

MODEL

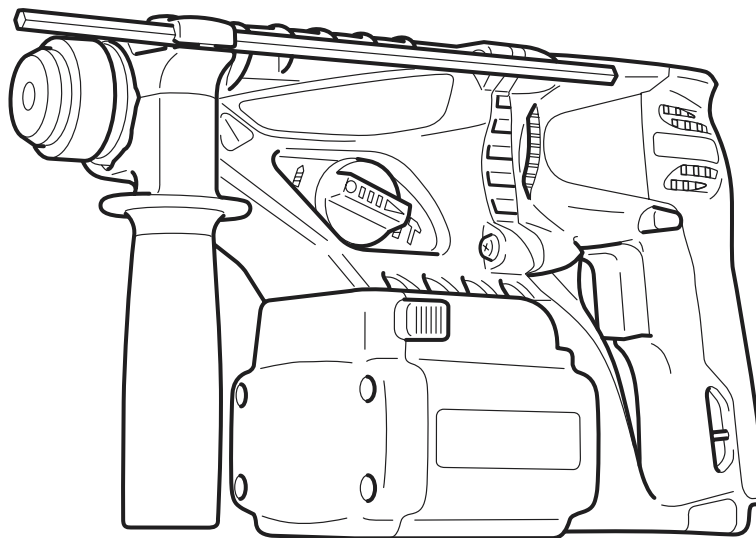
DH 24DV

Hitachi Power Tools

**CORDLESS ROTARY HAMMER
DH 24DV**

**TECHNICAL DATA
AND
SERVICE MANUAL**

D



LIST No. G811

Jun. 2004

REMARK:

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

Symbols Utilized	Competitors	
	Company Name	Model Name
B	BOSCH	GBH24V
P	DEWALT	DW004K
C	MAKITA	BHR200
Q	Panasonic	EZ6813



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1. PRODUCT NAME

Hitachi Cordless Rotary Hammer, Model DH 24DV

2. MARKETING OBJECTIVE

The Model DH 24DV is an upgraded version of the current Model DH 20DV. It features the fastest drilling speed in the 24-V class thanks to the higher power motor and the more efficient transmission of the hammering force. In addition, the cylindrical gear cover contributes to the reliable resistance to grease leakage and the powerful design. The Model DH 24DV is more convenient than the current model thanks to the switchable hammering force mechanism. The applicable battery is the Type EB 2420 or EB 2430HA. Each battery can be mounted and removed easily as they are slide-type batteries. The main components of the hammering mechanism and the tool retainer are common with the Model DH 24PB2.

3. APPLICATIONS

(1) Rotation and striking 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)

[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

Fastest drilling speed in the 24-V class

- Equivalent to Q
- 1.4 times faster than B, P, C and the Model DH 20DV

Cylindrical gear cover

- Increased in sturdiness and reliability
- Powerful and advanced design
(B and C: Constructed of two parts)

Replaceable carbon brushes

The carbon brushes can be replaced by loosening the two screws and removing the grip cover.
(B, P and Q: Not replaceable.)

Comfortably shaped handle

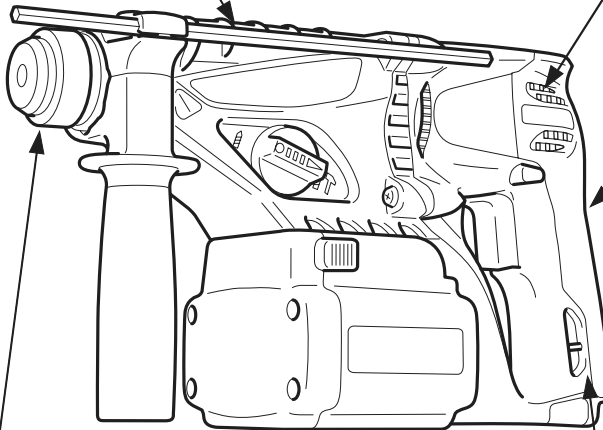
It is well-balanced and easy to push straight in either upward or horizontal direction.

One-push tool retainer eliminates the need for sliding the grip at mounting the bit.

- Sliding the grip is required at removal of the bit.

Switchable hammering force mechanism increases working efficiency

POWER mode: For drilling holes in 5 mm or more diameter
→ Powerful and quick drilling
SAVE mode: For drilling holes in 4.8 mm or less diameter
→ Prevents the bit from being bent



4-1. Selling Point Descriptions

4-1-1. Fastest drilling speed in the 24-V class

The drilling speed of the Model DH 24DV is equivalent to Q and 1.4 times higher than the Model DH 20DV, B, P and C thanks to the efficient transmission of the hammering energy. For detail, refer to "6-2. Drilling Speed Comparisons" on page 13.

4-1-2. Cylindrical gear cover

To avoid grease leakage, the Model DH 24DV is equipped with the cylindrical gear cover that is used for electric rotary hammer drills instead of the current Model DH 20DV's two-part housing. In addition, the Model DH 24DV is equipped with a sealed type bearing at the tip of the bearing unit in the gear cover to increase the resistance to grease leakage.

4-1-3. Switchable hammering force mechanism increases working efficiency

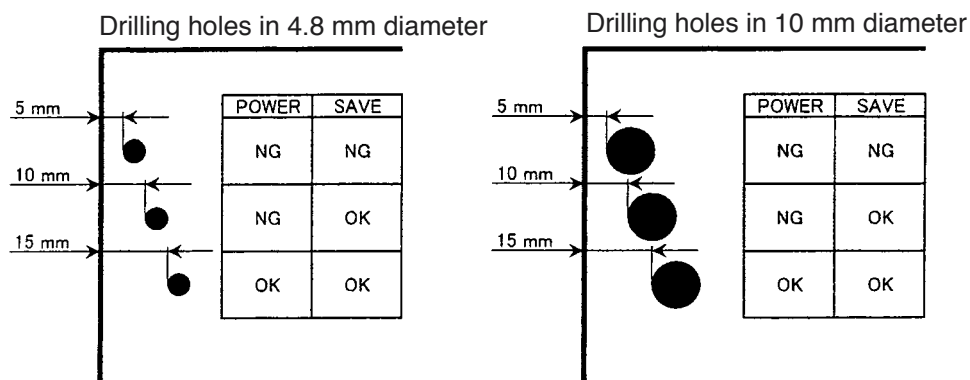
The Model DH 24DV is equipped with the switchable hammering force mechanism to prevent small-diameter bits (4.8 mm or less) from being bent. The hammering force can be adjusted by switching between "POWER" mode and "SAVE" mode.

POWER (= Powerful mode) → For drilling holes in 5 mm or more diameter speedily

SAVE (= Suppressing mode) → For drilling holes in 4.8 mm or less diameter preventing the bit from being bent

The Model DH 24DV can also be used for drilling holes into soft workpieces by decreasing the hammering force.

Following figures show a comparison of the brick breakage when drilling holes into bricks as a guide of the hammering force.



4-1-4. One-push tool retainer

The tool retainer of the current Model DH 20DV needs sliding the grip to mount the bit. The one-push tool retainer of the Model DH 24DV eliminates the need for sliding the grip to mount the bit (sliding the grip is required at removal of the bit).

4-1-5. Replaceable carbon brushes

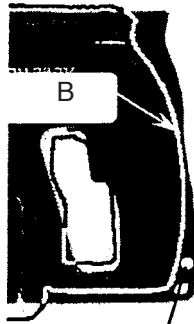
The Model DH 24DV has the grip cover secured with two screws to the housing. By removing the grip cover, the carbon brushes are exposed and they can be replaced with new ones. For detail, refer to "(7) Replacement of the carbon brushes" on page 27. These carbon brushes are auto-stop type. When they become worn, the Model DH 24DV automatically interrupts the current and stops. Instruct the customers to replace the carbon brushes with new ones in this case.

4-1-6. Comfortably shaped handle

The handle is shaped so that it is easy to push the main body straight in either upward or horizontal direction.

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

Drilling
in horizontal direction



It is easy to hold because this portion
reduces the massive feeling.

Drilling
in upward direction








It is well balanced by holding
the rear of the motor.

5. SPECIFICATIONS

5-1. Specifications

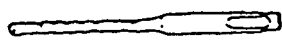
Capacity	Concrete	24 mm (15/16")
	Steel	13 mm (1/2")
	Wood	30 mm (1-3/16")
Usable drill bits		SDS-plus type only
No-load rotation speed		"POWER" mode: 1,000/min., "SAVE" mode: 500/min.
Full-load blow		"POWER" mode: 4,500/min., "SAVE" mode: 2,200/min.
Type of motor		DC magnet motor
Enclosure	Body	Glassfiber reinforced polyamide resin ···· Housing, gear cover Glassfiber reinforced polycarbonate resin and thermoplastic elastomer ········· Grip cover Aluminum alloy die casting ········· Inner cover
	Battery	Glassfiber reinforced polyamide resin
		Charger ABS resin
Type of switch		Trigger switch with forward/reverse rotation selector (with brake)
Handle shape		D-type handle with side handle
Weight	Main body	4.0 kg (8.8 lbs.) (with battery)
	Battery	EB 2420 1.3 kg (2.87 lbs.)
		EB 2430HA 1.4 kg (3.09 lbs.)
	Charger	UC 24YFB 0.6 kg (1.3 lbs.)
Battery (Type EB 2420)		Sealed cylindrical nickel cadmium storage battery Nominal voltage: DC 24V Nominal life: Charging/discharging approximately 1,000 cycles (in the case of Model UC 24YFB) Nominal capacity: 2.0 Ah
Battery (Type EB 2430HA)		Sealed cylindrical nickel-metal hydride storage battery Nominal voltage: DC 24V Nominal life: Charging/discharging approximately 500 cycles (in the case of Model UC 24YFB) Nominal capacity: 3.0 Ah
Charger (Model UC 24YFB)		Sealed power source: Single-phase AC, 50/60 Hz Voltage: Depending on the order specification Power input: 90 W Charging system: Constant current charge with full wave phase control Overcharge protection system: (1) Battery voltage detection (Δ^2V system) for EB 2420 battery Ni-MH battery temperature detection (dT/dt system) for EB 2430HA battery (2) Battery surface temperature detection (thermistor) (3) 120 minutes timer Output voltage: DC 24V Output current: 2.5 A Charging time: Approx. 50 minutes (for EB 2420 at 20°C (68°F)) Approx. 70 minutes (for EB 2430HA at 20°C (68°F)) Operable ambient temperature range: 0°C — 40°C (32°F — 104°F) The maximum allowable temperature of the Model 2420 battery is 60°C (140°F) and the Model EB 2430HA battery is 45°C (113°F).

