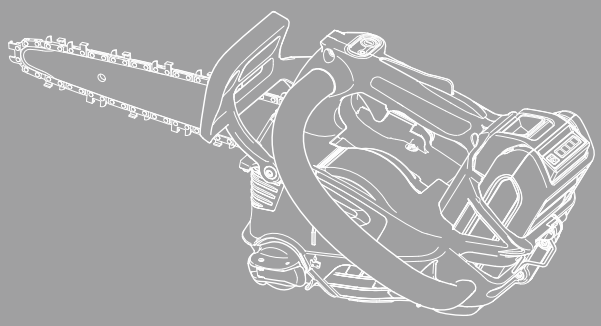


SERVICE MANUAL

ECHO: DCS-2500T

(Serial number: 35000001 and after)

Ref. No. 401-46

INTRODUCTION

This service manual contains information for service and maintenance of **ECHO BATTERY CHAINSAW, model DCS-2500T**.

For systematic diagnosis, to avoid extra work and time loss, please refer to “Troubleshooting chart” that describes problems, testing, remedies and references. We recommend you make use of Operator’s Manual and Parts Catalogue together with this manual when servicing.

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, illustrations and directions in this manual are based on the latest product information available at the time of publication.

Page

1 SERVICE INFORMATION 2
1-1 Specifications 2
1-2 Technical data 3
1-3 Torque limits 3
1-4 Special repairing materials 3
1-5 Special tools 3
1-6 Wiring diagram 4

2 TROUBLESHOOTING 5
2-1 Error indicator 5
2-2 Troubleshooting chart 6

3 CHAIN BRAKE SYSTEM 15
3-1 Replacing brake lever and chain brake parts . 16

4 SAW CHAIN LUBRICATION SYSTEM 18
4-1 Inspecting oil cap and strainer 19
4-2 Inspecting and replacing worm gear 20
4-3 Inspecting oil line 20
4-4 Cleaning and repairing auto-oiler 21
4-5 Replacing oil tank vent 24

5 SWITCH AND TRIGGER 25
5-1 Inspecting power switch and variable speed switch 26
5-2 Installing switches and trigger lever 28

6 MORTOR AND CONTROL SYSTEM 30
6-1 Inspecting control board 31
6-1 Inspecting motor 32
6-3 Installing motor and control board 33

Page

7 GUIDE BAR MOUNTING SYSTEM 36
7-1 Replacing nut for fixing guide bar 36
7-2 Assembling chain tensioner 37
7-3 Inspecting sprocket 38

8 BATTERY AND CHARGER 39
8-1 Battery LED indicator 40
8-2 Charger LED indicator 40
8-3 Inspecting battery 41

9 MAINTENANCE GUIDE 42
9-1 Disassembly chart 42
9-2 Service Intervals 43

1 SERVICE INFORMATION

1-1 Specifications

Dimensions*	Length	mm(in)	259 (10.2)
	Width	mm(in)	188 (7.4)
	Height	mm(in)	209 (8.2)
Dry weight**		kg(lb)	1.6 (3.5)
Motor	Type		DC electric motor
	Rotation		Clockwise as viewed from the output end
	Rated current	A	22.1
	Rated voltage	V	50.4
	Rated output	kW	0.91
Li-Ion Battery	Standard battery		LBP-560-100
	Rated voltage	V	50.4
	Capacity	Ah / Wh	1.82 / 92
	Weight	kg(lb)	1.0 (2.2)
Battery charger	Standard charger		LCJQ-560C
	Input voltage	V	AC220-240
	Rated output	V	58.1
Guide bar / Saw chain lubrication type			Automatic oil pump
Oil	Tank capacity	L (UK.fl.oz.)	0.12 (4.1)
Auto oiler	Type		Motor driven type
Sprocket	Type		Spur

* Without guide bar and saw chain ** Without battery, guide bar and saw chain

Cutting devices			***Sprocket nose bar***	***Carving bar***	
Guide bar	Type		C25S91-40SL	C25HA4-60CL	C20HA4-52CL
	Called length	cm	25		20
	Gauge	in	0.050	0.043	
Saw chain	Type		OREGON 91PX	SUGIHARA A4S	
	Number of drive links		40	60	52
	Pitch	in	3/8	1/4	
	Gauge	in	0.050	0.043	
Sprocket	Number of teeth		6	8	
	Pitch	in	3/8	1/4	

1-2 Technical data

Motor	Speed at maximum power	r/min	10000
Speed control		r/min	Low (4000 r/min) - High (10000 r/min)
Battery	Charging time	min.	24 (80%) / 42 (100%)
	Operating time/one charge*	min.	20.8
Chain oil discharge volume at 7,000 r/min		mL/min (US.fl .oz./min)	Adjustable : 1.8 - 12.5 (0.06 - 0.42)

*It varies according to work.

1-3 Torque limits

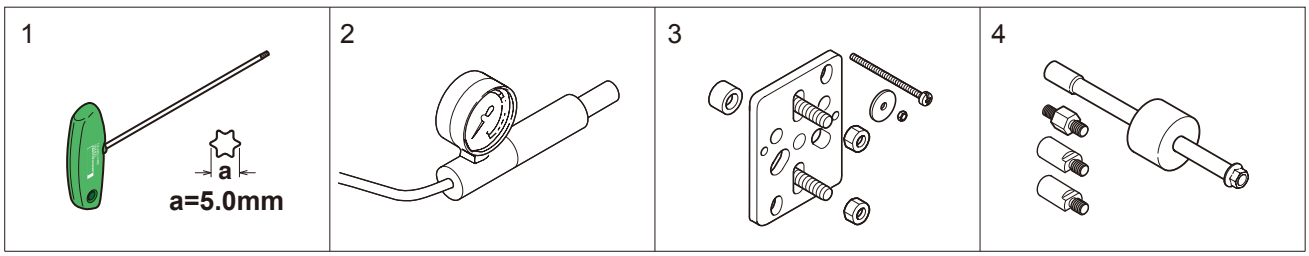
Descriptions		Size	kgf•cm	N•m	lbf•in
Motor	Motor assembly	M5	30 - 45	3 - 4.5	26 - 40
	Motor cover assembly	M4†	20 - 35	2 - 3.5	17 - 30
Others	Front handle	M5†	50 - 60	5 - 6	45 - 52
	Brake lever (Hand guard)	M5	30 - 40	3 - 4	26 - 35
	Brake cover	M4†	20 - 35	2 - 3.5	17 - 30
	Chain catcher	M5	30 - 45	3 - 4.5	26 - 40
	Sprocket guard plate (Sprocket guard side)	M4†	15 - 25	1.5 - 2.5	13 - 22
	Auto oiler assembly	M4†	20 - 35	2 - 3.5	17 - 30
Regular bolt, nut and screw		M3	6 - 10	0.6 - 1	5 - 9
		M4	15 - 25	1.5 - 2.5	13 - 22
		M5	25 - 45	2.5 - 4.5	22 - 40

† Tapping screw

1-4 Special repairing materials

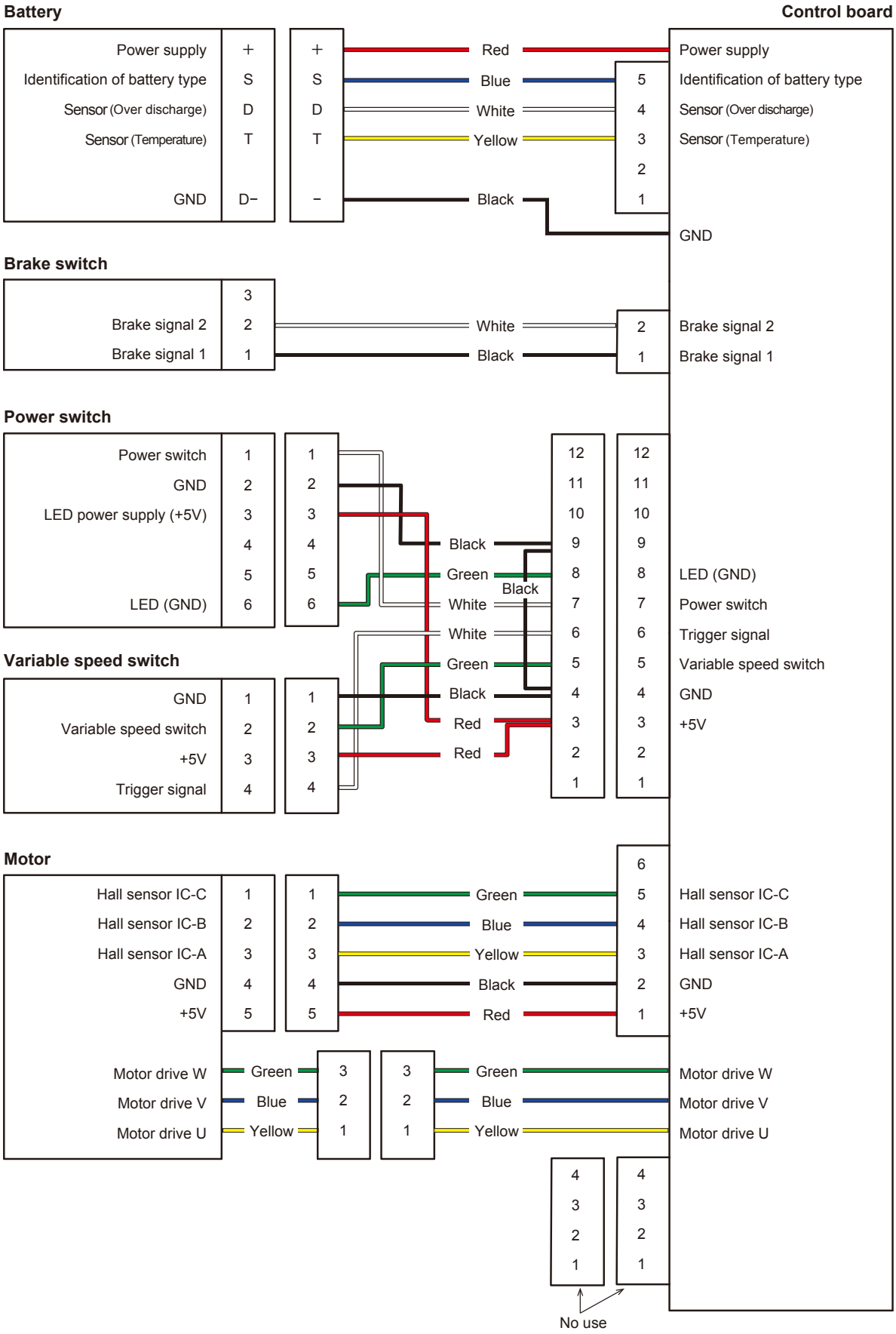
Material	Location	Remarks
Grease	Worm gear, auto-oiler	EPNOC AP2 (Lithium based grease) P/N X695-000060

1-5 Special tool



Key	Part Number	Description	Reference
1	X602-000340	Torx wrench (T27)	Removing and installing torx bolt
2	897803-30133	Pressure tester	Testing oil line leakage
3	Y089-000111	Puller	Removing plug from auto-oiler assembly
4	P021-044871	PTO shaft puller	Removing plug from auto-oiler assembly

1-6 Wiring diagram



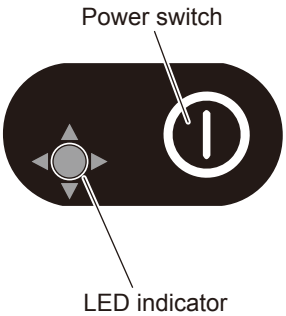
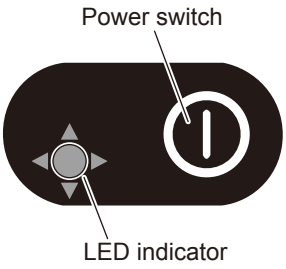
2 TROUBLESHOOTING

WARNING ⚠ DANGER

Do not open, crush, heat above 60°C or incinerate batteries. Do not use damaged or deformed batteries. Failure to follow these rules may result in electric shock, fire, and/or serious personal injury.

2-1 Error indicator

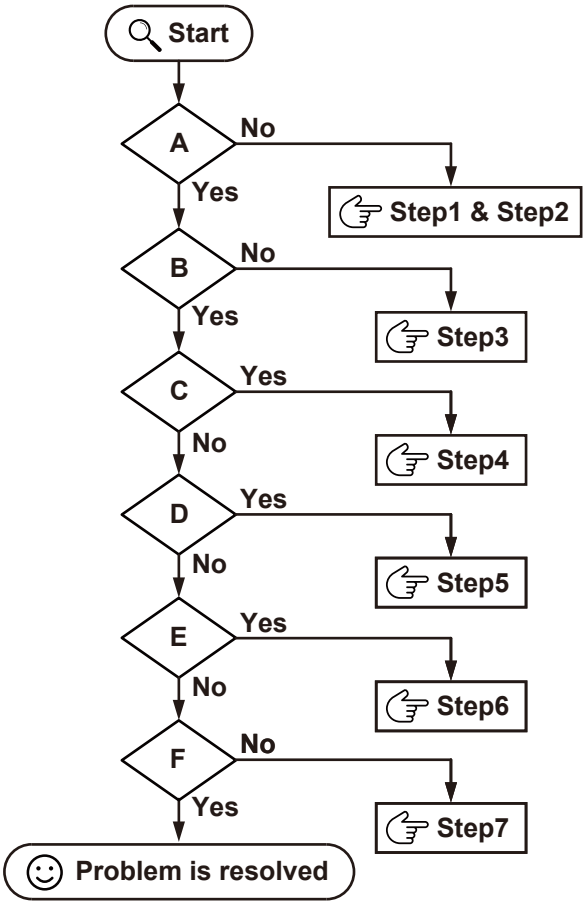
Power indicator LED on power switch flashes as shown when trouble occurs.(Refer to section 2-2)

LED indicator	Cause	How to recover
Flashing ***4*** times per second  	Unit and/or battery is/are too hot or cold.	Warm or cool them to normal temperature.
	Chain brake is activated.	Release the chain brake.
	Throttle trigger was being on and off repeatedly in a short time.	Press power switch to turn off power and then turn on power.
	Motor is blocked.	Press power switch to turn off power and inspect guide bar, saw chain and drive system. Repair or replace as required and then turn on power.
	Motor sensor detects abnormality or its defective. (Refer to Troubleshooting STEP 5 and STEP6 described in Section 2-2)	Repair or replace defective items as needed.
Flashing ***1*** time per second  	Battery capacity is too low.	Charge the battery.
	Battery is defective due to over-discharging, degradation or sensor failure. (Refer to Troubleshooting STEP 4 described in Section 2-2)	Replace the battery with new one.

2-2 Troubleshooting chart

Be sure to begin with “STEP0” when troubleshooting.

Troubleshooting "STEP0"



NOTE: Be sure to release chain brake.

A: Is battery fully charged?

B: Press power switch. Is LED indicator lighting or flashing?

C: Press power switch. Is LED indicator flashing ***1*** time per second?

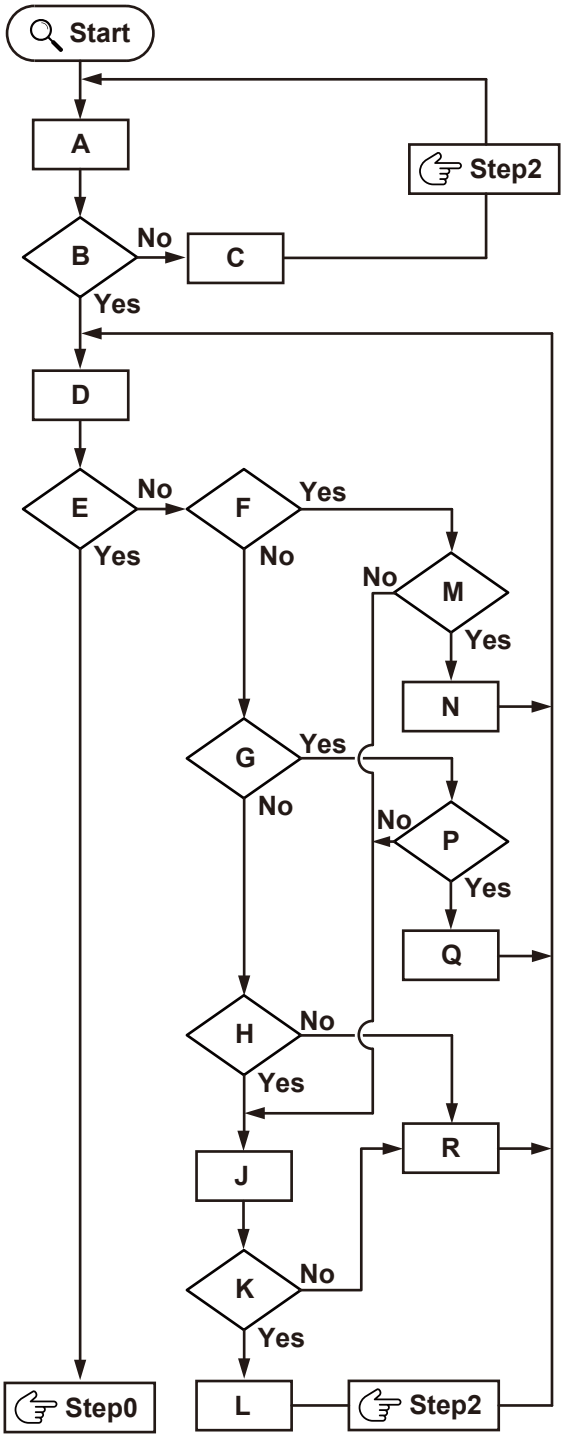
D: Press power switch. Is LED indicator flashing ***4*** time per second?

