

# CONTENTS

|      |                                                        |    |
|------|--------------------------------------------------------|----|
| I.   | SPECIFICATIONS . . . . .                               | 3  |
| 1.   | SPECIFICATIONS . . . . .                               | 3  |
| 2.   | DIMENSIONAL DRAWINGS . . . . .                         | 4  |
| II.  | SERVICE INFORMATION . . . . .                          | 5  |
| 1.   | GENERAL SAFETY . . . . .                               | 5  |
| 2.   | SERVICE RULES . . . . .                                | 5  |
| 3.   | SERIAL NUMBER LOCATION . . . . .                       | 5  |
| 4.   | MAINTENANCE STANDARDS . . . . .                        | 6  |
| 5.   | TORQUE VALUES . . . . .                                | 7  |
| 6.   | SPECIAL TOOLS . . . . .                                | 8  |
| 7.   | WIRING DIAGRAM . . . . .                               | 10 |
| 8.   | TUBE ROUTING . . . . .                                 | 11 |
| 9.   | TROUBLESHOOTING . . . . .                              | 12 |
| 10.  | MAINTENANCE SCHEDULE . . . . .                         | 15 |
| 11.  | RECOMMENDED SERVICE MATERIALS . . . . .                | 16 |
| 12.  | LUBRICATION CHART . . . . .                            | 17 |
| III. | MAINTENANCE . . . . .                                  | 18 |
| 1.   | ENGINE OIL . . . . .                                   | 18 |
| 2.   | GEAR OIL . . . . .                                     | 19 |
| 3.   | SPARK PLUG . . . . .                                   | 19 |
| 4.   | VALVE CLEARANCE . . . . .                              | 20 |
| 5.   | FUEL LINE FILTER . . . . .                             | 20 |
| 6.   | FUEL TANK FILTER . . . . .                             | 21 |
| 7.   | CARBURETOR . . . . .                                   | 21 |
| 8.   | THROTTLE CABLE . . . . .                               | 22 |
| 9.   | THROTTLE OPENER SYSTEM . . . . .                       | 22 |
| 10.  | SHIFT ROD . . . . .                                    | 23 |
| 11.  | REVERSE LOCK . . . . .                                 | 23 |
| IV.  | DISASSEMBLY AND SERVICE . . . . .                      | 25 |
| 1.   | DISASSEMBLY CHART . . . . .                            | 25 |
| 2.   | ENGINE COVER/RECOIL STARTER . . . . .                  | 26 |
| 3.   | CARBURETOR/FUEL PUMP . . . . .                         | 29 |
| 4.   | FLYWHEEL/ELECTRICAL EQUIPMENT . . . . .                | 34 |
| 5.   | ENGINE REMOVAL . . . . .                               | 39 |
| 6.   | CYLINDER HEAD/VALVE . . . . .                          | 41 |
| 7.   | OIL PAN . . . . .                                      | 45 |
| 8.   | CRANKSHAFT/PISTON . . . . .                            | 48 |
| 9.   | THROTTLE CABLE/HANDLE . . . . .                        | 56 |
| 10.  | EXTENSION CASE/SWIVEL CASE/<br>STERN BRACKET . . . . . | 59 |
| 11.  | GEAR CASE REMOVAL . . . . .                            | 62 |
| 12.  | PROPELLER SHAFT/GEAR CASE . . . . .                    | 63 |
| 13.  | FUEL TANK . . . . .                                    | 69 |
| V.   | OPTIONAL PARTS . . . . .                               | 70 |
| 1.   | REMOTE CONTROL BRACKET KIT . . . . .                   | 70 |
| 2.   | DC CHARGING AND LIGHTING KIT . . . . .                 | 74 |
| VI.  | OPERATION . . . . .                                    | 75 |
| 1.   | LUBRICATION SYSTEM . . . . .                           | 75 |
| 2.   | COOLING SYSTEM . . . . .                               | 76 |
| 3.   | POWER TRAIN . . . . .                                  | 77 |
| 4.   | FUEL SYSTEM . . . . .                                  | 78 |
| 5.   | NEUTRAL START SYSTEM . . . . .                         | 79 |
| 6.   | THROTTLE OPENER SYSTEM . . . . .                       | 80 |
| 7.   | HALF THROTTLE SYSTEM . . . . .                         | 81 |

# **HONDA**

## **BF50·BF5A**

---

### **PREFACE**

This manual covers the construction, function and servicing procedure of the Honda BF50·BF5A outboard motor. Careful observance of these instructions will result in better, safer service work.

ALL INFORMATION, ILLUSTRATIONS, DIRECTIONS AND SPECIFICATIONS INCLUDED IN THIS PUBLICATION ARE BASED ON THE LATEST PRODUCT INFORMATION AVAILABLE AT THE TIME OF APPROVAL FOR PRINTING. HONDA MOTOR CO., LTD. RESERVES THE RIGHT TO MAKE CHANGES WITHOUT INCURRING ANY OBLIGATION WHATEVER. NO PART OF THIS PUBLICATION MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION.

HONDA MOTOR CO., LTD.  
SERVICE PUBLICATIONS OFFICE

# I. SPECIFICATIONS

**HONDA**  
**BF50·BF5A**

## 1. SPECIFICATIONS

## 2. DIMENSIONAL DRAWINGS

### 1. SPECIFICATIONS

#### DIMENSIONS/WEIGHT

| Type<br>Item                 | BF50S                               | BF50L              | BF5A S             | BF5A L             |
|------------------------------|-------------------------------------|--------------------|--------------------|--------------------|
| Overall length               | 525 mm (20.7 in)                    |                    |                    |                    |
| Overall width                | 340 mm (13.4 in)                    |                    |                    |                    |
| Overall height               | 1,005 mm (39.6 in)                  | 1,135 mm (44.7 in) | 1,005 mm (39.6 in) | 1,135 mm (44.7 in) |
| Dry weight                   | 27.0 kg (59.5 lb)                   | 27.5 kg (60.6 lb)  | 27.0 kg (59.5 lb)  | 27.5 kg (60.6 lb)  |
| Operating weight (incl. oil) | 27.5 kg (60.6 lb)                   | 28.0 kg (61.7 lb)  | 27.5 kg (60.6 lb)  | 28.0 kg (61.7 lb)  |
| Transom height               | 445 mm (17.5 in)                    | 572 mm (22.5 in)   | 445 mm (17.5 in)   | 572 mm (22.5 in)   |
| Transom angle                | 5-stage (5° - 9° - 13° - 17° - 21°) |                    |                    |                    |
| Tilting                      | 3-stage (30° - 45° - 70°)           |                    |                    |                    |
| Swivel angle                 | R: 45°, L: 45°                      |                    |                    |                    |

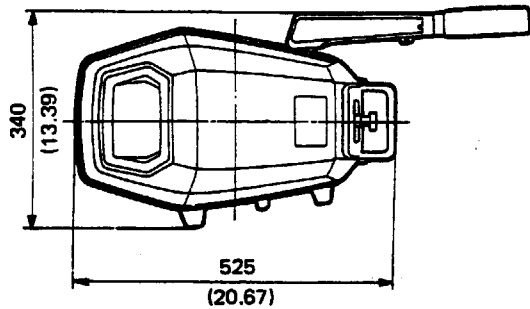
|                           |                                                           |
|---------------------------|-----------------------------------------------------------|
| Type                      | Single cylinder, 4 stroke, water cooled, vertical OHV     |
| Total piston displacement | 127 cm <sup>3</sup> (7.7 cu in)                           |
| Bore x stroke             | 60 x 45 mm (2.36 x 1.77 in)                               |
| Maximum horsepower        | 5.0 PS/5,000 rpm                                          |
| Maximum torque            | 7.9 N·m (0.79 kg·m, 5.71 ft·lb)                           |
| Compression ratio         | 8.7 : 1                                                   |
| Fuel consumption ratio    | 310 g/PS-h (0.68 lb/PS-h)                                 |
| Cooling system            | Forced water circulation by impeller pump with thermostat |
| Ignition system           | Transistorized magneto                                    |
| Ignition timing           | 25° BTDC fixed                                            |
| Spark plug                | (NGK) BPR5ES, (ND) W16EPR-U                               |
| Carburetor                | Horizontal type, butterfly valves                         |
| Lubrication system        | Pressure lubrication by trochoid pump                     |
| Lubricant capacity        | 0.55 l (0.58 US qt, 0.48 Imp qt)                          |
| Starting system           | Recoil starter                                            |
| Stopping system           | Grounding of primary circuit                              |
| Fuel                      | Regular automotive gasoline                               |
| Fuel tank capacity        | 13 l (3.4 US gal, 2.9 Imp gal)                            |
| Fuel pump                 | Diaphragm type                                            |
| Exhaust system            | Underwater type                                           |

#### LOWER UNIT

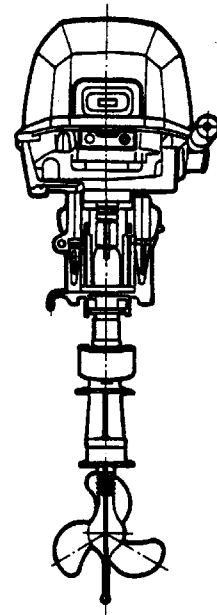
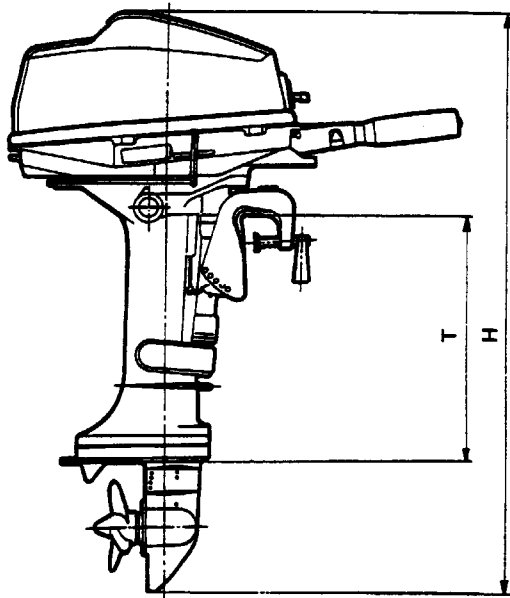
|                            |                                            |                                              |
|----------------------------|--------------------------------------------|----------------------------------------------|
| Clutch                     | Dog clutch (Forward - Neutral - Reverse)   |                                              |
| Gear ratio                 | 0.48 (13/27)                               |                                              |
| Gear case oil capacity     | 0.1 l (0.21 US pt, 0.18 Imp pt)            |                                              |
| Propeller                  | (Standard)                                 | (Optional)                                   |
| No. of blades-Dia. x Pitch | 3-200 mm x 190 mm<br>(7-7/8 in x 7-1/2 in) | 3-200 mm x 170 mm<br>(7-7/8 in x 6-11/16 in) |
| Rotating direction         | Clockwise (viewed from rear)               |                                              |

## 2. DIMENSIONAL DRAWINGS

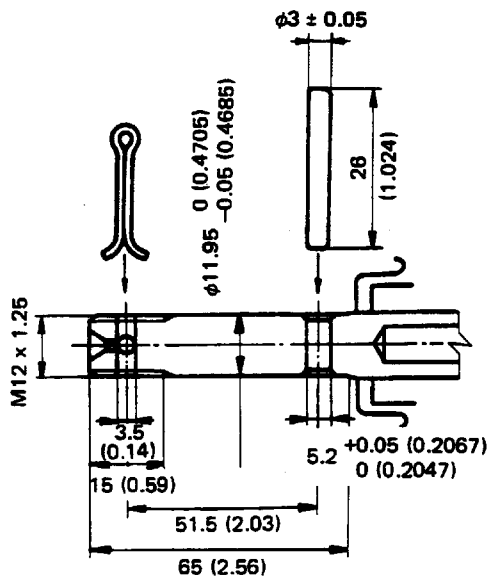
Unit mm (in)



|                 | H: HEIGHT             | T: TRANSOM HEIGHT   |
|-----------------|-----------------------|---------------------|
| BF50S,<br>BF5AS | 1,005 mm<br>(39.6 in) | 445 mm<br>(17.5 in) |
| BF50L,<br>BF5AL | 1,135 mm<br>(44.7 in) | 572 mm<br>(22.5 in) |



### • PROPELLER SHAFT



# II. SERVICE INFORMATION

**HONDA**  
**BF50·BF5A**

1. GENERAL SAFETY
2. SERVICE RULES
3. SERIAL NUMBER LOCATION
4. MAINTENANCE STANDARDS
5. TORQUE VALUES
6. SPECIAL TOOLS

7. WIRING DIAGRAM
8. TUBE ROUTING
9. TROUBLESHOOTING
10. MAINTENANCE SCHEDULE
11. RECOMMENDED SERVICE MATERIALS
12. LUBRICATION CHART

## 1. GENERAL SAFETY

Pay attention to these symbols and their meanings:

**▲ WARNING** Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.

**CAUTION:** Indicates a possibility of personal injury or equipment damage if instructions are not followed.

### ▲ WARNING

- If the motor must be running to do some work, make sure the area is well ventilated. Never run the engine in a closed area. The exhaust contains poisonous carbon monoxide gas.
- Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.

### CAUTION:

- Keep away from rotating or hot parts and spark plug wires when the engine is run with the cover off.
- Make sure the water level is above the anti-cavitation plate when testing the unit in a tank, otherwise the pump will be damaged and the engine will overheat.

## 2. SERVICE RULES

1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may damage the unit.
2. Use the special tools designed for the product.
3. Install new gaskets, O-rings, etc. when reassembling.
4. When torquing bolts or nuts, begin with larger-diameter or inner bolt first and tighten to the specified torque diagonally, unless a particular sequence is specified.
5. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before reassembly.
6. After reassembly, check all parts for proper installation and operation.
7. Follow the instructions represented by these symbols when they are used:



: Apply oil.

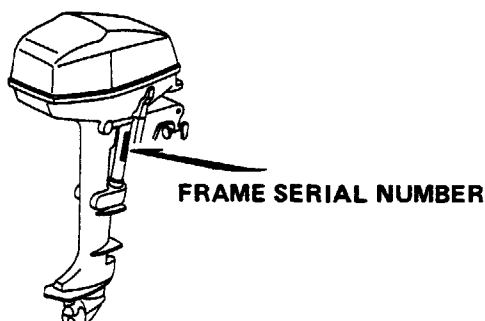


: Apply grease.



: Use special tool.

## 3. SERIAL NUMBER LOCATION



The serial number is stamped on the identification plate attached to the swivel case. Refer to the serial number when ordering parts or making technical inquiries.

## 4. MAINTENANCE STANDARDS

| Item       |                                      | Standard                                                                         | Service Limit       |
|------------|--------------------------------------|----------------------------------------------------------------------------------|---------------------|
| Engine     | Idle speed                           | 1,300±100 min <sup>-1</sup> (rpm) (in Forward)                                   | —                   |
|            | Cylinder compression                 | 4,500±100 kPa (4.5±1 kg/cm <sup>2</sup> , 64±14 psi)/600 min <sup>-1</sup> (rpm) | —                   |
| Carburetor | Main jet                             | #75                                                                              | —                   |
|            | Pilot screw opening                  | 2-3/8 turns                                                                      | —                   |
|            | Float height                         | 9.0–11.0 mm (0.35–0.43 in)                                                       | —                   |
| Thermostat | Opens                                | 50°–54°C (122°–140°F)                                                            | —                   |
|            | Valve lift                           | 3–4 mm (0.12–0.16 in)                                                            | —                   |
| Spark plug | Gap                                  | 0.7–0.8 mm (0.028–0.031 in)                                                      | —                   |
| Valve      | Valve tappet clearance               | IN 0.06–0.14 mm (0.002–0.006 in)                                                 | —                   |
|            |                                      | EX 0.11–0.19 mm (0.004–0.007 in)                                                 | —                   |
|            | Valve stem O.D.                      | IN 5.48 mm (0.216 in)                                                            | 5.45 mm (0.215 in)  |
|            |                                      | EX 5.44 mm (0.214 in)                                                            | 5.41 mm (0.213 in)  |
|            | Valve guide I.D.                     | IN 5.50 mm (0.217 in)                                                            | 5.54 mm (0.218 in)  |
|            |                                      | EX 5.50 mm (0.217 in)                                                            | 5.57 mm (0.219 in)  |
|            | Valve stem-to-guide clearance        | IN 0.020–0.044 mm (0.0008–0.0017 in)                                             | 0.07 mm (0.003 in)  |
|            |                                      | EX 0.060–0.087 mm (0.0024–0.0034 in)                                             | 0.15 mm (0.006 in)  |
|            | Valve seat width                     | 0.8 mm (0.03 in)                                                                 | 1.80 mm (0.070 in)  |
|            | Valve spring free length             | 29.60 mm (1.165 in)                                                              | 28.10 mm (1.106 in) |
| Camshaft   | Cam height                           | IN 27.710 mm (1.0909 in)                                                         | 27.45 mm (1.081 in) |
|            |                                      | EX 27.747 mm (1.0924 in)                                                         | 27.50 mm (1.083 in) |
|            | O.D. (at oil pump)                   | 13.984 mm (0.5506 in)                                                            | 13.95 mm (0.549 in) |
| Oil pump   | Body I.D.                            | 23.15 mm (0.911 in)                                                              | 23.20 mm (0.913 in) |
|            | Inner rotor-to-outer rotor clearance | 0.15 mm (0.006 in) max.                                                          | 0.20 mm (0.008 in)  |
|            | Outer rotor-to-body clearance        | 0.15–0.21 mm (0.006–0.008 in)                                                    | 0.26 mm (0.010 in)  |
|            | Outer rotor height                   | 11.98 mm (0.472 in)                                                              | 11.95 mm (0.470 in) |
|            | Pump body depth                      | 12.00 mm (0.472 in)                                                              | 12.06 mm (0.475 in) |
|            | Rotor-to-body side clearance         | 0.02–0.09 mm (0.0008–0.0035 in)                                                  | 0.11 mm (0.004 in)  |
|            |                                      |                                                                                  |                     |
| Piston     | O.D. (at skirt)                      | 59.985 mm (2.3616 in)                                                            | 59.92 mm (2.359 in) |
|            | Piston pin hole I.D.                 | 18.002 mm (0.7087 in)                                                            | 18.02 mm (0.709 in) |
|            | Piston pin O.D.                      | 18.000 mm (0.7087 in)                                                            | 17.97 mm (0.707 in) |
|            | Piston pin-to-piston clearance       | 0.002–0.014 mm (0.0001–0.0006 in)                                                | 0.04 mm (0.002 in)  |
|            | Piston ring side clearance           |                                                                                  |                     |
| Cylinder   | Top/Second/Oil                       | 0.015–0.045 mm (0.0006–0.0018 in)                                                | 0.10 mm (0.004 in)  |
|            | Ring end gap                         | 0.15–0.35 mm (0.006–0.014 in)                                                    | 0.50 mm (0.020 in)  |
|            | Sleeve I.D.                          | 60.000 mm (2.3622 in)                                                            | 60.07 mm (2.365 in) |
|            | Piston-to-cylinder clearance         | 0.015–0.050 mm (0.0006–0.0020 in)                                                | 0.10 mm (0.004 in)  |

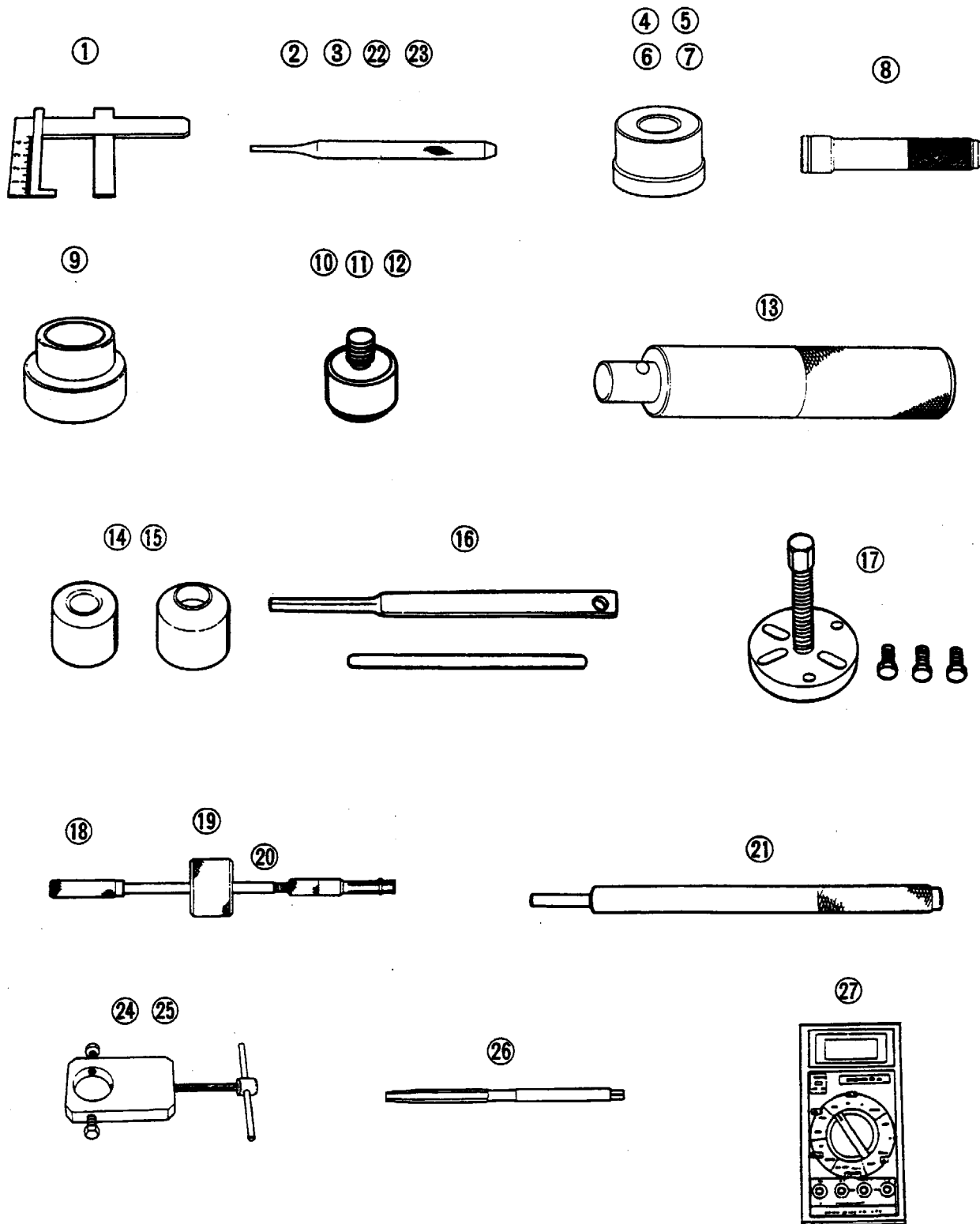
| Item                         |                                 | Standard                          | Service Limit       |
|------------------------------|---------------------------------|-----------------------------------|---------------------|
| Connecting rod               | Small end I.D.                  | 18.005 mm (0.7089 in)             | 18.04 mm (0.710 in) |
|                              | Big end radial clearance        | 0.04–0.063 mm (0.0016–0.0025 in)  | 0.08 mm (0.003 in)  |
|                              | Big end axial clearance         | 0.1–0.7 mm (0.004–0.028 in)       | 1.00 mm (0.039 in)  |
| Crankshaft                   | Crankpin O.D.                   | 29.98 mm (1.180 in)               | 29.95 mm (1.179 in) |
|                              | Journal O.D. (at oil pan)       | 24.993 mm (0.9840 in)             | 24.97 mm (0.983 in) |
| Oil pan                      | I.D.                            | 25.013 mm (0.9848 in)             | 25.04 mm (0.986 in) |
|                              | Oil pan-to-crankshaft clearance | 0.020–0.046 mm (0.0008–0.0018 in) | 0.07 mm (0.003 in)  |
| Propeller shaft              | O.D. (at bevel gear) Forward    | 11.984 mm (0.4718 in)             | 11.95 mm (0.470 in) |
|                              | Reverse                         | 12.984 mm (0.5112 in)             | 12.95 mm (0.510 in) |
|                              | Bevel gear I.D. Forward         | 12.00 mm (0.472 in)               | 12.04 mm (0.474 in) |
|                              | Reverse                         | 13.00 mm (0.512 in)               | 13.04 mm (0.513 in) |
| Pinion shaft                 | O.D. (at gear case)             | 12.984 mm (0.5112 in)             | 12.95 mm (0.510 in) |
| Gear case                    | Bushing I.D.                    | 13.00 mm (0.512 in)               | 13.04 mm (0.513 in) |
|                              | Case-to-pinion shaft clearance  | 0.016–0.045 mm (0.0006–0.0018 in) | 0.09 mm (0.004 in)  |
| Transistorized ignition coil | Resistance Primary              | 0.7 – 0.9 $\Omega$                | —                   |
|                              | Secondary                       | 6.3 – 7.7 k $\Omega$              | —                   |
|                              | Air gap                         | 0.4±0.2 mm (0.02±0.01 in)         | —                   |

## 5. TORQUE VALUES

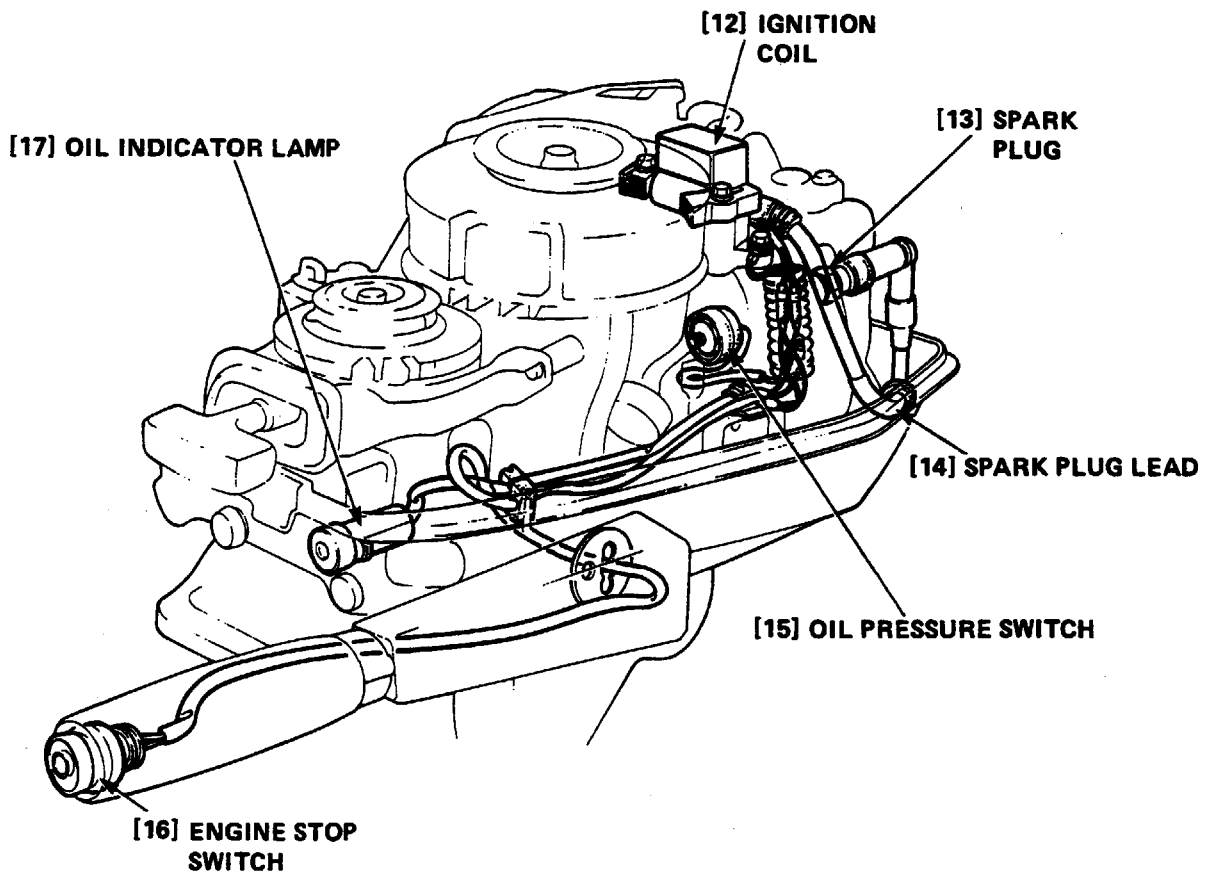
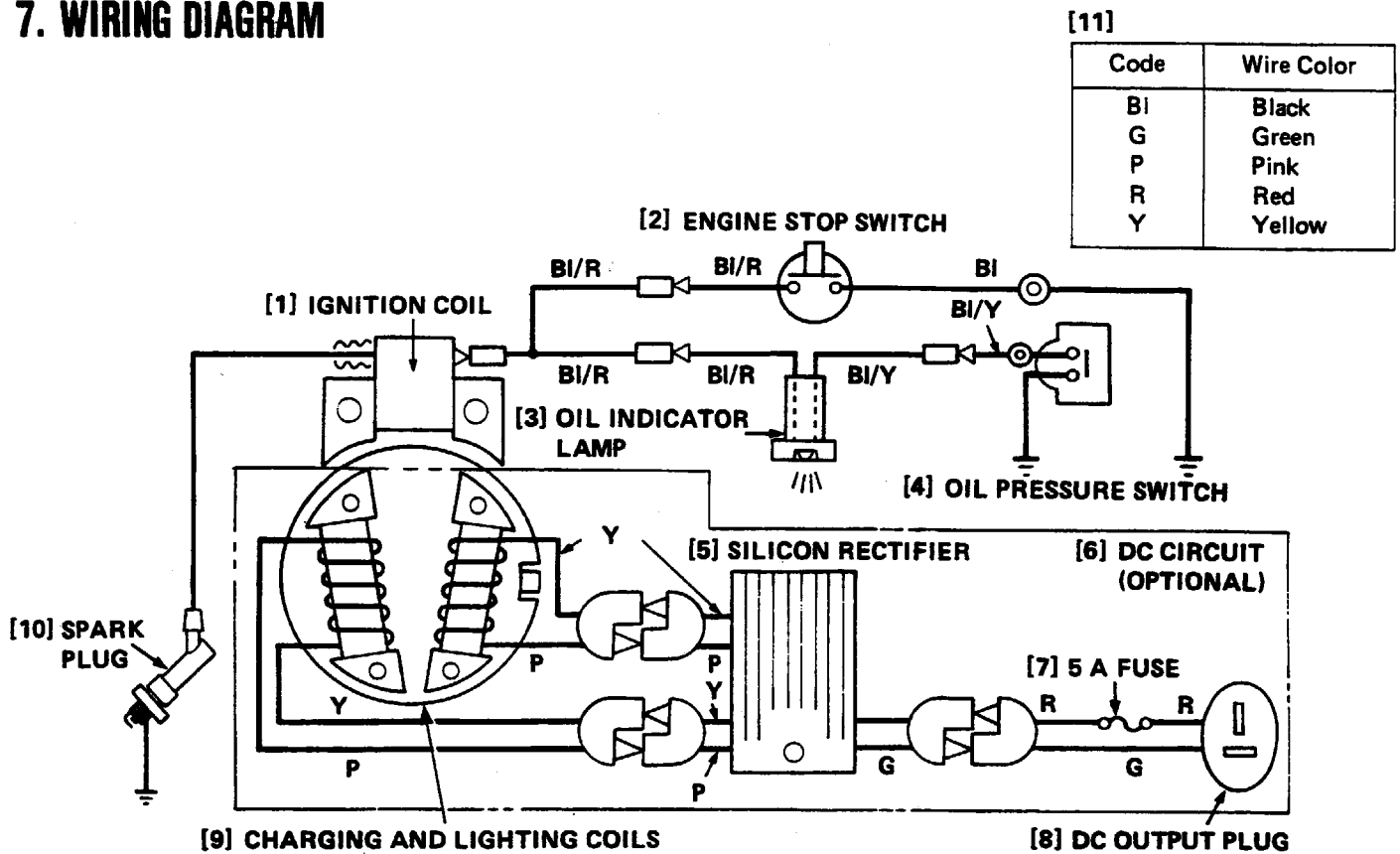
| Part                     | Fasteners               | Torque                                     |
|--------------------------|-------------------------|--------------------------------------------|
| Connecting rod           | M7 x 1.0 x 35 bolt      | 11–13 N·m (110–130 kg-cm, 8.0–9.3 ft-lb)   |
| Oil drain plug           | M10 x 1.25 x 24 bolt    | 15–20 N·m (150–200 kg-cm, 10.8–14.5 ft-lb) |
| Oil pan                  | M8 x 1.25 x 32 bolt     | 22–28 N·m (220–280 kg-cm, 15.9–20.2 ft-lb) |
| Cylinder head            | M8 x 1.25 x 60 bolt     | 22–28 N·m (220–280 kg-cm, 15.9–20.2 ft-lb) |
|                          | M8 x 1.25 x 90 bolt     | 22–28 N·m (220–280 kg-cm, 15.9–20.2 ft-lb) |
| Pivot bolt               | M8 x 1.25 bolt          | 28–30 N·m (280–300 kg-cm, 20.2–21.7 ft-lb) |
| Pivot adjust nut         | M6 x 0.5 nut            | 8–12 N·m (80–120 kg-cm, 5.8–8.7 ft-lb)     |
| Oil pressure switch      | PT1/8                   | 7–10 N·m (70–100 kg-cm, 5.1–7.2 ft-lb)     |
| Oil pressure switch wire | 4 mm pan screw          | 1–2 N·m (10–20 kg-cm, 0.7–1.4 ft-lb)       |
| Flywheel                 | M14 x 1.5 nut           | 70–80 N·m (700–800 kg-cm, 50.6–57.8 ft-lb) |
| Spark plug               | M10 x 1.25              | 15–25 N·m (150–250 kg-cm, 10.8–18.1 ft-lb) |
| Fuel meter               | M5 x 0.8 x 10 pan screw | 3–4 N·m (30–40 kg-cm, 2.2–2.9 ft-lb)       |
| Oil check bolt           | M8 x 1.25 bolt          | 5–8 N·m (50–80 kg-cm, 3.6–5.8 ft-lb)       |
| Stearn bracket           | M8 x 1.25 x 130 bolt    | 15–20 N·m (150–200 kg-cm, 10.8–14.5 ft-lb) |
| Choke knob guide         | M16 x 1.0 nut           | 2–4 N·m (20–40 kg-cm, 1.4–2.9 ft-lb)       |
| Throttle rod set bolt    | M5 x 0.8 x 8            | 1.7–2.5 N·m (17–25 kg-cm, 1.2–1.8 ft-lb)   |
| Engine mounting bolt     | M6 x 1.0 x 32 bolt      | 10–12 N·m (100–120 kg-cm, 7.2–8.7 ft-lb)   |
|                          | M6 x 1.0 x 40 bolt      | 10–12 N·m (100–120 kg-cm, 7.2–8.7 ft-lb)   |
| Standard torque values   | 5 mm bolt, nut          | 4–7 N·m (40–70 kg-cm, 2.9–5.1 ft-lb)       |
|                          | 6 mm bolt, nut          | 8–12 N·m (80–120 kg-cm, 5.8–8.7 ft-lb)     |
|                          | 8 mm bolt, nut          | 20–28 N·m (200–280 kg-cm, 14.5–20.2 ft-lb) |
|                          | 10 mm bolt, nut         | 35–40 N·m (350–400 kg-cm, 25.3–28.9 ft-lb) |

**6. SPECIAL TOOLS**

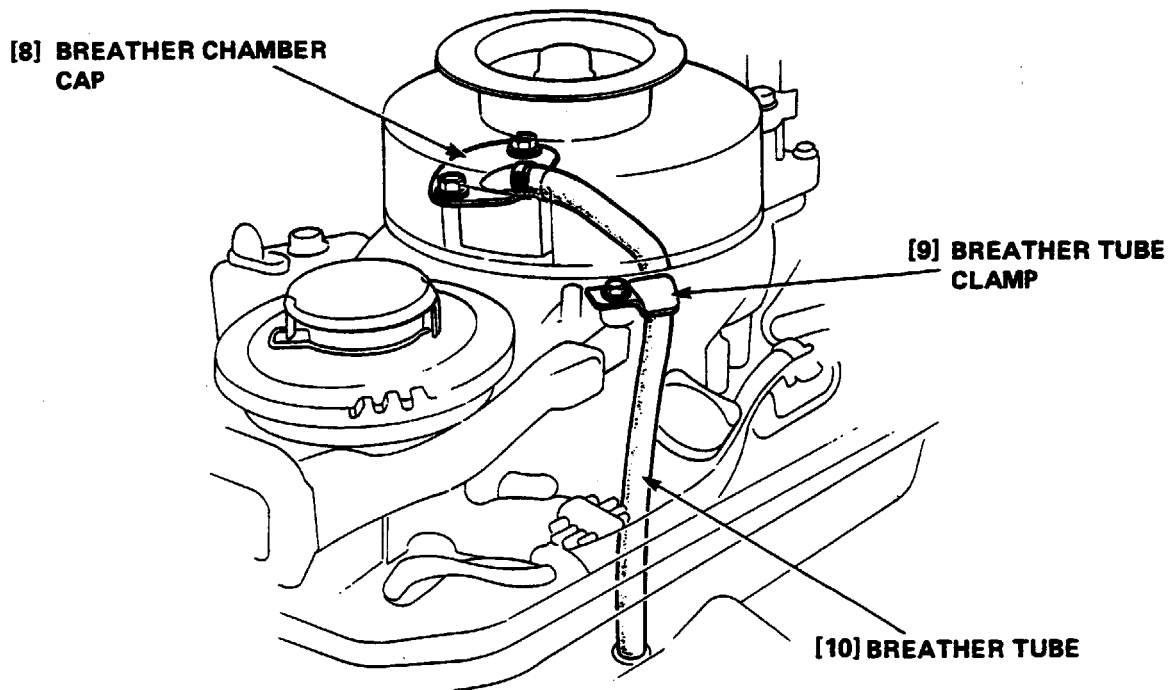
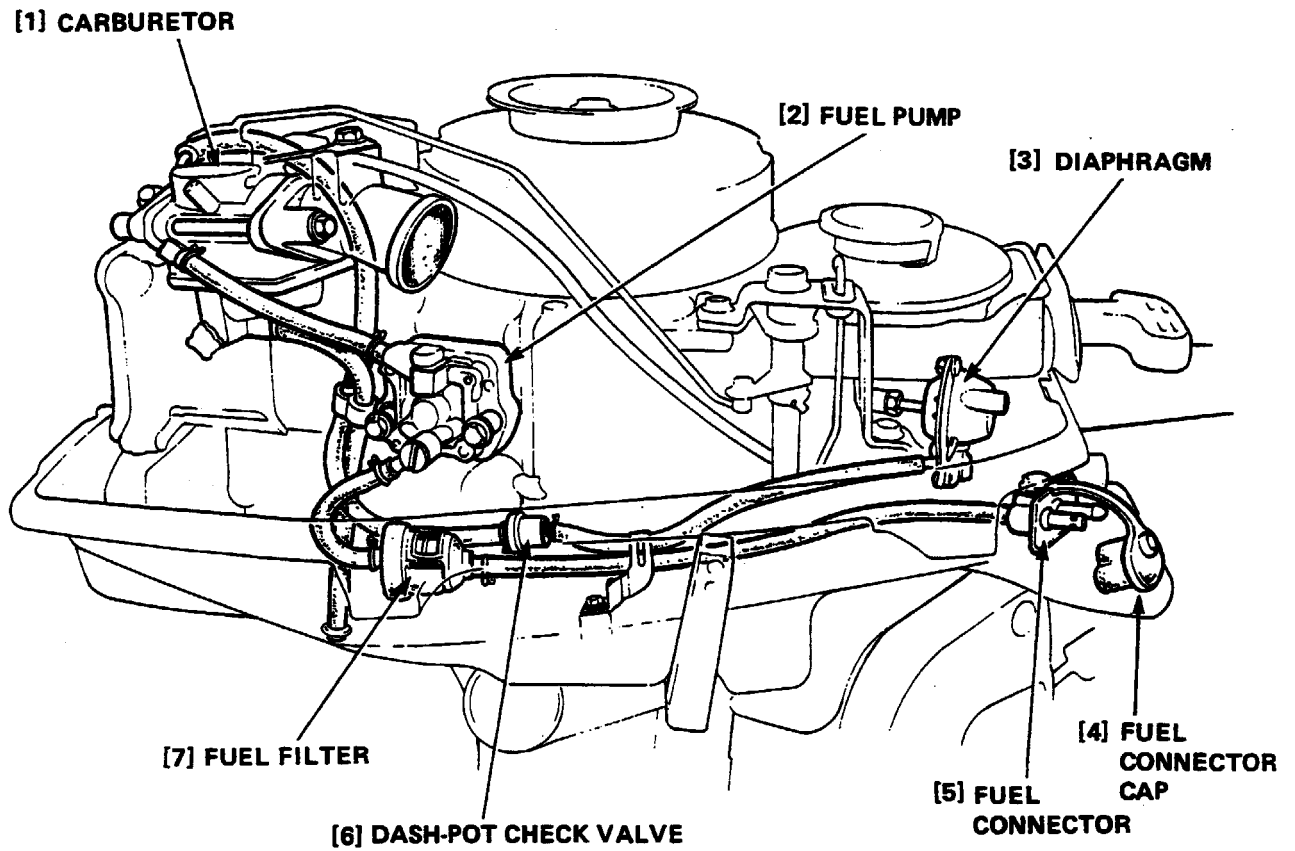
| No. | Tool name                | Tool number   | Application                                         |
|-----|--------------------------|---------------|-----------------------------------------------------|
| 1   | Float level gauge        | 07401-0010000 | Carburetor float level inspection                   |
| 2   | Pin driver, 2.5 mm       | 07744-0010100 | 2.5 mm spring pin removal/installation              |
| 3   | Pin driver, 3 mm         | 07744-0010200 | 3.0 mm spring pin removal/installation              |
| 4   | Attachment, 32 x 35 mm   | 07746-0010100 | Swivel case oil seal, 13 mm water seal installation |
| 5   | Attachment, 37 x 40 mm   | 07746-0010200 | Crankshaft oil seal, coupling seal installation     |
| 6   | Attachment, 42 x 47 mm   | 07746-0010300 | 6004 bearing (gear case) installation               |
| 7   | Attachment, 52 x 55 mm   | 07746-0010400 | 6205 bearing (gear case) installation               |
| 8   | Driver, 40 mm            | 07746-0030100 | Use with 07746-0030200 (9)                          |
| 9   | Attachment, 25 mm        | 07746-0030200 | Timing gear installation                            |
| 10  | Pilot, 20 mm             | 07746-0040500 | 6004 bearing (gear case) installation               |
| 11  | Pilot, 25 mm             | 07746-0040600 | 6205 bearing (crankcase) installation               |
| 12  | Pilot, 28 mm             | 07746-0041100 | Swivel case oil seal installation                   |
| 13  | Driver                   | 07749-0010000 | Handle for tools (4) thru (7) and (10) thru (12)    |
| 14  | Valve seat cutter, 45°   | 07780-0010200 | } Valve seat reconditioning                         |
| 15  | Valve seat cutter, 32°   | 07780-0012100 |                                                     |
| 16  | Cutter holder            | 07781-0010100 |                                                     |
| 17  | Flywheel puller          | 07935-8050002 | Flywheel removal                                    |
|     |                          | or            |                                                     |
|     |                          | 07935-8050003 |                                                     |
| 18  | Bearing remover handle   | 07936-3710100 | Use with 07936-3710600 (20)                         |
| 19  | Bearing remover weight   | 07936-3710200 | Use with 07936-3710600 (20)                         |
| 20  | Bearing remover, 20 mm   | 07936-3710600 | 6004 bearing (gear case) removal                    |
| 21  | Valve guide driver       | 07942-3290100 | Valve guide removal/installation                    |
| 22  | Pin driver, 2 mm         | 07944-9350100 | 2 mm spring pin removal/installation                |
| 23  | Pin driver, 4 mm         | 07944-9350200 | 4 mm spring pin removal/installation                |
| 24  | Pin flare tool, 3.0 mm   | 07968-ZV10000 | Propeller shaft dis./assembly                       |
| 25  | Pin remover shaft 3.0 mm | 07968-ZV10100 | Use with 07968-ZV10000 (24)                         |
| 26  | Valve guide reamer       | 07984-2000000 | Valve guide reaming                                 |
| 27  | Digital multimeter       | KS-AHM-32-003 | Electrical testing                                  |



## 7. WIRING DIAGRAM



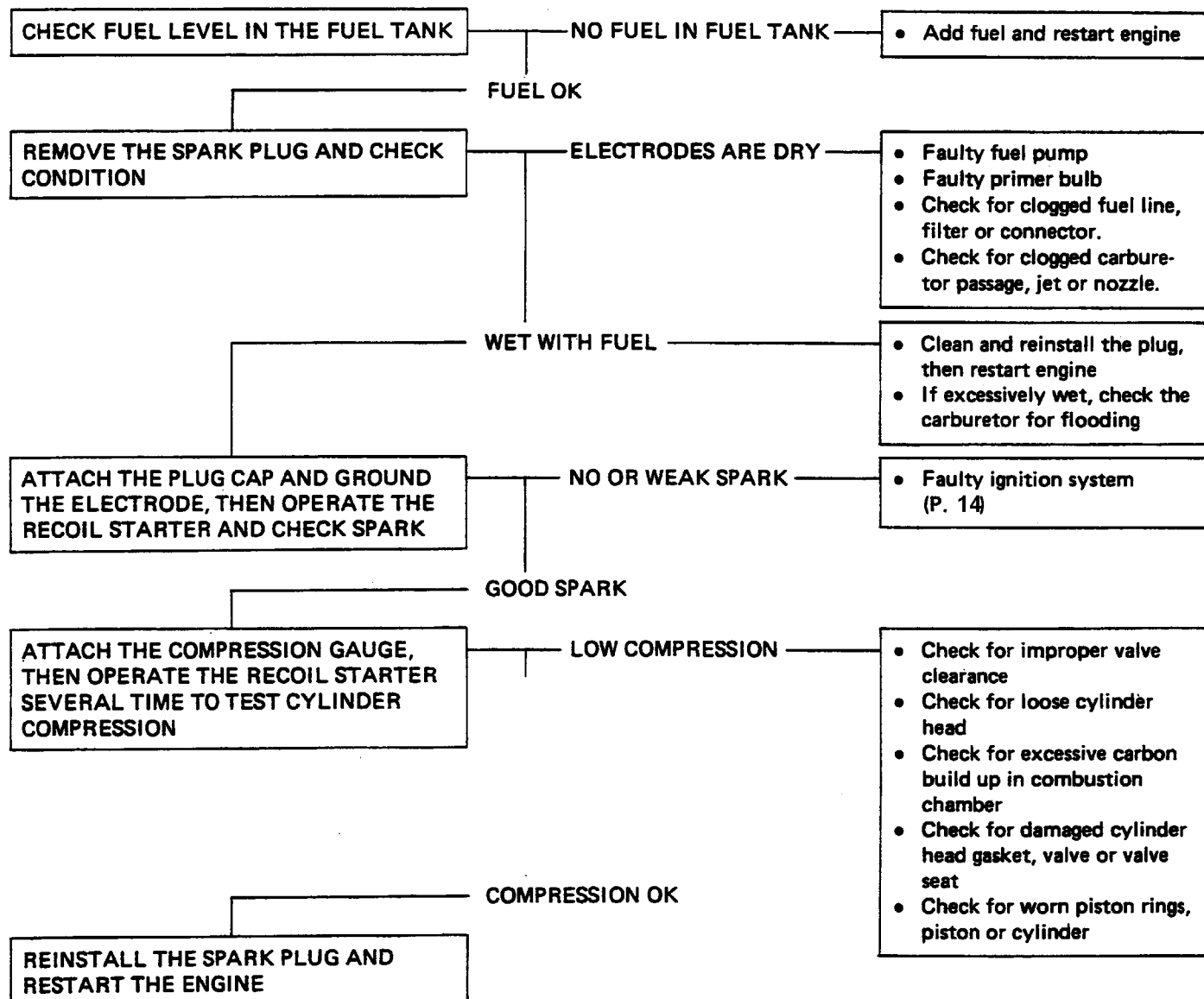
## 8. TUBE ROUTING



## 9. TROUBLESHOOTING

### • ENGINE

#### a. HARD STARTING

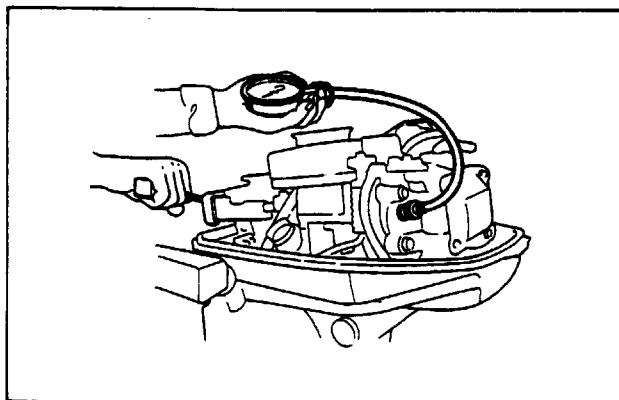


### CYLINDER COMPRESSION

- 1) Remove the spark plug, ground the spark lead, and install a compression gauge in the spark plug hole.
- 2) Use the throttle friction knob to hold the throttle in the fully open position and pull out the choke knob to hold it in the fully open position.
- 3) Operate the recoil starter until the highest reading is reached.

|                      |                                                                                        |
|----------------------|----------------------------------------------------------------------------------------|
| Cylinder compression | 4,500 ± 100 kPa (4.5 ± 1 kg/cm <sup>2</sup> , 64 ± 14 psi)/600 min <sup>-1</sup> (rpm) |
|----------------------|----------------------------------------------------------------------------------------|

- 4) Remove the compression gauge and reinstall the plug.



