

MODEL

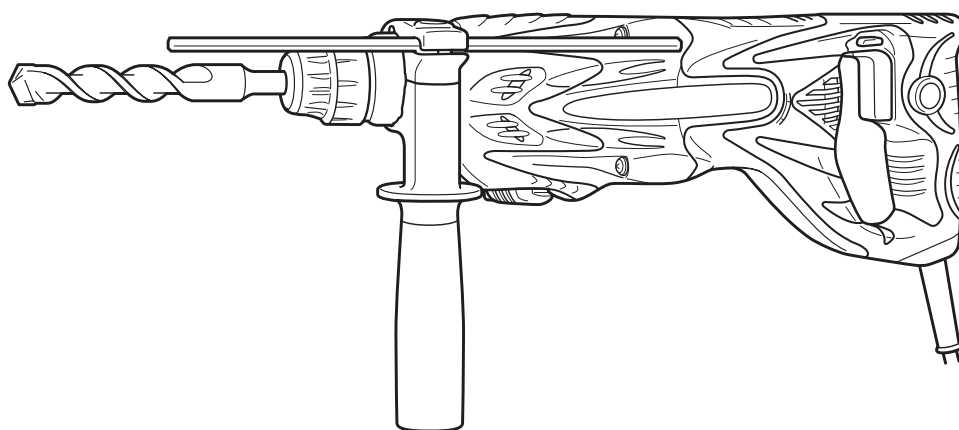
DH 24PF3

Hitachi Power Tools

**ROTARY HAMMER
DH 24PF3**

**TECHNICAL DATA
AND
SERVICE MANUAL**

D



LIST No. E490

May 2005

REMARK:

Throughout this TECHNICAL DATA AND SERVICE MANUAL, symbols are used in the place of company names and model names of our competitors. The symbols utilized here are as follows:

Symbols Utilized	Competitors	
	Company Name	Model Name
B	BOSCH	11224VSR
C	MAKITA	HR2455



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1. PRODUCT NAME

Hitachi Rotary Hammer, Model DH 24PF3

2. MARKETING OBJECTIVE

The new Model DH 24PF3 is a 3-mode type rotary hammer with a D-shaped handle based on the Model DH 24PC3 rotary hammer drill. It features the "rotation + hammering" mode, "rotation only" mode and "hammering only" mode. The Model DH 24PF3 is equipped with the variable lock mechanism that is available in the "hammering only" mode. With the variable lock mechanism, the tip angle of a cold chisel or other tool is selectable from 36 levels.

The main features of the Model DH 24PF3 are as follows:

- (1) Class-top drilling speed
- (2) More comfortable and frisky drilling
- (3) Long service life and high durability thanks to the internal pressure adjustment mechanism
- (4) Non-slip double-layer molded handle and gear cover
- (5) New and powerful design aiming at iF design award

3. APPLICATIONS

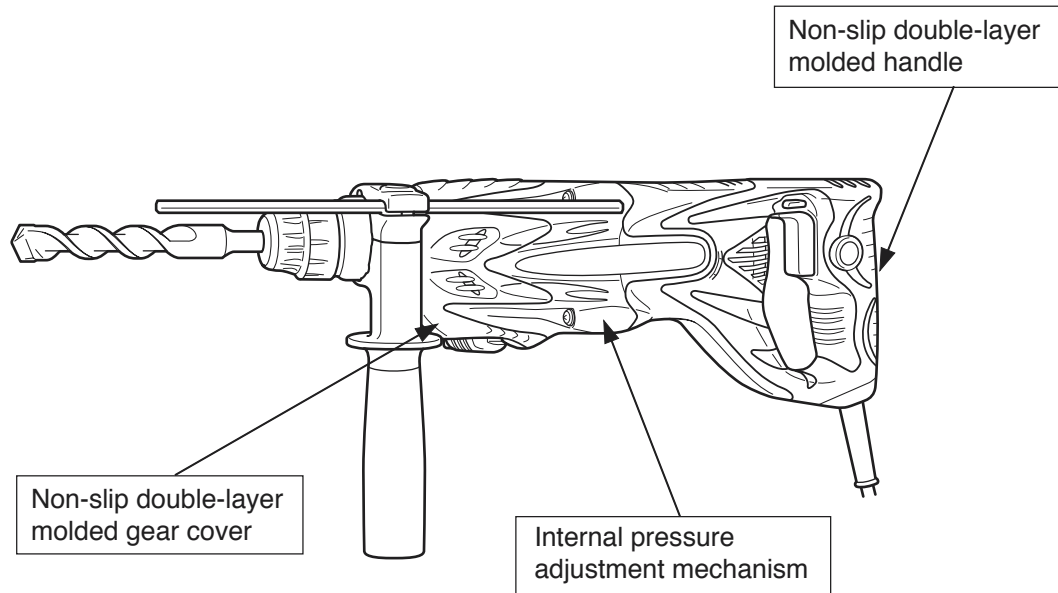
- (1) Rotation and hammering function
 - Drilling anchor holes
 - Drilling holes in concrete, tile, brick and similar materials
- (2) Rotation only function
 - Drilling holes in steel and wood (with chuck adapter)
 - Tightening and loosening machine screws and wood screws (with chuck adapter)
- (3) Hammering only function
 - Light-duty chiselling of concrete
 - Groove digging and edging

[Typical applications]

- Air conditioning Installation of air conditioners, water coolers and heaters, and air ducts
- Piping and plumbing Installation of gas, water, and sanitary facilities
- Electrical work Installation of light fixtures and various electric appliances
- Interior decoration Installation of seating , display stands and partitions
- Other civil engineering, construction and repair work

4. SELLING POINTS

- Class-top drilling speed
- More comfortable and frisky drilling
- New and powerful design



4-1. Selling Point Descriptions

4-1-1. Selectable from 3 modes, "rotation + hammering", "rotation only" and "hammering only"

The new Model DH 24PF3 is a 3-mode type rotary hammer with a D-shaped handle based on the Model DH 24PC3 rotary hammer drill (2-mode type). It features the "hammering only" mode in addition to the "rotation + hammering" mode and the "rotation only" mode. The Model DH 24PF3 is available not only for light-duty chipping by means of bull points but also for groove digging and edging by means of cold chisels and cutters for various applications.

4-1-2. Variable lock mechanism

With the variable lock mechanism, the tip angle of a tool such as a cold chisel or a cutter is selectable from 36 levels and can be locked in the "hammering only" mode. Thus the tip of a tool can be properly positioned according to the application.

4-1-3. Class-top drilling speed

The drilling speed of the Model DH 24PF3 is 1.4 times higher than B and 1.2 times higher than C thanks to the efficient transmission of the hammering energy.

4-1-4. More comfortable and frisky drilling

The Model DH 24PF3 can drill holes more comfortably and friskily with a light pushing force because the quantity of body jumping is 20% less than C.

4-1-5. Internal pressure adjustment mechanism

By minimizing variations in the internal pressure during operation, hammering operation is stabilized. In addition, idling and grease leakage can be prevented.

4-1-6. Non-slip double-layer molded gear cover

The double-layer molded gear cover consists of a plastic resin base covered with a soft resin to ensure ease of operation and a non-slip grip during chipping.

4-1-7. Non-slip double-layer molded handle

The double-layer molded handle consists of a plastic resin base covered with a soft resin to ensure a soft-touch and non-slip grip.

5. SPECIFICATIONS

5-1. Specifications

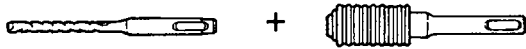
Model		DH 24PF3								
Capacity	Concrete	3.4 to 24 mm (1/8" to 15/16")								
	Steel	13 mm (1/2")								
	Wood	32 mm (1-1/4")								
Power source		AC single phase 60 Hz								
Voltage, current and input		<table><tr><td>Voltage (V)</td><td>Current (A)</td><td>Input (W)</td></tr><tr><td>120</td><td>7.0</td><td>800</td></tr></table>			Voltage (V)	Current (A)	Input (W)	120	7.0	800
		Voltage (V)	Current (A)	Input (W)						
120	7.0	800								
Rotation speed	No-load	Forward: 0 to 1,150/min Reverse: 0 to 550/min								
	Full-load	0 to 890/min								
Full-load blow		0 to 4,600/min								
Type of motor		AC single-phase commutator motor								
Type of switch		Variable speed control switch and reversing switch								
Type of handle		D-type handle of main body and side handle								
Enclosure		Housing Handle cover } ... Glassfiber reinforced polyamide resin (green and black) Gear cover Glassfiber reinforced polyamide resin (cool gray and black)								
Weight	Net*	2.4 kg (5.3 lbs.)								
	Gross	4.5 kg (9.9 lbs.)								
Packaging		Plastic case								
Standard accessories		(1) Plastic case 1								
		(2) Side handle 1								
		(3) Depth gauge 1								

*: Weight excludes cord and side handle.

5-2. Optional Accessories

A. Drilling anchor holes (rotation + hammering)

- Drill bit (slender shaft)

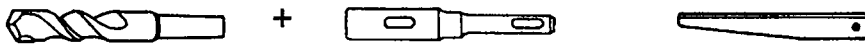


(1) Drill bit (slender shaft)

(2) Adapter for slender shaft
(SDS-plus shank)

Drill bit (slender shaft)				Adapter for slender shaft
Outer dia. (mm)	Effective length (mm)	Overall length (mm)	Code No.	Code No.
3.4 (1/8")	45 (1-25/32")	90 (3-17/32")	306369	306370
3.5 (9/64")	45 (1-25/32")	90 (3-17/32")	306368	

- Drill bit (taper shank)



(1) Drill bit (taper shank)

(2) Taper shank adapter
(SDS-plus shank)

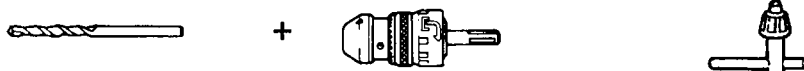
(3) Cotter

(1) Drill bit (taper shank)		(2) Taper shank adapter		(3) Cotter
Outer dia. (mm)	Code No.	Type	Code No.	Code No.
11 (7/16")	944460	Morse taper No. 1	303617	944477
12.3 (31/64")	944461			
12.7 (1/2")	993038			
14.3 (9/16")	944462			
14.5 (73/128")	944500			
17.5 (11/16")	944463			
21.5 (27/32")	944464	Morse taper No. 2	303618	

Part name	Code No.	Taper shank adapter (A-taper or B-taper) is provided as an optional accessory, but drill bit is not provided.
A-taper	303619	
B-taper	303620	

- 13 mm hammer drill chuck

For drilling operations when using a straight shank bit for impact drilling with a rotary hammer



(Straight-shank bit for
impact drills)

13 mm (1/2") hammer drill
chuck (SDS-plus shank)

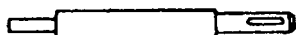
Chuck wrench

Part name	Code No.
13 mm (1/2") hammer drill chuck (including chuck wrench)	303332
Chuck wrench	303334
Rubber cap	303335

B. Anchor setting (hammering only)

- Anchor setting bar to permit anchor setting operation with the rotary hammer

Anchor setting bar



Anchor setting adapter (SDS-plus shank)

Part name	Overall length	Code No.	Part name	Overall length	Code No.
W-1/4 Anchor setting adapter-A	260	302976	W-1/4 Anchor setting adapter-B	260	302979
W-5/16 Anchor setting adapter-A	260	302975	W-5/16 Anchor setting adapter-B	260	302978
W-3/8 Anchor setting adapter-A	160	303621	W-3/8 Anchor setting adapter-B	160	303622
W-3/8 Anchor setting adapter-A	260	302974	W-3/8 Anchor setting adapter-B	260	302977
Internal cone type			External cone type		

- Anchor setting bar for manual anchor setting



Anchor setting adapter

+



Part name	Code No.	Part name	Code No.
W-1/4 Anchor setting adapter-A	971794	W-1/4 Anchor setting adapter-B	971799
W-5/16 Anchor setting adapter-A	971795	W-5/16 Anchor setting adapter-B	971800
W-3/8 Anchor setting adapter-A	971796	W-3/8 Anchor setting adapter-B	971801
W-1/2 Anchor setting adapter-A	971797	W-1/2 Anchor setting adapter-B	971802
W-5/8 Anchor setting adapter-A	971798	W-5/8 Anchor setting adapter-B	971803
Internal cone type		External cone type	

C. Large hole boring (rotation + hammering)

- Center pin, core bit, core bit shank and guide plate



+



+



+



(Guide plate)

Center pin

Core bit

Core bit shank
(SDS-plus shank)

(1) Center pin (Do not use bit with outer diameter of 25 mm (31/32") and 29 mm (1-5/32").)

Center pin (A)	Core bit (outer diameter) 32, 35, 38 mm (1-1/4", 1-3/8", 1-1/2")	Code No. 982684
Center pin (B)	Core bit (outer diameter) 45, 50 mm (1-25/32", 2")	Code No. 982685

(2) Guide plate

Core bit (outer diameter) (mm)	Code No.	Core bit (outer diameter) (mm)	Code No.
32 (1-1/4")	982686	50 (2")	982690
35 (1-3/8")	982687		
38 (1-1/2")	982688		
45 (1-25/32")	982689		

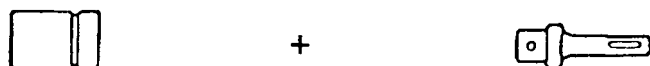
(3) Core bit with guide plate (The guide plate is not supplied with 25 mm (31/32") and 29 mm (1-5/32") outer diameter core bits.)

