

FOREWORD

This manual contains an introductory description on SUZUKI Outboard motor DF90/115/140 and procedures for the inspection, service and overhaul of its main components.

General knowledge information is not included.

Please read the GENERAL INFORMATION section to familiarize yourself with basic information concerning this motor. Read and refer to the other sections in this manual for information regarding proper inspection and service procedures.

This manual will help you better understand this outboard motor so that you may provide your customers with optimum and quick service.

- This manual has been prepared using the latest information 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 and may not represent the actual outboard motor in exact detail.

- This manual is intended for use by technicians who already possess the basic knowledge and skills to service SUZUKI outboard motors.

Persons without such knowledge and skills should not attempt to service an outboard engine by relying on this manual only.

Instead, please contact your nearby authorized SUZUKI outboard motor dealer.

▲ WARNING

Apprentice mechanics or do-it-yourself mechanics that don't have 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 2001 (K1) model.

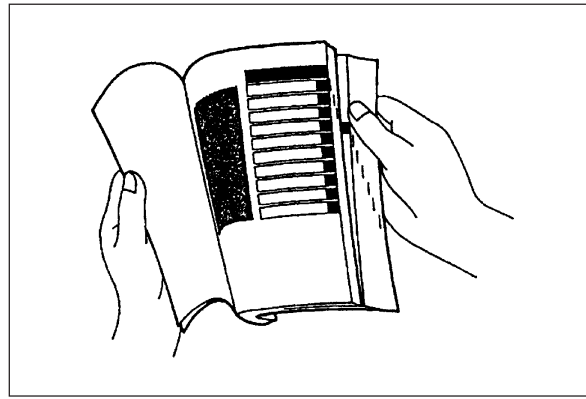
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HOW TO USE THIS MANUAL

TO LOCATE WHAT YOU ARE LOOKING FOR :

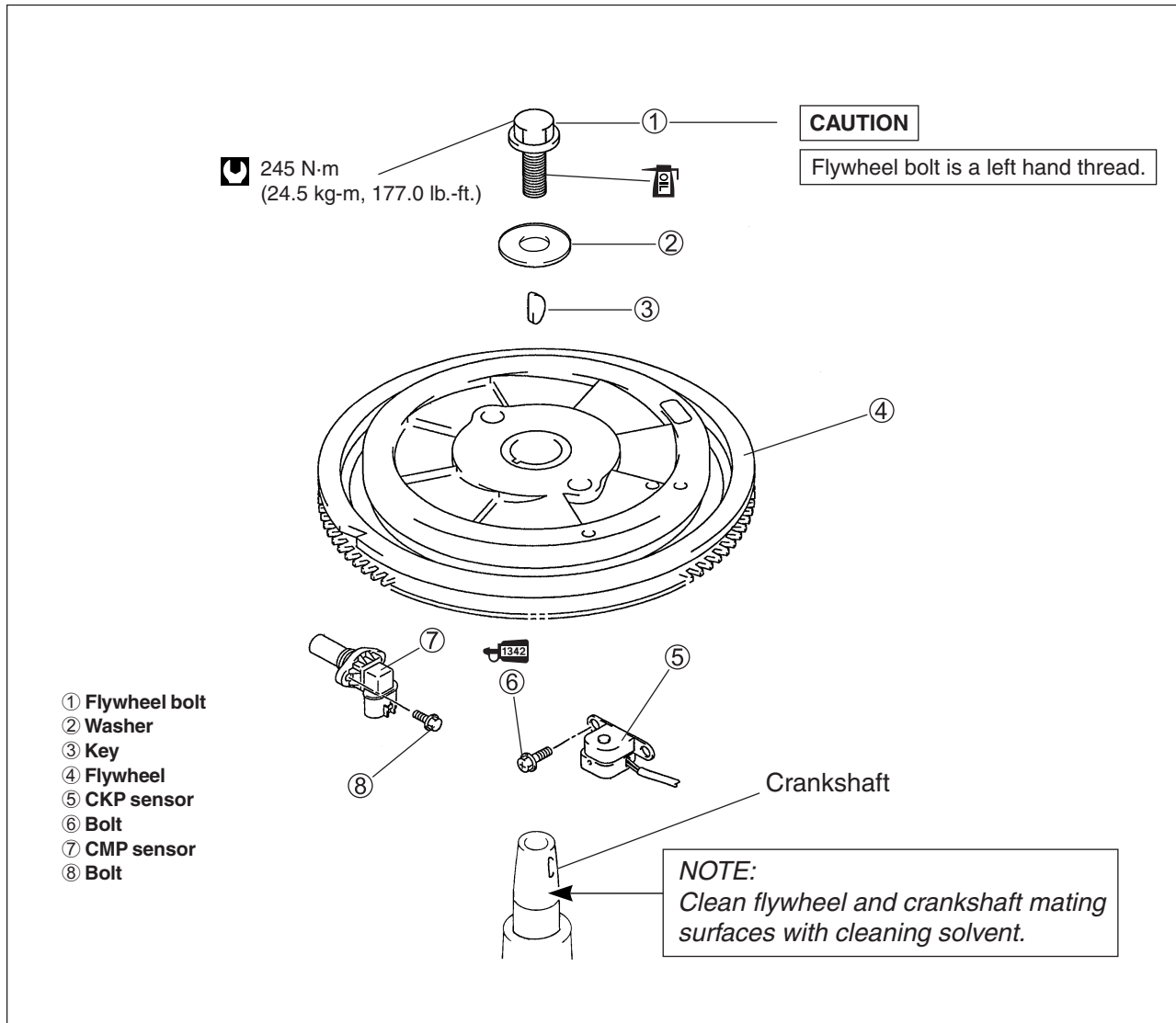
1. The text of this manual is divided into sections.
2. The section titles are listed on the previous page in a GROUP INDEX. Select the section needed for reference.
3. Holding the manual as shown at the right will allow you to find the first page of the section easily.
4. The first page of each section lists a table of contents to easily locate 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 :

