Service Manual

HomeSite Power
2400 (2EGMBB-5267)
3500 (2.5EGMBG-5268)
Portable Generator Set

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SAFETY PRECAUTIONS

Thoroughly read the OPERATOR'S MANUAL before operating the generator set. Safe operation and top performance can only be attained when equipment is operated and maintained properly.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to operators, service personnel and equipment.

⚠ DANGER ***This symbol alerts you to an immediate hazard that will result in severe personal injury or death.***

⚠ WARNING ***This symbol alerts you to a hazard or unsafe practice that can result in severe personal injury or death.***

⚠ CAUTION ***This symbol alerts you to a hazard or unsafe practice that can result in personal injury or damage to equipment or property.***

Electricity, fuel, exhaust, moving parts and batteries present hazards against which precautions must to taken to prevent severe personal injury or death.

Exhaust Gas Is Deadly

- Operate the generator set outdoors only. Stay away from the exhaust outlet.
- Make sure generator set exhaust will not enter windows, doors, vents or air intakes of adjacent buildings, vehicles or boats.
- NEVER USE THE GENERTOR SET INSIDE a home, garage, crawl space, barn, shed, cabin, boat, boat house, RV or tent, or in a confined outdoor space such as an alley, ditch, parking garage or courtyard, or in any other space where exhaust can accumulate. Note that HAZARDOUS CARBON MONOXIDE LEVELS FROM ENGINE EXHAUST CAN ACCUMULATE INDOORS EVEN WHEN ALL WINDOWS AND DOORS ARE OPEN AND FANS ARE RUNNING.

Gasoline is Flammable / Explosive

- Refuel the generator set outdoors only.
- Static electric sparks caused by fuel flowing through a service station pump nozzle can ignite gasoline. Never fill the generator set with a service station pump nozzle. Instead, fill a safety tank sitting on the ground and then slowly transfer fuel to the generator set from the safety tank.
- DO NOT fill fuel tanks while the engine is running. A hot engine can ignite the fuel.
- To prevent fire due to fuel leakage, always close the fuel valve and let the generator set cool before transporting it or storing it in a confined space.
- DO NOT SMOKE OR ALLOW AN OPEN FLAME near the generator set. Keep flames, sparks, electrical switches, pilot lights, electrical arcs, arc-producing equipment and all other sources of ignition well away.

Generator Voltage is Deadly

- DO NOT CONNECT THE GENERATOR SET DIRECTLY TO ANY BUILDING ELECTRICAL SYSTEM. Back-feed could cause electrocution of utility line workers and damage to equipment. An approved switching device must be used to prevent interconnections. A trained and experienced electrician must make electrical connections when the generator set is used for emergency power.
- Make sure clothing, shoes and skin are dry when handling electrical equipment.
- Never operate the generator set in rain or snow or when it is sitting on wet ground.

Moving Parts Can Cause Severe Personal Injury or Death

- Before performing any maintenance on the generator set, disconnect the spark plug wire.
- Always keep hands away from moving parts.
- Do not wear loose clothing or jewelry while servicing the generator set. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts causing sparks, flame and electrical shock.
- Make sure that fasteners and clamps on the generator set are tight. Keep guards in position over fans, rotors, etc.

SAFETY PRECAUTIONS

Battery Gases are explosive

- Wear safety glasses when servicing batteries.
- Do not smoke.
- To reduce arcing when disconnecting or reconnecting battery cables, always disconnect the negative (–) cable of the battery first and reconnect it last.

General Precautions

- Keep children away from the generator set.
- Wear hearing protection when near an operating generator set.
- Keep a multi-class ABC fire extinguisher readily at hand. Class A fires involve ordinary combustible materials such as wood and cloth. Class B fires involve combustible and flammable liquids and gaseous fuels. Class C fires involve live electrical equipment. (ref. NFPA No. 10)
- Benzene and lead may be found in gasoline and have been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale or contact gasoline.
- Used engine oils have been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale or contact used engine oil or its vapors.
- Keep the generator set clean and dry at all times. Excess grease and oil can catch fire and/or accumulate dirt, which can cause overheating.
- Do not store anything on the generator set, such as oil cans, oily rags, chains or wooden blocks. A fire could result or operation could be adversely affected
- Do not work on the generator set when you are mentally or physically fatigued or have consumed alcohol or drugs.

⚠ WARNING: ⚠

Improper service or repairs can create an unsafe condition that can cause your customer or others to be seriously hurt or killed.

Follow the procedures and precautions in this manual and other service materials carefully.

⚠ WARNING: ⚠

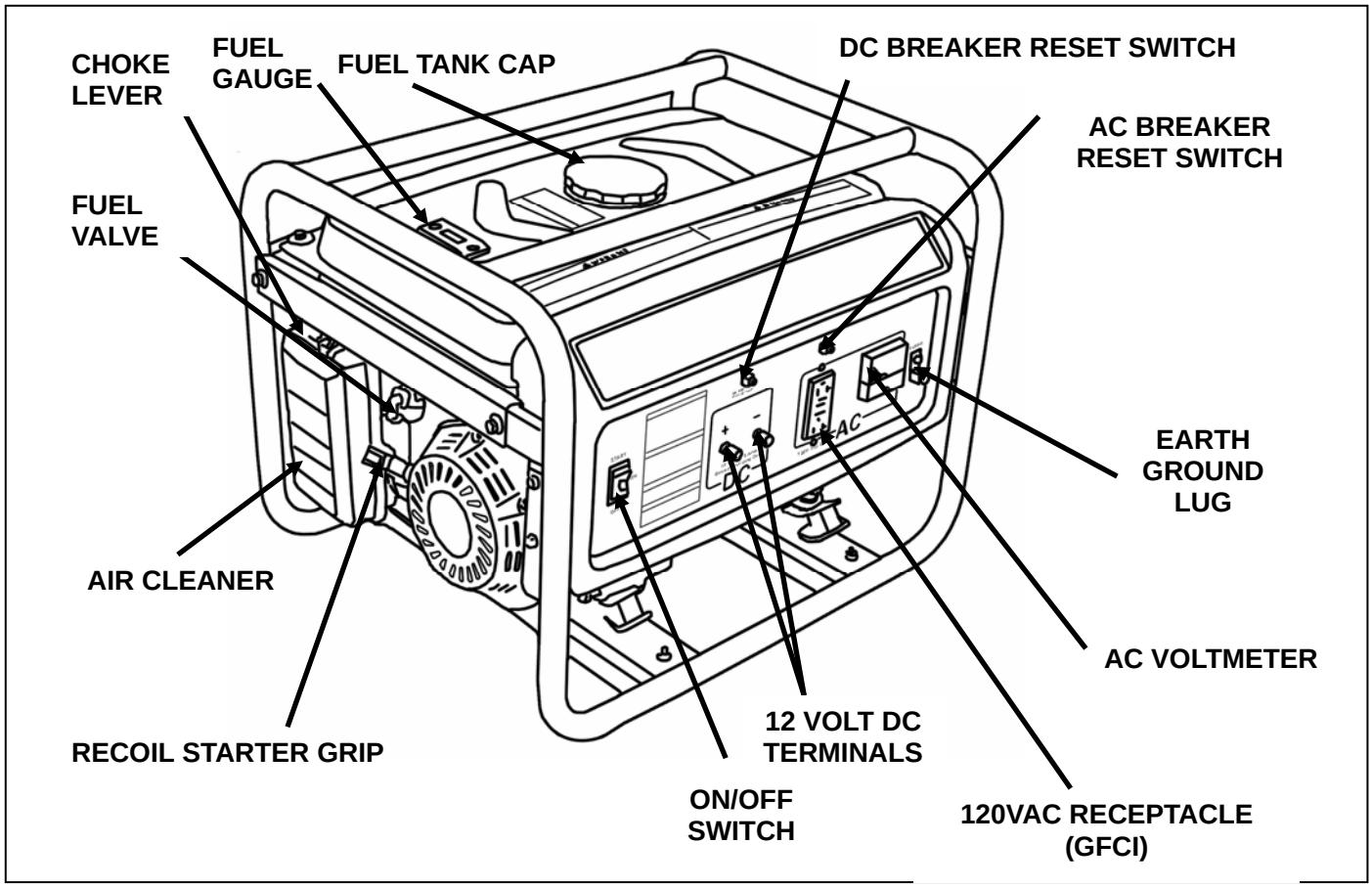
Failure to properly follow instructions and precautions can cause you to be seriously hurt or killed.

Follow the procedures and precautions in this manual carefully.

TABLE OF CONTENTS

SECTION 1. INTRODUCTION

1-1 Generator Components



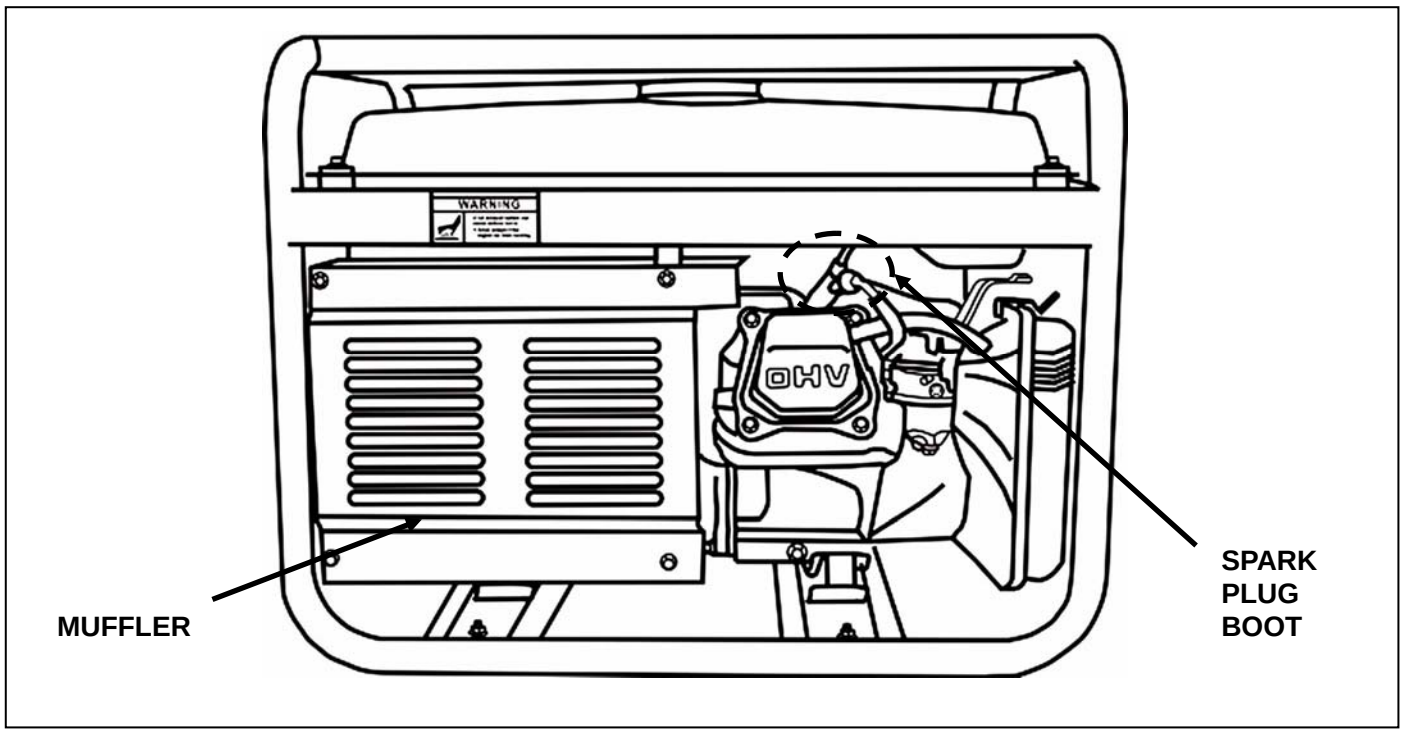
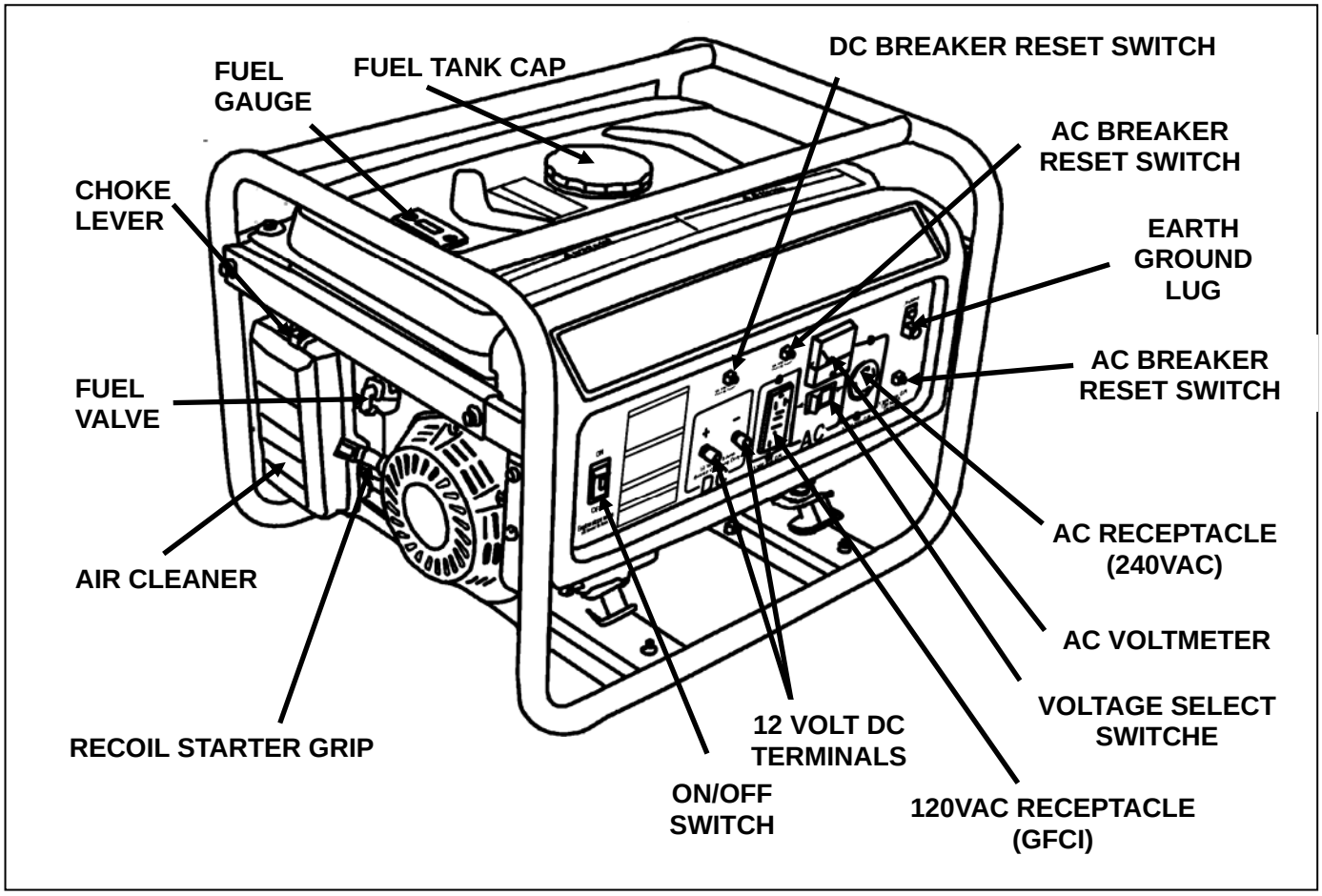


FIGURE 1. 2400 COMPONENT LOCATIONS

SECTION 1. INTRODUCTION



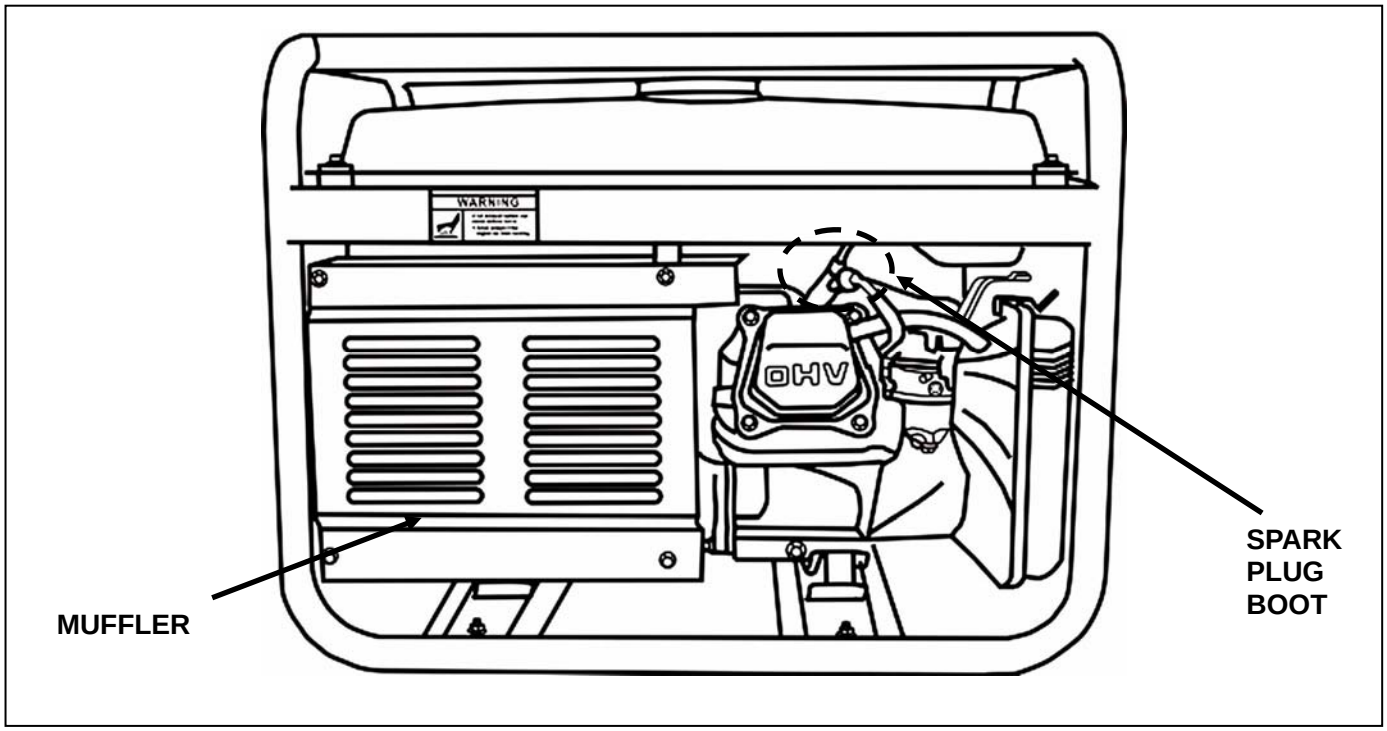


FIGURE 2. 3500 COMPONENT LOCATIONS

SECTION 1. INTRODUCTION

1-2 Specifications

GENERATOR	2400	3500
AC OUTPUT:		
Frequency (Hertz)	60 Hz	60 Hz
Voltage	120 Volts	120 / 240 Volts
Rated Power	2000 Watts	2500 Watts
Rated Current	16.6 Amps	20.8 / 10.4 Amps
DC OUTPUT:	12 VDC / 8.3 Amps	12 VDC / 8.3 Amps
ENGINE		
Engine Type	Single Cylinder, Forced Air Cooling, 4-Stroke	
Engine Speed (RPM)	3600	3600
Fuel	Gasoline	Gasoline
Engine Oil Capacity	0.63 US qt (0.6 L)	0.63 US qt (0.6 L)
Spark Plug Type	F7RTC	F7RTC
Spark Plug Gap	0.028 in. (0.7 mm)	0.028 in. (0.7 mm)
Engine Valve Lash (Intake / Exhaust)	0.0039 /0.006 inches (0.10/ 0.15 mm)	0.0039 /0.006 inches (0.10 / 0.15 mm)
Ignition Timing (fixed)	20° BTDC	20° BTDC
Starting System	Recoil	Recoil
Displacement	197 cc	197 cc
GENERATOR SET		
Dry Weight	99.9 lb (45 kg)	106.6 lb (48 kg)
Dimensions:		
Length	24.1 inches (612 mm)	24.1 inches (612 mm)
Width	19.6 inches (497 mm）	19.6 inches (497 mm）
Height	19.3 inches (490 mm)	19.3 inches (490 mm)
Fuel Tank Capacity	4.0 US gal (15 L)	4.0 US gal (15 L)
Operating Time at Rated Output	13 Hours	12 Hours

SECTION 2. DIMENSIONS AND TORQUE

2-1 Engine Dimensions

2400

Part	Item	Factory Specification	Allowable limit
Engine	Maximum speed	3750±150 rpm	-
	Idle speed	1400±150 rpm	-
	Cylinder compression	6.0-8.5 kg/cm (1.5 – 2.13 kg/in)at 600 rpm	-
Cylinder	Sleeve I.D.	68.015 mm (2.6778 in)	68.165 mm (2.6837 in)
Cylinder head	Warpage	-	0.10 mm (0.004 in)
Piston	Skirt O.D.	67.985 mm (2.6766 in)	67.845 mm (2.6711 in)
	Piston-to-cylinder clearance	0.030-0.050 mm (0.0012-0.0020 in)	0.12 mm (0.005 in)
	Piston pin bore I.D.	18.002 mm (0.7087 in)	18.048 mm (0.7105 in)
	Pin O.D.	17.998 mm (0.7086 in)	17.954 mm (0.7068 in)
	Piston -to- piston pin bore clearance	0.004-0.016 mm (0.00016-0.0006 in)	0.06 mm (0.002in)
Piston rings	Ring side clearance Top/second/oil	0.015-0.045 mm (0.0006-0.0018 in)	0.15 mm (0.0006 in)
	Ring end gap Top/ second Oil	0.2-0.4 mm (0.008-0.016 in)	1.0 mm (0.04 in)
	Ring Width Top/ second Oil	1.5 mm (0.06 in) 2.5 mm (0.10 in)	1.37 mm (0.054 in) 2.37 mm (0.093 in)
Connecting rod	Small end I.D. (Pin End)	18.007 mm (0.7089 in)	18.07 mm (0.711 in)
	Big end I.D. (Crankshaft)	30.015 mm (1.1817 in)	30.0667 mm (1.1837 in)
	Big end oil clearance	0.030-0.050 mm (0.0012-0.0020 in)	0.12 mm (0.0048 in)
	Big end side clearance	0.1-0.7 mm (0.004-0.028 in)	1.1 mm (0.043 in)
Crankshaft	Crankshaft O.D. (Connecting rod Big end)	29.985 mm (1.181 in)	29.92 mm (1.178 in)

SECTION 2. DIMENSIONS AND TORQUE

2400

Part	Item	Factory Specification	Allowable limit
Valves	Valve Lash IN	0.10±0.02 mm (0.004±0.001 in)	-
	EX	0.15±0.02 mm (0.006±0.001 in)	-
	Stem O.D. IN	5.48 mm (0.216 in)	5.318 mm (0.2094 in)
	EX	5.47 mm (0.215 in)	5.275 mm (0.2077 in)
	Guide I.D. IN/ EX	5.50 mm (0.217 in)	5.572 mm (0.2194 in)
	Stem clearance IN	0.02-0.044 mm (0.0008-0.0017 in)	0.10mm (0.004 in)
	EX	0.06-0.087 mm (0.0024-0.0034 in)	0.12 mm (0.005 in)
	Seat width	0.8 mm (0.03 in)	2.0mm (0.08 in)
	Spring fee length	30.0 mm (1.18 in)	28.5 mm (1.122 in)
Camshaft	Cam height IN	27.7 mm (1.09 in)	27.45 mm (1.081 in)
	EX	27.75 mm (1.093 in)	27.5 mm (1.083 in)
	Camshaft O.D.	13.984 mm (0.5506 in)	13.916 mm (0.5479 in)
Crankcase cover	Camshaft-holder I.D.	14.0 mm (0.55 in)	14.048 mm (0.5531 in)
Spark plug	Gap	0.7-0.8 mm (0.028-0.031 in)	-
Ignition coil	Resistance Primary coil	0.8-1.0 Ω	-
	Secondary coil	5.9-7.1 KΩ	-
	Air gap (at flywheel)	0.4±0.2 mm (0.016±0.008 in)	-

SECTION 2. DIMENSIONS AND TORQUE

2-2 Generator Dimensions

2400 (2.0 kW)

Part	Item	Factory specification
Main winding (R / Bu)	Resistance	0.51-0.53 Ω
Field winding	Resistance	40-50 Ω
Exciter winding (Bu / Bu)	Resistance	3.1-3.3 Ω
DC winding (G / G)	Resistance	0.4-0.6 Ω
Carbon brush	Brush length	5-9 mm

3500 (2.5 kW)

Part	Item	Factory specification
Main winding Ⅰ (Br / W)	Resistance	0.76-0.79 Ω
Main winding Ⅱ (R / Bu)	Resistance	0.76-0.79 Ω
Field winding	Resistance	35-45 Ω
Exciter winding (Bu / Bu)	Resistance	1.5-1.7 Ω
DC winding (G / G)	Resistance	0.4-0.6 Ω
Carbon brush	Brush length	5-9 mm

2-3 Torque Specification

Part	Fastener size	Torque values N· m (kg· cm, lb·ft)
Cylinder head bolt	8×1.25×55 mm	26-28 (260-280, 18.8-20.2)
Pivot bolt	6×0.5 mm	8-12 (80-120, 5.8-8.7)
Pivot adjusting nut	6×1.25 mm	22-26 (220-260, 15.9-18.8)
Crankcase cover bolt	8×1.25×32 mm	24-26 (240-260, 17.4-18.8)
Connecting rod bolt	7×1.25 mm	12-14 (120-140, 8.7-17.4)
Air cleaner wing nut	6×1.0 mm	7-10 (70-100, 5.1-7.2)
Air cleaner mounting nut	6×1.0 mm	7-10 (70-100, 5.1-7.2)
Muffler mounting bolt	8×1.25 mm	20-28 (200-280, 14.5-20.2)
Oil drain bolt	10×1.5 mm	20-25 (200-250, 14.5-18.1)
Fuel tank mounting bolt/ nut	6×1.0 mm	8-12 (80-120, 5.8-8.7)
Fuel valve joint nut	10×1.25 mm	20-25 (200-250, 14.5-18.1)
Oil level switch mounting nut	10×1.25 mm	8-12 (80-120, 5.8-8.7)
Flywheel mounting nut	14×1.25 mm	80-90 (800-900, 58-865.3)

2-4 Standard Torques Specification

Standard torque values	5 mm bolt, nut	4-7 (40-70, 2.9-5.1)
	6 mm bolt, nut	8-12 (80-120, 5.8-8.7)
	8 mm bolt, nut	20-28 (200-280, 14.5-20.2)
	10 mm bolt, nut	35-40 (350-400, 14.5-20.2)
	12 mm bolt, nut	50-60 (500-600, 36.2-43.4)

SECTION 3. MAINTENANCE

3-1 Maintenance Schedule

Periodic maintenance is essential for top performance. Use Table 3 as a guide. Under hot or dusty operating conditions some maintenance operations should be performed more frequently, as indicated by the footnotes in the table.

