

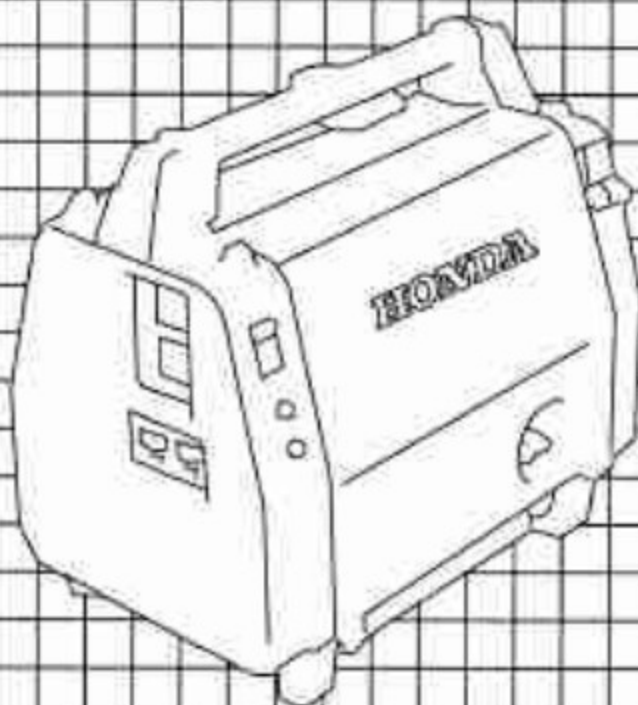
HONDA

Power

Equipment

SHOP MANUAL

Generator EM650





PREFACE

This manual covers construction, function and servicing procedures of the Honda EM650 generator.

Careful observance of the instructions given herein will result in better, safer service work.

If you don't know the source of the trouble, see section II-7, TROUBLESHOOTING.

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.

NOTE: Gives helpful information.

CAUTION: Detailed descriptions of *standard* workshop procedures, safety principles and service operations are not included. Please note that this manual does contain warnings and cautions against some specific service methods which could cause **PERSONAL INJURY**, or could damage the product or make it unsafe. Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by American Honda, might be done, or of the possible hazardous consequences of each conceivable way, nor could American Honda investigate all such ways. Anyone using service procedures or tools, whether or not recommended by American Honda, *must satisfy himself thoroughly* that neither personal safety nor product safety will be jeopardized.

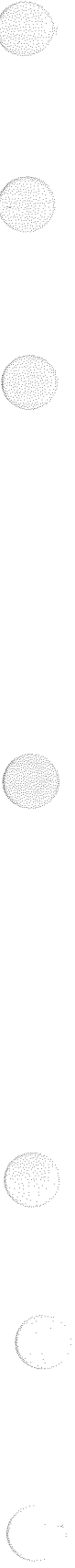
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NOTE



- | | |
|-----------------------|-------------------------|
| 1. SPECIFICATIONS | 4. DIMENSIONAL DRAWINGS |
| 2. CHARACTERISTICS | 5. WIRING DIAGRAM |
| 3. PERFORMANCE CURVES | |

1. SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Overall length	410 mm (16.1 in)
Overall width	270 mm (10.6 in)
Overall height	375 mm (14.8 in)
Dry weight	22 kg (48.5 lb)
Operating weight	24 kg (52.9 lb)

GENERATOR

Type	Self-exciting, 2-pole, rotating field type
Maximum output	650W
Rated output	550W
Rated voltage	120V
Rated current	4.6A
Rated frequency	60 Hz
Phase	Single
DC output	100W (12V, 8.3A)
Voltage regulating system	Condensor compensated

ENGINE

Type	4-Stroke, Side valve, 1 cylinder
Total displacement	76 cm ³ (4.7 cu in)
Bore x Stroke	46 x 46 mm (1.81 x 1.81 in)
Maximum horsepower	1.6HP @3,600 r.p.m.
Maximum torque	32 kg-cm (2.3 ft-lb)
Compression ratio	6.0 : 1
Fuel consumption	0.53ℓ/h (0.14 gal/h)
Cooling system	Forced air
Ignition system	Transistorized magneto
Ignition timing	20° B.T.D.C.
Spark plug	BMR-4A (NGK), W14MR-U (ND)
Carburetor	Horizontal type, butterfly valve
Air cleaner	Single element
Governor	Centrifugal
Lubricating system	Splash
Oil capacity	0.35ℓ (0.37 US qt)
Starting system	Recoil starter
Stopping system	Primary circuit ground
Fuel tank capacity	2.8ℓ (0.74 US gal)
Recommended fuel	Regular automotive gasoline (86 pump octane: unleaded preferred)
Recommended oil	SAE 10W-40

2. CHARACTERISTICS

Voltage variation rate	Momentary: 15% max. Average: 10% max. Average time: 3 seconds max.
Voltage stability	±2%
Frequency variation rate	Momentary: 10% max. Average: 5% max. Average time: 3 seconds max.
Frequency stability	±1%
Noise level (at 7 m)	56 dB (A)
Rated power factor	1.0
Insulation resistance	10 MΩ
Maximum load	110%/30 minutes
Circuit protector capacity	AC: 5A DC: 12A
Fuel consumption ratio (at rated load)	0.57ℓ/h (0.15 US gal/h)
Motor drive	150W max. (Single phase, induction motor)
Continuous operating time (at rated load) without refueling	5.2 Hours

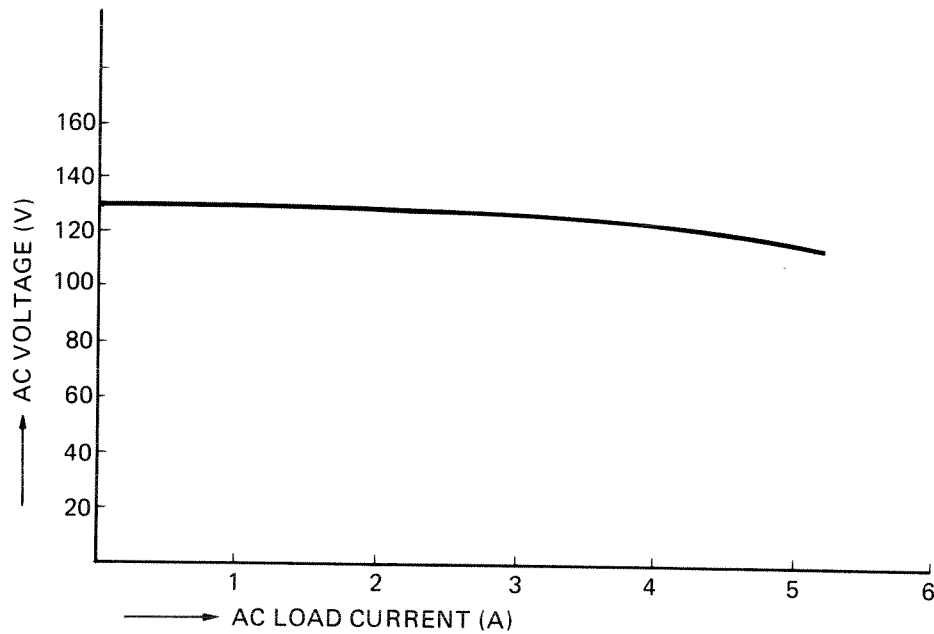
3. PERFORMANCE CURVES

The curves show performance of the generator under average conditions.

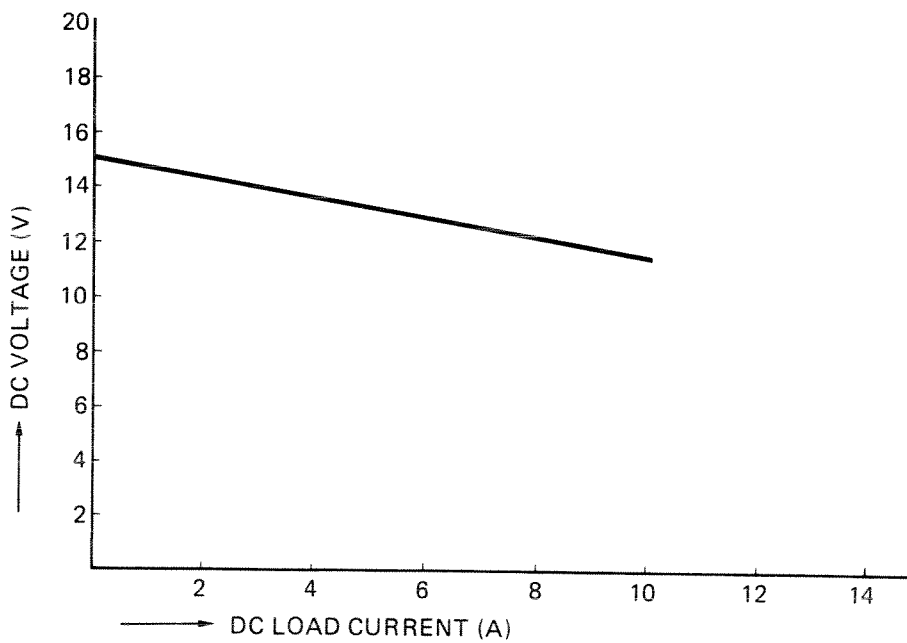
Performance may vary to some degree, depending on ambient temperature and humidity.

The output voltage will be higher than usual when the generator is cold immediately after the engine starts.

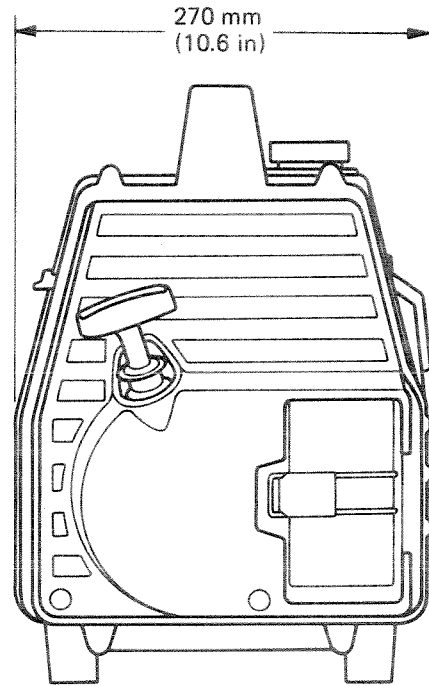
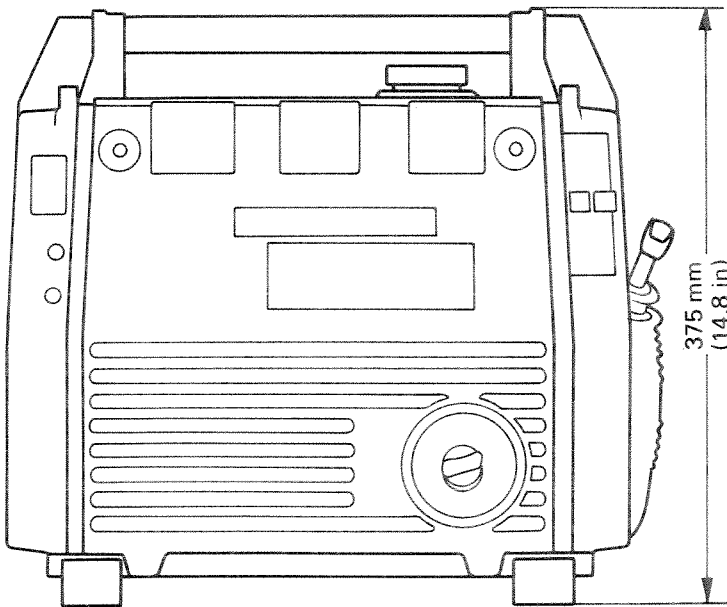
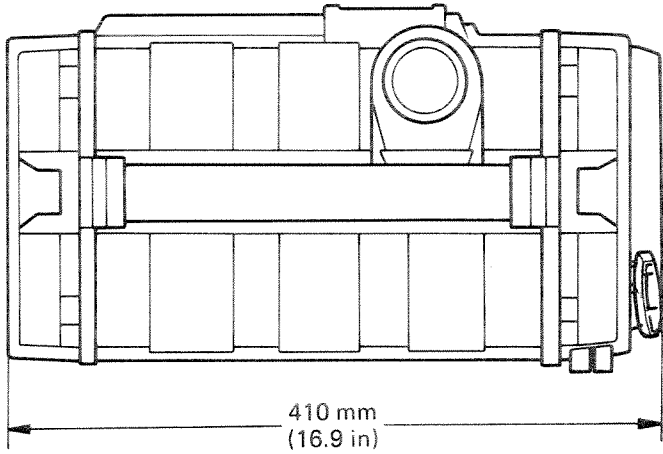
• AC EXTERNAL CHARACTERISTIC CURVE



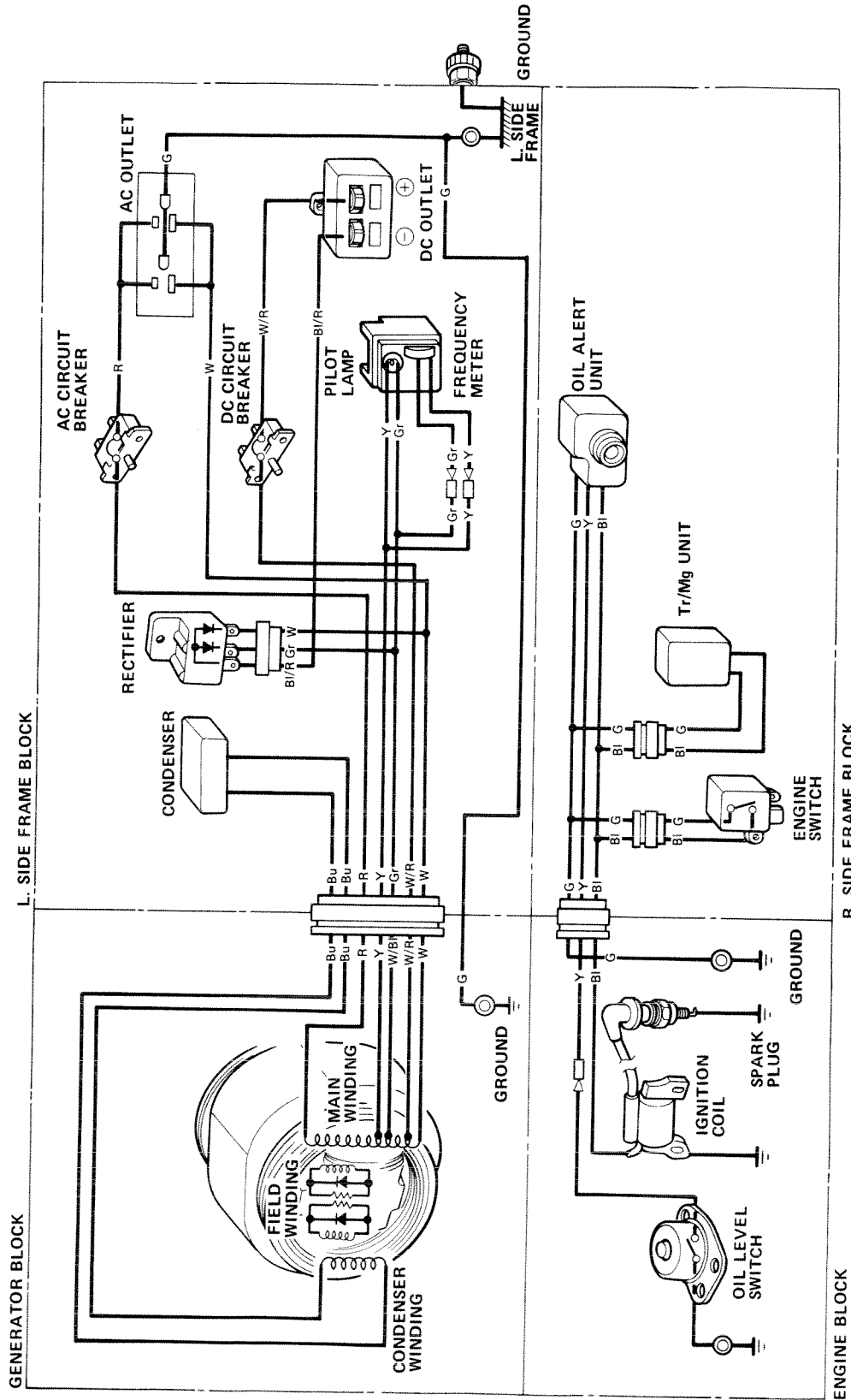
• DC EXTERNAL CHARACTERISTIC CURVE



4. DIMENSIONAL DRAWINGS



5. WIRING DIAGRAM



Bl	BLACK	Lg	LIGHT GREEN
Br	BROWN	O	ORANGE
G	GREEN	P	PINK
Gr	GRAY	R	RED
Bu	BLUE	W	WHITE
Lb	LIGHT BLUE	Y	YELLOW

NOTE



- | | |
|---------------------------|-------------------------|
| 1. GENERAL SAFETY | 5. SPECIAL TOOLS |
| 2. SERVICE RULES | 6. TORQUE VALUES |
| 3. SERIAL NUMBER LOCATION | 7. TROUBLESHOOTING |
| 4. MAINTENANCE STANDARDS | 8. MAINTENANCE SCHEDULE |

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 cap 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.
- 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 voltage wires when the engine is run with its cover removed.

2. SERVICE RULES

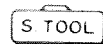
1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may damage the unit.
2. Use the special tools designed for the product.
3. Install new gaskets, O-rings, etc. when reassembling.
4. When torquing bolts or nuts, begin 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. 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:



: Apply oil



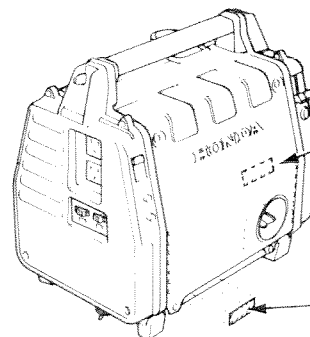
: Apply grease



: Use special tool

3. SERIAL NUMBER LOCATION

The engine serial number is stamped on the crankcase, and the frame serial number is stamped on the lower left of the front panel. Refer to the engine and frame serial numbers when ordering parts or making technical inquiries.



ENGINE SERIAL NUMBER
(GE100-1000001 ~)

FRAME SERIAL NUMBER
(EA3-1000001 ~)

4. MAINTENANCE STANDARDS

ENGINE

PART	ITEM	STANDARD	SERVICE LIMIT	
Engine	Cylinder compression	6.0 kg/cm ² (85 psi) (using recoil starter)	—	
Carburetor	Main jet	#50	—	
	Pilot screw	3/4 turns	—	
	Float height	19.2–21.2 mm (0.76–0.83 in)	—	
Spark plug	Gap	0.6–0.7 mm (0.023–0.028 in)	—	
Ignition coil	Resistance (Primary side)	0.7–0.9Ω	—	
	(Secondary side)	6.1–7.5kΩ	—	
	Air gap	0.4 ± 0.2 mm (0.016 ± 0.008 in)	—	
Cylinder	ID	46.00 mm (1.8110 in)	46.05 mm (1.813 in)	
Piston	Skirt OD	45.995 mm (1.8108 in)	45.92 mm (1.808 in)	
	Piston-to-cylinder clearance	Max. 0.3 mm (0.0012 in)	0.13 mm (0.0051 in)	
	Piston pin bore ID	10.002 mm (0.3938 in)	10.05 mm (0.396 in)	
Piston ring	Width	1.5 mm (0.059 in)	1.37 mm (0.054 in)	
	Side clearance	Top	0.04 mm (0.0016 in)	0.1 mm (0.004 in)
		2nd	0.025 mm (0.001 in)	0.1 mm (0.004 in)
	End gap	Top/2nd	0.25 mm (0.01 in)	1.0 mm (0.04 in)
		Oil	0.45 mm (0.018 in)	1.0 mm (0.04 in)
Piston pin	OD	10.0 mm (0.3937 in)	9.95 mm (0.392 in)	
	Piston-to-pin bore clearance	0.015 mm (0.0006 in)	0.1 mm (0.0039 in)	
Connecting rod	Small end ID	10.006 mm (0.3939 in)	10.05 mm (0.396 in)	
	Big end ID	18.00 mm (0.708 in)	18.04 mm (0.710 in)	
	Big end radial clearance	0.025 mm (0.001 in)	0.1 mm (0.004 in)	
	Big end axial clearance	0.55 mm (0.02 in)	1.1 mm (0.043 in)	
Crankshaft	Crank pin OD	17.984 mm (0.7080 in)	17.94 mm (0.7063 in)	
Camshaft	Cam height	21.10 mm (0.8307 in)	20.75 mm (0.8169 in)	
	Journal OD	12.184 mm (0.4797 in)	12.15 mm (0.4783 in)	
Crankcase	Camshaft journal OD	12.20 mm (0.4803 in)	12.25 mm (0.4823 in)	
Valve	Seat width	0.6 mm (0.024 in)	1.0 mm (0.039 in)	
	Valve clearance IN/EX	0.06–0.14 mm (0.002–0.006 in)	—	
	Valve stem OD	IN	5.49 mm (0.2161 in)	5.45 mm (0.215 in)
		EX	5.445 mm (0.2144 in)	5.40 mm (0.213 in)
Valve guide	ID	5.50 mm (0.216 in)	5.56 mm (0.219 in)	
Valve spring	Free length	27.1 mm (1.07 in)	25.0 mm (0.98 in)	

