

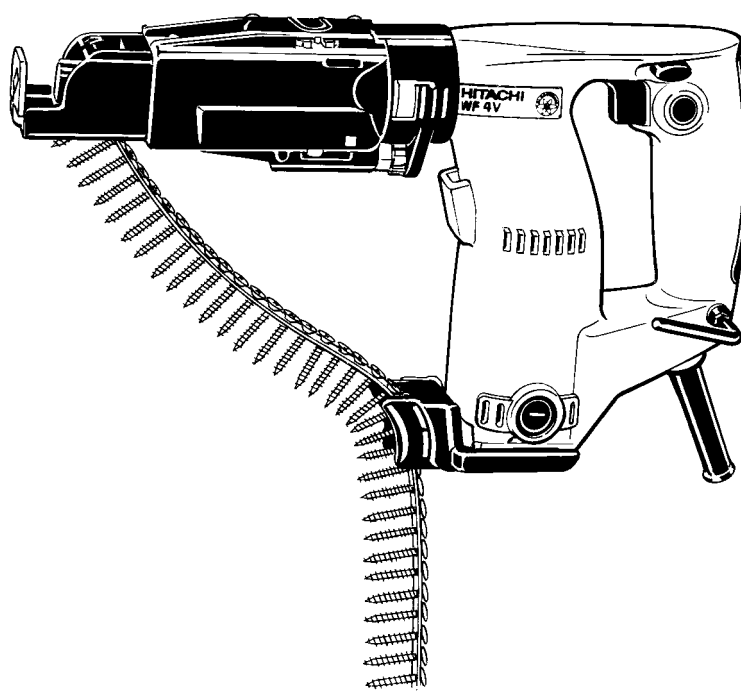
MODEL

WF 4V

HITACHI
POWER TOOLS

AUTOMATIC SCREW DRIVER
WF 4V

TECHNICAL DATA
AND
SERVICE MANUAL



LIST No. 0783

Nov. 1999

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:

| Symbols Utilized | Competitors | |
|------------------|--------------|------------|
| | Company Name | Model Name |
| C | MAKITA | 6830 |

Notice for use

Specifications and parts are subject to change for improvement.
Refer to Hitachi Power Tool Technical News for further information.

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1. PRODUCT NAME

Hitachi Automatic Screwdriver, Model WF 4V

2. MARKETING OBJECTIVE

This machine is an impact type screwdriver designed for use with collated screws. The screw feed attachment at the head of the machine is detachable without tools. The Model WF 4V is also capable of driving ordinary bolts and wood screws that are not collated and retightening protruded screws. The new functions and higher performance of this multi-purpose screwdriver which uses Hitachi's innovative technology assure greater demand and increased sales in this category of products.

3. APPLICATIONS

- Continuous drywall screw driving by using collated screws or screw strips
- Driving various individual screws and bolts with the collated screw strip attachment removed
- Drilling holes into various materials

4. SELLING POINTS

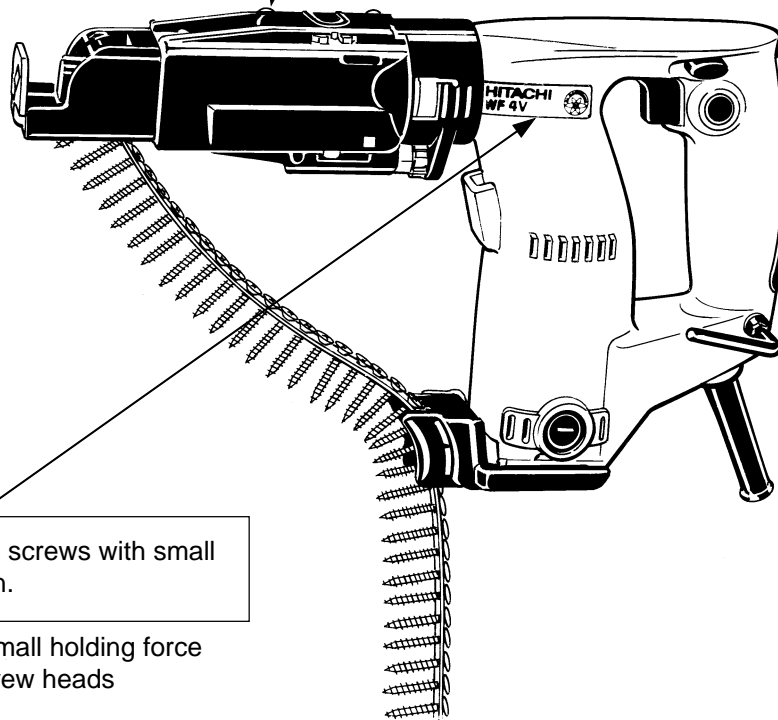
Can be use as a drilling tool by removing the screw feed attachment (with use of Drill Chuck Adapter Set).

Tool-less detachable collated screw feed attachment

- Two kinds of uses, as a collated screwdriver and an impact driver
- Capable of retightening protruded screws

Impact method permits screws with small recoil force to be driven.

- Easy work due to small holding force
- Less damage to screw heads



4-1. Selling Point Descriptions

- (1) An impact mechanism that allows screw tightening with a smaller thrust, plus our unique collated screw feed attachment

The WF 4V employs an impact mechanism which is capable of tightening screws with a smaller thrust than with the claw clutch system used for competitors' screwdrivers. The way it works is schematically illustrated in Fig. 2.

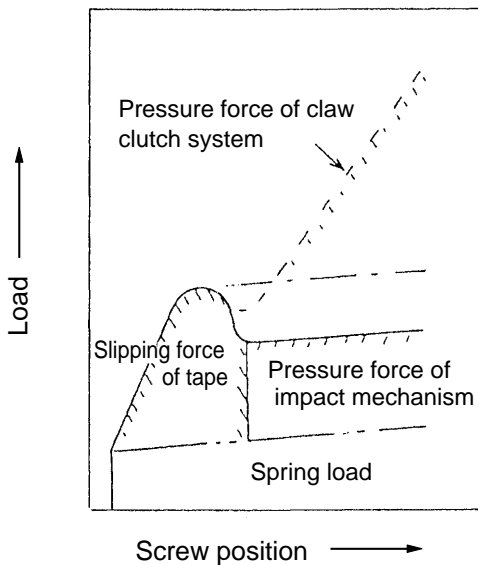


Fig. 2

In Fig. 2, the solid line indicates the screw tightening load applied with the impact mechanism, and the broken line a typical load required with the conventional claw clutch system. As the screw is tightened, tightening torque rises with the screw's pushing into the work. Increasing downward pressure is required when the screw slips off the tape because, on the one hand, the clutch cannot be disengaged without such force and on the other hand, the bit and the screw cannot be separated apart otherwise. Both could be reasons for incomplete driving when insufficient pressure is applied. First referring to the claw clutch system, since the clutch disengaging torque is strong, increasing pressure must be applied to the screw as it is pushed in, because the clutch claws would otherwise disengage, making further screw tightening impossible. As a result, the required force goes on rising, as indicated by the dotted line, until screw tightening is finished.

With the impact system, on the contrary, it is sufficient to apply only enough force to keep the bit and screw together, because hammering impact provides the necessary torque as the tightening torque increases, with no need for the operator to increase pressure against the workpiece. The load indicated by solid line in Fig. 2 should be enough for optimum tightening. However, the actual load required will be such as indicated by the chain line in Fig. 2 because it is very difficult for operators to take the force off as soon as the screw slips off the tape.

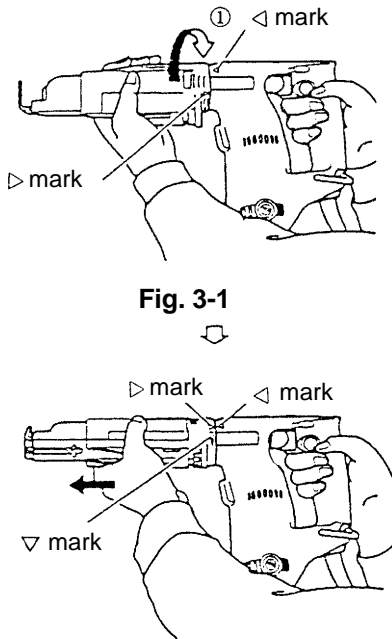
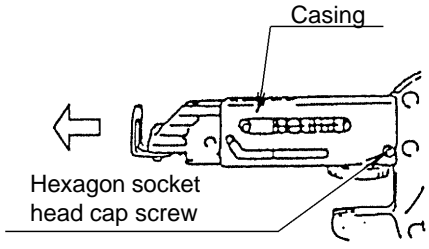
- (2) The WF 4V can be used as an impact screwdriver by removing the collated screw feed attachment:

For re-tightening jobs or other operations

(3) The collated screw feed attachment can be removed without tools.

Tool-less detachment is possible for the collated screw feed attachment, making bit replacement and re-working much easier. This improved operability of the WF 4V will be a great selling point because the competitors' collated screw feed attachments must be secured by means of a hexagon socket head cap screw or the like.