Red pilot lamp remains lit or flashes.	Pilot lamp indications (UC 24YFB)		
	Prior to charging	Blinks 0.5 sec. ON, 0.5 sec. OFF 	
	During charging	Lit Stays ON constantly 	
	Charging completed	Blinks 0.5 sec. ON, 0.5 sec. OFF 	
	Charging not possible	Flickers 0.1 sec. ON, 0.1 sec. OFF 	Storage battery or charger is faulty.
Green pilot lamp is lit.	High battery temperature	Lit Stays ON constantly 	Charging not possible because storage battery temperature is too high.
Standard accessories	Charger (depending on order specifications) 1 unit Side handle 1 pc. Plastic case 1 pc. Depth gauge 1 pc.		

5-2. Optional Accessories

A. Drilling anchor holes (rotation + striking)

- Drill bit (slender shaft)

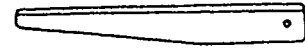


(1) Drill bit (slender shaft)

(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)

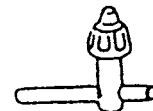
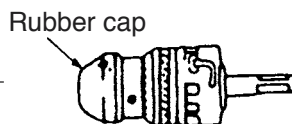
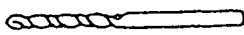
(3) Cotter

(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 hammer drill



(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

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

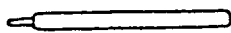
Anchor setting bar



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. Crushing operation (rotation + striking)

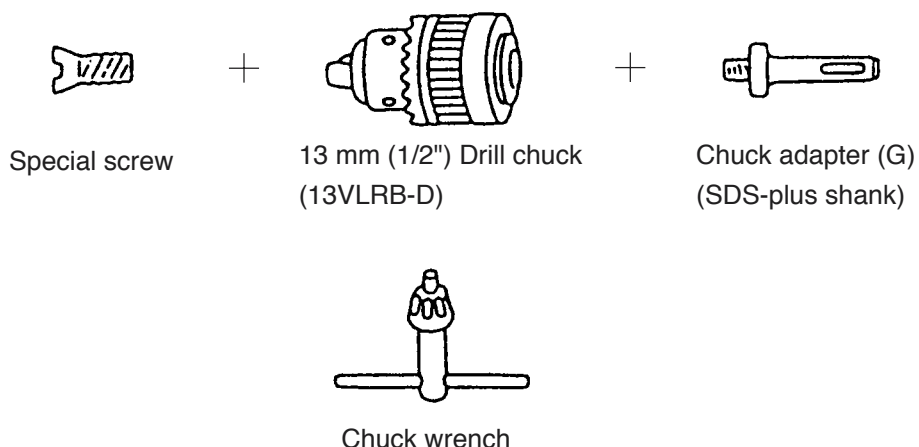


Bull point (round type only)
(SDS-plus shank)

Code No. 303046

D. Drilling holes and driving screws (rotation only)

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



(Note)

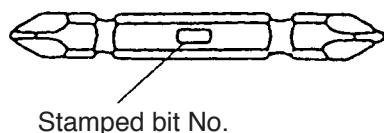
If the tool is to be used for loosening screws, open the three jaws of the drill chuck and securely fix the drill chuck to chuck adapter (G) with the special screw (a left-hand threaded M6 screw) when mounting the drill chuck onto chuck adapter (G).

	Part name	Code No.
	Drill chuck and adapter set (SDS-plus) (including a-c)	321825
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: 65 mm]

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

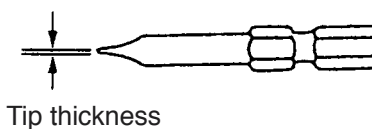


Bit No.	Code No.	Applicable screw dia. (mm)
No. 2	955654	3 – 5
No. 3	955655	6 – 8

(2) Slotted-head (minus) bit

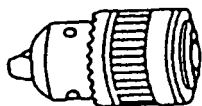
[Overall length: 50 mm]

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



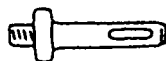
Bit tip thickness	Code No.	Applicable screw dia. (mm)
0.8	955658	4
1	955673	5 – 6

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

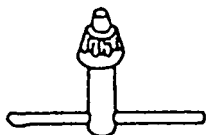


Drill chuck (13VLD-D)

+



Chuck adapter (D)
(SDS-plus shank)



Chuck wrench

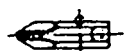
(NOTE)

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 cross-recessed head (Phillips) 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

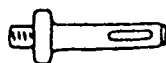
F. Driving screws (rotation only)

- Phillips (plus) driver bit [overall length: 25 mm] (for cross-recessed head screw)



Bit No.

+

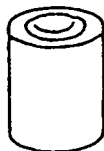


Chuck adapter (D)
(SDS-plus shank)

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

G. Grease for electric impact drill

- Containing 500 g (1.1 lbs.): Code No. 980927



- Containing 30 g (0.07 lbs.): Code No. 981840

70 g (0.15 lbs.): Code No. 308471



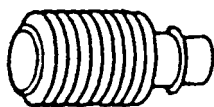
H. Dust cup, dust collector (B)

Dust cup



Code No. 971787

Dust collector (B) ass'y



Code No. 306885

6. COMPARISONS WITH SIMILAR PRODUCTS

6-1. Specification Comparisons

Maker			HITACHI		B	P	C	Q
Model			DH 24DV	DH 20DV				
Capacity	Concrete	mm	24 (15/16")	20 (25/32")	20 (25/32")	20 (25/32")	20 (25/32")	20 (25/32")
	Steel	mm	13 (1/2")	13 (1/2")	10 (3/8")	13 (1/2")	13 (1/2")	13 (1/2")
	Wood	mm	30 (1-3/16")	27 (1-1/16")	20 (25/32")	30 (1-3/16")	27 (1-1/16")	27 (1-1/16")
No-load rotation speed		/min	0 – 1,000	0 – 1,150	0 – 1,000	0 – 1,100	0 – 1,100	0 – 950
Full-load blow		/min	0 – 4,500	0 – 4,400	0 – 4,400	0 – 4,200	0 – 4,700	0 – 4,600
Changeover of impact energy			○	×	×	×	×	○
Bit setting			Single action	Double action	Single action	Single action	Single action	Single action
Hammering only function			×	×	×	×	○	×
Soft grip handle			○	×	○	○	○	○
Safety slip clutch			○	○	○	○	○	○
Externally accessible CB			○	×	×	×	○	×
Variable speed			○	○	○	○	○	○
Brake			○	○	○	○	○	×
Battery	Type		Nicd/NiMH	Nicd/NiMH	Nicd	Nicd	NiMH	NiMH
	Capacity	Ah	2.0/3.0	2.0/3.0	2.0	2.0	3.0	3.0
	Voltage	V	24	24	24	24	24	24
	Charging time	min	50/70	50/70	18/60	60	40	45
Dimension	Length	mm	322	292	329	348	316	316
	Height	mm	186	211	235	215	235	206
Weight		kg	4.0	3.7	3.8	4.2	4.0	4.35

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

2) Weight excludes battery and side handle.

6-2. Drilling Speed Comparisons

Drilling speed depends on the operating conditions. The test results shown in Fig. 3 is based on actual factory tests, and is used as a reference only. Figure 3 shows the drilling speed comparisons for downward drilling. The drill bits used are the Hitachi genuine SDS-plus shank bits.