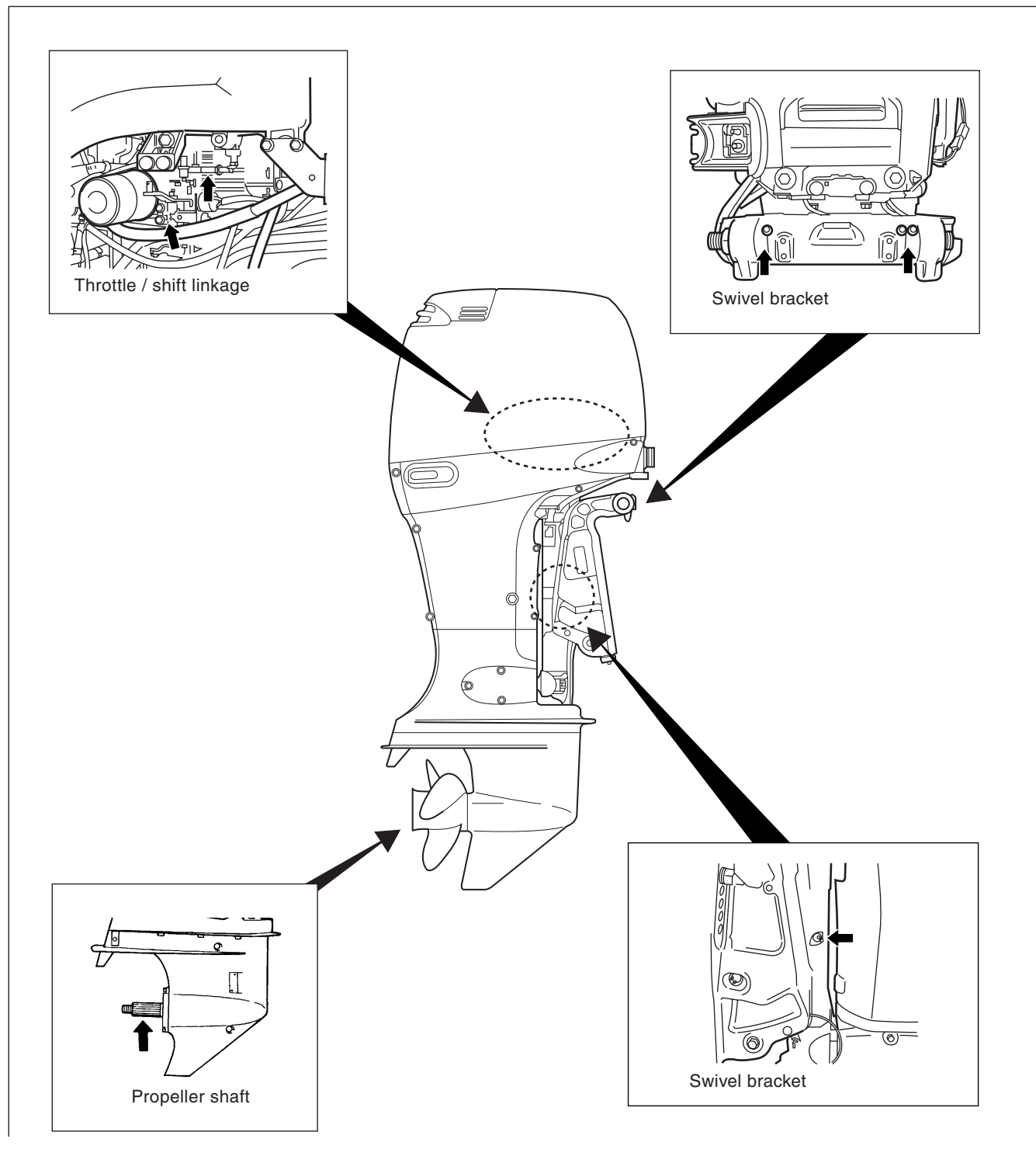


LUBRICATION

Inspect every 50 hours (3 months).

Apply Suzuki Water Resistant Grease to the following points.

 **99000-25161 : Water Resistant Grease**



OIL PRESSURE

Oil pressure (at normal operating temp.) :
 550 – 600 kPa (5.5 – 6.0 kg/cm², 78 – 85 psi.)
 at 3000 r/min.

NOTE:

The figure shown above is a guideline only, not an absolute service limit.

If oil pressure is lower or higher than specification, following causes may be considered.

(See page 6-65 for oil passage locations)

Low oil pressure

- Clogged oil filter
- Leakage from oil passages
- Defective oil pump
- Defective oil pressure regulator
- Damage O-ring
- Combination of above items

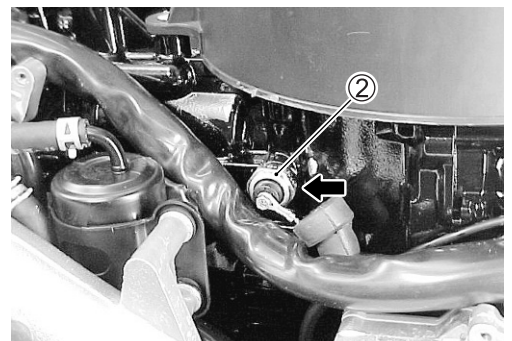
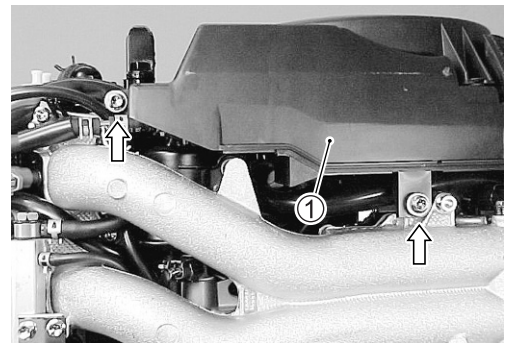
High oil pressure

- Using an engine oil of too high viscosity
- Clogged oil passage
- Clogged oil pressure regulator
- Combination of above items

TEST PROCEDURE

1. Check engine oil level.
2. Remove bolts and air duct ① .

3. Loosen screw and disconnect blue lead wire from oil pressure switch ② .
 Remove oil pressure switch.



FUEL VAPOR SEPARATOR

The fuel vapor separator incorporates a float system that maintains a constant fuel level inside the separator chamber.

As the fuel level decreases, fuel flows into the vapor separator from the low pressure fuel pump.

