

technical manual

impact dot matrix printer

Model M190G

PREFACE

This Technical Manual provides a description for the mechanisms, maintenance and repair procedures, and other technical aspects of the Model M190G printer.

Major technical modifications or improvement of Model M190G, if made in the future, will be published, which can be used in conjunction with this Manual. The details in the contents of this Manual are subject to change without prior notice.

We shall not be responsible for any troubles that might occur from the application of this Manual by customer either to a machine other than this printer, or to a drive circuit or other device that is the industrial property of a third party.

Points That Must Be Observed In Order To Assure Product Safety

In order to assure the safe operation of this product, carefully observe the specifications as well as the notes provided below.

Maxim Peripherals Pvt. Ltd. will not bear any responsibility for any damage or injuries arising from use of this product that is not in accordance with the specifications and the notes provided below.

Notes on Printer Control

1. Absolute maximum voltage
 - 1) Printer voltage: 5.8 VDC or less
(Apply to the print solenoid, motor, trigger solenoid for fast paper feeding, and detectors.)
2. The conditions setting forth the maximum time power can be applied (and the maximum voltage that can be applied) to electronic components such as the motor and magnets must be observed. If the maximum time power can be applied (or the maximum voltage that can be applied) is exceeded, the components mentioned above could overheat and start a fire or begin to smoke.
 - 1) Motor
The motor is DC brush motors which can be short-circuited and must therefore be protected using a fuse that is properly matched to the power supply.
 - 2) Print Solenoid
Under any condition (including software runaway), the maximum power-on time may not exceed 1 second.
 - 3) Fast Trigger Solenoid
Under any condition (including software runaway), the maximum power-on time may not exceed 5 seconds.
 - 4) All Detectors (Sensors and Switches)
All detectors must protect the circuitry so that current never exceeds the maximum standard.

Notes on Handling

The case must be designed so that movable parts such as gears, etc., are not exposed. Touching moving parts could cause a laceration or other injury.

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Chapter 1

Overview and Operating Principle

1.1 Overview

1.1.1 Characteristics

Micro Dot Printer Model M190G were designed and developed as general-use printers for a widerange of applications, including use with data collectors, hand-held type personalcomputersand calculators. They have the following characteristics.

- ❑ A simple and highly reliable print mechanism design.
- ❑ A thin, compact and light-weight design.
- ❑ Use of a compact, light-weight and highly reliable dot head which produces clear printing, even for graphics.
- ❑ Pressure-sensitive copying capability [one sheet original + one copy].
- ❑ One-touch detachable ribbon cassette inking system.
- ❑ Power saving design. Can be powered by Ni-Cd battery.
- ❑ Use ordinary plain paper for printing.
- ❑ Fast paper feed capability.
- ❑ Operation loss on paper loading has been reduced by setting the "paper free" function and manual knob.

1.1.2 General Specifications

The general specifications for Model M190G are given below. (Refer to the optional specification sheets for detailed specifications on Model M190G)

Table 1.1 General Specifications

No.	Item	Model M190G
1	Print Method	· Impact dot matrix printer (8 print solenoids)
2	Printing speed	· 1 line printing: 2.7 lines/sec±20% (typical) (5 × 7 font + 3-dot line spacing) (Motor terminal voltage at 4.8 VDC constant, 25×C(77×F), continuous printing) · 1 dot line: 21.6 dot lines/sec ± 20% (typical) (Motor terminal voltage at 4.8 VDC constant, 25×C(77×F), continuous printing)
3	Inking	· Ribbon cassette (ERC-22 or ERC-09)
4	Total number of dots	· Maximum 144 dots/dot line

Table 1.1 General Specifications

No.	Item	Model M190G
5	Number of columns	· Maximum 24 (5 × 7 font and 1 dot column space)
6	Character size	· Dot pitch: Horizontal: 0.33 mm; Vertical: 0.37 mm (0.013"; 0.015") · 5 × 7 font: 1.7 mm (W) × 2.6 mm (H) (0.067"×0.102")
7	Coping capability	· 1 original + 1 copy
8	Paper feeding pitch	· When feeding automatically: 1-dot line pitch (0.37 mm (0.015")) · During fast feeding: 3-dot line pitch (1.11 mm (0.044"))
9	Fast paper feeding speed	· 6.5 lines/sec (Motor terminal voltage at 4.8 VDC constant, 25×C(77×F), continuous printing)
10	Paper	· <1-ply paper roll> · Type: Normal paper · Size: 57.5 ± 0.5 mm (paper width) × 83 mm or less (outside diameter) × 10 mm or more (inside diameter) · Thickness: 0.06 to 0.085 mm · Weight: 52.3 to 64 g/m ² (13.9 to 17.0 lbs) (45 to 55 Kg (20.41 to 24.94 lbs) / 1000 sheets / 1091×788mm (42.95"×31.02"))
		· <2-ply pressure - sensitive paper> · Type: No-carbon paper (Mitsubishi Seishi) N40: Upper sheet(Hi) + Lower sheet (Blue color printing) · Size: · 1) Form for cut sheet type 57.5 ± 0.5 mm (paper width) × 300 mm or less (paper length) · 2) Form for paper roll type 57.5 ± 0.5 mm (paper width) × 83 mm or less (outside diameter) 10 mm or more (inside diameter) · Thickness: Upper sheet:0.066 mm Lower sheet:0.058 mm · Weight: Upper sheet:47.0 g/m ² Lower sheet:47.0 g/m ²

Table 1.1 General Specifications

No.	Item	Model M190G
11	Power supply voltage	<ul style="list-style-type: none"> · Printer Driving Voltage 5.0 +0.8/-0.5 VDC (Ni-Cd battery, nominal voltage 4.8V) · 5.0 ±0.5 VDC (when stabilized power supply is used) · NOTES: · Can be applied to motor, print solenoid, and fast paper feed trigger solenoid · Use the same power supply. · In all printing pattern used, even during sending of current to print solenoids, the voltage drop by the power supply volt- age and from wiring resistance must be 0.8 V or less. Also, voltage loss in the driver circuitry (driver saturation volt- age) must be 0.4 V or less. · Detector Input Voltage 5.0 +0.8/-1.7 VDC · NOTES: · Can be applied to reset detector, timing detector. · Can be used with the same printer driver power supply.
12	Reliability	<ul style="list-style-type: none"> · MCBF:1,500,000 lines · Printer life:2,250,000 lines
13	Environmental conditions for operating	<ul style="list-style-type: none"> · Operating ambient temperature: · a) When using the ERC-22 -10× to 50× (14× to 122×F) (The assured temperature for printing is 0× to 50×C (32× to 122×F)) · b) When using the ERC-09 0× to 50×C (32× to 122×F) · Operating ambient humidity: 10 to 90%RH (non-condensing)
14	Connection	<ul style="list-style-type: none"> · Printer side: PCB fixed to the frame (with 2.5 mm (0.098") pitch copper pattern) · Circuit side: Flat cables or lead wires
15	Overall dimensions	<ul style="list-style-type: none"> · 91mm(W) × 46.9mm(D) × 15.8mm(H) (3.58"(W) × 1.85"(D) × 0.62"(H))
16	Weight	<ul style="list-style-type: none"> · Approximately 100 g (approximately 0.23 lb) except ribbon cassette
17	Factory options	<ul style="list-style-type: none"> · Manual feed knob Horizontal type Outside diameter: 20 mm (0.79")

Table 1.1 General Specifications

No.	Item	Model M190G
18	Ribbon cassette	<ul style="list-style-type: none"> · <ERC-22> · Size: 90.9mm(W) × 24.9mm(D) × 6.3mm(H) (3.58" × 0.98" × 0.25") · Color: Purple or Black · Life: Purple: Approx. 1 million characters Black: Approx. 600,000 characters · <ERC-09> · Size: 90.9mm(W) × 26.4mm(D) × 7.0mm(H) (3.58" × 1.04" × 0.28") · Color: Purple or Black · Life: Purple: Approx. 250,000 characters Black: Approx. 200,000 characters · NOTE: Power supply voltage: 5.0 VDC, 25×C (77×F), continuous printing

1.1.3 Overview of the Mechanism Section

Model M190G is configured of the block mechanisms:

(1) the transmission mechanism, (2) detector mechanism, (3) print mechanism, (4) paper feed mechanism and (5) ribbon feed mechanism. Fig. 1.1 illustrates the appearance of the Micro Dot Printer Model M190G (The manual knob is equipped and the cover is removed). Refer to Section 1.2 "Operation principle" and Chapter 2 for the operation principle and handling of each mechanism.

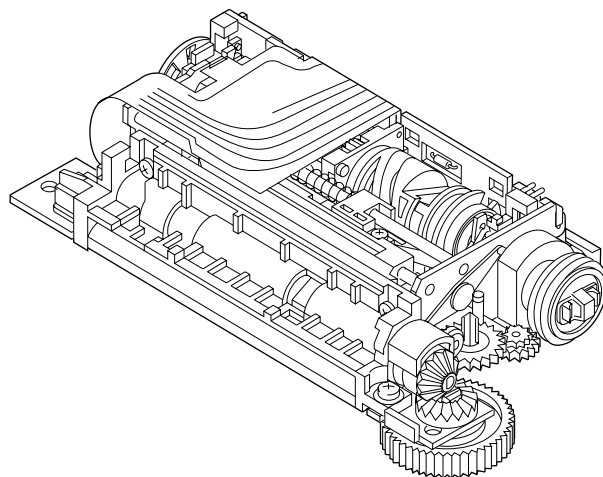


Figure 1-1 Appearance of Model M190G

1.2 OPERATION PRINCIPLE

1.2.1 Transmission Mechanism

The transmission mechanism is structured of the reduction gear assembly, paper feeding gear assembly and the ribbon feeding reduction gear assembly. The individual gear assemblies are shown in Figs. 1.2 to 1.4.

Reduction gear assembly

The reduction gear assembly consists of the Gear, motor in the motor shaft, large and small Gears, intermediate and Gears, reduction, and the internal gear built into the cam subunit. The large intermediate gear engages with the motor gear, the small intermediate gear with the large reduction gear and the small reduction gear with the Cam, oscillate's internal gear. The speed is reduced at each gear sequentially and transmitted to the Cam, oscillate.

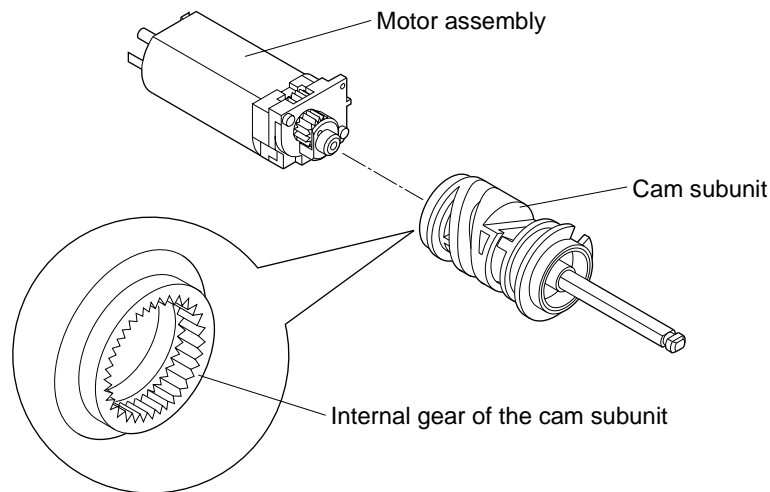


Figure 1-2 Reduction Gear Assembly

Paper feeding gear assembly

The paper feeding gear assembly consists of the Gear, paper feeding fixed to the Roller, paper feeding and the Gear, paper feeding drive which is mounted on the same shaft. The Gear, paper feeding engages with the paper feeding lever, while the paper feeding lever moves up and down (in the direction of arrows (a) to (b) causing the Gear, paper feeding to rotate repeatedly (in the direction of arrows (c) to (d)). The Gear, paper feeding which engages with the Gear, paper

feeding drive meshes with the Gear, paper feeding drive only when the Gear, paper feeding drive rotates in the direction of arrow (c). It rotates intermittently 1 or 2 teeth in the direction of arrow (e) depending on the amount of the stroke of the paper feeding lever.

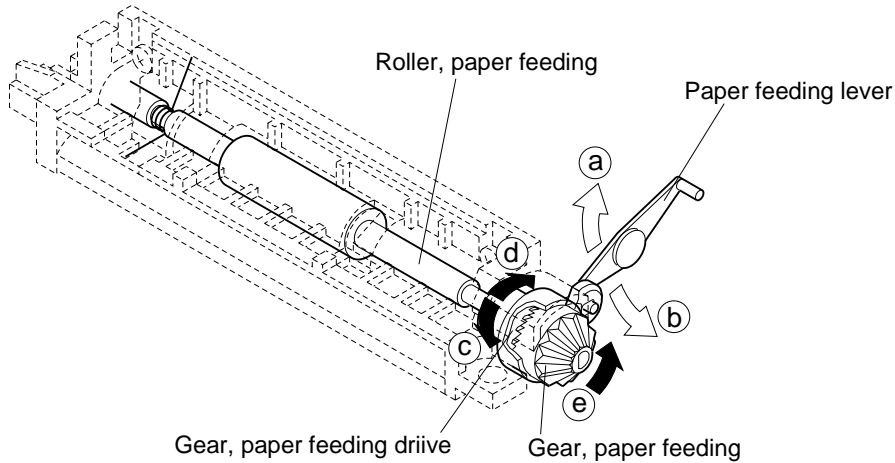


Figure 1-3 Paper Feeding Gear Assembly

Ribbon feeding gear assembly

The ribbon feeding gear assembly consists of the Ribbon drive gear, the Ribbon feeding gear which combines a bevel gear and a smaller gear, and the spool gear assembly. When the Ribbon driving gear rotates in the direction of arrow (a), the bevel gear of the Ribbon feeding gear which engages with the ribbon driving gear rotates in the direction of arrow (b). As the small gear mounted on the Ribbon feeding gear engages with the spool gear assembly, the ribbon feeding gear rotates, causing the spool gear assembly to rotate in the direction of arrow (c).

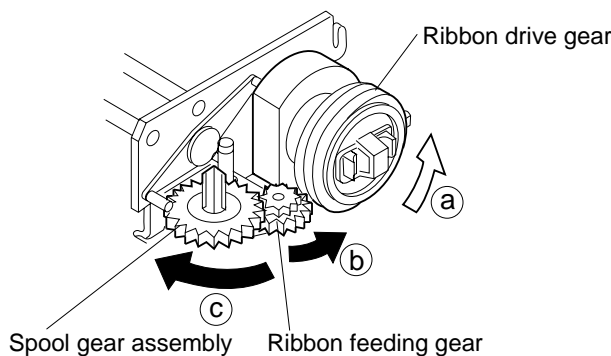


Figure 1-4 Ribbon Feeding Reduction Gear Assembly

1.2.2 Detector Mechanism

The detector mechanism consists of a T-detector mechanism and R detector mechanism and these play an important role in the operation of each section of the printer mechanism. The respective detector mechanisms are shown in Figs. 1.5 and 1.6.

T-detector mechanism

The T-detector mechanism is structured of a Detector plate which is fixed to the motor shaft of the motor assembly and a photo micro sensor which is mounted on the Circuit board. This generates Timing signal T of the frequency in proportion to the r.p.m. of the motor. The output waveforms are to be wave-shaped through a waveform shaping circuit on the designer's side and constitute Timing signal T by recognizing the change in waveform level. Print timing and fast feed trigger electromagnet driving timing are decided by selecting this timing signal.

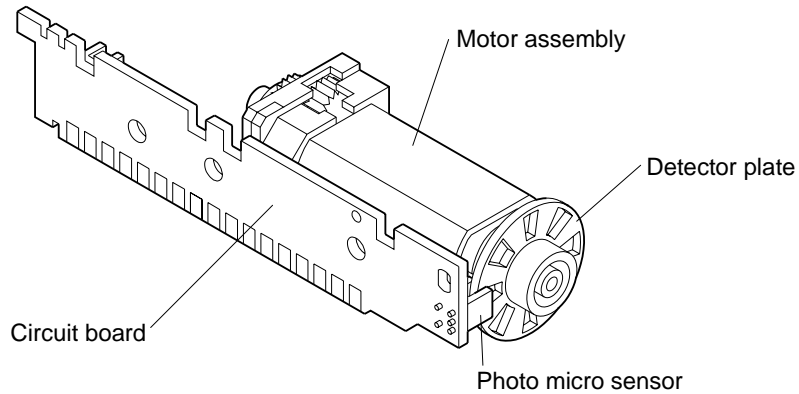


Figure 1-5 T-detector Mechanism

R detector mechanism

The R detector mechanism is structured of a shade plate of the Holder, trigger yoke of the cam trigger assembly and a photo interruptor on the Circuit board. When the Cam trigger set rotates once (1 dot line), the reset signal is generated once. The output waveforms are to be wave-shaped through a waveform shaping circuit on the designer's side and constitute Reset signal R by recognizing the change in waveform level. Reset signal R is used to reset the counting of Timing signal T for each character or graphics.

NOTE: For example, in printing a printing cycle of one character line (of 5 × 7 font) or a printing cycle of a bit image, Reset signal R is used only when the first Timing signal T in dot line 1 is confirmed. Resetting of the counting of Timing signal T is not performed until one character line or each printing cycle of a bit image is completed.

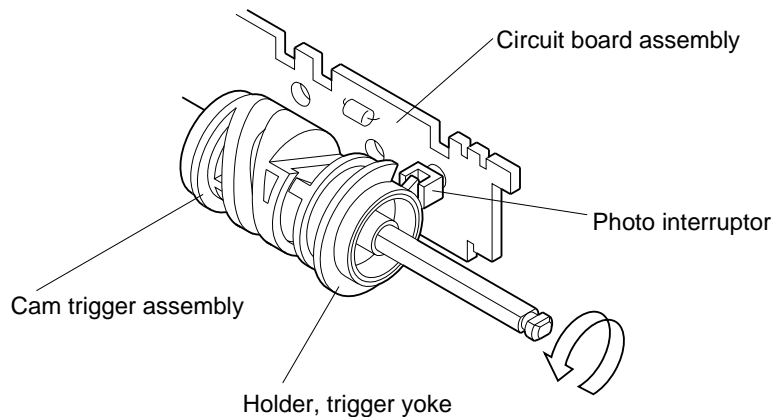


Figure 1-6 R detector Mechanism

1.2.3 Print Mechanism

The print mechanism consists of the print head unit which features 8 solenoids (Print solenoid A-H) arranged in parallel, Shaft, carriage, Shaft, carriage guide, Cam trigger assembly, Paper feeding platen unit.

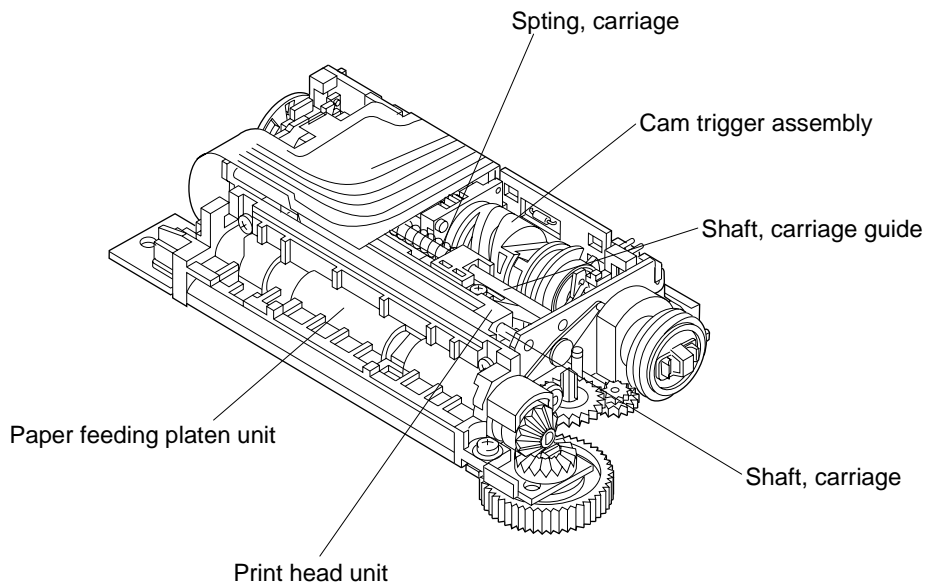


Figure 1-7 Print Mechanism

Movement of the print head unit

The print head unit is supported by Shaft, carriage guide and Shaft, carriage which are fixed in parallel alignment with the paper feeding platen unit. As shown in Fig. 1.7, the head oscillating pin which is caulked to the print head unit engages with the endless cam groove engraved on the outer circumference of the Cam trigger assembly. When the Cam trigger set rotates in the direction of the arrow, the head oscillating pin moves along the cam groove causing the head unit to move in parallel with the paper feeding platen unit.

