

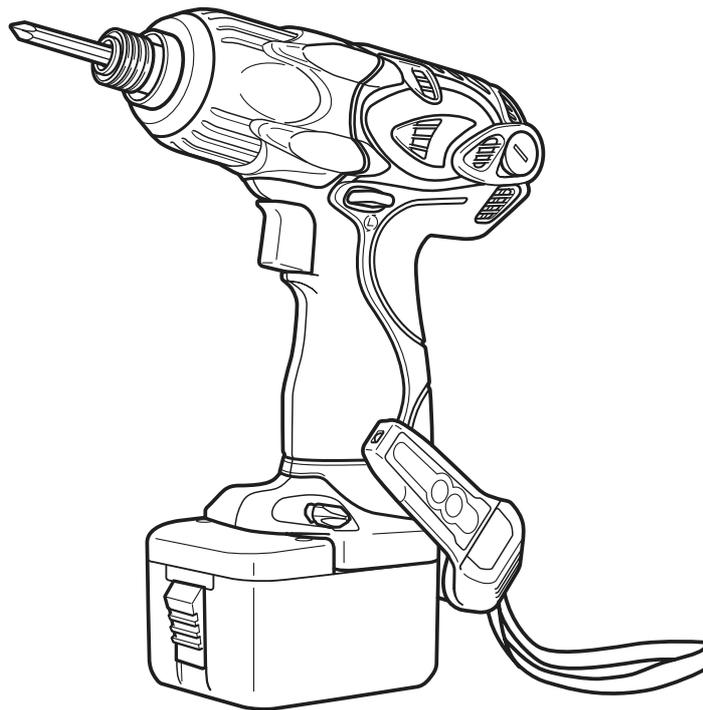
MODEL

WP 12DM

Hitachi Power Tools

**CORDLESS OIL PULSE DRIVER
WP 12DM**

**TECHNICAL DATA
AND
SERVICE MANUAL**



LIST No. G803

Mar. 2004

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

W

REMARK:

Throughout this TECHNICAL DATA AND SERVICE MANUAL, a symbol(s) is(are) used in the place of company name(s) and model name(s) of our competitor(s). The symbol(s) utilized here is(are) as follows:

| Symbol Utilized | Competitor | |
|-----------------|--------------|------------|
| | Company Name | Model Name |
| C | MAKITA | 6960D |
| P | MATSUSHITA | EZ6609 |
| | | |

Note: The above two competitors marketed only in Japan are mentioned for reference because there is no competitor for the Model WP 12DM in the destined countries overseas.

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1. PRODUCT NAME

Hitachi Cordless Oil Pulse Driver, Model WP 12DM

2. MARKETING OBJECTIVE

Recently, there is an increasing demand for quiet impact drivers as impact drivers are becoming popular in the market. To meet the market demand, we bring out the new cordless oil pulse driver. The new Model WP 12DM greatly reduces striking noise thanks to the adoption of the hydraulic unit that generates pressure using oil viscosity. With the introduction of the Model WP 12DM, we aim to make the cordless impact series more competitive.

3. APPLICATIONS

- Tightening/loosening of wood screws [Designed for driving wood screws]

<Applicable market>

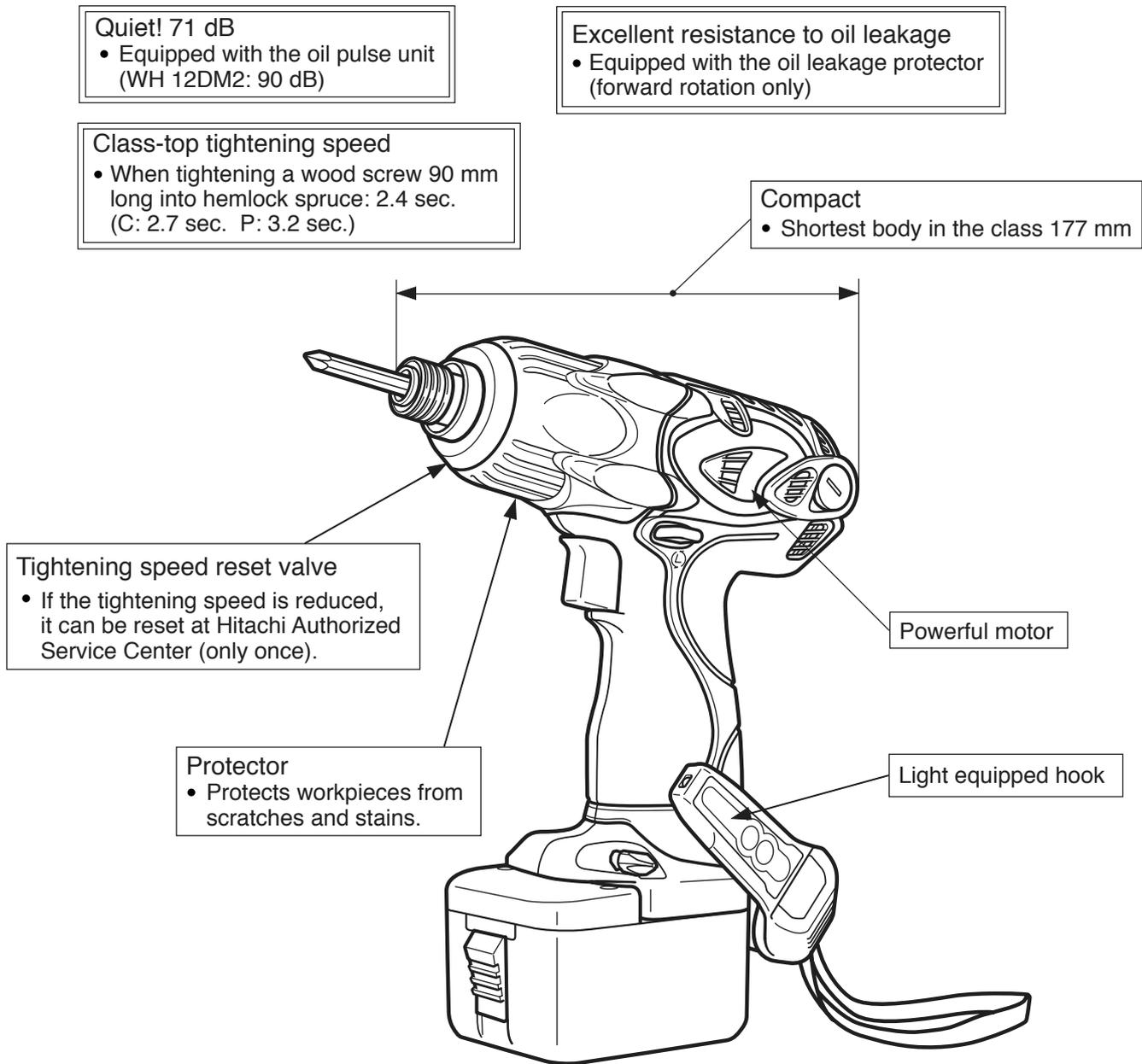
- Wooden building industry: Tightening/loosening of wood screws

Do not use the Model WP 12DM for driving bolts. Otherwise, the Model WP 12DM will be damaged.

4. STANDARD EQUIPMENT

- (1) BLFK specification: One EB 1220BL battery (NiCad, capacity 2.0 Ah), UC 14YFA charger and case
- (2) 2BLFK specification: Two EB 1220BL batteries (NiCad, capacity 2.0 Ah), UC 14YFA charger and case
- (3) HLFK specification: One EB 1230HL battery (NiMH, capacity 3.0 Ah), UC 14YFA charger and case
- (4) 2HLFK specification: Two EB 1230HL batteries (NiMH, capacity 3.0 Ah), UC 14YFA charger and case

5. SELLING POINTS



5-1. Selling Point Descriptions

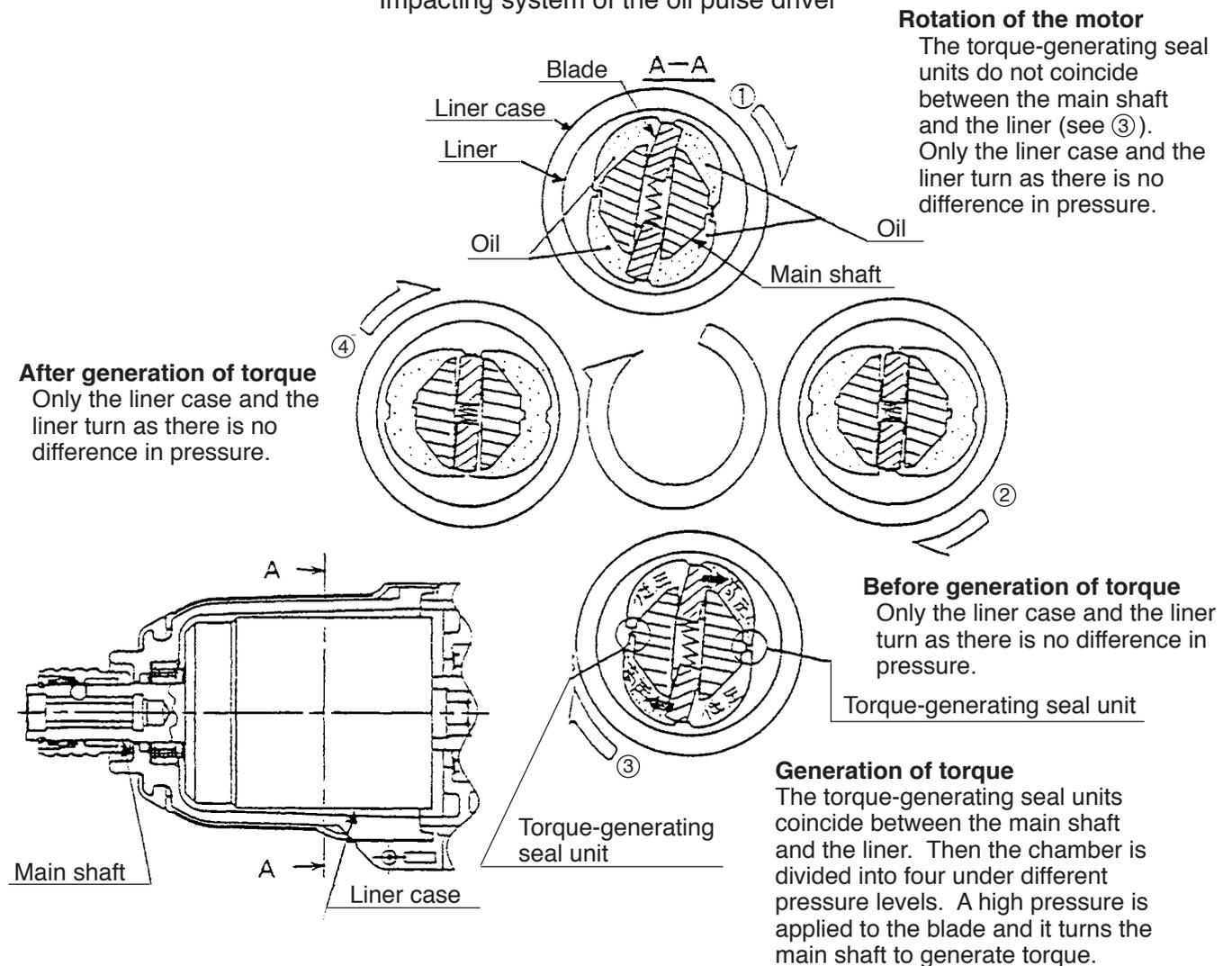
(1) Quiet operation

While the impacting system of the conventional impact drivers utilizes the force generated by impacting iron pieces each other, the oil pulse driver tightens screws utilizing the high oil pressure in the oil pulse unit (hydraulic unit) increased by the rotation of the motor. The impacting noise of the Model WP 12DM is substantially lower than that of the conventional impact driver as there is no need to impact iron pieces.