GENERATOR

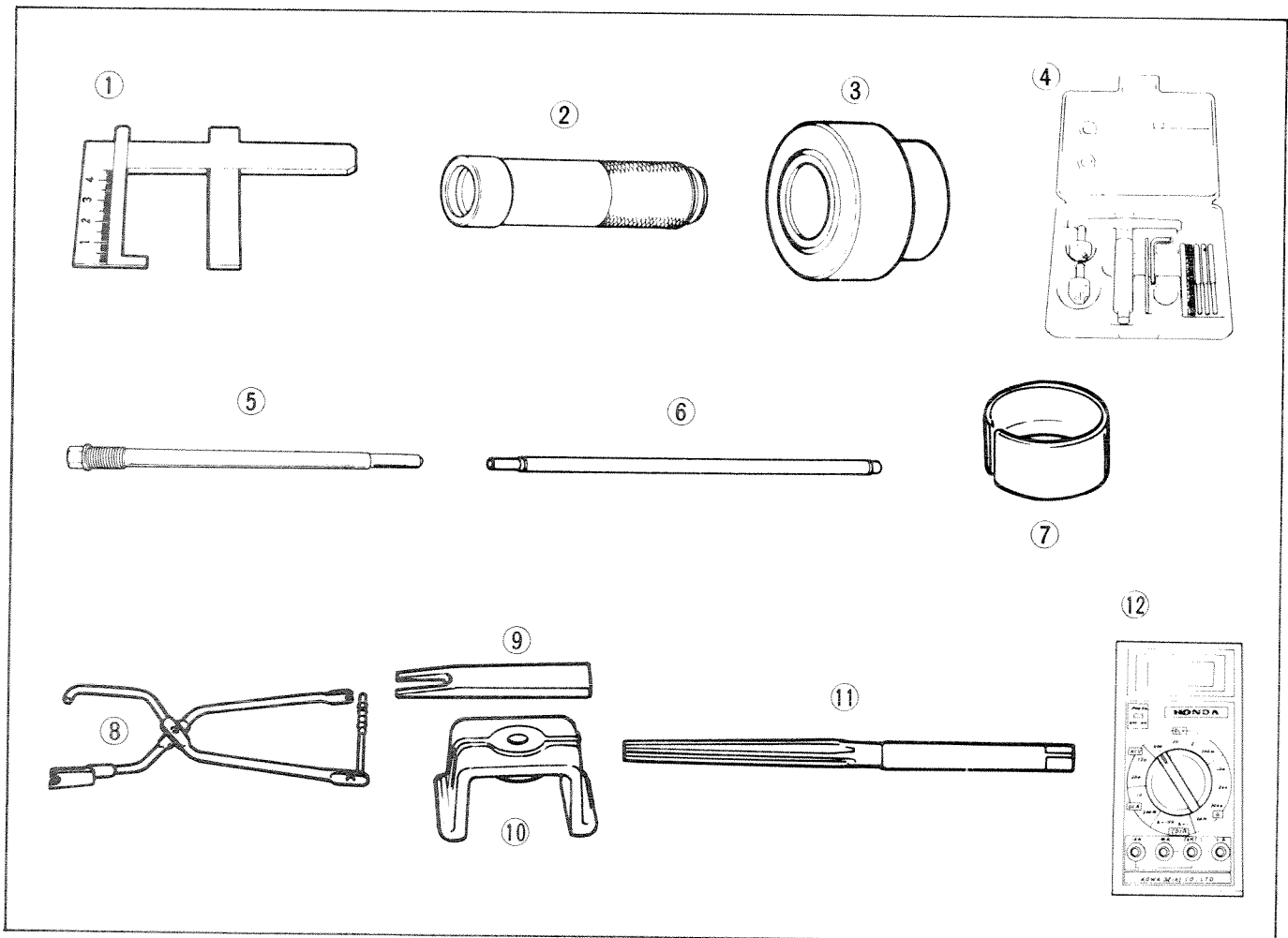
ITEM	STANDARD
Main winding (AC)	1.7–2.1Ω
Condenser winding	6.7–8.2Ω
Main winding (DC)	0.4–0.5Ω
Field winding (ROTOR)	14.9–18.2Ω

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5. SPECIAL TOOLS

Ref. No.	Tool No.	Tool name	Application
1	07401-0010000	Float level gauge	Carburetor float height measurement
2	07746-0030100	Driver	Crankshaft timing gear installation
3	07746-0030200	Attachment, 25 mm	(Use with 07746-0030200) Crankshaft timing gear installation
4	07780-P02000A	Valve seat cutter kit	(Use with 07746-0030100) Valve seat refacing
5	07933-8920001	Rotor puller	Rotor removal
6	07942-8920000	Valve guide driver	Valve guide removal & installation
7	Commercially available	Piston ring compressor	Piston installation
8	07956-8920000	Valve spring compressor (not available in USA) or commercially available spring compressor.	Valve removal & installation
9	07972-8120000	Valve holder	Tappet adjuster removal & installation
10	07975-8920000	Valve lapping guide or commercially available valve lapping guide.	Tappet adjuster lapping
11	07984-2000000	Valve guide reamer (5.5 mm)	Valve guide reaming
12	KS-AHM-32-003	Digital multimeter	Electrical testing



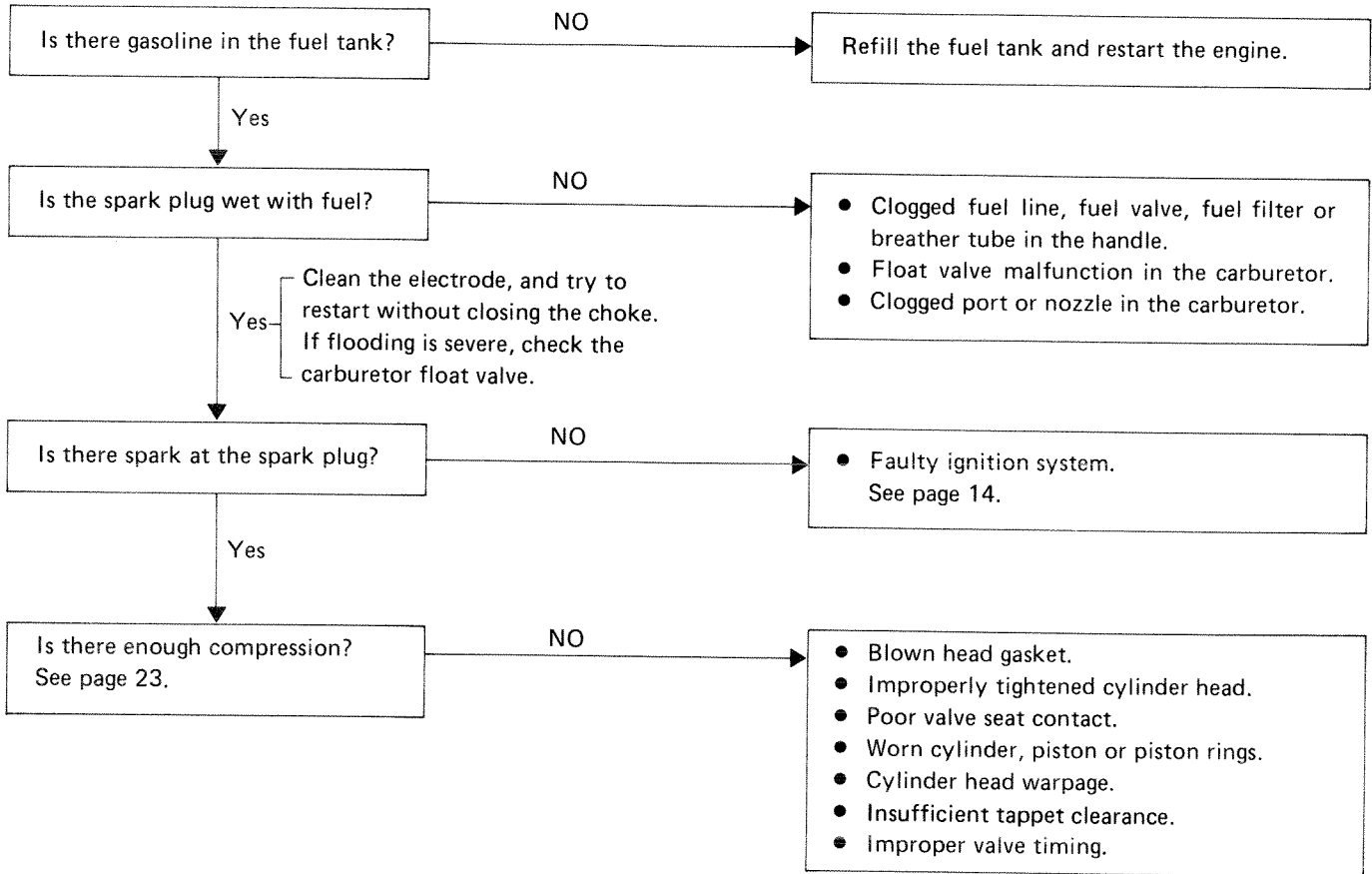
6. TORQUE VALUES

Tightening points	Thread diameter	Torque
Cylinder head	6 mm bolts, nuts	80–120 kg-cm (5.8–8.7 ft-lb)
Crankcase cover	6 mm bolts	80–120 kg-cm (5.8–8.7 ft-lb)
Connecting rod lower cap	5 mm bolts	40–60 kg-cm (2.9–4.3 ft-lb)
Carburetor	5 mm nuts	80–120 kg-cm (5.8–8.7 ft-lb)
Governor arm	6 mm bolt	40–80 kg-cm (2.9–5.8 ft-lb)
Flywheel	12 mm nut	450–550 kg-cm (33–40 ft-lb)
Generator rotor	8 mm bolt	200–280 kg-cm (14–20 ft-lb)
Generator stator	6 mm bolt	80–120 kg-cm (5.8–8.7 ft-lb)
Standard torque	5 mm bolts, nuts	40–70 kg-cm (2.9–5.1 ft-lb)
	6 mm bolts, nuts	80–120 kg-cm (5.8–8.7 ft-lb)
	8 mm bolts, nuts	200–280 kg-cm (15–20 ft-lb)
	10 mm bolts, nuts	350–400 kg-cm (25–29 ft-lb)

7. TROUBLESHOOTING

• ENGINE

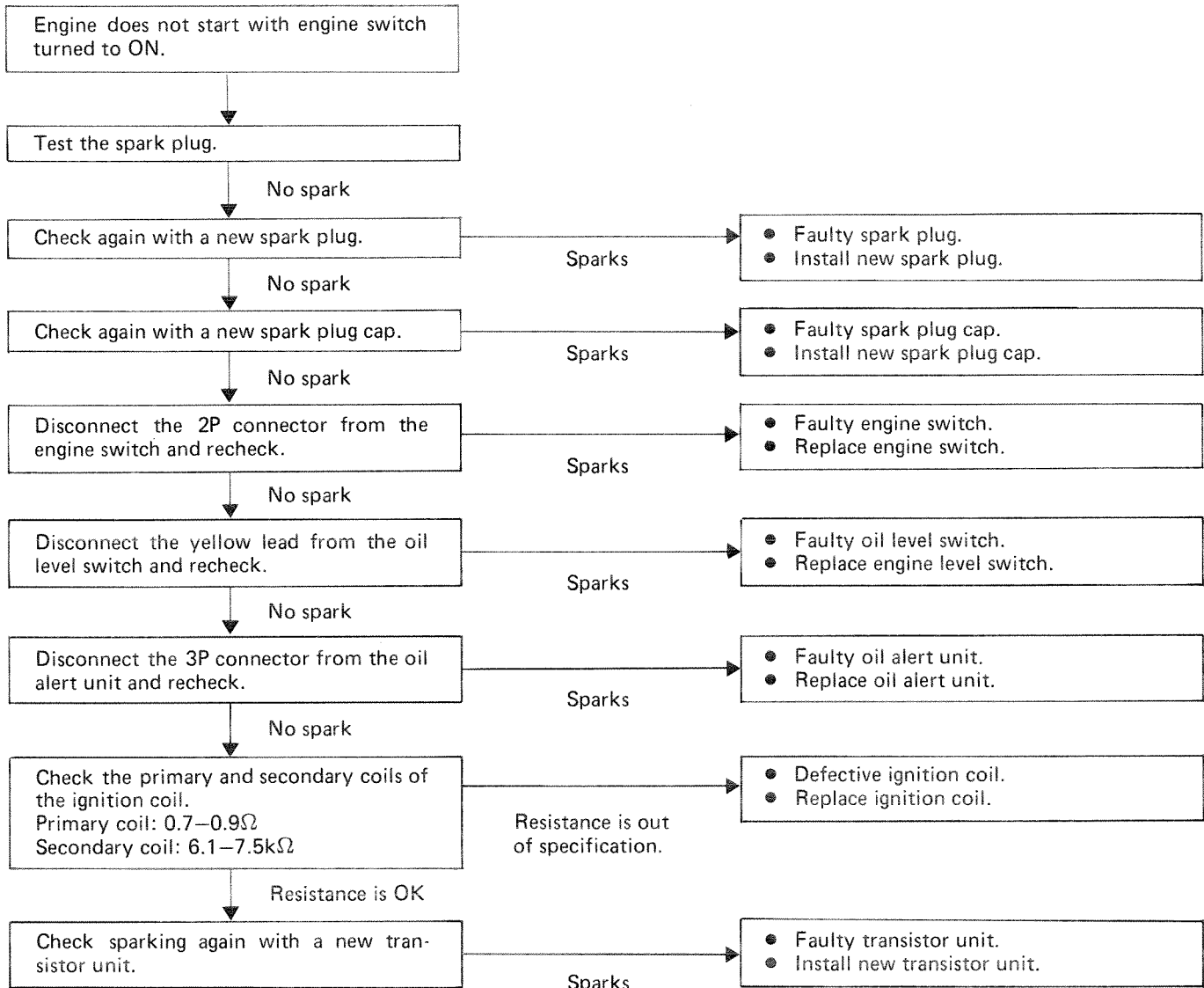
a. Engine will not start.



WARNING

- Gasoline is extremely flammable and explosive under certain conditions. Refuel in a well ventilated area with the engine stopped.
- Do not smoke or allow flames or sparks in the area where the generator is refueled or where gasoline is stored.
- Exhaust gas contains poisonous carbon monoxide. Never run the generator in an enclosed area. Be sure to provide adequate ventilation.

b. IGNITION SYSTEM

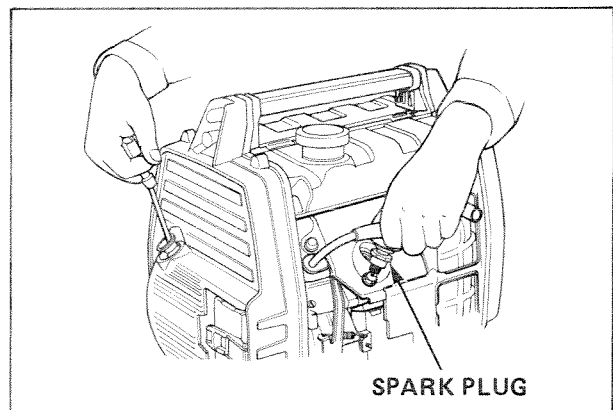


SPARK TEST

- 1) Remove the rear cover. Disconnect the spark plug cap, and remove the spark plug.
- 2) Attach the removed spark plug to the plug cap and ground the side electrode to the cylinder head cover as shown in the picture.
- 3) Turn on the engine switch, pull the recoil starter and check to see if sparks jump across the electrodes.

WARNING

- 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.
- Never hold the spark plug lead with wet hands while performing this test.



c. OIL ALERT SYSTEM

Engine does not stop when engine oil is insufficient (oil alert malfunctioning).

NOTE: Drain the oil. Remove the spark plug, attach the spark plug cap, and ground the plug against the engine, so you can see it sparks when you pull the starter.

Check continuity between the yellow and green wires at the oil alert 3P connector.

No continuity

Continuity

Make a connection between the green and black wires at the oil alert 3P connector. Pull the starter, and see if the spark plug fires.

Spark

- Black wire to the ignition coil is broken.
- Repair or replace wiring.

No spark

- Faulty oil alert unit.
- Replace oil alert unit.

Check continuity in the yellow wire between the oil alert unit and the oil level switch.

Continuity

- Faulty oil level switch.
- Replace oil level switch.

No continuity

- Yellow wire to the oil level switch is broken.
- Repair or replace wiring.

Warning lamp does not light up when oil alert is actuated.

- Pull the recoil starter with oil completely drained to be sure the oil alert system should actuate.
- Check the warning lamp. See page 32.

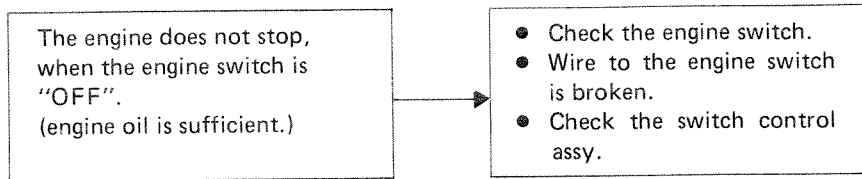
No light

- Lamp bulb burnt out.
- Replace the oil alert unit.

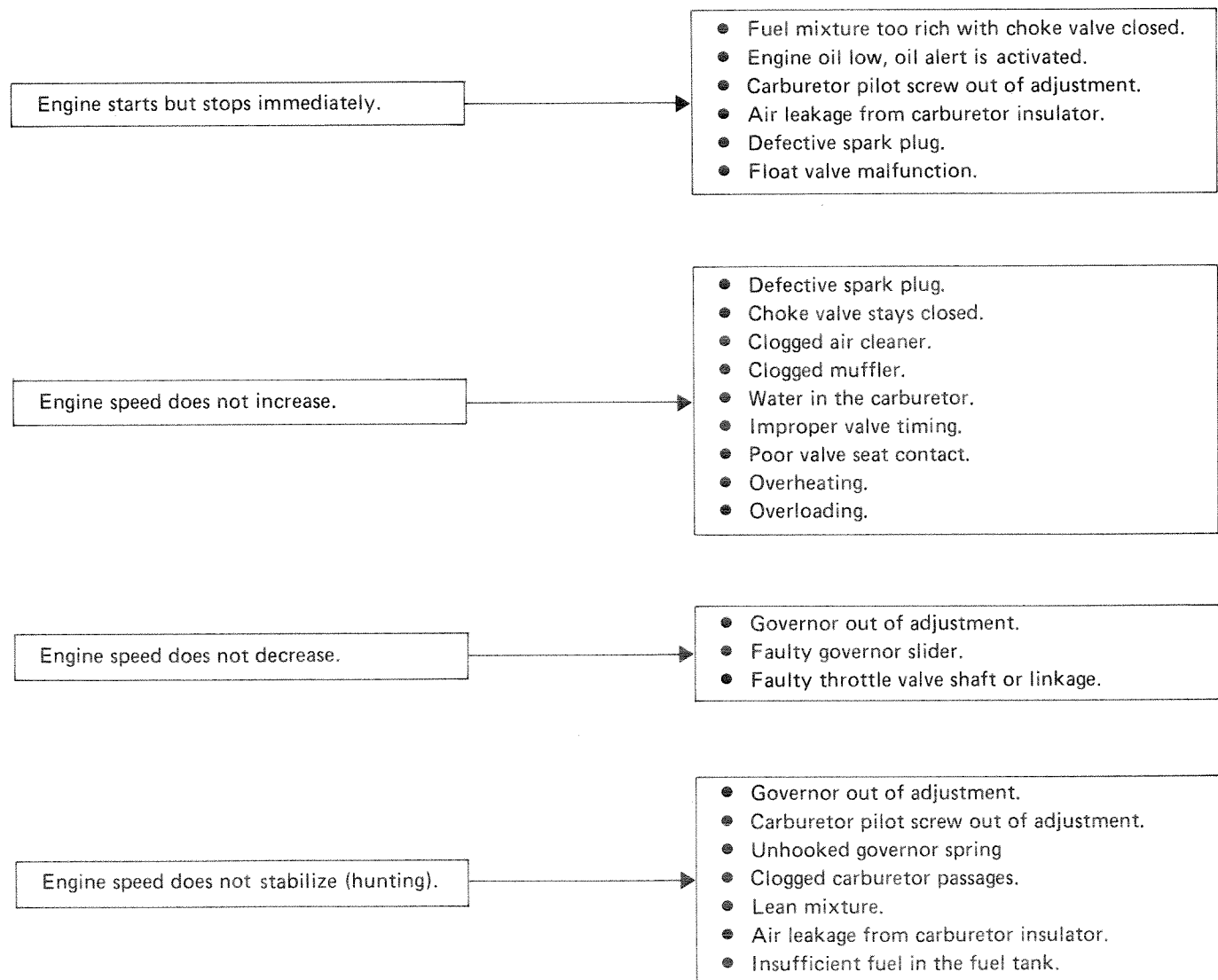
Warning lamp lights up when engine oil is sufficient.

Faulty generator rotor installation. See page 43.

d. ENGINE WILL NOT STOP



e. ABNORMAL ENGINE SPEED



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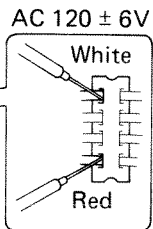
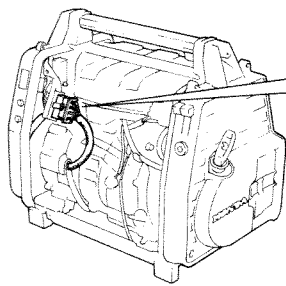
● GENERATOR

- A. No. or low AC output voltage.
NOTE: Is the AC circuit protector on?
Is the engine speed correct?
3,750 ± 50 rpm (No load)

Remove the rear cover.
Start the engine.

1. Is there AC output between the red and white wire leads at the 8P connector?

ENGINE
RUNNING
(No load)



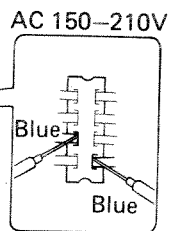
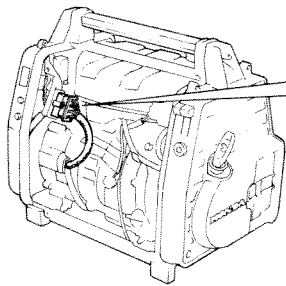
NORMAL
OUTPUT

Trouble exists in front panel.
Check receptacle, circuit protector
and each wire lead.

NO OR
LOW AC
OUTPUT

2. Is there AC output between two blue wire leads at the 8P connector?

ENGINE
RUNNING
(No load)



NORMAL
OUTPUT

Faulty stator main coil.
Stop the engine and disconnect the
8P connector. Measure the resistance
between the red and white wire leads
at the 8P connector.
1.7-2.1Ω
If the resistance is out of spec,
replace the stator.

NO OR
LOW AC
OUTPUT

See next page

⚠ WARNING

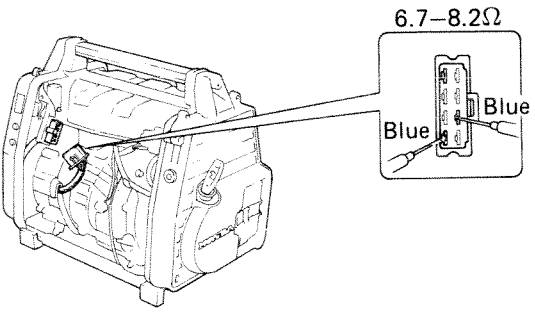
Exhaust gas contains poisonous carbon monoxide. Never run the generator in an enclosed area. Be sure to provide adequate ventilation.