Outer diameter (mm)	Code No.	Outer diameter (mm)	Code No.
25 (31/32")	982672	45 (1-25/32")	982677
29 (1-5/32")	982673	50 (2")	982678
32 (1-1/4")	982674		
35 (1-3/8")	982675		
38 (1-1/2")	982676		

(4) Core bit shank (SDS-plus shank)

Core bit shank (A)	Core bit (outer diameter) 25 - 38 mm (31/32" - 1-1/2")	Overall length 105 mm (4-1/8")	Code No. 303625
		Overall length 300 mm (11-52/64")	Code No. 303626
Core bit shank (B)	Core bit (outer diameter) 45 - 50 mm (1-25/32" - 2")	Overall length 300 mm (11-52/64")	Code No. 303627

D. Bolt placing operations with chemical anchor (rotation + hammering)



(Standard sockets available on the market)

12.7 mm (1/2") Chemical anchor adapter (SDS-plus shank)

19 mm (3/4") Chemical anchor adapter (SDS-plus shank)

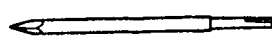
Part name	Code No.
12.7 mm (1/2") Chemical anchor adapter	303044
19 mm (3/4") Chemical anchor adapter	303045

E. Crushing operations (hammering only)



Bull point (round type)
(SDS-plus shank)

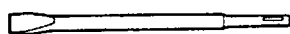
Code No. 303046



Square bull point
(SDS-plus shank)

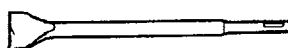
Code No. 316656

F. Groove digging and edging (hammering only)



Cold chisel
(SDS-plus shank)

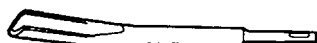
Code No. 316657



Cutter
(SDS-plus shank)

Code No. 316658

G. Grooving (hammering only)



Grooving chisel
(SDS-plus shank)

Code No. 316659

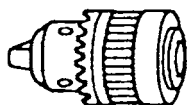
H. Drilling holes and driving screws (rotation only)

- Drill chuck, chuck adapter (G), special screw and chuck wrench



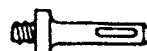
Special screw

+



13 mm (1/2") Drill chuck
(13VLRB-D)

+



Chuck adapter (G)
(SDS-plus shank)



Chuck wrench

(Note)

If the tool is to be used for loosening screws, open the three jaws of the drill chuck and securely fix the drill chuck to chuck adapter (G) with the special screw (a left-hand threaded M6 screw) when mounting the drill chuck onto chuck adapter (G).

	Part name	Code No.
a.	Chuck adapter (G) for SDS-plus shank system	303623
b.	13 mm (1/2") Drill chuck 13VLRB-D (with chuck wrench)	321814
c.	Special screw (M6 left-hand threaded)	981122

(1) Cross-recessed head (Phillips) bit

[Overall length: 70 mm]

(For use with cross-recessed head (Phillips) screw)



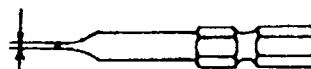
Stamped bit No.

Bit No.	Code No.	Applicable screw dia. (mm)
No. 2	955654	4 – 5
No. 3	955655	6 – 8

(2) Slotted-head (minus) bit

[Overall length: 50 mm]

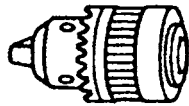
(For use with slotted-head (minus) screw)



Tip thickness

Bit tip thickness	Code No.	Applicable screw dia. (mm)
0.8	955658	4
1	955673	5 – 6

I. Drilling hole (rotation only) ... For drilling holes in steel and wood

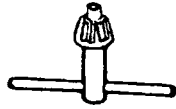


Drill chuck (13VLD-D)

+



Chuck adapter (D)
(SDS-plus shank)



Chuck wrench

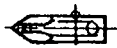
(NOTE)

The 13VLD-D drill chuck and chuck adapter (D) cannot be used for reverse rotation. If reverse rotation is to be used for loosening screws, use the plus bit (bit No. 2) described below by attaching it directly to chuck adapter (D).

Part name	Code No.
Chuck adapter (D) (for SDS-plus shank type)	303624
13 mm (1/2") Drill chuck 13VLD-D (with chuck wrench)	321813

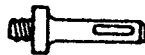
J. Drilling screws (rotation only)

- Plus driver bit [overall length: 25 mm] (for cross-recessed head screws)



Bit No.

+



Chuck adapter (D)
(SDS-plus shank)

Bit No.	Screw size	Code No.
No. 2	3 – 5 mm	971511Z
No. 3	6 – 8 mm	971512Z

K. Grease for electric impact drill

- Containing 500 g (17.64 oz): Code No. 980927



- Containing 30 g (1.06 oz.): Code No. 981840

70 g (2.5 oz.): Code No. 308471



L. Dust cup, dust collector (B)

Dust cup



Code No. 971787

Dust collector (B) ass'y



Code No. 306885

6. COMPARISONS WITH SIMILAR PRODUCTS

6-1. Specification Comparisons

Maker・Model Item			HITACHI DH 24PF3	HITACHI DH 24PF	B	C
Capacity	Concrete	mm	24 (15/16")	24 (15/16")	22 (7/8")	25 (1")
	Steel	mm	13 (1/2")	13 (1/2")	13 (1/2")	13 (1/2")
	Wood	mm	32 (1-1/4")	32 (1-1/4")	25 (1")	32 (1-1/4")
Input		W	800	720	750	780
No-load rotation speed		min ⁻¹	0 – 1,150	0 – 1,150	0 – 1,100	0 – 1,100
Full-load impact rate		min ⁻¹	0 – 4,600	0 – 4,600	0 – 4,450	0 – 4,500
Weight		kg	2.4 (5.3 lbs.)	2.5 (5.5 lbs.)	2.9 (6.5 lbs.)	2.8 (6.2 lbs.)
Dimension	Length	mm	405 (15-15/16")	420 (16-1/2")	445 (17-1/2")	424 (16-3/4")
	Height	mm	148 (5-53/64")	147 (5-51/64")	154 (6-1/16")	155 (6-7/64")
	Width	mm	78 (3-1/16")	69 (2-23/32")	84 (3-5/16")	80 (3-5/32")
Function	Forward-reverse changeover switch		○ (Push-button type)	○ (Push-button type)	○ (Lever-type)	○ (Lever-type)
	Tool retainer		One-push type	One-push type	One-push type	One-push type
	Double-layer molded handle		○	○	×	○
	Changeover modes		3 modes	3 modes	3 modes	3 modes

Note 1) Mark "○": Equipped Mark "×": Not equipped

2) Weight excludes cord and side handle.

6-2. Drilling Speed Comparison

Drilling speed varies considerably depending on the work conditions. Use the factory test results shown in Fig. 1 for comparison purpose only.

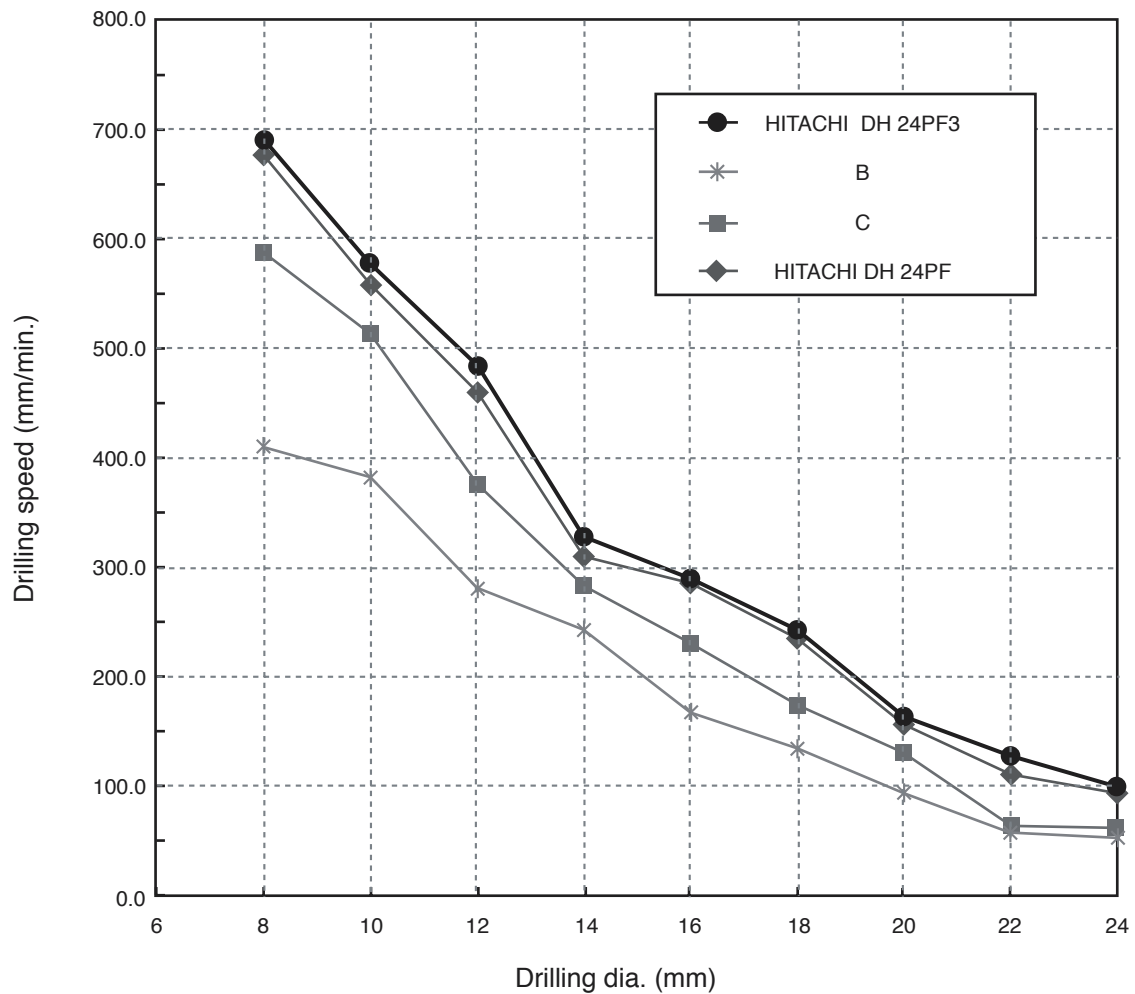


Fig. 1

[Test conditions]

- Direction : Downward drilling
- Pushing force : 98 N (10 kgf)
- Test material : Concrete panel with a compression strength of 2,352 N/cm² (240 kgf/cm²)

6-3. Chiseling Performance Comparison

Chiseling performance varies considerably depending on the work conditions. Use the factory test results shown in Fig. 2 for comparison purposes only.



Fig. 2

7. PRECAUTIONS IN SALES PROMOTION

In the interest of promoting the safest and most efficient use of the Model DH 24PF3 Rotary Hammer by all of 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 attached to each tool.

7-1. Handling Instructions

Although every effort is made in each step of design, manufacture and inspection to provide protection against safety 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 Rotary Hammer 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.

7-2. Caution Plate

The Model DH 24PF3 unit is provided with a Caution Plate (illustrated below) which lists basic safety precautions in use. Carefully ensure that the customer fully understands and follows these precautions before using tool.

For the U. S. A. and 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.

8. REFERENCE MATERIAL

8-1. Lubrication

It is not necessary to replenish the grease lubricant unless the tool is disassembled or there is grease leakage due to a defective seal. Special grease is used in the striking section. Should the striking section (within the gear cover) be disassembled, carefully remove the old grease from all parts and, on reassembly, inject 45 g (1.6 oz) of new grease into the gear cover and 5 g (0.2 oz) into the groove portion of inner cover. Be careful not to exceed the designated amount of grease. Excessive grease will reduce striking efficiency.

Apply Molub Alloy No. 777-1 grease to the pin portion of the change lever.

8-2. Tool Structure

- Transmission of rotation

Unlike conventional rotary hammers, the armature shaft in the Model DH 24PF3 is in parallel with the tool shaft - the same structure that is employed in most impact drills. This structure was adopted in order to make the Model DH 24PF3 more compact for easier handling and operation. Thus, the appearance of the Model DH 24PF3 is similar to that of an impact drill. The rotation of the armature is transmitted to the second shaft via the first gear, and causes it to rotate. The second pinion provided on the second shaft engages the second gear mounted on the outer circumference of the cylinder. The cylinder is coupled to the second gear by means of a slip mechanism, and they rotate together. The end of the cylinder also functions as the drill bit retainer. The cylinder is key-connected to the inserted drill bit by means of two key rails, and transmits rotation to the drill bit. A steel ball is used to prevent the bit from coming off.

- Piston reciprocating mechanism

In conventional rotary hammers, a piston is caused to reciprocate by a connecting rod and crank shaft, and the crank shaft and the cylinder axes are at right angle to each other. Accordingly, the armature shaft and the cylinder axes are also at right angles to each other. In the Model DH 24PF3, through adoption of a spiral drive system (a mechanism using a reciprocating bearing), a more compact design has been achieved by arranging the armature shaft in parallel with the cylinder axis. Referring to Fig. 3, the armature's rotation is transmitted to the second shaft via the first gear. The second shaft's rotation is then transmitted through a spline to the clutch, which engages with a reciprocating bearing and causes it to rotate. However, as illustrated, circular grooves on the inner race of the reciprocating bearing are positioned on an angle of inclination with relation to the second shaft. The rotation of the inner race and the shaft causes the angle of inclination to change regularly forward and back with relation to the second shaft, and produces a rocking motion in the outer race of the reciprocating bearing. Finally, a rod extending from the outer race of the reciprocating bearing is connected to the piston by a piston pin, and causes the reciprocating motion of the piston.

