

SUZUKI OUTBOARD MOTOR

DF 2.5

FOUR STROKE

SERVICE MANUAL



99500-97J00-01E

FOREWORD

This manual contains an introductory description on the SUZUKI Outboard motor DF2.5 and procedures for its inspection, service and overhaul of its main components.

Other information considered as generally known is not included.

Read the GENERAL INFORMATION section to familiarize yourself with the outboard motor and its maintenance. Use this section as well as other sections to use as a guide for proper inspection and service.

This manual will help you know the outboard motor better so that you can assure your customers of fast and reliable service.

- This manual has been prepared on the basis of the latest specifications available at the time of publication.

If a modification has been made since then, differences may exist between the content of this manual and the actual outboard motor.

- Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual outboard motor exactly in detail.
- This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI outboard motors.

If you do not have proper knowledge and tools, ask your authorized SUZUKI marine dealer to help you.

⚠ WARNING

Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the engine unsafe for the boat operator and passengers.

NOTE:

This manual is compiled based on 2006 (K6) model.

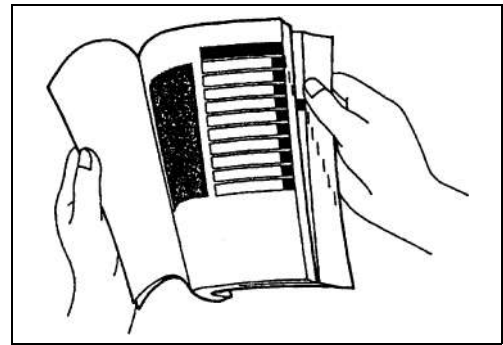
GROUP INDEX

GENERAL INFORMATION	1
PERIODIC MAINTENANCE	2
IGNITION AND ELECTRICAL	3
FUEL SYSTEM	4
RECOIL STARTER	5
POWER UNIT	6
MID UNIT	7
LOWER UNIT	8
WIRE AND HOSE ROUTING	9

HOW TO USE THIS MANUAL

TO LOCATE WHAT YOU ARE LOOKING FOR:

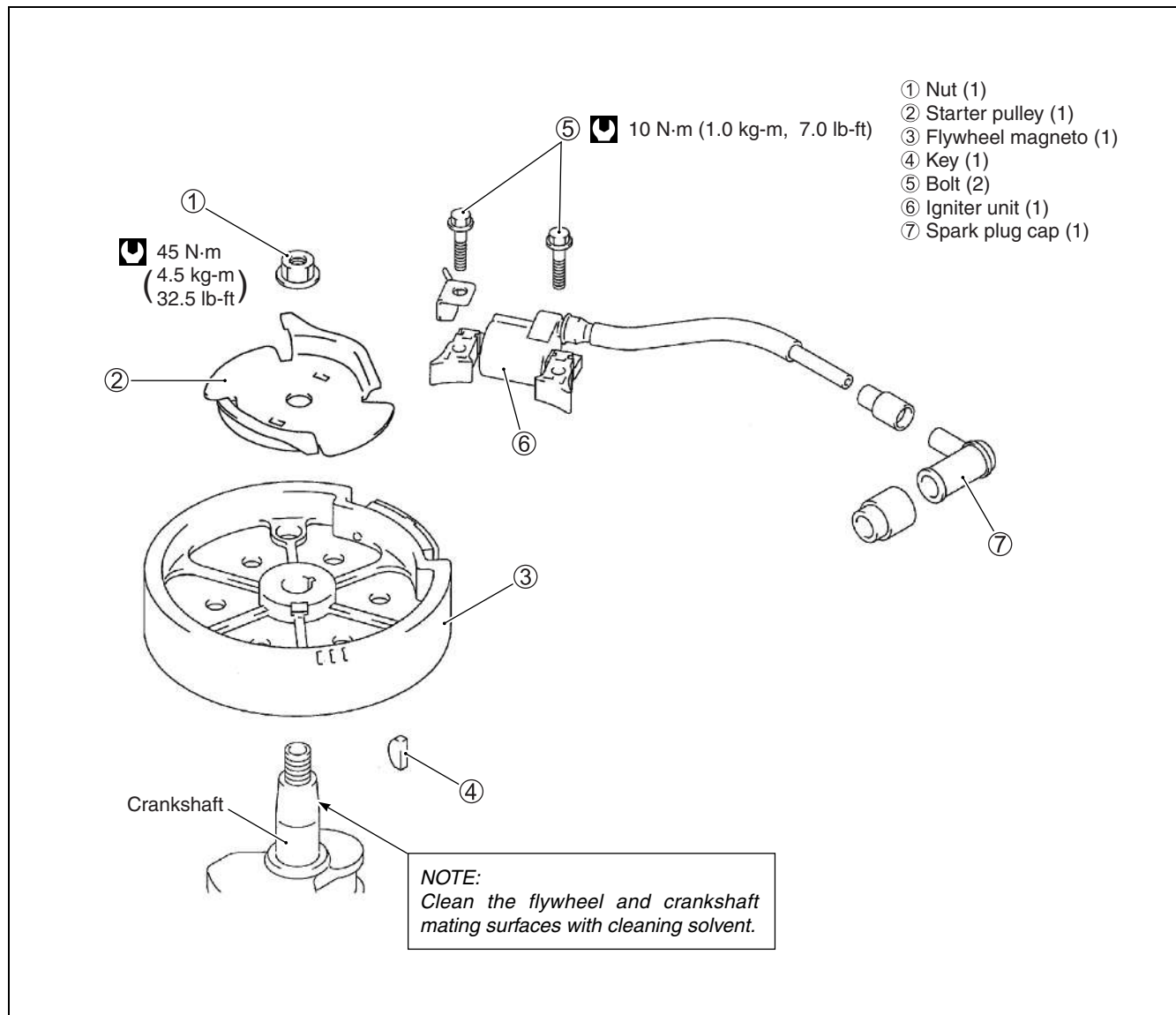
1. The text of this manual is divided into sections.
2. The section titles are listed in the GROUP INDEX.
3. Holding the manual as shown at the right will allow you to find the first page of the section easily.
4. The contents are listed on the first page of each section to help you find the item and page you need.



COMPONENT PARTS AND IMPORTANT ITEM ILLUSTRATIONS












Under the name of each system or unit, an exploded view is provided with work instructions and other service information such as the tightening torque, lubrication and locking agent points.

Example:



SYMBOL

Listed in the table below are the symbols indicating instructions and other important information necessary for proper servicing. Please note the definition for each symbol. You will find these symbols used throughout this manual. Refer back to this table if you are not sure of any symbol(s) meanings.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Torque control required. Data beside it indicates specified torque.		Apply SUZUKI SILICONE SEAL.
	Apply oil. Use the engine oil unless otherwise specified.		Apply THREAD LOCK "1342".
	Apply SUZUKI OUTBOARD MOTOR GEAR OIL.		Measure in resistance range.
	Apply SUZUKI SUPER GREASE "A".		Measure in continuity test range.
	Apply SUZUKI WATER RESISTANT GREASE.		Use special tool.
	Apply SUZUKI BOND "1207B".		

GENERAL INFORMATION

CONTENTS

WARNING / CAUTION / NOTE	1- 2
GENERAL PRECAUTIONS	1- 2
IDENTIFICATION NUMBER LOCATION	1- 4
FUEL AND OIL	1- 4
GASOLINE RECOMMENDATION	1- 4
ENGINE OIL	1- 5
ENGINE BREAK-IN	1- 6
WARM-UP RECOMMENDATION	1- 6
THROTTLE RECOMMENDATION	1- 6
PROPELLERS	1- 7
SPECIFICATIONS	1- 8
SERVICE DATA.....	1-10
TIGHTENING TORQUE	1-14
SPECIAL TOOLS	1-15
MATERIALS REQUIRED	1-17

WARNING / CAUTION / NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the symbol and the words WARNING, CAUTION and NOTE have special meanings. Pay special attention to the messages highlighted by these signal words.

⚠ WARNING

Indicates a potential hazard that could result in death or injury.

CAUTION

Indicates a potential hazard that could result in motor damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

Please note, however, that the warnings and cautions contained in this manual cannot possibly cover all potential hazards relating to the servicing, or lack of servicing, of the outboard motor. In addition to the WARNING and CAUTION stated, you must also use good judgement and observe basic mechanical safety principles.

GENERAL PRECAUTIONS

⚠ WARNING

- Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the outboard motor.
- To avoid eye injury, always wear protective goggles when filing metals, working on a grinder, or doing other work, which could cause flying material particles.
- When 2 or more persons work together, pay attention to the safety of each other.
- When it is necessary to run the outboard motor indoors, make sure that exhaust gas is vented outdoors.
- When testing an outboard motor in the water and on a boat, ensure that the necessary safety equipment is on board. Such equipment includes: flotation aids for each person, fire extinguisher, distress signals, anchor, paddles, bilge pump, first-aid kit, emergency starter rope, etc.
- When working with toxic or flammable materials, make sure that the area you work in is well-ventilated and that you follow all of the material manufacturer's instructions.
- Never use gasoline as a cleaning solvent.
- To avoid getting burned, do not touch the engine, engine oil or exhaust system during or shortly after engine operation.
- Oil can be hazardous. Children and pets may be harmed from contact with oil. Keep new and used oil away from children and pets. To minimize your exposure to oil, wear a long sleeve shirt and moisture-proof gloves (such as dishwashing gloves) when changing oil. If oil contacts your skin, wash thoroughly with soap and water. Launder any clothing or rags if wet with oil. Recycle or properly dispose of used oil.
- After servicing fuel, oil/engine cooling system and exhaust system, check all lines and fittings related to the system for leaks.
- Carefully adhere to the battery handling instructions laid out by the battery supplier.

CAUTION

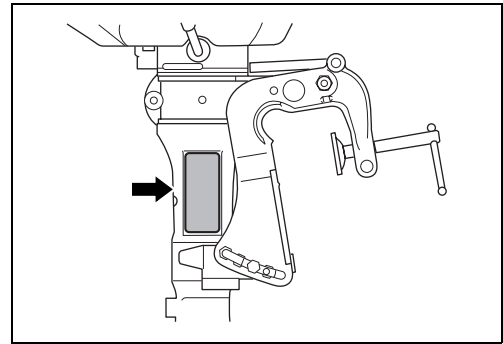
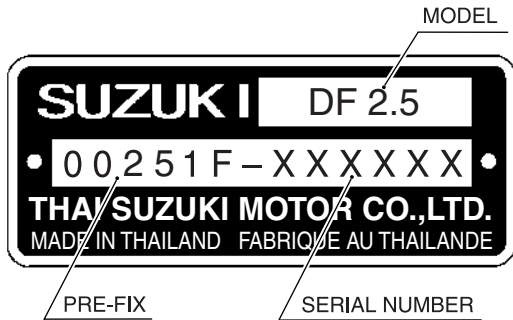
- If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.
 - When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.
 - Be sure to use special tools when instructed.
 - Make sure that all parts used in assembly are clean and also lubricated when specified.
 - When use of a certain type of lubricant, bond, or sealant is specified, be sure to use the specified type.
 - When removing the battery, disconnect the negative cable first and then the positive cable. When reconnecting the battery, connect the positive cable first and then the negative cable.
 - When performing service to electrical parts, if the service procedures do not require using battery power, disconnect the negative cable from the battery.
 - Tighten cylinder head and case bolts and nuts, beginning with larger diameter and ending with smaller diameter. Always tighten from inside to outside diagonally to the specified tightening torque.
 - Whenever you remove oil seals, gaskets, packing, O-rings, locking washers, locking nuts, cotter pins, circlips, and certain other parts as specified, always replace them with new. Also, before installing these new parts, be sure to remove any left over material from the mating surfaces.
 - Never reuse a circlip. When installing a new circlip, take care not to expand the end gap larger than required to slip the circlip over the shaft. After installing a circlip, always ensure that it is completely seated in its groove and securely fitted.
 - Use a torque wrench to tighten fasteners to the specified torque. Wipe off grease and oil if a threads is smeared with them.
 - After reassembly, check parts for tightness and proper operation.
-
- To protect the environment, do not unlawfully dispose of used motor oil, other fluids, and batteries.
 - To protect the Earth's natural resources, properly dispose of used motor and parts.

IDENTIFICATION NUMBER LOCATION

MODEL, PRE-FIX, SERIAL NUMBER

The MODEL, PRE-FIX and SERIAL NUMBER of the motor are stamped on a plate attached to the driveshaft housing.

Example



ENGINE SERIAL NUMBER

A second engine serial number plate is pressed into a boss on the cylinder block.



FUEL AND OIL

GASOLINE RECOMMENDATION

Suzuki highly recommends that you use alcohol-free unleaded gasoline with a minimum pump octane rating of 87 (R/2 + M/2 method) or 91 (Research method). However, blends of unleaded gasoline and alcohol with equivalent octane content may be used.

Allowable maximum blend of a single additive (not combination):

5% Methanol, 10% Ethanol, 15% MTBE

CAUTION

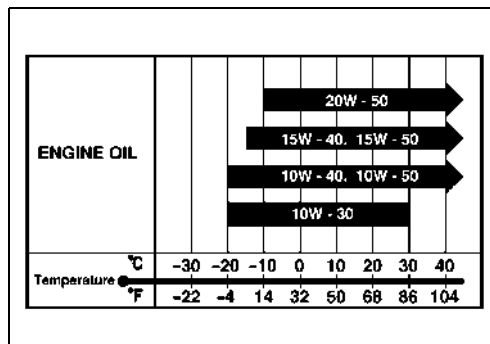
**If leaded gasoline is used, engine damage may result.
Use only unleaded gasoline.**

ENGINE OIL

Use only oils that are rated SE, SF, SG, SH or SJ under the API (American Petroleum Institute) classification system.

The viscosity rating should be SAE 10W-40.

If an SAE 10W-40 motor oil is not available, select an alternative according to the chart at right.



ENGINE BREAK-IN

The first 10 hours are critically important to ensure correct running of either a brand new motor or a motor that has been reconditioned or rebuilt. How the motor is operated during this time will have direct bearing on its life span and long-term durability.

Break-in period: 10 hours

WARM-UP RECOMMENDATION

Allow sufficient idling time (more than 5 minutes) for the engine to warm up after cold engine starting.

THROTTLE RECOMMENDATION

NOTE:

Avoid maintaining a constant engine speed for an extended period at any time during the engine break-in by varying the throttle position occasionally.

1. FIRST 2 HOURS

For first 15 minutes, operate the engine in-gear at idling speed.

During the remaining 1 hour and 45 minutes, operate the engine in-gear at less than 1/2 (half) throttle (3 000 r/min).

NOTE:

The throttle may be briefly opened beyond the recommended setting to plane the boat, but must be reduced to the recommended setting immediately after planing.

2. NEXT 1 HOUR

Operate the engine in-gear at less than 3/4 (three-quarter) throttle (4 000 r/min).

3. LAST 7 HOURS

Operate the engine in-gear at desired engine speed.

However, do not operate continuously at full throttle for more than 5 minutes.

PROPELLERS

An outboard motor is designed to develop its rated power within a specified engine speed range. The maximum rated power delivered by the DF2.5 models are shown below.

Recommended operating range	5 250 – 5 750 r/min
------------------------------------	----------------------------

If the standard propeller fails to meet the above requirement, use another pitch propeller to hold the engine speed within the range specified above.

Propeller selection chart

Code Number	Blade	x	Diameter	x	Pitch
A400	3	x	188 mm (7-3/8 in)	x	115 mm (4-1/2 in)
A510	3	x	188 mm (7-3/8 in)	x	135 mm (5-3/8 in)

CAUTION

Installing a propeller with pitch either too high or too low will cause incorrect maximum engine speed, which may result in severe damage to the motor.

*** SPECIFICATIONS**

* These specifications are subject to change without notice.

Item	Unit	Data
		DF2.5
PRE-FIX		00251F

DIMENSIONS & WEIGHT

Overall length (front to back)		mm (in)	437 (17.2): with tiller handle raised
Overall width (side to side)		mm (in)	262 (10.3)
Overall height	S	mm (in)	963 (37.9)
Weight (without engine oil)	S	kg (lbs)	13.0 (28.7)
Transom height	S	mm (inch type)	435 (15)

PERFORMANCE

Maximum output		kW (PS)	1.8 (2.5)
Recommended operating range		r/min	5 250 – 5 750
Idle speed		r/min	1 900 ± 100 (in-gear: approx. 1 500)

POWER HEAD

Engine type		4-stroke OHV
Number of cylinders		1
Bore	mm (in)	48.0 (1.89)
Stroke	mm (in)	38.0 (1.50)
Total displacement	cm ³ (cu. in)	68 (4.1)
Compression ratio	: 1	9.0
Spark plug	NGK	CR6HSA
Ignition system		Transistorized ignition
Fuel supply system		Carburetor
Exhaust system		Above prop exhaust
Cooling system		Water cooled
Lubrication system		Wet sump by trochoid pump
Starting system		Manual
Choke system		Manual
Throttle control		Twist grip

Item	Unit	Data
		DF2.5

FUEL & OIL

Fuel		Suzuki highly recommends that you use alcohol-free unleaded gasoline with a minimum pump octane rating of 87 (R/2 + M/2 method) or 91 (Research method). However, blends of unleaded gasoline and alcohol with equivalent octane content may be used.
Fuel tank capacity (Built-in tank)	L (US/Imp. gal)	1.0 (0.26/0.22)
Engine oil		API classification SE, SF, SG, SH, SJ Viscosity rating SAE 10W-40
Engine oil amounts	L (US/Imp. qt)	0.38 (0.40/0.33)
Gear oil		SUZUKI Outboard Motor Gear Oil (SAE #90 hypoid gear oil)
Gearcase oil amounts	ml (US/Imp. oz)	60 (2.0/2.1)

BRACKET

Trim angle	Degrees	6 – 20
Number of tilt pin position		4
Maximum tilt angle	Degrees	74 (from lowest tilt pin position)

LOWER UNIT

Reversing system	Gear				
Transmission	Forward-Neutral				
Reduction system	Bevel gear				
Gear ratio	13 : 28 (2.15)				
Drive line impact protection	Shear pin				
Propeller	Blade	×	Diam.	×	Pitch
	3	×	188 mm (7-3/8 in)	×	115 mm (4-1/2 in) (A400)
	3	×	188 mm (7-3/8 in)	×	135 mm (5-3/8 in) (A510)

*** SERVICE DATA**

* These service data are subject to change without notice.

Item	Unit	Data
		DF2.5

POWER HEAD

Recommended operating range	r/min	5 250 – 5 750
Idle speed	r/min	1 900 ± 100 (in-gear: approx. 1 500)
* Cylinder compression	kPa (kg/cm ² , psi)	960 – 1 400 (9.6 – 14.0, 137 – 199)
Engine oil		API classification SE, SF, SG, SH, SJ Viscosity rating SAE 10W-40
Engine oil amounts	L (US/Imp. qt)	0.38 (0.40/0.33)
Thermostat operating temperature	°C (°F)	48 – 52 (118 – 126)

* Figures shown are guidelines only, not absolute service limit.

CARBURETOR

Type	Walbro	LMJ-26
I.D mark		97J10
Main jet	#	70
Pilot jet	#	32
Pilot screw	Turns open	Pre-set
Float height	mm	10 ± 2

CYLINDER HEAD/CAMSHAFT

Cylinder head distortion	Limit	mm (in)	0.05 (0.002)	
Cam height	IN, EX	STD	mm (in)	28.480 – 28.680 (1.1213 – 1.1291)
		Limit	mm (in)	28.180 (1.1094)
Rocker arm shaft hole diameter	IN	STD	mm (in)	4.015 – 4.027 (0.1581 – 0.1585)
	EX			
Rocker arm shaft outside diameter	IN	STD	mm (in)	3.990 – 4.005 (0.1571 – 0.1577)
	EX			

Item	Unit	Data	
		DF2.5	

VALVE/VALVE GUIDE

Valve diameter		IN	mm (in)	20.0 (0.79)	
		EX	mm (in)	18.0 (0.71)	
Valve clearance (Cold engine condition)	IN	STD	mm (in)	0.13 – 0.17 (0.005 – 0.007)	
	EX	STD	mm (in)	0.13 – 0.17 (0.005 – 0.007)	
Valve seat angle		IN	—	45°	
		EX	—	45°	
Valve guide to valve stem clearance		IN	STD	mm (in)	0.010 – 0.037 (0.0004 – 0.0015)
			Limit	mm (in)	0.075 (0.0030)
		EX	STD	mm (in)	0.025 – 0.052 (0.0010 – 0.0020)
			Limit	mm (in)	0.090 (0.0035)
Valve guide inside diameter	IN, EX	STD	mm (in)	4.000 – 4.012 (0.1575 – 0.1580)	
Valve stem outside diameter		IN	STD	mm (in)	3.975 – 3.990 (0.1565 – 0.1571)
		EX	STD	mm (in)	3.960 – 3.975 (0.1559 – 0.1565)
Valve stem deflection	IN, EX	Limit	mm (in)	0.35 (0.014)	
Valve stem runout	IN, EX	Limit	mm (in)	0.05 (0.002)	
Valve head radial runout	IN, EX	Limit	mm (in)	0.08 (0.003)	
Valve head thickness	IN, EX	Limit	mm (in)	0.5 (0.02)	
Valve seat contact width	IN, EX	STD	mm (in)	0.8 – 1.0 (0.03 – 0.04)	
Valve spring free length		STD	mm (in)	22.42 (0.883)	
		Limit	mm (in)	21.52 (0.847)	
Valve spring tension		STD	N (kg, lbs)	36.5 – 41.9 (3.65 – 4.19, 8.05 – 9.24) for 15 mm (0.6 in)	
		Limit	N (kg, lbs)	33.3 (3.33, 7.34) for 15 mm (0.6 in)	

Item	Unit	Data	
		DF2.5	

CYLINDER/PISTON/PISTON RING

Cylinder distortion	Limit	mm (in)	0.05 (0.002)
Piston to cylinder clearance	STD	mm (in)	0.018 – 0.033 (0.0007 – 0.0013)
	Limit	mm (in)	0.100 (0.0039)
Cylinder bore	STD	mm (in)	48.000 – 48.015 (1.8898 – 1.8904)
Cylinder measuring position		mm (in)	20 (0.8) from cylinder top surface
Piston skirt diameter	STD	mm (in)	47.975 – 47.990 (1.8888 – 1.8894)
Piston measuring position		mm (in)	5 (0.2) from piston skirt end
Cylinder bore wear	Limit	mm (in)	0.100 (0.0039)
Piston ring end gap	1st, STD	mm (in)	0.15 – 0.35 (0.006 – 0.014)
	2nd, Limit	mm (in)	0.50 (0.020)
Piston ring free end gap	1st	STD	Approx. 6.1 (0.24)
		Limit	4.9 (0.19)
	2nd	STD	Approx. 5.7 (0.22)
		Limit	4.6 (0.18)
Piston ring to groove clearance	1st, STD	mm (in)	0.020 – 0.060 (0.0008 – 0.0024)
	2nd, Limit	mm (in)	0.120 (0.0047)
Piston ring groove width	1st, STD	mm (in)	1.21 – 1.23 (0.048 – 0.049)
	Oil, STD	mm (in)	1.51 – 1.53 (0.059 – 0.060)
Piston ring thickness	1st, STD	mm (in)	1.17 – 1.19 (0.046 – 0.047)
Pin clearance in piston pin hole	STD	mm (in)	0.002 – 0.013 (0.0001 – 0.0005)
	Limit	mm (in)	0.040 (0.0016)
Piston pin outside diameter	STD	mm (in)	11.995 – 12.000 (0.4722 – 0.4724)
	Limit	mm (in)	11.980 (0.4717)
Piston pin hole diameter	STD	mm (in)	12.002 – 12.008 (0.4725 – 0.4728)
	Limit	mm (in)	12.030 (0.4736)
Pin clearance in conrod small end	STD	mm (in)	0.006 – 0.019 (0.0002 – 0.0007)
	Limit	mm (in)	0.050 (0.0020)

Item	Unit	Data	
		DF2.5	

CRANKSHAFT/CONROD

Conrod small end inside diameter	STD	mm (in)	12.006 – 12.014 (0.4727 – 0.4730)
	Limit	mm (in)	12.040 (0.4740)
Conrod big end oil clearance	STD	mm (in)	0.015 – 0.035 (0.0006 – 0.0014)
	Limit	mm (in)	0.080 (0.0031)
Conrod big end inside diameter	STD	mm (in)	19.015 – 19.025 (0.7486 – 0.7490)
Crank pin outside diameter	STD	mm (in)	18.990 – 19.000 (0.7476 – 0.7480)
Crank pin outside diameter difference (out-of-round and taper)	Limit	mm (in)	0.010 (0.0004)
Conrod big end side clearance	STD	mm (in)	0.20 – 0.70 (0.008 – 0.028)
	Limit	mm (in)	1.00 (0.039)
Conrod big end width	STD	mm (in)	17.50 – 17.80 (0.689 – 0.701)
Crank pin width	STD	mm (in)	18.00 – 18.20 (0.709 – 0.717)
Crankshaft runout	Limit	mm (in)	0.05 (0.002)

ELECTRICAL

Ignition timing		Degrees	BTDC 30
Ignition coil resistance	Primary	Ω at 20 °C	0.5 – 0.9
	Secondary	k Ω at 20 °C	10 – 16
Spark plug cap resistance		k Ω at 20 °C	4 – 6
Standard spark plug	Type	NGK	CR6HSA
	Gap	mm (in)	0.6 – 0.7 (0.024 – 0.028)

LOWER UNIT

Preliminary gear shim & thrust washer

Pinion gear backup shim	mm (in)	2.0 (0.08)
Forward gear backup shim	mm (in)	0.5 (0.02)
Propeller shaft reverse thrust washer	mm (in)	1.8 (0.07)

Initial selection-shim adjustment may be required.

TIGHTENING TORQUE

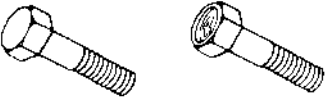



Tightening torque – Important fasteners

ITEM	THREAD DIAMETER	TIGHTENING TORQUE		
		N·m	kg·m	lb·ft
Cylinder head cover bolt	5 mm	7	0.7	5.0
Cylinder head bolt	6 mm	13	1.3	9.5
Crankcase bolt	6 mm	11	1.1	8.0
Conrod cap bolt	5 mm	7	0.7	5.0
Valve adjusting lock nut	5 mm	7	0.7	5.0
Intake pipe bolt	6 mm	11	1.1	8.0
Carburetor mounting bolt	6 mm	10	1.0	7.0
Flywheel nut	10 mm	45	4.5	32.5
Igniter unit bolt	6 mm	10	1.0	7.0
Engine oil drain plug	10 mm	10	1.0	7.0
Power unit mounting bolt	6 mm	10	1.0	7.0
Tiller handle pivot bolt	8 mm	17	1.7	12.5
Lower cover bolt	6 mm	8	0.8	6.0
Swivel shaft nut	8 mm	10	1.0	7.0
Gearcase bolt	6 mm	8	0.8	6.0
Water pump case bolt	6 mm	5	0.5	3.5
Propeller shaft bearing housing bolt	6 mm	8	0.8	6.0

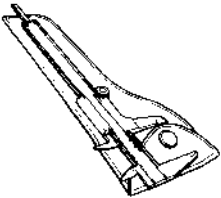
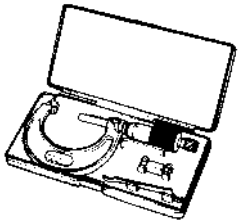
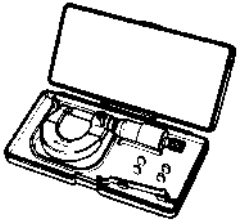
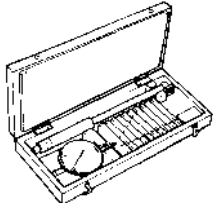
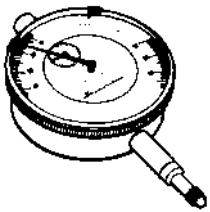
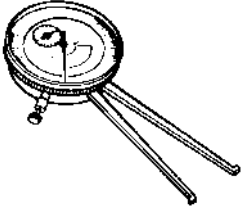
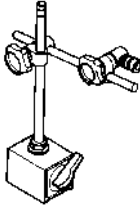
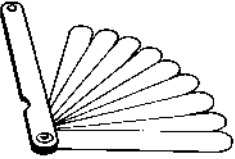
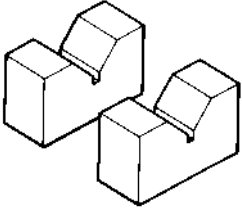


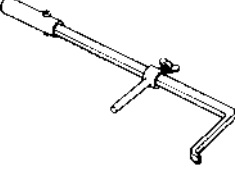



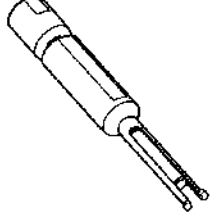
Tightening torque – General bolt

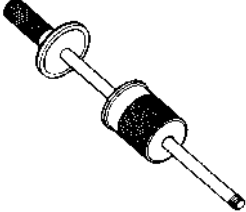
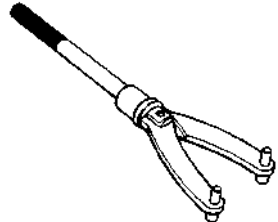
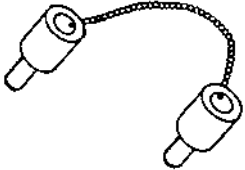
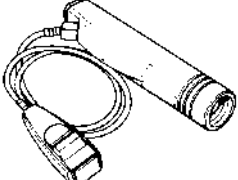

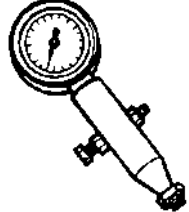

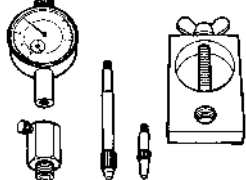
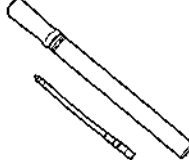
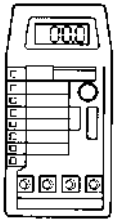
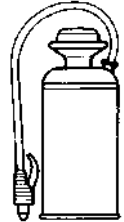
NOTE:

These value are only applicable when torque for a general bolt is not listed in the "Important fasteners" table.

TYPE OF BOLT	THREAD DIAMETER	TIGHTENING TORQUE		
		N·m	kg·m	lb·ft
 (Conventional or "4" marked bolt)	5 mm	2 – 4	0.2 – 0.4	1.5 – 3.0
	6 mm	4 – 7	0.4 – 0.7	3.0 – 5.0
	8 mm	10 – 16	1.0 – 1.6	7.0 – 11.5
	10 mm	22 – 35	2.2 – 3.5	16.0 – 25.5
 (Stainless steel bolt)	5 mm	2 – 4	0.2 – 0.4	1.5 – 3.0
	6 mm	6 – 10	0.6 – 1.0	4.5 – 7.0
	8 mm	15 – 20	1.5 – 2.0	11.0 – 14.5
	10 mm	34 – 41	3.4 – 4.1	24.5 – 29.5
 (7 marked or  marked bolt)	5 mm	3 – 6	0.3 – 0.6	2.0 – 4.5
	6 mm	8 – 12	0.8 – 1.2	6.0 – 8.5
	8 mm	18 – 28	1.8 – 2.8	13.0 – 20.0
	10 mm	40 – 60	4.0 – 6.0	29.0 – 43.5

SPECIAL TOOLS




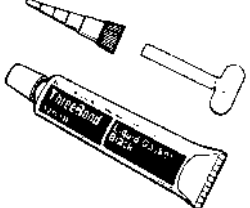

<p>1.</p>  <p>09900-20101 (150 mm) Vernier calipers</p>	<p>2.</p>  <p>09900-20202 Micrometer (25 – 50 mm)</p>	<p>3.</p>  <p>09900-20205 Micrometer (0 – 25 mm)</p>	<p>4.</p>  <p>09900-20530 Cylinder gauge set (40 – 100 mm)</p>
<p>5.</p>  <p>09900-20602 Dial gauge</p>	<p>6.</p>  <p>09900-20605 Dial calipers (10 – 34 mm)</p>	<p>7.</p>  <p>09900-20701 Magnetic stand</p>	<p>8.</p>  <p>09900-20803 Thickness gauge</p>
<p>9.</p>  <p>09900-21304 Steel “V” block set</p>	<p>10.</p>  <p>09900-22301 Plastigauge (0.025 – 0.076 mm)</p>	<p>11.</p>  <p>09900-26006 Engine tachometer</p>	<p>12.</p>  <p>09913-50121 Oil seal remover</p>
<p>13.</p>  <p>09915-63311 Compression gauge adaptor</p>	<p>14.</p>  <p>09915-64512 Compression gauge</p>	<p>15.</p>  <p>09916-10911 Valve lapper</p>	<p>16.</p>  <p>09921-20210 Bearing remover</p>

<p>17.</p>  <p>09930-30104 Sliding hammer</p>	<p>18.</p>  <p>09930-40113 Flywheel holder</p>	<p>19.</p>  <p>09930-40120 Rotor holder attachment</p>	<p>20.</p>  <p>09930-76420 Timing light</p>
<p>21.</p>  <p>09930-99320 Digital tester</p>	<p>22.</p>  <p>09950-69512 Gearcase oil leakage tester</p>	<p>23.</p>  <p>09950-69710 Gear oil leakage tester attachment</p>	<p>24.</p>  <p>09951-09530 Gear adjusting gauge</p>
<p>25.</p>  <p>09952-99310 Air pump assy</p>	<p>26.</p>  <p>99954-53008-820* Digital voltmeter</p>	<p>27.</p>  <p>99954-53883* Gear oil filler</p>	

NOTE:

* Marked part No. is in U.S. market only.

MATERIALS REQUIRED

<p>SUZUKI OUTBOARD MOTOR GEAR OIL</p>  <p>99000-22540 (400 ml × 24 pcs.)</p>	<p>SUZUKI WATER RESISTANT GREASE</p>  <p>99000-25161 (250 g)</p>	<p>SUZUKI SILICONE SEAL</p>  <p>99000-31120 (50 g)</p>	<p>SUZUKI BOND "1207B"</p>  <p>*99104-33140 99000-31140 (100 g)</p>
<p>THREAD LOCK "1342"</p>  <p>99000-32050 (50 g)</p>	<p>4-STROKE MOTOR OIL</p> <p>API: SE, SF, SG, SH, SJ SAE: 10W-40</p>		

NOTE:

* Marked part No. is in U.S. market only.

PERIODIC MAINTENANCE

CONTENTS

PERIODIC MAINTENANCE SCHEDULE	2- 2
PERIODIC MAINTENANCE CHART	2- 2
MAINTENANCE AND TUNE-UP PROCEDURES	2- 3
ENGINE OIL	2- 3
GEAR OIL	2- 5
LUBRICATION	2- 6
SPARK PLUG	2- 7
VALVE CLEARANCE	2- 8
IDLE SPEED	2-11
CARBURETOR	2-12
IGNITION TIMING	2-12
BREATHER HOSE AND FUEL LINE	2-13
FUEL FILTER	2-13
WATER PUMP	2-13
WATER PUMP IMPELLER	2-13
PROPELLER AND PIN	2-14
ANODE	2-14
BOLTS AND NUTS	2-15
CYLINDER COMPRESSION	2-16

PERIODIC MAINTENANCE SCHEDULE

The chart below lists the recommended intervals for all the required periodic service work necessary to keep the motor operating at peak performance and economy.

Maintenance intervals should be judged by number of hours or months, whichever comes first.

NOTE:

More frequent servicing should be performed on outboard motors that are used under severe conditions.

PERIODIC MAINTENANCE CHART

Interval Item to be serviced	Initial 20 hrs. or 1 month	Every 50 hrs. or 3 months	Every 100 hrs. or 6 months	Every 200 hrs. or 12 months
Spark plug	—	—	I	R
Breather hose and Fuel line	I	I	I	I
	Replace every 2 years.			
Engine oil	R	—	R	R
Gear oil	R	—	R	R
Lubrication	—	I	I	I
Anode	—	I	I	I
Fuel filter	Replace every 400 hours or 2 years.			
Ignition timing	—	—	—	I
Carburetor	I	—	I	I
Idle speed	I	—	—	I
Valve clearance	I	—	—	I
Water pump	—	—	—	I
Water pump impeller	—	—	—	R
Propeller and Pin	I	—	I	I
Bolts and Nuts	T	—	T	T

I: Inspect and clean, adjust, lubricate or replace, if necessary **T:** Tighten **R:** Replace

MAINTENANCE AND TUNE-UP PROCEDURES

This section describes the servicing procedures for each of the periodic maintenance requirements.

ENGINE OIL

ENGINE OIL LEVEL CHECK

Inspect the oil level before every use.

1. Place the motor in a vertical position.
2. Check the oil level through the oil level inspection window
 - ①. The oil should be between the upper and lower limits.

If the level is low, add the recommended oil to the upper limit.

Recommended oil:

- **4 stroke motor oil**
- **API classification** SE, SF, SG, SH, SJ
- **Viscosity rating** SAE 10W-40

Perform the following steps in order to add the oil to the upper limit:

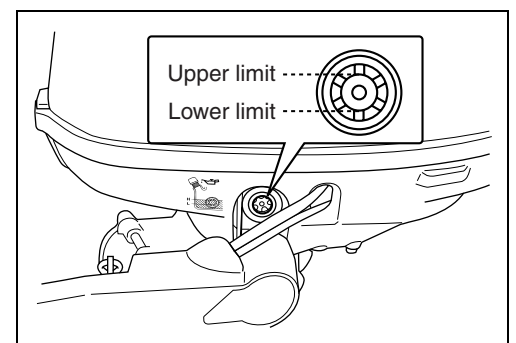
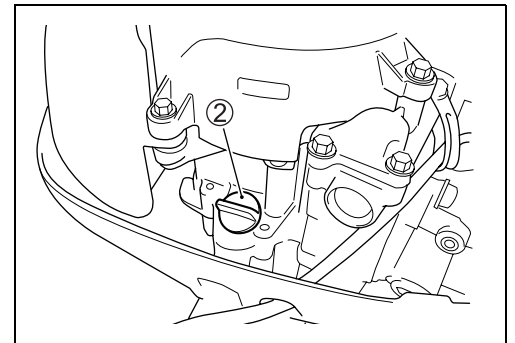
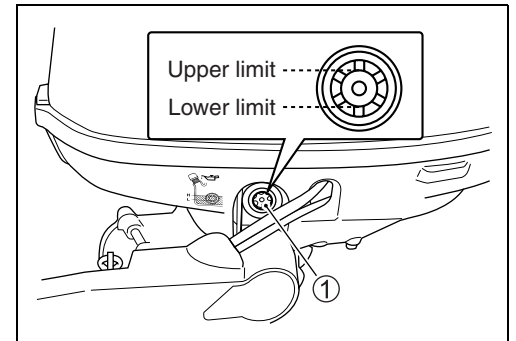
3. Remove the motor cover.
4. Remove the oil filler cap ②.

5. Add the recommended engine oil until the oil level reaches the upper limit.

CAUTION

Do not overfill, as excessive oil can damage the engine.

6. Tighten the oil filler cap securely.



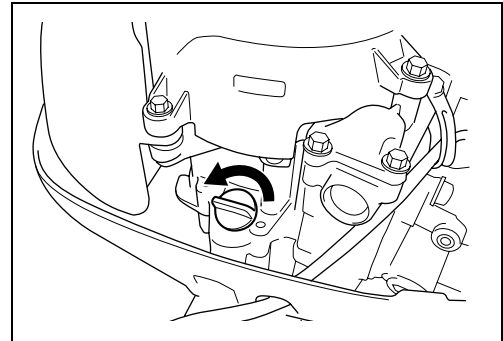
ENGINE OIL CHANGE

Change initially after 20 hours (1 month) and every 100 hours (6 months) thereafter.

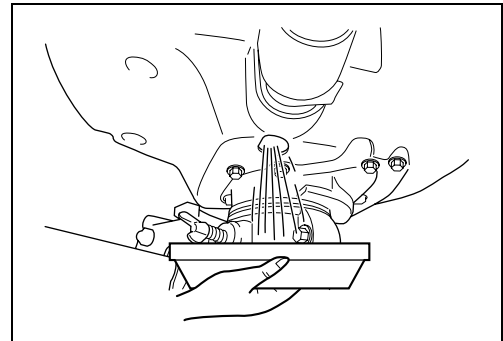
NOTE:

Change the engine oil while the engine is warm.

1. Place the motor in a vertical position and remove the motor cover.
2. Remove the oil filler cap.



3. Place a container under the engine oil drain plug.
4. Remove the engine oil drain plug and the gasket in order to drain the engine oil.

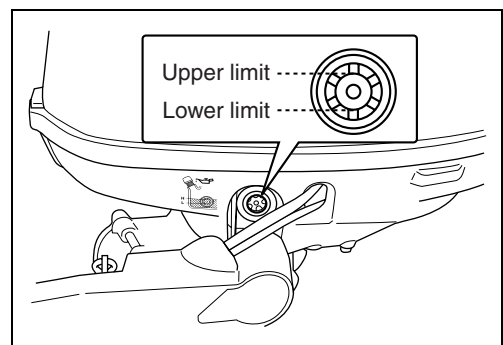


5. Install the gasket and the engine oil drain plug.
Tighten the plug to the specified torque.

🔧 Engine oil drain plug: 10 N·m (1.0 kg·m, 7.0 lb·ft)

CAUTION

Do not re-use the removed gasket. Always use a new gasket.



6. Pour the recommended engine oil to the upper limit.
7. Tighten the oil filler cap securely.

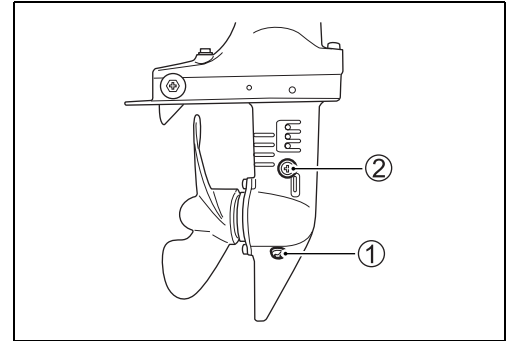
Engine oil amounts: 0.38 L (0.40/0.33 US/Imp. qt)

8. Start the engine. Allow the engine to run for several minutes at the idle speed. Check for oil leakage.
9. Turn off the engine and wait for approx. two minutes. Re-check the engine oil level. (See page 2-3.)

GEAR OIL

Change initially after 20 hours (1 month) and every 100 hours (6 months) thereafter.

1. Place the outboard motor upright on a level surface.
2. Place a container under the lower unit.
3. Remove the gear oil drain plug ① before the gear oil level plug ② and drain the gear oil.



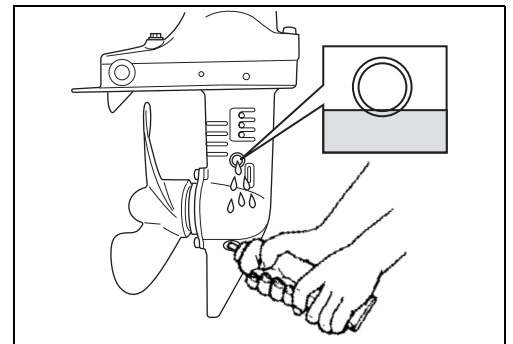
4. Fill with the recommended gear oil through the oil drain hole until the oil just starts to flow out from the oil level hole.

Gear oil amounts: 60 ml (2.0/2.1 US/Imp. oz)

Recommended oil:

**SUZUKI OUTBOARD MOTOR GEAR OIL or SAE #90
HYPOID GEAR OIL**

5. Install the oil level plug before removing the oil filler tube from the drain hole.
6. Install the oil drain plug.



CAUTION

Do not re-use the removed gasket. Always use a new gasket.

