CHAPTER 5
DISASSEMBLY AND REASSEMBLY

5.1 Precautions for Disassembly and Reassembly

Pay attention to the following precautions when disassembling or reassembling the HX-20.

(1) Make sure that the power switch on the HX-20 is off.

(2) Disconnect the options and cables from the HX-20.

(3) If programs are stored in the RMAs, transfer them onto a cassette tape or the like to save them.

(4) After removing the upper and lower cases, disconnect the cable from the battery connector (CN9) to prevent electrical circuits from shorting.

(5) Avoid directly placing the circuits boards that use ICs (for example, the MOSU circuit board and LCD panel circuit board) on a work bench. If it is necessary to do so, the component side must be down (to protect the circuit boards from static effect).

(6) Be careful not to pinch the cables with the cases.

(7) Be careful of screw length when using screws.

(8) If screw lock is used, be sure to apply the specified screw lock after tightening the screws.

* Unless otherwise specified, reassemble in the reverse order of disassembly.

5.2 Precautions for Disassembly and Reassembly

5.2.1 Case Cover

Disassembly Procedure	Disassembly Precautions
1. Turn the HX-20 upside down, and remove the 7 screws indicated by arrows in the sketch below.	
2. Turn the HX-20 back up, and slightly raise the LCD side of the upper case as shown below.	● When turning the HX-20 back up, hold the upper and lower cases together by hand so they won't open.
3. Disconnect the cable set No. 701 which connects the upper case to the connector CN8 on the MOSU circuit board.	● CN8 is a lock type connector so first grip the connector, slightly pull it up to unlock, and disconnect the cable.
4. Slowly open the upper case until the key tops face down.	

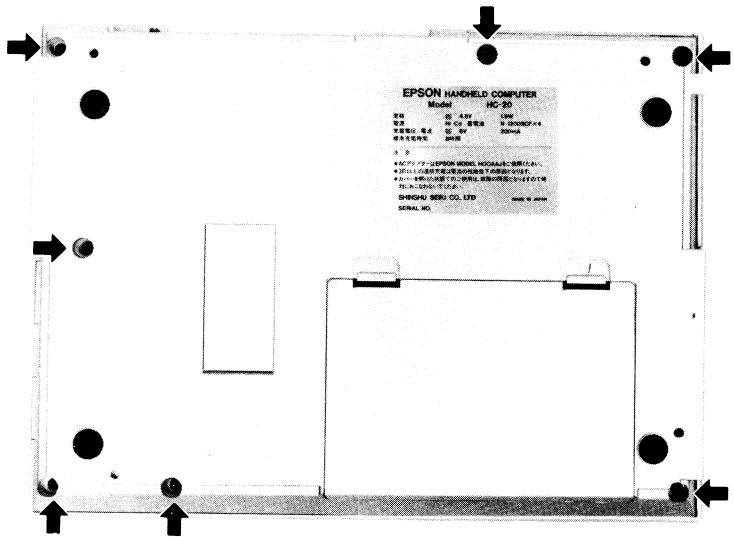


Fig. 5-1

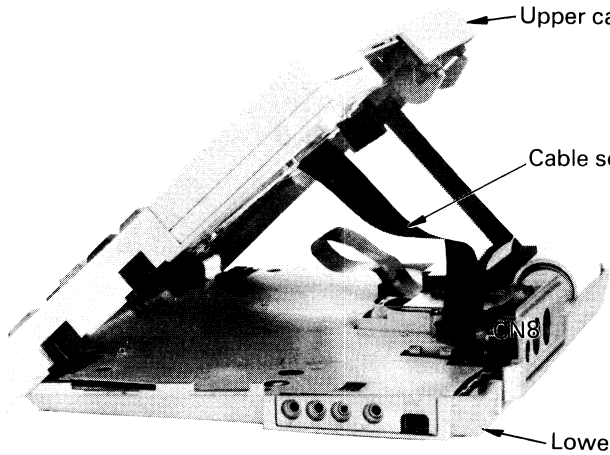


Fig. 5-2

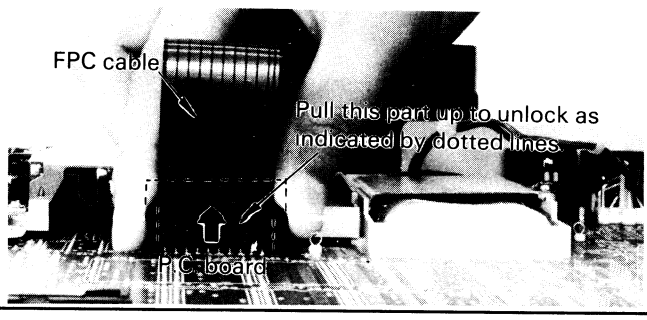


Fig. 5-3

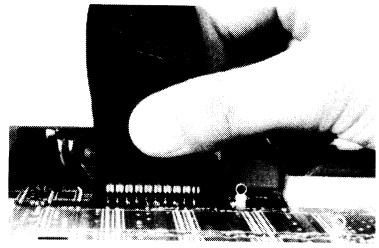


Fig. 5-4

5.2.2 Keyboard

Disassembly Procedure	Disassembly Precautions
1. Disconnect the FPC cables from connectors CN4, CN5 and KCN2. 2. Disconnect the piezo-electric buzzer connector from connector KCN1. 3. Remove the screws from Parts Ⓐ and Ⓑ. 4. Slowly raise the keyboard.	● Unlock the connectors before disconnecting the FPC cables. Slide this part in the arrow direction to the position indicated by dotted lines to unlock.

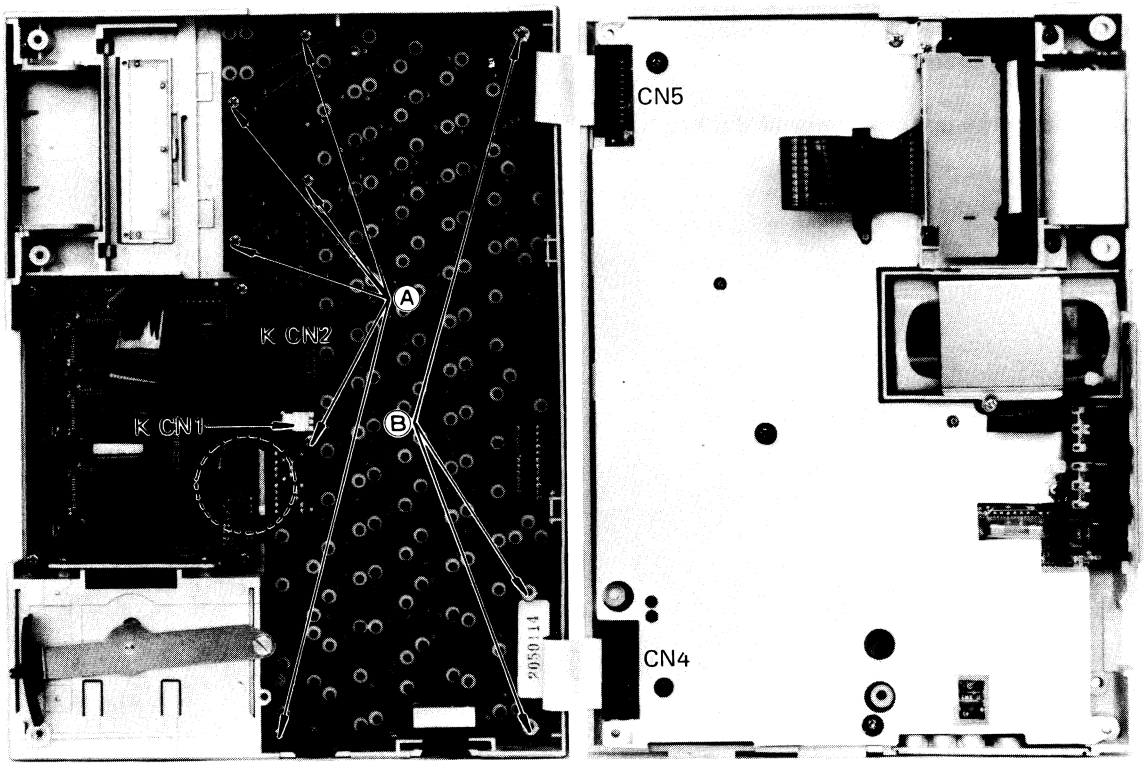
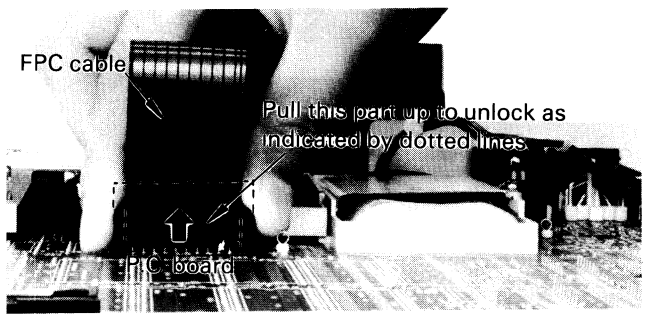


Fig. 5-5



5.2.3 Control Circuit Board

Disassembly Procedure	Disassembly Precautions
1. Disconnect the battery cable from the battery connector CN9. 2. Disconnect the printer FPC cables from CN4, CN5 and CN6. 3. Remove the three screws from Part Ⓐ, and take off the printer together with its mount. 4. Remove the four screws from Part Ⓑ, and take off the shielding plate. 5. Remove the circuit board, exercising care that connector CN7 is not hit by the case.	● The connector is a lock type, and must be unlocked before disconnecting the battery cable. ● Connectors CN4 and CN5 are also a lock type, and must be unlocked before disconnecting the FPC cables.

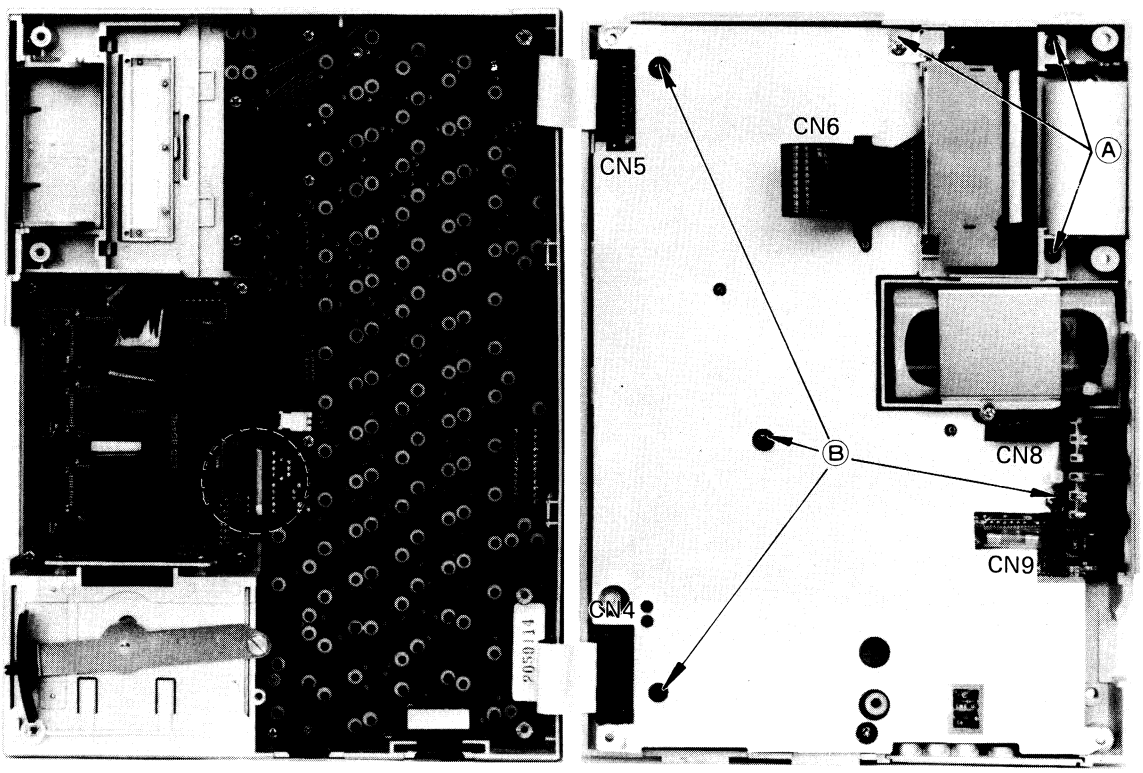
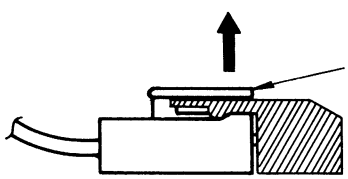


Fig. 5-6



5.2.4 LCD Unit

Disassembly Procedure	Disassembly Precautions
1. Disconnect the FPC cable from connector KCN2. 2. Remove the four screws indicated by arrows in the sketch below. 3. Raise the liquid crystal dispay.	● Unlock the connector before disconnecting the FPC cable.

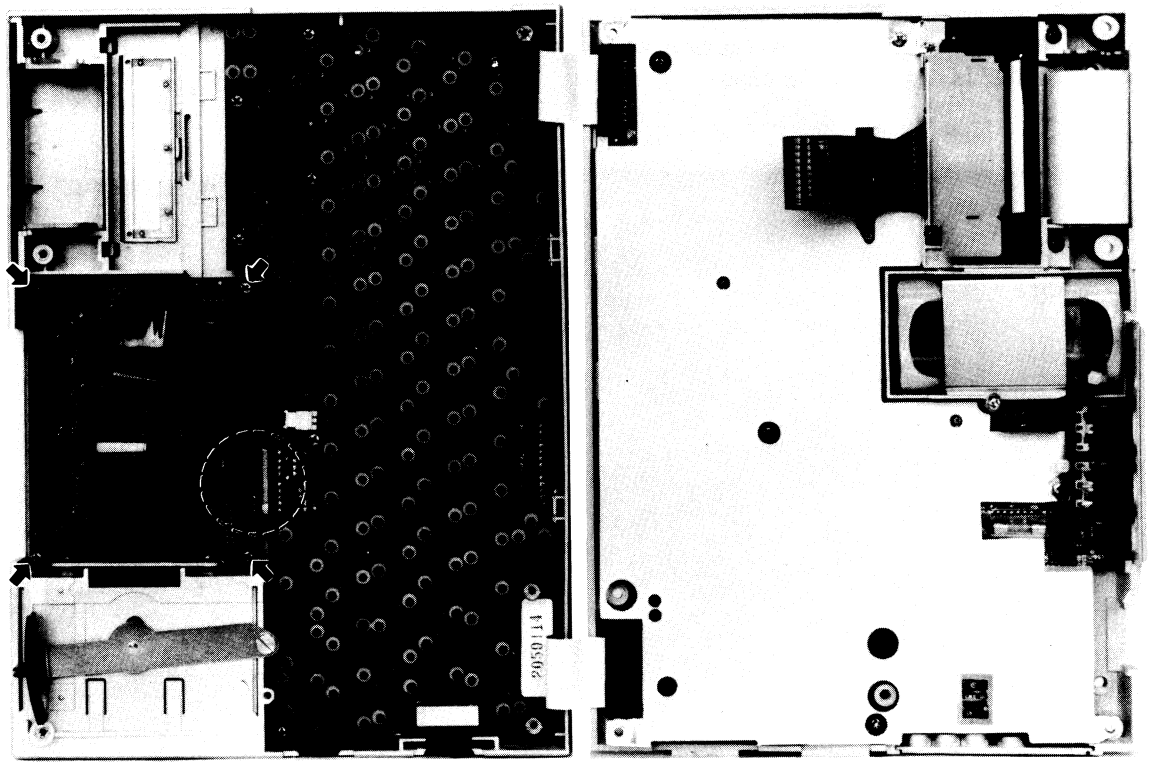
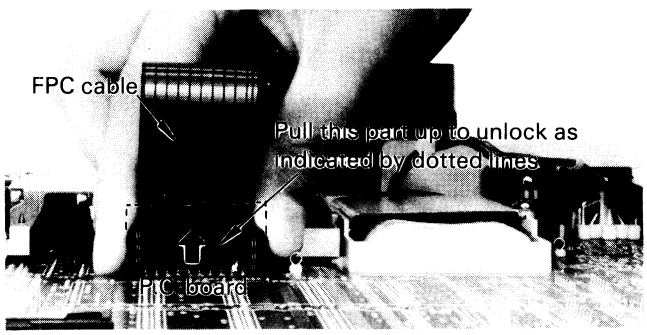


Fig. 5-7



5.2.5 Batteries

Disassembly Procedure	Disassembly Precautions
1. Open the case cover of the HX-20. 2. Disconnect the battery cable from connector CN9. 3. Remove the screw from Part A, the battery holding plate, and the batteries.	● Unlock the connector before disconnecting the battery cable.