### b. POOR PERFORMANCE

ENGINE STARTS BUT SOON STOPS

- Wet fouled spark plug caused by improper choke operation
- Faulty spark plug
- Flooded carburetor
- Improperly adjusted pilot screw
- Air leaking past carburetor insulator caused by damaged gasket

ENGINE SPEED WILL NOT INCREASE

- Fouled or faulty spark plug
- Choke stuck closed
- Improper valve timing
- Water in carburetor
- Overheating
- Improper valve seat contact

ENGINE SPEED WILL NOT DROP

- Binding of throttle cable
- Faulty carburetor throttle valve
- Improperly adjusted throttle opener

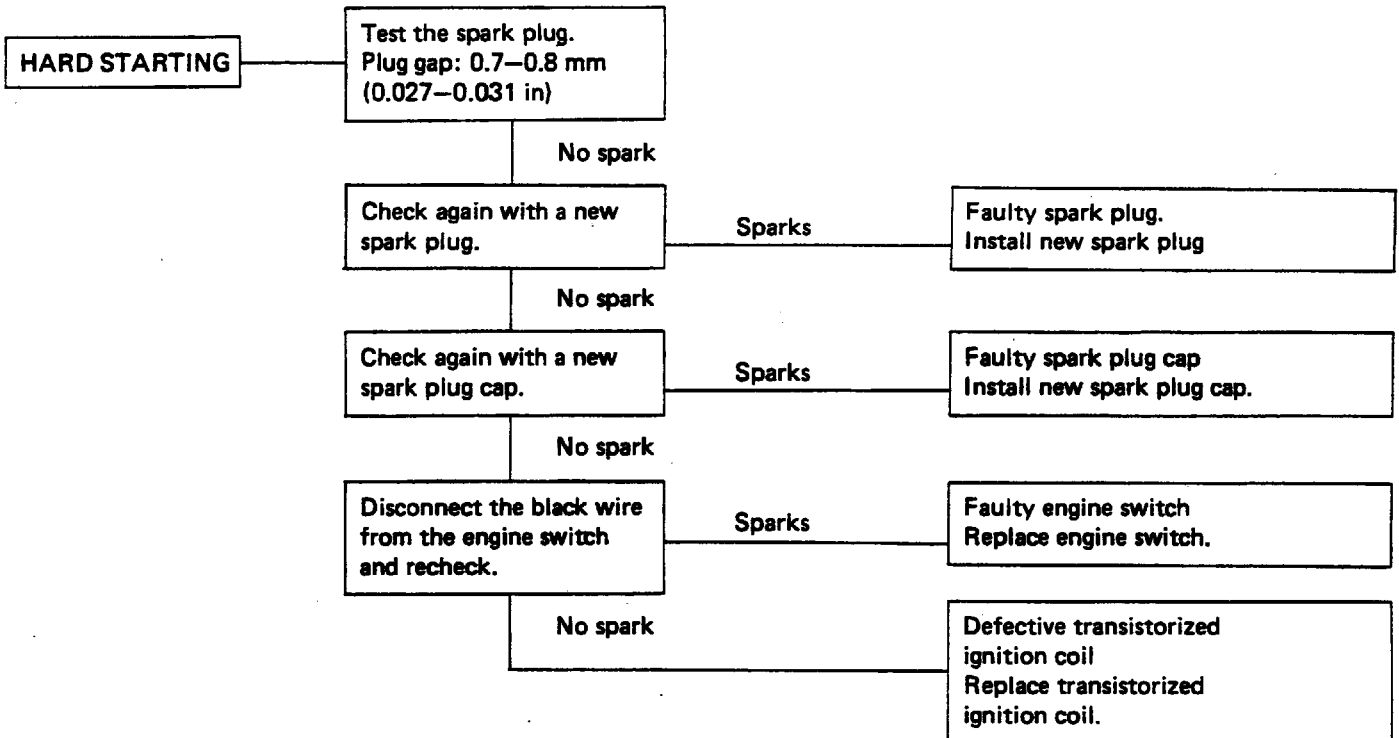
HUNTING

- Clogged carburetor slow jet
- Improperly adjusted pilot screw
- Lean fuel-air mixture
- Air leaking past carburetor insulator caused by damaged gasket
- No fuel in tank
- Poorly installed throttle opener tube

OVERHEATING

- Insufficient lubricating oil
- Faulty oil pump
- Clogged or damaged water tube
- Faulty water pump
- Faulty thermostat
- Clogged water intake hole

### • IGNITION SYSTEM

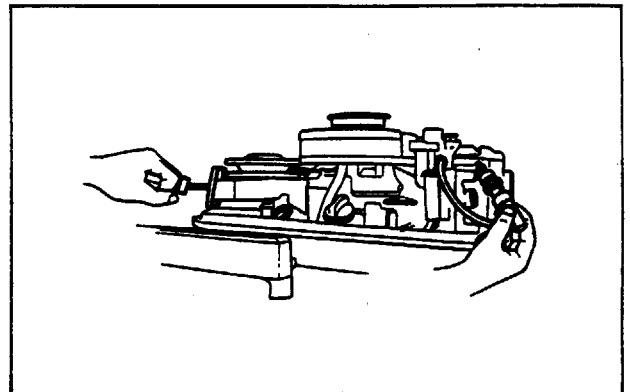


### SPARK TEST

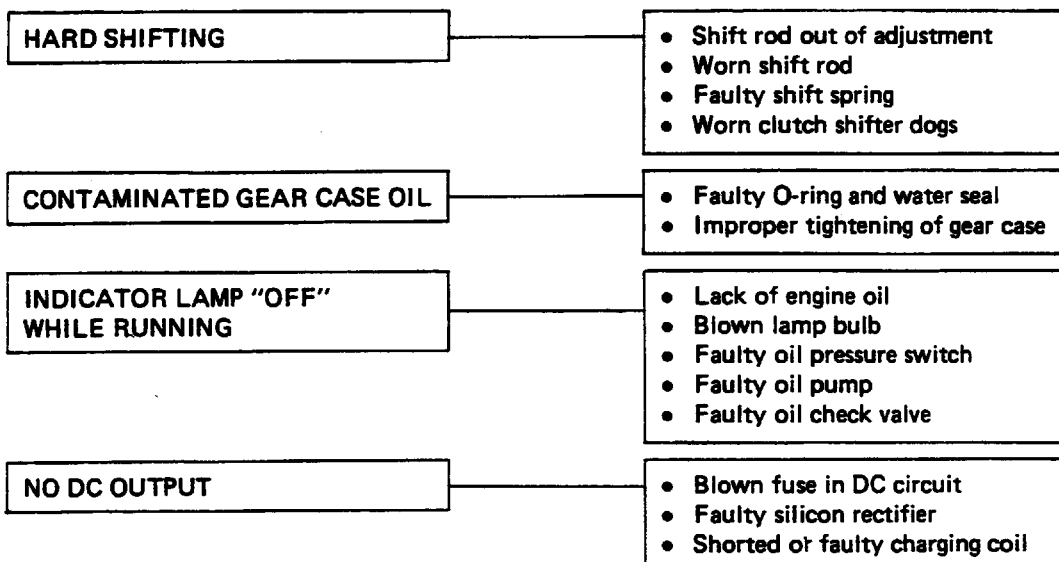
#### ⚠ WARNING

- When checking spark, keep your hands away from high tension electrical parts.
- Make sure that no fuel has been spilled on the engine and that the plug is not wet with fuel.

- 1) Remove the spark plug, attach the plug cap and ground the circuit by touching the negative (side) electrode to an 8 mm head bolt as shown.
- 2) Pull the recoil starter and check to see if sparks jump across the electrodes.



### • MISCELLANEOUS



**10. MAINTENANCE SCHEDULE**

| REGULAR SERVICE PERIOD Performed at every indicated month or operating hour interval, whichever comes first. (2) |                               | EACH USE      | FIRST MONTH OR 20 HRS | EVERY 6 MONTHS OR 100 HRS | EVERY YEAR OR 200 HRS |
|------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------|-----------------------|---------------------------|-----------------------|
| ITEM                                                                                                             |                               |               |                       |                           |                       |
| Engine oil                                                                                                       | Check level                   | ○             |                       |                           |                       |
|                                                                                                                  | Change                        |               | ○                     | ○                         |                       |
| Gear case oil                                                                                                    | Check level                   | ○             |                       |                           |                       |
|                                                                                                                  | Change                        |               | ○                     |                           | ○                     |
|                                                                                                                  | Check for water contamination |               |                       | ○                         |                       |
| Carburetor linkage                                                                                               | Check                         |               | ○                     |                           |                       |
| Valve clearance                                                                                                  | Check-Readjust                |               | ○                     |                           | ○                     |
| Spark plug                                                                                                       | Clean-Readjust                |               |                       | ○                         |                       |
| Shear pin                                                                                                        | Check                         |               |                       | ○                         |                       |
| Lubrication                                                                                                      | Grease                        |               |                       | ○ (1)                     |                       |
| Fuel tank and filter                                                                                             | Clean                         |               |                       |                           | ○                     |
| Fuel filter                                                                                                      | Replace                       |               |                       |                           | ○                     |
| Thermostat                                                                                                       | Check                         |               |                       |                           | ○                     |
| Fuel line                                                                                                        | Check (Replace if necessary)  | Every 3 years |                       |                           |                       |

NOTE: (1) Lubricate more frequently when used in salt water.

(2) For professional commercial use, log hours of operation to determine proper maintenance intervals.

**11. RECOMMENDED SERVICE MATERIALS**

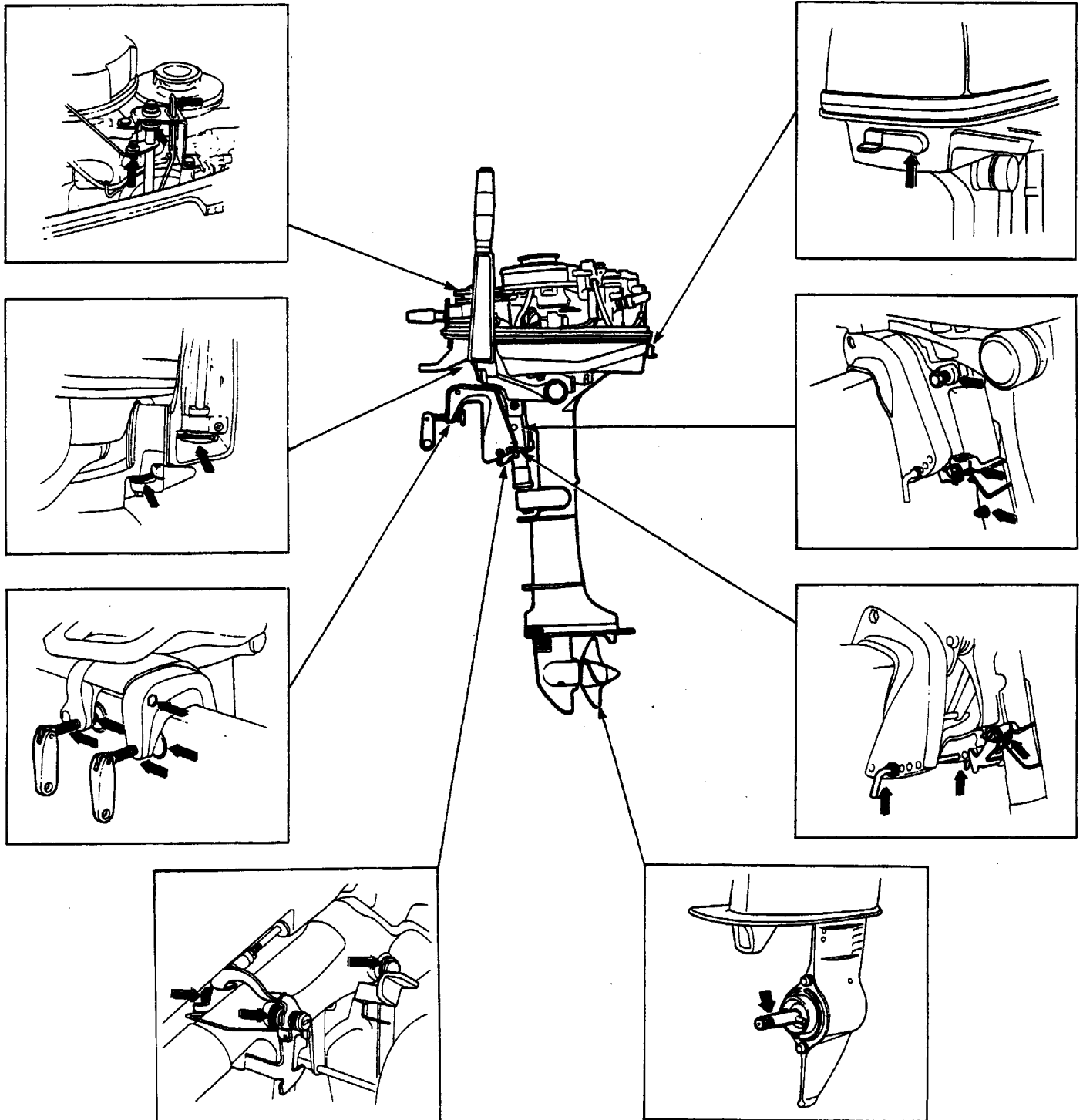
| Types of Lubricants or Materials | Items to be Serviced | Brand                        | Remarks                                       |
|----------------------------------|----------------------|------------------------------|-----------------------------------------------|
| OIL                              | ENGINE OIL PAN       | SAE 10W-40 SE or SF<br>Rated | Capacity: 0.55 l<br>(0.58 US qt, 0.48 Imp qt) |
|                                  | GEAR CASE            | SAE 90 MARINE                | Capacity: 0.1 l<br>(0.21 US pt, 0.18 Imp pt)  |
| LIQUID<br>SEALANT                | CRANKCASE            | THREE-BOND · 5TW             | } or equivalent                               |
|                                  | EXTENSION CASE       | CEMEDINE 521                 |                                               |
|                                  | OIL FILLER BODY      | CEMEDINE 521                 |                                               |
|                                  | OIL FILTER           | THREE-BOND · No. 50          |                                               |
|                                  | OIL PRESSURE SWITCH  | CEMEDINE 521                 |                                               |
|                                  | HANDLEBAR GRIP       |                              | } With anti-rust agent                        |
|                                  | RUBBER<br>BOLTS      | LOCTITE                      |                                               |

## 12. LUBRICATION CHART

Apply marine anticorrosion grease to the following parts.

**NOTE:**

Apply anticorrosion oil to pivot surface where grease cannot penetrate.



# III. MAINTENANCE

**HONDA**  
**BF50·BF5A**

1. ENGINE OIL
2. GEAR OIL
3. SPARK PLUG
4. VALVE CLEARANCE
5. FUEL LINE FILTER
6. FUEL TANK FILTER

7. CARBURETOR
8. THROTTLE CABLE
9. THROTTLE OPENER SYSTEM
10. SHIFT ROD
11. REVERSE LOCK

## 1. ENGINE OIL

### NOTE:

Draining can be performed rapidly and completely while the engine is still warm.

- 1) Remove the oil filler cap/dipstick and drain plug. Allow the oil to drain completely.
- 2) Reinstall the drain plug and tighten it securely.
- 3) Fill the crankcase with the recommended engine oil to the upper level mark on the dipstick. Check the oil level with the dipstick resting on the filter opening (do not screw in).

### NOTE:

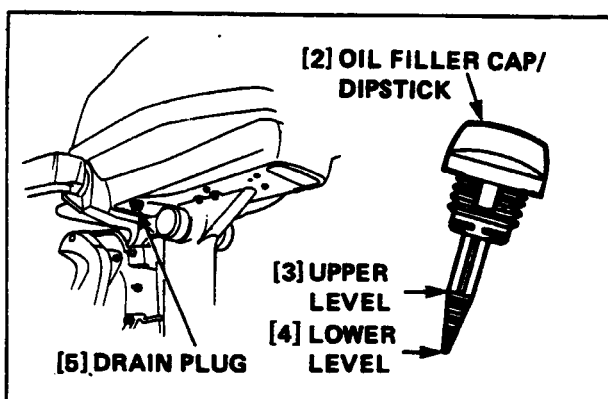
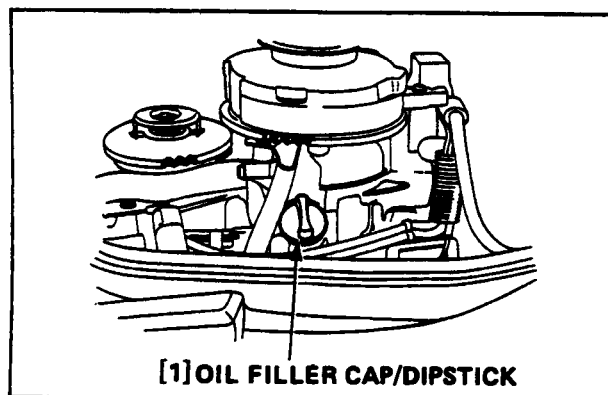
- Check the oil level with the dipstick fully inserted but not screwed in.
- Be sure the engine is upright, not tilted. When checking the engine oil level.

### RECOMMENDED ENGINE OIL:

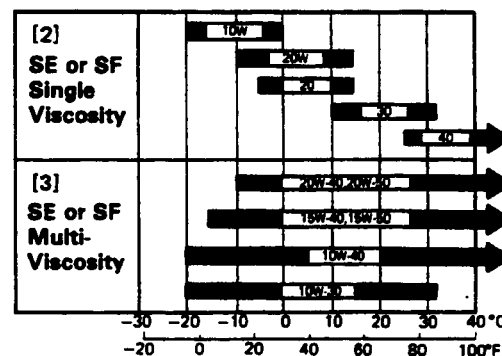
SAE10W-30 is recommended for general, all-temperature use; service classification SE or SF.

**OIL CAPACITY: 0.55ℓ (0.58 US qt, 0.48 Imp qt)**

- 4) Reinstall the oil filler cap/dipstick.



- [1] Select the appropriate viscosity for the average temperature in your area.

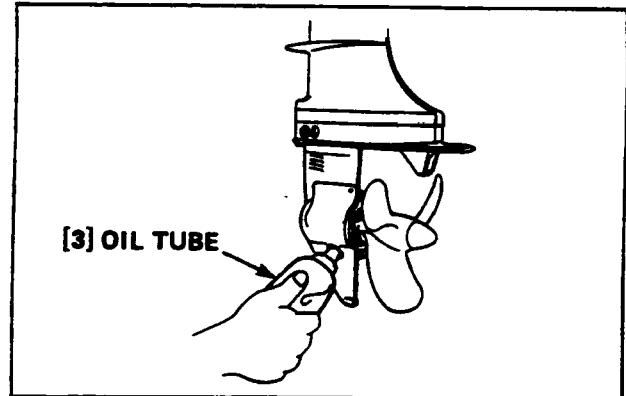
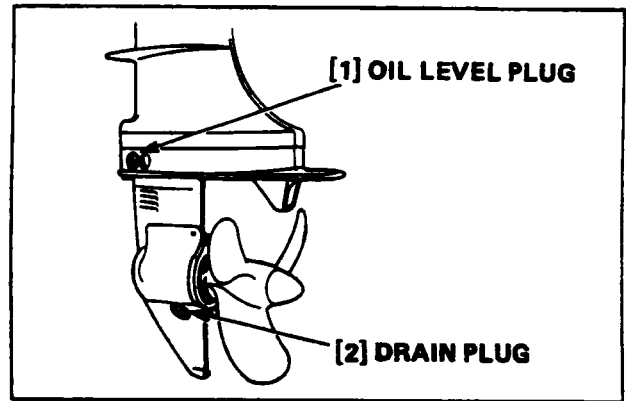


## 2. GEAR OIL

- 1) Remove the oil level plug and drain plug to drain oil thoroughly.
- 2) Squeeze fresh oil through the drain plug hole until oil begins flowing out of the level plug hole. Use the oil tube available as an optional part.

|                    |                                 |
|--------------------|---------------------------------|
| GEAR OIL CAPACITY: | 0.1 L (0.21 US pt, 0.18 Imp pt) |
|--------------------|---------------------------------|

|                       |               |
|-----------------------|---------------|
| RECOMMENDED GEAR OIL: | SAE 90 MARINE |
|-----------------------|---------------|



## 3. SPARK PLUG

### CAUTION:

- Use only the recommended spark plugs or their equivalent.
- Spark plugs that have an improper heat range may cause engine damage.

|                     |                            |
|---------------------|----------------------------|
| Standard Spark Plug | BPR5ES(NGK), W14EPR-U (ND) |
|---------------------|----------------------------|

- 1) Disconnect the cap and remove the spark plug.
- 2) Visually inspect the plug. Discard the plug if it is heavily fouled or if the insulator is cracked or chipped.
- 3) Remove carbon or other deposits with a stiff wire brush.
- 4) Measure the plug gap with a wire-type feeler gauge.

|                |                             |
|----------------|-----------------------------|
| Spark plug gap | 0.7–0.8 mm (0.028–0.031 in) |
|----------------|-----------------------------|

If necessary, adjust the gap by bending the side electrode.

- 5) Make sure the sealing washer is in good condition, then thread the spark plug in by hand until it seats.
- 6) After the spark plug is seated, tighten with a spark plug wrench to compress the washer.

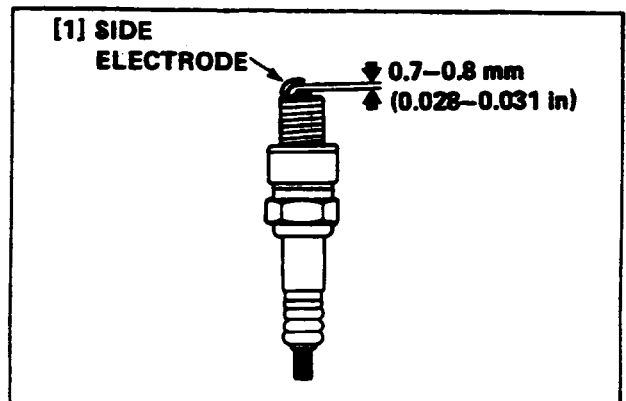
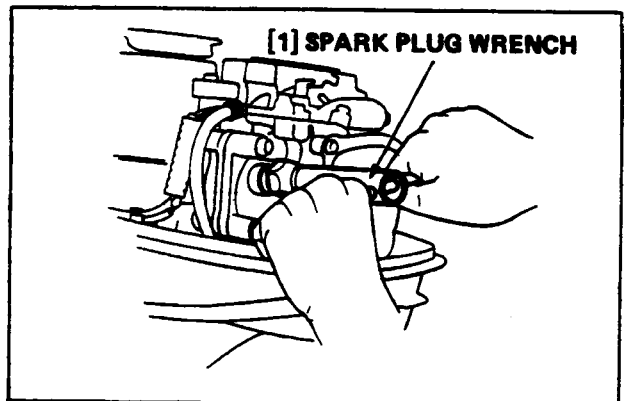
### NOTE:

If installing a new spark plug, tighten 1/2 turn after the spark plug seats to compress the washer. If reinstalling a used spark plug, tighten 1/8 to 1/4 turn after the spark plug seats to compress the washer.

### CAUTION:

- The spark plug must be securely tightened. An improperly tightened plug can become very hot and possibly damage the engine.
- Never use a spark plug with an improper heat range.

- 7) Install the spark plug cap.



## 4. VALVE CLEARANCE

### NOTE:

Check and adjust the valve clearance when the engine is cold.

- 1) Remove the cylinder head cover and align the "T" mark on the flywheel with the "▲T" mark on the ignition coil. Make sure that the piston is at TDC of the compression stroke.
- 2) Measure the clearance between the valve and the rocker arm by inserting a thickness gauge.

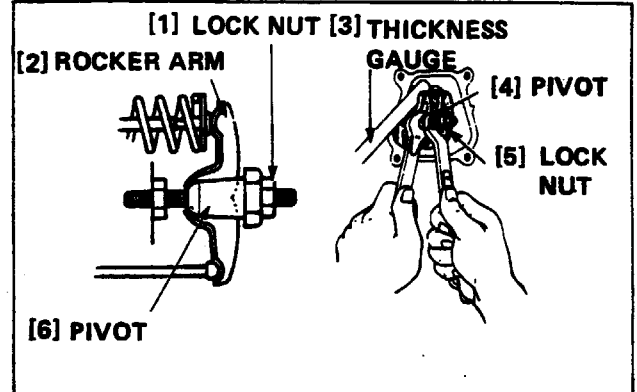
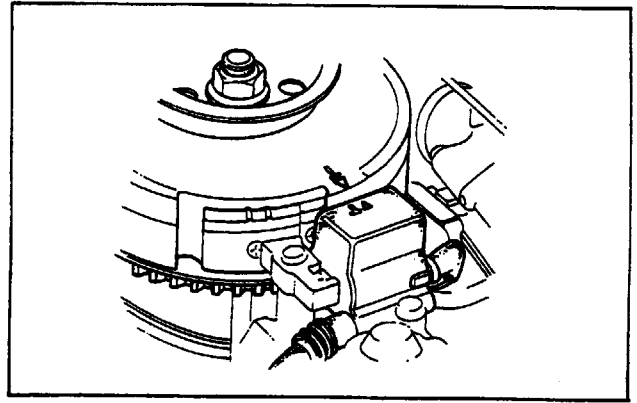
|                 |    |                               |
|-----------------|----|-------------------------------|
| Valve clearance | IN | 0.06–0.14 mm (0.002–0.006 in) |
|                 | EX | 0.11–0.19 mm (0.004–0.007 in) |

- 3) If the valve clearance is not within the specified range, adjust by loosening the lock nut while holding the pivot. Now turn the pivot.

TURNING IN: DECREASE CLEARANCE

TURNING OUT: INCREASE CLEARANCE

- 4) Hold the pivot and tighten the lock nut.
- 5) Recheck the valve clearance.



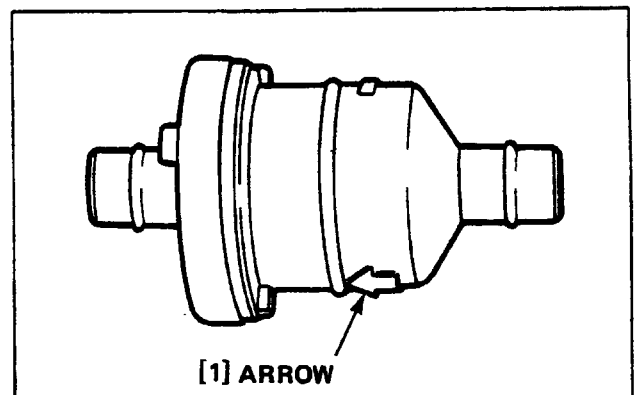
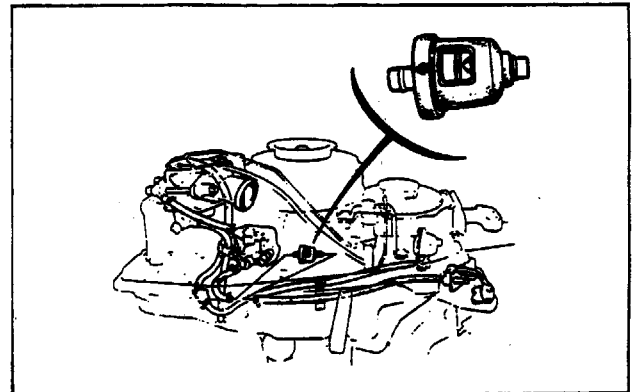
## 5. FUEL LINE FILTER

Water or sediment accumulated in the fuel filter can cause loss of power or hard starting. To prevent engine malfunction, replace the fuel filter regularly.

### WARNING

- Gasoline is flammable and explosive under certain conditions. Do not smoke or allow flames or sparks near the equipment while draining fuel.
- Always work in a well-ventilated area.
- Be sure that any drained fuel is stored in safe container.
- Wipe up any spilled gasoline immediately.

- 1) Turn the fuel tank vent knob to the OFF position and remove the engine cover.
- 2) Install tube clamps on the fuel tubes on each side of the filter to prevent fuel leakage. Remove the fuel filter.
- 3) Install a new fuel filter with the arrow on the filter pointing toward the carburetor.
- 4) Remove the tube clamps, turn the fuel tank vent knob to the ON position, pump the primer bulb and check for fuel leaks.



## 6. FUEL TANK FILTER

### ▲ WARNING

- Gasoline is flammable and explosive under certain conditions. Do not smoke or allow flames or sparks near the equipment while draining fuel.
- Always work in a well-ventilated area.
- Wipe up any spilled gasoline immediately.

- 1) Remove the fuel line connector by removing the two bolts.
- 2) Remove the fuel filter from the end of the fuel pick-up pipe and clean it.
- 3) Install the fuel filter screen and fuel line connector and tighten the bolts securely.

## 7. CARBURETOR

### a. Idle speed

#### • WITH TEST PROPELLER

- 1) Install a test propeller on the propeller shaft and mount the outboard motor in a water tank with the water level at least 4 inches about the anti-cavitation plate.
- 2) Start the engine and let it idle until it reaches normal operating temperature.
- 3) Move the shift lever to the "FORWARD" position and turn the throttle stop screw in or out as necessary until the specified idle speed is obtained.

|            |                                               |
|------------|-----------------------------------------------|
| Idle speed | $1,300 \pm 100 \text{ min}^{-1} (\text{rpm})$ |
|------------|-----------------------------------------------|

#### • WITH STANDARD PROPELLER

With the outboard motor installed on a boat in the water, run the engine with the standard propeller, and adjust idle speed as described above.

#### • WITH NO LOAD (SHIFT LEVER IN NEUTRAL)

- 1) Remove the propeller, and mount the outboard motor in a water tank with the water level at least 4 inches above the anti-cavitation plate.

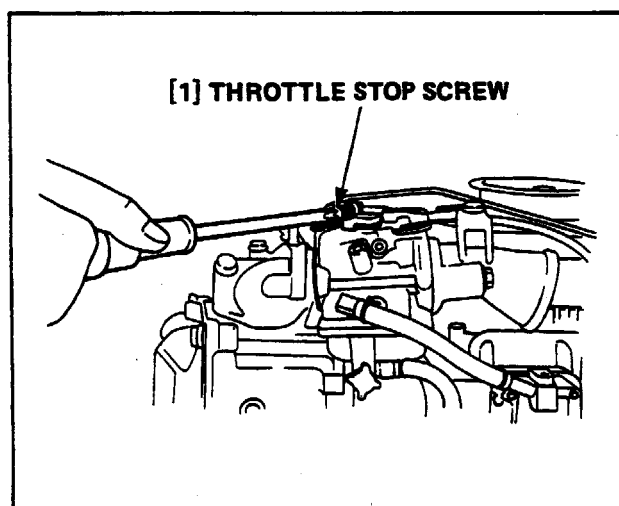
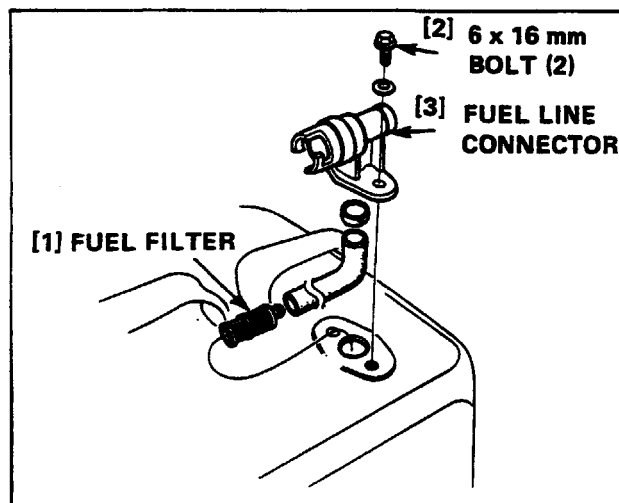
A water tank is not required if a hose is connected from a water faucet to the outboard motor, using a hose coupler (optional part).

### CAUTION:

- Running the engine without water can cause serious engine damage due to overheating. Be sure that water flows from the water check hole while the engine is running. If not, stop the engine and determine the cause of the problem.
- Keep clear of moving parts.

- 2) Start the engine and idle until it reaches normal operating temperature.
- 3) Turn the throttle stop screw in or out as necessary until the specified no load idle speed is obtained.

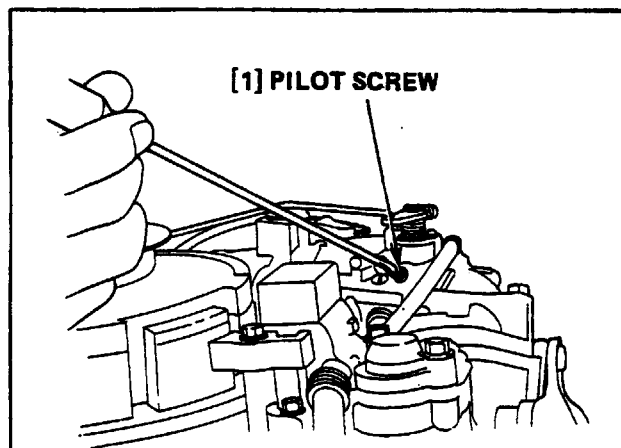
|                    |                                              |
|--------------------|----------------------------------------------|
| No load idle speed | $1,550 \pm 50 \text{ min}^{-1} (\text{rpm})$ |
|--------------------|----------------------------------------------|



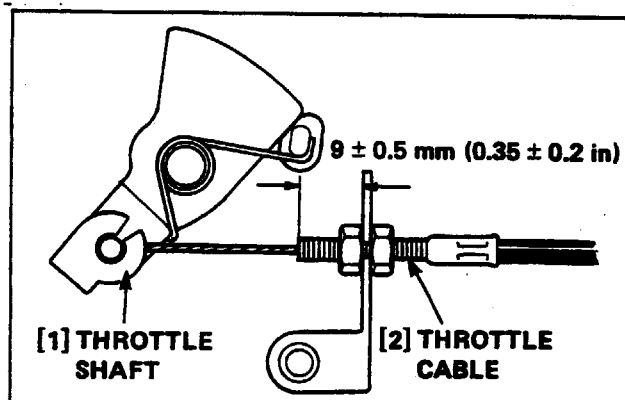
**b. Pilot screw**

If the pilot screw setting needs adjustment:

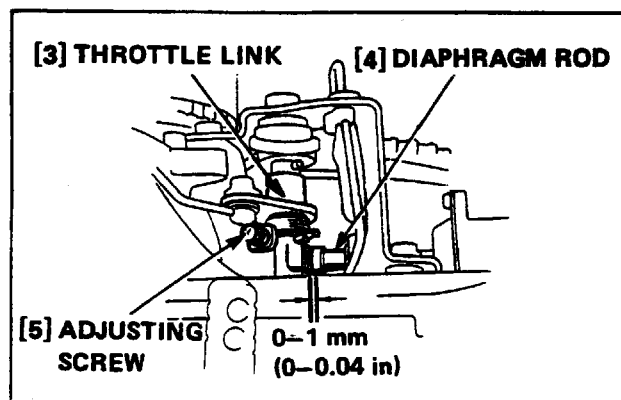
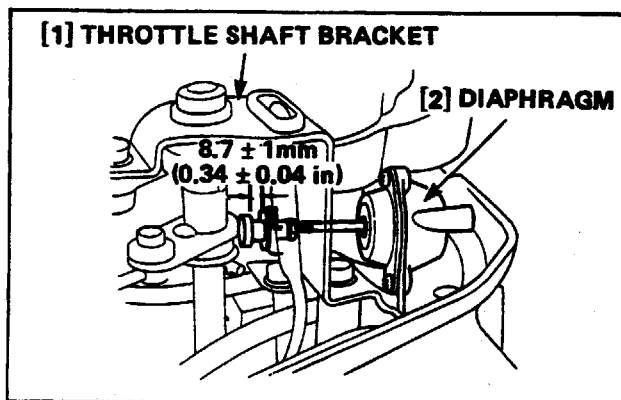
- 1) Turn the pilot screw in or out until the engine runs at the highest idle rpm. If the pilot screw has been removed and replaced, start with an initial setting of 2-3/8 turns out from the fully closed position.
- 2) Turn the throttle stop screw to obtain the specified idle speed.

**8. THROTTLE CABLE**

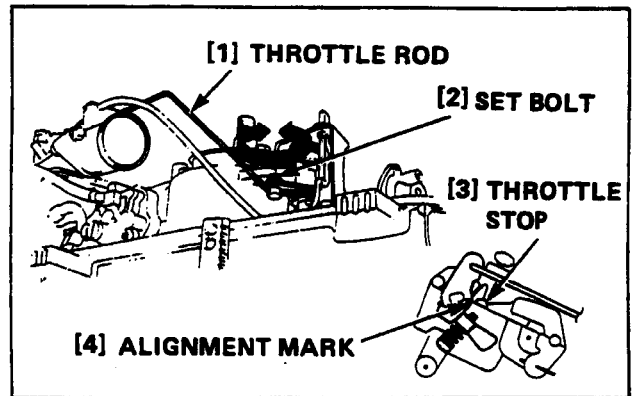
- 1) Remove the recoil starter.
- 2) With the throttle grip in "SLOW" position, adjust the distance between the cable bracket and the end of the cable sheath to  $9.0 \pm 0.5$  mm ( $0.354 \pm 0.020$  in) by loosening the lock nut and turning the adjusting nut.
- 3) Tighten the lock nut securely.

**9. THROTTLE OPENER SYSTEM**

- 1) Adjust the throttle cable.
- 2) Loosen the diaphragm rod lock nut, and adjust the rod so rod travel is  $8.7 \pm 1$  mm ( $0.34 \pm 0.04$  in). Tighten the lock nut securely.
- 3) Move the shift lever to the "NEUTRAL" position, turn the throttle grip toward "FAST" until the throttle arm touches the limiter plate, and turn the throttle grip lock knob clockwise to keep the throttle grip in this position.
- 4) Adjust the clearance between the throttle link and the diaphragm rod to 0–1 mm (0–0.04 in) by turning the adjusting screw.