NOTE:

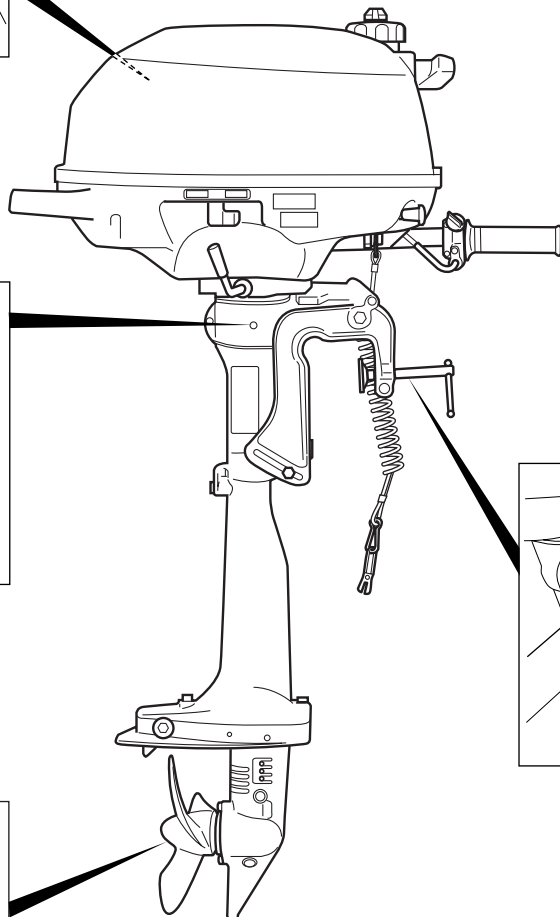
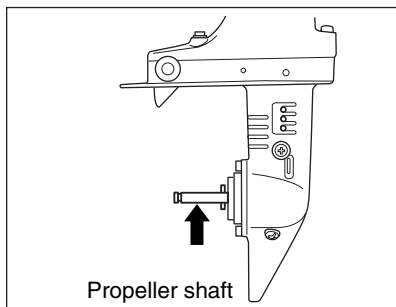
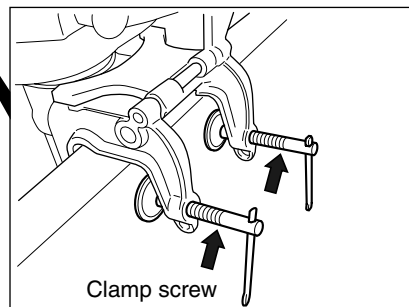
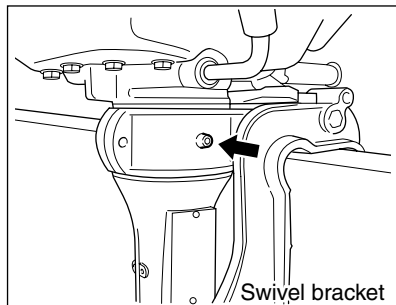
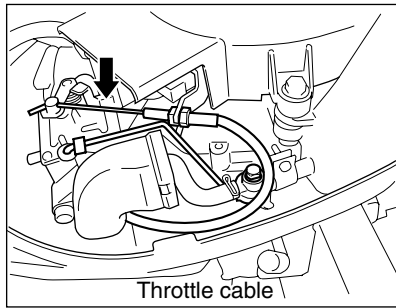
To avoid insufficient injection of the gear oil, check the gear oil level 10 minutes after doing the procedure in the step 6. If the oil level is low, slowly inject the gear oil up to the correct level.

LUBRICATION

Inspect every 50 hours (3 months).

Apply the Water Resistant Grease to the following points.

 99000-25161: SUZUKI WATER RESISTANT GREASE



SPARK PLUG

- Inspect every 100 hours (6 months).
- Replace every 200 hours (12 months).

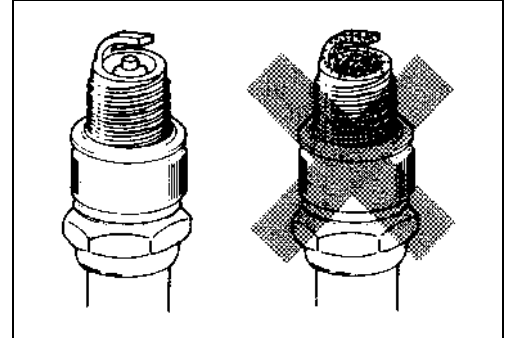
Standard spark plug: NGK CR6HSA

CAUTION

Only resistor (R) type spark plugs must be used with this engine. Using a non-resistor spark plug will cause ignition system malfunctions.

CARBON DEPOSIT


Inspect for a carbon deposit on the spark plug bases. If carbon is present, remove carbon with a spark plug cleaning machine or by carefully using a pointed tool.

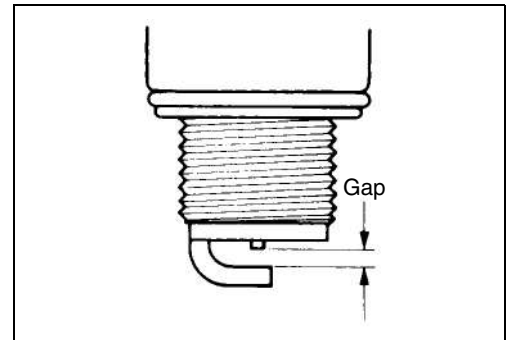


SPARK PLUG GAP

Measure for the spark plug gap using the thickness gauge. Adjust to within the specified range if the gap is out of the specification.

Spark plug gap: 0.6 – 0.7 mm (0.024 – 0.028 in)

 09900-20803: Thickness gauge



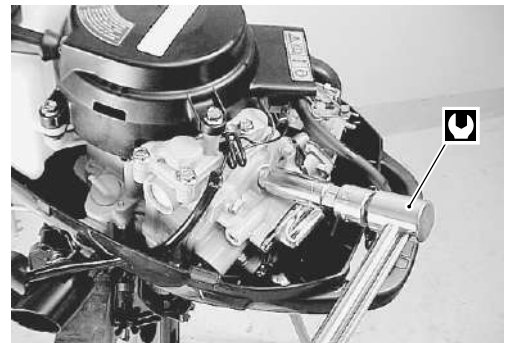
CONDITION OF ELECTRODE/INSULATOR

Check the electrode and insulator condition. If the electrode is extremely worn or burnt, replace the spark plug. If the spark plug has a broken insulator, damaged threads, etc., replace the spark plug.

CAUTION

Confirm the thread size and reach when replacing the plug. If the reach is too short, carbon will be deposited on the threaded portion of the plug hole resulting in possible engine damage.

 Spark plug: 11 N·m (1.1 kg·m, 8.0 lb-ft)

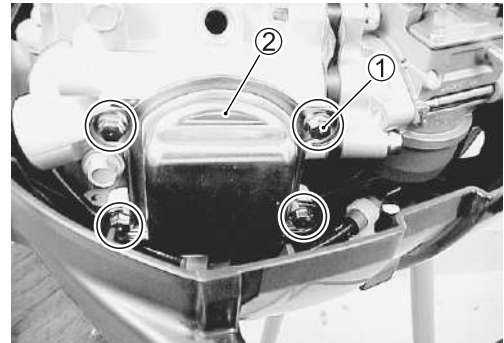
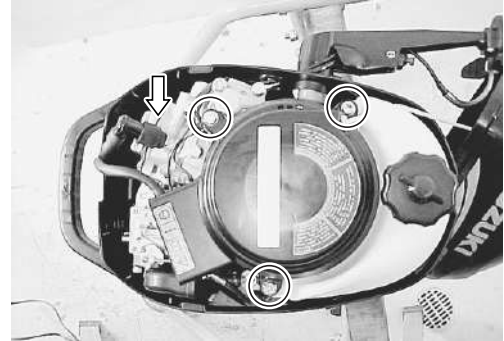


VALVE CLEARANCE

Inspect initially after 20 hours (1 month) and every 200 hours (12 months) thereafter.

CHECKING

- Remove the following parts:
 - Motor cover (See page 5-2)
 - Recoil starter (See page 5-2)
 - Spark plug
- Remove the four bolts ① and the cylinder head cover ②.
- Rotate the flywheel clockwise to bring the piston to the Top Dead Center (TDC) on a compression stroke.




CAUTION

Rotate the crankshaft clockwise to prevent water pump impeller damage.

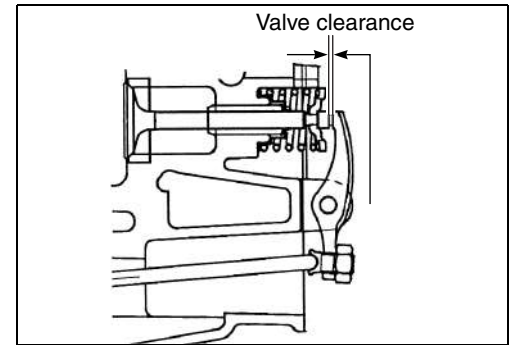
NOTE:

- To confirm whether the piston is at the TDC position on a compression stroke or on an exhaust stroke, rotate the flywheel within $\pm 15^\circ$ beyond the TDC position.
- If both rocker arms do not move at all, the piston is at the position on a compression stroke.
- If any rocker arm moves, the piston is at the TDC position on an exhaust stroke. Rotate the flywheel one more turn.
- The valve clearance specification is for COLD engine condition.

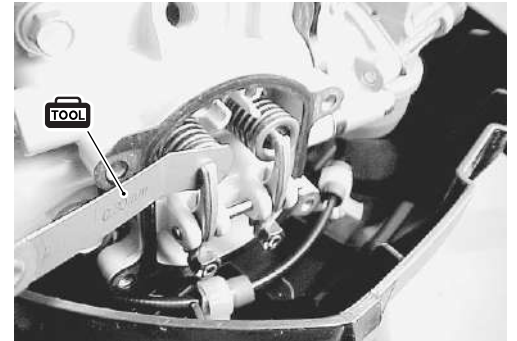
4. Measure the valve clearance by inserting thickness gauge between the valve stem end and the rocker arm.

 **09900-20803: Thickness gauge**

Valve clearance (cold engine condition):
IN. & EX. 0.13 – 0.17 mm (0.005 – 0.007 in)




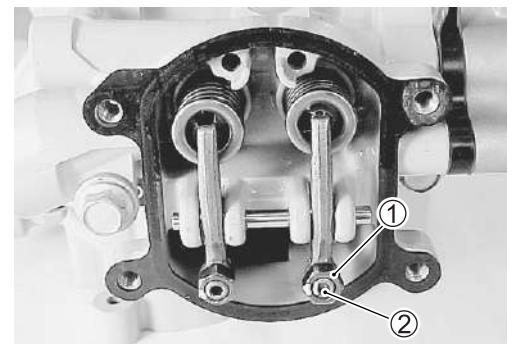
If the valve clearance is out of the specification, adjust the clearance.



ADJUSTMENT

5. Loosen the lock nut ① while holding the adjusting screw ②.
6. Turn the adjusting screw ② to bring the valve clearance to within the specification.

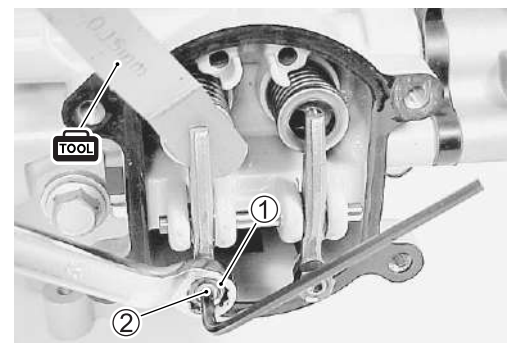
 **09900-20803: Thickness gauge**



7. Tighten the lock nut ① to the specified torque while holding the adjusting screw ②.

 **Valve adjusting lock nut: 7 N·m (0.7 kg·m, 5.0 lb·ft)**

8. Recheck the valve clearance.



INSTALLATION

Installation is reverse order of removal with the special attention to the following steps.

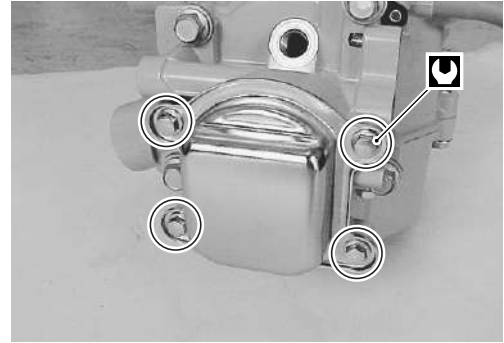
- Tighten the four cylinder head cover bolts diagonally to the specified torque.

 **Cylinder head cover bolt: 7 N·m (0.7 kg-m, 5.0 lb-ft)**

CAUTION

Do not re-use the removed gasket. Always use a new gasket.

- Make sure that the cylinder head cover gasket is installed correctly.

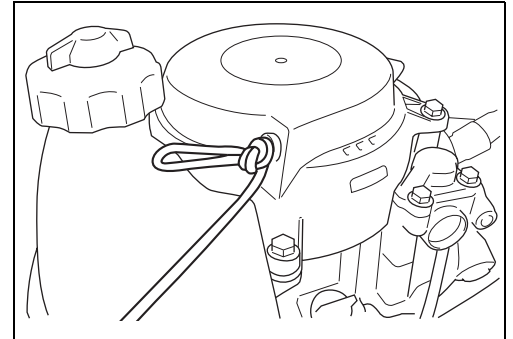


IDLE SPEED

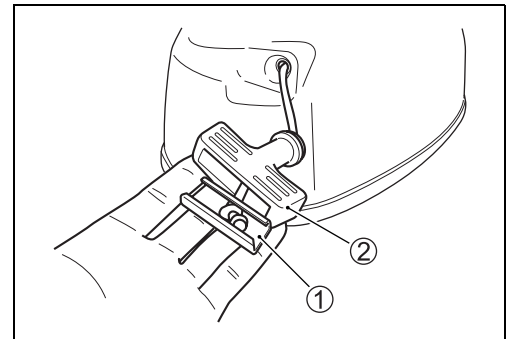
Inspect initially after 20 hours (1 month) and every 200 hours (12 months) thereafter.

CHECKING

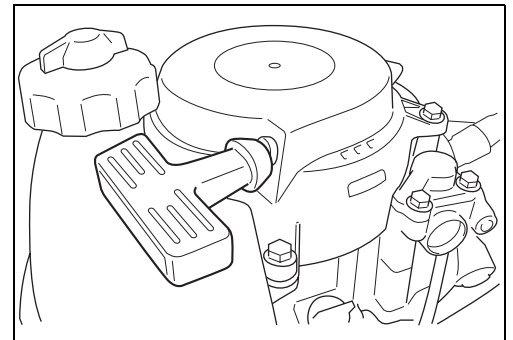
1. Check the link mechanism and the carburetor throttle valves for smooth operation.
2. Remove the motor cover.
3. Tie a knot in the rope inside of the motor cover, in order to prevent the rope binding onto the recoil reel when the starter grip is off.




4. Remove the knot from the grip holder ①. Remove the grip holder ① and the starter grip ②. Completely remove the motor cover.



5. Install the starter grip and the holder to the end of the rope.
6. Loosen the knot previously tied in the rope.



7. Attach the tachometer cord to the spark plug high-tension cord.

 **09900-26006: Engine tachometer**

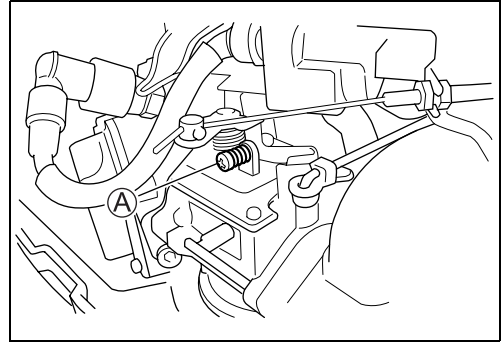
8. Start the engine.
9. Warm-up the engine for about 5 minutes.
10. Make sure the engine is in "NEUTRAL" and the throttle is fully closed.
11. Check the idle speed.

Idle speed (in neutral): 1 800 – 2 000 r/min



ADJUSTMENT

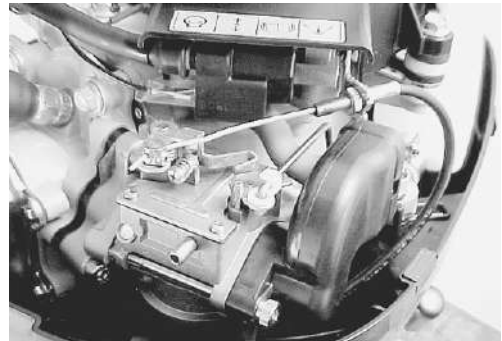
If engine idle speed is out of specification, adjust engine speed. Turn the idle adjustment screw (A) clockwise to increase idle speed or counterclockwise to decrease idle speed.



CARBURETOR

Inspect initially after 20 hours (1 month) and every 100 hours (6 months) thereafter.

Inspect the body, the float chamber, the lever, the linkage, the connector and the fuel inlet.
If crack or other damage is found, replace.




IGNITION TIMING

Inspect every 200 hours (12 months).

NOTE:

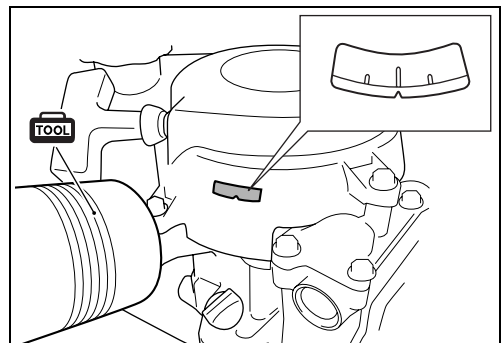
Before checking the ignition timing, make sure that the idle speed is adjusted within the specification.

1. Start and warm up the engine.
2. Attach the timing light cord to the spark plug high-tension cord.

 **09930-76420: Timing light**

3. Check the ignition timing while operating the engine at the idling speed.

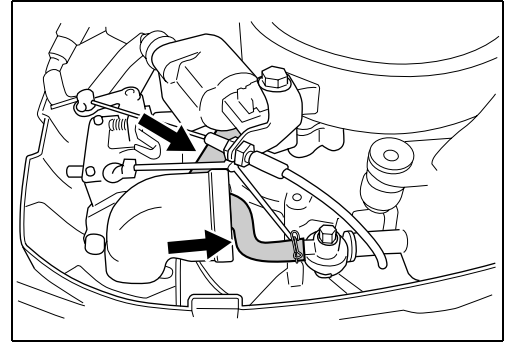
Ignition timing: Approx. BTDC 30°



BREATHER HOSE AND FUEL LINE

- Inspect initially after 20 hours (1 month) and every 50 hours (3 months) thereafter.
- Replace every 2 years.

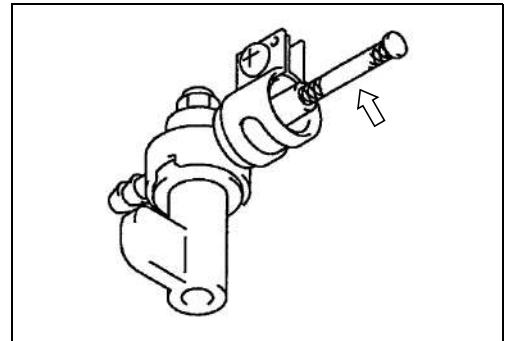
If leakage, crack, swelling or other damage is found, replace the breather hose and/or the fuel line.



FUEL FILTER

- Replace every 400 hours or 2 years.

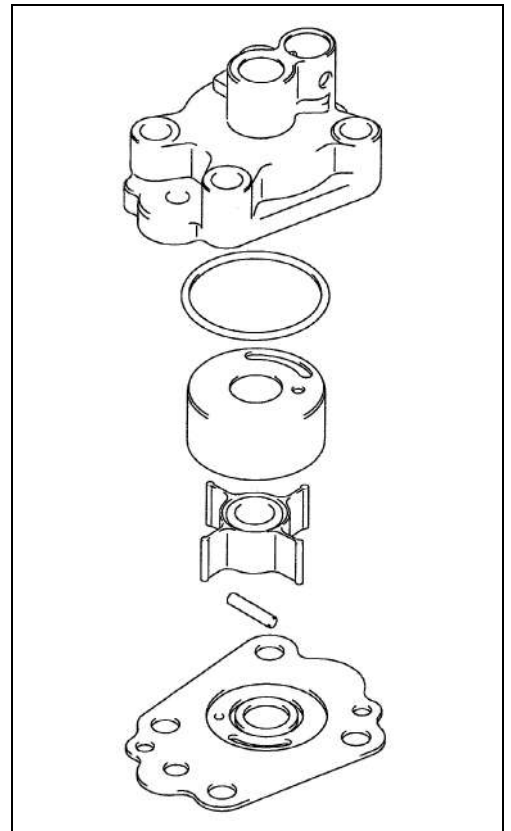
If water accumulation, sediment, leakage, crack, or other damage is found, replace the fuel cock Assy.



WATER PUMP

- Inspect every 200 hours (12 months).

Inspect the pump case, the sleeve and the under panel. If wear, crack, distortion or corrosion is found, replace.



WATER PUMP IMPELLER

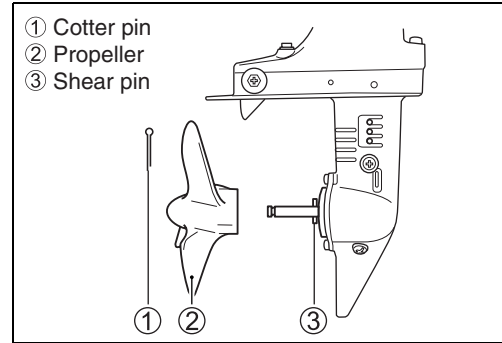
- Replace every 200 hours (12 months).

If cut, tear, or excessive wear is found, replace the impeller.

PROPELLER AND PIN

Inspect initially after 20 hours (1 month) and every 100 hours (6 months) thereafter.

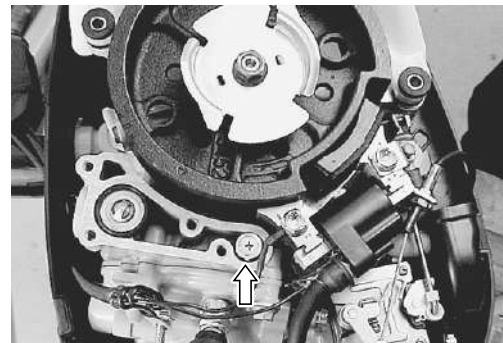
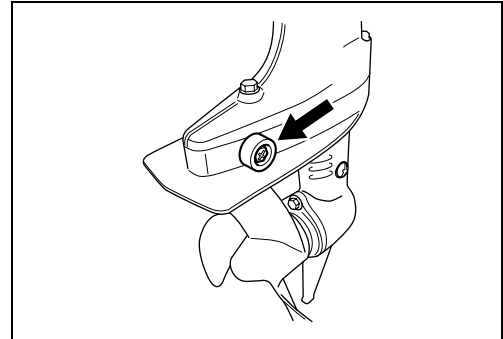
- Inspect the propeller for bent, chipped or broken blades. If damage noticeably affects operation, replace.
- Inspect the shear pin for bent or damage.
- Make sure that the cotter pin is installed securely.



ANODE

Inspect every 50 hours (3 months).

If 2/3 of the anode has corroded away, replace the anode.



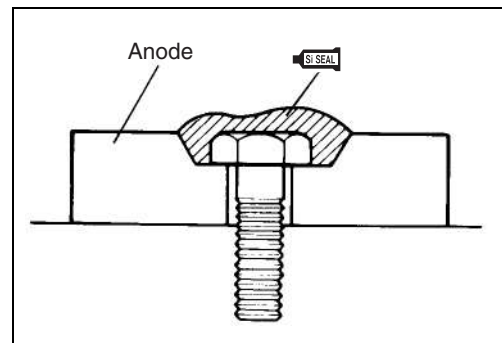
CAUTION

Do not paint the anode.

NOTE:

Apply the silicone seal to the anode securing bolts.

 99000-31120: SUZUKI SILICONE SEAL



BOLTS AND NUTS

Inspect initially after 20 hours (1 month) and every 100 hours (6 months) thereafter.

Check that all bolts and nuts listed below are tightened to the each specified torque.

ITEM	THREAD DIAMETER	TIGHTENING TORQUE		
		N·m	kgf·m	lb·ft
Cylinder head cover bolt	5 mm	7	0.7	5.0
Cylinder head bolt	6 mm	13	1.3	9.5
Flywheel nut	10 mm	45	4.5	32.5
Power unit mounting bolt	6 mm	10	1.0	7.0
Swivel shaft nut	8 mm	10	1.0	7.0
Gearcase bolt	6 mm	8	0.8	6.0

CYLINDER COMPRESSION

NOTE:

Figures shown are guidelines only, not absolute service limits.

Cylinder compression:

960 – 1 400 kPa (9.6 – 14.0 kg/cm², 137 – 199 psi)

Low compression pressure can indicate one or more of the following:

- Excessively worn cylinder wall
- Worn piston or piston rings
- Stuck piston rings
- Poor seating of valves
- Ruptured or otherwise damaged cylinder head gasket

Test procedure

1. Start and warm up the engine, then shut the engine off.
2. Remove the spark plug.
3. Install the compression gauge into the plug hole.

 **09915-64512: Compression gauge**

09915-63311: Compression gauge adaptor

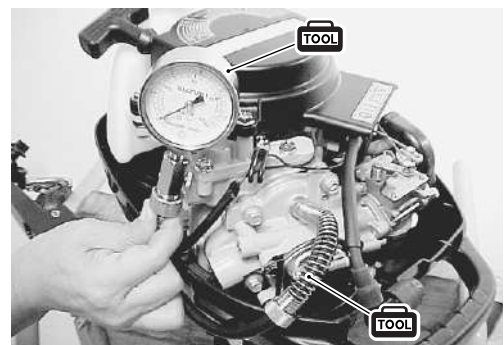
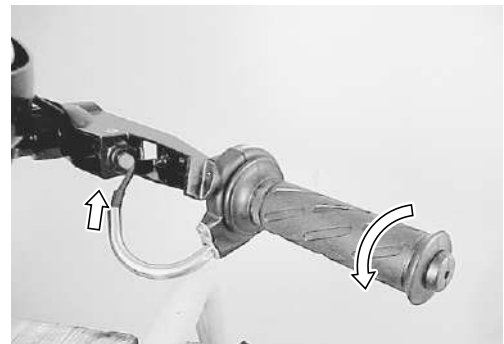
4. Disconnect the safety lanyard from the emergency stop switch.

WARNING

Disconnect the safety lanyard from the emergency stop switch prior to cranking the engine.

This will prevent any residual fuel discharged from the cylinder from being ignited by a spark discharged from the spark plug cap.

5. Move and hold the throttle control grip in the full-open position.
6. While cranking the engine with the recoil starter, note the maximum compression pressure reading on the gauge.



IGNITION AND ELECTRICAL

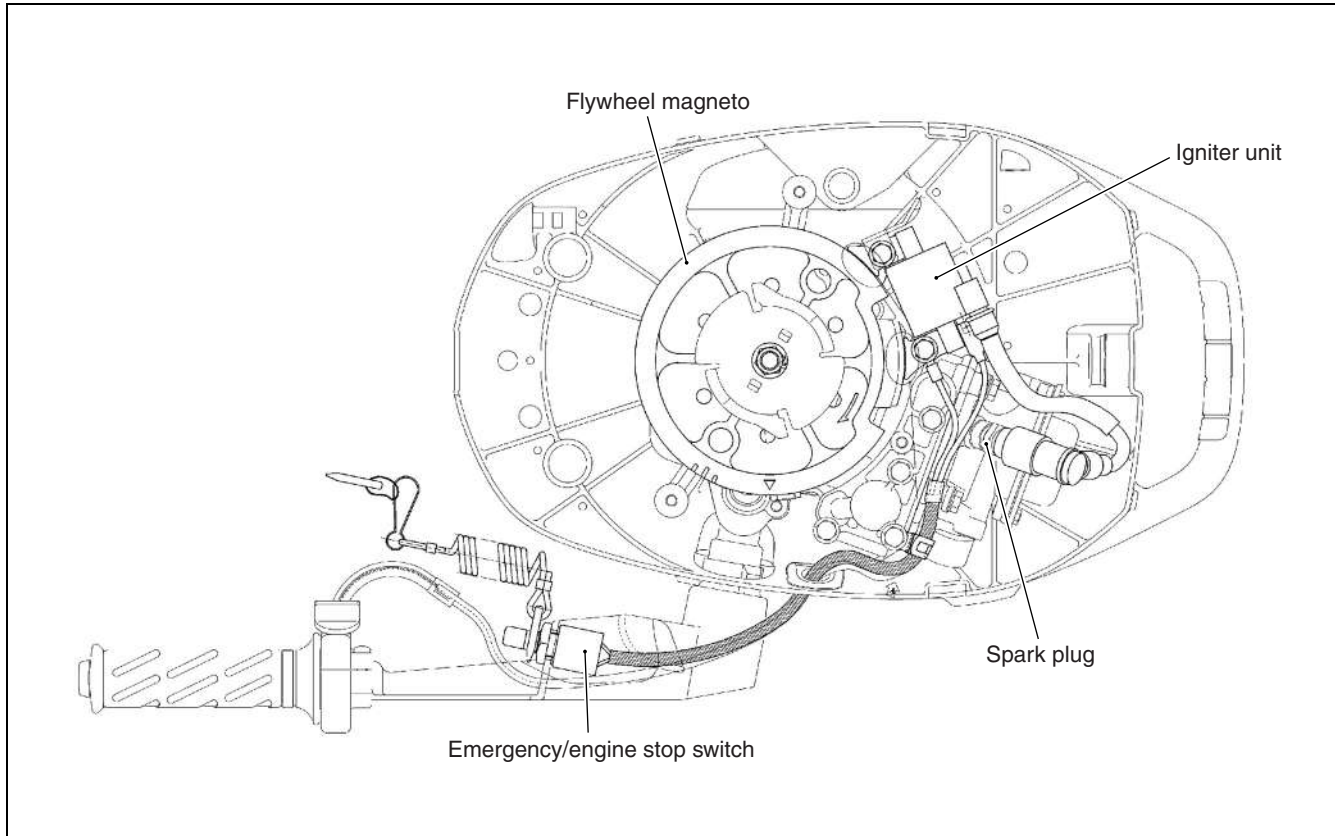
CONTENTS

IGNITION SYSTEM.....	3- 2
 OUTLINE	3- 2
 IGNITION TROUBLESHOOTING	3- 4
 INSPECTION	3- 5
 REMOVAL AND INSTALLATION.....	3- 7

IGNITION SYSTEM OUTLINE

A transistorized ignition system is employed on the DF2.5.

This system consists of flywheel magneto, igniter unit, spark plug and emergency/engine stop switch.



SPECIFICATIONS

Ignition type	Transistorized ignition
Ignition timing	BTDC 30°

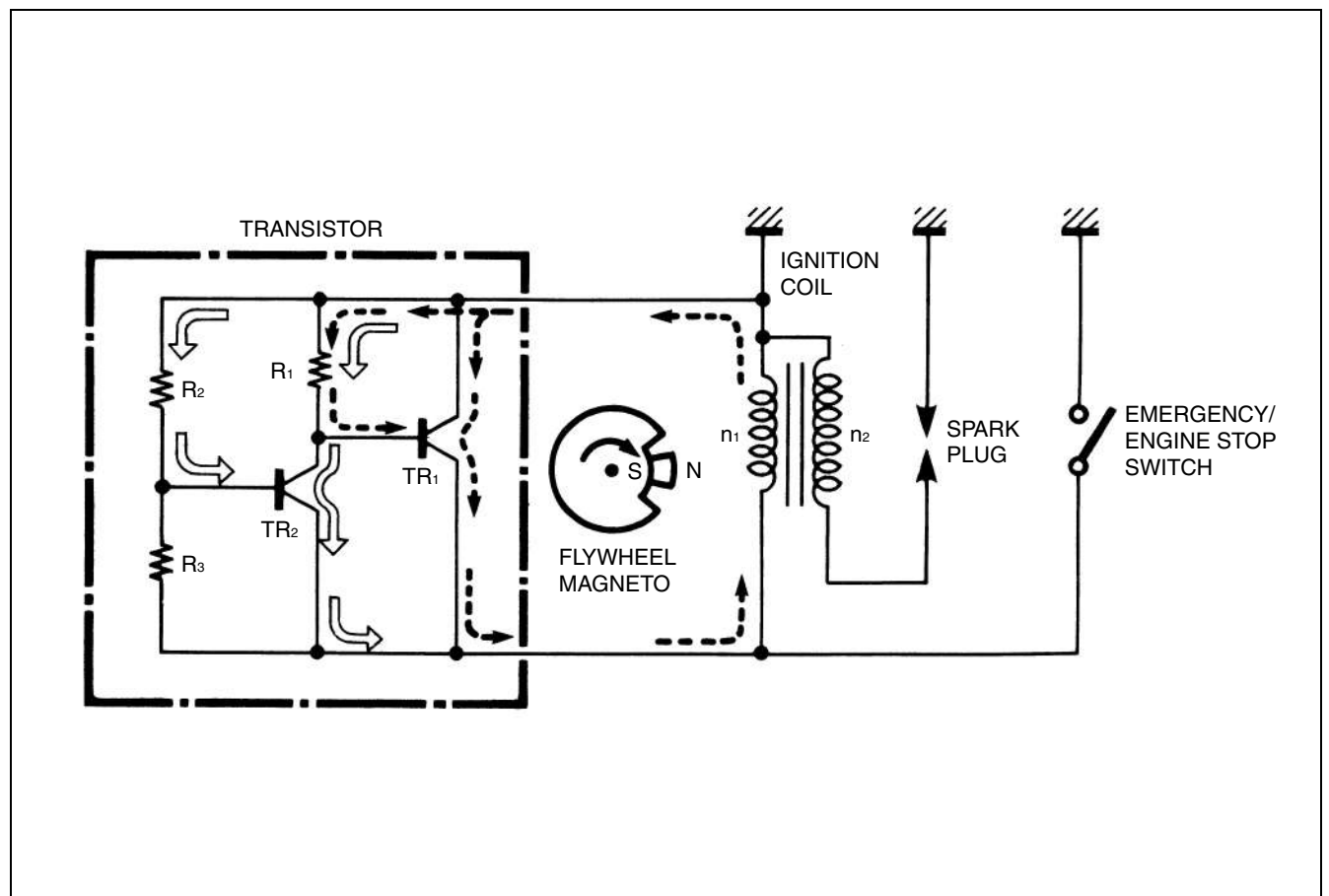
OPERATION

The transistorized ignition circuit will be discussed by referring to the diagram below:

When the recoil starter is pulled, the flywheel is turned. An electromotive force generated in the primary winding (n_1) of the ignition coil makes the transistor (TR_1) conduct through the resistor (R_1) and forms the primary circuit (indicated by dashed lines).

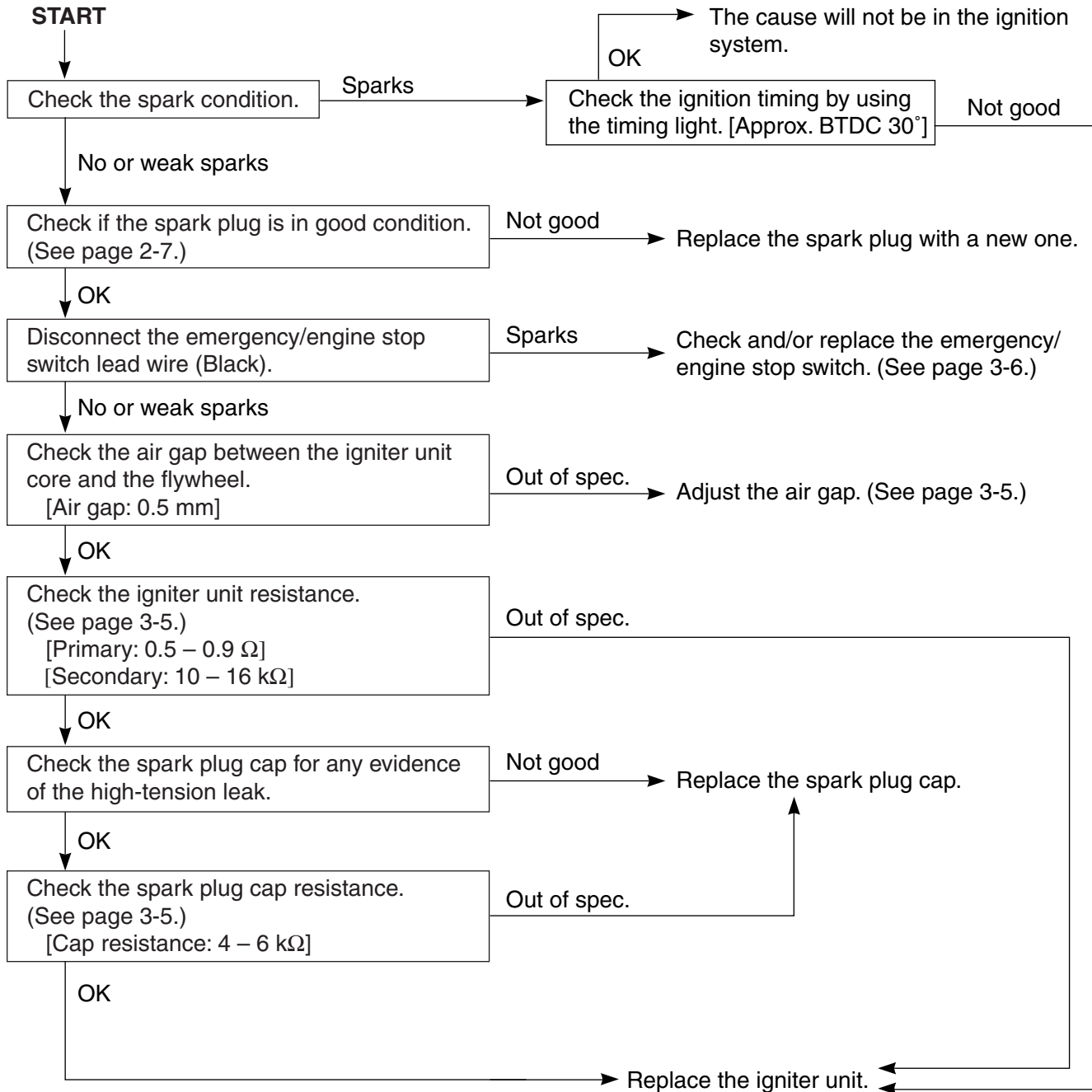
As the flywheel turns further, the primary current increases, and the terminal voltage of the circuit consisting of the resistor (R_1) and transistor (TR_1) increases. This increases the working voltage at the connection of the series circuit (R_2 and R_3) connected in parallel to the primary circuit. As the flywheel turns further, the terminal voltage of the resistor (R_3) in the resistor circuit (R_2 and R_3) rises to the level of working voltage of the transistor (TR_2) when the ignition timing approaches, and thus the transistor (TR_2) is turned on. As a result, the base current of (TR_1) flowing through the resistor (R_1) is by-passed, and the transistor (TR_1) is turned off from the conductive state.

The current flowing through the primary winding (n_1) is thus interrupted, and a rapid change occurs in the magnetic flux across the ignition coil. The result is a high surge voltage in the secondary winding (n_2).



IGNITION TROUBLESHOOTING


Perform the following ignition system tests when the engine is hard to start in order to determine if the cause is in the ignition or another system.



INSPECTION

IGNITER

Measure the resistance in the igniter unit.

 **09930-99320: Digital tester**

 **Tester range: Ω (Resistance)**

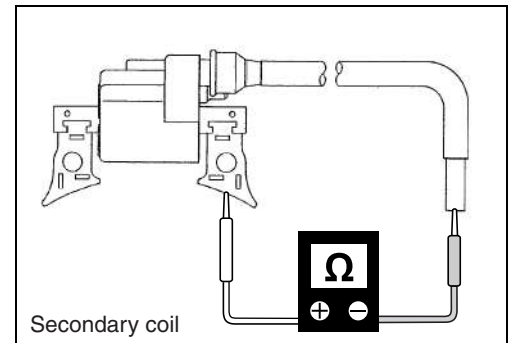
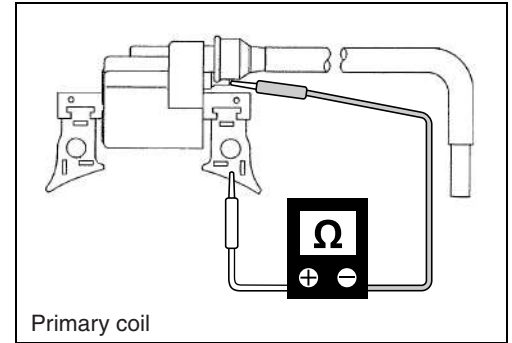
1. Remove the spark plug cap from the high-tension cord.
2. Measure the resistance.

Tester probe connection		
	Probe	Other probe
Primary coil	Terminal	Core
Secondary coil	High-tension cord	Core


Primary coil resistance: 0.5 – 0.9 Ω

Secondary coil resistance: 10 – 16 k Ω

If the measurement is out of the specification, replace the igniter unit.



SPARK PLUG CAP

 **09930-99320: Digital tester**

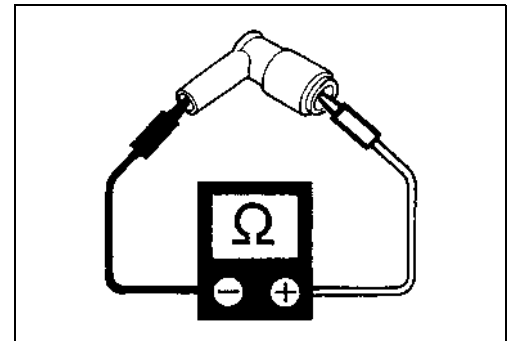
 **Tester range: Ω (Resistance)**

Measure the spark plug cap resistance.

Tester probe connection	
Probe	Other probe
Cap end	Other cap end


Spark plug cap resistance: 4 – 6 k Ω

If the measurement is out of the specification, replace the spark plug cap.

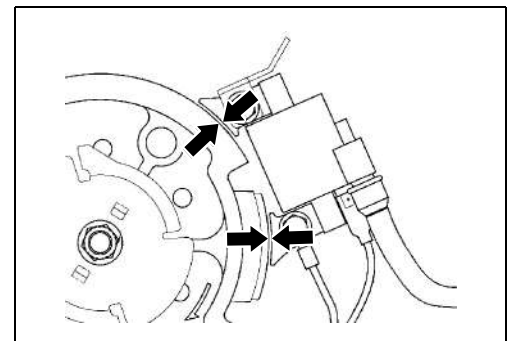


IGNITER TO FLYWHEEL MAGNETO AIR GAP

Measure the air gap of between the flywheel magneto and igniter unit.


 **09900-20803: Thickness gauge**

Air gap: 0.5 mm (0.02 in)



EMERGENCY / ENGINE STOP SWITCH

TOOL 09930-99320: Digital tester

CONT Tester range:  **(Continuity)**

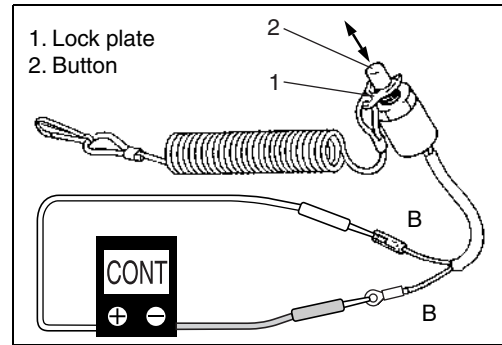
Inspect the continuity of the emergency/engine stop switch.

Tester probe connection	
Probe	Other probe
Black	Black

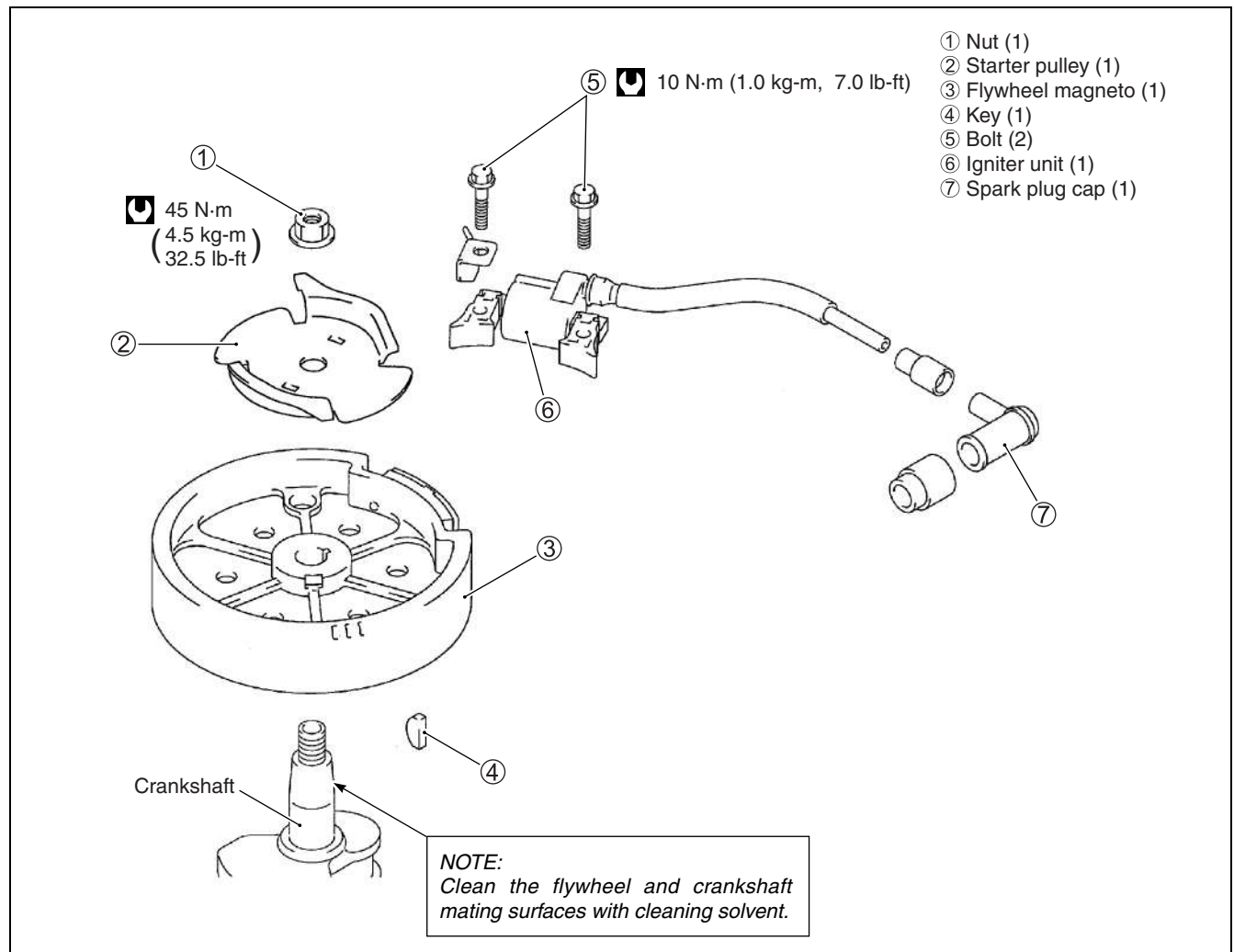
Emergency/engine stop switch continuity:

Switch condition	Continuity
Lock plate IN	No
Lock plate OUT	Yes
Lock plate IN & button depressed	Yes

If the result is out of the specification, replace the emergency/engine stop switch.



