SERVICE DATA

BATTERY CHAIN SAW

ECHO: DCS-3500T

(Serial number : E84135000001 - E84135999999)

Reference No. 22-006-EN
ISSUED: 202507

Introduction

This manual contains description for the maintenance and repair on this product.

Technical improvement of this product can cause changes to the maintenance, repair and spare parts. All specifications, illustrations and directions in this manual are based on the latest product information available at the time of publication.

Specifications are subject to change without notice.

Safety Alert Symbols

Safety messages in this manual are identified by the words "DANGER", "WARNING", "CAUTION", and "NOTICE."

The meanings are as follows.

⚠ DANGER

- The safety alert symbol accompanied by the word "DANGER" calls attention to an act or condition which WILL lead to serious personal injury or death if not avoided.

⚠ CAUTION

- The safety alert symbol accompanied by the word "CAUTION" calls attention to an act or condition which might lead to minor or moderate personal injury if not avoided.

⚠ WARNING

- The safety alert symbol accompanied by the word "WARNING" calls attention to an act or condition which CAN lead to serious personal injury or death if not avoided.

NOTICE

- The enclosed message provides information necessary for the protection of the unit.

Trademarks

1. Basic Information

1-1 Product Specifications

Item		Unit	Details	
Dimensions*1	Length	mm (in)	318 (12.5)	
	Width	mm (in)	199 (7.8)	
	Height	mm (in)	240 (9.4)	
Weight*2		kg (lb)	2.2 (4.8)	
Motor	Type	-	Brushless motor	
	Rotation direction	-	Clockwise as viewed from the output end	
	Rated current	A	43.5	
	Rated voltage	V	50.4	
	Rated output	kW	1.81	
	Speed control	-	Variable	
Battery	Standard battery	-	LBP-56V125	LBP-56V250
	Type	-	Lithium-ion	
	Rated voltage	V	50.4	
	Capacity	Ah / Wh	2.5 / 126	5.0 / 252
	Charging time	min.	LC56V4A: 38(100%) LCJQ-560: 28(80%) 47(100%)	LC56V4A: 75(100%) LCJQ-560: 56(80%) 86(100%) LCJU-560: 27(80%) 52(100%)
	Run time on a single charge*3	min.	-	Up to 51
Battery charger	Standard charger	-	LC-56V4A LCJQ-560 LCJU-560	
	Input voltage	-	AC220 - 240V	
Guide bar / Saw chain lubrication type		-	Automatic oil pump	
Chain Oil	Tank capacity	mL (UK.fl.oz.)	240 (8.44)	
Sprocket	Type	-	Spur	
	Number of teeth	-	7	
	Pitch	inch	0.325	

*1 Without guide bar and saw chain

*2 Without battery, guide bar and saw chain

*3 Depending on battery size, charge level and operating conditions.

Guide bar				Saw chain			
Type	Nose Type	Length (cm)	Gauge (inch)	Type	Pitch (inch)	Gauge (inch)	Drive links
12A4CD3251	sprocket	30	0.043	80TXL	0.325	0.043	51
14A4CD3259		35					59
16A4CD3264		40					64

1-2 Torque Limits

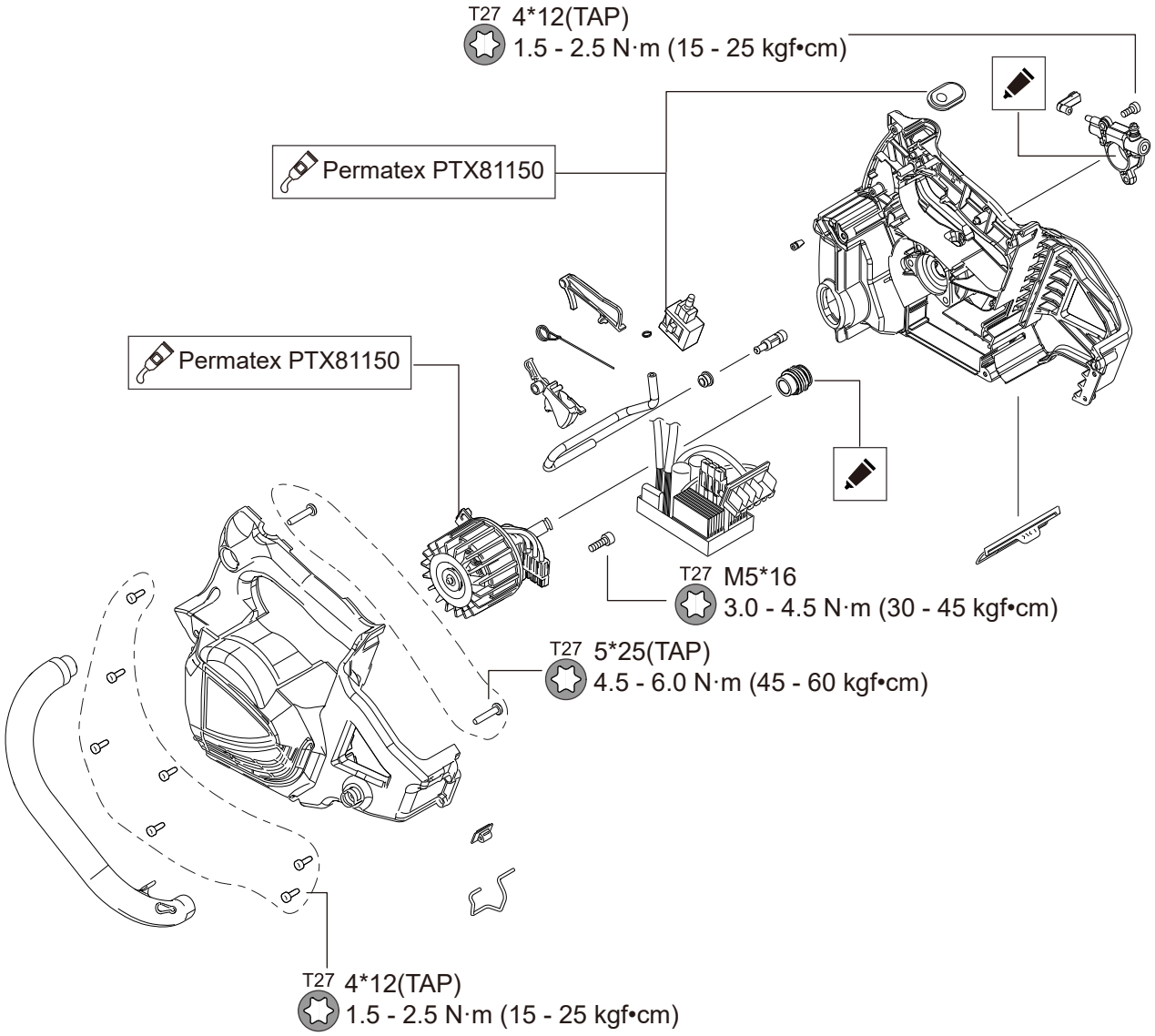


Figure : Torque Limits (1)

Remark

TAP : Tapping

: Apply lithium-based grease to part

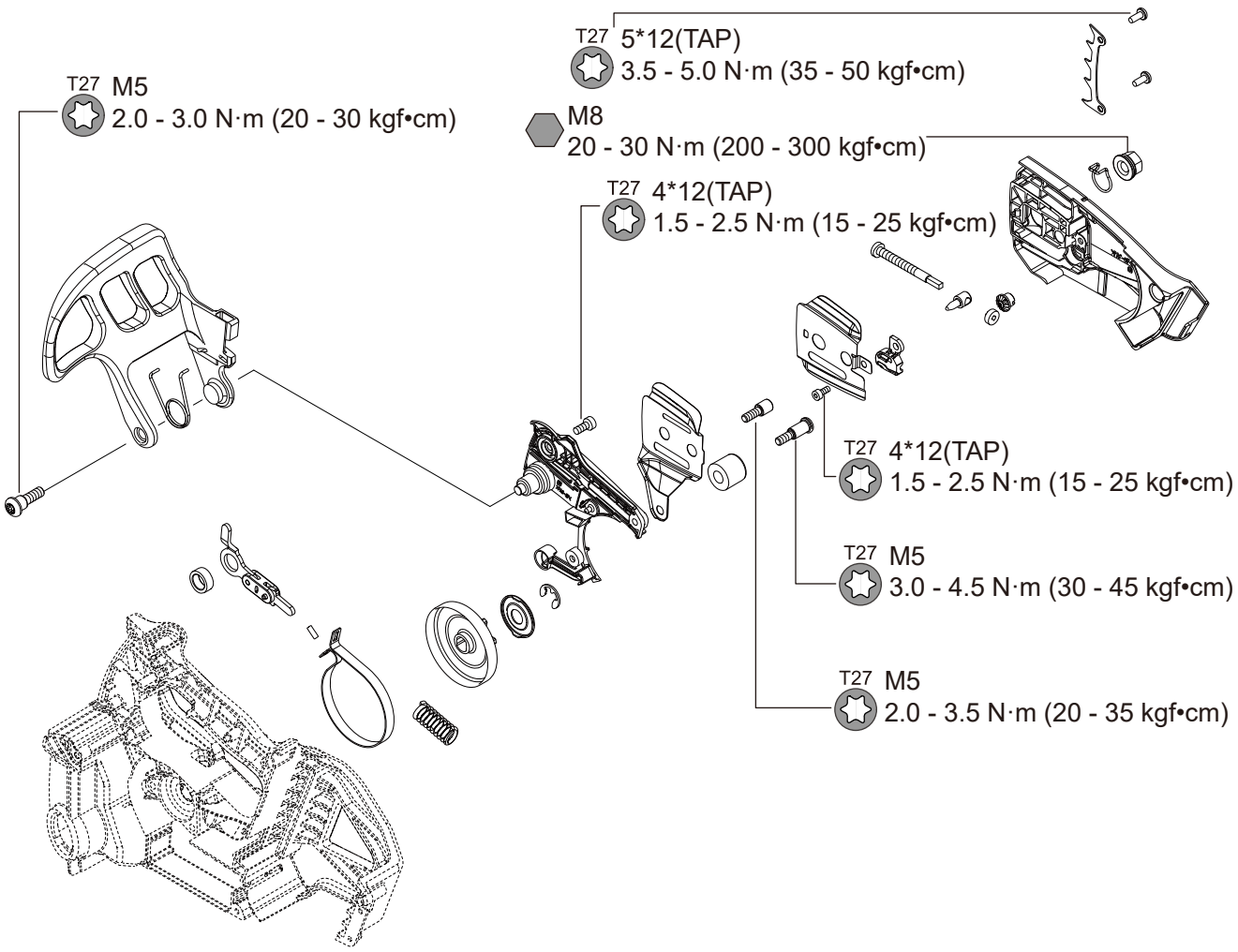


Figure : Torque Limits (2)

Remark

TAP : Tapping

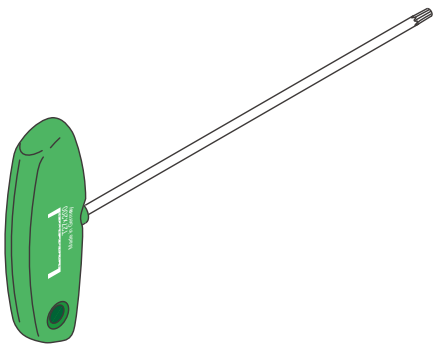
: Apply lithium-based grease to part

Related Topics

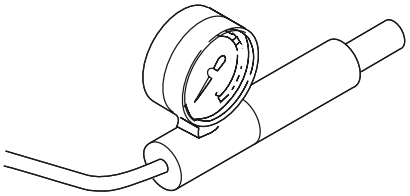
1-3 Required Tools and Special Maintenance Materials (p.5)

