



SERVICE DATA

CHAIN SAW

ECHO: CS-3510AC

shindaiwa: 341AC

(Serial number : 38000001 and after)

INTRODUCTION

We are constantly working on technical improvement of our products. For this reason, technical data, equipment and design are subject to change without notice. All specifications and directions in this SERVICE DATA are based on the latest product information available at the time of publication.

Caburetor Adjustment video

CLICK HERE



CONTENTS

1 SERVICE INFORMATION	2
1-1 Specifications.....	2
1-2 Technical data	3
1-3 Torque limits.....	4
1-4 Special repairing materials	4
1-5 Service Limits	5
1-6 Special tools	6
2 SERVICE HINT FOR AUTO CHOKE SYSTEM	7
2-1 Auto choke system	8
2-2 Auto choke system structure and working principle	8
2-3 Troubleshooting guide	9
2-4 Diagnosis of auto choke system	11
2-5 Remedy for auto choke failure.....	12
2-6 Installing ignition coil.....	14
2-7 Setting pole shoe air gaps	16
2-8 Replacing solenoid valve on carburetor.....	16
3 SERVICE HINT FOR IGNITION SWITCH	17
3-1 Inspecting ignition switch	17
3-2 Replacing ignition switch	18



Reference No. **01-34G-01**
ISSUED : 202107

1 SERVICE INFORMATION

1-1 Specifications

Dimensions*	Length	mm(in)	386 (15.2)
	Width	mm(in)	233 (9.2)
	Height	mm(in)	271 (10.7)
Dry weight*		kg(lb)	3.8 (8.4)
Engine	Type	YAMABIKO, stratified scavenging, air-cooled, two-stroke, single cylinder	
	Rotation	Clockwise as viewed from the output end	
	Displacement	cm ³ (in ³)	34.4 (2.099)
	Bore	mm(in)	40.0 (1.575)
	Stroke	mm(in)	27.4 (1.079)
	Compression ratio	7.4	
Carburetor	Type	Diaphragm, horizontal-draft with solenoid valve	
	Model	Walbro WT-1237	
	Venturi size-Throttle bore	mm(in)	14.0 - 15.85 (0.551 - 0.624)
	Choke	Auto choke system	
Ignition	Type	CDI (Capacitor discharge ignition) system, Integrated control unit	
	Spark plug	NGK BPMR8Y	
Exhaust	Muffler type	Spark arrester muffler	
Starter	Type	ES (Effortless-Start) / S (Soft-start)	
	Rope diameter x length	mm(in)	3.5 x 910 (0.14 x 35.8)
Fuel	Type**	Mixed two-stroke fuel	
	Mixture ratio	50 : 1 (2 %)	
	Gasoline	Minimum 89 octane petrol	
	Two-stroke air cooled engine oil	ISO-L-EGD (ISO/CD13738), JASO FC/FD	
	Tank capacity	L (UK.fl.oz.)	0.28 (9.5)
Clutch	Type	Centrifugal type, 2-shoe slide with 2-tension spring	
Guide bar / Saw chain lubrication type	Pencil type, Automatic oil pump		
Oil	Tank capacity	L (UK.fl.oz.)	0.23 (7.8)
Auto oiler	Type	Pencil shape, Clutch driven type	
Sprocket	Type	Spur	
	Number of teeth	6	
	Pitch	in	3/8

* Without guide bar and saw chain.

** Premixed alkylate fuel for 2-stroke can be used.

Cutting devices							
Guide bar	Type	C30S90-45SA	C30S91-47ML	C35S90-52SA	C35S91-53ML	C40S91-58AL	
	Called length	cm	30	35	40		
	Gauge	in	0.043	0.050	0.043	0.050	0.050
Saw chain	Type	Oregon: 90PX	Oregon: 91PX, 91VXL Carlton: N1C-BL	Oregon 90PX	Oregon: 91PX, 91VXL Carlton: N1C-BL	Oregon: 91PX, 91VXL Carlton: N1C-BL	
	Number of drive links	45	47	52	53	58	
	Pitch	in	3/8				
	Gauge	in	0.043	0.050	0.043	0.050	0.050

1-2 Technical data

Engine			
Compression pressure	MPa (kgf/cm ²) (psi)		0.99 (10.1) (143)
Clutch engagement speed	r/min		4500
Ignition system			
Spark plug gap	mm(in)		0.6 - 0.7 (0.024 - 0.028)
Spark test	Tester gap w/ spark plug	mm(in)	4.0 (0.16)
	Tester gap w/o spark plug	mm(in)	6.0 (0.24)
Secondary coil resistance	kΩ		1.45 - 1.9
Pole shoe air gaps	mm(in)		0.3 - 0.4 (0.012 - 0.016)
Ignition timing	at 3000 r/min	°BTDC	9
	at 8000 r/min	°BTDC	28
	at 10000 r/min	°BTDC	28
Carburetor			
Test Pressure, minimum	MPa (kgf/cm ²) (psi)		0.05 (0.5) (7.0)
Metering lever height	mm(in)		1.65 (0.06) lower than diaphragm seat
Limit cap / plug			Limit cap: P003-000010
Tool to adjust mixture needles			Screwdriver 2.0 mm P/N X603-000060 (Carb. adjustment tool P/N Y089-000095)

IMPORTANT: Use Tachometer PET-1000R to measure engine speed (Refer to 1-6 Special tools on page 6).

Carburetor adjustment			
1) Initial setting	H mixture needle	turn out	3 3/8
	L mixture needle	turn out	3
	Throttle adjust screw	turn in*1	6/8
Engine warm-up	Idle - WOT : Total	sec.	5 - 10 : 150
2) Find idle maximum speed			Adjust L mixture needle to maximum idle speed*2
3) Set idle maximum speed w/ TAS		r/min	4100
4) Set idle speed by turning L mixture needle CCW		r/min	3300
5) Confirm H mixture needle position before WOT setting			Turn H mixture needle CCW to confirm engine speed decreases less than or equal to 12500 r/min.
6) WOT setting		r/min	Turn H mixture needle CW in 1/8 turn increments with the engine at idle, then accelerate to WOT and check engine speed. The final engine speed should fall within: 12500 - 13200
7) Verify final engine speed with standard equipment		r/min	Idle: 2800 - 3400 WOT: 12500 - 13200
8) Verify clutch engagement speed			Confirm clutch engagement speed. If it is less than 1.25 times the idle speed, adjust the idle speed by turning TAS CCW.
Chain oil discharge volume at 7,000 r/min		mL/min (US.fl.oz./min)	Fixed: 6 (0.20)

BTDC: Before top dead center **WOT:** Wide open throttle **CCW:** Counterclockwise **TAS:** Throttle adjust screw

*1 Set Throttle adjust screw to the point that its tip just contacts throttle plate before initial setting.

*2 If chain starts to rotate during adjustment process step 2), decrease engine speed by turning TAS CCW until chain stops and then redo step 2). Repeat this until chain no longer rotates after the adjustment step 2).