Keep a log of maintenance performed and the hours run. Recording maintenance will help you keep it regular and provide a basis for supporting warranty claims.

⚠ WARNING ***Accidental starting of the generator set during maintenance can cause severe personal injury or death. Before performing maintenance, disconnect the spark plug wire from the spark plug.***

⚠ WARNING ***A hot generator set can cause severe burns. Always allow the generator set to cool before performing any maintenance or service.***

TABLE 3. PERIODIC MAINTENANCE SCHEDULE

SERVICE THESE ITEMS	SERVICE INTERVAL					
	EACH USE	FIRST MONTH OR 20 HOURS	EVERY 3 MONTHS OR 50 HOURS	EVERY MONTH	EVERY 6 MONTHS OR 100 HOURS	EVERY YEAR OR 300 HOURS
General Inspection	×[1]					
Check Oil Level	×					
Test GFCI	×					
Change Engine Oil		×			×	
Clean Air Cleaner			×[2]			
Clean Cylinder Cooling Fins			×[2]			
Clean Spark Plug					×	
Clean the Spark Arrestor					x	
Clean Fuel Sediment Cup						×[3]
Clean Fuel Tank						×[3]
Adjust Valve Clearance						×[3]
Check fuel line	Every 2 years(Replace if necessary) [3]					

1.See GENERAL INSPECTIONS.

2.Service more frequently when used in dusty environments.

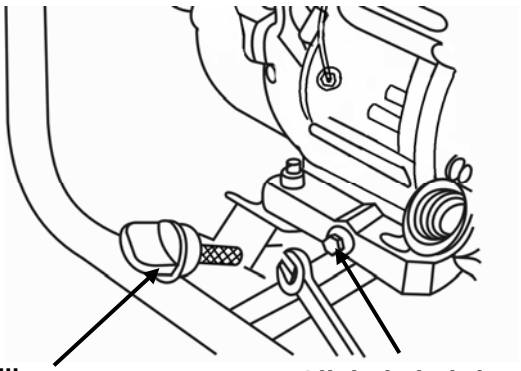
3. These items must be performed by a trained and experienced mechanic (authorized Onan dealer).

SECTION 3. MAINTENANCE

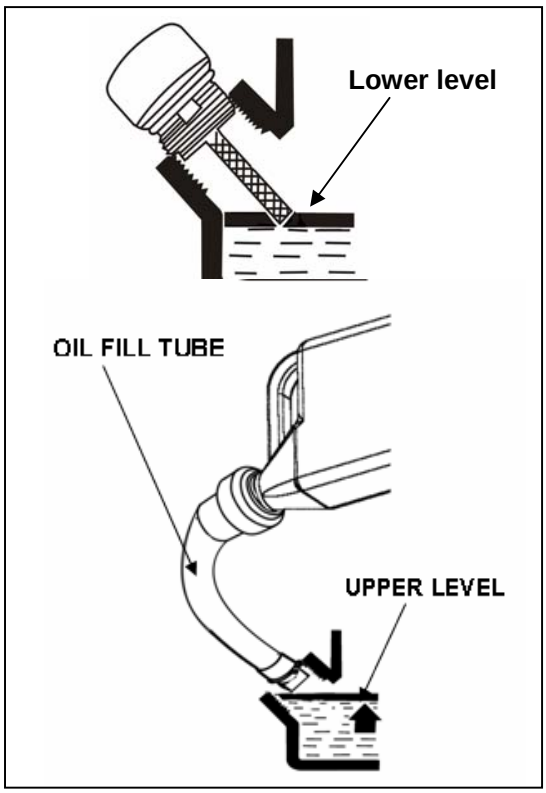
3-2 Engine Oil

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

1) Remove the oil filler cap and drain plug.
2) Drain the oil from the crankcase.



3) Reinstall the drain plug securely.
4) Add new oil up to the bottom edge of the oil filler hole with the engine stopped and in a level position.



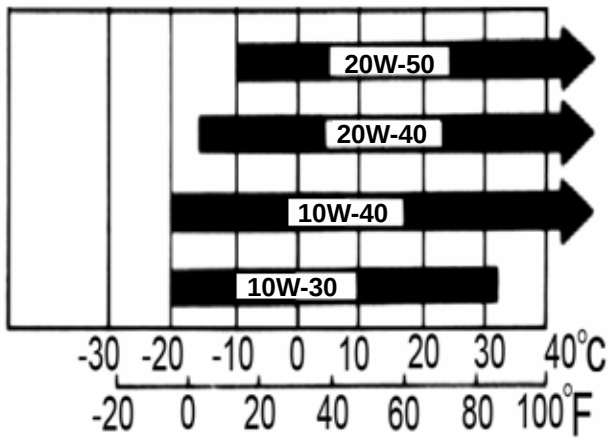
Engine Oil Capacity	1.16 US qt (1.1 L)

5) Reinstall the oil filler cap and tighten it securely.

RECOMMENDED ENGINE OIL:

SAE 10W-30 is recommended for general, all temperature use: service classification

SG • SF/CC • CD.



⚠ WARNING Used motor oil may cause skin cancer if repeatedly left in contact with the skin for prolonged periods. Thoroughly wash your hands with soap and water as soon as possible after handling used oil.

SECTION 3. MAINTENANCE

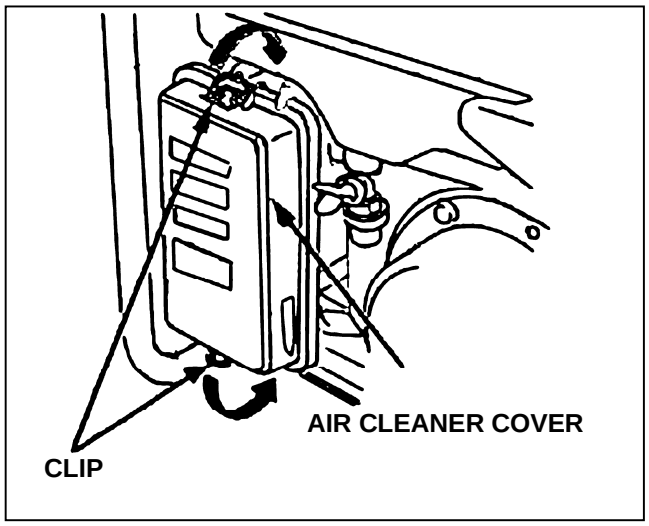
3-3 Air Cleaner

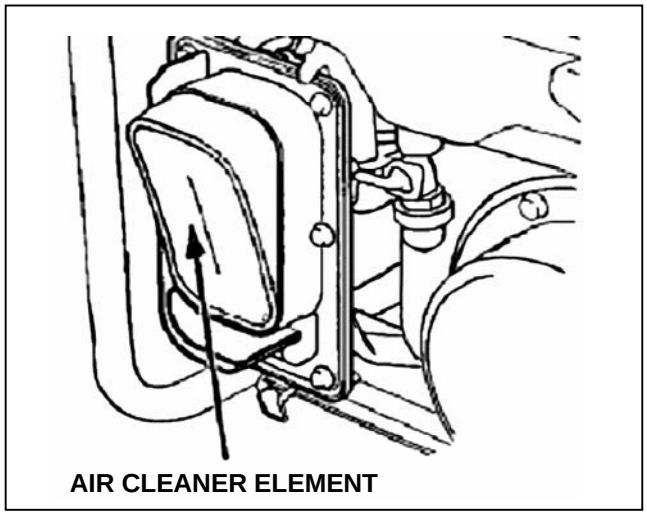
⚠CAUTION A dirty air cleaner will restrict air flow to the carburetor. To prevent carburetor malfunction, service the air cleaner regularly. Service more frequently when operating the generator in extremely dusty areas.

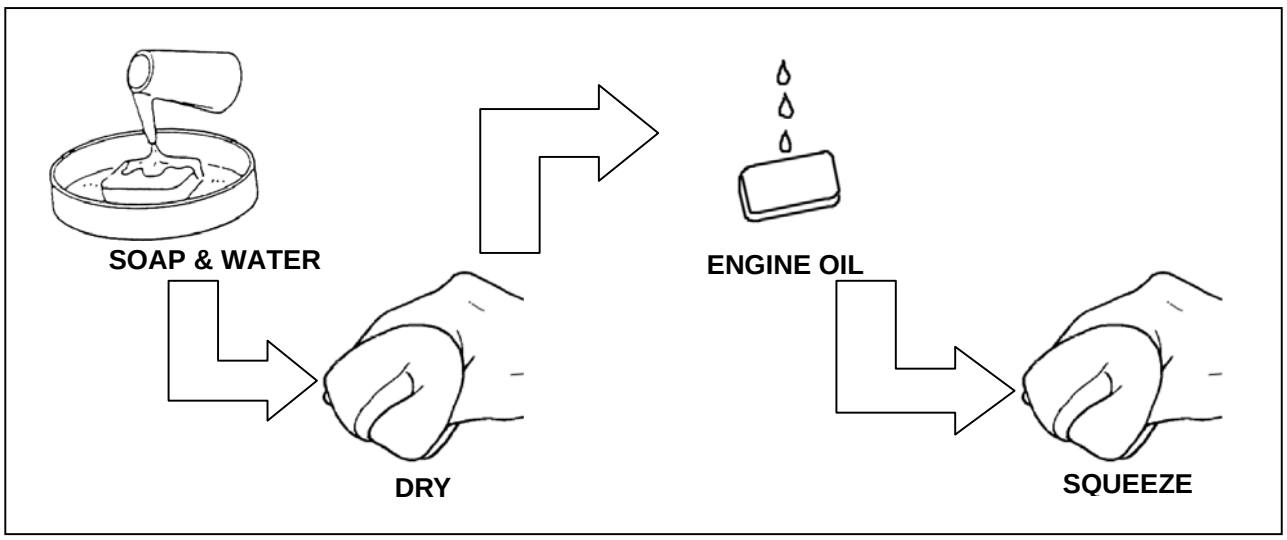
⚠WARNING **Using gasoline or flammable solvent to clean the filter element can cause a fire or explosion. Use only soapy water or nonflammable solvent.**

⚠WARNING **Never run the generator without the air cleaner. Rapid engine wear will result.**

1) Remove the cleaner cover by unsnapping the two spring clips. Clean more often in dusty environments
2) Remove the two foam filter elements and thoroughly wash them with soap and water. Let them dry thoroughly.
3) Knead in 1 teaspoon (5 cm^3) of clean engine oil into each foam filter element. The oil should be distributed evenly throughout each filter elements.
4) Reinstall the filter elements, the gray filter first (finer pores) and then the black filter (larger pores).
5) Secure the cover with the spring clips.





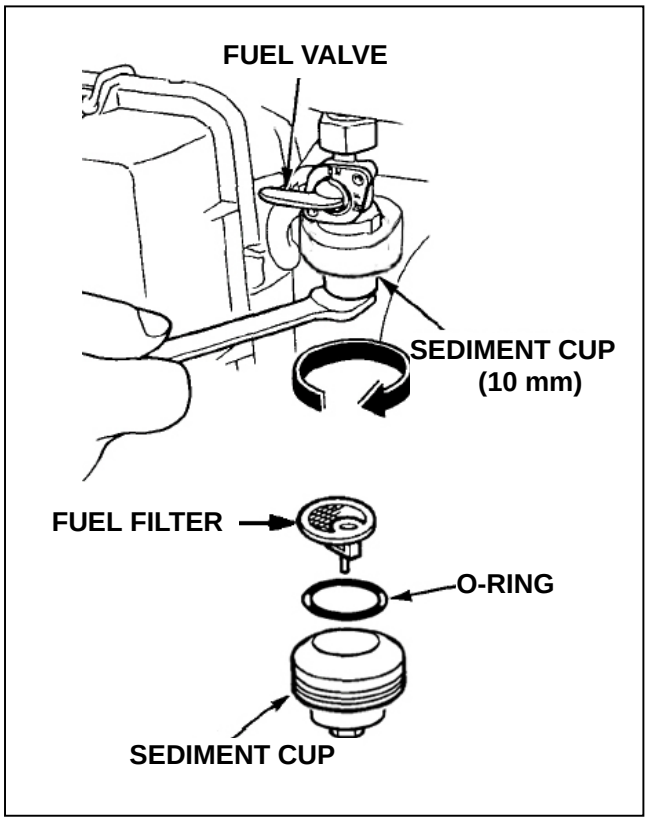


SECTION 3. MAINTENANCE

3-4 Fuel Sediment Cup Cleaning

The sediment cup prevents dirt or water which may be in the fuel tank from entering the carburetor. If the engine has not been run for a long time, the sediment cup should be cleaned.

1) Turn the fuel valve to the OFF position. Remove the sediment cup, and o-ring.
2) Clean the sediment cup, and o-ring, in nonflammable or high flash point solvent.
3) Reinstall o-ring, and sediment cup.
4) Turn the fuel valve ON and check for leaks.



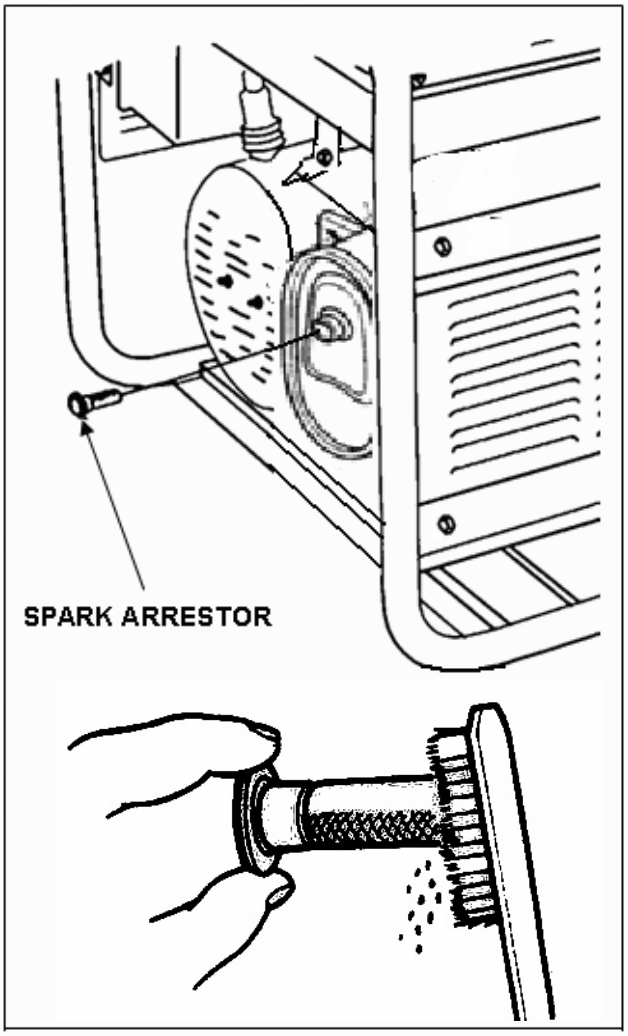
⚠WARNING Gasoline is extremely flammable and is explosive. Do not smoke or allow flames or sparks in the area.

⚠WARNING After reassembly, check for leaks, and make sure the area is dry before starting the engine.

3-5 Spark Arrester

⚠WARNING A hot muffler can cause severe burns. Allow the generator set to cool before servicing the muffler.

Refer to MAINTENANCE SCHEDULE for scheduled spark arrester cleaning. After letting the generator set cool down, remove the spark arrester screen. Inspect for damage, and replace if defective. Clean any deposits on the screen with a wire brush. Reinstall the spark arrester, and tighten the screw securely.



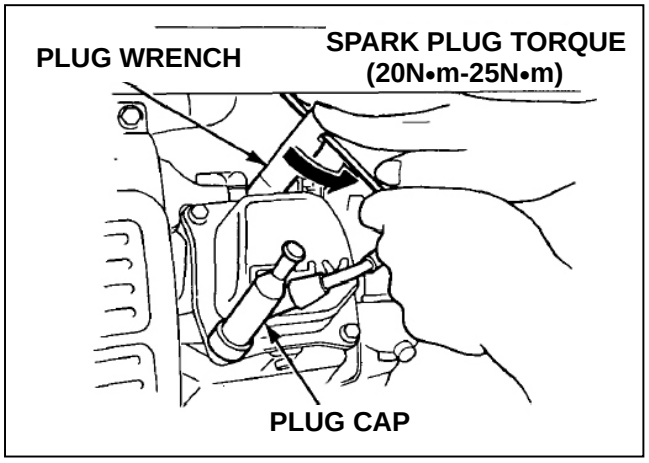
SECTION 3. MAINTENANCE

3-6 Spark Plug

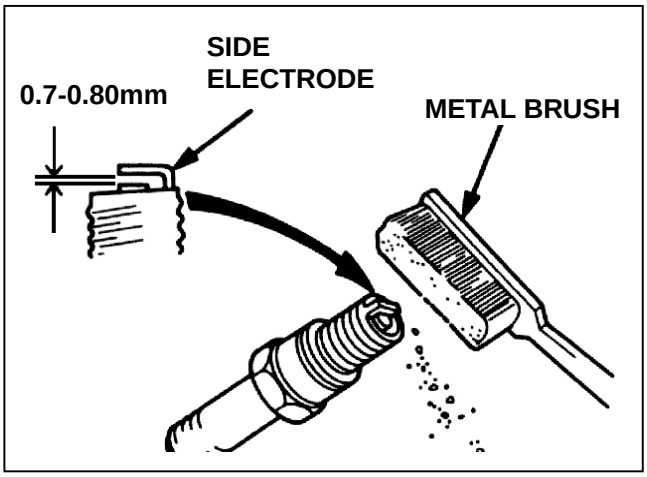
To ensure proper engine operation, the spark plug must be properly gapped and free of deposits.

If the engine has been running, the spark plug and muffler will be very hot. Be careful not to touch the muffler or spark plug.

1) Turn off generator.
2) Remove the spark plug cap.
3) Clean any dirt from around the spark plug base.
4) Use the wrench supplied in the tool kit to remove the spark plug.



5) Visually inspect the spark plug. Discard it if the insulator is cracked or chipped. Clean the spark plug with a wire brush if it is to be reused.
6) Measure the plug gap with a feeler gauge. Correct as necessary by carefully bending the side electrode.



The gap should be: 0.70-0.80 mm (0.028-0.031 in).

7) Check that the spark plug washer is in good condition, and thread the spark plug in by hand to prevent cross-threading.
8) After the spark plug is seated, tighten with a spark plug wrench to compress the washer.

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

⚠ CAUTION The spark plug must be securely tightened. An improperly tightened spark plug could damage the engine.

⚠ CAUTION Never use spark plugs which have an improper heat range. Use only the recommended spark plugs or equivalent.

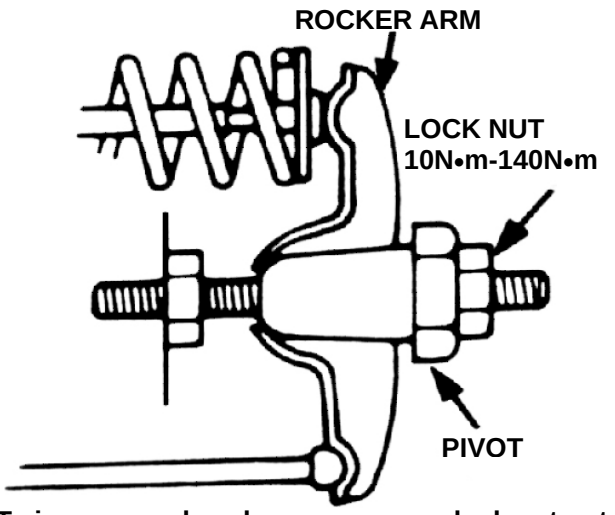
SECTION 3. MAINTENANCE

3-7 Valve Clearance

⚠CAUTION Valve clearance inspection and adjustment must be performed with the engine cold.

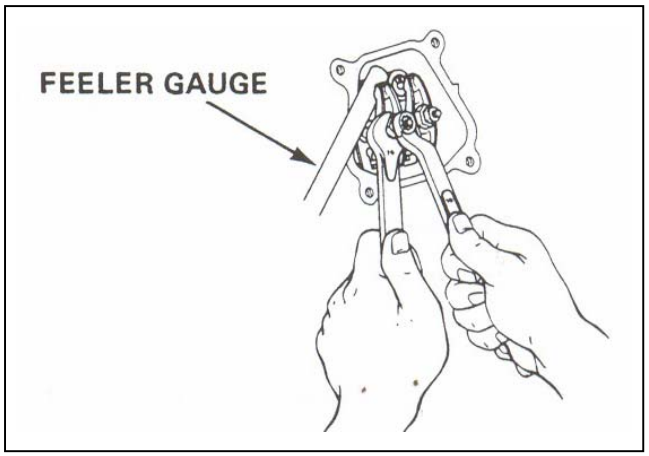
1) Remove the cylinder head cover, and set the piston at top dead center of the compression stroke (both valves fully closed). Pull the starter until the piston is at top dead center of the compression or exhaust stroke.
2) Insert a feeler gauge between the rocker arm and valve to measure valve clearance.

Standard valve clearance	IN.	0.10±0.02 mm (0.004±0.001 in)
	EX.	0.2±0.02 mm (0.008±0.001 in)



To increase valve clearance, screw lock nut out.
To decrease valve clearance, screw lock nut in.

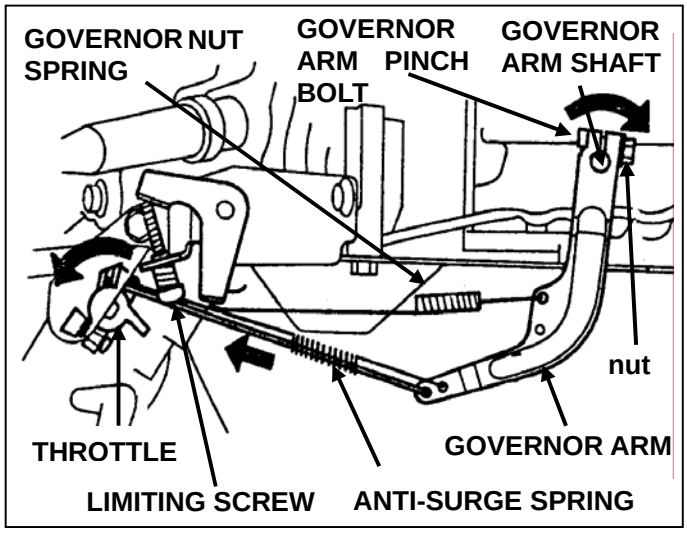
3) If adjustment is necessary, proceed as follows:
   a) Hold the rocker arm pivot and loosen the pivot lock nut.
   b) Turn the rocker arm pivot to obtain the specified clearance.
   c) Retighten the lock nut while holding the rocker arm pivot.
   d) Recheck valve clearance after tightening the lock nut.



3-8 Governor

1) Take down the fuel tank.
2) Loosen the nut on the governor arm pinch bolt.
3) Move the arm until the throttle is completely open, and hold it in that position.
4) Rotate the governor arm shaft as far as it will go in same direction it was just moved by the governor arm, and then tighten the governor arm pinch bolt.
5) Whether check the arm and throttle move smoothing.
6) Install the fuel tank.
7) Start the engine and adjust the limiting screw to produce the standard until the engine warm up to normal operating temperature.