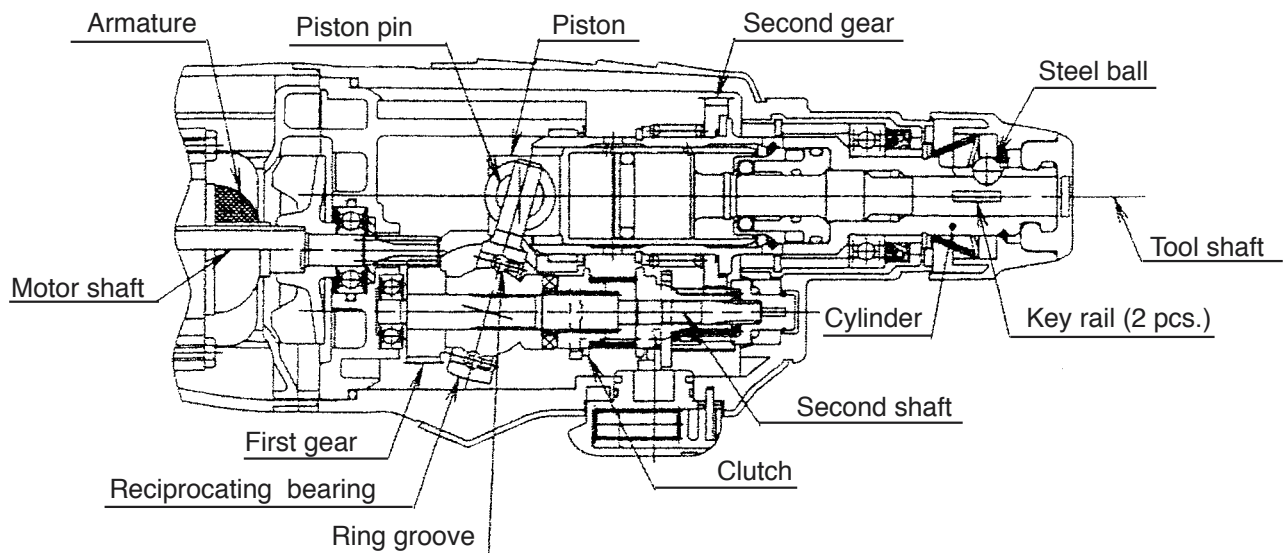


Fig. 3

- Hammering function

The piston reciprocates within the cylinder to move the striker in the same manner as in conventional rotary hammers. As the piston reciprocates, the changing air pressure inside the air chamber between the piston and the striker causes the striker to move and repeatedly strike against the end of the second hammer. At the same time, the changing air pressure within the air chamber which moves the striker also provides an "air cushion" which absorbs the impact of the hammering action. As any air leakage from the air chamber weakens the air-cushion effect and reduces impact absorption, the O-ring (mounted on the striker) is extremely important to seal the air. Although special rubber material is utilized in construction of the O-ring to make its effective service life as long as possible, wear cannot be fully avoided. Accordingly, it is recommended that the O-ring be replaced approximately once a year, depending on the frequency of usage of the tool.

- Idle hammering prevention mechanism

The idle hammering prevention mechanism in the Model DH 24PF3 is different from that of conventional rotary hammers. When the drill bit is lifted from the work surface on completion of drilling, the second hammer moves to the position indicated by the continuous lines in Fig. 4 and the protruding (lip) portion at the tip of the striker is gripped by O-ring (C) mounted between the hammer holder and the damper holder. In this state, should the piston continue to move so that the small piston vent hole is blocked by the inner wall of the cylinder, the air in the air chamber will pass through the large piston vent hole and be released through the air-escape slot and large cylinder vent hole provided on the inner wall of the cylinder. Accordingly, there is no change in the air pressure within the air chamber, and movement of the striker (idle hammering operation) is prevented. The gripping force of O-ring (C) on the striker is so small in comparison with the conventional mount system that practically no pressing force at all is required to restart the hammering operation.

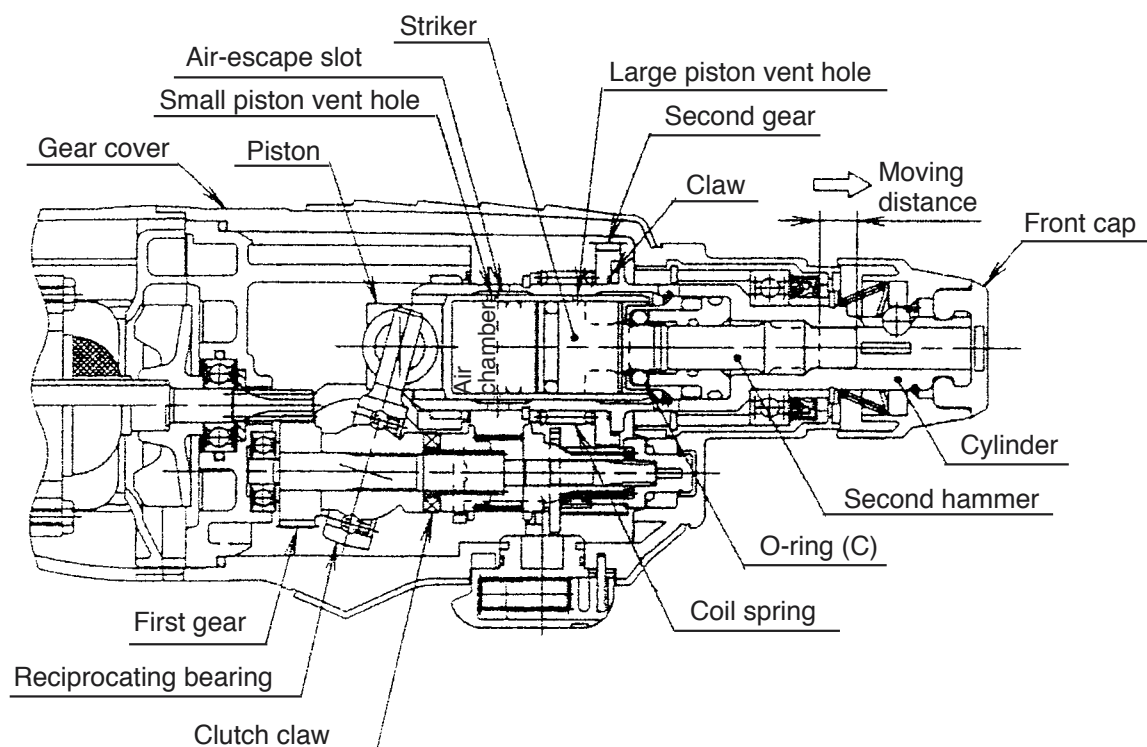


Fig. 4

- Slip mechanism

The slip mechanism in the Model DH 24PF3 consists of a coil spring which applies a pre-set amount of pressure to ensure the interlocking of three claws provided on the flange of the cylinder (the final rotating shaft) and six matching claws provided on the face of the second gear, by which rotation is transmitted to the cylinder. The second gear is fitted to the cylinder with a certain amount of play.

If an excessively large torque is applied to the tool shaft (cylinder), the force of the torque will exceed the pressure of the coil spring and cause the claws on the second gear to disengage from and ride over the claws on the cylinder so that the second gear idles and does not transmit rotation. Even if the drill bit comes in contact with a reinforcing bar within the concrete, causing sudden excessive torque, the slip mechanism functions to prevent damage to the gears, and possible loss of control of the tool by the operator.

- Sealed and dustproof construction

The gear cover is totally enclosed by oil seals, O-rings and other devices to prevent leakage of lubricating grease, and to keep dust and dirt out of the internal mechanisms. The drill bit chuck portion is protected by a rubber front cap to keep out dust and chips which could cause improper fitting of the drill bit and/or other faulty operation of the chuck portion. The speed control switch is also a fully dust-proofed type to prevent dust and chips from entering the handle section and causing possible operational trouble or a break down of the insulation.

- Speed control

The Model DH 24PF3 is equipped with a variable speed control switch which permits free change of the rotation speed and hammering force. When drilling in fragile materials, pull the switch trigger gently for low rotation speed (hammering force) to achieve optimum results.

Note that the switch trigger cannot be pulled to the full but up to the half in the reverse drilling, and the speed is about half of the forward drilling. In addition, the switch stopper cannot be used in the reverse drilling.

- Internal pressure adjustment mechanism

An air passage is provided as shown in Fig. 5 to let out air inside the gear cover and let outside air in the gear cover. This passage is sandwiched between felt packings to pass only air (pressure). Thus variations in the internal pressure are minimized for stable hammering operation and prevention of idling and grease leakage.

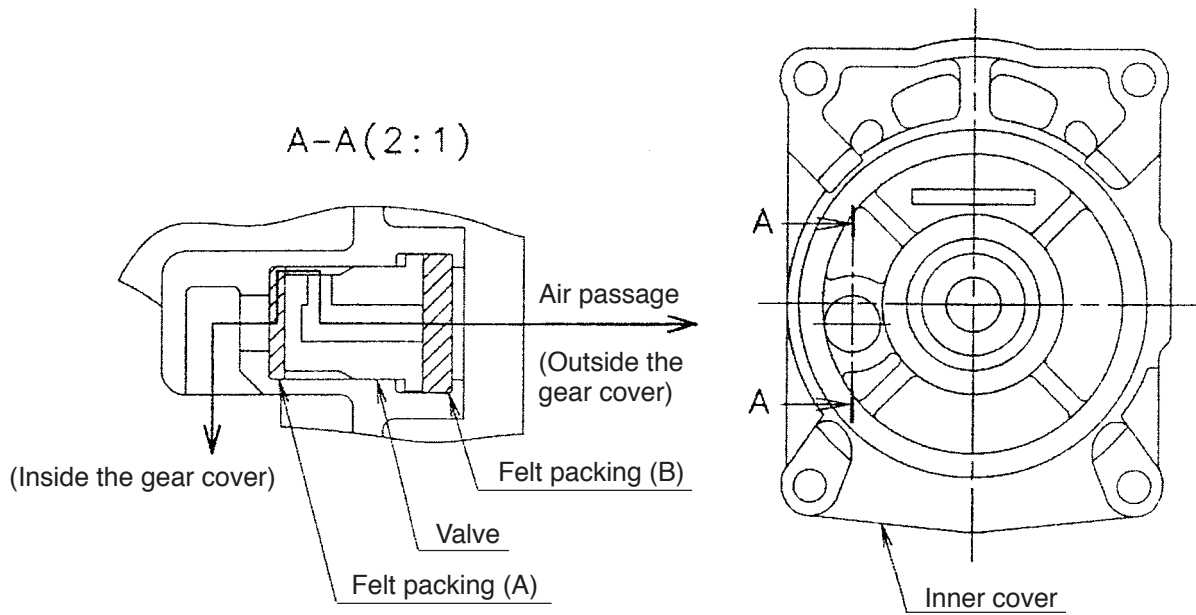


Fig. 5

8-3. "Three-Mode" Changeover Mechanism

The change lever of the Model DH 24PF3 permits quick and easy changeover among the "rotation and hammering", "rotation only" and "hammering only" functions. Each function mode is explained below. When operating the change lever, be sure to continue pressing the pushing button.

(1) Rotation and hammering (Fig. 6)

Adjust the change lever to "rotation and hammering" (T marks). Armature rotation is transmitted to the first gear and second shaft, and then to the clutch via the spline of the second shaft. Claws on the end surface of the clutch engage with matching claws of the reciprocating bearing (A portion in the figure) to convert the rotation into reciprocating motion. Three claws on the tip of the second shaft engage with matching three claws of the pinion sleeve all the time, and the second shaft rotation is transmitted to the pinion sleeve. Then claws on the large-dia. portion of pinion sleeve engage with the second pinion (B portion in the figure), and the rotation is transmitted to the second gear and the cylinder.

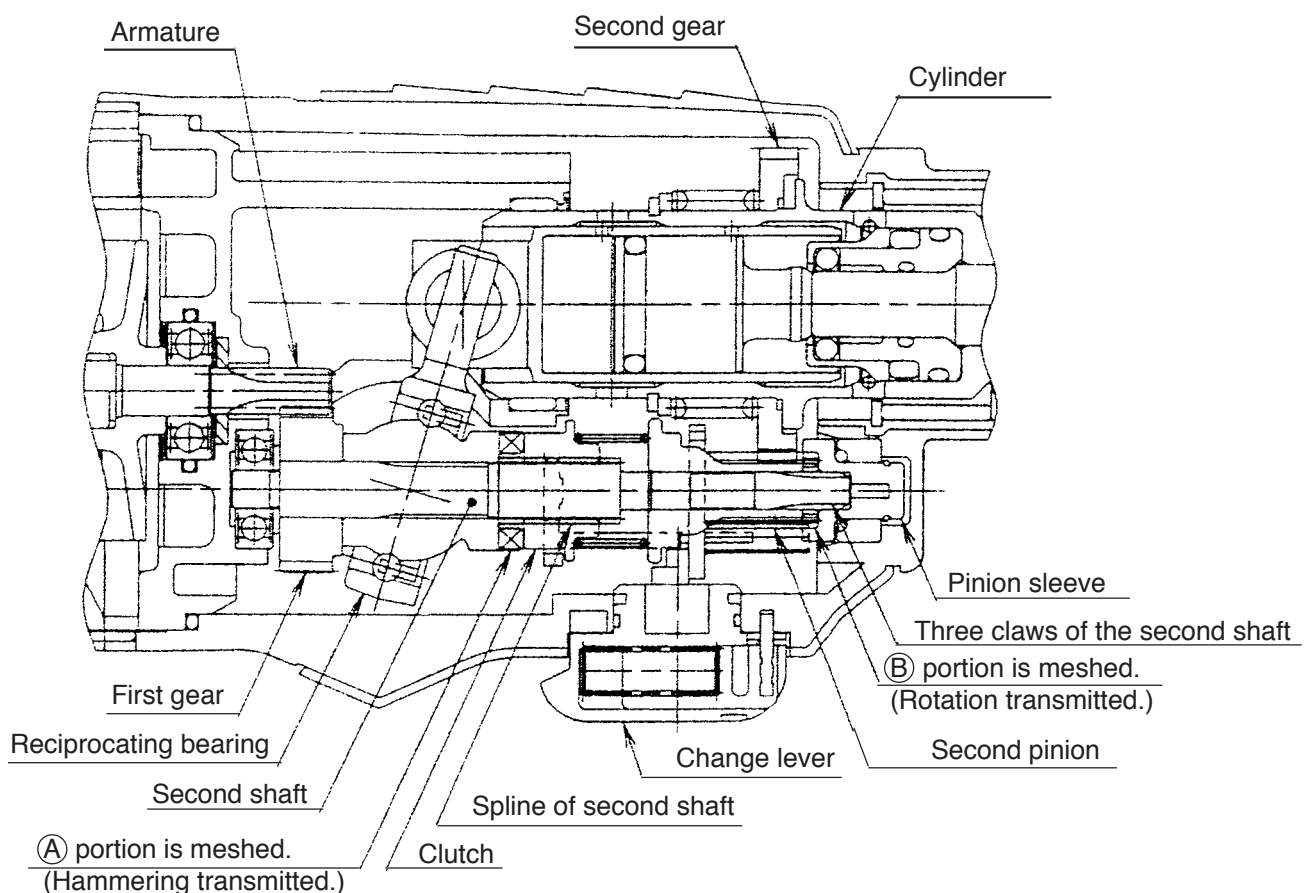



Fig. 6

(2) Rotation only (Fig. 7)

Adjust the change lever to "rotation only" ( mark). The lock plate is moved forward by the pin of the change lever, and the clutch is moved forward at the back end of the lock plate. Engagement between the clutch and the claws of the reciprocating bearing is released (Ⓐ portion in the figure). Thus no rotation is transmitted to the reciprocating bearing and hammering is stopped. On the other hand, the pinion sleeve engages with the second pinion (Ⓑ portion in the figure), and so the rotation is transmitted to the pinion sleeve for "rotation only" function.

