CONTENTS

PREFACE

This manual covers construction, function and servicing procedures of Honda BF20·BF2A outboard motors.

Careful observance of these instructions will result in better, safer service work.

HONDA MOTOR CO., LTD.
SERVICE PUBLICATIONS OFFICE

1. SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Item \ Model		BF2OS	BF2OL	BF2AS	BF2AL
Length	mm (in)	410 (16.1)			
Width	mm (in)	275 (10.8)			
Height	mm (in)	930 (36.6)	1,080 (42.5)	930 (36.6)	1,080 (42.5)
Dry weight	kg (lb)	12.5 (27.6)	13.0 (28.7)	12.5 (27.6)	13.0 (28.7)
Operating weight	kg (lb)	13.6 (30.0)	14.0 (30.9)	13.6 (30.0)	14.0 (30.9)
Transom height	mm (in)	420 (16.5)	570 (22.4)	420 (16.5)	570 (22.4)
Transom angle		4 stages (5°–10°–15°–20°)			
Tilting stage		1 stage			
Tilting angle		75°			
Turning angle		360°			

ENGINE

Type	4-stroke, side valve, 1 cylinder	
Displacement	76 cm^3 (4.6 cu in)	
Bore and stroke	46 x 46 mm (1.8 x 1.8 in)	
Max. horsepower	2.0 HP/5,000 rpm [At propeller shaft]	
Max. torque	0.62 kg-m (4.5 ft-lb)	
Compression ratio	6.5 : 1	
Fuel consumption	400 g/HPh	
Cooling system	Forced-air cooling (Water cooling for exhaust system)	
Ignition system	Transistorized magneto	
Ignition timing	20° B.T.D.C. (Fixed)	
Spark plug	BMR-4A (NGK)	BMR-4A (NGK), W14MR-U (ND)
Carburetor	Horizontal-type butterfly valve	
Lubrication system	Splash-type	
Oil capacity	0.4ℓ (0.42 US qt)	
Starting system	Recoil starter	
Stopping system	Grounding primary circuit	
Fuel tank capacity	1.0ℓ (0.26 US gal)	
Fuel	Regular grade automobile gasoline	
Exhaust system	Underwater exhaust system.	

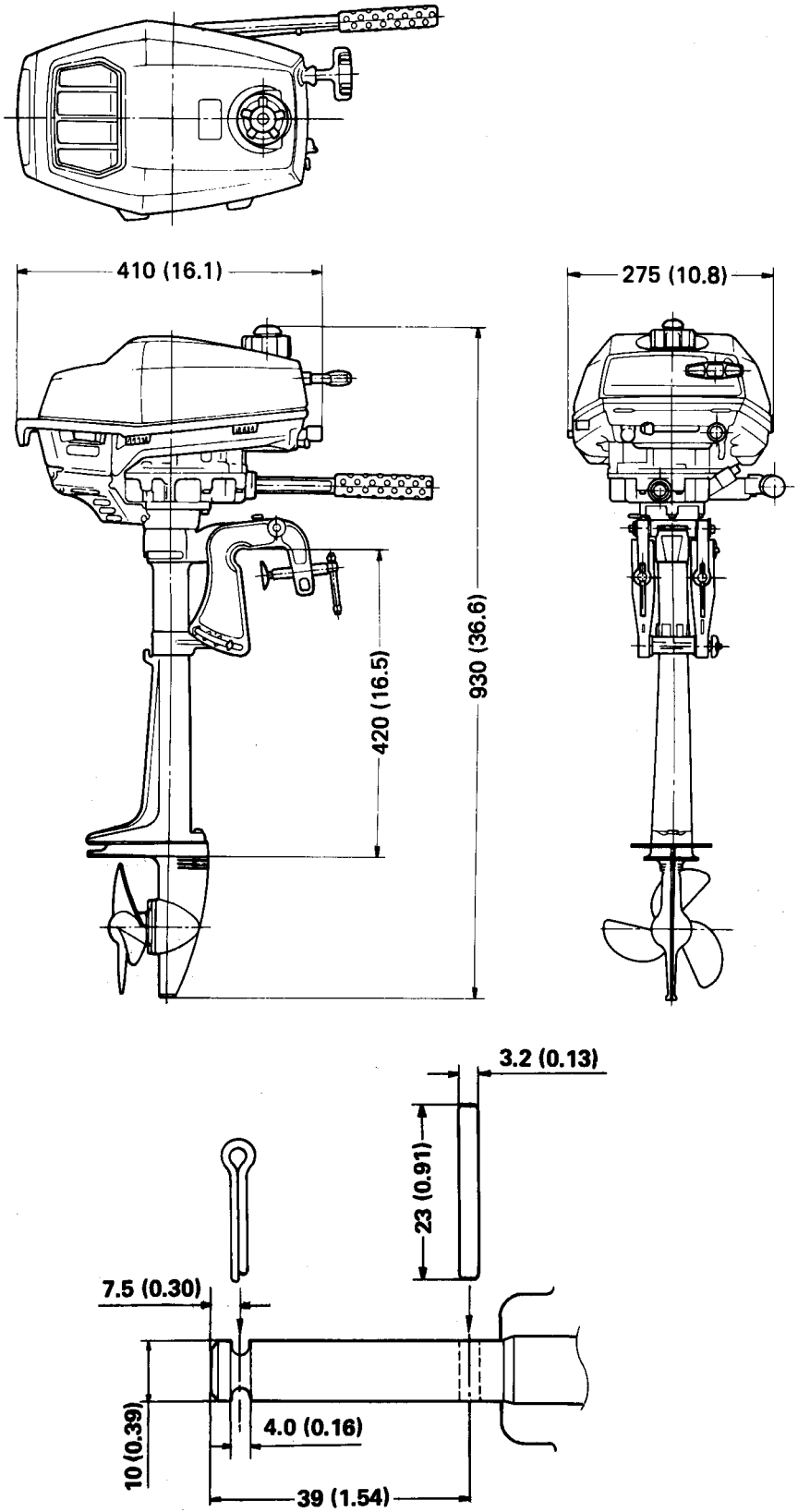
LOWER UNIT

Gear ratio	13 : 28
Gear case oil capacity	0.05ℓ (0.053 US qt)
Propeller (No. of blades–dia. x pitch)	3–184 x 120 mm (3–7.2 x 4.7 in)
Rotating direction	Clockwise (viewed from rear)

2. DIMENSIONAL DRAWINGS

UNIT: mm (in)

Illustrations are based on model BF20S.



II. SERVICE INFORMATION

1. GENERAL SAFETY

Pay attention to these symbols and their meaning:

⚠ 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

Stop the engine and remove the spark plug before servicing.
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.

