



## MODELS

## DV 20VB/DV 20VC/DV 20T2

### 1. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

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

The **[Bold]** numbers are for the Model DV 20VB, the **<Bold>** numbers for the Model DV 20VC, and the **(Bold)** numbers for the Model DV 20T2.

#### 1-1. Disassembly

##### 1-1-1. Motor Section Disassembly

###### (1) Removal of the handle cover

Loosen the D4 x 20 Tapping Screws **[43]** **<41>** **(42)**, and remove the Handle Cover **[44]** **<42>** **(43)**.

###### (2) Removal of the carbon brushes

With a small slotted head screwdriver, slightly lift the Brush Holders **[49]** **<47>** **(49)**. Then, while pushing the Carbon Brushes **[48]** **<46>** **(48)** to the bottom of the Brush Holders, gently pull out and disconnect the internal wire terminals. (See Fig. 8 and Fig. 9)

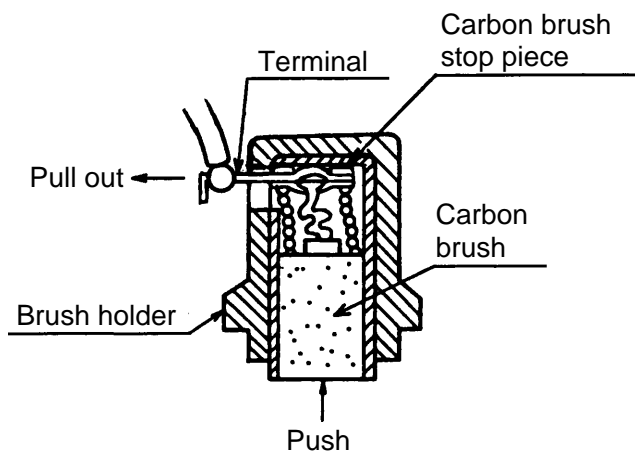


Fig. 8

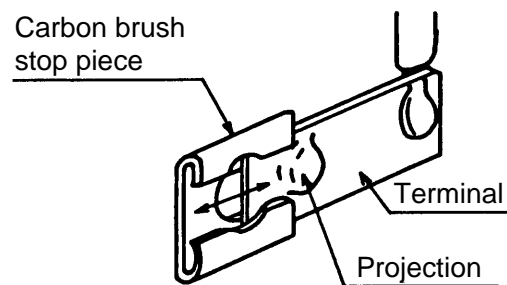


Fig. 9

###### (3) Removal of the gear cover from the housing

Loosen the D5 x 60 Tapping Screws **[12]** **<11>** **(11)**, and separate the Gear Cover **[13]** **<12>** **(12)** from the Housing **[39]** **<38>** **(38)**. Then, remove the Inner Cover Ass'y **[26]** **<25>** **(25)** together with the Outer Cover **[20]** **<19>** **(19)** and the Armature **[30]** **<29>** **(29)** from the Housing.

(4) Removal of the internal wire from the stator

Be sure to follow the method shown in Fig. 10 when removing the internal wire from the Stator [33] <32> (32).

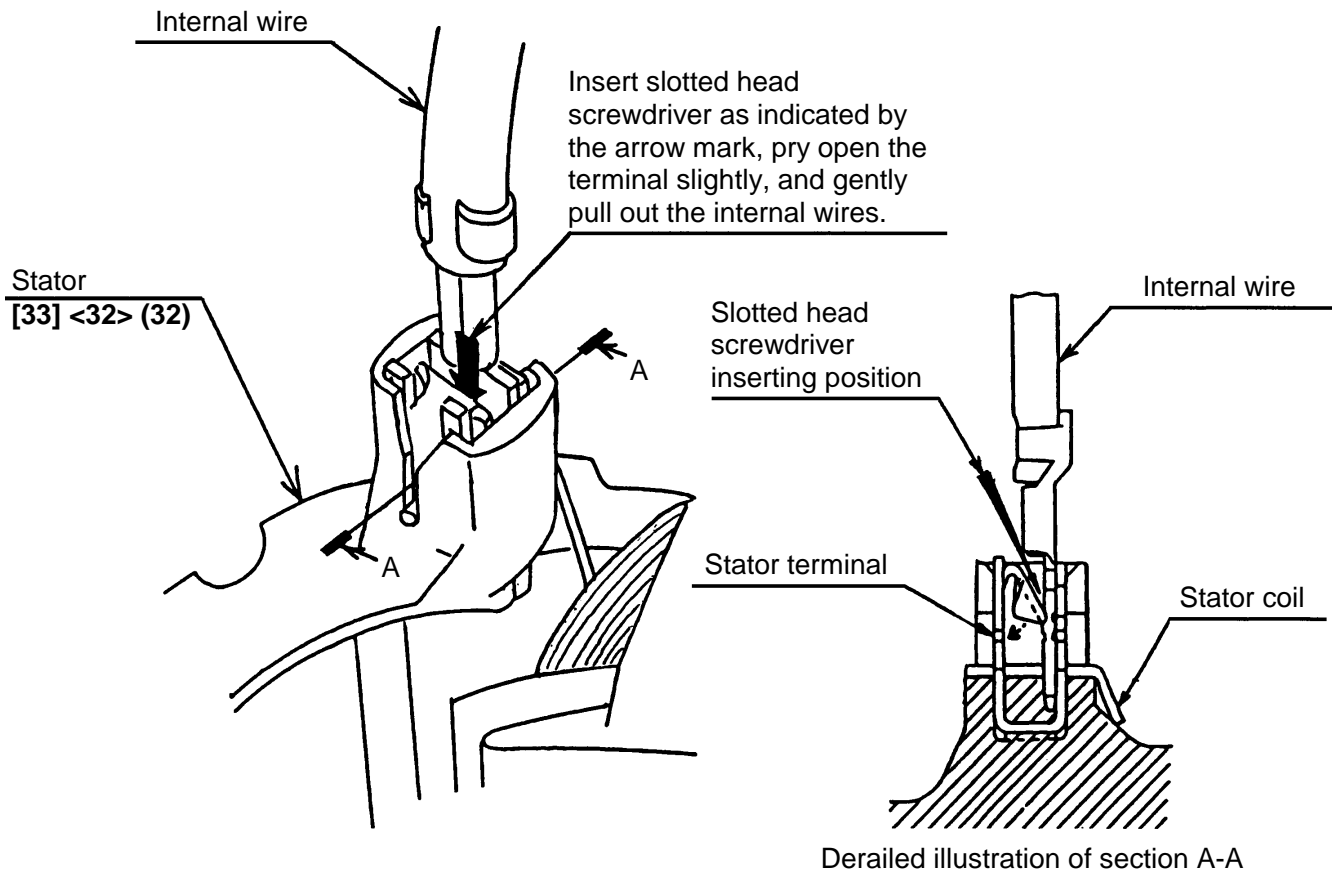


Fig. 10

(5) Removal of the armature from the inner cover ass'y

As illustrated in Fig. 11, support the Inner Cover Ass'y [26] <25> (25) with a tubular jig, and push down on the top of the pinion of the Armature [30] <29> (29). Be careful not to lose the D2.5 x 23.8 Needle [27] <26> (26) at this time.