Stop the engine.

Disconnect the 8P connector.

ENGINE STOPPED

3. How many ohms in the condenser winding?
Measure the resistance between the two blue wire leads at the 8P connector (Generator side).



6.7-8.2Ω

Blue Blue

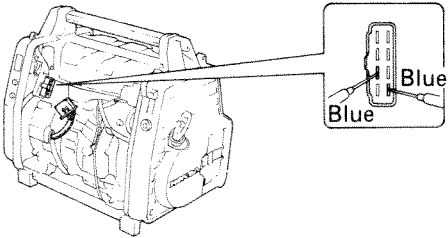
OUT OF SPEC.

Faulty condenser winding.
Replace stator.

NORMAL
RESIST-
ANCE

ENGINE STOPPED

4. Discharge the condenser by shorting across the two blue leads at the 8P connector (L. side panel side). Then check continuity between the two blue leads with a multimeter or ohmmeter in the 200KΩ range. The meter needle should deflect and return to infinity within a few seconds (if using a digital meter, the readout should run upscale to infinity).



Blue Blue

NO GOOD

Faulty condenser.
Replace condenser.

OK

Faulty rotor.
Replace rotor.

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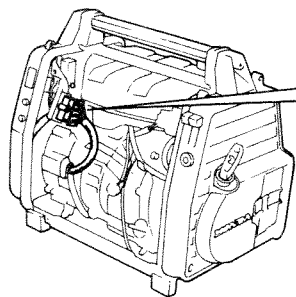
EM650

B. No or low DC output voltage.
NOTE: Is the DC circuit protector on?
Is the engine speed correct?
3,750 ± 50 rpm (No load)

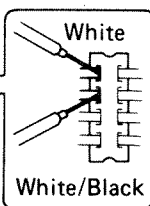
Remove the rear cover.
Start the engine.

1. Is there AC output between the white and white/black wire leads at the 8P connector?

ENGINE
RUNNING
(No. load)



AC 25-45V



NORMAL
OUTPUT

Trouble exists in front panel.
Check DC diode, circuit protector
and each wire lead.

NO OR
LOW AC
OUTPUT

Proceed to step 2 on page 17.

8. MAINTENANCE SCHEDULE

Periodic maintenance is an important factor in keeping the generator in the best operating condition. Service the unit in accordance with the maintenance schedule below.

CAUTION:

- Use only new genuine HONDA parts or their equivalent.
- The use of replacement parts which are not of equivalent quality may damage the engine.

REGULAR SERVICE PERIOD Performed at every indicated month or operating hour interval, whichever comes first.		Each use	First month or 20 Hrs.	Every 3 months or 50 Hrs.	Every 6 months or 100 Hrs.	Every year or 300 Hrs.
Item						
Engine oil	Check level	○				
	Change		○		○	
Air cleaner	Check	○				
	Clean			○*		
Spark plug	Clean-Readjust				○	
Spark arrester	Clean				○	
Valve clearance	Check-Readjust					○
Combustion chamber and valves	Clean-Relap					○
Fuel tank and strainer	Clean					○
Fuel line	Check (Replace if necessary)		Evey 3 years			

NOTE: *Service more frequently when used in dusty areas.

- | | |
|---------------------------|-----------------------|
| 1. ENGINE OIL | 6. COMBUSTION CHAMBER |
| 2. AIR CLEANER | 7. VALVES |
| 3. SPARK PLUG | 8. CARBURETOR |
| 4. MUFFLER/SPARK ARRESTER | 9. GOVERNOR |
| 5. CYLINDER COMPRESSION | 10. OIL ALERT |

1. ENGINE OIL

NOTE:

- Draining can be performed rapidly and completely while the engine is still warm.
- Check the oil alert system (P. 25) at the time the engine oil is to be changed.

- 1) Remove the oil filler cap.
- 2) Turn the engine switch OFF and tilt the generator to drain the oil.
- 3) Fill the crankcase with recommended engine oil to the edge of the oil filler neck. Reinstall the filler cap/dipstick.

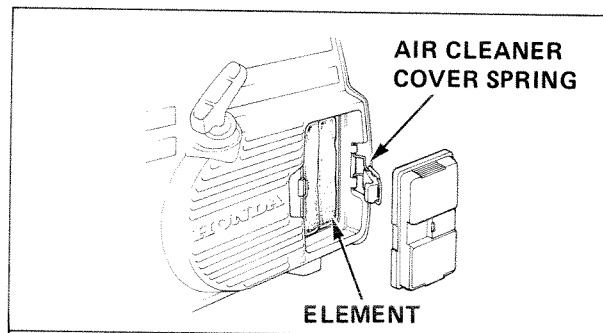
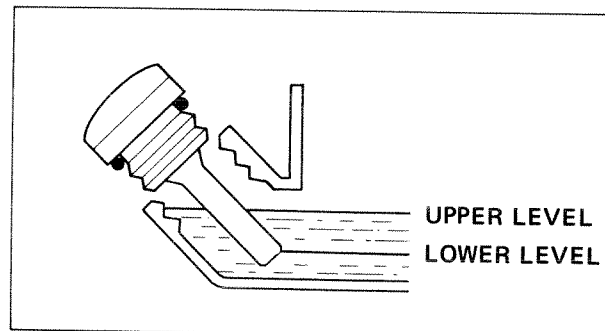
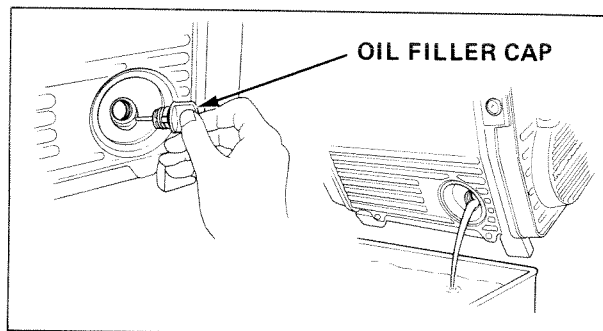
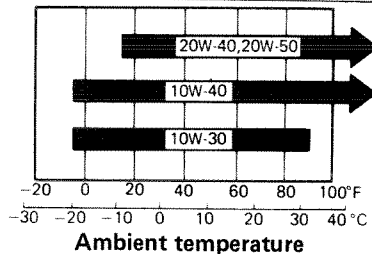
NOTE:

Be sure the generator is upright, not tilted, when checking the engine oil level.

RECOMMENDED ENGINE OIL:

SAE 10W-40 is recommended for general, all-temperature use; service classification SE or SF.

OIL CAPACITY:
0.35ℓ (0.37 US qt)

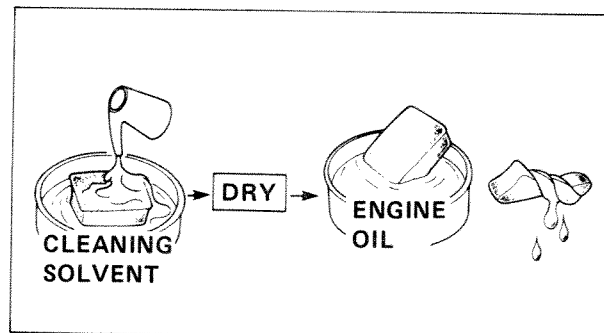


2. AIR CLEANER

- 1) Unsnap the air cleaner cover spring. Remove the cover and air cleaner element.
- 2) Wash the element in nonflammable or high flashpoint solvent and dry it thoroughly.
- 3) Soak the element in clean engine oil and squeeze out the excess oil.
- 4) Reinstall the air cleaner element and the cover.

CAUTION:

If the element or the cover is not securely reattached, dust will enter and cause engine wear.



3. SPARK PLUG

- 1) Open the spark plug cover, and remove the spark plug cap.
- 2) Clean any dirt from around the spark plug base.
- 3) Use the wrench supplied in the tool kit to remove the spark plug.
- 4) Visually inspect the spark plug. Discard it if the insulator is cracked or chipped. Clean the spark plug with wire brush if it is to be reused.
- 5) Measure the plug gap with a feeler gauge.
The gap should be 0.6–0.7 mm (0.024–0.028 in). Adjust as necessary by carefully bending the side electrode.
Recommended spark plug: BMR-4A (NGK)
W14MR-U (ND)
- 6) Make sure the sealing washer is in good condition, and with the washer attached, screw the spark plug in by hand to prevent cross-threading.
- 7) After the spark plug is seated, tighten with the 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 1/8–1/4 turn after the spark plug seats to compress the washer.

CAUTION:

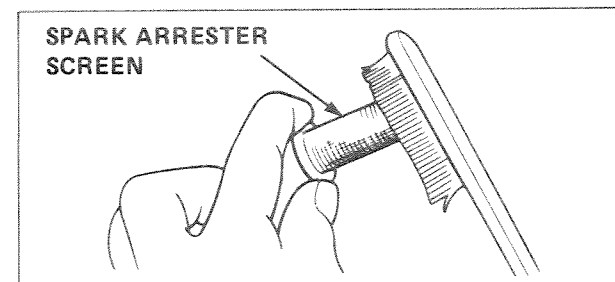
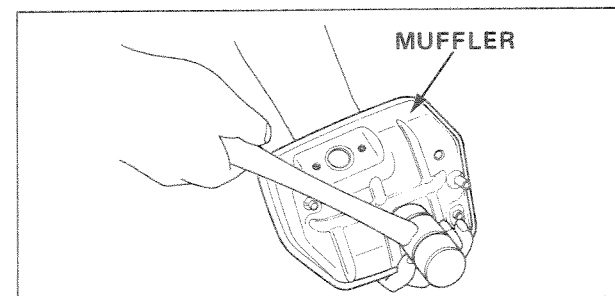
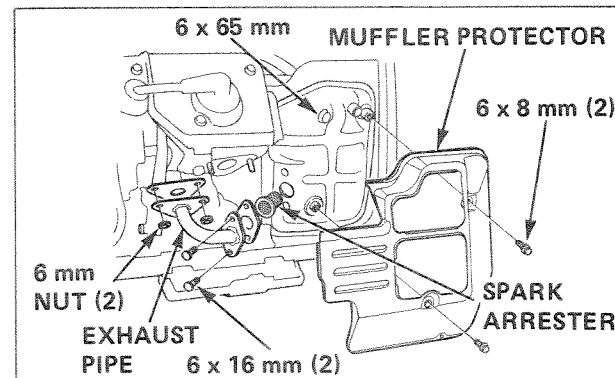
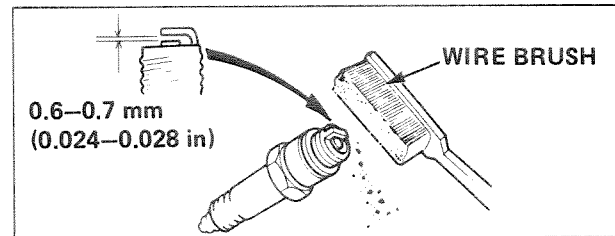
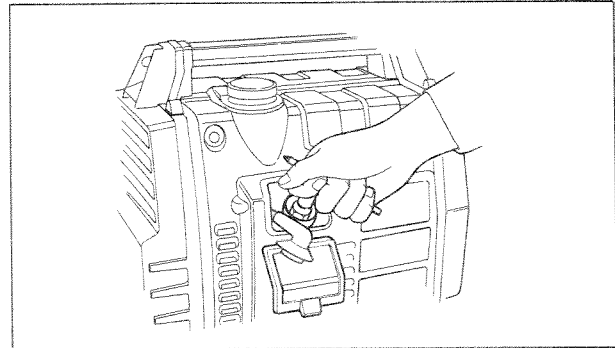
- The spark plug must be securely tightened. An improperly tightened plug can become very hot and possibly damage the generator.
- Never use a spark plug with an improper heat range.

4. MUFFLER/SPARK ARRESTER

WARNING

If the generator has been running, the muffler will be very hot. Allow it to cool before proceeding.

- 1) Remove the four 5 mm screws from the rear cover, remove the fuel tank cap, then remove the rear cover. Reinstall the fuel tank cap.
- 2) Remove the two 6 mm bolts from the muffler protector, and remove the muffler protector.
- 3) Remove the two 6 mm nuts and two 6 mm bolts from the exhaust pipe, and remove the exhaust pipe.
- 4) Remove the 6 mm bolt from the muffler, and remove the muffler. Remove the spark arrester screen from the muffler. Be careful not to damage the spark arrester screen.
- 5) Use a brush to remove carbon deposits from the spark arrester screen. Inspect the screen for breaks or tears, and replace it if necessary.
- 6) Loosen carbon deposits in the muffler by tapping all around it with a plastic hammer, and shake the loose carbon from the muffler.
- 7) Inspect the muffler gasket, and replace if damaged. Reinstall the parts in the reverse order of disassembly.

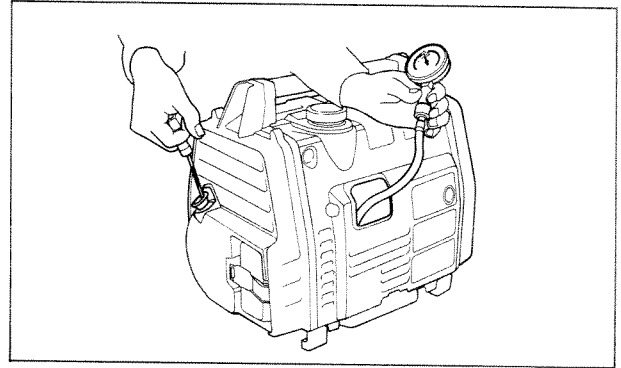


5. CYLINDER COMPRESSION

- 1) Open the spark plug cover.
- 2) Install a compression gauge in the spark plug hole.
- 3) Operate the recoil starter until the highest reading is reached.

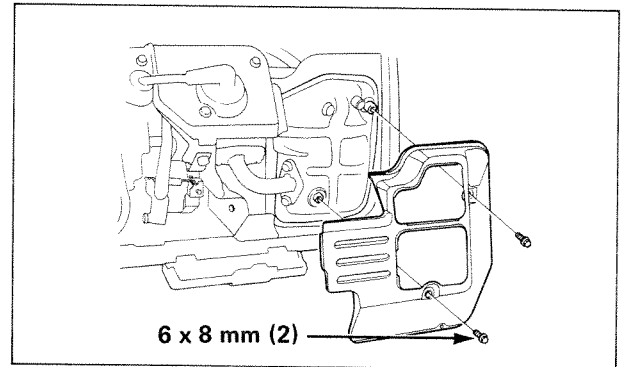
Cylinder compression	6.0 kg-cm ² (85 psi)
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- 4) Remove the compression gauge, reinstall the spark plug, and close the spark plug cover.

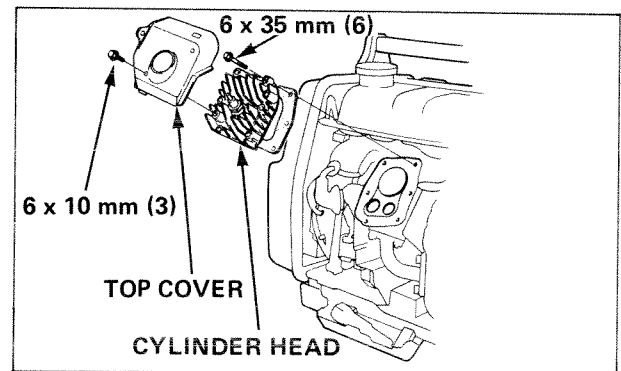


6. COMBUSTION CHAMBER

- 1) Remove the rear cover, two 6 x 8 mm bolts, and the muffler protector.



- 2) Remove the spark plug cap, three 6 x 10 mm flange bolts and the top cover.
- 3) Remove six 6 x 35 mm flange bolts and the cylinder head.

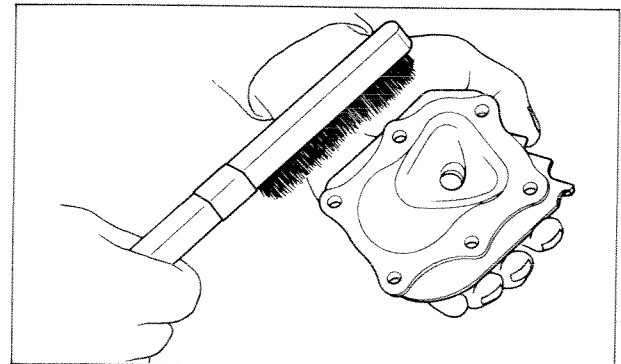


- 4) Remove the carbon from the cylinder head with a wire brush.

CAUTION:

- Do not scratch the surface of the cylinder head.
- Tighten the cylinder head bolts in the sequence shown.

Cylinder head bolt torque	80–120 kg-cm (5.8–8.7 ft-lb)
---------------------------	------------------------------



7. VALVES

- 1) Remove the front and rear cover.
Remove two 6 x 8 mm bolts, and the muffler protector.
P. 28
- 2) Remove R. and L. side panels, four 6 mm nuts, and the bottom cover. P. 30, 31
- 3) Remove two 6 x 16 mm bolts, and 6 x 10 mm bolt. Remove the exhaust pipe separator and the frequency adjuster together.
- 4) Remove three 5 x 10 mm bolts, and the tappet cover.
- 5) With the engine cold and the piston at TDC on its compression stroke, measure the valve clearance.

Standard valve clearance	0.06–0.14 mm (0.002–0.006 in)
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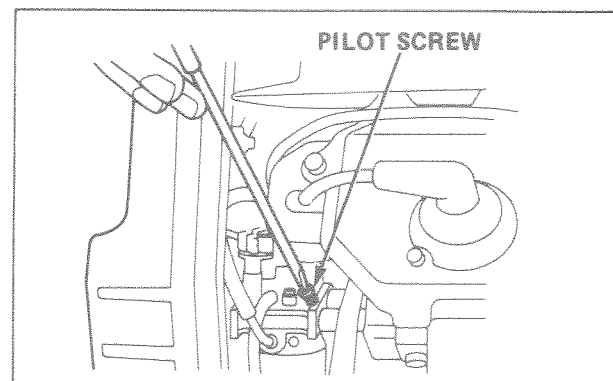
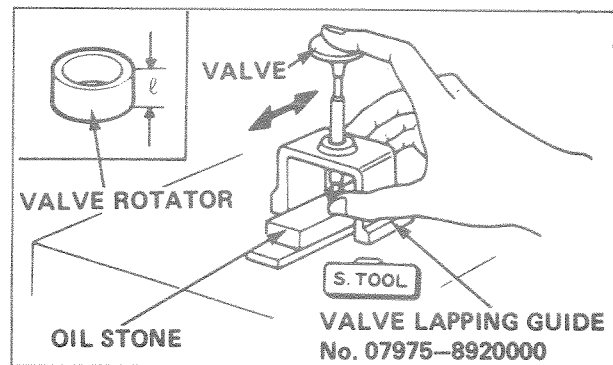
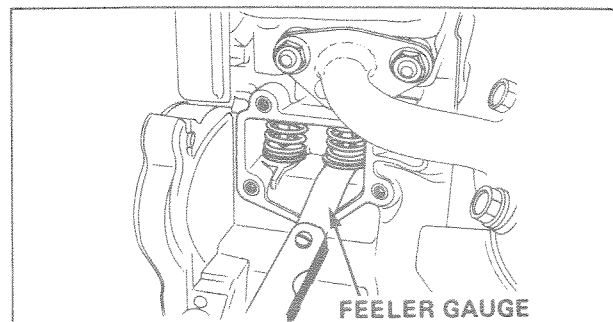
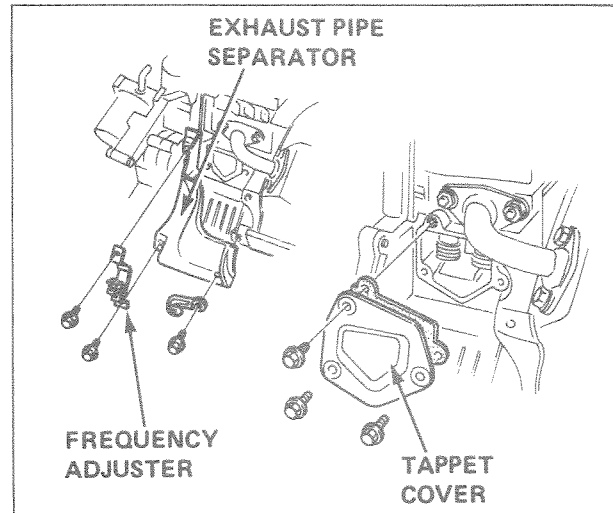
- 6) If the clearance is out of the standard range, replace the valve rotator with the correct one following this procedure:
 - a. Note the present clearance.
 - b. Remove the valve rotator and measure its height (ℓ).
 - c. Add the measurements from steps a. and b. together and subtract 0.10 mm (0.004 in) — The median standard valve clearance.
 - d. From the table below, select the valve rotator whose height (ℓ) is the closest to the value obtained in step c. above.

Part No.	ℓ
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)

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

8. CARBURETOR

There is no idle adjustment on this carburetor. Adjust the pilot screw by turning it in until it bottoms lightly, and then screwing it out 3/4 turns.

