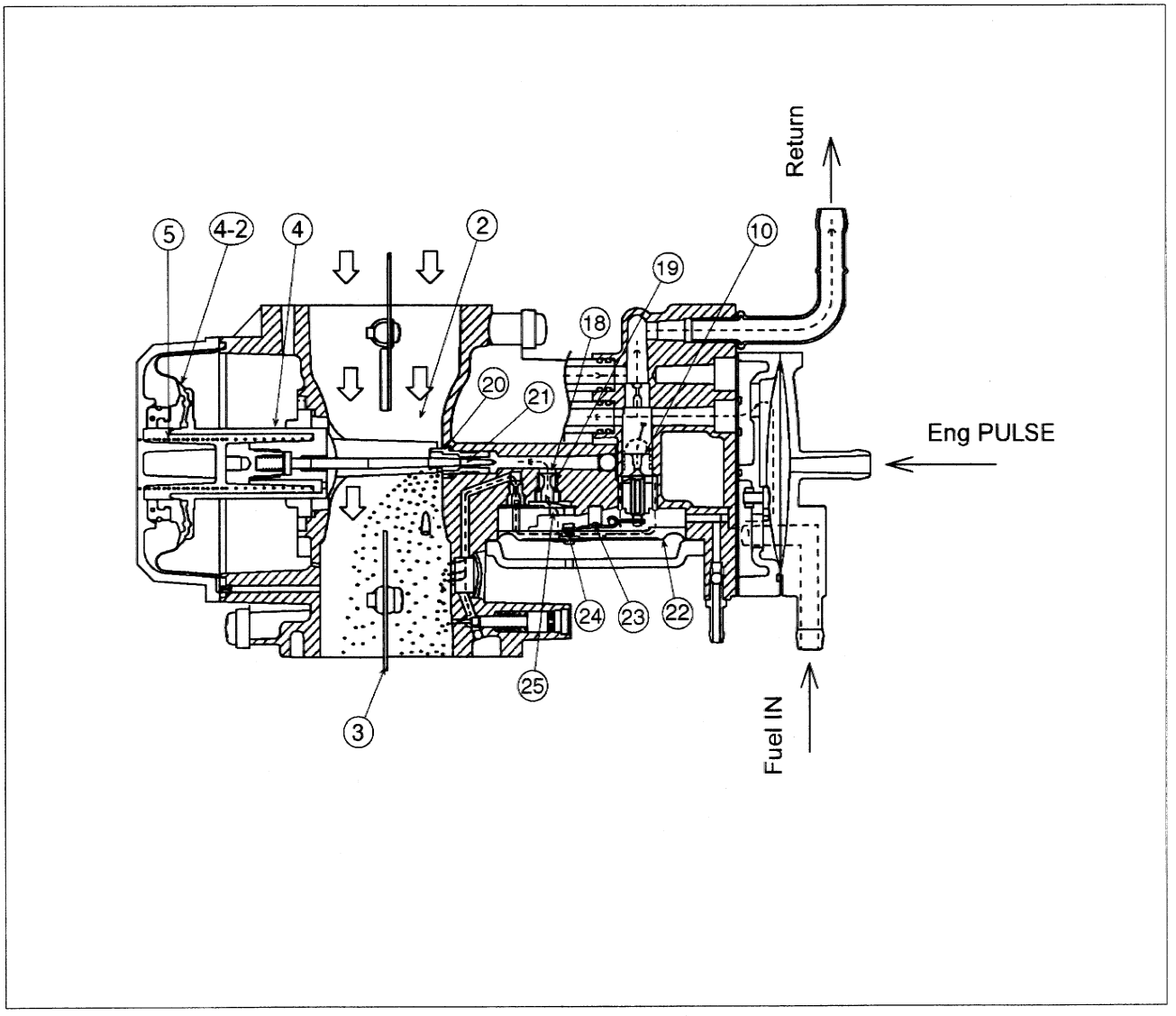


6) As the fuel in the regulator chamber [12] flows out, the pressure in the chamber drops and draws the regulator diaphragm [22] into contact with the collar [24] of the float arm [23], which in turn pulls the needle float valve [11] away from the valve seat [10]. Fuel can now flow into the regulator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

Technical Information

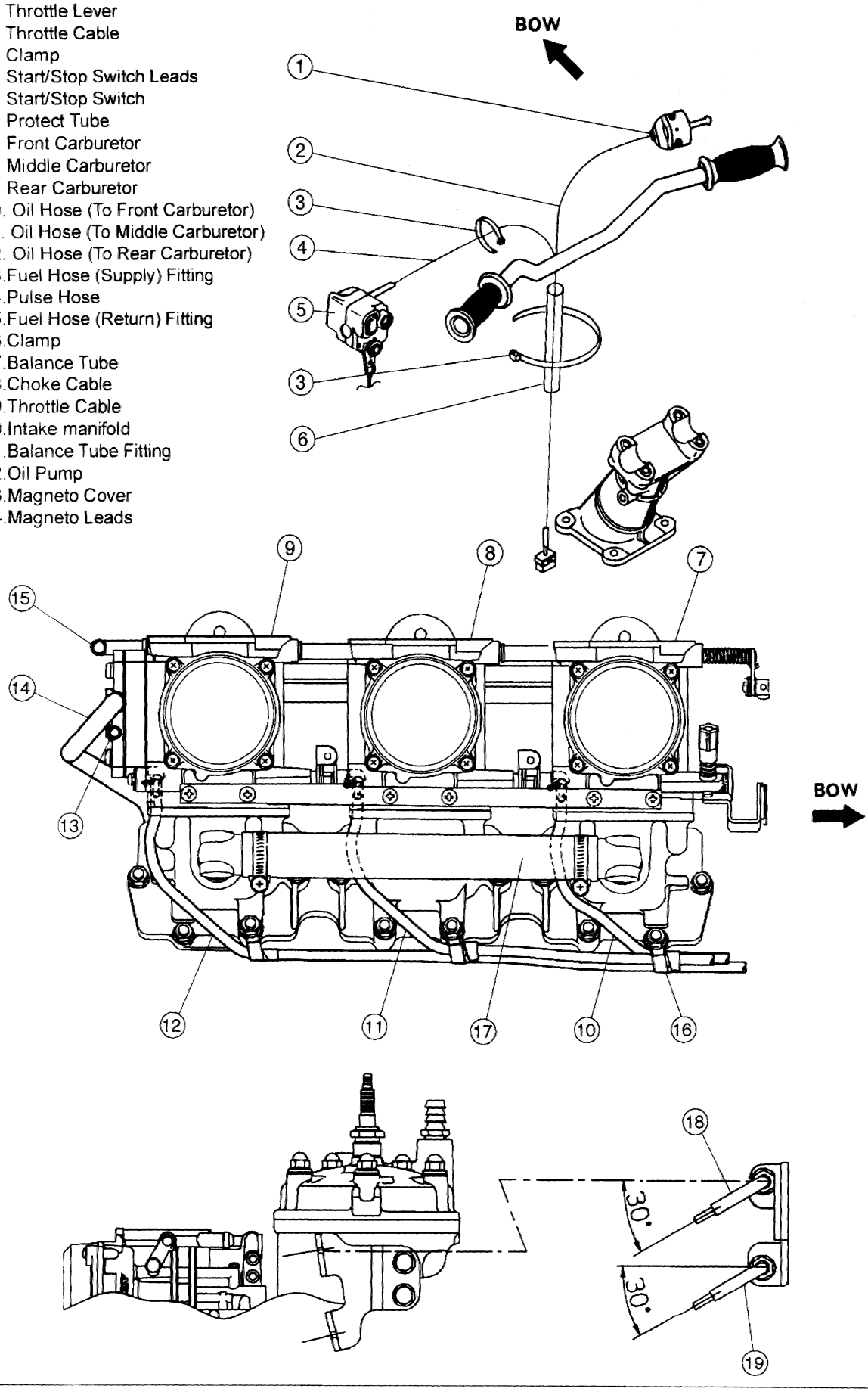
7) When the throttle valve [3] opens, the engine runs at mid-range or higher speeds. The pressure in the venturi [2] drops as the air flow speed through it rises. This pressure drop allows the check valve [18] to open and fuel flows through the main jet [19], the needle jet [20], past the jet needle [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

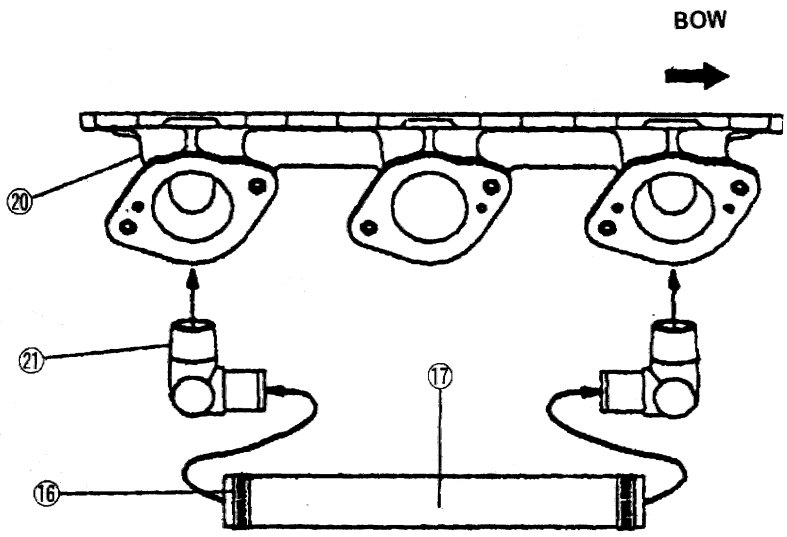


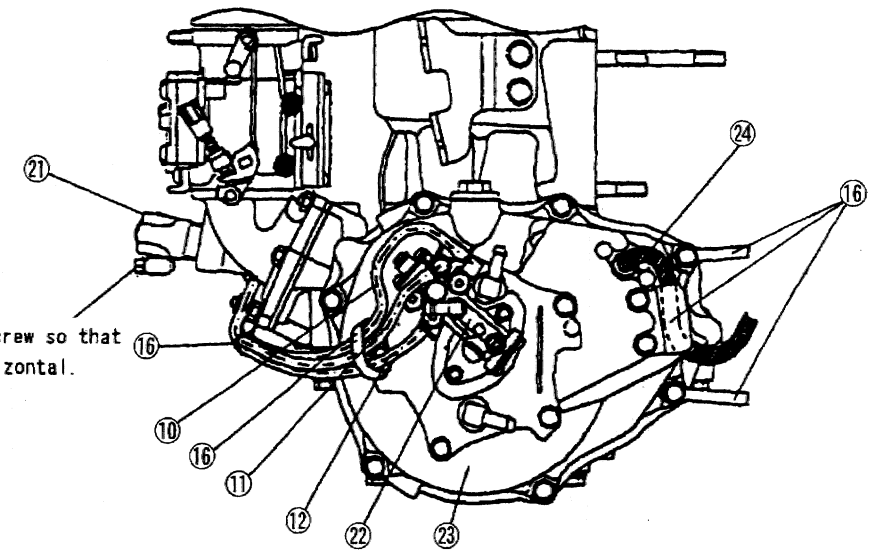
Cable, Wire and Hose Routing (JH1100–A3/A4)

1. Throttle Lever
2. Throttle Cable
3. Clamp
4. Start/Stop Switch Leads
5. Start/Stop Switch
6. Protect Tube
7. Front Carburetor
8. Middle Carburetor
9. Rear Carburetor
10. Oil Hose (To Front Carburetor)
11. Oil Hose (To Middle Carburetor)
12. Oil Hose (To Rear Carburetor)
13. Fuel Hose (Supply) Fitting
14. Pulse Hose
15. Fuel Hose (Return) Fitting
16. Clamp
17. Balance Tube
18. Choke Cable
19. Throttle Cable
20. Intake manifold
21. Balance Tube Fitting
22. Oil Pump
23. Magneto Cover
24. Magneto Leads



