Confidential

Service manual

TM-L90 series

Issued date	, ,
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English

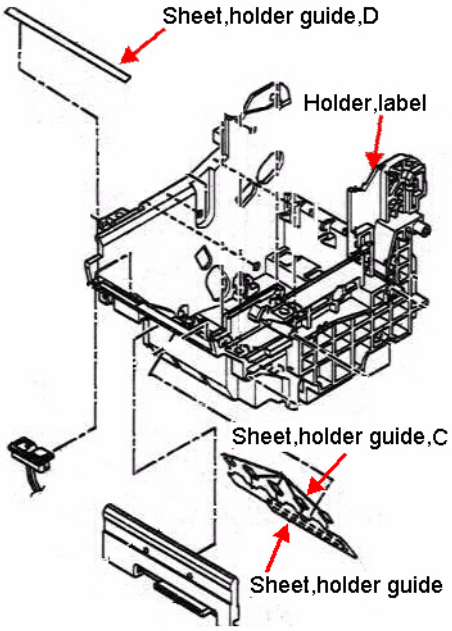
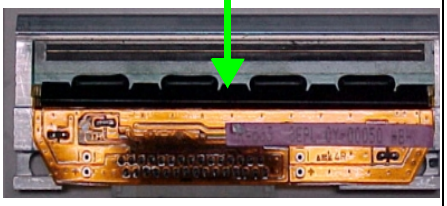
401392002
Rev.C

EPSON

Revision Table

Rev.	Page	Description
Rev. A	all pages	Newly authorized
Rev. B	viii	Add the information of the related documentation Reason for change: The "TM Service & Support Tool" is release.
	1-1	Add the "power supply unit type in the "specifications and configurations. Exclusive external power supply unit: PS-175 (North America only) or PS-180 (power supply packaged specification only). External power supply unit: Model PS-180 and PS-170. Reason for change: Missing information.
	2-2	Added the sentence below to the explaination "Paper is jammed inside the printer". {Please confirm to be attached the holder guide sheet C(#182) and D(#183) when the paper is jammed in spite of doing the above steps. (Refer to Appendix D-12.)} Reason for change: The parts "Holder guide sheet C(#182) and Holder guide sheet D(#183)" were provided in order to prevent the paper from jamming. Add the "before servicing" and "diagnosing failures". Reason for change: To make the explanation easier to understand.
	2-3	Change the "Troubleshoting Fliowcharts" to the "simptoms and solutions". Reason for change: To make the explanation easier to understand.
	2-5	Add the explanation to the "paper layout error" that is the automatically recoverable errors of the "Troubleshooting using the ERROR LED" Reason for change: Missing information.
	2-6	Add the below explanation to "Autocutter error" that is the automatically recoverable errors of the "Troubleshooting using the ERROR LED" ❑ Check the cutter motor sub-assembly. (see page 2-8.) Replace the motor and the main circuit board unit if the cutter motor sub-assembly has been shorted. (See page 3-39, 3-13.) ❑ Replace the main circuit board unit to see if the printer is repaired. (See page 3-13.) If the printer is repaired, analyze the defective part by referring to "Main Circuit Board Unit Test Points" on page appendix F-6. Reason for change: Missing information.
	2-8	Add the "test points on the printer mechanism". Reason for change: Because of changing chapter 2.
	3-17	Add the "inslating tape" to fix ferrite core.
	3-37	Add two spacers on the illustration.

Rev.	Page	Description
	4-1	Add the paper types for original and specified paper. Reason for change: To make the explanation easier to understand.
	6-10	Add the note about the setting for serial communication conditions.
	6-13	Changed the explanation for the "Capacity of the receive buffer" that is the function for the"memory switch1-2" old: Capacity of the receive buffer "large"/OFF. new: Capacity of the receive buffer "4KB"/OFF. old: Capacity of the receive buffer "small"/ON. new: Capacity of the receive buffer "45B"/ON. Reason for change: To make the explanation easier to understand.
Rev. B	6-15	Add the felow explanation for "select paper withs". 43 steps in increment of 1 mm, except for the size from 71 mm to 79 mm Reason for change: To make the explanation easier to understand.
	7-3	Add the explanation for "Precautions on paper handling". When the printer is not used for one week or more, it is recomended not to leave the thermal paper between the platen and the print head. Reason for change: Missing information.
	Appendix A	Add the explanation for the paper types for original and specified paper . (To ensure print quality, be sure to use the specified paper.) old: Label paper new: Lavel paper (with black mark) Lavel paper (without black mark) Reason for change: Missing information.
	Appendix D	The parts below were newly provided. spacer Sheet, holder guide, C Sheet, holder guide, D

Rev.	Page	Description
Rev. C		<Discontinued parts> Sheet, holder guide, (Ref# 176) Sheet, holder guide, C (Ref# 182) Sheet, holder guide, D (Ref# 183 
	3-26,46,52	The new parts “Spacer Thermal Head“ is added on Thermal Print Head.So the following illustration is changed. Before change After change Spacer Thermal Head  
	3-25,52	Added the explanation about the method of installing the head (new type) as “Important Note About Installing Thermal Print Head“.
	Appendix D-10	The part “Spacer Thermal Head“ on ParsList and Exploded Diagram is deleted.

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Contents

For Safe Repair and Maintenance Work

Key to Symbols

The symbols in this manual are identified by their level of importance, as defined below. Read the following carefully before handling the product.

⚠ *WARNING:*

You must follow warnings carefully to avoid serious bodily injury.

⚠ *CAUTION:*

Observe cautions to avoid minor injury to yourself, damage to your equipment, or loss of data.

✎ ***Note:***

Notes have important information and useful tips on the operation of your equipment.

Safety Precautions on Maintenance/Repair/Inspection

⚠ *WARNING:*

- *Be sure to use the designated type of fuse for the circuit board. Use of a different type may result in fire.*
- *Remove the power cord and all other cables from this product before disassembly or reassembly to prevent electrical shock.*
- *To prevent the possibility of electrical shock, do not perform maintenance, repair, or inspection during a thunderstorm.*
- *Shut down your equipment immediately if it produces smoke, a strange odor, or unusual noise. Continued use may lead to fire or electric shock. Immediately unplug the equipment.*
- *Only disassemble this product as described in this manual. Do not make modifications to the unit. Tampering with this product may result in injury, fire, or electric shock.*
- *Be sure to use the specified power source. Connection to an improper power source may cause fire or shock.*
- *Never insert or disconnect the power plug with wet hands. Doing so may result in severe shock.*

⚠ CAUTION:

- *When mounting or replacing the paper roll, be careful not to touch the manual cutter, because it is sharp and can injure you.*
- *This product contains other metal parts with sharp edges in addition to the cutter. Touching these parts also may cause injury.*
- *Parts on the circuit board may become hot during operation. Therefore, wait approximately 10 minutes after turning the power off before touching them.*
- *Note that the thermal print head and paper feed motor become very hot during normal operation, creating the danger of burn injury. Be sure to wait for about 10 minutes after turning printer power off before beginning the maintenance, repair, or inspection.*

Modular Connector

Use the modular connector specifically designed for the cash drawer for this product. Do not connect this connector to an ordinary telephone line.

About this Manual

Aim of the Manual

This manual was created to provide the information on printer maintenance and repair required by technicians who handle this work.

Contents of the Manual

The configuration of the manual is as follows.

Chapter 1 Product Overview	Describes features and configurations of the unit.
Chapter 2 Troubleshooting Guide	Explains troubleshooting (to pinpoint the problem area by the symptom).
Chapter 3 Disassembly and Assembly	Describes disassembly and assembly of the unit.
Chapter 4 Adjustment and Settings	Provides information about adjustment.
Chapter 5 Maintenance, Inspection, Cleaning, and Lubrication	Offers information about periodic maintenance and inspection, cleaning, and lubrication of the unit.
Chapter 6 Installation	Provides information about installation.
Chapter 7 Handling	Gives information about handling.
Appendix A Features and General Specifications	Describes major specifications of the unit.
Appendix B Overview of the Mechanisms	Describes major mechanisms of the unit.
Appendix C Tools	Provides information about tools required for maintenance and repair.
Appendix D Parts list	Lists service parts and gives an exploded view of the unit.
Appendix E Lubrication Points Diagram	Shows a lubrication drawing of the unit.
Appendix F Overview of Electric Circuits	Provides electric circuit diagrams and explanations about major elements

Related Documentation

Documents related to the TM-L90 are listed below.

Documentation

Related Documents

Name of document	Description
TM Service & Support Utility User's Manual *1)	This manual is written for the person that repairs or adjusts of the TM-L90.
TM-L90 User's Guide	This manual is written for the operator of the TM-L90.
TM-L90 Developer's Guide.	This manual is written for users who are designing TM-L90.

*1)TM Service & Support utility is to use for repairing the TM printer. The utility has the function below.

- It uses for repair of the TM-L90 and adjustment.

  The repairment means to change the print head, autocutter, main circuit board unit etc.

- Communication test, self-test, and test print can be performed.
- Setting for the memory switch or customized value can be performed.
- The error history information saved on the memory that a printer has when a printer is repaired can be reffered to.
- It can check that sensors are operating by using the demand of real-time status.
- Sequence peculiar to a printer, such as a paper layout setting, can be performed.
- The newest firmware released can be written in memeory that a printer has.
- It is released and multilingual fonts can be written in the memory that a printer has corresponding to multilingual.
- If a repair wizard is used, it can be made to complete by operating a series of work which is needed for part exchange according to a screen.

If you have any questions, please contact SD-Technical Support.

Mail Address: Sd.techsupt@exc.epson.co.jp

Chapter 1

Product Overview

The TM-L90 is a line-thermal printer for POS systems that can print on roll paper or a ticket.

TM-L90 external view

Specifications and Configurations

The TM-L90 is configured by combining features from the list below.

Table 1-1 Specifications and configurations

Features	Selection	Description
Interface type	UB-S01 (RS-232) UB-P02II (IEEE1284 (bidirectional parallel)) etc.	Use an EPSON-approved interface board
Font type	Alphanumeric Japanese Simplified Chinese Traditional Chinese Thai Korean	Use the EPSON-approved main circuit board
Autocutter setting	Partial cut Full cut	For details about how to set partial or full cut, see Chapter 6, “Installation.”
Paper width selection	38/60/80 mm, etc.	For details about how to set the paper width, see Chapter 6, “Installation.”
Power supply unit type	Exclusive external power supply unit: PS-175 (North America only) or PS-180 (power supply packaged specification only) External power supply unit: Model PS-180 and PS-170	--

Note: Selections in the table above may be added or changed in the future.

dpi: dots per 25.4 mm (dots per inch)

Chapter 2

Troubleshooting Guide

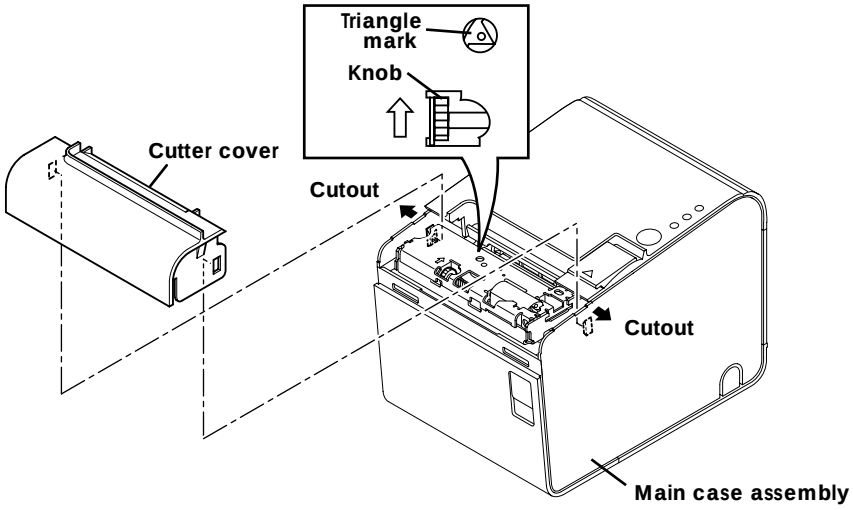
Preparations for Troubleshooting

Before troubleshooting, check and, if necessary, correct the following point.

Roll paper cover does not open (cover open lever does not move)

1. Lift up and remove the cutter cover by inserting a flathead screwdriver or similar tool into the cutout in the main case assembly and spreading it in the direction of an arrow.

2. Return the cutter blade to the normal position by rotating the autocutter knob in the direction of the arrow. When it is returned to the normal position, a triangle mark becomes visible through the hole in the autocutter frame.



3. Lift up the roll paper cover.

Note:

❑ *Besides a paper jam, a foreign object, such as a push pin, can cause the autocutter to lock up. If this is the case, follow the same procedure described above to return the cutter to its normal position.*

❑ *Do not open the cutter cover unless you find that the roll paper cover does not open.*

Paper is jammed inside the printer

⚠ CAUTION:

- *Take care not to let metal objects come into contact with the thermal head. Metal can damage the head.*
- *Do not touch the thermal head or radiation plate. Printing can cause them to become very hot.*

1. Power off the unit and open the roll paper cover. If you cannot open the roll paper cover, see the previous section.
2. Remove the jammed paper.

Please confirm to be attached the holder guide sheet C(#182) and D(#183) when the paper is jammed in spite of doing the above steps. (Refer to Appendix D-12.)

Before Servicing

Pages *vi* to *viii* at the beginning of this manual provide precautions you should observe to perform work safely and the necessary information to service this product safely. Always read that information before starting your work.

Diagnosing Failures

Use one of the following methods to identify the area where a failure occurred.

- See Table 2-1 for diagnosing failures by the symptom of the problem.
- See Table 2-3 on page 2-5 for diagnosing failures from the ERROR LED code.
- See Table F-5 on page Appendix F-7when the failure is on the main circuit board unit.

Note:
The explanation of how to use the self test is on page 2-4.
The explanation of power on self checks is on page appendix F-4.

Symptoms and Solutions

This explains how to find the source of a problem using the symptom. The numbers in the "Checkpoints" column indicate the order to use to check the problem. If you cannot determine the cause of the problem after checking the first item, proceed to the next number.

Table 2-1 Symptoms and Checkpoints

Symptom		Checkpoints (by Priority)
Power does not turn on. Power on self check is not completed. Or, POWER LED does not light.		1. Check the power supply unit. Check that 24V is coming out of the power supply. (See page F-6.) 2. Check the main circuit board unit. (See page F-6.) 3. Unplug the printer. Then unplug each motor or head or FFC's connector from the main board one by one; plug the printer back in, and power it on. This will let you know if any motor has burned out and is pulling down the power. (See page 3-13.) 4. Replace the I/F circuit board. (See page 3-11.) 5. Replace the Sub circuit board assembly. (See page 3-20.)
There are missing dots in the print.	ThermallPrinting Label printing	1. Clean the thermal print head assembly. (See page 5-2.) 2. Replace the thermal print head assembly. (See page 3-4.) 3. Replace the main circuit board unit. (See page 3-13.) 4. Replace the Head FFC. (See page 3-13.)
The print is thin.	Receipt Printing Label printing	1. Clean the thermal print head assembly. (See page 5-2.) 2. Setting the memory switch. (See page 6-12.) 3. Replace the thermal print head assembly. (See page 3-4.) 4. Replace the main circuit board unit. (See page 3-13.)
Unevenness occurs in the concentration of the print.	Receipt Printing Label printing	1. Clean the thermal print head assembly. (See page 5-2.) 2. Replace the thermal print head assembly. (See page 3-4.) 3. Replace the main circuit board unit. (See page 3-13.)
Paper feed failure.	Thermal Printing Label Printing	1. Check that the roll paper is properly loaded. (See page 7-6.) 2. Replace the main circuit board unit. (See page 3-13.) 3. Replace the receipt paper feed motor. (See page 3-34.)
Drawer kick operation failure.		1. Replace the main circuit board unit. (See page 3-13.) 2. Replace the Sub circuit board assembly. (See page 3-20.)
Missing characters/misprinted characters/font breakdown.		1. Check the setting for serial communication conditions by Self-test. (See page 2-4.) You can change the setting with the DIP switch 2 or memory switch (See page 6-10.). Also you can set with the 'Printer Status' function in the TM Printer Service & Support Utility. (See the TM Printer Service & Support Utility Operatation Guide.) 2. Replace the interface cable. (See page 6-11.)
ERROR LED is lit. (When it is flashing, see page 2-5.)		Close the roll paper cover secure.

How to Use the Self-test

There are two types of self-tests.

- ❑ Print tests

Print Tests

Testing the Thermal Printer

Execute this test using the following procedure.

Table 2-2 Running the thermal printer print test

Step	Operation	Printer Operation
1	Turn the power supply ON while pressing the FEED button, and continue to push the FEED button untill ERROR LED is li.	The printer will print the status of the printer settings. Afterward, the autocutter will cut the roll paper and the PAPER OUT LED will flash.
2	Press the FEED button after the PAPER OUT LED flashes.	The print test will be executed. When the print test is completed, the printer will print ***completed***. The printer will enter the normal printing mode when the test is ended.

Note:
You can interrupt the test print by pressing the FEED *button during the test. To continue, press the* FEED *button again.*

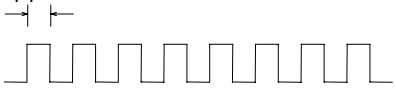
Troubleshooting Using the ERROR LED

You can learn the cause of a failure by checking the ERROR LED code. The following table shows problems and solutions to repair the printer. Numbers in the "Solutions" column indicate the order to use to check the problem. If you cannot determine the cause of the problem after checking all the solutions listed, go back to Table 1-1, earlier in this chapter.

Automatically recoverable errors

Automatically recoverable errors are not abnormalities.

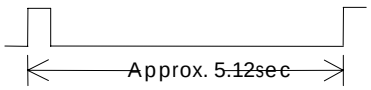
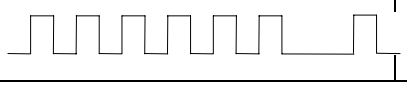
Table 2-3 Automatically recoverable errors

Error **ERROR LED Blinking Pattern**	**Description**	**Recovery**
Print head temperature error Approx. 320 msec 	The temperature of the print head is extremely high.	❑ Recovers automatically when the print head cools.
Roll paper cover open error 	Printing is not performed correctly due to a cover open.	❑ Replace the autocutter unit. Recovers automatically when the roll paper cover is closed.
Paper layout error 	Label paper or the black mark is not detected, or the paper layout of the paper installed in the printer and the setting of the paper layout defined by the **GS (E** command do not match.	❑ Recovers automatically when prpper label paper or the black mark installed in the printer.

Note:
With the memory switch, the "roll paper cover open" error can be specified either as an "automatically recoverable error" or as a "recoverable error."

Recoverable errors

Table 2-4 Recoverable errors

Error **ERROR LED Blinking Pattern**	**Description**	**Remedy**
Autocutter error 	The autocutter does not work correctly.	❑ Check to see if paper is jammed around the autocutter. If so that, remove the jammed paper. After then close the roll paper cover, turn it off, and then turn it on again. ❑ Check for paper dust or foreign particles attached to the autocutter blade (See the section, "Cleaning."in Chapter 5 for details on how to remove these). ❑ Check the cutter motor sub-assembly. (see page 2-8.) Replace the motor and the main circuit board unit if the cutter motor sub-assembly has been shorted. (See page 3-39, 3-13.) ❑ Replace the main circuit board unit to see if the printer is repaired. (See page 3-13.) if The printer is repaired, analyze the defective part by referring to "Main Circuit Board Unit Test Points". (See page Appendix F-6.) ❑ Replace the autocutter unit.
Paper layout error 	Label paper or the black mark is not detected, or the paper layout of the paper installed in the printer and the setting of the paper layout defined by the **GS (E** command do not match.	❑ Confirm if the error happened by the jammed paper while printing. If so that, remove the jammed paper. After then close the roll paper cover, turn it off, and then turn it on again ❑ Perform the threshold value setting for detectors. (See Chapter 4.) ❑ Check if the label paper or the black mark paper installed in the printer is a cause of the problem. ❑ Check if the paper layout of the paper installed in the printer and the setting of the paper layout defined by the **GS (E** command match. ❑ Check for paper dust or foreign particles attached to the LED holder assembly and the black mark paper detector circuit board assembly. ❑ Replace the LED holder assembly. ❑ Replace the black mark paper detector circuit board assembly.
Roll paper cover open error (when an error that can possibly recover is selected) *1) 	Printing is not performed correctly due to a cover open	❑ Close the roll paper cover, turn it off, and then turn it on again.

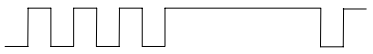
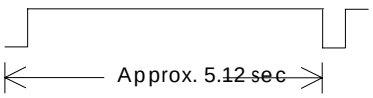
Note:
When a paper jam is present in the autocutter, turn off the unit and remove the jammed paper. Then turn it on again.

Non-recoverable errors

⚠ *CAUTION:*

When any error shown below occurs, turn off the power as soon as possible.

Table 2-5 Non-recoverable errors

Error **ERROR LED Blinking Pattern** **Approx. 320 msec**	**Description**	**Remedy**
R/W error in memory or gate array 	After R/W checking, the printer does not work correctly.	❑ Replace the main circuit board unit. (See page 3-13.)
High voltage error 	The power supply voltage is extremely high.	❑ Replace the power supply unit. ❑ Replace the main circuit board unit. (See page 3-13.)
Low voltage error 	The power supply voltage is extremely low.	❑ Replace the power supply unit. ❑ Replace the main circuit board unit. (See page 3-13.)
CPU execution error 	The CPU executes an incorrect address.	❑ Replace the main circuit board unit. (See page 3-13.)
Interface circuit board error 	Interface circuit board does not work correctly.	❑ Check installation status of the interface circuit board. ❑ Replace the interface circuit board. (See page 3-11.) ❑ Replace the main circuit board unit. (See page 3-13.)
Drive circuit error 	One of the following was detected. 1. Print head thermistor. 2. Level drive motor. assembly.	❑ Check installation status of the interface circuit board. ❑ Replace the head FFC. (See page 3-13.) ❑ Replace the thermal print head assembly. (See page 3-4.) ❑ Replace the main circuit board unit. (See page 3-13.) ❑ Replace the interface circuit board. (See page 3-11.)

Test Points on the Printer Mechanism

Before you replace the main circuit board to see if the printer is repaired, you need to check the printer mechanism. If the motor or the coils are shorted, replacing the main circuit board will not fix the problem. The following explains how to test the motors and coils.

Table 2-6 Test points on the printer mechanism

Name of Mechanism	Part Name	Internal Element	Function	Where to Check	Normal Status
Thermal mechanism assembly	Cutter motor sub-assembly	DC brush motor	Autocutter drive	Remove the cable connector connected to CN8 on the main circuit board. Test between + and -.	There is continuity. (Aproxinately 38 ± 3.8Ω)
	Paper feed motor	4-phase stepping motor 	Receipt paper feed	Remove the cable connector connected to CN9 on the main circuit board. Test between pin 1 and pin 2 and between pin 3 and pin 4.	Approximately 2.6 Ω (per phase)

Chapter 3

Disassembly and Assembly

Notes for Assembly and Disassembly

Always observe the following precautions when disassembling and assembling the printer.

⚠ *CAUTION:*

- ❑ *Wear a grounded wrist band when handling the internal circuit boards to prevent damage from static electricity.*
- ❑ *When removing an internal circuit board, place it on an anti-static rubber sheet or similar surface to prevent damage from static electricity.*
- ❑ *Be careful not to subject the circuit boards to shock or vibration, because this may damage them.*
- ❑ *Do not touch the circuit board or cable terminals with your hands to prevent contamination that may result in a malfunction.*
- ❑ *Always remove the power supply unit from the printer before working. Power is flowing to the internal circuit boards even if you turn the printer off at the power supply switch. You may damage the printer if you work while the power supply is still attached.*
- ❑ *Remove all peripheral equipment connected to the printer before starting work.*
- ❑ *Do not perform any work that is not described in this chapter. Doing so may result in injury or damage to the printer.*
- ❑ *Do not touch the FPC or FFC pins.*
- ❑ *Hold circuit boards only by their edges.*

How to Read this Chapter

Structure of this Chapter

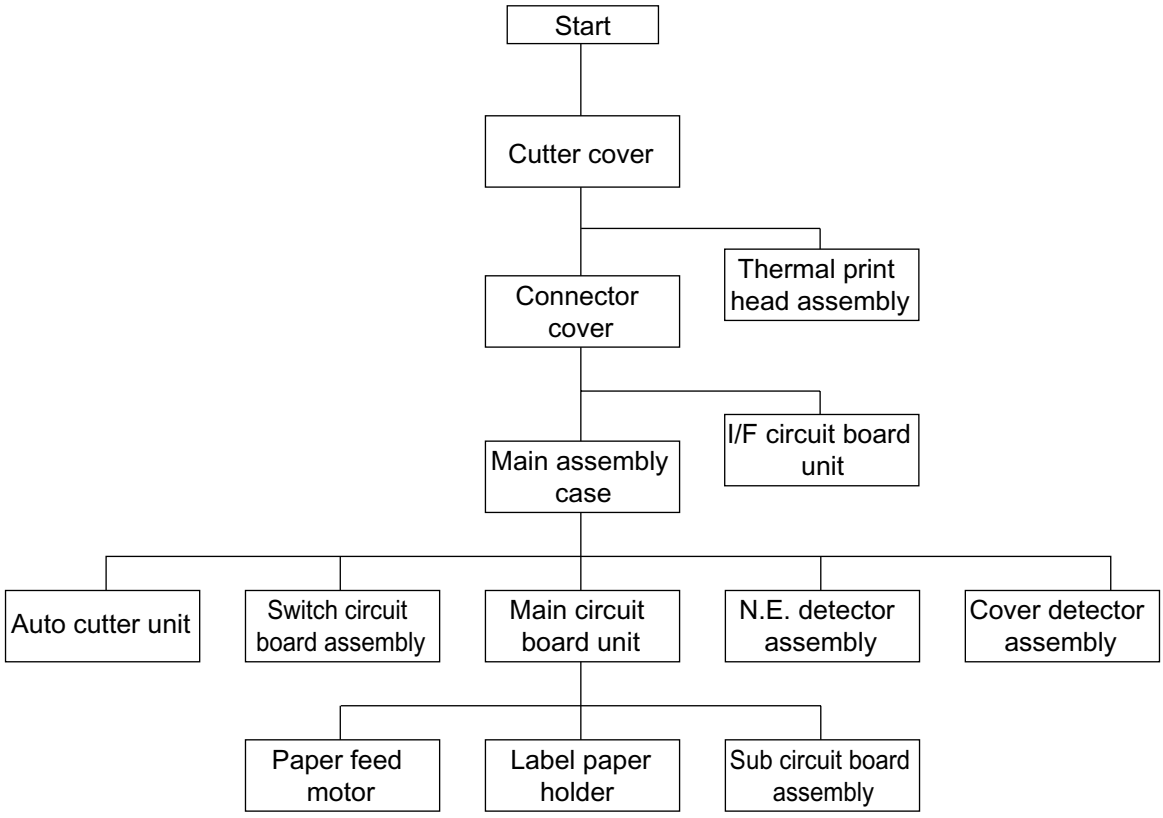
This chapter consists of the items listed in Table 3-1. Reading from the top item to the bottom in sequence allows users to disassemble all the serviceable parts.

Table 3-1 Structure of this chapter

	1st level	2nd level	3rd level
Disassembly and assembly of the TM-L90	Cutter cover		
	Connector cover		
	I/F circuit board unit		
	Main assembly case		
	Main circuit board unit		
Disassembly and assembly of the printer mechanism	Cable wiring		
	Roll paper cover unit	Roll paper cover unit	Platen holder
	Switch circuit board assembly		
	Sub circuit board assembly		
	Autocutter unit	Autocutter unit	
	Thermal print head assembly		
	Hinge cover		
	Label paper guide		
	Reduction gears		
	Label paper holder assembly	LED holder assembly and cover plate spring	
		NE detector assembly	
		Auxiliary holder plate and side plate guide shaft	
	Circuit board frame		
	Frame R and center frame		
	Front frame		
	Paper feed motor		

Shortest Route for Disassembly of Major Parts

The next diagram shows the shortest disassembly route of major parts. Perform disassembly by following this diagram as well as explanations for the target item. For the disassembly procedure of the thermal print head, see page 3-4.



Representation of Small Parts

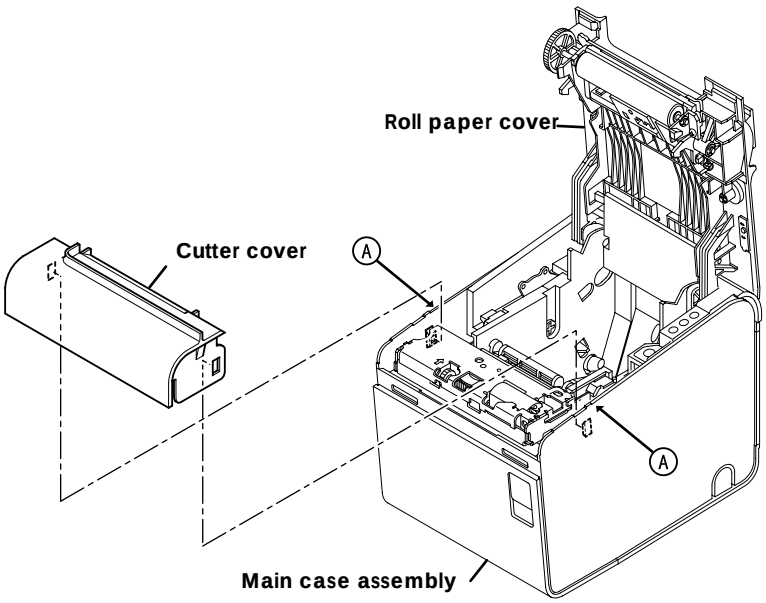
The standard small parts used in this chapter (such as screws, washers, and nuts) are all indicated with abbreviations. For details, see Appendix D, “Parts List.”

Replacing the Thermal Print Head Assembly

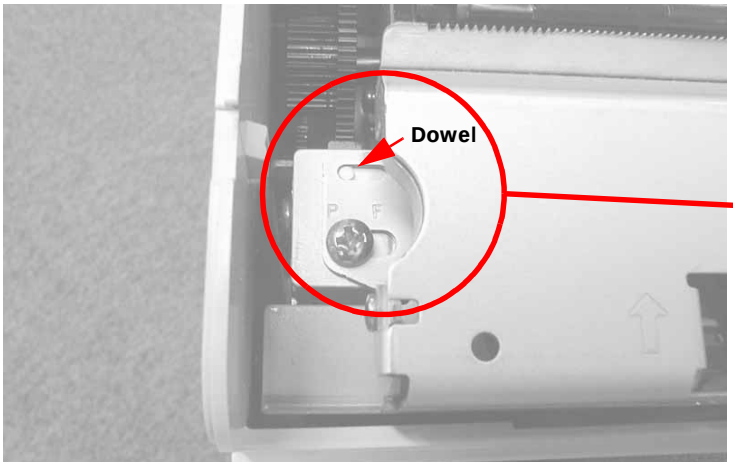
⚠ *CAUTION:*

- ❑ *This job may be performed only after turning off the printer and waiting for approximately 10 minutes. The thermal print head assembly may be hot, and otherwise, you might get burned.*
- ❑ *When performing this job, take anti-static measures, such as wearing a grounded wrist band. Failure to do so may result in thermal print head failure.*
- ❑ *Do not touch the print head (portion that appears like a black line, and the adjacent areas) in the thermal print head assembly. Touching this area may result in thermal print head failure.*
- ❑ *When the thermal print head assembly is contaminated or has a deposit of foreign particles, wipe it off with a cotton swab moistened with alcohol.*

1. Open the roll paper cover.
2. Remove the cutter cover by spreading area Ⓐ of the main case assembly, as shown below:



3. Users may choose between partial cut and full cut by adjusting the autocutter unit to the desired position. Check the part shown below to see if the autocutter is set to full cut or partial cut. When you install the autocutter unit, return the unit to the user's position.

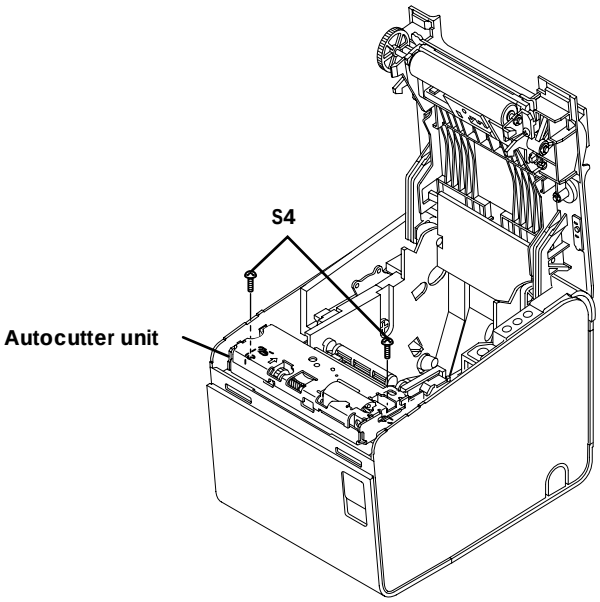


The dowel positions are marked "F" and "P."

To select partial cut: adjust the dowel to the position marked P.

To select full cut: adjust the dowel to the position marked F.

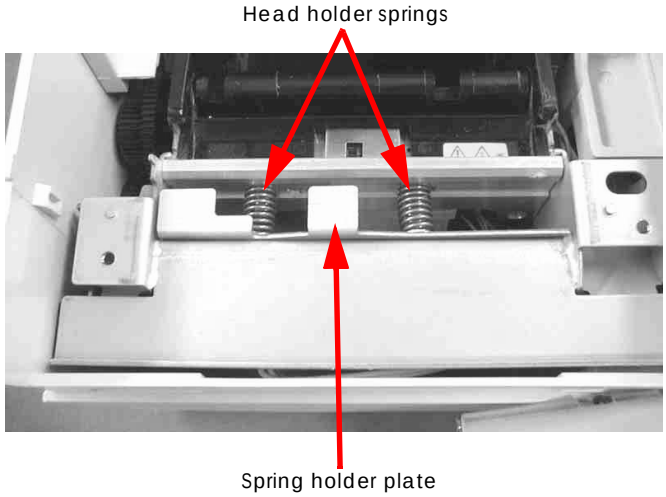
4. Remove the autocutter unit by removing the two S4 screws securing it. Stand the removed autocutter unit against the front of the printer.



5. While holding the two head holder springs so they do not fly out, pull out the spring holder plate.

⚠ CAUTION:

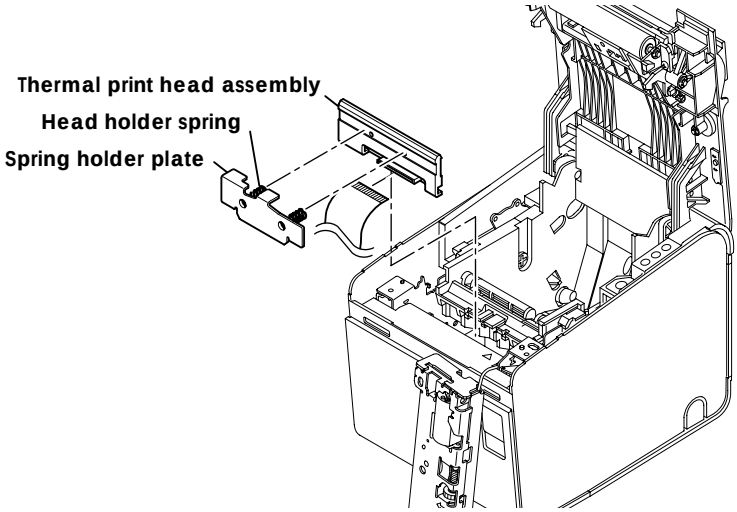
Be sure to hold the two head holder springs while removing spring holder plate. Otherwise, head holder springs may suddenly fly out, creating the danger of eye injury.



6. Lift up the thermal print head assembly and remove the head FFC from the thermal print head assembly.

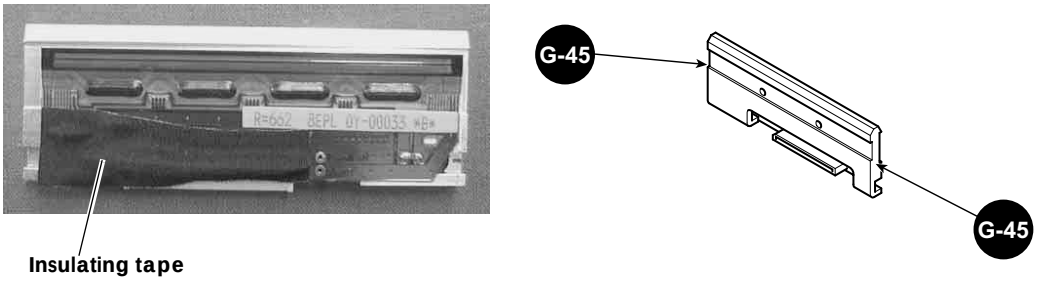
⚠ CAUTION:

To prevent static-generated failures, keep the removed thermal print head assembly in an anti-static bag or other suitable container.