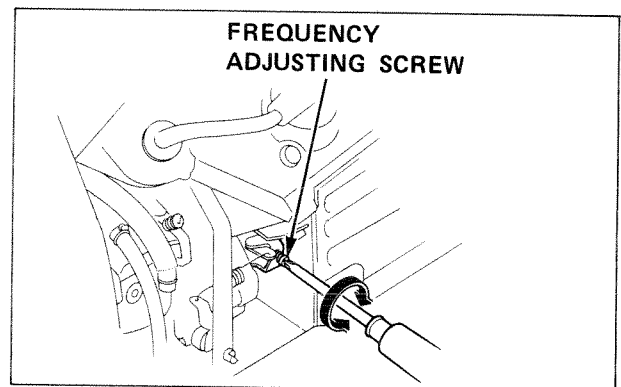
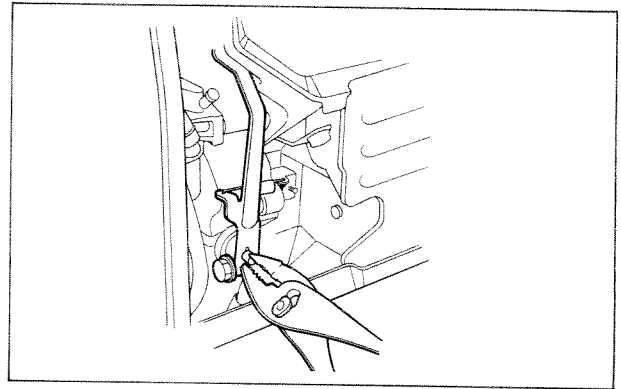


9. GOVERNOR

- 1) Loosen the governor arm pinch bolt, and check that the governor arm is holding the throttle fully open.
- 2) With the governor arm in the full throttle position, turn the governor arm shaft in the full throttle direction as far as it will go, and tighten the pinch bolt.
- 3) Start the engine and allow it to warm up fully. Connect a 550W load (Rated load) to the generator, and adjust the frequency adjusting screw to maintain a 60 Hz frequency.

NOTE:

If a 550W load is not available, maximum speed can be adjusted with no load connected to the generator by setting the frequency adjusting screw with the engine running at $3,750 \pm 50$ rpm.



10. OIL ALERT

NOTE:

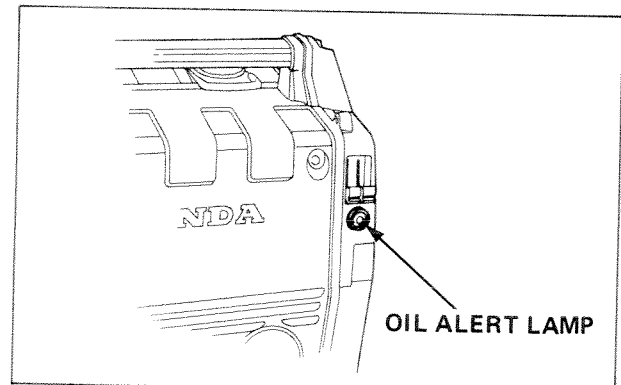
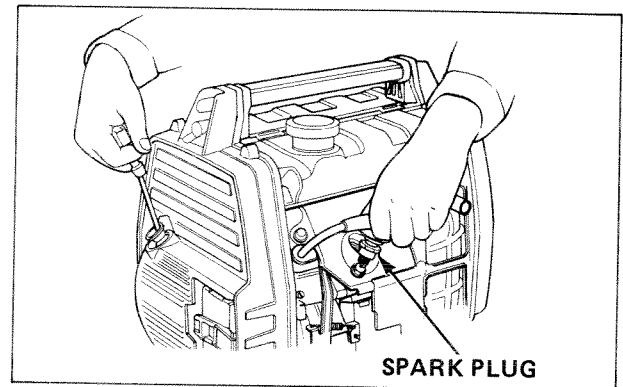
For convenience, perform this test in conjunction with the engine oil change (P.21).

- 1) Remove the rear cover and the spark plug. Attach the spark plug to the plug cap, and ground the side electrode against the cylinder head cover.
- 2) With the oil completely drained from the crankcase, move the engine switch to the ON position, and operate the recoil starter.

When operating the recoil starter, the oil alert lamp should flash, and there should be no spark at the spark plug. If the oil alert system does not operate properly, refer to the troubleshooting chart on page 15.

WARNING

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



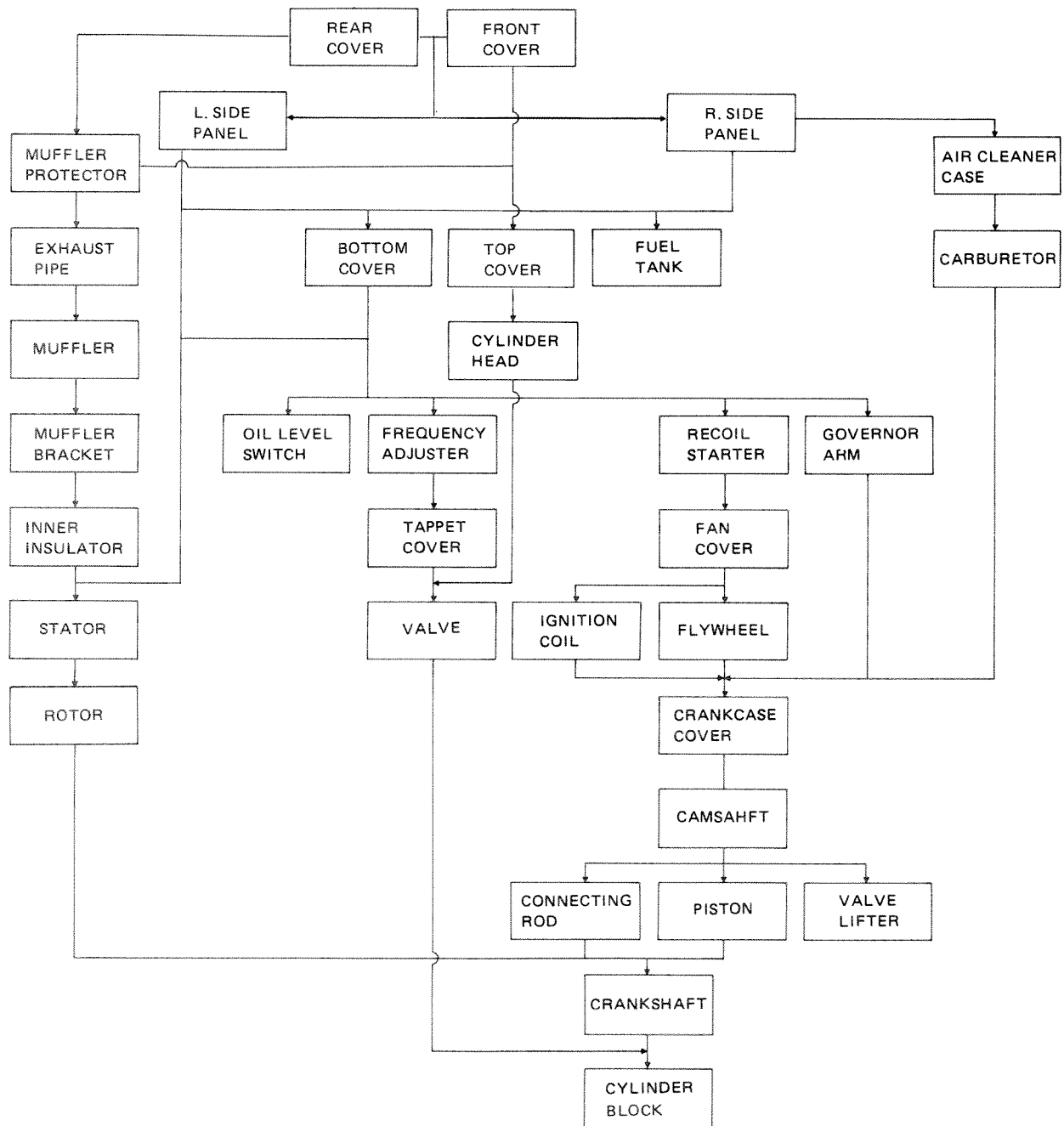
NOTE



- | | |
|------------------------------------|--|
| 1. DISASSEMBLY CHART | 6. FLYWHEEL/IGNITION COIL |
| 2. COVERS/PANELS/FUEL TANK | 7. STATOR/ROTOR |
| 3. MUFFLER | 8. CRANKCASE COVER/CYLINDER HEAD/VALVE |
| 4. AIR CLEANER/CARBURETOR GOVERNOR | 9. PISTON/CRANKSHAFT/ CYLINDER BLOCK |
| 5. RECOIL STARTER/FAN COVER | |

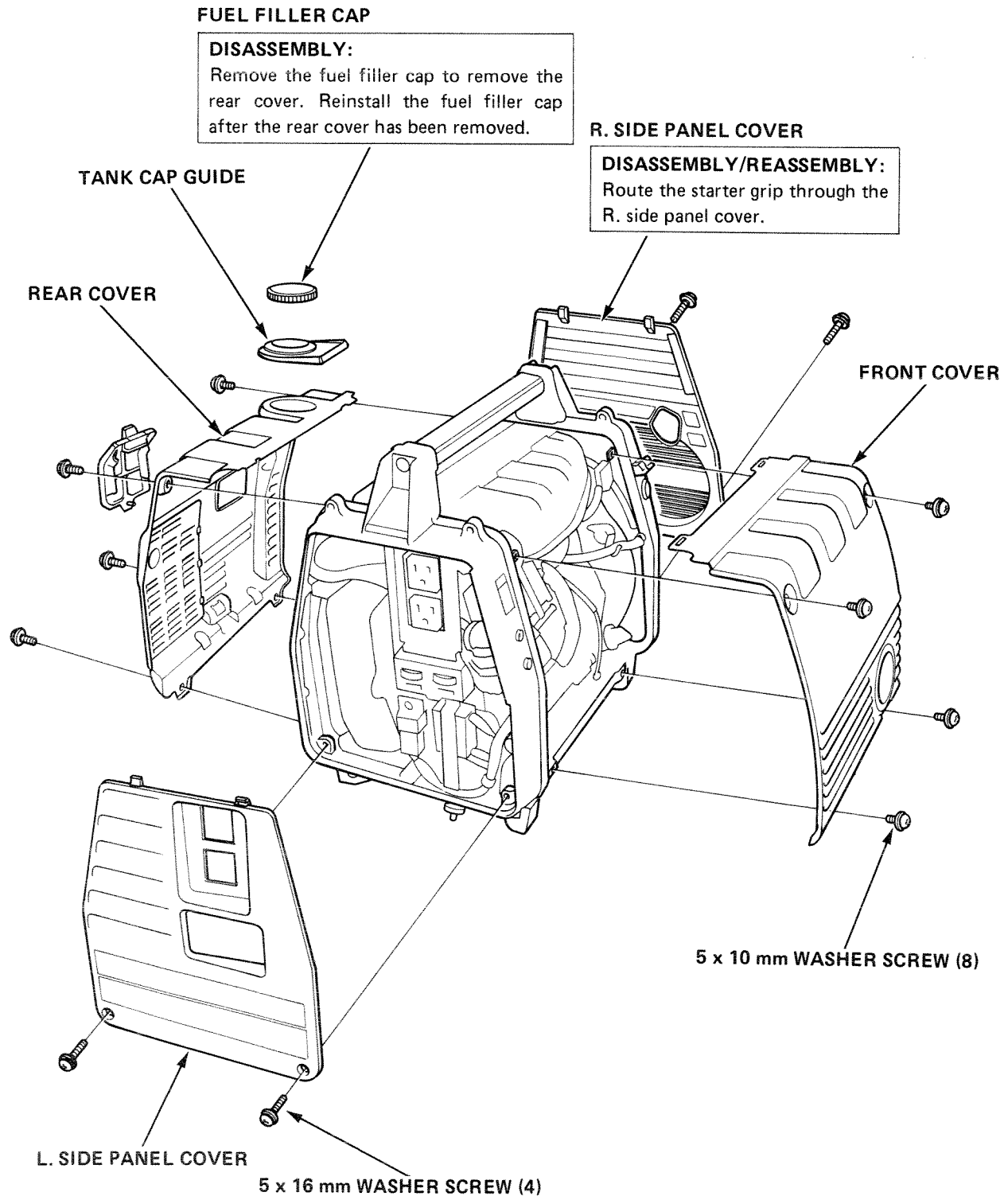
1. DISASSEMBLY CHART

Arrows indicate the disassembly sequence.



2. COVERS/PANELS/FUEL TANK

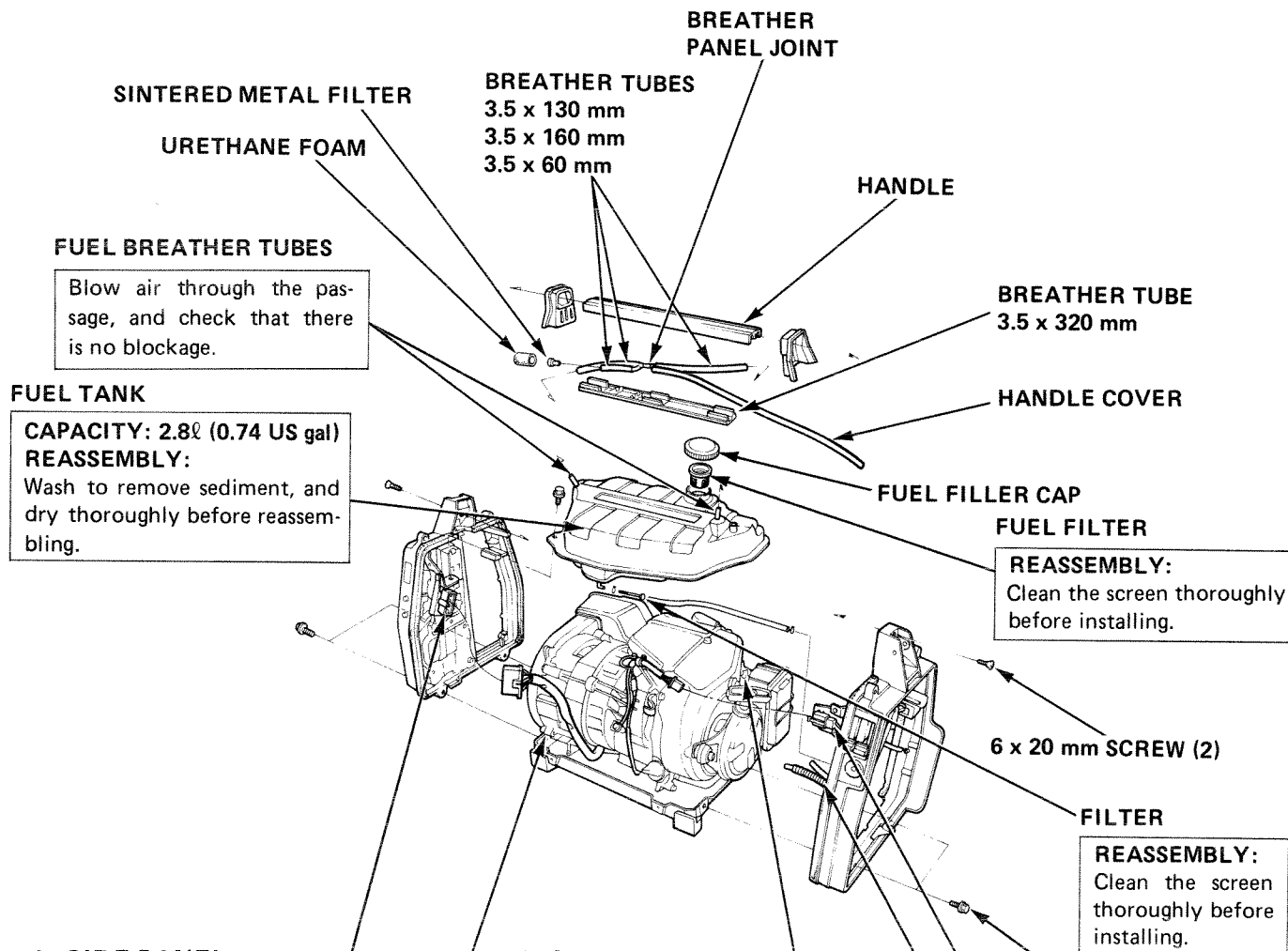
a. DISASSEMBLY/REASSEMBLY



HONDA

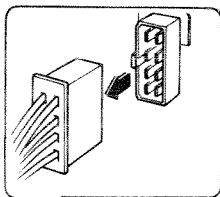
EM650

• R.L. SIDE PANELS · FUEL TANK

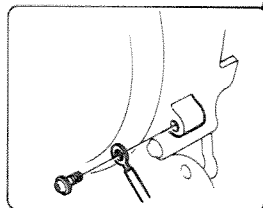


• L. SIDE PANEL REMOVAL

- 1) Disconnect the 8P connector from L. side panel.

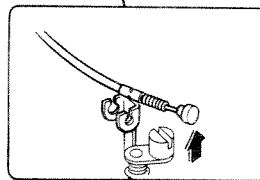


- 2) Remove the screw from the panel on the generator side, and disconnect the ground wire.

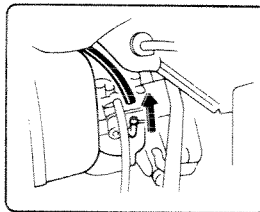


• R. SIDE PANEL REMOVAL

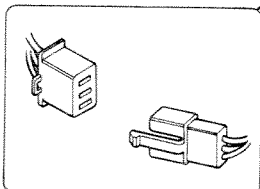
- 1) Remove the choke cable from the carburetor.



- 2) Turn the engine switch off, and disconnect the fuel tube from the carburetor.

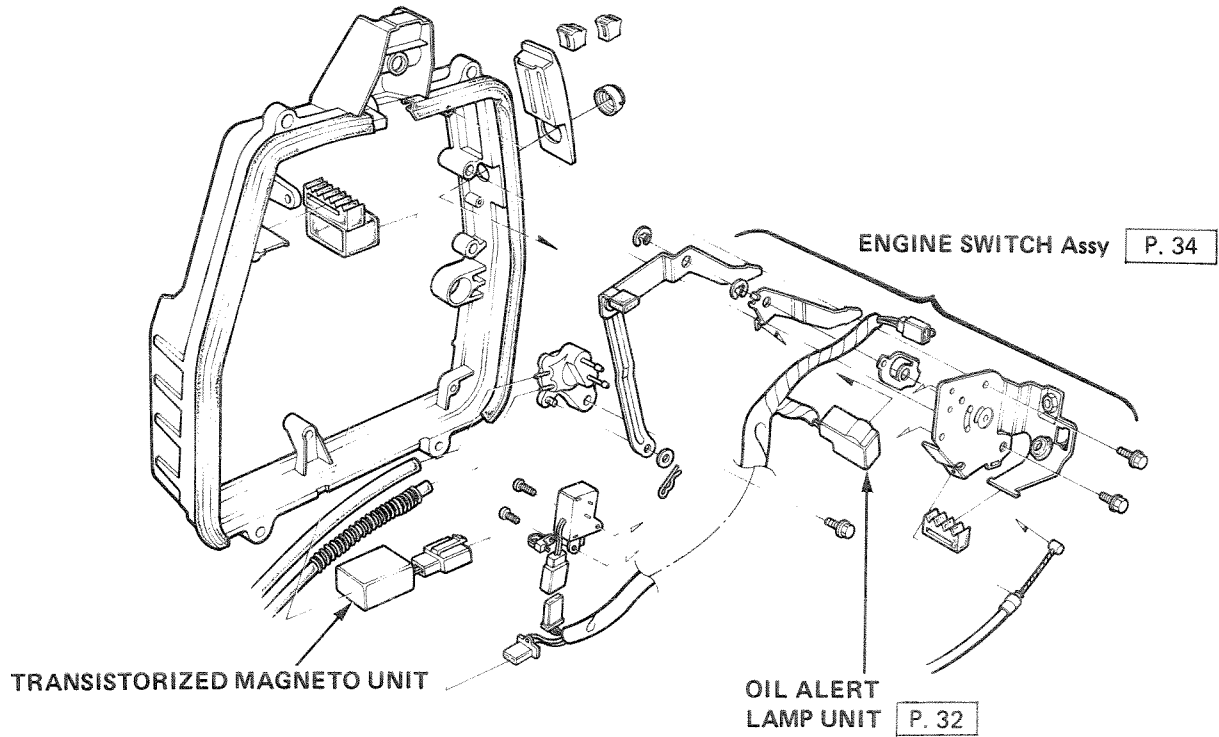


- 3) Disconnect the 3P connector.