Print operation of the head

Movement of the print lever when printing 1 dot:

The print head is structured of a Coil, head, Iron core, head, Push bar, head, Plunger, head, and features 8 solenoids (Print solenoid A-H) arranged in parallel, with the Lever, printing, head and the Printing, lever spring for each solenoids. Driving the Print solenoids (energizing the Coil, head) perform printing with the Lever, printing, head.

1. When power is supplied to the Coil,head, the plunger,head which is mounted to the Push,bar head is pulled toward the Iron core,head in the direction of arrow (a) to press against the back of the Lever,printing,head.
2. As the base of the Lever,printing,head is supported by the printing lever shaft, when the back of the Lever,printing,head is pressed, the top end of the print lever is pushed out toward the paper feeding platen unit in the direction of arrow (b) centering on the print lever shaft. (This position is indicated by a broken line in the Fig. below.)
3. Then the Lever,printing,head hits against the paper feeding platen unit on the paper to print 1 dot.
4. When the Coil,head has been energized, the Lever,printing,head and the plunger,head return to the home position under the spring force of the print lever spring and sets to the standby state (the position indicated by the solid line in the Fig. below.)

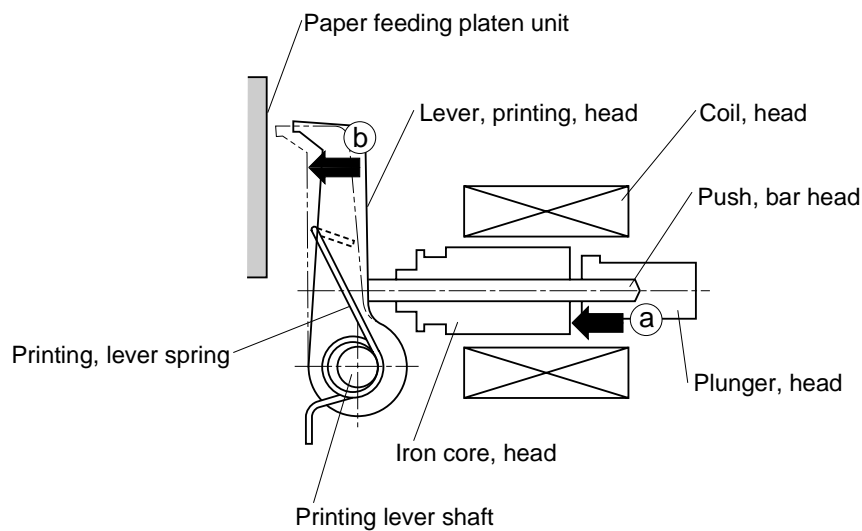


Figure 1-8 Operation of Print Head

Print solenoids drive timing

For printing, print solenoids A, D and G are energized with drive pulse P_n which has the pulse width of Timing signal T_n to T_{n+1} . Next, print solenoids B, E and H are energized with drive pulse P_{n+1} which has a pulse width equal to Timing signal T_{n+1} to T_{n+2} . In the same way,

print solenoids C and F are energized with drive pulse Pn+2, and then print solenoids A, D and G are energized with drive pulse Pn+3. The 8 solenoids are driven in the order (A, D, G) - (B, E, H) - (C, F).

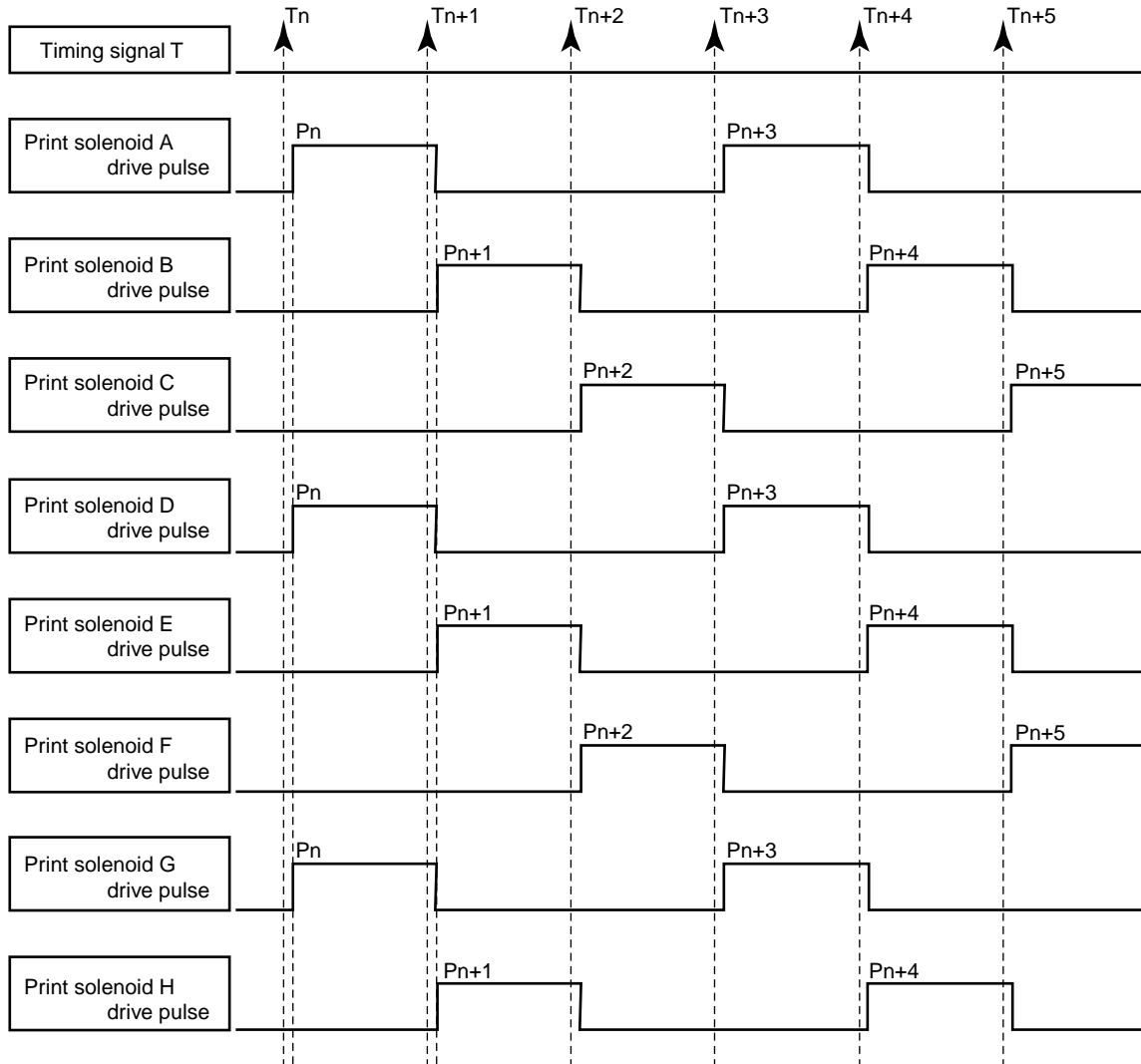


Figure 1-9 Print Solenoids Drive Timing

1.2.4 Paper Feeding Mechanism

The paper feeding mechanism consists of the Cam, paper feeding, Lever, fast feeding, Paper feeding lever, Trigger lever, Paper feeding platen unit, Lever, release, etc. This mechanism features normal paper feeding and fast feed functions. It also features a paper free function

which allows you to remove the paper freely from the printer by pulling it straight out in the paper feeding direction (in the direction of the arrow in the Fig. below) or reverse. The paper free function mechanism is shown in Fig. 1.10.

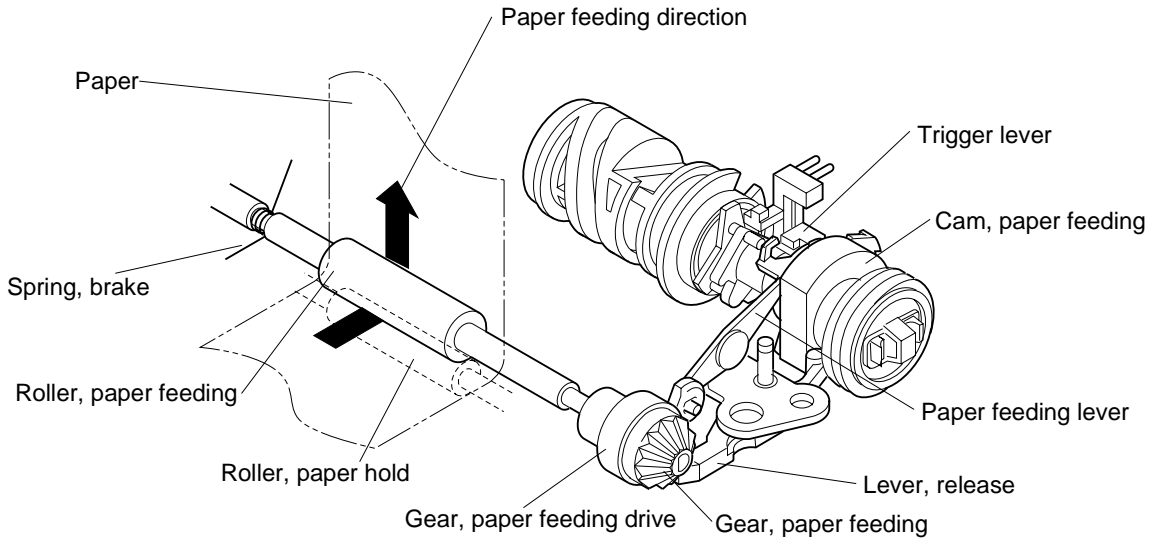


Figure 1-10 Paper Feeding Mechanism

Operation of the paper feeding lever

The groove cam is built into the Cam, paper feeding. Section A of the Paper feeding lever is set on the groove cam. When the Cam, paper feeding rotates in the direction of arrow (a), the paper feeding lever moves along the groove cam. The paper feeding lever moves with section B as the supporting point and is amplified with the lever ratio causing section C to move up and down in the direction of arrows (b) and (c).

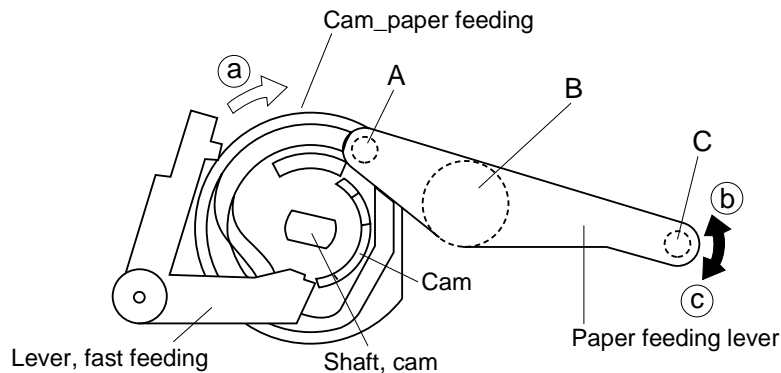


Figure 1-11 Operation of Paper Feeding Lever

Normal paper feeding (Refer to Fig. 1.12)

When the cam, paper feeding is caused to rotate in the direction of arrow (a) by the rotating of the Shaft, cam, the inner cam mounted at the center of the Cam, paper feeding (the shaded section in the Fig. below) makes contact with the Lever, fast feeding and the Cam, paper feeding rotates

while sliding toward the cam shaft. Section A of Shaft,cam moves along the shaft (the shaded section in the Fig. below) of the paper feeding cam for one turn, causing section C of the paper feeding lever to move up and down one pitch with Section B as the center (in the direction of arrow (b) and (c) to feed the paper.

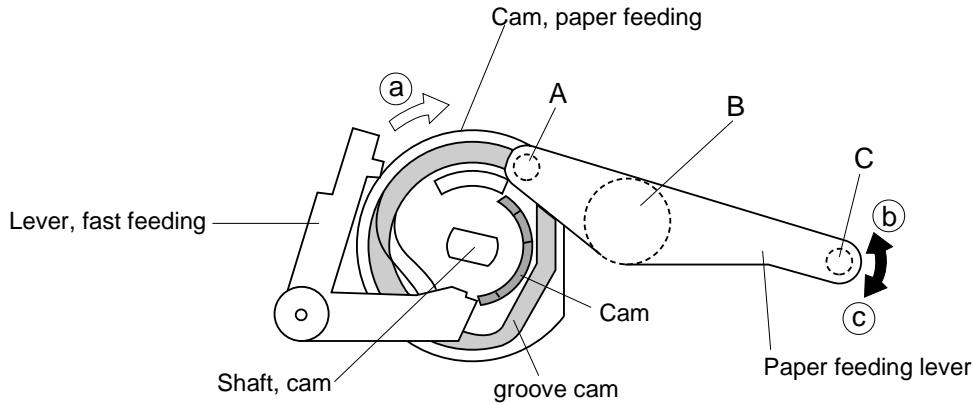


Figure 1-12 Normal Paper Feeding

Fast paper feeding (Refer to Figs. 1.13 and 1.14)

When the specified timing is applied to the trigger coil, the trigger plate is pulled toward the Holder, trigger yoke then rotates in the direction of arrow (d) as shown in Fig. 1.13. The force of rotation is also transmitted to the trigger lever which is mounted to the trigger plate and the trigger lever is rotated in the direction of arrow (e) in Fig. 1.13. Following this, the trigger lever is released by the fast feeding lever and the fast feeding lever rotates in the direction of arrow (f) as shown in Figs. 1.13 and 1.14. The top end of the fast feeding lever then disengages from the cam track (the shaded section) at the center of the paper feeding cam. In this state, the cam track (the shaded section) does not engage the Lever,fast feeding and rotates in the direction of arrow (a) in Fig. 1.14. Then, Section A of the paper feeding lever moves along the groove cam (the shaded section in Fig. 1.14) on the paper feeding cam once to feed the paper 3 pitches.

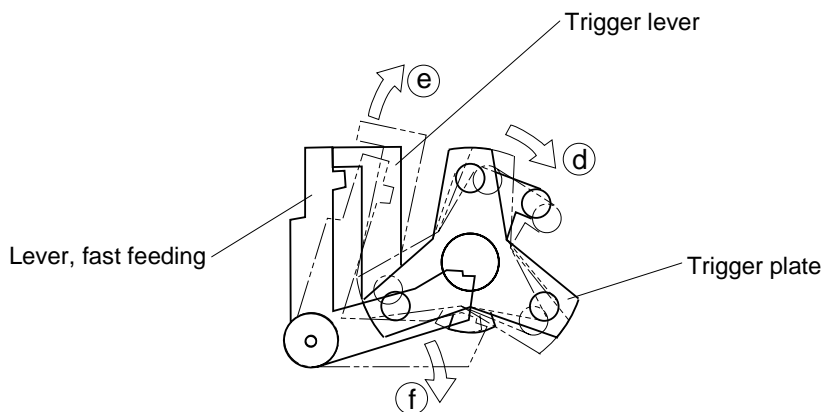


Figure 1-13 Operation of Trigger Lever during Fast Paper Feeding

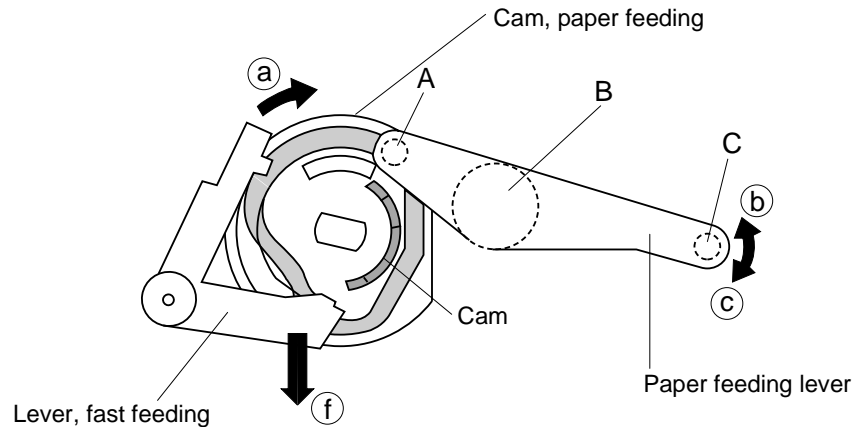


Figure 1-14 Fast Paper Feeding

Operation of Gear,paper feeding drive and Gear,paper feeding (Refer to Figs. 1.15 and 1.16.)

The Gear,paper feeding drive engages with the Paper feeding lever, then Gear,paper feeding drive rotates again in the direction of arrows (a) and (b) in relation to the vertical movement of the paper feeding lever (in the direction of arrows (c) and (d)). Conversely, the Gear,paper feeding which engages with the Gear,paper feeding drive meshes with the Gear,paper feeding drive in one direction only to perform intermittent rotation in the direction of arrow (f).

Paper feeding condition (Refer to Fig. 1.15)

When the paper feeding lever is pulled in the direction of arrow (a) by the groove cam section of the Cam,paper feeding, the Gear,paper feeding drive rotates in the direction of arrow (e) to mesh with the Gear,paper feeding. This causes the Gear,paper feeding to rotate intermittently one or two teeth in the direction of arrow (f), and the Roller,paper feeding mounted on the same shaft as the paper feeding gear rotates simultaneously in the direction of arrow (d) to feed paper.

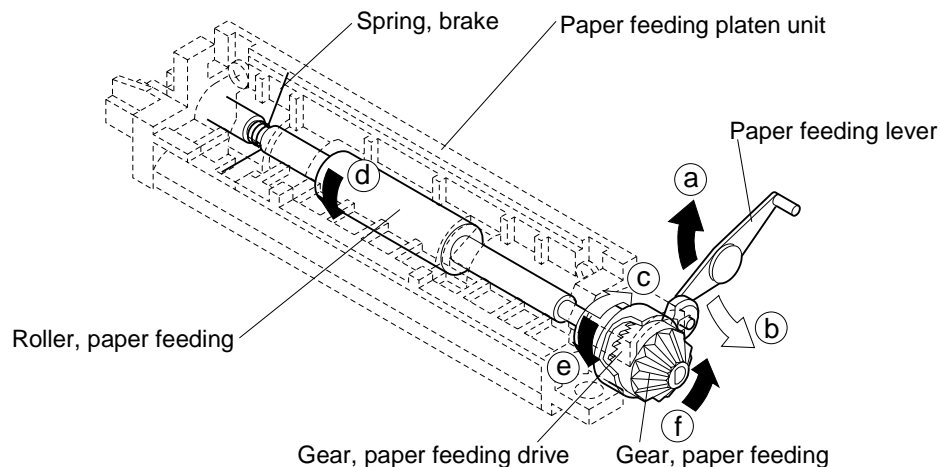


Figure 1-15 Operation of Gear,paper feeding drive and Gear,paper feeding

Returning (Refer to Figs. 1.15 and 1.16)

When the paper feeding lever moves in the direction of arrow (b) in Fig. 1.15 along the groove cam on the Cam, paper feeding, the Gear, paper feeding drive rotates in the direction of arrow (c) in Fig. 1.15. After paper is fed one gear tooth, the Gear, paper feed drive returns to the paper free state (in the state which tooth section of the Gear, paper feeding drive disengages the tooth section of the Gear, paper feeding. (refer to the Section "Paper Free".) After the paper feeds two gear teeth the Gear, paper feeding drive is returned by passing over the gear teeth of the Gear, paper feeding. At this time, the shaft for the Gear, paper feeding which is blocked by the detent spring disengages from the paper feeding gear and the paper feeding gear rotates in reverse, returning it to the home position.

