CORDLESS IMPACT WRENCH
DTW300/DTW301

REPAIR MANUAL

April 2020
Ver.1

1 CONTENTS

2 CAUTION

Repair the machine in accordance with “Instruction manual” or “Safety instructions”.

Follow the instructions described below in advance before repairing:

- Wear gloves.
- In order to avoid wrong reassembly, draw or write down where and how the parts are assembled, and what the parts are. It is also recommended to have boxes ready to keep disassembled parts by group.
- Handle the disassembled parts carefully. Clean and wash them properly.
- Remove Battery, except when it is necessary to check the operation of the machine.

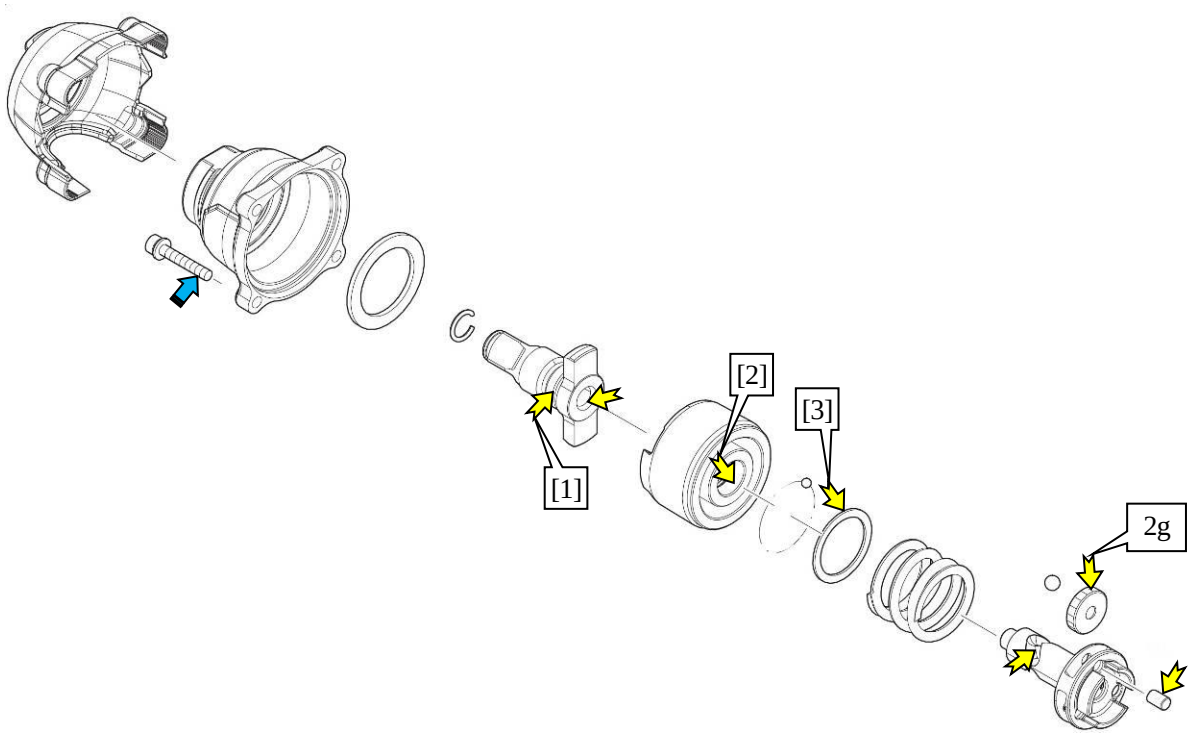
3 NECESSARY REPAIRING TOOLS

Code No.	Description	Use for
1R004	Retaining ring pliers RT ST-2	removing/ assembling Ring spring 10
1R045	Gear puller large	removing/ assembling Hammer
1R082	Vise	holding Anvil
1R274	Field press-fitting jig 72	removing Ring spring 10
1R288	Screwdriver magnetizer	removing Steel ball 5.6

4 LUBRICANT AND ADHESIVE APPLICATION

Description		Amount
⇧	Makita grease FA No.2	Apply a little amount unless specified in the figure. ・ Outer surface groove [1] ・ Inner surface groove [2] ・ Contact surface with Steel ball 3.5 [3]
⇧	Loctite 272	This bolt is a thread lock type fastener with a coating of adhesive. So before tightening, whether you tighten a brand new or removed one, be sure to; ・ Remove adhesive residue from the fastener with carburetor cleaner. ・ Apply a little amount of Loctite 243 to the fastener.

Fig.1

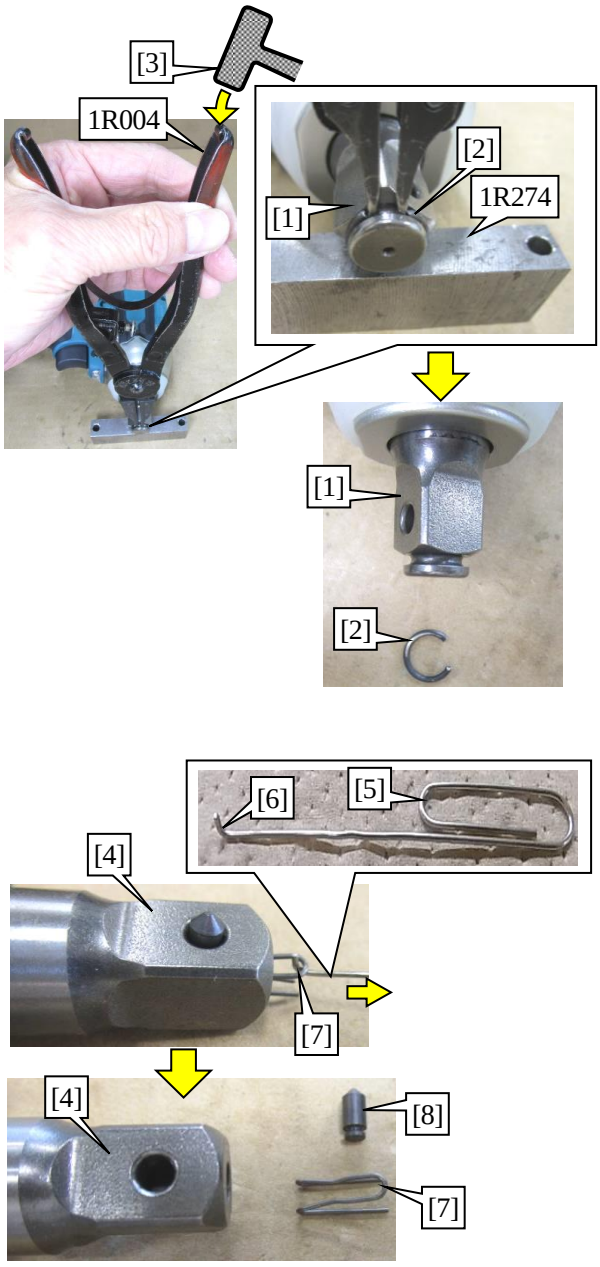


5 TIGHTENING TORQUE SPECIFICATIONS

Parts to fasten	Fastener	Q'ty	Tightening torque (N・m)
Housing R ↔ Housing L	Tapping screw bind PT 3x16	8	1.1 - 1.3
Rear cover ↔ Housing R, L	Tapping screw bind PT 3x16	2	1.1 - 1.3
Hammer case ↔ Housing R, L	Hex socket head bolt M4x25	4	4.0 - 5.0

6 REPAIR
6-1 Rotor, Hammer case section
6-1-1 Disassembling

Fig.2

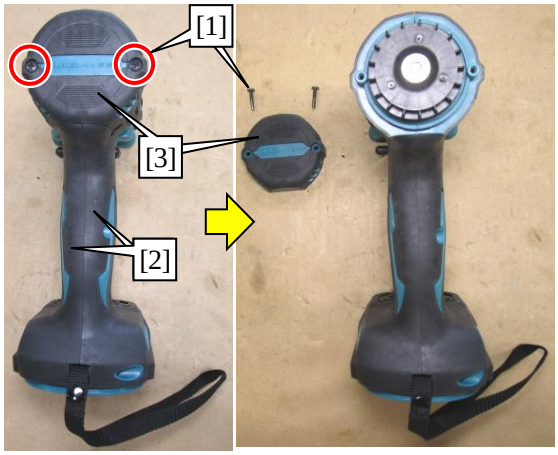


1 For removing Anvil E [1], support it with 1R274 or the like, then spread and apply the claws of 1R004 to the ends of Ring spring 10 [2]. And then remove the ring by tapping the end of the handle of 1R004 with a plastic hammer [3].

Note
・ Be careful not to fly off Ring spring 10 [2].
・ Be careful not to scratch Anvil E [1].

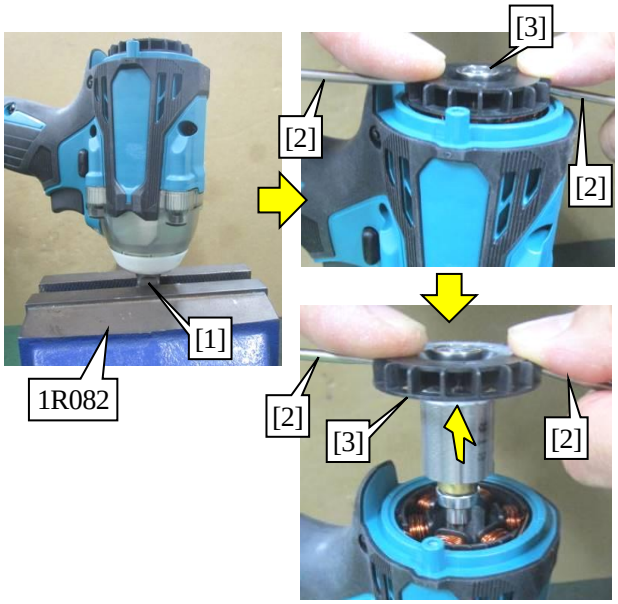
2 For removing Anvil A [4], straighten a paper clip [5] and bend the tip [6] by about 2 mm as shown left. Then use the clip to pull out Clip [7], and then remove Pin 4 [8].