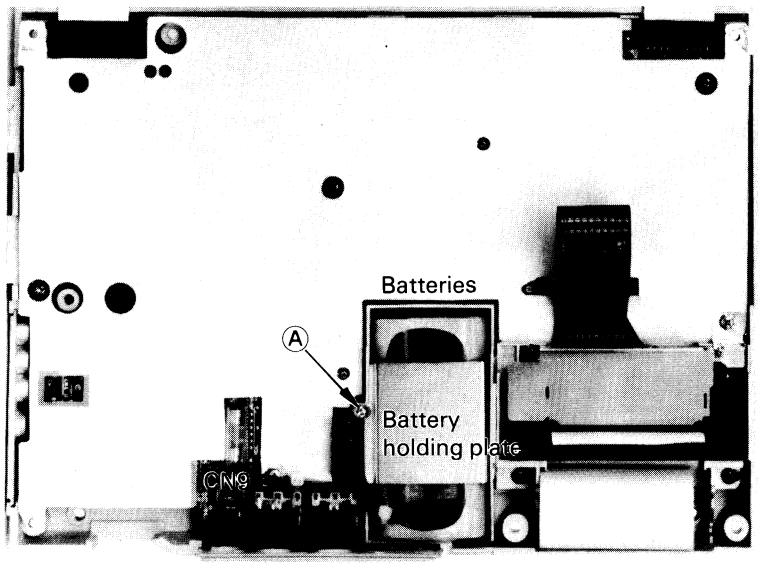


Fig. 5-8

5.2.6 Micro Printer

Disassembly Procedure	Disassembly Precautions
1. Open the case cover of the HX-20. 2. Disconnect the FPC cable from connector CN6. 3. To remove the printer mechanism alone, remove the two screws from Part B. When removing the printer together with the printer mount, remove the three screws from Part A. 4. Raise the printer and pull it out.	● Unlock the connector before disconnecting the cable.

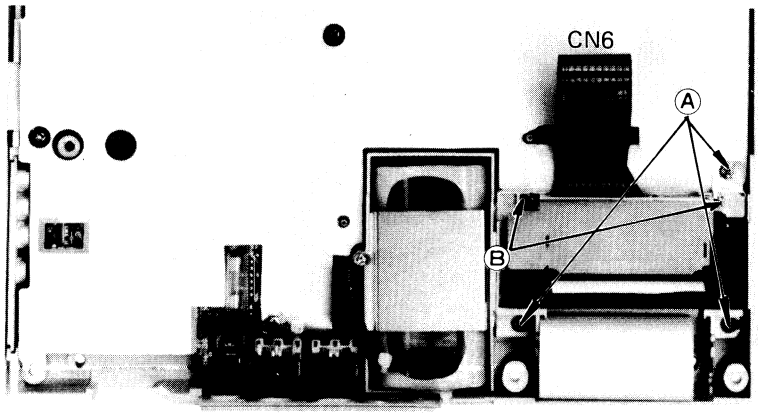


Fig. 5-9

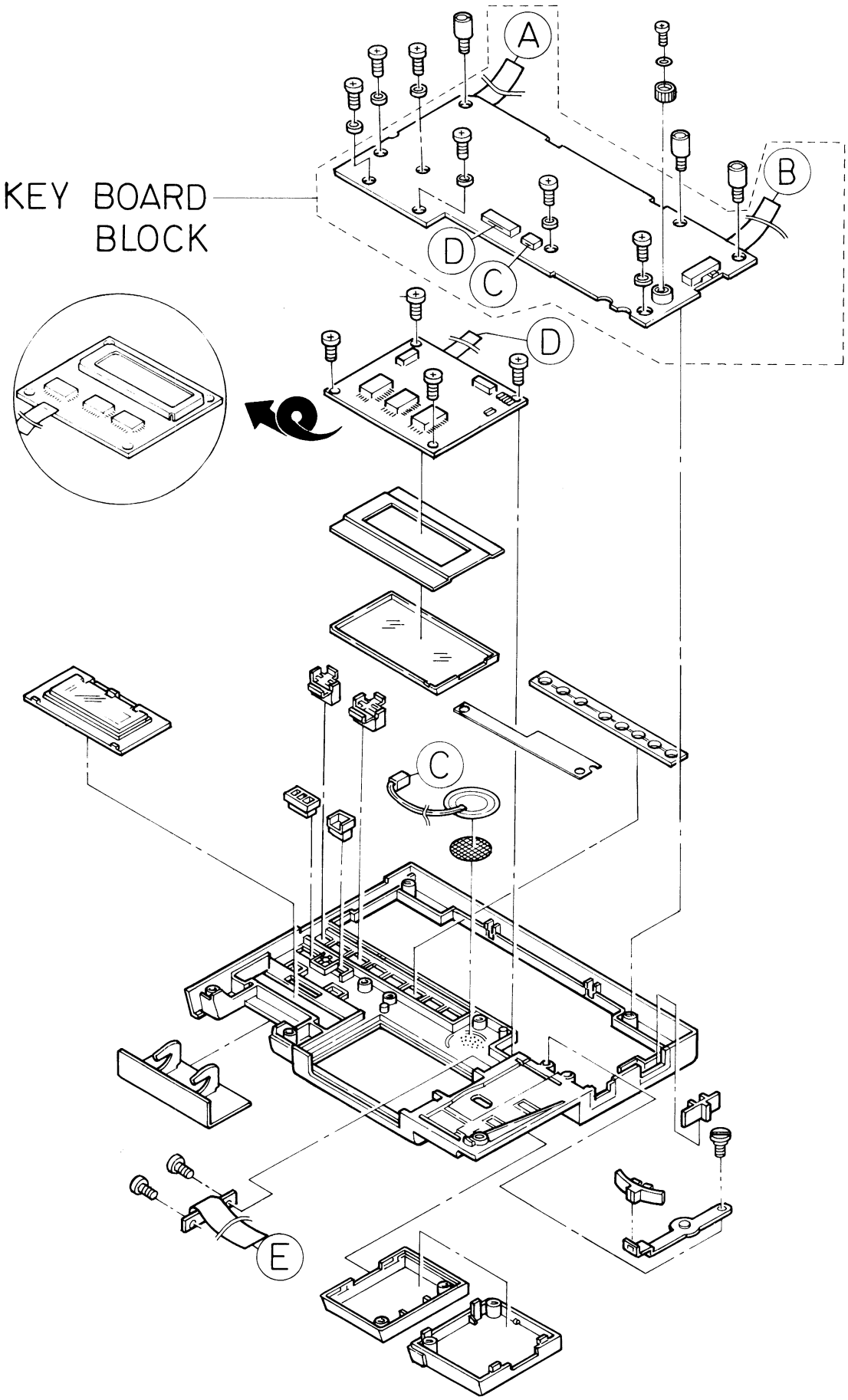


Fig. 5-10

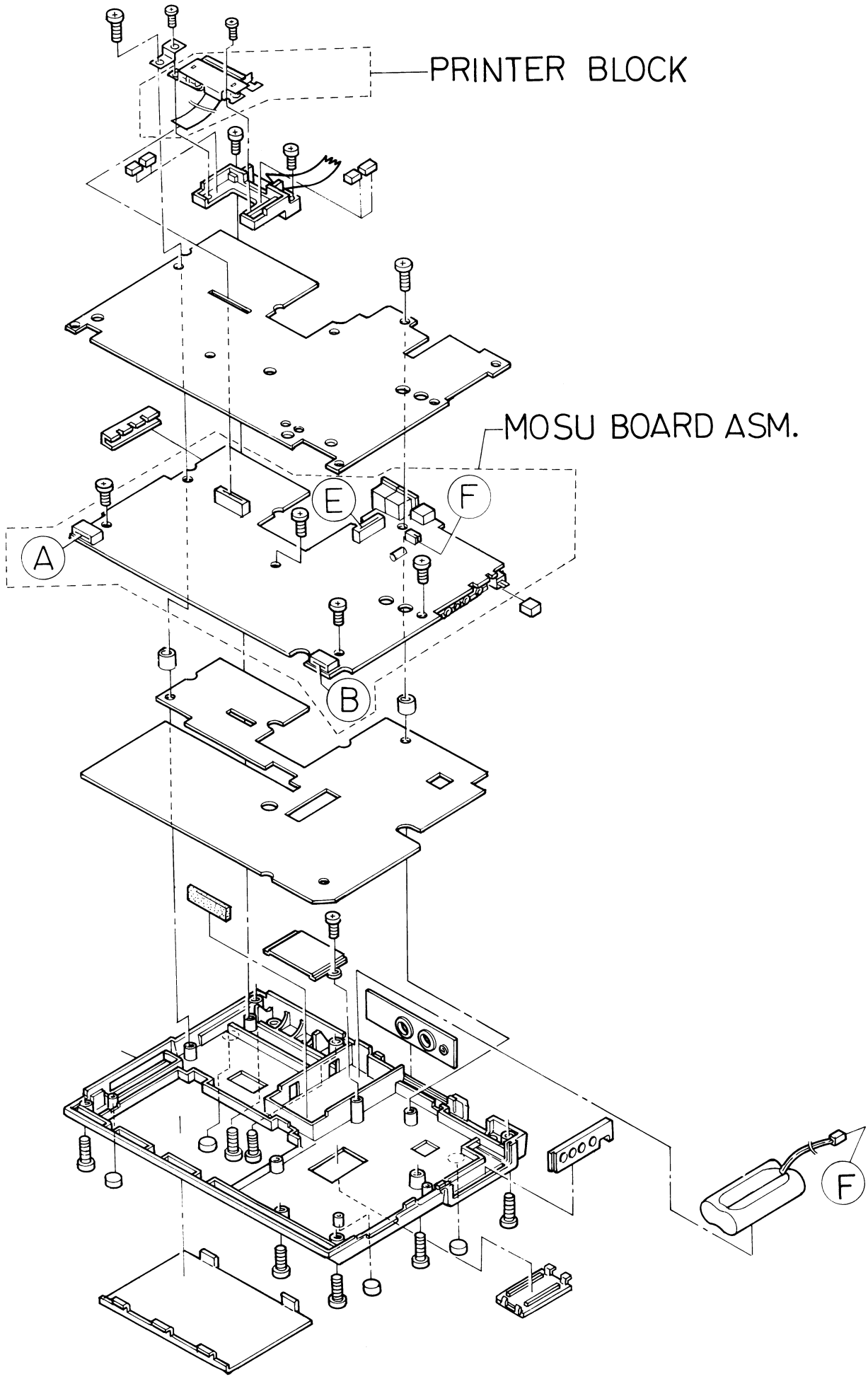


Fig. 5-11

5.3 Disassembly and Reassembly of Units

5.3.1 Keyboard Switches

Disassembly Procedure	Disassembly Precautions
*** Data Keys** Key Top Removal 1. Insert a thin screwdriver between adjacent key tops, raise one edge of the key to be removed, and unlock it. 2. When the key top is unlocked, the key top and return spring can be removed.	● Be careful not to damage the key tops in front and back. **Fig. 5-12**
Key Stem or Inner Spring A Removal 1. After removing the key top, insert a thin precision screwdriver into Part A or B of the key stem, and unlock it. 2. Pull out the key stem, and the inner spring A can be taken out.	● Be careful not to damage the frame. **Fig. 5-13**
Key Stem or Inner Spring A Removal 1. Remove the key top, check if the switch is connected to other switch. If so, cut off Parts C and D. 2. Scrape off the soldered parts on the back, completely using a cutter or the like; and slowly pull out the frame. (When installing, fasten with solder using a soldering iron or the like. Do not use an adhesive.)	● Be careful not to damage the FPC pattern when scraping off Parts C and D. **Fig. 5-14** ● Completely scrape off the soldered parts, and do not forcibly pull out the frame.

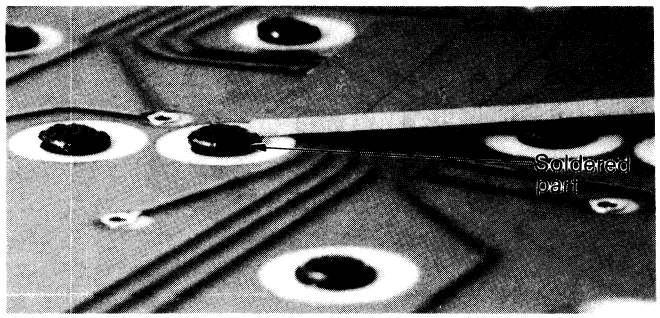


Fig. 5-15

Disassembly Procedure	Disassembly Precautions
*** Function Keys** When the keyboard is removed from the casing, the rubber contact points are exposed. Function key tops are mounted under these rubber contact points (8 in a row).	● Keep the conductive parts of the rubber contacts free of dust. ● When installing the keyboard, make sure that the rubber contacts are in position.