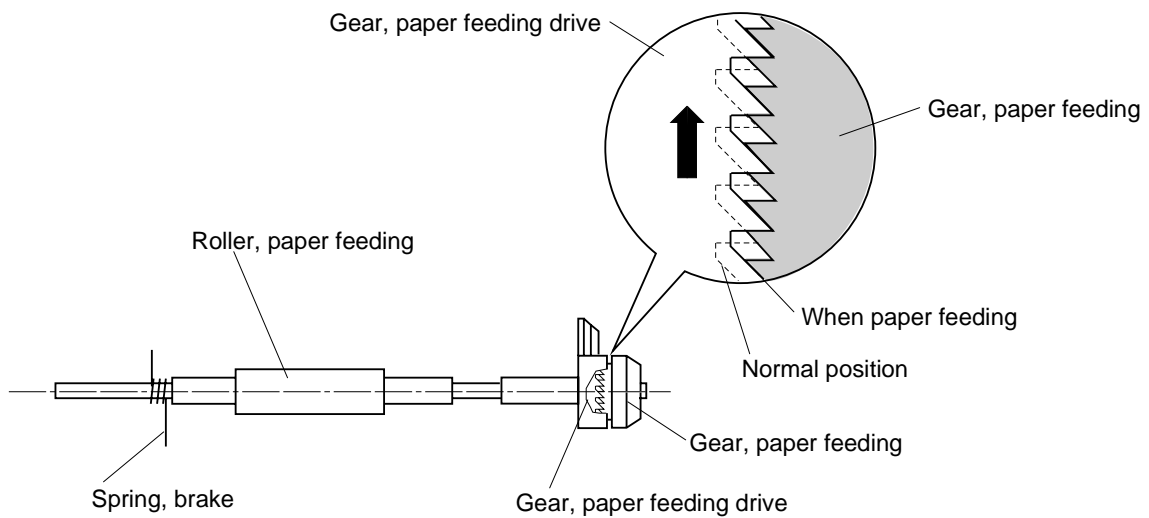


Figure 1-16 Operation of Gear, paper feeding drive and Gear, paper feeding while Paper Feeding and Returning

Paper free

The Lever, release is rotated in the direction of arrow (a) in the Fig. 1.17 by cam A of the Cam, paper feeding. This causes the Gear, paper feeding drive to slide in the direction of arrow (b) and disengage the Gear, paper feeding drive from the Gear, paper feeding. This condition is referred to as the "Paper free state" below.) Even when the Cam, paper feeding cam rotates in the direction of arrow (c) to stop cam A, the cam cannot be controlled. The paper free state is maintained as long as the Cam, paper feeding remains in contact with the Lever, fast feeding due to the structure, thus, the paper free state continues until the cam of the paper feeding cam is released from the Lever, fast feeding.

This unit stops in the paper free state during the normal operation (under the conditions specified in the specifications). In this state paper can be removed easily from the unit in either in the paper feed or reverse paper feed direction, or else the paper can be fed in either direction by the manual knob.

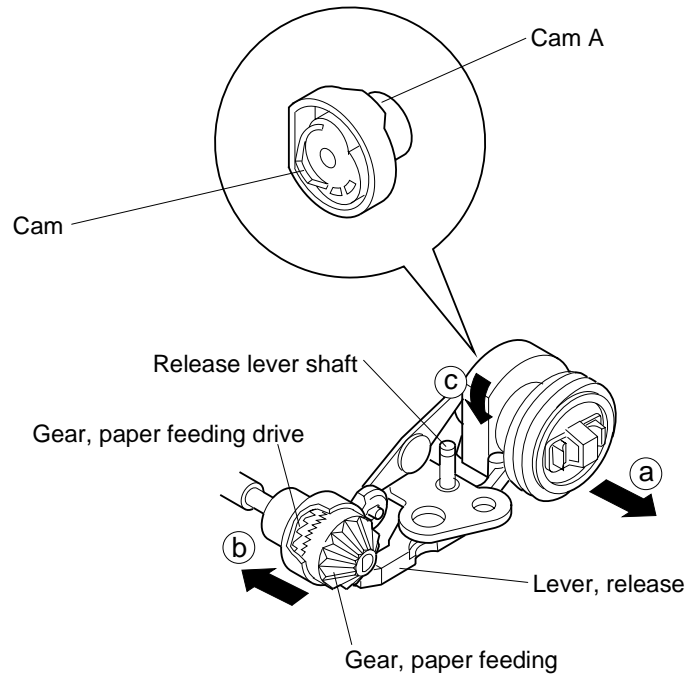


Figure 1-17 Paper Free Operation

1.2.5 Ribbon Feeding

The ribbon feeding mechanism consists of the ribbon driving gear, ribbon feeding gear, spool gear assembly and the ribbon cassette utilizing the endless ribbon. When the motor starts rotating, the ribbon is fed automatically. The mechanism is shown in Fig. 1.18.

Feeding ribbon

When the unique shape ribbon driving gear rotates in the direction of arrow (a) in the figure below, the ribbon feeding gear which matches up with the bevel gear and small gear rotates in the direction of arrow (b) in the Fig. below. Also, the spool gear which engages with the ribbon

feeding gear and the small gear rotate in the direction of arrow (c). The force of rotation of the spool gear causes the ribbon feeding roller (inside the ribbon cassette) to engage with the spool gear shaft which rotates in the same direction as the spool gear to feed the ribbon.

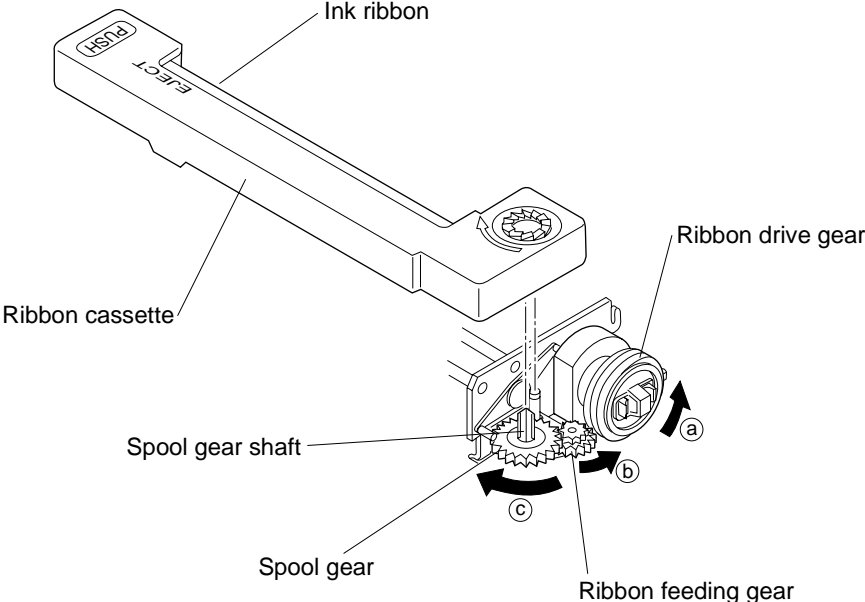


Figure 1-18 Ribbon Feeding Mechanism

Chapter 2

Handling, Maintenance, and Repair

2.1 HANDLING

2.1.1 Handling the Printer Unit

When the printer is unpacked and transported, consider the following precautions.

Precautions during moving

- 1) Grasp the frame and the ribbon cassette (or the platen of the printer); then lift it out of the box.

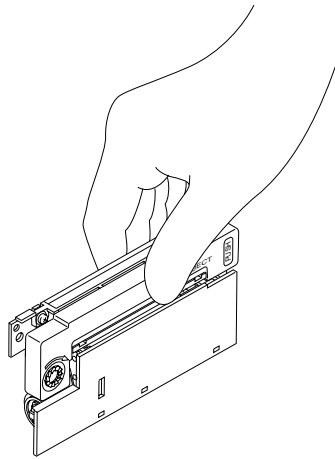


Figure 2-1 Handling the Printer

- 2) Grasp the frame of the printer and the center of the printer cover; then lift it.
- 3) If the printer is transported by grasping the platen and the circuit board, pay attention to the following matters:
 - Because the printer uses the electronic devices for reset and timing detection, static electricity may cause the damage to the printer. To protect against static electricity use one of the following methods:
 - Use a grounded wrist band
 - Use an anti-static device
 - Use a conductive mat
 - Do not touch the circuit terminals.

- 4) To prevent camshaft damage, do not grasp the Ribbon drive gear with your hands when moving the printer.

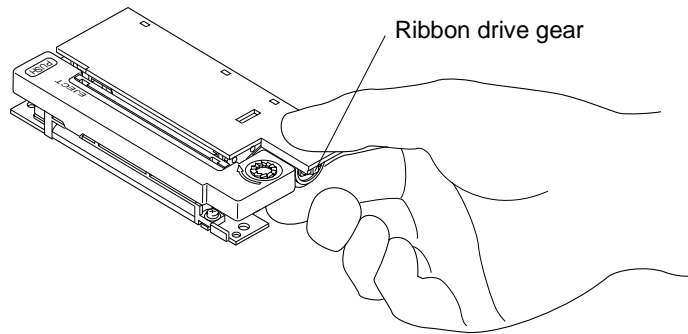


Figure 2-2 Portion not to be held

- 5) To prevent frame damage, do not hold the Ribbon feeding gear when you move the printer.

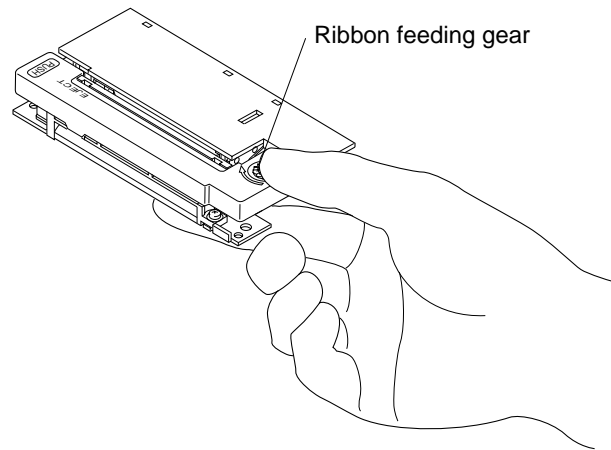


Figure 2-3 Portion not to be held

- 6) Do not subject the printer to strong impact, shock, or excessive external stress.

Precaution when the printer is temporarily set down

When the printer is temporarily placed on a surface such as a desk, do not let the printer terminals or either side of the printer contact anything.

Precautions when installing the case

- 1) To prevent the camshaft damage, do not touch the Ribbon drive gear with your hands.

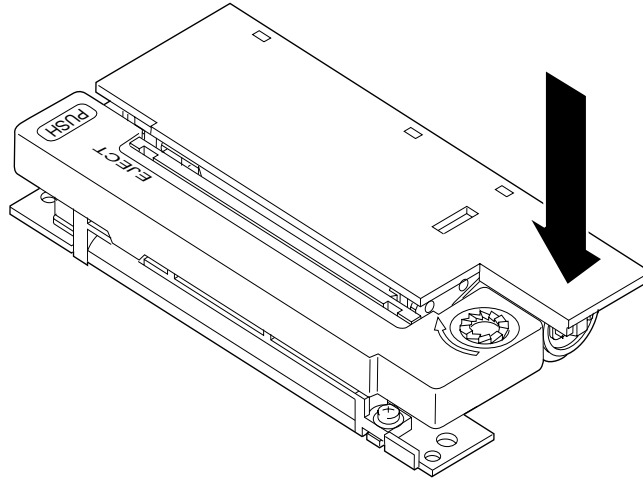


Figure 2-4 Precaution when installing the case (I)

- 2) To prevent damage to the paper feeding gear, do not let it contact any object such as a tool when assembling.

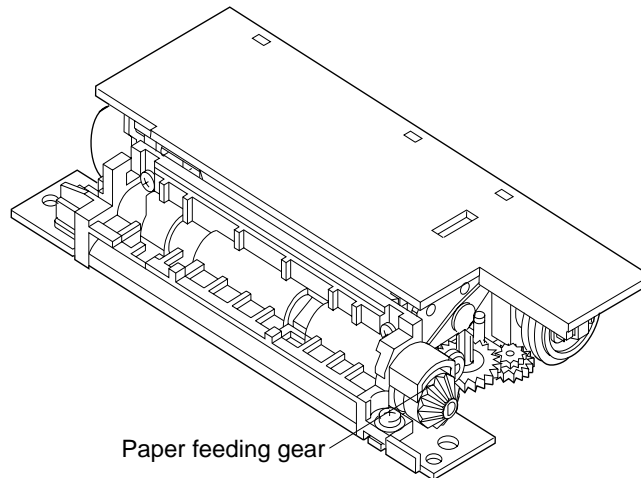


Figure 2-5 Precaution when installing the case (II)

Precautions during storage

- 1) Avoid installing the unit in dusty or humid places and do not expose the unit to direct sunlight.
- 2) When the unit is stored for long periods of time, place the unit in an anti-static-electricity bag and wrap it with anti-rust paper (VCI), and store it in a dry place.

Precautions for use

- 1) Because permanent magnets are used in the motor of this printer and electromagnets are used in various parts, do not use the printer in places where the air has a high content of iron particles or in dusty places.
- 2) Do not print without paper inserted in the unit or without the ink ribbon installed.
- 3) Do not re-ink the ribbon.
- 4) Be sure to use the paper specified by the manufacturer. (Refer to 1.1.2.)
- 5) Be sure to use the ribbon cassette specified by the manufacturer.
- 6) Do not operate the manual knob during printing or do not do anything to hinder rotation of the manual knob.

2.1.2 Loading Paper

Inserting paper

Keep the following in mind when inserting paper into the printer.

- 1) Paper inserting direction

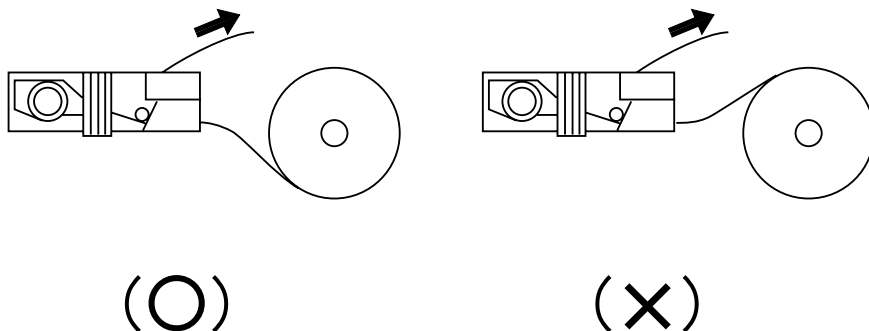


Figure 2-6 Paper Inserting Direction

2) Shape of the front edge of the paper

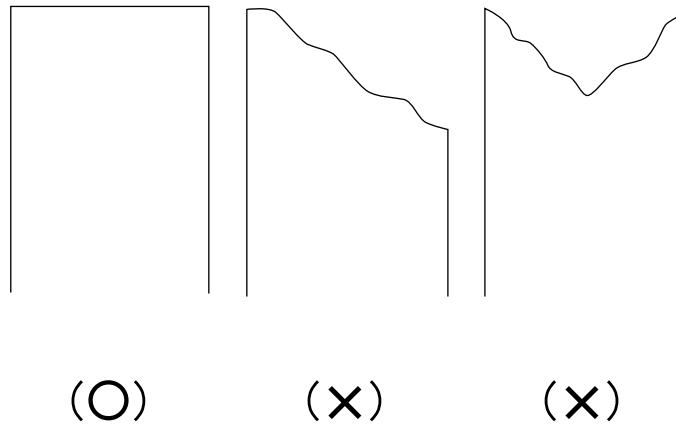


Figure 2-7 Shape of the Front Edge of Paper

- Do not fold the front edge of paper.
- Be sure to insert paper straight into the paper insertion slot of the printer. When inserting paper, push paper lightly in the paper feeding direction so that paper comes in contact with the paper feeding roller and the paper loads easily.

Removing paper

When removing paper from the printer to replace it, be sure to follow one of the methods below.

- 1) Electrical operation
Turn the power ON and press the paper feed key to feed the paper out.
- 2) Remove the paper using the manual knob.
- 3) Pull the paper slowly out of the paper delivery slot or paper insertion slot using the paper free mechanism.

Do not remove the paper by other methods than the ones above. If you remove the paper by any other method, it could cause a paper feeding error or a paper jam.

2.1.3 Replacing the Ribbon Cassette

Removing the ribbon cassette

When removing the ribbon cassette from the printer, be sure to use one of the following methods:

- 1) Grasp the both sides of the ribbon cassette and lift it up.

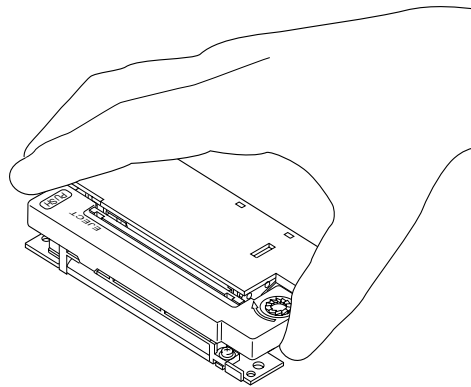


Figure 2-8 Removing the Ribbon Cassette (I)

- 2) Push section A (indicated as "PUSH") of the ribbon cassette in the direction of the white arrow in Fig. 2.9 with a finger tip so that the knob side of the ribbon cassette will come loose. Then pull it up in the direction of the black arrow to remove it.

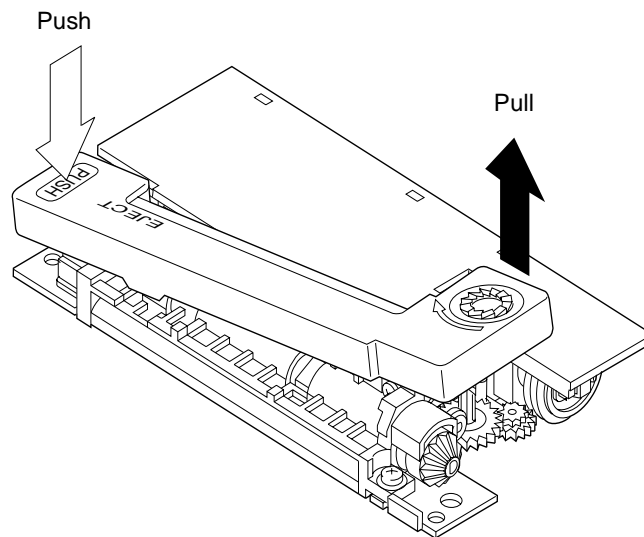


Figure 2-9 Removing the Ribbon Cassette (II)

Installing the ribbon cassette

- 1) Be sure to use the ribbon cassette specified in the specification. Ribbon cassettes other than the specified type can cause such problems as malfunction of the printer lever and lowering of print quality.
- 2) It is recommended to install the ribbon cassette without any paper in the printer.

- 3) Before installing the ribbon cassette in the printer, rotate the knob in the direction of the arrow in Fig. 2.10 to tighten the ink ribbon.

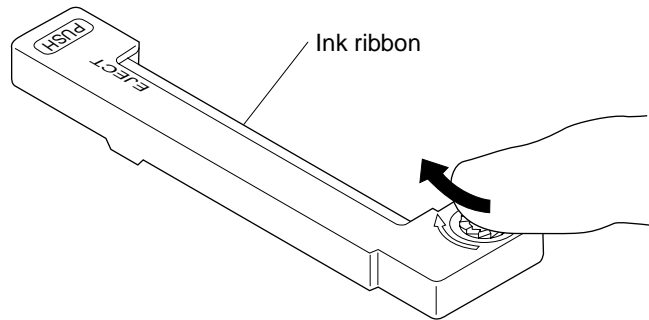


Figure 2-10 Tightening Ink Ribbon

- 4) Place the ribbon cassette on the frame as shown in Fig. 2.11; then press the knob and section A simultaneously.

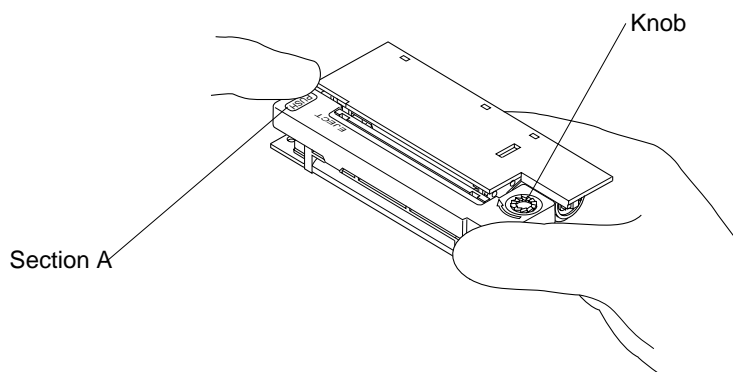


Figure 2-11 Installing the Ribbon Cassette

- 5) After setting the cassette, turn the knob in the same manner as in step 2) above to tighten the ink ribbon; then check that the ink ribbon is not bent or loose.

2.1.4 Cleaning paper jams

If a paper jam is occurred, proceed as follows:

1. Cut the paper on the paper insertion side.
2. Remove the ribbon cassette.
3. Pull out the paper from the paper delivery side with a tool, such as tweezers.
4. If there still remain unremovable pieces of paper inside of the printer, remove them as follows:

- Remove the paper feeding platen unit from the printer with handling the paper guide carefully not to deform.
 - Pull out the pieces of paper from between the platen and the paper guide with such as tweezers (Refer to 3-20 for detaching the paper feeding platen unit).
5. If the paper feeding platen unit is detached, adjust the platen gap when reattached (Refer to 3-26).