Fig.3



3 Remove Tapping screws bind PT 3x16 [1] (2 pcs), then remove Rear cover [3] from Housing [2].

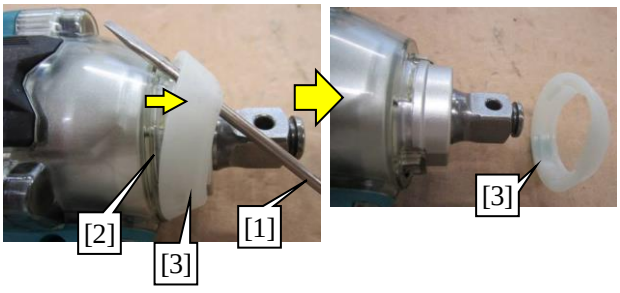
Fig.4



4 Hold Anvil [1] in 1R082.

5 Insert two slotted screwdrivers [2] into the clearance between the blades of Fan, and pull out Rotor [3] together with the screwdrivers.

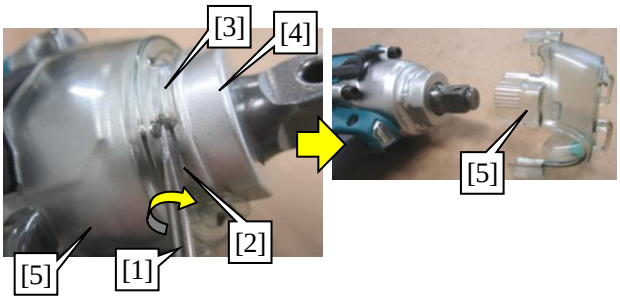
Fig.5



6 Remove Anvil from 1R082. (Fig.4)

7 Remove Bumper [3] from Hammer case [2] with a thin slotted screwdriver [1].

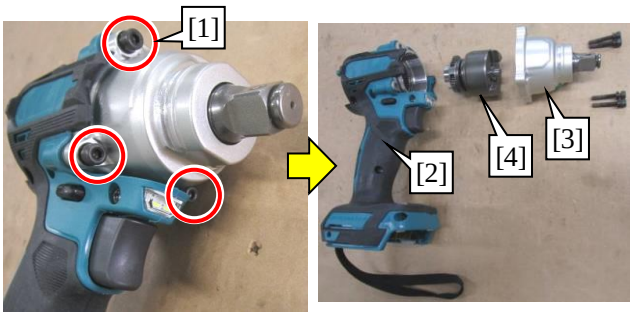
Fig.6



8 Remove one claw [3] of Hammer case cover from the groove of Hammer case [2] with a thin slotted screwdriver [1]. Then remove the other claw the same way, and then remove Hammer case cover [5] from Hammer case [4].

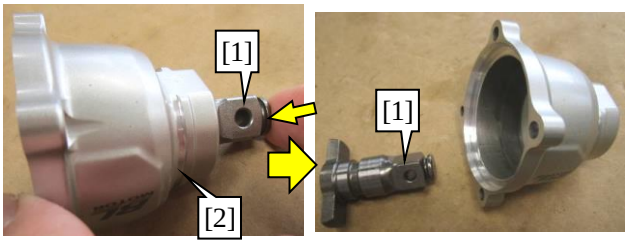
Note
Be careful not to scratch Hammer case [4] with a thin slotted screwdriver [1].

Fig.7



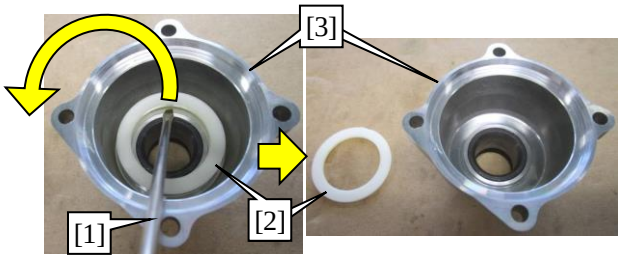
9 Loosen Hex socket head bolts M4x25 [1] (4 pcs) with Hex wrench 3 beforehand, then use 1R014-A and an impact screwdriver to remove Hammer case section [3] and Hammer section [4] from Housing [2].

Fig.8



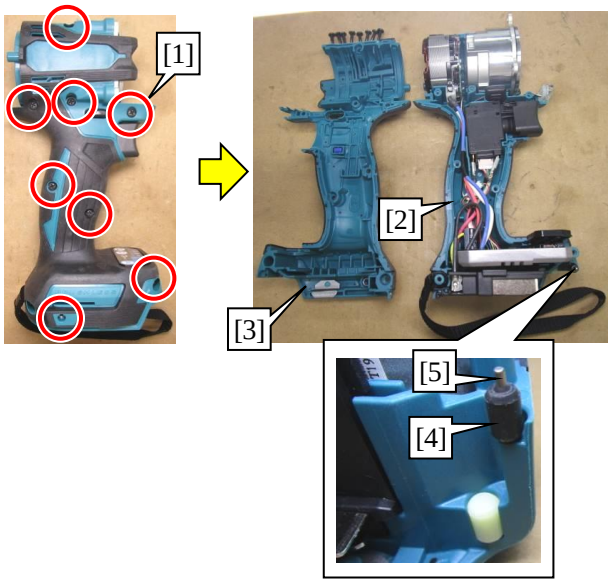
10 Push Anvil E [1] out of Hammer case [2]. Push out Anvil A the same way. Shown left is Anvil E [1].

Fig.9



11 Remove Nylon washer 28 [2] from Hammer case [3] with a thin slotted screwdriver [1].

Fig.10



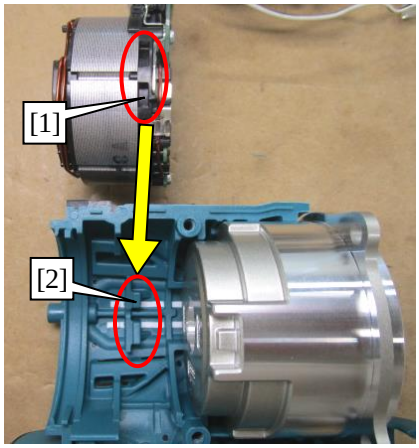
12 Remove Tapping screws bind PT 3x16 [1] (8 pcs), then remove Housing R [3] from Housing L [2].

Note
Be careful not to allow Rubber pin 5 [4] and Pin 1.5 [5] to fall off Housing L [2].

13 Switch and Stator can be replaced.

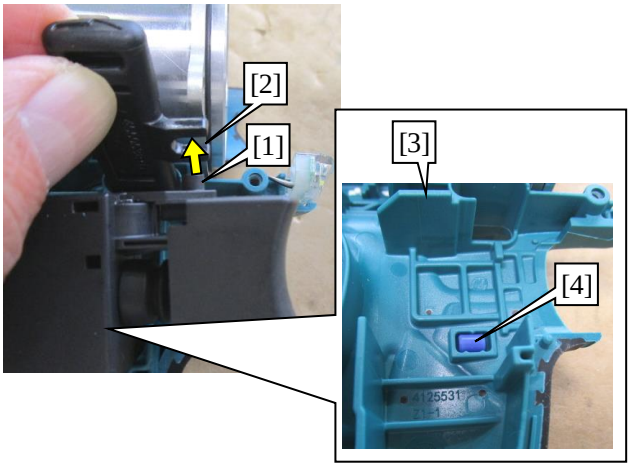
6-1-2 Assembling

Fig.11



1 While aligning the notch of Stator [1] with the protrusion of Housing L [2], assemble the two parts together.

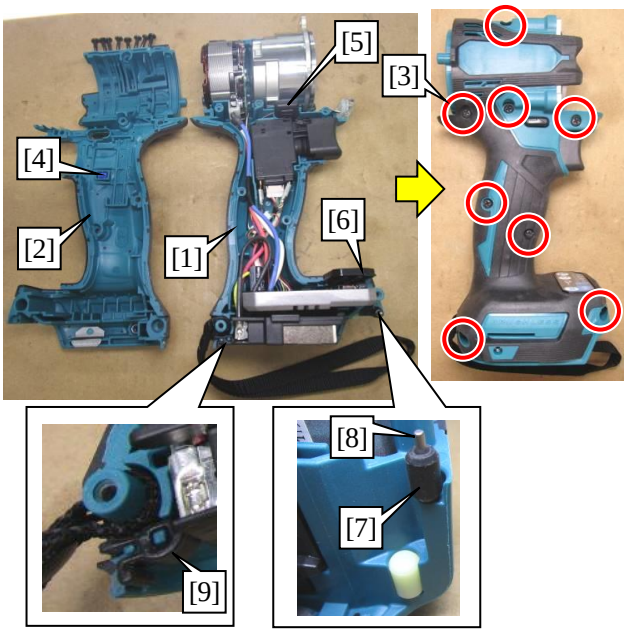
Fig.12



2 Fit the protrusion of Switch [1] into the groove of F/R change lever [2].

Note
Make sure that Rubber pin 4 [4] is assembled to Housing L [3].