⚠ WARNING

Gasoline is extremely flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks in your working area.

CAUTION:

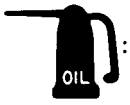
Keep away from rotating or hot parts and high tension wires when the engine is run with the cover off.

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 bolts 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 surface before reassembly.
6. After reassembly, check all parts for proper installation and operation.
7. Many screws used in this machine are self-tapping. Be aware that cross-threading or overtightening these screws will strip the female threads and ruin the hole.
8. Use only metric tools when servicing this unit. Metric bolts, nuts and screws are not interchangeable with nonmetric fasteners. The use of incorrect tools and fasteners may damage the unit.
9. Follow the instructions represented by these symbols when they are used:

p. : Indicates the reference page

0 x 0 (○): Indicates the type and quantity of bolts used.



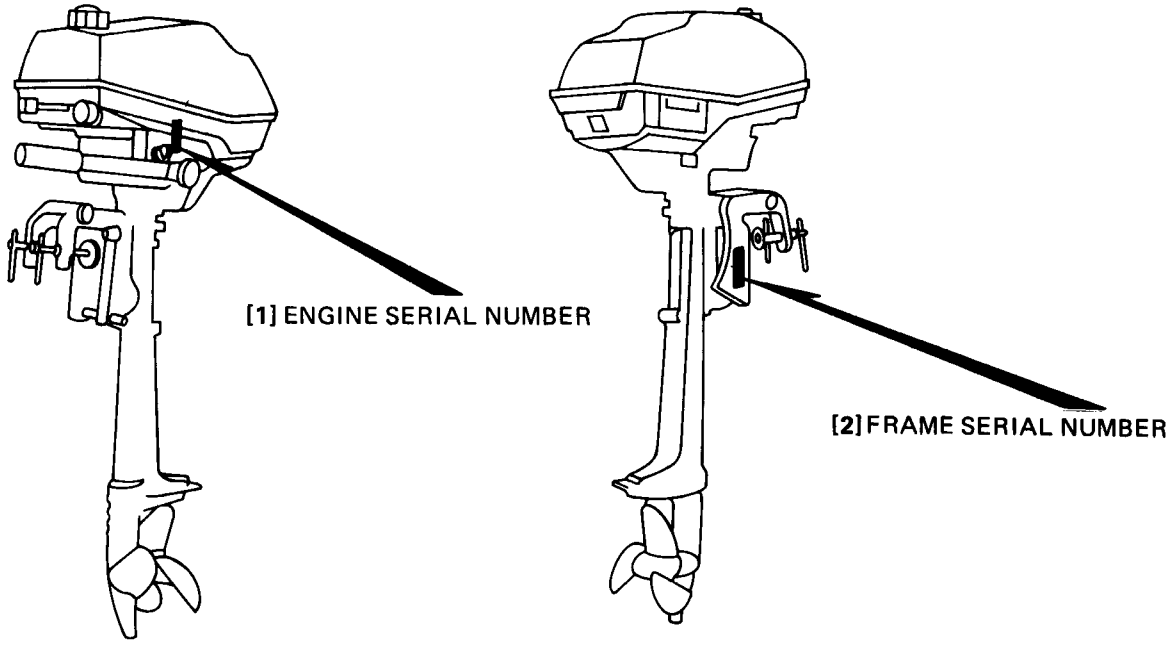
: Apply oil.

: Apply grease.

: Use special tool.

3. SERIAL NUMBER LOCATION

The serial numbers are stamped on the engine and the stern bracket as illustrated below. Always give these numbers when inquiring about the outboard motor or ordering parts to be sure you get the correct parts.