2.2 MAINTENANCE

Perform the maintenance as outlined below to maintain the initial performance of the unit for many years and to prevent possible problems.

2.2.1 Cleaning

Stain

Wipe the unit with a cloth dampened with alcohol.

Dust, cloth particles, foreign particles

Dust, cloth particles, and foreign particles on the unit should be vacuum cleaned. Be sure to vacuum even in the smaller sections.

Notes:

- 1) *Do not use such liquids as thinners and solvents for cleaning because they may damage the plastic or rubber parts of the unit.*
- 2) *After cleaning, check the amount of oil present and add more oil if necessary.*

2.2.2 Inspection

Maintenance and inspection for this unit is divided into two types: "Daily checks" that can be performed daily by the user and "Periodical checks" that require special knowledge or techniques and should only be performed by a specialist. The type of check should be decided depending on the knowledge or ability of the individual.

Daily check

Before using the printer, check if the printer is used properly according to Section 2.1 "Handling the printer" in order to obtain optimum performance from the printer.

Periodic check

Every six months, periodic maintenance and inspection of the points below should be conducted.

Table 2.1 Periodic Check

No.	Check item	Standard
1	Check for dust, fluff, paper lint, etc. adhering or trapped inside the printer.	<ul style="list-style-type: none"> · Must be free of noticeable amount of dust, fluff, paper lint, etc. Likewise, there must be no other foreign matter. (Especially around the detector) · Paper fragments must not remain in the paper guides.
2	Shape of springs	<ul style="list-style-type: none"> · Must not be deformed.
3	Shape of gears	<ul style="list-style-type: none"> · Must not be chipped, worn out, or damaged.
4	Lubrication	<ul style="list-style-type: none"> · See "2.4 LUBRICATION".
5	Printing operation	<ul style="list-style-type: none"> · Must be free of trouble. · Paper feeding must be free of trouble. · Ribbon feeding must be free of trouble. · There must be no strange noise during printing. · Observe the functions and check for any abnormal operation due to worn or bent parts, paper jams, etc.
6	State of ink ribbon	<ul style="list-style-type: none"> · Make sure that the ribbon being used satisfies the requirements of specification. · The ribbon and ribbon cassette must be free of damage.

2.3 REPAIR

Repairs are classified into two levels (A and B) in consideration of the degree of difficulty of repairs. Thus, the person in charge of repair must decide the method of repairing depending on the knowledge and skill of the technician.

2.3.1. Repair Levels

Level A: Requires general knowledge of the printer's operation principles and structure but does not require specialized experience.

Level B: Requires a certain degree of knowledge of the printer's operating principles and structure as well as skills and experience using special tools for disassembly and reassembly of the printer.

2.3.2 Repairing Procedure

When problems occur, locate the cause of the problem and the condition of the printer as outlined in Section 2.3.3 "Guidelines for Repair" and repair the unit properly.

1) "Phenomenon"

Find the type of problem in this column.

2) "Condition"

Check the condition of malfunctioning by referring to this column.

3) "Cause"

Locate the cause of the problem by referring to this column. Also, the repair level is indicated for each cause; use this indication to determine the method of repairing.

4) "Check points and method"

The mechanisms which cause problems as well as check points are listed in this column. Check the unit as outlined in this column to locate the malfunctioning section.

5) "Repair method"

Repair malfunctioning sections as indicated in this column. If the same problem or phenomenon reoccurs after the specified repair method is performed, check other items in the "Cause" column and repair the unit again. The above procedure allows you to locate the cause of malfunction efficiently by minimizing human error. Also, refer to Fig. 2.13 "Board assembly terminal arrangement diagram" and Figs. 1.19 and 1.20 "Detailed timing signal T allocation" for each model for easier check for repair.

2.3.3 Repairing Guide

Table 2.2 Repairing guide

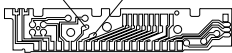
Phenomenon	Condition	Cause	Level	Check point and method	Repair method
1. The motor does not rotate.	Even if a print command is input, the motor does not rotate.	(1) Poor contact of motor lead	A	● Check the continuity between the motor lead and board ass'y and between motor terminals.	● Re-solder when no continuity is obtained.
		(2) Malfunction of power source input to the motor terminal	B	● Input power source check: check the motor terminal voltage with the tester or oscilloscope.	● Check the power supply circuit and repair. (+) red (-) black 
		(3) Malfunction of the motor	B	● Apply 3.3V to the motor terminal to check if the motor rotates.	● If the motor does not rotate, replace the motor unit.
2. The motor rotates but does not stop.	The motor does not stop after 1-print cycle ends.	Malfunction of R detector	B	● Rotate the cam trigger unit and check if the R-detector generates signals using the oscilloscope.	● If reset signal is not generated, replace the board ass'y.

Table 2.2 Repairing guide

Phenomenon	Condition	Cause	Level	Check point and method	Repair method
3. Does not print all dots.	The motor rotates normally but the printer does not print.	(1) Disconnection or burnt-out of Cable, head common line.	B	● Check continuity between the Cable, head common lines.	● If no continuity exists, replace the print head unit.
		(2) Poor contact of the Cable, head common line with board ass'y.	A	● Check continuity for the soldered section of the board ass'y and Cable, head and the soldered section.	● When no continuity is checked, re-solder.
4. Continuous missing dots	Certain head does not print. (does not print in several columns)	(1) Disconnection or burnt-out of Cable, head.	B	● Check continuity between patterns of the pertinent Cable, head.	● When no continuity exists, replace the print head unit.
		(2) Poor contact of Cable, head.	A	● Check continuity between the Cable, head terminal and board ass'y.	● When no continuity exists, re-solder.
		(3) Bad contact of Coil, head wire.	A	● Check the pertinent Coil, head wire end and Cable, head soldered section.	● If poor soldering, resolder.
		(4) Disconnection or burnt-out of Coil, head	B	● Check that resistance for the pertinent head coil meets the rating. (approx. 1.3-ohm at 25°C)	● When resistance does not match with the rating, replace the print head unit.
		(5) Malfunction of Coil, head	B	● Check that the clamp shaft and print lever for the pertinent head operate smoothly	● When they do not operate smoothly, replace the print head unit.
5. Intermittent dot missing	Intermittent dot missing for certain head	(1) Poor contact of Cable, head	A	● Refer to Phenomenon (4) and Cause (2).	● When no continuity exists, re-solder.
		(2) Poor contact of Coil, head wire	A	● Refer to Phenomenon (4) and Cause (3).	● When no continuity exists, re-solder.
		(3) Malfunction of Coil, head	B	● Refer to Phenomenon (4) and Cause.	● In case of malfunction, replace the head unit.
	Intermittent dot missing occurs continuously.	Poor contact of Cable, head	A	● Check continuity between the common line terminal for Cable, head and the board ass'y.	● When no continuity exists, re-solder.
6. Fluctuation of letter width	The letter width for the certain columns changes.	(1) Worn out of damage to the gears	B	● Check that motor gear, reduction gear, the Cam trigger unit gear are not worn out or damaged.	● Replace the parts (motor unit, Cam trigger unit).
		(2) The cam groove on the Cam trigger unit is worn out.	B	● Check that the cam groove on the Cam trigger unit is not worn.	● Replace the Cam trigger unit.

Table 2.2 Repairing guide

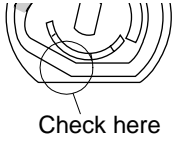
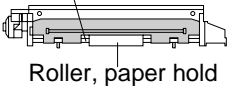
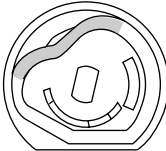
Phenomenon	Condition	Cause	Level	Check point and method	Repair method
7. Paper does not feed	Paper does not feed and prints on the same section.	(1) Inproper paper feed	A	<ul style="list-style-type: none"> ● Check if paper with the specified width, thickness and diameter is being used. ● Check if paper is jammed in the paper feeding track. 	<ul style="list-style-type: none"> ● Use the specified paper. ● Remove the jammed paper.
		(2) The cam in the Cam, paper feeding is worn.	B	<ul style="list-style-type: none"> ● Check that the cam for the Cam, paper feeding section is not worn. 	<ul style="list-style-type: none"> ● Replace the Cam, paper feeding.
		(3) The Paper feeding platen unit is damaged or worn out.	B	<ul style="list-style-type: none"> ● Check that the gears or other parts in the Paper feeding platen unit are not damaged or worn. 	<ul style="list-style-type: none"> ● Replace the paper feeding platen unit.
		(4) The paper holding spring is deformed.	B	<ul style="list-style-type: none"> ● Check that the holding spring for the Roller, paper hold roller is not deformed. 	<ul style="list-style-type: none"> ● Replace the paper feeding platen unit.
8. Paper feeding pitch is not even.	Uneven line spacing or printed letter is blurred.	(1) Improper paper feeding	A	<ul style="list-style-type: none"> ● Refer to Phenomenon (7) and Cause (1). 	<ul style="list-style-type: none"> ● Use the specified paper.
		(2) The cam in the Cam, paper feeding is worn.	B	<ul style="list-style-type: none"> ● Refer to Phenomenon (7) and Cause (3). 	
		(3) The Paper feeding platen unit is worn or damaged.	B	<ul style="list-style-type: none"> ● Refer to Phenomenon (7) and Cause (4). 	
		(4) The paper holding roller does not rotate properly.	B	<ul style="list-style-type: none"> ● Check if the paper holding roller is worn or damaged. Check the oiling condition. 	<ul style="list-style-type: none"> ● Replace the platen unit. Oil properly. (Refer to Section 2.4 "Oiling".)
		(5) Paper holding spring is deformed or worn.	B	<ul style="list-style-type: none"> ● Refer to Phenomenon (7) and Cause (5). 	

Table 2.2 Repairing guide

Phenomenon	Condition	Cause	Level	Check point and method	Repair method
9. Paper does not feed by fast paper feeding.	1-pitch paper feed functions properly but 3-pitch paper feed does not function.	(1) Improper paper feeding	A	● Refer to Phenomenon (7) and Cause (1).	● Use the specified paper and remove excessive paper loaded in the feed track.
		(2) Improper trigger coil continuity	B	● Connect the tester to the both ends of the trigger coil and check continuity. Resistance: approx. 20-ohm (at 25°C)	● If soldered improperly, re-solder. ● If resistance at the trigger coil is abnormal, replace the trigger coil.
		(3) Paper feeding cam is worn.	B	● Remove the paper feeding cam and check if the cam groove (colored part) is worn. 	● Replace the paper feeding cam.
10. The paper free function cannot be set.	Prints normally but does not set for the paper free.	Lever, release is worn or damaged.	B	● Check if the Lever, release is worn or damaged.	● Replace the Lever, release.
11. The inking mechanism does not function.	The print mechanism functions normally but the inking mechanism does not function at all.	(1) Bad ribbon cassette.	A	● Check if the ribbon in the ribbon cassette rotates normally.	● Replace the ribbon cassette.
		(2) The ribbon drive gear is worn or damaged.	B	● Check if the outer teeth of the ribbon drive gear are worn or damaged.	● Replace the ribbon drive gear.
		(3) Spool gear spring is worn.	B	● Check if the spool gear spring is worn.	● Replace the spool gear spring.

Board assembly terminal functions

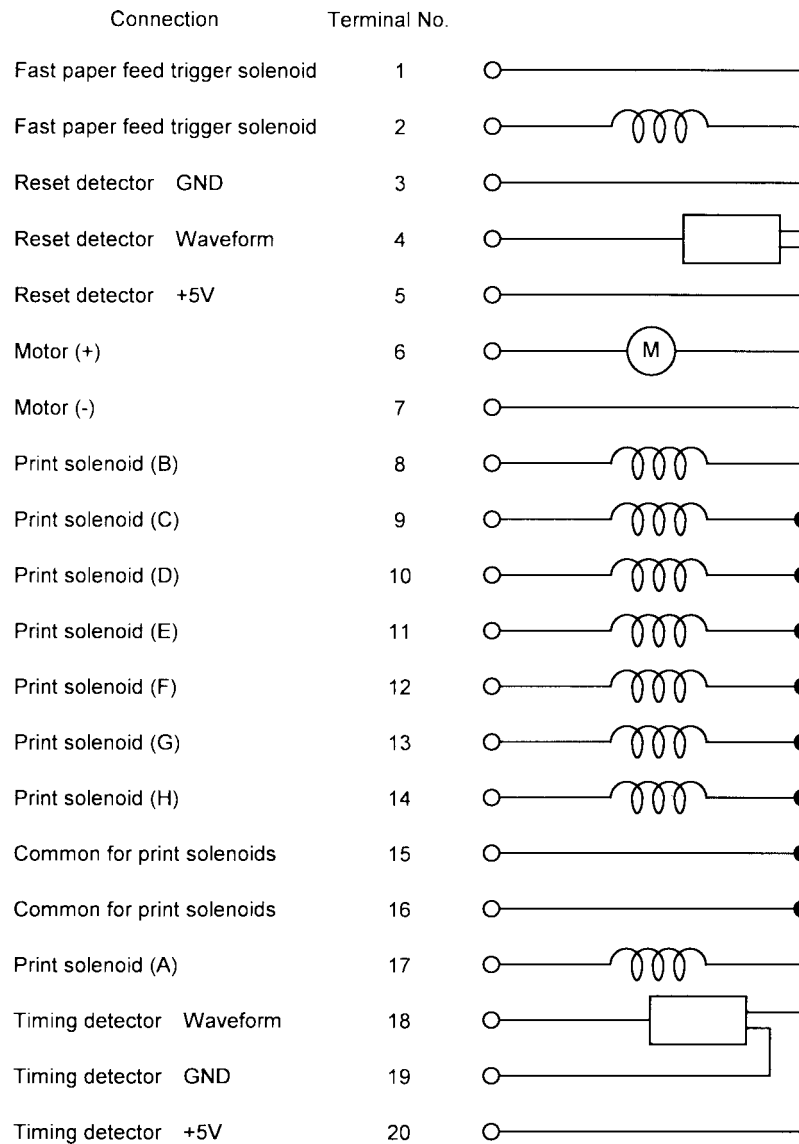


Figure 2-12 Board Assembly Terminal Functions

Board assembly terminal arrangement diagram

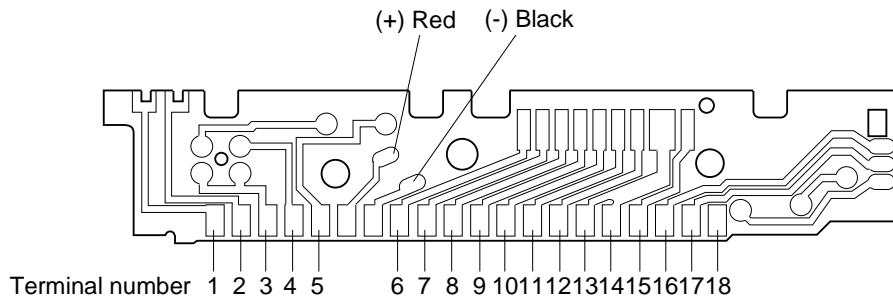


Figure 2-13 Board Assembly Terminal Arrangement Diagram

2.4 OILING

Oiling is important in maintaining the initial performance of the unit for many years and preventing problems. Oil the unit as outlined below.

2.4.1 Oil Types

The type of oil used has great influence on the performance and durability of the unit. When selecting the oil, special attention should be paid to the temperature characteristics of oil. The manufacturer has specified the type of oil to be used with this unit through analysis and R & D on various types of oil. The specified type oil is provided in a 40cc (gr.) can or plastic container (minimum supply unit) by the company.

<References>

The number of printers that can be oiled with the minimum supply unit (40gr):

- G-36:Approx. 100 printers
- O-3:Approx. 100 printers

2.4.2 Oiling Standard

- Use G-18, G-2 and O-3 oil for oiling this unit.
 - Before oiling during disassembly and reassembly, clean the unit well. Refer to Tables 2.4.3 "Oiling point list" and Figs. 3.2 and 3~4 "Overall oiling diagram" for oiling points. (the numbers in the oiling point list correspond to the numbers indicated in the overall oiling diagram.)
 - Oiling is classified into two ranks. Oil the points according to the ranks below.
 - Rank A: Oil once each year
 - Rank B: Oil after each 1,500,000 characters printed.
- The oiling points should be oiled regardless of the ranks in the following situations:
- Overhaul
 - Oil is wiped out during such operations as maintenance or inspection
 - The parts are disassembled or replaced

2.4.3 Oiling Points (Refer to Fig. 3.2 "Overall oiling diagram")

The points marked with (*) in the table must be oiled during assembly.

Rank A (Oil once each year.)

Table 2.3 Oiling Points

Oiling point number	Oiling point	Oil type	Method of oiling (Quantity of oil)
A-1 (*)	Contact point between shaft- cam and cam- paper feeding	O-3	Point oiling (One drip)
A-2	Contact point between cam trigger assembly and trigger plate 3 (Outside of the ring)	O-3	Line oiling (One rotation)
A-3	Contact point between lever-fast feeding and fast- feeding lever shaft	O-3	Point oiling (One drip)
A-4	Gear of the ribbon drive gearShaft of Lever,fast feeding which makes contact with the shaft of Lever,fast feeding	G-36	Line oiling (Half rotation with 2-mm-diameter grease)
A-5 A-6 A-7 A-8 A-9 A-10	Contact point between printing head unit and shaft-carriage /shaft -carriage guide (six points)	G-36	Point oiling (2-mm-diameter grease)
A-11	Contact point between ground plate-head and shaft-carriage guide	G-36	Point oiling (One drip)

Rank B (Oil after each 1,500,000 characters printed.)

Table 2.4 Oiling Points

Oiling point number	Oiling point	Oil type	Method of oiling (Quantity of oil)
B-1 (*)	Supporting point of cam-shaft holder	O-3	Point oiling (One drip)
B-2	Contact point between trigger lever and lever-fast feeding	O-3	Point oiling (One drip)
B-3	Shaft of roller-paper holder in the paper-feeding platen unit	O-3	Point oiling (One drip)
B-4 (*) B-5 (*)	Groove on cam-paper feeding (Two points, the top of cam form and the opposite side)	G-36	Point oiling (Fill the groove with 5-mm-long grease)
B-6 (*)	Contact point between cam-paper feeding and lever-fast feeding	G-36	Line oiling (Oil the entire edge of the cam form with 1-mm-diameter grease)
B-7	Contact point between lever-release and cam-paper feeding	G-36	Line oiling (Oil the entire edge of the cam form with 1-mm-diameter grease)
B-8 (*)	Shaft of cam trigger assembly	G-36	Point oiling (1-mm-diameter grease)

Table 2.4 Oiling Points

Oiling point number	Oiling point	Oil type	Method of oiling (Quantity of oil)
B-9 (*)	Inner teeth of cam trigger assembly	G-36	Line oiling (One rotation with 1-mm-diameter grease)
B-10	Supporting point of paper feeding lever	G-36	Line oiling (Half rotation with 1-mm-diameter grease)
B-11	Contact point between paper feeding lever and frame assembly	G-36	Line oiling (1-mm-diameter grease)
B-12	Shaft of paper feeding lever (One side)	G-36	Point oiling (2-mm-diameter grease)
B-13 B-14	Groove on cam-oscillation (Two points of the top of cam form)	G-36	Point oiling (Fill the groove with 10-mm-long grease)
B-15	Contact point between cam-trigger unit and frame assembly	G-36	Point oiling (Quarter rotation with 1-mm-diameter grease)
B-16 B-17 B-18	Retaining ring Type E fixing lever-release (three points)	G-36	Point oiling (Oil the inner side of the ring)
B-19	Retaining ring type E fixing spool gear assembly	G-36	Point oiling (Oil the inner side of the ring)
B-20	Contact point between ribbon feeding gear and the frame assembly	G-36	Point oiling (1-mm-diameter grease)
B-21	Contact point between lever-release and gear-paper feeding drive	G-36	Point oiling (2-mm-diameter grease)
B-22	Middle of the motor unit gear	G-36	Point oiling (1-mm-diameter grease)
B-23	Deceleration point of the motor unit gear	G-36	Point oiling (1-mm-diameter grease)

2.5 TOOLS AND OIL

2.5.1 Tool List

The following tools are necessary for maintenance and repair of M190G.