1-3 Required Tools and Special Maintenance Materials

1



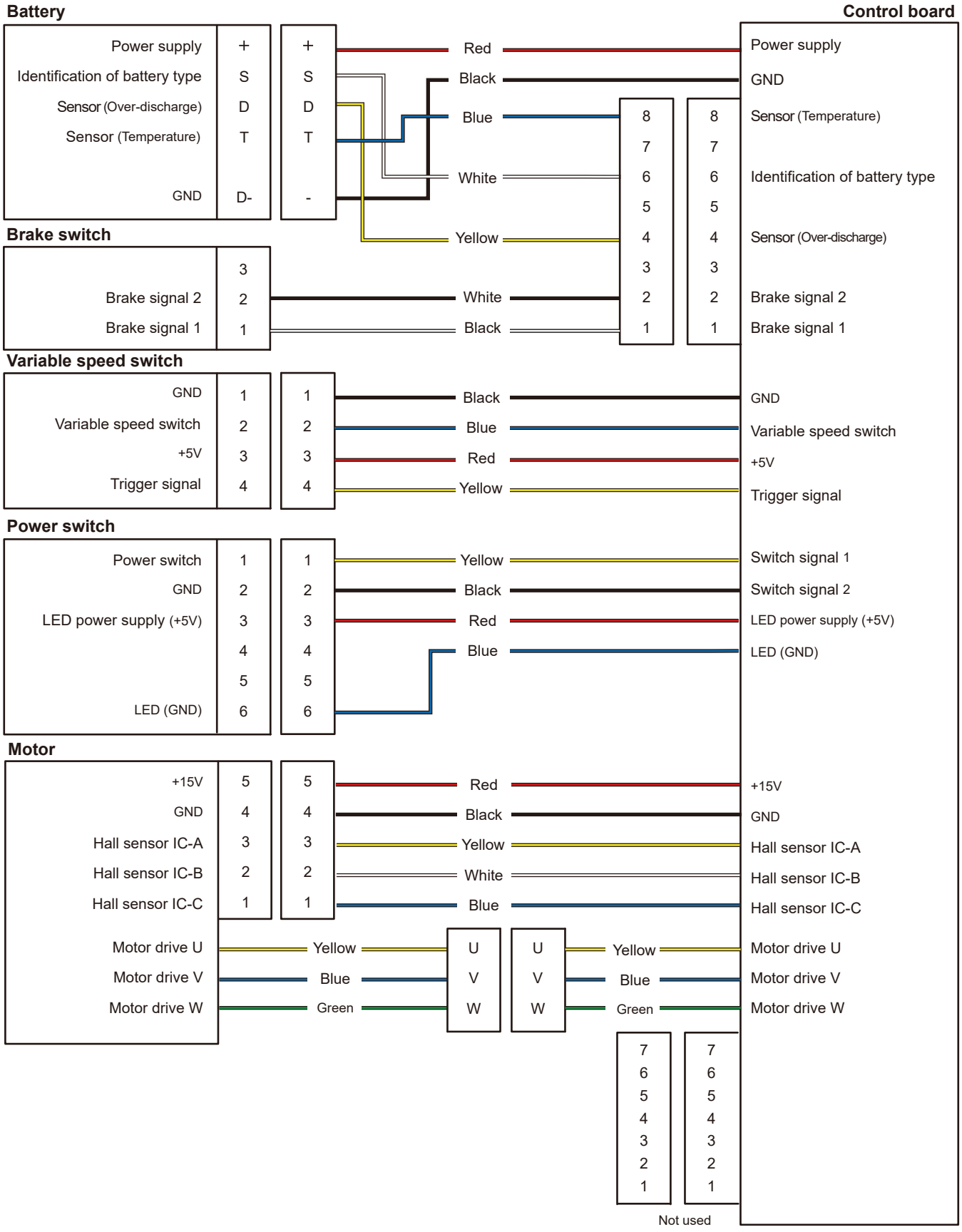
2



3

	Part Number	Part Name	Use
1	X602-000340	Torx wrench (T27)	To loosen/tighten Torx bolts
2	897803-30133	Pressure tester	To check oil line leakage
3	X695-000060	Lithium-based grease	To lubricate a worm gear

1-4 Wiring Diagram



2. Troubleshooting

2-1 Flow of Troubleshooting

Problems with the unit may have several causes.

Perform troubleshooting according to the flow below in order to identify the cause of the problem.

(1) Checking the power indicator

The flashing of the power indicator enables you to identify possible error causes.

(2) Diagnosis with the maintenance mode

The unit has a maintenance mode that can be used for diagnosis.

You can operate the unit to check the error number indicating the most recent error.

(3) Troubleshooting flow

If you cannot solve the problem with the maintenance mode, perform troubleshooting via the flow indicated below.

Start troubleshooting from flow **STEP 0** .

STEP 0 Error diagnosis

STEP 1 Checking the battery and the charger

STEP 2 Checking the unit when battery failure occurs

STEP 3 Checking the power supply circuit

STEP 4 Checking low voltage and over-discharge

STEP 5 Checking each sensor of the battery

STEP 6 Checking the overload

STEP 7 Checking other failures

Related Topics

- 2-2 Power Indicator Error Display (p.8)
- 2-3 Diagnosis with Maintenance Mode (p.9)
- 2-4 List of Maintenance Mode Error Numbers and Remedies (p.10)
- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)

2-2 Power Indicator Error Display

The flashing of the power indicator Ⓐ enables you to identify possible error causes.

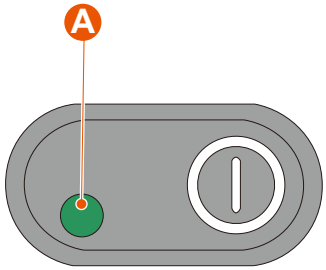


Figure : Power switch

Slow flashing (1 time/second)

- Low battery voltage
- Battery voltage too low to charge
- The battery sensor has a bad connection, or is disconnected.
- The capacitor is damaged.

Fast flashing (4 times/second)

- The chain brake is activated.
- The brake switch is disconnected.
- The battery voltage is too high.
- The battery is too hot or too cold.
- The unit is too hot or too cold.
- No electric current flows to the motor.
- The motor speed does not reach the set speed because a load is applied when the motor is started.
- The hall sensor is defective, or disconnected.
- The variable speed switch is defective, or disconnected.
- The board is defective.

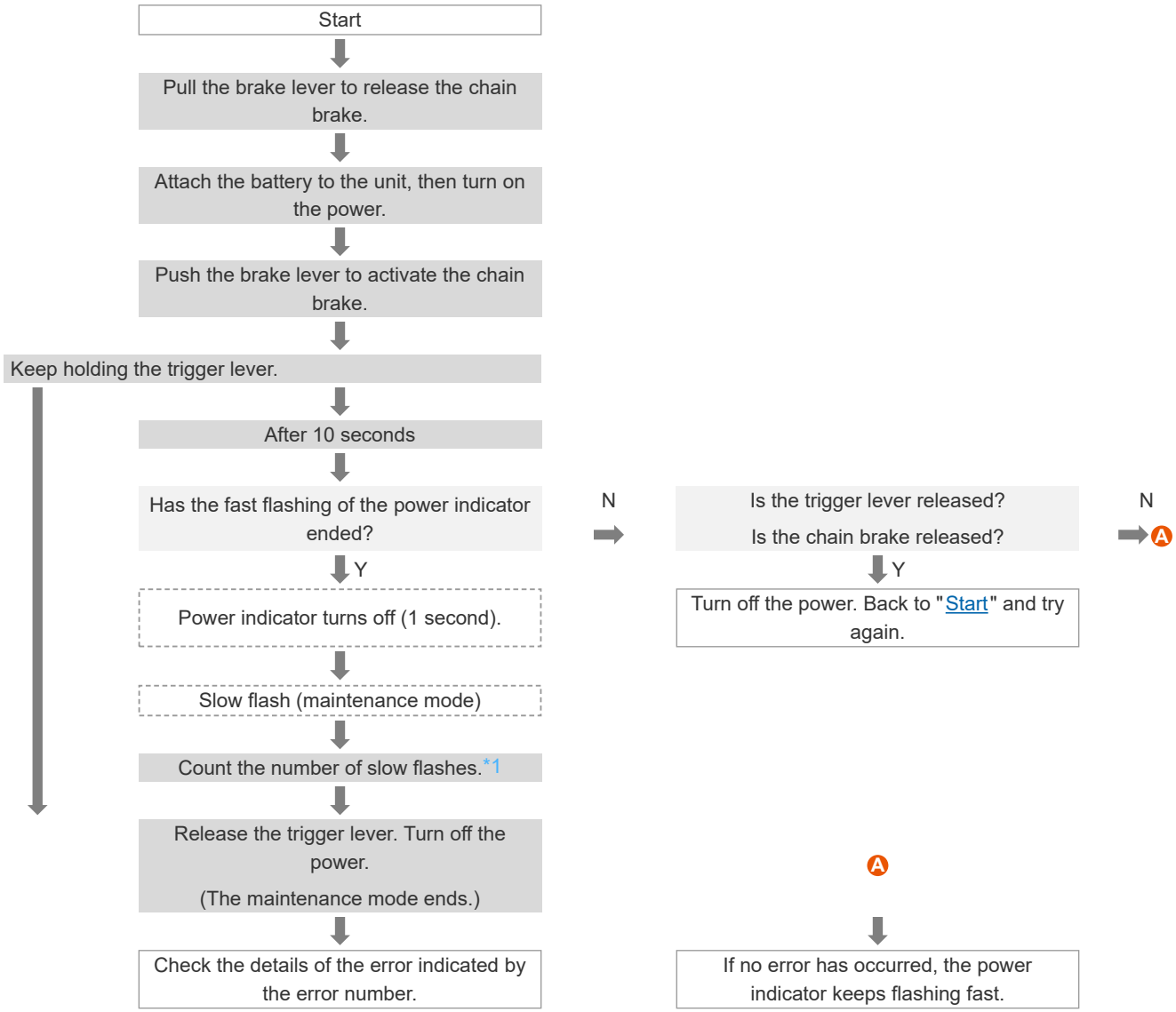
Related Topics

2-1 Flow of Troubleshooting (p.7)

2-3 Diagnosis with Maintenance Mode

⚠ CAUTION

- Do not pull the trigger lever when releasing the chain brake. The saw chain may run unexpectedly.



Remark

Y : Yes
N : No

*1 The power indicator alternates between slow flashes indicating the error number and fast flashes indicating a pause.

Related Topics

- 2-1 Flow of Troubleshooting (p.7)
- 2-4 List of Maintenance Mode Error Numbers and Remedies (p.10)
- 2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit) (p.16)

2-4 List of Maintenance Mode Error Numbers and Remedies

You can identify the error number by counting the number of slow power indicator flashes in the maintenance mode.

The error number indicates the most recent error. Maintenance mode retains the last error number after the error is resolved. Error numbers are not deleted unless another error occurs.

The causes and remedies of each error number are indicated below.

Error number	Possible cause	Remedy
2	The battery is too hot.	Wait for the battery to cool down. Check the battery temperature sensor.
5	The power switch is defective.	Inspect the variable power switch.
7 to 9	The variable speed switch is defective, or disconnected.	Inspect the variable speed switch.
12	High motor drive voltage.	Inspect the motor assembly. Inspect the battery.
16	The hall sensor is defective, or disconnected.	Inspect the motor assembly.
17	The motor driver circuit is too hot.	Wait for the control board assembly to cool down. Inspect the control board assembly.

関連項目

- 2-1 Flow of Troubleshooting (p.7)
- 2-3 Diagnosis with Maintenance Mode (p.9)
- 3-6 Inspect the Battery Voltage (p.28)
- 3-8 Inspect the Battery Temperature Sensor (p.29)
- 4-4 Inspect the Motor Assembly (p.37)
- 4-7 Inspect the Variable Speed Switch (p.40)

2-5 Troubleshooting "STEP 0" (Error Diagnosis)

⚠ CAUTION

- Do not pull the trigger lever when releasing the chain brake. The saw chain may run unexpectedly.

