

Models No. ▶ BFL300F, BFL400F, BFL401F

Description ▶ Cordless Angle Screwdriver 14.4V

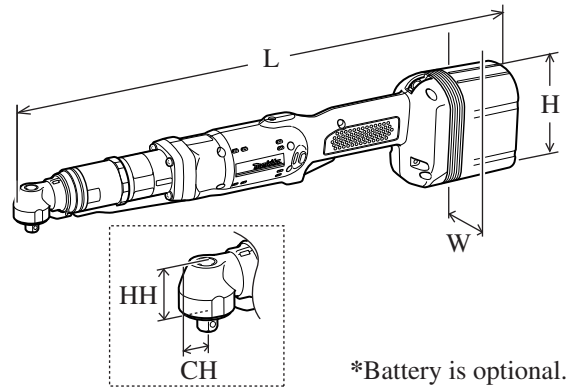
CONCEPT AND MAIN APPLICATIONS

Models BFL300F and BFL400F have been developed as specialist tools for industrial assembly applications, featuring high torque capacity of 30N.m (BFL300F)/ 40N.m (BFL400F).

Their brief advantages are;

- *High precision fastening
- *DC brushless motor for increased no load speed
- *14.4V, 2.7Ah Ni-MH battery equipped with new type battery cells for more efficient energy supply to motor

Model BFL401F is a sister tool designed for Italy. These models do not include battery and charger.



*Battery is optional.

Dimensions: mm (")		
Model No.	BFL300F	BFL400F/ BFL401F
Length (L)	506 (20)	510 (20-1/16)
Width (W)	73 (2-7/8)	73 (2-7/8)
Height (H)	104 (4-1/8)	104 (4-1/8)
Head height (HH)	31.5 (1-1/4)	34 (1-5/16)
Center height (CH)	16 (5/8)	18 (11/16)

► Specification

Model No.		BFL300F	BFL400F/ BFL401F
Battery	Voltage: V	14.4	
	Capacity: Ah	2.7	
	Cell	Ni-MH	
Capacity		9.5mm (3/8") Square drive*	
Fastening torque: N.m	Hard joint	16 - 30	25 - 40
	Soft joint	16 - 30	25 - 40
No load speed: min.-1=rpm		400	260
Net weight: kg (lbs)		2.3 (5.1)	2.4 (5.3)

*Note: 12.7mm (1/2") with optional Spindle G complete

► Standard equipment

No (however, with Protector for some countries, and with Torque adjust tool for some countries)

► Optional accessories

- Ni-MH battery BH1427
- Chargers DC24SA, DC14SA, DC14SC
- Automatic refreshing adapter ADP03
- Switch lever set (paddle switch)
- Spindle G complete (12.7mm square drive)
- Protectors Red, Blue, Yellow, Clear
- Torque adjust tool

► Repair

Warning: Always be sure to disconnect battery cartridge from the machine before starting repair.

Note: See the instruction manual for safety instructions, safety rules and operating instructions.

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[1] NECESSARY REPAIR TOOLS

(Code No.)	(Tool Name)	(Code No.)	(Tool Name)
1R004	Retaining Ring Pliers ST-2	1R223	Torque Wrench Shaft 20-90N.m
1R005	Retaining Ring Pliers RT-2N	1R269	Bearing Extractor
1R006	Retaining Ring Pliers RT-2E	1R291	Retaining Ring S and R Pliers
1R008	Tips for Retaining Ring Pliers	1R341	Spanner Head
1R033	Bearing setting Plate 10.2	134844-7	Socket 27-50 Ass'y
1R219	Torque Wrench Shaft 7-23N.m	134848-9	Socket 27-50 Ass'y
1R220	Ratchet Head 9.5	765025-8	Torque Adjust Tool
1R222	Socket Adapter		

[2] LUBRICATION AND ADHESIVE

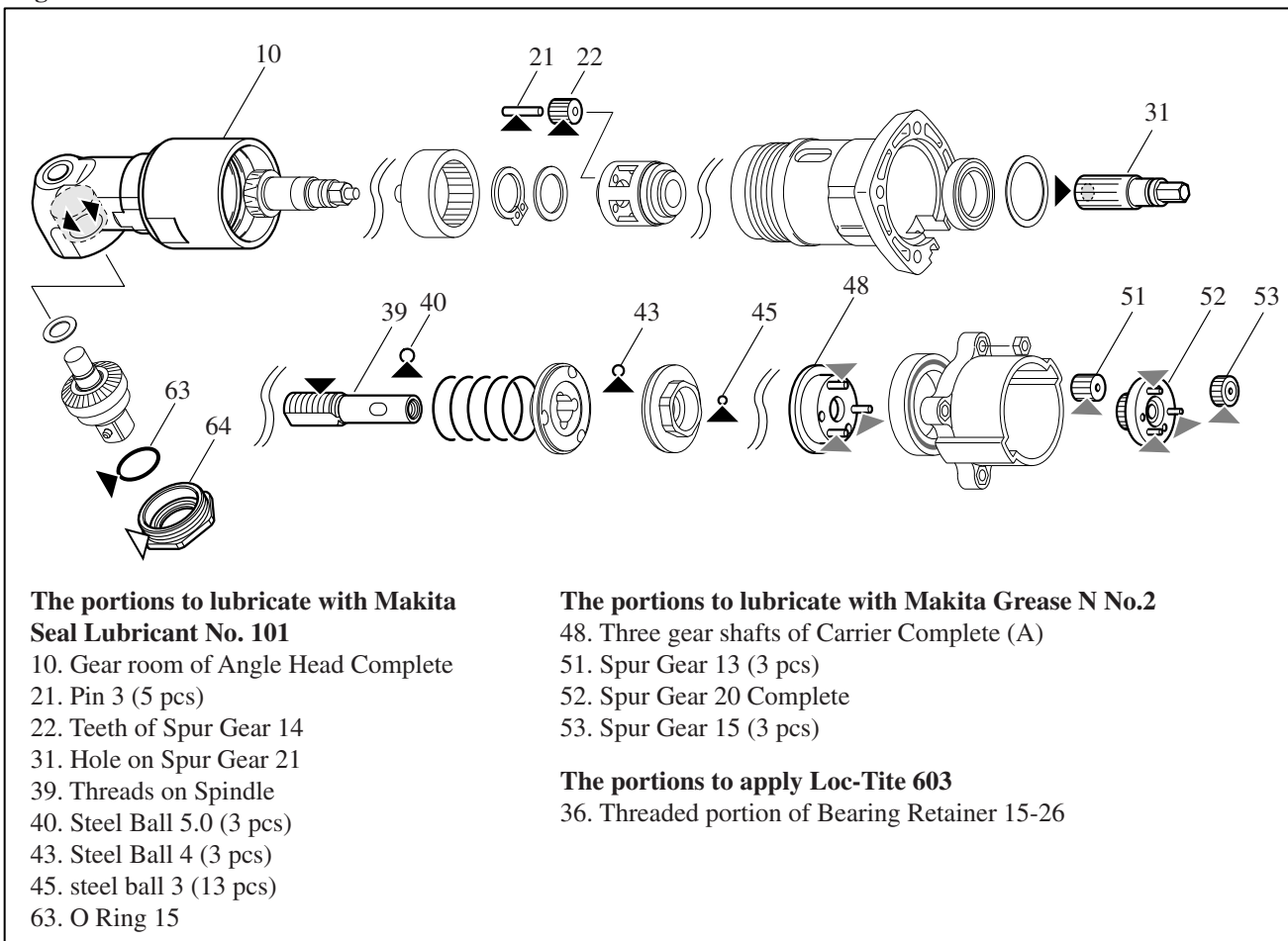
See the parts breakdown below.

Apply 2.0g of Makita Grease N. No.2 to the portions designated with the mark of ▼ .

Apply Makita seal lubricant to the portions designated with the mark of ▼ .

Apply Loc-Tite 603 to the portions designated with the mark of ▼ .