When tightening wood screws 4.2 mm in diameter and 90 mm in length into cedar:

| Noise level | | (dB) | | | | |
|---------------|----------|------|----|----|----|-----|
| Maker · Model | | 60 | 70 | 80 | 90 | 100 |
| HITACHI | WP 12DM | | | | | 71 |
| | C | | | | | 72 |
| | P | | | | | 78 |
| HITACHI | WH 12DM2 | | | | | 90 |

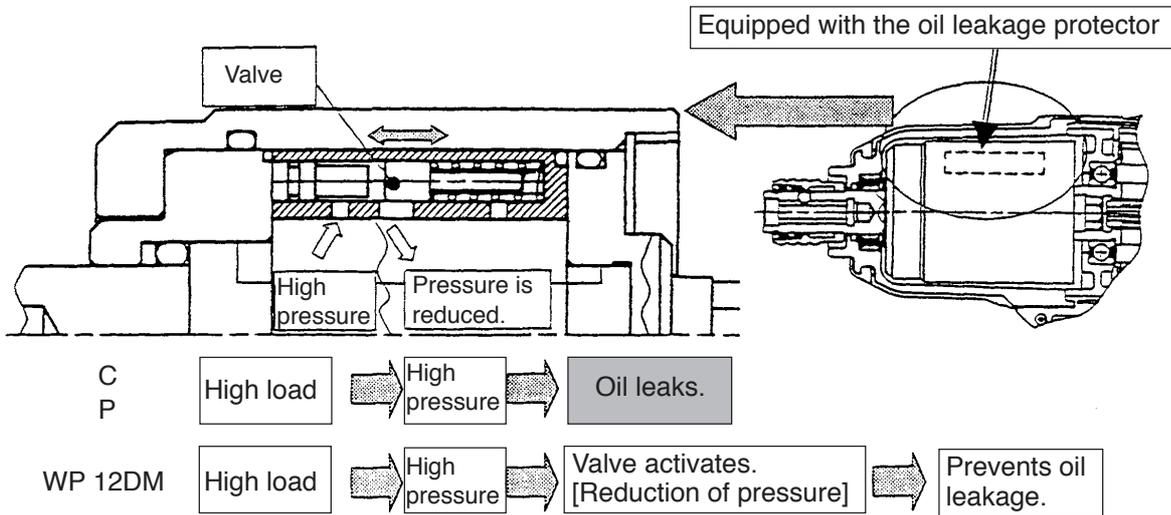
Impacting system of the oil pulse driver



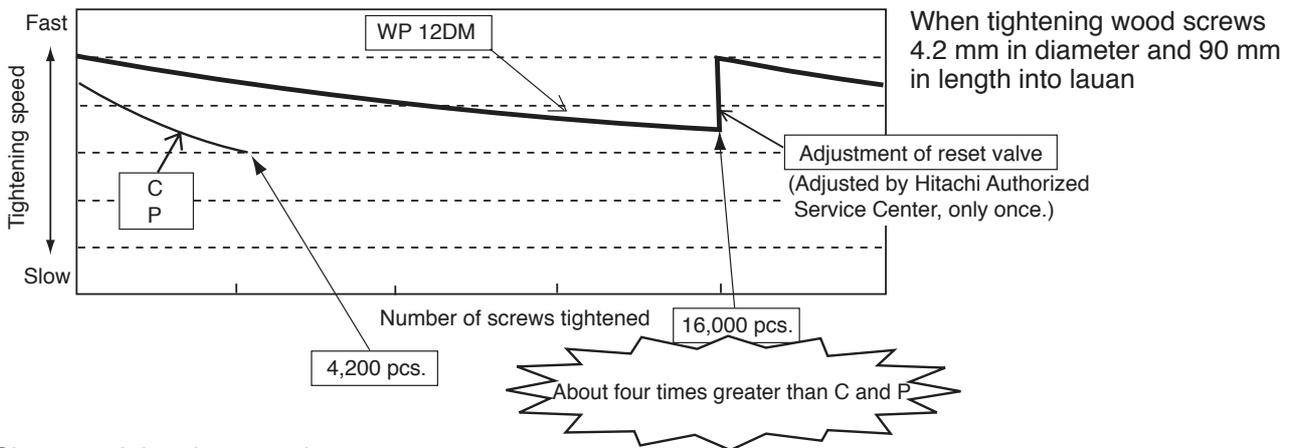
This system generates a torque per rotation (that is, it impacts once per rotation) as shown in ①, ②, ③ and ④.

(2) Resistance to oil leakage

The Model WP 12DM is equipped with the oil leakage protector (forward rotation only) in the oil pulse unit to reduce oil leakage. Even if a high pressure is generated by contacting a knot in the workpiece during screw tightening, the valve shown below activates and forcefully reduces the pressure to prevent oil leakage. As the tightening torque becomes low during screw tightening, it takes a little longer time to tighten screws because the pressure is forcefully reduced when contacting a knot in the workpiece.



• Comparison of resistance to oil leakage [When tightening wood screws]



(3) Class-top tightening speed

The Model WP 12DM is equipped with the same rare-earth magnet motor as the Model WH 12DM2.

In addition, the timing of pressure (torque) generation in the oil pulse unit is optimized. Thus the tightening speed of the Model WP 12DM is 10% higher than C and 30% higher than P.

Following table shows the time comparison when tightening a wood screw 4.2 mm in diameter and 90 mm in length into hemlock spruce. Note that tightening time may vary depending on hardness of the workpiece, ambient temperature, characteristics of the battery, etc.

| Maker · Model | Tightening time (When tightening a wood screw 4.2 mm in diameter and 90 mm in length into hemlock spruce) | | | | | | |
|-----------------|---|--------|----------|---|---|--------|---|
| | 1 | Fast 2 | 3 | 4 | 5 | Slow 6 | 7 |
| HITACHI WP 12DM | [Bar chart] | | 2.4 sec. | | | | |
| C | [Bar chart] | | 2.7 sec. | | | | |
| P | [Bar chart] | | 3.2 sec. | | | | |

6. SPECIFICATIONS

6-1. Specifications

| Item | Model | Cordless oil pulse driver WP 12DM |
|-----------------------------|-----------|---|
| Capacity | | 3.5 mm dia. – 9.5 mm dia. (Wood screw) |
| Tip condition | | 6.35 mm (1/4") Bit holder |
| Type of motor | | Fan cooled rare-earth magnet motor |
| Enclosure | | Main body: Polyamide resin + elastomer Housing Aluminum alloy die casting Hammer case Polypropylene Protector Storage battery: ABS resin (black) Charger: ABS resin (black) |
| Type of switch | | Trigger switch with forward/reverse changeover pushing button (with brake) |
| Handle configuration | | T-type |
| No-load rotational speed | | 0 – 2,300/min |
| Impact rate | | 0 – 1,500/min |
| Weight | Main body | 1.9 kg (4.2 lbs.) (Includes battery)*1 |
| | Battery | 0.68 kg (1.5 lbs.) |
| Overall length x height | | 177 mm (6-31/32") x 228 mm (8-31/32") |
| Center height | | 26.5 mm (1-3/64") |
| Battery (Type EB 1220BL) | | Sealed cylindrical nickel-cadmium batteries Nominal voltage: DC 12V Nominal life: Charging/discharging approximately 1,000 cycles (in the case of Model UC 14YFA) Nominal capacity: 2.0 Ah |
| Battery (Type EB 1230HL) | | Sealed cylindrical nickel-metal hydride batteries Nominal voltage: DC 12V Nominal life: Charging/discharging approximately 500 cycles (in the case of Model UC 14YFA) Nominal capacity: 3.0 Ah |
| Charger (For UC 14YFA) | | Charger power source: single-phase AC, 50/60 Hz Voltage: Depending on the order specification Power input: 56 W Charging system: Constant current charge with feedback control Overcharge protection system: (1) Battery voltage detection (Δ^2V system) Battery temperature detection (dT/dt system) for Ni-MH battery (2) Battery surface temperature detection (thermistor) (3) 120-minute timer Output voltage: 7.2 V – 14.4 V Output current: 2.6 A Charging time: Approx. 50 minutes (for BL-type storage battery at 20 °C) Approx. 70 minutes (for HL-type storage battery at 20 °C) Product weight: 0.6 kg Operable ambient temperature range: 0 °C – 40 °C The maximum allowable temperature of the EB 1220BL type battery is 55 °C and the EB 1230HL type battery is 45 °C. |

*1: The main body does not include accessory tools (hexagonal bit etc.).

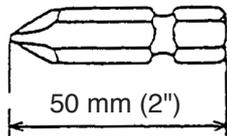
Pilot lamp indications (Model UC 14YFA)

| | | | | |
|--|--------------------------|----------|--|--|
| Red pilot lamp remains lit or flashes. | Prior to charging | Blinks | 0.5 sec ON, 0.5 sec OFF ■ ■ ■ ■ ■ | |
| | During charging | Lit | Stays ON constantly ■■■■■■■■■■ | |
| | Charging completed | Blinks | 0.5 sec ON, 0.5 sec OFF ■ ■ ■ ■ ■ | |
| | Charging not possible | Flickers | 0.1 sec ON, 0.1 sec OFF ■ ■ ■ ■ ■ ■ ■ ■ | Storage battery or charger is faulty. |
| Green pilot lamp is lit. | High battery temperature | Lit | Stays ON constantly ■■■■■■■■■■ | Charging not possible because storage battery temperature is too high. |

6-2. Optional Accessories

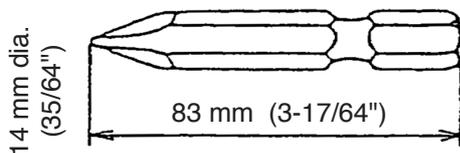
(1) Optional accessories for the Model WH 12DM2

- Plus driver bit



| Bit No. | Code No. |
|---------|----------|
| No. 2 | 992671 |
| No. 3 | 992672 |

- Woodworking drill bit (Code No. 959183)