Start

↓

Can the battery be charged? — N → Go to flow **STEP 1**.

↓ Y

Attach the battery to the unit, then turn off the power.*1

↓

Pull the brake lever to release the chain brake.

↓

Press the power switch.

↓

Is the power indicator turned on or flashing? — N → Go to flow **STEP 3**.

↓ Y

Is the power indicator flashing slowly? — Y → Go to flow **STEP 4**.

↓ N

Is the power indicator flashing fast? — Y → Go to flow **STEP 5**.

↓ N

Pull the trigger lever.

↓

Is the power indicator flashing fast? — Y → Go to flow **STEP 6**.

↓ N

Is the unit running correctly? — N → Go to flow **STEP 7**.

↓ Y

Problem is resolved.

Remark

Y : Yes
N : No

*1 If the power does not turn off, the power switch may be short-circuited. Inspect the power switch.

Related Topics

- 2-1 Flow of Troubleshooting (p.7)
- 2-6 Troubleshooting "STEP 1" (Check the Battery and Charger) (p.13)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)
- 2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit) (p.16)
- 2-9 Troubleshooting "STEP 4" (Check Low Voltage and Over-Discharge) (p.18)
- 2-10 Troubleshooting "STEP 5" (Check Each Sensor of Battery) (p.20)
- 2-11 Troubleshooting "STEP 6" (Check the Chain Brake Switch and Overload) (p.22)
- 2-12 Troubleshooting "STEP 7" (Check Other Failures) (p.24)
- 4-6 Inspect the Power Switch (p.38)

2-6 Troubleshooting "STEP 1" (Check the Battery and Charger)

NOTICE

- If the unit is defective, it may also damage the new battery when the battery is replaced with a new one.
  Before replacing the battery, perform flow **STEP 2** to check the unit for problems other than the battery.

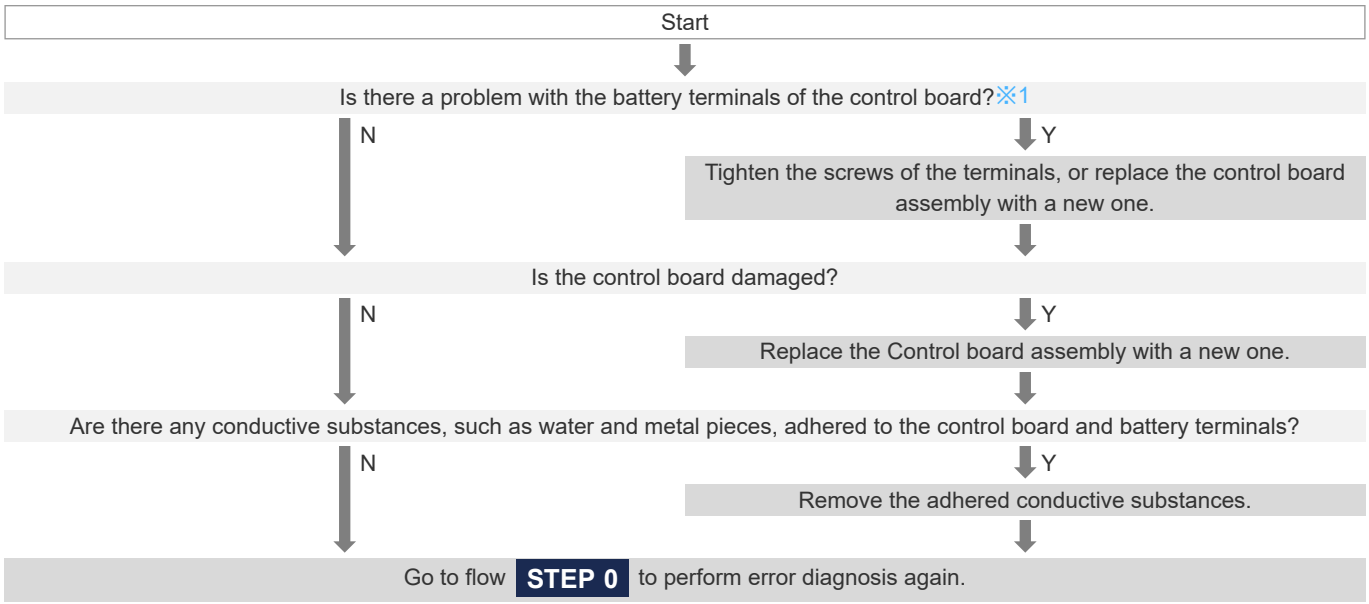
Remark

Y : Yes
N : No

Related Topics

- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)
- 2-9 Troubleshooting "STEP 4" (Check Low Voltage and Over-Discharge) (p.18)

2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs)



Remark

Y : Yes
N : No

※1 Inspect the battery terminals of the control board for the following problems.

- There is a short-circuit between the positive [+] terminal and the negative [-] terminal.
- The screws of the battery terminals are loose or disconnected.
- No electric current can flow in the positive [+] and negative [-] terminal wires.

関連項目

- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)
- 2-6 Troubleshooting "STEP 1" (Check the Battery and Charger) (p.13)
- 4-5 Inspect the Control board assembly (p.37)
- 2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit) (p.16)
- 2-9 Troubleshooting "STEP 4" (Check Low Voltage and Over-Discharge) (p.18)
- 2-10 Troubleshooting "STEP 5" (Check Each Sensor of Battery) (p.20)
- 3-6 Inspect the Battery Voltage (p.28)
- 3-7 Inspect for Damage from Over-Discharging (p.29)
- 3-8 Inspect the Battery Temperature Sensor (p.29)

2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit)

⚠ WARNING

- Perform troubleshooting in safe, clear surroundings. The unit may run unexpectedly.

⚠ CAUTION

- Do not pull the trigger lever when releasing the chain brake. The saw chain may run unexpectedly.

NOTICE

- If the unit is defective, it may also damage the new battery when the battery is replaced with a new one.
  Before replacing the battery, perform flow **STEP 2** to check the unit for problems other than the battery.

Start

Attach the battery to the unit.

Pull the brake lever to release the chain brake.

Press the power switch without pulling the trigger lever.

Is the power indicator turned on or flashing?
- Y → Go to flow **STEP 0** to perform error diagnosis again.
- N ↓

Does the unit appear to be in operating condition?*1
- N → Repair or replace the defective parts if necessary. → A
- Y ↓

Does the power switch have a bad connection?*2
- Y → Replace the power switch with a new one. → A
- N ↓

Does the power switch operate correctly?*3
- N → Replace the power switch with a new one. → A
- Y ↓

Is there a short circuit in the terminals?*4
- Y → Repair or replace the defective parts if necessary. → A
- N ↓

Replace the Control board assembly with a new one. → A

Remark

Y : Yes
N : No

*1 Inspect the unit for the following:

- Each connector is connected securely.
- Each wire is connected to each connector securely.
- All the wires are intact.

*2 Inspect the following.

- When the power switch button is pressed : An electric current flows between terminals [1] and [2].
- When the power switch button is released : No electric current flows between terminals [1] and [2].

*3 Apply an electric current between terminals [3] and [6] of the power switch. The power indicator should turn on.

*4 Inspect the following terminals for a short circuit.

- Between terminals [2] and [3] of the power switch
- Between terminals [1] and [3] of the variable speed switch
- Between terminals [4] and [5] of the motor assembly 5-pole terminal block.

Related Topics

- 2-3 Diagnosis with Maintenance Mode (p.9)
- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)
- 3-8 Inspect the Battery Temperature Sensor (p.29)
- 4-6 Inspect the Power Switch (p.38)
- 4-7 Inspect the Variable Speed Switch (p.40)
- 4-4 Inspect the Motor Assembly (p.37)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)

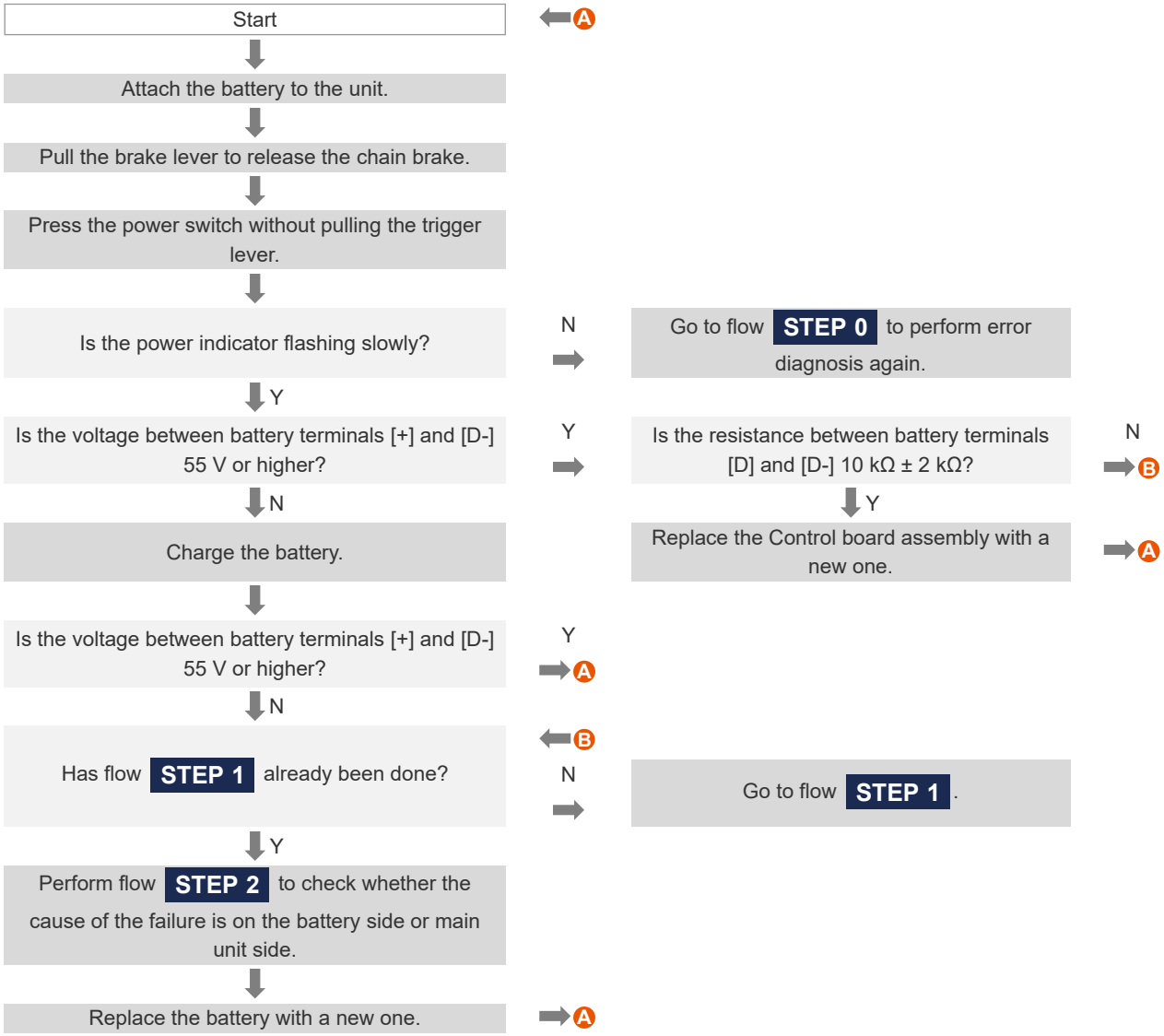
2-9 Troubleshooting "STEP 4" (Check Low Voltage and Over-Discharge)

⚠ CAUTION

- Do not pull the trigger lever when releasing the chain brake. The saw chain may run unexpectedly.