E: Press power switch and then hold trigger lever. Is LED indicator flashing ***4*** times per second?

F: Does unit run normally?

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP1" ~Checking battery and charger~



A: Press battery buttton ▶ to indicate charging status.

B: Is LED indicator of battery lighting?

C: Go to “Step 2” to find cause of battery failure. After passing Step2 then replace the battery to new one and continue to diagnosis. *.

**** Be sure to check Troubleshooting “Step2” before installing new battery. If the unit has something wrong, the battery can be damaged again.***

D: Charge the battery.

E: Is battery fully charged?

F: Does LED indicator of charger remain red?

G: Is LED indicator of charger flashing red?

H: Does LED indicator of charger light?

J: Prepare good battery and charger and then cross-check.

K: Battery failure?

L: Go to “Step 2” to find cause of battery failure. After passing Step2 then replace the battery to new one and continue to diagnosis. *.

**** Be sure to check Troubleshooting “Step2” before installing new battery. If the unit has something wrong, the battery can be damaged again.***

M: Is battery hot or cold?

N: Cool or warm battery as needed.(Rechargeble temperature of battery inside is 5 to 40°C.)

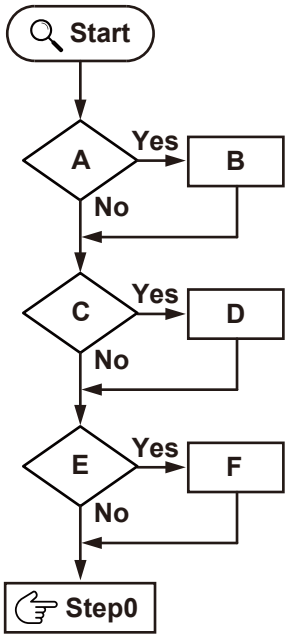
P: Are connectors of battery and charger dirty?

Q: Clean connectors of battery and charger.

R: Replace the charger with new one.

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP2" ~Checking unit in case of battery failure~



A: Are there conductive substances (water, metal pieces, etc.) on the surface of control board? (Refer to Section 6-1)

B: Remove conductive substances (water, metal pieces, etc.) on the surface of control board.

C: Is control board damaged? (Refer to Section 6-1)

D: Replace the control board with new one. (Refer to Section 6-1)

E: Inspect battery connection terminal of control board as follows

1) Control board is short-circuited between battery connection terminal (+) and (-). (Refer to Section 6-1)

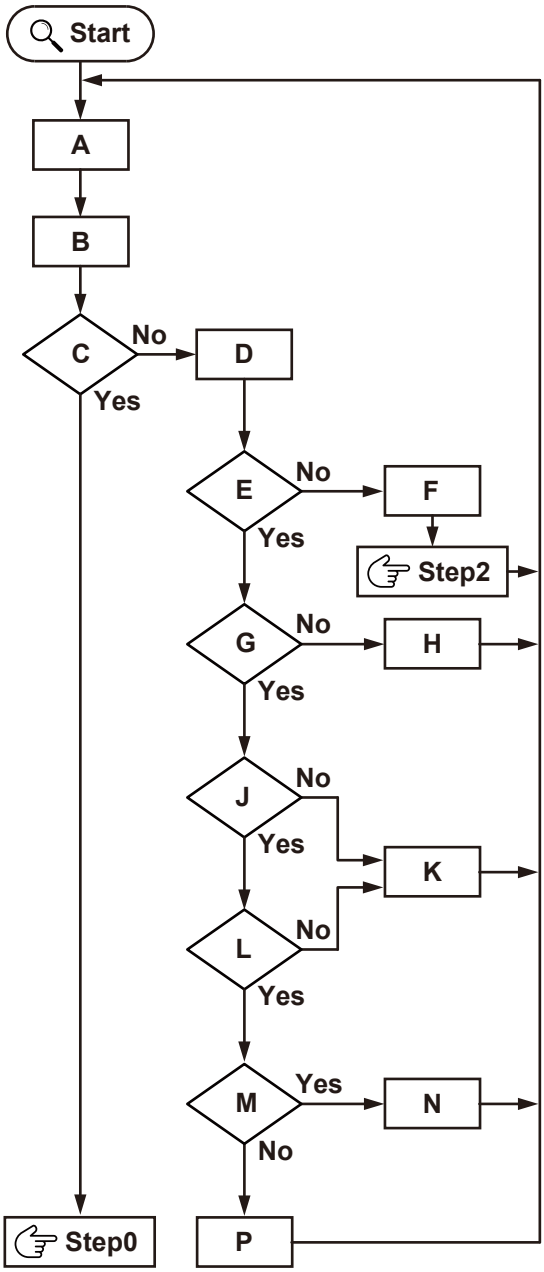
2) Screw(s) on battery connection terminal of control board loosen or come off.

3) Electrical current can not flow through each lead of battery connection terminal.

F: Repair the control board or replace with new one. (Refer to Section 6-3)

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP3" ~Checking power supply circuit~



WARNING DANGER

Verify the safety of the surroundings when doing Troubleshooting STEP3. The machine may run unexpectedly.

A: Install battery on the unit correctly.

B: Release chain brake and press power switch without holding trigger lever.

C: Is LED indicator lighting or flashing?

D: Remove battery from the unit.

E: Is resistance between battery terminal (T) and (D-) 20 kΩ or less when temperature of battery inside is 10°C or higher? (Refer to Section 8-3)

F: Go to "Step 2" to find cause of battery failure. After passing Step2 then replace the battery to new one and continue to diagnosis. *.

**** Be sure to check Troubleshooting "Step2" before installing new battery. If the unit has something wrong, the battery can be damaged again.***

G: Inspect the unit as follows:

1) Each connection between terminals is secure.

2) Each connection of terminal housing and lead is secure.

3) Electrical current can flow through each lead.

H: Repair or replace defective objects as needed.

J: Inspect power switch as follows: (Refer to Section 5-1)

1) Electrical current can flow between terminal "1" and "2" when pressing power switch.

2) Electrical current can not flow between terminal "1" and "2" when not pressing power switch.

K: Replace the power switch with new one. (Refer to Section 5-2)

L: Does LED indicator of power switch light when electrical current flow between terminal "3" and "6" using diode check function of degital multimeter? (Refer to Section 5-1)

M: Is there any short circuit in the following parts?

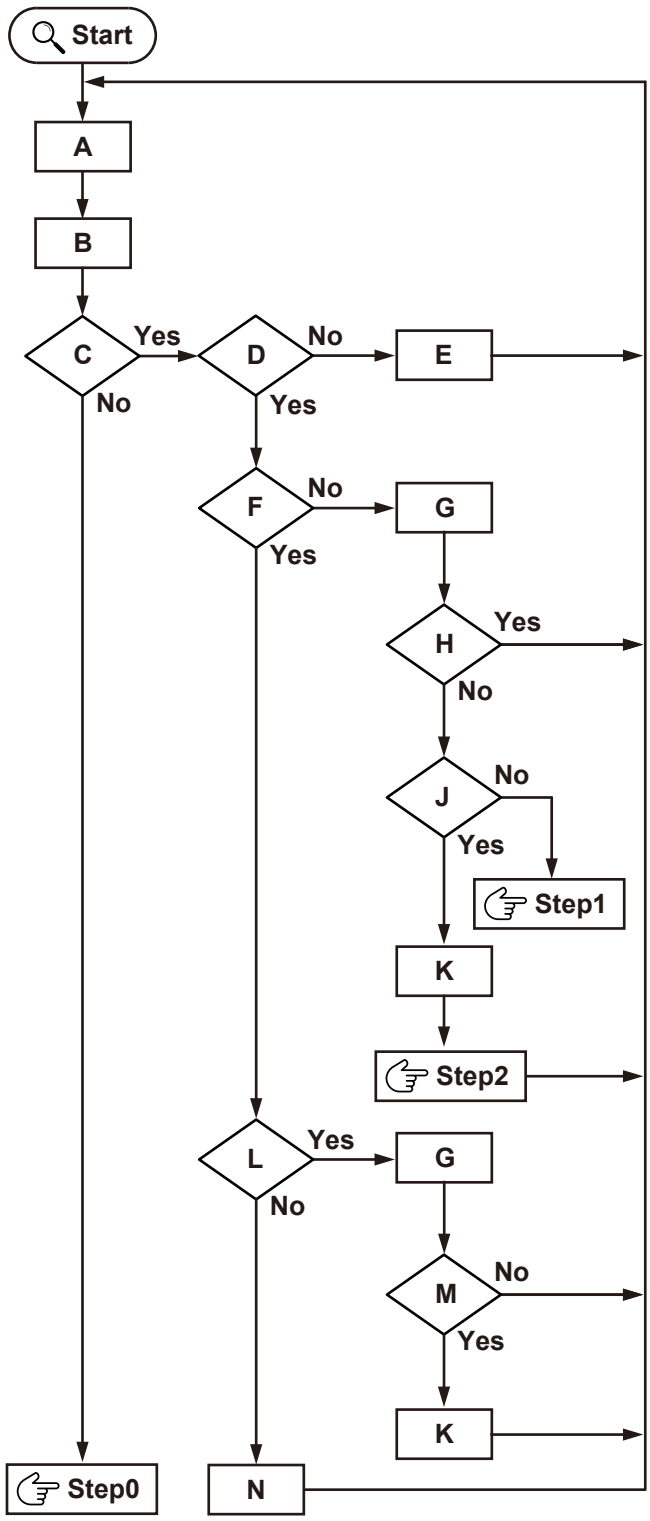
1) Between terminal "2" and "3" of power switch (Refer to Section 5-1)
2) Between terminal "1" and "3" of variable speed switch (Refer to Section 5-1)
3) Between terminal "4" and "5" of motor's 5-pin connector (Refer to Section 6-2)

N: Repair or replace defective object(s) as needed.

P: Replace the control board with new one.(Refer to Section 6-3)

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP4" ~Checking degradation and overdischarge of battery~



A: Install battery on the unit correctly.

B: Release chain brake and press power switch without holding trigger lever.

C: Press power switch. Is LED indicator flashing ***1*** time per second?

D: Inspect the unit as follows:

1) Each connection between terminals is secure.

2) Each connection of terminal housing and lead is secure.

3) Electrical current can flow through each lead.

E: Repair or replace defective object(s) as needed.

F: Is voltage between battery terminal (+) and (D-) 45V or more? (Refer to Section 8-3)

G: Fully charge the battery.

H: Is voltage between battery terminal (+) and (D-) 45V or more? (Refer to Section 8-3)

J: Has Troubleshooting "Step 1" already been done?

K: Go to "Step 2" to find cause of battery failure. After passing Step2 then replace the battery to new one and continue to diagnosis. *.

**** Be sure to check Troubleshooting "Step2" before installing new battery. If the unit has something wrong, the battery can be damaged again.***

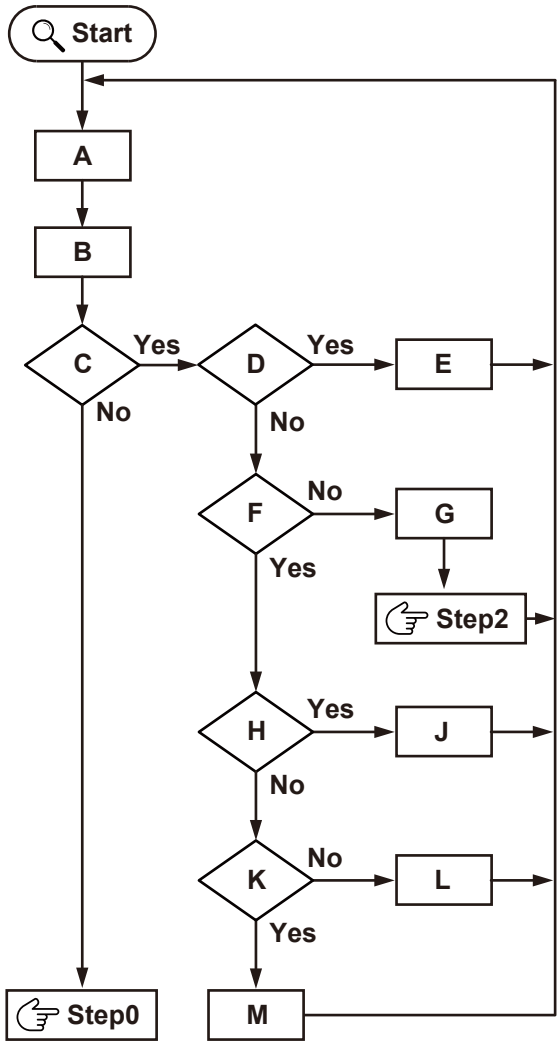
L: Is resistance between battery terminal (D) and (D-) 12 kΩ or more? (Refer to Section 8-3)

M: Has this check (resistance measurement between terminal (D) and (D-) and charging the battery) already been done three times or more?

N: Replace the control board with new one. (Refer to Section 6-3)

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP5" ~Checking each sensor of battery~



WARNING DANGER

Verify the safety of the surroundings when doing Troubleshooting STEP5. The machine may run unexpectedly.

A: Install battery on the unit correctly.

B: Release chain brake and press power switch without holding trigger lever.

C: Press power switch. Is LED indicator flashing ***4*** time per second?

D: Are battery and unit hot or cold?

E: Cool or warm the battery and the unit to normal temperature.

F: Is resistance between battery terminal (T) and (D-) 20 kΩ or less when temperature of battery inside is 10°C or higher? (Refer to Section 8-3)

G: Go to “Step 2” to find cause of battery failure. After passing Step2 then replace the battery to new one and continue to diagnosis. *.

**** Be sure to check Troubleshooting “Step2” before installing new battery. If the unit has something wrong, the battery can be damaged again.***

H: Is voltage between battery terminal (+) and (D-) 62.5 V or more? (Refer to Section 8-3)

J: Replace the battery and charger with new ones.

K: Inspect the unit as follows:

1) Each connection between terminals is secure.

2) Each connection of terminal housing and lead is secure.

3) Electrical current can flow through each lead.

4) There are **no** any short circuits.

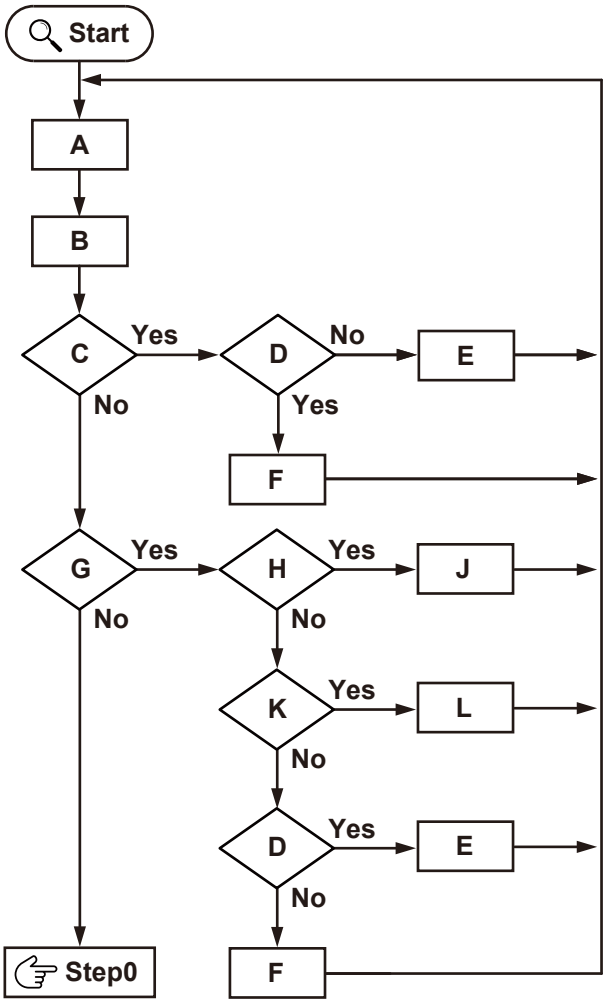
5) There is **no** conductive substance (water, metal pieces, etc.) on the surface of control board.