7. COMPARISONS WITH SIMILAR PRODUCTS

7-1. Specification Comparisons

| Item | | Maker | | HITACHI | C | P | HITACHI |
|--------------------------|------------------------------|---------------|---|---|---|---|------------------------------------|
| | | Model | | WP 12DM | | | WH 12DM2 |
| Catalog specifications | Capacity | Small screw | | — | — | — | *1 M4 – M8 (5/32" – 5/16") |
| | | Ordinary bolt | | — | — | — | M5 – M12 (3/16" – 15/32") |
| | | Wood screw | | 3.5 mm dia. – 9.5 mm dia. (9/64" – 3/8") | 3.5 mm dia. – 9.5 mm dia. (9/64" – 3/8") | 3.5 mm dia. – 9.5 mm dia. (9/64" – 3/8") | — |
| | Max. tightening torque | | N·m | — | 29.4 (300 kgf·cm, 260 in-lbs.) | 32.4 (330 kgf·cm, 290 in-lbs.) | 120 (1220 kgf·cm, 1060 in-lbs.) |
| | No-load rotation speed | | /min | 0 – 2,300 | 0 – 2,500 | 0 – 2,200 | 0 – 2,600 |
| Impact rate | | /min | 0 – 1,500 | 0 – 1,600 | 0 – 1,500 | 0 – 3,200 | |
| Main body weight | | kg | 1.9 (4.2 lbs.) | 1.8 (4.0 lbs.) | 1.85 (4.1 lbs.) | 1.6 (3.5 lbs.) | |
| Measured figures | *2 Max. tightening torque | | N·m | 23.7 (240 kgf·cm, 210 in-lbs.) | 30.8 (310 kgf·cm, 270 in-lbs.) | 33.7 (340 kgf·cm, 300 in-lbs.) | 122 (1250 kgf·cm, 1080 in-lbs.) |
| | No-load rotation speed | | /min | 0 – 2,280 | 0 – 2,550 | 0 – 2,220 | 0 – 2,600 |
| | Impact rate | | /min | 0 – 1,590 | 0 – 1,620 | 0 – 1,260 | 0 – 2,920 |
| | Overall length x height | | mm | 177 x 228 | 195 x 232 | 178 x 219 | 155 x 228 |
| | Center height | | mm | 26.5 | 26 | 28 | 26.5 |
| | Main body weight | | kg | 1.91 (4.2 lbs.) | 1.76 (3.9 lbs.) | 1.88 (4.1 lbs.) | 1.67 (3.7 lbs.) |
| | No-load sound pressure level | | dB(A) | 68 | 66 | 65 | 70 |
| Tool tip mounting system | | | Driver chuck | Driver chuck | Driver chuck | Driver chuck | |
| Type of switch | | | Variable speed switch with forward/reverse changeover lever | |
| Type of motor | | | DC magnet | DC magnet | DC magnet | DC magnet | |
| Battery | Type | | EB 1220BL or EB 1230HL | 1233S | EZ9200 | EB 1220BL or EB 1230HL | |
| | Nominal capacity | Ah | EB 1220BL: 2.0 EB 1230HL: 3.0 | 2.2 | 3.0 | EB 1220BL: 2.0 EB 1230HL: 3.0 | |
| | Nominal voltage | V | 12 | 12 | 12 | 12 | |
| | Ambient temperature | °C | 0 – 40 | — | — | 0 – 40 | |
| Charger | Model | | UC 14YFA | DC 1439 | EZ0208 | UC 14YF2 or UC 14YFA | |
| | Power input capacity | VA | 44 | — | — | 44 | |
| | Recharging voltage | V | 7.2 – 14.4 | 7.2 – 14.4 | 7.2 – 14.4 | 7.2 – 14.4 | |

*1: In the case of tapping screws and wood screws, a minimum of M3 (1/8") is possible.

*2: WH 12DM2: Max. tightening torque is based on tightening an M14 (9/16") bolt (strength grade: 12.9) for 3 seconds with a hexagon socket.

WP 12DM, C and P: When tightening with a torque tester for one second

7-3. Number of Screws Driven

7-3-1. Per-charge working capacity comparisons

Test data on the number of screws which can be driven per battery charge by the new models vs. the previous models are shown in the tables below. Please note that the data below are intended for general reference only as the number of screws which can be tightened per charge will vary slightly depending on screw tightening conditions, screw sizes, ambient temperatures and the charging capacity of the battery.

Number of screws

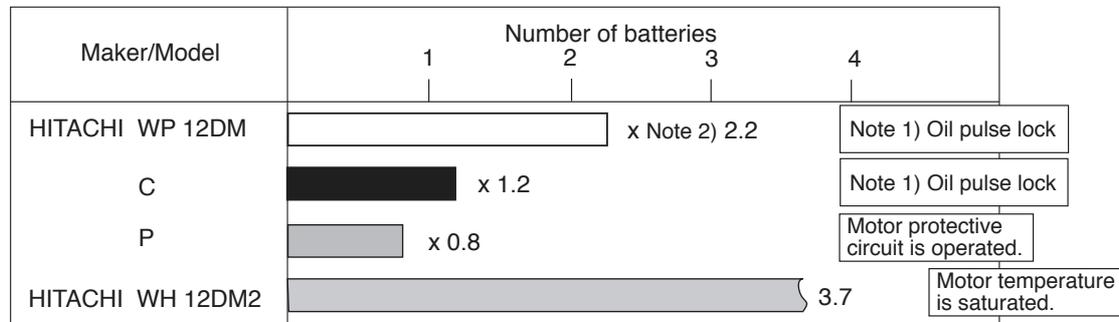
| Tightening condition | Model | HITACHI WP 12DM | C | P | HITACHI WH 12DM2 |
|---|-------|-----------------|--------------------------------------|--|------------------|
| Battery | | EB 1230HL | 1235 (Corresponding EB 1230HL) | EZ9200 (Corresponding EB 1230HL) | EB 1230HL |
| Wood screw 4.0 mm dia. x 50 mm (hard wood) | | 440 | 440 | 425 | 490 |
| Wood screw 4.2 mm dia. x 75 mm (hard wood) | | 235 | 235 | 235 | 260 |
| Wood screw 4.2 mm dia. x 90 mm (hard wood) | | 130 | 130 | 130 | 140 |
| Wood screw 5.3 mm dia. x 120 mm (hard wood) | | 50 | 50 | 50 | 55 |

7-4. Continuous Use Durability

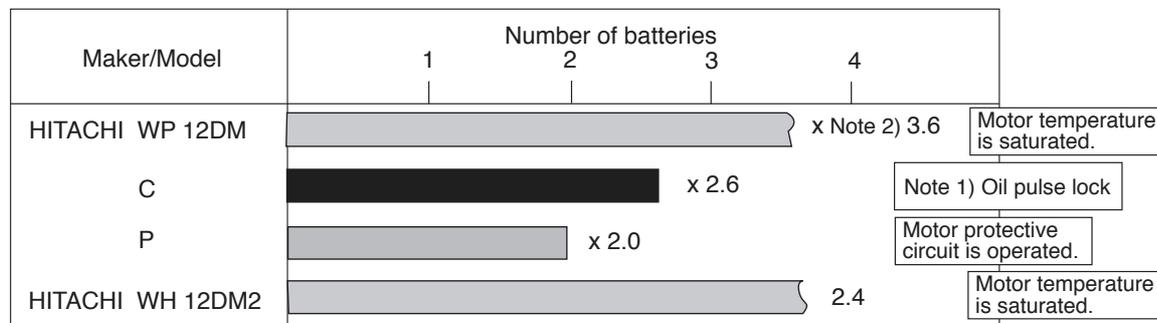
Following table shows the comparison of continuous use durability with C and P.

The data below are intended for reference purposes only because actual continuous use durability may vary depending on whether the workpiece has knots or not, hardness of the workpiece by the moisture content, ambient temperature, characteristics of the battery, etc.

① Wood screws 5.3 mm in diameter and 20 mm in length, lauan



② Wood screws 4.2 mm in diameter and 90 mm in length, lauan



Note 1) Oil pulse lock: If the temperature of the oil pulse unit becomes high, the internal pressure suddenly rises temporarily. "Oil pulse lock" means the state that the oil pulse unit is locked (like a drill) by the above phenomenon.

Note 2) Note that the above continuous use of 2.2 and 3.6 batteries is only for comparison of durability. Do not use more than two batteries for continuous operation. Otherwise, the oil pulse unit and the motor may be damaged.

8. PRECAUTIONS IN SALES PROMOTION

8-1. Safety Instructions

In the interest of promoting the safest and most efficient use of these tools by all our customers, it is very important that at the time of sale the salesperson carefully ensures that the buyer seriously recognizes the importance of the contents of the Handling Instructions, and fully understands the meaning of the precautions listed on the Caution Plate and Name Plate attached to each tool.

A. Handling Instructions

Salespersons must be thoroughly familiar with the contents of the Handling Instructions in order to give pertinent advice to the customer. In particular, they must have a thorough understanding of the precautions in the use of the cordless (battery charger type) electric power tools which are different from those of ordinary electric power tools.

- (1) Before use, ensure that the unit is fully charged.

New units are not fully charged. Even if the units were fully charged at the factory, long periods without use, such as during shipping, cause the storage battery to lose its charge. Customers must be instructed to fully charge the unit prior to use.

- (2) When charging storage batteries, use only the exclusive Model UC 14YFA Charger provided with the tool.

Because of the designed rapid-charging feature (UC 14YFA: Approx. 50 min.), use of other battery chargers is hazardous.

- (3) Follow prescribed steps in using the charger.

First connect the EB 1220BL Storage Battery to the Model UC 14YFA Charger, then plug the charger into an AC outlet (ensuring that the voltage matches that indicated on the unit). If this order is reversed, the charger may not function properly.

- (4) Ensure the power source voltage is the same as that indicated on the Name Plate of the charger. Use of any other power source (DC outlet, fuel powered generator, etc.) will cause the charger to overheat and burn out.

- (5) Do not use any voltage increasing equipment (transformer etc.) between the power source and the charger.

If the charger is used with voltage over and above that indicated on the unit, it will not function properly.

- (6) Conduct battery charging at an ambient temperature range of 0 °C – 40 °C (32 °F – 104 °F).

Special temperature sensitive devices are employed in the charger to permit rapid charging. Ensure that customers are instructed to use the charger at the indicated ambient temperature range. At temperatures under 0 °C (32 °F), the thermostat will not function properly, and the storage battery may be over-charged. At temperatures over 40 °C (104 °F), the storage battery cannot be sufficiently charged. The optimum temperature range is 20 °C – 25 °C (68 °F – 77 °F).

- (7) The battery charger should not be used continuously.

At high ambient temperatures, if over three storage batteries are charged in succession, the temperature of the coils on the transformer will rise and there is a chance that the temperature fuse inserted in the interior of the transformer will inadvertently melt. After charging one battery, please charge the next battery after about a fifteen-minute interval.

- (8) The charger case is equipped with air vents to protect the internal electronic components from overheating.

Caution the customer not to allow foreign materials, such as metallic or flammable objects, to be dropped or inserted into the air vents. This could cause electric shock, fire or other serious hazards.

(9) Do not attempt to disassemble the storage battery or the charger.

Special devices, such as a thermostat, are built into the storage battery and charger to permit rapid charging. Incorrect parts replacement and/or wiring will cause malfunctions which could result in fire or other hazards. Instruct the customer to bring these units to an authorized service center in the event repair or replacement is necessary.

(10) Disposal of the Type EB 1220BL or EB 1230HL Storage Battery

Ensure that all customers understand that Type EB 1220BL or EB 1230HL Storage Batteries should be turned into any Hitachi power tool sales outlet or authorized service center when they are no longer capable of being recharged or repaired. If thrown into a fire, the batteries may explode, or if discarded indiscriminately, leakage of the cadmium compound contained in the battery may cause environmental pollution.