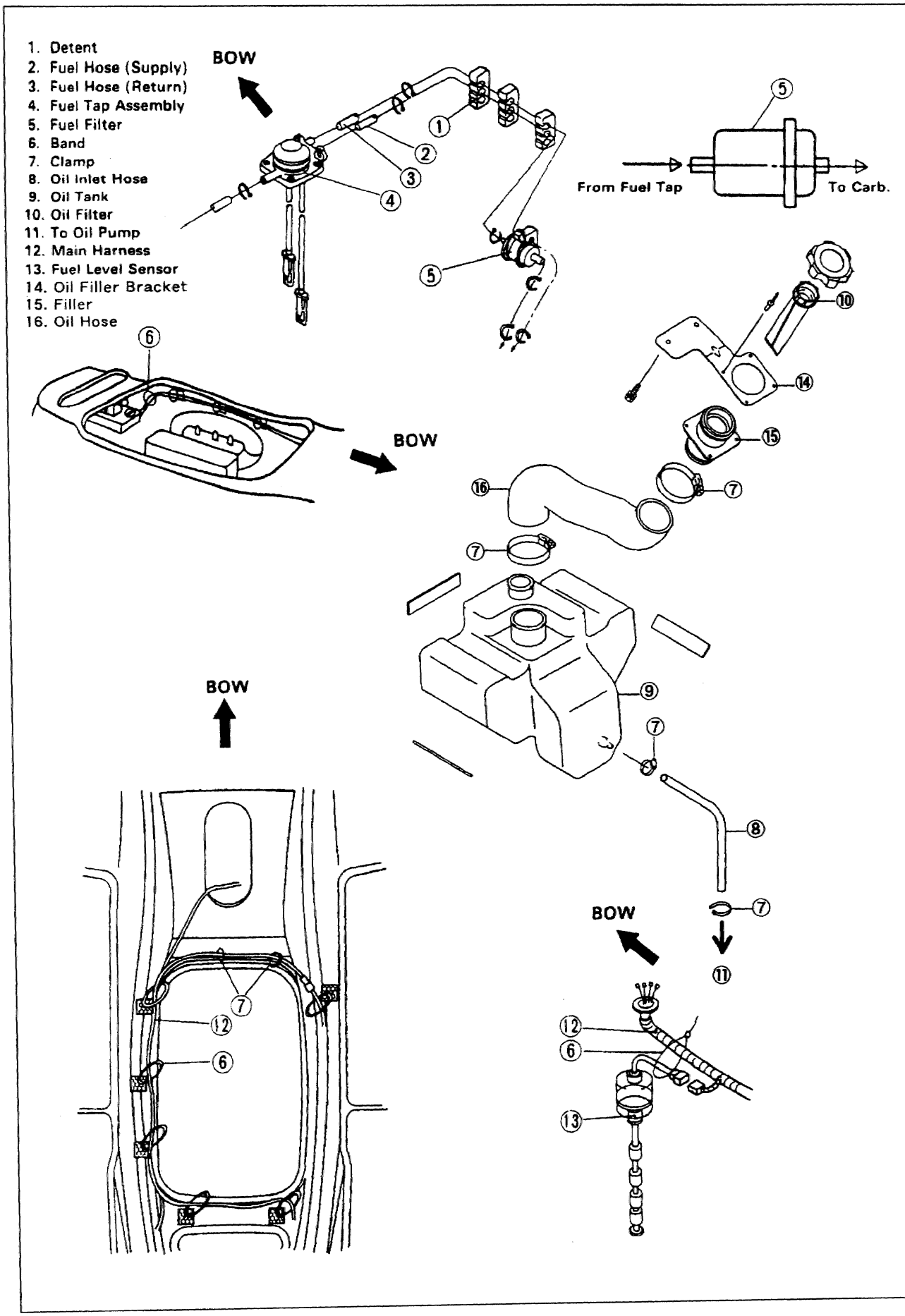
Cable, Wire and Hose Routing





Tighten the clamp screw so that its position is horizontal.

Cable, Wire and Hose Routing

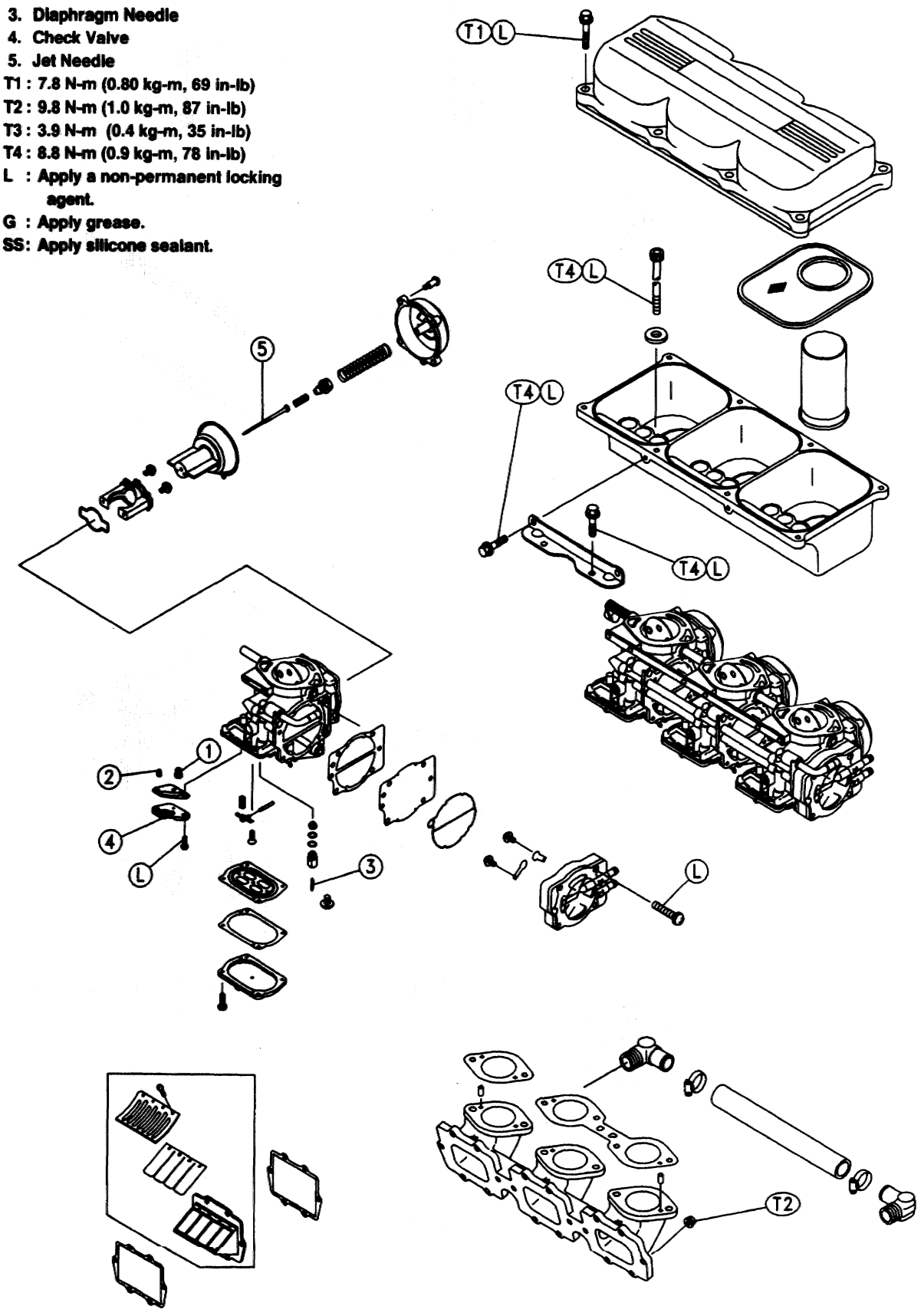


Fuel System

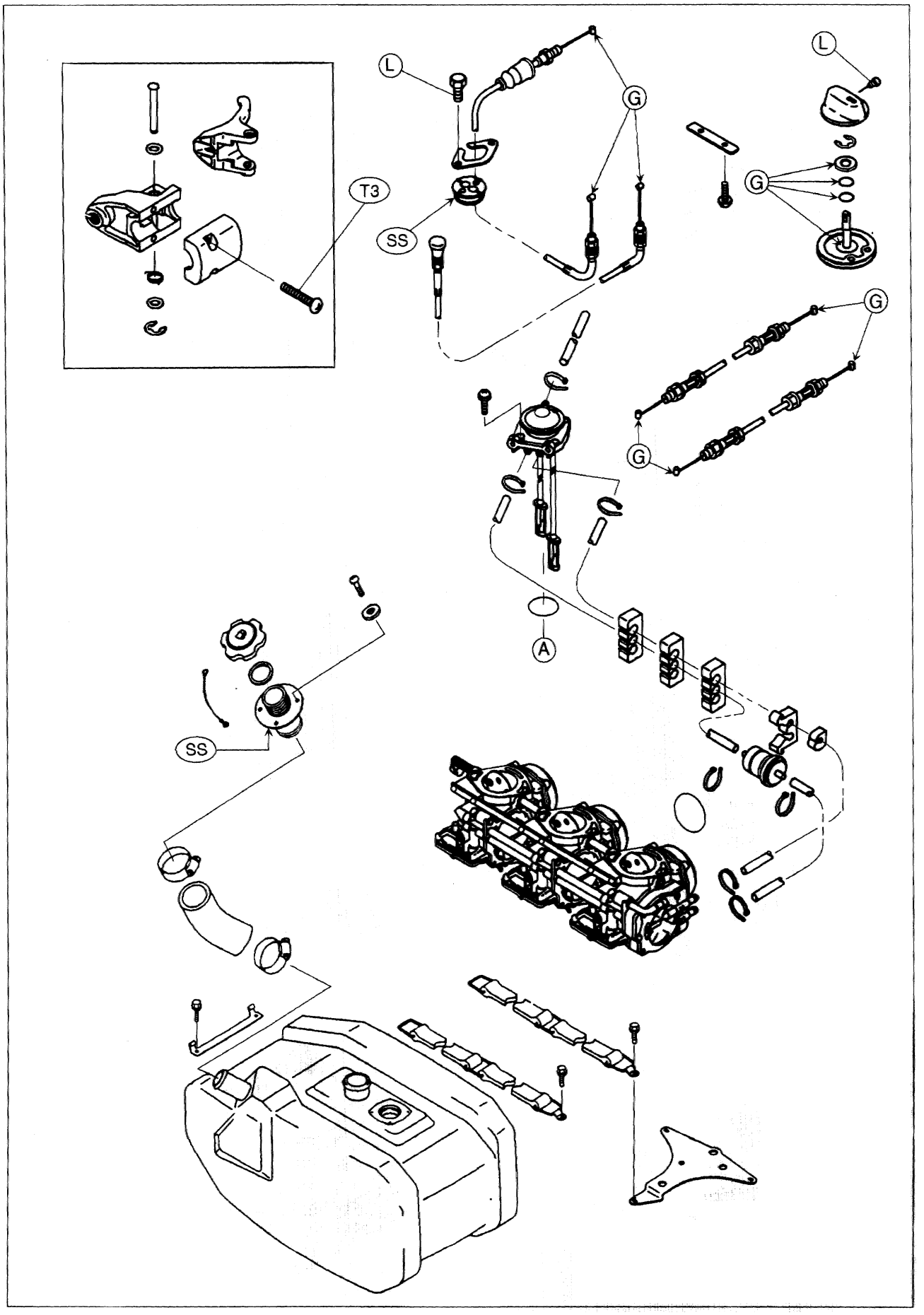
Exploded View (JH1100–A3/A4)

1. Main Jet
2. Pilot Jet
3. Diaphragm Needle
4. Check Valve
5. Jet Needle

T1 : 7.8 N-m (0.80 kg-m, 69 in-lb)
T2 : 9.8 N-m (1.0 kg-m, 87 in-lb)
T3 : 3.9 N-m (0.4 kg-m, 35 in-lb)
T4 : 8.8 N-m (0.9 kg-m, 78 in-lb)
L : Apply a non-permanent locking agent.
G : Apply grease.
SS: Apply silicone sealant.