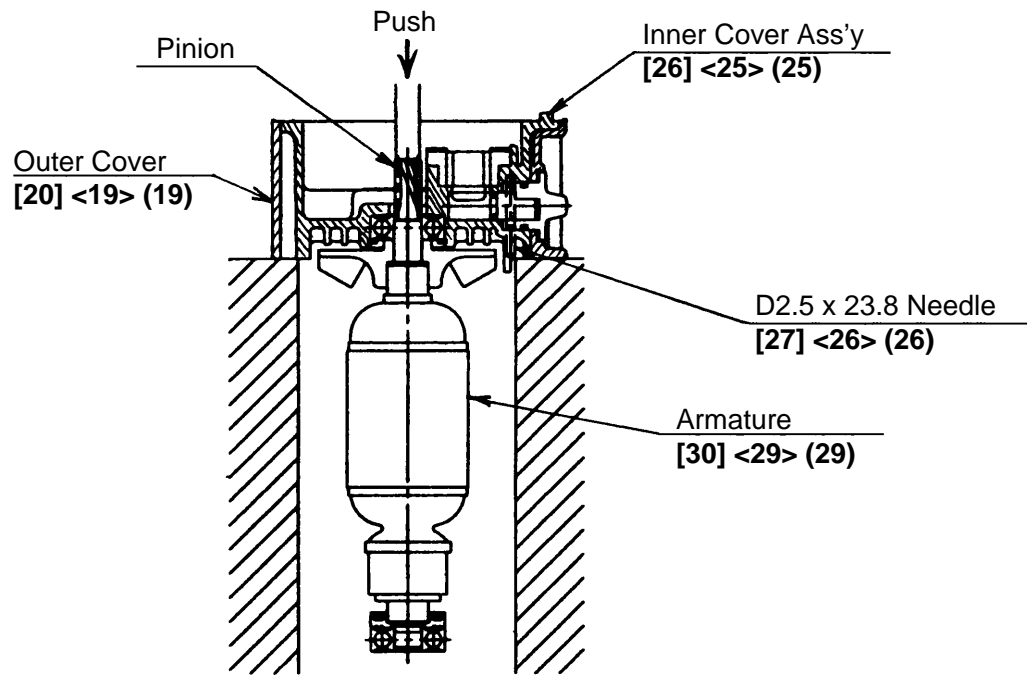


Fig. 11

### 1-1-2. Inner Cover Ass'y Disassembly

(1) Removal of the change lever

Remove the D2.5 x 23.8 Needle [27] <26> (26) and the Change Lever [19] <18> (18). The D2.5 x 23.8 Needle is just inserted in the hole without press-fitting. If it is difficult to remove the needle, utilize the magnetic attraction of a magnet bit or the like.

(2) Ratchet in the inner cover ass'y

Because the ratchet is press-fitted in the Inner Cover Ass'y, it is impossible to replace only the ratchet. When replacement of the ratchet is necessary, replace it together with the Inner Cover Ass'y.

### 1-1-3. Gear Cover Section Disassembly

#### (1) Removal of the ratchet (A)

Remove the Steel Ball [7] <6> (6) and the Second Pinion [24] <23> (23), then remove the Ratchet (A) [18] <17> (17) from the Spindle [4] <3> (3) using the bearing puller as shown in Fig. 12. Ratchet (A) is securely press-fitted to the Spindle, so a considerable amount of force is required to remove Ratchet (A). Do not reuse the removed Ratchet (A) because the press-fitting force between Ratchet (A) and the Spindle will be too low for proper operation.

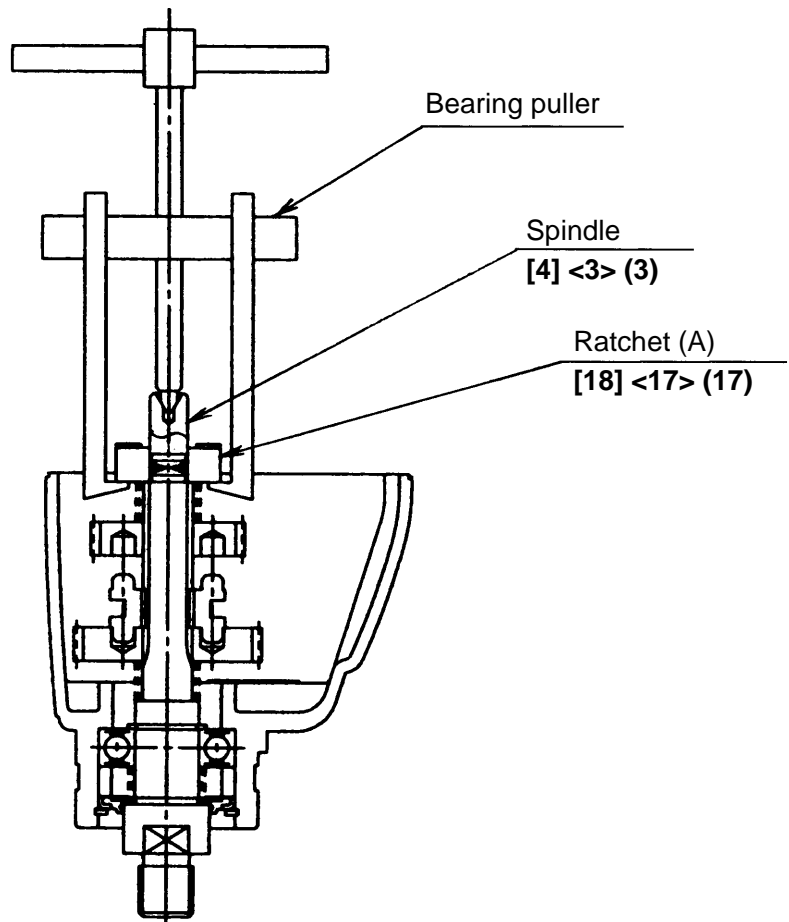


Fig. 12

#### (2) Disassembly of the speed shift mechanism

Remove the Spring [14] <13> (13) and High Speed Gear [17] <16> (16) from the rear portion of the Spindle. Next, turn the Shift Lever [21] <20> (20) so that the arrow mark (►) is directed to the neutral position (halfway between the “1” and “2” positions). Then, take out the Shift Spring [22] <21> (21), and pull out the Shift Lever. Finally, take out the Clutch Disk [16] <15> (15), Low Speed Gear [15] <14> (14) and Spring [14] <13> (13).

(3) Removal of the drill chuck

(a) For Model DV 20VB with keyed chuck only

First, fully open the jaws of the Drill Chuck [3] and remove the left-hand threaded Flat Hd. Screw (A) [1] by turning it clockwise with a slotted head screwdriver. Further disassembly is the same for all models.