Follow the steps below to assemble the parts.

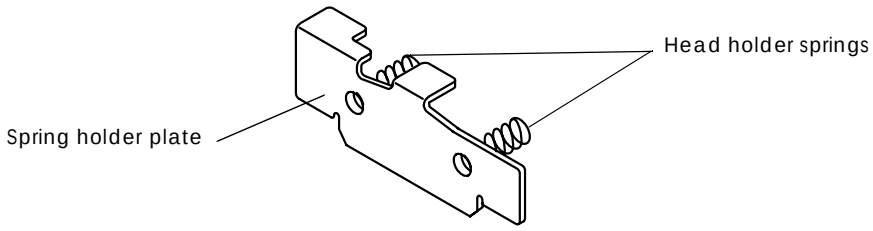
1. Attach the insulating tape on the new thermal print head assembly, as shown below; then lubricate with G-45 along the surfaces on both ends of the head assembly.



2. Attach the head FFC to the connector of the thermal print head assembly.

3. Place the thermal print head assembly in its installation position inside the printer.

4. Insert the two head holder springs onto the two dowels on the spring holder plate by rotating them.



5. Insert the two head holder springs into the groove in the thermal print head assembly.

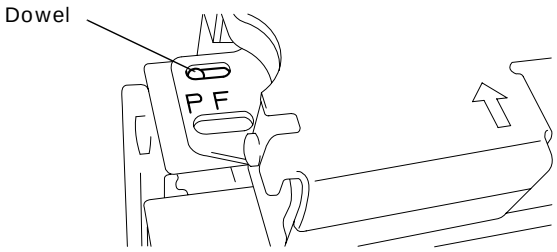
6. While holding the two head holder springs so they do not fly out, install the spring holder plate.

> ⚠ ***CAUTION:***
>
> *Be sure to hold the two head holder springs while installing the spring holder plate. Otherwise, the head holder springs may suddenly fly out, creating the danger of eye injury.*

7. Adjust the two head holder springs so they are perpendicular with the thermal print head assembly.

8. Attach the autocutter unit in its installation position. At this time, align the two dowels on the frame assembly with the two slits in the autocutter unit.

9. Set the autocutter unit to the user's position (partial cut or full cut).
   To select partial cut: adjust the dowel to the position marked P.
   To select full cut: adjust the dowel to the position marked F.



10. Secure the autocutter unit with the two S4 screws.

Note:

- *When tightening the screws, do not deform the frame assembly. This can decrease the sharpness of the cutter.*
- *Do not tighten the autocutter unit when the dowels are not properly engaged. This can also decrease the sharpness of the cutter.*

11. Install the cutter cover.

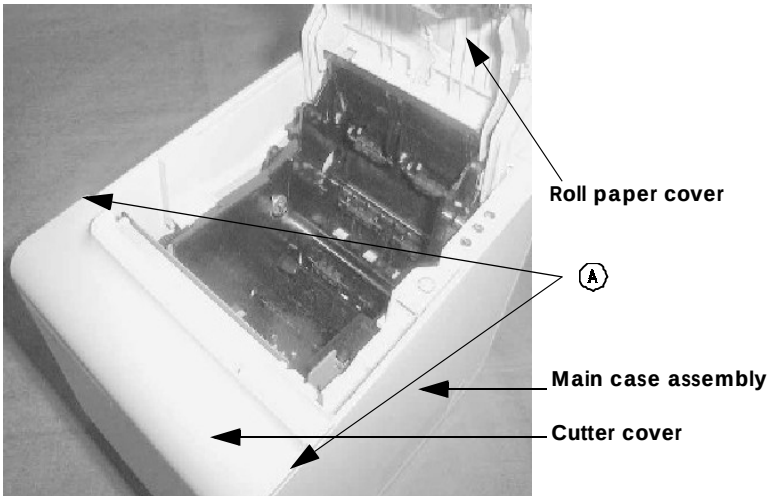
12. Close the roll paper cover.

Disassembly and Assembly of the TM-L90

First Level

Cutter Cover

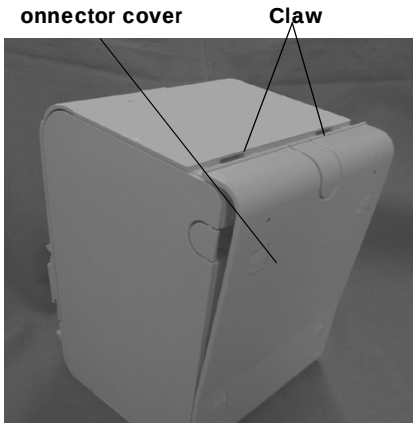
1. Open the roll paper cover.
2. Remove the cutter cover by spreading area Ⓐ of the main case assembly, as shown below:



Install in the reverse sequence of removal.

Connector Cover

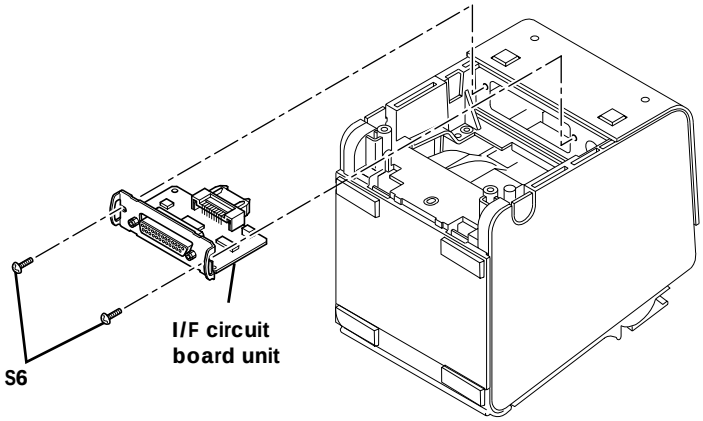
1. With the main assembly upside down, remove the connector cover by pressing its rear section and unhooking the two claws.



Install in the reverse sequence of removal.

I/F Circuit Board Unit

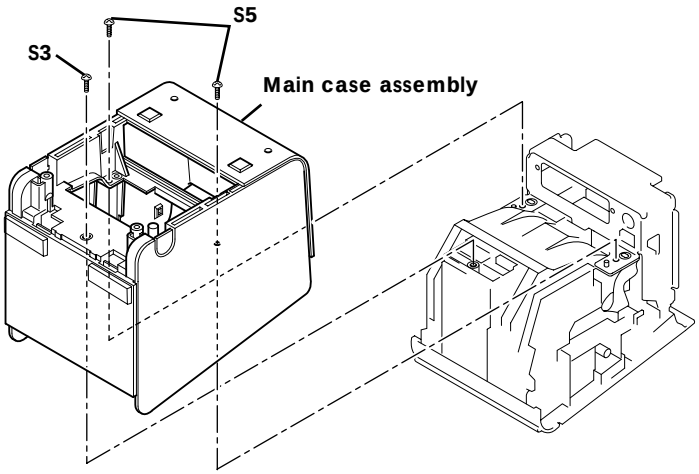
1. With the main assembly upside down, remove two S6 screws.
2. Remove the I/F circuit board unit.



Install in the reverse sequence of removal.

Main Case Assembly

1. With the main assembly upside down, remove two S5 screws and one S3 screw.
2. Remove the main case assembly.



⚠ *CAUTION:*

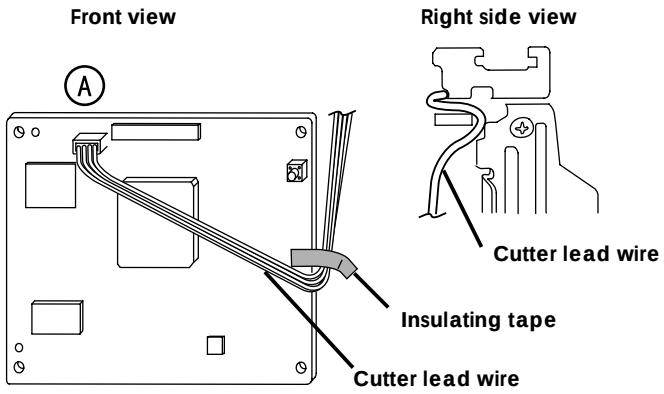
When installing the case, do not pinch the lead wire. Doing so may cause failures.

Install in the reverse sequence of removal.

Main Circuit Board Unit

1. Remove the cutter lead wire from connector Ⓐ. Then, remove the insulating tape securing the lead wire.

   When installing, route the cutter lead wire as shown below, and then fix with the insulating tape.



2. Remove four S6 screws and remove the bottom plate. (See the illustration on the next page.)

3. Remove lead wire Ⓑ from the connector on the main circuit board unit.

4. Remove four S6 screws. (See the illustration on the next page.)

   Note:
   When tightening the four S6 screws, tighten in the order ① and ②. The other two places can be tightened in any order, but should be tightened diagonally.

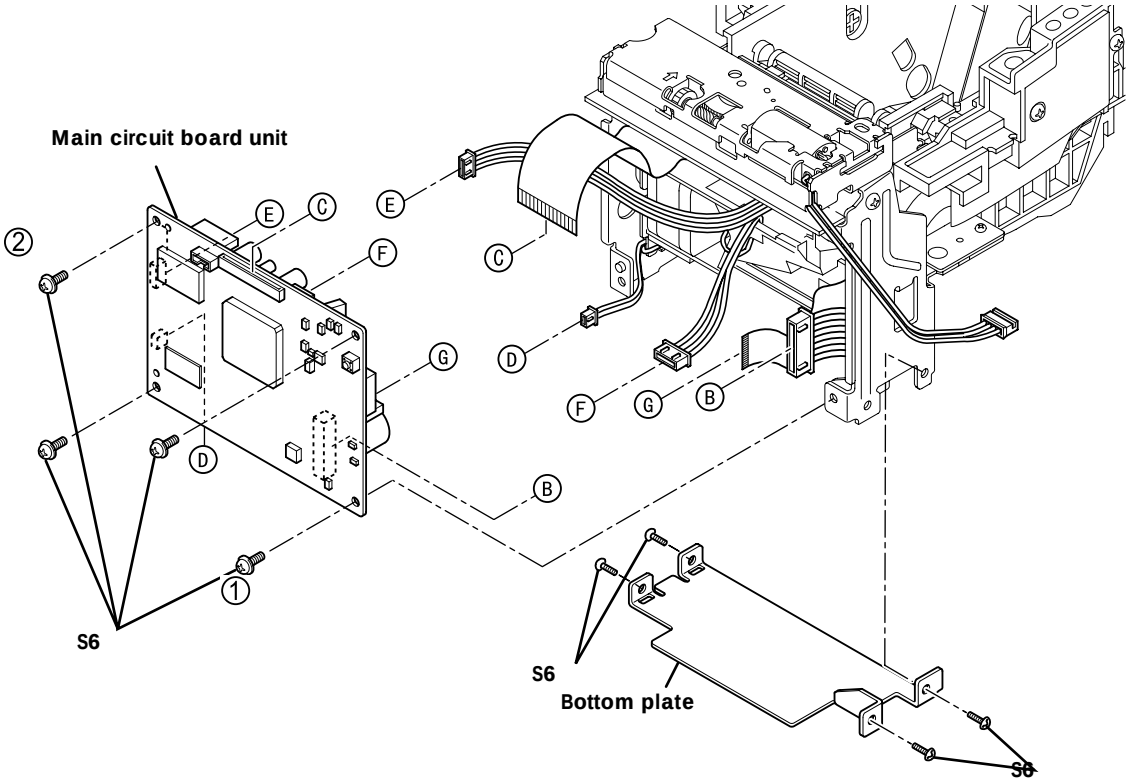
5. Remove the head FFC from connector Ⓒ on the main circuit board unit.

6. Remove the three lead wires from the main circuit board unit connector, in the order of Ⓓ, Ⓔ, and Ⓕ.

7. Remove the switch circuit board FFC from connector Ⓖ on the main circuit board unit.

   Note:
   When replacing the switch circuit board FFC, note that the switch circuit board FFC is not bent when provided as a service part. Bend it in the same way as the one that was installed into the printer. When installing, hook the bent portion against the circuit board frame.

8. Remove the main circuit board unit.



Install in the reverse sequence of removal.

Disassembly and Assembly of the Printer Mechanism

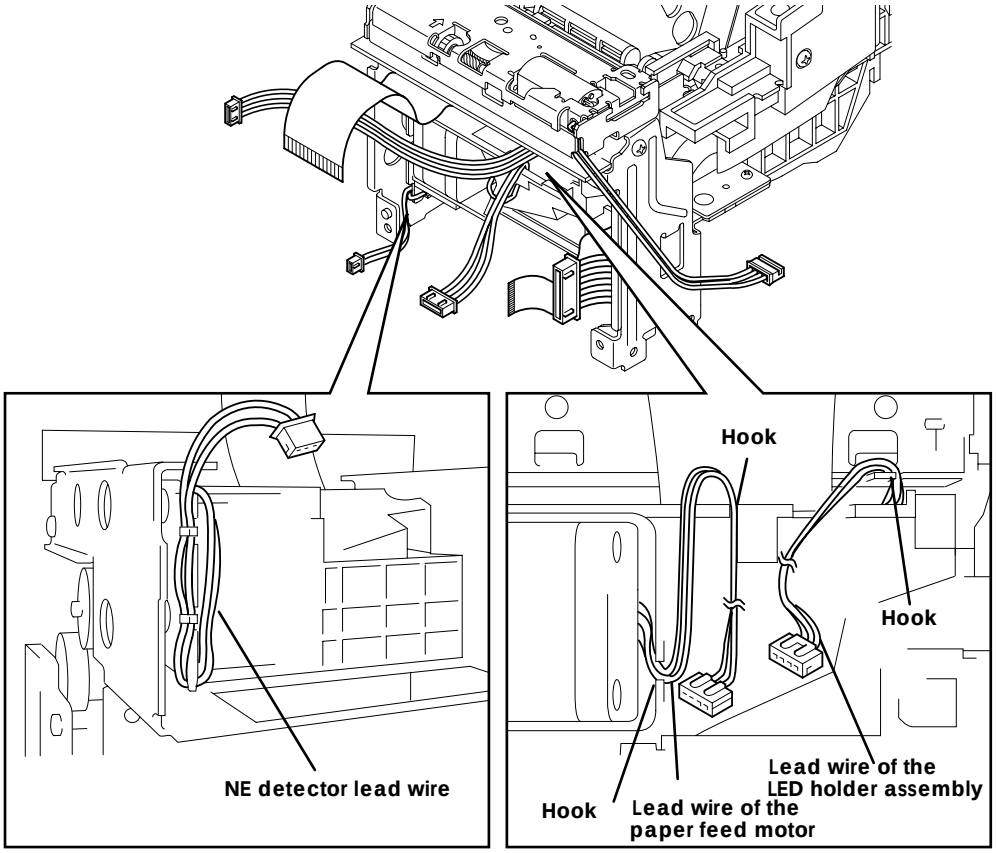
Note:
The term "printer mechanism" is used only for convenience in this document; there are no parts in the actual product that use this name.

First Level

Cable Wiring

1. Remove the lead wire of the LED holder assembly from one hook.
2. Remove the lead wire of the paper feed motor from two hooks.
3. Remove the NE detector lead wire from the hook on the frame L assembly. When installing, see the figure below and hook the NE detector lead wire onto the frame L assembly by wrapping around it twice.

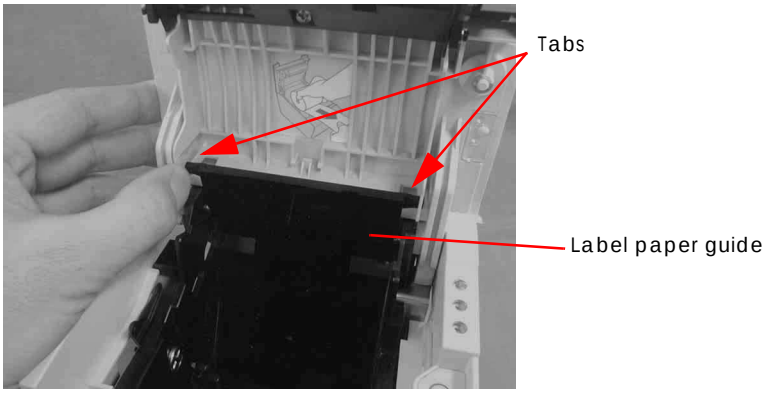
CAUTION:
When removing the lead wire, take precautions against damaging the cable.



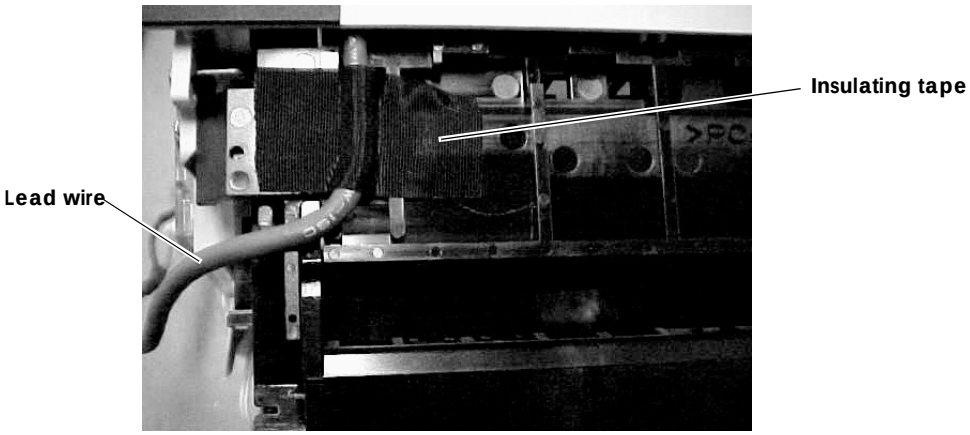
Install in the reverse sequence of removal.

Roll Paper Cover Unit

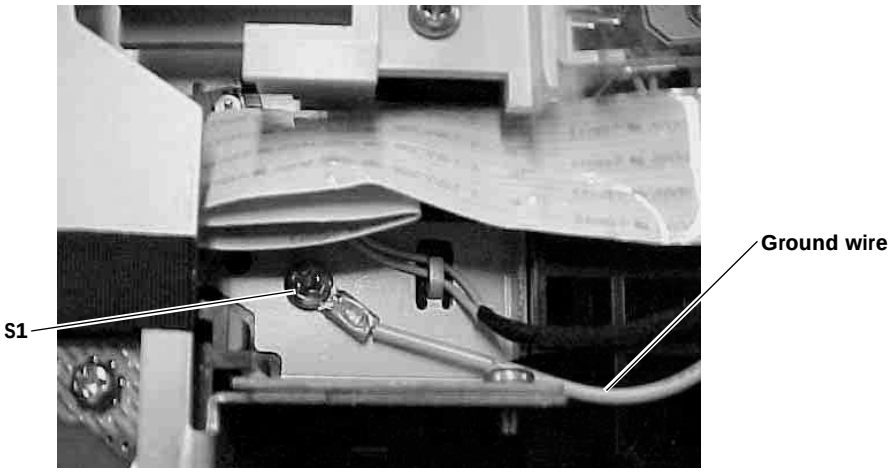
1. Release the two tabs on the label paper guide from the roll paper cover unit.



2. Remove the insulating tape that is securing the lead wire of the BM (black mark) paper detector circuit board assembly.

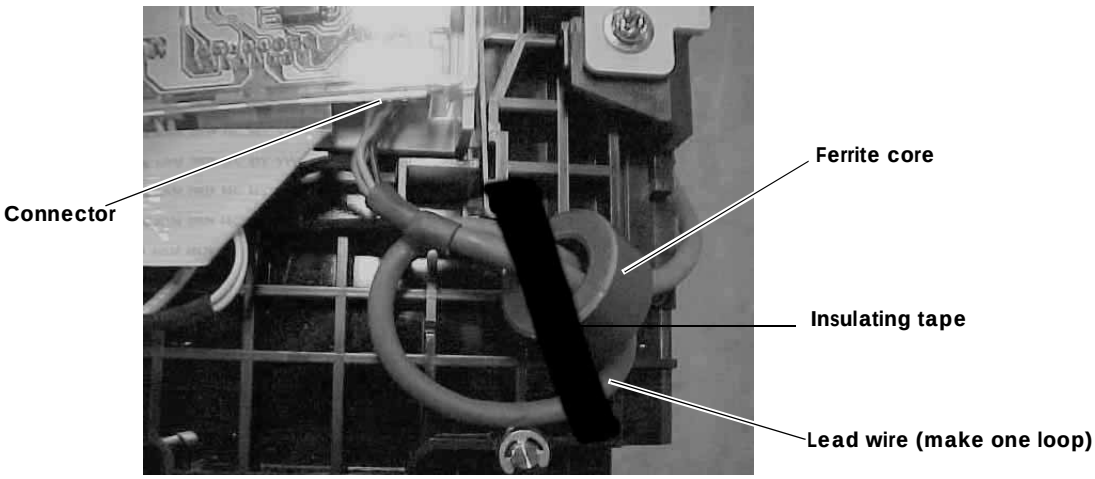


3. Remove one S1 screw to release the ground wire of the BM paper detector circuit board assembly.



4. Disconnect the lead wire of the BM paper detector circuit board assembly from the switch circuit board assembly, and remove the ferrite core.

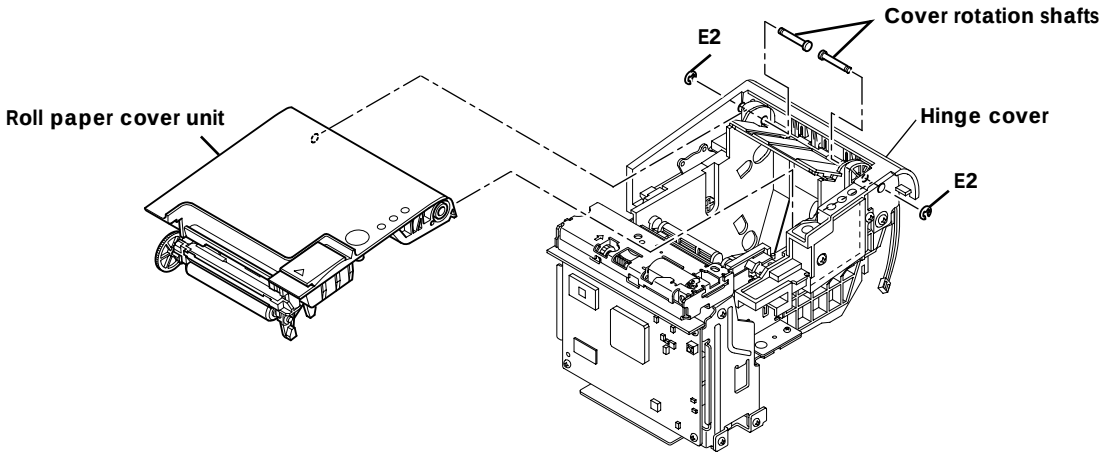
   When assembling, pass the lead wire into the ferrite core twice so that you make one loop, as shown below.



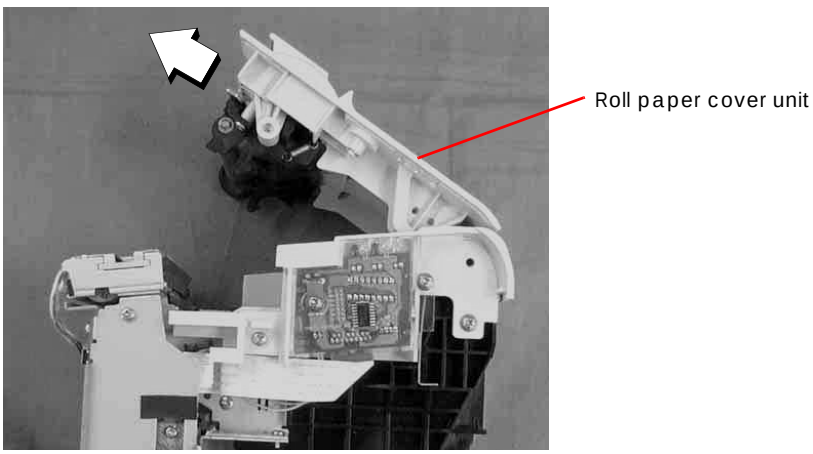
5. Remove the two E-rings (E2).

6. Remove the two cover rotation shafts by pressing them inside.

7. Remove the roll paper cover unit. Then, pull the lead wire of the BM paper detector circuit board assembly out through the clearance in the hinge cover.



To remove the roll paper cover unit, position the cover unit as shown below and pull out the unit in the direction shown with the arrow in the illustration.



Note:
When you need to disassemble or assemble the roll paper cover unit further, see page 3-35 for instructions.

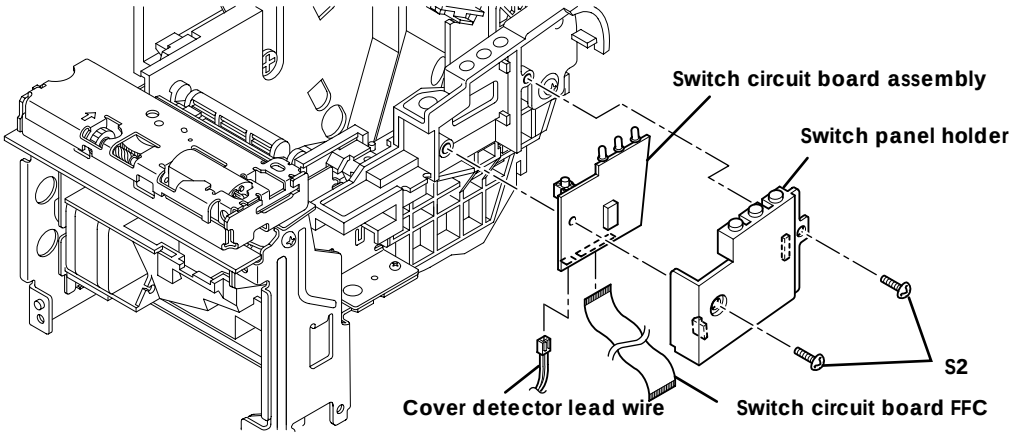
Install in the reverse sequence of removal.

Switch Circuit Board Assembly

1. Remove the cover detector lead wire and the switch circuit board FFC from the switch circuit board assembly.

2. Remove two S2 screws.

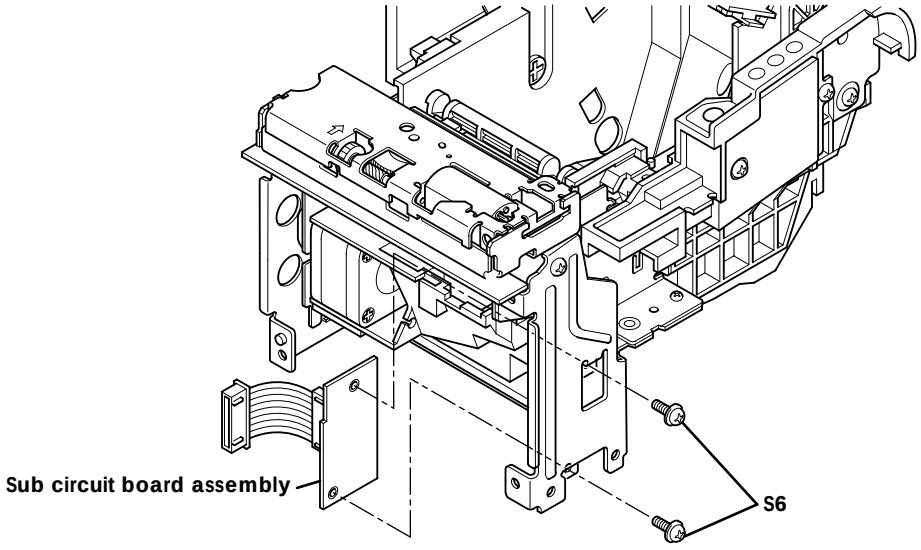
3. Remove the switch circuit board assembly by spreading the two hooks of the switch panel holder.



Install in the reverse sequence of removal.

Sub Circuit Board Assembly

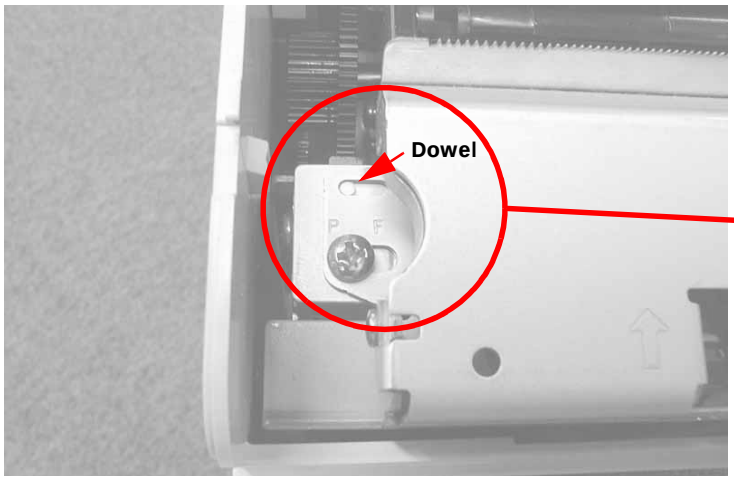
1. Remove two S6 screws.
2. Remove the sub circuit board assembly by pulling it up diagonally and out.



Install in the reverse sequence of removal.

Autocutter Unit

1. Users may choose between partial cut and full cut by adjusting the autocutter unit to the desired position. Check the part shown below to see if the autocutter is set to full cut or partial cut. When you install the autocutter unit, return the unit to the user's position.



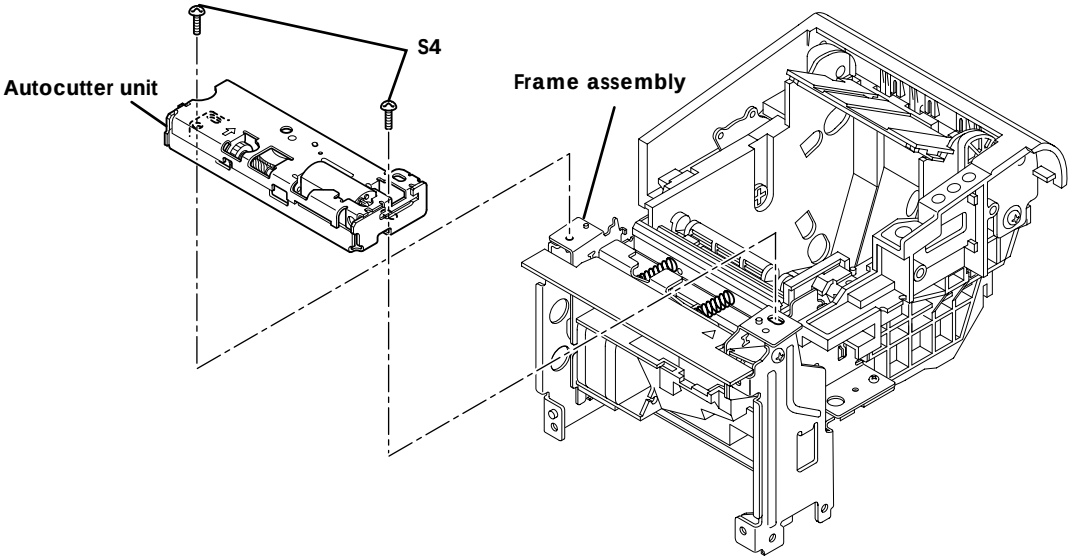
The dowel positions are marked "F" and "P."

To select partial cut: adjust the dowel to the position marked P.

To select full cut: adjust the dowel to the position marked F.

2. Remove the two S4 screws.

3. Remove the autocutter unit.



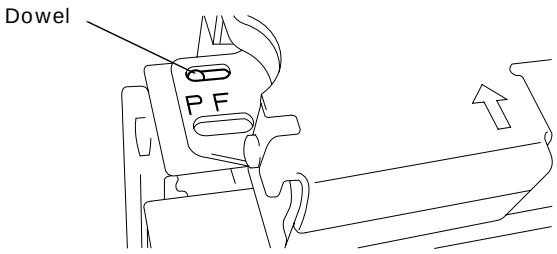
Note:

When you need to disassemble or assemble the autocutter unit further, see page 3-39 for instructions.

Install with the following steps:

1. Attach the autocutter unit in its installation position. Then, align the two dowels on the frame assembly with the two slits in the autocutter unit.

2. Set the autocutter unit to the user's position (partial cut or full cut).
   To select partial cut: adjust the dowel to the position marked P.
   To select full cut: adjust the dowel to the position marked F.



3. Secure the autocutter unit with the two S4 screws.

Note:

❑ *When tightening the screws, do not deform the frame assembly. This can decrease the sharpness of the cutter.*

❑ *Do not tighten the autocutter unit when the dowels are not properly engaged. This can also decrease the sharpness of the cutter.*

Thermal Print Head

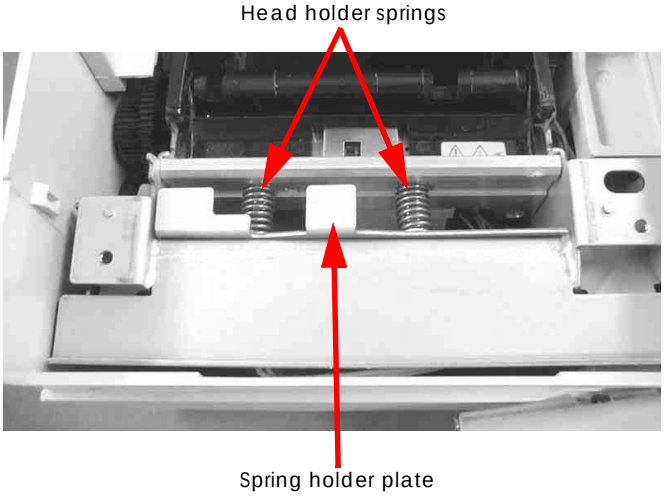
⚠ CAUTION:

- ❑ *This job may be performed only after turning off the printer and waiting for approximately 10 minutes. The thermal print head assembly may be hot, and otherwise, you might get burned.*
- ❑ *When performing this job, take anti-static measures, such as wearing a grounded wrist band. Failure to do so may result in thermal print head failure.*
- ❑ *Do not touch the print head (portion that appears like a black line, and the adjacent areas) in the thermal print head assembly. Touching this area may result in thermal print head failure.*
- ❑ *When the thermal print head assembly is contaminated or has a deposit of foreign particles, wipe it off with a cotton swab moistened with alcohol.*

1. While holding the two head holder springs so they do not fly out, pull out the spring holder plate.

⚠ CAUTION:

Be sure to hold the two head holder springs while removing spring holder plate. Otherwise, head holder springs may suddenly fly out, creating the danger of eye injury.

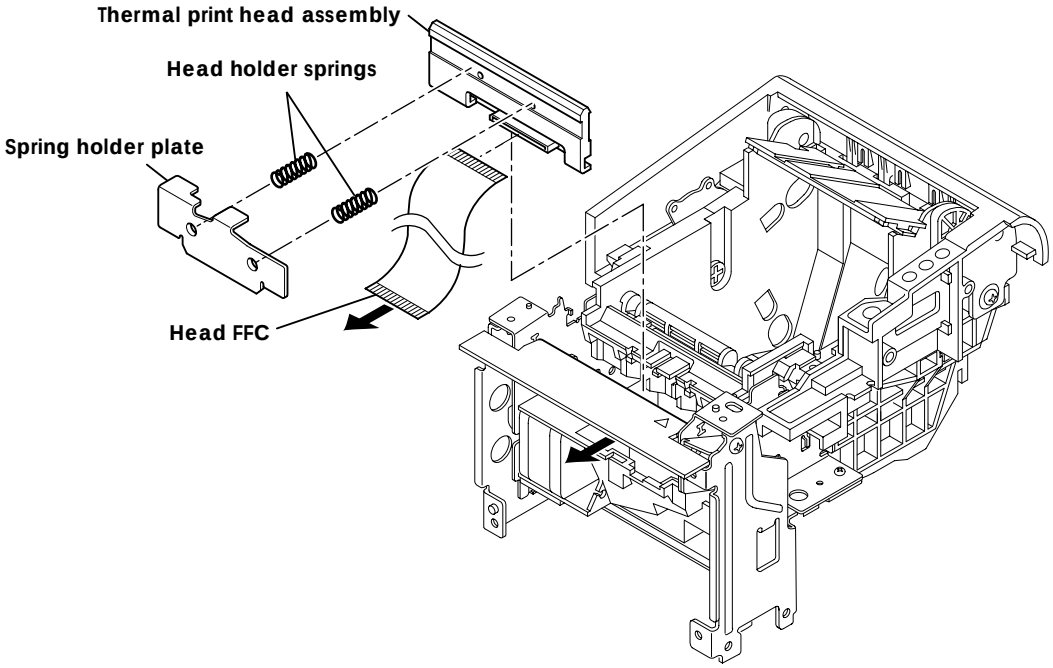


2. Remove the two head holder springs from the spring holder panel by rotating them.

3. Lift up the thermal print head assembly and remove the head FFC from the thermal print head assembly.

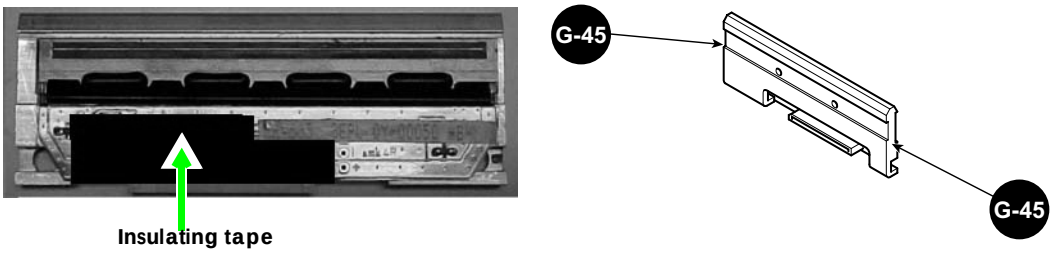
⚠ *CAUTION:*

To prevent static-generated failures, keep the removed thermal print head assembly in an anti-static bag or other suitable container.