Exploded View (JH1100–A3/A4)

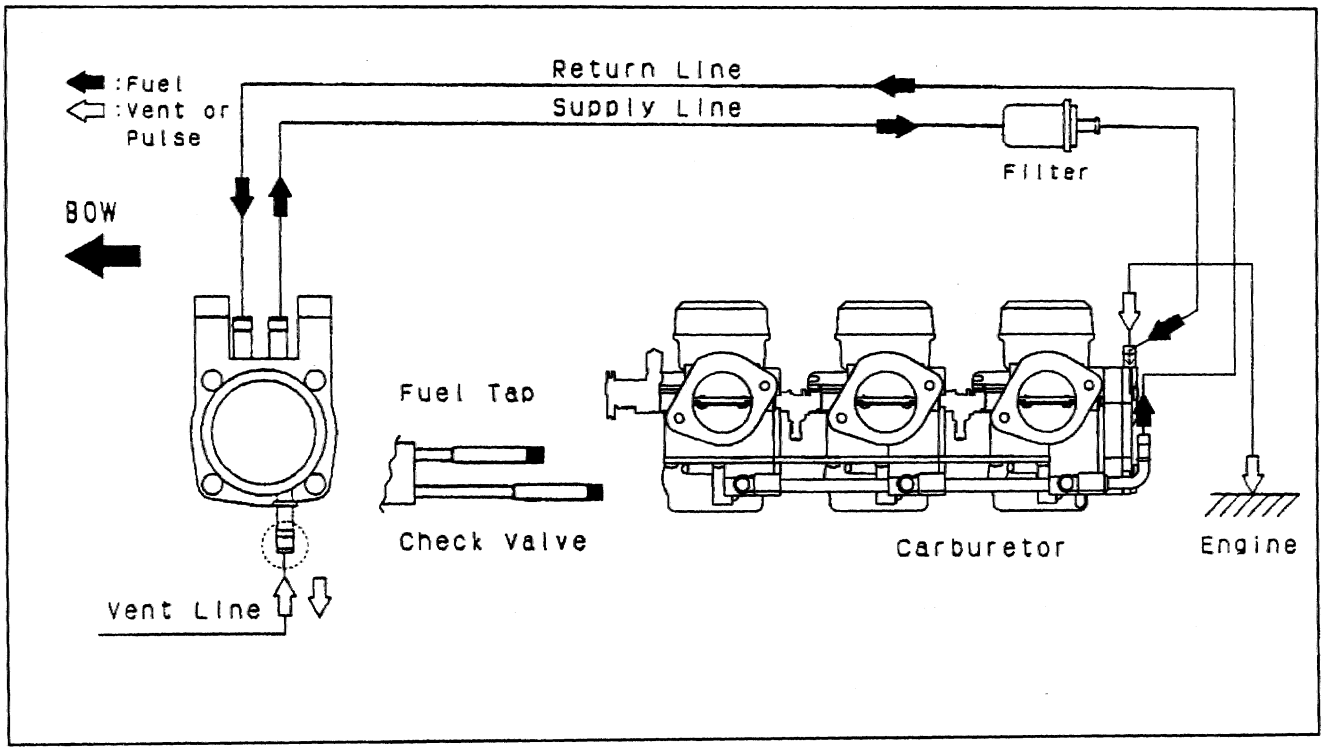


Specifications (JH1100–A3/A4)

Item	Standard	Service Limit
Carburetor		
Make, type	Keihin, CDCV 38-33	– – –
Size	33 mm Venturi	– – –
Main jet:		
Front	#165	
Middle	#165	
Rear	#165	
Pilot jet	#35	
Pilot screw	1 3/4 ± 1/4 turn open	– – –
Float arm level	1.5 ± 0.5 mm	– – –
Jet needle mark	N6PA	
Idle speed:		
in water	1 250 ± 100 rpm	– – –
out of water	1 800 ± 100 rpm	– – –
Reed Valve		
Reed warp	– – –	0.2 mm
Fuel Tank		
Capacity	52 L (including 7 L reserve)	– – –

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

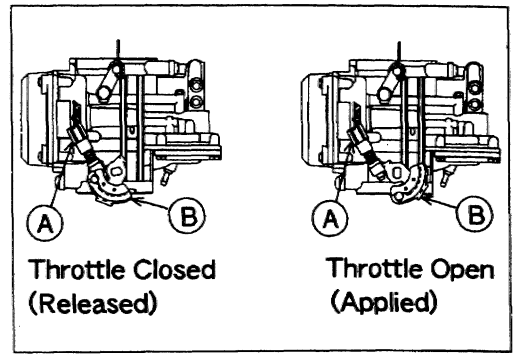
Fuel System Diagram (JH1100–A3/A4)



Throttle Cable (JH1100–A3/A4)

Throttle Cable Adjustment Note

- ● Refer to the original model, noting the following.
- ● Check throttle cable adjustment.
- ○ With the throttle lever released, the lower stop on the throttle pivot arm [B] should rest against the idle adjust screw [A], 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.



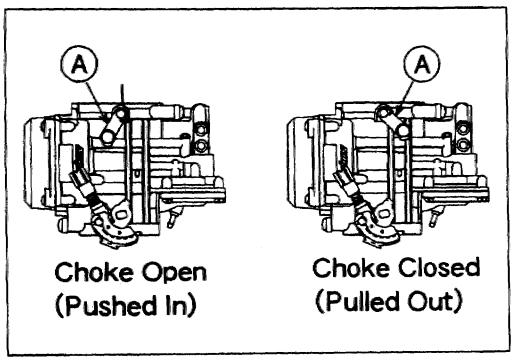
Throttle Closed (Released)

Throttle Open (Applied)

Choke Cable (JH1100–A3/A4)

Choke Cable Adjustment Note

- Refer to the original model, noting the following.
- When the choke knob is pushed in (off), the cable butterfly valve in the carburetor should be completely open. Check that the choke pivot arm [A] stands all the way toward the right side of the boat with minimum cable slack.



Carburetor / Fuel Pump (JH1100-A3/A4)

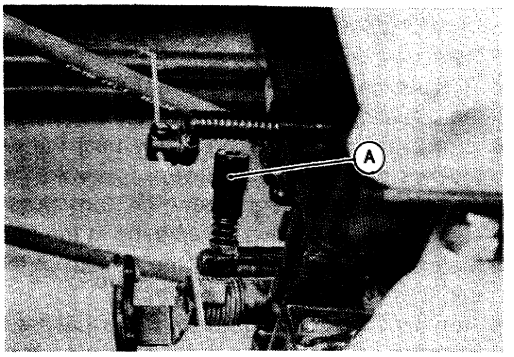
Idle Speed Adjustment

The normal idle speed setting is the lowest stable speed.

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

Idle Speed **1,250 ±100 rpm (in water)**

1,800 ±100 rpm (out of water)



High Altitude Performance Adjustment

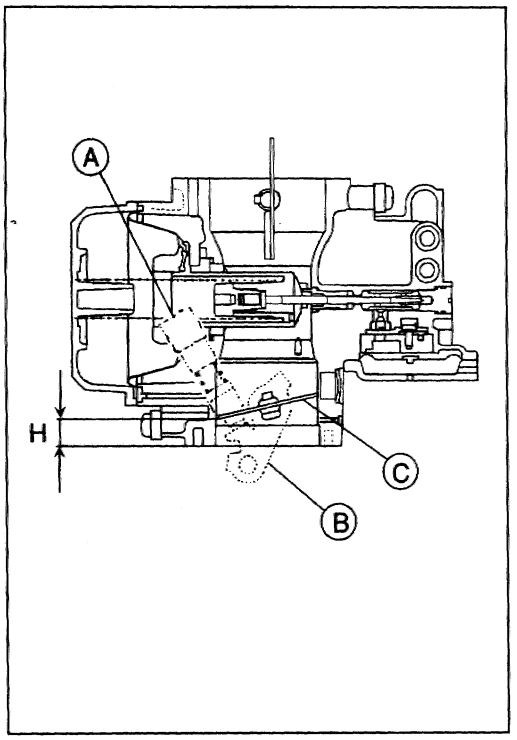
The normal carburetor settings are best for sea level. If the watercraft is used at the higher elevations, the lower atmospheric pressure makes the carburetion richer. To obtain the proper carburetor setting at higher elevations, change the main and slow jets according to the table.

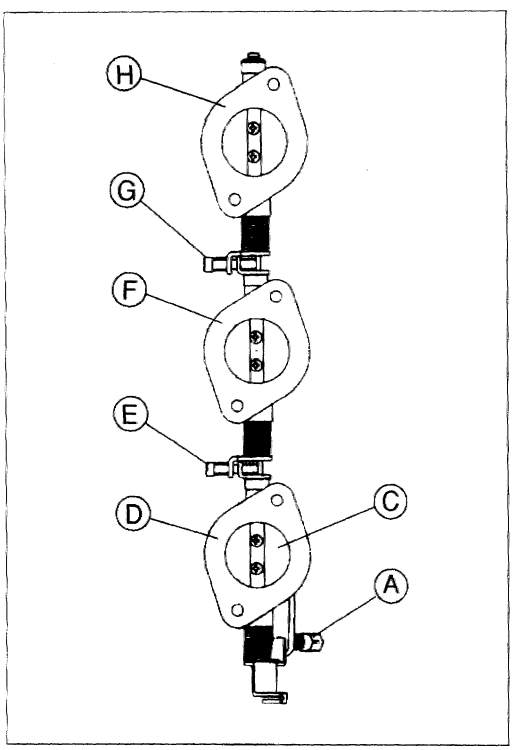
Altitude	Sea level-1,000 m (0 ~ 3,300 ft) STD	(1,000 ~ 2,000 ft) (3,300 ~ 6,600 ft) STD	2,000 ~ 3,000 m (6,600 ~ 9,800 ft)
Main jet # P/No.	#165 92063-3720	#165 92063-3720	#160 92063-3722
Pilot jet # (slow jet) P/No.	#35 16158-3720	#35 16158-3720	#32 16158-3723

Carburetor / Fuel Pump (JH1100-A3/A4)

Synchronization

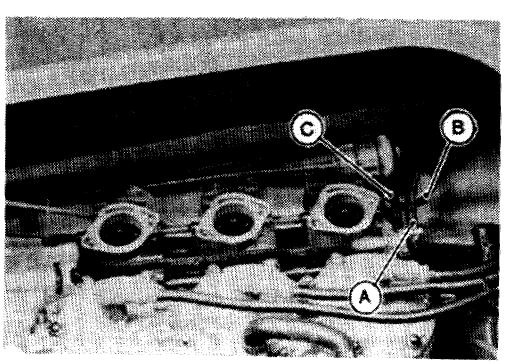
- Remove the carburetor (see Carburetor Removal).
- Turn out the idle adjusting screw [A] until there is a clearance between the adjusting screw end and throttle shaft lever [B].
- Turn in the idle adjusting screw until the adjusting screw end just touches the throttle shaft lever.
- Turn in the adjusting 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 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 tolerance as in the front carburetor.
- Install the carburetor.
- Adjust the throttle and choke cables.





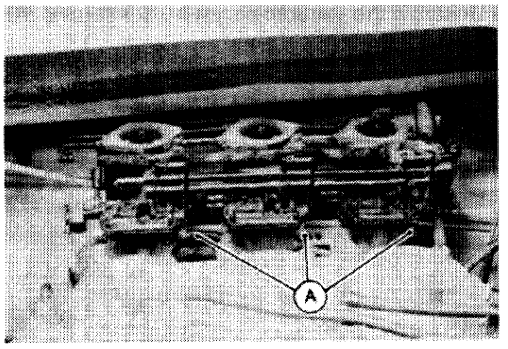
Carburetor Removal

- Remove:
  - Air Intake Cover (see Flame Arrester Removal)
  - Arrester Case (see Flame Arrester Removal)
- disconnect:
  - Throttle Cable
  - Choke Cable
  - Return Hose [A]
  - Inlet (Supply) Hose [B]
  - Pulse Hose [C]



Carburetor / Fuel Pump (JH1100-A3/A4)

- Lift the carburetor off the intake manifold and disconnect the oil hoses [A].

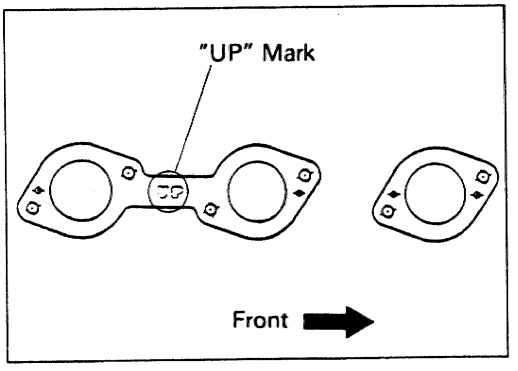


Carburetor Installation Notes

- Connect the fuel hoses and pulse hose correctly (see Fuel System Diagram).
- Install a new gasket under the carburetor as shown.
- Apply a non-permanent locking agent to the carburetor and air intake cover bolts.

Torque - Carburetor Mounting Bolts: 8.8 N·m (0.9 kg·m, 78 in·lb)
Air Intake Cover Bolts: 7.8 N·m (0.8 kg·m, 69 in·lb)

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

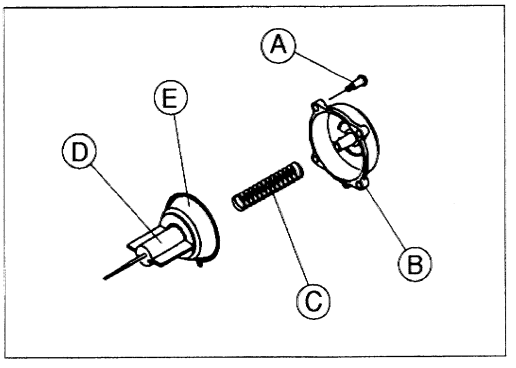


Carburetor Disassembly

⚠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.