Note: Ensure that the power plug is disconnected from the receptacle prior to the attachment removal.

| | 1. Hitachi WF 4V | 2. C |
|----------------------|---|--|
| Attachment mechanism |  <p>Fig. 3-1</p> <p>Fig. 3-2</p> |  <p>Fig. 3-3</p> |
| Instructions | <p>Holding the main unit with one hand, turn the collated screw feed attachment with the other in the direction indicated by the arrow in Fig. 3-1. Register the mark on the main unit with the mark on the attachment and remove by pulling it in the direction indicated in Fig. 3-2.</p> | <p>Loosen the hexagonal socket head bolt securing the casing with a hexagonal wrench and remove by pulling it in the direction indicated by the arrow.</p> |

5. SPECIFICATIONS

5-1. Specifications

Table 1

| | | |
|---------------------------|--------------|---|
| Capacity | | D4 x 25-41 mm (5/32" dia. x 1" – 1-5/8") |
| Type and number of screws | | Collated screw strips (50 screws) |
| Tightening torque | | Note 1) Max. 1,000 kgf·cm [98 N·m] (72.3 ft-lb) |
| Tip configuration | | Dihedral width: 6.35 mm (1/4") for Hex. Bit inserting |
| Power supply | | Single phase AC: 50/60 Hz Voltage: 240 and 230 V |
| Type of motor | | Single-phase AC commutator motor |
| Enclosure | | Housing: Polyamide resin Slider (A), (B) and (C): Polycarbonate resin Slider Case (A) and (B): Polycarbonate resin Belt Guide (A) and (B): Polycarbonate resin |
| Type of switch | | Variable speed trigger switch with forward/reverse changeover lever |
| Handle configuration | | D-type |
| Full-load current | | 1.3 A (240 V) and 1.4 A (230 V) |
| Power input | | 300 W |
| No-load rotation speed | | 0-2,300 /min. |
| Impact rate | | 0-3,400 /min. |
| Weight | Without cord | 1.8 kg (4.0 lbs.) |
| | Packaged | 3.8 kg (8.4 lbs.) |
| Packaging | | Corrugated cardboard box [with plastic case] |
| Overall length x height | | 354 mm (13-15/16") x 197 mm (7-3/4") |
| Center height | | 26 mm (1-1/64") |
| Standard accessories | | Philips bit 1 pc. Belt guide 1 pc. Rubber cover (B) 1 pc. Hook 1 pc. Plastic case 1 pc. |

Note 1) Based on tightening an M12 (15/32") bolt (Strength Grade: 12.9) for 3 sec. with a hexagon socket.

5-2. Standard Accessories

- | | |
|----------------------|-------------------|
| (1) Philips bit | [Code No. 313880] |
| (2) Belt guide | [Code No. 314283] |
| (3) Rubber cover (B) | [Code No. 314629] |
| (4) Hook | [Code No. 307343] |
| (5) Plastic case | [Code No. 306854] |

5-3. Optional Accessories

- The optional parts listed below can be used when the collated screw feed attachment has been removed.
- Phillips bit

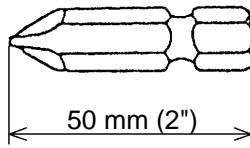


Fig. 4

Table 2

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

- Hexagon socket

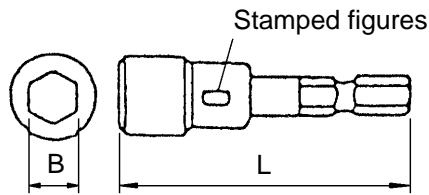


Fig. 5

Table 3

| Part Name | Stamped figures | L (mm) | B (mm) | Code No. |
|-----------------------------------|-----------------|----------------|-------------|----------|
| 5 mm Hexagon socket | 8 | 65 (2-9/16") | 8 (5/16") | 996177 |
| 6 mm Hexagon socket | 10 | 65 (2-9/16") | 10 (3/8") | 985329 |
| 5/16" Hexagon socket | 12 | 65 (2-9/16") | 12 (15/32") | 996178 |
| 8 mm Hexagon socket | 13 | 65 (2-9/16") | 13 (1/2") | 996179 |
| 10 mm Hexagon socket (small type) | 14 | 65 (2-9/16") | 14 (9/16") | 996180 |
| 10 mm Hexagon socket | 16 | 65 (2-9/16") | 16 (5/8") | 996181 |
| 10 mm Hexagon socket | 17 | 65 (2-9/16") | 17 (21/32") | 996182 |
| 1/2" Hexagon long socket | 21 | 166 (6-17/32") | 21 (13/16") | 996197 |

- Woodworking drill bit (Code No. 959183)

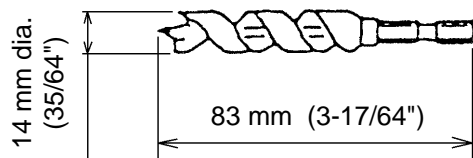


Fig. 6

- Drill chuck adapter set (Code No. 996195)

The drill chuck adapter set permits mounting of various types of locally - available drill bits for a variety of drilling operations.

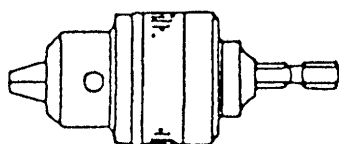


Fig. 7

6. COMPARISONS WITH SIMILAR PRODUCTS

6-1. Specification Comparisons

Table 4

| Maker/Model | | Hitachi | C | Hitachi | Hitachi |
|--|--------|--|---|--|--|
| Item | Unit | WF 4V | | W 4YF | WF 4DY |
| Capacity: Screw size | mm | 4 (5/32") | 4 (5/32") | 4 (5/32") | 4 (5/32") |
| Screw length | mm | 25 – 41 (1" – 1-5/8") | 25 – 40 (1" – 1-9/16") | 20 – 41 (25/32" – 1-5/8") | 25 – 41 (1" – 1-5/8") |
| Power input | W | 300 | 470 | 430 | DC 12V |
| No-load speed | /min. | 0 – 2,300 | 0 – 4,700 | 4,000 | 0 – 2,000 |
| Weight (without cord) (Actual weight) | kg | 1.8 (4.0 lbs.) (1.85) (4.08 lbs.) | 1.9 (4.2 lbs.) (1.97) (4.34 lbs.) | 1.8 (4.0 lbs.) (1.78) (3.92 lbs.) | 2.0 (4.4 lbs.) (2.04) (4.50 lbs.) |
| No-load noise level | dB | 82 | 82 | 82 | 70 |
| Tightening torque structure | | Impact type | Clutch type | Clutch type | Impact type |
| Dimensions | Length | mm | 345 – 354 (13-19/32" – 13-15/16") | 345 – 361 (13-19/32" – 14-7/32") | 369 – 378 (14-17/32" – 14-7/8") |
| | Height | mm | 197 (7-3/4") | 135 (5-5/16") | 202 (7-15/16") |
| | Width | mm | 76 (3") | 80 (3-5/32") | 73 (2-7/8") |
| Moment from centroid to grip | kg·cm | 17.2 [1.69 N·m] (1.24 ft-lb) | 18.7 [1.83 N·m] (1.35 ft-lb) | 23.4 [2.29 N·m] (1.69 ft-lb) | 17.4 [1.71 N·m] (1.26 ft-lb) |
| Standard accessories | | Plastic case Phillips bit Hook Rubber cover (B) Belt guide | Plastic case Phillips bit Hook Hex. bar wrench | Plastic case Phillips bit Hook Top adjuster No.1 Top adjuster No.2 | Plastic case Phillips bit Hook Charger Battery |

6-2. Characteristics Comparisons

6-2-1. Defect Rate Comparison

While defect rates depend on manufacturing irregularity of screws, materials to be tightened and operator's skill, reference data at the factory testing result are shown below.

<Testing conditions>

Testing method: Perform positioning by gently applying the tip end of the main unit to the material to be tightened and tighten by applying further pressure.

The material to be tightened: Plasterboard 9.5 (3/8") (T9.5 (3/8") x 2 for 40 mm (1-9/16") + base of Japanese hemlock)

Table 5

| Screw size | Hitachi WF 4V | C |
|-----------------|------------------|--------|
| 25 mm (1") | 0.20 % | 0.40 % |
| 40 mm (1-9/16") | 0.20 % | 1.80 % |

7. PRECAUTIONS IN SALES PROMOTION

7-1. Safety Instructions

In the interest of promoting the safest and most efficient use of model WF 4V by all our customers, it is very important that at the time of sales 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 Nameplate attached to each tool.

A. Handling Instructions

Although every effort is made in each step of design, manufacture and inspection to provide protection against any hazards, the dangers inherent in the use of any electric power tool cannot be completely eliminated.

Accordingly, general precautions and suggestions for the use of electric power tools, and specific precautions and suggestions for the use of the electric screwdriver are listed in the Handling Instructions to enhance the safe, efficient use of the tool by the customer. Salespersons must be thoroughly familiar with the contents of the Handling Instructions to be able to offer appropriate guidance to the customer during sales promotion.

B. Nameplate

Each tool is provided with a Nameplate which lists the following basic safety precautions in the use of the tool:

(1) For Europe (except Germany), Australia and New Zealand

CAUTION

- Read thoroughly HANDLING INSTRUCTIONS before use.

(2) For Germany

ACHTUNG

- Bedienungsanleitung vor Inbetriebnahme lesen.

7-2. Precautions in Sales Promotion

Ensure that the following precautions are taken for sales promotion of this unit.

7-2-1. Precautions When Using the Main Body

- (1) Use the specified genuine bit.

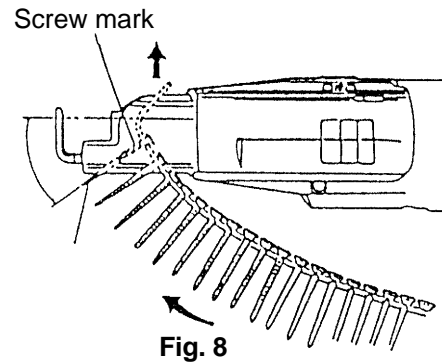
Using any bit other than the one specifically designed for the automatic screwdriver WF 4V may lead to incompletely tightened or improperly fed screws, so ensure that your customers do not use any bit other than that specified.

