

MODEL

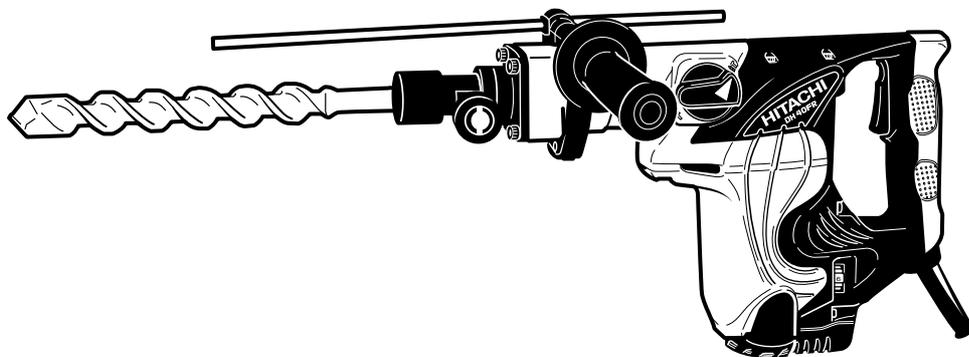
DH 40FR

Hitachi Power Tools

**ROTARY HAMMER
DH 40FR**

**TECHNICAL DATA
AND
SERVICE MANUAL**

D



LIST No. E472

Jul. 2003

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	11248EVS



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1. PRODUCT NAME

Hitachi Rotary Hammer, Model DH 40FR

2. MARKETING OBJECTIVE

The Model DH 40FR is an upgraded version of the current Model DH 40FA/DH 40FB, which features the use of spline shank tools. The performance, durability and operability are greatly improved. With this competitive Model DH 40FR, we aim to enhance the share of spline shank type rotary hammers.

The main specifications are as follows:

- (1) High drilling speed with low noise level
- (2) Self-drilling (Good feeling)
- (3) Internal double-insulation construction with sturdy aluminum frame
- (4) Constant speed with variable speed control
- (5) Soft-touch grip for easier handling
- (6) A very original design

3. APPLICATIONS

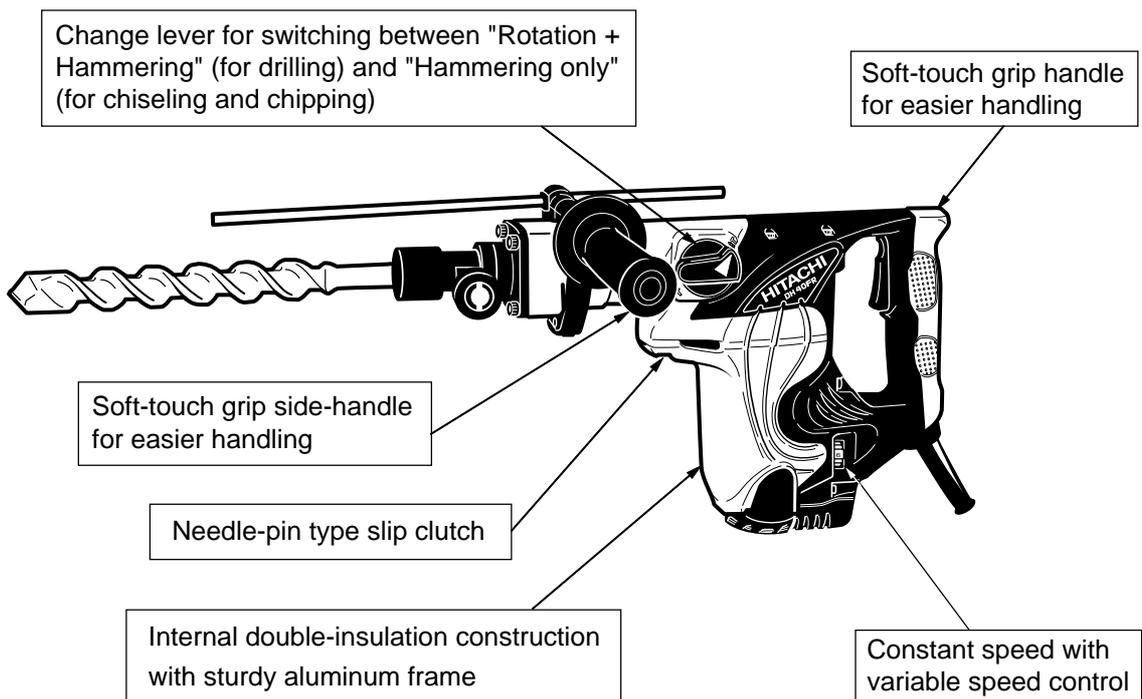
- Drilling holes in concrete and drilling anchor holes
- Demolishing and chiseling of concrete. Edging, gravel road digging, compacting and tamping, grooving, cutting, stripping and roughing, etc.

[Application examples]

- Air conditioning
- Piping and wiring
- Electric fixtures
- Sanitary facilities
- Interior finishing
- Other building, construction and repair work

4. SELLING POINTS

- High drilling speed with low noise level
- Self-drilling (Good feeling)
- A very original design



4-1. Selling Point Descriptions

4-1-1. High drilling speed with low noise level

The drilling speed is maximum 40 % faster than that of similar products thanks to efficient striking energy transmission. Even so, the Model DH 40FR produces lower noise levels than those of similar products.

Maker • Model		HITACHI DH 40FR	HITACHI DH 40FA/FB	HITACHI DH 38YE	B
Ratio of drilling speed	%	100	72	80	76
Full-load vibration level	dB (VL)	120	120	117	121
	m/s ²	10.1	10.1	7.3	10.8
Full-load noise level	dB (A)	91	95	94	92
No-load noise level	dB (A)	79	92	91	86

* Ratio of drilling speed: A 25-mm dia. drill bit is used.

Full-load vibration and noise levels: A 20-mm dia. drill bit is used.

4-1-2. Self-drilling (Good feeling)

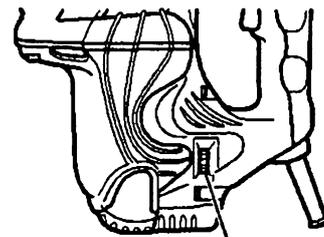
Thanks to the computer-simulated optimum striking characteristics, the quantity of body jumping is less than that of the current Model DH 40FA/FB and the working tool smoothly penetrates into the workpiece with a light pressing force. The Model DH 40FR realizes quicker self-drilling with better impact feeling.

4-1-3. Internal double-insulation construction with sturdy aluminum frame

The aluminum die-cast outer frame is very sturdy (same as the Models H 45MR/H 45SR and DH 40MR/DH 40SR). In addition, a plastic internal S holder is adopted to realize double-insulation construction. Thus the housing has greater rigidity and the double-insulated motor has greater durability. The Model DH 40FR is heavy-duty and the service life of the carbon brush is greatly prolonged (1.5 times longer than the conventional one) minimizing disconnection of the armature, deviation of the core and grease leakage.

4-1-4. Constant speed control

The Model DH 40FR is equipped with a built-in electronic control circuit that can adjust the number of hammering steplessly between 1320 and 2650 min⁻¹ with the dial. Even though the load varies, the Model DH 40FR provides better operability and stable and efficient drilling performance because the constant speed control minimizes changes in number of rotation and hammering.



Speed-adjust dial

4-1-5. Soft-touch grip for easier handling

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

4-1-6. Needle-pin type slip clutch

The Model DH 40FR is equipped with a needle-pin type slip clutch for higher slip torque accuracy and enhanced safety (same as the Model DH 40FA/DH 40FB).

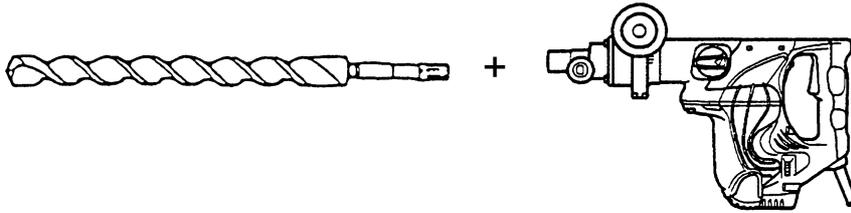
5. SPECIFICATIONS

5-1. Specifications

Capacity	Drill bit (Max. diameter): 40 mm (1-9/16") Core bit (Max. diameter): 105 mm (4-1/8")	
Power source	AC single phase 50 Hz or 60 Hz	
Voltage	120 V	230 V
Current	9.2 A	4.8 A
Power input	950 W	
Motor type	AC single-phase series commutator motor	
Insulation structure	Double insulation	
Enclosure	Materials: Aluminum alloy die casting Nylon resin (Handle, handle cover, tail cover and crank cover) Paint : Silver green metallic, black	
Switch	Trigger switch	
Type of handles	D-shaped handle and side handle	
Rotation rate	No load and full load: 240 to 480 min ⁻¹	
Impact rate	No load and full load: 1,320 to 2,650 min ⁻¹	
Weight	Product: 6.5 kg (14.3 lbs.); excluding cord and side handle Packed: 10.0 kg (22.1 lbs.)	
Packaging	Corrugated cardboard box with plastic tool case	
Standard accessories	<ul style="list-style-type: none"> • Plastic case 1 • Side handle 1 • Hex. bar wrench (for M6) 1 • Hex. bar wrench (for M5) 1 • Hex. bar wrench (for M4) 1 • Stopper 1 • Grease (A) 1 • Dust Cover 1 	

5-2. Optional Accessories

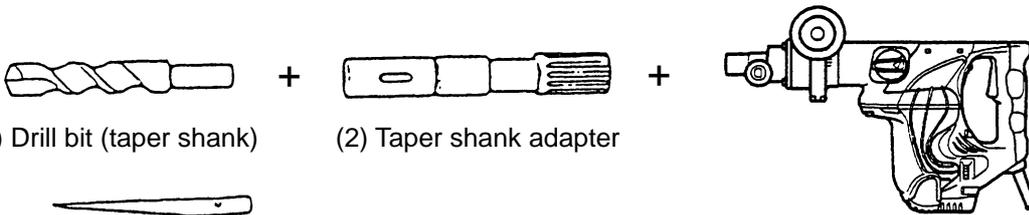
1. Drilling work for through-holes (rotation + hammering)



(1) Drill bit (hexagon shank)

Outer diameter (mm)	Overall length (mm)	Code No.
25 (1")	400 (15-3/4")	985375
38 (1-1/2")		985376

2. Drilling work for anchor holes (rotation + hammering)



(1) Drill bit (taper shank)