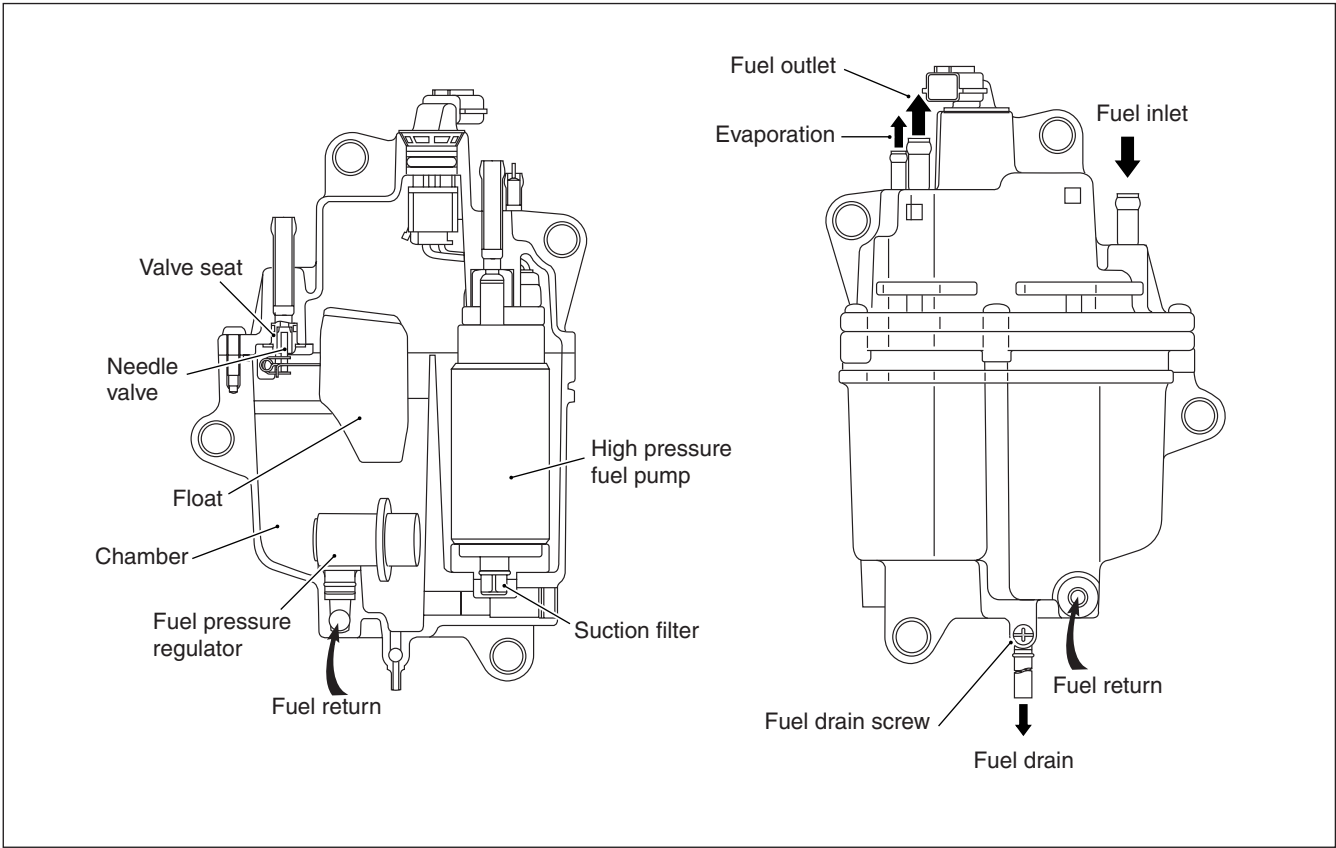
The function of this unit is to separate vapors from fuel delivered by the low pressure fuel pump or fuel returned from the fuel pressure regulator.

This vapor is routed through the evaporation hose connecting the vapor separator cover to the cylinder head cover.

HIGH PRESSURE FUEL PUMP

The high pressure fuel pump is an “integral” type in which the pump mechanism is located within the fuel vapor separator.

To supply the optimum fuel amount, the pump is driven by the duty cycle signal from ECM.



INSPECTION

PRECAUTION ON SYSTEM INSPECTION

⚠ WARNING

To prevent any unexpected engine start, perform the following before proceeding with any CRANKING tests.

- When performing tests not related to fuel injector operation :
 - Disconnect all fuel injector wire connectors.
- When performing tests related to fuel injector operation :
 - Relieve fuel pressure in line. (See page 5-3)
 - Disconnect high pressure fuel pump wire connector located on fuel vapor separator.

CAUTION

- Always turn ignition switch “OFF” and disconnect battery cables when wires are being disconnected or connected.
- Hold and pull connector pieces when disconnecting. Do not pull wires.

NOTE:

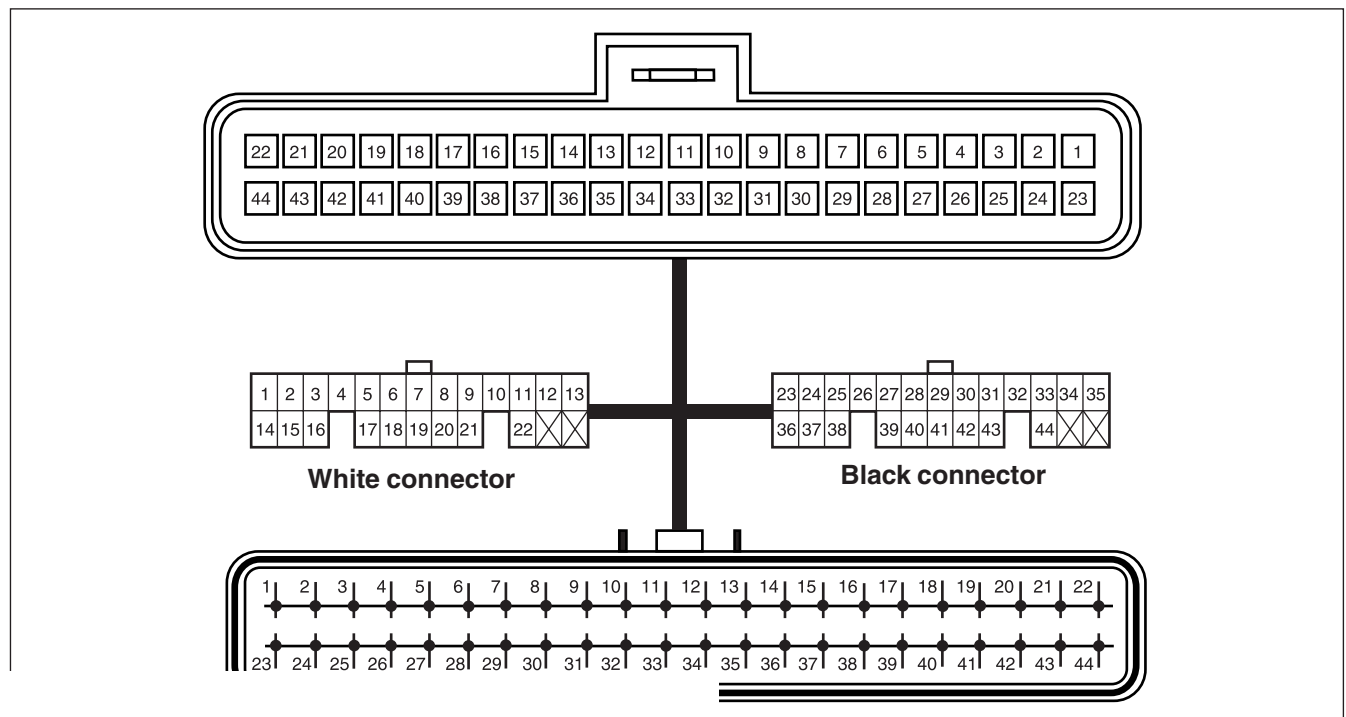
- Self-diagnostic codes will remain in ECM memory even if battery is disconnected.
- As each terminal voltage is affected by battery voltage, use a full-charged battery.
- Make sure all ground points have good electrical contact.
- Make sure all wires / cables are securely connected.