- (2) Do not lubricate the main unit.

Ensure that the main unit is never lubricated because this may lead to improper operation or other troubles. If the slider section is lubricated, it first moves smoothly but plasterboard powder gradually sticks to the oil, making the slider movement sluggish. Ensure that the plasterboard powder deposited around the slider is frequently cleaned away with compressed air before the slider movement becomes slow.

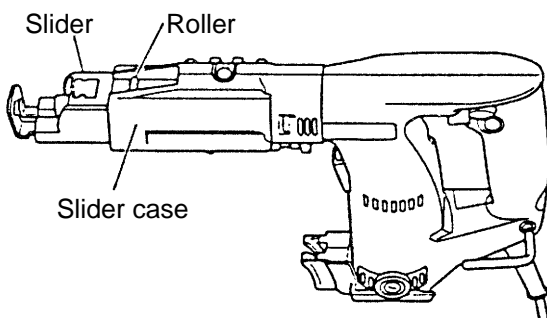
(3) Setting for collated screws

Ensure that the first one of the collated screws is set to the screw mark on the slider. If the screws are set otherwise than indicated in Fig. 8, the plasterboard surface may be scratched by the bit (because of insufficient feed of the screw series) or screws may be wasted (because of excessive feed of the screw series).



(4) Plasterboard powder deposited on the slider surface and on the roller on top of the slider as shown in Fig. 9 may result in improper operation. Ensure that these parts are frequently cleaned with compressed air before the slider movement becomes slow.

Likewise, plasterboard powder deposited on the mounting ends of the collated screw attachment may make



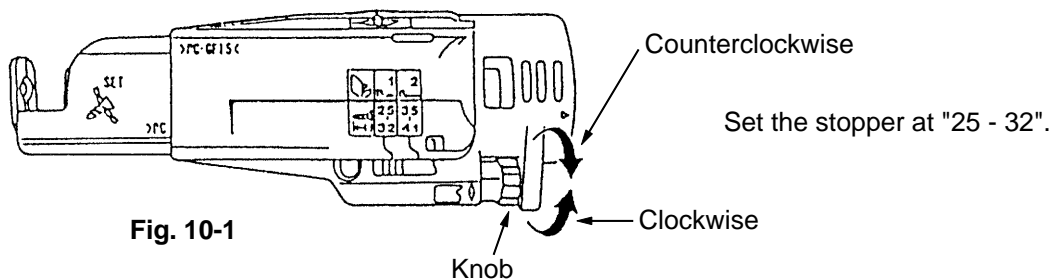
removing and mounting difficulty. Ensure these parts are cleaned frequently. (In particular, the powder tends to easily stick when working with the screwdriver held upward.)

(5) The small hole on either side of the handle section is important for ventilating gases. Ensure that this hole is not blocked.

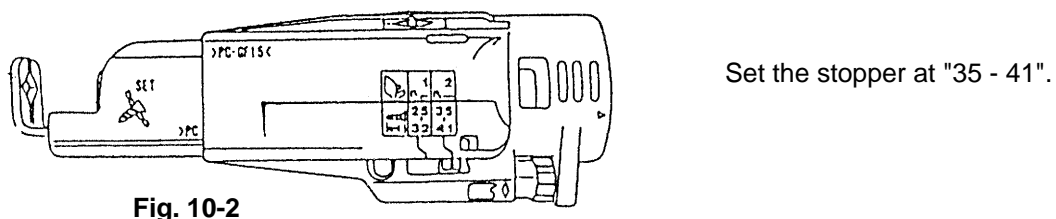
(6) Reference for tightening depth

This screwdriver is designed to adjust the tightening depth by turning the Knob. Ensure that the tightening depth is adjusted following the procedure given below so that the screws are properly tightened without such errors as the screw head remaining above the plasterboard surface or sunk below it after tightening.

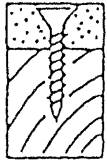
(a) Screws (L) 25 mm (1") – 32 mm (1-1/4") [using top adjuster No.1 (small)]



(b) Screws (L) 35 mm (1-3/8") – 41 mm (1-5/8") [using top adjuster No. 2 (large)]



Correct (Flush)



Protruded



Sunk

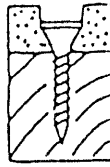


Fig. 10-3

- Test drive a screw, and if the screw head is still protruding, adjust by turning the Knob counterclockwise.
- If the screw head is too deep, turn the Knob clockwise.

In this unit, unlike other automatic screwdrivers, the bit keeps on turning after completely tightening the screw. Therefore, the screw head may be damaged when the bit moves away from the screw. So visually observe how the screw is tightened, in addition to adjusting the tightening depth with the Knob mentioned above.

7-2-2. Tightening Posi-Drive Screws

Advise your customers that to tighten Posi-Drive Screws, they should use only the optional Posi-Drive Screw Bit specially designed for the WF 4V. As for the WF 4V, as the bit engages the screw while it's turning, the use of conventional Posi-Drive Screw Bits, which are not designed for this type of service, may result in cracked or rounded out screws as screw driving may proceed without complete engagement of the bit with the screw. To prevent this, the Posi-Drive Screw Bit designed for use with the WF 4V is provided with a guide point at its tip (Fig. 11). However, the service life may be comparatively shorter than that of conventional Phillips Bits because the bit wings must be made comparatively smaller.

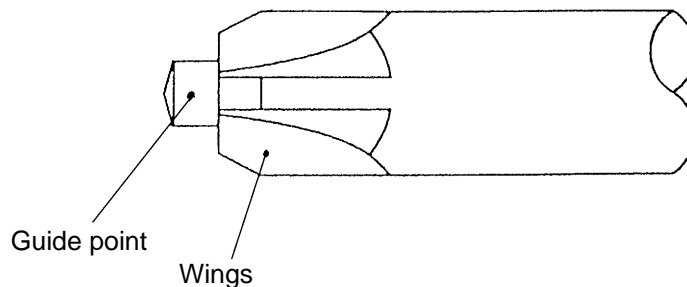


Fig. 11

8. TROUBLESHOOTING

8-1. Troubleshooting Guide

| No. | Symptom | Probable Cause | Test | Remedy |
|-----|---|---|---|--|
| 1 | Screws protrude from the workpiece surface. | • Faulty stopper adjustment. | • Turn knob counterclockwise and test drive screw. | • Turn knob and adjust to correct scale setting. |
| | | • Improper driver bit being used. | • Check length of driver bit. [Length = 114 mm (4-1/2")] | • Instruct operator to use genuine HITACHI Driver Bits. |
| | | • Driver bit excessively worn. | • Check for wear at the face of the driver bit. | • Replace driver bit. |
| | | • Thrust against workpiece is insufficient. | • Check pressure during driving. | • Instruct operator to apply enough force to engage screws and driver bits completely. |
| 2 | Screw jamming. | <ul style="list-style-type: none"> • Screws other than those specified are used. • Strip contains defective screw(s). • Defective collating strip (deformed or cut). • Screws are missing. | • Check if specified screws are used. | <ul style="list-style-type: none"> • Use specified screws. • Replace defective screws. |
| 3 | Screws are not fed. | <Collated screw strips> <ul style="list-style-type: none"> • Specified screws not used. • Defective screws used (bent screws, foreign matter in slots of screw head, defective collating). • Screws or collating tape are snagged or scraping. • Collating tape is deformed or cut. | • Check if specified screws are properly mounted. | <ul style="list-style-type: none"> • Use specified screws. • Replace defective screws. |
| | | <Feeder unit> <ul style="list-style-type: none"> • Sprocket pawl is damaged. • Link piece is damaged. | • Disassemble and check. | • Replace defective parts. |

| No. | Symptom | Probable Cause | Test | Remedy |
|-----|---------------------------------|--|--|---|
| 3 | Screws are not fed. | <ul style="list-style-type: none"> • Too high sliding resistance of slider ass'y (C) • Too high sliding resistance of sprocket ass'y | <ul style="list-style-type: none"> • Disassemble and check. | <ul style="list-style-type: none"> • Remove burrs or clean out dust. • Replace defective parts. |
| | | <ul style="list-style-type: none"> • Collated screw strips are not properly set into the slider groove and belt guide. | <ul style="list-style-type: none"> • Check if the collated screw strip is properly set in its groove. | <ul style="list-style-type: none"> • Set screws correctly. |
| | | <ul style="list-style-type: none"> • Belt guide groove burred or clogged with dust. | <ul style="list-style-type: none"> • Check groove for burring or clogging. | <ul style="list-style-type: none"> • Remove burrs or clean out dust. |
| | | <ul style="list-style-type: none"> • Top adjuster not appropriate for screw length. | <ul style="list-style-type: none"> • Check screw length and top adjuster. | <ul style="list-style-type: none"> • Install appropriate top adjuster for the screw length |
| 4 | Screws are bent during driving. | <ul style="list-style-type: none"> • Specified screws not used. | <ul style="list-style-type: none"> • Refer to Item 3. | <ul style="list-style-type: none"> • Refer to Item 3. |
| | | <ul style="list-style-type: none"> • Defective screws used (foreign matter in slots of screw heads or defective collating strip). | <ul style="list-style-type: none"> • Refer to Item 3. | <ul style="list-style-type: none"> • Refer to Item 3. |
| 5 | Slider does not return. | <ul style="list-style-type: none"> • Too high sliding resistance of slider • Too high sliding resistance of slider ass'y (C) | <ul style="list-style-type: none"> • Disassemble and check. | <ul style="list-style-type: none"> • Remove burrs or clean out dust. • Replace defective parts. |
| | | <ul style="list-style-type: none"> • Broken or weak slider spring | <ul style="list-style-type: none"> • Disassemble and check. | <ul style="list-style-type: none"> • Replace defective parts. |

9. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

The **[Bold]** numbers in the following descriptions correspond to the item numbers in the parts list of the Model WF 4V.

