Transmittal Page

Product	Title	Part Number
WorkCentre 385	**Service Manual**	**701P14250**
Status		**Date**
Initial Issue		**Dec 1998**

Binder Inserts - Cut on the dotted lines

WorkCentre 385

Service Manual

WorkCentre 385 Service Manual

XEROX

WorkCentre 385
Service Manual

Invisible laser radiation

Certain components in this product are susceptible to damage from electrostatic discharge. Observe all ESD procedures to avoid component damage.

701P14250
Dec 1998

NOTICE

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Revision Control List

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Introduction

About this manual

This manual is part of the multinational documentation that is structured in a specified Xerox format.

Organization

The Xerox Document WorkCentre 365c/365cx Service Manual is the primary document used for repairing and maintaining the family of products. The manual contains this information divided into the following sections:

Section 1 Installation

This section provides the machine installation instructions. Refer to the Users Guide for software installation instructions.

Section 2 Repair Procedures

This section contains Repair Procedures. Use this section to isolate a faulty component or subassembly.

Section 3 Image Quality Repair Procedures

This section contains Image Quality Repair Procedures. Use this section to isolate common image quality defects.

Section 4 Repair / Adjustment

This section contains the instructions for removal and replacement of the spared parts within the machine.

Section 5 Parts Lists

This section consists of illustrations and part number lists. Any part that is spared or any part that must be removed to access a spared part is illustrated.

Section 6 General Procedures/Information

This section contains general procedures and product specifications.

Section 7 Theory of Operation

This section contains illustrations, timing diagrams, circuit descriptions and lists of the signals and connectors.

Terminology and Symbols

The following is the terminology and symbols that are used in this manual for an Electrostatic Device caution, Laser Warning, and general Warnings, Cautions, or Notes.

Certain components in this product are susceptible to damage from electrostatic discharge. Observe all ESD procedures to avoid component damage.

Invisible laser radiation

Use of controls or adjustments other than those specified in this manual may result in an exposure to dangerous laser radiation. The WorkCentre 385 is certified to comply with Laser Product Performance Standards set by the US Department of Health and Human Services as a Class 1 product. This means that it is a laser product that does not emit dangerous laser radiation during any mode of customer operation. During servicing, the laser beam could cause eye damage if looked at directly. The service procedures must be followed exactly as written.

WARNING

Improper operation may result in injury to a person.

CAUTION

Improper operation may result in machine damage.

NOTE: Hints or other information that may assist the user.

Indicates that a surface can be hot. Use caution when reaching in the machine to avoid touching the hot surfaces.

Additional Product Safety Information

The following is additional product safety information.

CAUTION

During normal operation, this machine produces ozone gas. The amount of ozone produced does not present a hazard to the operator. However, it is advisable that the machine be operated in a well ventilated area.

CAUTION

The Main PBA has a lithium battery which is not a spared item. If the Main PBA fails, return the assembly to the Xerox premises for disposal in accordance with local regulations.

NOTE: The product contains a Laser Printer Cartridge that is recyclable. Under various state and local laws, it may be illegal to dispose of these items into the municipal waste stream. Check with your local solid waste officials for details in your area for recycling options or proper disposal.

Manual Revision Symbols

Revision pages containing the latest service information will be sent to you so that you can update your service manual. When a partial revision is distributed, the changes will be identified on each page.

Text	Black vertical bar at the beginning of the text for partial revisions.

When a partial revision or a complete manual revision is distributed, the changes will also be identified as follows:

Page	The date of issue on the bottom of each page.
Manual	An updated revision control list. This list will identify the latest date for each page.

1 Installation

Section Contents

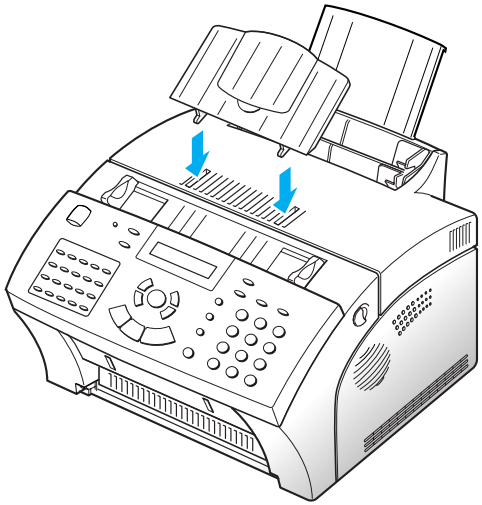
* Not available in all markets.

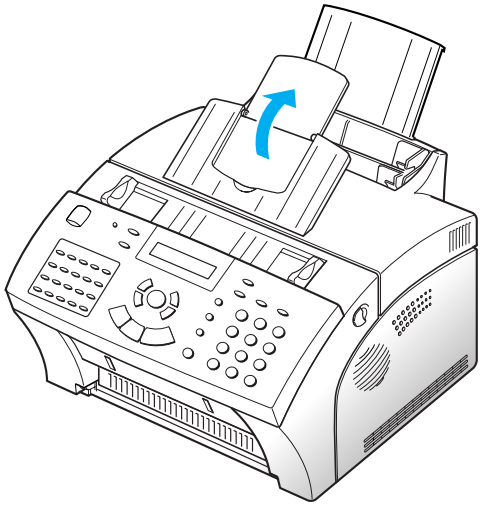
Introduction

This section provides the procedures required to install the machine. Refer to the User's Guide for software installation instructions.

Document Input Tray

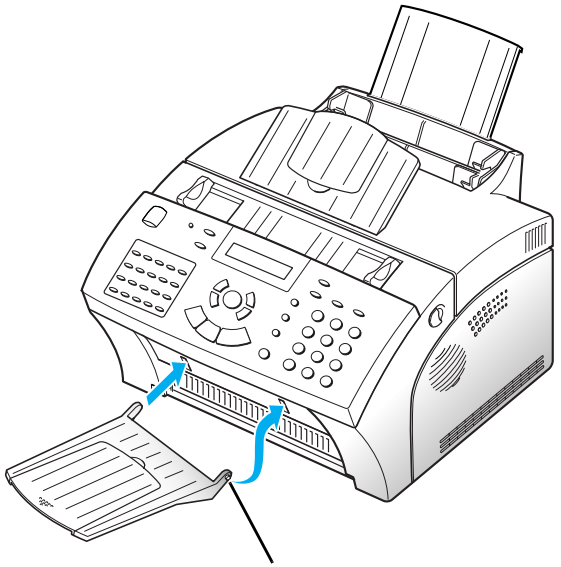
1. Insert two tabs on the tray into the slots as shown. Fold out the extender on the tray, if necessary.



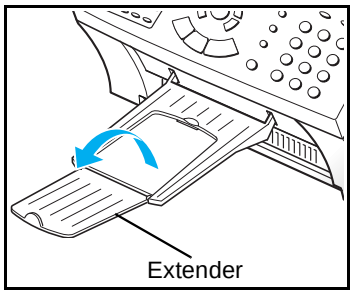


Document Exit Tray

1. Insert the two tabs on the document exit tray into the slots on the front of your machine. Fold out the extender, if necessary.



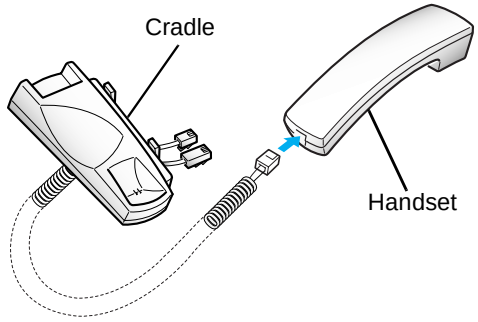
Insert one end first, then the other end by pulling this leg inward to make the tray easy to insert.



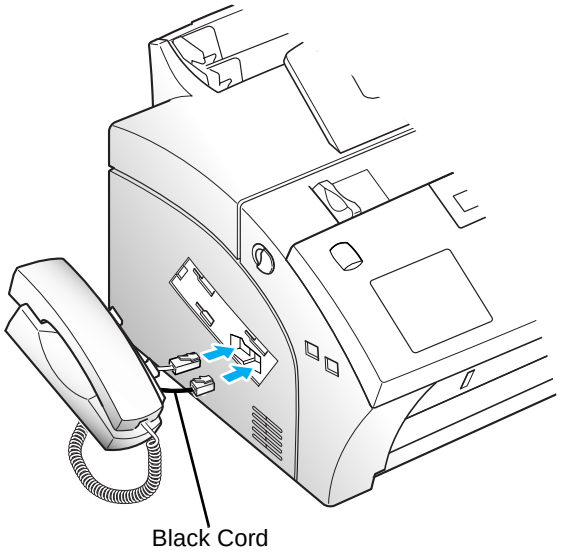
Handset and Handset Cradle*

* Not available in all markets.

1. Plug one end of the coiled cord into the jack on the handset. Then plug the other end into the modular jack on the bottom of the handset cradle.

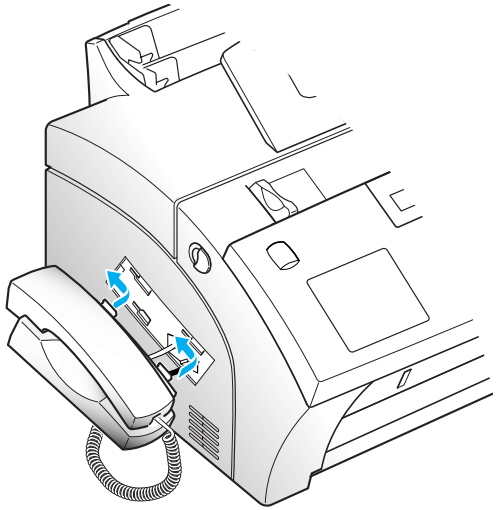


2. Plug the cradle's modular cords into the modular jacks on the left side of your machine.

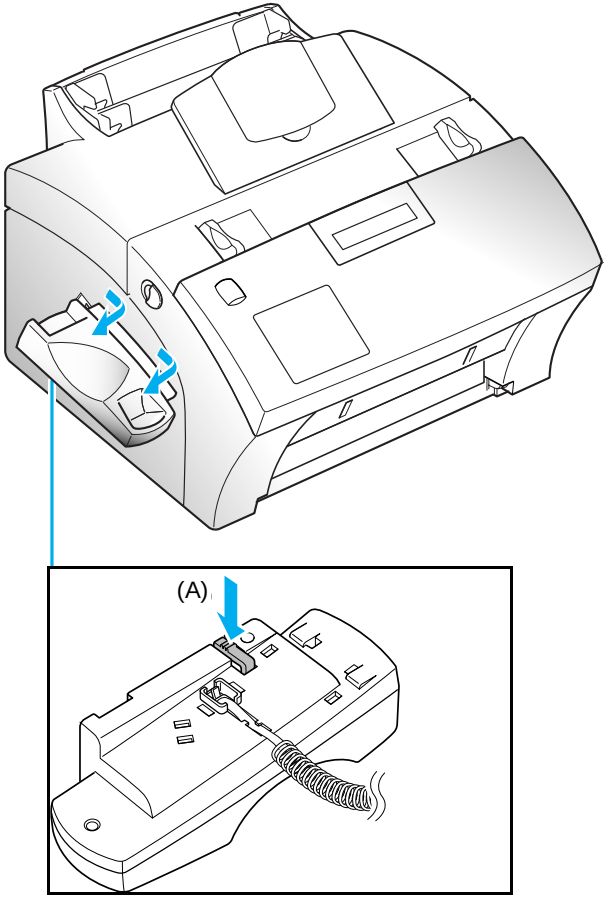


Route the excess cord so that it can be inserted into the cradle.

3. Attach the Handset Cradle to the main body. Insert the three tabs of the cradle into the slots on the left side of the main body as shown, and push it up and to the rear into position.

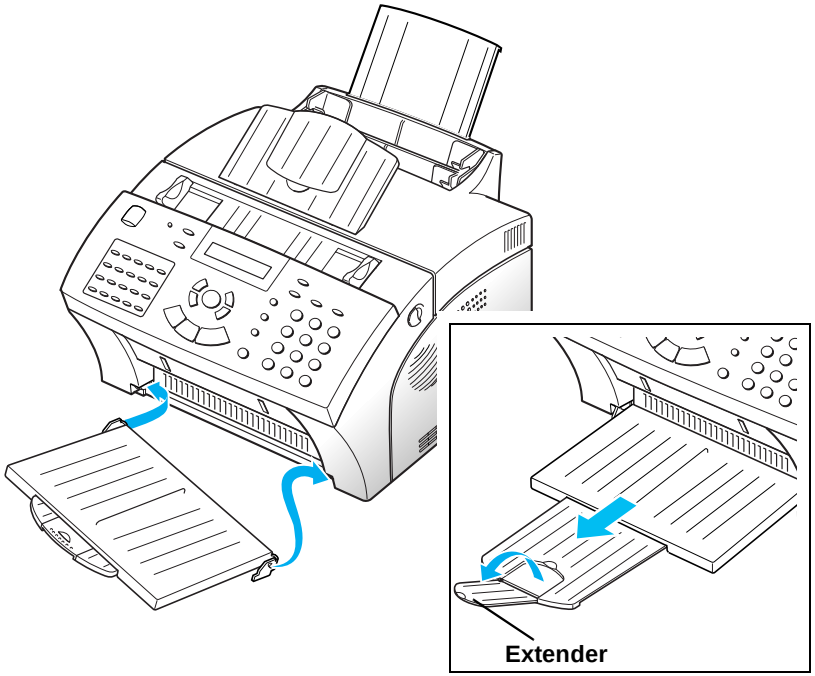


Note: If you want to remove the handset, pushing (A) in the bottom, slide it down and towards the front of the machine, then take it out.



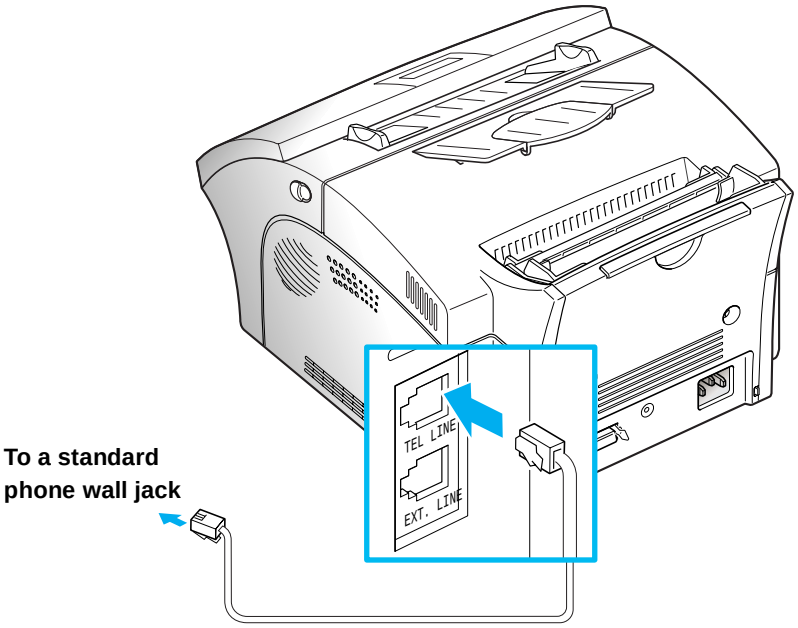
Printer Exit Tray

1. Holding the flexible side end, insert two tabs on the side ends into the corresponding slots. Fold out the extender, if necessary.



Telephone Line

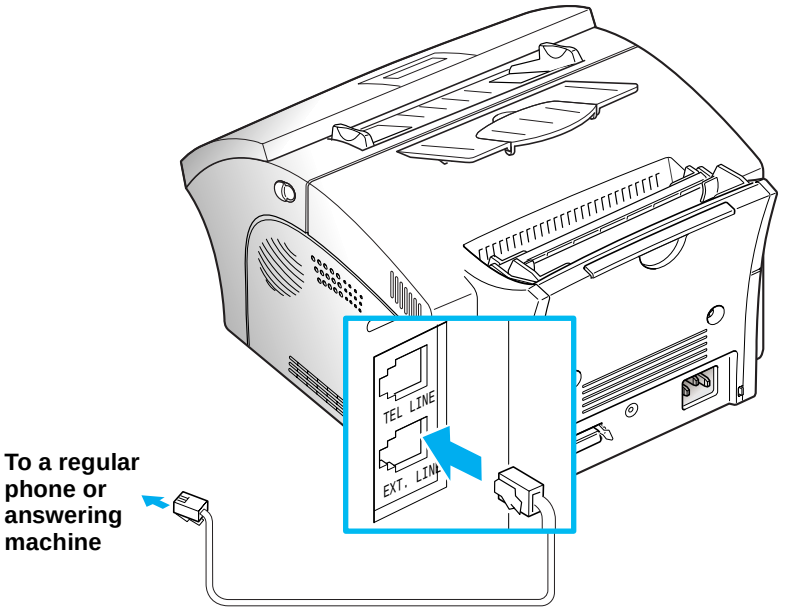
1. Plug one end of the telephone line cord into the TEL LINE jack and the other end into a standard phone wall jack.



Extension Phone

1. If you want to use a regular phone or answering machine with your Work Centre 385 machine, connect the phone into the EXT.LINE jack.

   Plug the cord of your extension phone or answering machine into the socket marked EXT.LINE on the back of the machine.

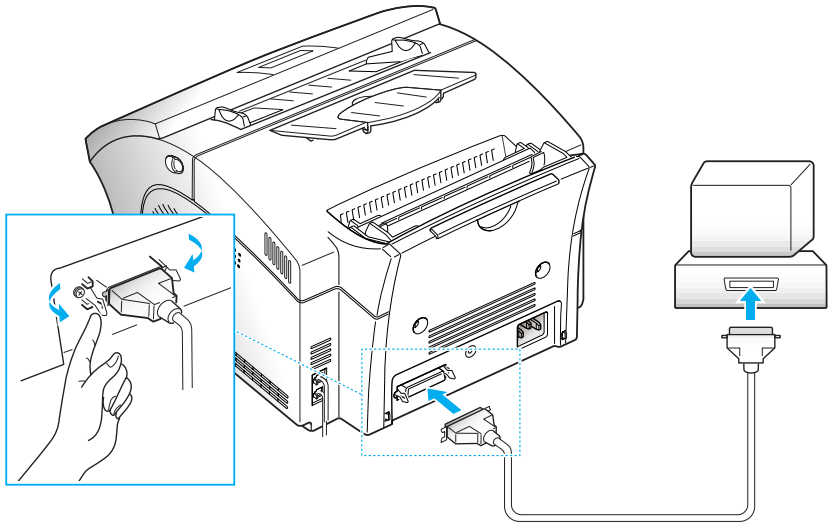


Parallel Cable

The WorkCentre 385 parallel interface port allows you to use it with your personal computer. It is recommended that the parallel cable supports IEEE-1284 bi-directional communications.

To connect the printer to the computer, follow the steps below:

1. Make sure that both the Xerox Work Centre 385 and the computer are turned off.
2. Plug the cable into the connector on the back of the printer. Push the metal clips to fit inside the notches on the cable plug.

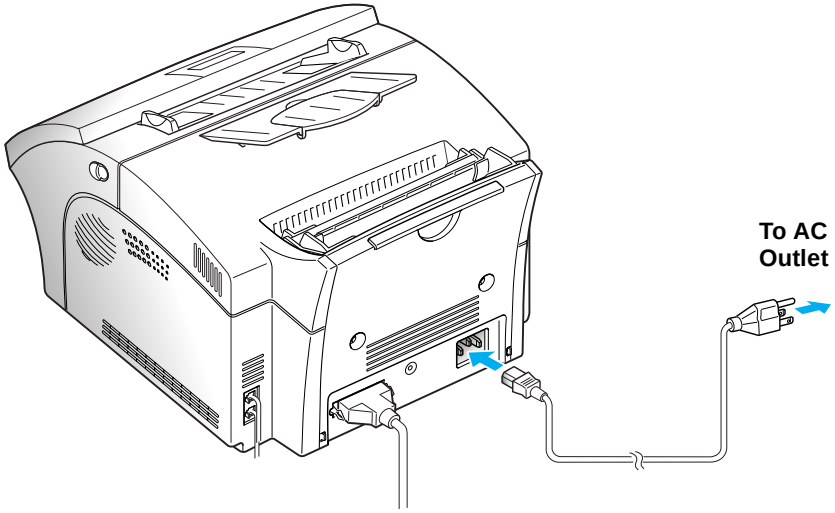


3. Connect the other end of the cable to the parallel interface port on your computer. See your computer documentation if you need help.

AC Power Cord

1. Plug one end of the cord into the back of the machine and the other end into a standard AC power outlet.

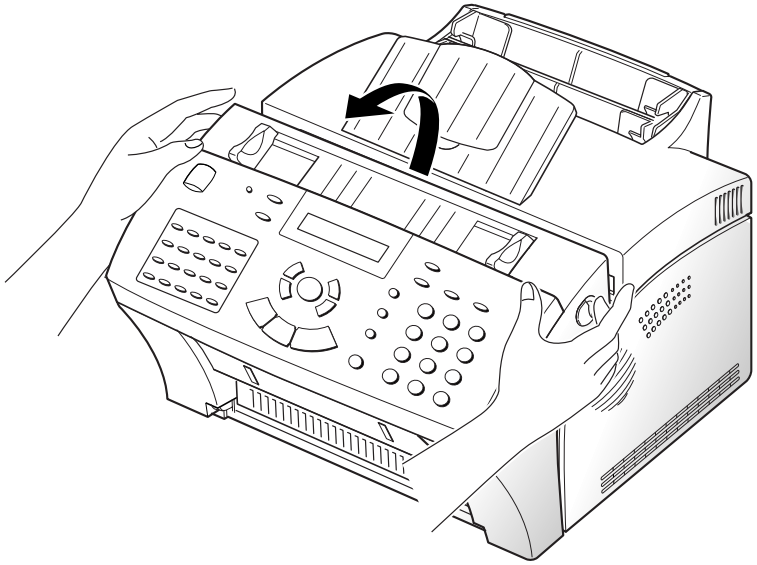
   The machine turns on. If there is no cartridge installed, or no paper, the display shows “DOOR OPEN or NO TONER!!!” or [NO PAPER].



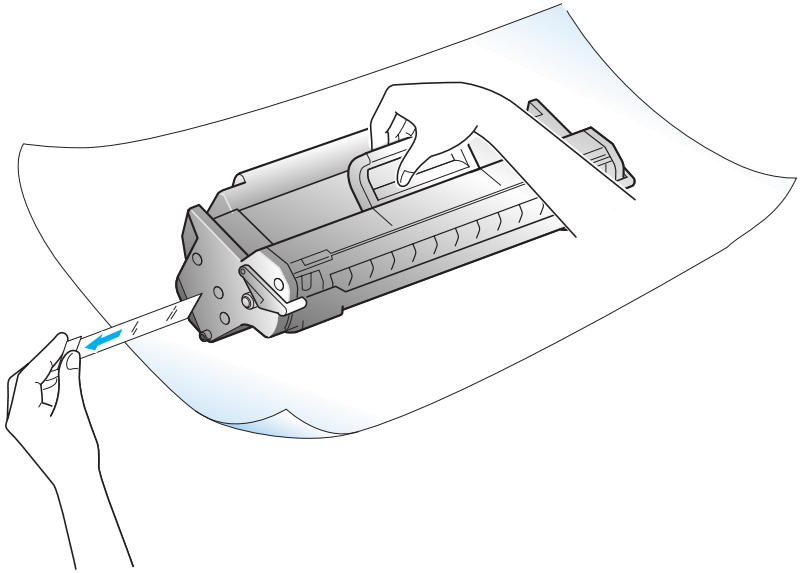
2. If you want to turn it off, unplug the power cord.

Laser Printer Cartridge

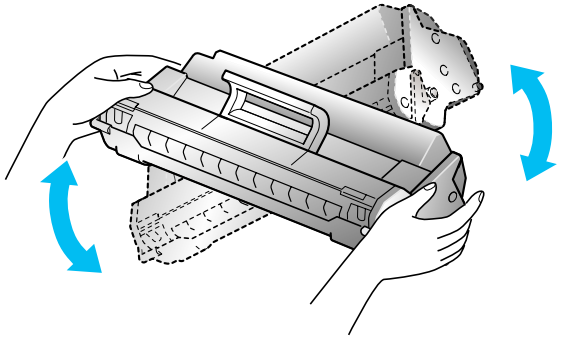
1. Pull the cover release buttons toward you, open the cover.



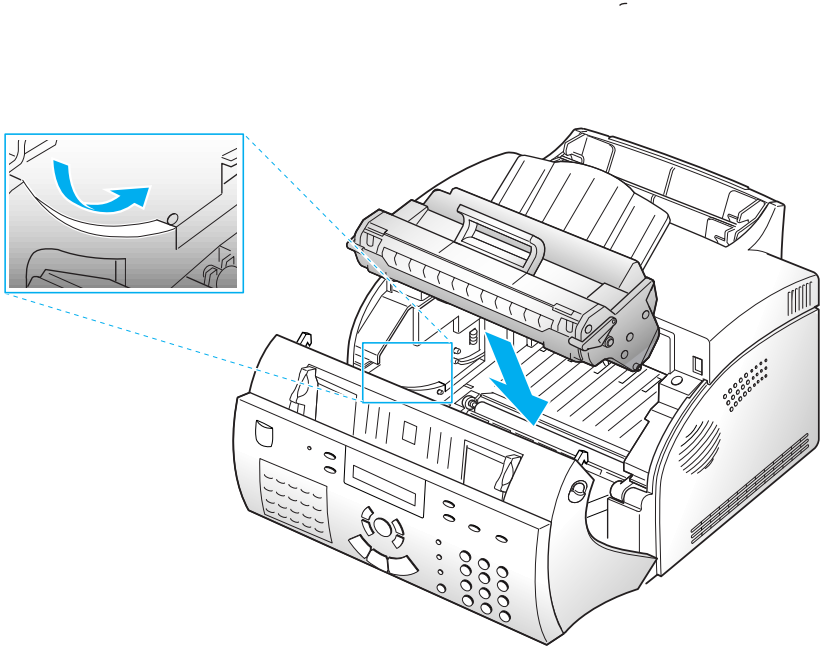
2. Unpack the cartridge, then carefully remove the sealing tape.



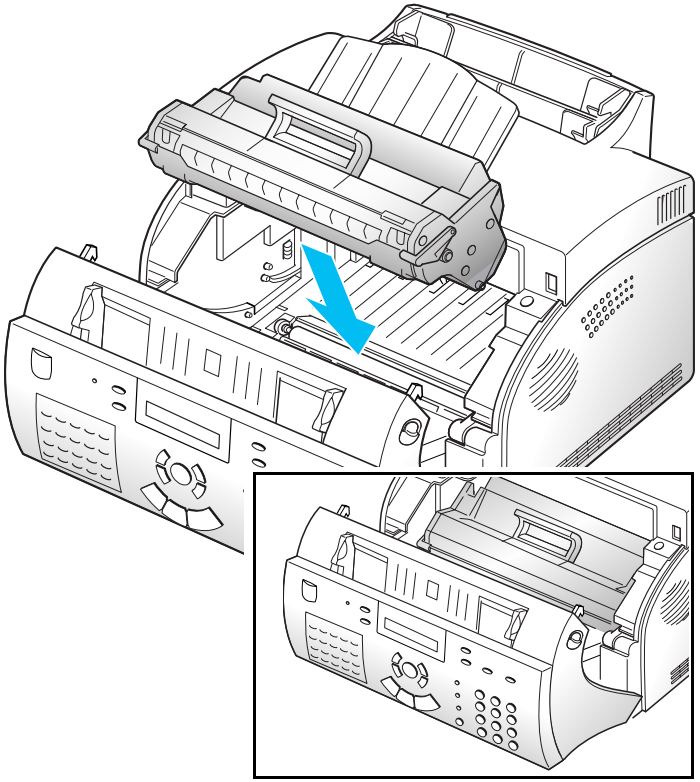
3. Shake the cartridge from side to side 5 or 6 times to distribute the toner evenly inside the cartridge.



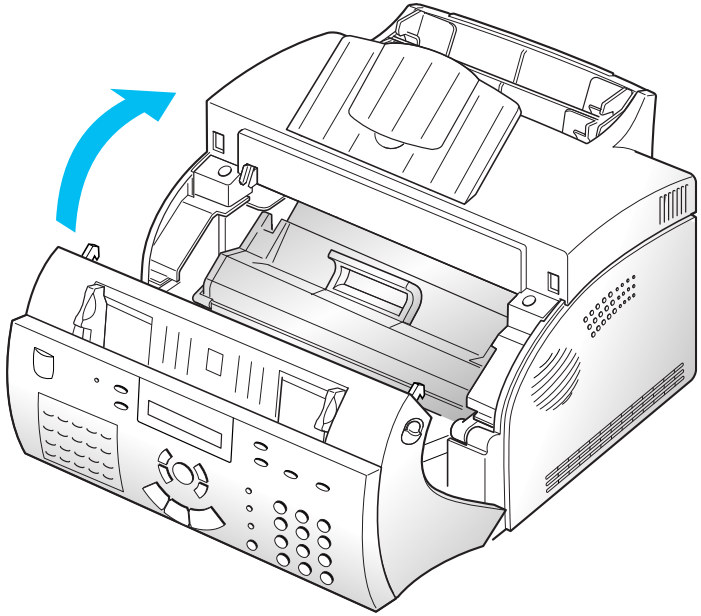
4. Find the cartridge slots inside the printer, one on each side.



5. Grasp the handle and slide the cartridge down between the cartridge slots, until it drops into place.



6. Close the cover. Make sure that the cover is securely closed.



2 Repair Procedures

Section Contents

Title Page

Repair Flow Procedures

Introduction

This section provides the troubleshooting information for identifying and resolving faulty components or subassemblies.

Error Messages

Error Message	Description	Solution
BUSY! REDIAL?	The machine is waiting the programmed interval to automatically redial.	You can press START to immediately redial, or STOP to cancel the redial operation.
COMM. ERROR	A problem with the facsimile communications has occurred.	Try operation again.
DOCUMENT JAM	Loaded document has Jammed in the feeder.	Clear the document Jam.
DOOR OPEN or NO TONER	The top cover is not securely latched. No Laser Printer Cartridge in the fax machine. The machine stops.	Close the cover firmly until it clicks in place. Install the Laser Printer Cartridge in place properly.
GROUP NOT AVAILABLE	You have tried to select a group location where only a single location number can be used, such as when adding locations for a multi-dial operation.	Try again, check location for group.
LINE ERROR	Your unit cannot connect with the remote machine, or has lost contact because of a problem on the phone line.	Try again. If failure persists, wait an hour or so for the line to clear then try again.
LOAD DOCUMENT	You have attempted to set up a sending operation with no document loaded.	Load a document and try again.
MEMORY FULL	The memory has become full.	Either delete unnecessary documents, or retransmit after more memory becomes available, or split the transmission into more than one operation.
NO ANSWER	The remote machine was not answered after all the redial attempts.	Try again. Make sure the remote machine is OK.
NO NOT ASSIGNED	The one-touch or speed dial location you tried to use has no number assigned to it.	Dial the number manually with the keypad, or assign a number.
NO PAPER	The Paper Tray is empty.	Load the recording paper in the paper feeder.

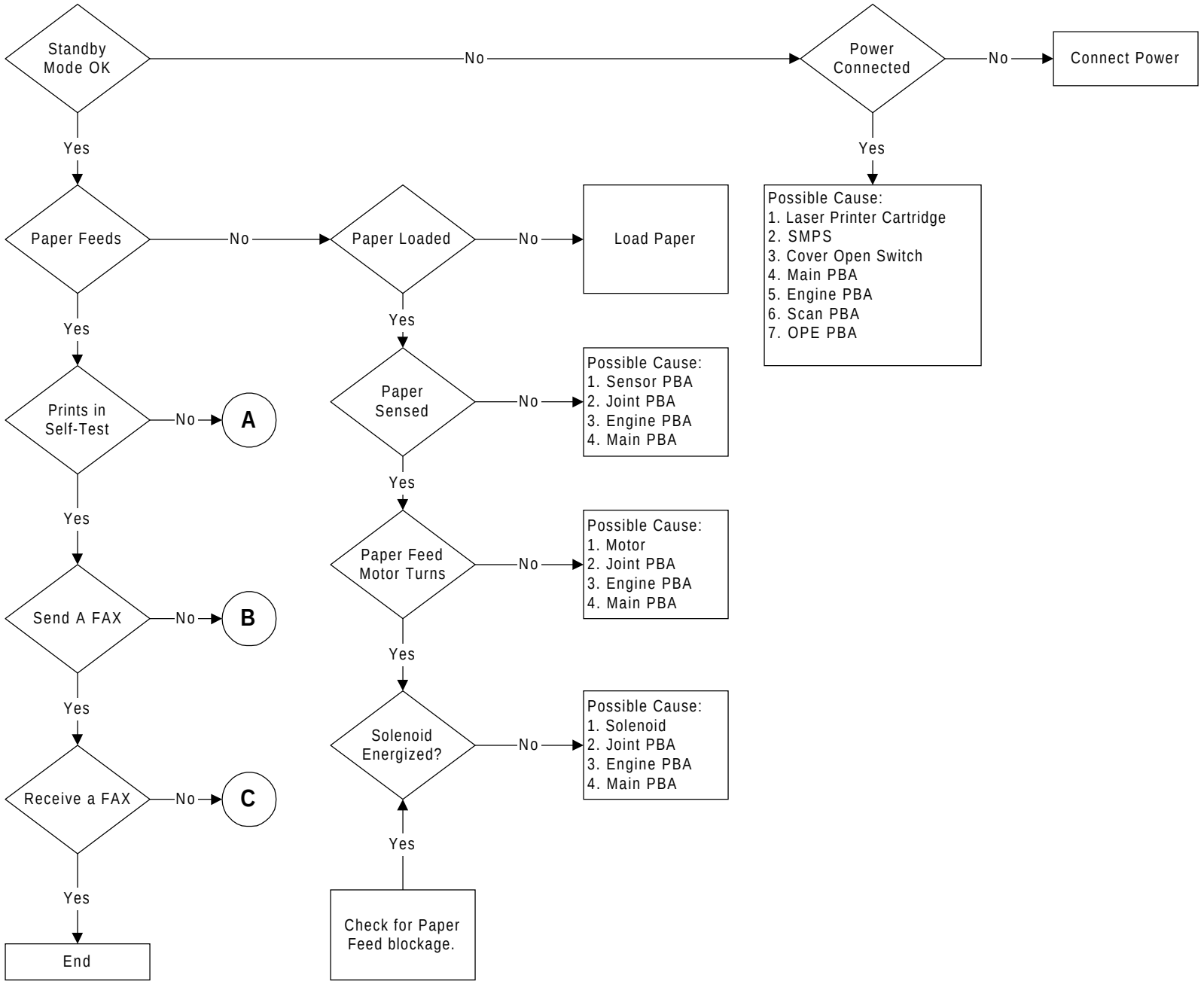
Error Message	Description	Solution
OVERHEAT	The printer part has overheated.	Your unit will automatically return to the standby mode when it cools down to normal operating temperature. If failure persists, call service.
PAPER JAM 0	Paper has jammed in the paper feeding area.	Press STOP and clear the jam.
PAPER JAM 1	Paper has jammed in the Feeding Area.	Clear the jam.
PAPER JAM 2	The jammed paper still remains inside the unit.	Clear the jam.
POLL CODE ERROR	When setting up to poll another fax machine, you've used an incorrect poll code.	Enter the correct poll code.
POLLING ERROR	The remote fax machine you want to poll is not ready to respond to your poll.	The remote operator should know in advance that you are polling and have their fax unit loaded with the document.
POWER FAILURE	A power failure has occurred.	If there have been documents stored in memory a power failure report will be printed automatically when the power is restored.
PLEASE WAIT	The machine is warming up and is off line.	Wait until the machine is on-line.

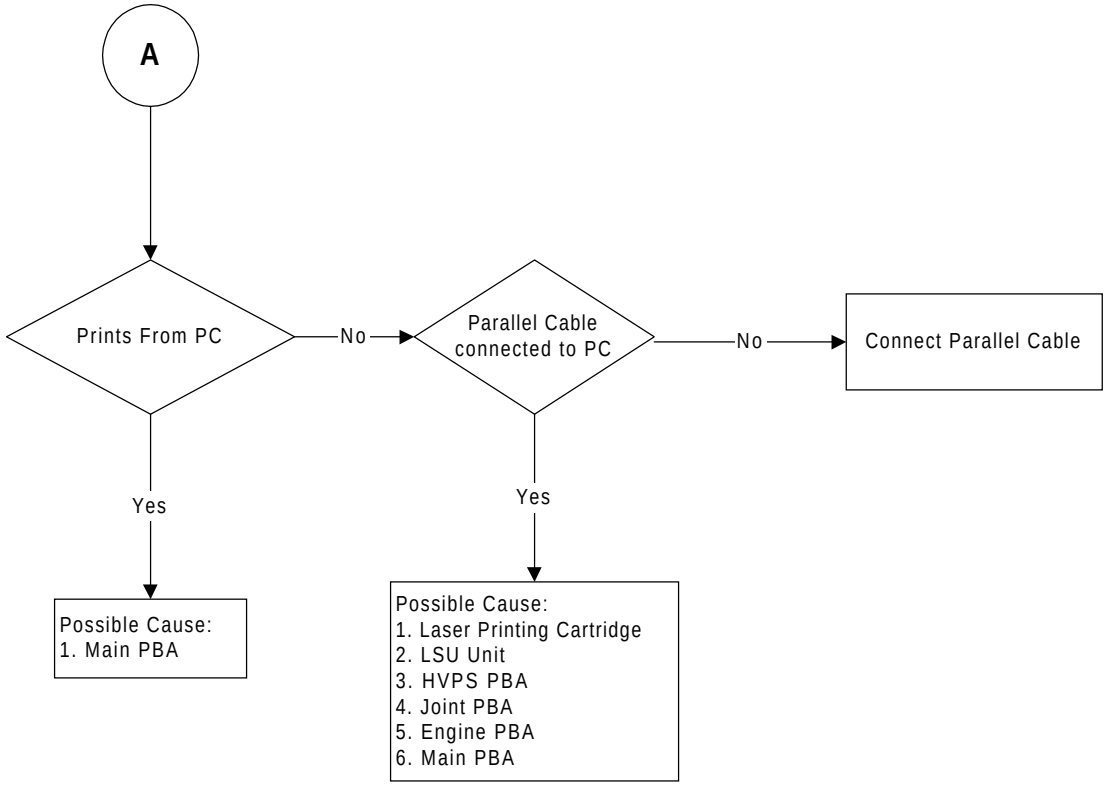
General Error Repair Procedures

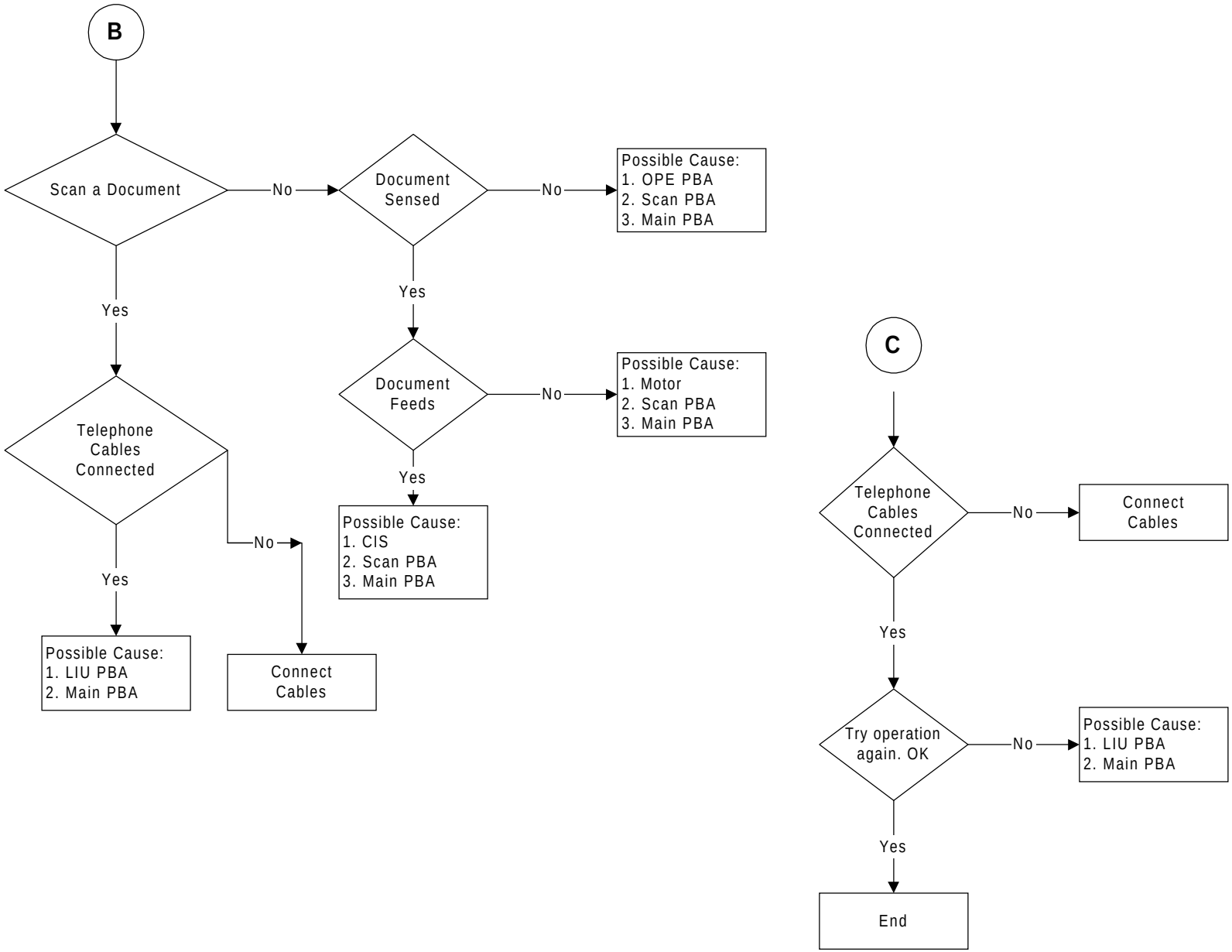
Error Status	Check	Solution
No Power See also “No Power” Trouble-shooting Flow.	1. Check wall power 2. Check power fuses F1, F2 & F3.	1. If power differs from machines power rating, have it corrected. 2. Replace open fuses.
Fuser Error See also “Fuser Error” Trouble-shooting Flow.	1. Thermostat open 2. AC wire open 3. Thermistor open 4. Engine PBA	1. Detach AC connector and measure the resistance between pin 1 and 2. Replace thermostat if open. 2. Check connector and wiring. 3. Check thermistor, wire and connection. 4. Replace Engine PBA.
Door Open or No Toner	1. When closing Top Cover, check that the lever is pressed 2. Micro switches open. 3. CPU and related circuit	1. Open top cover and press the lever. If Controller detects the cover is closed, check for mechanical problem in top cover and lever assembly. If ok, check for electrical problem.
Jam 0 See also “Paper Jam (mis-feed-ing)” Trouble-shooting flow.	Check where Jam 0 occurs. 1. Paper is not picked up. 2. Paper is located at feed sensor. 3. Occurs when inserting specific papers such as an envelope into the MPF (Multipurpose Paper Feeder)? 4. Occurs when inserting specific papers such as an envelope into the Manual Feeder? 5. Is the Stacker Extender folded out? 6. Does the Paper Guide Adjust distort the paper.	1. Check the solenoid. 2. Check feed sensor. Check if it is actuated by the paper width sensor. 3. Re-try inserting less paper. - Fan the paper and align. - Take out the loaded paper, and re-install in reverse direction. 4. Take out the loaded paper and re-install in reverse direction. - insert paper as recommended for Manual Feeding? - when loading, tap the paper until paper detect sensor senses that paper is loaded. 5. When using long paper, use the Extender. 6. Adjust Guide.

