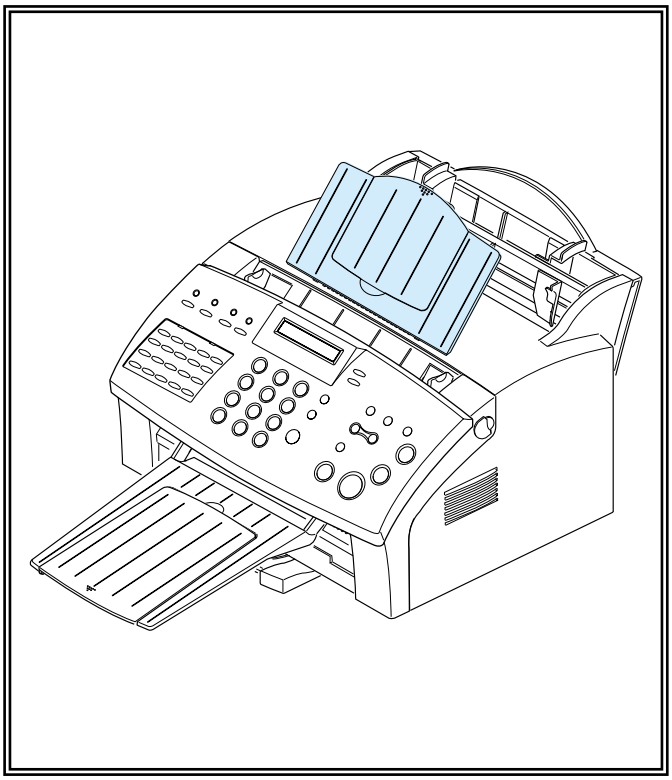
SAMSUNG

SAMSUNG FACSIMILE

SF-530/531P

SERVICE Manual

FACSIMILE



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ELECTRONICS

This service manual is also provided on the web, the ITSELF system Samsung Electronics Co., Ltd.

http://itself.sec.samsung.co.kr

VERSION NO. : 1.00 **CODE : JC-0059A**

This manual is stated and provided for service description.

Samsung Electronics Digital Printing CS Group

1. Precautions

Please read the following carefully to prevent any accidents and not to damage the unit during service.

1-1 Safety Precautions

1. Safety Precautions
There are some electric or machinery parts with safety related property. If the parts replaced are different from the original, the safety may not function. Even if the part could allow higher voltage than that of the part used, do not replace it and use a regular product clarified in specifications.

2. Be careful not to leave a switch, a cover or a safety device out when reinstalling or assembling the product after repair.

3. Replacing Precautions
Do not change or add parts as you like. You cannot benefit from such a remodeled product at your will during the term of guarantee.

4. You must replace overheated or damaged parts or cords with regular products. Please solve the problem causing any damage or overheating and troubles beforehand.

Especially mind the safety on the part with this mark.
You must use regular parts described in specifications for the parts inflammable and where the current can be flown. Otherwise any hazard such as an electric shock or a fire could occur.

LASER STATEMENT (LASERTURVALLISUUS)

WARNING : NEVER OPERATE AND SERVICE THE PRINTER WITH THE PROTECTIVE COVER REMOVED FROM LASER/SCANNER ASSEMBLY. THE REFLECTIVE BEAM, ALTHOUGH INVISIBLE, CAN DAMAGE YOUR EYES.

Class 1 laser product

Luokan 1 laserlaite
Klass 1 laser apparat

Allonpituus 770-795nm
Teho 0.3mW±0.03mW

CAUTION	INVISIBLE LASER RADIATION WHEN THIS COVER OPEN. DO NOT OPEN THIS COVER.
VORSICHT	UNSICHTBARE LASERSTRAHLUNG, WENN ABDECKUNG GEOFFNET. NIGHT DEM STRAHL AUSSETZEN.
ATTENTION	REYONNEMENT LASER INVISIBLE EN CAS D'OUVERTURE. EXPOSITION DANGERUSE AU FAISCEAU.
ATTENZIONE	RADIAZIONE LASER INVISIBLE IN CASO DI APERTURA. EVITARE L'ESPOSIZONE LA FASCIO.
PRECAUCION	REDIACION LASER INVISIBLE CUANDO SE ABRE. EVITAR EXPONERSE AL RAYO.

CAUTION : Avoid exposure to invisible laser radiation when the development unit is not installed.

1-2 Precautions on Disassembly and Reassembly

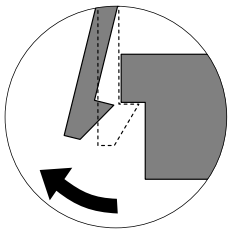
Very careful precautions should be taken when replacing parts. Before replacing, please check cables because you cannot put the cables that you removed for replacing parts into the proper place if you would not make sure of where they were connected and in which condition.

Please do the following before disassembling for a repair or replacement of parts.

1. Pull out paper cassette, printer cartridge installed. Especially careful not to be scratched by the surface of developer or not to expose them to light.
2. Turn the power switch off.
3. Take out the power plug, printer cable from the printer.
4. Use only the same type of part as original when replacing parts.
5. Do not force to open or fasten plastic material components.
6. Be careful that small parts such as screws should not get in the printer.
7. When disassembling, assembling, also observe small components are located in place.
8. If you uncover and turn the machine over to replace some parts, toner or paper particles may contaminate the LSU window. Protect the LSU window with clean paper.

Releasing Plastic Latches

Many of parts are held in place with plastic latches.
The latches break easily : release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.



1-3 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. Use only a grounded tip soldering iron to solder or desolder ESDs.

4. Use only an “anti-static” solder removal device. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESDs.

5. Do not use Freon-propelled chemicals. When sprayed, these can generate electrical charges sufficient to damage ESDs.

6. 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.

7. 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.

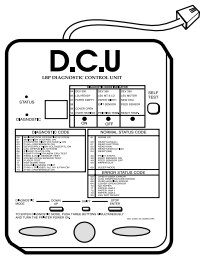
8. Maintain continuous electrical contact between the ESD and the assembly into which it will be installed, until completely plugged or soldered into the circuit.

9. Minimize bodily motions when handling unpackaged replacement ESDs. Normal motions, such as the brushing together of clothing fabric and lifting one’s foot from a carpeted floor, can generate static electricity sufficient to damage an ESD.

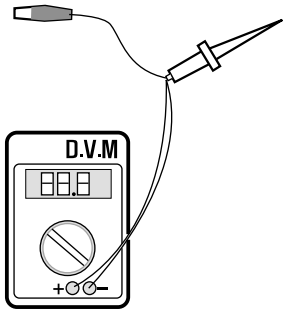
1-4 Tools for Troubleshooting

The following tools are recommended for safe and smooth troubleshooting described in this service manual.

1 **DCU(Diagnostic Control Unit)**
Standard: Test equipment to diagnose the Laser printer supplied by Samsung Electronics.

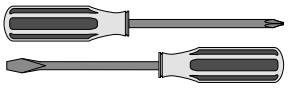


2 **DVM(Digital Volt Meter)**
Standard: Indicates more than 3 digits.



3 **Electronic Scale**
Standard: Equipment to check the weight of consumables(toner cartridge) supplied by Samsung Electronics. (The gram unit can be measured.)

4 **Driver**
Standard: "-" type, "+" type (M3 long, M3 short, M2 long, M2 short).

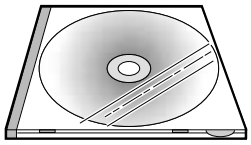


5 **Pinset**
Standard: For general home use, small type.

6 **Cotton Swab**
Standard: For general home use, for medical service.

7 **Cleaning Equipments a IPA(Isopropyl Alcohol)dry cloth or a soft stuff neutral detergent.**

8 **Software(Driver) installation CD ROM**



Note Mind your hands not to be touched when you disassemble and reassemble PBA ASS'Y, such as the main board, SMPS, HVPS.

2.Specifications

ITEMS			FAX	MFP	REMARKS
			SF-530	SF-531P	
General	Size(W*D*H)		370 X 356 X 195 mm		
	Weight		6.9 Kg (With accessories)		
	Power Rating		AC 110V ~ 120V ± 15%, 50/60Hz ± 3Hz		
			AC 220V ~ 240V ± 15%, 50/60Hz ± 3Hz		
	Operating Environment		Temperature : 10 ~ 32˚C		
			Humidity : 20 ~ 85% RH		
	LCD		16*1 Char	16*1 Char	
	Interface		NA	ECP(IEEE1284), USB	
	Halftone		64 Level	64 Level	
	Life		50000 Pages	50000 Pages	
Power	Power Button		No	No	
	Input Voltage		110V~120V, 220V~240V	110V~120V, 220V~240V	
	Power	Idle	10 W/H	10 W/H	
	Consumption	Max	140 W/H	140 W/H	
	Power Save Mode		OFF, 15, 30, 60 Min	OFF, 15, 30, 60 Min	
Print	Print Method		Laser	Laser	
	Speed		8ppm (FAX Print Out)	8ppm (PC Print & Fax Print)	
	Resolution	Normal	NA	600 x 600 DPI	
	Print language		No	PrinThru	
	Toner Save		30 ~ 50 %	30 ~ 50 %	
Scan	Scan Method		CIS	CIS	
	Quick Scan Speed		6 sec	3 sec	
	Resolution		200 x 200 DPI	300 x 300 DPI	
	Scan Width	Max	216 mm	216 mm	
		Effective	210 mm	210 mm	
	Scan Length	Max	1000 mm (Std Mode : 365 mm)	1000 mm (Std Mode : 365 mm)	
Copy	Speed		8 ppm	8 ppm	
	Resolution		600 x 600 DPI	600 x 600 DPI	
	Zoom Range		50 ~ 130 %	50 ~ 200%	
	Collate/Reverse		Yes	Yes	
	Multi Copy		1 ~ 99	1 ~ 99	

ITEMS			FAX SF-530	MFP SF-531P	REMARKS
Telephone	Handset		Yes	Yes	
	1-Touch Dial		20 EA	20 EA	
	Speed Dial		80 EA	80 EA	
	Group Dial		20 EA	20 EA	
	Caller ID		Yes (Germany, France, Canada, Australia, New Zealand, US)		
	TAD		No		
	TAD I/F		Yes		
	Tone/Pulse		Tone : US, UK, Korea		
			Tone/Pulse : ETC		
	No Power Operation		No		
	Earth/Recall		Yes		
	External Phone Transfer		Yes		
FAX	Compatibility		ITU G3		
	Communication System		PSTN/PABX		
	Modem Speed		33.6Kbps Fax Modem		
	TX Speed		3sec		Using CCitt #1 Chart with Standard Resolution
	Compression		MH/MR/MMRc		
	Rcv. Mode		TEL, FAX, AUTO, ANS/FAX		
	ECM		Yes		
	DRPD		Yes		USA, New Zealand, Australia, SEMI only
	Resolution	Std	203*98dpi		
		Fine	203*196dpi		
		S.Fine	203*392dpi		
	Memory	Capacity	2MB		
		Optional Memory	None		
	Functions	Voice Request	Yes		
		TTI	Yes		
		RTI	Yes		
		Polling	Yes		
		Flash	Yes		
		Auto Reduction	Yes		
		Broadcasting	20 EA (99 locations)	20 EA(98 locations)	
		Forced Memory	Yes		
		Delay TX	20 Locations	19 locations	
		Memory RX	Yes		
		RDC	Yes		
	Battery B/U		Yes (Max 20 Min)		

ITEMS			FAX	MFP	REMARKS
			SF-530	SF-531P	
Paper Handling	ASF	Type	BIN		
		Input Capacity	150 Sheets / 20lb		
		Optional Cassette	No		
		Output Capacity	100Sheets / 20lb		
		Output Control	Face up		
		Bypass	No	Yes	
		Media Type	Plain Paper	Plain, Coated, Transparency, Envelop, Card, Post Card, Label	
		Media Size	A4, Letter, Legal	• Paper : A4, Letter, Legal, Folio, Executive, B5, A5	Envelop : Manual feeding only
				• Envelop : 6 3/4, 7 3/4, #9, #10, DL, C5, B5, Baronial	
		Media Weight	16~24lb	16~43lb	
	ADF	Input Capacity	20 Sheets / 20lb		
		Media Weight	12.5 ~32lb		
Software	Compatibility	DOS	No		
		Win 3.x	No		
		Win 95	No	Yes	
		Win 98	No	Yes	
		Win NT 4.0	No	Yes	
		Win 2000	No	Provide After Launch Win 2000	
	Driver	Printer	No	Samsung PrinThru	
		TWAIN	No	Samsung ScanThru (TWAIN)	
		PC-FAX	No	Samsung FaxThru	
	Media	CD-ROM	No	Yes	
		Diskette	No	No	
	Y2K Compliant		Yes	Yes	
	Including Software		No	Print/Scan/Copy/Driver,	
				PC-Fax/ E-mail/ OCR Software	
Special Features	Direct E-mail Send		No	Yes	
	Fax Forward		Yes		
	Toner Save		Yes		
	Reprint		No	Yes (Only Last PC Print)	
	2-up FAX Receive		Yes		
	Scan to	PC-FAX	No	Yes	
Toner Cartridge	Life	Initial	1,000 Pages		Using 4% Coverage Pattern
		Running	2,500 Pages		Using 4% Coverage Pattern
	Toner Sensor	Support	Yes		
		Method	Software		Dot Counting
	Lock Key (With Printer & OEM)		Yes		
Maintenance Cycle	ADF Rubber		10K Pages Scan		
	Paper Feeding Roller		50K Pages Printer		
	Transfer Roller		60K Pages Print		
	Fuser Unit		50K Pages Print		

3. Disassembly and Reassembly

3-1 General Precautions on Disassembly

When you disassemble and reassemble components, you must use extreme caution. The close proximity of cables to moving parts makes proper routing a must.

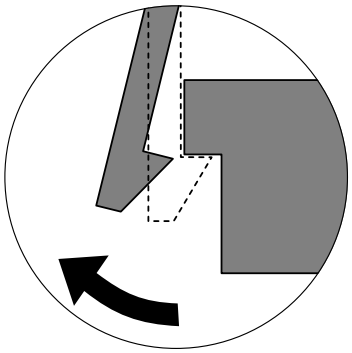
If components are removed, any cables disturbed by the procedure must be restored as close as possible to their original positions. Before removing any component from the machine, note the cable routing that will be affected.

Whenever servicing the machine, you must perform as follows:

1. Check to verify that documents are not stored in memory.
2. Be sure to remove the toner cartridge before you disassemble parts.
3. Unplug the power cord.
4. Use a flat and clean surface.
5. Replace only with authorized components.
6. Do not force plastic-material components.
7. Make sure all components are in their proper position.

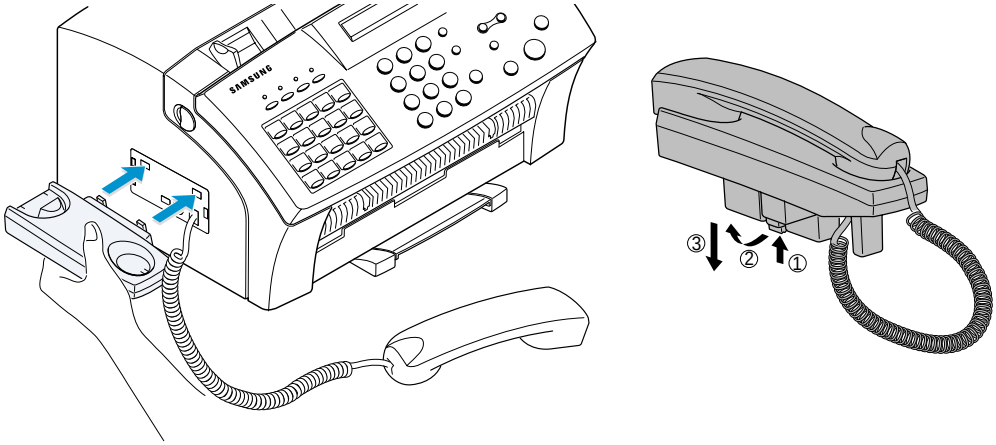
Releasing Plastic Latches

Many of the parts are held in place with plastic latches. The latches break easily; release them carefully.
To remove such parts, press the hook end of the latch away from the part to which it is latched.



3-2 Cradle

1. Push the lever and remove the cradle as shown below.

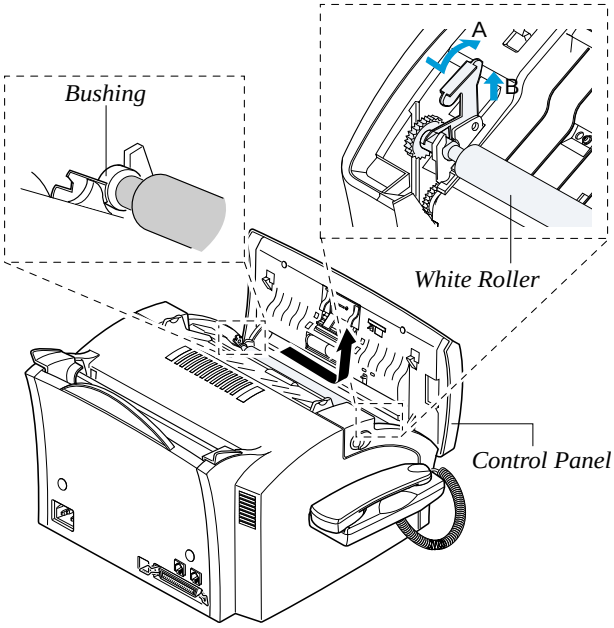


3-3 White Roller

1. Open the OPE cover.

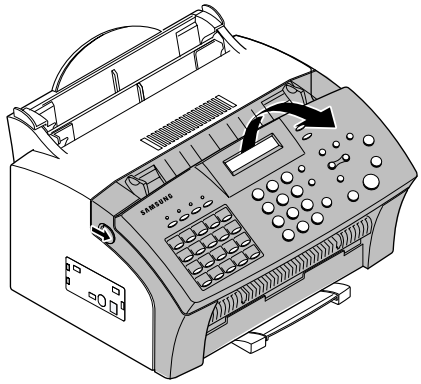
2. Push the bushing on the end of the Roller slightly inward, then rotate it until it reaches the slot. Then lift, the Roller out.