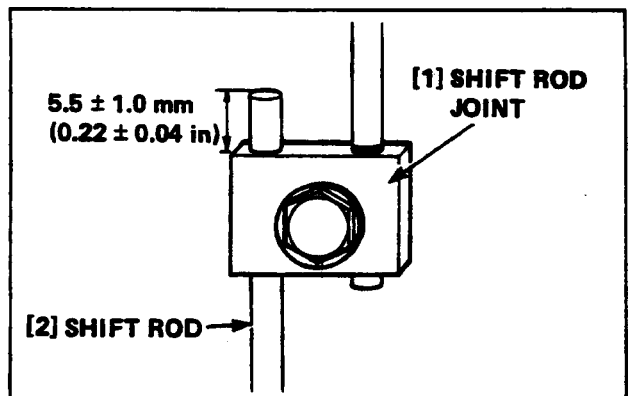
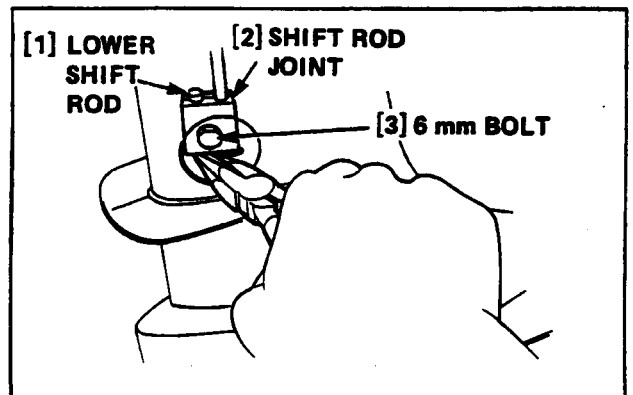


- 5) Return the throttle grip to "SLOW".
- 6) Loosen the throttle rod set bolt, and slide the throttle rod to align the alignment mark on the carburetor throttle lever with the end of the throttle stop. Tighten the throttle rod set bolt securely.  
Torque: 1.7–2.5 N·m (17–25 kg·cm, 1.2–1.8 ft·lb)
- 7) After adjustment, loosen the throttle friction knob, and move the shift lever to "NEUTRAL". Turn the throttle grip all the way to "FAST", and check that engine speed is 4,700–5,000 min<sup>-1</sup> (rpm).
- 8) Adjust the idle speed (page 21).



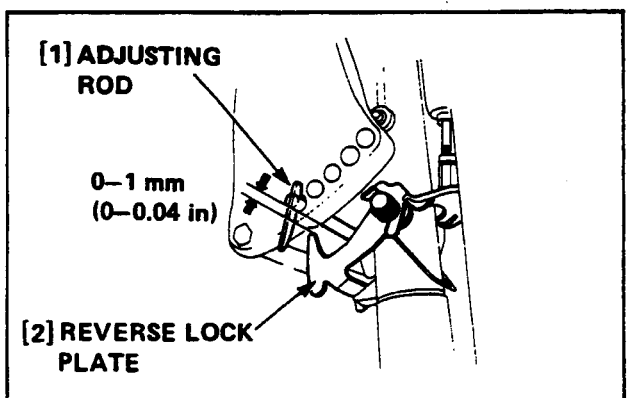
## 10. SHIFT ROD

- 1) Move the shift lever to the "FORWARD" position, and remove the plug from the shift rod inspection hole in the extension case.
- 2) Loosen the 6 mm bolt on the shaft rod joint, and adjust the height of the lower shift rod, so the end of the rod extends  $5.5 \pm 1.0$  mm ( $0.22 \pm 0.04$  in) above the shift rod joint.
- 3) Check gear shift operation by moving the shift lever to each gear position. Reinstall the plug in the inspection hole.

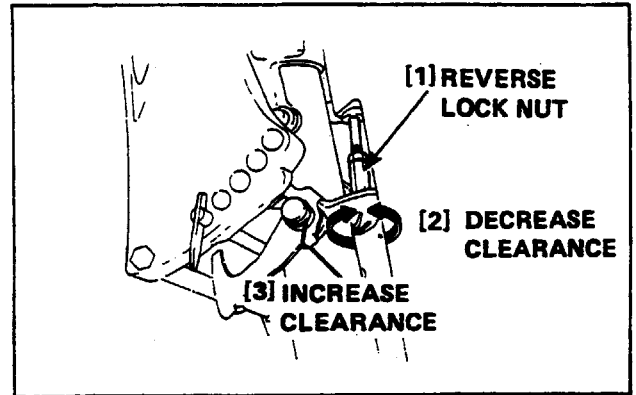


## 11. REVERSE LOCK

- 1) Move the shift lever to "NEUTRAL".
- 2) Check clearance between the reverse lock plate pawl and the stern bracket adjusting rod while tilting the unit. The clearance should be 0–1 mm (0–0.04 in).



- 3) If the clearance is not within the specification, adjust by loosening the lock nut and turning the adjusting nut.
- 4) Tighten the lock nut securely.
- 5) Turn the shift lever gradually to the "REVERSE" side while turning the propeller by hand until it will no longer turn, then make sure the reverse lock pawls hook on the adjusting rod securely and the outboard motor will not tilt.



# IV. DISASSEMBLY AND SERVICE

**HONDA**  
**BF50·BF5A**

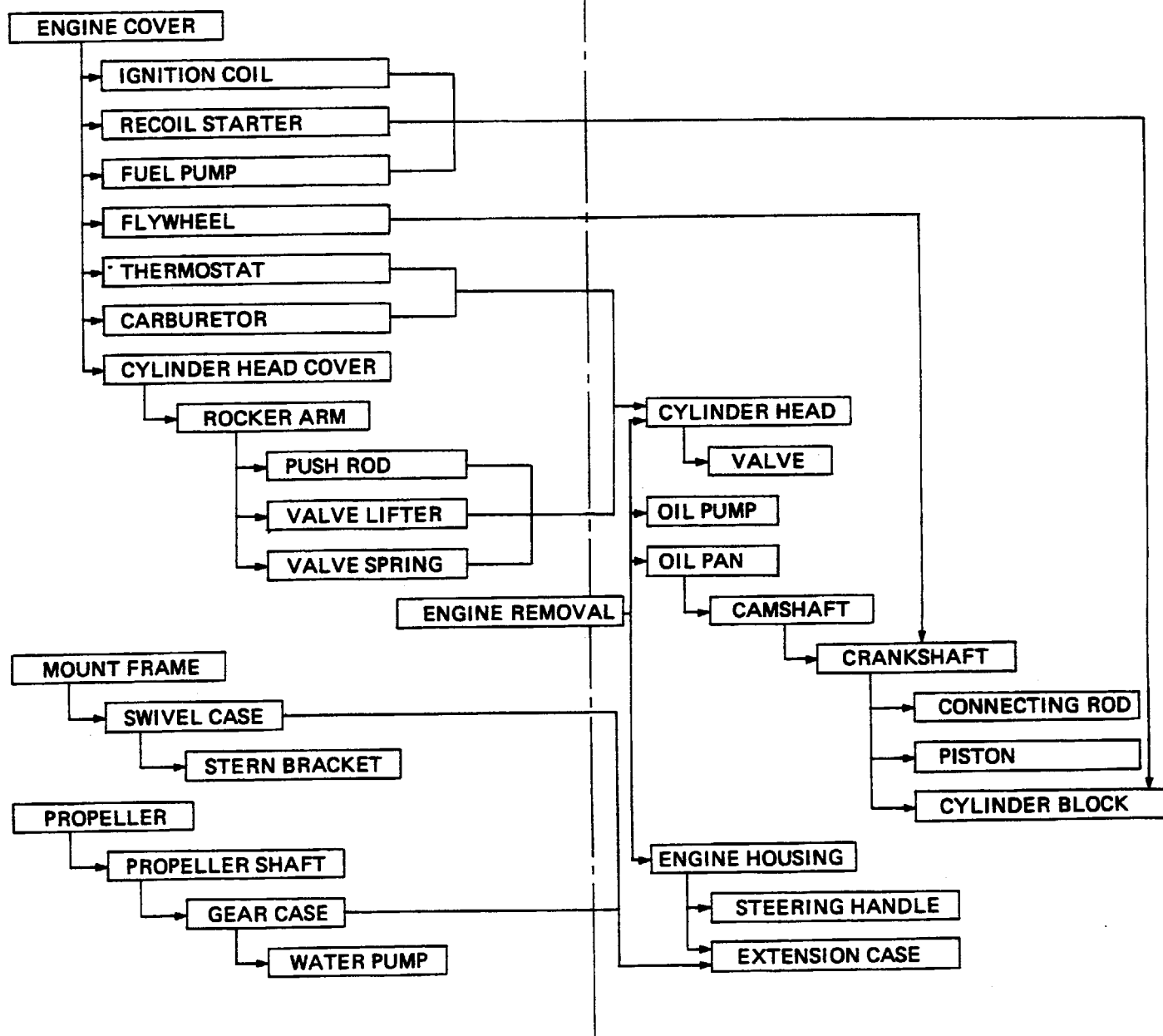
1. DISASSEMBLY CHART
2. ENGINE COVER/RECOIL STARTER
3. CARBURETOR/FUEL PUMP
4. FLYWHEEL/ELECTRICAL EQUIPMENT
5. ENGINE REMOVAL
6. CYLINDER HEAD/VALVES
7. OIL PAN

8. CRANKSHAFT/PISTON
9. THROTTLE CABLE/HANDLE
10. EXTENSION CASE/SWIVEL CASE/STERN BRACKET
11. GEAR CASE REMOVAL
12. PROPELLER SHAFT/GEAR CASE
13. FUEL TANK

## 1. DISASSEMBLY CHART

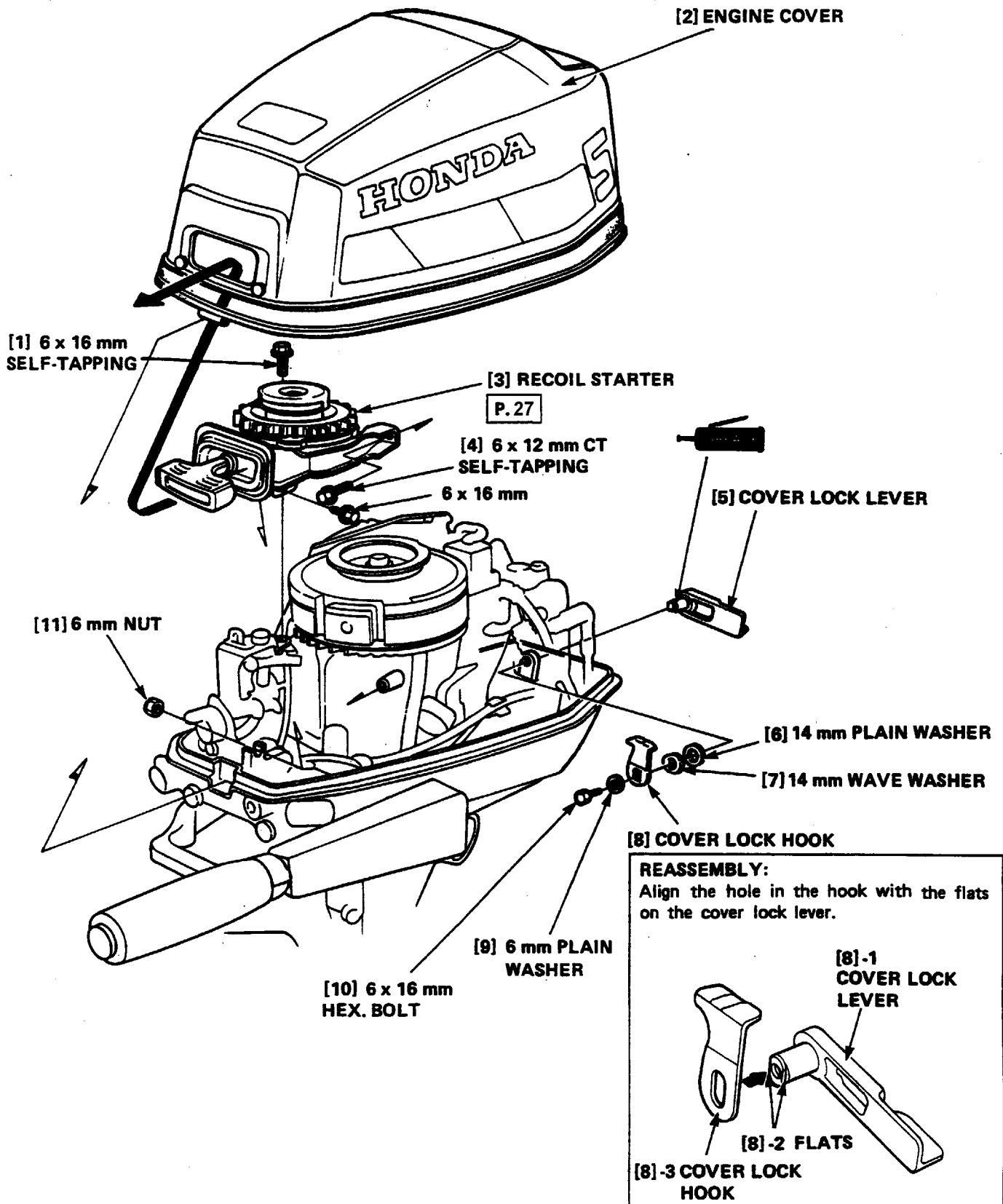
The following parts or components can be serviced with the engine installed in the unit.

The following parts or components must be serviced after removing the engine.



## 2. ENGINE COVER/RECOIL STARTER

### a. DISASSEMBLY/ASSEMBLY

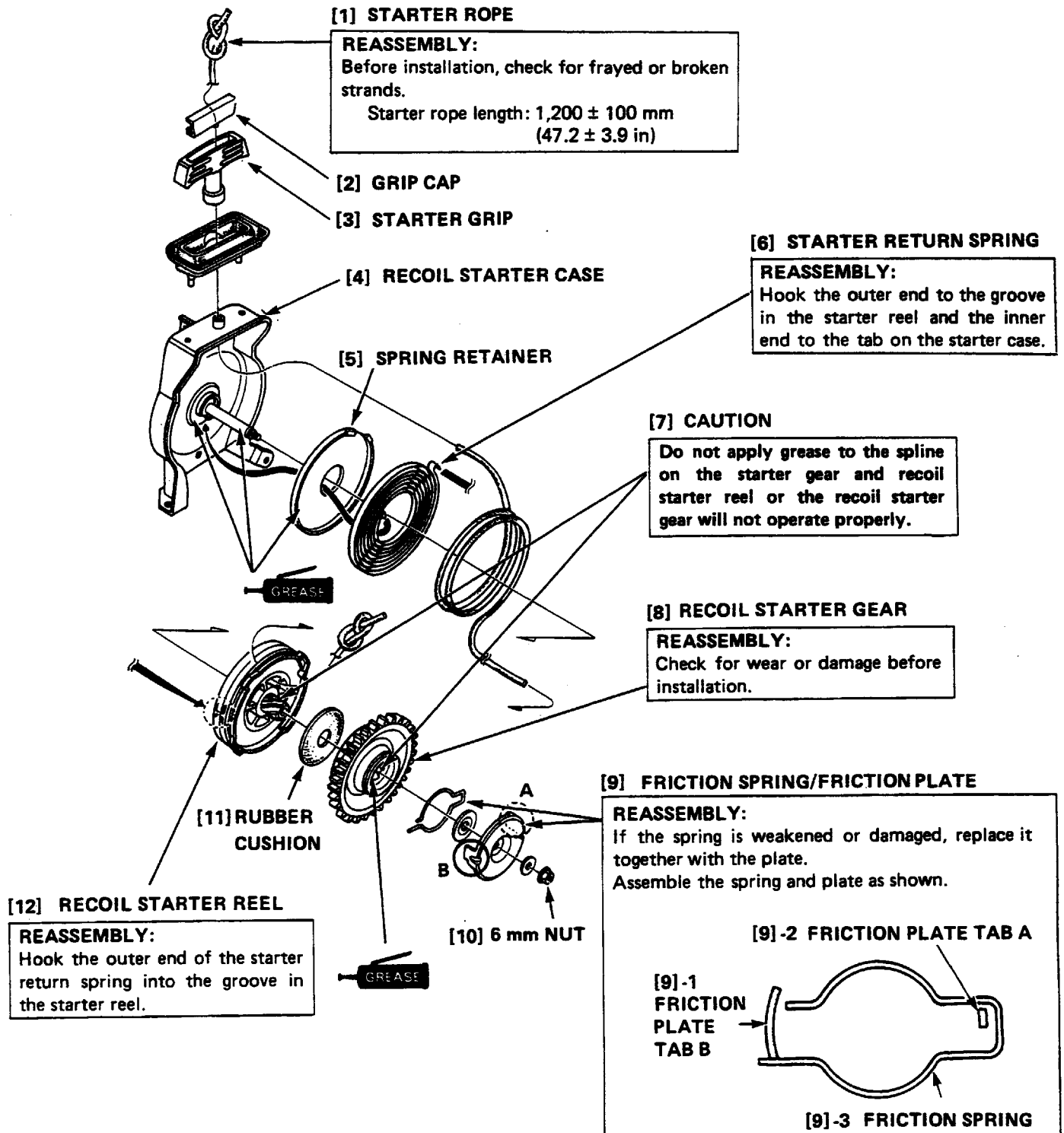


### • RECOIL STARTER

#### a. DISASSEMBLY/REASSEMBLY

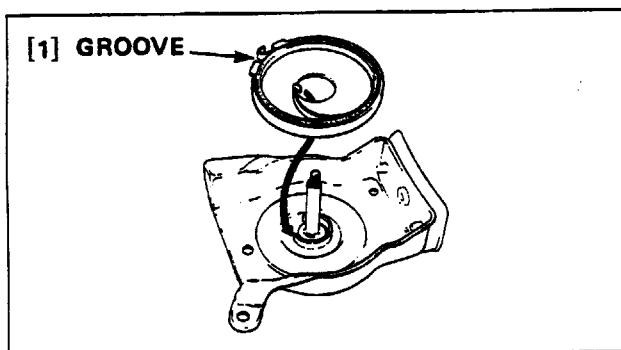
#### CAUTION

Be careful not to allow spring to jump out.  
Wear heavy gloves to protect your hands from injury.

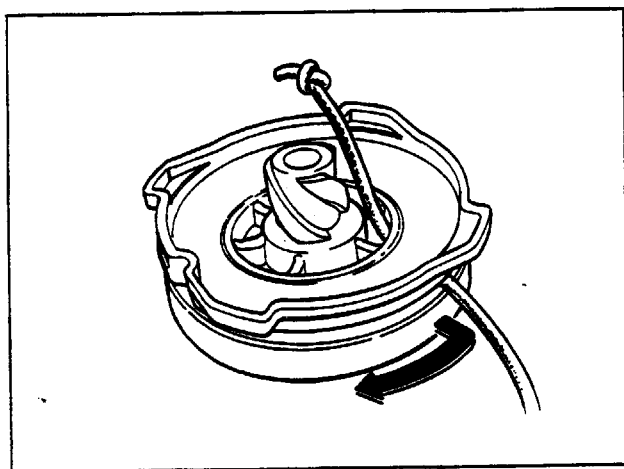


### • STARTER REEL (REASSEMBLY)

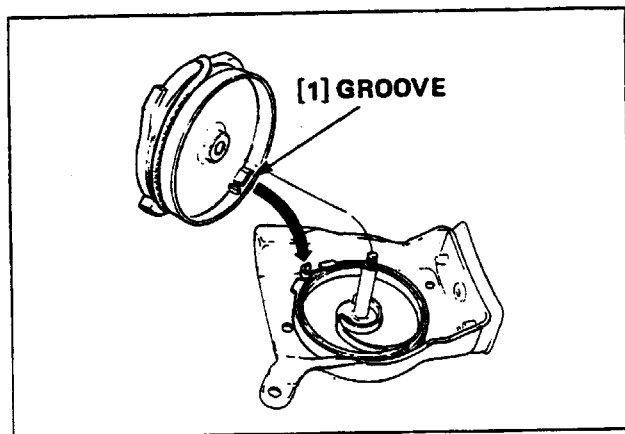
- 1) Install the return spring to the spring retainer then install into the starter case by hooking the spring outer end to the center of the groove of the retainer and inner end to the tab on the case.



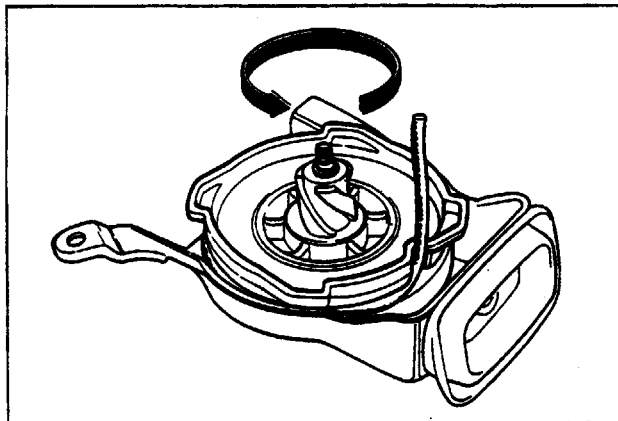
- 2) Route one end of the starter rope through the hole in the starter reel and tie a knot in the end.



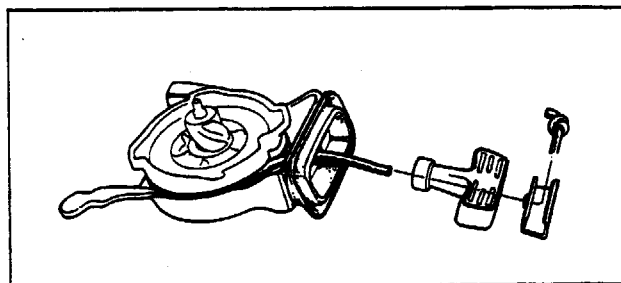
- 3) Wedge the end of the rope in the notch on the edge of the reel and install the reel aligning the groove in the reel with the spring end.



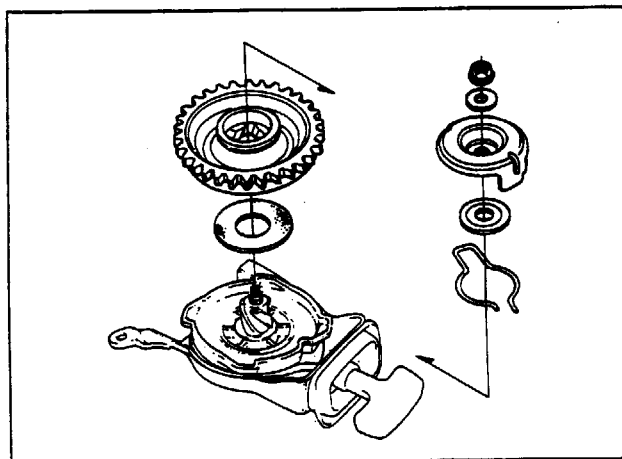
- 4) While holding the rope end in the notch on the edge of the reel, rotate the reel counterclockwise two turns to preload the return spring.



- 5) Pass the rope end through the hole out of the starter case by holding the starter reel. Insert the rope into the starter grip and tie the rope end and install the grip cap:



- 6) Install the rubber cushion, starter gear, friction spring and friction plate and tighten the 6 mm flange nut.



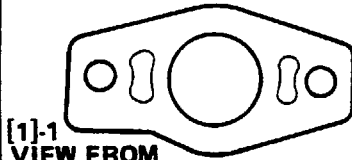
- 7) Pull the starter rope slowly and check the operation of the starter gear and return of the rope.

### 3. CARBURETOR/FUEL PUMP

#### a. DISASSEMBLY/REASSEMBLY

##### [1] CARBURETOR INSULATOR

**REASSEMBLY:**  
Note the installation direction.



[1]-1  
VIEW FROM  
CARBURETOR  
SIDE

##### [3] THROTTLE ROD

**REASSEMBLY:**  
Pass the rod through the hole in the throttle rod holder after installing it on the throttle arm on the carburetor.  
**ADJUSTMENT:** P. 22, 23

##### [4] CABLE HOLDER

**REASSEMBLY:**  
Align the groove with the tab on the air guide.

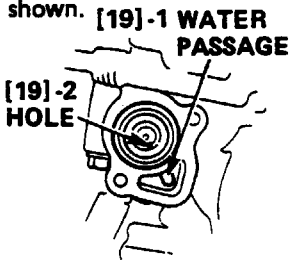
##### [5] CHOKE CABLE

**REASSEMBLY:**  
Connect the cable end to the choke arm, then push the cable sheath into the air guide slot as far as it will go, and secure with the cable holder.

##### [19] THERMOSTAT

**INSPECTION:**  
P. 32

**REASSEMBLY:**  
Install with the small hole in the thermostat toward the water passage side as shown.



[19]-1 WATER  
PASSAGE  
[19]-2  
HOLE

##### [2] THERMOSTAT COVER

6 x 23 mm (2)

6 x 28 mm

6 x 42 mm

##### [6] AIR GUIDE

6 x 102 mm (2)

##### [7] CARBURETOR

P. 30

##### [8] TO FUEL PUMP

##### [9] FUEL TUBE (4.5 x 100 mm)

##### [10] FUEL TUBE (3.5 x 165 mm)

**REASSEMBLY:**  
After installing the carburetor, insert the tube into the drain hole in the engine housing.

##### [11] 6 x 34 mm SPECIAL BOLT (2)

##### [13] FUEL TUBE (4.5 x 90 mm)

##### [12] FUEL PUMP

**INSPECTION:** P. 32

##### [14] FUEL TUBE (3.5 x 140 mm)

**REASSEMBLY:**  
Connect other end to the diaphragm.

##### [16] FUEL TUBE (3.5 x 295 mm)

##### [18] INTAKE MANIFOLD GASKET

**REASSEMBLY:**  
Check for damage.  
Note the installation direction.

##### [17] INTAKE MANIFOLD

**REASSEMBLY:**  
Before installing, clean the inside with compressed air.

##### [15] DASH POT CHECK VALVE

**REASSEMBLY:**  
Connect the valve with the pink paint mark toward the carburetor and the green paint mark toward the diaphragm.

##### [15]-1 PINK PAINT

##### [15]-2 GREEN PAINT

##### [15]-3 TO CARBURETOR

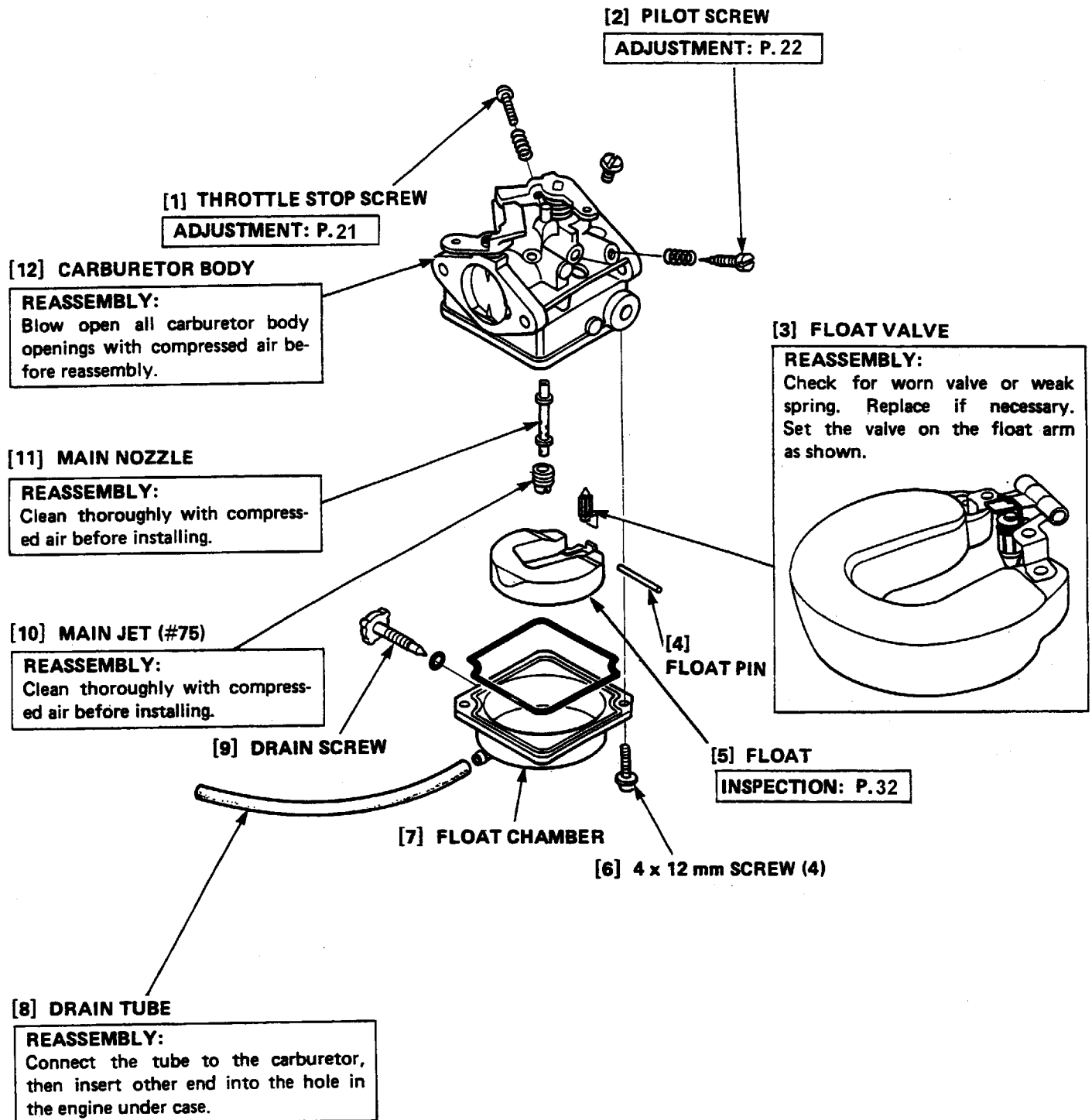
##### [15]-4 TO DIAPHRAGM



### • CARBURETOR

#### ▲ WARNING

- Loosen the drain screw and drain the carburetor before disassembly.
- Keep gasoline away from flames or sparks. Wipe up spilled gasoline at once.



### • FUEL PUMP

#### [1] DIAPHRAGM

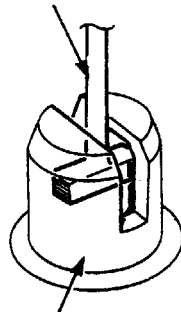
##### DISASSEMBLY:

Push the diaphragm down and turn it until the foot is parallel with the groove in the push rod.

##### REASSEMBLY:

Check the diaphragm for holes, deterioration and tears. Replace if necessary.

#### [1]-1 DIAPHRAGM



#### [1]-2 PUSH ROD

#### [3] PUSH ROD

##### REASSEMBLY:

After assembly, press the push rod to make sure it moves smoothly.

#### [2] PUMP LOWER BODY

#### [10] VALVE

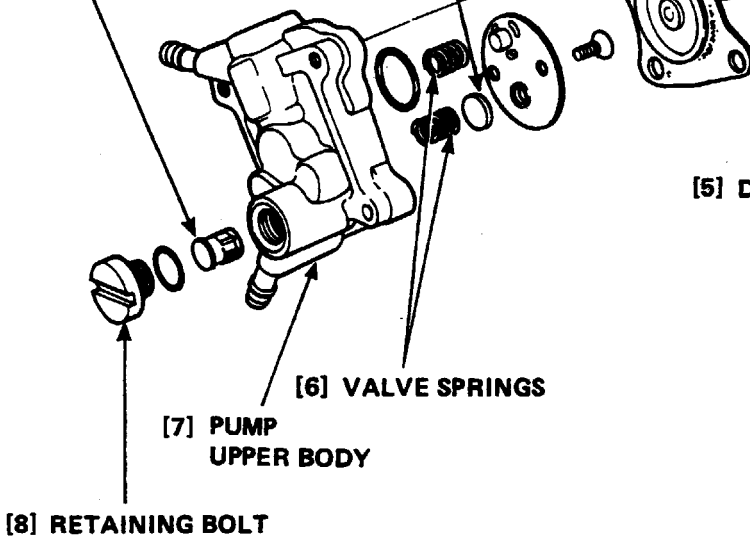
##### REASSEMBLY:

Check the valves for wear or cracks.

#### [9] FILTER

##### REASSEMBLY:

Check for deposits or damage.

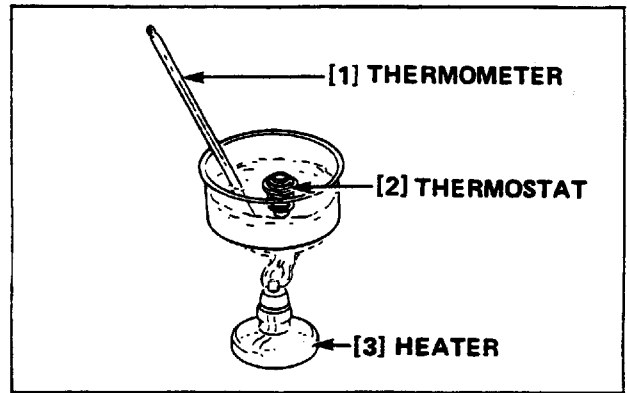


#### [8] RETAINING BOLT

### b. INSPECTION

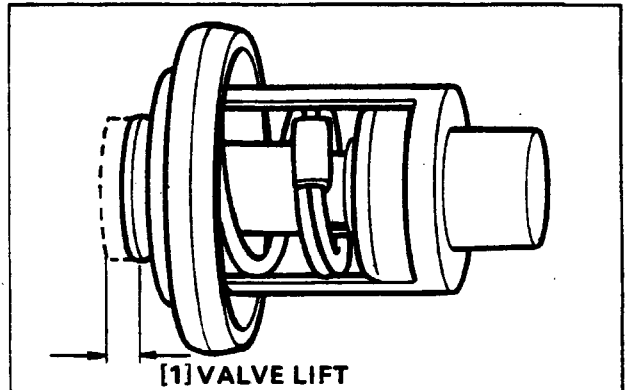
#### • THERMOSTAT

- 1) Inspect the thermostat visually for damage.
- 2) Suspend the thermostat in heated water to check its operation. Do not let the thermostat or thermometer touch the pan or false readings will result.



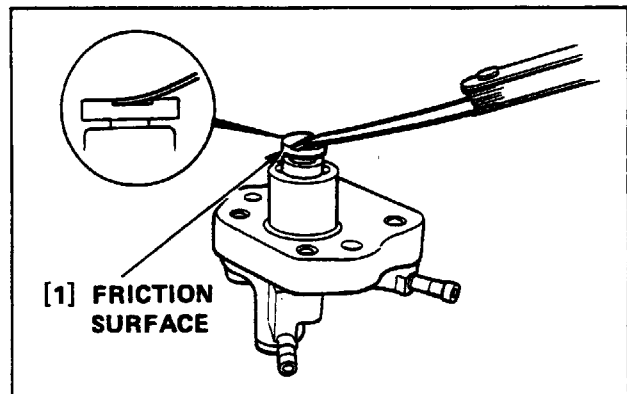
|               |                                                                                 |
|---------------|---------------------------------------------------------------------------------|
| Start to open | 50° – 54° C (122° – 129° F)                                                     |
| Valve lift    | 3–4 mm (0.12–0.16 in) when heated to more than 54° C (129° F) for five minutes. |

- 3) Replace the thermostat if the valve stays open at room temperature, or if it responds at temperatures other than those specified.



#### • FUEL PUMP

Check the friction surface on the push rod for wear using a feeler gauge, and replace the push rod with a new one if it is worn more than 0.05 mm (0.002 in).

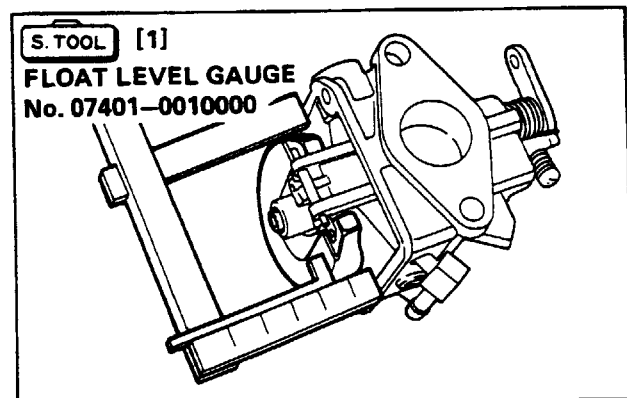


#### • CARBURETOR FLOAT LEVEL

Position the carburetor as shown, and measure the distance between the float top and the carburetor body when the float just contacts the float valve.

|              |                            |
|--------------|----------------------------|
| Float height | 9.0–11.0 mm (0.35–0.43 in) |
|--------------|----------------------------|

Float level cannot be adjusted. If the level is out of specification, replace the float or the valve.

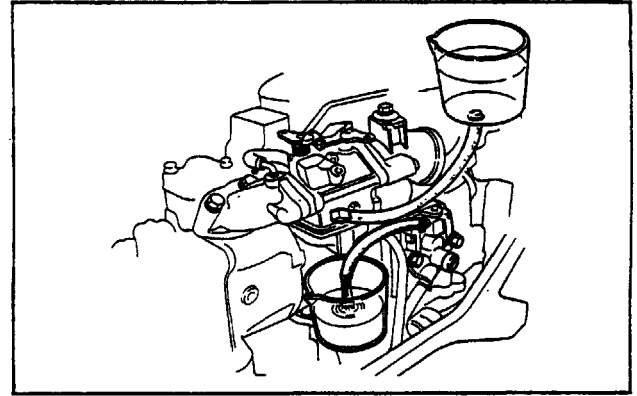


### ● FUEL PUMP DELIVERY

#### ▲ WARNING

- Gasoline is flammable and explosive under certain conditions. Do not smoke or allow flames or sparks near the equipment while draining fuel.
- Always work in a well-ventilated area.
- Wipe up any spilled gasoline at once.

- 1) Disconnect the fuel line at the carburetor. Connect the fuel tube to a container that can be added the fuel to the carburetor.
- 2) Start the engine and let fuel flow into a container for 1 minute and measure the delivery volume.



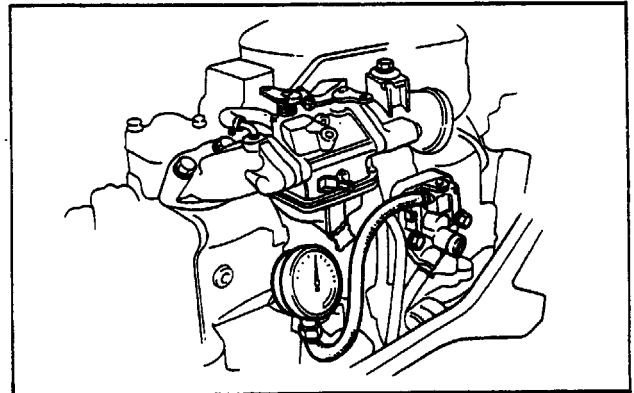
|                           |                                        |
|---------------------------|----------------------------------------|
| Specified delivery volume | 300 cc [1,300 min <sup>-1</sup> (rpm)] |
|---------------------------|----------------------------------------|

Fuel pump delivery will decrease as pump body temperature rises.

### ● FUEL PUMP DELIVERY PRESSURE

- 1) Disconnect the fuel line at the carburetor, and connect a pressure gauge (Max. 1 kg/cm<sup>2</sup> scale).
- 2) Start the engine and measure the fuel pressure.

|                         |                                                                       |
|-------------------------|-----------------------------------------------------------------------|
| Specified fuel pressure | 0.33 kg/cm <sup>2</sup> (4.7 psi)<br>at 5,000 min <sup>-1</sup> (rpm) |
|-------------------------|-----------------------------------------------------------------------|



### 4. FLYWHEEL/ELECTRICAL EQUIPMENT

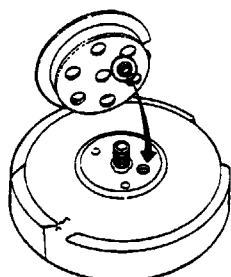
#### a. DISASSEMBLY/REASSEMBLY

#### • FLYWHEEL/IGNITION COIL

#### [1] STARTER PULLEY

##### REASSEMBLY:

Align the dowel boss on the pulley with the hole in the flywheel.



#### [2] 14 mm SPECIAL NUT

##### DISASSEMBLY/REASSEMBLY:

When loosening or tightening, hold the crankshaft by inserting a screwdriver or equivalent into the hole in the starter pulley.  
70–80 N·m (700–800 kg·cm,  
51–58 ft·lb)

#### [3] FLYWHEEL

##### DISASSEMBLY:

Remove by using the FLYWHEEL PULLER.

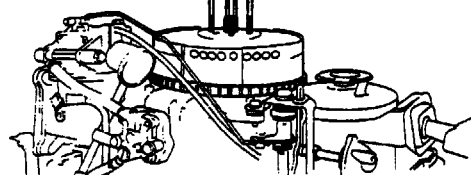
S. TOOL [3]-1

FLYWHEEL PULLER

07935-8050002

or

07935-8050003



##### REASSEMBLY:

Clean the tapered surface on the crankshaft and install by aligning keyway with the woodruff key on the crankshaft.

#### [9] OIL INDICATOR LAMP

INSPECTION: P. 37

#### [8] ENGINE SWITCH

INSPECTION: P. 36

##### REASSEMBLY:

Screw the switch into the steering handle before routing the wire through the hole in the engine housing.

#### [7] WOODRUFF KEY

##### REASSEMBLY:

Do not forget to install. Make sure the key is properly inserted in the key groove.

6 x 25 mm (2)

#### [4] GROMMET

##### REASSEMBLY:

Properly install in the groove in the engine housing.

5 x 10 mm

#### [5] OIL PRESSURE SWITCH

INSPECTION: P. 36

#### [6] IGNITION COIL

INSPECTION: P. 36

##### REASSEMBLY:

Insert a long thickness gauge between the coil and flywheel, then push the coil toward the flywheel while tightening the bolts.

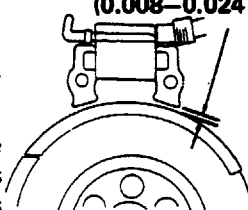
The clearance at both ends of the coil must be adjusted simultaneously. If a long thickness gauge is not available, use a separate thickness gauges at each end, or use a strip of post card of the proper thickness.

Avoid the magnet area of the flywheel when adjusting ignition coil clearance.

##### Specified clearance:

0.2–0.6 mm (0.008–0.014 in)

0.2–0.6 mm  
(0.008–0.024 in)



### • DC CHARGING AND LIGHTING CIRCUIT (Optional parts)

#### [1] CHARGING AND LIGHTING COILS

##### INSPECTION: P.38

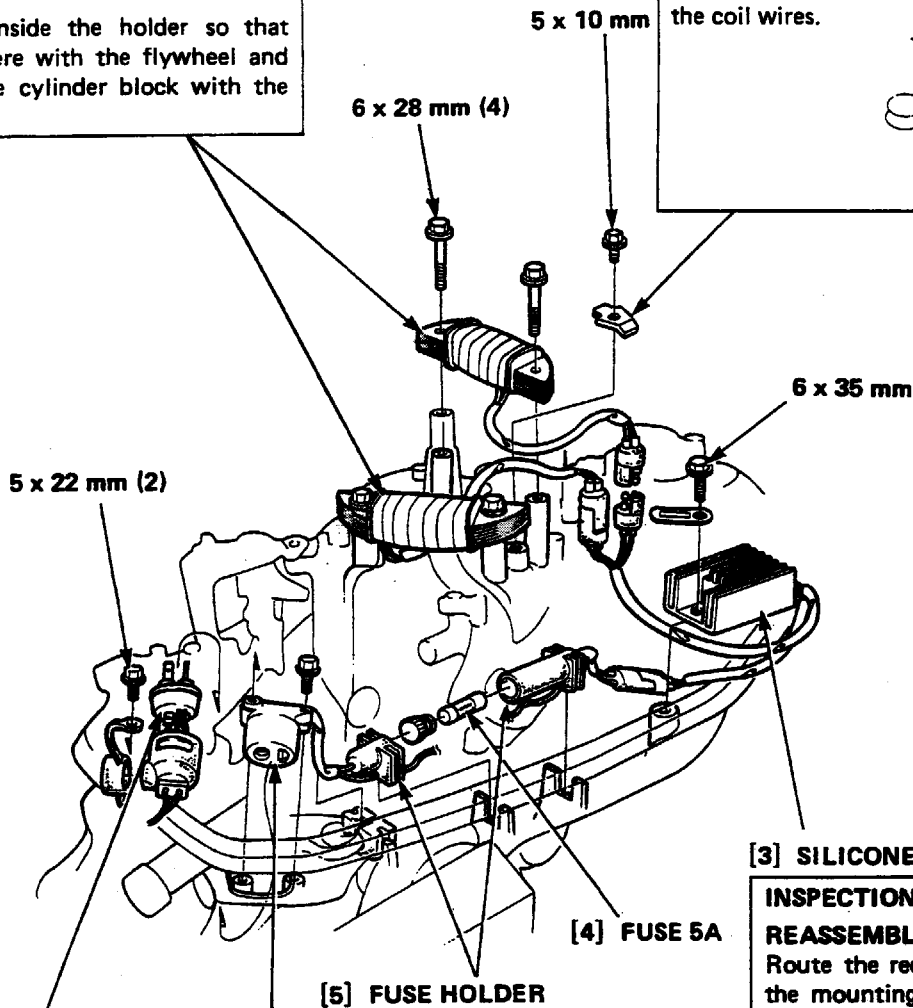
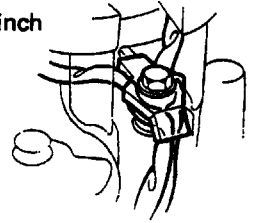
##### REASSEMBLY:

Route the wires inside the holder so that they do not interfere with the flywheel and secure them to the cylinder block with the wire clamp.