L: Repair or replace defective object(s) as needed.

M: Control board or motor may be defective. Prepare new control board and motor and then cross-check.Replace the defective one with new one.

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP6" ~Checking brake switch and over load ~



WARNING DANGER

Verify the safety of the surroundings when doing Troubleshooting STEP6. The machine may run unexpectedly.

A: Install battery on the unit correctly.

B: Release chain brake and press power switch without holding trigger lever. And then hold trigger lever.

C: Motor does not run and LED indicator is flashing ***4*** times per second.

D: Inspect the unit as follows:

1) Each connection between terminals is secure.

2) Each connection of terminal housing and lead is secure.

3) Electrical current can flow through each lead.

4) There are **no** any short circuits.

E: Repair or replace defective object(s) as needed.

F: Control board or motor may be defective. Prepare control board and motor, and then cross-check. Replace the defective one with new one.

G: Motor stops after running and LED indicator is flashing ***4*** times per second.

H: Are battery and unit hot or cold?

J: Cool or warm the battery and the unit to normal temperature.

K: Inspect the unit as follows:

1) Sprocket is clogged with saw dust or something.

2) Unsuitable saw chain or guide bar is used.

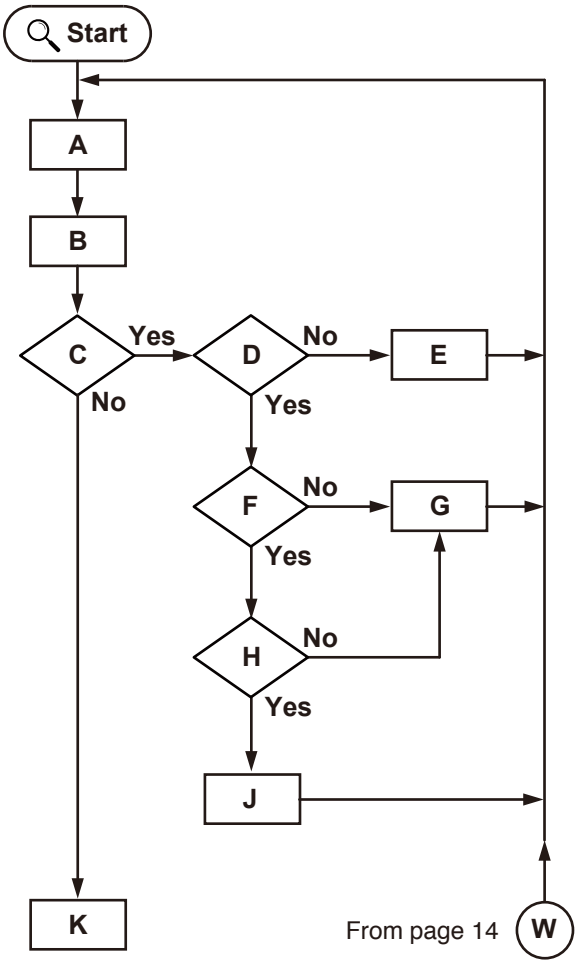
3) Saw chain tension is too tight.

4) There is trouble in drive system.

L: Clean, repair or replace the object(s) as needed.

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP7" ~Checking other failure~



WARNING DANGER

Verify the safety of the surroundings when doing Troubleshooting STEP7. The machine may run unexpectedly.

A: Install battery on the unit correctly.

B: Release chain brake and press power switch without holding trigger lever. And then hold trigger lever.

C: Motor does not run and LED indicator is lighting.

D: Inspect the unit as follows:

1) Each connection between terminals is secure.

2) Each connection of terminal housing and lead is secure.

3) Electrical current can flow through each lead.

4) There are **no** any short circuits.

E: Repair or replace defective object(s) as needed.

F: Inspect variable speed switch as follows: (Refer to Section 5-1)

1) Electrical current can flow between terminal “1” and “4” when pressing the switch.

2) Electrical current can not flow between terminal “1” and “4” when not pressing the switch.

G: Replace the variable speed switch with new one. (Refer to Section 5-2).

H: Inspect resistance between terminal “1” and “2” of variable speed switch as follows: (Refer to Section 5-1)

1) Its value is 100 Ω or less when pressing the switch.

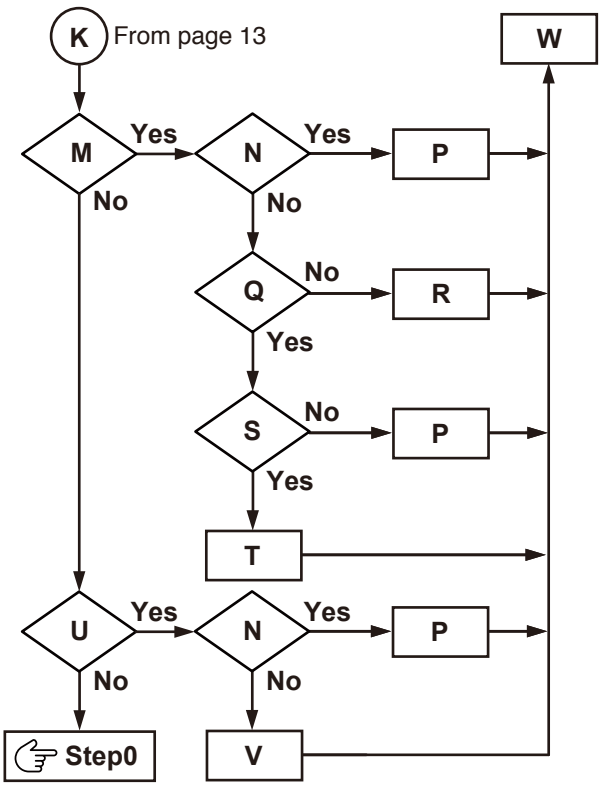
2) Its value is between 70 kΩ and 130 kΩ when not pressing the switch.

J: Replace control board with new one. (Refer to Section 6-3)

K: Go to page 14 (K).

2-2 Troubleshooting chart (Continued)

Troubleshooting "STEP7" ~Checking other failure (Continued)~



M: Motor speed can not be increased or is not stable.

N: Inspect the unit as follows:

1) Sprocket is clogged with saw dust or something.

2) Unsuitable saw chain or guide bar is used.

3) Saw chain tension is too tight.

4) There is trouble in drive system.

P: Clean, repair or replace the object(s) as needed.

Q: Can variable speed switch be pushed to the end? Check the position and the part itself. (Refer to Section 5-2)

R: Repair or replace the variable speed as needed. (Refer to Section 5-2)

S: Inspect the unit as follows:

1) Each connection between terminals is secure.

2) Each connection of terminal housing and lead is secure.

3) Electrical current can flow through each lead.

4) There are **no** any short circuits.

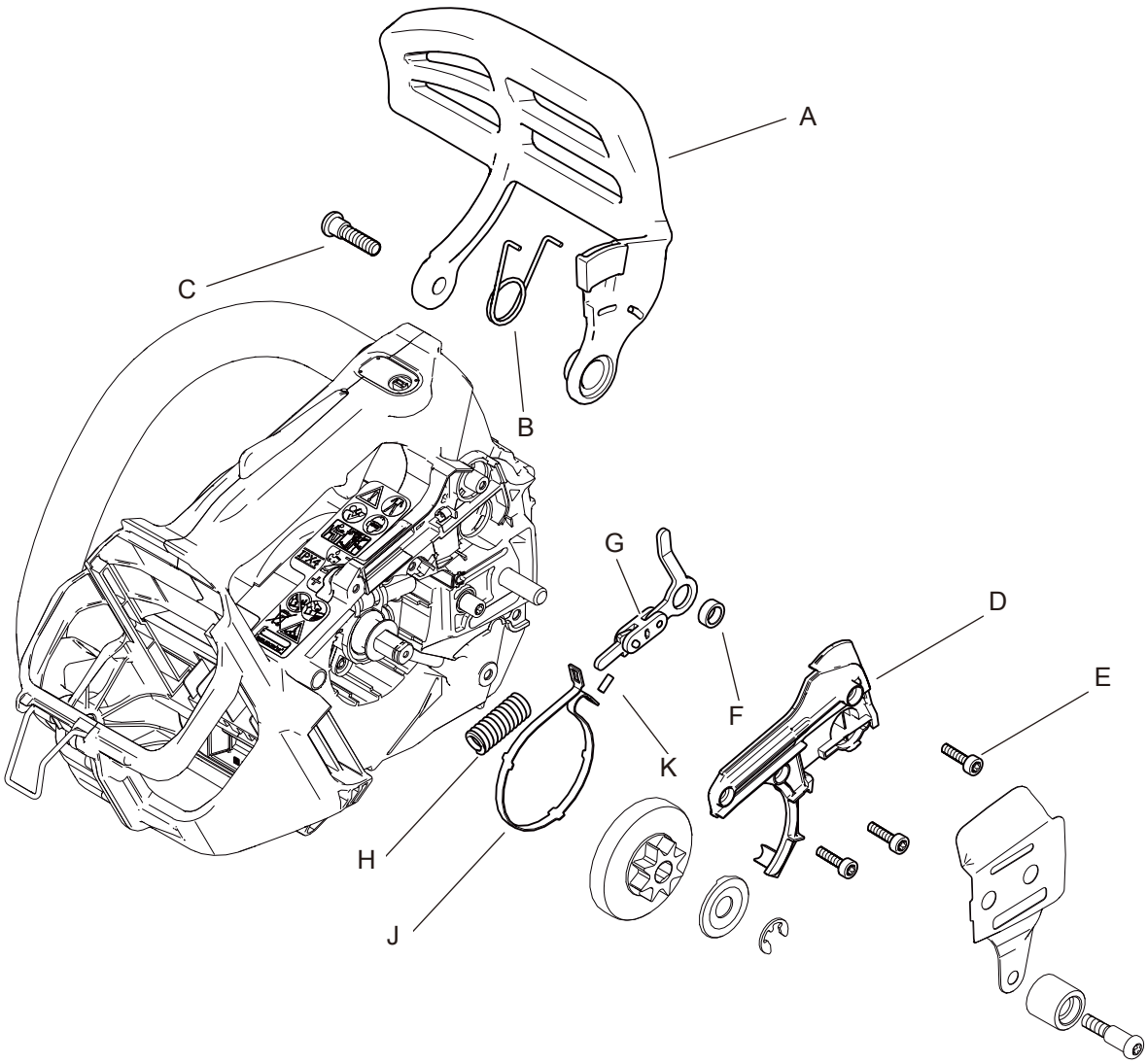
T: Control board or motor may be defective. Prepare control board and motor and then cross-check. Replace the defective one with new one.

U: Abnormal noise occurs when running.

V: Replace motor with new one.(Refer to Section 6-3)

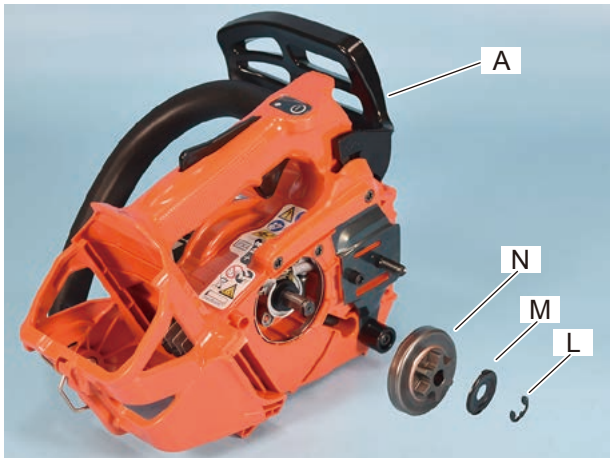
W: Go to page 15 (W).

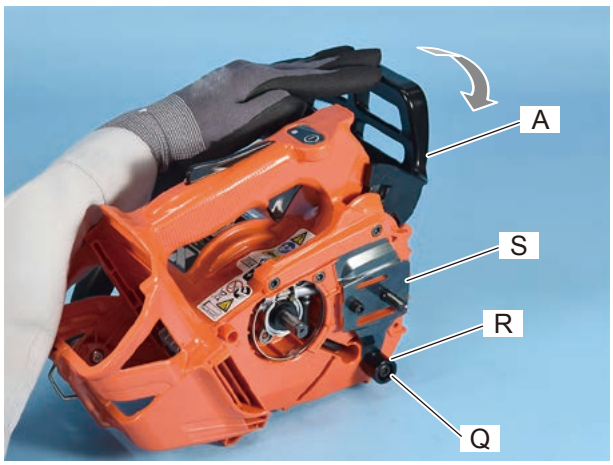
3 CHAIN BRAKE SYSTEM

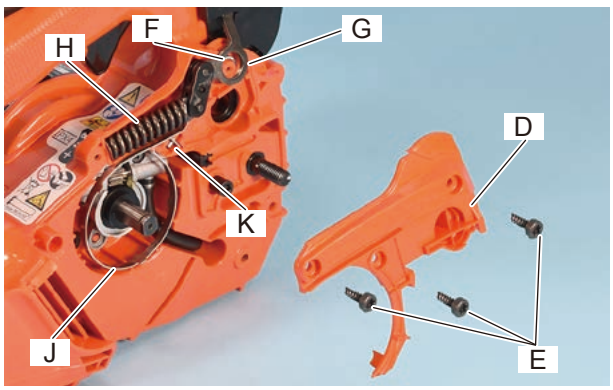


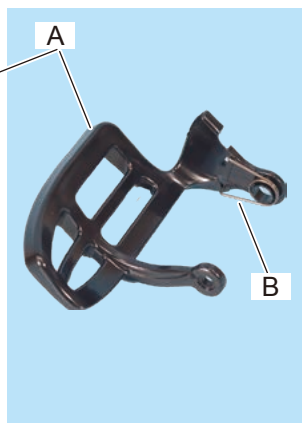
(A) Brake lever
(B) Tosion spring
(C) Tapping bolt (M5)
(D) Brake cover
(E) Tapping bolt (M4, 3pcs.)
(F) Collar
(G) Brake connector
(H) Compression spring
(J) Brake band
(K) Pin

3-1 Replacing brake lever and chain brake parts









WARNING DANGER

Wear eye protection and safety gloves when disassembling or assembling chain brake to protect eye and hand from injury.

Disassembling

1. Pull brake lever (A) to release chain brake and then remove retaining ring (L), washer (M) and drum (N).

2. Remove bolt (Q), chain catcher (R) and sprocket guard plate (S).

3. Move brake lever (A) forward to activate chain brake.

NOTE: Make sure that brake lever (A) is in activated position before removing brake cover (D), otherwise compression spring may jump out.

4. Remove 3 bolts (E) and brake cover (A).

5. Remove brake connector (F), collar (G), brake band (J), compression spring (H) and pin (K) from motor cover.

6. If blocked with dirt and/or dust, clean around brake parts. Inspect all the brake parts for damage. Replace with new part(s) as required.