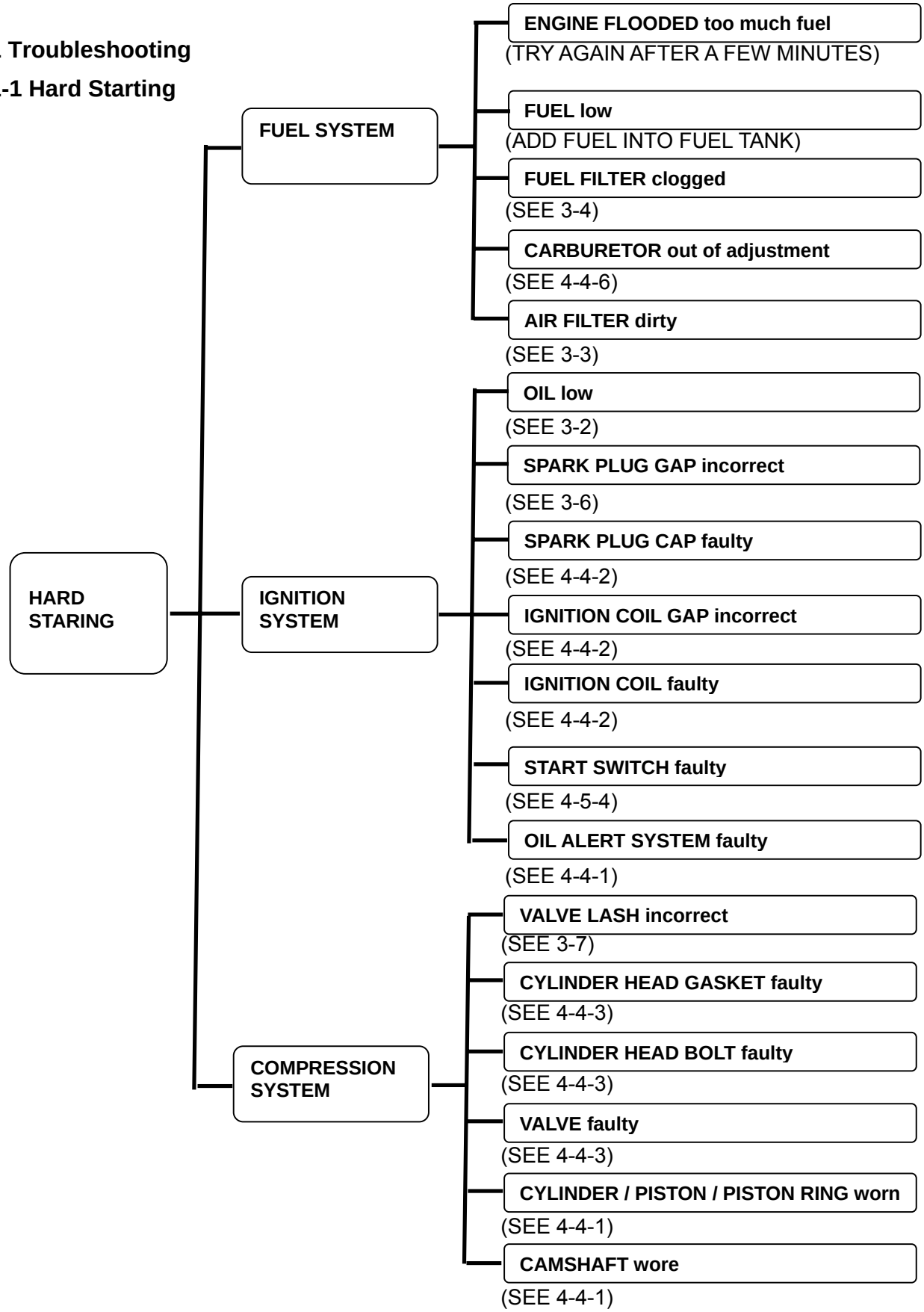
Idle speed	3600±150rpm



SECTION 4. DISASSEMBLY AND SERVICE

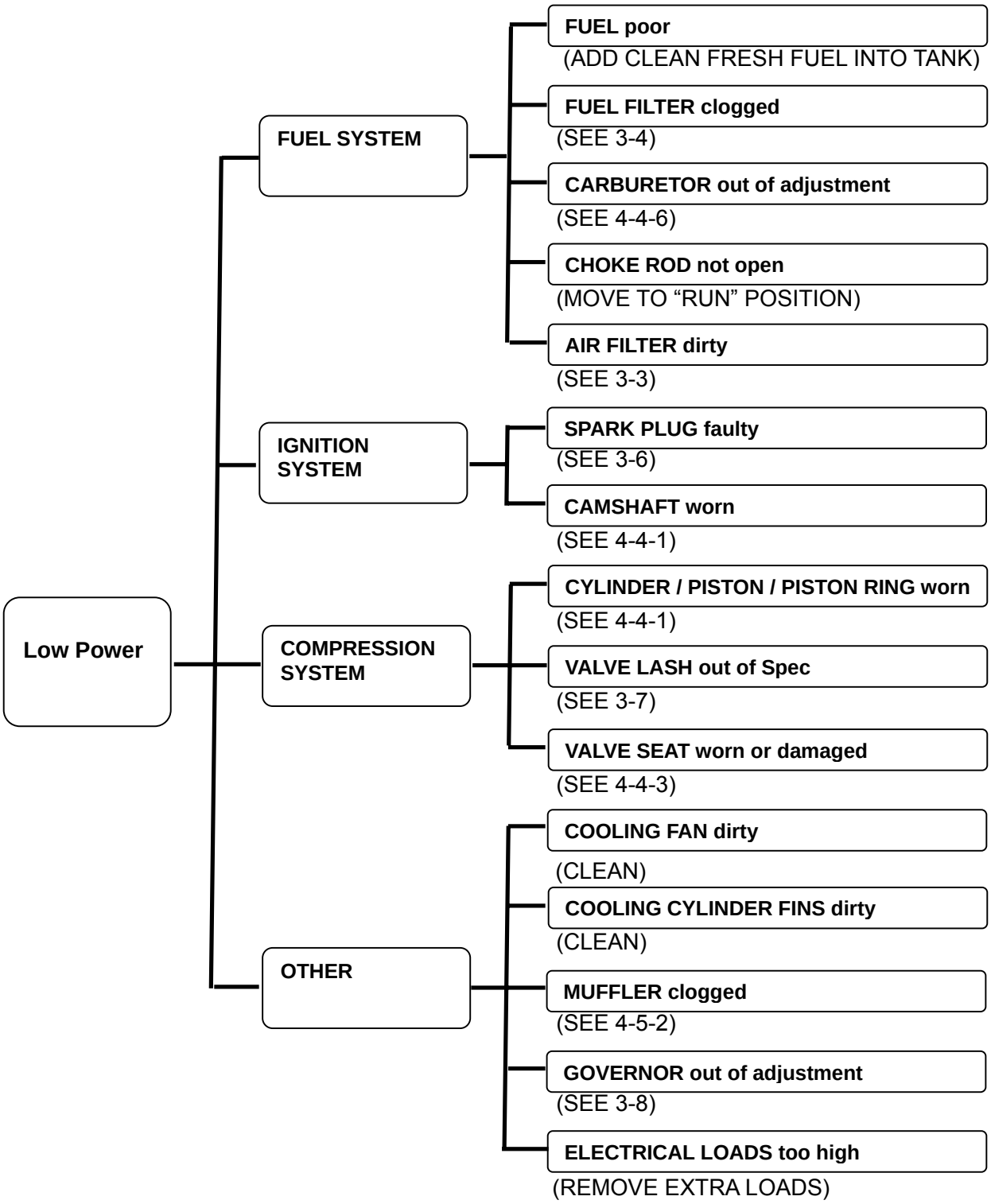
4-1 Troubleshooting

4-1-1 Hard Starting



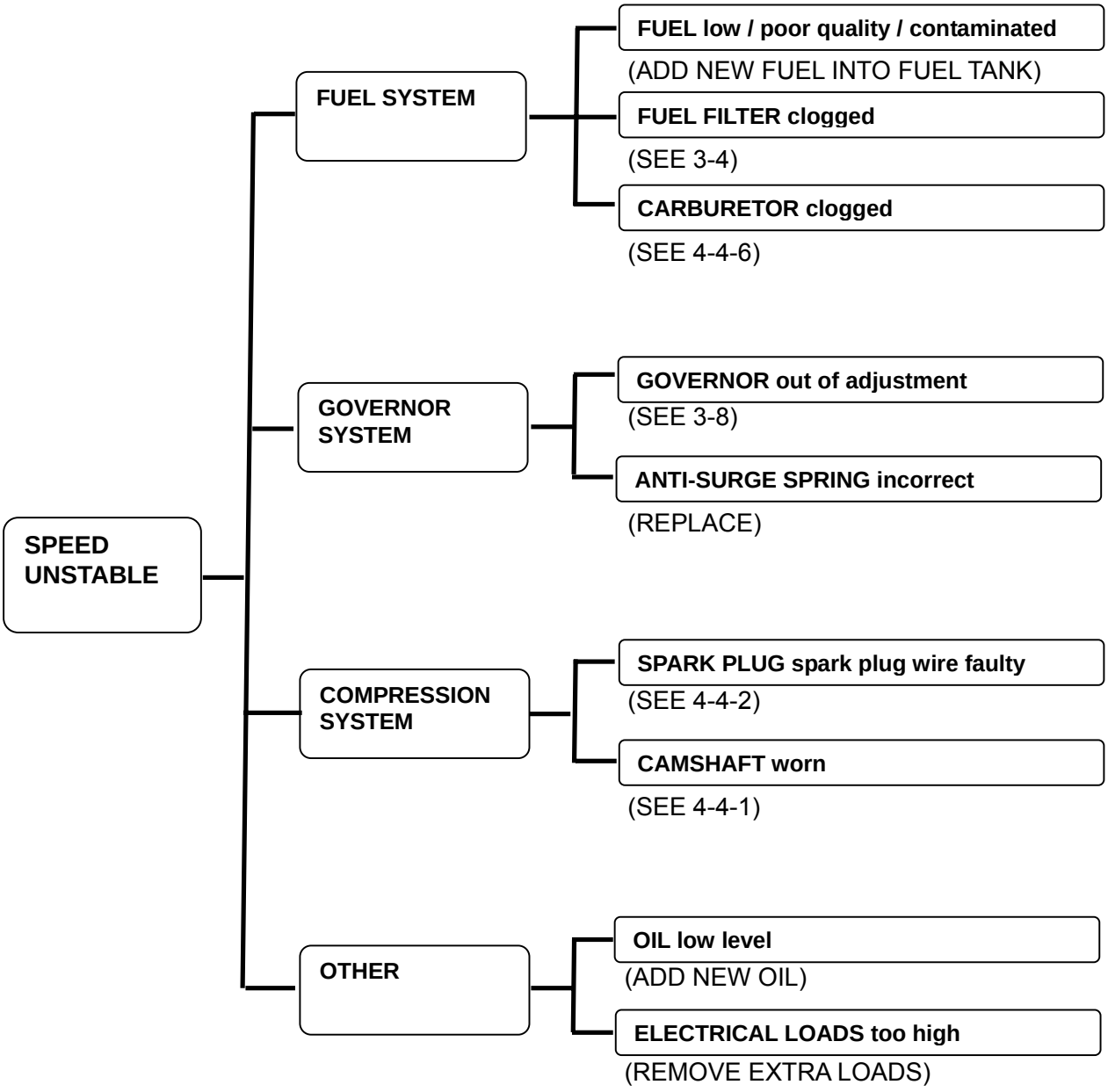
SECTION 4. DISASSEMBLY AND SERVICE

4-1-2 Low Power



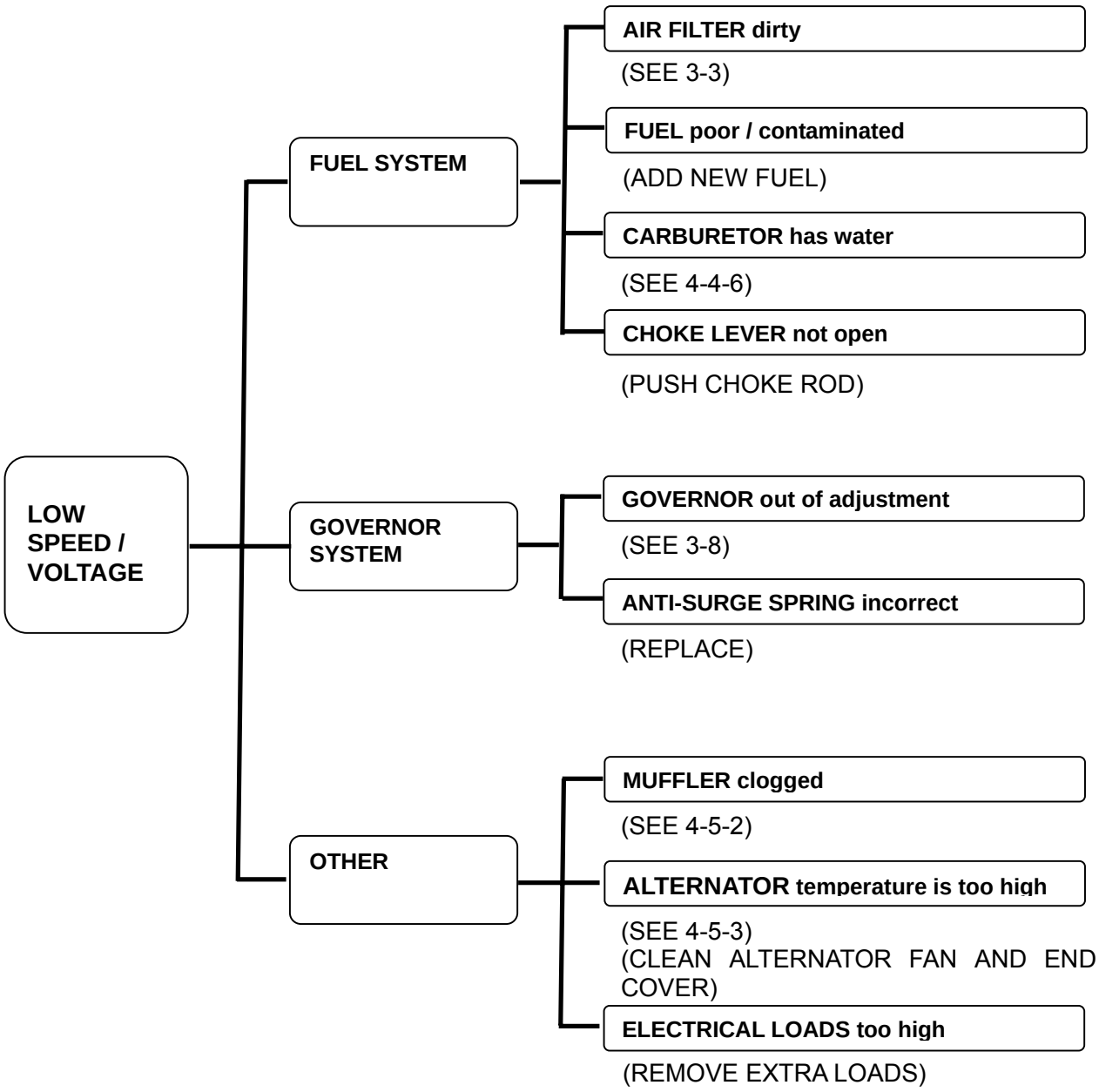
SECTION 4. DISASSEMBLY AND SERVICE

4-1-3 Speed Unstable



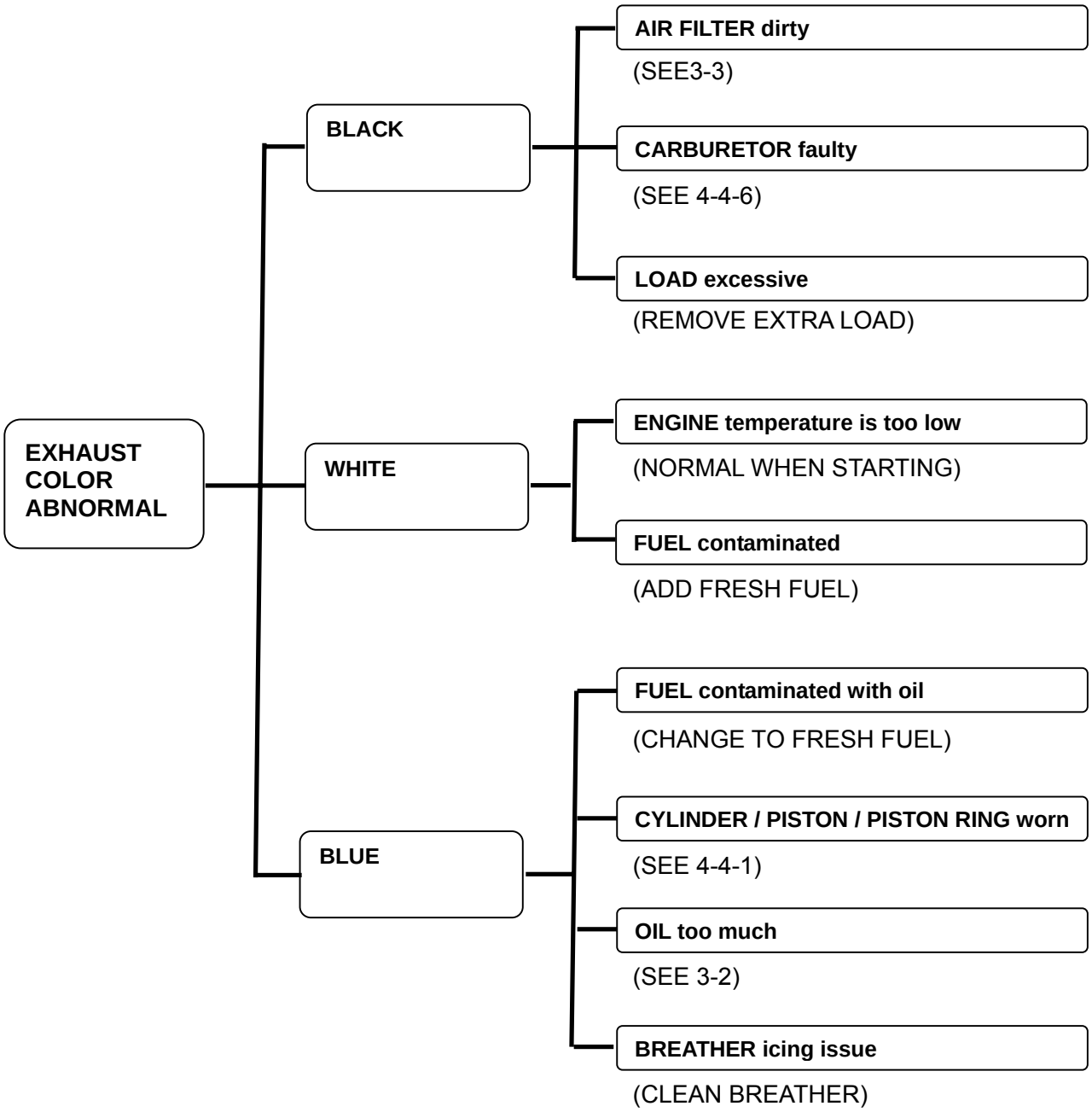
SECTION 4. DISASSEMBLY AND SERVICE

4-1-4 Low Speed / Voltage



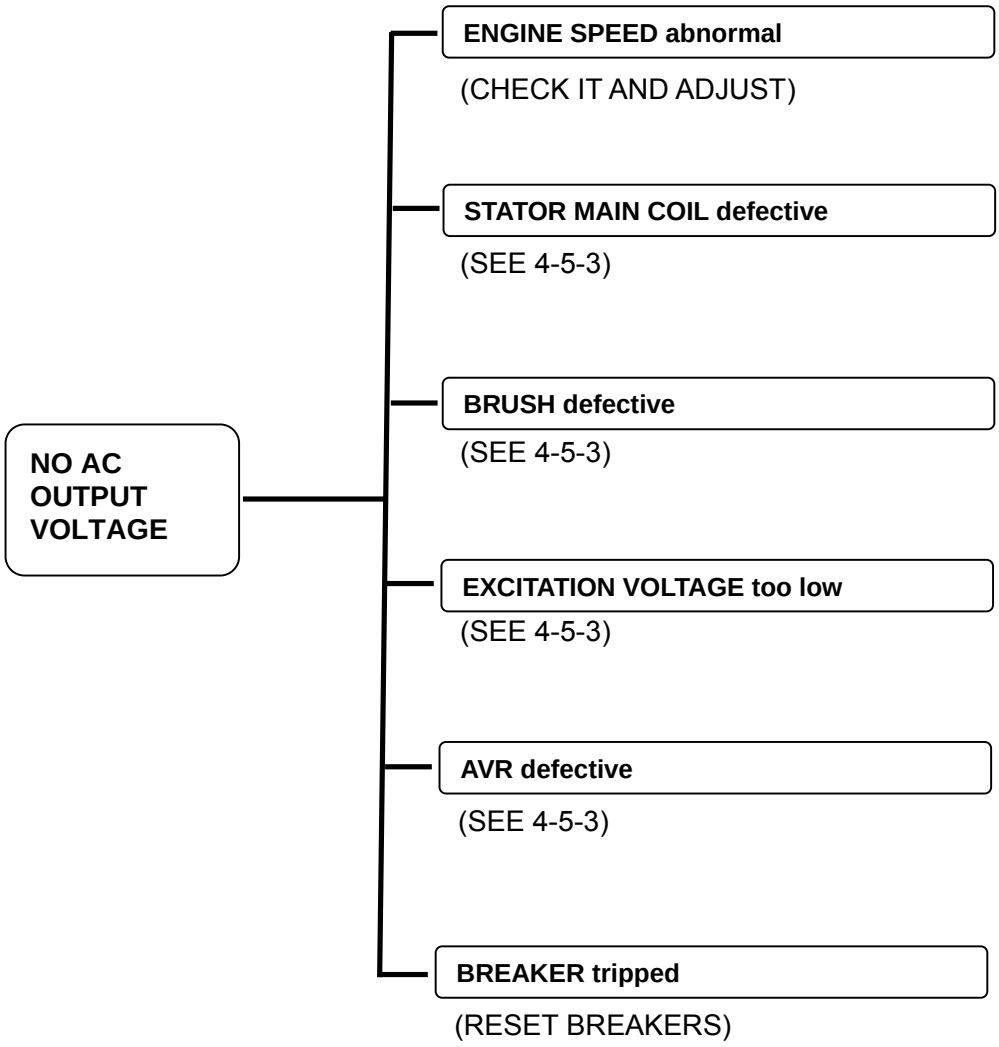
SECTION 4. DISASSEMBLY AND SERVICE

4-1-5 Exhaust Color Abnormal

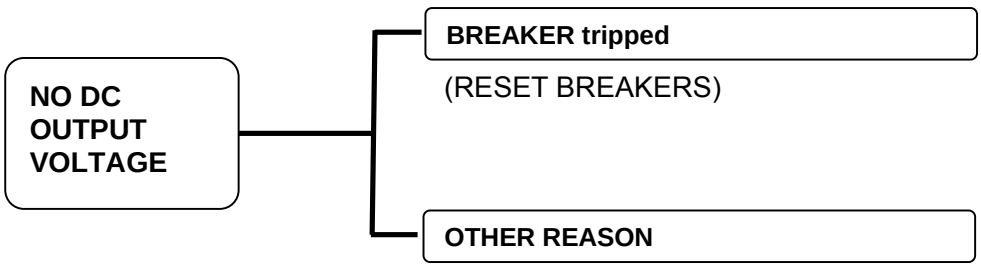


SECTION 4. DISASSEMBLY AND SERVICE

4-1-6 No AC Output Voltage



4-1-7 No DC Output Voltage



SECTION 4. DISASSEMBLY AND SERVICE

4-2 Preparing to Service

4-2-1 Safety Considerations

There are hazards in servicing gensets. Study Safety precautions and become familiar with the hazards listed in table 4-1. Note the following safeguards and ways of avoiding hazards.

- ***Use personal protection:*** Wear appropriate protective safety equipment, such as safety shoes and safety glasses.

- Do not wear rings or jewelry and do not wear loose or damp clothing that might get caught in equipment or conduct electricity.

- ***Reduce the hazard:*** A safety, order workshop area and well-maintained reduce the hazard potential. Keep guards and shields in place on machinery and maintain equipment in good working condition. Store flammable liquids in approved containers; away form fire, flame, spark, pilot light, switches, arc-producing equipment and other ignition sources. Keep the workshop clean and well-lighted and provide adequate ventilation.

- ***Develop safe work habits:*** Unsafe actions cause accidents with tools and machines. Be familiar with the equipment and know how to use them safely. Use the correct tool for the job and check its condition before starting. Comply with the warnings in this manual and take special precautions when working around electrical equipment. Do not work alone if possible and take no risks.

- ***Be prepared for an accident:*** Keep fire extinguishers and safety equipment nearby. Agencies such as the Red Cross and public safety departments offer courses in first aid, CPR and fire control. Take advantage of this information to be ready to respond to an accident. Learn to be safety-conscious and make safety procedures part of the work routine.

TABLE 4-1 HAZARDS AND THEIR SOURCES

Fire and Explosion	• Leaking or spilled fuel • Hydrogen gas from battery • Oily rag improperly stored • Flammable liquids improperly stored
Burns	• Hot exhaust pipes • Hot engine and generator surfaces
Poisonous Gas	• Operating genset where exhaust gases can accumulate
Electrical Shock (AC)	• Improper generator connections • Faulty wiring • Working in damp conditions • Jewelry touching electrical components
Rotating Machinery	• Fan guards not in place
Slippery Surfaces	• Leaking or spilled oil
Heavy Objects	• Removing genset form vehicle • Removing heavy components

4-2-2 Special Tools

Engine

A complete set of standard and metric shop tools are required to service the engine.