Install using the following steps:

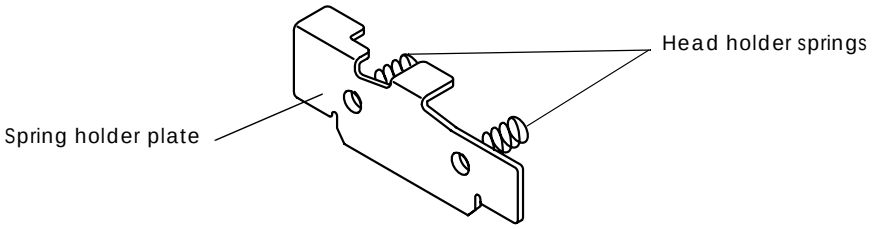
1. Attach the insulating tape on the new thermal print head assembly, as shown below; then lubricate with G-45 along the surfaces on both ends of the head assembly.



2. Insert the head FFC into the connector of the thermal print head assembly.

3. Pass the head FFC through as indicated with the arrow in the drawing on the previous page, and place the thermal print head assembly in the installation position.

4. Insert the two head holder springs onto the two dowels on the spring holder plate by rotating them.



5. Insert the two head holder springs into the groove in the thermal print head assembly.

6. While holding the two head holder springs so they do not fly out, install the spring holder plate.

> ⚠ ***CAUTION:***
>
> *Be sure to hold the two head holder springs while installing the spring holder plate. Otherwise, the head holder springs may suddenly fly out, creating the danger of eye injury.*

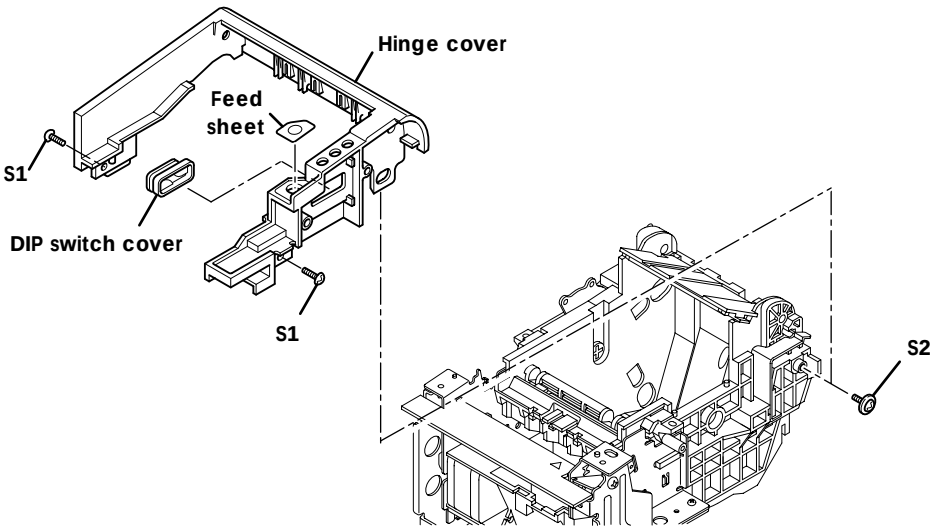
7. Adjust the two head holder springs so they are perpendicular with the thermal print head assembly.

Note:
Please take care the following explanation to exchange the thermal print head with new type.

If the printer has the old thermal print head, the plastic sheet that the head is installed on need to be cut. (Refer to "Importaint Note About Installing Thermal Print Head" on page 3-52.)

Hinge Cover

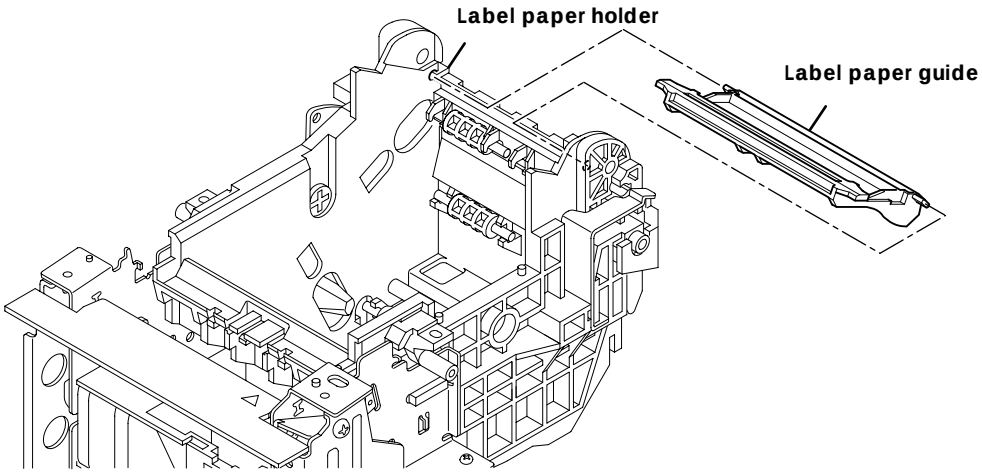
1. Remove two S1 screws and one S2 screw.
2. Remove the hinge cover by spreading the two hooks.
3. Remove the feed sheet from the hinge cover.
4. Remove the DIP switch cover from the hinge cover.



Install in the reverse sequence of removal.

Label Paper Guide

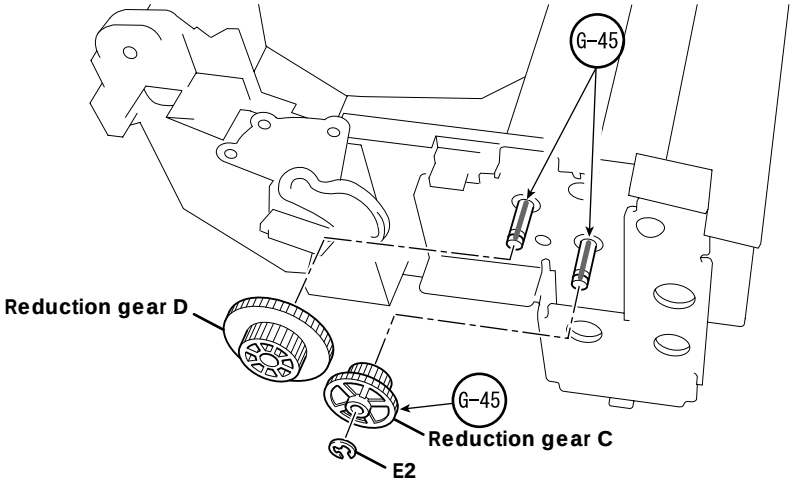
Remove the label paper guide by raising it and pulling it out from the label paper holder groove.



Install in the reverse sequence of removal.

Reduction Gears

1. Remove one E-ring (E2).
2. Remove reduction gear C.
3. Remove reduction gear D.



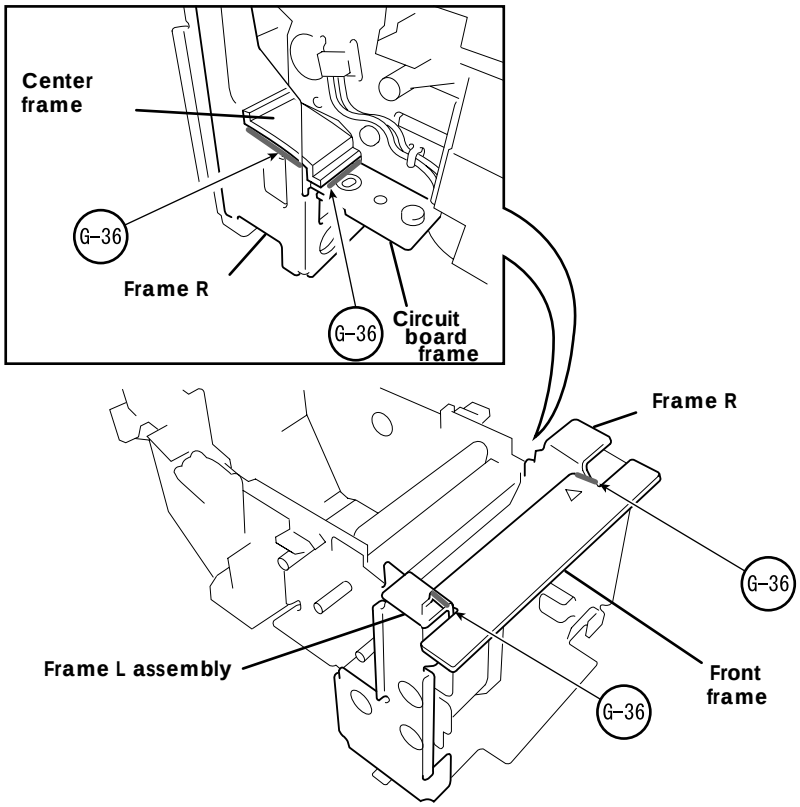
Install using the following steps:

1. Lubricate the two reduction gear shafts with G-45, in a line-shape.
2. Install reduction gear D.

   Note:
   When installing reduction gears C and D, see the drawing and install them in the correct directions.

3. Install reduction gear C.
4. Secure with one E-ring (E2).

5. Lubricate half of reduction gear C with G-45.
6. Lubricate the contact area of frame R and the front frame with G-36.
7. Lubricate the contact area of the frame L assembly and the front frame with G-36.
8. Lubricate the contact area of the right side of the center frame and the circuit board frame with G-36.
9. Lubricate the right side of the center frame and the groove in frame R with G-36.

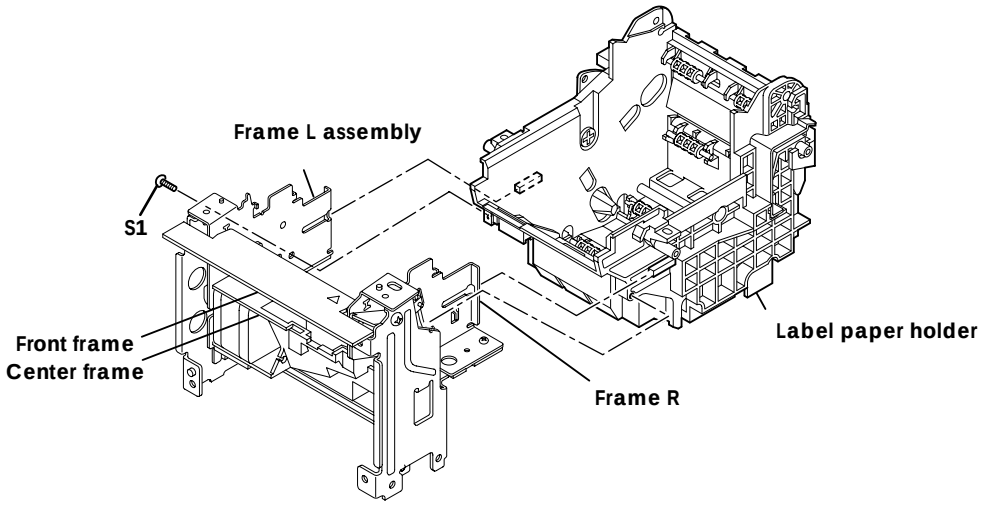


Label Paper Holder

1. Remove the lead wire of the LED holder assembly from between the center frame and the front frame.

2. Remove the S1 screw.

3. Pull the label paper holder out straight along the grooves in the frame L assembly and frame R.



Install using the following steps:

1. Pass the lead wire of the LED holder assembly through to the front, between the center frame and the front frame.

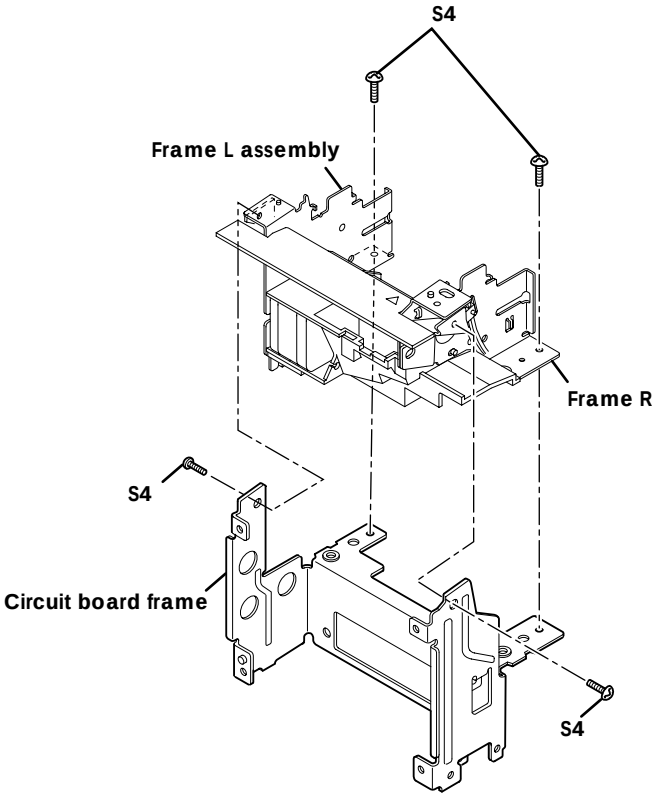
2. Press in and slide the label paper holder straight along the grooves in the frame L assembly and frame R, until it hits the stop.

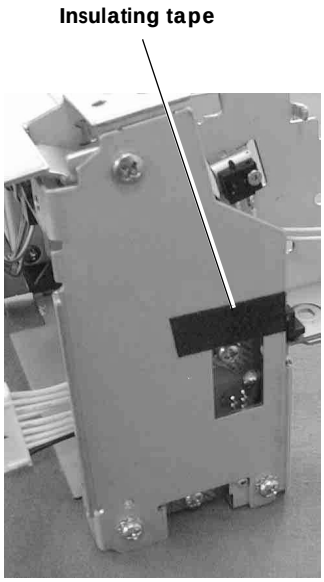
> ⚠ ***CAUTION:***
> *When installing the label paper holder, do not pinch the cables.*

3. Tighten the S1 screw.

Circuit Board Frame

1. Remove four S4 screws.
2. Remove the circuit board frame.



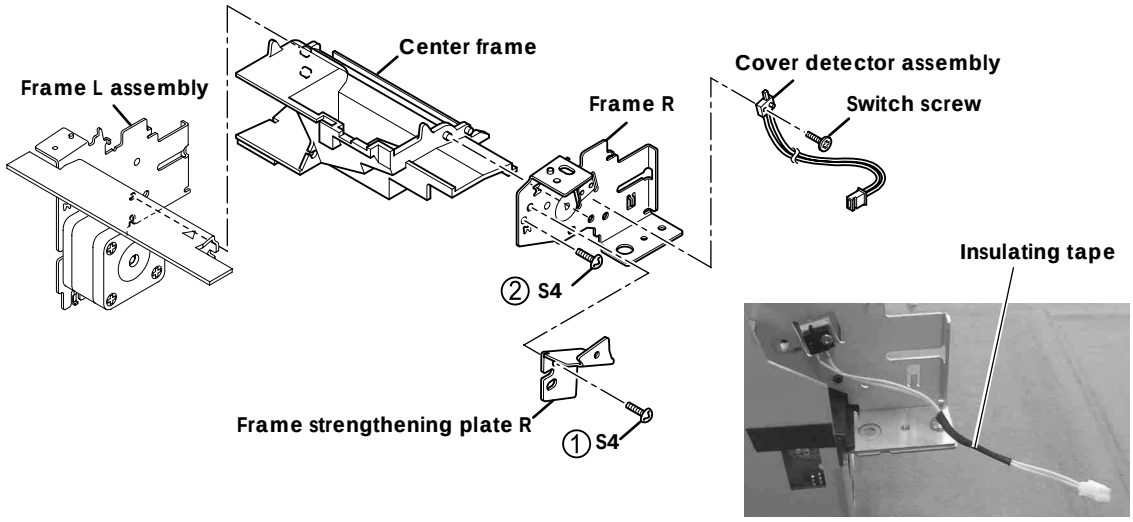


Install using the following steps:

1. Affix insulating tape on the right side of the circuit board frame, as shown in the photo above.
2. Install the circuit board frame. Then, align the dowels on the circuit board frame with the holes in the frame L assembly and frame R.
3. Tighten the four S4 screws. See the drawing to locate the screw holes.

Frame R and Center Frame

1. Remove one S4 screw ①.
2. Remove frame strengthening plate R.
3. Remove one S4 screw ②.
4. Remove frame R.
5. Remove the center frame.
6. Remove one switch screw and remove the cover detector assembly from frame R.

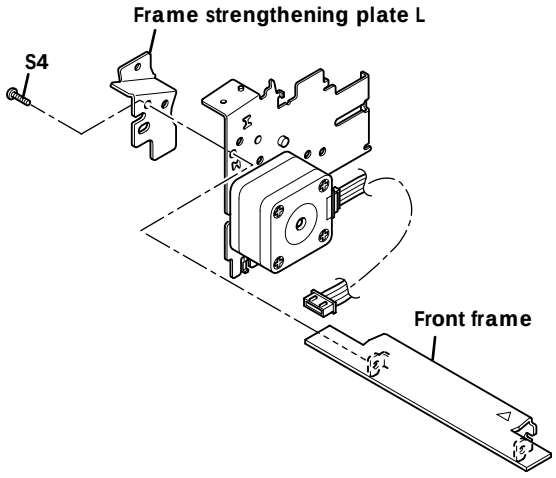


Install using the following steps:

1. Affix the insulating tape on the cover detector assembly, as shown in the photo above. (This process is necessary only if the original cover detector assembly has the insulation tape affixed.)
2. Install the cover detector assembly onto frame R and secure with one switch screw. Then, align the front and back so that the protrusion on the switch faces the position marked on frame R.
3. Install the center frame. Then, route the lead wire of the paper feed motor forward. Align two dowels on the center frame with two holes in the frame L assembly.
4. Install frame R.
5. Tighten one S4 screw at ②.
6. Install frame strengthening plate R.
7. Tighten one S4 screw at ①.

Front Frame

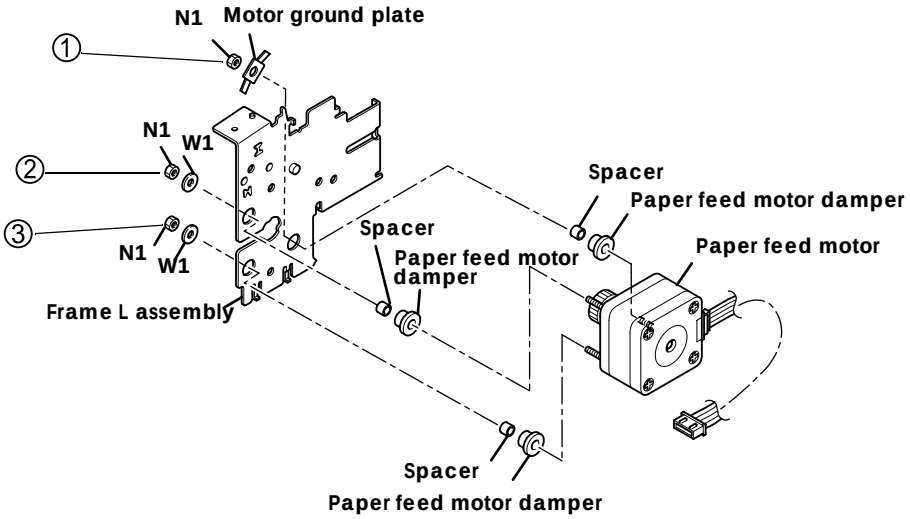
1. Remove one S4 screw.
2. Remove frame strengthening plate L.
3. Remove the front frame.



Install in the reverse sequence of removal.

Paper Feed Motor

1. Remove two W1 washers and one motor ground plate by removing three N1 nuts.
2. Slide out the paper feed motor from the hole in the frame L assembly.
3. Remove the three paper feed motor dampers from the paper feed motor.
4. Remove the three spacers from inside the three paper feed motor dampers.



Install using the following steps:

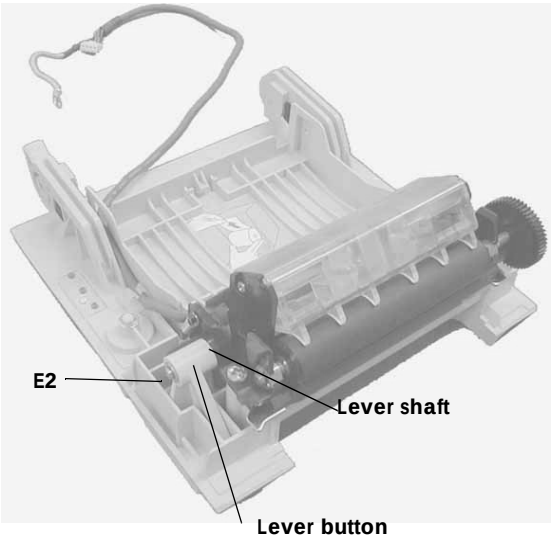
1. Insert the three spacers into the three paper feed motor dampers.
2. Insert the motor dampers into the three holes in the frame L assembly.
3. Install the paper feed motor. To do this, insert the motor shaft into the cutout in the frame L assembly; then insert the three screws on the motor into the holes in the three paper feed motor dampers.
4. Install two W1 washers and one motor ground plate. Then, make sure the ground plate touches the frame L assembly. If you insert the ground plate in an incorrect way, it does not touch the frame.
5. Tighten the three N1 nuts with the specified torque of 34.3 to 39.2 Ncm (3.5 to 4.0 kgcm) in the order shown in the illustration above. Make sure the motor ground plate is attached at the angle shown in the illustration above.

> ⚠ ***CAUTION:***
>
> *Tighten the three nuts with the specified torque. If you overtighten these nuts, the screws on the paper feed motor become loose when you loosen the nuts the next time.*

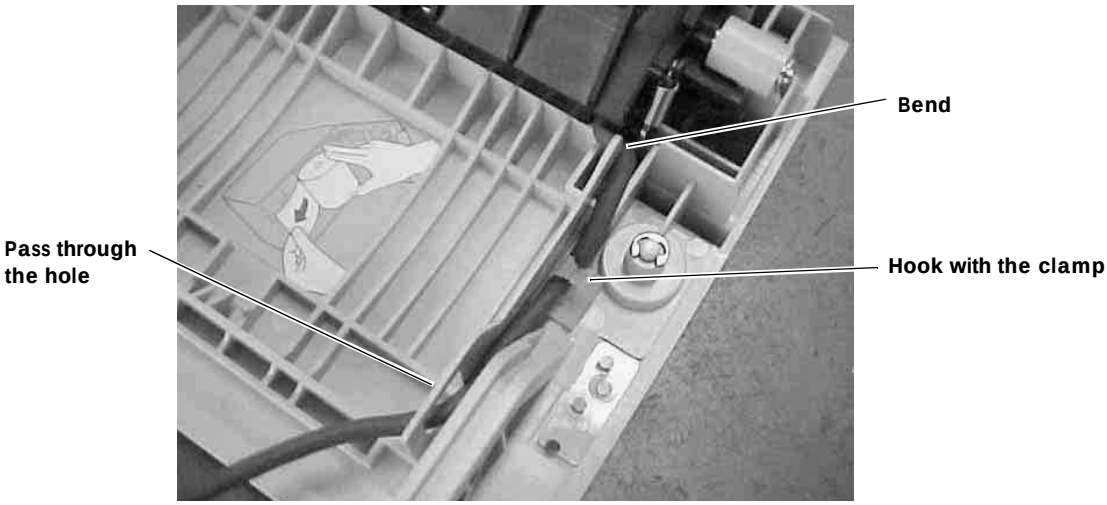
Second Level

Roll Paper Cover Unit

1. Remove one E2 type E retaining ring, and slide the lever shaft to remove the lever button.



2. Remove the lead wires of the BM (black mark) paper detector circuit board assembly from the roll paper cover unit. When assembling, thread the wires as shown below.



3. Remove the three S1 screws and remove the platen holder.

⚠ CAUTION:

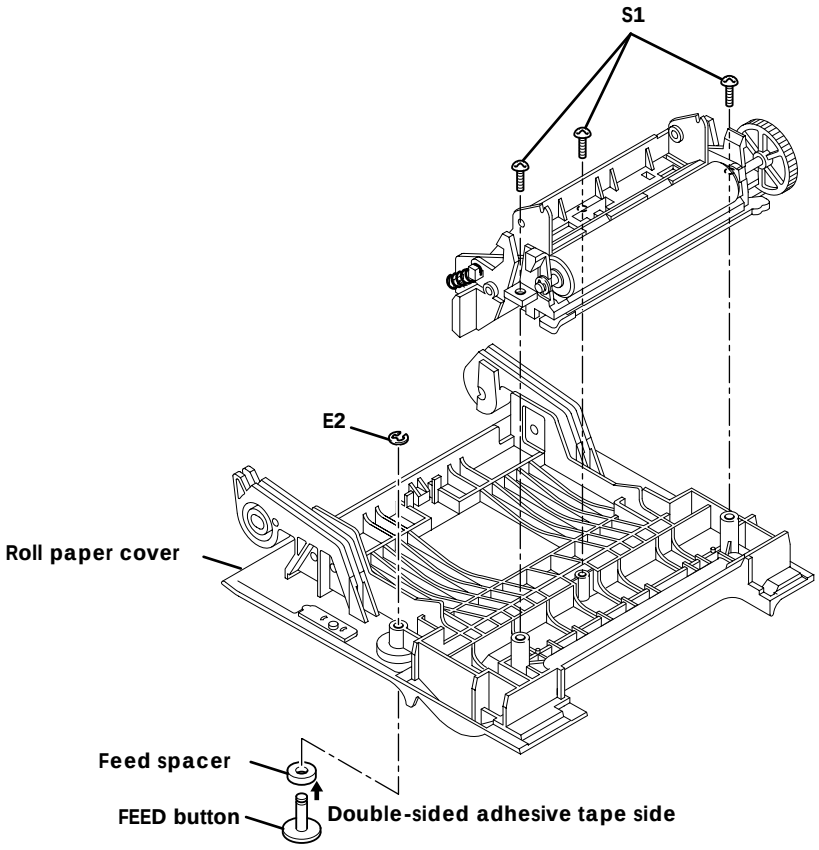
When removing the screws near the platen gear, take precautions against touching the gear with the screwdriver. Do not use a screwdriver with a short handle and/or thick shaft, as it can easily touch the gear. Touching the gear may damage it.

Note:

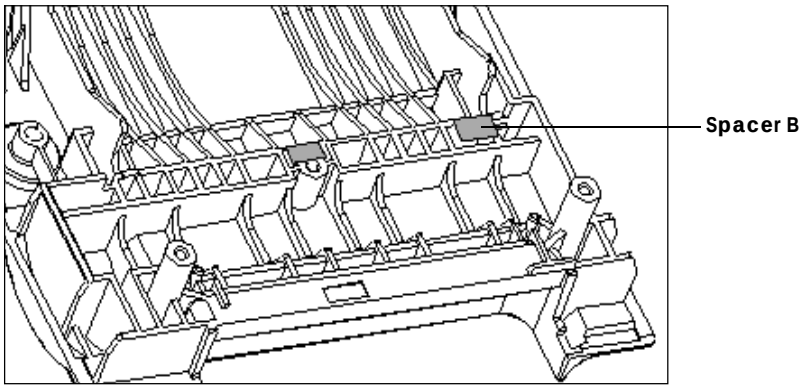
When you need to disassemble or assemble the platen holder further, see page 3-47 for instructions.

4. Remove one E2 type E retaining ring and remove the FEED button.

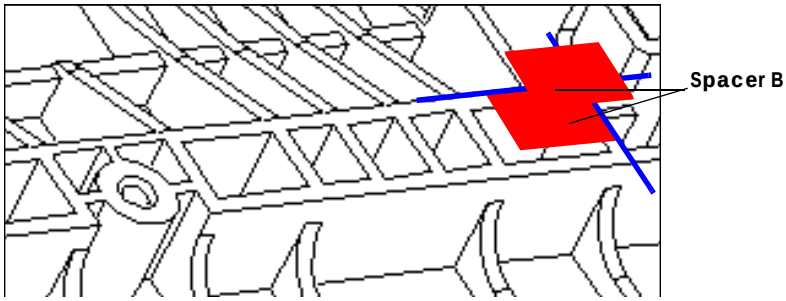
5. Remove the feed spacer from the FEED button.



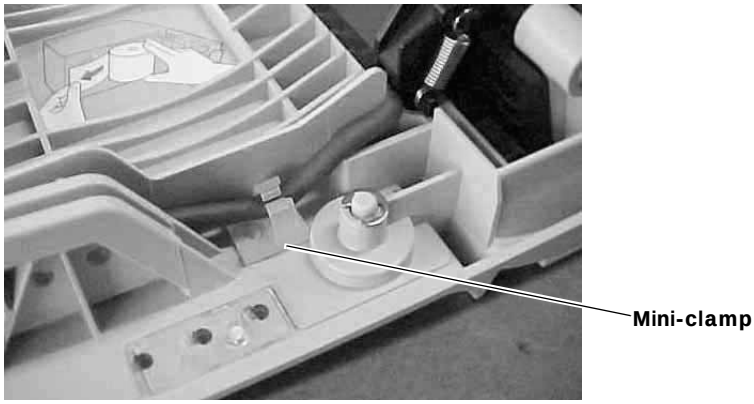
6. Peel off spacer B.



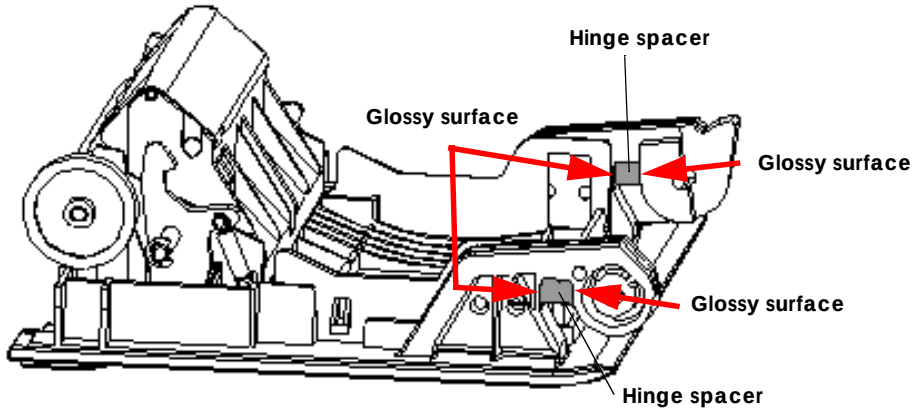
When assembling, affix the spacer as shown below.



7. Peel off the mini-clamp. When assembling, affix it in the direction shown below.



8. Remove the two hinge spacers from the roll paper unit. When assembling, make sure you insert the spacers in the direction shown below.



Install in the reverse sequence of removal.

Autocutter Unit

1. Remove two manual cutter screws ①.
2. Remove the manual cutter.

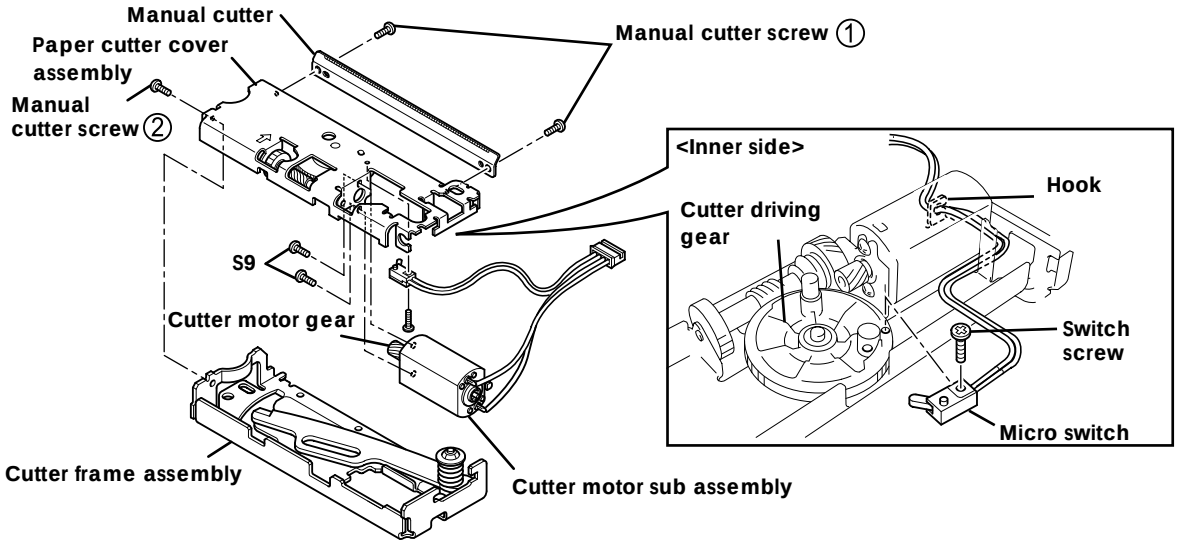
> ⚠ ***CAUTION:***
> *The manual cutter has a sharp blade. Handle it with care.*

3. Remove one manual cutter screw ②.
4. Remove the paper cutter cover assembly.
5. Remove one switch screw.
6. Remove the micro switch.
7. Remove the lead wires of the micro switch and the cutter motor from the hooks.
8. Remove the two S9 screws.

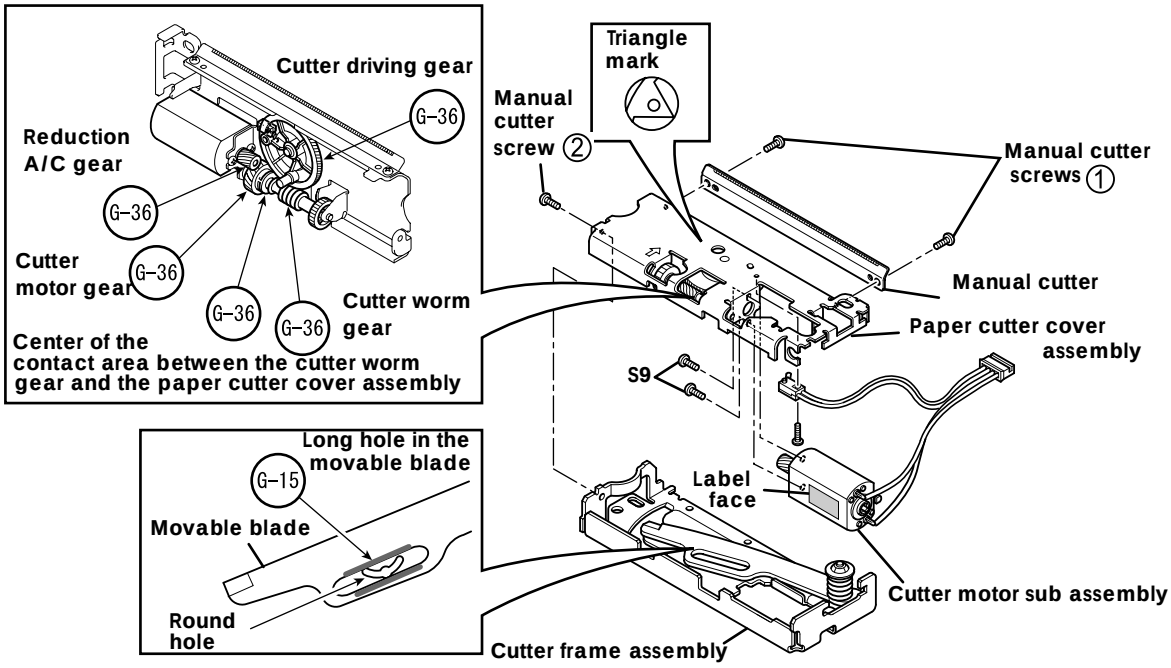
> ***Note:***
> *When removing the screws near the paper cutter cover, insert a screwdriver into the gap between the paper cutter cover and the cutter driving gear. Do not damage the gear.*

9. Remove the cutter motor sub assembly.

> ***Note:***
> *When removing the cutter motor sub assembly, pull it out straight so not to catch the cutter motor gear in the hole in the paper cutter assembly cover.*



Install using the following steps:



1. Install the cutter motor sub assembly. Then, see the drawing to insert it correctly so that the label side faces the right direction.