4. MAINTENANCE STANDARDS

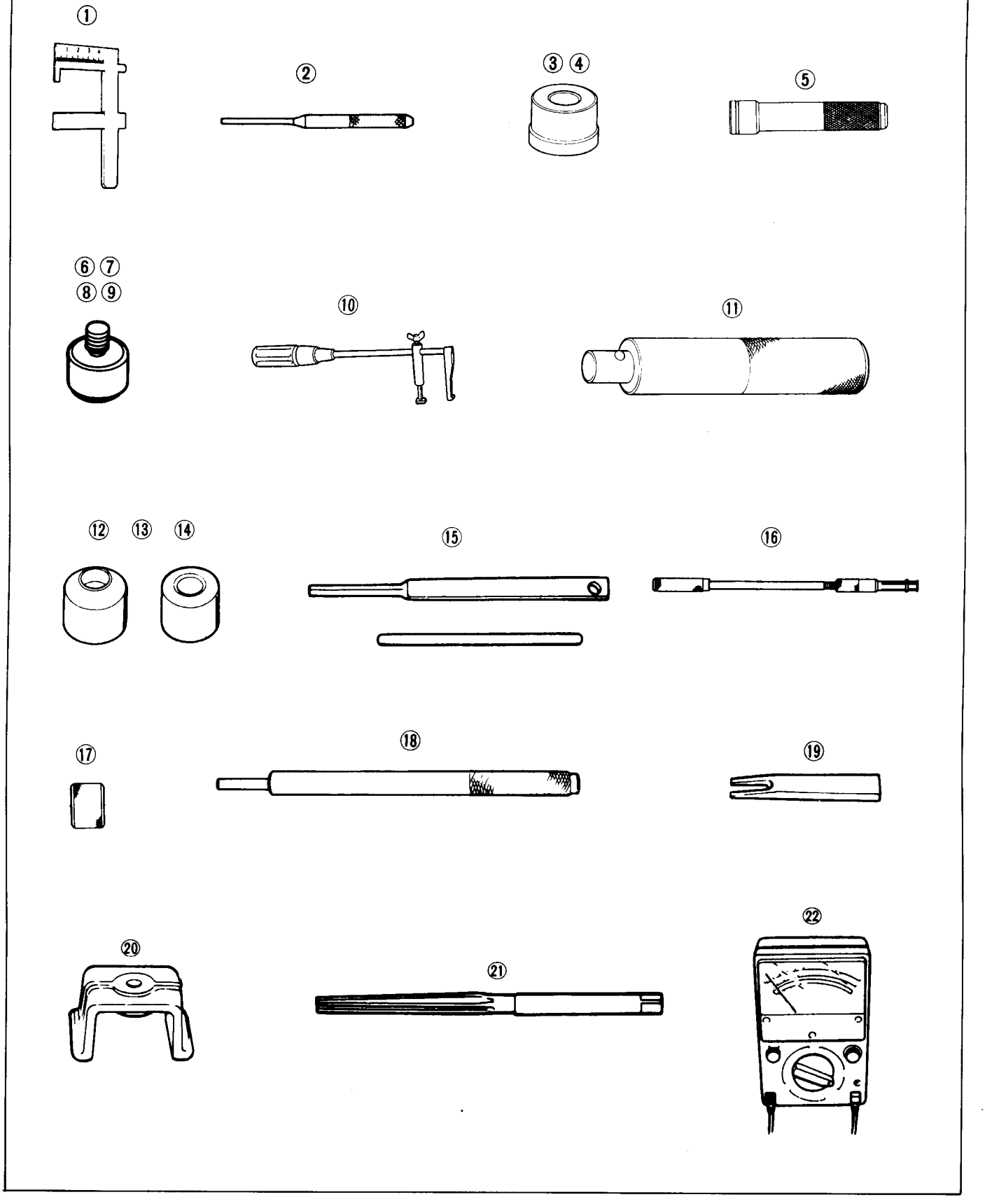
PART	ITEM	STANDARD	SERVICE LIMIT
Engine	Idle speed	1400±100 min^{-1} (rpm)	—
	Cylinder compression	6.5kg/cm^2 (92.4 lbs/in^2)[800 min^{-1}(rpm)]	—
Carburetor	Main jet	#70	—
	Pilot screw BF20S:	2 turns (Engine serial number 1000001–1007046)	—
		1-3/4 turns(Engine serial number 1007047 and subsequent)	—
	BF20L, BF2A:	2-1/8 turns	—
	Float height	10.5–13.5 mm (0.413–0.531 in)	—
Spark plug	Gap	0.6–0.7 mm (0.024–0.028 in)	—
Transistor unit	Primary side	0.7–0.9Ω	—
	Secondary side	6.3–7.7KΩ	—
	Air gap	0.2–0.6 mm (0.008–0.024 in)	—
Valve	Valve clearance IN	0.08–0.16 mm (0.003–0.006 in)	—
	EX	0.08–0.16 mm (0.003–0.006 in)	—
	Stem O.D. IN	5.490 mm (0.216 in)	5.45 mm (0.215 in)
	EX	5.445 mm (0.214 in)	5.40 mm (0.213 in)
	Guide I.D. IN/EX	5.50 mm (0.217 in)	5.56 mm (0.219 in)
	Stem-to-guide clearance IN	0.010 mm (0.0004 in)	0.11 mm (0.004 in)
	EX	0.055 mm (0.0022 in)	0.16 mm (0.006 in)
	Seat width IN/EX	0.7 mm (0.028 in)	1.0 mm (0.04 in)
	Spring free length	27.1 mm (1.07 in)	25.0 mm (0.98 in)
Cylinder	Sleeve I.D.	46.00 mm (1.8110 in)	46.05 mm (1.813 in)
Piston	Skirt O.D.	45.995 mm (1.8108 in)	45.92 mm (1.808 in)
	Piston-to-cylinder clearance	0–0.03 mm (0–0.0012 in)	0.13 mm (0.0051 in)
	Pin bore I.D.	10.002 mm (0.3938 in)	10.05 mm (0.3957 in)
Piston pin	O.D.	10.00 mm (0.3937 in)	9.95 mm (0.3917 in)
	Pin-to-pin bore clearance	0.015 mm (0.0006 in)	0.10 mm (0.0039 in)
Piston ring	Width Top/Second	1.5 mm (0.0591 in)	1.37 mm (0.0539 in)
	Side clearance Top	0.055–0.090 mm (0.0022–0.0035 in)	0.15 mm (0.0059 in)
	Second	0.055–0.085 mm (0.0022–0.0033 in)	0.15 mm (0.0059 in)
	End gap Top/Second	0.15–0.035 mm (0.0059–0.014 in)	1.0 mm (0.039 in)
	Oil	0.2–0.8 mm (0.0079–0.031 in)	1.0 mm (0.039 in)
Connecting rod	Small end I.D.	10.006 mm (0.3939 in)	10.05 mm (0.3957 in)
	Rod-to-pin clearance	0.006–0.023 mm (0.00024–0.00091 in)	0.10 mm (0.0039 in)
	Big end oil clearance	0.016–0.038 mm (0.00063–0.0015 in)	0.10 mm (0.0039 in)
	Big end axial clearance	0.20–0.90 mm (0.0079–0.035 in)	1.10 mm (0.043 in)
	Big end I.D.	18.00 mm (0.7087 in)	18.04 mm (0.7102 in)
Crankshaft	Crank pin O.D.	17.984 mm (0.7080 in)	17.94 mm (0.7063 in)
Camshaft	Cam height IN/EX	20.82 mm (0.8197 in)	20.47 mm (0.8059 in)
	Journal O.D.	12.184 mm (0.4797 in)	12.15 mm (0.4783 in)
Crankcase	Journal I.D.	12.20 mm (0.4803 in)	12.25 mm (0.4823 in)
Propeller shaft	O.D. at bevel gear	10.973–10.984 mm (0.4320–0.4324 in)	10.93 mm (0.4303 in)
Propeller shaft holder	Shaft bore I.D.	11.000–11.018 mm (0.4331–0.4338 in)	11.06 mm (0.4354 in)
	Shaft-to-shaft bore clearance	0.016–0.045 mm (0.0006–0.0018 in)	—
Vertical shaft	O.D. at gear case	10.973–10.984 mm (0.4320–0.4324 in)	10.93 mm (0.4303 in)
Gear case	Vertical shaft bore I.D.	11.000–11.018 mm (0.4331–0.4338 in)	11.06 mm (0.4354 in)
	Vertical shaft-to-bore clearance	0.016–0.045 mm (0.0006–0.0018 in)	—

5. TORQUE VALUES

Tightening points	Thread diameter	Torque
Flywheel	12 mm bolt	450–550 kg-cm (32.5–39.8 ft-lb)
Connecting rod	5 mm bolt	40–60 kg-cm (2.9-4.3 ft-lb)
Throttle cable clamp	6 mm bolt	45–55 kg-cm (3.3–4.0 ft-lb)
Engine switch	16 mm nut	8–12 kg-cm (0.6–0.9 ft-lb)
Standard torque	5 mm bolt, nut	40–70 kg-cm (2.9–5.1 ft-lb)
	6 mm bolt, nut	80–120 kg-cm (5.8–8.7 ft-lb)
	8 mm bolt, nut	200–280 kg-cm (14.5–20.2 ft-lb)
	10 mm bolt, nut	350–400 kg-cm (25.3–28.9 ft-lb)