Fig. 1



The portions to lubricate with Makita Seal Lubricant No. 101

- 10. Gear room of Angle Head Complete
- 21. Pin 3 (5 pcs)
- 22. Teeth of Spur Gear 14
- 31. Hole on Spur Gear 21
- 39. Threads on Spindle
- 40. Steel Ball 5.0 (3 pcs)
- 43. Steel Ball 4 (3 pcs)
- 45. steel ball 3 (13 pcs)
- 63. O Ring 15

The portions to lubricate with Makita Grease N No.2

- 48. Three gear shafts of Carrier Complete (A)
- 51. Spur Gear 13 (3 pcs)
- 52. Spur Gear 20 Complete
- 53. Spur Gear 15 (3 pcs)

The portions to apply Loc-Tite 603

- 36. Threaded portion of Bearing Retainer 15-26

[3] DISASSEMBLING/ ASSEMBLING

[3] -1. Disassembling/ Assembling of Job Light Section

DISASSEMBLING

*Shown in **Fig. 2** are the parts of Job light section.

- 1) Remove Lead cover (on which Ring spring 36 is installed) and Ring spring 29 using a slotted screwdriver. (**Figs. 3, 4**)
- 2) Remove Light covers (R) and (L) while pushing the portion designated with the gray circle to unlock the tab on Light cover (R) from the slot in (L). (**Fig. 5**)
- 3) Separate Switch cover from the tool by removing two M4x8 Pan head screws.
- 4) Remove Lead wires and LED circuit from Lead wire holders and Light cover (R), and disconnect Connector. (**Fig. 6**)

Fig. 2

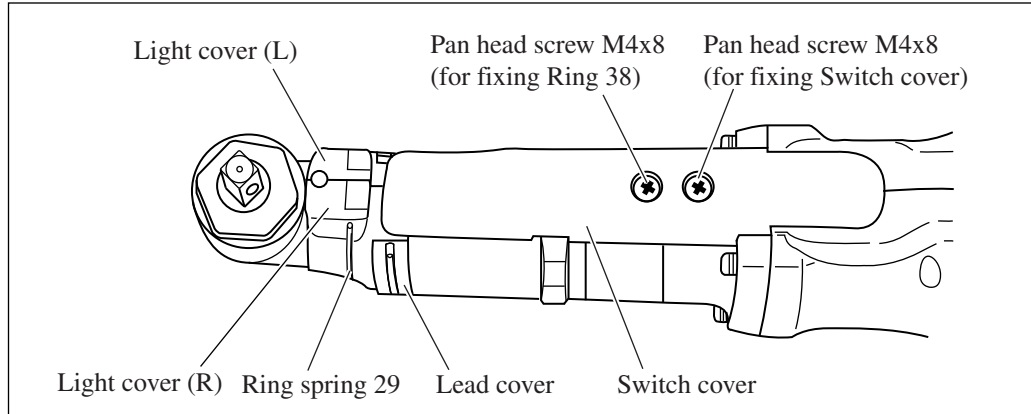


Fig. 3

Push the end face of Lead cover using a slotted screwdriver till it is lifted up as illustrated to left below. Now Lead cover can be removed by pulling in the direction of the arrow as illustrated to right.

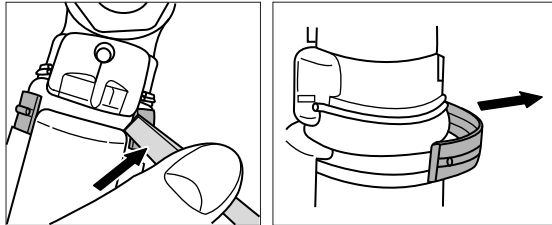


Fig. 4

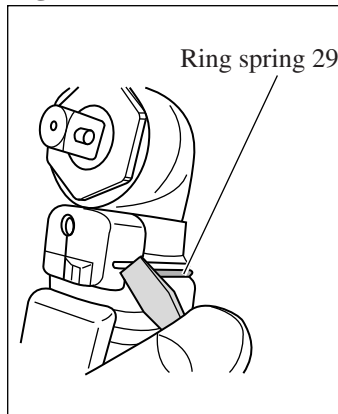
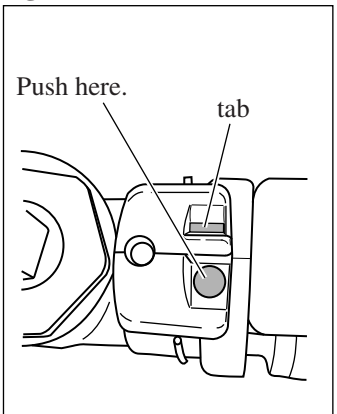


Fig. 5



ASSEMBLING

- 1) Fix Lead wires securely with Lead wire holders, and then install LED circuit on Light cover (R).
At this time, put the sag of Lead wires in place as illustrated to right in **Fig. 6**.
- 2) Push the tab on Light cover into the cut in Housing before fastening screws. And then fasten Switch cover with two M4x8 Pan head screws. Be careful not to pinch the Lead wires at this time. (**Figs. 2, 7**)
- 3) Install Light covers (R) and (L) while locking the tab on Light cover (R) in the slot in (L), then Ring spring 29. (**Fig. 5**)
Ring spring 29 can be easily installed by fixing one end on the groove in Light cover, then pushing toward Light cover while expanding the other end. (**Fig. 8**)
- 4) Being careful not to pinch the Lead wires from LED circuit, install Lead cover (on which Ring spring 36 is installed) as illustrated in **Fig. 9**.

Fig. 6

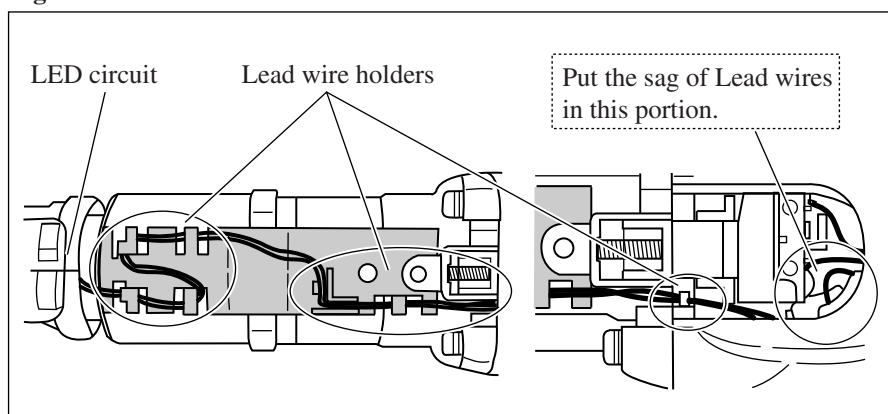
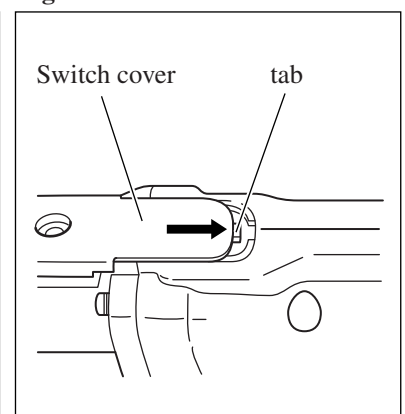
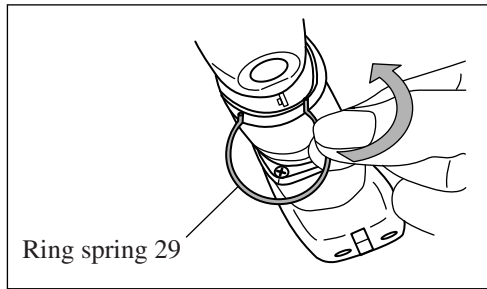
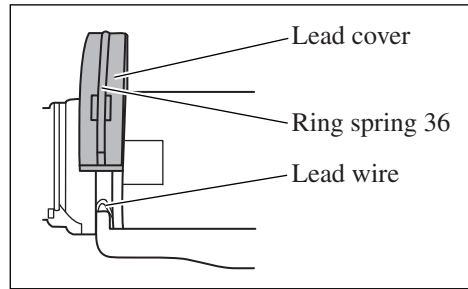