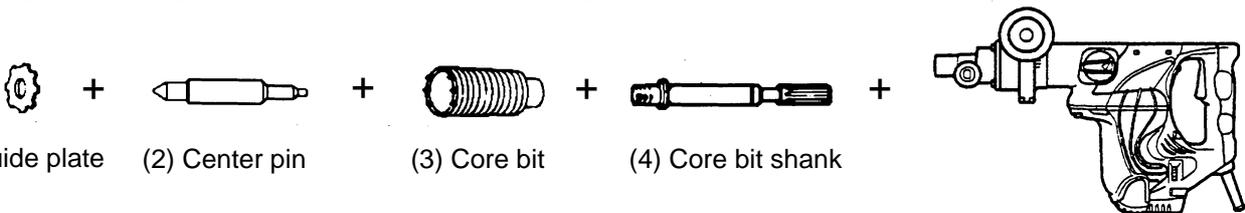
(2) Taper shank adapter

(3) Cotter Code No. 944477

(2) Taper shank adaptor

A-taper	Taper shank adaptor formed A-taper or B-taper is provided as optional accessory, but drill bit for it is not provided.	Code No. 985377
B-taper		Code No. 985378

3. Boring work for large-dia. holes (rotation + hammering)



(1) Guide plate

(2) Center pin

(3) Core bit

(4) Core bit shank

(1) Guide plate

Core bits with outer diameter of 32, 35, 38, 45, 54, 64, 79, 94, 105 mm (1-1/4", 1-3/8", 1-1/2", 1-3/4", 2-1/8", 2-1/2", 3-1/8", 3-11/16", 4-1/8")

[Guide plate is not used with core bits with outer diameter of 25 mm (1") and 29 mm (1-1/8")]

(2) Center pin

- Code No. 956009 for core bits with outer diameter of 32, 35 mm (1-1/4", 1-3/8")
- Code No. 955165 for core bits with outer diameter of 38, 45, 54, 64, 79, 94, 105 mm (1-1/2", 1-3/4", 2-1/8", 2-1/2", 3-1/8", 3-11/16", 4-1/8")

[Center pin is not used with core bits with outer diameter of 25 mm (1") and 29 mm (1-1/8").]

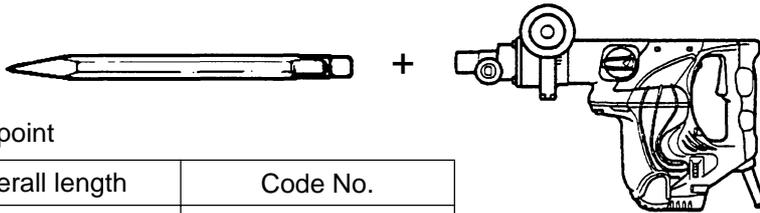
(3) Core bit

Outer diameter (in.)	Code No.	Outer diameter (in.)	Code No.
25 mm (1")	955994	54 mm (2-1/8")	955155
29 mm (1-1/8")	955995	64 mm (2-1/2")	956002
32 mm (1-1/4")	955996	79 mm (3-1/8")	955157
35 mm (1-3/8")	955998	94 mm (3-11/16")	956004
38 mm (1-1/2")	956000	105 mm (4-1/8")	955159
45 mm (1-3/4")	955154		

(4) Core bit shank

- Code No. 984029 for core bits with outer diameter of 25, 29, 32, 35 mm (1", 1-1/8", 1-1/4", 1-3/8")
- Code No. 985379 for core bits with outer diameter of 38, 45, 54, 64, 79, 94, 105 mm (1-1/2", 1-3/4", 2-1/8", 2-1/2", 3-1/8", 3-11/16", 4-1/8")

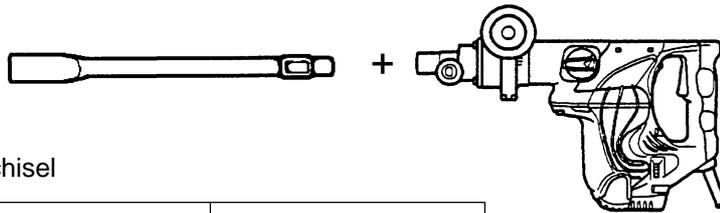
4. Demolition work (hammering)



(1) Bull point

Overall length	Code No.
300 mm (12")	985383

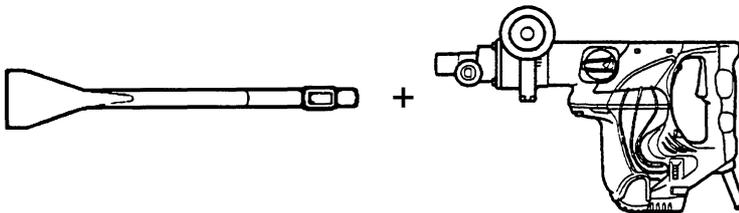
5. Grooving and edging work (hammering)



(1) Cold chisel

Overall length	Code No.
300 mm (12")	985381
460 mm (18")	985382

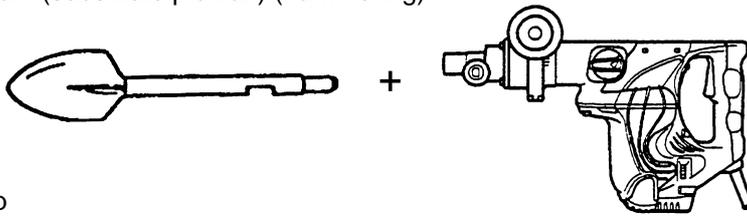
6. Cutting and stripping (asphalt cutting, etc.) (hammering)



(1) Cutter

Overall length	Width	Code No.
300 mm (12")	38 mm (1-1/2")	985384
	50 mm (2")	985385

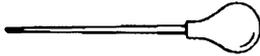
7. Digging work (substitute pick-ax) (hammering)



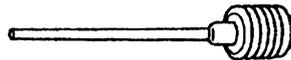
(1) Scoop

Overall length	Width	Code No.
405 mm (16")	105 mm (4-1/8")	985386

8. Syringe (for chip removal)



Code No. 320859



Code No. 318085

9. Grease for hammer, hammer drill



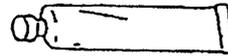
500 g (1.1 lbs.) Can

Code No. 980927



70 g (2.5 oz) Tube

Code No. 308471



30 g (1 oz) Tube

Code No. 981840

Note: Code numbers listed above are subject to change without notice. Please refer to periodic Technical News Bulletins for updates.

6. COMPARISONS WITH SIMILAR PRODUCTS

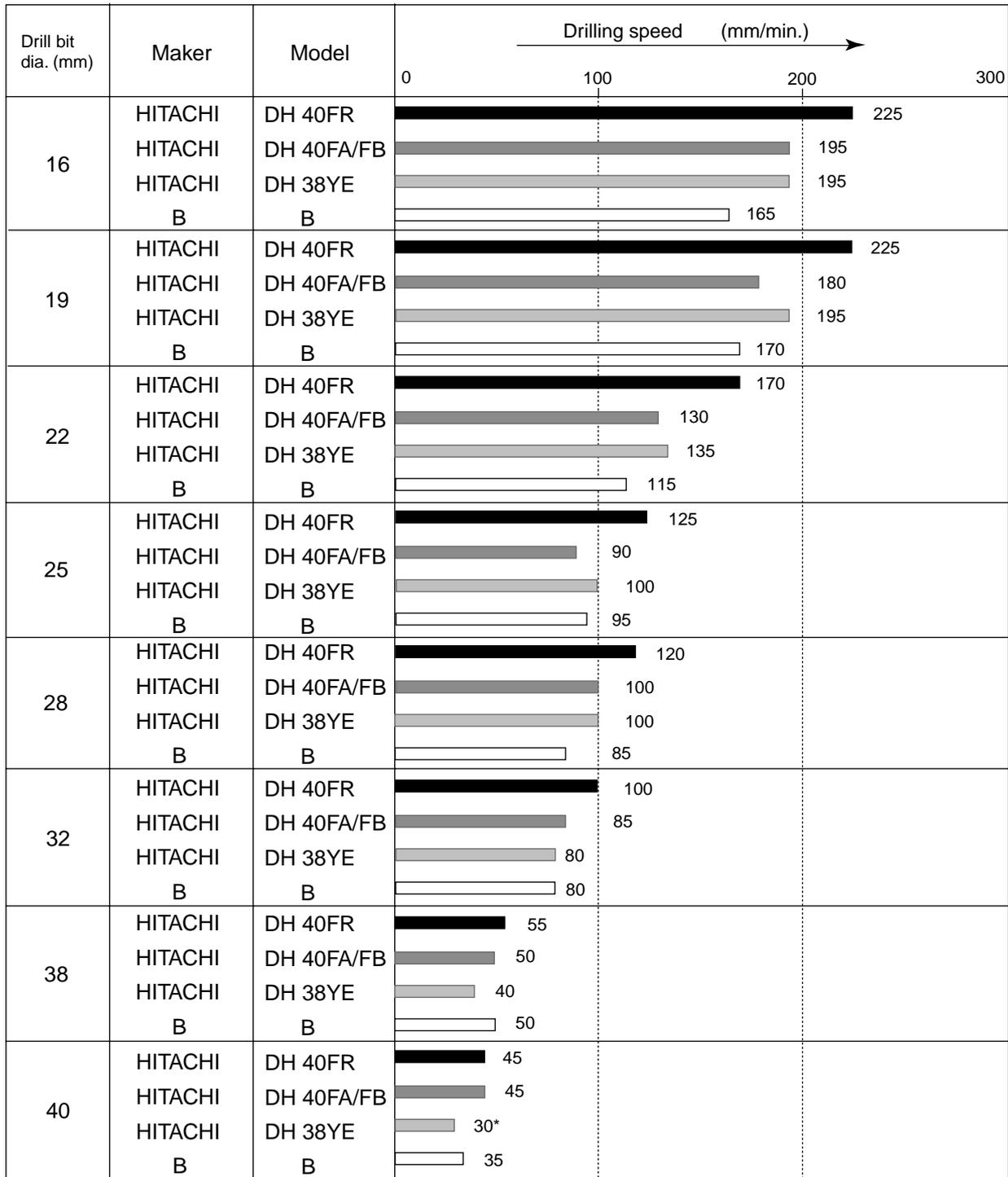
6-1. Specification Comparisons

Item		Maker • Model	HITACHI DH 40FR	HITACHI DH 40FA/FB	HITACHI DH 38YE	B
Capacity	Drill bit dia. (mm)		40 (1-9/16")	40 (1-9/16")	38 (1-1/2")	40 (1-9/16")
	Core bit dia. (mm)		105 (4-1/8")	105 (4-1/8")	105 (4-1/8")	100 (3-15/16")
Power input (W)			950	950	870	1,100
Impact energy per stroke (J)			10.0	8.0	7.5	8.5
Full-load rotation rate (min ⁻¹)			240 to 480	360/180 to 360	300	170 to 340
Full-load impact rate (min ⁻¹)			1,320 to 2,650	2,800/1,400 to 2,800	2,800	1,700 to 3,300
Full-load vibration level (dB(VL))			120	120	117	121
Full-load noise level (dB(A))			91	95	94	92
No-load noise level (dB(A))			79	92	91	86
Dimensions	Length (mm)		430 (16-15/16")	423 (16-21/32")	459 (18-1/16")	458 (18-1/32")
	Height (mm)		255 (10-3/64")	252 (9-15/16")	253 (9-31/32")	265 (9-21/32")
	Width (mm)		104 (4-7/64")	103 (4-1/16")	106 (4-3/16")	102 (4-1/64")
Weight * (kg)			6.5 (14.3 lbs.)	6.7 (14.8 lbs.)/ 6.8 (15.0 lbs.)	7.8 (16.6 lbs.)	6.5 (14.3 lbs.)
Insulation structure			Double insulation	Double insulation	Double insulation	Double insulation

* Weight does not include cord and side handle.