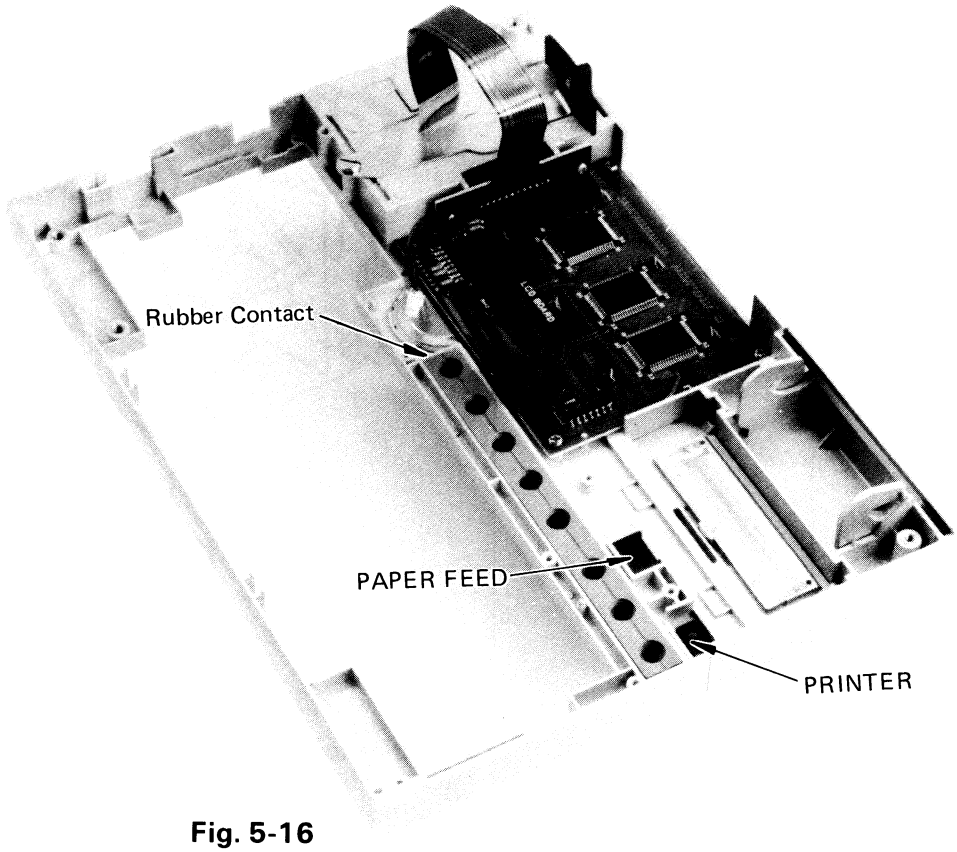


Fig. 5-16

Be careful of the direction of the rubber-contact switches which have their own direction.

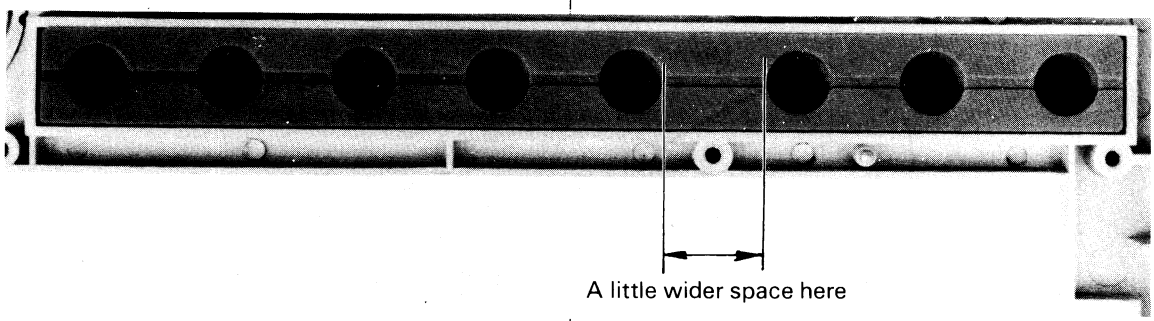


Fig. 5-17

*** Printer Key**

Exercise care about the installation procedure when installing or replacing the printer ON/OFF key.

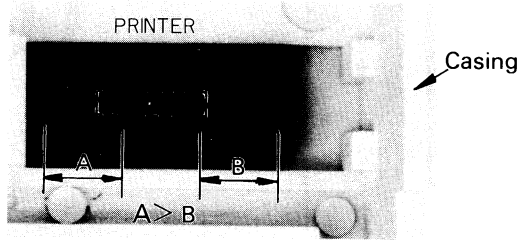


Fig. 5-18

5.3.2 Micro Printer (Model – 160)

5.3.2.1 Reassembly Stage A (Ribbon Feed Gear, Motor, Lead Cam Assy etc.)

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
1	1-1	Frame assy	● Lubrication (L-1).
2	3-6	Ribbon feed gear	
3	7-1	Spool gear assy	
	RE	Retaining TYPE-E (2)	
4	3-7	Reduction unit	● Lubrication (L-22, L-23)
5	3-1	Lead cam assy	● Lubrication (L-4, L-5) Set to reduction unit (3-7)

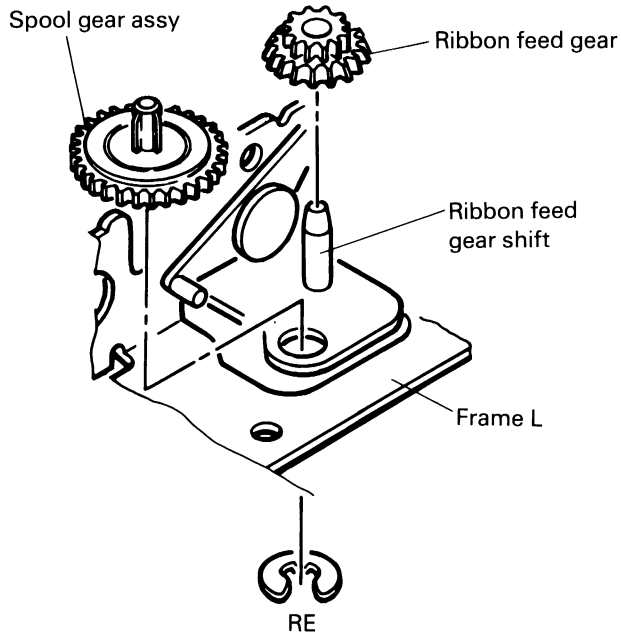


Fig. 5-19

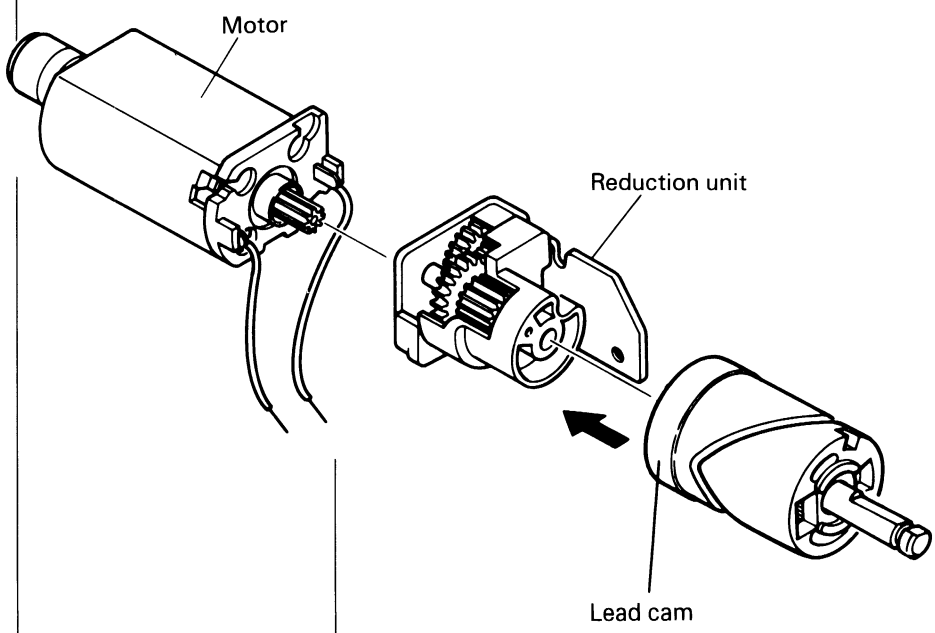


Fig. 5-20

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
6	2-1	Motor assy	● Reassembly motor unit, reduction unit and lead cam assy, then set the assembly in the frame and secure the motor to the frame by means of screws. Lubrication (L-24)
	SF	Slotted flat head machine screw (1 pcs.) (M1.6 × 2)	
7	3-2	Cam shaft bearing	● Lubrication (L-6). ● Push the bearing paying attention to the position of its detent part with respect to the corresponding notch in the frame.

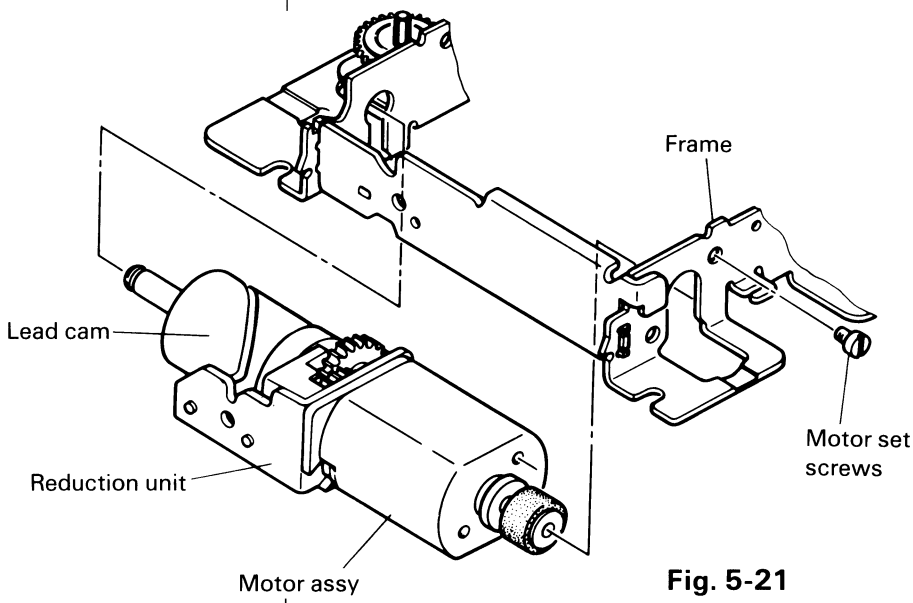


Fig. 5-21

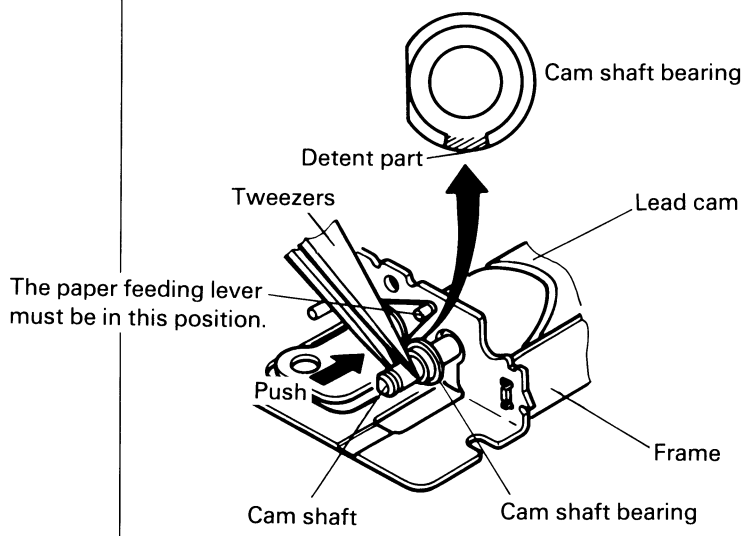


Fig. 5-22

5.3.2.2 Reassembly Stage B (Print Head, Print Head Carriage, etc.)

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
8	5-1	Print head assy	● Lubrication (L-7, L-8).
	5-3	Print head carriage assy	● Lubrication (L-9, L-10)
	SF	Slotted flat head machine screw (2 pcs.) (M1.6 × 3)	● Align the carriage guide pins with the guide holes in the print head, and temporarily reassemble the carriage and the print head by means of screw (at this step, do not fully tighten the screws).
9		Adjustment of print head position	① Adjust the position of the print head so that the impact face of printing lever becomes flush with the reference face of print head carriage, as illustrated below. ② Now tighten the screws fully.
10	5-4	Print head guide shafts (2 pcs.)	Lubrication (L-11, L-12) ● Engage the print head drive pin in the lead cam groove, then put into position the print head guide shafts from frame L side.
	5-5	Return support spring	
	RE	Retaining ring TYPE-E (2 pcs.) (1, 2)	

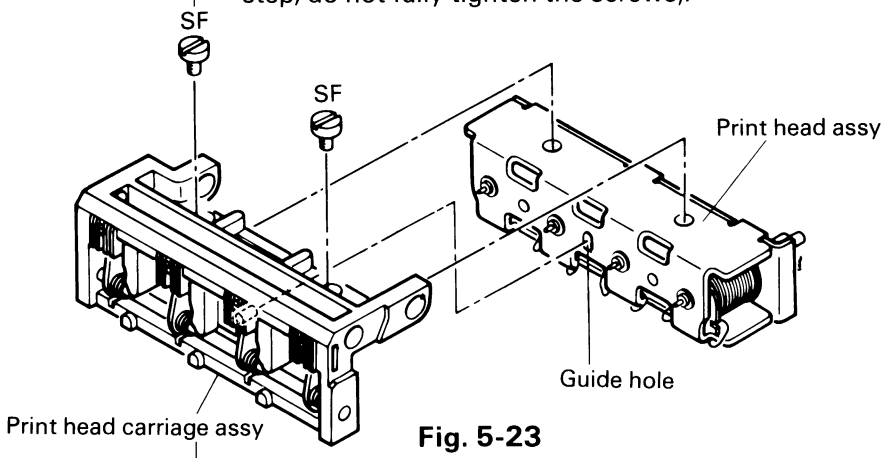


Fig. 5-23

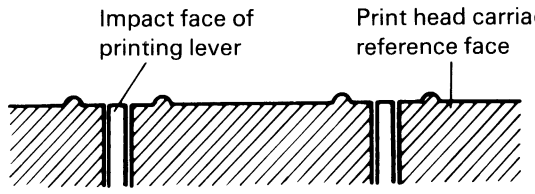


Fig. 5-24

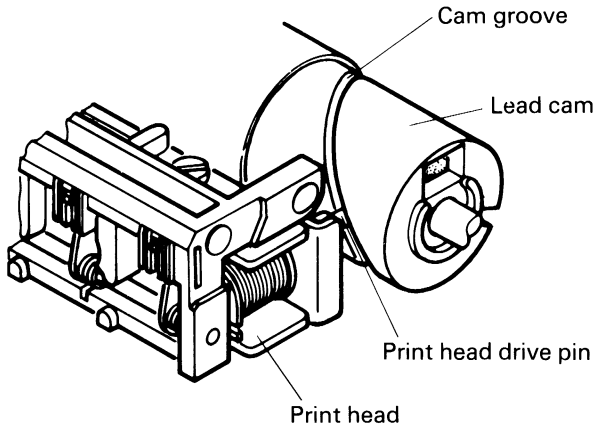
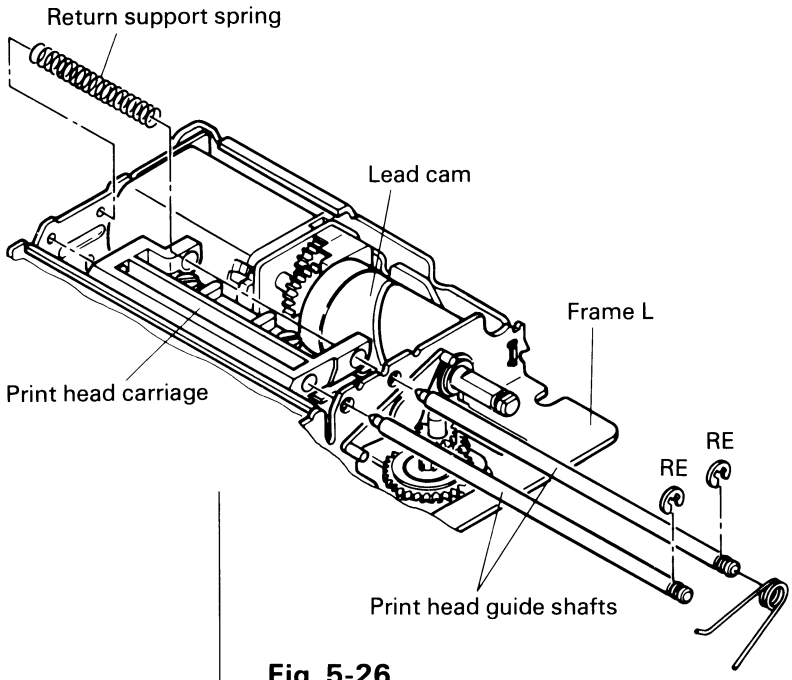
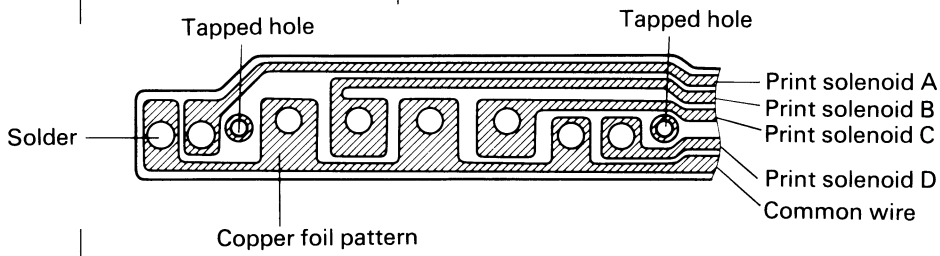