Fig. 7

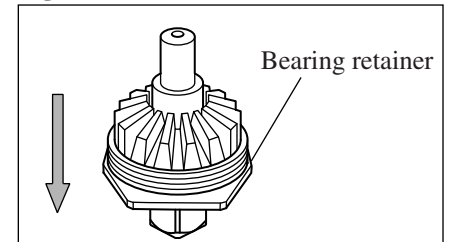


[3] -1. Disassembling/ Assembling of Job Light Section (cont.)**Fig. 8****Fig. 9****[3] -2. Disassembling/ Assembling of Bearing Retainer****DISASSEMBLING**

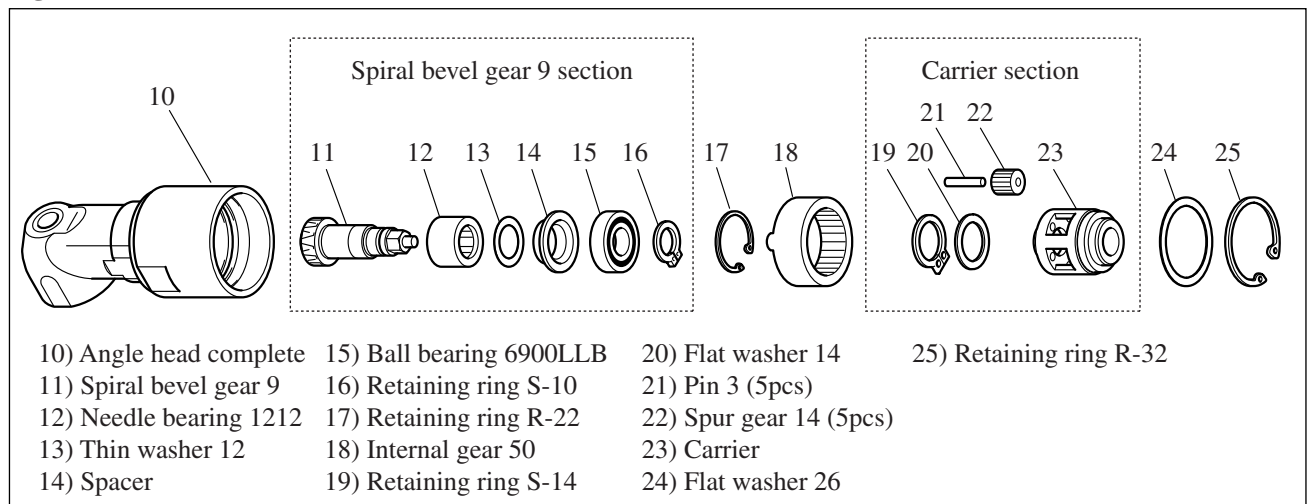
Turn Bearing retainer clockwise using a 27mm spanner for BFL300F/ 32mm spanner for BFL400F and BFL401F. Now Bearing retainer can be removed by pushing it down as illustrated in **Fig. 10**.

ASSEMBLING

- 1) After applying Makita seal lubricant No.101 to O ring 15, put O ring 15 and Bearing retainer in place on Spindle complete.
- 2) Put 2g of Makita seal lubricant No.101 in the gear room of Angle head complete. At this time, be careful not to put the grease on the threaded portion of Angle head complete.
- 3) Apply Loctite 603 to the threaded portion of Bearing retainer, and screw it into Angle head complete. At this time, remember to put Flat washer 5 in place.
- 4) Fasten Bearing retainer to the recommended torque of 30 - 50N.m by turning counterclockwise with the following tools; 1R219, 1R220, 1R222, 134844-7 (for BFL300F), 134848-9 (for BFL400F/ BFL401F)

Fig. 10**[3] -3. Disassembling/ Assembling/ Adjustment of Angle Head Section****DISASSEMBLING**

*Shown in **Fig. 11** are the parts of Angle head section.

Fig. 11

- 1) Remove Light covers (R) and (L), Ring spring 29, Lead cover and Switch cover. (Refer to **[3] -1.**)
- 2) Fix Angle head by clamping its two flats using adjustable wrench or vise, and remove Hex nut M36-41 by turning in the direction of the arrow with 1R223 and 1R341. (**Figs. 12, 13**)
Caution: When clamping Bearing retainer, be very careful not to deform it by overtightening.
- 3) Remove Angle head complete by turning counterclockwise.
- 4) Remove Retaining ring R-32 using 1R006 or the like, then Flat washer 26, Internal gear 50 and Carrier section.
- 5) Remove Retaining ring S-14 from Carrier section using 1R291 or the like. Now the following parts can be replaced; Flat washer 14, Pin 3 (5pcs), Spur gear 14 (5pcs)
Note: Pin 3 can be pulled out easily by using a magnet.
- 6) Remove Retaining ring R-22 located inside Angle head complete using 1R005 or the like.
- 7) Remove Spiral bevel gear 9 section by hitting the end face of Angle head complete. (**Fig. 14**)
- 8) Remove Retaining ring S-10 from Spiral bevel gear 9 section using 1R004, 1R008 or the like.
Now the following parts can be replaced by removing Ball bearing 6900LLB with 1R269 or the like:
Spiral bevel gear 9, Spacer, Thin washer 12, Needle bearing 1212

[3] -3. Disassembling/ Assembling/ Adjustment of Angle Head Section (cont.)

Fig. 12

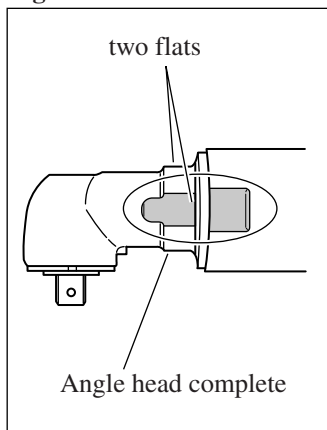


Fig. 13

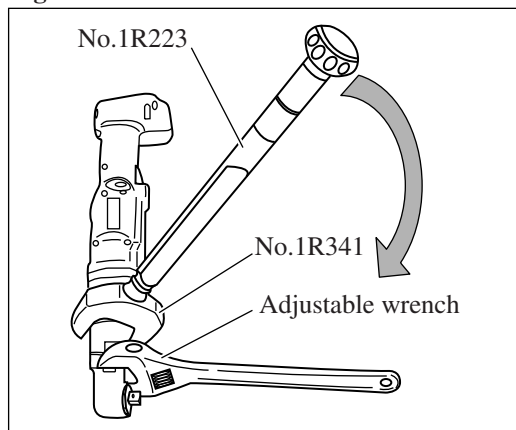
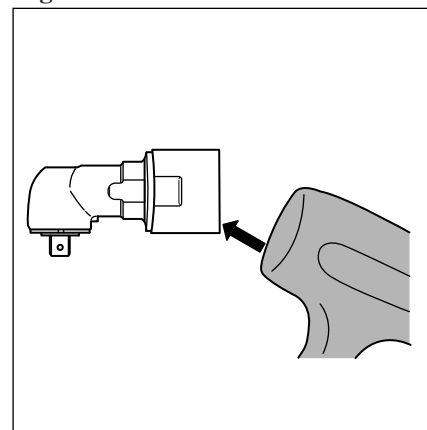


Fig. 14



ASSEMBLING

- 1) Assemble Needle bearing 1212, Thin washer 12 and Spacer to Spiral bevel gear 9.

Caution: Spacer is not reversible when assembled to Spiral bevel gear 9. Be sure to place as illustrated in **Fig. 11**.

- 2) Press-fit Ball bearing 6900LLB to Spiral bevel gear 9 using arbor press and 1R033. Assemble Retaining ring S-14 to Spiral bevel gear 9 to complete assembling of Spiral bevel gear 9 section.

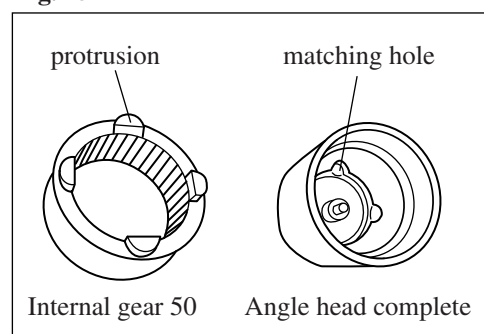
And then insert Spiral bevel gear 9 section into Angle head complete.