9-1. Disassembly and Reassembly of the Feeder Unit and Handling Precautions

9-1-1. Disassembly

(a) Loosen the four Tapping Screws (W/Flange) D4 x 20 **[13]** securing Slider Case (A) **[12]** and remove Slider Case (A) **[12]** from Slider Case (B) **[12]**. With Slider Case (A) **[12]** removed, the built-in parts and assemblies can be taken out as they are.

* Since Spring (A) **[11]** is fitted in compression, removing Slider Case (A) **[12]** will cause the Slider Ass'y to jump out. So be sure to hold the Slider Ass'y while loosening the Tapping Screw (W/Flange) D4 x 20 **[13]** to prevent it from jumping out. Also take care not to lose the Roller **[10]** housed in the Slider Case.

(b) Loosen the two Tapping Screws (W/Flange) D4 x 25 **[4]** securing the Sprocket **[3]**, Spring (B) **[8]**, Slider Ass'y (C) **[1]**, Bit Guide **[6]** and Slider (B) **[1]** and remove them.

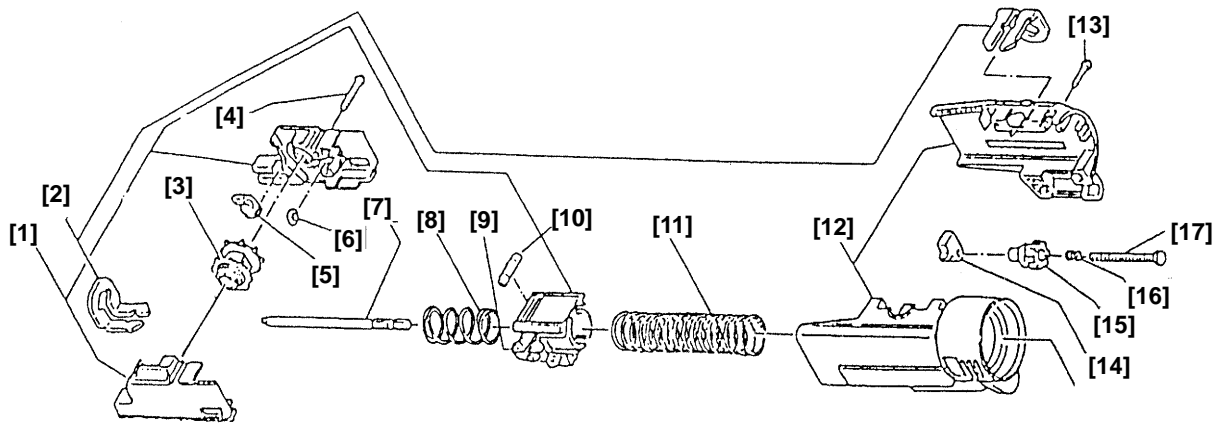


Fig. 12

9-1-2. Reassembly

Simply reverse the disassembly procedure, while observing the following precautions.

- (1) Make sure that the joint between the Slider (A)/(B) is completely aligned at the point marked (a) in Fig. 13 (as this is essential for proper sliding).
- (2) If the top surface (b) (Fig. 13) of the screw seat of Slider Case (A) is lower than Slider Case (B), it is likely to result in improper sliding movement. Adjust top surface (b) of the screw seat of Slider Case (A) to be flush with or a little higher than Slider Case (B).

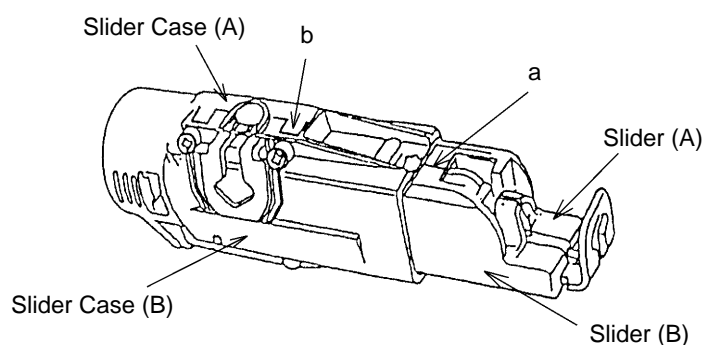


Fig. 13

9-1-3. Tightening Torque

- (1) Tapping Screw (W/Flange) D4 x 20 (25/32") $20 \pm 5 \text{ kg}\cdot\text{cm}$ [$1.96 \pm 0.49 \text{ N}\cdot\text{m}$] ($1.44 \pm 0.36 \text{ ft}\cdot\text{lb}$)
- (2) Tapping Screw (W/Flange) D4 x 25 (1") $20 \pm 5 \text{ kg}\cdot\text{cm}$ [$1.96 \pm 0.49 \text{ N}\cdot\text{m}$] ($1.44 \pm 0.36 \text{ ft}\cdot\text{lb}$)

9-1-4. Confirmation After Reassembly

- (1) Make sure that the Slider Ass'y moves smoothly within the Slider Case [12].
- (2) Make sure that the collated screws feed correctly.
- (3) Make sure that there are no lost or tilted screws when actually tightening.

9-2. Precautions in Disassembly and Reassembly of the Main Body

9-2-1. Disassembly

- (1) Remove Handle Cover and Housing (B).

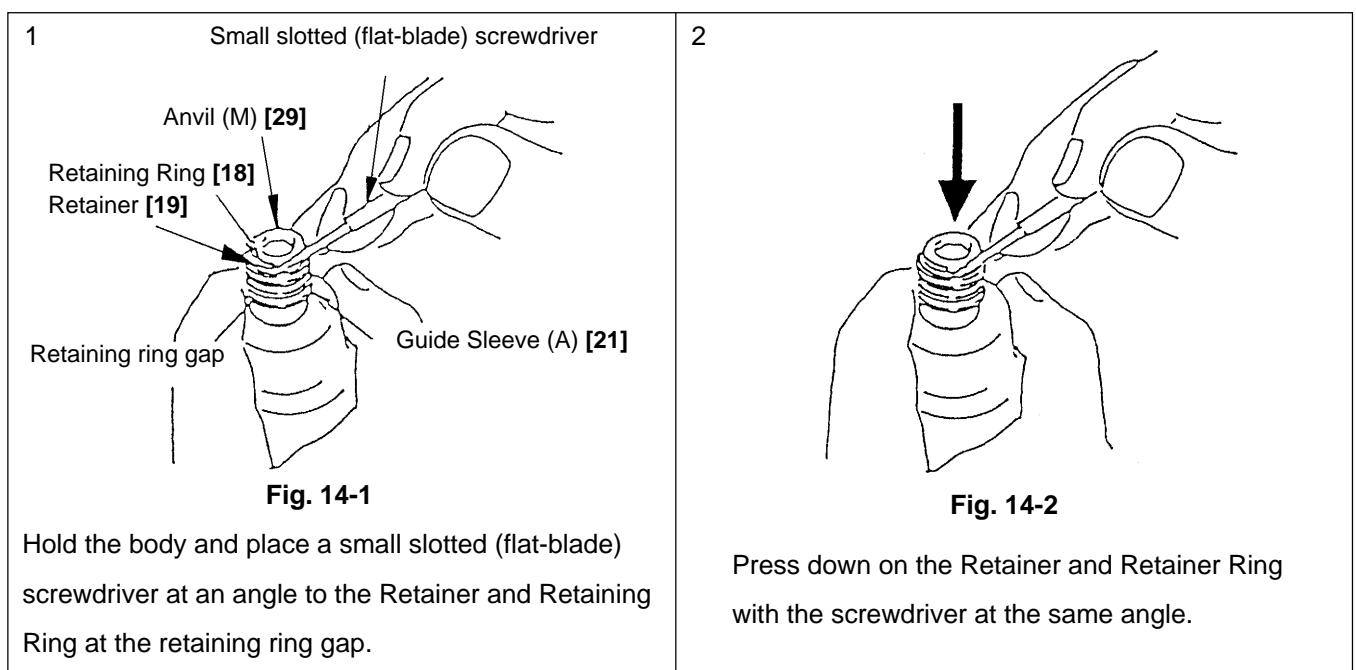
Remove the four Tapping Screws (W/Flange) D4 x 20 (25/32") secured to the Handle Cover. Then insert a cutter along the joint between Housing (A) and Handle Cover, cut the Grip Tape [45] and remove the Handle Cover. Remove the eight Tapping Screws (W/Flange) D4 x 20 (25/32") secured to Housing (B). After Housing (B) has been removed, the parts inside can be removed individually or subassemblies.

- (2) Removal of mechanical parts

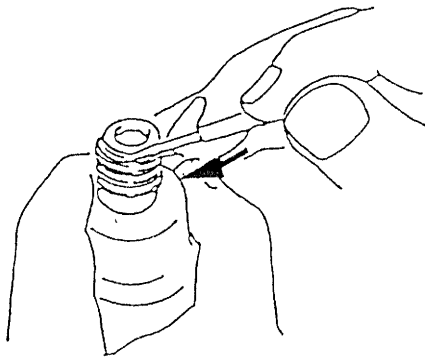
Lift Housing (A) while holding Anvil (M) [29] and Ball Bearing [39] of Spindle (A), and the Anvil section and Hammer (A) [31] and Spindle (A) [38] sections can be separated from each other. Then remove the Second Pinion Ass'y. Take care not to lose Washer (A) [40].