2. Tighten the two S9 screws.

3. Install the micro switch. The switch must face the shaft side, and one dowel on the back must align with the hole in the paper cutter cover assembly.

4. Hold the lead wire of the micro switch to the side of the cutter motor and secure it with the hook, together with the lead wire from the cutter motor sub assembly.

5. Tighten one switch screw.

6. Lubricate two areas on the long hole in the movable blade in a line-shape with G-15. The blade is located in the cutter frame assembly.

7. Adjust the position of the movable blade so that the round hole in the cutter frame assembly is visible through the long hole in the movable blade.

8. Lubricate halfway around the center of the contact area with G-36 between the cutter worm gear located in the paper cutter cover assembly and the paper cutter cover assembly.

9. Lubricate once around the cutter driving gear, which is located on the paper cutter cover assembly, with G-36.

10. Lubricate halfway around the cutter motor gear, located on the paper cutter cover assembly, and the reduction A/C gear, with G-36.

11. Adjust the position of the cutter driving gear so that the triangle mark on the cutter driving gear becomes visible through the hole in the paper cutter cover assembly.

12. Install the paper cutter cover assembly onto the cutter frame assembly.

> ⚠ ***CAUTION:***
>
> *Do not pinch the lead wire between the paper cutter cover assembly and the cutter frame assembly.*

13. Tighten one manual cutter screw at ② on the previous page.

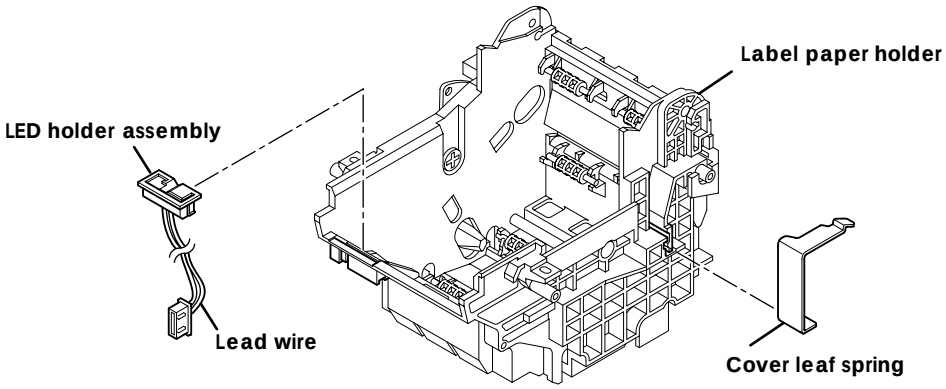
14. Install the manual cutter by aligning the two holes in it with the two dowels on the paper cutter cover assembly.

15. Tighten the two manual cutter screws at ① on the previous page.

LED Holder and Cover Plate Spring

1. Pull out the LED holder assembly from the label paper holder while pressing both claws inside.

2. Remove the cover leaf spring.



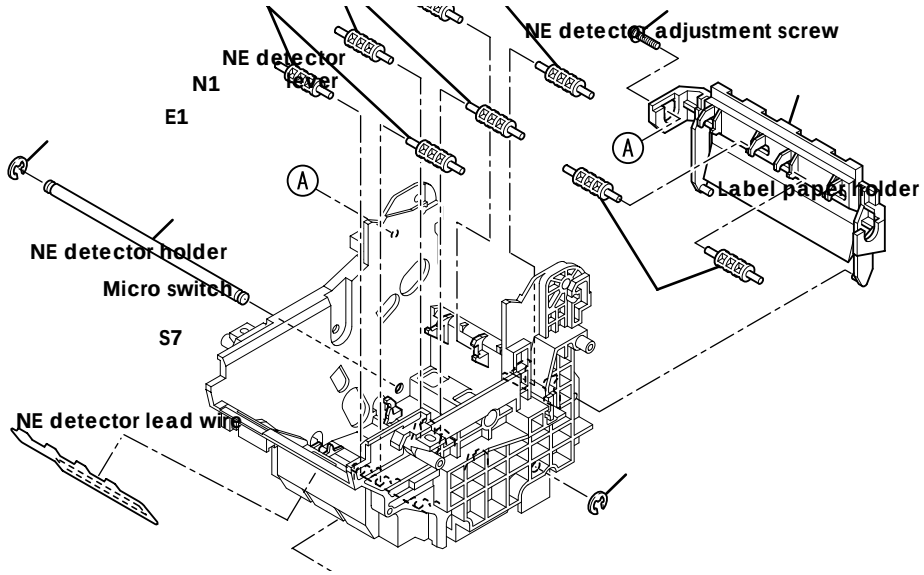
Install using the following steps:

1. Press in the cover leaf spring into the label paper holder.

2. Install the LED holder assembly. Then, pass the lead wire through first, and then insert the LED holder assembly into the label paper holder.

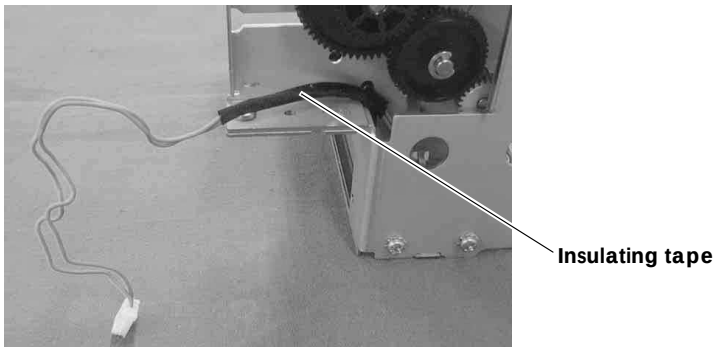
NE Detector Assembly

1. Remove the NE detector lead wire from the hook on the label paper holder.
2. Remove one E1 type E retaining ring.
3. Remove the NE detector adjustment screw by rotating it with a coin.
4. Remove the N1 hex nut and the NE detector assembly.
5. Remove the NE detector lead wire from the hook of the NE detector holder, and remove it from the micro switch connector.
6. Remove the NE detector lever by lightly pressing the two keys inside.
7. Remove one S7 screw.
8. Remove the micro switch.



Install using the following steps:

1. Affix insulating tape on the NE detector lead wire as shown in the photo below. (This process is necessary only if the original NE detector lead wire has insulation tape affixed.)



2. Install the micro switch by aligning one key with the hole in the NE detector holder and secure with one S7 screw.

3. Install the NE detector lever by pressing the two keys inside.

4. Connect the NE detector lead wire to the micro switch connector and hook it to the NE detector holder.

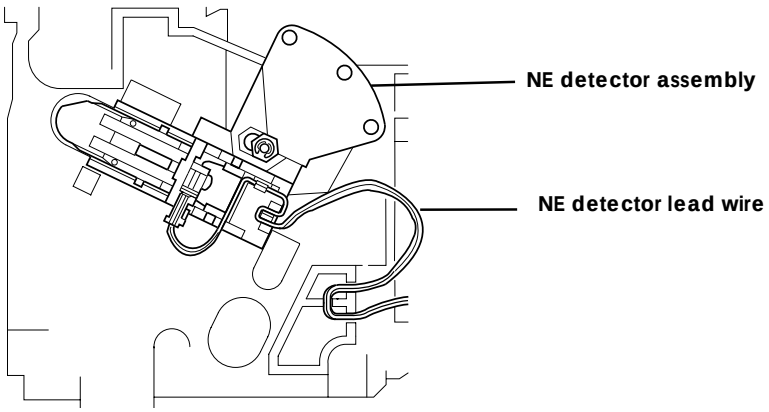
5. Install the NE detector assembly by placing it temporarily, facing the left slanting diagonally.

6. Fit the N1 hex nut and install the NE detector adjustment screw. Rotate the NE detector adjustment screw with a coin, until the groove in it comes out of the N1 hex nut.

7. Install one E1 type E retaining ring into one groove in the NE detector adjustment screw.

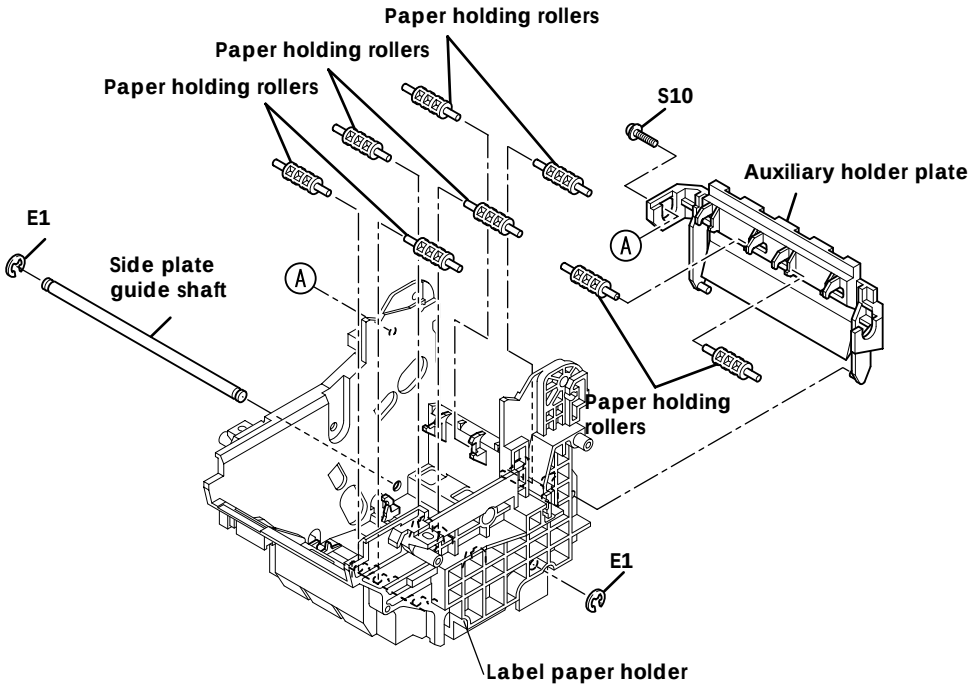
8. Align the NE detector assembly straight, and further tighten the NE detector adjustment screw.

9. Hook the NE detector lead wire to the label paper holder.



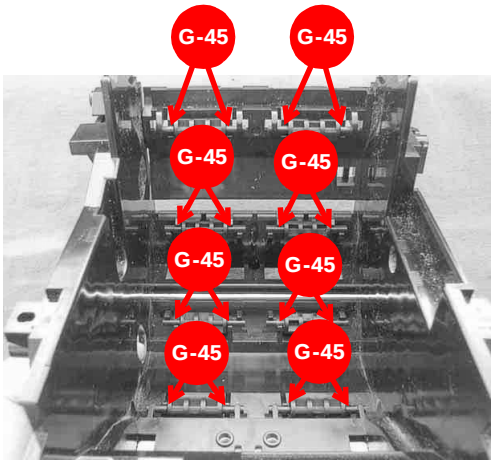
Auxiliary Holder Plate and Side Plate Guide Shaft

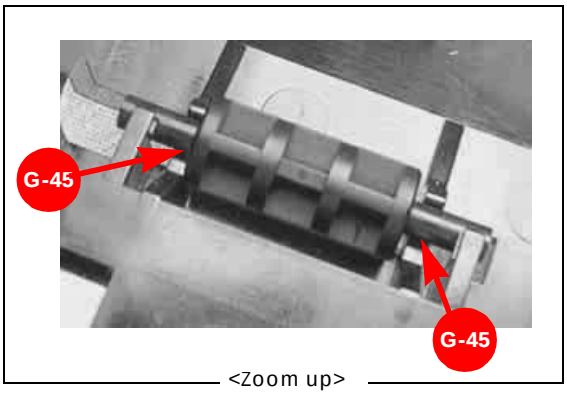
1. Remove one S10 screw.
2. Disengage both projections located in the lower part of the auxiliary holder plate, and pull out the auxiliary holder plate downward, at an angle.
3. Remove the eight paper holding rollers.
4. Remove the two E1 type E retaining rings, and pull out the side plate guide shaft.
5. Remove the spacer guide plate while pushing up one front claw of the label paper holder.



Install in the reverse sequence of removal.

After you have installed the paper holding rollers, lubricate with G-45 at the 16 points shown below.





<Zoom up>

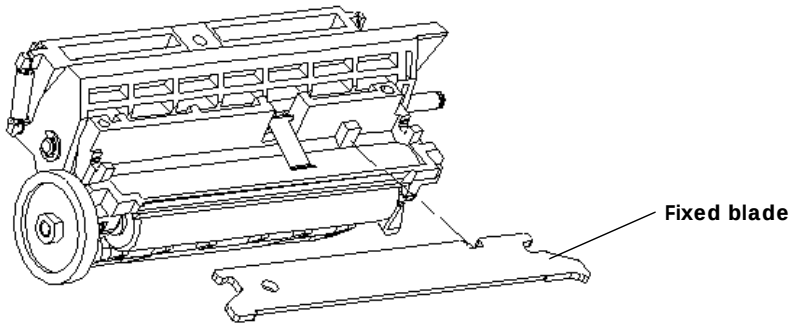
Third Level

Platen Holder

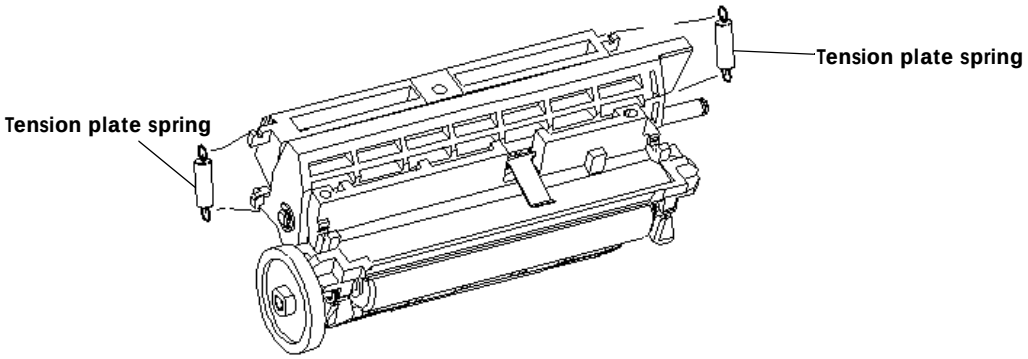
1. Remove the fixed blade from the platen holder by raising the blade. When installing the fixed blade, see the drawing below to check the installation direction.

⚠ CAUTION:

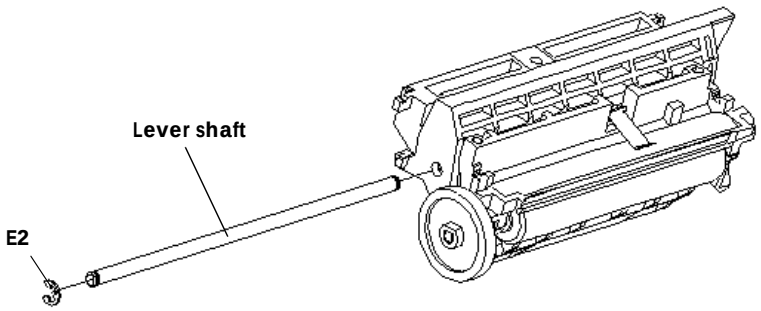
The fixed blade is sharp. Handle it with care.



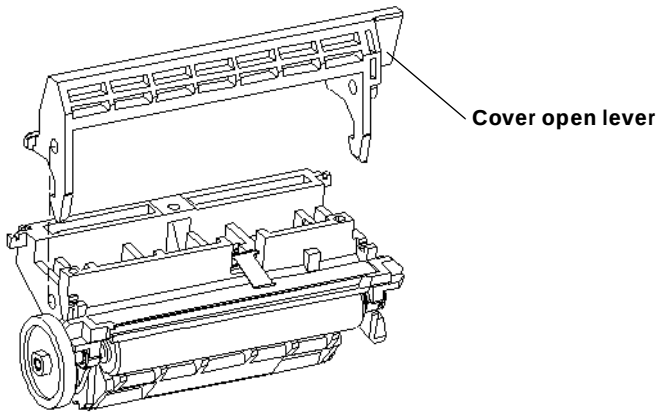
2. Remove the two tension plate springs.



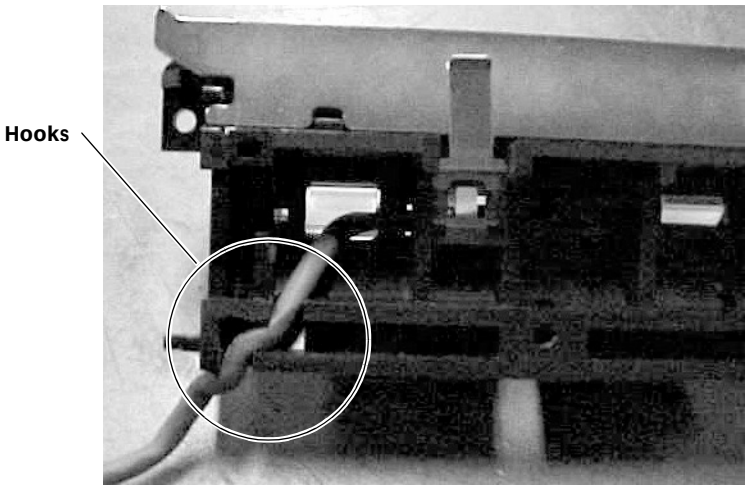
3. Pull out the lever shaft and remove one E2 type E retaining ring.



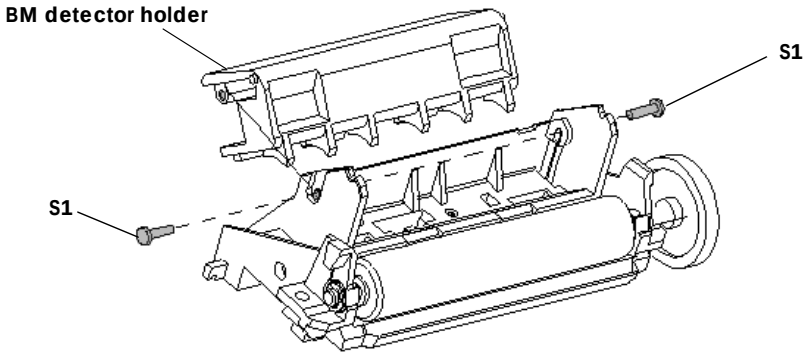
4. Remove the cover open lever.



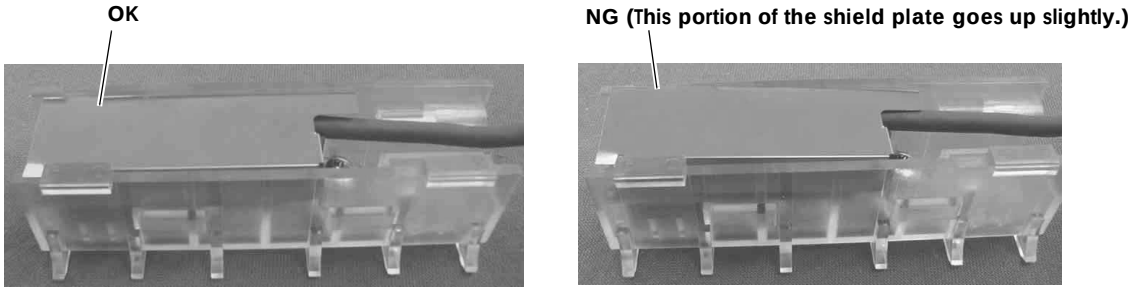
5. Remove the lead wire of the BM (black mark) detection set board from the hooks of the platen holder.



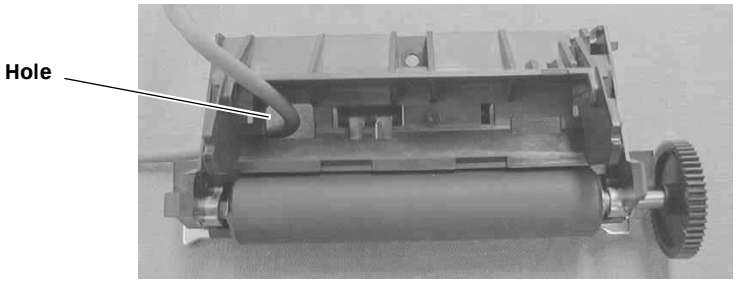
6. Remove two S1 screws, and remove the BM detector holder.



When you assemble the BM detector holder, make sure the shield plate fits into place as shown below.

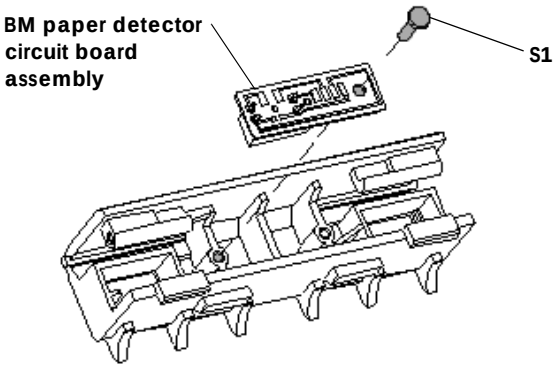


7. Pull the lead wire of the BM paper detector circuit board assembly out of the hole in the platen holder.



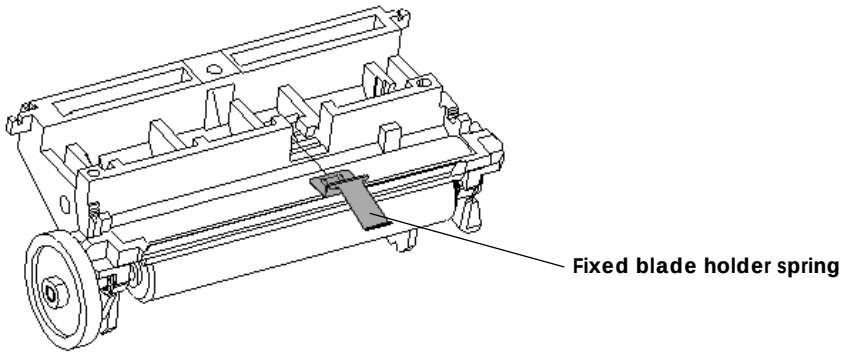
8. Remove one S1 screw; then, remove the shield plate.

9. Remove one S1 screw, and remove the BM paper detector circuit board assembly.



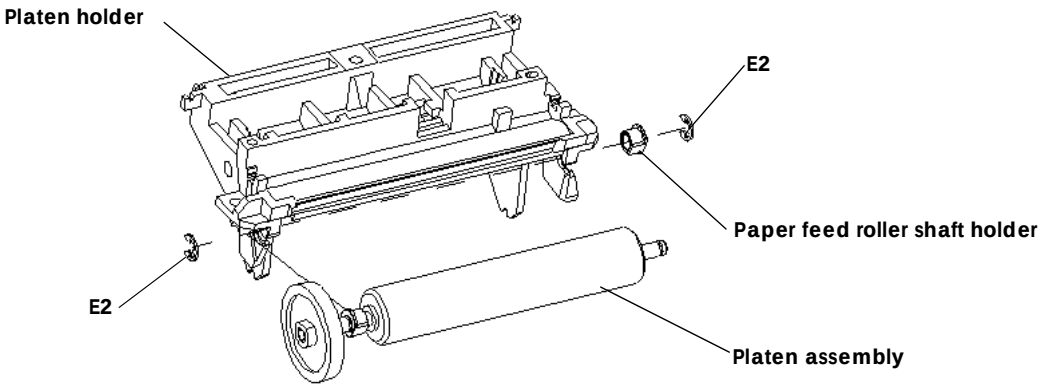
10. Remove the fixed blade holder spring by lifting up the claw.

Note:
The claw of the fixed blade holder spring is hooked to the platen holder. When removing it, do not pull forcibly, as this may result in deformation. When installing it, make sure the claw has been hooked.



11. Remove the two E2 type E retaining rings and one paper feed roller shaft holder; then remove the platen assembly.

Note:
When installing the paper feed roller shaft holder, see the drawing and engage it to the platen holder in the correct direction.

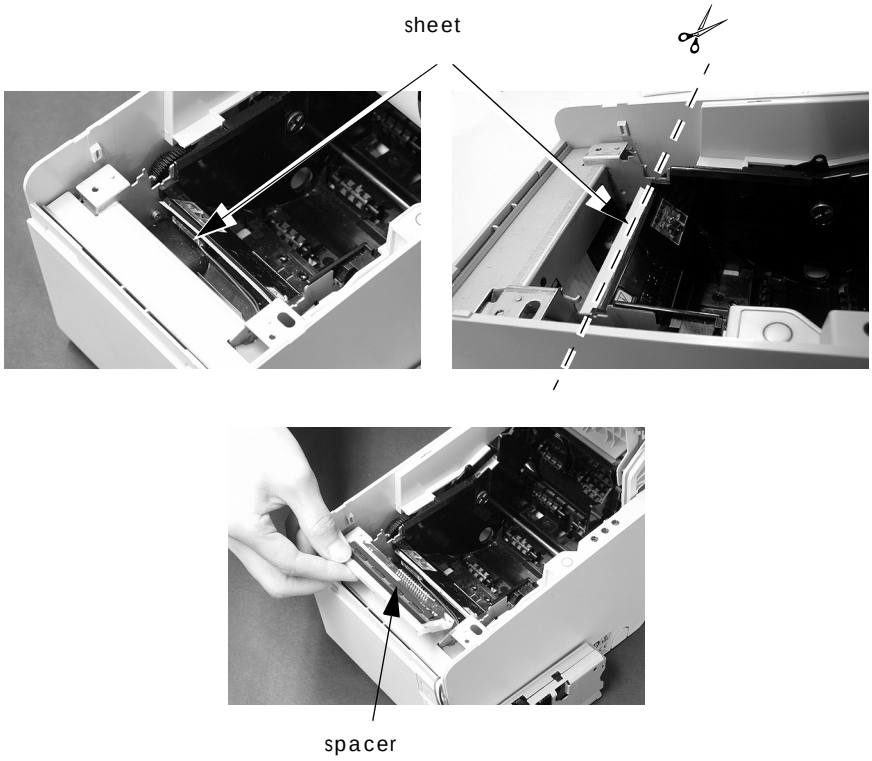


Install in the reverse sequence of removal.

Important Note About Installing Thermal Print Head

Please follow these instructions to install the new thermal print head correctly. Note that the new head has a spacer on it.

1. Cut the plastic sheet with a cutting tool such as a cutter knife. Be sure not to cut the surrounding parts.
2. Install the new thermal print head in the correct position.



Chapter 4

Adjustment and Settings

Threshold Value Setting for Detectors

Perform this setting when you have replaced any of the following.

Items Requiring Setting
❑ LED holder assembly ❑ BM paper detector circuit board assembly ❑ Main circuit board unit

Note:
If you do not perform this setting or perform it incorrectly, the printer generates the paper layout error. See the section, "Error types and Processing," in Chapter 2 for the description of the error.

Follow the steps below to execute the setting.

1. Install any of the following specified paper rolls for the detector setting.

Original paper or specified paper for detector setting
TF50KS-E (Nippon Paper Industries Co.,Ltd.)
P350 (Kanzaki Specialty Paper (USA))
KF50 (KANZAN Spezialpapiere GmbH (Germany))

Note:
You cannot make an accurate setting if you do not use the specified paper shown above.

2. With the roll paper cover opened, turn the power on while pressing the FEED button.
3. Press the FEED button again eight times.
4. Close the roll paper cover.
5. The printer performs the setting. Once the setting value is printed on the roll paper, the setting is finished. (The printer power may be turned off automatically, depending on the DIP switch setting.)

The setting value is stored in NV memory on the main circuit board unit.

Note:

For details about the settings listed below, see Chapter 6, "Installation."

- ❑ *Setting for the position of the roll paper near-end detector*
- ❑ *Setting for the roll paper cutting method*
- ❑ *Roll paper width setting*
- ❑ *DIP switch settings*
- ❑ *NV memory settings*

Chapter 5

Maintenance, Inspection, Lubrication, and Cleaning

Periodic Maintenance or Inspection

There are no parts in this product that require periodic maintenance or inspection.

Lubrication

There are no parts in this product that require periodic lubrication.

Lubrication is required during disassembly and assembly. Observe the instructions on lubricants and lubrication points described in Chapter 3, “Disassembly and Assembly.”

The table below lists the lubricants used in this product.

Table 5-1 Lubricants

Type	Name
Grease	G-15
	G-36
	G-45

Cleaning

Recommended Cleaning

It is recommended that you perform the following cleaning during repair. Observe the precautions in the front of Chapter 3 before cleaning.

Table 5-2 Recommended cleaning

Checkpoints	Cleaning method
Whether any dust or foreign material adheres to thermal print head.	See “Cleaning the thermal head” section in this chapter.
Whether any paper dust or foreign material adheres to LED holder assembly.	Remove the dust or foreign material with a cotton swab lightly dampened with water.
Whether any paper dust or foreign material adheres to BM paper detector circuit board assembly.	Remove the dust or foreign material with l a cotton swab lightly dampened with water.
Whether any paper dust or foreign material adheres to platen assembly.	Clean the platen with a cotton swab or cloth lightly dampened with water.
Whether any paper dust or foreign material is present on the cutter blade.	Wipe off with dry cloth or cotton swab.
Whether any paper dust, dirt, or foreign material adheres to or is inside other parts.	Clean thoroughly using a small vacuum cleaner for computer equipment.

Cleaning the Case

Use a dry cloth or lightly dampened cloth to clean the case. Disconnect the power cord from the wall outlet before doing this.

Avoid using alcohol, benzene, thinner, trichloroethylene, or ketone-based substances to remove dirt or foreign matter from the printer, because these substances can affect or damage plastic and rubber parts.

Cleaning the Thermal Head

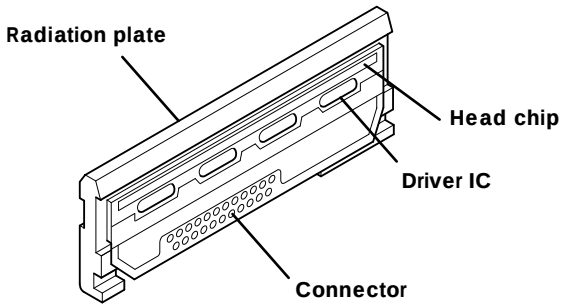
⚠ *CAUTION:*

- ❑ *Turn off the printer power before cleaning.*
- ❑ *Note that the thermal head (thermal element and radiation plate) becomes very hot during normal operation, creating the danger of burn injury. Be sure to wait for about 10 minutes after turning printer power off before beginning the cleaning.*

1. Open the paper roll cover.
2. Clean the thermal element (the area that looks like it is marked with a thin black line) of the thermal head with a cotton swab moistened with an alcohol solvent (ethanol, methanol, or IPA).

   ⚠ *CAUTION:*

   Never touch the thermal element with your hands. Doing so can damage the thermal elements.



3. After confirming that the alcohol solvent has dried completely, close the paper roll cover.

Chapter 6

Installation

Installation Precautions

⚠ *CAUTION:*

- ❑ *Do not place the printer in an unstable place (such as on an unsteady base or on a slanted surface). The unit may fall or drop, and may cause injury.*
- ❑ *Do not place the printer in a location where it is exposed to excessive humidity or dust. It may malfunction or cause fire.*
- ❑ *Do not wire cables other than as instructed in this document. Improper wiring may cause malfunction or fire.*

Installation Position

This printer can be installed vertically, horizontally, or mounted on the wall. If you change the installation position, you also need to set the installation position of the roll paper near-end detector. (Refer to the section, "Setting the Installation Position of the Roll Paper Near-End Detector," in this chapter.)

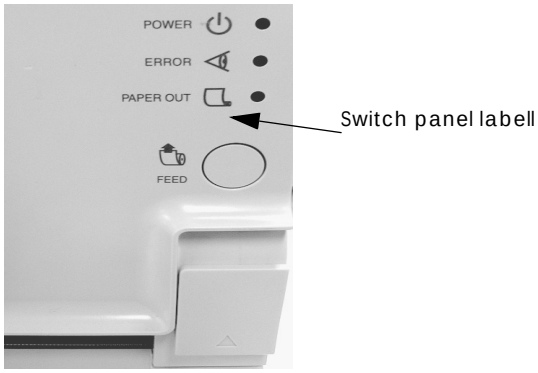
Vertical Installation

Place the printer with the paper exit facing forward.

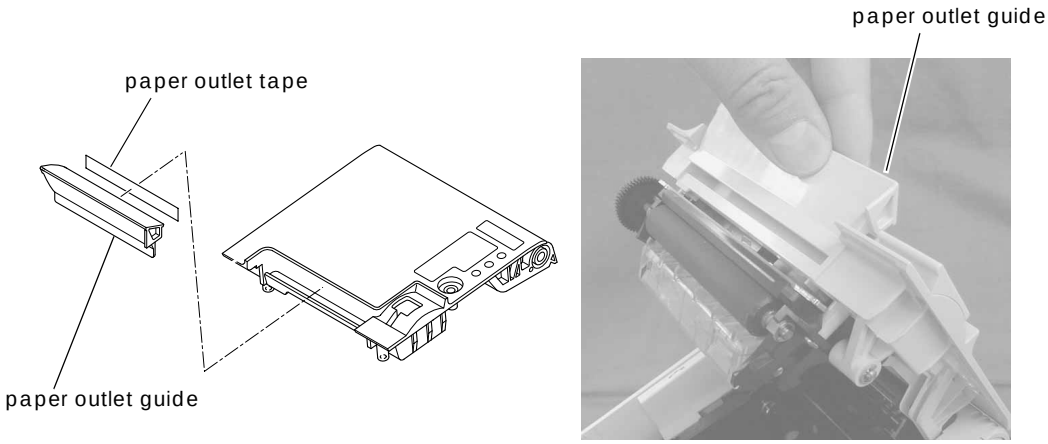
Horizontal Installation

Place the printer with the paper exit facing upward. When you install the printer horizontally, perform the following steps.

1. Attach the switch panel label as shown below.



2. If the autocutter is set to full cut, attach the paper outlet guide using the paper outlet tape (double-sided tape) as shown below.



Note:
If you install the printer horizontally and choose full cut without attaching the paper outlet guide, the cut paper falls inside the paper path, which can result in double-cuts, a paper jam, or cutter error. However, if the printer is installed vertically or partial cut is chosen, the paper outlet guide is not necessary.

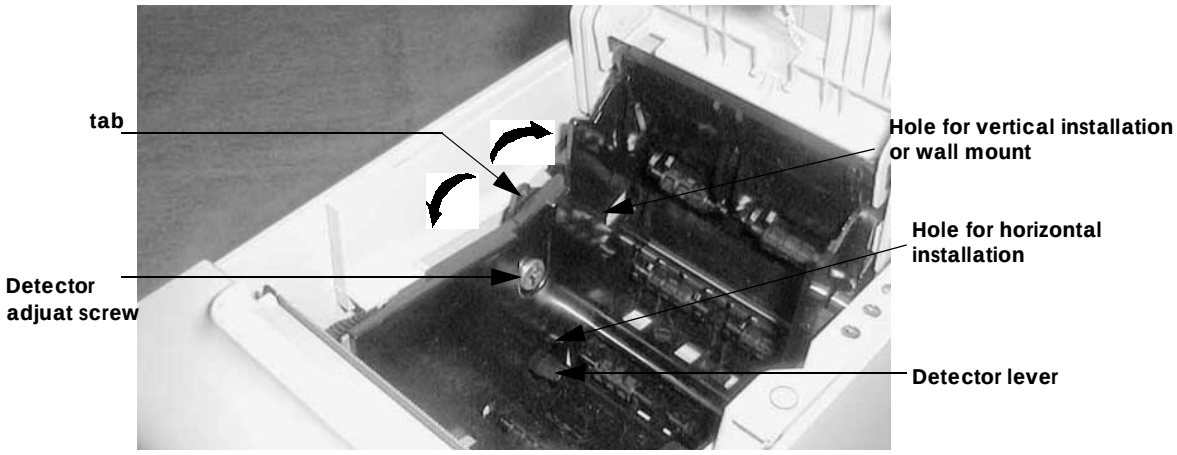
Wall Mounting

The printer can be attached to the wall by using the wall hanging bracket (WH-10). When you are going to use the printer by mounting it on a wall, see the installation manual that comes with the wall hanging bracket.