- 3) Assemble Retaining ring R-22 to Spiral bevel gear 9.
- 4) Put Internal gear 50 in Angle head complete so that the protrusions on Internal gear 50 fit in the matching holes on Angle head complete.

(**Fig. 15**)

- 5) Assemble Spur gear 14 and Pin 3 (5 pcs each) to Carrier, and then Thin washer 14 and Retaining ring S-14 to complete Carrier section.
- 6) Insert Carrier section into Angle head complete, and apply 1.5g of Makita seal lubricant No.101 to Spur gear 14.
- 7) Install Flat washer 26 and Retaining ring R-32.

Fig. 15



ADJUSTMENT

- 1) Fasten Angle head complete and Hex nut M36-41 to Clutch case section to the full by hand.
- 2) Turn Angle head complete counterclockwise to adjust to a desired angle.
- 3) Being very careful not to turn Angle head complete, fix it securely by turning Hex nut M36-41 clockwise with 1R223 and 1R341 to the recommended torque of 30 -50N.m.
- 4) Make sure that Lead wires are fixed in place with Lead wire holders as illustrated in **Fig. 6**. Then, being careful not to pinch Lead wires, install Lead cover.

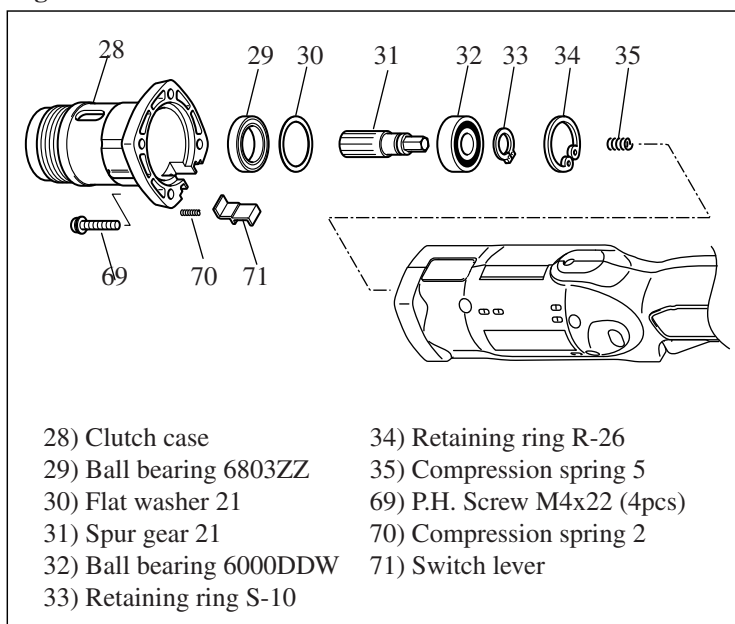
[3] -4. Disassembling/ Assembling of Clutch Case Section

DISASSEMBLING

*Shown in **Fig. 16** are the parts of Clutch case section.

- 1) Remove Angle head section. (Refer to [3]-1, 3.)
- 2) Remove Compression spring 2 and Switch lever.
- 3) Clutch case, Clutch assembly and Compression spring 5 can be removed by removing four M4x22 Pan head screws.
- 4) Remove Retaining ring R-26 using 1R006 or the like.
- 5) Push out Spur gear 21, and then, after removing Flat washer 21 using slotted screwdriver or the like, push out Ball bearing 6803ZZ.
- 6) Remove Retaining ring S-10 using 1R004 and 1R008 or the like, then Ball bearing 6000DDW using 1R269 or the like. Now Spur gear 21 can be replaced.
- 7) Remove Hex nut M36-41 by turning counterclockwise. Remove Ring 38, and now Clutch case can be replaced.

Fig. 16



[3] -4. Disassembling/ Assembling of Clutch Case Section (cont.)

ASSEMBLING

- 1) Press-fit Ball bearing 6000DDW to Spur gear 21 using arbor press and 1R033 or the like, then install Retaining ring S-10 on Spur gear 21.
 - 2) Into Clutch case, insert first Ball bearing 6803ZZ, next Flat washer 21, and third Spur gear 21. Then install Retaining ring R-26.
- Remark:** Remember to place Compression spring 5 between Clutch case and Clutch assembly.
- 3) Put an appropriate amount of Makita seal lubricant in the hole on Spur gear 21. (**Fig. 1**)

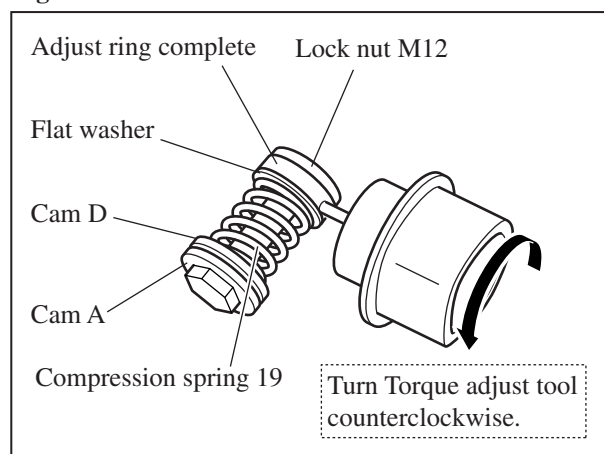
[3] -5. Disassembling/ Assembling of Clutch Section

Note: When repairing Clutch section, it is recommended to entirely replace Clutch assembly with fresh one. However, if required to replace component parts of Clutch assembly, follow the disassembling/assembling procedure described below

DISASSEMBLING

- 1) Remove Clutch case section, and take Clutch section out of the machine. (Refer to [3]-1, 3, 4.)
- 2) Insert Torque adjust toll into the hole of Adjust ring complete, and turn it counterclockwise to remove Lock nut M12. Decrease in the pressure of Compression spring 19 allows you to remove Lock nut M12 by turning it clockwise by hand. (**Fig. 17**)
- 3) Remove Adjust ring complete, Flat washer and Compression spring 19 from Spindle.
- 4) While shifting the positions of Cam A and Cam D, replace Steel ball 3.0 (13 pcs.), Steel ball 4.0 (3 pcs.) and Steel ball 5.0 (3 pcs.). Steel balls can be removed easily by using a magnet.

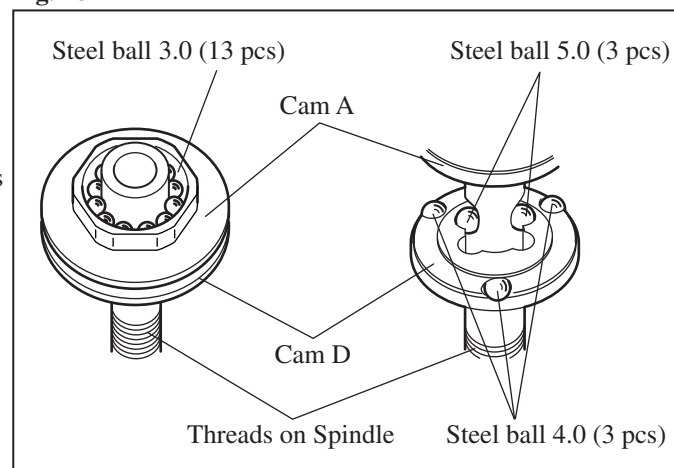
Fig. 17



ASSEMBLING

- 1) Apply Makita seal lubricant No. 101 to Steel ball 5.0 (3 pcs.), Steel ball 4.0 (3 pcs.) and Steel ball 3.0 (13 pcs.), and set these Steel balls in place on the Cams. (**Fig. 18**)
- 2) Apply Makita seal lubricant No. 101 to the male threads on Spindle, and then assemble Compression spring 19, Flat washer and Adjust ring complete to Spindle, and then secure Lock nut M12 to Spindle by turning it counterclockwise using Torque adjust tool, etc.