Error Status	Check	Solution
Jam 1 See also “Paper Jam (Jam 1)” Troubleshooting Flow.	Paper stops just after Fuser.	1. Check for double sheet feeding. Reload paper. 2. Check feed actuator position and actuator’s operation. 3. Check exit lever operation. Remove jam and check actuator. Is paper wrapped around the heat roller. Remove obstacles or replace.
Jam 2	Check where Jam 2 happens 1. Paper is curled and cannot exit. 2. Paper is curled in the exit area?	1. Remove paper and examine Fuser area for problems. Clean around fuser. 2. Check ribs of exit area for burrs or resistive edges. Remove obstacles or replace.
Jam 2 at Exit Tray	1. Check that print media meets specification. 2. Does paper curl when exiting?	1. Load recommended quantity of paper. 2. When using thick paper such as envelopes, card stock, labels and OHP slides, one-sheet printing is recommended. 3. Try loading paper upside down and reverse ends. 4. Open the Cover Front and check if roller or spring, which are related to paper feed are out of position. If yes, re-locate or replace.
Clutch error	1. Check the solenoid spring. 2. Check the armature assembly/ cushion. 3. Electrical check.	1. Check if the spring is stretched. 2. Check armature assembly installation. 3. Replace the Joint PBA (REP 4.20).
High voltage error	1. Voltage may not be supplied to Laser Printer Cartridge or cartridge may be defective.	1. Replace Laser Printer Cartridge. If error remains, replace the HVPS PBA (REP 4.23).
Feeding obstacles	1. Does the black film on the MEA Unit Tray prevent the paper from loading? 2. Does the MEA Unit Plate-knockup prevent the paper from loading?	1. Re-insert the film into the front area. When inserting it, the MEA Unit Plate-knockup needs to be aligned to the front. 2. Turn the power off and on. Open and close the Top cover to return to the original state.
Skew	1. Are the Paper Guides adjusted to the paper width without causing the paper to curl?	1. Reload the paper and adjust the paper guides to just touch the sides of the paper.

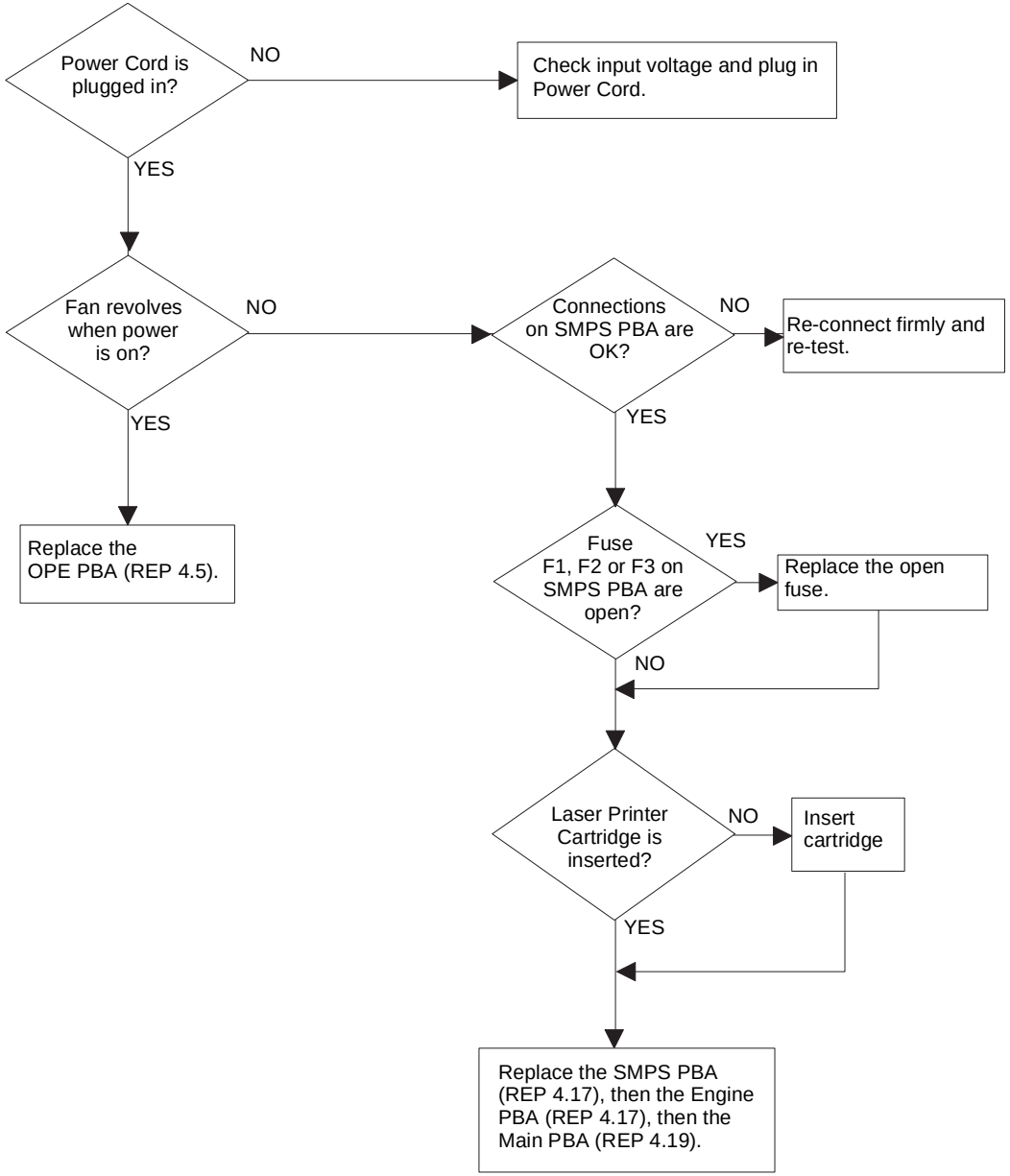
General Troubleshooting Reference



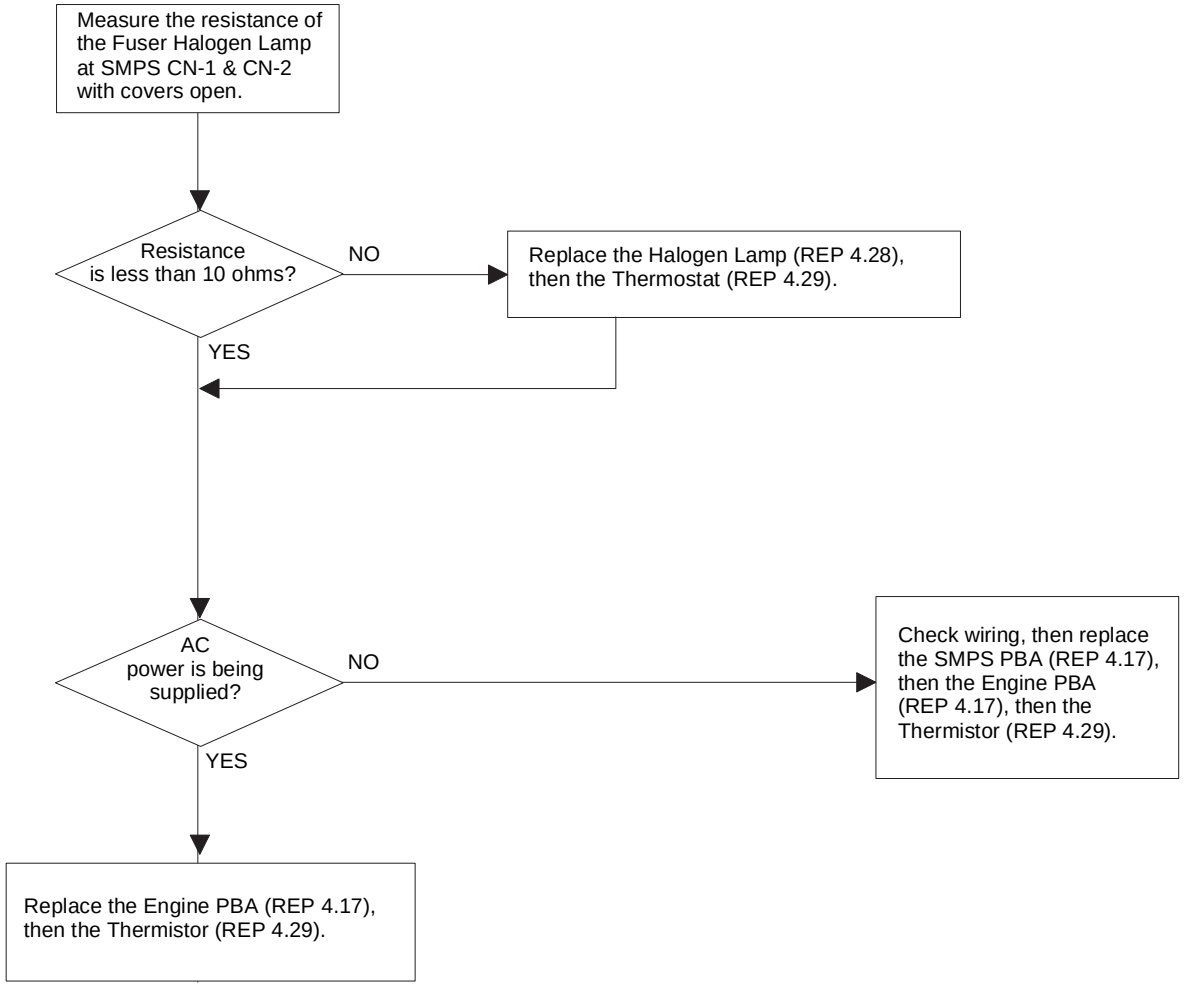

A
Prints From PC
No
Parallel Cable connected to PC
No
Connect Parallel Cable
Yes
Yes
Possible Cause:
1. Main PBA
Possible Cause:
1. Laser Printing Cartridge
2. LSU Unit
3. HVPS PBA
4. Joint PBA
5. Engine PBA
6. Main PBA


B
Scan a Document
No
Document Sensed
No
Possible Cause:
1. OPE PBA
2. Scan PBA
3. Main PBA
Yes
Yes
Document Feeds
No
Possible Cause:
1. Motor
2. Scan PBA
3. Main PBA
Yes
Possible Cause:
1. CIS
2. Scan PBA
3. Main PBA
Telephone Cables Connected
No
Yes
Possible Cause:
1. LIU PBA
2. Main PBA
Connect Cables
C
Telephone Cables Connected
No
Connect Cables
Yes
Try operation again. OK
No
Possible Cause:
1. LIU PBA
2. Main PBA
Yes
End

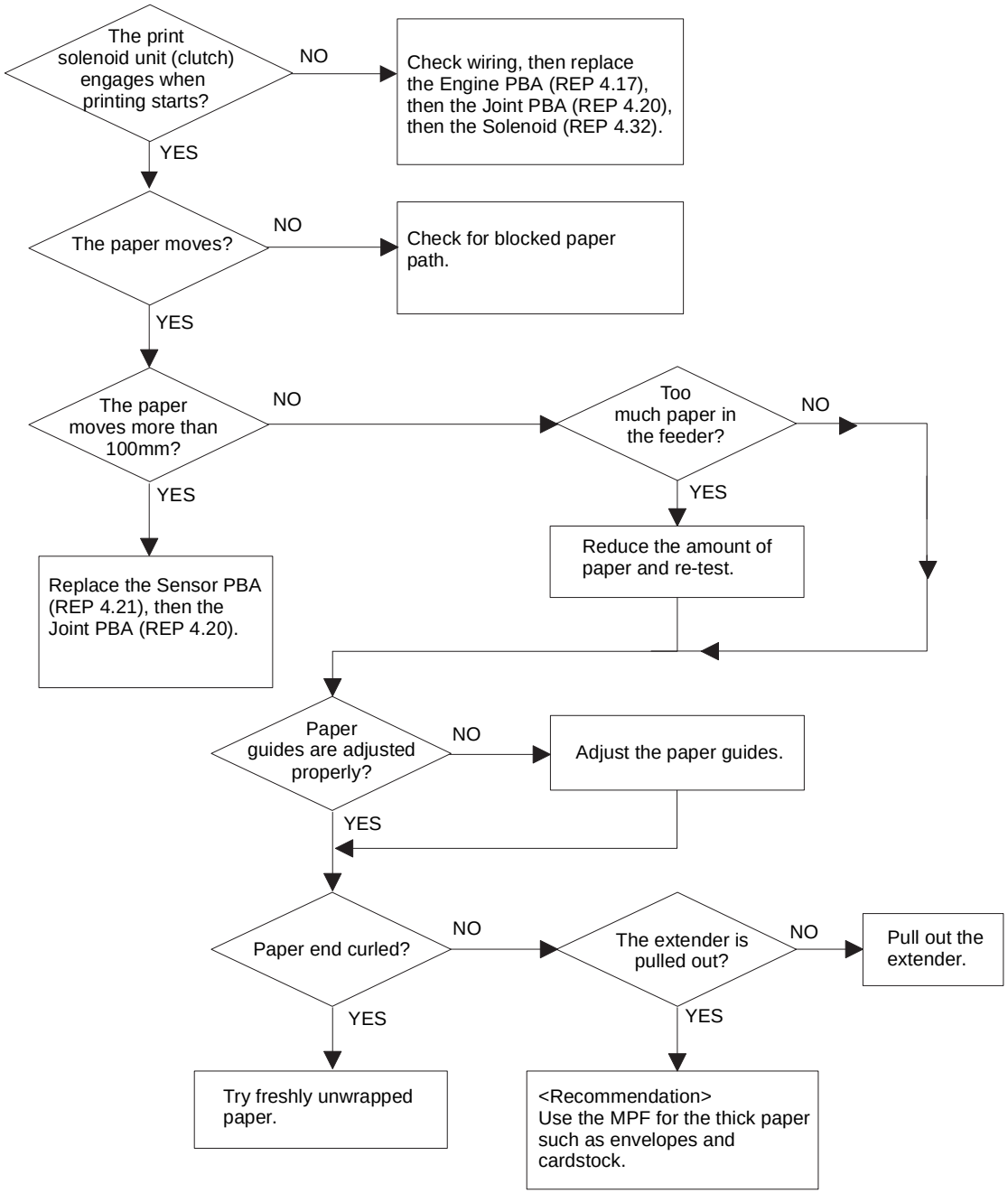
No Power (No LCD Display and LED off)



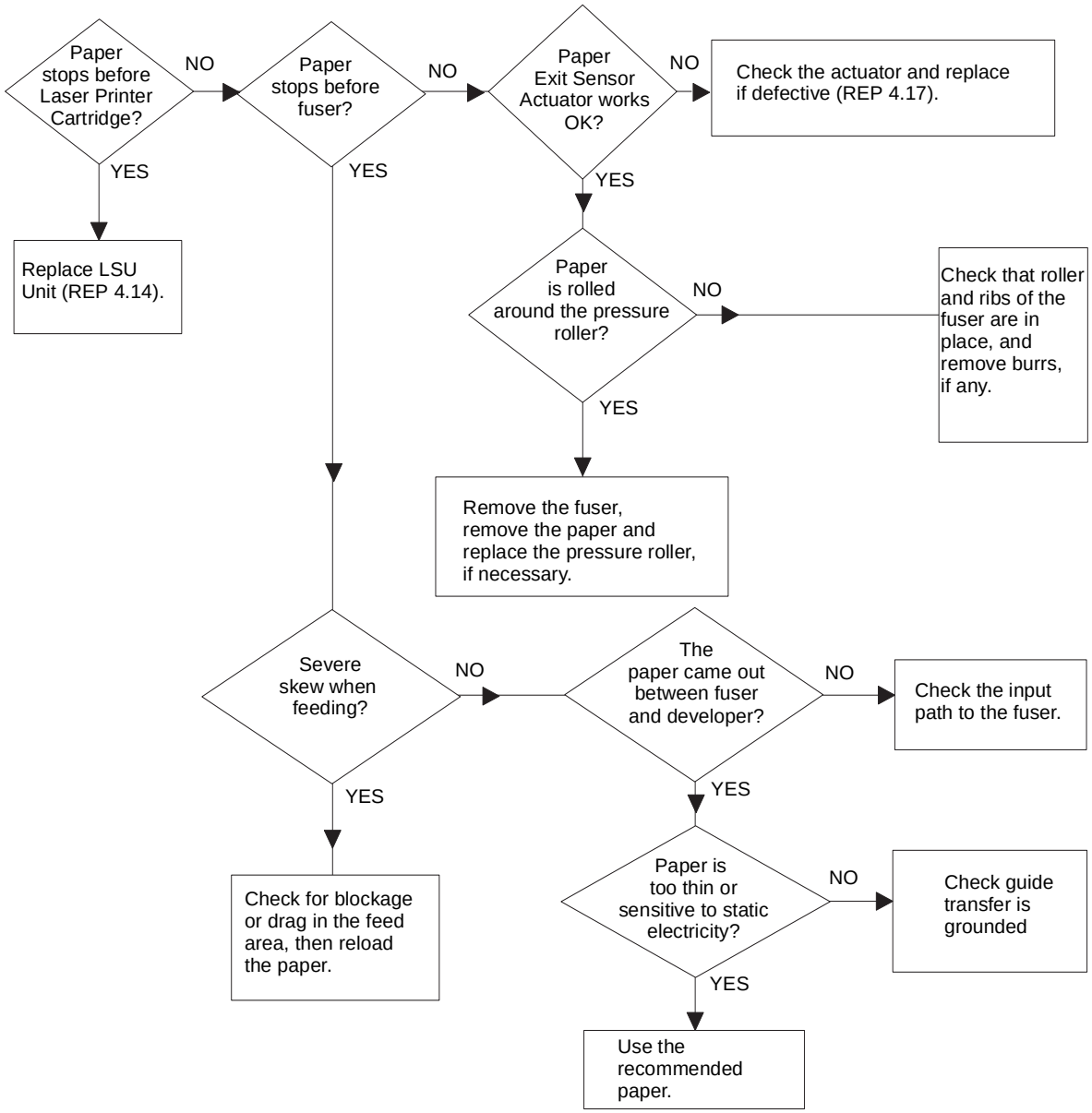
Fuser Error


Measure the resistance of the Fuser Halogen Lamp at SMPS CN-1 & CN-2 with covers open.
Resistance is less than 10 ohms?
NO
Replace the Halogen Lamp (REP 4.28), then the Thermostat (REP 4.29).
YES
AC power is being supplied?
NO
Check wiring, then replace the SMPS PBA (REP 4.17), then the Engine PBA (REP 4.17), then the Thermistor (REP 4.29).
YES
Replace the Engine PBA (REP 4.17), then the Thermistor (REP 4.29).

Paper Jam (mis-feeding)



Paper Jam (Jam 1)



3 Image Quality Repair Procedures

Section Contents

Title Page

Image Quality Flow Procedures

Introduction

This section contains the troubleshooting information for resolving image quality problems.

General Image Quality Errors

Error Status	Check	Status
Vertical black line and band	1. Bad blade in Laser Printer Cartridge. 2. LSU.	1. Change Laser Printer Cartridge. 2. Replace LSU.
Vertical white line See also “Vertical White Line (Band)” Troubleshooting Flow.	1. LSU window contamination. 2. Laser Printer Cartridge.	1. Clean LSU window. 2. If not LSU, change Laser Printer Cartridge.
No image See also “No Image” Troubleshooting Flow.	1. Seal tape is removed? 2. Grounding? 3. LSU? 4. Laser Printer Cartridge? 5. Is there scan data from PBA?	1. Removing seal tape. 2. Measure the resistance between frame ground and the ground spring attached frame. Confirm that ground is connected properly. 3. Replace LSU. 4. Shake Laser Printer Cartridge and print. If image is a little better, Laser Printer Cartridge is empty. 5. Replace Scan PBA.
Light image	1. Seal tape removed? 2. LSU beam normal? 3. Laser Printer Cartridge OK? 4. Contamination of high voltage contact. 5. HVPS defective.	1. Remove seal tape. 2. Replace LSU. 3. Replace Laser Printer Cartridge. 4. Clean high voltage output contacts. 5. Replace HVPS PBA.
Dark image See also “Dark Image” Troubleshooting Flow.	1. LSU beam normal? 2. Scan image OK?	1. Replace LSU. 2. Replace Scan PBA, then Main PBA, then Engine PBA, then Joint PBA, then HVPS PBA.
Background See also “Back-ground” Troubleshoot-ing Flow.	1. High voltage normal? 2. Laser Printer Cartridge is contaminated?	1. Replace HVPS PBA. 2. Replace Laser Printer Cartridge.

Error Status	Check	Status
Ghost See also “Ghost” Troubleshooting Flow.	1. High voltage normal. 2. Pre-Transfer Lamp on? 3. Bad high voltage contacts.	1. Replace HVPS PBA. 2. Check that PTL turns on. Replace if defective. 3. Clean the contacts.
Stains on back of paper See also “Black Dot” Troubleshooting Flow.	1. Contamination of transfer roller. 2. Stains in paper path. 3. Pressure rollers contaminated.	1. Clean the transfer roller. 2. Clean the paper path area. 3. Remove fuser and replace it or Pressure Roller.
Poor Fusing See also “Poor Fusing Grade” Troubleshooting Flow.	1. Check paper. 2. The machine was under the low temperature for a long time? 3. Fuser Lamp or Thermistor open.	1. Replace if defective. 2. Check Fuser after it warms up. 3. Replace Fuser Lamp, then Thermistor.
Partial blank image (not periodic)	1. Laser Printer Cartridge is low or out of position?	1. Replace Laser Printer Cartridge.
Partial blank image (periodic)	1. Developer roller scratch or contaminated. 2. Scratch or contamination (94 mm). 3. Transfer roller scratch or contamination (47 mm).	1. Replace Laser Printer Cartridge. 2. Replace Laser Printer Cartridge. 3. Replace transfer roller.
Different image density (left and right) See also “Irregular Density” Troubleshooting Flow.	1. Charge roller’s pressure force unbalance end to end. 2. Developer roller and OPC or Developer roller and blade’s pressure force unbalance end to end. 3. Transfer roller’s pressure force unbalance end to end.	1. Replace Laser Printer Cartridge. 2. Replace Laser Printer Cartridge. 3. Check transfer roller left and right spring.

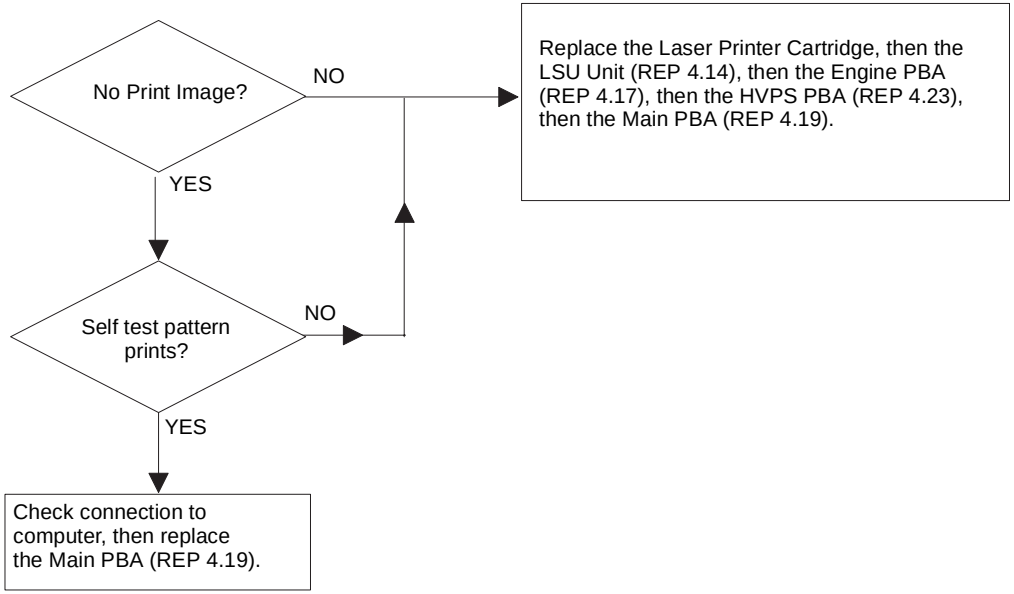
Error Status	Check	Status
Horizontal band See also “Horizontal Band” Troubleshooting Flow.	1. Unstable high voltage contact. 2. Charge roller’s contaminated. 3. Contamination of heat roller. 4. Malfunction of LSU.	1. Clean each contact and check for good contact pressure. 2. Clean charge roller. 3. Replace fuser unit or damaged rollers. 4. Replace LSU, HVPS PBA, Engine PBA, or Main PBA.

Periodic Abnormal Images

No	Roller	Abnormal image period	Kind of abnormal image
1	OPC Drum	96.2mm	White spot
2	Charge Roller	37.7mm	Black spot
3	Supply Roller	31.3mm	Horizontal density band
4	Developer Roller	46.1mm	Horizontal density band
5	Transfer Roller	47.1mm	Black side contamination/ transfer fault
6	Heat Roller	56.4mm	Black spot, White spot
7	Pressure Roller	56.5mm	Black side contamination

Note: If any of the above occurs replace the defective component.

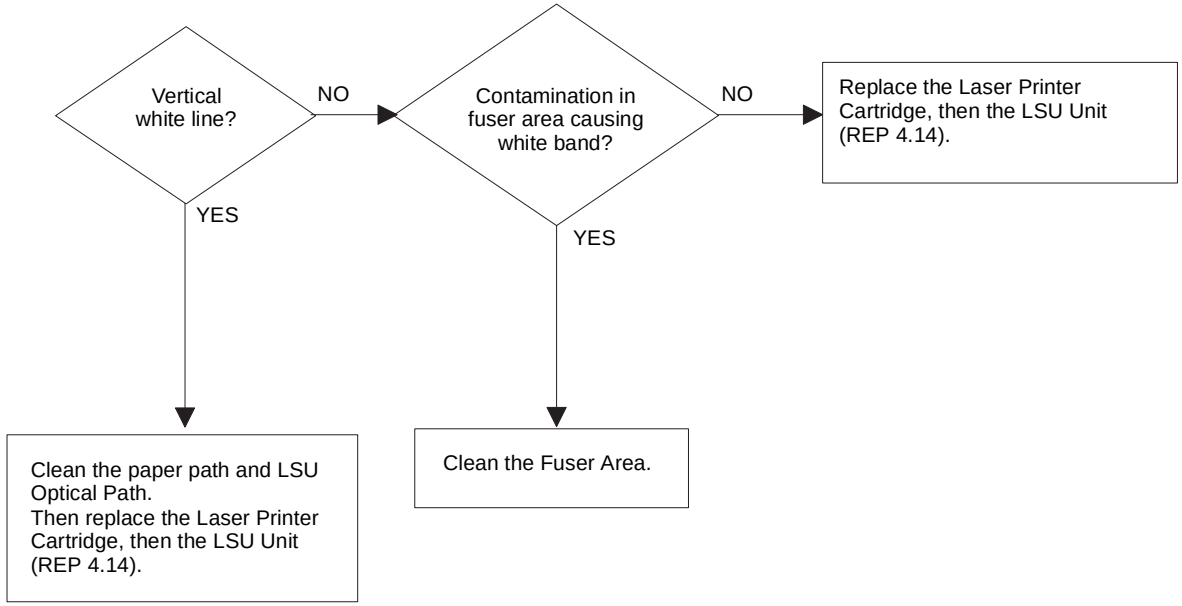
No Image


No Print Image?
NO
Replace the Laser Printer Cartridge, then the LSU Unit (REP 4.14), then the Engine PBA (REP 4.17), then the HVPS PBA (REP 4.23), then the Main PBA (REP 4.19).
YES
Self test pattern prints?
NO
YES
Check connection to computer, then replace the Main PBA (REP 4.19).

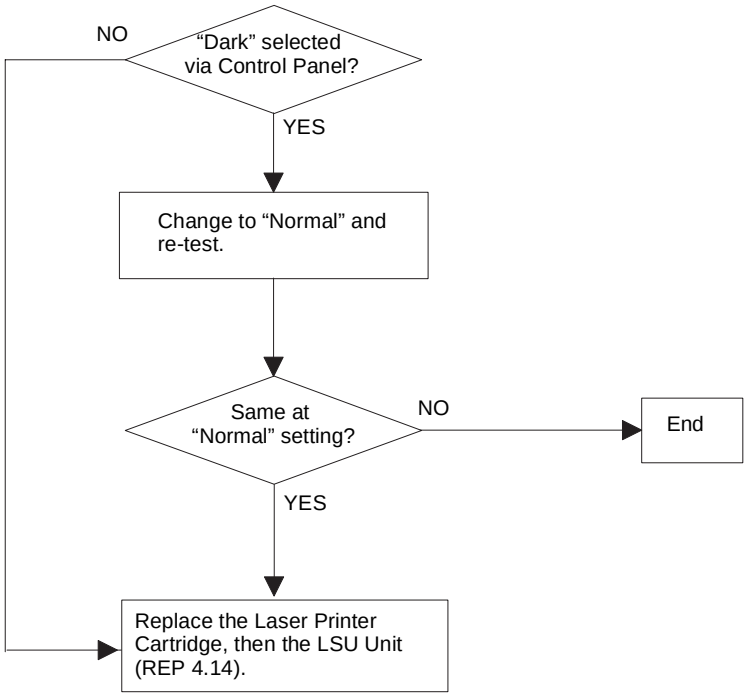
All Black

Replace the Laser Printer Cartridge, then the LSU Unit (REP 4.14), then the Engine PBA (REP 4.17), then the HVPS PBA (REP 4.23), then the Main PBA (REP 4.19).

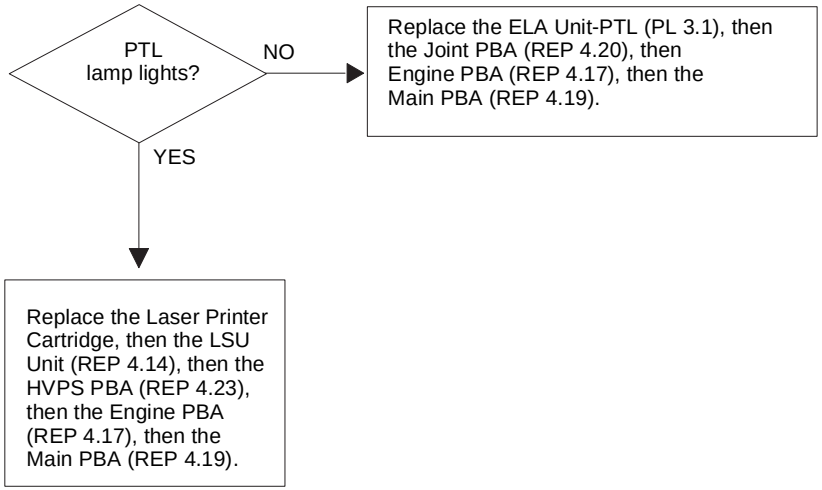
Vertical White Line (Band)



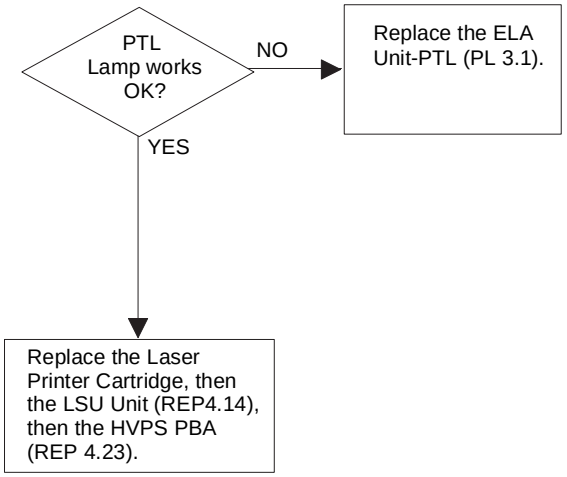
Dark Image


NO
"Dark" selected via Control Panel?
YES
Change to "Normal" and re-test.
Same at "Normal" setting?
NO
End
YES
Replace the Laser Printer Cartridge, then the LSU Unit (REP 4.14).

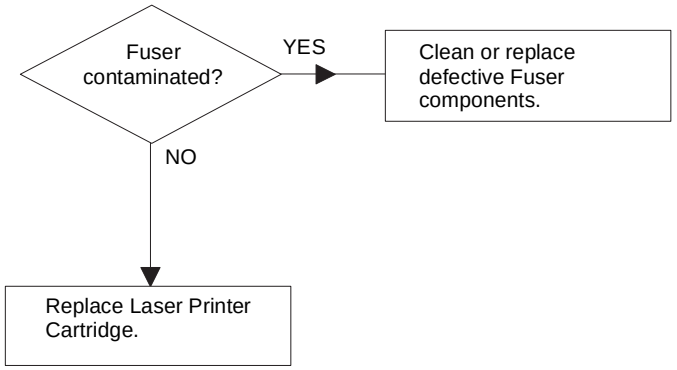
Background


PTL
lamp lights?
NO
Replace the ELA Unit-PTL (PL 3.1), then the Joint PBA (REP 4.20), then Engine PBA (REP 4.17), then the Main PBA (REP 4.19).
YES
Replace the Laser Printer Cartridge, then the LSU Unit (REP 4.14), then the HVPS PBA (REP 4.23), then the Engine PBA (REP 4.17), then the Main PBA (REP 4.19).

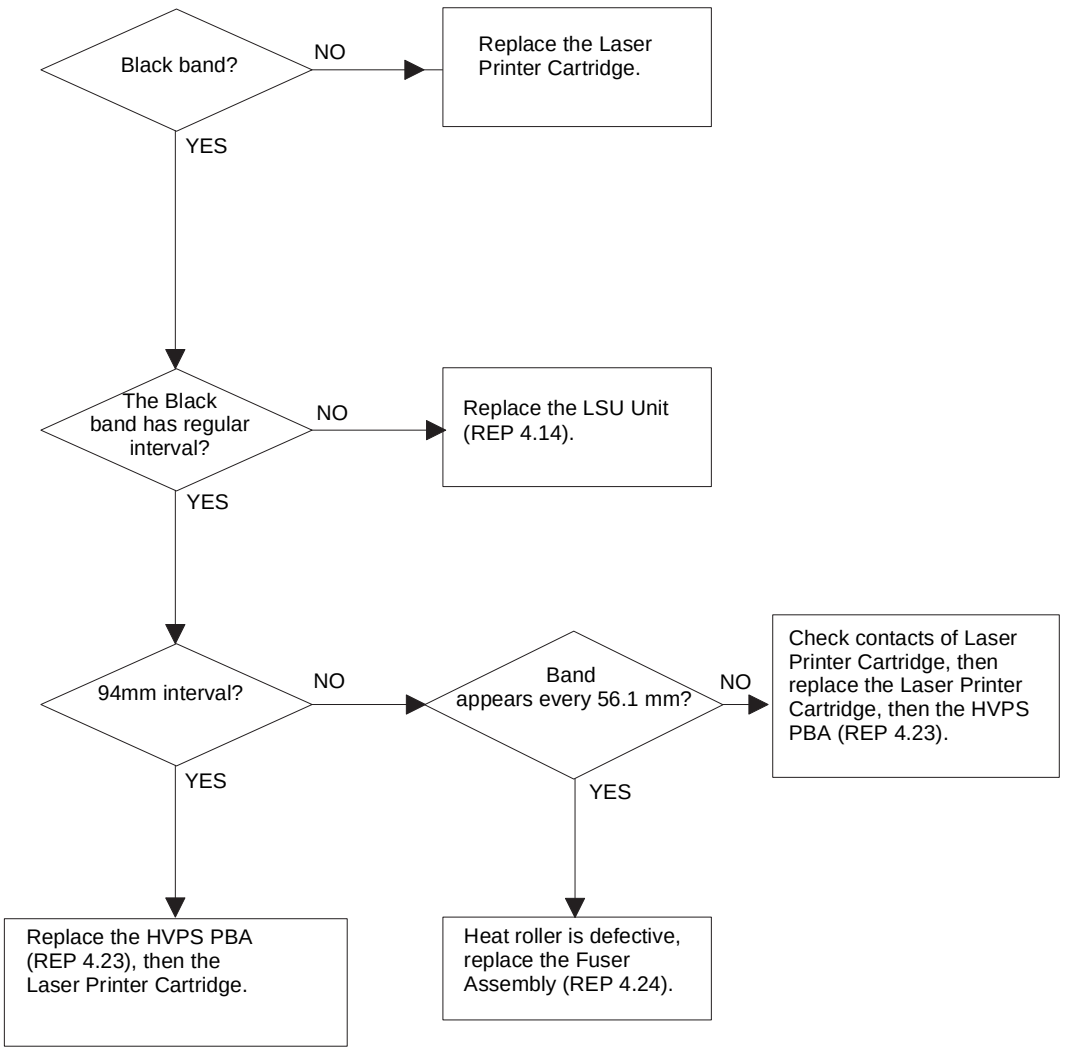
Ghost


PTL
Lamp works
OK?
NO
Replace the ELA
Unit-PTL (PL 3.1).
YES
Replace the Laser
Printer Cartridge, then
the LSU Unit (REP4.14),
then the HVPS PBA
(REP 4.23).

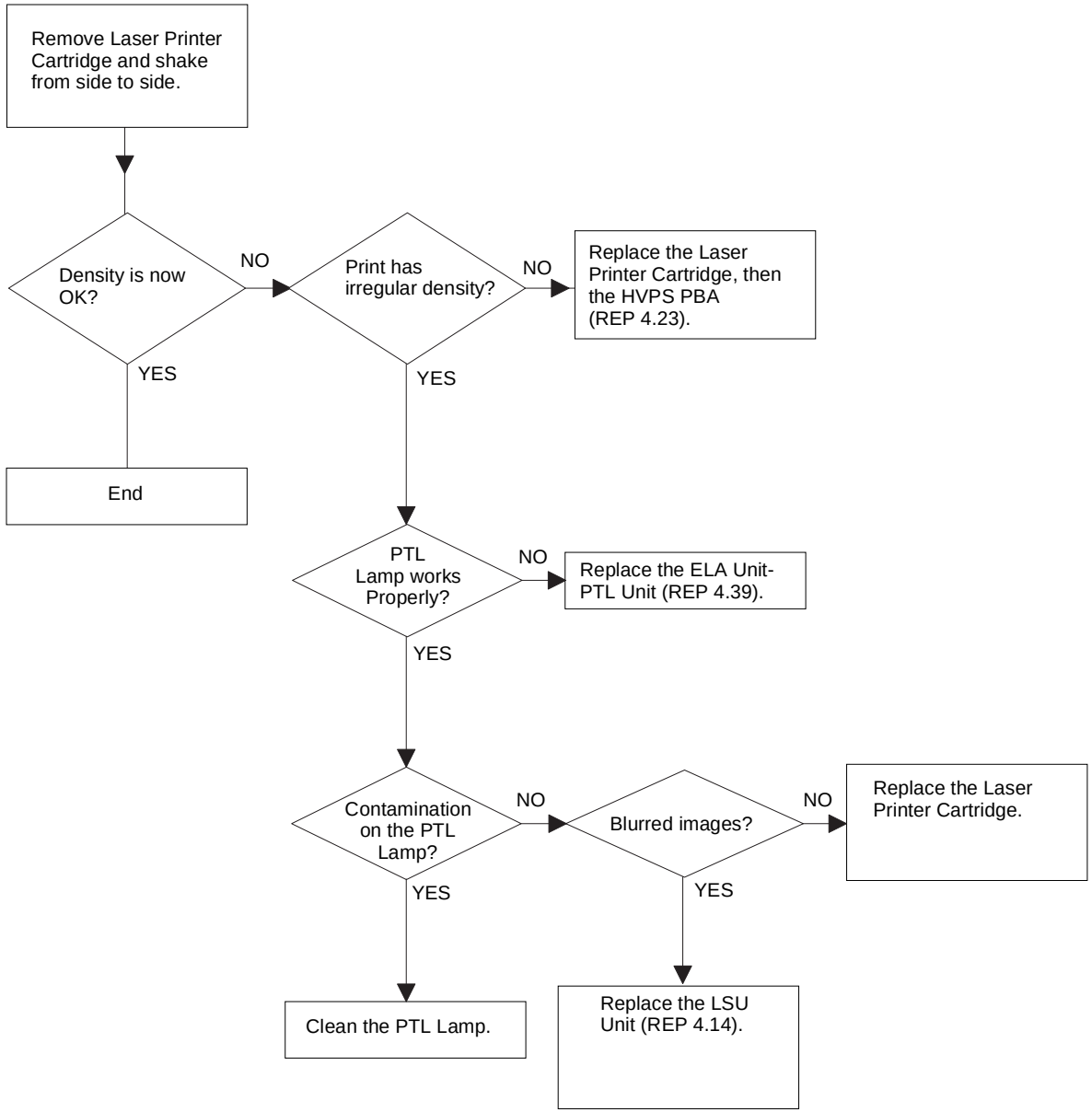
Black Dot


Fuser contaminated?
YES
Clean or replace defective Fuser components.
NO
Replace Laser Printer Cartridge.

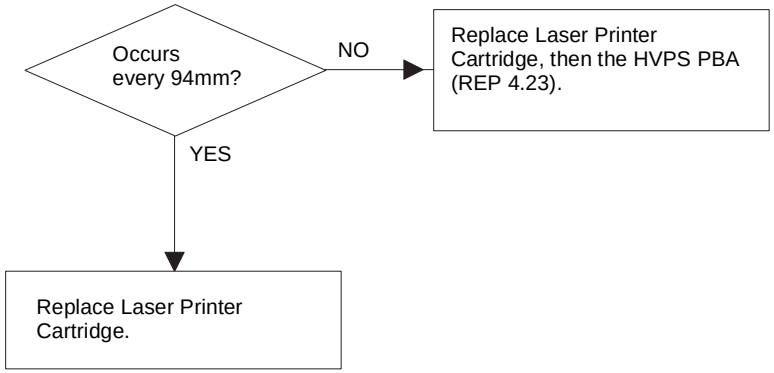
Horizontal Band



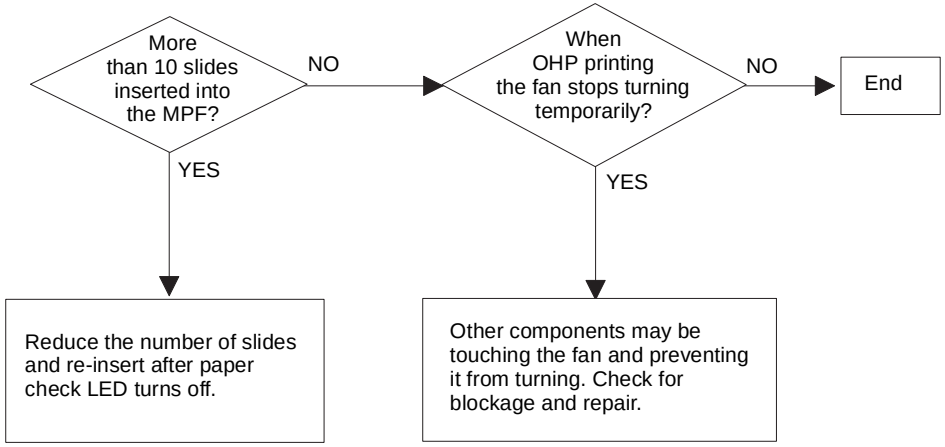
Irregular Density



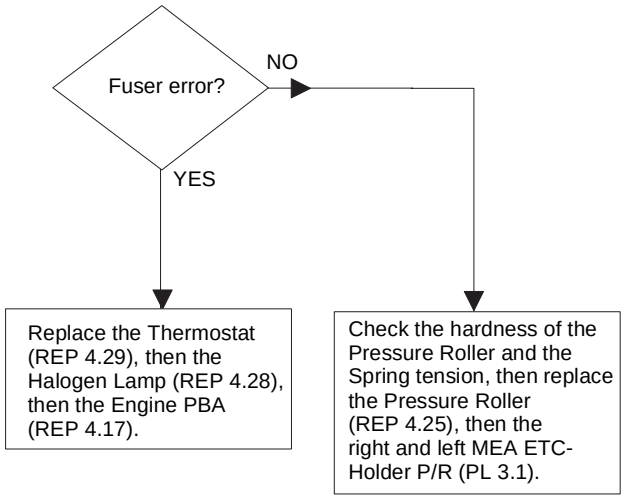
White Spot


Occurs
every 94mm?
NO
Replace Laser Printer
Cartridge, then the HVPS PBA
(REP 4.23).
YES
Replace Laser Printer
Cartridge.