(b) For all Models

The Drill Chuck [3] <2> (2) is fixed to the Spindle [4] <3> (3) by a UNF 1/2" -20 thread (right-hand threaded). Secure the Drill Chuck in a vise. Fit a wrench on the specified portion of the Spindle and turn it counterclockwise to remove the Drill Chuck.

(4) Removal of the spindle

Remove the Retaining Ring [5] <4> (4) and Dust Seal [6] <5> (5).

Support the tip of the Gear Cover [13] <12> (12) with a cylindrical jig of inside diameter 32 mm or more, and push the rear portion of the Spindle lightly. Then the Spindle can be removed together with the 6002DDCM Ball Bearing [10] <9> (9), Distance Ring [9] <8> (8) and the Spring (A) [8] <7> (7). (Fi9. 13)

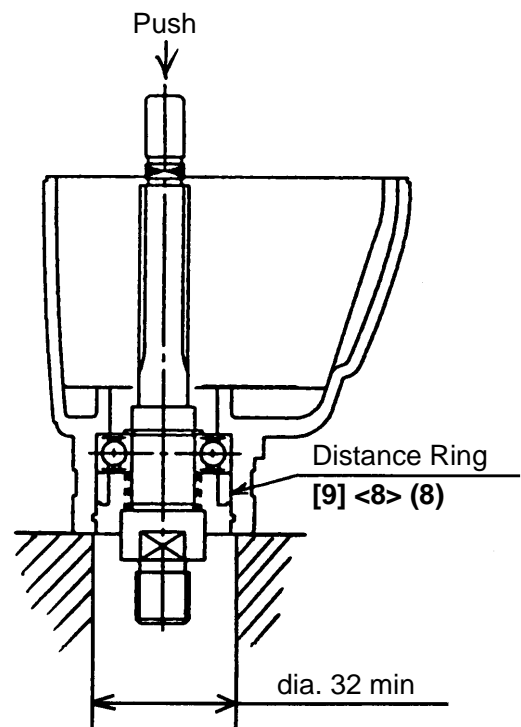


Fig. 13

## 1-2. Reassembly

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

### 1-2-1. Lubrication

(1) Apply ATTILUB MS No.2 Grease (Code No. 309922) on the following parts.

- Teeth of second pinion of the Second Pinion [24] <23> (23) the Low Speed Gear [15] <14> (14), the High Speed Gear [17] <16> (16), and the Ratchet (A) [18] <17> (17).
- On the Spindle [4] <3> (3)  
Ground portion for fitting the 6002DDCM Ball Bearing [10] <9> (9), splined portion and hole of rear Side.
- On the Clutch Disk [16] <15> (15)  
Grooved portion and dia. 5 mm convex portion.
- On the Shift Lever [21] <20> (20)  
Dia.17 mm outer circumference portion and dia. 4 mm convex portion.
- On the Change Lever [19] <18> (18)  
Dia. 8 mm outer circumference portion.
- Lip portion of the Dust Seal [6] <5> (5)
- On the Inner Cover Ass'y [26] <25> (25)  
Metal portion, teeth of ratchet.
- Inside the Gear Cover [13] <12> (12): 15 g (0.5 oz.)

(2) Apply SEP-3A Grease (Code No. 930035) on the following parts.

- Teeth of armature pinion, first gear of the Second Pinion [24] <23> (23) by finger (s).

### CAUTION

- Be sure to use Only SEP-3A Grease for the armature pinion and the teeth of the first gear. Use of other grease may remarkably shorten the useful life of the armature pinion.
- Be sure to Use only ATTILUB MS No. 2 Grease for the Gear Cover and the components in the Gear Cover. Use of other grease may cause grease leakage from the tip of the Gear Cover and the Shift Lever.

### 1-2-2. Tightening Torque

- |   |                                     |
|---|-------------------------------------|
| (1) Flat Hd. Screw (A) [1] (Model DV 20VB only)     | 40 - 50kgf-cm (34.7 - 43.3 in-lbs)  |
| (2) D4 Tapping Screws [43] [53] <41> <49> (42) (51) | 15 - 25 kgf-cm (13.1 - 21.7 in-lbs) |
| (3) D5 Tapping Screws [12] <11> (11)                | 25 - 35 kgf-cm (21.7 - 30.4 in-lbs) |
| (4) Drill Chuck [3] <2> (2)                         | 300 - 400 kgf-cm (260 - 347 in-lbs) |

### 1-2-3 .Reassembly of the Gear Cover Section

Fig. 14 shows the assembly drawing. Reassemble the gear cover section according to the following figure.