#### [2] WIRE CLAMP

##### REASSEMBLY:

Be careful not to pinch the coil wires.



#### [7] PLUG

##### REASSEMBLY:

Connect the battery or accessories in the correct polarity. After connecting the appliance wires to the plug, cover the connection with the rubber cap to prevent water from entering.

#### [5] FUSE HOLDER

##### INSPECTION: P.37

##### REASSEMBLY:

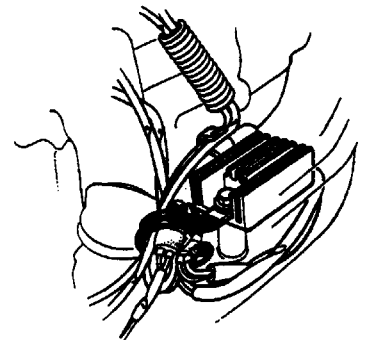
Install the rubber mount over the rib on the engine housing properly.

#### [3] SILICONE RECTIFIER

##### INSPECTION: P. 37

##### REASSEMBLY:

Route the rectifier wires between the mounting boss and the inside of the engine housing wall and clamp them together with the lamp coil wires.



#### [6] DC RECEPTACLE

##### INSPECTION: P.37

##### REASSEMBLY:

Route the wire into the grommet in the engine housing together with the engine stop switch and oil indicator lamp lead wires.

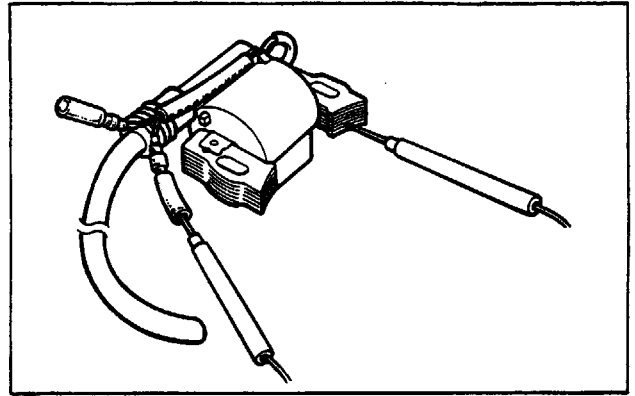
### b. INSPECTION

#### • IGNITION COIL

##### Primary coil

Measure the resistance between the wire terminal and the core.

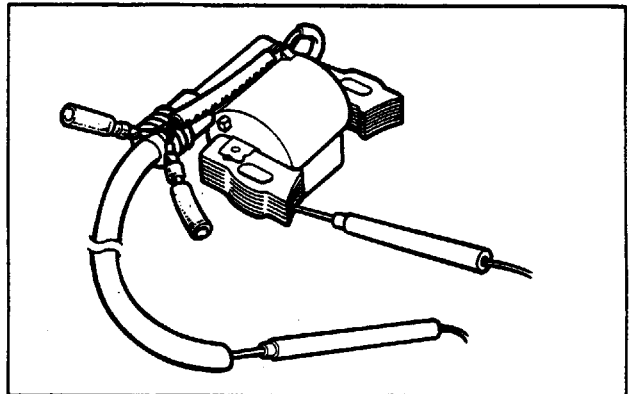
|                         |                  |
|-------------------------|------------------|
| PRIMARY COIL RESISTANCE | 0.7–0.9 $\Omega$ |
|-------------------------|------------------|



##### Secondary coil

Remove the spark plug cap from the spark plug lead and measure the resistance between the core and the spark plug lead.

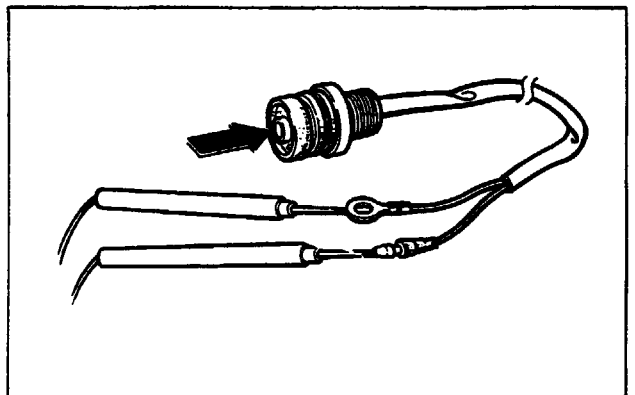
|                           |                    |
|---------------------------|--------------------|
| SECONDARY COIL RESISTANCE | 6.3–7.7 k $\Omega$ |
|---------------------------|--------------------|



#### • ENGINE SWITCH

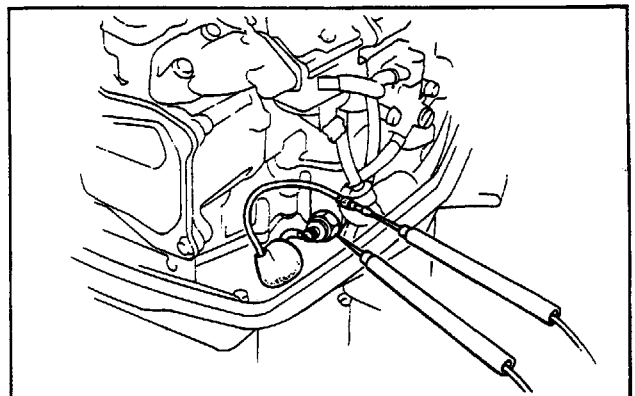
Check for continuity between the primary wire (BI/R) and ground wire (BI) when the switch is depressed.

| SWITCH POSITION |               |
|-----------------|---------------|
| DEPRESSED       | CONTINUITY    |
| RELEASED        | NO CONTINUITY |



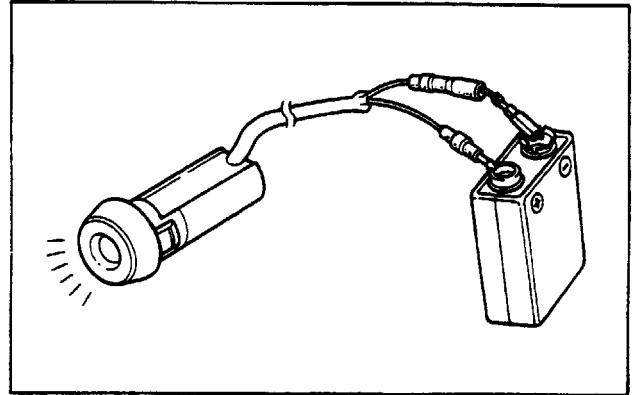
#### • OIL PRESSURE SWITCH

- 1) Check the oil pressure. (P. 46 )
- 2) Start the engine and check for continuity between the oil pressure switch wire and ground. There should be continuity.
- 3) If there is no continuity, replace the oil pressure switch.



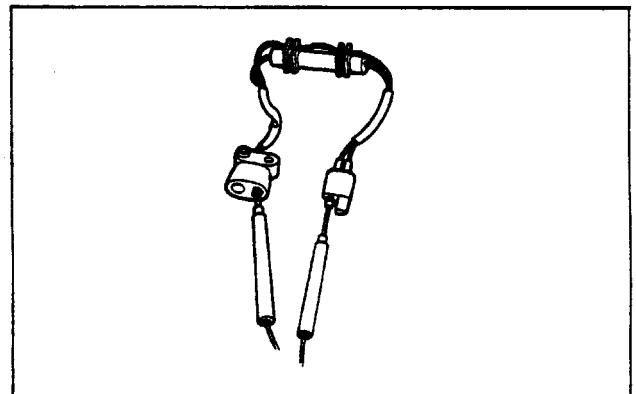
### • OIL INDICATOR LAMP

Connect the Black/Red wire to the 9 V dry cell positive terminal and Black/Yellow wire to the negative terminal. The indicator lamp should come on.



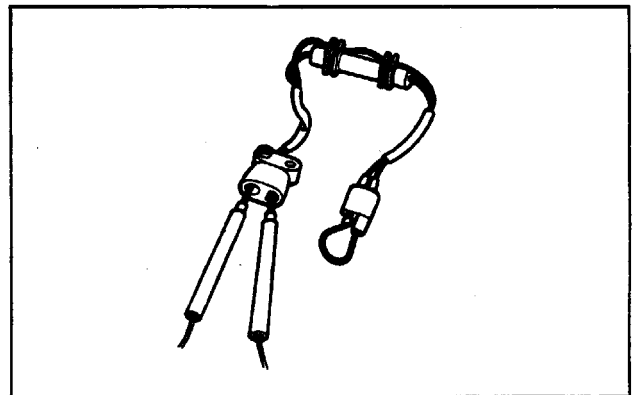
### • FUSE/FUSE HOLDER (Optional part)

Check the fuse for continuity.  
Install the fuse in the holder and check the continuity.



### • D.C. RECEPTACLE (Optional part)

After checking the fuse holder to be sure there is continuity through the fuse, short circuit the rectifier connector, and check to be sure there is continuity between the receptacle terminals.

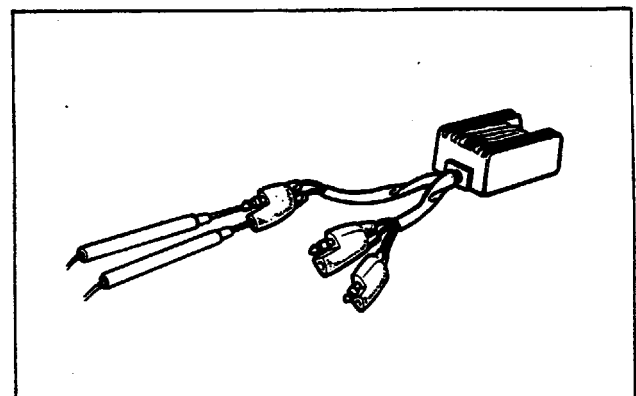


### • SILICONE RECTIFIER (Optional part)

Using the R x 100  $\Omega$  range of the digital tester, check the resistance between the terminals.

Unit: k $\Omega$

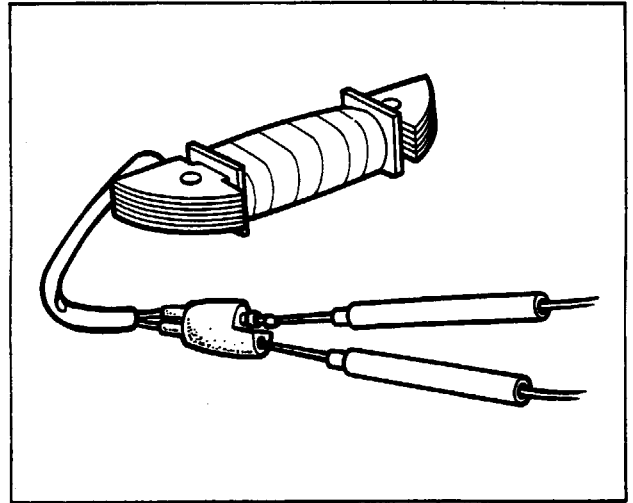
| $\ominus \diagup \oplus$ | RED     | YELLOW I | YELLOW II | PINK I   | PINK II  | GREEN    |
|--------------------------|---------|----------|-----------|----------|----------|----------|
| RED                      |         | $\infty$ | $\infty$  | $\infty$ | $\infty$ | $\infty$ |
| YELLOW I                 | 0.1-50  |          | $\infty$  | $\infty$ | $\infty$ | $\infty$ |
| YELLOW II                | 0.1-50  | $\infty$ |           | $\infty$ | $\infty$ | $\infty$ |
| PINK I                   | 0.1-50  | $\infty$ | $\infty$  |          | $\infty$ | $\infty$ |
| PINK II                  | 0.1-50  | $\infty$ | $\infty$  | $\infty$ |          | $\infty$ |
| GREEN                    | 0.2-100 | 0.1-50   | 0.1-50    | 0.1-50   | 0.1-50   |          |



- CHARGING AND LIGHTING COILS  
(Optional part)

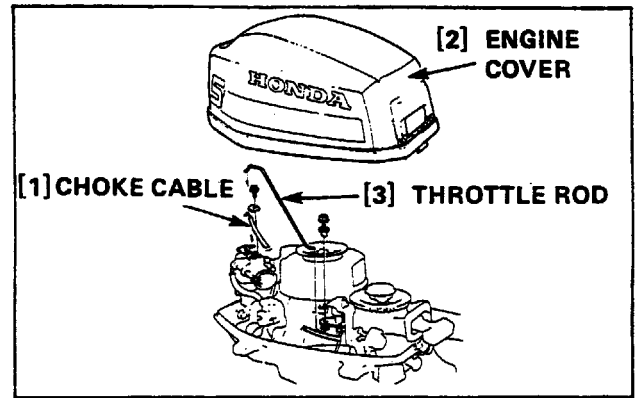
Measure the resistance between each terminal of the lamp coil wires.

|            |                  |
|------------|------------------|
| RESISTANCE | 0.2–0.4 $\Omega$ |
|------------|------------------|

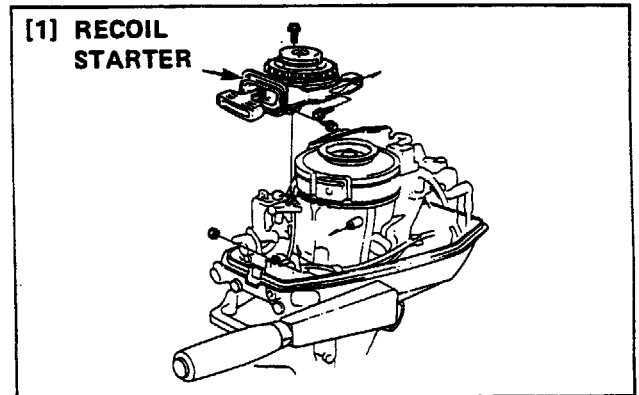


### 5. ENGINE REMOVAL

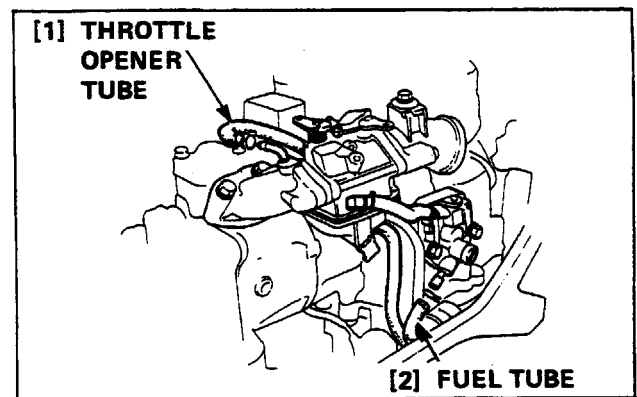
- 1) Remove the engine cover, loosen the 6 x 12 mm flange bolt and 5 x 8 mm hex bolt, and remove the choke cable and throttle rod.



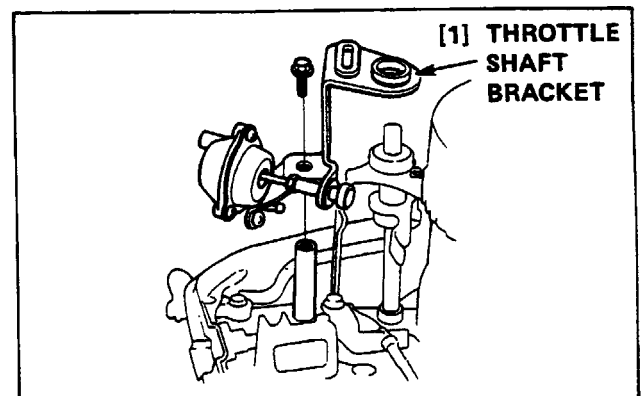
- 2) Remove the recoil starter by removing the two 6 x 12 mm flange bolts and 6 x 14 mm flange bolt.



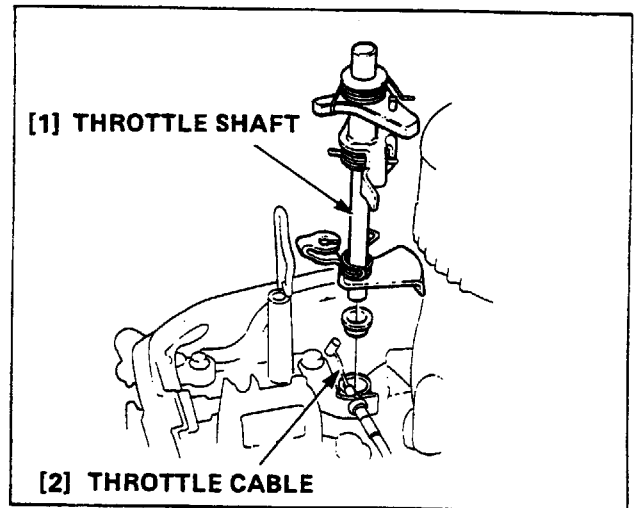
- 3) Disconnect the throttle opener tube from the carburetor and fuel tube from the fuel pump.



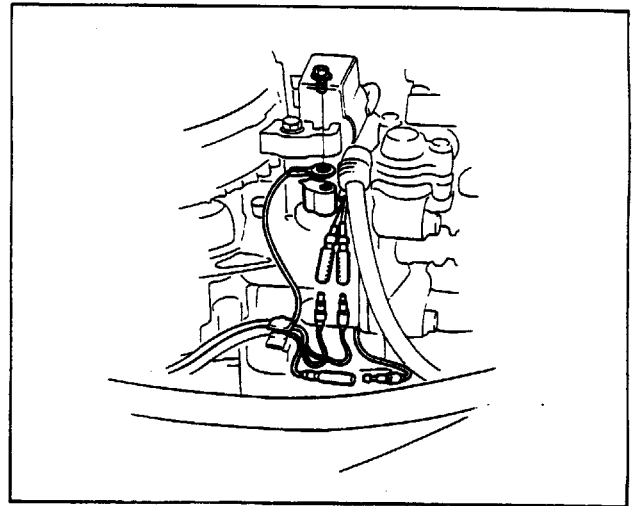
- 4) Remove the throttle shaft bracket by removing the 6 x 12 mm flange bolt.



- 5) Pull the throttle shaft out of the engine housing and remove the throttle cable.

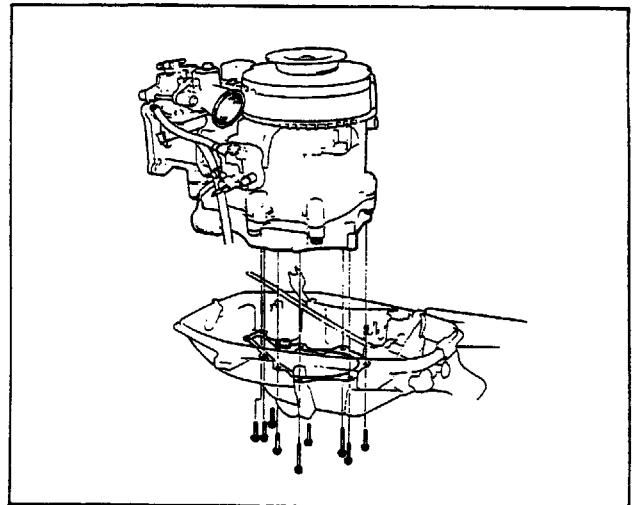


- 6) Remove the 5 x 10 mm flange bolt. Disconnect each wire connector.



- 7) Remove the seven 6 x 32 mm hex bolts and two 6 x 40 mm hex bolts, then raise the engine and remove it.

Tightening torque: 10–12 N·m (100–120 kg·cm, 7.2–8.7 ft·lb)



## 6. CYLINDER HEAD/VALVE

### a. DISASSEMBLY/REASSEMBLY

#### [1] INTAKE VALVE/EXHAUST VALVE

**REASSEMBLY:**

Check the valve head for carbon deposits or pitting before installation.  
Do not interchange the intake and exhaust valves.

**VALVE HEAD DIAMETER:**

Intake: 25 mm (0.98 in)  
Exhaust: 24 mm (0.94 in)

#### [3] CYLINDER HEAD

**REASSEMBLY:**

- Remove the carbon deposits from the combustion chamber.
- Check the valve seat contact before installation.
- Measure the cylinder compression after installation.

**P. 12**

#### [2] CYLINDER HEAD GASKET

**REASSEMBLY:**

Check for tears or damage before installation.

#### [4] 8 x 90 mm (2)

22–28 N·m (220–280 kg-cm,  
16–20 ft-lb)

#### [5] VALVE COTTERS (INTAKE SIDE ONLY)

#### [6] 8 x 60 mm (2)

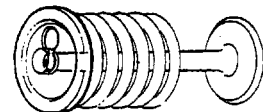
22–28 N·m (220–280 kg-cm,  
16–20 ft-lb)

#### [7] VALVE ROTATOR (EXHAUST SIDE ONLY)

#### [8] VALVE SPRING RETAINER

**DISASSEMBLY:**

- Slide the end of the valve stem sideways from the center and remove the retainer.



- When servicing with the cylinder head installed on the block, be careful that the valve does not fall into the cylinder.

#### [17] PUSH ROD

**REASSEMBLY:**

Check for bent rods and wear at the rods ends.

#### [18] EXHAUST MANIFOLD GASKET

6 x 32 mm (3)

#### [19] EXHAUST MANIFOLD

#### [16] PUSH ROD GUIDE

#### [15] PIVOT BOLT

28–30 N·m (280–300 kg-cm,  
20–22 ft-lb)

#### [14] ROCKER ARM

**REASSEMBLY:**

Check the center hole, pivot and push rod contacting surfaces for wear before installing.

#### [13] ROCKER ARM PIVOT

#### [11] HEAD COVER GASKET

#### [10] CYLINDER HEAD COVER

#### [12] PIVOT LOCK NUT

8–12 N·m (80–120 kg-cm,  
6–9 ft-lb)

#### [9] SPARK PLUG

**STANDARD:**

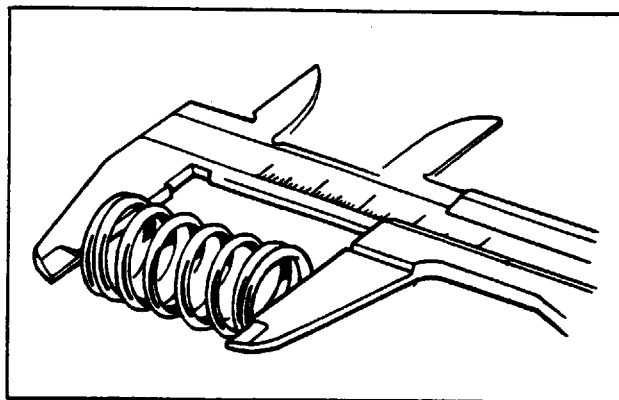
BPR5ES (NGK)  
W16EPR-U (ND)

**b. INSPECTION****• VALVE SPRING FREE LENGTH**

Measure the free length of the valve springs.

| STANDARD           | SERVICE LIMIT      |
|--------------------|--------------------|
| 29.0 mm (1.142 in) | 28.1 mm (1.106 in) |

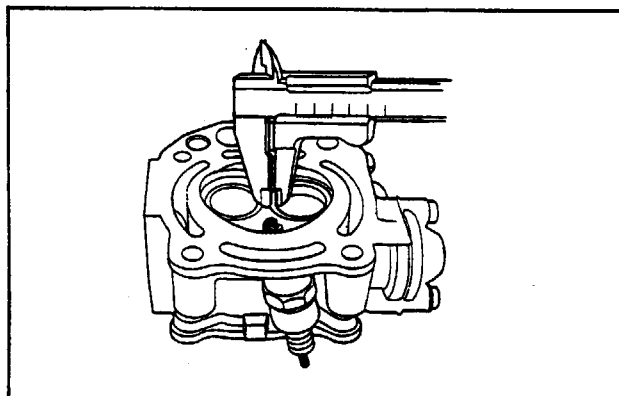
Replace the springs if they are shorter than the service limit.

**• VALVE SEAT WIDTH**

Measure the valve seat width

| STANDARD          | SERVICE LIMIT    |
|-------------------|------------------|
| 0.8 mm (0.031 in) | 1.8 mm (0.07 in) |

If the valve seat width is under the standard, or over the service limit, recondition the valve seat. (P. 44)

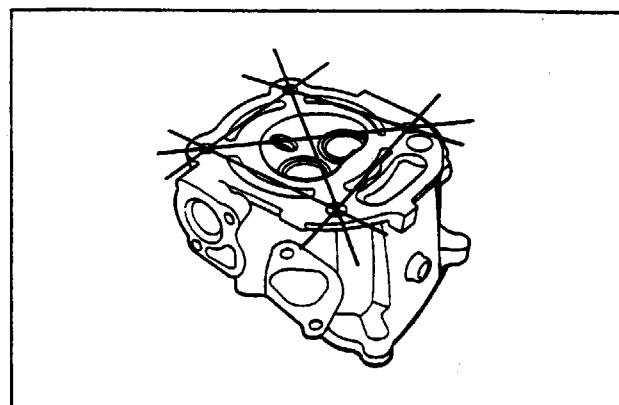
**• CYLINDER HEAD**

Remove carbon deposits from the combustion chamber. Clean off any gasket material from the cylinder head surface.

Check the spark plug hole and valve areas for cracks.

Check the cylinder head for warpage with a straight edge and a feeler gauge.

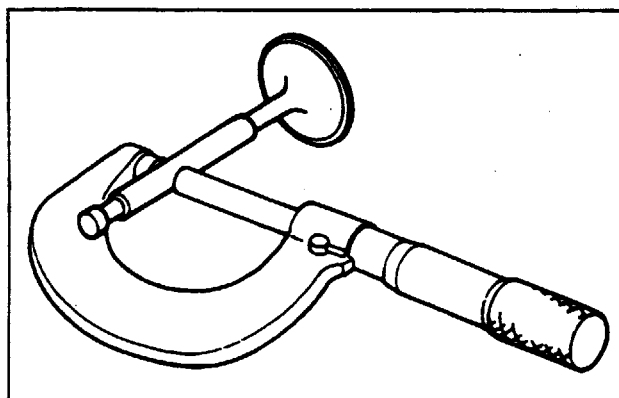
| SERVICE LIMIT | 0.10 mm (0.004 in) |
|---------------|--------------------|
|---------------|--------------------|

**• VALVE STEM O.D.**

Inspect each valve for face irregularities, bending or abnormal stem wear. Replace the valve if necessary.

Measure and record each valve stem O.D.

|    | STANDARD           | SERVICE LIMIT      |
|----|--------------------|--------------------|
| IN | 5.48 mm (0.216 in) | 5.45 mm (0.215 in) |
| EX | 5.44 mm (0.214 in) | 5.41 mm (0.213 in) |



Replace the valve if their O.D. is smaller than the service limit.

### ● VALVE GUIDE I.D.

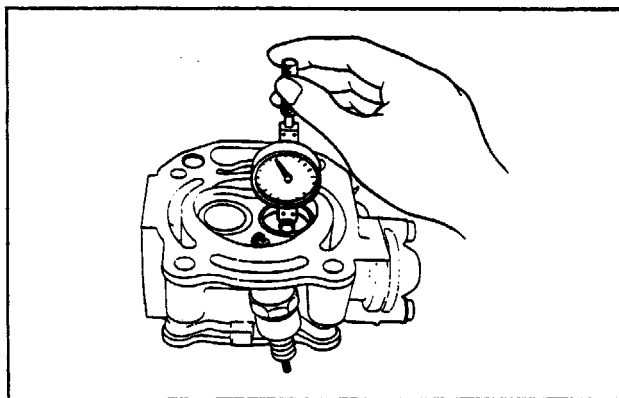
#### NOTE:

Ream the valve guides to remove any carbon deposits before measuring.

Measure and record each valve guide I.D.

|    | STANDARD           | SERVICE LIMIT      |
|----|--------------------|--------------------|
| IN | 5.50 mm (0.217 in) | 5.54 mm (0.218 in) |
| EX | 5.50 mm (0.217 in) | 5.57 mm (0.219 in) |

Replace the guides if they are over the service limit.



### ● VALVE GUIDE-TO-STEM CLEARANCE

Subject each valve stem O.D. from the corresponding guide I.D. to obtain the stem-to-guide clearance.

|    | STANDARD                             | SERVICE LIMIT         |
|----|--------------------------------------|-----------------------|
| IN | 0.020–0.044 mm<br>(0.0008–0.0017 in) | 0.07 mm<br>(0.003 in) |
| EX | 0.060–0.087 mm<br>(0.0024–0.0034 in) | 0.15 mm<br>(0.006 in) |

If the stem-to-guide clearance exceeds the service limit, determine if the new guide with standard dimensions would bring the clearance within tolerance. If so, replace any guide as necessary and ream to fit.

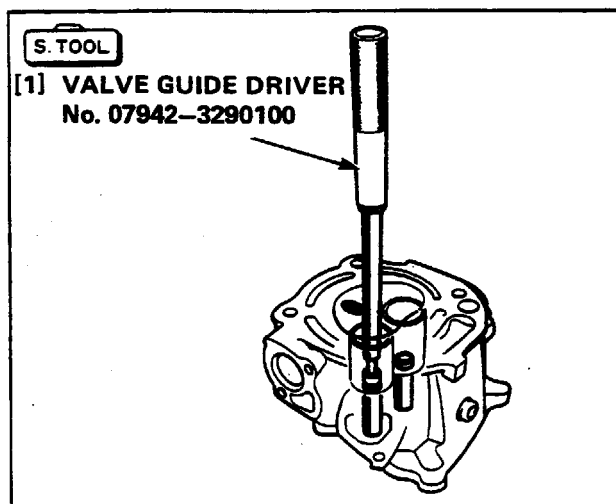
If the stem-to-guide clearance exceeds the service limit with new guides, replace the valve as well.

#### NOTE:

Recondition the valve seats when ever the valve guides are replaced.

### C. VALVE GUIDE REPLACEMENT

1) Using the Valve Guide Driver (Special tool), drive out the valve guides from the combustion chamber side of the cylinder head.

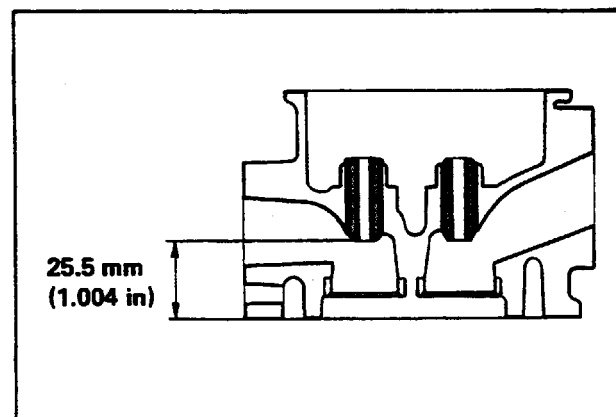


2) Clean the valve guide bores in the cylinder head. Apply clean oil to the new guides, and drive in the valve guides from the rocker arm side of the cylinder head until the valve guide depth is the specification.

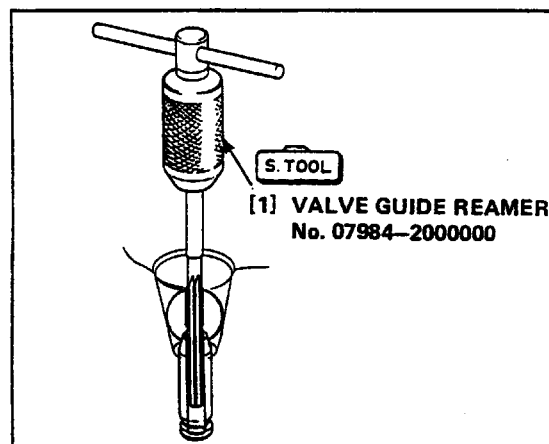
|                   |                    |
|-------------------|--------------------|
| VALVE GUIDE DEPTH | 25.5 mm (1.004 in) |
|-------------------|--------------------|

#### CAUTION:

Protect the cylinder head surface to prevent damage during the driving operation.



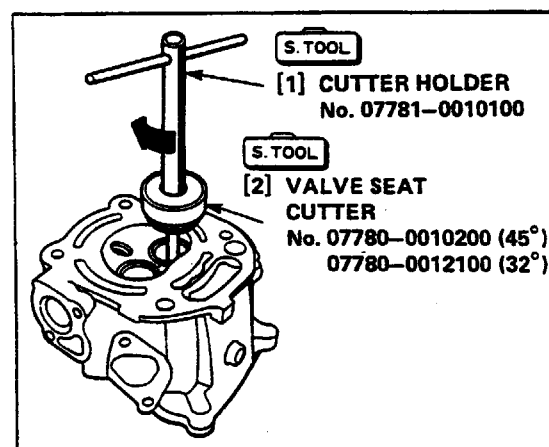
- 3) After installing the new valve guides, ream the guides with the Valve Guide Reamer (special tool). Always turn the reamer clockwise, never counterclockwise. Continue to turn the reamer as you pull it out of the valve guides.



### d. VALVE SEAT RECONDITIONING

- 1) Resurface the valve seat with a 45° cutter, removing only enough material to produce a smooth and concentric seat.

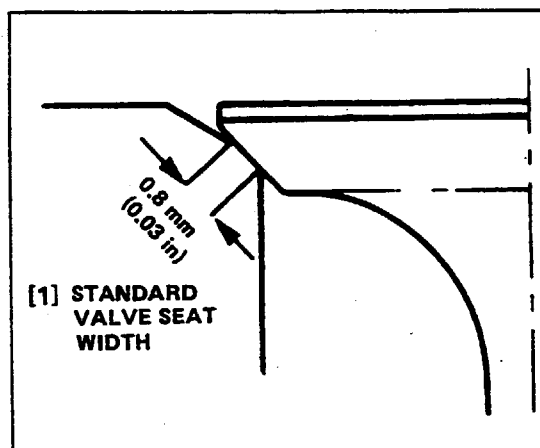
Turn the cutter clockwise, never counterclockwise. Continue to turn the cutter as you lift it from the valve seat.



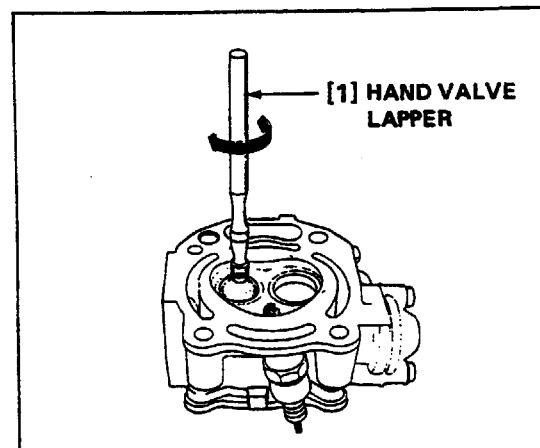
- 2) Use a 32° cutter to narrow the seat to standard width, then make a light pass with the 45° cutter to remove any possible burrs at the edge of the seat.

|                  |                  |
|------------------|------------------|
| VALVE SEAT WIDTH | 0.8 mm (0.03 in) |
|------------------|------------------|

- 3) After resurfacing the seat, inspect for even valve seating. Apply prussian blue compound to the valve face, insert the valve, then lift it and snap it closed against the seat several times. The valve seating surface, as shown by the prussian blue compound, should show good contact all the way around.



- 4) After cutting the seat, apply lapping compound to the valve face, and lap the valve using light pressure. After lapping, wash any residual compound off the cylinder head and valve.



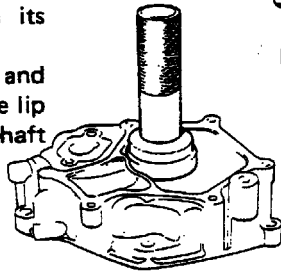
### 7. OIL PAN

#### a. DISASSEMBLY/REASSEMBLY

##### [1] OIL SEAL (25 x 38 x 7 mm)

###### REASSEMBLY:

- Drive a new oil seal into the oil pan until it bottoms with its markings facing up.
- Apply grease to the seal lip and be careful not to damage the lip when inserting the crankshaft into the seal.



###### S. TOOL

**DRIVER**  
No. 07749-0010000  
**ATTACHMENT, 37 mm**  
No. 07746-0010200  
**PILOT, 25 mm**  
No. 07746-0040600

##### [2] COUPLING SEAL (25 x 40 x 14 mm)

###### REASSEMBLY:

After installing the oil seal, install a new coupling seal using a following tools.

###### S. TOOL

**ATTACHMENT, 40 mm**  
No. 07746-0010200  
**PILOT, 25 mm**  
No. 07746-0040600  
**DRIVER No. 07749-0010000**

##### [14] OIL PUMP OUTER ROTOR

##### [13] OIL PUMP INNER ROTOR

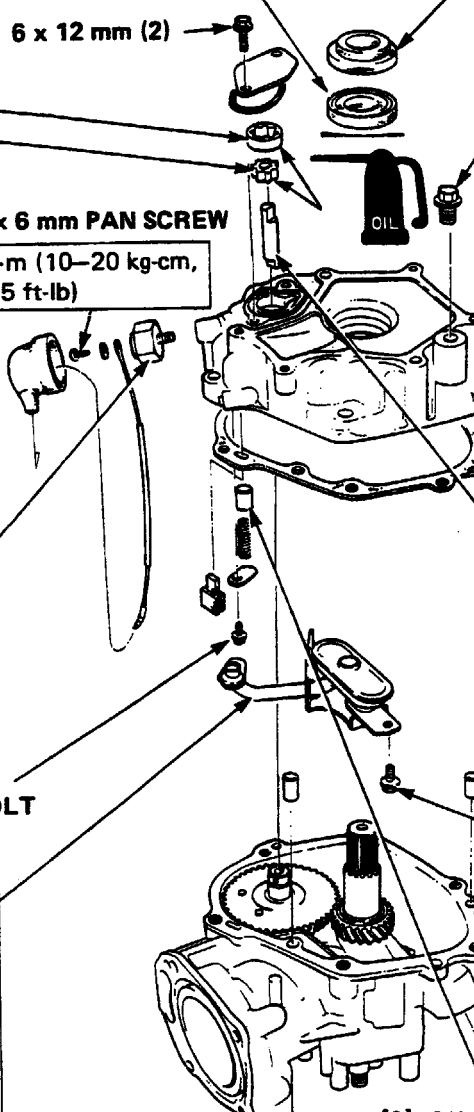
###### REASSEMBLY:

Align the flats on the pump shaft and rotor.



##### [12] 4 x 6 mm PAN SCREW

1-2 N·m (10-20 kg-cm,  
0.7-1.5 ft-lb)



##### [11] OIL PRESSURE SWITCH

###### INSPECTION: P.36

###### REASSEMBLY:

Apply sealing agent to the threads and mating surface. Do not over-apply.

**TORQUE: 7-10 N·m (70-100 kg-cm, 5-7 ft-lb)**

##### [3] OIL DRAIN BOLT

15-20 N·m (150-200 kg-cm,  
11-15 ft-lb)

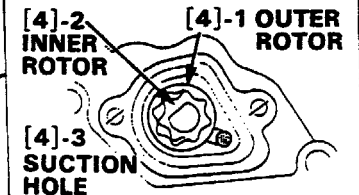
##### 8 x 32 mm (6)

22-28 N·m (220-280 kg-cm,  
16-20 ft-lb)

##### [4] OIL PAN

###### REASSEMBLY:

After installing the oil strainer, pour the engine oil into the suction hole at the oil pump.



##### [5] CRANKCASE COVER GASKET

##### [6] OIL PUMP SHAFT

###### REASSEMBLY:

Insert the shaft into the camshaft groove after installing the oil pan on the cylinder block.

##### [10] 6 x 12 mm HEX-BOLT

##### [9] OIL STRAINER

###### REASSEMBLY:

Check the strainer for clogging or breakage before installation. Install the O-ring on the pick up pipe and insert them into the tapered hole in the oil pan.



##### 6 x 12 mm

##### [7] OIL FILLER CAP

##### [8] OIL CHECK VALVE

###### [8]-1 OIL PAN SIDE

###### REASSEMBLY:

Note the installation direction.



**b. INSPECTION****• OIL PUMP**

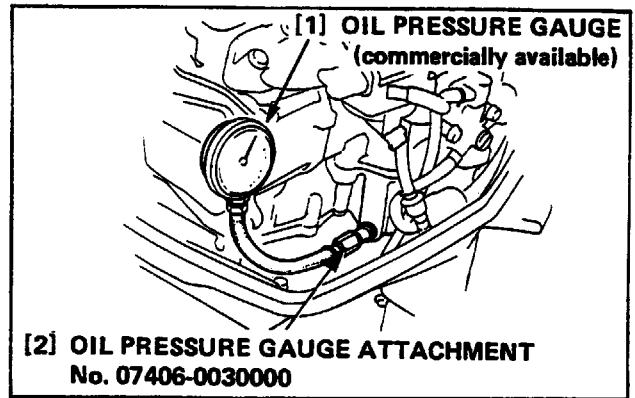
- 1) Remove the oil pressure switch install the oil pressure gauge attachment and connect the oil pressure gauge (7–10 kg/cm<sup>2</sup>).
- 2) Warm up the engine and measure the oil pressure when the oil temperature is 90°C (194°F).

| ENGINE RPM                    | OIL PRESSURE AT 90°C (194°F)                 |
|-------------------------------|----------------------------------------------|
| 1,300 min <sup>-1</sup> (rpm) | 60 kPa (0.6 kg/cm <sup>2</sup> , 8.53 psi)   |
| 5,000 min <sup>-1</sup> (rpm) | 300 kPa (3.0 kg/cm <sup>2</sup> , 42.66 psi) |

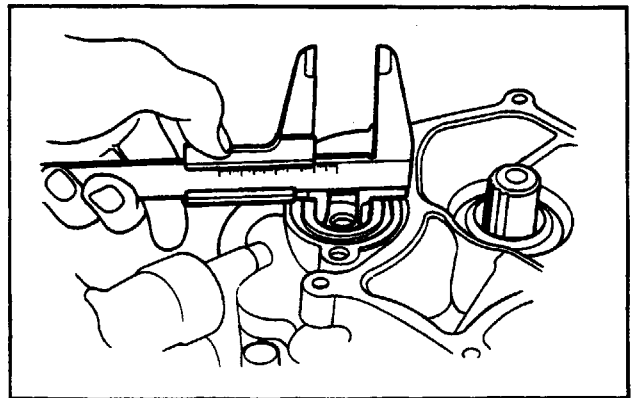
- 3) If the oil pressure is low, check the body and rotors for wear or damage.  
Check the check valve.

**CAUTION:**

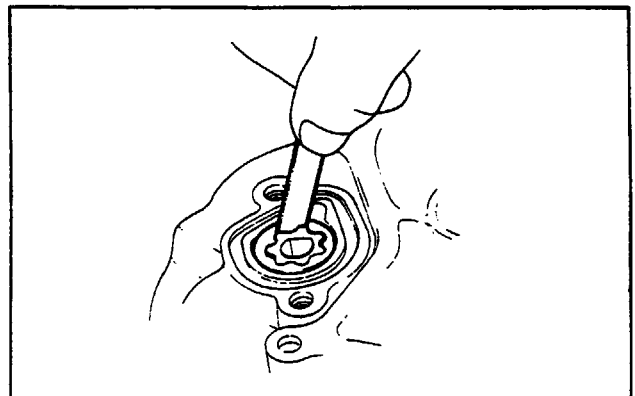
Do not raise the engine speed more than 2,500 min<sup>-1</sup> (rpm) until the oil indicator light comes on.