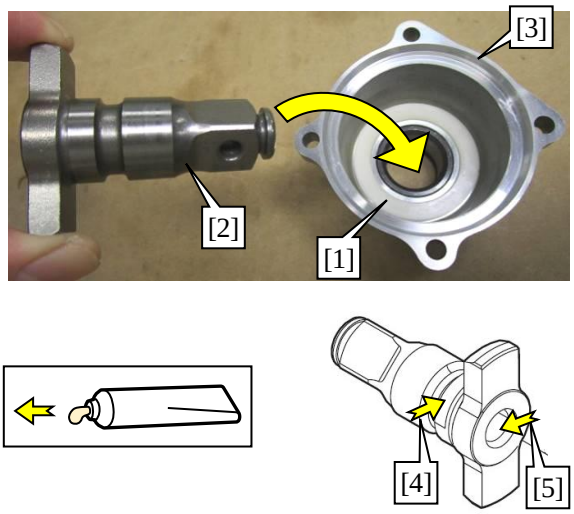
Fig.13



3 Fasten Housing R [2] to Housing L [1] with Tapping screws bind PT 3x16 [3] (8 pcs).

Note
・ Make sure that Rubber pin 4 [4] is assembled to Housing R [2]. ・ Before fastening Housing R [2], make sure that: 　・ Lead wires are not caught. 　・ F/R change lever [5] moves smoothly. 　・ Switch plate [6], Rubber pin 5 [7], Pin 1.5 [8] and Cushion [9] are in place.

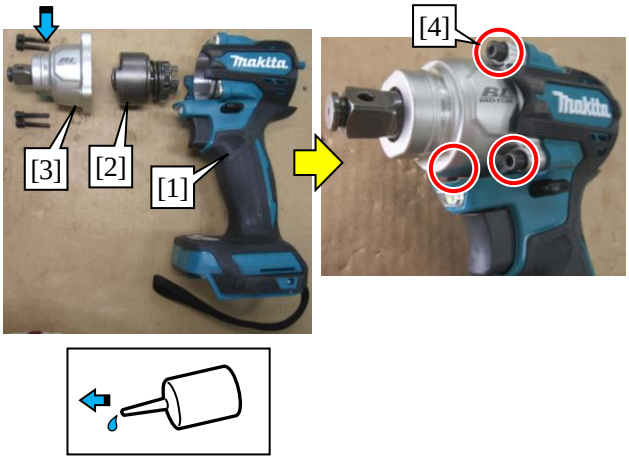
Fig.14



4 Push and assemble Nylon washer 28 [1] and Anvil E [2] into Hammer case [3]. Do the same in the case of Anvil A. Shown left is Anvil E [2].

Tips
Apply the specified grease to the outer surface groove [4] and the inner surface [5] of Anvil E.

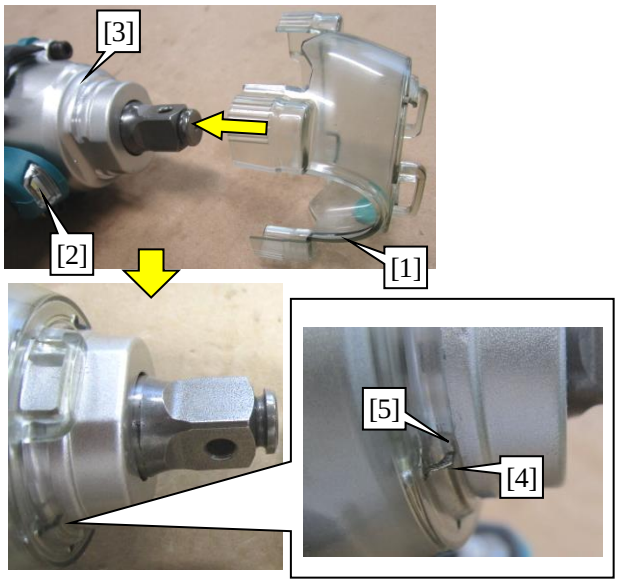
Fig.15



5 Fasten Hammer section [2] and Hammer case section [3] to Housing [1] with Hex socket head bolts M4x25 [4] (4 pcs).

Tips
Apply the specified adhesive to Hex socket head bolts M4x25 [4] (4 pcs).

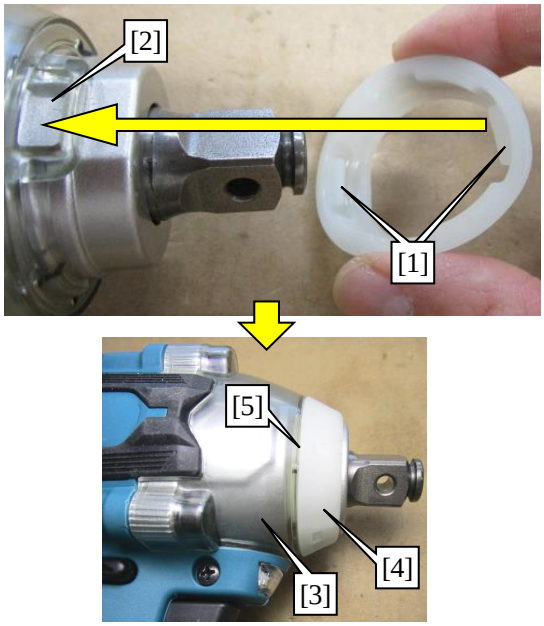
Fig.16



6 Position the U-shaped notch of Hammer case cover [1] on the LED circuit side [2], then assemble it to Hammer case [3].

Tips
Be sure to fit the two claws [4] of Hammer case cover into the two grooves [5] of Hammer case.

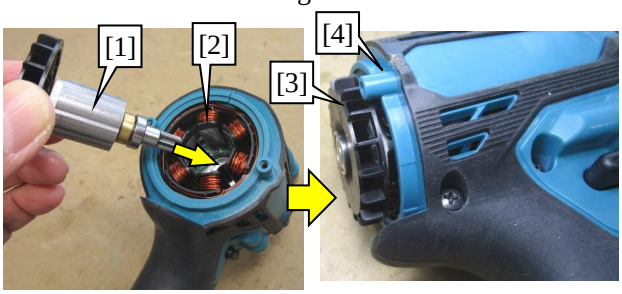
Fig.17



7 Fit the two protrusions [1] of Bumper into the two grooves of Hammer case cover [2].

Note
Make sure that there is no gap [5] between Hammer case cover [3] and Bumper [4].

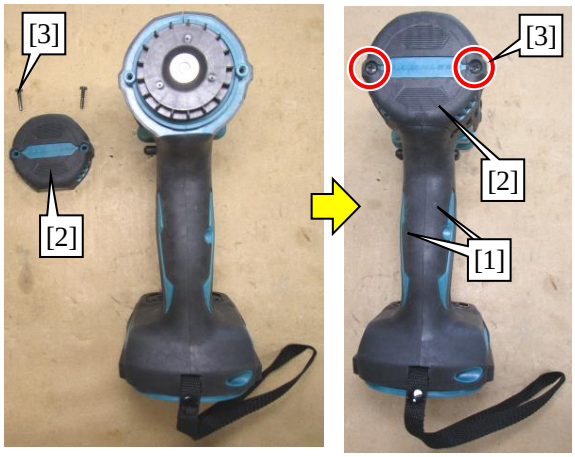
Fig.18



8 Insert Rotor [1] into Stator [2].

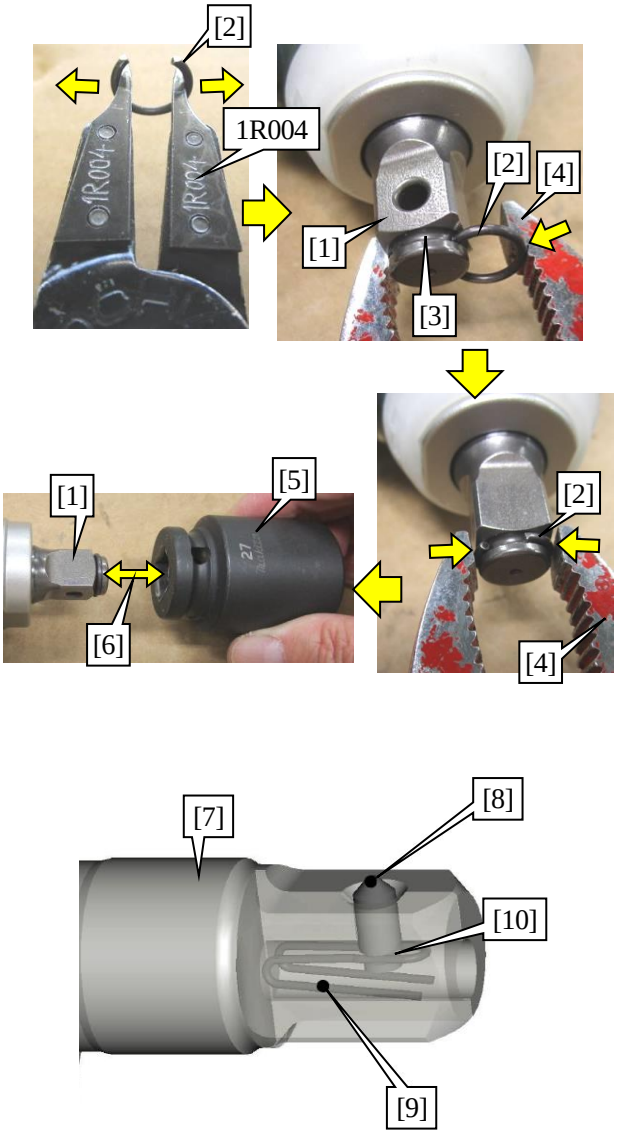
Note
・ Be careful not to pinch your fingers between Fan [3] and Housing [4] because Rotor has strong magnetic force. ・ If Rotor [1] is pushed too far and Printed circuit board is pushed, the board will be broken. Therefore, in the case of models consisting of two housing halves and a rear cover, be sure to insert Rotor [1] after assembling Housing.