Fig. 5-25

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
			 **Fig. 5-26**
11	5-2 SF	FPC Slotted flat head machine screw (2 pcs.) (M1 x 2)	● Solder FPC as follows: ① Secure FPC to the back of the print head by means of screws. ② Cut the two wires of print solenoid A to the same length, and so with solenoids B, C and D. (Solenoid A is the solenoid to be located nearest to frame L.) ③ Solder the wires of solenoids A, B, C and D in this order. PRECAUTIONS * ● Do not apply the iron to FPC for too long a time. ● Be careful that solenoid wires be not broken.
			 **Fig. 5-27**

5.3.2.3 Reassembly Stage C (Paper Feed Mechanism, Timing Detector Assy, Circuit Board etc.)

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
12	6-3	Paper holding roller	● Lubrication (L-13). ● Set the roller on the paper holding spring.
13	6-1	Paper feed assy	● Lubrication (L-14 to L-18). ● Place the one-way spring on the paper feed assembly, then set the assembly in the frame, as illustrated below. ● Put the detent part of the plane bearing in the corresponding notch in the frame. ● Be careful not to damage gear teeth, which are very fine.
	RE	Retaining ring TYPE-E (2)	
	6-2	One-way spring	
14	6-4	Paper feed lever spring.	● Set this spring as illustrated below.

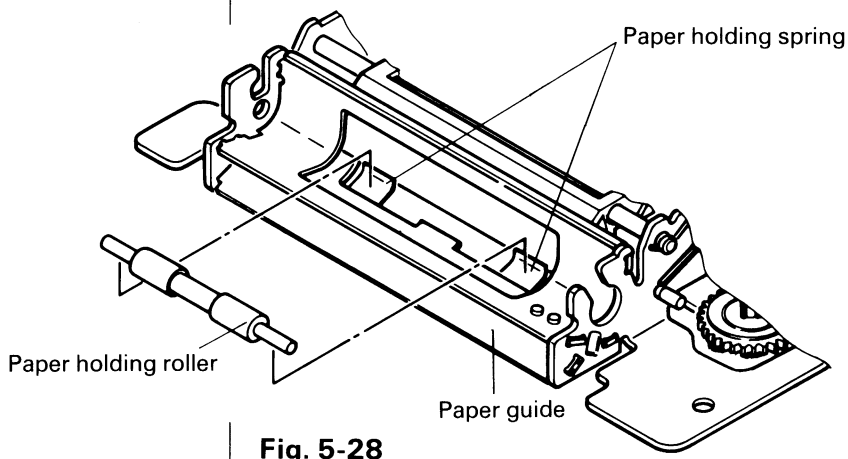


Fig. 5-28

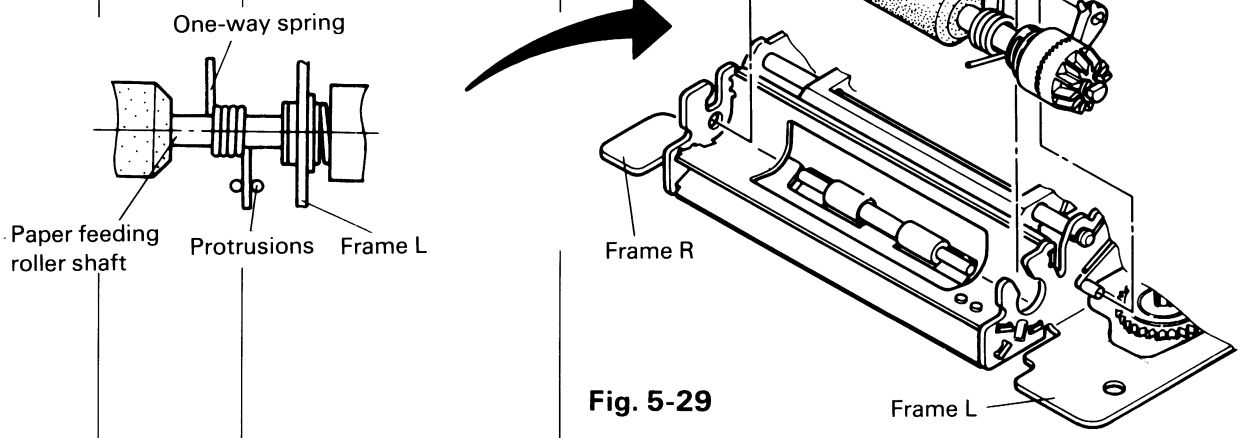


Fig. 5-29

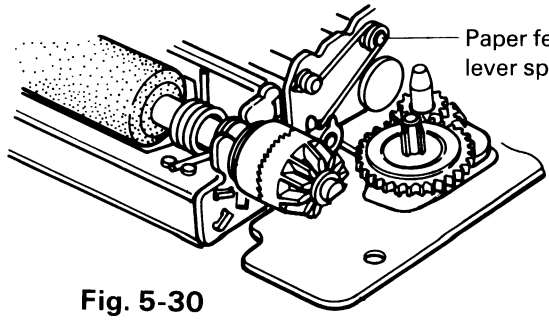


Fig. 5-30

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
15	3-4	Ribbon feed cam	● Lubrication (L-19 to L-21).
	3-5	Cam spring	● Place the ribbon feed cam in position as follows: ① Turn the timing detector magnet until the D-groove of the cam shaft faces toward the frame bottom. ② Place on the cam shaft the plain washer, cam spring and ribbon feed cam, in this order. ③ Place the retaining ring TYPE-E in position.
	RE	Retaining ring TYPE-E (1.5)	
16	4-2	Circuit board assy	● Press the circuit board against the frame tie plate, then against frame L. After that, push it down and finally secure to the tie plate by means of screws.
	SF	Slotted flat head machine screw (1 pcs.) (M1.6 × 3)	

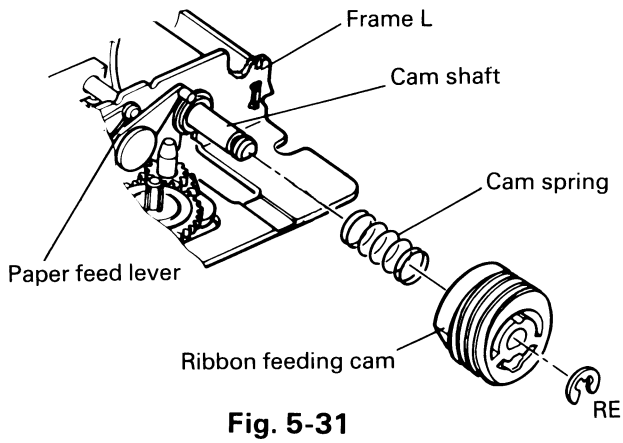


Fig. 5-31

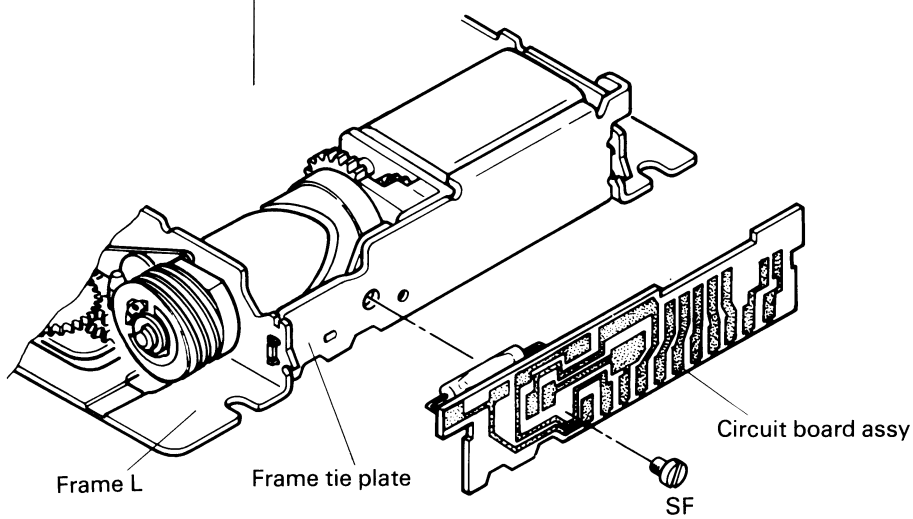


Fig. 5-32

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
6	4-1	Timing detector assy	● Place the timing detector assy on the timing detector magnet, and secure with screw. ● Clearance between the timing detector assy and the timing detector magnet must be uniform.
	SF	Slotted flat head machine screw (M1.4 × 1.8)	
18		FPC, Timing detector assy, Motor lead wires — Connect by soldering.	● Align the positioning hole in the FPC with that in the circuit board, then solder these elements. ● Do not apply the iron to the FPC for too long a time.

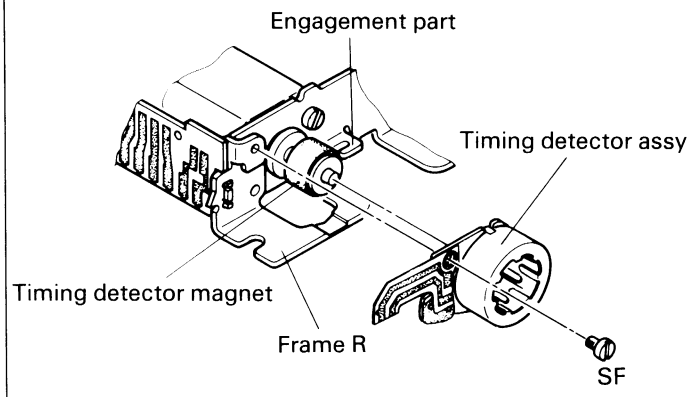


Fig. 5-33

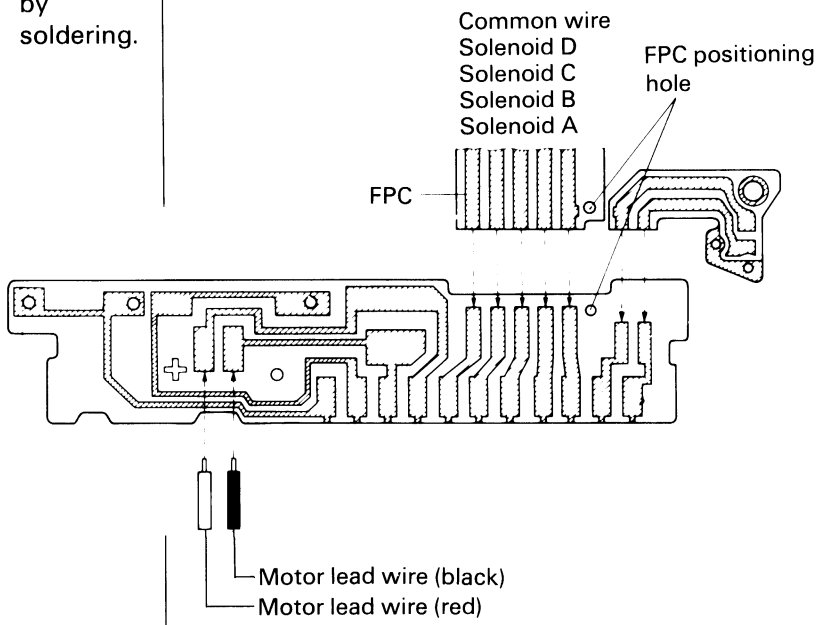
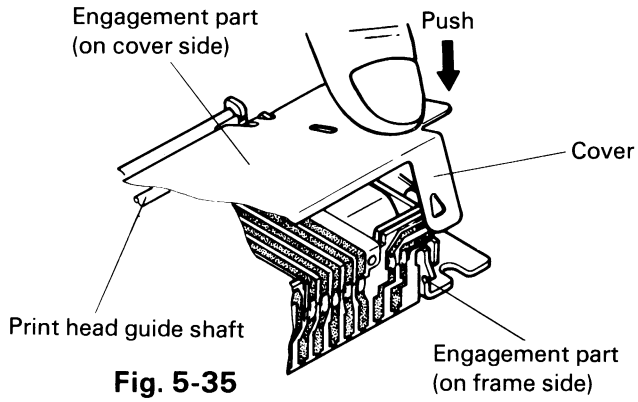
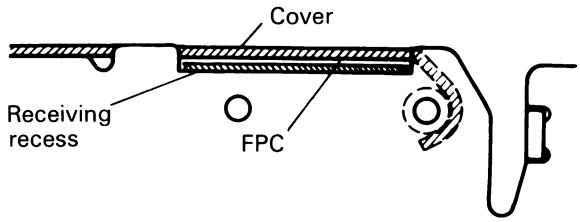
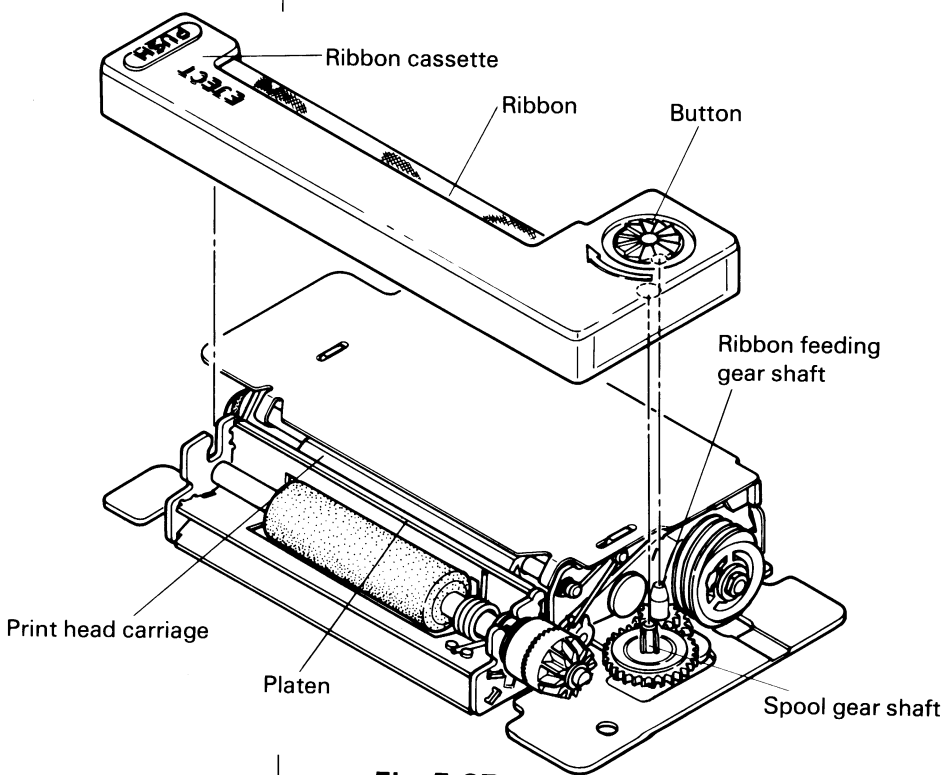