44-PIN TEST CORD

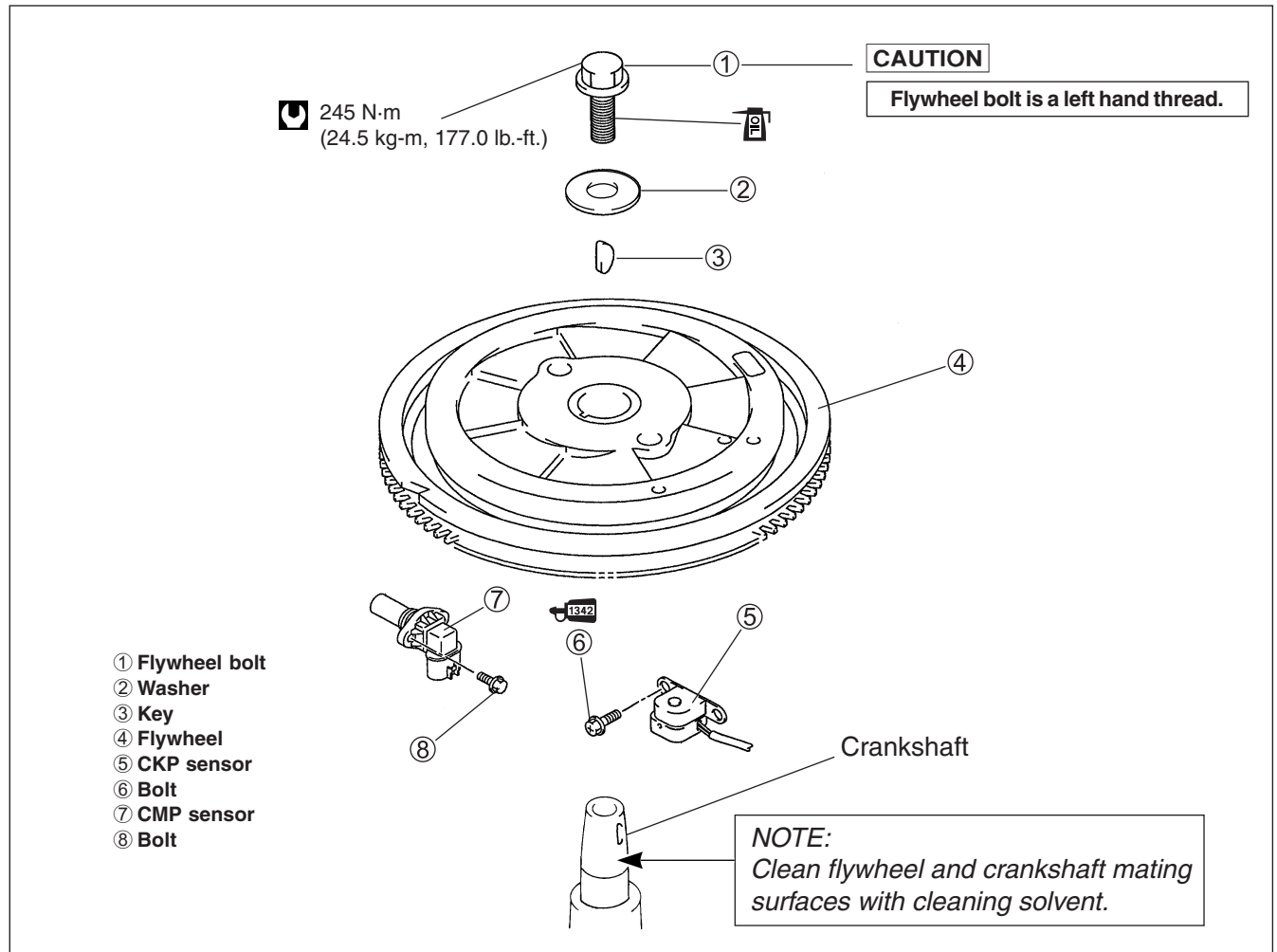
This test cord is used when checking the circuit for voltage, etc. and connected between ECM and the wiring harness.

To measure, connect the tester probe to the relevant terminal of the test cord.

 09930-89950 : 44-pin test cord



REMOVAL / INSTALLATION FLYWHEEL



REMOVAL

Prior to removing flywheel :

- Disconnect battery cables from battery.

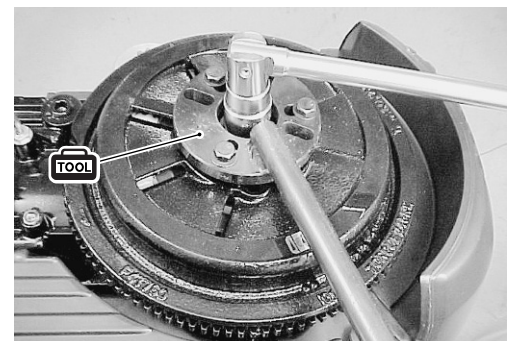
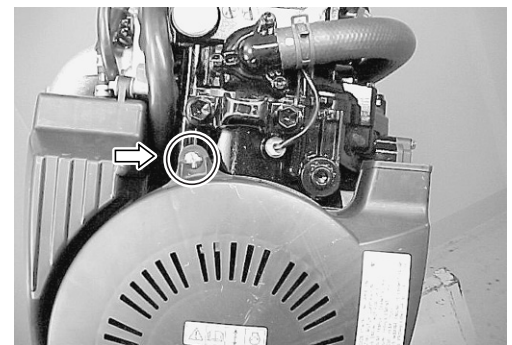
1. Remove flywheel cover.
2. Loosen flywheel bolt 2 – 3 turns to right direction.