6-2. Drilling Speed Comparisons

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



*: Note that the data marked with asterisks are test results using drill bits which are beyond the tool's rated capacity. Use the above data as a reference, for comparisons 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.

Voltage supply	Maker	Model	Chiseling amount (kg/15 min.)					
			0	10	20	30	40	50
120 V	HITACHI	DH 40FR	36					
	HITACHI	DH 40FA/FB	35					
	HITACHI	DH 38YE	30					
	B	B	31					

Fig. 2

7. PRECAUTIONS IN SALES PROMOTION

In the interest of promoting the safest and most efficient use of the Model DH 40FR 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 40FR 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 INFORMATION

8-1. Grease Replacement

The striking portion and the speed reduction portion of the Model DH 40FR respectively use different types of grease. It is not necessary to replenish the grease unless the tool is disassembled for repair or there is grease leakage due to a damaged seal.

The striking portion uses special grease. To change the grease in the striking portion (inside the cylinder crank case), carefully wipe the old grease off the parts, and re-lube with 50 g (1.8 oz) into the cylinder crank case (connecting rod side). Take care not to overfill the grease as an excessive amount of grease can cause hammer failure.

The speed reduction portion (inside the gear cover) uses Hitachi Motor Grease No. 29. The proper supply volume is 30 g (1 oz). Never use the striking portion special grease in the speed reduction portion. Special grease would leak into the motor portion and cause subsequent trouble.

Periodically replenish the inside of the slip clutch with Hitachi Motor Grease No. 29 to the full.

8-2. O-Ring Replacement

The O-rings (mounted on the striker and piston) are extremely important to ensure adequate sealing of the air pressure. Although the O-rings are made of special rubber to give them a long service life, they do nonetheless become worn, and should be replaced by new ones periodically depending on frequency of use of the tool. With average use, it is recommended that the O-rings be replaced at least every six months to ensure maximum effectiveness.

8-3. Structure of the Model DH 40FR Rotary Hammer

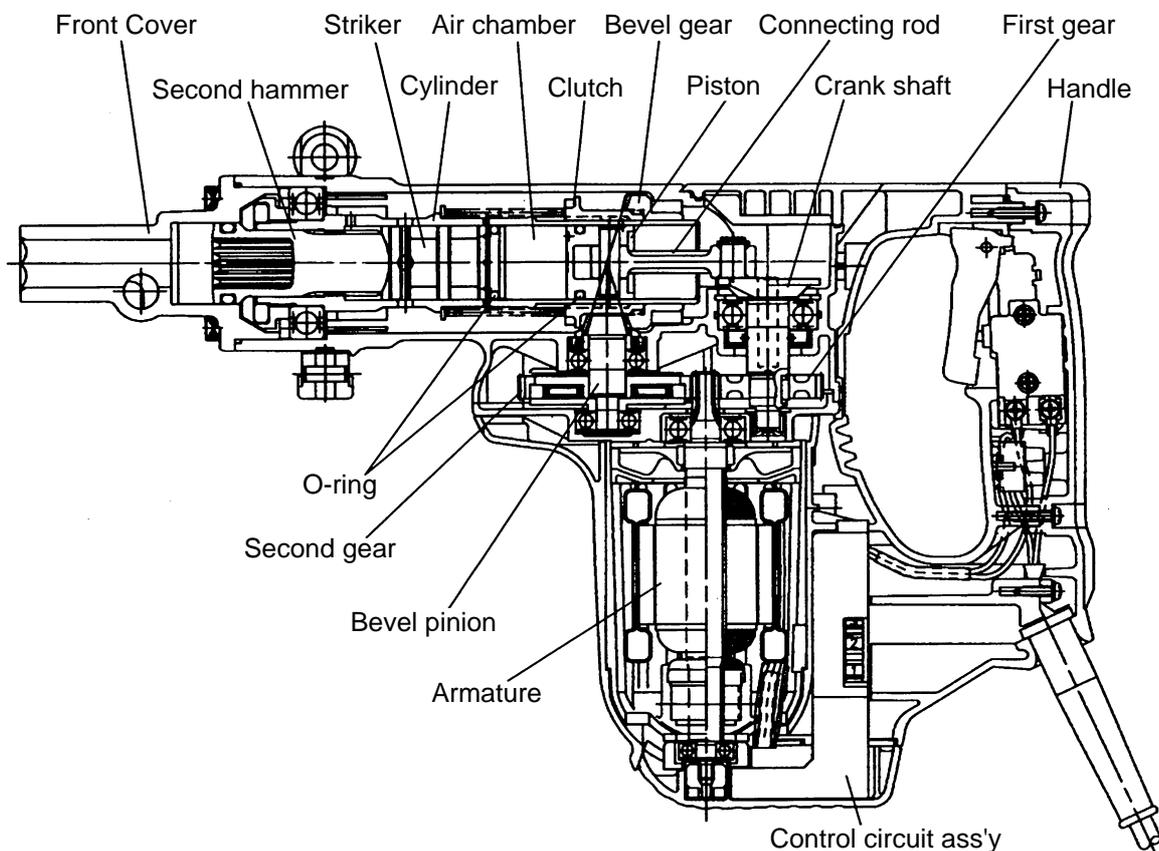


Fig. 3

○ Torque transmission

Armature revolution is transmitted to the second gear to rotate the bevel gear via the slip mechanism between the second gear and bevel pinion axes. Rotation of the bevel gear is then transmitted to the cylinder keyed thereto through the clutch. Cylinder rotation is transmitted through the spline connection to the second hammer. Rotation is then transmitted to the drill bit which is fitted into the spline hole of the second hammer.

○ Striking operation

The rotation of the armature is transferred to the crank shaft and connecting rod, which in turn cause the piston to reciprocate inside the cylinder. As the piston reciprocates, the changing air pressure inside the air chamber between the piston and the striker causes the striker to continuously strike against the end of the second hammer. At the same time, the air-cushion effect within the air chamber absorbs the impact of the striker. Should the air escape from the air chamber, the air-cushion effect would cease, and the impact energy would not be absorbed. Accordingly, the o-rings mounted on the striker and piston play an extremely important role in sealing the air within the air chamber.

○ Mechanism to prevent idle hammering

The arrangement against idle hammering of this rotary hammer is about the same as for the DH 40FA/ DH 40FB in which, when the drill bit or bull point is not longer pressed against the concrete or similar material, the second hammer moves to a position shown in Fig. 4 so that the striker is displaced from its hammering position. This opens the air hole so that piston movement causes no change in air pressure chamber, thus stopping the hammering action.

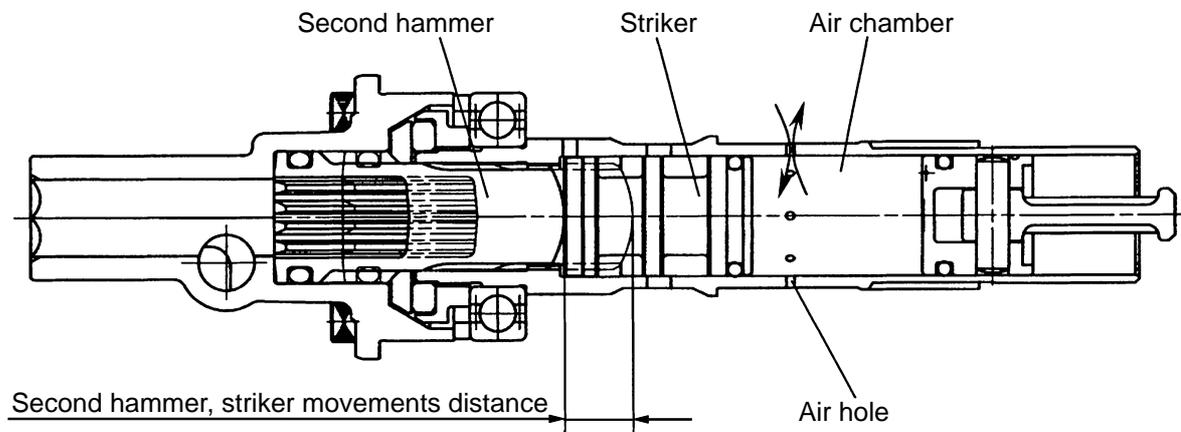


Fig. 4

○ Slip clutch mechanism

The slip clutch mechanism is described below with reference to Fig. 5. The bevel pinion and the gear holder are coupled together by the key and press-fitting. Spring (C) and needle pins are housed in elongated grooves of the gear holder. The needle pin is pressed against the inner face of second gear by spring (C) to allow idle rotation of the second gear relative to the gear holder. When an excess torque is exerted on the bevel pinion shaft, the needle pin is raised upon the projection of the second gear against the load of spring (C) to allow idle rotation of the second gear. With the arrangement, the clutch slips when an excessive torque is applied to the working tool as when the drill bit contacts steel bar/wire in the concrete, protecting the operator from unexpected motion of the side handle.