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

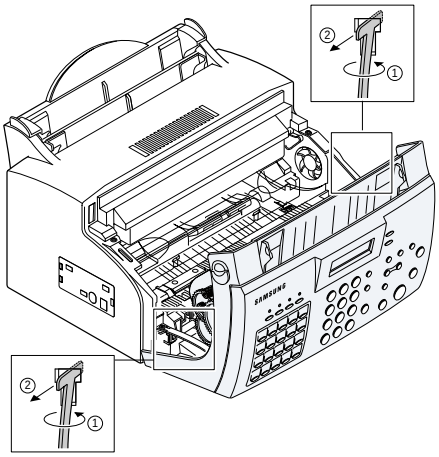


3-4 OPE Cover

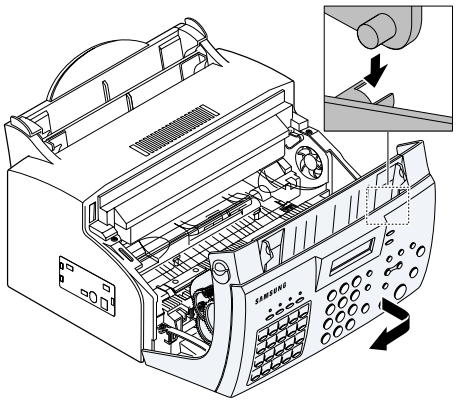
1. Pull the cover release button on both sides of the machine, and open the front cover.



2. Remove two stoppers holding the front cover unit and unplug one connector and one wire.

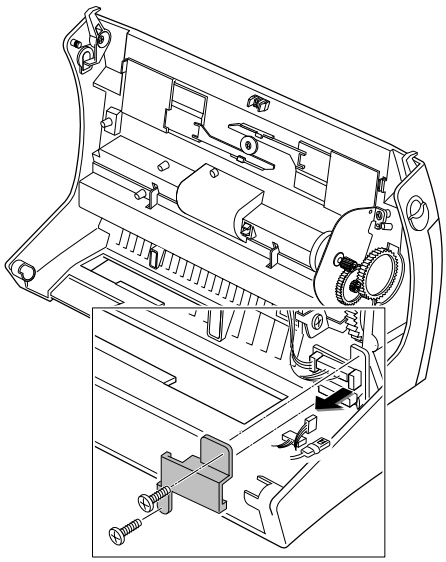


3. Pull the bottom left end of the cover downward to unlatch the front cover unit and remove the cover from the main frame.

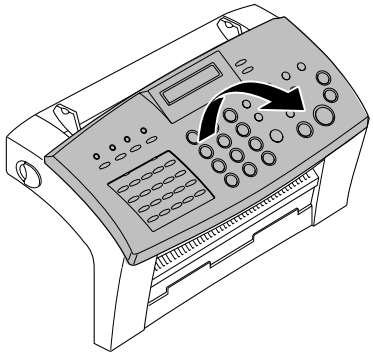


4. Remove two screws securing bracket scan board, then take out the bracket scan board.

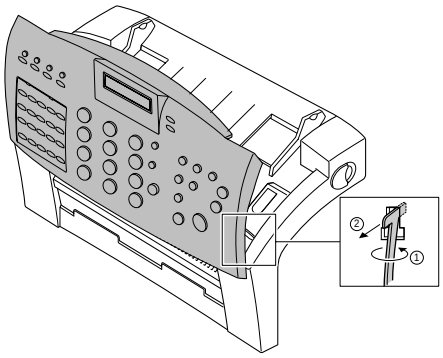
5. Unplug two connectors and one wire from the scan board.



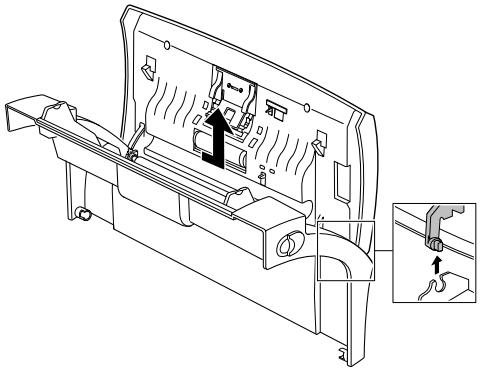
6. Lift the OPE cover.



7. Remove the stopper holding the OPE cover.



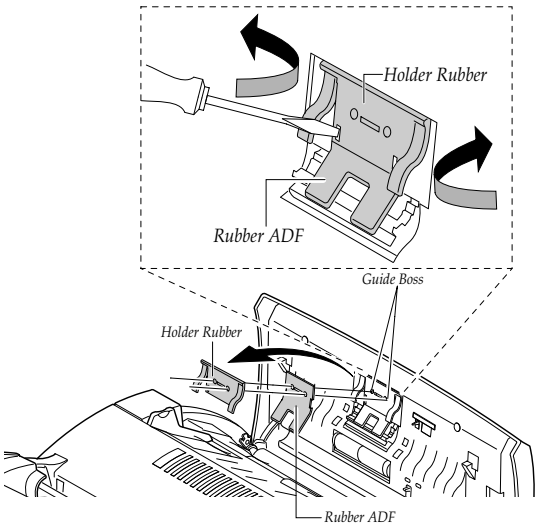
8. Unlatch the bottom ends, then remove the OPE cover.

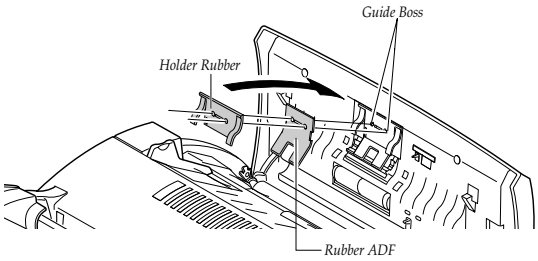


3-5 ADF Rubber

1. Open the OPE unit.

2. Insert a flat blade screw driver and pinset into the slot as shown below, and release the latches. Take out the Holder Rubber, Sheet ADF and the Rubber ADF.

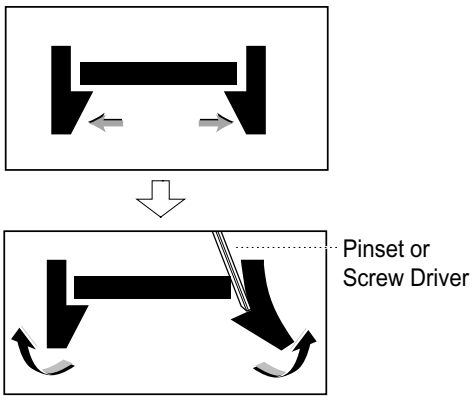




Notes : • When you reassemble the them, be sure that the Rubber ADF and Holder Rubber fit into the guide boss and the Holder Rubber latches fit into the corresponding hole. Then push firmly until it clicks.

⚠ Safely Precautions :

Do not force to open or fasten plastic material components.



3. Clean the surface of the rubber pad with IPA (Isopropyl Alcohol). After wiping it, be sure to dry it. Check the rubber wear. If the wear reaches 1/2 its original thickness, replace it with a new one.

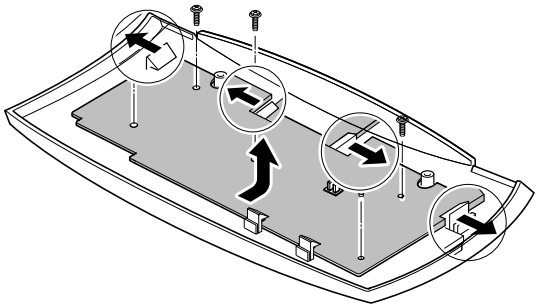
3-6 OPE Board

1. Before you remove the OPE board, you should remove:

   – OPE cover (see page 3-3)

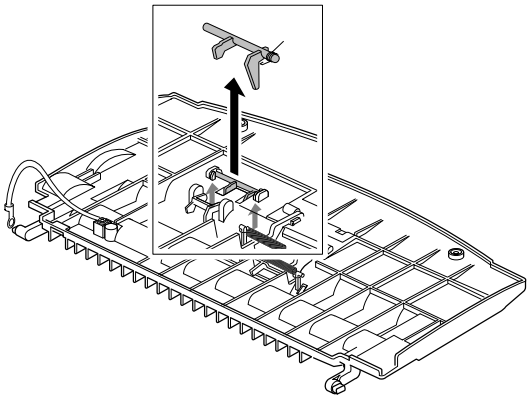
2. Remove four screws securing the OPE board.

3. Release two latches securing the both side of the LCD and the two of four latches securing the board. Then remove the OPE board.



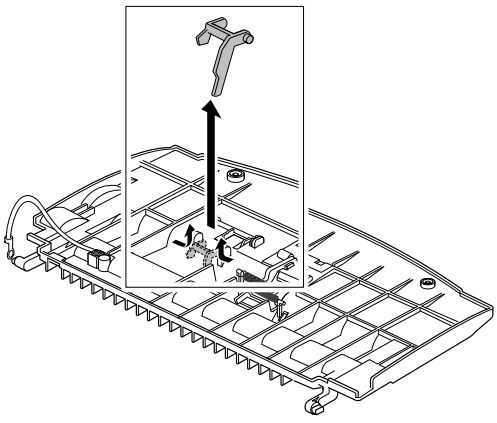
3-7 Lever Sensor Doc.

1. Unlatch the lever sensor Doc from the scan upper frame and take it out.



3-8 Lever Sensor Scan

1. Push the both sides of Lever sensor Scan inward, then unlatch and take out the sensor Scan from the scan upper frame.

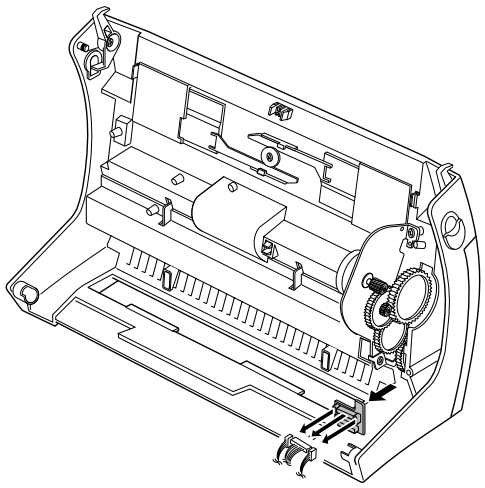


3-9 Scan Board

1. Before you remove Scan board, you should remove:

   – Bracket scam board (see page 3-3)

2. Unplug all the connectors from the scan board and remove the board.



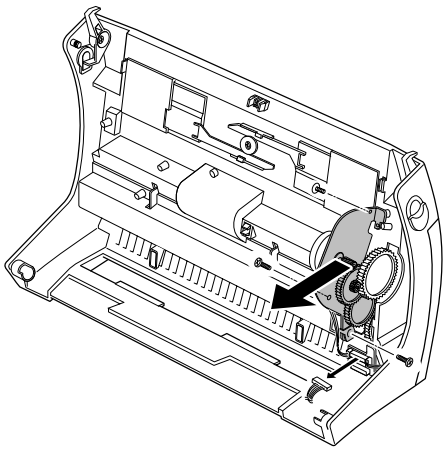
3-10 Scan Motor

1. Before you disassemble Scan Motor, you should remove:

   – OPE cover (see page 3-3)
   – Bracket scan board (see page 3-3)

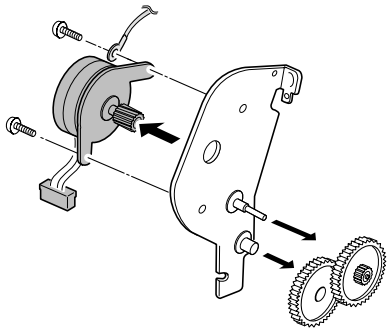
2. Unplug one connector from the scan board.

3. Remove three screws, then remove the motor Ass'y from the main frame.



4. Take out the gear from the Motor Ass'y.

5. Remove two screws and remove the motor.

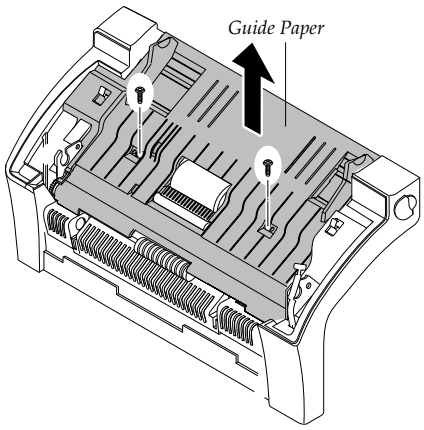


3-11 ADF Roller

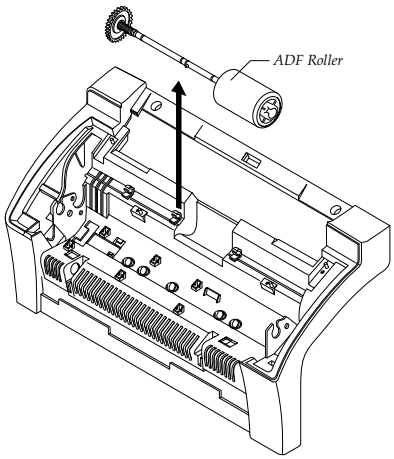
1. Before you remove the ADF Roller, you should remove:

   – OPE cover (see page 3-3)

2. Remove two screws securing the guide paper and remove the guide paper.

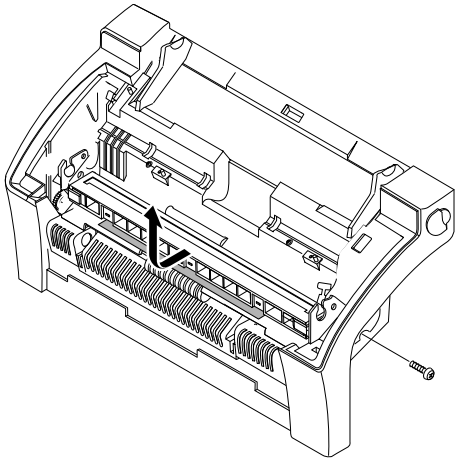


3. Remove ADF Roller from the scan front frame.

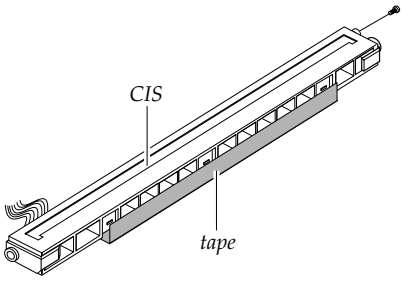


3-12 CIS

1. Remove one screw and push CIS as shown below and lift it.



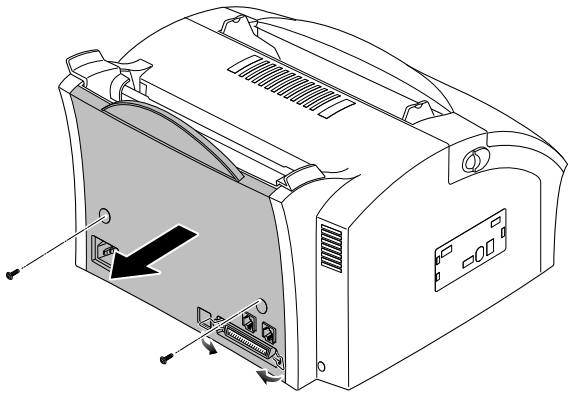
2. Separate the Dummy CIS from CIS.



3-13 Rear Cover

1. Remove two screws.

2. Push the metal clip on the parallel port down and remove the rear cover from the main frame.

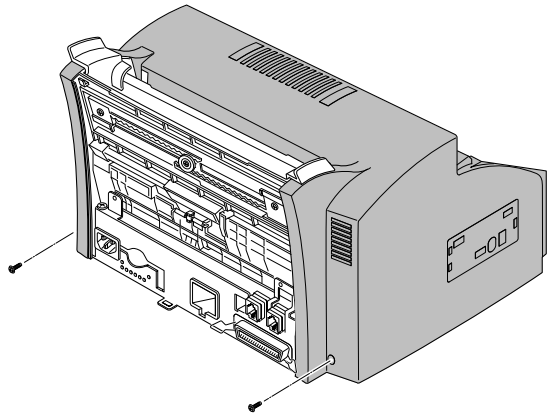


3-14 Top Cover

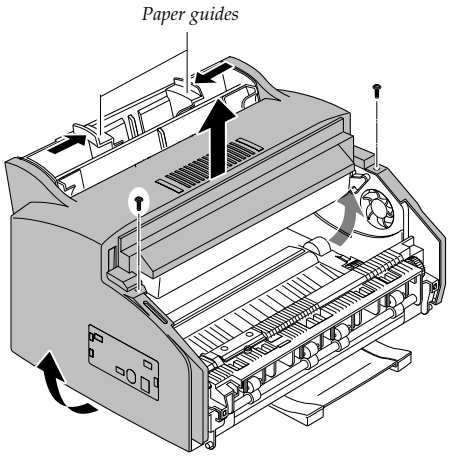
1. Before you remove the ADF Roller, you should remove:

   – OPE cover (see page 3-3)
   – Rear cover (see above)

2. Remove two screws securing the top cover from the back side of the machine.



3. Remove two screws and slide the left and right paper guides fully inward. Then spread the bottom of the top cover and lift the cover to remove.

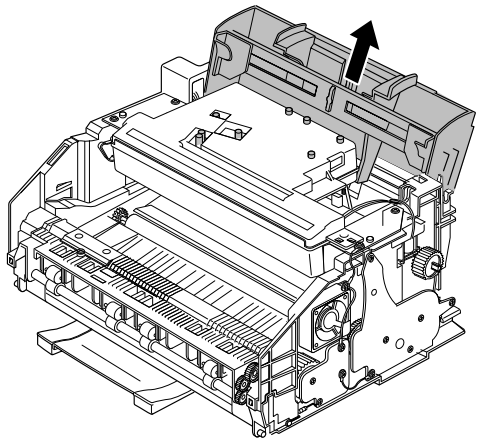


3-15 Tray

1. Before you remove the tray, you should remove:

   – OPE cover (see page 3-3)
   – Rear cover (see page 3-9)
   – Top cover (see page 3-9)

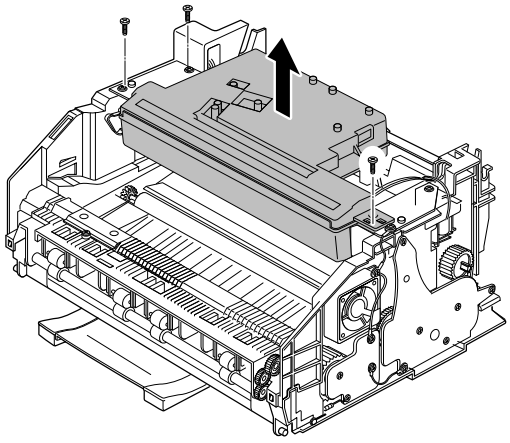
2. Take out the tray from the main frame.



