

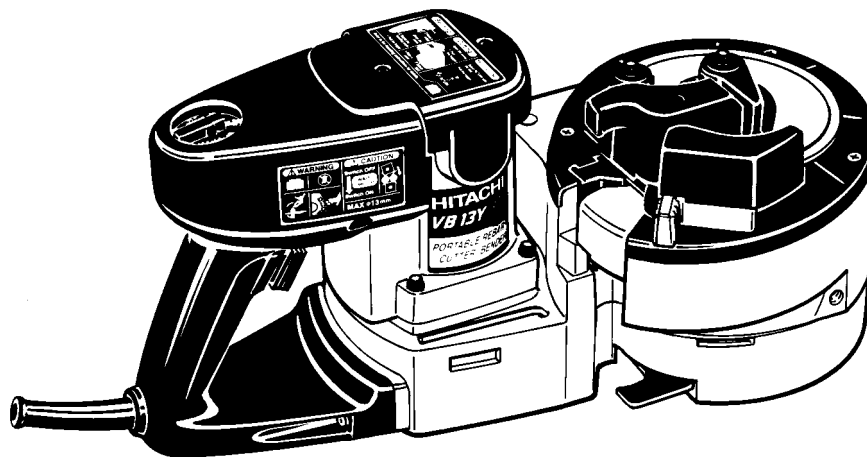
MODEL

VB 13Y

HITACHI
POWER TOOLS

PORTABLE REBAR CUTTER/BENDER
VB 13Y

TECHNICAL DATA
AND
SERVICE MANUAL



LIST No. 0782

Jan. 2000

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
S	MCC	CB-13
Y	ALBA	DR-12E

Notice for use

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

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1. PRODUCT NAME

Hitachi Portable Rebar Cutter/Bender, Model VB 13Y

2. MARKETING OBJECTIVE

A compact and lightweight power tool that reduces worker fatigue and enhances work efficiency.

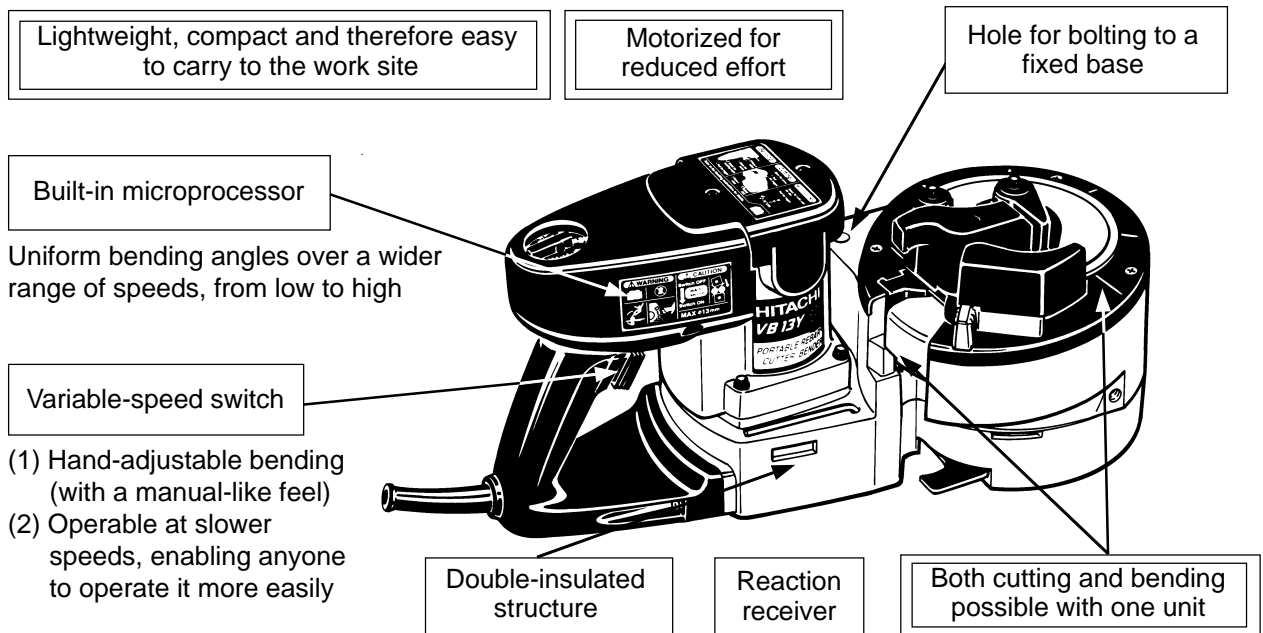
3. APPLICATIONS

- Cutting and bending of rebars (concrete reinforcing rod) during construction of foundations and external structures.
- Cutting and bending of rebars for fitting building parts during construction of reinforced concrete buildings.

4. CAPACITY

- Reinforcing bar diameter: 13 mm (1/2") or less

5. SELLING POINTS



5-1. Selling Point Descriptions

5-1-1. Motorized for reduced effort

A manual cutter/bender requires the worker to overcome a load of 392 to 490 N (40 to 50 kgf) to bend or cut a rebar of 13 mm (1/2") diameter. The Model VB 13 Y can reduce worker fatigue because it is motorized.

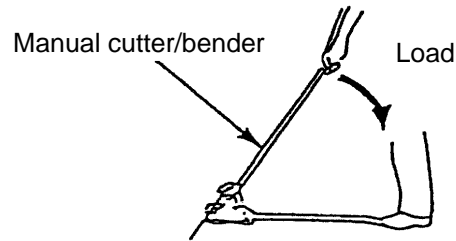


Fig. 1

5-1-2. Both cutting and bending possible with one unit

Both a cutter and a bender are required if each tool has only a single function (cutting or bending). The Model VB 13Y can perform both cutting and bending with one unit in the same manner as a manual cutter/bender.

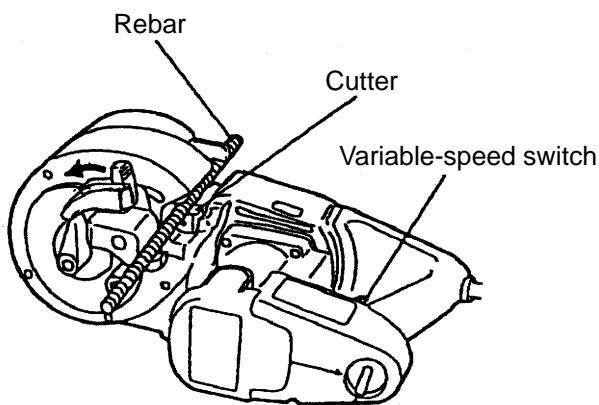


Fig. 2 Cutting

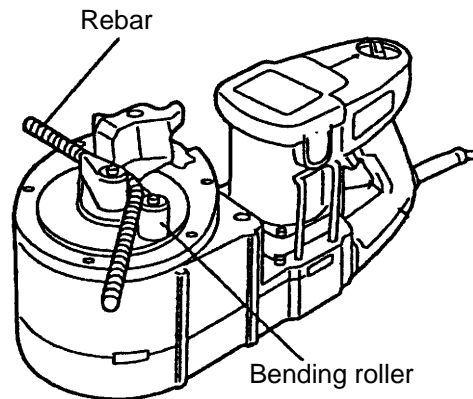


Fig. 3 Bending

5-1-3. Lightweight, compact and therefore easy to carry to the work site

The reason why manual cutter/benders have achieved widespread use in construction sites is that they are compact and lightweight. The Model VB 13Y is attractively convenient for carrying to work sites because the weight is almost the same as a manual cutter/bender (12.0 kg (26.5 lbs.)) while the size is smaller.

5-1-4. Excellent cost/performance ratio

The Model VB 13Y is about two-thirds or half the price of ordinary electric cutters or benders which have only single functions while the Model VB 13Y can perform both cutting and bending (13 mm (1/2") dia. rebar) with one unit. If comparisons are made with another maker's electro-hydraulic cutter/benders (capacity rebar dia. 16 mm (5/8")), the Model VB 13Y is half the price of the electro-hydraulic cutter/bender and the cost/performance ratio is excellent. This is because the Model VB 13Y is equipped with a gear and a cam instead of a hydraulic system for cutting rebars, and an advanced microprocessor instead of an electromagnetic clutch for bending rebars.

5-1-5. Variable-speed switch

A manual cutter/bender has an advantage of hand-adjustable bending by eye measurement. Since the Model VB 13Y uses a variable-speed switch, rebars can also be bent to the desired angles by eye measurement with a manual-like feel while the conventional electric bender provides only a fixed-speed bending. The operator can easily vary the bending speed depending on how far the switch trigger is depressed. These features make the Model VB 13Y convenient for bending work at construction sites.

5-1-6. Built-in microprocessor

The Model VB 13Y is equipped with a microprocessor for uniform bending angles over a wider range of speeds from low to high. Rebars can be bent according to the angles selected with the setting dial even if the bending speed is varied. The Model VB 13Y provides uniform bending results regardless of speeds and the motor's inertial force.

5-1-7. Double-insulated structure

The Model VB 13Y has double-insulated structure for safety in use outdoors or below the ground.

5-1-8. Reaction receiver

There is a need to prevent movement of the unit caused by cutting 5 m (197")-long rebars generally used in construction sites. The Model VB 13Y has two reaction receivers at the front and the rear for stable operation.

5-1-9. Hole for bolting to a fixed base

A hole is provided at the center of the unit to fix and stabilize it. This hole comes in quite handy for bending operations because it allows the unit to be bolted to a suitable work bench (bolt size M10, less than W3/8).