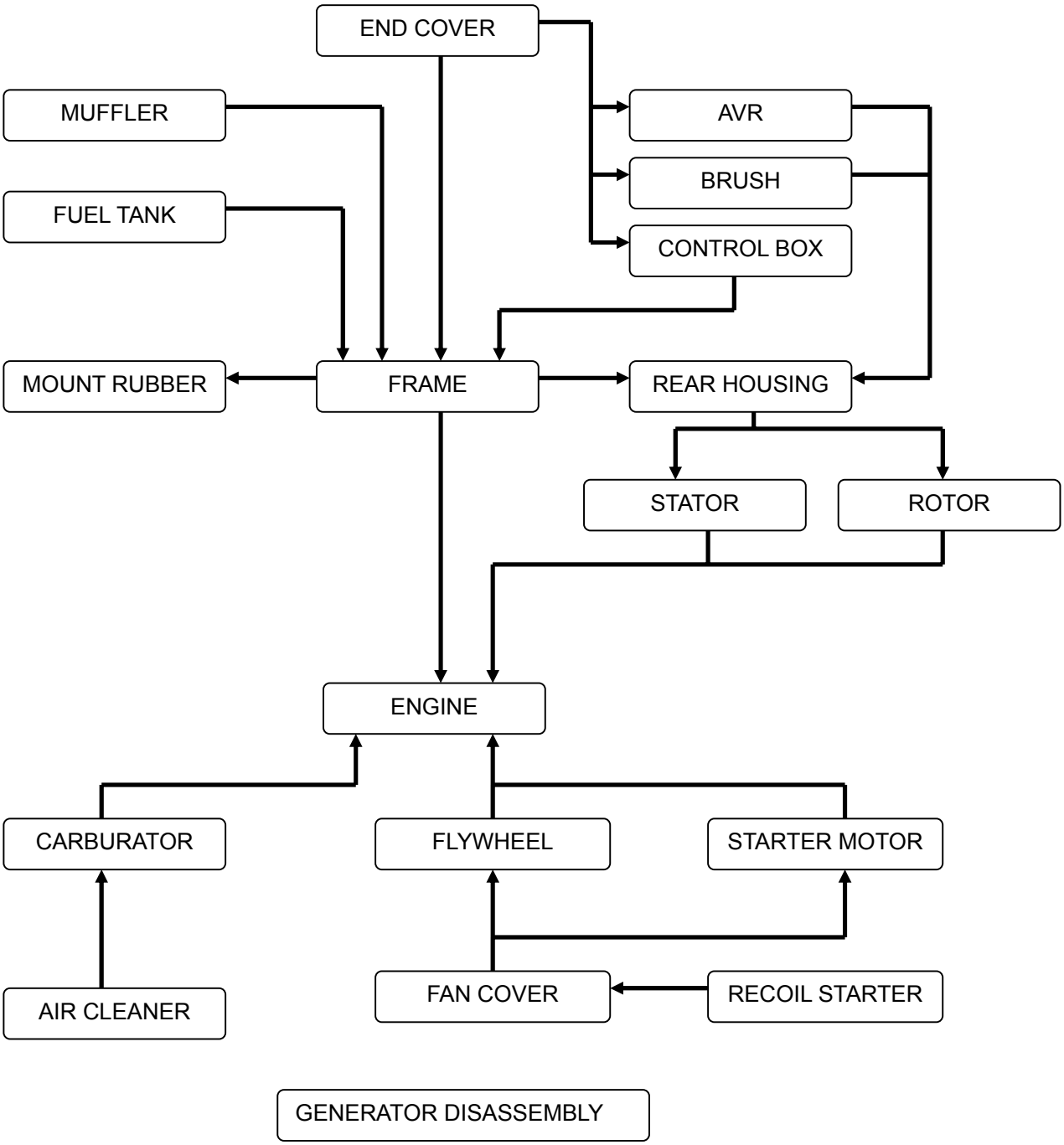
Control and Generator

A complete set of standard and metric shop tools are required to service the control and generator. Also needed are:

- ✧ Lead or dead blow hammer
- ✧ Battery hydrometer
- ✧ Torque wrench
- ✧ VOM millimeter
- ✧ Frequency meter
- ✧ Armature growler
- ✧ Load bank
- ✧ Jumper wires
- ✧ Rotor Puller

SECTION 4. DISASSEMBLY AND SERVICE

4-3 Disassembly Chart



This chart is a quick-reference guide for disassembling the product. Be sure to follow the sequence shown here for better and safer work.

Example:To remove the frame.

a) Remove the end cover.
b) Remove the control box.
c) Remove the fuel tank.
d) Remove the muffler.
e) Remove the frame.

SECTION 4. DISASSEMBLY AND SERVICE

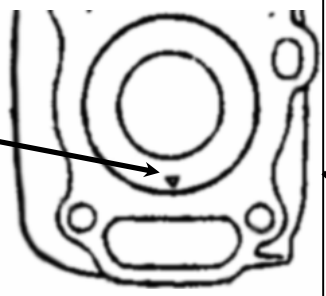
4-4 Engine

4-4-1 Crankshaft / piston

a.DISASSEMBLY/ ASSEMBLY

PISTON

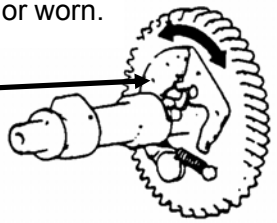
REASSEMBLY:
Install with the triangle mark toward the push rods.

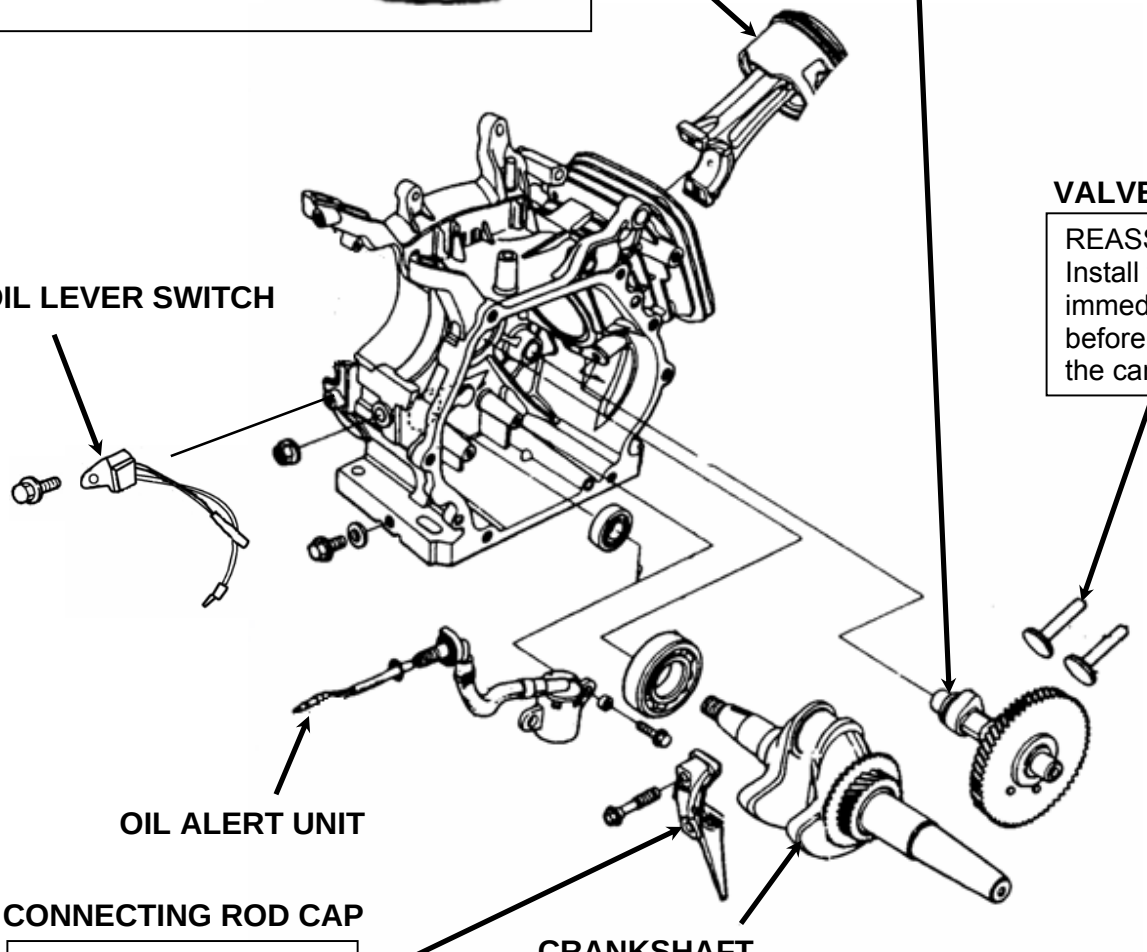


Crankshaft

REASSEMBLY:
Check that the decompressor weight moves smoothly, and the spring is not weak or worn.

DECOMPRESSOR WEIGHT





OIL LEVER SWITCH

VALVE LIFTER

REASSEMBLY:
Install the tappets immediately before installing the camshaft.

OIL ALERT UNIT

CONNECTING ROD CAP

REASSEMBLY:
Install with the oil dipper toward the camshaft . The ribs on the cap and connecting rod must be aligned.

CRANKSHAFT

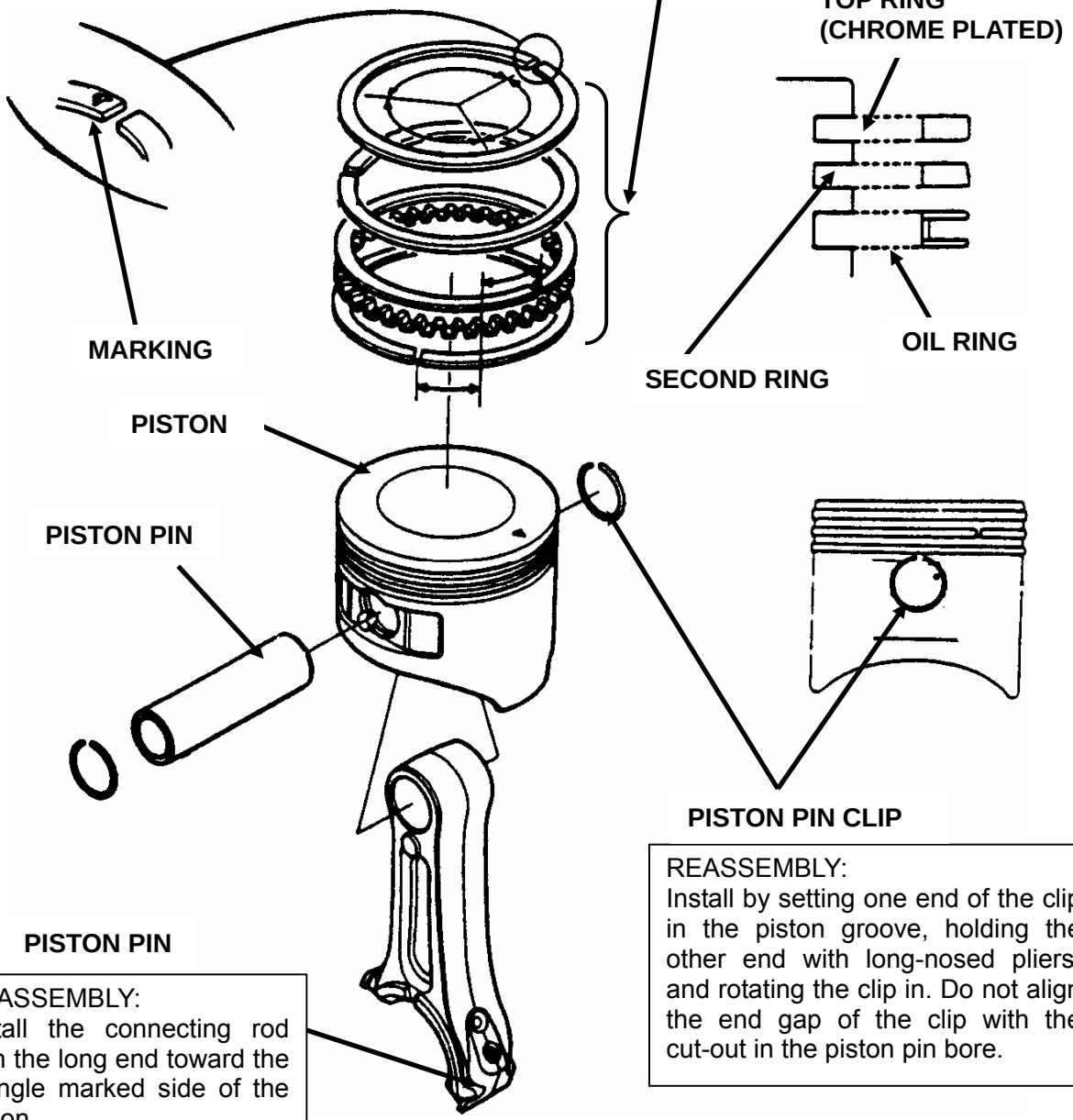
REASSEMBLY:
Push in until the bearing touches the crankcase. Be careful not to damage the oil seal.

SECTION 4. DISASSEMBLY AND SERVICE

b.PISTON/ PISTON RING

PISTON RING

REASSEMBLY:
1) Install all rings with the markings facing upward.
2) Be sure that the top (chrome plated) and second rings are not interchanged.
3) Check that the rings rotate smoothly after installation.
4) Space the piston ring end gaps 120 degrees apart, and do not align the gaps with the piston pin bore.



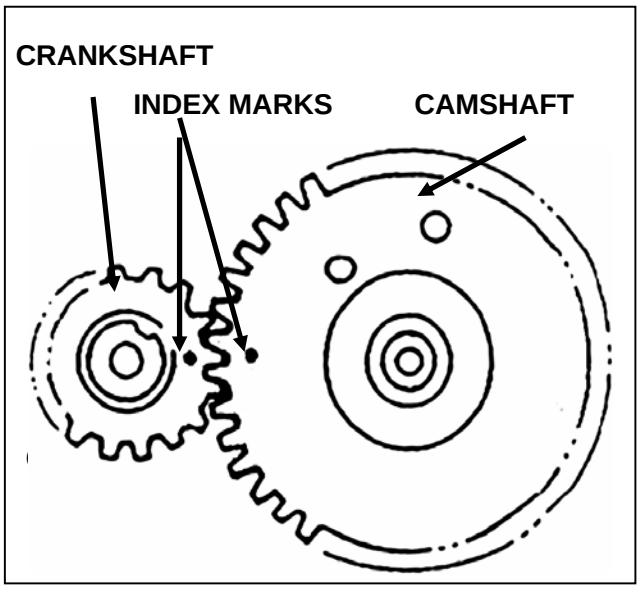
REASSEMBLY:
Install by setting one end of the clip in the piston groove, holding the other end with long-nosed pliers, and rotating the clip in. Do not align the end gap of the clip with the cut-out in the piston pin bore.

REASSEMBLY:
Install the connecting rod with the long end toward the triangle marked side of the piston.

SECTION 4. DISASSEMBLY AND SERVICE

c.CAMSHAFT/ CRANKSHAFT

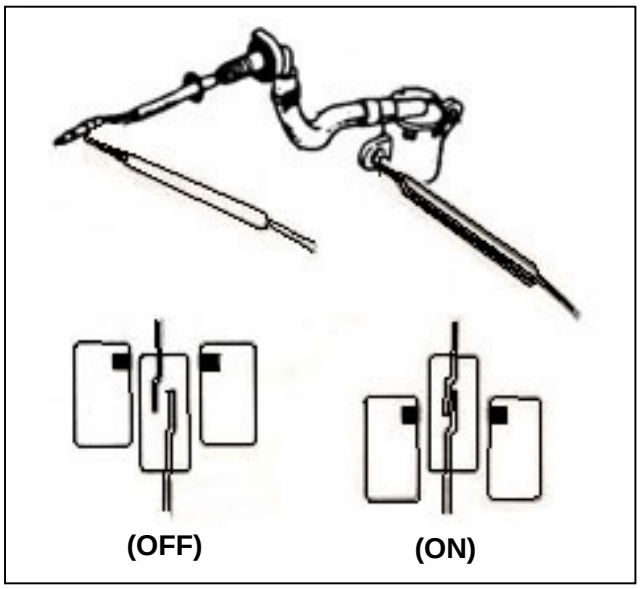
REASSEMBLY:
Align the index marks on the camshaft and timing gear.



d.OIL LEVEL SWITCH

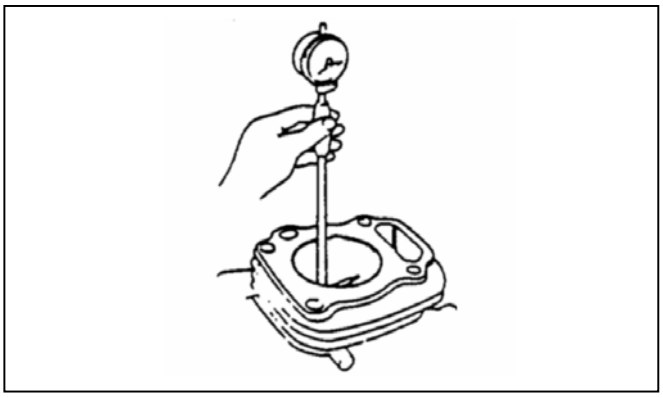
Ckeck continuity of the switch with an ohmmeter.

1) Hold the switch in its normal position. The ohmmeter should read zero resistance.
2) Hold the switch upside down. The ohmmeter should read infinity (∞) resistance.
3) Inspect the float by dipping the switch into a container of oil. The ohmmeter reading should go from zero to infinty as the switch is lowered.



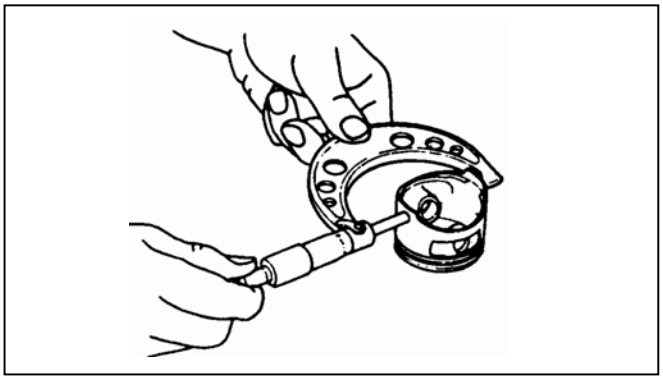
SECTION 4. DISASSEMBLY AND SERVICE

d.INSPECTION



CYLINDER ID(Inside Diameter)

Factory Specification	Allowable limit
68.015 mm (2.6778 in)	68.165 mm (2.684 in)

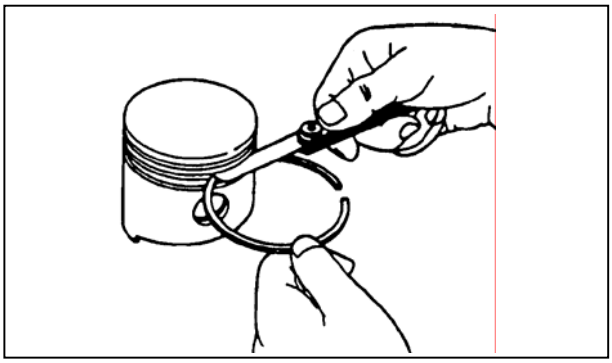


PISTON SKIRT OD(Outside Diameter)

Factory Specification	Allowable limit
67.985 mm (2.6766 in)	67.845 mm (2.6711 in)

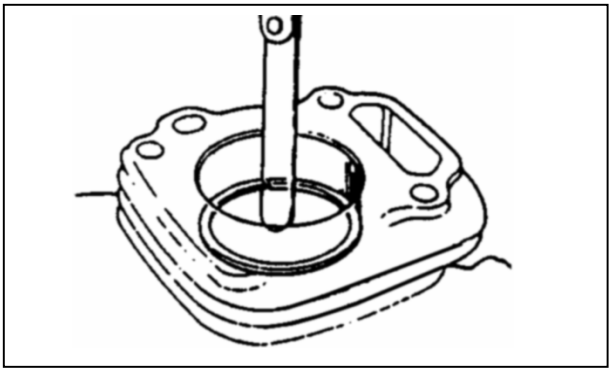
PISTON-TO CYLINDER CLEARANCE

Factory Specification	Allowable limit
0.03-0.05 mm (0.0012-0.002 in)	0.12 mm (0.005 in)



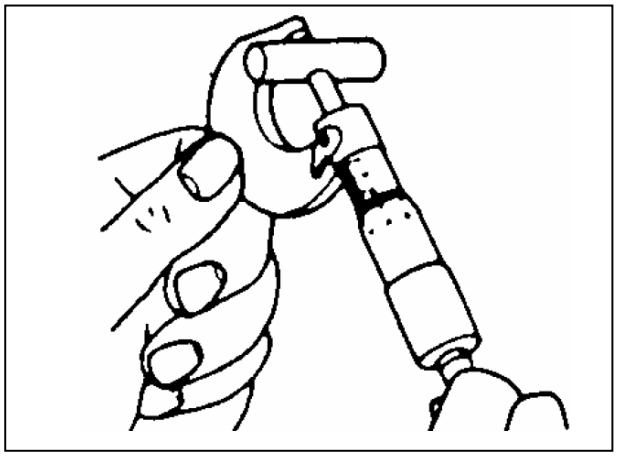
PISTON RING SIDE CLEARANCE

Factory Specification	Allowable limit
0.030-0.060 mm (0.0012-0.0024 in)	0.15 mm (0.006 in)



PISTON RING END GAP

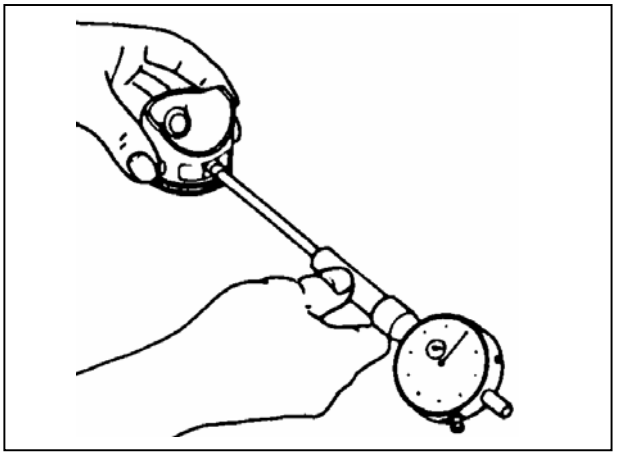
Factory Specification	Allowable limit
0.2-0.4 mm (0.008-0.016 in)	1.0 mm (0.04 in)



PISTON PIN OD

Factory Specification	Allowable limit
17.998 mm (0.7086 in)	17.954 mm (0.7068 in)

SECTION 4. DISASSEMBLY AND SERVICE

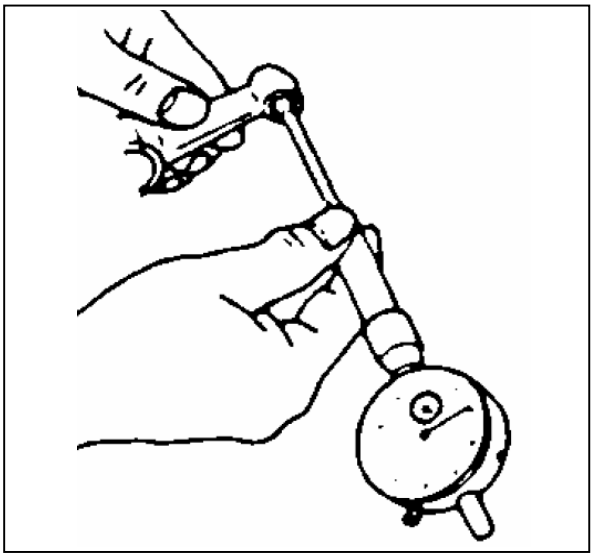


PISTON PIN BORE ID

Factory Specification	Allowable limit
18.002 mm (0.7087 in)	18.048 mm (0.7105 in)

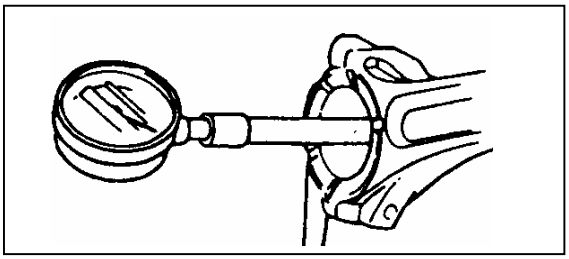
PISTON-TO-PISTON PIN BORE CLEARANCE

Factory Specification	Allowable limit
0.004.016 mm (0.00016-0.0006 in)	0.08 mm (0.0.003 in)



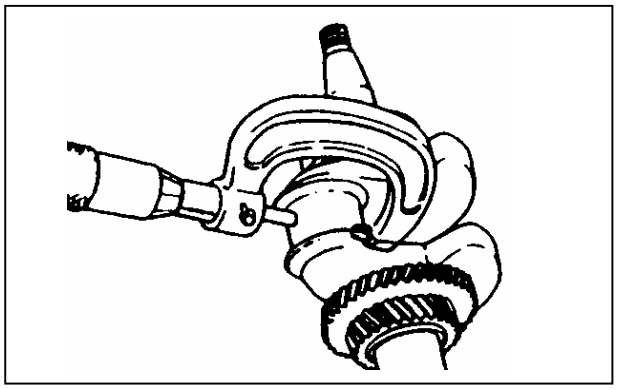
CONNECTING ROD SMALL END ID

Factory Specification	Allowable limit
18.006 mm (0.7089 in)	18.07 mm (0.711 in)