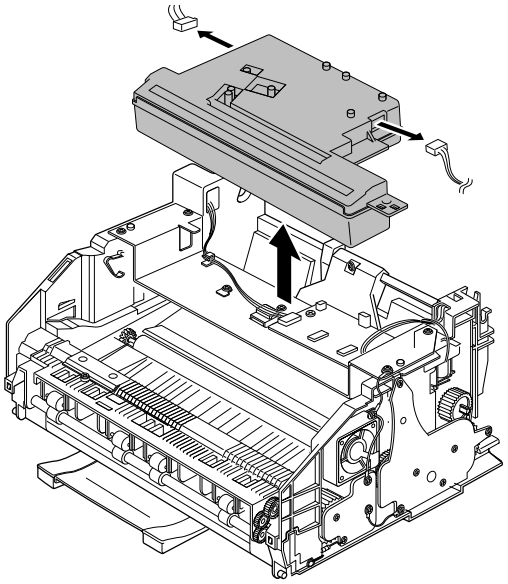
3-16 LSU

1. Before you remove the LSU, you should remove:
   – All covers (see page 3-3, 3-9)

2. Remove three screws securing the LSU.



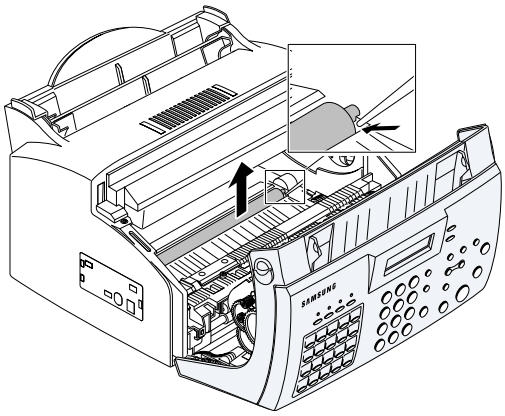
3. Unplug two connectors from the LSU and remove the LSU.



3-17 Transfer Roller

1. Pull the cover release button on both sides of the machine, and open the front cover.

2. Lift the transfer Roller using a proper tool (-Driver) and take out the Roller.

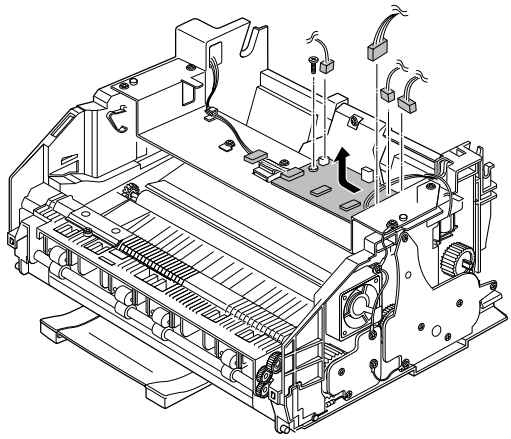


3-18 Engine Board

1. Before you remove the Engine board, you should remove:

   – All covers (see page 3-3, 3-9)
   – LSU (see page 3-10)

2. Unplug five connectors and remove one screw from the engine board, then remove the board.

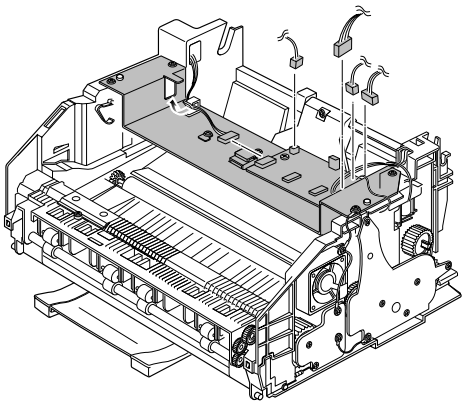


3-19 Pick-up Roller Ass'y

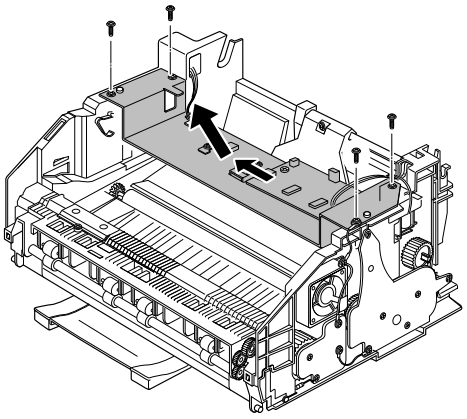
1. Before you remove the pick-up Roller Ass'y, you should remove:

   – All covers (see page 3-3, 3-9)
   – LSU (see page 3-10)

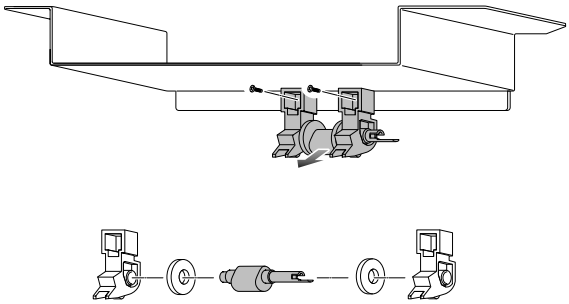
2. Unplug all the connectors from the engine board.



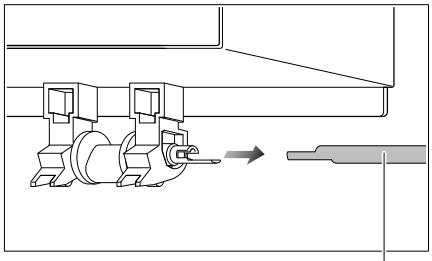
3. Remove four screws securing the plate upper and remove the plate upper as below.



4. Remove two screws and remove the Roller from the plate.



Note : When you reassemble the pick-up Roller, make sure that the right end of the pick-up Roller fits into the pick-up gear shaft.

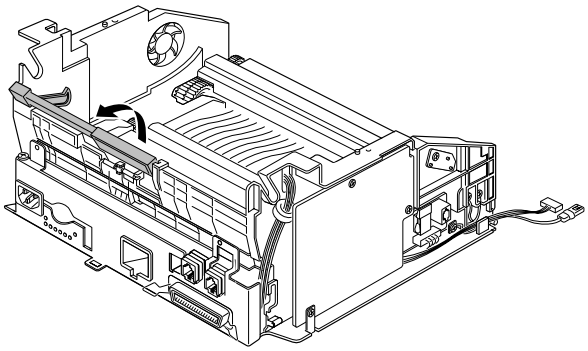


3-20 Knock-up Ass'y

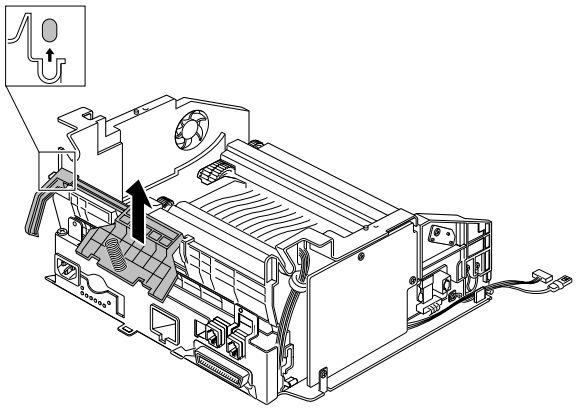
1. Before you remove the knock-up Ass'y, you should remove:

   – All covers (see page 3-3, 3-9)
   – LSU (see page 3-10)
   – Plate upper (see page 3-12)

2. Pull the knock-up Ass'y fully backward.



3. Remove the knock-up Ass'y from the main frame.

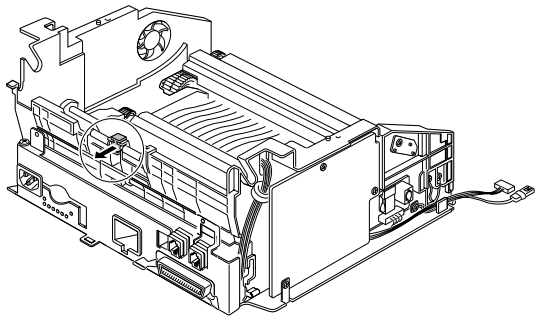


3-21 Cap-Pad

1. Before you remove the cap-pad, you should remove:

   – All covers (see page 3-3, 3-5)
   – LSU (see page 3-10)
   – Plate upper (see page 3-12)
   – Knock-up Ass'y (see above)

2. Take out the cap-pad from the main frame.

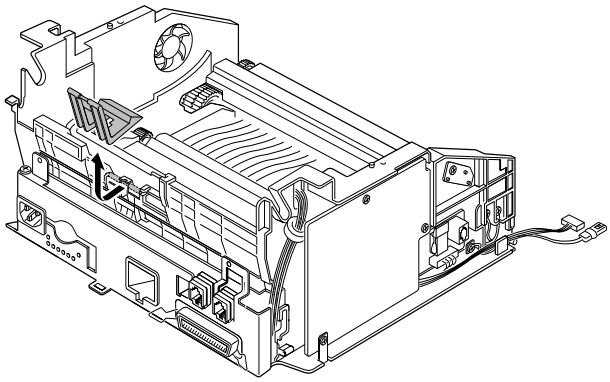


3-22 Holder-Pad

1. Before you remove the holder-pad, you should remove:

   – All covers (see page 3-3, 3-9)
   – LSU (see page 3-10)
   – Plate upper (see page 3-12)
   – Knock-up Ass'y (see 3-13)
   – Cap-Pad (see 3-13)

2. Remove the holder-pad from the main frame.

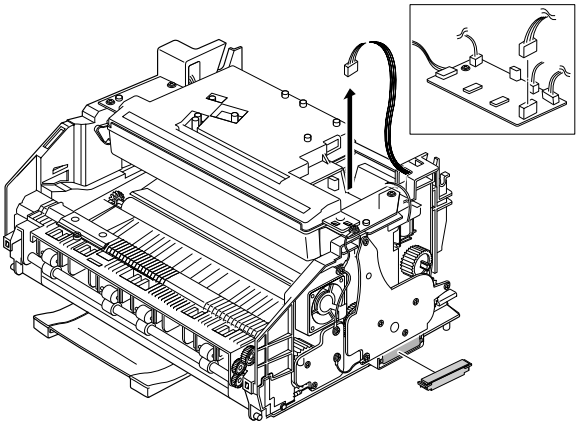


3-23 Motor Ass'y

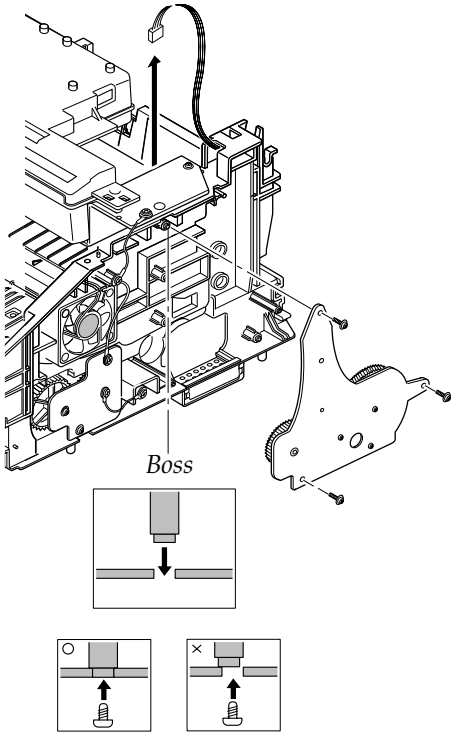
1. Before you remove the motor Ass'y, you should remove:

   – All covers (see page 3-3, 3-9)

2. Remove four screws securing the motor Ass'y and unplug one connector from the engine board, then remove the motor Ass'y.



Note : When you reassemble the motor Ass'y, make sure that the boss shown in the figure below fit into the corresponding screw holes on the motor Ass'y to allow the screws to be fastened properly.

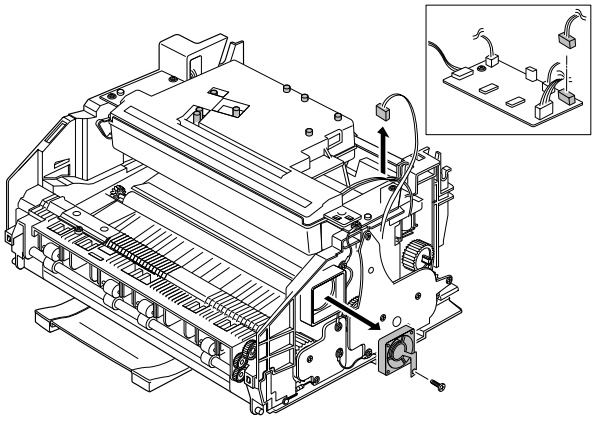


3-24 Fan

1. Before you remove the fan, you should remove:

   – All covers (see page 3-0)
   – Motor Ass'y (see page 3-15)

2. Unplug one connector from the engine board and remove the fan.

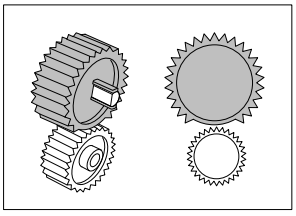


3-25 Gear pick-up Ass'y

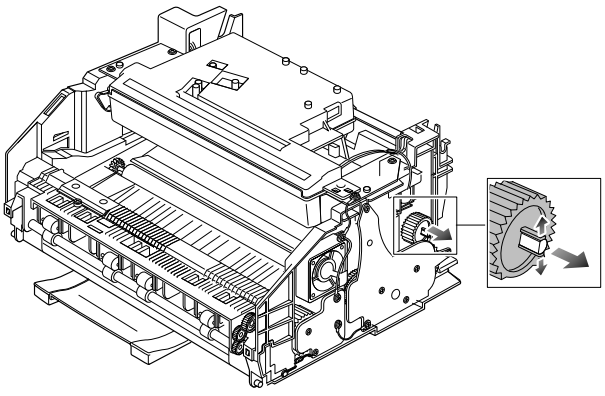
1. Before you remove the gear pick-up Ass'y, you should remove:

   – All covers (see page 3-3, 3-9)

Note: When reassembling, make sure that the direction of the gear is correct.



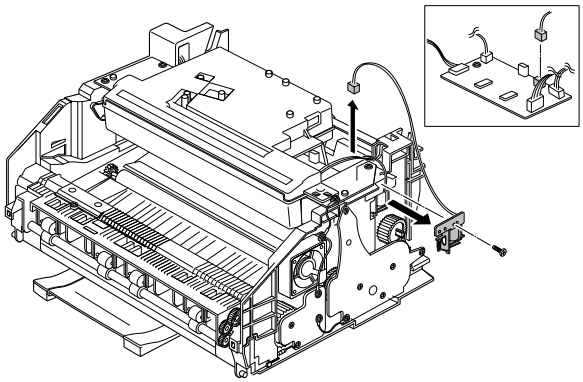
2. Release two snap-fits and remove the gear pick-up Ass'y from the main frame.



3-26 Solenoid

1. Before you remove the solenoid, you should remove:
   – All covers (see page 3-3, 3-9)

2. Unplug one connector from the engine board and remove one screw, then remove the solenoid.

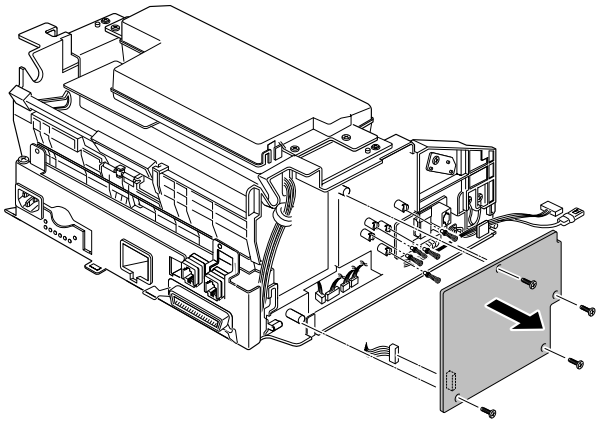


3-27 HVPS Board

1. Before you remove the HVPS board, you should remove:

   – All covers (see page 3-3, 3-9)

2. Remove three screws and one connector from the HVPS board, then remove the board.



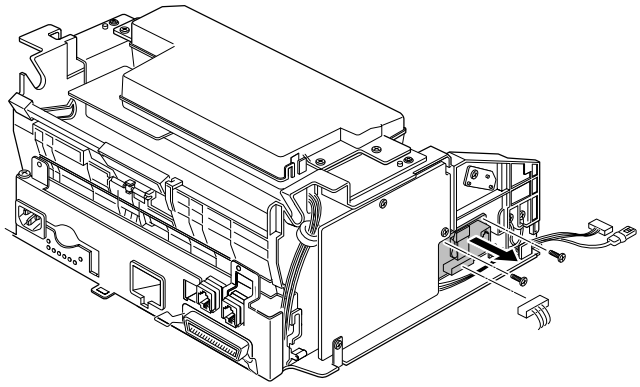
Note : when reassembling, make sure that the terminal is five.

3-28 Hook Board

1. Before you remove the hook board, you should remove:

– All covers (see page 3-3, 3-9)

2. Unplug one connector from the main board and remove two screws, then remove the hook board from the main frame.

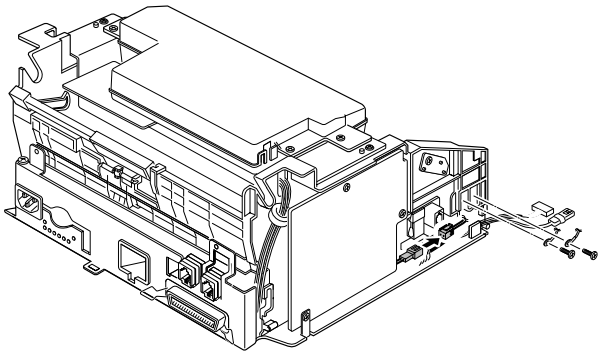


3-29 Fuser Ass'y

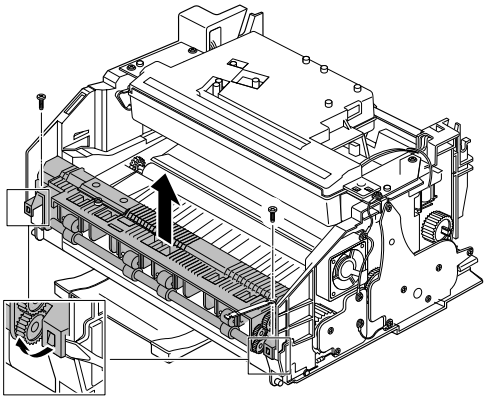
1. Before you remove the fuser Ass'y, you should remove:

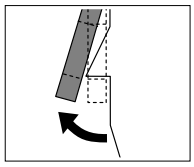
   – All covers (see page 3-3, 3-9)

2. Remove two wires after remove two screws from the main frame and one connector from the inter connector.



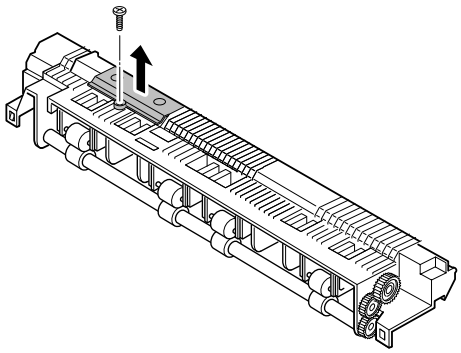
3. Remove two screws and unlatch the fuser Ass'y using a proper tool.