5-1-10. Low height

The Model VB 13Y has a unique design, with the bending unit being lower than the motor unit, to give the bender added stability when bending long rebars. Although the maximum capacity rebar diameter is smaller than another maker's electric cutter/bender, the Model VB 13Y is convenient to use thanks to its lower height (135 mm (5-5/16")) while the other maker's electric cutter/bender is 245 mm (9-41/64") high.

5-1-11. Center plate with marking for bending position adjustment

The Model VB 13Y eliminates manual marking work required for bending rebars with a manual cutter/bender because the center plate has reference markings for easy bending position adjustment.

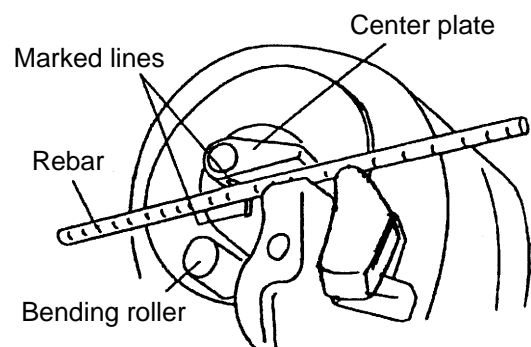


Fig. 4

6. SPECIFICATIONS

Model		VB 13Y	
Capacities		(1) Material; Rebar: Yield strength 460N/mm ² (47 kgf/mm ²) max. <ul style="list-style-type: none"> • GRADE 460 (Great Britain) • BST 500 (Germany) • B 500 (Spain) • GRADE 40 (U.S.A.) or equivalent grades (2) Diameter of material: 8 – 13 mm (3/8" – 1/2")	
Number of piece that can be processed at one time		Cutting 10 mm (3/8") max. ····· 1 piece 13 mm (1/2") max. ····· 1 piece	Bending 10 mm (3/8") max. ····· 2 pieces 13 mm (1/2") max. ····· 1 piece
Motor type		AC single-phase series commutator motor	
Enclosure		Materials: Aluminum alloy die cast Glass-fiber reinforced resin (Housing, handle, tail cover) Painting: Silver, light green, black	
Insulation structure		Double insulation	
Switch		Speed control switch	
Power source		Single-phase AC 50 Hz	
Voltage and current		1.3 A (230 V)	
Power input		285 W	
Rotation speed		0 – 16 /min.	
Weight	Net	Product: 12.0 kg (26.5 lbs.); excluding cord	
	Gross	Packed: 13.1 kg (28.9 lbs.)	
Packaging		Corrugated cardboard box	
Cord	Type	Two core cabtire cable	
	Overall length	2.5 m (8.2 ft.)	
Standard accessories		Allen key (for M5 hexagon socket bolt) ··········· 1 pc. One set of cutters ··········· 1 set.	

7. COMPARISONS WITH SIMILAR PRODUCTS

Specification Comparisons

Maker		HITACHI	S	Y
Model name		VB13Y		
Power Input	W	285	_____	_____
Power Output	W	300	_____	_____
Rotation Speed	/min	16	_____	_____
Dimensions	Length	430 (16-15/16")	1,050 (41-3/8")	950 (37-7/16")
	Height	196 (7-3/4")	115 (4-17/32")	250 (9-27/32")
	Width	197 (7-3/4")	220 (8-21/32")	135 (5-5/16")
Insulation Structure		Double Insulation	_____	_____
Full-load vibration level	dB (VL)	91.4	_____	_____
No-load Noise Level	dB (A)	79	_____	_____
Weight (excluding cord)	kg	12.0 (26.5 lbs.)	11.5 (25.4 lbs.)	12.3 (27.1 lbs.)

7-1. Working Efficiency Comparison

Maker		HITACHI	S	Y
Model name		VB 13Y		
Capacity Rebar Dia.	mm	13 (1/2")	13 (1/2")	13 (1/2")
Drive System		Motorized gear drive system	Manual	Manual
Cutting Time	seconds/operation	3.2	*10	
Bending Time (180°)	seconds/operation	4	*15	13

* The data shown in the above table are mean values of 50 bending operations. (The cutting time and bending time may vary in accordance with operating conditions such as the load to be applied.)

The cutter/bender sketched below is also used in Europe.

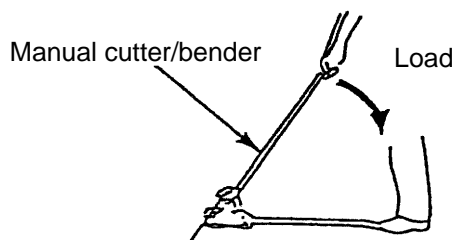


Fig. 5

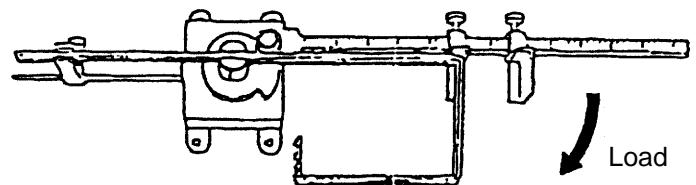
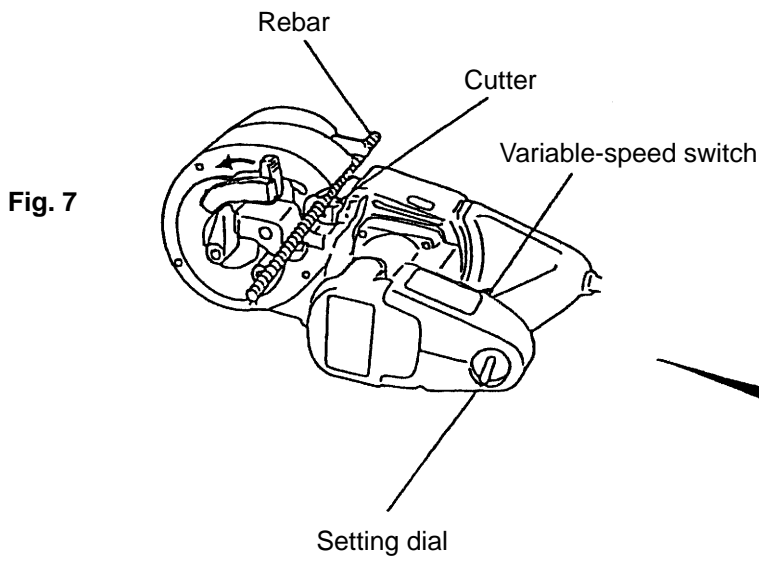


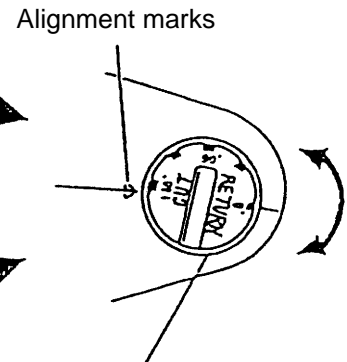
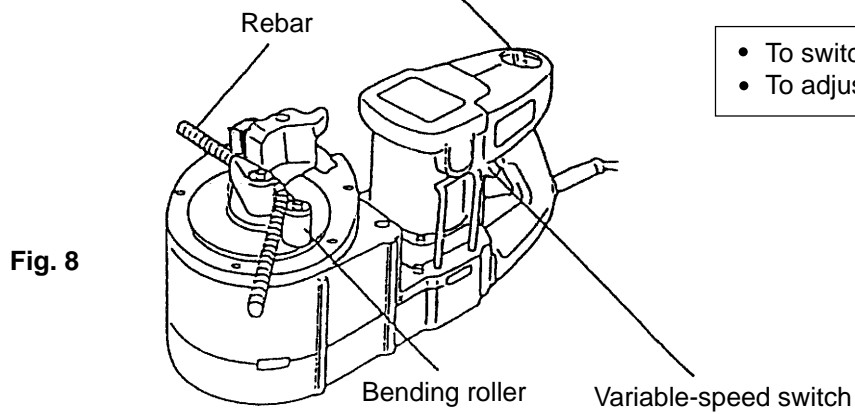
Fig. 6

8. HOW TO USE THIS UNIT

(1) Cutting work (Fig. 7)



(2) Bending work (Fig. 8)



- To switch between cutting and bending
- To adjust bending angle (0 fl – 180 fl)

Fig. 7, 8-a

9. SERVICE LIFE OF CUTTER

The life of a cutter edge is rated at 2,500 operations. (5,000 operations using both edges of each cutter blade). When the edge of a cutter is worn out or deformed, turn the cutter around so that the other edge is properly set or replace the cutter with new one.

10. PRECAUTIONS IN SALES PROMOTION

In the interest of promoting the safest and most efficient use of the Model VB 13Y Portable Rebar Cutter/Bender 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.

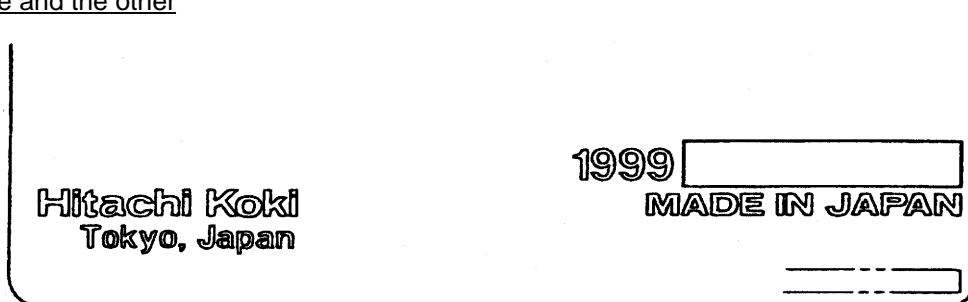
10-1. Handling Instructions

Salespersons must be thoroughly 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 for use of the portable rebar cutter/bender which is different from those of ordinary electric power tools.