- (a) Remove Anvil (M) [29]

Follow the procedure as shown on the next page to remove the Retainer Ring [18], Retainer [19], Guide Spring [20] and Guide Sleeve (A) [21] in this order. Take care not to lose the two Steel Balls [28] [3.175 mm dia. (1/8")] fitted in the hole of Anvil (M) [29].

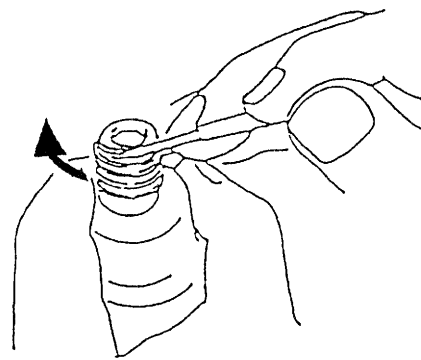


3

**Fig. 14-3**

Next, slide the screwdriver into the gap and under one side of the Retaining Ring.

4

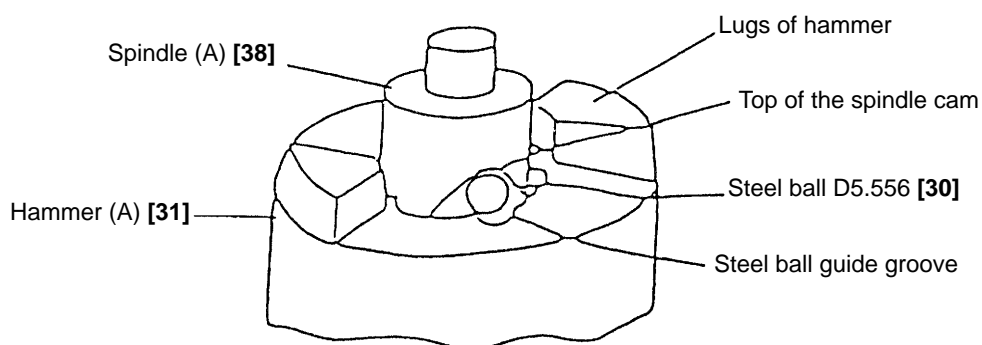
**Fig. 14-4**

Slowly raise the Retaining Ring using the end face of the Guide Sleeve as a fulcrum.

With one side of the Retainer Ring opening raised, slowly lift the rest with a small slotted (flat-blade) screwdriver to remove the Retainer Ring and Retainer. Do it slowly as quick action may cause the Retainer Ring [18] to jump out.

(b) Removal of Spring

Compress Spring [34] at one of the lugs at the Hammer end by hand and also Stopper (A) [35] (rubber) at end face of Hammer (A) [31]. While maintaining the pressure, pull out the Steel Ball [30] [5.55 mm dia. (7/32")] under the cam groove in Spindle (A) [38] and Hammer (A) [31] with a small slotted (flat-blade) screwdriver and remove it from the Steel Ball receiving groove. Then release the pressure and pull Hammer (A) [31] and Washer (G) [33], holding them together, out of Spindle (A) [38], and the Spring [34] can be removed.

**Fig. 15**

9-2-2. Reassembly

Simply reverse the disassembly procedures while observing the following precautions.

(1) Anvil section

- (a) Insert Anvil (M) [29] with the chamfered inner diameter section of Washer (F) [27] facing the Anvil vane.
 - (b) Insert the Rubber Washer [26] and the Metal D20 x 16 [24] and its Oil Seal 12 x 18 x 3 [22] so that grease will not leak from inside.
 - (c) Fit the two Steel Balls [28] [3.175 mm dia. (1/8")] into the hole in Anvil (M) [29] and assemble Guide Sleeve (A) [21], the Guide Spring [20] and the Retainer [19] in this order. Then fit the Retainer Ring [18] into the Anvil groove.
- (Note) Assemble with the stepped portion of the Retainer [19] facing the forward end.

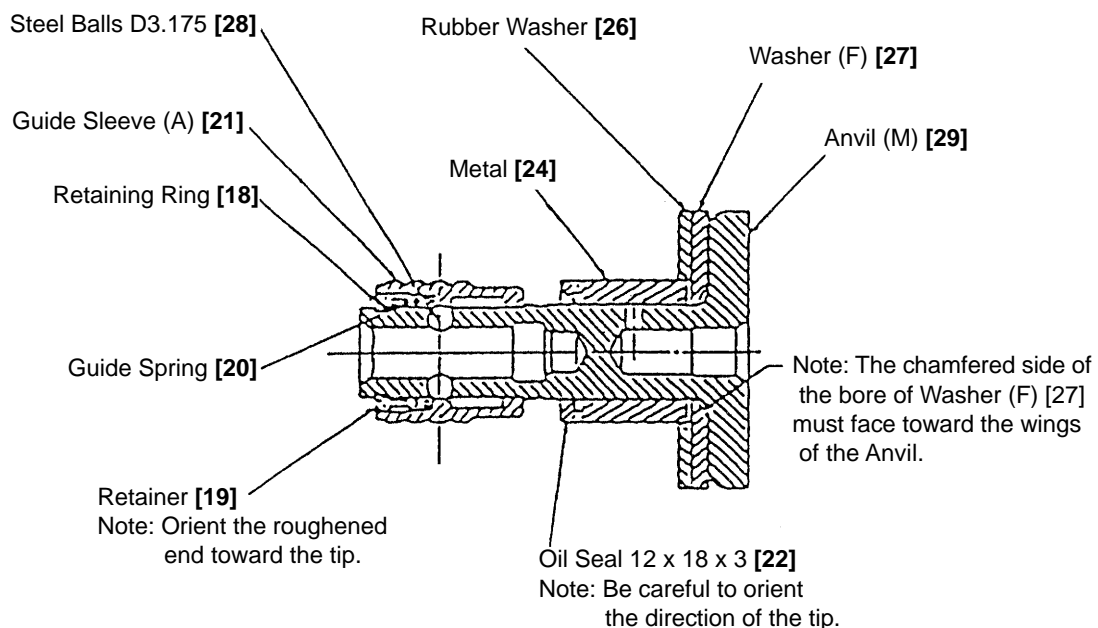


Fig. 16

(2) Hammer and spindle section

- (a) Press-fit the Gear [37] from the top of the Spindle, insert Washer (A) [36] and fit it into the groove of Spindle (A) [38] with the chamfered face of Stopper (A) [35] facing up. Then insert the Spring [34], and with 21 Steel Balls [32] [3.97 mm dia. (5/32")] and Washer (G) [33] placed in the Hammer, keep on the Hammer with Spindle (A) [38] contacted.
- (b) Bring the apex of the cam groove provided in Spindle (A) [38] in Fig. 15 on page 14 into alignment with the Steel Ball receiving groove in Hammer (A) [31]. Press down by hand one of the lugs at the Hammer end to compress Spring [34], and compress Stopper (A) [35] at end face of the Hammer (A) [31] until it rests on Spindle (A) [38] to support it.
- (c) Fit the two Steel Balls [30] [5.55 mm dia. (7/32")] into the Steel Ball receiving groove. After making sure that the Steel Balls are in the cam groove, release the pressure to complete assembly.

(3) Assembly of mechanical parts into Housing (A)

- (a) Spline the Anvil (M) [29] with its assembly parts shown in Fig. 16 to the Spindle and install in Housing (A). Fit Washer (A) [40] behind the Ball Bearing [39].
- (b) Insert Ball Bearing (B) [48] into the Gear (second pinion) [37] and install in Housing (A) so that the gears mesh.

(5) Housing section

(a) Lubrication

Before mounting the hammer, spindle and anvil sections, apply silicone rubber (ThreeBond 1211) (Code No. 306927) to the shaded areas shown in Fig. 18 to ensure grease sealing.