6. SPECIAL TOOLS

	Tool Name	Tool number	Application
1	Float level gauge	07401–0010000	Carb. float level inspection
2	Pin driver, 2.5 mm	07744–0010100	2.5 mm spring pin removal/installation
3	Attachment, 32 x 35 mm	07746–0010100	Oil seal installation (Use with Tool No. 07746–0040500
4	Attachment, 37 x 40 mm	07746–0010200	Water seal installation (Use with Tool No. 07746–0040400)
5	Bearing driver, 22 mm	07746–0020100	Crankshaft timing gear installation
6	Pilot, 10 mm	07746–0040100	Gear case bearing installation
7	Pilot, 17 mm	07746–0040400	Water seal installation
8	Pilot, 20 mm	07746–0040500	Oil seal installation
9	Pilot, 22 mm	07746–0041000	Propeller shaft holder seal installation
10	Water seal removal	07748–0010000	Water seal removal
11	Driver	07749–0010000	Use with attachments and pilots
12	Valve seat cutter, 45°	07780–0010100	Valve seat reconditioning
13	Valve seat cutter, 32°	07780–0012000	
14	Valve seat cutter, 32°	07780–0012600	
15	Cutter holder	07781–0010100	
16	Bearing remover, 15 mm	07936–KC10500	11 x 21 x 8 mm Water seal removal
17	Remover weight	07936–3710200	Use with Tool No. 07936–KC10500
18	Valve guide driver	07942–8920000	Valve guide removal/installation
19	Valve holder	07972–8120000	Tappet adjuster disassembly/reassembly
20	Valve lapping guide	07975–8920000	Tappet adjuster lapping
21	Valve guide reamer, 5.5 mm	07984–2000000	Valve guide reaming
22	Digital volt-ohmmeter or Analog volt-ohmmeter	KS–AH–32–003 or KS–TH–5H–1	Ignition coil and engine stop switch inspection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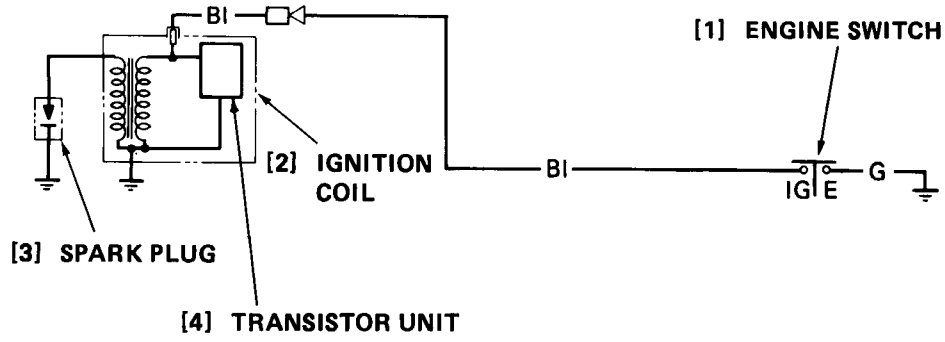
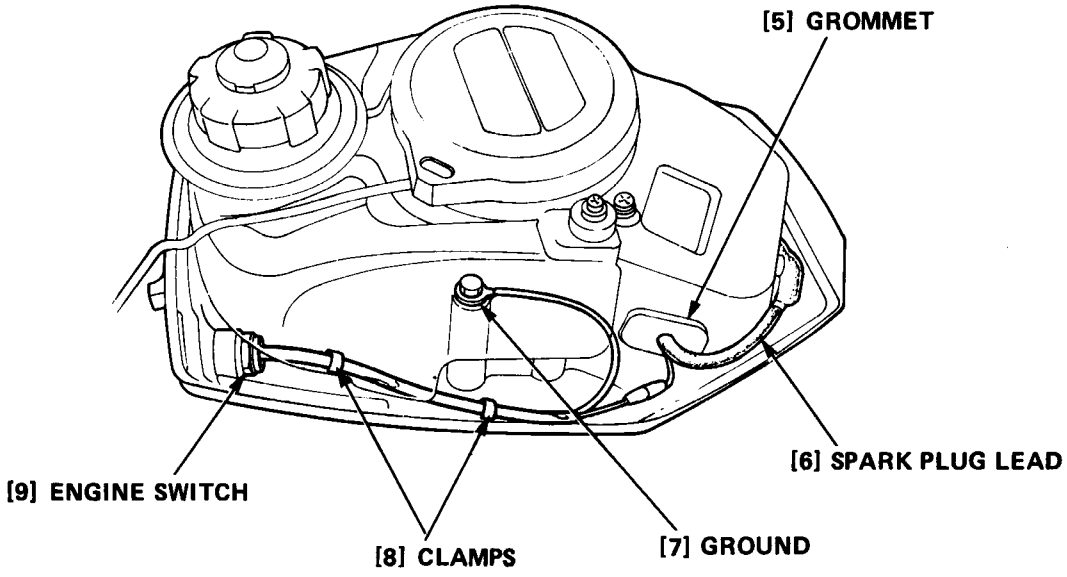
7. WIRING DIAGRAM





8. TROUBLESHOOTING

- ENGINE

a. Engine will not start.

Is there gasoline in the fuel tank? — NO → • Refill the fuel tank and restart the engine.

Yes

Is the spark plug flooded? — NO → • Clogged fuel line, fuel valve, fuel filter or breather tube.
• Float valve malfunction in the carburetor.
• Clogged port or nozzle in the carburetor.

Yes

Is there spark at the spark plug? — NO → • Faulty ignition system. (See page 13)

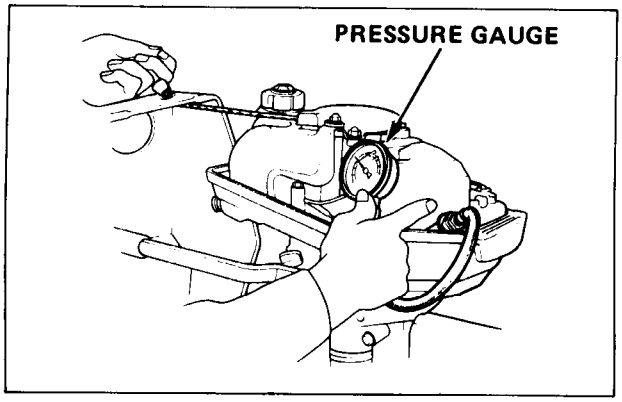
Yes

Is there enough compression? See page 14 — NO → • Blown head gasket.
• Improperly tightened cylinder head.
• Poor valve seat contact.
• Worn cylinder, piston or piston rings.
• Cylinder head warpage.
• Less tappet clearance.
• Improper valve timing.

CYLINDER COMPRESSION TEST

1) Remove the spark plug and connect a pressure gauge to the plug hole.
2) Move the throttle lever to the FAST position, and operate the recoil starter until the highest reading is attained.