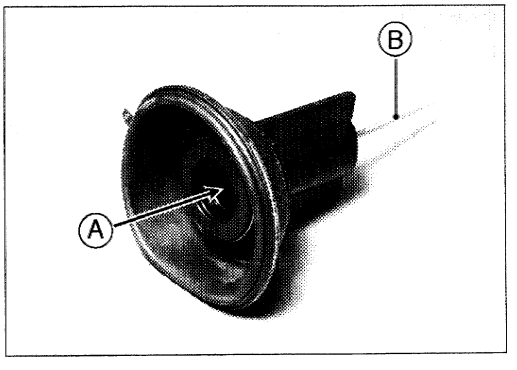
- Remove the carburetor (see Carburetor Removal).
- Unscrew the carburetor cap screws [A] and take off the carburetor cap [B].
- Remove:
  Cap Spring [C]
  Vacuum Piston [D] and Diaphragm [E]



CAUTION

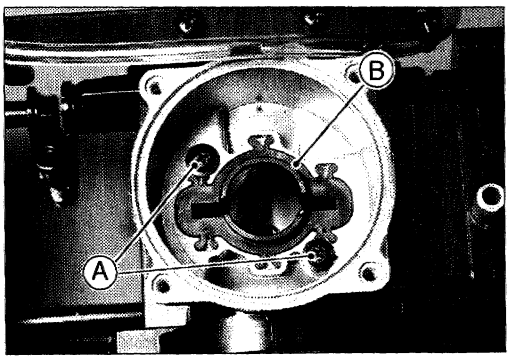
During carburetor disassembly, be careful not to damage the diaphragm. Never use a sharp edge to remove the diaphragm.

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

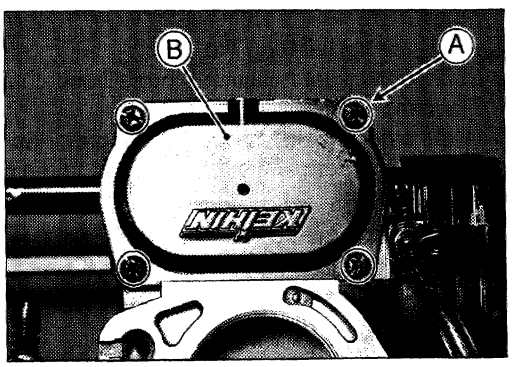


Carburetor / Fuel Pump (JH1100-A3/A4)

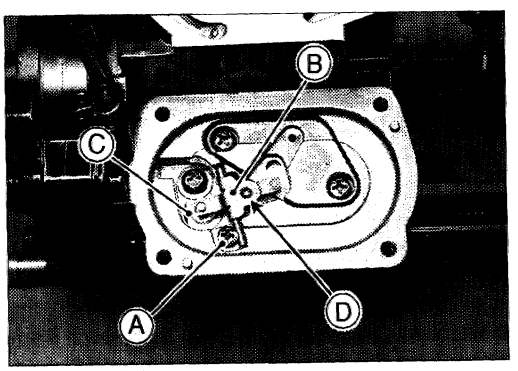
- Unscrew the vacuum piston holder screws [A] and take off the vacuum piston holder [B].



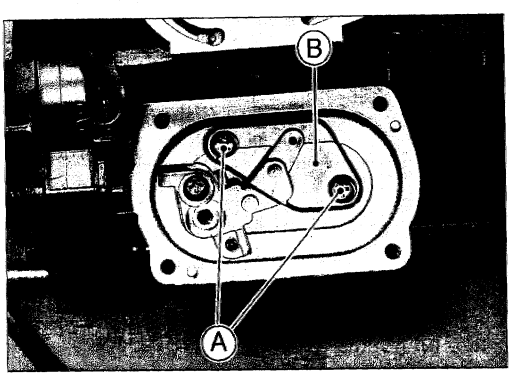
- Unscrew the carburetor cover screws [A] and take off the carburetor cover [B].



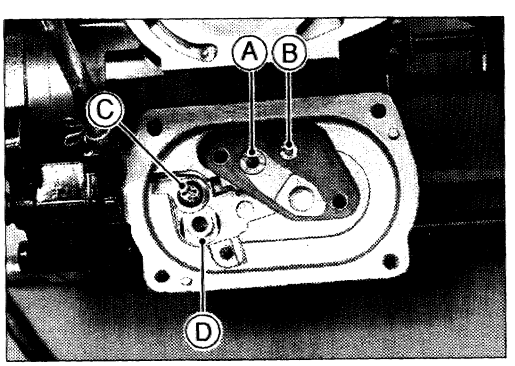
- Unscrew the float arm set screw [A].
- Remove:
  Float Arm [B] and Pin
  Diaphragm Needle [C]
  Spring [D]



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



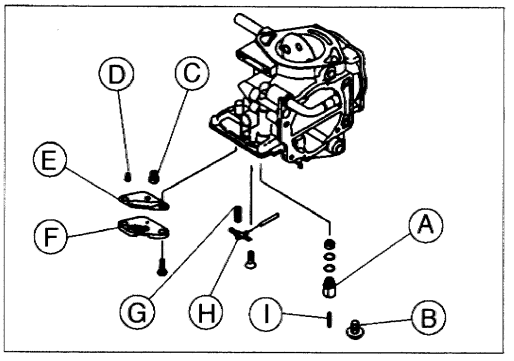
- Remove:
  Main Jet [A]
  Pilot Jet [B]
  Screw [C]
  Valve Seat [D]



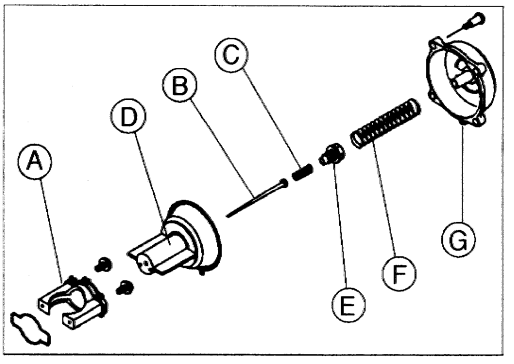
Carburetor / Fuel Pump (JH1100-A3/A4)

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 Diaphragm Needle [I]

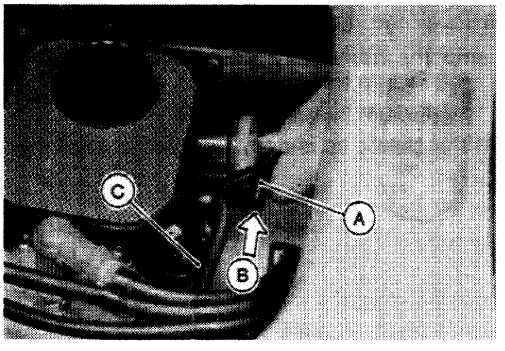


- Install the vacuum piston holder [A].
- Install the jet needle [B] and holder spring [C] in the vacuum piston [D], and tighten the jet needle holder bolt [E].
- Install:
  Cap Spring [F]
  Carburetor Cap [G]



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 in now full of fuel.*

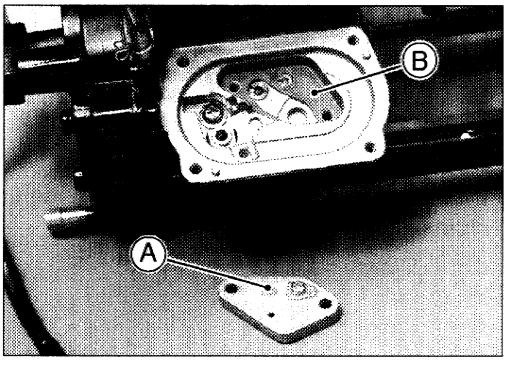


Carburetor Cleaning and Inspection

- 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 kg/cm^2, 25 psi) maximum nozzle pressure.

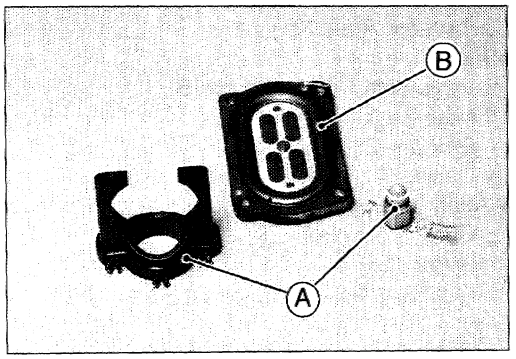


- Immerse all the metal parts in a carburetor cleaning solution.
- Rinse the parts in water.
- When the parts are clean, dry them with compressed air.
- Blow out the air and fuel passages with compressed air.
- Inspect the check valve [A] for damage or deterioration, and replace it if necessary.

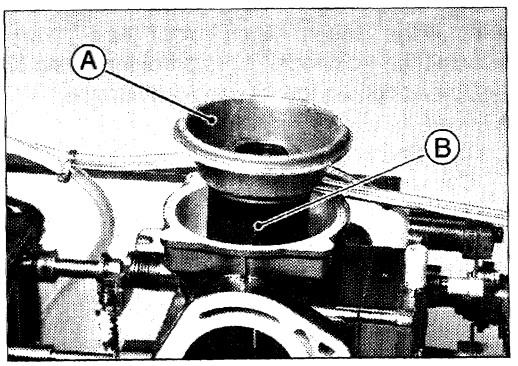
★ If the gasket [B] under the check valve appears damaged, it may leak and must be replaced.

Carburetor / Fuel Pump (JH1100-A3/A4)

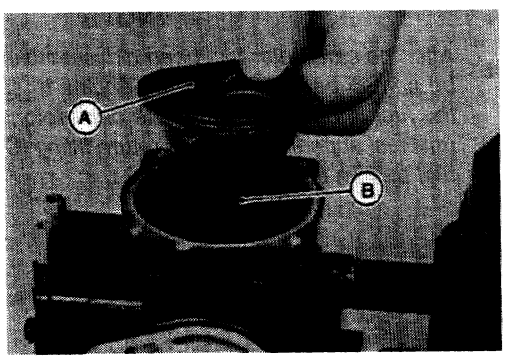
● Check these rubber parts for damage.
O-rings [A]
Diaphragm [B]
★ If any of these parts are not in good condition, replace them.



● 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.
Diaphragm Needle [A]
Diaphragm Needle Wear [B]
★ If the plastic tip is damaged, replace the needle.

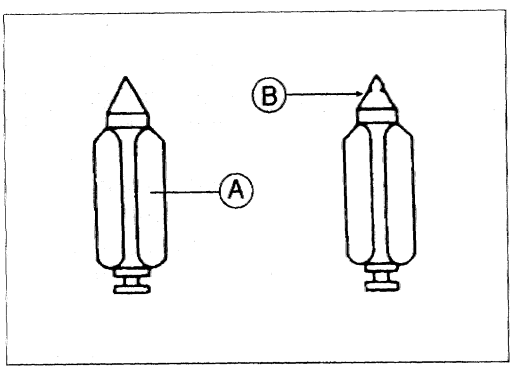


Float Arm Level Inspection and Adjustment

● 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

★ If the float arm level is incorrect, bent the float arm very slightly to changed the float arm level.

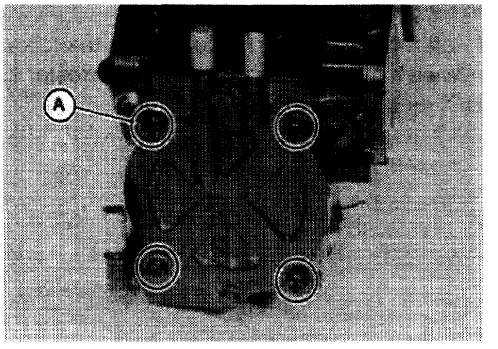


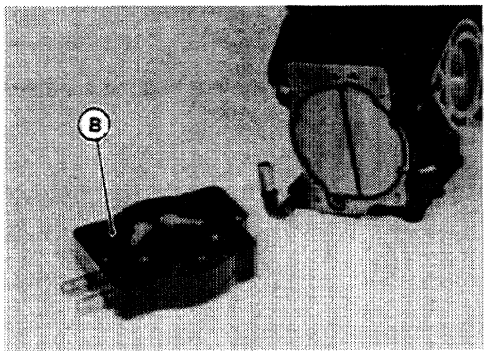
Carburetor / Fuel Pump (JH1100-A3/A4)

Fuel Pump Removal/Installation Notes

- 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].**

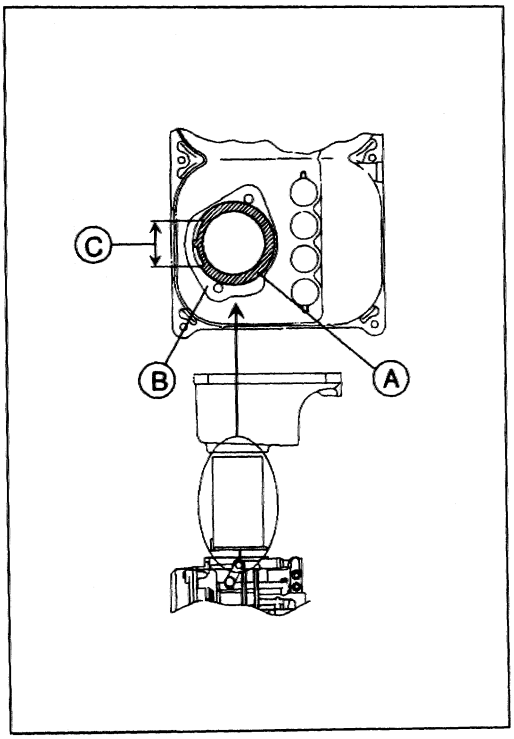




Flame Arrester

Installation Notes

- ● Refer to the original model, noting the following.
- ○ When mating the duct [A] with the arrester case [B], align the notches [C] as shown.