Fig. 5-34

5.3.2.4 Reassembly Stage D (Cover and Ribbon Cassette)

REASSEMBLY STEP	REF. NO.	NAME OF PART or REASSEMBLY	POINTS OF REASSEMBLY WORK
19	8-1	Cover.	 **Fig. 5-35** ● Engage the engagement part of the cover on the print head guide shaft, and push the cover to lock it on the frame. (Carry out this operation on both ends of the cover.) ● Check if the FPC is in the FPC receiving recess on frame R side.  **Fig. 5-36**
20	7-2	Ribbon cassette	● Set the ribbon cassette in position as illustrated below.  **Fig. 5-37**

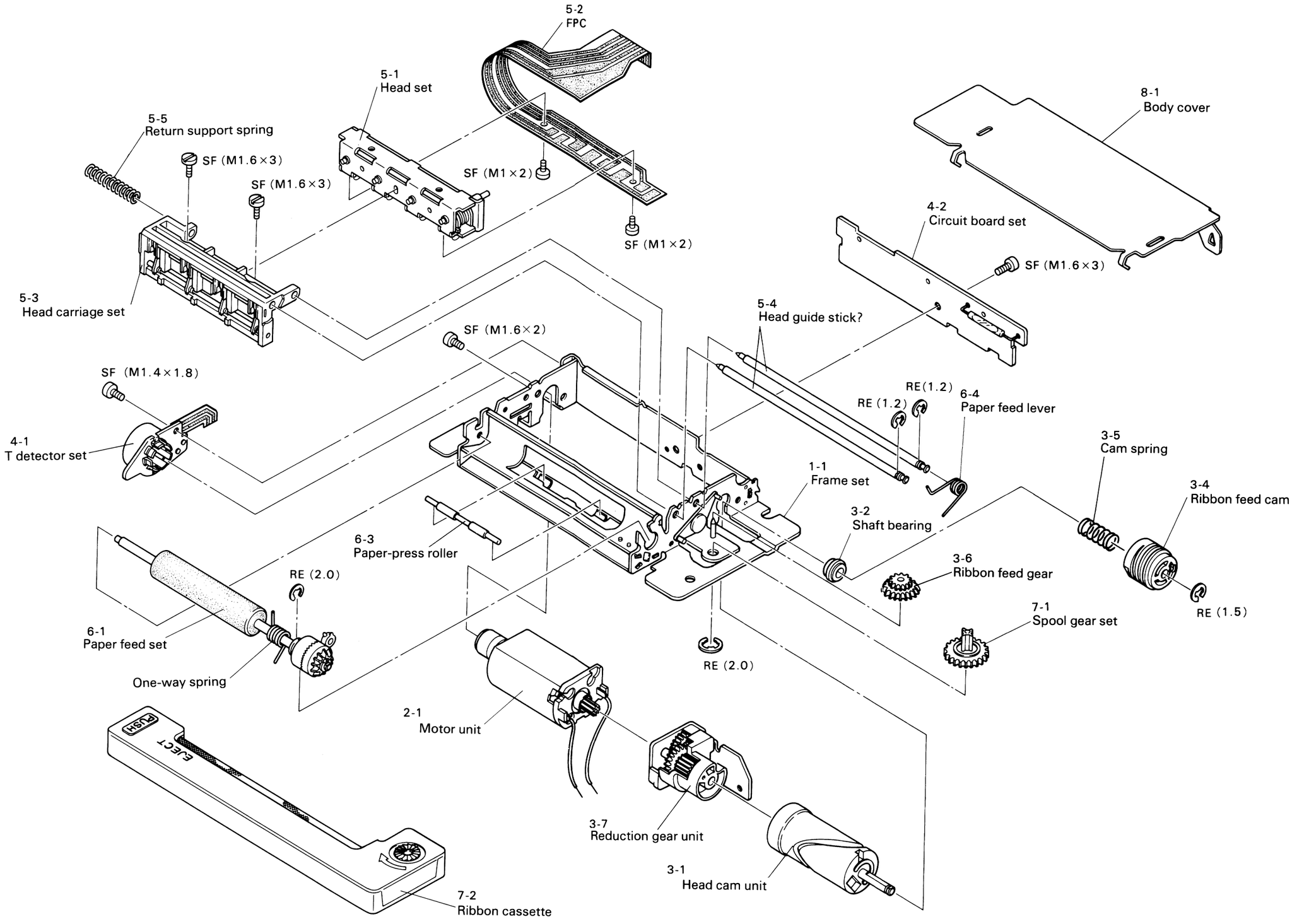
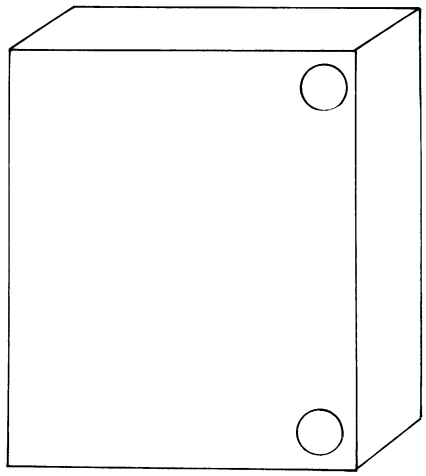


Fig. 5-38 Model-160 Exploded View

5.4 Disassembly and Reassembly of Options

5.4.1. ROM Cartridge

Disassembly Procedure	Disassembly Precautions
1. Remove the two screws on the back of the cartridge case.	

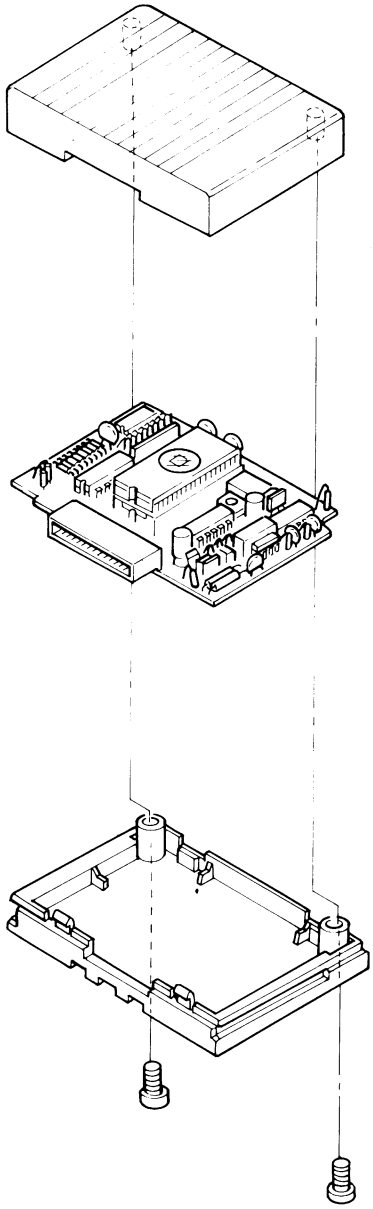


Fig. 5-39

5.4.2 Microcassette

5.4.2.1 Case Cover

Disassembly Procedure	Disassembly Precautions
1. Slowly peel the cover off from the cassette pocket. 2. Remove the two screws on the underside of the cartridge.	● Be careful not to bend the cassette pocket cover.

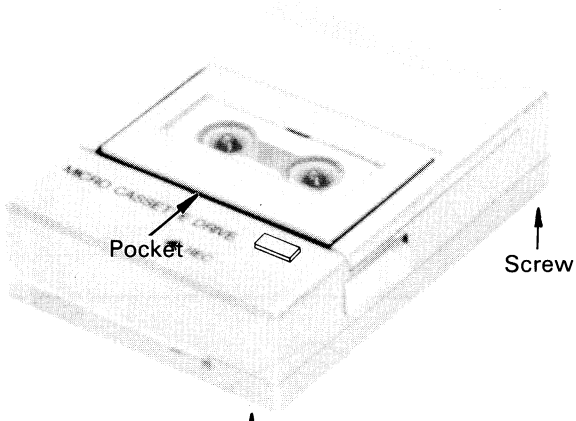
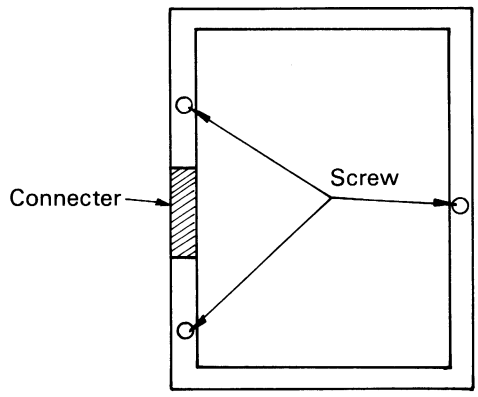


Fig. 5-40

3. Remove the cartridge lower case. 4. Remove the three screws that fasten the cassette mechanism. 5. With the cassette mechanism on the circuit board, slowly remove it from the upper case. * When separating the mechanism from the circuit board, remove all the wires that are connected to the circuit board and all the mounting screws.	



Be careful not to hitch the cassette pocket cover.

Fig. 5-41

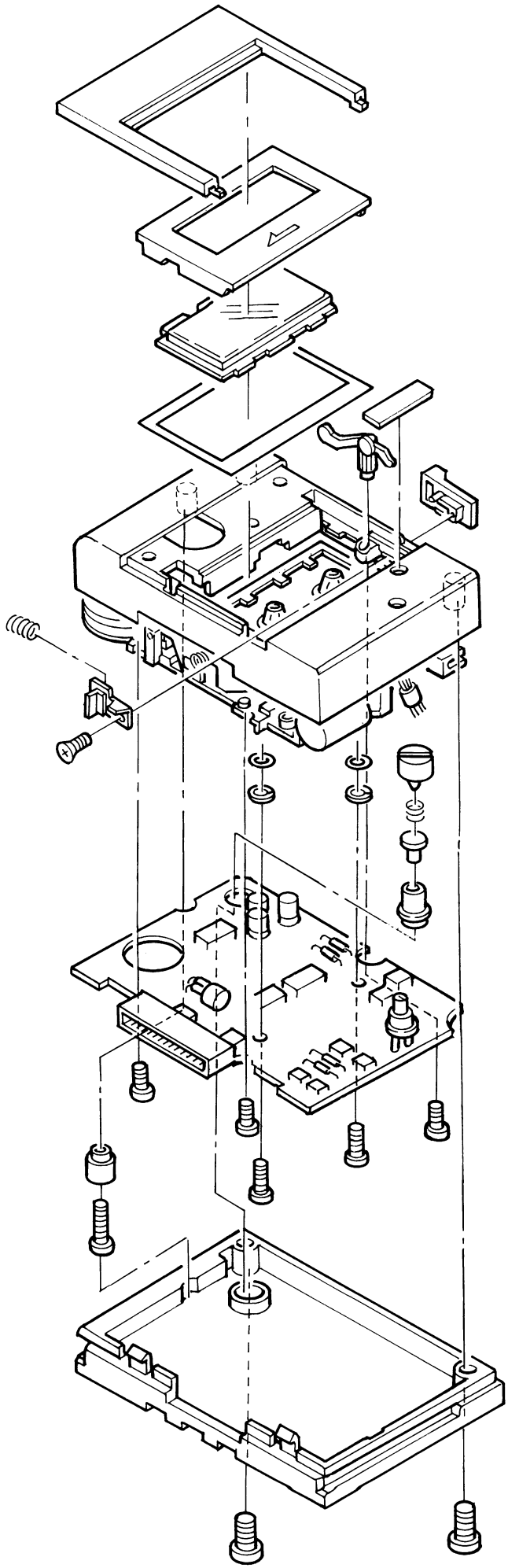


Fig. 5-42

5.4.2.2 Microcassette Mechanism

1 Microcassette Assy

1-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Place the microcassette mechanism backside up. 2. Remove the FG yoke assembly (tachogenerator). PUTS1.6 × 4SN × 2 FG support × M 3. Remove the clinched cassette support plate. PUTS1.6 × 3.5SN ×2 4. Remove the motor belt.	

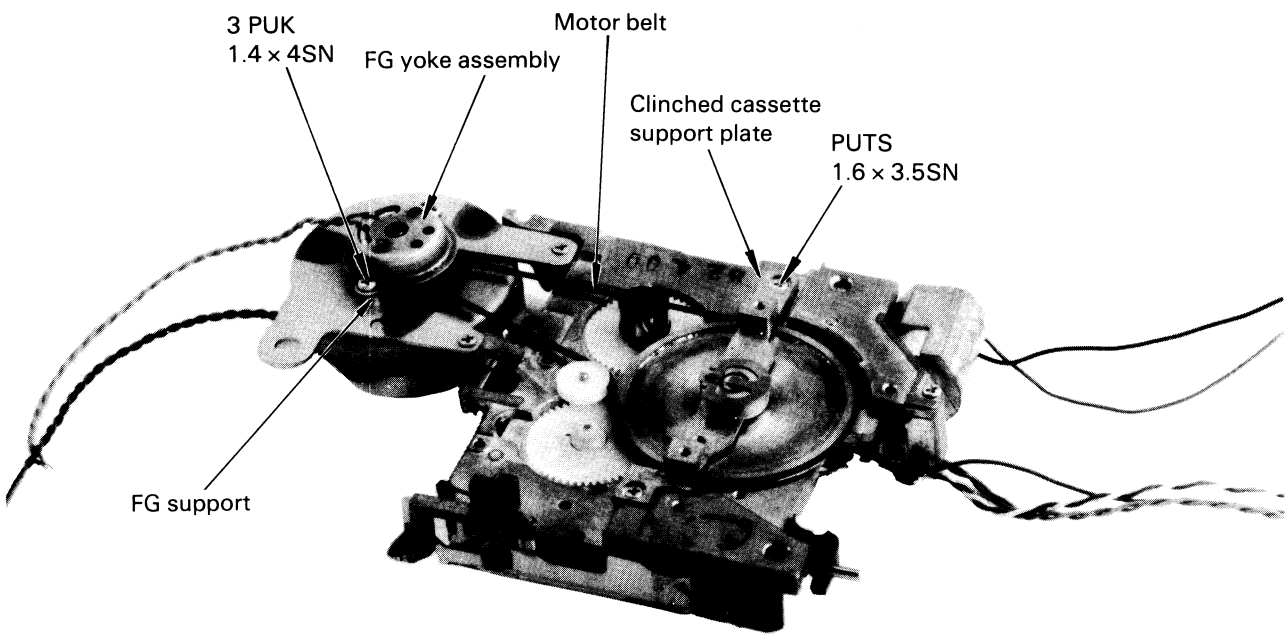


Fig. 5-43

1-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Check if the cassette shaft, idler, and motor are installed. If not, install them. 2. Place the motor belt around the motor shaft, pulley, and the V-groove of the cassette wheel. 3. Correct the belt if twisted, and check if the belt turns smoothly. 4. Clinch the cassette support plate in place. PUTS 1.6 × 3.5 SN × 2 5. Install the FG yoke assembly. 3 PUTS 1.4 × 4 SN × 2 FG support × 2 6. Apply a screw lock to the mounting screws for the FG yoke assembly.	● Be careful not to stain the belt with adhesive, oil, or grease.