Standard cylinder compression	6.5 kg/cm^2 (92.4 lbs/in^2)/ 800 min^{-1} (r.p.m.)



b. ABNORMAL ENGINE SPEED

Engine starts but stops immediately.	• Fuel mixture too rich with choke valve closed. • Carburetor pilot screw out of adjustment. • Air leakage from carburetor insulator. • Defective spark plug. • Float valve malfunction.
Engine speed does not increase.	• Defective spark plug. • Choke valve stays closed. • Water in the carburetor. • Improper valve timing. • Poor valve seat contact. • Overheating.
Engine speed does not decrease.	• Faulty throttle valve shaft or linkage.
Engine speed does not stabilize. (Hunting)	• Carburetor pilot screw out of adjustment. • Clogged carburetor passages. • Air leakage from carburetor insulator. • Insufficient fuel in the fuel tank.

c. IGNITION SYSTEM TROUBLESHOOTING

Engine does not start with engine switch turned to ON.
→ Test the spark plug.

No spark ↓

Check again with a new spark plug.
Sparks → • Faulty spark plug. • Install new spark plug.

No spark ↓

Check again with a new spark plug cap.
Sparks → • Faulty spark plug cap. • Install new spark plug cap.

No spark ↓

Disconnect the black wire from the engine switch and recheck.
Sparks → • Faulty engine switch. • Replace engine switch.

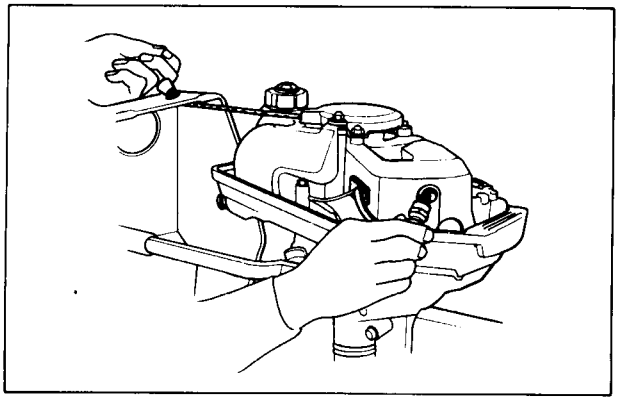
No spark →
• Defective transistorized ignition coil.
• Replace transistorized ignition coil.

• GEAR CASE

Water is detected in the gear oil.
→
• Worn or damaged water seal and gasket.
• Improperly tightened fasteners on gear case.
• Worn propeller shaft.

SPARK TEST

1) Remove the engine cover, plug cap and spark plug.
2) Attach the spark plug to the plug cap, and ground the side electrode against the 6 x 20 mm bolt.
3) Pull the recoil starter and check to see if sparks jump across the electrodes.



⚠ WARNING

- **Never hold the spark plug lead with wet hands while performing this test.**
- **Make sure that no fuel has been spilled on the engine—and that the plug is not wet with fuel.**
- **To avoid fire hazards, do not allow sparks near the plug hole.**

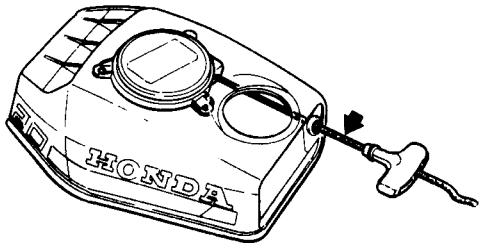
9. MAINTENANCE SCHEDULE

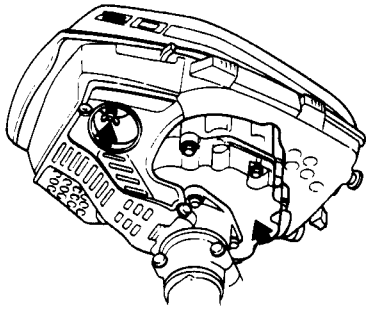
REGULAR SERVICE PERIOD Performed at every indicated month or operating hour intervals, whichever comes first. / ITEM		EACH USE (3)	FIRST MONTH OR 20 HRS (2)	EVERY 6 MONTHS OR 100 HRS (2)	EVERY YEAR OR 200 HRS (2)
Engine oil	Check level	○			
	Change		○	○	
Gear case oil	Check level	○			
	Change		○		○
	Check for water contamination			○	
Starter rope	Check			○	
Carburetor linkage	Check		○		
Valve clearance	Check-Readjust		○		○
Spark plug	Clean-Readjust			○	
Shear pin	Check			○	
Lubrication	Grease			○(1)	
Fuel tank and filter	Clean				○
Combustion chamber and valves	Clean-Relap	Every 300 hours			
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 interfals.
(3) To maintain cooling system efficiency, flush the outboard motor with fresh water after each use in salt water.

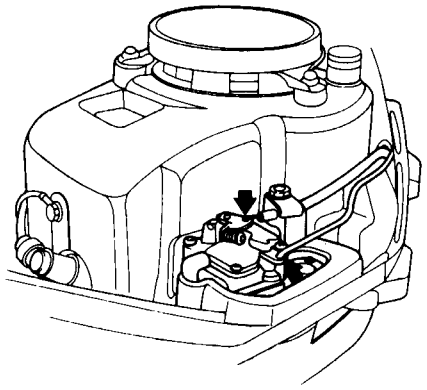
10. LUBRICATION CHART

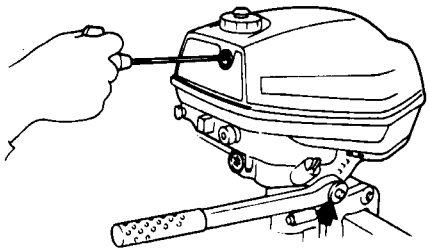
1. Wipe the outside of the engine with a cloth dipped in oil. Apply oil to the following parts.

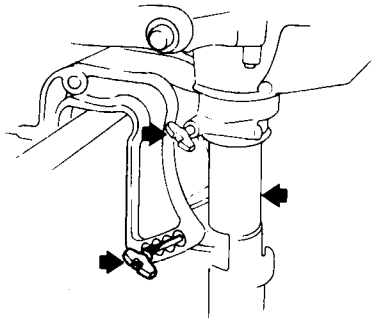


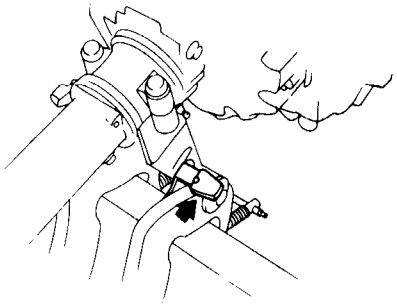


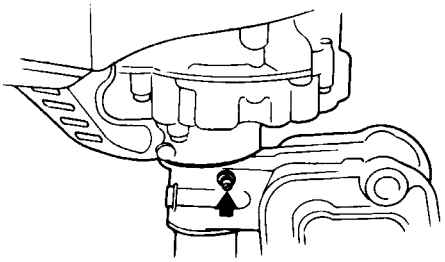
2. Apply marine anti-corrosion grease to the following parts.