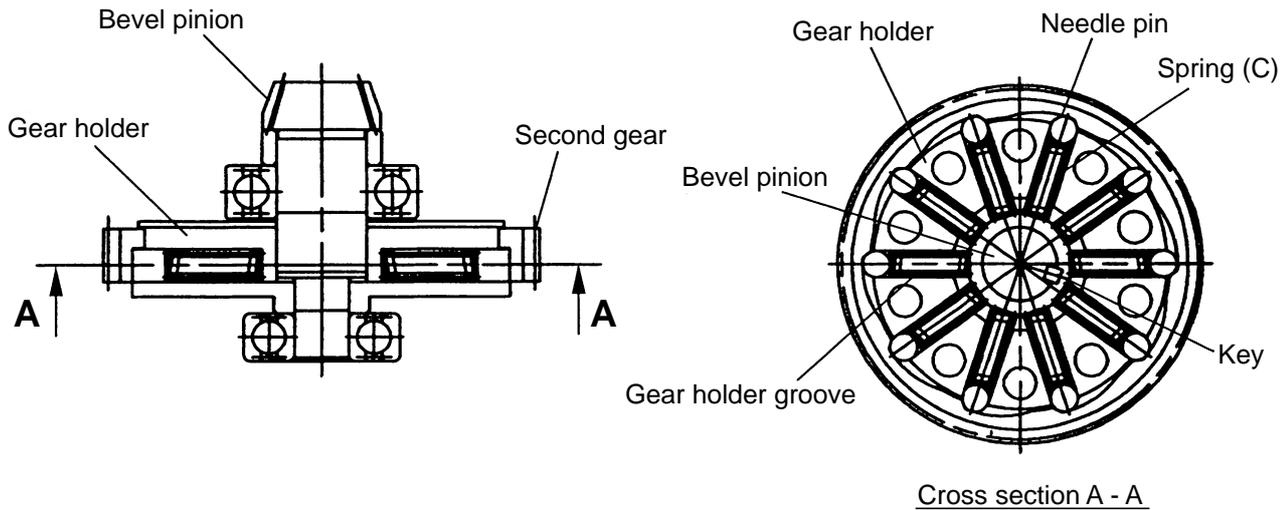


Fig. 5

○ Tool holder

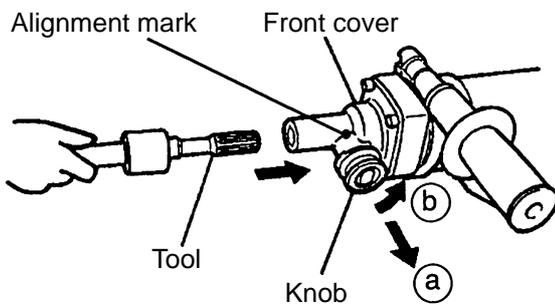


Fig. 6

A lever-type retainer is employed to permit easy one-touch mounting and removal of drill bits, bull points, etc.

As illustrated in Fig. 6, pull the knob in the direction indicated by arrow (a), and turn it 90° counterclockwise (arrow (b) direction) to align it with the alignment mark on the front cover. Insert the tool shank fully into the spline hole in the front cover, and return the knob to its original position. The tool is then securely attached.

○ Handle and side handle

The handle section is of a two-layer structure. The base is made of glassfiber-reinforced plastic and the outside layer is soft resin. They are molded in one piece.

The side handle also has a two-layer structure. The base is made of glassfiber-reinforced plastic base with a steel nut and the outside layer is soft resin. They are molded in one piece. The newly designed handle and side handle structure ensures more comfortable grip for improved operability.

○ Sealing and dust-proof structure

The cylinder crank case section is tightly sealed with three o-rings, two oil seals and rubber seal as shown in Fig. 7. This prevents leakage of grease from the cases, while also protecting them against dust from outside. For additional dust-proof protections, a standard accessory dust cover is provided which serves to prevent dust and chips from entering the spline hole of the second hammer and causing imperfect fitting of the drill bit.

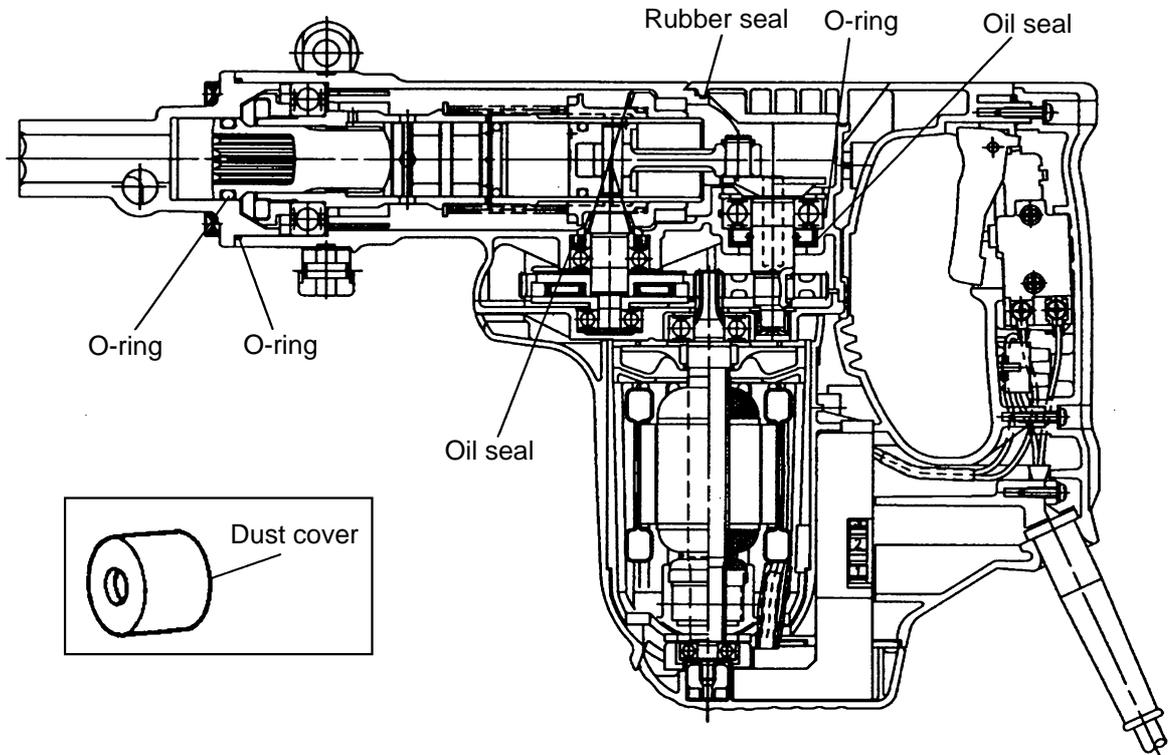


Fig. 7

9. REPAIR GUIDE

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

9-1. Disassembly

(1) Disassembly of the tool holder

Disassembly procedures are illustrated in Fig. 8. Pull Knob (A) **[3]** outward in the direction indicated by the arrow, and turn it slightly so that its end surface comes to rest on the flange portion of the Front Cover **[5]**. Push in the Stop Washer **[1]** with two flat-blade screwdrivers to compress the Stopper Spring **[2]**, and insert a steel rod (less than 3 mm in diameter) into the 3 mm diameter hole in Knob (A) **[3]** to push out the Needle Roller D4 x 20 **[4]**. The Stop Washer **[1]**, Stopper Spring **[2]**, Stop Lever **[7]** and Knob (A) **[3]** can then be taken off.

Slide the end surface of Knob (A) **[3]** onto the flange of the Front Cover **[5]**

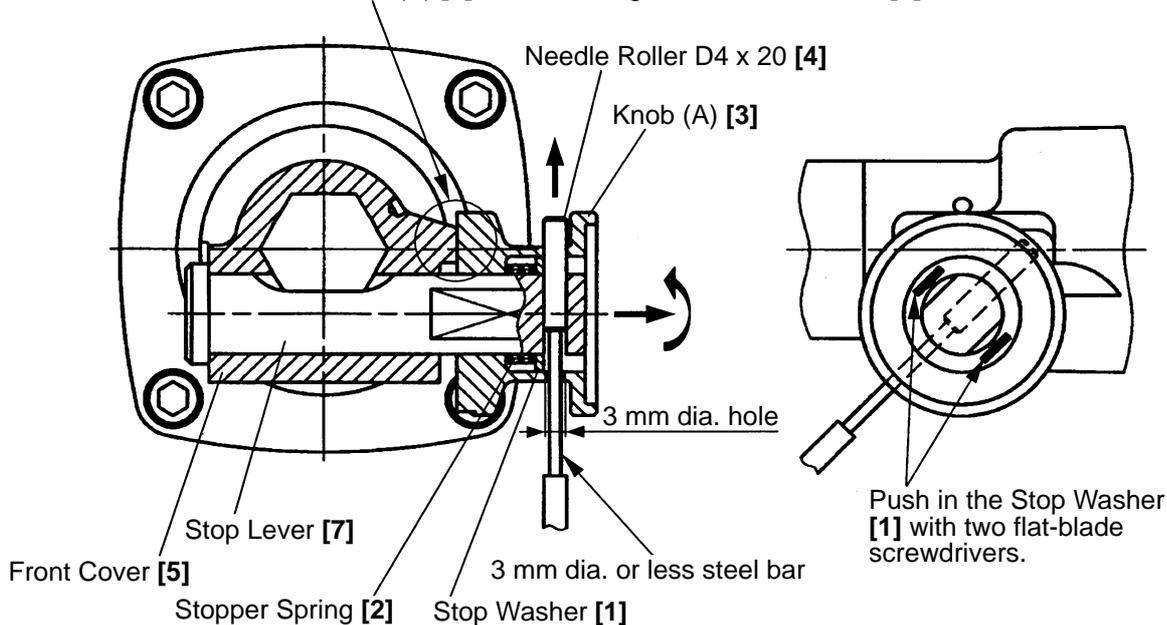


Fig. 8

(2) Disassembly of the piston and the striker

Remove the Seal Lock Hex. Socket Hd. Bolt M4 x 12 **[28]** from the Crank Cover **[30]** then remove the Crank Cover **[30]** from the Cylinder Crank Case **[40]**. Remove the Seal Lock Hex. Socket Hd. Bolt M6 x 45 **[27]** and Seal Lock Hex. Socket Hd. Bolt M6 x 22 **[82]**. Remove the Gear Cover **[57]** from the Cylinder Crank Case **[40]**. Remove the Bevel Pinion **[41]** (slip clutch) from the Cylinder Crank Case **[40]** (otherwise, Bevel Gear **[26]** cannot be removed later). Remove the Seal Lock Hex. Socket Hd. Bolt M4 x 12 **[63]** from the Change Lever **[64]** then remove the Change Lever **[64]**. Remove the Retaining Ring for D20 Hole **[66]** using a retaining ring puller and remove the Lever Shaft **[67]** (otherwise, Bevel Gear **[26]** cannot be removed later). Remove the Seal Lock Hex. Socket Hd. Bolt M6 x 25 **[6]** from the Front Cover **[5]**. Then the Front Cover **[5]**, Second Hammer **[10]**, Damper Washer **[11]**, Damper **[12]**, Cylinder Washer **[18]**, Clutch Spring **[19]**, Clutch **[22]**, Cylinder **[17]**, etc. can be removed from the Cylinder Crank Case **[40]** in an assembly state. Remove the Bevel Gear **[26]** from the Cylinder Crank Case **[40]** by tapping the Front Cover **[5]** side with a plastic hammer. Remove the Striker **[20]** from the Cylinder **[17]** by tapping with a plastic hammer. The Piston **[23]** remains in the Cylinder Crank Case **[40]**. Remove the Retaining Ring for D10 Shaft **[33]** using a retaining ring puller and remove the Connecting Rod **[25]** from the Crank Shaft **[34]** (Fig. 9).