10-2. Caution Plate

Each Model VB 13Y unit is provided with a Caution Plate (illustrated below) which lists basic safety precautions in its use. Carefully ensure that the customer fully understands and follows these precautions before using the tool.

For Europe and the other



11. SAFETY INSTRUCTIONS

Be particularly careful to ensure that the customer understands the following precautions which are listed on the Handling Instructions and Caution Plates attached to the main body of each tool.

(1) Do not cut and/or bend any materials other than rebar.

Avoid any work exceeding the maximum capacities of the unit described in the specifications. Otherwise, the cutter can be damaged and the material can shatter into pieces.

(2) While turning the switch on, never put your hand close to the cutter.

For the sake of safe operation, the Model VB 13Y is designed as follows:

- Cutter cover is provided.
- Gear cover prevents finger access to the cutter.
- Bending unit has no opening.
- Bending unit is designed so that fingers cannot be inserted.

Although these safety measures are taken, the opening of the cutter must be exposed for workability.

Unintentional starting with fingers touching the cutter can cause serious injury. Never bring your hand close to the cutter while the plug is connected to a receptacle.

(3) Make absolutely sure that the cutter cover is closed when you are not carrying out cutting work. If the cover is kept open, the cutter can jam on foreign objects and cause serious accidents.

(4) Reserve an extra length of at least 120 mm (4 – 23/32") on the bending length of the rebar to be bent (Fig. 9).

If the extra length is not long enough, the rebar can come off during the bending operation, or it can break into fragments and scatter dangerously.

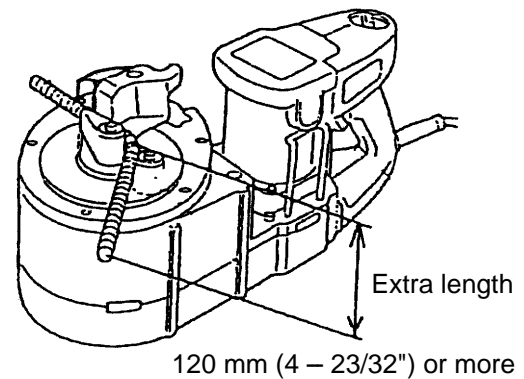


Fig. 9

(5) Begin operation only after making sure that there are no people or objects within the turning range of the material to be bent.

(6) If the switch is turned off and then immediately turned on again, the motor may not start, as a safety precaution. Wait for at least one full second before attempting to turn the motor on again after it has been switched off.

(7) Note that the unit is not a hand-held tool. Be absolutely sure to use the unit only after placing it on a stable surface such as a floor, the ground, etc.

(8) Be sure to unplug the power cord from the receptacle when the cutter is being checked, cleaned, or parts replaced. Failure to do so can result in a serious injury.

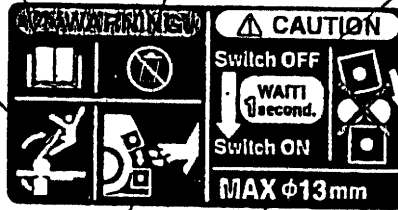
11-1. Pictograph Illustration and Explanation

Read handling instructions before use.

Begin operation only after making sure that there are no people within the turning range of the material to be bent.

Never bring your hand close to the cutter during operation.

Do not use or leave this electric power tool in wet weather conditions.



If the switch is turned off and then immediately turned on again, the motor may not start. Wait for at least one full second before attempting to turn the motor on again after it has been switched off.

Do not attempt to cut two rebars at one time.

Avoid any work exceeding the maximum capacities.
(Rebar diameter 13 mm (1/2"))

12. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

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

12-1. Disassembly

(1) Disassembly of the handle (Fig. 10)

Remove the two Tapping Screws (W/Flange) D4 x 20 **[81]** and the Tail Cover **[82]**. Remove the two Tapping Screws (W/Flange) D5 x 20 **[104]**, four Tapping Screws D4 x 20 (W/Flange) **[81]** and two Machine Screws (W/Washers) M5 x 20 **[105]** to remove the Handle (A).(B) Set **[94]**.

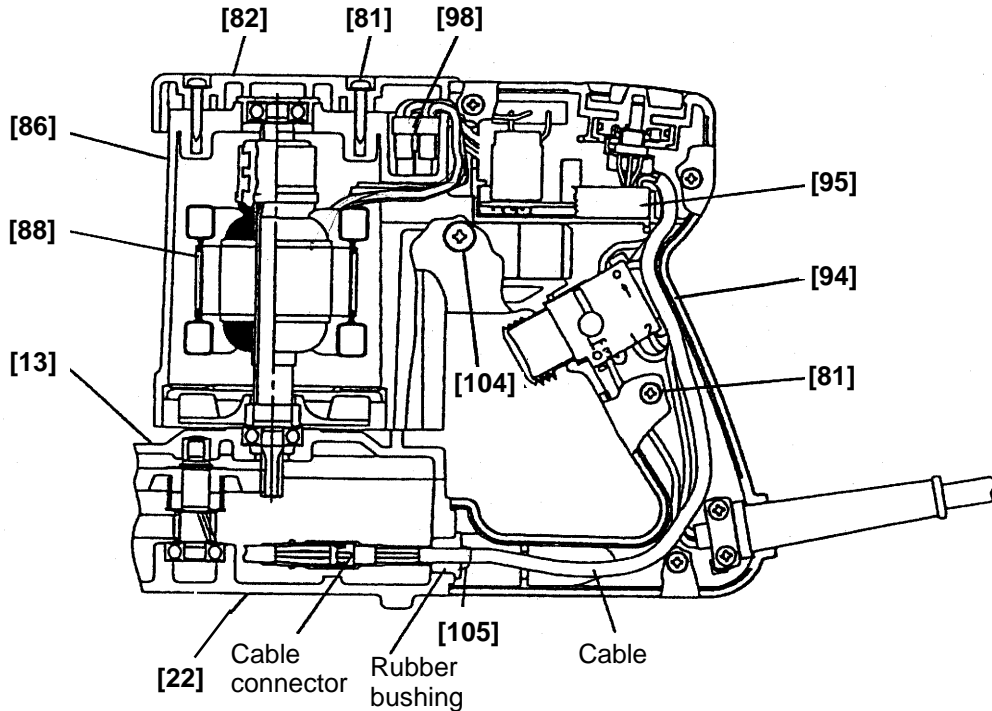


Fig. 10

(2) Removal of the cable (Fig. 11)

Disconnect the connector by pulling the rubber bushing and the cable in the direction of the arrow.

- *1. Gently pull the cable by moving it from side to side to disconnect the connector.
- *2. If the one part of the connector remains in the gear cover due to yanking the cable, disassemble the gear cover referring to "(5) Disassembly of the gear" and remove the remaining connector from the gear cover.

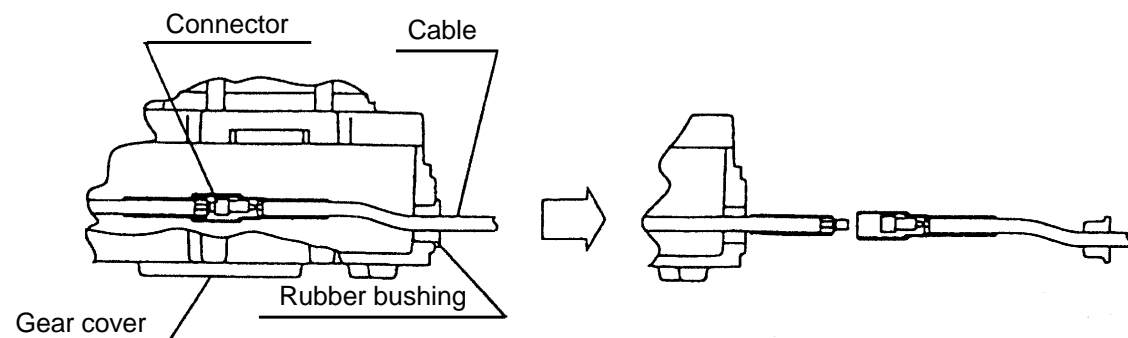


Fig. 11

(3) Disassembly of the power supply unit

1) Removal of the Controller Circuit [95] (Fig. 10)

Remove the rubber bushing and pull out the cable of the Controller Circuit [95] from the Gear Cover Ass'y [22]. Disconnect the cable connector from the cable and separate the Controller Circuit [95] from the Gear Cover Ass'y [22]. (The cable connector can be disconnected by pulling it out with hands.) Disconnect the Connector [98] which connects the seven internal wires with the Stator Ass'y [88].

2) Disassembly of the housing

Remove the Brush Cap [76] and take out the Carbon Brush [77]. Remove the four Hex. Socket Hd. Bolts (W/Flange) M5 x 30 [79] from the Housing Ass'y [86]. The Housing Ass'y [86] can then be removed from the Inner Cover Ass'y [13].

(4) Disassembly of the bending unit (Fig. 12)

1) Remove the Hex. Socket Hd. Bolt M5 x 12 [1], Hex. Socket Hd. Bolt (W/Flange) M5 x 16 [29] and the Center Plate (A) [3].