1-3 Torque limits

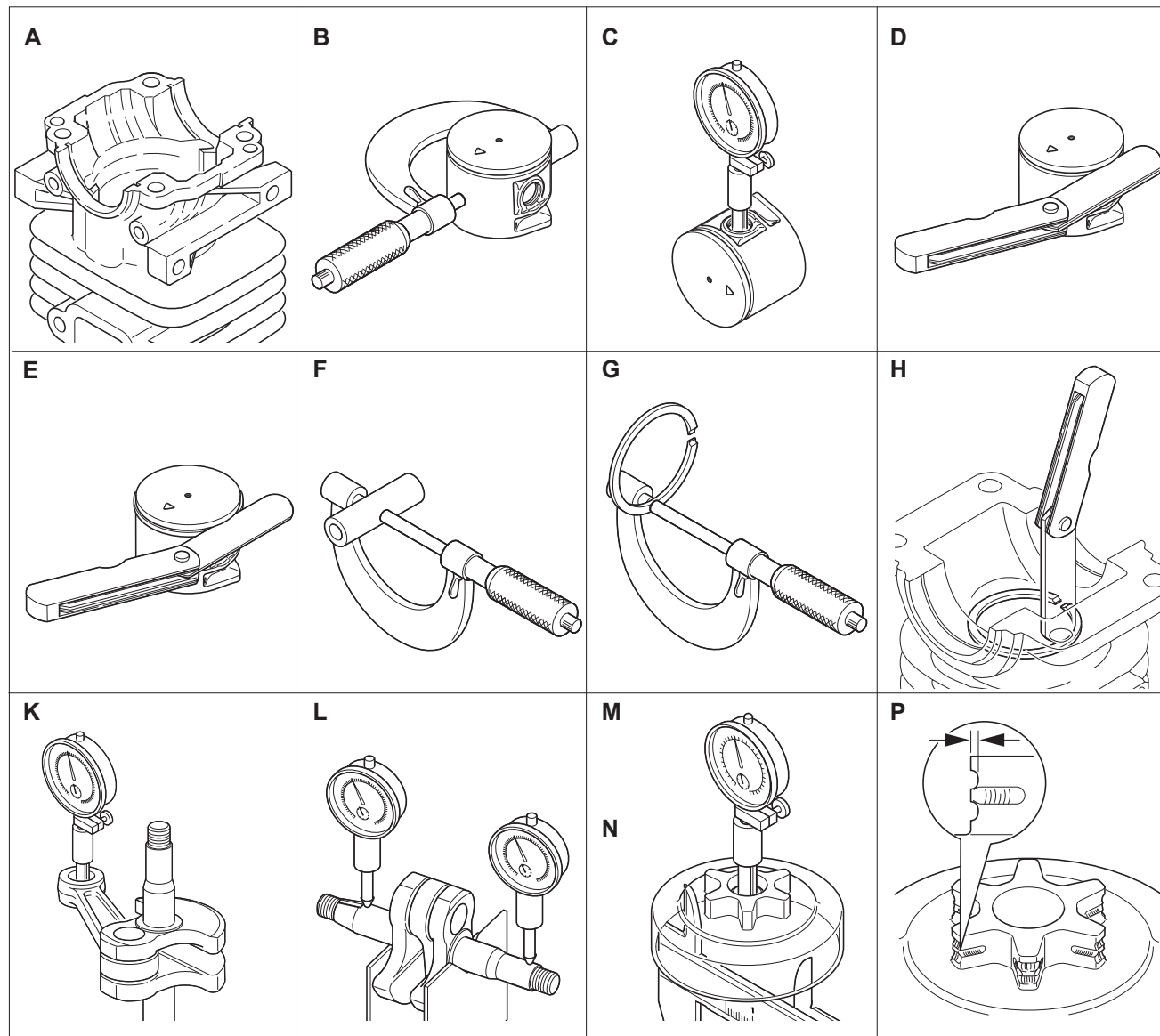
Descriptions		Size	kgf•cm	N•m	in•lbf
Starter system	Starter pawl	M5	30 - 45	3 - 4.5	26 - 40
	Starter case	M5 [†]	35 - 50	3.5 - 5	30 - 45
Ignition system	Magneto rotor (Flywheel)	M8	250 - 290	25 - 29	220 - 255
	Ignition coil	M5	30 - 45	3 - 4.5	26 - 40
	Spark plug	M14	130 - 170	13 - 17	110 - 150
Fuel system	Carburetor	M5	30 - 45	3 - 4.5	26 - 40
Clutch	Clutch hub	LM8	230 - 260	23 - 26	200 - 230
Engine	Cylinder / Crankcase	M5	60 - 100	6 - 10	60 - 90
	Engine mount	M5	70 - 110	7 - 11	60 - 95
	Muffler	M5	70 - 90	7 - 9	60 - 80
	Intake insulator	M4	30 - 45	3 - 4.5	26 - 40
Handle	Rear handle assembly with compression spring	M5	50 - 75	5 - 7.5	45 - 65
		M5 [†]	30 - 50	3 - 5	26 - 45
Others	Brake lever	M5	30 - 45	3 - 4.5	26 - 40
	Brake cover	M4 [†]	15 - 25	1.5 - 2.5	13 - 22
	Guide bar nut	M8	200 - 230	20 - 23	175 - 200
Regular bolt, nut, and screw		M4	15 - 25	1.5 - 2.5	13 - 22
		M5	25 - 45	2.5 - 4.5	22 - 40
		M6	45 - 75	4.5 - 7.5	40 - 65