7. Remove bolt (C) and brake lever (A).

8. Check torsion spring (B). If deformed or broken, replace with new one.

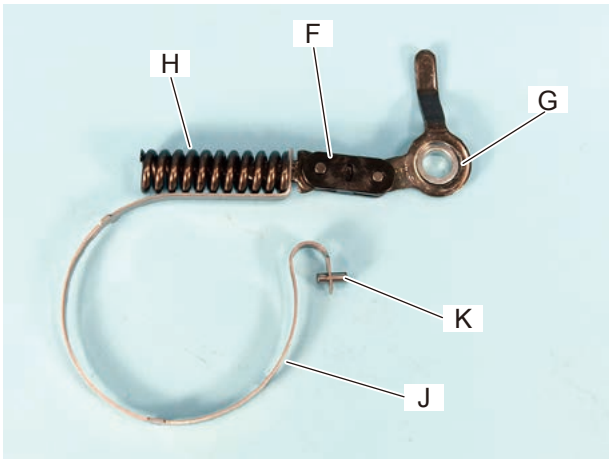
Assembling

9. Set torsion spring (B) on brake lever (A) as shown

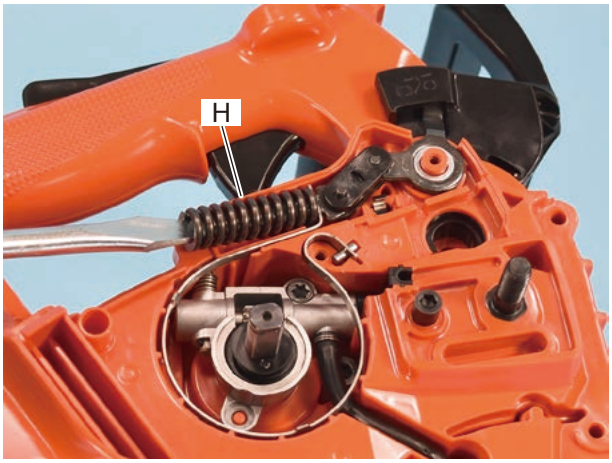
3-1 Replacing brake lever and chain brake parts (Continued)

10. Install brake lever (A) on motor cover.

11. Tighten brake lever (A) with bolt (C).



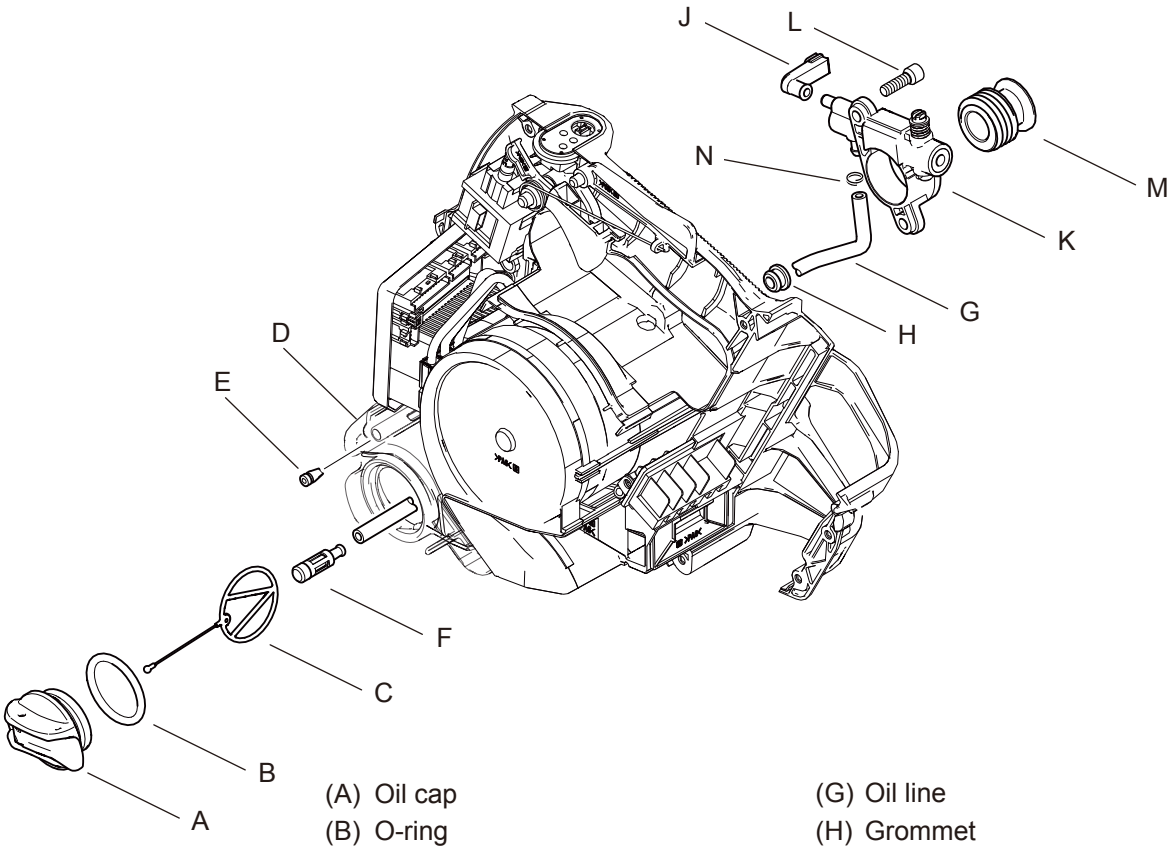
12. Assemble brake connector (F), collar (G), brake band (J), compression spring (H) and pin (K) as shown. And then, set them on motor cover.



13. Push compression spring (H) with flat head screw driver or other suitable tool and install compression spring (H) in motor cover as shown.

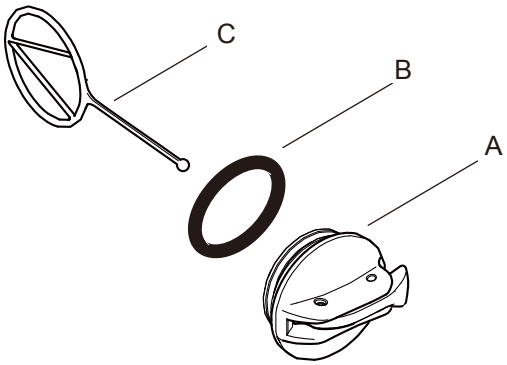
14. Reassemble removed parts.

4 SAW CHAIN LUBRICATION SYSTEM



(A) Oil cap
(B) O-ring
(C) Cap connector
(D) Oil tank
(E) Oil tank vent
(F) Oil strainer
(G) Oil line
(H) Grommet
(J) Oil outlet
(K) Auto-oiler
(L) Tapping bolt (M4)
(M) Worm gear
(N) Clip

4-1 Inspecting oil cap and strainer

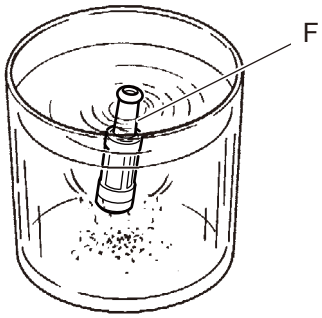


1. Remove oil cap (A).

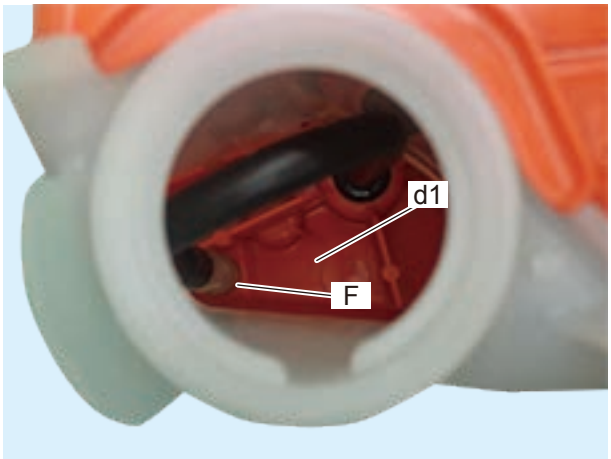
2. Inspect oil cap (A) for cracks and O-ring (B) for cuts or damage. Replace worn or damaged part(s) as required.

3. Replace cap connector (C) if damaged.

4. Pull out oil strainer (F) from oil tank.



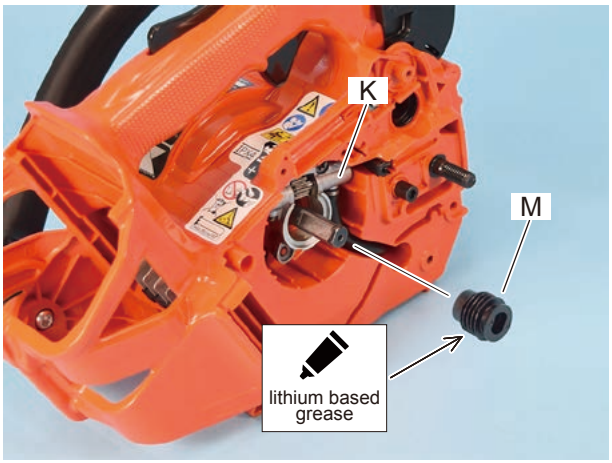
5. Remove oil strainer (F) from oil line and clean oil strainer in suitable solvent, or replace if damaged.



6. Reconnect oil strainer (F) to oil line and return the oil strainer (F) into oil tank.

NOTE: Set oil strainer (F) into pocket (d1) of oil tank so that chain oil can be supplied to the end.

4-2 Inspecting and replacing worm gear



1. Remove drum and brake related parts (Refer to “3-1 Replacing brake lever and chain brake parts”).

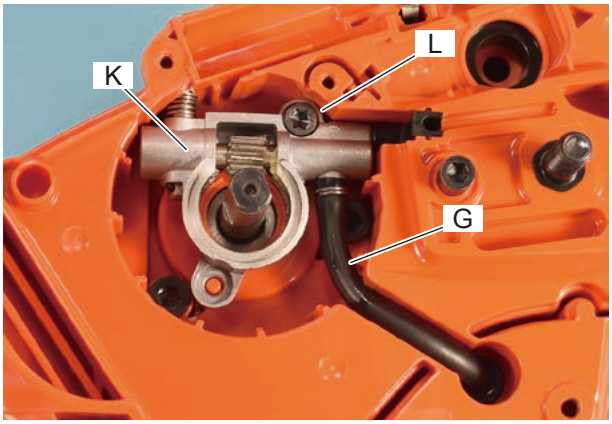
2. Remove worm gear (M) from auto-oiler (K).

3. Inspect worm gear (M) for damage, wear, or deformation. Replace with new one as required.

NOTE; If worm gear (M) is damaged, inspect gear of auto-oiler (Refer to “4-4 Cleaning and replacing auto-oiler”).

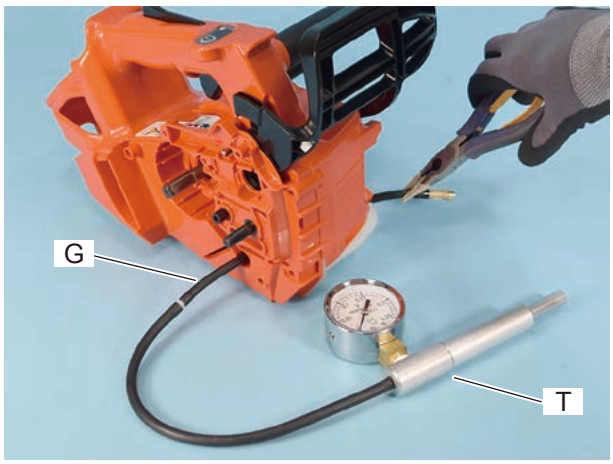
4. Apply lithium-based grease to worm gear (M) and reinstall it to auto-oiler.

4-3 Inspecting oil line



1. Remove bolt (L).

2. Remove auto-oiler (K) from oil line (G)



3. Connect oil line (G) to pressure tester 897803-30133 (T).

4. Remove fuel cap and pull out oil strainer from oil tank.

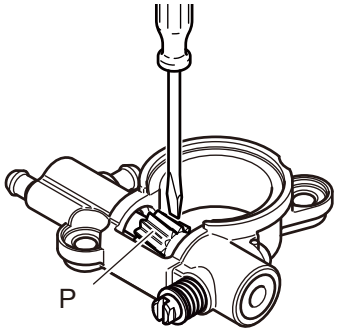
5. Pinch oil line (G) with longnose pliers as shown.

NOTE: Wrap the ends of longnose pliers with tape(or cover with soft pipes) to protect oil line from damage.

6. Apply pressure approx. 49 kPa (0.5 kgf/cm^2) (7psi).

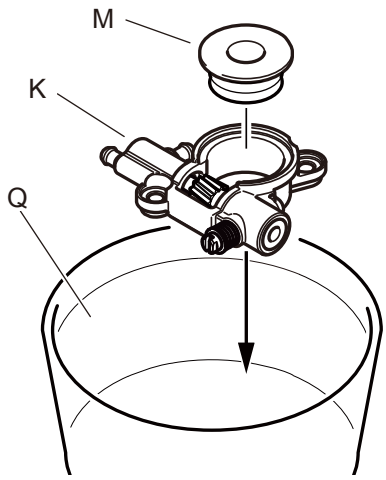
7. If pressure drops, replace oil line (G) with new one.

4-4 Cleaning and repairing auto-oiler



1. Inspect if plunger gear (P) of auto-oiler is rotated or not, using small flat blade driver or equivalent.

2. When plunger gear (P) can be rotated even though it is not smooth, go to step 3. When plunger gear (P) can not be rotated, go to step 10.



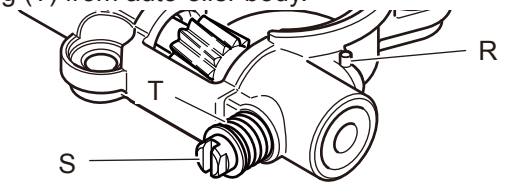
Cleaning auto-oiler

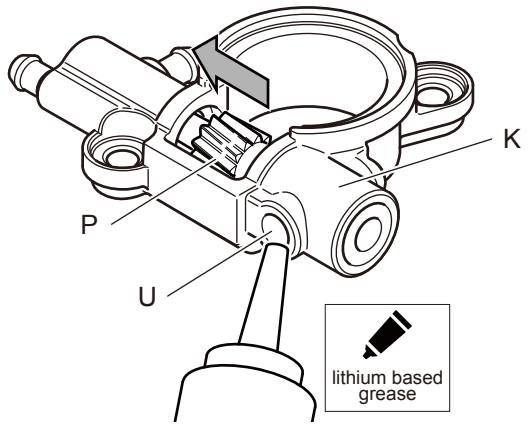
3. Prepare ethanol (Q) in container.

4. Install new worm gear (M) to auto-oiler (K).

5. Dip auto-oiler (K) in the ethanol (P) in container and rotate worm gear (M) until plunger gear (P) rotates smoothly.

6. Pull out spring pin (R) from adjust needle (S) with plier and pull out adjuster needle (S) and spring (T) from auto-oiler body.

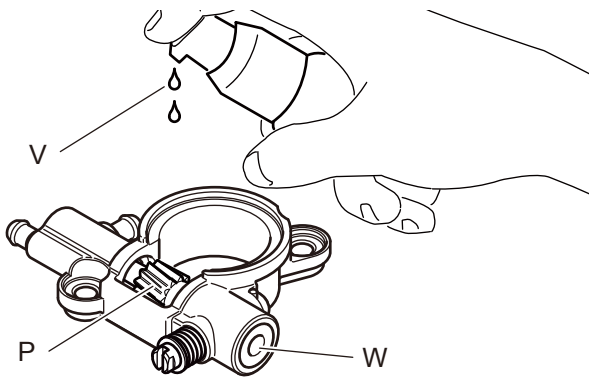




7. Hold plunger gear (P) to direction of arrow with finger. And apply grease in plunger hole (U).

8. Insert adjuster needle (S) with spring (T), holding plunger gear (P) to direction of arrow with finger. Reassemble adjuster needle (S) and spring pin as step 24 and 25.

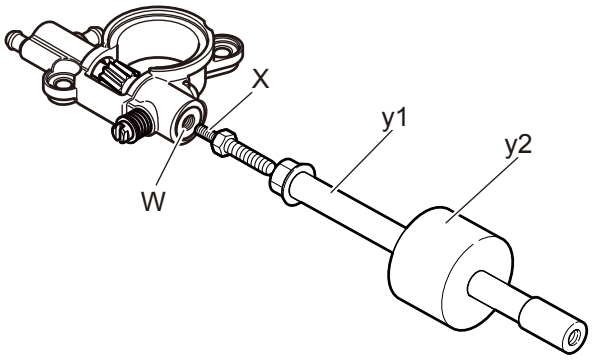
9. Reassemble auto-oiler (K) on the unit.



10. When plunger gear (P) cannot be rotated, apply nail-polish remover (V) to plunger gear (P) on auto-oiler (K) and leave it a few minutes.

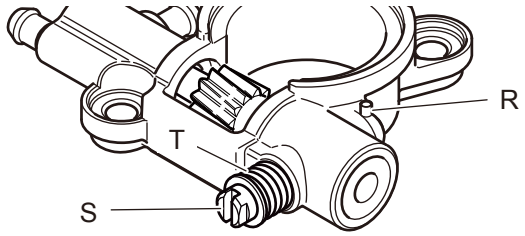
11. Tap 5-mm (M5 - Pitch 0.8mm) thread in the hole of plug (W).

4-4 Cleaning and repairing auto-oiler (Continued)



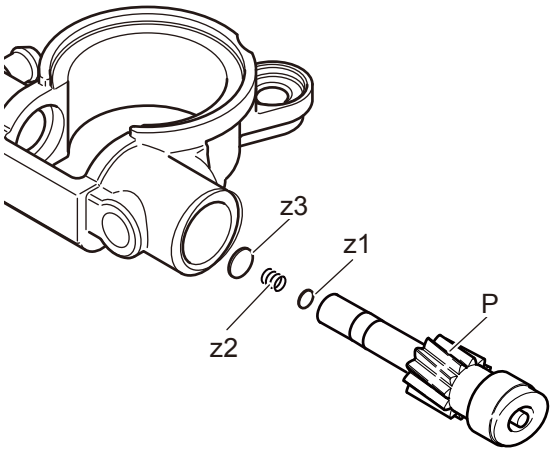
12. Screw the bolt (X) of puller Y089-000111 into the hole of plug (W), and connect PTO shaft puller P021-044871 as shown.