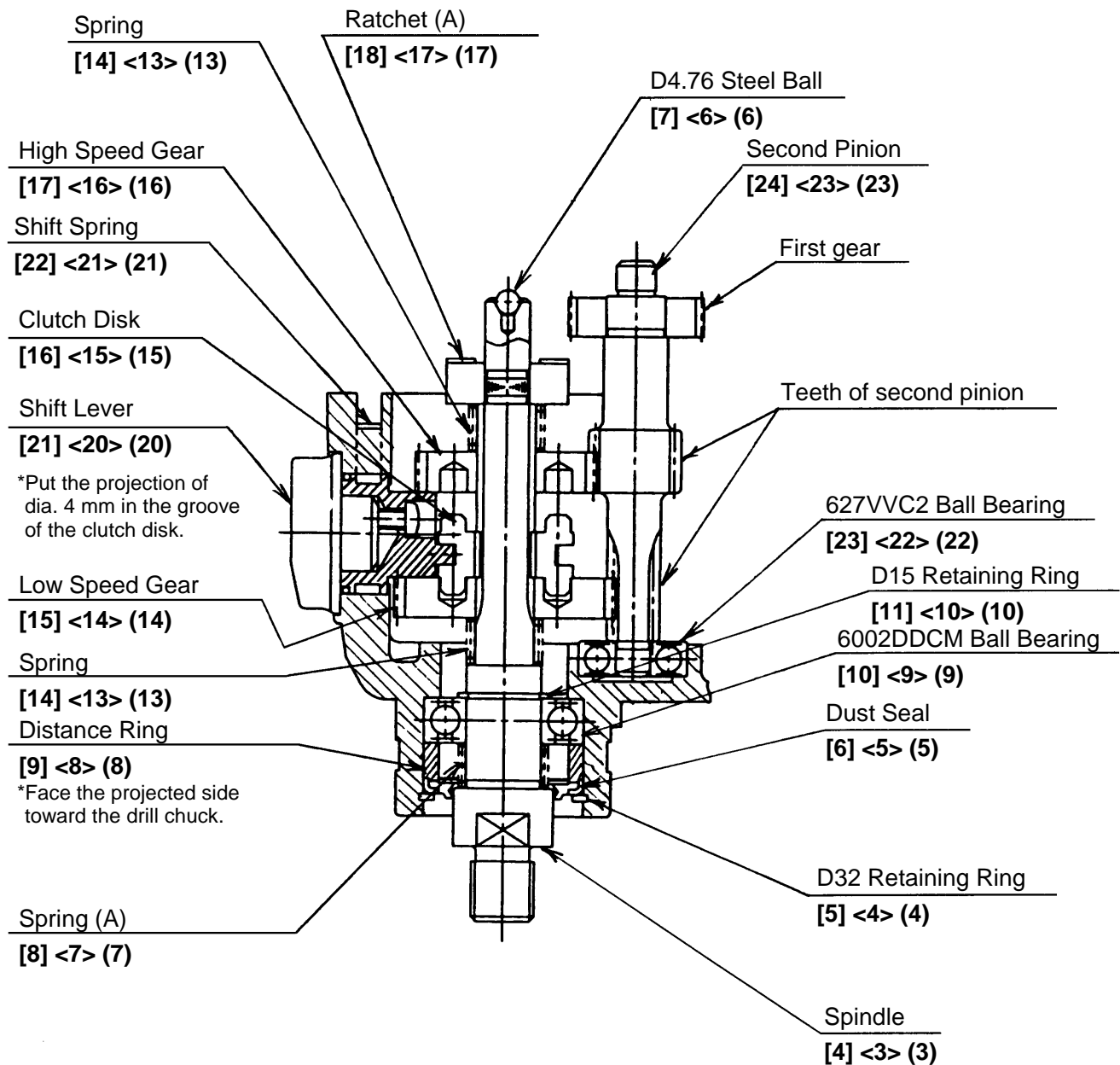


Fig. 14

### CAUTION

- Be sure to replace Ratchet (A) with a new one. Never reuse the Ratchet (A) previously removed from the Spindle. If reused, the tightening torque between the Ratchet (A) and the Spindle will be far too low and the Spindle may run idle in the IMPACT mode.
- Mounting directions of the Distance Ring, the High Speed Gear and the Low Speed Gear is specified. Mount these parts in the specified direction as shown in the above figure.

### 1-3. Wiring Diagrams

(1) Model DV 20VB (Product with noise suppressor)

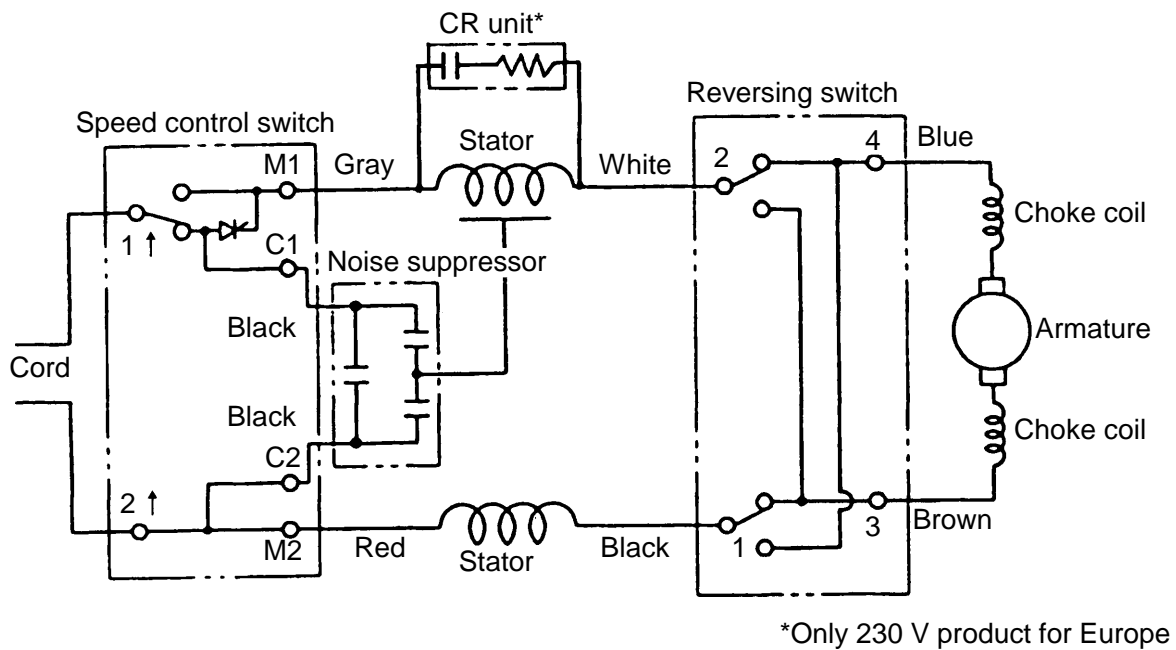


Fig. 15

(2) Model DV 20VB (Product without noise suppressor)

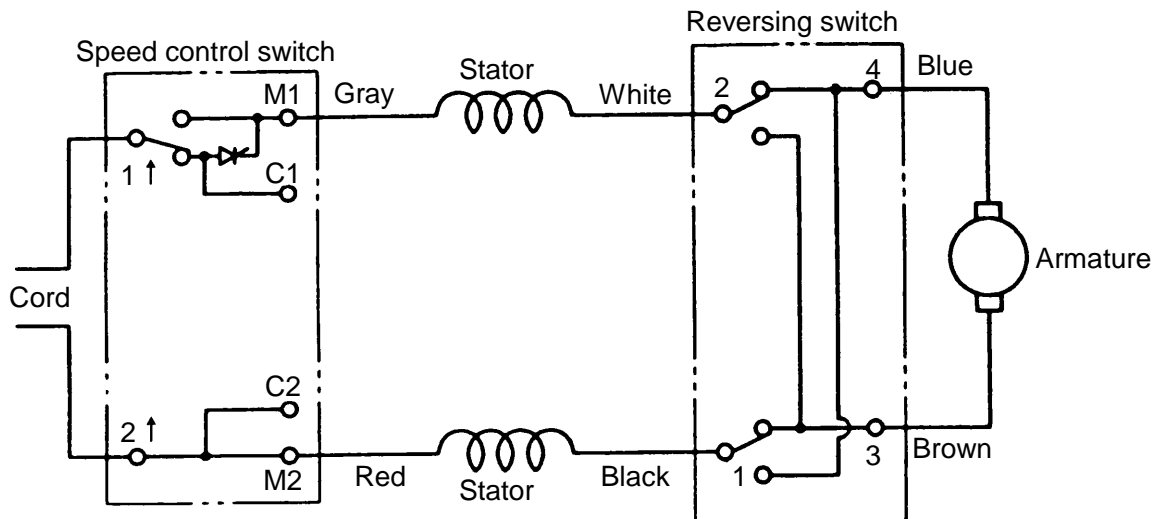
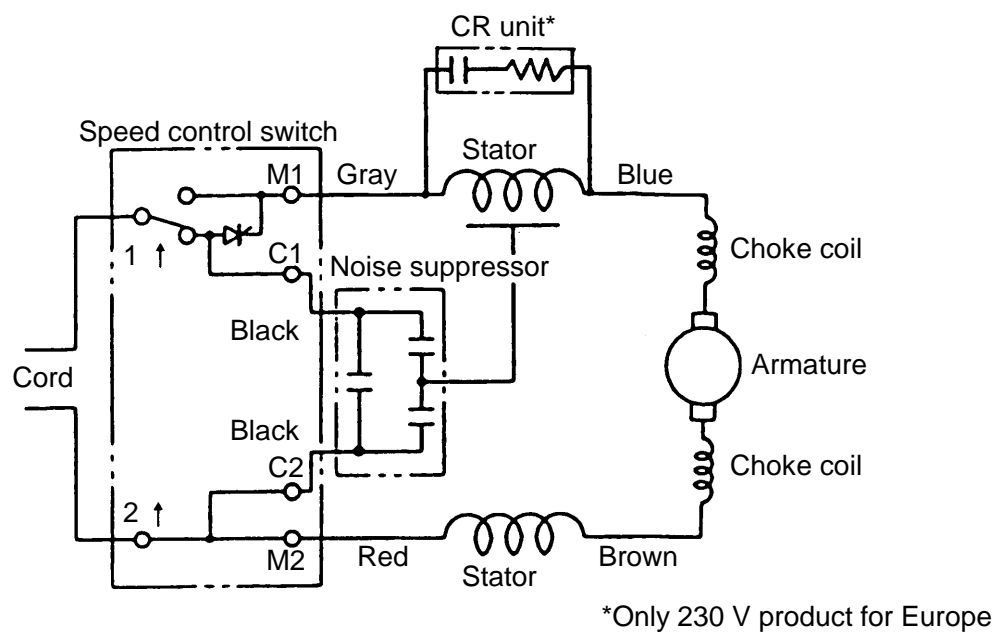