Table 2.5 Tool List

No.	Tool	Availability
1	Brush (thin)	○
2	Brush (medium)	○
3	Cleaning brush	○
4	Precision phillips screwdriver (+) #0	○
5	Precision phillips screwdriver (+) #1	○
6	Tweezers	○
7	Slanted blade cutter	○
8	Pliers #0	○
9	Electric solder iron	○
10	ET holder #1.5	○
11	ET holder #2.3	○
12	Thickness gauge (0.45mm, 0.5mm, 0.55mm)	○

○ Commercially available

Chapter 3

Disassembly and Reassembly

3.1 Disassembly

In general, the disassembly procedure is the reverse of the assembly procedure given in Section 3.2 below. Note that the printer should never be disassembled beyond the "subassembly" and "unit" blocks indicated in the Overall Disassembly Diagram (Fig. 3.1), as disassembly of low-level component block will not only complicate reassembly and adjustment but may also lead to functional failures.

3.2 Assembly

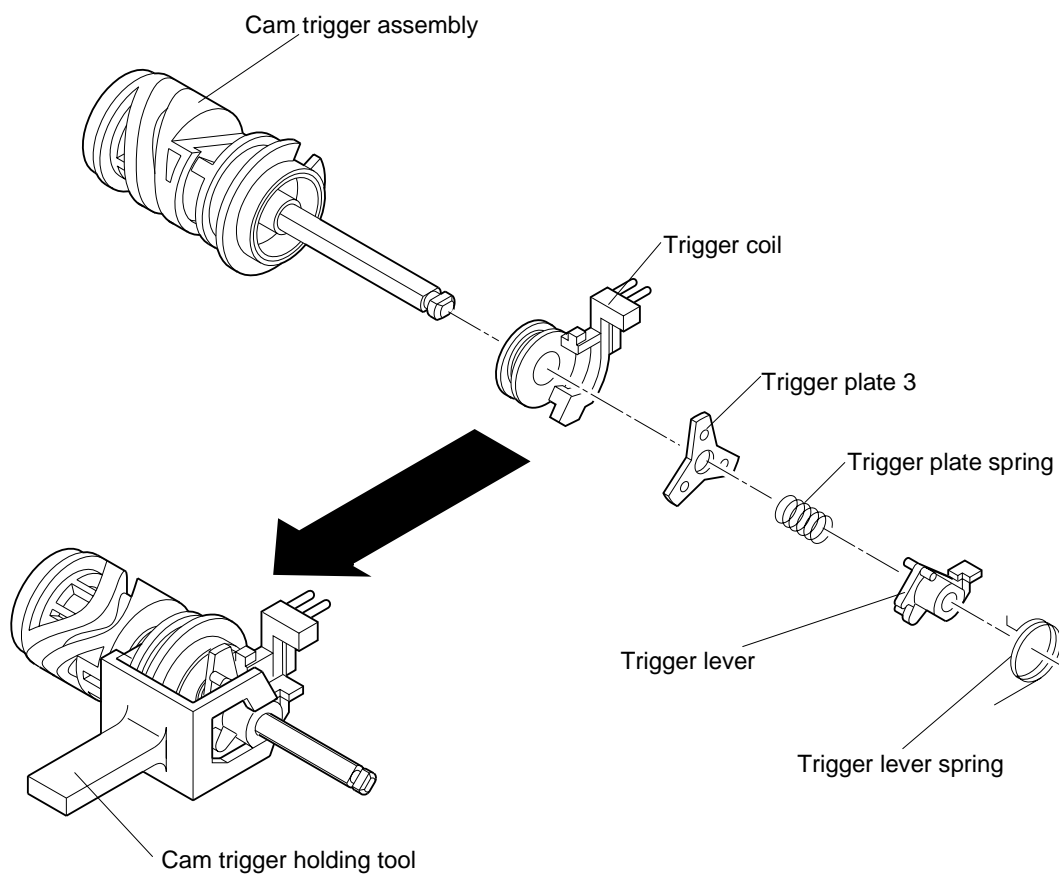
- The printer comprises one subassemblies and 10 main assemblies.
- Parentheses around a step number indicate that you must apply lubrication when carrying out that step of the assembly procedure. Refer also to section 2.4.3, "Oiling Points," as well as Figure 3.2, "Overall Oiling Diagram," (at the back of this manual) for information about all lubrication that must be carried out during and upon completion of printer assembly.
- Abbreviations for small components are as follows.
 - RE: E-ring (retaining ring)
 - CF: Cross-recessed Flat head screw
 - CP: Cross-recessed Pan head screw
 - CP(P1): Cross-recessed Pan head screw with Plane washer

Subassembly 1

Assembly Sequence

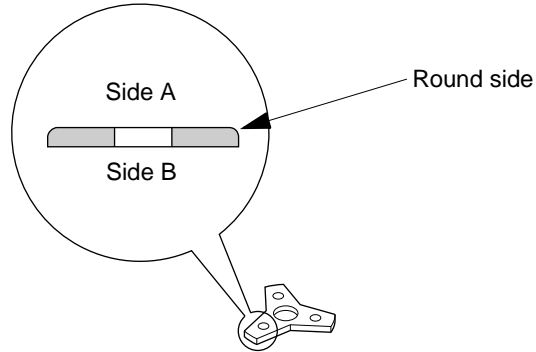
Assemble the parts with the following order.

1. Cam trigger assembly (x 1)
2. Trigger coil (x 1)
3. Trigger plate 3 (x 1)
4. Trigger plate spring (x 1)
5. Trigger lever (x1)
6. Trigger lever spring (x 1)
7. Cam trigger unit holding tool (x 1)

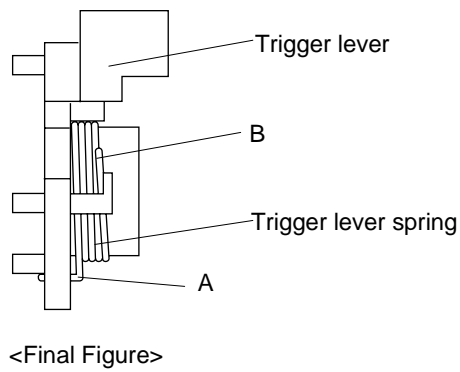
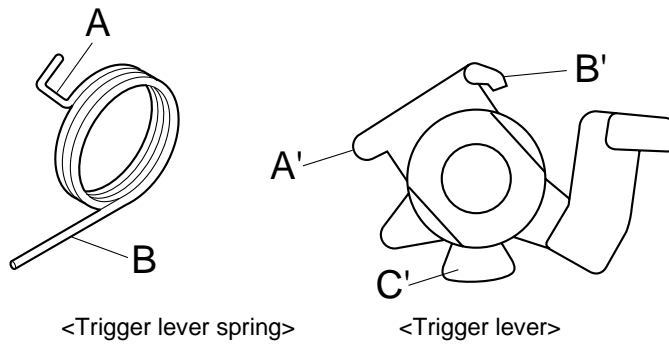


Assembly Instructions

- When attaching trigger plate 3:
Set so that side B (see illustration) is at the trigger coil side.

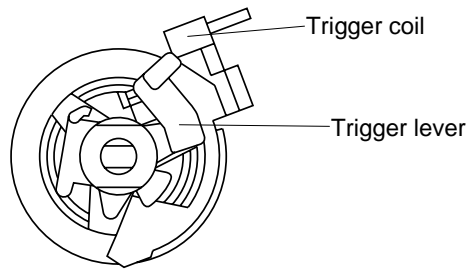


- When attaching the trigger lever spring:
Pass the hole of the trigger lever spring to the C' area of the trigger lever. Then, set the spring hooks into the trigger-lever latches (A into A', B into B').



- To attaching the trigger lever:

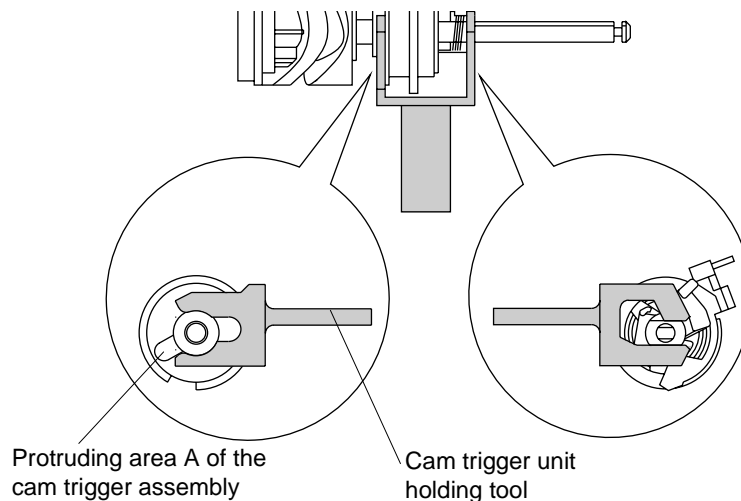
Set so that the three projections on the lever fit into the three corresponding holes on the trigger plate. Be sure that the trigger lever is oriented correctly with respect to the trigger coil (as shown in the drawing).



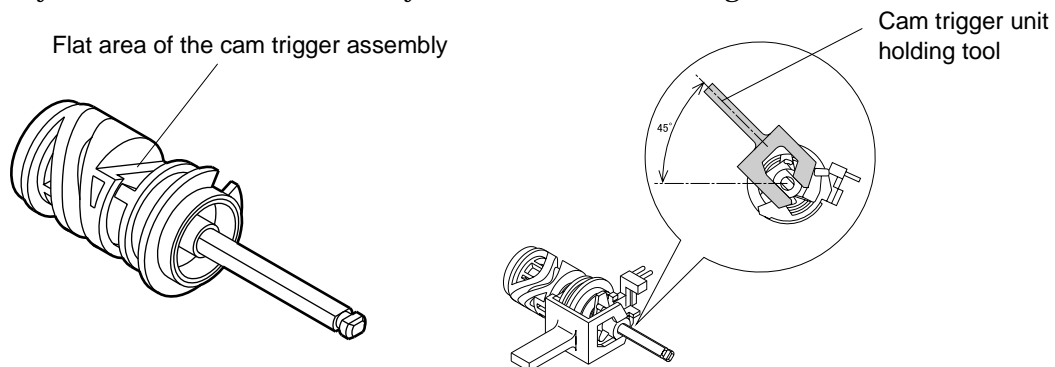
- To attach the cam trigger unit holding tool:

After mounting all components to the cam trigger assembly, hold down the trigger lever so that it remains flush with trigger plate 3 and attach the cam trigger unit holding tool. Be sure that positioning meets the following two conditions.

- > Be sure the holding tool is positioned correctly with respect to protruding area A of the cam trigger assembly, as shown in the drawing.



- > Be sure that the holding tool is positioned correctly with respect to flat area of the cam trigger assembly when lowered it horizontally, as shown in the drawing.

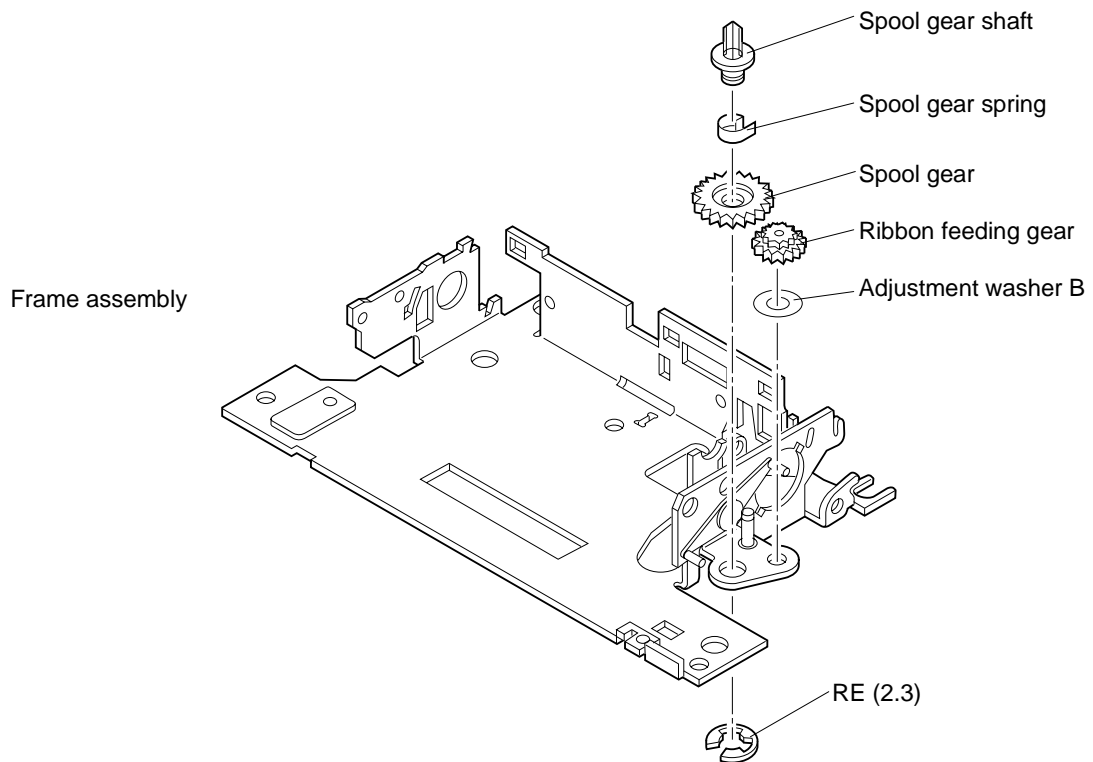


Main Assembly 1

Assembly Sequence

Assemble the parts with the following order.

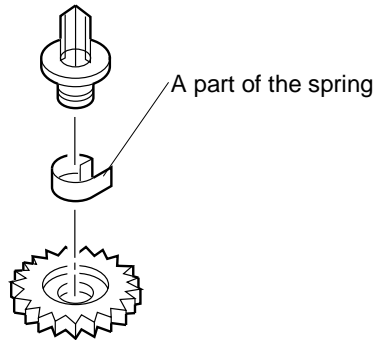
1. Frame assembly (x 1)
2. Adjustment washer B [2.6*0.13*4.7] (x 1)
3. Ribbon feeding gear (x1)
4. Spool gear spring (x1)
5. Spool gear shaft (x 1)
6. Spool gear (x 1)
7. RE (2.3) (x 1)



Assembly Instructions

- To attach the spool gear spring:

Insert the A part of the spring into the slit in the spool gear shaft. Make sure that the spring is positioned correctly with respect to the shaft, as shown in the drawing.



- To attach the spool gear shaft:

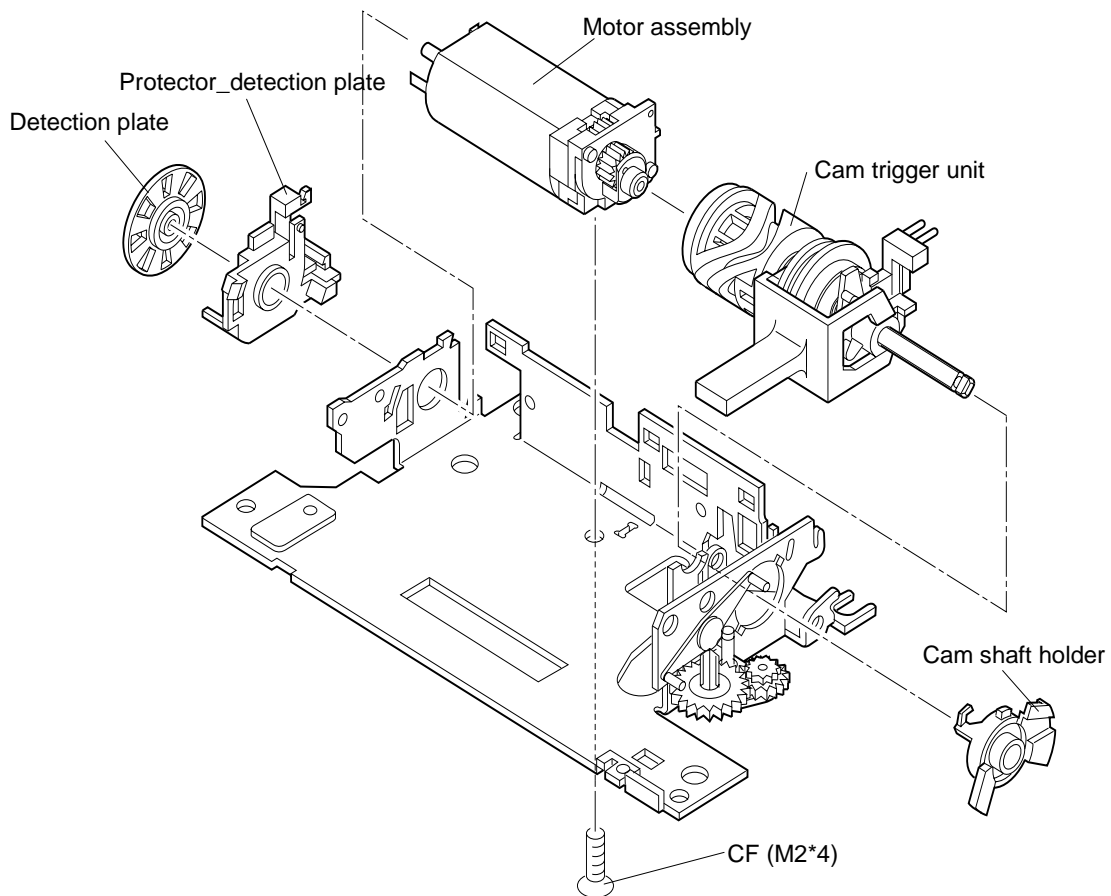
Rotate either the spool gear or the shaft to make the attachment. Be careful that the spring does not come off as you make the attachment.

Main Assembly 2

Assembly Sequence

Assemble the parts with the following order. Parentheses around a step number indicate that you must apply lubrication when carrying out that step of the assembly procedure.

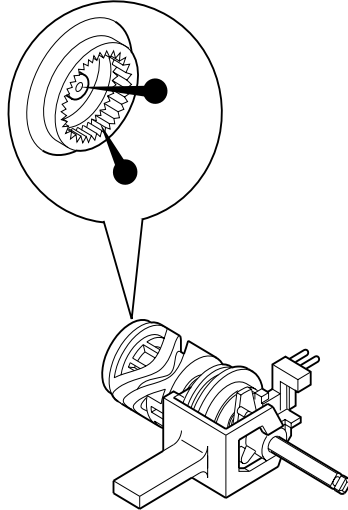
1. Motor assembly (x 1)
2. Cam trigger unit [subassembly 1] (x 1)
3. Cam shaft holder (x 1)
4. Remove the Cam trigger unit holding tool.
4. Protector_detection plate (x 1)
5. lead-wire-red (x 1)
6. Lead-wire-black (x 1)
7. Detection plate (x 1)
8. CF (M2*4) (x 1) [Tighten to torque: 19.6 ~ 24.5 N-cm (2.0 to 2.5kg-cm)]
9. Arrange the red and black lead wires.



Assembly Instructions

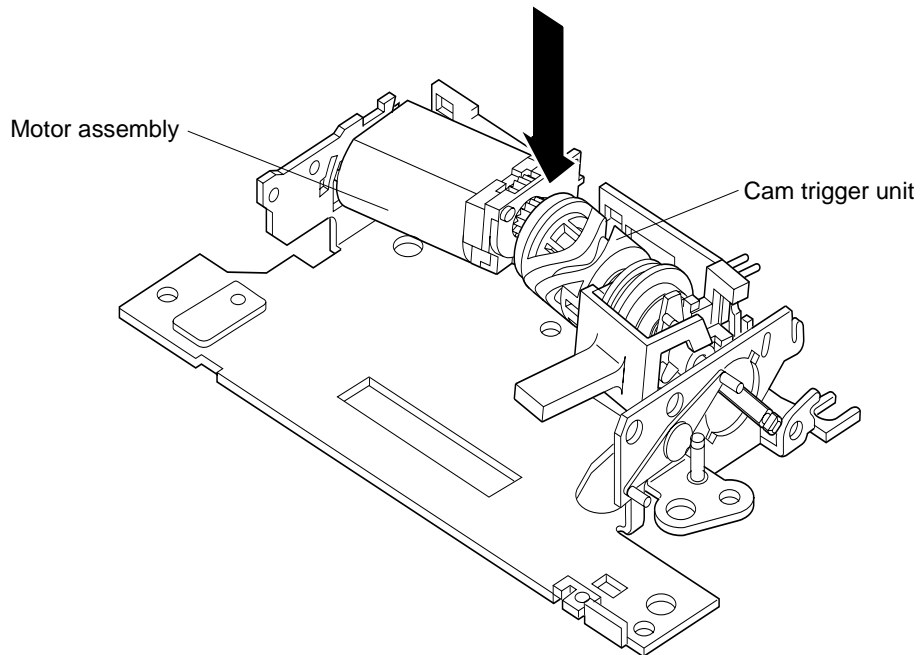
- To lubricate the cam trigger unit:

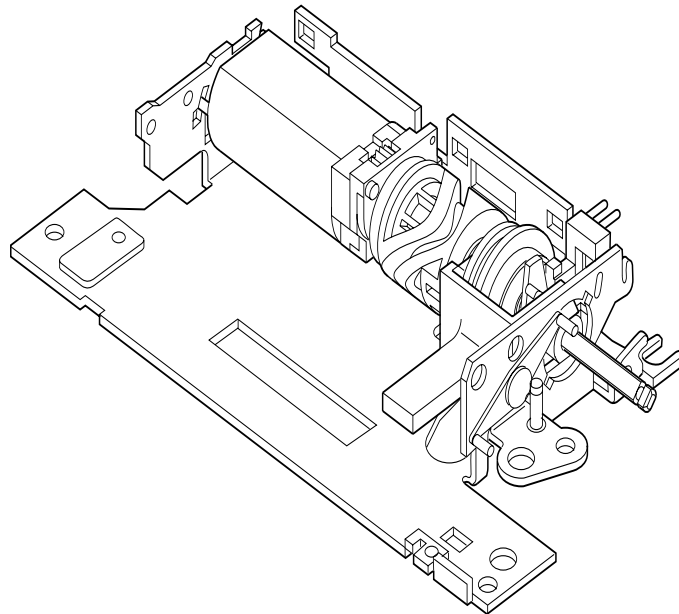
Apply the specified lubricant to the locations shown in the drawing below. (Refer to Table 2.3 "Oiling Points" and Figure 3.2 "Overall Oiling Diagram" for details.)