**• PUMP BODY ID**

| STANDARD            | SERVICE LIMIT       |
|---------------------|---------------------|
| 23.15 mm (0.911 in) | 23.20 mm (0.913 in) |

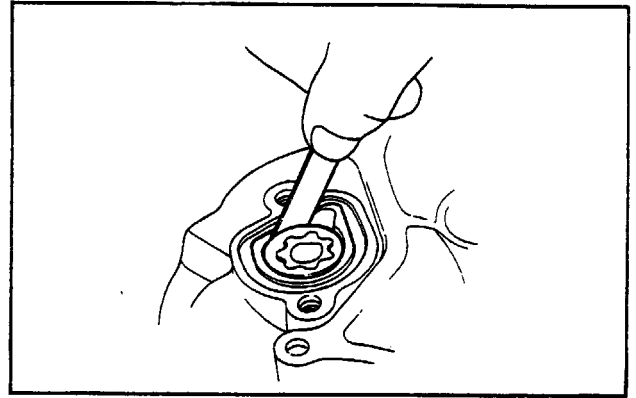
**• INNER ROTOR-TO-OUTER ROTOR CLEARANCE**

| STANDARD           | SERVICE LIMIT      |
|--------------------|--------------------|
| 0.15 mm (0.006 in) | 0.20 mm (0.008 in) |



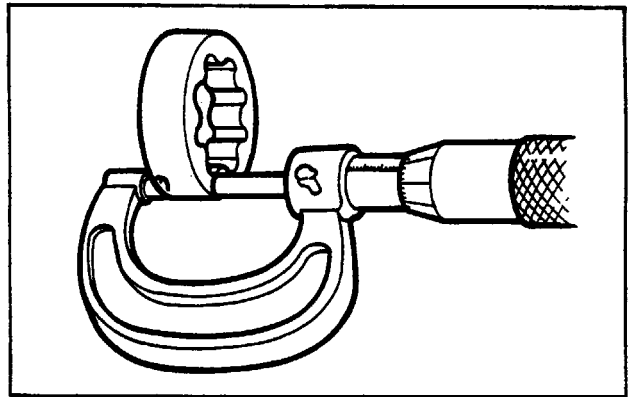
- OUTER ROTOR-TO-BODY CLEARANCE

| STANDARD                         | SERVICE LIMIT         |
|----------------------------------|-----------------------|
| 0.15–0.21 mm<br>(0.006–0.008 in) | 0.26 mm<br>(0.010 in) |



- OUTER ROTOR HEIGHT

| STANDARD            | SERVICE LIMIT       |
|---------------------|---------------------|
| 11.98 mm (0.472 in) | 11.95 mm (0.470 in) |

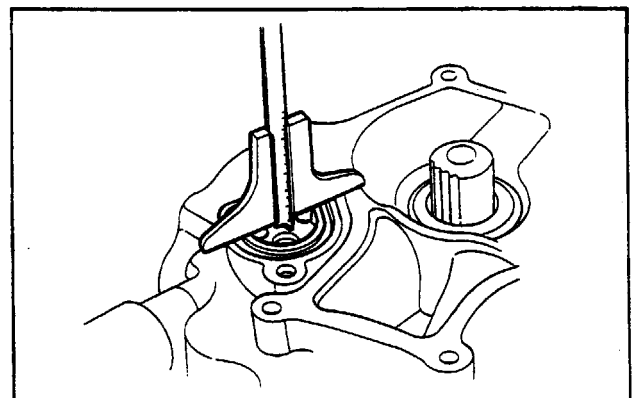


- PUMP BODY DEPTH

| STANDARD            | SERVICE LIMIT       |
|---------------------|---------------------|
| 12.00 mm (0.472 in) | 12.06 mm (0.475 in) |

- ROTOR-TO-BODY SIDE CLEARANCE

| STANDARD                           | SERVICE LIMIT         |
|------------------------------------|-----------------------|
| 0.02–0.09 mm<br>(0.0008–0.0035 in) | 0.11 mm<br>(0.004 in) |



### 8. CRANKSHAFT/PISTON

#### a. DISASSEMBLY/ASSEMBLY

#### • CRANKSHAFT/PISTON

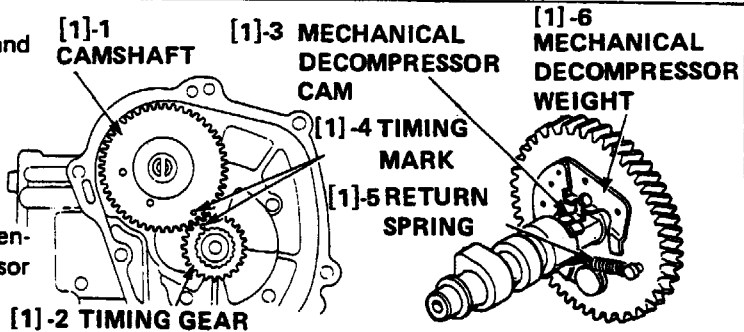
##### [1] CAMSHAFT

###### ASSEMBLY:

Align the timing marks on the crankshaft and camshaft, and install.

###### MECHANICAL DECOMPRESSOR ASSEMBLY:

Before installing, inspect for worn or weakened springs, and check that the decompressor weight is moving smoothly.



##### [12] VALVE LIFTER (2)

###### DISASSEMBLY:

Install the lifter before installing the camshaft.

##### [2] CONNECTING ROD BOLT (2)

10–14 N·m (100–140 kg·cm, 87–121 in·lb)

###### ASSEMBLY:

Tighten in two or more steps.

##### [11] PISTON PIN CLIP

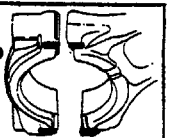
###### ASSEMBLY:

Insert one end of the clip into the groove in the piston, then install the other end by turning the clip.

##### [3] CONNECTING ROD CAP

###### ASSEMBLY:

Align the index marks on the cap and connecting rod, and install.



##### [4] CRANKSHAFT

###### ASSEMBLY:

Install by pressing in firmly until contact is made with the bearing surface.

##### [5] CYLINDER BLOCK

##### [6] BALL BEARING (6205)

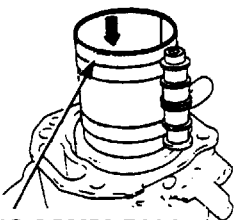
DISASSEMBLY, ASSEMBLY  
P. 50

##### [10] PISTON PIN

##### [9] PISTON

###### ASSEMBLY:

Install with the "▲" mark on the piston facing the push rod side.  
PISTON SLIDER



[9]-1  
PISTON RING COMPRESSOR  
(commercially available)

##### [8] CONNECTING ROD

Install with the longer end facing toward the "▲" mark on the piston head.

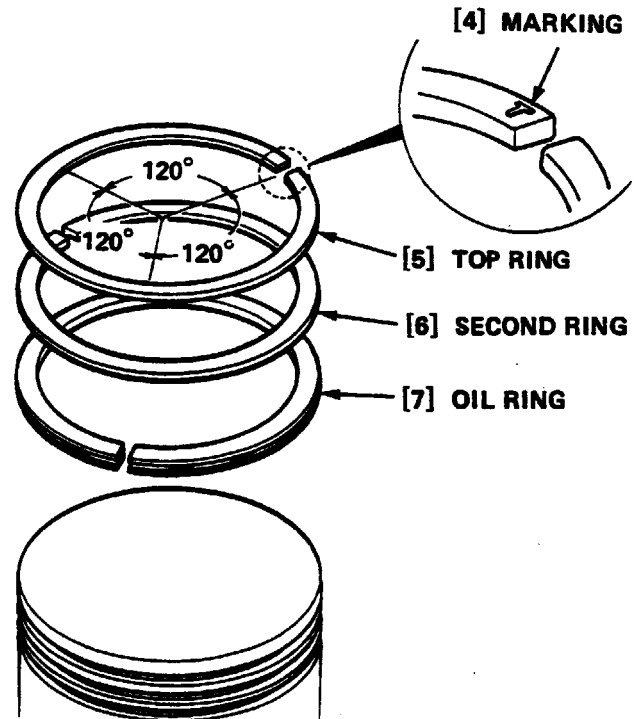
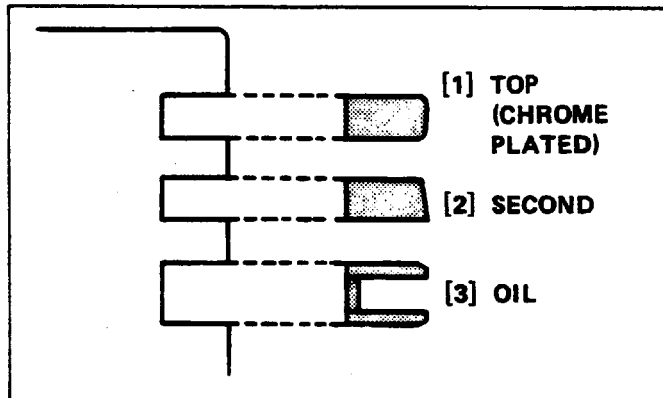
##### [7] OIL SEAL (25 x 38 x 7)

ASSEMBLY P. 51

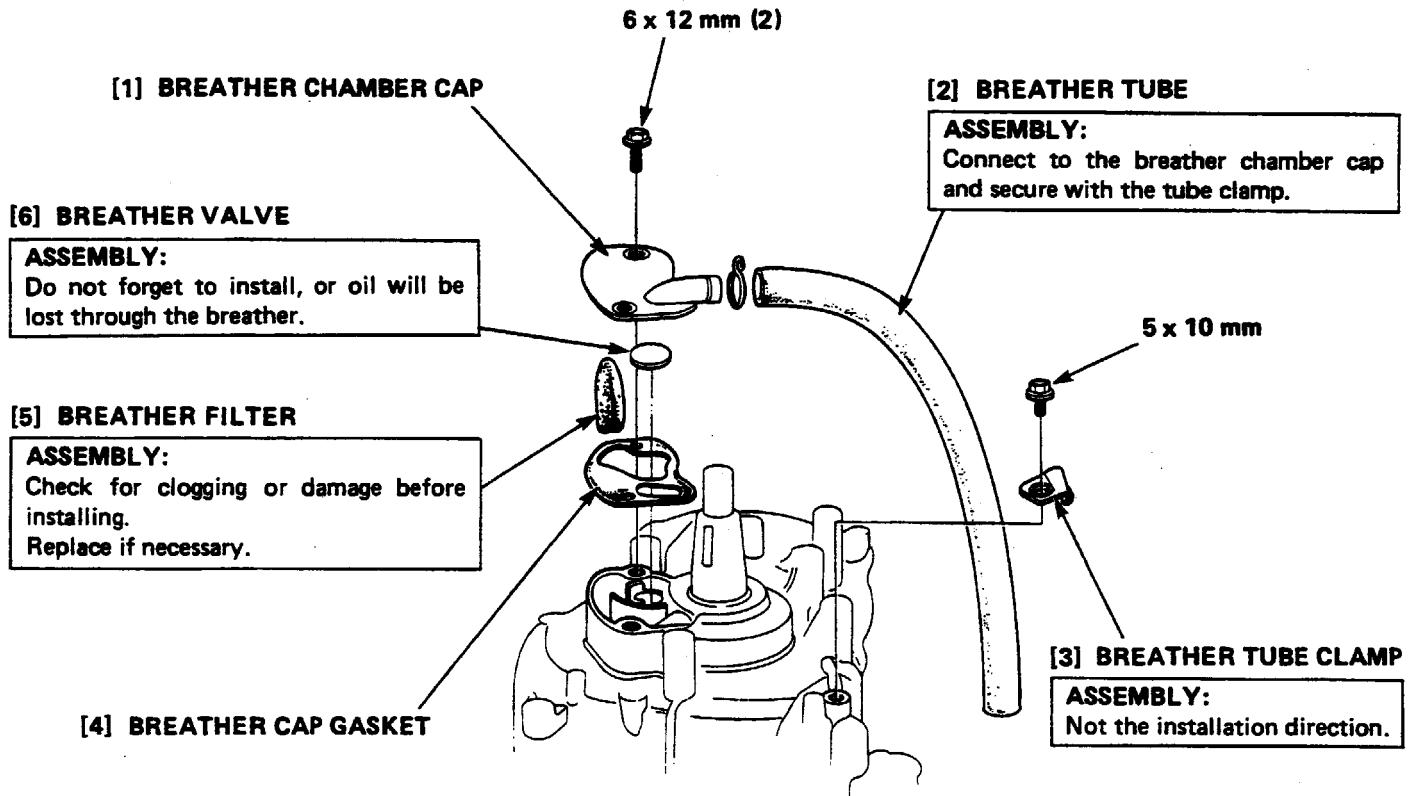
Apply grease to the oil seal lip.

### • PISTON RING

Install all ring with markings facing up.  
Be careful not to interchange the top and second ring.  
After installation, be sure the rings rotate freely in the piston groove.  
Space the piston ring end gaps  $120^{\circ}$  apart.  
Space the piston ring end gaps  $120^{\circ}$  apart.



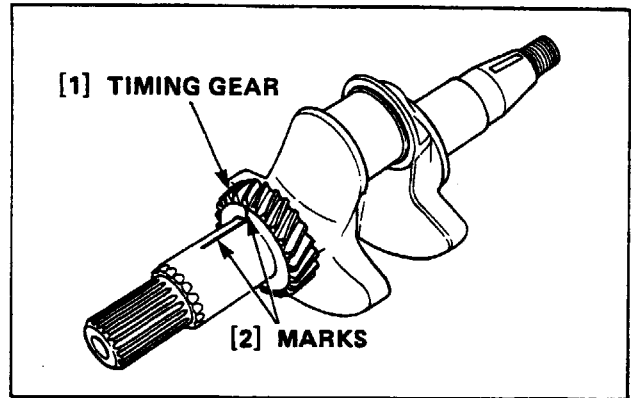
### • BREATHER CHAMBER



### • TIMING GEAR

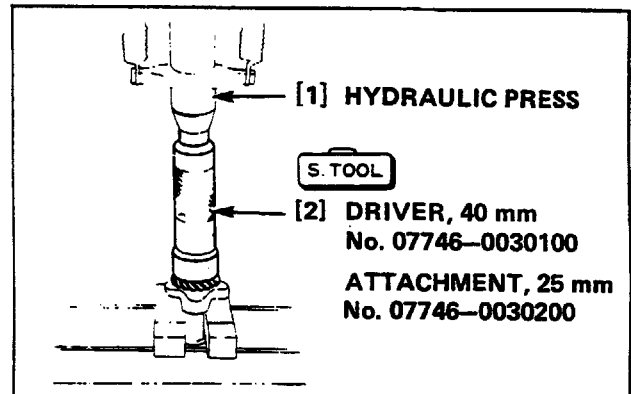
#### REMOVAL:

- 1) Make a mark on the crankshaft and timing gear as shown.
- 2) Remove the timing gear using a hydraulic press.



#### INSTALLATION:

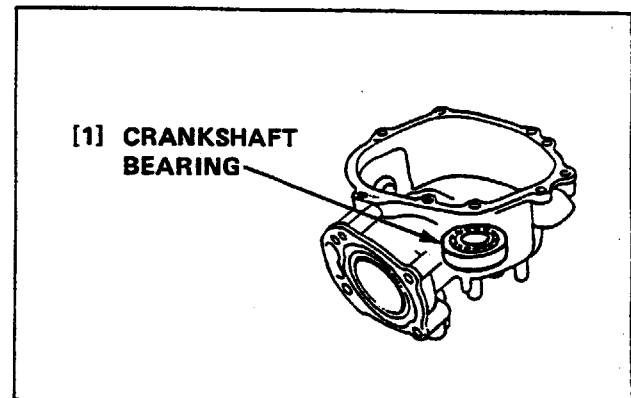
- 1) Using the old gear for reference, mark a line at the same position on the new gear.
- 2) Use a hydraulic press and the Driver (special tool) to press on the new timing gear with the reference marks aligned.



### • CRANKSHAFT BEARING (6205)

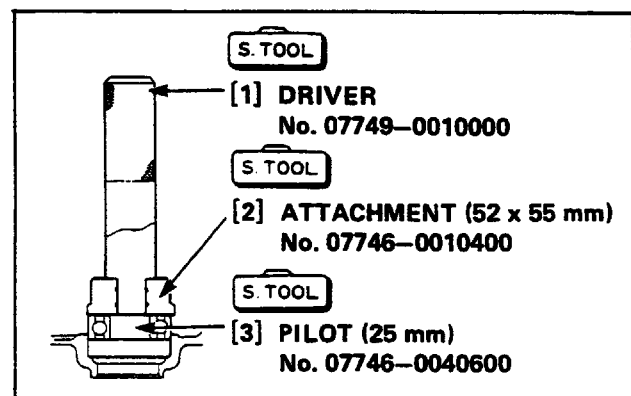
#### REMOVAL:

Drive out the crankshaft bearing.



#### INSTALLATION:

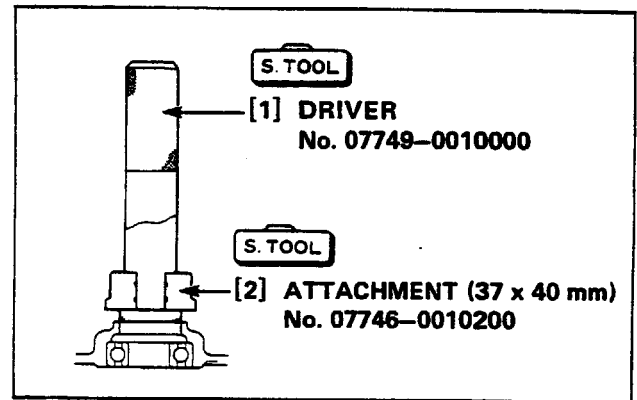
Apply engine oil to the bearing and drive the bearing in using the Driver, Attachment and Pilot (special tools).



### • OIL SEAL

#### ASSEMBLY:

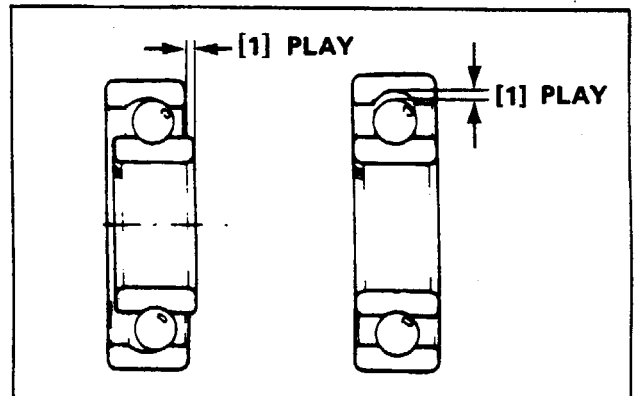
- 1) Drive the oil seal in using the Driver and Attachment (special tools).
- 2) Apply grease to the lip of the oil seal.



### b. INSPECTION

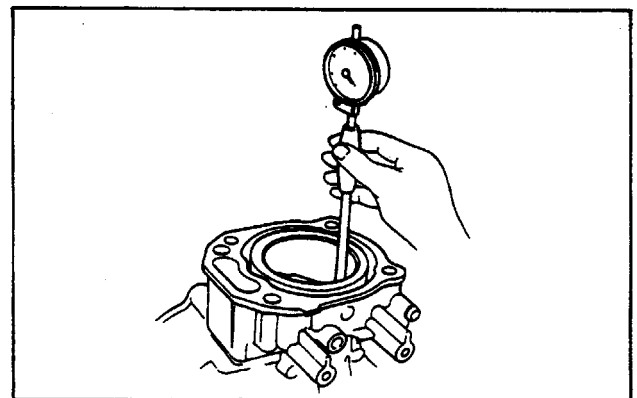
#### • CRANKSHAFT BEARING FREE PLAY

- 1) Clean the bearing in solvent and dry it.
- 2) Spin the bearing by hand and check for play.  
Replace the bearing if it is noisy or has excessive play.



#### • CYLINDER I.D.

| STANDARD             | SERVICE LIMIT       |
|----------------------|---------------------|
| 60.00 mm (2.3622 in) | 60.07 mm (2.365 in) |

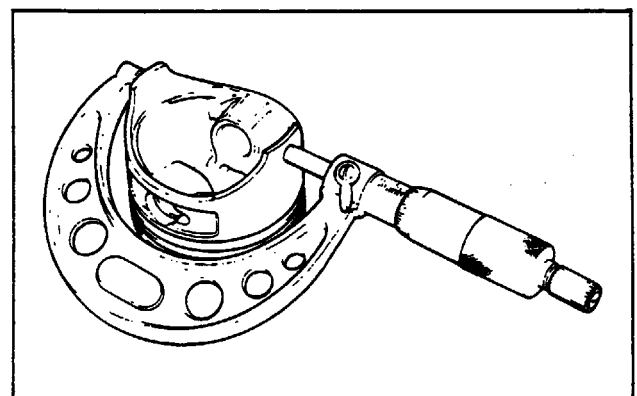


#### • PISTON SKIRT O.D.

| STANDARD              | SERVICE LIMIT       |
|-----------------------|---------------------|
| 59.985 mm (2.3616 in) | 59.92 mm (2.359 in) |

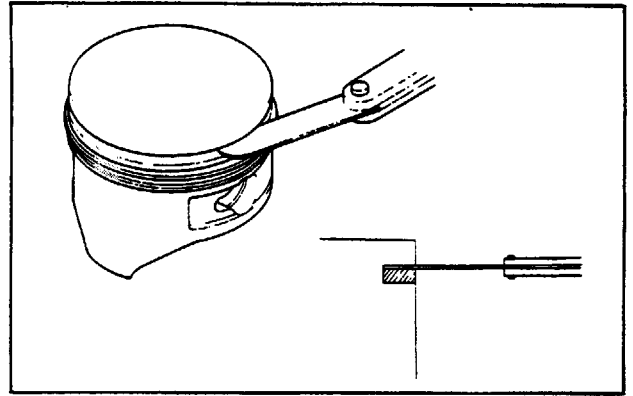
#### • PISTON-TO-CYLINDER CLEARANCE

| STANDARD                             | SERVICE LIMIT         |
|--------------------------------------|-----------------------|
| 0.015–0.050 mm<br>(0.0006–0.0020 in) | 0.10 mm<br>(0.004 in) |



### ● PISTON RING SIDE CLEARANCE

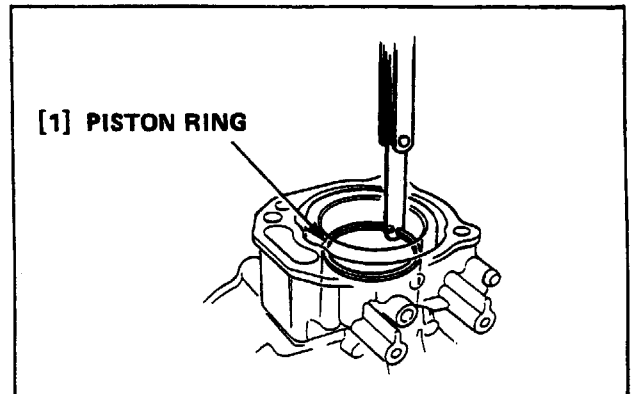
|                    | STANDARD                             | SERVICE LIMIT         |
|--------------------|--------------------------------------|-----------------------|
| TOP/SECOND/<br>OIL | 0.015–0.045 mm<br>(0.0006–0.0018 in) | 0.10 mm<br>(0.004 in) |



### ● PISTON RING END GAP

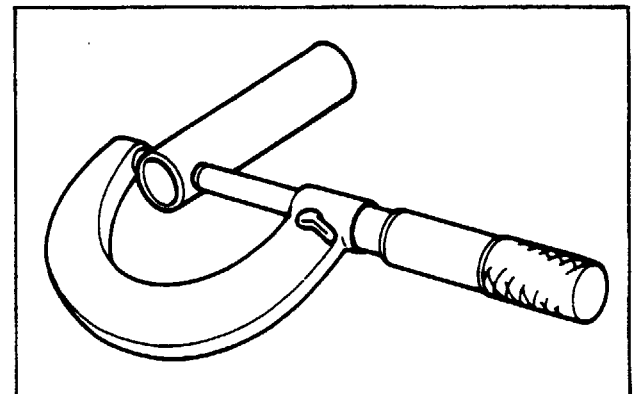
|                    | STANDARD                         | SERVICE LIMIT         |
|--------------------|----------------------------------|-----------------------|
| TOP/SECOND/<br>OIL | 0.15–0.35 mm<br>(0.006–0.014 in) | 0.50 mm<br>(0.020 in) |

Before measuring the end gap, use the piston top to position the ring so it will not be cocked in the cylinder bore.



### ● PISTON PIN O.D.

| STANDARD              | SERVICE LIMIT       |
|-----------------------|---------------------|
| 18.000 mm (0.7087 in) | 17.97 mm (0.707 in) |

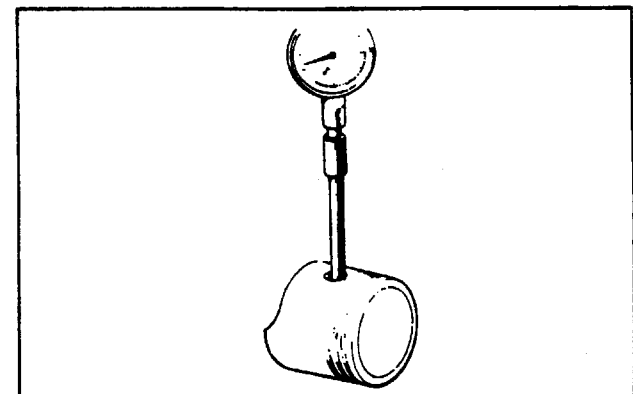


### ● PISTON PIN HOLE I.D.

| STANDARD              | SERVICE LIMIT       |
|-----------------------|---------------------|
| 18.002 mm (0.7087 in) | 18.02 mm (0.709 in) |

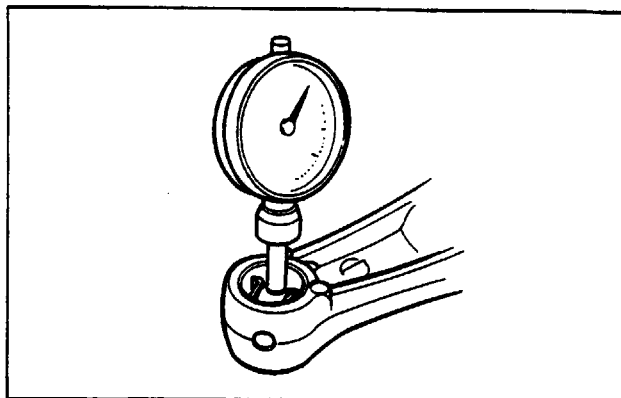
### ● PISTON PIN-TO-PISTON PIN HOLE CLEARANCE

| STANDARD                             | SERVICE LIMIT         |
|--------------------------------------|-----------------------|
| 0.002–0.014 mm<br>(0.0001–0.0006 in) | 0.04 mm<br>(0.002 in) |

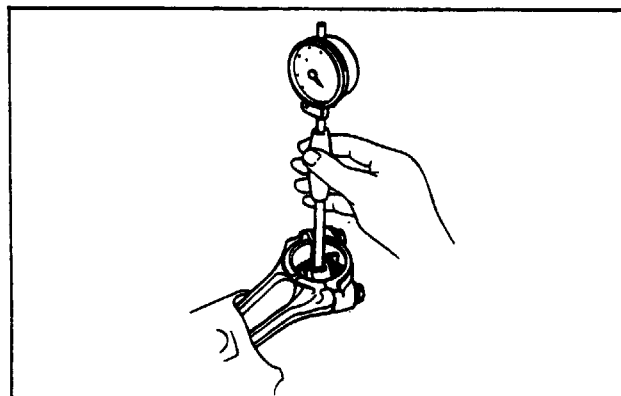


**• CONNECTING ROD SMALL END I.D.**

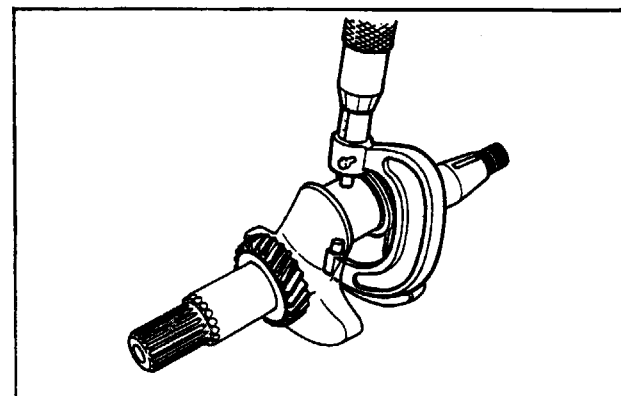
| STANDARD              | SERVICE LIMIT       |
|-----------------------|---------------------|
| 18.005 mm (0.7089 in) | 18.04 mm (0.710 in) |

**• CONNECTING ROD BIG END I.D.**

| STANDARD             | SERVICE LIMIT       |
|----------------------|---------------------|
| 30.02 mm (1.1819 in) | 30.05 mm (1.183 in) |

**• CRANKPIN O.D.**

| STANDARD             | SERVICE LIMIT       |
|----------------------|---------------------|
| 29.98 mm (1.1803 in) | 29.95 mm (1.179 in) |

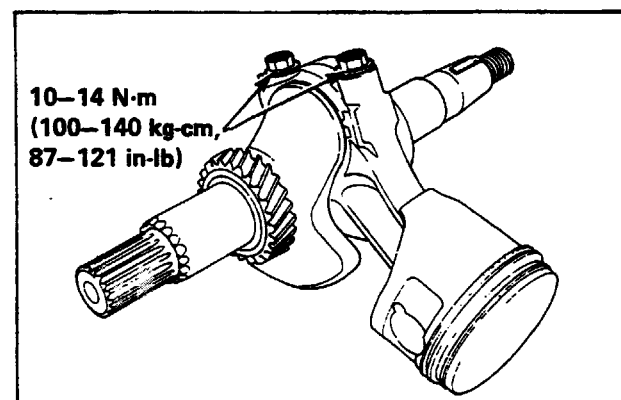
**• CONNECTING ROD BIG END OIL CLEARANCE (RADIAL)**

- 1) Clean all oil from the crank pin and connecting rod bearing surfaces.
- 2) Place a piece of plastigauge on the crank pin, install the connecting rod, and tighten the bolts to the specified torque.

**SPECIFIED TORQUE:** 10–14 N·m (100–140 kg-cm,  
87–121 in-lb)

**CAUTION:**

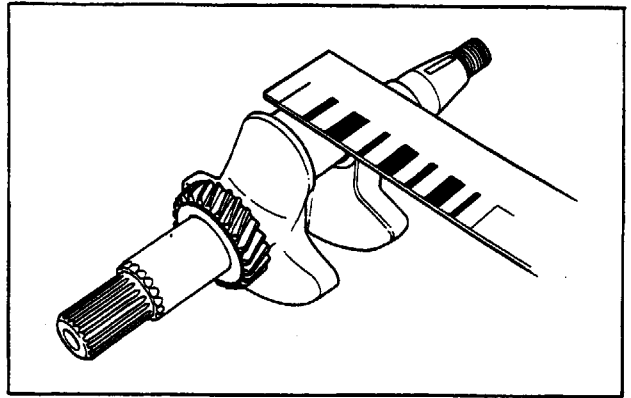
Do not rotate the crankshaft while the plastigauge is in place.



3) Remove the connecting rod and measure the plastigauge.

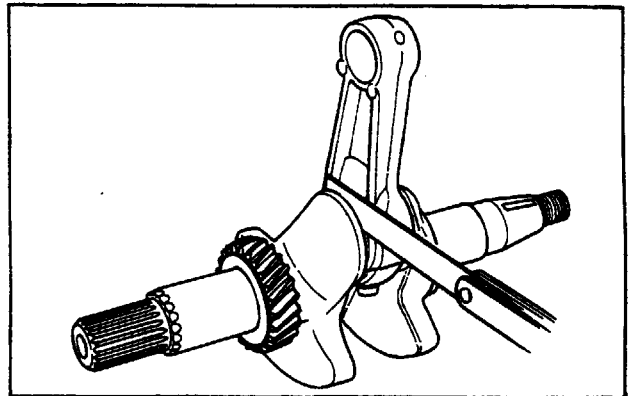
| STANDARD                             | SERVICE LIMIT         |
|--------------------------------------|-----------------------|
| 0.040–0.063 mm<br>(0.0016–0.0025 in) | 0.08 mm<br>(0.003 in) |

4) If the clearance exceeds the service limit, replace the connecting rod and recheck the clearance.



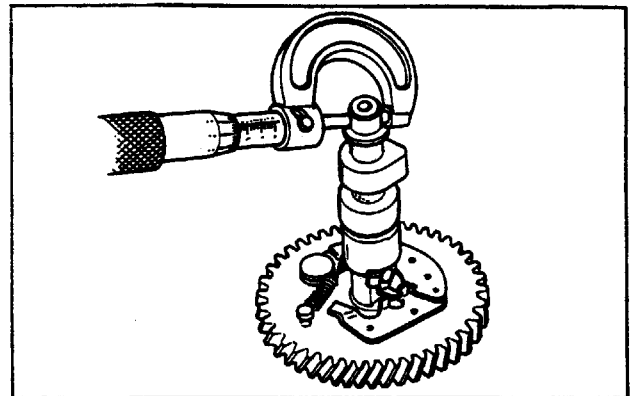
### • CONNECTING ROD BIG END AXIAL CLEARANCE

| STANDARD                       | SERVICE LIMIT        |
|--------------------------------|----------------------|
| 0.1–0.7 mm<br>(0.004–0.028 in) | 1.0 mm<br>(0.039 in) |



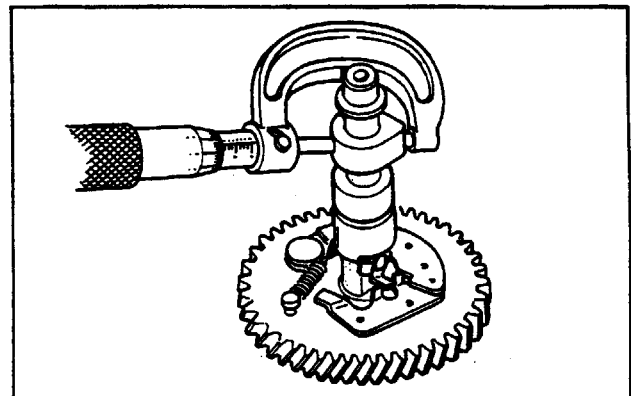
### • CAMSHAFT JOURNAL O.D.

|   | STANDARD             | SERVICE LIMIT       |
|---|----------------------|---------------------|
| A | 13.984 mm (0.551 in) | 13.95 mm (0.549 in) |
| B | 20.00 mm (0.787 in)  | 19.68 mm (0.775 in) |



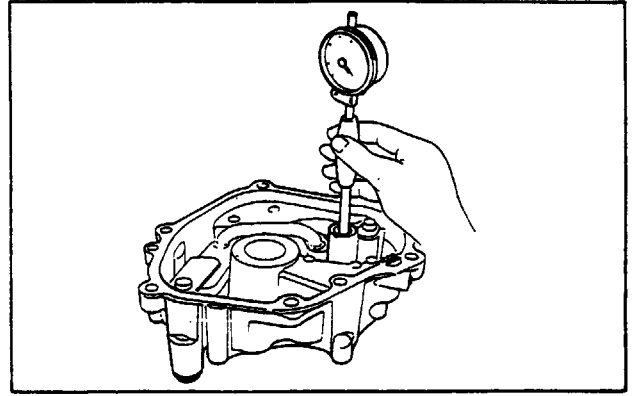
### • CAM HEIGHT

|    | STANDARD              | SERVICE LIMIT       |
|----|-----------------------|---------------------|
| IN | 27.710 mm (1.0909 in) | 27.45 mm (1.081 in) |
| EX | 27.747 mm (1.0924 in) | 27.50 mm (1.083 in) |



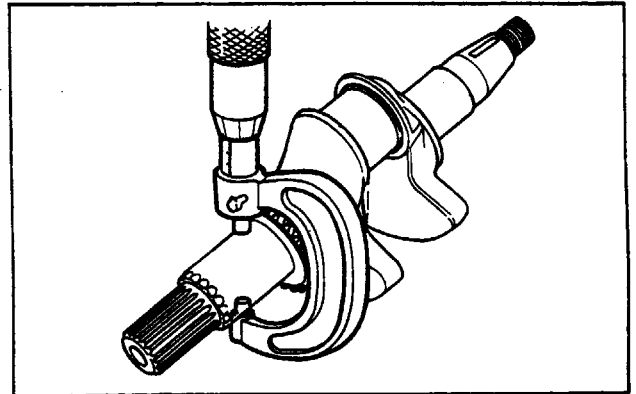
- CAMSHAFT BEARING I.D.

| STANDARD          | SERVICE LIMIT       |
|-------------------|---------------------|
| 14.0 mm (0.55 in) | 14.04 mm (0.553 in) |



- CRANKSHAFT OIL PAN BEARING O.D.

| STANDARD              | SERVICE LIMIT       |
|-----------------------|---------------------|
| 24.993 mm (0.9840 in) | 24.97 mm (0.983 in) |

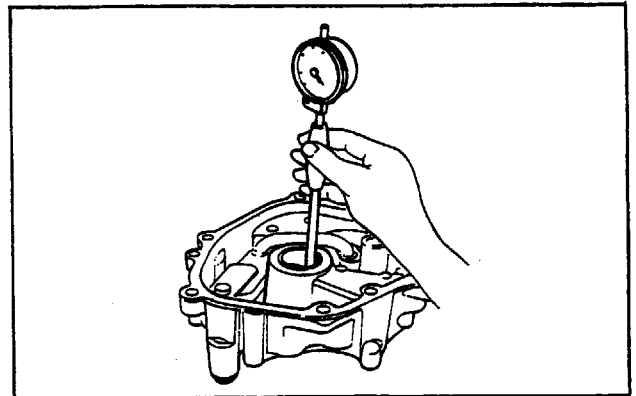


- OIL PAN MAIN BEARING I.D.

| STANDARD              | SERVICE LIMIT       |
|-----------------------|---------------------|
| 25.013 mm (0.9848 in) | 25.04 mm (0.986 in) |

- CRANKSHAFT-TO-MAIN BEARING CLEARANCE

| STANDARD                             | SERVICE LIMIT         |
|--------------------------------------|-----------------------|
| 0.020–0.046 mm<br>(0.0008–0.0018 in) | 0.07 mm<br>(0.003 in) |



### 9. THROTTLE CABLE/HANDLE

#### [1] DIAPHRAGM ASSEMBLY

##### REASSEMBLY:

Replace if the diaphragm rubber is deteriorated or damaged.

When installing to the throttle shaft bracket, adjust distance between the adjusting nut end and bracket to  $8.7 \pm 1$  mm ( $0.34 \pm 0.04$  in).

#### [1]-1 THROTTLE SHAFT

##### BRACKET

##### [1]-2 DIAPHRAGM

$8.7 \pm 1$  mm  
( $0.34 \pm 0.09$  in)

#### [1]-3 ADJUSTING NUT

#### [3] THROTTLE LINK

##### REASSEMBLY:

Install between the 3 x 32 mm and 3 x 18 mm spring pins.

#### [4] ADJUSTING SCREW

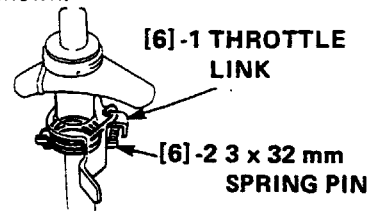
##### ADJUSTMENT: P. 22

#### [5] SHAFT BUSHING (2)

#### [6] THROTTLE ARM SPRING

##### REASSEMBLY:

Hook the ends to the throttle link and 3 x 32 mm spring pin as shown.



#### [6]-1 THROTTLE LINK

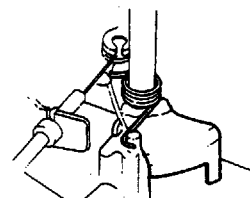
#### [6]-2 3 x 32 mm SPRING PIN

#### [7] 10 mm PLAIN WASHER

#### [8] THROTTLE SHAFT SPRING

##### REASSEMBLY:

Hook the ends to the shift shaft and lug on the engine housing as shown.



#### [2] 5 x 16 mm PAN HEAD SCREW (2)

#### [17] ADJUSTING NUT

#### [16] THROTTLE SHAFT BRACKET

##### REASSEMBLY:

After installing the diaphragm to the bracket, install the bracket being careful that the diaphragm rod does not interfere with the throttle link.

#### [9] 3 x 18 mm SPRING PIN

#### [10] 3 x 32 mm SPRING PIN

**DISASSEMBLY, REASSEMBLY:**  
Drive out and in with a commercially available pin driver, 3 mm or special tool.

##### S. TOOL

**PIN DRIVER, 3 mm**  
No. 07744-0010200

#### [15] NEUTRAL START PAWL

##### REASSEMBLY:

Hook one end of the pawl spring to the lug on the pawl and install the pawl. After installing the throttle bracket to the throttle shaft, unhook the spring end and hook it to the bracket.