B. Caution Plates

(1) The following precautions are listed on the Name Plate or Caution Plate attached to the main body of each tool.

For the U.S.A. (excludes French) or Canada

WARNING

- To reduce the risk of injury, user must read and understand Instruction Manual.

AVERTISSEMENT

- Afin de réduire le risque de blessures, l'utilisateur doit lire et bien comprendre le mode d'emploi.

For Oceania

CAUTION

- Read thoroughly HANDLING INSTRUCTIONS before use.

(2) The following cautions are listed on the Name Plate attached to each type EB 1220BL or EB 1230HL storage battery.

For Europe

- CAUTION**
- Read thoroughly HANDLING INSTRUCTIONS before use.
 - Do not disassemble nor throw into fire.

For the U.S.A.

CAUTION

- For safe operation, see Instruction Manual.
- Use HITACHI charger UC 12Y, -14Y, -24Y series for recharging.

(3) The following caution is listed on the Name Plate attached to the Model UC 14YFA Charger.

For the U.S.A.

CAUTION

- For safe operation, see Instruction Manual.
- Charge HITACHI rechargeable batteries Type EB 7, EB 9, EB 12 and EB 14 series. Other types of batteries may burst causing personal injury and damage.
- Charge between 32 and 104 °F.
- Indoor use only.
- Replace defective cord immediately.

C. Caution in using the oil pulse driver

(1) Avoid using the tool below temperature of -5°C. Otherwise, the motor may be damaged because no torque may be generated even when it is switched on, or the tool may be overloaded by extremely low torque.

Following table shows the comparison of continuous use durability with C and P under various operating temperatures. The data below are intended for reference purposes only because actual continuous use durability may vary depending on whether the workpiece has knots or not, hardness of the workpiece by the moisture content, ambient temperature, characteristics of the battery, etc.

Measuring conditions: When tightening wood screws 5.3 mm in diameter and 120 mm in length into hemlock spruce

| Operating ambient temperature: 20°C Maker/Model | | Number of screws tightened | | | | |
|---|---|----------------------------|----|----|-----|---------------------------------------|
| | | 25 | 50 | 75 | 100 | |
| HITACHI WP 12DM | | x Note 2) 99 | | | | Note 1) Oil pulse lock |
| | C | x 57 | | | | Note 1) Oil pulse lock |
| | P | x 41 | | | | Motor protective circuit is operated. |
| Operating ambient temperature: 5°C Maker/Model | | Number of screws tightened | | | | |
| | | 25 | 50 | 75 | 100 | |
| HITACHI WP 12DM | | x 47 | | | | Note 1) Oil pulse lock |
| □ | C | x 30 | | | | Note 1) Oil pulse lock |
| | P | x 24 | | | | Motor protective circuit is operated. |
| Operating ambient temperature: -5°C Maker/Model | | Number of screws tightened | | | | |
| | | 25 | 50 | 75 | 100 | |
| HITACHI WP 12DM | | x 47 | | | | Note 1) Oil pulse lock |
| □ | C | x 28 | | | | Motor is burnt. |
| | P | x 14 | | | | Motor protective circuit is operated. |
| Operating ambient temperature: -10°C Maker/Model | | Number of screws tightened | | | | |
| | | 25 | 50 | 75 | 100 | |
| HITACHI WP 12DM | | x 4 | | | | Motor is burnt. |
| □ | C | x 3 | | | | Motor is burnt. |
| | P | x 4 | | | | Motor protective circuit is operated. |

Note 1) Oil pulse lock: If the temperature of the oil pulse unit becomes high, the internal pressure suddenly rises temporarily. "Oil pulse lock" means the state that the oil pulse unit is locked (like a drill) by the above phenomenon.

Note 2) Note that the above continuous use of 2.2 batteries is only for comparison of durability. Do not use more than two batteries for continuous operation. Otherwise, the oil pulse unit and the motor may be damaged. If the tool is used at temperature below -5°C, the viscosity of the oil becomes extremely high and the impact rate is reduced which can lead to the motor being overloaded. If such operation is continued forcedly, the motor is burnt as shown in the above data of "-10°C" case. Avoid using the tool below temperature of -5°C.

(2) Do not use more than two batteries for continuous operation. If the tool is operated continuously so that it becomes excessively hot due to nonstop operation, the torque will abruptly increase making it difficult to tighten the screws. If this situation occurs, shut the tool off and let it rest for a half an hour or more.

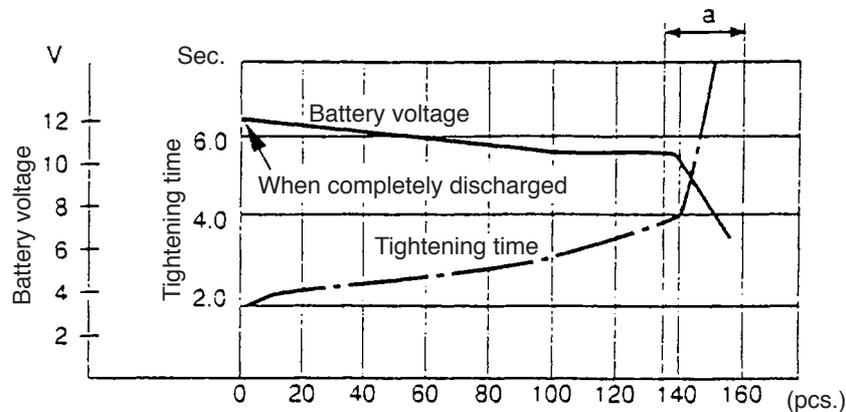
8-2. Decrease of Tightening Torque

The tightening speed of the oil pulse driver may vary depending on the factors described below.

(1) Voltage of battery

The tightening time is affected by the voltage output of the battery. For example, the following graph shows the relationship between the tightening time and the number of wood screws (4.2 mm in diameter and 90 mm in length) tightened when using the EB 1230HL battery. As can be seen in the graph, the tightening time gradually increases as the number of screws tightened increases. In particular, the tightening time increases rapidly just before the battery is completely discharged (range "a" in the graph).

When tightening wood screws 4.2 mm in diameter and 90 mm in length into hemlock spruce



Number of screws tightened per charge (When using the EB 1230HL battery)

Note that the characteristics shown above may vary depending on screw sizes, materials of workpieces, etc.

(2) Effects of low ambient temperatures

If the Model WP 12DM is left under low temperature conditions for a long time, the temperature of the Model WP 12DM decreases and the viscosity of the oil becomes extremely low. It causes come-out (a phenomenon that the bit comes off the screw head) more frequently than that caused under normal temperature (20°C) conditions. In addition, the tightening time may be longer due to the increase of the torque loss in the oil pulse unit.

(3) Different materials being tightened

The tightening speed may widely vary depending on materials of workpieces, whether the workpiece has knots or not, moisture contents, etc.

8-3. Suggestions and Precautions for the Efficient Use of the Charger

(1) Batteries may not be rechargeable immediately after use

If the Models EB 1220BL and EB 1230HL Storage Batteries are exposed to direct sunshine for an extended period, or if the temperature of the batteries is 40 °C (104 °F) or higher immediately after they have been used in the tool, the pilot lamp may not light up when the batteries are connected to the Model UC 14YFA Charger.

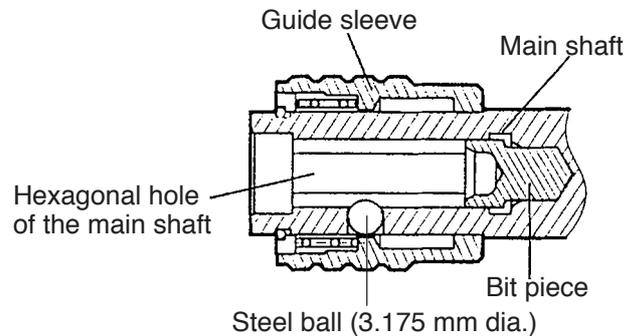
This is because the built-in thermostat functions to stop the charging when the temperature of the storage batteries reach 40 °C (104 °F) or more. In such a case, the customer should be advised to place the batteries in a shaded area with a good airflow, and allow sufficient cooling before recharging.

This phenomenon is common to all existing batteries which employ temperature sensitive overcharge devices. The cooling time required before charging can be accomplished varies from a few minutes to about 30 minutes, depending on the load, duration of use, and ambient temperature.

9. OTHER PRECAUTIONS

(1) Mounting the bit

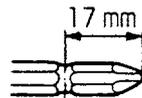
Before mounting the bit to the main body, check that the bit piece is in the hexagonal hole of the main shaft. If not, the guide sleeve and the steel ball (3.175 mm dia.) may wear out, and the bit may come off during operation or may not be removed after operation.



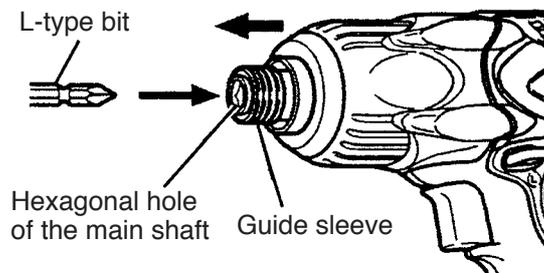
Checking the presence or absence of the bit piece

Before operation, check whether the bit piece is in the hexagonal hole of the main shaft or not according to the following procedure:

1. Prepare the L-type bit.



2. Slide the guide sleeve to the front end and insert the L-type bit into the hexagonal hole of the main shaft as far as it will go, then release the guide sleeve.



3. Pull the L-type bit forward. If the bit is pulled out, the bit piece is mounted. If not, the bit piece is not mounted. Be sure to mount the bit piece.

(2) Hammering section lubrication

Grease (Molub-Alloy 777-1) is utilized in the hammering section. Frequent or continuous use of the tool will cause excessive temperature rise of the hammering section, resulting in depletion of the grease and subsequent increased wear of components which will, in turn, cause loss of tightening efficiency. Accordingly, it is necessary to periodically replenish the grease in the hammering section to ensure proper lubrication of moving and sliding components.

10. REPAIR GUIDE

WARNING: Without fail, remove the battery (EB 1220BL or EB 1230HL) from the main body before starting repair or maintenance work. Because the tool is cordless, if the battery is left in and the switch is activated inadvertently, the motor will start rotating unexpectedly, which could cause serious injury.

10-1. Repair Procedures

To repair the Model WP 12DM whose screw tightening speed is decreased

To repair the Model WP 12DM having a problem other than decrease in screw tightening speed

Perform repair according to the following procedure.