REMOVAL AND INSTALLATION



REMOVAL

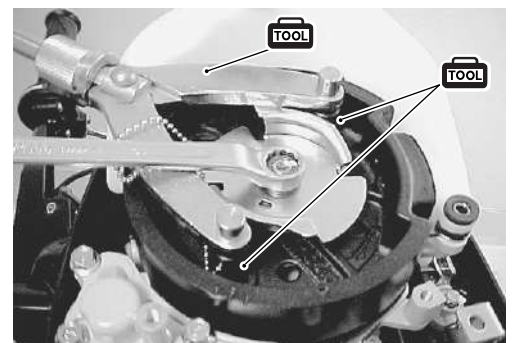
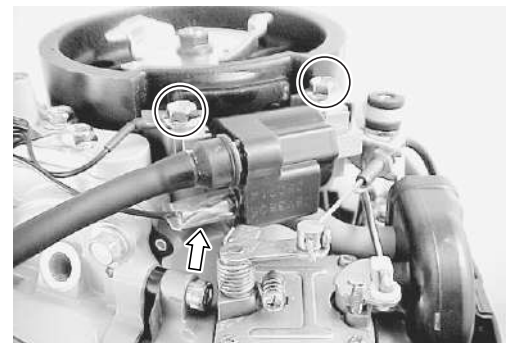
Prior to removing the electrical parts, disconnect the spark plug cap from the spark plug.

1. Remove the recoil starter. (See page 5-2.)
2. Disconnect the emergency/engine stop switch lead wire from the igniter unit.
3. Remove the two bolts securing the igniter unit.
4. Loosen the flywheel nut using the special tools.

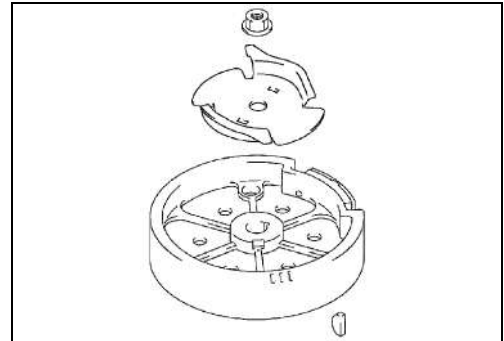
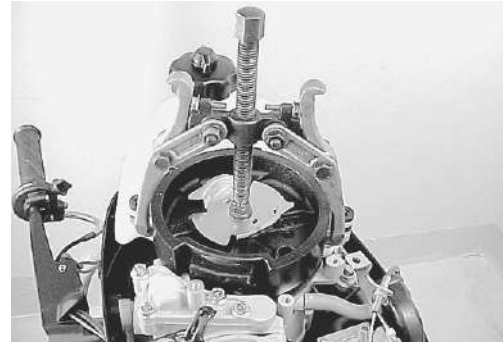
NOTE:

Do not remove flywheel nut at this time. This nut prevents damage to crankshaft when using flywheel remover tools.

TOOL 09930-40113: Flywheel holder
 09930-40120: Rotor holder attachment



5. Remove the flywheel from the crankshaft using the proper marketing tool.
6. Remove the key from the crankshaft.



INSTALLATION

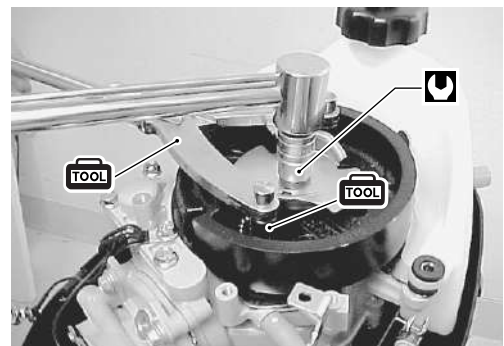
Installation is reverse order of removal with the special attention to the following steps.

Flywheel magneto

- Clean the flywheel and crankshaft mating surfaces with cleaning solvent.
- Tighten the flywheel nut to the specified torque.


 **09930-40113: Flywheel holder**
09930-40120: Rotor holder attachment

 **Flywheel nut: 45 N·m (4.5 kg·m, 32.5 lb-ft)**



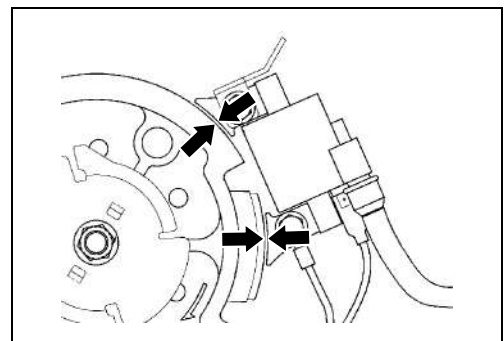
Igniter unit

- Install the igniter unit with an air gap of 0.5 mm between the both core ends and the flywheel. Check the gaps at the machining part of the flywheel as shown in the figure.

 **09900-20803: Thickness gauge**
Air gap: 0.5 mm (0.02 in)

- Tighten the two igniter unit bolts to the specified torque.

 **Igniter unit bolt: 10 N·m (1.0 kg·m, 7.0 lb-ft)**



FUEL SYSTEM

CONTENTS

PRECAUTION ON FUEL SYSTEM SERVICE	4- 2
GENERAL PRECAUTION.....	4- 2
FUEL LINE.....	4- 2
REMOVAL AND INSTALLATION.....	4- 2
CARBURETORS	4- 5
REMOVAL AND INSTALLATION.....	4- 5
DISASSEMBLY.....	4- 7
CLEANING AND INSPECTION	4-10
REASSEMBLY.....	4-11
FUEL TANK AND FUEL COCK	4-13
REMOVAL.....	4-13
INSPECTION.....	4-14

PRECAUTION ON FUEL SYSTEM SERVICE

GENERAL PRECAUTION

⚠ WARNING

Gasoline is extremely flammable and toxic. Always observe the following precautions when working around gasoline or servicing the fuel system.

- Keep the working area well ventilated and away from open flame (such as gas heater) or sparks.
- Do not smoke or allow anyone else to smoke near the working areas.

Post a “NO SMOKING” sign.

- Keep a fully charged CO₂ fire extinguisher and readily available for use.
- To avoid potential fire hazards, do not allow fuel to spill on hot engine parts or on operating electrical components.
- Wipe up fuel spills immediately.

FUEL LINE

REMOVAL AND INSTALLATION

Pay special attention to the following steps when removing or installing the fuel hoses.

CAUTION

- Do not over bend (kink) or twist the hoses when installing.
- When installing the hose clamps (clips), position the tabs in order to avoid contact with other parts.
- Be sure that the hoses do not contact the rods, levers or other components with the engine either operating or at rest.
- Use extreme care in order not to cut, abrade or cause any other damage to the hoses.
- Use care in order not to excessively compress hoses when tightening clamps.

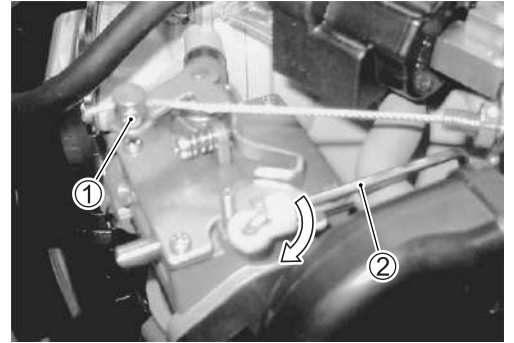
NOTE:

* Check the fuel hose routing. (See page 9-2.)

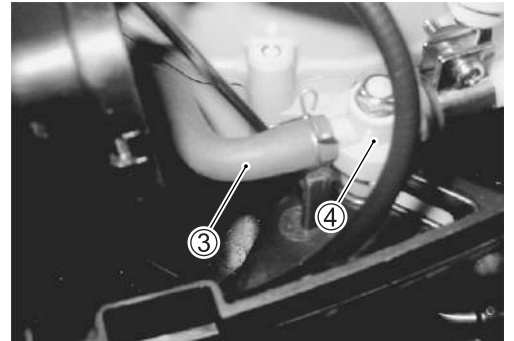
* Check for fuel leakage.

REMOVAL

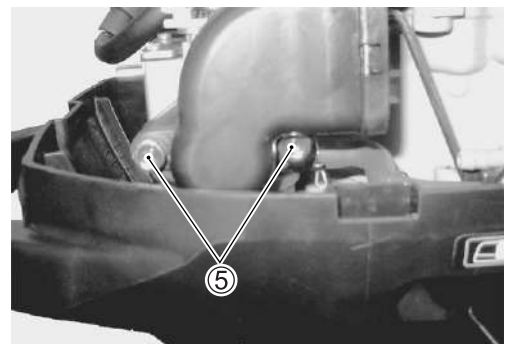
1. Remove the motor cover.
2. Remove the recoil starter.
3. Turn the fuel cock lever "OFF" position.
4. Loosen the screw ① securing the throttle control inner cable.
5. Detach the choke rod ② from the carburetor.



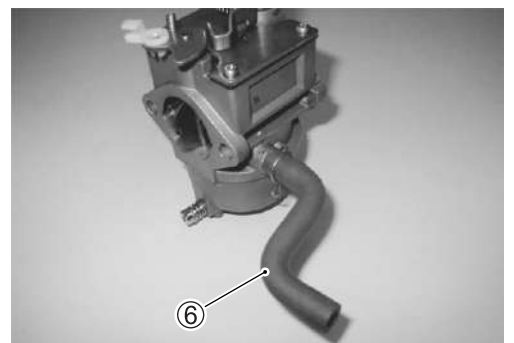
6. Remove the fuel hose ③ from the fuel cock ④.



7. Remove the two bolts ⑤ securing the carburetor.

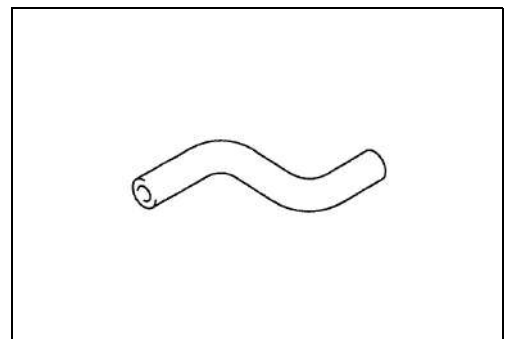


8. Remove the fuel hose ⑥ from the carburetor.

**INSPECTION**

Inspect the fuel hose.

If cracks, swelling or other damage is found, replace the fuel hose.

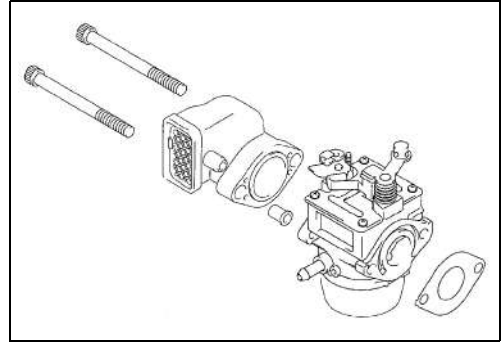


INSTALLATION

Installation is reverse order of removal with the special attention to the following steps.

CAUTION

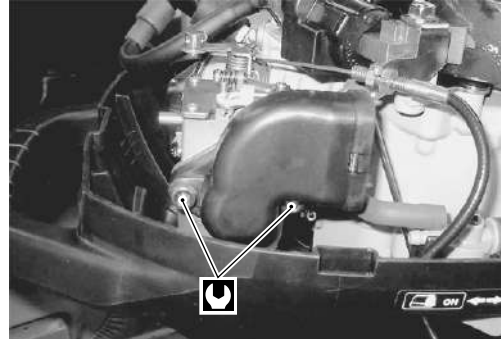
Do not re-use the removed gasket. Always use a new gasket.



- Tighten the carburetor mounting bolts to the specified torque.

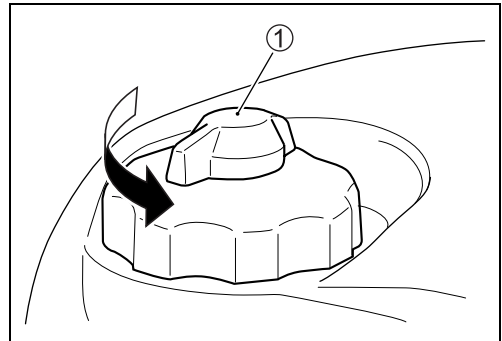
 Carburetor mounting bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)

Throttle control cable installation and adjustment
(See page 4-6.)

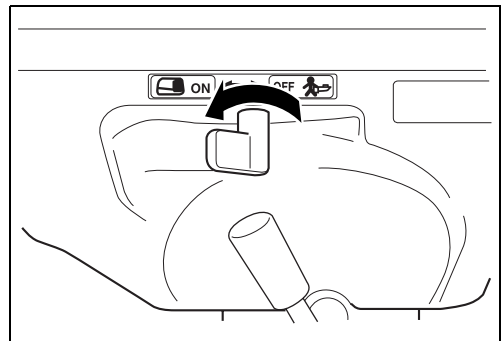


CHECK FOR FUEL LEAKAGE

1. Twist the air-vent screw ① on the fuel tank cap counter-clockwise to open the vent.



2. Turn the fuel cock lever "ON" position.



3. Check the fuel line for leaks.



CARBURETORS

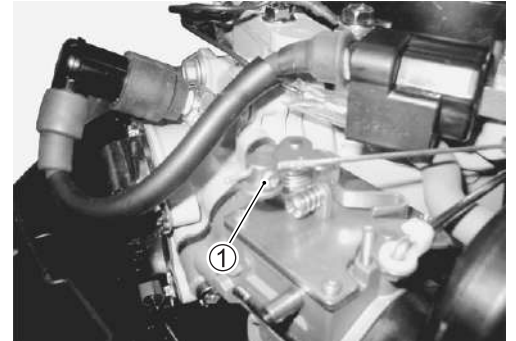
⚠ WARNING

Before servicing the fuel system, read and understand “PRECAUTION ON FUEL SYSTEM SERVICE” in the previous section.

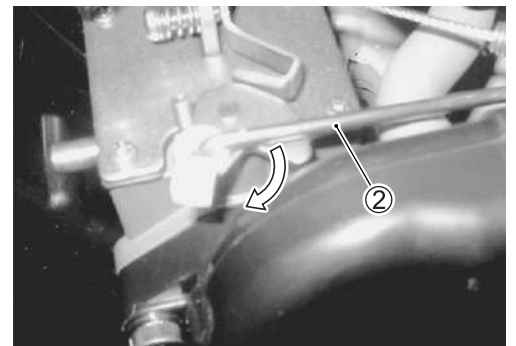
REMOVAL AND INSTALLATION

REMOVAL

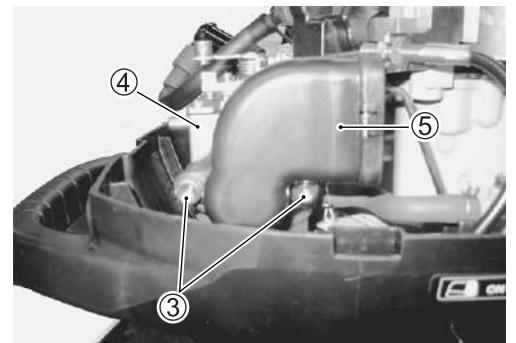
1. Remove the motor cover.
2. Remove the recoil starter.
3. Turn the fuel cock “OFF” position.
4. Loosen the screw ① securing the throttle control inner cable.



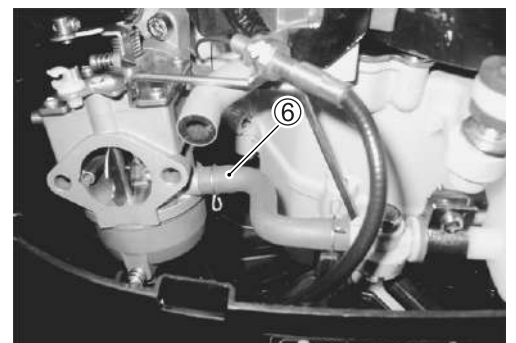
5. Detach the choke rod ② from the carburetor.



6. Remove the two bolts ③ securing the carburetor. Remove the carburetor assy ④ and the silencer ⑤.



7. Remove the fuel hose ⑥ from the carburetor.

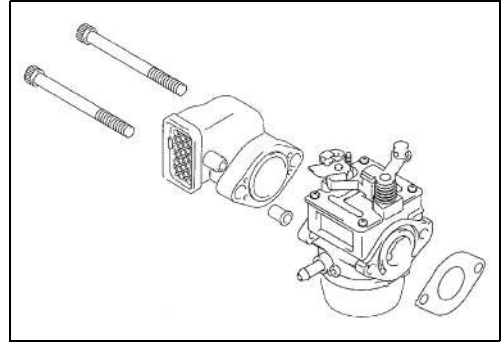


INSTALLATION

Installation is reverse order of removal with the special attention to the following steps.

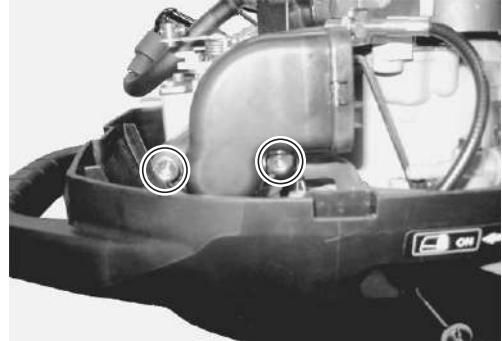
CAUTION

Do not re-use the removed gasket. Always use a new gasket.

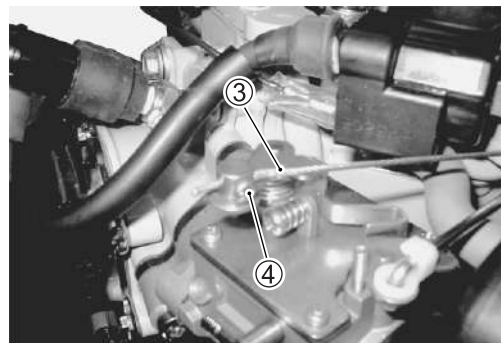
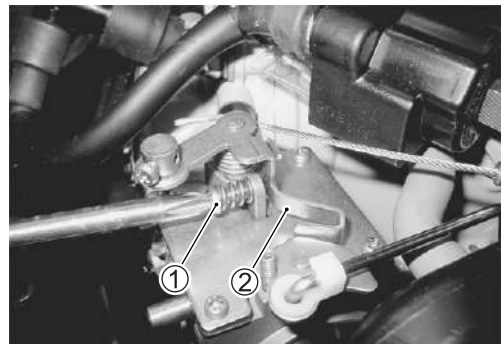


- Tighten the carburetor mounting bolts to the specified torque.

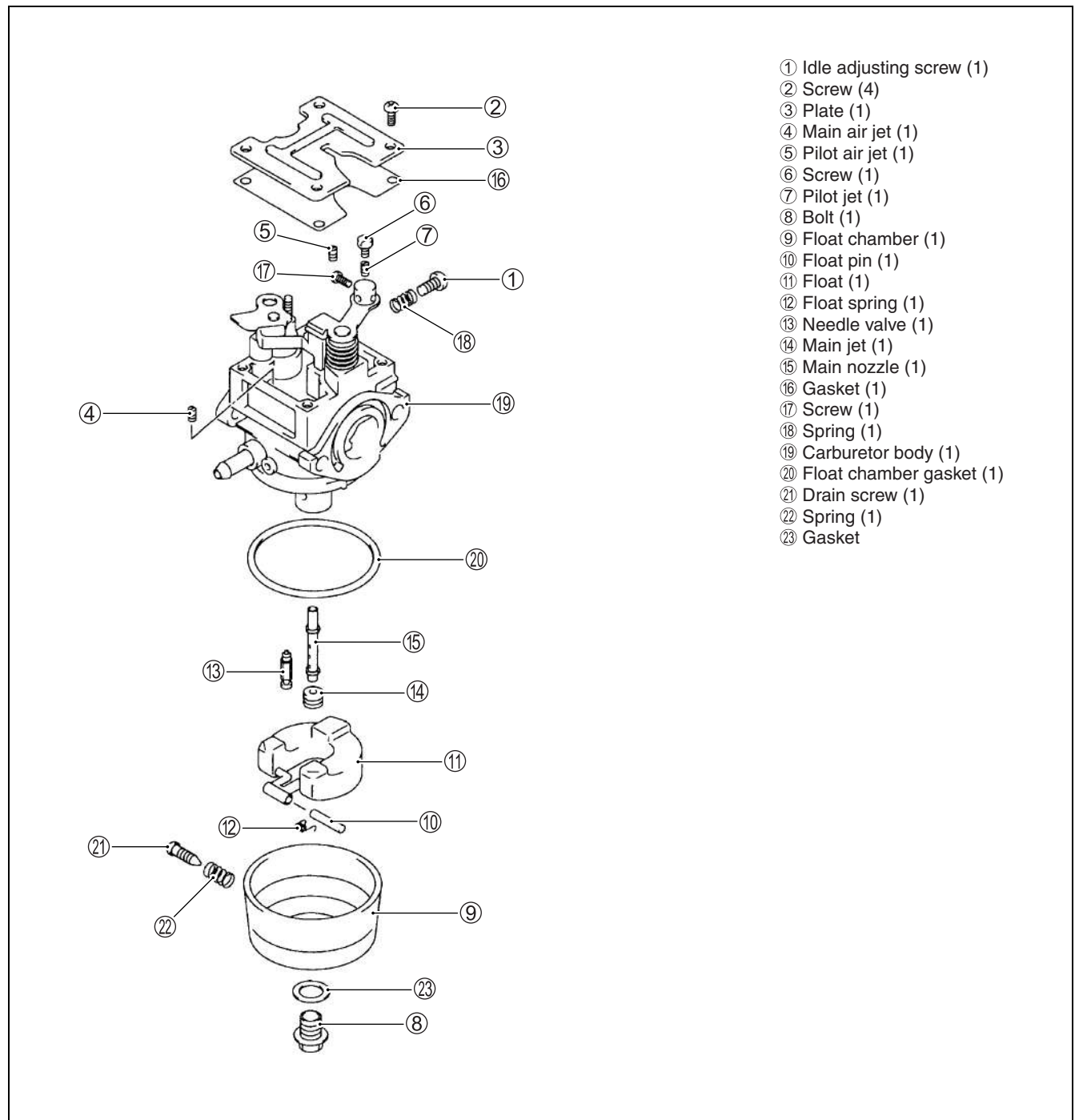
 **Carburetor mounting bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)**

**Throttle control cable installation and adjustment**

1. Fully close the throttle control grip.
2. Turn the idle adjusting screw ① counterclockwise until the screw do not touch the stopper plate ②.
3. Insert the throttle control inner cable ③ into the linkage hole.
4. While pulling the cable ③, tighten the screw ④ in order to secure the cable.
5. Adjust the idle speed. (See page 2-11 and 2-12.)

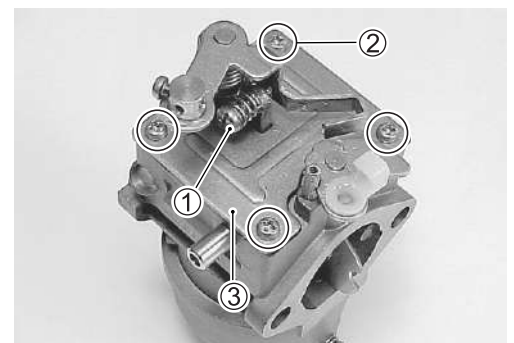


DISASSEMBLY

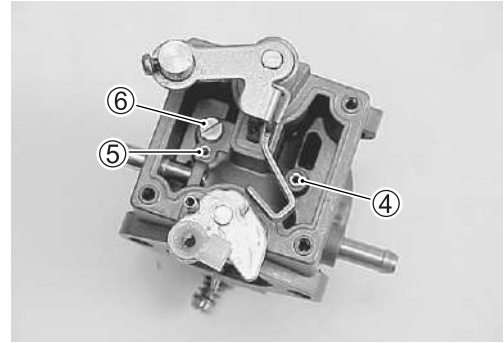


- ① Idle adjusting screw (1)
- ② Screw (4)
- ③ Plate (1)
- ④ Main air jet (1)
- ⑤ Pilot air jet (1)
- ⑥ Screw (1)
- ⑦ Pilot jet (1)
- ⑧ Bolt (1)
- ⑨ Float chamber (1)
- ⑩ Float pin (1)
- ⑪ Float (1)
- ⑫ Float spring (1)
- ⑬ Needle valve (1)
- ⑭ Main jet (1)
- ⑮ Main nozzle (1)
- ⑯ Gasket (1)
- ⑰ Screw (1)
- ⑱ Spring (1)
- ⑲ Carburetor body (1)
- ⑳ Float chamber gasket (1)
- ㉑ Drain screw (1)
- ㉒ Spring (1)
- ㉓ Gasket

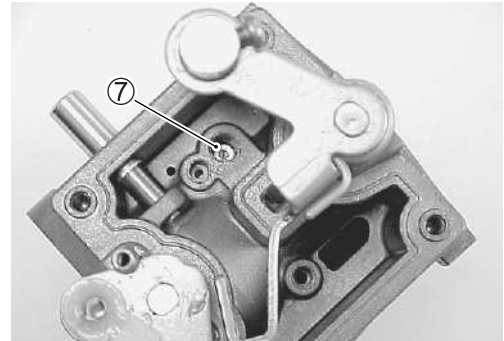
1. Remove the idle adjusting screw ①.
2. Remove the four screws ② and plate ③.



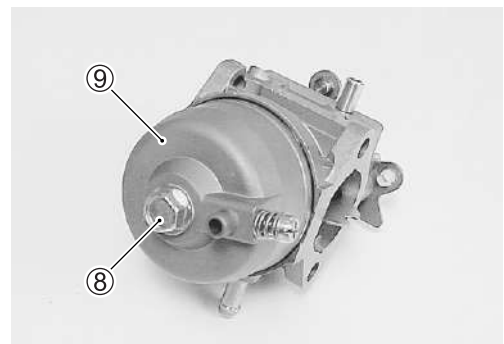
3. Remove the main air jet ④, the pilot air jet ⑤ and the screw ⑥.



4. Remove the pilot jet ⑦.



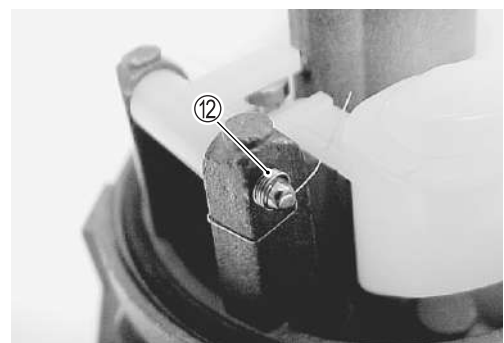
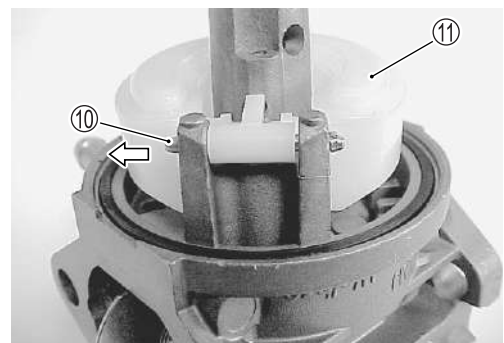
5. Remove the bolt ⑧ and the float chamber ⑨.



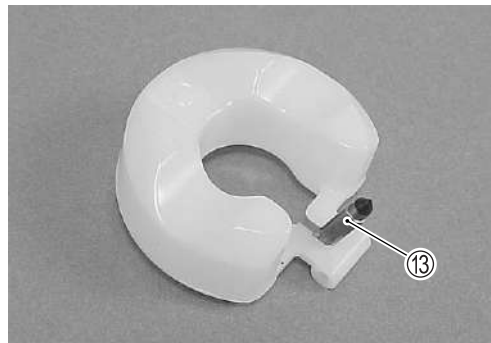
6. Remove the float pin ⑩, the float ⑪ and the float spring ⑫.

CAUTION

Always remove the float pin from the right side to the left side. (See the figure.)



7. Remove the needle valve ⑬ from the float.



8. Remove the main jet ⑭.



9. Remove the main nozzle ⑮.



CLEANING AND INSPECTION

Clean thoroughly with cleaning solvent and compressed air before inspection.

⚠ WARNING

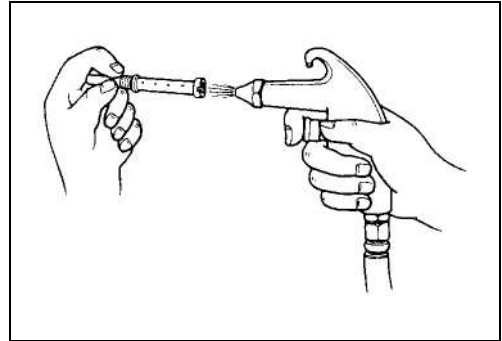
Wear safety glasses when using compressed air to expel solvent, carburetor cleaner etc.

CAUTION

Do not place any rubber, plastic and non-metallic parts in cleaning solvent, as severe damage or deterioration will result.

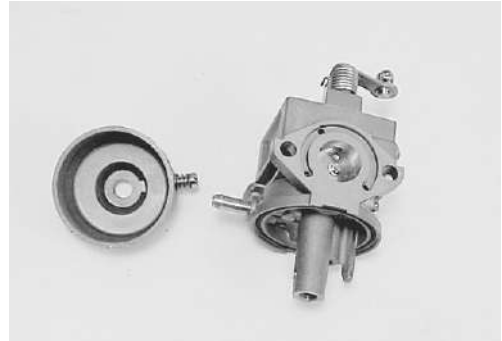
CAUTION

Do not use a wire or a small drill bit in order to clean the orifices and jets of the carburetor.



CARBURETOR BODY AND FLOAT CHAMBER

Inspect the carburetor body and the float chamber. If crack or other damage is found, replace the body and/or the chamber. Clean the carburetor body and the float chamber in order to remove obstructions.



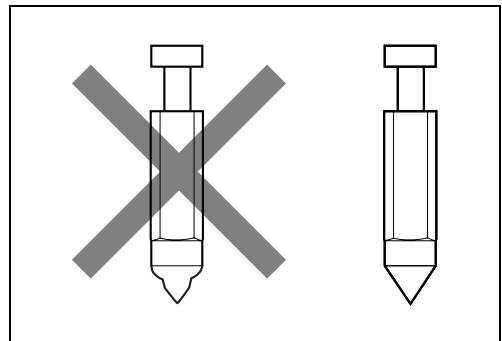
JET/NOZZLE

Inspect the jets and the nozzle. If crack or other damage is found, replace the jet and/or the nozzle. Clean the jets and the nozzle in order to remove obstructions.



NEEDLE VALVE

Inspect the needle valve. If broken tip or wear is found, replace the valve.



FLOAT

Inspect the float.

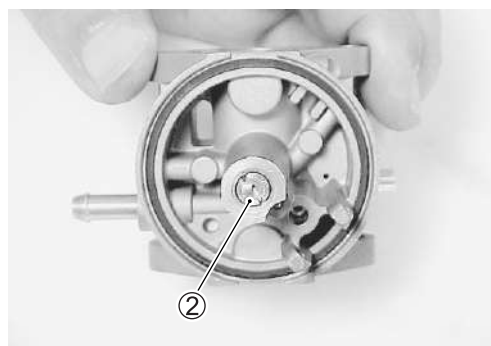
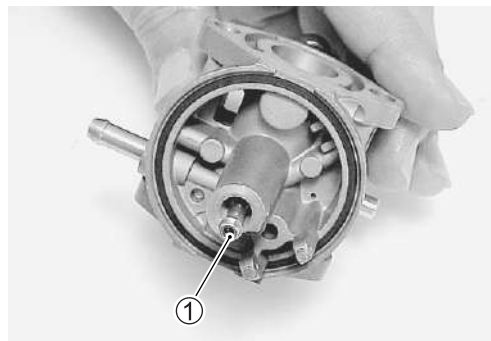
If crack or other damage is found, replace the float.

**REASSEMBLY**

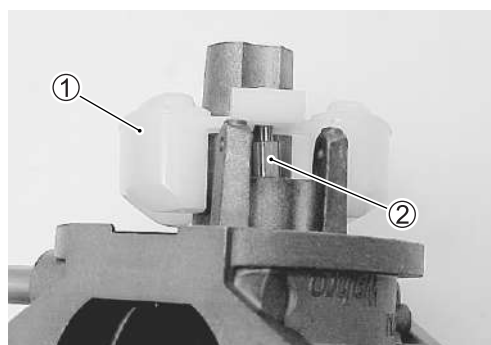
Reassembly is reverse order of disassembly with the special attention to the following steps.

MAIN JET AND MAIN NOZZLE

Install the main nozzle ① to the carburetor body before installing the main jet ②.

**FLOAT**

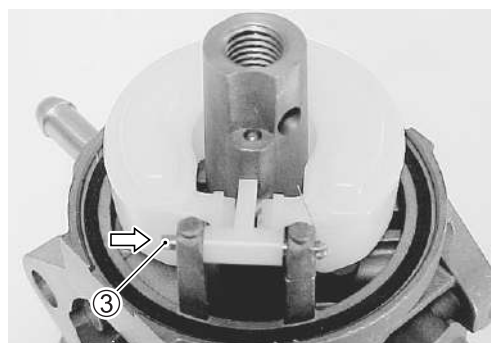
1. Install the float ① with need valve ②.



2. Install the float pin ③.

CAUTION

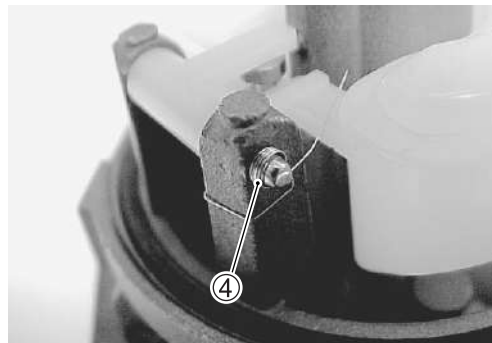
Always install the float pin from the left side to the right side. (See the figure.)



3. Install the float pin spring ④.

NOTE:

After installing float, inspect for smooth movement of float.




CHECKING FLOAT HEIGHT

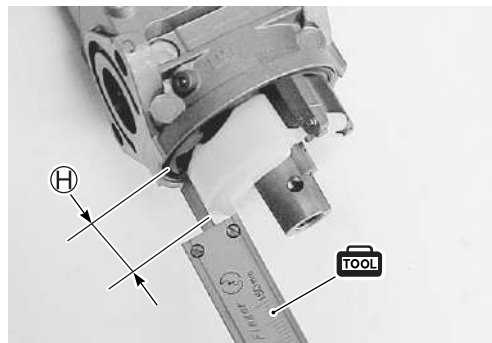
Measure the float height.

NOTE:

Make sure that float weight is not applied to needle valve.

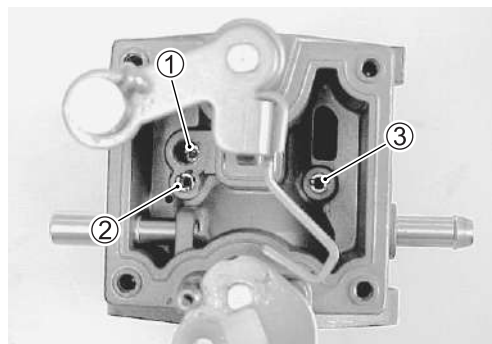
 09900-20101: Vernier calipers

Float height H : 10 ± 2 mm



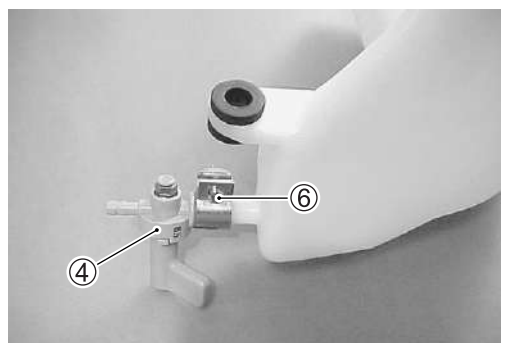
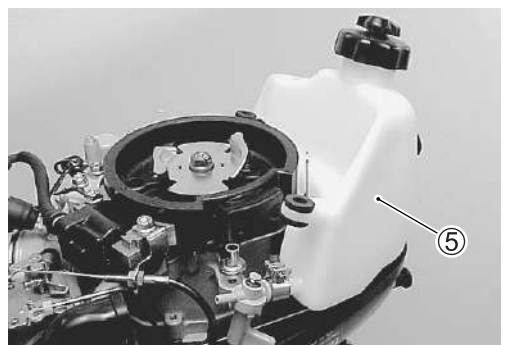
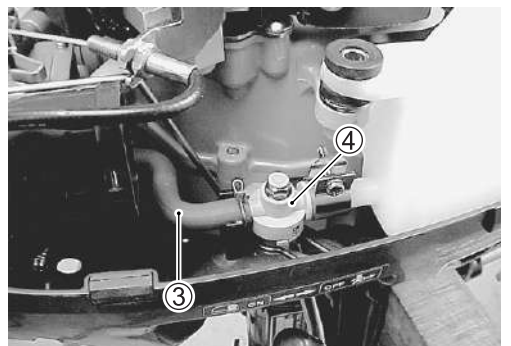
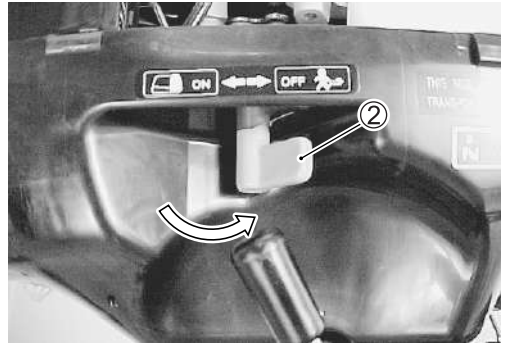
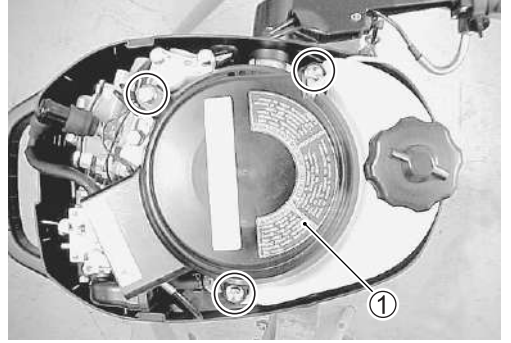
PILOT JET AND AIR JET

Install the pilot jet ①, the pilot air jet ② and the main air jet ③.



FUEL TANK AND FUEL COCK REMOVAL

1. Remove the motor cover.
2. Remove the recoil starter ①. (See page 5-2.)
3. Turn the fuel cock lever ② "OFF" position.
4. Remove the fuel hose ③ from the fuel cock ④.
5. Remove the fuel tank ⑤.
6. Loosen the screw ⑥.
Remove the fuel cock ④ from the fuel tank.



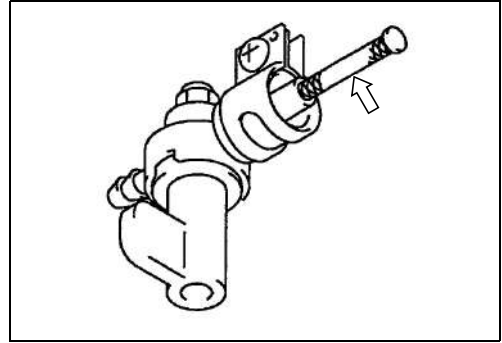
INSPECTION

Fuel cock

Check the filter.

If clogged or damaged is found, clean the filter or replace the fuel cock assy.

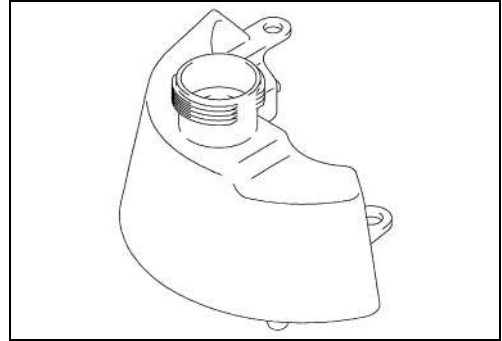
Inspect the fuel cock. If leakage, deterioration or other damage is found, replace the fuel cock assy.



Fuel tank

Inspect the fuel tank. If crack, leakage or deterioration is found, replace the tank.

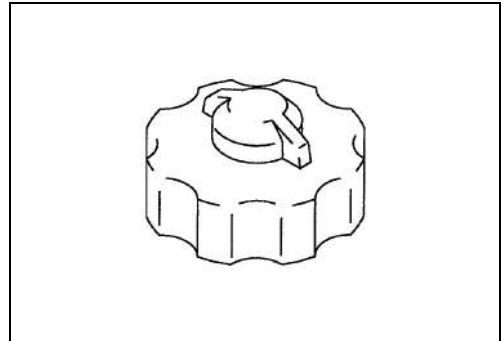
If water or other contamination is found, drain and clean the tank.



Tank cap

Check that the fuel tank vent opens and relieves internal tank pressure properly.

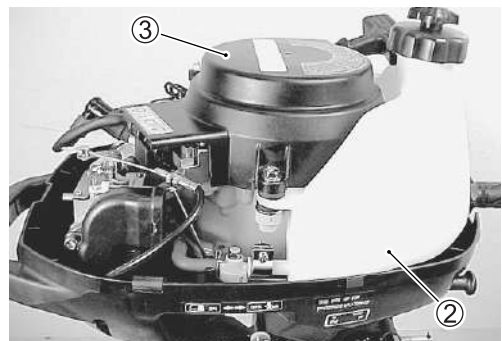
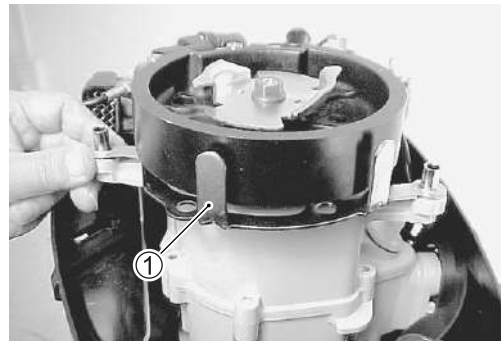
If vent is suspect, replace the tank cap.



INSTALLATION

Installation is reverse order of removal with special attention to the following steps.

- Place the fuel tank bracket ① in position.
- Install the fuel tank ② and the recoil starter ③.
- Check the fuel hose routing. (See page 9-2.)
- Check for fuel leakage.