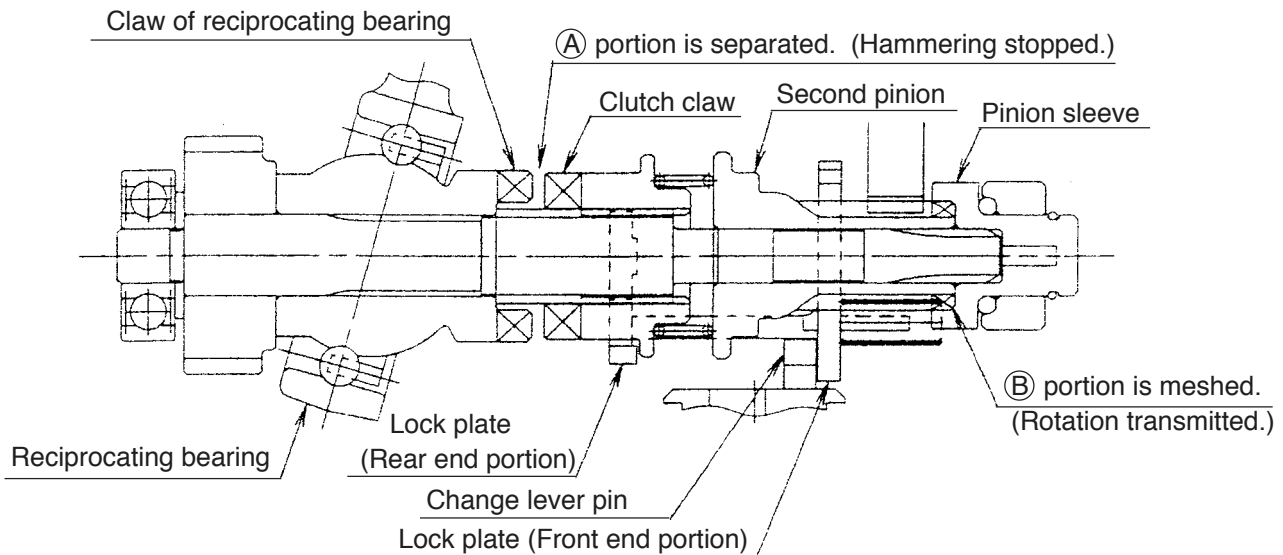



Fig. 7

(3) Hammering only (Fig. 8)

Adjust the change lever to "hammering only" ( mark). The second pinion is moved to the motor side by the pin of the change lever. Engagement between the pinion sleeve and the second pinion is released and no rotation is transmitted (Ⓑ portion in the figure). The lock plate is moved to the motor side by spring (B) and engaged with the locking claw of the second pinion to lock the cylinder rotation (Ⓒ portion in the figure). On the other hand, the clutch engages with the reciprocating bearing for "hammering only" function (Ⓐ portion in the figure).

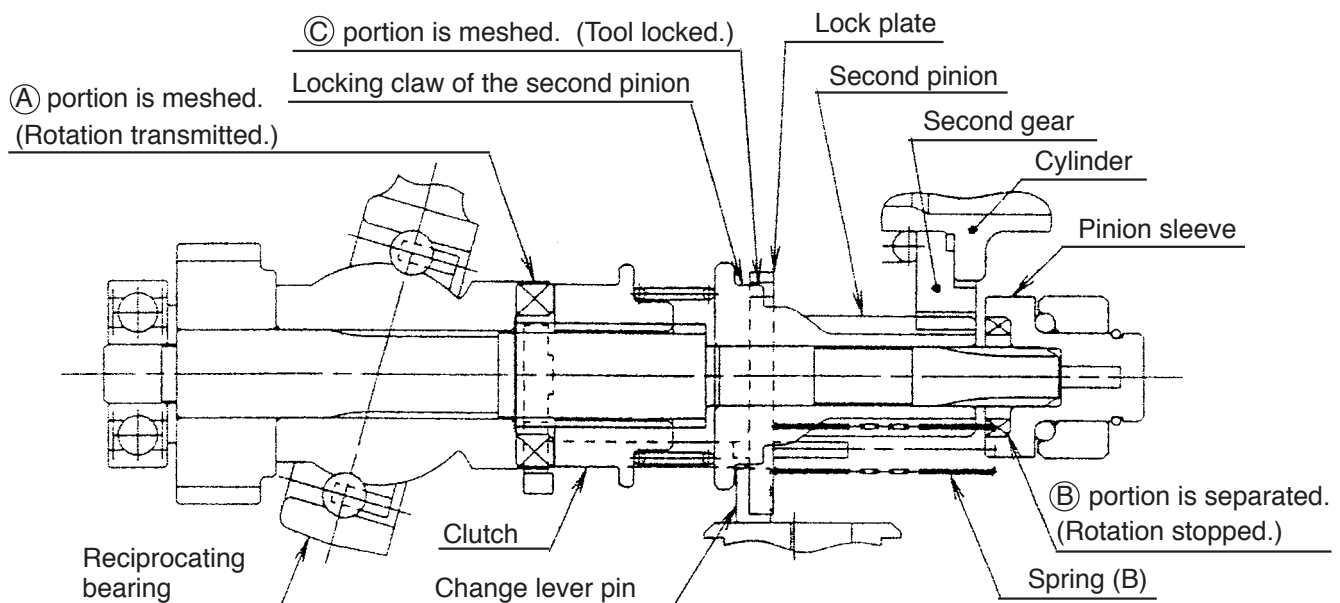


Fig. 8

(4) Neutral (Fig. 9)

The Model DH 24PF3 has a neutral mode used for positioning a tool such as a flat chisel. Adjust the change lever to a position halfway between "hammering only" (T mark) and "rotation and hammering" (T H marks). Engagement between the pinion sleeve and the second pinion (B portion in the figure), and between the lock plate and the locking claw of the second pinion (C portion in the figure) is released and the cylinder rotates freely. Simply turn the grip to adjust the tool to the desired position.

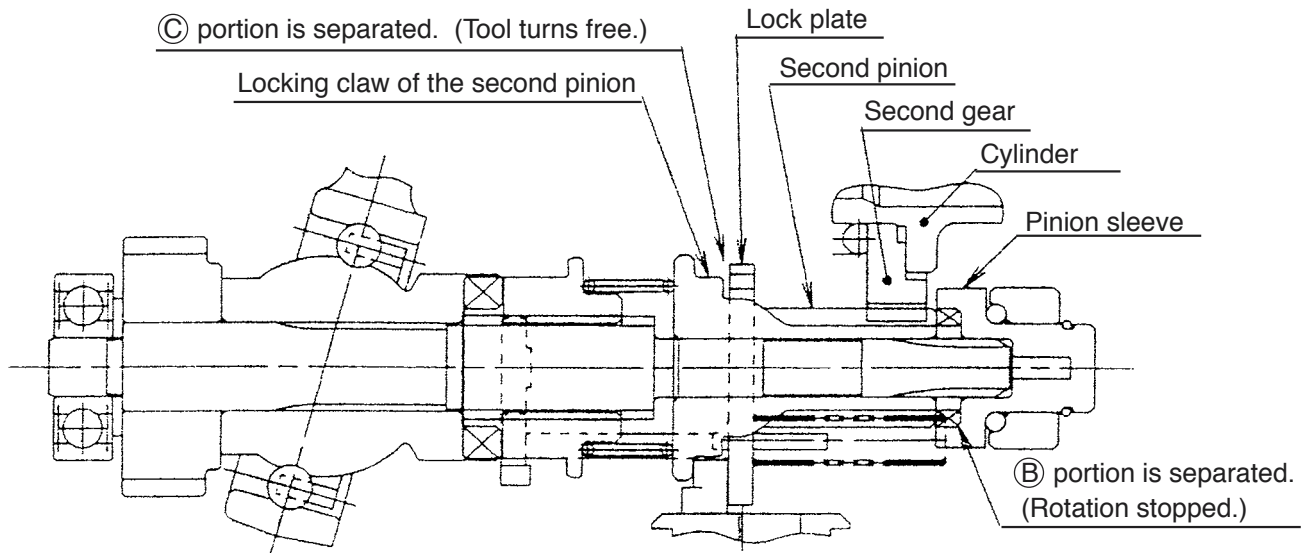


Fig. 9

8-4. Drill Bits

The chuck section is designed exclusively for the popular and widely available SDS-plus shank bits, as shown in Fig. 10. Rotating torque is transmitted to the drill bit by two key rails provided in the tool holding section. A steel ball is used to prevent the bit from coming off.

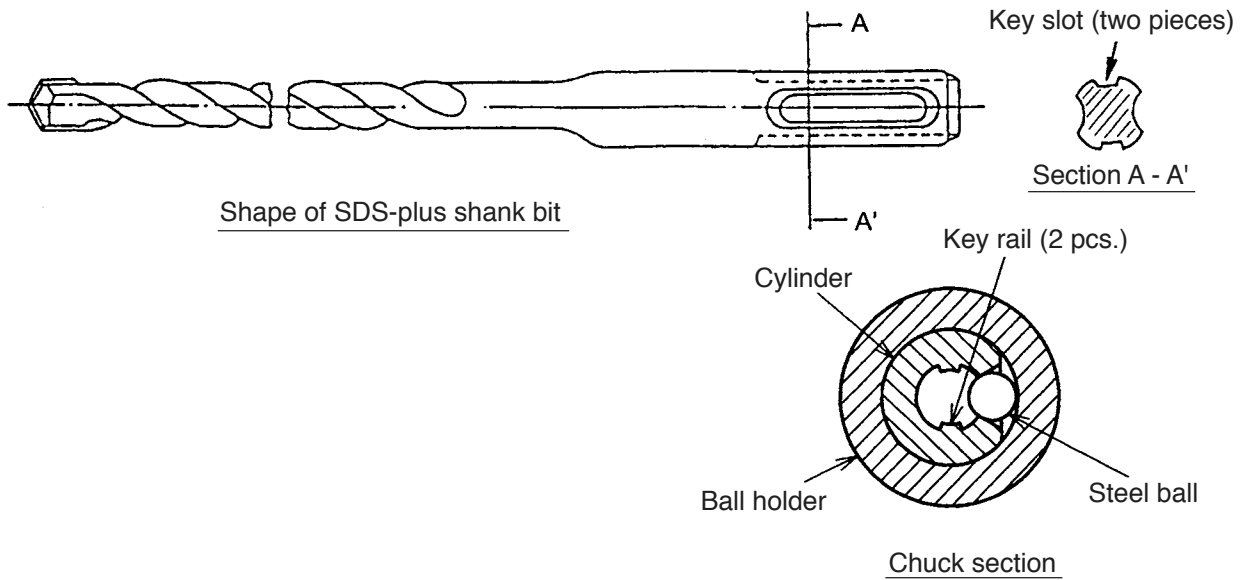


Fig. 10

The service life of a drill bit with a diameter of 8 mm is approximately 300 holes when drilling into concrete to a depth of 30 mm. If reground before the end of its service life, the drill bit will continue to provide efficient drilling. Figure 11 shows the regrinding angle.

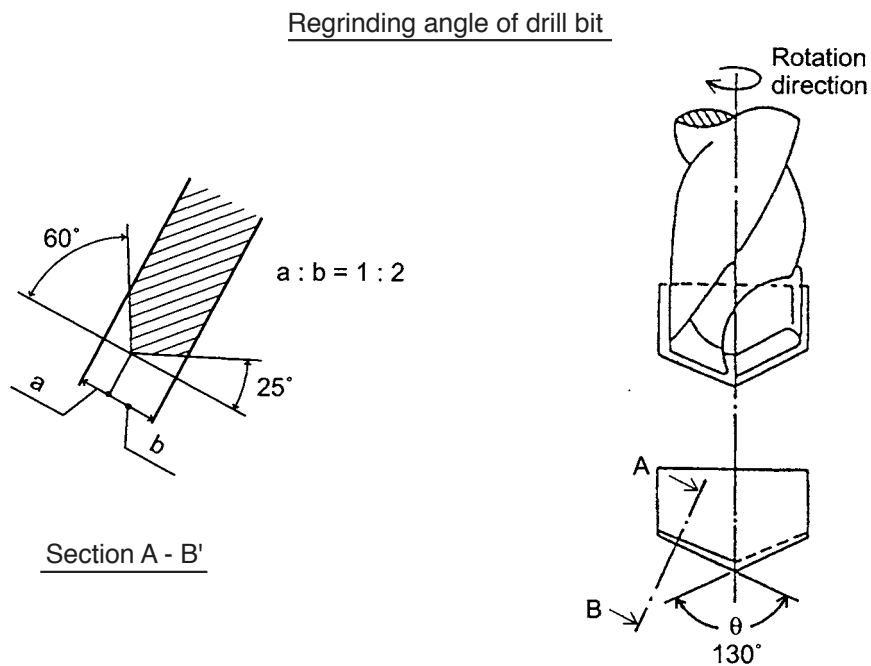


Fig. 11

8-5. Chuck Section

The tool retainer is structured as shown in Fig. 12.