Go to section 10-2.

| Item | Flow of repair |
|--|--|
| <p>Check the motor and other parts for abnormality.</p> | <div style="border: 1px solid black; padding: 5px;"> <p>Set an ammeter as shown in Fig. 1. Operate the Model WP 12DM on a fully charged DC 12 V battery to measure the following. Check: No-load current ... 4.0 A to 6.0 A No-load speed ... 2,070 min⁻¹ to 2,530 min⁻¹</p> </div> <p style="text-align: center;">OK ↓ NG ↓</p> <div style="border: 1px solid black; padding: 5px; margin-left: 150px;"> <p>Go to section 10-2. (Check and replace the faulty part.)</p> </div> |
| <p>Check the Oil Pulse Set [16] for abnormality and adjust it if abnormal.</p> | <div style="border: 1px solid black; padding: 5px;"> <p>Set an ammeter as shown in Fig. 1. Operate the Model WP 12DM on a fully charged DC 12 V battery to measure the current required for tightening five wood screws 120 mm in length into hemlock spruce. Check: Current required for tightening ... 30.0 A to 34.0 A</p> </div> <p style="text-align: center;">OK ↓ NG ↓</p> <div style="border: 1px solid black; padding: 5px; margin-left: 20px;"> <p>End</p> </div> <div style="border: 1px solid black; padding: 5px; margin-left: 150px;"> <p>Remove the Front Cap [5] as shown in Fig. 2. Aligning the output adjustment valve with the adjustment hole of the Hammer Case [9], turn it using a 1.5-mm hexagonal wrench to adjust the current for tightening screws.</p> <ul style="list-style-type: none"> ● When the current is small: Turn the output adjustment valve clockwise. ● When the current is large: Turn the output adjustment valve counterclockwise. [Table 1 shows the relationship between the turning angle of the output adjustment valve and the current for tightening screws as an index of adjustment.] </div> <p style="text-align: center;">↓</p> <div style="border: 1px solid black; padding: 5px; margin-left: 150px;"> <p>It cannot be adjusted even though the output adjustment valve is fully closed.</p> </div> <p style="text-align: center;">↓</p> <div style="border: 1px solid black; padding: 5px; margin-left: 150px;"> <p>Replace the Oil Pulse Set [16].</p> </div> |

- Measure the current for tightening screws using the ammeter shown in Fig. 1.

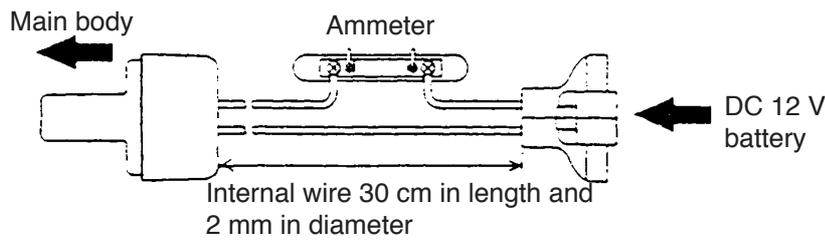
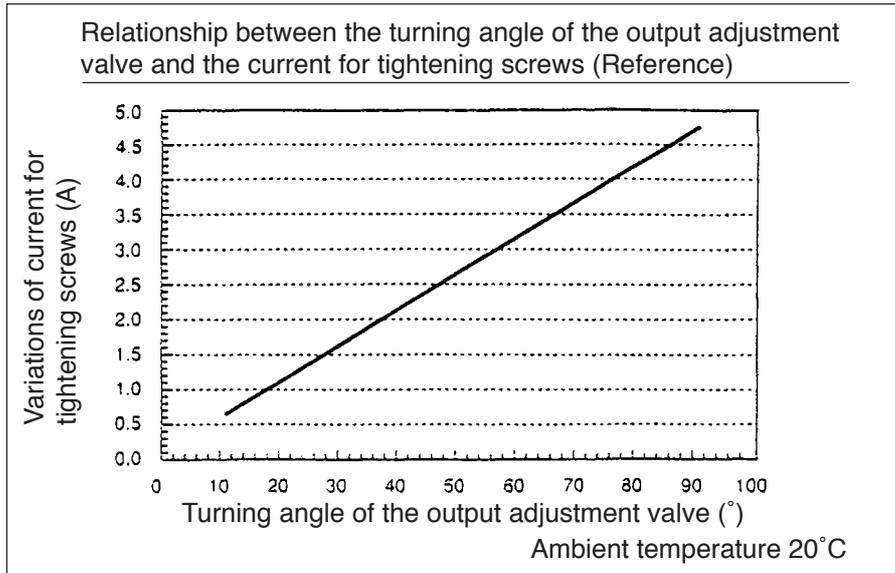


Fig. 1

Tighten five wood screws 120 mm in length into hemlock spruce to check that the current required for tightening is between 30.0 A and 34.0 A using the ammeter shown in Fig. 1.

- Table 1 shows the relationship between the turning angle of the output adjustment valve and the current for tightening screws as an index of adjustment. Figures 2 and 3 show the position of the output adjustment valve.



The current is increased by turning the output adjustment valve clockwise. The current is decreased by turning the output adjustment valve counterclockwise.

Table 1

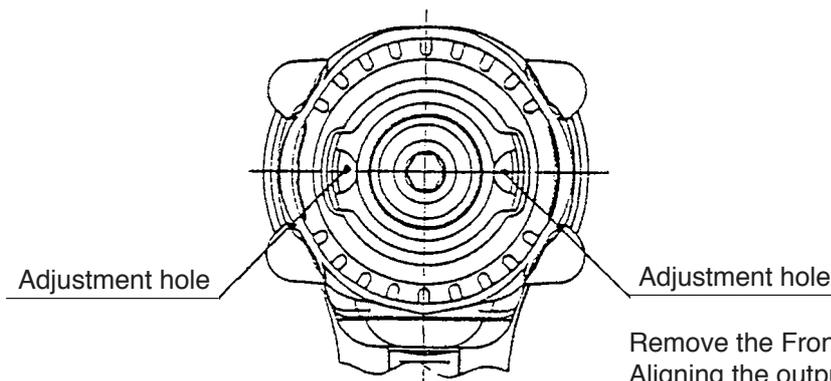


Fig. 2

Remove the Front Cap [5]. Aligning the output adjustment valve with either of the two adjustment holes of the Hammer Case [9], turn it using a 1.5-mm hexagonal wrench.

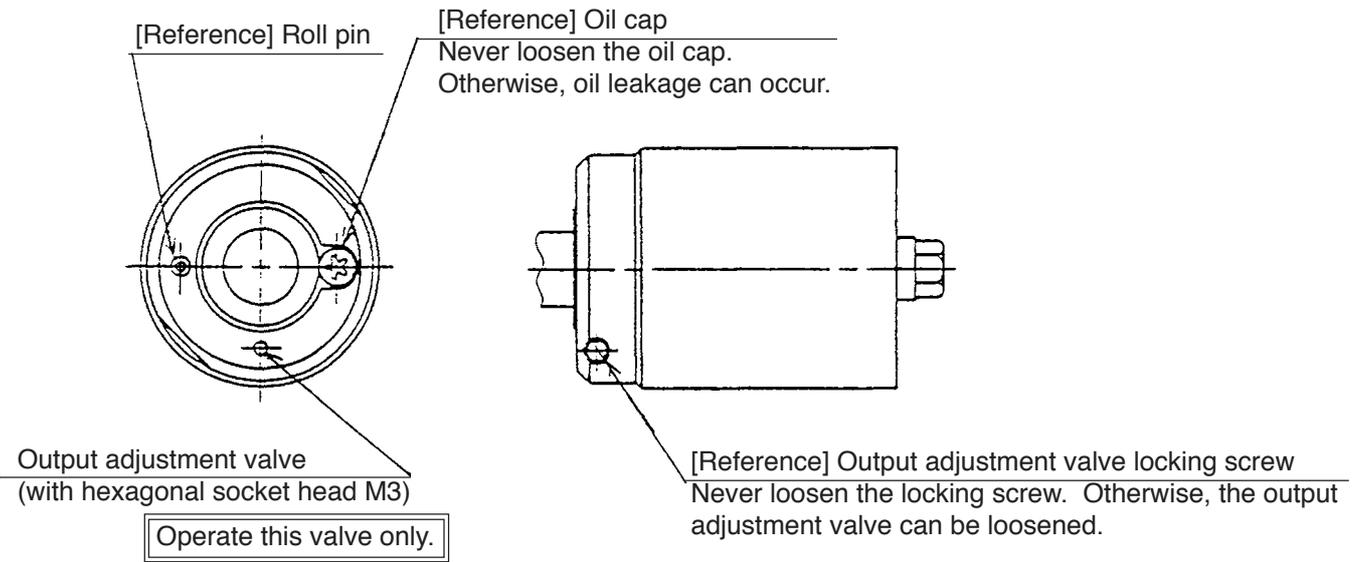


Fig. 3

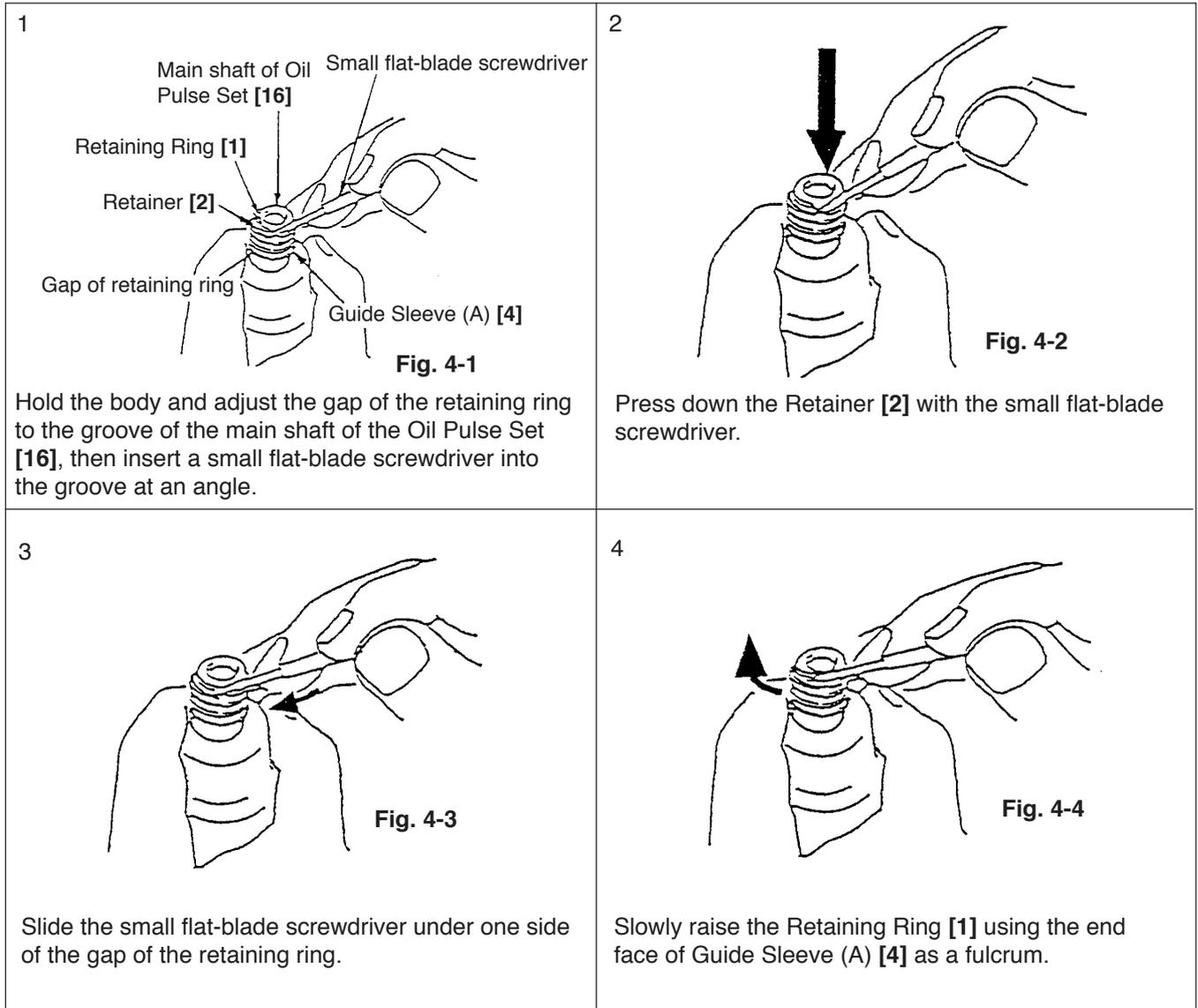
10-2. Precautions in Disassembly and Reassembly

The **[Bold]** numbers correspond to the item numbers in the Parts List and the exploded assembly diagram.