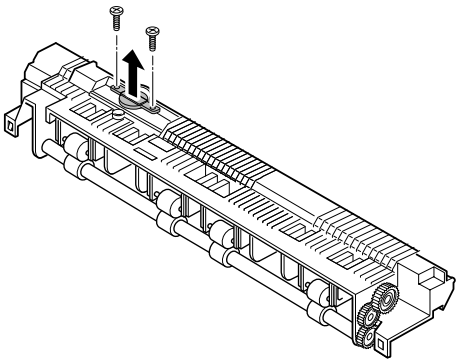


3-30 Thermostat

1. Remove one screw and remove the cover thermostat from the fuser Ass'y.



2. Remove two screws and take out thermostat from the fuser Ass'y.

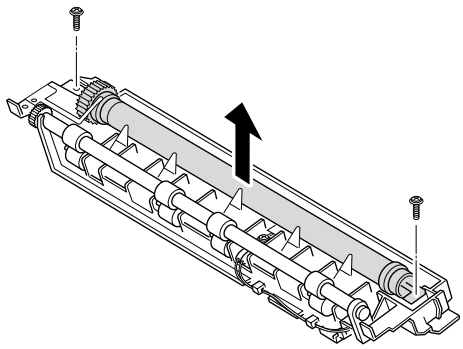


3-31 Halogen Lamp

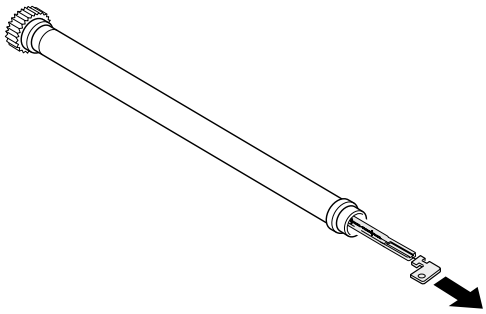
1. Before you remove the thermostat, you should remove:

   – All covers (see page 3-3, 3-9)
   – Fuser Ass'y (see page 3-17)

2. On the fuser Ass'y, remove the two screws, then remove the heat Roller.



3. Remove the halogen lamp from the heat Roller.

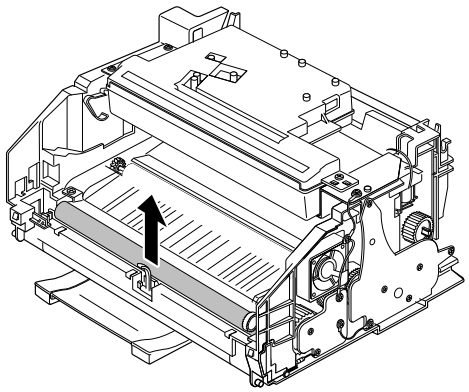


3-32 Pressure Roller

1. Before you remove the pressure Roller, you should remove:

   – All covers (see page 3-3, 3-9)
   – Fuser Ass'y (see page 3-17)

2. Lift and remove the pressure Roller from the main frame.

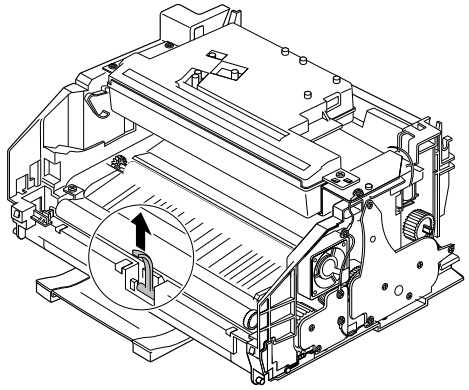


3-33 Actuator-Exit

1. Before you remove the actuator-exit, you should remove:

   – All covers (see page 3-3, 3-9)
   – Fuser Ass'y (see page 3-17)

2. Lift and remove the actuator-exit from the main frame.

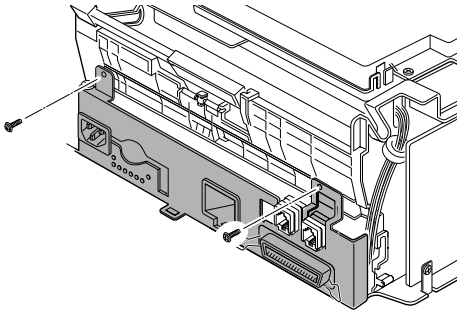


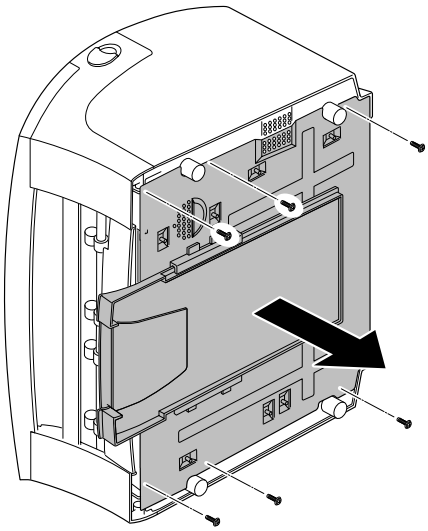
3-34 Shield Engine Ass'y

1. Before you remove the shield engine Ass'y, you should remove:

   – Rear cover (see page 3-9)

2. Remove eight screws securing the shield engine Ass'y and remove the shield engine Ass'y from the main frame.



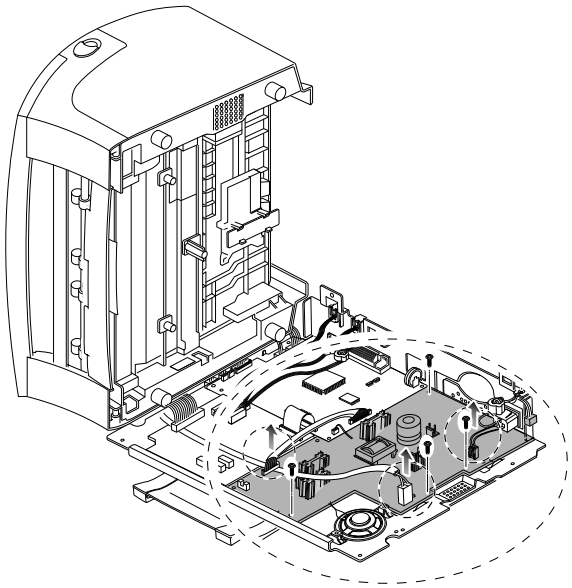


3-34 SMPS Board

1. Before you remove the SMPS board, you should remove:

   – Rear cover (see page 3-9)
   – Shield Engine Ass'y (see page 3-19)

2. Remove four screws and three connectors, then remove the SMPS board from the main frame.

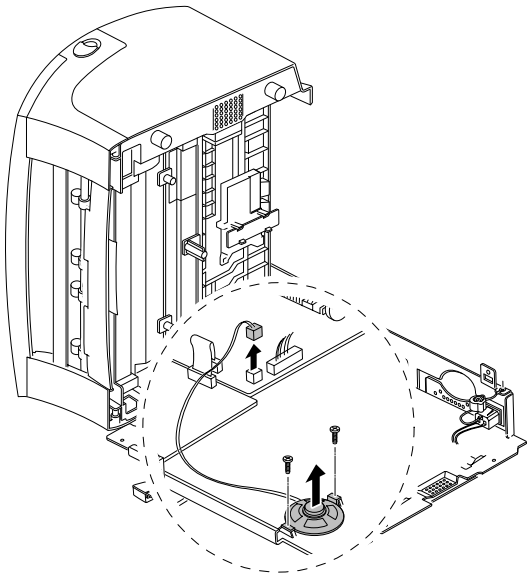


3-36 Speaker

1. Before you remove the speaker, you should remove:

   – Rear cover (see page 3-9)
   – Shield Engine Ass'y (see page 3-19)
   – SMPS board (see above)

2. Remove one connector that connects the speaker to the main board and two screws securing the speaker, then remove the speaker.

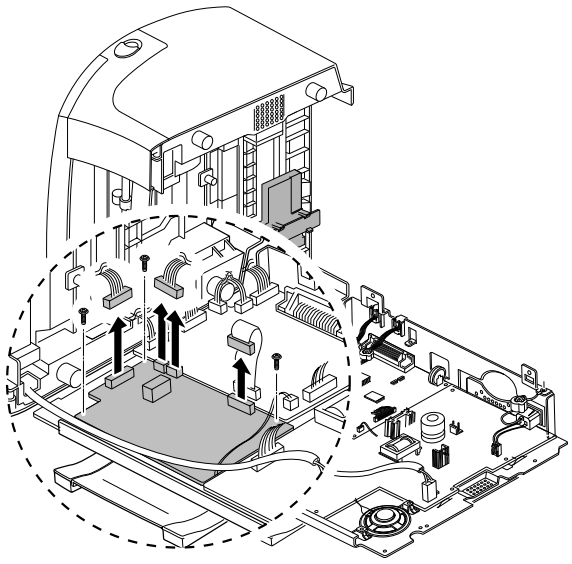


3-37 LIU Board

1. Before you remove the LIU board, you should remove:

   – Rear cover (see page 3-9)
   – Shield Engine Ass'y (see page 3-19)

2. Remove three screws and three connectors from the LIU board, then remove the board from the main frame.

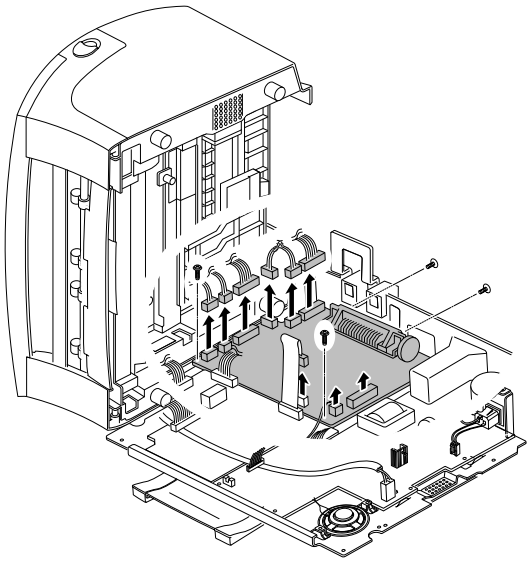


3-38 Main Board

1. Before you remove the main board, you should remove:

   – Rear cover (see page 3-9)
   – Shield Engine Ass'y (see page 3-19)

2. Remove four screws and all the connectors (9) from the main board, then remove the board.

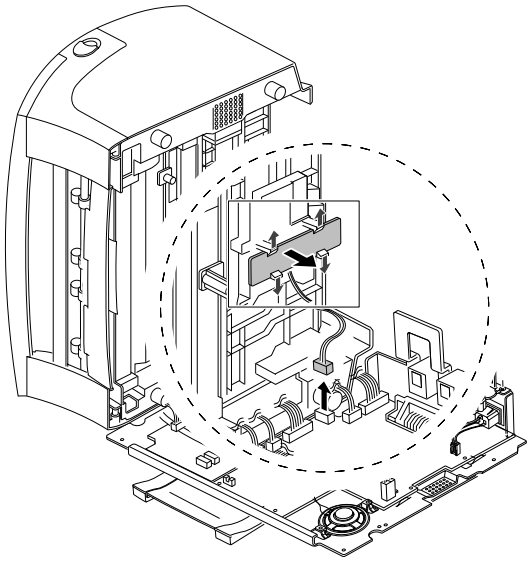


3-39 Sensor Board

1. Before you remove the sensor board, you should remove:

   – Rear cover (see page 3-9)
   – Shield Engine Ass'y (see page 3-19)

2. Release four snap-fits securing the sensor board and unplug one connector from the main board, then remove the sensor board.

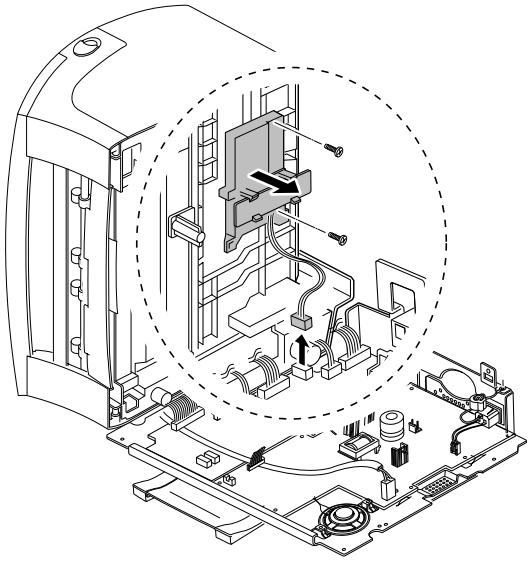


3-40 Actuator Empty/Feeder

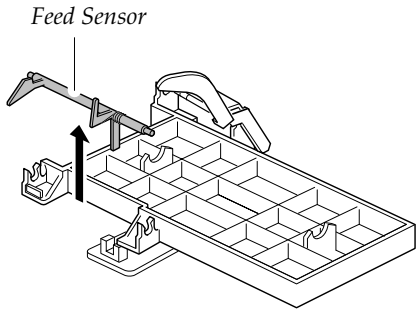
1. Before you remove the actuator empty/feeder, you should remove:

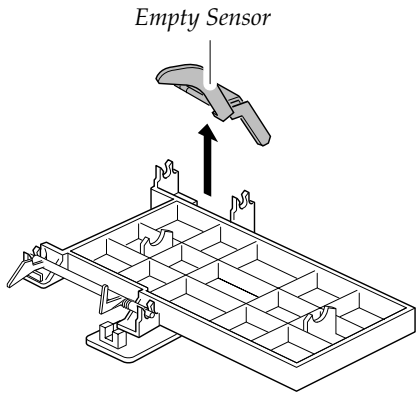
   – Rear cover (see page 3-9)
   – Shield Engine Ass'y (see page 3-19)

2. Remove one connector from the main board and two screws securing the holder feed Ass'y, then remove the holder feeder Ass'y.



3. Remove the Feed sensor and the Empty sensor.



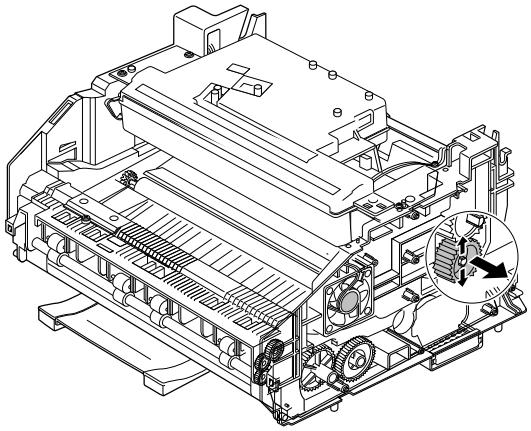


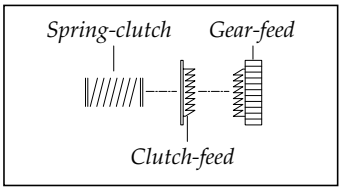
3-41 Roller Feeder

1. Before you remove the actuator empty/feeder, you should remove:

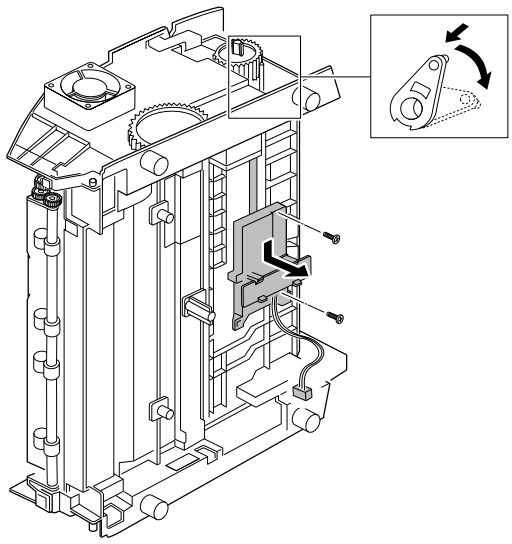
   – All covers (see page 3-0)
   – Motor Ass'y (see page 3-15)

2. Release two snap-fits and remove the gear-feed, clutch-feed, and the spring-clutch.

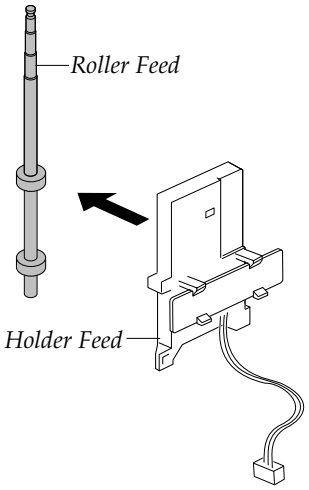




3. Rotate the pick-up bushing as shown below and remove holder feeder Ass'y and Roller feeder.



4. Separate the Roller Feeder from the Holder Feeder Ass'y.



4. Troubleshooting

4-1 Preventative 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	20,000 Pages	
	White Roller	As Needed	10,000 Pages	
	CIS	As Needed		
PRINTER	Cartridge		2,500 Pages	
	Pickup Roller		60,000 Pages	
	Feed Roller		50,000 Pages	
	Transfer Roller		60,000 Pages	
	Fuser		50,000 Pages	

4-2 Tech Mode

In Tech mode, the technician can perform various tests to isolate the causes of a malfunction, and set the technical option features to customize the machine depending on the user's operation environment.

To access TECH mode

: Press SETUP, #, 1, 9, 3, 4 in sequence, and the LCD displays 'TECH' in the standby mode screen. While in TECH mode, the machine still performs all normal operations.