LM: Left-hand thread [†]Tapping screw

1-4 Special repairing materials

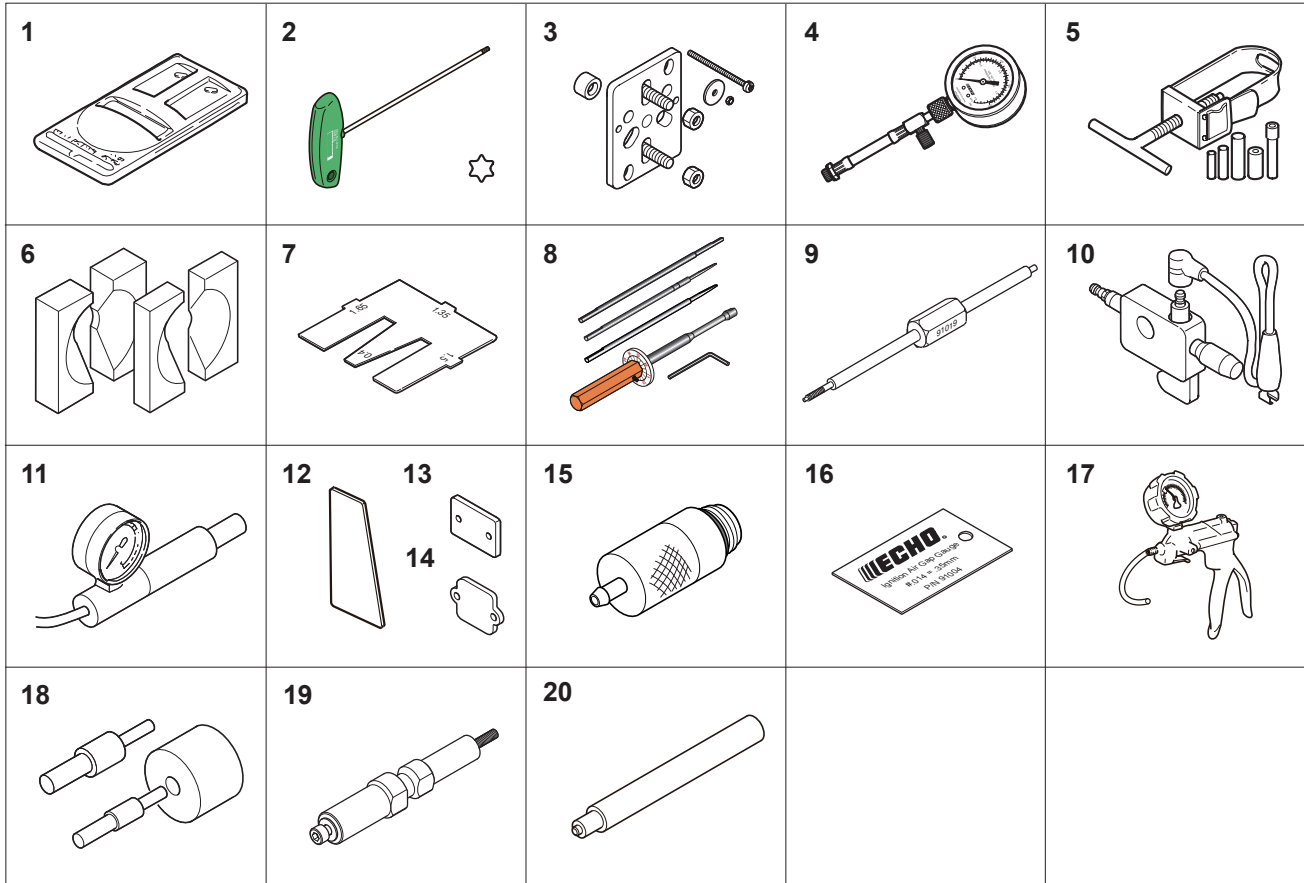
Material	Location	Remarks
Adhesive	Ball bearing outer / crankcase	Loctite #675 or equivalent
Liquid gasket	Crankcase seams	ThreeBond 1207D
Grease	Clutch needle bearing	EPNOC AP2 (Lithium based grease) P/N X695-000060
	Starter center shaft	
	Auto-oiler assembly gear part	
	Worm gear	
	Oil seal inner lips	

1-5 Service Limits



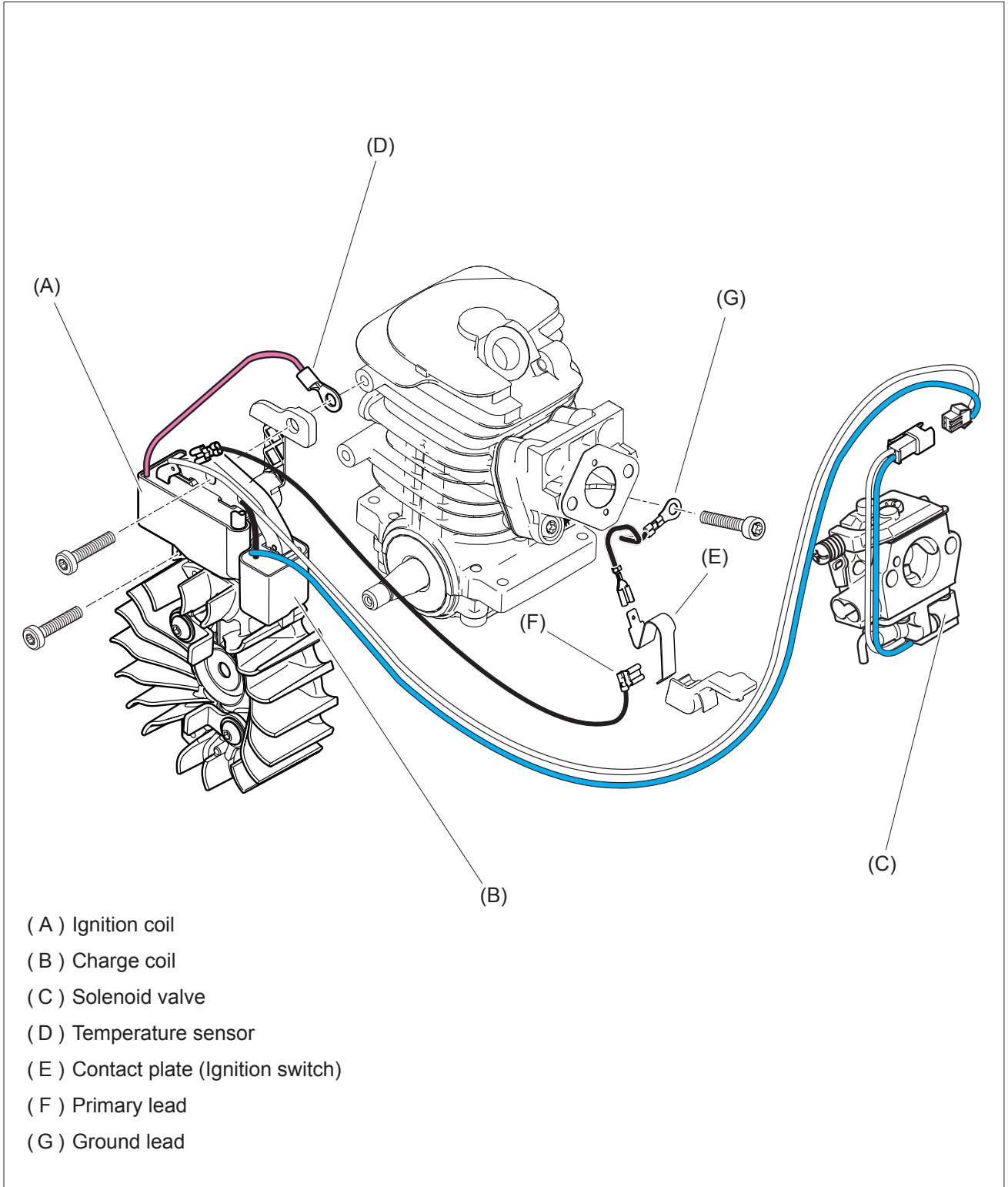
Description		mm (in)
A Cylinder bore		When plating is worn and aluminium can be seen
B Piston outer diameter	Min.	39.90 (1.571)
C Piston pin bore	Max.	9.035 (0.3557)
D Piston ring groove	Max.	1.6 (0.063)
E Piston ring side clearance	Max.	0.1 (0.004)
F Piston pin outer diameter	Min.	8.98 (0.3535)
G Piston ring width	Min.	1.45 (0.057)
H Piston ring end gap	Max.	0.5 (0.02)
K Con-rod small end bore	Max.	13.000 (0.5118)
L Crankshaft runout	Max.	0.02 (0.001)
M Sprocket bore	Max.	12.80 (0.5039)
N Clutch drum bore	Max.	61.5 (2.42)
P Sprocket wear limit	Max.	0.5 (0.02)