Blurred Image /OHP (Overhead Projector)



Poor Fusing Grade



4 Repair/Adjustment

Section Contents

Introduction

Main Assembly

OPE Unit Assembly

Frame Lower Assembly

Fuser Assembly

Front Assembly

Introduction

Overview

The Repair / Adjustment section, Section 4 of the Service Manual, provides information that enables the Service Representative to restore the product to within specification after fault isolation.

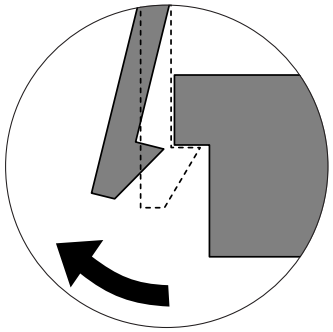
Cautions:

- Be sure to unplug the power cord whenever you are working on the machine with one of the covers removed.
- Be sure to remove the toner cartridge and place it into a dark container before you remove any parts.
- The close proximity of cables to moving parts makes proper routing a must. All cables disturbed by the removal procedure must be replaced as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.
- If the machine is equipped with handset, remove the handset and cradle.

Releasing Plastic Latches

Many of the parts are held in places with plastic latches.

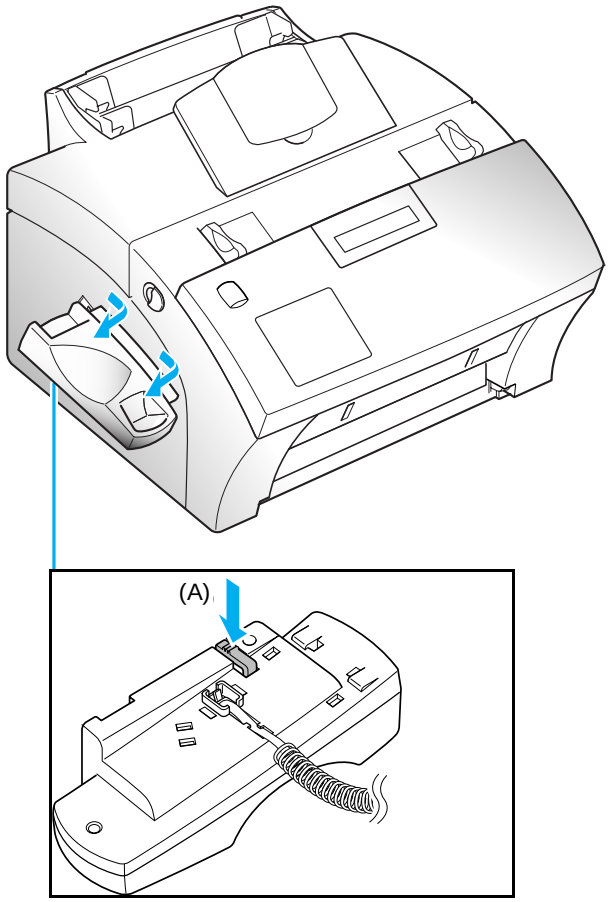
The latches break easily; release them carefully. To remove these parts, press the hook end of the latch away from the part to which it is latched.



REP 4.1 Handset & Cradle

Removal

1. Remove the Handset.
2. Press the tab on the under side of the Cradle and firmly slide the Cradle towards the front of the machine to remove.



3. Disconnect the Handset and Hook Switch connectors from the machine.

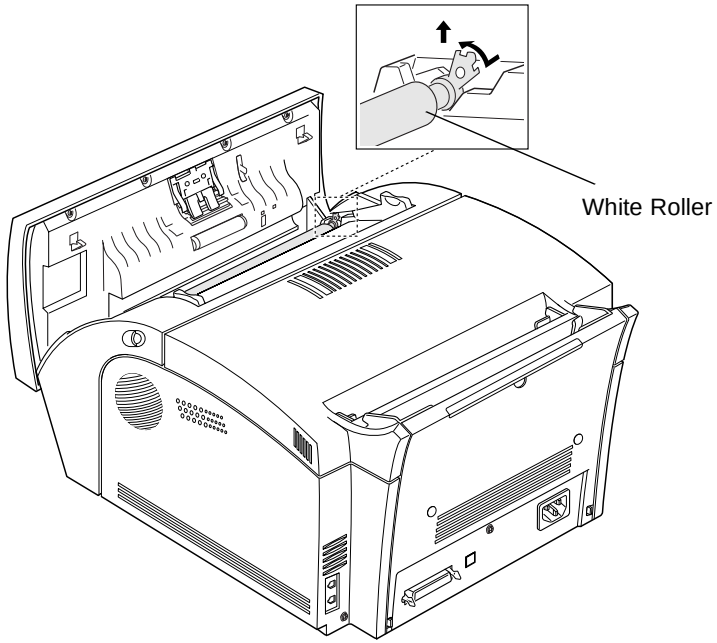
Replacement

4. Reinstall the components in the reverse order.

REP 4.2 White Roller

Removal

1. Lift the control panel using hand.
2. Push the bushing on both ends of the roller slightly inward, then rotate it until it reaches the slot. Then lift the roller out.



Replacement

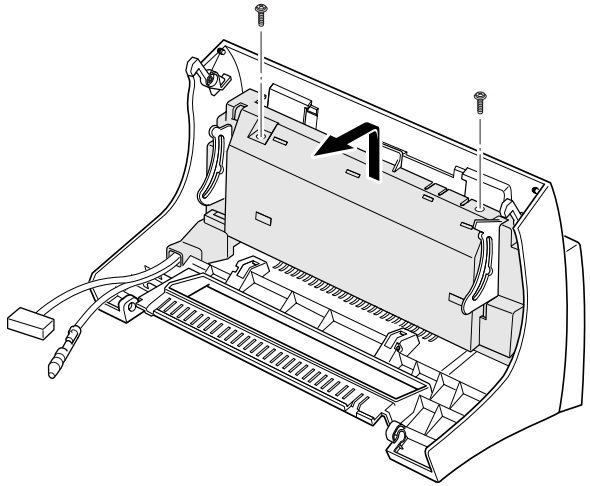
1. Reinstall the components in the reverse order.

Note: Check the roller for any dirt. If dirty, wipe it off with soft cloth dampened with water or alcohol. If the roller is heavily worn, replace it with a new one.

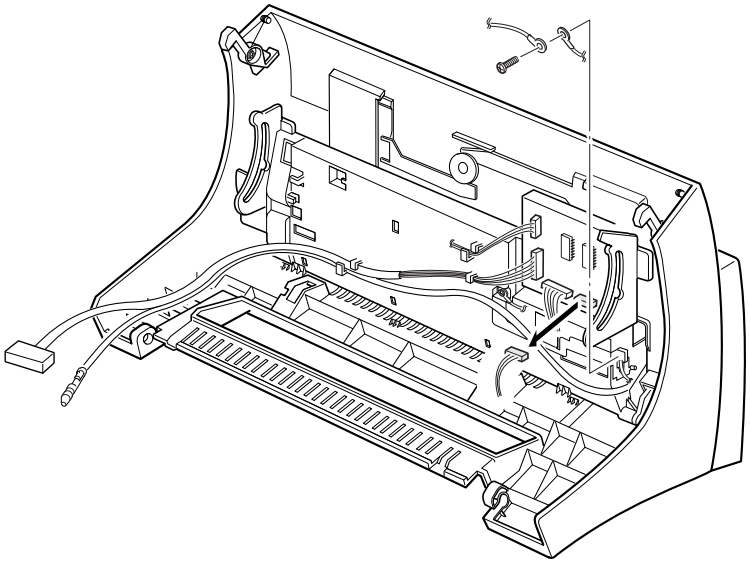
REP 4.3 OPE Cover

Removal

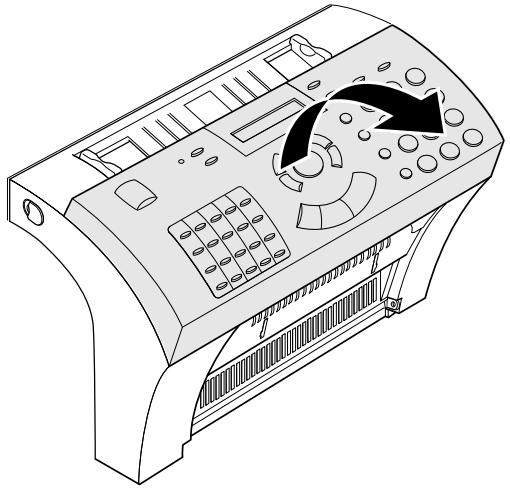
1. Remove Front Cover (REP 4.11).
2. Remove two screws, then remove the Scan Cover.



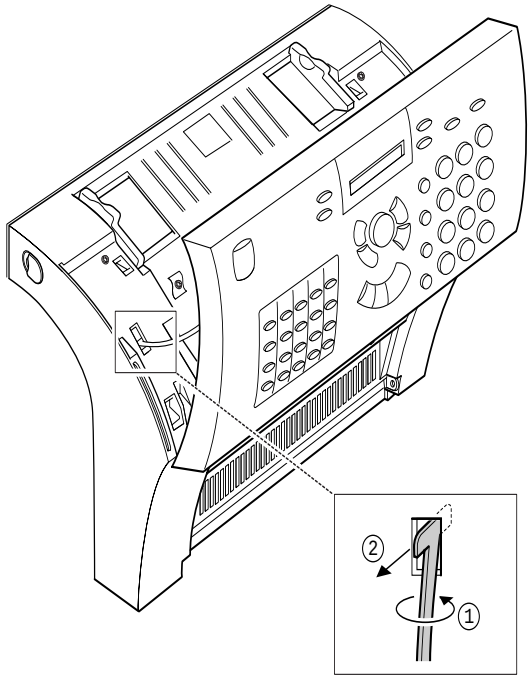
3. Unplug the OPE connector from the Scan PBA and remove ground screw.



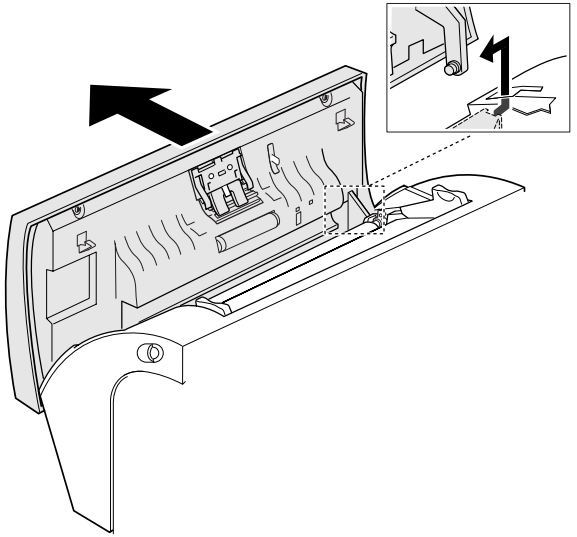
4. Lift the control panel by hand.



5. Remove the stopper holding the OPE Cover.



6. Unlatch the bottom ends, then remove the OPE cover.



7. Remove ground wire from routing tabs on back of OPE cover.

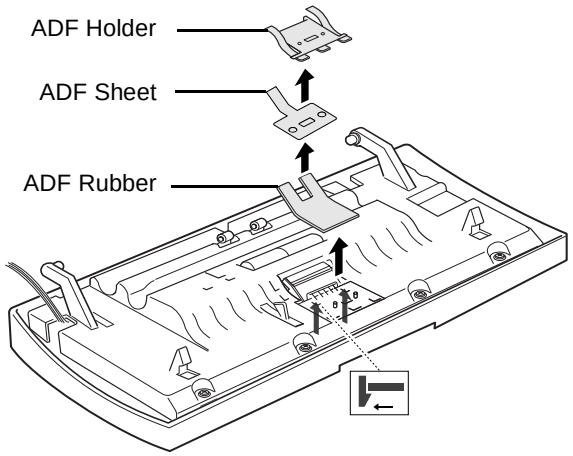
Replacement

1. Reinstall the components in the reverse order.

REP 4.4 ADF Rubber

Removal

1. Insert a small flat blade screw driver at right and left cut out in ADF Holder to release locking tabs on each side of ADF Rubber.

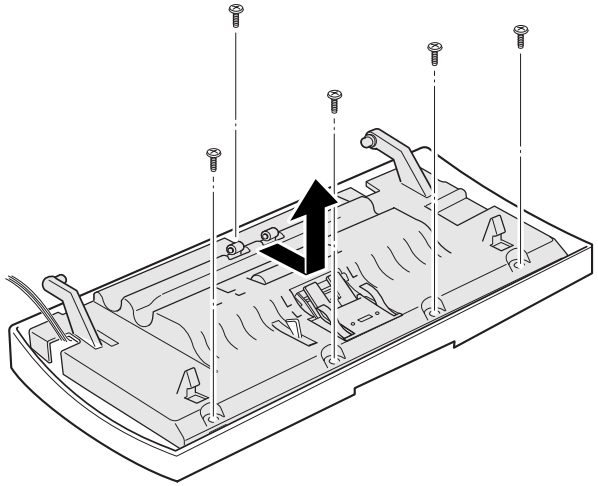


Replacement

1. Reinstall the components in the reverse order.

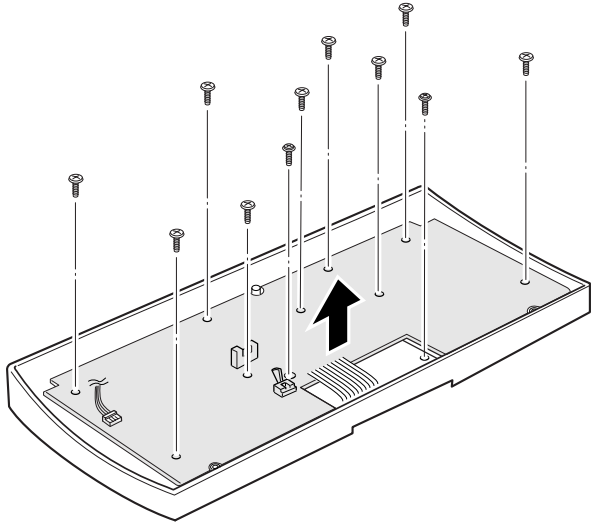
REP 4.5 OPE PBA

1. Remove the following:
   a. Front Cover (REP 4.11).
   b. OPE Cover (REP 4.3).
2. Remove five screws, then remove the scan upper frame.



3. Remove eleven screws securing the PBA, then remove the PBA.

   Note: Remove screws in numeric order. Do not turn OPE over after removing screws and OPE PBA.



Note: When replacing screws, tighten in reverse numeric order.

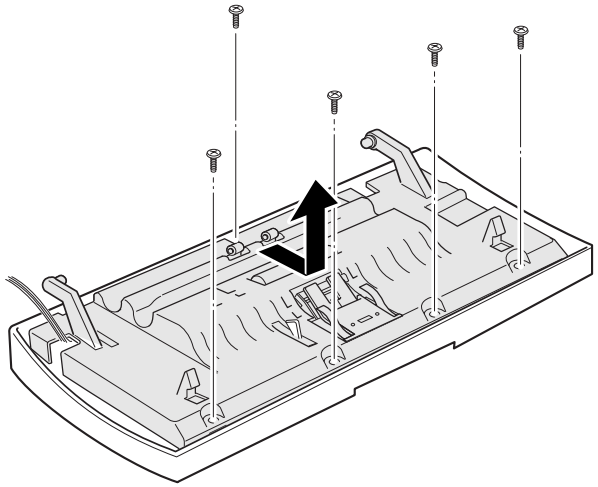
Replacement

1. Reinstall the components in the reverse order.

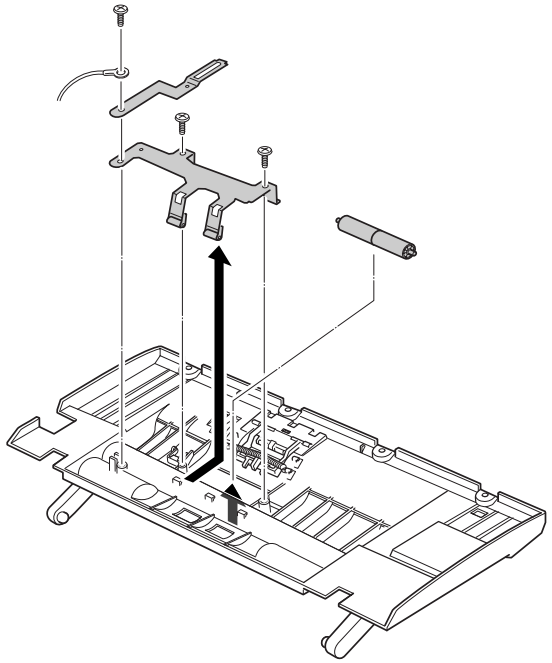
REP 4.6 Pinch Roller

Removal

1. Remove the following:
   a. Front Cover (REP 4.11).
   b. OPE Cover (REP 4.3).
2. Remove five screws, then remove the scan upper frame.



3. Turn the scan upper frame over, and remove three screws. Then, remove the Sensor bracket pinch spring, and pinch roller.
   To remove the pinch roller, push up from the bottom side.



Replacement

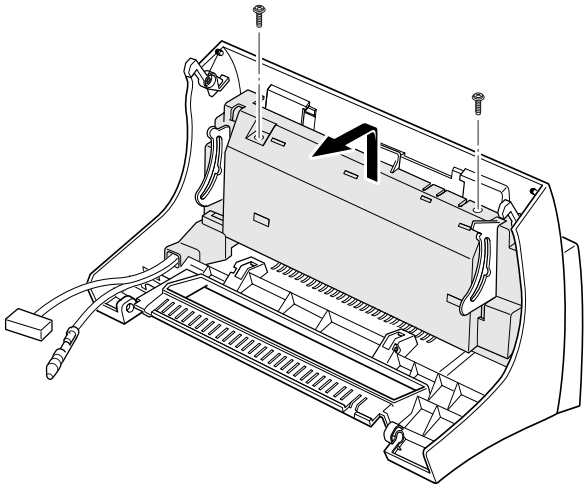
1. Reinstall the components in the reverse order.

   Note: When you replace the pinch spring, make sure that the pinch spring is properly latched.

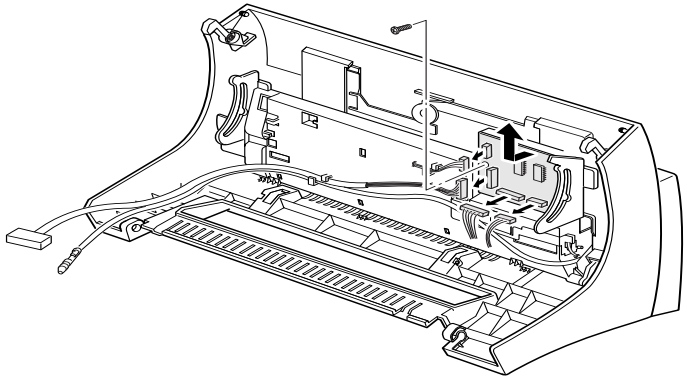
REP 4.7 Scan PBA

Removal

1. Remove the following:
   a. Front Cover (REP 4.11).
2. Remove two screws, then remove the scan cover.



3. Unplug all connectors from the scan PBA, remove one screw, then remove the PBA.



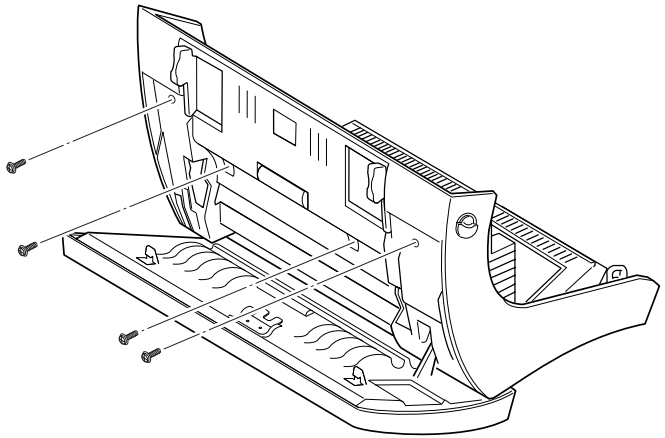
Replacement

1. Reinstall the components in the reverse order.

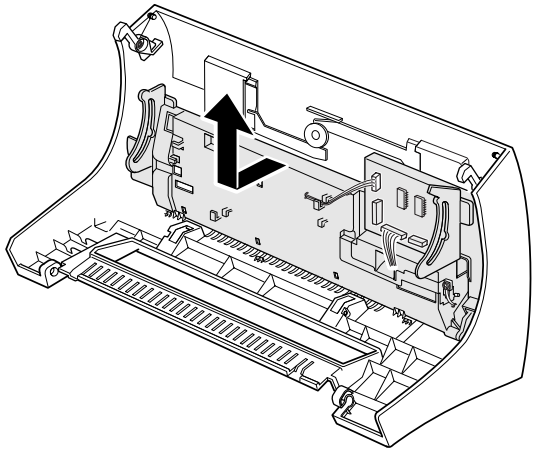
REP 4.8 Rollers (ADF, Drive Roller, Exit Roller)

Removal

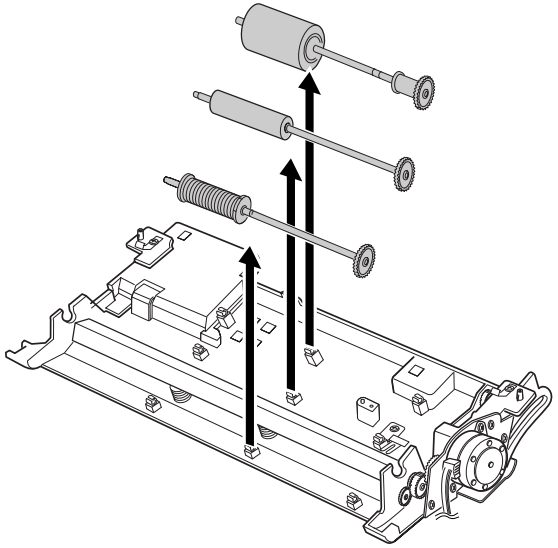
1. Remove the following:
   a. Front Cover (REP 4.11).
   b. OPE Cover (REP 4.3).
   c. White Roller (REP 4.2).
2. Open the control panel, then remove four screws.



3. Lift the scan lower frame up.



4. Remove three rollers. Use extreme caution when you remove rollers to prevent the gears on the right end of the rollers from being damaged.



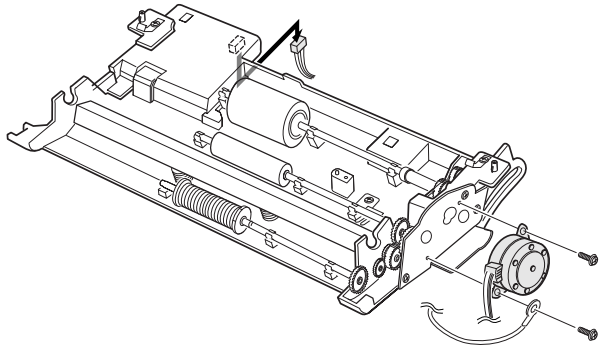
Replacement

1. Reinstall the components in the reverse order.

REP 4.9 Scan Motor

Removal

1. Remove the Scan Lower Frame using the instructions for Rollers (REP 4.8).
2. Remove two screws securing the motor, unplug the motor connector from the scan PBA, then remove the motor.



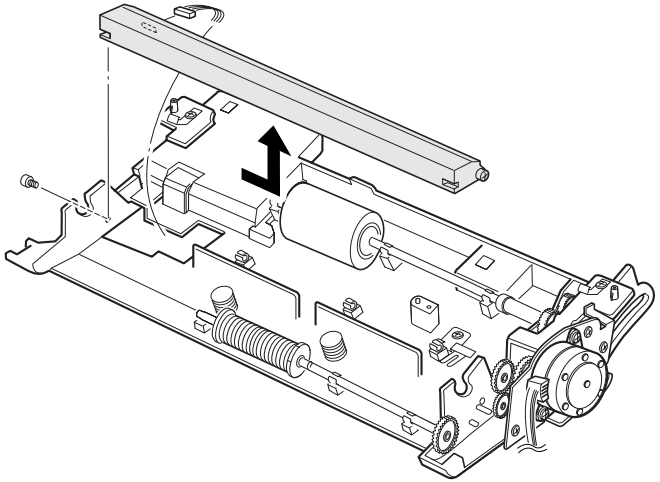
Replacement

1. Reinstall the components in the reverse order.

REP 4.10 CIS

Removal

1. Remove the CIS using the instructions for Rollers (REP 4.8).
2. Remove one screw, unplug one connector, then remove the CIS.



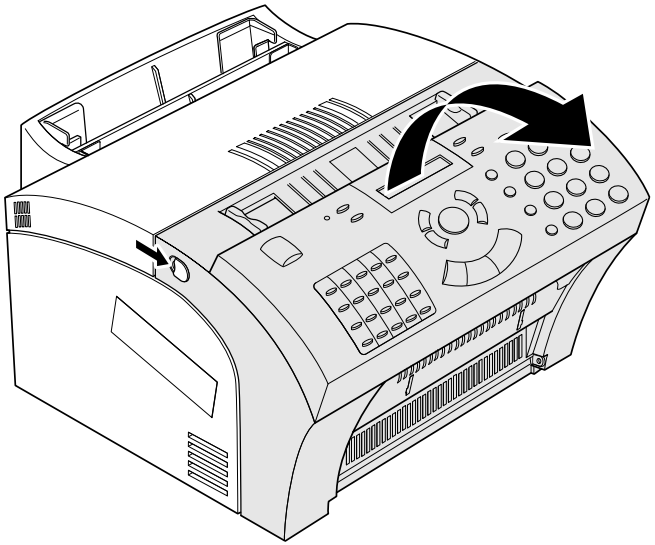
Replacement

1. Reinstall the components in the reverse order.

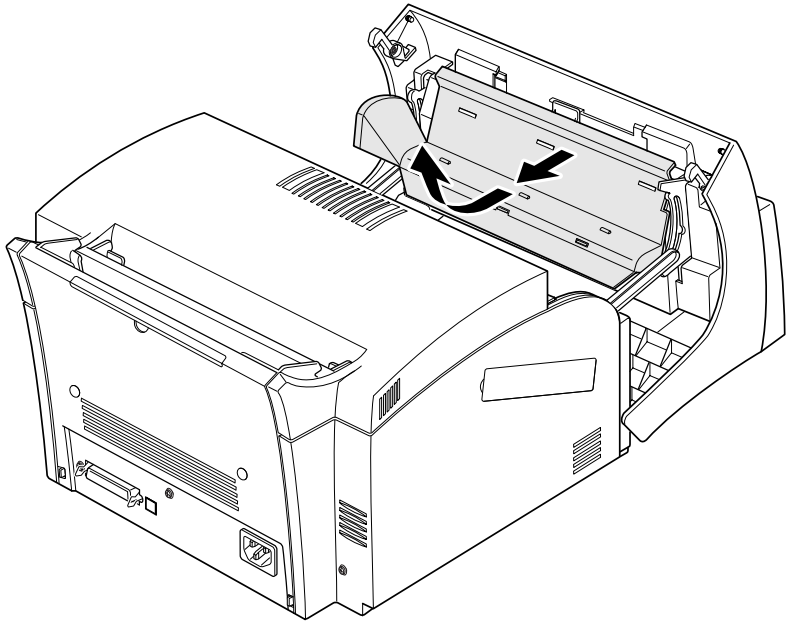
REP 4.11 Front Cover

Removal

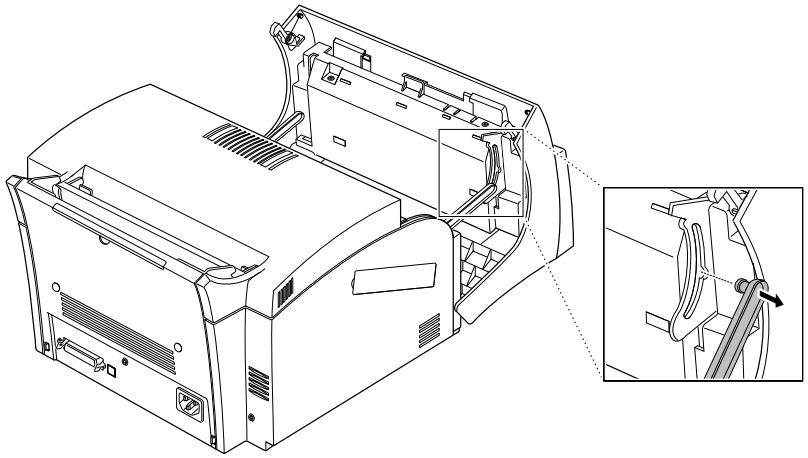
1. Remove Document Exit Tray.
2. Remove Printer Exit Tray.
3. Pull the cover release button on both sides of the machine, and open the front cover.



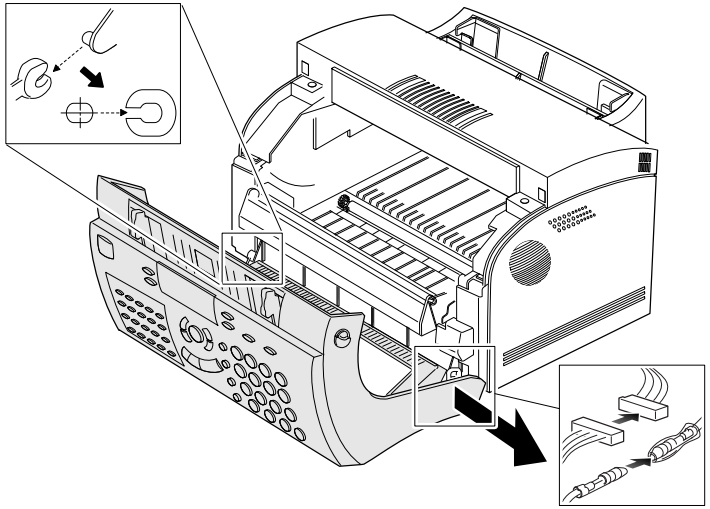
4. Remove the duct cover.



5. Remove the cover stopper securing the OPE unit. To remove the stopper, slide it until it reaches slot at the center, then take it out.



6. Wide open the cover. Pull the bottom left end of the cover toward you to unlatch the OPE cover, and take it out.



7. Disconnect the ground wire and connector.

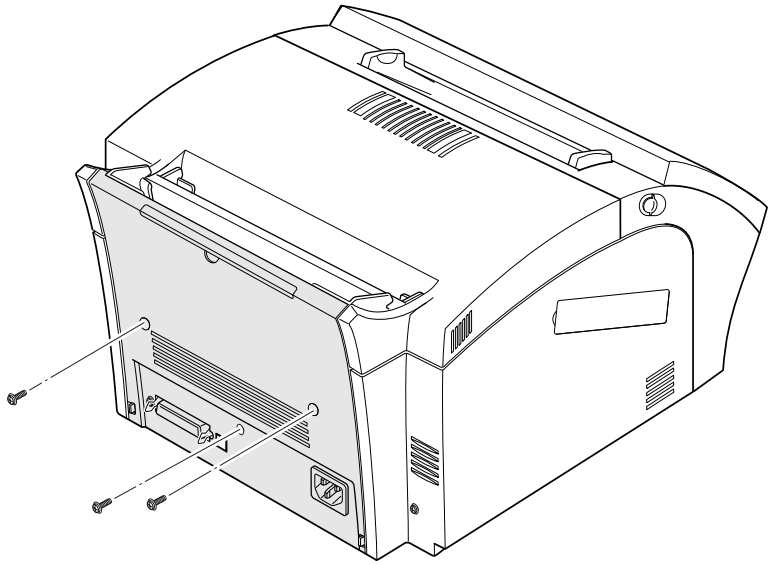
Replacement

1. Reinstall the components in the reverse order.

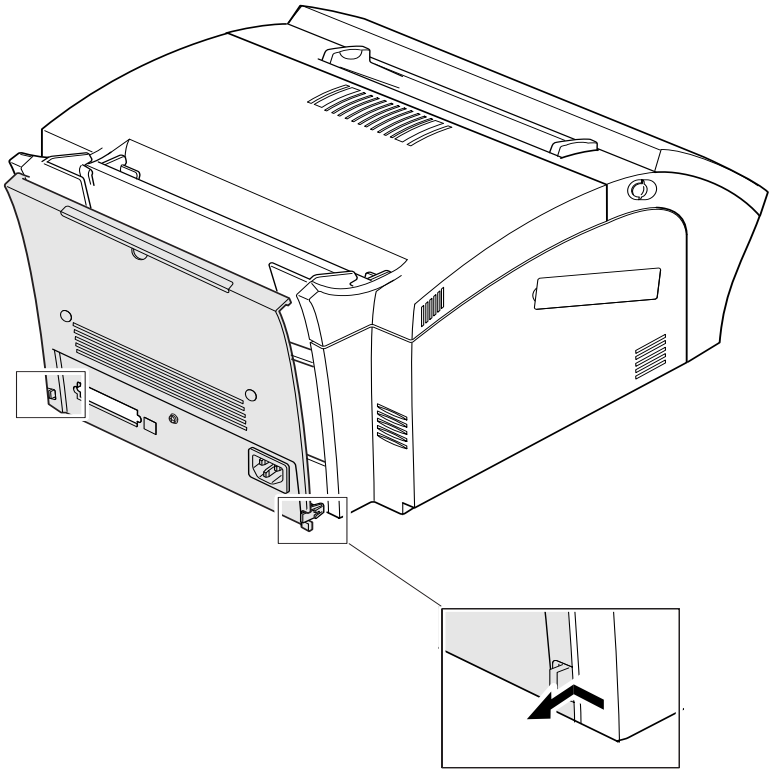
REP 4.12 Rear Cover

Removal

1. Remove three screws.



2. Unlatch the bottom ends, then remove the rear cover.



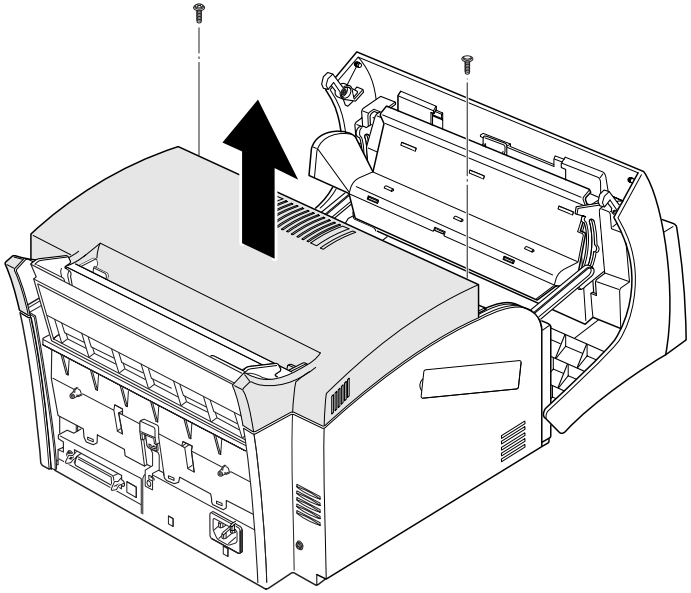
Replacement

1. Reinstall the components in the reverse order.

REP 4.13 Top Cover

Removal

1. Remove the following:
   a. Rear Cover (REP 4.12).
2. Pull the cover release button on both sides of the machine, and open the front cover.
3. Remove two screws.



4. Remove the top cover.

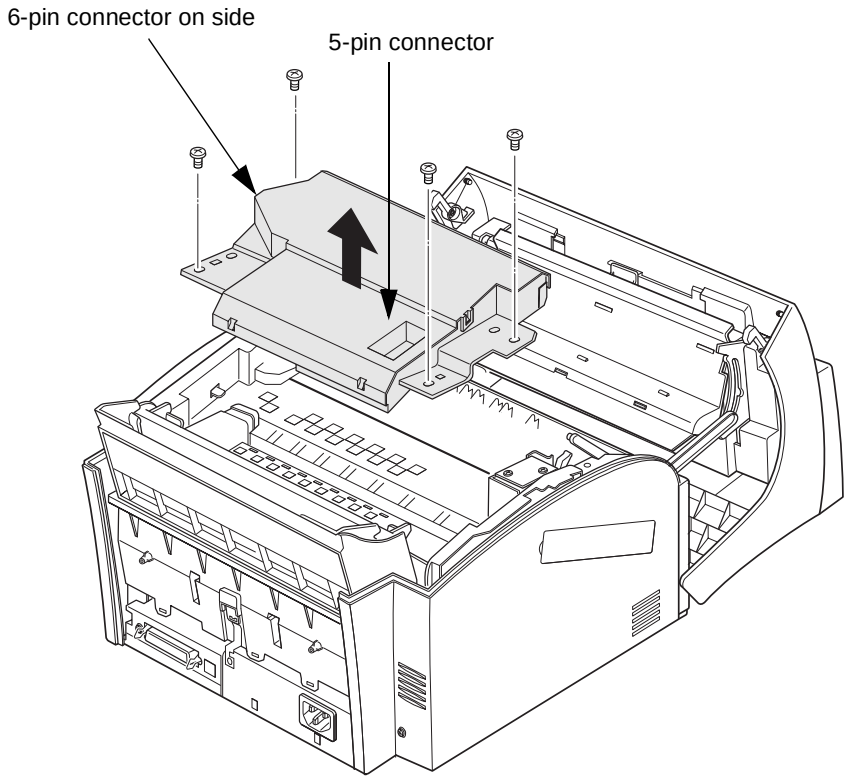
Replacement

1. Reinstall the components in the reverse order.

REP 4.14 LSU

Removal

1. Remove the following:
   a. Top Cover (REP 4.13).
2. Remove four screws, unplug 2 connectors from the LSU, then remove the LSU.



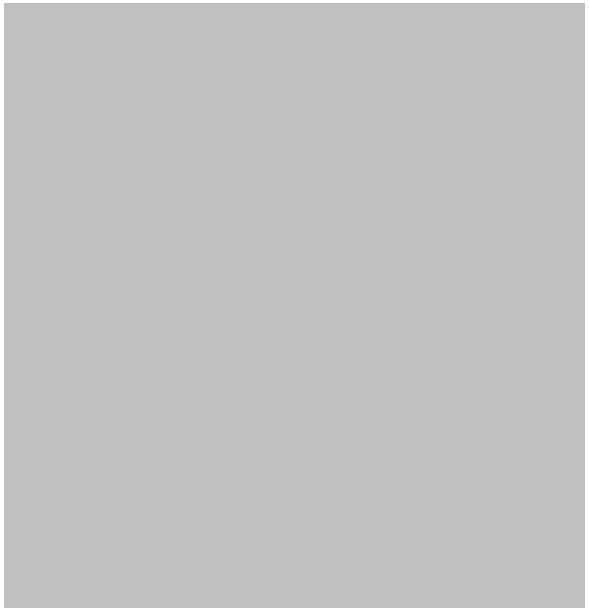
Replacement

1. Reinstall the components in the reverse order.

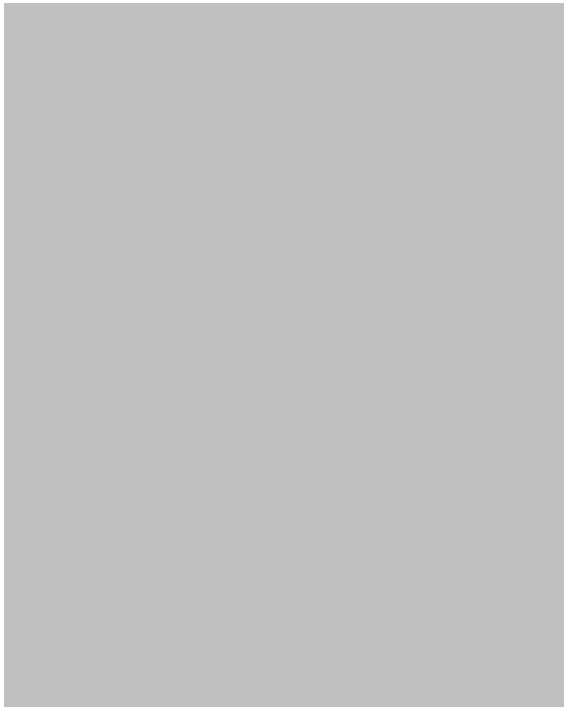
REP 4.15 Side Covers

Removal

1. Remove the following:
   a. Front Cover (REP 4.11).
   b. Top Cover (REP 4.13).
   c. Handset & Cradle (REP 4.1), if attached.
2. Remove two screws.



3. Spread the rear bottom to unlatch the rear side, then pull the covers in the direction of the arrow.



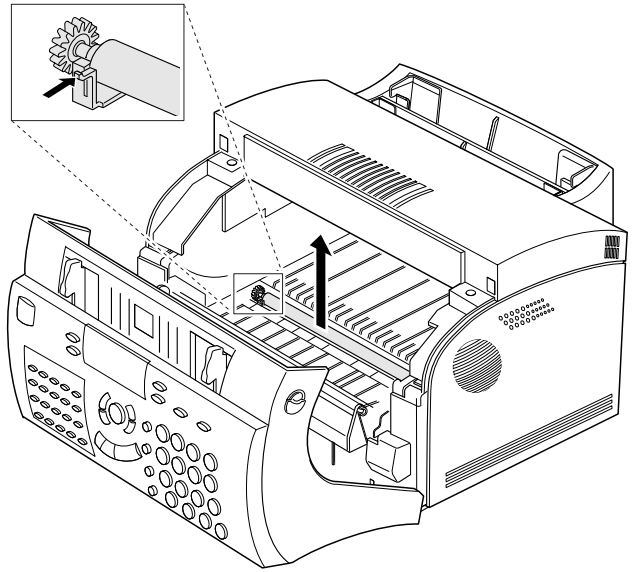
Replacement

1. Reinstall the components in the reverse order.

REP 4.16 Transfer Roller

Removal

1. Remove Laser Printer Cartridge.
2. Pull the cover release button on both sides of the machine, and open the front cover.
3. Press the latches at both ends of the roller, then remove the roller.



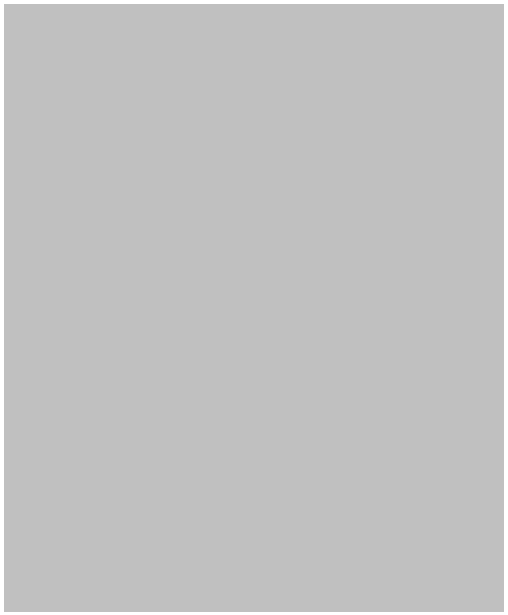
Replacement

1. Reinstall the components in the reverse order.

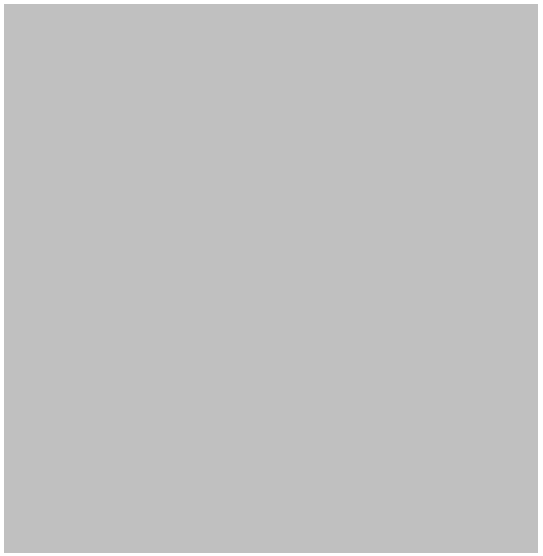
REP 4.17 SMPS/Engine Controller PBA

Removal

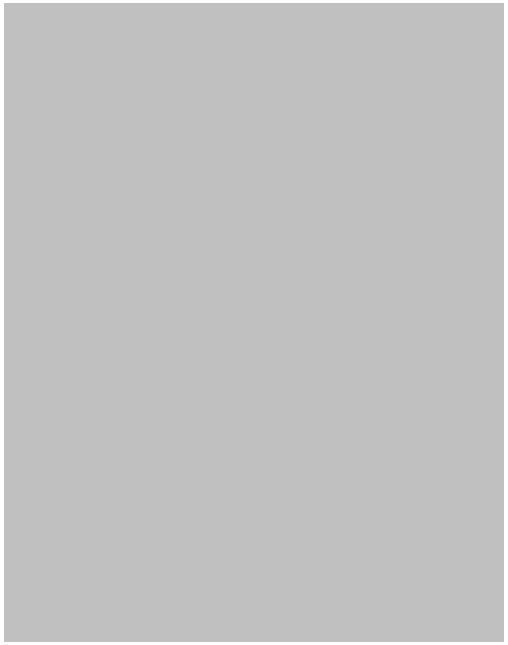
1. Remove the following:
   a. LIU PBA (REP 4.18).
   b. Main PBA (REP 4.19).
2. Turn the machine over
3. Remove three screws securing the shield, then remove the shield.