2) Remove the Hex. Socket Hd. Bolt M5 x 12 [1] and the Roller (B) [30].

3) Remove the Lever (A) [31], Turn Table [5] and the five Flat Hd. Screws M4 x 10 [32] to remove the Cam Cover [6].

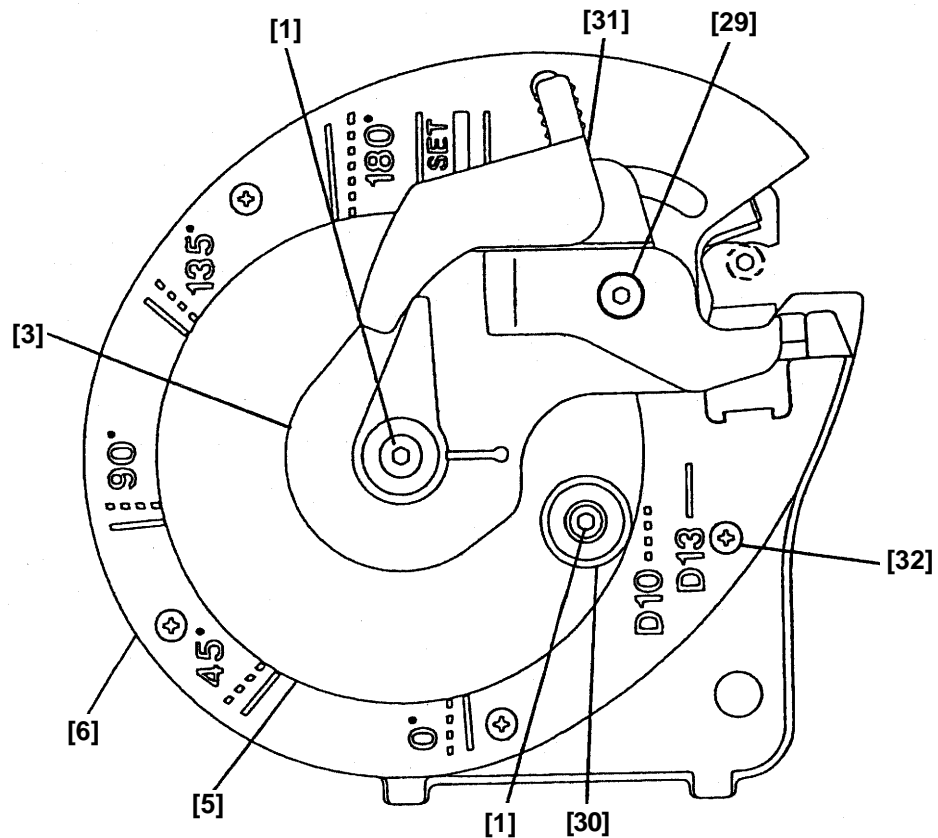
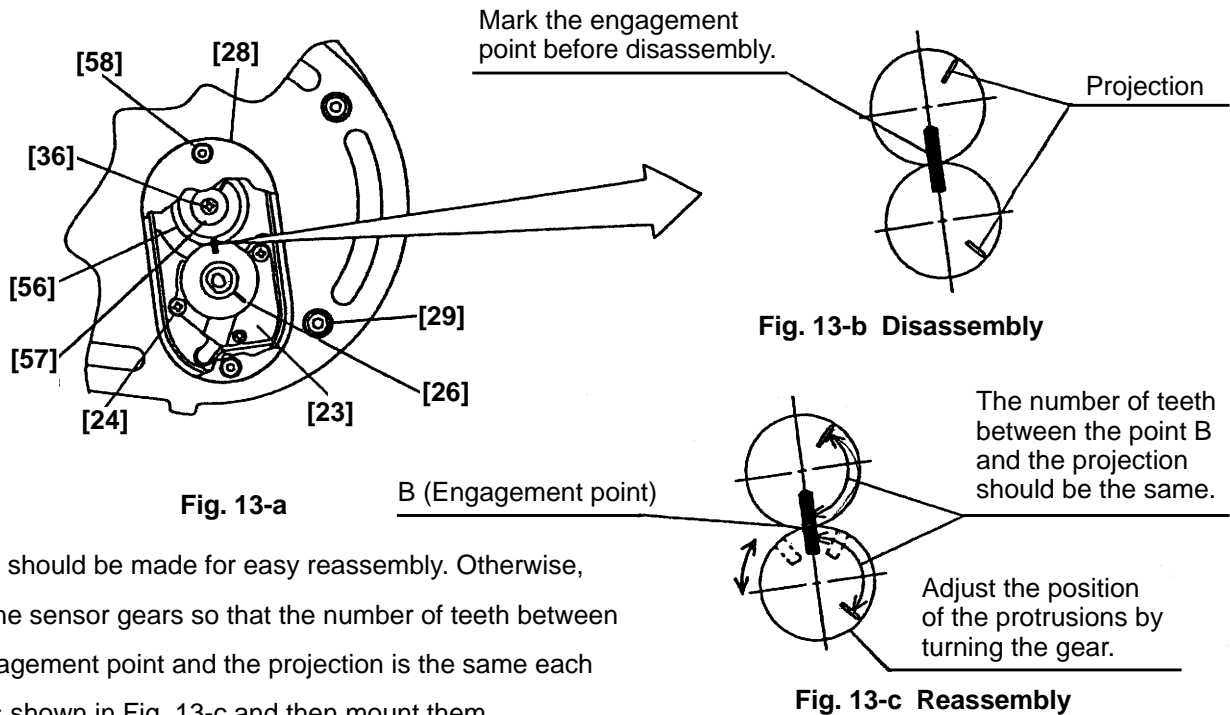


Fig. 12

(5) Disassembly of the gear (Figs. 13, 14 and 15)

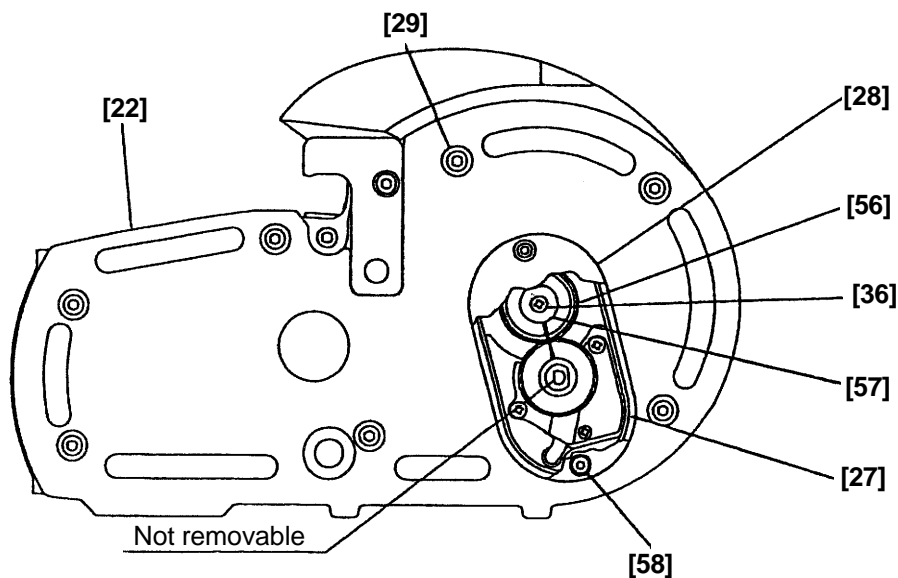
- 1) Remove the two Hex. Socket Hd. Bolts (W/Flange) M4 x 10 [58] from the bottom of the Gear Cover Ass'y [22] and remove the Sensor Cover [28] and the O-Ring (S-85) [27].
- 2) Mark the engagement point between the Sensor Gear [26] and the Sensor Gear [56] with a magic marker as shown in Fig. 13-b. Then, remove the Seal Lock Screw (W/SP. Washer) M4 x 12 [36] and Washer (B) [57] to remove the Sensor Gear [56] (Fig. 13).



* Marking should be made for easy reassembly. Otherwise, adjust the sensor gears so that the number of teeth between the engagement point and the projection is the same each other as shown in Fig. 13-c and then mount them.

Fig. 13

- 3) Remove the seven Hex. Socket Hd. Bolts (W/Flange) M5 x 16 [29] and the Gear Cover Ass'y [22]. Then First Pinion (B) [55], Second Pinion [47] and Third Pinion [43] can be removed. The Final Gear [18] can be removed by removing the Retaining Ring for D25 Shaft [19]. If it is hard to remove the Final Gear [18], use a bearing puller for removal. The Cam Shaft [12] can be removed just by pulling upward (toward Cam Cover [6]) if the Final Gear [18] has already been removed.