1-6 Special tools



Key	Part Number	Description	Reference
1	897802-33330	Tachometer PET-1000R	Measuring engine speed to adjust carburetor
2	X602-000340	Torx wrench (T27)	Removing and installing bolt
3	Y089-000111	Puller	Removing magneto rotor
4	91037	Compression gauge	Measuring cylinder compression
5	897702-30131	Piston pin tool	Removing and installing piston pin
6	897701-02830	Bearing wedge	Removing ball bearings on crankshaft
7	897563-19830	Metering lever gauge	Measuring metering lever height on carburetor
8	Y089-000095	Carburetor adjustment tool	Adjusting carburetor
9	91019	Limiter cap tool	Removing and installing limiter cap
10	897800-79931	Spark tester	Checking ignition system
11	897803-30133	Pressure tester	Testing Carburetor and crankcase leakage
12	91041	Pressure rubber plug	Plugging exhaust port to test crankcase/cylinder leakages
13	897826-16131	Pressure rubber plug	Plugging intake port to test crankcase/cylinder leakages
14	897827-16131	Pressure plate	Plugging intake port to test crankcase/cylinder leakages
15	A131-000150	Pressure connector	Testing crankcase and cylinder leakage
16	91004	Module air gap gauge	Adjusting pole shoe air gaps
17	91149	Pressure / vacuum tester	Testing crankcase / cylinder leakages
18	897705-11520	Bearing tool	Replacing needle bearing on con-rod small end
19	Y089-000131	Auto-oiler puller	Removing pencil type Auto-oiler
20	91073A	Auto-oiler installer	Installing pencil type Auto-oiler

2 SERVICE HINT FOR AUTO CHOKE SYSTEM



2-1 Auto choke system

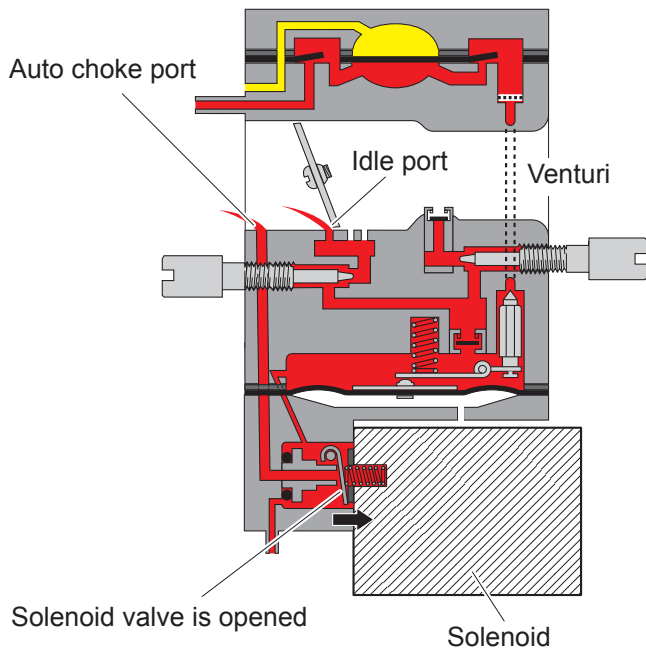
Auto choke system consists of solenoid valve on carburetor and temperature sensor and charge coil on ignition coil (Refer to page 7).

Auto choke system measures cylinder temperature when engine starts. When the engine is cold, solenoid valve on carburetor opens to supply fuel into carburetor venturi more than warm up condition.

Thanks to this function, no pulling choke action is required, and engine idling right after cold start is stable.

2-2 Auto choke system structure and working principle

When engine is cold



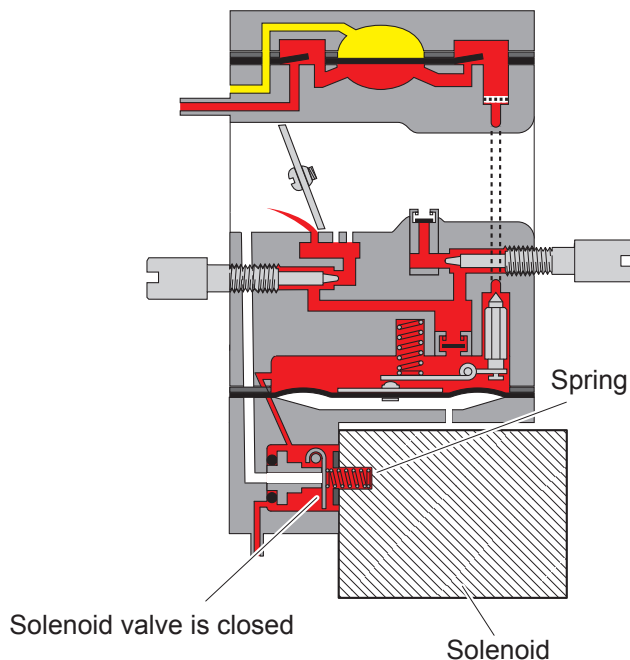
1. When ignition switch is turned on and recoil starter is pulled, electricity is supplied to ignition coil. Then, temperature sensor on ignition coil measures cylinder temperature and determines whether auto choke system is activated or not.

2. While engine is cold, electricity is supplied to solenoid to generate magnetic force, and then solenoid valve opens.

3. When recoil starter is pulled, additional fuel is supplied from auto choke port.

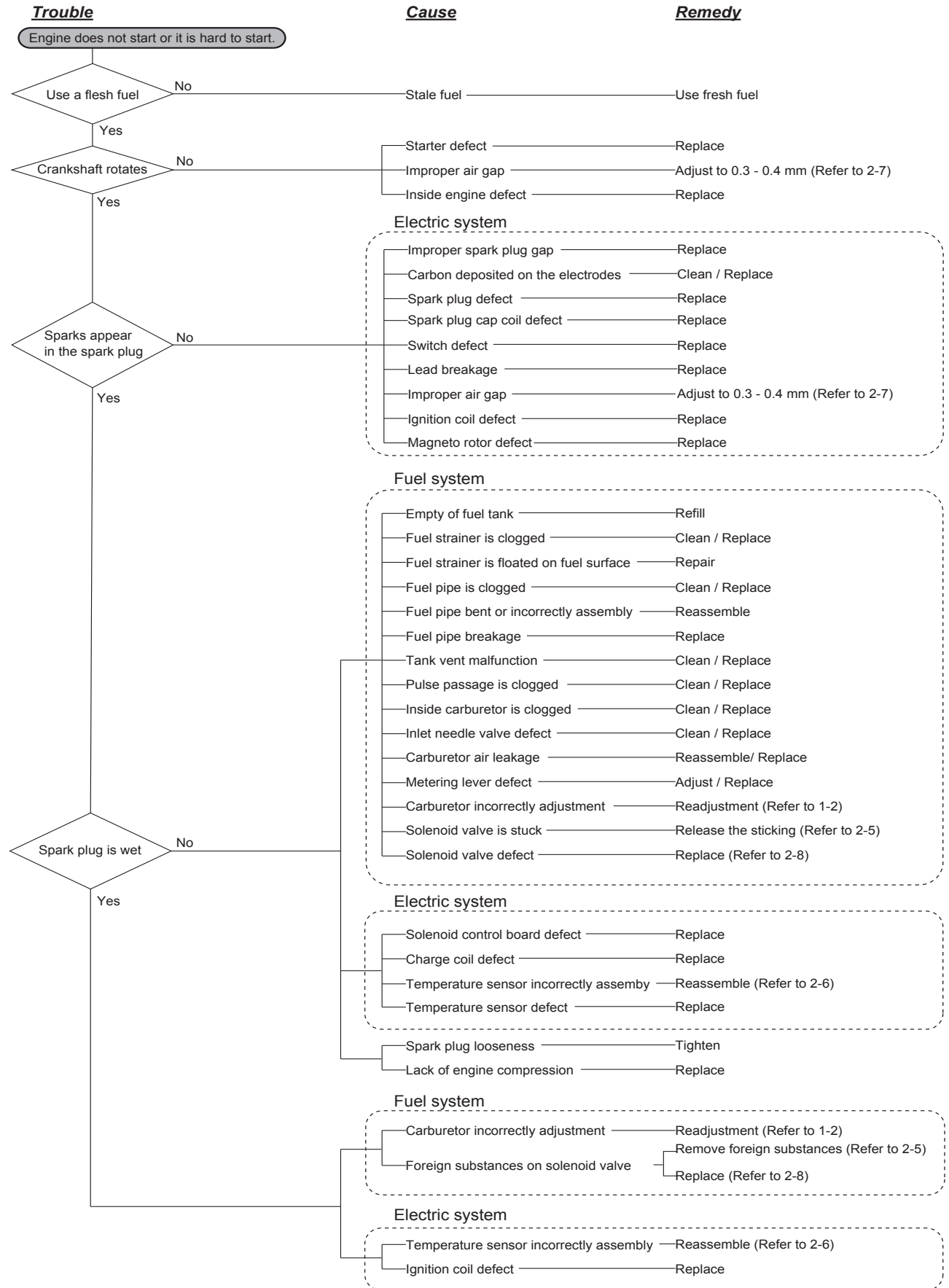
4. As a result, air-fuel ratio becomes richer by increasing fuel supply without changing amount of air.