Fig. 18



[3] -6. Disassembling/ Assembling of Gear case Section

DISASSEMBLING

- 1) Remove Switch lever, Switch cover and Compression spring 2. (Refer to [3] -1.)
- 2) Remove four M4x22 Pan head screws to separate Clutch case from the machine.
- 3) Remove seven M3x20 Pan head screws to separate Housing (L) from (R).
- 4) Remove switch unit from Gear case.
- 5) Separate Gear case section from Motor control unit by lifting up them, then turning Motor bracket counterclockwise. (**Fig. 19**)
- 6) Pull off Motor bracket from Rotor, and then pull off Rotor from Motor control unit.
- 7) Remove Lock washer located in Gear case by turning counterclockwise with pliers or slotted screwdriver. (**Fig. 20**)
- 8) Remove Spur gears, Internal gear, Carrier complete and Ball bearing 6805LLB.

[3] -6. Disassembling/ Assembling of Gear Case Section (cont.)

Fig. 19

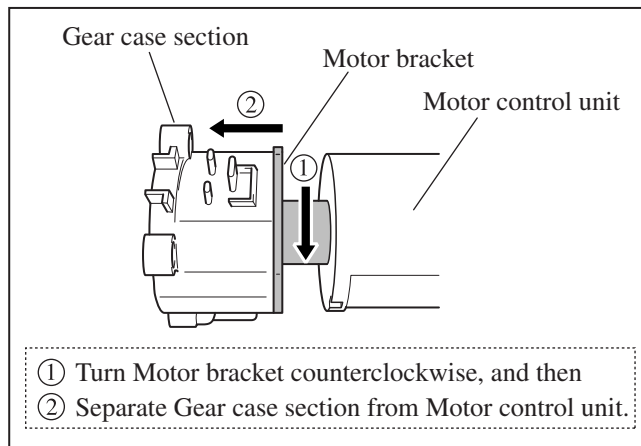
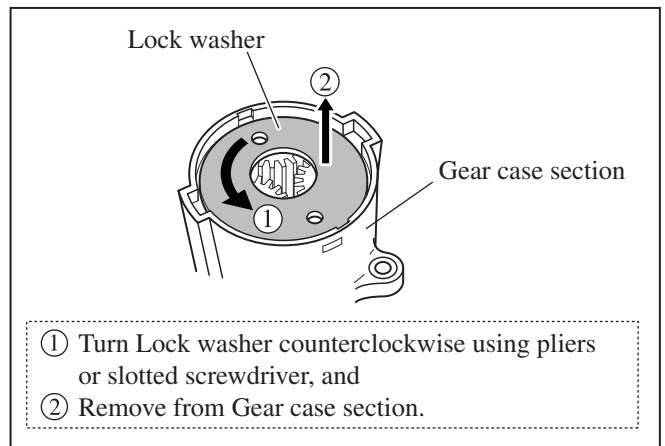


Fig. 20



ASSEMBLING

- 1) After applying Makita grease N No.2 to teeth of all Spur gears, shafts of Carrier complete and shafts of Spur gear 20 complete, assemble Ball bearing 6805LLB and Carrier complete (A) to Gear case. (Fig. 1)
And then assemble Internal gear 47 and Spur gears from the opposite side.
- 2) Install Rotor on Motor control unit as described below;
Fix Motor control unit on table or the like, and insert Rotor slowly into Motor control unit till it touches the surface of the table. Then lift up Motor control unit gradually till it stops. (Fig. 21)
Caution: 1. Because Rotor is a strong magnet, be sure to remove metal chips or debris from it before installation, and be very careful not to pinch your fingers between Rotor and metal parts, etc.
2. Be careful not to shock the printed wiring board of Motor control unit.
- 3) Install Lock washer on Gear case. Then put Motor bracket on Gear case, and turn it clockwise to lock in place.
- 4) Assemble Gear case section and Motor control unit to Housing (R) so that the lead wires of Motor control unit and the Switch unit installation portion on Gear case face the side of the LED - Trigger switch line. (Fig. 22)
When assembling, fit the boss on Housing (R) in the notch in Motor control unit. (Fig. 23)

Fig. 21

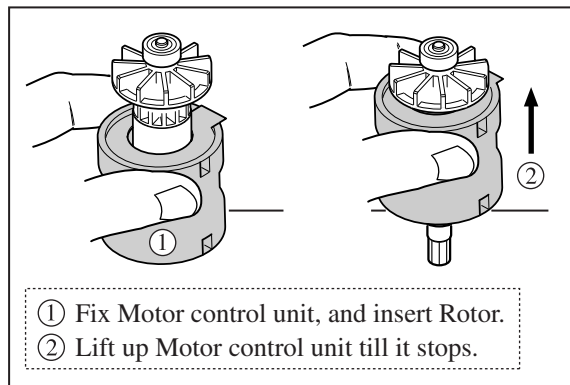
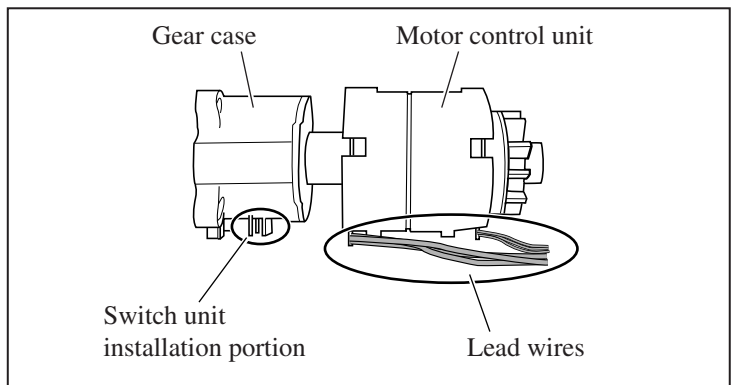


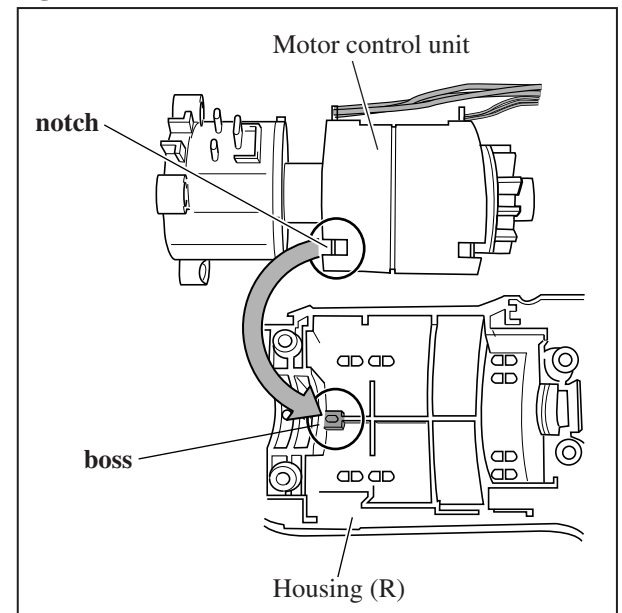
Fig. 22



- 5) Set Switch unit in place on Gear case.
- 6) Assemble the following parts to Housing (R) in numerical order:
 1. Controller of Motor control unit
 2. Terminal
 3. LED circuit
 4. Assembly of Gear case section and Motor control unit
 Put lead wires in place while taking care not to pinch them. After putting Switch section in place, install Plate and Lens. Then fasten Housing (L) to (R) with seven M3x20 Pan head screws. (Fig. 24)

Caution: When disconnecting connectors, do not pull lead wires. (Fig. 25)

Fig. 23



[3] -6. Disassembling/ Assembling of Gear Case Section (cont.)