Fig.19



9 Assemble Rear cover [2] to Housing [1] with Tapping screws 3x16 [3] (2 pcs).

Fig.20



10 In the case of Anvil E [1], first spread a brand-new Ring spring 10 [2] with 1R004 or the like.

11 Then set the ends of Ring spring 10 [2] in the groove of Anvil E [3], and then press-fit the ring onto the anvil with water pump pliers [4] or the like as shown.

12 Squeeze the ends of Ring spring 10 [2] tightly with water pump pliers [4] or the like, and then insert and remove the anvil from 12.7mm square socket of Socket 27-50 [5] or the like several times [6] and you will obtain an optimum tightness of the ring.

Note
If Ring spring 10 [2] is overtightened with water pump pliers [4] or the like, the spring will become too small for 12.7mm square socket of Socket 27-50 [5] or the like and the socket will fall off Anvil E [1].

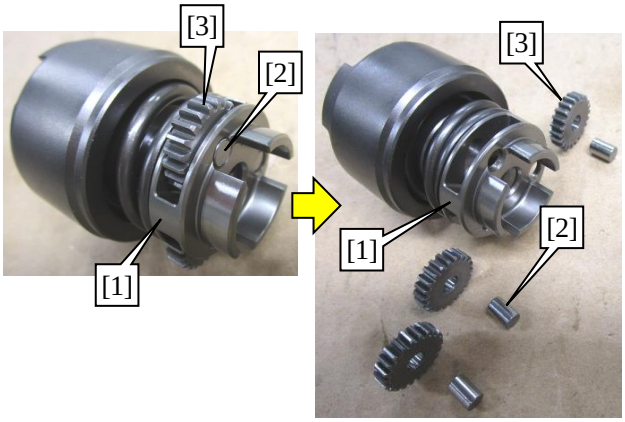
13 In the case of Anvil A [7], insert Pin 4 [8] and Clip [9] into Anvil A [7] with the groove [10] of Pin 4 [8] positioned inside as shown, then fit Clip [9] into the groove [10] of Pin 4 [8].

6-2 Hammer section
6-2-1 Disassembling

1 Disassemble Hammer section. (6-1-1)

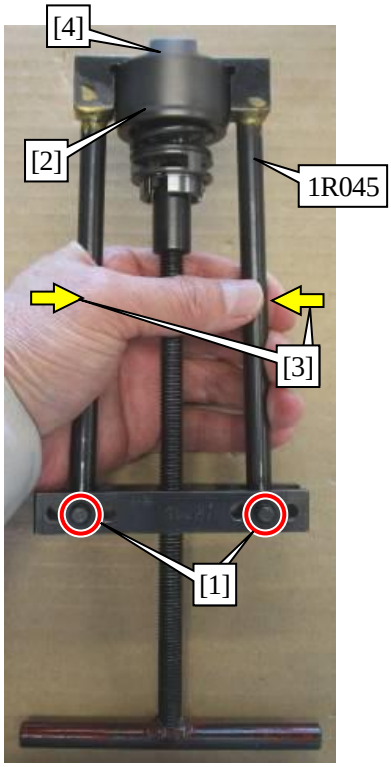
Tips
It is not necessary to disassemble the front end of Anvil and remove it from Hammer case.

Fig.21



2 Remove Pins 5 [2] (3 pcs) from Spindle [1], then remove Spur gears 22 [3] (3 pcs).

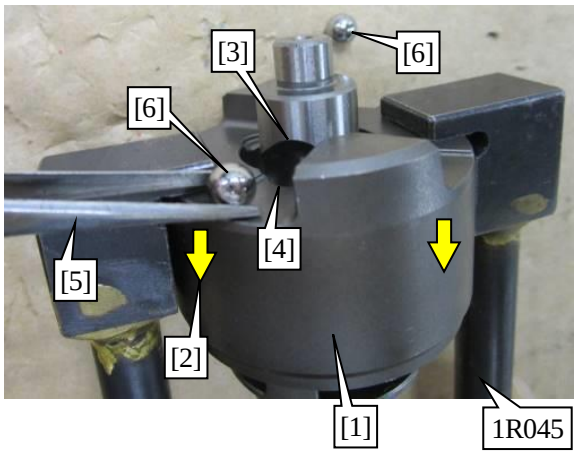
Fig.22



3 Set the claws of 1R045 in the position [1], then set 1R045 on Hammer [2], and then hold the claws by hand [3].

Tips
Set 1R045 so that the protrusion [4] of Hammer makes a right angle with the claws of 1R045.

Fig.23



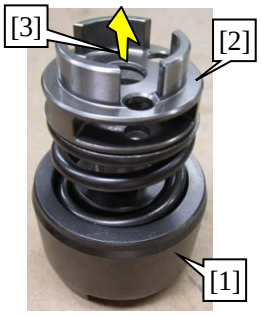
4 Pull down [2] Hammer [1] by turning the handle of 1R045 clockwise.

5 Pull down Hammer [1] fully, then turn the handle counterclockwise to raise Hammer until the top of the cam groove of Spindle [3] is aligned with the opening [4] of Hammer.

6 Take out Steel balls 5.6 [6] (2 pcs) from Hammer [1] with a tweezers [5] or a screwdriver magnetized with 1R288, then turn the handle counterclockwise.

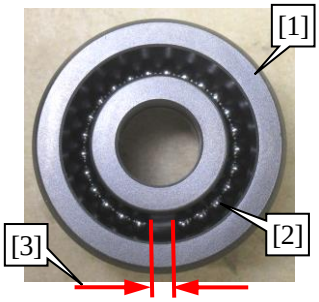
Note
Hold 1R045 securely by hand to prevent the claws from slipping off Hammer [1].

Fig.24



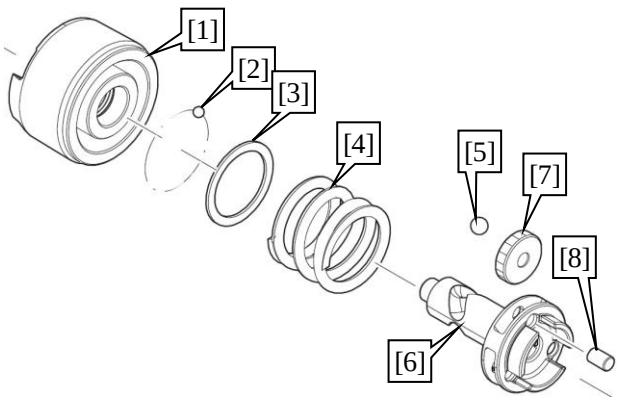
7 When removing Hammer [1] from Spindle [2], turn the Hammer side down, then pull out Spindle [2] upward [3] so that Steel balls 3.5 (24 pcs) in Hammer do not fall.

Fig.25



8 Inside of Hammer [1], there should be 24 pcs of Steel balls 3.5 [2] and a gap [3] equivalent to one piece of Steel ball 3.5 as shown.

Fig.26



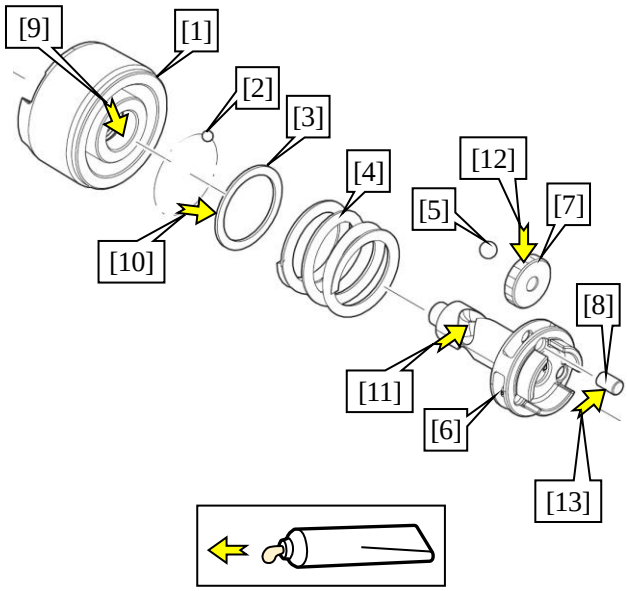
9 Hammer section can be disassembled as follows;

- Hammer [1]
- Steel balls 3.5 [2] (24 pcs)
- Flat washer 24 [3]
- Compression spring 25 [4]
- Steel balls 5.6 [5] (2 pcs)
- Spindle [6]
- Spur gears 22 [7] (3 pcs)
- Pins 5 [8] (3 pcs)

6-2-2 Assembling

1 Assemble by reversing the disassembling procedure. (6-2-1)

Fig.27



2 Assemble the following parts to Hammer [1]:

- Steel balls 3.5 [2] (24 pcs)
- Flat washer 24 [3]
- Compression spring 25 [4]
- Steel balls 5.6 [5] (2 pcs)
- Spindle [6]
- Spur gears 22 [7] (3 pcs)
- Pins 5 [8] (3 pcs)