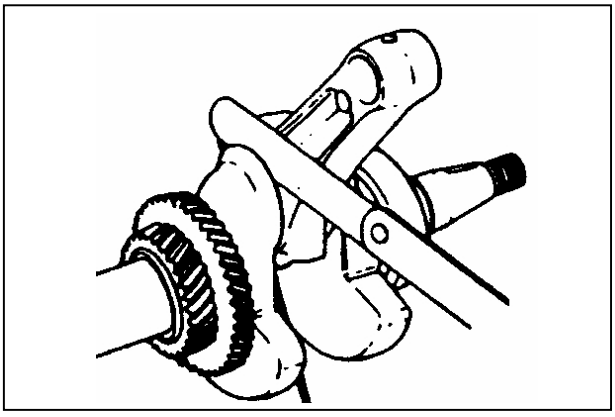
CONNECTING ROD BIG END ID

Factory Specification	Allowable limit
30.015 mm (1.1817 in)	30.066 mm (1.1837 in)



CRANKPIN OD

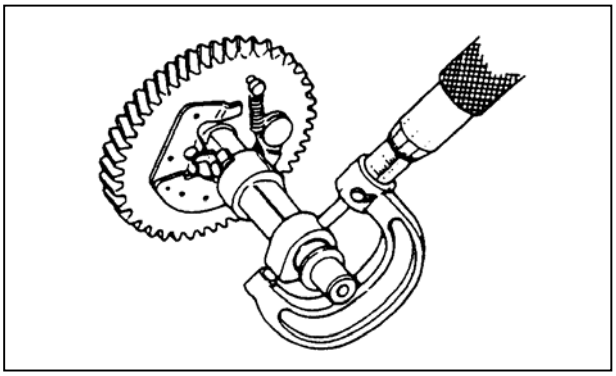
Factory Specification	Allowable limit
29.985 mm (1.181 in)	29.92 mm (1.178 in)



CONNECTING ROD BIG END SIDE CLEARANCE

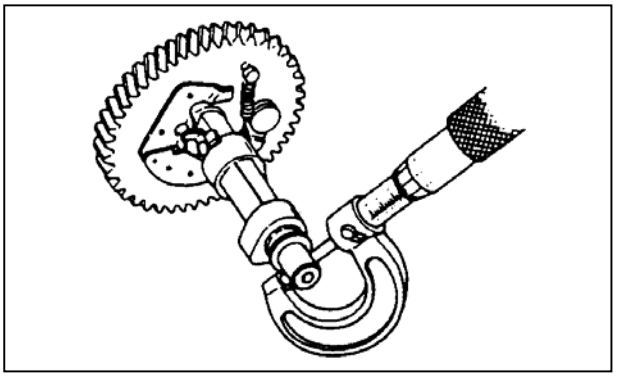
Factory Specification	Allowable limit
0.1-0.7 mm (0.0040.028 in)	1.1 mm (0.043 in)

SECTION 4. DISASSEMBLY AND SERVICE



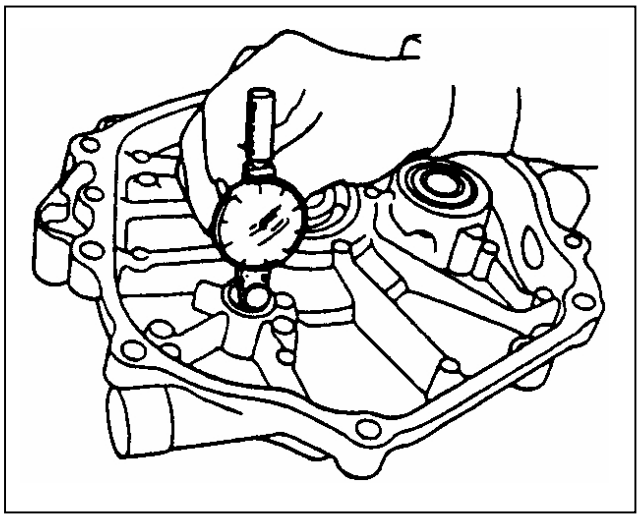
CAMSHAFT DIAMETER

	Factory Specification	Allowable limit
IN	27.7 mm (1.09in)	27.45 mm (1.081 in)
EX	27.75 mm (1.093 in)	27.50mm (1.083 in)



CAMSHAFT CAM DIAMETER

Factory Specification	Allowable limit
13.984 mm (0.5506 in)	13.916 mm (0.5479 in)



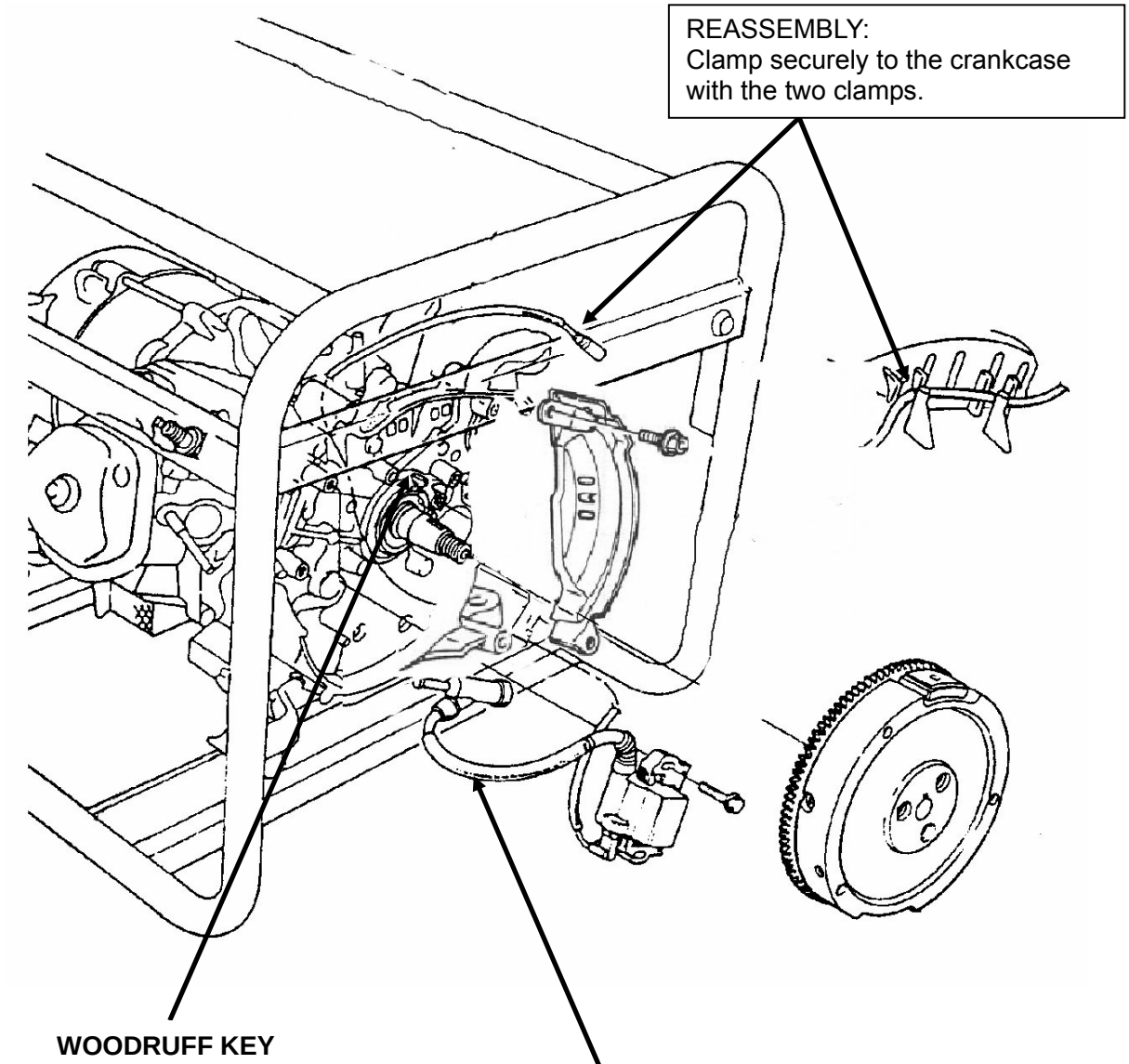
CAMSHAFT HOLDER ID

Factory Specification	Allowable limit
14.00 mm (0.55 in)	16.048 mm (0.5531 in)

SECTION 4. DISASSEMBLY AND SERVICE

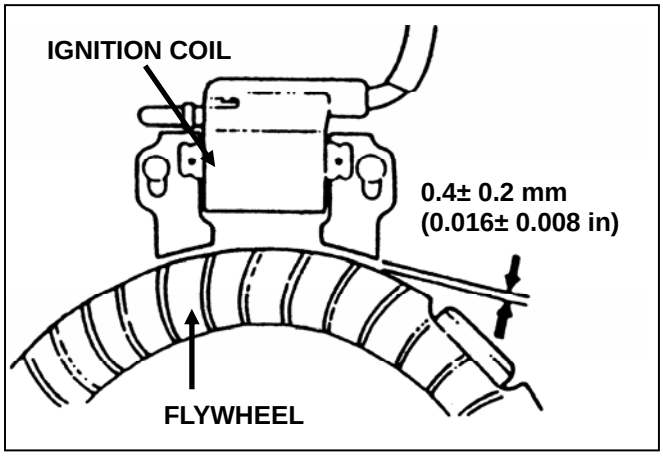
4-4-2 Flywheel

a.DISASSEMBLY/ ASSEMBLY



SECTION 4. DISASSEMBLY AND SERVICE

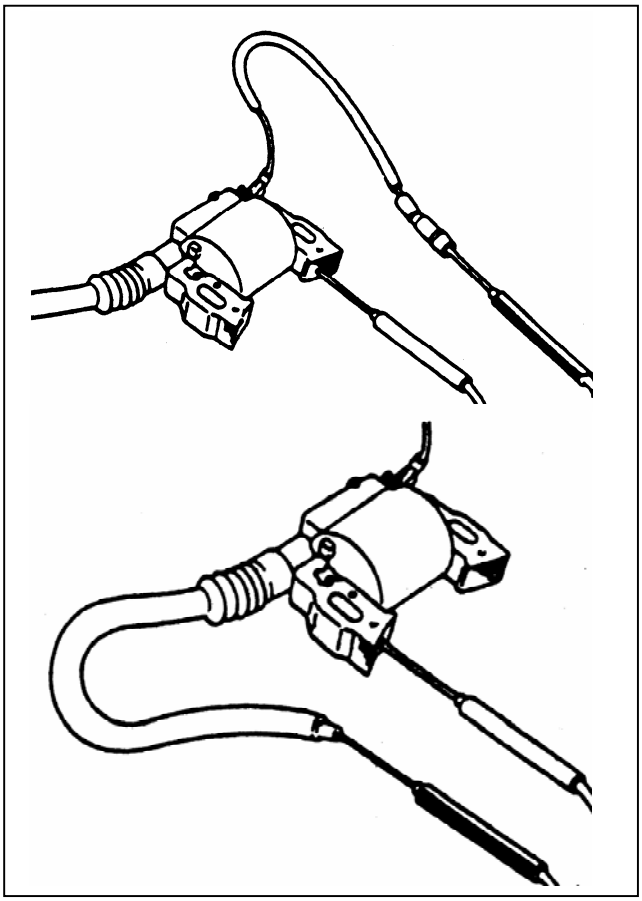
b. INSPECTION



AIR GAP (AT FLYWHEEL)

Measure the air gap between of the ignition and flywheel by thickness gauge.

Air gap (at flywheel)	0.4±0.2 mm (0.016±0.008 in)



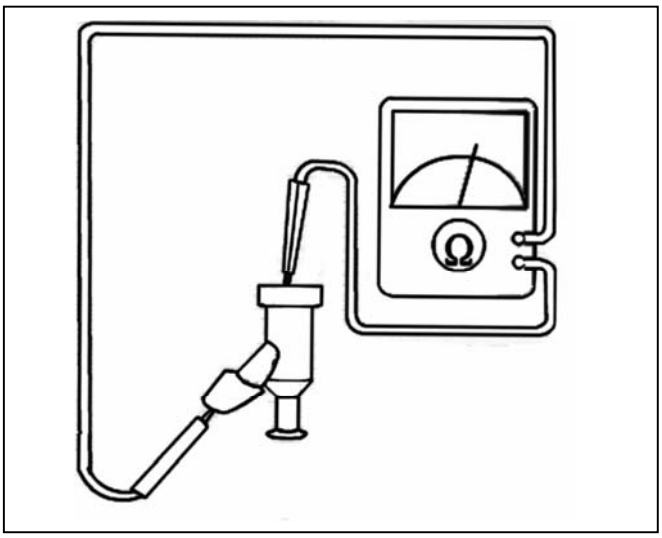
IGNITION COIL RESISTANCE

Primary side resistance value	0.8-1.0 Ω
Secondary side resistance value	5.9-7.1 KΩ

1. Measure the resistance of the primary coil by attaching one ohm-meter lead to the ignition coil's primary lead while touching the other test lead to the iron core.
2. Measure the resistance of the secondary side of the coil by removing the spark plug cap and touching one test lead to the spark plug lead wire while touching the other test lead to the iron core.

NOTE: A false reading will result if the spark plug cap is not removed.

If the resistance is not as specified, replace the ignition coil.



SPARK PLUG CAP

Measure the resistance of the spark plug cap by attaching one ohm-meter.

If the resistance is not as specified, change the spark plug cap.

Spark Plug Cap	5K

SECTION 4. DISASSEMBLY AND SERVICE

4-4-3 Cylinder Head / Valves

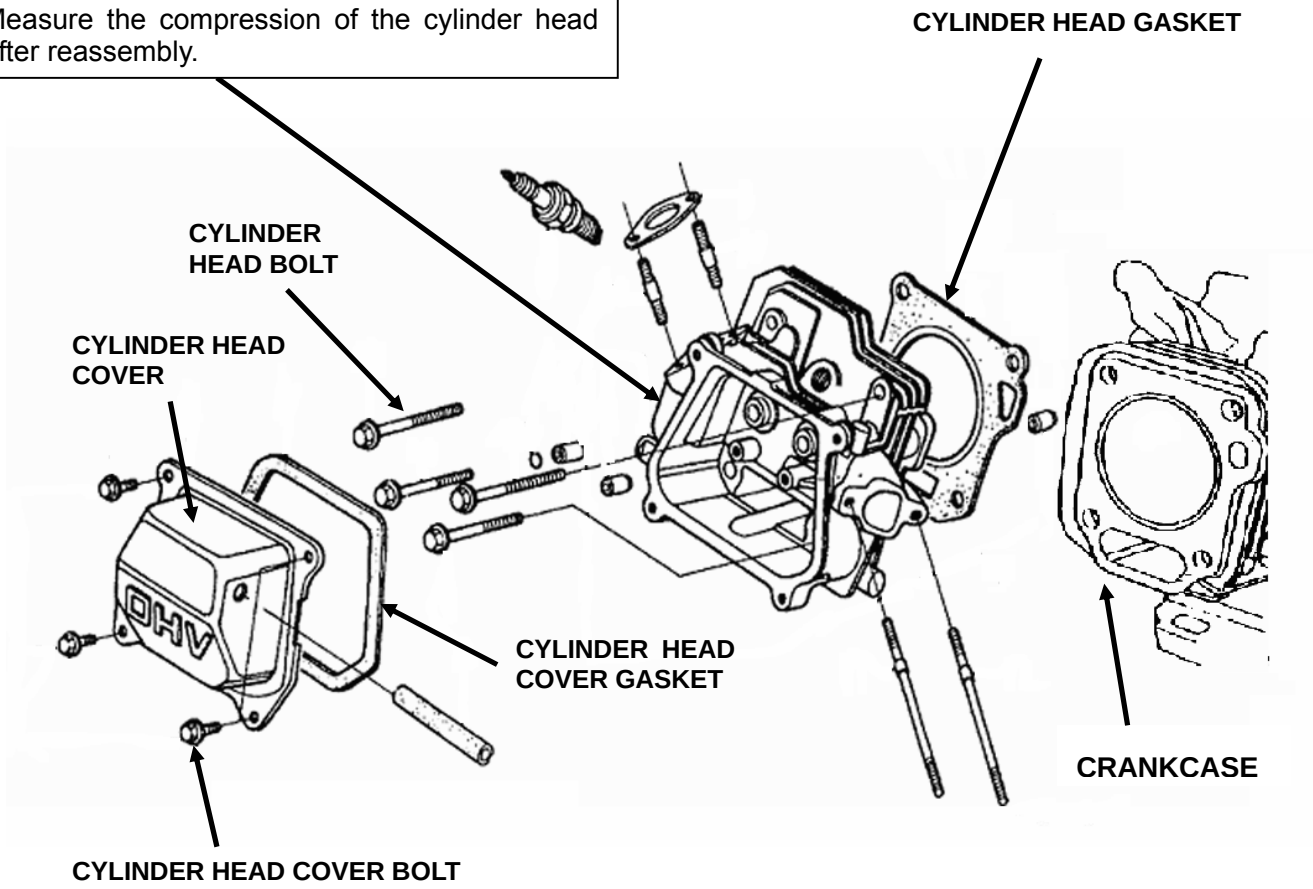
a.DISASSEMBLY/ ASSEMBLY

CYLINDER HEAD

REASSEMBLY:

Before installation, remove carbon deposits from the combustion chamber and inspect the valve seats.

Measure the compression of the cylinder head after reassembly.



CYLINDER HEAD BOLT

TORQUE:

26-28 N· m (260-280 kg· cm, 18.7-20.2 ft· lb)

REASSEMBLY/ DISASSEMBLY:

Tighten and untighten using a cross pattern.

CYLINDER HEAD COVER BOLT

TORQUE:

12-14 N· m (120-140 kg· cm, 8.7-17.4 ft· lb)

REASSEMBLY/ DISASSEMBLY:

Tighten and untighen using a cross pattern.

SECTION 4. DISASSEMBLY AND SERVICE

ROCKER ARM

REASSEMBLY:

Check the pivot bolt, push rod and rocker arm before installing.

SPARK PLUG

REASSEMBLY:

Before installation, clean and adjust the spark plug.

EXHAUST VALVE

REASSEMBLY:

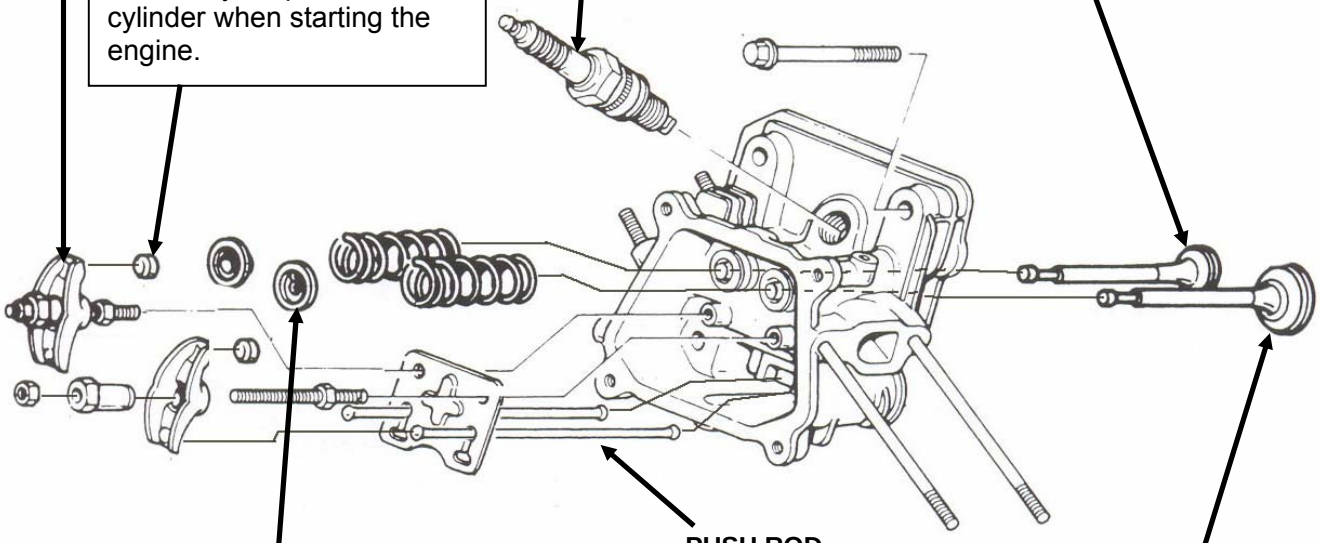
Check both ends for wear and check the rod for straightness.

Be sure the rod ends are firmly seated in the lifter.

VALVE ROTATOR

REASSEMBLY:

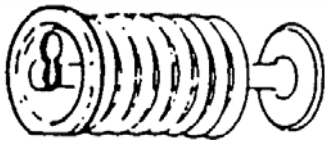
⚠CAUTION If the valve rotator is not installed, the valve may drop into the cylinder when starting the engine.



PUSH ROD

REASSEMBLY:

Before installation, remove carbon deposits and inspect the valve.



⚠CAUTION Do not remove the valve spring retainers while the cylinder head is installed, or the valves will drop into the cylinder.

DISASSEMBLY:

Compress the value spring and slide the retainer out to the side, so the valve stem slips through the hole at the side of the retainer.

VALVE HEAD DIAMETER:

IN: 24 mm
(0.94 in)

EX: 22 mm
(0.87 in)

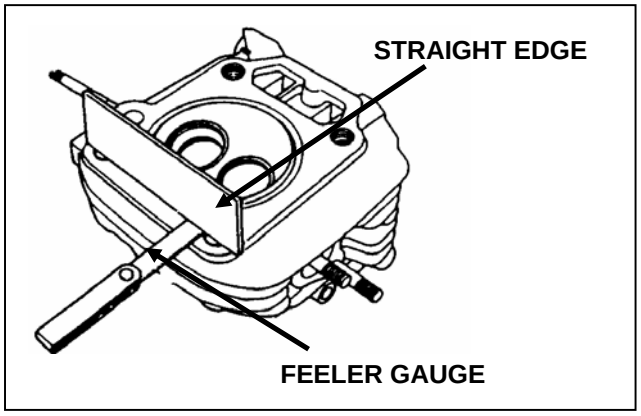
INTAKE VALVE

REASSEMBLY:

Do not interchange with the exhaust valve.

SECTION 4. DISASSEMBLY AND SERVICE

b.INSPECTION



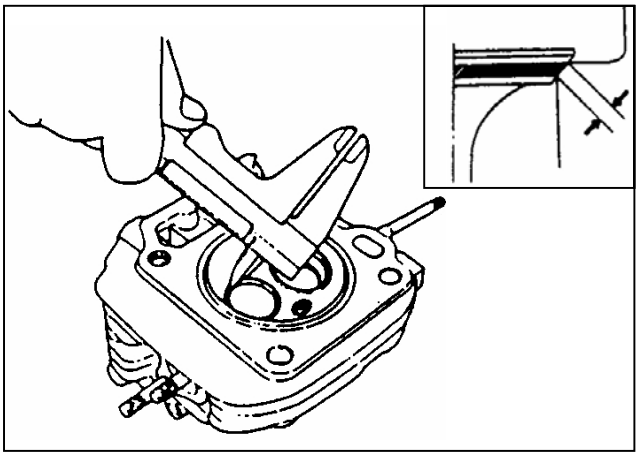
CYLINDER HEAD

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.

Allowable limit	0.1 mm (0.004 in)

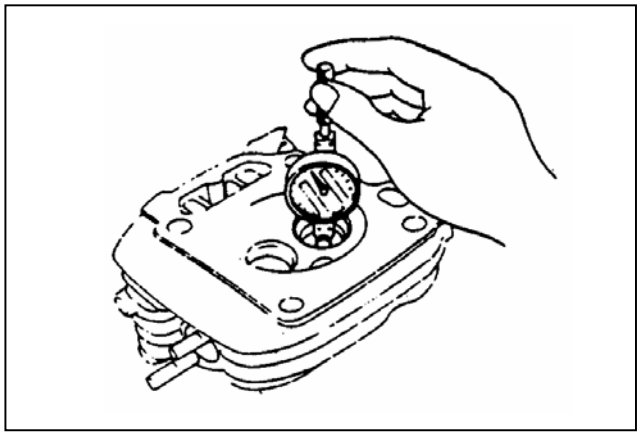


VALVE SEAT WIDTH

Measure the valve seat width.

If the valve seat width is under the factory section, or over the service limit, recondition the valve seat.

Factory Specification	Allowable limit
0.8 mm (0.03 in)	2.0 mm (0.08 in)



VALVE GUIDE ID

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

Measure and record each valve guide I. D.

Factory Specification	Allowable limit
5.50 mm (0.217 in)	5.572 mm (0.2193 in)

Replace the cylinder header if they are over the allowable limit.

GUIDE TO STEM CLEARANCE

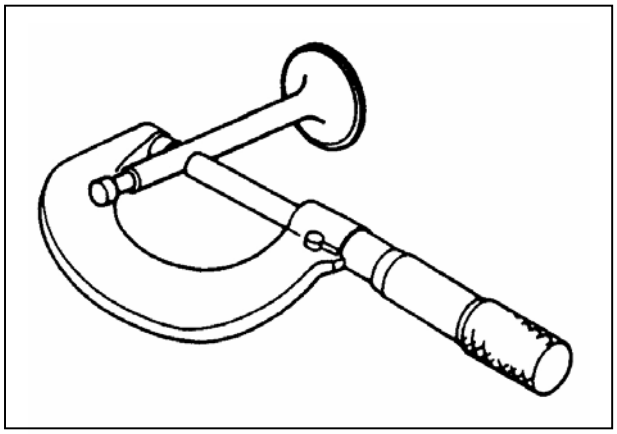
Subtract each valve stem O.D. from the corresponding guide I.D. to the stem to guide clearance.