The tip of the tool retainer is covered with the front cap (made of rubber) to prevent dust and chips from getting inside. The steel ball falls into the round groove of the bit to prevent the tool from coming off and the two key rails transmit the rotation torque.

To mount the bit, push the bit in the tool retainer as far as it will go. Pushing lightly, turn the bit until it is caught. At this position, push the bit in as far as it will go (sliding the grip is not required for mounting the bit). To remove the bit, slide the grip backward to the full and remove the bit.

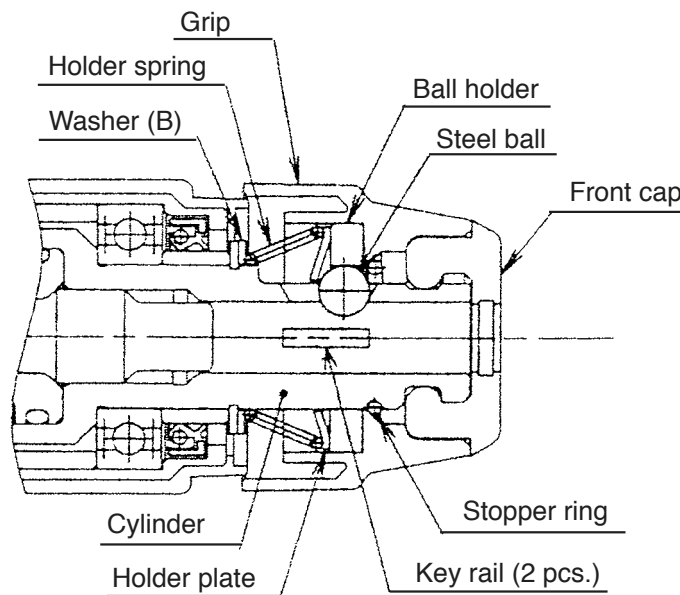


Fig. 12

8-6. Dust Collector (B)

When drilling holes overhead, dust collector (B) can be mounted on the Model DH 24PF3 to prevent dust and chips from falling downward. Dust collector (B) is intended solely for use when drilling holes in concrete, and cannot be used for drilling holes in steel or wood. It is designed for use with drill bits with overall length of 110 mm, 160 mm and 166 mm, and cannot be used with any longer bits. When using a drill bit with an overall length of 166 mm with dust collector (B), drilling up to a depth of approximately 72 mm is possible. When using dust collector (B), ensure it is securely fastened to the grip on the main body with socket adapter (B). Although the socket and socket adapter (B) rotate together with the tool shank, there is a steel ball between the outer race and the socket which serves as a ball bearing. Should the dust cover be forced against the concrete surface, it will not rotate even though the tool shank continues to rotate. Should the tool be operated when the dust cover is not being held against a concrete surface, inertia may cause dust collector (B) to become disconnected from the grip. Accordingly, caution the customer to press dust collector (B) and drill bit firmly against the concrete surface before turning on the switch to start drilling. When dust collector (B) is used, almost no dust and chips are scattered about. However, since the chips and dust remaining in the collector may scatter after completion of the drilling operation, the customer should be advised to always wear protective glasses. When dust collector (B) is disassembled for repair or maintenance, be very careful to prevent oil or grease from adhering to the steel balls. Grease or oil on the steel balls may cause concrete dust to enter the unit and cause defective rotation.

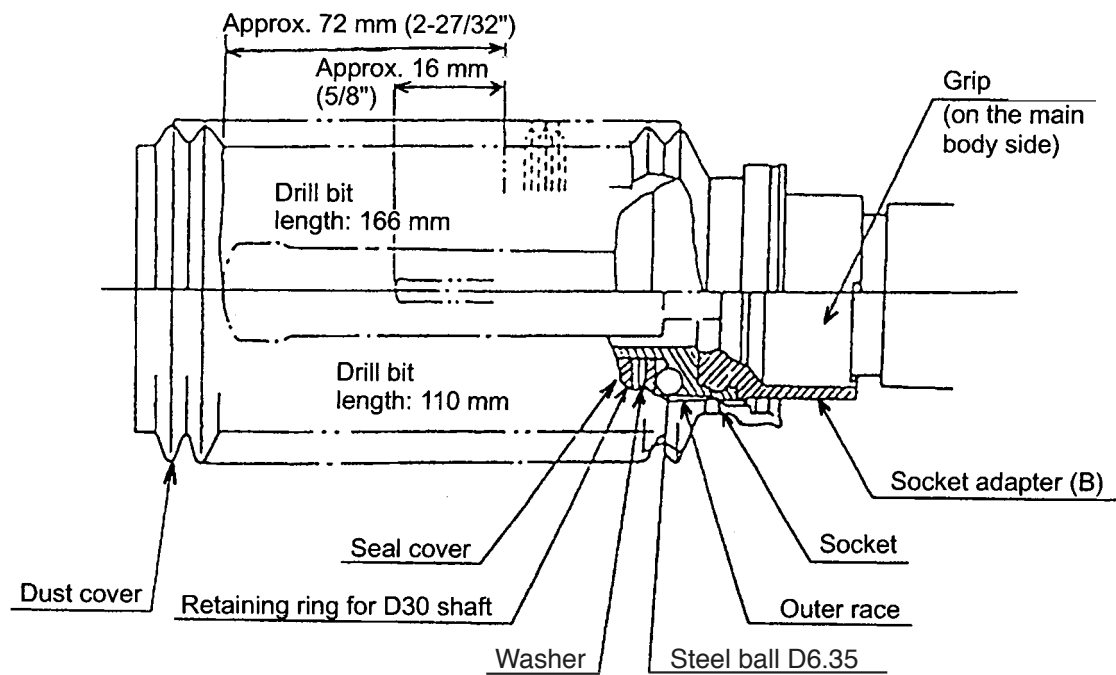



Fig. 13 Dust collector (B) surface

9. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

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

9-1. Disassembly

(1) Disassembly of the striking mechanism section

- Push the Second Hammer **[29]** in the main body with a drill bit or screwdriver to release the Striker **[37]** from O-ring (C) **[34]**.
- Pressing the Pushing Button **[18]**, move the Change Lever **[21]** to the "hammering only" mode ( mark). (Be sure to keep pressing the Pushing Button **[18]** when operating the Change Lever **[21]**.)
- Loosen the four Tapping Screws (W/Flange) D5 x 35 **[9]**, Å@Å@ and remove the Gear Cover Ass'y **[10]**. The Inner Cover Ass'y **[41]** and the Housing **[68]** are loosely fitted together. Attempting to pull them out first could cause the Armature Ass'y **[62]** to be pulled out at the same time, causing damage to the Carbon Brushes (Auto Stop Type) **[75]**.
- Remove Springs (B) **[22]** from the rails in the Gear Cover Ass'y **[10]** as shown in Fig. 14.
- Pull out the Second Pinion **[49]**, Clutch Spring **[50]**, Clutch **[51]** and Lock Plate **[48]** (these parts are sandwiched by means of the Lock Plate **[48]** as a unit as shown in Fig. 15) from the end of the Second Shaft **[52]**. Turn the Reciprocating Bearing **[53]** so that the Piston **[39]** is moved to its maximum upper position (Inner Cover Ass'y **[41]** side). The arm of the Reciprocating Bearing **[53]** can then be disconnected from the Piston Pin **[42]**, and the Second Shaft **[52]** and the components mounted on it can be removed from the Inner Cover Ass'y **[41]** as a unit.
- Remove the First Gear **[54]** from the Second Shaft **[52]** with a bearing puller. Then take off the Reciprocating Bearing **[53]**. At this time, take care not to damage the end surface of the Second Shaft **[52]** because the First Gear **[54]** is press-fitted in alignment with the 9 mm diameter end surface of the Second Shaft **[52]**.

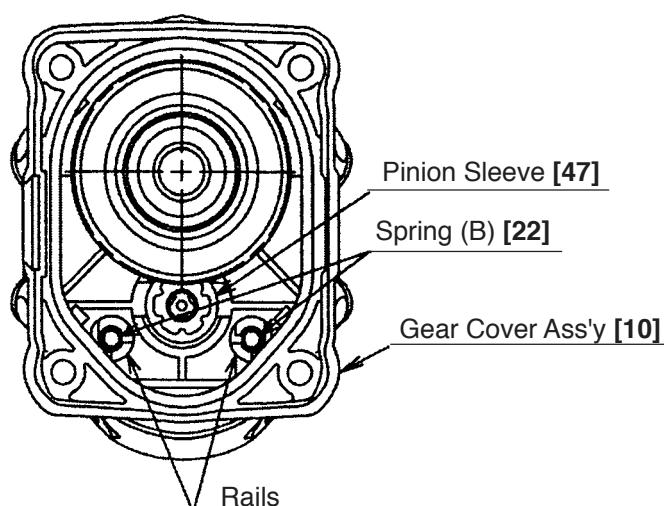


Fig. 14

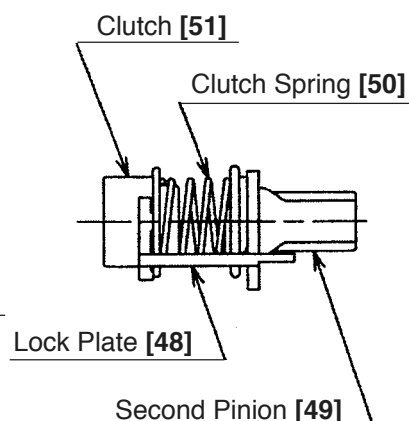


Fig. 15

(2) Removal of the change lever

As shown in Fig. 16, pressing the Pushing Button [18] hard, turn the Change Lever [21] 45° counterclockwise from the "hammering only" position (T mark). Pry out the Change Lever [21] at this position.

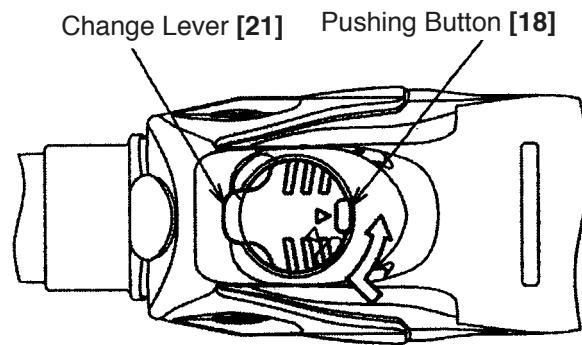


Fig. 16

(3) Disassembly of the tool retainer

Slide the Grip [3] fully in the arrow direction as shown in Fig. 17 and remove the Front Cap [1]. Pulling the Grip [3] as shown in Fig. 18, remove the Stopper Ring [2] with a retaining ring puller. Then the Grip [3], Ball Holder [4], Steel Ball D7.0 [23], Holder Plate [5], Holder Spring [6] and Washer (B) [7] can be removed from the Cylinder [24].

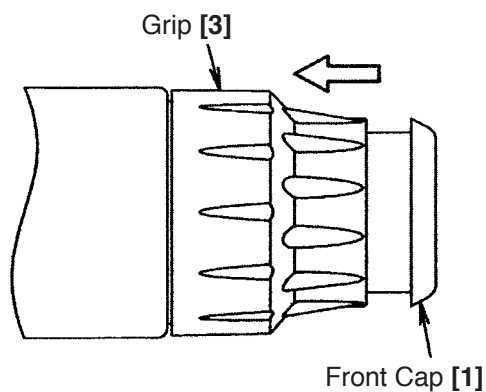


Fig. 17

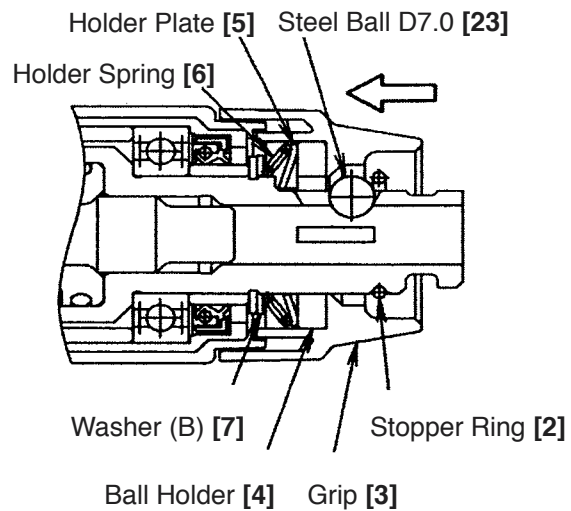


Fig. 18

(4) Removal of the cylinder and the second gear (slip mechanism section)

Remove the Gear Cover Ass'y [10] from the Inner Cover Ass'y [41] and remove the entire tool retainer.

Remove the Retaining Ring for D20 Shaft [8] with a retaining ring puller. Stand the Gear Cover Ass'y [10] in this state and pull out the Cylinder [24] from the Gear Cover Ass'y [10] with a hand press. Then the Sleeve [13] can be removed from the Cylinder [24]. Remove the Retaining Ring D30 [28] from the Cylinder [24] with a retaining ring puller. Then the Second Gear [25], Spring (A) [26] and Washer (A) [27] can be removed from the Cylinder [24].