Fig. 24

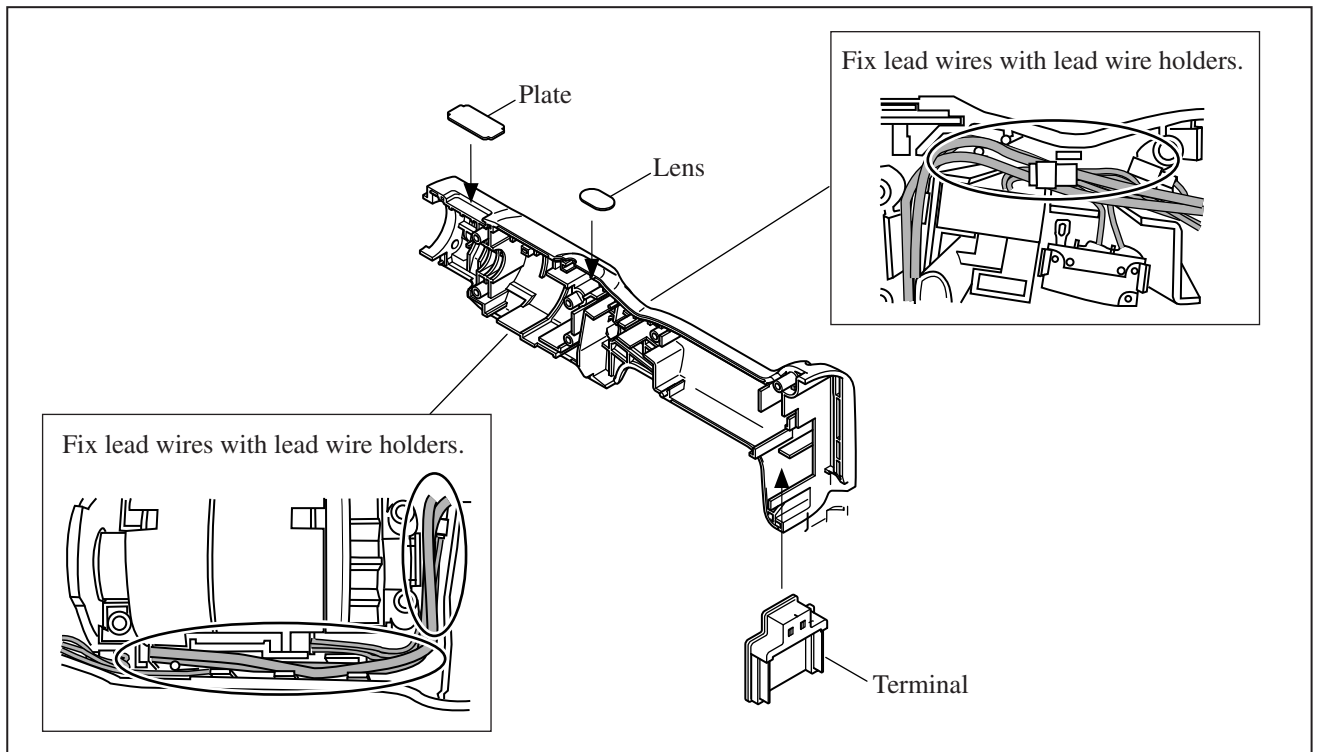
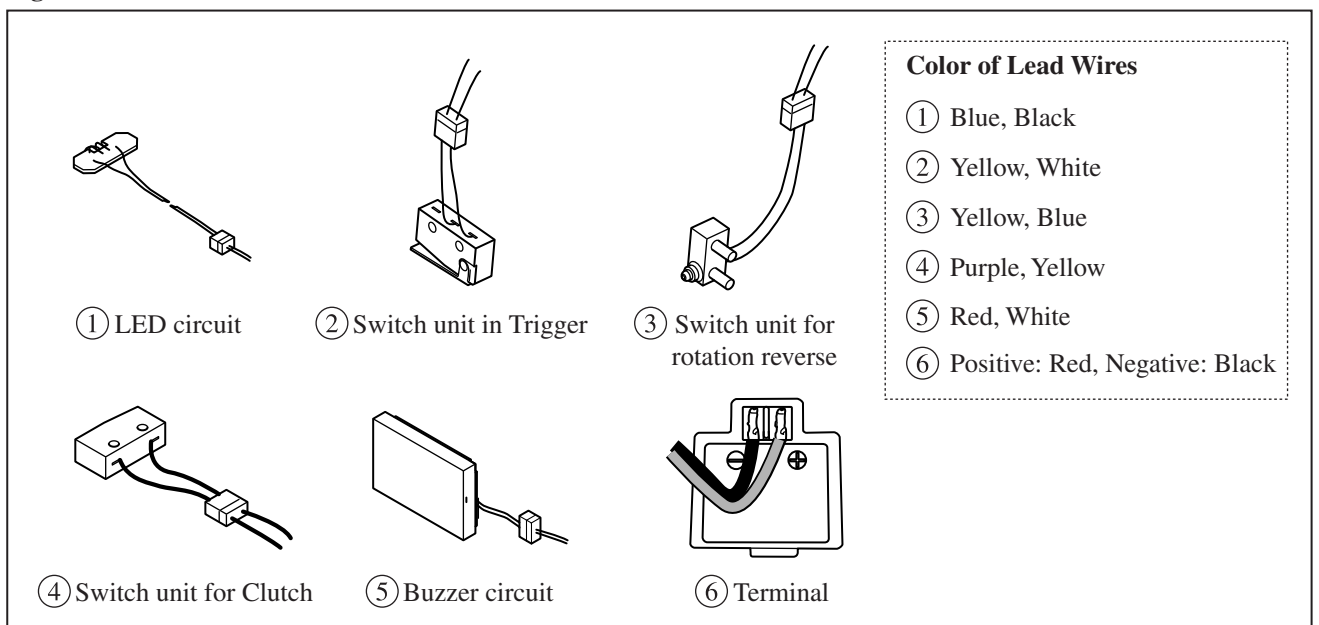


Fig. 25



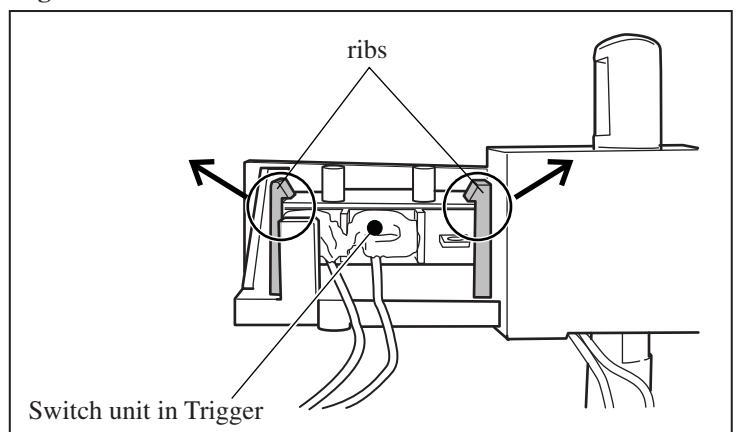
[3] -7. Disassembling/ Assembling of Switch Section

Although Switch section can be disassembled, you can also use Switch assembly to entirely replace Switch section.

DISASSEMBLING

- 1) Remove Clutch case section and Housing (L). (Refer to [3] -1, 6.)
 - 2) Remove Switch unit in Trigger while expanding the ribs. (Fig. 26)
 - 3) Switch unit for rotation reverse can be replaced by removing PT3x16 Tapping screw, then removing Cover.
- Now the following parts can also be replaced:
 F/R Change lever, Leaf spring, Switch lever (A), Compression spring (A)

Fig. 26

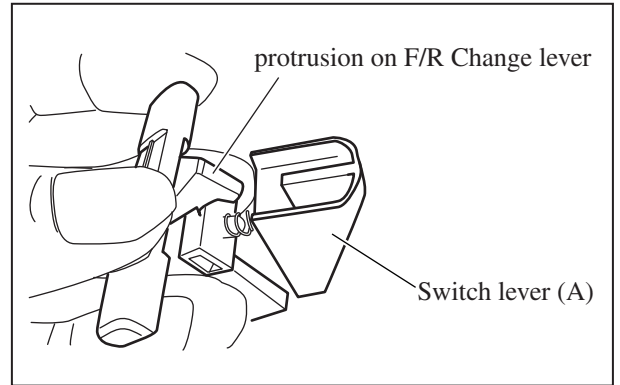


[3] -7. Disassembling/ Assembling of Switch Section (cont.)**ASSEMBLING**

Put Leaf spring in place on F/R Change lever, and Compression spring 4 on Switch lever (A).