	Factory Specification	Allowable limit
IN	0.02-0.044 mm (0.0008-0.0016 in)	0.10 mm (0.004 in)
EX	0.06-0.087 mm (0.0002-0.0034 in)	0.12 mm (0.005 in)

If the stem to guide clearance exceeds the Allowable 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 allowable limit with new guides, replace the valves as well.

NOTE: Recondition the valve seats whenever the valve guides are replaced.

SECTION 4. DISASSEMBLY AND SERVICE

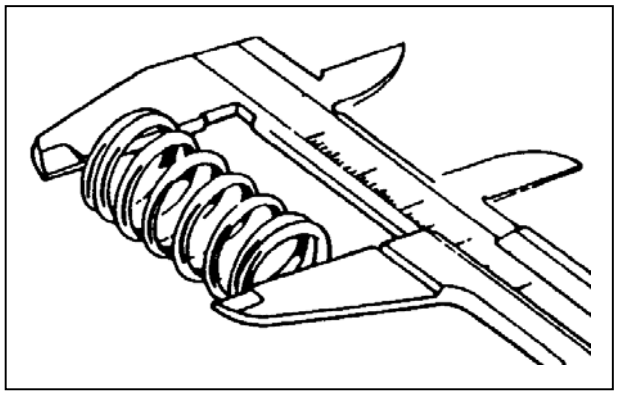


VALVE STEM OD

Inspect each valve for face irregularities, bending or abnormal stem wear. Replace the valve if necessary. Measure and record each valve stem O.D.

	Factory Specification	Allowable limit
IN	5.48 mm (0.216 in)	5.318 mm (0.2093 in)
EX	5.44 mm (0.214 in)	5.275 mm (0.2077 in)

Replace the valves if their O.D. is smaller than the allowable limit.



VALVE SPRING FREE LENGTH

Measure the free length of the valve springs.

Factory Specification	Allowable limit
30.0 mm (1.18 in)	28.5 mm (1.122 in)

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

SECTION 4. DISASSEMBLY AND SERVICE

4-4-4 Recoil Starter / Fan Cover

a.DISASSEMBLY/ ASSEMBLY

STARTER PULLEY

REASSEMBLY:

Install by aligning the hole in the pulley with the lug on the cooling fan.

FLANGE NUT 16mm

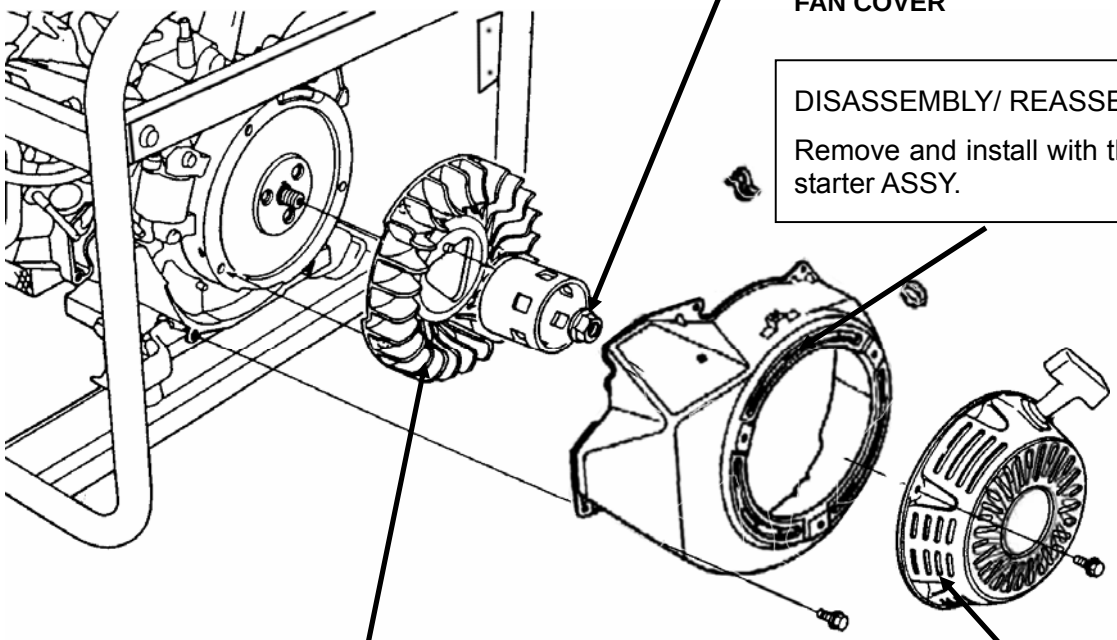
DISASSEMBLY/ REASSEMBLY:

Hold the flywheel by placing a screwdriver into the pulley.

FAN COVER

DISASSEMBLY/ REASSEMBLY:

Remove and install with the recoil starter ASSY.

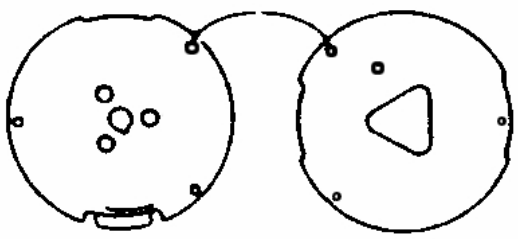


COOLING FAN

REASSEMBLY:

Install by aligning the three lugs on the rear side of the fan with the small hole in the flywheel.

When disassembling and assembling, take care not to damage the fan blades.



RECOIL STARTER ASSY

REASSEMBLY:

Install with the starter grip position as shown.

SECTION 4. DISASSEMBLY AND SERVICE

b.DISASSEMBLY (RECOIL STARTER ASSY)

⚠WARNING The recoil starter can cause personal injury, Wear safety glasses. Do not let the recoil spring snap.

REEL COVER

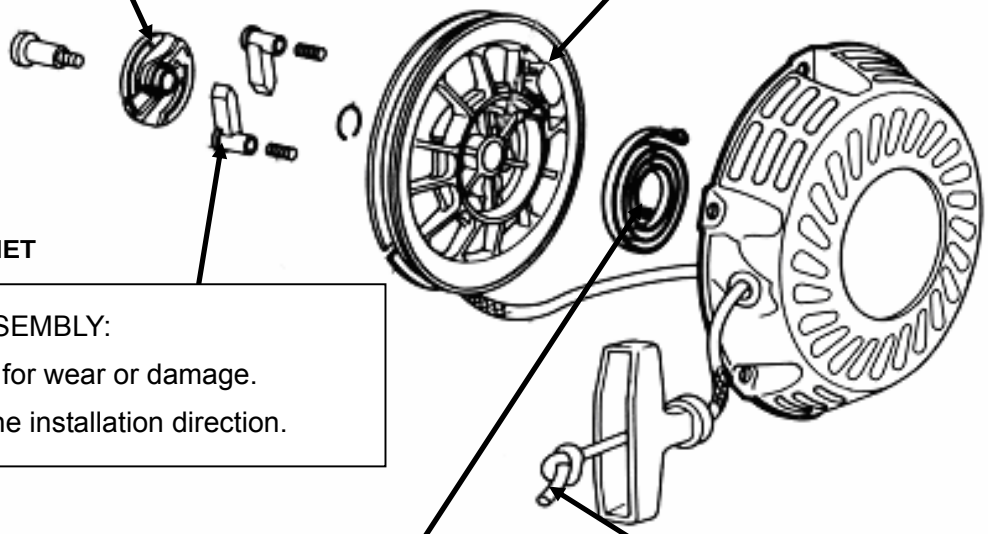
REASSEMBLY:

Align the ratchet with the reel cover notch.

STARTER REEL

REASSEMBLY:

Install on the starter case after installing the return spring.



RATCHET

REASSEMBLY:

Check for wear or damage.

Note the installation direction.

RETURN SPRING

REASSEMBLY:

Hook the outer hook in the groove of the starter reel and inner hook on the starter case tab.

STARTER ROE

REASSEMBLY:

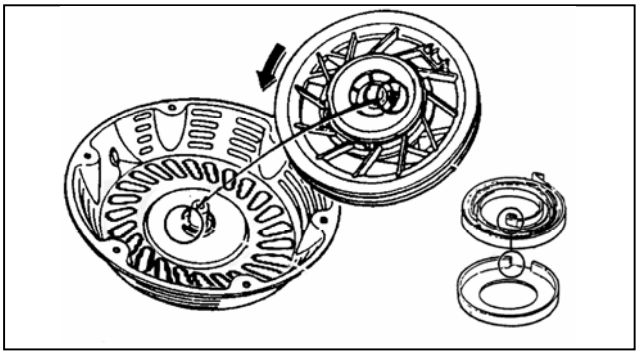
Install with the starter grip position as shown.

SECTION 4. DISASSEMBLY AND SERVICE

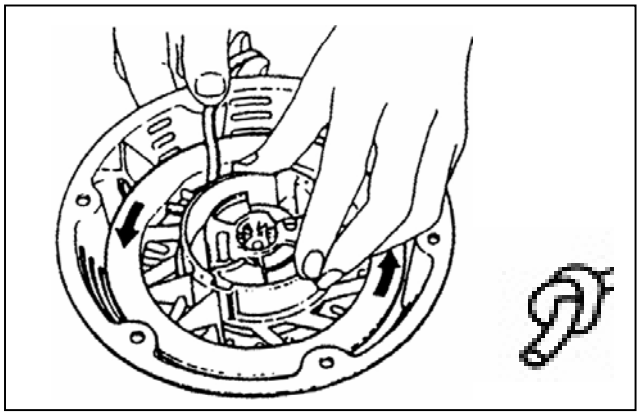
c.RECOIL STARTER ASSEMBLY

⚠WARNING Wear gloves and eye wear to protect your hands and eyes.

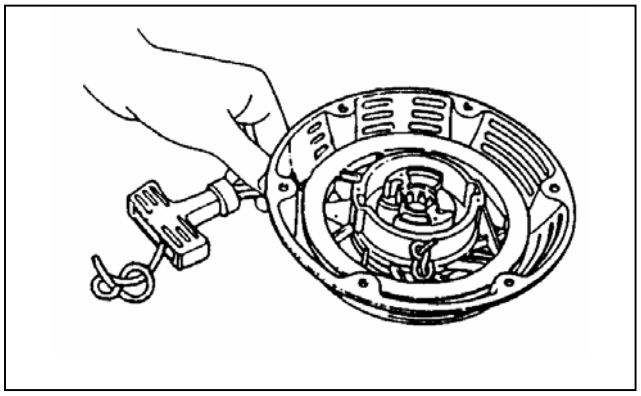
⚠WARNING Do not let the return spring jump.



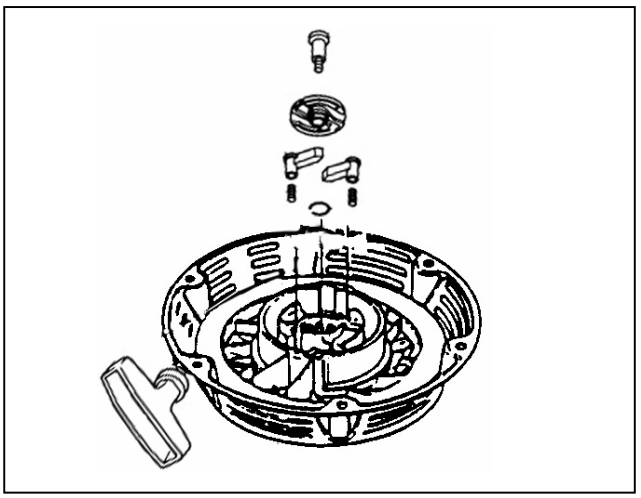
a) Hook the spring outer hook in the reel groove, and install the reel on the starter case, so that the spring inner hook is hooked to the starter case tab by turning the reel counterclockwise.



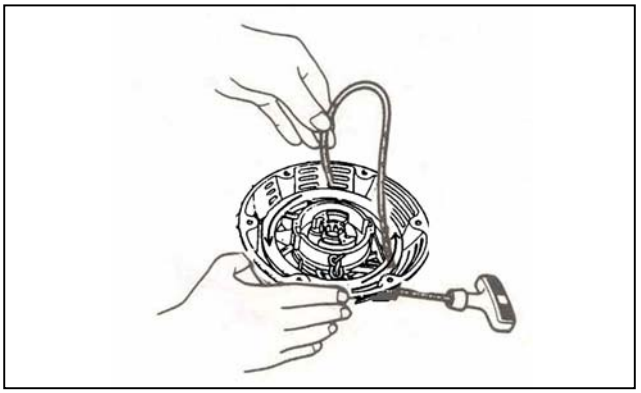
b) Feed the end of the rope through the hole in the starter reel, and tie the rope end. Wind the rope onto the direction shown, and wedge the rope end in the notch on the edge of the reel.



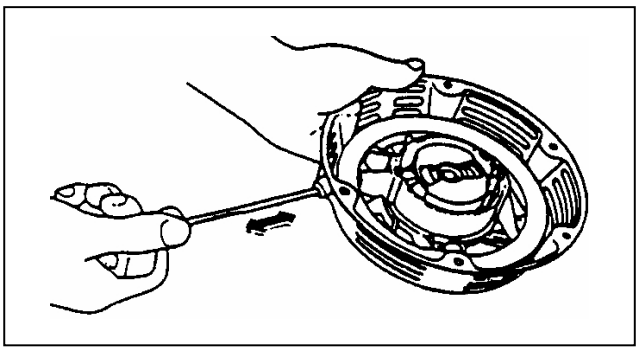
c) With a short length of the rope extending from the starter reel notch, pull the end of the rope out of the case, feed it through the starter grip, and tie a knot in the end of the rope.



d) Install the friction plates, friction spring, ratchet pin, guide plate, and reel cover. Tighten the reel cover bolt.



e) Rotate the reel three full turns in the direction of the arrow.

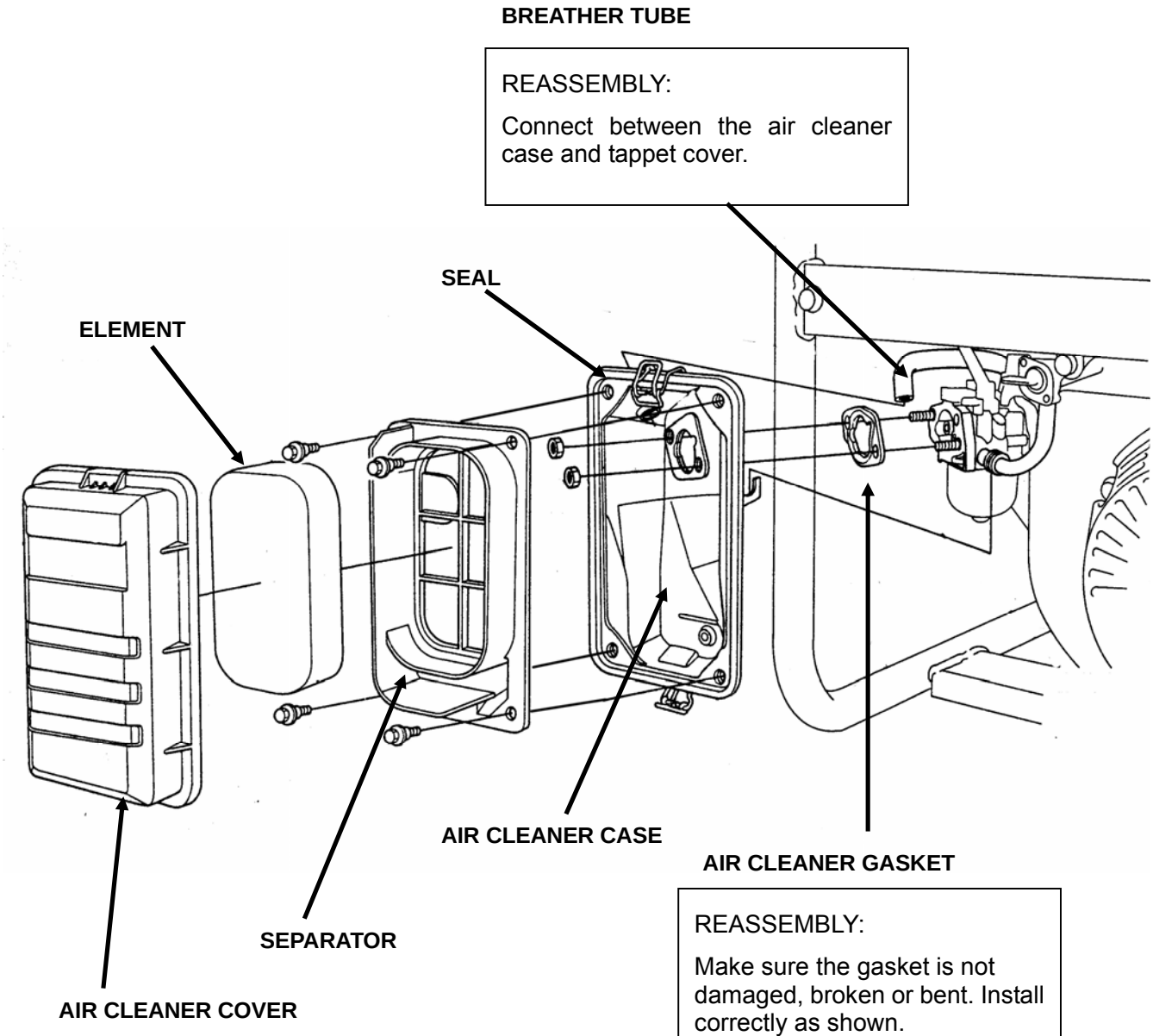


f) Check the operation of the ratchet by pulling the starter rope out several times.

SECTION 4. DISASSEMBLY AND SERVICE

4-4-5 Air Cleaner

DISASSEMBLLY/ REASSEMBLY



SECTION 4. DISASSEMBLY AND SERVICE

4-4-6 Carburetor

DISASSEMBLLY/ REASSEMBLY

⚠WARNING Gasoline is flammable and explosive. Close the fuel shut off valve, and drain the carburetor before servicing the carburetor.

PILOT SCREW

REASSEMBLY:

Check the screw head for wear or damage before installing. INITIAL OPENING: 1-5/8 turns out.

CARBURETOR BODY

REASSEMBLY:

Clean internal passages and orifices with compressed air before installing.

O-RING

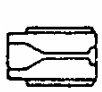
REASSEMBLY:

Check for correct installation.

MAIN JET

REASSEMBLY:

Clean thoroughly with compressed air before installation.



MAIN NOZZLE

REASSEMBLY:

Clean thoroughly with compressed air before installation.

FLOAT

REASSEMBLY:

Check for smooth movement after installing.

FLOAT VALVE

REASSEMBLY:

Check for worn valve or weak spring before installation.

SET BOLT

REASSEMBLY:

After assembly, check for any sign of fuel leakage.

DRAIN SCREW

REASSEMBLY:

Clean thoroughly with compressed air and check for leaks after installation.

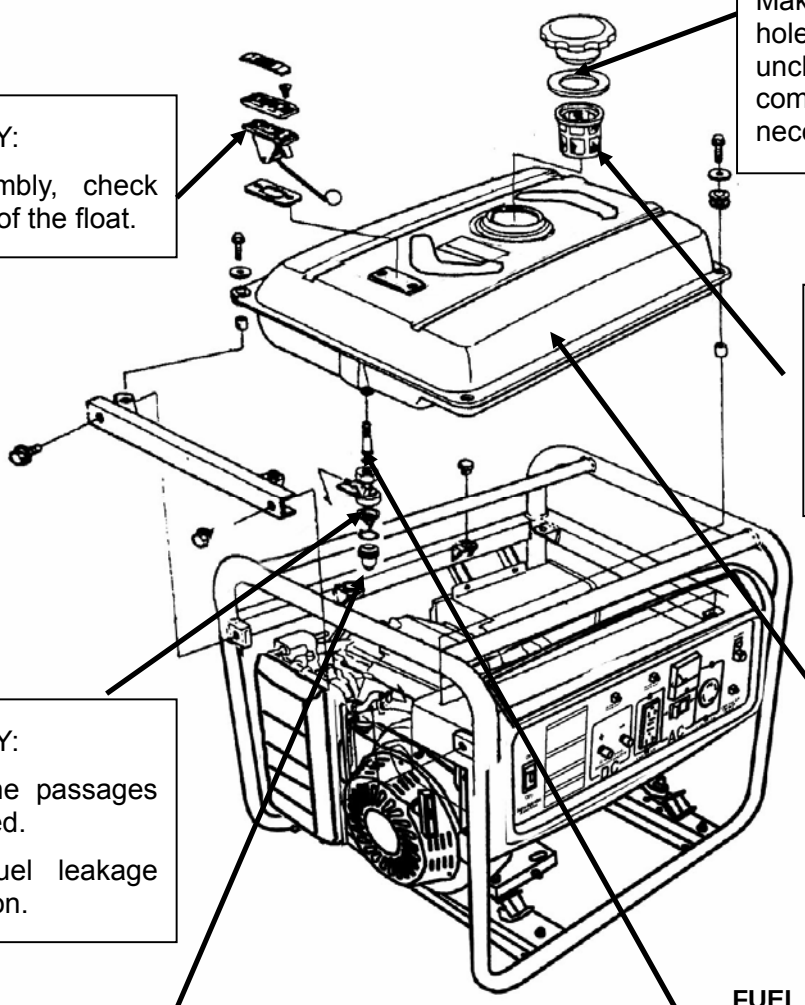
SECTION 4. DISASSEMBLY AND SERVICE

4-5 Generator

4-5-1 Fuel Tank

DISASSEMBLLY/ REASSEMBLY

⚠WARNING Gasoline is flammable and explosive. Drain the fuel tank and fuel line before disassembly. Wipe up spilled fuel immediately.



FUEL TANK CAP

REASSEMBLY:

Make sure that the air vent hole is clean and unclogged. Blow with compressed air if necessary.

FUEL METER

REASSEMBLY:

After reassembly, check the operation of the float.

FUEL STRAINER

REASSEMBLY:

Check to be sure the strainer is clean and undamaged before installation.

FUEL TANK

REASSEMBLY:

Wash the tank to remove sediment.

FUEL VALVE

REASSEMBLY:

Make sure the passages are not clogged.

Check for fuel leakage after installation.

FUEL FILTER

REASSEMBLY:

Check to be sure the filter is clean and undamaged.

SEDIMENT CUP

REASSEMBLY:

Wash to remove sediment. and dry thoroughly before installation.

SECTION 4. DISASSEMBLY AND SERVICE

4-5-2 Muffler

DISASSEMBLLY/ REASSEMBLY

EXHAUST PIPE

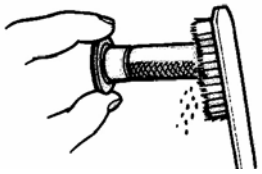
REASSEMBLY:

Install after removing the carbon deposits from the exhaust pipe.

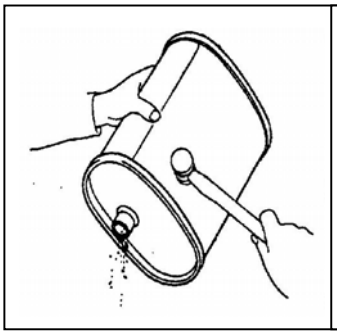
EXHAUST PIPE

REASSEMBLY:

Attach after removing the carbon from the screen with a wire brush.

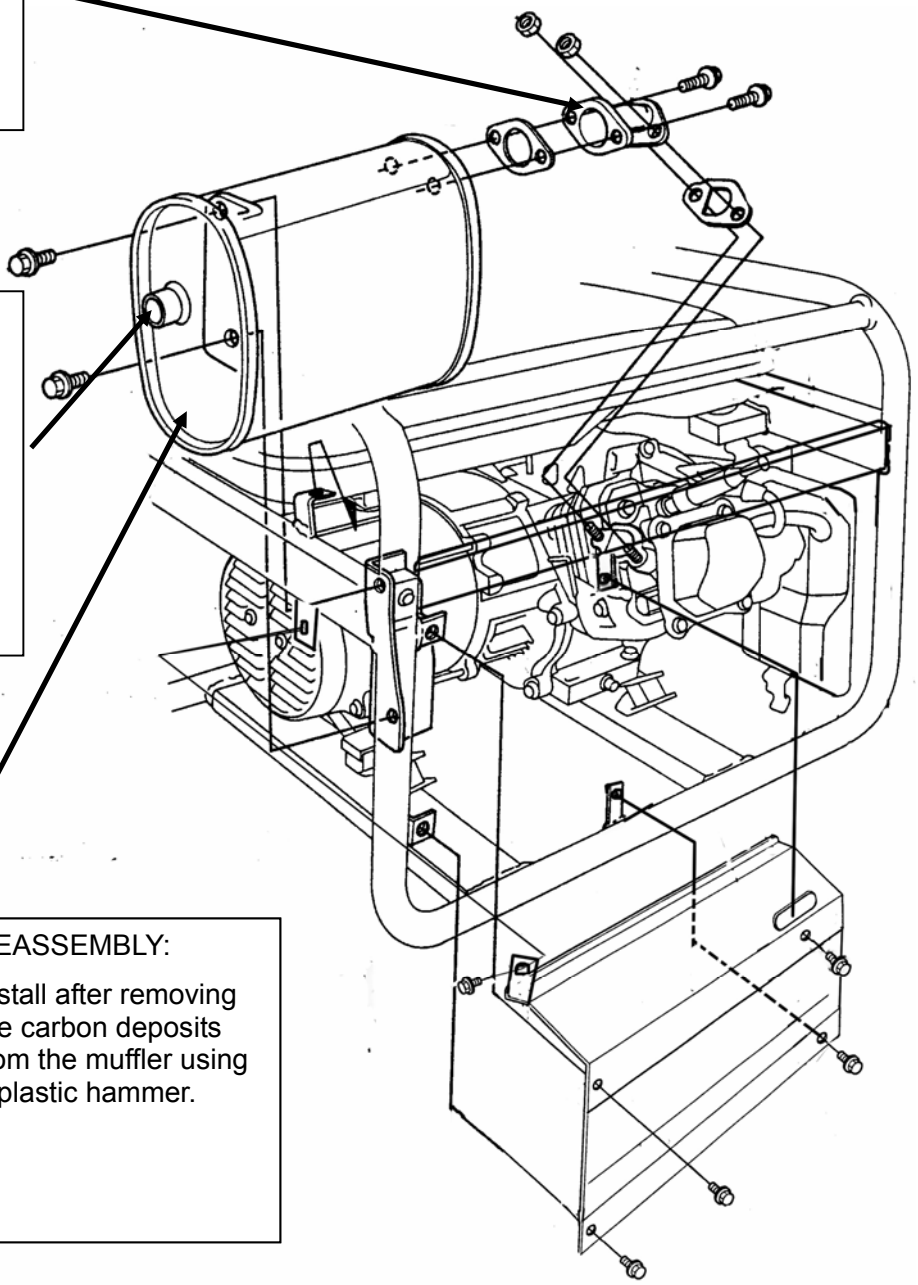


MUFFLER



REASSEMBLY:

Install after removing the carbon deposits from the muffler using a plastic hammer.