- When attaching the cam trigger unit:

Tilt the cam trigger unit and motor assembly as shown in the drawing.

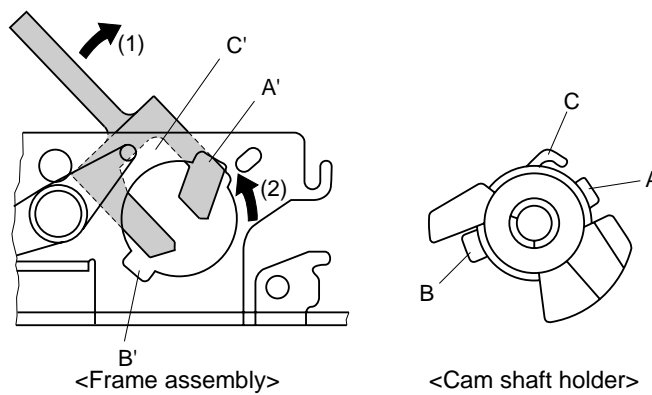




<Final Figure>

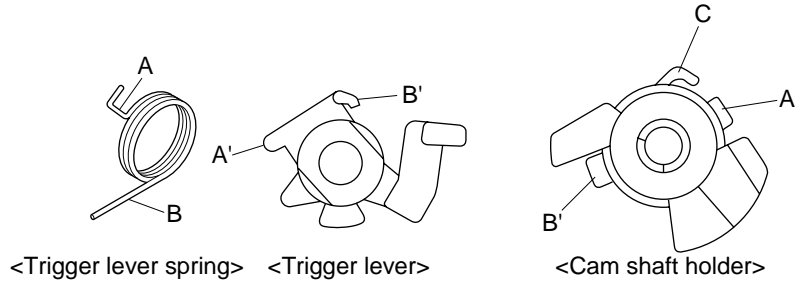
· To attach the cam shaft holder:
Use the following procedure to attach the holder.

1. Pass area C of the holder through hole A' in the frame assembly.
2. Align holder areas A and B with areas A' and B' on the frame assembly.
3. Push the holder in the direction of the cam trigger assembly. Rotate the hold tool in the direction shown by arrow (1) [see drawing below] so that the C area of the holder is put into the C' area.
4. Turn the holder in the direction of arrow (2) until it clicks into place. (Use the special holder-mounting tool.)



· After removing the cam trigger unit holding tool:

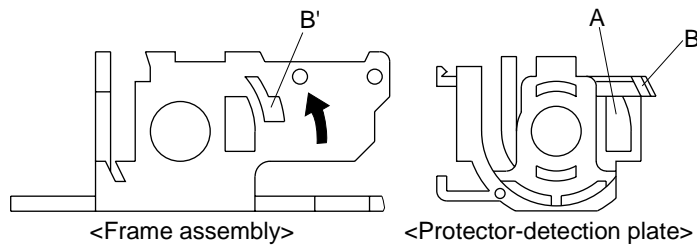
Unhook trigger-lever-spring area B from trigger-lever area B', and hook it to area C of the cam shaft holder.



· To attach the protector_detection plate:

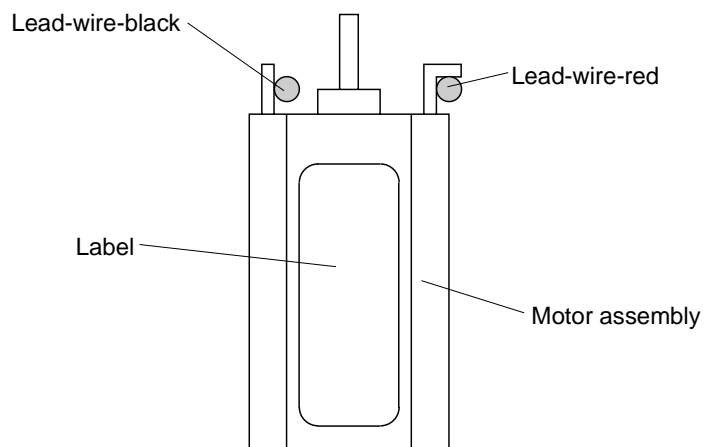
Use the following procedure to attach the protector.

1. Pass the red and black lead wires through hole A on the protector.
2. Align protector areas B with areas B' of the frame assembly.
3. Turn the protector in the direction of the arrow until it clicks into place.



· When connecting the lead wires:

Solder the wires in place as indicated in the drawing.

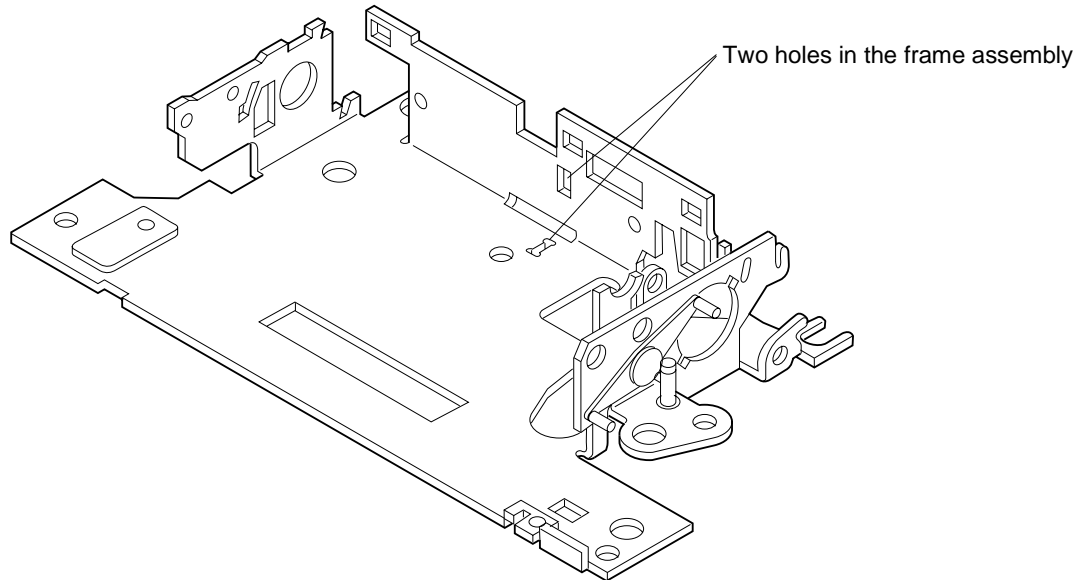


- When attaching the detection plate:

Push the plate in all the way.

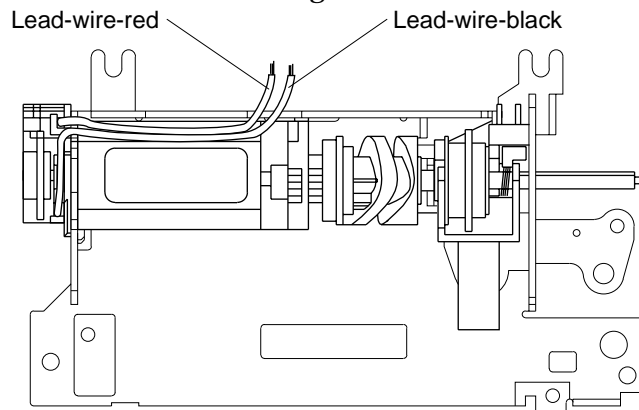
- When attaching the CF (M2*4):

Make sure that the 2 dowels on the motor assembly align with the two holes in the frame assembly.



- To arrange the lead wires:

Arrange the wires as shown in the drawing.

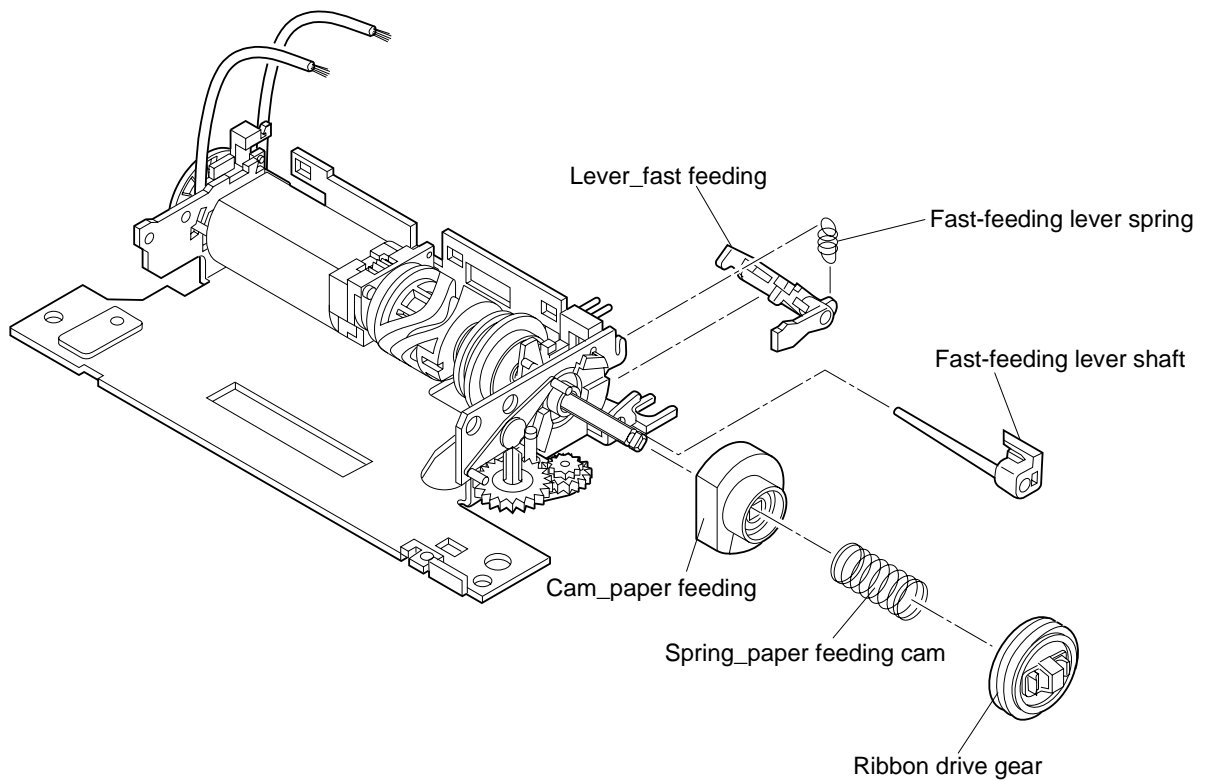


Main Assembly 3

Assembly Sequence

Assemble the parts with the following order. Parentheses around a step number indicate that you must apply lubrication when carrying out that step of the assembly procedure.

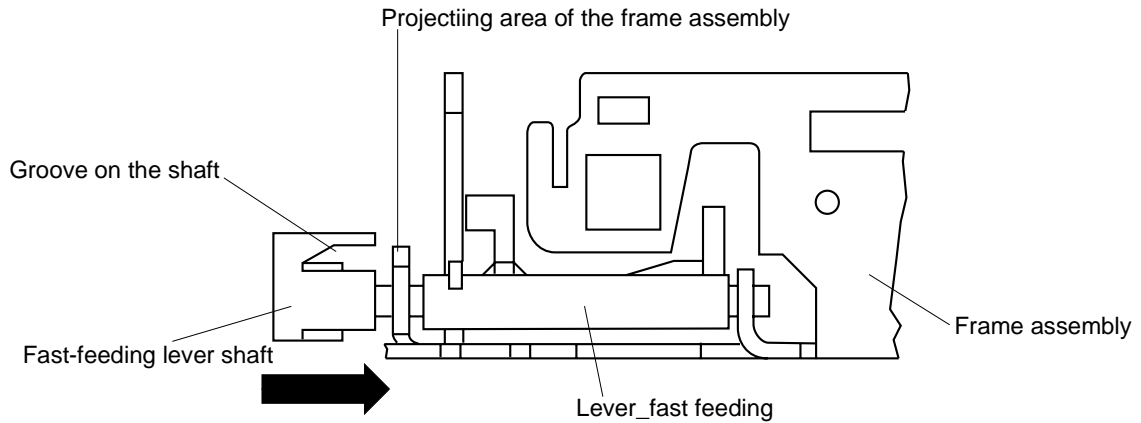
1. Lever_fast feeding (x 1)
2. Fast-feeding lever shaft (x 1)
3. Fast-feeding lever spring (x 1)
- (4) Cam_paper feeding (x 1)
5. Spring_paper feeding cam (x 1)
6. Ribbon drive gear (x 1)



Assembly Instructions

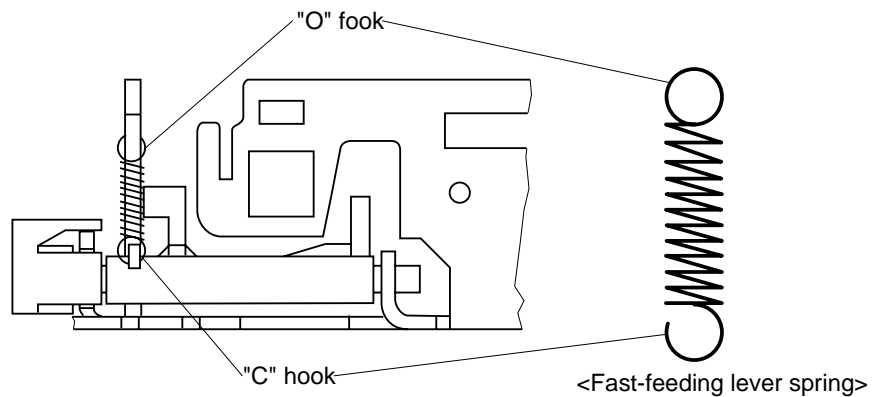
- To attach the fast-feeding lever shaft:

Align the groove on the shaft with the projecting area of the frame assembly. Push the shaft in the direction shown by the arrow until it fits into place.



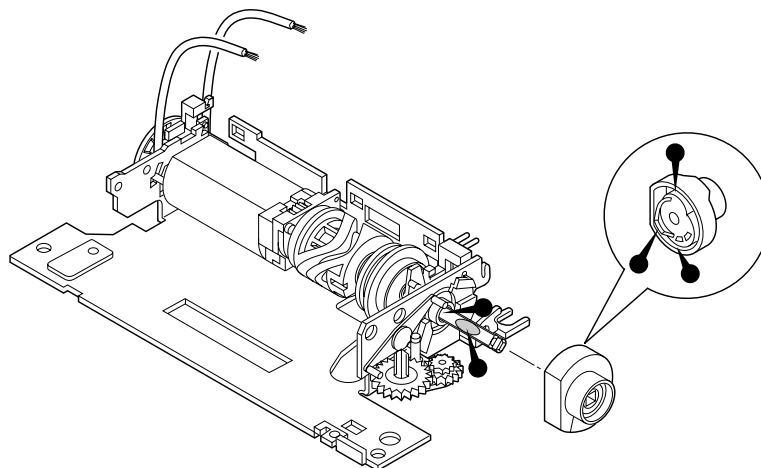
- To attach the fast-feeding lever spring:

Attach the spring's "O" hook to the frame assembly, and attach the "C" hook to the lever_fast feeding.



- To attach the cam_paper feeding:

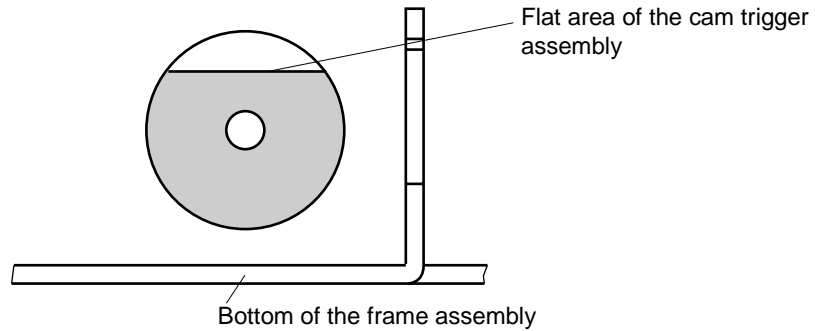
Apply the specified lubricant to the locations shown in the drawing below. (Refer to Table 2.3 "Oiling Points" and Figure 3.2 "Overall Oiling Diagram" for details.)



· To attach the cam_paper feeding:

Use the following procedure to attach the cam.

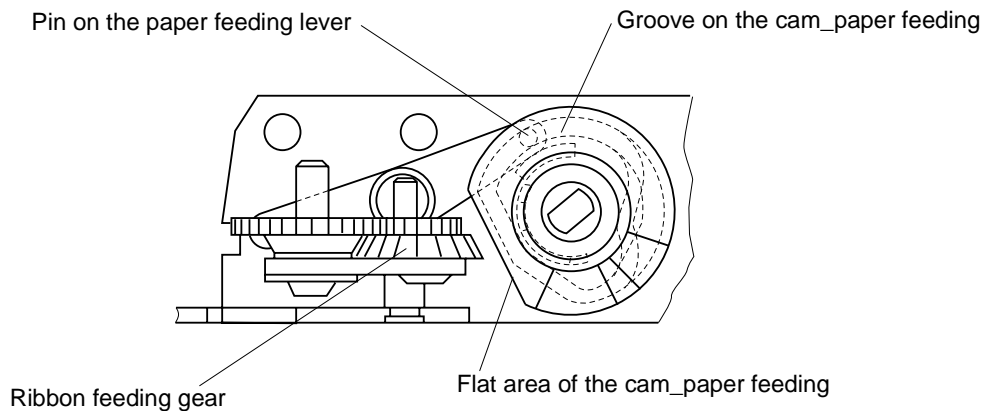
1. Rotate the cam trigger assembly so that flat area of the assembly is parallel with the bottom of the frame assembly.



2. Attach the cam_paper feeding, taking note of the following.

> Flat area of the cam must be facing the ribbon feeding gear.

> The pin on the paper feeding lever must fit into the groove on the cam.



· To attach the ribbon drive gear:

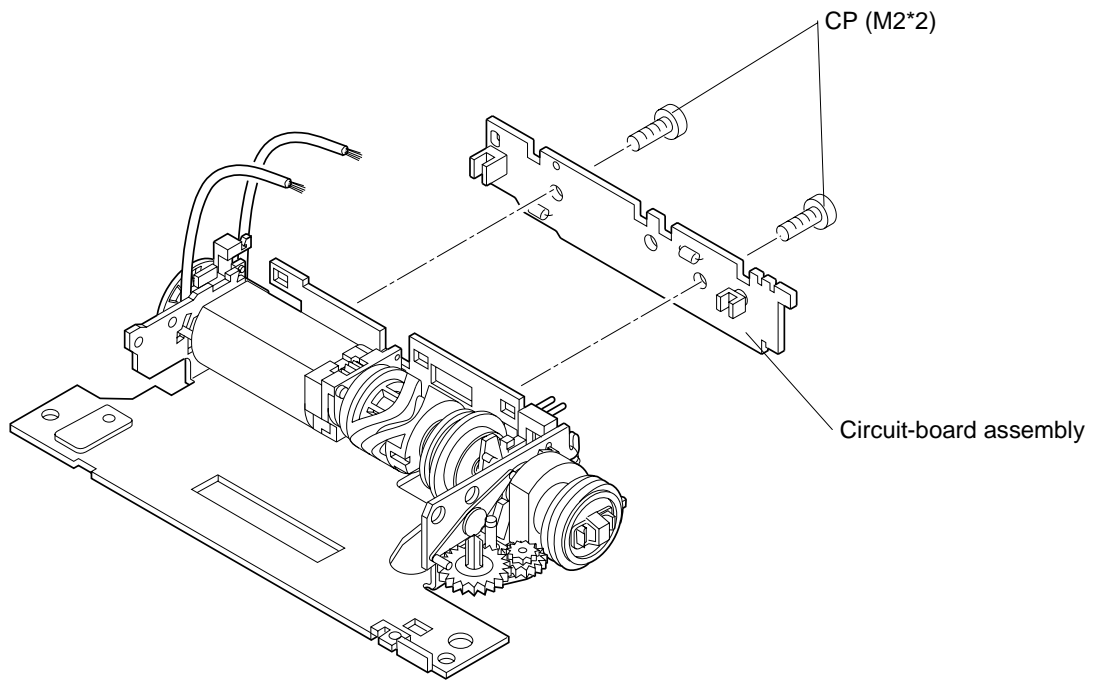
Push the gear in until it clicks into place.