NOTICE

- If the unit is defective, it may also damage the new battery when the battery is replaced with a new one.
  Before replacing the battery, perform flow **STEP 2** to check the unit for problems other than the battery.



Remark

Y : Yes
N : No

Related Topics

- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)
- 3-6 Inspect the Battery Voltage (p.28)
- 3-7 Inspect for Damage from Over-Discharging (p.29)
- 2-6 Troubleshooting "STEP 1" (Check the Battery and Charger) (p.13)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)

2-10 Troubleshooting "STEP 5" (Check Each Sensor of Battery)

⚠ WARNING

- Perform troubleshooting in safe, clear surroundings. The unit may run unexpectedly.

⚠ CAUTION

- Do not pull the trigger lever when releasing the chain brake. The saw chain may run unexpectedly.

NOTICE

- If the unit is defective, it may also damage the new battery when the battery is replaced with a new one.
  Before replacing the battery, perform flow **STEP 2** to check the unit for problems other than the battery.

Start

Attach the battery to the unit.

Pull the brake lever to release the chain brake.

Press the power switch without pulling the trigger lever.

Is the power indicator flashing fast?
- N → Go to flow **STEP 0** to perform error diagnosis again.
- Y ↓

Are the battery and unit too hot, or too cold?
- Y → Allow the battery and unit to cool down or warm up. → A
- N ↓

Is the battery resistance value within the normal range?*1
- N → Perform flow **STEP 2** to check whether the cause of the failure is on the battery side or main unit side.
  - Replace the battery with a new one. → A
- Y ↓

Is the voltage between battery terminals [+] and [D-] 59.1 V or higher?
- Y → Replace the battery and charger with new ones. → A
- N ↓

Does the unit appear to be in operating condition?*2
- N → Repair or replace the defective parts if necessary. → A
- Y ↓

Perform a crosscheck using a known good control board and motor.

Is the control board defective?
- N → Replace the motor assembly with a new one. → A
- Y ↓

Replace the Control board assembly with a new one. → A

Remark

Y : Yes
N : No

*1 The resistance between battery terminals [T] and [C-] and between battery terminals [T] and [D-] should be from 2.1 kΩ to 78.0 kΩ.

*2 Inspect the unit for the following:

- Each connector is connected securely.
- Each wire is connected to each connector securely.
- All the wires are intact.
- There are no short circuits.
- No conductive substances, such as water and metal pieces, are adhered to the control board.

Related Topics

- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)
- 3-8 Inspect the Battery Temperature Sensor (p.29)
- 3-6 Inspect the Battery Voltage (p.28)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)

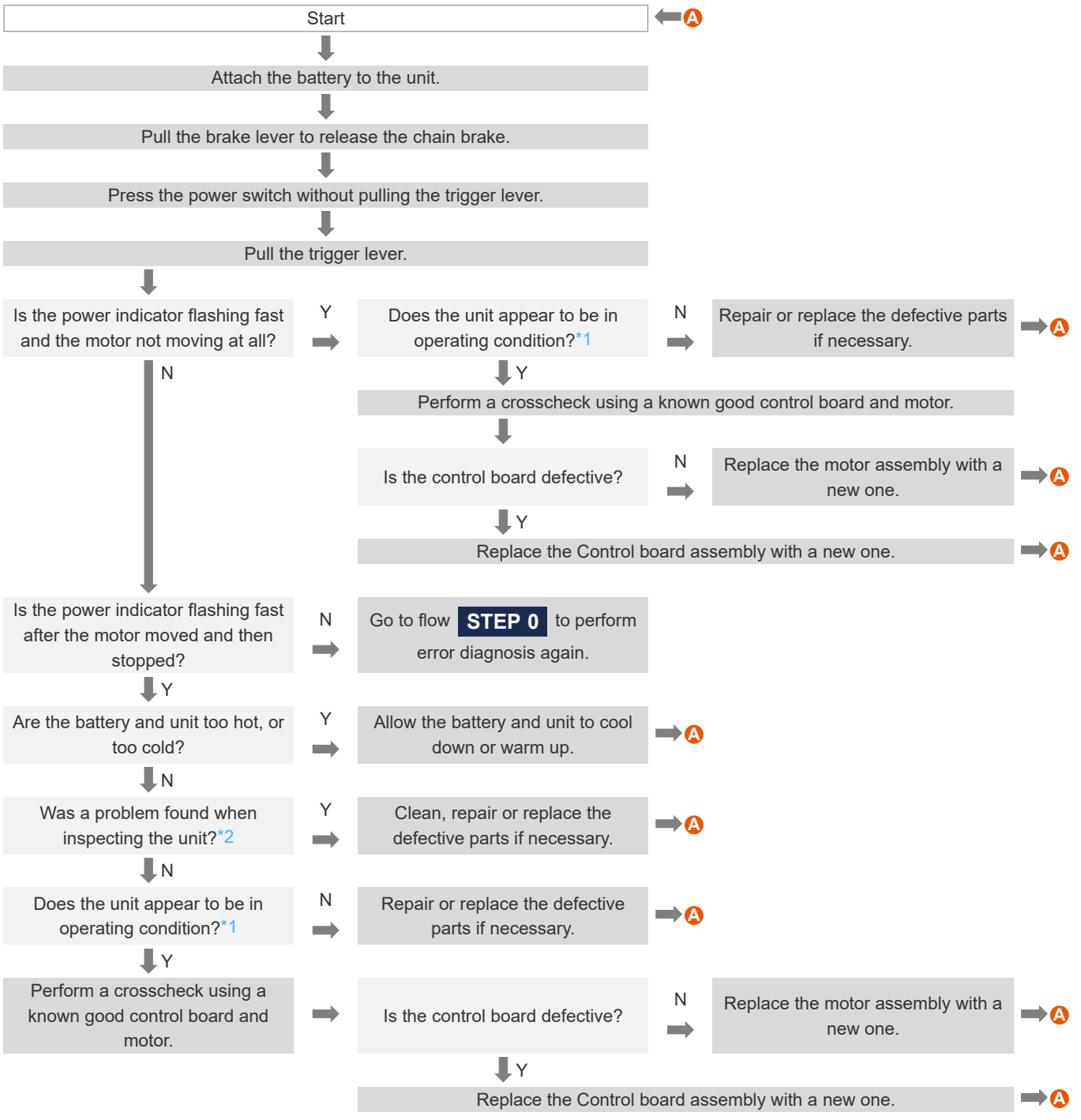
2-11 Troubleshooting "STEP 6" (Check the Chain Brake Switch and Overload)

⚠ WARNING

- Perform troubleshooting in safe, clear surroundings. The unit may run unexpectedly.

⚠ CAUTION

- Do not pull the trigger lever when releasing the chain brake. The saw chain may run unexpectedly.



Remark

Y : Yes
N : No

*1 Inspect the unit for the following:

- Each connector is connected securely.
- Each wire is connected to each connector securely.
- All the wires are intact.
- There are no short circuits.

*2 Inspect the unit for the following problems:

- Sprocket clogged with saw dust or other objects
- Non-recommended saw chain and guide bar used
- Saw chain too tight
- Trouble in the drive system

Related Topics

2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)

2-12 Troubleshooting "STEP 7" (Check Other Failures)

⚠ WARNING

- Perform troubleshooting in safe, clear surroundings. The unit may run unexpectedly.

⚠ CAUTION

- Do not pull the trigger lever when releasing the chain brake. The saw chain may run unexpectedly.

Flow STEP 7 (1)

Start ← B

↓

Attach the battery to the unit.

↓

Pull the brake lever to release the chain brake.

↓

Press the power switch without pulling the trigger lever.

↓

Pull the trigger lever.

↓

Is the power indicator lit and the motor not moving at all?

N → "Flow STEP 7 (2)" A

↓ Y

Does the unit appear to be in operating condition?*1

N → Repair or replace the defective parts if necessary. → B

↓ Y

Does the variable speed switch operate normally when the terminals are inspected?*2

N → Replace the variable speed switch with a new one. → B

↓ Y

Is the resistance value of the variable speed switch within the normal range?*3

N → Replace the variable speed switch with a new one. → B

↓ Y

Replace the Control board assembly with a new one. → B

Remark

Y : Yes
N : No

*1 Inspect the unit for the following:

- Each connector is connected securely.
- Each wire is connected to each connector securely.
- All the wires are intact.
- There are no short circuits.

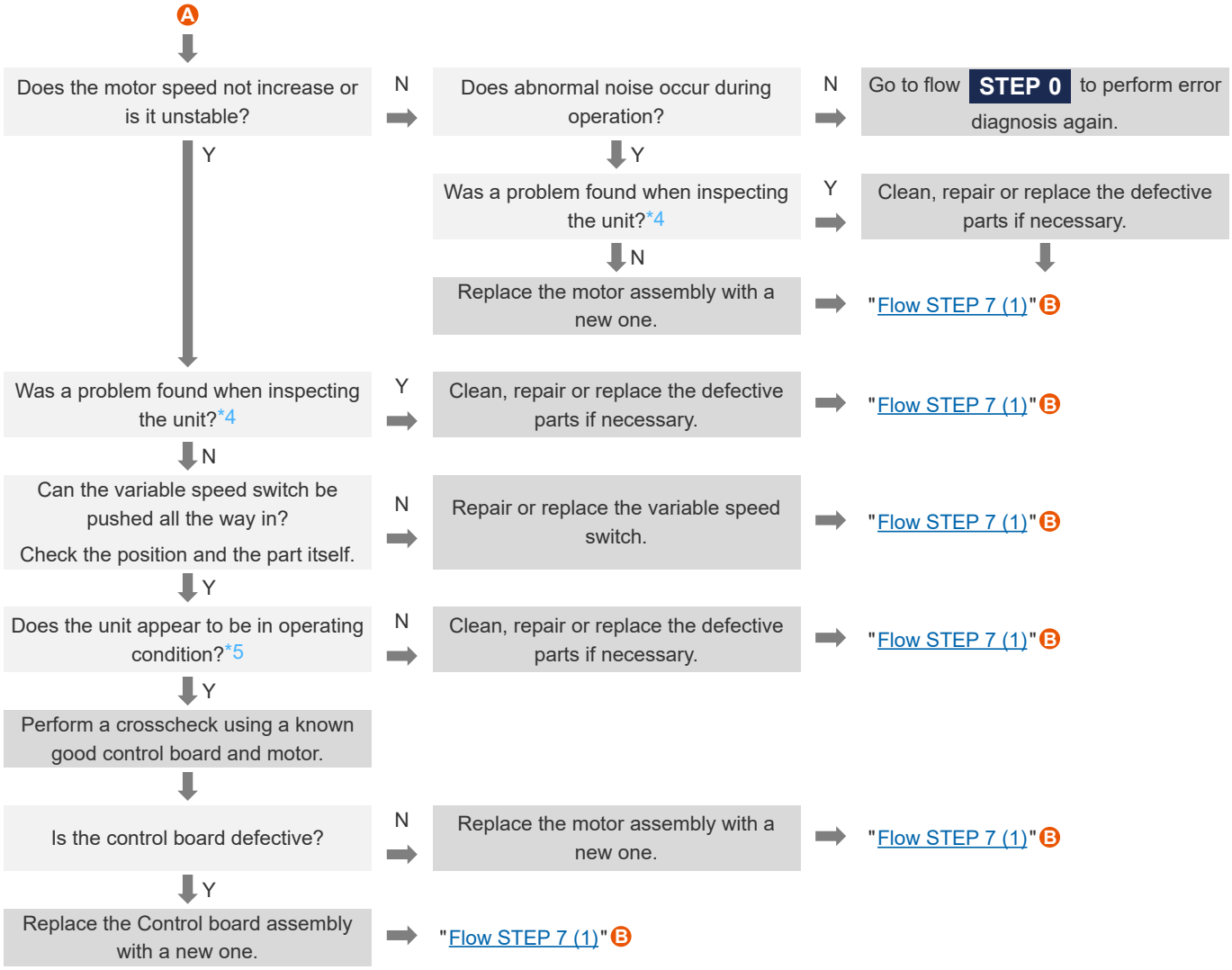
*2 Inspect the terminals of the variable speed switch for the following operation.