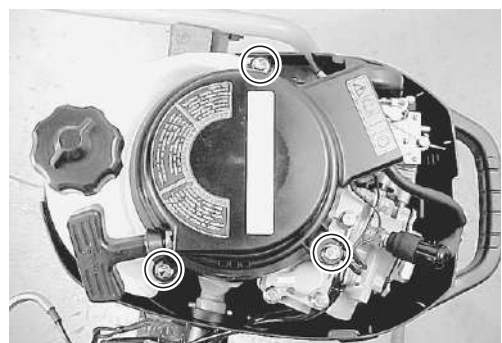
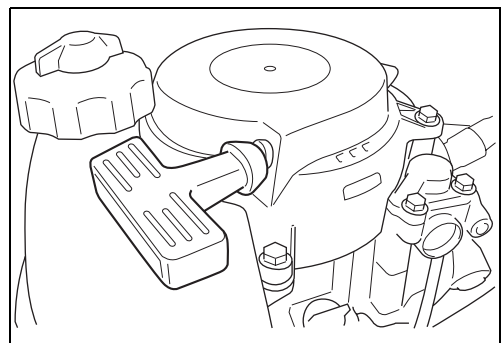
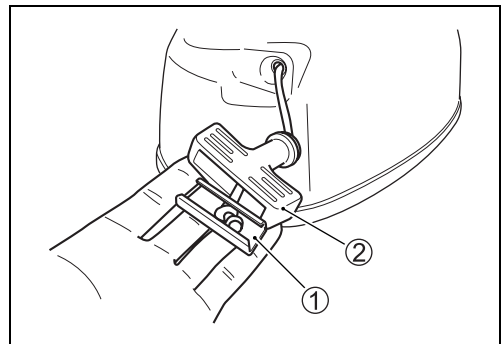
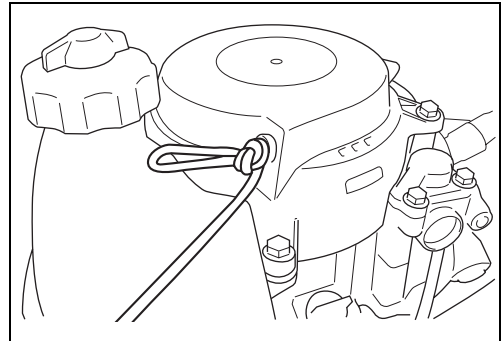
RECOIL STARTER

CONTENTS

REMOVAL	5- 2
DISASSEMBLY	5- 3
INSPECTION	5- 5
REASSEMBLY	5- 6
INSTALLATION	5- 7

REMOVAL

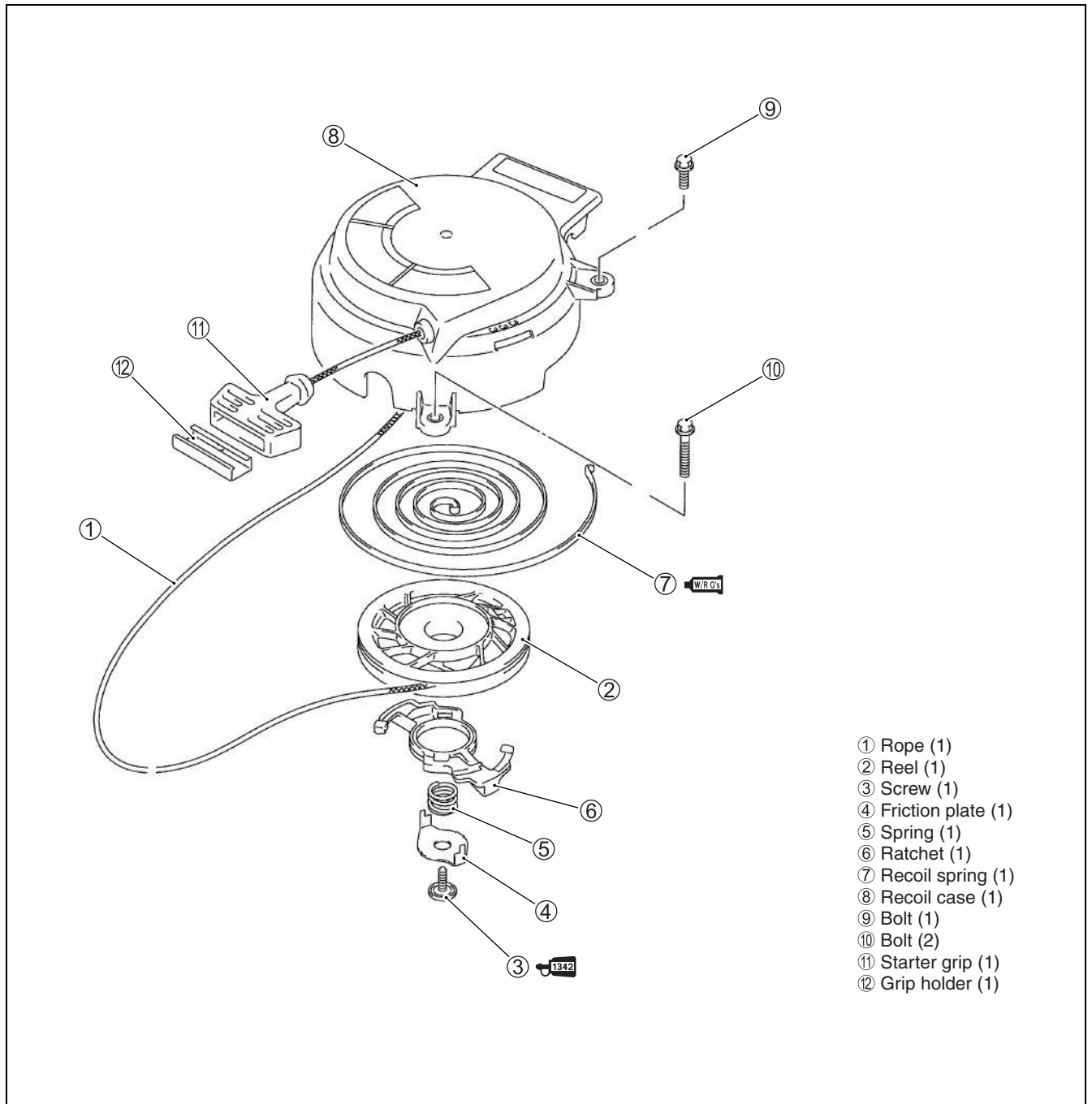
1. Remove the motor cover.
2. Tie a knot in the rope inside of the motor cover to prevent the rope from rewinding onto the recoil reel when the starter grip is removed.
3. Remove the knot from grip holder ①.
Remove the grip holder ① and the starter grip ②.
Completely remove the motor cover.
4. Install the starter grip and the grip holder to the end of the rope.
5. Loosen the knot previously tied in the rope.
6. Remove the recoil starter assy.



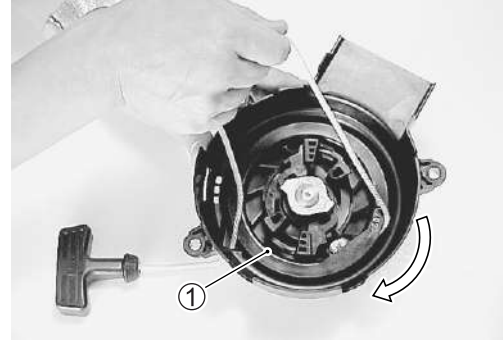
DISASSEMBLY

CAUTION

Because of the coiled tension in the recoil spring, wear safety glasses and hand protection when winding or unwinding the component.



1. Turn the reel ① clockwise in order to release the coiled tension in the recoil spring.



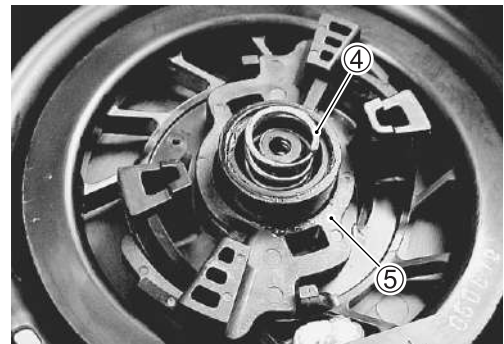
2. Remove the screw ② and the friction plate ③.

NOTE:

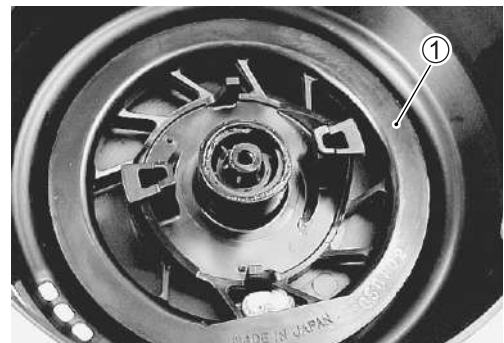
Screw ② is a left hand thread.



3. Remove the spring ④ and the ratchet ⑤.



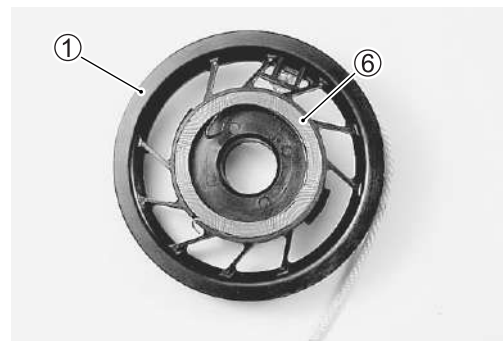
4. Slowly remove the reel ① with the recoil spring from the recoil case.



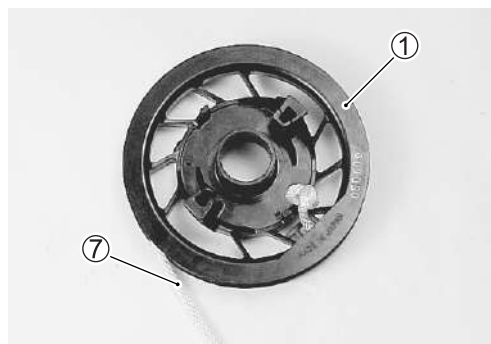
5. Remove the recoil spring ⑥ from the reel ①.

NOTE:

Do not remove the recoil spring unless replacement is necessary. Inspect the spring in the assembled position.



6. Remove the rope ⑦ from the reel ①.



INSPECTION

NOTE:

If excessive wear, crack, defective or other damage is found on any component, replace.

- Inspect the ratchet and the all springs.
If excessive wear or other damage is found, replace.
- Inspect the reel and the recoil case.
If crack or other damage is found, replace.
- Inspect the recoil rope.
If wear or fraying is found, replace.
- Inspect the recoil spring.
If crack, deformation or excessive curve is found, replace.



REASSEMBLY

Reassembly is the reverse order of disassembly with the special attention to the following steps.

- Secure the outer end of the recoil spring ⑥ on the boss in the reel ① and wind the spring toward the center of the reel in a counterclockwise direction.

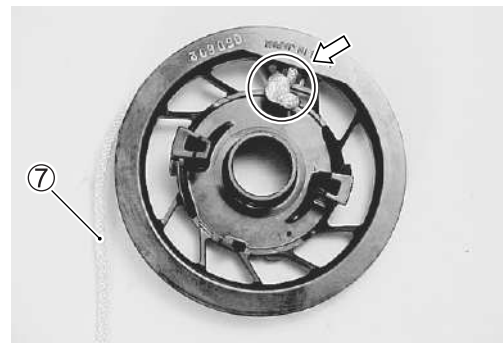
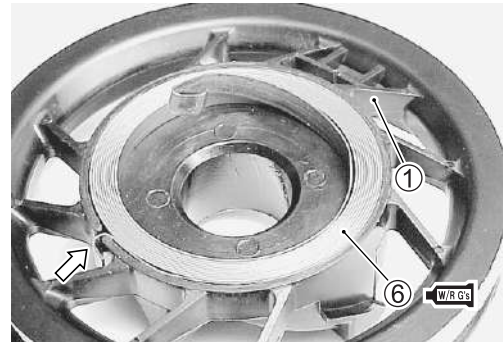
CAUTION

Because of the coiled tension in the recoil spring, wear safety glasses and hand protection when winding or unwinding the components.

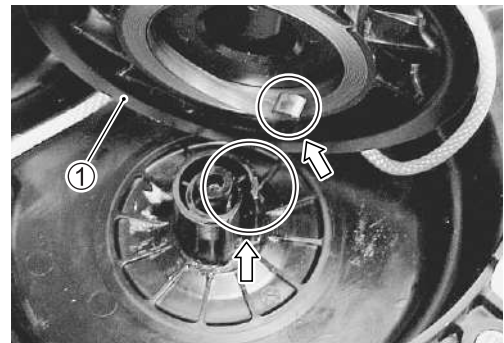
- Apply the Water Resistant Grease to the recoil spring.

 99000-25161: SUZUKI WATER RESISTANT GREASE

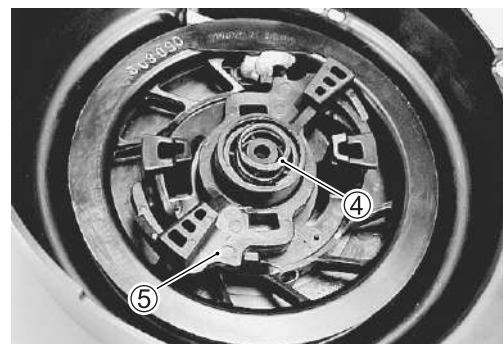
- Install the rope ⑦.



- Install the reel ① and the recoil spring to the recoil case aligning the inner end of the spring with the boss cutaway on the case.



- Install the ratchet ⑤ and the spring ④.

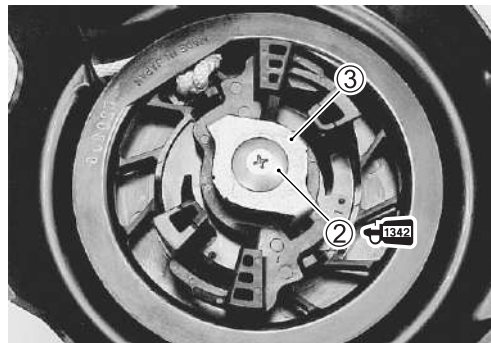


- Install the friction plate ③.
- Apply THREAD LOCK “1342” to threads of screw ② then tighten the screw ②.

NOTE:

Screw ② is a left hand thread.

 **99000-32050: THREAD LOCK “1342”**



- Rotate the reel approximately 4 turns counterclockwise until the recoil spring is tensioned.



INSTALLATION

Installation is reverse order of removal with the special attention to the following steps.

- Check to ensure that all removed parts are back in place.

POWER UNIT

CONTENTS

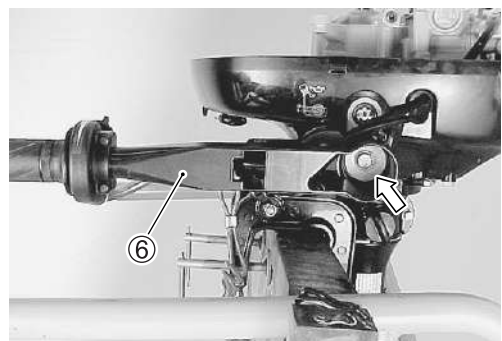
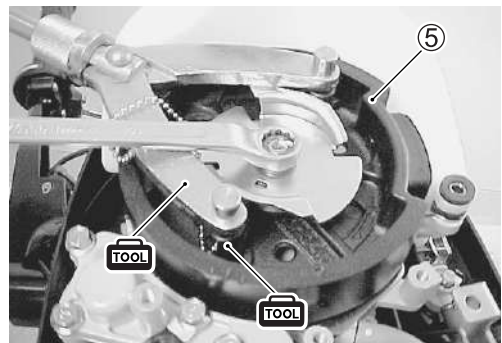
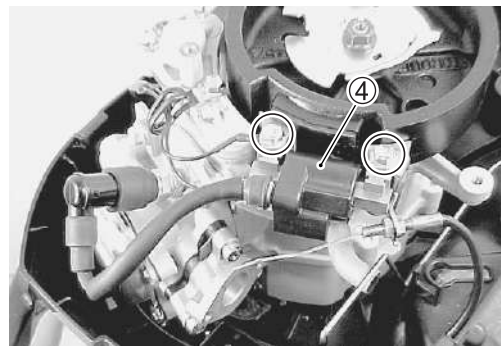
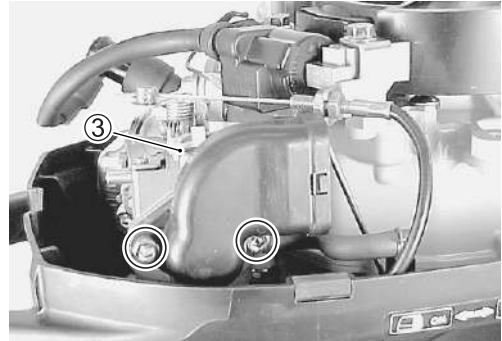
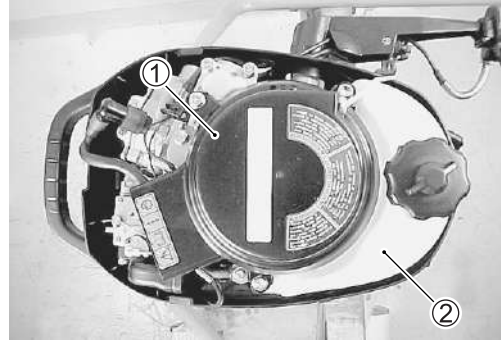
POWER UNIT	6- 2
REMOVAL	6- 2
INSTALLATION.....	6- 4
CYLINDER HEAD / VALVE / ROCKER ARM	6- 7
REMOVAL	6- 7
INSTALLATION.....	6- 8
DISASSEMBLY	6-10
INSPECTION AND SERVICING	6-11
REASSEMBLY	6-17
CYLINDER / PISTON / CRANKSHAFT / CONROD / CAMSHAFT.....	6-18
DISASSEMBLY	6-18
INSPECTION AND SERVICING	6-22
REASSEMBLY	6-31
THERMOSTAT	6-38
REMOVAL	6-38
INSPECTION	6-38
INSTALLATION.....	6-38
OPERATION	6-39
WATER COOLING SYSTEM	6-39
ENGINE LUBRICATION SYSTEM.....	6-40

POWER UNIT REMOVAL

Before removing the power unit:

- Drain the engine oil. (See page 2-4.)
- Shift into "NEUTRAL" position.

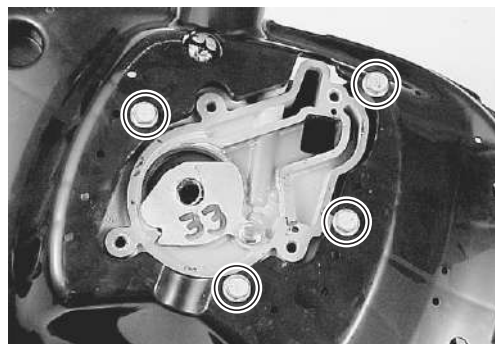
1. Remove the recoil starter assy ①. (See page 5-2.)
2. Remove the fuel tank ②. (See page 4-13.)
3. Remove the carburetor assy ③. (See page 4-5.)
4. Remove the igniter unit ④.
5. Remove the flywheel magneto ⑤. (See page 3-7 and 3-8.)
TOOL 09930-40113: Flywheel holder
 09930-40120: Rotor holder attachment
6. Remove the tiller handle assy ⑥. (See page 7-11.)



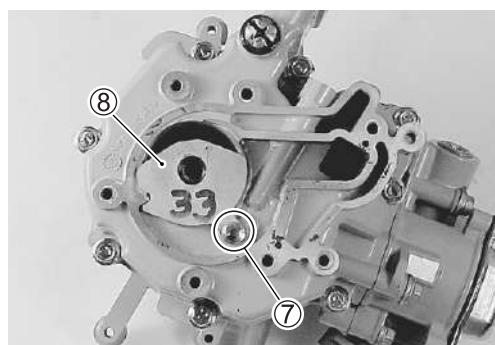
7. Remove the four engine mounting bolts.
8. Detach the power unit with the lower cover.



9. Remove the four bolts, then detach the power unit from the lower cover.



10. Remove a bolt ⑦ and oil seal protector ⑧.



INSTALLATION

Installation is reverse order of removal with the special attention to the following steps.

1. Install the two dowel pins ① and gasket ② onto the drive-shaft housing.

CAUTION

**Do not re-use the gasket once removed.
Always use new parts.**

2. Apply the Water Resistant Grease to the driveshaft splines.

 **99000-25161: SUZUKI WATER RESISTANT GREASE**

3. Apply the Water Resistant Grease to the seal lips of the driveshaft oil seal.

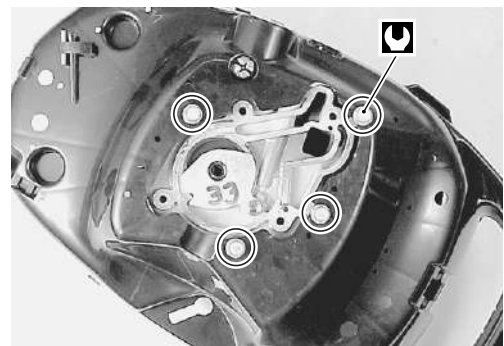
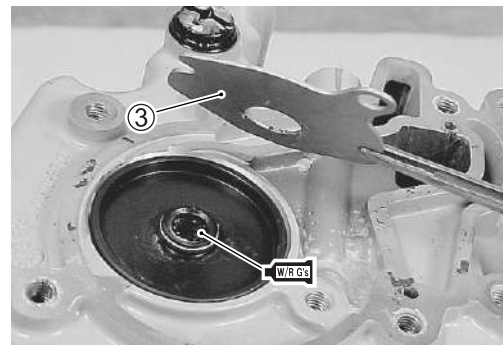
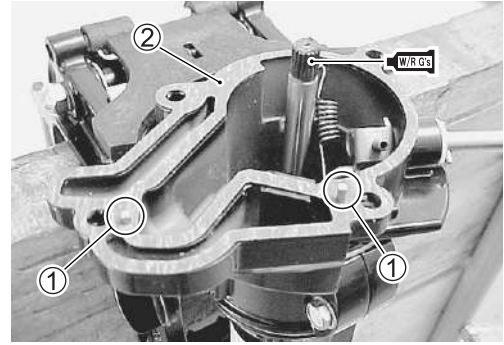
 **99000-25161: SUZUKI WATER RESISTANT GREASE**

4. Install the oil seal protector ③ and tighten the bolt after applying the Thread Lock to the bolt.

 **99000-32050: THREAD LOCK "1342"**

5. Install the power unit to the lower cover, then tighten the four bolts to the specified torque.

 **Lower cover bolt: 8 N·m (0.8 kg·m, 6.0 lb·ft)**



6. Install the power unit/lower cover assembly onto the drive-shaft housing.
7. Apply the Silicone Seal to the four power unit mounting bolts and tighten the bolts to the specified torque.


 **99000-31120: SUZUKI SILICONE SEAL**

 **Power unit mounting bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)**



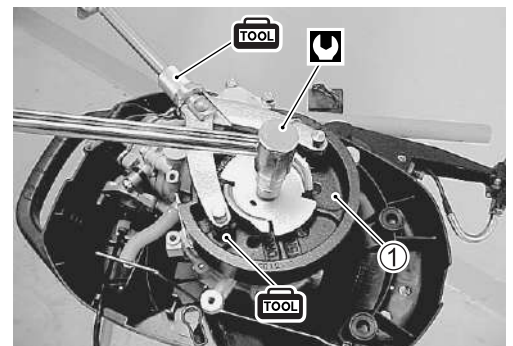
FLYWHEEL MAGNETO

- Install the flywheel magneto and tighten the flywheel nut to the specified torque. (See page 3-8.)

 **09930-40113: Flywheel holder**


09930-40120: Rotor holder attachment

 **Flywheel nut: 45 N·m (4.5 kg-m, 32.5 lb-ft)**

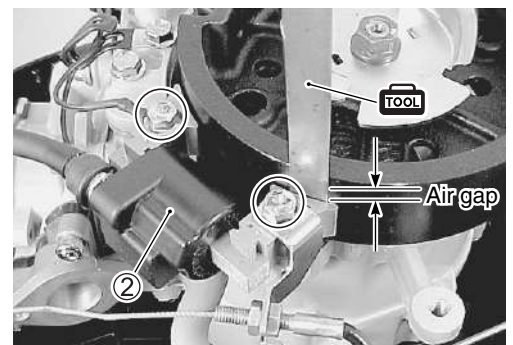


IGNITER UNIT

- Install the igniter unit with an air gap of 0.5 mm between the both core ends and the flywheel. (See page 3-8.)

 **09900-20803: Thickness gauge**

Air gap: 0.5 mm (0.02 in)



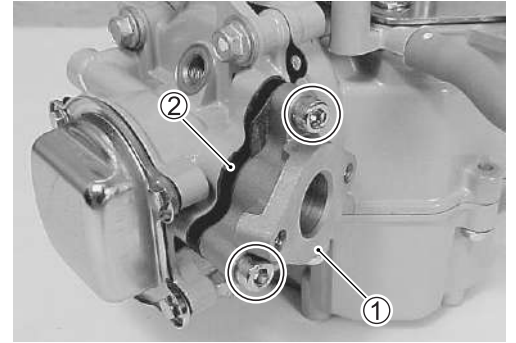
FINAL ASSEMBLY CHECK

Perform the following checks in order to ensure proper and safe operation of the repaired unit.

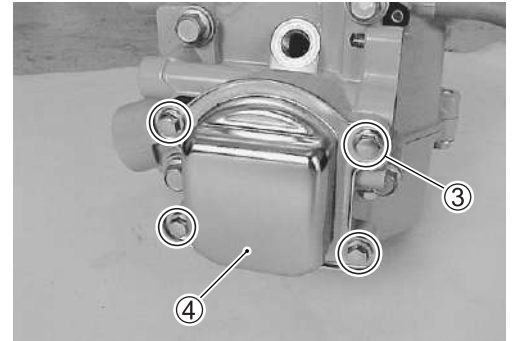
- All parts removed have been returned to the original positions.
- Lower unit gear engagement is properly adjusted.
(See page 8-19.)
- Fuel hose routing matches service manual illustration.
(See page 9-2.)
- Wire routing matches service manual illustration.
(See page 9-3.)
- No fuel leakage is evident.
- No water leakage is evident during final test running.

CYLINDER HEAD / VALVE / ROCKER ARM REMOVAL

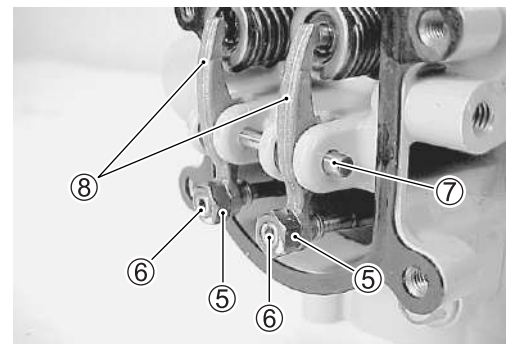
1. Remove the two bolts, the intake manifold ① and the insulator ②.



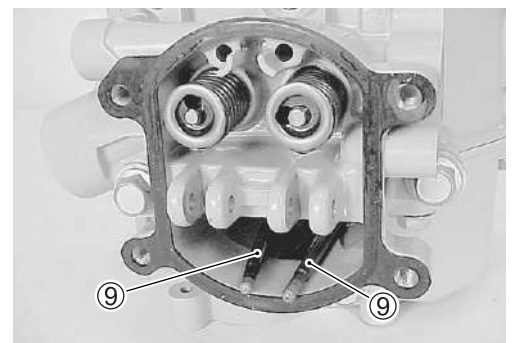
2. Remove the four bolts ③ and the cylinder head cover ④.



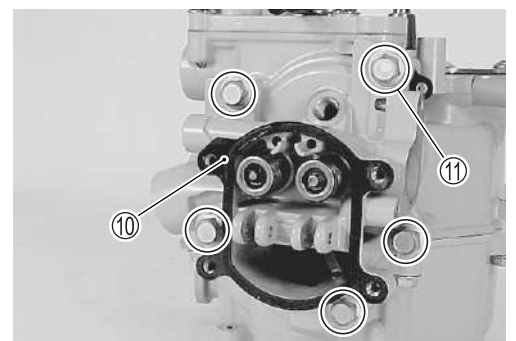
3. Remove the valve adjusting lock nuts ⑤, then remove the valve adjusting screw ⑥.
4. Remove the rocker arm shaft ⑦ and the rocker arms ⑧.



5. Remove the push rods ⑨.



6. Remove the gasket ⑩.
7. Remove the five bolts ⑪ and the cylinder head assembly from the cylinder block.



INSTALLATION

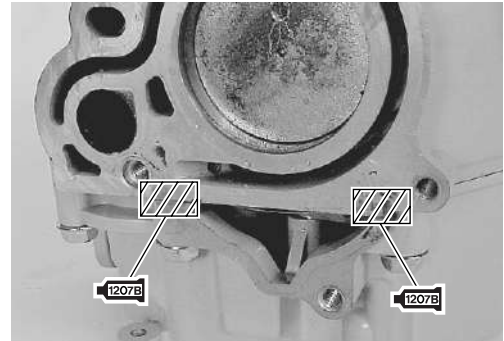
Installation in reverse order of removal paying special attention to the following steps.



CAUTION

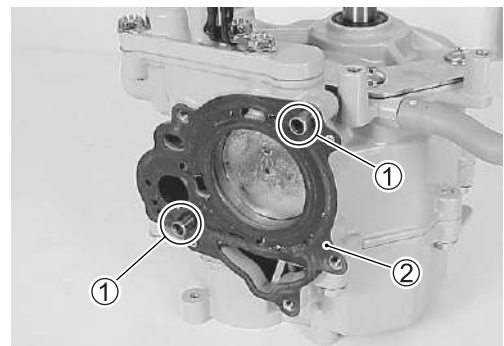
Do not re-use gasket. Always use a new gasket.

1. Before installing cylinder head gasket, apply bond to both surfaces of the hatched areas shown in illustration.

 **99000-31140: SUZUKI BOND "1207B"**



2. Insert the dowel pins  and place a new cylinder head gasket  into position on cylinder.

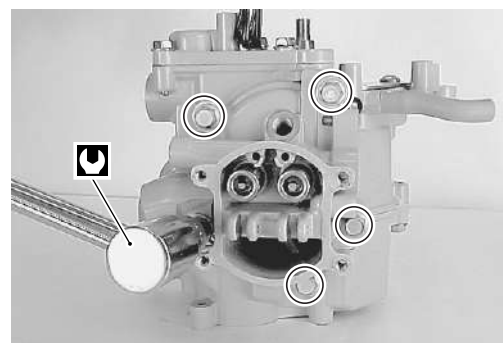
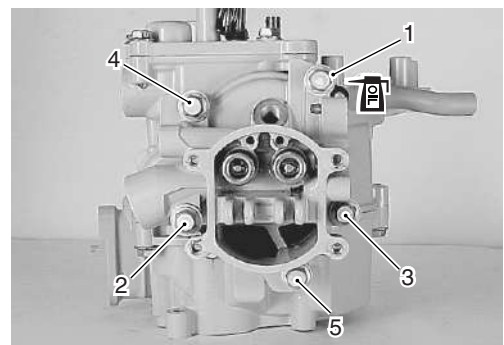


3. Position cylinder head assembly on cylinder.
4. Apply engine oil to cylinder head bolts.
5. Lightly seat all cylinder head bolts at first. According to tightening order in figure, tighten bolts in two steps.

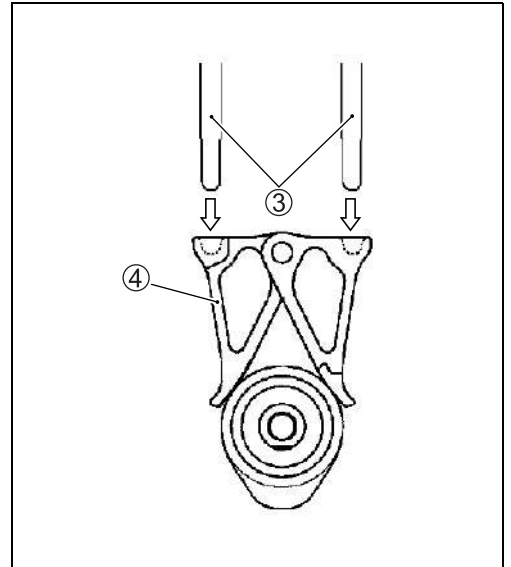
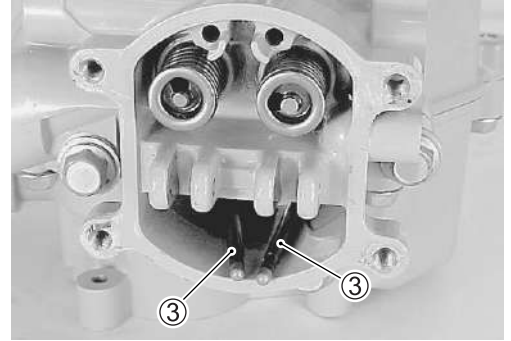
Cylinder head bolt:

1st step **7 N·m (0.7 kg-m, 5.0 lb-ft)**

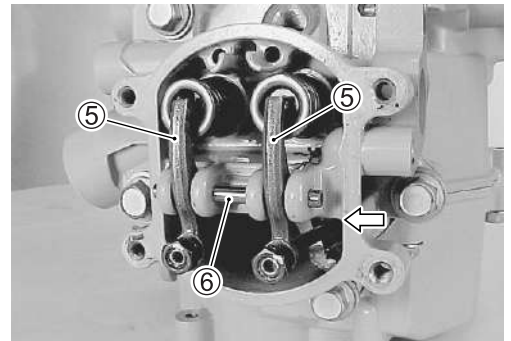
Final step **13 N·m (1.3 kg-m, 9.5 lb-ft)**



6. Install the two push rods ③ onto the cam rocker arms ④.

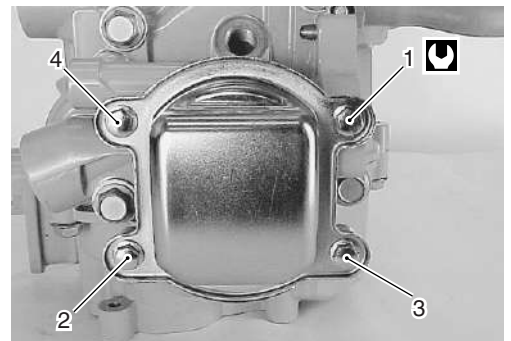


7. Install the rocker arms ⑤ and the rocker arm shaft ⑥.
8. Adjust the valve clearance. (See page 2-8 and 2-9.)



9. Install the cylinder head cover and the gasket, then tighten the four cylinder head cover bolts diagonally to the specified torque.

 **Cylinder head cover bolt: 7 N·m (0.7 kg·m, 5.0 lb·ft)**

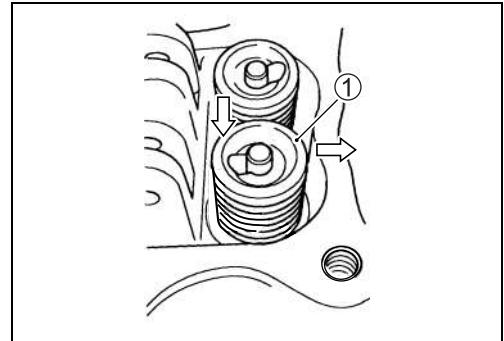
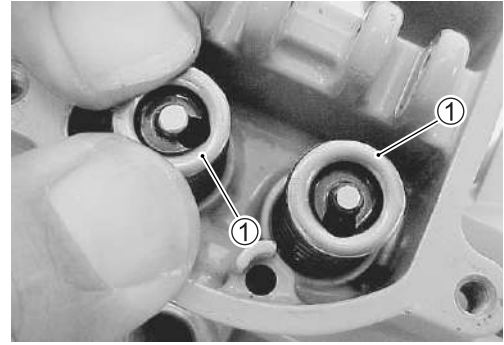


DISASSEMBLY

1. Remove the retainer ①.

NOTE:

To remove the retainer, push it with the thumbs of both hands: move it in the arrow direction and force it off the valve shaft.



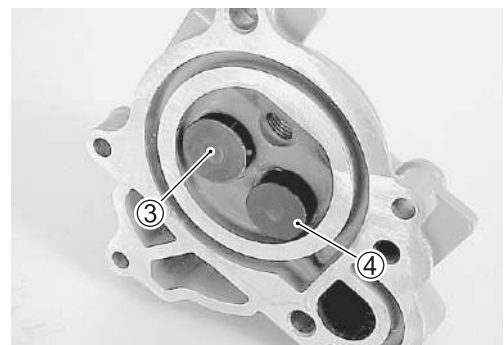
2. Remove the valve springs ②.

NOTE:

Reassemble each valve spring to their original position.



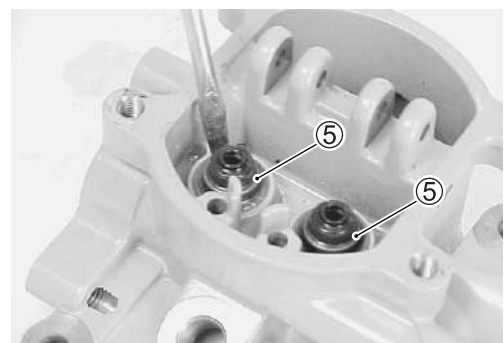
3. Remove the intake valve ③ and exhaust valve ④.



4. Remove the valve stem seals ⑤.

CAUTION

Do not re-use the removed valve stem seal.



INSPECTION AND SERVICING

NOTE:

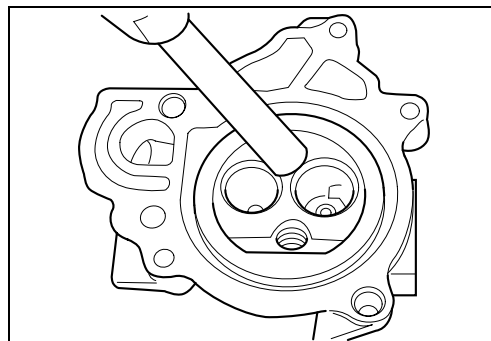
If excessive wear, crack, defective or other damage is found on any component, replace.

CYLINDER HEAD

1. Remove all carbon from the combustion chamber.

NOTE:

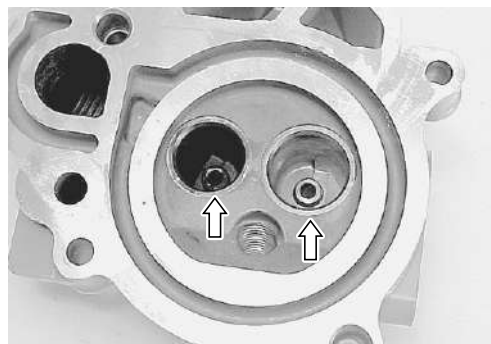
- Do not use any sharp edged tool in order to scrape carbon off the cylinder head or the head components.
- Be careful not to scuff or nick the metal surfaces when decarboning.



2. Inspect the cylinder head for crack in the intake and the exhaust ports, the combustion chamber and the head surface.


Valve seat

Inspect the valve seats for crack or other damage.



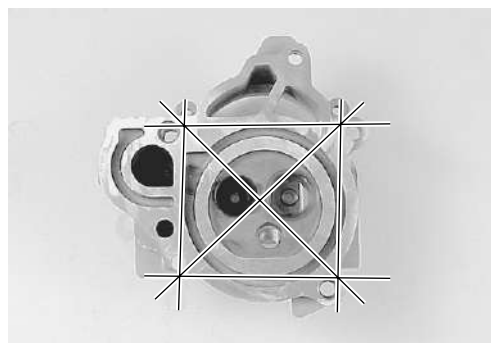
Cylinder head distortion

Using a straightedge and the thickness gauge, measure the gasket surface of the cylinder head at a total of six locations as shown in the figure.

 **09900-20803: Thickness gauge**

Cylinder head distortion:

Service limit: 0.05 mm (0.002 in)

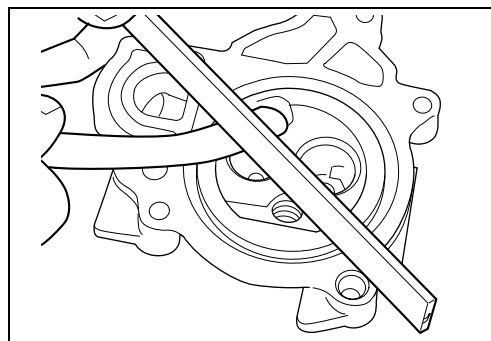


If the measurement exceeds the service limit, resurface or replace the cylinder head.

NOTE:

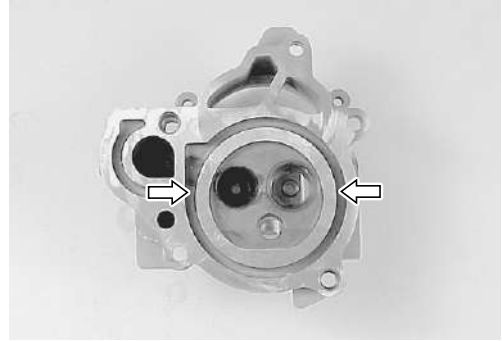
The cylinder head can be resurfaced, using a surface plate and a #400 grit wet sandpaper.

Move the cylinder head in a figure eight pattern when sanding.



Water jacket

Inspect the water jackets for clog or obstruction. Clean the water jackets if necessary.

**ROCKER ARM AND ROCKER ARM SHAFT**

Inspect the rocker arm for wear, crack or other damage.

Replace it necessary.

Inspect the rocker arm shaft for wear, bend or other damage.

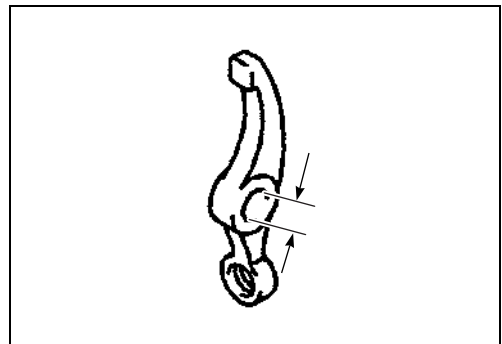
Replace it necessary.

**Rocker arm shaft hole diameter**


Measure the rocker arm shaft hole diameter using a small bore gauge.

Rocker arm shaft hole diameter:

Standard: 4.015 – 4.027 mm (0.1581 – 0.1585 in)

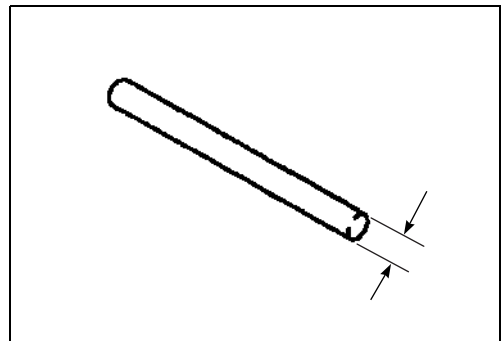
**Rocker arm shaft outside diameter**

Measure the rocker arm shaft diameter using the micrometer.

 09900-20205: Micrometer

Rocker arm shaft outside diameter:

Standard: 3.990 – 4.005 mm (0.1571 – 0.1577 in)

**PUSH ROD**


Inspect the push rod for bend or other damage.

Replace it necessary.



VALVE/VALVE GUIDE

Using the micrometer and a small bore gauge, take the diameter readings on the valve stems and the guides in order to check the guide to stem clearance. Be sure to take readings at more than one place along length of each stem and guide.

 **09900-20205: Micrometer**

Valve stem outside diameter

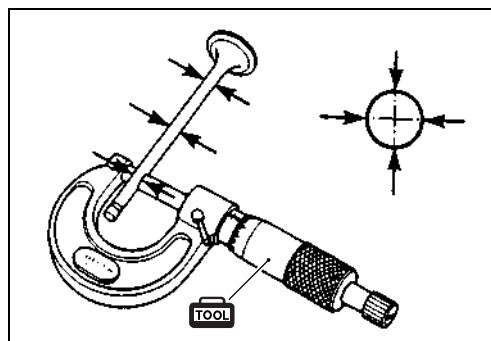
Measure the valve stem outside diameter using the micrometer.

Valve stem outside diameter:

Standard:

IN. 3.975 – 3.990 mm (0.1565 – 0.1571 in)

EX. 3.960 – 3.975 mm (0.1559 – 0.1565 in)



Valve guide inside diameter

Measure the valve guide inside diameter using a small bore gauge.

Valve guide inside diameter:

Standard:

IN. & EX. 4.000 – 4.012 mm (0.1575 – 0.1580 in)

Valve guide to valve stem clearance:

Standard:

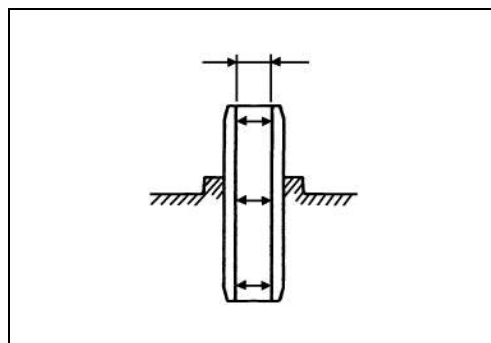
IN. 0.010 – 0.037 mm (0.0004 – 0.0015 in)

EX. 0.025 – 0.052 mm (0.0010 – 0.0020 in)

Service limit: IN. 0.075 mm (0.0030 in)

EX. 0.090 mm (0.0035 in)

If the measurement exceeds the service limit, replace the valve and/or the cylinder head.