To return to the normal user mode

: Turn the power off, then back on.

The technical options you have set in TECH mode are not changed unless you clear the machine's memory in TECH mode.

To communicate via direct connection with another fax machine, press OHD/V.REQ followed by Start/Enter.

• Caution :
When you finish operating in Tech Mode, you must turn the power Off/On.

4-2-1 System Data List in TECH MODE

Function	Item	Content	Default
FAX NUMBER/NAME	FAX NUMBER FAX NAME		
TIME/DATE SETUP TIME/DATE	DATE FORMAT	EUROPE/USA	EUROPE
SYSTEM SETUP	LANGUAGE SENDING MEMORY SEND FROM CONFIRM FAX PAPER SIZE AUTO REDUCTION DISCARD SIZE RINGS TO ANSWER STAMP RCV.NAME RCV.START CODE ECM MODE CALLER ID JUNK FAX BARRIER DRPD MODE	ENG/GER/FRE/ITA/SPA/POR/DUT ON/OFF ON/OFF/ERROR LETTER/A4/LEGAL ON/OFF 0~30mm 1~7 ON/OFF 0~9 ON/OFF ON/OFF ON/OFF ON/OFF	ENGLISH ON ERROR A4 ON 20MM 2 OFF * 9 * ON OFF OFF OFF
TECH MODE DIALING MODE SEND FAX LEVEL RCV. FAX LEVEL FLASH TIME(RECALL TIME) PAUSE TIME REDIAL INTERVAL REDIAL COUNT DP MAKE/BREAK SILENCE TIME RATE IGNORE TONER EMPTY	MODEM SPEED TONE/PULSE 0~15 40~50 80/280/600 1~9 1~15 0~5 40/60~33/67 UNLIMITED/12SEC 5%/10% ON/OFF	2.4/4.8/7.2/9.6/12.0/14.4/28.8/33.6 TONE -12 DBM -43DBM 80 MS 4 SEC 3 MIN 2 33/67 UNLIMITED 10% OFF	26.4 KBPS ERROR
GROUP DIAL SETUP	GROUP NO[1-20]		
VOLUM SETUP	ALARM VOLUM KEY VOLUM	ON/OFF ON/OFF	ON ON
MEMORY CLEAR	FAX NUMBER/NAME DIAL/SCHEDULE JOURNAL DEFAULT SETUP		
MAINTENANCE	CLEANING DRUM ADJUST SHADING REMOTE TEST NOTIFY TONER LOW	 OFF/ON OFF/ON	
	ROM TEST CIS TEST DRAM TEST SWITCH TEST DTMF TEST TONER COUNT PRINTING INFO PROGRAM DOWNLODE SCAN COUNT CLEAR	ROM OK! (VERSION) DRAM OK OFF/ON COUNT CLEARING ..	

: Only Tech Mode

4-2-2 Tech Mode Options

In TECH mode, press SETUP, then press ◄ or ► until 'TECH MODE' appears in the display. Press Start/Enter. The following technical options are available.

Note : If necessary, print System Data List in TECH mode. The list shows all current system data settings including the TECH MODE options. To print the system data list, press Report/Help, then press ◄ or ► until 'SYSTEM DATA' appears in the display, and press Start/Enter.

Modem Speed

- You can set the maximum modem speed.
- Communication is done with modem speed automatically set at lower speed when communicating with the modem with lower speed since communication is done on the standard of the side where modem speed is low for transmission/reception. It is better set 26.4KBPS as default setting.

DIALING MODE

- Select the dialing mode according to the user's line status.
- TONE: Electrical type of dial
- PULSE: Mechanical type of dial

SEND FAX LEVEL

- You can set the level of the transmission signal. Typically, the Tx level should be under -12 dBm. The level within the range of 1 to -15 dBm is acceptable.
- **Caution:** The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

RCV FAX LEVEL

- You can set the level of the receiving signal.
- The reception level may be too low due to the cable losses.
- If it is set to -43 dBm, the reception sensitivity will be between 0 and -43 dBm. If it is set to -48 dBm, the reception sensitivity will be between 0 and -48 dBm.
- **Caution:** The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

FLASH TIME

- Set the flash time to 80, 280, or 600 milliseconds.

PAUSE TIME

- Pause time mean delay time (unit: second) inserted between dial number signal and the next number of signal in the automatic dial (One touch, Speed dial, Redial) and the manual dial.
- **Caution:** The Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

REDIAL INTERVAL

- If the remote machine is busy when the machine sends a fax using automatic dialing, the machine automatically redials the number. Select the time interval between automatic redial attempts. Enter the desired redial interval using the number keypad: 1 - 15 minutes.

REDIAL COUNT

- You can set times that redial automatically attempts when automatic transmission is done or when the remote machine is busy or when the machine send a fax. If there is no response after redialing by the times already set, redial is no longer attempted. No redial is attempted if the settings is 0. Enter the desired times from 1 through 5.

DP Make/Break

- Select the dial pulse make and break time: 40-60 or 33-67
- **Caution:** Send Fax Level is set at the best condition in the shipment from factory. Never change settings arbitrarily.

SILENCE TIME

- In ANS/FAX mode, after a call is picked up by the answering machine, the machine monitors the line.
- If a period of silence is detected on the line at any time, the call will be treated as a fax message and the machine begins receiving.
- Silence detection time is selectable between limited (about 12 seconds) and unlimited time.
- When '2 sec' is selected, the machine switches to receiving mode as soon as it detects a period of silence. When 'unlimited'is selected, the machine waits until the answering operation is concluded even though a period of silence is detected. After the answering operation is concluded, the machine switches to receiving mode.

ERROR RATE

- When the error rate is about to be over the setting value, the Baud rate automatically lowers up to 2400 bps to make the error rate remain below the setting value.
- You can select the rate between 5% and 10%.

IGNORE TONER EMP

- You can set this function ON if desiring to drive the engine continuously even though the life of toner is run out and it becomes Toner Empty status.

4-2-3 Maintenance Options

In TECH mode, press SETUP, then press ◄ or ► until 'MAINTENANCE' appears in the display. Press Start/Enter. The following technical options are available

CLEAN DRUM

- Use this feature to get rid of the toner remained in the development unit, so you can get a clean printout.Perform this feature if stains or specks appear on the printing materials and print quality falls.
- Perform this feature several times until a clean printing material appears.

ADJUST SHADING

- Use this feature to correct the white reference of the scanner if you experience bad copy images. When using this feature, a white paper should be used to get clean copy images.

- Use this adjustment feature to achieve best image (scan) quality depending on the characteristics of the CIS (Contact Image Sensor) parts.

  1. Select [ADJUST SHADING] from the Service Mode.
  2. Insert a clean white original [Letter Size] into the paper loading part.
  3. Original is scanned if pressing the Setting button.
  4. If the original scan is completed, message is displayed on the LCD window and CIS SHADING PROFILE is output.

- If the output image is different from the normal screen, the CIS is poor.

Caution:
1. Always perform the CIS TEST after downloading Firmware. Otherwise, the system may not operate properly.
2. Always perform ADJUST SHADING after replacing the CIS.
3. Always use a clean white paper in ADJUST SHADING (Maximum paper width: Letter Size).
4. ADJUST SHADING may be performed even in the User Mode but ADJUST SHADING profile is output only in the TECH MODE.

REMOTE TEST

- The Remote Test feature can be enabled in order to allow a remote location to call up and run a diagnostic test on your machine. You may be instructed by a service representative to enable this feature.

NOTIFY TONER LOW

- With this feature enabled, when the toner becomes low, the toner low information will be sent to ta specified contact point, for example, the service company. After you access this menu, select ON, and when the LCD prompts, enter the name and the number of the contact point, the customer's fax number, the model name, and the serial number.

ROM TEST

- Use this feature to test the machine'S ROM. The result and the software version appear in the LCD display.

CIS TEST

- This test checks the operation of the Contact Image Sensor (CIS). Each time the number changes by one increment, the average ADC value of CIS prints out.

DRAM TEST

- Use this feature to test the machine's DRAM. The result appears in the LCD display.

SWITCH TEST

Use this feature to test all keys on the operation control panel. The result is displayed on the LCD window each time you press a key.

MODEM TEST

- Use this feature to hear various transmission signals to the telephone line from the modem and to check the modem.
- If no transmission signal sound is heard, it means that the modem part of the main board is poor.

DTMF TEST

- DTMF (Dual Tone Multi Frequency) signal. When you press any key on the number keypad including • and #, you will hear the corresponding key tone.

TONER COUNT

- This feature shows the current state of the toner cartridge.
- TONER CNT: The total number of the dots used to print up to current time.
- CRU STATE: The page number which the toner cartridge can print.

• Caution : After replacing Main board to new one, you should update the information to the new board.

PRINTING INFO

- This feature allows the machine to automatically print various information, like toner count, transfer voltage, fusing temperature and so on, at the bottom of each printed page.
- PAGE TONER CNT: prints the number of dots used to print the page.
- TOTAL TONER CNT: prints the total number of the dots used to print up to current time.
- THV ON DUTY: prints ADC value of transfer voltage.
- THERMISTER: prints ADC value of fusing temperature.
- P: prints the page number.

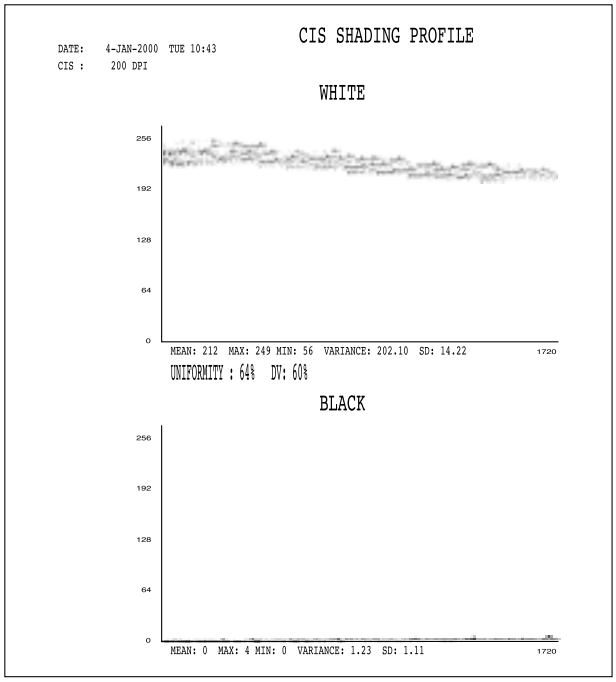
PROGRAM DOWNLOAD

- Use this feature to download a new upgraded ROM file from a PC that is connected to the machine with a parallel cable (IEEE 1284).

SCAN COUNT CLEAR

- If performing this feature, the value of scanning original until now is initialized (0). (Total scan count value on the system data list becomes 0.)

Adjust Shading Sample Pattern



4-2-4 Printout Report

In TECH mode, press Report/Help, then select the desired list or report by using ◄ or ► key, then press Start/Enter. The following options are available

HELP

- It shows a brief description on the machine's basic functions and commands.Use it as a quick reference guide

SENT JOURNAL

- This journal shows a specific information concerning transmission activities, the time and dates of up to 40 of the most recent transmissions.

RECEIVED JOURNAL

- This journal shows a specific information concerning reception activities, the time and dates of up to 40 of the most recent receptions.

PHONEBOOK

- It lists all telephone numbers that have been stored in the machine.

SENDING CONFIRM

- It shows the result of the last send operation.

SCHEDULE INFORM

- This list shows a specific information on the documents currently stored for delayed transmission. It provides the operation number, starting time, type of operation, etc.

SYSTEM DATA

- This list provides a list of the user system data settings and tech mode settings.

PROTOCOL LIST

- This list shows the sequence of the CCITT group 3 T.30 protocol during the most recent sending or receiving operation. Use this list to check for send and receive errors. If a communication error occurs while the machine is in TECH mode, the protocol list will print automatically.

PATTERN PRINT

- Using this pattern printout, you can check if the printer mechanism is functioning properly. Examine the pattern and look for a break in the diagonal line. If the diagonal lines are not broken, the printer mechanism is functioning properly.

SHADING PRIN

- With this print, you can check the scanning elements of the CIS (Contact Image Sensor).

4-2-5 Engine Test Mode

The Engine test mode is used to check the operation of the components related to the printer engine.
The following test are available.

To access the Engine Test Mode:

1. Press Setup, #, 1, 9, 3, 1 in sequence.
2. When 'ENGINE TEST?' appears, press Start/Enter.
3. Scroll the options by pressing ◄ or ► repeatedly find the one you want.
4. Press Start/Enter to start the test.
5. Press Stop to exit the Engine test mode.

• Caution :
When you finish operating in Engine Test Mode, you must turn the power Off/On.

Engine Test Mode Options :

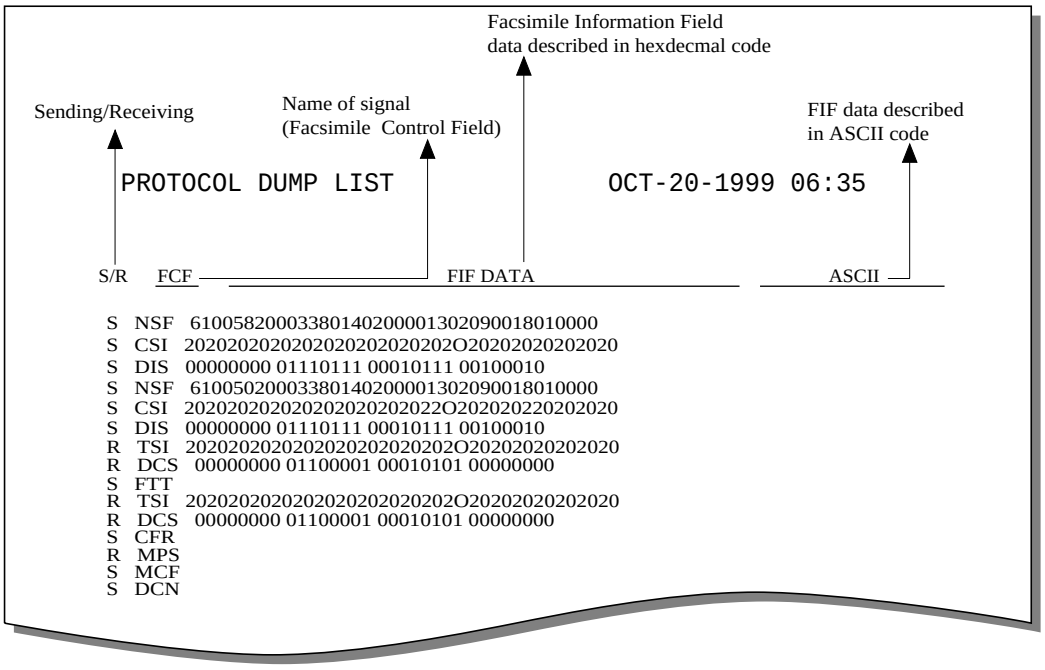
1. MAIN MOTOR TEST
2 PTL TEST
3. FAN TEST
4. FUSER TEST (FUSER ON : 145˚C ↓, FUSER OFF : 145˚C↑)
5. LSU MOTOR TEST
6. LD(LASER DIODE) TEST
7. HSYNC TEST (NG/OK)
8. LSU OPERATION TEST (NG/OK)
9. SENSOR TEST (FEED , EXIT , PAPER EMPTY , COVER OPEN)
10. SOLENOID TEST
11. MHV TEST (-1550 V)
12. DEV TEST (- 430 V)
13. THV(+) TEST (+1300 V)
14. THV(-) TEST
15. THV TRIGGER TEST
16. ALL FUNCTION TEST :
    This function is for a manufacturing press . You can test all function(1~15)
    - When you push the "Start" button, the Main Motor runs.
    - If you push the "Start" button again , the current test stops, and the next test starts.

4-2-6 Maintenance List

A number of reports can be printed from the fax machine within the test mode. The protocol list all contain detailed information which may be required when contacting technical support.

To printout the protocol list :

1. Get into the Tech mode by pressing Setup, #, 1, 9, 3, 4.
2. In Tech mode, press Report/Help.
3. Press ◄ or ► repeatedly until you find the Protocol List. When you find 'PROTOCOL LIST', press ENTER.
   SAMPLE OF A PROTOCOL DUMP LIST



< SAMPLE OF A PROTOCOL DUMP LIST >

4-3 Diagnostics

This section describes methods and procedures to isolate the cause of a malfunction in the machine. This machine displays diagnostic information on the LCD. In addition, it can perform a series of tests that allow the machine to observe individual machine functions.

4-3-1 Error Messages

Error Message	Description	Solution
DOCUMENT JAM	The loaded document has jammed in the feeder.	Clear the document jam.
DOOR OPEN	The top cover is not securely latched.	Press down on the cover until it clicks in place.
FUSER ERROR	There occurs a problem in the fuser unit.	Unplug the power code and plug it back in. If the problem still persists, please call for service.
JAM/NO CARTRIDGE	Recording paper has jammed inside the unit, or the toner cartridge is not installed.	Clear the jam, or install the cartridge
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. Or, turn the ECM mode on.
LOAD DOCUMENT	You have attempted to set up a sending operation with no document loaded.	Load a document and try again.
LSU ERROR	There occurs a problem in the LSU (Laser Scanning Unit).	Unplug the power code and plug it back in. If the problem still persists, please call for service.
MEMORY FULL	The memory is 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 has not answered after all the redial attempts.	Try again. Make sure the remote machine is operational.
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.

Error Message	Description	Solution
NO PAPER	The recording paper has run out.	Load the recording paper.
OVER HEAT	The printer part in your unit has overheated.	Please wait until it cools down. If you cannot solve the problem, please call for service.
PAPER JAM 0	Recording paper has jammed in the paper feeding area.	Clear the jam.
PAPER JAM 2	Jammed paper still remains inside the unit.	Clear the jam, or install the cartridge
POLLING ERROR	The remote fax machine you want to poll is not ready to respond to your poll. Or When setting up to poll another fax machine, you have used an incorrect poll code.	The remote operator should know in advance that you are polling and have their fax unit loaded with the original document. Enter the correct poll code.
POWER FAILURE	A power failure has occurred.	If documents have been stored in the memory, a 'Power Failure Report' will be printed automatically when the power is restored.
RECEIVE ERROR	A fax has not been received successfully.	A problem with the facsmile communications has occurred. Ask the sender to try again.
RETRY REDIAL ?	The machine is waiting for a specified time interval to redial a previously busy station.	You can press **Start** to immediately redial, or **Stop** to cancel the redial operation.
SEND ERROR	Your fax has not gone through successfully.	A problem with the facsmile communications has occurred. Try again.
TONER EMPTY	The toner cartridge has run out. The machine stops.	Replace with a new toner cartridge.
TONER LOW	The toner is almost empty.	Take out the toner cartridge and gently shake it. Using this way, you can temporarily re-establish the print quality.
WARMING UP	The printer is warming up and is off-line.	Wait until the printer is on-line.