- When the switch is pressed : An electric current flows between terminals [1] and [4].
- When the switch is not pressed : No electric current flows between terminals [1] and [4].

*3 Inspect whether the resistance value between terminals [1] and [2] of the variable speed switch is within the following range.

- When the switch is pressed : 100 Ω or lower
- When the switch is not pressed : Between 70 kΩ and 130 kΩ

Flow STEP 7 (2)



Remark

Y : Yes
N : No

*4 Inspect the unit for the following problems:

- Sprocket clogged with saw dust or other objects
- Non-recommended saw chain and guide bar used
- Saw chain too tight
- Trouble in the drive system

*5 Inspect the unit for the following:

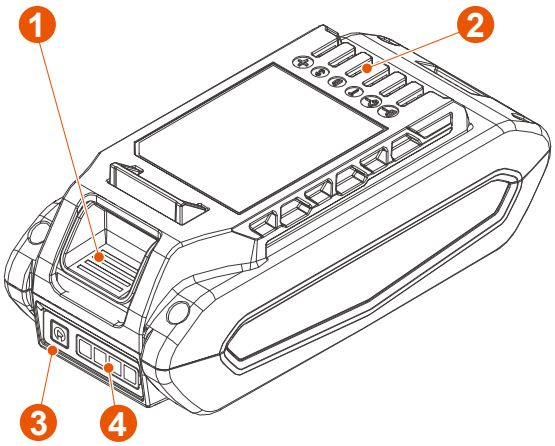
- Each connector is connected securely.
- Each wire is connected to each connector securely.
- All the wires are intact.
- There are no short circuits.

Related Topics

- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)
- 4-7 Inspect the Variable Speed Switch (p.40)

3. Inspect the Battery and Charger

3-1 Battery Components

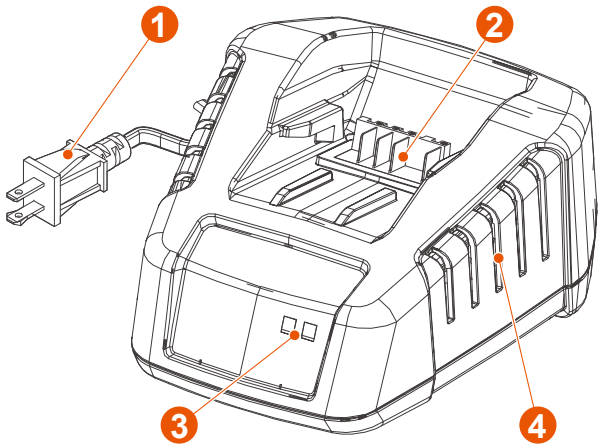


1. Battery pack latch
2. Battery terminal
3. Battery charge status button
4. LED charge level indicators

Related Topics

- 3-4 LED Charge Level Indicator (p.27)
- 3-6 Inspect the Battery Voltage (p.28)
- 3-7 Inspect for Damage from Over-Discharging (p.29)
- 3-8 Inspect the Battery Temperature Sensor (p.29)

3-2 Charger Components



1. Power cord
2. Battery terminal
3. Charging status indicator
4. Ventilation holes

Related Topics

- 3-5 Charging Status Indicator (p.28)
- 3-6 Inspect the Battery Voltage (p.28)
- 3-7 Inspect for Damage from Over-Discharging (p.29)

3-3 Cautions for Using Battery and Charger

⚠ CAUTION

- Do not open or modify the battery. Do not use a battery that is damaged or modified.

  Damaged or modified batteries may result in electric shock, fire, explosion or injury.

NOTICE

- Charge the battery in an environment where ambient temperature is within 5°C to 40°C (41°F to 104°F).
- The battery capacity may decrease due to repeated charging and discharging.

  When the battery has been charged 500 times, its capacity will have decreased to about 60%, but this is not a problem. If capacity is significantly reduced, replace the battery.

3-4 LED Charge Level Indicator

To light up the LED charge level indicator, press the battery charge status button of the battery.

The LED charge level indicator lights up according to the remaining battery charge.

- : 80% to 100%
- : 55% to 80%
- : 25% to 55%
- : 0% to 25%
- : 0%

Related Topics

3-1 Battery Components (p.27)

3-5 Charging Status Indicator

The charging status indicator shows the current battery status.

The charging status indicator lights up or flashes when the battery is inserted into the charger.

(Flashing in green)
The battery is being charged.

(Green light is on)
The battery is fully charged. Remove the battery from the charger.

(Flashing in red)
The battery or the charger is defective or there is a bad connection between the battery and the charger.

(Red light is on)
The battery is too hot or too cold.

Related Topics

3-2 Charger Components (p.27)

3-6 Inspect the Battery Voltage

Prerequisites

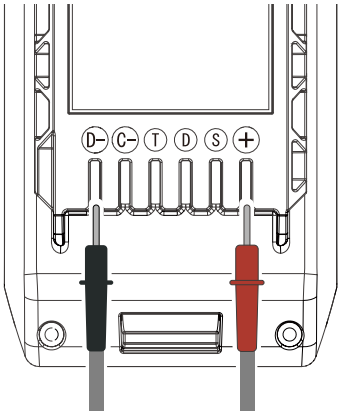
- The ambient temperature should be in the range of 0 to 40°C (32°F to 104°F).

  For correct measurement, check the ambient temperature in advance.
- Tools required:
  - Multimeter

Procedure

1. **Charge the battery.**
2. **Measure the voltage between battery terminals [D-] and [+] with a multimeter.**

   The voltage should be from 55 V to 59 V.



3. **If the voltage is not within the normal range (55 V to 59 V), replace the battery or charger with a new one, depending on the voltage.**

NOTICE

- If the unit is defective, it may also damage the new battery when the battery is replaced with a new one.

  Before replacing the battery, perform flow **STEP 2** to check the unit for problems other than the battery.

Lower than 55 V
The battery is defective. Replace the battery with a new one.

59.1 V or higher
The battery has been overcharged due to malfunction of the charger and battery. Replace both the battery and the charger with new ones.

⚠ CAUTION

- Do not use an overcharged battery. It may cause explosion or fire.

Related Topics

- 2-4 List of Maintenance Mode Error Numbers and Remedies (p.10)
- 2-9 Troubleshooting "STEP 4" (Check Low Voltage and Over-Discharge) (p.18)
- 2-10 Troubleshooting "STEP 5" (Check Each Sensor of Battery) (p.20)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)
- 3-1 Battery Components (p.27)
- 3-2 Charger Components (p.27)

3-7 Inspect for Damage from Over-Discharging

Prerequisites

- The ambient temperature should be in the range of 0 to 40°C (32°F to 104°F).

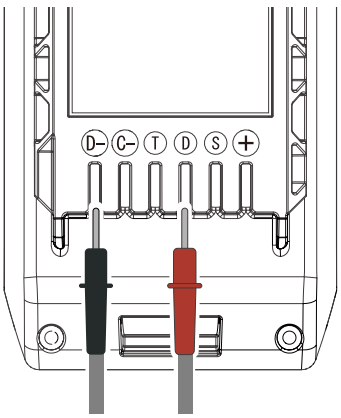
  For correct measurement, check the ambient temperature in advance.
- Tools required:
  - Multimeter

Procedure

1. **Charge the battery.**

2. **Measure the resistance between battery terminals [D-] and [D] with a multimeter.**

   The resistance should be within the10kΩ±2kΩ. Usually, it is about 10 kΩ.



3. **If the resistance is outside the 10 kΩ ± 2 kΩ, replace the battery with a new one.**

   If the resistance is greater than 0.95 MΩ, the battery is over-discharged.

NOTICE

- If the unit is defective, it may also damage the new battery when the battery is replaced with a new one.

  Before replacing the battery, perform flow **STEP 2** to check the unit for problems other than the battery.

⚠ CAUTION

- Do not use an over-discharged battery. It may cause explosion or fire.

Related Topics

- 2-9 Troubleshooting "STEP 4" (Check Low Voltage and Over-Discharge) (p.18)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)
- 3-1 Battery Components (p.27)
- 3-2 Charger Components (p.27)

3-8 Inspect the Battery Temperature Sensor

Prerequisites

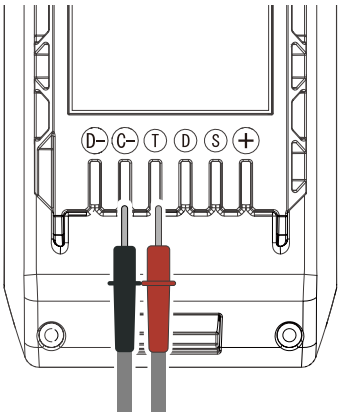
- The ambient temperature should be in the range of 0 to 40°C (32°F to 104°F).

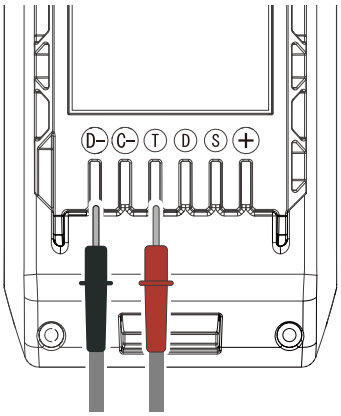
  For correct measurement, check the ambient temperature in advance.
- Tools required:
  - Multimeter

Procedure

1. **Measure the resistance between battery terminals [C-] and [T] and between battery terminals [D-] and [T] with a multimeter.**

   Both resistance should be within the 2.1 kΩ to 78.0 kΩ.





2. **If the resistance is outside the 2.1 kΩ to 78.0 kΩ, replace the battery with a new one.**

   The temperature sensor is damaged.

NOTICE

- If the unit is defective, it may also damage the new battery when the battery is replaced with a new one.

  Before replacing the battery, perform flow **STEP 2** to check the unit for problems other than the battery.

Related Topics

- 2-4 List of Maintenance Mode Error Numbers and Remedies (p.10)
- 2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit) (p.16)
- 2-10 Troubleshooting "STEP 5" (Check Each Sensor of Battery) (p.20)
- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)
- 3-1 Battery Components (p.27)

4. Inspect the Various Parts

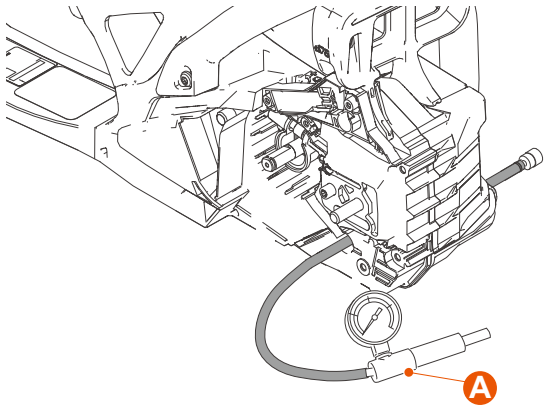
4-1 Inspect the Oil Line

Prerequisites

- Tools required:
  - Pressure tester
  - Longnose pliers (wrap the ends with tape)

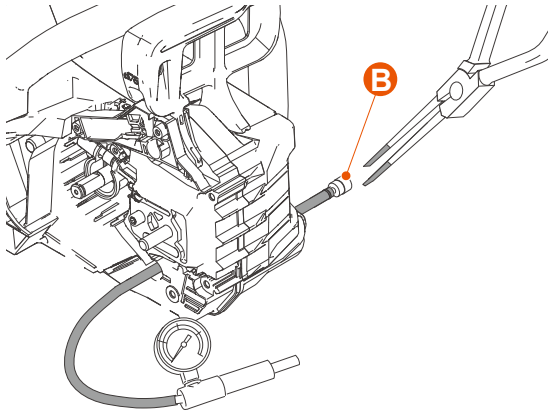
Procedure

1. **Connect the oil line on the auto-oiler side to the pressure tester A.**



2. **Remove the oil cap and pull out the oil strainer B from the oil tank.**

3. **Pinch the oil line on the oil-strainer side with longnose pliers.**



NOTICE

- Wrap the ends of the longnose pliers with plastic tape to protect the oil line from damage.