Tips
Apply the specified grease to the following portion: ・ Inner surface groove of Hammer [9] ・ Contact surface of Flat washer 24 [10] with Steel balls 3.5 [2] (24 pcs) ・ Cam groove of Spindle [11] ・ Spur gears 24 [12] (3 pcs) ・ Outer surface of Pins 5 [13] (3 pcs)

3 Assemble Hammer section and Rotor to Housing. (6-1-2)

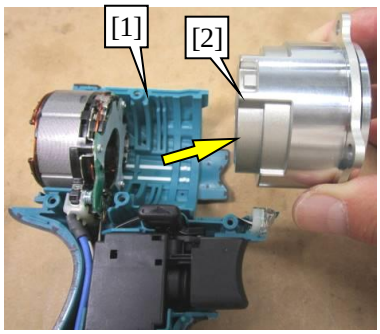
6-3 Internal gear case section

6-3-1 Disassembling

1 Disassemble Housing R. (6-1-1)

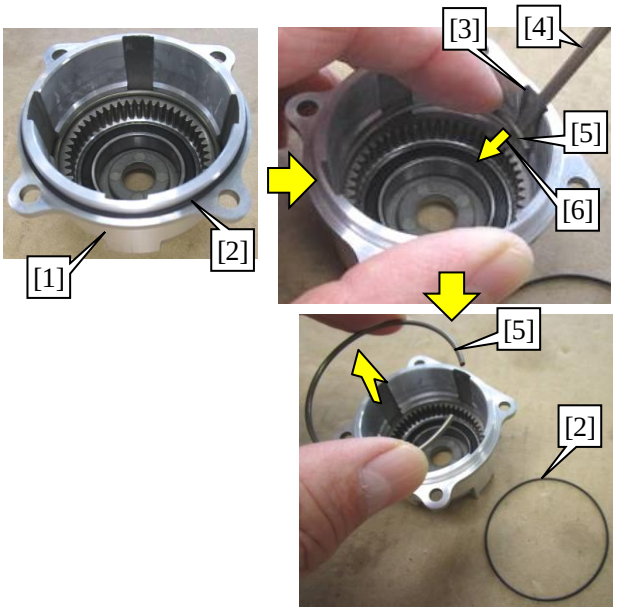
Tips
It is not necessary to disassemble the front end of Anvil and remove it from Hammer case.

Fig.28



2 Remove Internal gear case section [2] from Housing L [1].

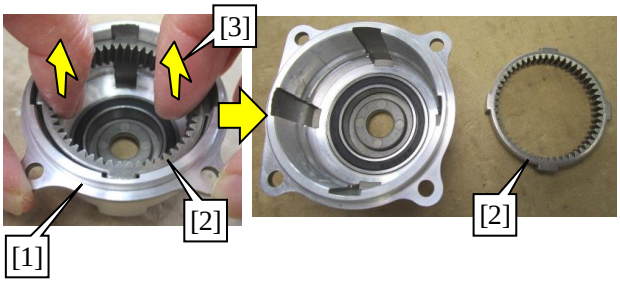
Fig.29



3 Remove O ring 49 [2] from Internal gear case [1].

4 Insert a slotted screwdriver [4] into the groove [3] of Internal gear case, then, while holding Spring 43 [5] with your finger, pry it off by pushing in the direction of the arrow [6].

Fig.30



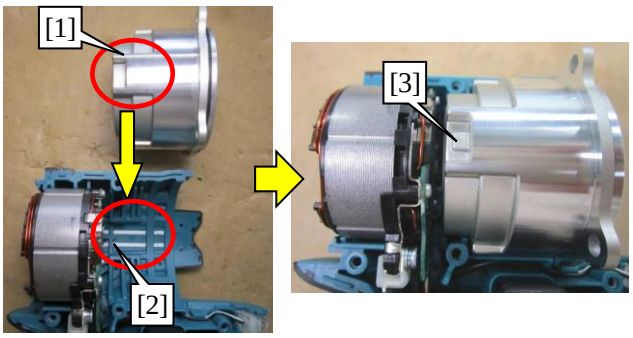
5 Pull Internal gear 51 [2] straight [3] out of Internal gear case [1].

6-3-2 Assembling

1 Assemble by reversing the disassembling procedure. (6-3-1)

Note
Make sure that O ring 49 is assembled. (Fig.29)

Fig.31



2 Align the flat [1] of Internal gear case with the groove [2] of Housing L, then assemble them together.

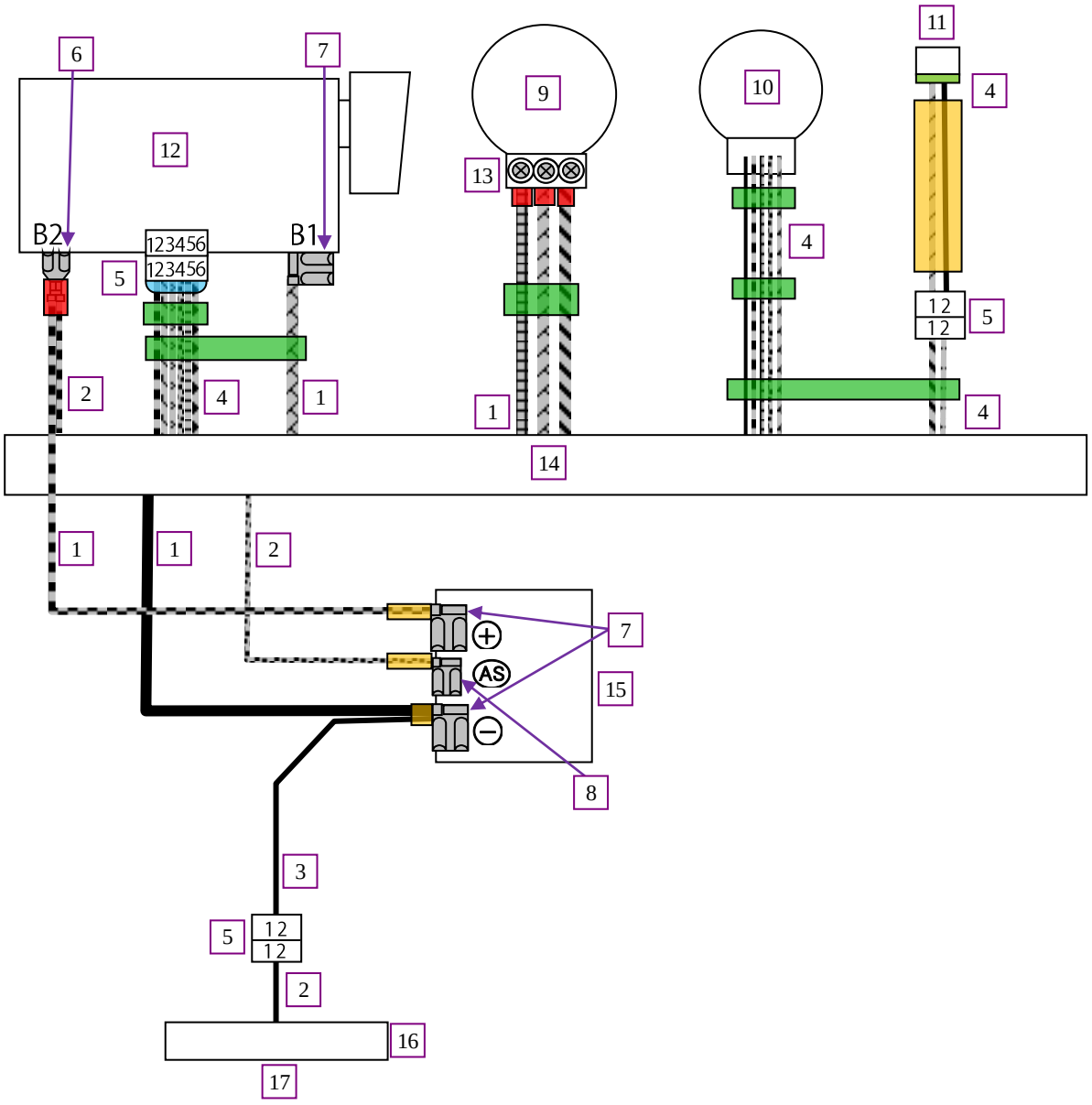
Note
The protrusion [3] between the two flats [1] of Internal gear case should be oriented as shown. (Fig.31)

3 Assemble Rotor. (6-1-2)

7 CIRCUIT DIAGRAM

Fig.32

Color index of lead wires' sheath			
White		Gray	
Blue		Green	
Yellow		Orange	
Red		Black	