13. Hold auto-oiler body by one hand. Hold puller shaft end (y1) by another hand. Hold auto-oiler body upper side and shake the weight (y2) up and down several times to remove the plug (W).



14. Pull out spring pin (R) from adjuster needle (S) with plier.

15. Pull out adjuster needle (S) and spring (T) from auto-oiler body.



16. Remove plunger gear (P), circular washer (z1), spring (z2) and circular washer (z3). Circular washer (z1) and (z3) are not always come out, because of stuck by chain oil.

17. Clean plunger gear (P), oiler body, oil channels and the otherparts using cotton-tipped stick with ethanol or nail-polish remover.

18. Check plunger gear (P) if worn or broken, and spring (z2) if fatigued or broken. Replace parts with new one if defective.

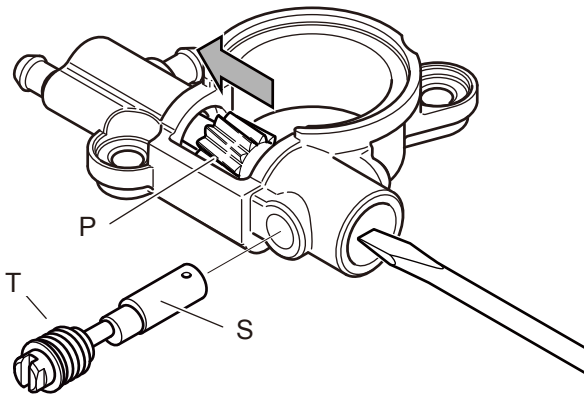
Assembling auto-oiler

19. Coat plunger gear (P) with 2 stroke oil.

20. Insert circular washer (z1) and spring (z2) into plunger gear (P).

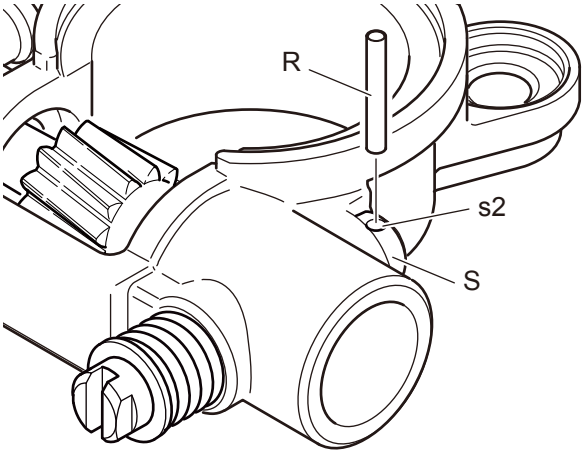
21. Insert circular washer (z3) and plunger gear (P) (with spring (z2) and cirsular washer (z3)) into cylinder of auto-oiler body.

4-4 Cleaning and repairing auto-oiler (Continued)

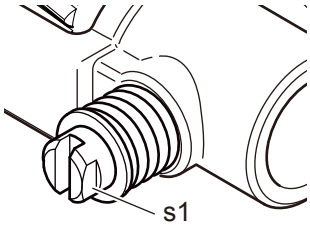


22. Push in plunger gear (P) with small screwdriver, and hold plunger gear (P) to direction of arrow with finger. Remove screwdriver.

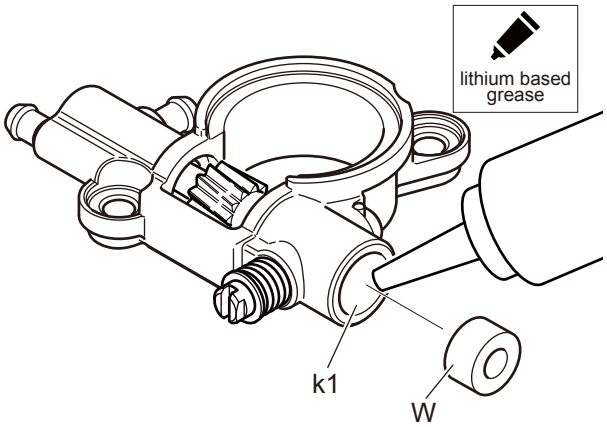
23. Install adjuster needle (S) with spring (T) into oiler body. Release finger from plunger gear (P).



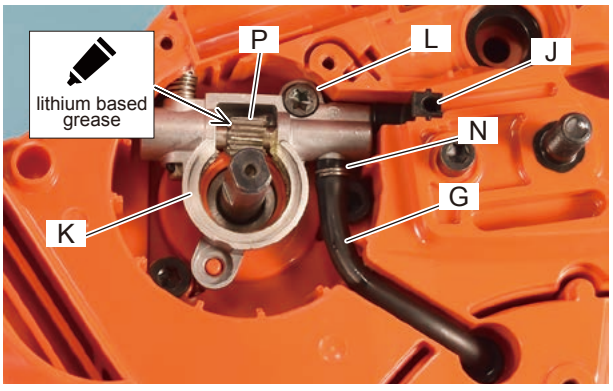
24. Press adjuster needle (S) to the bottom, orienting the flat surface (s1) as shown. This position indicates maximum discharge volume of chain oil.



25. Tap new spring pin (R) into hole (s2) of adjuster needle (K).



26. Apply grease in plunger hole (k1). Tap plug (W) into hole (k1) with plastic mallet until plug (W) is flush with end face of oiler body.



27. Connect oil outlet (J) and auto-oiler (K).

28. Connect oil line (G) and auto-oiler (K).

NOTE: Make sure to install clip (G).

29. Place auto-oiler (K) on motor cover and tighten with bolt (L).

30. Apply lithium-based grease to plunger gear (P).

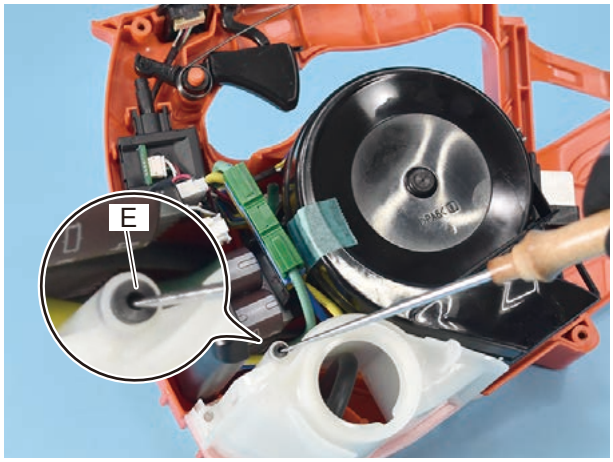
4-5 Replacing oil tank vent

NOTE: Oil tank vent prevents a vacuum from forming in oil tank when chain oil in the tank is consumed.

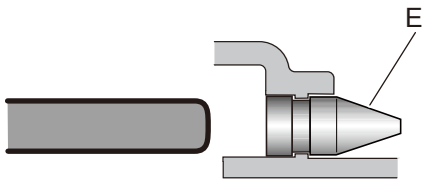
1. Remove brake cover and brake lever (Refer to “3-1 Replacing brake lever and chain brake parts”).

2. Remove oil cap.

3. Remove 6 bolts and separate motor cover.

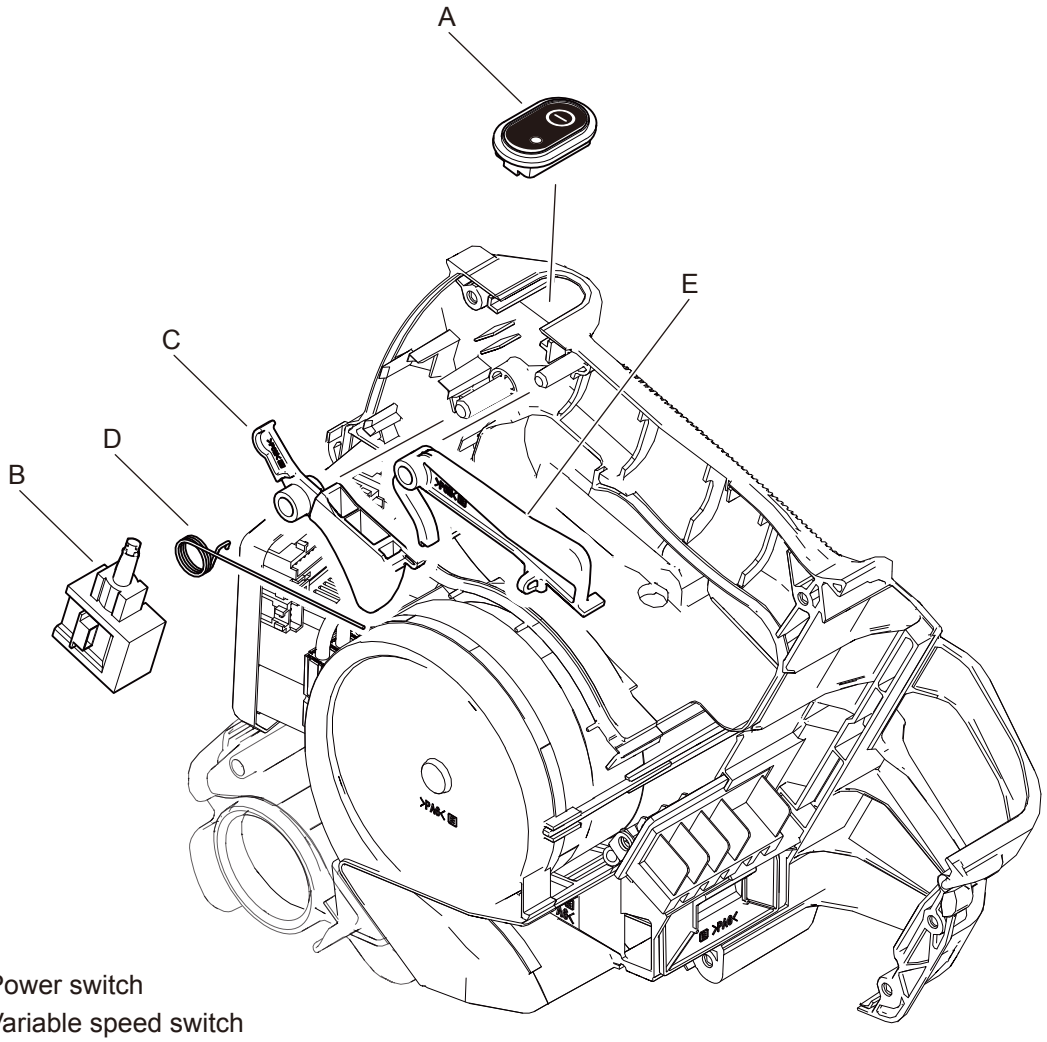


4. Put pointed tool into oil tank vent (E) and pull out the vent (E) while pressing the tool against the vent (E).



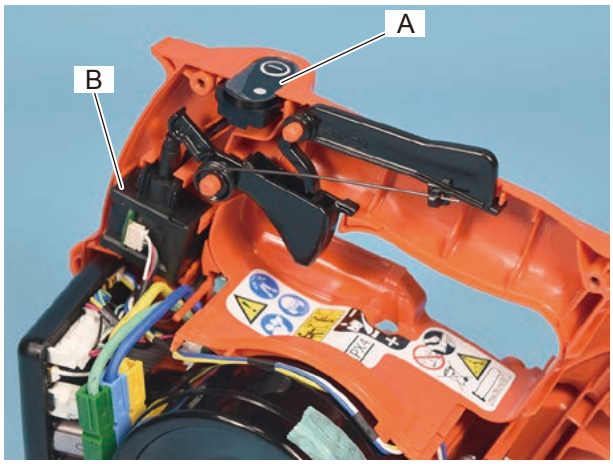
5. Push new oil tank vent (E) using suitable tool to install it.

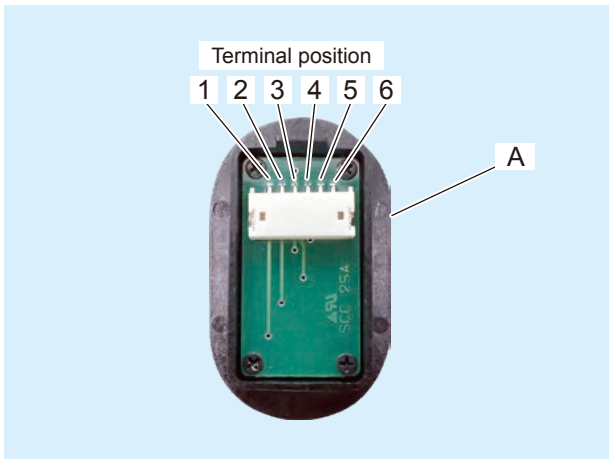
5 SWITCH AND TRIGGER

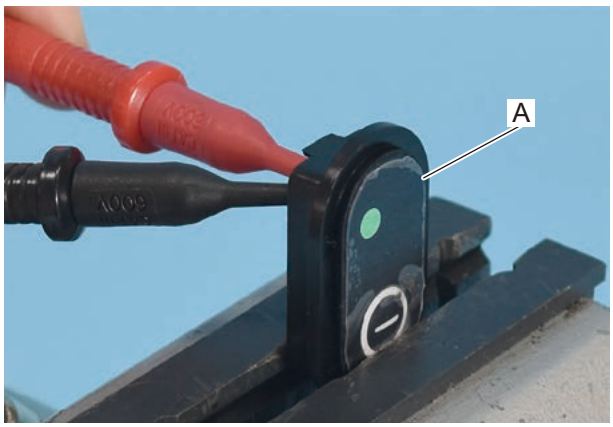


(A) Power switch
(B) Variable speed switch
(C) Trigger lever
(D) Torsion spring
(E) Trigger lockout

5-1 Inspecting power switch and variable speed switch







Disassembling

1. Remove brake cover and brake lever (Refer to “3-1 Replacing brake lever and chain brake parts”).

2. Separate motor cover (Refer to “4-5 Replacing oil tank vent”).

3. Remove power switch (A) and variable speed switch (B) from motor cover.

4. Disconnect power switch (A) and variable speed switch (B) from wire harness.

Inspecting power switch

5. Inspect power switch (A) as follows. If the switch (A) is not as follows, replace with new one.

(1) Inspecting of electrical contact

Connect one probe of multimeter to terminal “1” of power switch (A). Connect the other probe to terminal “2” .

When pressing power switch (A), multimeter should show that the circuit has continuity. (Electrical current can flow between terminal “1” and “2”.)

When not pressing power switch (A), multimeter should indicate infinite resistance.(Electrical current can not flow between terminal “1” and “2”.)

(2) Inspecting of LED

Turn dial to diode symbol on **digital** multimeter.

Connect one probe of multimeter to terminal “3” of power switch (A). Connect the other probe to terminal “6”. LED should light up. If not lighting, reconnect each probe to the opposite terminal. (Terminal “3” is positive(+). Terminal “6” is negative(-)

NOTE: When inspecting above, be sure to use the diode test function of digital multimeter. Voltages more than 5 volts and/or electric current more than 150 mA can cause to damage to the LED in power switch (A).

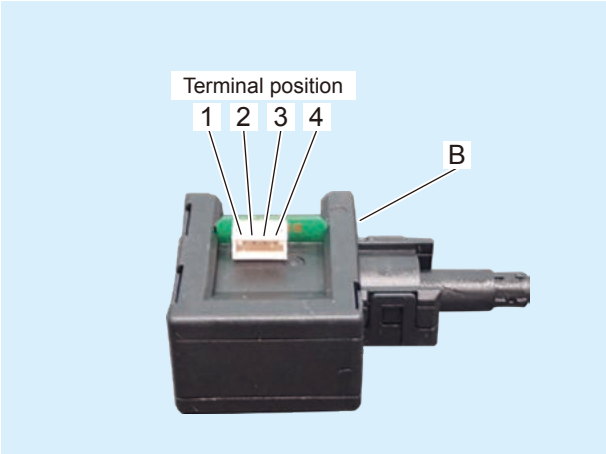
5-1 Inspecting power switch and variable speed switch (Continued)

(3) Inspecting of short circuit

Connect one probe of multimeter to terminal “2” of power switch (A). Connect the other probe to terminal “3”.Multimeter should indicate infinite resistance.(Electrical current can not flow between terminal “2” and “3”.)

Inspecting variable speed switch

6. Inspect variable speed switch (B) as follows. If the switch (B) is not as follows, replace with new one.



(1) Inspecting of short circuit

Connect one probe of multimeter to terminal “1” of variable speed switch (B). Connect the other probe to terminal “3”. Multimeter should show that the resistance value is between 70 kΩ and 130 kΩ.

(2) Inspecting of electrical contact

Connect one probe of multimeter to terminal “1” of variable speed switch (B). Connect the other probe to terminal “4” .