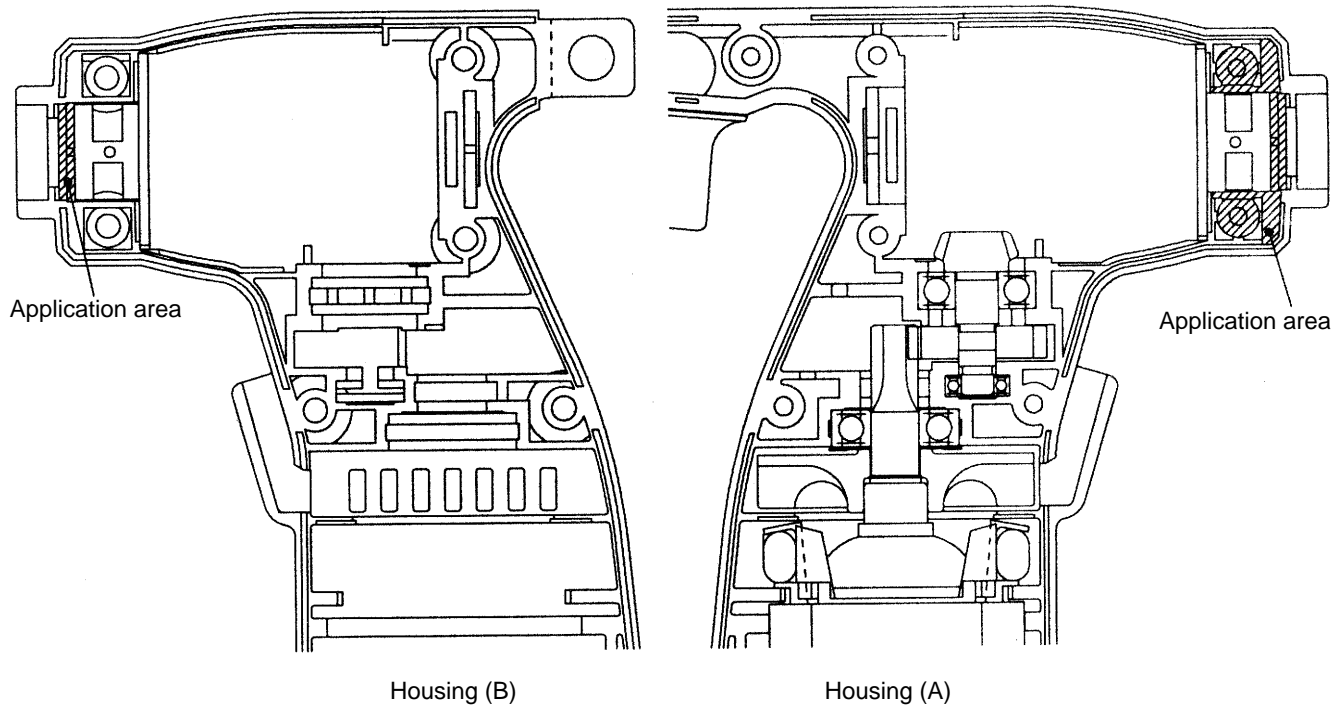


Fig. 18

(b) When replacement of Housings (A) and (B) is not required, apply silicone rubber (ThreeBond 1221) (Code No. 306927) to the Oil Seal 12 x 18 x 3 [22] and the spigot joint section (projection) of Housing (A) (shaded areas in Fig. 19) to ensure grease sealing.

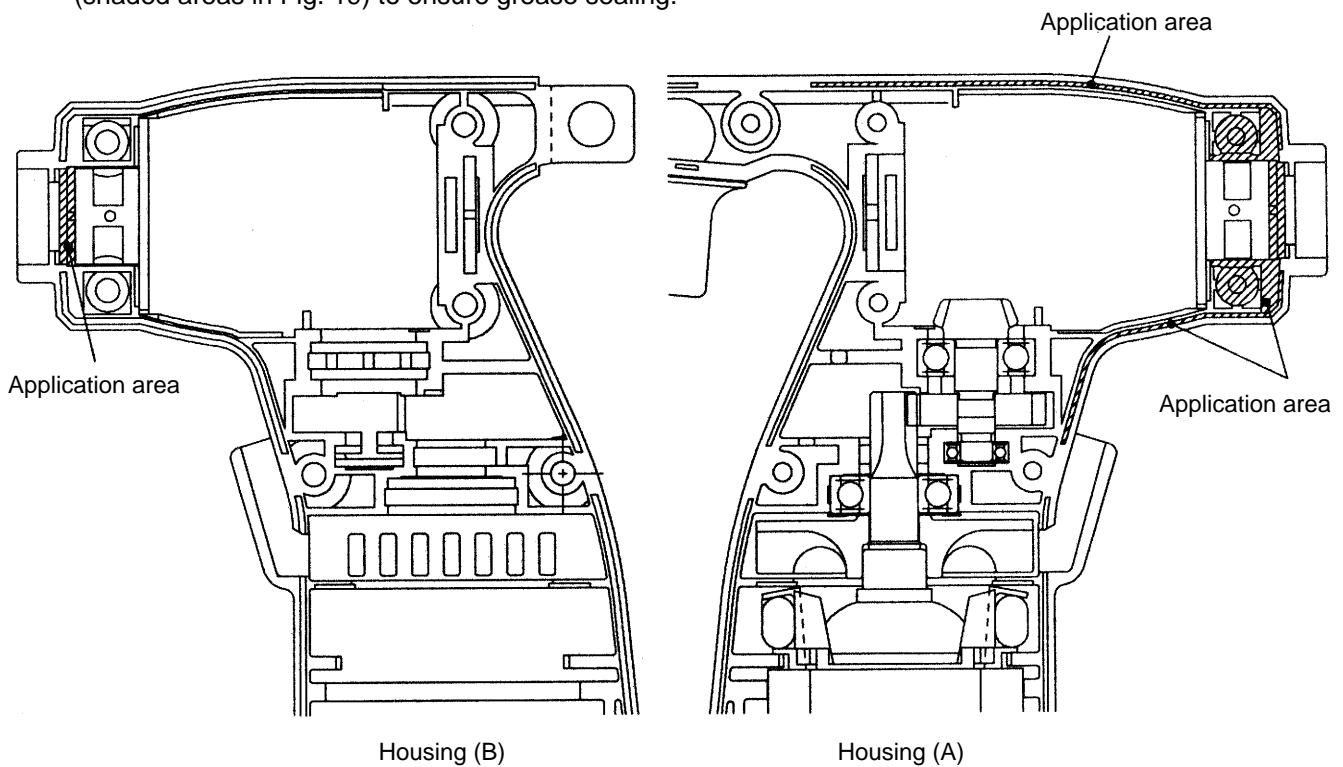


Fig. 19

(6) Wiring of switch

General internal wiring can be accomplished by referring to step (7). The following are special instructions for switch connection.

(a) Disconnection of reversing switch wiring

As illustrated in Fig. 20, insert a small flat-blade screwdriver into the slots near the terminals and pull out the lead wires.

(b) Disconnection of variable-speed control switch wiring

As illustrated in Fig. 22, insert a small flat-blade screwdriver into the slots near the terminals and pull out the lead wires in the same manner as illustrated in Fig. 20.

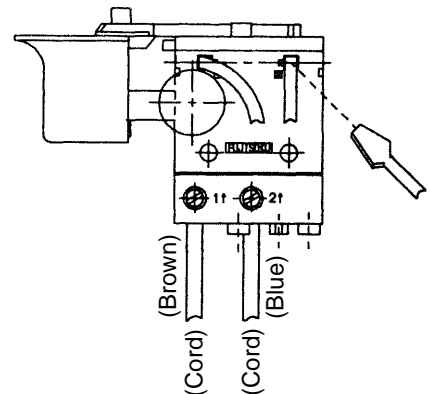


Fig. 20

(c) Wiring of reversing switch

As illustrated in Fig. 21, insert the lead wire (brown) coming from the stator into the terminal marked "(1)" of the reversing switch, and the lead wire (yellow) into terminal "(2)".

Insert the lead wire (brown) coming from the carbon brush into the terminal "(3)" and the lead wire (brown) into the terminal "(4)". After insertion, pull each lead wire slightly to check that the lead wires do not come out.

(d) Wiring of the variable-speed control switch

Insert each cord into the terminal marked "1 ↑" and terminal "2 ↑" of the speed control switch as shown in Figs. 20 and 22, and tighten the screw (tightening torque: 2.5 – 3.0 kg·cm). Insert the lead wire (blue) coming from the stator into the terminal marked "M1" and the lead wire (red) into terminal "M2". Insert each lead wire (red) coming from the noise suppressor into the terminals C1 and C2. After insertion, pull each lead wire slightly to check that the lead wires do not come out.