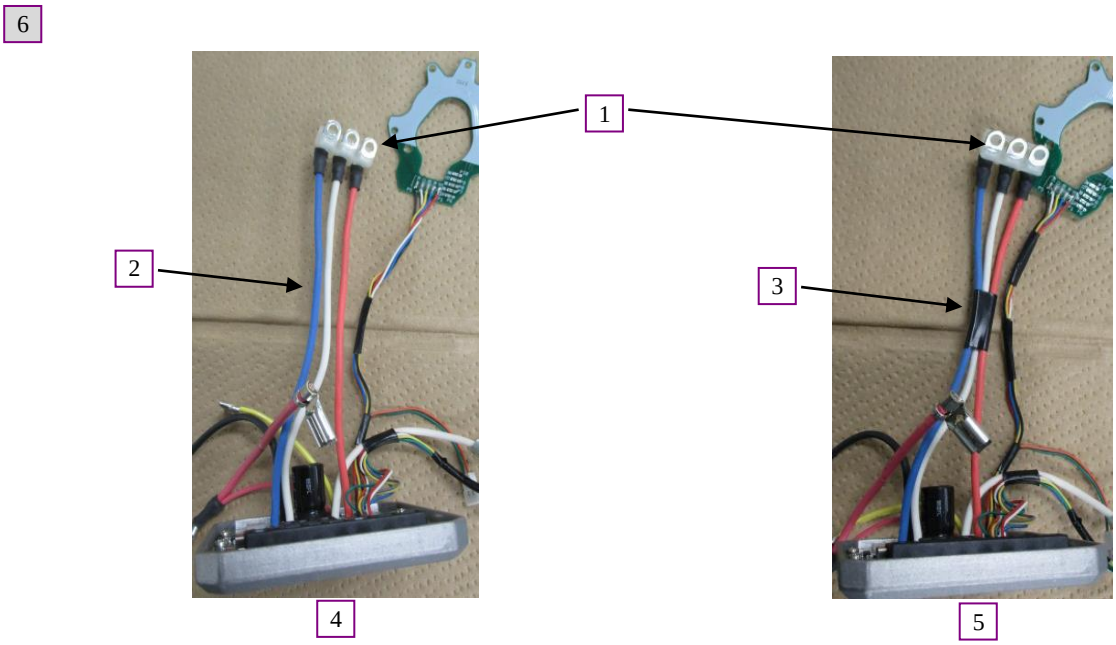


1	AWG16	10	Rotor rotation detector
2	AWG22	11	LED circuit
3	AWG22 (if Lead unit is used)	12	Switch
4	AWG28	13	Terminal unit
5	Connector	14	Controller
6	Straight receptacle with lock (#250, t=0.8)	15	Terminal
7	Flag receptacle with lock (#250, t=0.8)	16	Earth plate
8	Flag receptacle with lock (#187, t=0.8)	17	Lead unit (if used)
9	Stator (BL44)		

8 WIRING DIAGRAM

8-1 The difference in types of Controller

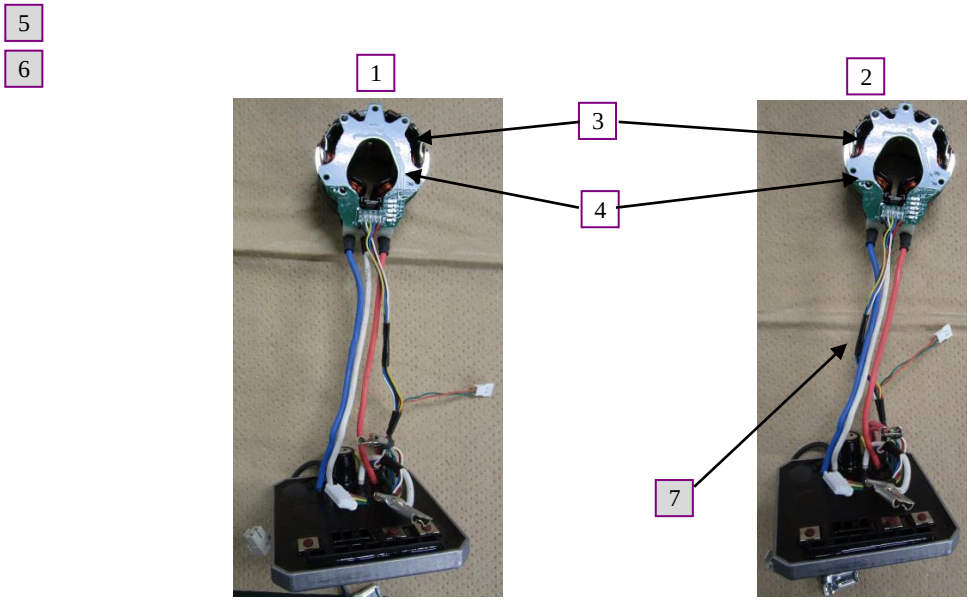
Fig.33



1	Terminal for Stator	4	Controller without Tape
2	Without Tape	5	Controller with Tape
3	With Tape		
6	There are two types of Lead wires for Stator on Controller. The one is bound with Tape and the other is without Tape, and they are different in wiring.		

8-1-1 Controller whose lead wires of Terminal for Stator are not bound with Tape

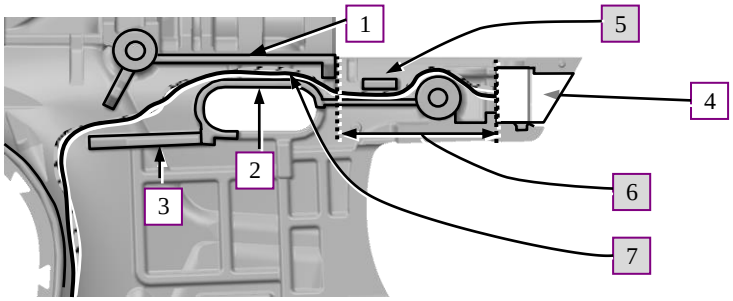
Fig.34



1	OK	3	Stator
2	NOK	4	Printed wiring board
5	Assembling of Printed wiring board		
6	Assemble Printed wiring board to Stator so as not to twist its Lead wires as “OK” example.		
7	Lead wires of Printed wiring board are twisted.		

8-1-1-1 LED circuit

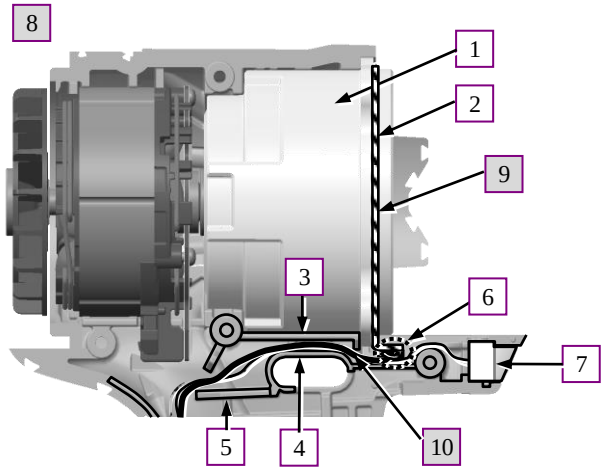
Fig.35



1	Rib A	3	Rib C
2	Rib B	4	LED circuit
5	Fix Lead wire of LED circuit in this Lead wire holder.		
6	Be careful not to slack Lead wires of LED circuit in this area.		
7	Route Lead wires of LED circuit between Rib A and Rib B/ Rib A and Rib C.		

8-1-1-2 Lead unit

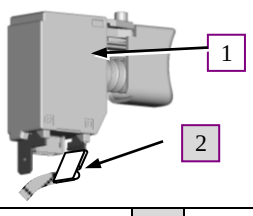
Fig.36



1	Internal gear case	5	Rib C
2	Lead unit	6	Crimped portion
3	Rib A	7	LED circuit
4	Rib B		
8	Assembling and Wiring of Lead unit (if used)		
9	Assemble Lead unit to Internal gear case so that Crimped portion faces LED circuit side.		
10	Route Lead wire of Lead unit between Rib A and Rib B/ Rib A and Rib C. Put Lead wire of Lead unit on Lead wires of LED circuit.		