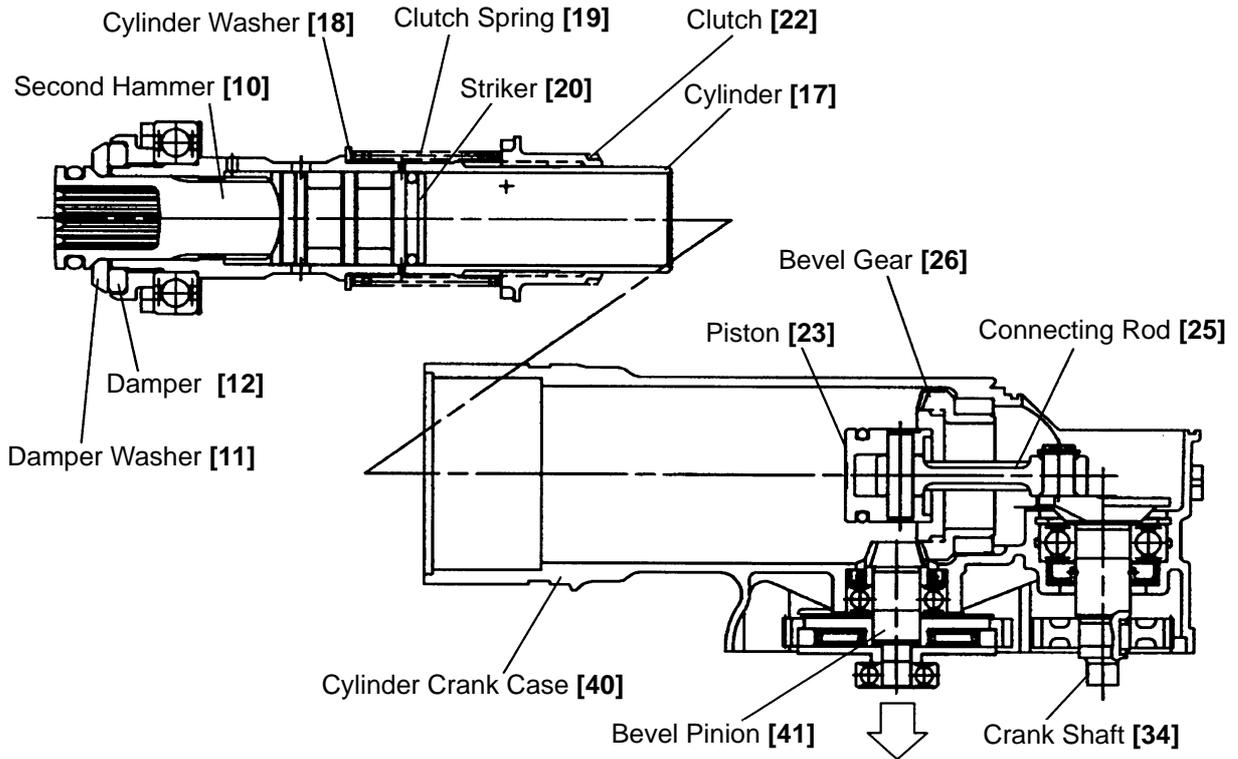


Fig. 9

(4) Disassembly of the first gear and the crank shaft

Remove grease from the Connecting Rod [25] side and the First Gear [55] side of the Cylinder Crank Case [40]. Remove the Retaining Ring for D40 Hole [36] from the Ball Bearing 6203DDCMPS2L [37] using a retaining ring puller. At this time, shift the position of the crank pin of the Crank Shaft [34] as shown in Fig.10 so that the hole of the retaining ring can be seen before removal. Face the Connecting Rod [25] side of the Cylinder Crank Case [40] downward and place it on a support. Press the end surface of the Crank Shaft [34] with a hand press to remove the First Gear [55] and the Crank Shaft [34] (Fig. 11).

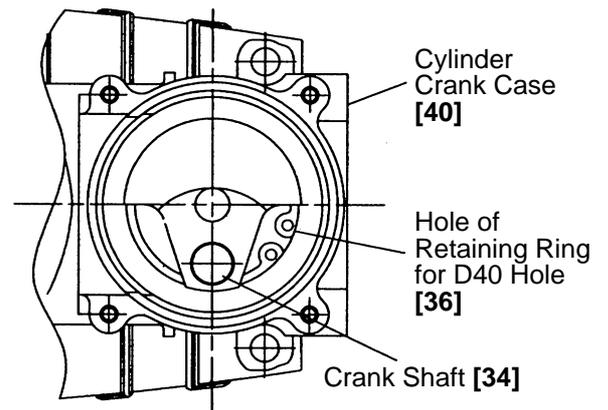


Fig. 10

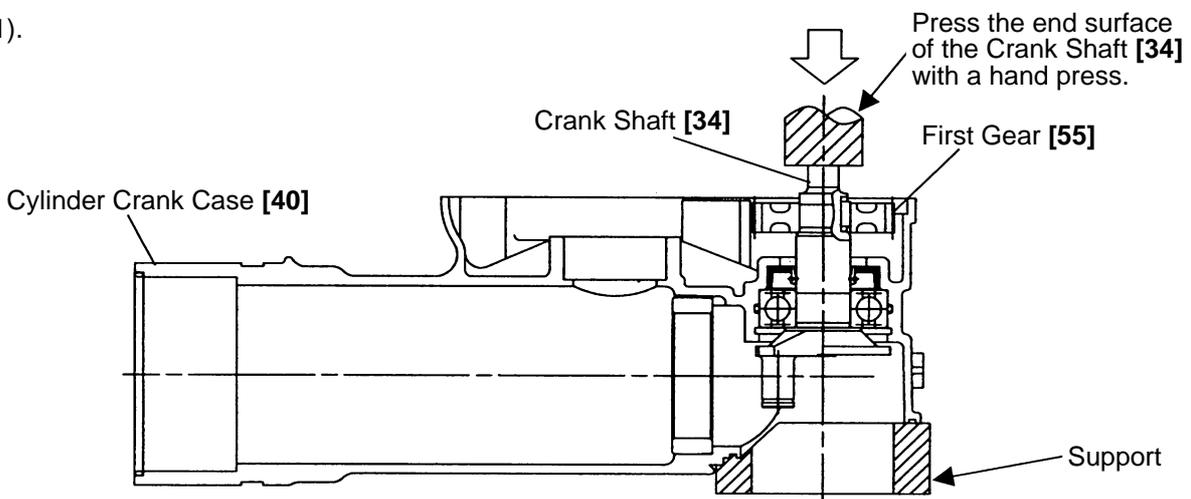


Fig. 11

(4) Disassembly of the cylinder

As illustrated in Fig. 12, insert the drill bit secured with a vise into the Second Hammer [10] and Cylinder [17]. Put the wrench (J-123 No. 970885) to the width across flats of the Cylinder Cap [13] and turn it to loosen the Cylinder Cap [13] (right-hand thread). Remove the Cylinder Cap [13] and the Ball Bearing 6007DDUAV2S [15] with a hand press. Then the Cylinder [17] can be pulled out.

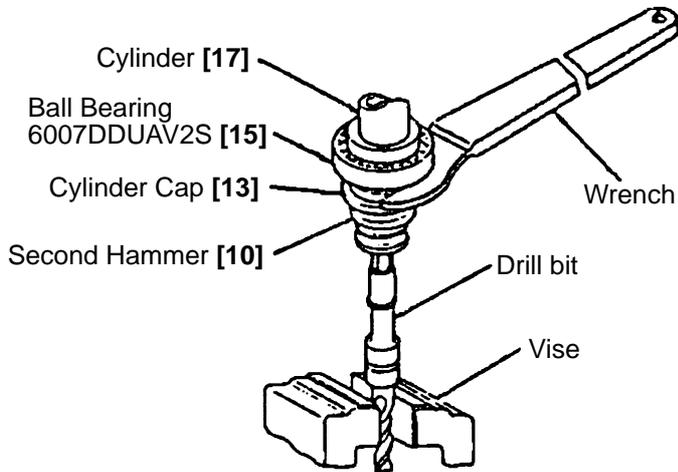


Fig. 12

(5) Disassembly of the slip clutch

Remove the Ball Bearing 629VVC2PS2L [52] with a bearing puller. Place the assembly on a sleeve-type support facing Washer (A) [46] downward as shown in Fig. 13. Push the Spacer [51] side of the Bevel Pinion [41] with a hand press to remove the Gear Holder [47] and the Spacer [51] from the Bevel Pinion [41]. Before removal of the Second Gear [50] from the Gear Holder [47], put the assembly in a poly bag and disassemble it inside the poly bag to prevent missing of Spring (C) [48] and the Needle [49].

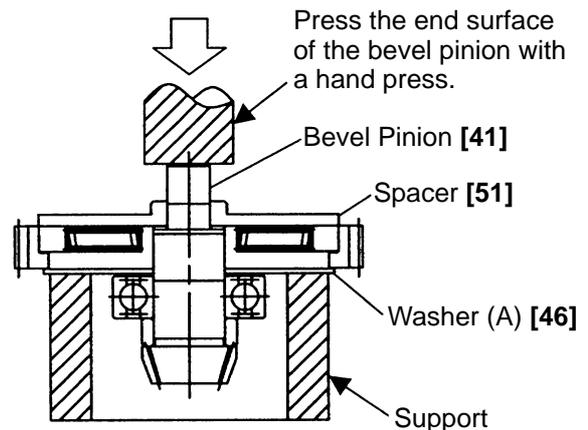


Fig. 13

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) Reassembly of the first gear and the crank shaft

Press-fit Oil Seal (B) [39] into the Cylinder Crank Case [40] and mount O-ring (S-40) [38]. Press-fit the Ball Bearing 6203DDCMPS2L [37]. Mount the Retaining Ring for D40 Hole [36] using a retaining ring puller. Press-fit the Crank Shaft [34] into the Ball Bearing 6203DDCMPS2L [37]. Put the Feather Key 3 x 3 x 8 [35] in the groove of the Crank Shaft [34] and press-fit the First Gear [55] with a suitable tool while holding the flat portion of the Crank Shaft [34] with a steel bar. Before press-fitting, make sure that the Feather Key 3 x 3 x 8 [35] fits in the key groove of the First Gear [55] (Fig. 14).