4. **Apply air pressure of approx. 0.05 MPa (0.5 kgf/cm2) (7.0 psi) with the pressure tester.**

5. **Check if the pressure drops.**

   If the pressure drops, replace the oil line with a new one.

4-2 Inspect the Auto-Oiler Assembly (When the Plunger Gear Cannot Be Rotated Smoothly)

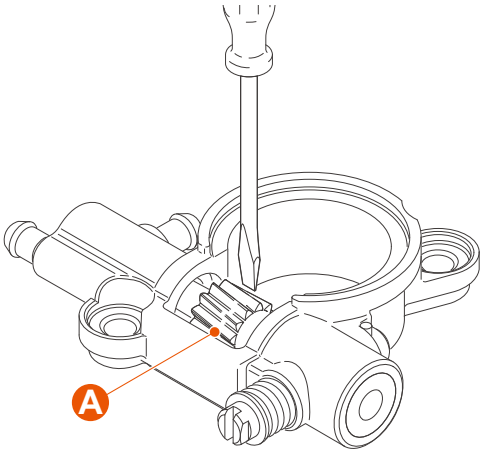
This procedure describes how to inspect the auto-oiler assembly when the plunger gear cannot be rotated smoothly.

If the plunger gear cannot be rotated at all, refer to the procedure for inspecting the auto-oiler assembly when the plunger gear cannot be rotated.

Prerequisites

- Remove the auto-oiler assembly.
- Required tools, materials and parts:
  - Suitable solvent (Fill a container that is large enough for the auto-oiler assembly to be immersed.)
  - Lithium-based grease
  - Small flat head screwdriver
  - Pliers
  - New spring pin
- Check the rotation of the plunger gear.

  Check the rotation of the plunger gear A using a small flat head screwdriver or equivalent.

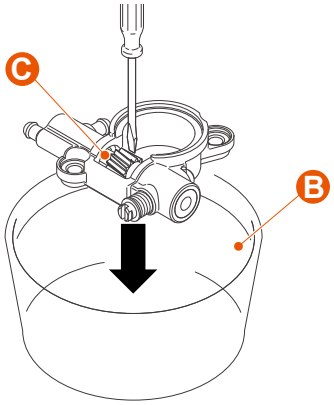


Procedure

1. **Immerse the auto-oiler assembly in the suitable solvent Ⓑ.**

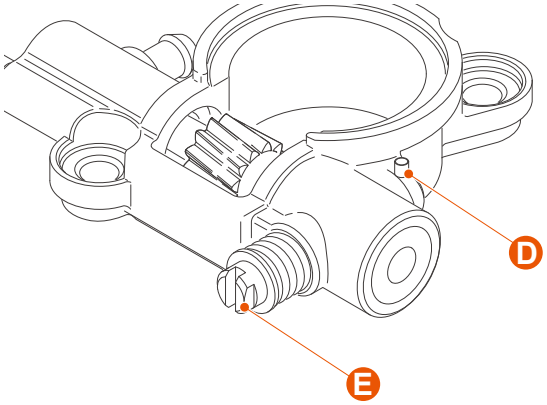
2. **With the auto-oiler assembly immersed, rotate the plunger gear Ⓒ using a small flat head screwdriver or equivalent.**

   Keep rotating the plunger gear until it rotates smoothly.

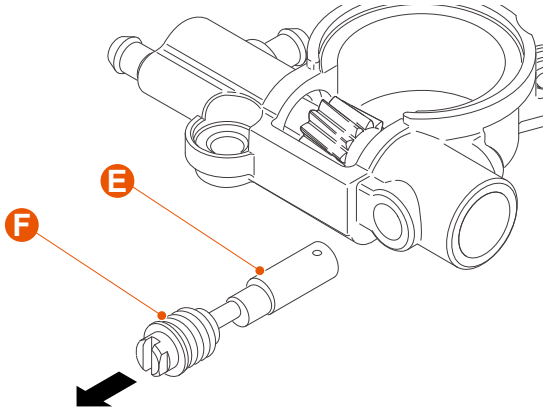


3. **Retrieve the auto-oiler assembly from the suitable solvent Ⓑ.**

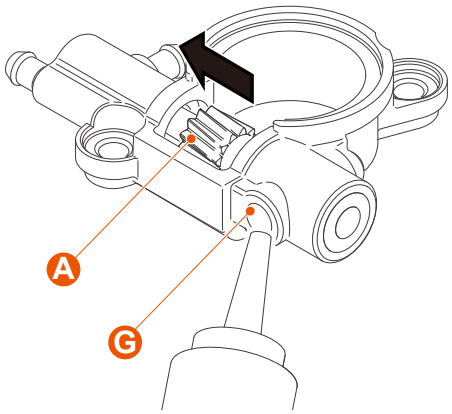
4. **Pull out the spring pin Ⓓ from the adjusting needle Ⓔ with pliers.**



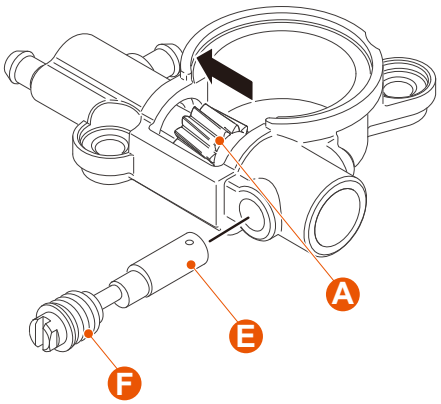
5. **Pull out the adjusting needle Ⓔ and the spring Ⓕ from the auto-oiler.**



6. **Push the plunger gear Ⓐ in the direction of the arrow with your finger and hold it there. Then inject grease in the hole Ⓖ.**



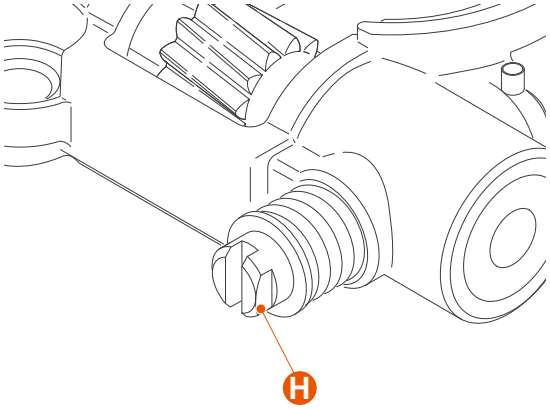
7. **Push the plunger gear Ⓐ in the direction of the arrow and hold it there. Then insert the adjusting needle Ⓔ with the spring Ⓕ to the auto-oiler.**



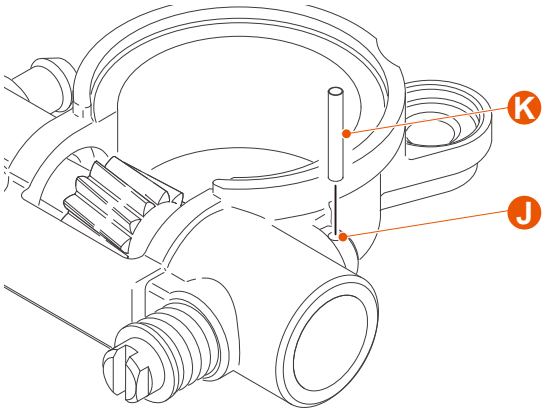
8. **Release your finger from the plunger gear Ⓐ after inserting the adjusting needle Ⓔ with the spring Ⓕ.**

9. **Turn the adjusting needle so that the cutout (H) of the adjusting needle is oriented as shown in the figure.**

   When the adjusting needle is in this position, the chain oil is at maximum discharge.



10. **Drive a new spring pin (K) into the hole (J) of the adjusting needle.**



If the above procedure does not solve the problem, refer to the procedure for inspecting the auto-oiler assembly when the plunger gear cannot be rotated.

4-3 Inspect the Auto-Oiler Assembly (When the Plunger Gear Cannot Be Rotated)

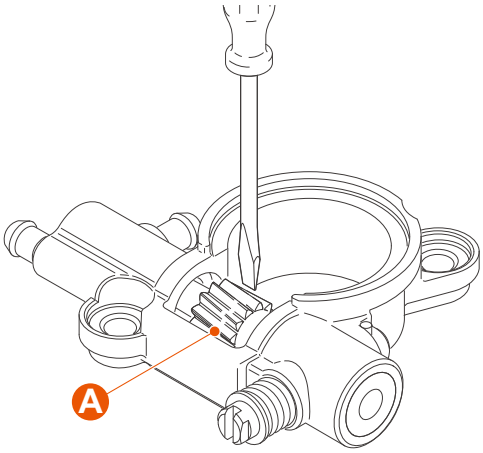
This procedure describes how to inspect the auto-oiler assembly when the plunger gear cannot be rotated.

If the plunger gear cannot be rotated smoothly, refer to the procedure for inspecting the auto-oiler assembly when the plunger gear cannot be rotated smoothly.

Prerequisites

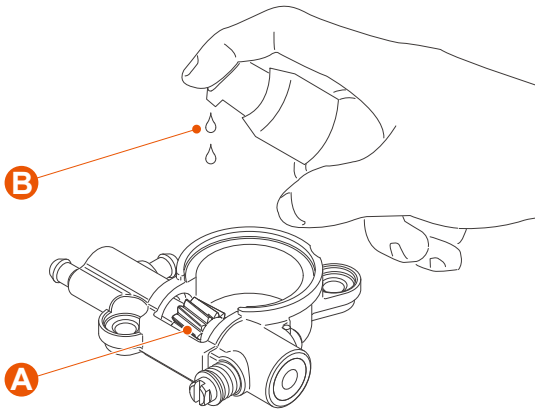
- Remove the auto-oiler assembly.
- Required tools, materials and parts:
  - Puller
  - PTO shaft puller
  - Pliers
  - Suitable solvent
  - Cotton swab
  - 2-stroke oil
  - Lithium-based grease
  - Small flat head screwdriver
  - Plastic hammer
  - New spring pin
- Check the rotation of the plunger gear.

  Check the rotation of the plunger gear (A) using a small flat head screwdriver or equivalent.