Valve stem deflection

If unable to measure the valve guide inside diameter, measure the "Valve stem deflection".

 **09900-20602: Dial gauge**

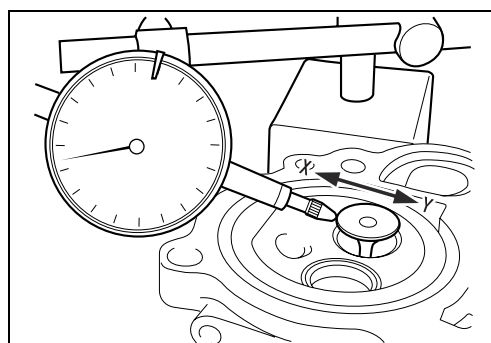
09900-20701: Magnetic stand

1. Install the valves into the valve guide.
2. Lift the valves 8 – 10 mm off seat.
3. Move the valve head in the direction "X – Y" and measure the deflection.

Valve stem deflection:

Service limit: IN. & EX. 0.35 mm (0.014 in)

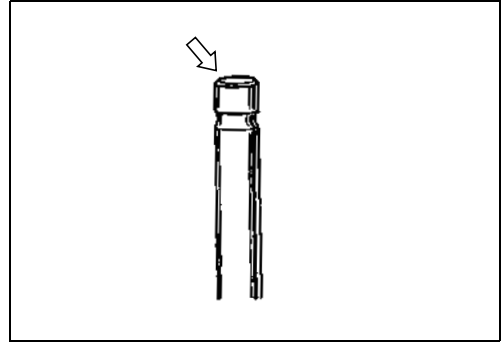
If the measurement exceeds the service limit, replace the valve and/or the cylinder head.



Valve stem end

Inspect the valve stem end face for pitting and wear. If pitting or wear is found, the valve stem end may be resurfaced.

If the chamfer of stem end has been worn away, replace the valve.

**Valve stem runout**

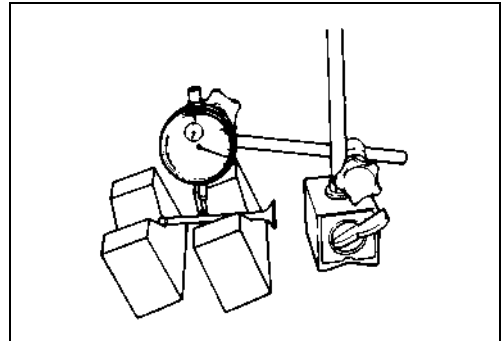
Measure the valve stem runout.

TOOL 09900-20602: Dial gauge
 09900-20701: Magnetic stand
 09900-21304: "V" block set

Valve stem runout:

Service limit: 0.05 mm (0.002 in)

If the measurement exceeds the service limit, replace the valve.

**Valve head radial runout**

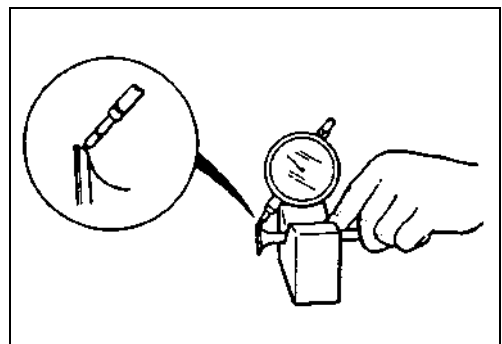
Measure the valve head radial runout.

TOOL 09900-20602: Dial gauge
 09900-20701: Magnetic stand
 09900-21304: "V" block set

Valve head radial runout:

Service limit: 0.08 mm (0.003 in)

If the measurement exceeds the service limit, replace the valve.

**Valve head thickness**

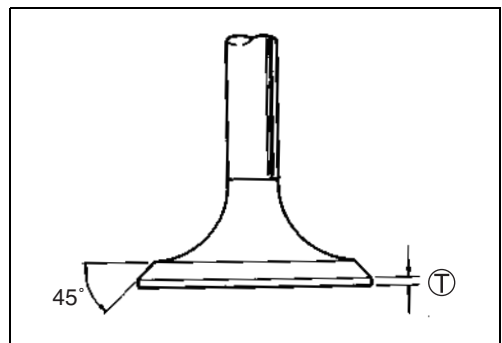
Measure the thickness Ⓣ of the valve head.

TOOL 09900-20101: Vernier calipers

Valve head thickness:

Service limit: IN. & EX. 0.5 mm (0.02 in)


If the measurement exceeds the service limit, replace the valve.




Valve seat contact width

Measure the valve seat contact width as follows.

1. Remove all carbon from the valve and seat.
2. Coat the valve seat evenly with Prussian Blue (or equivalent).
3. Install the valve into the valve guide.
4. Put the valve lapper on the valve head.

 **09916-10911: Valve lapper**

5. Rotate the valve while gently tapping the valve contact area against the seat.
6. Continuously pattern on the valve seating face with Prussian blue.
7. Measure the valve seat contact width (A).

 **09900-20101: Vernier calipers**

Valve seat contact width (A):

Standard: IN. & EX. 0.8 – 1.0 mm (0.03 – 0.04 in)

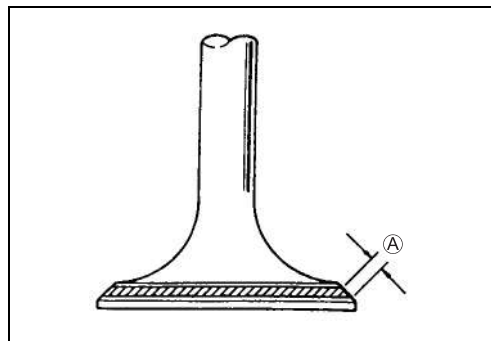
If measurement exceeds specification, repair valve seat.

NOTE:

Clean and assemble the cylinder head and the valve components.


Fill the intake and the exhaust ports with solvent in order to check for leaks between the valve seat and the valve.

If any leaks occur, inspect the valve seat and the face for burrs or other things that could prevent the valve from sealing.



VALVE SPRING**Valve spring free length**

Measure the valve spring free length.

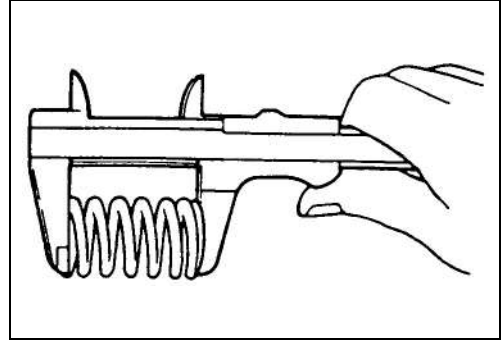
 **09900-20101: Vernier calipers**

Valve spring free length:


Standard: IN. & EX. 22.42 mm (0.883 in)

Service limit: IN. & EX. 21.52 mm (0.847 in)

If the measurement exceeds the service limit, replace the valve spring.

**Valve spring preload**

Measure the valve spring preload.

 **09900-20101: Vernier calipers**

Valve spring preload:

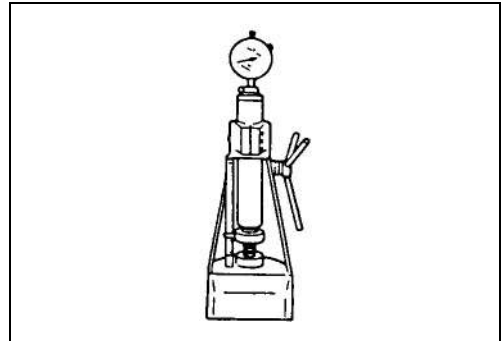
Standard:

**IN. & EX. 36.5 – 41.9 N (3.65 – 4.19 kg, 8.05 – 9.24 lbs)
for 15 mm (0.6 in)**

Service limit:

**IN. & EX. 33 N (3.3 kg, 7.34 lbs)
for 15 mm (0.6 in)**

If the measurement exceeds the service limit, replace the valve spring.



REASSEMBLY

Reassembly is reverse order of disassembly with the special attention to the following steps.

1. Apply engine oil to the valve stem seals ①.
2. Install the valve stem seals to the valve guide.

CAUTION

**Do not re-use the removed valve stem seal.
Always use a new stem seal.**

3. Apply engine oil to the valve guide bore and valve stem.
4. Install the valve ② to the valve guide.

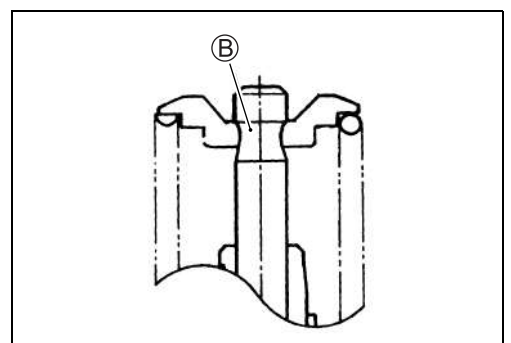
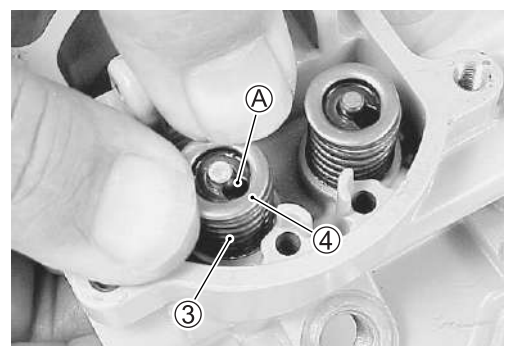
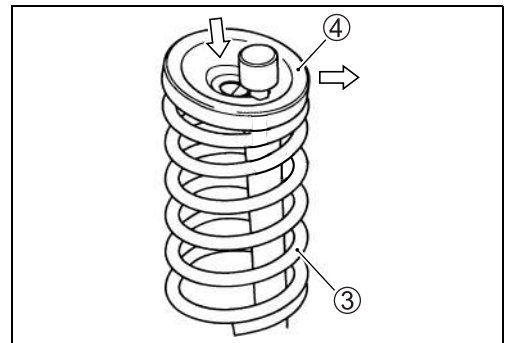
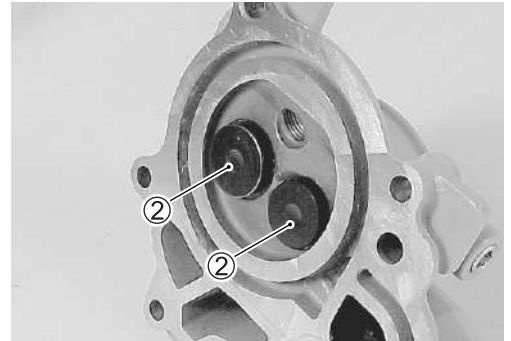
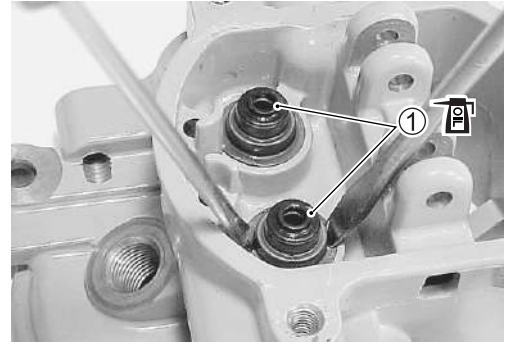
5. Install the valve spring ③ and the retainer ④.

NOTE:

Reassemble each valve spring to their original position.

6. Push down the retainer with both thumbs to admit the valve stem into the side hole (A) of the retainer, and let it slide side-wise into the center hole.

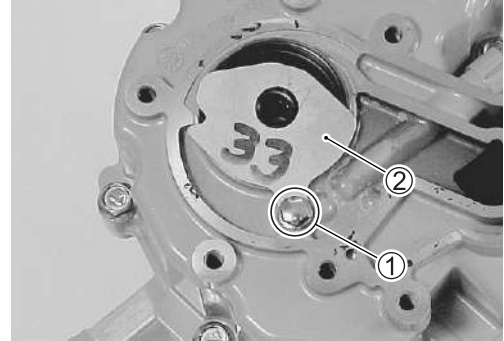
7. Make sure the retainers are properly seated in groove (B).



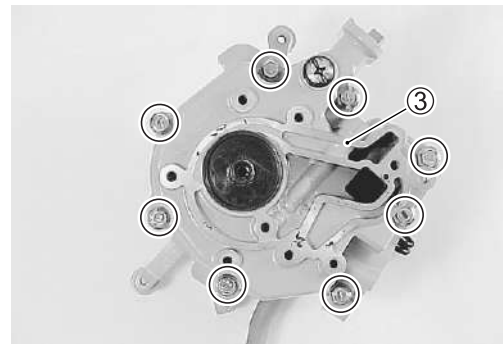
CYLINDER / PISTON / CRANKSHAFT / CONROD / CAMSHAFT DISASSEMBLY

1. Remove the power unit. (See page 6-2.)
2. Remove the cylinder head. (See page 6-7.)

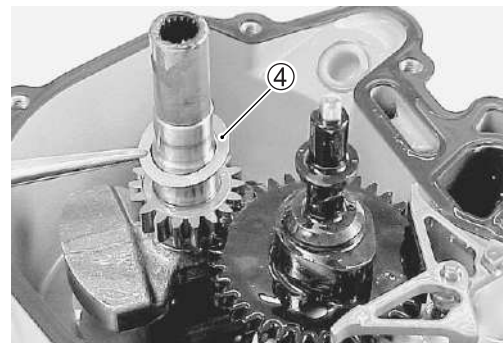
3. Remove the bolt ① and the under oil seal plate ②.



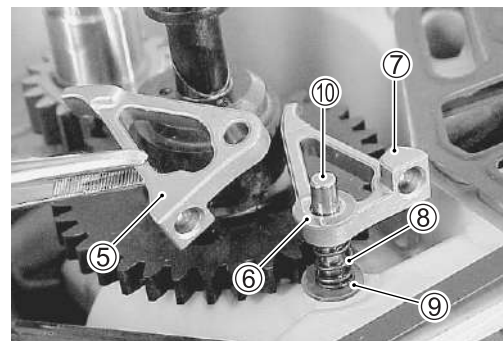
4. Remove the eight bolts and the crankcase ③.



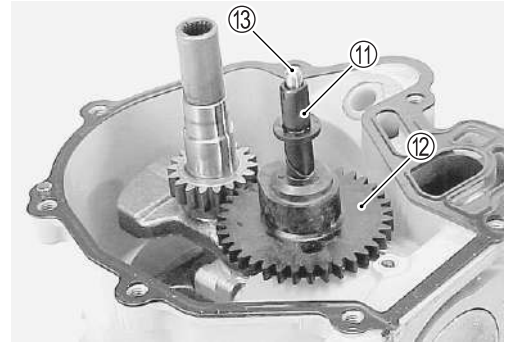
5. Remove the thrust washer ④.



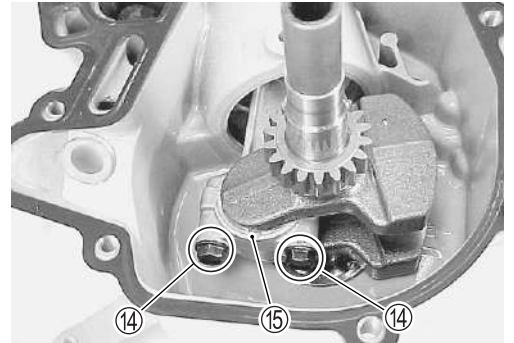
6. Remove the cam rocker arm ⑤, washer ⑥, cam rocker arm ⑦, spring ⑧, washer ⑨ and shaft ⑩.



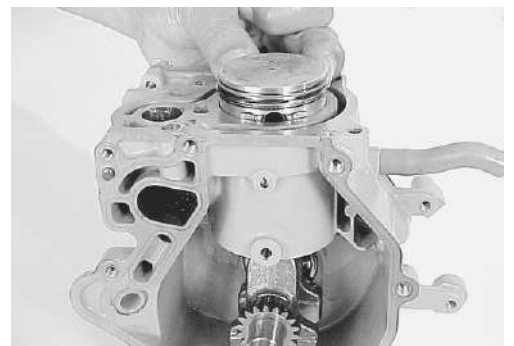
7. Remove the oil pump shaft ⑪, camshaft ⑫ and shaft ⑬.



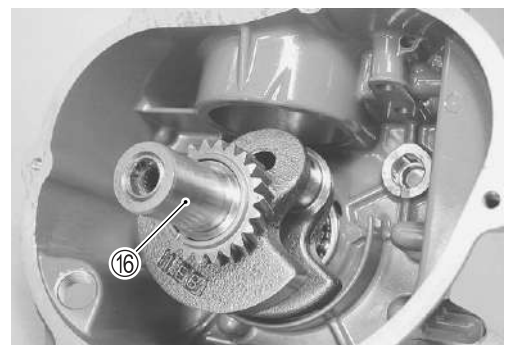
8. Remove the two conrod bolts ⑭ and the conrod cap ⑮.



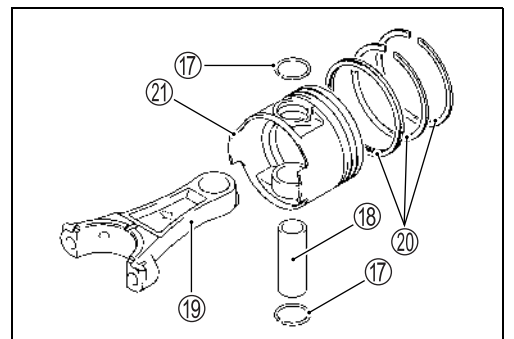
9. Remove the piston with the conrod through the top of the cylinder bore.



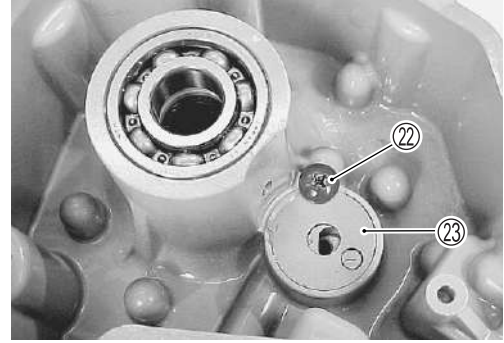
10. Remove the crankshaft ⑯ from the cylinder block.



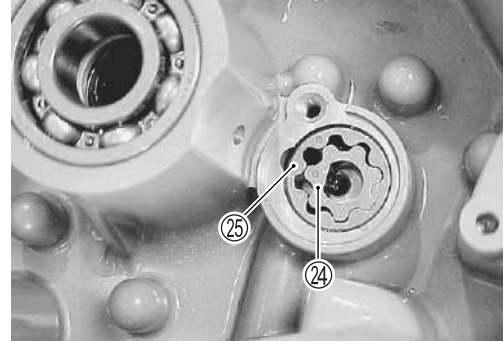
11. Remove the circlips ⑰, the piston pin ⑱, the conrod ⑲ and the piston rings ⑳ from the piston ㉑.



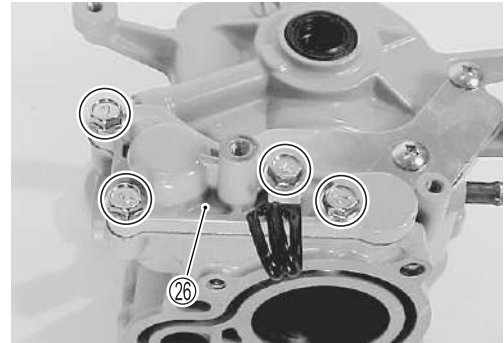
12. Remove the screw ②② and the oil pump outer plate ②③.



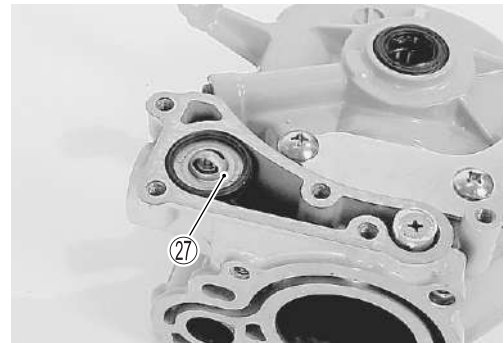
13. Remove the inner rotor ②④ and the outer rotor ②⑤.



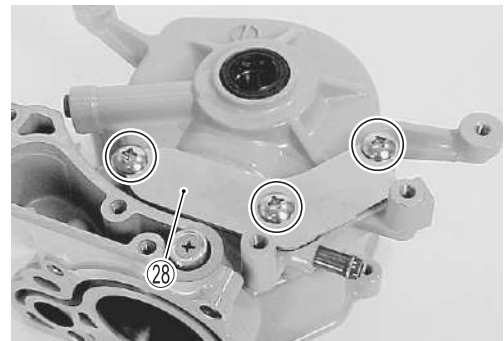
14. Remove the four bolts and the thermostat cover ②⑥.



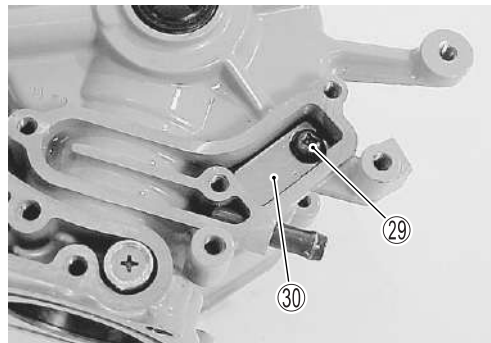
15. Remove the thermostat ②⑦.



16. Remove the three screws and the breather plate ②⑧.



17. Remove a screw ⑲ and the reed valve ⑳.



INSPECTION AND SERVICING

NOTE:

If excessive wear, crack, defective or other damage is found on any component, replace.


CAMSHAFT

Cam face

Inspect the cam face for scratches and wear.

Cam wear

Measure the cam height (H).

 09900-20202: Micrometer

Cam height:

Standard:

IN. & EX. 28.480 – 28.680 mm (1.1213 – 1.1291 in)

Service limit: IN. & EX. 28.180 mm (1.1094 in)

If the measurement exceeds the service limit, replace the camshaft.

Camshaft gear

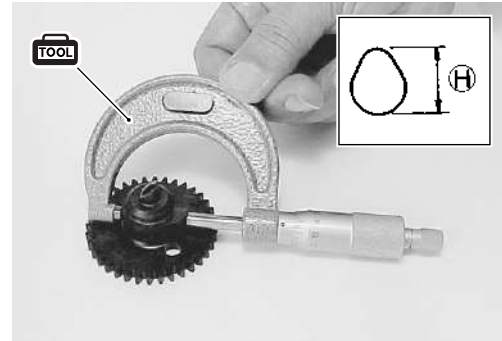
Inspect the camshaft gear for wear or other damage.

Replace it necessary.

CAM ROCKER ARM

Inspect the cam rocker arm for wear or other damage.

Replace it necessary.



CYLINDER / PISTON / PISTON RING**Cylinder distortion**

Using a straightedge and the thickness gauge, measure the gasket surface of the cylinder at a total of six locations as shown in the figure.

TOOL 09900-20803: Thickness gauge

Cylinder distortion:

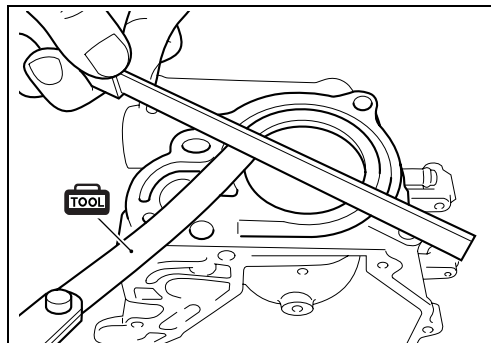
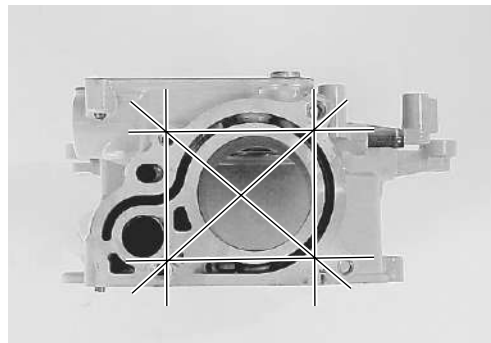
Service limit: 0.05 mm (0.002 in)

If the measurement exceeds the service limit, resurface or replace the cylinder.

NOTE:

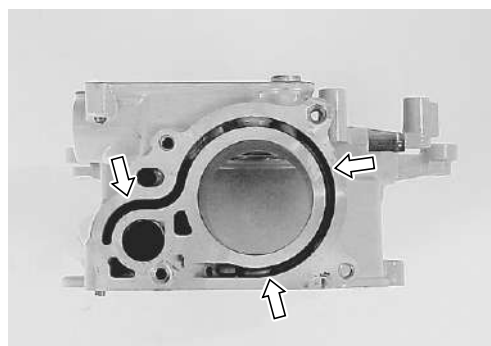
The cylinder can be resurfaced, using a surface plate and a #400 grit wet sandpaper.

Move the cylinder in a figure eight pattern when sanding.

**Water jacket**

Inspect the water jackets for clog or obstruction.

Clean the water jackets if necessary.

**Cylinder bore**

Inspect the cylinder wall for scratches, roughness or ridges which indicate excessive wear.

If the cylinder bore is very rough or deeply scratched or ridged, rebore the cylinder and use an oversize piston.

Cylinder bore wear (difference)

Using the cylinder bore gauge, measure the cylinder bore in the thrust and axial directions at the three positions (A), (B) and (C).

TOOL 09900-20530: Cylinder gauge set

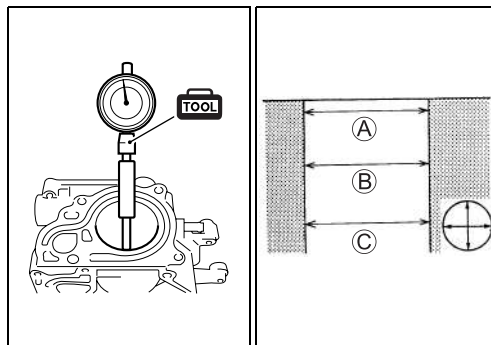
Check for the followings.

- Difference between the measurements at the three positions (taper).
- Difference between the thrust and axial measurements (out-of-round).

Cylinder bore wear (difference):

Service limit: 0.100 mm (0.0039 in)

If the wear (difference) exceeds the service limit, rebore or replace the cylinder.



Piston to cylinder clearance

To check the clearance, measure the following items.

- Cylinder bore at 20 mm elevation from the gasket surface at a right angle to the crankshaft pin.
- Piston skirt diameter at 5 mm elevation from the skirt end.

TOOL 09900-20530: Cylinder gauge set
09900-20202: Micrometer

Piston to cylinder clearance:

Standard: 0.018 – 0.033 mm (0.0007 – 0.0013 in)

Service limit: 0.100 mm (0.0039 in)

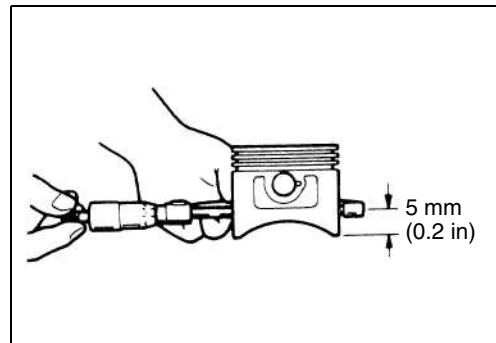
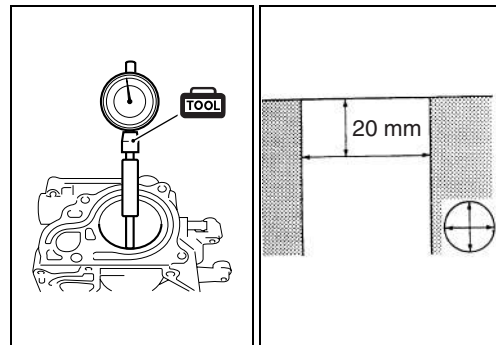
If the clearance exceeds the service limit, replace the piston and/or the cylinder, or rebore the cylinder.

Cylinder bore:

Standard: 48.000 – 48.015 mm (1.8898 – 1.8904 in)

Piston skirt diameter:

Standard: 47.975 – 47.990 mm (1.8888 – 1.8894 in)

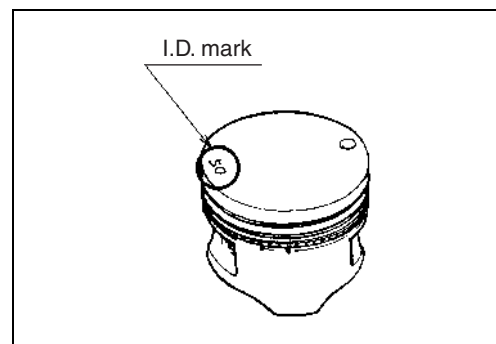


Identification of oversize piston and piston ring

Oversize piston and piston ring are marked as show in the figures.

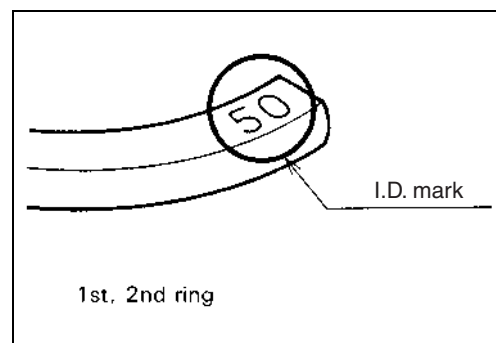
Piston

Oversize	I.D. mark
0.50 mm	50



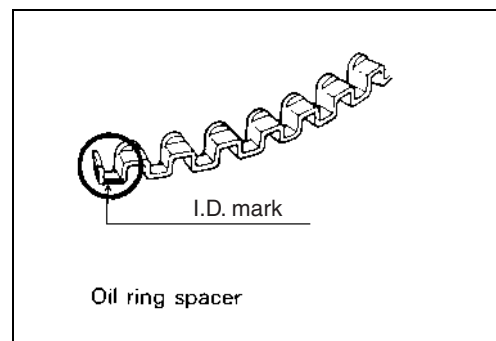
1st ring & 2nd ring

Oversize	I.D. mark
0.50 mm	50



Oil ring


Oversize	I.D. mark
0.50 mm	Blue paint



Piston ring to groove clearance

Before checking, the piston grooves must be clean, dry and free of carbon.

Fit the piston ring into the piston groove, and measure the clearance between the ring and the ring groove using the thickness gauge.

 **09900-20803: Thickness gauge**

Piston ring to groove clearance:

Standard:

1st & 2nd 0.020 – 0.060 mm (0.0008 – 0.0024 in)

Service limit:

1st & 2nd 0.120 mm (0.0047 in)

If the measurement exceeds the service limits, replace the piston and/or the piston ring.

Piston ring groove width:

Standard:

1st & 2nd 1.21 – 1.23 mm (0.048 – 0.049 in)

Oil 1.51 – 1.53 mm (0.059 – 0.060 in)


Piston ring thickness:

Standard:

1st & 2nd 1.17 – 1.19 mm (0.046 – 0.047 in)

Piston ring end gap

Measure the piston ring end gap with the piston ring in the lowest position of the cylinder bore.

 **09900-20803: Thickness gauge**

Piston ring end gap:

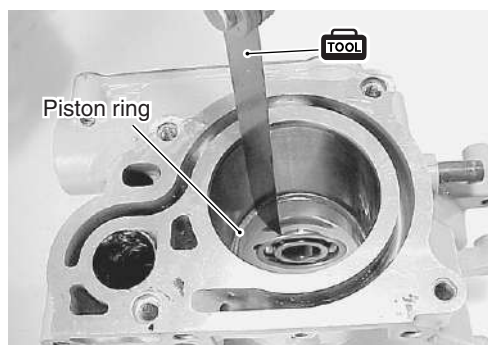
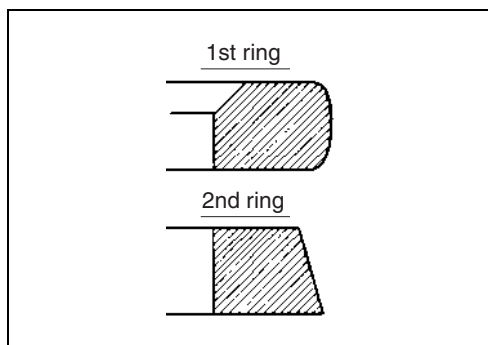
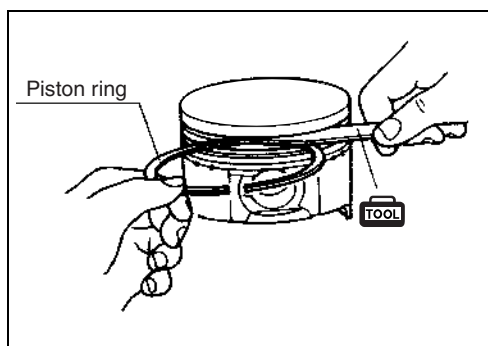
Standard:

1st & 2nd 0.15 – 0.35 mm (0.006 – 0.014 in)

Service limit:


1st & 2nd 0.50 mm (0.020 in)

If the measurement exceeds the service limit, replace the position ring.



Piston ring free end gap

Measure the piston ring free end gap.

 **09900-20101: Vernier calipers**

Piston ring free end gap:**Standard:**

1st Approx. 6.1 mm (0.24 in)

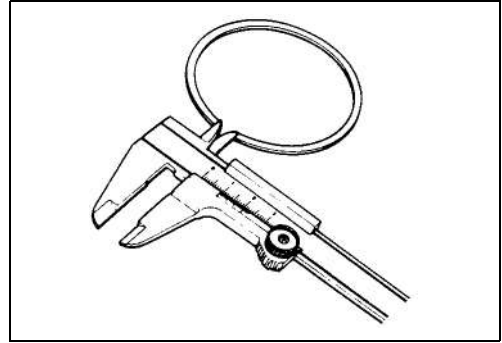
2nd Approx. 5.7 mm (0.22 in)

Service limit:

1st 4.9 mm (0.19 in)


2nd 4.6 mm (0.18 in)

If the measurement exceeds the service limits, replace the piston ring.

**PISTON PIN / CONROD / CRANKSHAFT****Piston pin clearance**

To check the clearance, measure the following items.

- Piston pin outside diameter in the thrust and axial directions.
- Piston pin hole diameter in the thrust and axial directions.

 **09900-20205: Micrometer**

09900-20605: Dial calipers

Pin clearance in piston pin hole:

Standard: 0.002 – 0.013 mm (0.0001 – 0.0005 in)

Service limit: 0.040 mm (0.0016 in)

Pin clearance in conrod small end:

Standard: 0.006 – 0.019 mm (0.0002 – 0.0007 in)

Service limit: 0.050 mm (0.0020 in)

If the clearance exceeds the service limit, replace the piston, the piston pin and/or the conrod assembly.

Piston pin outside diameter:

Standard: 11.995 – 12.000 mm (0.4722 – 0.4724 in)

Service limit: 11.980 mm (0.4717 in)

Piston pin hole diameter:

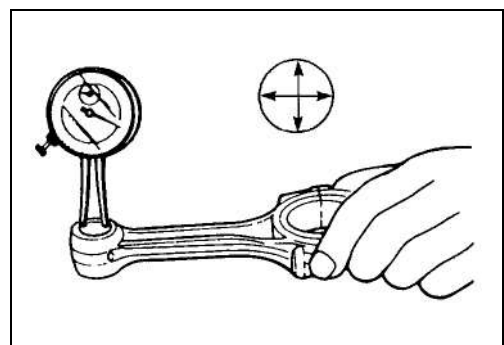
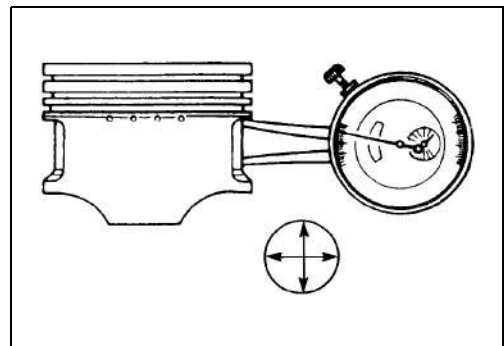
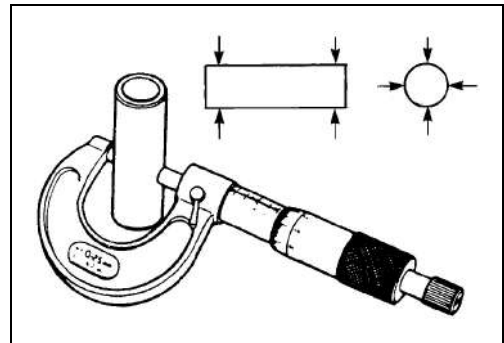
Standard: 12.002 – 12.008 mm (0.4725 – 0.4728 in)

Service limit: 12.030 mm (0.4736 in)

Conrod small end inside diameter:


Standard: 12.006 – 12.014 mm (0.4727 – 0.4730 in)

Service limit: 12.040 mm (0.4740 in)



Conrod big end side clearance

Measure the clearance with the conrod installed on the crank pin as shown in the figure.

 **09900-20803: Thickness gauge**

Conrod big end side clearance:

Standard: 0.20 – 0.70 mm (0.008 – 0.028 in)

Service limit: 1.00 mm (0.039 in)

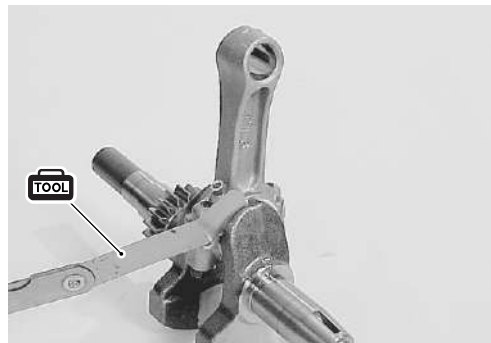
If the measurement exceeds the service limit, replace the conrod assembly and/or crankshaft.

Conrod big end width:

Standard: 17.50 – 17.80 mm (0.689 – 0.701 in)

Crank pin width:

Standard: 18.00 – 18.20 mm (0.709 – 0.717 in)

**Crank pin**

Inspect the crank pin for uneven wear or damage. Measure the crank pin outside diameter for out-of-round or taper using the micrometer.

Out-of-round: A – B

Taper: a – b

 **09900-20205: Micrometer**

Crank pin outside diameter difference

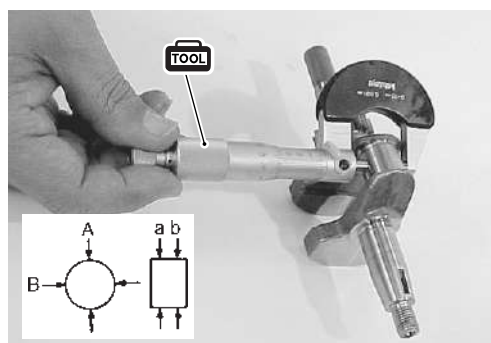
(Out-of-round and Taper):

Service limit: 0.010 mm (0.0004 in)

If the out-of-round or the taper is exceeds the service limit, replace the crankshaft.

Crank pin outside diameter:

Standard: 18.990 – 19.000 mm (0.7476 – 0.7480 in)



Conrod big end oil clearance

Check the clearance as follows.

1. Clean the surface of the conrod, the conrod cap and the crank pin.
2. Place a piece of the plastigauge on the crank pin parallel to the crankshaft, avoiding the oil hole.

 **09900-22301: Plastigauge**

3. Install the conrod and the conrod cap to the crank pin.
4. Install the two conrod bolts and tighten the bolts to the specified torque in two steps.

NOTE:

Do not rotate the conrod with the plastigauge in place.

 **Conrod bolt:**

- 1st step 3.5 N·m (0.35 kg-m, 2.5 lb-ft)**
2nd step 7 N·m (0.7 kg-m, 5.0 lb-ft)

5. Remove the conrod and the conrod cap from the crank pin.
6. Using the scale on the plastigauge envelop, measure the plastigauge with the widest point.

Conrod big end oil clearance:

- Standard: 0.15 – 0.035 mm (0.0006 – 0.0014 in)**
Service limit: 0.080 mm (0.0031 in)

If the measurement exceeds the service limit replace the conrod assembly and/or crankshaft.

Conrod big end inside diameter:

- Standard: 19.015 – 19.025 mm (0.7486 – 0.7490 in)**

Crankshaft runout

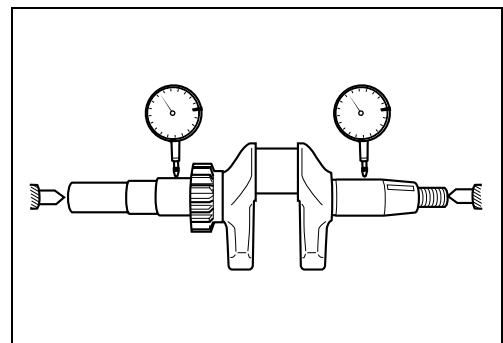
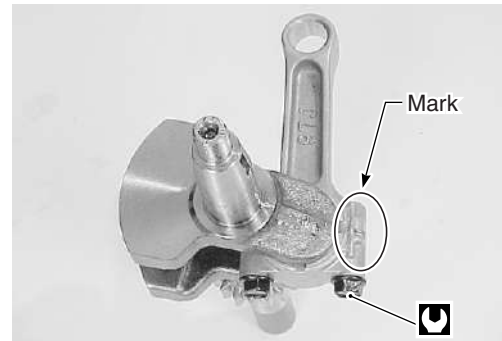
Measure the crankshaft runout as shown in the figure.

 **09900-20602: Dial gauge**

Crankshaft runout:

- Service limit: 0.05 mm (0.002 in)**

If the measurement exceeds the service limit, replace the crankshaft.



OIL SEAL AND BEARING

Visually check the oil seals installed in the cylinder block and crankcase for cut, nick, excessive wear or other damage.

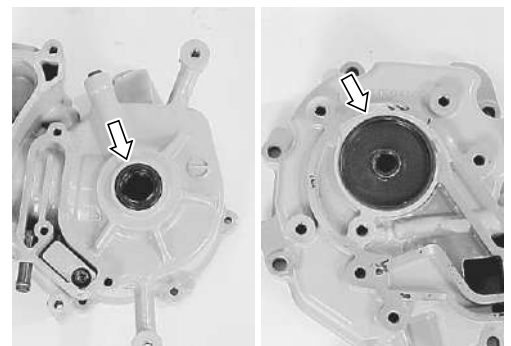
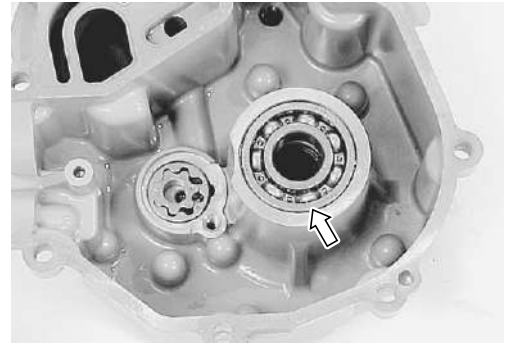
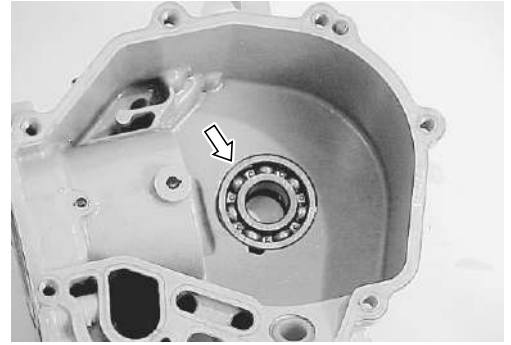
Visually check the crankshaft upper bearing for pitting, noisy, rough or other damage.

NOTE:

If neither defective nor any damage is found on the oil seals and the bearing, do not remove the oil seals and the bearing.

CAUTION

Do not re-use the oil seal once removed. Always use a new oil seal.