4. Remove seven screws, and unplug two connectors.



5. Unplug four connectors, then remove the SMPS and the engine PBA.



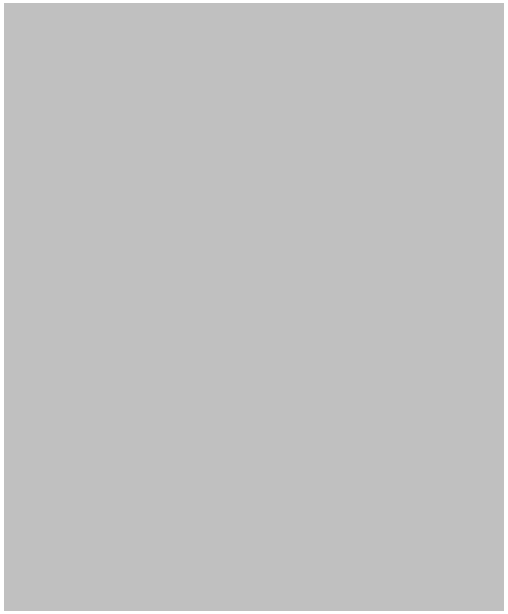
Replacement

1. Reinstall the components in the reverse order.

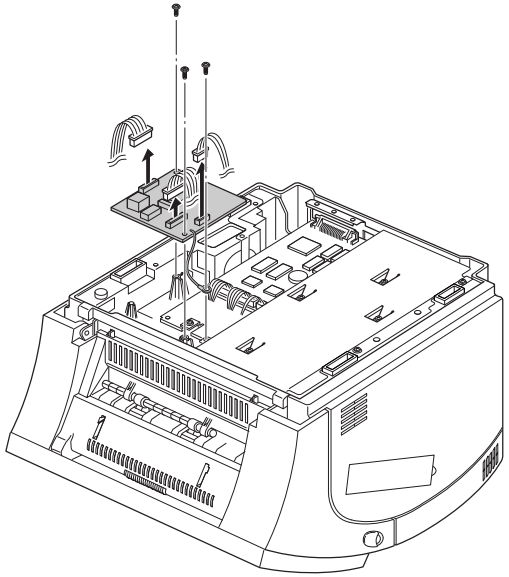
REP 4.18 LIU PBA

Removal

1. Turn the machine over.
2. Remove three screws securing the shield, then remove the shield.



3. Unplug all connectors from the PBA, remove the three screws and the ground wire, then remove the PBA.



Replacement

1. Reinstall the components in the reverse order.

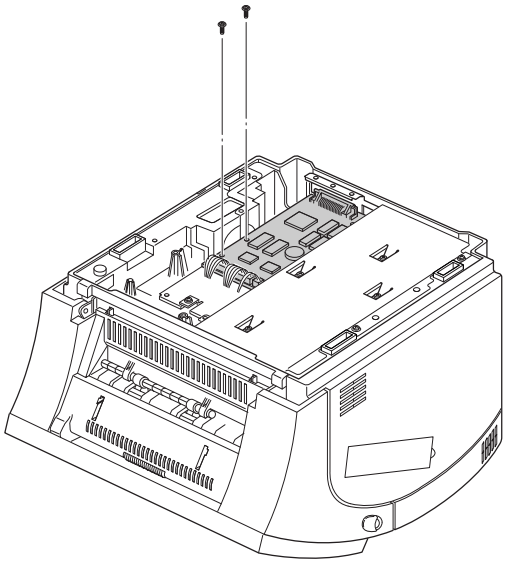
REP 4.19 Main PBA

CAUTION

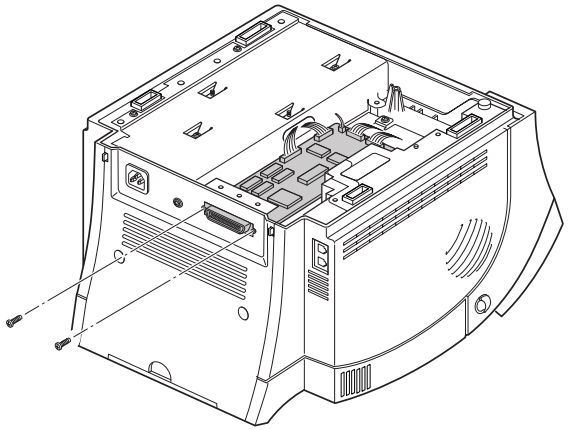
The Main PBA has a lithium battery which is not a spared item. If the Main PBA fails, return the assembly to the Xerox premises for disposal in accordance with local regulations.

Removal

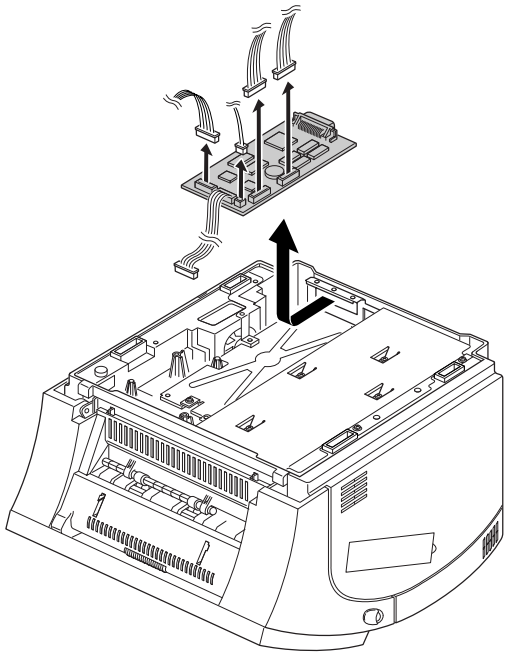
1. Remove the following:
   a. LIU PBA (REP 4.18).
2. Unplug all connectors from the Main PBA.
3. Remove two screws from the PBA.



4. Remove two screws securing the printer connector.



5. Remove the Main PBA.



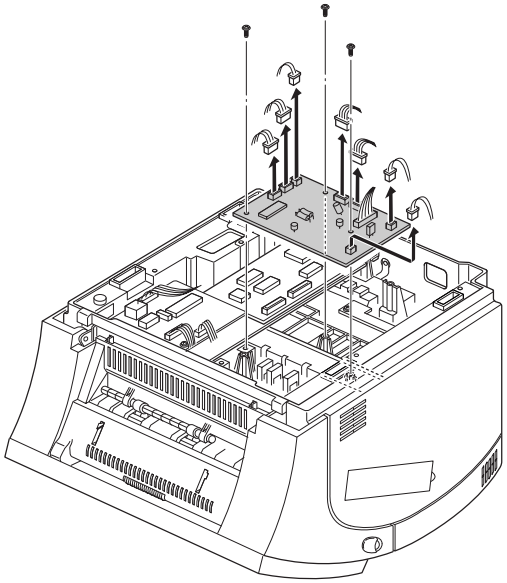
Replacement

1. Reinstall the components in the reverse order.

REP 4.20 Joint PBA

Removal

1. Remove the following:
   a. SMPS (REP 4.17).
2. Unplug all connectors from the PBA, remove three screws, then remove the PBA.



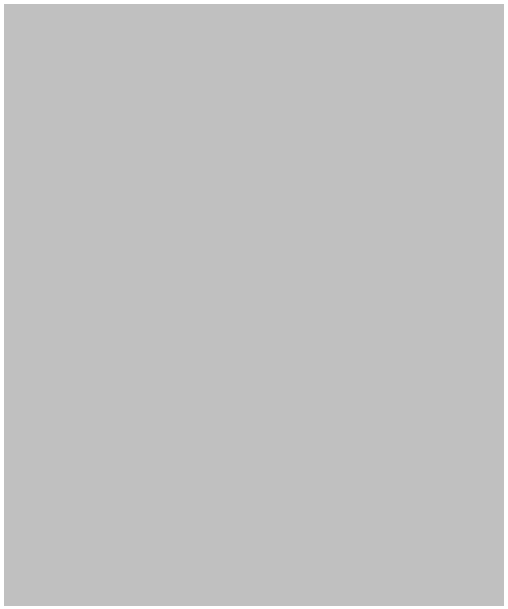
Replacement

1. Reinstall the components in the reverse order.

REP 4.21 Sensor PBA

Removal

1. Remove the following:
   a. SMPS (REP 4.17).
2. Remove two screws, unplug one connector from the Joint PBA, then remove the Sensor PBA.



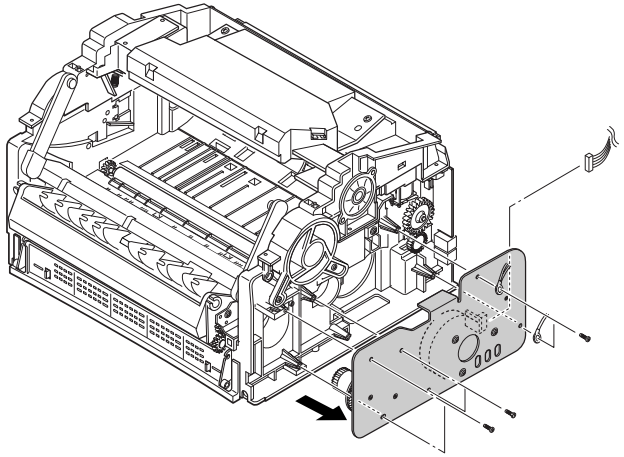
Replacement

1. Reinstall the components in the reverse order.

REP 4.22 Gear Bracket & Motor

Removal

1. Remove the following:
   a. Side Covers (REP 4.15).
2. Remove six screws securing the gear bracket, unplug the connector from the motor, then remove the gear bracket.



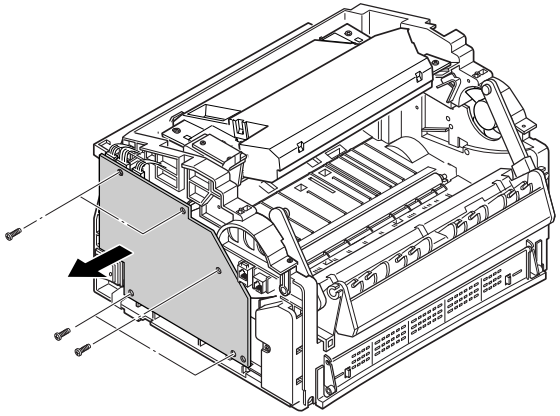
Replacement

1. Reinstall the components in the reverse order.

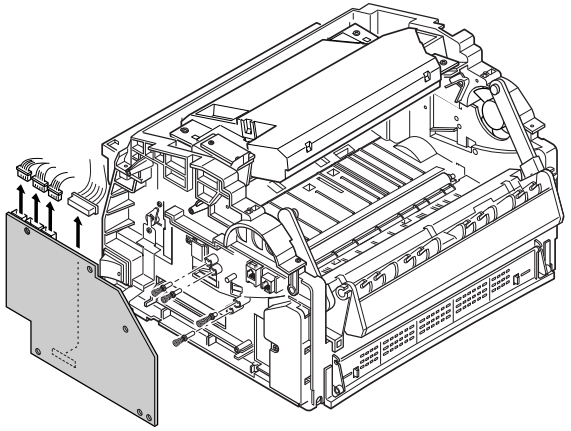
REP 4.23 HVPS PBA

Removal

1. Remove the following:
   a. Side Covers (REP 4.15).
2. Remove five screws from the HVPS PBA.



3. Unplug four connectors from the HVPS PBA, then remove the PBA.



Note: When you reassemble the HVPS PBA, make sure that the high voltage electrodes, contacts, springs and pins are inserted correctly.

Replacement

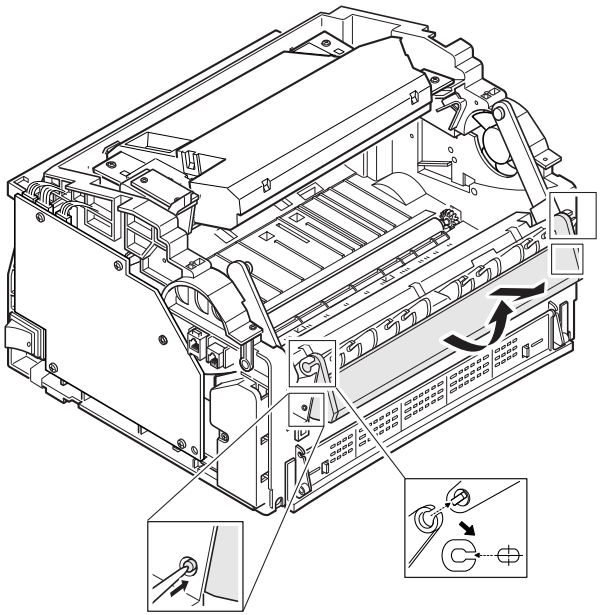
1. Reinstall the components in the reverse order.

REP 4.24 Fuser

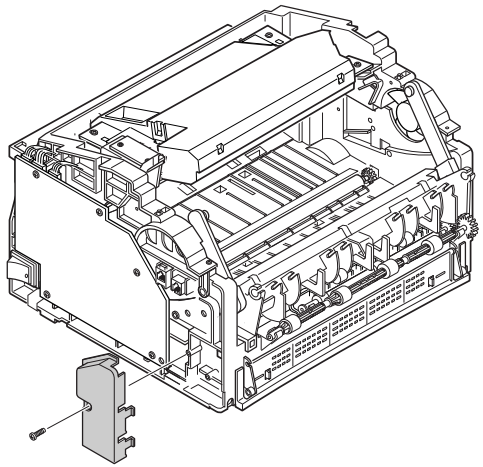
WARNING
Fuser components are hot. Wait until components cool before you begin work.

Removal

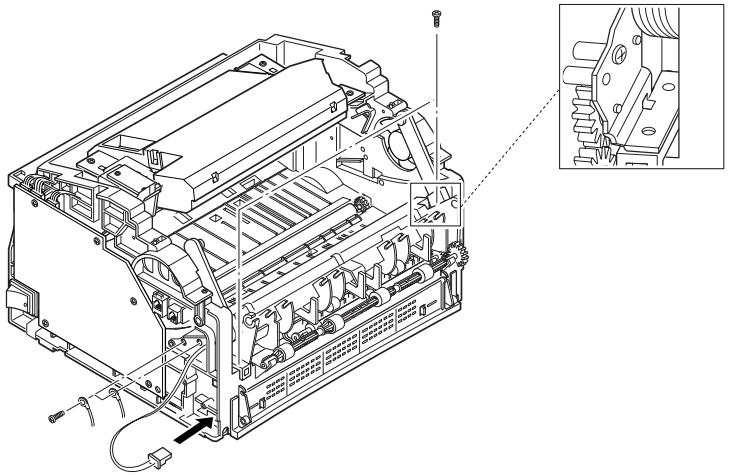
1. Remove the following:
   a. Side Covers (REP 4.15).
2. Remove the exit guide as shown.



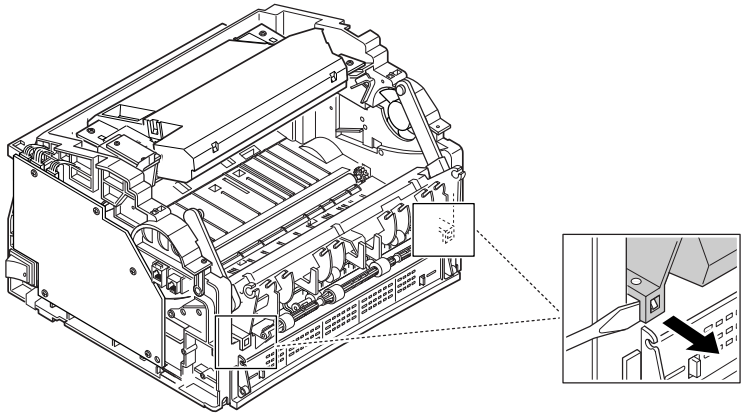
3. Remove the screw at the left side of the frame and unlatch the wire cap, then remove the cap.



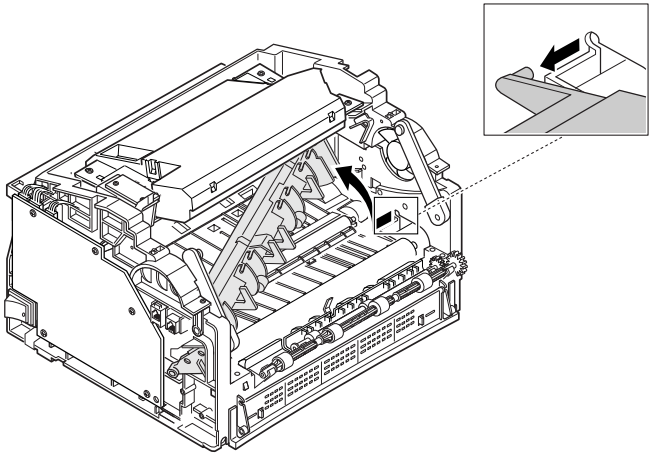
4. Remove four screws.



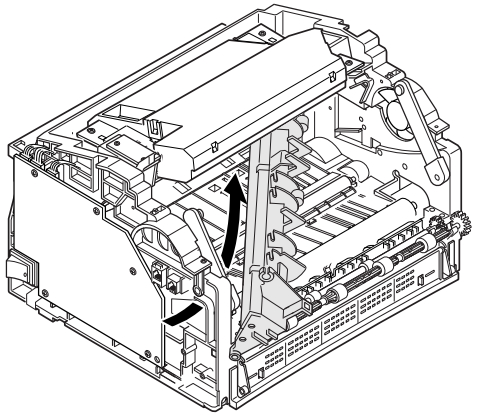
5. Unlatch the fuser using a small flat blade scewdriver.



6. Unlatch the right end, then push the right end slightly inward. A flat blade screwdriver may be needed to release the pin on the right end.



7. Release the left end, then remove the fuser.



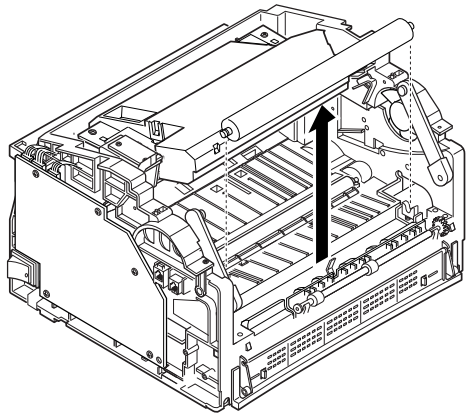
Replacement

1. Reinstall the components in the reverse order.

REP 4.25 Pressure Roller

Removal

1. Remove the following:
   a. Side Covers (REP 4.15).
   b. Fuser (REP 4.24).
2. Remove the roller.



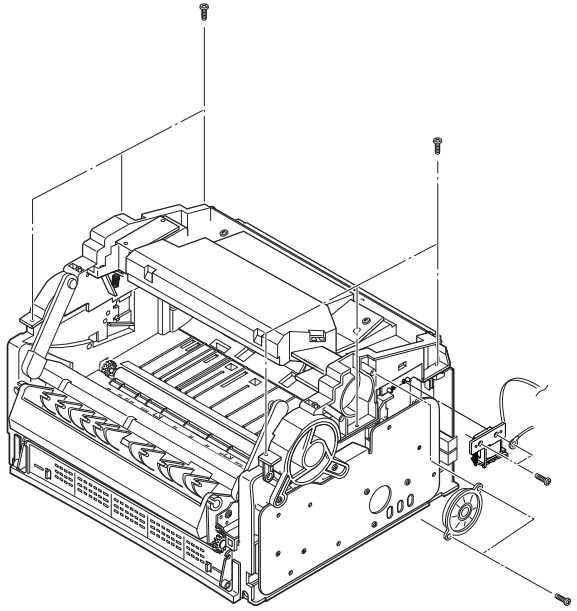
Replacement

1. Reinstall the components in the reverse order.

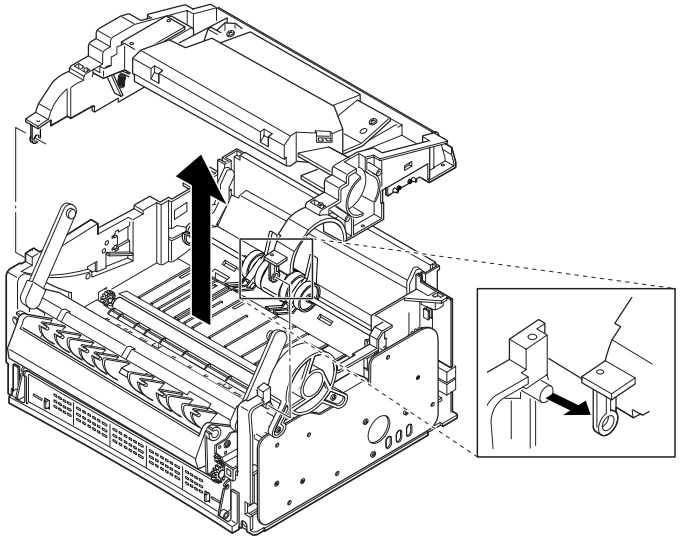
REP 4.26 Upper Frame

Removal

1. Remove the following:
   a. Side Covers (REP 4.15).
   b. HVPS PBA (REP 4.23).
2. Remove ten screws.



3. Unlatch the front end, then lift the upper frame up.



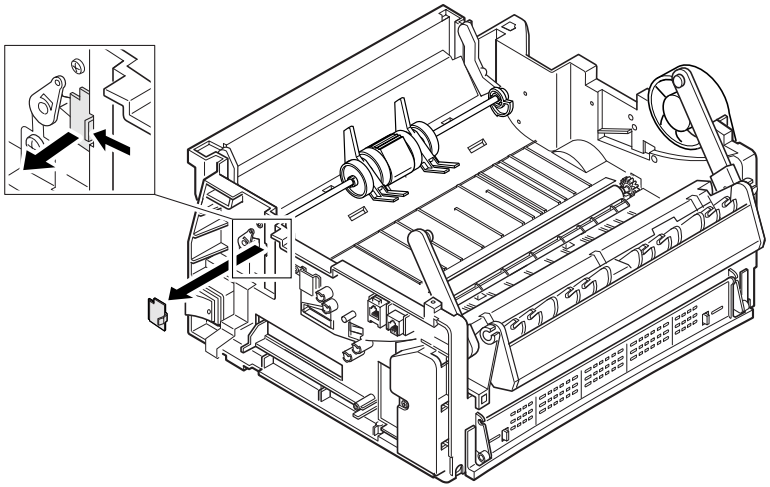
Replacement

1. Reinstall the components in the reverse order.

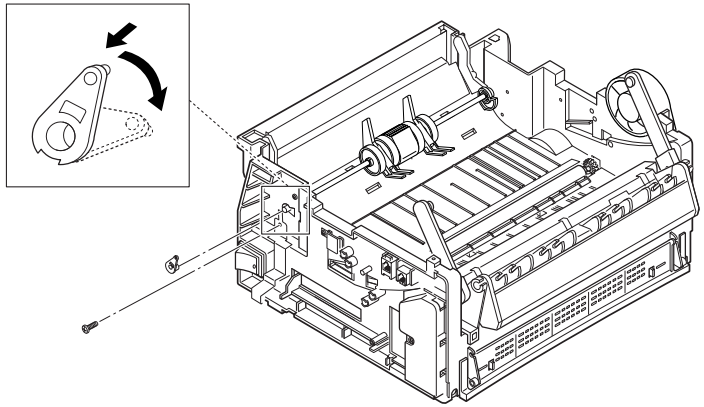
REP 4.27 Pickup Roller

Removal

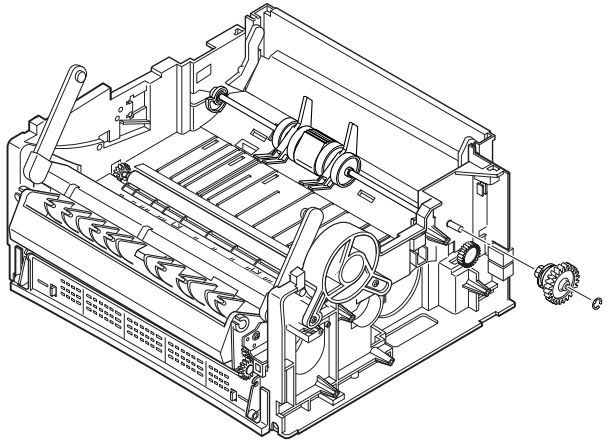
1. Remove the following:
   a. OPE Cover (REP 4.3).
   b. Front Cover (REP 4.11).
   c. Side Covers (REP 4.15).
   d. Gear Bracket (REP 4.22).
   e. HVPS PBA (REP 4.23).
   f. Upper Frame (REP 4.26).
2. Remove clip in front of roller shaft on the left side.



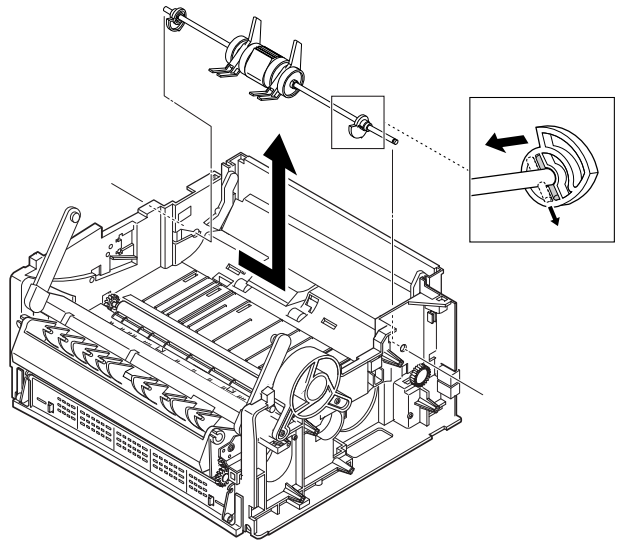
3. Remove one screw, then rotate the pickup bushing at the left end of the roller clock-wise.



4. Remove E-ring at the right end of the roller, then remove the gear clutch.



5. Pull the shaft forward and to the left to view a pin at the right end. Remove the pin passing through the shaft, then pull the roller shaft to the right, and lift it up.



Replacement

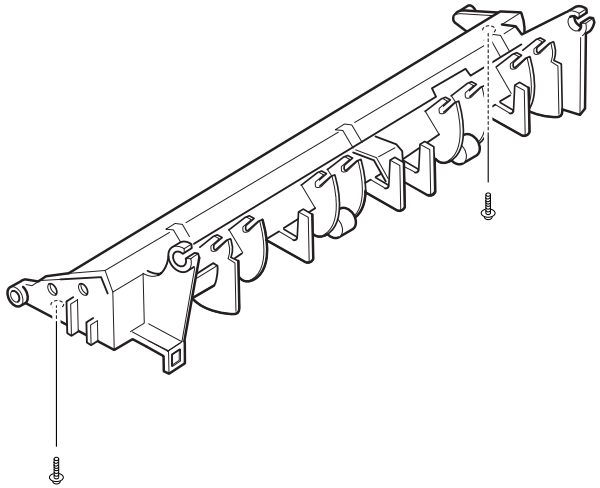
1. Reinstall the components in the reverse order.

REP 4.28 Halogen Lamp

WARNING
Fuser components are hot. Wait until components cool before you begin work.

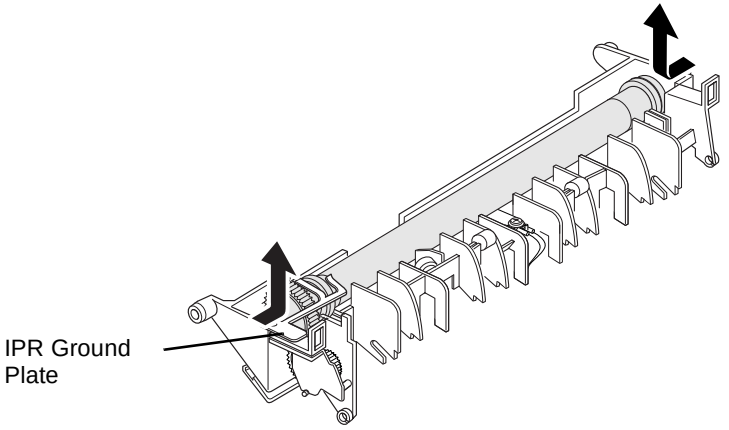
Removal

1. Remove the following:
   a. Fuser Assembly (REP 4.24).
2. Remove two screws from the fuser assembly.



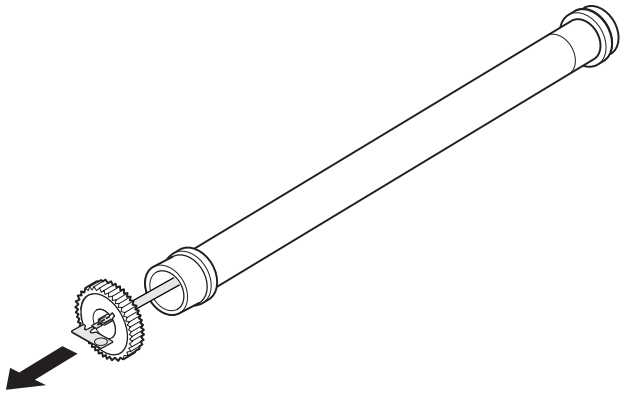
CAUTION
Be careful not to bend the IPR Ground Plate.

3. Unsnap and remove the heat roller from the Fuser Assy.



CAUTION
Do not touch the glass on the lamp. It will shorten the life of the lamp.

4. Remove the halogen lamp from the Heat Roller.



5. To remove the gear from the lamp, the metal terminal on the lamp must be positioned so that it can be extracted from the center hole and slot on the gear.

NOTE: Insure that the IPR Ground Plate is contacting the Fuser Roller after replacement.

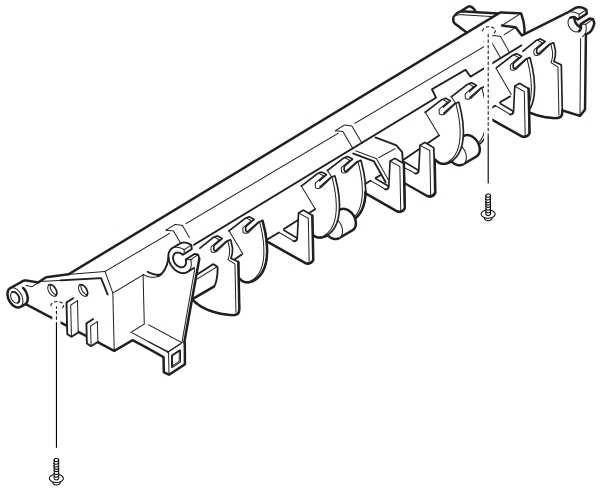
Replacement

1. Reinstall the components in the reverse order.

REP 4.29 Thermistor

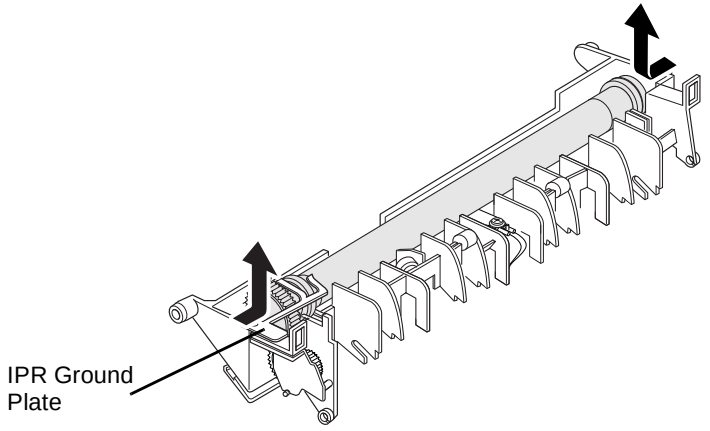
Removal

1. Remove the following:
   a. Fuser Assembly (REP 4.24).
2. Remove two screws from the fuser assembly.

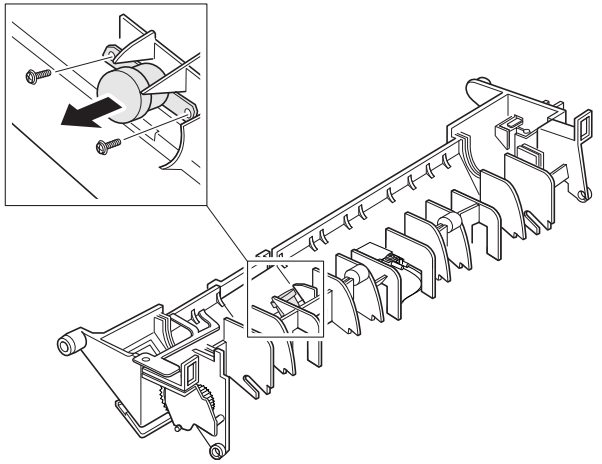


CAUTION
Be careful not to bend the IPR Ground Plate.

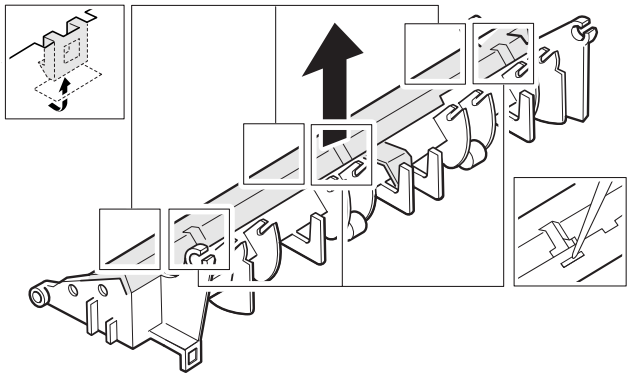
3. Remove the heat roller.



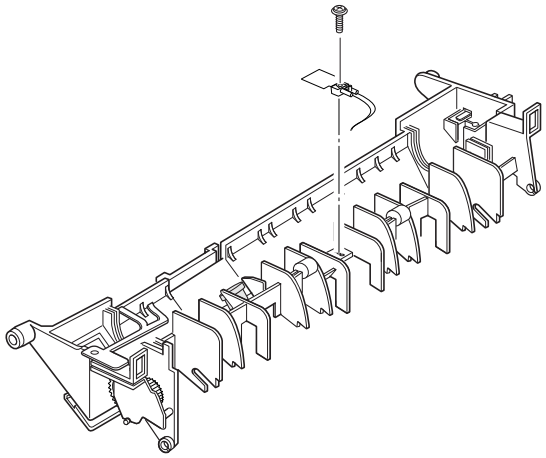
4. Remove two screws, then remove the Thermostat.



5. Unlatch the fuser cover, then take it out.



6. Remove one screw securing the thermistor, then remove the thermistor.



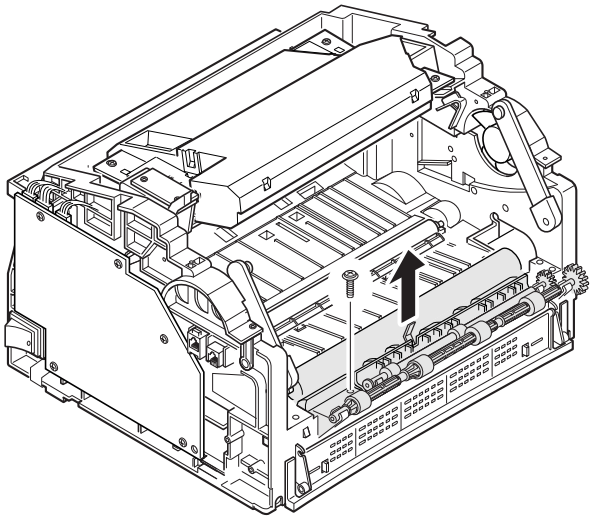
Replacement

1. Reinstall the components in the reverse order.

REP 4.30 Exit-Lower Unit

Removal

1. Remove the following:
   a. Fuser Assembly (REP 4.24).
2. Remove one screw, then remove the exit-lower assembly.



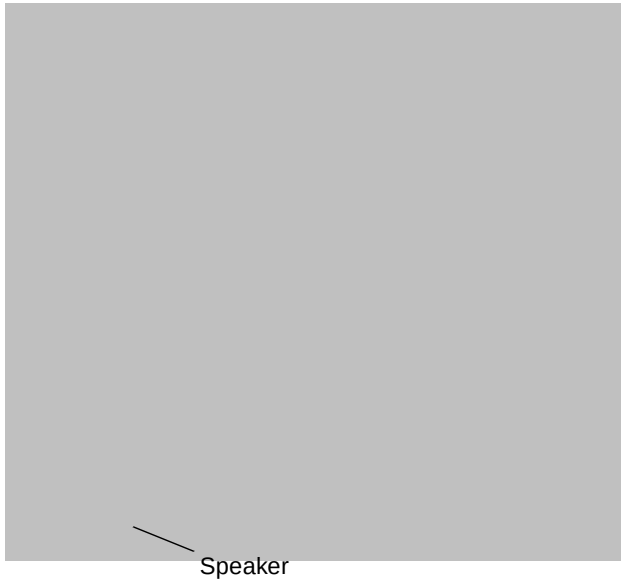
Replacement

1. Reinstall the components in the reverse order.

REP 4.31 Speaker Assembly

Removal

1. Remove the following:
   a. Side Covers (REP 4.15).
   b. LIU PBA (REP 4.18).
2. Unplug the speaker connector from the Main PBA. Remove two screws from the speaker bracket, then remove the speaker.



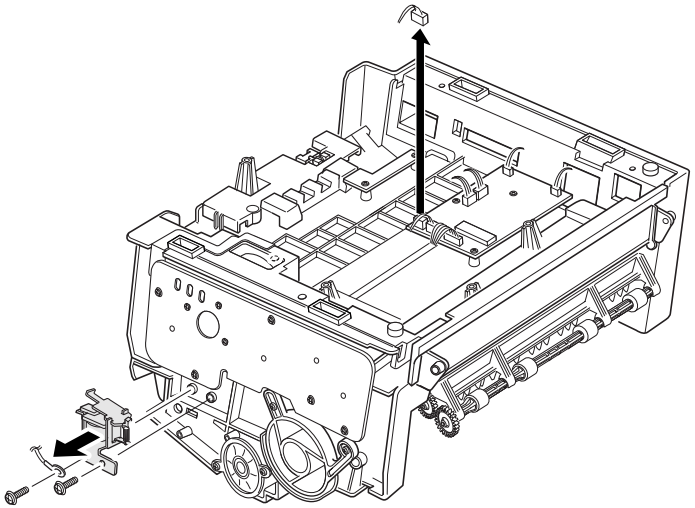
Replacement

1. Reinstall the components in the reverse order.

REP 4.32 Solenoid

Removal

1. Remove the following:
   a. Side Covers (REP 4.15).
   b. SMPS & Engine PBA (REP 4.17).
   c. Main PBA (REP 4.19).
2. Remove two screws securing the solenoid, unplug one connector from the Joint PBA, then remove the solenoid.



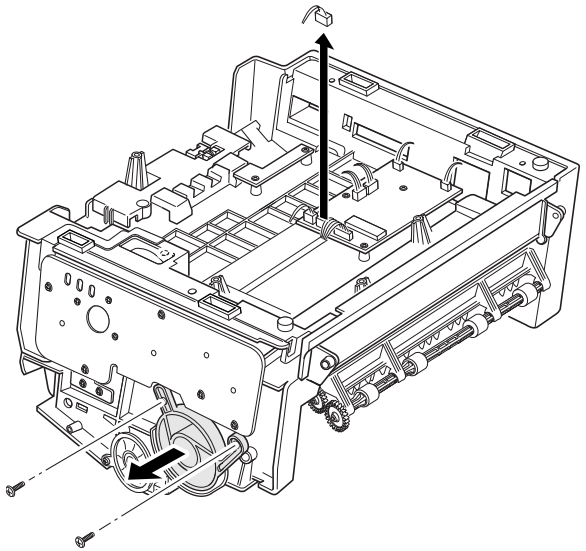
Replacement

1. Reinstall the components in the reverse order.

REP 4.33 Fan Motor

Removal

1. Remove the following:
   a. Side Covers (REP 4.15).
   b. SMPS & Engine PBA (REP 4.17).
   c. Main PBA (REP 4.19).
2. Remove two screws securing the fan, unplug one connector from the Joint PBA, then remove the fan.



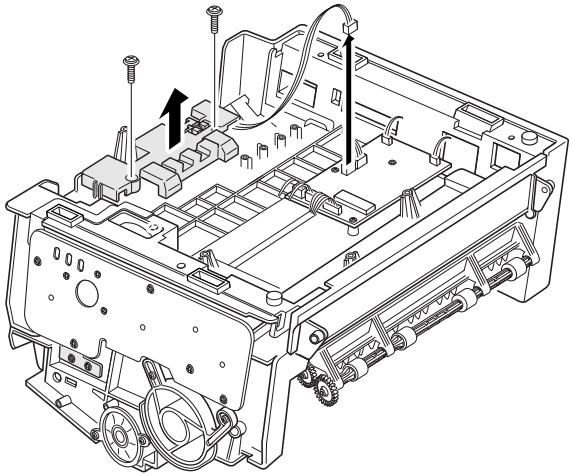
Replacement

1. Reinstall the components in the reverse order.

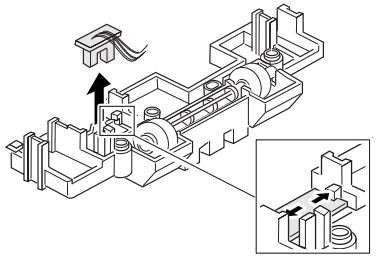
REP 4.34 P-Empty Assembly & Actuator

Removal

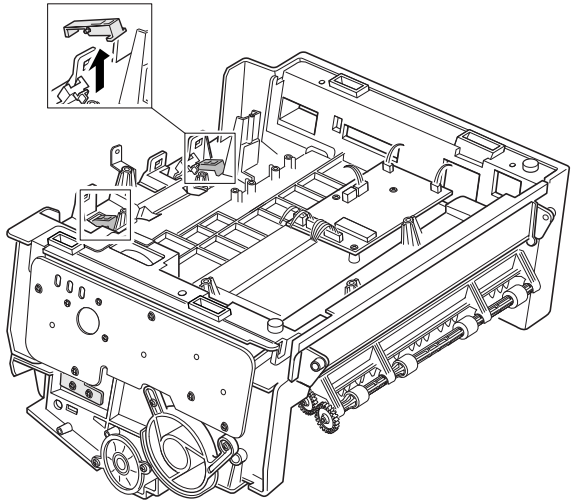
1. Remove the following:
   a. SMPS and Engine PBA (REP 4.17).
   b. Sensor PBA (REP 4.21).
2. **To remove the paper empty assembly:**
   Remove two screws, unplug one connector from the Joint PBA, then remove the frame unit.



Then, unlatch the paper empty assembly, and take it out.



3. **To remove the P-empty actuator:**
   Unlatch the actuator, then take it out.