When engine is warm



5. After engine starts, ignition coil measures engine speed. When the engine speed reaches specified value or more, stops electricity supply to solenoid valve. Solenoid valve is closed by spring force and stops discharge of fuel from auto choke port.

2-3 Troubleshooting guide



2-3 Troubleshooting guide (continued)

<u>Trouble</u>	<u>Cause</u>	<u>Remedy</u>
Engine starts but instability	Electric system	
	Improper air gap	Adjust to 0.3 - 0.4 mm (Refer to 2-7)
	Improper spark plug gap	Replace
	Carbon deposited on the electrodes	Clean / Replace
	Spark plug defect	Replace
	Ignition coil defect	Replace
	Magneto rotor defect	Replace
	Fuel system	
	Stale fuel	Use fresh fuel
	Air filter is clogged	Clean / Replace
	Fuel strainer is clogged	Clean / Replace
	Carburetor incorrectly adjustment	Readjustment (Refer to 1-2)
	Fuel pipe is clogged	Clean / Replace
	Fuel pipe bent or incorrectly assembly	Reassemble
	Fuel pipe breakage	Replace
	Tank vent malfunction	Clean / Replace
	Pulse passage is clogged	Clean / Replace
	Inside carburetor is clogged	Clean / Replace
	Inlet needle valve defect	Clean / Replace
	Carburetor air leakage	Reassemble/ Replace
	Carburetor metering lever defect	Adjust / Replace
	Carburetor diaphragm defect	Replace
	Carburetor solenoid valve defect	Replace (Refer to 2-8)
	Wear of Piston assy O-ring for carburetor acceleration pump	Replace
	Engine	
	Cylinder fins are clogged	Clean
	Intake bellows leakage	Replace
	Crankcase air leakage	Replace
Carbon deposited on the exhaust port	Clean / Replace	
Carbon deposited in the combustion chamber	Clean / Replace	
Lack of engine compression	Repair	
Throttle defect	Repair	

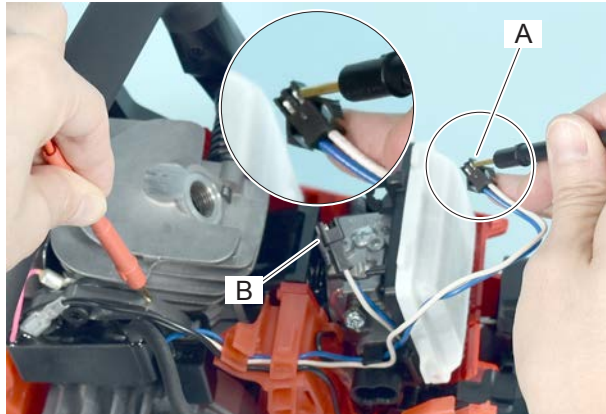
2-4 Diagnosis of auto choke system

When engine does not start or when it is hard to start, diagnose the unit in the following procedure.

Tool Required:

Digital multimeter (Resistance range: 500Ω and more) *Analog multimeter can not be measured correctly.

NOTE: Before starting the following procedure, make sure that the engine is cold.



-- Diagnosis of Solenoid control board and Charge coil --

1. Remove cylinder cover. Disconnect connector (A) of ignition coil from connector (B) of carburetor.
2. Measure coil resistance as follows:

If the coil resistance is abnormal, replace ignition coil with new one.

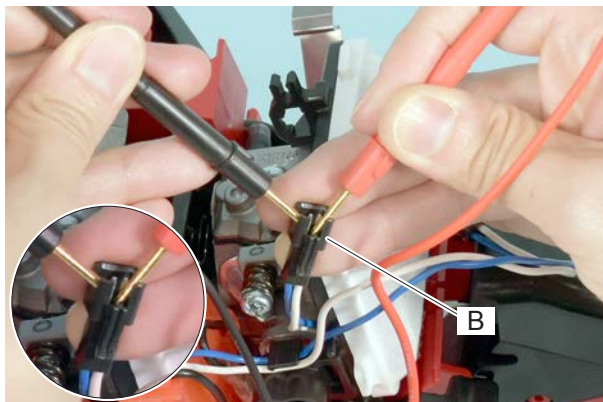
NOTE: Charge coil can not be replaced only. Replace together with ignition coil.

Diagnosis of Solenoid control board

Connection	Multimeter range	Normal resistance	Abnormal resistance
Ignition coil iron core - Plus of multimeter Ignition coil "White" lead terminal - Minus of multimeter	Minimum	Infinity*	Approx. 0 Ω

Diagnosis of Charge coil

Connection	Multimeter range	Normal resistance	Abnormal resistance
Ignition coil iron core - Plus of multimeter Ignition coil "Bule" lead terminal - Minus of multimeter	Minimum	Infinity*	Approx. 0 Ω



-- Diagnosis of Carburetor solenoid --

1. Remove cylinder cover. Disconnect connector of ignition coil from connector (B) of carburetor.
2. Measure coil resistance as follows:

If the coil resistance is abnormal, replace carburetor solenoid with new one (Refer to **2-8 Replacing solenoid valve on carburetor**).

Diagnosis of Carburetor solenoid

Connection	Multimeter range	Normal resistance	Abnormal resistance
Solenoid "White" lead terminal - Plus of multimeter Solenoid "Bule" lead terminal - Minus of multimeter	Minimum range which can measure 500 Ω	400 - 500 Ω	Out of the normal range

2-5 Remedy for auto choke failure

-- When Solenoid valve may be clogged with foreign substances --

According to "2-3 Troubleshooting guide", when engine does not start and spark plug is wet with fuel, solenoid valve may be forced to be open by foreign substances and fuel is excessively supplied to cylinder. Start engine as follows and circulate fuel in carburetor to remove the foreign substances on solenoid valve.