CAUTION

Flywheel bolt is a left hand (LH) thread.

TOOL 09930-48720 : Flywheel holder

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



PISTON RING**Piston ring end gap**

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

 **09900-20803: Thickness gauge**

Piston ring end gap :**Standard :**

1 st 0.20 – 0.35 mm (0.008 – 0.014 in.)

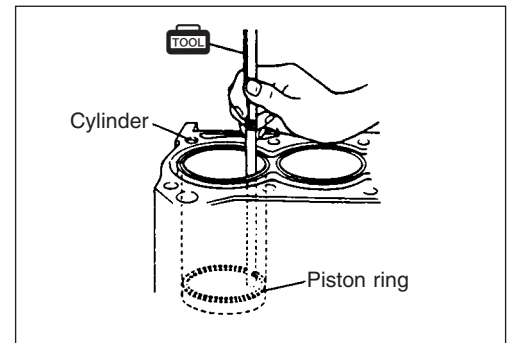
2 nd 0.35 – 0.50 mm (0.014 – 0.020 in.)

Service limit :

1 st 0.70 mm (0.028 in.)

2 nd 1.00 mm (0.039 in.)

If measurement exceeds service limit, replace piston ring.

**Piston ring free end gap**

Measure piston ring free end gap using vernier calipers.

 **09900-20101 : Vernier calipers**

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

1 st Approx. 11.3 mm (0.44 in.)

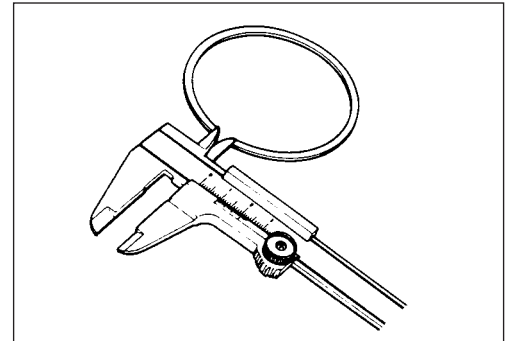
2 nd Approx. 11.0 mm (0.43 in.)

Service limit :

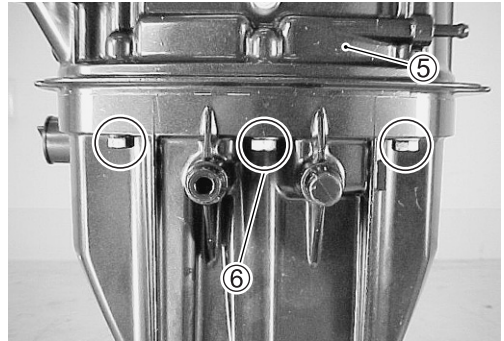
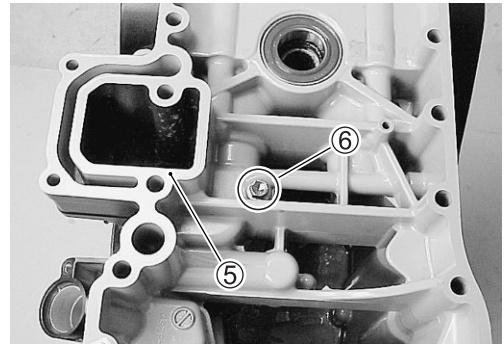
1 st 9.0 mm (0.354 in.)

2 nd 8.8 mm (0.347 in.)

If measurement exceeds service limit, replace piston ring.



4. Install engine holder ⑤ to oil pan, then securely tighten it with four bolts ⑥.



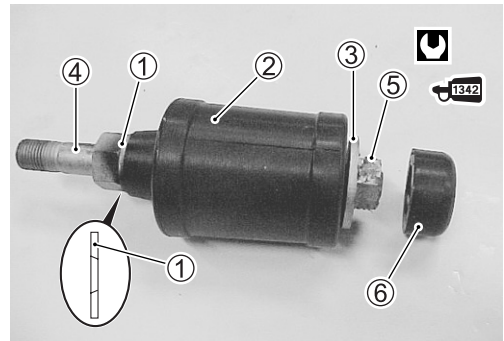
UPPER MOUNT

Upper mount and mount cover

1. Place washer ①, upper mount ② and washer ③ on upper mount bolt ④.
2. Tighten upper mount rear nut ⑤, pre-coated with thread lock, to specified torque.

 99000-32050 : Thread Lock “1342”

 Upper mount rear nut :
80 N·m (8.0 kg·m, 58.0 lb.-ft.)



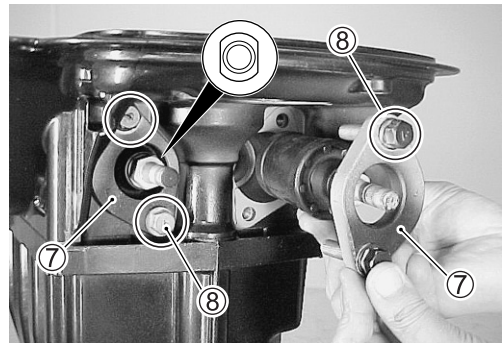
3. Install thrust mount ⑥ to upper mount rear nut, then place upper mount into engine holder.
4. Install upper mount covers ⑦, then tighten bolts ⑧, pre-coated with thread lock, to specified torque.

NOTE:

Before tightening mount cover bolts, be sure upper mount bolt head is positioned as shown in figure.

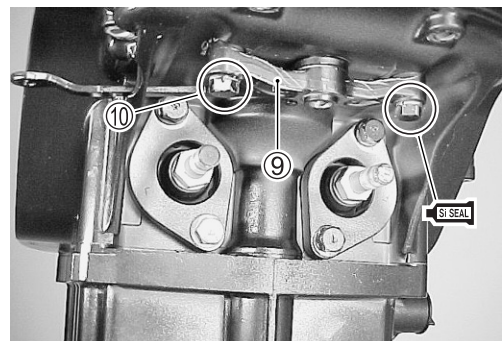
 99000-32050 : Thread Lock “1342”

 Upper mount cover plate bolt :
50 N·m (5.0 kg·m, 36.0 lb.-ft.)