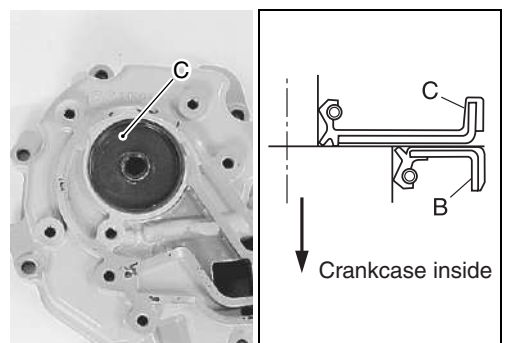
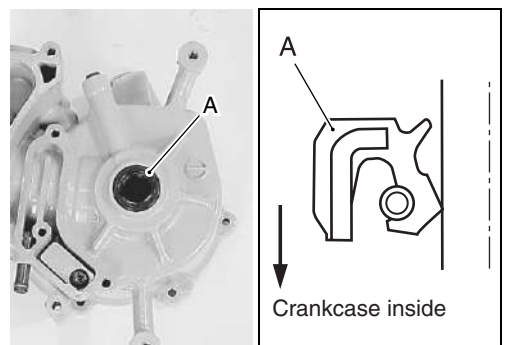


Drive the oil seal down into the position as shown in the figure.

A: Crankshaft upper oil seal

B: Crankshaft lower oil seal

C: Driveshaft oil seal



OIL PUMP

Inspect the outer rotor, the inner rotor and the rotor plate for excessive wear or other damage.

Replace it necessary.



REASSEMBLY

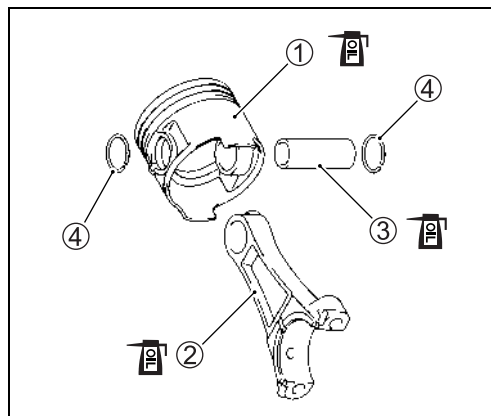
Reassembly is reverse order of disassembly with the special attention to the following steps.

CAUTION

- If the original components are not replaced, each piston, piston pin and conrod is to be assembled and installed in the original order and position.
- Do not re-use the gasket, the oil seal, the O-ring and the circlip once removed. Always use new parts.

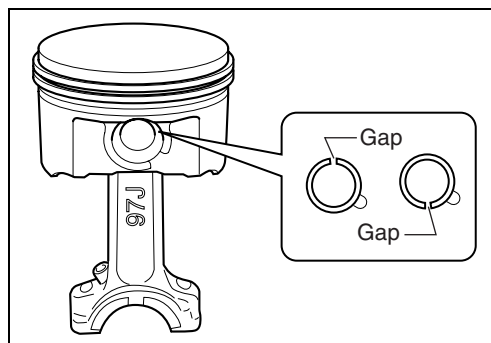
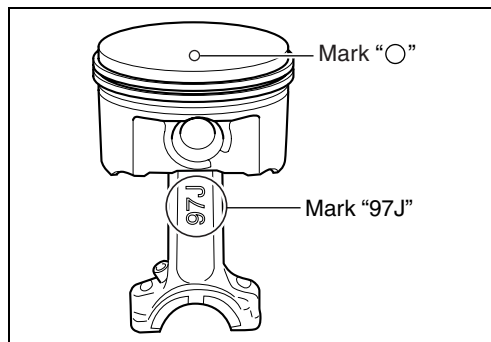
PISTON TO CONROD

1. Apply engine oil to the piston pin ③, the piston pin bore and the conrod ②.
2. Fit the conrod to the piston ① as shown in the figure and insert the piston pin through the piston and the conrod.
3. Install the piston pin circlips ④.



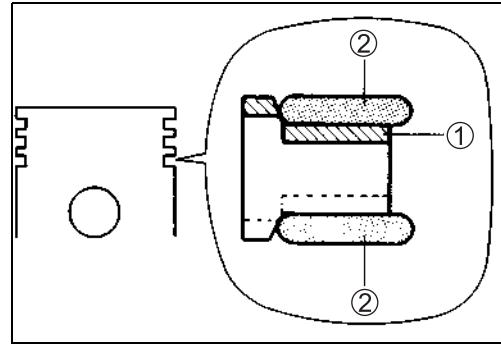
NOTE:

- Make sure that the conrod is installed in the direction shown in the figure.
- Install the circlips with a gap facing either up or down as shown in the figure.

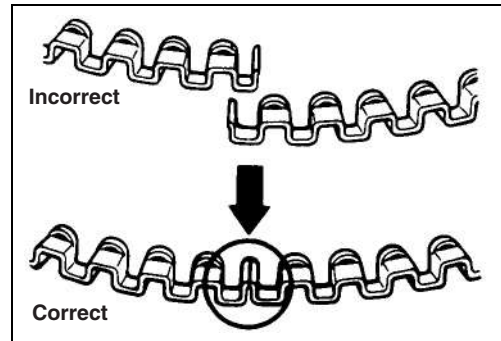


PISTON RING TO PISTON**Oil ring**

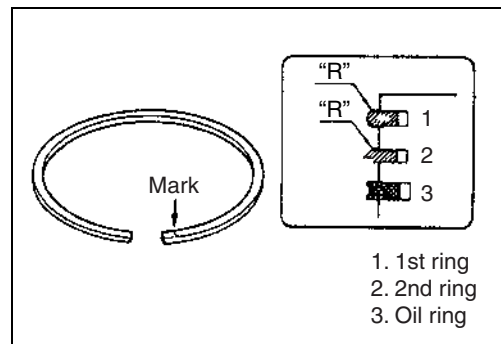
1. Apply engine oil to the piston rings.
2. Install the spacer ① first, then the side rails ② to the piston.

**CAUTION**

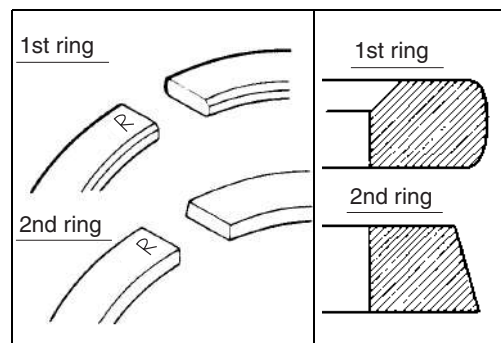
When installing the spacer, do not allow the ends to overlap in the groove.

**1st ring and 2nd ring**

1. Apply engine oil to the piston rings.
2. Install the 2nd ring and the 1st ring to the piston with the "R" mark toward the piston head side.

**NOTE:**

The 1st ring differs from the 2nd ring in shape.
Distinguish the 1st ring from the 2nd ring by referring to the figure.

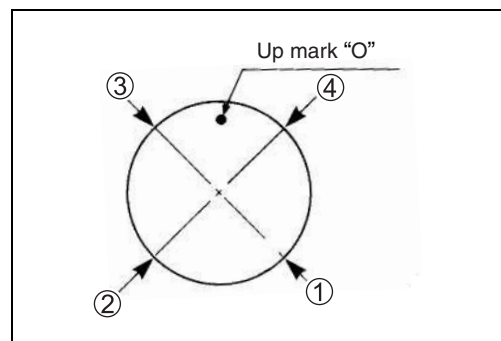
**Ring gap direction**

Position the piston rings so that the ring gaps are staggered at approximately 90 degree angles as shown in the figure.

- ① 1st ring
- ② Oil ring lower side rail
- ③ 2nd ring
- ④ Oil ring upper side rail

CAUTION

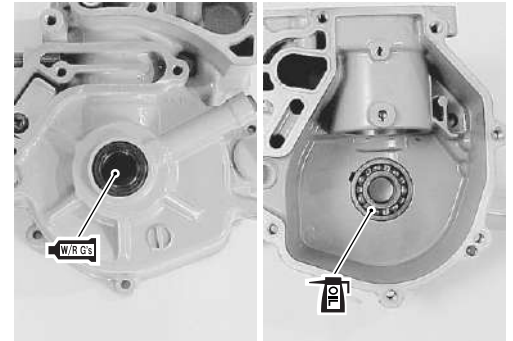
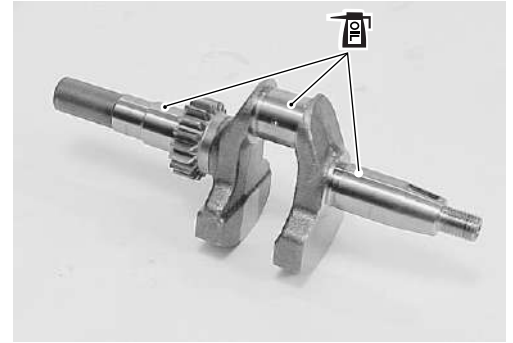
Failure to stagger the piston ring gaps may result in the crankcase oil dilution.



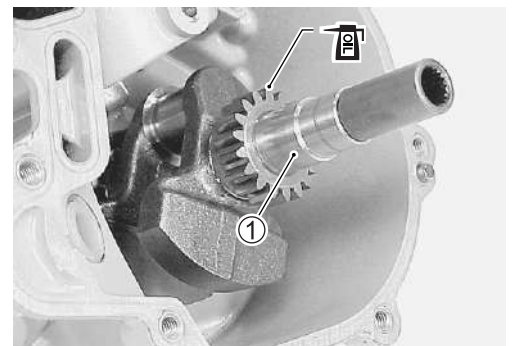
CRANKSHAFT AND PISTON TO CYLINDER

1. Apply engine oil to the crankshaft journals, the crank pin and the bearing.
2. Apply the Water Resistant Grease to the lip of the upper oil seal.

 **09900-25161: SUZUKI WATER RESISTANT GREASE**



3. Install the crankshaft ① to the cylinder block.

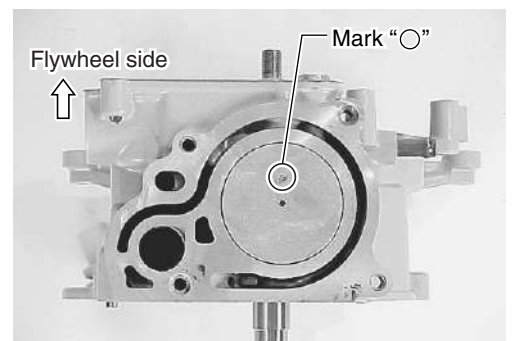


4. Apply engine oil to the piston and the cylinder wall.
5. Insert the piston/conrod assembly into the cylinder bore from the cylinder head side using the piston ring compressor.

 **Piston ring compressor**

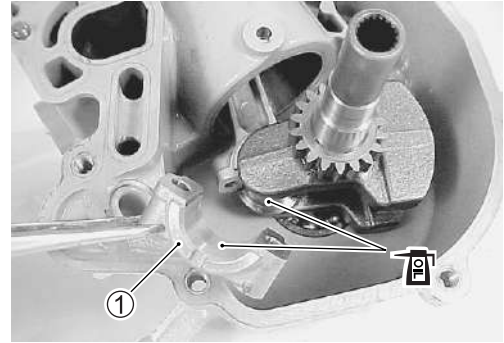
**NOTE:**

Position the "○" mark on the piston head to the flywheel side.

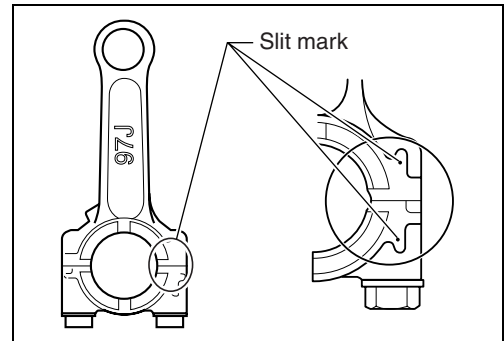


CONROD CAP

1. Apply engine oil to the crank pin, the connecting rod and the connecting rod cap ①.



2. Install the conrod cap in the direction as shown in the figure.

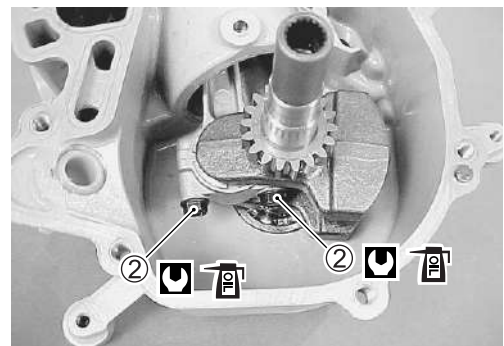


3. Apply engine oil lightly to the conrod bolts.
4. Tighten the two conrod bolts to the specified torque in two steps.

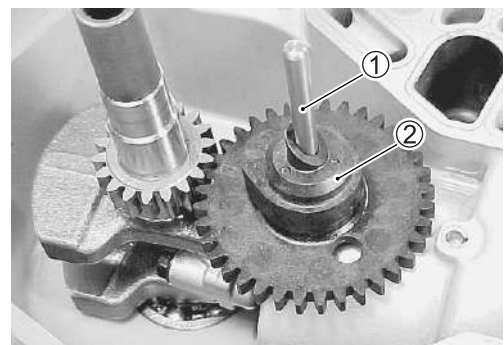
Conrod bolt:

1st step 3.5 N·m (0.35 kg-m, 2.5 lb-ft)

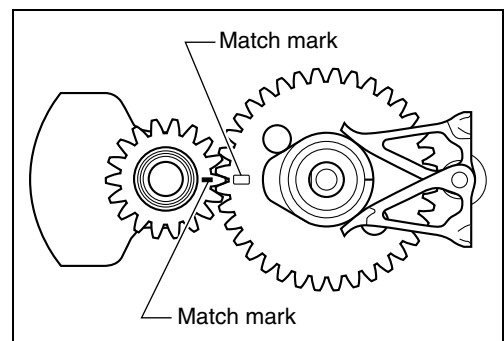
2nd step 7 N·m (0.7 kg-m, 5.0 lb-ft)

**CAMSHAFT**

1. Apply engine oil to the shaft ①.
2. Install the shaft ① to the cylinder block.
3. Apply engine oil to the cam faces, the cam journals and the timing gear.

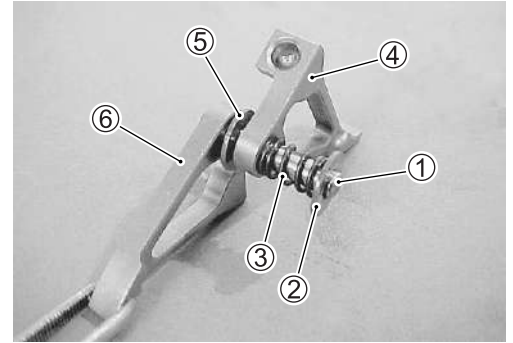


4. While aligning each mark on the camshaft gear and the crankshaft gear, install the camshaft ②.

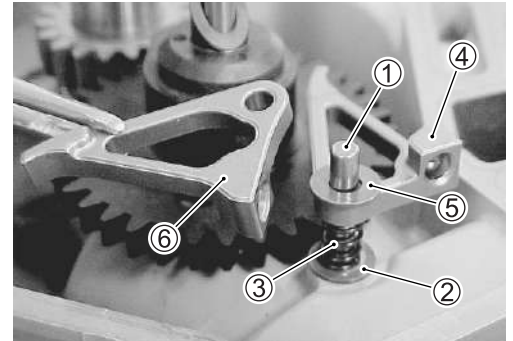


CAM ROCKER ARM

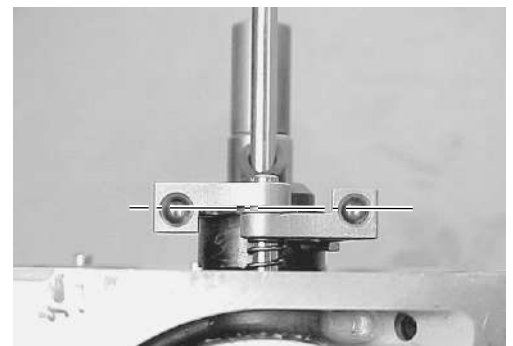
1. Apply engine oil to the cam rocker arm shaft ①.
2. Install the washer ② and the spring ③ to the shaft ① as shown in the figure.



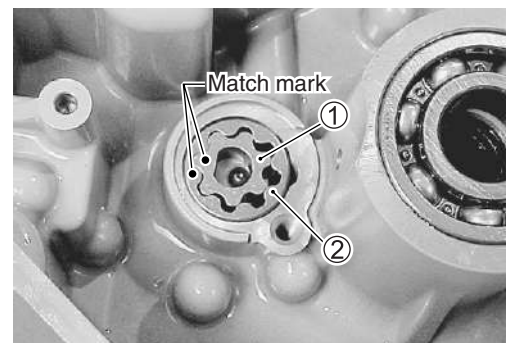
3. Install the cam rocker arm ④, the washer ⑤ and the cam rocker arm ⑥.

**NOTE:**

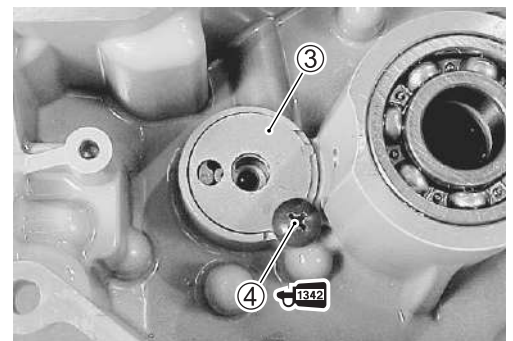
Be sure the cam rocker arms are positioned as shown in the figure.

**OIL PUMP**

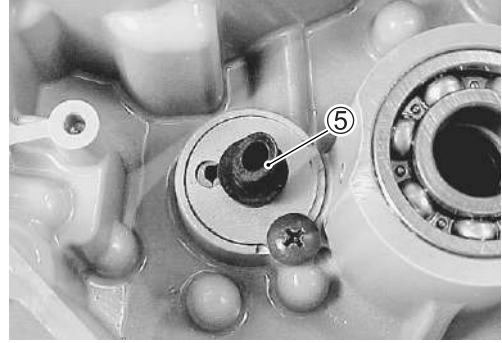
1. Apply engine oil to the inner rotor and the outer rotor.
2. Install the inner rotor ① and the outer rotor ② to the crankcase as shown in the figure.



3. Install the outer plate ③.
4. Apply the THREAD LOCK to the screw ④.
- 1342 99000-32050: THREAD LOCK "1342"
5. Secure the outer plate ③ with the screw ④.

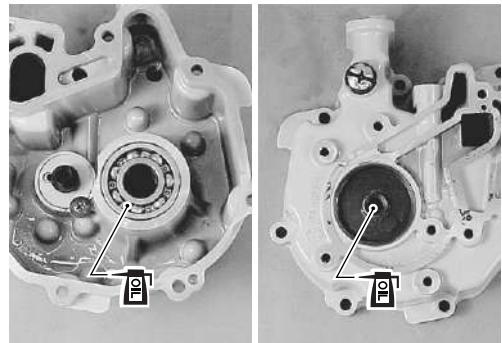
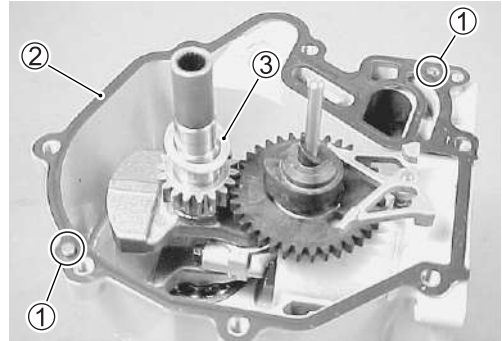


6. Install the oil pump shaft ⑤.



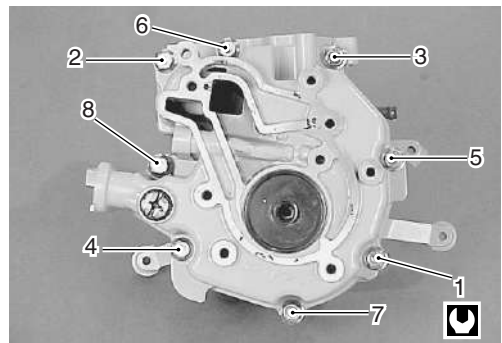
CRANKCASE TO CYLINDER

1. Clean the mating surfaces of the cylinder block and the crankcase.
2. Install the two dowel pins ① and the gasket ② to the cylinder block.
3. Install the thrust washer ③ into the crankshaft.
4. Apply engine oil to the crank journals.
5. Apply engine oil to the crankcase bearing, the crankshaft lower oil seal and the driveshaft oil seal.



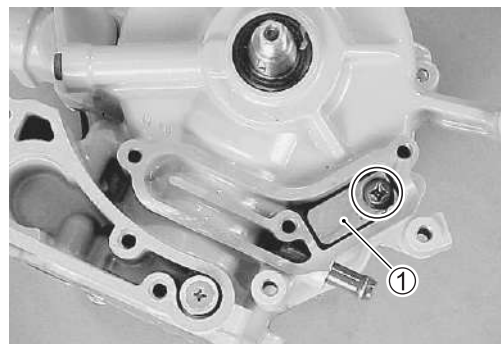
6. Install the crankcase to the cylinder block.
7. Tighten the eight crankcase bolts to the specified torque in the order indicated.

 **Crankcase bolt: 11 N·m (1.1 kg-m, 8.0 lb-ft)**

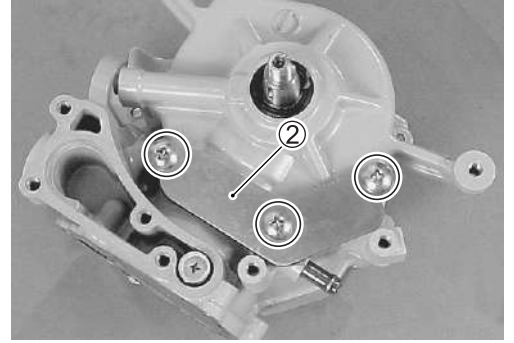


BREATHER PLATE AND THERMOSTAT

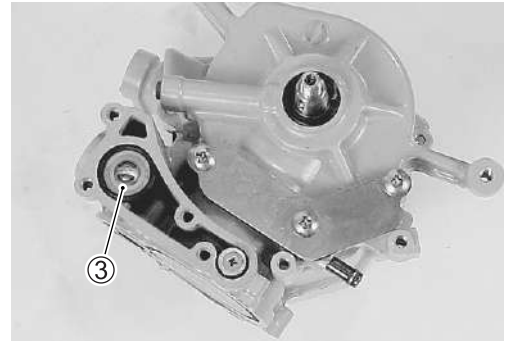
1. Install the reed valve ① to the cylinder block and secure with a screw.



2. Install the gasket and breather plate ② to the cylinder block and secure with the three screws.

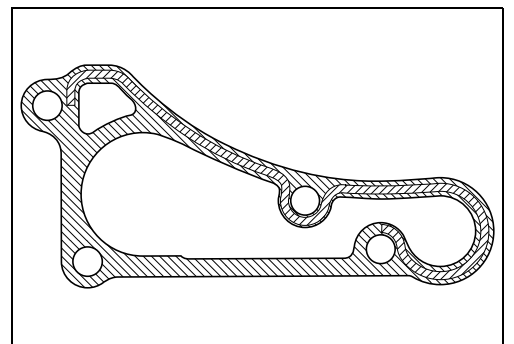


3. Install the thermostat ③.

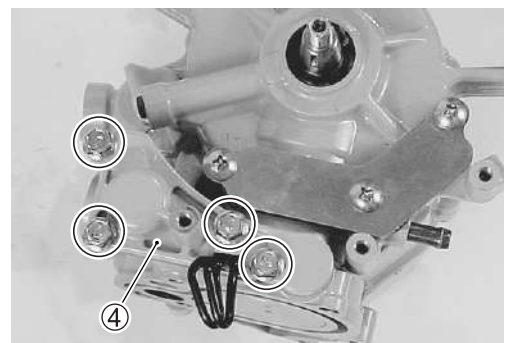


4. Apply sealant to both surfaces of thermostat cover gasket (as shown with hatched lines).

 **99000-31120: SUZUKI SILICONE SEAL**



5. Install the gasket and the thermostat cover ④ to the cylinder block and secure with the four bolts.



CYLINDER HEAD

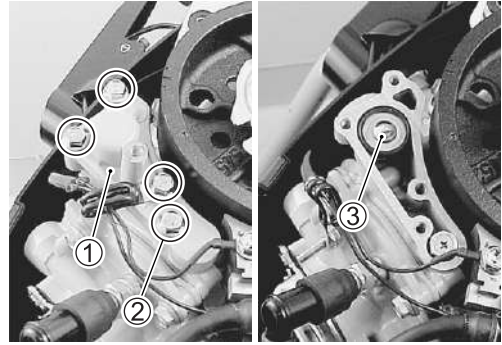
Install the cylinder head. (See page 6-8 and 6-9.)

POWER UNIT

Install the power unit. (See page 6-4 to 6-6.)

THERMOSTAT REMOVAL

1. Remove the recoil starter assy. (See page 5-2.)
2. Remove the four bolts ② and the thermostat cover ①.
3. Remove the thermostat ③.



INSPECTION

If salt deposits, corrosion, wear or other damage is found, clean or replace the thermostat.

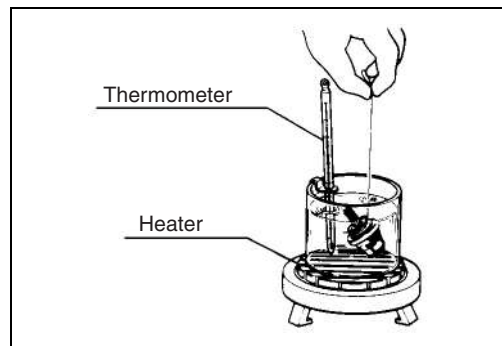
Thermostat operation

Check the thermostat operating temperature as follows.

1. Insert a length of thread between the thermostat valve/body and suspend the thermostat in a container filled with water.
2. Place the thermometer in the container and heat water. Observe water temperature when the thermostat valve opens and releases the thread.

Thermostat operating temperature:

Standard: 48 – 52 °C (118 – 126 °F)



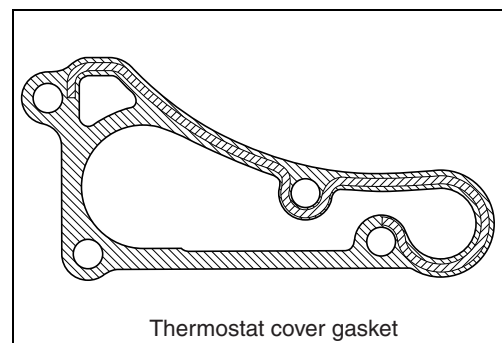
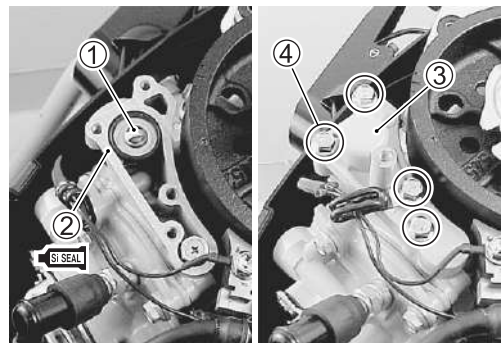
INSTALLATION

Installation is reverse order of removal with special attention to the following steps.

1. Install the thermostat ①.
2. Apply sealant to both surfaces of thermostat cover gasket (as shown with hatched lines).

 **99000-31120: SUZUKI SILICONE SEAL**

3. Install the gasket ② and the thermostat cover ③ to the cylinder block and secure with the four bolts ④.



OPERATION

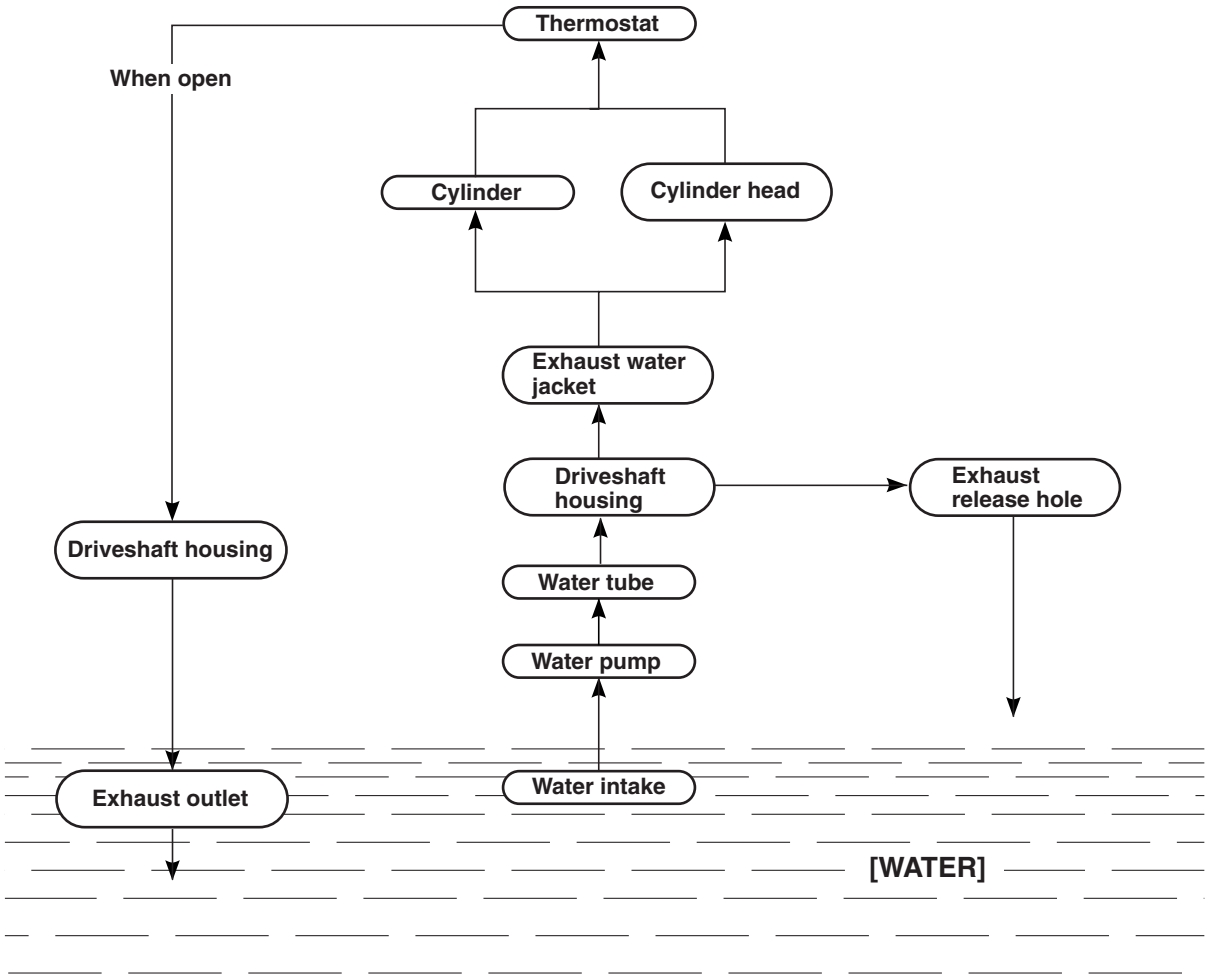
WATER COOLING SYSTEM

The water cooling system consists of the water pump (in the lower unit), the water tube (between the lower unit and the power unit) and the thermostat (in the cylinder). This system cools both the power unit and the exhaust and is shown in schematic form below.

If overheating occurs, the components of the cooling system must be inspected for blockage, corrosion build-up or damage.

<u>Component inspection</u>	<u>Refer to page</u>
Water pump/Impeller.....	8-8
Water tube.....	7-6
Thermostat.....	6-38
Cylinder head.....	6-11
Cylinder block.....	6-23

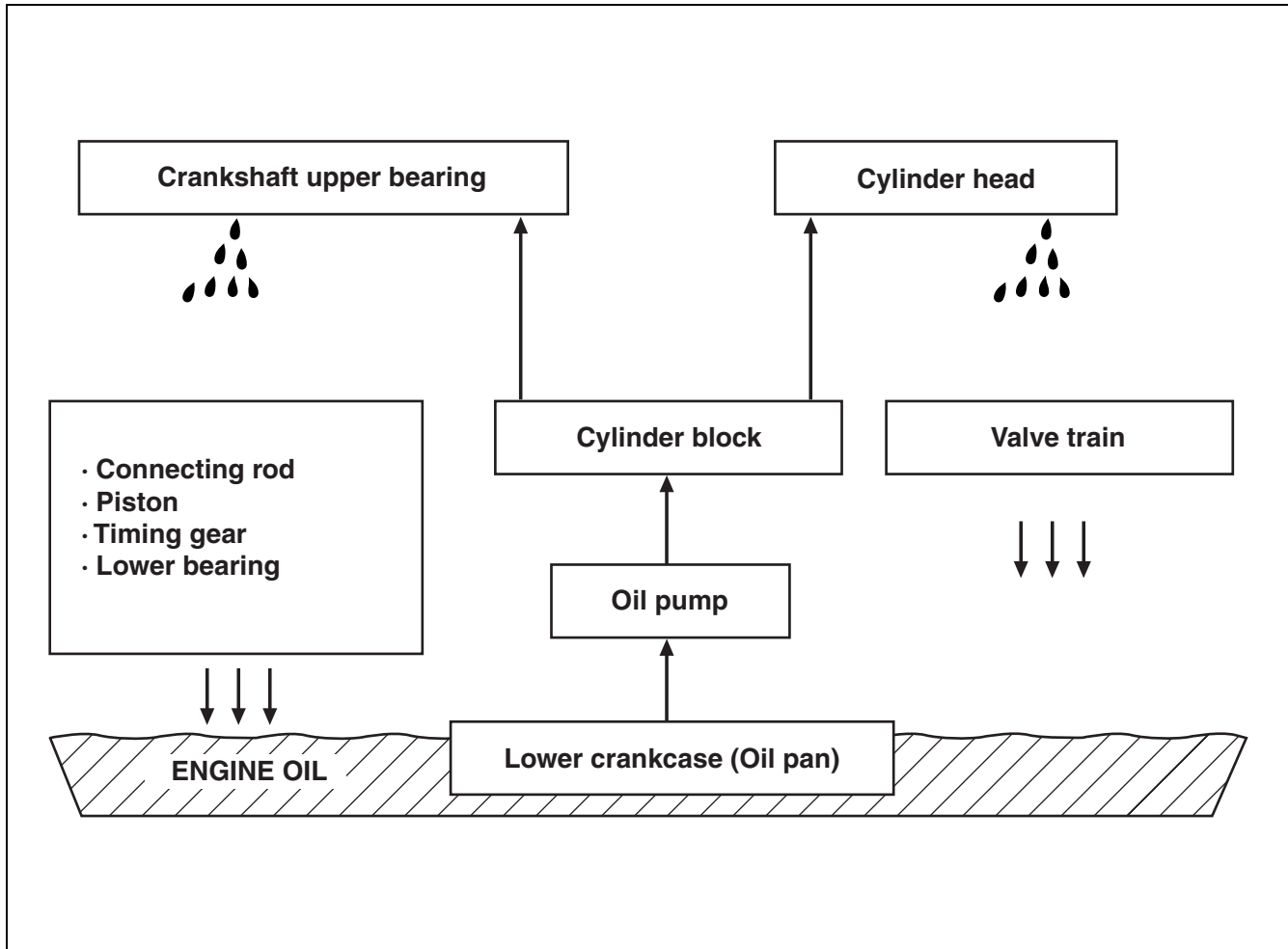
COOLING SYSTEM SCHEMATIC



ENGINE LUBRICATION SYSTEM

A camshaft driven trochoid type pump provides engine oil to all power unit components requiring lubrication.

ENGINE OIL LUBRICATION CHART



MID UNIT

CONTENTS

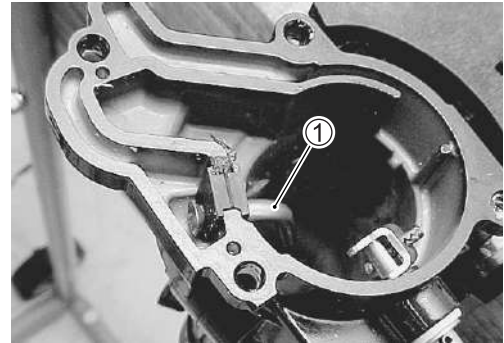
DRIVESHAFT HOUSING/SWIVEL BRACKET/CLAMP BRACKET	7- 2
DISASSEMBLY	7- 2
INSPECTION	7- 5
REASSEMBLY	7- 7
TILLER HANDLE	7-11
REMOVAL	7-11
DISASSEMBLY/REASSEMBLY	7-12

DRIVESHAFT HOUSING/SWIVEL BRACKET/CLAMP BRACKET DISASSEMBLY

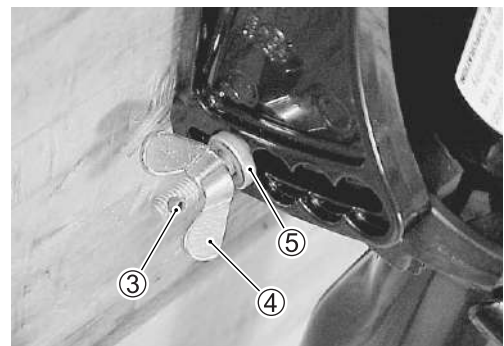
Remove the power unit. (See page 6-2.)

Remove the lower unit. (See page 8-2.)

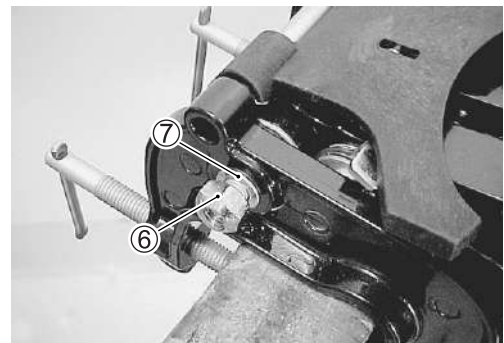
Remove the water tube ① with the grommet upside.



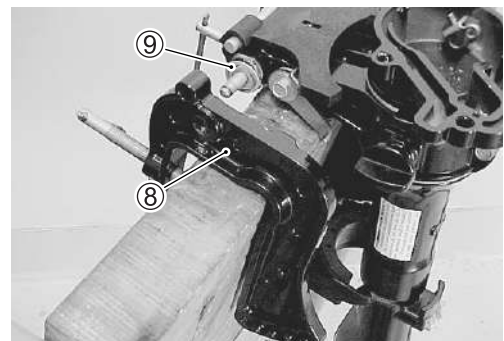
Remove the spring pin ③ and the tilt lock wing nut ④.
Remove the tilt lock spacer ⑤.



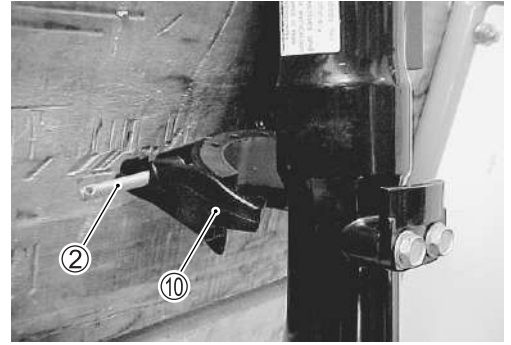
Remove the swivel shaft nut ⑥ and swivel shaft washer ⑦.



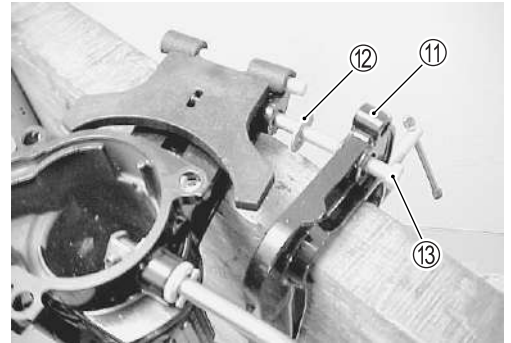
Remove the port side clamp bracket ⑧ and tilt friction washer ⑨.



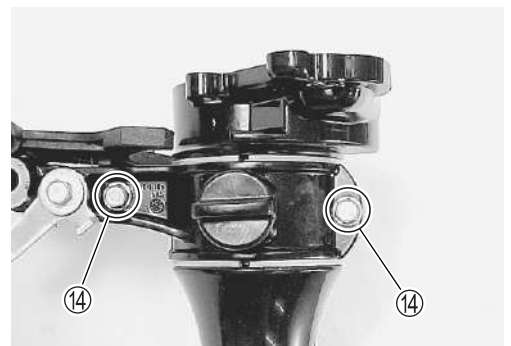
Remove the tilt lock bolt ② and the thrust block with the lower thrust mount ⑩.



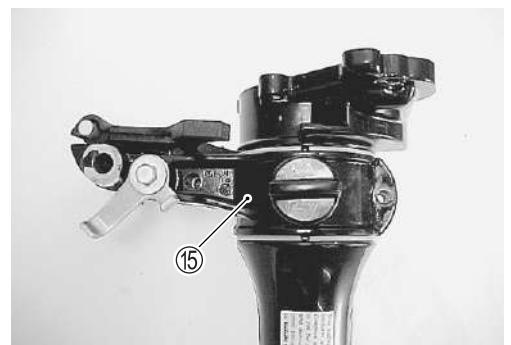
Remove the starboard side clamp bracket ⑪, the tilt friction washer ⑫ and the swivel shaft bolt ⑬.



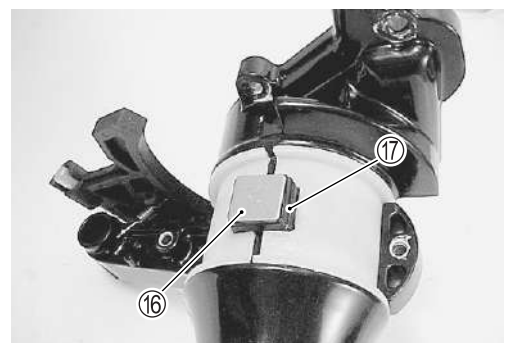
Remove the two swivel bracket bolts ⑭.



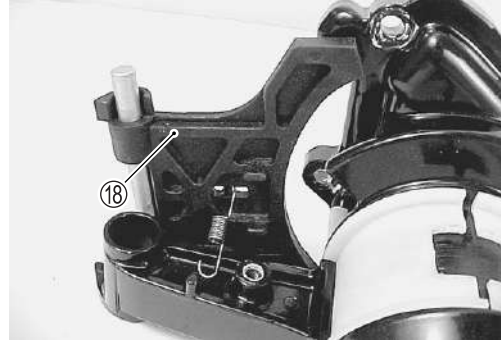
Remove the port side swivel bracket ⑮.



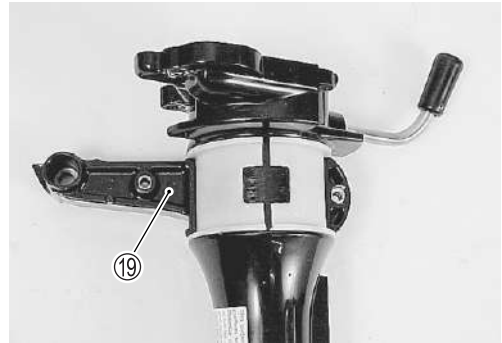
Take out the steering adjuster plate ⑯ with the steering adjuster rubber ⑰.



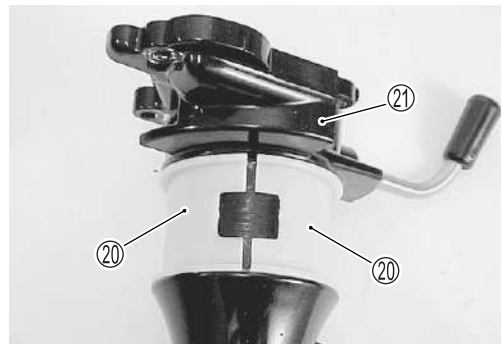
Remove the stopper bracket ⑱.



Remove the starboard side swivel bracket ⑲.



Take out the steering upper bush ⑳ from the driveshaft housing ㉑.



INSPECTION

NOTE:

If excessive wear, crack, defective or other damage is found on any component, replace.

DRIVESHAFT HOUSING

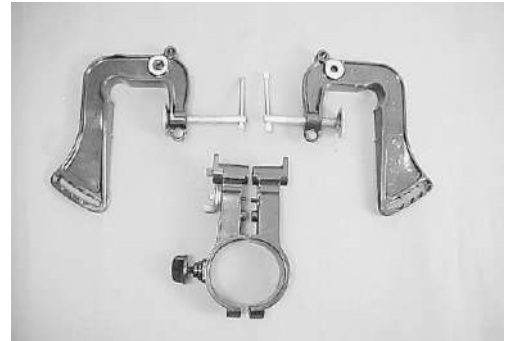
If crack or other damage is found, replace.