Fuel Tank

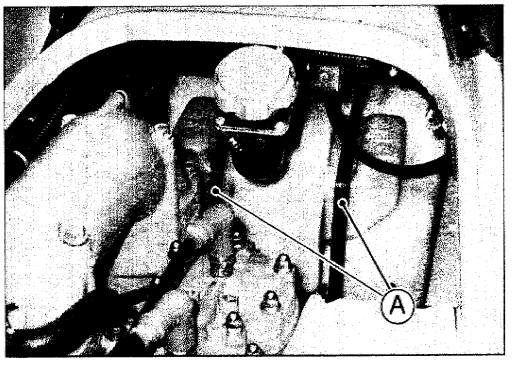
Fuel Tank Removal

- Refer to the original model, noting the following.
- If the level of the fuel is above the filler neck, siphon some fuel out to prevent spilling it.

⚠WARNING

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

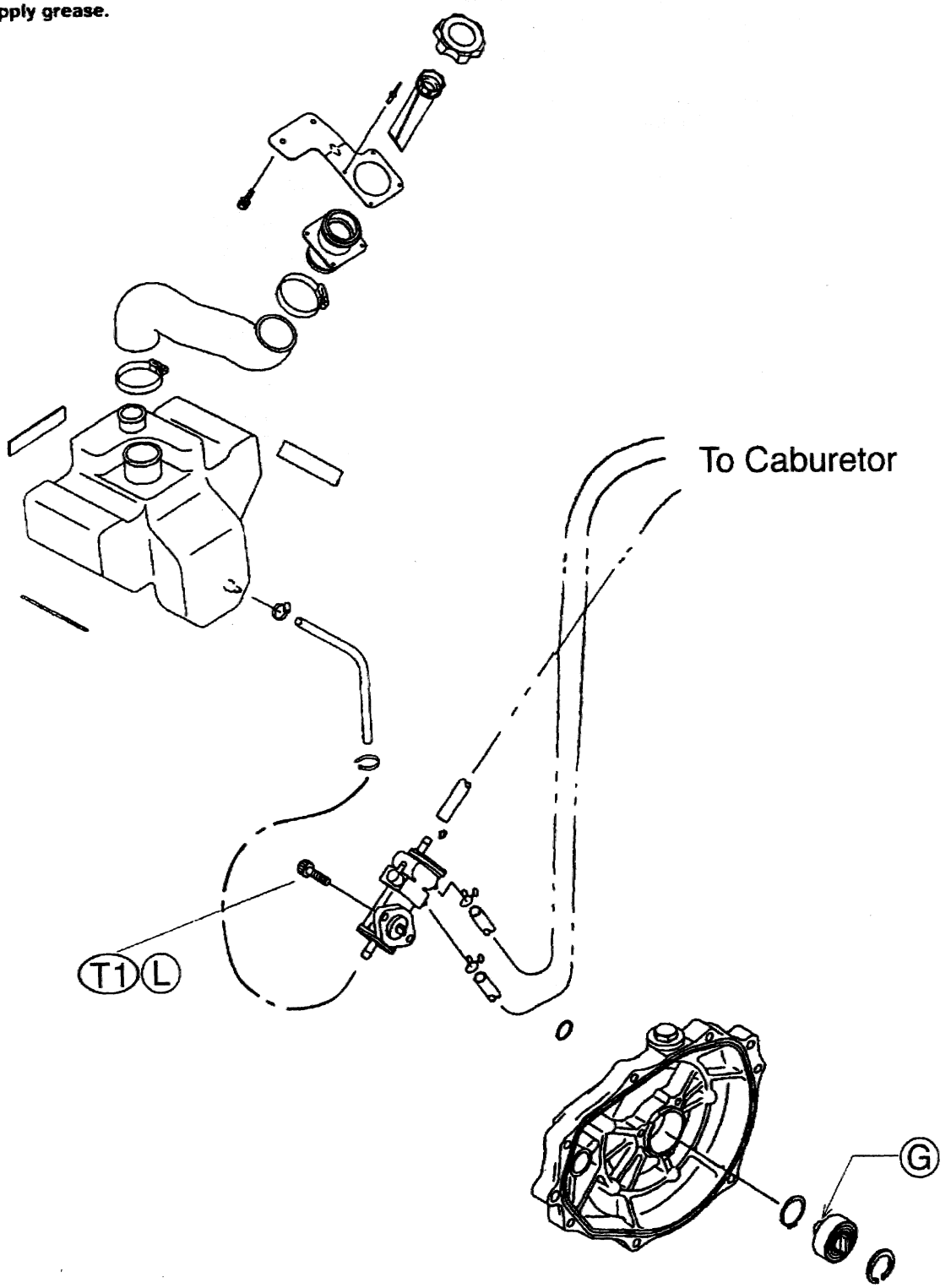
- Remove or disconnect:
  Engine
  Fuel Tank Straps [A]
  Oil Tank



Engine Lubrication System

Exploded View

T1 : 8.8 N-m (0.9 kg-m, 78 in-lb)
L : Apply a non-permanent locking agent.
G : Apply grease.



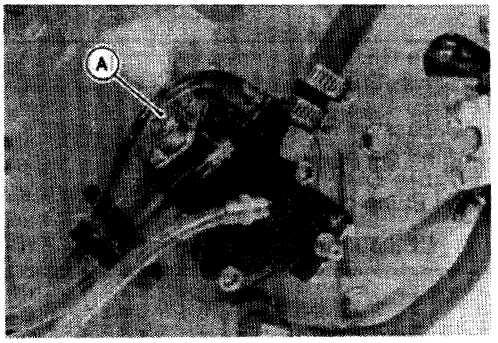
Specifications

Item	Standard
Engine Oil:	
Type	2-stroke, N.M.M.A. Certified for Service TC-W3
Capacity	3.8 L
Engine Oil Pump:	
Oil Pump output	
@3,000 r/min (rpm), 2 min:	10.1 ~ 12.3 mL

Oil Pump

Oil Pump Bleeding

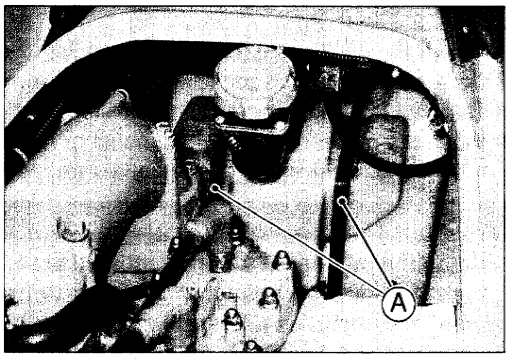
- Refer to the original model, noting the following.
- Make sure that there is plenty of engine oil in the oil tank and that oil flow is not restricted.
- Loosen the air bleeder bolt [A] on the oil pump a couple of turns, wait until oil flows out, and then tighten the bleeder bolt securely.



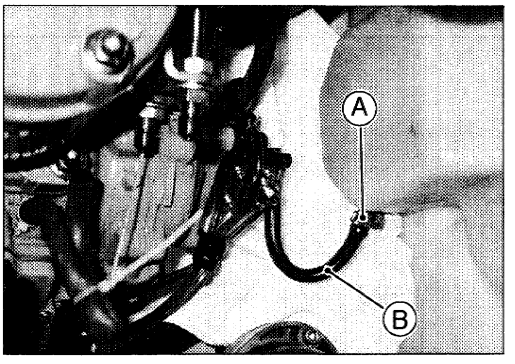
Oil Tank

Oil Tank Removal

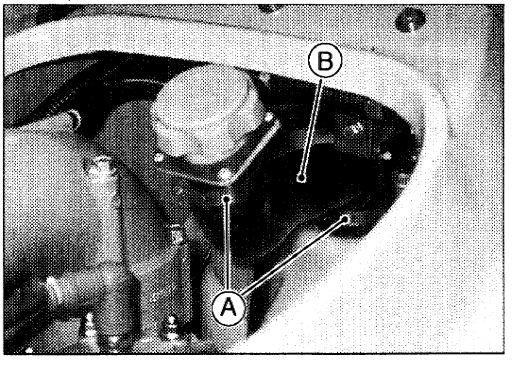
- Remove the air intake cover (see Flame Arrester Removal).
- Remove the arrester case (see Flame Arrester Removal).
- Remove the fuel tank straps [A].
- Disconnect the lead wire of oil level sensor.



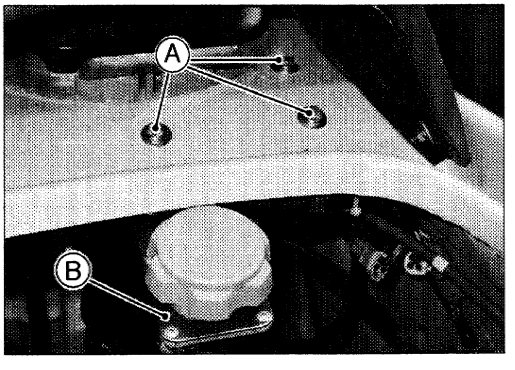
- Place the oil receiver under the oil outlet, and loosen the clamp [A] and pull the tube [B].



- After taking off the tube, plug the tube with like a screw and the oil tank outlet with some parts immediately so that the oil does not leak from them.
- Loosen both clamps [A] of the oil inlet hose [B] and remove it.



- Remove the three bolts [A] and slide the bracket [B] installed the oil filler to left side.
- Remove the oil tank.



Oil Tank Cleaning

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

⚠WARNING

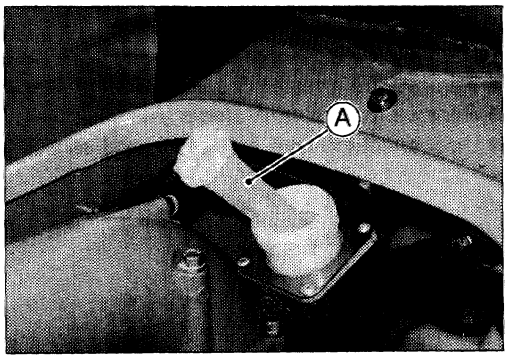
Clean the tank in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the tank. A fire or explosion could result.

Oil Tank

Oil Filter Cleaning

Check the oil filter [A] for foreign particles every time you add the oil. If there are any foreign particles, the oil filter must be cleaned.

- Take out the oil filter out of the oil filter.
- Wash the oil filter in a non-flammable or high flash-point solvent. Use a brush to remove any contaminates trapped in the filter.