Fig. 16

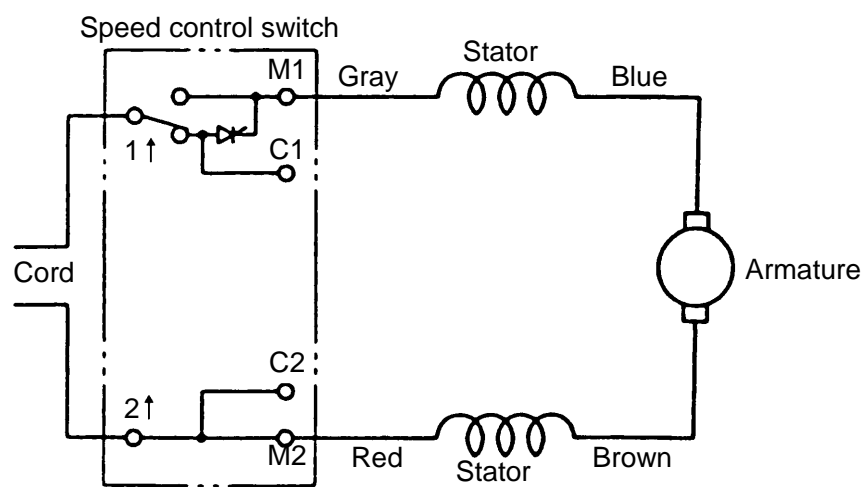


(3) Model DV 20VC (Product with noise suppressor)



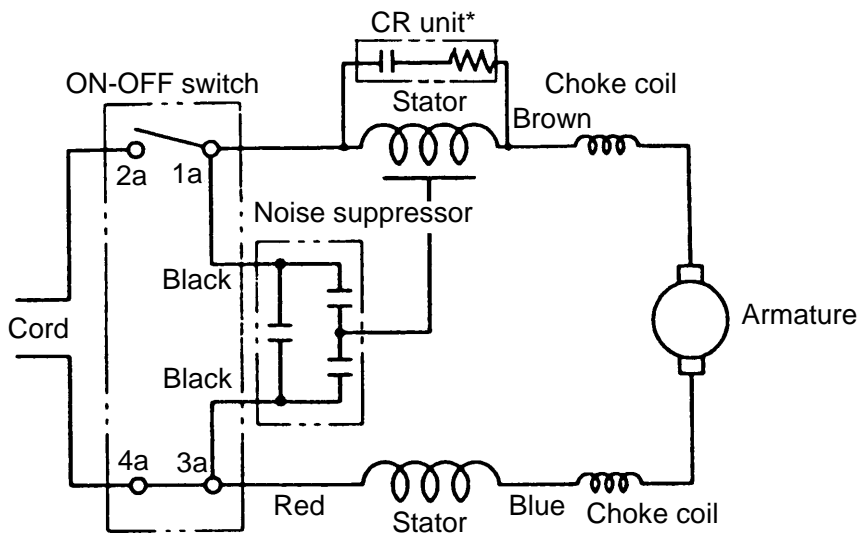
**Fig. 17**

(4) Model DV 20VC (Product without noise suppressor)



**Fig. 18**

(5) Model DV 20T2 (Products with noise suppressor)



\*Only 230 V product for Europe

Fig. 19

(6) Model DV 20T2 (Product without noise suppressor)