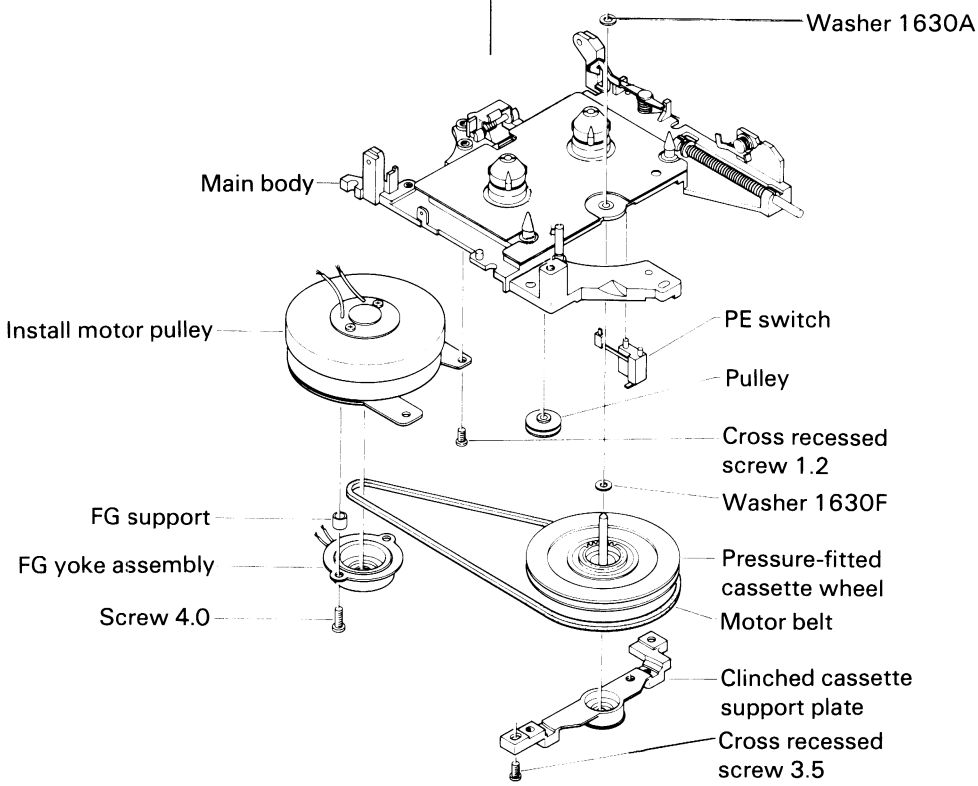


Fig. 5-44

2. Motor

2-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Remove the FG yoke assembly. 3 PUK 1.4 x 4 SN x 2 FG support x 2 2. Remove the motor belt from the motor pulley on the motor. 3. Remove the motor pulley. PUTS 1.6 x 2.2 SN x 2	

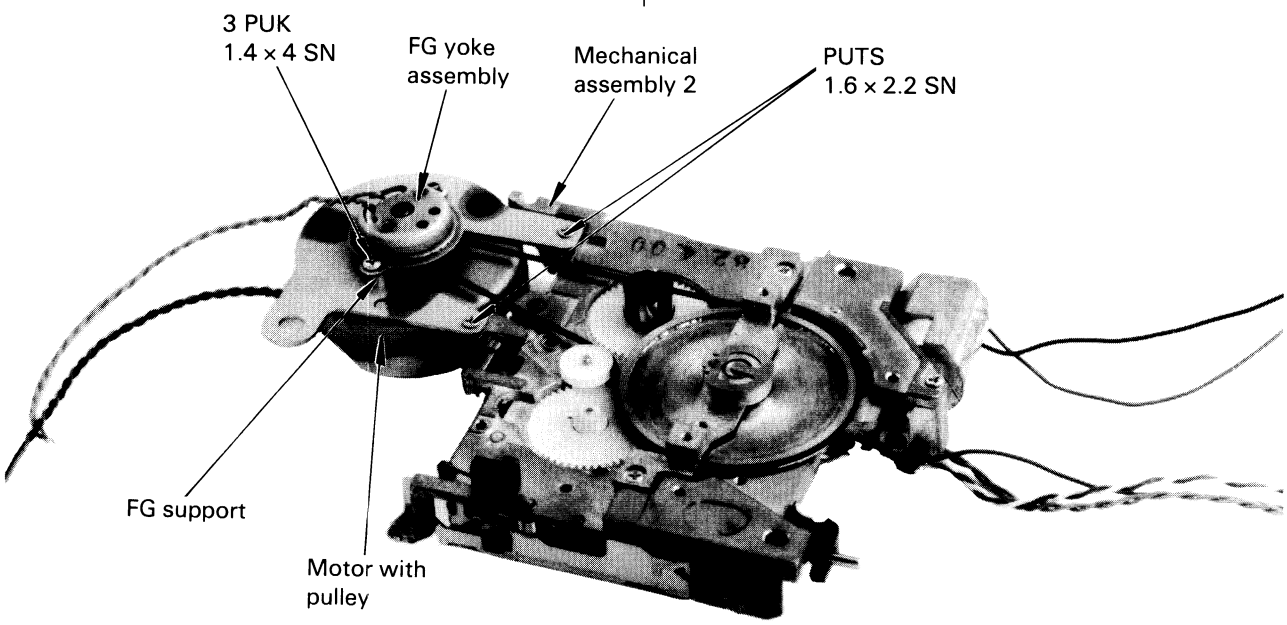
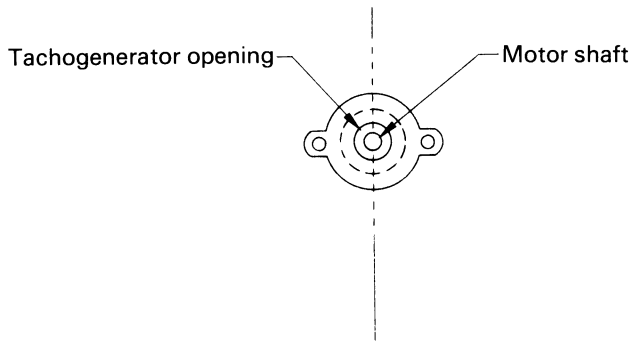


Fig. 5-45

2-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Install the motor. PUTS 1.6 × 2.2 SN × 2 Apply a screw lock to the tips of the screws before tightening them. 2. Place the motor belt in the V-groove around the motor pulley. Straighten the motor belt if twisted. 3. Install the FG yoke assembly. 3 PUK1.4 × 4 SN × 2 FG support × 2 4. Apply screw lock K-SM to the two screws that fasten the FG yoke assembly. PUTS 1.6 × 3.5 SN × 2	● Make sure that the FG yoke assembly is concentric with the motor shaft. (Check that the clearance between the motor shaft and tachogenerator opening is uniform.)  **Fig. 5-46**

3. Cassette Wheel, Idler

3-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Remove the cassette support plate. PUTS 1.6 × 3.5 SN × 2 2. Remove the motor belt. 3. Remove the pressure-fitted cassette wheel.	● Be careful not to bend the cassette wheel shaft.

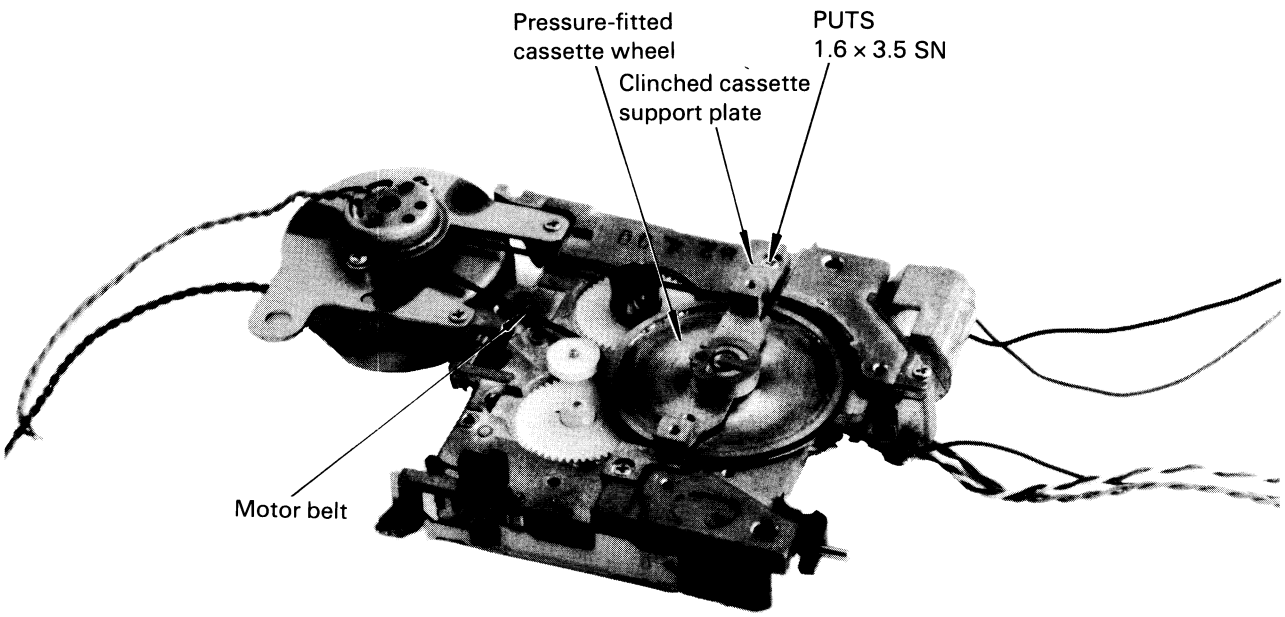


Fig. 5-47

3-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Pressure-fit the cassette wheel in place. 2. Place the motor belt around the cassette wheel. 3. Clinch the cassette support plate in place. PUTS 1.6 x 3.5SN x 2 4. Wipe the cassette wheel shaft to remove oil.	● The gear in the mechanical assembly is thin and not so rigid, and must be carefully turned into mesh. ● Make sure that the gear is in mesh. Turn it clockwise and counterclockwise 2 or 3 times, and see if the gear (reel) turns one way only. ● Carefully handle the shaft because it can easily bend. (Neither drop nor strain the shaft.) ● Check that the front washer hasn't come up. (The washer is transparent, and is not easy to see.)

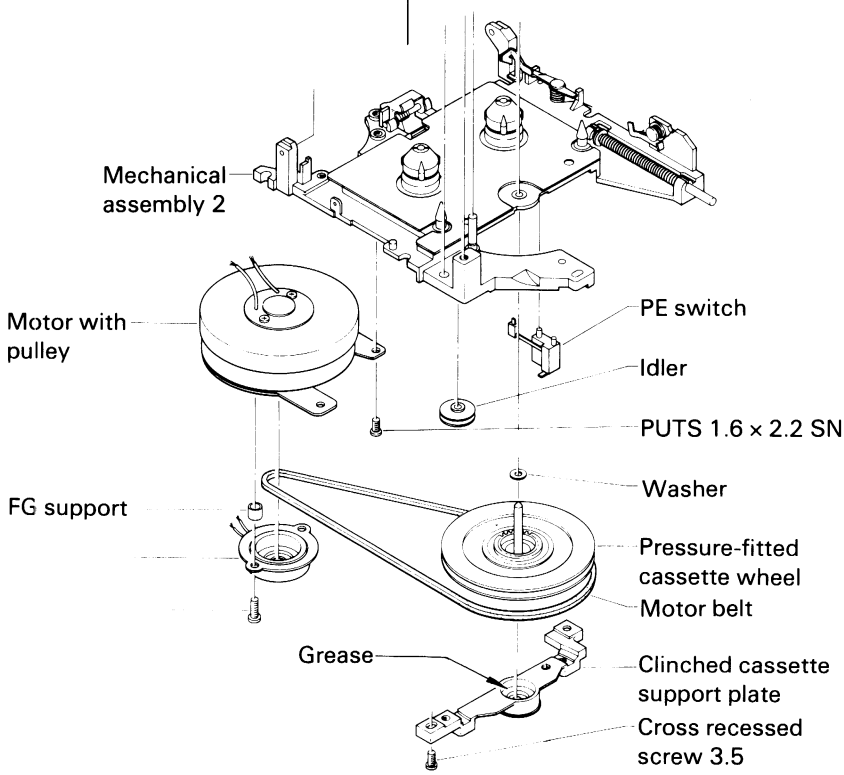


Fig. 5-48

4. PE Switch

4-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Open the cassette pocket. 2. Remove the pocket lever and spring. ER 0.8 UO × 1 3. Remove the PE switch. Cut off the pressure-fitted part on the top with nippers, and pull downward.	