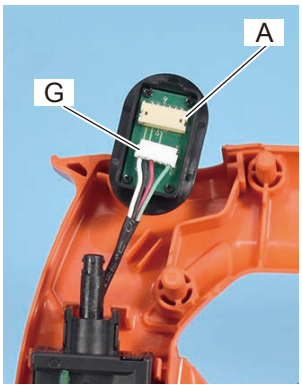
When pressing variable speed switch (B), multimeter should show that the circuit has continuity. (Electrical current can flow between terminal “1” and “4”.)
When not pressing variable speed switch (B), multimeter should indicate infinite resistance. (Electrical current can not flow between terminal “1” and “4”.)

(3) Inspecting variable resistance part

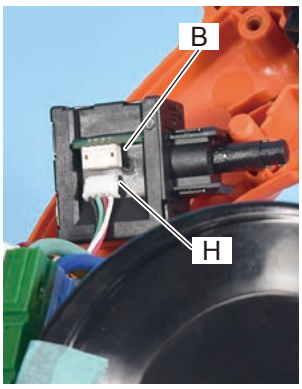
Connect one probe of multimeter to terminal “1” of variable speed switch (B). Connect the other probe to terminal “2” .

When pressing variable speed switch (B) to the end, multimeter should show that the resistance value is 100 Ω or less.
When not pressing variable speed switch (B), multimeter should show that the resistance value is between 70 kΩ and 130 kΩ.

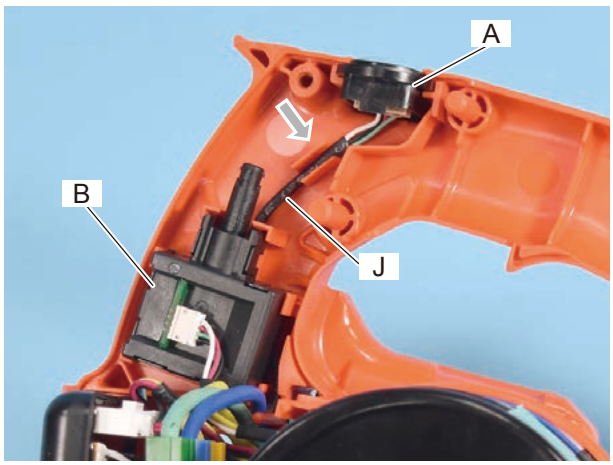
5-2 Installing switches and trigger lever



1. Connect power switch (A) and 6-pole terminal (G) of wire harness.

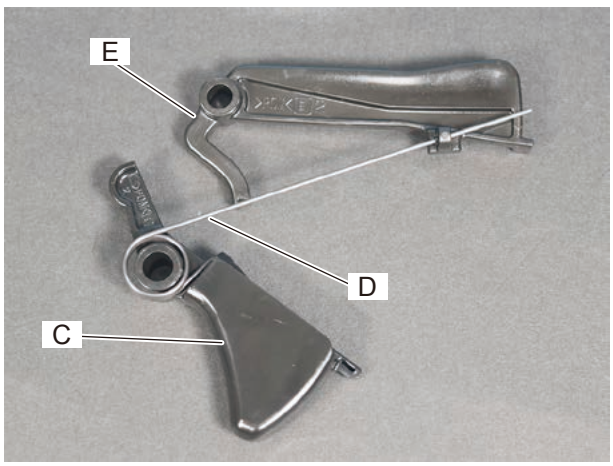


2. Connect variable speed switch (B) and 4-pole terminal (H) of wire harness.



3. Install power switch (A) on motor cover and pass wire harness (J) between ribs of motor cover as shown.

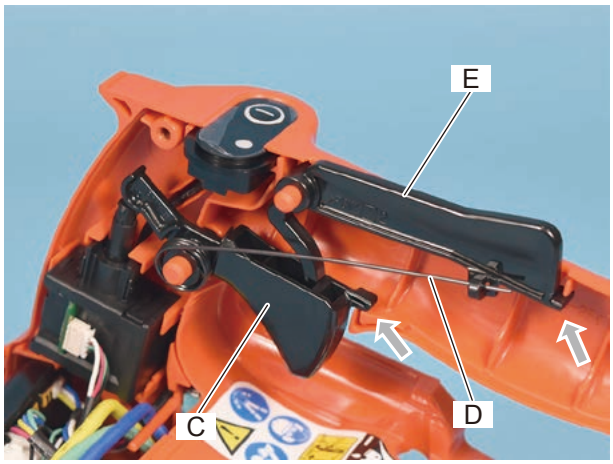
4. Place variable speed switch (B) on motor cover as shown.



5. Set torsion spring (D) on trigger lever (C) as shown.

6. Insert end of torsion spring (D) into hole of trigger lockout (E).

5-2 Installing switches and trigger lever (Continued)

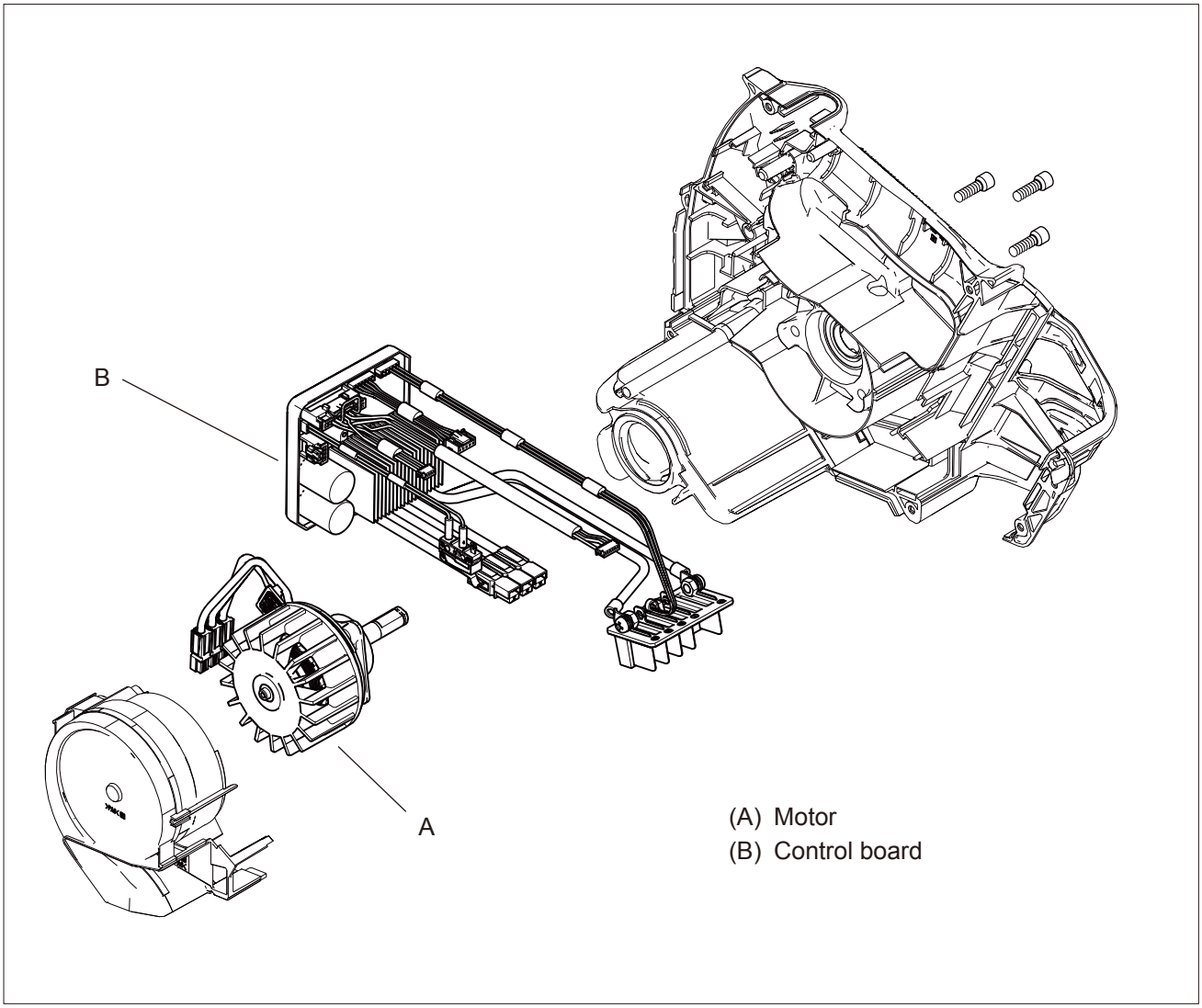


7. Install trigger lever (C), torsion spring (D) and trigger lockout (E) on motor cover as shown.

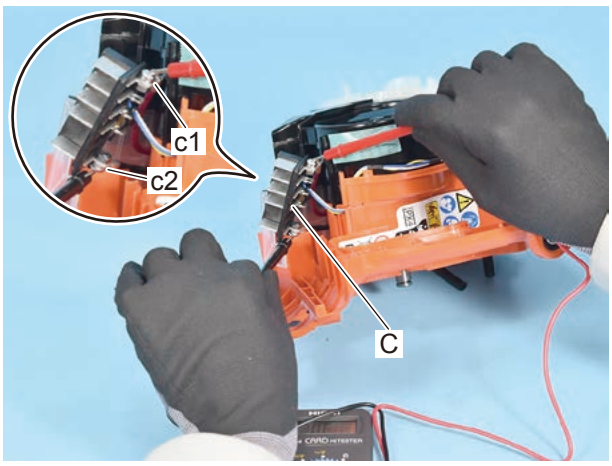
NOTE: Make sure to place the end of throttle trigger and throttle lockout inside of motor cover.

8. Assemble motor cover halves together (Refer to “6-3 Installing motor and control board”).

6 MOTOR AND CONTROL SYSTEM



6-1 Inspecting control board

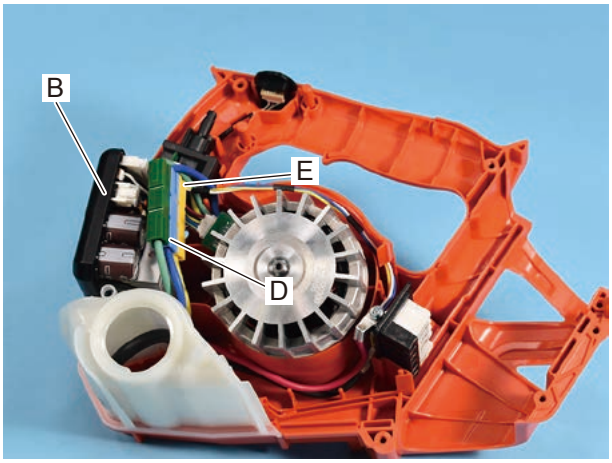


1. Remove brake cover and brake lever (Refer to “3-1 Replacing brake lever and chain brake parts”).

2. Separate motor cover. (Refer to “4-5 Replacing oil tank vent”)

3. Remove battery connection terminal (C) of control board from motor cover.

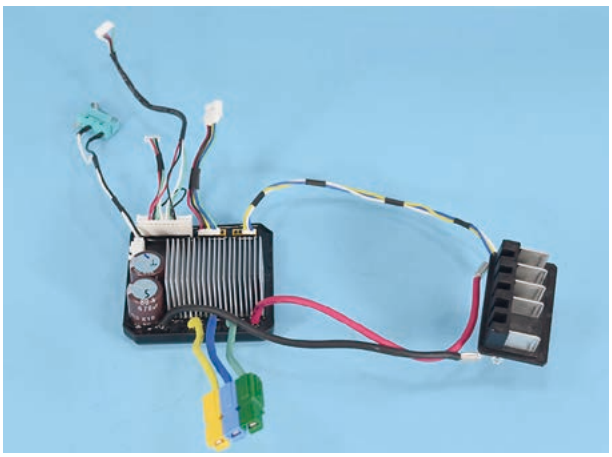
4. Determine whether control board is short-circuited between positive terminal (c1) and negative terminal (c2).
Connect one probe of multimeter to terminal (c1). Connect the other probe to terminal (c2). Multimeter should indicate infinite resistance. If not, replace control board with new one.



5. Remove fan case from motor cover.

6. Disconnect 3-pole terminal (D) of control board and 3-pole terminal (E) of motor.

7. Remove control board (B) from motor cover.



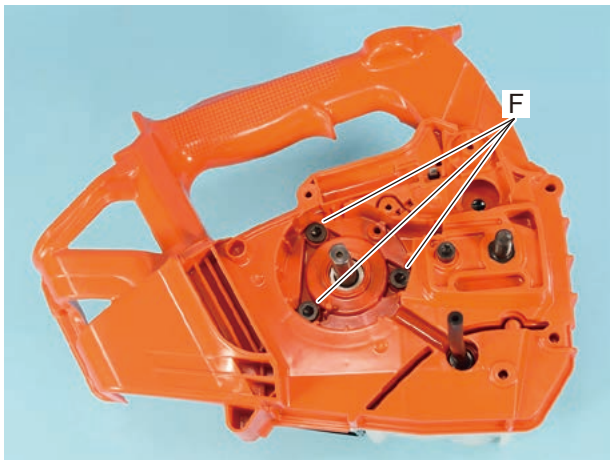
8. Inspect the following:

- Conductive substances (water, metal pieces, etc.) on the surface of control board.
→ Remove debris, clean and dry components

- Burnout and/or damage of control board.
→ Replace

- Damage of each terminal on control board.
→ Replace

6-2 Inspecting motor

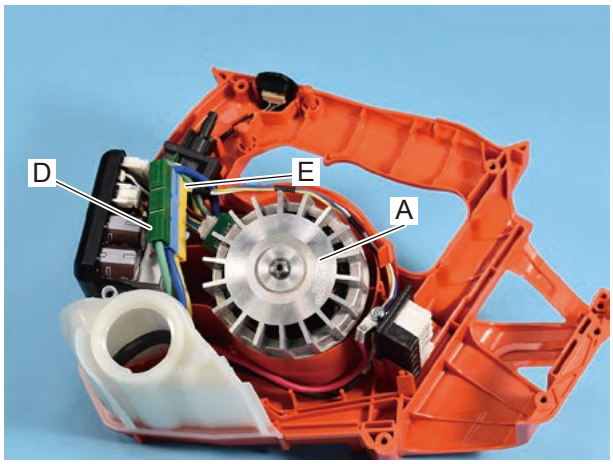


1. Remove brake related parts (Refer to “3-1 Replacing brake lever and chain brake parts”).

2. Separate motor cover. (Refer to “4-5 Replacing oil tank vent”)

3. Remove auto-oiler.

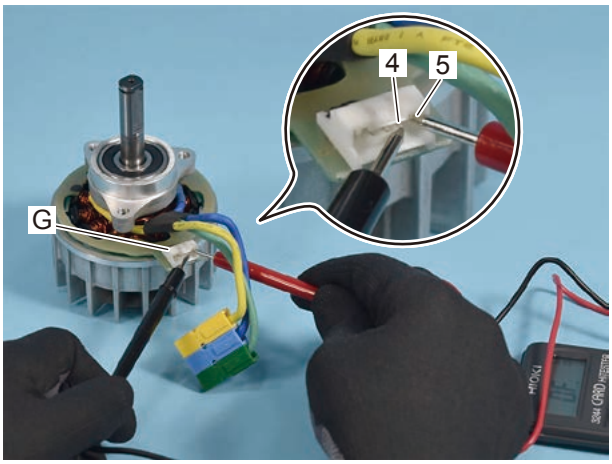
4. Remove 3 bolts (F).



5. Remove fan case from motor cover.

6. Disconnect 3-pole terminal (D) of control board and 3-pole terminal (E) of motor.

7. Remove motor (A) from motor cover.



8. Determine whether motor is short-circuited between terminal “4” and “5” of motor’s 5-pole terminal (G).
Connect one probe of multimeter to terminal “4”. Connect the other probe to terminal “5”. Multimeter should indicate infinite resistance. If not, replace motor with new one.