8-1-1-3 Switch

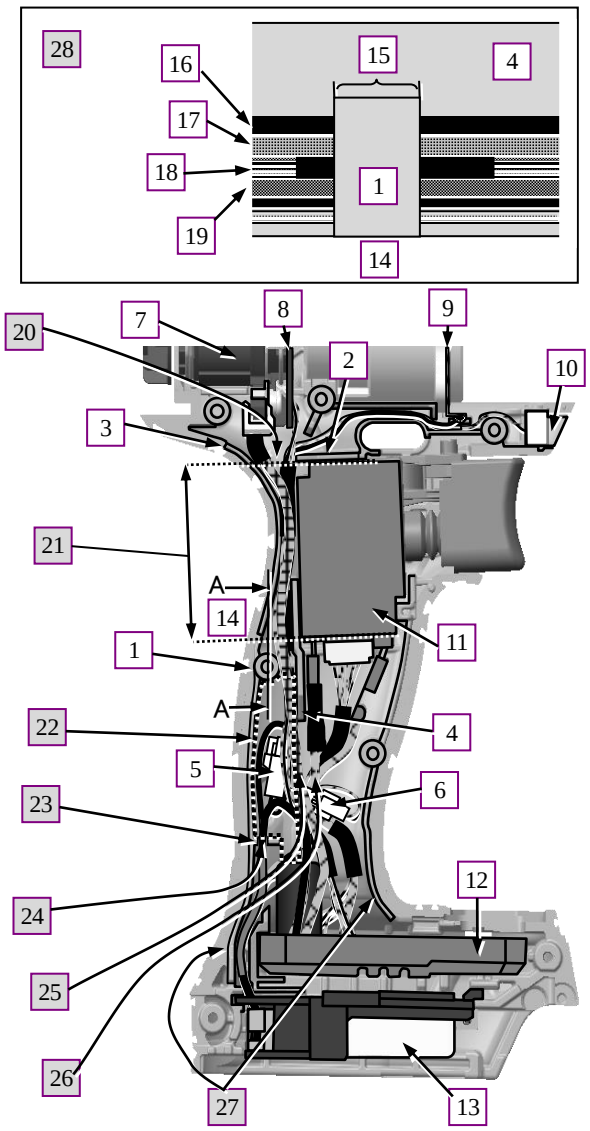
Fig.37



1	Switch	2	Connect Flag receptacle to Switch as show.

8-1-1-4 Housing section

Fig.38

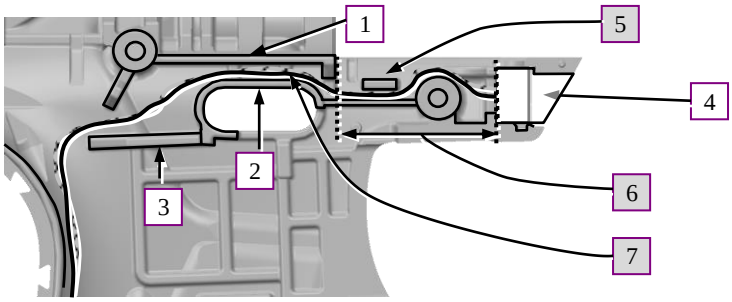


1	Boss A	11	Switch
2	Rib C	12	Controller
3	Rib D	13	Terminal
4	Rib E	14	Section A-A
5	Connector A	15	Range of Boss A
6	Connector B	16	Lead wire (Blue) of Stator
7	Stator	17	Lead wire (White) of Stator
8	Printed wiring board	18	Lead wire of Printed wiring board
9	Lead unit (if used)	19	Lead wire (Orange) of Stator
10	LED circuit		
20	Route the following Lead wires between Rib D and Rib C, Rib D and Rib E. ・ Lead wires of Stator ・ Lead wires of LED circuit ・ Lead wire of Lead unit		
21	Put the thick lead wire (Blue) of Stator on the other Lead wires in this area.		
22	Be careful not to put Connector A on the thick Lead wire (Black) of Terminal.		
23	Be careful not to put Lead wires and Connector B on this Lead wire holder.		
24	Fix the thick Lead wire (Black) of Terminal in this Lead wire holder.		
25	Put Lead wires of Printed wiring board under Lead wires (Red, White) of Switch.		
26	Put Lead wire (Red) of Switch under Lead wires of Stator.		
27	Be careful not to put Lead wires on these Ribs.		
28	Route Lead wires of Printed wiring board between Lead wire (Orange) and Lead wire (White) of Stator in the range of Boss A.		

8-1-2 Controller whose lead wires of Terminal for Stator are bound with Tape

8-1-2-1 LED circuit

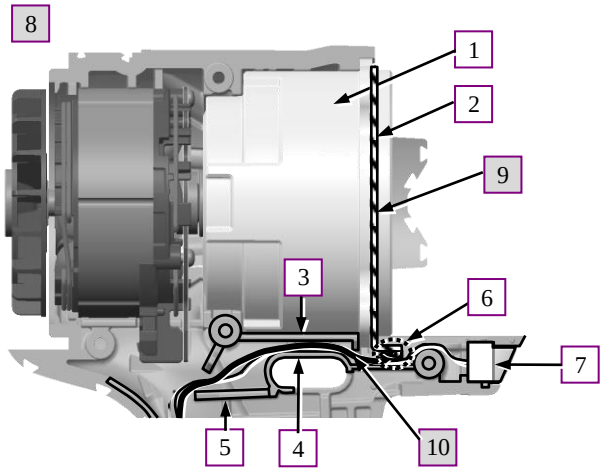
Fig.39



1	Rib A	3	Rib C
2	Rib B	4	LED circuit
5	Fix Lead wires of LED circuit in this Lead wire holder.		
6	Be careful not to slack Lead wires of LED circuit in this area.		
7	Route Lead wires of LED circuit between Rib A and Rib B/ Rib A and Rib C.		

8-1-2-2 Lead unit

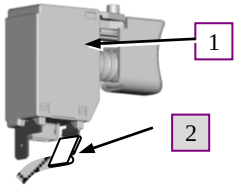
Fig.40



1	Internal gear case	5	Rib C
2	Lead unit	6	Crimped portion
3	Rib A	7	LED circuit
4	Rib B		
8	Assembling and Wiring of Lead unit (if used)		
9	Assemble Lead unit to Internal gear case so that Crimped portion faces LED circuit side.		
10	Route Lead wire of Lead unit between Rib A and Rib B/ Rib A and Rib C. Put Lead wire of Lead unit on Lead wires of LED circuit.		

8-1-2-3 Switch

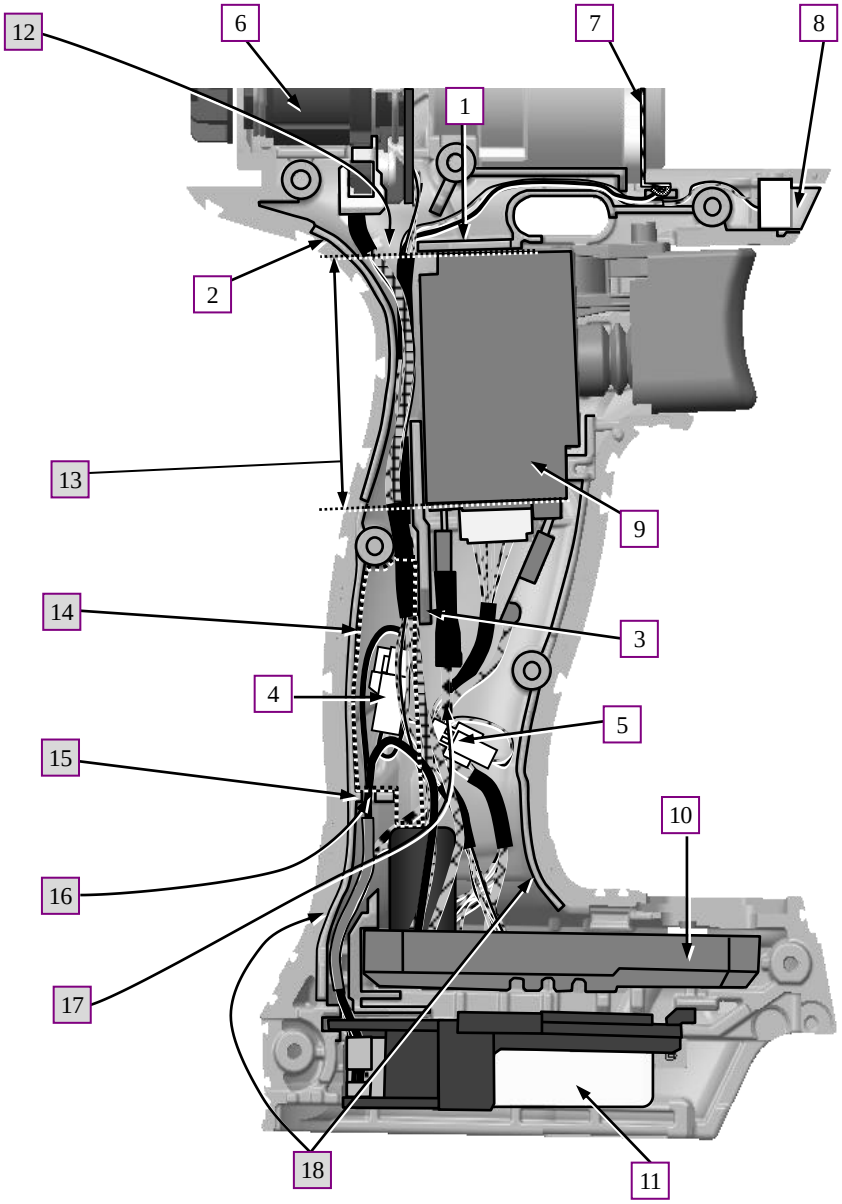
Fig.41



1	Switch	2	Connect Flag receptacle to Switch as shown.

8-1-2-4 Housing section

Fig.42



1	Rib C	7	Lead unit (if used)
2	Rib D	8	LED circuit
3	Rib E	9	Switch
4	Connector A	10	Controller
5	Connector B	11	Terminal
6	Stator		

12	Route the following Lead wires between Rib D and Rib C, Rib D and Rib E ・ Lead wires of Stator ・ Lead wires of LED circuit ・ Lead wire of Lead unit
13	Put the thick lead wire (Blue) of Stator on the other Lead wires in this area.
14	Be careful not to put Connector A on the thick Lead wire (Black) of Terminal.
15	Be careful not to put Lead wires and Connector B on this Lead wire holder.
16	Fix the thick Lead wire (Black) of Terminal in this Lead wire holder.
17	Put Lead wire (Red) of Switch under Lead wires of Stator.
18	Be careful not to put Lead wires on these Ribs.

9 TROUBLESHOOTING

Whenever you find any trouble in your machine, first, see this list to check the machine for solution.

9-1 Note for Repairing

The content may vary depending on the model.

1 Use a full charged battery which has a star mark.

2 When Housing is disassembled, check the conditions of each section (ex. Mechanical lock, Iron powder on Motor section, Connection of Connector, Breaking or Pinching of Lead wire, Assembling of Stator, Connection of Terminal and Battery).