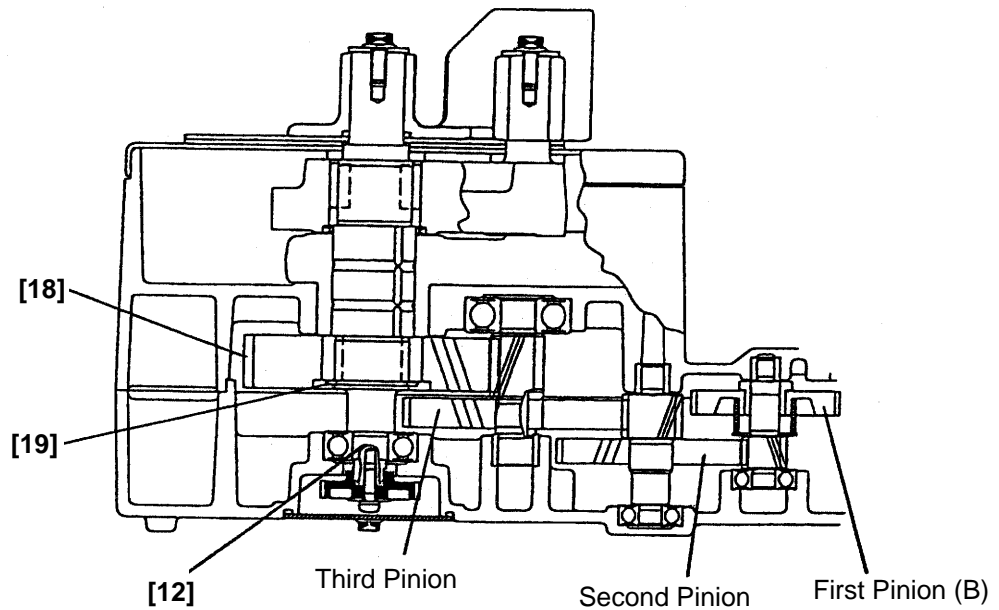


Fig. 15

(6) Disassembly of the gear unit (Figs. 16, 17 and 18)

- 1) Press First Pinion (B) [55] in A direction with a hand press supporting the surfaces B and C respectively. Then remove Sleeve (B) [50], First Gear (B) [51], Clutch Spring [52], Collar (A) [53] and Washer [54] (Fig. 16).
- 2) Remove the Second Pinion [47] from the Second Gear [48] by pressing with a hand press (Fig. 17).
- 3) Remove the Feather Key [44] and the Third Pinion [43] from the Third Gear [45] by pressing with a hand press (Fig. 18).

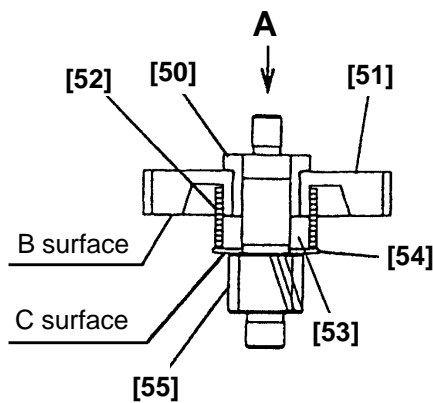


Fig. 16

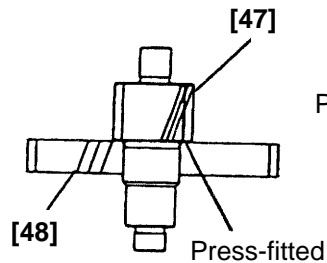


Fig. 17

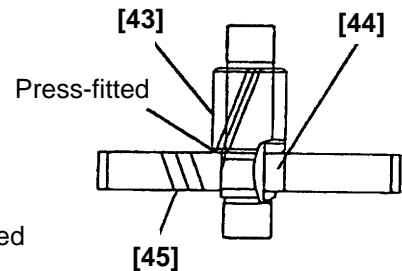


Fig. 18

(7) Removal of bracket (A), bracket (B) and covers (Figs. 19 and 20)

- 1) Remove the Seal Lock Screw (W/SP. Washer) M4 x 12 [36] and Thrust Washer [37] that fix the Return Spring [38] from the upper surface of the Inner Cover Ass'y [13]. Then remove the Return Spring [38] from the Inner Cover [13] (by prying it off with a flat-blade screwdriver).
- 2) Remove the two Hex. Socket Hd. Bolts M5 x 16 [67] and the Flange Nut M12 [39] from the inside of the Inner Cover Ass'y [13]. Then remove Bracket (A) [68], Bracket (B) [73], Cover [63] and O-Ring (S-34) [64] from the Inner Cover [13].

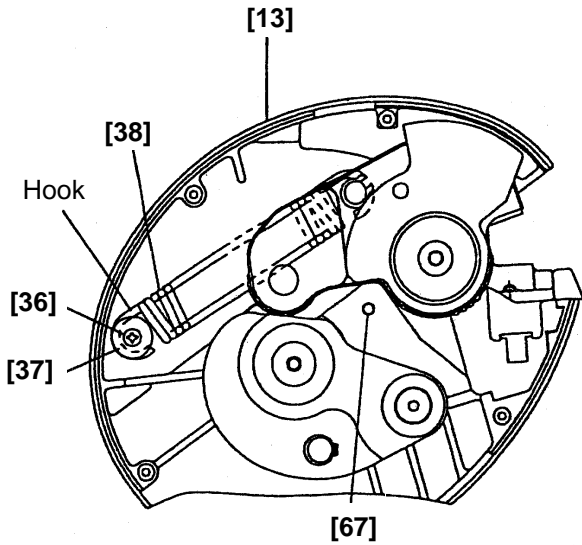


Fig. 19

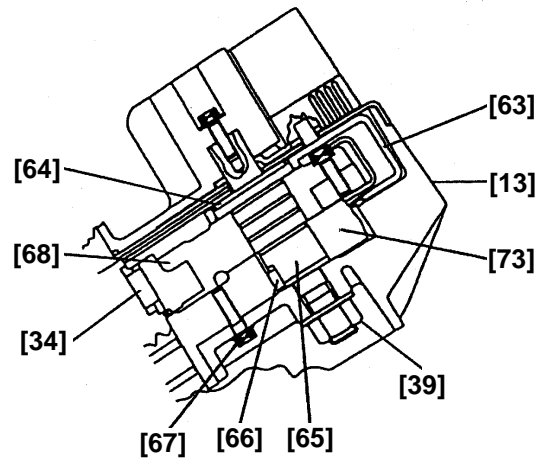


Fig. 20

(8) Disassembly of bracket (A) and (B) unit (Fig. 20)

Press the Bolt (A) [65] with a hand press supporting Bracket (A) [68]. Then the Feather Key [66], Bracket (A) [68] and Bracket (B) [73] can be removed.

(9) Disassembly of bracket (A) unit (Fig. 21)

1) Remove the Retaining Ring for D9 Shaft [61]. Then the Pin for Spring [72], Spring (C) [71] and Cutter Guard [70] can be removed.

2) Pull out the Needle [60] with a hand press to remove Roller (C) [62] from Bracket (A) [68].

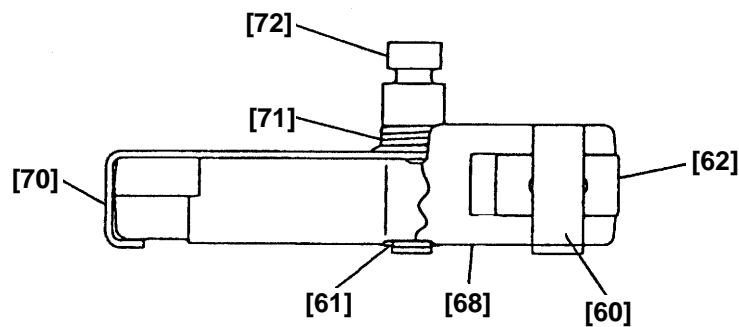


Fig. 21

(10) Disassembly of the cam shaft unit (Fig. 22)

Remove the Cam [8] and two Feather Keys [34] from the Cam Shaft [12] with a hand press.

12-2. Reassembly

Reassembly can generally be carried out as the reverse of the disassembly procedure, with some items to be noted as follows.

(1) Reassembly of the cam shaft unit (Fig. 22)

Perform reassembly so that the chamfered portion of the Cam Shaft [12] is aligned with the pins of the Cam [8] in the same direction.

* Otherwise, the Sensor Gear [56] cannot be mounted in the proper position and damage to the volume and the gear will result. Be sure to check the mounting direction after reassembly.

(2) Reassembly of bracket (A) unit (Fig. 23)

Mount Bracket (A) [68] to Spring (C) [71] so that the folded portion of Spring (C) [71] securely fits in the notch of the Cutter Guard [70] (Fig. 23). Apply grease (TUFREX 251) to the hole of Roller (C) [62] adequately (Fig. 24).

(3) Reassembly of bracket (A) and (B) unit (Fig. 24)

Mount the Bolt (A) [65] to Bracket (A) [68]. Apply grease (TUFREX 251) to the shaded areas shown in Fig. 24 adequately. Mount the Feather Key [66] to Bracket (A) [68] and press-fit it to Bracket (B) [73].

(4) Installation of bracket (A) and (B) unit to the inner cover (Figs. 19 and 20)

Mount bracket (A) and (B) unit into the Inner Cover Ass'y [13] and secure it with two Hex. Socket Hd. Bolts M5 x 16 [67] and the Flange Nut M12 [39]. Hook one end of the Return Spring [38] in the groove of the Pin for Spring [72] and the other end on the projection of the Inner Cover Ass'y [13]. Secure it with the Thrust Washer [37] and the Seal Lock Screw (W/SP. Washer) M4 x 12 [36].

* For easy reassembly, mount the Return Spring [38] first before mounting the Cam Shaft [12]. Use a flat-blade screwdriver for mounting the Return Spring [38].