5. Install clutch shaft holder ⑨ to engine holder, then tighten bolts ⑩, pre-coated with silicone seal, to securely.

 SI SEAL

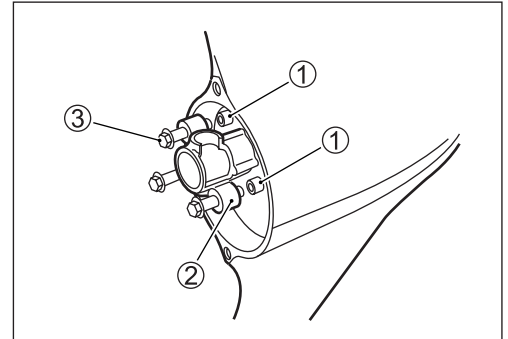


CAUTION

- Make sure that all parts used in assembly are clean and lubricated.
 - After assembly, check 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 “GEARS SHIMMING AND ADJUSTMENT” section on page 9-24)

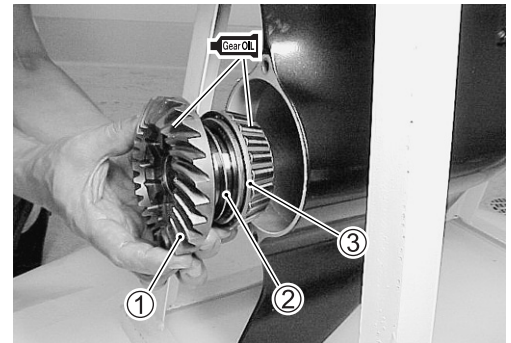
SHIFT CAM HOUSING

Install dowel pins ① and shift cam housing ②, then tighten three bolts ③ securely.

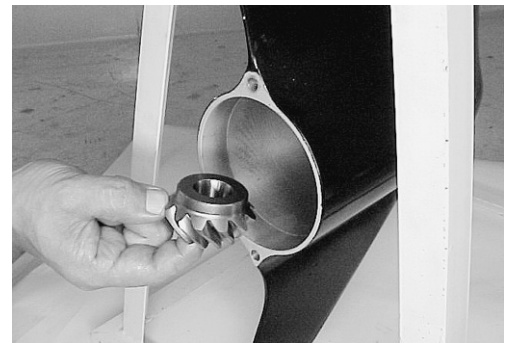
**FORWARD GEAR**

Place forward gear bearing ③ and back-up shim ② in position, then install forward gear ①.

 99000-22540 : Suzuki Outboard Motor Gear Oil

**PINION GEAR**

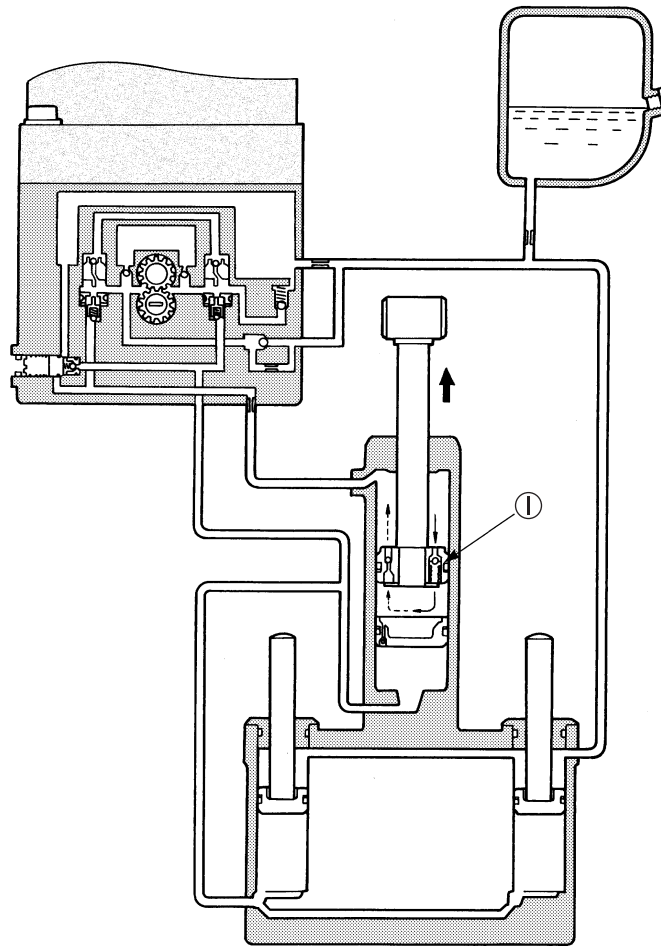
Place pinion gear in gearcase.



SHOCK ABSORBER CIRCUIT

This incorporated safety feature is for protection of the gearcase and prevention of internal PTT pressure build-up in the event of an impact.

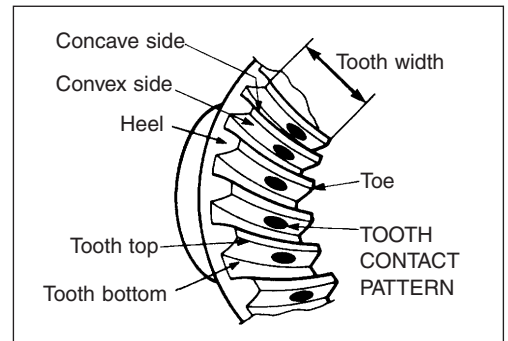
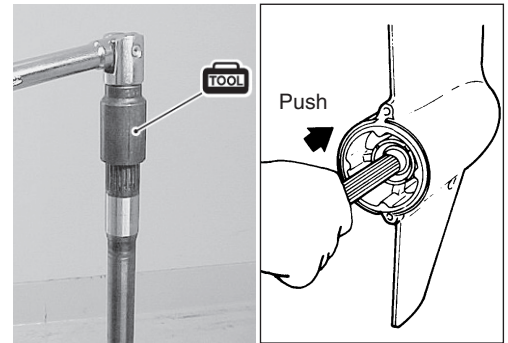
- (1) The pressure from a sudden impact will make impact relief valve ① open, allowing oil from the upper area of the tilt cylinder to flow into the area between the tilt rod piston and the free piston. The tilt rod will then extend.
- (2) When the moment of impact has passed, the PTT DOWN switch must be activated to return the engine to within the normal trim range. When the switch is pressed, the oil between the piston and free piston will be directed to the cylinder upper chamber via the return valve below the tilt piston.



2. Install propeller shaft and housing assembly (minus reverse gear and internal components).
3. Push propeller shaft inward and hold in position.
4. Using driveshaft holder tool, rotate the driveshaft 5 – 6 times.