(5) Removal of the cylinder and the second hammer

Remove the Stopper Ring [36] from the inside diameter portion of the Cylinder [24]. Then the Second Hammer [29], O-ring (1AP-20) [30], Hammer Holder [31], O-ring (B) [32], Damper (A) [33], O-ring (C) [34] and Damper Holder [35] can be removed from the Cylinder [24]. As shown in Fig. 19, insert the no-hole side of stopper ring jig (A) (J-341) into the Cylinder [24] until it contacts the end surface of the Damper Holder [35]. Hold the Cylinder [24] and the end surface of stopper ring jig (A) (J-341) with a vise, and compress Damper (A) [33] (it moves a little when the Stopper Ring [36] is pressed with punch (C) (J-341)). Insert punch (C) (J-341) into the 5-mm diameter hole (2 places) in the Cylinder [24] and tap the outside of the Stopper Ring [36] until the Stopper Ring [36] cannot be seen from the 5-mm diameter hole (2 places) to remove the Stopper Ring [36] from the groove of the inside diameter portion of the Cylinder [24]. Then remove the Cylinder [24] from the vise and pull out the Stopper Ring [36] from the inside diameter portion of the Cylinder [24] with ring puller jig (B) (J-341) being careful not to pop out the Stopper Ring [36]. At reassembly, replace the Stopper Ring [36] with new one as the removed Stopper Ring [36] is deformed. To prevent idle hammering, also replace O-ring (C) [34] with new one at reassembly.

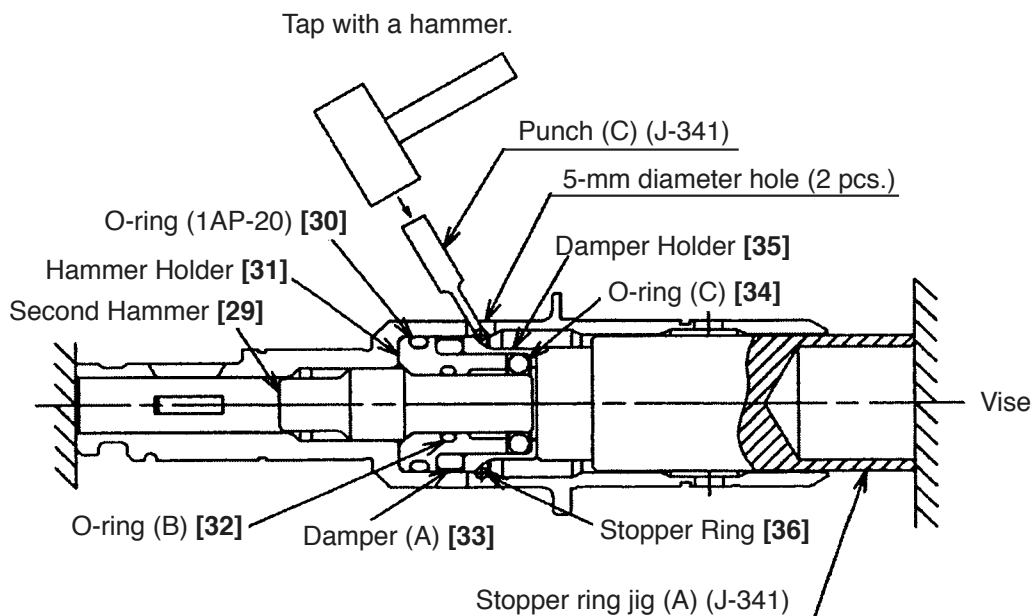


Fig. 19

(6) Removal of the gear cover and the pinion sleeve

Pinch the Pinion Sleeve [47] with the pinion sleeve puller (J-302, No. 319265) and fix the pinion sleeve puller to a vise. Pull the Gear Cover Ass'y [10] to remove the Pinion Sleeve [47] from the Gear Cover Ass'y [10] (Figs. 20 and 21).

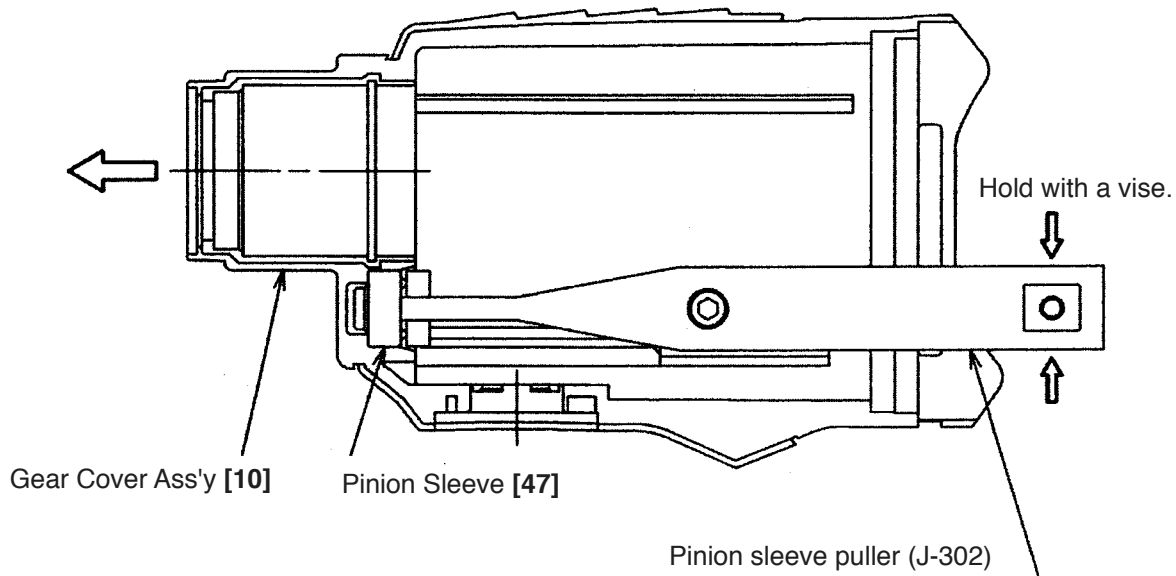


Fig. 20

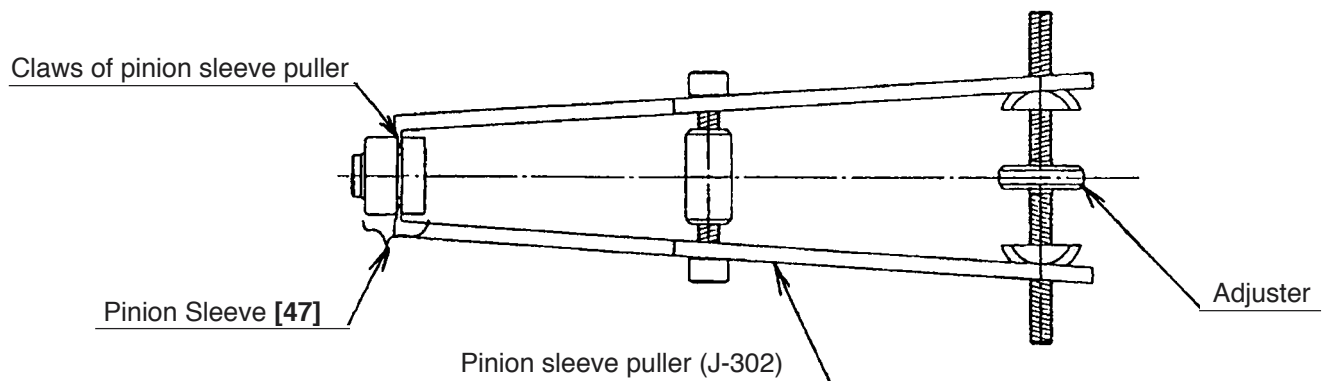


Fig. 21

9-2. Reassembly

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

(1) Application of lubricant

Apply special grease (for hammer and hammer drill) to the O-ring (1AP-20) [30] and O-ring (B) [32] for the Hammer Holder [31], Damper (A) [33], O-ring (C) [34], O-ring (I.D.16) [38] for the Striker [37], outer circumference of the Striker [37], inner and outer circumference of the Piston Pin [42], outer circumference of the Piston [39], Reciprocating Bearing [53], Reciprocating Bearing [53] rotary shaft of the Second Shaft [52], Second Pinion [49] rotary shaft, clutch claw of the Cylinder [24], inner circumference of the metal of the Inner Cover Ass'y [41], Second Hammer [29], and the lip portion of the Oil Seal [12]. Fill 45 g of the special grease in the gear cover and 5 g in the inner cover groove. Apply Molub Alloy No. 777-1 grease to the pin portion of the Change Lever [21]. Apply Molub Alloy No. 777-1 grease to the contact portion between the Clutch [51] and the Lock Plate [48]. Fill Molub Alloy No. 777-1 grease in the ball portion of the Reciprocating Bearing [53]. Apply Hitachi Motor Grease No. 29 to the O-ring (S-18) [20] for the Steel Ball D7.0 [23] and the Change Lever [21].

(2) Mounting the Cylinder [24]

Mount the Second Hammer [29], O-ring (1AP-20) [30], Hammer Holder [31], O-ring (B) [32], Damper (A) [33], new O-ring (C) [34] and Damper Holder [35] in the Cylinder [24]. Push the new Stopper Ring [36] in the Cylinder [24] then push in the hole side of stopper ring jig (A) (J-341) on it as shown in Fig. 22. Push the upper end surface of stopper ring jig (A) (J-341) with a hand press to fit the Stopper Ring [36] in the groove of the inside diameter portion of the Cylinder [24]. Check that the Stopper Ring [36] is securely fitted in the groove of the inside diameter portion of the Cylinder [24] viewing from the 5-mm diameter hole (2 pcs.) on the Cylinder [24].

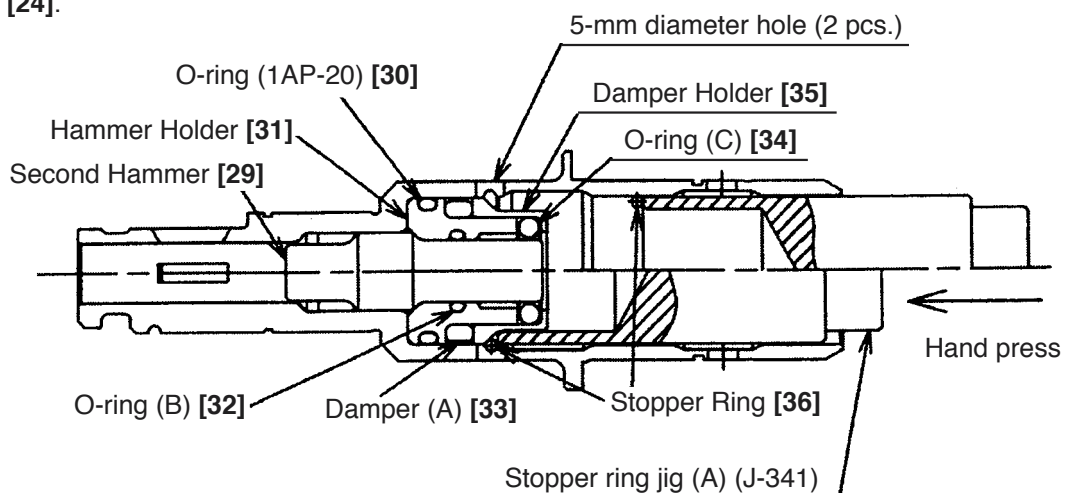


Fig. 22

(3) Reassembly of the change lever

Press the Pushing Button [18] deeply into the hole of the Change Lever [21]. Adjust the Change Lever [21] to the position shown in Fig. 23 of the Gear Cover Ass'y [10] and press it hard. Then move the Change Lever [21] to the "hammering only" position (T mark).

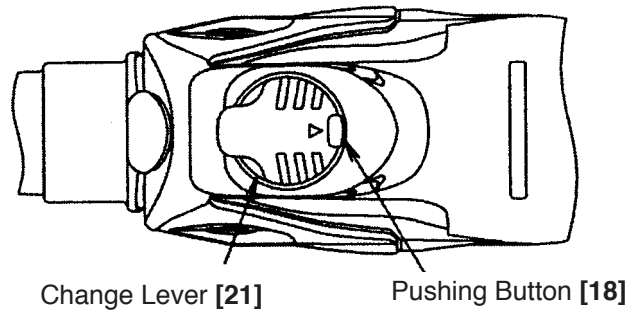


Fig. 23

(4) Press-fitting the first gear

Press-fit the First Gear [54] aligning with the shaft end surface of the Second Shaft [52]. After press-fitting the First Gear [54], check that the inner ring of the Reciprocating Bearing [53] turns smoothly.

(5) Reassembly of the oil seal

Prior to reassembly, apply grease to the inner circumference of the Oil Seal [12]. However, do not apply grease to its outer circumference. Also, when press-fitting the Oil Seal [12], ensure that it is straight and level.

(6) Reassembly of the internal pressure adjustment mechanism

Push Felt Packing (A) [44], Valve [45] and Felt Packing (B) [46] in the Inner Cover Ass'y [41] as far as they will go in this order.