#### [15]-1 THROTTLE SHAFT BRACKET

#### [15]-3 PAWL

#### [15]-2 PAWL SPRING

#### [15]-4 LUG

#### [14] 10 mm PLAIN WASHER

#### [12] THROTTLE CABLE

##### REASSEMBLY: P. 22

#### [13] THROTTLE ROD SET BOLT

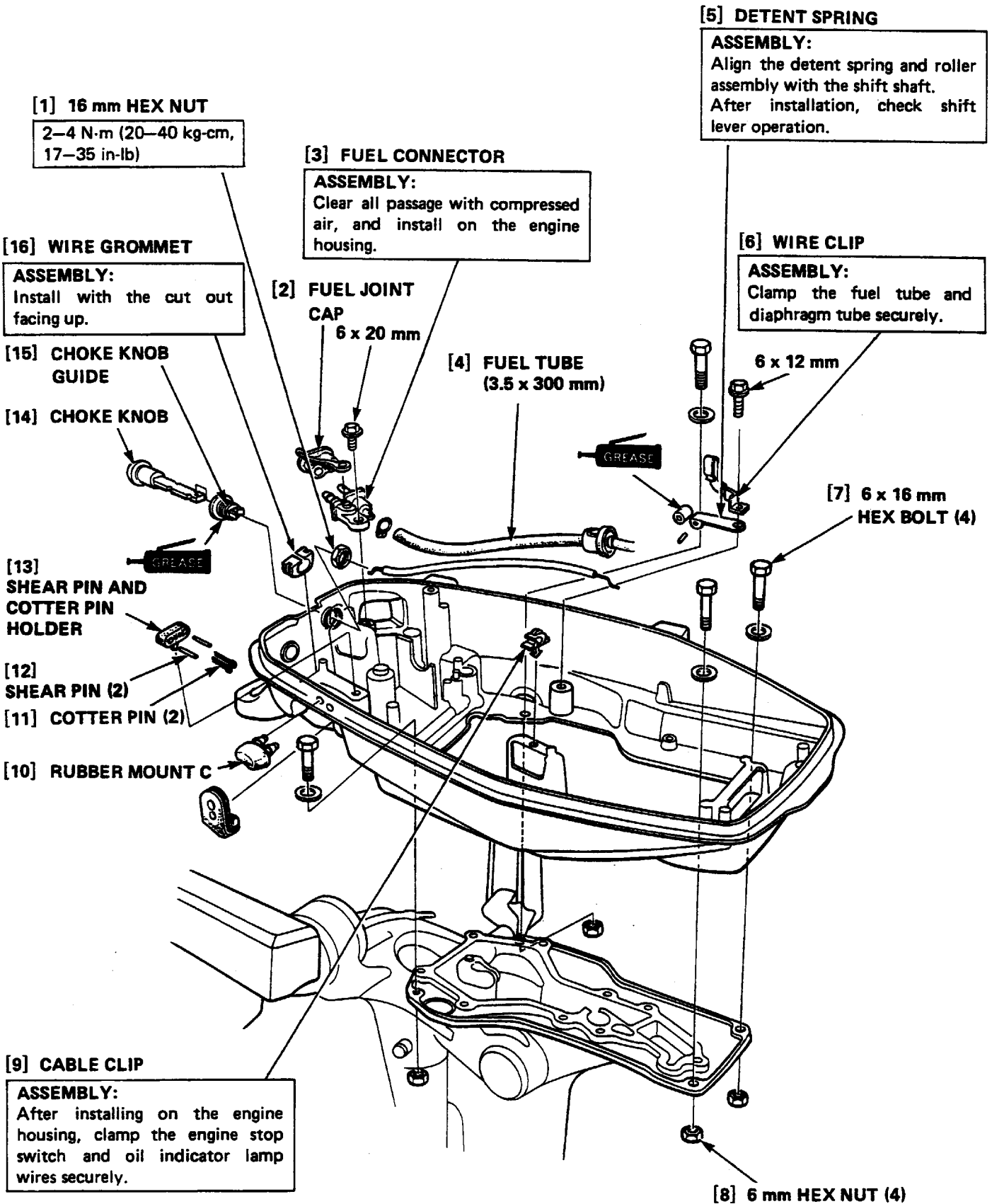
1.7-2.5 N·m (17-25 kg-cm, 1.2-1.8 ft-lb)

#### [11] CABLE HOLDER

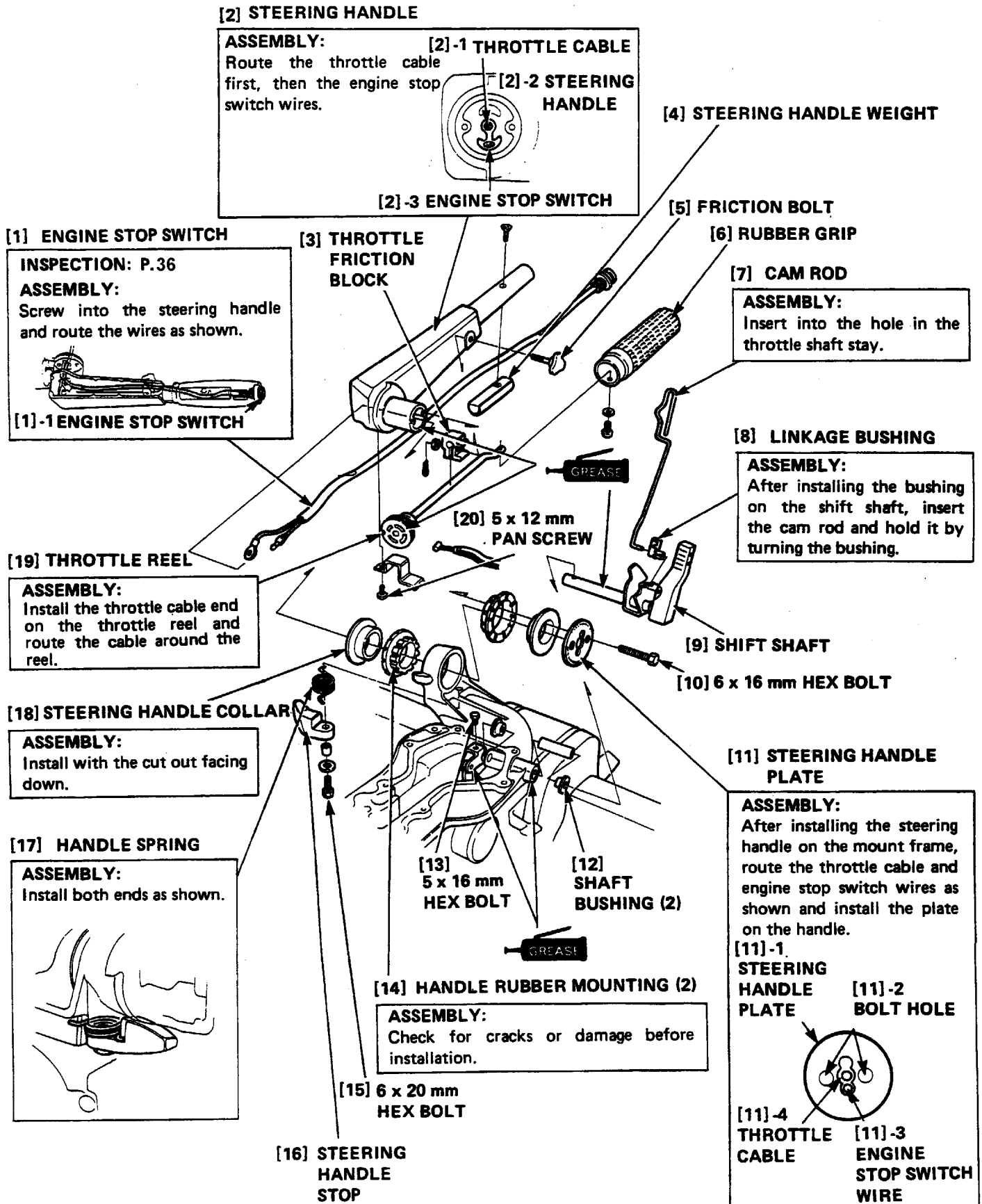
##### REASSEMBLY:

Install on the engine housing together with the choke cable outer.

### • ENGINE HOUSING



### • HANDLE/SHIFT SHAFT



## 10. EXTENSION CASE/SWIVEL CASE/STERN BRACKET

### • EXTENSION CASE/MOUNT FRAME

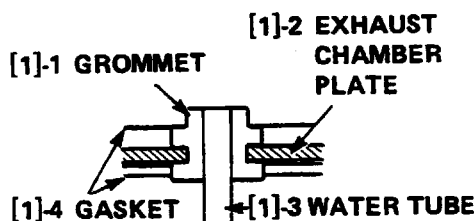
#### [1] WATER TUBE

##### DISASSEMBLY:

Cannot remove from gear case side.

##### ASSEMBLY:

Install the water tube grommet on the exhaust chamber plate, then connect the water tube as shown.



#### [2] VERTICAL SHAFT

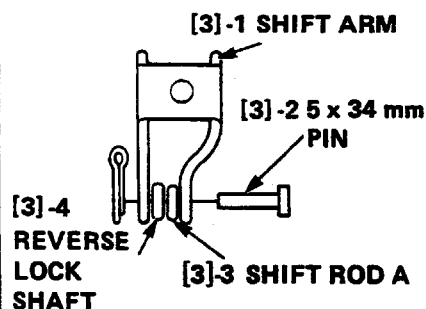
##### ASSEMBLY:

Apply molybdenum grease to the serrations. Install the upper end on the crankshaft and lower end on the pinion shaft by rotating the propeller shaft.

#### [3] SHIFT ARM

##### ASSEMBLY:

Install the shift rod A and reverse lock shaft.



#### [4] MOUNTING WASHER

##### ASSEMBLY:

Note the installation direction.



[23] WATER TUBE GROMMET

[22] LEFT SHIFT ROD JOINT  
ADJUSTMENT: P.23

[21] 6 x 14 mm  
HEX BOLT

[20] RIGHT SHIFT ROD JOINT

[19] UPPER EXHAUST CHAMBER  
PLATE GASKET

[18] LOWER EXHAUST  
CHAMBER PLATE  
GASKET

[17] EXHAUST CHAMBER PLATE

##### ASSEMBLY:

Check for cracks or wear and install.

[5] 40 mm INTERNAL CIRCLIP (2)

##### ASSEMBLY:

Install in the mount frame groove securely.

[6] UPPER RUBBER MOUNT (2)

##### ASSEMBLY:

Checks for cracks or tears and install with the OUT side facing out.

[7] THRUST  
WASHER

[8] MOUNTING FRAME

[9] MOUNTING CAP

[10] RIGHT LOWER MOUNTING HOUSING

[11] LEFT LOWER MOUNTING HOUSING

##### ASSEMBLY:

Install aligning the tab with the swivel shaft hole.

[16] INSPECTION PLUG

[15] EXTENSION CASE

[14] REVERSE LOCK NUT  
ADJUSTMENT: P. 23, 24

[12] LOWER MOUNTING RUBBER B

##### ASSEMBLY:

Check for cracks or tears then install with the spherical surface facing extension case.

[12]-1 EXTENSION CASE



[13] LOWER MOUNTING RUBBER A

##### ASSEMBLY:

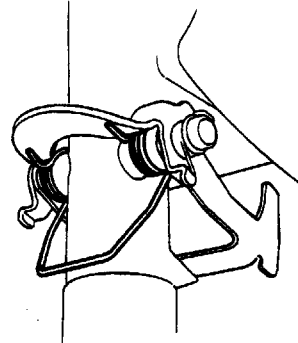
Check for crack or tear and install.

### • REVERSE LOCK

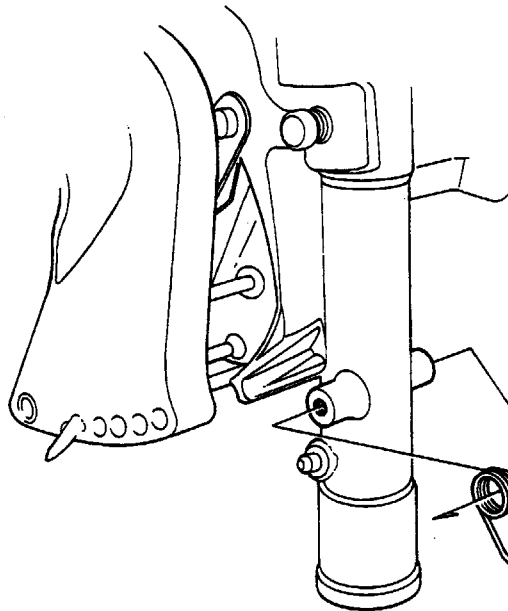
#### [1] REVERSE LOCK SPRING

##### ASSEMBLY:

Hook the both ends on the reverse lock plate.



#### [2] LEFT REVERSE LOCK SPRING



#### [6] REVERSE LOCK HOOK

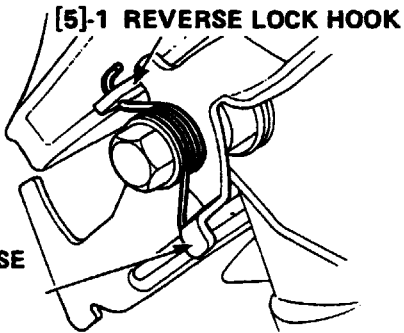
#### [5] RIGHT REVERSE LOCK SPRING

##### ASSEMBLY:

Right and left springs are not interchangeable. Hook the one end of the spring on the reverse lock hook and other end to the reverse lock plate, as shown.

##### [5]-1 REVERSE LOCK HOOK

##### [5]-2 REVERSE LOCK PLATE



#### [3] REVERSE LOCK PLATE

#### [4] REVERSE LOCK BOLT

### • SWIVEL CASE/STERN BRACKET

#### [1] SWIVEL CASE LINER (2)

##### ASSEMBLY:

Check for wear, cracks or damage and install aligning the liner groove with the tab on the swivel case.

#### [2] 8 mm THRUST WASHER

#### [4] 2 mm SPRING PIN

##### DISASSEMBLY/ASSEMBLY:

Drive in and out of the adjusting rod using a commercially available pin driver, 2 mm or special tool.

##### S. TOOL

PIN DRIVER, 2 mm  
No. 07944-9350100

#### [21] FRICTION BLOCK

##### ASSEMBLY:

Install to the swivel case cutout.

#### [20] 8 x 130 mm HEX BOLT

15-20 N·m (150-200 kg-cm,  
130-174 in-lb)

#### [19] CLAMP GRIP

#### [18] 6 x 140 mm HEX BOLT

#### [16] 4 mm SPRING PIN

##### DISASSEMBLY/ASSEMBLY:

Drive in and out using a commercially available pin driver, 4 mm or special tool.

##### S. TOOL

PIN DRIVER, 4 mm  
No. 07944-9350200

#### [15] GREASE NIPPLE

After installing the mount frame on the swivel case, apply grease using the grease gun.

#### [14] OIL SEAL (28 x 33 x 7)

##### ASSEMBLY:

Drive into the swivel case using the special tools.

##### S. TOOL

##### DRIVER:

No. 07749-0010000

ATTACHMENT, 32 x 35 mm

No. 07746-0010100

PILOT, 28 mm

No. 07746-0041100

#### [3] 8 mm SELF-LOCKING NUT

#### [5] ROD STOPPER

#### [6] ADJUSTING ROD

#### [7] 6 mm HEX NUT

#### [8] 6 mm SPRING WASHER

#### [9] 6 mm THRUST WASHER

#### [10] 6 mm HEX NUT

##### ASSEMBLY:

Install with the spring ends on the tilt arm and the center against the swivel case.

#### [13] TILT SHAFT

#### [12] TILT ARM

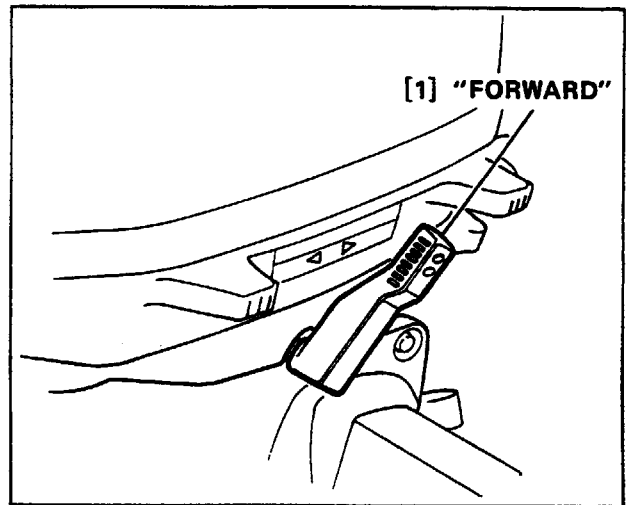
##### ASSEMBLY:

Install the tilt arm with the hook return spring on the swivel case, using the tilt shaft and 6 mm hex nut. When installing on the stern bracket, align the tilt arm rod with the stern bracket groove.

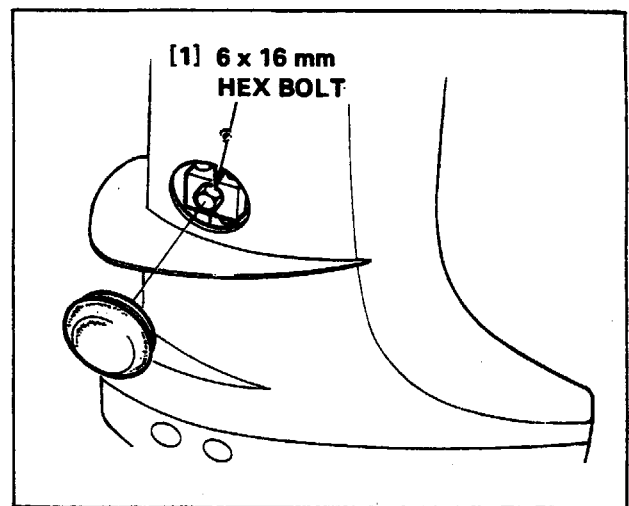


### 11. GEAR CASE REMOVAL

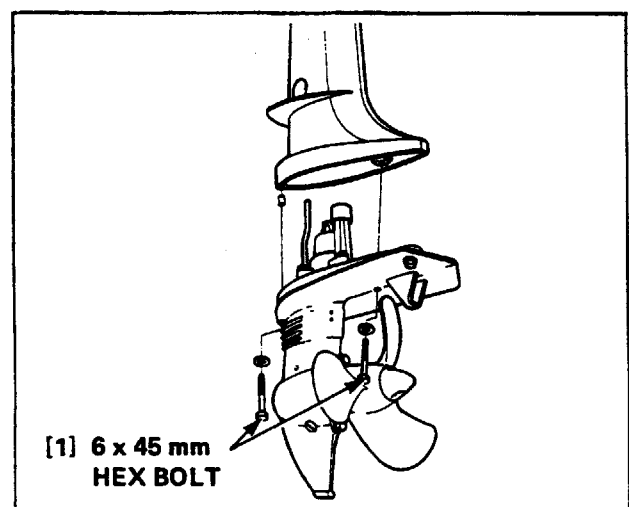
- 1) Place the shift lever in the "FORWARD" position.



- 2) Remove the inspection plug from the extension case, and loosen the 6 x 16 mm bolt on the shift rod joint.



- 3) Remove the gear case from the extension case by removing the two 6 x 45 mm hex bolts.



## 12. PROPELLER SHAFT/GEAR CASE

### a. DISASSEMBLY/ASSEMBLY

#### • PROPELLER

##### [1] 6004 BALL BEARING

###### DISASSEMBLY:

Hold the propeller shaft B holder with a vise or other holder, then pull the bearing off the propeller shaft holder using the Bearing remover, 20 mm (special tool).

###### S. TOOL [1]-1

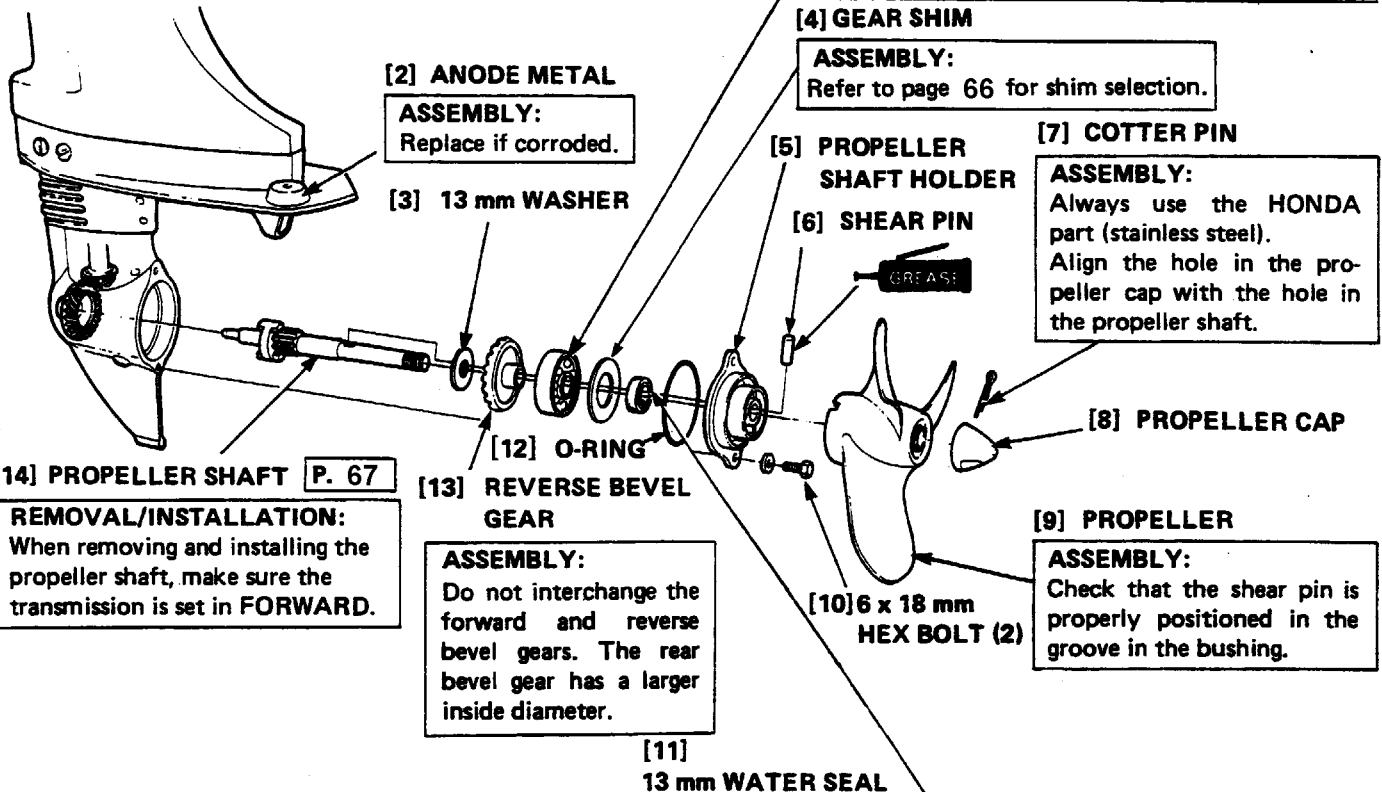
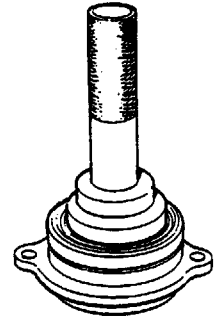
**BEARING REMOVER, 20 mm**  
No. 07936-3710600  
**BEARING REMOVER WEIGHT**  
No. 07936-3710200  
**BEARING REMOVER HANDLE**  
No. 07936-3710100

###### ASSEMBLY:

Apply oil to the bearing outer, then drive the bearing into the propeller shaft holder using the special tools.

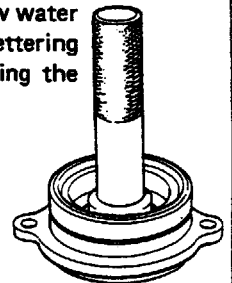
###### S. TOOL [1]-2

**DRIVER No. 07749-0010000**  
**ATTACHMENT, 42 x 47 mm**  
No. 07746-0010300  
**PILOT, 20 mm No. 07746-0040500**



###### S. TOOL

**ATTACHMENT, 32 x 35 mm**  
No. 07746-0010100  
**DRIVER No. 07749-0010000**



### • IMPELLER PUMP

#### [1] 6 x 28 mm HEX BOLT (4)

##### ASSEMBLY:

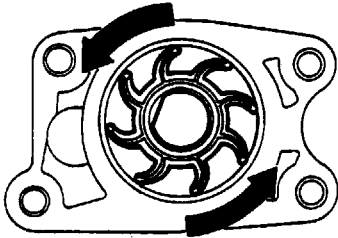
Apply SEA LOCK #10 to the thread before installing.

#### [2] WATER TUBE SEAL RING

#### [7] IMPELLER PUMP

##### ASSEMBLY:

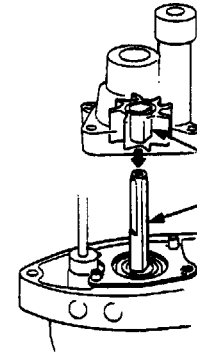
Check for wear or cracks. Install the pump in the impeller housing while turning it counterclockwise.



#### [3] IMPELLER HOUSING

##### ASSEMBLY:

Align the flat surface in the center of the pump with the flat side of the pinion shaft.



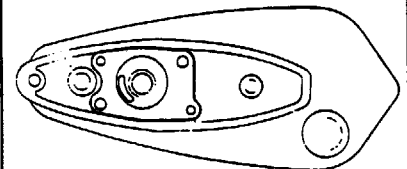
[3]-1  
FLAT  
SIDE

#### [4] IMPELLER GASKET (2)

#### [5] IMPELLER COVER

##### ASSEMBLY:

Check to be sure the cover is not bent or cracked. Install with gaskets on both sides of the cover.



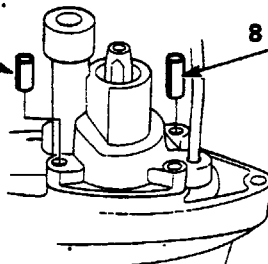
#### [6] DISTANCE COLLAR

##### ASSEMBLY:

The collars are not interchangeable. Install as shown.

8 x 14 mm (2)

8 x 20 mm (2)



### • PINION SHAFT/FORWARD BEVEL GEARS

#### [1] 2.5 x 12 mm SPRING PIN

##### REMOVAL/INSTALLATION:

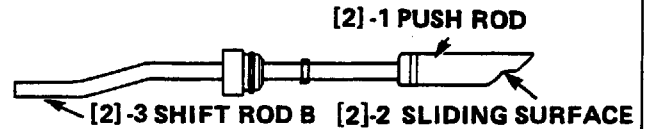
Drive the spring pin in and out using a commercially available pin driver, 2.5 mm or special tool.

**S. TOOL** PIN DRIVER, 2.5 mm  
No. 07744-0010100

#### [2] SHIFT ROD B

##### ASSEMBLY:

Install with bent side facing the push rod sliding surface.



#### [18] 6 mm WATER SEAL

##### DISASSEMBLY:

Remove the push rod and 2.5 x 12 mm spring pin, then pull the water seal out of the shift rod B with the seal holder.

#### [17] 2.5 x 11.8 mm SPRING PIN

##### REMOVAL/INSTALLATION:

Drive the spring pin in and out using a commercially available pin driver, 2.5 mm or special tool.

**S. TOOL** PIN DRIVER, 2.5 mm  
No. 07744-0010100

#### [16] 8 mm NYLON WASHER

#### [15] OIL CHECK BOLT (3)

5-8 N·m (50-80 kg·cm,  
43-69 in·lb)

#### [14] GEAR CASE

##### ASSEMBLY:

If a new gear case is installed, be sure to select the correct gear shims and pinion washer (page 66).

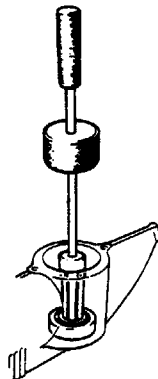
#### [12] 6004 BALL BEARING

##### DISASSEMBLY:

Remove the bearing using the Bearing remover (special tool).

##### S. TOOL

BEARING REMOVER, 20 mm  
No. 07936-3710600  
BEARING REMOVER WEIGHT  
No. 07936-3710200  
BEARING REMOVER HANDLE  
No. 07936-3710100

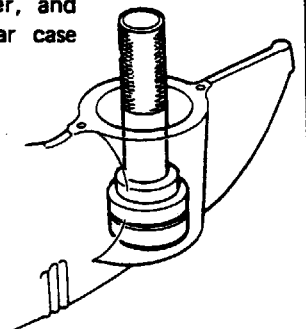


##### ASSEMBLY:

Apply oil to the bearing outer, and drive the bearing into the gear case using the special tools.

##### S. TOOL

ATTACHMENT, 42 x 47 mm  
No. 07746-0010300  
PILOT, 20 mm  
No. 07746-0040500  
DRIVER  
No. 07749-0010000



#### [3] PINION SHAFT

#### [4] SEAL HOLDER

#### [5] O-RING (10.8 x 2.5)

#### [6] PUSH ROD

GREASE

#### [7] 13 mm WATER SEAL

##### ASSEMBLY:

Apply grease to the seal lip and install the seal with the lettering facing upward, away from the gear case.

#### [8] PINION WASHER

##### ASSEMBLY:

Refer to page 66 for washer selection.

#### [13] GEAR SHIM

##### ASSEMBLY:

Refer to page 66 for shim selection.

#### [11] FORWARD BEVEL GEAR

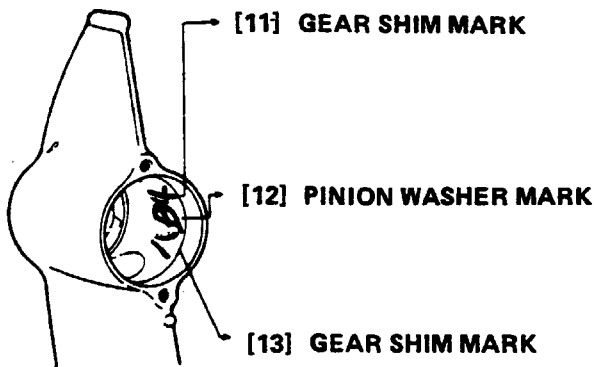
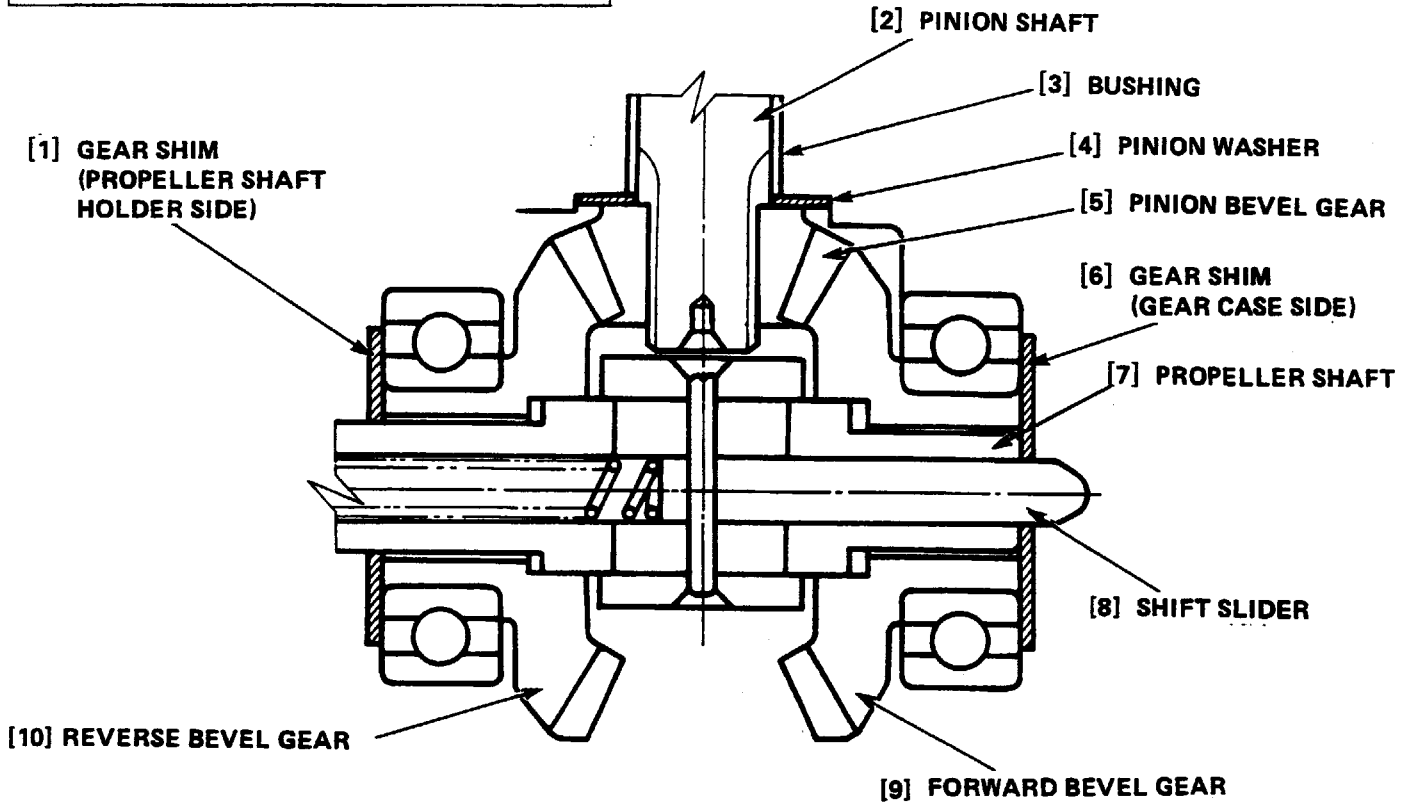
#### [9] PINION BEVEL GEAR

##### ASSEMBLY:

After installing the forward bevel gear, place the pinion washer and pinion bevel gear in the gear case, and insert the pinion shaft.

### • SHIM SELECTION

Gear shim and pinion washer codes are marked inside the gear case. If a new gear case is installed, refer to these codes, and select the correct parts.



#### GEAR SHIM (GEAR CASE SIDE)

| CODE | SHIM                         | SHIM Q'TY |
|------|------------------------------|-----------|
| 1    | NOT NECESSARY                | —         |
| □    | SHIM A<br>0.05 mm (0.002 in) | 1         |
| △    | SHIM B<br>0.10 mm (0.004 in) | 1         |
| ＝    | SHIM C<br>0.15 mm (0.006 in) | 1         |

#### PINION WASHER

| CODE | WASHER             | WASHER Q'TY |
|------|--------------------|-------------|
| A    | 1.00 mm (0.039 in) | 1           |
| B    | 1.05 mm (0.041 in) | 1           |

#### GEAR SHIM (PROPELLER SHAFT HOLDER SIDE)

| CODE | SHIM                         | SHIM Q'TY |
|------|------------------------------|-----------|
| 1    | NOT NECESSARY                | —         |
| 2    | SHIM A<br>0.05 mm (0.002 in) | 1         |
| 3    | SHIM B<br>0.10 mm (0.004 in) | 1         |
| 4    | SHIM C<br>0.15 mm (0.006 in) | 1         |

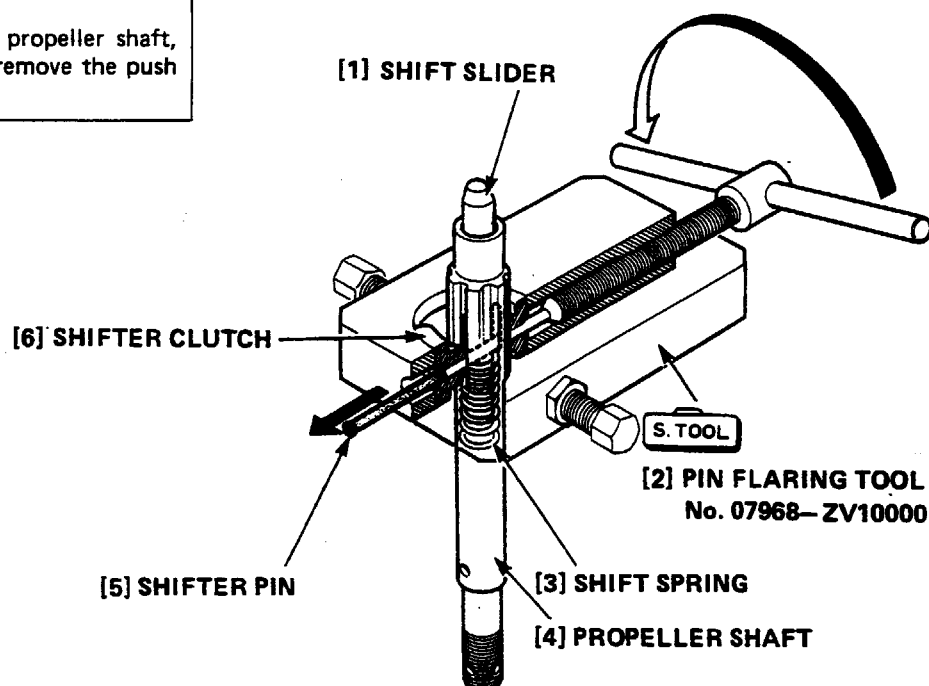
EXAMPLE: GEAR CASE NUMBER: "△-B4"

△ : GEAR SHIM (GEAR CASE SIDE) SHIM B 0.10 mm (0.004 in)  
 B : PINION WASHER WASHER B 1.05 mm (0.041 in) x 1  
 4 : GEAR SHIM (PROPELLER SHAFT HOLDER SIDE) SHIM C 0.15 mm (0.006 in) x 1

### • PROPELLER SHAFT

#### DISASSEMBLY:

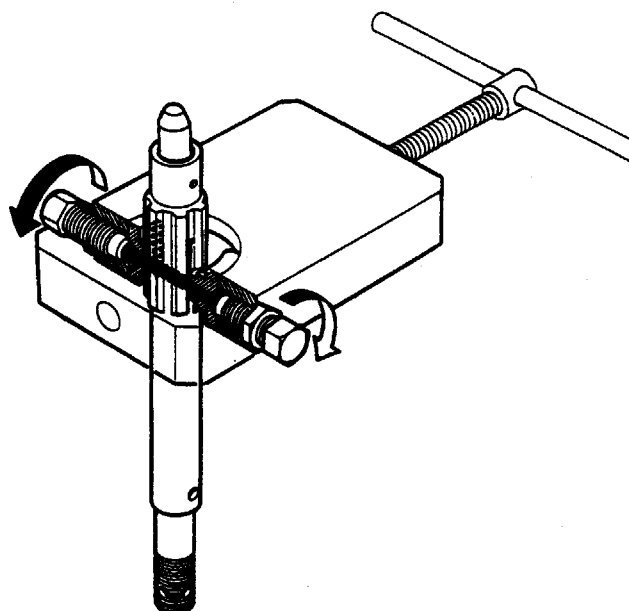
Remove the shifter pin from the propeller shaft, using a 3.0 mm pin driver. Then remove the push rod, spring, and shifter pin.



#### ASSEMBLY:

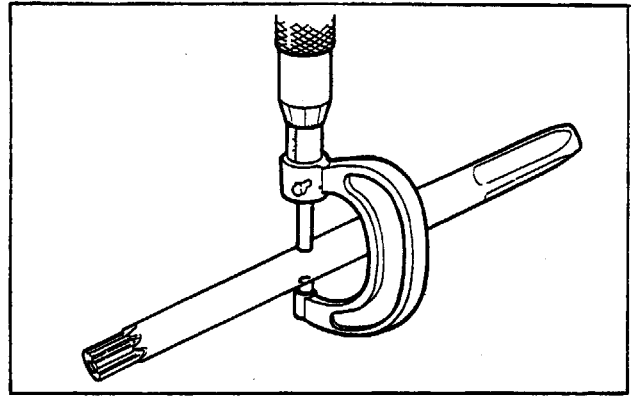
Align the holes in the shifter clutch, propeller shaft and push rod, and insert a new shifter pin into the holes.

Flare both ends of the shifter pin.

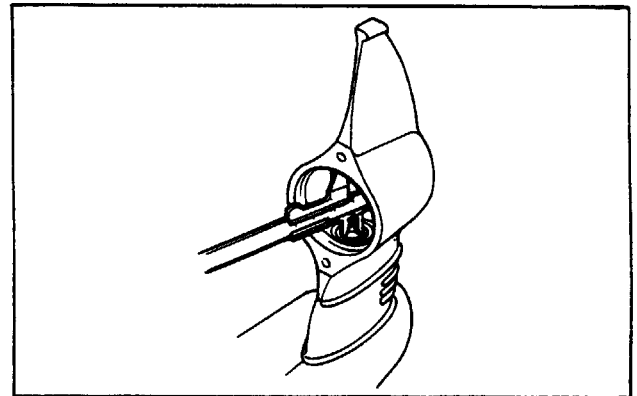


**b. INSPECTION****• PINION SHAFT O.D.**

| STANDARD              | SERVICE LIMIT       |
|-----------------------|---------------------|
| 12.984 mm (0.5112 in) | 12.95 mm (0.510 in) |

**• GEAR CASE BUSHING I.D.**

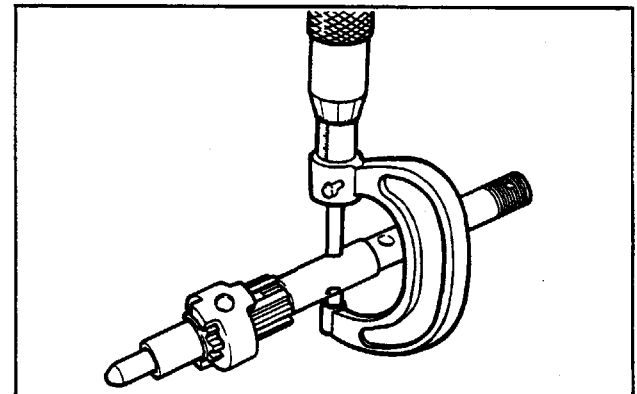
| STANDARD            | SERVICE LIMIT       |
|---------------------|---------------------|
| 13.00 mm (0.512 in) | 13.04 mm (0.513 in) |

**• PINION SHAFT-TO-BUSHING CLEARANCE**

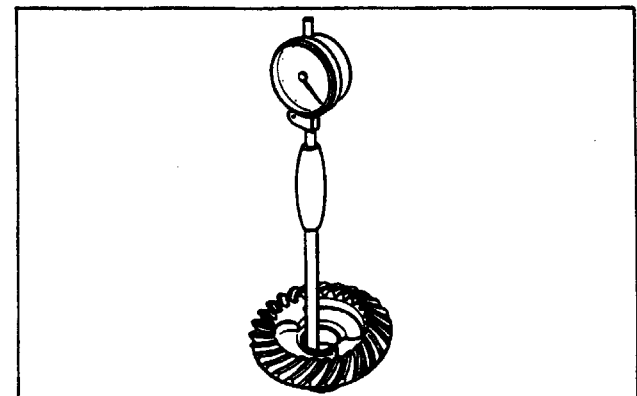
| STANDARD                             | SERVICE LIMIT         |
|--------------------------------------|-----------------------|
| 0.016–0.045 mm<br>(0.0006–0.0018 in) | 0.09 mm<br>(0.004 in) |

**• PROPELLER SHAFT O.D.**

|         | STANDARD              | SERVICE LIMIT       |
|---------|-----------------------|---------------------|
| FORWARD | 11.984 mm (0.4718 in) | 11.95 mm (0.470 in) |
| REVERSE | 12.984 mm (0.5112 in) | 12.95 mm (0.510 in) |

**• BEVEL GEAR I.D.**

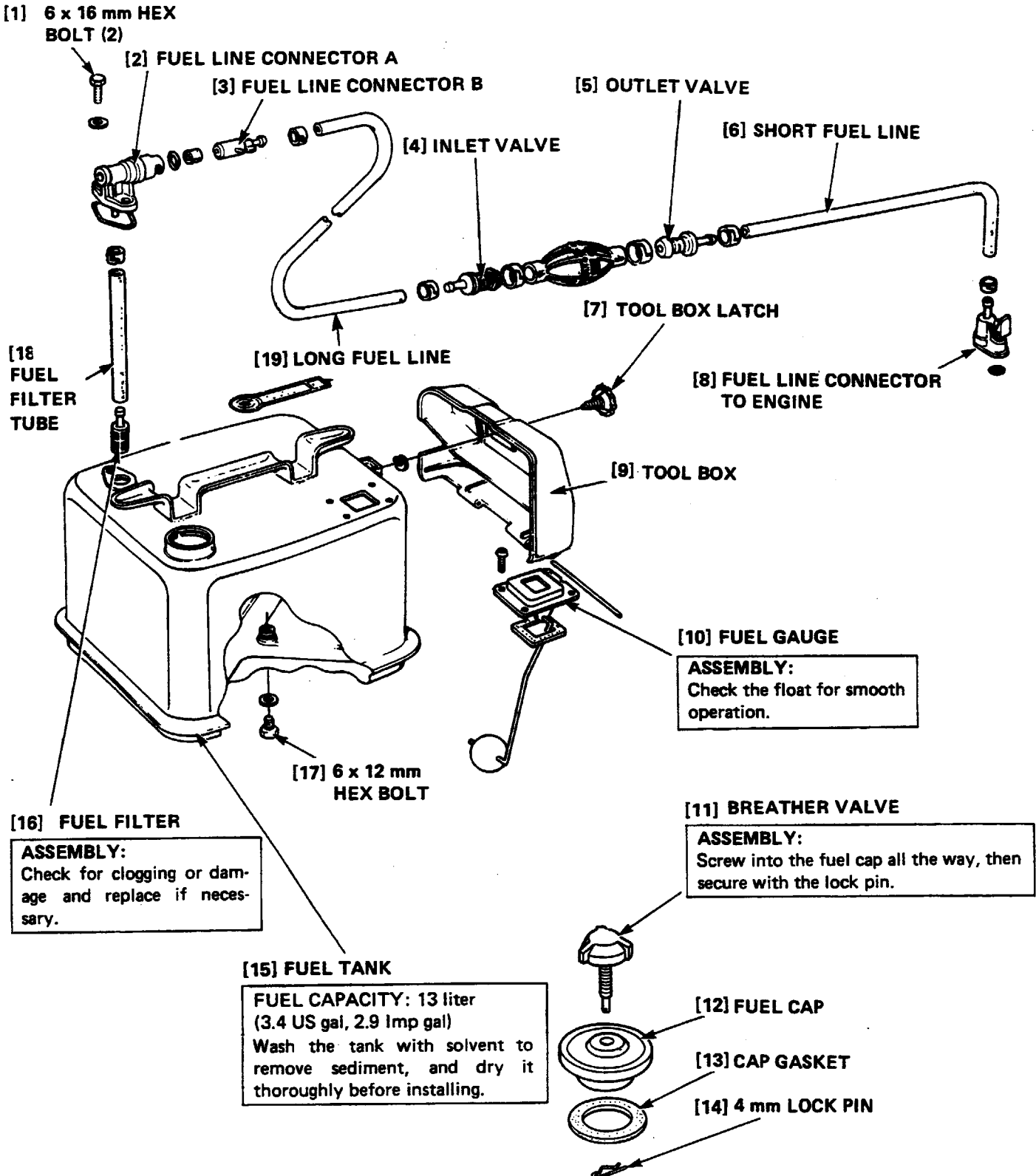
|         | STANDARD            | SERVICE LIMIT       |
|---------|---------------------|---------------------|
| FORWARD | 12.00 mm (0.472 in) | 12.04 mm (0.474 in) |
| REVERSE | 13.00 mm (0.512 in) | 13.04 mm (0.513 in) |



### 13. FUEL TANK

#### ▲ WARNING

Drain the fuel from the fuel tank before disassembly.