Setting the Installation Position for the Roll Paper Near-End Detector

This printer allows you to change the installation position for the roll paper near-end detector using the following procedure. Set the detector based on whether your printer is installed vertically or horizontally.

1. Loosen the detector adjustment screw with a coin or similar tool. Turn the screw at least 3 or 4 times.
2. Push the detector lever in until it touches the back of the hole.
3. While pushing the detector lever, turn the tab until the lever clicks into place in the desired hole.



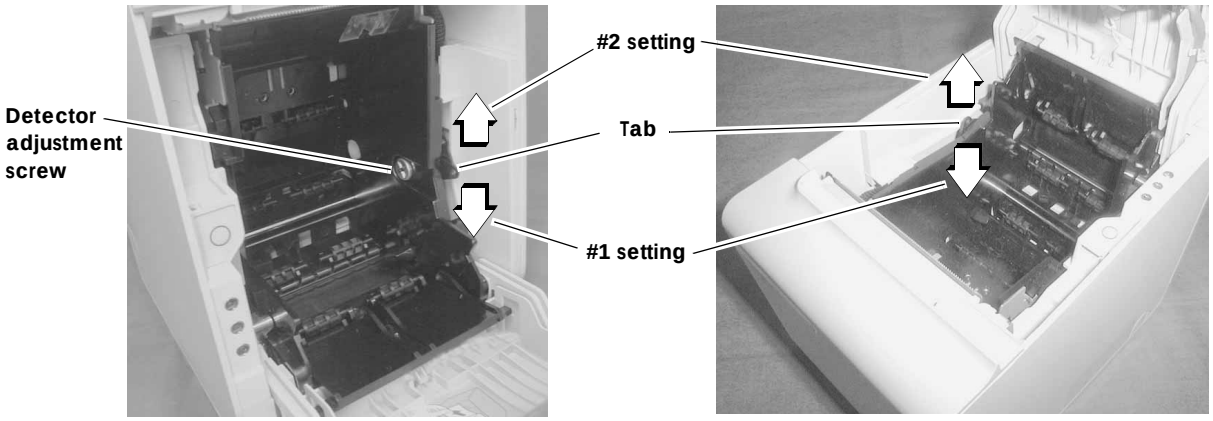
4. Secure the detector adjustment screw.
5. Make sure the detector lever moves smoothly.

Adjusting the Detecting Point of the Roll Paper Near-End Detector

Below are two reasons for the roll paper to require an NE detector adjustment.

- ❑ To adjust the location of detection for the diameter of the roll paper core.
- ❑ To adjust the amount of remaining paper.

1. Open the roll paper cover, and remove the paper roll.
2. Loosen the detector adjustment screw with a coin or similar tool.
3. Adjust the detector by sliding the tab in the direction shown below.



Vertical installation or wall mounting

Horizontal installation

The table below shows the diameter at which the near-end detector is triggered. Note that this figure is a calculated value, and there may be some variations, depending on the printer.

Table 6-1 Detection point of roll paper near-end

Detector position	Trigger point (diameter of paper roll)
#1 setting	Approx. 36 mm {1.42"}
#2 setting	Approx. 41 mm {1.61"}

4. Tighten the detector adjustment screw.
5. Check to be sure that the detecting lever moves freely.
6. Replace the paper roll.

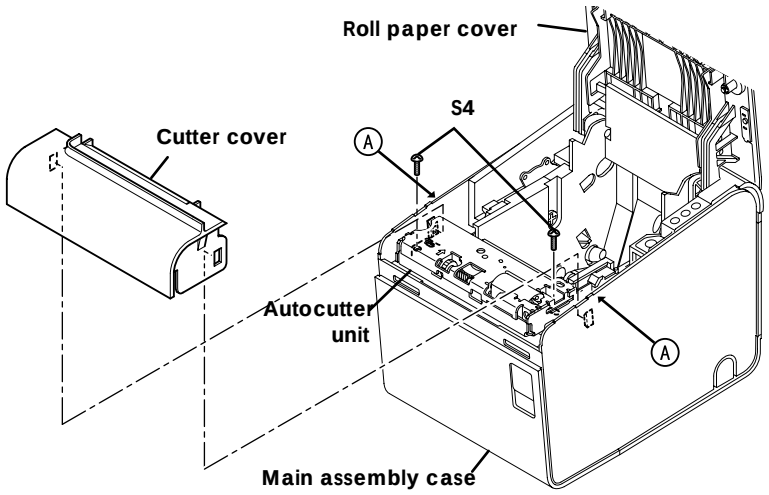
Setting the Paper Roll Cutting Method

You can choose between partial cut and full cut by adjusting the autocutter unit to the desired position. The steps below show the setting of the cutting method.

Note:

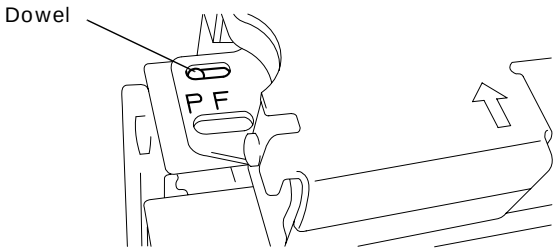
- ❏ *Once the printer is used, do not change the cutting method from partial cut to full cut, because of the difference in the wear rate on the blades between the areas where the paper passes and the paper does not pass, which can result in a paper-cutting problem. However, if the printer is new, you can change the cutting method from partial cut to full cut.*
- ❏ *If the printer is installed horizontally and full cut is chosen, attach the paper outlet guide. (See page 6-2.) If it is not attached, the cut paper falls inside the paper path, which can result in double-cuts, a paper jam, or cutter error.*

1. Open the roll paper cover.
2. Remove the cutter cover by spreading area Ⓐ of the main assembly case, as shown below:



3. Remove two S4 screws.

4. Adjust the autocutter unit to the desired position.
   To select partial cut: adjust the dowel to the position marked P.
   To select full cut: adjust the dowel to the position marked F.



5. Secure the autocutter unit with the two S4 screws. Make sure the two dowels on the frame assembly engage the two slits in the autocutter unit.

   Note:
   - *When tightening the screws, do not deform the frame assembly. This can decrease the sharpness of the cutter.*
   - *Do not tighten the autocutter unit when the dowels are not properly engaged. This can also decrease the sharpness of the cutter.*

6. Install the cutter cover.

7. Close the roll paper cover.

Setting the Paper Roll Width

The TM-L90 accommodates 80 mm {3.15"} wide paper rolls with no adjustments. For rolls from 38 to 70 mm {1.5 to 2.76"} wide, use the label paper spacer included with the printer.

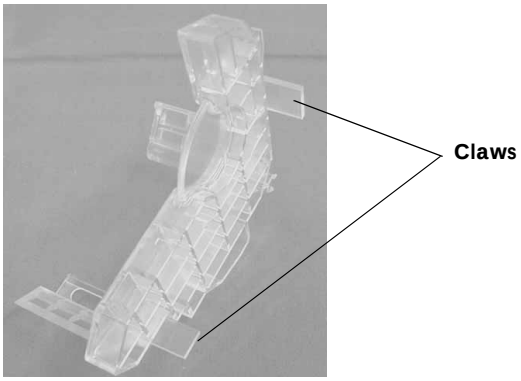
Note:

Once the printer is used, do not change the paper width from narrow to wide. Otherwise printing problems and paper-cutting problems may occur. There are two reasons for this restriction, as follows.

- ❏ *The area on the print head where paper does not pass can be worn out, since the platen directly contacts the head.*
- ❏ *The wear rate of the cutter blades is different between the areas where paper passes and does not pass, which can result in a paper-cutting problem.*

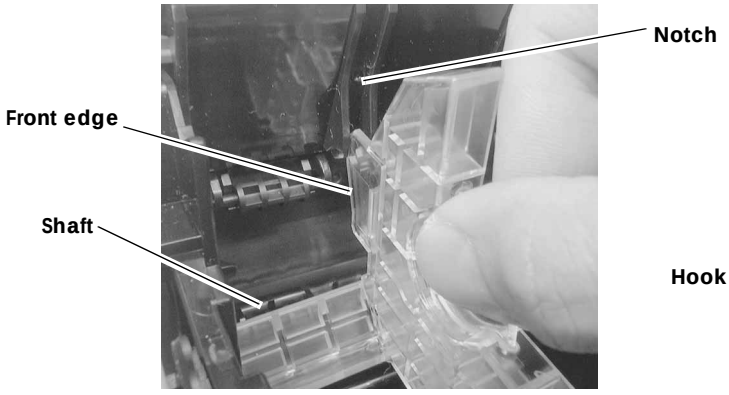
However, if the printer is new, you can change the paper width from narrow to wide.

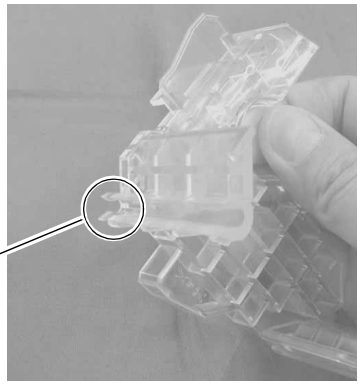
1. When you want to set the roll paper width from 61 mm to 70 mm {2.4 to 2.76"}, break off the two claws on the spacer shown in the illustration below with your hands.



2. Open the paper roll cover.

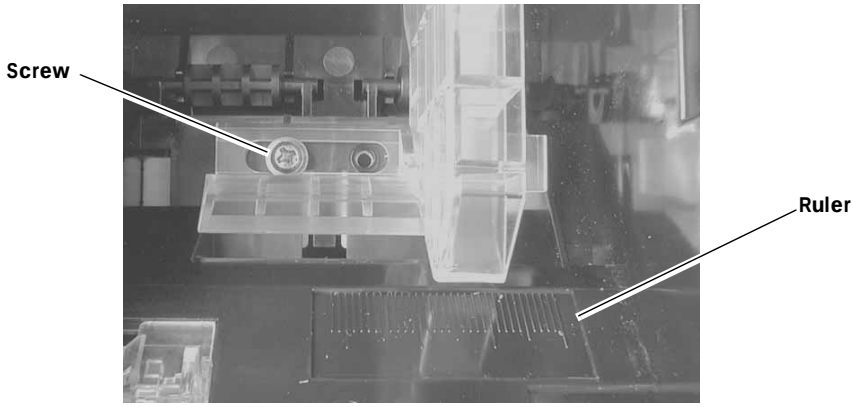
3. Insert the label paper spacer so that the front edge goes through the notch; then push down the spacer so that the hook on the spacer and the shaft align.





4. Push the label paper spacer until you feel it click onto the shaft. Check that the label paper spacer slides smoothly to the left and right.

5. Slide the label paper spacer to the appropriate width. You can use the ruler printed inside the printer, aligning the inside edge of the spacer with the desired measurement.



6. Tighten the spacer with the screw included with the spacer. (See figure above.)

7. Set the NV memory for the desired paper width.

Attaching the Power Switch Cover

⚠ *WARNING:*

If an accident occurs when the power switch cover is attached, unplug the power supply cord from the outlet immediately. Continued usage may lead to fire or shock.

You can use the power switch cover to make sure the power switch is not accidentally pressed.

Peel off the paper on the back of the power switch cover, and attach it as shown in the illustration.

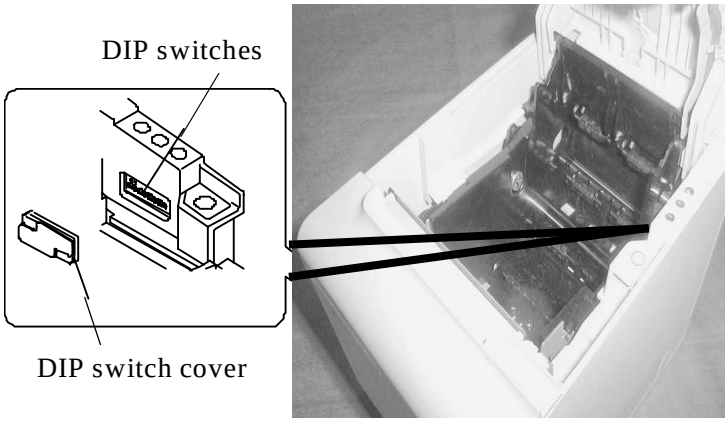
For removal, use a sharp-edged object.

If you want to turn on or off the power switch with the cover attached insert a sharp edged object into the hole in the power switch cover, and remove portion ① in the above illustration.

Setting the DIP Switches

Location of the DIP switches

A single set of DIP switches is located in the area shown below. To access the DIP switches, remove the DIP switch cover.



Note: About the DIP switch on the main circuit board

When disassembling and assembling the printer, you may notice a DIP switch on the main circuit board. This switch is used only at the factory. Always set this switch to OFF.

DIP switch settings

For serial interface models

Table 6-2 DIP switch settings for serial interface models

Switch number	Function	ON	OFF
1	Power switch function	Disabled	Enabled
2	Setting for serial communication conditions	To be specified with DIP switches.	To be specified with NV memory.
3	Handshake	XON/XOFF	DTR/DSR
4	Bit length	7 bits	8 bits
5	Parity check	Yes	No
6	Parity selection	Even	Odd
7	Baud rate selection	See the next table.	
8			

Table 6-3 Baud rate selection

Transmission speed [bps]	Switch number	
	7	8
2400	ON	ON
4800	OFF	ON
9600	ON	OFF
19200	OFF	OFF

bps: bits per second

Note: About the setting for serial communication conditions.

When DIP switch 2 is “ON”, you can set for serial communication conditions by the DIP switch. In case of OFF, it doesn’t enables to set by the DIP switch, but by the memory switch. Then you need to run the Memory Switch Setting Mode.

For non-serial interface models

Table 6-4 DIP switch settings for non-serial interface models

Switch number	Function	ON	OFF
1	Power switch function	Disabled	Enabled
2	Reserved	-	Fixed to off
3	Reserved	-	Fixed to off
4	Reserved	-	Fixed to off
5	Reserved	-	Fixed to off

Switch number	Function	ON	OFF
6	Reserved	-	Fixed to off
7	Reserved	-	Fixed to off
8	Reserved	-	Fixed to off

Connecting Cables

⚠ WARNING:

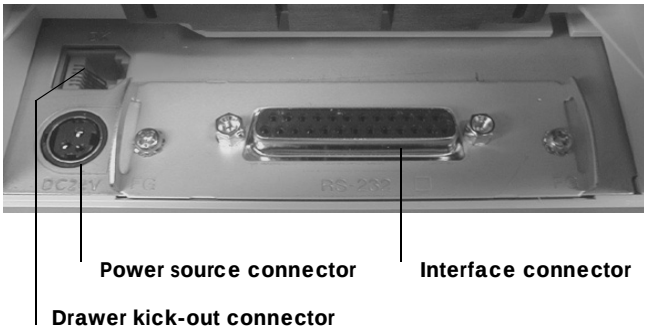
Make sure you use the EPSON PS-170 or PS-180 power supply. Using an incorrect power supply may cause fire or electrical shock.

⚠ CAUTION:

When connecting or disconnecting the power supply from the printer, make sure the power supply is not plugged into an electrical outlet. Otherwise you may damage the power supply or the printer.

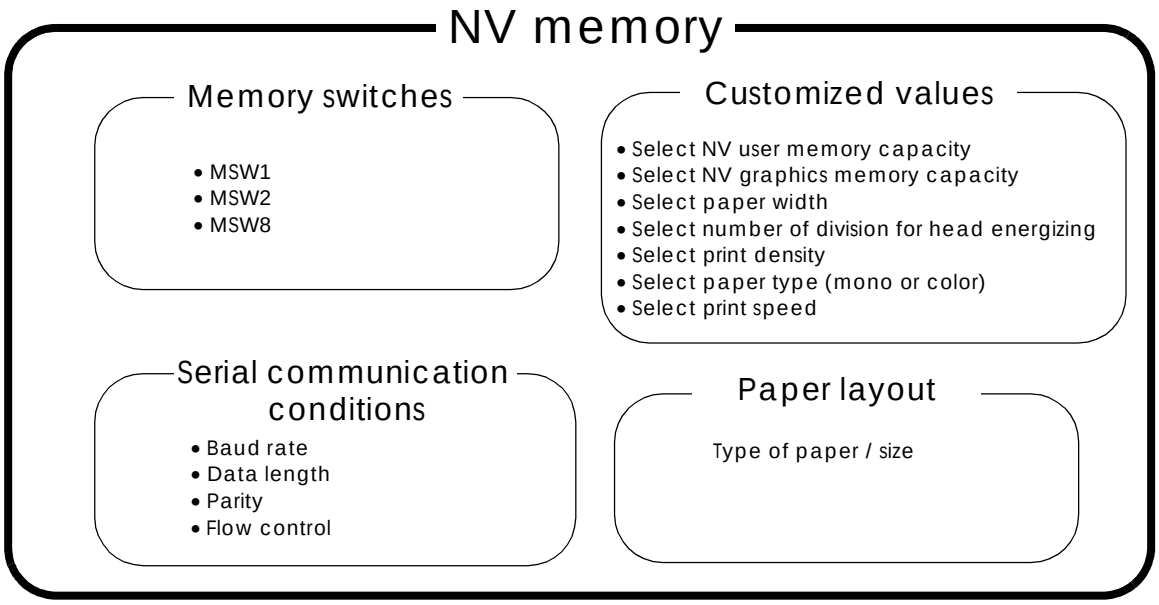
✎ ***Note:***

To remove the DC cable connector, make sure the power supply's power cord is unplugged; then grasp the connector at the arrow and pull it straight out.



Setting the NV Memory

The functions shown below are assigned to the memory system used with this printer.



Normally, you set the NV memory using the ESC / POS command. However, some functions can be set using either the Memory Switch Setting Mode or the Paper Layout Automatic Setting Mode on the printer itself, as described below.

Memory Switch Setting Mode

The functions listed below can be set using the Memory Switch Setting Mode.

Table 6-5 Setup items in the memory switch setting mode

Items	Description
Autocutter	Enables or disables the autocutter operation
Paper / Print density	• Selects paper type (mono or color) • Selects print density
Basic serial interface settings	Sets the baud rate, data length, flow control, parity
Advanced interface settings	Sets the receive buffer capacity, data processing for receiving error, conditions for busy
Interface reset signal	Sets if the reset signal on the interface connector is used or not used
Paper width	Sets paper width

Follow the steps below to run the Memory Switch Setting Mode.

1. Install a paper roll.
2. With the roll paper cover opened, turn the power on while pressing the FEED button. And You need to hold down the paper FEED button continuously until the ERROR LED lights on; release the paper FEED button once when the ERROR LED light on.
3. Press the paper FEED button (located inside the printer) twice.
4. Close the roll paper cover. The printer prints the main menu and operation instructions.
5. Follow the instructions for further operation to set the memory switches.
6. Once the setting is finished, the printer initializes and enters the normal state.

Paper Layout Automatic Setting Mode

Follow the steps below to run the Paper Layout Automatic Setting Mode.

1. Install the paper roll you want to use.
2. With the roll paper cover opened, turn the power on while pressing the FEED button.
3. Press the FEED button again six times.
4. Close the roll paper cover. The printer runs the Paper Layout Automatic Setting Mode. During the mode, the printer checks the necessary information for the paper installed and stores it in the NV memory.

Memory Switches

MSW1

Table 6-6 Memory switch MSW1

Bit	Function	0 (off)	1 (on)
1	Send power on notification	No	Yes
2	Capacity of the receive buffer	4KB	45B
3	Conditions for BUSY	Receive buffer full or offline	Receive buffer full
4	Data processing for receiving error	Prints '?'	Ignores
5	Automatic line feed	Disabled	Enabled
6	Reserved	Fixed to off	---
7	Pin #6: selection of reset signal	Not used	Used
8	Pin #25: selection of reset signal	Not used	Used

MSW2

Table 6-7 Memory switch MSW2

Bit	Function	0 (off)	1 (on)
1	Reserved	---	Fixed to on
2	Autocutter operation	Disabled	Enabled
3	Undefined	---	---
4	Undefined	---	---
5	Undefined	---	---
6	Undefined	---	---
7	Undefined	---	---
8	Undefined	---	---

MSW8

Table 6-8 Memory switch MSW8

Bit	Function	0 (off)	1 (on)
1	Undefined	---	---
2	Undefined	---	---
3	Undefined	---	---
4	Undefined	---	---
5	Undefined	---	---
6	Feeding paper to the start position during power on	Enabled	Disabled
7	Undefined	---	---
8	Select the type of error when the roll paper cover is opened while printing	Generate an automatically recoverable error	Generate an error recoverable by ESC/POS command

Customized Values

Table 6-9 Customized values

Function	Selection
Select NV user memory capacity	1KB 64KB 128KB 192KB
Select NV bit image memory capacity	None 64KB 128KB 192KB 256KB 320KB 384KB
Select paper width	38 mm 39 mm • • • 80 mm (43 steps in increment of 1 mm, except for the size from 71 mm to 79 mm)
Select number of division for head energizing	Undivided energizing Two-part energizing Three-part energizing Four-part energizing
Select print density	× 0.7, × 0.75, × 0.8, × 0.85, × 0.9, × 0.95, × 1.0, × 1.05, × 1.1, × 1.15, × 1.2, × 1.25, × 1.3, × 1.35, × 1.4
Select paper type (mono or color)	Single color Two colors
Select print speed	Print speed level 1 • • • Print speed level 9

Serial Communication Conditions

Table 6-10 Serial communication conditions

Function	Selection
Baud rate	2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 57600 bps, 115200 bps
Parity	None Odd Even
Flow control	DTR/DSR control XON/XOFF control
Data length	7 bits, 8 bits

Chapter 7
Handling

Safety Precautions

⚠ WARNING:

- ❑ *Shut down your equipment immediately if it produces smoke, a strange odor, or unusual noise. Continued use may lead to fire or electric shock. Immediately unplug the equipment.*
- ❑ *Only disassemble this product as described in this manual. Do not make modifications to the unit. Tampering with this product may result in injury, fire, or electric shock.*
- ❑ *Be sure to use the specified power source. Connection to an improper power source may cause fire or shock.*
- ❑ *Never insert or disconnect the power plug with wet hands. Doing so may result in severe shock.*
- ❑ *Do not allow foreign objects to fall into the equipment. Penetration by foreign objects may lead to fire or shock.*
- ❑ *If water or another liquid spills into this equipment, unplug the power cord immediately. Continued usage may lead to fire or shock.*
- ❑ *Do not place multiple loads on the power outlet (wall outlet). Overloading the outlet may lead to fire.*
- ❑ *Always supply power directly from a standard domestic power outlet.*
- ❑ *Handle the power cord with care. Improper handling may lead to fire or shock.*
  - *Do not modify or attempt to repair the cord.*
  - *Do not place any object on top of the cord.*
  - *Avoid excessive bending, twisting, and pulling.*
  - *Do not place cord near heating equipment.*
  - *Check that the plug is clean before plugging it in.*
  - *Be sure to push the prongs all the way in.*

⚠ CAUTION:

- *Do not connect cables other than as described in this manual. Different connections may cause equipment damage and burning.*
- *Be sure to set this equipment on a firm, stable, flat surface. Product may break or cause injury if it falls.*
- *Do not use in locations subject to high humidity or dust levels. Excessive humidity and dust may cause equipment damage, fire, or shock.*
- *Do not place heavy objects on top of this product. Never stand or lean on this product. Equipment may fall or collapse, causing breakage and possible injury.*
- *To ensure safety, please unplug this product prior to leaving it unused for an extended period.*
- *Be aware that the thermal print head and its supporting parts become very hot. Be sure not to touch these parts. Touching them may cause burns.*

Precautions on Handling the Printer

Observing the following operational precautions protects the unit against damage.

⚠ CAUTION:

- *Do not turn off the printer while the autocutter is working. Doing so leaves the cutter blade exposed, which prevents the roll paper cover from opening.*
- *Do not pull out paper when the roll paper cover is closed.*
- *Except for a paper jam, do not turn the autocutter knob when the cutter cover is open. Turning it accidentally may expose the cutter blade, which prevents the roll paper cover from opening.*
- *The heating element of the printer mechanism's thermal head and the driver IC are easily damaged. Never allow these components to come into contact with metal or other hard objects.*
- *Never touch the printer mechanism's (thermal head's) heating elements with your hands. Doing so can contaminate the heating elements and affect proper operation.*
- *Do not open the roll paper cover during printing. The printer mechanism may fail.*

Precautions on Paper Handling

⚠ *CAUTION:*

- *Thermal paper containing Na, K, or CL ions, etc., can adversely affect the heating elements of the thermal head. Be sure to use thermal paper that meets the paper specifications described in Appendix A, "General Specifications."*
- *Thermal paper starts to color at around 70°C {158°F}. Take care to protect unused and printed thermal paper against the effects of heat, light, and humidity, which can cause the paper to color and characters on the paper to fade.*
- *Take the roll paper out of the printer when you will not use the printer for a long time in an environment of high temperatures and humidity.*
- When the printer is not used for one week or more, it is recomended not to leave the thermal paper between the platen and the print head.

Part Names

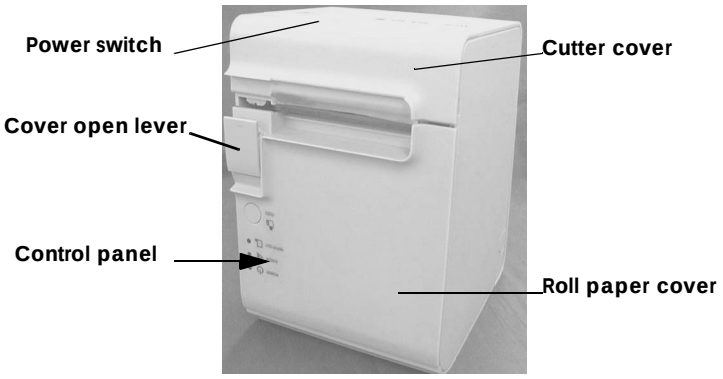


Table 7-1 Part names and functions

Name	Function
Roll paper cover	Open to insert or remove roll paper.
Cutter cover	Remove when the roll paper cover does not open. Do not open this normally.
Power switch	Turns on or off power.
Cover open lever	Used to open the roll paper cover.
Control panel	Includes LEDs for showing the printer status and a button for feeding paper. See the next illustration for details.

LEDs and Button

Table 7-2 LEDs and button

Name	Function
POWER LED	Lights when the power is on, and is off when the power is off.
ERROR LED	Off when the printer is online, lights when the printer is offline, and flashes when an error occurs.
PAPER OUT LED	Lights when roll paper is nearly out.
FEED Button	Feeds the roll paper.

Handling

Powering the unit ON or OFF

There are two methods to power this printer ON or OFF:

- ❏ Using the power switch
- ❏ With the power switch disabled

Each method is used for the following purposes:

Table 7-3 Purpose of each method of power ON/OFF

Method	Description
Power ON/OFF using the power switch	To power the printer ON or OFF using the power switch
Power ON/OFF with the power switch disabled	To power the printer ON or OFF using the power breaker where the printer is installed or using the switch on the power box or wall outlet where the printer is connected. In this case, the program must execute the power off process using the **DLE DC4** (***fn***=2) command before turning the printer power off.

These methods can be selected by DIP switch 1.

Table 7-4 Setting of DIP switch 1

Method	DIP switch 1
Power ON/OFF using the power switch	OFF
Power ON/OFF with the power switch disabled	ON

The explanations below show how to power the unit ON or OFF by each method.

Power ON/OFF method using the power switch

Power ON: Press the power switch.

Power OFF: Hold down the power switch for more than 3 seconds.

Power ON/OFF method with disabling the power switch

Power ON: Turn ON the power breaker at the store where the printer is installed, or turn ON the switch on the power box or wall outlet where the printer is connected.

Power OFF:

1. Execute the power off process using the **DLE DC4** (***fn***=2) command.
2. Make sure the POWER LED starts flashing.
3. Turn off the power breaker or the switch on the power box or wall outlet.

Loading the paper roll

⚠ *CAUTION:*

- ❑ *The manual cutter blade is sharp. Do not touch it with your hands when mounting or replacing roll paper, because you can be injured.*
- ❑ *Be aware that the thermal print head and its supporting parts become very hot. Be sure not to touch these parts. Touching them may cause burns.*

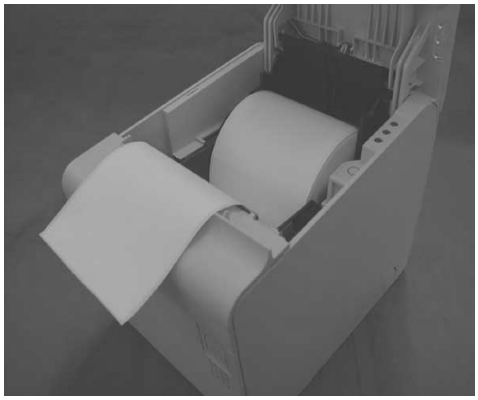
✎ ***Note:***

Be sure to use paper rolls that meet the specifications. Do not use paper rolls that have the paper glued to the core, because the printer cannot detect the paper end correctly.

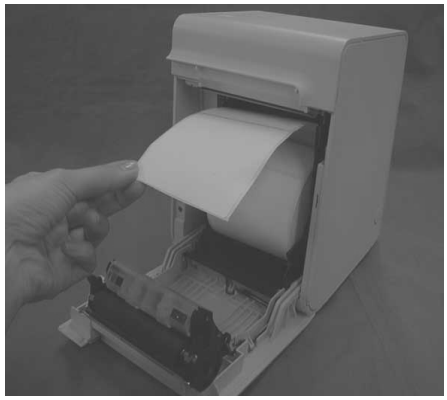
1. Make sure the printer is not receiving data; otherwise, it may be lost. Open the paper roll cover by pressing the cover-open button.

2. Load the roll paper inside the printer in the correct direction.

Horizontal installation

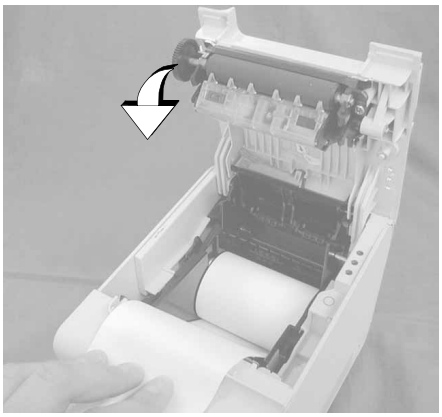


Vertical installation

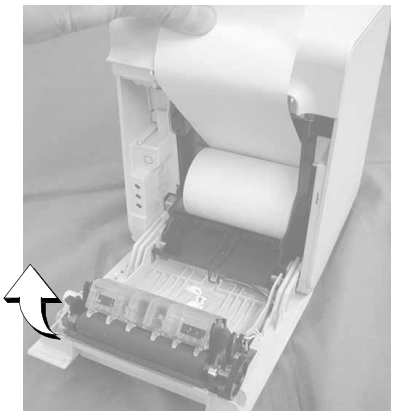


3. Pull out a small amount of roll paper.
4. Then close the paper roll cover.

Horizontal installation



Vertical installation



5. Tear off the paper as shown.

Removing the roll paper

Open the roll paper cover, and remove the used paper roll core if there is one.

Appendix A

General Specifications

Printing Specifications

Printing method: Thermal line printing

Dot density: 203 dpi × 203 dpi [dpi: dots per 25.4 mm (dots per inch)]

Paper Specifications

Paper type: Specified thermal roll paper

The following paper can be used:
- Receipt paper (without black mark)
- Receipt paper (with black mark)
- Label paper (without black mark)
- Label paper (with black mark)

Refer to page 6-13 “Paper Layout Automatic setting mode“

Form: Paper roll

Paper width: 79.5 ± 0.5 mm {3.13 ± 0.02"} (for 80 mm {3.15"} paper width)
59.5 ± 0.5 mm {2.34 ± 0.02"} (for 60 mm {2.36"} paper width)
37.5 ± 0.5 mm {1.48 ± 0.02"} (for 38 mm {1.5"} paper width)

Paper Specifications

Specified roll paper:

		Roll Width)			Original paper
		80mm {3.15"}	60 mm {2.36"}	38mm {1.5"}	
Monochrome thermal roll paper		ENTPD080090	---	---	TF60KS-E
Monochrome thermal roll paper (thickness type)		ENTPE080090	---	---	TF11KS-ET
Two-color thermal roll paper		ENTPC080090	---	---	PD750R
Label stock	Length of label	Label Width			
		80 mm {3.15"}	60 mm {2.36"}	38mm {1.5"}	---
Monocrome label paper stock	25 mm (1")	ENTLA080090025	ENTLA060090025	ENTLA038090025	---
	51 mm (2")	ENTLA080090051	ENTLA060090051	---	---
	76 mm (3")	ENTLA080090076	ENTLA060090076	---	---
	102 mm (4")	ENTLA080090102	ENTLA060090102	---	---
Two-color label paper stock	25 mm (1")	ENTLA080090025	ENTLA060090025	ENTLA038090025	---
	51 mm (2")	ENTLA080090051	ENTLA060090051	---	---
	76 mm (3")	ENTLA080090076	ENTLA060090076	---	---
	102 mm (4")	ENTLA080090102	ENTLA060090102	---	---

Note:
To ensure the print quality, be sure to use the specified paper.

Specified original paper: The following original paper types can be used.

Monochrome thermal paper
TF60KS-E (Paper thickness 75 µm) (Nippon Paper Industries Co., Ltd.)
TF11KS-ET (Paper thickness 145 µm) (Nippon Paper Industries Co., Ltd.)
TF50KS-E (Paper thickness 65 µm)(Nippon Paper Industries Co., Ltd.)
PD160R (Paper thickness 75 µm) (Oji paper Mfg. Co., Ltd.)
P350 (Paper thickness 62 µm) (Kanzaki Specialty Paper (USA))
KF50 (Paper thickness 62 µm) (KANZAN Spezialpapiere GmbH (Germany))

Two-color thermal paper
PD750R (Paper thickness 75 µm) (Oji paper Mfg. Co., Ltd.)

Paper roll size: Roll diameter: Maximum 90 mm {3.54"}
Take-up paper roll width: 80, 60, 38 mm {3.15, 2.36, 1.5"} with +0.5/-1.0 mm {+0.02/-0.04"} of tolerance

Paper roll core: Inside diameter: 25.4 mm {1"}
Out side diameter: 31.4 mm {1.24"}

Paper must not be pasted to the paper roll core.

Autocutter

Either of the following settings can be applied.

Table A-1 Autocutter settings

Setting	Description
Partial cut (cutting with one point in left edge left uncut)	Set by changing the autocutter unit position.
Full cut (completely cut)	

Note:

- *Once the printer is used, do not change the cutting method from partial cut to full cut, since the wear rate on the blades differs between the areas where the paper passes and where the paper does not, which can result in a paper-cutting problem. However, if the printer is new, you can change the cutting method from partial cut to full cut.*
- *If the printer is installed horizontally and the full cut is chosen, attach the paper outlet guide. (Refer to Chapter 6.) If it is not attached, the cut paper falls inside the paper path, which can result in double-cutting, a paper jam, or cutter error.*

Paper Roll Supply Device

Supply method: Drop-in paper roll

Near-end detector

Detection method: Micro switch

Paper roll core diameter: Inside: 25.4 mm {1"}, Outside: 31.4 mm {1.24"}

Near-end adjustment: Adjusting screw
Fixed position #1 (diameter: approximately 36 mm {1.42"}), #2 (diameter: approximately 41 mm {1.61"})

Paper width selection: 80 mm {3.15"} (default setting)
38 mm or 60 mm {1.5 or 2.36"} paper width can be selected using the label paper spacer packed in the box.
(By adjusting the label paper spacer, it is also possible to set optional positions in the range of 38 mm to 70 mm {1.5 to 2.76"}.

When you attach the label paper spacer, you must also specify the paper width setting in the NV memory to match the print areas.

Note:
Once the printer is used, do not change the paper width from narrow to wide. Otherwise, printing problems and paper-cutting problems may occur. There are two reasons for this restriction, as the follows.

- *The area on the print head where the paper does not pass can be worn out, since the platen directly contacts the head.*
- *The wear rate on the cutter blades differs between the areas where the paper passes and does not, which can result in paper-cutting problems.*

However, if the printer is new, you can change the paper width from narrow to wide.

Electrical Specifications

Operating voltage: +24 VDC ± 7% (optional power supply: EPSON PS-170 or PS-180)

Pin assignments for the power connector:

Table A-2 Pin assignment for the power connector

Pin #	Function
1	+24V
2	GND
3	N.C.
SHELL	F.G.