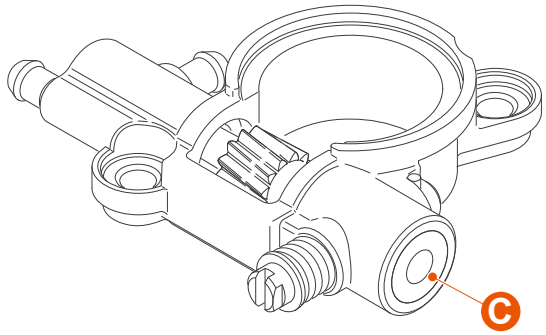


Procedure

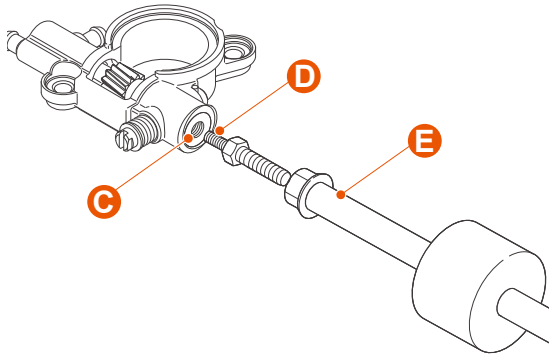
1. **Drip a suitable solvent (B) onto the plunger gear (A) and leave it for a few minutes.**



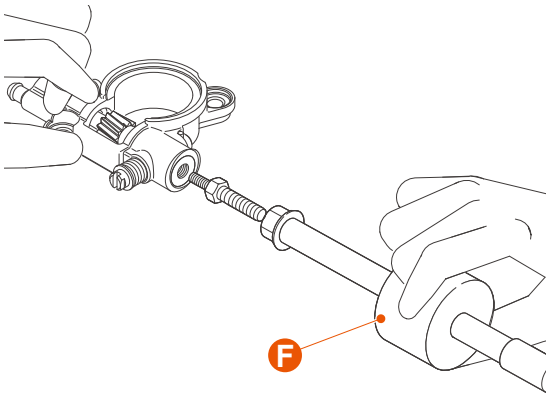
2. Tap 5mm (M5-Pitch 0.8 mm) thread in the hole Ⓒ of the plug.



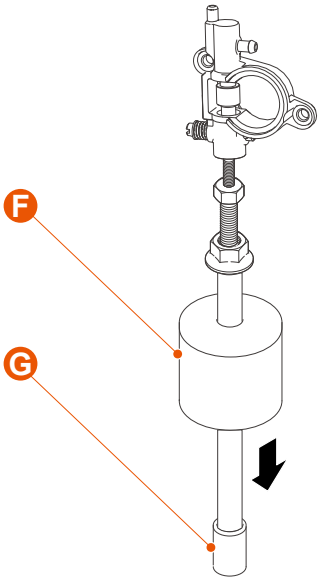
3. Screw the M5 bolt Ⓓ of the puller into the hole of the plug Ⓒ to connect the PTO shaft puller Ⓔ.



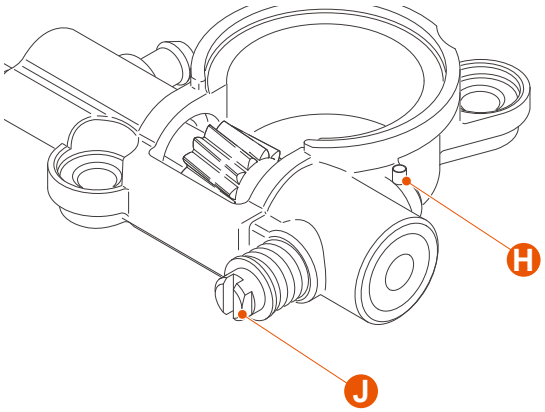
4. Hold the auto-oiler with one hand and the weight Ⓕ of the PTO shaft puller with your other hand.



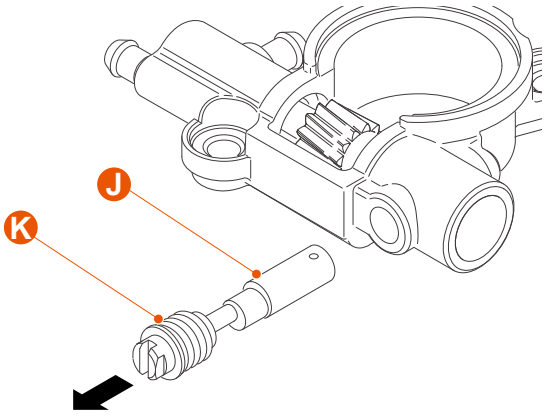
5. With the auto-oiler on top, knock the weight Ⓕ into the shaft end Ⓖ to remove the plug from the auto-oiler.



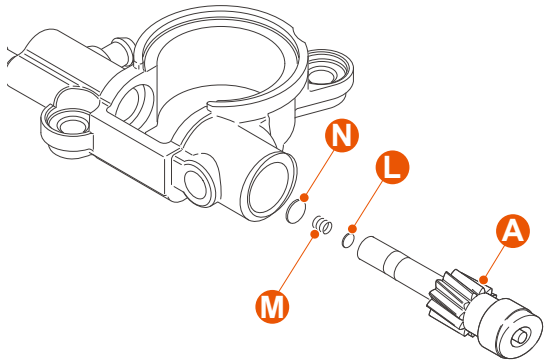
6. Pull out the spring pin Ⓗ from the adjusting needle Ⓙ with pliers.



7. Pull out the adjusting needle Ⓙ and the spring Ⓚ from the auto-oiler.



8. **Remove the following parts.**



- Plunger gear A
- Circular washers L N
- Spring M

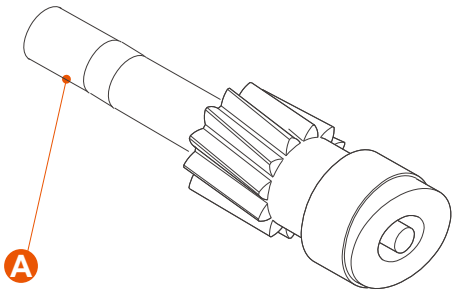
If a circular washer is adhered inside the cylinder of the auto-oiler because of chain oil, leave it as it is.

9. **Use a cotton swab soaked with a suitable solvent to clean the oil pathways of the auto-oiler and the plunger gear A.**

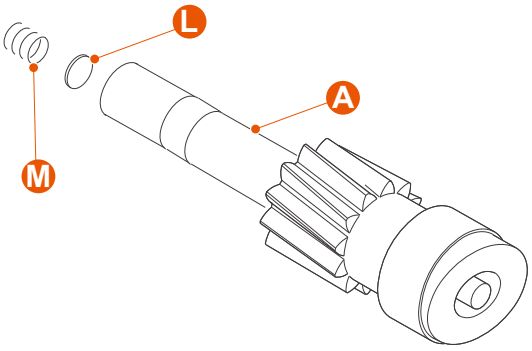
10. **Inspect the plunger gear A and the spring M.**

If any deformation, damage, or wear is found, replace the parts with new ones.

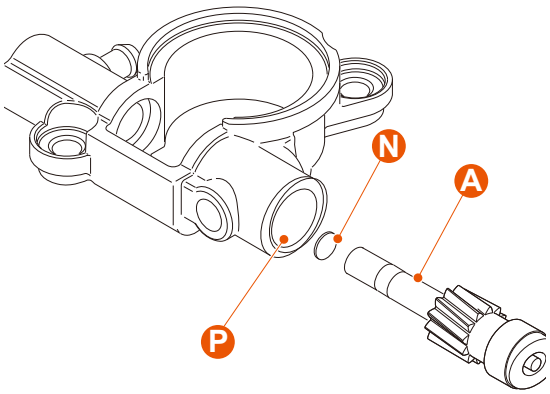
11. **Apply 2-stroke oil to the shaft A of the plunger gear.**



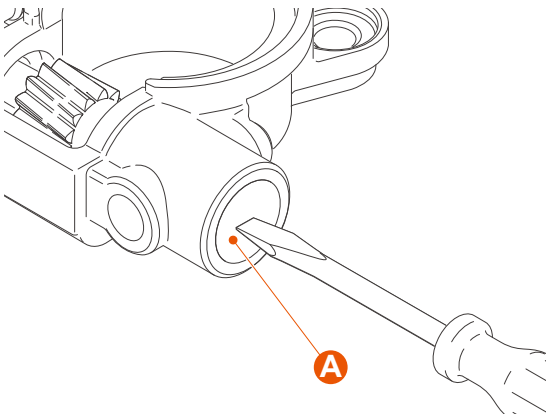
12. **Attach the circular washer L and the spring M to the plunger gear A.**



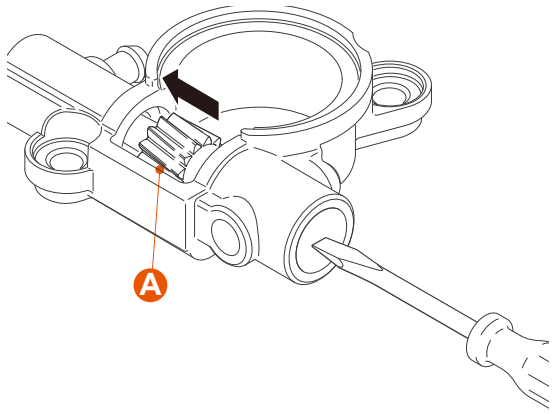
13. **Insert the circular washer N and the plunger gear A (with the spring and the circular washer attached) into the cylinder P of the auto-oiler.**



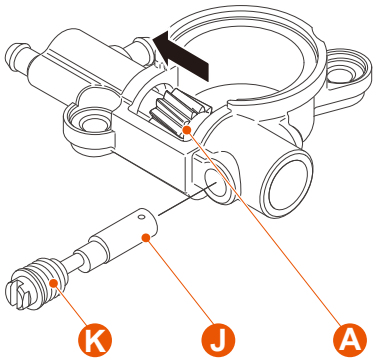
14. **Using a small flat head screwdriver, push the plunger gear A into the auto-oiler.**



15. **Push the plunger gear Ⓐ in the direction of the arrow with your finger and hold it in place. Then pull out the flat head screwdriver.**



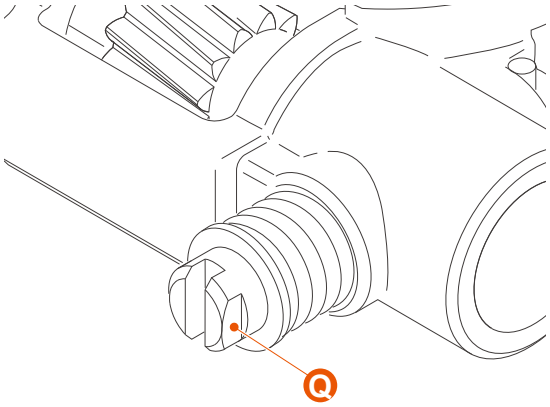
16. **Push the plunger gear Ⓐ in the direction of the arrow and hold it there. Then insert the adjusting needle Ⓙ with the spring Ⓚ to the auto-oiler.**



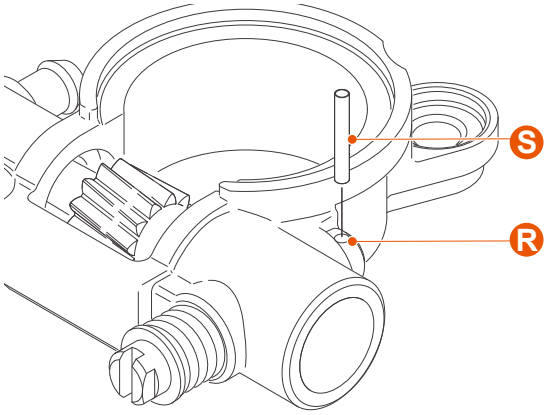
17. **Release your finger from the plunger gear Ⓐ after inserting the adjusting needle Ⓙ with the spring Ⓚ.**

18. **Turn the adjusting needle so that the cutout Ⓠ of the adjusting needle is oriented as shown in the figure.**

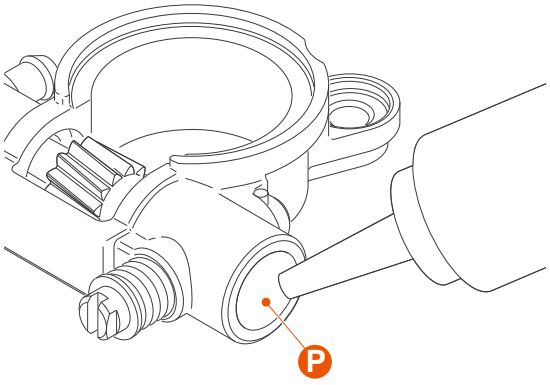
    When the adjusting needle is in this position, the chain oil is at maximum discharge.