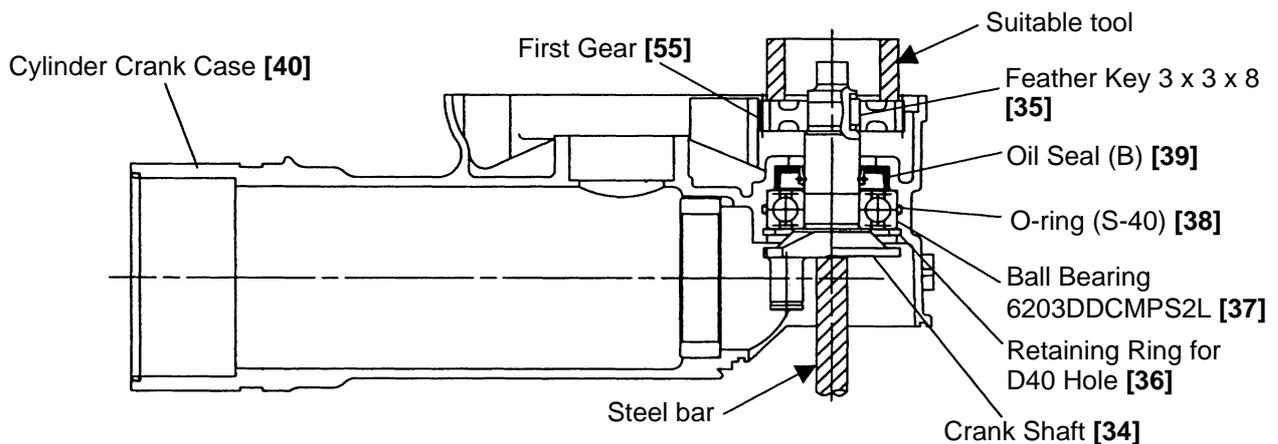


Fig. 14

(2) Reassembly of the piston

Insert the Piston Pin [24] into the 8-mm dia. hole (marked side) of the Piston [23] and the Connecting Rod [25] then press-fit it. Mount the O-ring [21] to the Piston [23]. Be careful not to protrude the Piston Pin [24] from the outside diameter of the Piston [23]. Move the crank pin of the Crank Shaft [34] to the bottom dead center and mount the piston assembly to the Crank Shaft [34] from the front cover side of the Cylinder Crank Case [40]. Mount the Retaining Ring for D10 Shaft [33] using a retaining ring puller (Fig. 15).

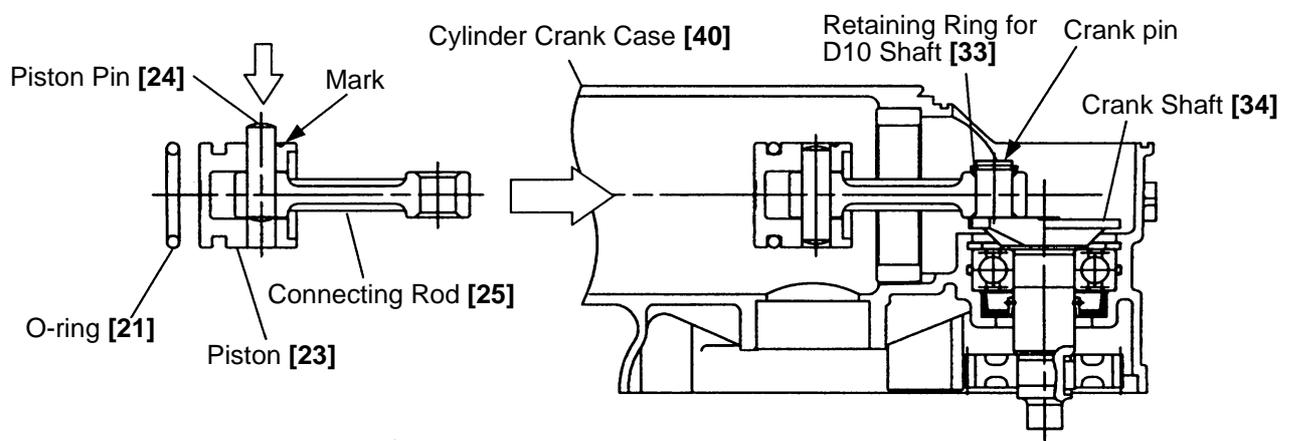


Fig. 15

(3) Reassembly of the cylinder and the hammer sleeve

Press-fit the Cylinder [17] into the Ball Bearing 6007DDUAV2S [15]. Screw down the Cylinder Cap [13] against the Cylinder [17]. At this time, apply screw locking agent TB1401 to each threaded portion. Insert the Striker [20] into the Cylinder [17]. Mount the Bearing Washer [16], Cylinder Washer [18], Clutch Spring [19], Clutch [22] and Bevel Gear [26] to the Cylinder [17]. Move the crank pin of the Crank Shaft [34] and move the Piston [23] to the top dead center. Insert the cylinder ass'y into the Cylinder Crank Case [40] to mount it. If the Slip Clutch Ass'y [53] and the Lever Shaft [67] are mounted in the Cylinder Crank Case [40], it will be an obstacle to mounting the Bevel Gear [26]. Before mounting the Slip Clutch Ass'y [53] and the Lever Shaft [67], mount the cylinder ass'y to the Cylinder Crank Case [40] (Fig. 16).

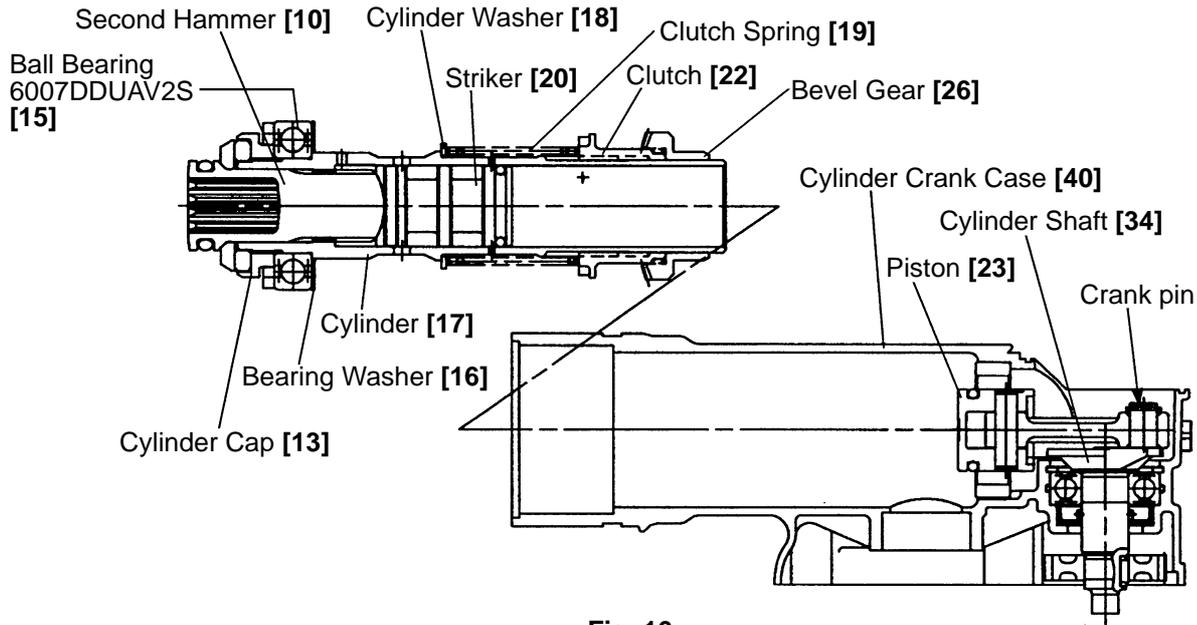


Fig. 16

(4) Reassembly of the slip clutch

Press-fit the Bevel Pinion [41] into the Collar [42] and the Ball Bearing 6002DDCMPS2L [44] then insert it into the Washer [45] and Washer (A) [46]. Mount the Feather Key 3 x 3 x 8 [35] to the Bevel Pinion [41] then press-fit into the Gear Holder [47]. Mount the Second Gear [50] around the outer circumference of the Gear Holder [47]. Before mounting, apply Hitachi Motor Grease No. 29 to the inner circumference of the Second Gear [50]. Insert the ten Needles [49] being careful not to incline them, then push in ten Springs (C) [48] as shown in Fig. 17. Fill the slots and the through holes of the Gear Holder [47] with Hitachi Motor Grease No. 29. Press-fit the Bevel Pinion [41] into the Spacer [51] and the Ball Bearing 629VVC2PS2L [52].

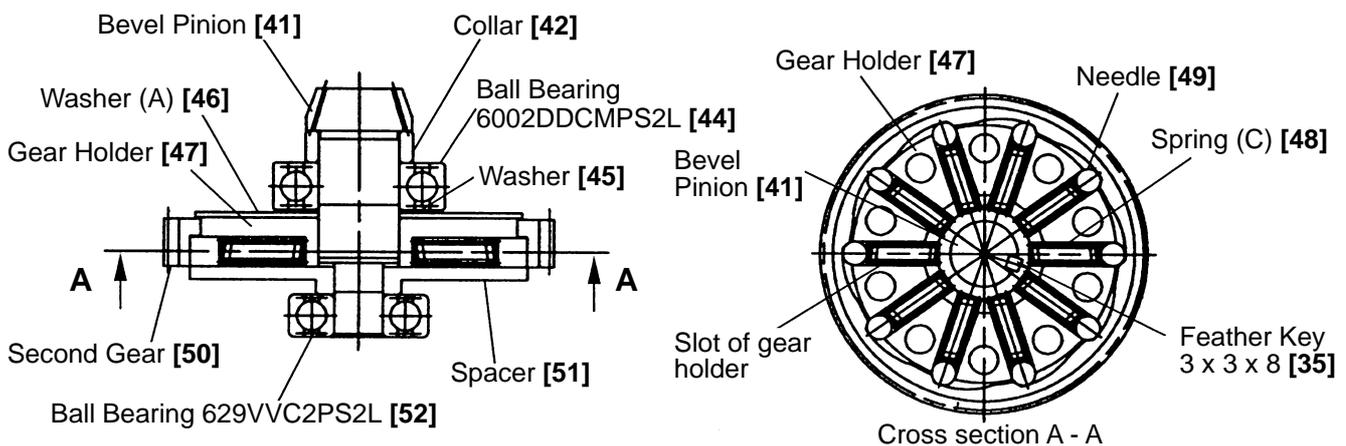


Fig. 17

(5) Reassembly of the tool holder

As illustrated in Fig. 18, ensure that the notched portions of the Stop Lever [7] and Knob (A) [3] are properly aligned during reassembly. If not properly aligned and assembled, the tool (drill bit, bull point, etc.) cannot be properly inserted into the retainer.

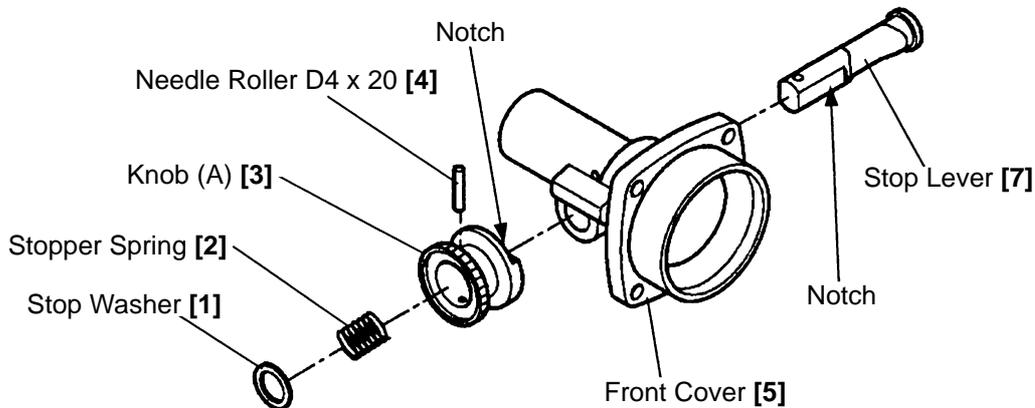


Fig. 18

(6) Carbon brush inspection

The motor employs Carbon Brushes [84] which are consumable parts. When they become worn to or near "wear limit" (7 mm), it could result in motor trouble. Replace the Carbon Brushes [84] with new ones which are numbered "73" as shown in Fig. 19. In addition, always keep Carbon Brushes [84] clean and ensure that they slide freely within the brush holders.