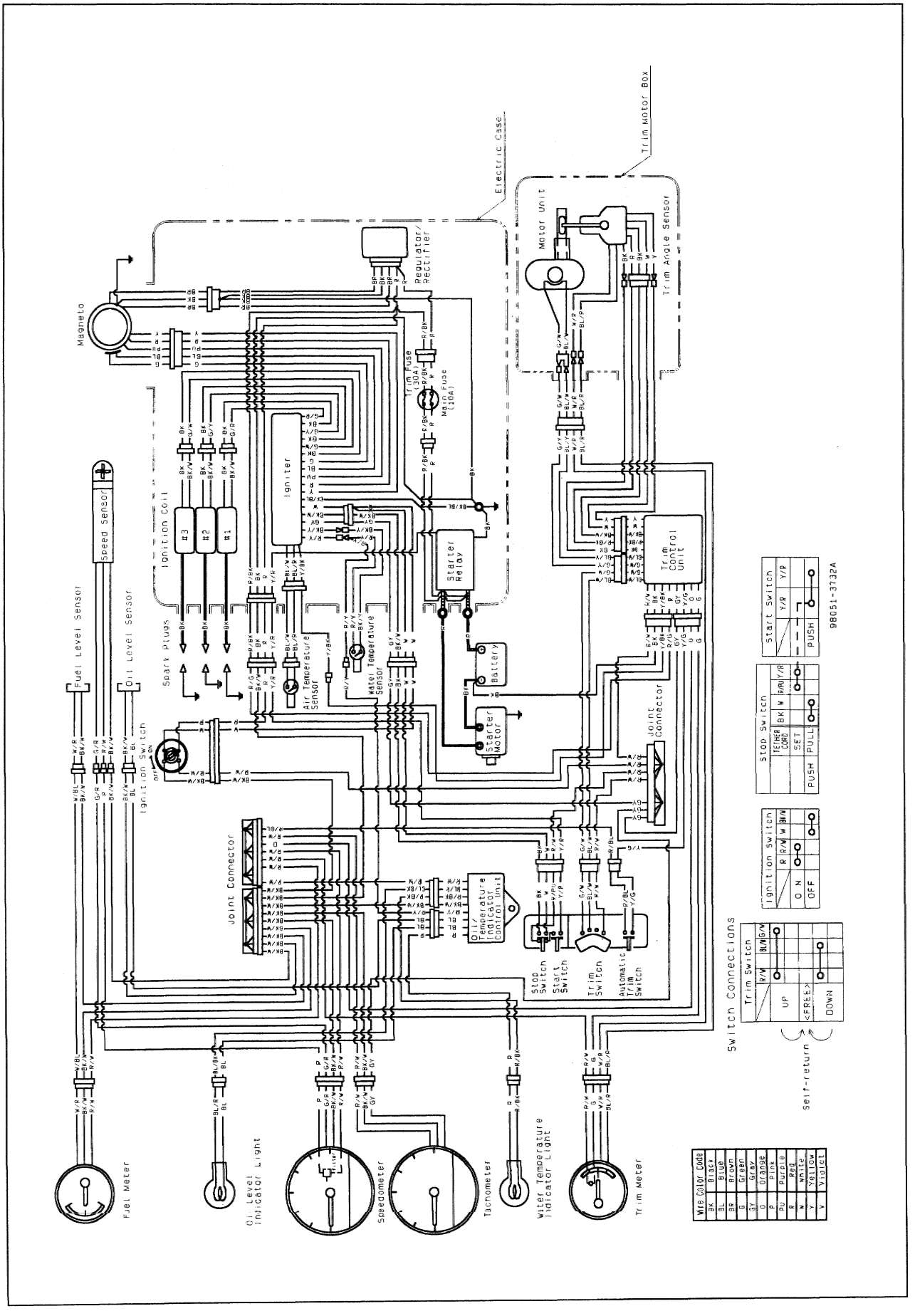


⚠WARNING

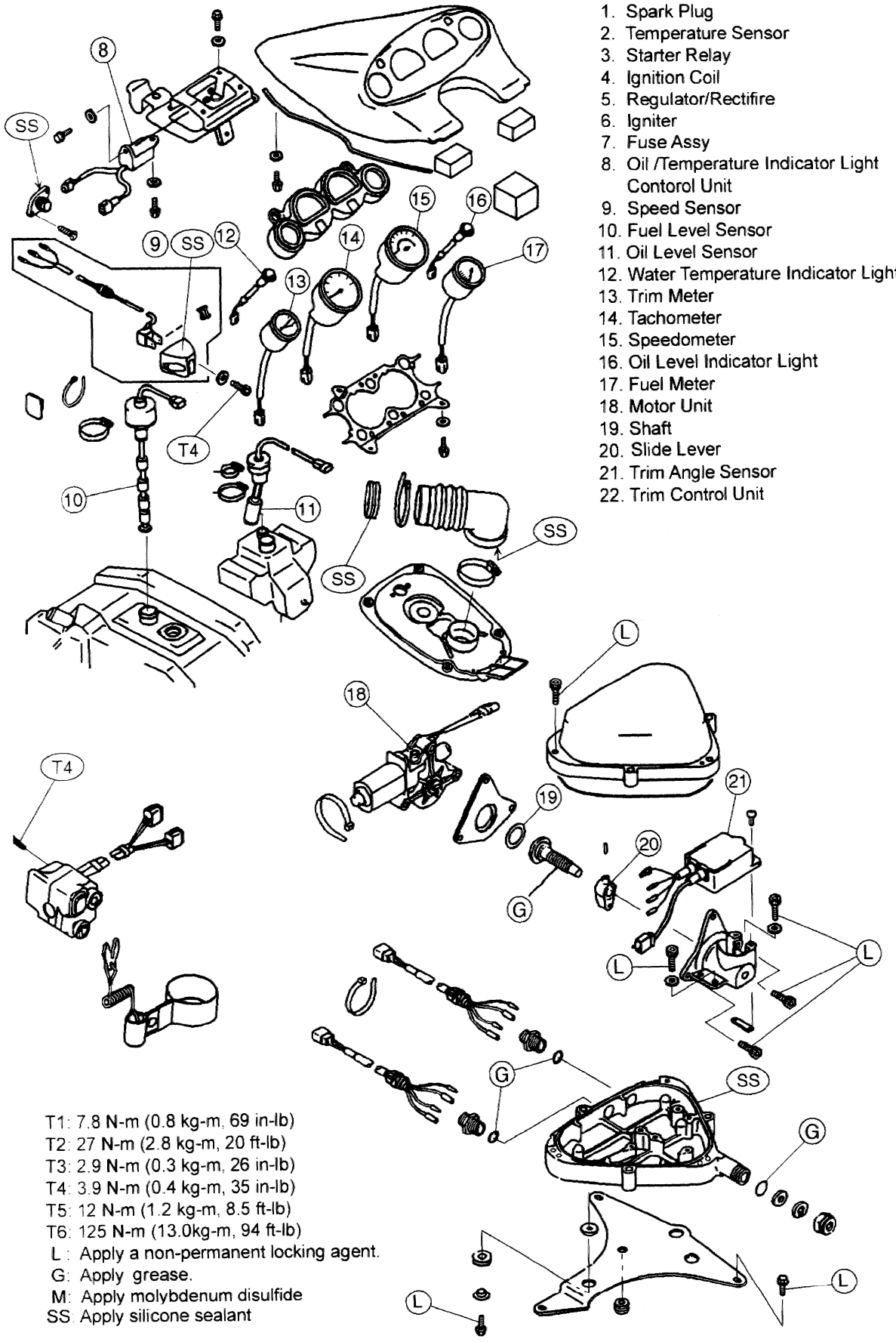
Clean the oil filter in a well-ventilated area, and take ample care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low flash-point solvent to clean the filter. A fire or explosion could result.

Electrical System

Wiring Diagram



Exploded View



Ignition System

CDI Igniter Inspection

- Remove the CDI igniter.
- Set the hand tester to the x 1 kΩ range, zero it, and make the measurements shown in the table.

★ If the tester readings are not as specified, replace the CDI igniter.

Special Tool - Hand Tester: 57001–1394

CAUTION

Use only Hand Tester (special tool: 57001–1394) for this test. A multi-meter other than the Kawasaki Hand Tester may show different readings.
If a megger or a meter with a large-capacity battery is used, the CDI igniter will be damaged.

CDI Igniter Internal Resistance **Unit: kΩ**

		Tester (+) Lead Connection					
	Lead Color	R	PU	Y	BL	G	G/W
(-)*	R	–	15 ~500	∞	9.5~100	18 ~200	28 ~500
	PU	more than 100	–	∞	90 ~ 1000	90 ~1000	more than 100
	Y	more than 100	more than 100	–	90 ~ 1000	90 ~1000	more than 80
	BL	1.6 ~ 20	1.6~ 20	∞	–	4.8 ~ 35	1.6 ~ 20
	G	9.5 ~ 40	9.5 ~ 40	∞	3.8 ~ 22	–	9.5 ~ 40
	G/W	∞	∞	∞	∞	∞	–
	BK	1.6 ~ 20	1.6 ~ 20	∞	0	4.8 ~ 35	1.6 ~ 20
	G/Y	∞	∞	∞	∞	∞	∞
	G/R	∞	∞	∞	∞	∞	∞
	R/Y	∞	∞	∞	∞	∞	∞
	BK/Y	1.6 ~ 20	1.6 ~ 20	∞	0	4.8 ~ 35	1.6 ~ 20
	W	15 ~ 500	45 ~ 500	∞	8.5 ~ 200	22 ~ 200	10 ~ 300
	BK/W	1.6 ~ 20	1.6 ~ 20	∞	0	4.8 ~ 35	1.6 ~ 20
	GY	22 ~ 300	28 ~ 300	∞	14 ~ 200	20 ~ 200	22 ~ 300
	Y/BK	22 ~ 300	28 ~ 300	∞	14 ~ 200	20 ~ 200	22 ~ 200
	BL/W	∞	∞	∞	∞	∞	∞
	BL/R	1.6 ~ 20	1.6 ~ 20	∞	0	4.8 ~ 35	1.6 ~ 20
	BK/BL	1.6 ~ 20	1.6 ~ 20	∞	0	4.8 ~ 35	1.6 ~ 20

(–)*: Tester (–) Lead Connection

Ignition System

CDI Igniter Internal Resistance

Unit: kΩ

		Tester (+) Lead Connection					
	Lead Color	BK	G/Y	G/R	R/Y	BK/Y	W
	R	9.5 ~ 100	28 ~ 500	28 ~ 500	28 ~ 400	9.5 ~ 100	3.8 ~ 70
	PU	90 ~ 1000	more than 100	more than 100	more than 100	90 ~ 1000	more than 90
	Y	90 ~ 1000	more than 100	more than 100	more than 100	90 ~ 1000	more than 90
	BL	0	1.6 ~ 20	1.6 ~ 20	9 ~ 40	0	2.2 ~ 22
	G	3.8 ~ 22	9.5 ~ 40	9.5 ~ 40	17 ~ 70	3.8 ~ 22	8 ~ 35
	G/W	∞	∞	∞	∞	∞	∞
	BK	–	1.6 ~ 20	1.6 ~ 20	9 ~ 40	0	2.2 ~ 22
	G/Y	∞	–	∞	∞	∞	∞
(-)*	G/R	∞	∞	–	∞	∞	∞
	R/Y	∞	∞	∞	–	∞	∞
	BK/Y	0	1.6 ~ 20	1.6 ~ 20	9 ~ 40	–	2.2 ~ 22
	W	8.5 ~ 200	10 ~ 300	10 ~ 300	5.5 ~ 24	8.5 ~ 200	-
	BK/W	0	1.6 ~ 20	1.6 ~20	9 ~ 40	0	2.2 ~ 22
	GY	14 ~ 200	28 ~ 300	28 ~ 300	9 ~ 40	14 ~ 200	2.2 ~ 22
	Y/BK	14 ~ 200	28 ~ 300	28~ 300	9 ~ 40	14 ~ 200	2.2 ~ 22
	BL/W	∞	∞	∞	∞	∞	∞
	BL/R	0	1.6 ~ 20	1.6 ~20	9 ~ 40	0	2.2 ~ 22
	BK/BL	0	1.6 ~ 20	1.6 ~20	9 ~ 40	0	2.2 ~ 22

(–)*: Tester (–) Lead Connection

CDI Igniter Internal Resistance

Unit: kΩ

		Tester (+) Lead Connection					
	Lead Color	BK	G/Y	Y/BK	BL/W	BL/R	BK/BL
	R	9.5 ~ 100	14 ~ 60	14 ~ 60	28 ~ 400	9.5 ~ 100	9.5 ~ 100
	PU	90 ~ 1000	more than 90	more than 90	more than 100	90 ~ 1000	90 ~ 1000
	Y	90 ~ 1000	more than 90	more than 90	more than 100	90 ~ 1000	90 ~ 1000
	BL	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	G	3.8 ~ 22	10 ~ 45	10 ~ 45	17 ~ 70	3.8 ~ 22	3.8 ~ 22
	G/W	∞	∞	∞	∞	∞	∞
	BK	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	G/Y	∞	∞	∞	∞	∞	∞
(-)*	G/R	∞	∞	∞	∞	∞	∞
	R/Y	∞	∞	∞	∞	∞	∞
	BK/Y	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	W	8.5 ~ 200	4.2 ~ 17	4.2 ~ 17	5.5 ~ 24	8.5 ~ 200	8.5 ~ 200
	BK/W	–	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	0
	GY	14 ~ 200	–	4.8 ~ 45	9 ~ 40	14 ~ 200	14 ~ 200
	Y/BK	14 ~ 200	4.8 ~ 45	–	9 ~ 40	14 ~ 200	14 ~ 200
	BL/W	∞	∞	∞	–	∞	∞
	BL/R	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	–	0
	BK/BL	0	3.8 ~ 16	3.8 ~ 16	9 ~ 40	0	–

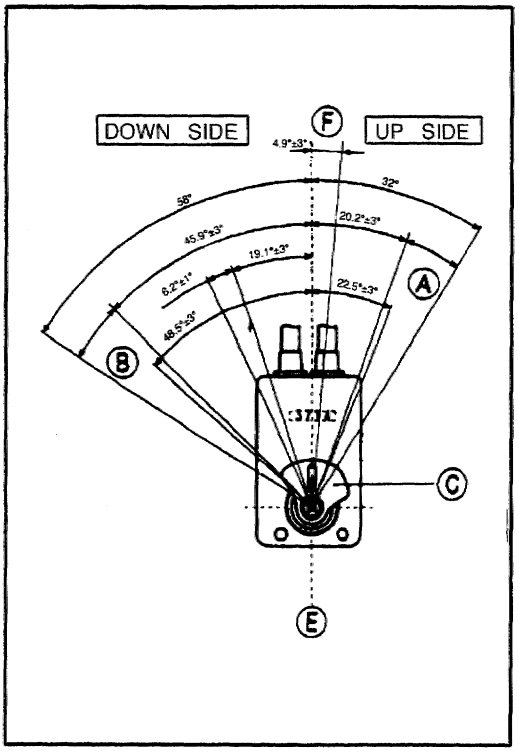
(–)*: Tester (–) Lead Connection

Electric Trim System

Trim Limit Switch Inspection

- Refer to the original model, noting the following.
- Check the trim limit switch.