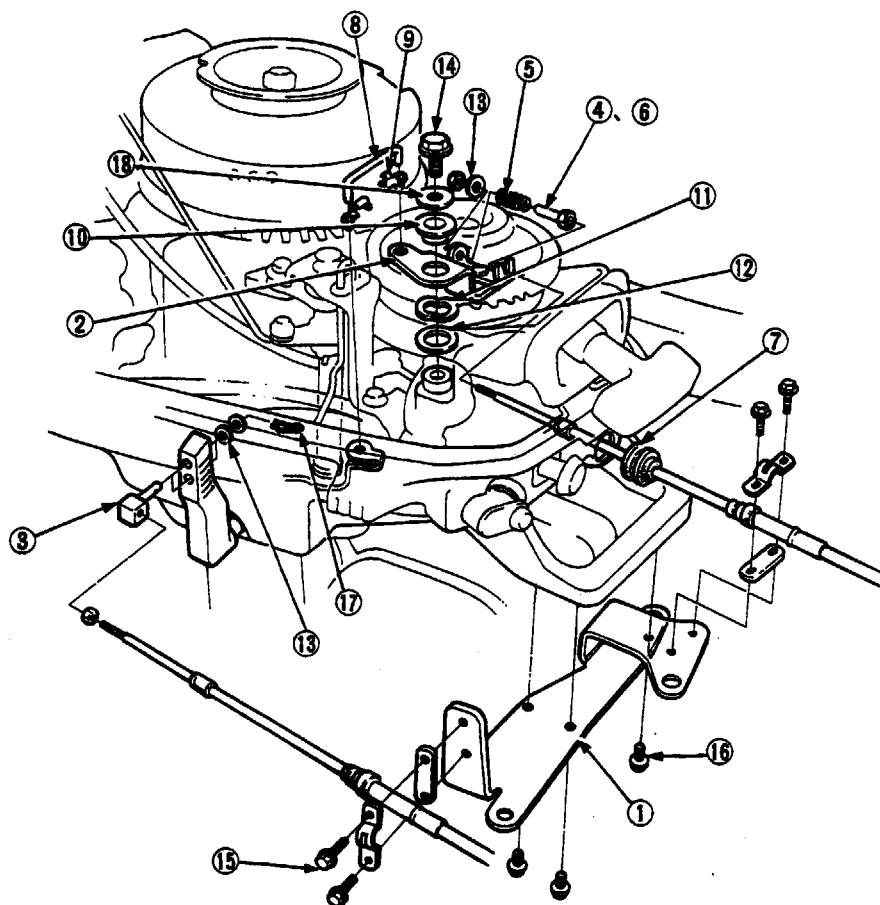


## 1. REMOTE CONTROL BRACKET KIT

## 2. DC CHARGING AND LIGHTING KIT

### 1. REMOTE CONTROL BRACKET KIT

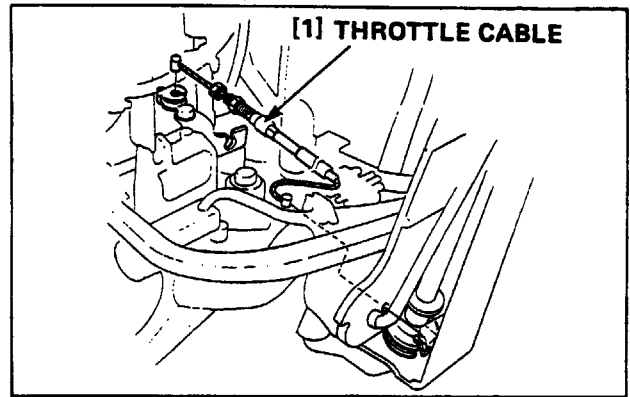
#### • KIT PARTS



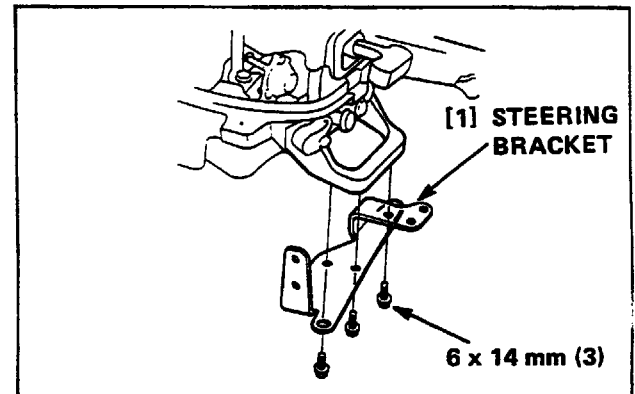
| No. | PART NUMBER   | PART NAME                            | QTY |
|-----|---------------|--------------------------------------|-----|
| 1   | 17851-ZV1-810 | STEERING BRACKET                     | 1   |
| 2   | 17860-ZV1-810 | CONTROL LEVER                        | 1   |
| 3   | 24618-ZV1-810 | SHIFT PIVOT                          | 1   |
| 4   | 17864-ZV1-810 | CONTROL ADJUSTING NUT B              | 1   |
| 5   | 17868-ZV1-810 | CONTROL LEVER SPRING                 | 1   |
| 6   | 17867-ZV1-810 | CONTROL ADJUSTING NUT A              | 1   |
| 7   | 17938-ZV1-810 | CONTROL CABLE GROMMET                | 1   |
| 8   | 17865-ZV1-810 | THROTTLE ROD                         | 1   |
| 9   | 17946-ZV1-000 | LINKAGE BUSHING                      | 2   |
| 10  | 17866-ZV1-810 | CONTROL LEVER BUSHING                | 1   |
| 11  | 90506-ZV1-810 | 14 mm WAVE WASHER                    | 1   |
| 12  | 90505-ZV1-000 | 14 mm WASHER                         | 1   |
| 13  | 90452-GK4-600 | 5 mm PLAIN WASHER                    | 3   |
| 14  | 90013-ZV0-000 | 6 x 12 mm FLANGE BOLT (Self-tapping) | 1   |
| 15  | 90002-ZG0-920 | 5 x 10 mm FLANGE BOLT                | 4   |
| 16  | 90013-ZV1-000 | 6 x 14 mm FLANGE BOLT (Self-tapping) | 3   |
| 17  | 90757-ZV1-000 | 5.0 mm LOCK PIN                      | 1   |
| 18  | 94103-06200   | 6 mm PLAIN WASHER                    | 1   |

### ● INSTALLATION PROCEDURE

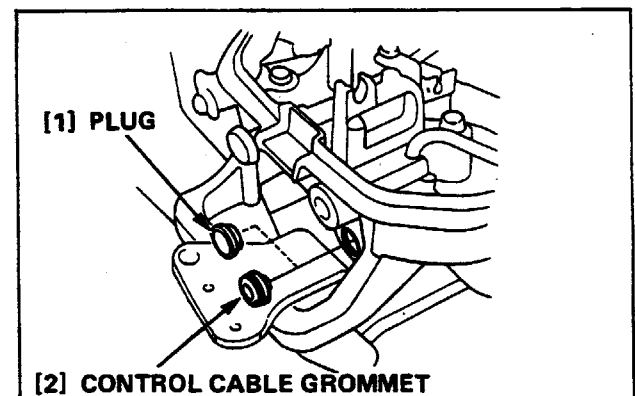
1) Remove the recoil starter and throttle cable.



2) Install the steering bracket on the motor's carrying handle, using three 6 x 14 mm flange bolts (self-tapping).

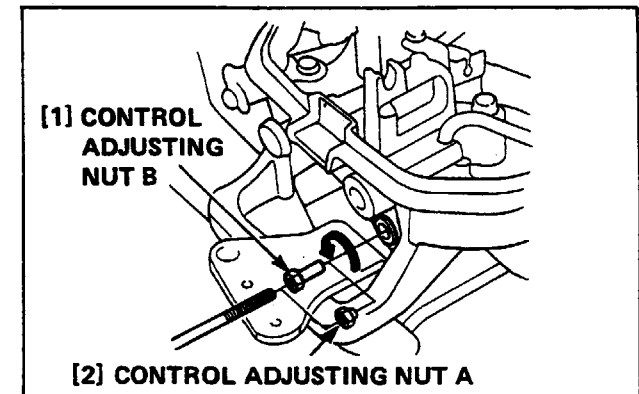


3) Remove the plug from the engine housing, and install the control cable grommet.



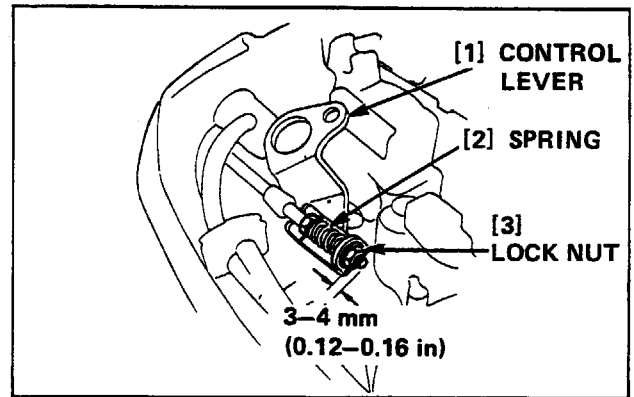
4) Screw the control adjusting nut A or B onto the throttle cable of the remote control unit, then insert into the grommet hole.

Control adjusting nut A: with dowel  
Control adjusting nut B: without dowel

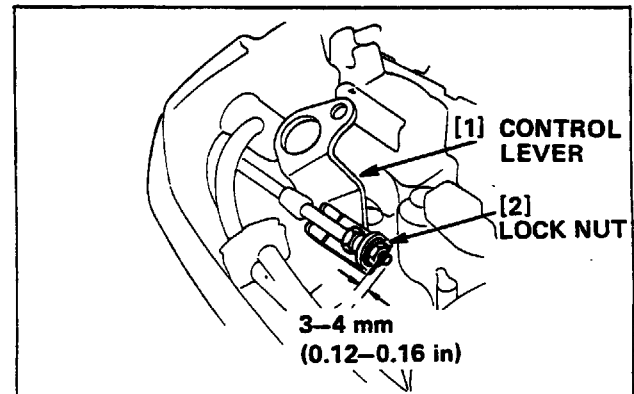


- 5) When the remote control is not equipped with the dowel system:

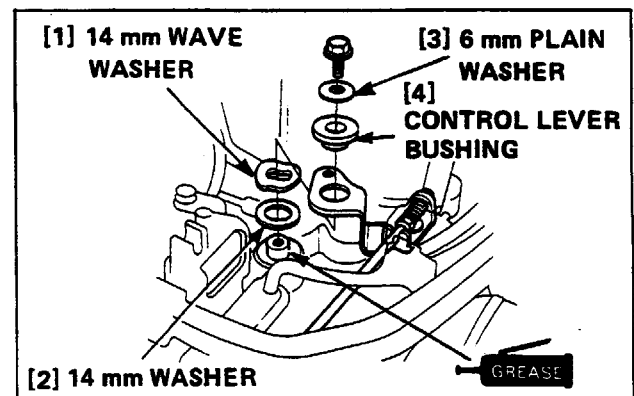
Install the throttle spring over the control adjusting nut B and pass through the control lever, then tighten the lock nut. The throttle cable end should protrude 3–4 mm (0.12–0.16 in) from the lock nut.



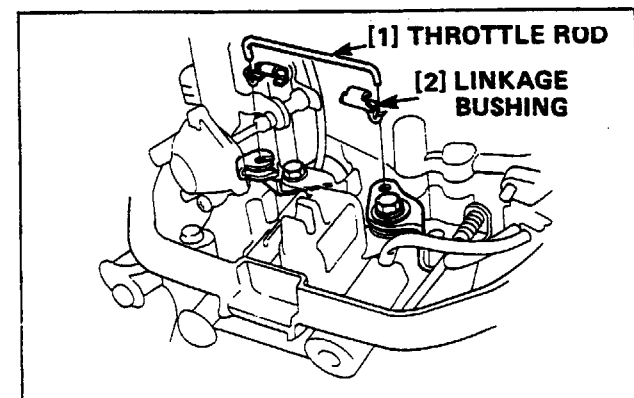
When the remote control is equipped with the dowel system:  
Pass the throttle cable through the control lever and then tighten the lock nut. The throttle cable end should protrude 3–4 mm (0.12–0.16 in) from the lock nut.



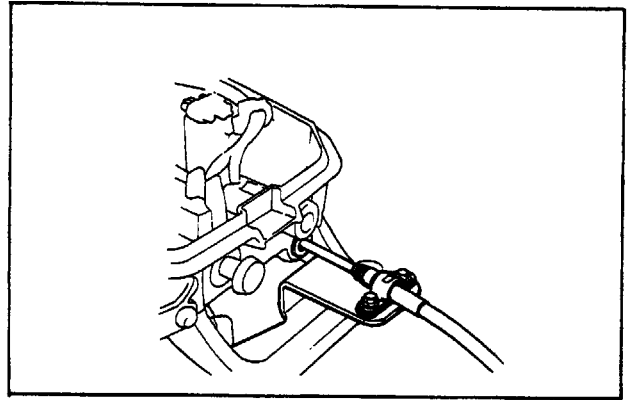
- 6) Install the control lever on the engine housing using a 6 x 12 mm flange bolt (self-tapping).



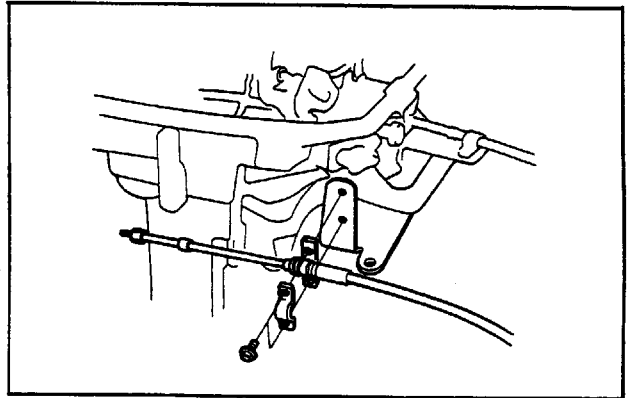
- 7) Install the throttle rod on the shift shaft and the control lever using the linkage bushing.



- 8) Clamp the throttle cable sheath to the steering bracket, using 5 x 10 mm flange bolts.

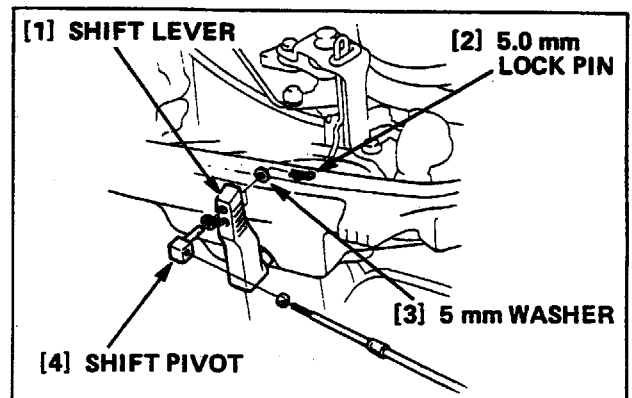


- 9) Clamp the shift cable sheath to the steering bracket, using 5 x 10 mm flange bolts.



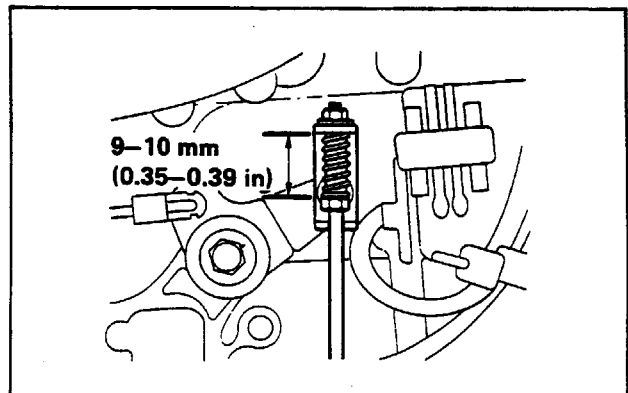
- 10) Screw the shift pivot onto the shift cable. Insert the shift pivot into either of the shift lever holes, according to the stroke required for remote control operation. Install 5 mm plain washers on the shift pivot and secure with the 5 mm lock pin.

| SHIFT LEVER STROKE | SHIFT LEVER HOLE POSITION |
|--------------------|---------------------------|
| 38 mm (1.50 in)    | Upper hole                |
| 35 mm (1.38 in)    | Lower hole                |



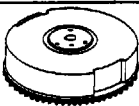
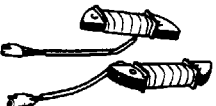
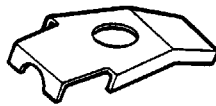
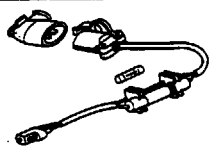
- 11) When the remote control is not equipped with the dowel device:  
Adjust the throttle spring length to 9–10 mm (0.35–0.39 in) with the throttle cable adjustment device at the remote control side.

- 12) Check operation by operating the remote control.



## 2. DC CHARGING AND LIGHTING KIT

### • KIT PARTS

|                                                                                     | PART NUMBER   | PART NAME                                   | Q'TY |
|-------------------------------------------------------------------------------------|---------------|---------------------------------------------|------|
|    | 06310-ZV1-810 | DC charging and lighting kit                | 1    |
|    | 31100-ZV1-810 | Flywheel (DC)                               | 1    |
|    | 31510-ZV1-810 | Charging and lighting coil<br>(12 V - 25 W) | 2    |
|    | 31511-ZV1-810 | Wire clamp                                  | 1    |
|    | 31650-ZV1-003 | Electrical plug and receptacle<br>assembly  | 1    |
|   | 31700-ZV1-003 | Rectifier assembly                          | 1    |
|  | 31652-881-004 | Plug                                        | 1    |
|  | 90014-ZV1-000 | 5 x 22 mm self-tapping bolt                 | 2    |
|  | 90015-ZV0-000 | 6 x 28 mm self-tapping bolt                 | 4    |
|  | 90016-ZV1-000 | 6 x 35 mm self-tapping bolt                 | 1    |
|  | 90019-ZV1-000 | 5 x 10 mm self-tapping bolt                 | 1    |

\* Refer to page 10 for wiring diagram.

\* Refer to page 35 for installation.

1. LUBRICATION SYSTEM
2. COOLING SYSTEM
3. POWER TRAIN
4. FUEL SYSTEM

5. NEUTRAL START SYSTEM
6. THROTTLE OPENER SYSTEM
7. HALF THROTTLE SYSTEM

## 1. LUBRICATION SYSTEM

### a. OIL CIRCULATION

The oil pump draws oil through a strainer in the oil pan and supplies it under pressure to the lower main bearing and connecting rod journal. Other engine parts receive lubrication from the oil that is thrown off the crankshaft either directly in the form of splash lubrication, or indirectly in the form of oil mist.

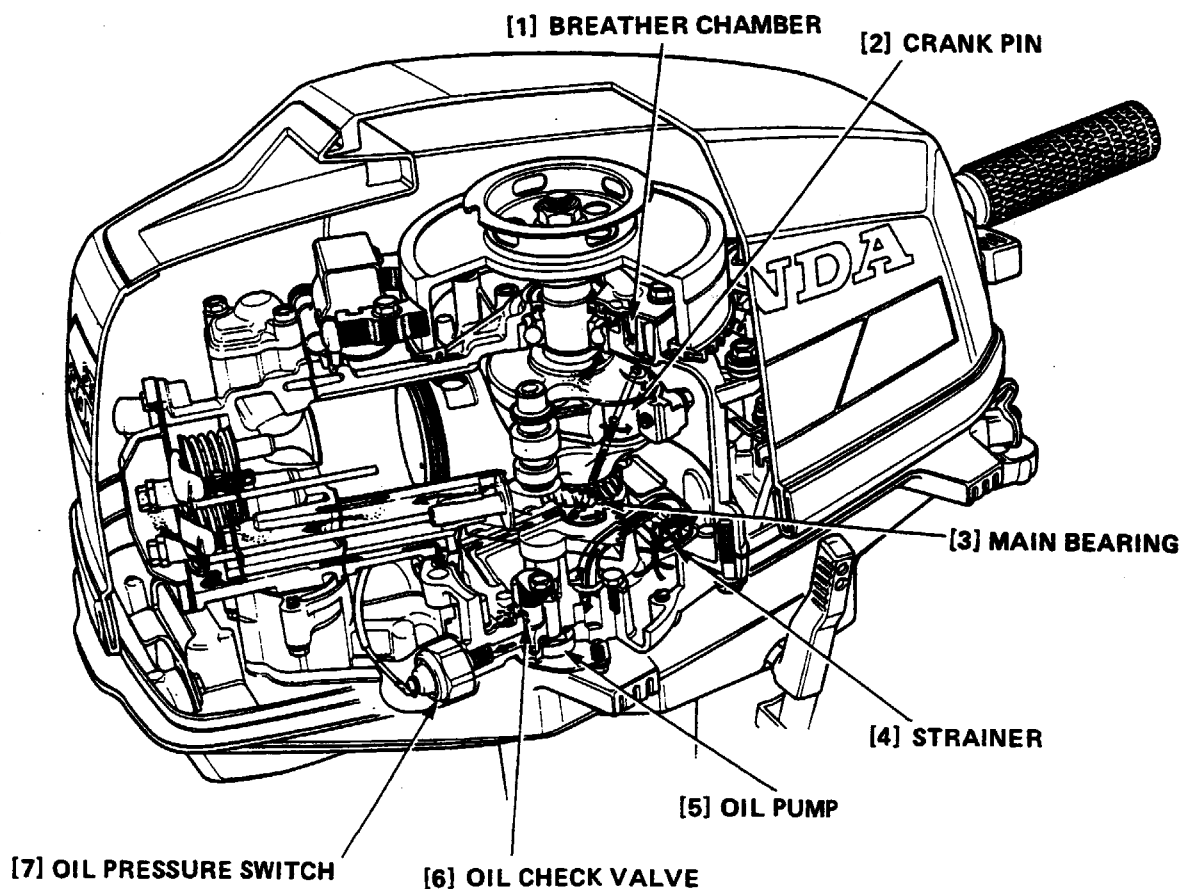
The breather chamber, located at the upper main bearing, allows crankcase ventilation while preventing air that leaves the crankcase from taking oil with it.

### b. OIL PUMP

The oil pump is a trochoid type and consists of an inner rotor, outer rotor and a pump body. The inner rotor is driven by the camshaft and causes the outer rotor to turn with it. As this happens, the spaces between the rotor lobes become filled with oil. Then, when the lobes of the inner rotor move into the spaces in the outer rotor, the oil is squeezed out through the outlet. When the pressure rises to the preset value ( $3.5 \pm 0.4 \text{ kg/cm}^2$ ,  $50 \pm 5.7 \text{ psi}$ ), the check valve opens and oil flows back to the oil pan.

### c. OIL PRESSURE WARNING SYSTEM

An oil pressure switch is installed in the oil passage in the oil pan and senses oil pressure from the oil pump. When the oil pressure is more than the preset value ( $0.3 \pm 0.1 \text{ kg/cm}^2$ ,  $4.3 \pm 1.4 \text{ psi}$ ), the oil pressure switch closes and the oil warning light comes on.



## 2. COOLING SYSTEM

### a. WATER CIRCULATION

Water enters the inlet in the front of the gear case. The water pump, located just above the gear case pumps the water through a tube in the extension case to the engine, where it circulates through a water jacket surrounding the cylinder and cylinder head.

Water leaves the engine water jacket by draining through the water check hole and by flowing through the thermostat to the exhaust manifold. Water flowing from the exhaust manifold mixes with the exhaust gas in the extension case and exits through the exhaust port above the propeller.

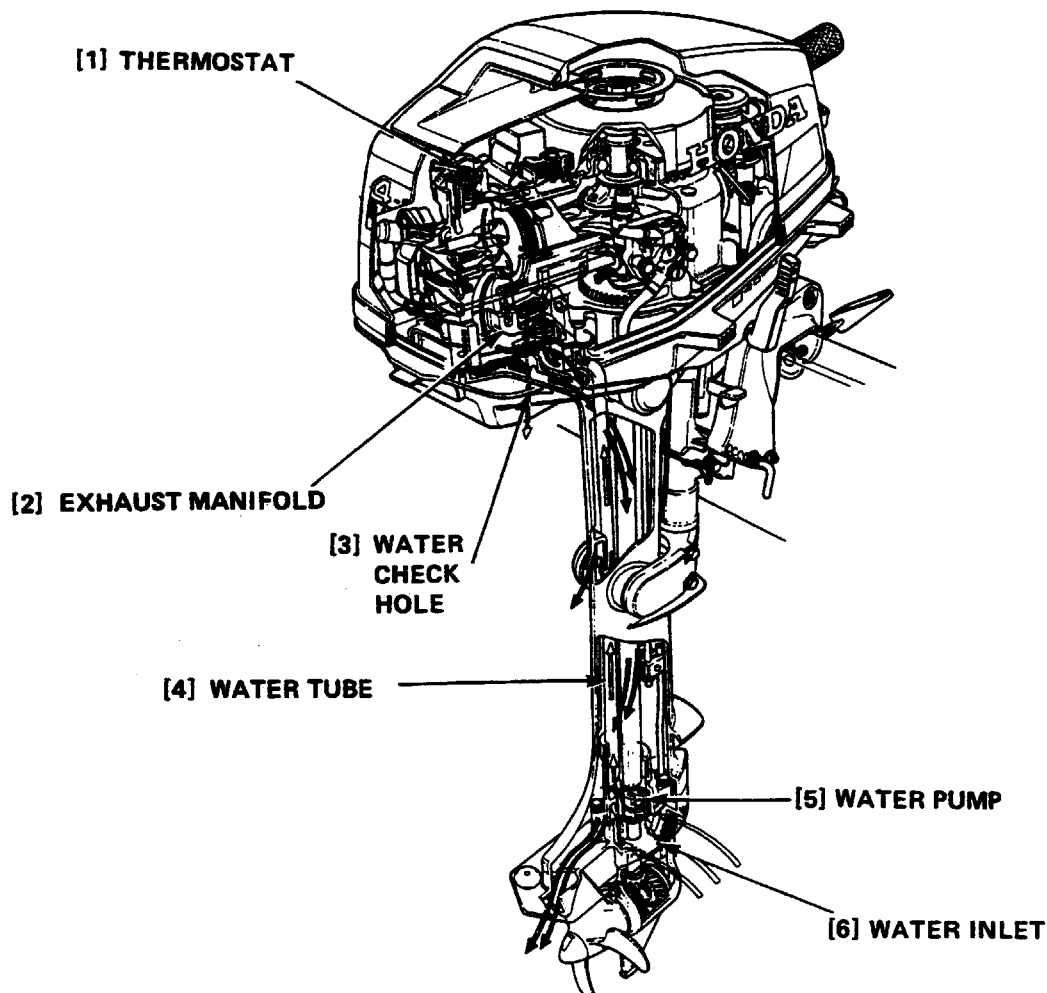
### b. WATER PUMP

The water pump is an impeller type driven by the pinion shaft and located in the gear case.

### c. THERMOSTAT

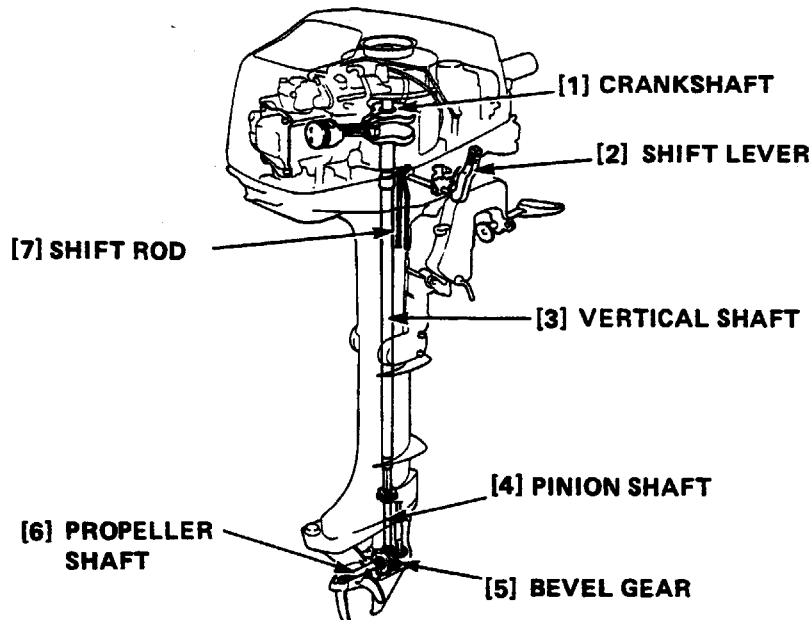
The thermostat is located at the water jacket outlet, above the cylinder head. Its purpose is to stabilize engine operating temperature by regulating the volume of water flowing through the engine water jacket.

When the engine is cold, the thermostat remains closed restricting water flow through the engine water jacket. As the engine warms up, the thermostat opens, allowing more water to flow through the water jacket.



### 3. POWER TRAIN

Crankshaft rotation is transmitted to the bevel gear and propeller shaft through the vertical shaft and pinion shaft.



#### a. FORWARD

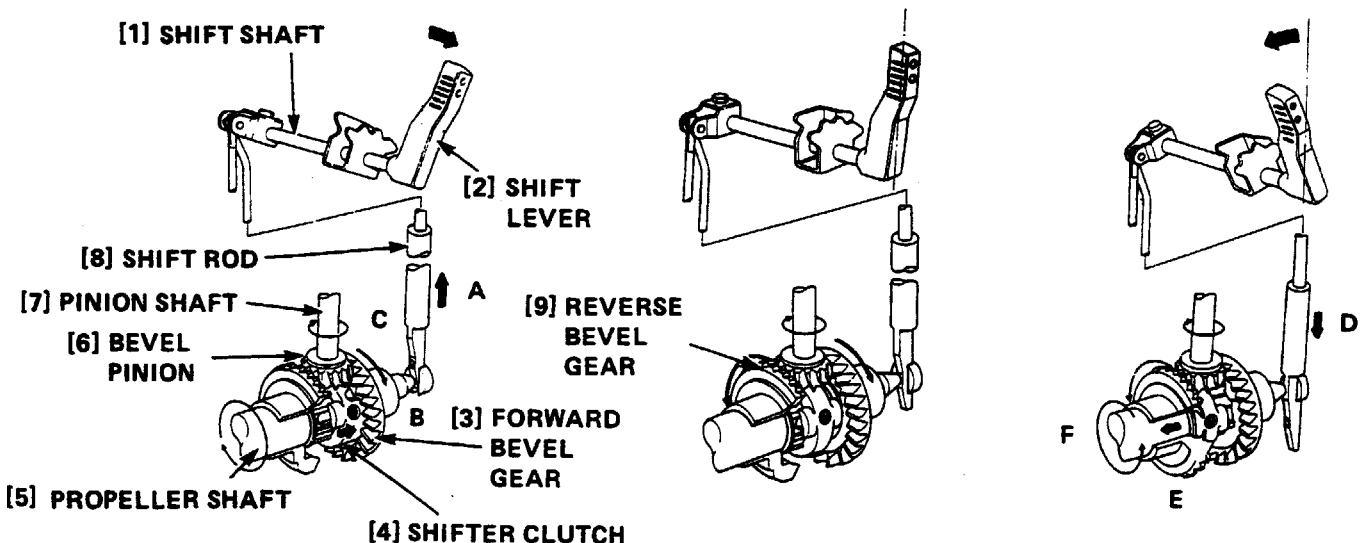
When the shift lever is moved to the "FORWARD" position, the shift rod is raised (direction A), allowing the shifter clutch to move by spring pressure toward the forward bevel gear (direction B). The shifter clutch engages the forward bevel gear, locking it to the propeller shaft. Pinion shaft rotation, transmitted through the forward bevel gear, then rotates the propeller shaft in direction C.

#### b. NEUTRAL

When the shift lever is moved to the "NEUTRAL" position, the shift rod is moved to the middle of its range of travel, forcing the shifter clutch out of engagement with either bevel gear. Pinion shaft rotation then spins the bevel gears freely, without transmitting any rotation to the propeller shaft.

#### c. REVERSE

When the shift lever is moved to the "REVERSE" position, the shift rod is lowered (direction D), forcing the shifter clutch into engagement with the reverse bevel gear (direction E), locking the reverse bevel gear to the propeller shaft. Pinion shaft rotation, transmitted through the reverse bevel gear, then rotates the propeller shaft in direction F.



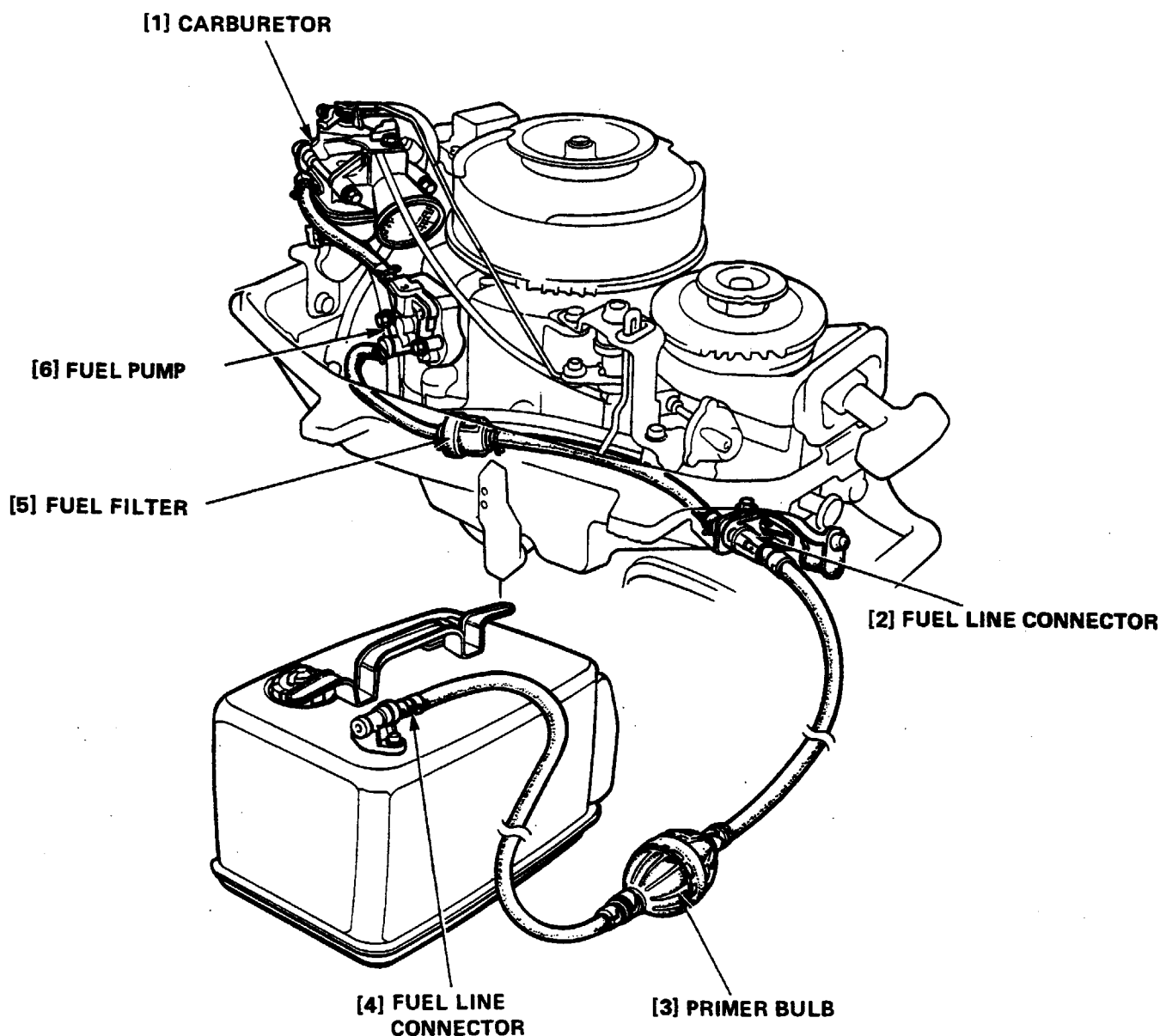
## 4. FUEL SYSTEM

### a. FUEL FLOW

The fuel line connecting the fuel tank to the outboard motor is equipped with a primer bulb that is used to fill the system with fuel to start the engine. After starting, the engine fuel pump maintains the flow of fuel to the carburetor. The system contains two fuel filters; one filter is located inside the fuel tank, and another filter is located in the outboard motor, on the line that leads to the fuel pump inlet.

### b. FUEL PUMP

The fuel pump is a diaphragm type, located on the cylinder block and driven by a cam on the engine camshaft.



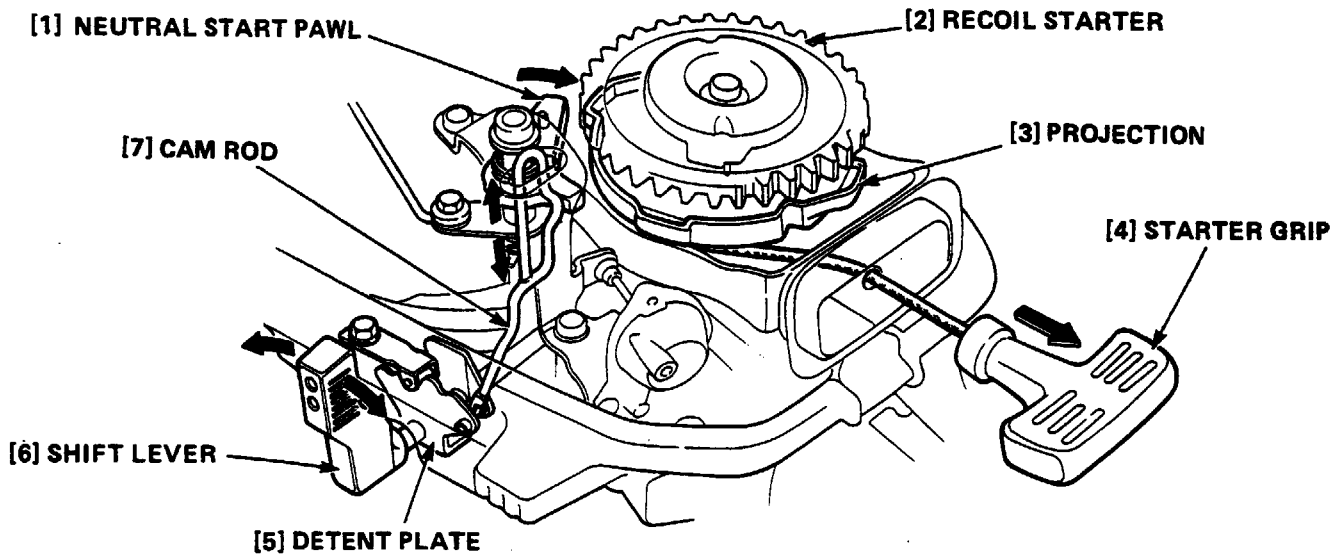
## 5. NEUTRAL START SYSTEM

### a. DESCRIPTION

The neutral start system prevents the recoil starter from being operated unless the shift lever is in the "NEUTRAL" position.

### b. CONSTRUCTION

A spring-loaded pawl blocks the recoil starter by butting against one of the four projections on the circumference of the recoil starter. A cam rod, connected to the shift lever detent plate, withdraws the pawl only when the shift lever is moved to the center ("NEUTRAL") position.

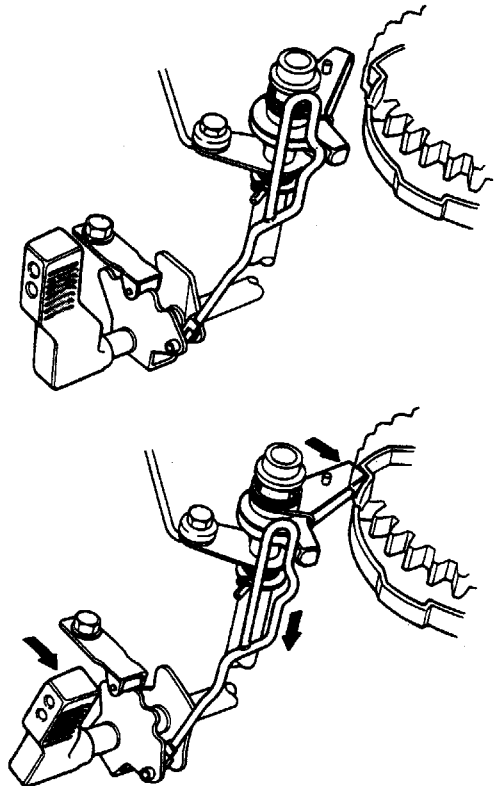


### c. OPERATION

The cam rod pulls the neutral start pawl away from the recoil starter, allowing the starter to rotate.

When the shift lever is in "FORWARD" or "REVERSE" position:

The cam rod releases the neutral start pawl, which swings against the recoil starter by spring pressure. If the starter grip is pulled, the pawl butts against one of the projections on the recoil starter and blocks any further motion.



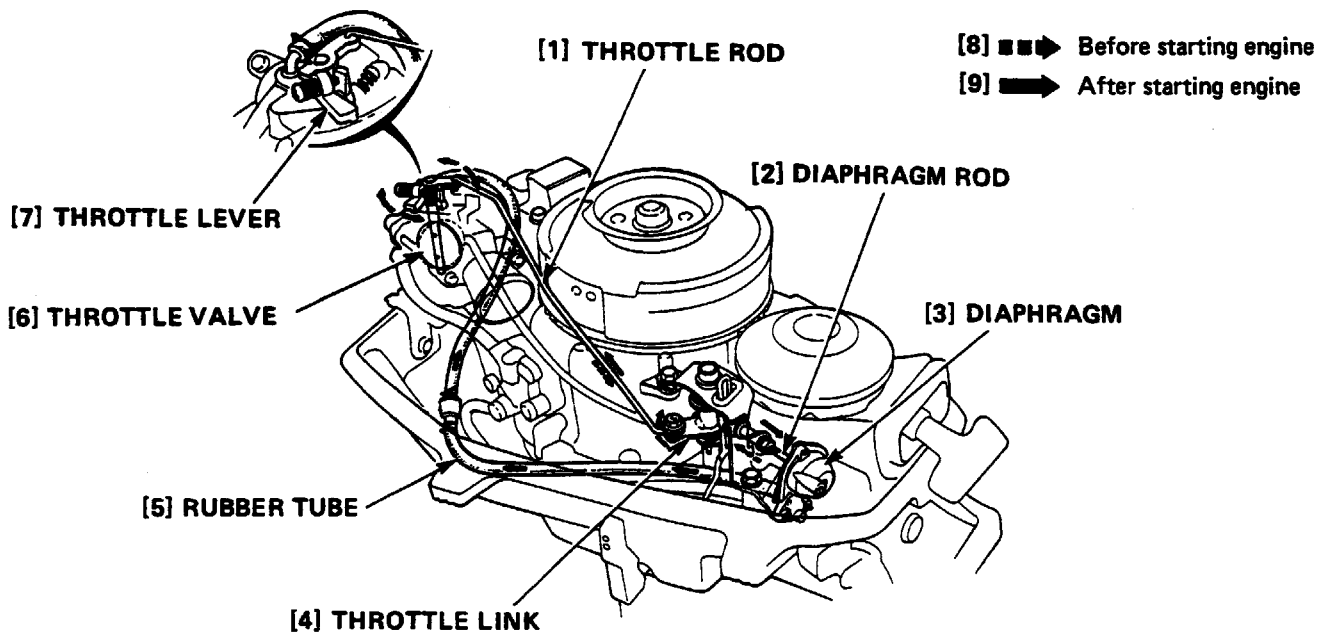
## 6. THROTTLE OPENER SYSTEM

### a. DESCRIPTION

The throttle opener system allows the carburetor throttle valve to open to the most suitable position for starting (approx. 9°), even if the throttle grip is in the "SLOW" position. Starting ability is greatly improved by this system.

### b. CONSTRUCTION

The carburetor throttle lever is connected to the throttle link by the throttle rod. The diaphragm rod contacts the throttle link. The diaphragm chamber is connected to the intake manifold with the rubber tube which has a check valve.