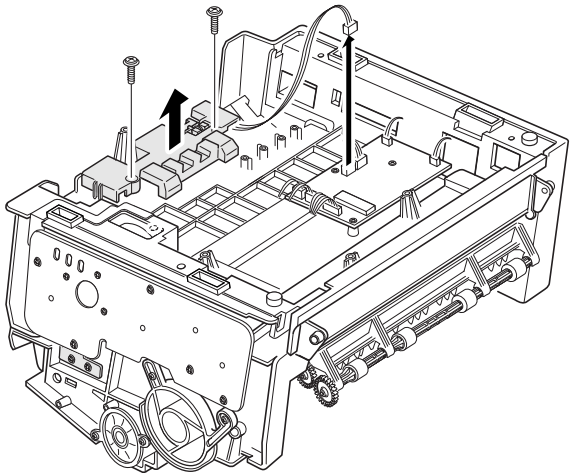
Replacement

1. Reinstall the components in the reverse order.

REP 4.35 Paper Separator

Removal

1. Remove the following:
   a. SMPS and Engine PBA (REP 4.17).
   b. LIU PBA (REP 4.18).
   c. Main PBA (REP 4.19).
   d. Sensor PBA (REP 4.21).
2. Remove two screws, unplug one connector from the Joint PBA, then remove the frame unit.



3. Unlatch the paper separator, then take it out.

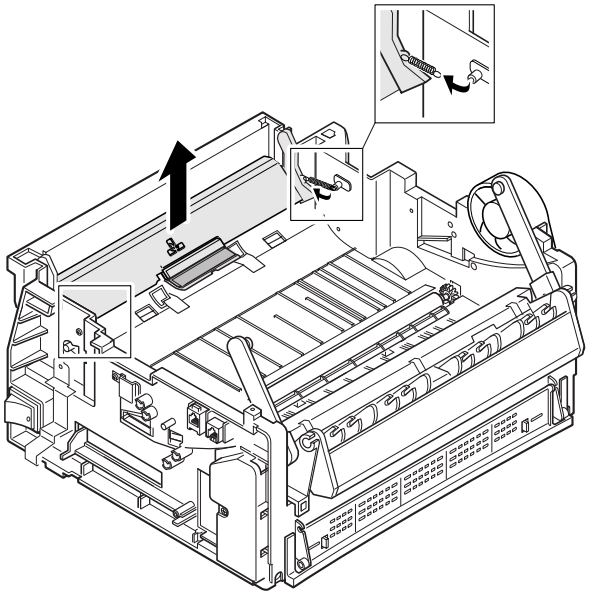
Replacement

1. Reinstall the components in the reverse order.

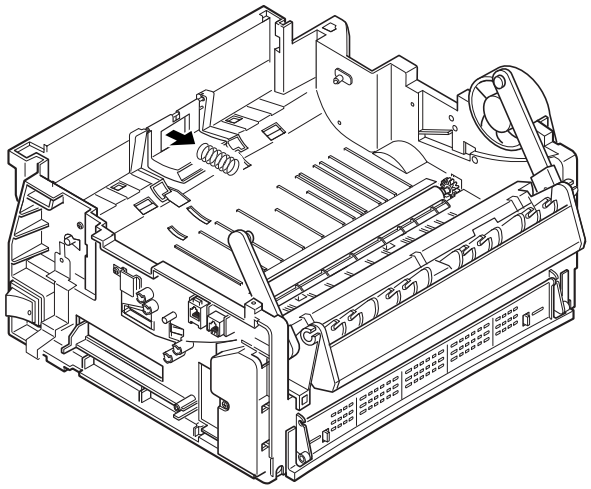
REP 4.36 Knock Up Unit, Spring & Holder, Separate Unit

Removal

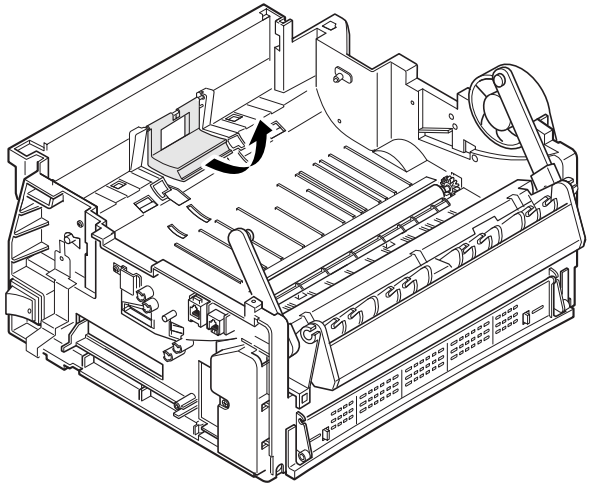
1. Remove the following:
   a. Pickup Roller (REP 4.27).
2. Release the springs at both sides of the unit, then remove the Knock Up Unit.



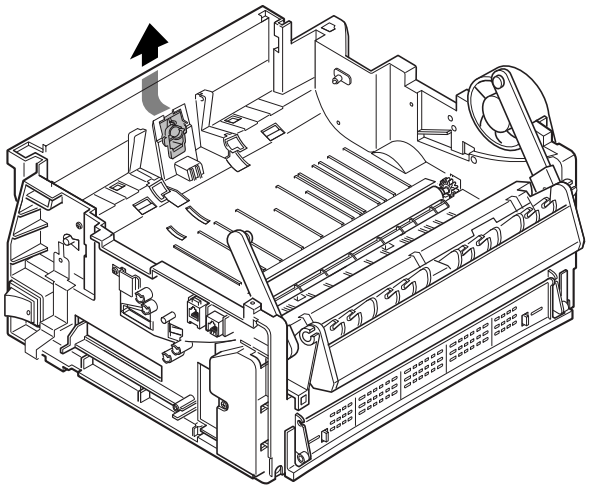
3. Remove the Knock Up Spring.



4. Remove the Spring Holder with small spring on rear post.



5. Remove the Separate Unit.



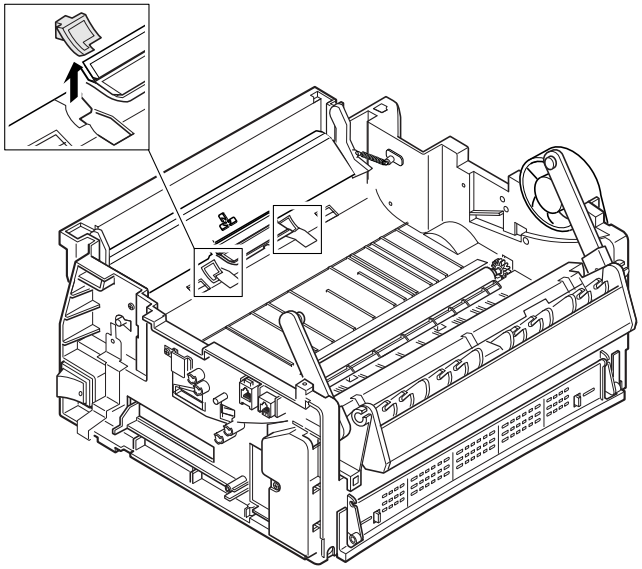
Replacement

1. Reinstall the components in the reverse order.

REP 4.37 Paper Separate Units (Left, Right)

Removal

1. Remove the following:
   a. Knock Up Unit (REP 4.36).
2. Unlatch the separate units, then take them out.



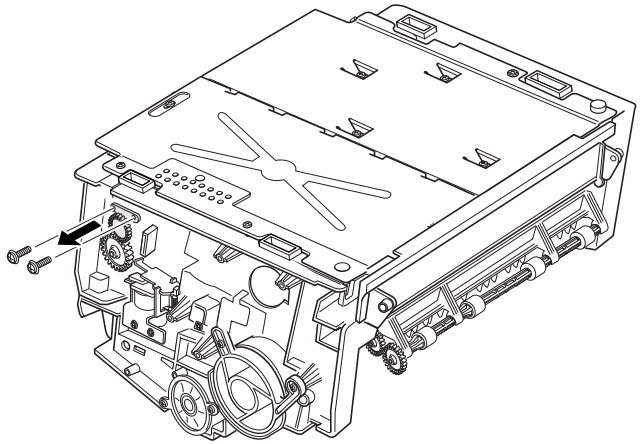
Replacement

1. Reinstall the components in the reverse order.

REP 4.38 Gear Feed

Removal

1. Remove the following:
   a. Gear Bracket (REP 4.22).
2. Remove two screws, then remove the Gear Feed.



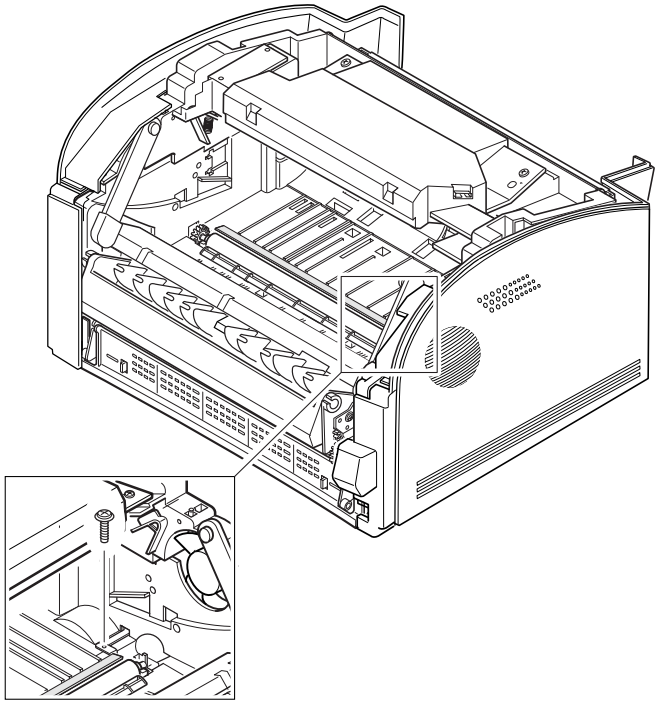
Replacement

1. Reinstall the components in the reverse order.

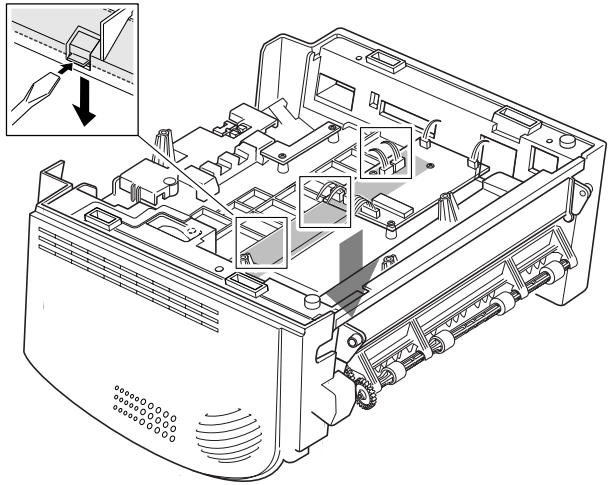
REP 4.39 PTL Unit

Removal

1. Remove the following:
   a. LSU (REP 4.14).
   b. Main PBA (REP 4.19).
   c. Joint PBA (REP 4.20).
   d. EMI IPR Shield (PL 3.1)
2. Remove one screw.



3. Unlatch the three metal tabs on the rear side of the PTL Unit, then take it out.



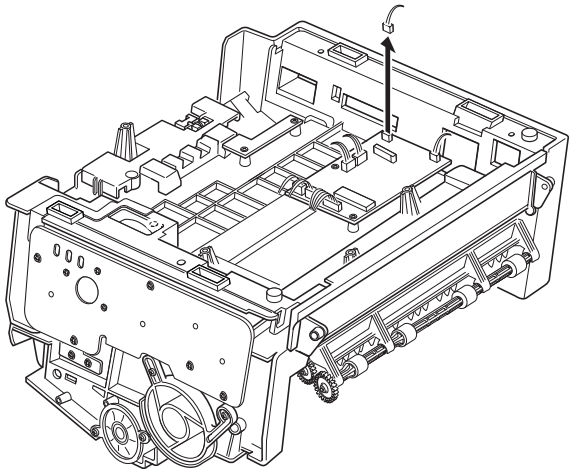
Replacement

1. Reinstall the components in the reverse order.

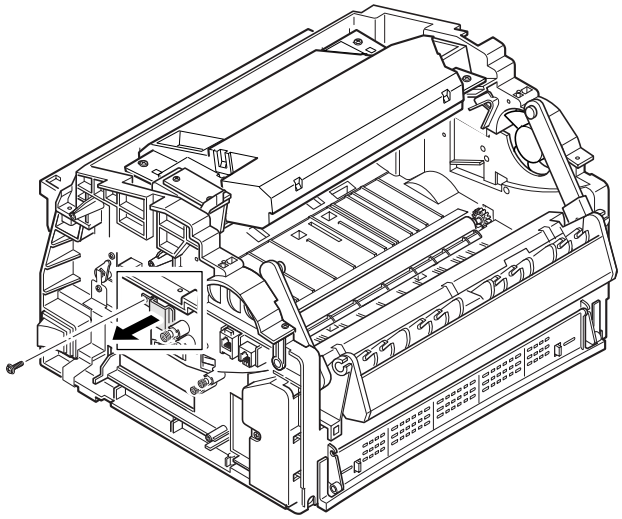
REP 4.40 Fuser Deve

Removal

1. Remove the following:
   a. SMPS/Engine Controller PBA (REP 4.17).
   b. HVPS PBA (REP 4.23).
2. Unplug the connector from the Joint PBA.



3. Remove one screw, then remove the Fuser Deve.



Replacement

1. Reinstall the components in the reverse order.

5 Parts Lists

Section Contents

Introduction

Overview

The Parts Lists section provides exploded view illustrations of all spared subsystem components and a listing of the corresponding part numbers. The illustrations show the relationships between parts.

Organization of this Section

The following elements make up the Parts List section:

Parts Lists (PL)

Each item number in the part numbers listing corresponds to an item number in the illustration. All the parts in a given subsystem of the machine will be located in the same illustration or in a series of associated illustrations. The parts which are not spared are indicated by “- -” in the Part column.

Exploded View Illustrations

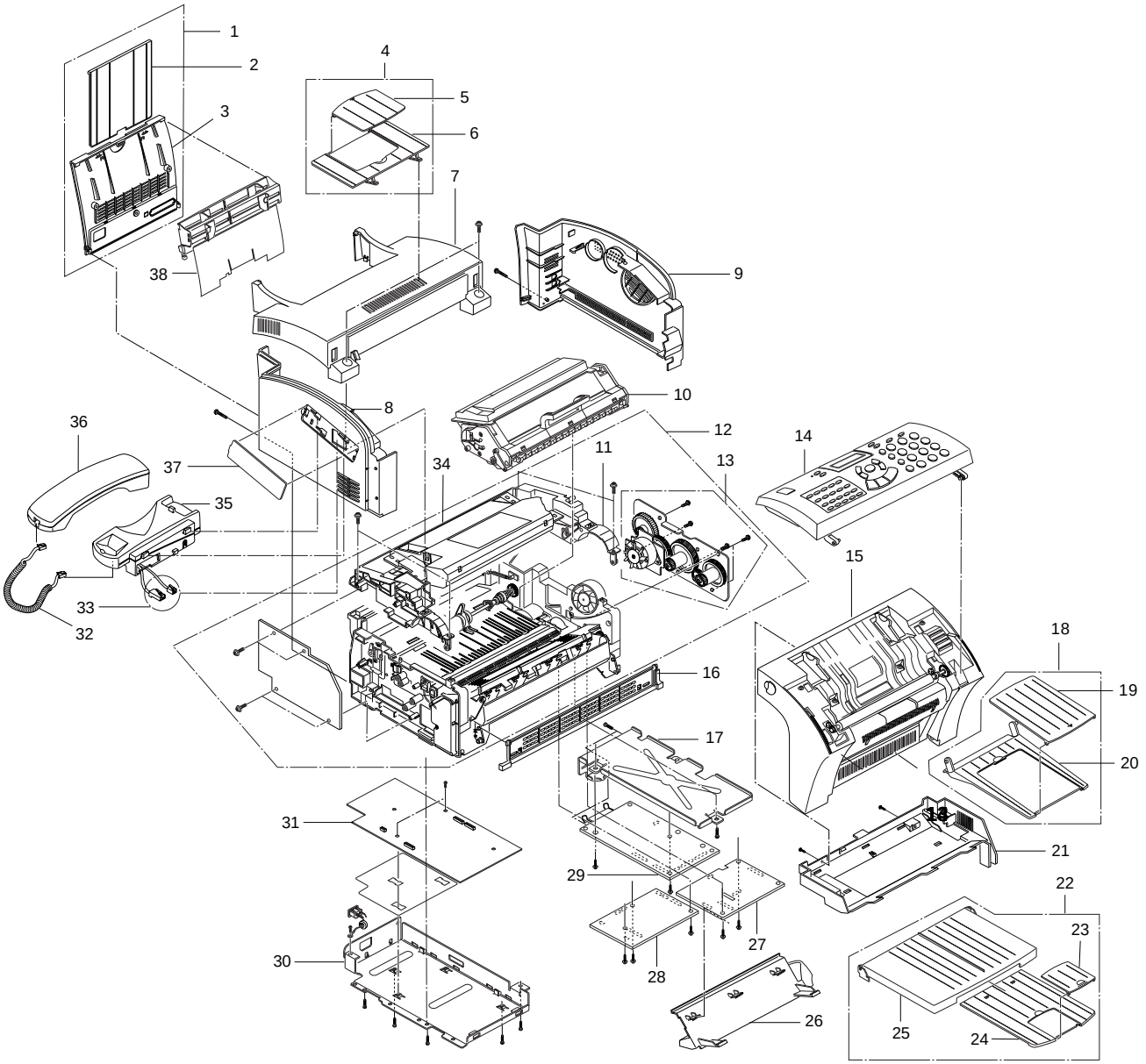
An item that is called out on an illustration has a corresponding listing within this section.

Components are given item numbers that correspond to the part number listings.

Part Number Index

This index lists all the spared parts in the system in numerical order. Each number is followed by a reference to the parts list on which the part may be found.

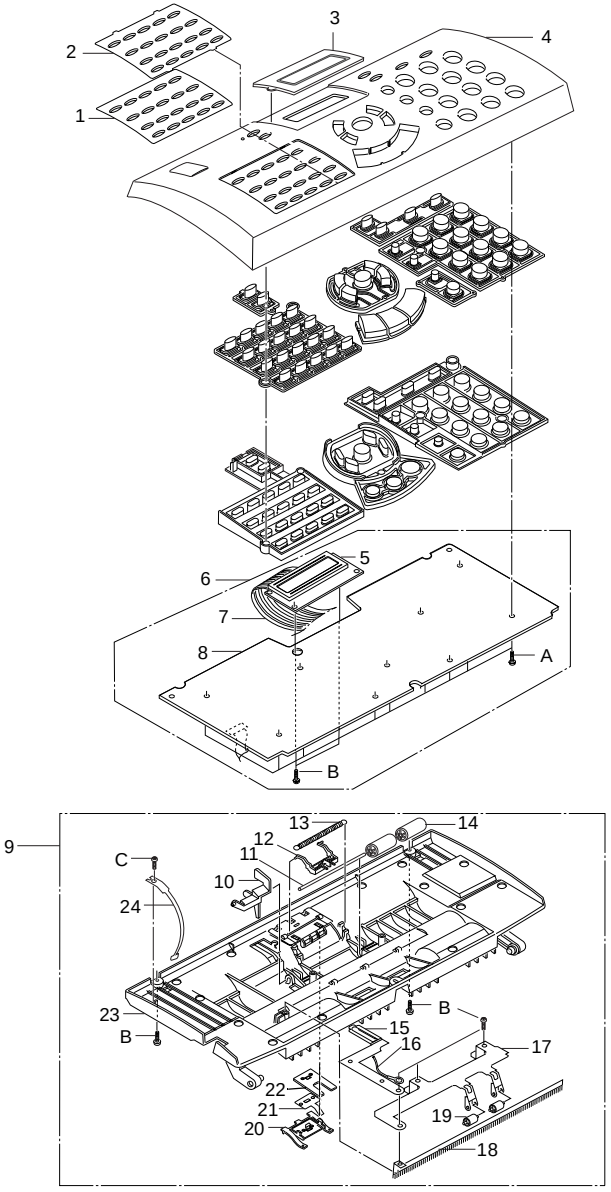
PL 1.1 Main Assembly



PL 1.1 Main Assembly

Item	Part	Description
1.	802E19240	MEA Unit-Rear Cover
2.	---	PMO-Paper Tray
3.	---	PMO-Rear Cover
4.	050K45880	Document Tray
5.	---	PMO- Doc. Tray
6.	---	PMO-Chute
7.	802E17800	PMO-Top Cover
8.	802E17780	PMO-Left Side Cover
9.	802E17790	PMO-Right Side Cover
10.	113R00296	PRA ETC-Developer Assy
11.	001K72470	ELA Unit-Upper Frame
12.	---	ELA HOU-Lower Frame
13.	127K30150	ELA Unit-Motor
14.	101K41130	ELA Hou-OPE Assy (English)
	101K41140	ELA Hou-OPE Assy (XBRA)
	101K41150	ELA Hou-OPE Assy (XLA)
15.	---	ELA HOU-Front Assy
16.	802E17770	PMO-Bottom Cover
17.	---	IPR-Shield EMI
18.	050K45860	Document Exit Tray
19.	---	PMO-Stacker TX (B)
20.	---	PMO-Stacker TX (A)
21.		PMO-Top Cover
22.	050K45870	Printer Exit Tray
23.	---	PMO-Stacker Flip
24.	---	PMO-Stacker RX (B)
25.	---	PMO-Stacker RX (A)
26.	054K18920	MEA Unit-Duct Assy
27.	160K64040	PBA LIU (USA)
	160K64850	PBA LIU (German, Italian, UK)
	160K64860	PBA LIU (XLA, XBRA)
28.	160K64070	PBA Sub-Joint
29.	160K64000	PBA Main
30.	105K18400	SMPS-Orion (110V), AC/DC, 50W
	105K18510	SMPS-Orion (220V), AC/DC, 60W
31.	160K64020	PBA Engine
32.	117K32600	Telephone Coil Cord
33.	162K57770	LIU-Cradle Harness
34.	101K41060	Unit-LSU
35.	062K09350	Telephone Cradle
36.	110K10140	Telephone
37.	802E17820	PMO-Dummy Side
38.	050K45850	MEA Unit Tray
39.	162K06530	Data Cable
40.	117E13660	Power Cord
41.	162K39580	Parallel Cable
42.	108E05430	Fuse 125/T8A
43.	108E05440	Fuse 125/T5A
44.	108E05450	Fuse 250/T5A
45.	108E05470	Fuse 250/T3.15A
46.	300E82870	CDROM
47.	600K72020	Hardware Kit

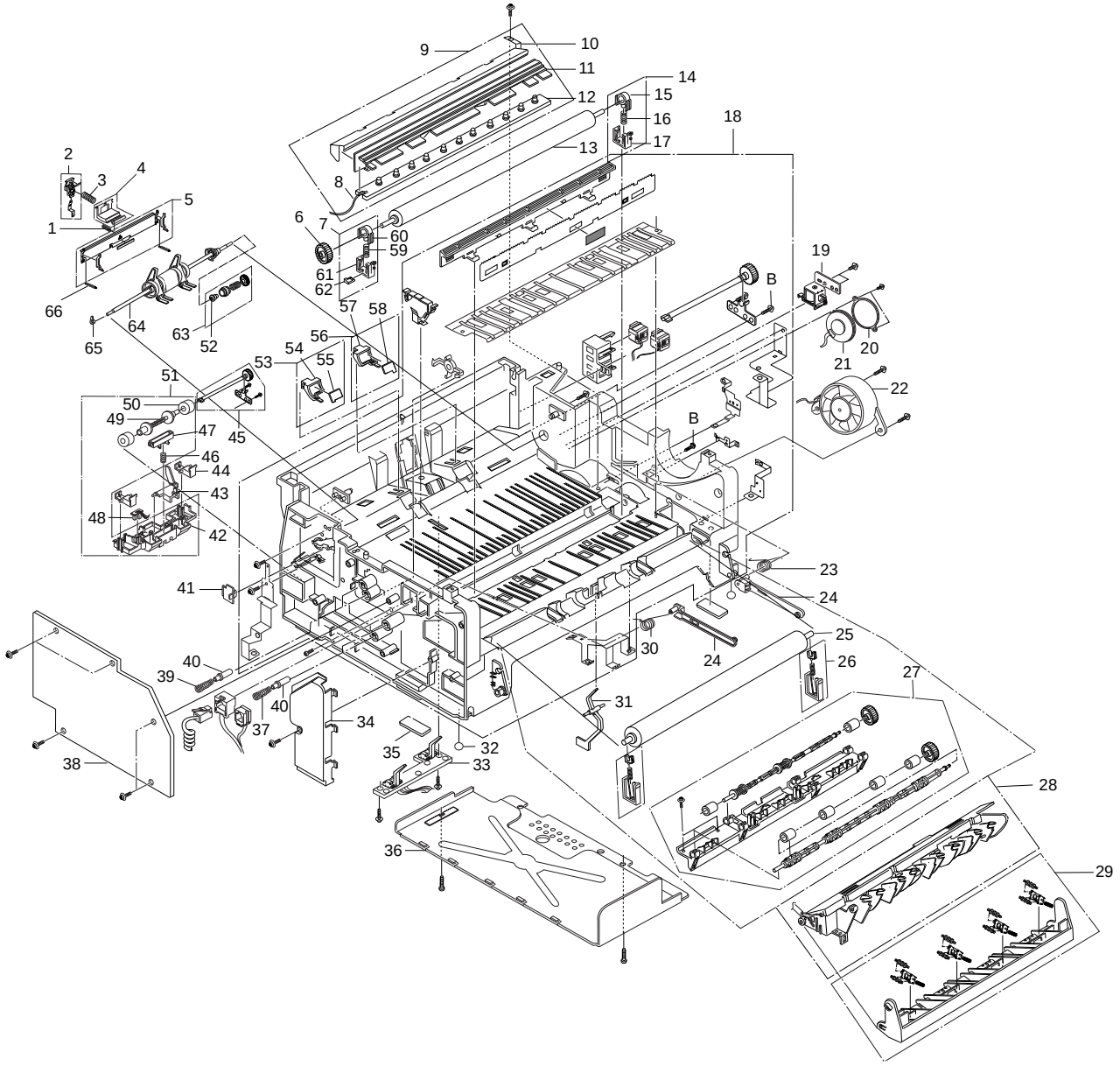
PL 2.1 OPE Unit Assembly



PL 2.1 OPE Unit Assembly

Item	Part	Description
1.	891E88990	MPR-Address Paper (English)
	891E89050	MPR-Address Paper (French)
	891E89240	MPR-Address Paper (XBRA)
	891E92090	MPR-Address Paper (XLA)
2.	802E17830	MPR-Address Cover
3.	802E17760	PMO-Window LCD
4.	---	PMO-Cover OPE
5.	---	Display LCD
6.	160K64030	PBA OPE
7.	---	CBF Harness-LCD
8.	---	PCB-Main OPE
9.	101K41230	ELA Hou-Scan Upper
10.	---	PMO-Lever Sensor
11.	---	ICT-Pinch Shaft
12.	---	PMO-Support ADF
13.	---	ICT-Spring Coil
14.	---	PMO-Pinch Roller
15.	---	NPR-Sensor Bracket
16.	---	CBF-Ground Harness
17.	022E23860	MEC-Pinch
18.	---	MEC-Antistatic Brush
19.	---	PMO-Pinch Roller
20.	019E43540	PMO-ADF Holder
21.	019E43930	PPR-ADF Sheet
22.	019E43530	RPR-ADF Rubber
23.	---	PMO-Scan Upper
24.	830E28530	PMO-Tie Stopper
25.	600K72020	Hardware Kit

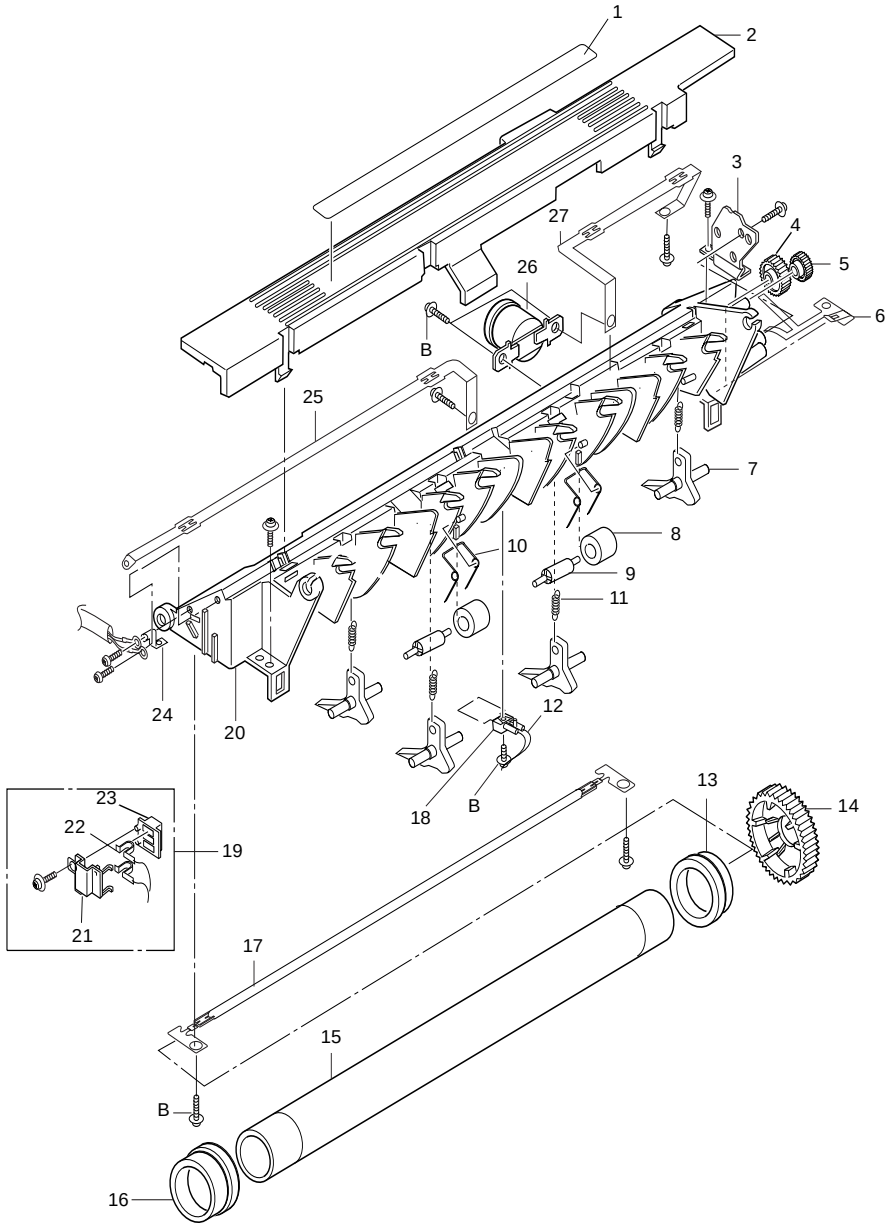
PL 3.1 Frame Lower Assembly



PL 3.1 Frame Lower Assembly

Item	Part	Description
1.	---	Spring-Separate P/Up
2.	019K04770	Holder K/Spring Assy
3.	809E18310	Spring-Knock Up
4.	019K04760	MEA Unit-Separate
5.	015K39950	MEA Unit-Knock Up
6.	007E63150	Gear-Transfer
7.	018K00970	MEA Unit-Holder TR L
8.	---	CBF Harness-2P
9.	038K12830	ELA Unit-PTL
10.	---	IPR-Ground PLT Paper
11.	---	PMO-Cover Quenching
12.	---	LED
13.	022E23250	MEC-Roller Transfer
14.	019K04780	MEA Unit-Holder TR
15.	---	PMO-Bushing TR
16.	---	Spring-TR R
17.	---	PMO-Transfer Holder
18.	015K39960	MEA Unit-Frame Lower
19.	121E15480	Solenoid-Unit
20.	---	IPR-Brkt Speaker
21.	130K64990	ELA Hou-Speaker Assy
22.	127E12600	Fan-DC Fan Motor
23.	809E24900	Spring-Stopper R
24.	802E17610	PMO-Stopper cover
25.	126K12890	MEC-Roller Pressure
26.	009K01910	MEA ETC-Holder P/R
27.	022K68010	MEA Unit-Exit (Lower)
28.	126K12970	ELA Hou-Fuser Assy (220V)
	126K13090	ELA Hou-Fuser Assy (110V)
29.	032K03170	ELA Hou-Exit Assy
30.	809E24890	Spring-Stopper L
31.	120E19130	PMO-Actuator_Exit
32.	---	RMO-Rubber Support
33.	130E09090	Sensor PBA
34.	101E19690	PMO-Cover Wire FU
35.	---	RPR-Rubber Foot
36.	---	IPR-Shield SIMM
37.	---	Spring-HV Large
38.	160K60070	PBA Sub-HVPS
39.	---	Spring-HV Small
40.	---	ICT-Shaft HV Large
41.	---	PMO-Cap Pickup
42.	---	PMO-Support FR/Feed
43.	120E19120	PMO-Actuator Empty
44.	695E58680	PMO-Separate Paper
45.	007E63180	MEA Unit-Gear Feed
46.	---	Spring-Spring Feed
47.	---	PMO-Bearing Shaft, FE
48.	130K64640	Paper Empty Assy
49.	---	PMO-Shaft Idle Feed
50.	---	RPR-Feed Rubber
51.	022K64020	MEA Unit-Frame Sup
52.	---	PMO-Hub Clutch
53.	019K05110	MEA Unit-Separate (L)
54.	---	PMO-Holder Pad, L
55.	---	RPR-Pad Separate PA
56.	019K05120	MEA Unit-Separate (R)
57.	---	PMO-Holder Pad, R
58.	---	RPR-Separate (R)
59.	---	Spring-TR
60.	---	PMO-Bushing TR
61.	---	PMO-Transfer Holder
62.	---	IPR-Plate TR
63.	007K10890	MEA Unit-Clutch
64.	022K68000	MEA Unit Pickup
65.	016E15060	PMO-Bushing Shaft
66.	809E24960	Spring-Extension
67.	600K72020	Hardware Kit

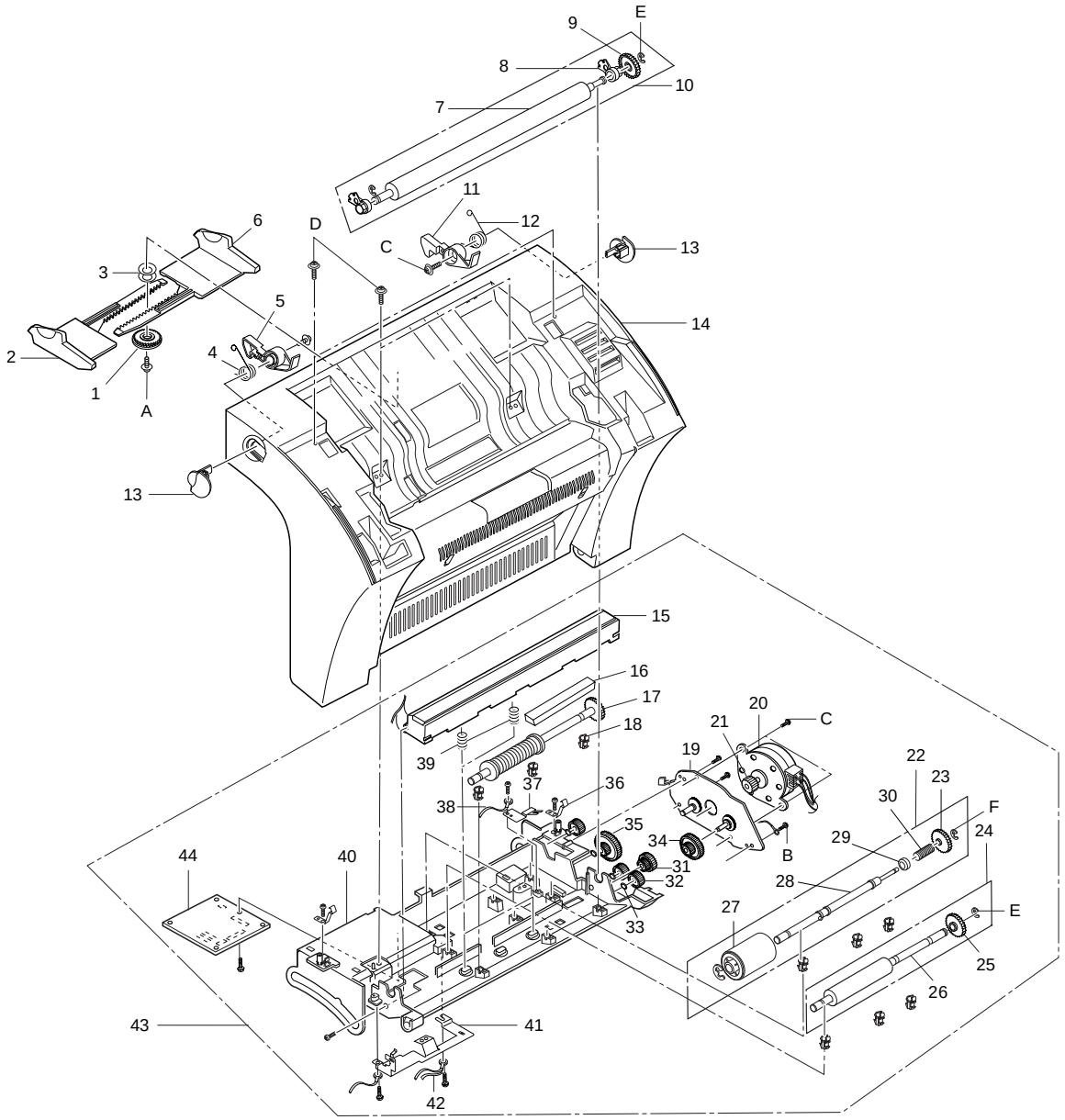
PL 4.1 Fuser Assembly



PL 4.1 Fuser Assembly

Item	Part	Description
1.	---	Label (4)-CAU_Hot_FU
2.	---	PMO-Cover Fuser
3.	---	IPR-Brkt Holder, FU
4.	---	Gear-Idle2 (19)
5.	---	Gear-Idle(14)
6.	---	IPR-Ground Plate
7.	---	PMO-Guide Claw
8.	---	PEX-Roller Exit F_UP
9.	---	IEX-Shaft Idle, F/UP
10.	---	Spring-Exit, F_UP
11.	---	Spring-ES, Guide Claw
12.	---	CBF Harness-3P, 2 Wire
13.	---	Bearing-H/R R
14.	---	Gear-Fuser
15.	---	NEX-Roller Heat
16.	---	Bearing-H/R L
17.	122E02480	Lamp-Halogen, 220V, 400W
	122E02490	Lamp-Halogen, 110V, 400W
18.	130E09100	Thermistor-NTC, 2.11 Kohm, 5%
19.	108K00690	ELA Unit-Fuser Deve
20.	---	PMO-Frame Fuser
21.	---	PMO-Cap Plate FU U
22.	---	IPR-Plate Fuser Deve
23.	---	PMO-Cap Plate FU L
24.	---	NPR-Terminal, Lamp
25.	---	NPR-Electrode L AC
26.	130E09360	Thermostat, 125/250V, 15/7.5A
27.	---	NPR-Electrode_R AC
28.	600K72020	Hardware Kit

PL 5.1 Front Assembly



PL 5.1 Front Assembly

Item	Part	Description
1.	---	Gear-Pinion
2.	---	PMO-Guide Doc (L)
3.	---	IPR-Washer Spring CU
4.	---	Spring-Locker L
5.	---	PMO-Locker L
6.	---	PMO-Guide Doc (R)
7.	---	MEC-Roller CIS
8.	---	PMO-Bushing White
9.	---	PMO-Gear Drive (B4)
10.	022K67980	MEC-White Roller
11.	---	PMO-Locker R
12.	---	Spring-Locker R
13.	003E51190	PMO-Open button
14.	802E17810	PMO-Cover Front
15.	109K01230	Contact Image Sensor (CIS)
16.	---	PPR-Sheet CIS
17.	---	PMO-Shaft Exit
18.	115E06360	PMO-Bushing TX (B4)
19.	---	IPR-Brkt Motor
20.	127K30780	Motor-Step, 75 Deg, 24V
21.	---	Gear-Pinion
22.	022K67990	MEA ETC-ADF Roller
23.	---	PMO-Gear ADF
24.	---	MEC-Drive Roller 6000
25.	---	PMO-Gear Drive (B4)
26.	022E23880	MEC-Roller Drive 6000
27.	---	MEC-Roller ADF
28.	---	ICT-Shaft ADF
29.	---	PMO-Bushing
30.	---	ICT-Spring Clutch
31.	---	Gear-Idle 3315
32.	---	Gear-Spur
33.	---	Washer-Plain, M4, ID4.1, OD7.0
34.	---	PMO-Gear Trans (B4)
35.	---	Gear-Idle 4920
36.	---	Locker-TX
37.	---	IPR-Ground Drive
38.	---	CBF Harness, CIS-Scan
39.	---	Spring-CIS (Canon)
40.	---	PMO-Scan Lower
41.	---	NPR-Ground-CIS
42.	---	CBF Harness-FG, Scan-FG
43.	101K41160	ELA Hou-Scan Lower
44.	160K64010	PBA Main-Scan
45.	600K72020	Hardware Kit

Part NO. Index

Part Number	PL	Part Number	PL	Part Number	PL	Part Number	PL
001K72470	1.1	054K18920	1.1	127K30780	5.1	802E17820	1.1
003E51190	5.1	062K09350	1.1	130E09090	3.1	802E17830	2.1
007E63150	3.1	101E19690	3.1	130E09100	4.1	802E19240	1.1
007E63180	3.1	101K41060	1.1	130E09360	4.1	809E18310	3.1
007K10890	3.1	101K41130	1.1	130K64640	3.1	809E24890	3.1
009K01910	3.1	101K41140	1.1	130K64990	3.1	809E24900	3.1
015K39950	3.1	101K41150	1.1	160K60070	3.1	809E24960	3.1
015K39960	3.1	101K41160	5.1	160K64000	1.1	830E28530	2.1
016E15060	3.1	101K41230	2.1	160K64010	5.1	891E88990	2.1
018K00970	3.1	105K18400	1.1	160K64020	1.1	891E89050	2.1
019E43530	2.1	105K18510	1.1	160K64030	2.1	891E89240	2.1
019E43540	2.1	108E05430	1.1	160K64040	1.1	891E92090	2.1
019E43930	2.1	108E05440	1.1	160K64070	1.1		
019K04760	3.1	108E05450	1.1	160K64850	1.1		
019K04770	3.1	108E05470	1.1	160K64860	1.1		
019K04780	3.1	108K00690	4.1	162K06530	1.1		
019K05110	3.1	109K01230	5.1	162K39580	1.1		
019K05120	3.1	110K10140	1.1	162K57770	1.1		
022E23250	3.1	113R00296	1.1	300E82870	1.1		
022E23860	2.1	115E06360	5.1	600K72020	1.1		
022E23880	5.1	117K32600	1.1	600K72020	2.1		
022K64020	3.1	117E13660	1.1	600K72020	3.1		
022K67980	5.1	120E19120	3.1	600K72020	4.1		
022K67990	5.1	120E19130	3.1	600K72020	5.1		
022K68000	3.1	121E15480	3.1	695E58680	3.1		
022K68010	3.1	122E02480	4.1	802E17610	3.1		
032K03170	3.1	122E02490	4.1	802E17760	2.1		
038K12830	3.1	126K12890	3.1	802E17770	1.1		
050K45850	1.1	126K12970	3.1	802E17780	1.1		
050K45860	1.1	126K13090	3.1	802E17790	1.1		
050K45870	1.1	127E12600	3.1	802E17800	1.1		
050K45880	1.1	127K30150	1.1	802E17810	5.1		

Common Hardware

S1 Screw-Taptite BH, +, B, M3, L5

S2 Screw-Taptite, BH, +, B, M3, L8

S3 Screw-Taptite, PWH, +, B, M3, L6

S4 Screw-Taptite, PWH, +, B, M3, L10

S5 Ring-C, ID3, OD7, 50.6

S6 Ring-C, ID5, OD11, 50.6

6 General Procedures/Information

Section Contents

Introduction

This section includes the precautions and machine specifications. Also included is a list of abbreviations used throughout the manual.

Precautions

Follow these safety, ESD, and servicing precautions to prevent personal injury and equipment damage.