4-4 Print Quality

No	Roller	Abnormal image period	Kind of abnormal image
1	OPC Drum	75.4mm	•White spot on black image •Black spot
2	Charge Roller	37.7mm	Black spot
3	Supply Roller	26.8mm	Horizontal density band
4	Develope Roller	31.6mm	Horizontal density band
5	Transfer Roller	47.1mm	Black side contamination/transfer fault
6	Heat Roller	50.1mm	Black spot, White spot
7	Pressure Roller	50.2mm	Black side contamination

4-5 Note for replacing Main board

When you replace the main board to new one, the information on the toner state is cleared. Therefore, you should update the information to the new board by entering the exact value of total toner count and specifying the toner cartridge installed currently is shipped with the machine or new. If not, 'TONER LOW/EMPTY' message may not appear when the toner is run out.

1. In Tech mode, print 'SYSTEM DATA LIST'. The list includes the total toner count and CRU state information.

   • TOTAL TONER COUNT: The total number of the dots used to print up to current time.

   • CRU STATE: The page number which the toner cartridge can print. (The yield of a new toner cartridge is approximately 2,500 pages and that of the cartridge supplied with the machine is approximately 1.000 pages.)

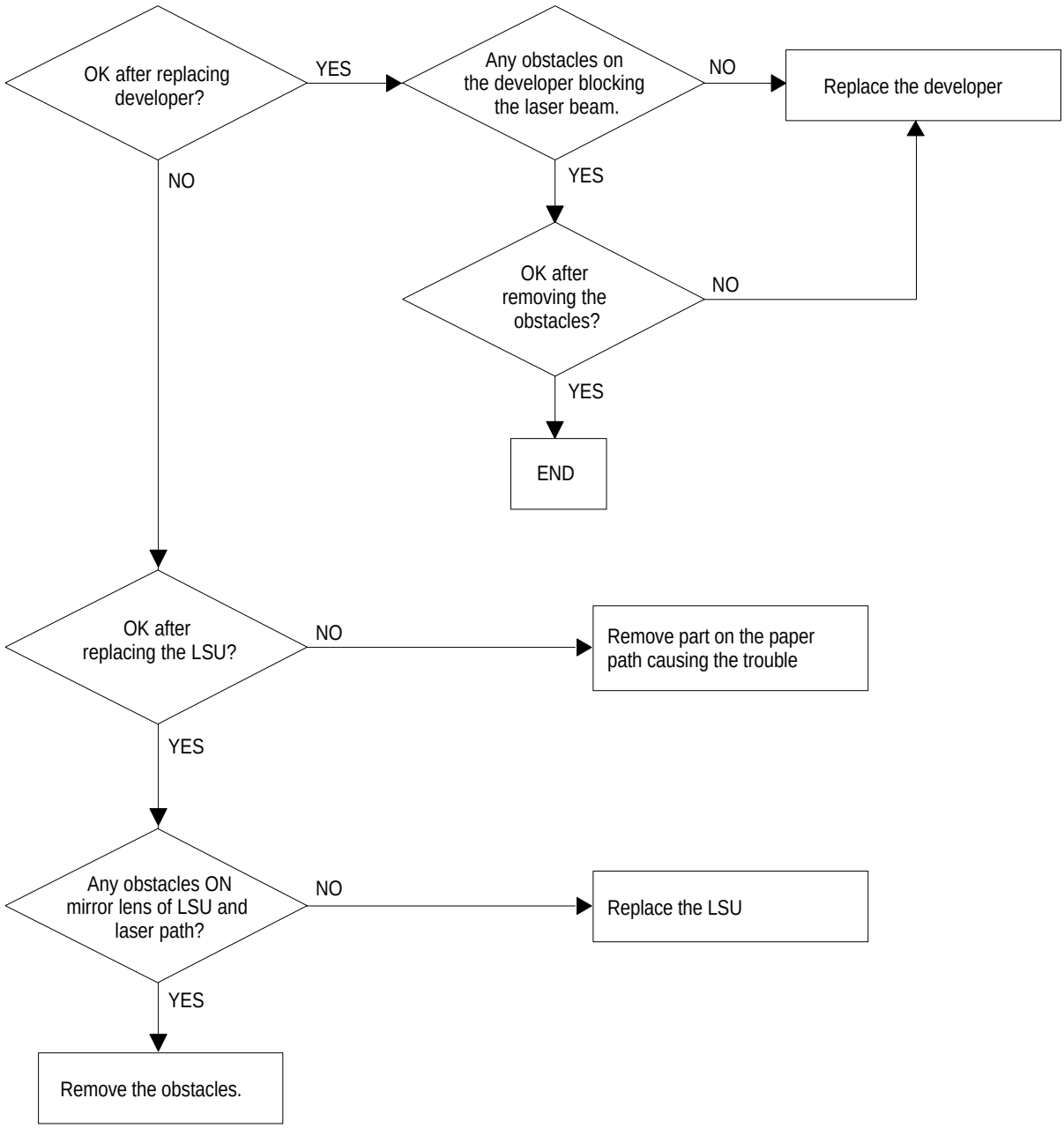
2. Replace Main board.

3. In Tech mode,
   3-1) Press Setup, and find 'MAINTENANCE' by pressing repeatedly ◄ or► , then press Start/Enter.
   3-2) When 'TONER COUNT' is displayed in LCD, press Start/Enter, and enter the value of the total toner count in the system data list.
   3-3) When you are prompted to enter CRU STATE, press Start/Enter.
   3-4) When you see '[1.1000 2.2300]' in LCD, select the value of the CRU state in the system data list.

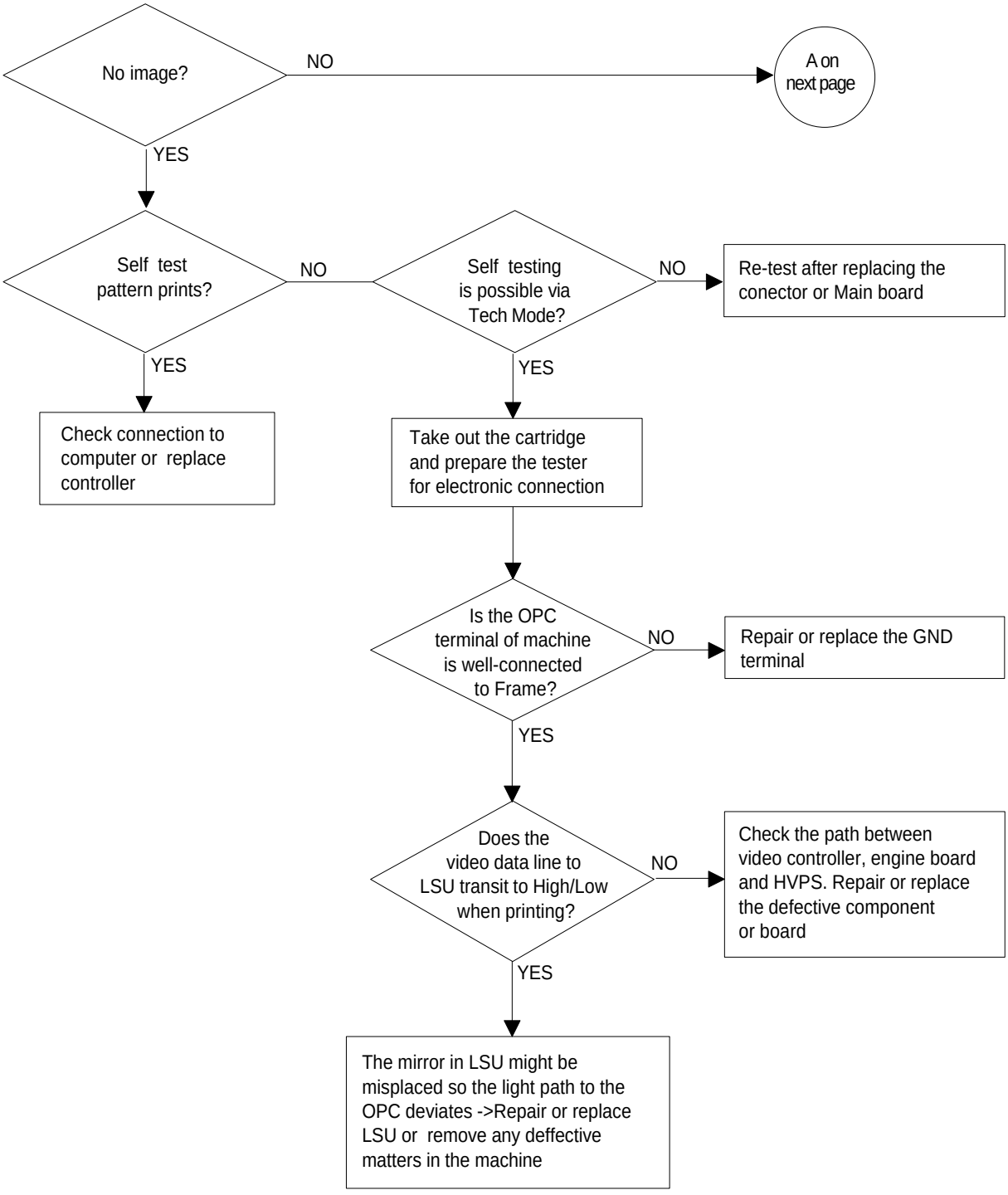
4. In Tech mode, print 'SYSTEM DATA LIST' and make sure that the toner information is updated.