1. Remove spark plug (A) and wipe off the fuel with a clean cloth.



2. Face spark plug hole (B) downwards. Blow fuel in cylinder by pulling starter grip 5 to 10 times as shown.

WARNING  **DANGER**

Fuel may come out form spark plug hole. Do not smoke and bring flame or sparks near the fuel.

3. Reinstall spark plug (A). Disconnect connector of ignition coil from connector of carburetor (Refer to **2-4 Diagnosis of auto choke system**). Install cylinder cover (D).

4. Start engine. When engine does not start, repeat above steps 1 to 3.

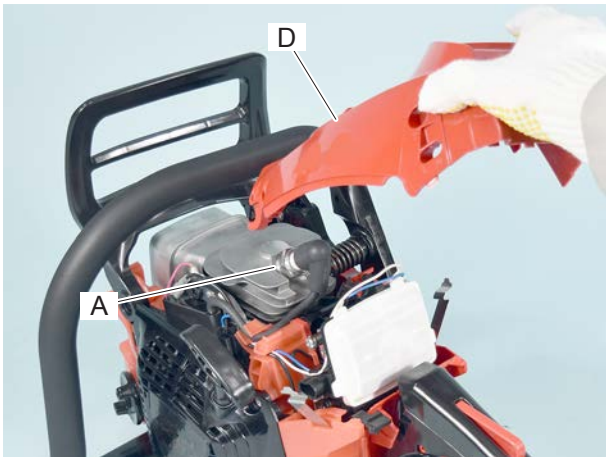
If engine does not start after repeating above steps, because carburetor body may have a problem (such as check valve failure, inlet needle valve seal failure, etc.). Check, clean or replace carburetor body if necessary.

5. When engine starts, warm engine for 100 seconds alternating engine speed between WOT and idle every 5 seconds.

6. Stop engine and leave the engine for a while until cool down.

7. Remove cylinder cover and connect connector of ignition coil to connector of carburetor. Then, re-install cylinder cover.

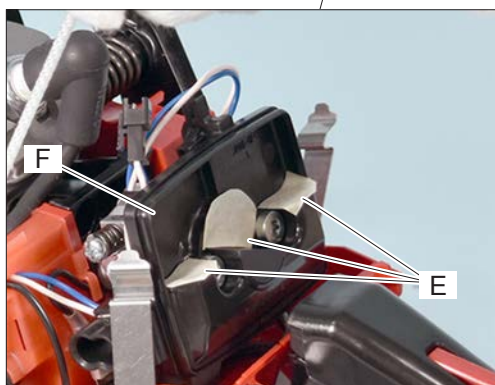
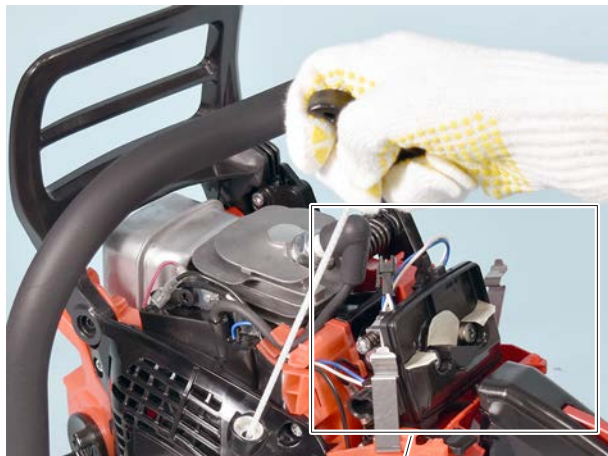
8. When engine can be started smoothly with engine is cold, the foreign substances on solenoid valve could be removed.



2-5 Remedy for auto choke failure (continued)

-- When Solenoid valve may be stuck --

According to "2-3 Troubleshooting guide", when solenoid valve is stuck and fuel is not supplied to auto choke port of carburetor, start engine as follows and release the sticking.



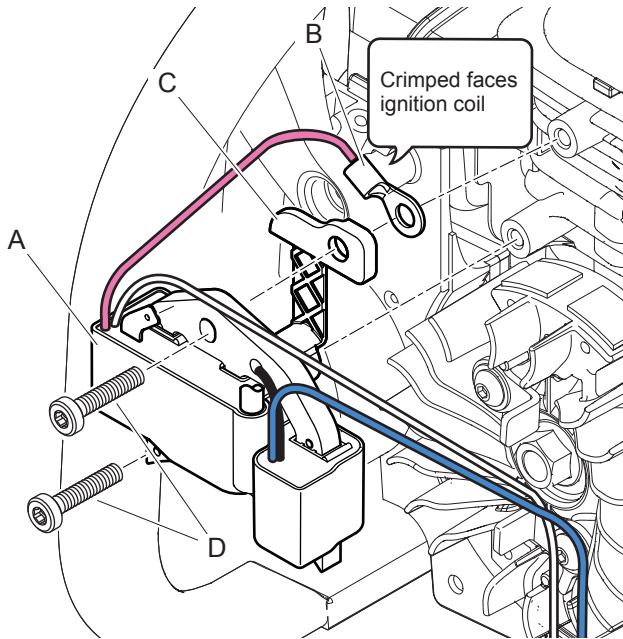
1. Remove cylinder cover and air filter from unit.
2. Disconnect connector of ignition coil from connector of carburetor (Refer to **2-4 Diagnosis of auto choke system**).
3. Cover air port of element holder (F) using tapes (E) or equivalent as shown.
4. Turn on ignition switch and pull starter grip once.

WARNING  **DANGER**

When pulling starter, wear safety gloves and do not touch engine. Otherwise, a burn will result.

5. Remove tapes (E) from element holder (F) quickly and reinstall cylinder cover and air filter.
6. Pull starter grip until engine starts.
7. Warm engine for 100 seconds alternating engine speed between WOT and idle every 5 seconds.
8. Stop engine and leave the engine for a while until cool down.
9. Connect connector of ignition coil to connector of carburetor.
10. When engine can be started smoothly with engine is cold, the sticking could be released. If it does not, repeat above steps or replace metering cover assembly which has the solenoid valve with new one (Refer to **2-8 Replacing solenoid valve on carburetor**).

2-6 Installing ignition coil



When replacing ignition coil, install new ignition coil as follows:

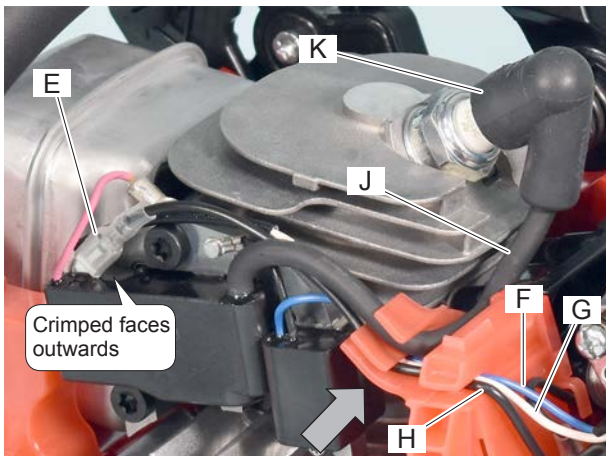
1. Loosely install ignition coil (A), temperature sensor (B) and spacer (C) with two bolts (D) as shown.