CLAMP BRACKET/SWIVEL BRACKET

Inspect the clamp brackets and swivel bracket.

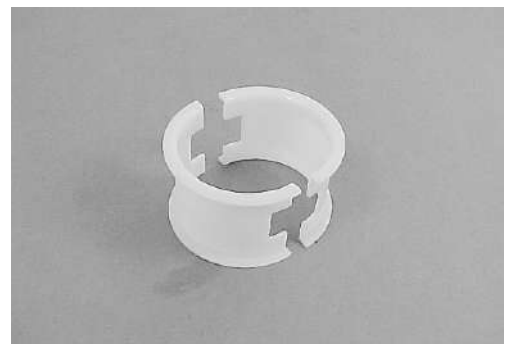
If crack or other damage is found, replace.



STEERING UPPER BUSHING

Inspect the upper bushings.

If crack, excessive wear, deterioration or other damage is found, replace.



STOPPER BRACKET/STOPPER SPRING

Inspect the stopper bracket and the stopper spring.

If crack or other damage is found, replace.



THRUST BLOCK/LOWER THRUST MOUNT

Inspect the thrust block and the lower thrust mount.

If crack, excessive wear, deterioration or other damage is found, replace.



SWIVEL SHAFT BOLT

Inspect the swivel shaft bolt.

If wear, twist, bend or other damage is found, replace.



WATER TUBE

Inspect the water tube.

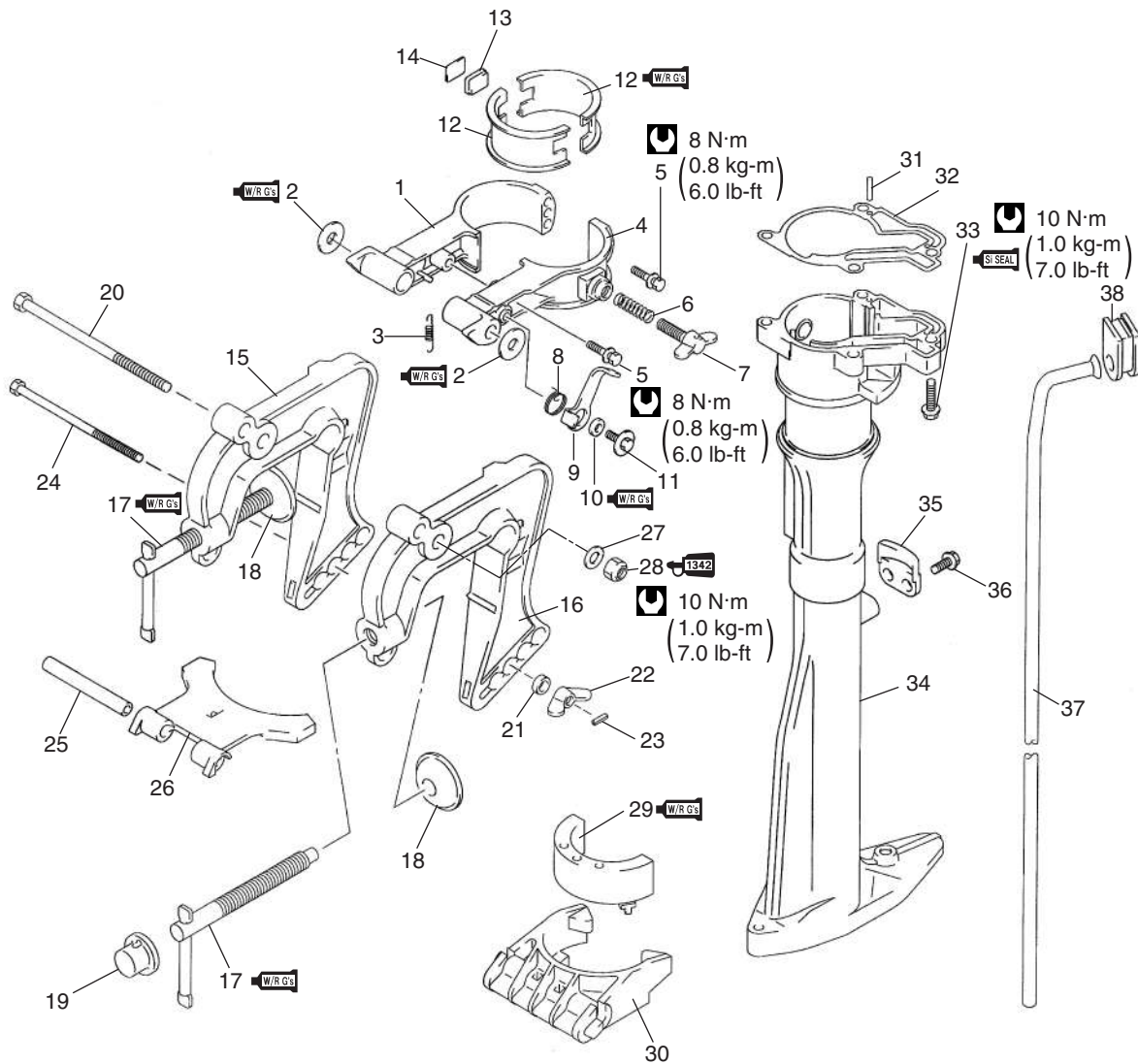
If clog, obstruction or other damage is found, clean or replace.



REASSEMBLY

Reassembly is reverse order of disassembly with the special attention to the following steps.

Consisting parts



1. Swivel bracket STBD
2. Tilt friction washer
3. Stopper spring
4. Swivel bracket PORT
5. Swivel bracket bolt
6. Steering adjuster spring
7. Steering adjuster bolt
8. Tilt lock spring
9. Tilt lock lever
10. Tilt lock lever spacer
11. Tilt lock lever bolt
12. Steering upper bushing
13. Steering adjuster rubber

14. Steering adjuster plate
15. Clamp bracket STBD
16. Clamp bracket PORT
17. Clamp handle/screw
18. Clamp plate
19. Clamp handle/screw cap
20. Swivel shaft bolt
21. Tilt lock spacer
22. Tilt lock wing nut
23. Tilt lock pin
24. Tilt lock bolt
25. Stopper shaft
26. Stopper bracket

27. Swivel shaft washer
28. Swivel shaft nut
29. Lower thrust mount
30. Thrust block
31. Driveshaft housing knock pin
32. Driveshaft housing gasket
33. Driveshaft housing bolt
34. Driveshaft housing
35. Reverse thrust stopper
36. Stopper reverse thrust bolt
37. Water tube
38. Water tube upper grommet

DRIVESHAFT HOUSING/SWIVEL BRACKET

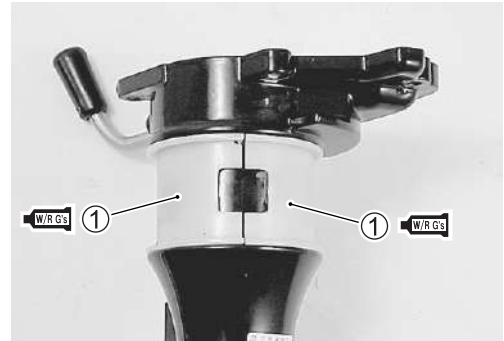
After completing reassembly of the mid unit, apply the Water Resistant Grease through grease nipple.

 **99000-25161: SUZUKI WATER RESISTANT GREASE**

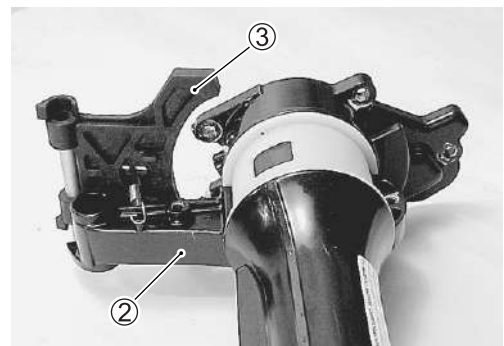
- Apply the Water Resistant Grease to the following parts.
 - Inside and outside surfaces of the bushings.
 - Inside surface of the lower thrust mount
 - Steering adjuster

 **99000-25161: SUZUKI WATER RESISTANT GREASE**

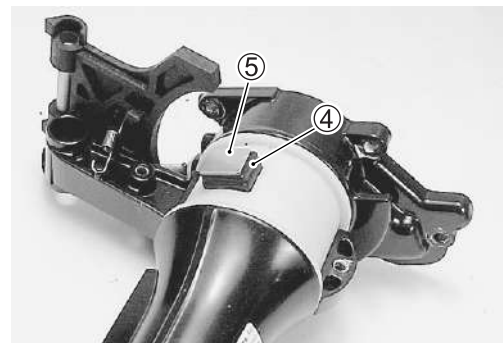
- Install the steering upper bushings ① in position as shown in the figure.




- Install the swivel bracket STBD ②.
- Install the stopper bracket ③.



- Install the steering adjuster rubber ④ with the steering adjuster plate ⑤.



- Install the swivel bracket PORT ⑥.
- Install the two swivel bracket bolts.

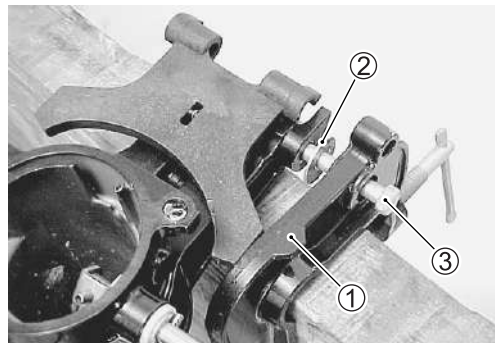
 **Swivel bracket bolt: 8 N·m (0.8 kg-m, 6.0 lb-ft)**



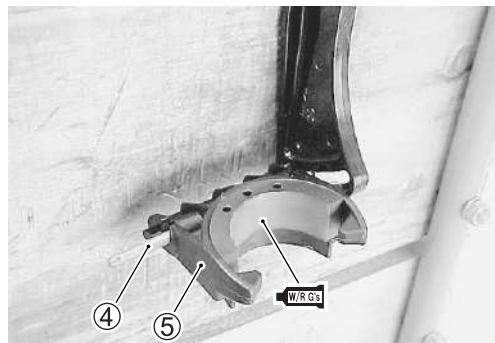
CLAMP BRACKET/THRUST BLOCK

- Apply the Water Resistant Grease to the clamp bracket through swivel shaft bolt hole.
- Install the clamp bracket starboard side ①, the tilt friction washer ② and the swivel shaft bolt ③.

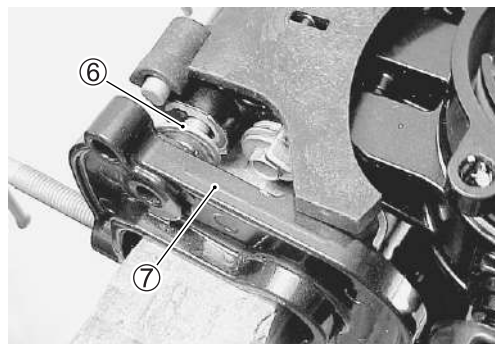
 **99000-25161: SUZUKI WATER RESISTANT GREASE**



- Install the thrust block ⑤ with the lower thrust mount and the tilt lock bolt ④.



- Install the tilt friction washer ⑥ and the clamp bracket port side ⑦.

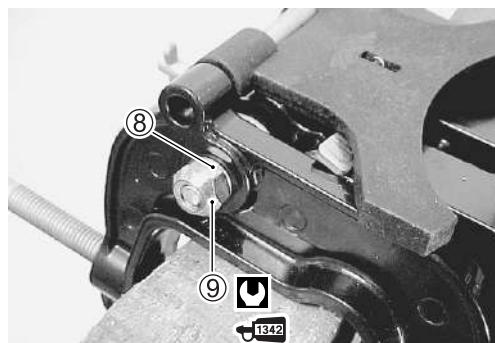


- Install the tilt friction washer ⑧ and the swivel shaft nut ⑨.
- Tighten the swivel shaft nut to the specified torque.

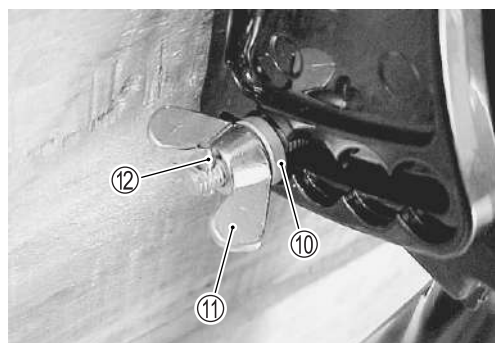
 **Swivel shaft nut: 10 N·m (1.0 kg·m, 7.0 lb-ft)**

- Apply the Thread Lock to the swivel shaft nut.

 **99000-32050: THREAD LOCK "1342"**



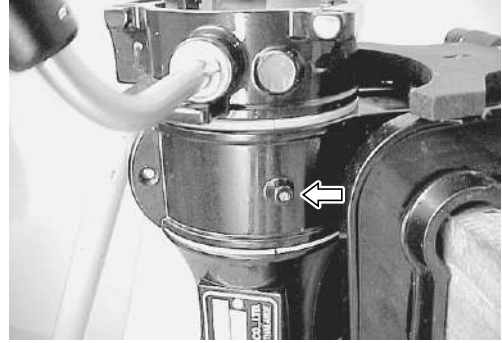
- Install the tilt lock spacer ⑩ and the tilt lock wing nut ⑪.
- Install the tilt lock pin ⑫ to the tilt lock bolt.



LUBRICATION

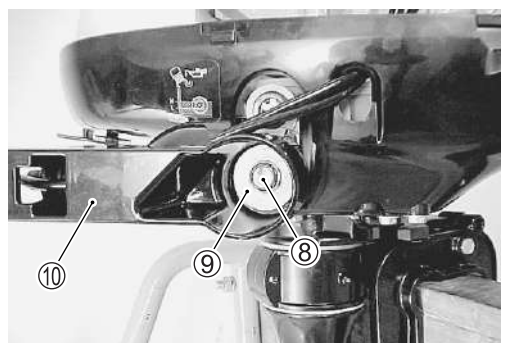
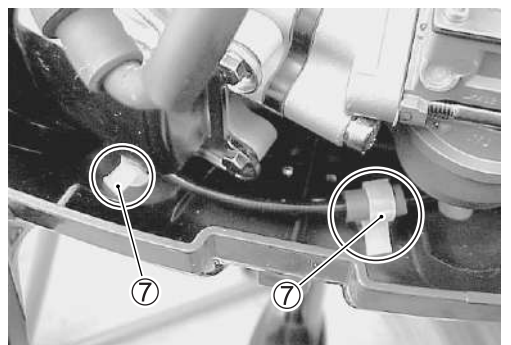
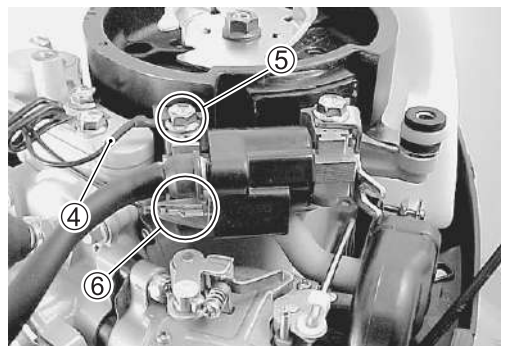
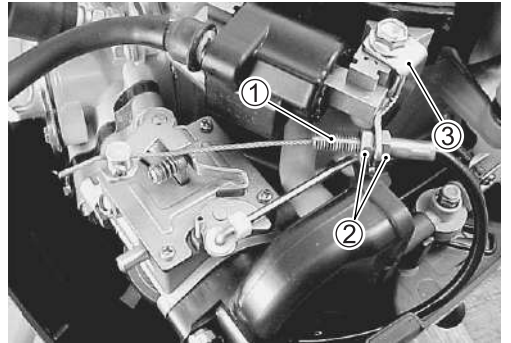
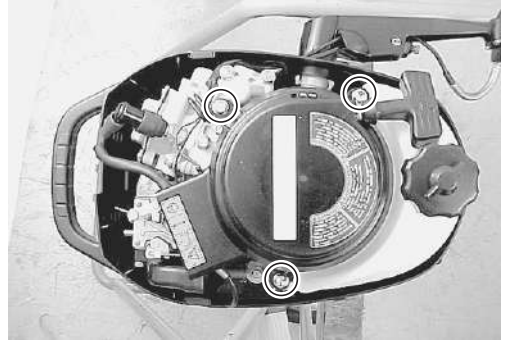
After completing reassembly of the mid unit, apply the Water Resistant Grease through grease nipple.

 **99000-25161: SUZUKI WATER RESISTANT GREASE**

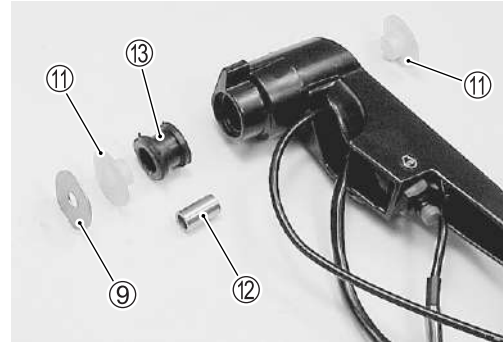


TILLER HANDLE REMOVAL

- Remove the three bolts and the recoil starter.
- Remove the throttle cable ① from the carburetor.
- Loosen the lock nuts ② and remove the throttle cable ① from the throttle cable holder ③.
- Remove the igniter unit bolt ⑤ and ground lead ④ of the emergency/engine stop switch.
- Remove the plus lead ⑥ of the emergency/engine stop switch from the igniter unit.
- Remove the throttle cable clamp ⑦.
- Remove the handle pivot bolt ⑧ and tiller handle washer ⑨.
- Remove the tiller handle ⑩.



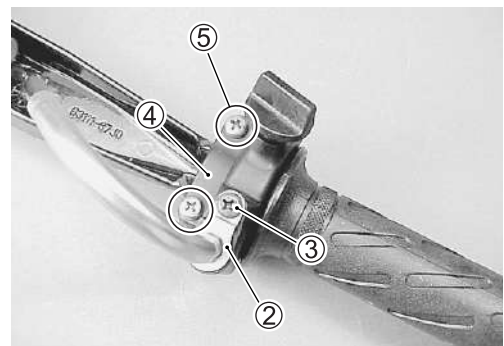
- Remove the two tiller handle bushings ⑪, the tiller handle mount ⑬ and the tiller handle spacer ⑫ from the tiller handle.



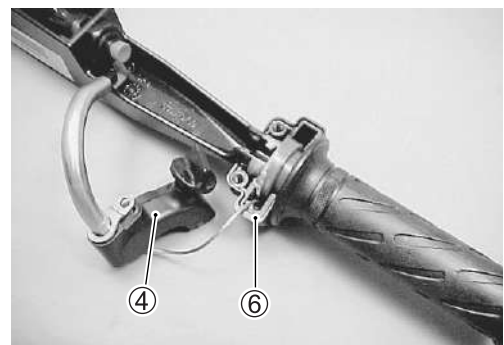
DISASSEMBLY/REASSEMBLY

DISASSEMBLY

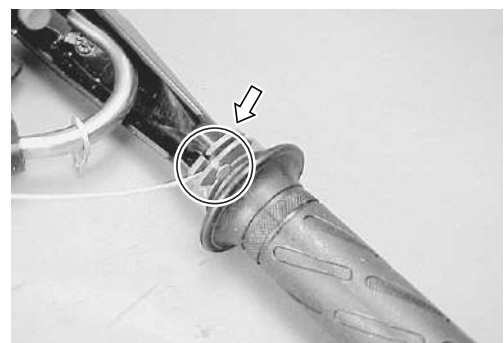
- Remove the throttle adjust knob ①.
- Remove the throttle cable screw ③ and the cable stopper ②.
- Remove the two throttle cable screws ⑤.



- Take out the throttle lower case ④ and the throttle upper case ⑥ from the tiller handle.



- Remove the throttle cable end from the tiller handle.

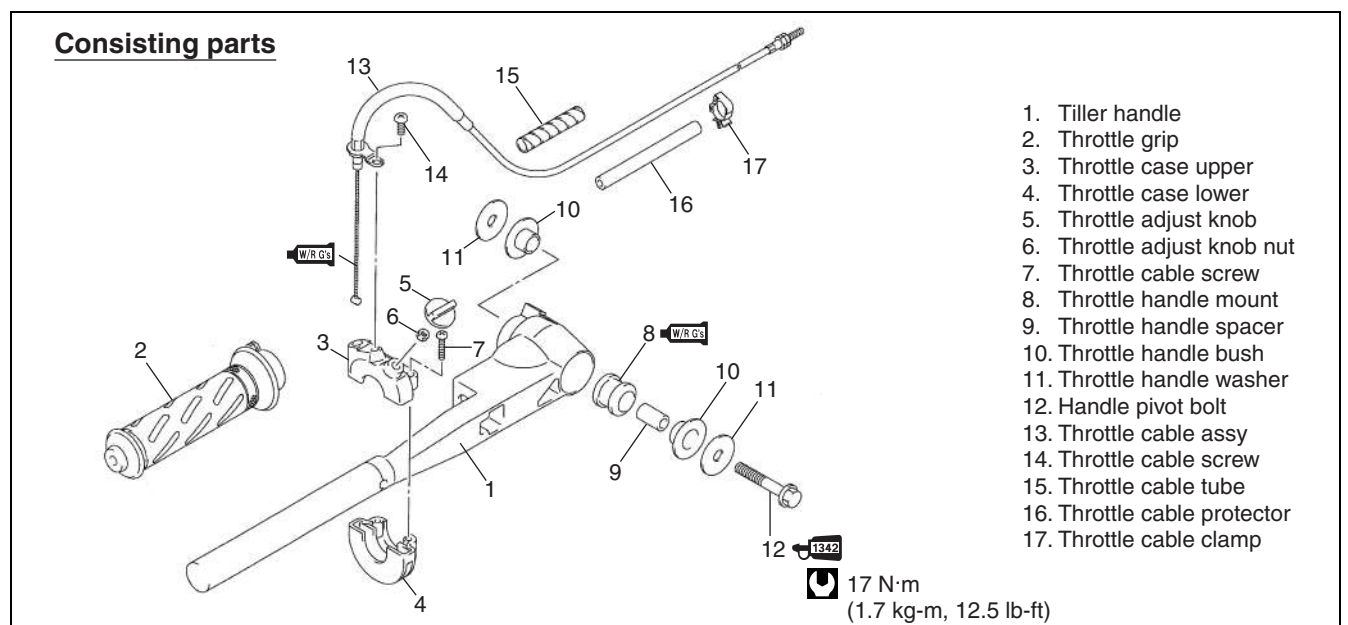


- Remove the throttle grip ⑦ from the tiller handle.



REASSEMBLY

Reassembly is reverse order of disassembly with the special attention to the following steps.



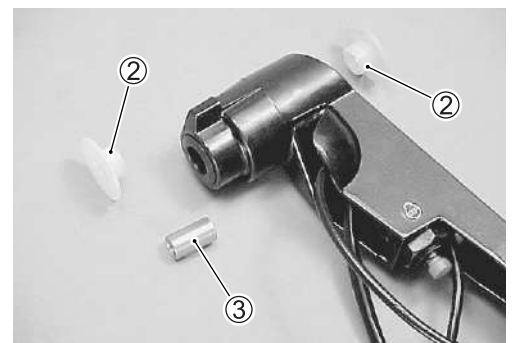
- Apply the Water Resistant Grease to the throttle handle mount ①.

W/R GS 99000-25161: SUZUKI WATER RESISTANT GREASE

- Install the throttle handle mount ① in position.

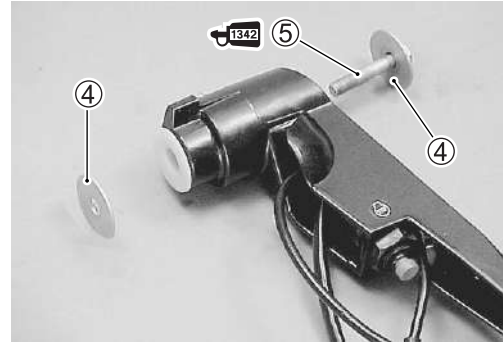


- Install the throttle handle spacer ③ and the throttle handle bushings ②.



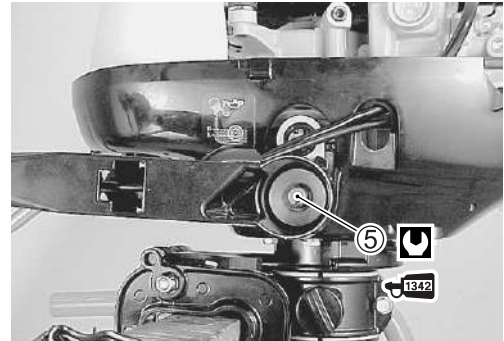
- Install the tiller handle washers ④ and the handle pivot bolt ⑤.
- Apply the Thread Lock to the handle pivot bolt.

 99000-32050: THREAD LOCK "1342"

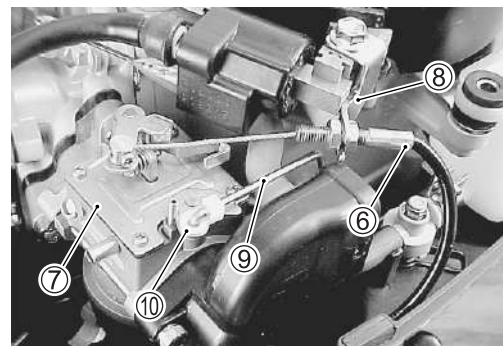


- Tighten the tiller handle pivot bolt ⑤ to the specified torque.

 Tiller handle pivot bolt: 17 N·m (1.7 kg-m, 12.5 lb-ft)



- Install the throttle cable ⑥ to the throttle cable holder ⑧.
- Install the throttle cable ⑥ to the carburetor ⑦.
- Check that the throttle control is smoothly operated from the full closed position to the full opened position.
- Install the choke rod connector ⑩ to the carburetor ⑦.
- Install the choke rod ⑨ to the choke rod connector ⑩.
- Check that the choke control is smoothly operated from the full closed position to the opened position.



LOWER UNIT

CONTENTS

REMOVAL AND DISASSEMBLY.....	8- 2
INSPECTION	8- 6
REASSEMBLY AND INSTALLATION	8-10
LOWER UNIT GEARS-SHIMMING AND ADJUSTMENT	8-19

REMOVAL AND DISASSEMBLY

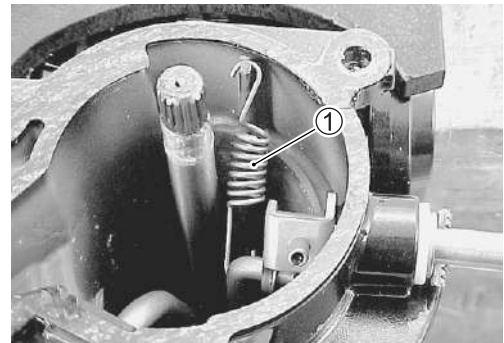
⚠ WARNING

Disconnect the spark plug cap from the spark plug before removing the lower unit.

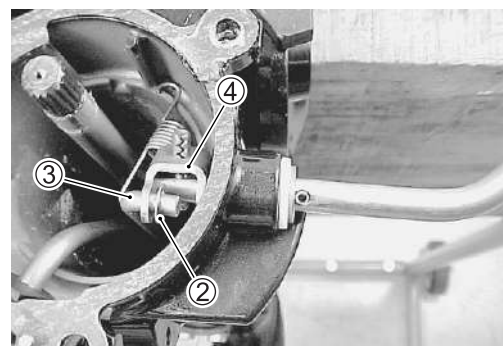
1. Remove the four engine mounting bolts.
Detach the power unit with the lower cover.



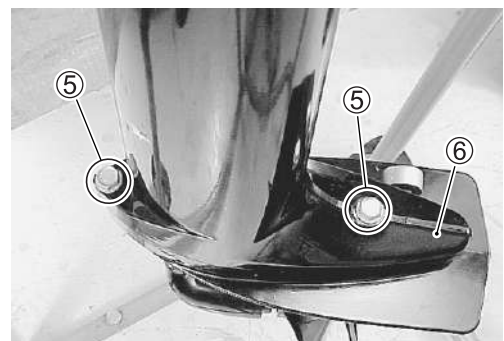
2. Remove the spring ①.



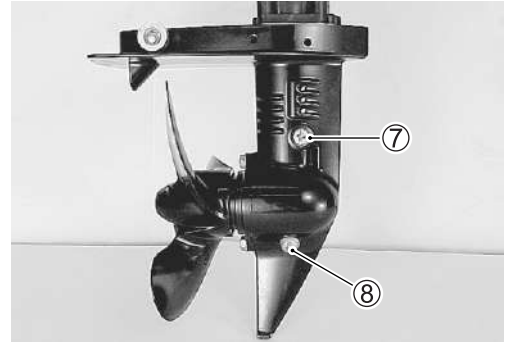
3. Remove the E-ring ②.
4. Take out the shift rod ③ from the clutch rod arm ④.



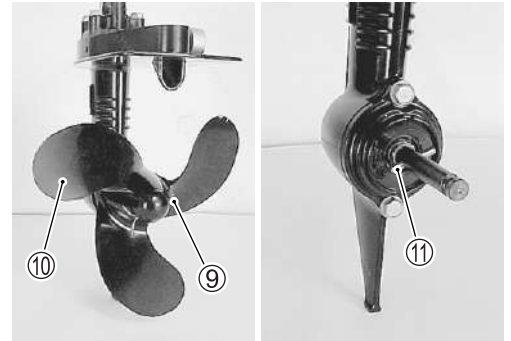
5. Remove the two bolts ⑤.
6. Separate the gearcase assembly from the driveshaft housing ⑥.



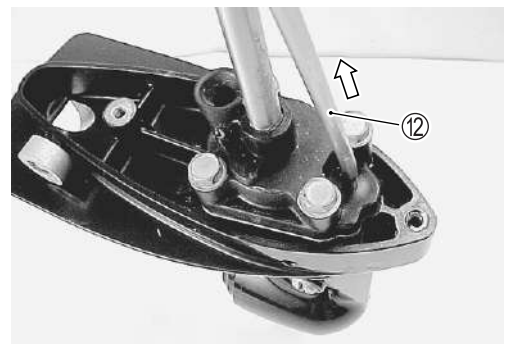
7. Remove the gear oil drain plug ⑧ before the gear oil level plug ⑦ and drain the gear oil.



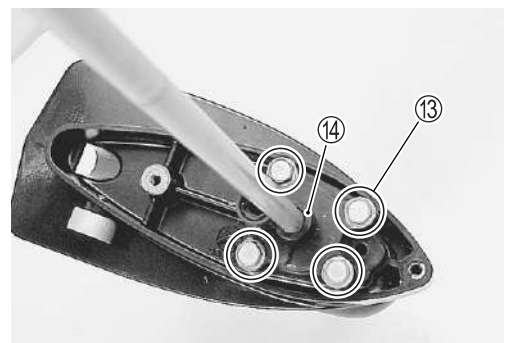
8. Remove the cotter pin ⑨ then detach the propeller ⑩.
9. Remove the shear pin ⑪.



10. Pull out the shift rod ⑫.

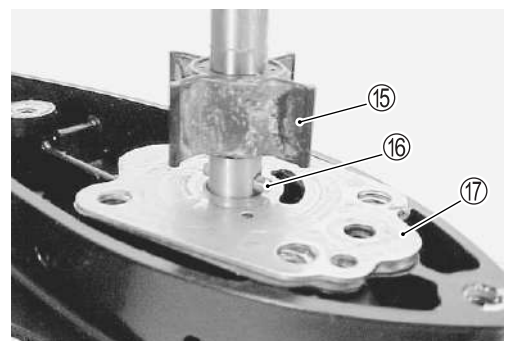


11. Remove the four bolts ⑬.
12. Remove the pump case ⑭.



13. Remove the following parts.

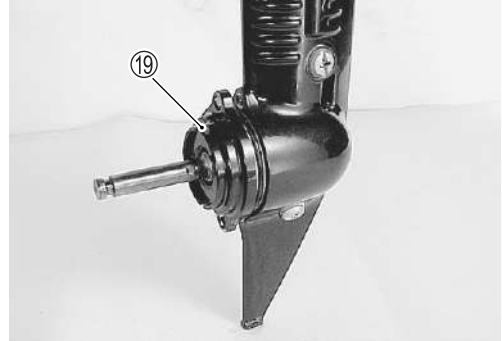
- Water pump impeller ⑮
- Key ⑯
- Pump under panel ⑰



14. Remove the two bolts ⑱ securing the propeller shaft bearing housing.



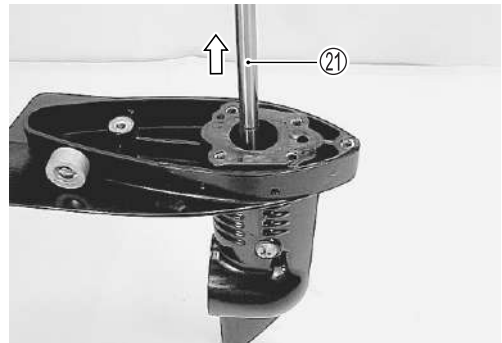
15. Remove the propeller shaft bearing housing ⑲.



16. Remove the E-ring ⑳.

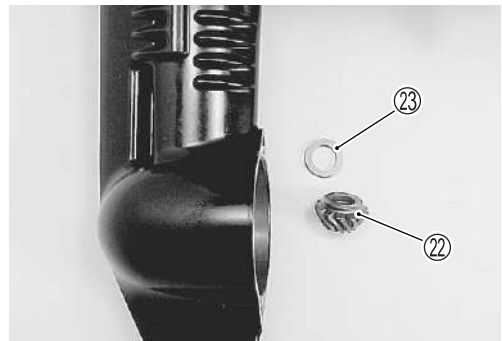


17. Pull out the driveshaft ㉑.



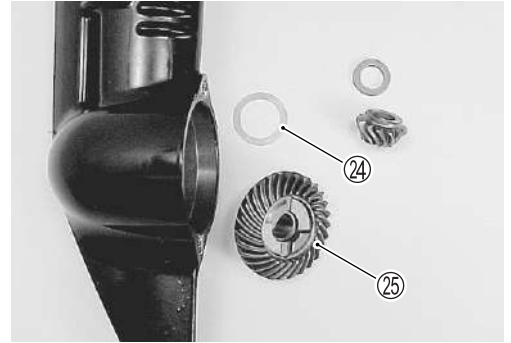
18. Take out the following parts.

- Pinion gear ㉒
- Pinion gear backup shim ㉓



19. Take out the following parts.

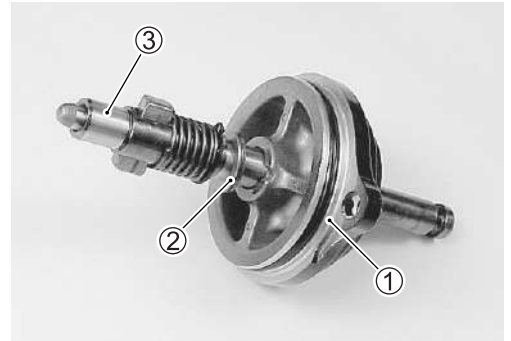
- Forward gear ⑳
- Forward gear backup shim ㉕



DISASSEMBLY OF PROPELLER SHAFT COMPONENTS

1. Separate the following parts.

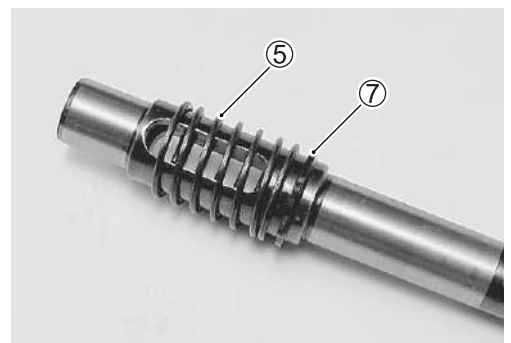
- Bearing housing ①.
- Washer ②.
- Propeller shaft assy ③.



2. Push rod out the propeller shaft ④.
Remove the clutch dog ⑥.



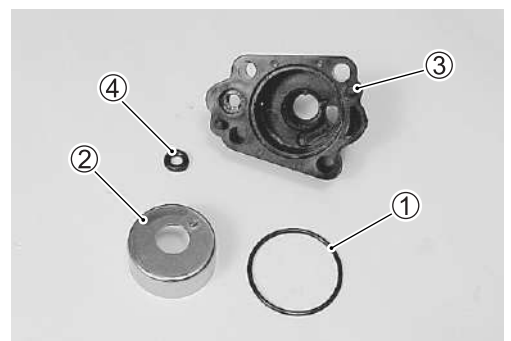
3. Remove the spring ⑤.
4. Remove the circlip ⑦.



DISASSEMBLY OF WATER PUMP COMPONENTS

Separate the following parts.

- Water pump case seal ①.
- Water pump case sleeve ②.
- Water pump case ③.
- O-ring ④.



INSPECTION

NOTE:

If excessive wear, crack, defective or other damage is found on any component, replace.

PROPELLER

- Inspect the propeller. If bend, chip or other damage is found on the blades, replace or repair the propeller.
- Inspect the shear pin. If bend or other damage is found, replace the shear pin.



GEARCASE

- Inspect the gearcase. If crack or other damage is found, replace the gearcase.
- Visually check the forward gear bearing. If pitting, noisy, rough or other damage is found, replace the bearing.
- Visually check the driveshaft bushing. If excessive wear, pitting or other damage is found, replace the bushing.



GEAR

- Inspect the teeth of the forward gear and pinion gear. If excessive wear, chip or other damage is found, replace.



- Inspect the engaging dogs of the forward gear. If excessive wear, chip or other damage is found, replace.



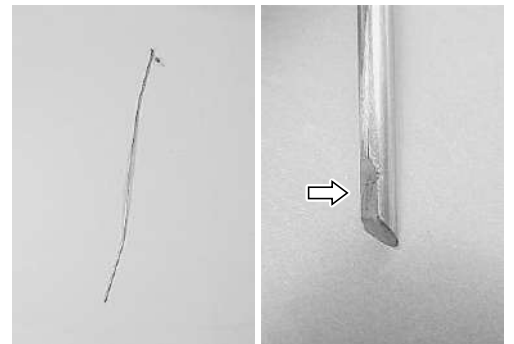
PROPELLER SHAFT COMPONENTS

- Inspect the push rod. If excessive wear or other damage is found, replace.
 - Inspect the clutch dog shifter. If excessive wear, crack, chip or other damage is found, replace.
 - Inspect the return spring. If excessive wear or other damage is found, replace.
-
- Inspect the propeller shaft. If excessive wear, twist or other damage is found, replace.



SHIFT ROD AND SHIFT CAM

- Inspect the “stepped” surfaces of the shift cam. If excessive wear, chip or other damage is found, replace the cam.



PROPELLER SHAFT BEARING HOUSING

- Inspect the housing. If crack or other damage is found, replace the housing.
- Visually check the oil seal and O-ring. If cut, nick, excessive wear or other damage is found, replace the oil seal.

CAUTION

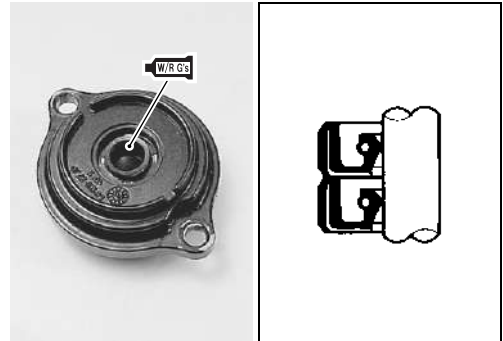
Do not re-use the oil seal and the O-ring once removed. Always use new parts.



Replacing propeller shaft bearing housing oil seal

1. Remove the oil seals using a screwdriver.
2. Apply the Water Resistant Grease to the outer circumference of the oil seal.
3. Drive the oil seals down into the housing with the lipped portion toward the propeller. (one at a time)
4. Apply the Water Resistant Grease to the seal lips.

W/R G's 99000-25161: SUZUKI WATER RESISTANT GREASE

**WATER PUMP AND RELATED ITEMS**

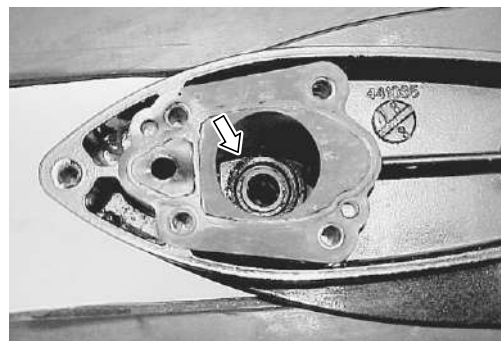
- Inspect the impeller. If cut, tear or excessive wear is found, replace the impeller.
- Inspect the pump case, the inner sleeve and the under panel. If wear, crack, distortion or corrosion is found, replace.
- Inspect the impeller pin. If excessive wear or other damage is found, replace the pin.
- Inspect the seal and the O-ring. If cut, excessive wear or other damage is found, replace.

**CAUTION**

**Do not re-use the seal and the O-ring once removed.
Always use new parts.**

DRIVESHAFT OIL SEALS

- Visually check the oil seals. If cut, nick, excessive wear or other damage is found, replace the oil seal.

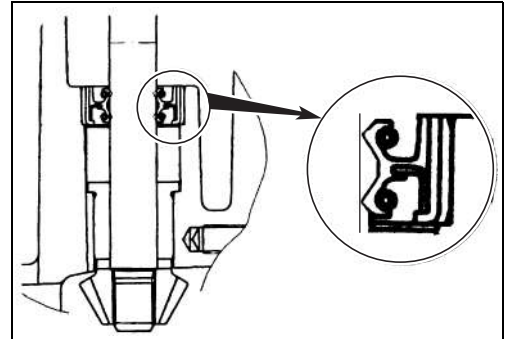
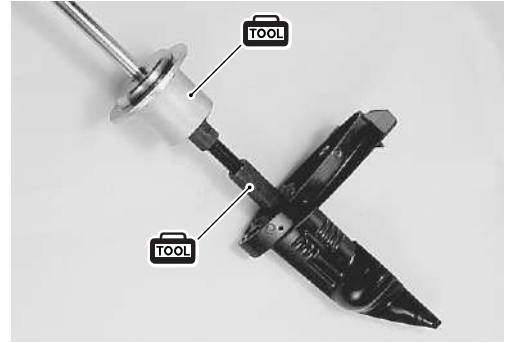


REPLACING DRIVESHAFT OIL SEAL

1. Remove the oil seal using special tools.
2. Apply the Water Resistant Grease to outer circumference of the oil seal.
3. Drive the oil seals down into the housing with lipped portion toward the water pump case. (one at a time)
4. Apply the Water Resistant Grease to the seal lips.