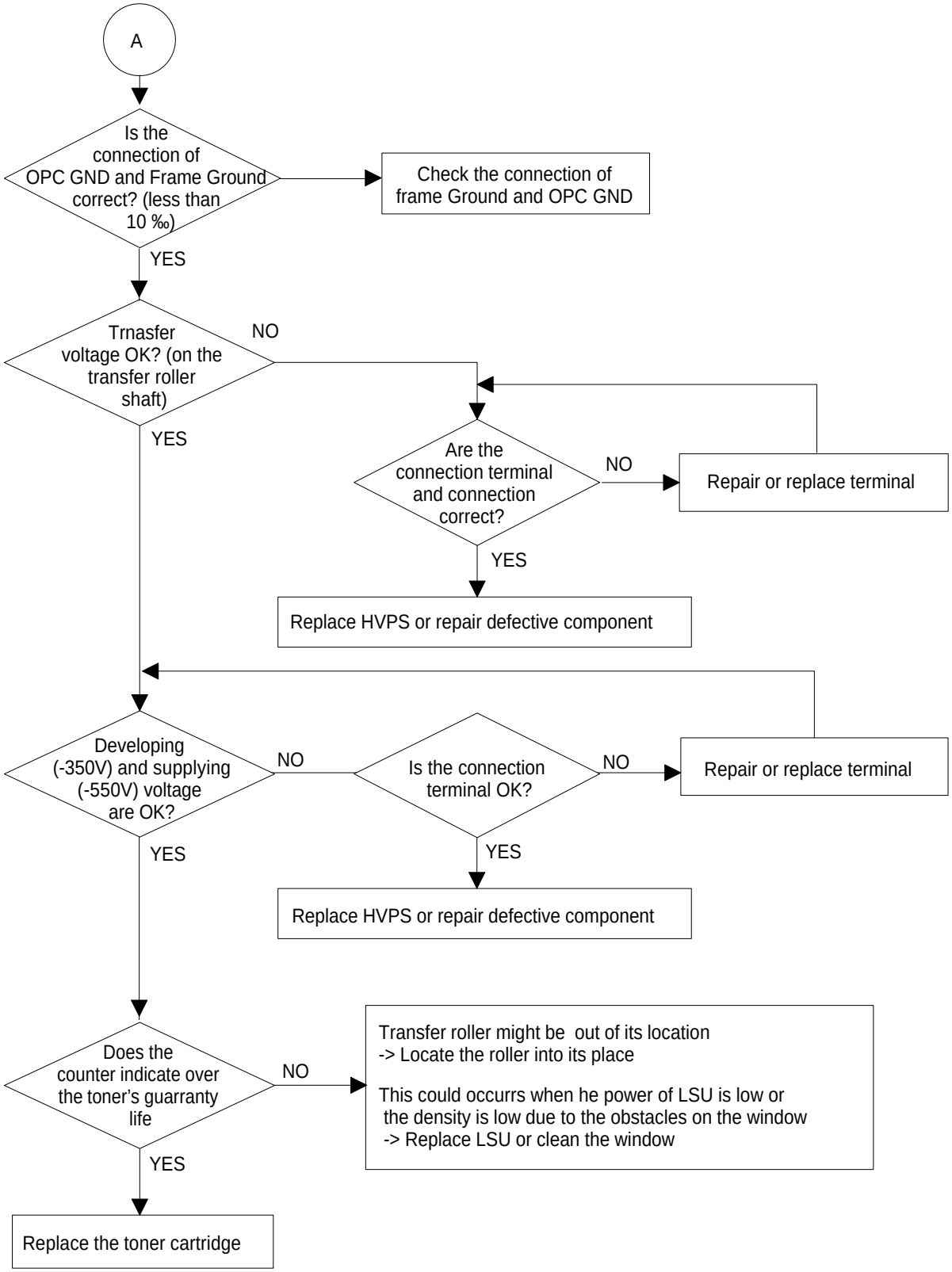
4-6 Troubleshooting Flow Chart

Vertical black line and band

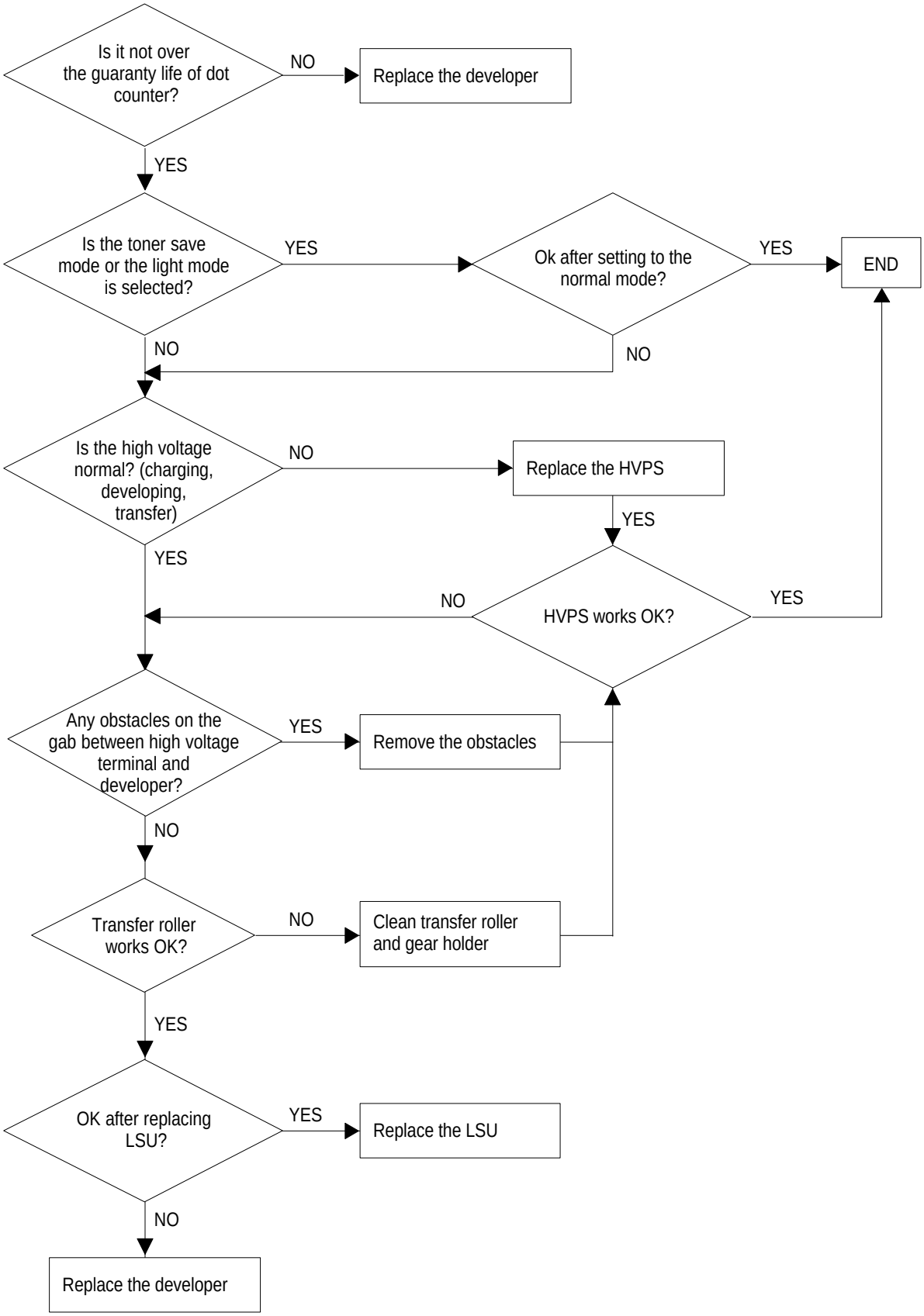


No Image

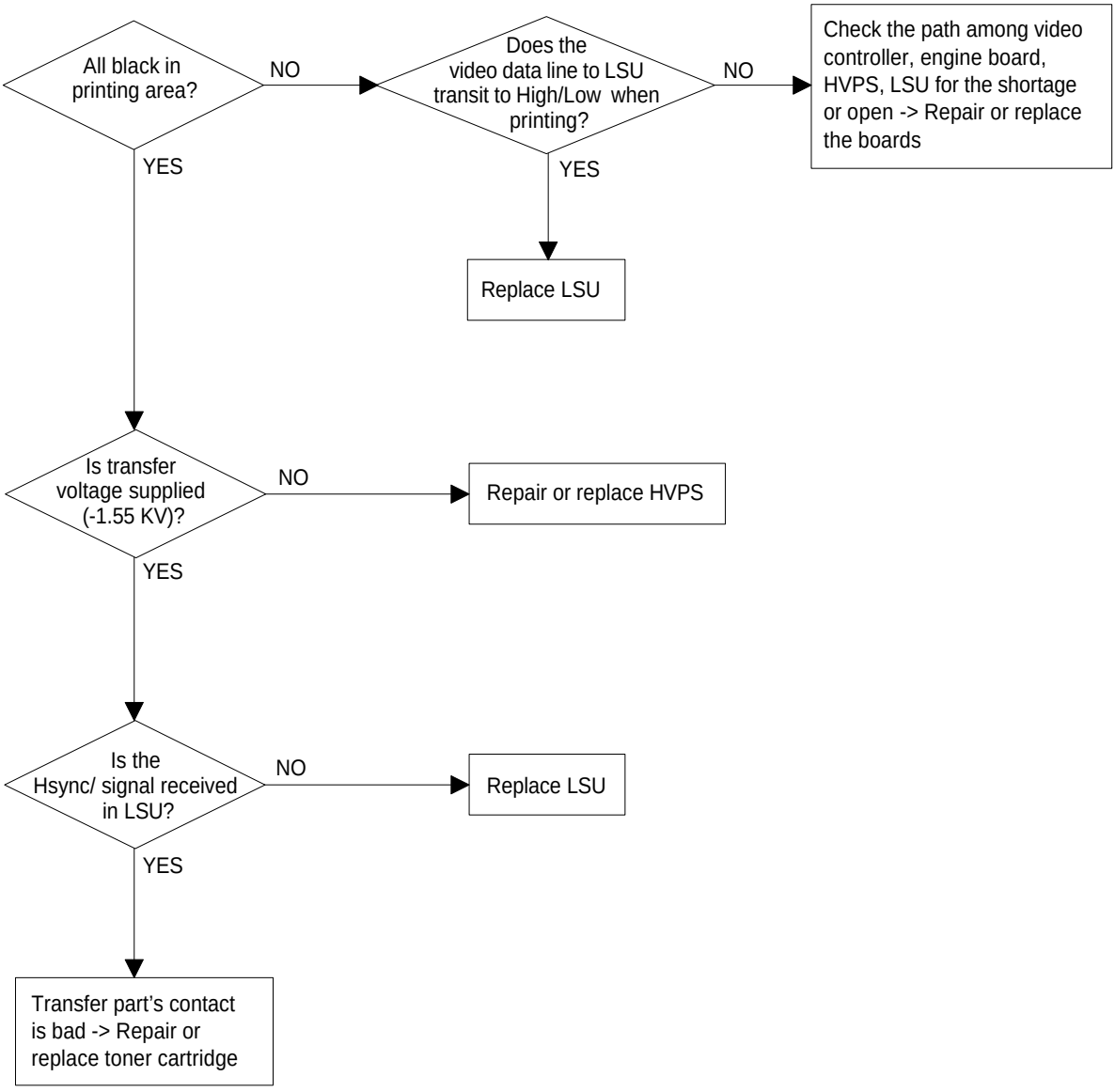

No image?
NO
A on next page
YES
Self test pattern prints?
NO
Self testing is possible via Tech Mode?
NO
Re-test after replacing the conector or Main board
YES
YES
Check connection to computer or replace controller
Take out the cartridge and prepare the tester for electronic connection
Is the OPC terminal of machine is well-connected to Frame?
NO
Repair or replace the GND terminal
YES
Does the video data line to LSU transit to High/Low when printing?
NO
Check the path between video controller, engine board and HVPS. Repair or replace the defective component or board
YES
The mirror in LSU might be misplaced so the light path to the OPC deviates ->Repair or replace LSU or remove any deffective matters in the machine


A
Is the connection of OPC GND and Frame Ground correct? (less than 10 ‰)
Check the connection of frame Ground and OPC GND
YES
Trnasfer voltage OK? (on the transfer roller shaft)
NO
YES
Are the connection terminal and connection correct?
NO
Repair or replace terminal
YES
Replace HVPS or repair defective component
Developing (-350V) and supplying (-550V) voltage are OK?
NO
Is the connection terminal OK?
NO
Repair or replace terminal
YES
YES
Replace HVPS or repair defective component
Does the counter indicate over the toner's guarranty life
NO
Transfer roller might be out of its location
-> Locate the roller into its place
This could occurrs when he power of LSU is low or the density is low due to the obstacles on the window
-> Replace LSU or clean the window
YES
Replace the toner cartridge

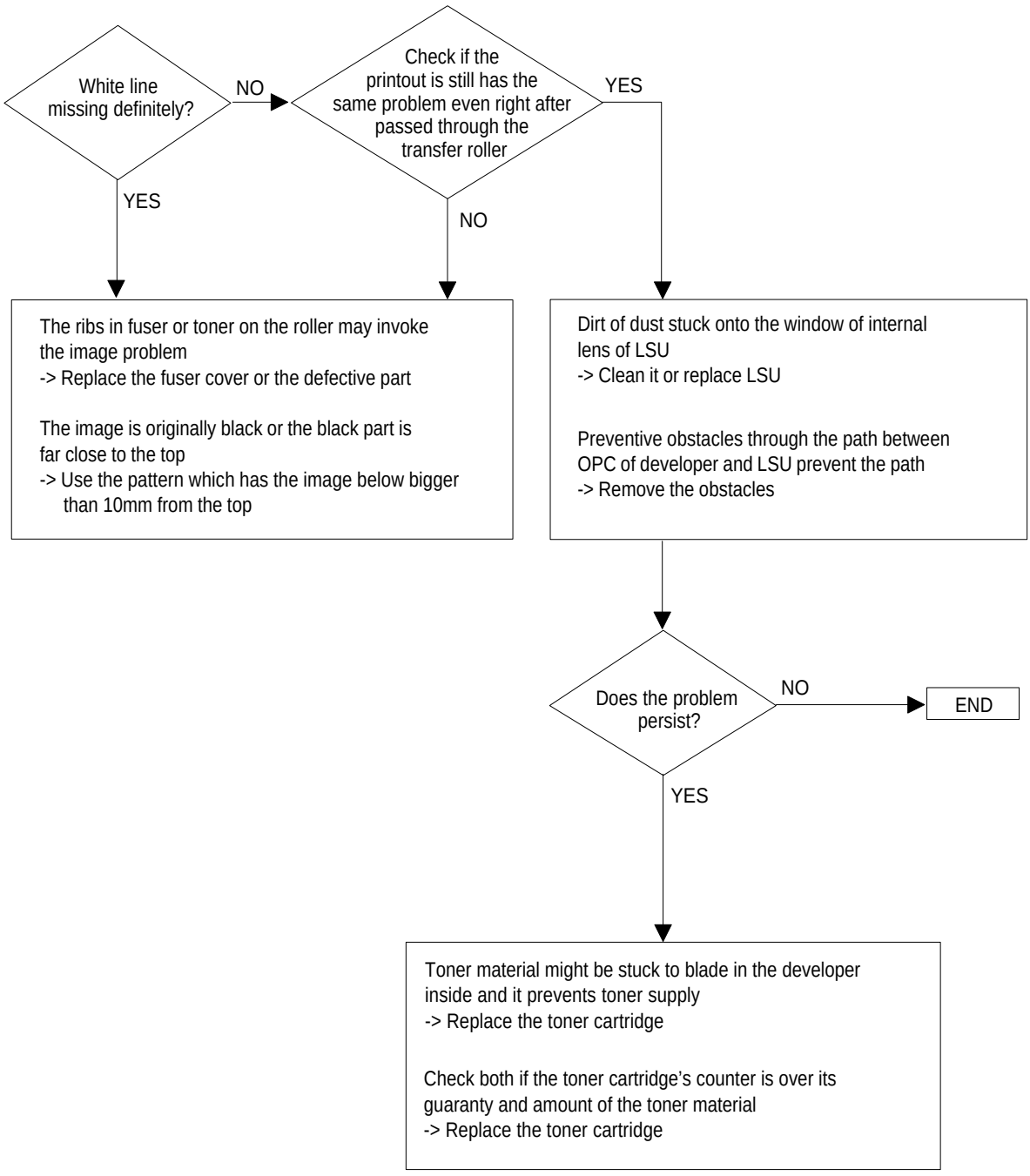
Light image


Is it not over the guaranty life of dot counter?
NO
Replace the developer
YES
Is the toner save mode or the light mode is selected?
YES
Ok after setting to the normal mode?
YES
END
NO
NO
Is the high voltage normal? (charging, developing, transfer)
NO
Replace the HVPS
YES
YES
NO
HVPS works OK?
YES
Any obstacles on the gab between high voltage terminal and developer?
YES
Remove the obstacles
NO
Transfer roller works OK?
NO
Clean transfer roller and gear holder
YES
OK after replacing LSU?
YES
Replace the LSU
NO
Replace the developer

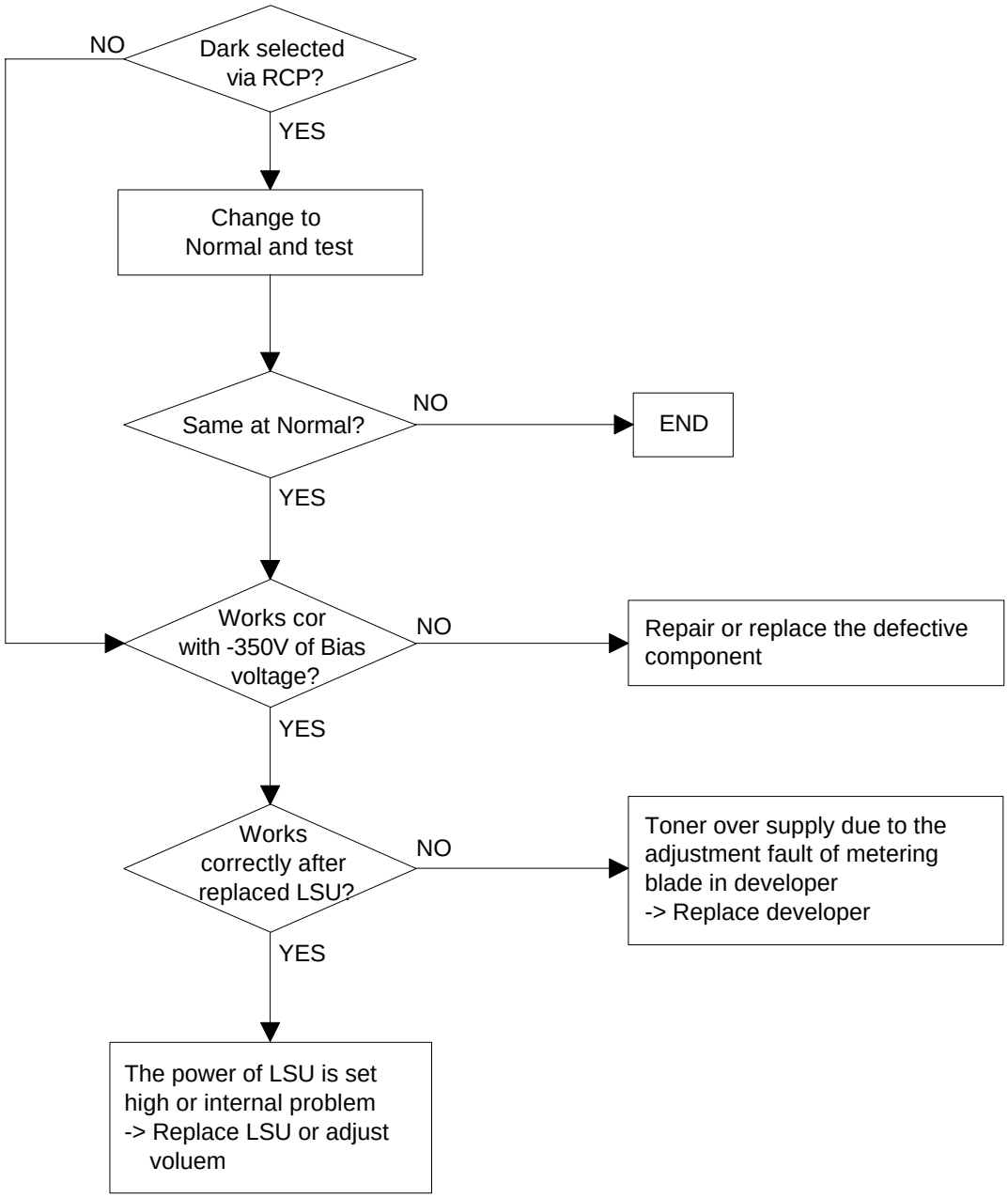
All Black


All black in printing area?
NO
Does the video data line to LSU transit to High/Low when printing?
NO
Check the path among video controller, engine board, HVPS, LSU for the shortage or open -> Repair or replace the boards
YES
YES
Replace LSU
Is transfer voltage supplied (-1.55 KV)?
NO
Repair or replace HVPS
YES
Is the Hsync/ signal received in LSU?
NO
Replace LSU
YES
Transfer part's contact is bad -> Repair or replace toner cartridge

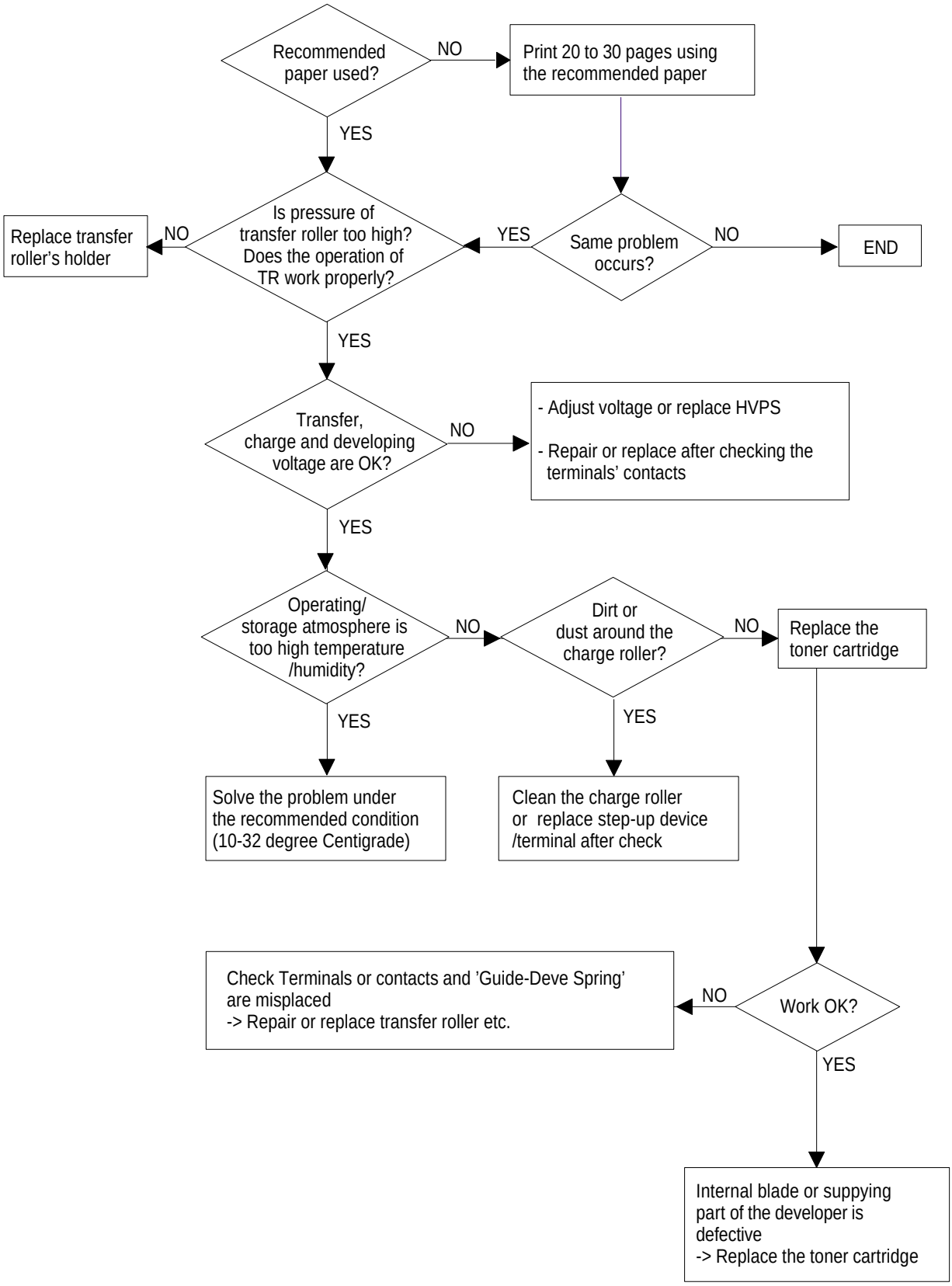
Vertical White Line (Band)