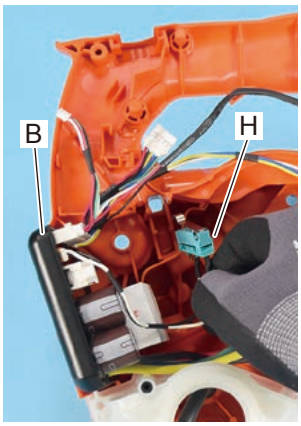
9. Inspect the following:

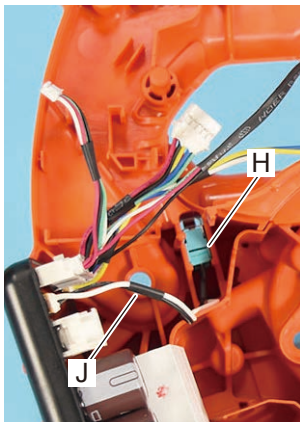
- Damage to terminals on motor → Replace

- Burnout of motor windings → Replace

- Hard rotation and damage → Replace

6-3 Installing motor and control board

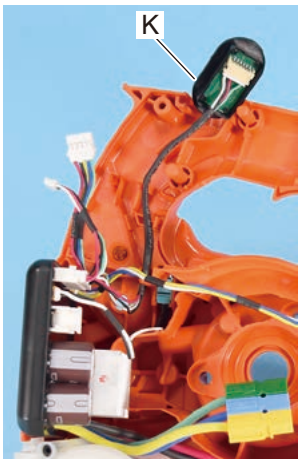


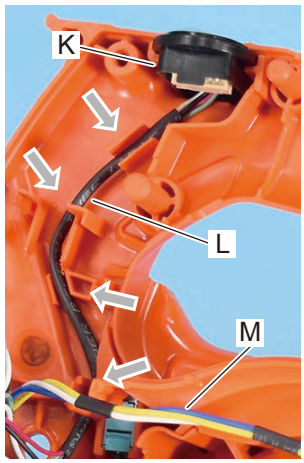


1. Place control board (B) on motor cover as shown.

2. Put brake switch (H) into slot of motor cover as shown.

NOTE: Make sure not to cross brake switch leads (J) and other leads.

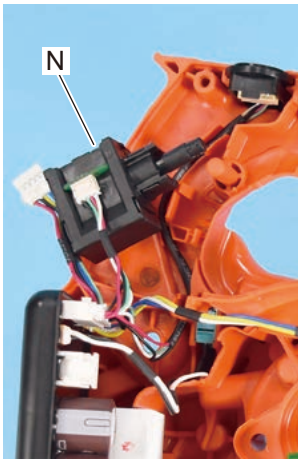


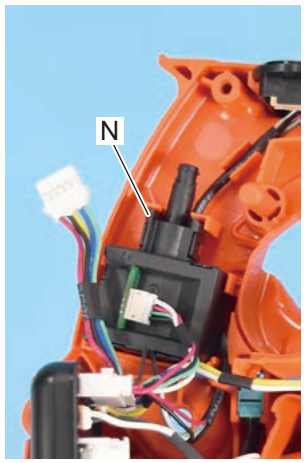


3. Connect power switch (K) and 6-pole terminal of control board.

4. Place power switch (K) and leads (L) on motor cover as shown.

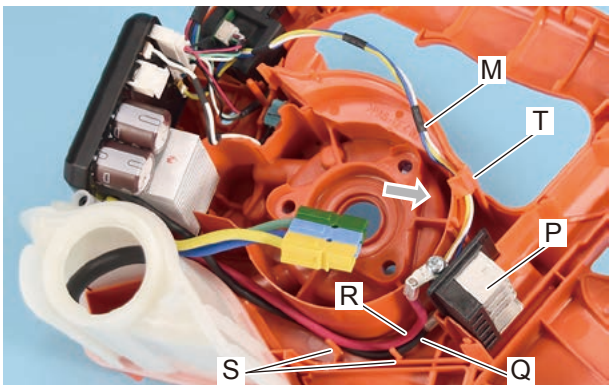
NOTE: Make sure to route leads (L) underneath leads (M) connected battery connection terminal.





5. Connect variable speed switch (N) and 4-pole terminal of control board.

6. Place variable speed switch (N) on motor cover as shown.



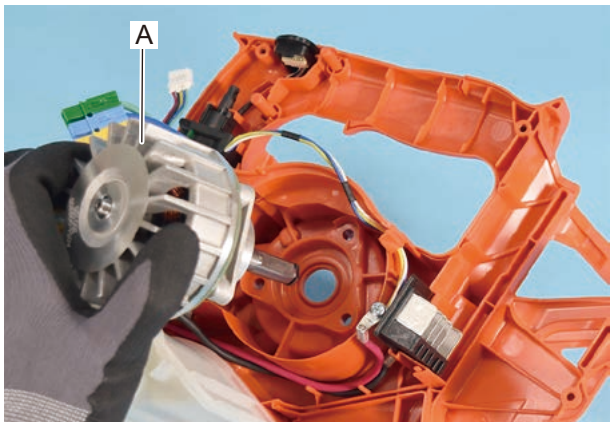
7. Place battery connection terminal (P) on motor cover as shown.

8. Route black lead (Q) and red lead (R) connected battery connection terminal (P) between pins (S) and wall on motor cover.

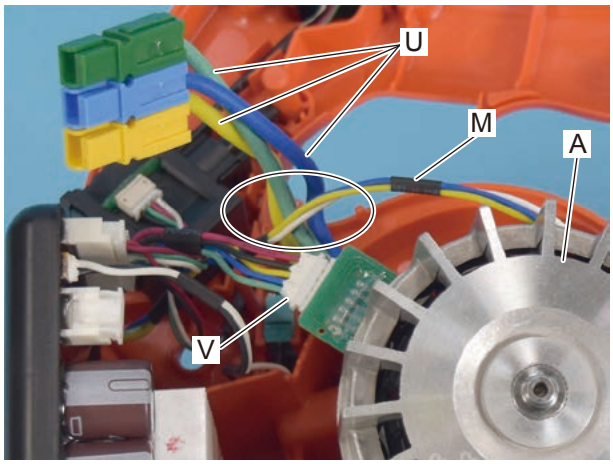
NOTE: Make sure to route red lead (R) over black lead (Q) as shown.

9. Route leads (M) connected battery connection terminal (P) under hooked part (T) on motor cover.

6-3 Installing motor and control board (Continued)

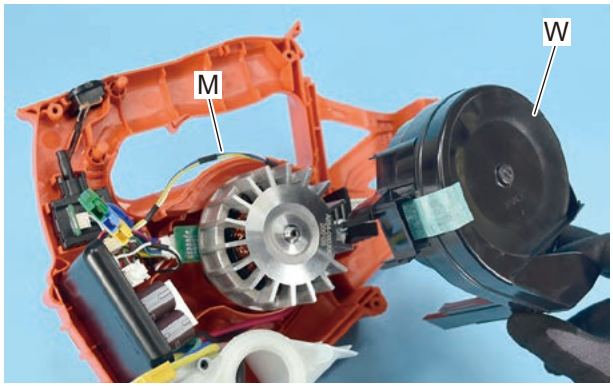


10. Install motor (A) to motor cover.



11. Route leads (U) of motor (A) under leads (M).

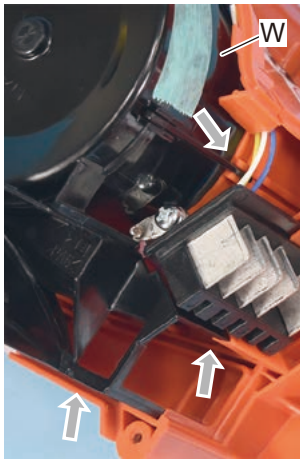
12. Connect motor (A) and 5-pole terminal (V) of control board.

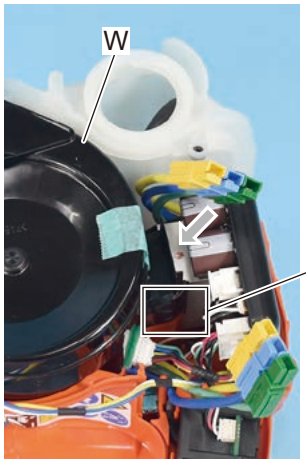


13. Put fan case assembly (W) on motor.

NOTE: Taping fan case assembly (W) makes it easier to install it.

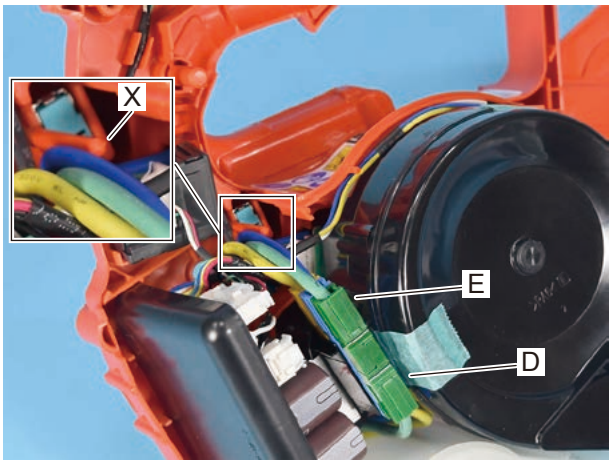
NOTE: Make sure not to be pinched leads (M) by fancase assembly (W).





14. Confirm fan case assembly (W) is firmly installed as shown.

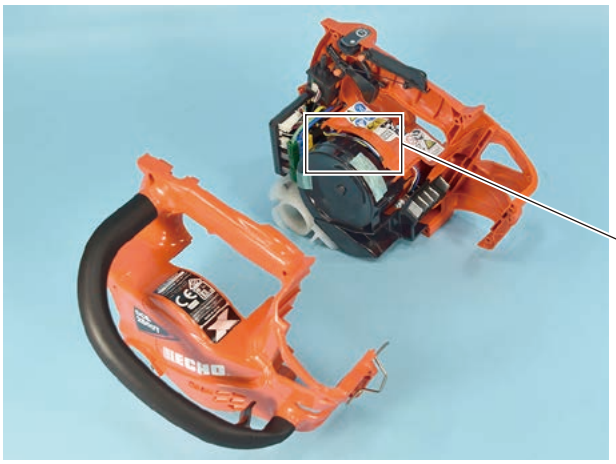
6-3 Installing motor and control board (Continued)



15. Connect 3-pole terminal (D) of control board and 3-pole terminal (E) of motor.

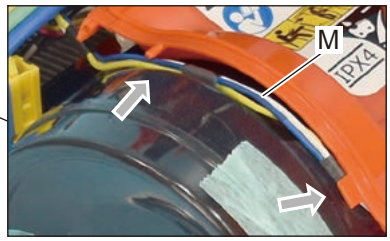
16. Put the terminals (D) and (E) into slot on fan case assembly as shown.

NOTE: Make sure not to route any leads above pin (X) of motor cover.



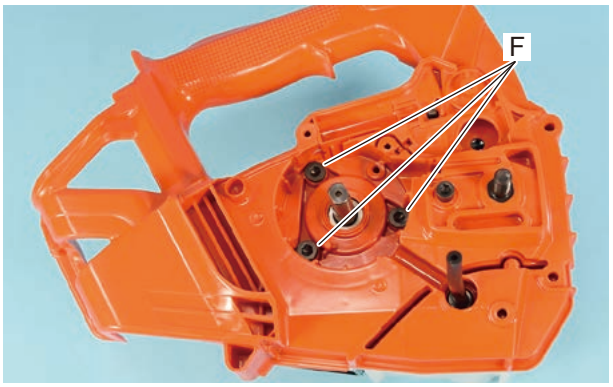
17. Install trigger related parts on motor cover (Refer to ”5-2 Installing switches and trigger lever”).

18. Make sure to route leads (M) between motor cover and fan case assembly as shown.



19. Assemble motor cover halves together.

20. Tighten motor cover with 6 bolts.



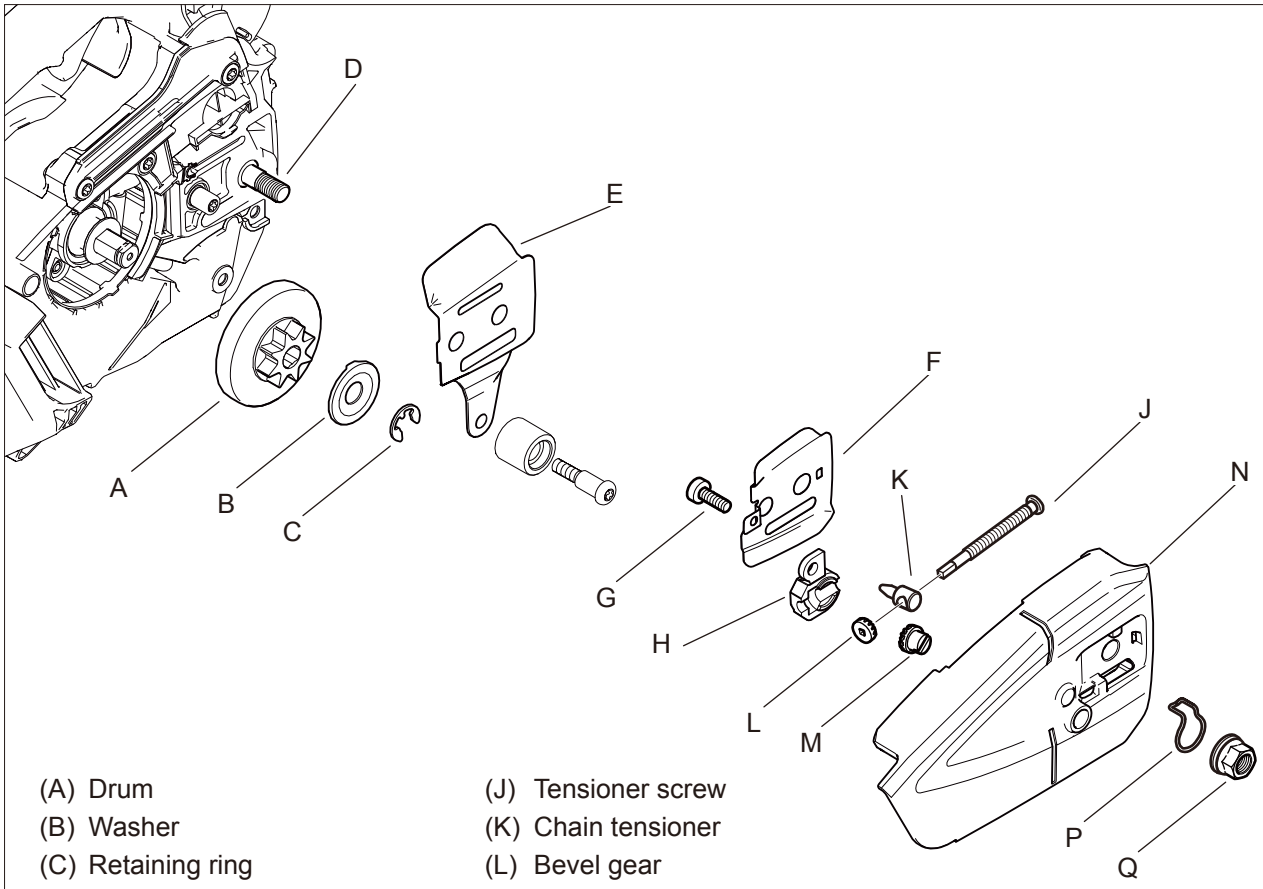
21. Tighten motor and motor cover with 3 bolts (F).

22. Reinstall removed parts.

- Auto-oiler;
Refer to “4-4 Cleaning and repairing auto-oiler”

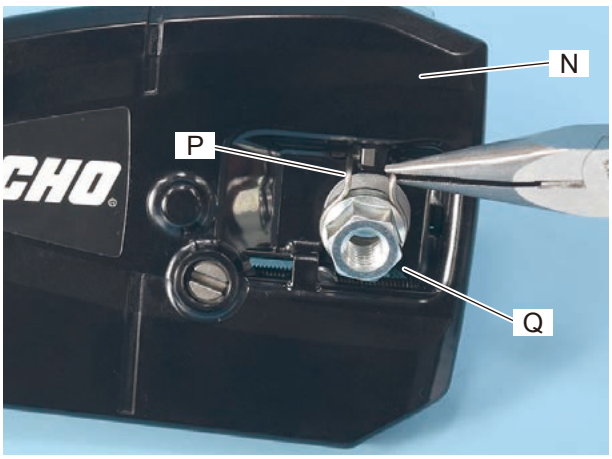
- Brake related parts;
Refer to “3-1 Replacing brake lever and chain brake parts”

7 GUIDE BAR MOUNTING SYSTEM



(A) Drum
(B) Washer
(C) Retaining ring
(D) Stud
(E) Sprocket guard plate
(F) Sprocket guard plate
(G) Torx tapping bolt
(H) Cover
(J) Tensioner screw
(K) Chain tensioner
(L) Bevel gear
(M) Bevel gear
(N) Sprocket guard
(P) Hook
(Q) Nut

7-1 Replacing nut for fixing guide bar



Disassembling

1. Pinch hook (P) with pliers and remove hook (P) and nut (Q) together from sprocket guard (N).

2. Remove nut (Q) from hook (P).

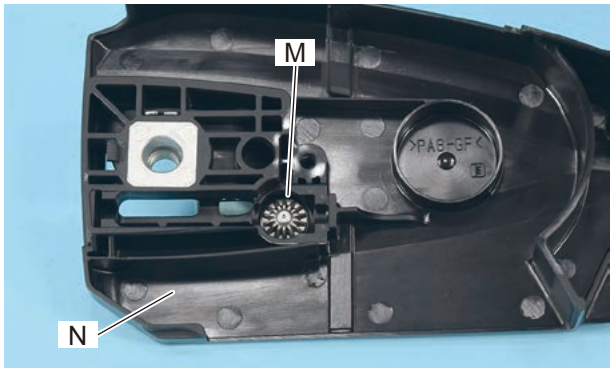
3. Check removed parts and replace defective parts with new one(s) as needed.