SECTION 4. DISASSEMBLY AND SERVICE

4-5-3 Generator

a. DISASSEMBLLY/ REASSEMBLY

CRANKCASE GROMMET

REASSEMBLY:

Check to be sure the grommet is inserted securelv.

GENERATOR ASSY

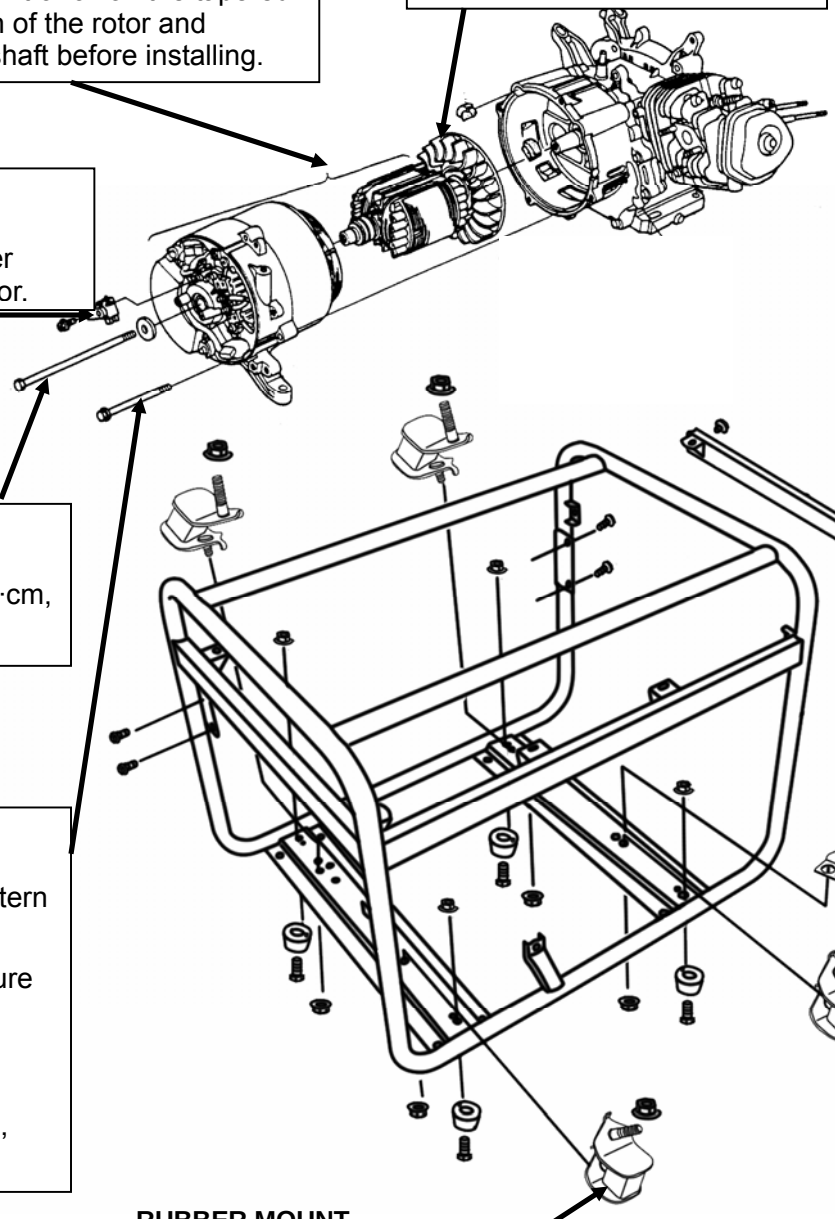
REASSEMBLY:

Wipe dirt or oil off the tapered portion of the rotor and crankshaft before installing.

BRUSH HOLDER ASSY

DISASSEMBLY:

Remove the brush holder before the rotor and stator.



ROTOR BOLT

REASSEMBLY:

43-47 N·m (430-470 kg·cm, 31.0-33.9 ft·lb)

STATOR BOLT

REASSEMBLY:

Tighten in crisscross pattern in 2-3 steps.

After tightening, make sure there is no clearance between the crankcase cover and stator cover.

8-12 N·m (80-120 kg·cm, 5.8-8.7 ft·lb)

RUBBER MOUNT

REASSEMBLY:

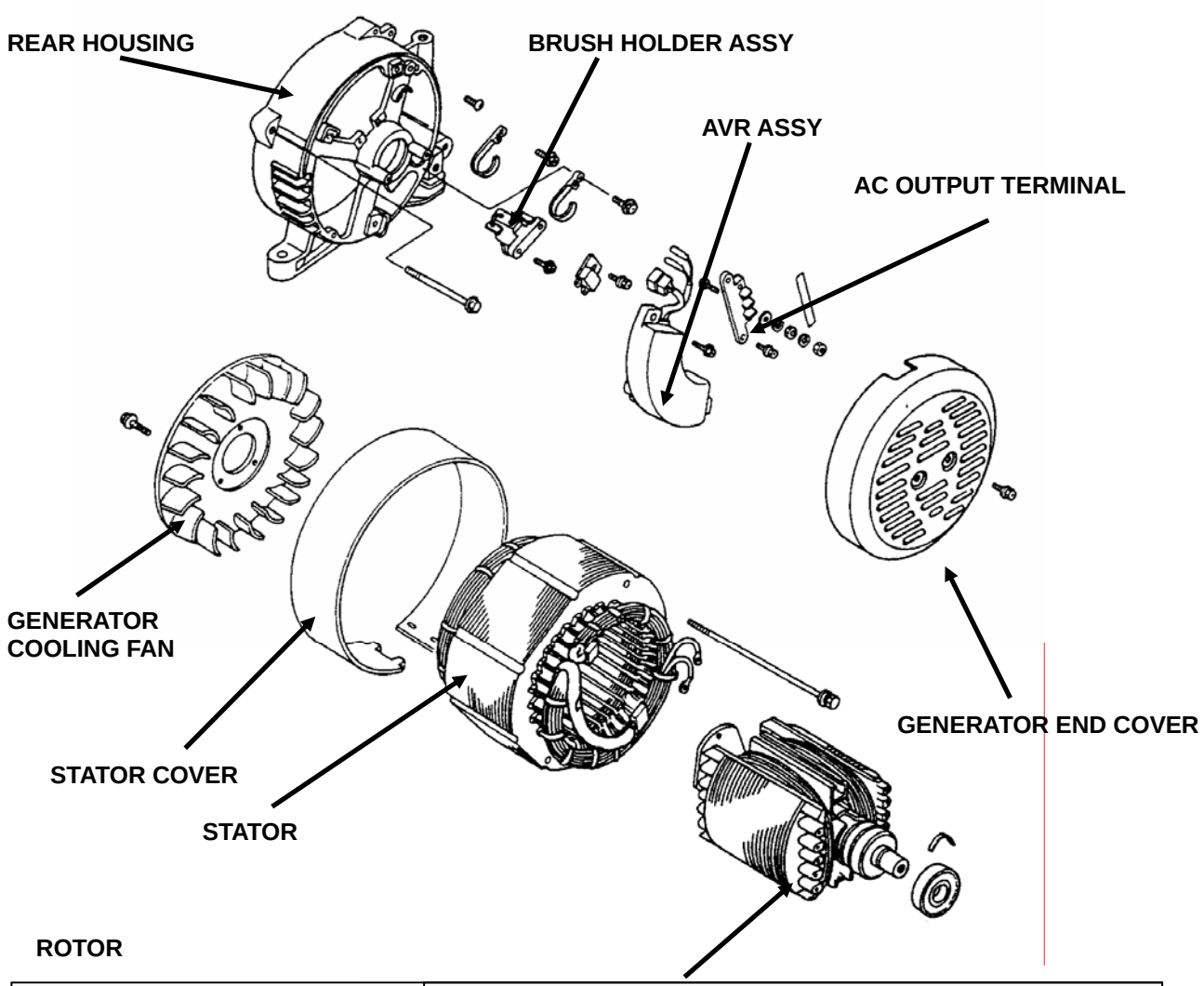
Insert the alignment tabs onto the holes.

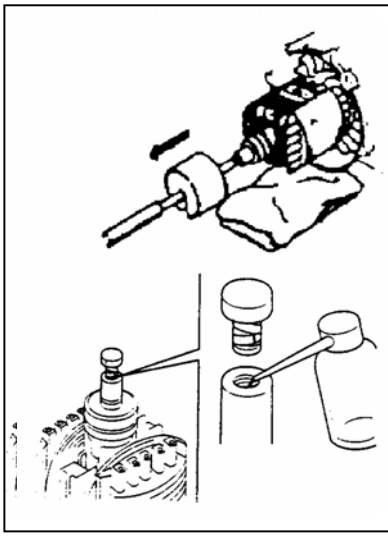
Make sure the rubber is not chipped, hard or worn.

Note the installation direction.

SECTION 4. DISASSEMBLY AND SERVICE

REAR HOUSING





DISASSEMBLY:

Install the appropriate rotor puller (special tool), hold the flywheel and torque the puller to 6.9 Kg-cm (50 ft-lb).

⚠CAUTION To avoid damaging the rotor, place a wooden block and a shop rag under the rotor for support.

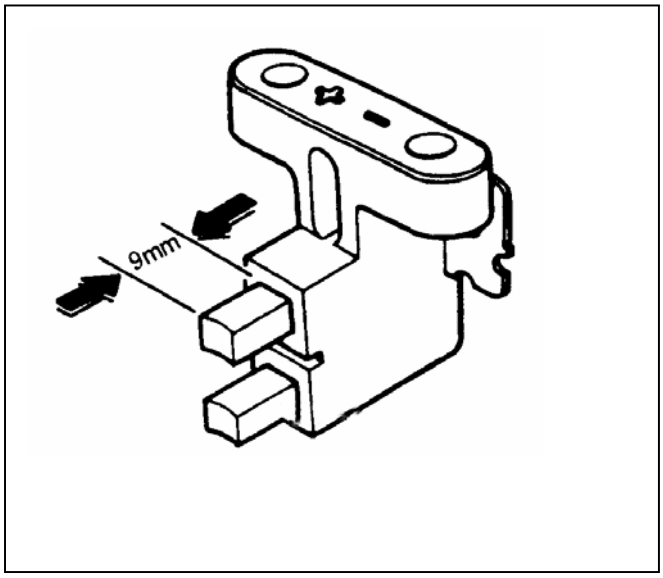
NOTE:

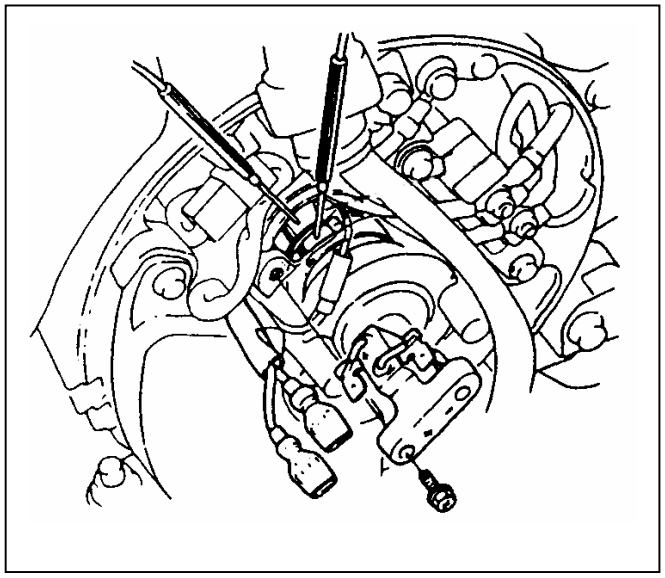
If torquing the rotor puller does not free the rotor from the crankshaft, tap the end of the puller with a brass hammer to help loosen the rotor.

⚠WARNING To prevent eye injury, always wear safety glasses or goggles when striking the end of the rotor puller.

SECTION 4. DISASSEMBLY AND SERVICE

b. INSPECTION





CARBON BRUSH/ SLIP RING

Remove the carbon brushes from the brush holder.

Check the brush for length, wearing condition or any other defect. Replace if the length is less than 5 mm (0.20in).

NOTE:

- Connect the Blue wire lead to the positive (+) side of the brush holder.
- Avoid damaging the brushes when removing and installing the brush holder.

Visually inspect the slip rings for dust, rust or other damage. If necessary, wipe them with a clean lint-free cloth. If they are rusted or damaged, remove the rotor and rub with fine emery cloth.

FIELD WINDING

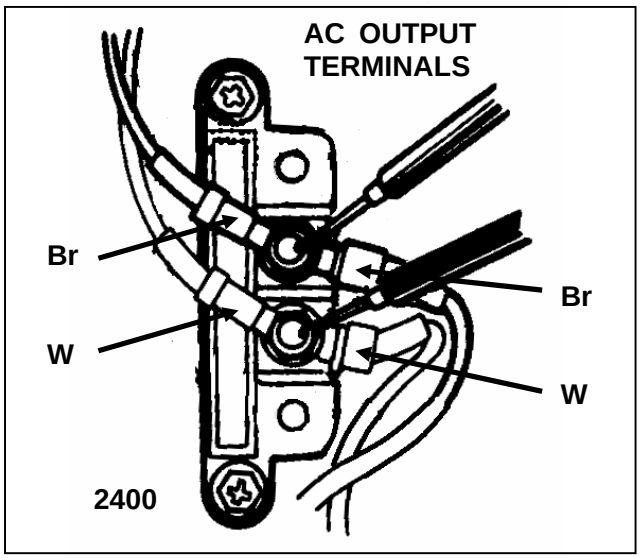
Remove the brushes and measure resistance between the slip rings.

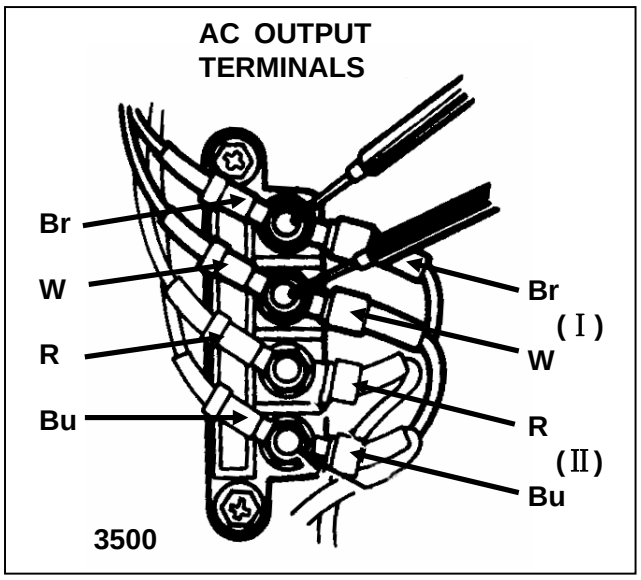
RESISTANCE	2400	40-50 Ω
	2500	35-45 Ω

If the specified resistance is obtained at the slip rings, but not at the brush terminals, clean or replace the brushes.

If the specified resistance is not obtained at the slip rings, clean or replace the rotor.

SECTION 4. DISASSEMBLY AND SERVICE





MAIN WINDING

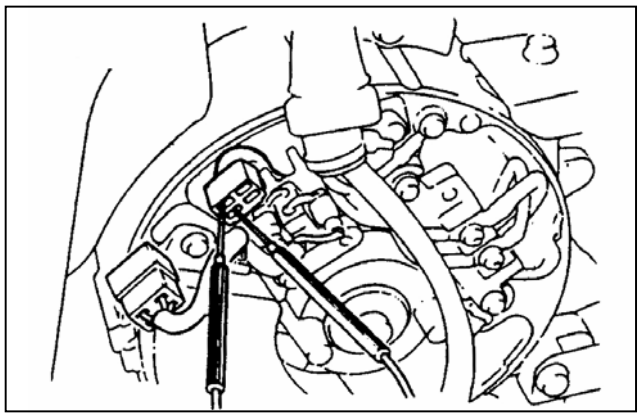
Using an ohmmeter, measure the resistance between the AC output terminals.

RESISTANCE	2400	0.51-0.53 Ω
	3500（Ⅰ）	0.76-0.79 Ω
	3500（Ⅱ）	0.76-0.79Ω

NOTE:

Set the voltage selector switch to 120 V only position.

If the resistance is zero or infinity, replace the stator.

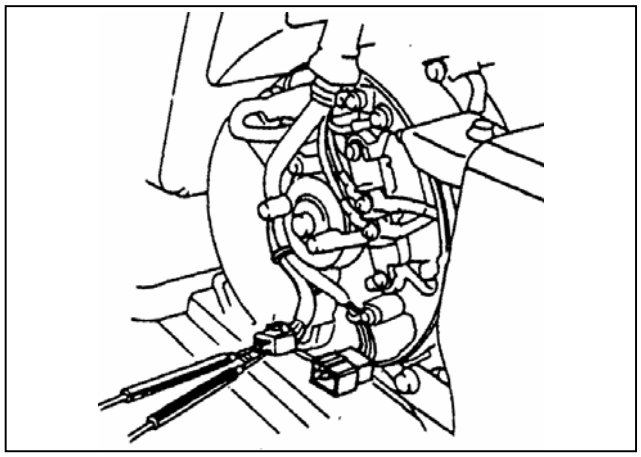


EXCITER WINDING

Using an ohmmeter, measure the resistance between the Light green/ Red and Green wires in the 4P coupler.

RESISTANCE	2400	3.1-3.3 Ω
	3500	1..5-1.7 Ω
	Slip ring - Ground	∝

If the resistance is zero or infinity, replace the stator.



DC WINDING

Using an ohmmeter, measure the resistance between the brown wire leads at the DC diode connecter.

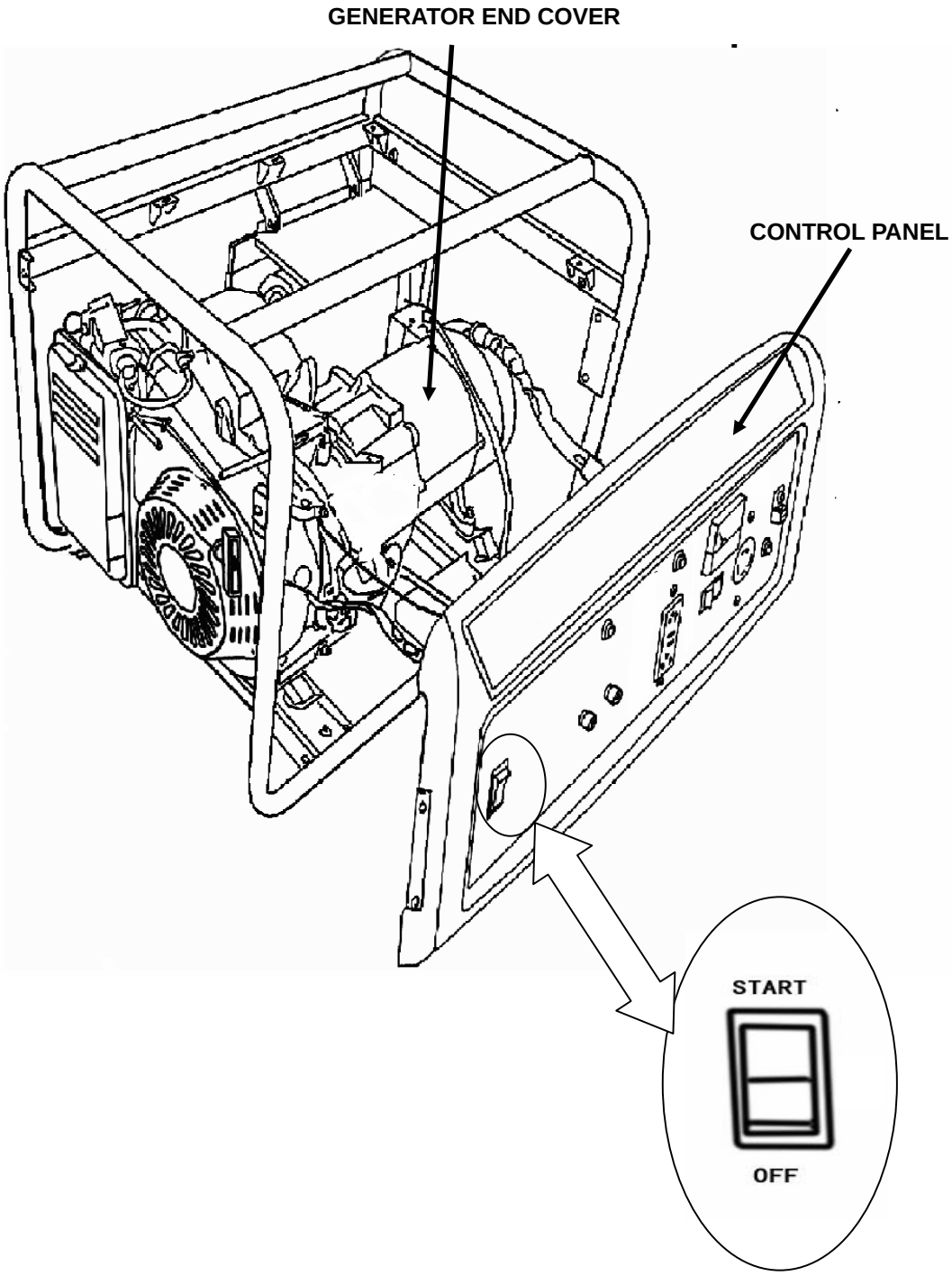
RESISTANCE	0.4-0.6 Ω

If the resistance is out of specification, replace the stator.