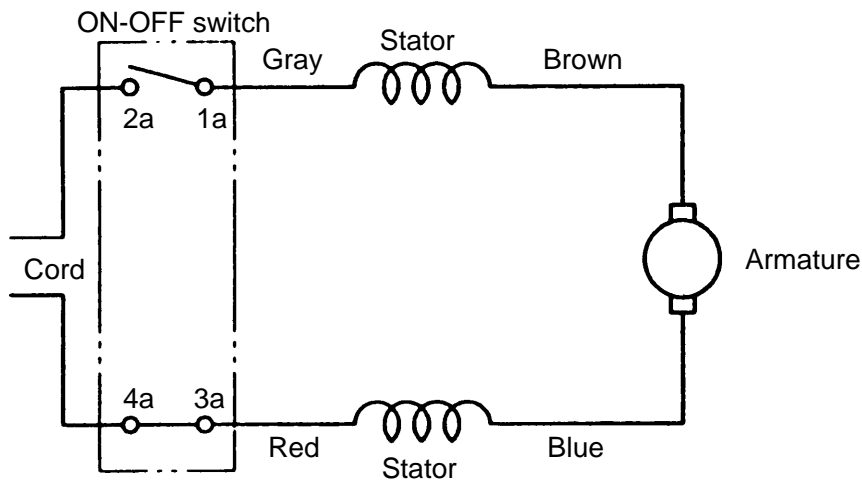


Fig. 20

## 1-4. Internal Wire Arrangement and Wiring Work

### A. Internal wire arrangement

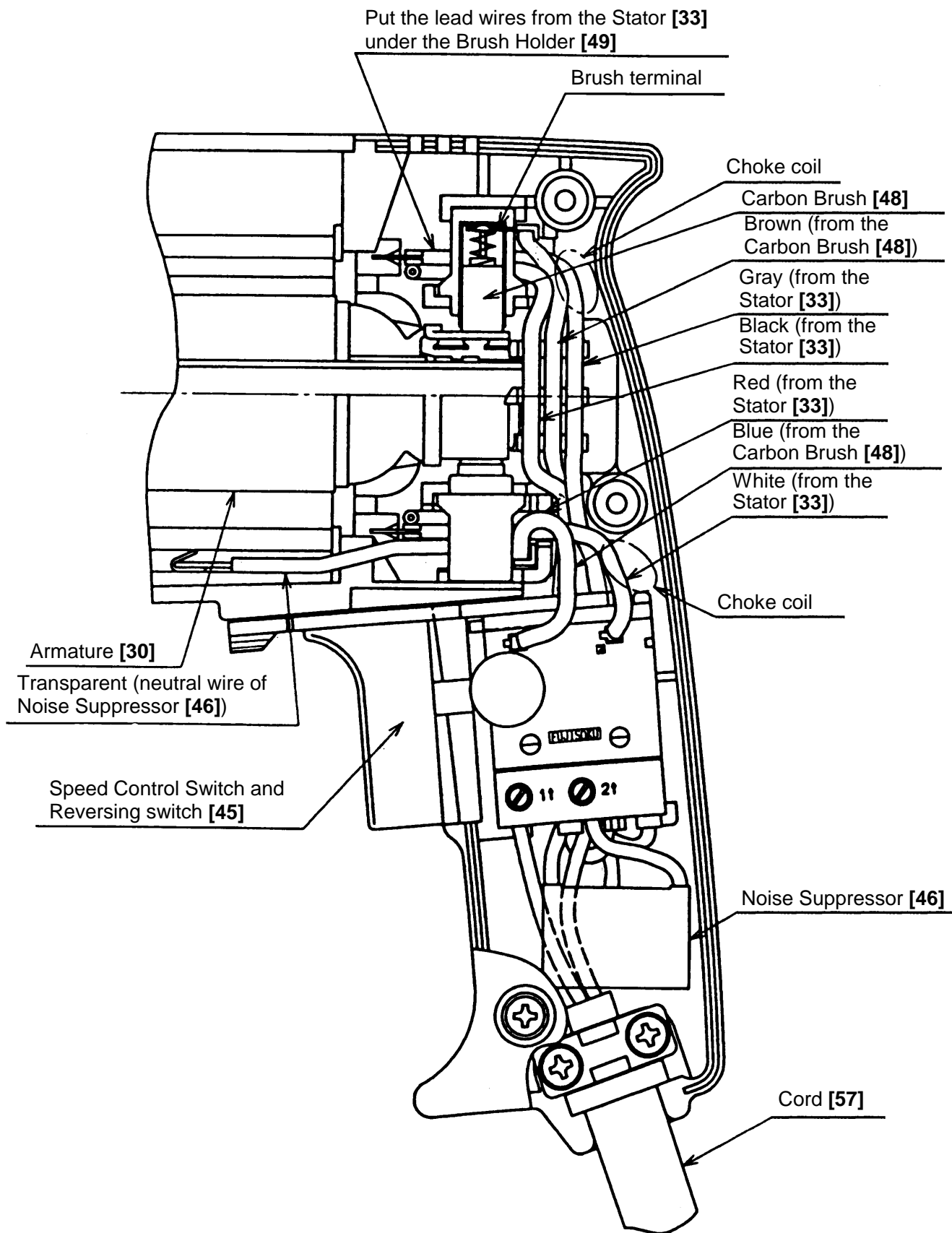


Fig. 21 Schematic diagram (Model DV 20VB)