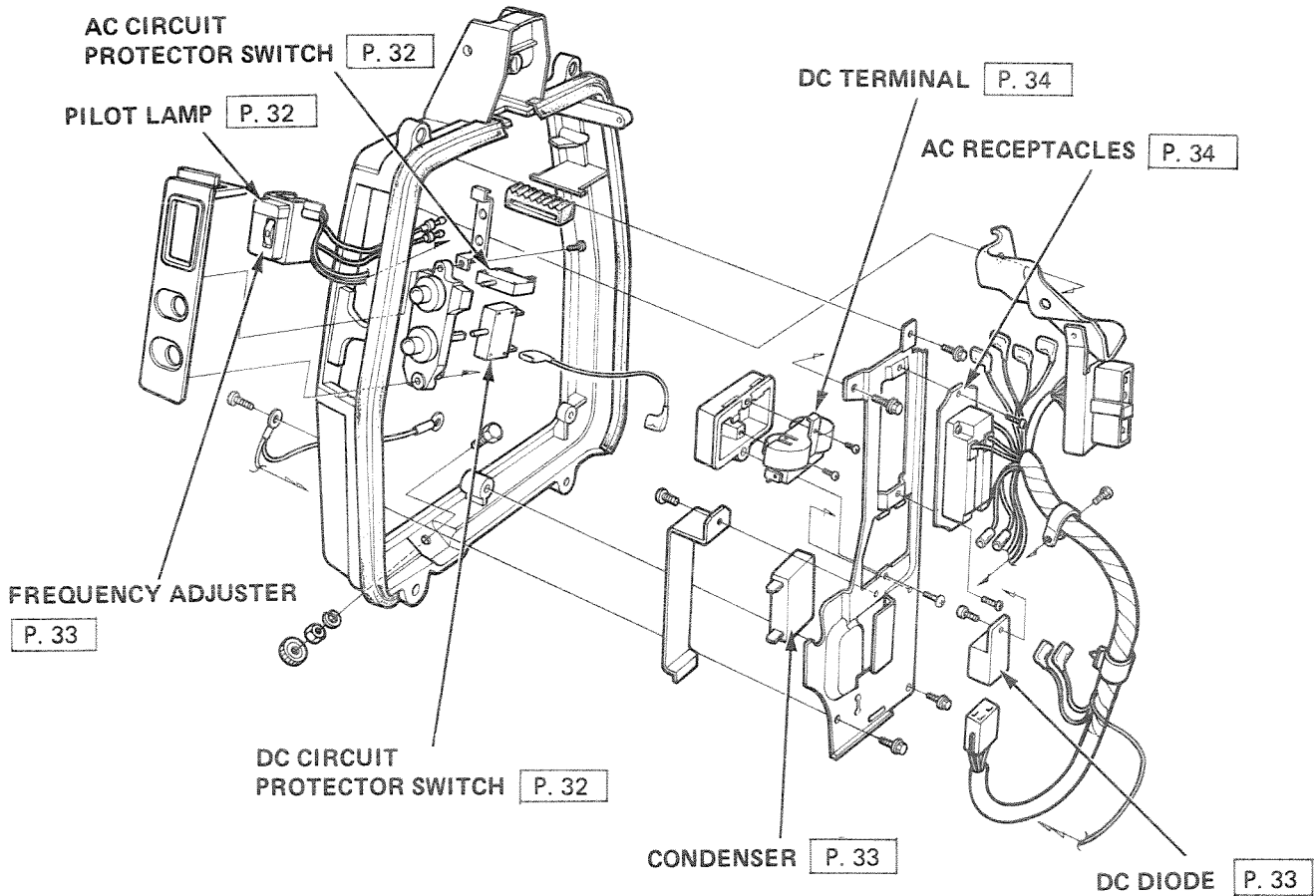


6 x 20 mm (4)

● R. SIDE PANEL



● L. SIDE PANEL



HONDA

EM650

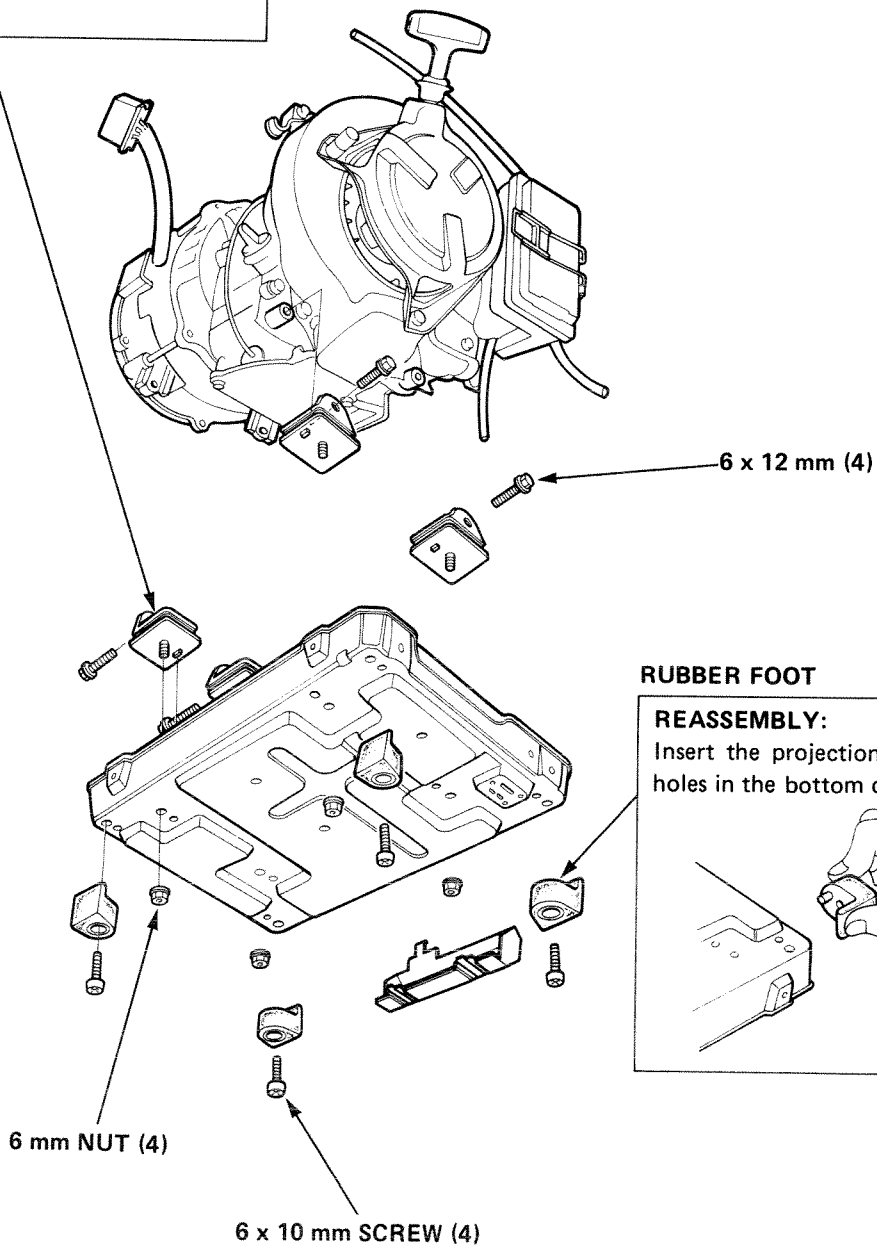
• BOTTOM COVER

RUBBER MOUNT(4)

REASSEMBLY:

These are interchangeable.

First install them on the generator with four 6 x 12 mm flange bolts. Leave bolts loose at this time. Install the bottom cover on the generator with four 6 mm nuts. Be sure that the projections on rubber mounts are inserted in the holes in the bottom cover.



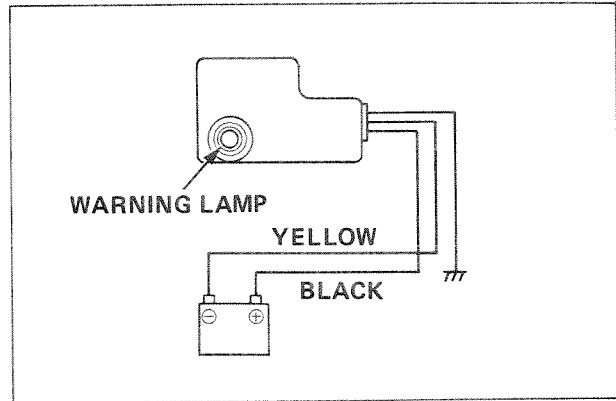
b. INSPECTION

● OIL ALERT LAMP UNIT

Connect a 6V battery between the black and yellow lead with the positive terminal to the black lead and negative terminal to the yellow lead.

CAUTION:

Do not use a battery of more than 6V, or the bulb may burn out.

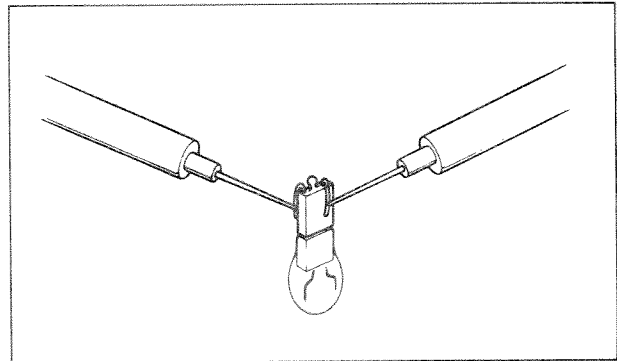


● PILOT LAMP

- 1) Remove the bulb from the lamp socket and check it for continuity. If there is none, replace the bulb.

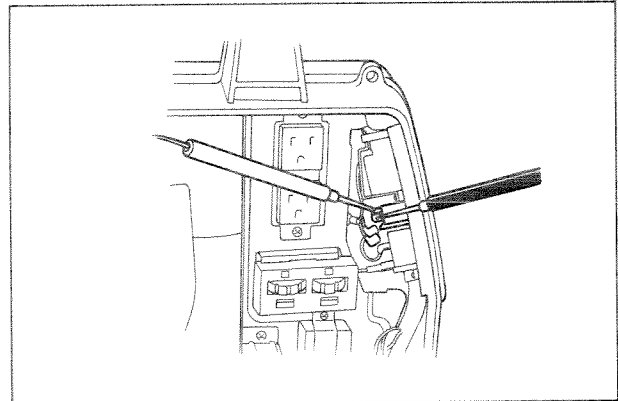
Recommended bulb	6V-0.9W
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- 2) If the bulb is normal, and there is no continuity between the yellow and gray terminals, the lead is broken.



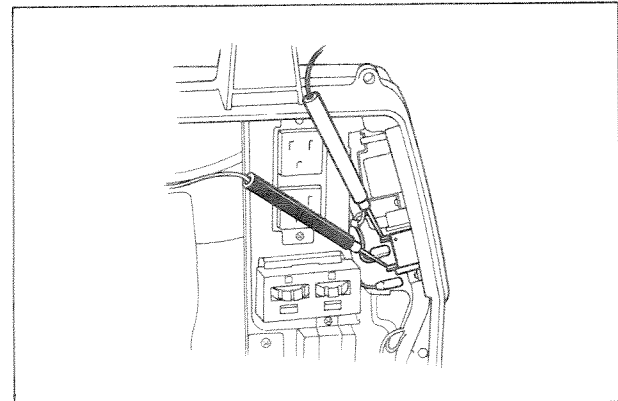
● AC CIRCUIT PROTECTOR

There should be continuity between both terminals.



● DC CIRCUIT PROTECTOR

There should be continuity between both terminals.



HONDA

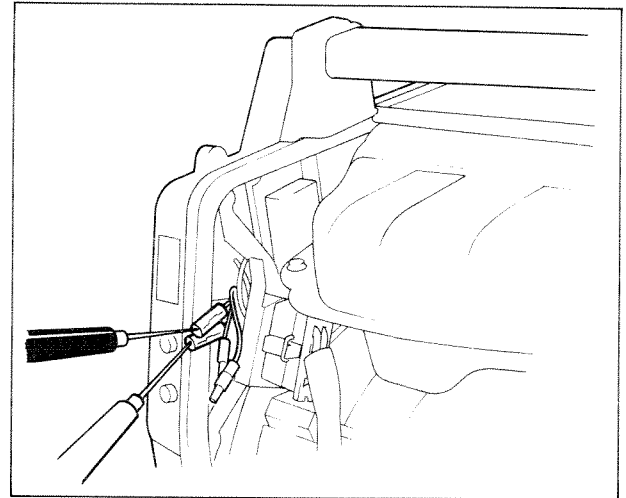
EM650

● FREQUENCY METER

Using an ohmmeter, measure the resistance between the yellow and gray leads.

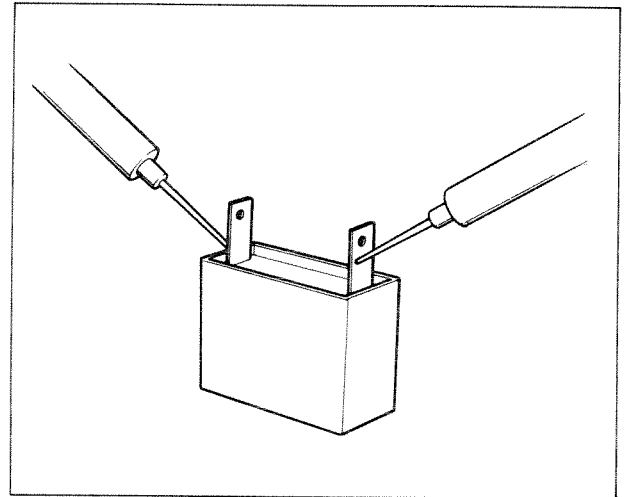
Specified resistance	150–190K Ω
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If the resistance is ZERO or infinity, replace the frequency meter.



● CONDENSER

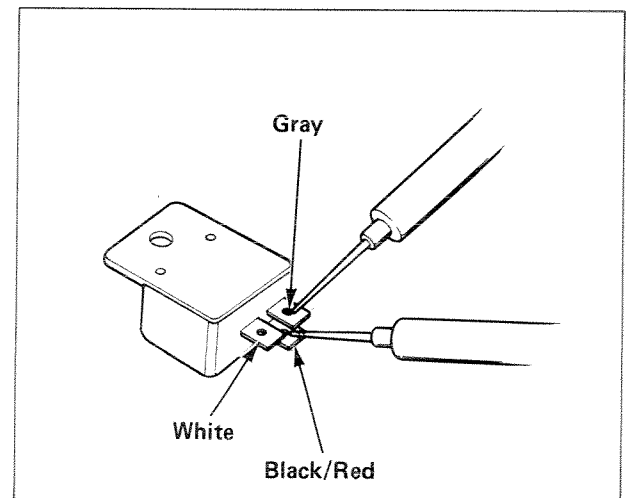
Discharge the condenser by shorting across the terminals. Then check continuity between the terminals, using a multimeter or ohmmeter in the 200K Ω range. The meter needle should deflect and return to infinity within a few seconds (if using a digital meter, the readout should run upscale to infinity).



● DC DIODE

Using a digital multimeter in the CDI Ω RX1 range, measure the resistance between the diode terminals.

\ominus / \oplus	Black/Red	Gray	White
Black/Red		17 Ω	18 Ω
Gray	∞ (Infinity)		∞ (Infinity)
White	∞ (Infinity)	∞ (Infinity)	



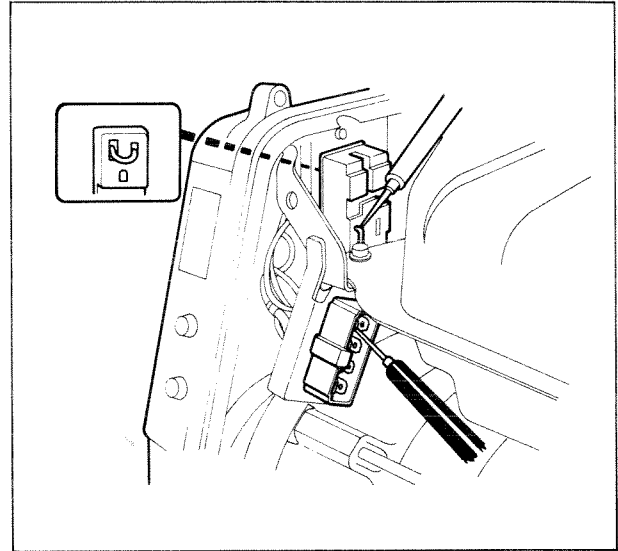
● TRANSISTOR UNIT

Follow the troubleshooting procedure on page 14.

● AC RECEPTACLE

Connect the terminals of the receptacle with a piece of wire as shown.

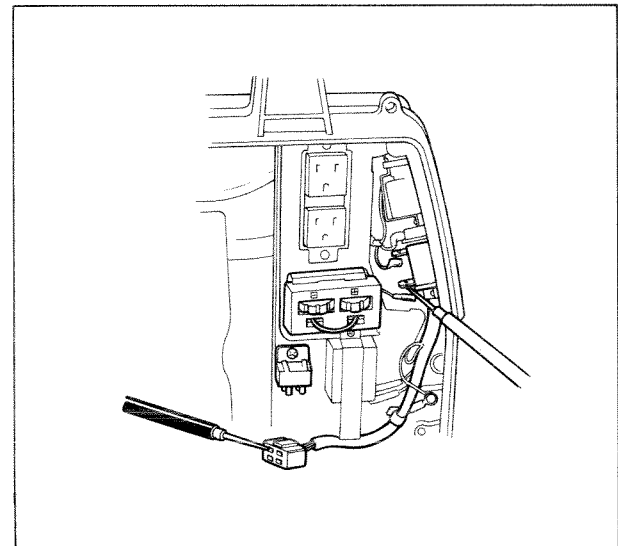
Check continuity between the red and white leads of the 8P connector. There should be continuity.



● DC TERMINALS

Connect the DC terminals with a piece of wire as shown.

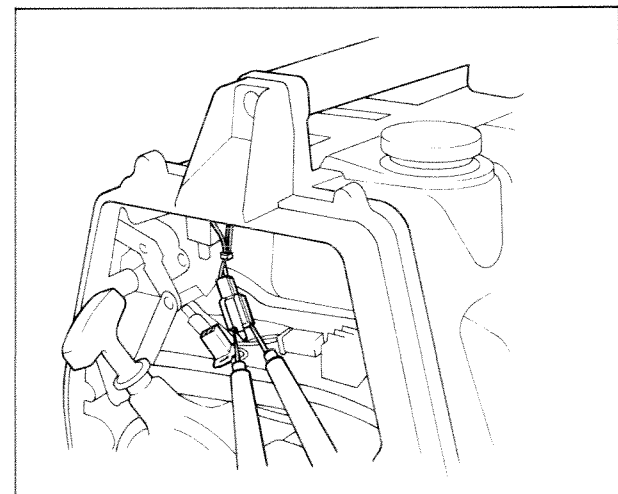
Check continuity between the black/red lead of the 4P connector and the white/red lead of the (+) terminal. There should be continuity.



● ENGINE SWITCH

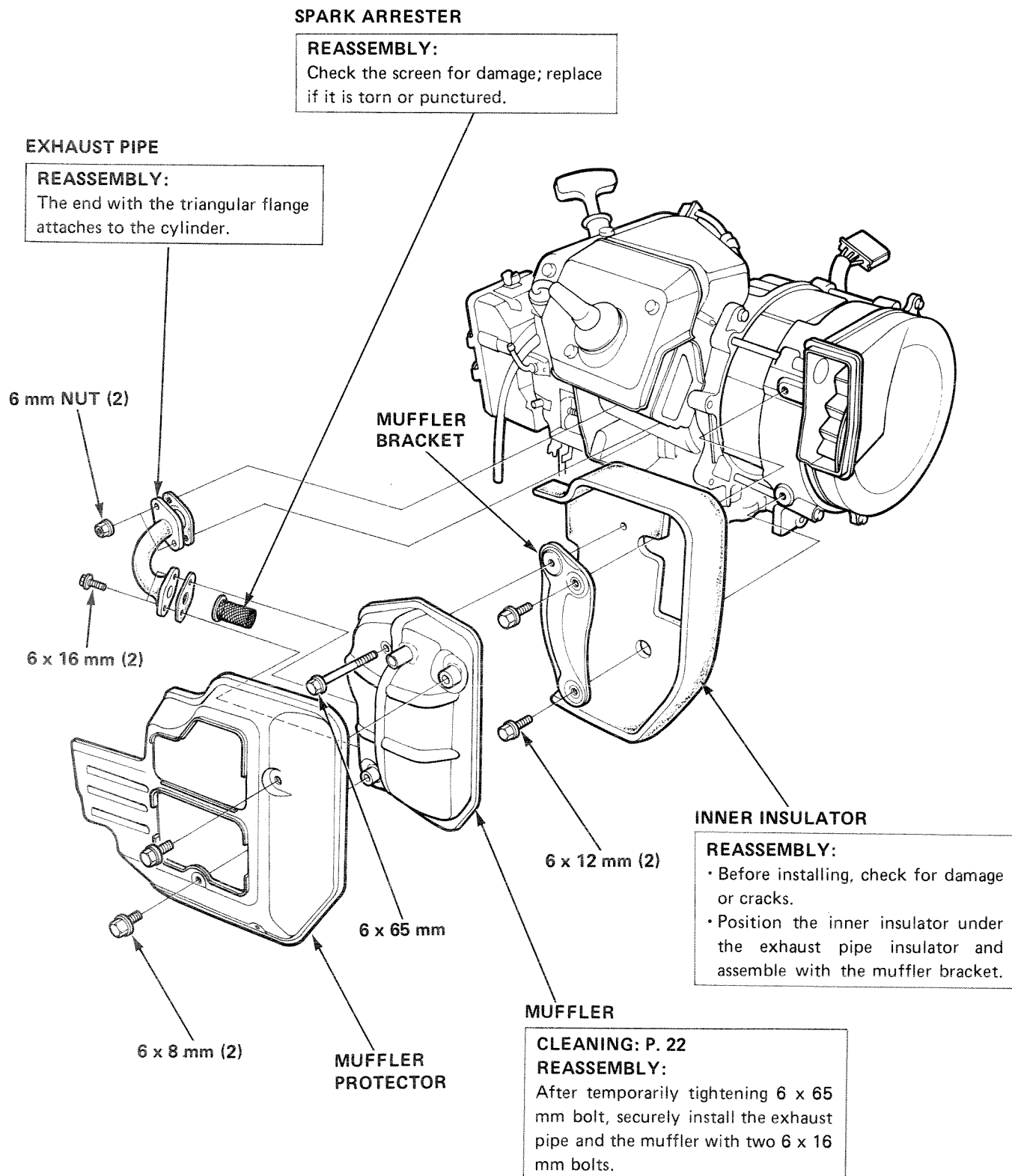
Check continuity between both leads of the 2P connector.

ENGINE SWITCH	ON (engine switch lever up)	OFF (engine switch lever down)
Continuity	No	Yes



3. MUFFLER

a. DISASSEMBLY/REASSEMBLY



4. AIR CLEANER/CARBURETOR/GOVERNOR

AIR CLEANER CASE

REASSEMBLY:

Connect the breather tube into the air cleaner case hole.

6 mm NUT (2)

80–120 kg-cm
(5.8–8.7 ft-lb)

AIR CLEANER
ELEMENT

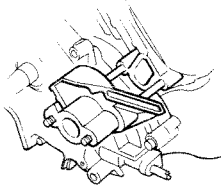
AIR CLEANER
COVER

AIR VENT TUBE

CARBURETOR INSULATOR

REASSEMBLY:

Note installation direction.
Set the rib of insulator inside the top cover.



GOVERNOR ARM

REASSEMBLY:

After installing, readjust the frequency.

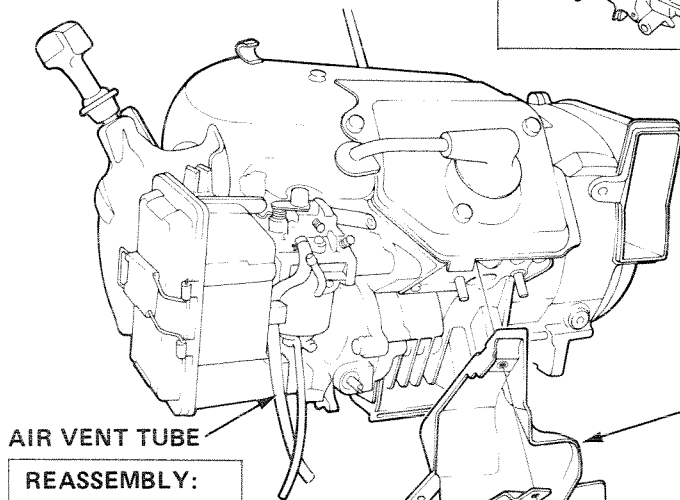
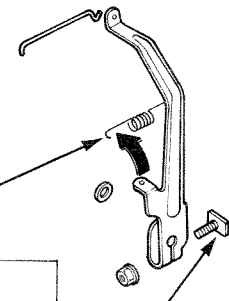
GOVERNOR
SPRING

REASSEMBLY:

Install the frequency
adjuster to the op-
posite side of the
governor arm.