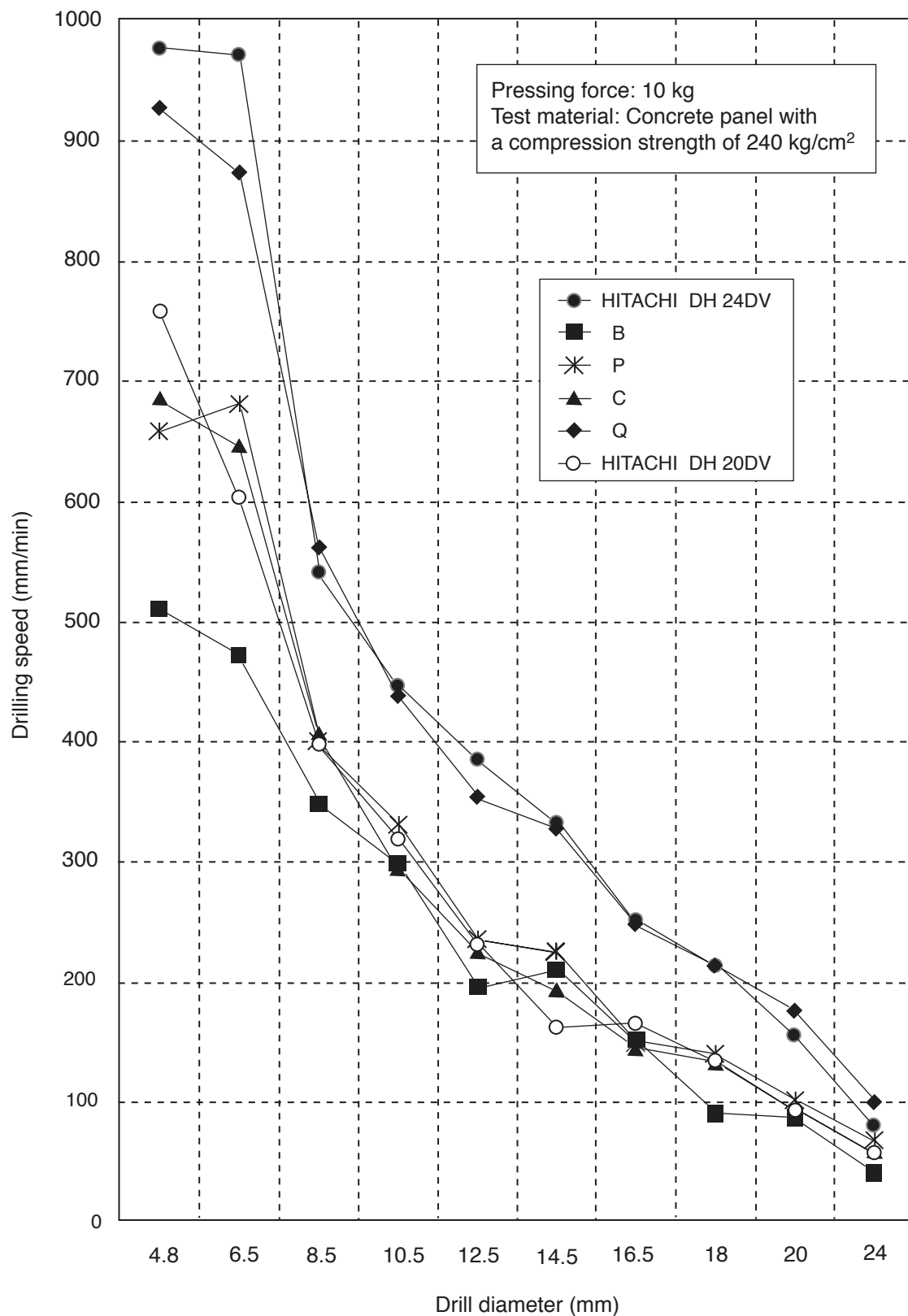


Fig. 3 Drilling speed comparisons (downward drilling)

6-3. Per Charge Working Capacity Comparisons

6-3-1. Drilling into concrete

The number of holes which can be drilled into concrete per battery charge may vary widely in accordance with the hardness of the concrete, the sharpness and condition of the drill bit and other factors. Accordingly, the test results shown in Fig. 4 are intended for reference purposes only.

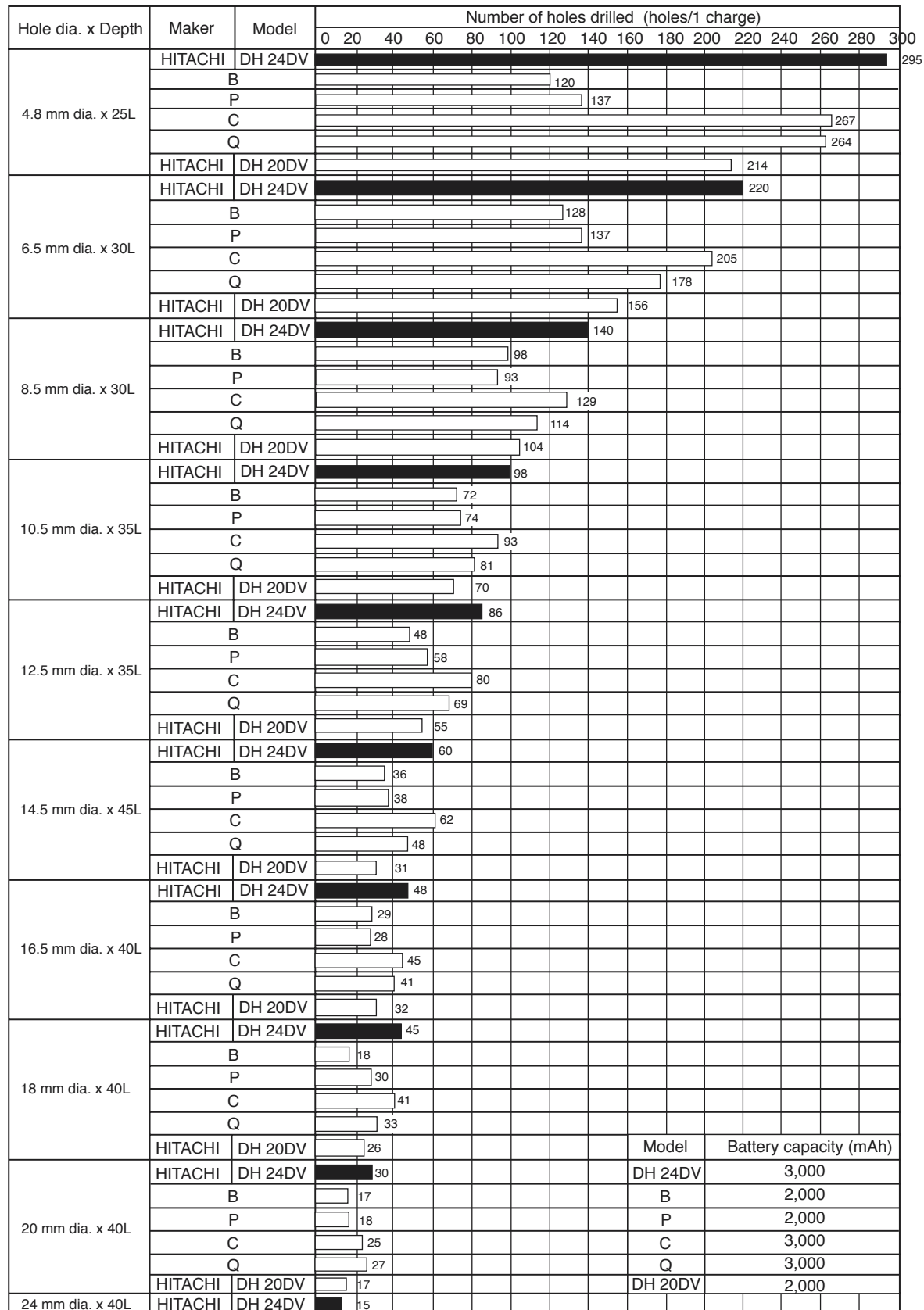


Fig. 4 Downward drilling into concrete

7. PRECAUTIONS IN SALES PROMOTION

In the interest of promoting the safest and most efficient use of the Model DH 24DV Cordless 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 and Name Plate attached to each tool.

7-1. Handling Instructions

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

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

New units are not fully charged. Even if the units were fully charged at the factory, long periods out of use, such as during shipping, cause the storage battery to lose its charge.

Customers must be instructed to fully charge the unit prior to use.

- (2) When charging storage batteries, use only the exclusive Model UC 24YFB charger provided with the tool.

Because of the batteries' rapid-charging feature (about one hour), use of other battery chargers is hazardous.

- (3) Connect the charger to an AC power outlet only.

Use of any other power source (DC outlet, fuel powered generator, etc.) will cause the charger to overheat and burnout.

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

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

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

Special temperature sensitive devices are employed in the charger to permit rapid charging. Ensure that customers are instructed to use the charger at the indicated ambient temperature range. At temperature under 0°C (32°F), the thermostat will not function properly, and the storage battery may be over-charged.

At temperatures over 40°C (104°F), the storage battery cannot be sufficiently charged. The optimum temperature range is 20°C — 25°C (68°F — 77°F).

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

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

- (7) Do not use more than two batteries in succession.

If three or more batteries are used in rapid succession, the main body may become overheated, causing possible motor or switch malfunction. After two batteries have been used, stop operation for about 15 minutes to allow the main body to cool.

(8) Do not insert foreign objects into the air vents on the charger.

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

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

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

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

(10) Disposal of the Models EB 2420 and EB 2430H batteries

Ensure that all customers understand that the Models EB 2420 and EB 2430H batteries should be turned in to a Hitachi Power Tool sales outlet or authorized service center when they are no longer capable of being recharged or repaired. If thrown into a fire, the batteries may explode, or, if discarded indiscriminately, leakage of the cadmium compound contained in the battery may cause environmental pollution.

7-2. Caution Plates

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

- For Australia and New Zealand

CAUTION

- Read thoroughly HANDLING INSTRUCTIONS before use.

- 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.

(2) The following cautions are listed on the Name Plate attached to each of the Models EB 2420 and EB 2430HA batteries.

- For Europe

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

- For the U. S. A. and Canada

CAUTION • For safe operation, see instruction manual. • Use HITACHI charger recommended in instruction manual for recharging.

(3) The following cautions are listed on the Name Plate attached to each Model UC 24YFB charger.

- For the U. S. A. and Canada

CAUTION • For safe operation, see instruction manual.
• Charge HITACHI rechargeable battery type EB 2420.
Other types of batteries may burst causing personal injury and damage. • Charge between 32°F and 104°F. • Indoor use only. • Replace defective cord immediately.

7-3. Precautions Requiring Particular Attention During Sales Promotion

The cordless hammer drill offers many advantages: it can be used in places where no power source is available, the absence of a cord allows easy use, etc. However, in comparison with conventional AC type impact drills and hammer drills, there are certain precautions which require particular attention. Salespersons must be thoroughly familiar with the following points to properly advise the customer in the most efficient use of the tool.

(1) Appropriate drilling capacity of the Model DH 24DV

The Model DH 24DV is not capable of drilling several dozens of holes like a conventional AC type impact or hammer drill because it is a cordless hammer drill powered by a battery. If the customer wishes to use the tool to drill many holes in succession, please recommend that a spare battery should be kept available for use.

(2) Use thrust within the range of 10 to 15 kg

Applying heavy thrust (pressure) on the tool, such as is possible with AC type impact and hammer drills, will not accelerate the drilling speed. On the contrary, excessive pressure will reduce bit rotation and hammering speed, and cause the storage battery to rapidly lose its charge.

(3) Variation in amount of work possible per charge

Although the nominal capacity of the storage batteries used with the Model DH 24DV is 2,000 mAh, the actual capacity may vary within the range of 1,800 to 2,200 mAh depending on the ambient temperature during use and recharging, and the number of times the storage batteries have been discharged and recharged. It should also be noted that other factors which may have a bearing on the amount of work possible per charge are the working conditions (ambient temperature, type and moisture content of the workpieces, sharpness of the drill bits, etc.) and the operational skill of the user.

(4) Precautions in drilling with metal drill bits.