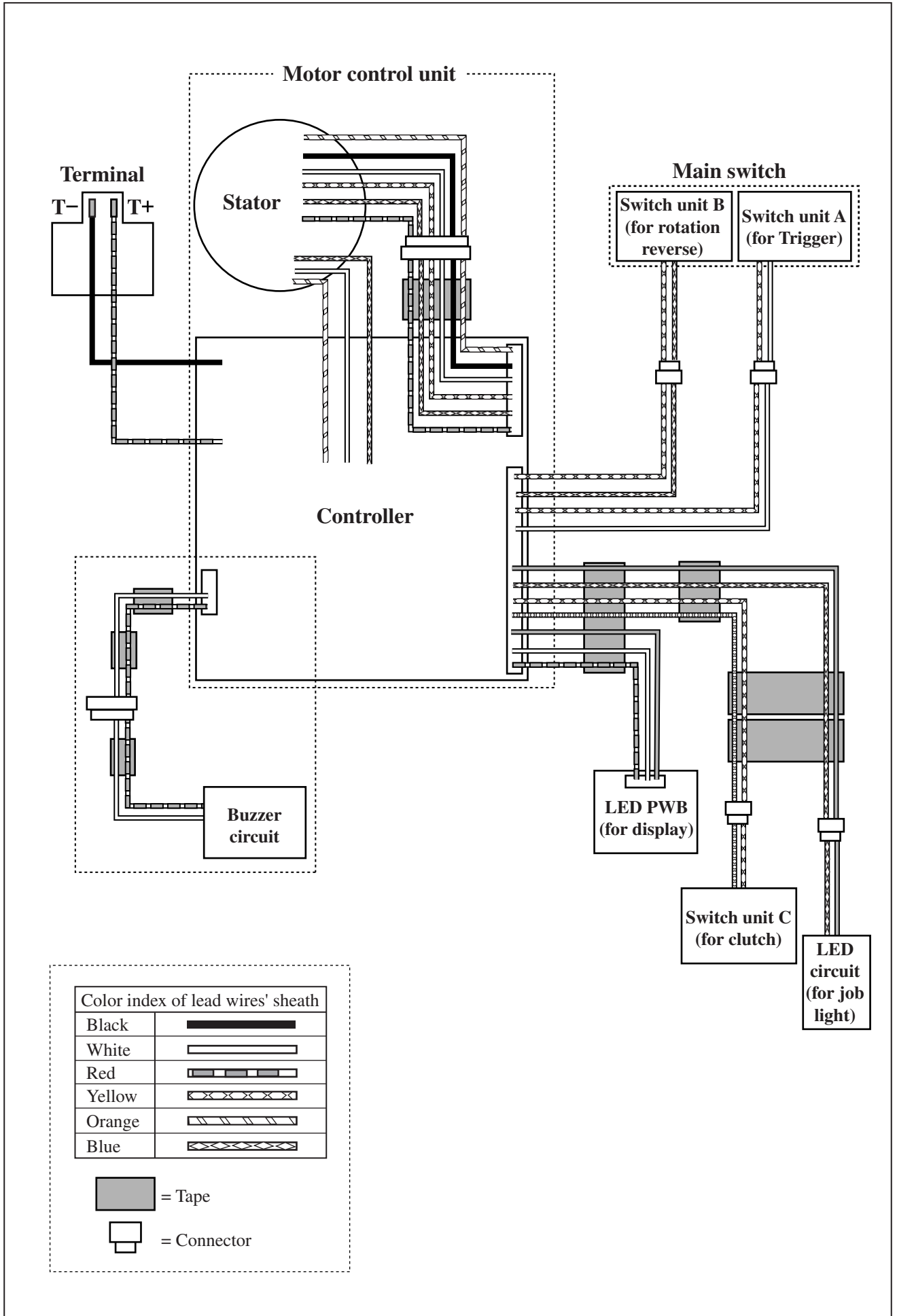
Put F/R Change lever, Switch lever and Switch unit for rotation reverse in place. At this time, fit the protrusion on F/R Change lever in Switch lever (A). (**Fig. 27**)

Then, while pushing these parts with Cover, fasten with PT3x16 Tapping screw.