10-2-1. Disassembly

(1) Removal of Guide Sleeve (A) [4]

Remove the Retaining Ring [1], Retainer [2], Guide Spring [3], Guide Sleeve (A) [4] and Oil Pulse Set [16] in order by following the procedure shown in Figs. 4-1 to 4-4. Be sure not to lose one Steel Ball D 3.175 [15] in the main shaft hole.



Then slowly raise the other side of the retaining ring with the small flat-blade screwdriver until it is free. Avoid quickly raising the retaining ring or it may fly out forcefully.

(2) Removal of the Bit Piece [14]

Remove the Bit Piece [14] from the hexagonal hole of the main shaft facing the main shaft downward.

(Note) Be careful not to lose the removed Bit Piece [14].

(3) Removal of the Front Cap [5] and the Protector [7]

Insert a small flat-blade screwdriver between the Front Cap [5] and the Protector [7] and remove them from the Hammer Case [9].

(4) Removal of the Hammer Case [9] and the Oil Pulse Set [16]

Remove the four Tapping Screws (W/Sp. Washer) D4 x 25 (Black) [8] that connect the Hammer Case [9] with Housing (A). (B) Set [41]. Remove the Hammer Case [9] and the Oil Pulse Set [16] from Housing (A). (B) Set [41].

(5) Disassembly of the hammer assembly

The Oil Pulse Set [16] requires repair at the factory. Do not disassemble the Oil Pulse Set [16].

(6) Removal of the Hook Ass'y (W/Light) [37]

Remove the Special Screw M5 [51] with a flat-blade screwdriver or a coin and remove the Hook Ass'y (W/Light) [37] and the Hook Spring [50].

(7) Removal of the Carbon Brushes 5 x 6 x 11.5 [33]

Remove the two Brush Caps [34]. Catch the flanges of the Carbon Brushes 5 x 6 x 11.5 [33] with a flat-blade screwdriver and remove the Carbon Brushes 5 x 6 x 11.5 [33] at both sides.

(8) Removal of housing (B)

Remove the seven Tapping Screws (W/Flange) D4 x 20 (Black) [35] and the Machine Screw (W/Washers) M4 x 25 [49] from the main body. The Strap (Black) [47] and Sleeve (A) [48] can be removed by removing the Machine Screw (W/Washers) M4 x 25 [49]. Before removing housing (B), be sure to remove the Brush Caps [34] because housing (B) cannot be removed if the Brush Caps [34] are mounted.

(9) Removal of the switch

The FET of the DC-Speed Control Switch [43] is firmly inserted in the housing. Insert a small flat-blade screwdriver between the FET and housing (B) to raise and remove the FET. Then, Inner Cover (A) [27], Armature DC 12V [28], Magnet (D) [30], Brush Block [32] and DC-Speed Control Switch [43] can be removed in a piece. Pushing Button (A) [44] can also be removed.

(Note) Be careful not to break the three legs coming from the FET to avoid malfunction of the switch.

(10) Removal of the switch assembly

Remove the two Machine Screws (W/Sp. Washer) M3 x 5 [42] that secure the flag terminal and disconnect the internal wires (red and black) of the Brush Block [32] from the DC-Speed Control Switch [43].

(Note) Do not disconnect the three FET internal wires soldered to the DC-Speed Control Switch [43].

(11) Removal of Magnet (D) [30], Dust Guard Fin (A) [31] and Side Yoke [29]

Remove Magnet (D) [30] in the "B" direction (see Fig. 5) holding Inner Cover (A) [27] securely because Magnet (D) [30] has a strong magnetism. Dust Guard Fin (A) [31] and the Side Yoke [29] can be easily removed from Magnet (D) [30] by holding Magnet (D) [30] securely and pulling them in the direction of diameter because they are mounted to Magnet (D) [30] magnetically.

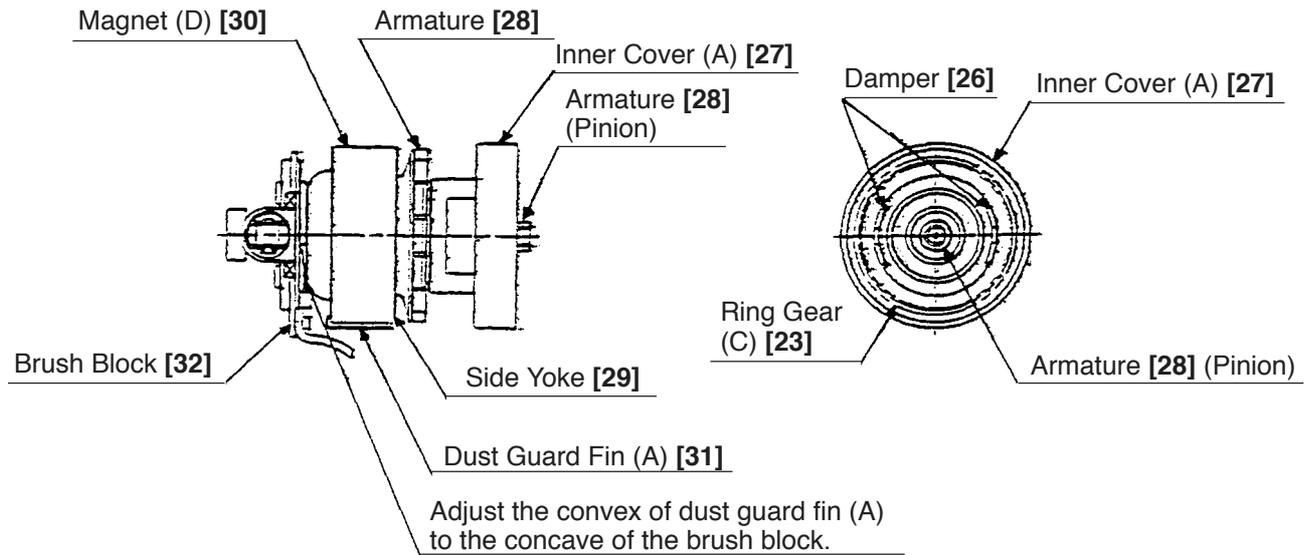


Fig. 5

(12) Removal of the Armature DC 12V [28]

Support Inner Cover (A) [27] so that it does not contact the fan of the Armature DC 12V [28]. With a hand press, push down the tip portion of the Armature DC 12V [28] to remove it.

(13) Removal of Ring Gear (C) [23] and the Damper [26]

Remove Ring Gear (C) [23] from Inner Cover (A) [27] and remove the Damper [26] with a small flat-blade screwdriver. Ring Gear (C) [23] is firmly inserted in Inner Cover (A) [27]. Insert a small flat-blade screwdriver between Ring Gear (C) [23] and Inner Cover (A) [27] to remove Ring Gear (C) [23]. Remove the Damper [26] with a small flat-blade screwdriver.

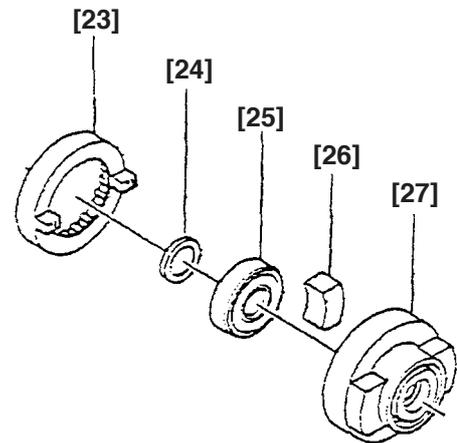


Fig. 6

10-2-2. Reassembly

Reassembly can be accomplished by following the disassembly procedures in reverse. However, special attention should be given to the following items.

(1) Reassembly of the housing assembly

- (a) Be sure to follow the wiring diagram (Fig. 7) for proper wiring.
- (b) When connecting the internal wires of the Brush Block [32] to the DC-Speed Control Switch [43], fasten them with the Machine Screws (W/Sp. Washer) M3 x 5 [42] paying attention to the direction of the flag terminal (Fig. 7).

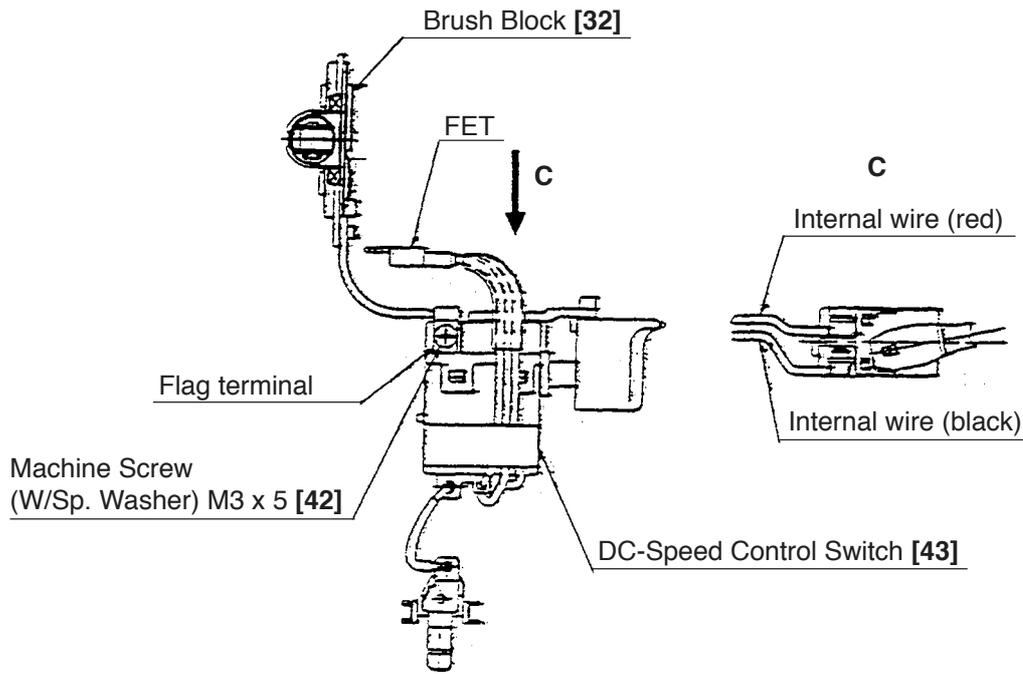


Fig. 7

(c) Mount a unit of Inner Cover (A) [27] (including the Armature DC 12V [28]), Magnet (D) [30] (including Dust Guard Fin (A) [31] and Side Yoke [29]) and Brush Block [32] into housing (A) (see Fig. 11). Pay attention to the following items.