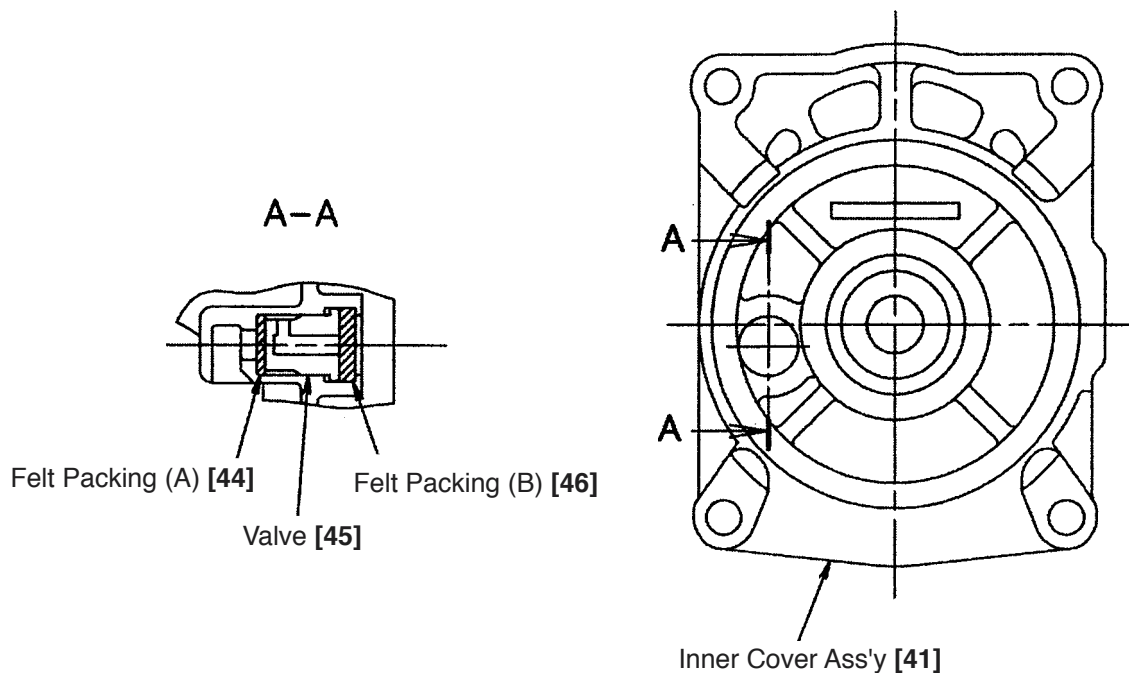


Fig. 24

(7) Mounting the piston

Mount the Piston [39] as shown in Fig. 25.

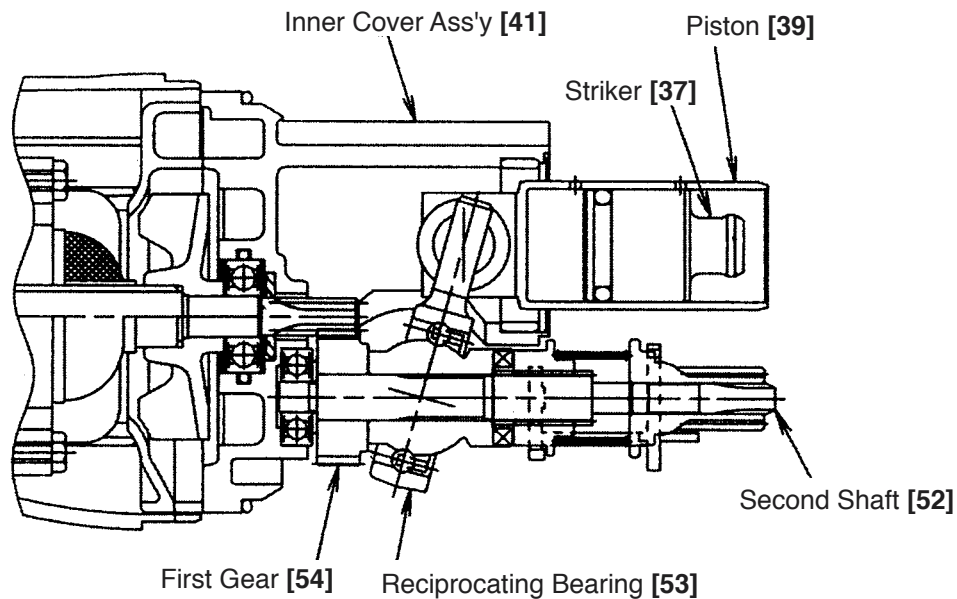


Fig. 25

(8) Reassembly of the gear cover

After reassembly as shown in Fig. 26, ensure that the Change Lever [21] is adjusted to the "hammering only" position. Engage the claws of the Clutch [51] and the Reciprocating Bearing [53] each other. Align the wing portion of the Lock Plate [48] horizontally and reinstall the Gear Cover Ass'y [10] so that the wing portion of the Lock Plate [48] is contained in the rail inside of the Gear Cover Ass'y [10]. When the Second Shaft [52] contacts the Pinion Sleeve [47] inside the Gear Cover Ass'y [10], move the Change Lever [21] to the "rotation and hammering" mode and rotate the Grip [3]. Then the Second Shaft [52] and the Pinion Sleeve [47] are engaged and the end surface of the Gear Cover Ass'y [10] contacts that of the Housing [68]. At this time, rotate the Grip [3] to check that the rotation of the Cylinder [24] is transmitted to the armature shaft.

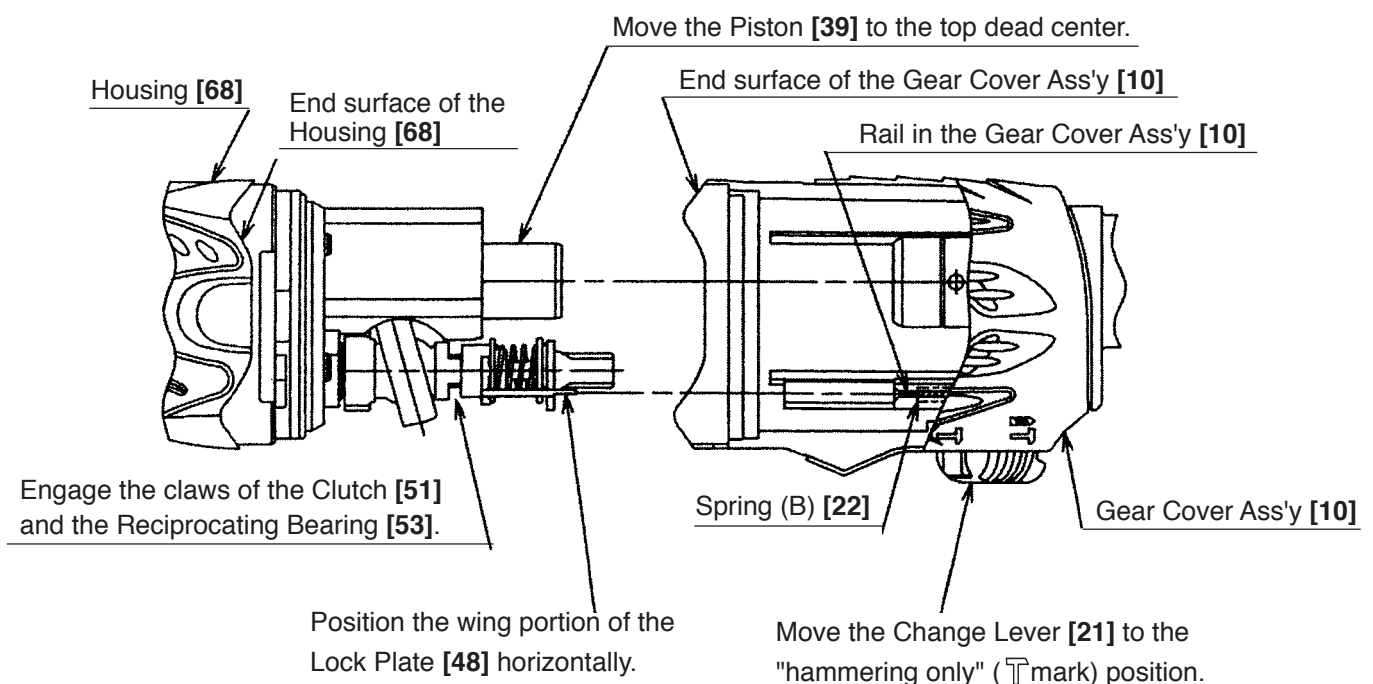


Fig. 26

9-3. Tightening Torque

Tapping Screws D4 [64] [81]	$2.0 \pm 0.5 \text{ N}\cdot\text{m}$ ($20 \pm 5 \text{ kgf}\cdot\text{cm}$, $17.4 \pm 4.3 \text{ in}\cdot\text{lbs.}$)
Tapping Screws (W/Flange) D5 X 35 [9]	$2.9 \pm 0.5 \text{ N}\cdot\text{m}$ ($30 \pm 5 \text{ kgf}\cdot\text{cm}$, $26.0 \pm 4.3 \text{ in}\cdot\text{lbs.}$)

9-4. Wiring Diagram

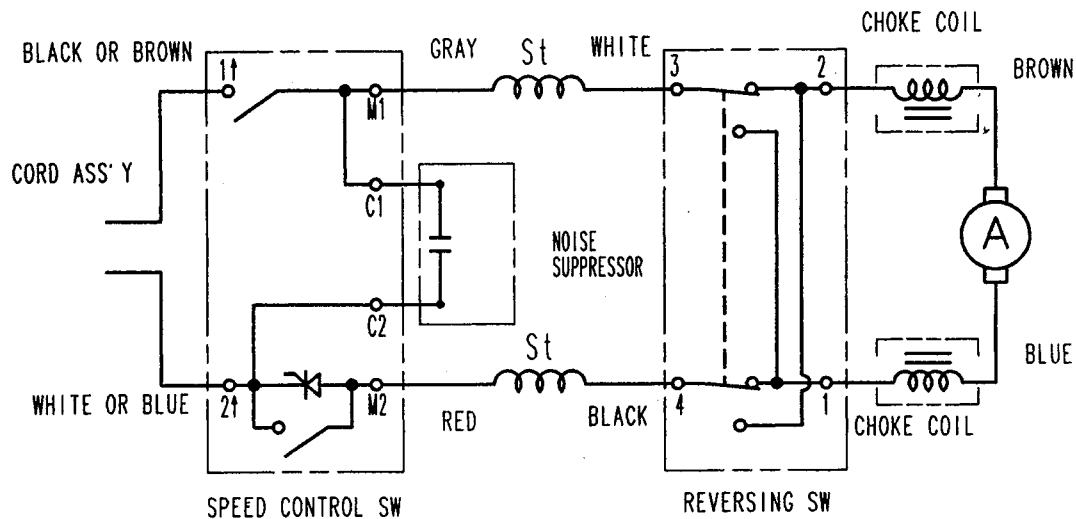


Fig. 27

9-5. Internal Wire Arrangement and Wiring Work

A. Internal wire arrangement

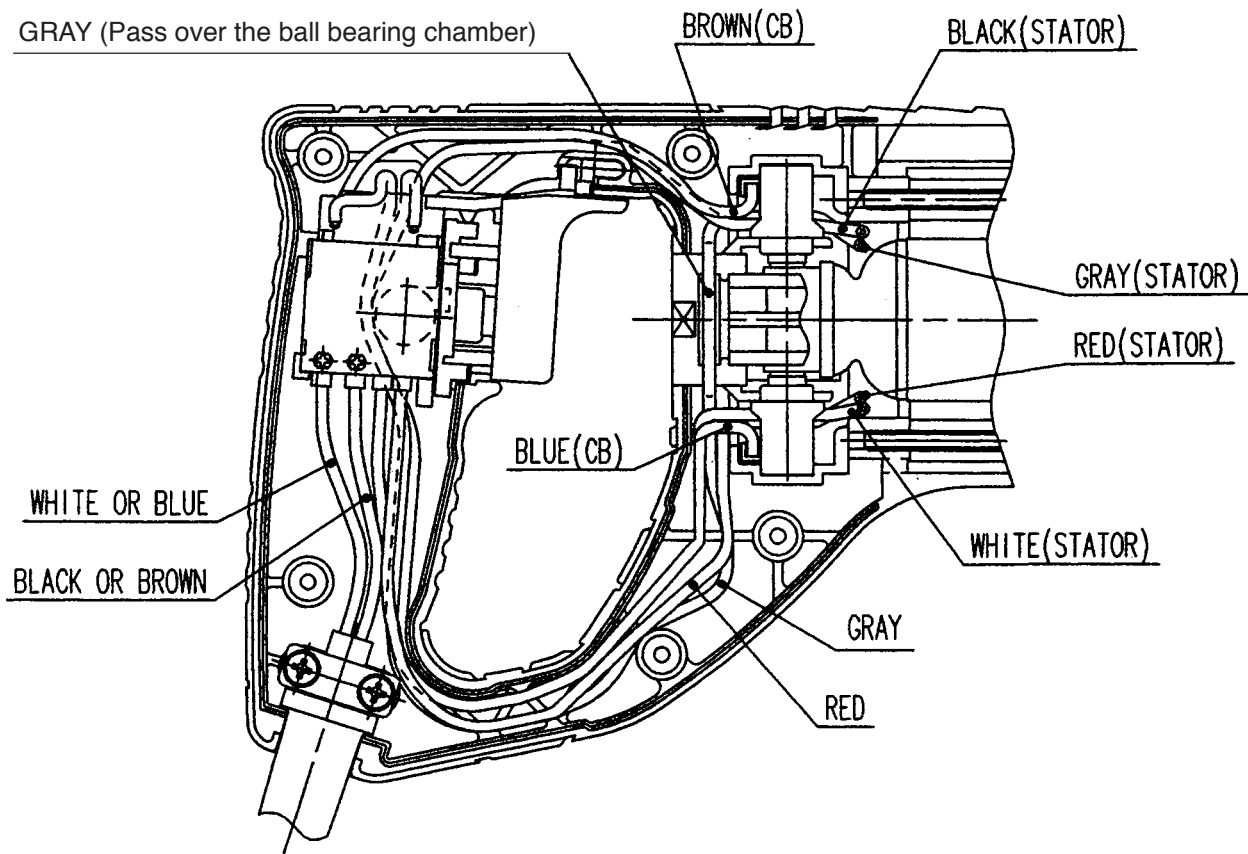


Fig. 28

B. Additional wiring work

General internal wiring can be accomplished by referring to paragraphs 9-4 and 9-5-A. The following are special instructions for switch connection.