6 x 20 mm

40–80 kg-cm
(2.9–5.8 ft-lb)



EXHAUST PIPE INSULATOR

REASSEMBLY:

Before installing, check for
damage or cracks.

AIR VENT TUBE

REASSEMBLY:

Install the air vent
tube as shown.



6 x 16 mm (2)

6 x 10 mm

FREQUENCY ADJUSTER

HONDA

EM650

● CARBURETOR

CAUTION:

Remove the set bolt and drain the carburetor before disassembling. Fuel vapor or spilled fuel may ignite.

CARBURETOR BODY

REASSEMBLY:

Clean internal passages and orifices with compressed air before installing.

PILOT SCREW

P. 24

STOP SCREW

MAIN JET

REASSEMBLY:

Clean thoroughly with compressed air before installing.

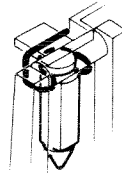
Standard

#50

FLOAT VALVE

REASSEMBLY:

Check for worn head or weak spring. Replace if necessary. Set the valve on the float arm properly as shown.



FLOAT PIN

FLOAT

REASSEMBLY:

Check for smooth movement after installing.

GASKET

REASSEMBLY:

Make sure the gasket is in place before installing the float chamber.

FLOAT CHAMBER

SET BOLT

REASSEMBLY:

After assembly, check for any sign of fuel leakage.

DRAIN SCREW

DRAIN TUBE

b. INSPECTION

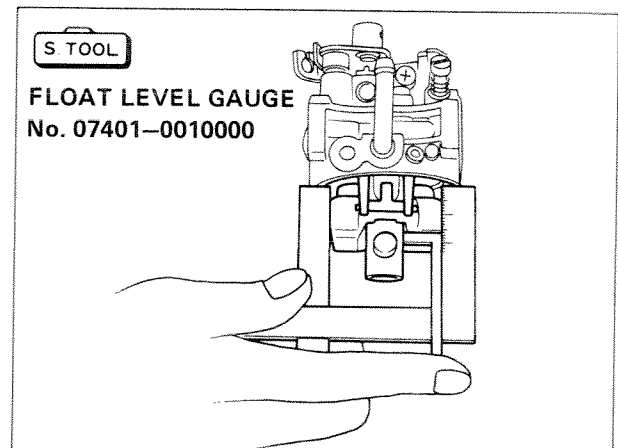
● FLOAT HEIGHT

Place the carburetor in an upright position and measure the distance between the float top and carburetor body when the float just contacts the float valve.

Standard float height

19.2–21.2 mm (0.76–0.83 in)

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



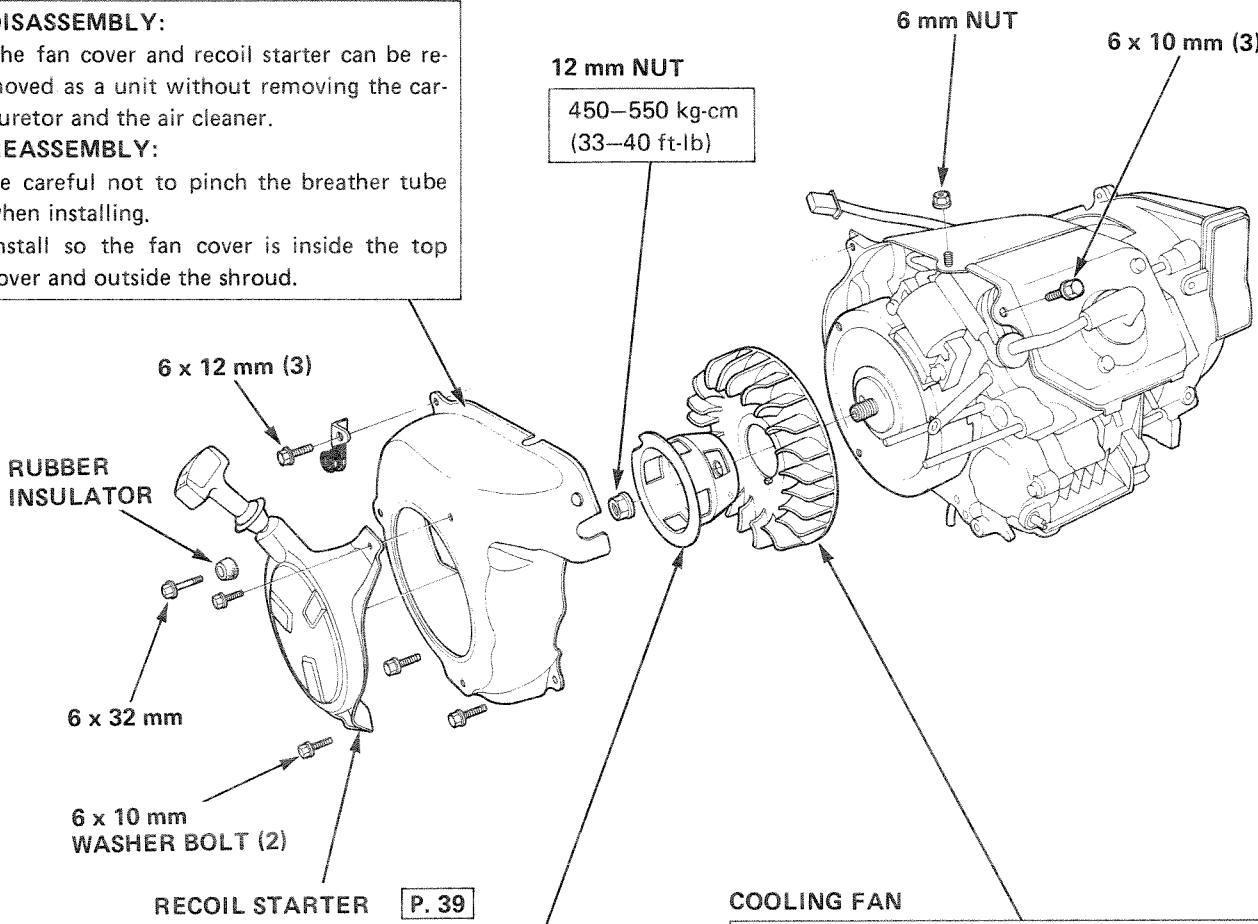
5. RECOIL STARTER/FAN COVER

● RECOIL STARTER

FAN COVER

DISASSEMBLY:
The fan cover and recoil starter can be removed as a unit without removing the carburetor and the air cleaner.

REASSEMBLY:
Be careful not to pinch the breather tube when installing.
Install so the fan cover is inside the top cover and outside the shroud.



STARTER PULLEY

REASSEMBLY:
Install with the small hole aligned with the fan lug.

COOLING FAN

CAUTION:
Be careful not to break fan blades.

REASSEMBLY:
Install by inserting the lugs in the rear side of the fan in small holes in flywheel.

HONDA

EM650

• RECOIL STARTER

STARTER ROPE

REASSEMBLY:

Before installing, check for frayed or broken strands.

STARTER REEL

DISASSEMBLY:

Before removing the reel, pull a length of rope through the reel notch, and unwind the reel to release spring tension.

REASSEMBLY:

Install the recoil starter spring in the starter reel by hooking the outer end of the spring on the tab in the reel.

REEL COVER

REASSEMBLY:

Position the top of the ratchet through the notch on the reel cover, and install the reel cover in the starter reel.

REEL COVER BOLT

GREASE

STARTER CASE

RECOIL STARTER SPRING

DISASSEMBLY:

Be careful not to allow spring to jump out.

INSTALLATION:

After installing in the starter reel, install the reel assembly in the starter case by hooking the inner end of the spring on the tab in the case.

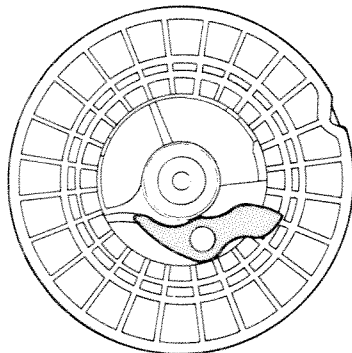
CAUTION:

Wear heavy gloves to protect your hands from injury.

RATCHET

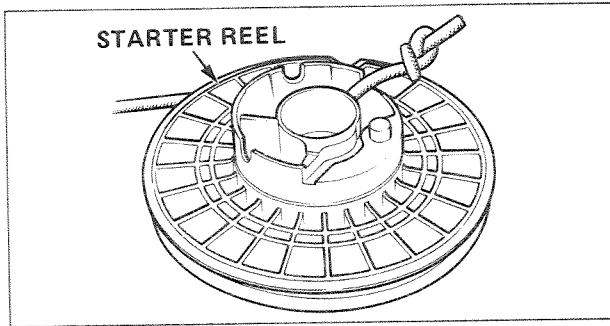
REASSEMBLY:

- Check for wear or damage.
- Install as shown.

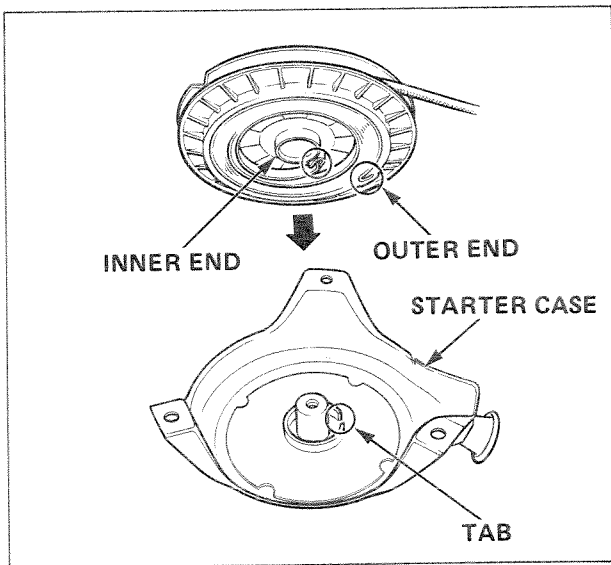


● STARTER CASE ASSEMBLY

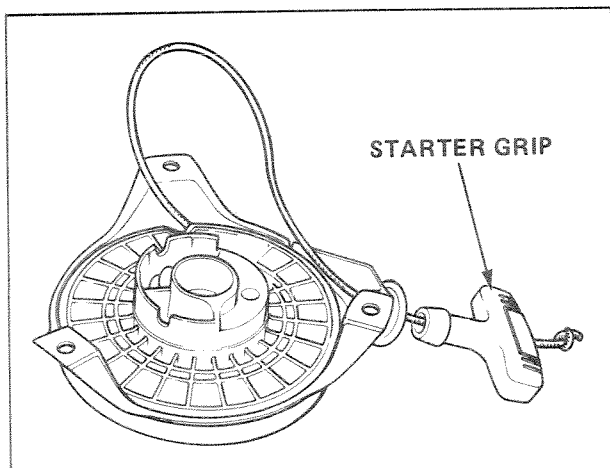
- 1) Pass the rope through the hole in the starter reel, and tie the end of the rope in a figure eight.



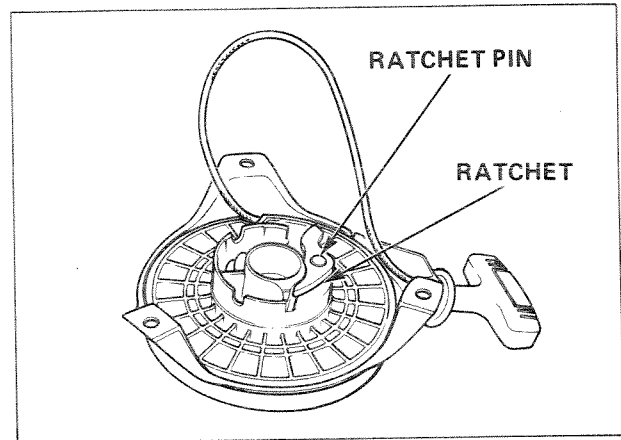
- 2) Wind the rope onto the reel clockwise. Hook the outer end of the spring on the notch of the starter reel, then, hook the inner end of the spring on the tab in the case.



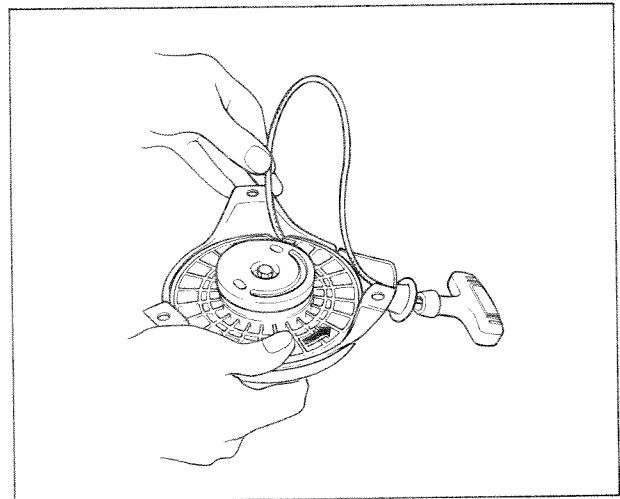
- 3) With a length of rope extending from starter reel notch, pull the end of the rope out of the case, feed it through the starter grip, and tie a knot in the end of the rope.



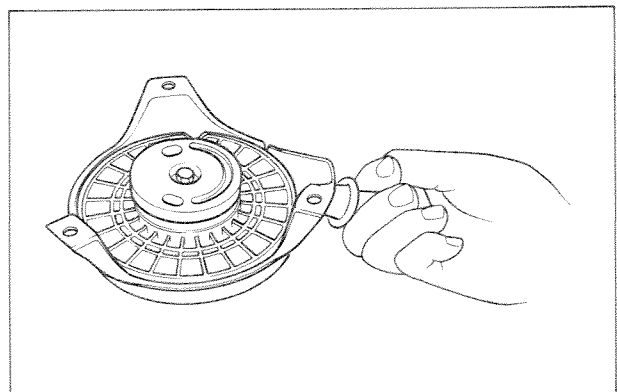
- 4) Install the ratchet pin and the ratchet.



- 5) Attach the friction spring, mount the reel cover, and tighten the reel cover bolt. Rotate the reel 2 full turns in the direction of the arrow.



- 6) Pull the starter grip several times and check that the ratchet is operating properly.



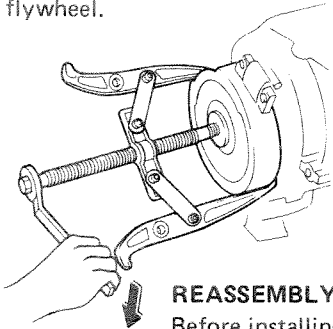
6. FLYWHEEL/IGNITION COIL

a. DISASSEMBLY/REASSEMBLY

FLYWHEEL

DISASSEMBLY:

- Do not hit the flywheel with a hammer.
- Remove with a commercially available four-inch puller.
- Avoid the magnet section when attaching the puller.
- Hook the claws of puller in the recesses of the flywheel.



REASSEMBLY:
Before installing, clean the taper.

GREEN

REASSEMBLY:
Connect to the cylinder block.

3P CONNECTOR

REASSEMBLY:
Connect to 3P connector on the R. side panel.

YELLOW

REASSEMBLY:
Connect to the oil level switch.

6 x 10 mm (3)

6 x 12 mm

6 x 25 mm (2)

WOODRUFF KEY

REASSEMBLY:
After reinstalling the flywheel, check to be sure that the woodruff key is still in its slot on the crankshaft.

IGNITION COIL

INSPECTION: P. 42

REASSEMBLY:

- 1) Lightly tighten the ignition coil mounting bolts.
- 2) Insert the feeler gauge or a piece of paper of post card thickness between the flywheel and coil as shown.
- 3) Push the coil against the flywheel by hand and tighten the bolts.

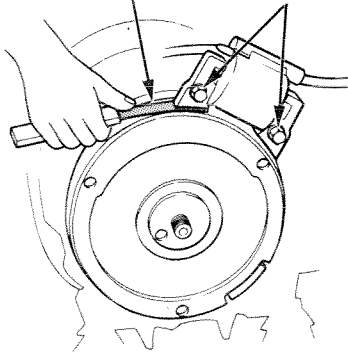
Specified gap	0.4 ± 0.2 mm (0.016 ± 0.008 in)
---------------	---------------------------------

NOTE:

- Avoid the magnet portion of the flywheel when adjusting.
- To adjust both ends of the coil to the same gap, insert the feeler gauge along the circumference of the flywheel and adjust the both gaps simultaneously.

FEELER GAUGE

6 x 25 mm (2)



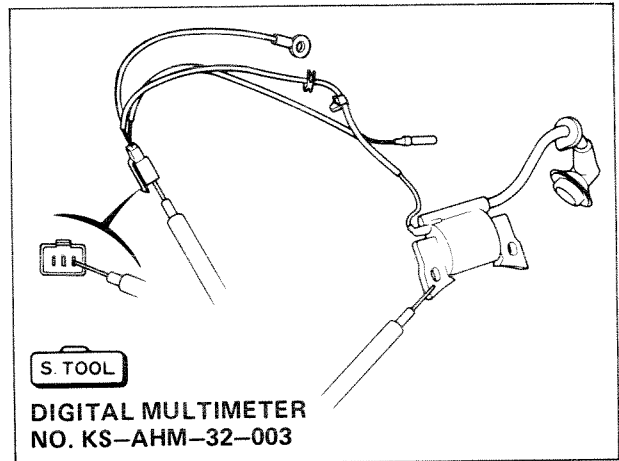
b. INSPECTION

● IGNITION COIL

< Primary coil >

Measure the primary coil resistance between the black lead of the 3P connector and iron core.

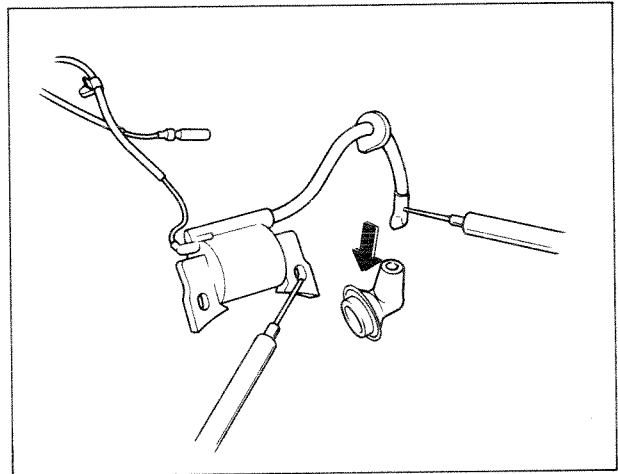
Primary coil resistance	0.7–0.9Ω
-------------------------	----------



< Secondary coil >

Measure the secondary coil resistance between the iron core and spark plug lead with the spark plug cap removed.

Secondary coil resistance	6.1–7.5kΩ
---------------------------	-----------



7. STATOR/ROTOR

a. DISASSEMBLY/REASSEMBLY

FAN SET PLATE (2)

REASSEMBLY:

Align the holes in the plate with the lugs on the cooling fan.

GENERATOR END COVER

REASSEMBLY:

Check for cracks or damage.

EARTH CORD

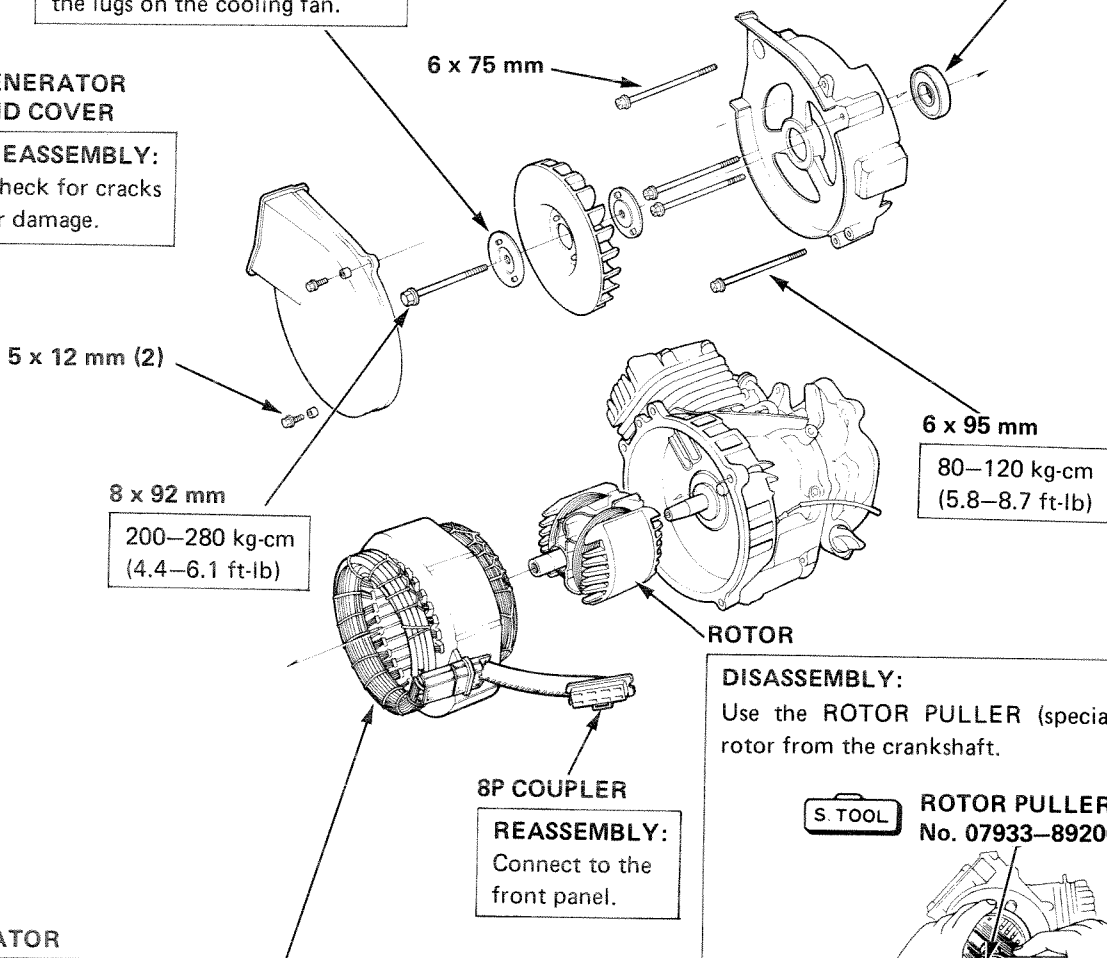
REASSEMBLY:

Lay the ground wire along the generator end cover so the ground wire will not interfere when installing L. side panel.