2. Set air gap (Refer to **2-7 Setting pole shoe air gaps**), and then tighten two bolts (D).

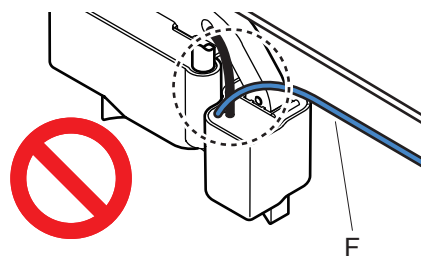
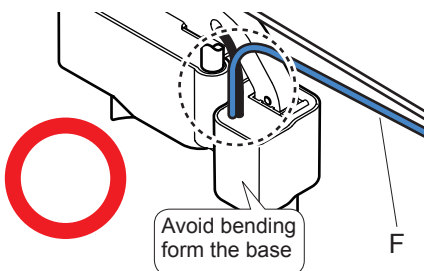
3. Connect terminal (E) of ignition switch to ignition coil as shown.

4. Install ignition coil wires (F, G) and ignition switch wire (H) to engine cover ribs in the following order: blue lead (F), white lead (G), black lead (H).

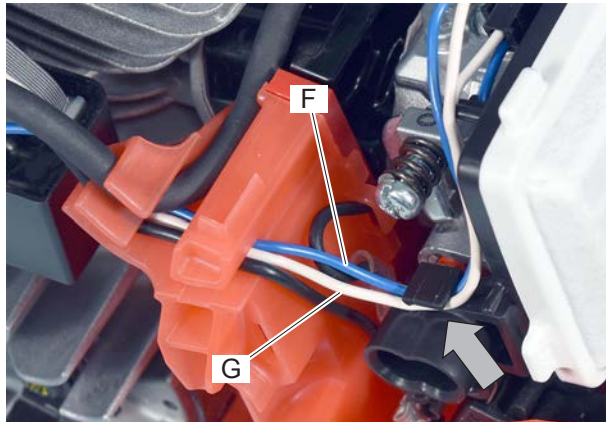
5. Install spark plug cap (K) to spark plug, installing high tension lead (J) to engine cover rib as shown.



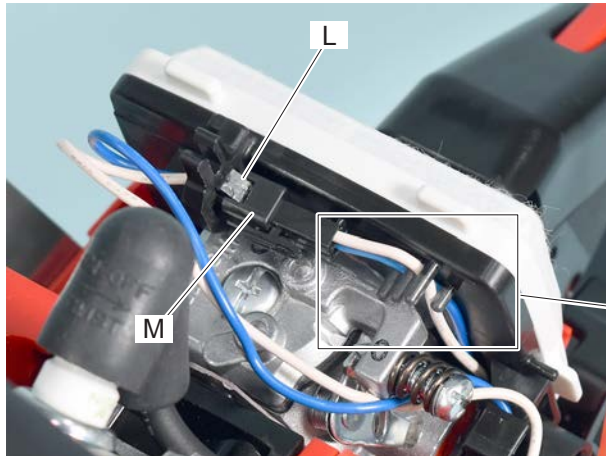
NOTE: Install ignition coil wire (F) as shown below to avoid breaking of the wire.



2-6 Installing ignition coil (continued)

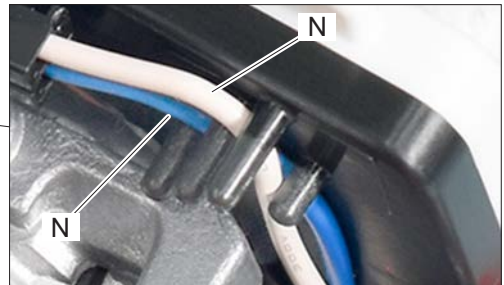


6. Install ignition coil wires (F, G) to element holder rib in the following order: blue wire (F), white wire (G) as shown.



7. Plug connector (L) of ignition coil into element holder, and then connect the connector (L) to connector (M) of carburetor.

8. Install carburetor wires (N) to element holder ribs as shown.



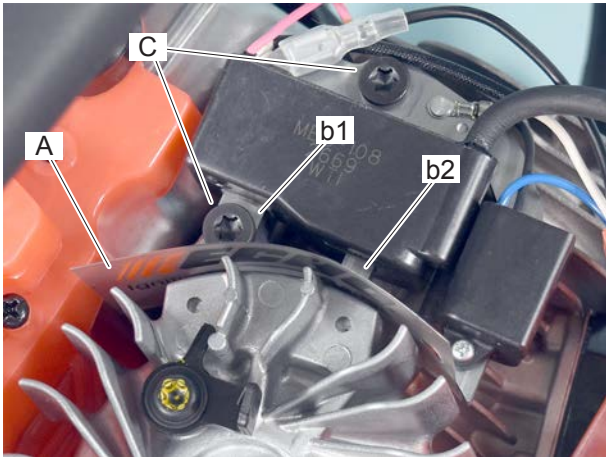
9. Install ignition wires (P, Q) to element folder ribs as shown.



10. Intall the wires (P, Q) to element holder rib in the following order: bule wire (P), white wire (Q).

11. Reassemble removed parts.

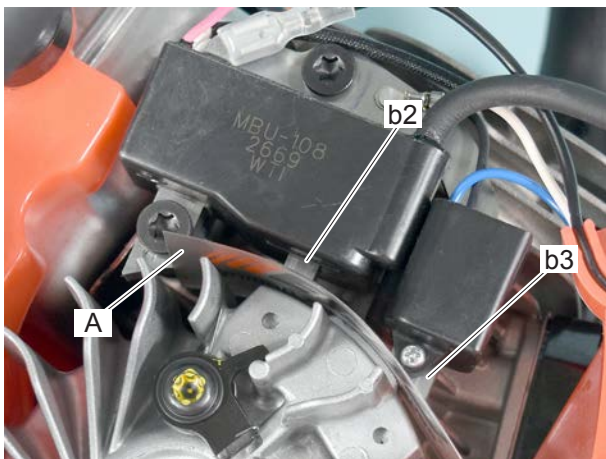
2-7 Setting pole shoe air gaps



1. Insert Module air gap gauge: 91004 (A) or 0.3 - 0.4 mm (0.012 - 0.016 in) thick feeler gauge between flywheel and ignition coil shoes (b1) and (b2).

2. Rotate flywheel until magnetic poles of flywheel face ignition coil shoes (b1) and (b2).

3. Hold ignition coil against flywheel and tighten two bolts (C) to specified torque (Refer to **Service information 1-3 Torque limits**). After tightening the bolts, remove Module air gap gauge: 91004 (A) (or feeler gauge).