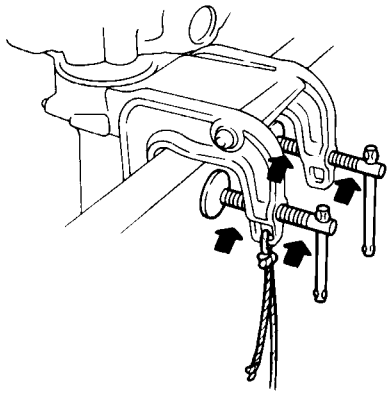












1. ENGINE OIL

CAUTION:

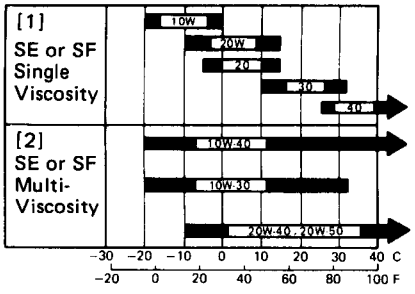
Used motor oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Although this is unlikely unless you handle used oil on a daily basis, it is still adviseable to thoroughly wash your hands with soap and water as soon as possible after handling used oil.

Drain the oil while the engine is still warm to assure rapid and complete draining.

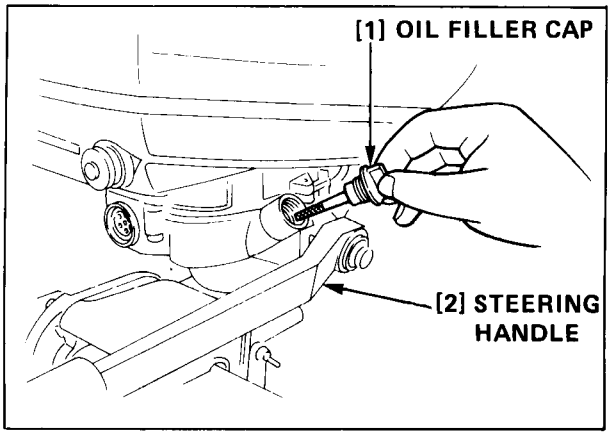
1. Turn the fuel valve lever OFF, and close the fuel cap vent knob.
2. Remove the oil filler cap, and turn the motor on its side to drain the oil.
3. Stand the engine in an upright position, and fill the crankcase with the recommended oil. Check the oil level with the dipstick resting on the filler opening (do not screw in). Fill to the upper level mark on the dipstick.

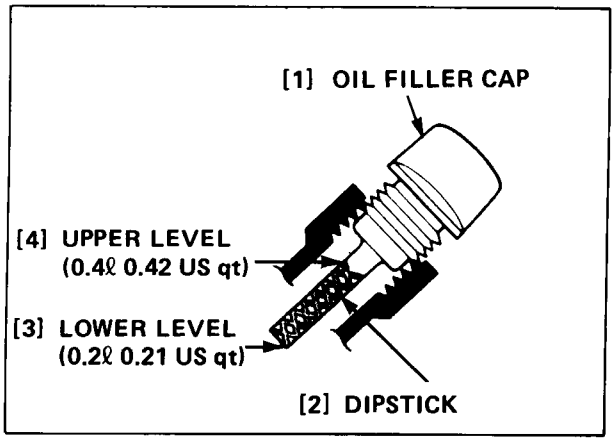
Engine oil capacity	0.4ℓ (0.42 US qt)

Recommended oil:
Select the appropriate viscosity for the average temperature in your area. SAE10W-40 is recommended for general, all-temperature use.



[3] Ambient temperature

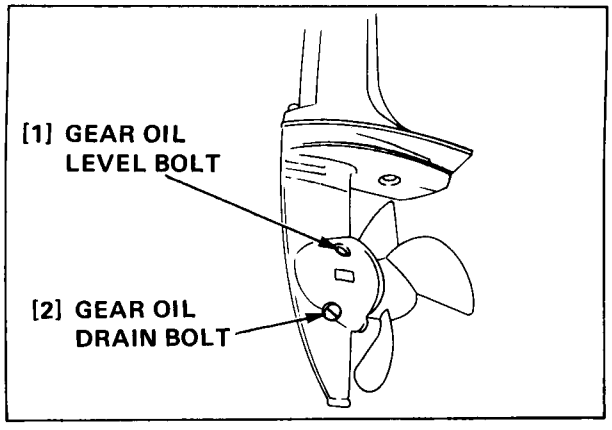




2. GEAR OIL

1) Remove the gear oil level bolt and gear oil drain bolt to drain the oil.
2) Using the gear oil bottle (optional part), inject oil through the drain bolt hole until it starts flowing out through the level bolt hole.
3) Reinstall and tighten the level and drain bolts securely.
4) Remove the oil bottle and reinstall the drain bolt.

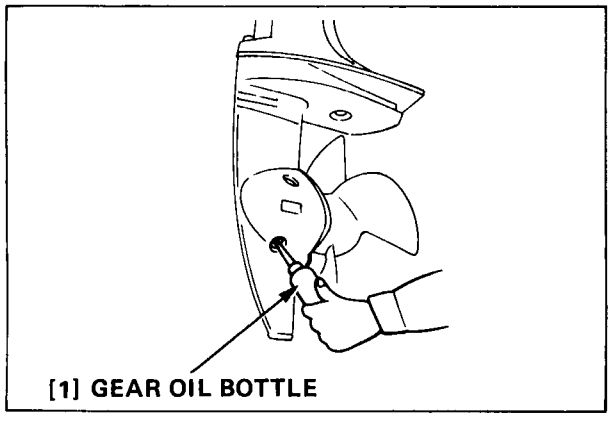
Gear oil capacity	0.05ℓ (0.053 US qt)



Recommended oil	API standard (GL-4 or GL-5) SAE90 outboard motor gear oil

CAUTION:

If water is detected in the oil, check the gasket and water seal for damage and the gear case for improper installation.