6002 BALL BEARING

REMOVAL/INSTALLATION:

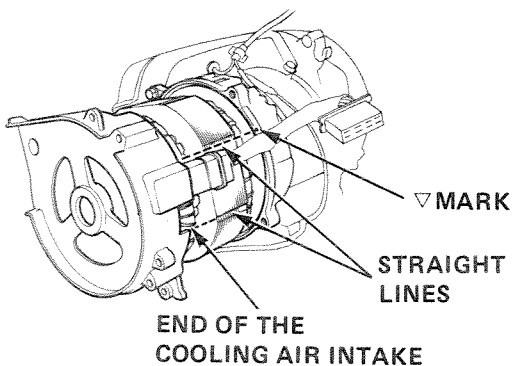
Use a hydraulic press and a suitable bearing driver or cylinder (outside diameter is 32 mm (1.26 in)).



STATOR

REASSEMBLY:

Be sure to align the end of the cooling air intake on the end cover with the straight lines on the core, and ▽ mark on the crankcase.



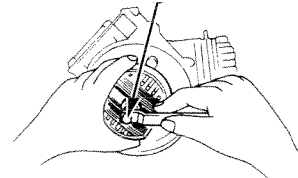
ROTOR

DISASSEMBLY:

Use the ROTOR PULLER (special tool) to pull the rotor from the crankshaft.

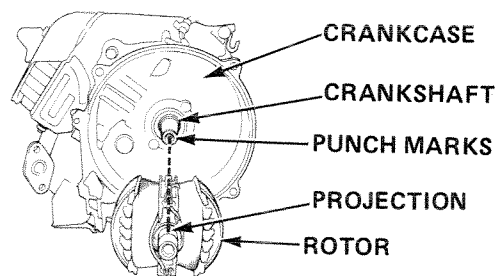
S. TOOL

ROTOR PULLER
No. 07933-8920001



REASSEMBLY:

Be sure to align the punch mark on the crankshaft with the projection on the rotor shaft.



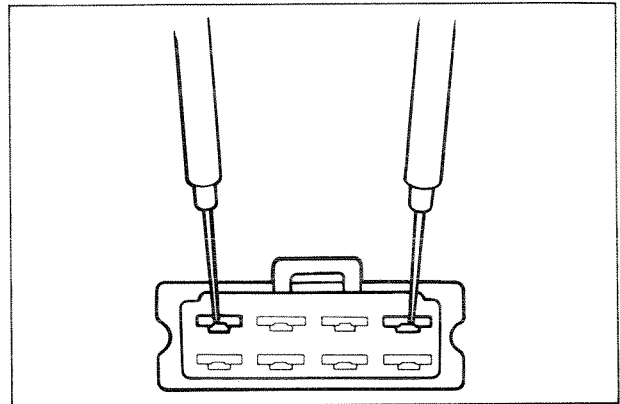
b. INSPECTION

● MAIN WINDING (AC)

Using an ohmmeter, measure the resistance between the red and white leads of the 8P connector.

Specified resistance	1.7–2.1Ω
----------------------	----------

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

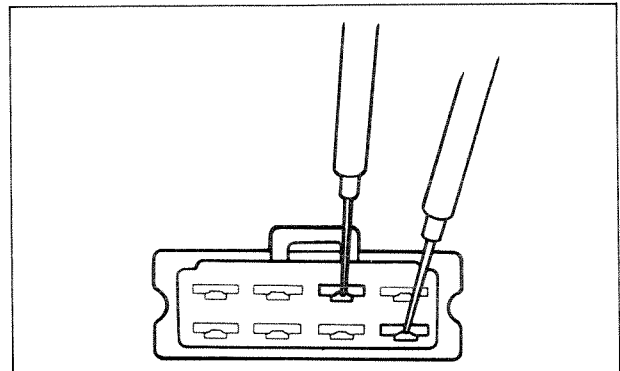


● CONDENSOR WINDING

Using an ohmmeter, measure the resistance between the two blue leads of the 8P connector.

Specified resistance	6.7–8.2Ω
----------------------	----------

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

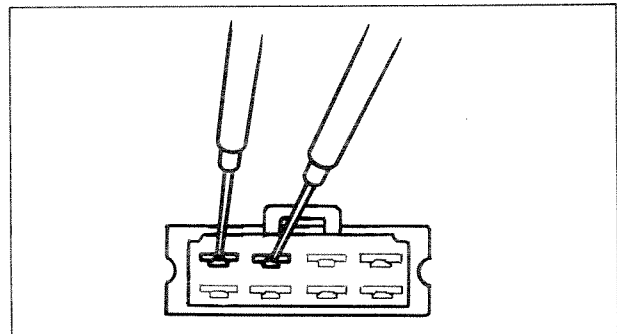


● MAIN WINDING (DC)

Using an ohmmeter, measure the resistance between the white and white/black leads of the 8P connector.

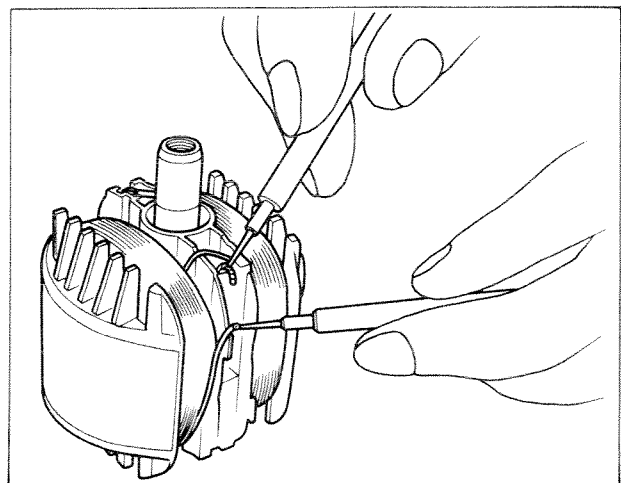
Specified resistance	0.4–0.5Ω
----------------------	----------

If the resistance is other than specified, replace the stator.



● FIELD WINDING (ROTOR)

Refer to the troubleshooting procedure on page 17 and 18.



8. CRANK CASE COVER/CYLINDER HEAD/VALVE

a. DISASSEMBLY/REASSEMBLY

6203 BALL BEARING

DISASSEMBLY:

After removing the oil seal, use a hydraulic press and 32 mm bearing driver to remove the bearing.

17 x 30 x 6 OIL SEAL

REASSEMBLY:

Drive in the crankcase cover using the 32 mm bearing driver until the outer end of the oil seal aligns with the crankcase cover end.

Do not drive in too deeply, or it will touch the ball bearing and damage the oil seal.

GOVERNOR FORK

REASSEMBLY:

Install on the governor arm shaft so the slanting side faces the cylinder.

OIL LEVEL SWITCH

DISASSEMBLY:

It can be removed without removing the crankcase cover.

REASSEMBLY:

Connect the yellow wire leads to the ignition coil. Route the green wire leads through the two projections on the oil level switch and install on the crankcase with 5 x 14 flange bolts.

6 x 25 mm (7)

80-120 kg-cm
(5.8-8.7 ft-lb)

THRUST
WASHER

O-RING

5 x 14 mm (3)

AIR GUIDE

5 x 12 mm (3)

GOVERNOR ARM SHAFT

REASSEMBLY:

Be sure the thrust washer is installed, and position the shaft in the crankcase cover so the flat surface faces toward the cylinder block.

LOCK PIN

REASSEMBLY:

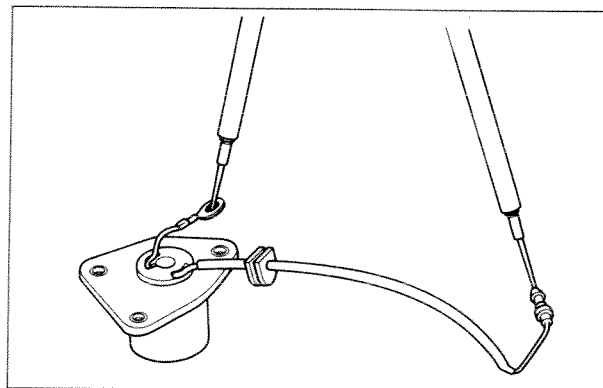
Install so that the straight portion is in governor arm shaft groove.

b. INSPECTION

● OIL LEVEL SWITCH

Check continuity between the yellow and green switch leads with an ohmmeter.

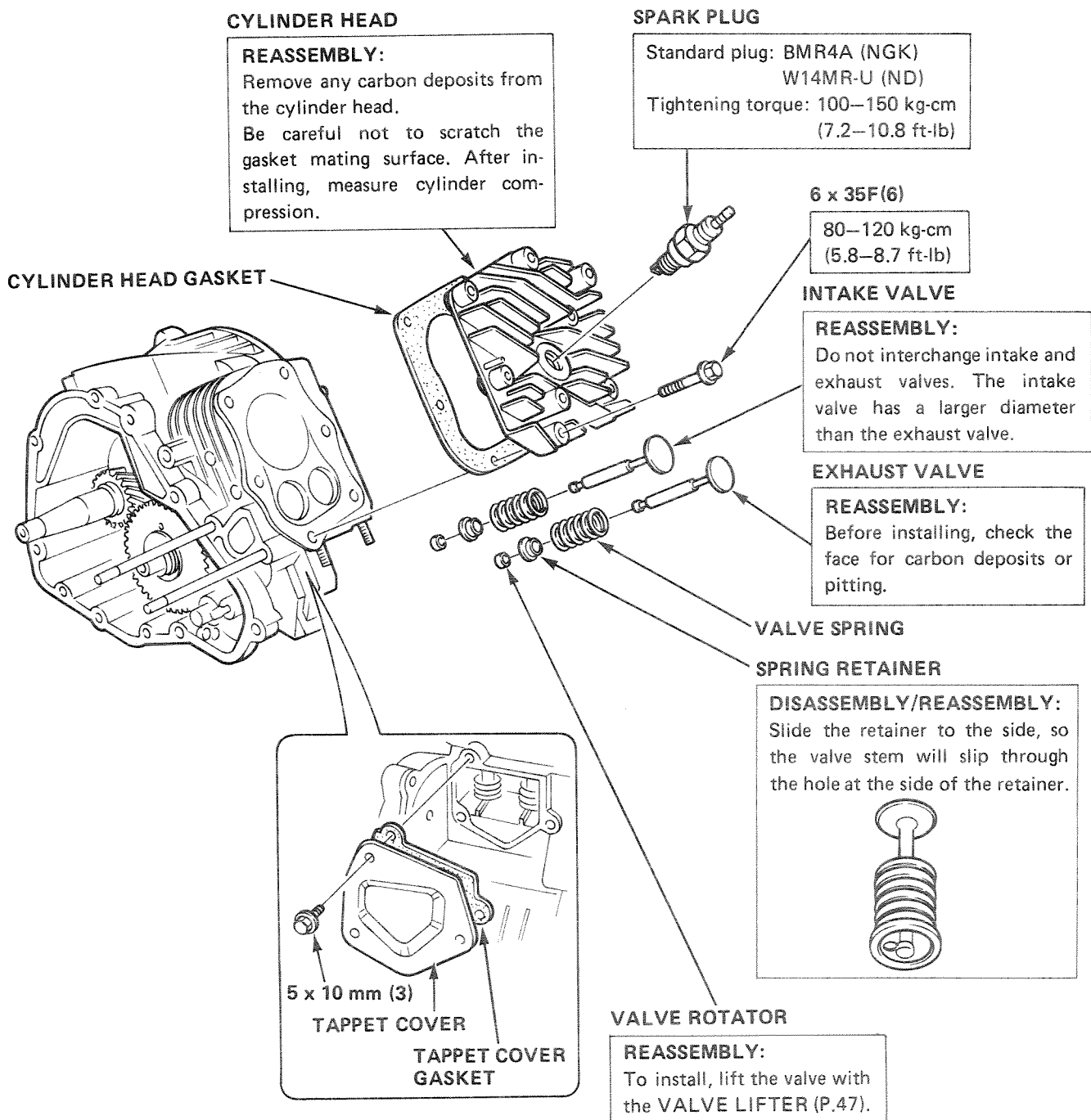
- 1) Hold the switch in its normal position. The ohmmeter should read zero resistance.
- 2) Hold the switch upside down. The ohmmeter should read infinite (∞) resistance.
- 3) Inspect the float by dipping the switch into a container of oil. The ohmmeter reading should go from zero to infinity as the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



9. PISTON/CRANKSHAFT/CYLINDER BLOCK

a. DISASSEMBLY/REASSEMBLY

Refer to page 47 for VALVE disassembly and reassembly.



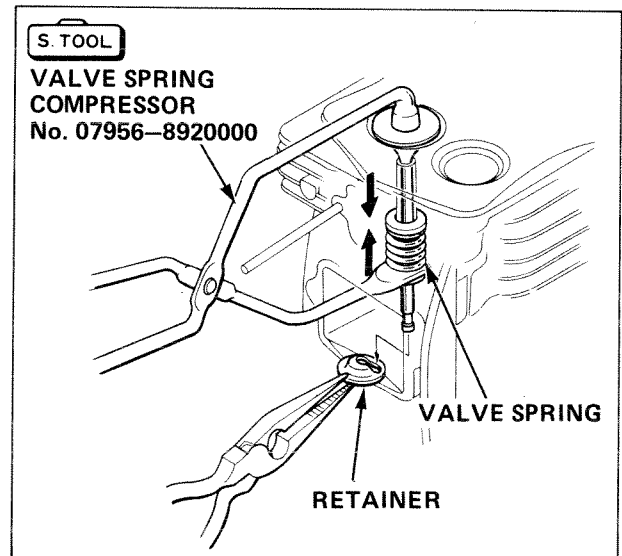
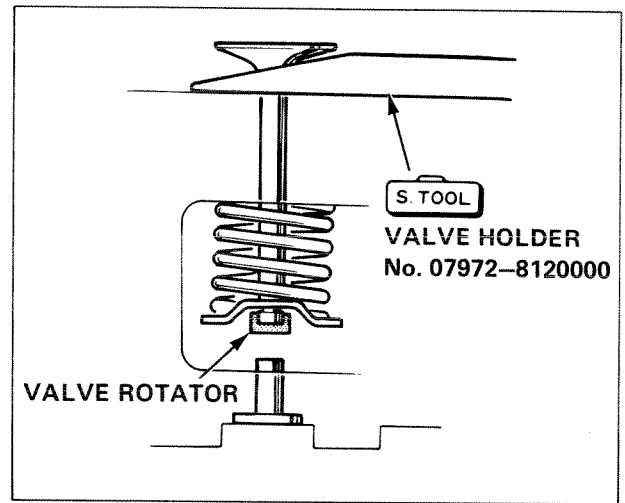
HONDA

EM650

● VALVES

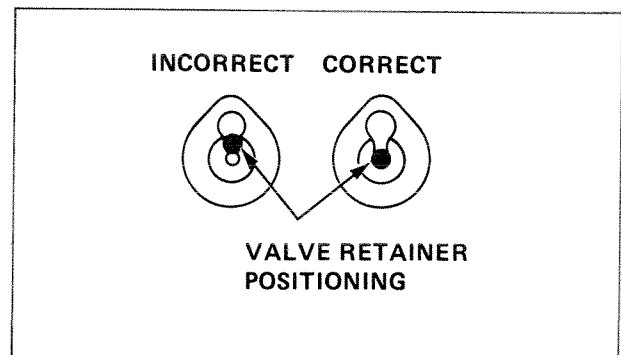
DISASSEMBLY:

- 1) Rotate the crankshaft to lift the valves fully, then hold the valves with a VALVE HOLDER.
- 2) Remove the valve rotators and keep them in order so that they can be placed back in their original locations.
- 3) Compress the springs with a VALVE SPRING COMPRESSOR and remove the spring retainers.



REASSEMBLY:

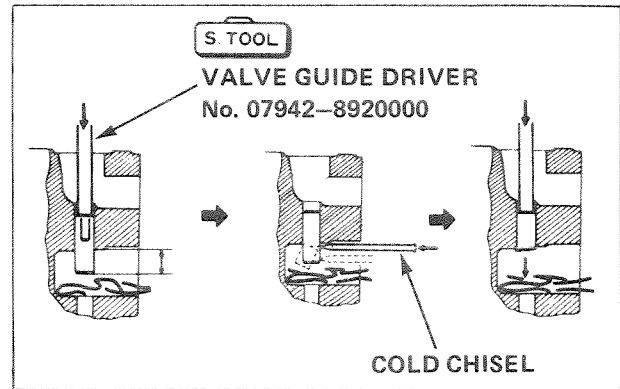
- 1) Slide the valves into the valve guides and install the springs on the stems. Install the spring retainers by compressing the springs.
Be sure to set the valve stem into the small hole in the center of the retainer.
- 2) Install the valve rotators using the VALVE HOLDER as in DISASSEMBLY.
After installing, check valve operation.



● VALVE GUIDE

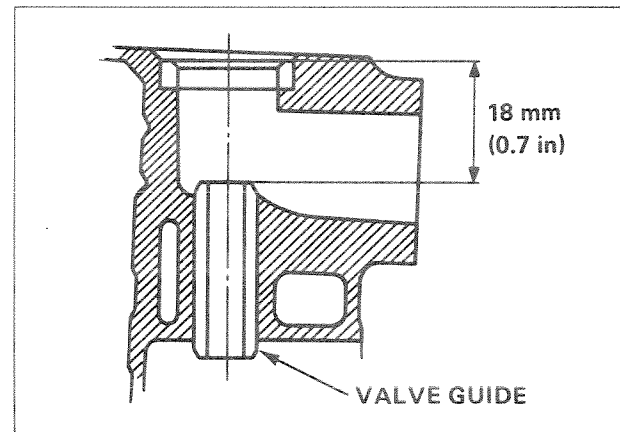
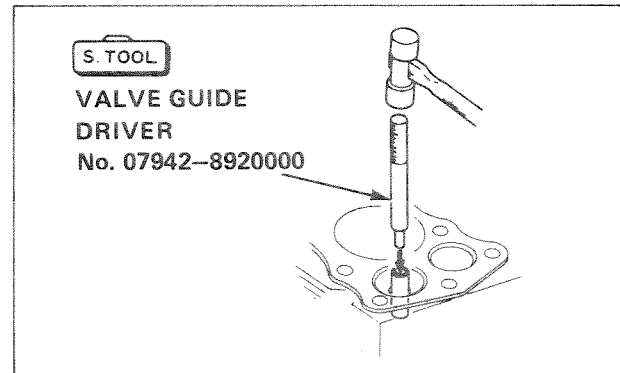
REMOVAL:

- 1) Place a shop towel in the space below the valve guide, and drive the valve guide down about 15 mm (a little over 1/2 inch).
- 2) Using a hammer and chisel, score the valve guide at the point where it emerges, then strike the tip of the guide to break it off.
- 3) Drive out the remainder of the valve guide. If necessary, repeat step 2 to gain additional clearance.



INSTALLATION:

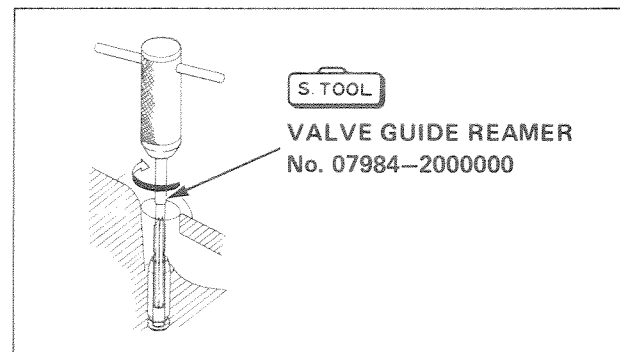
- 1) Drive in the new guide to a seating depth of 18 mm (0.7 in).



- 2) Ream the new valve guide.

CAUTION:

Always turn the reamer clockwise, never counterclockwise. Continue to turn the reamer clockwise as you remove it from the valve guide.