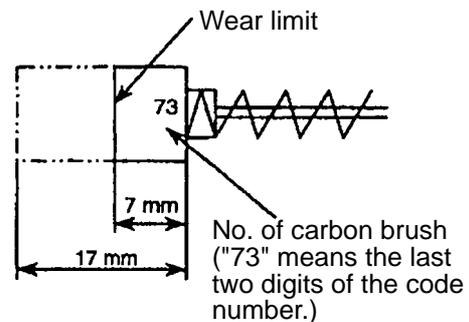


Fig. 19

(7) Application of lubricant

Apply special grease (for hammer and rotary hammer) to the inner circumference of the Connecting Rod [25], the O-rings [21] of the Striker [20] and the Piston [23], the sliding portion of the Second Hammer [10], O-ring (C) [9] of the Second Hammer [10], the Damper [12], the inner and outer circumferences of the Bevel Gear [26], Oil Seal (A) [43] and Oil Seal (B) [39]. Fill 50 g of the special grease in the Cylinder Crank Case [40] on the Connecting Rod [25] side and 20 g in the Cylinder Crank Case [40] on the Clutch [22] side. Apply Hitachi Motor Grease No. 29 to the Needle Bearing (M661) [56] and the pinion portion of the Armature Ass'y [75]. Fill 30 g of Hitachi Motor Grease No. 29 in the Cylinder Crank Case [40] on the First Gear [55] side and the Gear Cover [57] side. Apply Doubrex 251 grease to the spline hole of the Second hammer [10].

(8) Oil seal and others

Take care not to scratch or cut Oil Seal (A) [43] and Oil Seal (B) [39] of the Cylinder Crank Case [40], the O-ring (1AS-60) [8] of the Front Cover [5], O-ring (C) [9] of the Second Hammer [10], the Rubber Seal [32] of the Crank Cover [30] and the O-ring [21] of the Piston [23] and the Striker [20].

9-3. Screw Locking Agent TB1401

Apply screw locking agent TB1401 to all hex. socket head bolts M4, M5, M6 and Cylinder Cap [13].

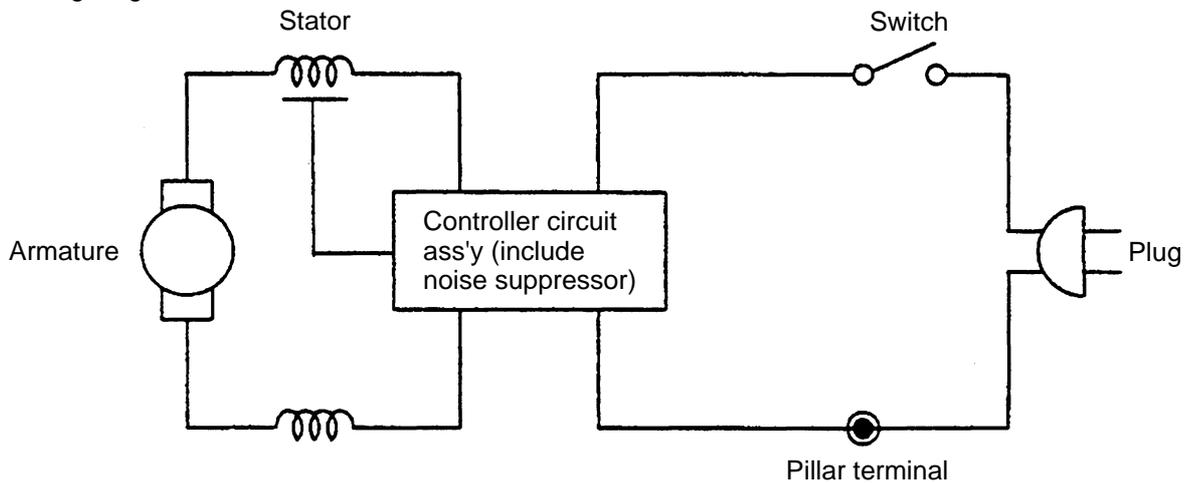
(Note) Be sure to apply screw locking agent ThreeBond TB1401 to the threads during reassembly, as the bolts loosened with vibration may cause damage to the tool body.

9-4. Tightening Torque

Front cover mounting bolts.....	13.7 $^{+0.98}_0$ N•m (140 $^{+10}_0$ kgf•cm)
(Hex. socket head bolt M6 x 25)	
D5 tapping screw	2.94 ± 0.49 N•m (30 ± 5 kgf•cm)
M6 x 45 hex. socket head bolt	9.8 $^{+1.96}_0$ N•m (100 $^{+20}_0$ kgf•cm)
M6 x 22 hex. socket head bolt	
Tail cover mounting bolt	4.41 ± 0.49 N•m (45 ± 5 kgf•cm)
(M5 x 10 hex. socket head bolt)	
Crank cover mounting bolt	4.41 ± 0.49 N•m (45 ± 5 kgf•cm)
Lever shaft mounting bolt	
(M4 x 12 hex. socket head bolt)	
D4 tapping screw (W/Flange).....	1.96 ± 0.49 N•m (20 ± 5 kgf•cm)
Handle mounting bolt	4.41 ± 0.49 N•m (45 ± 5 kgf•cm)
(M5 x 14 hex. socket head bolt (W/Flange))	
Cylinder cap	58.8 $^{+4.9}_0$ N•m (600 $^{+50}_0$ kgf•cm)

9-5. Internal Wiring

- Wiring diagram



- Mounting diagram

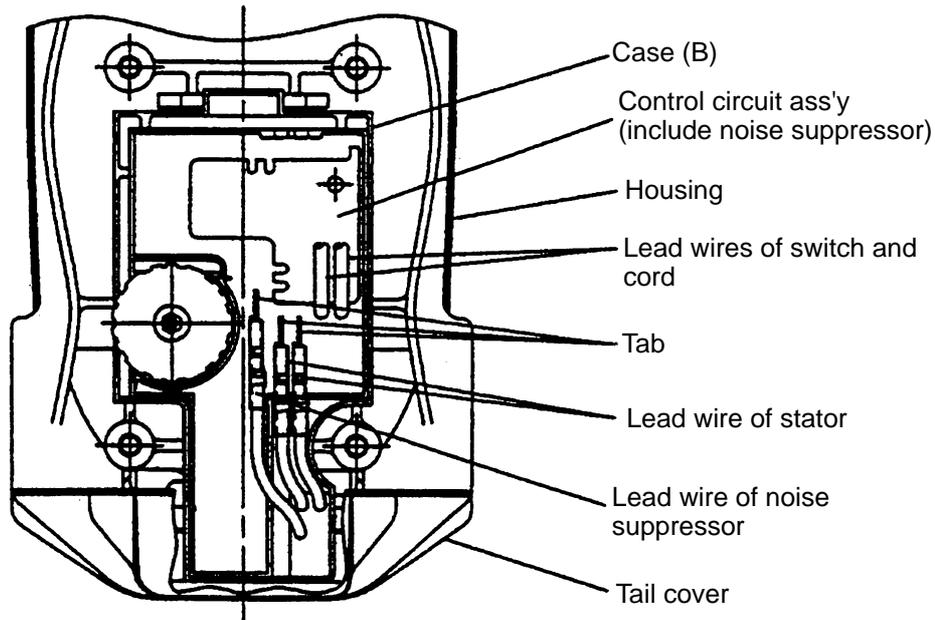


Fig. 20

9-6. Insulation Tests

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

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

9-7. No-load Current Value

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

Voltage (V)	120	230
Current (A) (Max.)	5.9	3.1

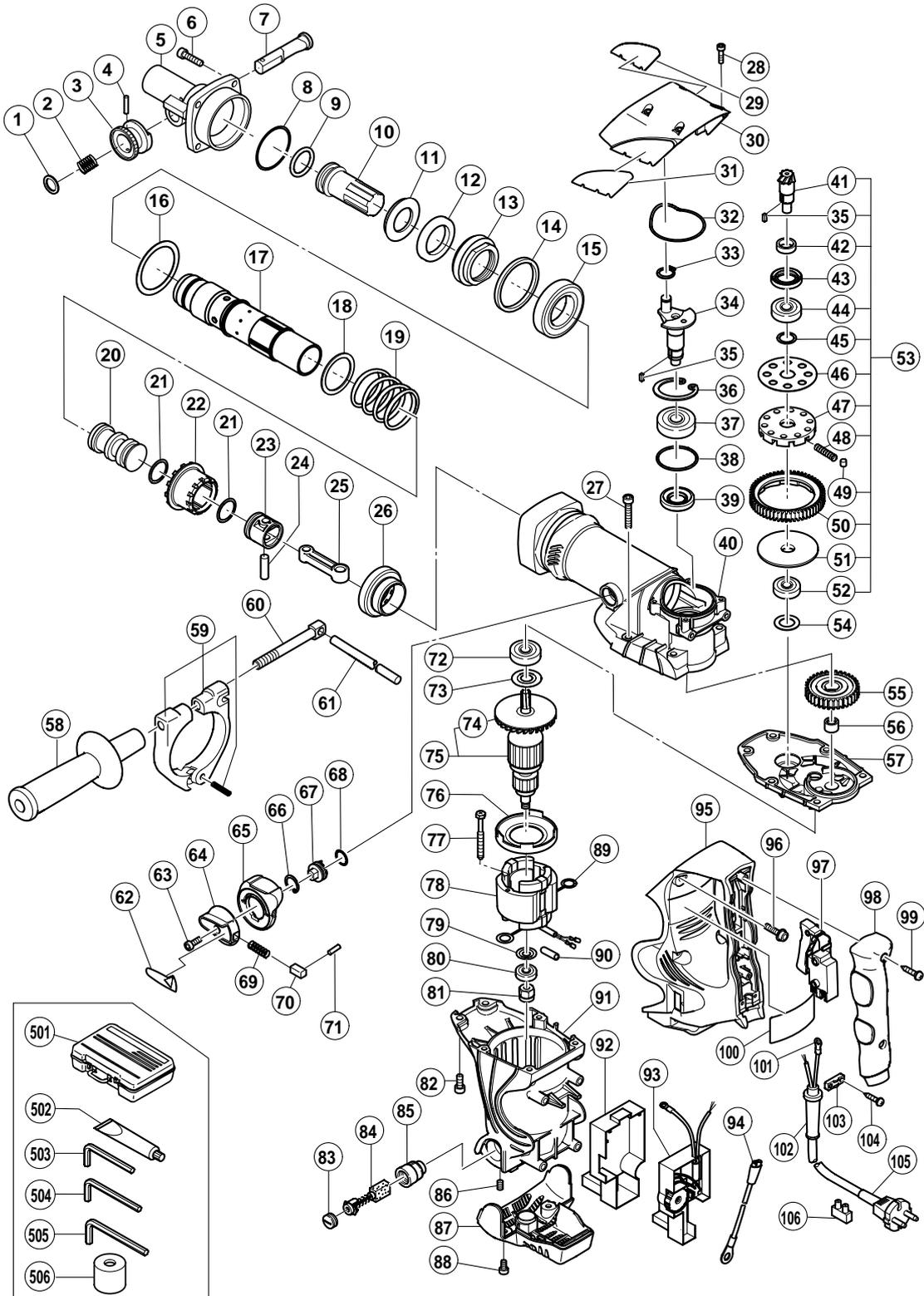
10. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.	
	Fixed								
DH 40FR	General Assembly	Work Flow						Housing Ass'y Stator Ass'y	
		Switch (C) Cord Cord Armor					Armature Ass'y Ball Bearing (6201DD) Dust Washer (B) Ball Bearing (608VV) Magnet		
		Tail Cover							
		Crank Cover							
					Control Circuit Handle			Crank Shaft Ball Bearing (6203DD) O-ring Oil Seal (B) First Gear	Cylinder Crank Case
		Knob (A) Stopper Spring Stop Lever						Slip Clutch Ass'y Bevel Pinion Oil Seal (A) Ball Bearing (6002DD) Washer (A) Gear Holder Second Gear Ball Bearing (629VV)	
		Change Lever Lever Holder Lever Shaft O-ring							
		Front Cover O-ring O-ring (C) Second Hammer Damper Washer Damper				Striker O-ring Piston Connecting Rod		Cylinder Cylinder Cap Urethane Ring Ball Bearing (6007DD) Clutch Spring Clutch Bevel Gear	