1. The WorkCentre 385 is a Class 1 laser product. During servicing, the laser beam could cause eye damage if looked at directly. Service procedures must be followed exactly as written without change.
2. Be sure that all built-in protective devices are in place. Restore any missing protective shields.
3. Make sure there are no cabinet openings through which people- particularly children- might insert fingers or objects and contact dangerous voltages.
4. When re-installing chassis and assemblies, be sure to restore all protective devices, including control knobs and compartment covers.
5. Design Alteration Warning:
   Never alter or add to the mechanical or electrical design of this equipment, such as auxiliary connectors, etc. Such alterations and modifications will void the manufacturer's warranty.
6. Components, parts, and wiring that appear to have overheated or are otherwise damaged should be replaced with parts which meet the original specifications. Always determine the cause of damage or overheating, and correct any potential hazards.
7. Observe the original lead dress, especially near sharp edges, AC, and high voltage power supplies. Always inspect for pinched, out-of-place, or frayed wiring. Do not change the spacing between components and the printed circuit board.
8. Product Safety Notice:
   Some electrical and mechanical parts have special safety-related characteristics which might not be obvious from visual inspection. These safety features and the protection they provide could be lost if a replacement component differs from the original. This holds true, even though the replacement may be rated for higher voltage, wattage, etc.

Components critical for safety are indicated in the parts list. Use only replacement components that have the same ratings, especially for flame resistance and dielectric specifications. A replacement part that does not have the same safety characteristics as the original may create shock, fire, or other safety hazards.

ESD Precautions

Certain semiconductor devices can be easily damaged by static electricity. Such components are commonly called “Electrostatically Sensitive (ES) Devices”, or ESDs. Examples of typical ESDs are: integrated circuits, some field effect transistors, and semiconductor “chip” components.

The techniques outlined below should be followed to help reduce the incidence of component damage caused by static electricity.

CAUTION:
Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

1. Immediately before handling a semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, employ a commercially available wrist strap device, which should be removed for your personal safety reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ESDs, place the assembly on a conductive surface, such as aluminum or copper foil, or conductive foam, to prevent electrostatic charge buildup in the vicinity of the assembly.
3. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.
4. Do not remove a replacement ESD from its protective packaging until immediately before installing it. Most replacement ESDs are packaged with all leads shorted together by conductive foam, aluminum foil, or a comparable conductive material.
5. Immediately before removing the protective shorting material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
6. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged into the circuit.
7. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting ones foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

Specifications

Facsimile

Machine type:	Desk Top
Applicable line:	Public Switched Telephone Network (PSTN) or behind PABX
Compatibility:	ITU (CCITT) Group 3
Data coding:	MH/MR/MMR
Modem speed:	14400/12000/9600/7200/4800/2400 bps
Transmission speed:	Approx. 6 sec.
Effective scanning width:	8.3 inches (210 mm)
Effective printing width:	8.2 inches (208 mm: LTR)
Scanning method:	Sheet-feed scanning using a Contact Image Sensor (CIS)
Memory:	2 MByte
Halftone:	64 levels
Printing speed:	8 PPM (Letter size)
Automatic document feeder:	30 pages (75g/m^2, 20 lb.)
Documents size:	Width: 148 to 216 mm
	Length: 120 to 1500mm (Single Page)
	279 to 297mm (Multi Pages)
	Weight: 50 to 100 g/m^2(Single Page)
	50 to 90 g/m^2(20 Pages)
	75 g/m^2(30 Pages)
One-touch dial:	20 locations
LCD:	16 characters x 2 lines

Quality

Conditions

Paper	Normal Paper	75g/m^2
Environment	Temperature: 20 ~ 25°C	
	Humidity: 40 ~ 60%	

Fusing System

Trouble Sensing	The temperature doesn't rise to the specific temperature in the specific time. (Fuser Error) The temperature is too high.
Overheat Sensing	240 ~ 250°C (The thermostat cuts off the Fuser from the power.)
	Thermistor Open Sensing: Without the initial temperature change of the Fuser.

Scanner

Scanning Method: Sheet-fed scanning by CIS and feeding of the document by a stepping motor.

Resolution

Horizontal	11.8 lines/mm (300 dpi)
Vertical	STANDARD: 3.85 lines/mm (98 dpi)
	FINE: 7.7 lines/mm (196 dpi)
	SUPER FINE: 11.8 lines /mm (300 dpi)
	SUPER FINE: 15.4 lines /mm (392 dpi)

Photo Scale:	256 shades
Scanning period:	STANDARD: 2.5 ms/line
	FINE: 2.5 ms/line
	SUPER FINE: 2.5 ms/line

Printer

Print Speed	8 PPM (A4 Size, 5% Character Pattern)	At Copy Mode
Resolution	600 X 600 DPI	
Source of Light	Laser Diode(LSU)	
Print Method	Non-impact Electrophotography,	Laser Beam
Feed Method	Multi-Purpose Feeder and Manual	
Feed Reference	Center Reference Loading	
Paper	Size	Bin Type
	Normal Paper: A4,Letter,Legal,B5, Executive, A5	
	Envelope: Normal Envelope	
	Length: 149 ~ 365mm	
	Width: 100 ~ 216mm	
	Weight: For MPF, 60 ~ 90g/m^2	
	For manual, 60 ~ 163g/m^2	
For Manual, Paper Capacity	60 ~163g/m^2	
	MPF: 150 Sheets (75g/m^2, 20 lb.)	
	Manual Slot: 1 Sheet	
Paper Stacker Capacity	Face up: 100 Sheets (75g/m^2,20 lb)	
Warming up Time		
First Printing Time	Stand-By: 20 Sec	
	Power Save Mode: 30 Sec	
Power Rating	AC 110V ~127V ± 15% 50/60Hz ± 3Hz,	
	AC 220V ~ 240V ± 15% 50/60Hz ± 3Hz	
Power Consumption	Max. 450Wpeak	
	Avg. 150Wh	
Power Saving Consumption	Avg. 25Wh	Sleeping Mode
Certification & Compliance	FCC,UL,CSA	

Acoustic Noise	Standby: Less than 36dB
	Sleep Mode: Less than 29dB
	Operating: Less than 50dB
Operating Environment	Temperature: 10 ~ 32.5°C
	Humidity: 20 ~ 80%
Storage Environment	Temperature: -20 ~ 40°C
	Humidity: 10 ~ 95%RH
Weight	Net: Max. 9kg
	Gross: Max. 14kg
External Dimension	355(W) X 415(D) x 238(H)mm (without Handset)
	424(W) X 415(D) x 238(H)mm (with Handset)
Developer	Life Span: 5% Pattern, Min. 5,000 Sheets
	Developing: Non-magnetic Contact Developing
	Charging: Conductive Roller Charging
	Density Adjustment: Dark, Medium
	Toner Supply Method: Exchanging Toner Cartridge
	New Developer Checkable
	Transfer System: Pre-transfer By LED & Conductive Roller Transfer
	Fusing System: Temperature & Pressure
	OZONE Emission: Max. 0.1 PPM(8 Hours)

SMPS (Switching Mode Power Supply)

Input (AC)

AC Input Voltage	European	American
Minimum	198V	90V
Typical	230V	120V
Maximum	264V	135V
Max. AC Input Current	2.5Amps	3Amps
Max. Inrush Current	Ap-p (at 20°C)	

Output (DC)

Line Regulation	24V ± 10%
	12V ± 5%
Road Regulation	-12V ± 5%
	5V ± 5%
Ripple Noise	24V: Peak 300mV
	12V: Peak 500mV
	-12V: Peak 500mV
	5V: Peak 500mV
Over Current Protect	24V: 2.7A ± 10% (by C'ct)
	5V: A ± 10% (by C'ct)
Over Voltage Protect	24V: 33V
	5V: 5.6V

Recommended Maintenance

The cycle period outlined below is a general guideline for maintenance. The example list is for an average usage of 50 transmitted and received documents per day. Environmental conditions and actual use will vary these factors. The cycle period given below is for reference only.

	Component	Cleaning Cycle	Replacement Cycle	Solution
Scanner	ADF Rubber	6 Months	10,000 Pages	
	ADF Roller	1 Year	50,000 Pages	
	Drive Roller	1 Year	50,000 Pages	
	White Roller	6 Months	50,000 Pages	
	CIS	6 Months		
Printer	Cartridge		5,000 Pages	
	Pickup Roller	1 Year	50,000 Pages	
	Feed Roller	1 Year	50,000 Pages	
	Transfer Roller		50,000 Pages	
	Fuser		30,000 Pages	
	Driver		50,000 Pages	

Test Mode

The test mode is used to test certain functions of the machine. The available tests are:

- User mode: Maintenance
- Tech mode: Switch Test › Modem Test › Memory Test › ROM Test › DRAM Test › Pattern Test

To enter the Test Mode:

1. Get into the Tech mode by pressing ***Menu***, ***#***, ***1***, ***9***, ***3***, ***4***.
2. In Tech mode, press ***Menu***, and "***Maintenance***" on the one-touch keypad.
3. Scroll to the options by pressing Up or Down repeatedly until you find the one you want.
4. Press ***Enter*** to initiate the Test Mode.

Cleaning Drum

This procedure removes excess toner on the OPC drum.

1. Make sure that paper is loaded in the automatic feeder.
2. Press ***Menu***, and "Maintenance" on the one-touch keypad.
3. Press ***Enter***. The machine automatically pulls in a sheet of paper, and prints out. The toner particles on the OPC drum surface is fixed to the paper.

Adjust Shading

This procedure is needed to set (make) a new shading reference value. The reference value is preset at factory. However, when the CIS or the main board is replaced with new one, the reference value must be set again.

Load the white, letter-sized paper into the feeder and perform the test mode (MENU+ONE-TOUCH 04 "SYSTEM SETUP"). Follow the next steps as instructed through the LCD window. After the shading value is newly set, the shading value pattern is automatically printed. The shading value pattern shows the value of the white reference level of the Contact Image Sensor. Check for the waveform in the pattern. It is best when the wave form is level. If there are many points sharply broken, perform the Make shading procedure several times until you get a level waveform.

Switch Test

This test checks the operation of the LCD display and the LED indicators that interface the switches on the operation panel.

Modem Test

This test causes the machine to generate a particular frequency to verify the operation of the modem control circuits and the modem.

Memory Test

This test is used for checking the Random Access Memory (RAM) on the main PBA. If all memory is working normally, the LCD shows TESTING OK!. When this testing is carried out, any picture data stored in memory is erased.

ROM Test

This test mode will display and check the current ROM level in your machine.

FLASH VER.:1.0.0
ENGINGE VER. VER 1.0.1

DRAM TEST

This test checks the DRAM memory status and shows if it is functioning properly.

Pattern Test

1. Pattern Test?
2. Pattern 1? - There are 4 different pattern tests.
   Scroll to the options by pressing UP or Down repeatedly until you find the one you want.
3. Press ***START*** key.
4. Key in the number of pages.
5. Press ***START*** key.

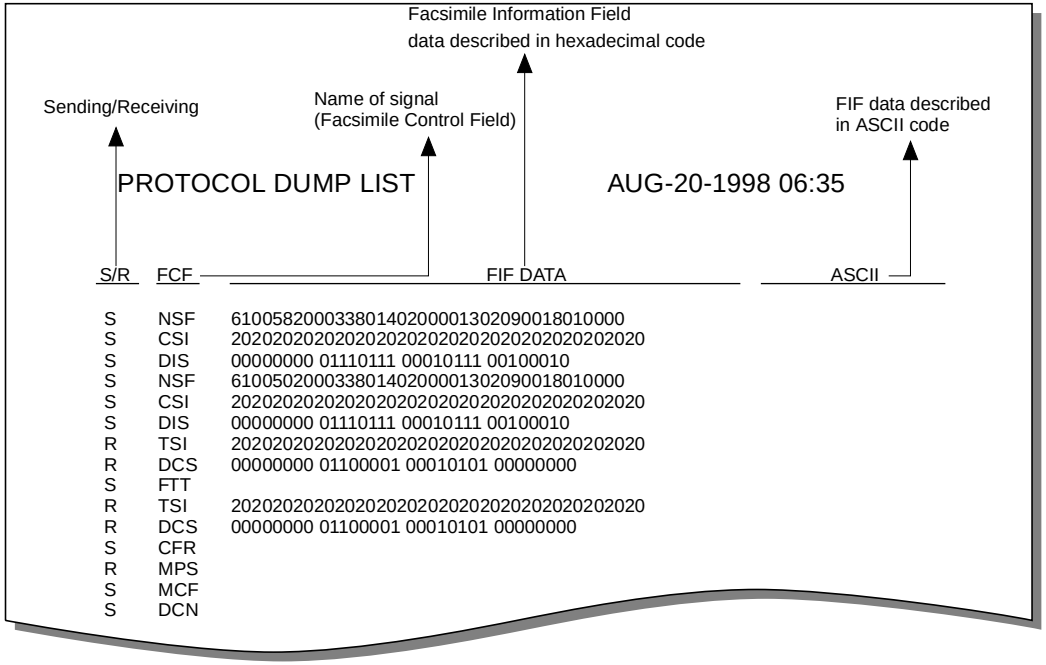
Maintenance List

A number of reports can be printed from the fax machine within the test mode. The protocol list and memory dump list all contain detailed information which can be used when troubleshooting problems.

To printout the protocol and memory dump lists:

1. Get into the Tech mode by pressing ***Menu***, ***#***, ***1***, ***9***, ***3***, ***4***.
2. In Tech mode, press ***Menu***, and "***Tx. Confirm***" on the one-touch keypad.
3. Press UP or DOWN t repeatedly until you find the Protocol Dump List. When you find "PROTOCOL REPORT?", press ***ENTER***.

SAMPLE OF PROTOCOL DUMP LIST



System Setup

In Tech mode (Press # 1 9 3 4), you can access the following setup menu functions:

- Ringer Volume
- Default Settings
- Sound control
- Remote Diagnosis Protection
- Select Language
- Econo Mode Setting
- Last Fax Data Reprint
- Page Count Clear
- Flash Download

To access system setup menu functions.

1. Press ***Menu*** in tech mode.
2. Press "***System setup***" on the one-touch keypad, and press ***Enter***. The first setup menu "RINGER VOLUME?" appears in the display.
3. Press ***Up*** or ***Down*** repeatedly to choose the desired setup menu.
4. When the desired setup item is displayed, use ***Left*** or ***Right*** to select the desired status, and press ***Enter***.
   To change the status, you can also press the number of the status in the display.
5. The display shows the next setup menu. If you return to Standby mode, press ***Stop***.

Table 1: System Setup Menu Functions

Function	Description	Value
Ringer Volume	You can adjust the volume of the ringer.	The display shows the loudness level with > symbol. The more, the louder.
Default Settings • Resolution • Contrast	The print resolution and contrast can be set to their most frequently used modes. Whenever a document is sent or copied, the home contrast and resolution mode will be activated unless otherwise changed by using Resolution or Contrast button on the control panel.	**Home Resolution** • STANDARD - use with most documents. • FINE - use for documents with fine detail, such as small print. • SUPER FINE - use for documents that have extremely fine detail. **Home Contrast** • NORMAL - use with documents of average or normal contrast. • DARKEN - use with documents with low contrast or light images. • LIGHTEN - use with documents with high contrast or dark images. • PHOTO - for obtaining maximum image quality with documents that contain pictures or photographs with shades of gray.
Sound Control • Alarm Sound • Key Sound	You can choose an alarm tone to sound when an error occurs (ALARM SOUND) or any key is pressed (KEY SOUND).	1: ON 2: OFF

Table 1: System Setup Menu Functions

Function	Description	Value
Remote Diagnosis Protection	Remote diagnosis feature allows your machine to be checked out by service company at a remote place through phone line. If you do not want to use the remote diagnosis feature and want to protect your machine from being open by an unauthorized person, you can enable this remote diagnosis protection feature.	1: ON 2: OFF
Select Language	You can select the LCD display language between English, German, French, Italian and Spanish.	1: English 2: German 3: French 4: Italian 5: Spanish
Econo Mode Setting	To get the most from your toner supply, set the Econo mode to On. If set to On, you can preserve the toner supply. The print quality may be reduced.	1: ON 2: OFF
Last Fax Data Reprint	If the toner is low or empty, the received fax page may be too light to read the message. If you lost the fax message because of low or empty toner, use the feature to print the last fax data. Your machine stores the last 10 pages of received fax data all the time and updates the pages each time you receive a fax.	Press 1 to print the last 10 pages of a received fax. If you want to clear the data to save memory, press 2. You can use full memory until a new fax is received.
Page Count clear	You can reset the page counter to zero (0). To reset the counter, the passcode (1934) is required.	
Flash Download	This function allows you to download newly updated ROM into the machine.	1: ON 2: OFF

Setting the Date and Time

1. Press ***Menu***, then press "***Date & Time***" on the one-touch keypad. The display asks you to choose a date format.

   The display shows the currently set date and time using the selected date format.

   ```
   12-11-1998
   02:23 (PM)
   ```

2. Enter the correct date and time using the number keypad.

   DD (Day) = 01~31

   MM (Month) = 01~12

   YY (Year) = two digits

   HH (Hour) = 00~12

   MM (Minute) = 00~59

   AM or PM (Use the Up or Down arrow keys to set)

3. Press ***Enter*** when the date and time in the display is correct.

   If you enter an invalid number, the machine beeps and doesn't proceed to the next step. If this happens, just reenter the correct number.

   The display shows the date and time you have set, then returns to Standby mode.

Setting the System ID

The System ID (Your Number and Name) will be printed at the top of each page sent from your machine.

1. Press ***Menu***, then press "***System ID***" on the one-touch keypad. The display asks you to enter the telephone number.

   If there is a number previously registered, the number appears.

2. Enter the telephone number (up to 20 digits) which your machine is connected to. You can include the hyphen(-) symbol using ***Pause*** button.

   If you make a mistake, press ***Right*** or ***Left*** to move the cursor under the wrong digit, then enter the correct number to change or press ***Delete*** to delete the number.

3. Press ***Enter*** when the number in the display is correct. The display asks you to enter your ID name.

4. Enter your ID name (up to 20 characters).

   You can enter alphanumeric characters using the number keypad, and include special symbols such as + by pressing ***0*** repeatedly.

   If you want to enter the same letter or number in succession (e.g. SS, AA, 777), enter one digit, then move the cursor by pressing ***Right***, and enter the next digit.

   If you want to insert a space in the name, you can also use ***Right*** button to move the cursor to skip the position.

5. Press ***Enter*** when the name in the display is correct.

Memory Clear

Memory Clear in User Mode

In the user mode, you can selectively clear information stored in this machines memory. The list of data you can clear is as follows:

- SYSTEM ID: your terminal ID number and name are erased from the machines memory.
- SYSTEM DATA: restores user-selectable options to the default value.
- PHONEBOOK/MEMORY: clears the One-Touch, Speed Dial, or Group Dial numbers stored in memory. In addition, all the delayed time operations you have reserved are also canceled.
- TX-RX JOURNAL: clears all records of transmissions & receptions.

1. If the machine is in the tech mode, return to the user mode by pressing ***Menu***, ***#***, ***1***, ***9***, ***3***, ***4*** in sequence.

2. Press ***Menu***, and "***Memory Clear***" on the one-touch keypad.

   The LCD displays the type of memory you can choose.

3. Scroll to the options by pressing Up or Down until you find the one you want to clear. When the cursor blinks under the memory you want to clear, press ***Enter***.

   Otherwise, you can enter the number of the memory.

4. The LCD prompts you to confirm your selection. Press ***1*** to choose "YES".

Memory Clear in Tech Mode

Memory clear, contained in the tech mode, is used for clearing all the user's data in memory and setting to default status.

1. If not in the tech mode, Press ***Menu***, ***#***, ***1***, ***9***, ***3***, ***4*** in sequence to initiate the tech mode.

2. Press ***Menu***, and "***Memory Clear***" on the one-touch keypad.

   The LCD displays "***Memory ALL CLEAR***" on the one-touch keypad.

3. Press ***1*** to clear all memory.

   If you want to cancel, press ***2***. The machine returns to Standby Mode.

System Data Set-up

There are system data settings that are set by the user in the user-mode, and system data settings set by the technician in the tech mode.

System Data Settings in User-mode

The fax machine has various user-selectable functions. These functions are usually selected during the initial setup of the machine, and there should be little need to change them there after.

*Note: Before you begin, print out the system data list to see the current settings. To print the system data list, press **Menu**, and "**System Data**" on the one-touch keypad.*

1. Press ***Menu***, then press "***System Data***" on the one-touch keypad.
   The LCD displays user-selectable options.

2. Scroll to the options by pressing Up or Down repeatedly.

3. When the option you want appears in the display, enter the number for the desired status. You can use the ***Left*** or ***Right*** button and press ***Enter*** to select the desired status.

User-Selectable Options

These instructions assume you've followed the steps under "System Data Settings in User-mode" and the machine is asking if you want to change one of the options listed here.

- Paper Size - Select the paper size you will use for the recording paper.

  Press 1 for letter (LTR), 2 for A4, or 3 for legal (LGL) size paper.

- Message Confirmation Report - A confirmation report shows whether the transmission was successful or not, how many pages were sent, etc.

  Press 1 to print out journal automatically each time you send a fax.

  Press 2 to print only when an error occurs and the transmission was not successful.

- Auto Print Journal - A journal report shows specific information concerning transmission and reception activities, the time and dates up to 50 of the most recent transmission and reception.

  Press 1 to print journal automatically after every 50 transmission and receptions.

  Press 2 to print journal manually.

- Remote Receive Start Code - The remote receive code allows you to initiate fax receive from an extension phone plugged into the EXT.TEL jack. If you pick up the extension phone and hear fax tones, enter the remote receive code and the fax will start receiving. The password is preset to * 9 * at factory.

  Enter the desired code 0 to 9 on the number keypad.

- Power Saving Mode - The power saving menu item lets you reduce power usage when the printer is idle.

  Press 1 to turn the feature ON. The display asks you to determine the length of time the printer waits after a job is printed before it goes to a reduced power state: Press 1 for 10 minutes, 2 for 15 minutes, 3 for 30 minutes, 4 for 45 minutes, or 5 for 60 minutes.

  If your printer is used constantly, press 2 to turn the feature OFF. It keeps the printer ready to print with the minimum warm-up time.

- Dial Mode - Select the type of dial system your fax machine is connected to.

  Press 1 if the fax machine is connected to a tone (Touch Tone) dial line.

  Press 2 if the fax machine is connected to a pulse (Rotary) dial line.

- ECM Mode (Error Correction Mode) - This mode compensates for poor line quality and ensures accurate, error-free transmission with any other ECM-equipped facsimile machine. If the line quality is poor, transmission time may be increased when ECM is enabled.

  Press 1 to turn the Error Correction mode on.

  Press 2 to turn the Error Correction mode off.

- RX Reduction - When receiving a document as long as or longer than the paper installed in your machine, the machine can reduce the data in the document to fit into your recording paper size.

  Turn on this feature if you want to reduce an incoming page that may otherwise need to be divided into two pages with only a few centimeters on the second page. If the fax machine cannot reduce the data to fit into one page with the feature enabled, the data is divided and printed in actual size on two or more sheets if needed.

  Press 1 to turn this feature on. Note that this feature does not apply to the copy mode.

  Press 2 to turn this feature off. The overflow data will be printed out on a second page.

- H.(Horizontal) Reduction - If you turn the RX reduction feature on, you are allowed to set the horizontal reduction feature on or off. When you set the horizontal reduction to be on, the machine will reduce an incoming page containing overflow data only in vertical direction.

  If you want to reduce both in vertical and horizontal at the same rate in order to maintain height to width relationships, turn the horizontal reduction feature off.

  Press 1 to turn this feature on.

  Press 2 to turn this feature off.

- Discard Size - When receiving or copying a document as long as or longer than the paper installed in your fax machine, you can set the fax machine to discard any excess image at the bottom of the page to fit into the recording paper size.

  If the received page is outside the margin you set, it will be printed on two sheets of paper at the actual size.

  If the data is within the margin, and the Auto Reduction feature is turned on, it will be reduced to fit into the appropriate size paper (Discard does not take place). If the Auto Reduction feature is turned OFF or fails, the data within the margin will be discarded.

  Enter the desired discard size using the number keypad, and press ***Enter***.

- Redial term - Your machine can automatically redial a remote fax machine if it was busy or does not answer the first call.

  Enter the number of minutes (from 1 to 7) using the number keypad.

- Redial TRY - Enter the number of attempts (from 0 to 2) to redial the number before giving up.

  If you enter 0, the machine will not redial.

- Answer Rings - You can select the number of times your machine rings before answering an incoming call. If you are using your machine as both a telephone and a fax machine, we suggest you set the ring count to at least 4 to give you time to answer.

  Enter a number from 1 through 7 on the number keypad.

- DRPD (Distinctive Ring Pattern Detection) Mode - “Distinctive Ring” is a telephone company service which enables a user to use a single telephone line to answer several different telephone numbers. The particular number someone uses to call you on is identified by different ringing patterns, which consist of various combinations of long and short ringing sounds. This feature is often used by answering services who answer telephones for many different clients and need to know which number someone is calling in on to properly answer the phone.

  Using the Distinctive Ring Pattern Detection feature, your fax machine can “learn” the ring pattern you designate to be answered by the FAX machine. Unless you change it, this ringing pattern will continue to be recognized and answered as a FAX call, and all other ringing patterns will be forwarded to the extension telephone or answering machine plugged into the EXT.LINE jack.

  You can easily suspend or change Distinctive Ring Pattern Detection at any time.

  Before using the Distinctive Ring Pattern Detection option, Distinctive Ring service must be installed on your telephone line by the telephone company. To setup Distinctive Ring Pattern Detection, you will need another telephone line at your location, or someone available to dial your FAX number from outside.

  Press 1 to turn this feature on.

  Press 2 to turn this feature off.

  Press 3 to setup the Distinctive Ring Pattern Detection. The LCD displays “WAITING RING”. Call your fax number from another telephone. It is not necessary to place the call from a fax machine. When your machine begins to ring, do not answer the call. The machine requires several rings to learn the pattern.

  When the machine completes “learning”, the LCD displays “END DRPD SETUP”.

  With the DRPD feature active, “DRPD” appears in the display and the previously set reception mode is ignored. If you turn DRPD off, the machine returns to any previously set reception mode.

Notes:

- DRPD must be set up again if you re-assign your fax number, or connect the machine to another telephone line.
- After DRPD has been set up, call your fax number again to verify that the machine answers with a fax tone, then have a call placed to a different number assigned to that same line to be sure the call is forwarded to the extension telephone or answering machine plugged into the EXT.LINE jack.
- Send From Memory - If you are annoyed that you have to wait until documents in the feeder are sent out when you try to send or reserve another fax, turn this feature on. This feature enables all transmission documents are automatically scanned into memory before transmission.

  Press 1 to turn this feature on.

  Press 2 to turn this feature off.

- RTI (Receive Terminal Identification)-This feature allows the machine to automatically print the page number, and the date and time of the reception at the bottom of each page of a received document.

- Press 1 to turn this feature on.

- Press 2 to turn this feature off.

- Priority Term - When you want to print a PC document while the machine prints a received fax on the recording paper, you can interrupt the printing and print the PC document. Press the PRINT PRIORITY button to enable the feature. The LCD displays “PP” on the lower line, right corner. The interrupted fax data will be stored in memory. To disable, press the PRINT PRIORITY button again. “PP” on the LCD disappears.

  You can set your machine to turn the feature off automatically if there is no further data printed within 30 minutes or 8 hours after PC printing.

  Press 1 to select 8 hours. The machine turns off automatically 8 hours after PC printing is completed.

  Press 2 to select 30 minutes. The machine turns off automatically 30 minutes after PC Printing is completed.

- Reprint - Your machine stores the last 10 pages of received fax data all the time and updates the pages each time you receive a fax. Use this feature to print the last fax data.
  Press 1 to enable the feature.

  Press 2 to disable the feature.

- Clock Mode - Use this feature to set the clock mode.

  Press 1 to select 12 hour mode.

  Press 2 to select 24 hour mode.

Confirming System Data Settings

Confirm the system data settings by printing out a system data list.

1. If not in the tech mode, press ***Menu***, ***#***, ***1***, ***9***, ***3***, ***4*** in sequence to initiate the tech mode.
2. Press ***Menu***.
3. Press one of the one-touch “***PRINT***” keys. The LCD displays the lists you can print out.
4. Press Up or Down until you find “***SYSTEM DATA LIST***”.
5. Press ***Enter***. The machine prints the system data list.

   The system data list printed in the tech mode contains the system data set in the tech mode as well as in the user mode. The model number and software version will be printed at the bottom of the system data list.

System Data Settings in Tech-mode

Various technical features of fax machine are provided with optional parameters. Set the features to the users need according to the following procedure.

1. If not in the tech mode, press ***Menu***, ***#***, ***1***, ***9***, ***3***, ***4*** in sequence to initiate the tech mode.
2. Press ***Menu***, and press "***System Data***" on the one-touch keypad.

   The LCD displays "TECH MODE SYSTEM DATA?".
3. To set the system data available in tech mode, press ***Enter***.

   If you want to set the system data available in the user mode, press ***Stop***. The LCD displays "USER MODE SYSTEM DATA?". Press ***Enter*** to set the system data available in the user mode.
4. The LCD displays the options you can choose. In tech mode, the LCD displays the technician-selectable options as well as all the user-selectable options.
5. Scroll to the options by pressing Up or Down repeatedly.
6. When the option you want appears in the display, enter the number for the desired status. You can use the ***Left*** or ***Right*** button and press ***Enter*** to select the desired status. You can exit from setup mode at any time by pressing ***Stop***. When you press ***Stop***, the machine stores the options you've already changed and returns to Standby mode.

Table 2: System Data Settings in Tech Mode

Feature	Parameter	Function
Modem Speed	14400/12000/9600/ 7200/4800/2400 bps	The maximum Tx speed can be limited to 14400, 12000, 9600, 7200, 4800 or 2400 bits per second. When the Tx speed is set to 14400, 12000 the Rx speed can be either V.33 or V.17 speed. When the Tx speed is set to 9600 or 7200, the Rx speed can be either V.29 or V.27ter speed. When the Tx speed is set to 4800 or 2400, the Rx speed can be any V.27ter speed.
Error Rate	5%, 10%	If the error rate exceeds the chosen rate, fall back occurs which will lower the baud rate automatically down to as low as 2400 baud until the error rate is less than the chosen rate.
Tx Level	-4 ~ -15 dBm	You can set the level of transmission signal. Typically, Tx level should be under -12 dBm. The level within the range of -4 dBm to -15 dBm is acceptable. Enter the desired value using the dial keypad.
Receive Sensitivity	High/Normal	High sensitivity is between 0 and -49 dBm. Normal sensitivity is -43 dBm.
Silence Time	12sec/Unlimit	

LCD Display

During Communication

In user mode, the LCD shows the remote machines TTI number, TX or RX communication type, (modem speed), and page number.

In service mode, the display shows the communication type, abbreviations for the ITU (CCITT) Group 3 T.30 protocol as they occur, the protocol type (G3), baud rate in kbps, and line time.

If a Communication Problem Occurs:

In user mode, the display shows one of the following:

PAPER JAM, COMM.ERROR, LINE ERROR.

In service mode, the display shows all error messages available in user mode, plus additional error messages available only in Service Mode.

Error messages shown in service mode only are as follows:

- PRE-MESSAGE ERROR: problem occurred during phase B of session.
- POST-MESSAGE ERROR: problem occurred during phase D of session.
- MESSAGE ERROR: problem occurred during phase C of session.
- LINE ERROR: machine cannot connect or has lost connection with the remote machine.

Additional messages, not shown above, will appear in the TX/RX journal printed in service mode.

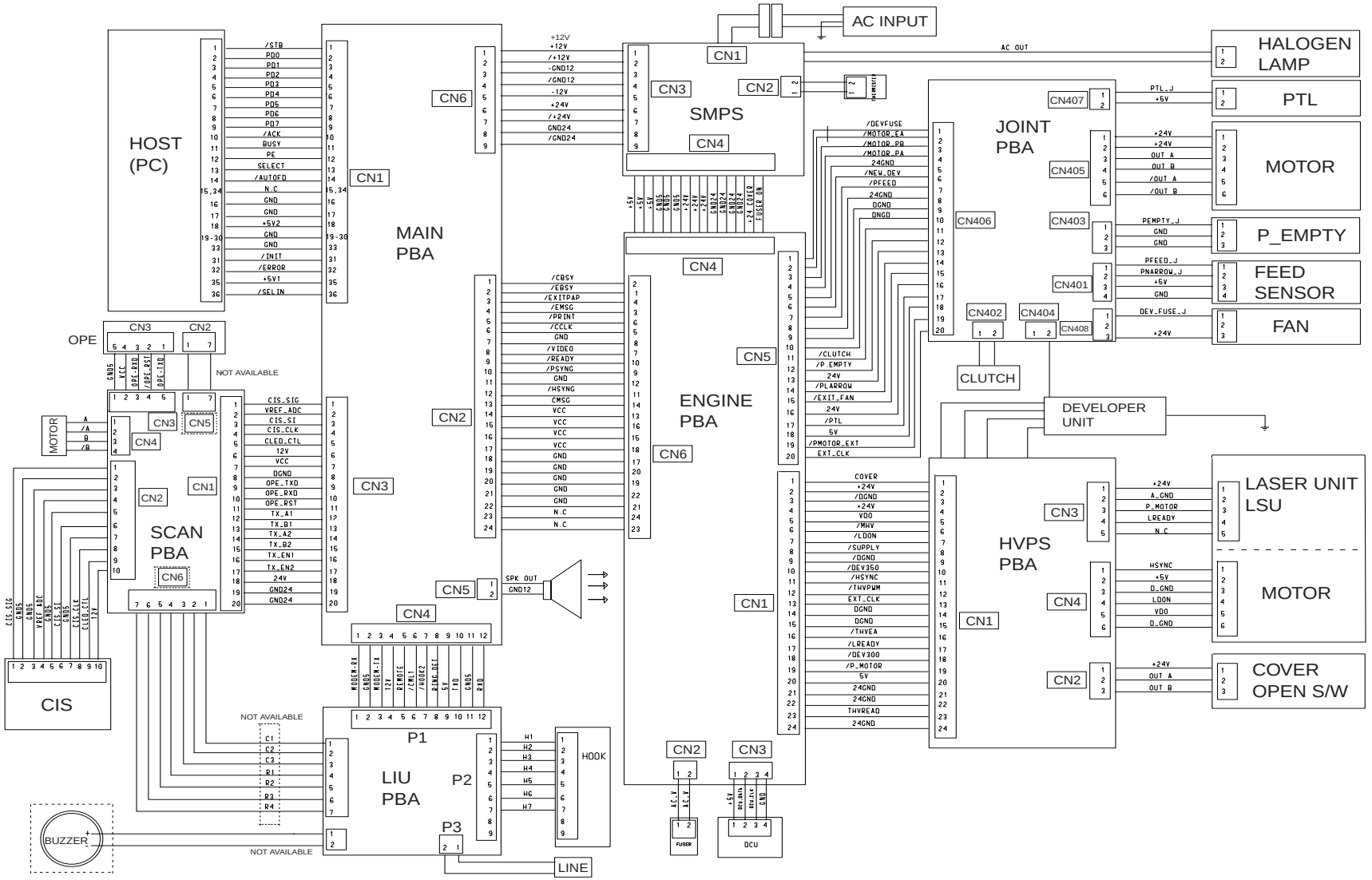
7 Theory of Operation

Section Contents

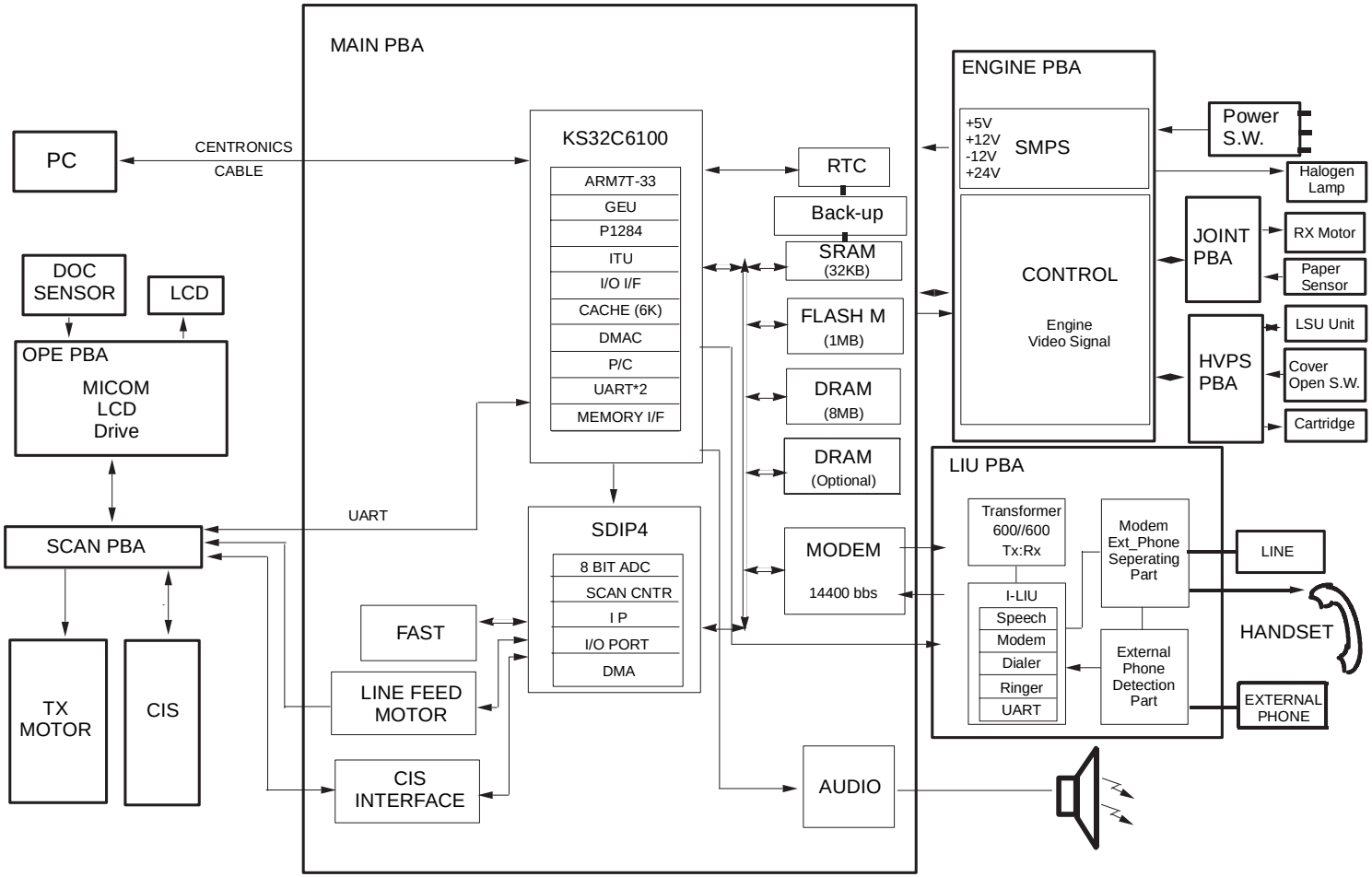
Introduction

This section contains the theory of operation. This information is not specific to individual procedures but is provided for general reference.

Connection Diagram



System Block Diagram



Engine Configuration

Video Controller PBA

Video Controller PBA receives image data from the host computer and converts it to a bitmap(binary) image, which is sent to the Engine Controller PBA.

Engine Controller PBA

Engine Controller PBA receives the video data from the Controller PBA, and sends the video image to LSU and controls the electrophotography process for printing.

HVPS PBA

HVPS PBA generates THV/MHV/BIAS high voltages for the Developer unit. The LSU and Cover Open Sensor interface signals connect via the Engine Controller PBA.

Joint PBA

Joint PBA connects with the Engine Controller PBA and contains the Main Motor, Clutch, Pre-Transfer Lamp driver, New Developer, Paper Empty and Paper Exit Sensing circuits.

Laser Printer Cartridge

Laser Printer Cartridge creates the image via the electrophotography process. The Charge Roller, OPC Drum, Developer Roller, Supply Roller and Toner constitute the Laser Printer Cartridge.

LSU (Laser Scanner Unit)

Under control of the Engine, controls the laser beam and the OPC Drum exposure and rotation. The OPC Drum is synchronized and rotating with the same speed as the paper. When laser beam reaches the position of the Scanning Mirror, it creates a line. Synchronization Signal(HSYNC), which is sent to the Engine PBA which transfers image data to LSU and synchronizes the vertical scanning line with the printed page.

Transfer

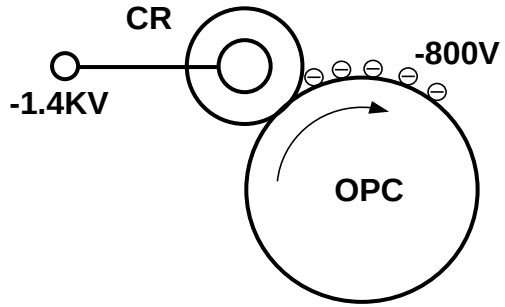
It contains the PTL (Pre-transfer Lamp) and the Transfer Roller. The PTL exposes the light to the OPC drum and lowers the OPC drum surface potential, to improve transfer efficiency. The Transfer Roller transfers Toner on the OPC Drum to the paper.

Fuser

It contains the Heat Lamp, Heat Roller, Pressure Roller, Thermistor and thermostat, and causes the Toner to adhere to the paper.

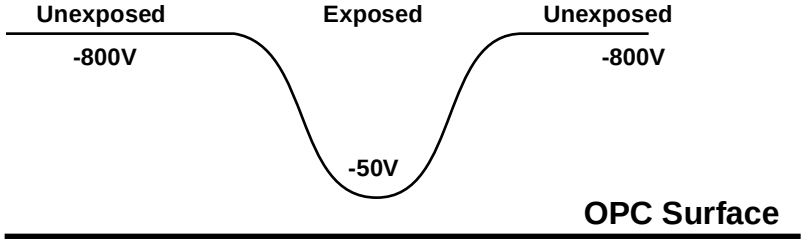
Development Processing

Charging



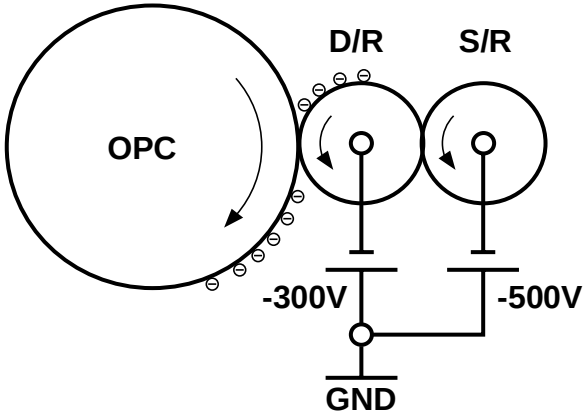
A negative voltage is applied to the surface of the OPC Drum. This is the first step in creating an electrophotograph. The high voltage section of the Engine Controller PBA supplies (-)1.4KV to the Charge Roller and transfers a charge of approximately (-)800 V to the OPC Drum.

Exposure



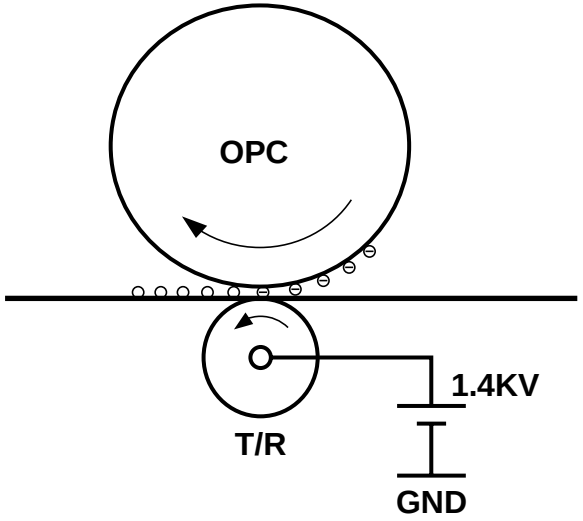
LSU receives the transferred bitmap image data from the Engine PBA and turns the LSU's laser diode on and off, exposing the OPC Drum. If there is no data to print the Laser Diode remains off and the OPC Drum is not exposed. Portions of the OPC Drum exposed charged to approximately (-)50V by the laser beam while unexposed portions charge to (-)800V. The image formed by the exposed laser beam is invisible, and is called a latent image.