Although the Model DH 24DV is designed for a drilling capacity of up to 13 mm in steel, its operational capabilities are considerably less than those of conventional AC type impact drills. Especially when drilling with a 13 mm drill bit for steel, the drill tends to become locked when the drill bit penetrates through the material. For this reason, the customer should be cautioned to reduce the pressure on the main body of the tool when drilling completely through the material to avoid locking the drill.

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, insert 50 g (1.8 oz) of new grease into the gear cover and 10 g (0.4 oz) into the groove of the inner cover. Be careful not to exceed the designed amount of grease. Excessive grease will reduce striking efficiency.

Apply Molub Alloy No. 777-1 grease to the outer circumference of the clutch groove and the pin portion of the change lever.

8-2. Tool Structure

While the structure is essentially the same as that of the Model DH 24PB2, the description below are included to enhance your understanding of the tool and its mechanisms.

- Transmission of rotation

Unlike conventional hammer drills, the armature shaft in the Model DH 24DV 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 24DV more compact for easier handling and operability. Thus, the appearance of the Model DH 24DV 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 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 hammer drills, a piston is caused to reciprocate by a connecting rod and crank shaft, and the crank shaft and the cylinder axis are at right angle to each other. Accordingly, the armature shaft and the cylinder axis are at a right angle to each other. In the Model DH 24DV, 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. 5, the rotation of the armature is transmitted to the second shaft via the first gear. The second shaft rotation is further 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 that angle of inclination to change regularly forward and back with relation to the second shaft, and produces a rocking motion to 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 the piston pin, and causes the reciprocating motion of the piston.

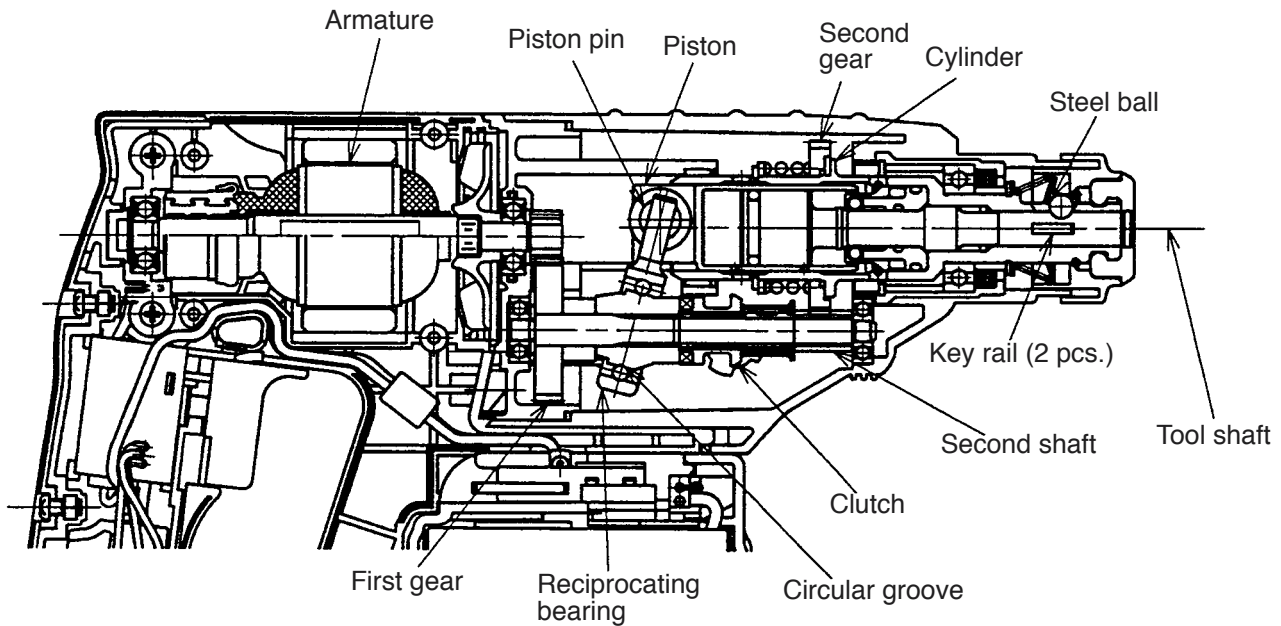


Fig. 5

- Hammering function

The piston reciprocates within the cylinder to move the striker in the same manner as in conventional hammer drills. As the piston reciprocates, the changing air pressure inside the air chamber between the piston and the striker causes the striker to move and continuously 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 would weaken the air-cushion effect and reduce 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 striking prevention mechanism

The idle striking prevention mechanism in the Model DH 24DV is different from that of conventional hammer drills. When the drill bit is lifted from the concrete surface on completion of drilling, the second hammer moves to the position indicated by the continuous lines in Fig. 6, 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 respiratory hole is blocked by the inner wall of the cylinder, the air in the air chamber will pass through the large piston respiratory hole and be released through the air-escape slot and large cylinder respiratory 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 mouth system that practically no pressing force at all is required to restart the hammering operation.

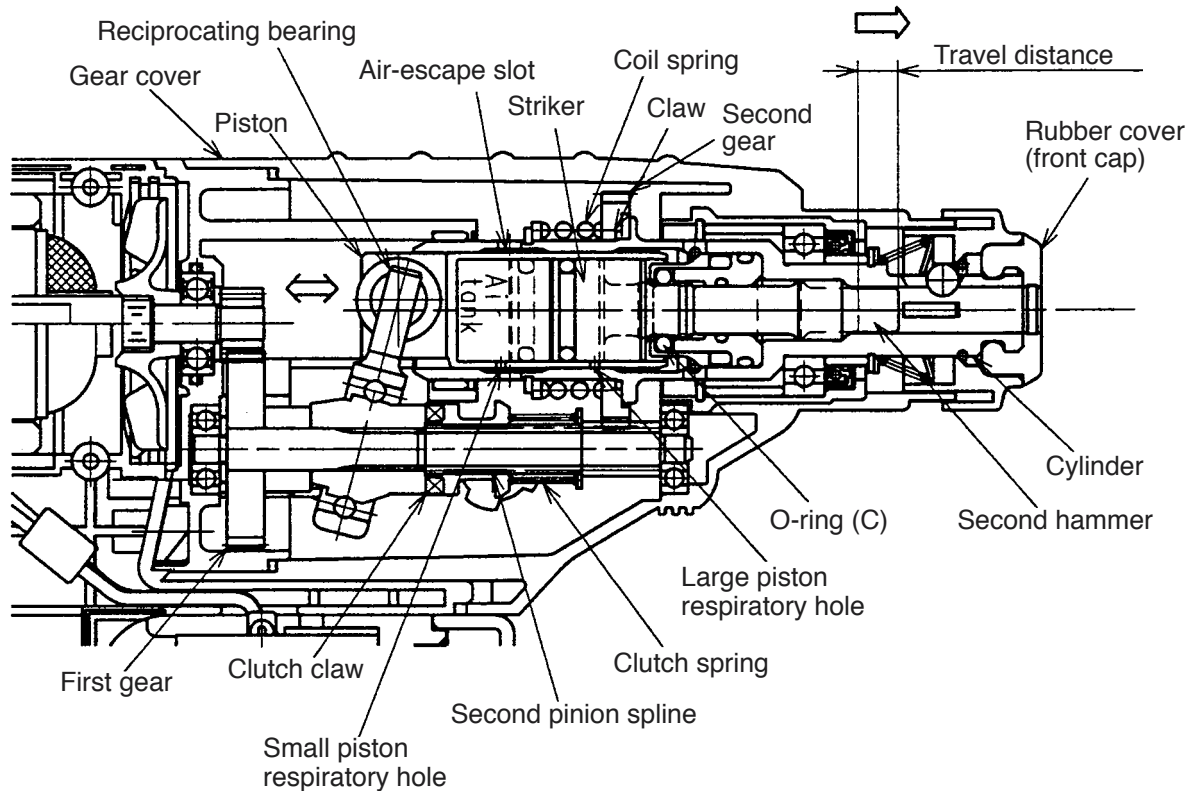


Fig. 6

- Slip mechanism

The slip mechanism in the Model DH 24DV 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 three 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 should the drill bit come 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 the 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 breakdown of the insulation.

- Speed control

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

8-3. "Rotation Only" and "Rotation + Striking" Changeover Mechanism

The change lever on the Model DH 24DV permits quick and easy changeover between the "rotation only" and "rotation + striking" functions.

Armature rotation is transmitted to the second shaft and the first gear, and then to the clutch via the spline on the second shaft spline. Claws on the surface of the clutch engage matching claws on the reciprocating bearing to convert the rotation into reciprocating motion. The clutch can travel back and forth on the second shaft. Claws on the surface of the clutch is pressed against on the reciprocating bearing by the force of the clutch spring during usual operation ("rotation + striking"). The reciprocating bearing is fitted on the second shaft with some play. When the change lever is set to the "rotation only" (⚙️ mark) position, the eccentric pin of the change lever forces the clutch to move against the pressure of the clutch spring in the direction of the front cap, so that it disengages from the claws on the reciprocating bearing, and the reciprocating bearing stops rotating on the second shaft. When the change lever is returned to the "rotation + striking" (⚡️ mark) position, the force of the clutch spring presses the clutch back against the reciprocating bearing so that the claws engage to transmit rotation to the reciprocating bearing once more.

8-4. "Rotation Only" (No striking)

The Model DH 24DV is equipped with a change lever for changeover between "rotation + striking" and "rotation only" functions, merely mounting the chuck adapter will not stop the striking action; it is absolutely necessary to turn the change lever to the "rotation only" setting for drilling or driving screws. Should the change lever be set to the "rotation + striking" position when the tool is used for drilling, the striking action may cause the drill chuck to be broken or damaged. Salespersons should carefully ensure that the buyer is thoroughly advised on this point.

8-5. Drill Bits

The chuck section is designed exclusively for the popular and widely available SDS-plus shank bits, as shown in Fig. 7. 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 falling out.