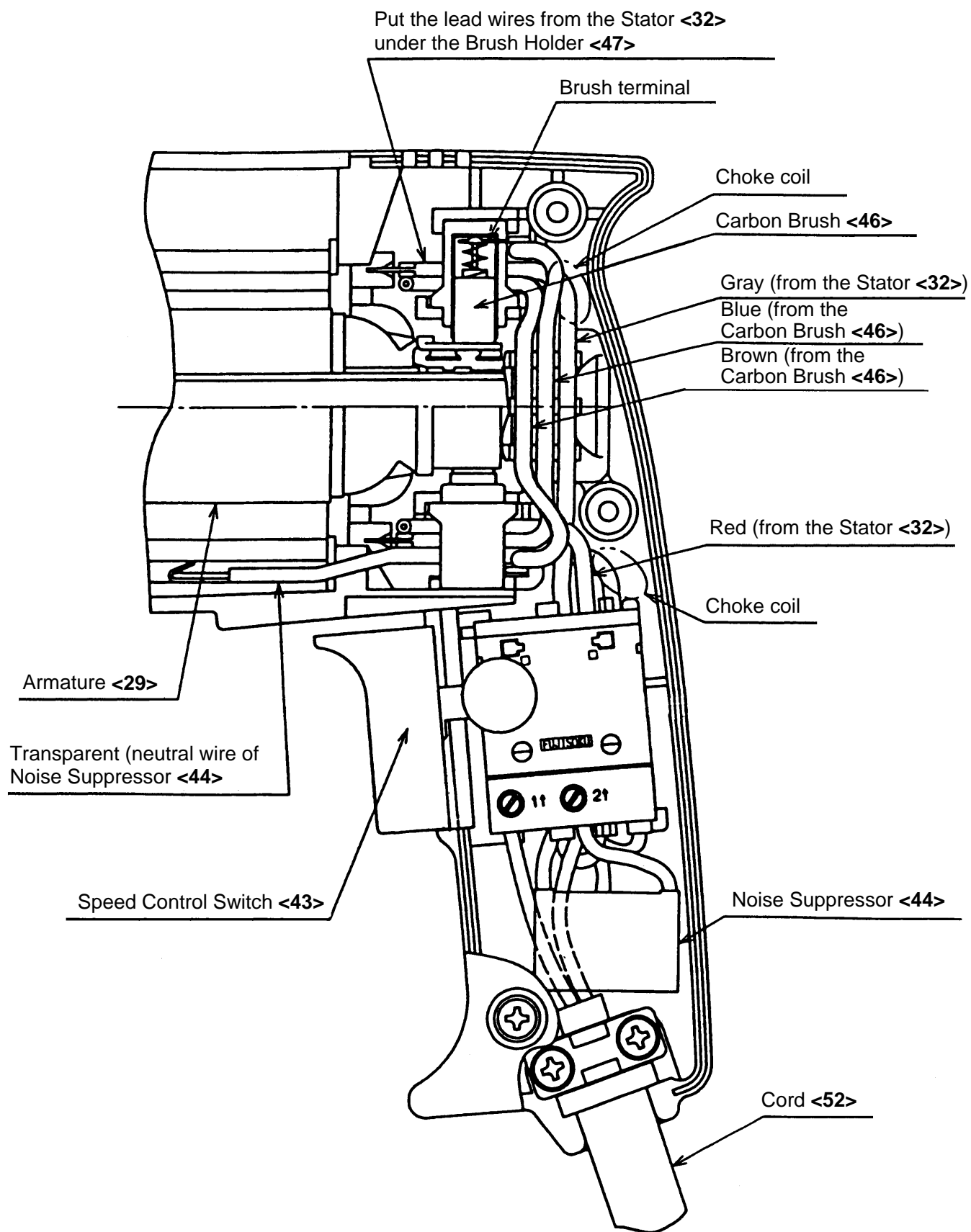
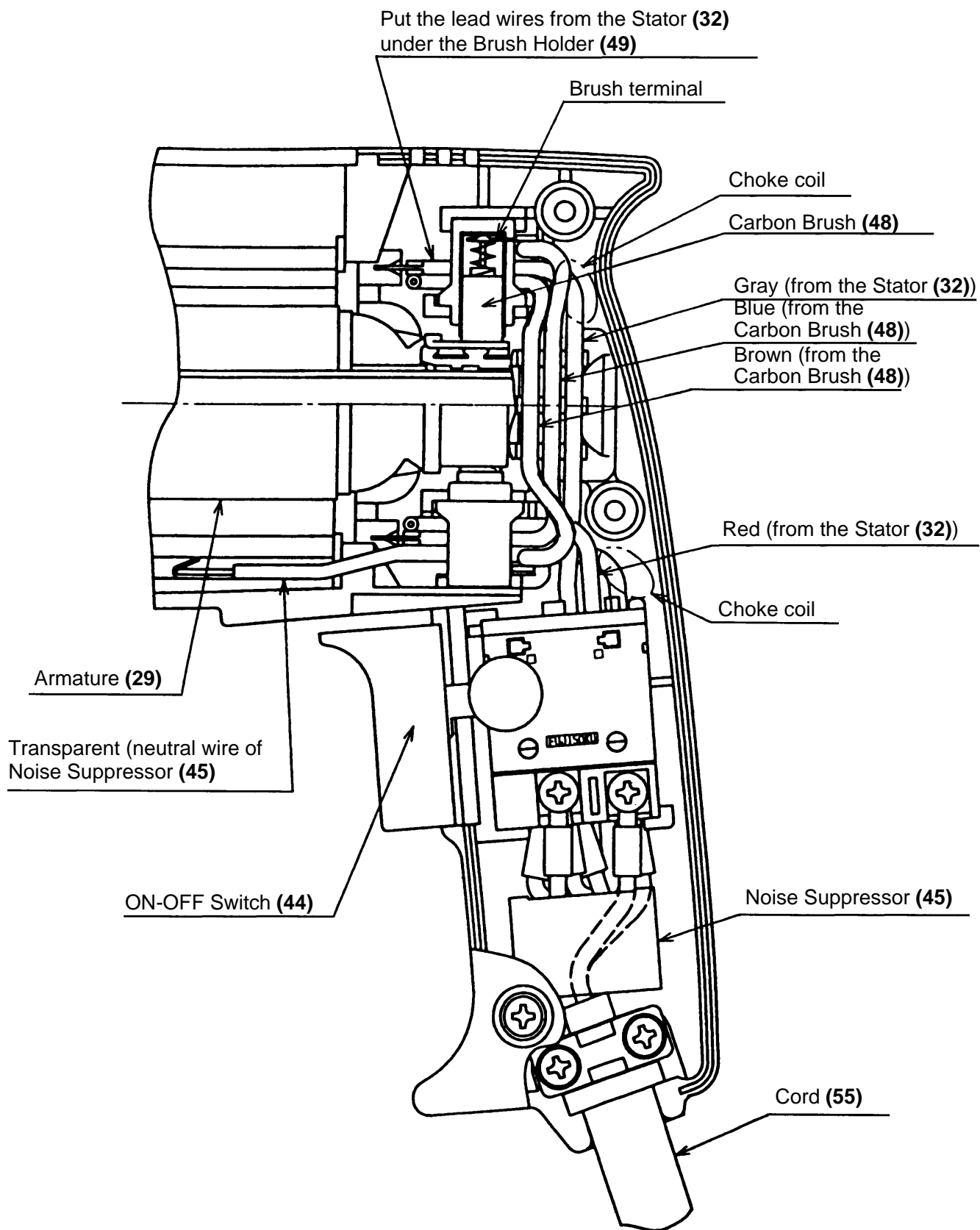


Fig. 22 Schematic diagram (Model DV 20VC)



**Fig. 23 Schematic diagram (Model DV 20T2)**

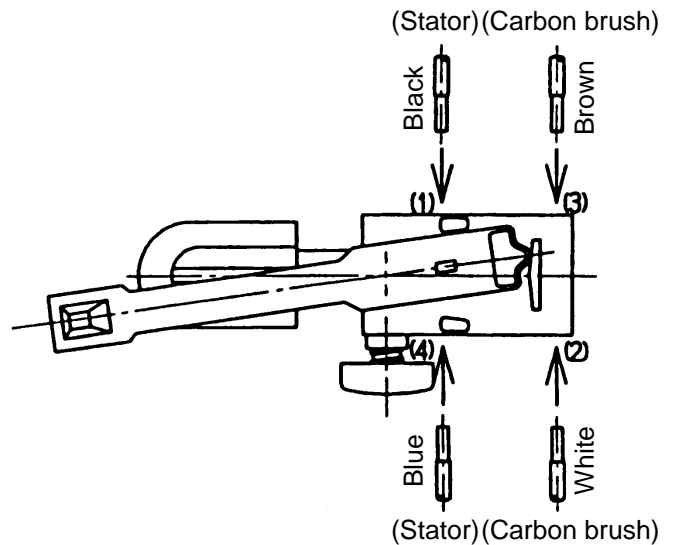
## B. Additional wiring work

General internal wiring can be accomplished by referring to paragraphs 1-4 and 1-5. The followings are special instructions for switch connection.

### (1) Wiring of reversing switch (DV 20VB)

Insert the lead wire (black) coming from the stator into the terminal (1) of the reversing switch, and the lead wire (white) into the terminal (2) as shown in Fig. 24. Insert the lead wire (brown) coming from the carbon brush into the terminal (3) and the lead wire (blue) into the terminal (4). After insertion, pull each lead wire slightly to check the lead wires do not come off.

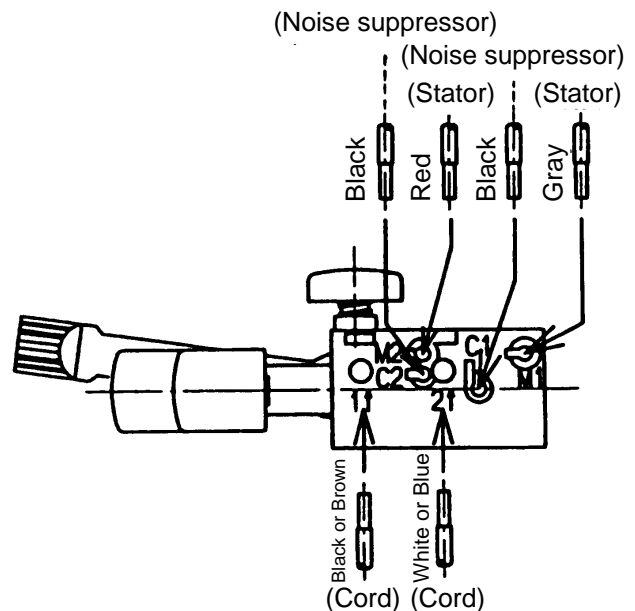
To disconnect the lead wires, insert a small slotted-head screwdriver into the windows near the terminals and pull out the lead wires.