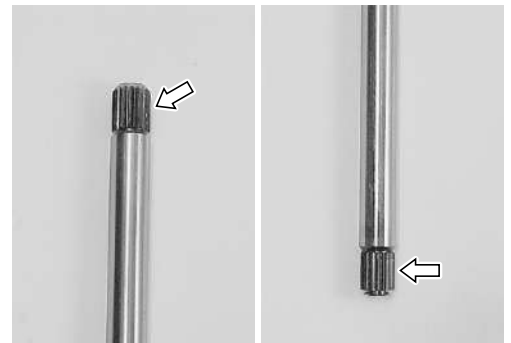
TOOL 09921-20210: Bearing remover
09930-30104: Sliding hammer

WRG's 99000-25161: SUZUKI WATER RESISTANT GREASE



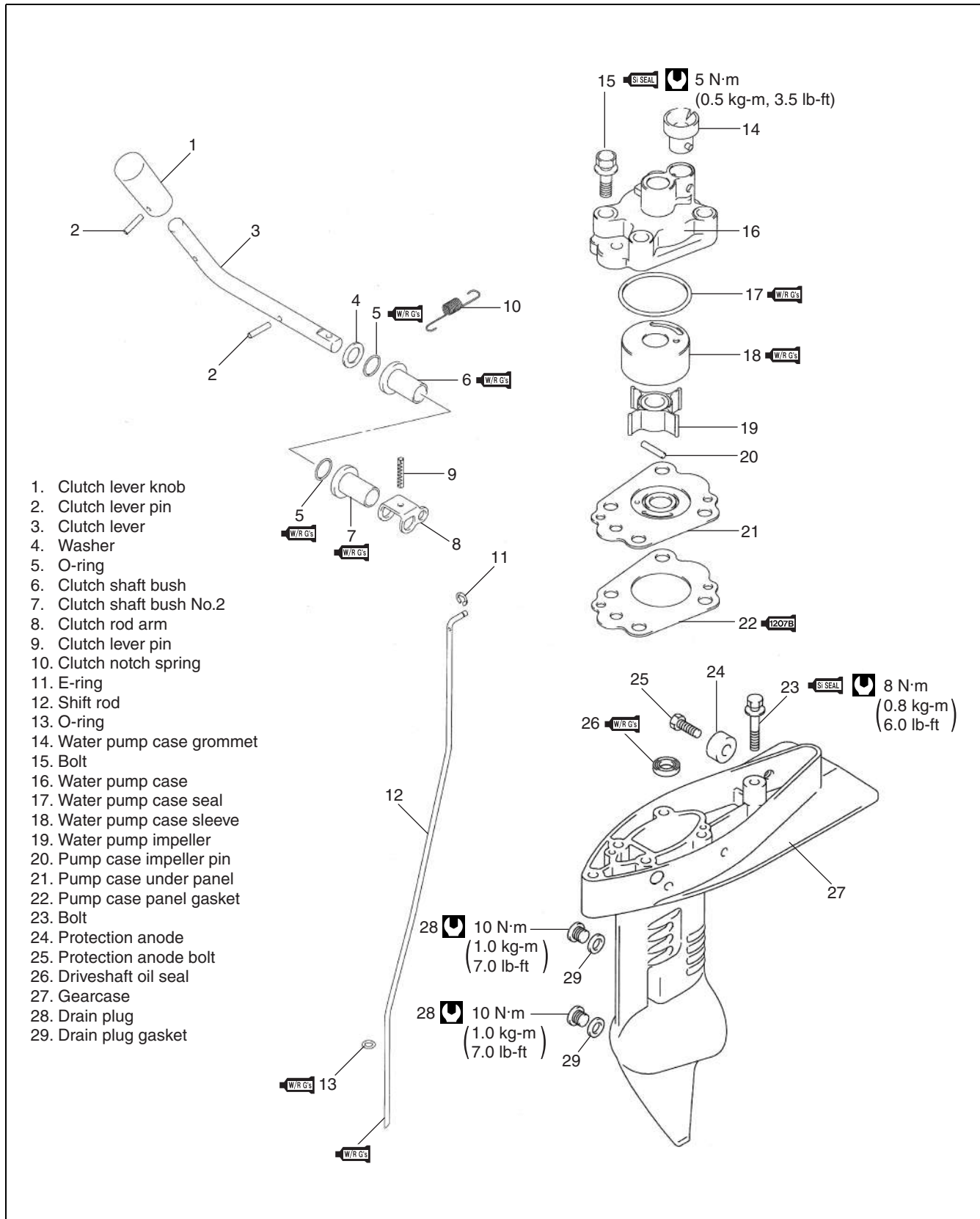
DRIVESHAFT

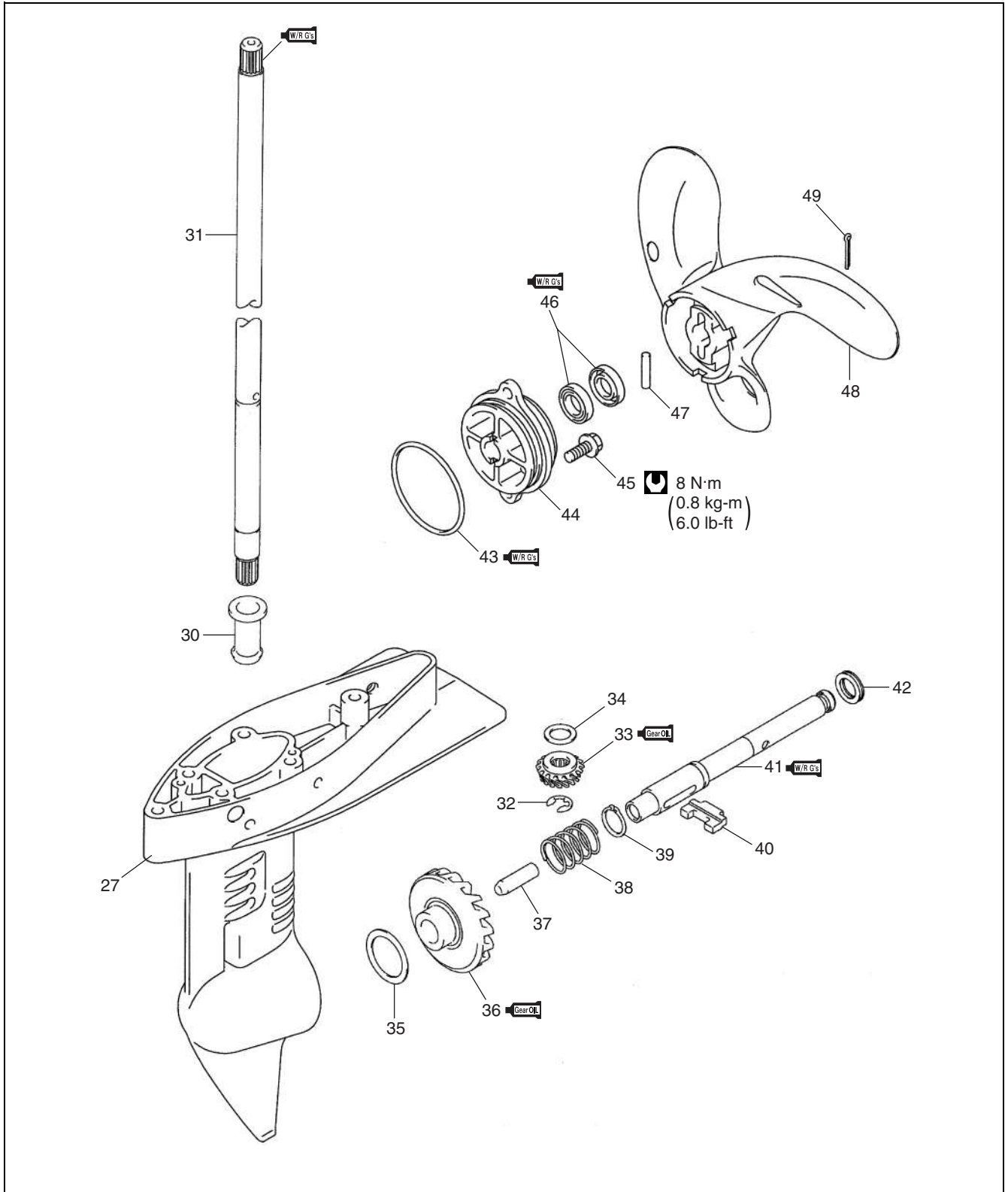
Inspect the driveshaft. If wear, twist or other damage is found on the splines, replace the driveshaft.



REASSEMBLY AND INSTALLATION

Reassembly and installation is reverse of removal and disassembly with the special attention to the following steps.





- 30. Driveshaft bush
- 31. Driveshaft
- 32. E-ring
- 33. Pinion gear
- 34. Pinion gear backup shim
- 35. Forward gear backup shim
- 36. Forward gear

- 37. Push rod
- 38. Return spring
- 39. Propeller shaft circlip
- 40. Shifter clutch dog
- 41. Propeller shaft
- 42. Thrust washer
- 43. Propeller shaft housing O-ring

- 44. Propeller shaft housing
- 45. Bolt
- 46. Propeller shaft housing oil seal
- 47. Shear pin
- 48. Propeller
- 49. Cotter pin

CAUTION

- Make sure that all parts used in assembly are clean and lubricated.
- After assembly, check the parts for tightness and smoothness of operation.
- Before final assembly, be absolutely certain that all gear contact, shim adjustments and tolerances are correct.
- Failure to correctly adjust these areas will result in lower unit damage.
(See the “LOWER UNIT GEARS-SHIMMING AND ADJUSTMENT” section on the page 8-19.)
- Do not re-use the gasket, the O-ring and the cotter pin once removed. Always use new parts.

FORWARD GEAR

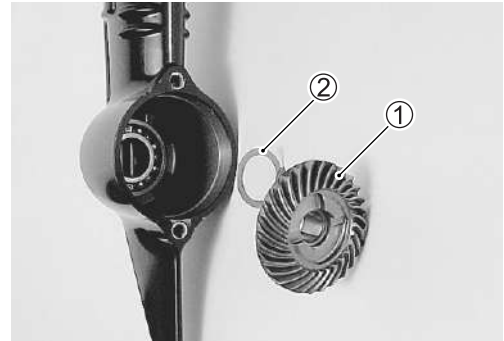
Apply the gear oil to the following parts.

- Forward gear backup shim ②
- Forward gear ①

 **99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL**

NOTE:

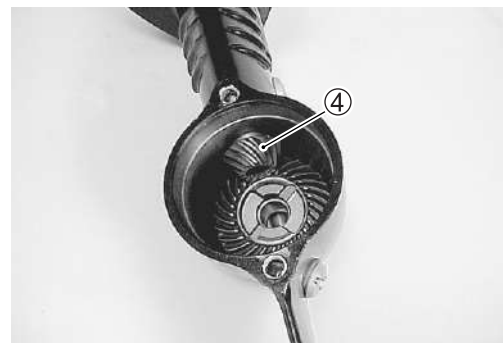
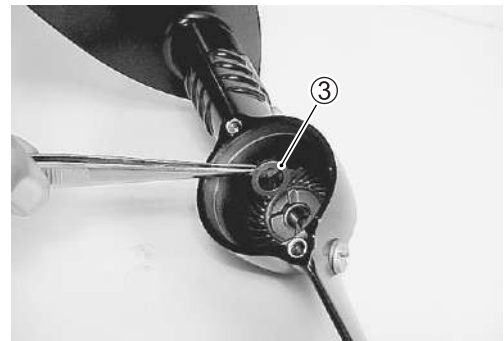
The forward gear has the bushing and the dents at the side of the dog bosses.

**PINION GEAR**

Apply the gear oil to the following parts.

- Pinion gear backup shim ③
- Pinion gear ④

 **99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL**



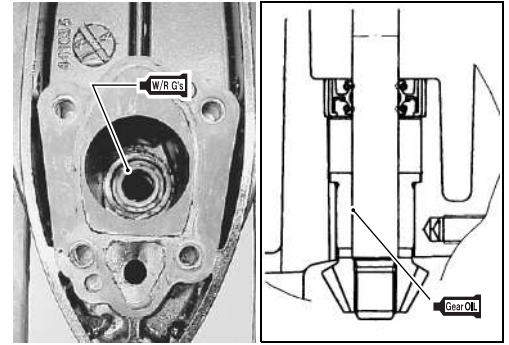
DRIVESHAFT

- Apply the Water Resistant Grease to the oil seal lips.

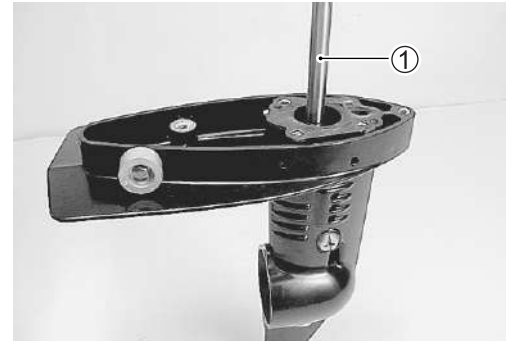
 **99000-25161: SUZUKI WATER RESISTANT GREASE**

- Apply the gear oil to the bushing in the housing.

 **99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL**



- Install the driveshaft ①.

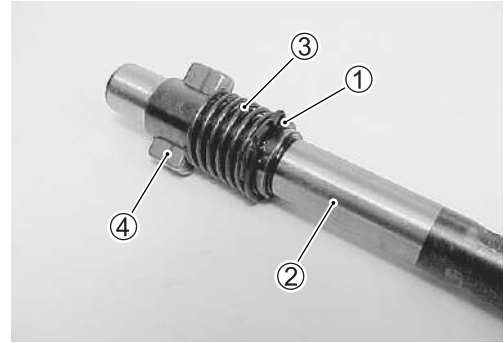


- Install the E-ring ②.



PROPELLER SHAFT COMPONENTS

- Install the circlip ① to the propeller shaft ②.
- Insert the return spring ③ and the clutch dog ④ to the propeller shaft ②.



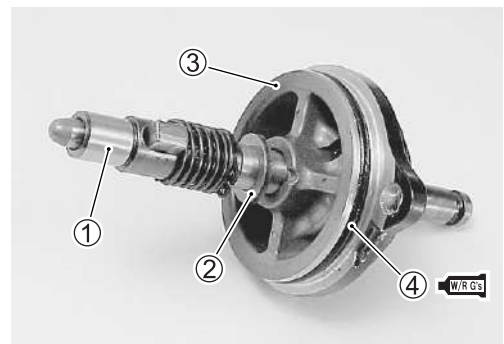
- Insert push rod ⑤ into the propeller shaft ②.



Propeller shaft assy/bearing housing

- Insert the thrust washer ② and the bearing housing ③ to the propeller shaft ①.
- Apply the Water Resistant Grease to the O-ring ④ and the oil seals of the bearing housing.

 **99000-25161: SUZUKI WATER RESISTANT GREASE**



- Install the propeller shaft/housing assembly to the gearcase and tighten the two bolts to the specified torque.

 **Propeller shaft bearing housing bolt:**
8 N·m (0.8 kg·m, 6.0 lb·ft)



WATER PUMP AND RELATED ITEMS

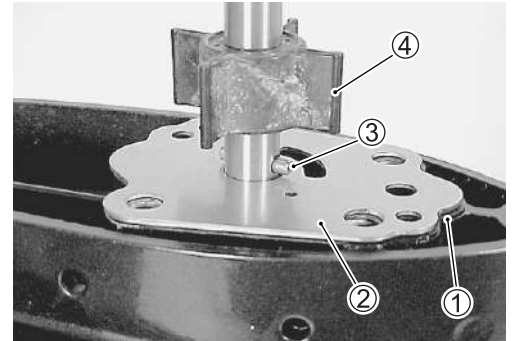
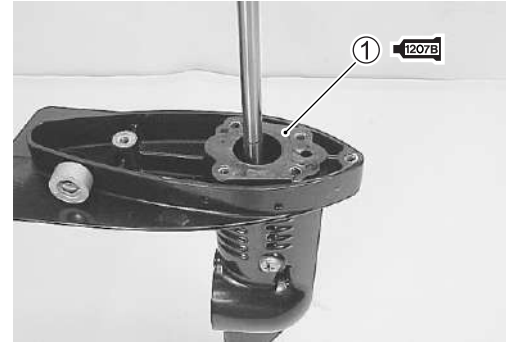
- Under panel gasket ① into position.
- Apply SUZUKI BOND “1207B” to under panel gasket.

NOTE:

Apply both side sealant evenly/without irregularity.

1207B 99000-31140: SUZUKI BOND “1207B”

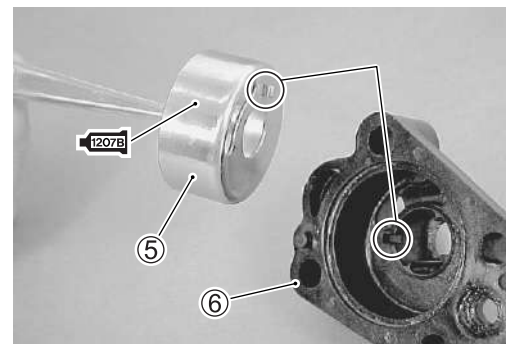
- Install the under panel ②.
- Install the impeller pin ③.
- Install the impeller ④.



- Apply SUZUKI BOND “1207B” onto the outer-surface of water pump sleeve ⑤.

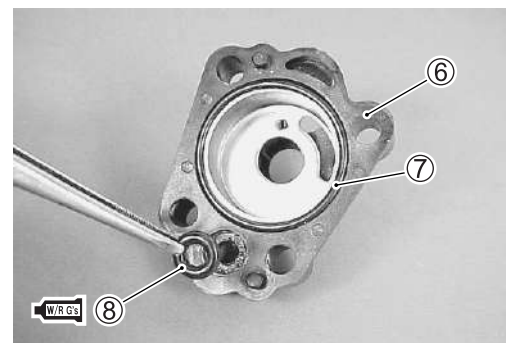
1207B 99000-31140: SUZUKI BOND “1207B”

- Install the water pump sleeve into the water pump case ⑥ by confirming the boss on the sleeve should be meeting with the groove on the pump case.



- Install the water pump case seal ⑦.
- Apply the Water Resistant Grease to the O-ring ⑧.
- Install the O-ring ⑧.

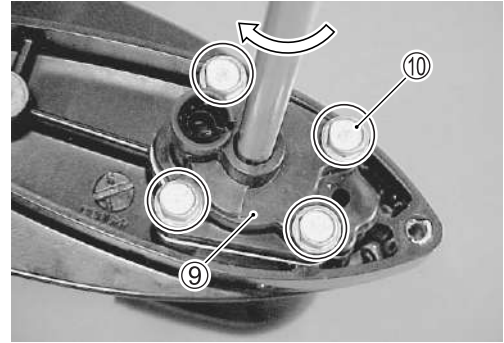
WRGS 99000-25161: SUZUKI WATER RESISTANT GREASE



WATER PUMP AND RELATED ITEMS

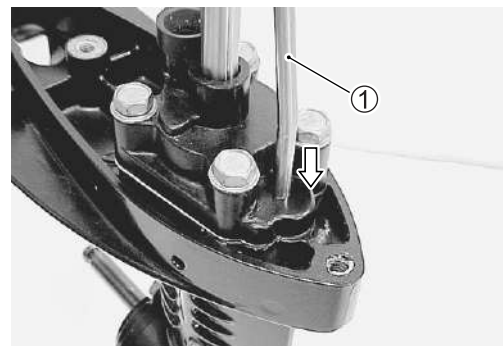
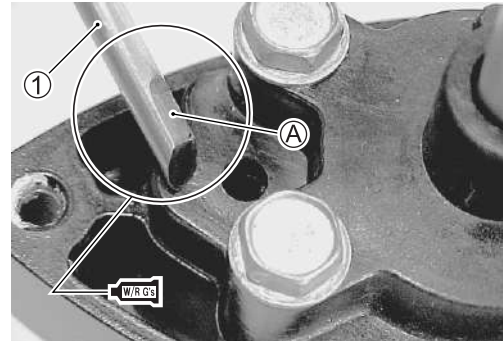
- Install the water pump case ⑨ while rotating the driveshaft clockwise in order to flex the impeller vanes in the correct direction.
- Tighten the water pump case bolts ⑩ to the specified torque.

 **Water pump case bolt: 5 N·m (0.5 kg-m, 3.5 lb-ft)**




SHIFT ROD

- Install the shift rod ① with the stepped section of the shift cam **A** toward the propeller shaft.



LEAKAGE CHECK

Check for leakage of the oil seals and O-ring when applying the specified pressure inside of the gearcase.

-  **09950-69512: Oil leakage tester**
- 09952-99310: Air pump**
- 09950-69710: Attachment**

Procedure

1. Install the special tool into the oil level hole.
2. Connect an air pump into the special tool.
3. Rotate the driveshaft and the propeller shaft clockwise several times and then apply the specified pressure for the test.

NOTE:

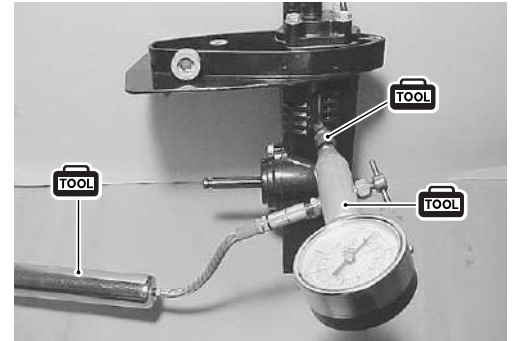
Apply low initial pressure of 20 – 40 kPa (0.2 – 0.4 kg/cm², 2.8 – 5.7 psi) first, then apply the specified pressure.

Leakage test pressure: 100 kPa (1.0 kg/cm², 14.2 psi)

CAUTION

Do not exceed pressure of 110 kPa (1.1 kg/cm², 15.6 psi) or damage to oil seals will result.

4. Once stabilized, the pressure should remain steady for at least 5 minutes.
If the pressure does not fall, sealing performance is correct.



PROPELLER

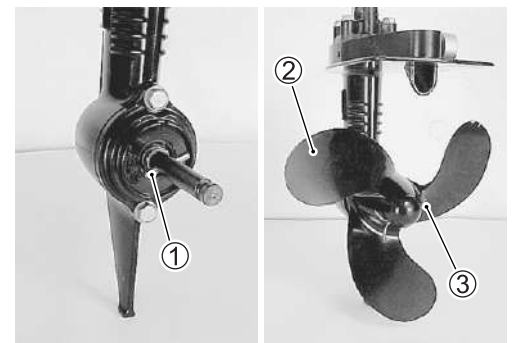
- Apply the Water Resistant Grease to the propeller shaft.

 **99000-25161: SUZUKI WATER RESISTANT GREASE**

- Install the shear pin ① and propeller ②.
- Push the cotter pin ③ through the propeller shaft, then bend the pin securely.

⚠ WARNING

To prevent injury from the propeller blades, wear gloves.



LOWER UNIT INSTALLATION

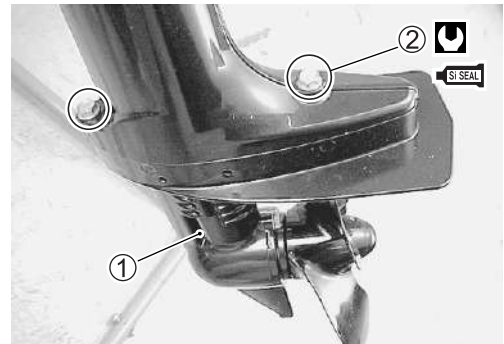
- Apply the Water Resistant Grease to the driveshaft splines.
- Install the lower unit ①.

WRG's 99000-25161: SUZUKI WATER RESISTANT GREASE

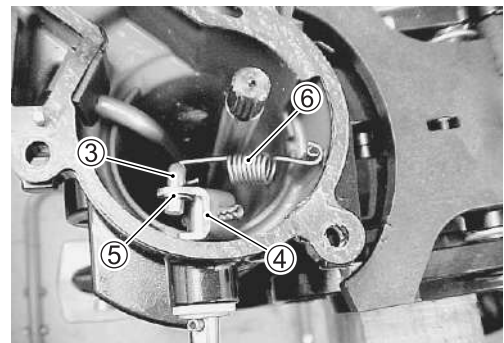
- Apply the Silicone Seal to the gearcase retaining bolts ② and tighten the bolts to the specified torque.

SI SEAL 09900-31120: SUZUKI SILICONE SEAL

Gearcase bolt: 8 N·m (0.8 kg·m, 6.0 lb·ft)



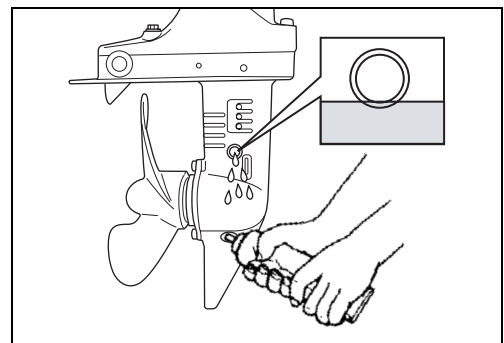
- Install the shift rod ③ to the clutch rod arm ④.
- Install the E-ring ⑤.
- Install the clutch notch spring ⑥.
- Shift the clutch lever from neutral and forward to check.



GEAR OIL

Fill the gearcase with the specified gear oil. (See page 2-5.)

Gear OIL 99000-22540: SUZUKI OUTBOARD MOTOR GEAR OIL

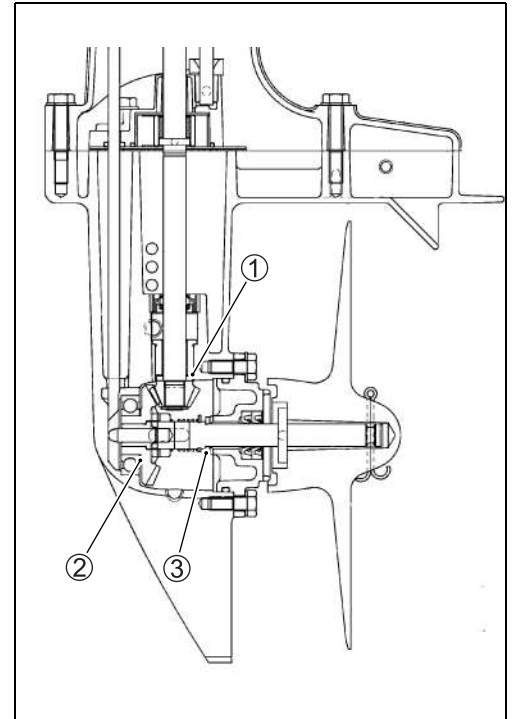


LOWER UNIT GEARS-SHIMMING AND ADJUSTMENT

If the lower unit has been rebuilt or has had components replaced, shimming for correct gear contact and backlash will have to be adjusted in order to ensure smooth, reliable operation of gears.

Shim/Washer and Mounting position

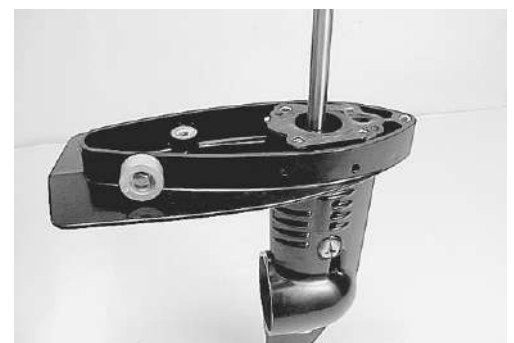
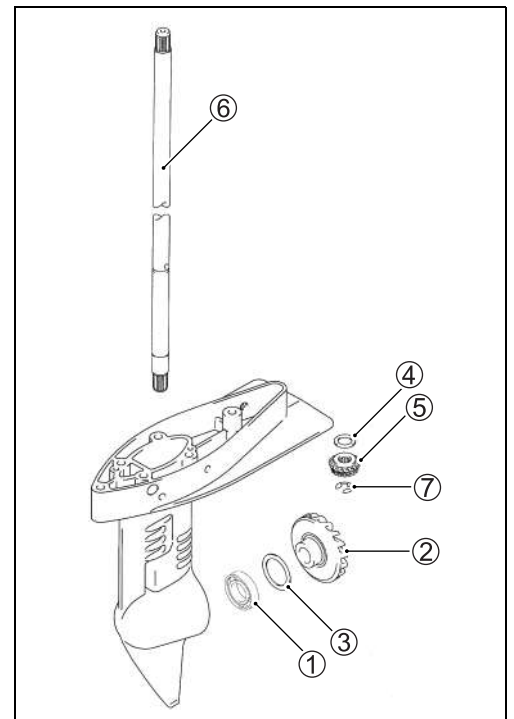
	Numerical index/item	Available thickness (mm)	Design specification thickness (mm)
①	Pinion gear backup shim	1.8, 1.9, 2.0, 2.1, 2.2	2.0
②	Forward gear backup shim	0.3, 0.4, 0.5, 0.6	0.5
③	Propeller shaft thrust washer	1.6, 1.7, 1.8, 1.9, 2.0	0.2 (Thrust play)



FORWARD GEAR/PINION GEAR SHIM ADJUSTMENT

Adjust the forward gear/pinion gear shimming as shown below.

- Install the forward gear bearing ①, the backup shim ③ and the forward gear ②.
- Install the driveshaft ⑥, the pinion gear backup shim ④, the pinion gear ⑤ and E-ring ⑦.

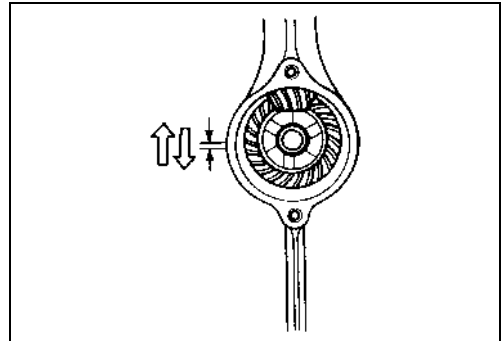
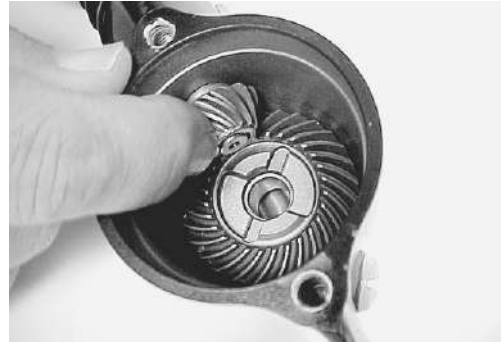


Adjusting gear backlash (Pinion and Forward gear)

To check the backlash, hold the pinion gear by hand, then gently rock forward gear back and forth by hand.

Gear backlash: 0.10 – 0.20 mm (0.004 – 0.008 in)

- If backlash is larger than the specified, the thickness of the forward gear backup shim must be increased.
- If backlash is smaller, the thickness of the backup shim must be decreased.

**Checking and adjusting tooth contact pattern (Pinion and Forward gear)**

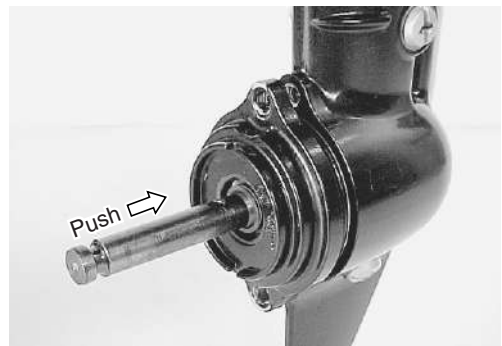
Check tooth contact pattern by using the following procedure.

- To assess tooth contact, apply a light coat of Prussian Blue on the convex surface of the forward gear.
- Install the propeller shaft and the housing assembly.
Do not install the push rod.

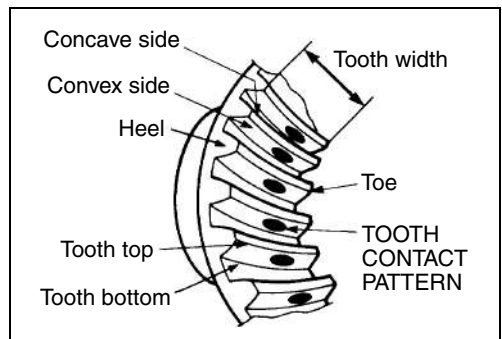
NOTE:

Securing the propeller shaft housing with the bolts is not required.

- Push the propeller shaft inward and hold in position.
- Rotate the driveshaft 5 – 6 times clockwise.



- Carefully pull out propeller shaft and housing to check tooth contact pattern.



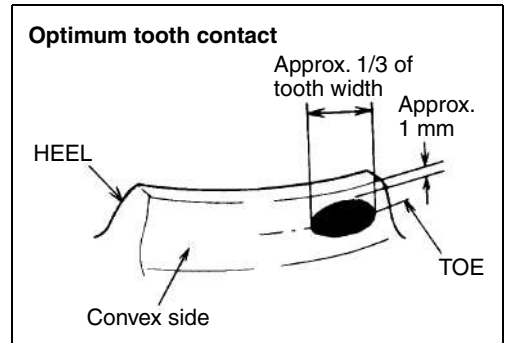
Optimum tooth contact

The optimum tooth contact is shown in the figure.

A shim adjustment may be necessary in order to obtain the optimum tooth contact pattern.

CAUTION

The backlash of the gear should be checked when increasing or decreasing the thickness of the shim to adjust tooth contact.

**Example (1)**

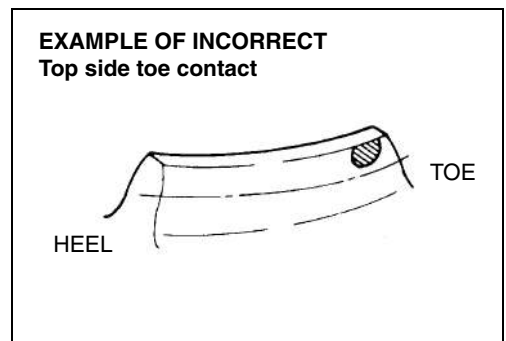
Incorrect top side toe contact:

Correction measures:

- Decrease the thickness of the forward gear shim.
- Slightly increase the pinion gear shim thickness.

CAUTION

Do not set tooth contact in the top side toe contact position. Damage and chipping of the forward and pinion gear may result.

**Example (2)**

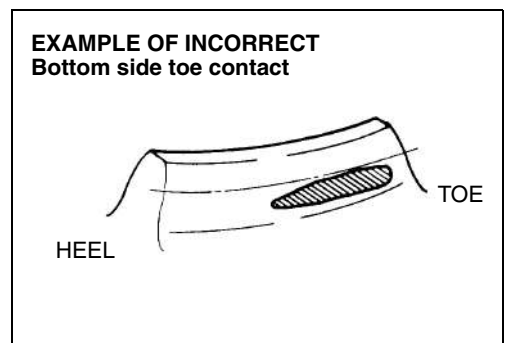
Incorrect bottom side toe contact:

Correction measures:

- Increase the thickness of the forward gear shim.
- Slightly decrease the pinion gear shim thickness.

CAUTION

Do not set tooth contact in the bottom side toe contact position. Chipping of the pinion gear may result.



CHECKING PROPELLER SHAFT THRUST PLAY

After adjusting all gear positions, measure the propeller shaft thrust play.

Propeller shaft thrust play:

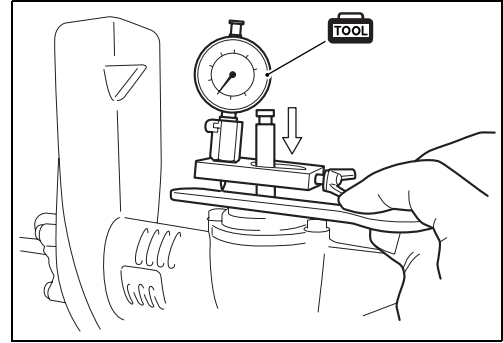
0.20 – 0.40 mm (0.008 – 0.016 in)

Measurement step

1. Assemble the gear adjusting gauge to the propeller shaft as shown in the figure.

 09951-09530: Gear adjusting gauge

2. Push the propeller shaft inward.
3. Hold the propeller shaft in and set the dial gauge pointer to zero.
4. Slowly pull the propeller shaft outward and read the maximum thrust play on the dial.
 - If the measurement is more than the specification, increase the propeller shaft thrust washer thickness.
 - If the measurement is less than the specification, reduce the propeller shaft thrust washer thickness.



WIRE AND HOSE ROUTING

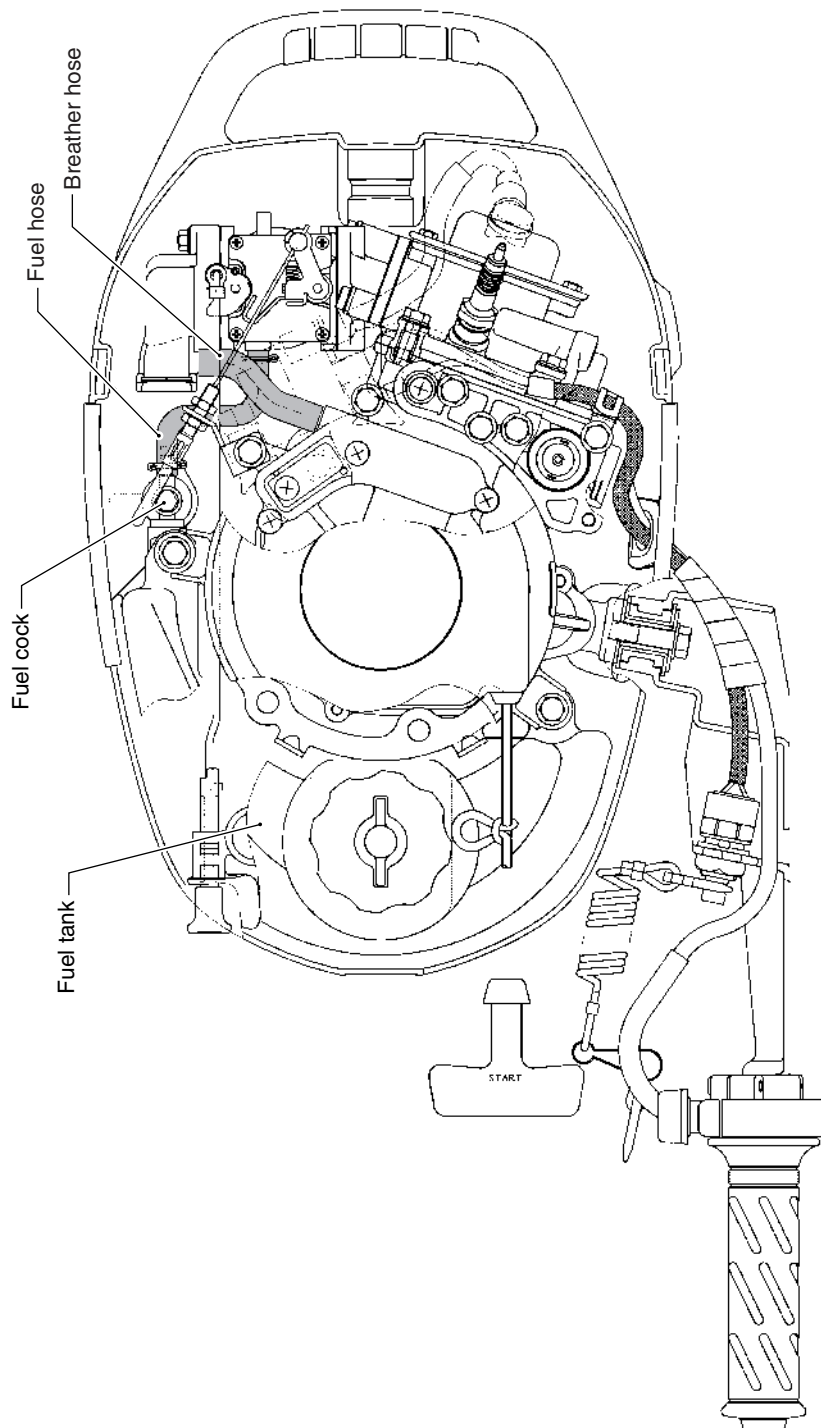
CONTENTS

HOSE ROUTING.....	9- 2
WIRE ROUTING	9- 3
WIRING DIAGRAM.....	9- 4

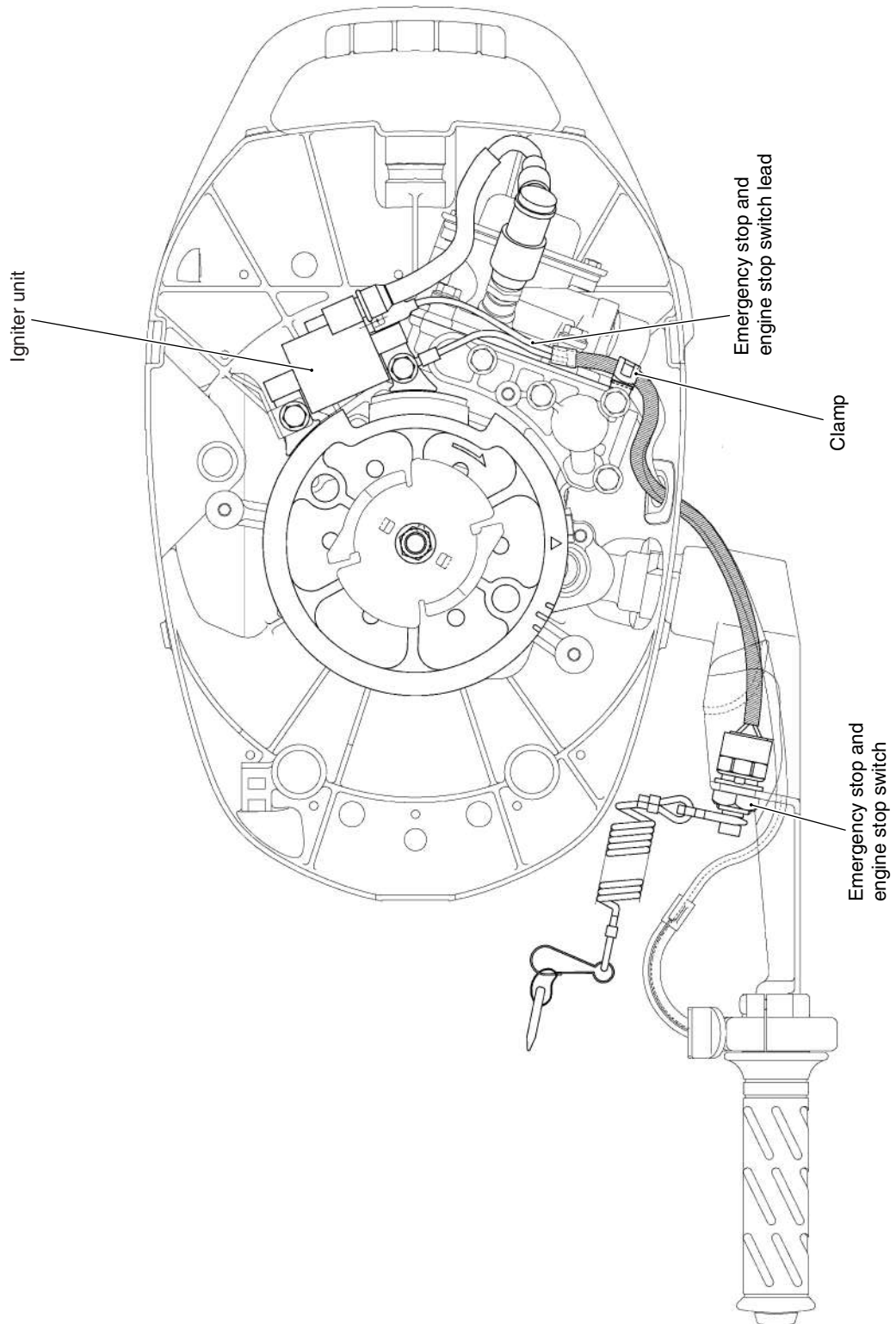
HOSE ROUTING

CAUTION

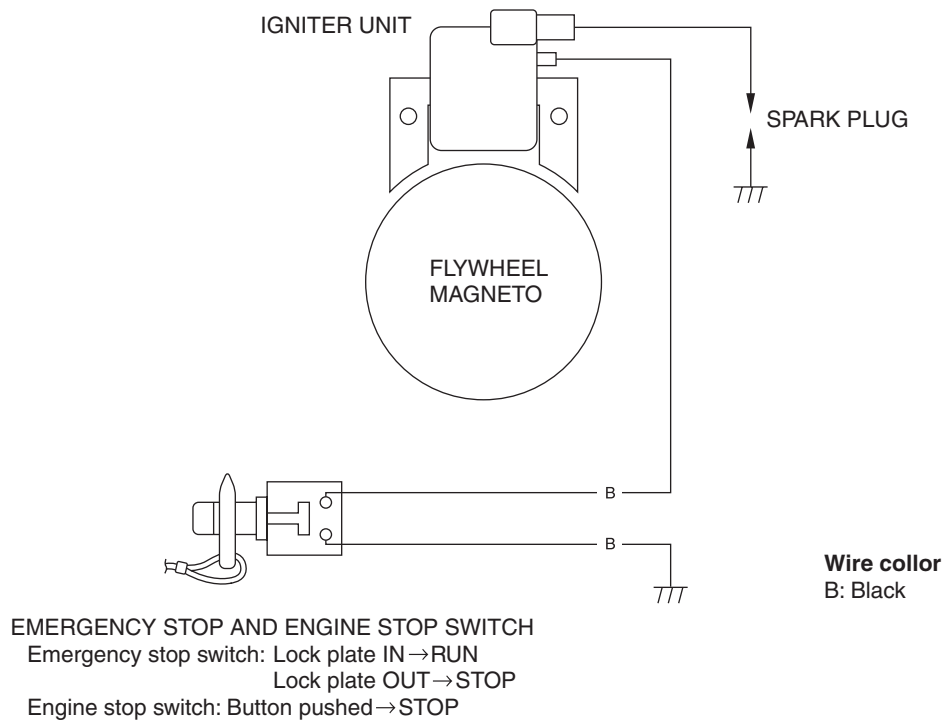
- Do not over-bend (kink) or twist hoses when installing.
- When installing hose clips, position tab to avoid contact with other parts.
- Check that hoses do not contact rods and levers during either engine operation or standstill.
- Extreme care should be taken not to cut, abrade or cause any other damage on hoses.
- Care should be taken not to cause hoses to be compressed excessively by any clamp when fitted.



WIRE ROUTING



WIRING DIAGRAM



Prepared by

SUZUKI MOTOR CORPORATION

Service Department

May, 2006

Manual No.99500-97J00-01E

Printed in Japan

SUZUKI MOTOR CORPORATION