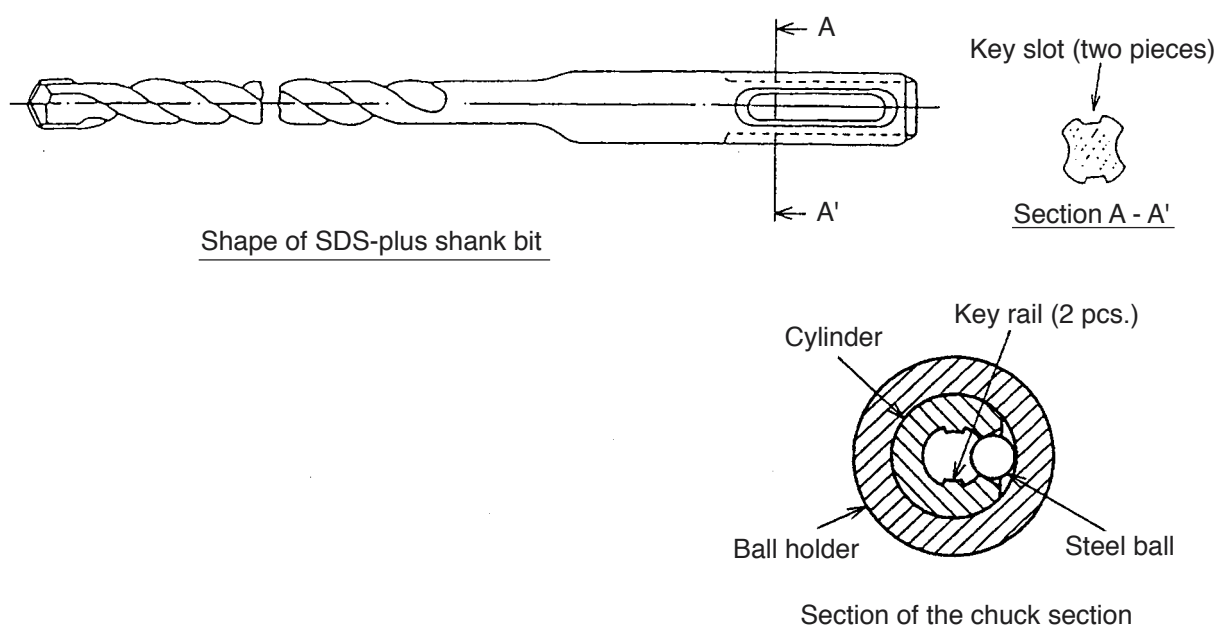
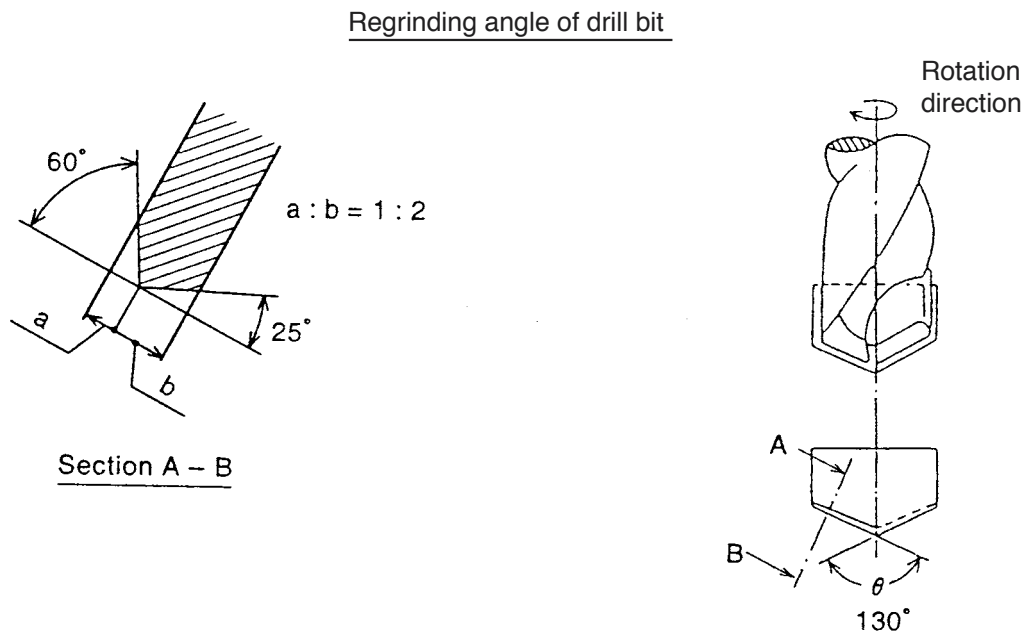


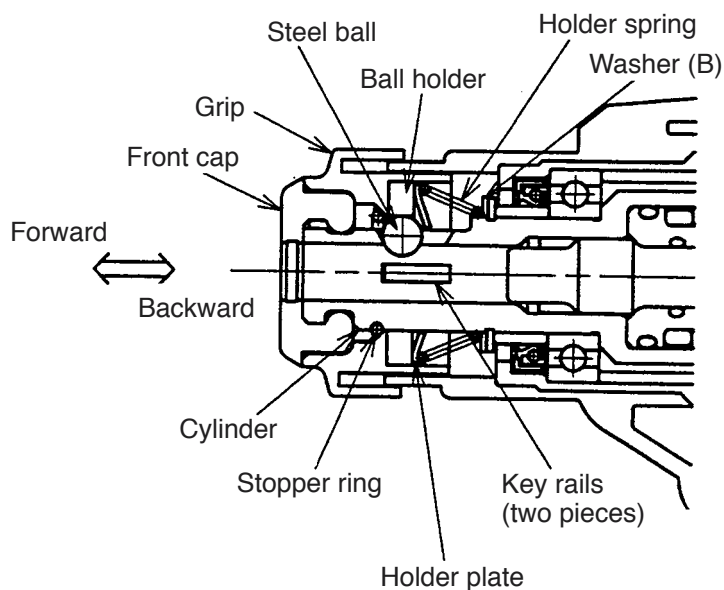
Fig. 7

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



8-6. Tool Retainer Section

Figure 9 shows the construction of the chuck section.



The tool retainer is structured as shown in Fig. 9.

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.

8-7. Dust Collector (B)

When drilling holes overhead, dust collector (B) can be mounted on the Model DH 24DV 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 166 mm, 160 mm and 110 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 eyeglasses.

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.

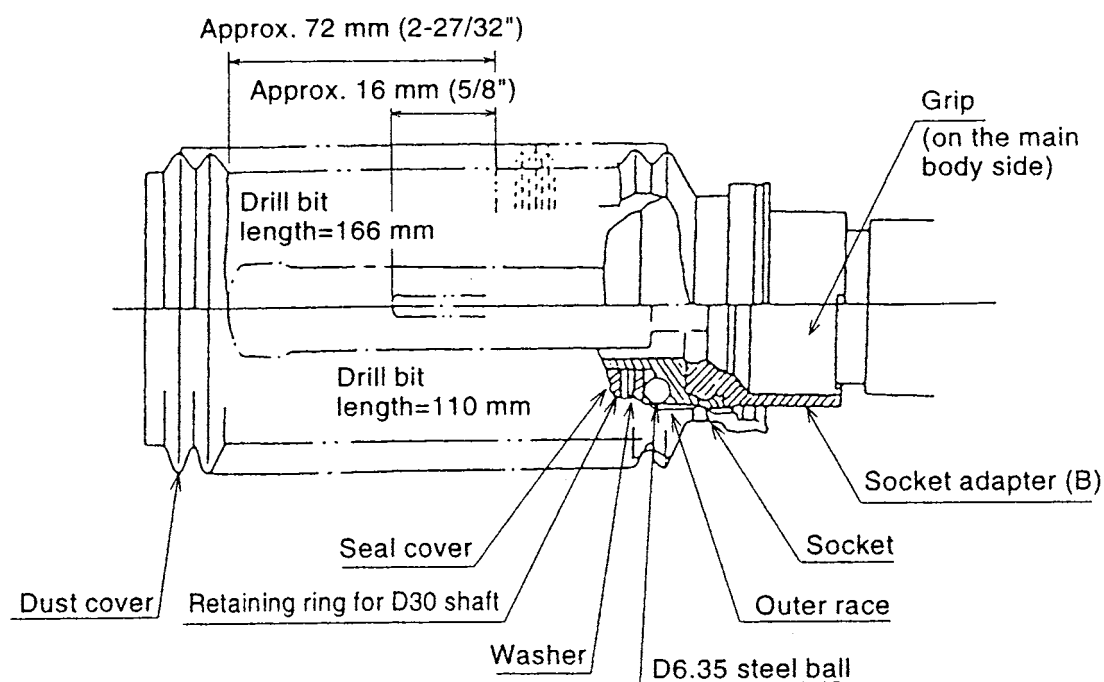



Fig. 10 Dust collector (B) structure

9. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

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

9-1. Disassembly

(1) Disassembly of the striking mechanism section

Push in the Second Hammer **[26]** with a drill bit or a screwdriver. Remove the Striker **[34]** chucked by O-ring (C) **[31]**. The Change Lever **[19]** is positioned "Rotation Only" ( mark) as shown in Fig. 11. Remove the Tapping Screw D2.6 **[17]** and turn the Change Lever **[19]** by approximately 200° clockwise. Adjust the "△" mark of the Change Lever **[19]** to the center of the notch on the gear cover. Ply out the Change Lever **[19]** at this position. Remove the Tapping Screw (W/Flange) D5 x 25 (Black) **[9]** from the Gear Cover **[10]** and remove the Gear Cover **[10]**.

The Inner Cover Ass'y **[39]** and Housing (A). (B) Set **[67]** are loosely fitted together. Attempting to pull them out first could cause the Armature and Pinion Ass'y **[55]** to be pulled out at the same time, causing damage to the Carbon Brushes **[61]**. Remove from the end of the Second Shaft **[41]**, and turn the Second Shaft **[41]** so that the Piston **[36]** moves to its maximum upper position (inner cover side). The arm of the Reciprocating Bearing **[46]** can then be disconnected from the Piston Pin **[45]**, and the Second Shaft **[41]** and the components mounted on it can be removed from the Inner Cover Ass'y **[39]** as a unit.