Dimensions and Mass

Height: Approx. 203 mm {7.99"}

Width: Approx. 140 mm {5.51"}

Depth: Approx. 148 mm {5.83"}

Weight: Approx. 1.9 kg {4.19 lb} (not including paper)

Environmental Conditions

Temperature:

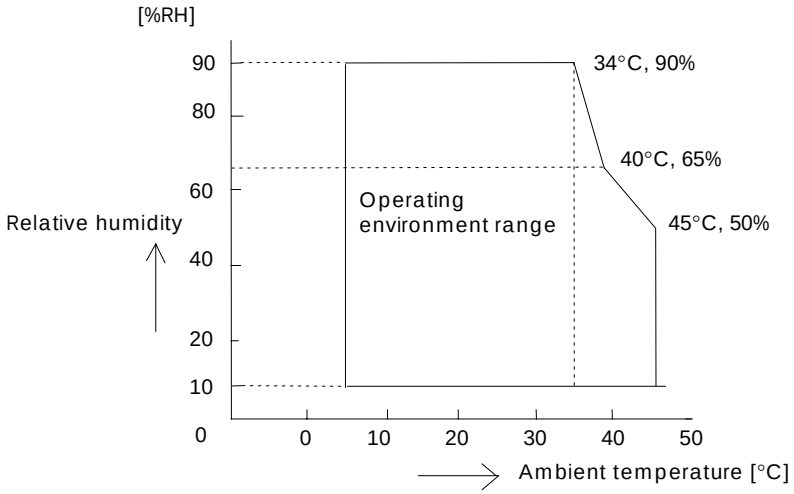
Operating: 5 ~ 45°C {23-113°F} (See the figure below.)

Storage: -10 ~ 50°C {14-122°F} (except for paper)

Humidity:

Operating: 10 ~ 90% RH (See the figure below.)

Storage: 10 ~ 90% RH (except for paper)

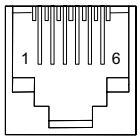


Drawer Kick-out Connector

Pin assignments

Table A-3 Drawer kick-out connector pin assignments

Pin Number	Signal Name	Direction
1	Frame GND	—
2	Drawer kick-out drive signal 1	Output
3	Drawer open/close signal	Input
4	+24 V	—
5	Drawer kick-out drive signal 2	Output
6	Signal GND	—



+24V is always output through pin 4 during power on.

Interfaces

Various interface boards (EPSON UB series, except for the UB-P02) can be used.

Buttons and Switches

Power switch

The power switch (non-locking, push switch) on the right part of the front face of the unit turns the printer on or off.

You can use the DIP switches to enable or disable the power switch.

Panel Button

Feed (FEED) button:

Type: Non-locking push button

Function: Feeds paper. The paper cannot be fed if:
(1) roll paper end detector detects no paper.
(2) cover is open.

Note:
*The **ESC c 5** command enables or disables the panel button. When disabled, the button will not function.*

DIP Switches and NV Memory

For explanations of the DIP switches and the NV memory, see Chapter 6, “Installation.”

Indicators

Panel LEDs

Power (POWER) LED: Green

ON: Power is stable.

OFF: Power is not stable.

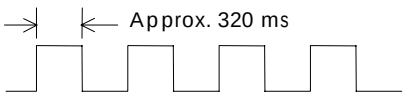
Paper roll end (PAPER OUT) LED: Red

On: The paper roll near end or real end is detected.

Off: Paper is loaded (normal condition)

Blinking: Waiting for the self-test print to continue. Or, it is waiting for the macro execution command.

Table A-4 PAPER OUT LED blinking pattern

State	PAPER OUT LED Blinking Pattern	Recovery Conditions
Waiting for self-test printing to continue or macro execution ready state.	PAPER OUT 	Pressing the PAPER FEED button continues self-test printing or executes a macro.

Error (ERROR) LED: Red

On: Offline (except during paper feeding using the FEED button, self-test printing, and the error state)

Blinking: Error (See the section “Error types and processing” in Chapter 2.)

Off: Normal condition.

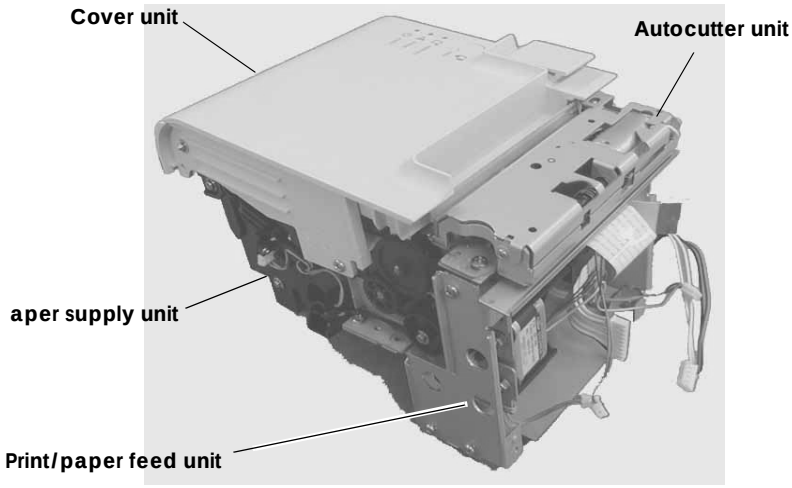
Appendix B

Overview of the Mechanisms

This printer consists of the next four units:

- ❏ Cover unit
- ❏ Print / paper feed unit
- ❏ Paper supply unit
- ❏ Autocutter unit

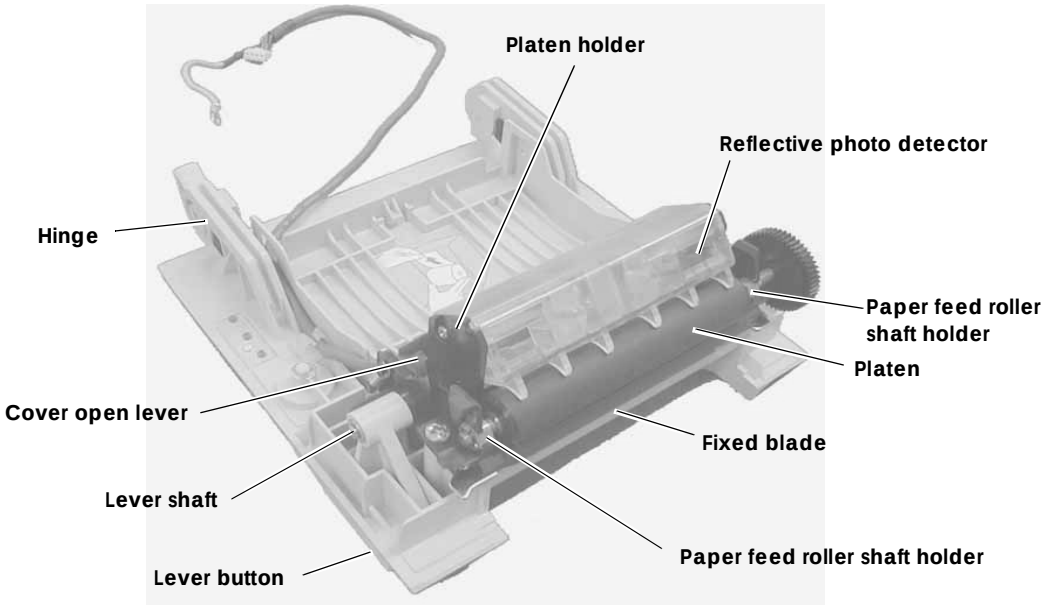
The illustration below shows an external view of the printer mechanism:



Cover Unit

The cover unit is installed onto the paper supply unit by a hinge, and it makes a rotational movement.

Attached to the platen holder of the cover unit are the paper feed roller shaft holder, platen, cover open lever, lever shaft, lever button, fixed blade, and reflective photo detector. The reflective photo detector is able to detect the black mark on the non-printing surface of the paper.



When an operator closes the cover unit, the cover open lever is engaged by the protrusions on the print / paper feed unit and the cover unit is locked to the print / paper feed unit.

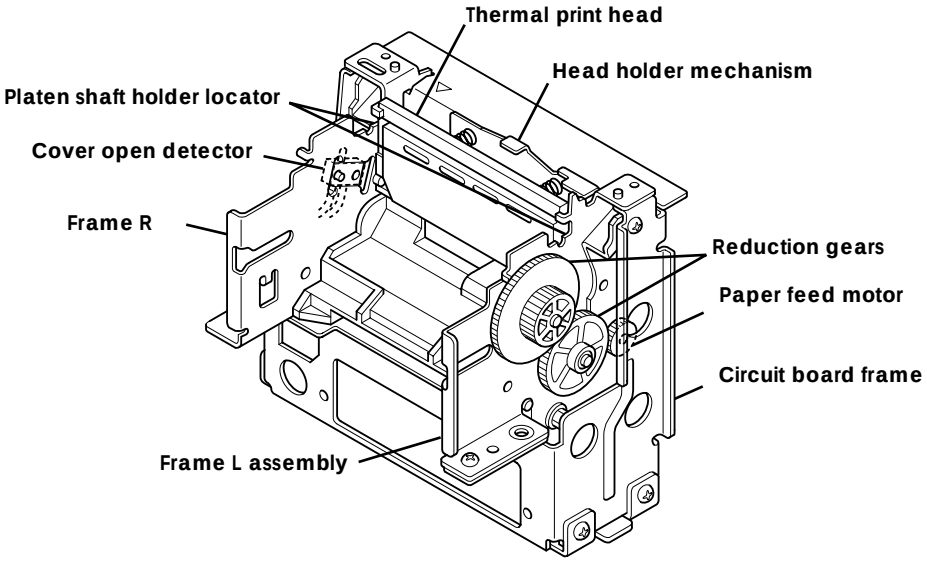
At this time, the paper feed roller shaft holder hits the locators on the right and the left frames of the print / paper feed unit, and the platen is secured into place. The platen gear attached to the lever shaft is engaged with the reduction gear on the print / paper feed unit, and can rotate the platen.

A proper load is applied to the cover unit by the leaf spring on the paper supply unit. When an operator manipulates the lever button while the cover unit is closed, the lock between the cover open lever and the print / paper feed unit is released, and the cover unit opens slightly. Then the cover unit can be fully opened by the operator.

Although the cover open lever and the lever button are installed onto a single lever shaft, they can move individually, allowing the cover unit to be closed without manipulating the lever button.

Print/Paper Feed Unit

The print / paper feed unit consists of various frames, thermal print head, head holder mechanism, paper feed motor, reduction gear, and cover open detector.



The right and the left frames supporting the thermal print head can be installed or removed together with the paper supply unit, and provide the locator for the paper feed roller shaft holder.

The circuit board frame holds the main circuit board that controls the printer mechanism.

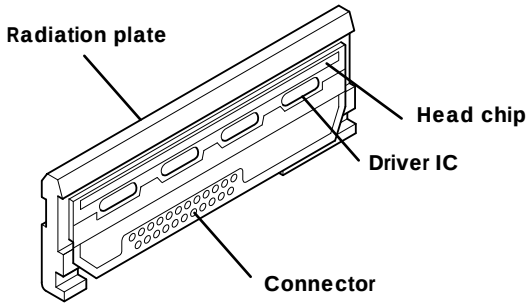
The cover open detector detects if the cover unit is closed or open.

Rotating the paper feed motor when the cover unit is closed drives the reduction gear to rotate the platen. Thermal paper is fed, if it is rolled up on the platen.

With the thermal paper pinched between the platen and the thermal print head, the printing is performed by heat generation in the heating element of the thermal print head.

Thermal Print Head

The thermal print head consists of a head chip that includes the heating element, a driver IC that controls each dot of the heating element, a thermistor that detects the temperature of the thermal print head, radiation plate, and connector.



Principles of Thermal Printing

When the print signal energizes a corresponding dot of the heating element with the specified pulse, the dot heats up to a high temperature, and dissolves the color-forming ingredient of the color-forming layer on the thermal paper that is contacting the dot. When the transparent color-forming layer is dissolved at room temperature, it generates color. When the temperature cools down, it is fixed again to the thermal paper side, thus forming printing.

The color can be set to various colors by changing the formulation of chemicals used for the color-forming layer, but the popular thermal paper is the one that forms the color black.

Depending on the paper type, environment, and printing conditions, part of the dissolved color-forming layer may be deposited on the thermal printer head side. In this case, you need to clean the heat-generating element of the thermal print head.

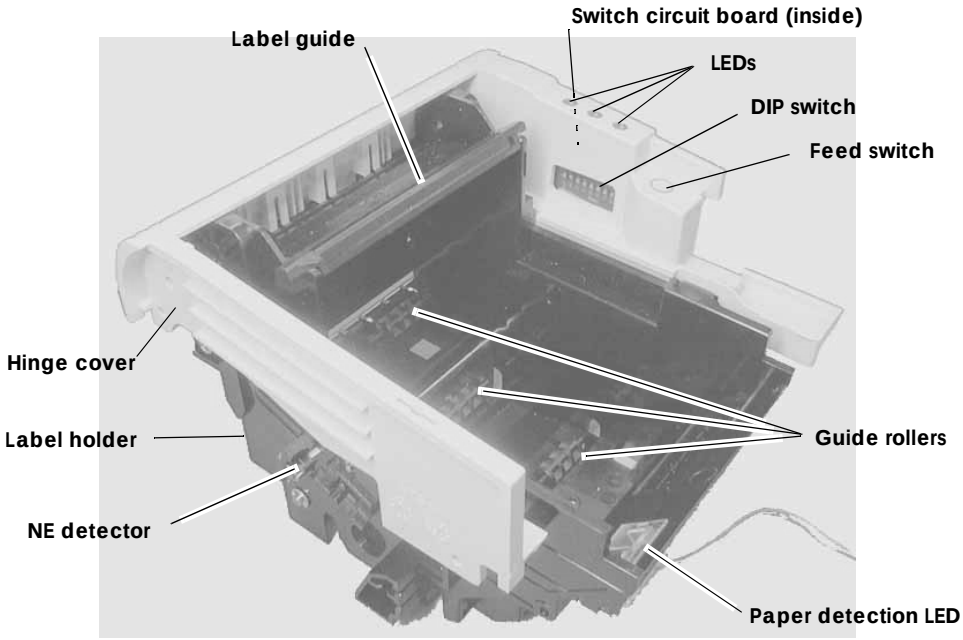
Data Input and Printing

Serial print data input from DATA IN synchronizes with the CLOCK signal, and is transmitted to the SHIFT REGISTER within the driver IC. It is then recorded to the LATCH REGISTER within the driver IC on the LATCH signal timing, turns on the gate with the STROBE signal, and energizes the heating element.

The STROBE signal (energizing pulse width) is set properly, depending on the voltage, thermistor-detected temperature, and print speed, to obtain the optimum print density. There are two terminals for STROBE, which can be driven with up to two parts by hardware. Normal printing performs one-part printing for printing speed, and two-part printing for high-duty printing, which causes a high-voltage drop.

Paper Supply Unit

The paper supply unit consists of the label holder, paper detection LED, NE detector, and hinge cover.



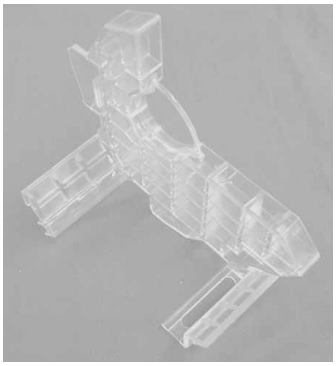
The label guide is attached to the label holder and interlocks with the cover unit. This allows the TM-L90 to receive paper roll in the correct position, whether the unit is installed vertically or horizontally. The guide rollers that receive the paper roll ease the load that occurs during paper feed, improve the paper-feed pitch accuracy, and ease the maximum load applied to the paper feed motor.

The paper detection LED works with the reflective photo detector on the platen holder and detects the several types of paper. The paper detection LED is covered by a transparent resin to prevent the detector from being destroyed by static. The NE detector detects the remaining amount of roll paper. It can be set to perform detection at two points, depending on the setting. This detector can be rotated by loosening it with a coin, and allows detection whether the TM-L90 is installed vertically or horizontally.

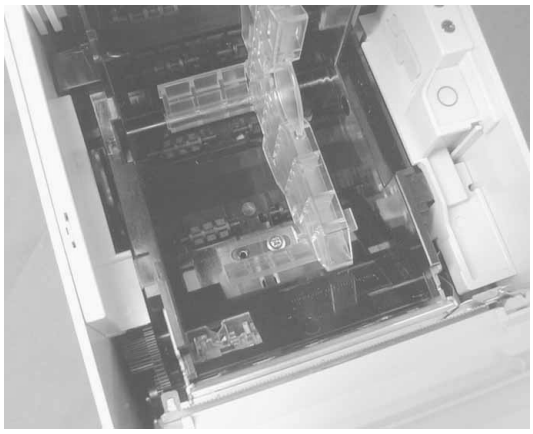
The switch circuit board is installed onto the hinge cover, and the printer settings can be configured with the DIP switches or FEED button, even when the cover is open. The printer status is shown with LEDs.

Changing the paper width

The unit can handle paper roll widths of 38 mm to 70 mm {1.5 to 2.76"}, when you install a paper spacer into the label holder.



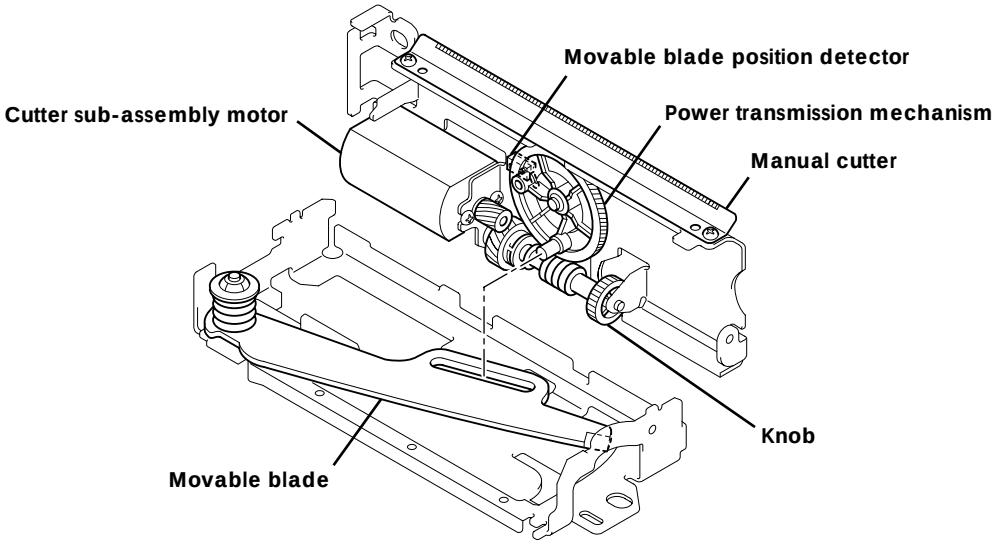
Appearance of paper spacer



Paper spacer is attached to the label holder (example)

Autocutter Unit

The autocutter unit is installed into the print / paper feed unit, and consists of a movable blade, cutter sub-assembly motor, movable blade position detector, power transmission mechanism, and frame.



The autocutter unit's movable blade and the fixed blade attached to the cover unit cross each other, and cut paper with the principle of scissors.

Opening the cover unit separates the two blades. Closing the cover unit while the movable blade is in the standby position makes the fixed blade hit the frame portion of the autocutter unit, and is set to the correct position against the movable blade.

The movable blade is always in the standby position, and is moved to the intersecting direction against the fixed blade by various gears. If paper is present, it is cut between the movable and the fixed blades. Then, the movable blade returns to the standby position.

The movable blade position detector detects if the movable blade is in the standby position or not.

The power transmission mechanism is equipped with a one-way clutch that cuts power transmission when the movable blade catches on foreign material or something.

Full cut and partial cut

The paper cutting can be set to either of two methods (full-cut and partial-cut) by changing the autocutter installation position on the print / paper feed unit.

Manual cut

You can also use the manual cutter to cut paper manually.

Appendix C
Tools

Table C-1 Tools

Tool	Specifications	Purpose	Source
Torque-limiting hexagon box driver	Tip size: 5 mm The tightening torque for the nut should be between 34.3 to 39.2 Ncm (3.5 to 4.0 kgcm).	Remove and install the paper feed motor	Use commercially available product.
Crosshead screwdriver	No. 0, 1, 2	Disassembly and assembly	Use commercially available product.
Flathead screwdriver	—	Disassembly and assembly	Use commercially available product.
Tweezers	—	Disassembly and assembly	Use commercially available product.
Wrist strap (static electricity countermeasure)	—	Disassembly and assembly	Use commercially available product.
E-ring holder	1.5, 3	Disassembly and assembly	Use commercially available product.

Appendix D
Parts List

Alphanumeric List

Table D-1 Alphanumeric list

Name for service manual	Name for price list	Q'ty	Ref.#	Note
Autocutter unit	AUTO CUTTER UNIT	1	162	
Auxiliary holder plate	PLATE,HOLDER AUXILIARY	1	169	
BM detector holder	HOLDER,BM DETECTOR	1	112	
BM paper detector circuit board assembly	CIRCUIT BOARD,BM PAPER DETECTOR ASSEMBLY	1	213	
Bottom plate	PLATE,LOWER	1	165	
Caution seal	SEAL,CAUTION,C	1	106	
Center frame	FRAME,CENTER	1	119	
Circuit board frame	FRAME CIRCUIT BOARD,A	1	111	
Connector cover	COVER,CONNECTOR,AA	1	141	
Cover detector assembly	COVER,DETECTOR ASSEMBLY	1	166	
Cover leaf spring	PLATE SPRING,COVER	1	124	
Cover open lever	LEVER,COVER OPEN	1	128	
Cover rotation shaft	SHAFT,COVER TURNING	2	133	
Cover tape	TAPE,COVER	1	160	Accessory
Cutter cover	COVER,CUTTER,AA	1	139	
Cutter frame assembly	FRAME,CUTTER ASSEMBLY	1	149	
Cutter motor sub-assembly	MOTOR,CUTTER SUB ASSEMBLY	1	151	
NE detector adjustment screw	SCREW,DETECTOR ADJUSTMENT, N.E.	1	101	
DIP switch cover	COVER,DIP SWITCH	1	154	
E-ring (E1)	RETAINING RING	—	E1	
E-ring (E2)	RETAINING RING	—	E2	
FEED button	BUTTON,FEED,AA	1	131	
Feed sheet	SHEET,FEED,A	1	135	
Feed spacer	SPACER,FEED	1	132	
Ferrite core	FERRITE CORE	1	211	
Fixed blade	FIXED BLADE	1	114	
Fixed blade holder spring	SPRING,BLADE HOLDER	1	104	
Frame L assembly	FRAME,L ASSEMBLY,A	1	142	

Table D-1 Alphanumeric list

Name for service manual	Name for price list	Q'ty	Ref.#	Note
Frame R	FRAME,R	1	107	
Frame strengthening plate L	PLATE,FRAME STRENGTHEN,L	1	110	
Frame strengthening plate R	PLATE,FRAME STRENGTHEN,R	1	109	
Front frame	FRAME,FRONT	1	108	
Handling label	LABEL,OPERATION,BA	1	155	
Head caution seal	SEAL,CAUTION,HEAD B	1	103	
Head FFC	FFC,HEAD	1	207	
Head holder spring	SPRING,HEAD HOLDER	2	125	
Hinge cover	COVER,ARM,AA	1	127	
Hinge spacer	SPACER,HINGE	2	172	
I/F circuit board unit	I/F CIRCUIT BOARD UNIT	1	202	
Label paper guide	GUIDE,LABEL	1	126	
Label paper holder	HOLDER,LABEL	1	120	
Label paper platen holder	HOLDER,LABEL PLATEN	1	156	
Label paper spacer	SPACER,LABEL	1	173	Accessory
LED holder assembly	HOLDER,LED ASSEMBLY	1	121	
Lever button	BUTTON,LEVER,AA	1	130	
Lever shaft	SHAFT,LEVER	1	129	
Logo plate	LOGO PLATE,AB	1	102	
Main case assembly	CASE,MAIN ASSEMBLY,AA	1	136	
Main circuit board unit	MAIN CIRCUIT BOARD UNIT	1	201	
Manual cutter	MANUAL CUTTER	1	167	
Manual cutter screw	SCREW,MANUAL CUTTER	3	148	
Micro switch	MICRO-SWITCH	1	146	
Mini-clamp	MINI CLAMP	1	179	
Motor ground plate	GROUND PLATE,MOTOR	1	118	
NE detector holder	HOLDER,N.E.DETECTOR	1	145	
NE detector lead wire	LEAD WIRE,N.E.DETECTOR	1	206	
NE detector lever	LEVER,N.E.DETECTOR	1	144	
Nut (N1)	HEXAGON NUT	-	N1	
Paper cutter cover assembly	COVER,PAPER CUTTER ASSEMBLY,B	1	150	
Paper feed motor	MOTOR,PAPER FEED,B	1	205	
Paper feed motor damper	DAMPER,PAPER FEED MOTOR	3	117	
Paper feed roller shaft holder	SHAFT HOLDER,PAPER FEED ROLLER	1	164	
Paper holding roller	ROLLER,PAPER HOLD	8	122	
Paper outlet guide	GUIDE,PAPER OUTLET,AA	1	174	Accessory

Table D-1 Alphanumeric list

Name for service manual	Name for price list	Q'ty	Ref.#	Note
Paper outlet tape	TAPE,PAPER OUTLET	1	175	Accessory
Plain washer (W1)	PLAIN WASHER	—	W1	
Platen assembly	PLATEN ASSEMBLY	1	163	
Power switch cover	COVER,POWER SWITCH,AA	1	157	Accessory
Reduction gear C	GEAR,REDUCTION,C	1	115	
Reduction gear D	GEAR,REDUCTION,D	1	116	
Roll paper cover assembly	COVER,ROLL PAPER ASSEMBLY,BA	1	152	
Rubber foot A	RUBBER FOOT,A	4	140	
Rubber foot C	RUBBER FOOT,C	4	159	
Screw (S1)	C.B.P-TITE,3X10,F/ZN	—	S01	
Screw (S10)	C.C.S. SCREW	—	S10	Accessory
Screw (S2)	C.C.P-TITE SCREW,3X8,F/ZN	—	S02	
Screw (S3)	C.B.B.SCREW,4X12,F/ZN	—	S03	
Screw (S4)	C.B.S. SCREW	—	S04	
Screw (S5)	C.B.S. SCREW	—	S05	
Screw (S6)	C.P.S.(O) SCREW	—	S06	
Screw (S7)	C.B.B-TITE SCREW	—	S07	
Screw (S9)	C.B. SCREW	—	S09	
Shield plate	PLATE,SHIELD	1	180	
Spacer	SPACER,3x4x4	3	153	
Spacer B	SPACER,B	2	178	
Spacer guide plate	PLATE,SPACER GUIDE	1	171	
Spacer guide shaft	SHAFT,SPACER GUIDE	1	170	
Spacer (3X4X4)	SPACER,3X4X4,F/ZN	3	153	
Spring holder plate	PLATE,SPRING HOLDER	1	113	
Sub circuit board assembly	SUB CIRCUIT BOARD ASSEMBLY,AA	1	209	
Switch circuit board assembly	SWITCH CIRCUIT BOARD ASSEMBLY,AA	1	210	
Switch circuit board FFC	FFC,SWITCH CIRCUIT BOARD	1	208	
Switch panel holder	HOLDER,SWITCH PANEL	1	134	
Switch panel label	LABEL,SWITCH PANEL,BA	1	158	Accessory
Switch screw	SCREW,SWITCH,1	2	105	
Tension plate spring	SPRING,TENSION PLATE	2	123	
Thermal print head assembly	THERMAL PRINT HEAD ASSEMBLY,C	1	147	

Reference Number List

Table D-2 Reference number list

Ref.#	Name for service manual	Name for price list	Q'ty	Note
101	NE detector adjustment screw	SCREW,DETECTOR ADJUSTMENT, N.E.	1	
102	Logo plate	LOGO PLATE,AB	1	
103	Head caution seal	SEAL,CAUTION,HEAD B	1	
104	Fixed blade holder spring	SPRING,BLADE HOLDER	1	
105	Switch screw	SCREW,SWITCH,1	2	
106	Caution seal	SEAL,CAUTION,C	1	
107	Frame R	FRAME,R	1	
108	Front frame	FRAME,FRONT	1	
109	Frame strengthening plate R	PLATE,FRAME STRENGTHEN,R	1	
110	Frame strengthening plate L	PLATE,FRAME STRENGTHEN,L	1	
111	Circuit board frame	FRAME CIRCUIT BOARD,A	1	
112	BM detector holder	HOLDER,BM DETECTOR	1	
113	Spring holder plate	PLATE,SPRING HOLDER	1	
114	Fixed blade	FIXED BLADE	1	
115	Reduction gear C	GEAR,REDUCTION,C	1	
116	Reduction gear D	GEAR,REDUCTION,D	1	
117	Paper feed motor damper	DAMPER,PAPER FEED MOTOR	3	
118	Motor ground plate	GROUND PLATE,MOTOR	1	
119	Center frame	FRAME,CENTER	1	
120	Label paper holder	HOLDER,LABEL	1	
121	LED holder assembly	HOLDER,LED ASSEMBLY	1	
122	Paper holding roller	ROLLER,PAPER HOLD	8	
123	Tension plate spring	SPRING,TENSION PLATE	2	
124	Cover leaf spring	PLATE SPRING,COVER	1	
125	Head holder spring	SPRING,HEAD HOLDER	2	
126	Label paper guide	GUIDE,LABEL	1	
127	Hinge cover	COVER,ARM,AA	1	
128	Cover open lever	LEVER,COVER OPEN	1	
129	Lever shaft	SHAFT,LEVER	1	
130	Lever button	BUTTON,LEVER,AA	1	
131	Feed button	BUTTON,FEED,AA	1	
132	Feed spacer	SPACER,FEED	1	
133	Cover rotation shaft	SHAFT,COVER TURNING	2	
134	Switch panel holder	HOLDER,SWITCH PANEL	1	

Table D-2 Reference number list

Ref.#	Name for service manual	Name for price list	Q'ty	Note
135	Feed sheet	SHEET,FEED,A	1	
136	Main case assembly	CASE,MAIN ASSEMBLY,AA	1	
139	Cutter cover	COVER,CUTTER,AA	1	
140	Rubber foot A	RUBBER FOOT,A	4	
141	Connector cover	COVER,CONNECTOR,AA	1	
142	Frame L assembly	FRAME,L ASSEMBLY,A	1	
144	NE detector lever	LEVER,N.E.DETECTOR	1	
145	NE detector holder	HOLDER,N.E.DETECTOR	1	
146	Micro switch	MICRO-SWITCH	1	
147	Thermal print head assembly	THERMAL PRINT HEAD ASSEMBLY,C	1	
148	Manual cutter screw	SCREW,MANUAL CUTTER	3	
149	Cutter frame assembly	FRAME,CUTTER ASSEMBLY	1	
150	Paper cutter cover assembly	COVER,PAPER CUTTER ASSEMBLY,B	1	
151	Cutter motor sub-assembly	MOTOR,CUTTER SUB ASSEMBLY	1	
152	Roll paper cover assembly	COVER,ROLL PAPER ASSEMBLY,BA	1	
153	Spacer (3X4X4)	SPACER,3X4X4,F/ZN	3	
154	DIP switch cover	COVER,DIP SWITCH	1	
155	Handling label	LABEL,OPERATION,BA	1	
156	Label paper platen holder	HOLDER,LABEL PLATEN	1	
157	Power switch cover	COVER,POWER SWITCH,AA	1	Accessory
158	Switch panel label	LABEL,SWITCH PANEL,BA	1	Accessory
159	Rubber foot C	RUBBER FOOT,C	4	
160	Cover tape	TAPE,COVER	1	Accessory
162	Autocutter unit	AUTO CUTTER UNIT	1	
163	Platen assembly	PLATEN ASSEMBLY	1	
164	Paper feed roller shaft holder	SHAFT HOLDER,PAPER FEED ROLLER	1	
165	Bottom plate	PLATE,LOWER	1	
166	Cover detector assembly	COVER,DETECTOR ASSEMBLY	1	
167	Manual cutter	MANUAL CUTTER	1	
169	Holder auxiliary plate	PLATE,HOLDER AUXILIARY	1	
170	Spacer guide shaft	SHAFT,SPACER GUIDE	1	
171	Spacer guide plate	PLATE,SPACER GUIDE	1	
172	Hinge spacer	SPACER,HINGE	2	
173	Label paper spacer	SPACER,LABEL	1	Accessory
174	Paper outlet guide	GUIDE,PAPER OUTLET,AA	1	Accessory
175	Paper outlet tape	TAPE,PAPER OUTLET	1	Accessory

Table D-2 Reference number list

Ref.#	Name for service manual	Name for price list	Q'ty	Note
178	Spacer B	SPACER,B	2	
179	Mini-clamp	MINI CLAMP	1	
180	Shield plate	PLATE,SHIELD	1	
201	Main circuit board unit	MAIN CIRCUIT BOARD UNIT	1	
202	I/F circuit board unit	I/F CIRCUIT BOARD UNIT	1	
205	Paper feed motor	MOTOR,PAPER FEED,B	1	
206	NE detector lead wire	LEAD WIRE,N.E.DETECTOR	1	
207	Head FFC	FFC,HEAD	1	
208	Switch circuit board FFC	FFC,SWITCH CIRCUIT BOARD	1	
209	Sub circuit board assembly	SUB CIRCUIT BOARD ASSEMBLY	1	
210	Switch circuit board assembly	SWITCH CIRCUIT BOARD ASSEMBLY	1	
211	Ferrite core	FERRITE CORE	1	
213	BM paper detector circuit board assembly	CIRCUIT BOARD,BM PAPER DETECTOR ASSEMBLY	1	
E1	E-ring (E1)	RETAINING RING	—	
E2	E-ring (E2)	RETAINING RING	—	
N1	Nut (N1)	HEXAGON NUT	—	
S01	Screw (S1)	C.B.P-TITE,3X10,F/ZN	—	
S02	Screw (S2)	C.C.P-TITE SCREW,3X8,F/ZN	—	
S03	Screw (S3)	C.B.B.SCREW,4X12,F/ZN	—	
S04	Screw (S4)	C.B.S. SCREW	—	
S05	Screw (S5)	C.B.S. SCREW	—	
S06	Screw (S6)	C.P.S.(O) SCREW	—	
S07	Screw (S7)	C.B.B-TITE SCREW	—	
S09	Screw (S9)	C.B. SCREW	—	
S10	Screw (S10)	C.C.S. SCREW	—	Accessory
W1	Plain washer (W1)	PLAIN WASHER	—	

Reference for Screw Types

Standard Screws

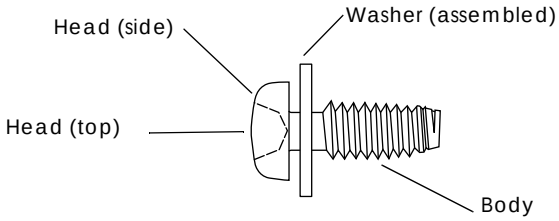
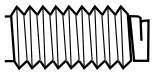
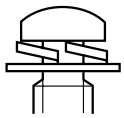
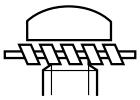
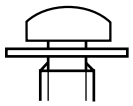
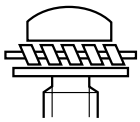
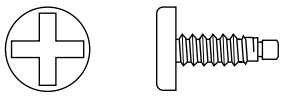
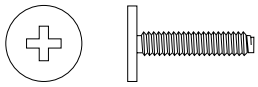
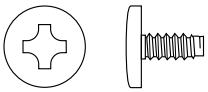


Table D-3 Standard screw types

Head (top)	Head (side)	Body	Washer (assembled)
C (Cross) 	P(Pan)  B (Bind)  C (Cup) 	S-tite  B-tite  P-tite  T-B 	(S) (Spring lock washer)  (S-P1)/(S-P2)/(S-P3)/(S-P4) (Spring lock washer + plain washer)  (O) (Outside toothed lock washer)  (P1)/(P2)/(P3)/(P4) (Plain washer)  (O-P1) (Outside toothed washer + plain washer) 