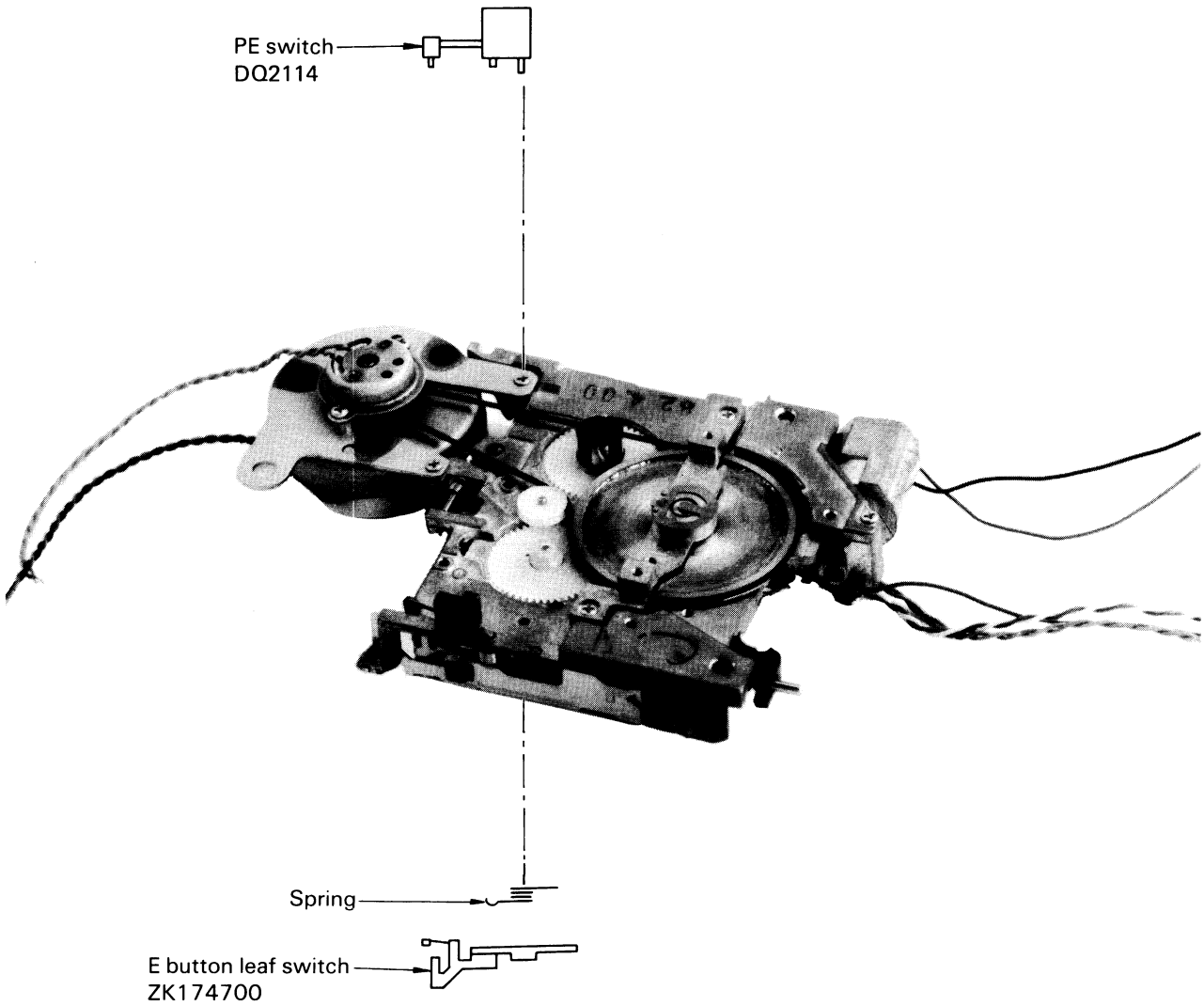


Fig. 5-49

4-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Install the PE switch. Bond the pressure-fitted part with an instant adhesive. 2. Install the pocket lever. ERO 0.8 UO × 1 Hook the spring. 3. Adjust the installed position.	

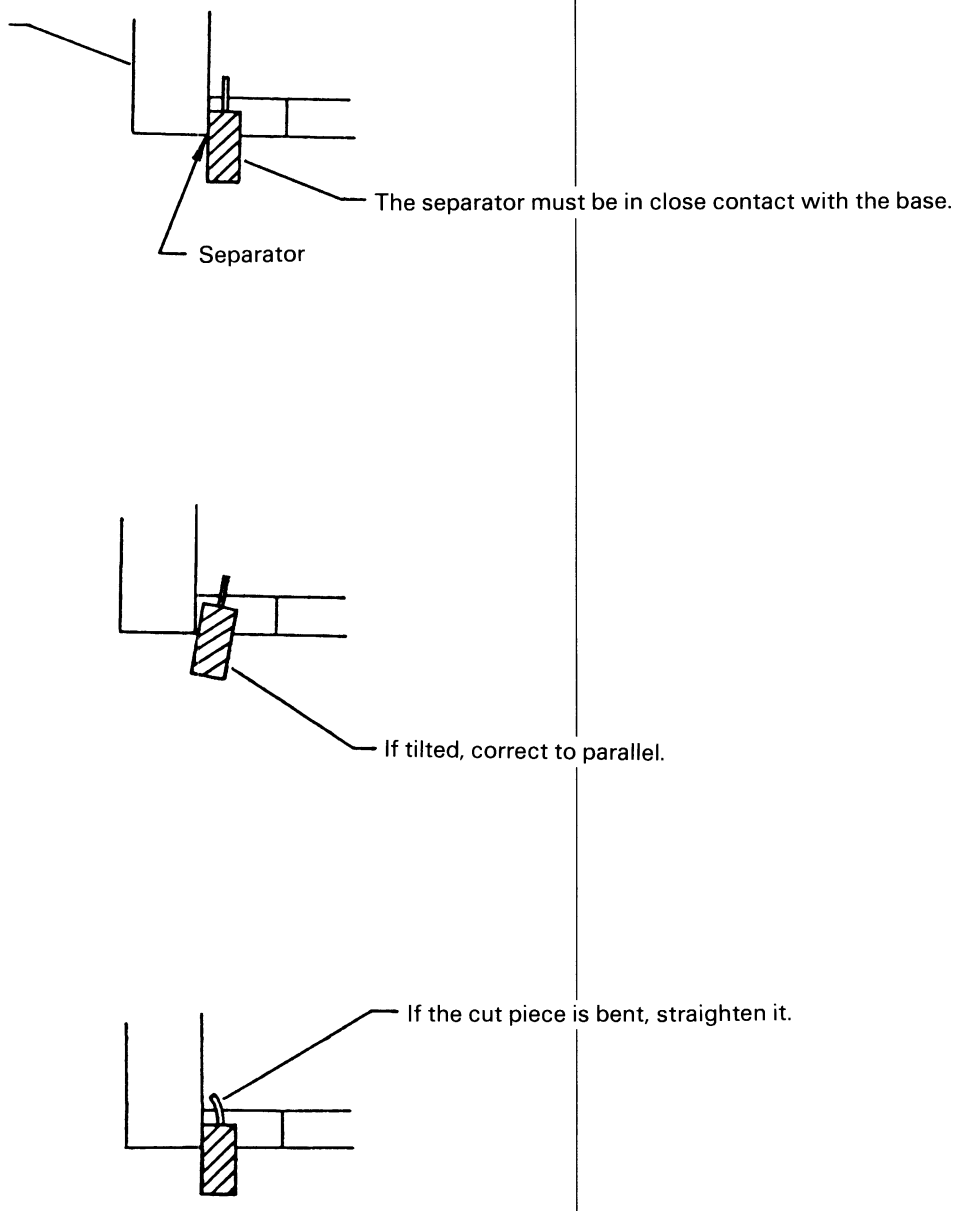


Fig. 5-50

Disassembly Procedure	Disassembly Precautions
4. Checking method. a) When a MIN cassette is inserted into place.	

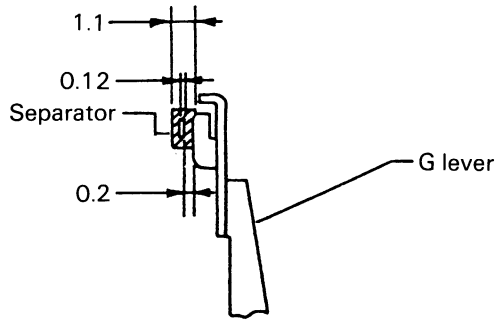


Fig. 5-51

The separator must be in contact with the base, and there must be a clearance of more than 0.2 mm between the G lever and cut piece. (About 2 cut pieces, each 0.12 mm thick)

b) When a cassette with a folded lug is inserted into place.

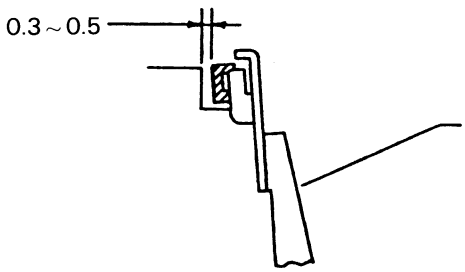


Fig. 5-52

There must be a clearance of 0.3 to 0.5 mm between the separator and base (about one half to one third of the separator thickness).

5. HP Switch

5-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Remove the HP switch. PUK 1.6 x 2.5 SN x 1 Disconnect the brown leads.	

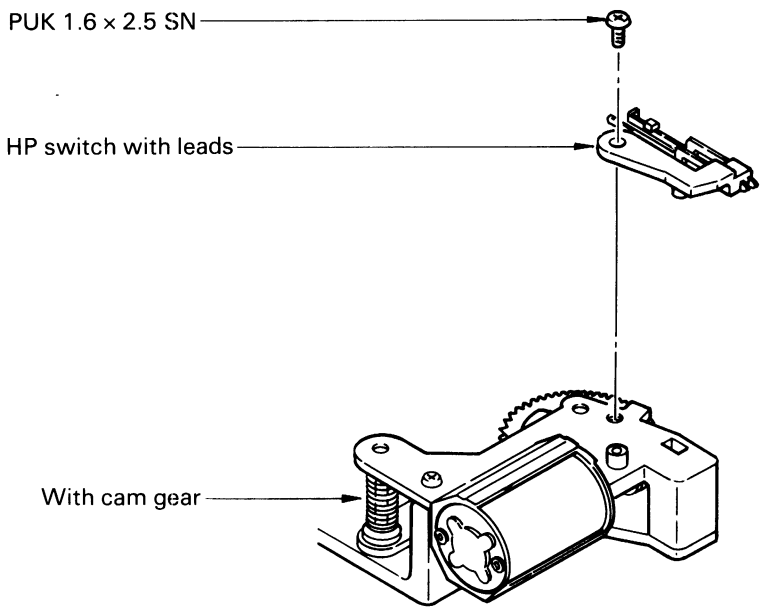


Fig. 5-53

5-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Install the HP switch. Connect the 2 brown leads to the HP motor. Pass them through transparent clamp tube. PUK 1.6 x 2.5 SN x 1 2. Adjust the HP switch.	

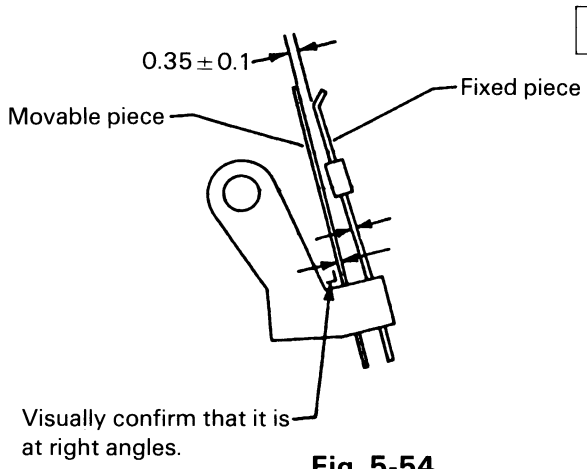


Fig. 5-54

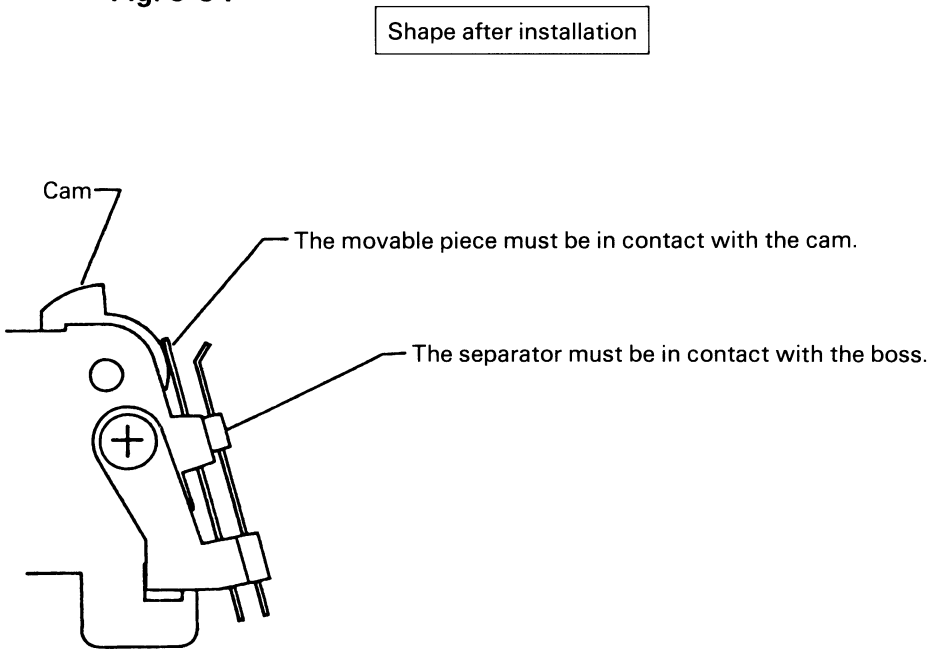


Fig. 5-55

6. HP Motor (with Cam Gear)

6-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Disconnect the cable from the cam gear. Remove the transparent tube. 2. Remove the HP switch. PUK 1.6 x 2.5 SN x 1 3. Remove the cam gear. PUTS 1.6 x 3.5 SN x 2 (One on the front, the other on the back)	● Wipe off oil from the top surface of the cam gear. Keep it clean.

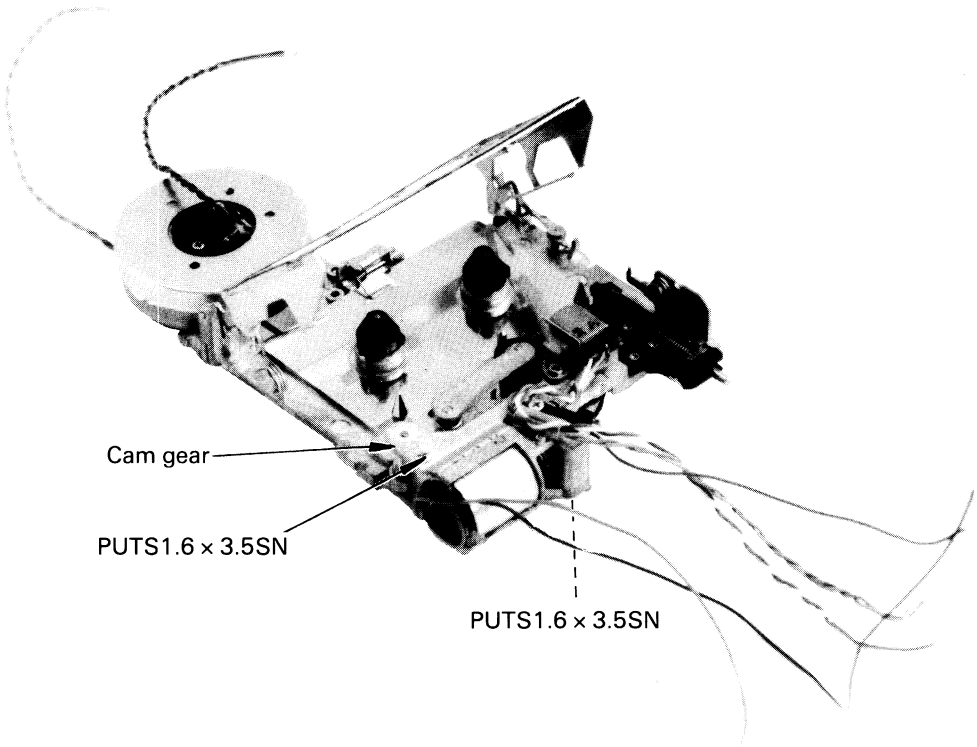


Fig. 5-56

6-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Adjust the cam position. 2. Install the cam gear. PUTS 1.6 × 3.5 SN × 1	● To adjust the cam position, turn the worm gear clockwise with tweezers or the like. ● Make sure that when the cam gear is installed, the cam will not ride on the die pin. ● Be careful not to pull the P lever assembly to the front because if you do so the P lever holder disengages from the bearing.