TOOL 09921-29410: Driveshaft holder

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

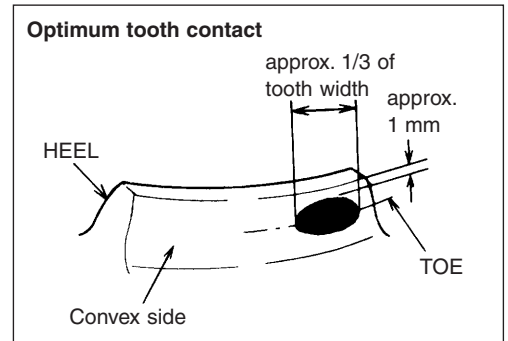


Optimum tooth contact

The optimum tooth contact is shown at right. A shim adjustment may be necessary to obtain this contact pattern.

CAUTION

The driveshaft thrust play should be checked when increasing or decreasing the thickness of the shim to adjust tooth contact.

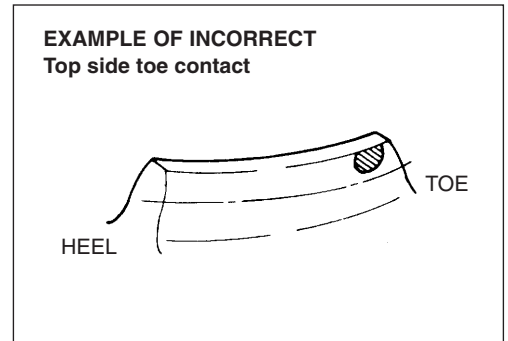


Example (1)

Incorrect topside toe contact:
 Correction measures:
 • Decrease thickness of forward gear shim.
 (• Slightly increase pinion gear shim thickness.)

CAUTION

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

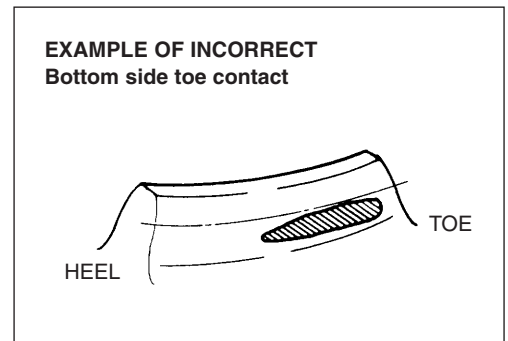


Example (2)

Incorrect bottom side toe contact:
 Correction measures:
 • Increase thickness of forward gear shim.
 (• Slightly decrease pinion gear shim thickness.)

CAUTION

Do not set tooth contact in this position (bottom side



REVERSE GEAR BACK-UP SHIM ADJUSTMENT

1. Correctly assemble reverse gear bearing housing, reverse gear thrust bearing, reverse gear retainer, reverse gear, reverse gear spacer, pinion gear, driveshaft assembly/oil seal housing and related components.

2. Tighten pinion nut to specified torque.

 **Pinion nut: 120 N·m (12.0 kg·m, 87.0 lb-ft)**

3. Install propeller shaft assembly and bearing housing assembly without the forward gear, then tighten bearing housing retaining bolts to the specified torque.

4. Install the special tool to the bearing housing and then attach it to the propeller shaft as shown.

 **09951-98721: Gear holder**

NOTE:

- Before installing special tool, loosen the jam nuts securing the long bolts and then remove the plate from long bolts.
- Screw long bolts into the 10 mm thread on propeller shaft bearing housing.

5. Turn the bolt ① clockwise, and tighten until the propeller shaft can rotate smoothly without play. Do not over tighten.

6. Affix gear adjusting gauge to driveshaft.

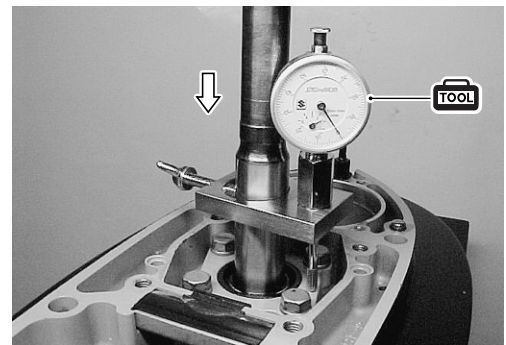
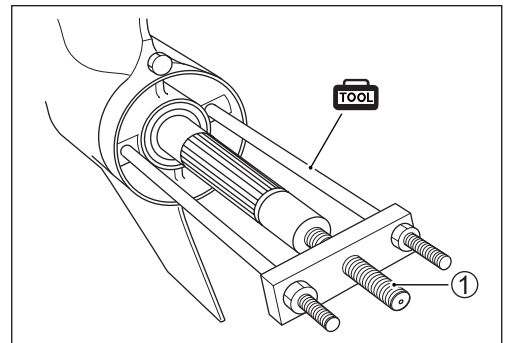
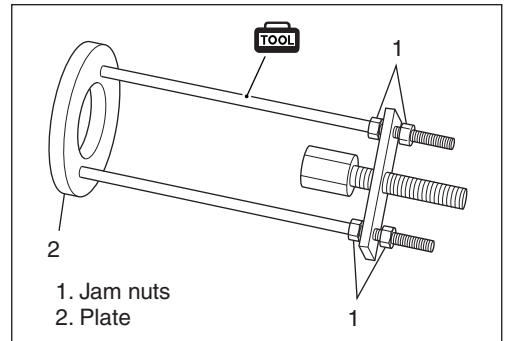
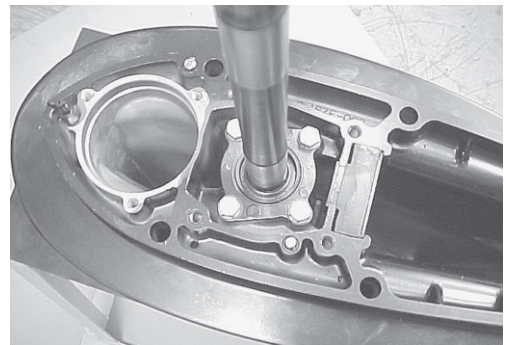
 **09951-09530: gear adjusting gauge**