○ Turn the sensor plate [C] within three ranges [A], [B], [F] as shown.



CAUTION

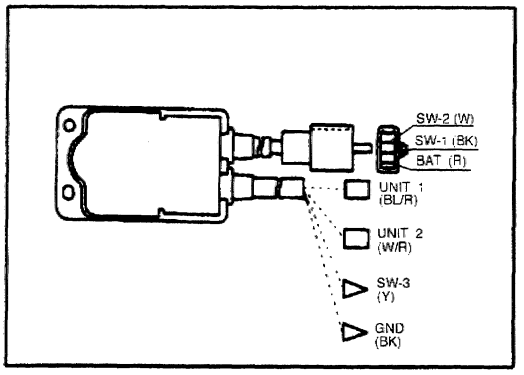
Do not turn the sensor plate beyond 58 degrees to the left and 32 degrees to the right from the center line [E], or the trim angle sensor could be damaged.

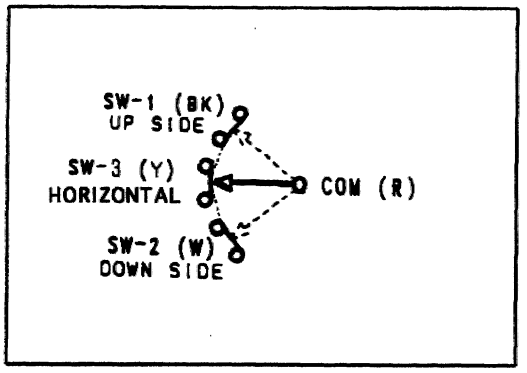
- Using the hand tester, check to see that only the connections shown in the table have continuity (about zero ohms).

Special Tool - Hand Tester: 57001–1394

- If the limit switch has an open or short, replace it with new one.

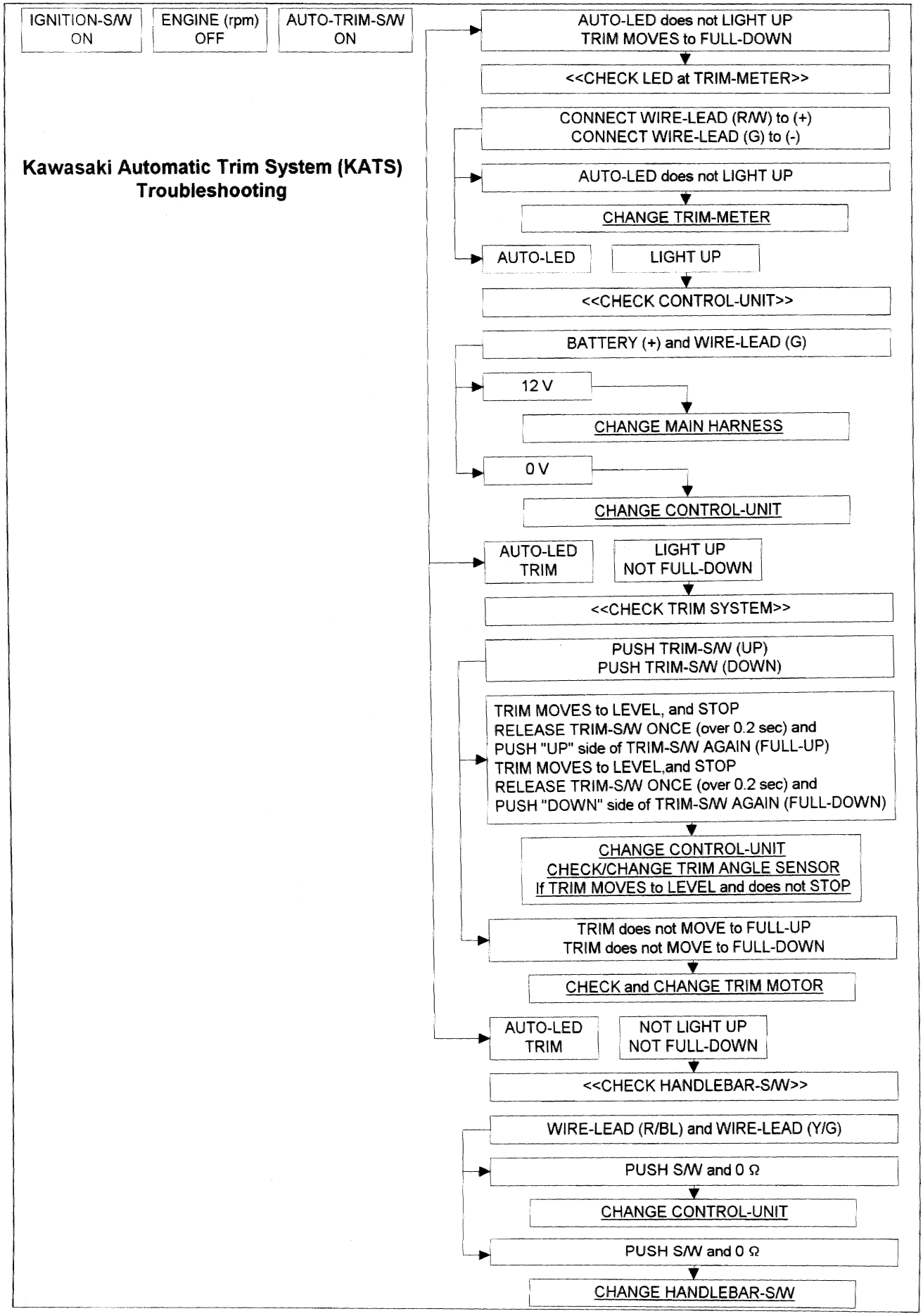
	R	BK	W	Y
Up (Switch 1)[A]	○	○		
OWN (Switch 2)[B]	○		○	
HORIZONTAL (Switch 3)[F]	○			○



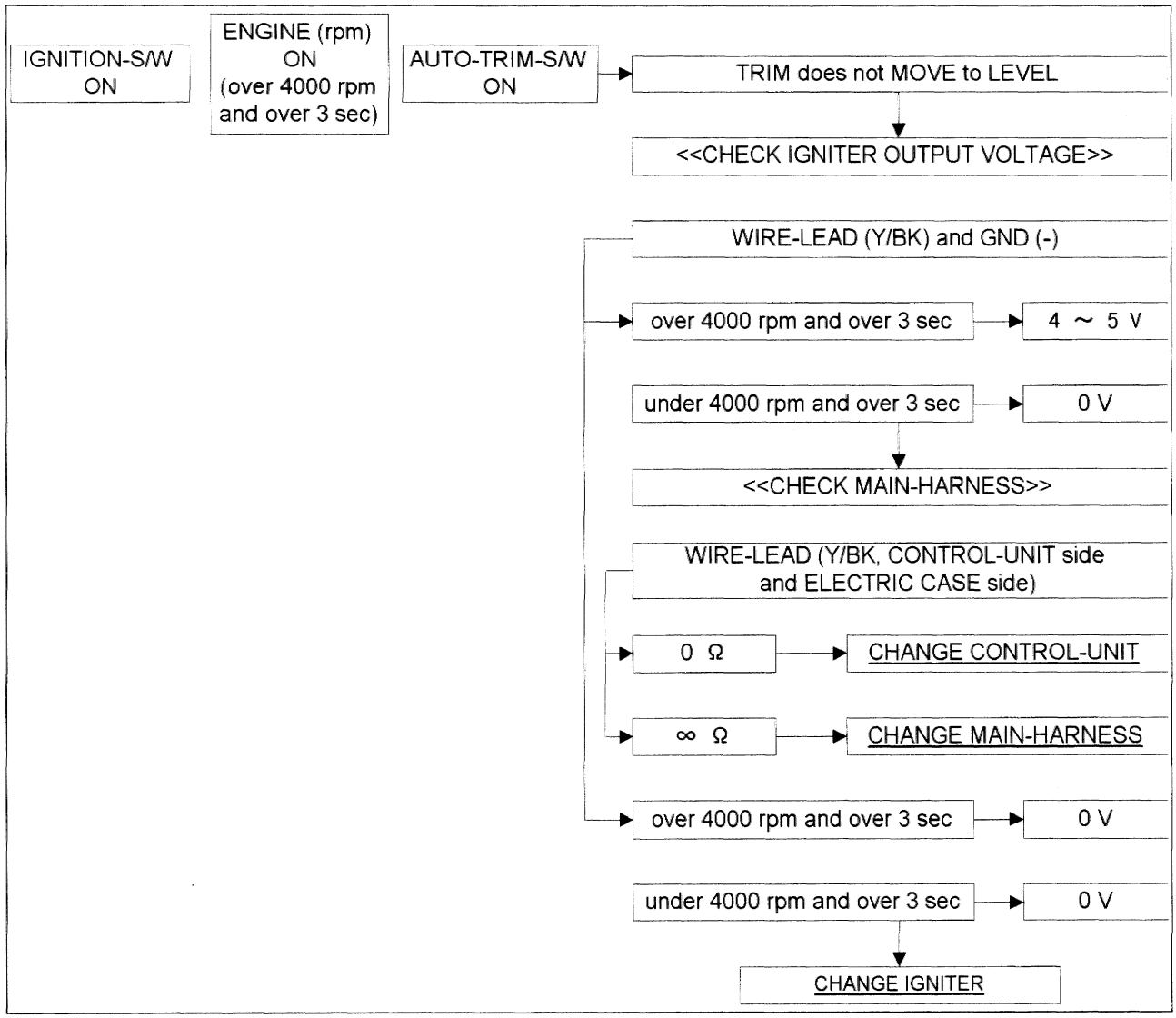


Electric Trim System

Kawasaki Automatic Trim System (KATS) Troubleshooting



Electric Trim System



Supplement-2000 ~ 2002 Models

Table of Contents

Foreword

How to Use This Manual

This "Supplement-2000 ~ 2002 Models" chapter is designed to be used in conjunction with the front part of this manual (up to Page 16-37). This maintenance and repair procedures described in this chapter are only those that are unique to the JH1100-A5~A7 models. Most service operations for these models remain identical to those described in front of this chapter.

Complete and proper servicing of the JH1100-A5~A7 models, therefore requires mechanics to read both this chapter and the text in front of this chapter.