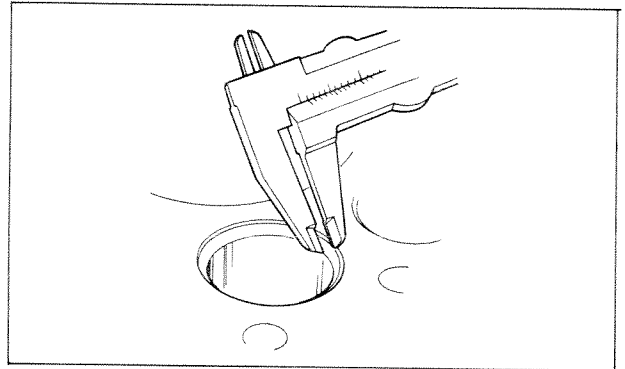
HONDA

EM650

b. INSPECTION

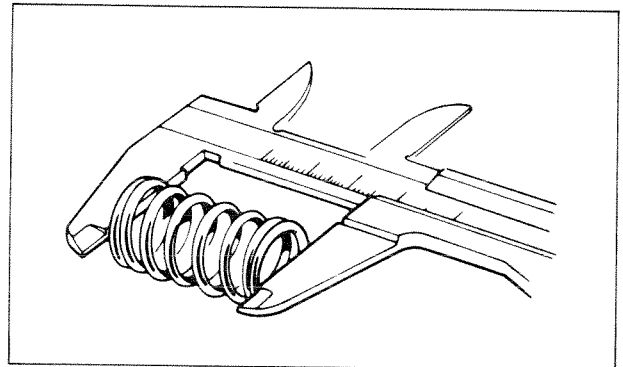
● VALVE SEAT WIDTH

STANDARD	SERVICE LIMIT
0.6 mm (0.024 in)	1.0 mm (0.039 in)



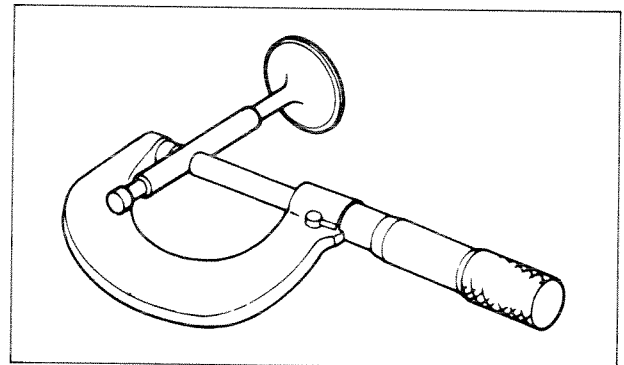
● VALVE SPRING FREE LENGTH

STANDARD	SERVICE LIMIT
27.1 mm (1.07 in)	25.0 mm (0.98 in)



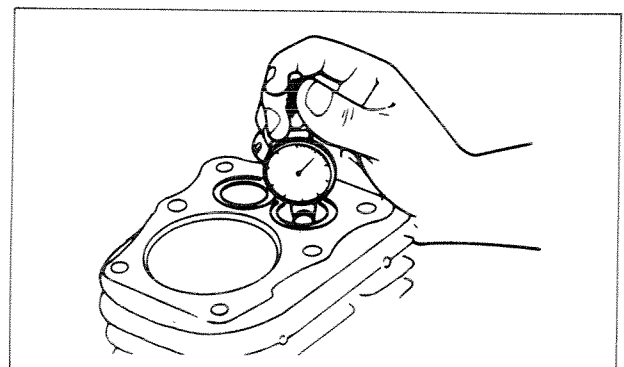
● VALVE STEM OD

	STANDARD	SERVICE LIMIT
IN	5.490 mm (0.2161 in)	5.450 mm (0.2146 in)
EX	5.445 mm (0.2144 in)	5.400 mm (0.2126 in)



● VALVE GUIDE ID

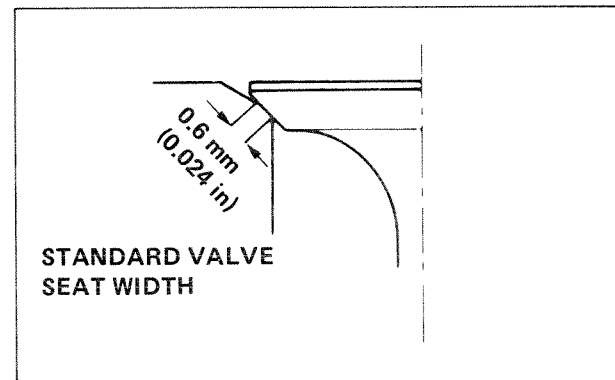
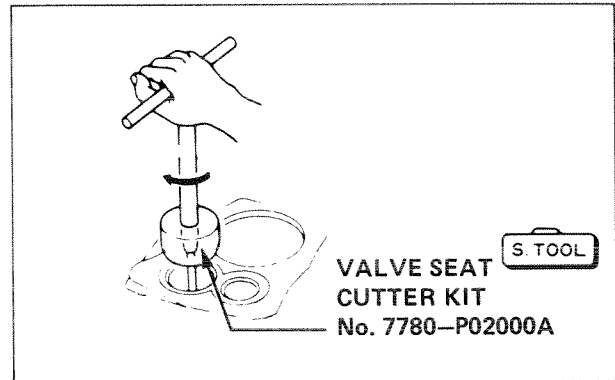
STANDARD	SERVICE LIMIT
5.5 mm (0.2165 in)	5.560 mm (0.2189 in)



c. RECONDITIONING

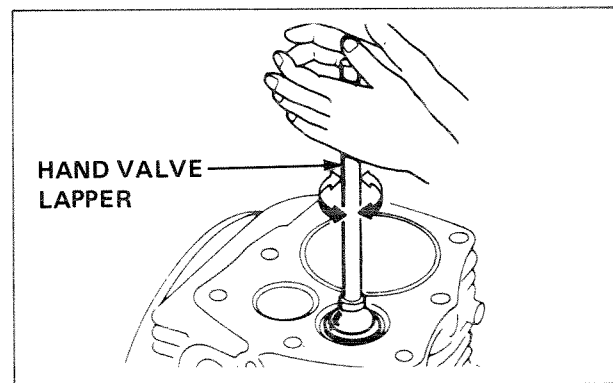
● VALVE SEAT RECONDITIONING

- 1) Using a 45° or 46° cutter, remove 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 30° or 31° cutter to narrow the seat to standard width, then make a light pass with the 45° or 46° cutter to remove any possible burrs at the edge of the seat. The finished seat should have a width of 0.6 mm (0.024 in).
- 3) After resurfacing the seat, inspect for even 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.



● VALVE LAPPING

Lap the valves into their seats, using a hand valve lapper and lapping compound (commercially available).



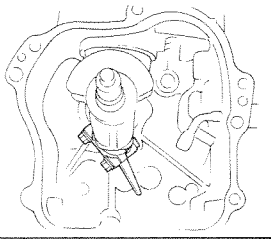
10. PISTON/CRANKSHAFT/CYLINDER

a. DISASSEMBLY/REASSEMBLY

CONNECTING ROD CAP

REASSEMBLY:

Install cap with oil dipper pointed toward camshaft as shown.

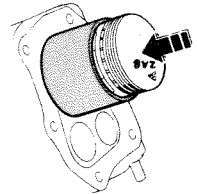


PISTON

REASSEMBLY:

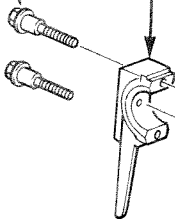
Install with the ZA8 mark facing the valves, using a piston ring compressor (commercially available).

S. TOOL



CONNECTING ROD BOLT (2)

40-60 kg-cm
(2.9-4.3 ft-lb)



VALVE LIFTER

DISASSEMBLY:

Mark to facilitate identification in reassembly.

REASSEMBLY:

Just before installing camshaft, install lifters. Prevent them from falling down by tilting the cylinder.

CRANKSHAFT

REASSEMBLY:

Avoid damage to oil seal.

TIMING GEAR

P. 52

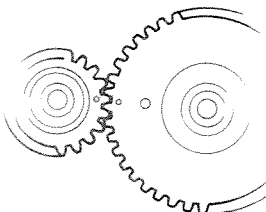
CAMSHAFT

DISASSEMBLY:

Bring the piston to top dead center on its compression stroke, then remove the camshaft.

REASSEMBLY:

Align timing mark with crankshaft mark.



GOVERNOR SLIDER

THRUST WASHER

GOVERNOR WEIGHT HOLDER

CLIP

GOVERNOR WEIGHT (9)

REASSEMBLY:

- 1) Install governor weight holder on holder shaft and secure with the clip.
- 2) Assemble the three governor weights and attach them to the weight holder with the cotter pin.
- 3) Expand the governor weights and place the thrust washer and the governor slider on the holder shaft.
- 4) Operate weights to make sure slider moves freely.

● PISTON

TOP RING

- Chrome plated.

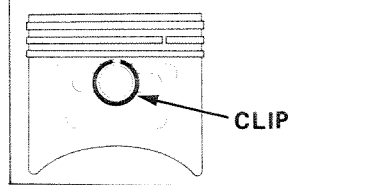
OIL RING

- Combination ring.

PISTON PIN CLIP

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.



PISTON PIN

PISTON RINGS

REASSEMBLY:

- Install with marking facing up.
- Position the rings so that the end gaps are staggered or equally spaced at 120-deg intervals and are away from piston pin axis.



CONNECTING ROD

ASSEMBLY:

- Install rod with longer end facing "ZAB" mark on the piston head.

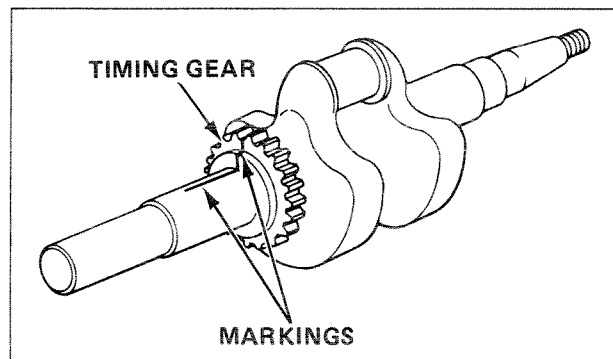
● TIMING GEAR

DISASSEMBLY:

- 1) Mark a line on the crankshaft and the timing gear as shown.
- 2) Use a hydraulic press to remove the timing gear.

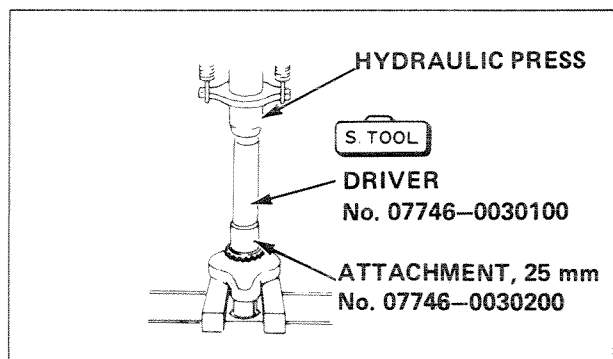
CAUTION:

Do not scratch oil seal surfaces.



ASSEMBLY:

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



HONDA

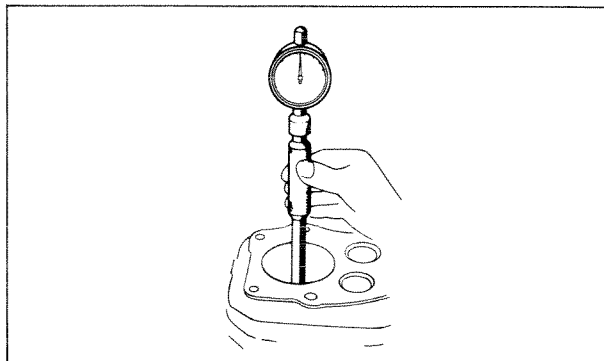
EM650

b. INSPECTION

● CYLINDER ID

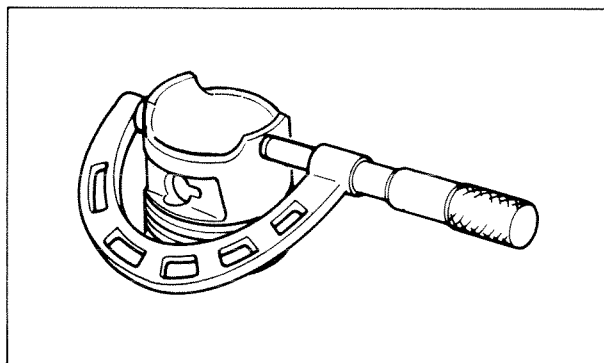
STANDARD	SERVICE LIMIT
46.0 mm (1.811 in)	46.05 mm (18.13 in)

If the service limit is exceeded, rebore the cylinder and install the oversize piston and piston rings.



● PISTON SKIRT OD

STANDARD	SERVICE LIMIT
45.995 mm (1.8108 in)	45.920 mm (1.808 in)

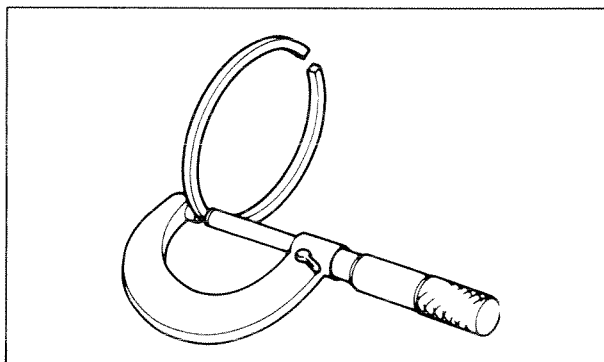


● PISTON-TO-CYLINDER CLEARANCE

STANDARD	SERVICE LIMIT
0–0.03 mm (0–0.0012 in)	0.13 mm (0.0051 in)

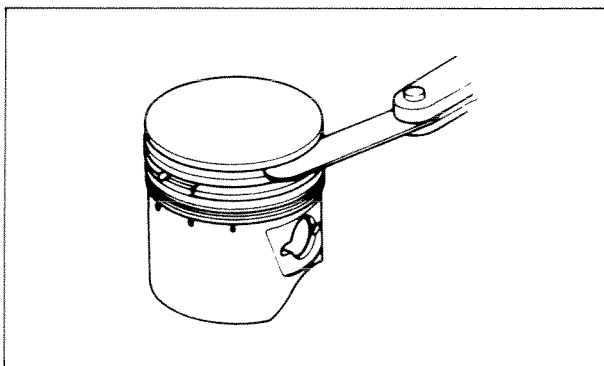
● PISTON RING WIDTH

	STANDARD	SERVICE LIMIT
TOP/ SECOND	1.5 mm (0.059 in)	1.37 mm (0.054 in)



● PISTON RING SIDE CLEARANCE

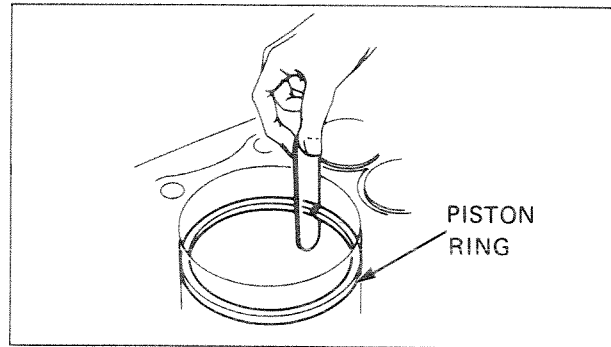
	STANDARD	SERVICE LIMIT
TOP	0.04 mm (0.0016 in)	0.10 mm (0.004 in)
SECOND	0.25 mm (0.0010 in)	0.10 mm (0.004 in)



● PISTON RING END GAP

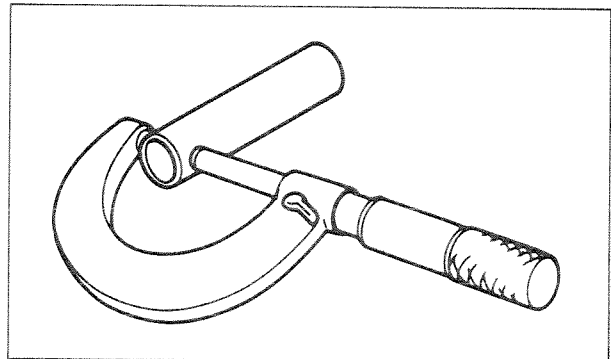
	STANDARD	SERVICE LIMIT
TOP SECOND	0.25 mm (0.010 in)	1.00 mm (0.039 in)
OIL	0.45 mm (0.018 in)	1.00 mm (0.039 in)

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



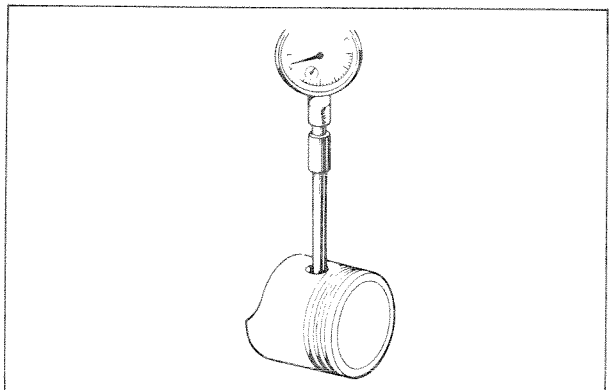
● PISTON PIN OD

STANDARD	SERVICE LIMIT
10.0 mm (0.3937 in)	9.95 mm (0.392 in)



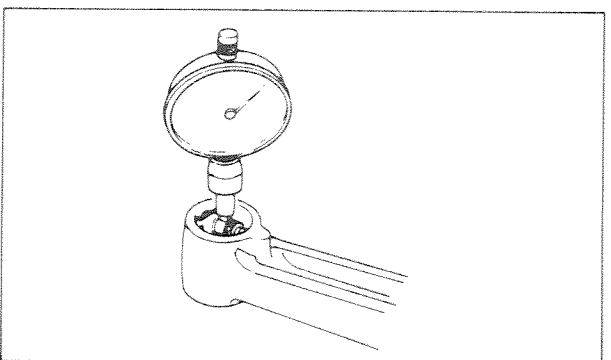
● PISTON PIN BORE ID

STANDARD	SERVICE LIMIT
10.002 mm (0.3938 in)	10.05 mm (0.396 in)



● PISTON-TO-PIN BORE CLEARANCE

STANDARD	SERVICE LIMIT
0.015 mm (0.0006 in)	0.1 mm (0.004 in)



● CONNECTING ROD SMALL END ID

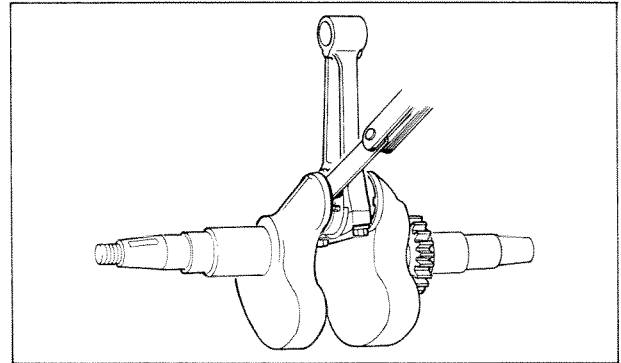
STANDARD	SERVICE LIMIT
10.006 mm (0.3939 in)	10.05 mm (0.396 in)

HONDA

EM650

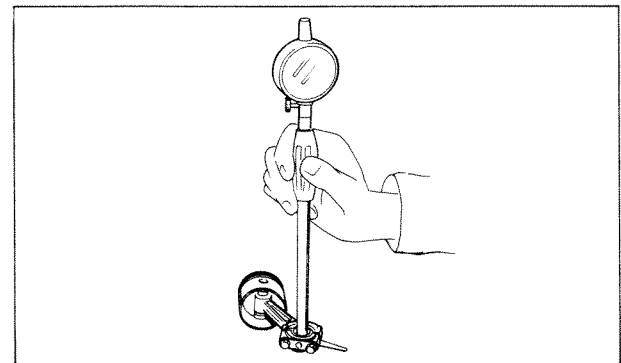
● CONNECTING ROD BIG END SIDE CLEARANCE

STANDARD	SERVICE LIMIT
0.55 mm (0.022 in)	1.1 mm (0.043 in)



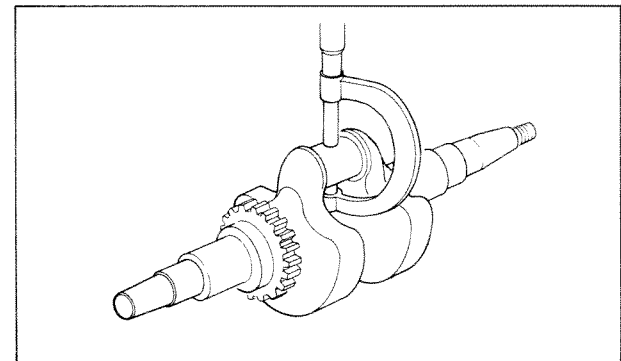
● CONNECTING ROD BIG END ID

STANDARD	SERVICE LIMIT
18.0 mm (0.7087 in)	18.04 mm (0.7102 in)



● CRANKPIN OD

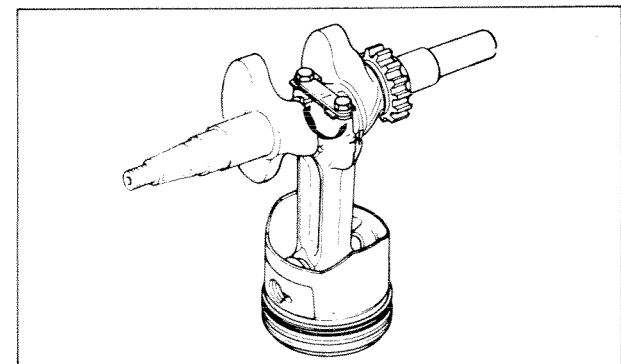
STANDARD	SERVICE LIMIT
17.984 mm (0.7080 in)	17.94 mm (0.706 in)



● OIL CLEARANCE

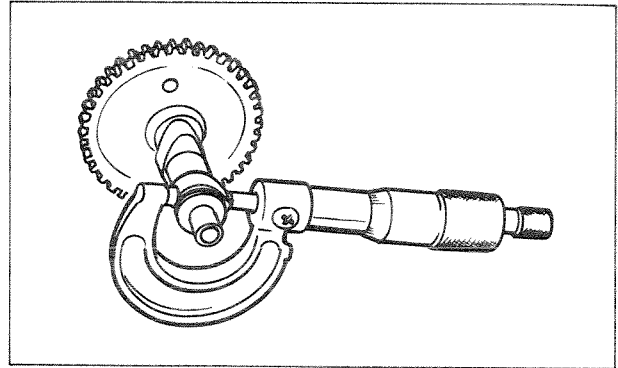
STANDARD	SERVICE LIMIT
0.025 mm (0.001 in)	0.1 mm (0.004 in)

Measure with plastigauge.



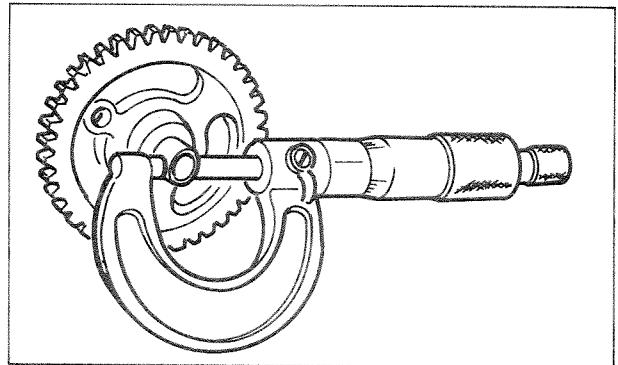
● CAM HEIGHT

	STANDARD	SERVICE LIMIT
IN/EX	21.10 mm (0.8307 in)	20.75 mm (0.817 in)



● CAMSHAFT OD

STANDARD	SERVICE LIMIT
12.184 mm (0.4797 in)	12.15 mm (0.478 in)



● CAMSHAFT JOURNAL ID

STANDARD	SERVICE LIMIT
12.20 mm (0.4803 in)	12.25 mm (0.482 in)