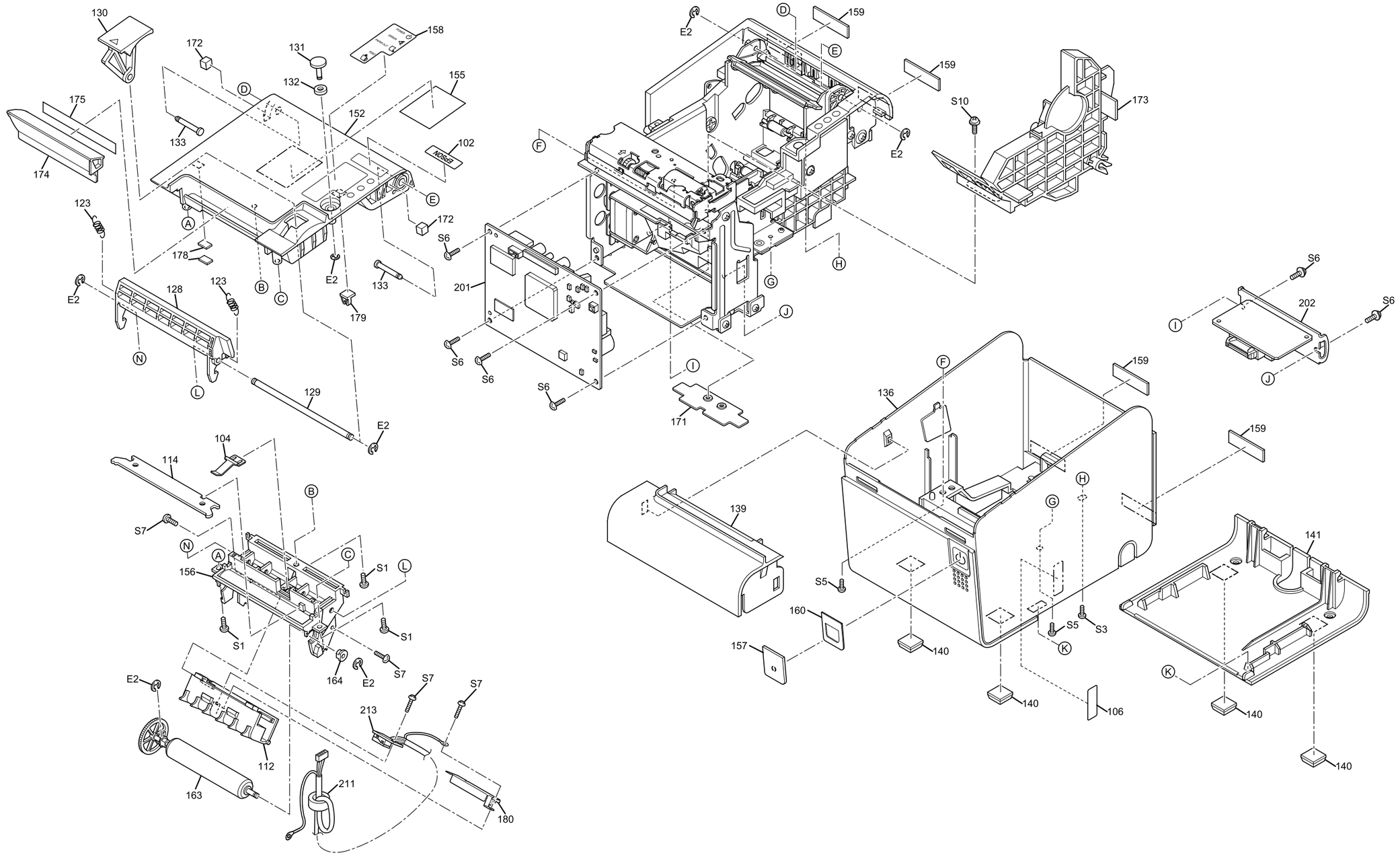
Special Screws

Table D-4 Special screws

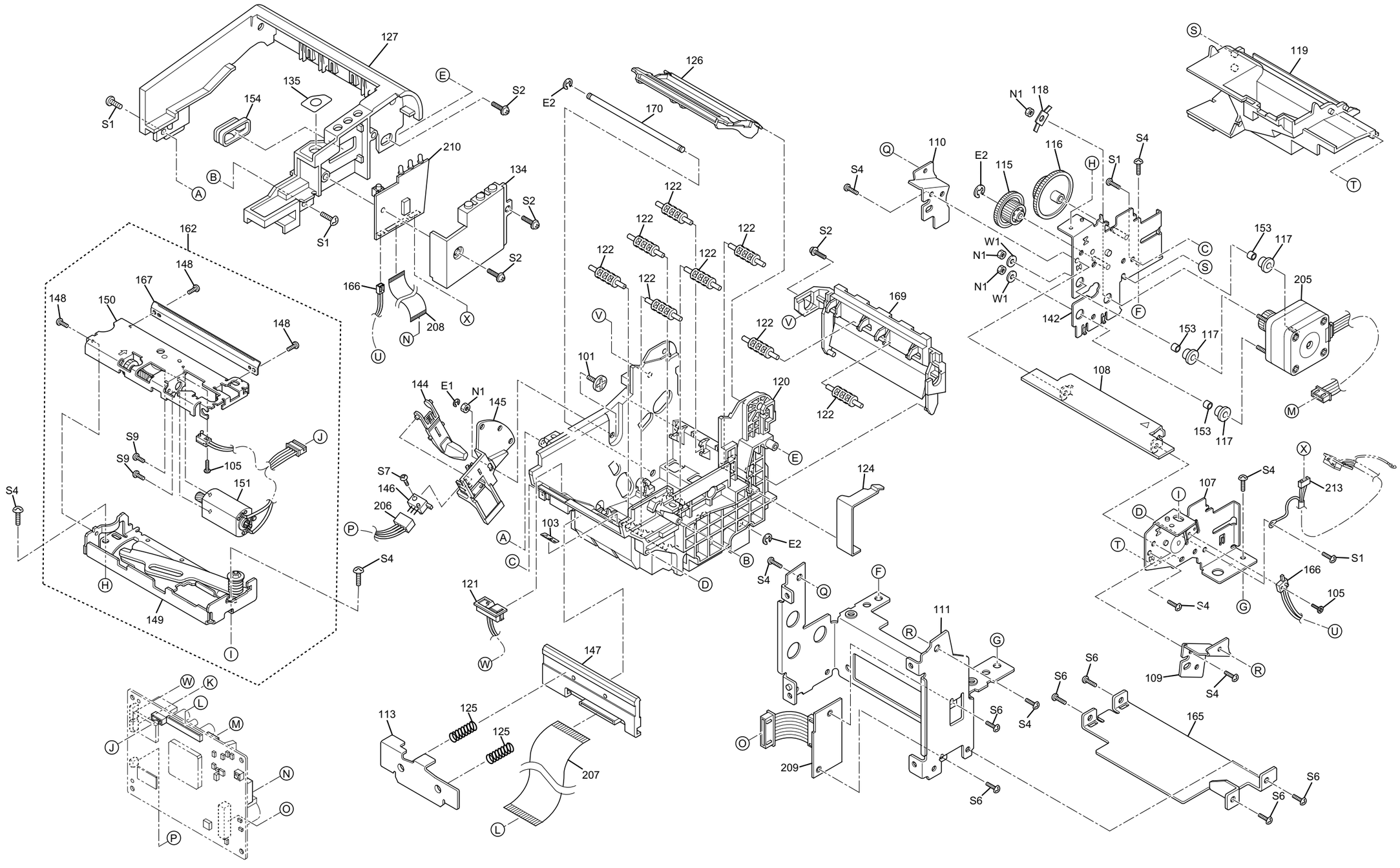
Overview	Ref. #
	101
	105
	148

Overall Exploded Diagram

Case Unit

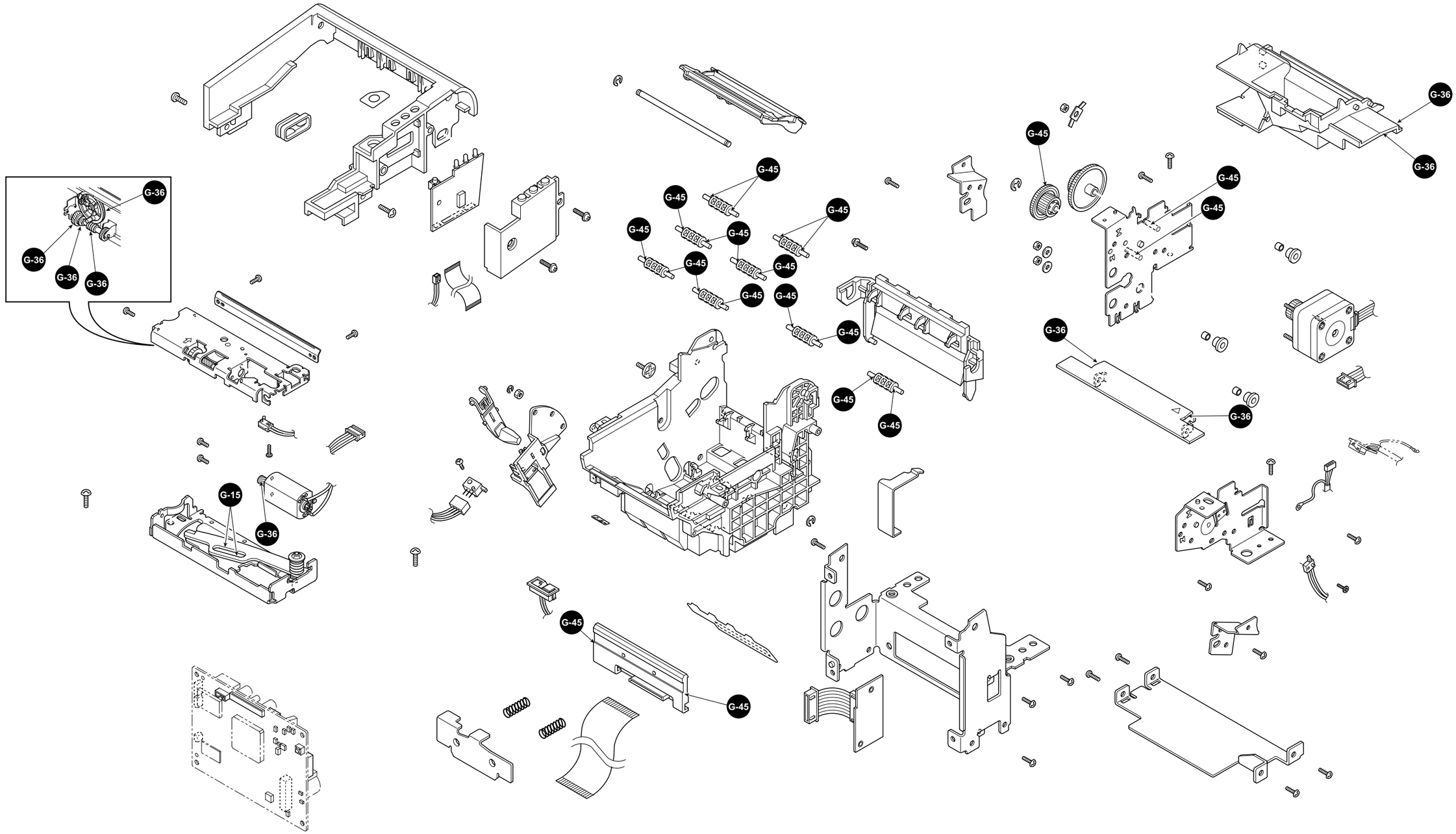


Printer Mechanism



Appendix E

Lubrication Points Diagram

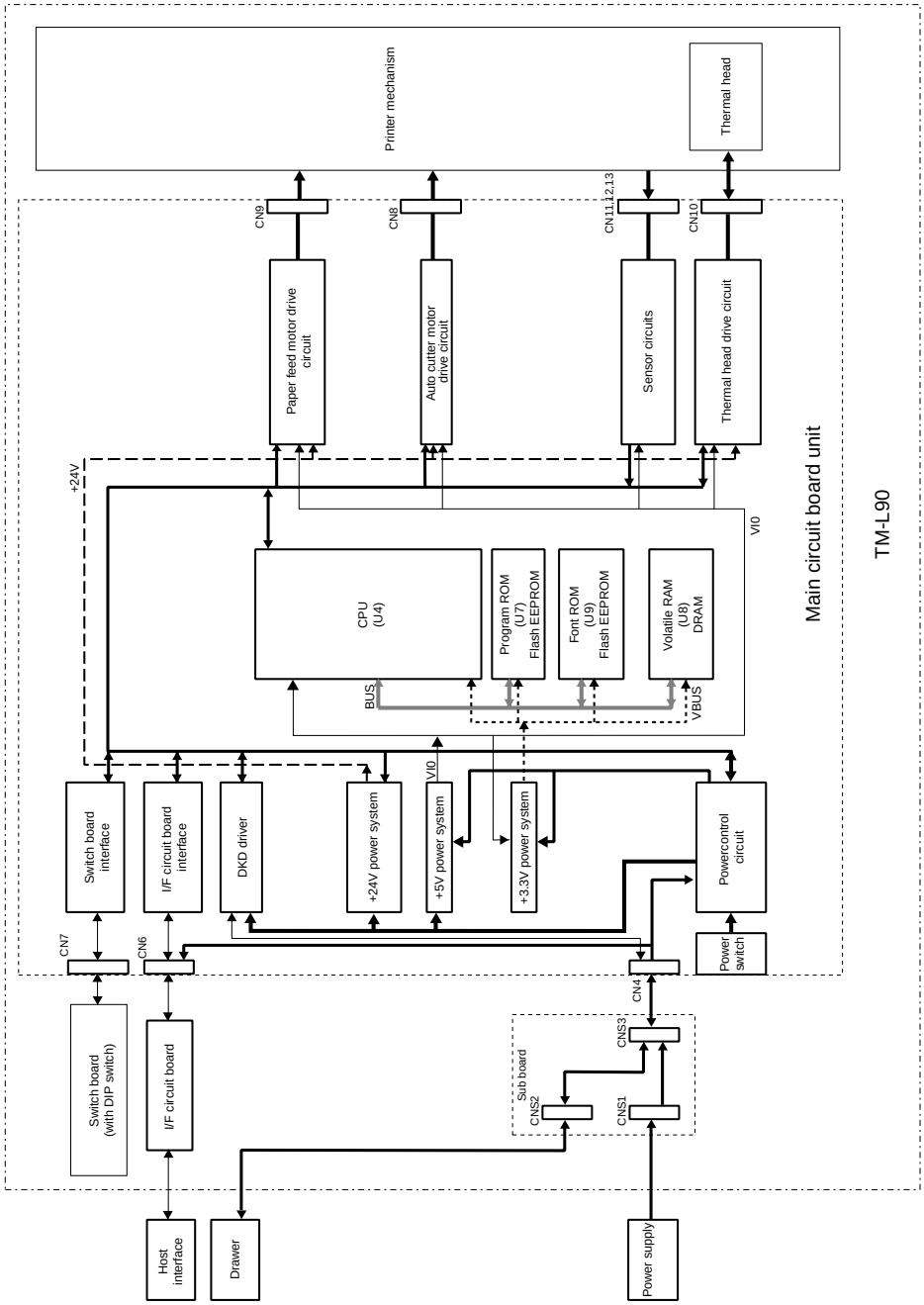


Appendix F

Overview of Electric Circuits

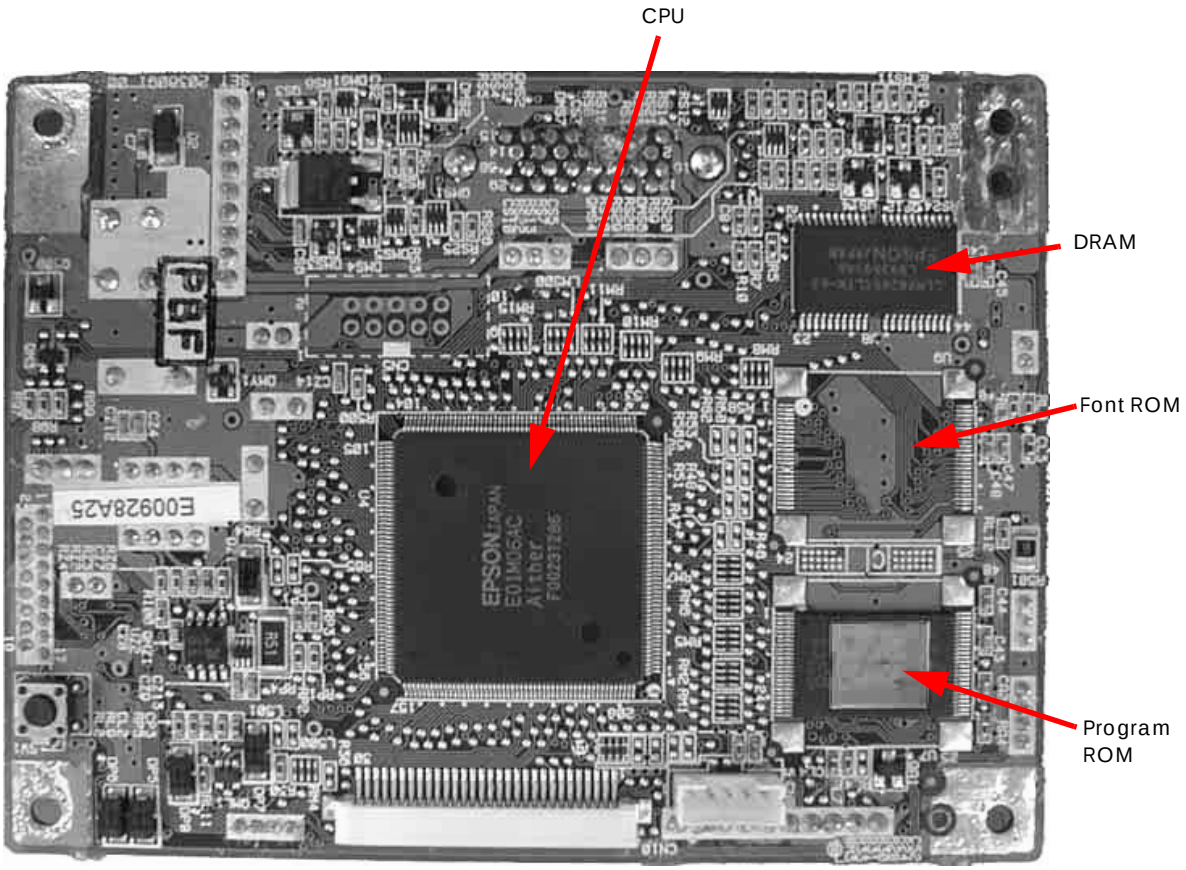
General Description

The figure below shows a block diagram of the electric circuits for the TM-L90.



Main Circuit Board Unit

The main circuit board unit is comprised of circuits used to control the CPU, memory, mechanism drive unit, detectors, and power supply. It forms the nucleus of the control system for the TM-L90.



The table below lists the main elements of the main circuit board unit and their functions.

Table F-1 Main elements and their functions for main circuit board unit

Block	Location	Signals on diagram	Description	Functions
CPU and peripherals	U4	—	—	CPU and custom logic I/O ports
	U7	—	max 8M bit (512K*16 bit)	Program memory
	U8	—	4M bit (256K*16 bit)	DRAM
	U9	—	8M bit (512K*16 bit)	Font Memory
	X1	—	40 MHz	System clock (for U4)
	X2	—	25 MHz	System clock (for U4)
Power supply system	F1	154004T	4A, surge-proof	Printer power supply fuse
	Q1	+24V	24 VDC, 1.7A	Semiconductor switch for power supply to mechanism
	QS1, QS2	+24V OUT	24 VDC, 1.7A	Semiconductor switch for power supply to printer
	U1K	DKP	24 VDC, 1A	Power supply to drawer
	LH9	VH 2		Power supply for thermal head
	UZ1	VIO	5 VDC, 1.5A	Power supply to I/O logic circuits
	UZ2	VBUS	3.3 VDC, 0.15A	Power supply to bus logic circuits
Connectors	CN6	I/F BOARD	—	Universal interface board (UIB) connector
	CN10	HEAD	—	Connector for thermal head unit connection (front of the printer)
	CN11	NE	—	Connector for paper near-end connection
	CN12	RE	—	(for TM-T90 only)
	CN13	Label photo	—	Connector for transmission sensor photo connection
	CN4	SUB	—	Connector for sub circuit board connection
	CN7	SWITCH	—	Connector for switch circuit board connection
	CN8	A/C	—	Connector for autocutter unit connection (front of the printer)
	CN9	PF	—	Connector for PF motor connection
Switch	SW1	—	—	Power switch (front of the printer)
Interfaces	QK2, QK3	DKD 1, DKD 2	24 VDC, 1A	Drawer drive transistor output signal
Mechanism drivers	QMA1	ACM+, ACM-	24 VDC, 0.25A	Driver and output signal for push-pull cutter motor
	UP1, UP2	PF_A+, PF_A-, PF_B+, PF_B-	24 VDC, 0.7A	Driver and output signal for PWM power supply control of bipolar stepping motor for feed mechanism

Power circuit

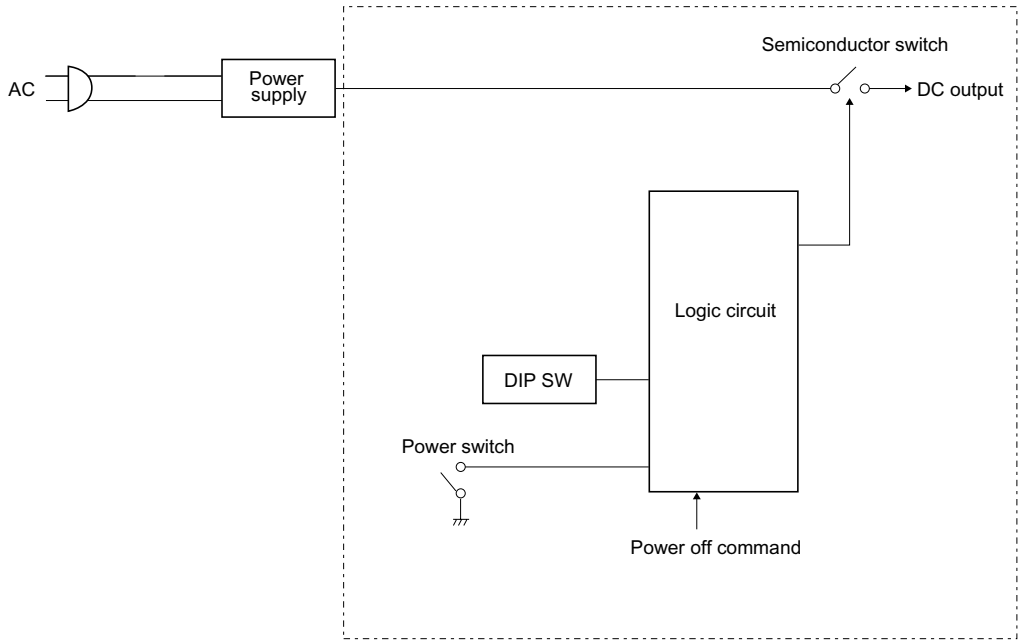
The power circuit generates three voltages (+5 V, +24 V and +3.3 V). Each voltage is supplied to the circuits listed below:

Table F-2 Output voltages and their applications

Voltage Level	Application
+5 V	• Logic circuit (used mainly for circuits around CPU)
+24 V	• Print mechanism power supply • Drawer kick power supply • Interface circuit board unit power supply
+3.3V	• Logic circuit (used mainly for circuits around memory)

Power Supply On/Off Control

The figure below shows a block diagram of the power supply and on / off control circuit.



TM-L90

The logic circuit operates according to the specifications listed in the table below.

Table F-3 Logic circuit functions

DC IN	Dip switch 1-1	Power Switch	DC Out
IN	ON	OFF	ON
	OFF	1 sec ON	ON
	OFF	3 sec ON	OFF

DIP switch on the main circuit board (DSW2)

This DIP switch is used only at the factory. Always set this to OFF.

Switch Circuit Board Assembly

The switch circuit board assembly consists of three LEDs, one switch, and one DIP switch.

Sub Circuit Board Assembly

The next table shows the major components of the sub circuit board and their major functions:

Table F-4 Major components of the sub circuit board unit and their major functions

Block	Location	Signal name	Description	Function
Connector	CNS1	PS	—	Connector for PS adapter connection
	CNS2	DKD	—	Connector for drawer connection
	CNS3	—	—	Cable for main circuit board connection

Interface Circuit Board Unit

The interface circuit board unit serves as the core of the system that controls data send and receive operations between the TM-L90 and host computer. Various interface circuit boards can be used (including the EPSON UB series, except for the UB-P02 and UB-S03).

Test Points

Test points on the main circuit board

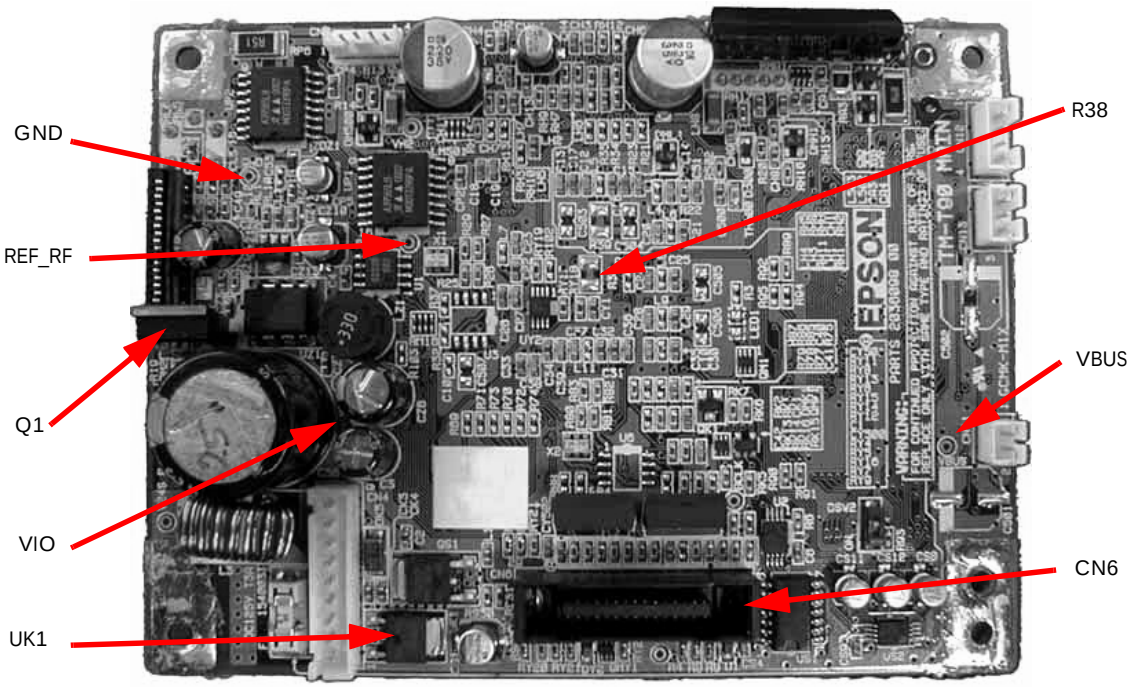
After a main circuit board unit failure, one basic method for diagnosing the cause of the problem on the main circuit board unit is to check the power supply line. Use the following table to check the power supply line. First, check step number 1, and proceed to the next step, if that is not the problem.

Table F-5 Checking the power supply line

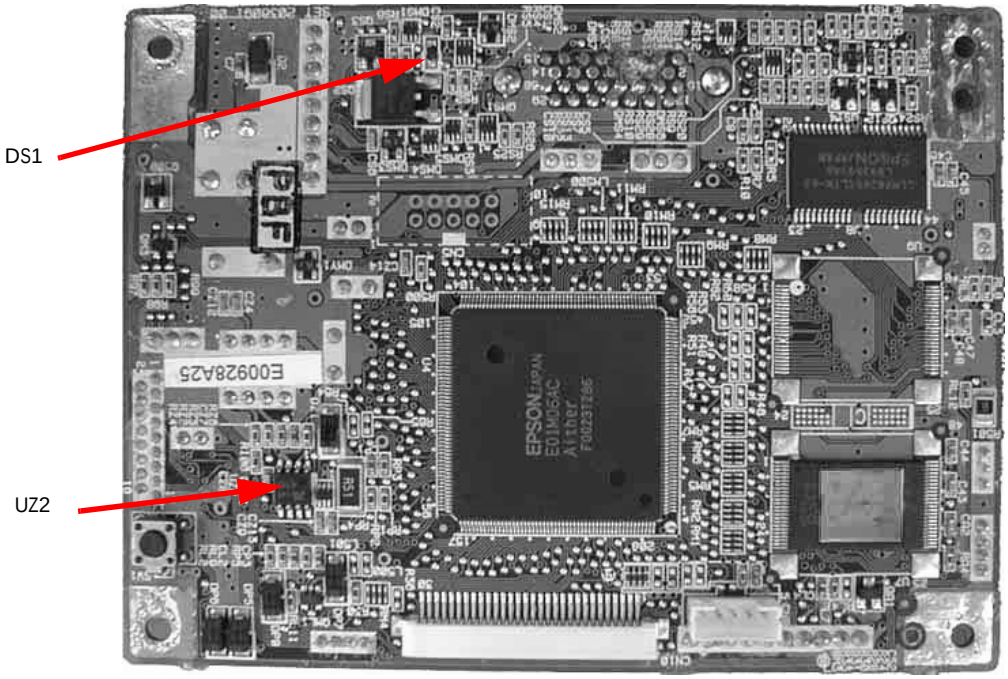
Power source	Terminal name	Test terminal	Parts terminal	Normal value
Power source for logic circuit (DC)	Semiconductor switch ON	—	DS1, C	15V
	Semiconductor switch OFF			24V
	Power source for logic circuit (VIO)	VIO	UZ2, #4	5V
	Power source for logic circuit (VBUS)	VBUS	UZ2, #5	3.3V
	Power source for logic circuit (GND)	GND	—	0V
Power source for mechanisms	+24V-operated components (printer mechanism) Drive power source (Q1, ON)	—	Q1, D	24V
Paper feed motor	Rotating	REF_PF	—	0.81~1.36V
	Halted			0.0V
Power source for I/F board	—	—	CN6, #5	24V
Power source for drawer	—	—	UK1 pin#3	24V

Test Point Locations

Test Point Locations (Side A)



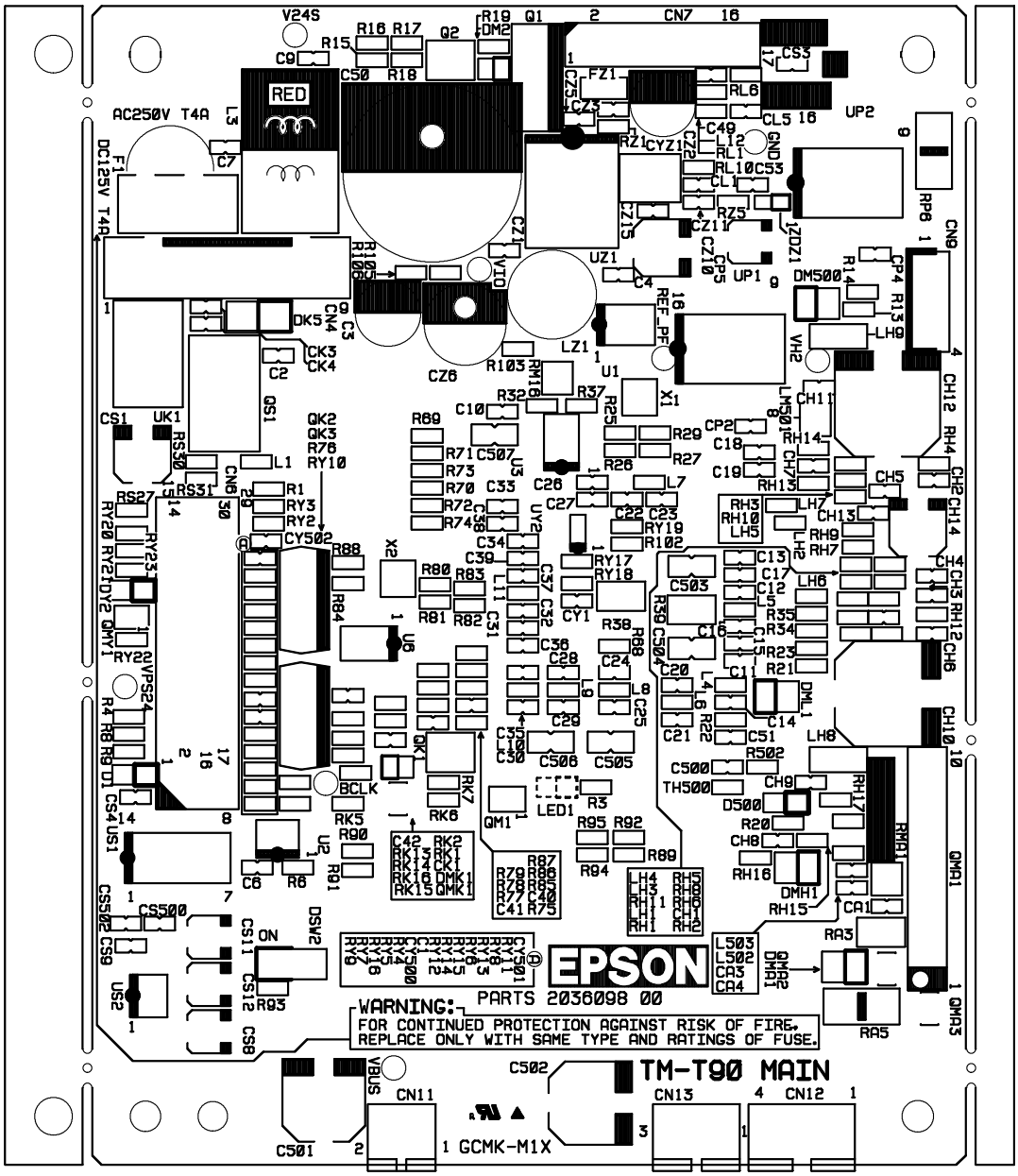
Test Point Locations (Side B)



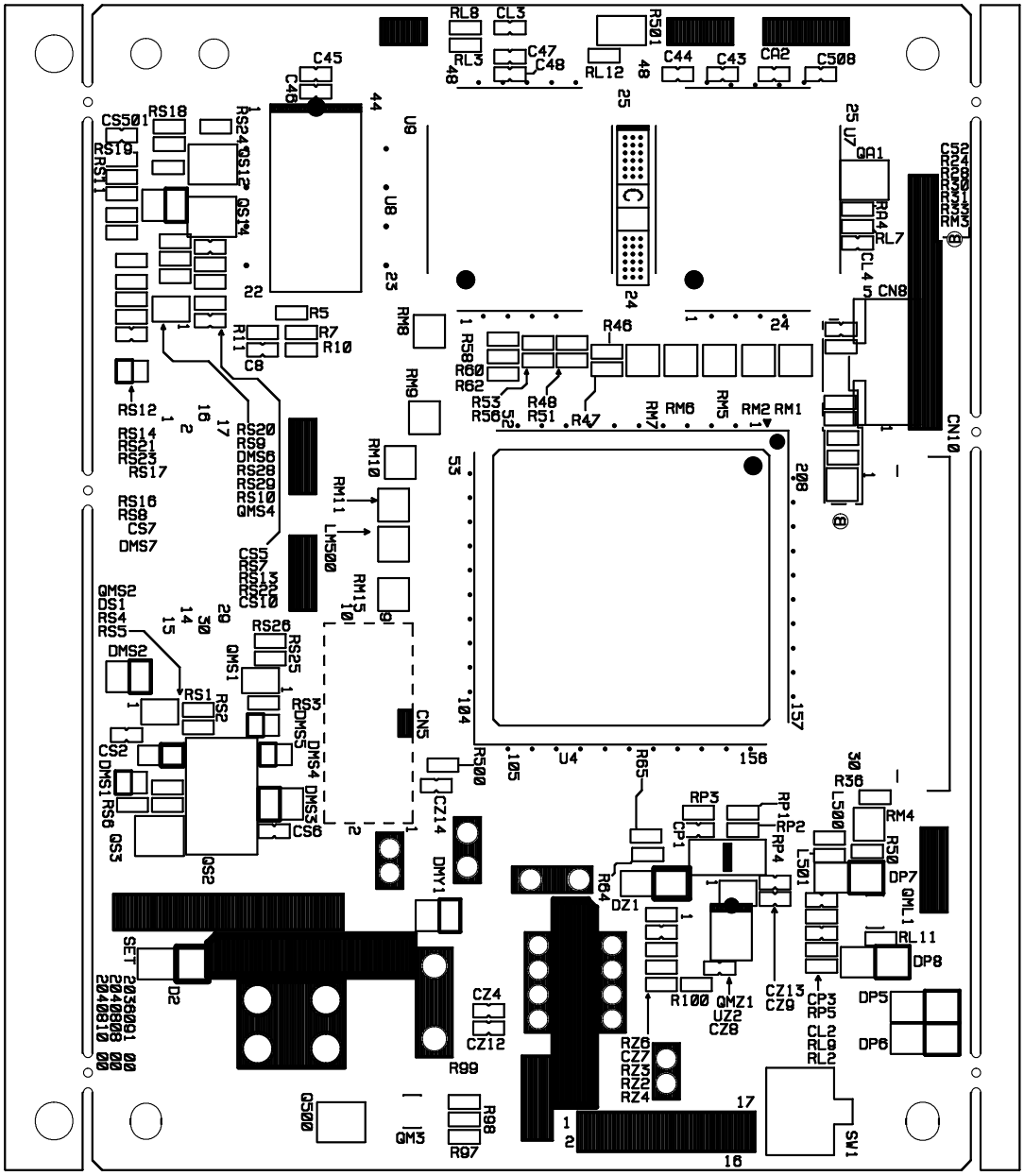
Parts Layout

Main Circuit Board Unit

Parts Layout for the Main Circuit Board Unit (Side A)