Main Assembly 4

Assembly Sequence

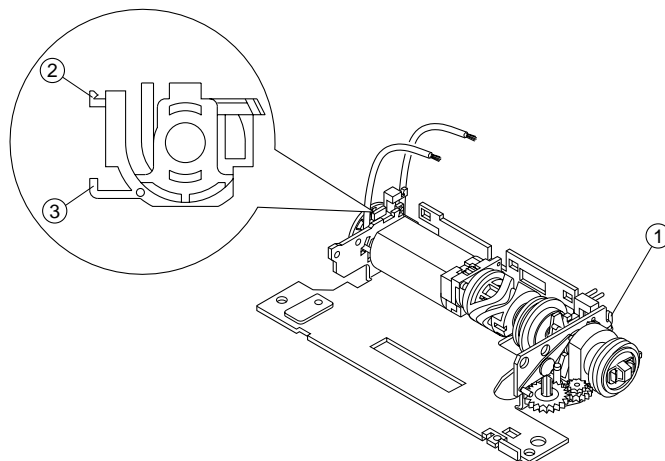
Assemble the parts with the following order.

1. Circuit-board assembly (x 1)
2. CP (M2*2) (x 2) [Tighten to torque 19.6 ~ 24.5 N-cm (2.0 to 2.5kg-cm)]

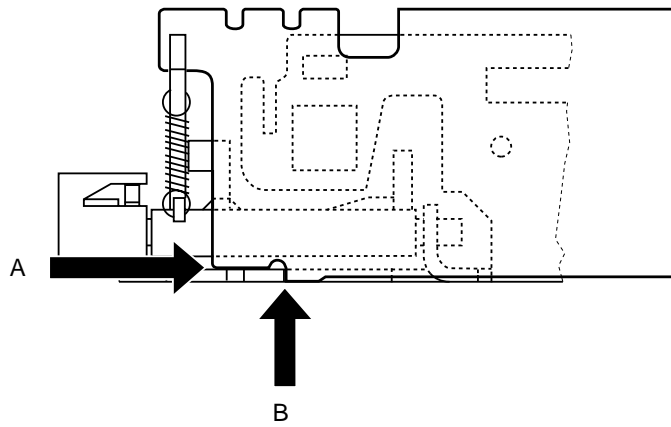


Assembly Instructions

- When attaching the circuit-board assembly, take note of the followings:
 1. Be sure that the three latches are correctly positioned.



2. No gap between the circuit-board assembly and the frame assembly in the A area and B area shown below.

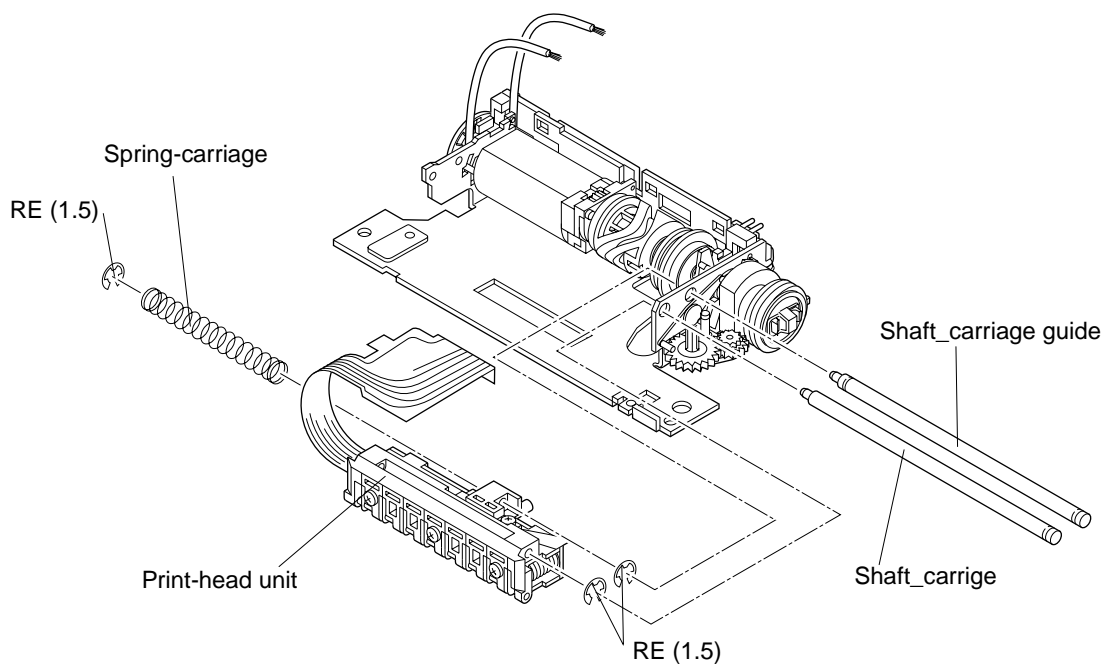


Main Assembly 5

Assembly Sequence

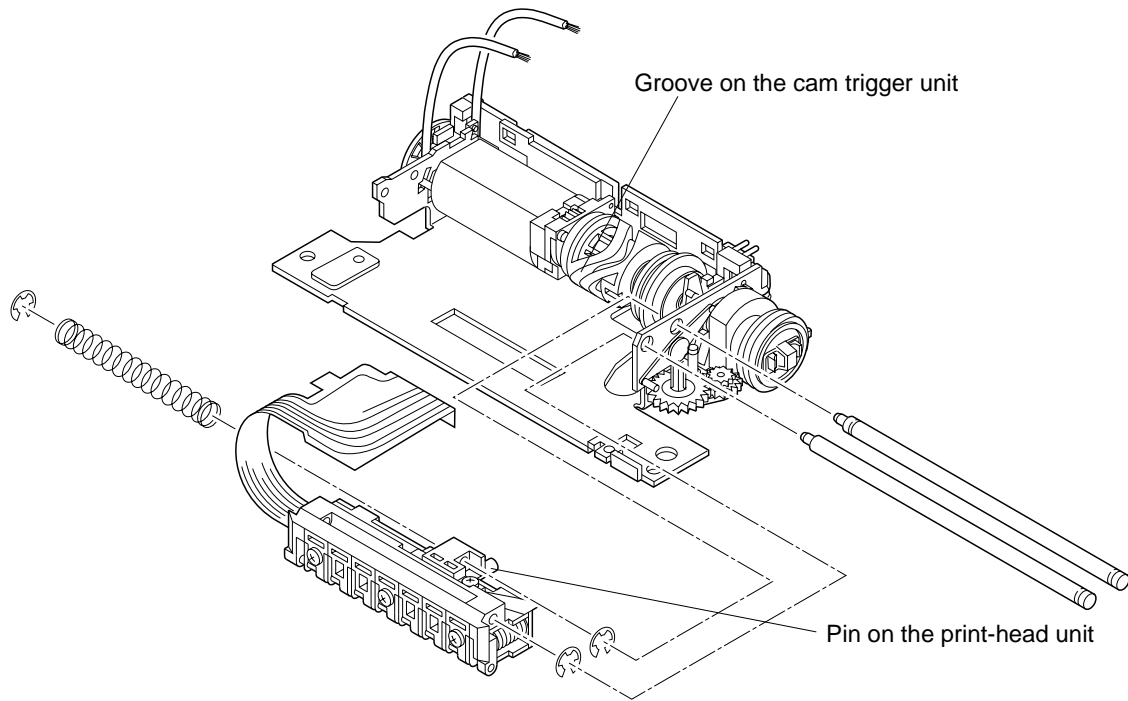
Assemble the parts with the following order.

1. Print-head unit (x 1)
2. Shaft_carriage (x 1)
3. Spring_carriage (x 1)
4. RE (1.5) (x 1) [To fasten the spring_carriage.]
5. Shaft_carriage guide (x 1)
6. RE (1.5) (x 2) [To fasten the shaft_carriage and shaft_carriage guide.]

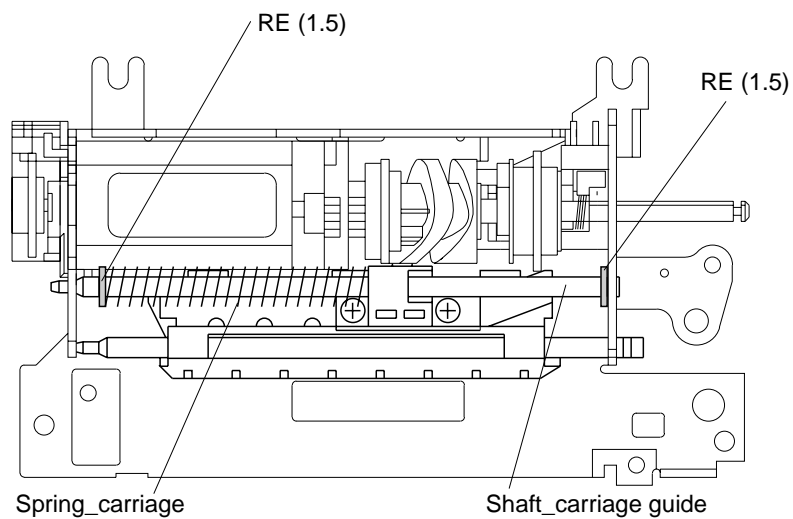


Assembly Instructions

- To attach the print-head unit:
Insert the pin on the print-head unit into the groove on the cam trigger unit.

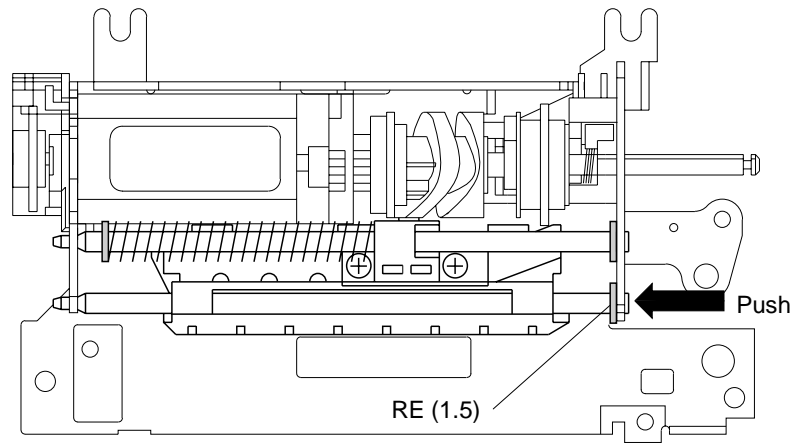


- To fasten the spring_carriage:
Attach the RE (1.5) as shown in the drawing.



· To attach the shaft_carriage:

Push the shaft in the direction shown by the arrow while attaching the RE's to the inside of the frame assembly.

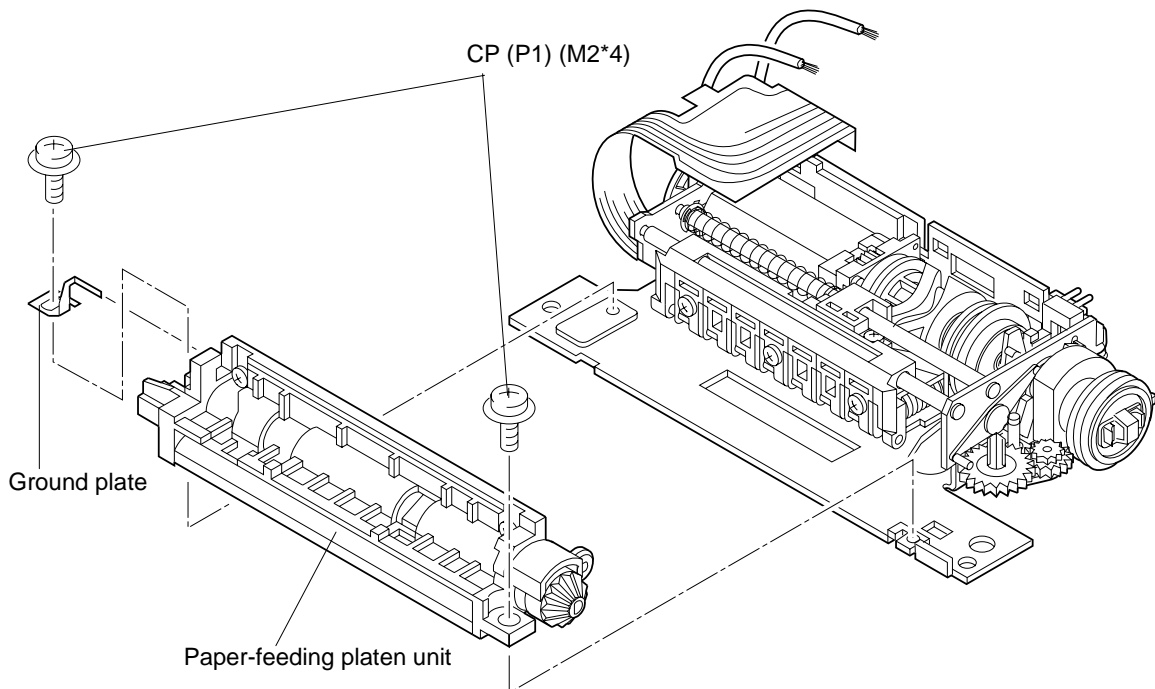


Main Assembly 6

Assembly Sequence

Assemble the parts with the following order.

1. Paper-feeding platen unit (x 1)
2. Ground plate (x 1)
3. CP(P1)(M2*4) (x 1) [Tightening torque: Temporary tightening only]



Assembly Instructions

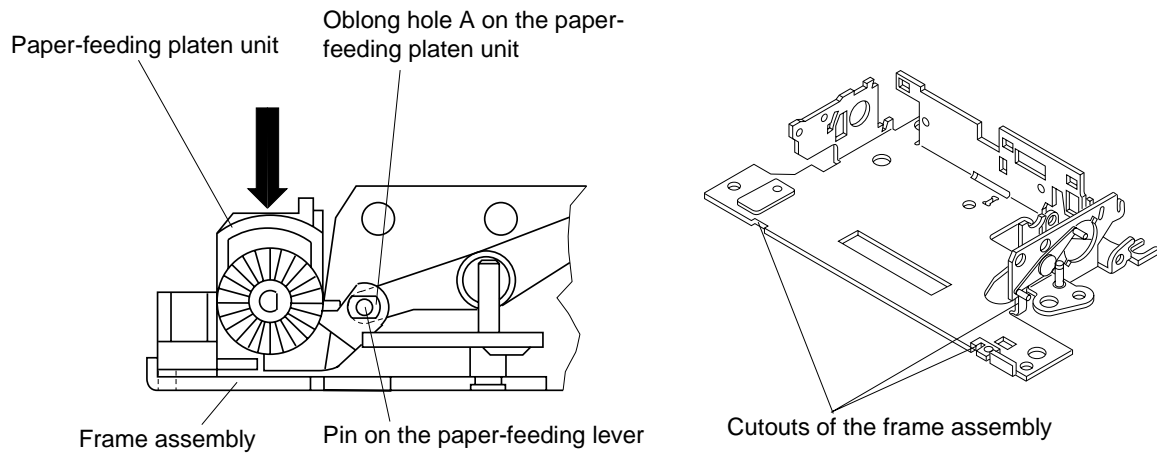
- Attachment of paper-feeding platen unit:

In this procedure the platen unit is set into place temporarily. You will need to come back and adjust the platen gap later (after all assembly work is completed).

Use the following procedure to attach the platen unit.

1. Fit the pin on the paper-feeding lever into oblong hole A on the platen unit.

2. Push the platen unit to the frame-assembly side, so that the three dowels on the platen unit fit into the cutouts on the frame assembly.



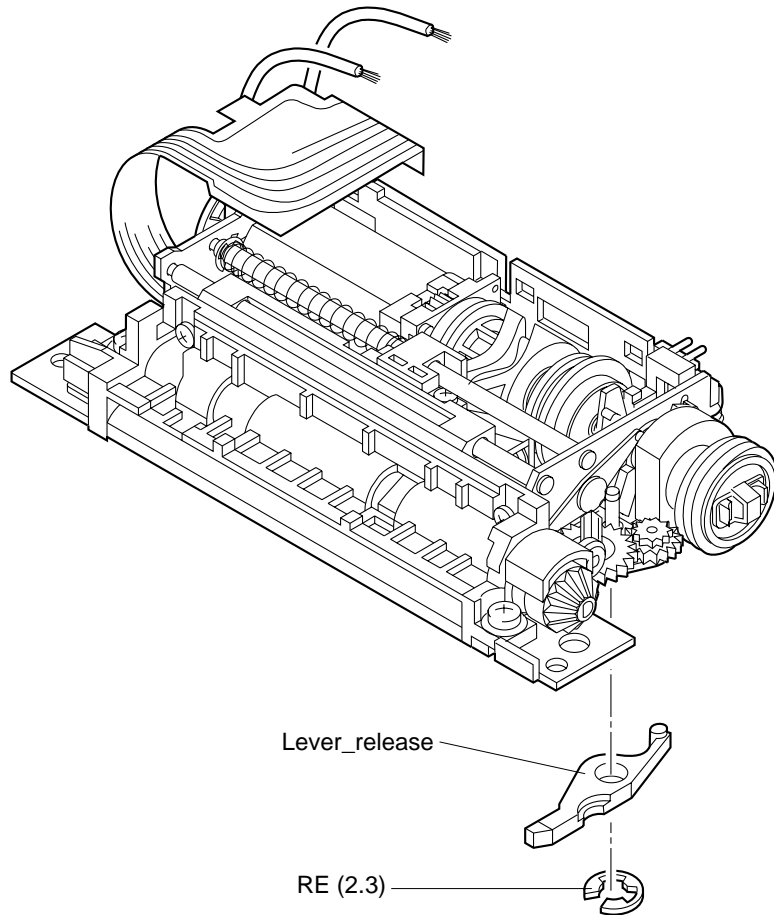
· To attach the ground plate:
Fit the projection part of the ground plate into the slit in the platen unit.

Main Assembly 7

Assembly Sequence

Assemble the parts with the following order.

1. Lever_release (x 1)
2. RE(2.3) (x 1)

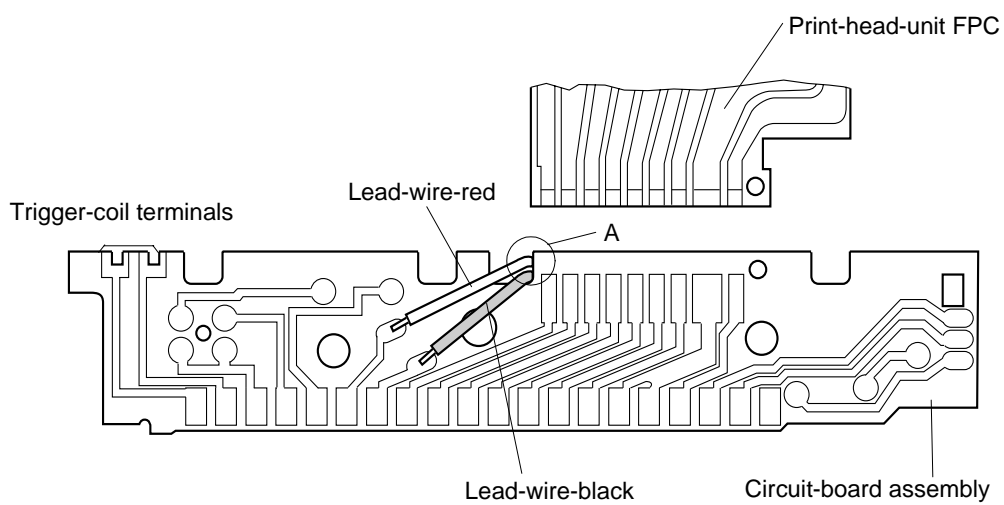


Main Assembly 8

Assembly Sequence

Assemble the parts with the following order.