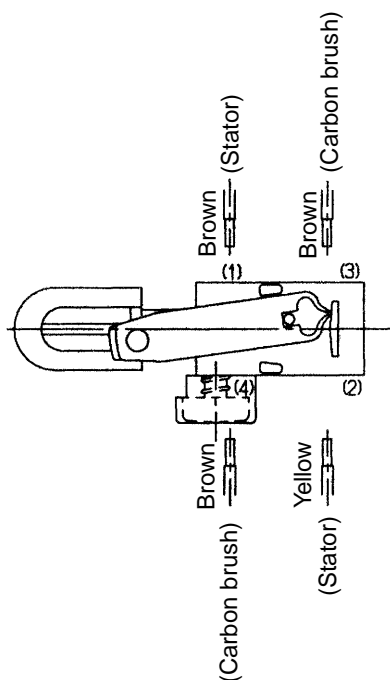


Fig. 21

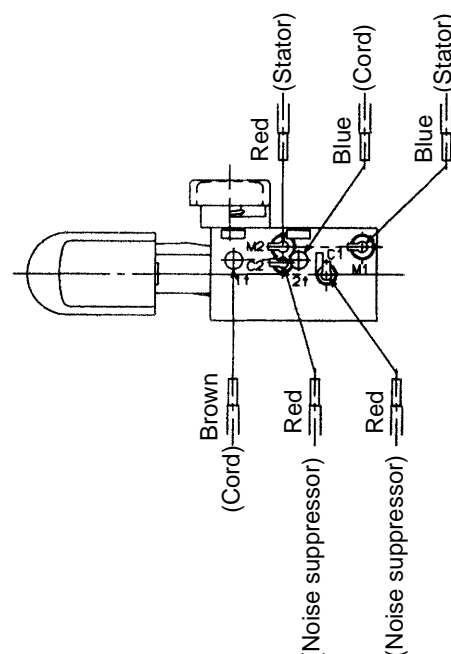


Fig. 22

(7) Internal wire arrangement

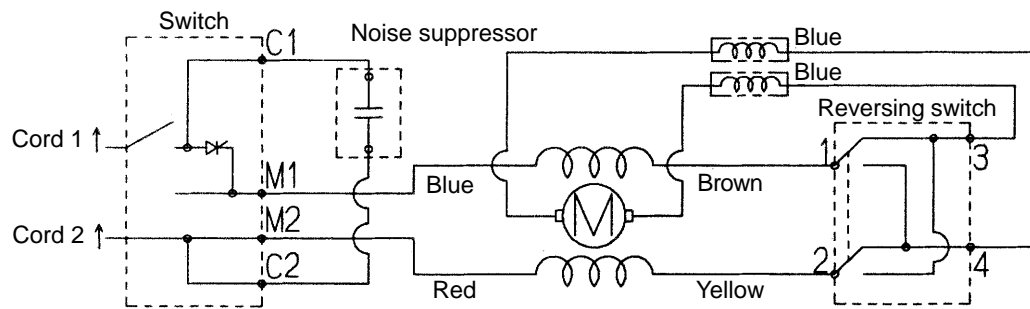


Fig. 23 Wiring diagram

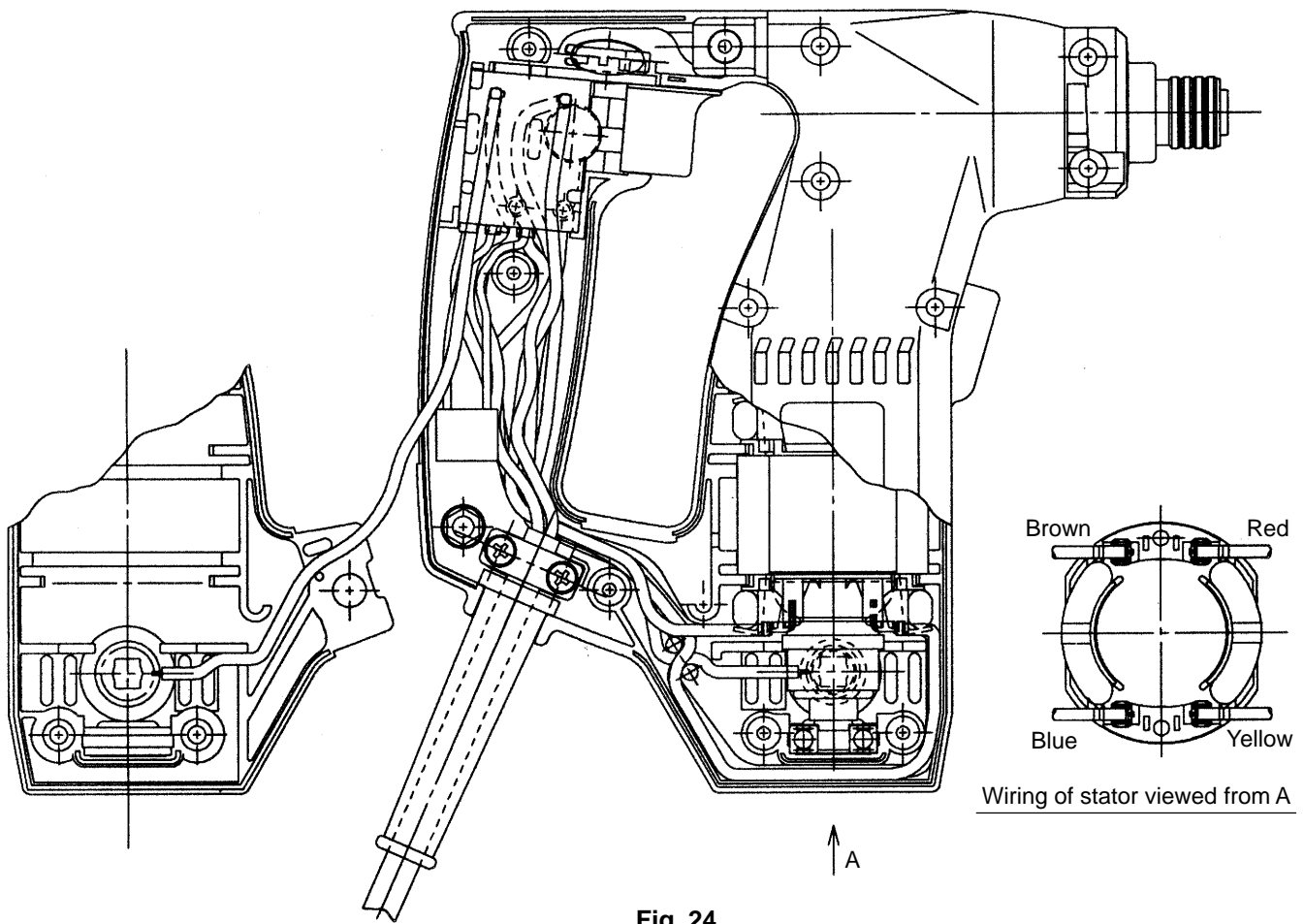
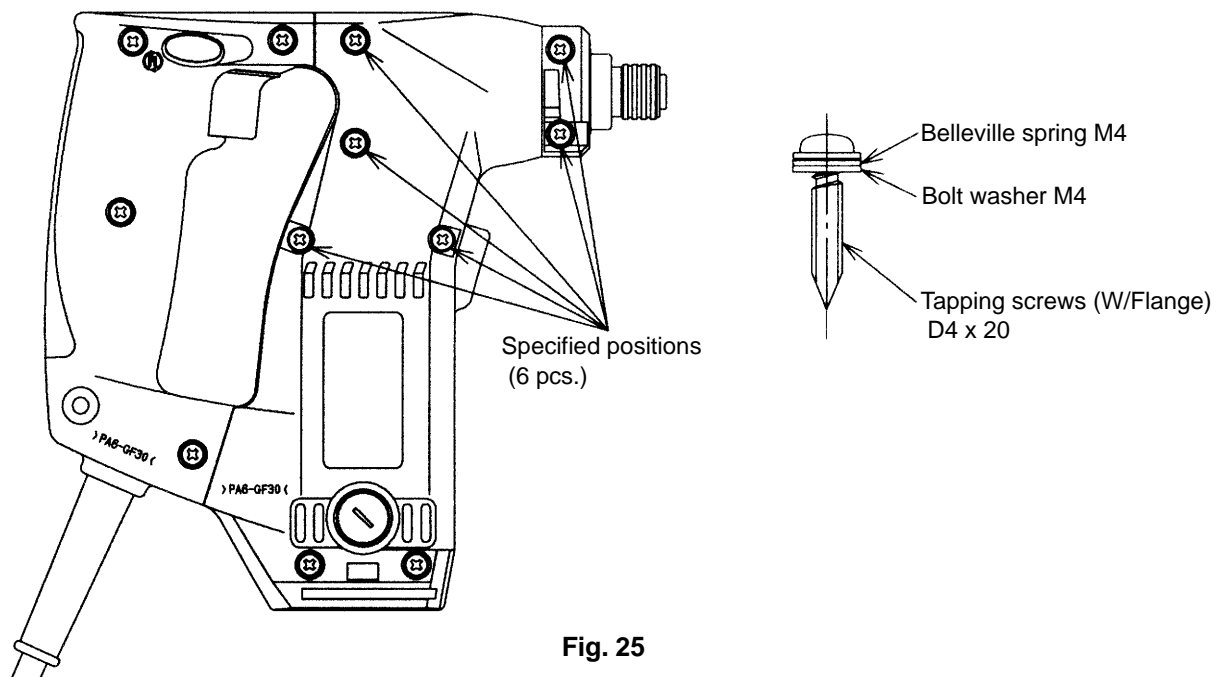


Fig. 24

- (a) Connect the internal wires as illustrated in the above diagrams. Ensure that the wiring does not contact the armature.
- (b) Mount housing (B) and handle cover being careful not to catch the internal wires.

(8) Mounting position of the tapping screw

Note that the Belleville Springs M4 [43] and the Bolt Washers M4 [42] must be mounted together with the Tapping Screws (W/Flange) D4 x 20 [13] at the positions specified in Fig. 25. Use only the Tapping Screws (W/Flange) D4 x 20 [13] for the other positions.



(9) Grease

- Grease application spots

*MOLUB-ALLOY 777-1 (Code No. 309922) is recommended.

- (a) Tooth surfaces of the Gear [37]
 - (b) Hammer (A) [31] lugs
 - (c) The Steel Balls [32] [3.97 mm dia. (5/32")]
 - (d) Spindle (A) [38] cam groove
 - (e) The sliding surface between Hammer (A) [31] and Spindle (A) [38]
 - (f) The 6 mm dia. hole in Anvil (M) [29]
 - (g) The sliding surface between Anvil (M) [29] and the Metal D20 x 16 [24]
 - (h) Hammer (A) [31] cam groove
 - (i) Spindle (A) [38] and Anvil (M) [29] or their splined portion
 - (j) The Steel Balls [30] [5.55 mm dia. (7/32")]
 - (k) Anvil (M) [29] vane
- *Hitachi motor grease No. 29 [Code No. 930035 (tube) or 930037 (can)]
- (l) Tooth surfaces of the Armature Ass'y [70] and First Gear [47]
 - (m) The Steel Balls [28] [3.175 mm dia. (1/8")] to be fitted into Anvil (M) [29]
 - (n) The sliding part of Guide Sleeve (A) [21] of Anvil (M) [29]
 - (o) The both side surfaces of the Ball Bearing [39] of the Gear [37]

(10) Tightening Torque

- (a) Tapping Screws (W/Flange) [4] [13] 1.5 – 2.5 N•m (15 – 25 kgf•cm, 1.08 – 1.80 ft-lb)
- (b) Brush Cap [55] 0.5 – 1.5 N•m (5 – 15 kgf•cm, 0.36 – 1.08 ft-lb)

9-2-3. Insulation Tests

On completion of disassembly and repair, measure the insulation resistance and conduct insulation tests (Dielectric Strength Test).

Insulation Resistance: 7 MΩ or more with DC 500 V Megohm Tester.