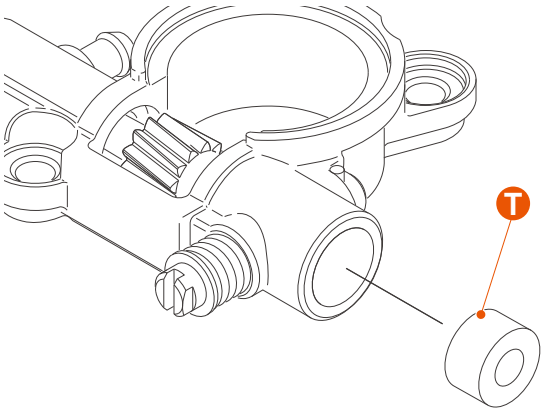
19. **Drive a new spring pin Ⓢ into the hole Ⓡ of the adjusting needle.**



20. **Apply lithium-based grease in the cylinder Ⓟ of the auto-oiler.**



21. **Hit the plug (T) into the auto-oiler with a plastic hammer until the end surface of the plug is flush with the end surface of the auto-oiler.**



If the above procedure does not solve the problem, replace the auto-oiler assembly with a new one.

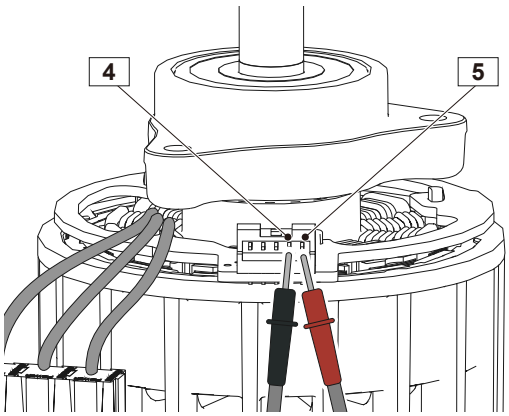
4-4 Inspect the Motor Assembly

Prerequisites

- Remove the motor assembly.
- Tools required:
  - Multimeter

Procedure

1. **Confirm that there is no short-circuit between terminals [4] and [5] of the motor assembly 5-pole terminal block.**



Measure the resistance between terminals [4] and [5] with a multimeter.

- If the multimeter registers infinite resistance : There is no continuity.
- If the multimeter registers zero resistance : There is continuity.

If those 2 points are short-circuited (there is continuity), replace the motor assembly with a new one.

2. **Inspect the parts of the motor assembly.**

If the followings are found, replace the motor assembly with a new one.

- Damage to motor terminals
- Burning or disconnection of motor winding
- Non-smooth rotation or damage in the motor ball bearings

Related Topics

- 2-4 List of Maintenance Mode Error Numbers and Remedies (p.10)
- 2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit) (p.16)

4-5 Inspect the Control board assembly

Prerequisites

- Remove the control board assembly.
- Tools required:
  - Multimeter

Procedure

1. **Check that there is no short-circuit between the positive terminal screw Ⓐ and the negative terminal screw Ⓑ of the battery terminal.**

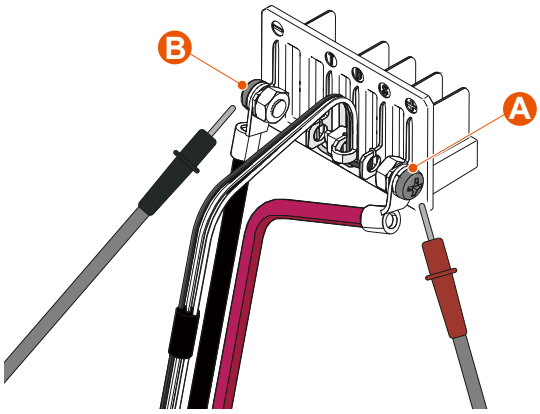


Figure : Battery terminal

Measure the resistance between the positive terminal screw Ⓐ and the negative terminal screw Ⓑ with a multimeter.

- If the multimeter registers infinite resistance : There is no continuity.
- If the multimeter registers zero resistance : There is continuity.

If those 2 points are short-circuited (there is continuity), replace the control board assembly with a new one.

2. **Check if any conductive substances, such as water and metal pieces, adhered to the control board assembly.**

   If conductive substances are adhered to the control board assembly, remove them.

3. **Inspect the control board assembly and control board terminals for burning or damage.**

   If found, replace the control board assembly with a new one.

Related Topics

- 2-7 Troubleshooting "STEP 2" (Check the Unit When Battery Failure Occurs) (p.15)

4-6 Inspect the Power Switch

Prerequisites

- Remove the power switch.
- Tools required:
  - Multimeter
- LED tester

  Used for inspecting the power indicator (step 3.). If an LED tester is not available, inspect the power switch using coin batteries.

Procedure

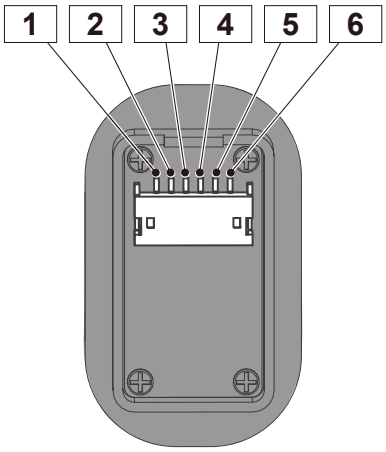


Figure : Power switch (rear)

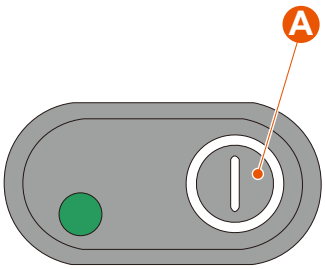


Figure : Power switch (front)

1. **Check that there is no short-circuit between terminals [2] and [3] of the power switch.**

   Measure the resistance between terminals [2] and [3] of the power switch with a multimeter.

   - If the multimeter registers infinite resistance : There is no continuity.
   - If the multimeter registers zero resistance : There is continuity.

If those 2 points are short-circuited (there is continuity), replace the power switch with a new one.

2. Check that there is no bad connection between terminals [1] and [2] of the power switch.

Measure the resistance between terminals [1] and [2] of the power switch with a multimeter.

- If the multimeter registers zero resistance when the switch button Ⓐ is pressed : There is continuity.
- If the multimeter registers infinite resistance when the switch button Ⓐ is released : There is no continuity.

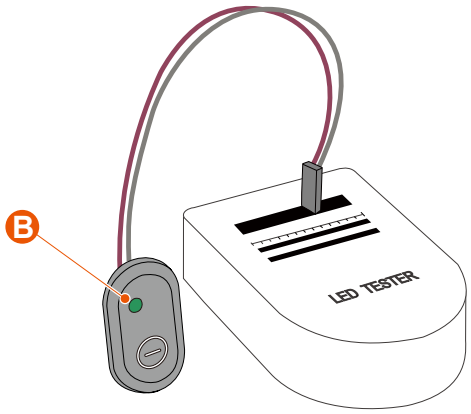
If the power switch is not in the state above, replace it with a new one.

3. Check if the power indicator is intact.

The power indicator can be checked using an LED tester or coin batteries.

If the power indicator does not light up, replace the power switch with a new one.

When using an LED tester



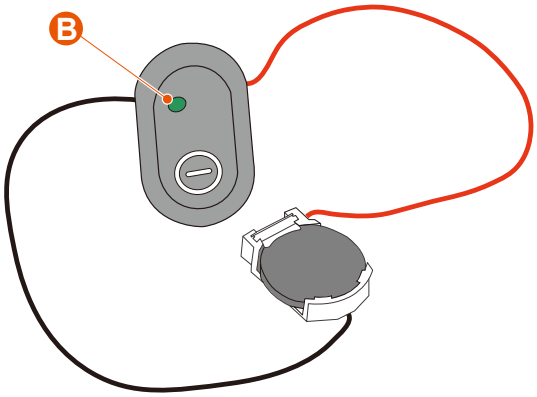
⚠ CAUTION

- When inspecting the power indicator using an LED tester, be sure not to apply electric current higher than 150 mA to the power indicator. It may damage the power indicator.

(1) Connect the positive (+) wire of an LED tester to terminal [3] of the power switch. Likewise, connect the negative (-) wire to terminal [6].

(2) Apply an electric current of 10 mA to 50 mA and check if the power indicator Ⓑ lights up.

When using coin batteries



⚠ CAUTION

- When inspecting the power indicator using a coin battery, be sure to use one of the following coin battery types.

  CR2032 / ECR2032 / DL2032 / SB-T51

  If a battery type other than above is used, the power indicator will be damaged due to overcurrent (150 mA or higher).

(1) Connect the positive (+) wire from the coin battery to terminal [3] of the power switch. Likewise, connect the negative (-) wire to terminal [6].

(2) Check if the power indicator Ⓑ lights up.

(3) If the power indicator Ⓑ does not light up, connect 2 coin batteries in series and check the power indicator again.

⚠ CAUTION

- When connecting 2 coin batteries in series to check the power indicator, take care to ensure that the connection of the coin batteries and power switch has the correct polarity.

  If a voltage of 5 V or higher is applied to the power indicator in the opposite direction, the power indicator will be damaged.

Related Topics

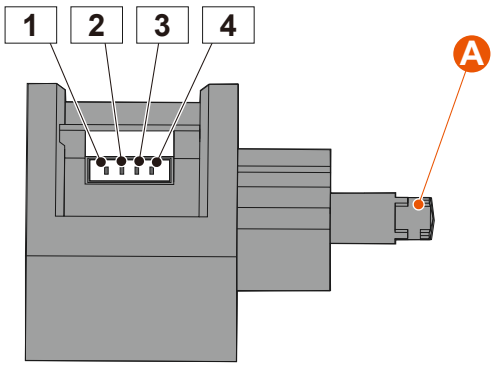
- 2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit) (p.16)
- 2-5 Troubleshooting "STEP 0" (Error Diagnosis) (p.11)

4-7 Inspect the Variable Speed Switch

Prerequisites

- Remove the variable speed switch.
- Tools required:
  - Multimeter

Procedure



1. **Check that there is no short-circuit between terminals [1] and [3] of the variable speed switch.**

   Measure the resistance between terminals [1] and [3] of the variable speed switch with a multimeter.

   - If the resistance is 70 kΩ to 130 kΩ : Normal
   - If the resistance is outside the range of 70 kΩ to 130 kΩ : Short-circuited

   If short-circuited, replace the variable speed switch with a new one.

2. **Check that there is no bad connection between terminals [1] and [4] of the variable speed switch.**

   Measure the resistance between terminals [1] and [4] of the variable speed switch with a multimeter.

   - If the multimeter registers zero resistance when the switch button Ⓐ is pressed : There is continuity.
   - If the multimeter registers infinite resistance when the switch button Ⓐ is released : There is no continuity.

   If the variable speed switch is not in the state above, replace it with a new one.

3. **Check that there is no abnormal change in resistance when measuring the resistance between terminals [1] and [2] of the variable speed switch.**

   Measure the resistance between terminals [1] and [2] of the variable speed switch with a multimeter.

   - When the switch button Ⓐ is pressed : The resistance should be 100 Ω or lower.
   - When the switch button Ⓐ is released : The resistance should be 70 kΩ to 130 kΩ.

   If there is abnormal change in resistance, replace the variable speed switch with a new one.

Related Topics

- 2-4 List of Maintenance Mode Error Numbers and Remedies (p.10)
- 2-8 Troubleshooting "STEP 3" (Check the Power Supply Circuit) (p.16)
- 2-12 Troubleshooting "STEP 7" (Check Other Failures) (p.24)

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