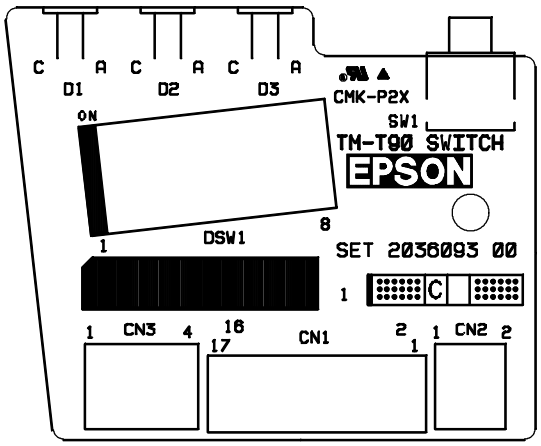


Parts Layout for the Main Circuit Board Unit (Side B)

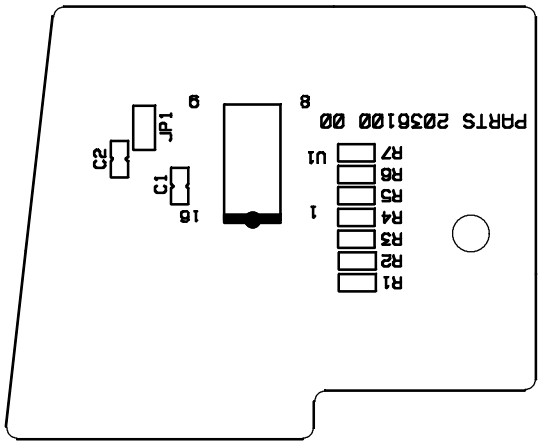


Switch Circuit Board Assembly

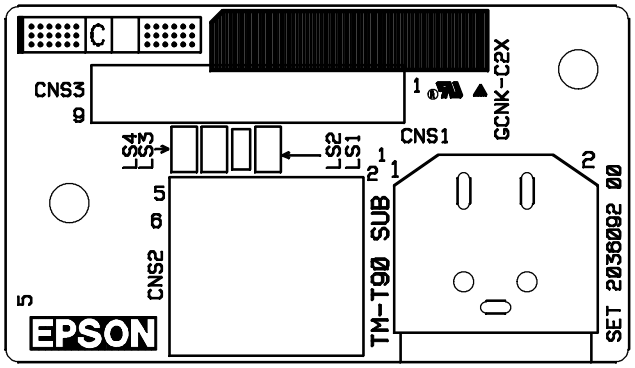
Parts Layout for the Switch Circuit Board (Side A)



Parts Layout for the Switch Circuit Board (Side B)



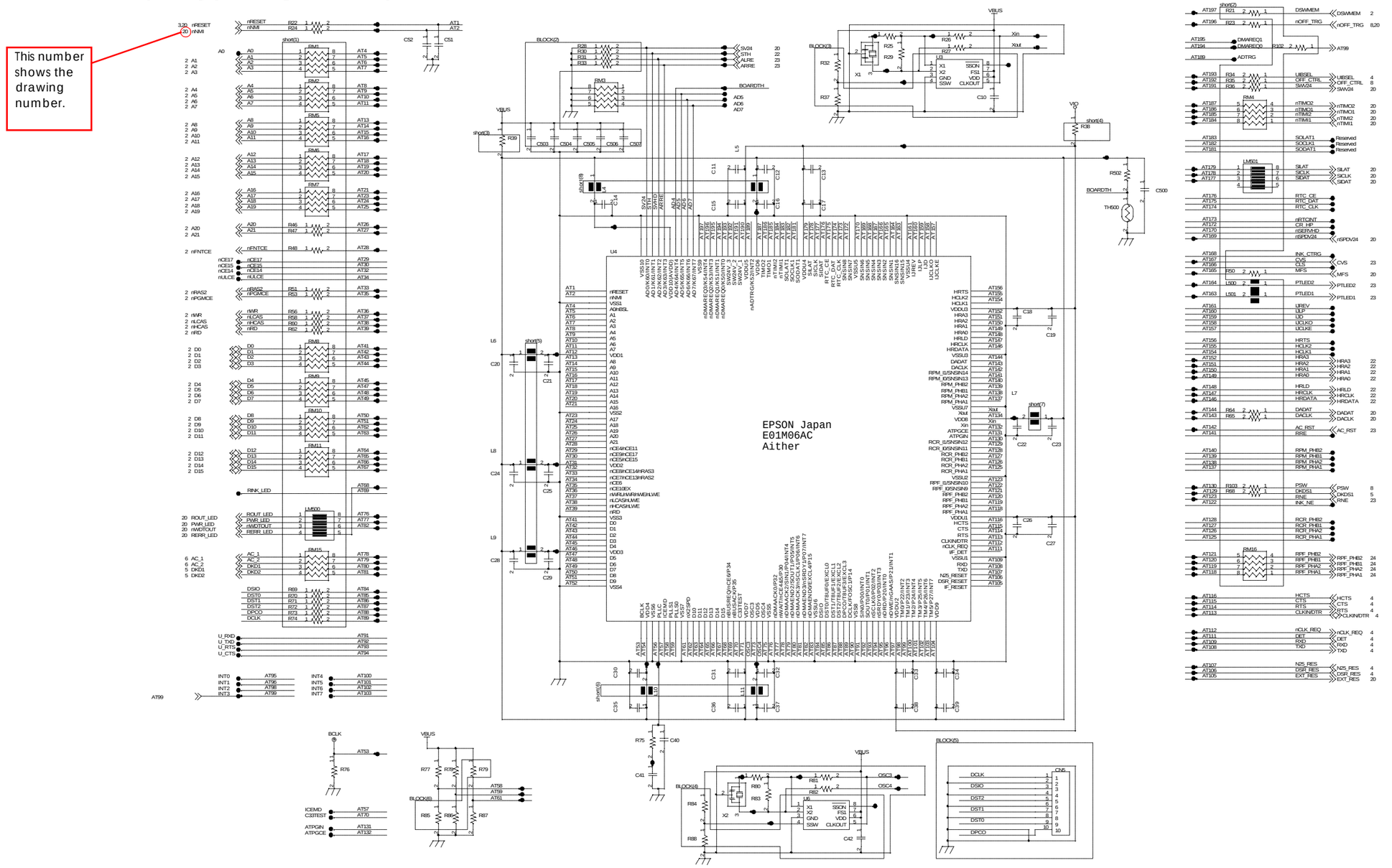
Sub Circuit Board Assembly



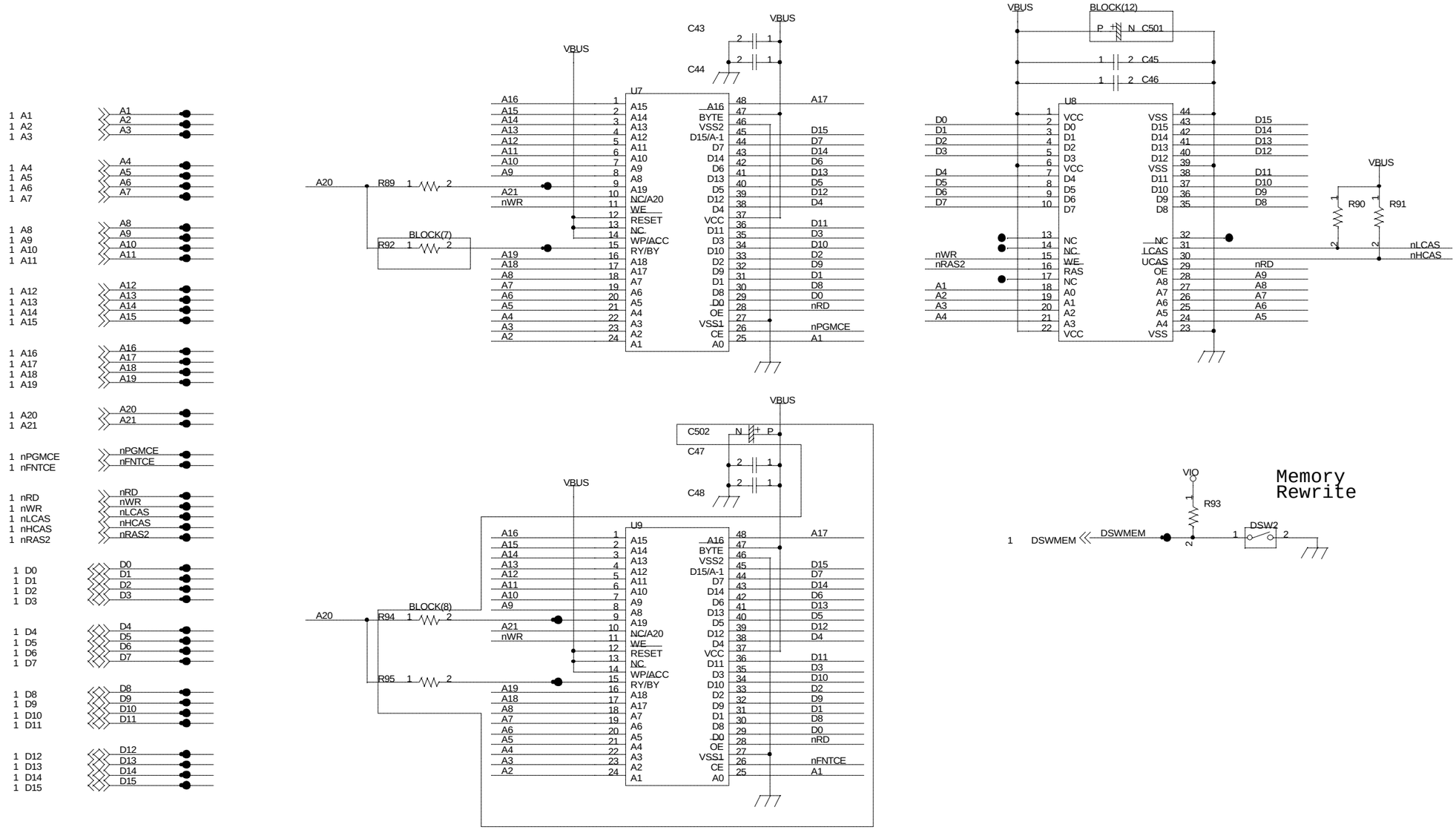
Circuit Board Diagrams

Main Circuit Board (1 of 3) (Drawing Number 1)

This number shows the drawing number.

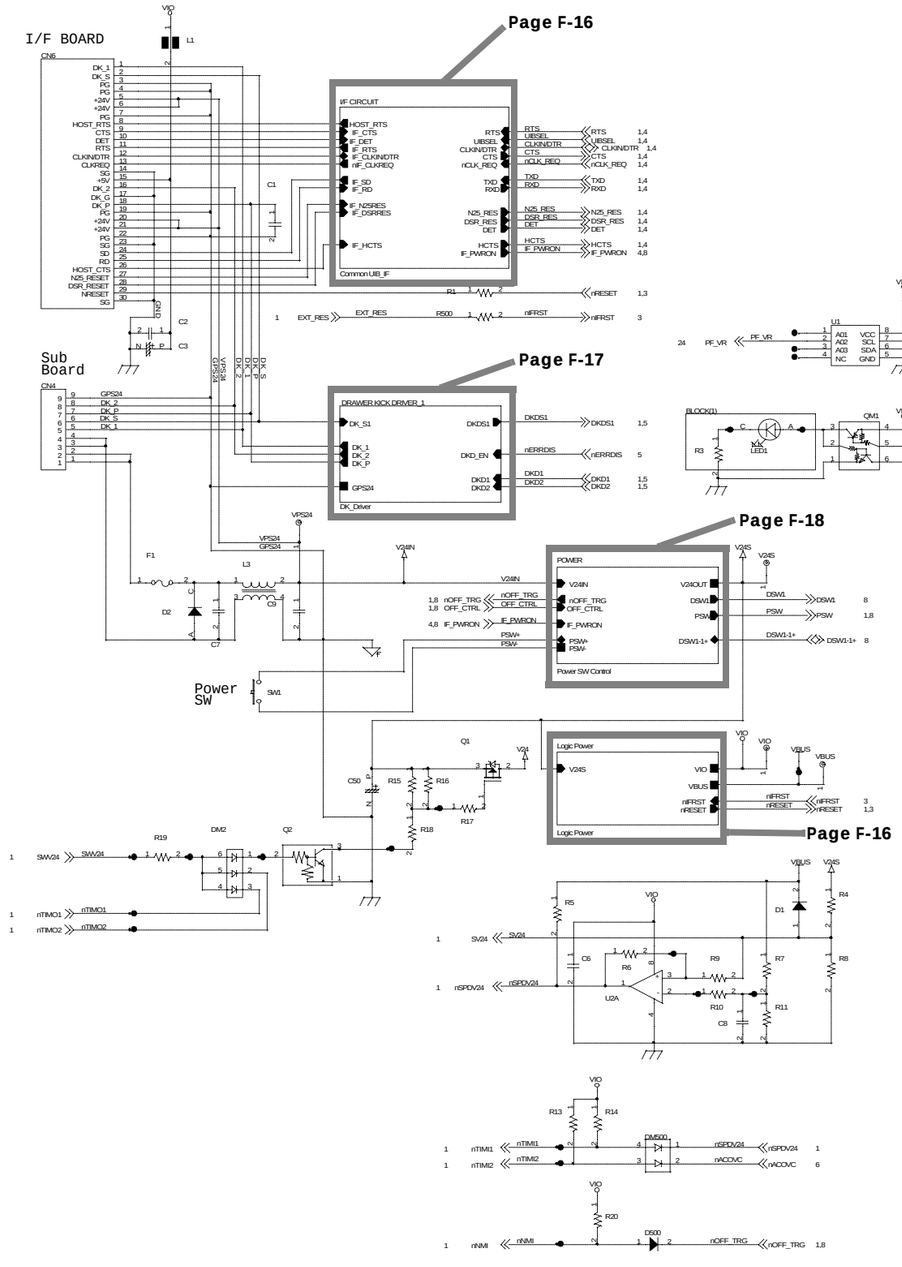


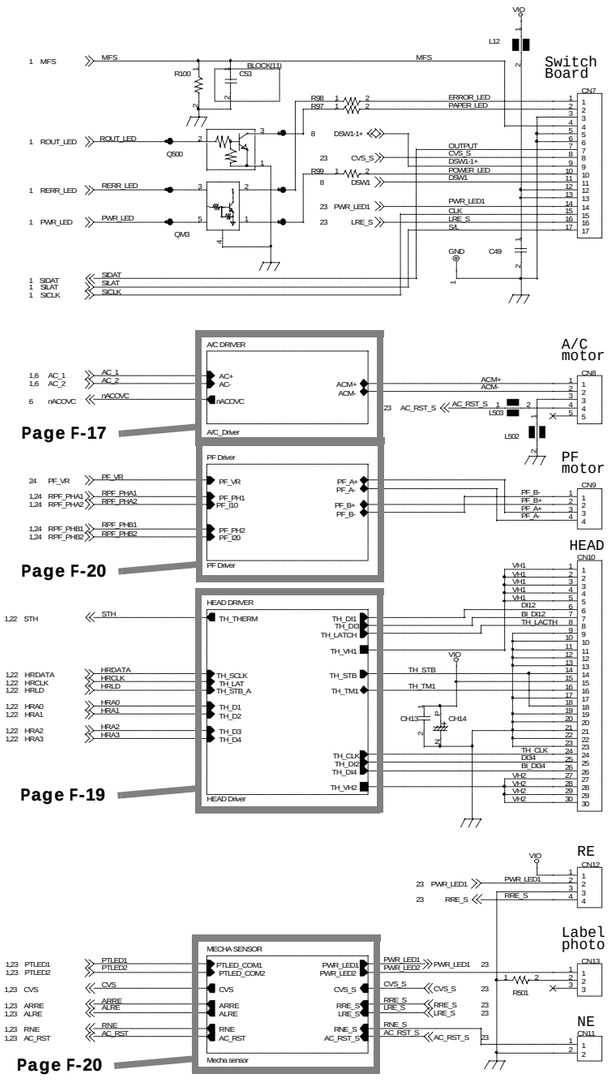
Main Circuit Board (2 of 3) (Drawing Number 2)



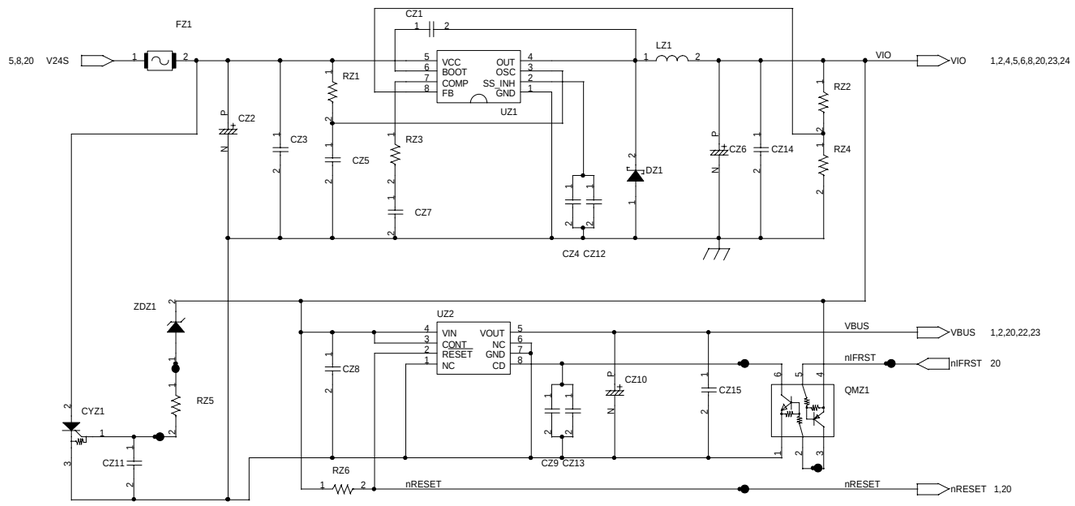
Main Circuit Board (3 of 3) (Drawing Number 20)

Note; Non-contiguous numbers are given to the drawing numbers.

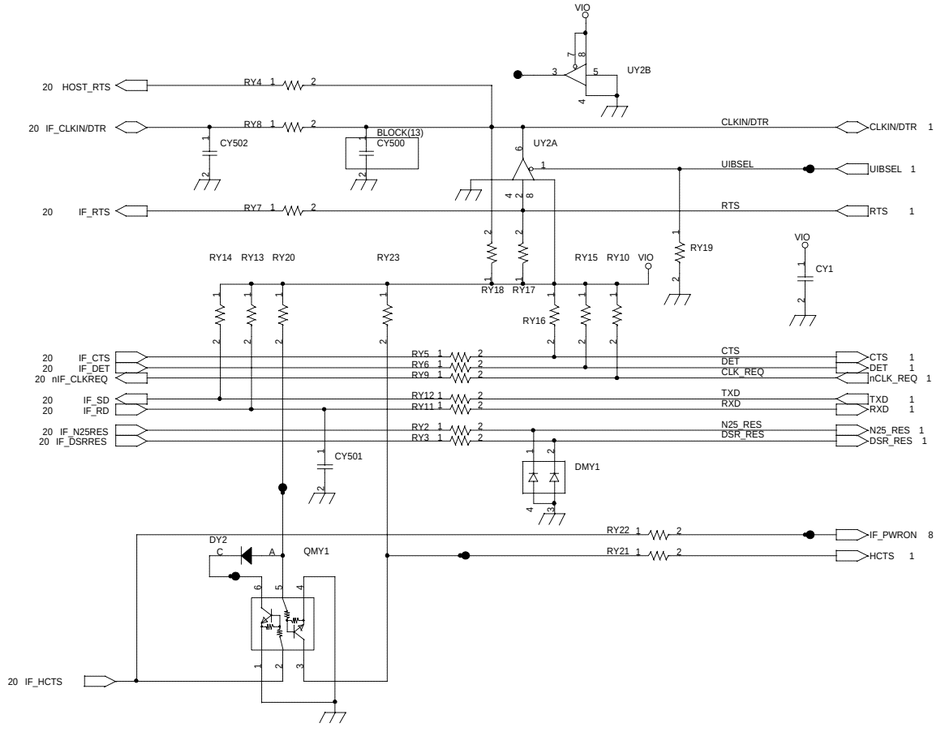




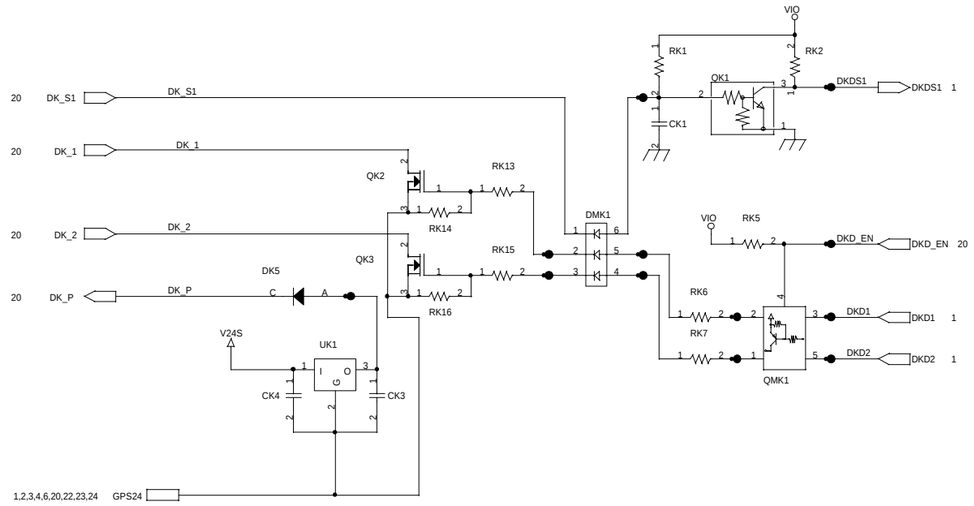
Logic Power Block (Drawing Number 3)



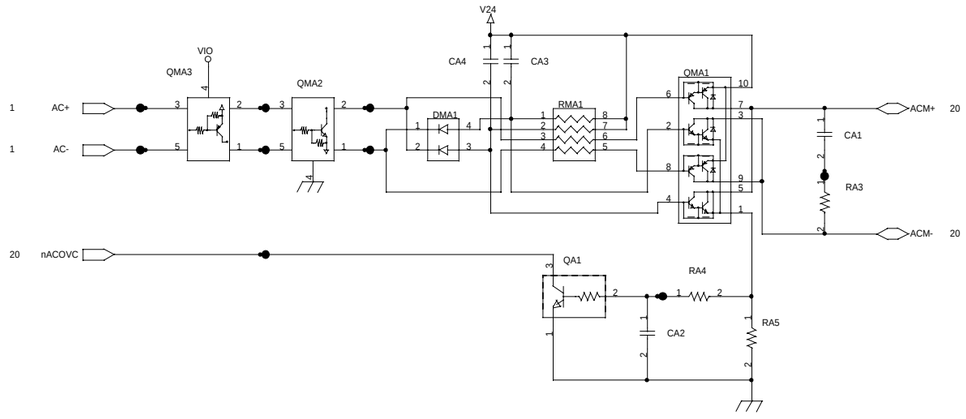
I/F Circuit Block (Drawing Number 4)



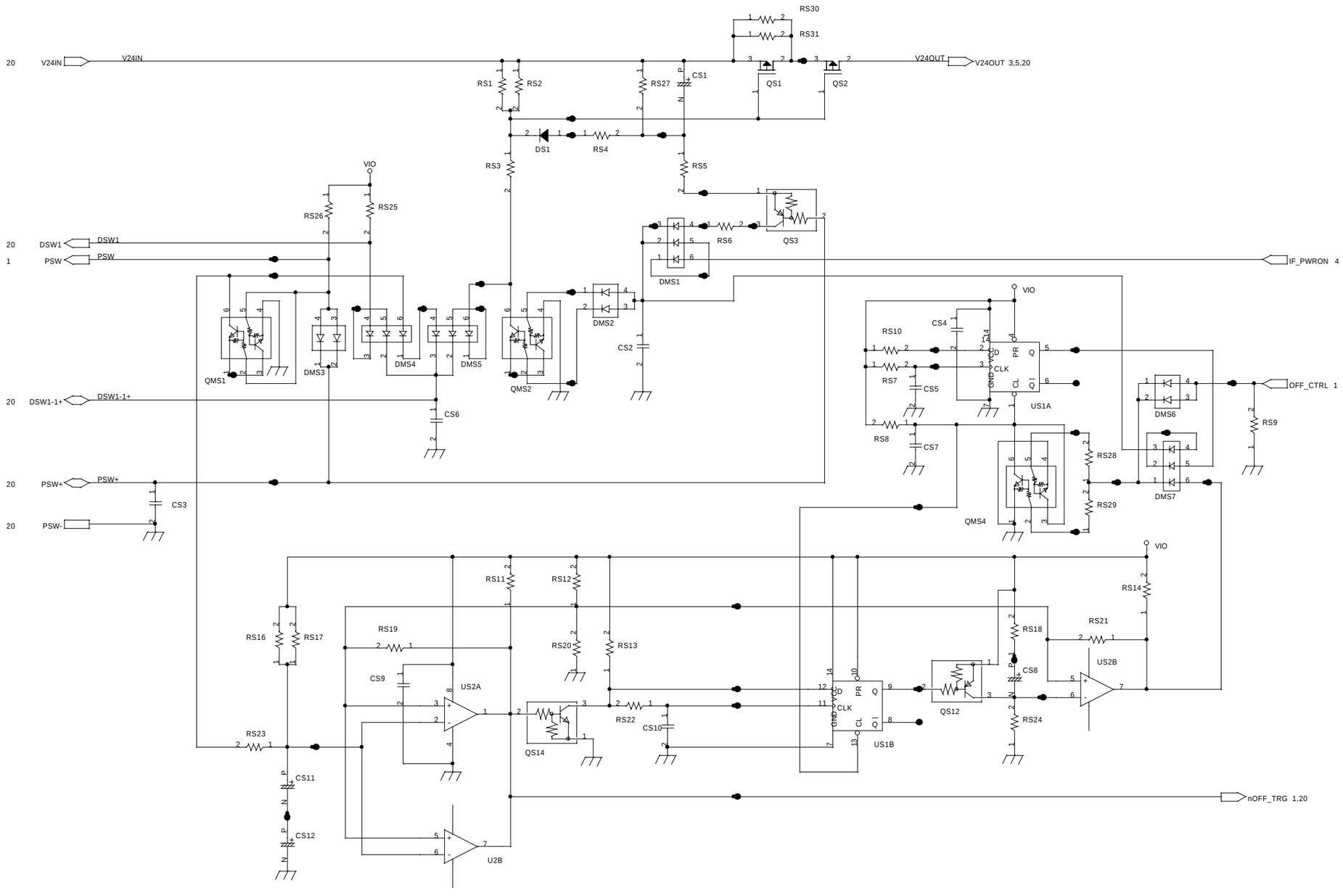
DK Driver Block (Drawing Number 5)



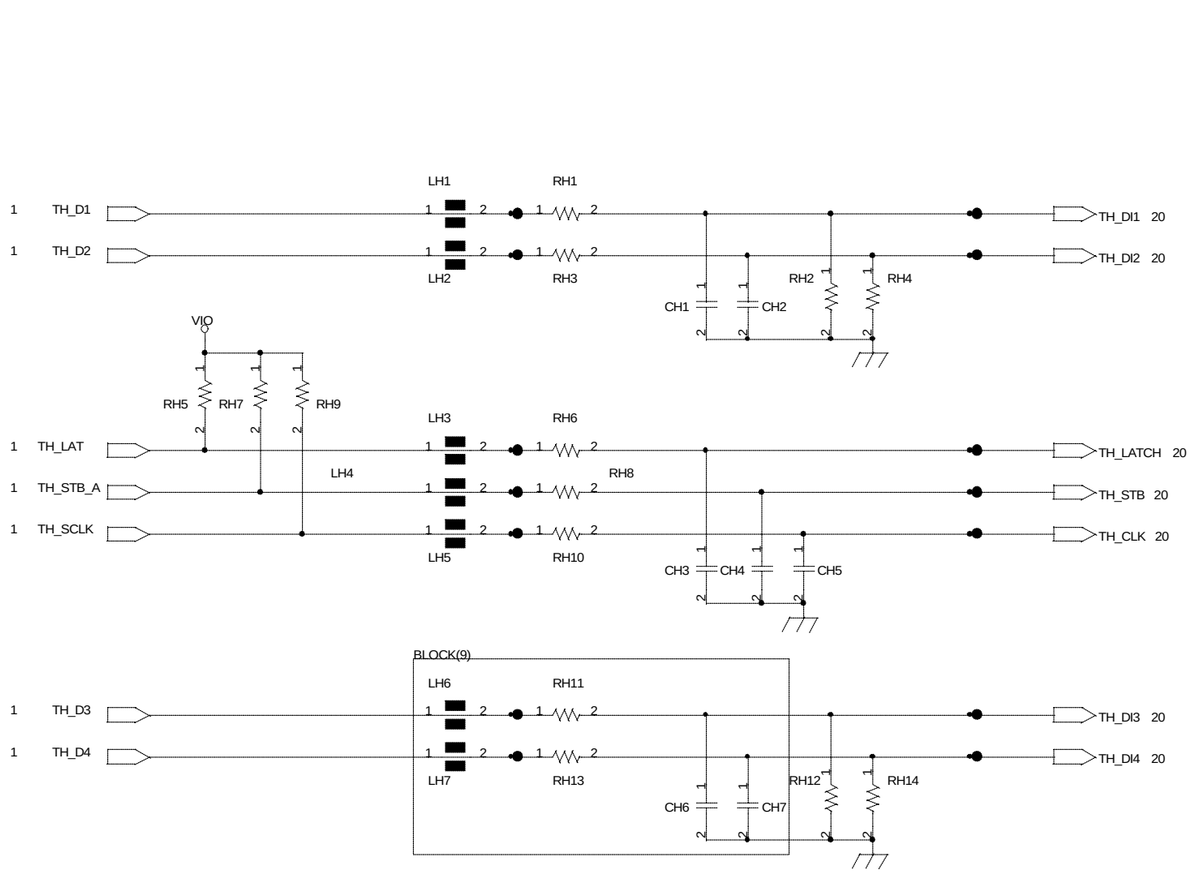
A/C Driver Block (Drawing Number 6)

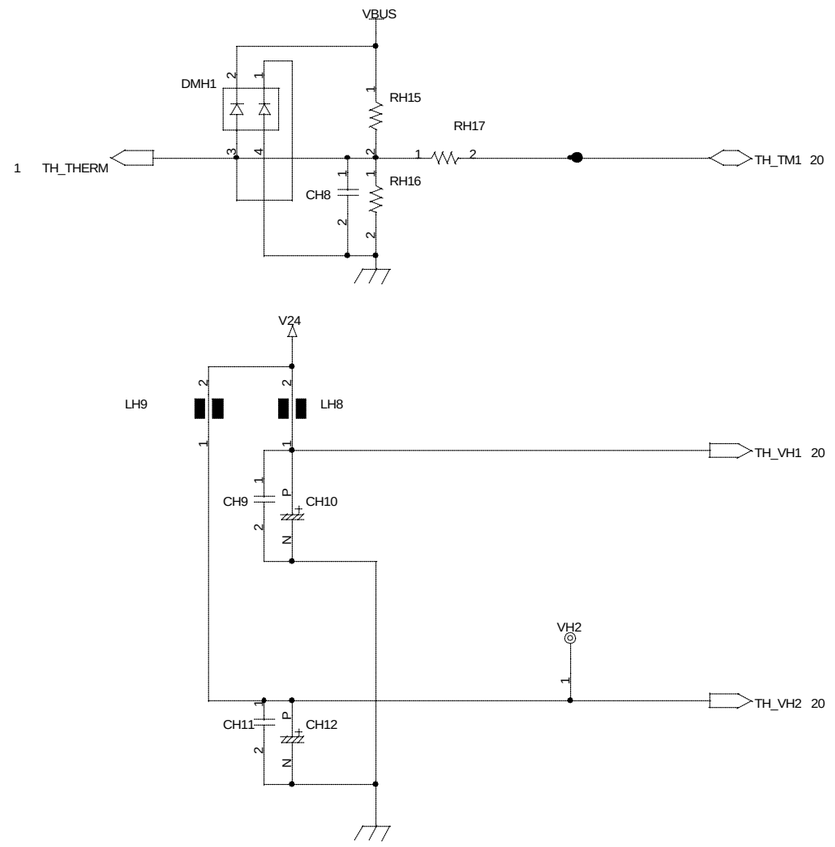


Power SW Controller Block (Drawing Number 8)

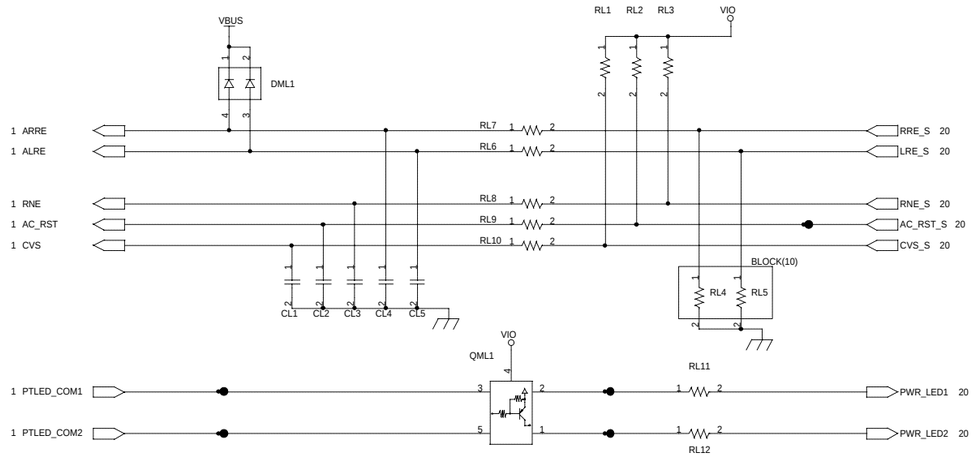


HEAD Driver Block (Drawing Number 22)

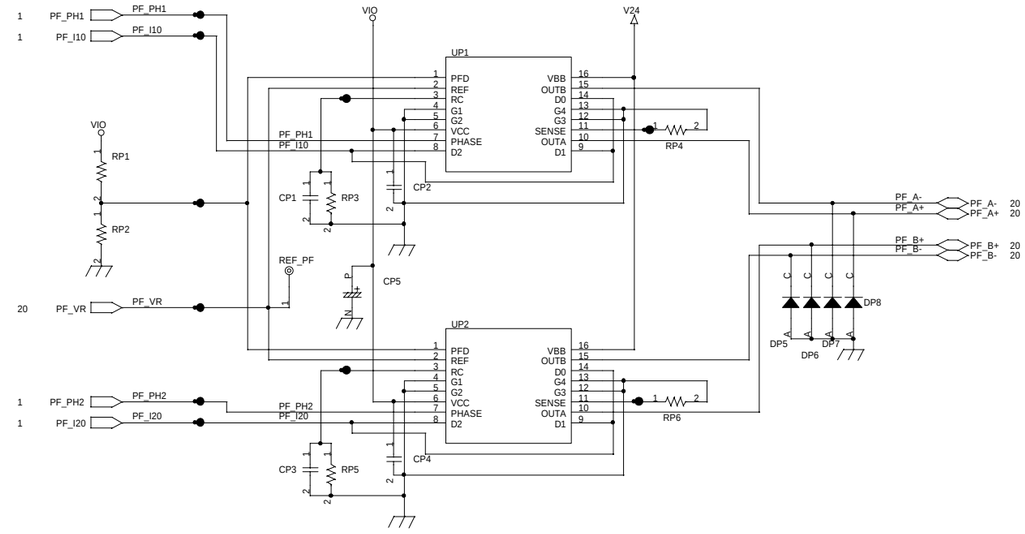




MECHA Sensor Block (Drawing Number 23)



PF Driver Block (Drawing Number 24)



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