Assembling

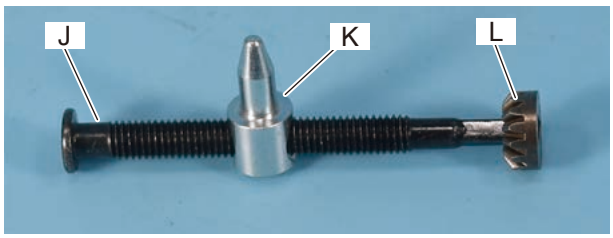
4. Assemble nut (Q) and hook (P).

5. Insert both ends of hook (P) in holes of sprocket guard (N).

7-2 Assembling chain tensioner

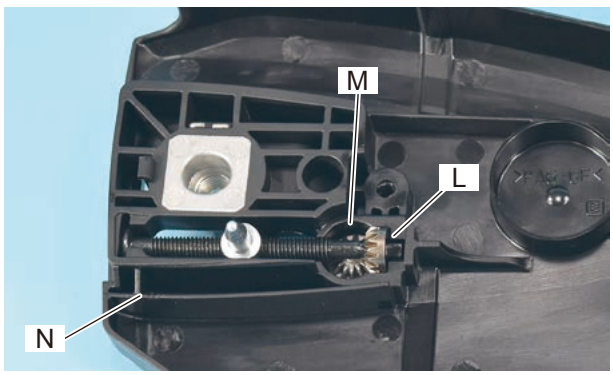


1. Place bevel gear (M) on sprocket guard (N).

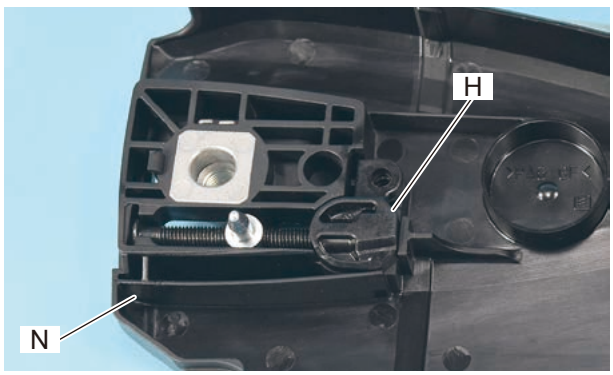


2. Screw chain tensioner (K) on tensioner screw (J).

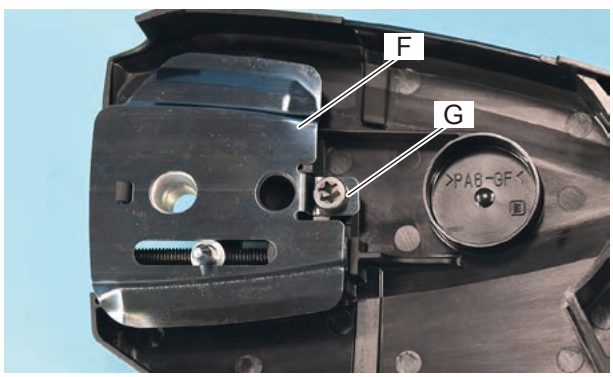
3. Put bevel gear (L) on the end of tensioner screw (J).



4. Install sub assembled tensioner screw in slot of sprocket guard (N) confirming engagement of bevel gear (M) and (L).



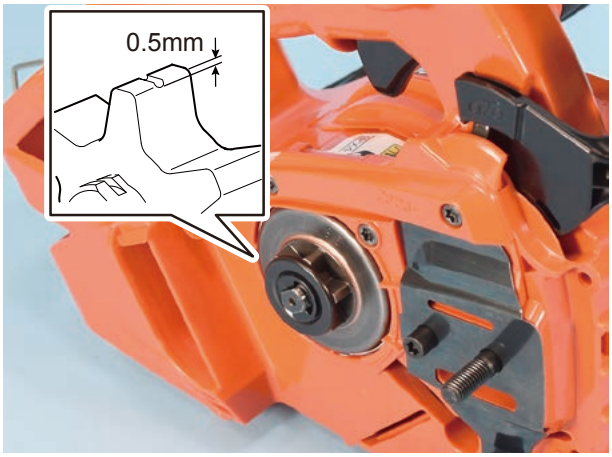
5. Put cover (H) on sprocket guard (N).



6. Put sprocket guard plate (F) on sprocket guard (N).

7. Tighten bolt (G).

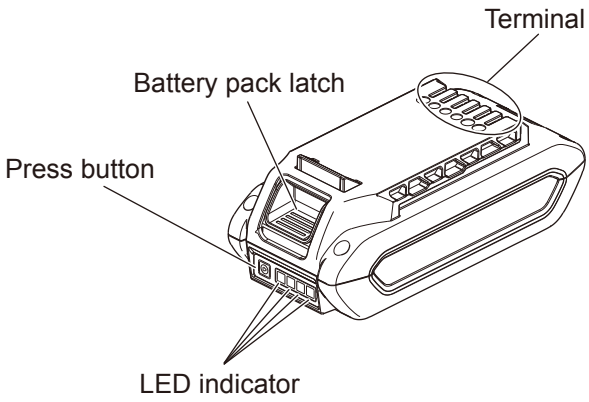
7-3 Inspecting sprocket



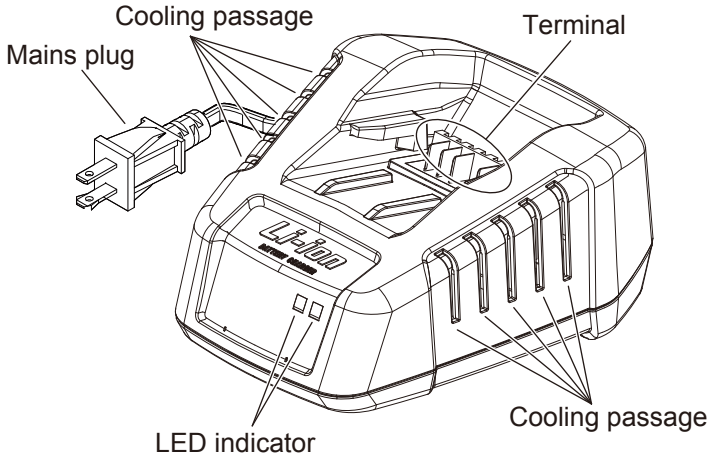
Inspect sprocket of drum. If worn out 0.5 mm (0.02 in.) or more, replace with new one.

8 BATTERY AND CHARGER

Battery



Charger



WARNING ⚠ DANGER

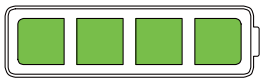
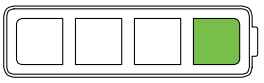
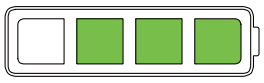
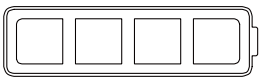
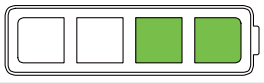
Do not open, crush, heat above 60°C or incinerate batteries and do not use damaged or deformed batteries. Failure to follow these rules may result in electric shock, fire, and/or serious personal injury.

NOTE:

- Charge battery in ambient temperature of 5 - 40°C (41 - 104°F).
- Repeated discharges and recharges can cause reduced battery capacity. By 500 times of recharges, charge capacity falls to about 60%, but this is not trouble normally. If capacity is significantly reduced, replace the battery.

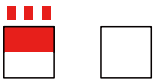
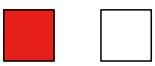
8-1 Battery LED indicator

Battery LED indicator shows battery charging capacity as follows when pressing button.

Battery LED indicator		Capacity	Battery LED indicator		Capacity
	4 LED is lighting	80 - 100%		1 LED is lighting	0 - 25%
	3 LED is lighting	55 - 80%		LED is **not** lighting	< 0
	2 LED is lighting	25 - 55%			

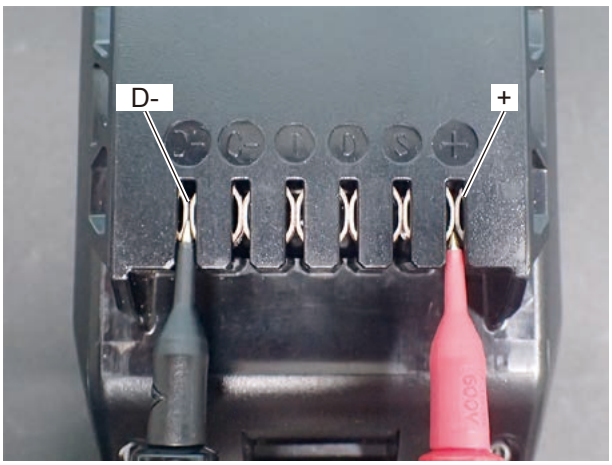
8-2 Charger LED indicator

Charger LED indicator shows charging situation as follows.

Charger LED indicator		Situation	Reason and how to recover
	Green flash	Charging	Normal charging
	Green ON	Charging complete	Charging completed
	Red flash	Defective battery or charger	Contacts of battery and charger are dirty → Clean them and reinsert battery
			Battery and/or charger trouble → Crosscheck them with known good ones
	Red ON	Charging delay	Battery is too hot or cold to charge → Cool or warm the battery

8-3 Inspecting battery

NOTE: This check must be done when the battery can be fully charged but has a shorted cell or does not have capacity to run the unit.
If battery is found defective by the following check, do Troubleshooting “Step2” (Refer to section 2-2) before installing a new battery. If the unit has something wrong, the new battery can be damaged again.



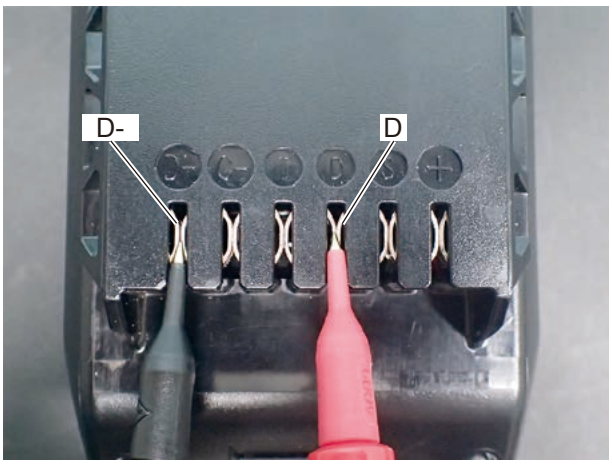
Inspecting for weaken battery and overcharging

1. Charge battery fully.

2. Connect one probe of multimeter to terminal (+) of battery. Connect the other probe to terminal (D-). Measure the voltage.

If the voltage is 45 V or lower, Replace the battery with new one.

If the voltage is 62.5 V or more, the battery have been overcharged due to malfunction of charger. Replace the battery and the charger with new ones.



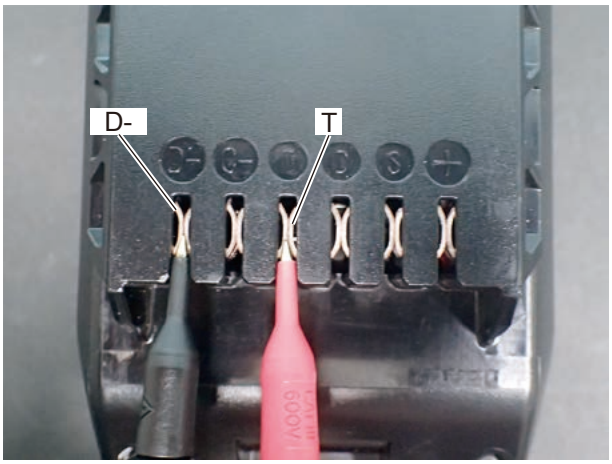
Inspecting for damage by over discharge

3. Charge battery fully.

4. Connect one probe of multimeter to terminal (D) of battery. Connect the other probe to terminal (D-). Mesure the resistance. The resistance should be about 10 kΩ.

5. If the resistance is 12 kΩ or more, recharge the battery fully and remeasure the resistance.

6. If the resistance is 12 kΩ or more after repeating above check three times, the battery is damaged from over discharge.



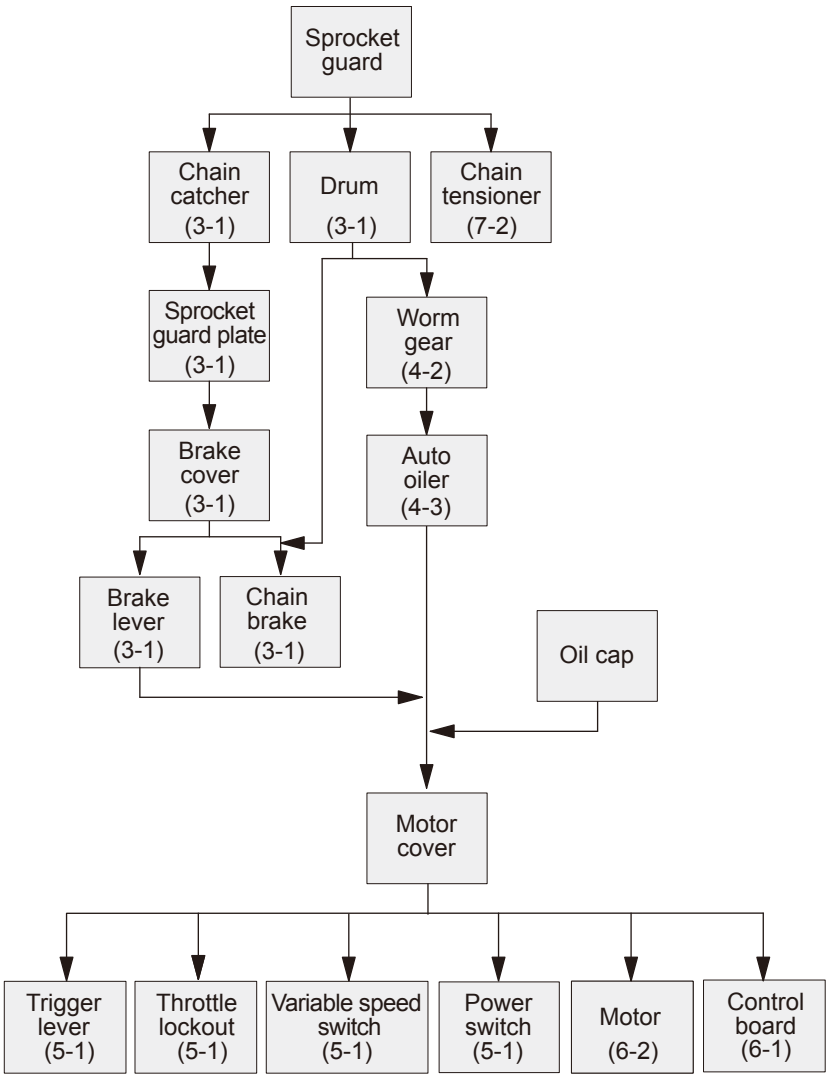
Inspecting for damage of temperature sensor

7. If battery is hot, cool it to 10 ~ 30°C (50 ~ 86°F).

8. Connect one probe of multimeter to terminal (T) of battery. Connect the other probe to terminal (D-). Mesure the resistance. The resistance should be 20 kΩ or lower. If not, temperature sensor of the battery is damaged.

9 MAINTENANCE GUIDE

9-1 Disassembly chart



9-2 Service intervals

IMPORTANT: Service intervals shown above are maximum. Actual use and your experience will determine the frequency of required maintenance.

Inspecting point	Service Reference		Intervals	
			Before use	Monthly
Battery	Inspect / Clean / Charge	8-3	✓	
Chain brake	Inspect / Clean / Replace	3-1	✓	
Saw chain	Inspect / Clean / Sharpen / Replace		✓	
Guide bar	Inspect / Clean / Replace		✓	
Air filter	Inspect / Clean / Replace		✓	
Cooling system	Inspect / Clean / Replace		✓	
Oil strainer	Inspect / Clean / Replace	4-1		✓
Oil tank	Inspect / Clean / Replace		✓ (The amount of remaining)	✓
Sprocket	Inspect / Clean / Replace	7-3		✓
Screws, bolts and nuts	Inspect / Tighten / Replace		✓	

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