3 Be sure to test the machine 10 times to correctly diagnose functions such as F/R control, variable speed control, etc.

4 In order to make it easier to reproduce symptoms, run the motor at Lowest speed.

5 Use the following Repairing tools for diagnosing LED and Switch.

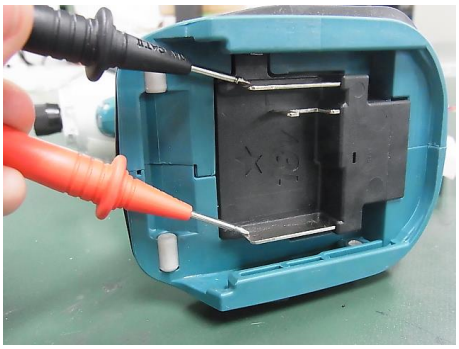
Repairing tools	Purpose
1R402	For checking variable resistance value or electrical continuity at contact points
1R402-B	
1R412	For checking whether LED lights up
1R413	For checking variable resistance value or electrical continuity at contact points

9-2 Test for checking the short-circuit in FET (Field Effect Transistor) of controller

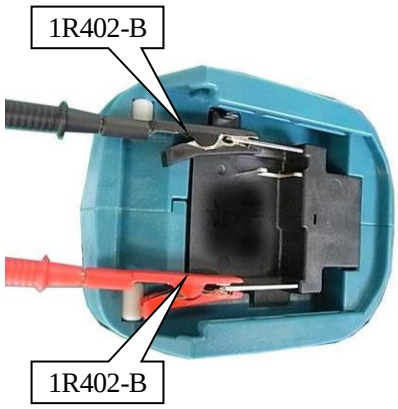
Fig. 43

1 Set Digital tester (1R402) to Diode mode.

Fig. 44



2 Connect Black probe to the plus pole of Terminal, and Red probe to the minus pole.



Tips
By attaching 1R402-B to each probe of 1R402, you can make your hands free for easier check.

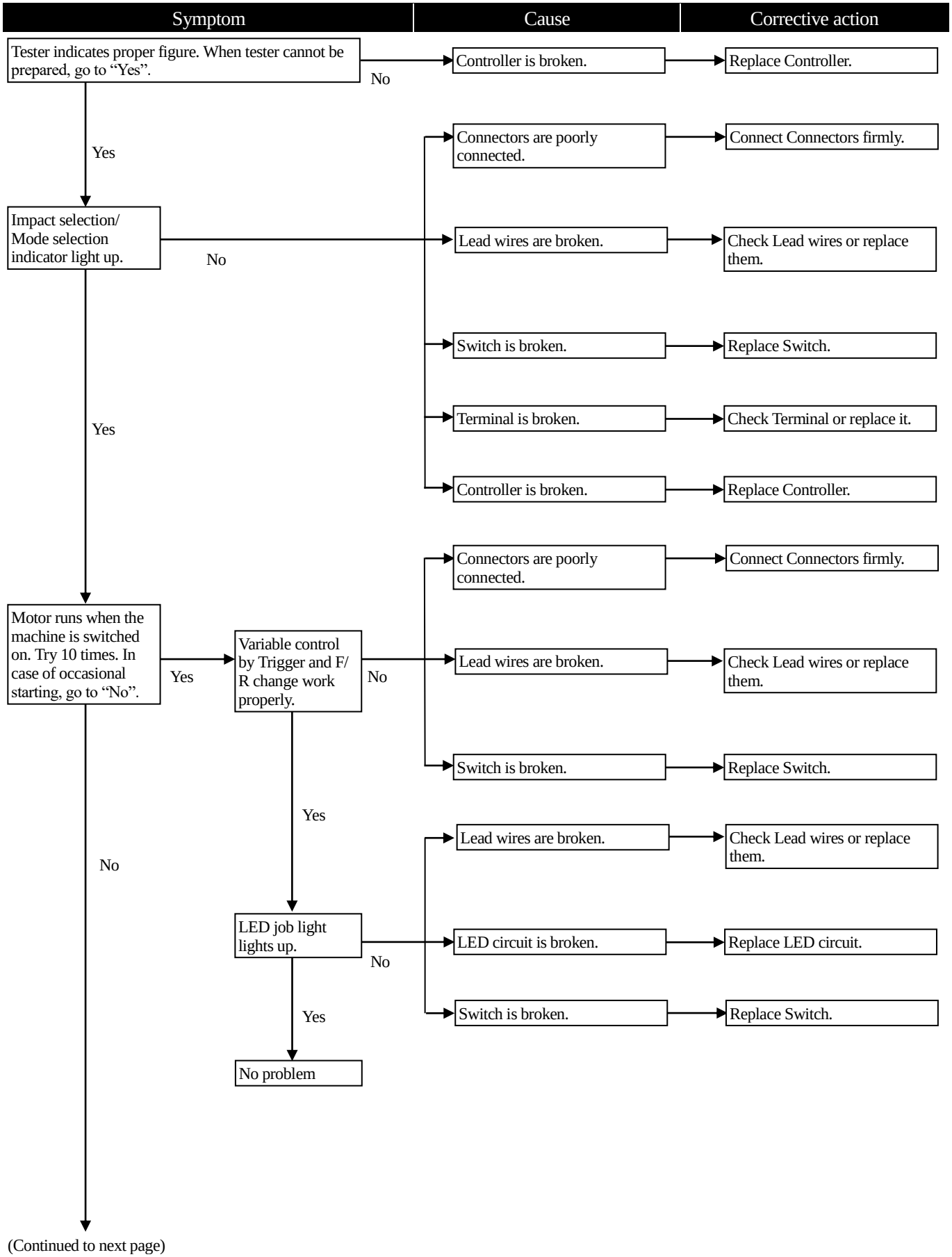
Note
Be careful not to reverse them. The reversed contacts could spoil the test.

3 Wait until the figure on Tester gets stable.

4 Controller is in order if Tester indicates 0.8±0.1V. If Tester indicates 0V or 0.4V approx., Controller is broken. Replace it with a new one.

9-3 Flowchart for Troubleshooting

Check the items in the following flowchart in order from the top to bottom. (Description of the item is referred to CIRCUIT DIAGRAM. (Fig.32) After corrective action, return to the start of Troubleshooting and re-check again.



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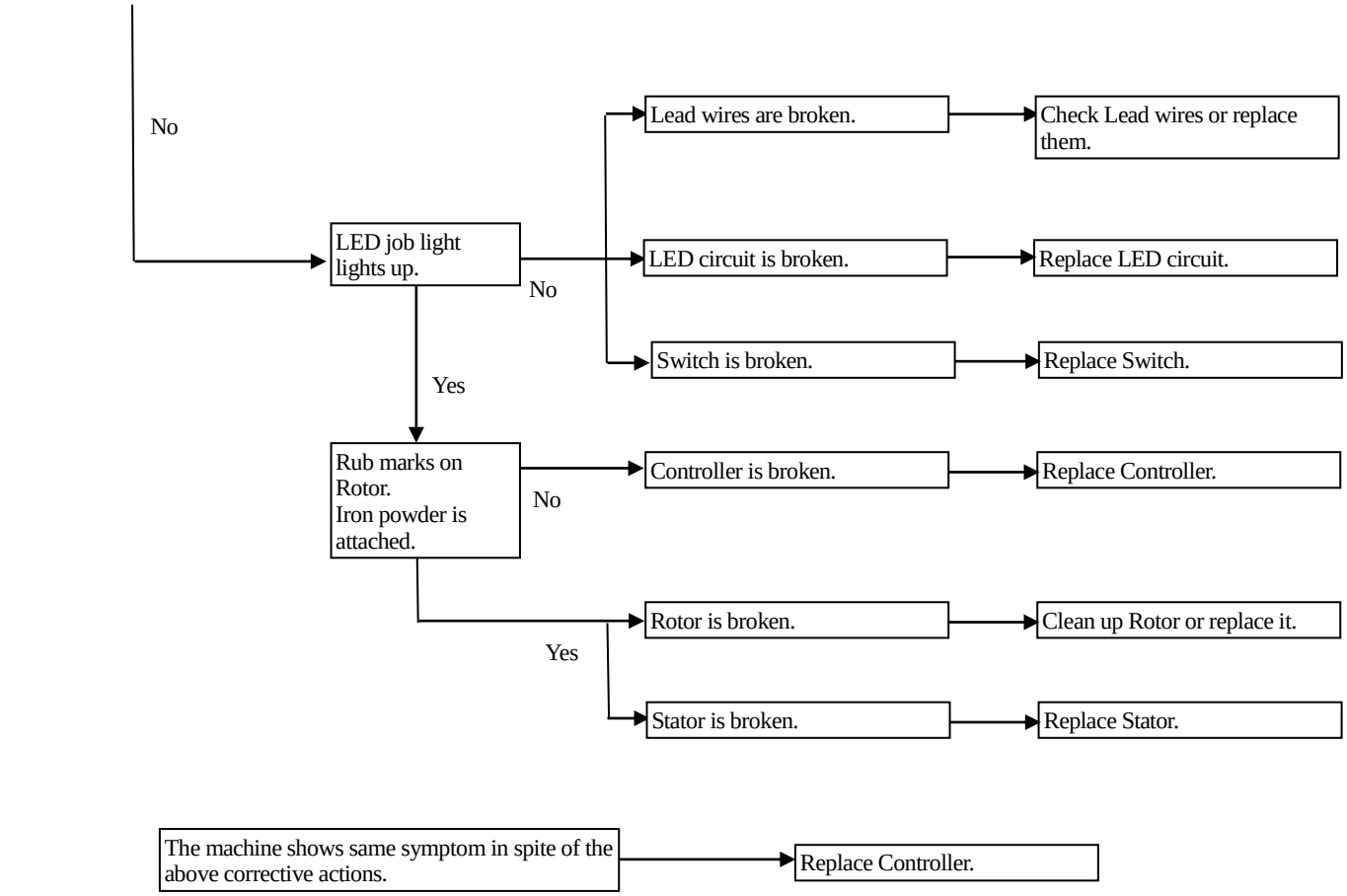

The machine shows same symptom in spite of the above corrective actions. → Replace Controller.