7. Pinch Roller (PR Lever Assembly)

7-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. If the HP motor and HP switch have been installed, remove them. 2. Remove the pinch roller. ER 1.2 UO x 1 PR spring x 1	● Be careful not to stain the pinch roller rubber with adhesive, oil, or grease.

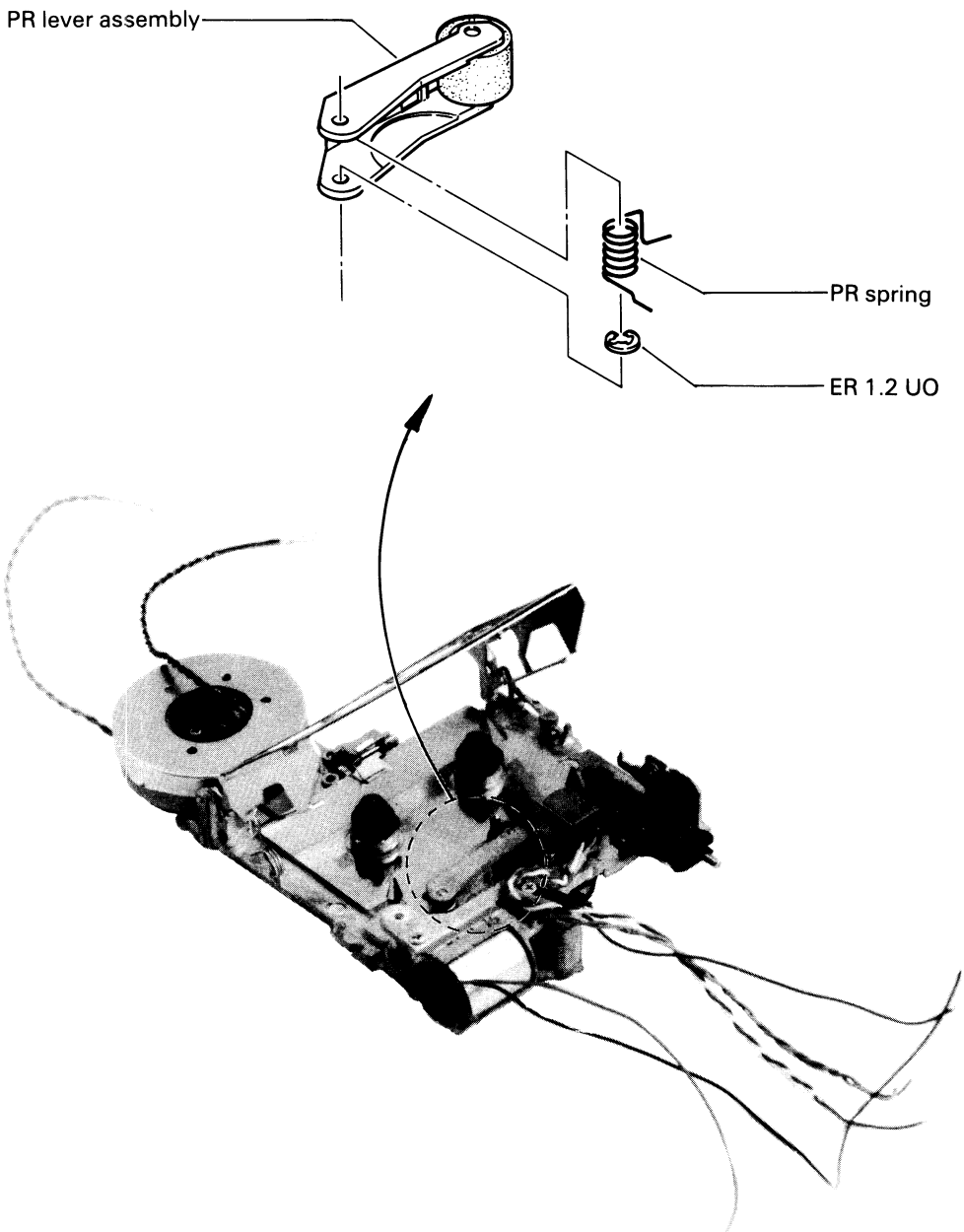


Fig. 5-57

7-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Install the pinch roller. PR spring × 1 ER 1.2 UO × 1 Apply grease to the PR spring.	

8. Head (P Lever Assembly 2)

8-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Remove the P lever assembly 2.	● Remove the HP motor, HP switch and pinch roller beforehand.

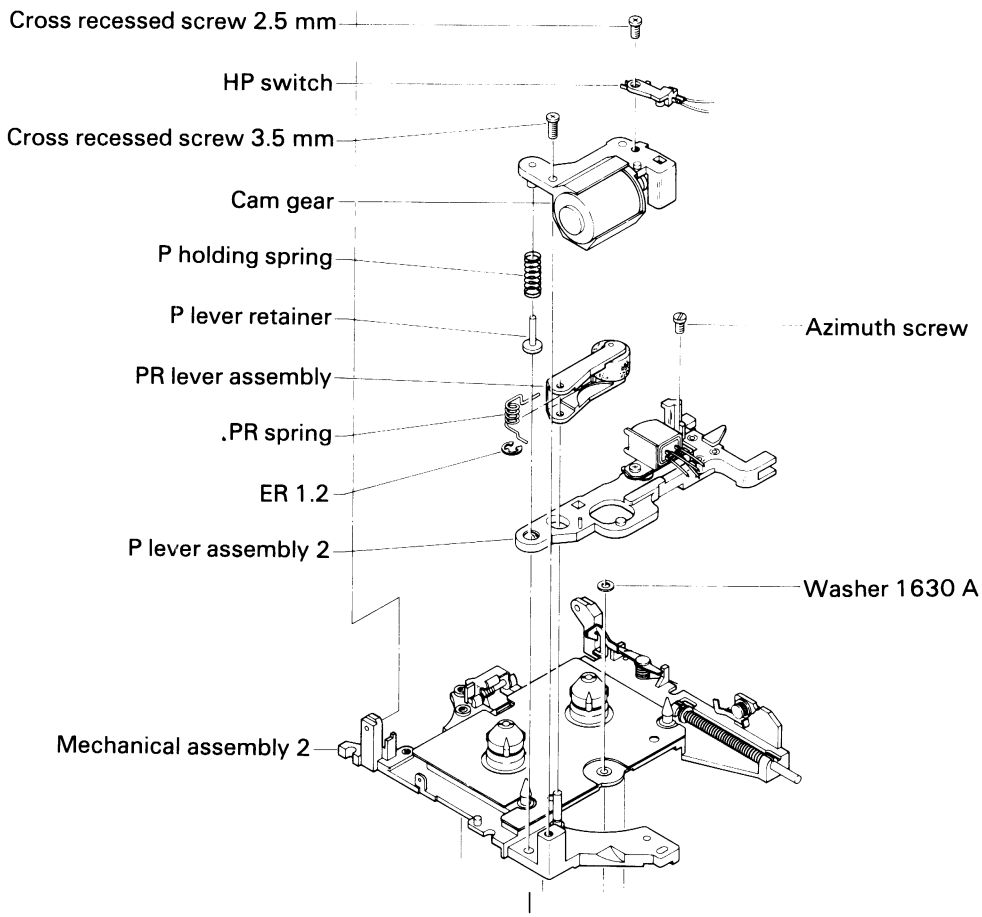
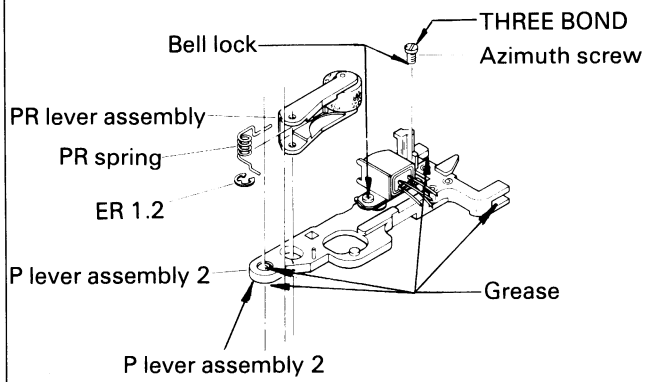


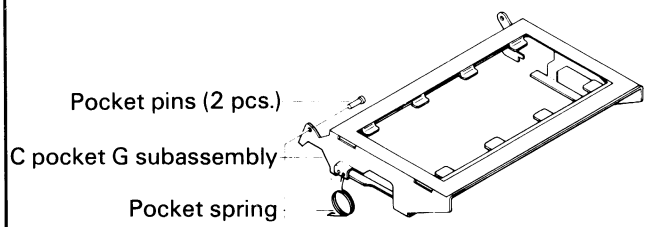
Fig. 5-58

8-2 Reassembly and Adjustment Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Compress the E button spring with tweezers, fit the black plastic on the right to the E button spring shaft, and fit it onto the pinch roller shaft. 2. Longitudinal head position adjustment. ● Connect a wow meter, valve voltmeter, and oscilloscope to the head leads (red, white). ● Remove the cross recessed screw on the left of the head, attach the bell lock to the bottom of the screw, and tighten the screw loosely. ● Load an uneven rotation test tape into place, and play it. ● Move the left of the head forward and back with tweezers, and tighten the cross recessed screw at a point where the valve voltmeter reads about 5 mV. 3. Azimuth adjustment ● Connect a wow meter, valve voltmeter, and oscilloscope to the head leads (red, white). ● Remove the single-slotted screw on the right, attach the bell lock to the bottom of the screw, and tighten it loosely. ● Load an azimuth test tape, and play it. ● Turn the screw until the output rises to the maximum (about 5 mV), and tighten the screw securely.	● Apply grease and adhesive to the points shown below. ● Apply grease to the E button spring.  **Fig. 5-59**

9. Pocket

9-1 Disassembly Procedure

Disassembly Procedure	Disassembly Precautions
1. Remove the pocket (C pocket G subassembly). Pocket pin × 2 Pocket spring × 1 ● Push the pins inward with pliers, and pull them out. ● Remove the spring.  **Fig. 5-60**	

9-2 Reassembly Procedure

Reassembly and Adjustment Procedure	Precautions for Reassembly and Adjustment
1. Install the C pocket G subassembly. ● Install the spring. Pocket spring × 1 ● Install the pins. Pocket pin × 2	● Fasten the pins with an instant adhesive.

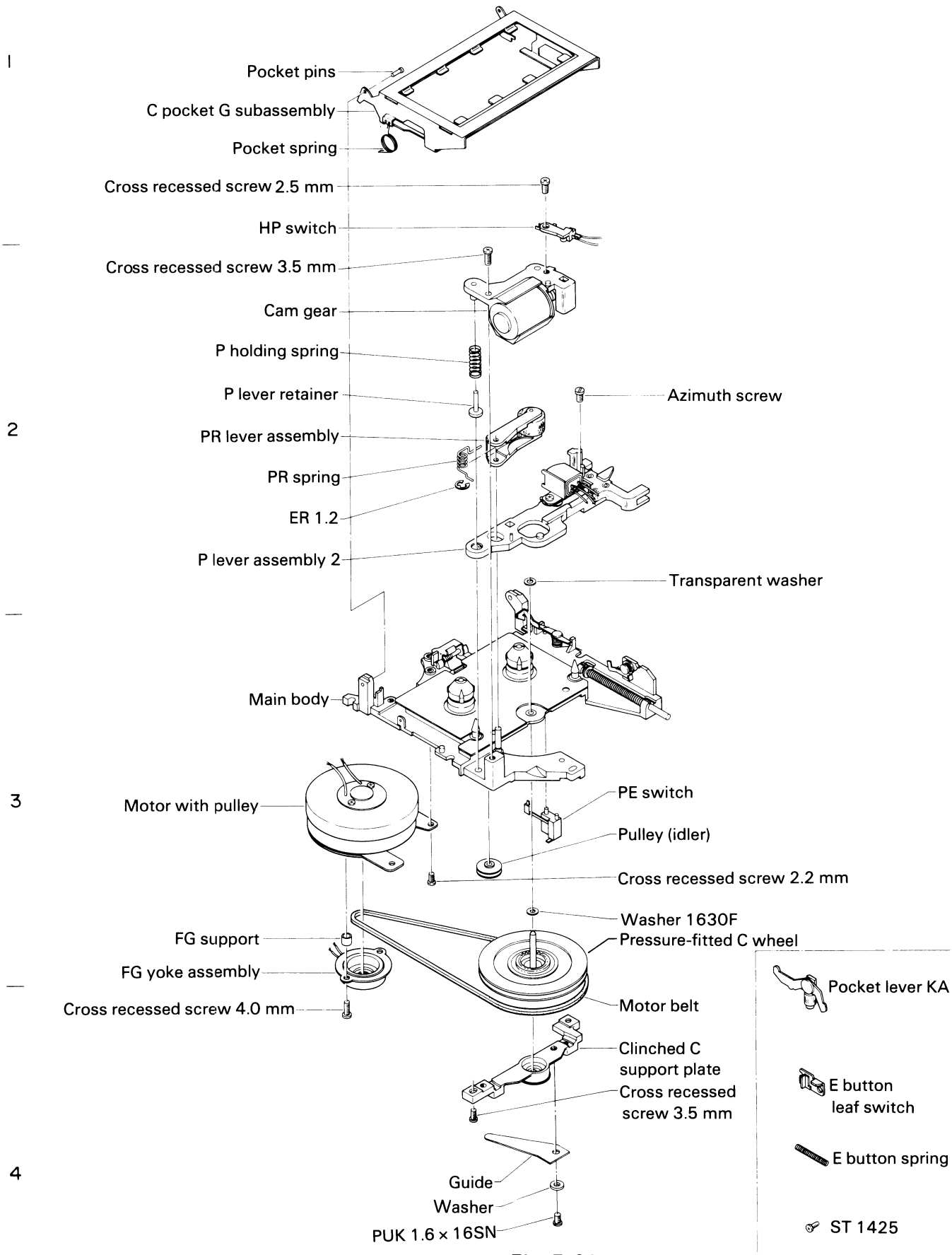

Pocket pins
C pocket G subassembly
Pocket spring
Cross recessed screw 2.5 mm
HP switch
Cross recessed screw 3.5 mm
Cam gear
P holding spring
P lever retainer
Azimuth screw
PR lever assembly
PR spring
ER 1.2
P lever assembly 2
Transparent washer
Main body
Motor with pulley
PE switch
Pulley (idler)
Cross recessed screw 2.2 mm
Washer 1630F
Pressure-fitted C wheel
FG support
FG yoke assembly
Cross recessed screw 4.0 mm
Motor belt
Clinched C support plate
Cross recessed screw 3.5 mm
Guide
Washer
PUK 1.6 x 16SN
Pocket lever KA
E button leaf switch
E button spring
ST 1425

Fig. 5-61