With a bearing puller, remove the First Gear **[48]** from the Second Shaft **[41]**. Then take off the Reciprocating Bearing **[46]**. At this time, carefully note that the First Gear **[48]** must be aligned with and press-fitted onto the 9 mm diameter end of the Second Shaft **[41]**.

The Clutch **[44]**, Clutch Spring **[43]** and Washer (B) **[42]** can then be removed from the Second Shaft **[41]**.

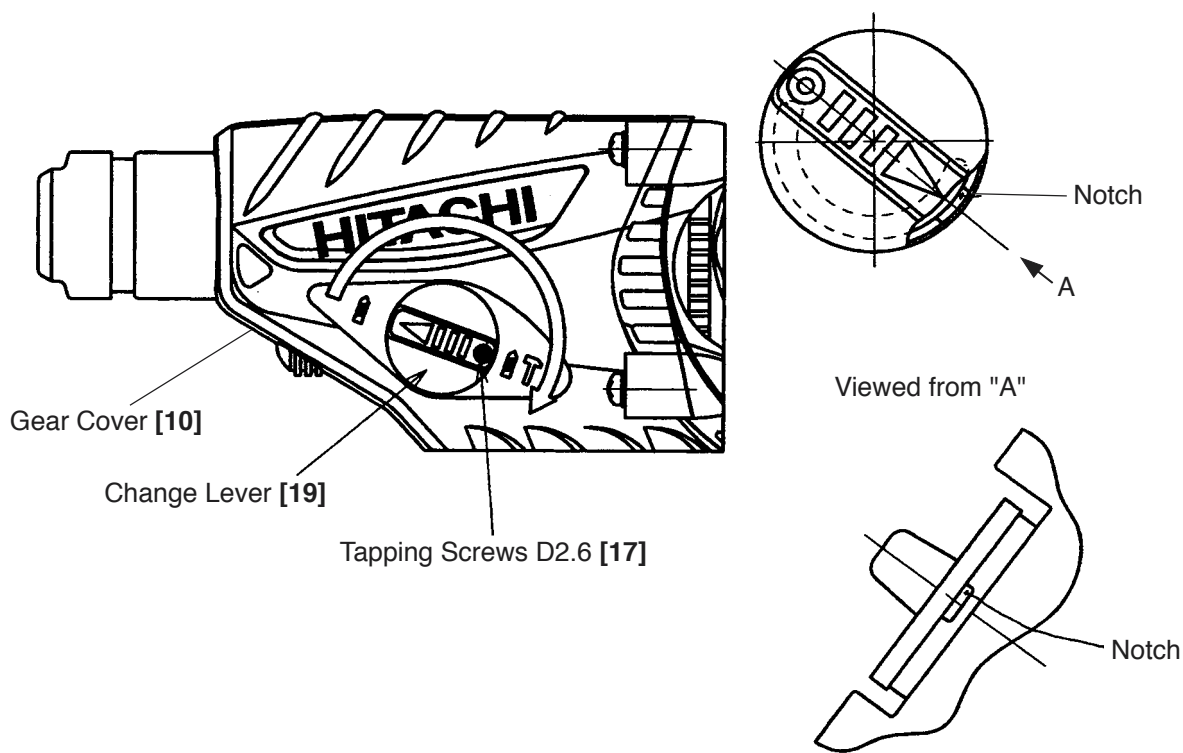


Fig. 11

(2) Disassembly of the tool retainer

Slide the Grip [3] fully in the arrow direction as shown in Fig. 12 and remove the Front Cap [1]. Pulling the Grip [3] as shown in Fig. 13, remove the Stopper Ring [2] with a retaining ring puller. Then the Grip [3], Ball Holder [4], Steel Ball D7.0 [20], Holder Plate [5], Holder Spring [6] and Washer (B) [7] can be removed from the Cylinder [21].

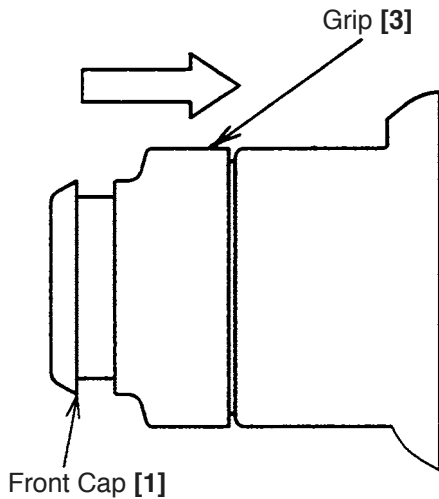


Fig. 12

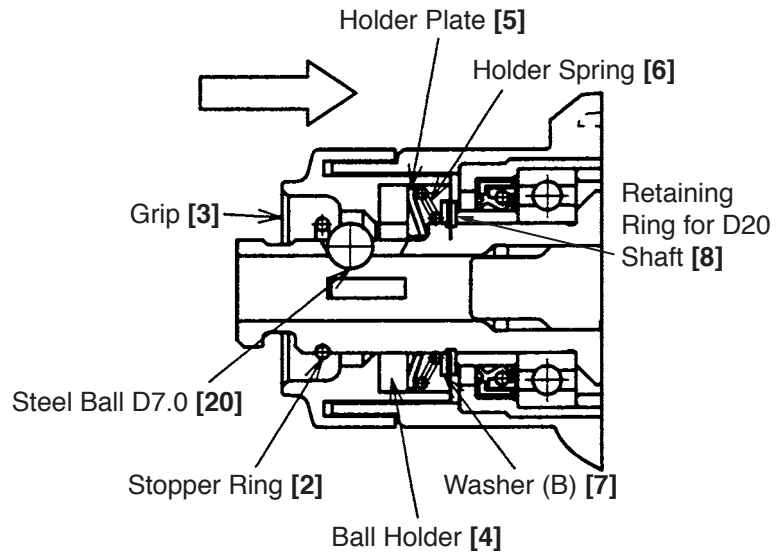


Fig. 13

(3) Disassembly of the cylinder and the second gear (slip mechanism section)

Remove the Gear Cover [10] from the Inner Cover Ass'y [39] and remove the entire tool retainer. Remove the Retaining Ring for D20 Shaft [8] with a retaining ring puller. Stand the Gear Cover [10] in this state and pull out the Cylinder [21] from the Gear Cover [10] with a hand press. Then Sleeve (A) [14] can be removed from the Cylinder [21]. Remove the Retaining Ring for D30 Shaft [25] from the Cylinder [21] with a retaining ring puller. Then the Second Gear [22], Spring (A) [23] and Washer (A) [24] can be removed from the Cylinder [21].

(4) Disassembly of the cylinder and the second hammer

Remove the Stopper Ring [33] from the inside diameter portion of the Cylinder [21]. Then the Second Hammer [26], O-ring (1AP-20) [27], Hammer Holder [28], O-ring (B) [29], Damper (A) [30], O-ring (C) [31] and Damper Holder [32] can be removed from the Cylinder [21]. Remove the Stopper Ring [33] from the groove of the inside diameter portion of the Cylinder [21] by tapping the Stopper Ring [33] through the 5-mm diameter hole of the Cylinder [21] with a hammer and a punch as shown in Fig. 14. At reassembly, replace the Stopper Ring [33] with new one as the removed Stopper Ring [33] is deformed. To prevent idle hammering, also replace O-ring (C) [31] with new one at reassembly.

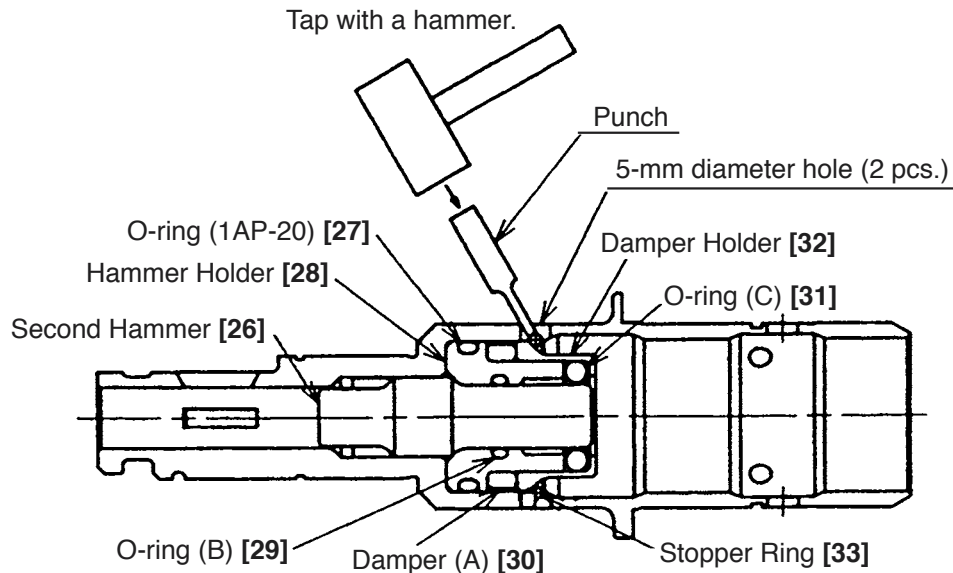


Fig. 14

(5) Disassembly of the armature and the housing

After disassembly of the striking mechanism section, remove the Machine Screw M4 x 8 [77] from the Grip Cover [76] and remove the Grip Cover [76] to show the carbon brushes. Hook the Spring [59] on the edge of the carbon brush tube. Remove the Tapping Screw (W/Flange) D4 x 16 (Black) [52] from the Inner Cover Ass'y [39]. Then the Inner Cover Ass'y [39] can be removed together with the Armature and Pinion Ass'y DC 24 V [55]. At this time, be careful not to damage the carbon brushes. The Inner Cover Ass'y [39] and the Armature and Pinion Ass'y DC 24 V [55] can be removed just by pressing the Pinion [50] slightly with a press because there is an interference of the O-ring [53]. The housing is constructed of two parts. Remove the Tapping Screw (W/Flange) D4 x 20 (Black) [65] to disassemble the housing.