Fig. 28

► **Circuit diagram**

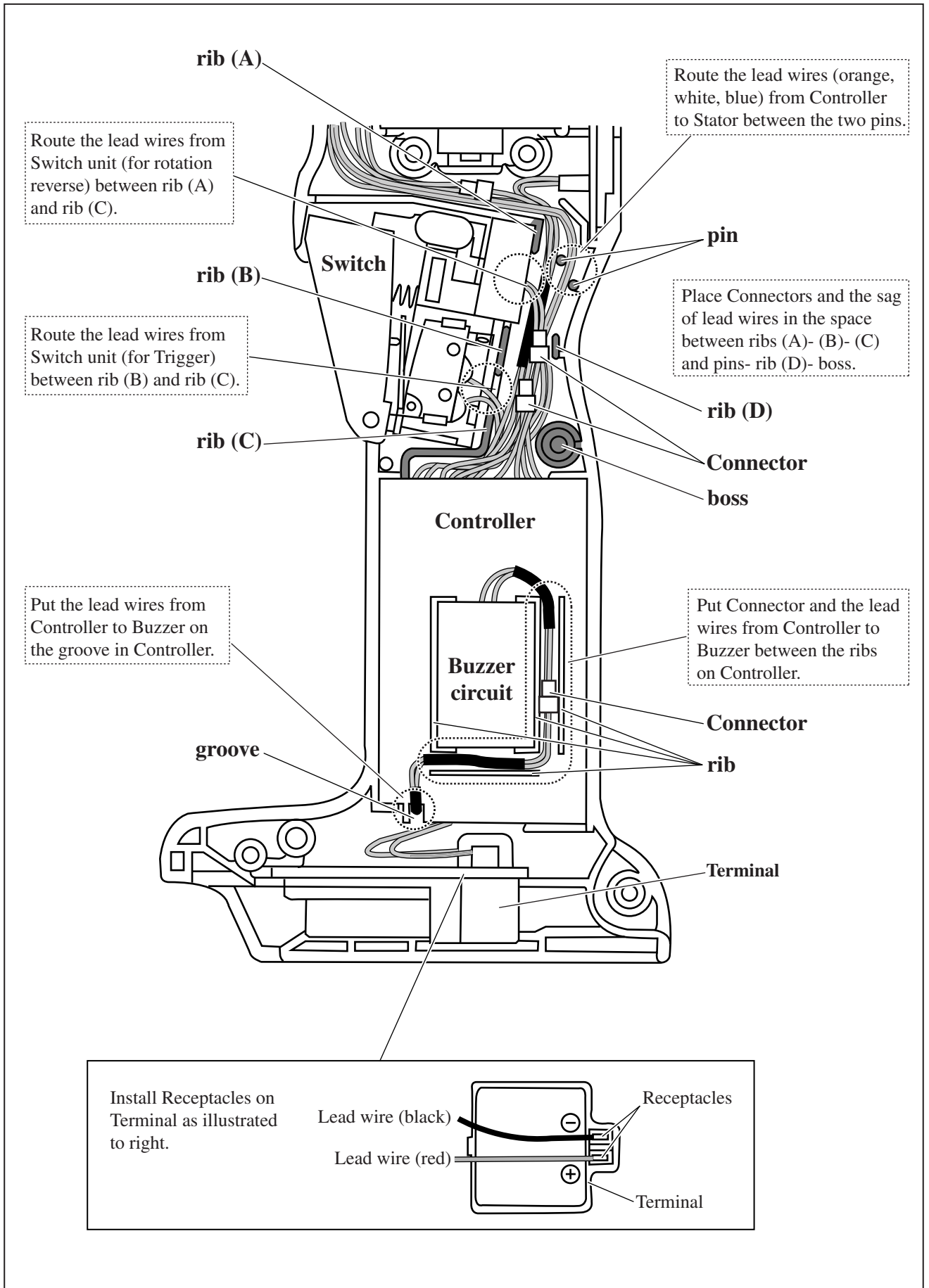
Fig. 28



► **Wiring diagram**

[1] **Wiring Around Controller**

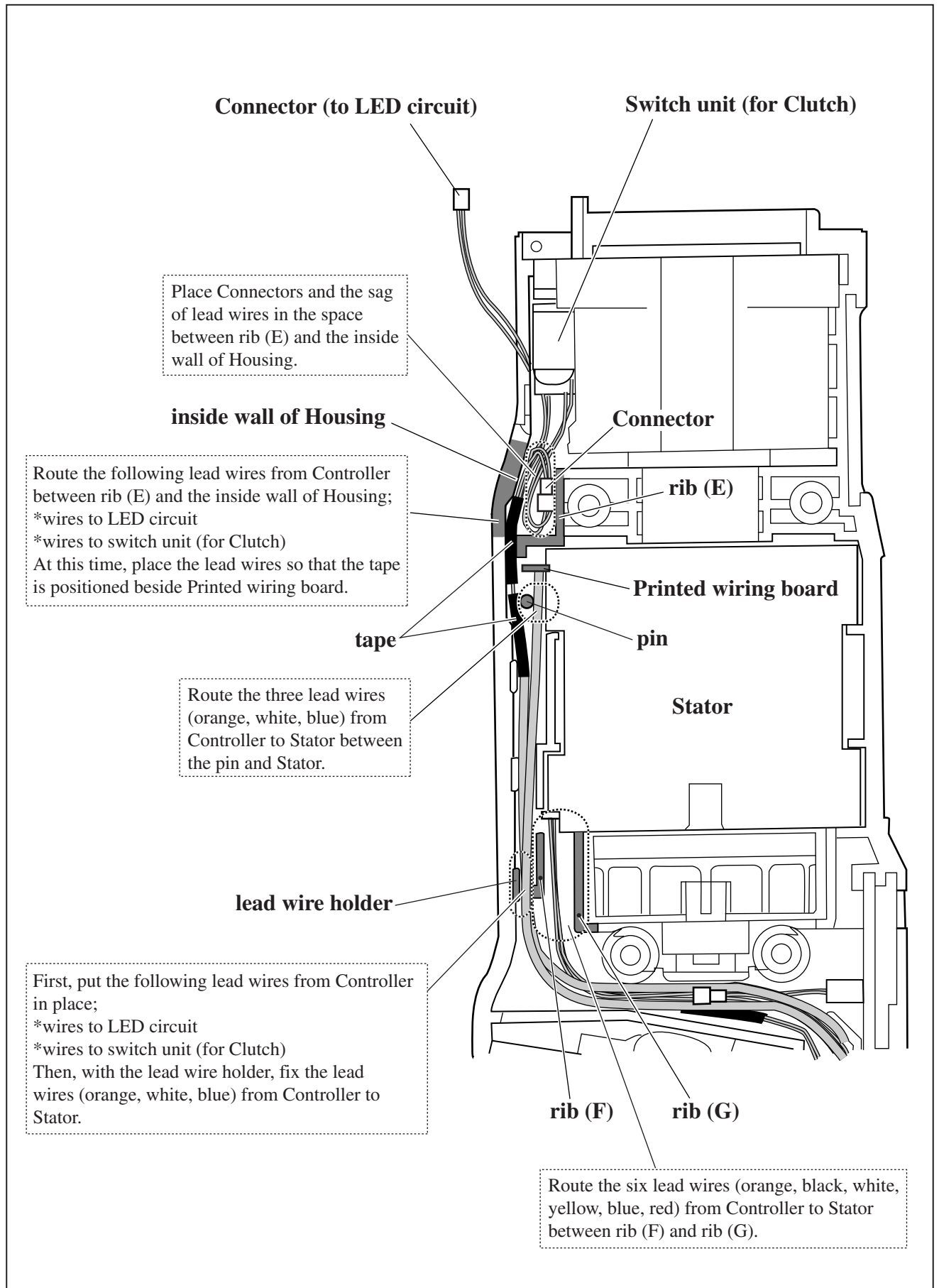
Fig. 29



► **Wiring diagram**

[2] **Wiring Around Stator**

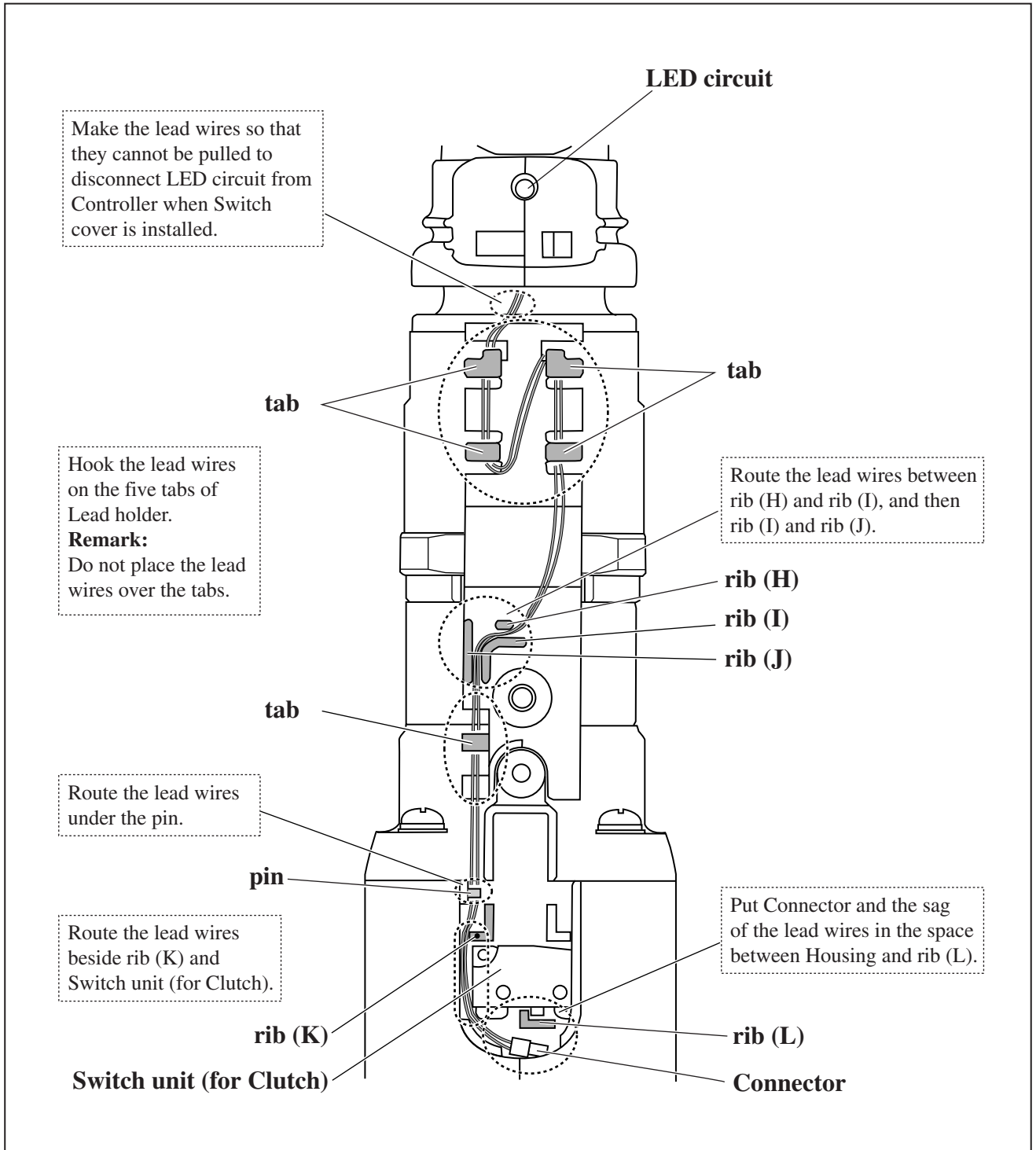
Fig. 30



► **Wiring diagram**

[3] Wiring the Lead Wires from LED Circuit on Lead Holder

Fig. 31



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