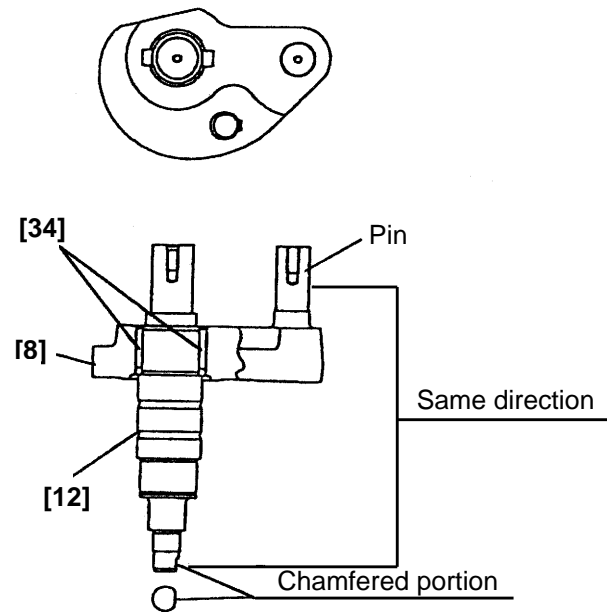


Fig. 22

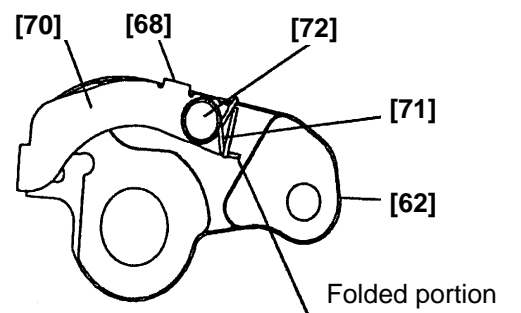


Fig. 23

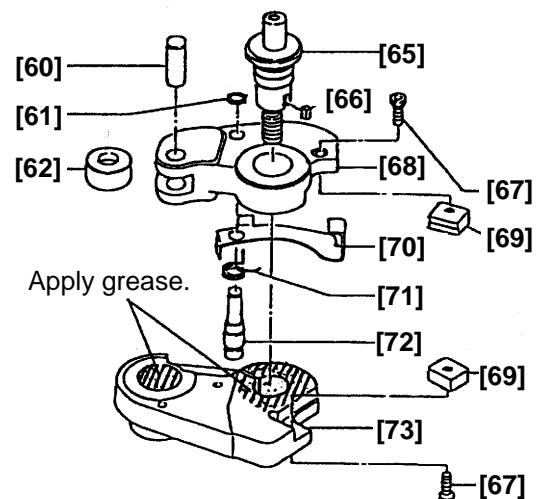


Fig. 24

(5) Reassembly of bending unit (Figs. 12 and 22)

Mount the Cam Cover [6], Turn Table [5] and Center Plate (A) [3] in the reverse of the disassembly procedure. Before mounting the Center Plate (A) [3], apply grease (TUFREX 251) to the 18 mm dia. hole of Center Plate (A) [3] adequately. Check that the hole of the Turn Table [5] and the pin of the Cam [8] are properly adjusted to ensure smooth movement of Roller (B) [30].

(6) Installation of gears

Apply grease (Nippeko SEP-3A) to the meshing parts of First Pinion (B) [55], Second Pinion [47], Third Pinion [43] and Final Gear [18], and mount them in the reverse of the disassembly procedure. Apply grease (TUFREX 251) to the Clutch Spring [52], Collar (A) [53] and the boss of First Gear (B) [51] adequately. Check that the Sensor Holder Ass'y [23] is mounted and the wiring is completed. Secure the Inner Cover Ass'y [13] and the Gear Cover Ass'y [22] with seven Hex. Socket Hd. Bolts (W/Flange) M5 x 16 [29].

* Perform wiring of the Sensor Holder Ass'y [23] in this step. Wiring in later step is impossible though the Sensor Holder Ass'y [23] is secured with the Tapping Screw D3 x 12 [24] in the next step (Fig. 13-a).

(7) Installation of the Sensor Gear [56] (Fig. 13)

Mount the Sensor Gear [56] in the reverse of the disassembly procedure shown in 12-1 (5) 2). **Pay attention to the mounting position of the Sensor Gear [56].**

12-3. Wiring Diagram

Be sure to perform wiring connections as indicated in the wiring diagrams.

- For products without noise suppressor

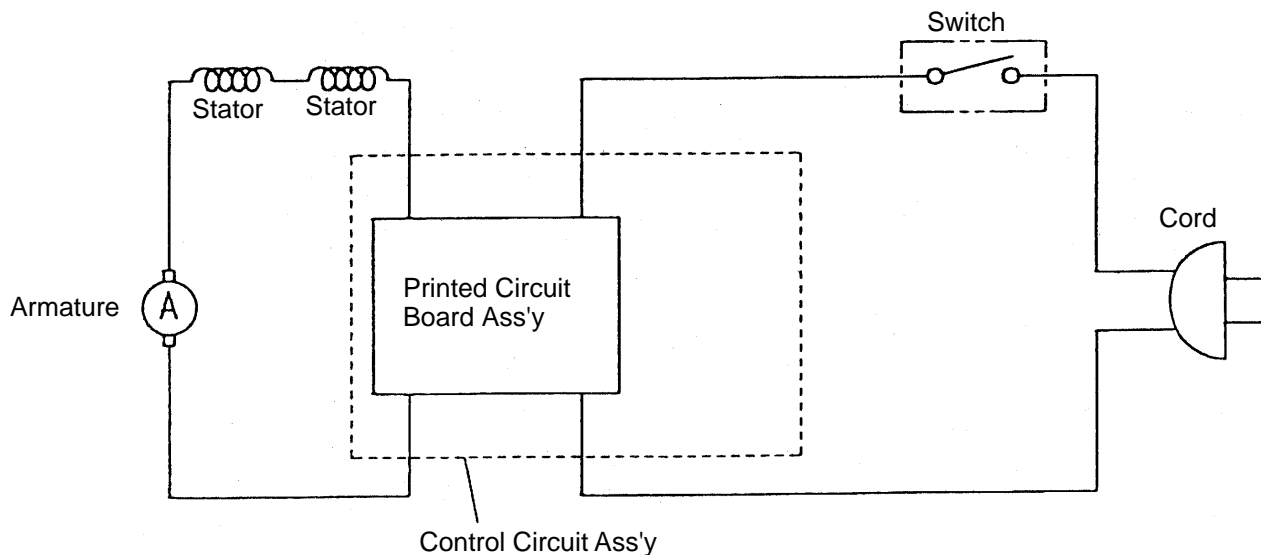


Fig. 25

- For products with noise suppressor

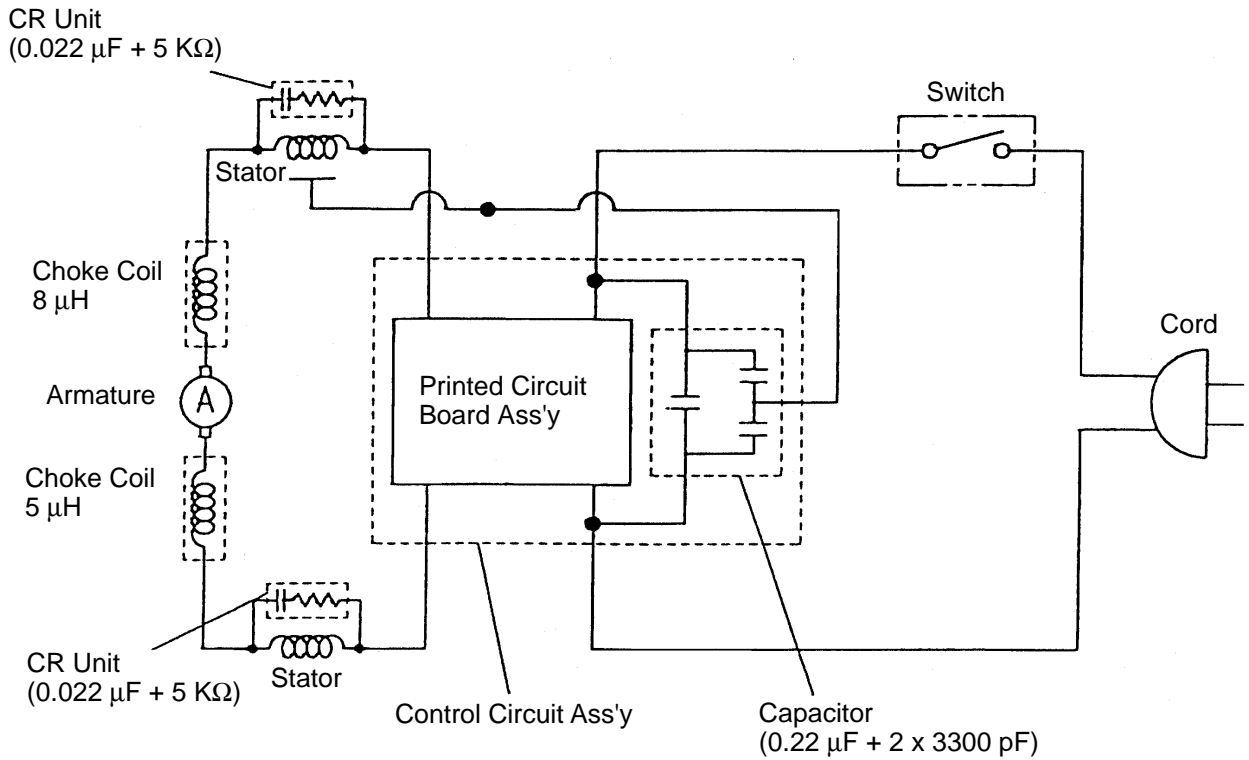


Fig. 26

12-4. Confirmation after Reassembly

- (1) Check the accuracy with an angle gauge (Figs. 27, 28 and 29).
 - 1) Adhere an angle gauge to the Turn Table [5] (Fig. 27).
 - 2) Turn the Volume Holder Ass'y [100] (bending angle selector) clockwise until it is locked (Fig. 28).
 - 3) Pull the trigger slightly to run the machine as slow as possible.
 - 4) It is all right if the Turn Table [5] starts backward rotation from the marked line for 13 mm dia. bar with the marking on the angle gauge aligned (Fig. 29).
 - 5) If the marking on the angle gauge is not aligned with the marked line for 13 mm dia. bar, perform adjustment according to the next step (2).