- Adjust the protrusions of Dust Guard Fin (A) [31] to the concave portions of Magnet (D) [30] and also adjust the outside diameter of Dust Guard Fin (A) [31] to the outside diameter of Magnet (D) [30] when mounting Dust Guard Fin (A) [31] to Magnet (D) [30] (see Fig. 8).
- Adjust the protrusions of the Side Yoke [29] to the concave portions of Magnet (D) [30] and also adjust the outside diameter of the Side Yoke [29] to the outside diameter of Magnet (D) [30] when mounting the Side Yoke [29] to Magnet (D) [30] (see Fig. 8).
- Insert the two Dampers [26] so that they fit into Inner Cover (A) [27]. Fit the locking ribs of Ring Gear (C) [23] to the concave portions of Dampers [26]. Press-fit the Armature DC 12V [28] into Inner Cover (A) [27].
- Adjust the convex portion of Dust Guard Fin (A) [31] to the concave portion of the Brush Block [32] (see Fig. 9).
- Adjust the concave portions (for locking) of Magnet (D) [30] to the protrusions of housing (A) (see Figs. 8 and 10).

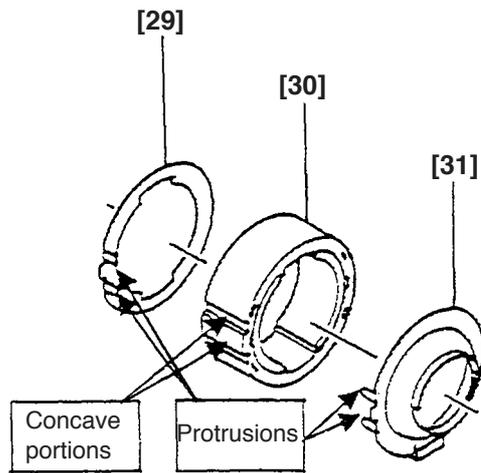


Fig. 8

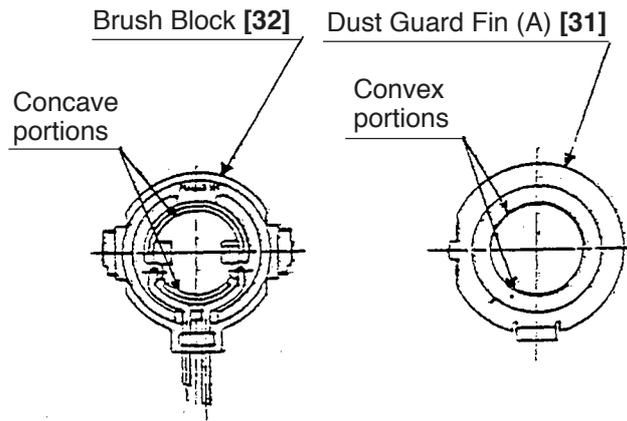


Fig. 9

Align the protrusions of housing (A) to the concave portions (for locking) of Magnet (D) [30].

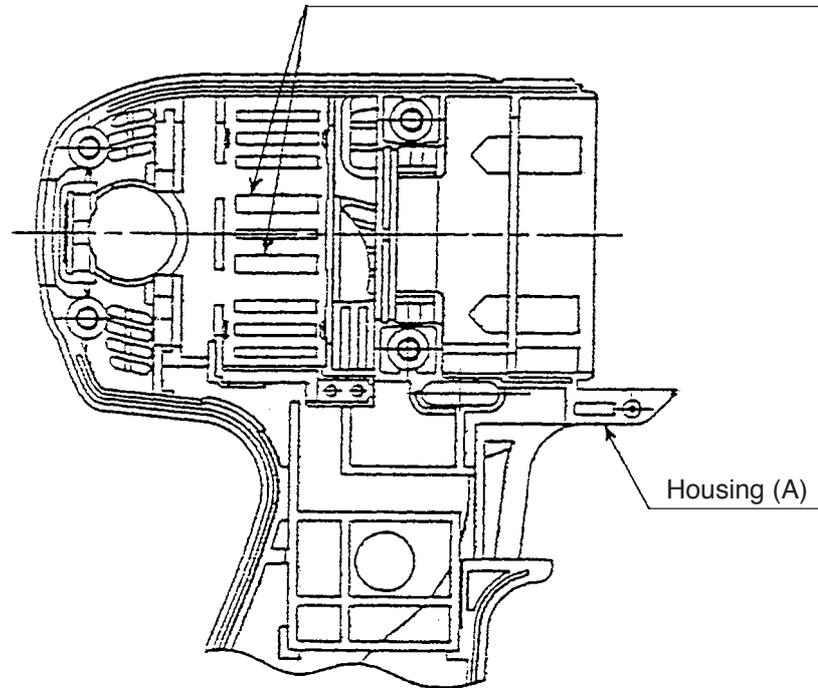


Fig. 10

(d) Mount the DC-Speed Control Switch [43] to housing (A) so that the protrusion of the forward/reverse lever at the top of the switch is inserted into the hole of Pushing Button (A) [44]. Apply silicone grease (KS609, Shin-Etsu Chemical Co., Ltd.) to the contacting surfaces of the FET of the DC-Speed Control Switch [43] and Dust Guard Fin (A) [31] then mount them to housing (A).

(Note) The temperature of the FET may be high if the silicone grease is not applied. Make sure that the three internal wires from the FET are bent as shown in Fig. 11 and passed above the DC-Speed Control Switch [43] to keep from contact with Pushing Button (A) [44] (see Fig. 11).

- (2) Mount housing (B) and secure with seven Tapping Screws (W/Flange) D4 x 20 (Black) [35]. Insert Sleeve (A) [48] into the Strap (Black) [47] and tighten the Machine Screw (W/Washers) M4 x 25 [49].

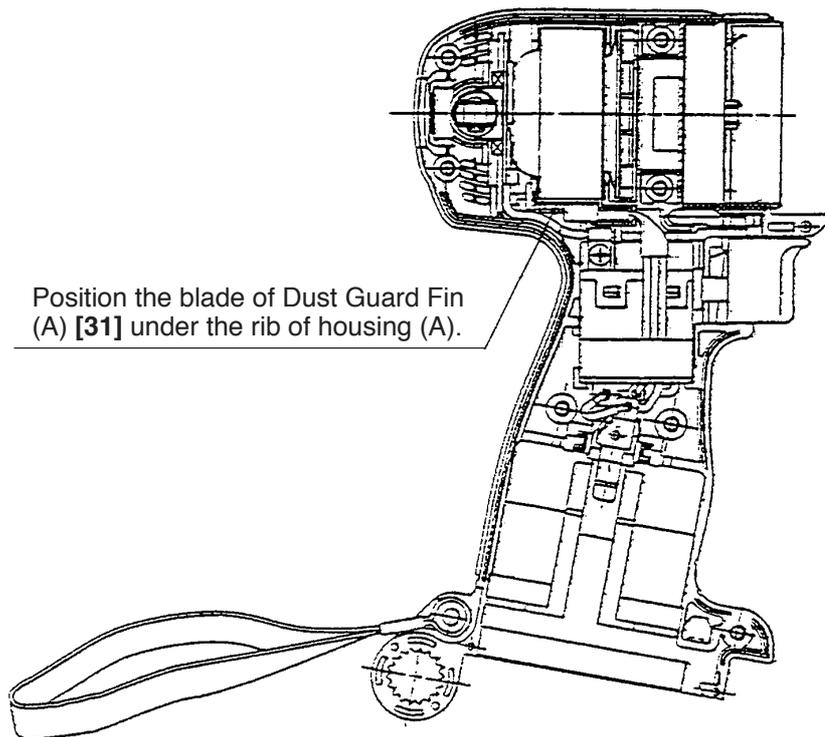


Fig. 11

- (3) Mounting the gear assembly to the housing

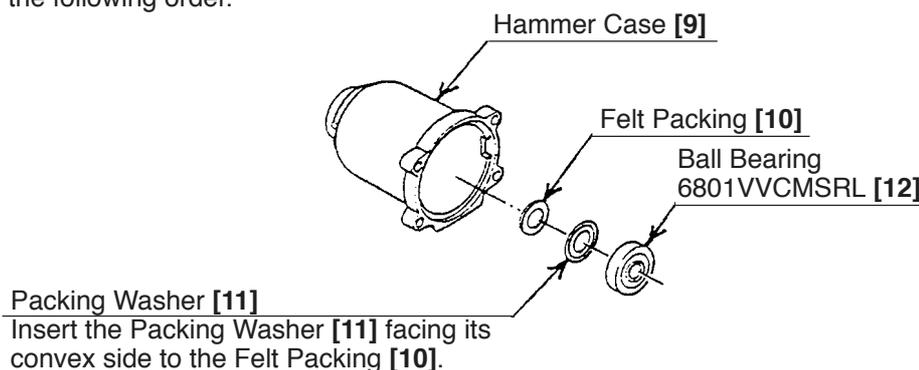
Raise the housing assembled in step (2) and mount the Gear Holder [21] to the housing being careful of proper engagement between the Idle Gear Set [20] of the Gear Holder [21] (check that Washer (E) [24] and Washer [19] are inserted in the Gear Holder [21]) and Ring Gear (C) [23]. After mounting, check that the Gear Holder [21] turns. If the Gear Holder [21] does not turn, the gears engage improperly.

- (4) Mounting the Oil Pulse Set [16]

Mount the Oil Pulse Set [16] aligning the hexagonal portion of the Oil Pulse Set [16] with the hexagonal hole of the Gear Holder [21]. After mounting, check that Washer (A) [13] is fitted on the main shaft of the Oil Pulse Set [16].

- (5) Mounting the Hammer Case [9]

Check that the Felt Packing [10], Packing Washer [11] and Ball Bearing 6801VVCMSRL [12] are inserted in the Hammer Case [9]. Mount the Hammer Case [9] and secure it with the four Tapping Screws (W/Sp. Washer) D4 x 25 (Black) [8]. When inserting the Ball Bearing 6801VVCMSRL [12] and other parts again, insert them in the following order.



(6) Mounting Guide Sleeve (A) [4]

Insert one Steel Ball D 3.175 [15] into the hole of the main shaft of the Oil Pulse Set [16] and insert the Bit Piece [14] into the hexagonal hole of the main shaft. Mount Guide Sleeve (A) [4], Guide Spring [3] and Retainer [2] in sequence. Mount the Retaining Ring [1] into the main shaft groove of the Oil Pulse Set [16].

(Note) • Mount the Retainer [2] facing its stepped side to the tip.

- Be sure to replace the Retaining Ring [1] with new one because the Retaining Ring [1] may be deformed and Guide Sleeve (A) [4] may come off if the deformed Retaining Ring [1] is used again.