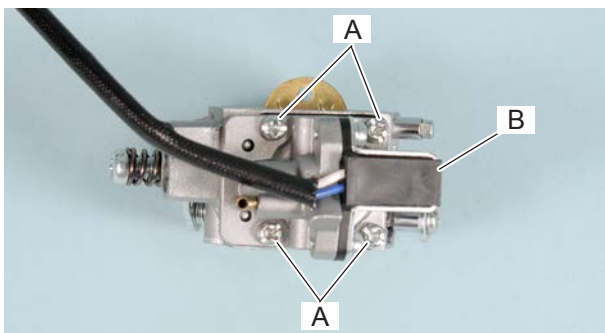
4. Insert Module air gap gauge: 91004 (A) or 0.3 - 0.4 mm (0.012 - 0.016 in) thick feeler gauge between flywheel and ignition coil shoes (b2) and (b3).

5. Rotate flywheel until magnetic poles of flywheel face ignition coil shoes (b2) and (b3).

6. If Module air gap gauge (or feeler gauge) can be removed easily or can not be inserted in step 4, go back step1.

NOTE: When air gap is too narrow, contact with flywheel may result. When the air gap is too wide, spark is weak.

2-8 Replacing solenoid valve on carburetor



[Removing]

1. Remove carburetor from the unit.
2. Remove four screws (A).
3. Remove metering cover assembly (B) which has solenoid valve.

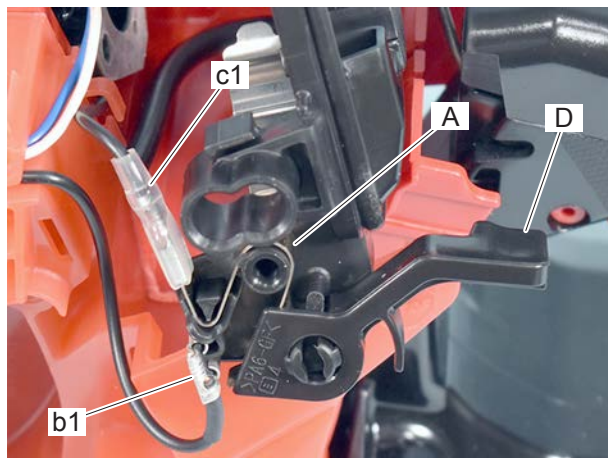


[Installing]

4. Install metering cover assembly (B) with the four bolts.

3 SERVICE HINT FOR IGNITION SWITCH

3-1 Inspecting ignition switch



1. Inspect contact plate (A), terminal (b1) of ignition coil and terminal (c1) of ground lead.
2. Clean if blocked with wood debris, and replace with new one if defective.
3. Inspect that contact plate (A) contacts terminal (b1) of ignition coil when pushing switch knob (D).
4. If not, reassemble the parts or replace defective part(s) with new part(s) as necessary.



[Inspecting ignition coil lead]

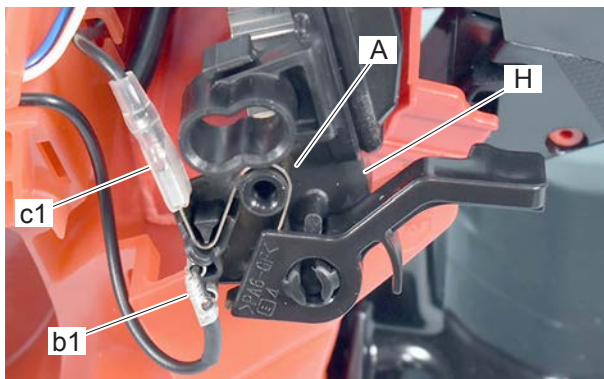
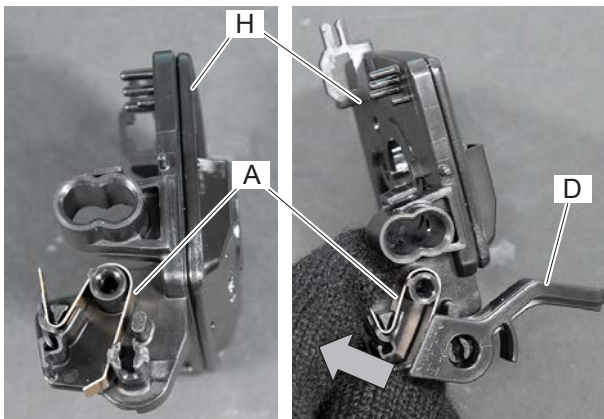
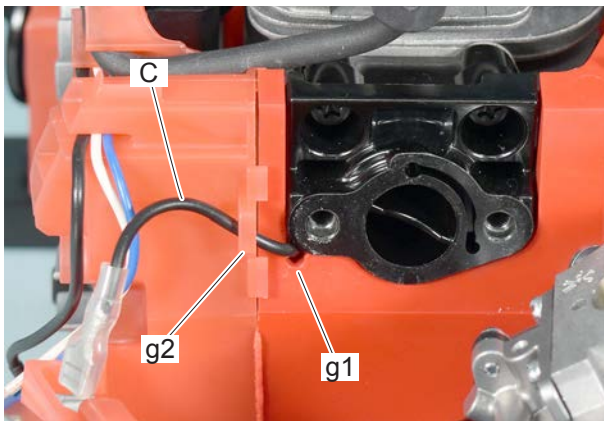
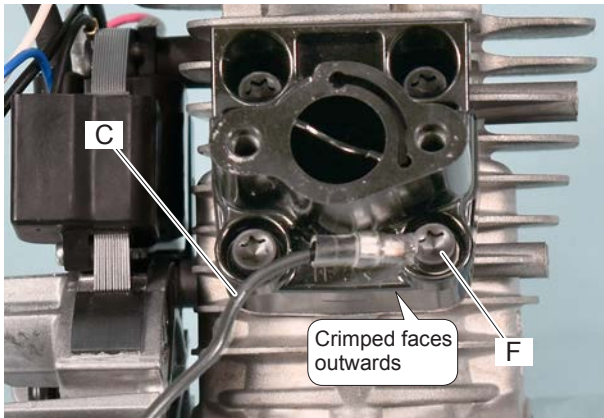
5. Connect one probe of ohm-meter or multi meter to one terminal (b1) of ignition coil.
6. Connect the other probe to other terminal (b2) of ignition coil.
7. Tester should show that the circuit is in conducting state. If not, replace with new one.



[Inspecting ground lead]

8. Connect one probe of ohm-meter or multi meter to terminal (c1) of ground lead.
9. Connect the other probe to cylinder (E).
10. Tester should show that the circuit is in conducting state.
11. If not, inspect continuity of ground lead by itself.
12. Tester should show that the circuit is in conducting state. If not, replace with new one.

3-2 Replacing ignition switch

**[Replacing ground lead]**

1. Remove engine mount from engine cover.
2. Remove ground lead (C) with bolt (F).
3. Install new ground lead with bolt (F).

4. Install engine mount to engine cover, positioning the ground lead (C) in notch (g1) of engine cover.
5. Pass the ground lead (C) through guide (g2) of engine cover.

[Replacing contact plate]

6. Remove contact plate (A) from element holder (H).
7. Install contact plate (A) to element holder (H).
8. Install switch knob (D) to element holder (H), pushing contact plate (A) to the arrow.

9. Connect terminal (c1) of ground lead to contact plate (A) as shown.

10. Connect terminal (b1) of ignition coil to element holder (H) as shown.

11. Reassemble removed parts.