General Information

Model Identification

JH1100-A5 Left Side View:

JH1100-A5 Right Side View:

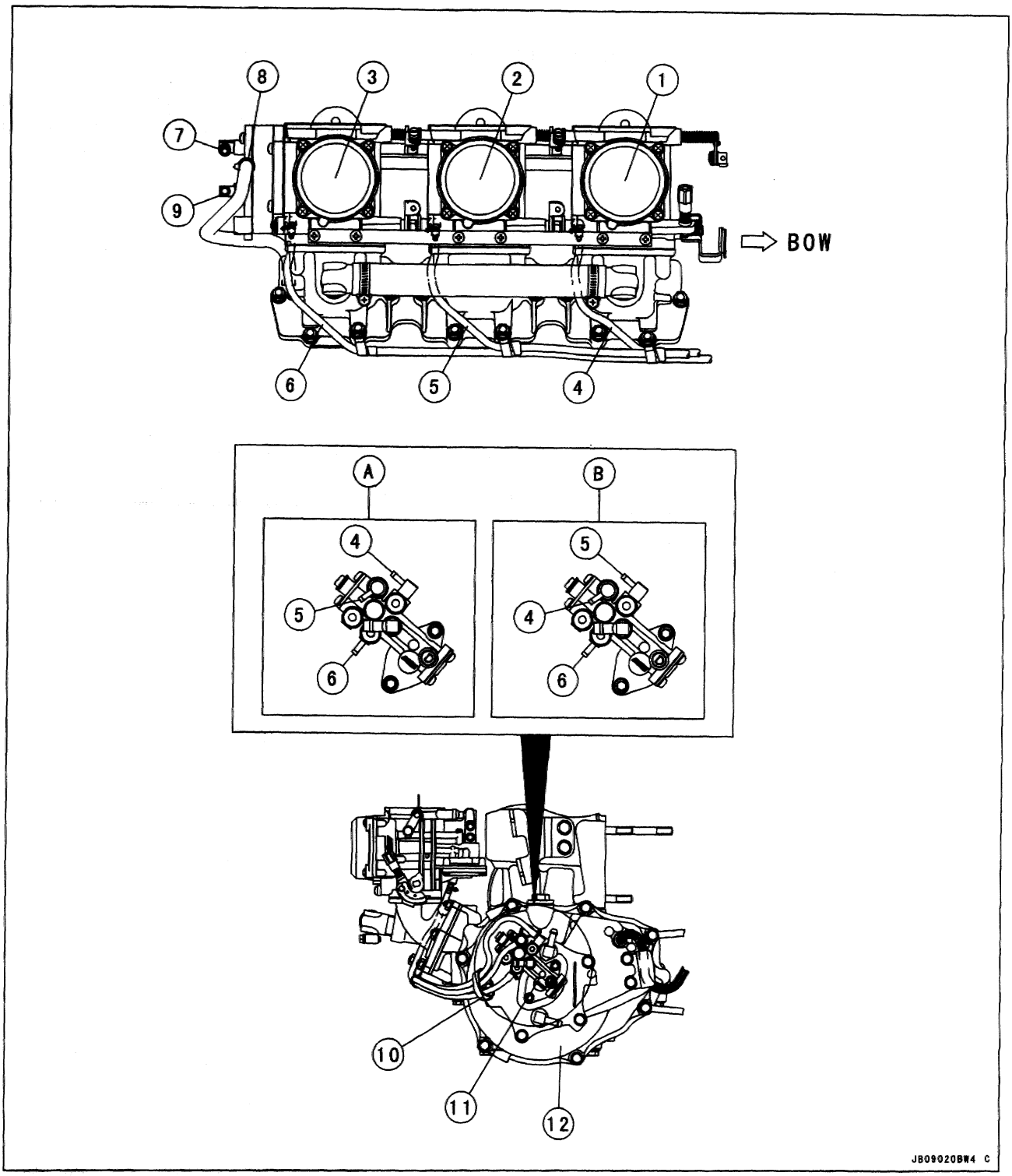
Torque and Locking Agent

Note the following tightening torque.

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Steering:				
Steering Cable Nuts	39	4.0	29	
Trim Cable Nut	39	4.0	29	

Special Tool - Box Wrench (27 mm): 57001–1451

Cable, Wire and Hose Routing



A: JH1100–A5~A6 Models
B: JH1100–A7 Model
1. Front Carburetor
2. Middle Carburetor
3. Rear Carburetor
4. Oil Hose (To Front Carb.)
5. Oil Hose (To Middle Carb.)
6. Oil Hose (To Rear Carb.)
7. Return Hose Fitting
8. Pulse Hose Fitting
9. Supply Fuel Hose Fitting
10. Clamp
11. Oil Pump
12. Magneto Cover

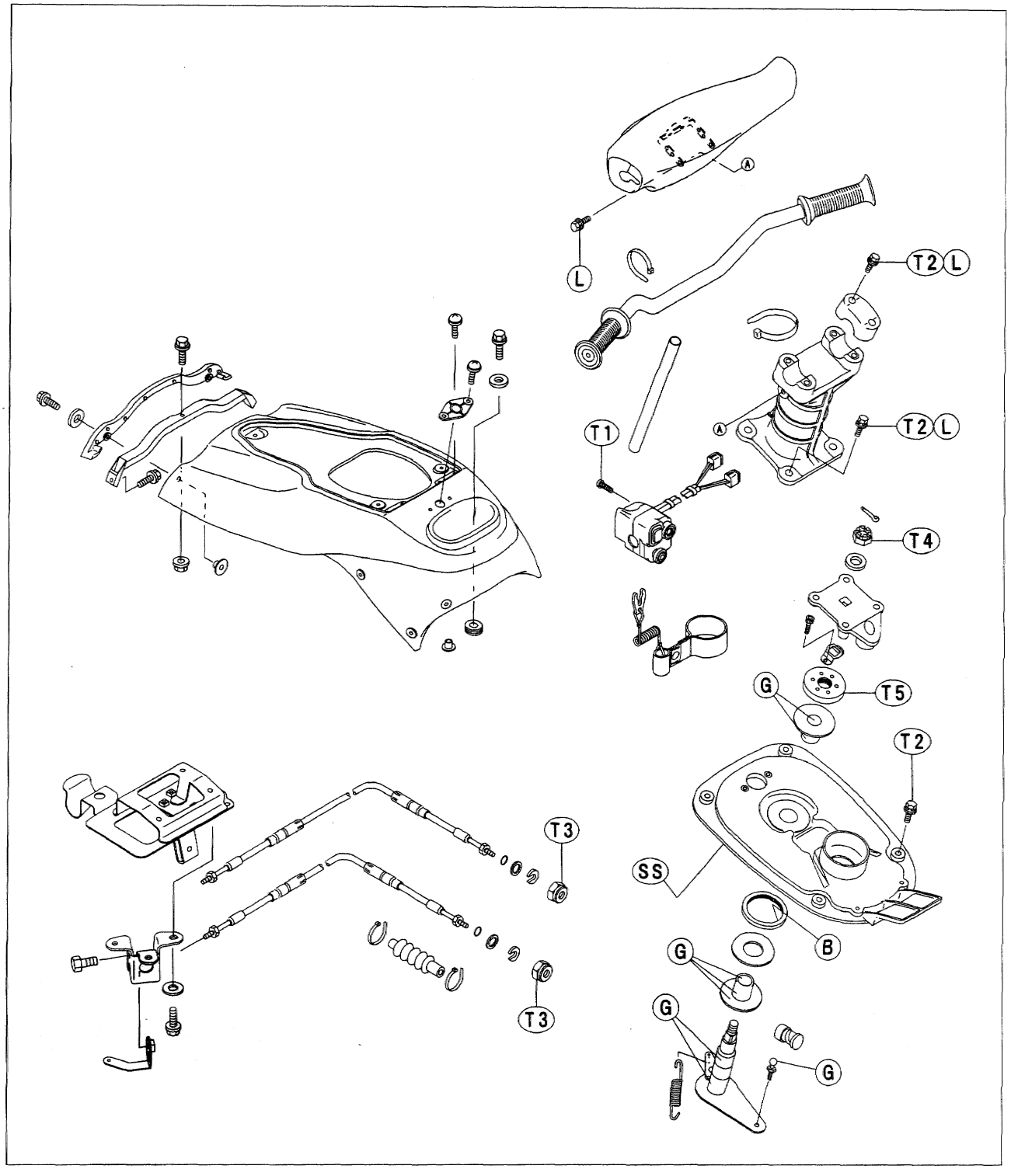
Fuel System

Specifications (JH1100–A5~A7)

Item	Standard	Service Limit
Carburetor		
Make, type	keihin, CDCV 38-33	- - -
Size	33 mm Venturi	- - -
Main jet:		
Front	#165	
Middle	#165	
Rear	#165	
Pilot jet	#35	- - -
Pilot screw	1 3/4 ± 1/4 turn open	
Float arm level	1.5 ± 0.5 mm	- - -
Jet needle mark	N6PA (JH1100-A5) N6PD (JH1100-A6 ~ A7)	
Idle speed:		
in water	1 250 ± 100 rpm	- - -
out of water	1 800 ± 100 rpm	- - -
Reed Valve		
Reed warp	- - -	0.2 mm
Fuel Tank		
Capacity	52 L (including 7 L reserve)	- - -

Sealant - Kawasaki Bond (Silicones Sealant): 5619–120

Steering



Note the tightening torque of the steering & trim cable nuts.

T1: 3.9 N·m (0.4 kgf·m, 35 in·lb)
T2: 16 N·m (1.6 kgf·m, 11.5 ft·lb)
T3: 39 N·m (4.0 kgf·m, 29 ft·lb)
T4: 39 ~ 49 N·m (5 ~ 6 kgf·m, 29 ~ 36 ft·lb)
T5: Hand-Tighten
L: Apply a non-permanent locking agent.
G: Apply grease.
B: Apply a bonding agent.

Steering Cable/Trim Cable

Steering Cable/Trim Cable Installation

- Lubricate the outside of the new cable to ease cable installation.
- Torque:

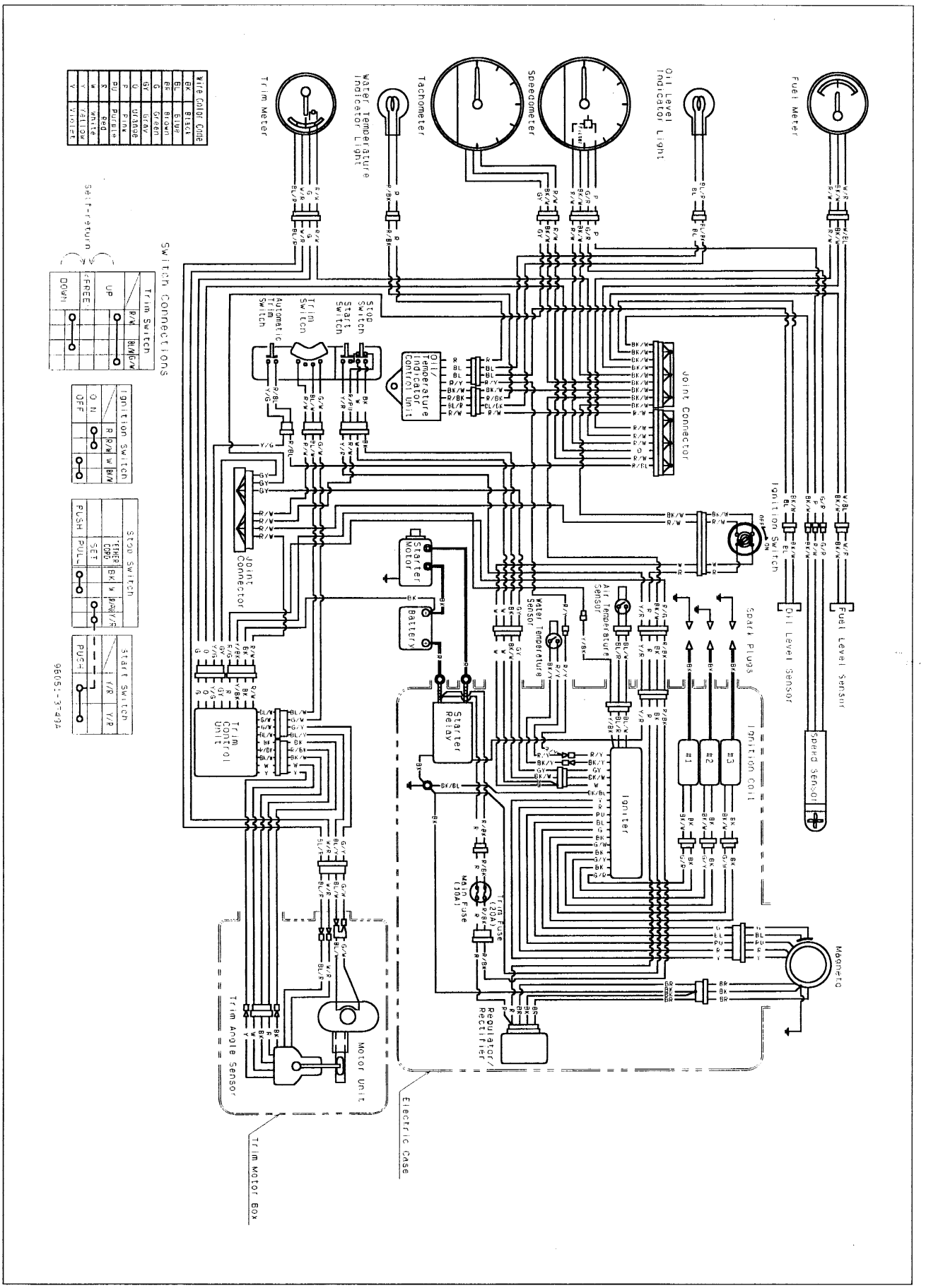
Torque - Steering Cable Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)
Trim Cable Nut: 39 N·m (4.0 kgf·m, 29 ft·lb)

Special Tool - Box Wrench (27 mm): 57001–1451

- Adjust the steering cable and trim cable.

Electrical System

Wiring Diagram



MODEL APPLICATION

Year	Model	Beginning Hull No.
1996	JH1100-A1	KAW80001□596 or JHT10A-601201
1997	JH1100-A2	KAW92941□697
1998	JH1100-A3	KAW96501□798
1999	JH1100-A4	KAW30001□899
2000	JH1100-A5	KAW30001□900
2001	JH1100-A6	KAW30001□001
2002	JH1100-A7	KAW30001□102

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

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