Development



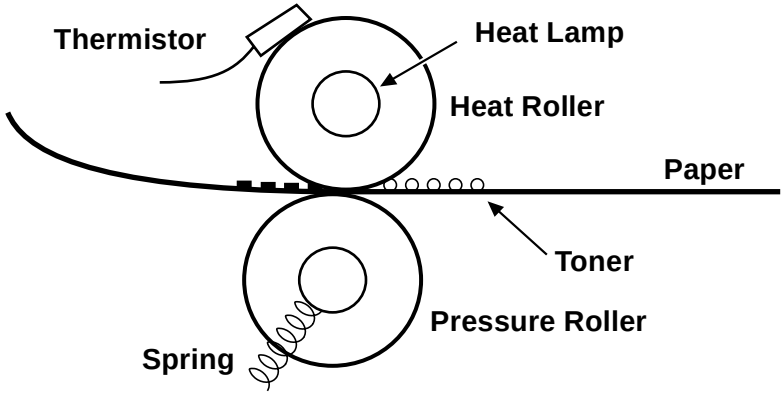
Surface moves between the DEV Roller and the OPC Drum. Negatively charged Toner is attracted to the high voltage(-50V) of the exposed portions of the OPC Drum and is exposed more easily than the more negative (-800V) surface voltage of unexposed areas of the OPC Drum, resulting in a latent image.

Transfer



Toner moves from the surface of the OPC Drum to the paper via the Transfer Roller. Toner on the surface of the OPC DRUM will be attracted by the Transfer Roller, which is charged to approximately + 1.5 kV (600 ~ 2800V), depending upon temperature, and humidity. Toner then moves from the OPC DRUM to the paper.

Fixing



Toner image on the surface of the paper is in a low state electronically, so it can be scattered easily. By heating the paper to a high temperature(180°C) and applying pressure(4Kg), the Toner becomes permanently fixed to the paper, and this fixed image will remain forever. The Heat Roller transfers the heat of Lamp within the Roller to the paper. The effect of Teflon-coating is to prevent the melted toner from staying on the roller. The lower Roller is the Pressure Roller, and is made of silicon resin. Its surface is also Teflon-coated. The thermistor senses the temperature of the surface of the heat roller, and feeds back the information to maintain 180°C while printing, and 135°C during standby. The thermostat prevents the overheat by disconnecting main power if the Heat lamp is overheated.

Exit

Printed paper passes through the Exit Sensor after the electrophotography process is completed. The paper also contacts an Actuator during printing out. This signal is transferred to the Engine PBA and indicates paper position. The Actuator and Exit Sensor must report the correct position information, or a Paper Jam error will be indicated.

Circuit Description

Main PBA

The main circuit that consists of CPU, MFP controller (built-in 32bit RISC processor core: ARM7TDMI) including various I/O device drivers, system memory, scanner, printer, motor driver, PC I/F, and FAX transceiver controls the whole system. The entire structure of the main circuit is as follows:

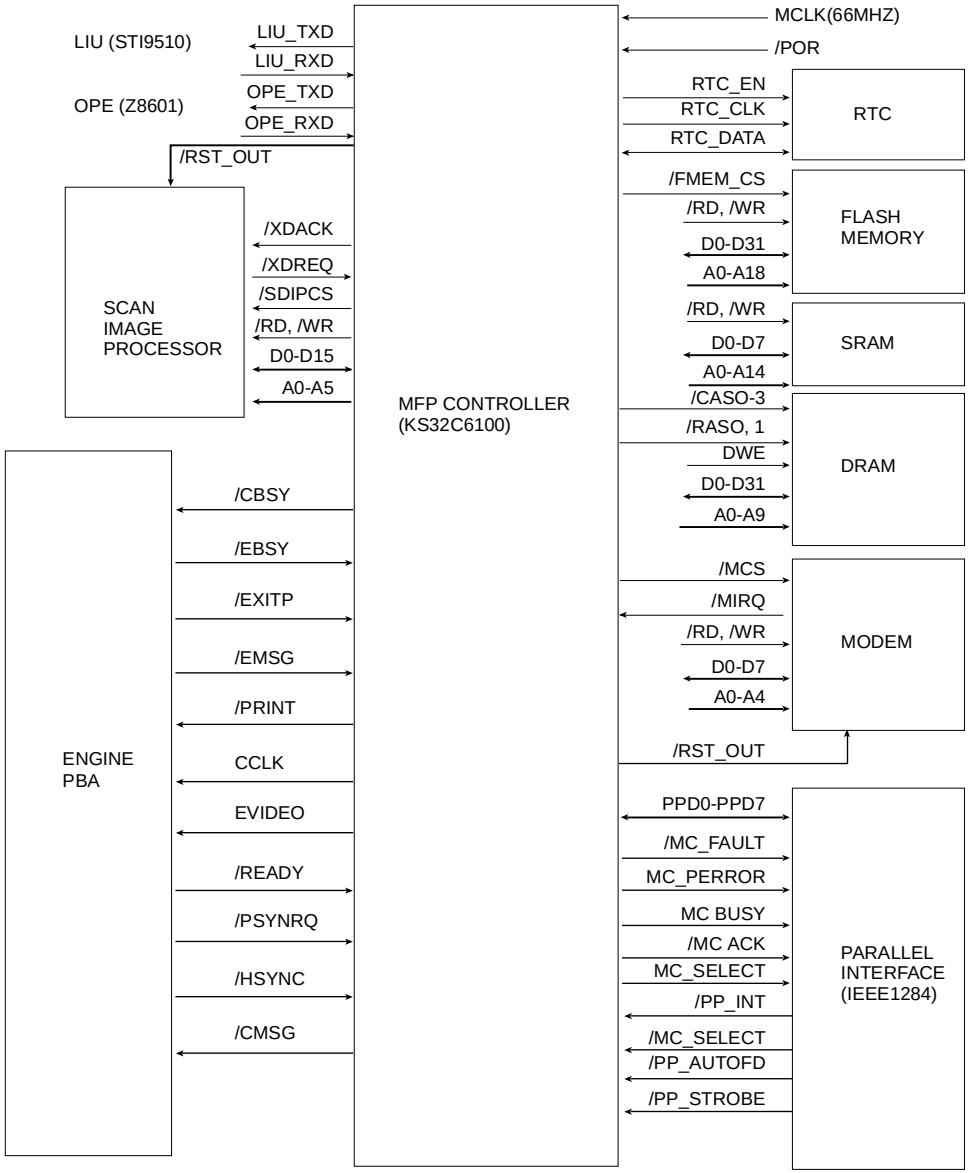


FIG. 7-1: ENTIRE STRUCTURE OF MAIN CIRCUIT FOR EACH KEY SIGNAL

MFP Controller (KS32C6100: U1)

SYSTEM CLOCK

The internal clock frequency is 33MHz 66MHz system clock (MCLK) supplied from the outside is used being divided inside.

DATA & ADDRESS BUS CONTROL

- /RD & /FMEM_WR, /WR/RD & /FMEM_WR signals are synchronized with MCLK(33MHz) and become LOW ACTIVE.
  These signals are strobe signals used to read and write data when each CHIP SELECT is connected with /RD and /WR pin of RAM, ROM, MODEM and the outside devices and becomes active. /WR is strobe signal used only write signal for SCAM image processor.
- CHIP SELECT (/SDIP_CS, /RCS0, /RCS2, /MCS, /SCS
  - /SDIP_CS: SCAN MEMORY CHIP SELECT (LOW ACTIVE)
  - /RCS0: FLASH MEMORY CHIP SELECT (LOW ACTIVE)
  - /RCS2: MASK ROM CHIP SELECT (LOW ACTIVE)
  - /MCS: MODEM CHIP SELECT (LOW ACTIVE)
  - /SCS: SRAM CHIP SELECT (LOW ACTIVE)
- D0 - D31
  - 32bit data bus
- A0 - A23
  - ADDRESS BUS (A22 - A23 are reserved.)

SERIAL COMMUNICATION PART

UART (Universal Asynchronous Receiver/ Transmitter) at KS32C6100 enables the main and LIU, main and OPE to transmit serial data. The block diagram of UART is as follows:

KS32C6100 has two UART channels. The baud rate is 9600bps.

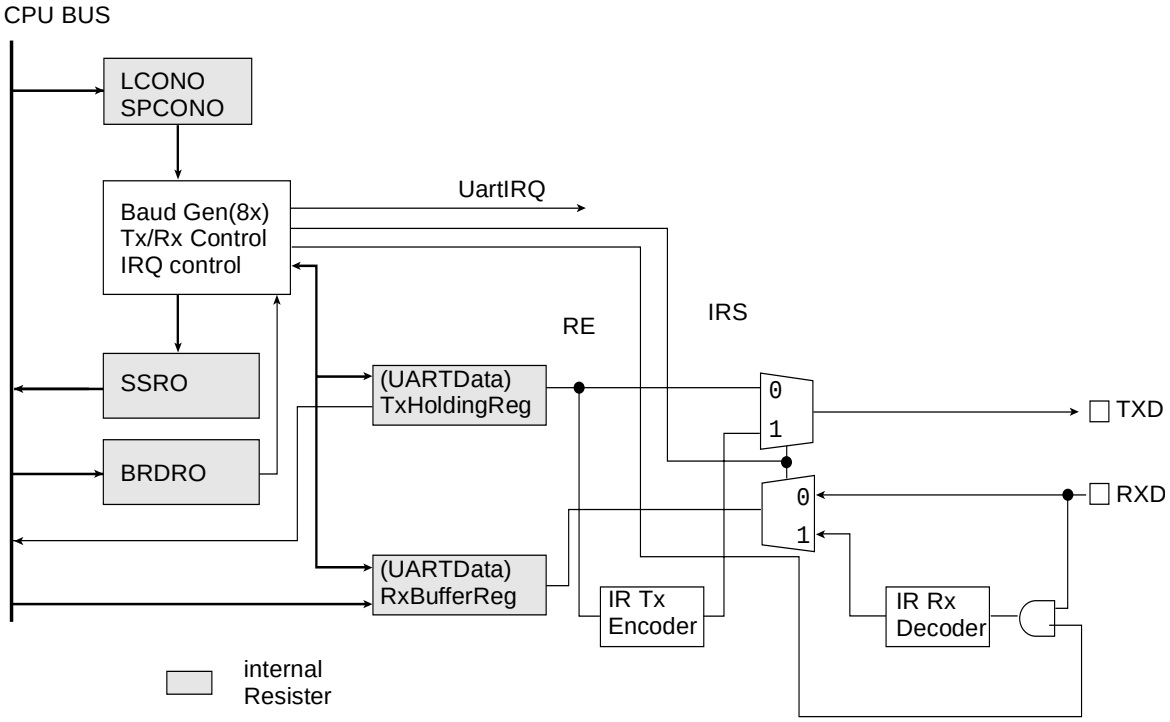


FIG. 7-2: UART BLOCK DIAGRAM

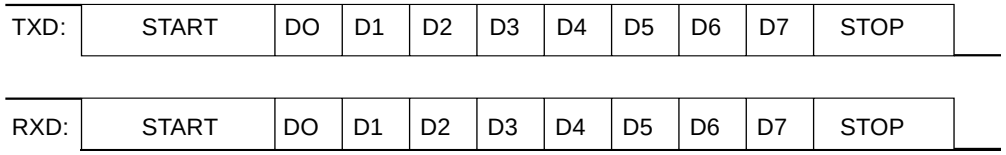


FIG. 7-3: UART DATA FORMAT

External DMA

It brings data from an external device (SCAN_IP:U31) through EXTDMA channel 1. When the DMA REQUEST is sent from an external device to KS32C6100, DMA ACKNOWLEDGE signal is activated and DMA channel 1 is driven to produce CHIP SELECT and READ STROBE (/RD) and data is brought from the external device. It generates the address, CHIP SELECT and WRITE STROBE (/WR) in order to move this data to destination memory, and then stores the data.

In other words, when the external DMA is requested by an external device, KS32C6100 drives internal DMA controller, DMA channel 1 is assigned to external channel, the data is sent from memory to memory or from external device to memory.

Following timing shows that when DMA REQUEST (/XDREQ) is generated, DMA ACKNOWLEDGE (/XDACK) is sent after 2 cycles and the 2 Word Data is read from external device, and is written into memory. After that if the DMA REQUEST is maintained continuously, DMA ACKNOWLEDGE signal is generated after 4 cycles and the same operation is repeated.

Following diagram shows one DMA cycle. The external device (SCAN_IP) using the DMA maintains continuously DMA request to be activated until second DMA is performed, so one request brings 2 Word.

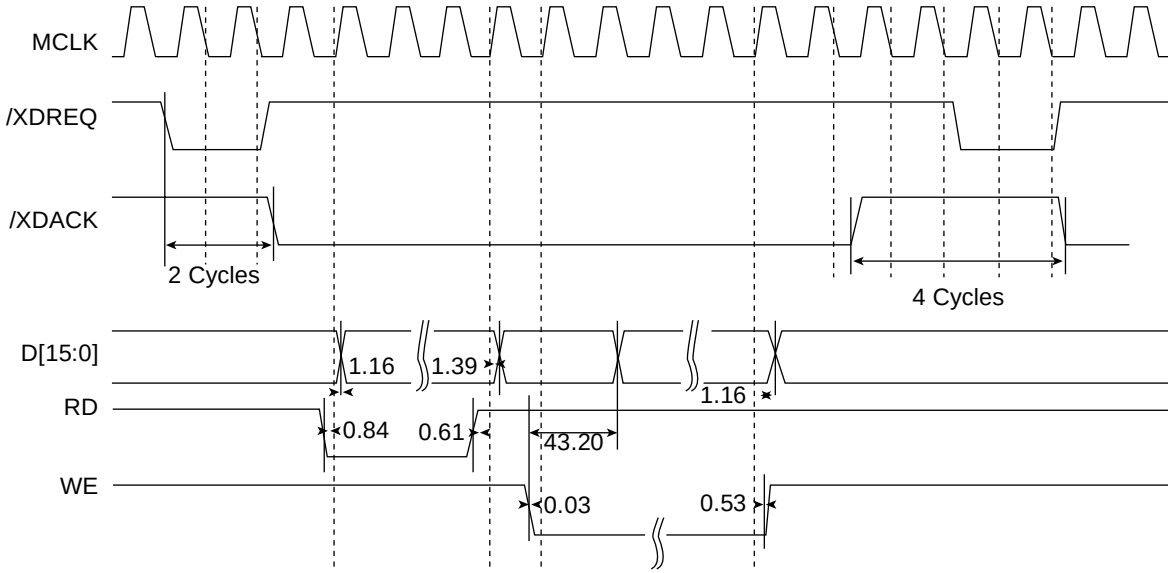


FIG. 7-4 EXTERNAL DMA TIMING DIAGRAM

DRAM Controller

As KS32C6100 has DRAM controller, DRAM can be connected with external memory.
The control mode of DRAM controller can access EARLY WRITE, NORMAL READ, PAGE MODE, and BYTE/HALF, and supports EDO DRAM as well as normal DRAM.
DRAM READ/WRITE signals use /DWE signal to control system buses. It supports CAS BEFORE RAS for DRAM REFRESH. Connected with common /CAS(0-3), /RAS(1:0), it consists of 2 banks and each may be connected with up to 2M - 8M halfword, the default setting of this system is 8MB.
The field of DRAM is in figure 7-1 (Entire Structure of Main Circuit for Each Key Signal), related timing diagram is in figure 7-4.

RTC (REAL TIME CLOCK)

RTC circuit maintains current time information, and it operates in both primary power mode and battery back-up mode. As RTC does not in MFP controller, RTC IC is needed separately. This circuit (RTC-4513) receives clock source from an internal 32.768 kHz crystal, and divides it into hours, minutes, seconds, year, month, and day. RTC_EN, DATA and CLK control the RTC IC. RTC_EN is CHIP SELECT signal, DATA is bidirectional signal and used to select mode, write address, read/write data. CLK reads or output data in rising edge.

Parallel Port Interface

KS32C6100 has parallel port interface enabling parallel interface with PC. This part connected with the computer through the centronics connector makes possible parallel interface with the computer. It generates control signal and consists of /ERROR, PE, BUSY, /ACK, SLCT, /INIT, / SLCTIN, /AUTOFD, and /STB.

Data is transmitted according to the standard of IEEE P1284 (http://www.fapo.com/ieee 1284.html). The controller supports compatibility mode which is the traditional way to transmit print data, nibble mode (4bit data) to upload data to the computer, and ECP (Extended Capabilities Port: 8bit data transmission) duplex high-speed transmission with the computer.

Compatibility mode, called as Centronics mode, is protocol which used to transmit data from PC to printer. ECP mode is protocol which supports rapid bidirectional communication with input/output device such as printer, scanner. ECP mode supports 2 cycles for bidirectional communication: Data cycle and Command cycle. Command cycle is formed run-length count and channel addressing. RLE (Run Length Encoding) mode can compress data, and be used to transmit raster image to printer or scanner.

This system uses RLE method for high-speed transmission. It enables data to be printed, uploaded, and downloaded. It also monitors system

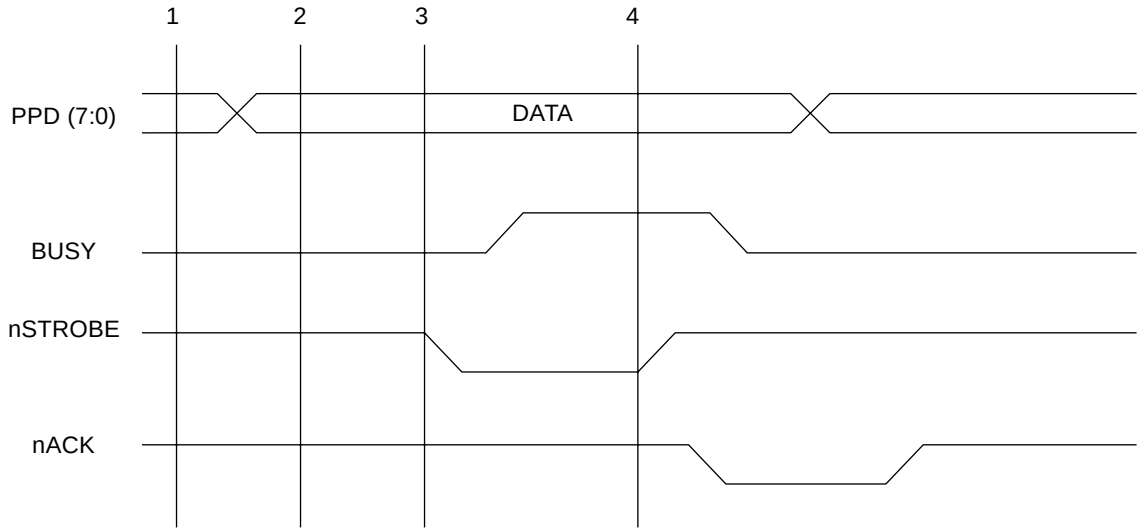


FIG. 7-5 COMPATIBILITY HARDWARE HANDSHAKING TIMING

1. Write the data to the data register.
2. Program reads the status register to check that the printer is not BUSY.
3. If not BUSY, then Write to the Control Register to assert the STROBE line.
4. Write to the Control register to de-assert the STROBE line.

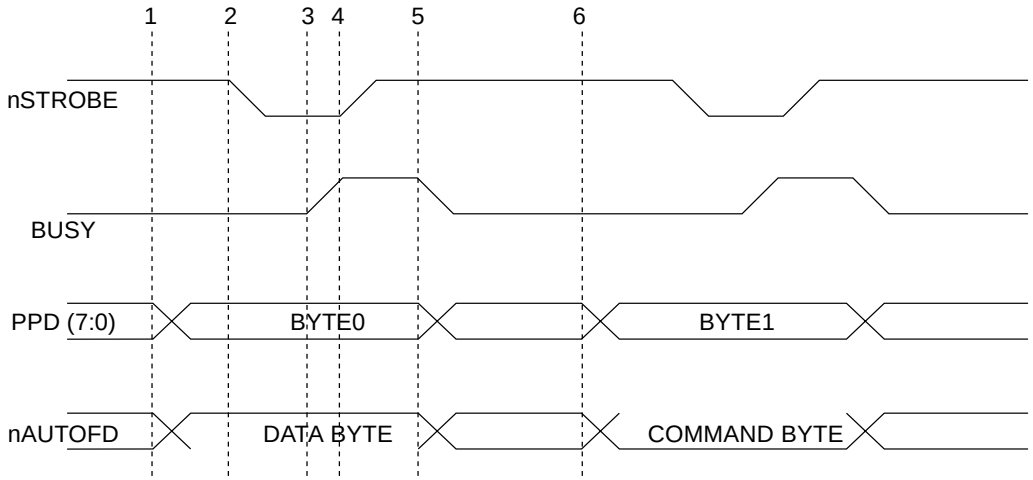


FIG. 7-6: ECP HARDWARE HANDSHAKING TIMING (FORWARD)

1. The host places data on the data lines and indicates a data cycle by setting nAUTOFD.
2. Host asserts nSTROBE low to indicate valid data.
3. Peripheral acknowledges host by setting BUSY high.
4. Host sets nSTROBE high. This is the edge that should be used to clock the data into the Peripheral.
5. Peripheral sets BUSY low to indicate that it is ready for the next byte.
6. The cycle repeats, but this time it is a command cycle because nAUTOFD is low.

)

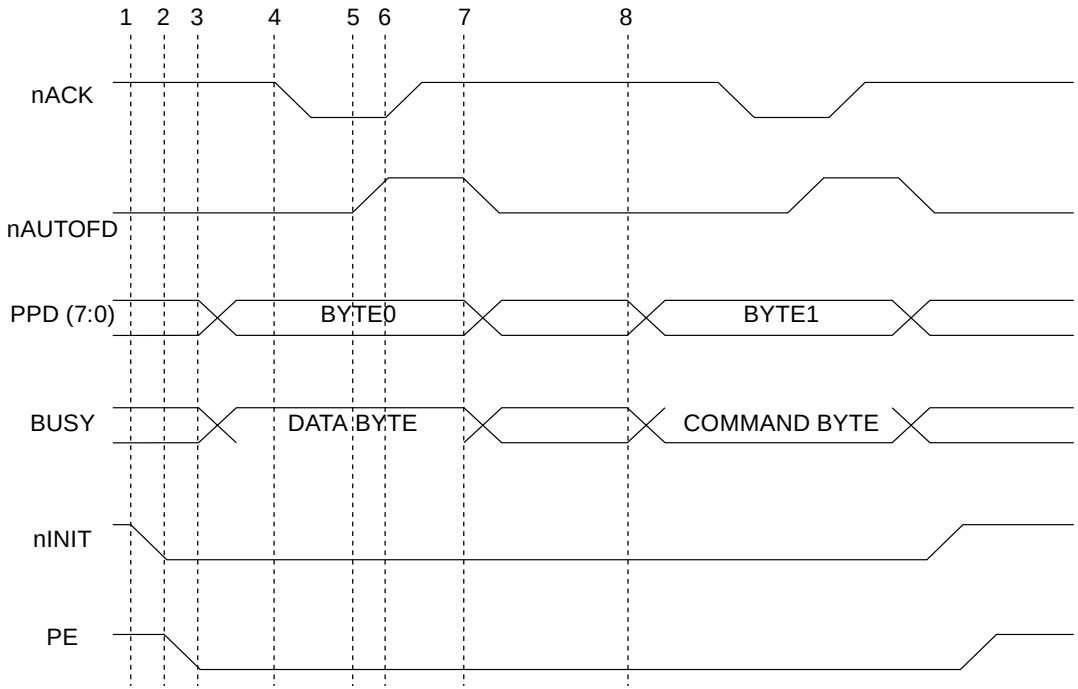


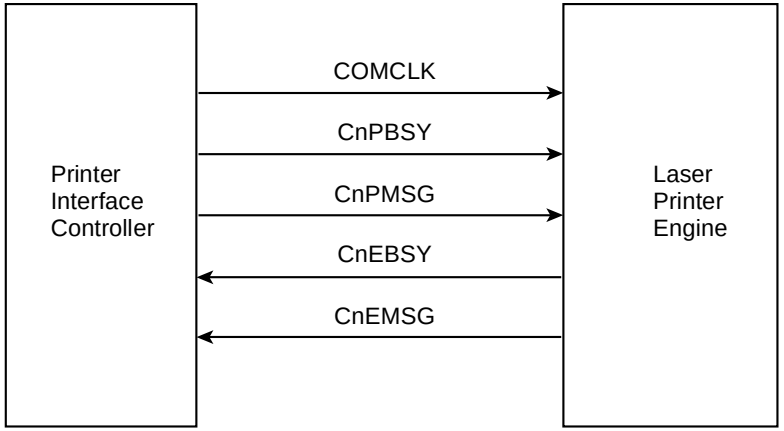
FIG. 7-7: ECP HARDWARE HANDSHAKING TIMING (REVERSE)

1. The host request a reverse channel transfer by setting nINIT low.
2. The peripheral signals that it is OK to proceed by setting PE low.
3. The peripheral places data on the data lines and indicates a data cycle by setting BUSY high.
4. Peripheral asserts nACK low to indicate valid data.
5. Host acknowledges by setting nAUTOFD high.
6. Peripheral sets nACK high. This is the edge that should be used to clock the data into the host.
7. Host sets nAUTOFD low to indicate that it is ready for the next byte.
8. The cycle repeats, but this time it is a command cycle because BUSY is low.

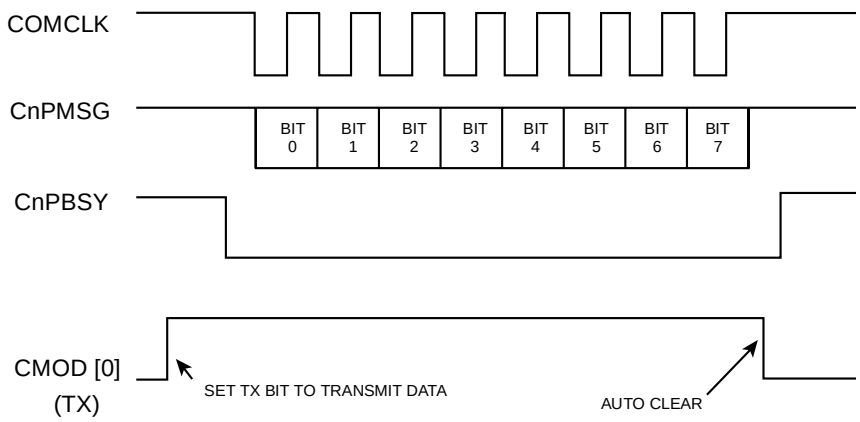
- Message Communication

The print interface uses CnPMSG and CnEMSG to transmit and receive 8-bit message, CnPBSY and CnEBSY to indicate the direction of data transfer and COMCLK to pace data transmissions. PIFC does not employ handshaking, but asserts CnPBSY and CnEBSY before the actual data transmission to provide sufficient time for the logic to prepare for the subsequent data.

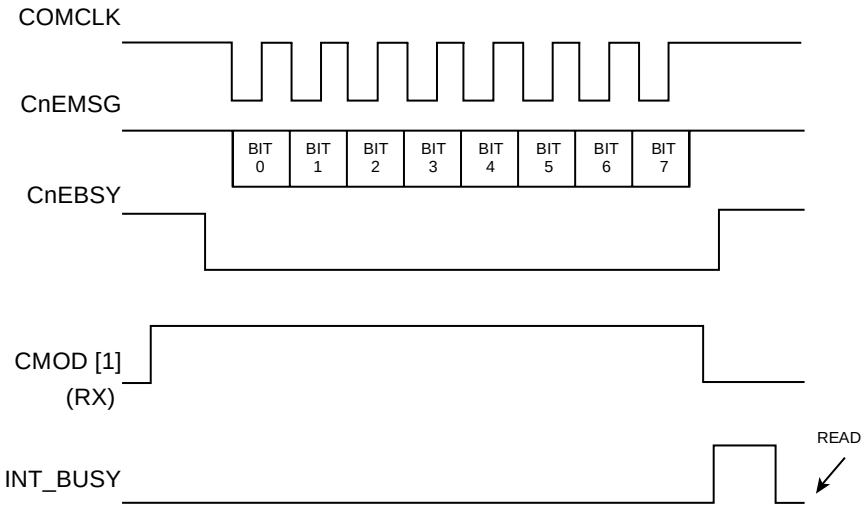
COMCLK remains inactive until either CnPBSY or CnEBSY is asserted and then goes through eight periods for 8-bit data transmission or reception.



Three registers, TBR (Transmit Buffer Register), RBR (Receive Buffer Register), are used for message communication. The TBR and RBR contain the 8-bit command to be transmitted to the printer engine through the CnEMSG pin and the 8-bit engine message received for the printer engine through the Cnemsg pin, respectively. The CMOD contain a transmit enable bit (TX) to make CnPSBY signal active, a read-only status bit (RX) to indicate the Cnebsy signal status and 5-bit prescaler value used to generate COMCLK clock. In message reception, the RX bit is cleared when a low-to-high transition occurs on CnEBSY, and at the meantime an interrupt signal INT_BUSY is posted to indicate that one-byte engine message has been received by PIFC.



Command Message Transfers from KS32C6100 to Printer Engine



Engine Message transfers from Engine to KS32C6100

Table 1: General Purpose I/O Port Of KS32C6100

PIN NAME	CIRCUIT NAME	I/O	STATE	DESCRIPTION
GPI00/EXTDRQ0	/OPE_RST	O	L	Z8201 OPE MICOM RESET OUTPUT
GPI01/EXTDRQ1	/SDREQ	I	L	SDIP DMA REQUEST SIGNAL INPUT
GPI02/EXTDRQ2	RY/BY	O	H	SET FLASH MEMORY WRITE MODE
			L	SET FLASH MEMORY READ MODE
GPI03/EXTACK0	/RST_OUT	O	L	EXTERNAL I/O RESET OUTPUT
GPI04/EXTACK1	/SDACK	O	L	SDIP DMA ACKNOWLEDGE SIGNAL OUTPUT
GPI05/EXTACK2	RTC_CE	O	L	RTC-4513 CHIP SELECT OUTPUT
GPI06/EXTIREQ0	NC			
GPI07/EXTIREQ1	/MIRQ	I	L	MODEM INTERRUPT REQUEST INPUT
GPI08/EXTIACK0	RTC_CLK	O		RTC-4513 CLOCK OUTPUT
GPI09/EXTIACK1	RTC_DATA	I/O		RTC-4513 DATA INPUT/OUTPUT
GPI010/PPDOE	/WR_FLASH	O	L	FLASH MEMORY WRITE CONTROL SIGNAL OUTPUT
GPI011/nCPUPWR	NC			
GPI012/nENGPWR	NC			
GPI013/TECLK	/EXITP	O	L	
GPI014	/TONER_DET	I	L	UNUSED
GPI015/TIMEOUT0	KEYCLICK	O		KEY CLICK OUTPUT SIGNAL

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
MCLK	206	I	External master clock input. It has a 50% duty cycle and an operating frequency up to 33MHz.
CLKSEL	201	I	Clock select. When CLKSEL is “1” (High level), MCLK is used as internal master clock directly. When CLKSEL is “0” (Low level), the external MCLK frequency is divided by two and then used as the internal master clock.
nRSTO	194	O	Reset signal output from watch dog timer.
nRESET	195	I	Not reset. nRESET is the global reset input for the KS32C6100. To reset system, nRESET must be held to Low level for at least 65 machine cycles.
nBK0HW	198	I	Bank 0 data bus width select. When nB0HW is “0”, the bank 0 data bus is recognized as 16-bit wide. When nB0HW is “1”, the bank 0 data bus is recognized as 32-bit wide.
TMODE	197	I	Test pin. For normal operation, this pin should be connected to GND.
TCK	208	I	TAP controller clock.
TMS	204	I	TAP controller mode select.
TDI	202	I	TAP controller data input.
TDO	203	O	TAP controller data output.
TnRST	196	I	TAP controller reset signal.

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
XA[23:0]/ ExtMA[23:0]	40~45 47~51 54~60 63~68	I/O	The 24-bit address data bus, XA[23:0], acts as an output when the ARM core or DMA is accessing the chip-select banks and covers the full 16M-word (32-bit) address range of each ROM and SRAM bank, and 64K-byte external I/O address range; or it acts as an input in external master mode and corresponds to ExtMA[23:0], the lower 24 bits out of 28-bit external master address bus ExtMA[27:0].
XD[31:0]	75~79 81~87 89~94 96~102 106~112	I/O	External bi-directional three-state 32-bit data bus. The KS32C6100 data bus supports external 8-bit, 16-bit, and 32-bit bus connection.
nRCS[3:0]	69 72~74	O	Not ROM chip select. The KS32C6100 can access up to four external ROM banks. nRCS0 corresponds to ROM bank 0, nRCS1 to bank 1, and so on.
nSCS	28	O	Not RSAM chip select. Selection to access external SRAM bank.
nECS[3:0]	29~32	O	Not external chip select. Four I/O banks are provided for memory-mapped external I/O operations, each of which contains up to 16K bytes. The four nECS signals are used to select the four I/O banks respectively.
nOE	37	O	Not data output enable for ROM/SRAM/External IO. Whenever a memory access for ROM/SRAM/External IO occurs, the nOE output controls the output enable port of the specific device.
nWE[3:0]/ ExtMnDB[3:0]	33~36	O	Not data write enable for SRAM/External I/O. Whenever a memory access for SRAM/External I/O occurs, the four nWE outputs indicate the byte selections and control the write enable port of the specific devices. In external bus master mode, it acts as ExtMnDB[3:0] to indicate the byte latch for external master accessing memory.

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
DA[12:0] / ExtMA[27:24] ExtMBST ExtMAS[1:0] ExtMRnW	128~133 135~141 128~131 138 139~140 141	I/O	DA[12:0] acts as an output for the 13-bit DRAM address bus. In external master mode, it acts as an input, in which ExtMA[27:24] corresponds to the higher 4-bits out of 28-bit external master address bus ExtMA[27:0]; ExtMBST is burst mode selection signal;ExtMRnW is R/W control signal; and ExtMAS[1:0] is memory access size control signal which is used to inform KS32C6100's memory controller that the external master will access memory in byte (00), halfword (10). Note the state (11) for ExtMAS[1:0] is not used.
nRAS[5:0]	122~127	O	Not row address strobes for Dram banks. The KS32C6100 supports up to six DRAM banks. One nRAS output is provided for each bank.
nCAS[3:0]	116~118 121	O	Not column address strobes for DRAM. The four nCAS outputs indicate the byte selections whenever a DRAM bank is accessed.
nDOE	115	O	Not output enable for DRAM. Whenever a DRAM access occurs, the nOE output controls the output enable port of the specific DRAM.
nDWE	114	O	Not write enable for DRAM. Whenever a DRAM access occurs, the nWE output controls the write enable port of the specific DRAM.
nSRD[1:0]	144, 146	O	Not special I/O read strobe with address latch.
nSWR[1:0]	145, 147	O	Not special I/O write strobe with address latch.
ExtMREQ	23	I	External master request. The ExtMREQ input signal indicates that the external master requests to hold KS32C6100 system bus.
ExtMACK	24	O	Acknowledge for external master holding request. This output signal indicates that the external master holding request has been accepted.
ExtMnDL	25	I/O	External master data latch signal.

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
UCLK	156	I	The external UART clock source input. Usually, MCLK is used as the UART clock source.
RXD	151	I	Receive data input for the UART. RXD is the UART's input signal for receiving serial data.
DTR	149	I	Data terminal ready. DTR input signals the KS32C6100 that the peripheral (or host) is ready to transmit or receive serial data.
TXD	150	O	Transmit data output for the UART. TXD is the UART's output for transmitting serial data.
DSR	148	O	Data set ready. DSR output signals the host (peripheral) that the KS32C6100 UART is ready to transmit or receive serial data.
SIO_RXD	153	I	Receive data input for the serial I/O. Rxd is the SIO's input signal for receiving serial data.
SIO_TXD	152	O	Transmit data input for the serial I/O. TXD is the SIO's output for transmitting serial data.
nSELECTIN	11	I	Not select information. This input signal is used by parallel port interface to request "on-line" status information.
nSTROBE	12	I	Not strobe. The nSTROBE input indicates when valid data is present on the parallel port data bus, PPD[7:0].
nAUTOFD	13	I	Not autofeed. The nAUTOFD input indicates whether data on the parallel port data bus, PPD[7:0], is an autofeed command. Otherwise, the bus signal are interpreted as data only.
nINITIAL	14	I	Not initialization. This input signal initializes the parallel port's input control.
nACK	15	O	Not parallel port acknowledge. The nACK output signal is issued whenever a transfer on the parallel port data bus is completed.
BUSY	16	O	Parallel port busy. The BUSY output signal indicates that the KS32C6100 parallel port is currently busy.

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
SELECT	17	O	Parallel port select. The SELECT output signal indicates whether the device connected to the KS32C6100 parallel port is “on-line” or “off-line”.
PERROR	18	O	Parallel port paper error. PERROR output indicates that a problem exists with the paper in the laser printer. It could indicate that the printer has a paper jam or that the printer is out of paper.
nFAULT	19	O	Not fault. The nFAULT output indicates that an error condition exists with the laser printer. This signal can be used to indicate that the printer is out of toner or to inform the user that the printer is not turned on.
PPD[7:0]	3~10	I/O	Parallel port data bus. This 8-bit, tri-state bus is used to exchange data between the KS32C6100 and an external host (peripheral).
COMCLK	158	O	Command clock. COMCLK is used to synchronize command data that the KS32C6100 sends to the printer engine, as well as the status messages that the KS32C6100 receives from the printer engine. Whenever the KS32C6100 receives status data, it selects itself (COMCLK) as the source of the synchronization signal. Whenever the KS32C6100 sends a command, the data is synchronized with COMCLK.
CnPBSY	160	O	Not command busy. This output signal indicates that the KS32C6100 is sending command data to the printer engine. When CnPBSY goes active, the command data, which is COMCLK, is sent to the engine.
CnPMSG	161	O	Not command message. The CnPMSG output is used to send a one-byte command, synchronized with COMCLK, to the printer engine. The command data from the KS32C6100 is sent MSB-first.

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
CnEBSY	162	I	Not engine busy. This signal indicates whether or not the laser printer engine ready to send a 1-byte status message in response to a command from the KS32C6100. When CnEBSY is active, the STATUS data is sent, synchronized with COM-CLK.
CnEMSG	163	I	Not engine message. This input signal is used by the printer engine to send a 1-byte status message in response to a command from the KS32C6100. When CnEBSY is active, the STATUS data is sent, synchronized with COMCLK.
VCLK[1:0]	164, 165	I	Video shift clock. The VCLK input is a free-running signal that is used to drive transfers of video data. The two VCLK signals can supplied by the laser printer engine or by an on-PBA oscillator.
nENGPRQ	166	I	Not page synchronize signal request. The nENGPRQ input informs the KS32C6100 that the LBP engine is ready to receive the nCPUPSYNC signal. When the printer engine receives the nCPUPRINT command from the KS32C6100, it enables nENGPRQ within a preset time interval. nENGPRQ is disabled whenever the nCPUPSYNC level goes active Low.
nENGHSYNC	169	I	Not engine horizontal synchronize. The nENGHSYNC input is used to synchronize signals with the horizontal scanning line of a printer engine. A new line starts with each nENGHSYNC pulse. When nENGHSYNC goes active, the KS32C6100 sends one row of data to the engine, thereby maintaining synchronization with video out (VIDEO_OUT).
nCPUPSYNC	170	O	Not page synchronize. The nCPUPSYNC output is used to synchronize signals with the print of one page. The printer engine waits until nCPUPSYNC goes active. After a predetermined time interval has elapsed, the KS32C6100 must send image data synchronized with nENGHSYNC.

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
nENGREADY	171	I	Not engine print ready. This nENGREADY input signal indicates that the printer engine is ready to print. nENGREADY goes active when certain status conditions in the printer engine are met.
nCPUPRINT	172	O	Not start print. The nCPUPRINT output is a print command issued by the KS32C6100. When nCPUPRINT goes active, the printer engine starts printing. the KS32C6100 must then hold nCPUPRINT to its active state until nCPUPSYNC becomes inactive.
VIDEO_OUT	173	O	Video data output. The VIDEO-OUT signal carries the actual image data to be printed by the laser printer. VIDEO-OUT must be synchronized with nCPUPSYNC for vertical scanning and with nENGHSYNC for horizontal scanning.
GPIO[15:0]	175~182 185~192	I/O	Programmable I/O ports. Each of the sixteen I/O ports can be mapped to a specific signal name (to external interrupts, for example). The port assignments that follow are used as one example of such an I/O port map.
GPIO[15]: TIMEOUT0	192	O	Timer 0 output. When a timer 0 time-out occurs, the TIMEOUT0 pulse is output in predefined time intervals.
GPIO[13]: TECLK	190	I	External timer clock input.
GPIO[12]: nENGPWR	189	I	Engine power ready. nENGPWR is a status signal from the printer engine. Actually, any I/O port pin can be mapped to input nENGPWR without any modifications.
GPIO[11]: nCPUPWR	188	O	KS32C6100 power ready. nCPUPWR is a status nCPUPWR signal that is output to the laser printer engine. Actually, any I/O port pin can be mapped to output this signal without any modifications.
GPIO[10]: PPDOE	187	O	Parallel data output enable. When PPDOE is PPDOE “1”, the parallel port data bus, PPD[7:0], is in output mode. Otherwise it is in input mode.

Table 2: KS32C6100 Signal Descriptions

Signal	PIN No.	Type	Description
GPIO[9]: ExtACK1	186	O	Interrupt acknowledge for external ExtiACK1 interrupt request ExitREQ1.
GPIO[8]: Ext1ACK0	185	O	Interrupt acknowledge for external interrupt ExtiACK0 request ExitREQ0.
GPIO[7]: ExtREQ1	182	I	External interrupt request input 1. For a valid ExtiREQ1 request, this signal must be held active for at least four machine cycles
GPIO[6]: ExtREQ0	181	I	External interrupt request input 0. For a valid request, this signal must be held active for at least four machine cycles.
GPIO[5]: ExtDACK2	180	O	DMA acknowledge for external DMA2 request. The active output signal is generated whenever a DMA transfer on GDMA1 is completed.
GPIO[4]: ExtDACK1	179	O	DMA acknowledge for external DMA1 request. The active output signal is generated whenever a DMA transfer on GDMA0 is completed.
GPIO[3]: ExtDACK0	178	O	DMA acknowledge for external DMA0 request. The active output signal is generated whenever a DMA transfer on GDMA is completed.
GPIO[2]: ExtDREQ2	177	I	External DMA2(GDMA1) request. ExtDREQ2 is asserted by a peripheral device to request a data transfer using GDMA1. This signal must be held active for at least four machine cycles
GPIO[2]: ExtDREQ1	176	I	External DMA1(GDMA0) request. ExtDREQ1 is asserted by a peripheral device to request a data transfer using GDMA0. This signal must be held active for at least four machine cycles.
GPIO[2]: ExtDREQ0	175	I	External DMA0(GDMA) request. ExtDREQ0 is asserted by a peripheral device to request a data transfer using GDMA. This signal must be held active for at least four machine cycles.

NOTE: The I/O port pin assignments described in this table are presented as only one example.
You can modify the port map as necessary in order to meet the requirements of a specific application.

Reset Circuit

Reset circuit consists of power reset including primary reset (/F_POR), secondary reset (/POR) and reset (/RSTO) by watch dog timer. Primary reset is used to initialize flash memory when the system power turn on, secondary reset is used to initialize all the system by initializing MFP controller (U1) after initializing flash memory.

In primary reset, flash memory is read mode enabling to fetch program code, in secondary reset, MFP controller (KS32C6100) is waked up and external peripheral is initialized, the system is activated.

Figure 7-8 is block diagram related to the system reset, figure 7-9 is timing diagram.