3. SPARK PLUG

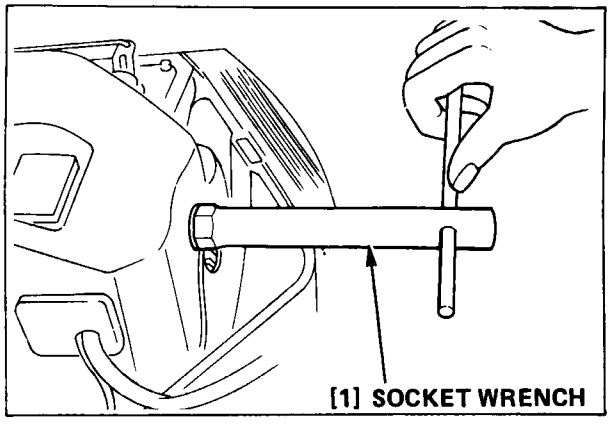
1) Remove the engine cover and spark plug cap.
   Remove the spark plug using the socket wrench.
2) Visually inspect the spark plug. Discard it if the insulator is cracked or chipped.

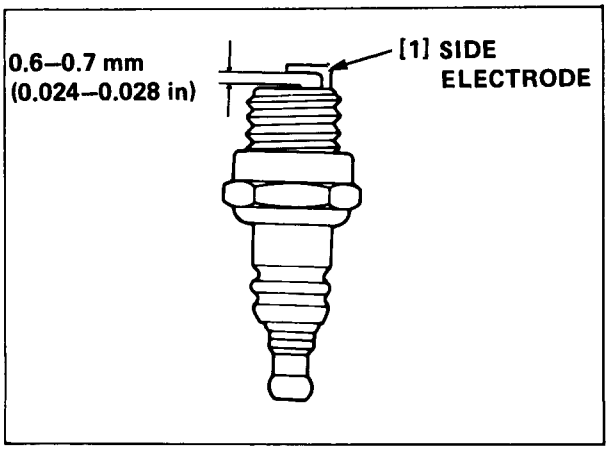
Standard spark plug	BF20: BMR-4A (NGK) BF2A: BMR-4A (NGK), W14MR-U (ND)

3) Remove carbon or other deposit with a stiff wire brush.
4) Measure the plug gap with a wire type feeler gauge.

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

If necessary, adjust the gap by bending the side electrode.
Make sure the sealing washer is in good condition, replace if necessary.
Install the plug fingertight to seat the washer, then tighten with a plug wrench (an additional 1/2 turn if a new plug) to compress the sealing washer. If you are reusing a plug, tighten 1/8–1/4 turn after the plug seats.





CAUTION:

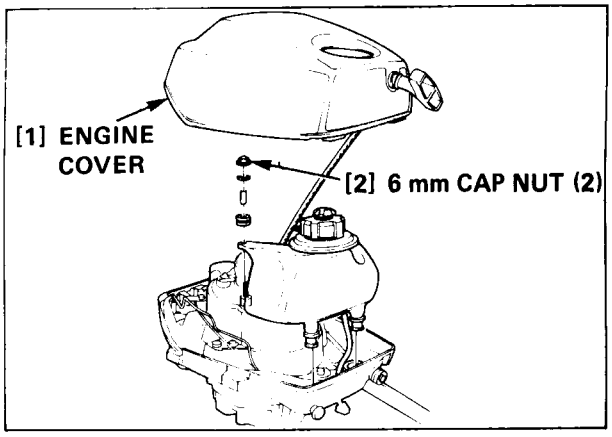
- **The spark plug must be securely tightened. An improperly tightened plug can become very hot and possibly damage the engine.**
- **Never use a spark plug with an improper heat range.**

4. COMBUSTION CHAMBER

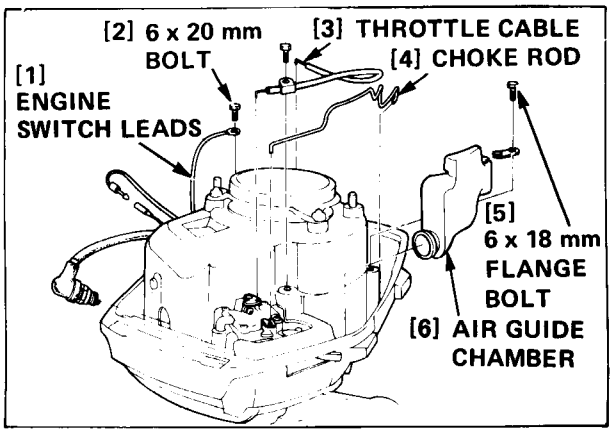
⚠ WARNING

- **Gasoline is flammable and is explosive under certain conditions. Do not smoke or allow flames or sparks near the outboard motor while draining fuel.**
- **Always work in a well-ventilated area.**
- **Be sure to store drained fuel in a safe container.**
- **Be careful not to spill fuel. Fuel vapor or spilled fuel may ignite; Wipe up any spilled fuel immediately, and make sure the area is dry before starting the engine.**

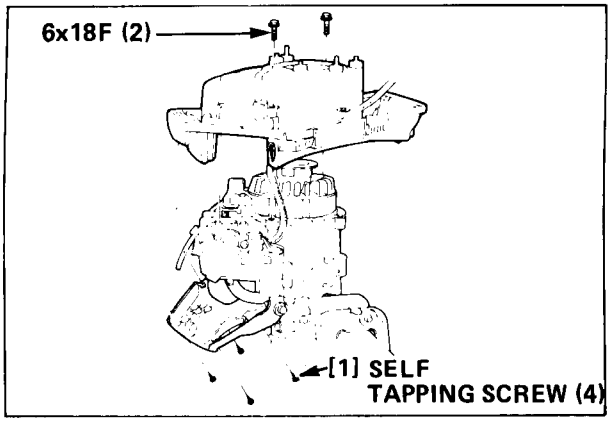
1) Remove the engine cover, recoil starter, two 6 mm cap nuts, and fuel tank.



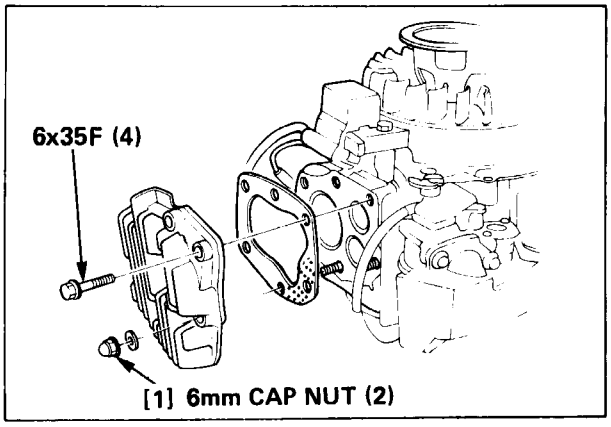
2) Remove the choke rod, throttle cable, 6 x 18 mm flange bolt, and air chamber. Disconnect the engine switch leads, spark plug cap and remove the 6 x 20 mm bolt. Remove the spark plug and fan cover grommet.