(1) Wiring of reversing switch

Insert the lead wire (black) coming from the stator into the terminal (4) of the reversing switch, and the lead wire (white) into the terminal (3) as shown in Fig. 29.

Insert the lead wire (brown) coming from the carbon brush or choke coil into the terminal (2) and the lead wire (blue) into the terminal (1). After the insertion, pull each lead wire slightly to check the lead wires do not come off.

To disconnect the lead wires, insert a small flat-blade screwdriver into the windows near the terminals and pull out the lead wires.

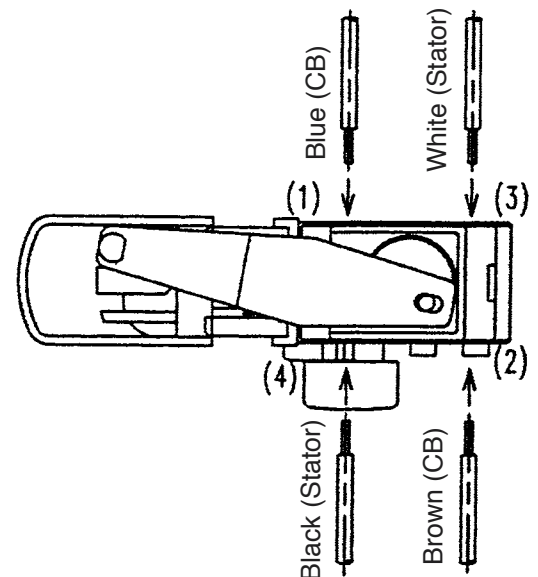


Fig. 29 Wiring of reversing switch

(2) Wiring of speed control switch

Insert each cord into the terminal 1† and terminal 2† of the speed control switch as shown in Fig. 30 and tighten the screw (tightening torque: 0.6 ± 0.2 N·m (6 ± 2 kgf·cm, 5.2 ± 1.7 in·lbs.)). Insert the lead wire (gray) coming from the stator into the terminal M1 and the lead wire (red) into the terminal M2. After the insertion, pull each lead wire slightly to check the lead wires do not come off. To disconnect the lead wires, insert a small flat-blade screwdriver into the windows near the terminals and pull out the lead wires.

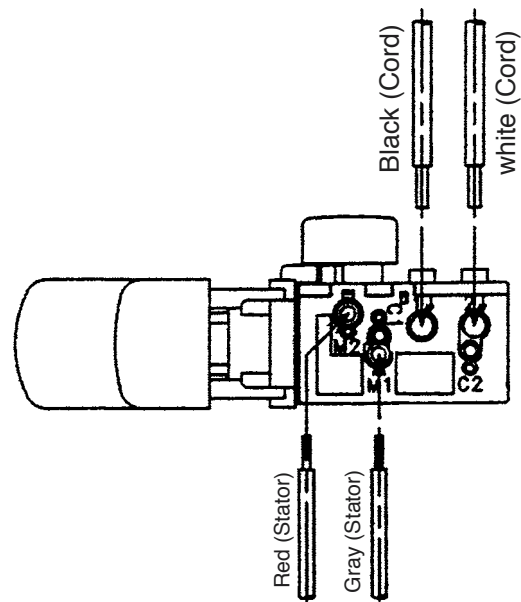


Fig. 30 Wiring of reversing switch

9-6. Insulation Tests

On completion of disassembly and repair, measure the insulation resistance and conduct the dielectric strength test.

Insulation resistance: 7 M Ω or more with DC 500 V megohm tester

Dielectric strength: AC 2,500 V/1 minute, with no abnormalities 120 V

9-7. No-load Current Values

After no-load operation for 30 minutes, the no-load current value should be as follows:

Voltage (V)	120
Current (A) max.	3.3

10. STANDARD REPAIR TIME (UNIT) SCHEDULES

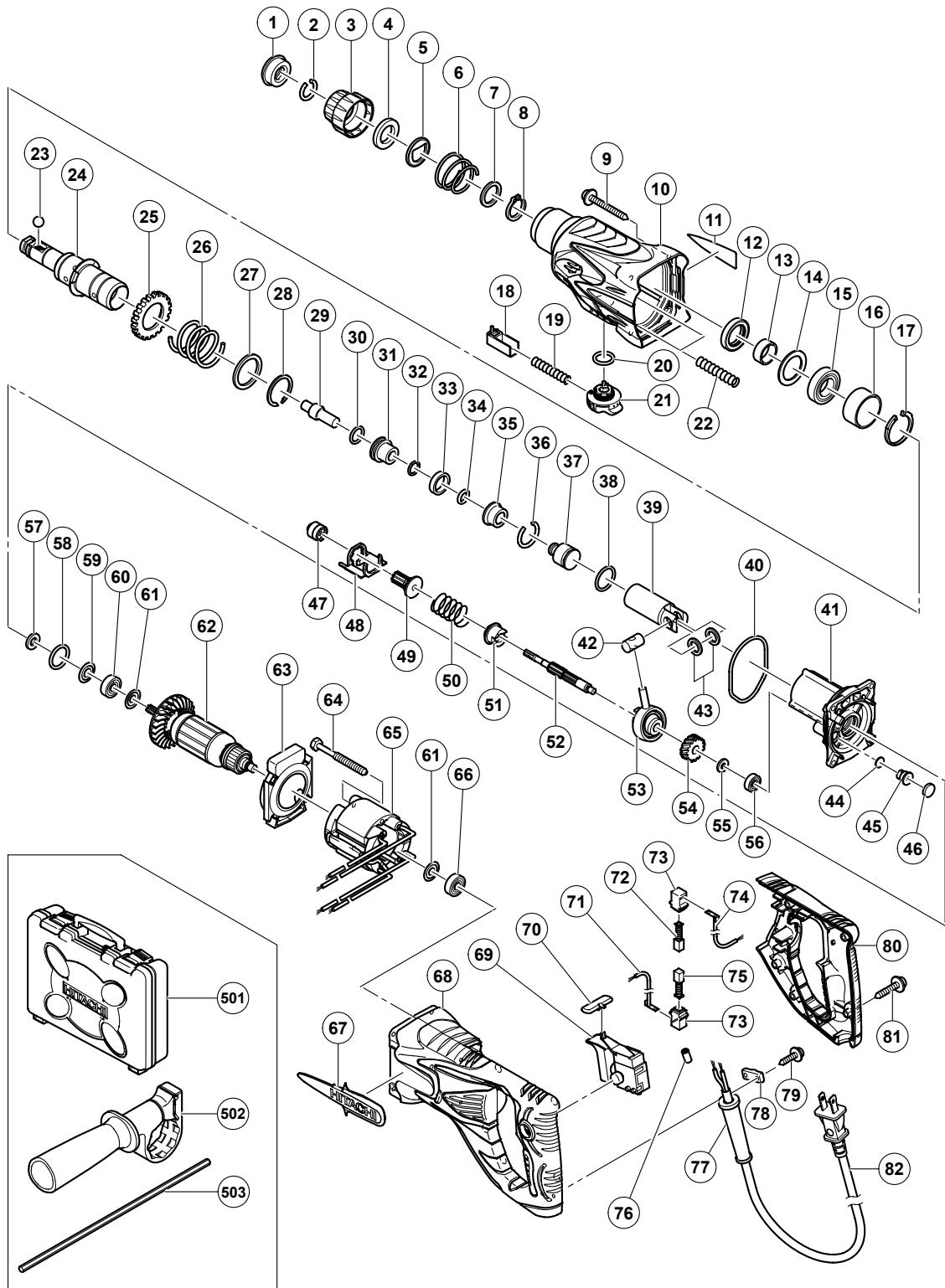
MODEL	Fixed	Variable	10	20	30	40	50	60 min.
DH 24PF3	General Assembly	Work Flow						
		Handle Cover Cord Armor	Switch Cord					

ELECTRIC TOOL PARTS LIST

■ ROTARY HAMMER Model DH 24PF3

2005 · 5 · 20

(E1)



PARTS

DH 24PF3

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS	
1	306-345	FRONT CAP	1		
2	306-340	STOPPER RING	1		
3	324-527	GRIP	1		
4	324-528	BALL HOLDER	1		
5	324-526	HOLDER PLATE	1		
6	322-812	HOLDER SPRING	1		
7	984-118	WASHER (B)	1		
8	939-547	RETAINING RING FOR D20 SHAFT (10 PCS.)	1		
9	301-654	TAPPING SCREW (W/FLANGE) D5X35	4		
10	324-605	GEAR COVER ASS'Y	1	INCLUD. 47	
11		NAME PLATE	1		
12	307-688	OIL SEAL	1		
13	322-815	SLEEVE	1		
14	323-232	FELT PACKING (B)	1		
15	690-4DD	BALL BEARING 6904DDPS2L	1		
16	324-522	SLEEVE (A)	1		
17	322-813	RETAINING RING 37MM	1		
18	324-530	PUSHING BUTTON	1		
19	317-223	PUSHING SPRING	1		
20	878-885	O-RING (S-18)	1		
21	324-603	CHANGE LEVER	1		
22	317-238	SPRING (B)	2		
23	959-156	STEEL BALL D7.0 (10 PCS.)	1		
24	323-184	CYLINDER	1		
25	323-185	SECOND GEAR	1		
26	317-233	SPRING (A)	1		
27	317-234	WASHER (A)	1		
28	317-235	RETAINING RING D30	1		
29	324-525	SECOND HAMMER	1		
30	944-486	O-RING (1AP-20)	1		
31	324-523	HAMMER HOLDER	1		
32	322-802	O-RING (B)	1		
33	322-805	DAMPER (A)	1		
34	322-808	O-RING (C)	1		
35	324-524	DAMPER HOLDER	1		
36	322-807	STOPPER RING	1		
37	324-535	STRIKER	1		
38	322-834	O-RING (I.D. 16)	1		
39	324-534	PISTON	1		
40	322-793	O-RING (I.D. 66.5)	1		
41	324-542	INNER COVER ASS'Y	1	INCLUD. 44-46	
42	322-798	PISTON PIN	1		
43	322-799	WASHER (C)	2		
44	324-543	FELT PACKING (A)	1		
45	324-545	VALVE	1		
46	324-544	FELT PACKING (B)	1		
47	323-249	PINION SLEEVE	1		
48	318-522	LOCK PLATE	1		
49	323-181	SECOND PINION	1		
50	323-182	CLUTCH SPRING	1		
51	324-606	CLUTCH	1		

PARTS

DH 24PF3

[illegible]

STANDARD ACCESSORIES

DH 24PF3

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS	
501	324-591	CASE	1		
502	324-548	SIDE HANDLE	1		
503	310-331	DEPTH GAUGE	1		

OPTIONAL ACCESSORIES

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS	
601	981-840	GREASE (A) FOR HAMMER. HAMMER DRILL (30G)	1		
602	308-471	GREASE FOR HAMMER. HAMMER DRILL (70G)	1		
603	980-927	GREASE FOR HAMMER. HAMMER DRILL (500G)	1		
604	306-885	DUST COLLECTOR (B) ASS'Y	1	INCLUD. 605, 613	
605	986-802	DUST COLLECTOR ASS'Y	1	INCLUD. 606-612	
606	986-803	DUST COVER	1		
607	986-804	SEAL COVER	1		
608	948-310	RETAINING RING FOR D30 SHAFT	1		
609	958-063	WASHER	1		
610	959-150	STEEL BALL D6.35 (10 PCS.)	19		
611	986-805	OUTER RACE	1		
612	986-806	SOCKET	1		
613	306-910	SOCKET ADAPTER (B)	1		
614	971-787	DUST CUP	1		
615	931-844	STOPPER	1		
616	321-814	DRILL CHUCK 13VLRB-D	1	INCLUD. 617	
617	995-344	FLAT HD. SCREW (A) (LEFT HAND) M6X25	1		
618	321-813	DRILL CHUCK 13VLD-D	1		
619	971-511Z	+ DRIVER BIT (A) NO. 2 25L	1		
620	971-512Z	+ DRIVER BIT (A) NO. 3 25L	1		
621	944-477	COTTER	1		
622	982-684	CENTER PIN (A) 109L FOR CORE BIT D32-38	1		
623	982-685	CENTER PIN (B) 104L FOR CORE BIT D45-90	1		
624	982-672	CORE BIT (A) 25MM	1		
625	982-673	CORE BIT (A) 29MM	1		
626	982-674	CORE BIT (A) 32MM	1	INCLUD. 627	
627	982-686	GUIDE PLATE (FOR CORE BIT 32MM)	1		
628	982-675	CORE BIT (A) 35MM	1	INCLUD. 629	
629	982-687	GUIDE PLATE (FOR CORE BIT 35MM)	1		
630	982-676	CORE BIT (A) 38MM	1	INCLUD. 631	
631	982-688	GUIDE PLATE (FOR CORE BIT 38MM)	1		
632	982-677	CORE BIT (B) 45MM	1	INCLUD. 633	
633	982-689	GUIDE PLATE (FOR CORE BIT 45MM)	1		
634	982-678	CORE BIT (B) 50MM	1	INCLUD. 635	
635	982-690	GUIDE PLATE (FOR CORE BIT 50MM)	1		
636	971-794	ANCHOR SETTING ADAPTER A W1/4" (MANUAL)	1		
637	971-795	ANCHOR SETTING ADAPTER A W5/16" (MANUAL)	1		
638	971-796	ANCHOR SETTING ADAPTER A W3/8" (MANUAL)	1		
639	971-797	ANCHOR SETTING ADAPTER A W1/2" (MANUAL)	1		
640	971-798	ANCHOR SETTING ADAPTER A W5/8" (MANUAL)	1		
641	971-799	ANCHOR SETTING ADAPTER B W1/4" (MANUAL)	1		

OPTIONAL ACCESSORIES

DH 24PF3

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