ELECTRIC TOOL PARTS LIST

■ ROTARY HAMMER
Model DH 40FR

2003 • 7 • 15
(E1)



PARTS

DH 40FR

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
1	983-242	STOP WASHER	1	
2	981-937	STOPPER SPRING	1	
3	983-241	KNOB (A)	1	
4	943-364	NEEDLE ROLLER D4X20	1	
5	322-159	FRONT COVER	1	
6	981-942	SEAL LOCK HEX. SOCKET HD. BOLT M6X25	4	
7	985-372	STOP LEVER	1	
8	956-996	O-RING (1AS-60)	1	
9	981-857	O-RING (C)	1	
10	985-370	SECOND HAMMER	1	
11	981-862	DAMPER WASHER	1	
12	981-861	DAMPER	1	
13	981-860	CYLINDER CAP	1	
14	981-859	URETHANE RING	1	
15	600-7DD	BALL BEARING 6007DDUAV2S	1	
16	321-297	BEARING WASHER	1	
17	322-156	CYLINDER	1	
18	322-158	CYLINDER WASHER	1	
19	321-294	CLUTCH SPRING	1	
20	322-157	STRIKER	1	
21	986-104	O-RING	2	
22	321-295	CLUTCH	1	
23	321-284	PISTON	1	
24	980-708	PISTON PIN	1	
25	321-285	CONNECTING ROD	1	
26	321-296	BEVEL GEAR	1	
27	986-940	SEAL LOCK HEX. SOCKET HD. BOLT M6X45	4	
28	983-162	SEAL LOCK HEX. SOCKET HD. BOLT M4X12	4	
29		HITACHI LABEL	1	
30	321-315	CRANK COVER	1	
31		HITACHI LABEL	1	
32	321-314	RUBBER SEAL	1	
33	939-540	RETAINING RING FOR D10 SHAFT (10 PCS.)	1	
34	321-275	CRANK SHAFT	1	
35	944-109	FEATHER KEY 3X3X8	2	
36	948-391	RETAINING RING FOR D40 HOLE	1	
37	620-3DD	BALL BEARING 6203DDCMPS2L	1	
38	996-363	O-RING (S-40)	1	
39	321-274	OIL SEAL (B)	1	
40	322-155	CYLINDER CRANK CASE	1	
41	321-278	BEVEL PINION	1	
42	321-279	COLLAR	1	
43	313-050	OIL SEAL (A)	1	
44	600-2DD	BALL BEARING 6002DDCMPS2L	1	
45	313-058	WASHER	1	
46	313-053	WASHER (A)	1	
47	321-281	GEAR HOLDER	1	
48	321-282	SPRING (C)	10	
49	320-343	NEEDLE	10	
50	321-280	SECOND GEAR	1	
51	321-283	SPACER	1	

PARTS

DH 40FR

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
52	629-VVM	BALL BEARING 629VVC2PS2L	1	
53	321-277	SLIP CLUTCH ASS'Y	1	INCLUD. 35, 41, 42, 44-52
54	944-525	BEARING WASHER (C)	1	
55	321-276	FIRST GEAR	1	
56	939-299	NEEDLE BEARING (M661)	1	
57	321-319	GEAR COVER	1	
58	313-078	SIDE HANDLE	1	
59	313-079	HANDLE HOLDER	1	
60	313-080	HANDLE BOLT	1	
61	971-786	STOPPER ROD	1	
62	321-867	LEVER LABEL	1	
63	983-162	SEAL LOCK HEX. SOCKET HD. BOLT M4X12	1	
64	321-309	CHANGE LEVER	1	
65	322-160	LEVER HOLDER	1	
66	311-229	RETAINING RING FOR D20 HOLE	1	
67	321-307	LEVER SHAFT	1	
68	873-095	O-RING (P-16)	1	
69	321-310	LEVER SPRING	1	
70	321-311	PUSHING BUTTON	1	
71	321-312	PIN D2X10	1	
72	620-1DD	BALL BEARING 6201DDCMPS2L	1	
73	302-429	DUST WASHER (B)	1	
74	321-640	FAN	1	
* 75	360-591U	ARMATURE ASS'Y 110V-120V	1	INCLUD. 72-74, 79, 80
* 75	360-591E	ARMATURE ASS'Y 220V-230V	1	INCLUD. 74
76	321-320	FAN GUIDE	1	
77	953-174	HEX. HD. TAPPING SCREW D5X55	2	
* 78	340-542G	STATOR ASS'Y 120V	1	INCLUD. 89
* 78	340-542E	STATOR ASS'Y 220V-230V	1	INCLUD. 89
79	982-631	WASHER (A)	1	
80	608-VVM	BALL BEARING 608VVC2PS2L	1	
81	318-721	MAGNET	1	
82	321-313	SEAL LOCK HEX. SOCKET HD. BOLT M6X22	2	
83	935-829	BRUSH CAP	2	
84	999-073	CARBON BRUSH (AUTO STOP TYPE) (1 PAIR)	2	
85	971-001	BRUSH HOLDER	2	
86	938-477	HEX. SOCKET SET SCREW M5X8	2	
87	321-321	TAIL COVER	1	
88	877-839	SEAL LOCK HEX. SOCKET HD. BOLT M5X10	2	
89	930-703	BRUSH TERMINAL	2	
90	321-322	VINYL TUBE	1	
91	321-318	HOUSING ASS'Y	1	INCLUD. 85, 86
92	321-317	CASE (B)	1	
* 93	321-328	CONTROLLER CIRCUIT 120V	1	
* 93	321-327	CONTROLLER CIRCUIT 220V-240V	1	
* 94	317-113	INTERNAL WIRE	1	FOR EUROPE, SUI
95	321-323	HANDLE	1	
96	998-485	HEX. SOCKET HD. BOLT (W/FLANGE) M5X14	6	
97	313-093	SWITCH (C) (2P SCREW TYPE W/O LOCK)	1	
98	321-324	HANDLE COVER	1	
99	301-653	TAPPING SCREW (W/FLANGE) D4X20 (BLACK)	2	

PARTS

DH 40FR

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
100		NAME PLATE	1	
* 101	980-063	TERMINAL	1	
* 101	930-804	TERMINAL M4.0 (10 PCS.)	1	FOR USA, CAN
102	940-778	CORD ARMOR D10.7	1	
* 103	960-266	CORD CLIP	1	
* 103	981-987Z	CORD CLIP	1	FOR SUI
104	984-750	TAPPING SCREW (W/FLANGE) D4X16	2	
* 105	500-390Z	CORD	1	(CORD ARMOR D10.7)
* 105	500-434Z	CORD	1	(CORD ARMOR D10.7) FOR USA, CAN
* 105	500-391Z	CORD	1	(CORD ARMOR D10.7) FOR SUI
106	938-307	PILLAR TERMINAL	1	

STANDARD ACCESSORIES

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
501	322-152	CASE (PLASTIC)	1	
502	981-840	GREASE (A) FOR HAMMER.HAMMER DRILL (30G)	1	
503	943-277	HEX. BAR WRENCH 3MM	1	
504	944-458	HEX. BAR WRENCH 4MM	1	
505	944-459	HEX. BAR WRENCH 5MM	1	
506	993-245	DUST COVER	1	

OPTIONAL ACCESSORIES

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
601	985-374	DRILL BIT D13X400L (D1/2"X16")	1	
602	985-375	DRILL BIT D25X400L (D1"X16")	1	
603	985-376	DRILL BIT D38X400L (D1-1/2"X16")	1	
604	985-377	A-TAPER SHANK ADAPTER	1	
605	985-378	B-TAPER SHANK ADAPTER	1	
606	944-477	COTTER	1	
607	984-029	CORE BIT SHANK D35 (1-3/8") OR BELOW	1	
608	985-379	CORE BIT SHANK D38 (1-1/2") OR ABOVE	1	
609	985-380	CORE BIT 50MM	1	INCLUD. 610
610	985-388	GUIDE PLATE (FOR CORE BIT 50MM)	1	
611	955-159	CORE BIT 105MM	1	INCLUD. 612
612	955-169	GUIDE PLATE (FOR CORE BIT 105MM)	1	
613	955-165	CENTER PIN (A) 133L FOR CORE BIT D38-150	1	
614	985-383	BULL POINT 300MM (12")	1	
615	985-381	COLD CHISEL W25X300L (1"X12")	1	
616	985-382	COLD CHISEL W25X460L (1"X18")	1	
617	985-384	CUTTER W38X300L (1-1/2"X12")	1	
618	985-385	CUTTER W50X300L (2"X12")	1	
619	985-386	SCOOP 105X405L (4-1/2"X16")	1	
620	320-859	SYRINGE (BLOW-OUT BULB TYPE)	1	
621	318-085	SYRINGE (BELLOWS TYPE)	1	
622	308-471	GREASE FOR HAMMER.HAMMER DRILL (70G)	1	
623	980-927	GREASE FOR HAMMER.HAMMER DRILL (500G)	1	