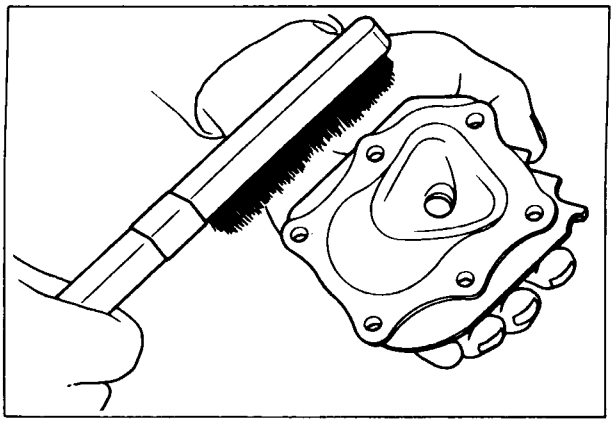
3) Remove the four 5 mm tapping screws, two 6x18 mm flange bolts, and fan cover.



4) Remove the four 6x35 mm flange bolts, two 6 mm cap nuts, and cylinder head.



5) Clean the cylinder head using a wire brush.



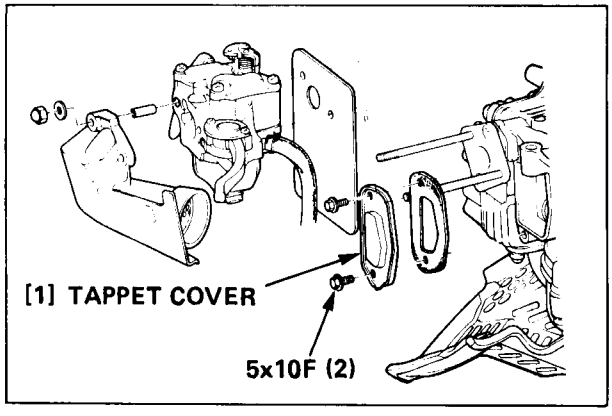
CAUTION

Be careful not to damage the cylinder head gasket surface.

6) Inspect cylinder head for warpage.

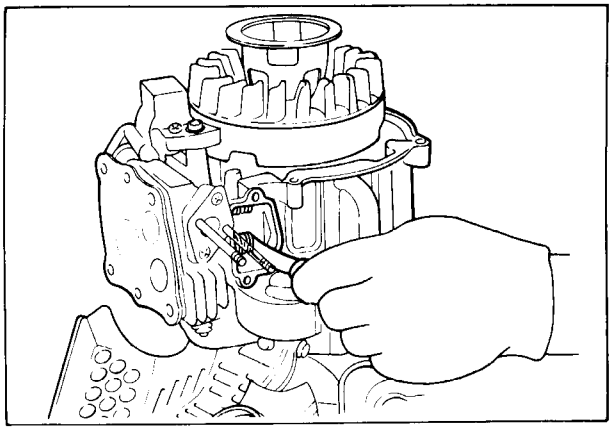
5. VALVE CLEARANCE

1) Remove the fan cover.
2) Remove the two 6 mm cap nuts and the carburetor.
3) Remove the two 5x10 mm flange bolts and the tappet cover.



4) With the engine cold and the piston at TDC on its compression stroke, measure the valve clearance.

Standard valve clearance IN/EX	0.08–0.16 mm (0.003–0.006 in)

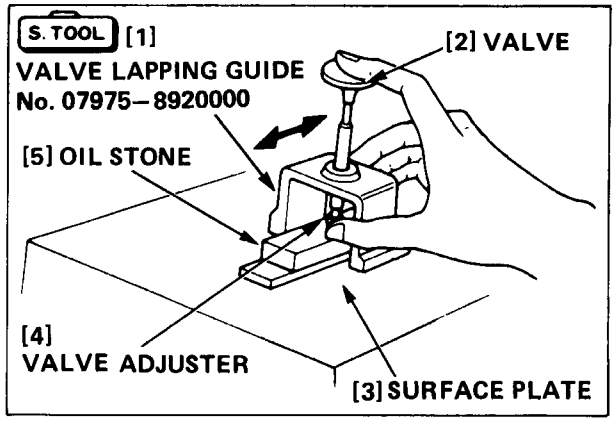


5) If the valve clearance is not within the specified range, replace the valve adjuster to obtain the correct clearance.
Valve adjusters are available in the sizes shown in the following table.
Measure the thickness of the used adjuster, and then select the replacement adjuster that will achieve the correct clearance.

REPLACEMENT VALVE ADJUSTER

Part No.	Thickness
14801–892–000	3.15 mm (0.124 in)
14803–892–000	3.25 mm (0.128 in)
14806–892–000	3.34 mm (0.132 in)
14809–892–000	3.43 mm (0.135 in)
14812–892–000	3.52 mm (0.139 in)
14815–892–000	3.61 mm (0.142 in)
14818–892–000	3.72 mm (0.146 in)
14820–892–000	3.82 mm (0.150 in)

If the standard clearance cannot be obtained by replacement, lap the bottom of the adjuster on an oil stone using the valve and the VALVE LAPPING GUIDE (special tool), as shown.



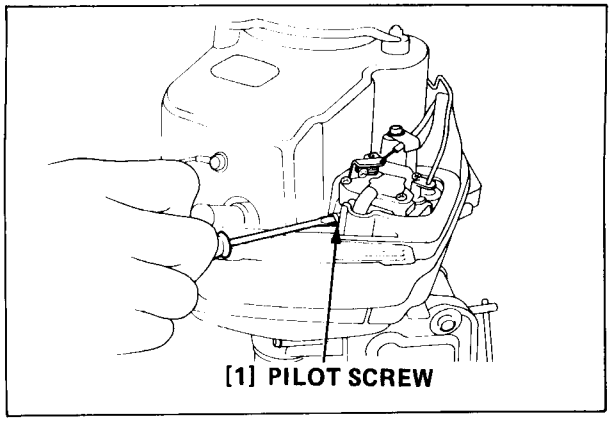
6. CARBURETOR

1) Start the engine and allow it to warm up to normal operating temperature.
2) With the engine idling, turn the pilot screw in or out to the setting that produces the highest idle rpm. The correct setting will usually be obtained at approximately the following number of turns out from the fully closed (lightly seated) position:

Pilot screw opening	BF20S: 2 turns (Engine serial number 1000001–1007046) 1-3/4 turns (Engine serial number 1007047 and subsequent) BF20L, BF2A: 2-1/8 turns

3) After the pilot screw is correctly adjusted, attach a tachometer to the engine and turn the throttle stop screw to obtain the standard idle speed.

Standard idle speed	1,400 ± 100 min^{-1} (rpm)


[1] PILOT SCREW