SECTION 4. DISASSEMBLY AND SERVICE

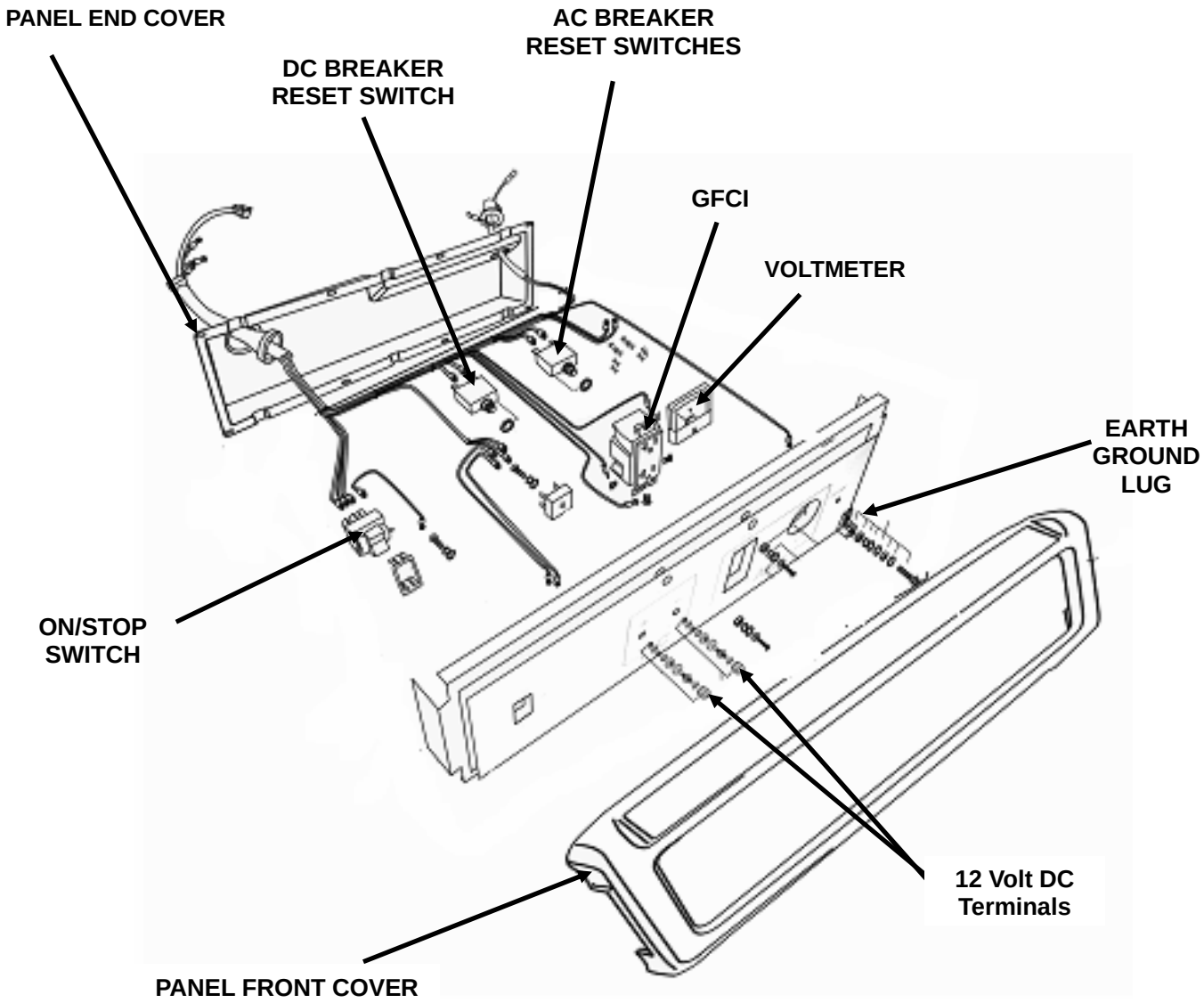
4-5-4 Control Panel

a. DISASSEMBLLY/ REASSEMBLY



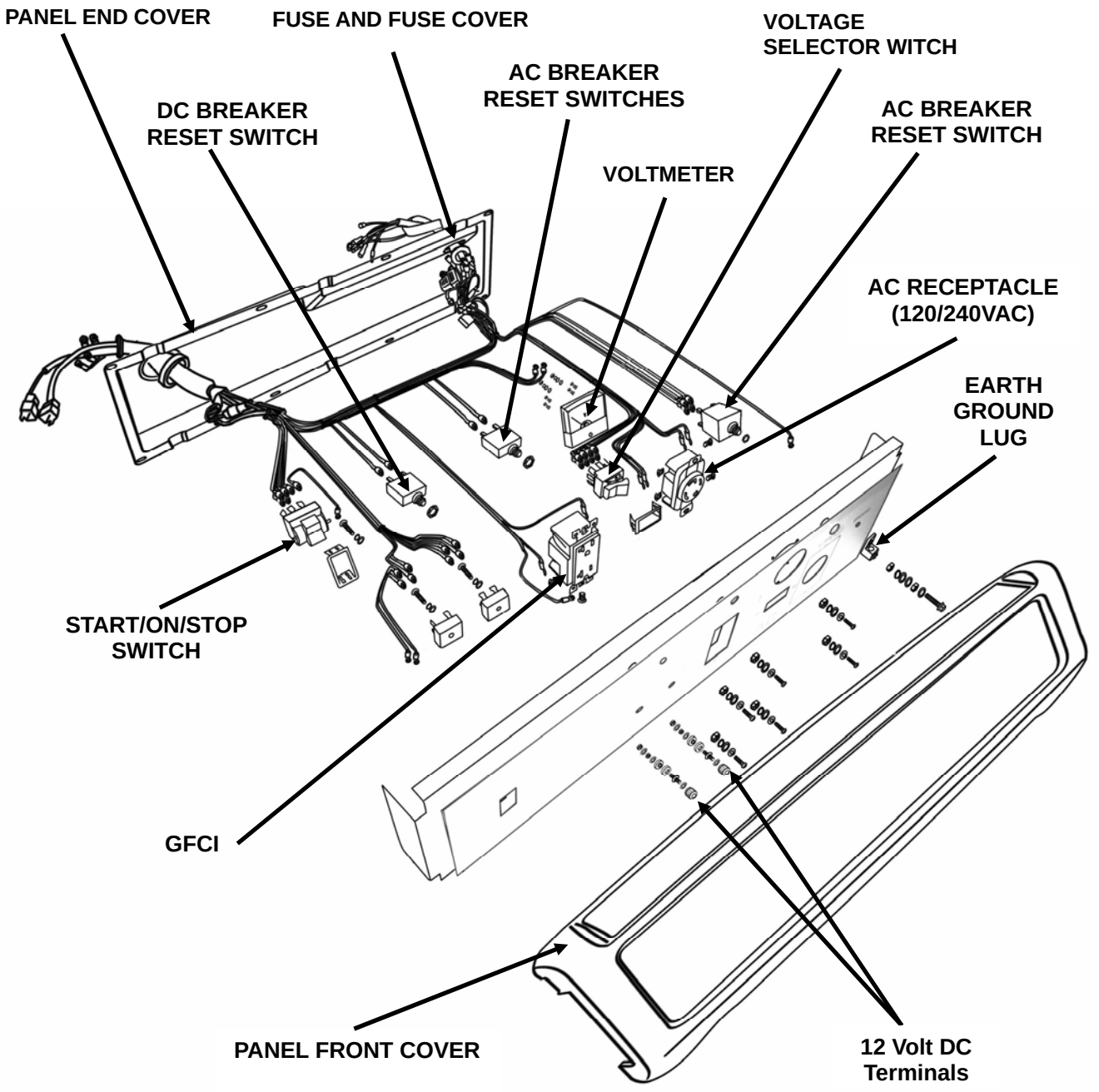
SECTION 4. DISASSEMBLY AND SERVICE

2400



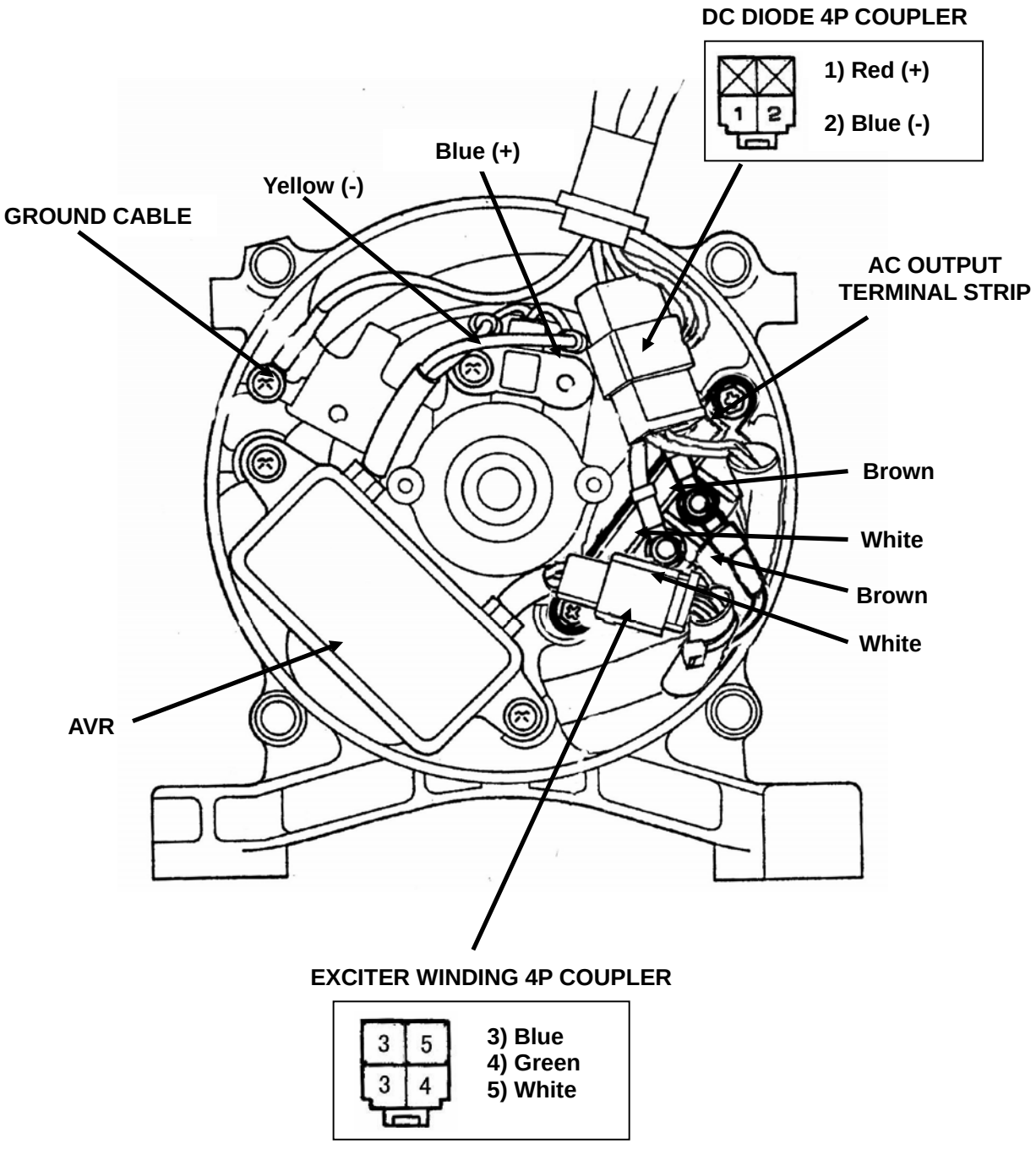
SECTION 4. DISASSEMBLY AND SERVICE

3500



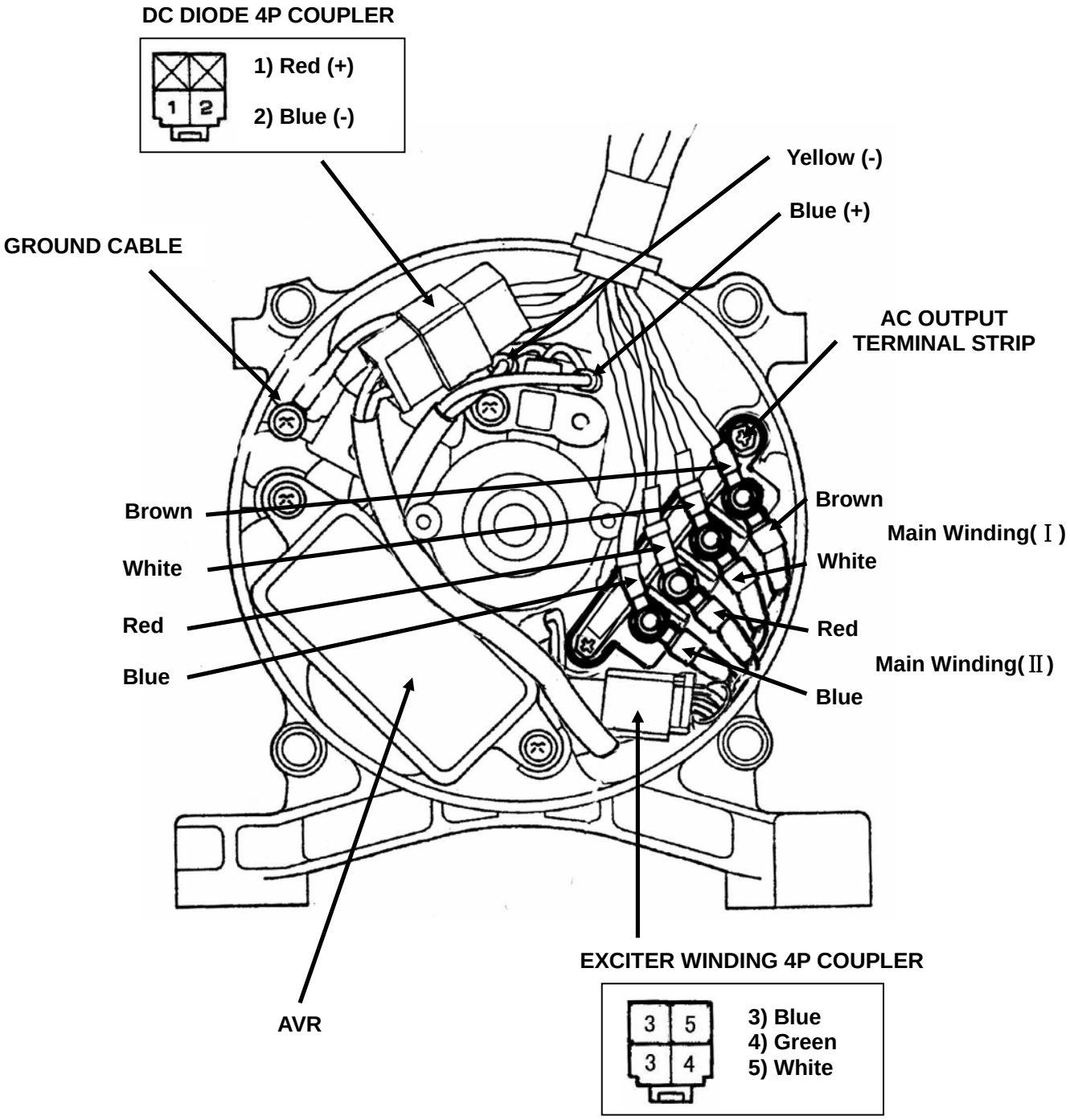
SECTION 4. DISASSEMBLY AND SERVICE

2400



SECTION 4. DISASSEMBLY AND SERVICE

3500

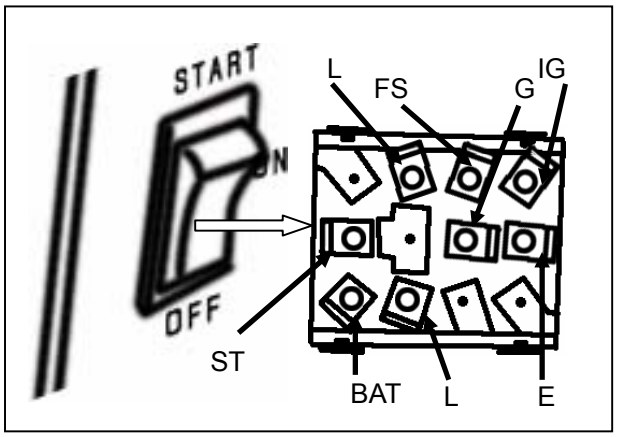


SECTION 4. DISASSEMBLY AND SERVICE

b. INSPECTION

ENGINE SWITCH

Check for continuity between the terminals with the switch in each position.



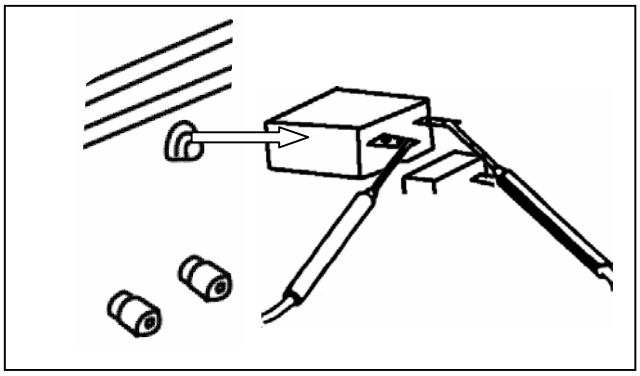
Wire / Position	Yellow/ Black	Black	Green/ White	Green/ White	Red	White
	IG	E	FS	G	L	L
OFF	●	●				
ON					●	●

When switch to “OFF” position, IG is connecting to E. When switch to “ON” position, L is connecting to L.

DC BREAKER RESET SWITCH

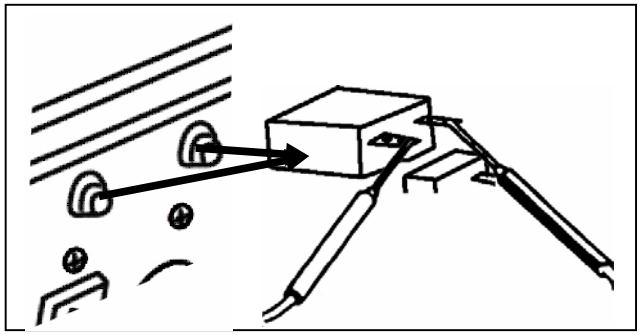
Check continuity between the breaker terminals.

There should be continuity with the breaker button pushed in.



AC BREAKER RESET SWITCHES

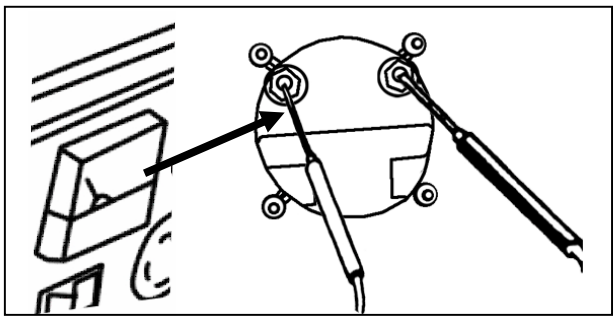
Check continuity between the breaker terminals. There should be continuity with the breaker button pushed in.



VOLTMETER

Using an ohmmeter, check for continuity between the terminals.

Continuity should exist between them.

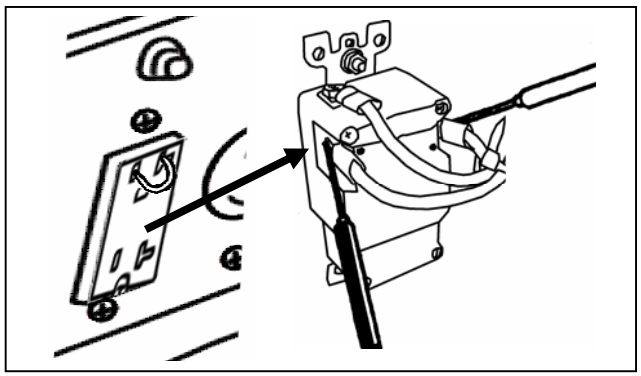


AC RECEPTACLE

Connect the terminals of the receptacles with a piece of wire.

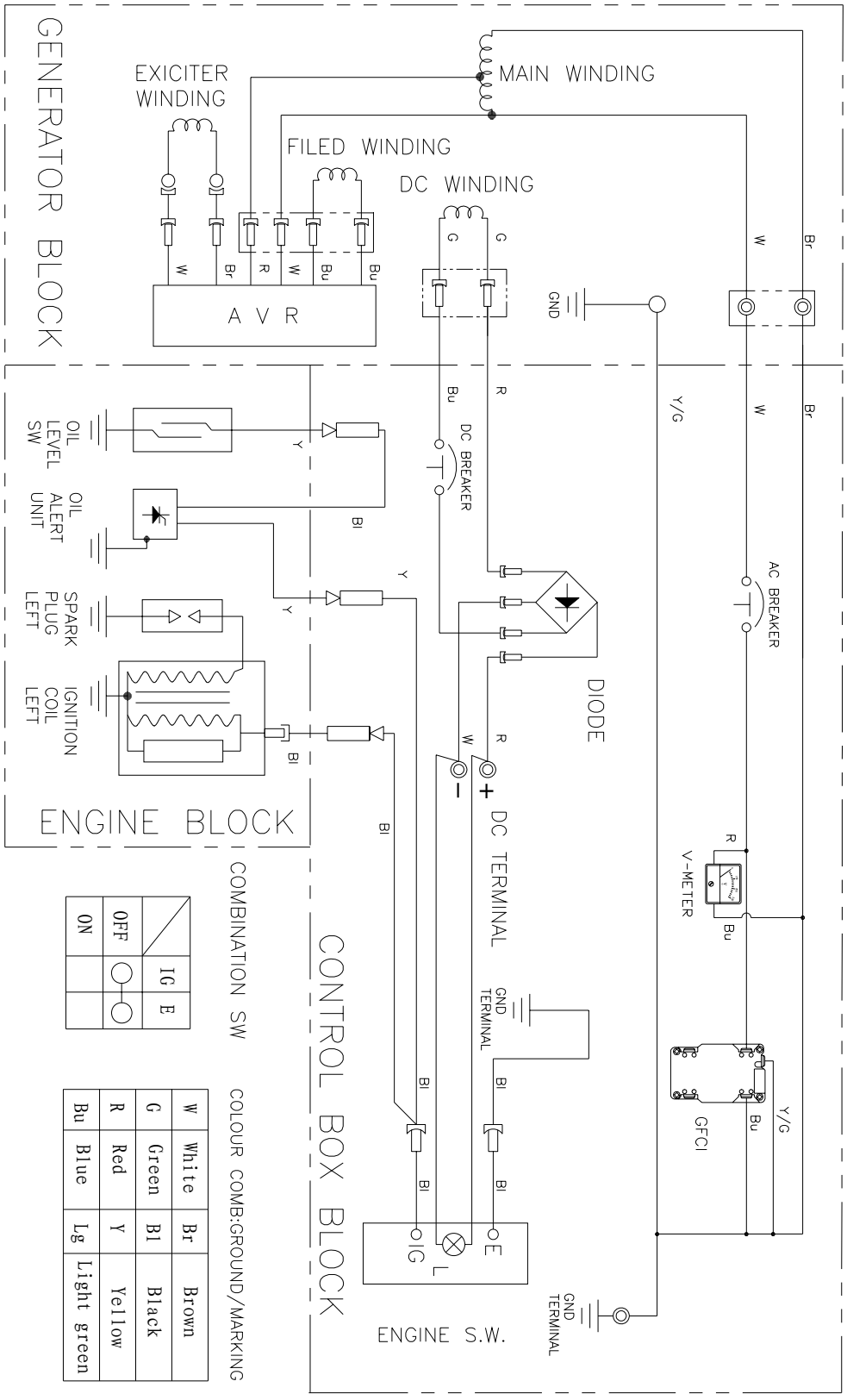
Using an ohmmeter, check for continuity between the terminals.

If there is no continuity, the receptacle is defective, and must be replaced.



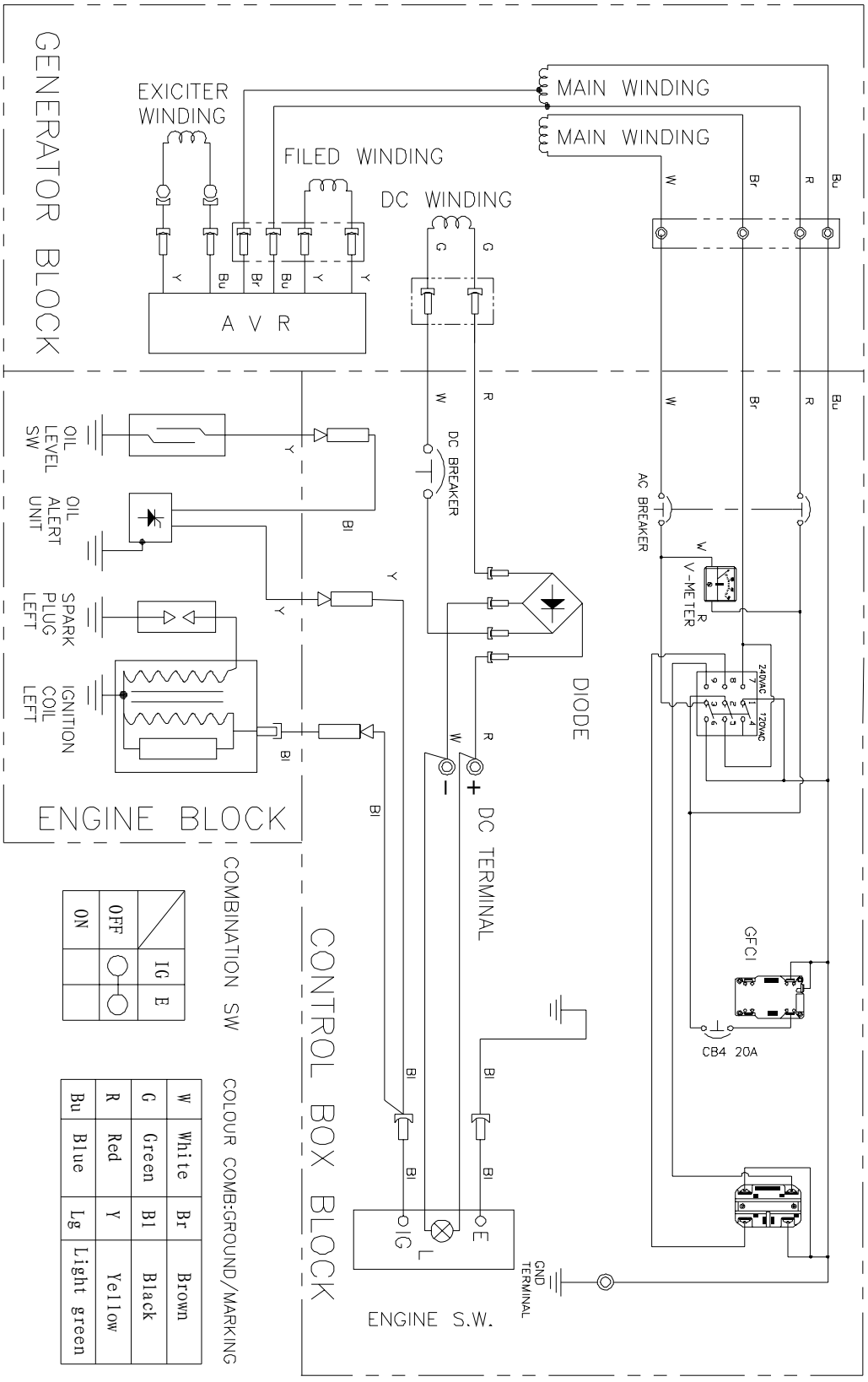
SECTION 5. WIRING DIAGRAMS

5-1 The Wiring Diagram of 2400



SECTION 5. WIRING DIAGRAMS

5-2 The Wiring Diagram of 3500



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