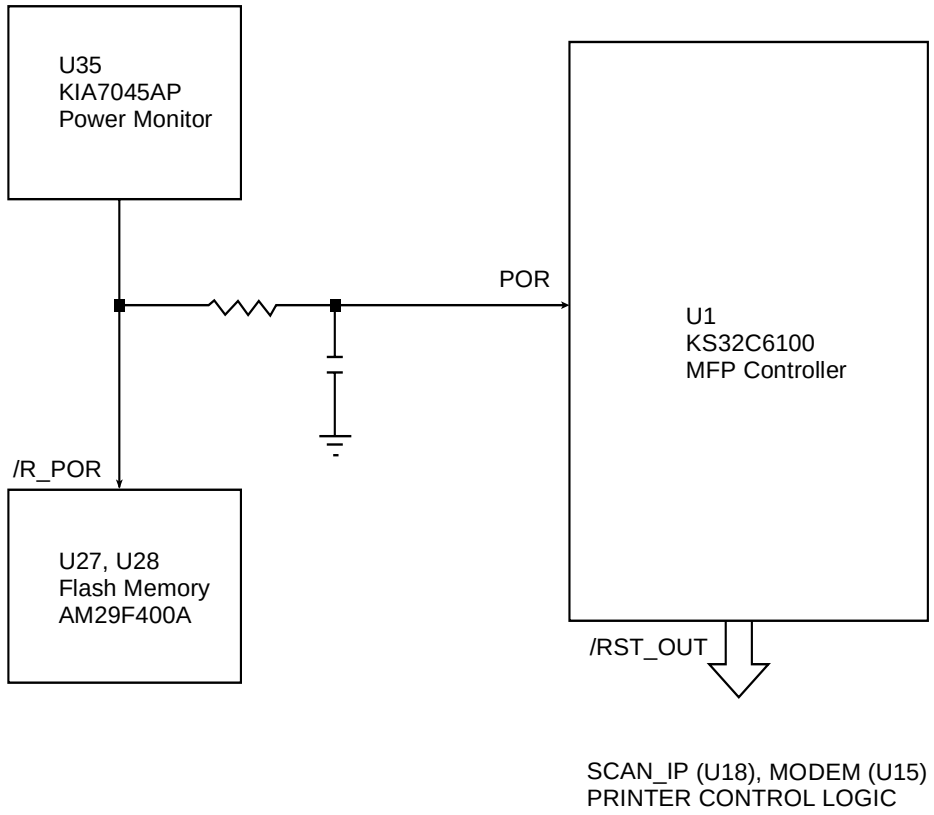


FIG. 7-8: POWER RESET DIAGRAM

Main power (+5V) drops to +4.5, power monitor (U103) perceive this condition and output changes low (0V) to high (+5). The reset signal inputs into reset pin of flash memory built in booting program. Flash memory switches read mode by this signal, the signal will access in MFP controller.

After that reset signal inputs into MFP controller (KS32C6100) and MFP controller wakes up. Reset signal to MFP controller (U16) inputs into internal circuit (after 65MCLK) by internal filter. Reset is completed after 256 MCLK, then program access is started. Reset of external device is dissolved in initial booting program.

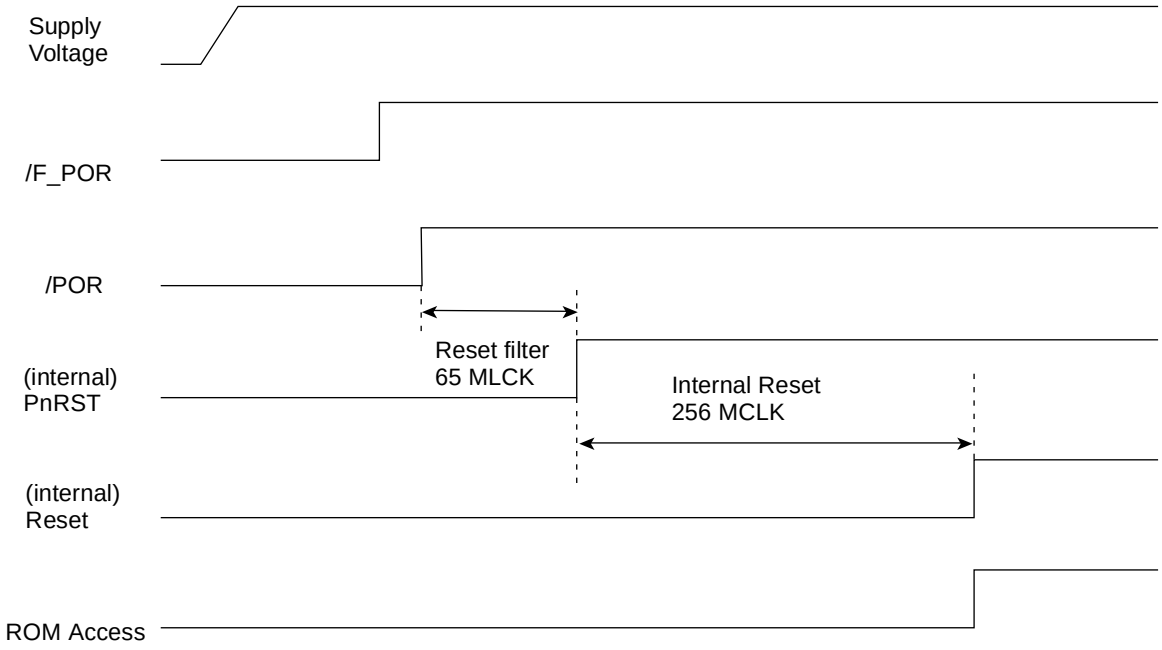


FIG. 7-9: POWER RESET TIMING DIAGRAM

Power Monitor (U35: KIA7045AP)

If 5V power to KIA7045F drops to between +4.65V and +4.35V (typically 4.5V), power failure will be indicated and the output of KIA7045F will go “low”. This cause the flash memory (U27M28) and KS32C6100 (U1) to became active (“low”=reset). The flash memory and KS32C6100 reset causes the SCAN-IP connected to /RST_OUT terminal, modem, print controller to be reset. The output terminal of KIA7045AP is an open
drain configuration, output through a 5.1K pull-up resistor.

Watch Dog Output (/RSTO)

Watch dog timer is programmable counter in the KS32C6100. As initial state is enable, set the state to be disable. After system switches to initialize mode, set the state to be enable. If the watch dog reset and power on, according to default setting,

Memory

SUMMARY

System memory consists of 2MB flash memory, 32KB SRAM, 8MB DRAM. MASKROM is selected optional.

MEMORY STRUCTURE

Flash memory and DRAM are selected by chip select (/RCSO-1, /FMEM_CS, /RASO-1, /SCS, / CASO-3) lines, and data is accessed by the units position of the word.

Modem, TX & RX Related Circuits

MODEM

These circuits control signal transmission between the internal modem and the LIU or a remote modem. The KS16117 modem is a signal-chip fax-modem having features to detect and generate DTMF tones. TX OUT (pin44) is the modem output port, and RXIN (pin45) is the input port. /PORI (pin67) from KS32C6100 is the signal which enables modem initialization at system power on.

D0~D7 (pin8-15) are the data bus RS0-RS4 (pin56~60) are internal resister select signals which determine the mode.

/CS (pin54) is chip select, /RD (pin55), /WR (pin53) are read and write control signals. /IRQ (pin52) is modem interrupt output signal. The transmission speed of KS16117 is maximum 14.4 Kbps.

TRANSMIT CIRCUIT

This circuit controls transmission of analog signals from the modem (KS16117).

Output voltage from the modem (TXOUT:44) is buffered through LIU PBA and OP-AMP after signal smoothing and filtering, and finally output to the line.

RECEIVE CIRCUIT

In receive mode, analog signals from the LIU PBA are amplified and transferred to RXIN:45 through the smoothing filter.

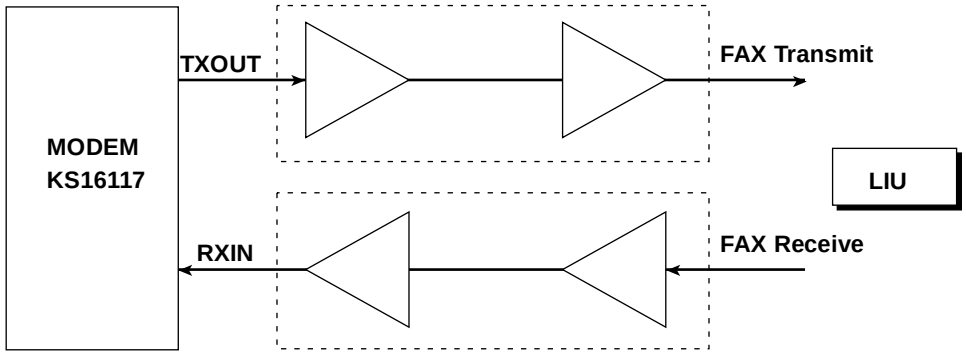


FIG. 7-10: TX AND RX PART

Table 3: Hardware Interface Signal Descriptions

Signal	PIN No.	Type	Description
RS4 RS3 RS2 RS1 RS0	56 57 58 59 60	I	**Register select bus** These lines are used to address interface memory registers within the modem. When $\overline{CS}$ is active, the modem decodes RS0 through RS4 to address one of its 32 internal interface memory registers. RS4 is the most significant bit. In a typical design, RS0-RS4 are connected to A0-A4 address lines of the host microprocessor.
D7 D6 D5 D4 D3 D2 D1 D0	8 9 10 11 12 13 14 15	I/O	**Data bus** These bi-directional data bus lines provide parallel data transfer between the modem and the host microprocessor. D7 is the most significant bit. The direction of the D0-D7 data bus is controlled by the $\overline{READ}$-ϕ2 and $\overline{WRITE}$-R/$\overline{W}$ signals. When not being written into or read from, D0-D7 assume the high impedance state.
$\overline{CS}$	54	I	**Chip select** The modem is selected and decodes RS0-RS4 when $\overline{CS}$ becomes active at which time data transfer between the modem and the host can take place over the parallel data bus. Typically, $\overline{CS}$ is driven by address decode logic.
$\overline{READ}$-ϕ2	55	I	**Read enable (bus mode) or phase2 (6500 bus mode)** If 8085 bus mode is selected ($\overline{EN85}$ is connected to ground), this signal acts as the $\overline{READ}$ input. If 6500 bus mode is selected ($\overline{EN85}$ is pulled-up to +5V), this signal acts as the Phase 2 clock input.
$\overline{WRITE}$-R/$\overline{W}$	53	I	**Write enable (bus mode) or R/W (6500 bus mode)** If 8085 bus mode is selected ($\overline{EN85}$ is connected to ground), this signal acts as the $\overline{WRITE}$ input. If 6500 bus mode is selected ($\overline{EN85}$ is pulled-up to +5V), this signal acts as the R/W strobe.

Table 3: Hardware Interface Signal Descriptions

Signal	PIN No.	Type	Description
$\overline{\text{IRQ}}$	52	O	**Interrupt request** The modem can use $\overline{\text{IRQ}}$ to interrupt the host microprocessor program execution.$\overline{\text{IRQ}}$ can be enabled in the modem interface memory to be asserted in response to a specified change of conditions in the modem status.$\overline{\text{IRQ}}$ is an open drain output and must be connected to an external pull up resistor of suitable value (typically, a 5.6KW, 1/4 watt, 5% resistor is adequate).
TXDI	79	I	**Transmit data input** TXDI is the modem's transmit data serial input. When configured for serial data mode (PDME bit is reset) the modem accepts data bits for transmission via this input. When transmitting data, the modem reads the TXDI pin on the rising edge of DCLK. When the modem is configured for parallel data mode (PDME bit is set), the TXID pin is ignored and transmit data is accepted by the modem via the DBFR register.
RXDO	95	O	**Receive data output** RXDO is the modem receive data output. Received data is output to the DTE via the RXDO pin in both serial and parallel data modes (PDME bit set or reset). When receiving data, the modem outputs a data bit on the falling edge of DCLK. The center of RXDO bits coincides with the rising edge of DCLK, thus, the DTE should read RXDO on the rising edge of DCLK.
RTS	64	I	**Request to send** When the $\overline{\text{RTS}}$ input is forced low, the transmitter starts transmitting the modem training sequence has been transmitted (signaled by the $\overline{\text{CTS}}$ pin and CTSB bit becoming active), data present at either the TXDI input pin in serial mode (PDME bit is reset) or written into the DBFR register in parallel mode (PDME bit is set) is modulated and transmitted. The $\overline{\text{RTS}}$ input pin is logically ORed with the RTSB bit in the interface memory.
$\overline{\text{CTS}}$	78	O	**Clear to send** $\overline{\text{CTS}}$ is used to indicate of that the transmission training sequence has been completed and the modem is ready to transmit any data present at either the TXID input pin in serial mode (PDME bit is reset) or in DBFR in parallel mode (PDME bit is set).

Table 3: Hardware Interface Signal Descriptions

Signal	PIN No.	Type	Description
$\overline{\text{RLSD}}$	79	O	**Received line signal detector** $\overline{\text{RLSD}}$ becomes active at the end of the reception of the training sequence indicating the beginning of data reception. If no training is detected but the received energy level is above the $\overline{\text{RLSD}}$ off-to-on threshold, $\overline{\text{RLSD}}$ will become active.
XTALI XTALO	68 69	I O	**Oscillator In/Out** An external 24.00014MHz (KS16116) or 38.00053 MHz (KS16117) crystal and two capacitors are connected to the XTALI and XTALO. Alternatively, an external crystal oscillator of the appropriate frequency can be connected to the XTALI input leaving XTALO unconnected. In order to minimize electromagnetic emissions and ensure proper oscillator start up and operation, the crystal and the capacitors should be placed as close as possible to the XTALI and XTALO pins. Further, the circuit board traces connecting the crystal and capacitors to XTALI and XTALO should be as short as possible. The use of circuit board bias should be avoided in the crystal oscillator circuitry and circuit board traces should be routed using curved turns.
$\overline{\text{PORI}}$	67	I	**Power On reset In** When power is first applied to the modem, $\overline{\text{PORI}}$ is held low for approximately 350ms. The modem is turn ready for normal operation 15ms after the low to high transition of PORI.
V_{DD}	22, 72	Power	**+5V Digital voltage supply** This pin must be connected to +5V +/- 5% supply. The +5V Digital power supply voltage ripple should not exceed $100mV_{p-p}$.
V_{CC}	46	Power	**+5V Analog voltage supply** This pin must be connected to +5V +/- 5% supply. The +5V Analog power supply voltage ripple should not exceed $100mV_{p-p}$.
GNDD	6, 7, 16, 23, 50, 66, 77, 80, 81, 89, 92, 97	GND	**Digital ground** These pins must be connected to digital ground.

Table 3: Hardware Interface Signal Descriptions

Signal	PIN No.	Type	Description
GNDA	17, 21, 30, 43, 47	GND	**Analog ground** These pins must be connected to analog ground.
$\overline{EN85}$	65	I	**Enable $\overline{8085}$ bus mode** When $\overline{EN85}$ is connected to ground, 8085 bus mode is selected and the modem can interface directly to an 8085 compatible microprocessor bus using $\overline{READ}$ and $\overline{WRITE}$. When $\overline{EN85}$ is pulled-up to +5V, 6500 bus mode is selected and the modem can interface directly to a 6500 compatible micro-processor using $\phi 2$ and R/$\overline{W}$.
XCLKO	70	O	**XCLKO output** This output pin is a 12 MHz (KS16116) or 19 MHz (KS16117) square wave output derived from XTALI.
YCLKO	71	O	**YCLKO output** This output pin is a 6 MHz (KS16116) or 9.5 MHz (KS16117) square wave output derived from XTALI.
SEPXO SEPYO	86 90	O	**Serial eye pattern bit data** These two outputs provide two serial bit streams containing eye pattern display data for the oscilloscope X and Y axis. The data words are 9 bits long with the sigh bit shifted out first and the bits clocked by the rising edge of SEPCLK.
SEPCLKX	84	O	**Serial eye pattern bit clock** SEPCLK is a 230.4 KHz clock used to shift the eye pattern data into the serial-to-parallel converters. SEPXO and SEPYO are shifted out by the modem on the rising edge of SEPCLKX.
SEPWCLK	83	O	**Serial eye pattern word clock** SEPWCLK (9600Hz) provides SEPXO and SEPYO 9-bit word timing and its rising edge is used for copying the output of the serial to parallel converters into the X and Y digital-to-analog converters.
TXAO	44	O	**Transmitter analog output** The TXAO can supply a maximum of 2.5 +/- .015 volts into a load resistance of 10Kohm (minimum). An external analog smoothing filter with transfer function 28735.63/(S+11547.34) is required.

Table 3: Hardware Interface Signal Descriptions

Signal	PIN No.	Type	Description
RXAI	45	I	**Receiver analog input** The input impedance of RXAI is greater than 1Mohm. An external analog anti-aliasing filter with transfer function 21551.72/(S+11547.34) is required between the line interface and the modem RAXI input. The maximum input signal level into the anti-aliasing filter should not exceed 0 dBm.
SEPCLK ECLKIN1 RCVO SWGAINO	85 25 98 99	O I O O	**Digital Loopback** **Over-sampling Clock Output.** 2.304MHz clock output. Normally tied to ECLKIN1. **Over-sampling Clock Input.** Input to the AFE's over-sampling clock input pin. Normally connected to SEPCLK. **Disable Transmitter Output.** "1" on this pin disables AFE's transmitter. Normally connected to RCVI. **Externally connected to SWGAINI pin.**
TXATT[3:1]	38, 39, 40	I	**Auxiliary Signals** **Analog Transmit Attenuation.** The host can cause the modem to attenuate the transmit analog output in steps of 2dB from 0dB by using the three encoded TXATT[3:1] inputs as follows: TXATT3 TXATT2 TXATT1 Attenuation (dB) 0 0 0 0 0 0 1 2 0 1 0 4 0 1 1 6 1 0 0 8 1 0 1 10 1 1 0 12 1 1 1 14 The TXATT[3:1] lines may be connected directly to 0V or 5V, or to three GPIO lines used as outputs to select the attenuation under the host program control.
BYPASS	36	I	**Receiver Highpass Filter Bypass Enable.** The state of this pin does not have any effect on the operation of the modem, but it should tied to either +5V or ground.

Table 3: Hardware Interface Signal Descriptions

Signal	PIN No.	Type	Description
GP13, GP11 GP[7:2] GP[21:19] GP[17:16]	61, 63 5, 4, 3, 2 1, 100 91, 93, 94 76, 75	I/O I	**General Purpose I/O** General Purpose Input/Output General Purpose Input
NC	19, 20, 27 28, 29, 31 32, 33, 41 51, 62, 73		**No Connection**
SYNCIN1 SYNCIN2	26 74	I I	Eye Sync Input 1, connect to SEPWCLK. Eye Sync Input 2, connect to SEPWCLK.
 VC RCVI RXAMPI SWGAINI VREFN	 48 37 18 24 42	 O I I I O	**Analog Interface** **Center Voltage**. 2.5V output and it needs an external capacitor. **Transmitter Disable.** When tied to “1”, it disables the transmitter side of AFE. **Receiver Amplifier Input.** This internally tied to pin17 which is Analog Ground. **Externally connected to SWGAINI pin.** **Negative Reference Voltage**
AOUT	49	O	Externally connected to bypass capacitor to ground.
 ADIN ADOUT DAIN DAOUT	 87 35 34 88	 I O I O	**Analog Loopback Interface** **Analog-to-digital Data In**. 1-bit input to the internal decimation filter. **Analog-to-digital Data Out**. 1-bit input to the internal AFE’s RXPATH. **Digital-to-analog Data In**. 1-bit input to the internal AFE’s RXPATH. **Digital-to-analog Data Out**. 1-bit output from the internal digital interpolation filter.

SCAN_IP Block Diagram

SCAN_IP internal consists of A/D converter, scanner controller, and image processor. A/D converter changes image signal to digital signal. Scanner controller supplies interface signal between host controller, and CIS driver signal. Image processor performs shading correction of image signal, gamma correction, and logic.

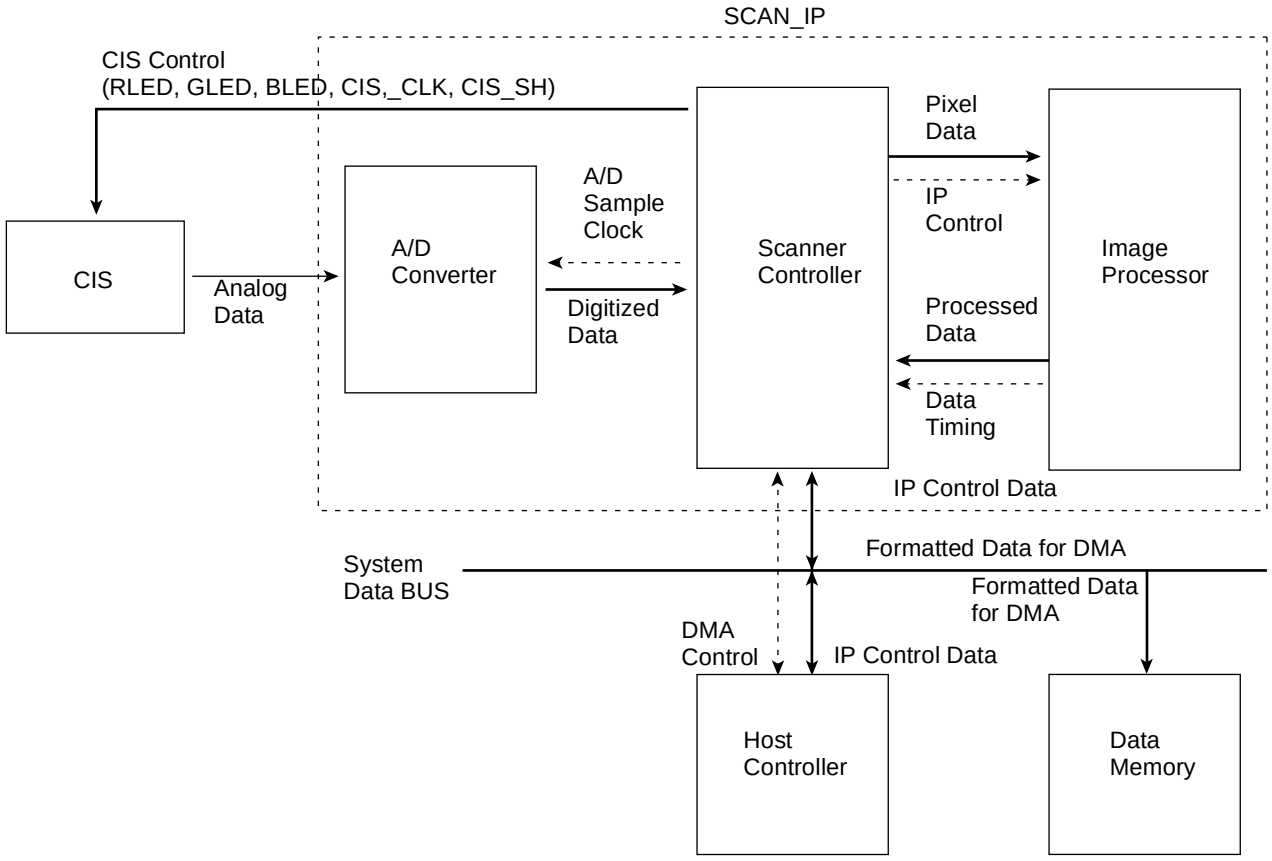


FIG. 7-11: SCAN_IP BLOCK DIAGRAM

Table 4: I/O Port of Scan IP

Signal	PIN No.	Type	Circuit Name	Description H	Description L
GIP 0	23	I	Reserved		
GIP 1	28	I	Reserved		
GIP 2	37	I	Reserved		
GIP 3	43	I	Reserved		
GIP 4	48	I	Reserved		
GIP 5	84	I	/RING_DET		Ring detection from tel line.
GIP 6	92	I	/HOOK_OFF	External phone hook on.	External phone hook off.
GIP 7	113	I	Reserved		
GOP 0	26	O	Reserved		
GOP 1	31	O	RX_CTL	Connected remote path.	Connected modem RX path.
GOP 2	40	O	SOUND_CTL	Connected modem TX path to speaker path	Connected modem RX path to speaker path.
GOP 3	46	O	SPK_CTL	Sound on.	Sound off.
GOP 4	51	O	CLED_CTL	CIS LED on.	CIS LED off.
GOP 5	87	O	CML1	CML relay on.	CML relay off.
GOP 6	103	O	Reserved		
GOP 7	116	O	Reserved		
GPIO 0	24	O	VOL_C	Adjust speaker volume.	
GPIO 1	25	O	VOL_B	Adjust speaker volume.	
GPIO 2	29	O	VOL_A	Adjust speaker volume.	
GPIO 3	30				

Table 4: I/O Port of Scan IP

Signal	PIN No.	Type	Circuit Name	Description H	Description L
GPIO 4	38				
GPIO 5	39				
GPIO 6	44				
GPIO 7	45				
GPIO 8	49				
GPIO 9	50				
GPIO 10	85				
GPIO 11	86				
GPIO 12	93				
GPIO 13	95				
GPIO 14	114				
GPIO 15	115				

PIN Name	PIN No.	Description
XCLK	35	IP_CLK(30MHz) input from OSC.3
/RESET	2	/RST_OUT input from U1-178
SI	89	From line scanning to start signal output at 2.5mS intervals
CLKI	91	Supply 1MHz to CIS clock output
/TRDREQ	118	External DMA request signal output
/TRDACK	117	External DMA acknowledge input
VREKDAC	97	Top standard voltage (+Vref) input of A/D converter
ADCIN	96	Analog signal input of CIS
VREFADC	102	Bottom standard voltage (-Vref) input of A/D converter
TX_A1	105	Scan motor driver control signal, TMIA0 output
TX_B1	106	Scan motor driver control signal, TMIA1 output
TX_A2	107	Scan motor driver control signal, TMIB0 output
TX_B2	108	Scan motor driver control signal, TMIB1 output
TX_EN1	109	Scan motor driver control signal, TMPHA output
TX_EN2	110	Scan motor driver control signal, TMPHB output
TX_INT	111	Scan motor interrupt output

Scanner

Summary

Scanner consists of image sensor which inputs graphic signal using CIS (Contact Image Sensor), scanner control signal, image processing by using image processor, SCAN_IP. Data flow of scanner, block diagram of SCAN_IP, I/O port and circuit description are as follows.

CIS Driver, Input Processor

CIS driver consists of /LED_GND1, 2, 3, CIS_CLK, CIS_SH. CIS driver power supply is 12V, LED driver power supply is 5V. Especially, /LED_GND1, 2, 3 are enable to control voltage from U18 using Q1 in CLED signal.

As CIS input signal, minimum ($-V_{ref}$) values supply about 1.3V to voltage divider (R164, R78) through OP-AMP (U16-5, 7), Maximum ($+V_{ref}$) values supply about 3V to voltage divider (R70, R71) through OP-AMP (U16-3, 1).

Image signal from CIS supply to U31-96 through CN3-1, U5-5, U5-7, and R75.

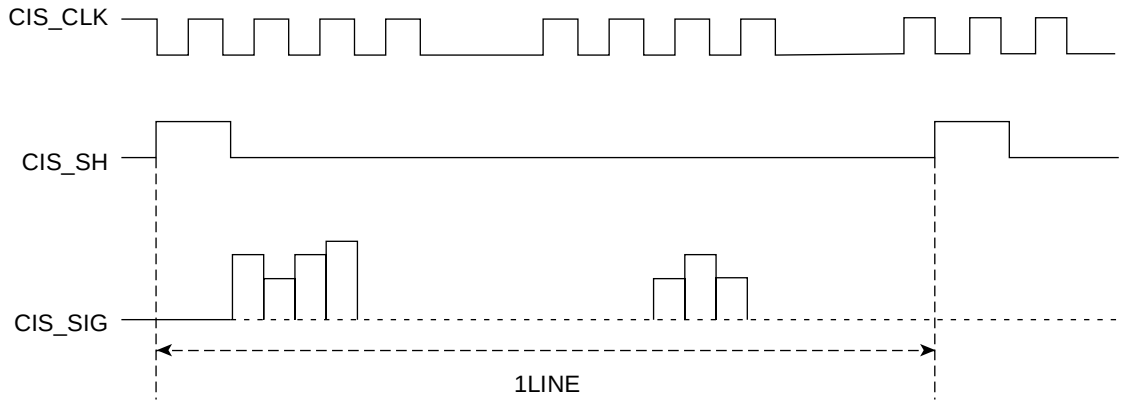


FIG. 7-12: CIS DRIVER CLOCK TIMING

OPE PBA

OPE PBA is separated functionally from the main PBA and operated by the micom(Z8601) in the PBA. OPE and the main use UART (universal asynchronous receiver/transmitter) channel to exchange information. OPE reset can be controlled by the main. OPE micom controls key-scanning and LCD and LED display, detects documents and senses SCAN position. If there occurs an event in OPE (such as key touch and sensor level change), it sends specific codes to the main to respond to the situation and the main analyzes these codes and operates the system. For example, if the main is to display messages in OPE, the main transmits data through UART line to OPE according to the designated format and OPE displays this on LCD, LED. OPE's sensing is also transmitted to the main through UART line and then the main drives necessary operation.

OPE PBA consists of U1 (MICOM, Z8601), LCD, key matrix, LED indicators, SCAN position sensor and the document detect sensor. Refer to OPE Schematic Diagram and Wiring Diagram sections of this manual.

- Signals from the key matrix are delivered to U1X/Y input pin group (P1-x).
- U1 pin 4 (TX DATA) is the UART code sent to MAIN PBA.
- Display from the controller is received at U1 pin 5 (RX DATA).
- LCD drive signals are sent from U1 P2-x pin group, P3-4~P3-6 pins.
- Machine status LED drive signals are sent from U1 P0-x pin group.
- Document detect sensor output is received at U1 pin 33 (P3-3).
- Scan position sensor output is received at U1 pin 43 (P3-1).

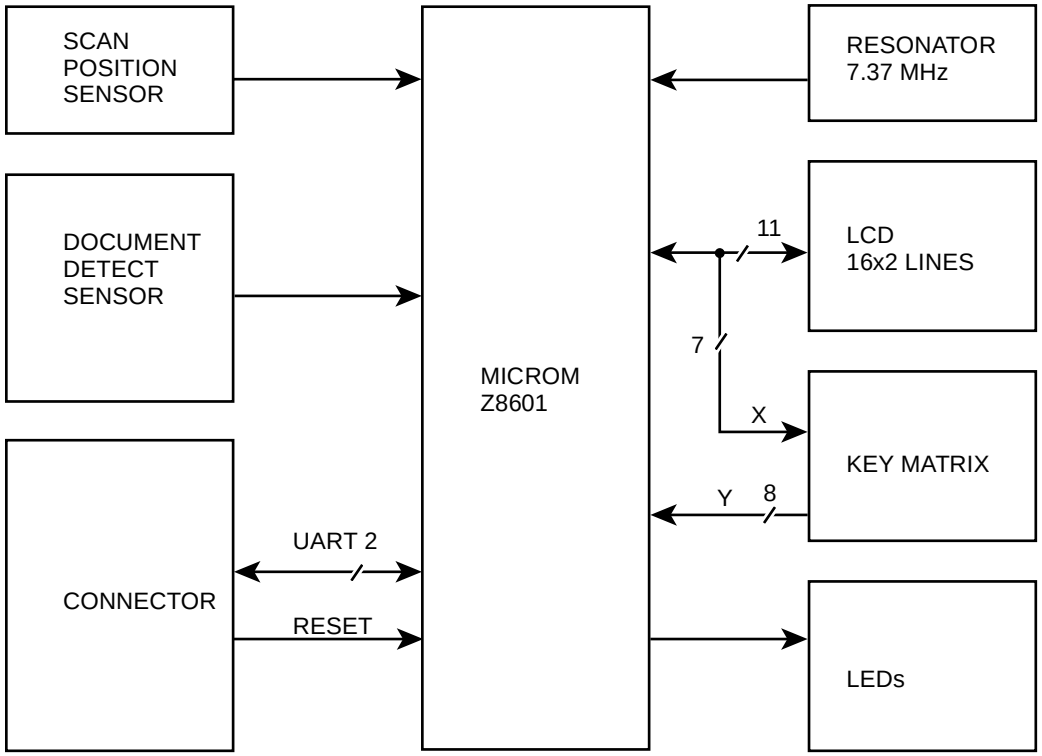


FIG. 7-13: OPE BLOCK DIAGRAM

LIU PBA

LIU (Line Interface Unit) circuit added, and is controlled by the main circuit. It monitors telephone line and helps interface between the system and the telephone line. It uses:
1-LIU(STI9510) to control the whole LIU, MODEM/ LINE INTERFACE, RING SIGNAL DETECTOR, DIALER, LINE CURRENT DETECTOR, and SERIAL INTERFACE.

Modem/Line Interface

This is the path through which transmitted and received data of modem is put in and out.

- CML1 Relay: It divides telephone line into external telephone and fax.
- U3-3 TIT(Transformer Input from Transformer): This single ended input receives image signals from modem through transformer T2 and transmits them on telephone line.
- U3-40 ROT(Receive Output Transformer): This output transformer receives signals on telephone line and delivers them to modem through transformer T1. It has AC impedance of 10Kohm or over.
- AC impedance: Normal operation range of U3(STI9510) is from 15mA to 100mA. DC characteristics depend on the voltage of U3-37 LI(Line Input) terminal and the voltage of resistance R48 between U3-37 LI(Line Input) terminal and U3-39 LS terminal.

Ring Signal Detector

- U3-28(MO) terminals are ring signal output terminals. Q4 and Q5 put out ring signals and drive Piezzo. It has only the functions related to ring detection such as driving the photocoupler of U4 and delivering ring signals to MFP controller of the main.

Dialer

MF DIAL

- Default mode it is set in DP. You can change it to MF mode by control of MFP controller.
- MF signal can be measured at (tone level of low group: typical - 14dBm) U3-4 MFO(DTMF Generator Output). The signal is adjustable by R40, R41 and C29. The adjusted signal enters U3-9 MFI (DTMF Amplifier Input) and is amplified to be transmitted on telephone line.
- U3-39 LS(Line Current Sense Input) terminals show the final signals transmitted to telephone line.

DP DIAL

- If U3-2(DMS) is made Vcc by R42, it is set at 33:67 DP signal. If it is made Vss by R43, it is set at DP signal. This product is set at DP signal.
- DP signal is made by U3-27(DPn) terminals. This signal turns on/off Q1. The signal made at that time turns on/off Q2, which interrupts DC current on telephone line and puts out pulse signal on telephone line.
- U3-35 CS terminals: It makes Make Resistance by shorting telephone line with Vss during Make period of DP dial.

Line Current Detector

- When CML1 relay connects telephone line, U3 (STI9510) of LIU PBA and MFP controller of the main PBA (U16) start communication through UART. U3 of LIU PBA sends signal that includes information of line current value, whenever it receives orders or data from U16 of the main PBA.

Serial Interface

This part does serial communication with MFP controller of the main PBA (MAIN PBA:U16) that controls the whole system. It controls LIU by giving and taking all control orders and line status.

- U3-11 RxD: Schmitt Trigger input, Receiving terminal.
- U3-29 TxD: Open Drain output terminal.
- Standard UART communication.
  - Baud Rate: 9600bps
  - Start, Stop bit: 1bit each
  - Data bits: 8 bit
  - Parity bit: none

Major Functions Of Parts

1. U3: STI9510

   - Key part of LIU PBA. Speech Network, Dialer, Ringer and UART are built in one IC package.

2. U5: PC817

   - Photo coupler. It enables UART of U3(STI9510) to receive control signal or dialing information from MFP controller of the main PBA (U15).

   - Insulation Between primary and secondary circuit part.

3. U6: PC817

   - Photo coupler. It enables UART(U3-29:TxD) of U3(STI9510) to deliver telephone line status or response signal about control signal or dialing information from LIU MFP controller of the main PBA (U15).

   - Insulation Between primary and secondary circuit part.

4. U4: PC817

   - It senses and delivers ring signal to the main PBA.

   - Insulation Between primary and secondary circuit part.

5. U2: PC814

   - It senses hook-off (Line connection) of the external telephone and delivers it to the main PBA.

   - Insulation Between primary and secondary circuit part.

6. BD1: BRIDGE DIODE

   - Regardless of the polarity of DC power from telephone line, the voltage put out on Pin.1 has always + polarity against pin Pin.2. So DC loop forms always in the same direction regardless of the polarity of the telephone line.

7. T2,T3: TRANSFORMER

   - It delivers signals from the telephone line to modem or signals from modem to the telephone line.

   - Insulation Between primary and secondary circuit part.

SMPS (Switching Mode Power Supply)

AC Input Stage

AC Input power path is the Fuse(F201) for AC current limit, the Varistor(TNR201) for by-passing high voltage surge, the discharge resistor(R201), the AC Impulse Noise Filtering Circuit(C201/L201/C202), the Common Mode Grounding Circuit(C203/C204), the 2nd noise filter(L202), and the thermistor(TH201). When power is turned on, TH201 limits Power-On-In Rush-Current by it's high resistance, and when its temperature rise, its resistance becomes approximately zero ohms.

SMC (Switched Mode Control)

The AC input voltage is rectified and filtered by DB201 and C207 to create the DC high voltage applied to the primary winding of T201. T201 pin #1 is driven by the SMPS device TOP226(U201). U201 auto-starts and chops the DC voltage. The U201 is PWM SMPS IC and has internally a SMC (switched mode control) IC and a MOSFET output stage. The SMC IC has a Auto-restart without a Power Supply for the IC and a Thermal Shutdown function and so on. C208/R208/D202 clamp leading- edge voltage spikes caused by transformer leakage inductance. The power secondary winding (pin #11-12) is rectified and filtered by D252,C251,L251, and C255, C259 to create the 5V output voltage. The bias winding (pin #4-5) is rectified and filtered by D203 and C213 to create U201 bias voltage. The secondary output 5V is regulated through the path of the voltage divide by R253/R254 - U251 switching - PC252 - the bias voltage of U201 - U201 PWM duty cycle - T201 secondary voltage. C209 filters internal pin, determines the auto-restart frequency, and together with R251 and R210, compensates the control loop. Q251 of the secondary stage 24V is the Low Power-loss Regulator with built-in overcurrent protection function and overheat protection function, and consists a control IC and a drive transistor. It switches the input DC voltage and the switched DC voltage is filtered by C257. D204 and D205 clamp impulse noises.

Fuser Drive

Fuser is driven by the Triac(Q201) that AC input power is applied directly and the Photo-triac(PC251) that is controlled by Engine controller. The Thermistor resistance changes according to Heat Roller in Fuser, the voltage in temperature sensing circuit changes according to this resistance change, and this feedbacks to Engine Controller, it controls temperature by PID method.

Engine Controller

Power On Reset

The reset circuit initializes the CPU(U3) at power on and prevents unstable operation due to power fluctuations. It consists of LM393(U5) - voltage comparator-, and RC for reset timing.When a DC 3.8V or higher are applied to LM393ís pin #3, the “RESET” signal goes “HIGH” and the CPU begins the initialization procedure, “RESET” is active for approximately 122ms.

CPU(+5V)

The used CPU is a 8bit microprocessor, SAMSUNG KS88C4316(U3). This is operated at 6.944MHz and controls all IC’s. The shape is a 64pin DIP type.

EPROM (+5V)

The EPROM, 27C256(U2), has the storage capability of 256KBits and the access time is 150ns. The EPROM stores the program data that controls the Engine part.

Address Latch

There contain Address and Data in CPU port[1.7:1.0] signals. This signals are applied to LS574(U4) and Addresses synchronize with “AS”(Address Strobe) and output to EPROM(U2).

Extended Output Ports

HC259(U12) is composed of 3-to-8 Decoder and Output Latch. Address x8000 to x8007 are mapped Output Port, the D0 value is latched ports. This outputs control the clutch, LSU, HVPS.

NVRAM Control

The NVRAM(U1) stores “Used Sheet Count” for SET and Developer unit. To control it, it is selected by “CS”, and “DI”/”DO” synchronizes with “SK” clock writes in/reads out the serial data to/from the NVRAM.

Motor Driving(+24V)

The Motor Driver, SLA7029M(U207), is used to drive the Main Stepping Motor. An SLA7029M(U207) receives Motor Drive Enable and two phase signals from the CPU. It then generates a constant-current unipolar pulsed signal for Motor driving, applied to the Motor through R5(1ohm, 5%, 3W) and R6(1ohm, 5%, 3W).

Solenoid Clutch(+24V)

The Solenoid controls the paper Pick-up Clutch. The Solenoid receives control signal from U12 Q0. KSC1008-Y(Q4) is the driving transistor, and 1N4003(D1) protects KSC1008-Y(Q4) from the noise pulse generated by deenergizing the Solenoid

Fuser Control(+24V, AC Power)

The Fuser Temperature Control circuit reads the Heat Rollers Thermistor voltage at CPU port 5.0, and turns the Fuser unit on and off via CPU port 6.4 and KSC1008 (Q3). If CPU port 6.4 or LM393(U5) pin #7 are “LOW”, KSC1008 is off and the Fuser Lamp is off. LM393ís pin #5 is proportional to fixing units temperature. LM393 pin #6 is the “OVERHEAT” signal. If LM393 pin #5 is less than its pin #6, its pin #7 output is “LOW”, keeping the fixing unit off. The “Fuser on” signal of Q3 turns the Triac through the Photo LED on inside the Photo Coupler(PC251). And PC151 trigger input signal supplies into the Triac Thyristor(Q201), then the Fuser’s Heat Lamp turns on.

Cover Open Sensing(+24V)

“Cover Open Sensor” is placed on the left top of Printer. If the front cover is open or Developer unit is placed in, the Printer does not operate.

Paper Sensing(+5V)

There are three Sensors for the paper in the Printer:

1. Paper Empty Sensing
   It is placed in Paper Cassette, and senses if there are papers in Cassette.

2. Paper Feed Sensing
   It is placed before Transfer process, and senses if the paper is feeding. When the paper feeding is sensed by it, Printer image data is output to LSU.

3. Paper Check
   It is placed on the side of paper path. When narrow paper is feeding, the paper does not touch the actuator, and it is sensed the narrow paper. The Printer Engine check resistance of Transfer Roller and the feeding paper, if the feeding paper width is narrow, THV according to the resistance outputs higher voltage than wide paper.

4. Exit Sensing
   It is placed in the exit of Printer, and senses the paper exit.

LSU Control

LSU is composed of a polygon mirror motor and a laser gun part. The polygon mirror motor starts rotation by “PMOTOR” signal and reaches the constant speed, “LREADY” signal outputs “High” from LSU. And when video image signal from Video Controller is applied to Laser Gun, it fire the laser beam. And the polygon mirror reflects and scans the beam horizontally. When the scanned laser beam reaches at the side of LSU, “HSYNC” outputs one pulse. Video controller synchronizes this signal, and outputs the left edge of image.

New Developer Check

A fuse is placed in Developer unit, When user opens Printer front cover, Engine Controller checks the fuse open. If the fuse is not opened, Engine Controller judges the Developer unit new, and clears the “used sheet counter” in NVRAM, and applies 24V to the fuse in New Developer Unit.

H.V.P.S (High Voltage Power Supply)

Output Specifications

Item	Printing/ Initial	DCU On
Supply Voltage	-500V	-500V
Bias Voltage	-300V	-300V
THV(Transfer High Voltage) (-)	-1KV	-1KV
THV(Transfer High Voltage) (+)	0V	0V
MHV(Main High Voltage)	-1.4KV	-1.4KV

Transfer High Voltage(THV)

THV output is a series circuit of positive and negative voltage generation part. Negative output is for cleaning the OPC Drum and positive output is for transferring the Toner on the paper. High voltage is generated by DC-DC Converter that is composed of a PWM Control Circuit, a Blocking Oscillator and 4 times voltage rectifying circuit. the “THV-EA” goes to “low” positive and negative parts operate. And this state, THV positive output is controlled by “THV-PWM” duty cycle, when it goes to “High”, positive part outputs 0V, and negative part only output -1000V. When some duty cycle is applied to the PWM input of H.V. circuit, THV terminal outputs positive voltage.

Main and Bias High Voltage

(MHV,SUPPLY,DEV)

MHV generation part is composed of blocking oscillator and double voltage rectifying circuit. When “MHV-EA” signal goes to “High”, the MHV outputs, and this state, when “SUPPLY-EA” or “DEV-EA” input goes to “Low”, SUPPLY or DEV terminal corresponding it outputs the voltage that is generated by dropping MHV. DEV output voltage is selectable 300V or 350V.

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