(6) Disassembly of the carbon brush holder

After disassembly of the housing, remove the Tapping Screw (W/Flange) D4 x 16 (Black) [52] to disassemble the carbon brush holder.

(7) Replacement of the carbon brushes

Remove the Grip Cover [76] to show the carbon brushes. Pinch the terminal of the Carbon Brush [61] with a pair of long-nose pliers as shown in Fig. 15 and pull it out of the carbon brush holder. Hook the Spring [59] on the Carbon Brush [61] with a flat-blade screwdriver and remove the Carbon Brush [61].

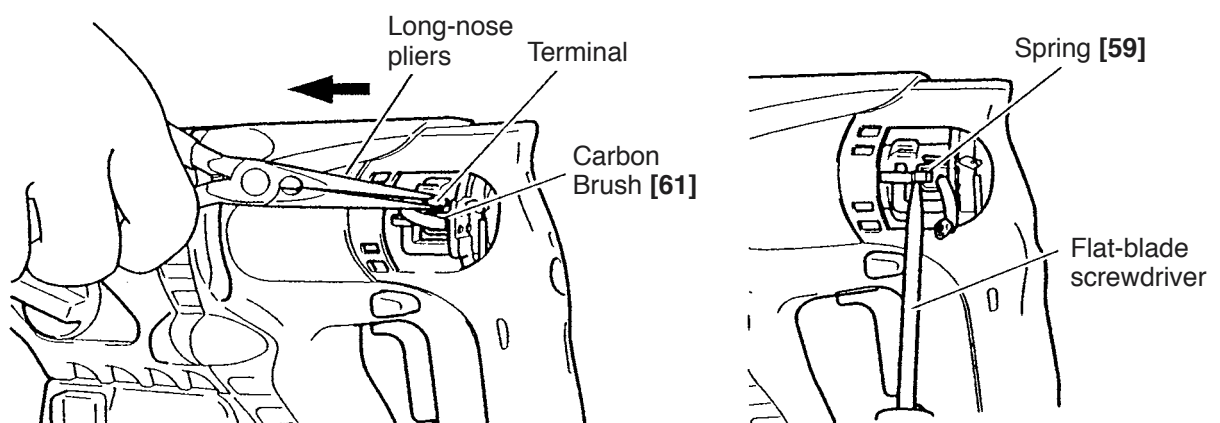


Fig. 15

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) [27] and O-ring (B) [29] for the Hammer Holder [28], Damper (A) [30], O-ring (C) [31], O-ring (I.D.16) [35] for the Striker [34], outer circumference of the Striker [34], inner and outer circumference of the Piston Pin [45], outer circumference of the Piston [36], Reciprocating Bearing [46], Reciprocating Bearing [46] rotary shaft of the Second Shaft [41], clutch claw of the Cylinder [21], inner circumference of the metal of the Inner Cover Ass'y [39], Second Hammer [26], and the lip portion of the Oil Seal [11]. Fill 50 g of the special grease in the gear cover and 10 g in the inner cover groove. Apply Molub Alloy No. 777-1 grease to the outer circumference of the Clutch [44] groove and the pin portion of the Change Lever [19]. Apply HITACHI Motor Grease No. 29 to the O-ring (S-18) [18] for the Steel Ball D7.0 [20] and the Change Lever [19].

* Application of Hitachi Motor Grease No. 29 makes it easy to mount the Spacer [49].

(2) Mounting the Change Lever [19]

Position the Change Lever [19] on the Gear Cover [10] as shown in Fig. 16 and push it in firmly. Adjust the Change Lever [19] to the position where "Δ" mark points in the upward direction. Tighten the Tapping Screw D2.6 [17].

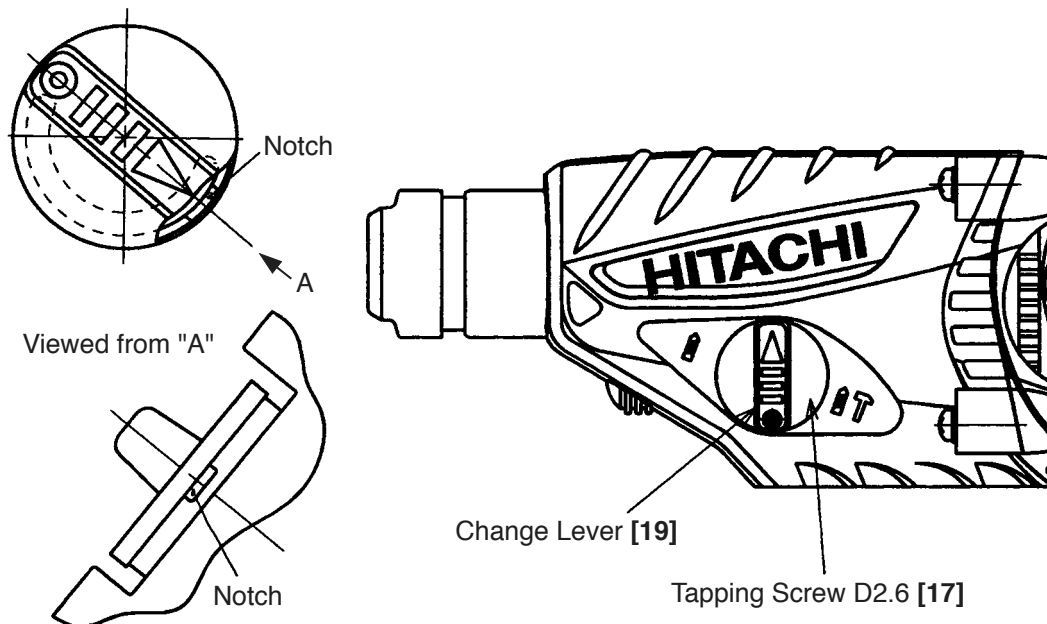


Fig. 16

(3) Press-fitting the first gear

Press-fit the First Gear [48] aligning with the shaft end surface of the Second Shaft [41]. After press-fitting the First Gear [48], check that the inside ring of the Reciprocating Bearing [46] turns smoothly.

(4) Reassembly of the oil seal

Prior to reassembly, apply grease to the inner circumference of the Oil Seal [11]. However, do not apply grease to its outer circumference. Also, when press-fitting the Oil Seal [11], ensure that it is straight and level.

(5) Mounting the piston

Mount the Piston [36] facing its two 2-mm diameter holes to the Second Shaft [41] as shown in Fig. 17.

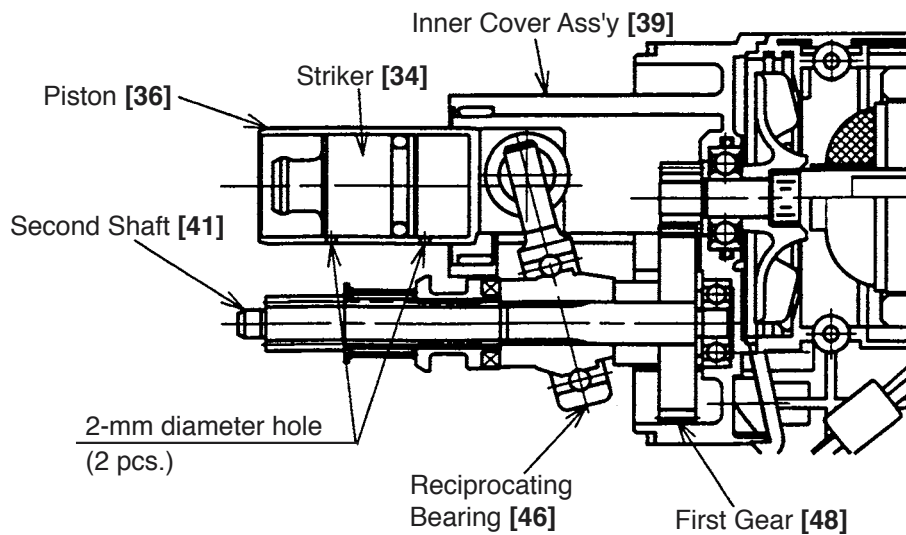


Fig. 17

(6) Perform wiring as shown in Fig. 18.