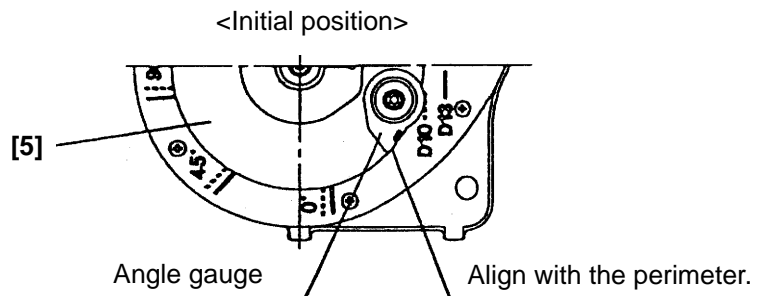


Fig. 27

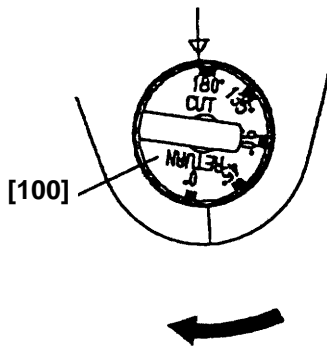
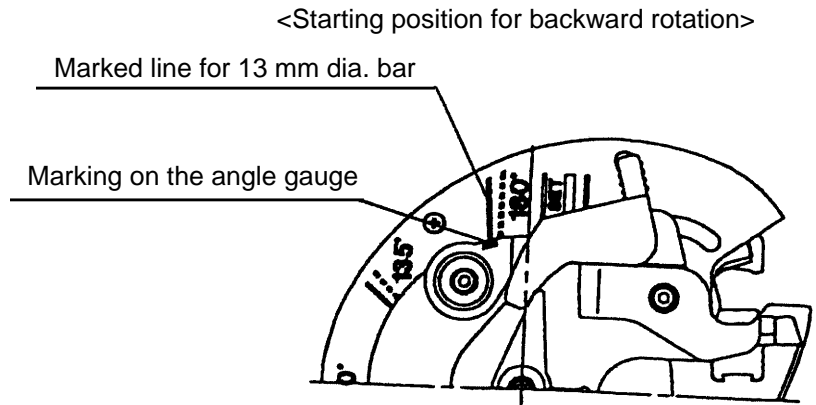


Fig. 28



Check the starting position for backward rotation.

Fig. 29

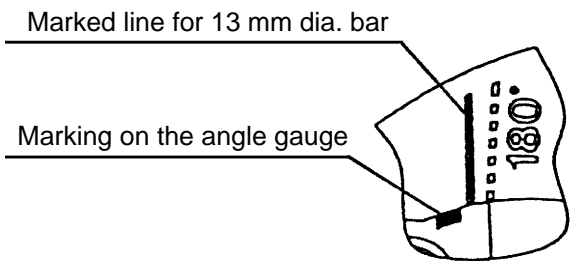
(2) Adjust the bending accuracy as follows (Fig. 30).

- 1) Unplug the power cord from the receptacle.
- 2) Slightly turn the fine-adjustment control on the Controller Circuit [95] with a screwdriver.
- 3) Plug the power cord in the receptacle and check the accuracy again with an angle gauge. Repeat the adjustment until the marking is aligned.

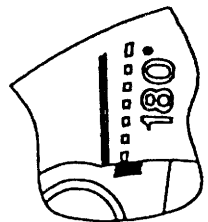
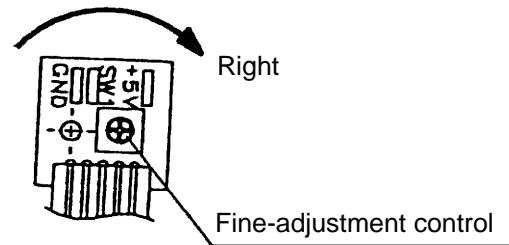
* Be sure to unplug the power cord from the receptacle before touching the circuits for safety's sake.

<Locations of marking and marked line>

<Turning direction>



Small rotation angle



Large rotation angle

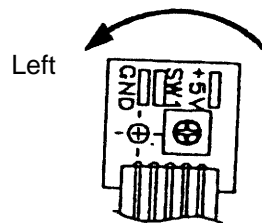


Fig. 30

12-5. Repair Procedure

Following table shows rough repair procedures. Refer to the above mentioned disassembly and reassembly procedures for details.

* Be sure to confirm the operation of the controller circuit, gears, brackets and cam after reassembly of them, and perform adjustment if necessary.

No.	Item	Procedure	Remarks
1	Replacement of control circuit	<pre> graph TD A(12-1 (1) Disassembly of the handle) --> B(12-1 (2) Removal of the cable) B --> C(12-1 (3) Disassembly of the power supply unit) C --> D(12-2 Reassembly) D --> E(12-4 Confirmation after Reassembly) </pre>	<ul style="list-style-type: none"> • Wiring of the controller circuit * Refer to "12-3. Wiring Diagram". • Confirmation after reassembly * Refer to 12-4 (1) and (2).
2	Replacement of gears, brackets and cam	<pre> graph TD A(12-1 (1) Disassembly of the handle) --> B(12-1 (2) Removal of the cable) B --> C(12-1 (4) Disassembly of the bending unit (Fig. 12)) C --> D(Removal of sensor gear) D --> E(Disassembly of the gear unit, bracket unit and cam unit) E --> F(12-2 Reassembly) F --> G(12-4 Confirmation after Reassembly) </pre>	<ul style="list-style-type: none"> • Removal and installation of the sensor gear * Refer to 12-1 (5) and 12-2 (6). • Confirmation after reassembly * Refer to 12-4 (1) and (2).

12-6. Tightening Torque

Machine Screw (W/Washers)	M5	3.4 ± 0.7 N•m (35 ± 7 kgf•cm) (30.4 ± 6.1 in-lbs.)
Seal Lock Screw	M4	1.8 ± 0.4 N•m (18 ± 4 kgf•cm) (15.6 ± 3.5 in-lbs.)
Machine Screw Machine Screw (for the Sensor Gear only)	M4	1.8 ± 0.4 N•m (18 ± 4 kgf•cm) (15.6 ± 3.5 in-lbs.) 1 ± 0.2 N•m (10 ± 2 kgf•cm) (8.7 ± 1.7 in-lbs.)
Flange Nut	M12	39.2 ± 7.8 N•m (400 ± 80 kgf•cm) (347.2 ± 69.4 in-lbs.)
Tapping Screw (W/Flange)	D5	2.9 ± 0.5 N•m (30 ± 5 kgf•cm) (26 ± 4.3 in-lbs.)
Tapping Screw (W/Flange)	D4	2.0 ± 0.5 N•m (20 ± 5 kgf•cm) (17.4 ± 4.3 in-lbs.)
Hex. Socket Hd. Bolt	M5	5.9 ± 1.5 N•m (60 ± 15 kgf•cm) (52 ± 13 in-lbs.)
Hex. Socket Hd. Bolt	M4	3.4 ± 0.7 N•m (35 ± 7 kgf•cm) (30.4 ± 6.1 in-lbs.)

12-7. 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 4000 V/1 minute, with no abnormalities 230 V