(7) Reassembly of the Hook Ass'y (W/Light) [37]

Check that the V-Lock Nut M5 [45] is mounted into the Hook Ass'y (W/Light) [37]. Mount the Hook Spring [50] and secure it with the Special Screw M5 [51]. (Make sure to mount the Hook Spring [50] with its larger diameter side pointing inward the housing.)

(8) Checking the direction of rotation

Check whether the rotating direction of the main shaft of the Oil Pulse Set [16] coincides with the directional marking on the push-on side of Pushing Button (A) [44]. When Pushing Button (A) [44] is turned to (R) side, the rotating direction of the main shaft of the Oil Pulse Set [16] should be clockwise as viewed from behind.

(9) Lubrication

(a) ATTOLUB MS No. 2

- Hexagonal portions of the Oil Pulse Set [16] and the Gear Holder [21]
- Pinion tooth flanks of the Armature DC 12V [28], tooth flanks of Ring Gear (C) [23] and teeth of the Idle Gear Set (2 pcs.) [20]

(b) HITACHI MOTOR GREASE No. 29

- One Steel Ball D3.175 [15]
- Sliding sections of the main shaft of the Oil Pulse Set [16] and Guide Sleeve (A) [4]

(c) MOLUB ALLOY 777-1

- 5-mm diameter hole of the Idle Gear Set (2 pcs.) [20]
- All around the Needle Roller [22]

(10) Screw tightening torque

- Tapping Screw (W/Sp. Washer) D4 x 25 (Black) [8] 1.96 ± 0.49 N·m (20 ± 5 kgf·cm)
- Tapping Screw (W/Flange) D4 x 20 (Black) [35] 1.96 ± 0.49 N·m (20 ± 5 kgf·cm)
- Machine Screw (W/Washers) M4 x 25 [49] 1.27 to 1.96 N·m (13 to 20 kgf·cm)
- Machine Screw (W/Sp. Washer) M3 x 5 [42] 0.29 to 0.39 N·m (3 ± 4 kgf·cm)
- Special Screw M5 [51] 1.96 ± 0.49 N·m (20 ± 5 kgf·cm)
- Brush Cap [34] 0.78 ± 0.10 N·m (8 ± 1 kgf·cm)

10-3. Precautions in Disassembly and Reassembly of Battery Charger

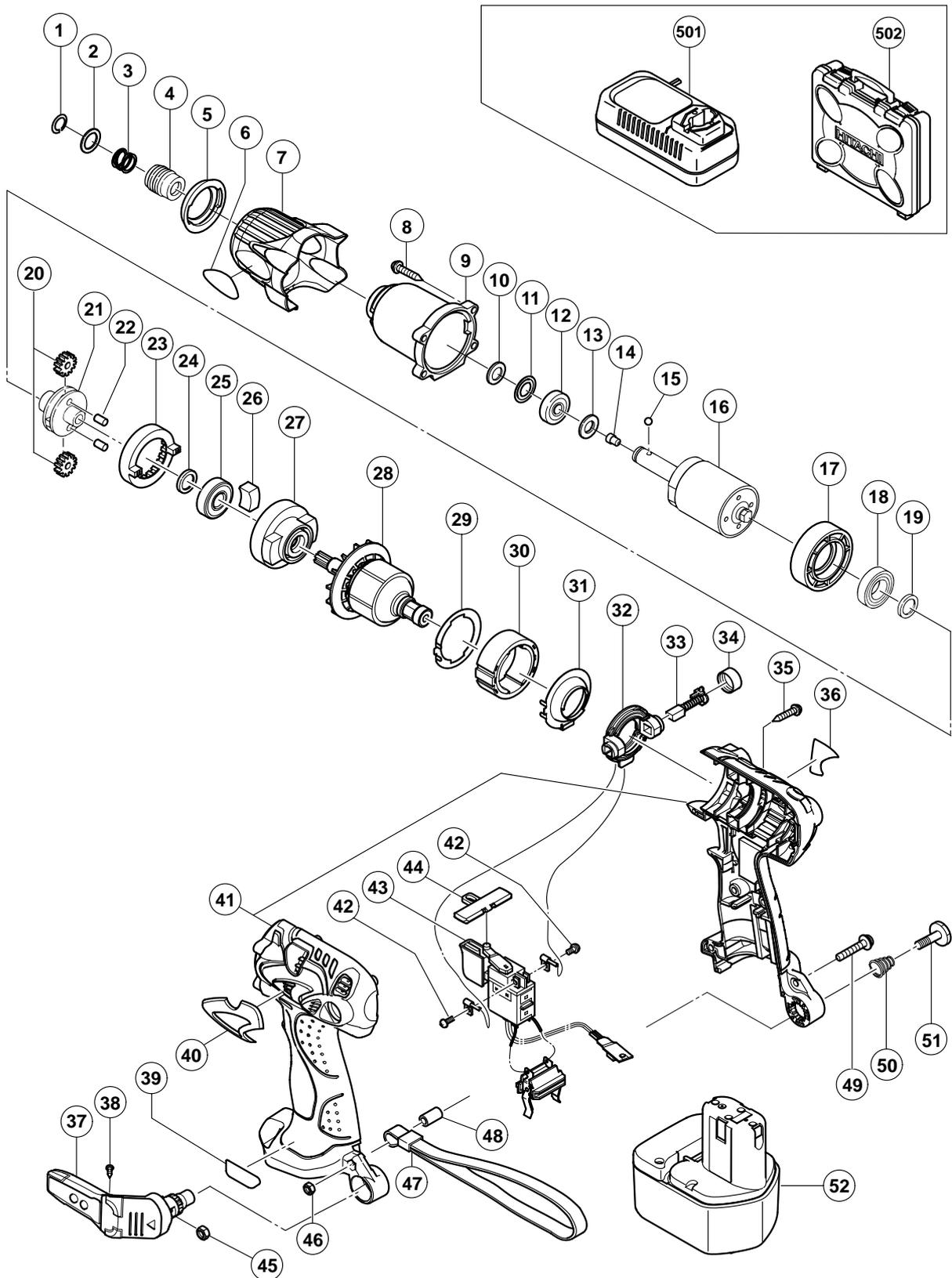
Refer to the Technical Data and Service Manual for precautions in disassembly and reassembly of the Model UC 14YFA Battery Charger.

11. STANDARD REPAIR TIME (UNIT) SCHEDULES

| MODEL | Variable | | 10 | 20 | 30 | 40 | 50 | 60 min. |
|---------|------------------|-----------|--|------------------------------|--|----|----|---------|
| | Fixed | | | | | | | |
| WP 12DM | | Work Flow | | | | | | |
| | | | Hook Ass'y | DC-Speed Control Switch | Housing (A).(B) Set | | | |
| | | | Inner Cover (A) Armature Magnet (D) Brush Block | | | | | |
| | General Assembly | | Guide Sleeve (A) | Hammer Case Ring Gear (C) | Oil Pulse Set Bearing Cover Ball Bearing (6801VV) Ball Bearing (6902VV) Idle Gear Set Gear Holder Needle Roller Ball Bearing (6901VV) | | | |

ELECTRIC TOOL PARTS LIST

■ CORDLESS OIL PULSE DRIVER 2004 • 3 • 25
Model WP 12DM (E1)



PARTS

WP 12DM

| ITEM NO. | CODE NO. | DESCRIPTION | NO. USED | REMARKS |
|----------|----------|--|----------|----------------|
| 1 | 995-933 | RETAINING RING | 1 | |
| 2 | 307-899 | RETAINER | 1 | |
| 3 | 995-931 | GUIDE SPRING | 1 | |
| 4 | 307-782 | GUIDE SLEEVE (A) | 1 | |
| 5 | 322-239 | FRONT CAP | 1 | |
| 6 | | LABEL (D) | 1 | |
| 7 | 322-887 | PROTECTOR | 1 | |
| 8 | 319-917 | TAPPING SCREW (W/SP. WASHER) D4X25 (BLACK) | 4 | |
| 9 | 322-238 | HAMMER CASE | 1 | |
| 10 | 322-218 | FELT PACKING | 1 | |
| 11 | 322-219 | PACKING WASHER | 1 | |
| 12 | 322-220 | BALL BEARING 6801VVCMSRL | 1 | |
| 13 | 320-319 | WASHER (A) | 1 | |
| 14 | 996-184 | BIT PIECE | 1 | |
| 15 | 959-148 | STEEL BALL D3.175 (10 PCS.) | 1 | |
| 16 | 003-455 | OIL PULSE SET | 1 | |
| 17 | 322-217 | BEARING COVER | 1 | |
| 18 | 690-2VV | BALL BEARING 6902VVCMP2L | 1 | |
| 19 | 313-058 | WASHER | 1 | |
| 20 | 321-667 | IDLE GEAR SET (2 PCS.) | 2 | |
| 21 | 322-221 | GEAR HOLDER | 1 | |
| 22 | 319-914 | NEEDLE ROLLER | 2 | |
| 23 | 320-877 | RING GEAR (C) | 1 | |
| 24 | 319-911 | WASHER (E) | 1 | |
| 25 | 690-1VV | BALL BEARING 6901VVCMP2L | 1 | |
| 26 | 319-909 | DAMPER | 2 | |
| 27 | 321-664 | INNER COVER (A) | 1 | |
| 28 | 360-620 | ARMATURE DC 12V | 1 | |
| 29 | 321-659 | SIDE YOKE | 1 | |
| 30 | 321-668 | MAGNET (D) | 1 | |
| 31 | 321-663 | DUST GUARD FIN (A) | 1 | |
| 32 | 321-662 | BRUSH BLOCK | 1 | |
| 33 | 999-054 | CARBON BRUSH 5X6X11.5 (1 PAIR) | 2 | |
| 34 | 319-918 | BRUSH CAP | 2 | |
| 35 | 302-086 | TAPPING SCREW (W/FLANGE) D4X20 (BLACK) | 7 | |
| 36 | | NAME PLATE | 1 | |
| 37 | 321-918 | HOOK ASS'Y (W/LIGHT) | 1 | INCLUD. 38, 45 |
| 38 | 321-672 | TAPPING SCREW D2X6 | 2 | |
| 39 | | CAUTION LABEL (A) | 1 | |
| 40 | 322-339 | HITACHI PLATE | 1 | |
| 41 | 322-174 | HOUSING (A).(B) SET (GREEN) | 1 | |
| 42 | 994-532 | MACHINE SCREW (W/SP. WASHER) M3X5 | 2 | |
| 43 | 319-906 | DC-SPEED CONTROL SWITCH | 1 | |
| 44 | 321-661 | PUSHING BUTTON (A) | 1 | |
| 45 | 320-288 | V-LOCK NUT M5 | 1 | |
| 46 | 949-565 | LOCK NUT M4 (10 PCS.) | 1 | |
| 47 | 306-952 | STRAP (BLACK) | 1 | |
| 48 | 322-718 | SLEEVE (A) | 1 | |
| 49 | 676-386 | MACHINE SCREW (W/WASHERS) M4X25 | 1 | |
| 50 | 319-926 | HOOK SPRING | 1 | |
| 51 | 319-927 | SPECIAL SCREW M5 | 1 | |