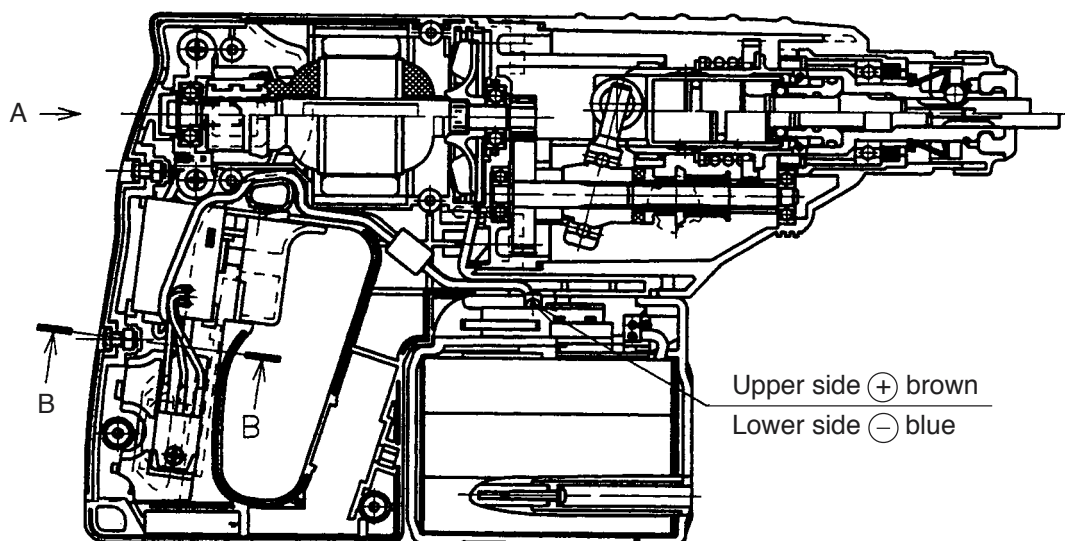
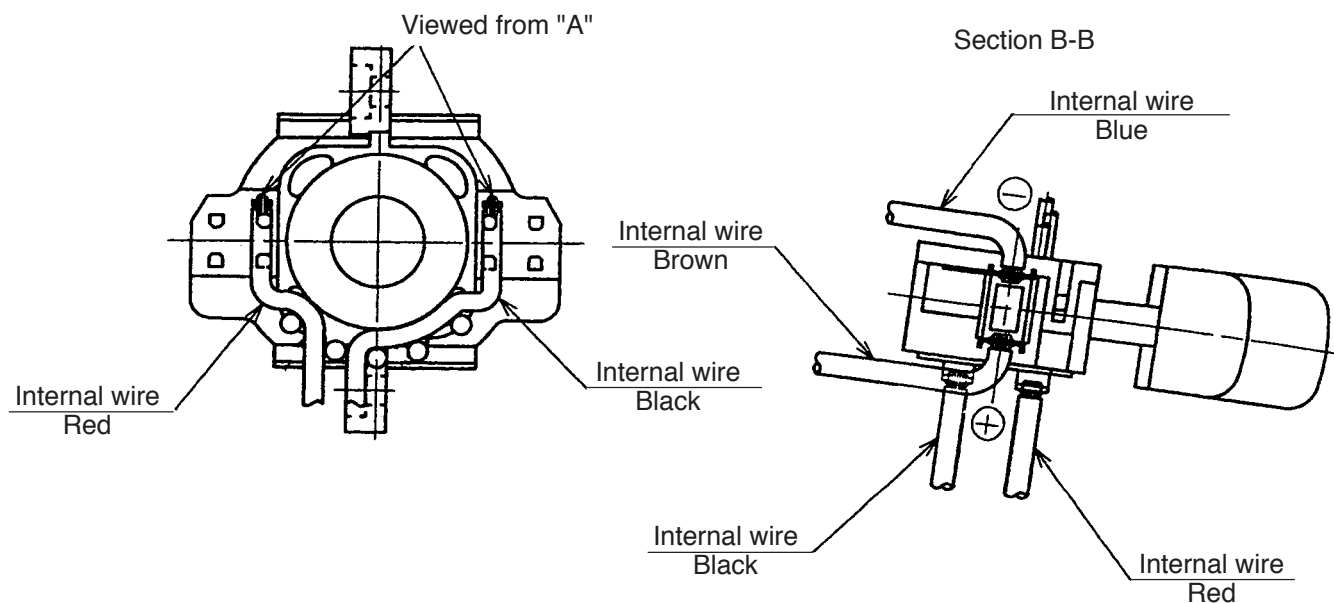


Fig. 18 Wiring arrangement and port locations



9-3. Precautions on Disassembly and Reassembly of the Charger

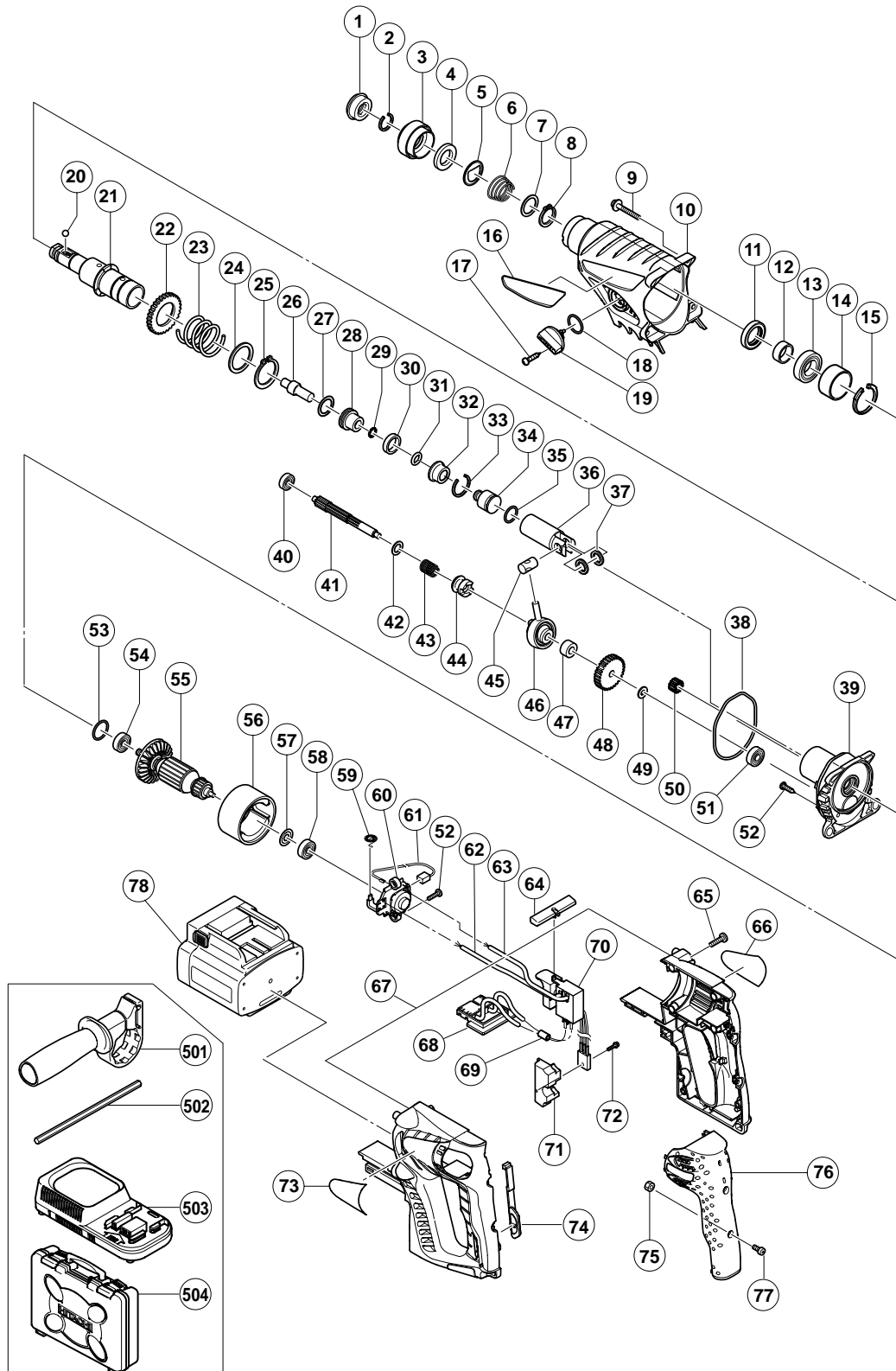
Please refer to Technical Data and Service Manual for Model UC 24YFB for precautions on disassembly and resassembly.

10. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
DH 24DV		Work Flow						
		Grip Cover			Armature O-ring (P-22) Ball Bearing (608DD) Magnet Ball Bearing (608DD) Brush Holder Terminal Support DC-Speed Control Switch	Housing (A).(B) Set		
		General Assembly						
		Front Cap Grip Ball Holder Holder Spring Steel Ball D7.0				Second Hammer O-ring (1AP-20) Hammer Holder O-ring (B) Damper (A) O-ring (C) Damper Holder	Cylinder Second Gear Spring (A)	
		Change Lever O-ring (S-18)				Gear Cover Oil Seal Ball Bearing (6904DD) Sleeve (A)		
			Striker O-ring Piston Washer (C) x 2 Rubber Seal Piston Pin		Inner Cover Ball Bearing (626VV) Second Shaft Clutch Spring Clutch Reciprocating Bearing First Gear Pinion Ball Bearing (626VV)			

ELECTRIC TOOL PARTS LIST

■ **CORDLESS ROTARY HAMMER** 2004 • 6 • 10
Model DH 24DV (E1)



PARTS

DH 24DV

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS	
1	306-345	FRONT CAP	1		
2	306-340	STOPPER RING	1		
3	323-154	GRIP	1		
4	322-810	BALL HOLDER	1		
5	322-811	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	305-558	TAPPING SCREW (W/FLANGE) D5X25 (BLACK)	4		
10	323-167	GEAR COVER	1		
11	307-688	OIL SEAL	1		
12	322-815	SLEEVE	1		
13	690-4DD	BALL BEARING 6904DDPS2L	1		
14	322-819	SLEEVE (A)	1		
15	322-813	RETAINING RING 37MM	1		
16	323-172	HITACHI PLATE (GREEN)	1		
17	323-239	TAPPING SCREW D2.6	1		
18	878-885	O-RING (S-18)	1		
19	323-161	CHANGE LEVER	1		
20	959-156	STEEL BALL D7.0 (10 PCS.)	1		
21	322-814	CYLINDER	1		
22	301-677	SECOND GEAR	1		
23	316-135	SPRING (A)	1		
24	301-679	WASHER (A)	1		
25	948-310	RETAINING RING FOR D30 SHAFT	1		
26	322-803	SECOND HAMMER	1		
27	944-486	O-RING (1AP-20)	1		
28	322-804	HAMMER HOLDER	1		
29	322-802	O-RING (B)	1		
30	322-805	DAMPER (A)	1		
31	322-808	O-RING (C)	1		
32	322-806	DAMPER HOLDER	1		
33	322-807	STOPPER RING	1		
34	322-801	STRIKER	1		
35	322-834	O-RING (I.D. 16)	1		
36	322-800	PISTON	1		
37	322-799	WASHER (C)	2		
38	323-150	RUBBER SEAL	1		
39	323-157	INNER COVER ASS'Y	1	INCLUD. 51	
40	626-VVM	BALL BEARING 626VVC2PS2L	1		
41	323-151	SECOND SHAFT	1		
42	301-659	WASHER (B)	1		
43	301-660	CLUTCH SPRING	1		
44	301-661	CLUTCH	1		
45	322-798	PISTON PIN	1		
46	306-990	RECIPROCATING BEARING	1		
47	323-152	COLLAR	1		
48	323-153	FIRST GEAR	1		
49	301-663	SPACER	1		
50	323-170	PINION	1		
51	626-VVM	BALL BEARING 626VVC2PS2L	1		

PARTS

DH 24DV

[illegible]

STANDARD ACCESSORIES

DH 24DV

[illegible]