Dielectric Strength: AC 4,000 V/1 minute, with no abnormalities 230 V – 240 V

CAUTION

- Ensure without fail that the insulation resistance measurement and dielectric strength test are conducted between the plug blade and some portion of the external metal frame, such as the gear cover.

Never carry out these tests between the two blades of the plug with main switch turned ON. This could cause burning out of the control element in the switch.

9-2-4. No-load Current Value

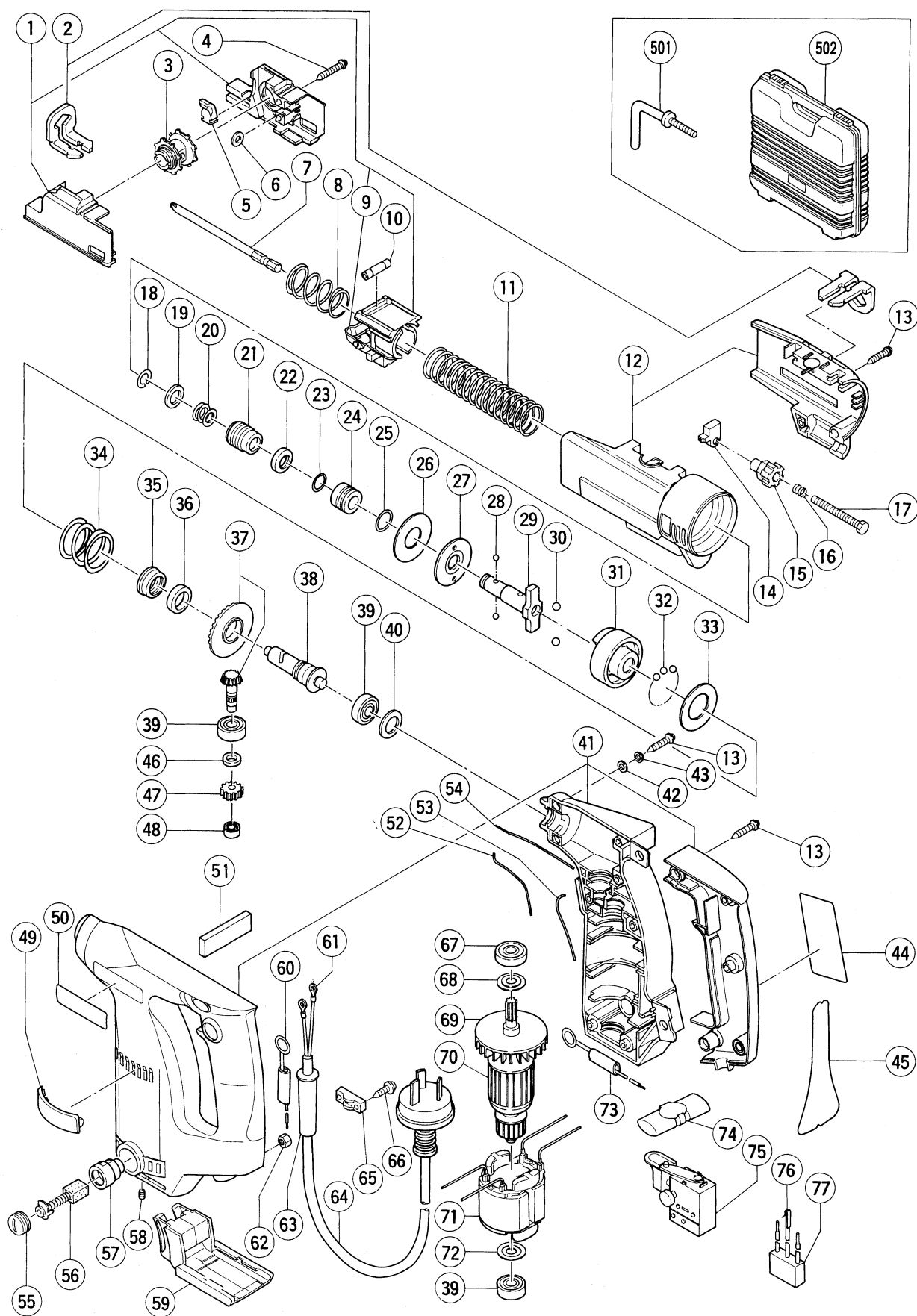
After no-load operation for 30 minutes, the no-load current value should be lower than the specified one at a frequency of 50/60 Hz.

230 – 240 V 0.8 – 0.9 A

10. STANDARD REPAIR TIME (UNIT) SCHEDULES

| MODEL | Variable | | 10 | 20 | 30 | 40 | 50 | 60 |
|-------|----------|--|---------------------------------------|---|---|----|----|----|
| | Fixed | | | | | | | |
| WF 4V | | Work Flow | | | | | | |
| | | | | Spring (D) Stopper Piece Screw Stopper (A) Bit Guide Slider Ass'y Sprocket Spring (A) Spring (B) Link Piece Roller Slider Case (A).(B) Set Stopper Bolt M5 x 50 Knob Spring | | | | |
| | | Top Adjuster (A).(B) Set | | | | | | |
| | | | | Armature Ass'y (with Ball Bearing) | Housing (A).(B) Set Stator (A) | | | |
| | | General Assembly | | | | | | |
| | | Fin Ass'y Terminal (C) Guide Sleeve (A) | Oil Seal Metal Rubber Washer | Hammer Spring Stopper (A) Anvil (G) | Spindle Ball Bearing (608VV) Metal Gear Ball Bearing (608VV) First Gear Ball Bearing (B) MR126 | | | |
| | | Switch Cord | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Assembly Diagram for WF 4V



PARTS
WF 4V

| ITEM NO. | CODE NO. | DESCRIPTION | NO. USED | REMARKS | |
|----------|----------|--|----------|-----------------------------|--|
| 1 | 313-733 | SLIDER ASS'Y | 1 | INCLUD.9 | |
| 2 | 312-420 | TOP ADJUSTER (A).(B) SET | 1 | | |
| 3 | 313-758 | SPROCKET | 1 | | |
| 4 | 304-035 | TAPPING SCREW (W/FLANGE) D4X25 (BLACK) | 2 | | |
| 5 | 312-421 | SCREW STOPPER (A) | 2 | | |
| 6 | 312-424 | BIT GUIDE | 1 | | |
| 7 | 313-880 | + DRIVER BIT (A) NO.2 109L | 1 | | |
| 8 | 312-814 | SPRING (B) | 1 | | |
| 9 | 312-510 | LINK PIECE | 1 | | |
| 10 | 312-418 | ROLLER | 1 | | |
| 11 | 312-417 | SPRING (A) | 1 | | |
| 12 | 312-416 | SLIDER CASE (A).(B) SET | 1 | | |
| 13 | 302-086 | TAPPING SCREW (W/FLANGE) D4X20 (BLACK) | 16 | | |
| 14 | 312-419 | STOPPER | 1 | | |
| 15 | 312-428 | KNOB | 1 | | |
| 16 | 312-430 | SPRING | 1 | | |
| 17 | 312-429 | BOLT M5X50 | 1 | | |
| 18 | 995-933 | RETAINING RING | 1 | | |
| 19 | 307-899 | RETAINER | 1 | | |
| 20 | 995-931 | GUIDE SPRING | 1 | | |
| 21 | 307-782 | GUIDE SLEEVE (A) | 1 | | |
| 22 | 314-271 | OIL SEAL 12X18X3 | 1 | | |
| 23 | 314-272 | O-RING (A) | 1 | | |
| 24 | 314-270 | METAL D20X16 | 1 | | |
| 25 | 314-273 | O-RING (B) | 1 | | |
| 26 | 302-328 | RUBBER WASHER | 1 | | |
| 27 | 302-329 | WASHER (F) | 1 | | |
| 28 | 959-148 | STEEL BALL D3.175 (10 PCS.) | 2 | | |
| 29 | 318-158 | ANVIL (M) | 1 | | |
| 30 | 959-154 | STEEL BALL D5.556 (10 PCS.) | 2 | | |
| 31 | 314-269 | HAMMER (A) | 1 | | |
| 32 | 959-155 | STEEL BALL D3.97 (10 PCS.) | 21 | | |
| 33 | 302-331 | WASHER (G) | 1 | | |
| 34 | 312-413 | SPRING | 1 | | |
| 35 | 314-268 | STOPPER (A) | 1 | | |
| 36 | 941-732 | WASHER (A) | 1 | | |
| 37 | 314-266 | GEAR | 1 | | |
| 38 | 314-267 | SPINDLE (A) | 1 | | |
| 39 | 608-VVM | BALL BEARING 608VVC2PS2L | 3 | | |
| 40 | 987-641 | WASHER (A) | 1 | | |
| 41 | 318-155 | HOUSING (A).(B) SET | 1 | INCLUD.45,52-54,57,58,60,73 | |
| 42 | 949-429 | BOLT WASHER M4 (10 PCS.) | 6 | | |
| 43 | 314-279 | BELLEVILLE SPRING M4 (BLACK) | 6 | | |
| 44 | | NAME PLATE | 1 | | |
| 45 | 312-815 | GRIP TAPE | 1 | | |
| 46 | 314-265 | DISTANCE WASHER D13X6.5 | 1 | | |
| 47 | 314-264 | FIRST GEAR | 1 | | |
| 48 | 314-263 | BALL BEARING (B) MR126ZZ | 1 | | |
| 49 | 314-629 | RUBBER COVER (B) | 1 | | |
| 50 | | HITACHI LABEL | 1 | | |
| 51 | 314-284 | FELT | 1 | | |

* : ALTERNATIVE PARTS

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WF 4V

9 – 99

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WF 4V

OPTIONAL ACCESSORIES

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