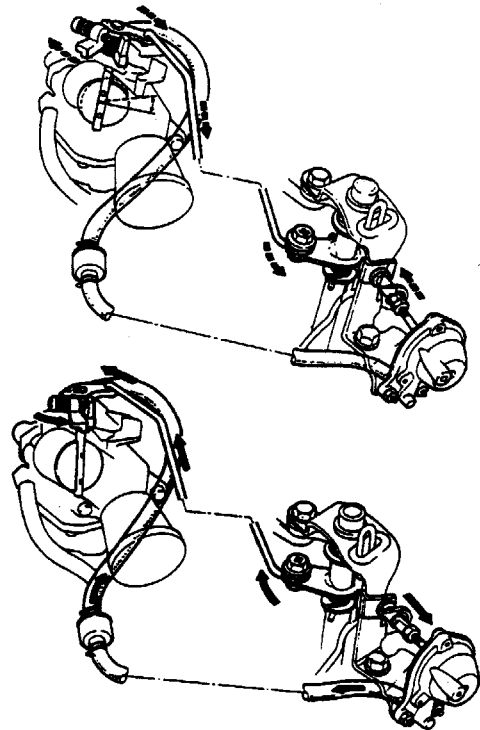
### c. OPERATION

**Before starting the engine:**

The intake manifold and diaphragm chamber are under atmospheric pressure, so the diaphragm spring causes the diaphragm rod to push against the throttle link, pulling the carburetor throttle rod. This moves the throttle lever, opening the throttle valve approximately 9°.

**After starting the engine:**

The vacuum produced in the intake manifold is applied to the diaphragm. The diaphragm rod retracts, and spring pressure rotates the throttle link clockwise. This pushes the throttle rod, moving the throttle lever against its stop, which closes the throttle valve and allows the engine to idle.

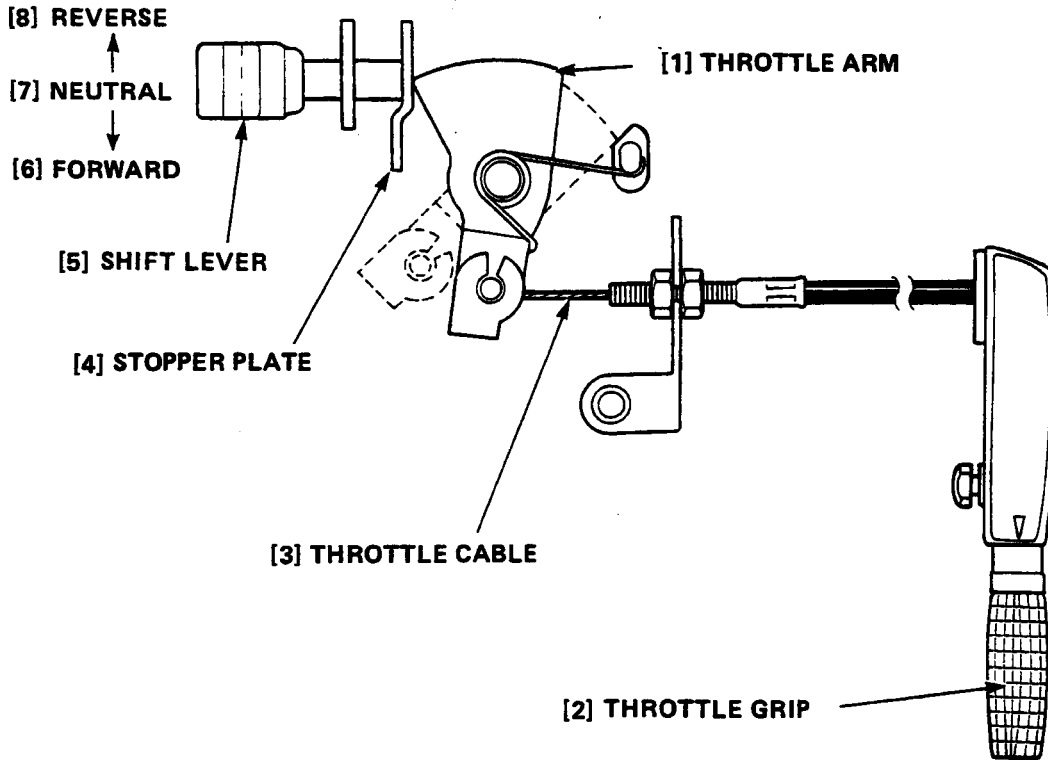


## 7. HALF THROTTLE SYSTEM

### a. DESCRIPTION

The half throttle system limits the carburetor throttle opening when the shift lever is in "NEUTRAL" and "REVERSE" positions. It prevents the engine from overrevving at no load and controls the reverse speed of the boat.

### b. CONSTRUCTION

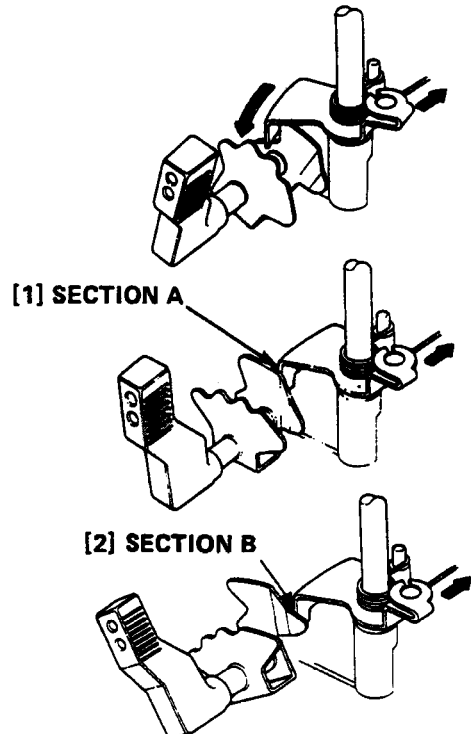


### c. OPERATION

When the shift lever is in "FORWARD" position:  
The stopper arm does not block the throttle arm and the throttle grip can be turned to full throttle.

When the shift lever is in "NEUTRAL" position:  
When the throttle grip is turned, the throttle arm is blocked by section A of the stopper plate, and engine speed cannot be increased above 5,000–5,300 rpm (at no load).

When the shift lever is in "REVERSE" position:  
When the throttle grip is turned, the throttle arm is blocked by section B of the stopper plate, and engine speed cannot be increased above 3,200 rpm (with load).



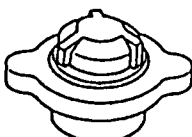
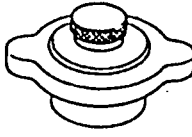
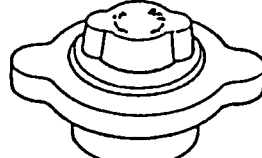
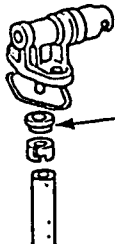
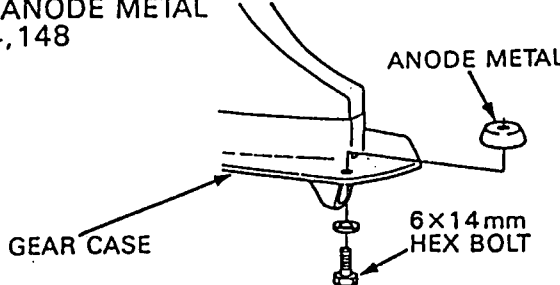
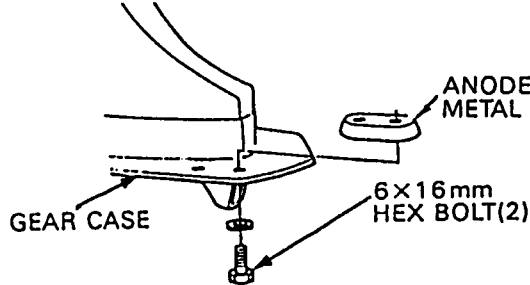
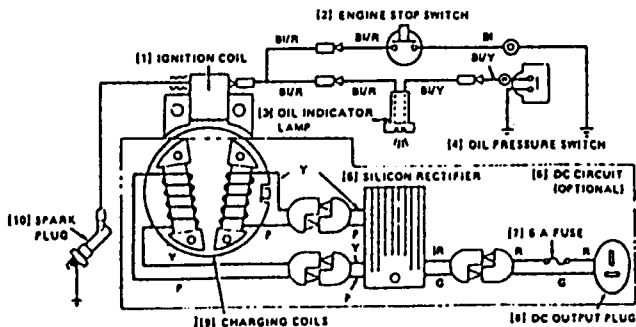
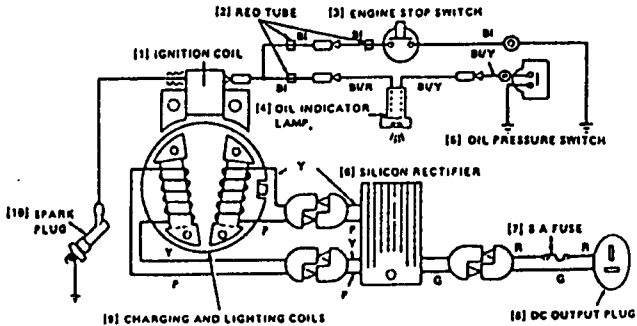
SOME PARTS OF BF50 AND BF5A ARE CHANGED

News No.  
P/P-002

Issue Date  
MAR.89

| Applicable information                        | Publication NO. |
|-----------------------------------------------|-----------------|
| Honda outboard motor<br>BF50·BF5A shop manual | 66ZV101         |

### CHANGE LOCATIONS

| BEFORE MODIFICATION<br>Frame serial number 1000001~1099999                                                                                                                                                                                                                                                                                                                               | AFTER MODIFICATION<br>Frame serial number 1100001 and subsequent                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>No.1 FUEL TANK CAP</b><br>P.156<br>  <p>Except SC, LC types      (SC, LC types)</p>                                                                                                                                 | <p>• Except SC, LC types</p>                                                                                                                                                                                                                                                                           |
| <b>No.2 FUEL LINE CONNECTOR A</b><br>P.58,156<br>                                                                                                                                                                                                                                                      |  <p>JOINT INNER SEAL</p>                                                                                                                                                                                                                                                                              |
| <b>No.3 ANODE METAL</b><br>P.144,148<br> <p>ANODE METAL<br/>GEAR CASE<br/>6×14mm HEX BOLT</p>                                                                                                                                                                                                         |  <p>ANODE METAL<br/>GEAR CASE<br/>6×16mm HEX BOLT(2)</p>                                                                                                                                                                                                                                              |
| <b>No.4 WIRING DIAGRAM/DC CHARGING KIT (OPTIONAL PARTS)</b><br>P.30, 88, 92, 93<br> <p>(1) IGNITION COIL (2) ENGINE STOP SWITCH (3) OIL INDICATOR LAMP (4) OIL PRESSURE SWITCH (5) SILICON RECTIFIER (6) DC CIRCUIT (OPTIONAL) (7) 5 A FUSE (8) DC OUTPUT PLUG (9) CHARGING COILS (10) SPARK PLUG</p> | <p>• The DC charging kit is standard for SB, LB types and optional for others.</p>  <p>(1) IGNITION COIL (2) RED TUBE (3) ENGINE STOP SWITCH (4) OIL INDICATOR LAMP (5) OIL PRESSURE SWITCH (6) SILICON RECTIFIER (7) 5 A FUSE (8) DC OUTPUT PLUG (9) CHARGING AND LIGHTING COILS (10) SPARK PLUG</p> |

## CONTENTS

|                                   |   |
|-----------------------------------|---|
| I. SPECIFICATIONS .....           | 2 |
| 1. SPECIFICATIONS .....           | 2 |
| II. OUTLINE OF CHANGES .....      | 3 |
| 1. OUTLINE OF CHANGES .....       | 3 |
| III. SERVICE INFORMATION .....    | 6 |
| 1. WIRING DIAGRAM .....           | 6 |
| IV. DISASSEMBLY AND SERVICE ..... | 7 |
| 1. ELECTRICAL EQUIPMENT .....     | 7 |
| 2. STEERING HANDLE .....          | 8 |
| 3. IMPELLER PUMP .....            | 9 |

## PREFACE

This supplement describes the major differences between Honda BF5A Outboard Motor (Serial No. 1100001 and subsequent) and BF5A Outboard Motor (Serial No. 1000001-1099999), and the differences between Honda BF5A Outboard Motor (Serial No. 1200001 and subsequent) and BF5A Outboard Motor (Serial No. 1000001-1199999).

For service information which is not covered in this supplement, please refer to the base shop manuals, part number 66ZV101.

ALL INFORMATION, ILLUSTRATIONS, DIRECTIONS AND SPECIFICATIONS INCLUDED IN THIS PUBLICATION ARE BASED ON THE LATEST PRODUCT INFORMATION AVAILABLE AT THE TIME OF APPROVAL FOR PRINTING. HONDA MOTOR CO., LTD. RESERVES THE RIGHT TO MAKE CHANGES WITHOUT INCURRING ANY OBLIGATION WHATEVER. NO PART OF THIS PUBLICATION MAY BE REPRODUCED WITHOUT WRITTEN PERMISSION.

HONDA MOTOR CO., LTD.  
SERVICE PUBLICATIONS OFFICE

**1. SPECIFICATIONS****DIMENSIONS/WEIGHT**

| Item                         | Type | SD, SB, SC                          | LD, LB             |
|------------------------------|------|-------------------------------------|--------------------|
|                              |      |                                     |                    |
| Overall length               |      | 525 mm (20.7 in)                    |                    |
| Overall width                |      | 340 mm (13.4 in)                    |                    |
| Overall height               |      | 1,005 mm (39.6 in)                  | 1,135 mm (44.7 in) |
| Dry weight                   |      | 27.0 kg (59.5 lb)                   | 27.5 kg (60.6 lb)  |
| Operating weight (incl. oil) |      | 27.5 kg (60.6 lb)                   | 28.0 kg (61.7 lb)  |
| Transom height               |      | 445 mm (17.5 in)                    | 572 mm (22.5 in)   |
| Transom angle                |      | 5-stage (5° – 9° – 13° – 17° – 21°) |                    |
| Tilting                      |      | 3-stage (30° – 45° – 70°)           |                    |
| Swivel angle                 |      | R: 45°, L: 45°                      |                    |

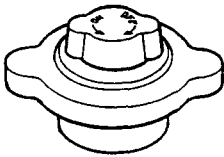
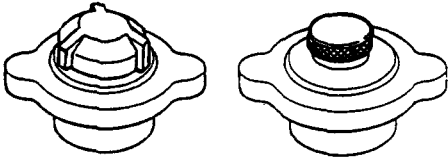
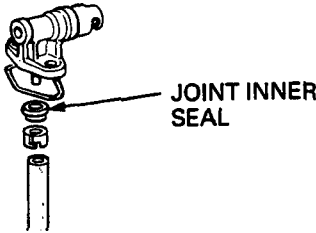
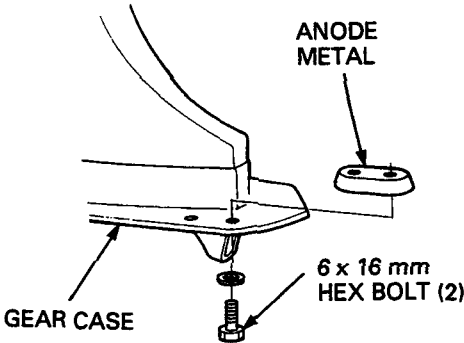
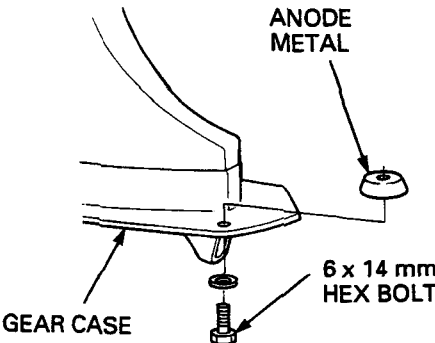
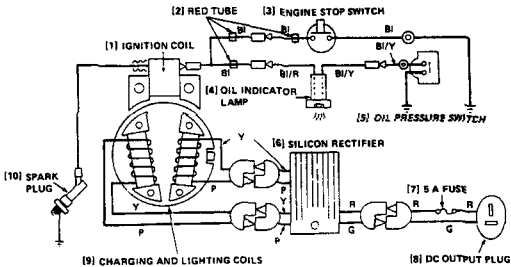
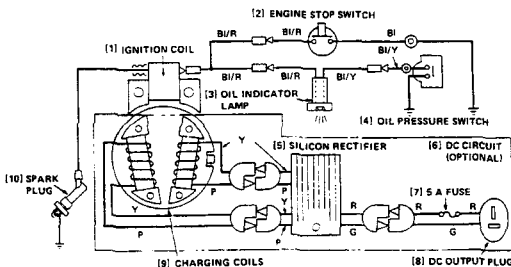
**ENGINE**

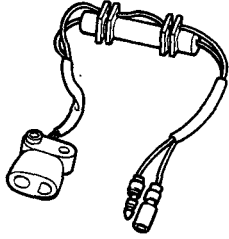
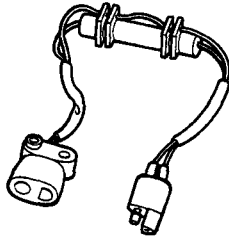
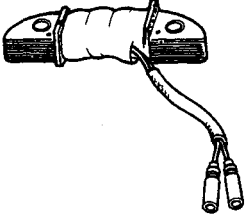
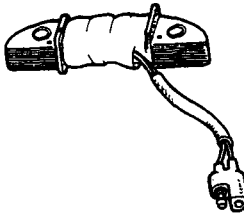
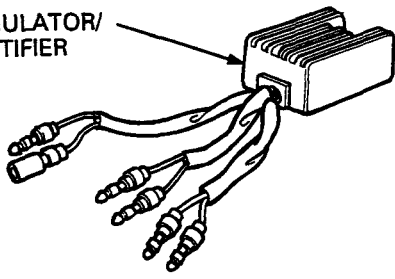
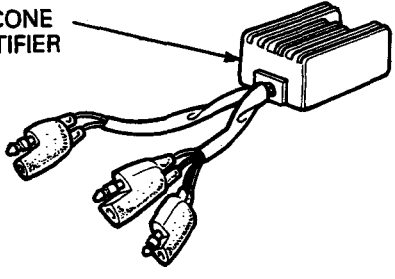
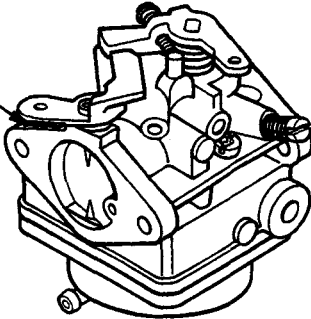
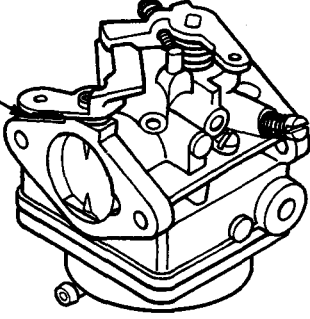
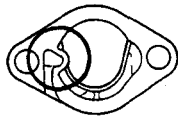
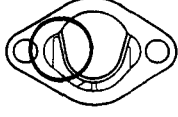
|                           |                                                           |
|---------------------------|-----------------------------------------------------------|
| Type                      | Single cylinder, 4 stroke, water cooled, vertical OHV     |
| Total piston displacement | 127 cm <sup>3</sup> (7.7 cu in)                           |
| Bore x stroke             | 60 x 45 mm (2.36 x 1.77 in)                               |
| Maximum horsepower        | 5.0 PS/5,000 rpm                                          |
| Maximum torque            | 7.9 N·m (0.79 kg·m, 5.71 ft·lb)                           |
| Compression ratio         | 8.7 : 1                                                   |
| Fuel consumption ratio    | 310 g/PS-h (0.68 lb/PS-h)                                 |
| Cooling system            | Forced water circulation by impeller pump with thermostat |
| Ignition system           | Transistorized magneto                                    |
| Ignition timing           | 25° BTDC fixed                                            |
| Spark plug                | (NGK) BPR5ES, (ND) W16EPR-U                               |
| Carburetor                | Horizontal type, butterfly valves                         |
| Lubrication system        | Pressure lubrication by trochoid pump                     |
| Lubricant capacity        | 0.55 ℓ (0.58 US qt, 0.48 Imp qt)                          |
| Starting system           | Recoil starter                                            |
| Stopping system           | Grounding of primary circuit                              |
| Fuel                      | Regular automotive gasoline                               |
| Fuel tank capacity        | 13 ℓ (3.4 US gal, 2.9 Imp gal)                            |
| Fuel pump                 | Diaphragm type                                            |
| Exhaust system            | Underwater type                                           |

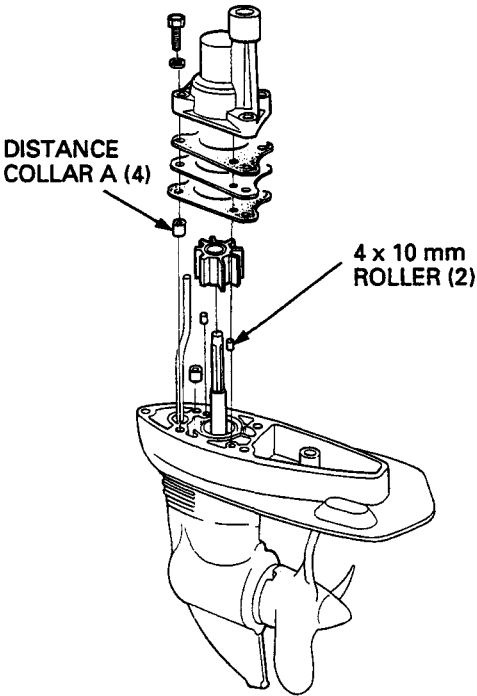
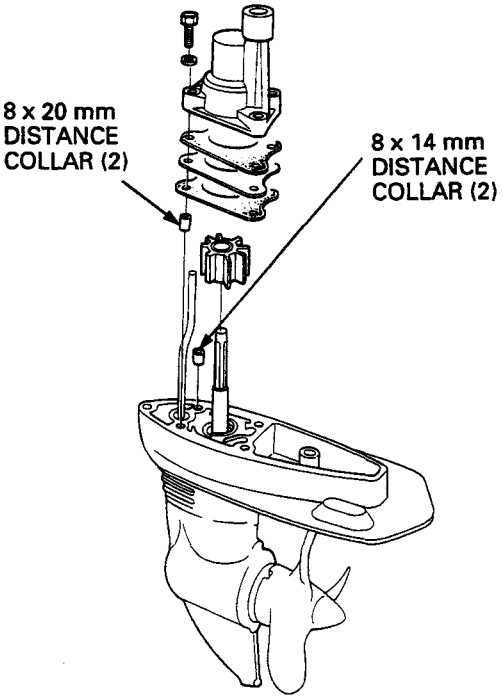
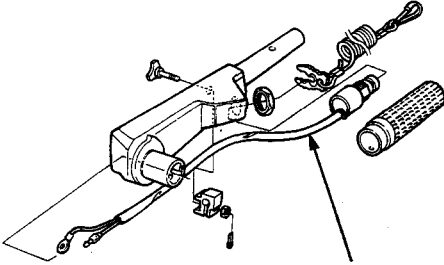
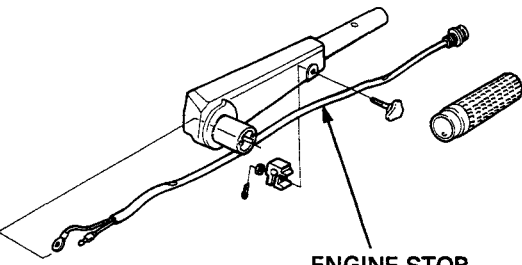
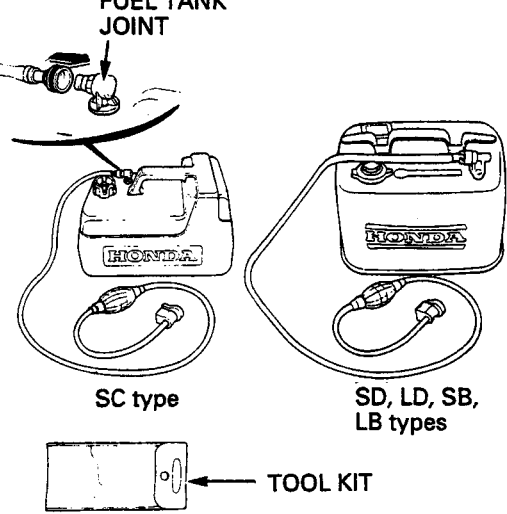
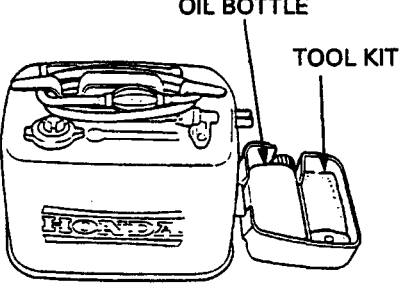
**LOWER UNIT**

|                            |                                            |                                              |
|----------------------------|--------------------------------------------|----------------------------------------------|
| Clutch                     | Dog clutch (Forward – Neutral – Reverse)   |                                              |
| Gear ratio                 | 0.48 (13/27)                               |                                              |
| Gear case oil capacity     | 0.1 ℓ (0.11 US qt, 0.09 Imp qt)            |                                              |
| Propeller                  | (Standard)                                 | (Optional)                                   |
| No. of blades-Dia. x Pitch | 3–200 mm x 190 mm<br>(7-7/8 in x 7-1/2 in) | 3–200 mm x 170 mm<br>(7-7/8 in x 6-11/16 in) |
| Rotating direction         | Clockwise (viewed from rear)               |                                              |

## 1. OUTLINE OF CHANGES

| PARTS DESCRIPTION               | Frame serial number 1100001 and subsequent                                                                                                                                                                        | Frame serial number 1000001 – 1099999                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| FUEL TANK CAP                   | <ul style="list-style-type: none"> <li>• Except SC, LC types</li> </ul>                                                          |  <p>Except SC, LC types      (SC, LC types)</p>                       |
| FUEL LINE CONNECTOR A           |  <p>JOINT INNER SEAL</p>                                                                                                         |                                                                      |
| ANODE METAL                     |  <p>ANODE METAL</p> <p>GEAR CASE</p> <p>6 x 16 mm HEX BOLT (2)</p>                                                             |  <p>ANODE METAL</p> <p>GEAR CASE</p> <p>6 x 14 mm HEX BOLT</p>      |
| WIRING DIAGRAM/ DC CHARGING KIT | <ul style="list-style-type: none"> <li>• The DC charging kit is standard for SB, LB types and optional for others.</li> </ul>  | <ul style="list-style-type: none"> <li>• Optional parts</li> </ul>  |

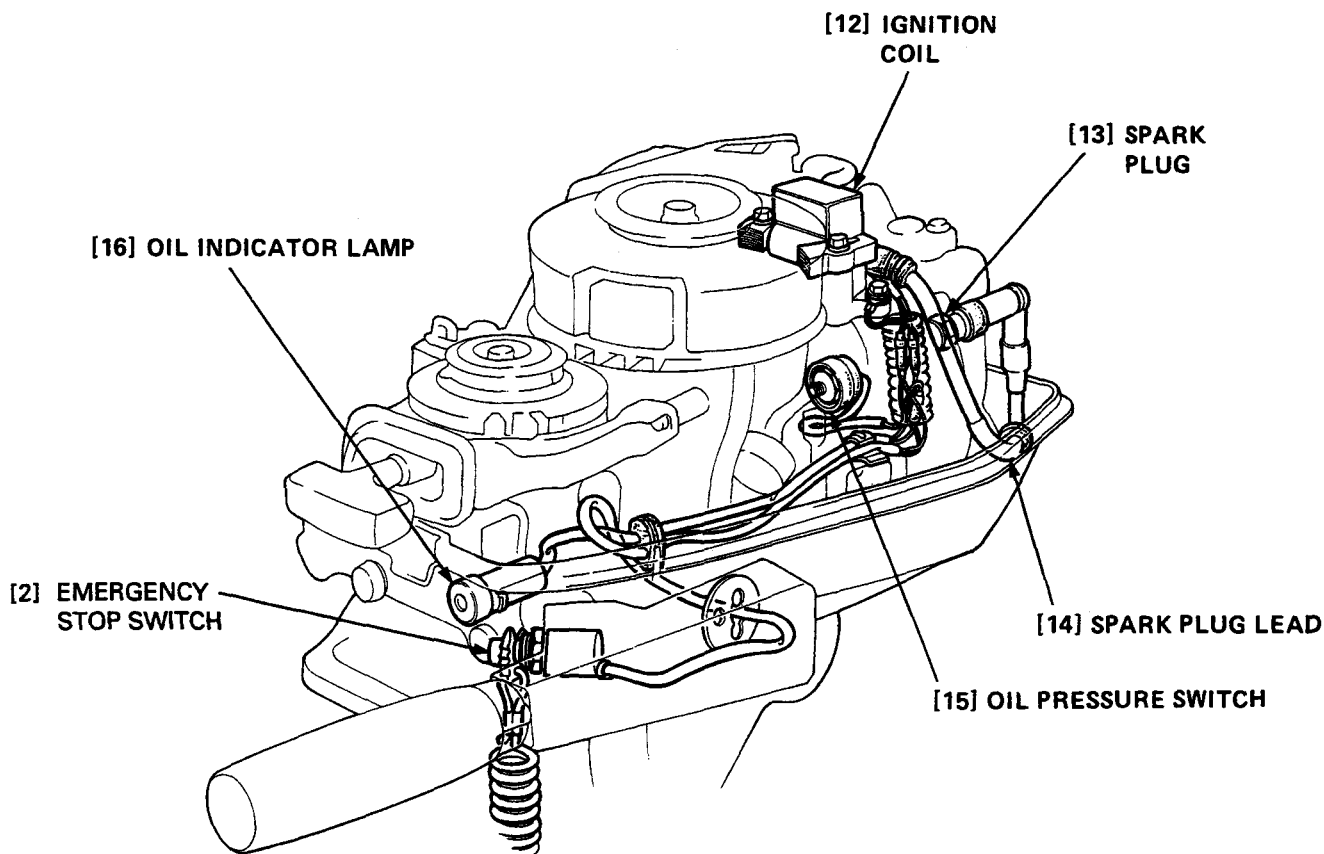
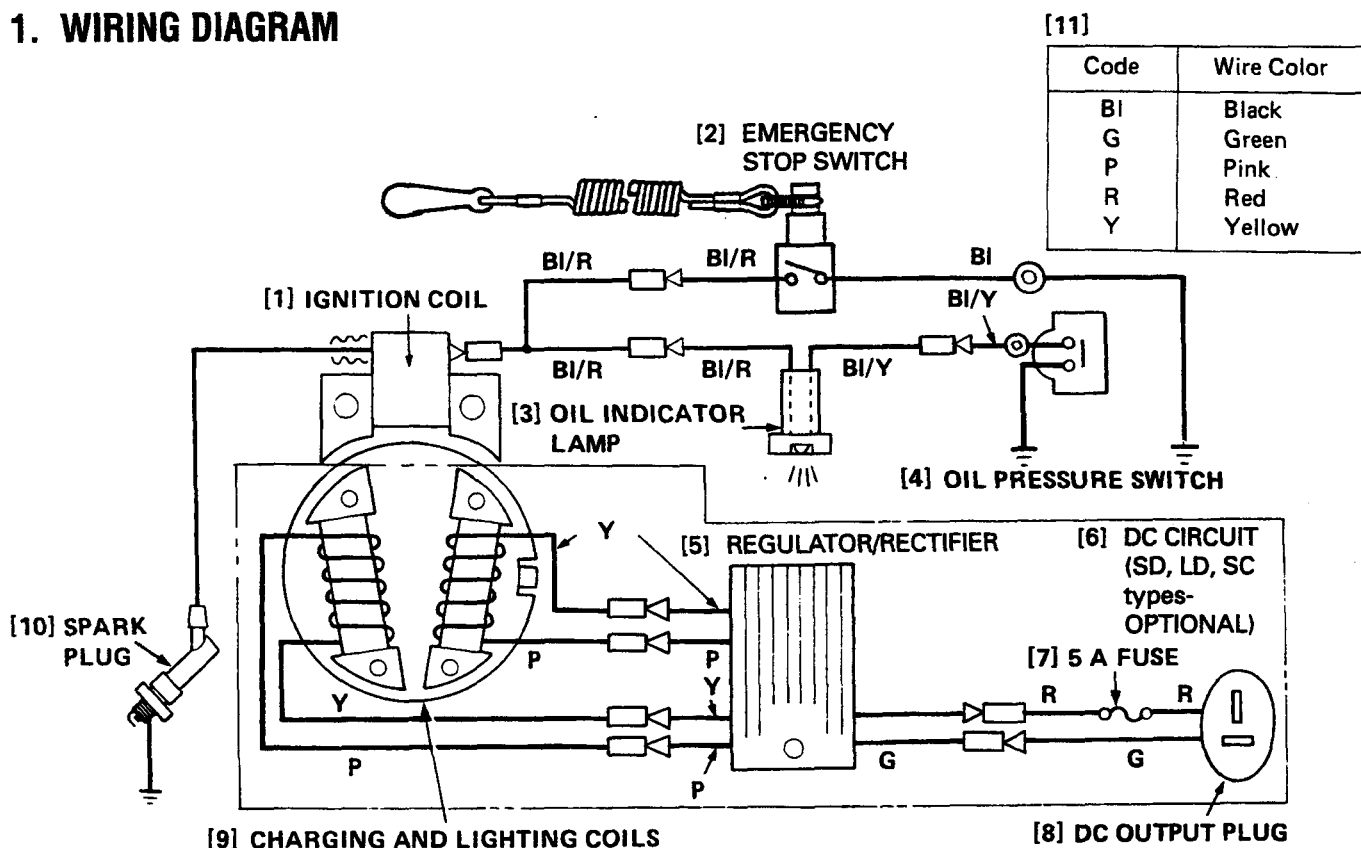
| PARTS<br>DESCRIPTION                                                    | Frame serial number 1200001 and subsequent                                                                     | Frame serial number 1000001 - 1199999                                                                         |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| OIL CHECK BOLT                                                          |                               |                            |
| ANODE METAL                                                             |                               |                            |
| D.C. RECEPTACLE<br>(SD, LD, SC types -<br>optional part)                |                               |                            |
| CHARGING AND<br>LIGHTING COILS<br>(SD, LD, SC types -<br>optional part) |                              |                           |
| REGULATOR/<br>RECTIFIER<br>(SD, LD, SC types -<br>optional part)        | REGULATOR/<br>RECTIFIER<br> | SILICONE<br>RECTIFIER<br> |
| CARBURETOR                                                              | "BC05B"<br>                 | "BC05A"<br>              |
| AIR GUIDE                                                               |                             |                          |

| PARTS<br>DESCRIPTION                         | Frame serial number 1200001 and subsequent                                                                                                                            | Frame serial number 1000001 – 1199999                                                                                                                        |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IMPELLER PUMP                                |  <p>DISTANCE COLLAR A (4)</p> <p>4 x 10 mm ROLLER (2)</p>                            |  <p>8 x 20 mm DISTANCE COLLAR (2)</p> <p>8 x 14 mm DISTANCE COLLAR (2)</p> |
| STEERING HANDLE/<br>EMERGENCY STOP<br>SWITCH |  <p>EMERGENCY STOP SWITCH</p>                                                      |  <p>ENGINE STOP SWITCH</p>                                               |
| FUEL TANK/<br>FUEL TANK JOINT                |  <p>FUEL TANK JOINT</p> <p>SC type</p> <p>SD, LD, SB, LB types</p> <p>TOOL KIT</p> |  <p>OIL BOTTLE</p> <p>TOOL KIT</p>                                       |

# III. SERVICE INFORMATION

**HONDA**  
**BF5A**

## 1. WIRING DIAGRAM



# IV. DISASSEMBLY AND SERVICE

**HONDA**  
**BF5A**

## 1. ELECTRICAL EQUIPMENT

### a. INSPECTION

- REGULATOR/RECTIFIER  
(SD, LD, SC types optional part)

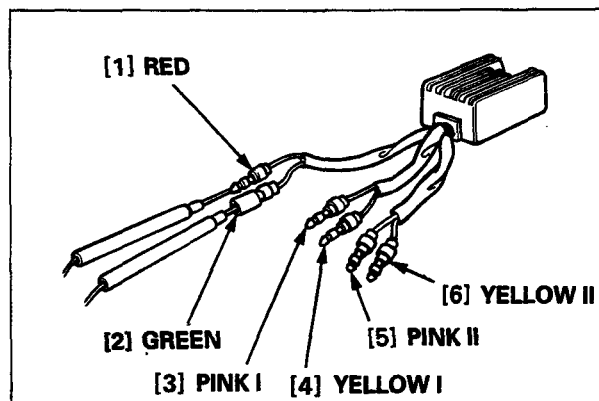
Measure the resistance between each terminal.

Replace the regulator/rectifier if the measurement is out of the specification listed in the table below.

- Use the tester below.

SANWA: SP-10D k $\Omega$  range

KOWA : TH-5H R x 100 range



Unit:k $\Omega$

|           | + | YELLOW I | YELLOW II | PINK I   | PINK II  | RED      | GREEN    |
|-----------|---|----------|-----------|----------|----------|----------|----------|
| -         |   |          |           |          |          |          |          |
| YELLOW I  |   |          | $\infty$  | $\infty$ | $\infty$ | $\infty$ | $\infty$ |
| YELLOW II |   | $\infty$ |           | $\infty$ | $\infty$ | $\infty$ | $\infty$ |
| PINK I    |   | $\infty$ | $\infty$  |          | $\infty$ | $\infty$ | $\infty$ |
| PINK II   |   | $\infty$ | $\infty$  | $\infty$ |          | $\infty$ | $\infty$ |
| RED       |   | 1k-200k  | 1k-200k   | 1k-200k  | 1k-200k  |          | 500-100k |
| GREEN     |   | 100-50k  | 100-50k   | 100-50k  | 100-50k  | $\infty$ |          |

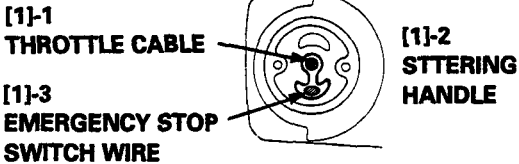
## 2. STEERING HANDLE

### a. DISASSEMBLY/REASSEMBLY

#### [1] STEERING HANDLE

##### REASSEMBLY:

Route the throttle cable first, then the emergency stop switch wires.



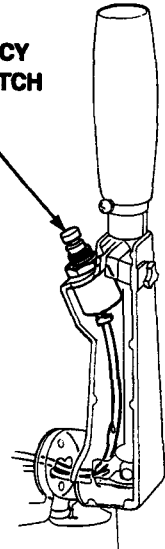
[2]  
16 mm HEX. NUT  
1.5 N·m (0.15 kg-m,  
1.1 ft-lb)

#### [3] EMERGENCY STOP SWITCH

##### REASSEMBLY:

After installing the switch, route the switch wire as shown.

#### [3]-1 EMERGENCY STOP SWITCH



#### [9] FRICTION BOLT

#### [4] RUBBER GRIP

#### [5] STEERING HANDLE WEIGHT

#### [6] THROTTLE FRICTION BLOCK

#### [7] THROTTLE REEL

##### REASSEMBLY:

Install the throttle cable end on the throttle reel and route the cable around the reel.

#### [8] 5 x 12 mm PAN SCREW

### 3. IMPELLER PUMP

#### a. DISASSEMBLY/REASSEMBLY

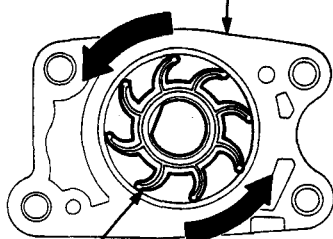
[1]  
6 x 28 mm HEX. BOLT (4)

**REASSEMBLY:**  
Apply SEA LOCK #10 to the thread before installing.

[8]  
IMPELLER PUMP

**REASSEMBLY:**  
Check for wear or cracks.  
Install the pump in the impeller housing while turning it counterclockwise.

[8]-1  
IMPELLER  
HOUSING

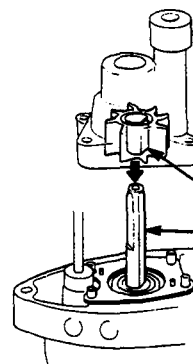


[8]-2  
IMPELLER  
PUMP

[2]  
WATER TUBE SEAL RING

[3]  
IMPELLER HOUSING

**REASSEMBLY:**  
Align the flat surface in the center of the pump with the flat side of the pinion shaft.



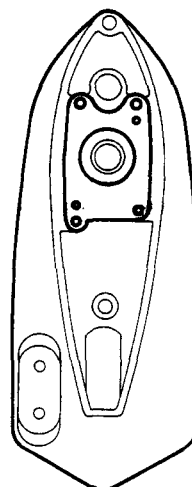
[3]-1  
FLAT  
SIDE

[4]  
IMPELLER GASKET (2)

**REASSEMBLY:**  
Install with gaskets on both sides of the cover.

[5]  
IMPELLER COVER

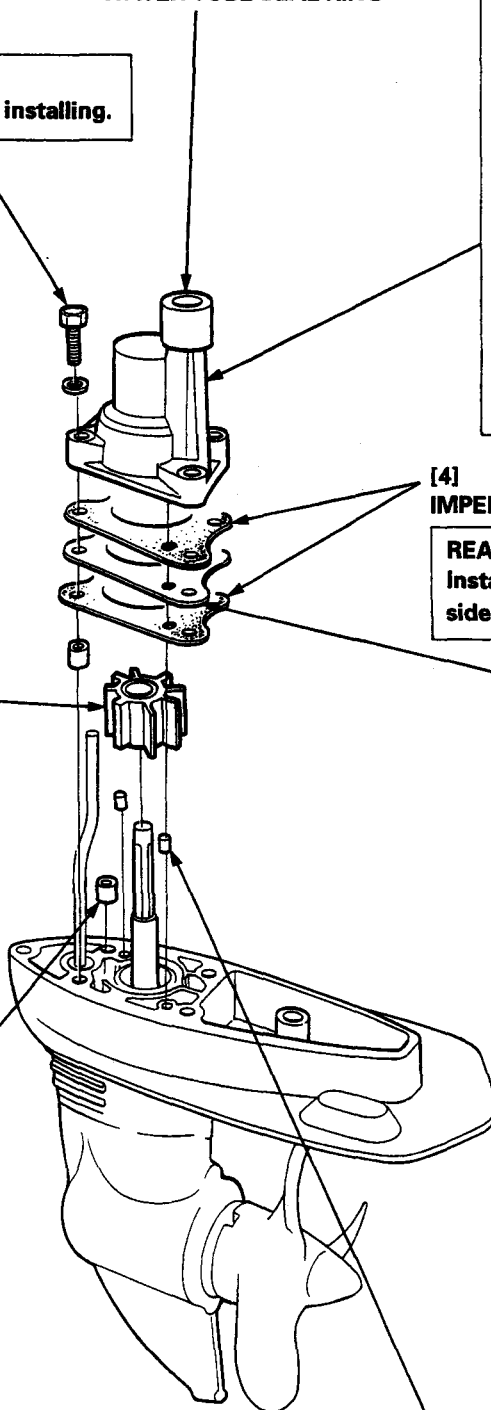
**REASSEMBLY:**  
Check to be sure the cover is not bent or cracked and set the cover on the gear case as shown.



[7]  
DISTANCE COLLAR A (4)

[6]  
4 x 10 mm ROLLER (2)

**REASSEMBLY:**  
Do not forget to install.



|           |                                |                |
|-----------|--------------------------------|----------------|
| <b>1.</b> | <b>Specifications</b>          | <b>3 - 4</b>   |
| <b>2.</b> | <b>Service Information</b>     | <b>5 - 17</b>  |
| <b>3.</b> | <b>Maintenance</b>             | <b>18 - 24</b> |
| <b>4.</b> | <b>Disassembly and Service</b> | <b>25 - 69</b> |
| <b>5.</b> | <b>Optional Parts</b>          | <b>70 - 74</b> |
| <b>6.</b> | <b>Operation</b>               | <b>75 - 81</b> |
| <b>7.</b> | <b>Shop Manual News</b>        | <b>82</b>      |
|           | <b>BF5A Supplement</b>         | <b>83 - 91</b> |