7. To check the driveshaft thrust play, slowly push driveshaft downward, then read the maximum play.

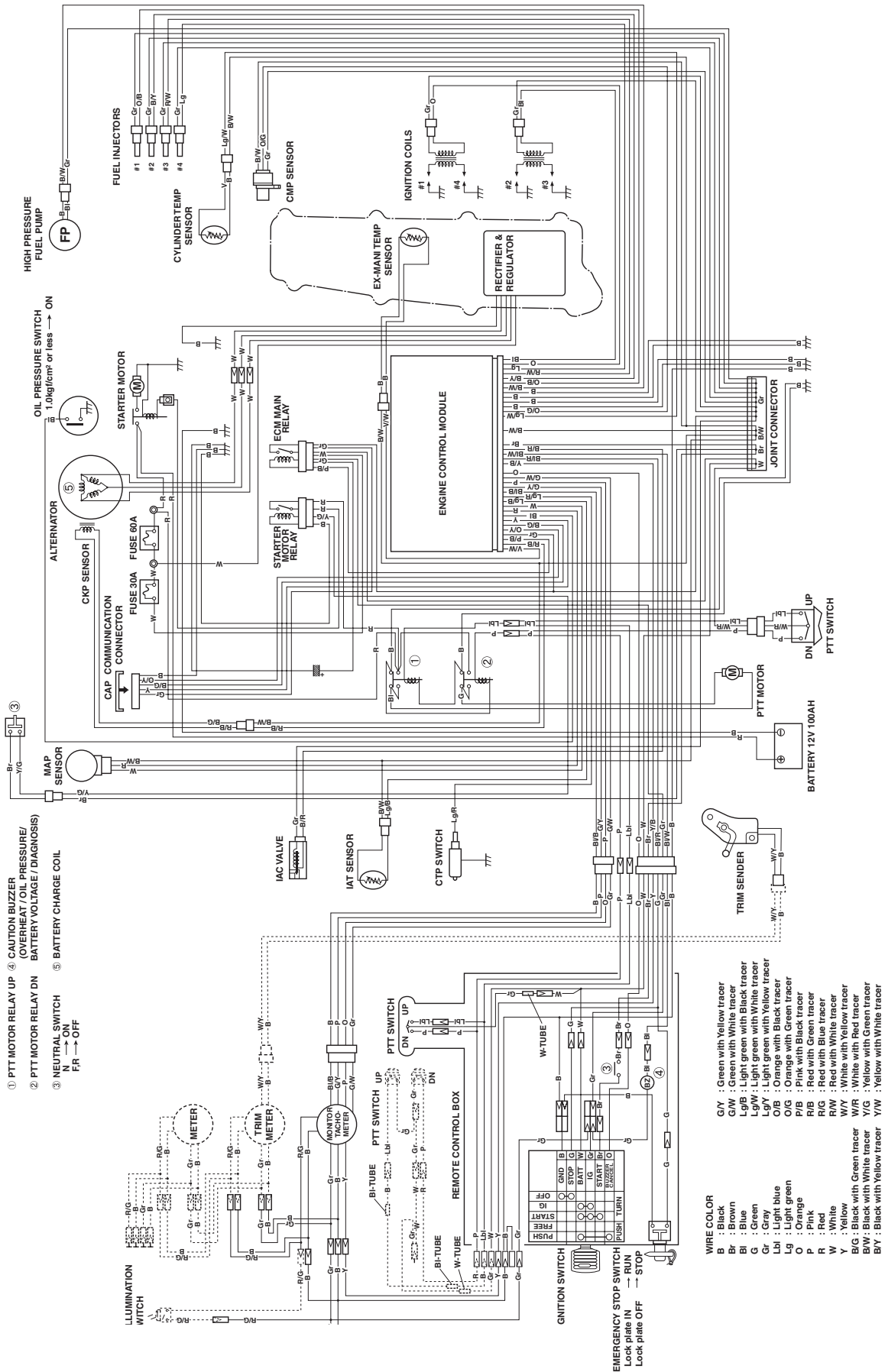
Driveshaft thrust play:

Approx. 0.6 – 0.8 mm (0.024 – 0.031 in.)

- If thrust play is larger than the specified , thickness of reverse gear back-up shim must be increased.
- If thrust play is smaller, reverse gear back-up shim thickness must be decreased.



WIRING DIAGRAM



Item	Unit	Data	
		DF140(W)T	DF140Z

CYLINDER / PISTON / PISTON RING

Cylinder distortion	Limit	mm (in)	0.05 (0.002)
Piston to cylinder clearance	STD	mm (in)	0.020 – 0.040 (0.0008 – 0.0016)
	Limit	mm (in)	0.100 (0.0039)
Cylinder bore	STD	mm (in)	86.000 – 86.020 (3.3858 – 3.3866)
Cylinder measuring position		mm (in)	50 (2.0) from cylinder top surface
Piston skirt diameter	STD	mm (in)	85.970 – 85.990 (3.3846 – 3.3854)
Piston measuring position		mm (in)	26.5 (1.04) from piston skirt end
Cylinder bore wear	Limit	mm (in)	0.100 (0.0039)
Piston ring end gap	1st	STD	0.20 – 0.35 (0.008 – 0.014)
		Limit	0.70 (0.028)
	2nd	STD	0.35 – 0.50 (0.014 – 0.020)
		Limit	1.00 (0.039)
Piston ring free end gap	1st	STD	Approx. 11.6 (0.46)
		Limit	9.3 (0.37)
	2nd	STD	Approx. 11.5 (0.45)
		Limit	9.2 (0.36)
Piston ring to groove clearance	1st	STD	0.030 – 0.070 (0.0012 – 0.0028)
		Limit	0.120 (0.0047)
	2nd	STD	0.020 – 0.060 (0.0008 – 0.0024)
		Limit	0.100 (0.0039)
Piston ring groove width	1st	STD	1.22 – 1.24 (0.048 – 0.049)
	2nd	STD	1.51 – 1.53 (0.059 – 0.060)
	Oil	STD	2.51 – 2.53 (0.099 – 0.100)
Piston ring thickness	1st	STD	1.17 – 1.19 (0.046 – 0.047)
	2nd	STD	1.47 – 1.49 (0.058 – 0.059)
Pin clearance in piston pin hole	STD	mm (in)	0.006 – 0.017 (0.0002 – 0.0007)
	Limit	mm (in)	0.040 (0.0016)
Piston pin outside diameter	STD	mm (in)	20.997 – 21.000 (0.8267 – 0.8268)
	Limit	mm (in)	20.980 (0.8260)
Piston pin hole diameter	STD	mm (in)	21.006 – 21.014 (0.8270 – 0.8273)
	Limit	mm (in)	21.040 (0.8283)
Pin clearance in conrod small end	STD	mm (in)	0.003 – 0.014 (0.0001 – 0.0006)
	Limit	mm (in)	0.050 (0.0020)
Conrod small end bore	STD	mm (in)	21.003 – 21.011 (0.8269 – 0.8272)