12-8. No-load Current Value

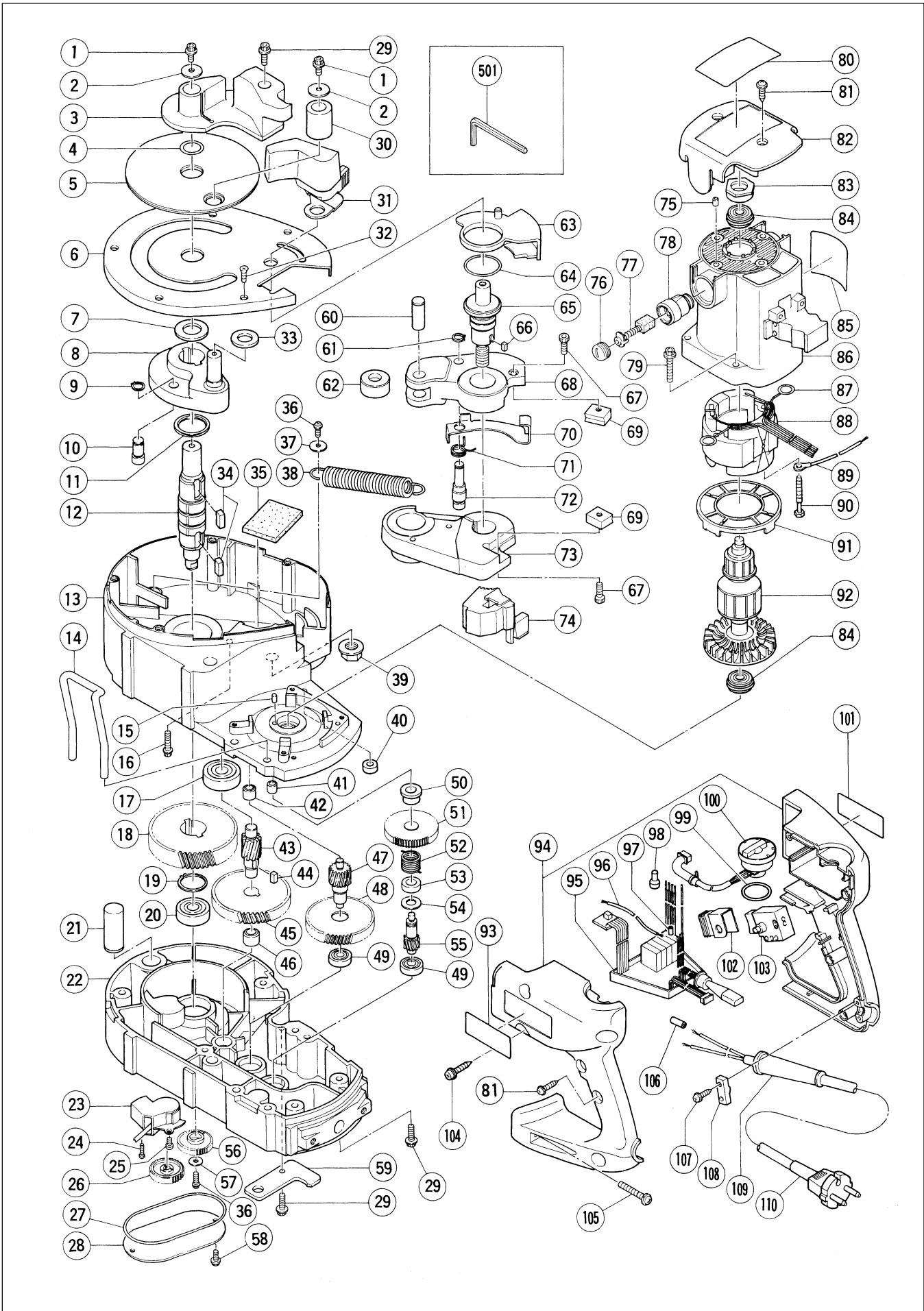
After no-load operation for 30 minutes, the no-load current value should be as follows.

Voltage	230 V
Current (Max.)	1.3

13. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	70 min.
	Fixed							
VB 13Y		Work Flow						
		Tail Cover	Handle (A).(B) Set Controller Circuit O-Ring Volume Holder Ass'y	Housing Ass'y Bearing Bushing (B) Ball Bearing (608VV) x 2 Stator Ass'y Fan Guide Armature				
		Steel Bar Guide	Switch Rubber Cover Switch Cord Armor Cord Rubber Bushing					
		General Assembly	Sensor Cover O-Ring (S-85) Sensor Gear Sensor Holder Ass'y	Gear Cover Ass'y	Final Gear Ball Bearing (6201VV)		Cam Lock Pin (B) V-Ring Cam Shaft Feather Key (7 x 7 x 15) x 2	Inner Cover Ass'y
				First Pinion Ball Bearing (608VV)				
		Center Plate Roller (B) O-Ring (P-18) Turn Table Lever Cam Cover Felt Packing x 2 Cover O-Ring (S-34) Dust Guard	Clutch Spring First Gear Metal	Second Pinion Second Gear Ball Bearing (608VV) Metal			Return Spring Bolt (A) Feather Key (4 x 4 x 8) Bracket (A) Cutter Guard Spring (C) Pin for Spring Bracket (B) Needle Roller (C)	
				Third Pinion Feather Key (5 x 5 x 10) Third Gear Metal (B) Ball Bearing (6301VV)				

Assembly Diagram for VB 13Y



PARTS

VB 13Y

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
1	998-471	HEX. SOCKET HD. BOLT M5X12	2	
2	316-224	WASHER	2	
3	318-288	CENTER PLATE (A)	1	
4	873-570	O-RING (P-18)	1	
5	316-220	TURN TABLE	1	
6	316-219	CAM COVER	1	
7	316-216	FELT PACKING	1	
8	316-199	CAM	1	
9	939-540	RETAINING RING FOR D10 SHAFT (10 PCS.)	1	
10	316-201	LOCK PIN (B)	1	
11	316-198	V-RING	1	
12	316-200	CAM SHAFT	1	
13	316-184	INNER COVER ASS'Y	1	INCLUD.17,35,41,42
14	316-225	STAND	1	
15	931-701	BEARING LOCK	1	
16	316-195	HEX. SOCKET HD. BOLT (W/FLANGE) M5X20	2	
17	630-1VV	BALL BEARING 6301VVCMP2L	1	
18	316-202	FINAL GEAR	1	
19	965-469	RETAINING RING FOR D25 SHAFT	1	
20	620-1VV	BALL BEARING 6201VVCMP2L	1	
21	316-451	PIN D18	1	
22	316-211	GEAR COVER ASS'Y	1	INCLUD.20,21,46,49
23	318-284	SENSOR HOLDER ASS'Y	1	INCLUD.24,56
24	316-214	TAPPING SCREW D3X12	1	
25	949-215	MACHINE SCREW M4X8 (10 PCS.)	2	
26	316-212	SENSOR GEAR	1	
27	985-227	O-RING (S-85)	1	
28	316-215	SENSOR COVER	1	
29	994-192	HEX. SOCKET HD. BOLT (W/FLANGE) M5X16	9	
30	316-223	ROLLER (B)	1	
31	318-287	LEVER (A)	1	
32	949-322	FLAT HD. SCREW M4X10 (10 PCS.)	5	
33	316-217	FELT PACKING	1	
34	306-506	FEATHER KEY 7X7X15	4	
35	316-186	SUPPORT (B)	1	
36	987-203	SEAL LOCK SCREW (W/SP. WASHER) M4X12	2	
37	875-249	THRUST WASHER	1	
38	316-197	RETURN SPRING	1	
39	316-196	FLANGE NUT M12	1	
40	307-607	WRENCH HOLDER	1	
41	316-185	METAL	1	
42	954-940	METAL D8X10	1	
43	316-203	THIRD PINION	1	
44	948-015	FEATHER KEY 5X5X10	1	
45	316-204	THIRD GEAR	1	
46	954-789	METAL (B)	1	
47	316-205	SECOND PINION	1	
48	316-206	SECOND GEAR	1	
49	608-VVM	BALL BEARING 608VVC2PS2L	2	
50	318-360	SLEEVE (B)	1	
51	318-358	FIRST GEAR (B)	1	

* : ALTERNATIVE PARTS

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PARTS

VB 13Y

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS
52	316-209	CLUTCH SPRING	1	
53	316-208	COLLAR (A)	1	
54	981-077	WASHER	1	
55	318-359	FIRST PINION (B)	1	
56	316-212	SENSOR GEAR	1	
57	962-569	WASHER (B)	1	
58	316-228	HEX. SOCKET HD. BOLT (W/FLANGE) M4X10	2	
59	316-226	STEEL BAR GUIDE	1	
60	316-190	NEEDLE	1	
61	992-805	RETAINING RING FOR D9 SHAFT	1	
62	316-189	ROLLER (C)	1	
63	318-285	COVER	1	
64	980-879	O-RING (S-34)	1	
65	316-194	BOLT (A)	1	
66	980-809	FEATHER KEY 4X4X8	1	
67	949-821	HEX. SOCKET HD. BOLT M5X16 (10 PCS.)	2	
68	316-188	BRACKET (A)	1	
69	316-235	CUTTER (1 PAIR)	2	
70	316-191	CUTTER GUARD	1	
71	316-192	SPRING (C)	1	
72	316-193	PIN FOR SPRING	1	
73	316-187	BRACKET (B)	1	
74	316-222	DUST GUARD	1	
75	938-477	HEX. SOCKET SET SCREW M5X8	2	
76	935-829	BRUSH CAP	2	
77	999-043	CARBON BRUSH (1 PAIR)	2	
78	971-001	BRUSH HOLDER	2	
79	313-585	HEX. SOCKET HD. BOLT (W/FLANGE) M5X30	4	
80	318-286	CAUTION PLATE (E)	1	
81	301-653	TAPPING SCREW (W/FLANGE) D4X20 (BLACK)	6	
82	316-227	TAIL COVER	1	
83	310-111	BEARING BUSHING (B)	1	
84	318-362	BALL BEARING (A)	2	
85		HITACHI LABEL	1	
86	310-146	HOUSING ASS'Y	1	INCLUD.75,78
87	930-703	BRUSH TERMINAL	2	
88	340-419E	STATOR ASS'Y 230V	1	INCLUD.87
89	990-861	INTERNAL WIRE	1	
90	980-864	HEX. HD. TAPPING SCREW D5X40	2	
91	980-931	FAN GUIDE	1	
92	360-470E	ARMATURE 230V	1	
93		NAME PLATE	1	
94	316-234	HANDLE (A).(B) SET	1	
95	318-282	CONTROLLER CIRCUIT	1	
96	318-283	INTERNAL WIRE	1	
97	981-373	TUBE (D)	1	
98	959-140	CONNECTOR 50091 (10 PCS.)	7	
99	878-609	O-RING (S-24)	1	
100	318-281	VOLUME HOLDER ASS'Y	1	INCLUD.99
101	318-289	CAUTION PLATE (D)	1	