**Fig. 24 Wiring of reversing switch (DV 20VB)**

### (2) Wiring of speed control switch (DV 20VB)

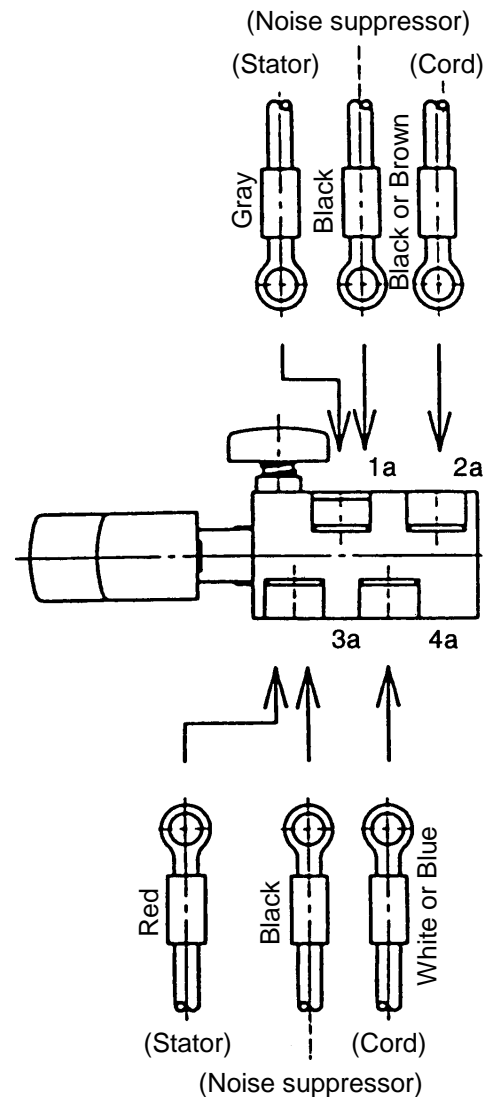
Insert each cord into the terminal 1 ↑ and terminal 2 ↑ of the speed control switch as shown in Fig. 25 and tighten the screw [tightening torque:  $0.6 \pm 0.2$  N·m ( $6 \pm 2$  kgf-cm,  $5.2 \pm 1.7$  in-lbs)]. Insert the lead wire (gray) coming from the stator into the terminal M1 and the lead wire (red) into the terminal M2. Insert each lead wire (black) coming from the noise suppressor into the terminal C1 and C2. After insertion, pull each lead wire slightly to check the lead wires do not come off. To disconnect the lead wires, insert a small slotted-head screwdriver into the windows near the terminals and pull out the lead wires.



**Fig. 25 Wiring of speed control switch (DV 20VB)**

### (3) Wiring of ON-OFF switch (DV 20T2)

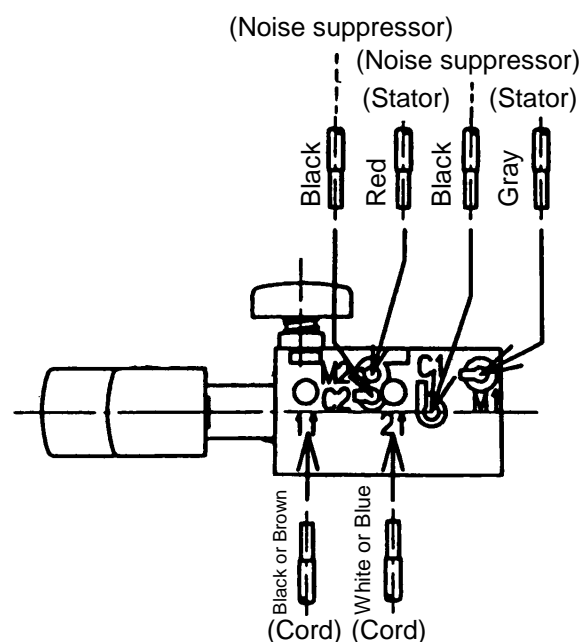
Fix terminals coming from the cord to the terminal number 2a and 4a of the ON-OFF switch with a screw as shown in Fig. 26. Fix the terminal (gray) coming from the stator and the terminal (black) coming from the noise suppressor together to the terminal number 1a with a screw. Fix the terminal (red) coming from the stator and the terminal (black) coming from the noise suppressor together to the terminal number 3a with a screw in the same manner. Tightening torque of the screws is  $0.6 \pm 0.2 \text{ N}\cdot\text{m}$  ( $6 \pm 2 \text{ kgf}\cdot\text{cm}$ ,  $5.2 \pm 1.7 \text{ in}\cdot\text{lbs}$ ).



**Fig. 26 Wiring of ON-OFF switch (DV 20T2)**

### (4) Wiring of speed control switch (DV 20VC)

Insert each cord into the terminal 1 ↑ and the terminal 2 ↑ of the speed control switch as shown in Fig. 27 and tighten the screw [tightening torque:  $0.6 \pm 0.2 \text{ N}\cdot\text{m}$  ( $6 \pm 2 \text{ kgf}\cdot\text{cm}$ ,  $5.2 \pm 1.7 \text{ in}\cdot\text{lbs}$ )]. Insert the lead wire (gray) coming from the stator into the terminal M1 and the lead wire (red) into the terminal M2. Insert each lead wire (black) coming from the noise suppressor into the terminal C1 and C2. After insertion, pull each lead wires lightly to check the lead wires do not come off. To disconnect the lead wires, insert a small slotted-head screw driver into the windows near the terminals and pull out the lead wires.



**Fig. 27 Wiring of speed control switch (DV 20VC)**

### 1-5. Insulation Tests

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

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

Dielectric strength:

AC 4,000 V/1 minute, with no abnormalities 220 V - 240 V (and 110 V for U.K. products)

AC 2,500 V/1 minute, with no abnormalities 110 V - 127 V (except U.K. products)

### 1-6. No-Load Current Value

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

Voltage (V)	110	115	120	220	230	240
Current (A) Max.	3.3	3.3	3.3	2.0	2.0	2.0



## 2. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
<div>DV 20VB</div> <div>DV 20VC</div> <div>DV 20T</div>		Work Flow						
		Switch Cord						
					Housing Stator			
				Inner Cover Ass'y Armature Ball Bearing (608DD) Dust Seal Ball Bearing (608VV)	Change Lever Outer Cover			
		General Assembly		Second Pinion Ball Bearing (627VV) Ball Bearing (608VV) Steel Ball Spring Ratchet (A)				
				Retaining Ring Dust Seal	Spindle Spring (A) Ball Bearing (6002DD)	Gear Cover Shift Lever Shift Spring Spring Low Speed Gear Clutch Disk High Speed Gear		