1. Solder the red and black lead wires.
2. Solder the print-head-unit FPC.
3. Solder the trigger-coil terminals.



Assembly Instructions

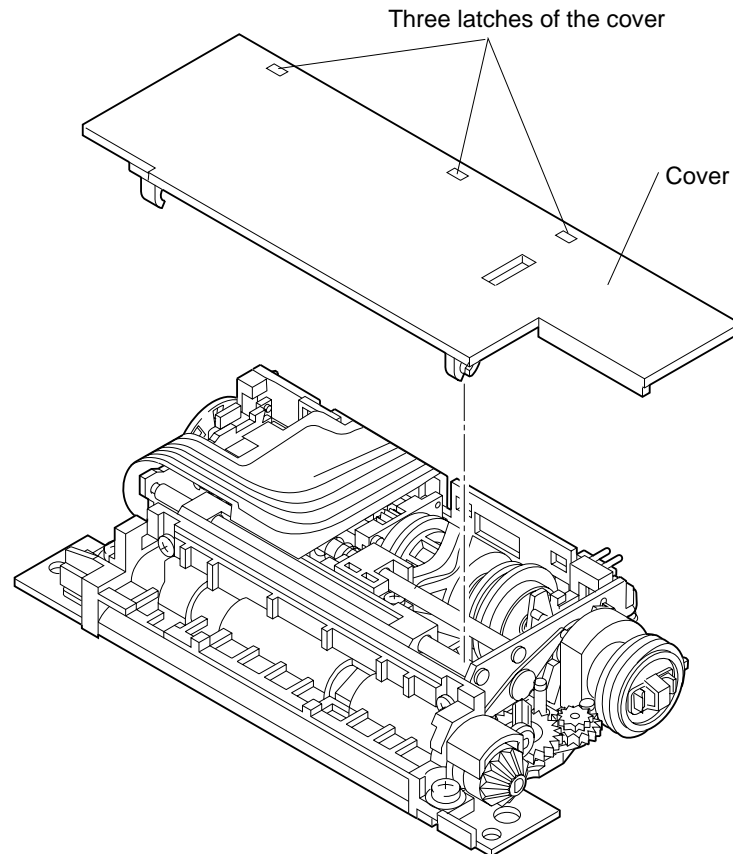
- To solder the red and black lead wires:
Arrange the lead wires as shown above. (A area)

Main Assembly 9

Assembly Sequence

Assemble the parts with the following order.

1. Cover (x 1)



Assembly Instructions

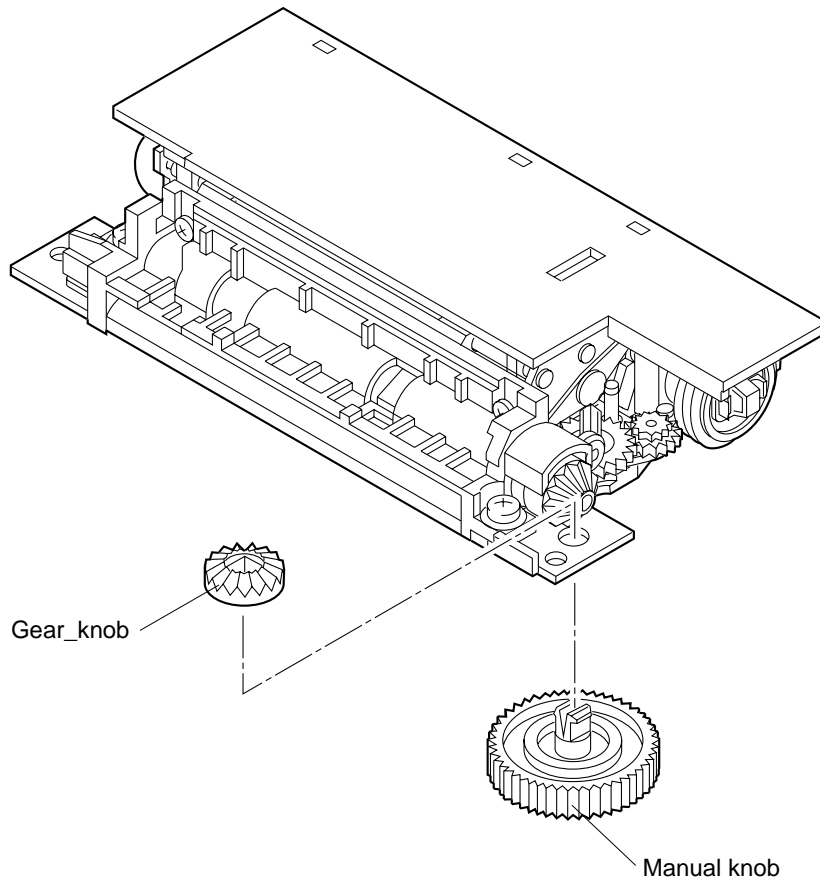
- First hook the cover's three latches to the frame assembly. Then hook the remaining latches to the shaft_carriage guide.

Main Assembly 10

Assembly Sequence

Assemble the parts with the following order.

1. Manual knob (x 1)
2. Gear_knob (x 1)



Assembly Instructions

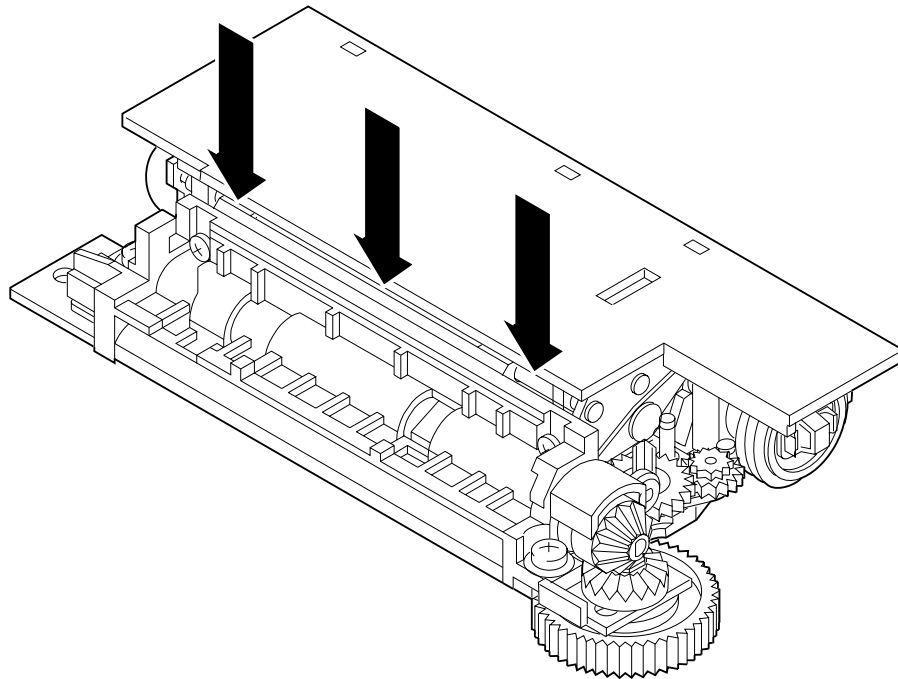
- To attach the manual knob:
Push the knob in until it clicks into place.

3.3 Adjustment

Adjusting the Platen Gap

Adjustment Procedure

1. Loosen the two screws holding the paper-feeding platen unit in place.
2. Using a gap gauge, adjust so that the gap is 0.5 ± 0.05 mm at each of the three locations indicated in the drawing.
3. Retighten the two screws to a torque of 19.6~24.5 N-cm (2.0 to 2.5 kg-cm).
4. Check the gap again with the gauge. If the gap is outside the range indicated above (0.5 ± 0.05 mm), repeat the adjustment from step 1.



3.4 Model M190G Parts Name List

Ref No.	Number	Name
102	1	Manual knob
103	1	Gear, knob
104	1	Motor assembly
106	1	Cam trigger assembly
107	1	Trigger lever spring
108	1	Trigger lever
109	1	Trigger plate spring
110	1	Trigger plate
111	1	Trigger coil
112	1	Cam, paper feeding
113	1	Spring, paper-feeding cam
114	1	Ribbon drive gear
115	1	Cam shaft holder
117	1	Fast-feeding lever spring
118	1	Fast-feeding lever shaft
119	1	Lever, fast feeding
120	1	Lever, release
121	1	Retaining ring type E (2.3)
123	1	Circuit-board assembly
124	2	Cross-recessed Pan head screw-3, 2 × 2, F/Zn
125	1	Print head unit
126	1	Shaft, carriage
127	1	Shaft, carriage guide
128	1	Spring, carriage
129	3	Retaining ring Type E (1.5)
130	1	Paper-feeding platen unit
131	1	Cover
132	1	Spool gear
133	1	Shaft, gear, spool
134	1	Spool gear spring
135	1	Ribbon feeding gear
136	1	Adjustment washer B (2. 6 × 0. 13 × 4. 7)
137	1	Retaining ring Type E (2.3)
138	1	Lead-wire-red
139	1	Lead-wire-black
140	1	Detection plate
141	1	Cross-recessed Flat head screw-1, 2 × 4, F/Ni
142	1	Ground plate
143	2	Cross-recessed Pan head screw with Plane washer W1, 2 × 4, F/Zn
144	1	Protector-detection plate

Overall Disassembly Diagram

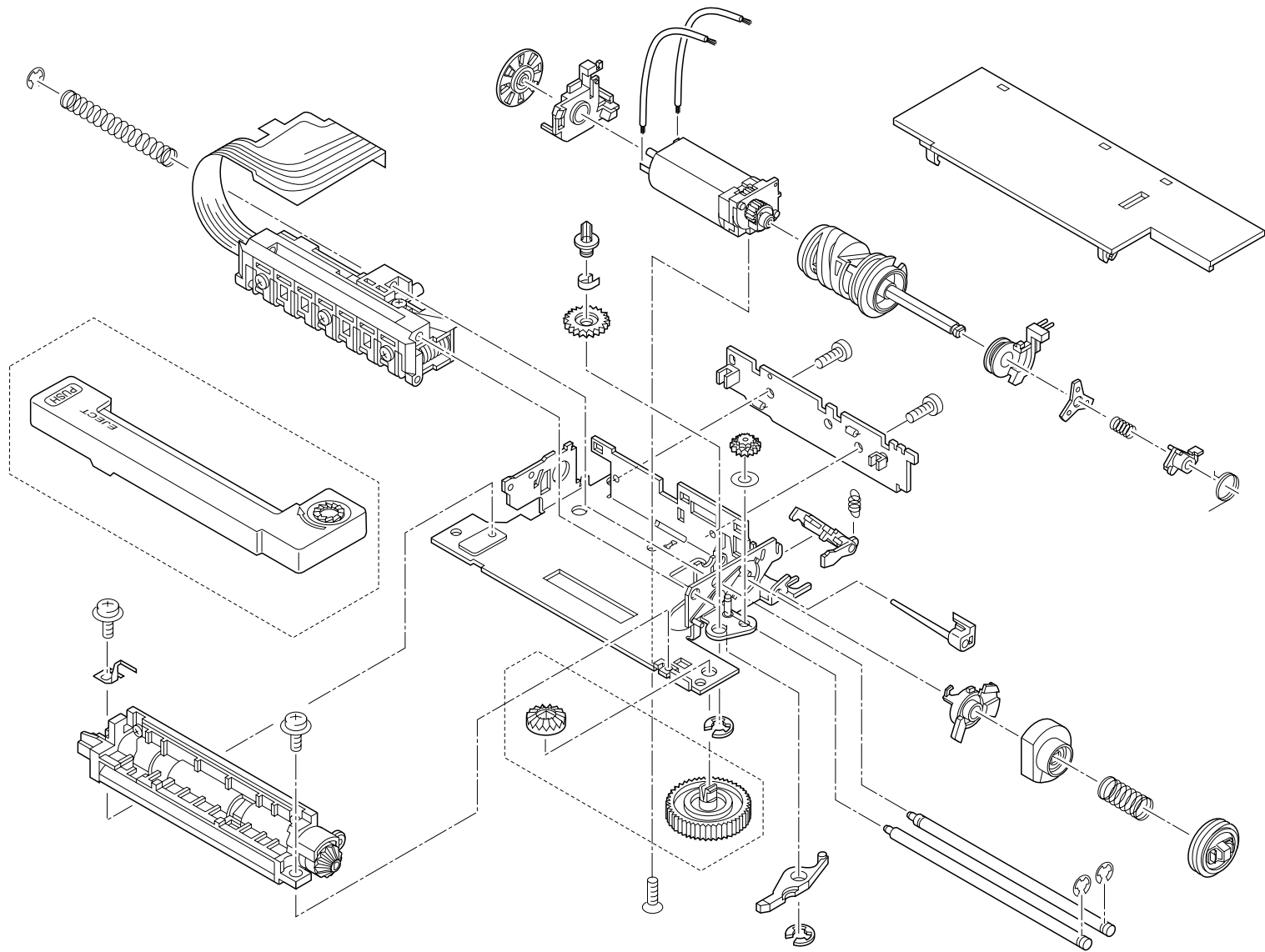


Figure3.1 Overall Disassembly Diagram

3.5 Oiling Points

The points marked with(*) in the table must be oiled during reassembly.

Rank A (Oil once each year.)

Oiling point number	Oiling point	Oil type	Method of oiling (Quantity of oil)
A-1 (*)	Contact point between shaft- cam and cam- paper feeding	O-3	Point oiling (One drip)
A-2	Contact point between cam trigger assembly and trigger plate 3 (Outside of the ring)	O-3	Line oiling (One rotation)
A-3	Contact point between lever-fast feeding and fast- feeding lever shaft	O-3	Point oiling (One drip)
A-4	Gear of the ribbon drive gearShaft of Lever,fast feeding which makes contact with the shaft of Lever,fast feeding	G-36	Line oiling (Half rotation with 2-mm-diameter grease)
A-5 A-6 A-7 A-8 A-9 A-10	Contact point between printing head unit and shaft-carriage /shaft -carriage guide (six points)	G-36	Point oiling (2-mm-diameter grease)
A-11	Contact point between ground plate-head and shaft-carriage guide	G-36	Point oiling (One drip)

Rank B (Oil after each 1,500,000 characters printed.)

Oiling point number	Oiling point	Oil type	Method of oiling (Quantity of oil)
B-1 (*)	Supporting point of cam-shaft holder	O-3	Point oiling (One drip)
B-2	Contact point between trigger lever and lever-fast feeding	O-3	Point oiling (One drip)
B-3	Shaft of roller-paper holder in the paper-feeding platen unit	O-3	Point oiling (One drip)
B-4 (*) B-5 (*)	Groove on cam-paper feeding (Two points, the top of cam form and the opposite side)	G-36	Point oiling (Fill the groove with 5-mm-long grease)
B-6 (*)	Contact point between cam-paper feeding and lever-fast feeding	G-36	Line oiling (Oil the entire edge of the cam form with 1-mm-diameter grease)
B-7	Contact point between lever-release and cam-paper feeding	G-36	Line oiling (Oil the entire edge of the cam form with 1-mm-diameter grease)
B-8 (*)	Shaft of cam trigger assembly	G-36	Point oiling (1-mm-diameter grease)

Oiling point number	Oiling point	Oil type	Method of oiling (Quantity of oil)
B-9 (*)	Inner teeth of cam trigger assembly	G-36	Line oiling (One rotation with 1-mm-diameter grease)
B-10	Supporting point of paper feeding lever	G-36	Line oiling (Half rotation with 1-mm-diameter grease)
B-11	Contact point between paper feeding lever and frame assembly	G-36	Line oiling (1-mm-diameter grease)
B-12	Shaft of paper feeding lever (One side)	G-36	Point oiling (2-mm-diameter grease)
B-13 B-14	Groove on cam-oscillation (Two points of the top of cam form)	G-36	Point oiling (Fill the groove with 10-mm-long grease)
B-15	Contact point between cam-trigger unit and frame assembly	G-36	Point oiling (Quarter rotation with 1-mm-diameter grease)
B-16 B-17 B-18	Retaining ring Type E fixing lever-release (three points)	G-36	Point oiling (Oil the inner side of the ring)
B-19	Retaining ring type E fixing spool gear assembly	G-36	Point oiling (Oil the inner side of the ring)
B-20	Contact point between ribbon feeding gear and the frame assembly	G-36	Point oiling (1-mm-diameter grease)
B-21	Contact point between lever-release and gear-paper feeding drive	G-36	Point oiling (2-mm-diameter grease)
B-22	Middle of the motor unit gear	G-36	Point oiling (1-mm-diameter grease)
B-23	Deceleration point of the motor unit gear	G-36	Point oiling (1-mm-diameter grease)

Overall Oiling Diagram

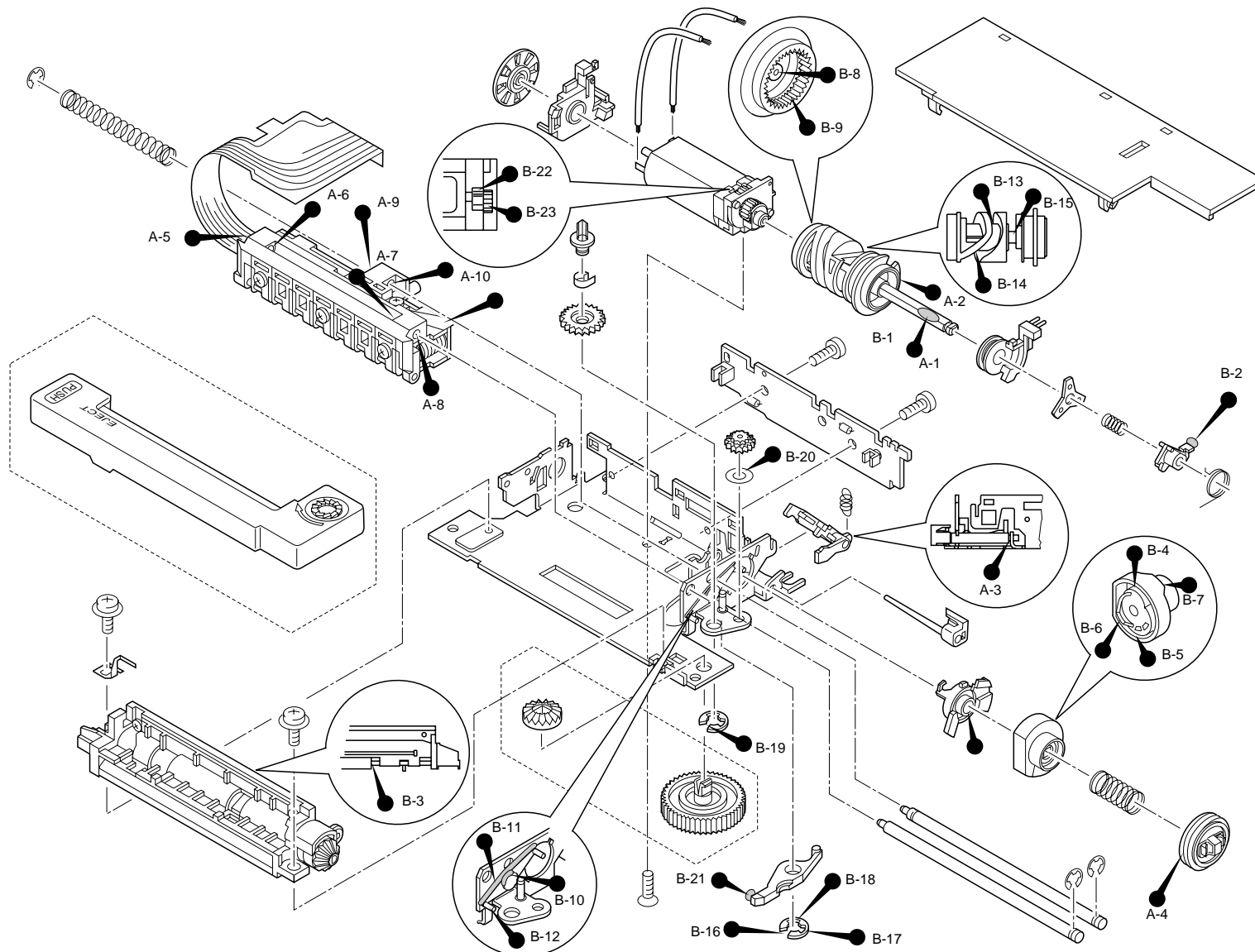


Figure3.2 Overall Oiling Diagram



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