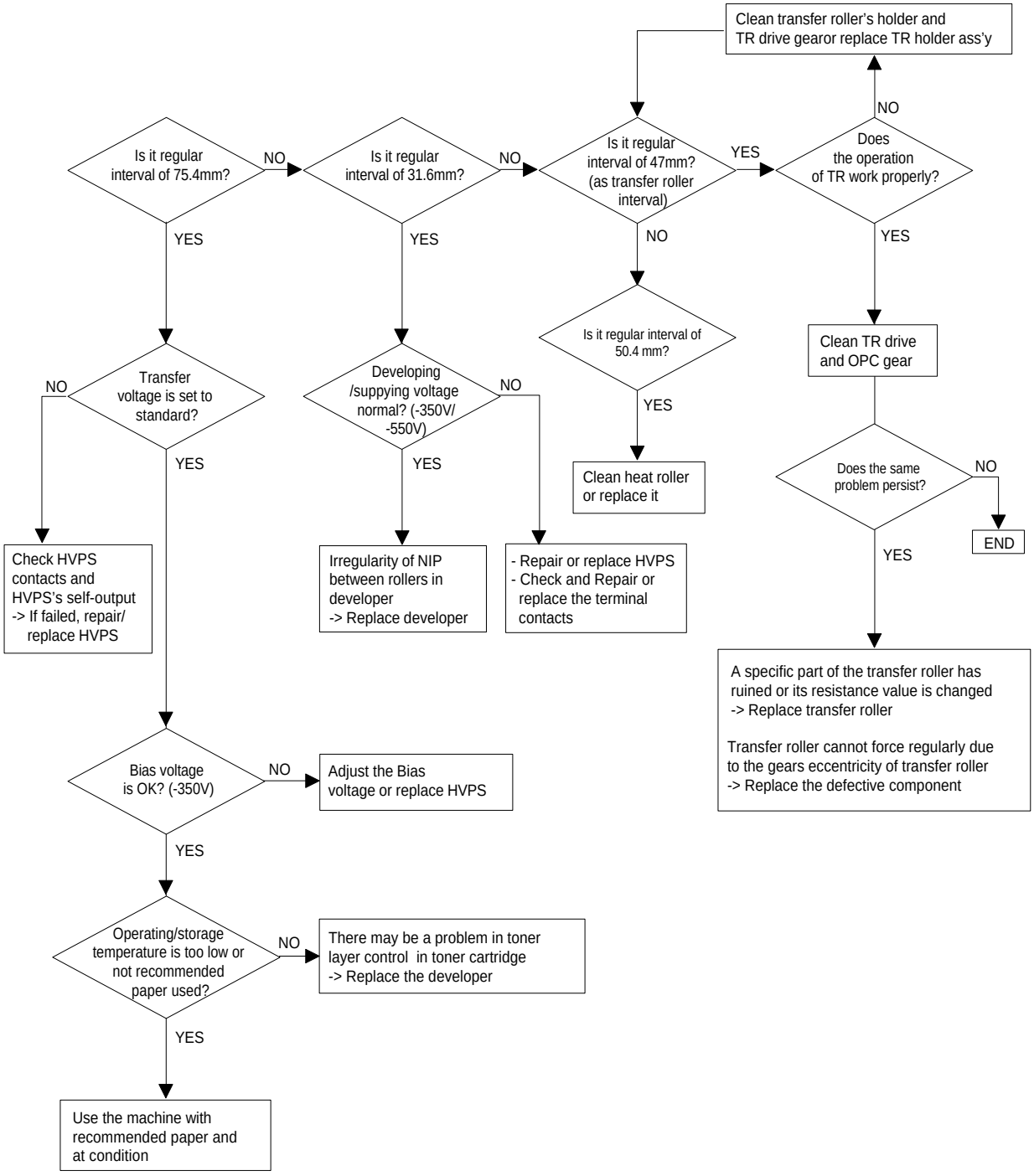
Dark Image


Dark selected via RCP?
NO
YES
Change to Normal and test
Same at Normal?
NO
END
YES
Works cor with -350V of Bias voltage?
NO
Repair or replace the defective component
YES
Works correctly after replaced LSU?
NO
Toner over supply due to the adjustment fault of metering blade in developer
-> Replace developer
YES
The power of LSU is set high or internal problem
-> Replace LSU or adjust voluem

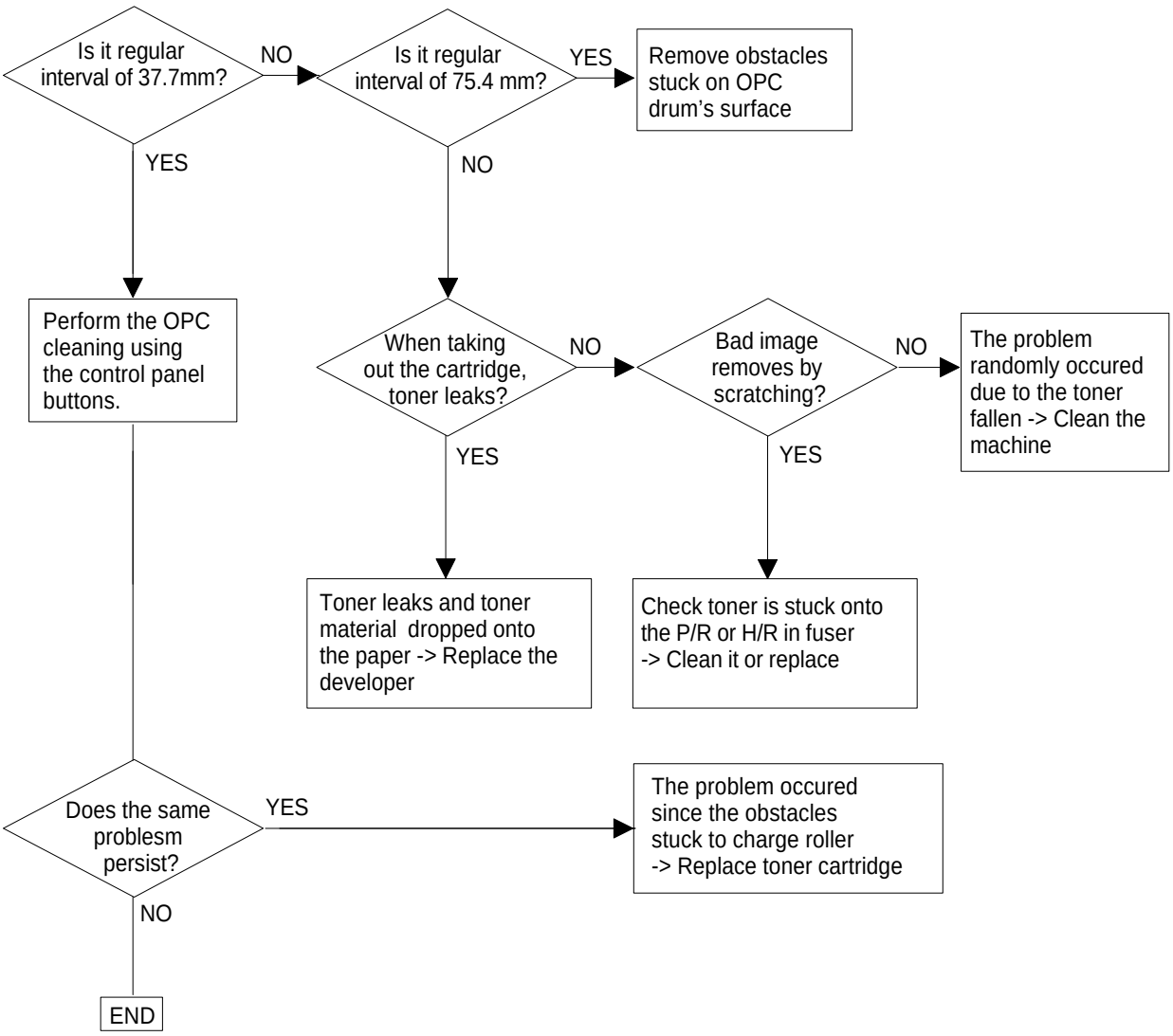
Background


Recommended paper used?
NO
Print 20 to 30 pages using the recommended paper
YES
Is pressure of transfer roller too high? Does the operation of TR work properly?
NO
Replace transfer roller's holder
YES
Same problem occurs?
NO
END
YES
Transfer, charge and developing voltage are OK?
NO
- Adjust voltage or replace HVPS
- Repair or replace after checking the terminals' contacts
YES
Operating/ storage atmosphere is too high temperature /humidity?
NO
Dirt or dust around the charge roller?
NO
Replace the toner cartridge
YES
YES
Solve the problem under the recommended condition (10-32 degree Centigrade)
Clean the charge roller or replace step-up device /terminal after check
Check Terminals or contacts and 'Guide-Deve Spring' are misplaced
-> Repair or replace transfer roller etc.
NO
Work OK?
YES
Internal blade or suppying part of the developer is defective
-> Replace the toner cartridge

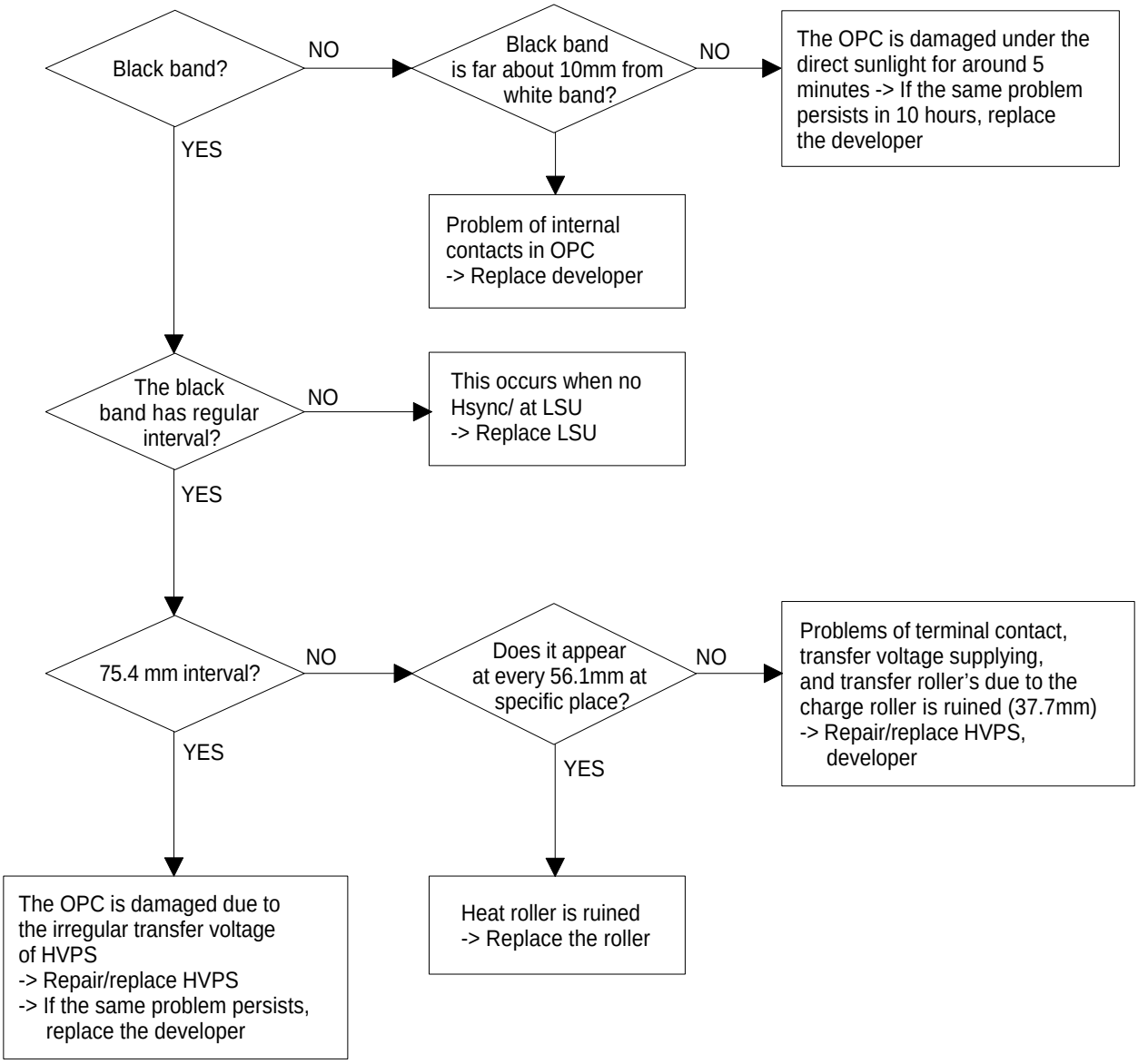
Ghost


Clean transfer roller's holder and TR drive gearor replace TR holder ass'y
Is it regular interval of 75.4mm?
NO
Is it regular interval of 31.6mm?
NO
Is it regular interval of 47mm? (as transfer roller interval)
YES
Does the operation of TR work properly?
NO
YES
YES
YES
NO
YES
Transfer voltage is set to standard?
NO
YES
Developing /suppying voltage normal? (-350V/ -550V)
NO
YES
Is it regular interval of 50.4 mm?
YES
Clean heat roller or replace it
Clean TR drive and OPC gear
Does the same problem persist?
NO
END
YES
Check HVPS contacts and HVPS's self-output -> If failed, repair/ replace HVPS
Irregularity of NIP between rollers in developer -> Replace developer
- Repair or replace HVPS
- Check and Repair or replace the terminal contacts
A specific part of the transfer roller has ruined or its resistance value is changed -> Replace transfer roller
Transfer roller cannot force regularly due to the gears eccentricity of transfer roller -> Replace the defective component
Bias voltage is OK? (-350V)
NO
Adjust the Bias voltage or replace HVPS
YES
Operating/storage temperature is too low or not recommended paper used?
NO
There may be a problem in toner layer control in toner cartridge -> Replace the developer
YES
Use the machine with recommended paper and at condition

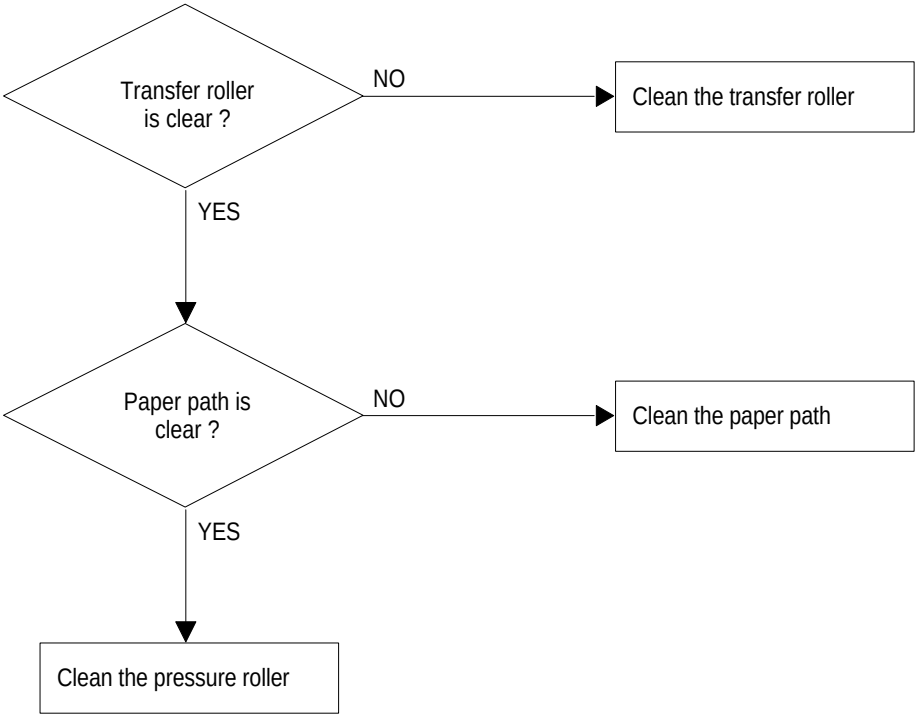
Black Spot


Is it regular interval of 37.7mm?
NO
Is it regular interval of 75.4 mm?
YES
Remove obstacles stuck on OPC drum's surface
YES
NO
Perform the OPC cleaning using the control panel buttons.
When taking out the cartridge, toner leaks?
NO
Bad image removes by scratching?
NO
The problem randomly occured due to the toner fallen -> Clean the machine
YES
YES
Toner leaks and toner material dropped onto the paper -> Replace the developer
Check toner is stuck onto the P/R or H/R in fuser -> Clean it or replace
Does the same problesm persist?
YES
The problem occured since the obstacles stuck to charge roller -> Replace toner cartridge
NO
END

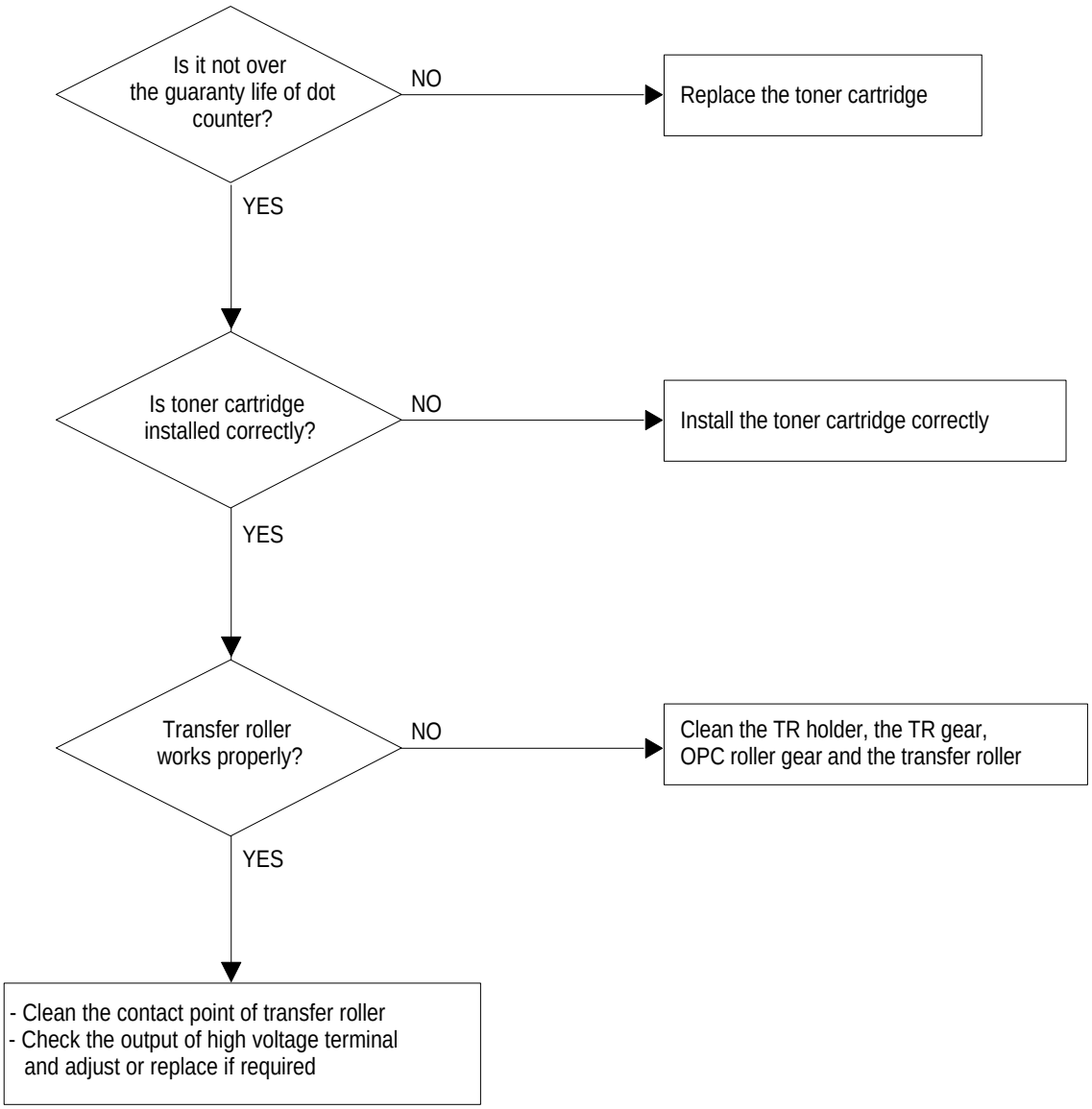
Horizontal Band



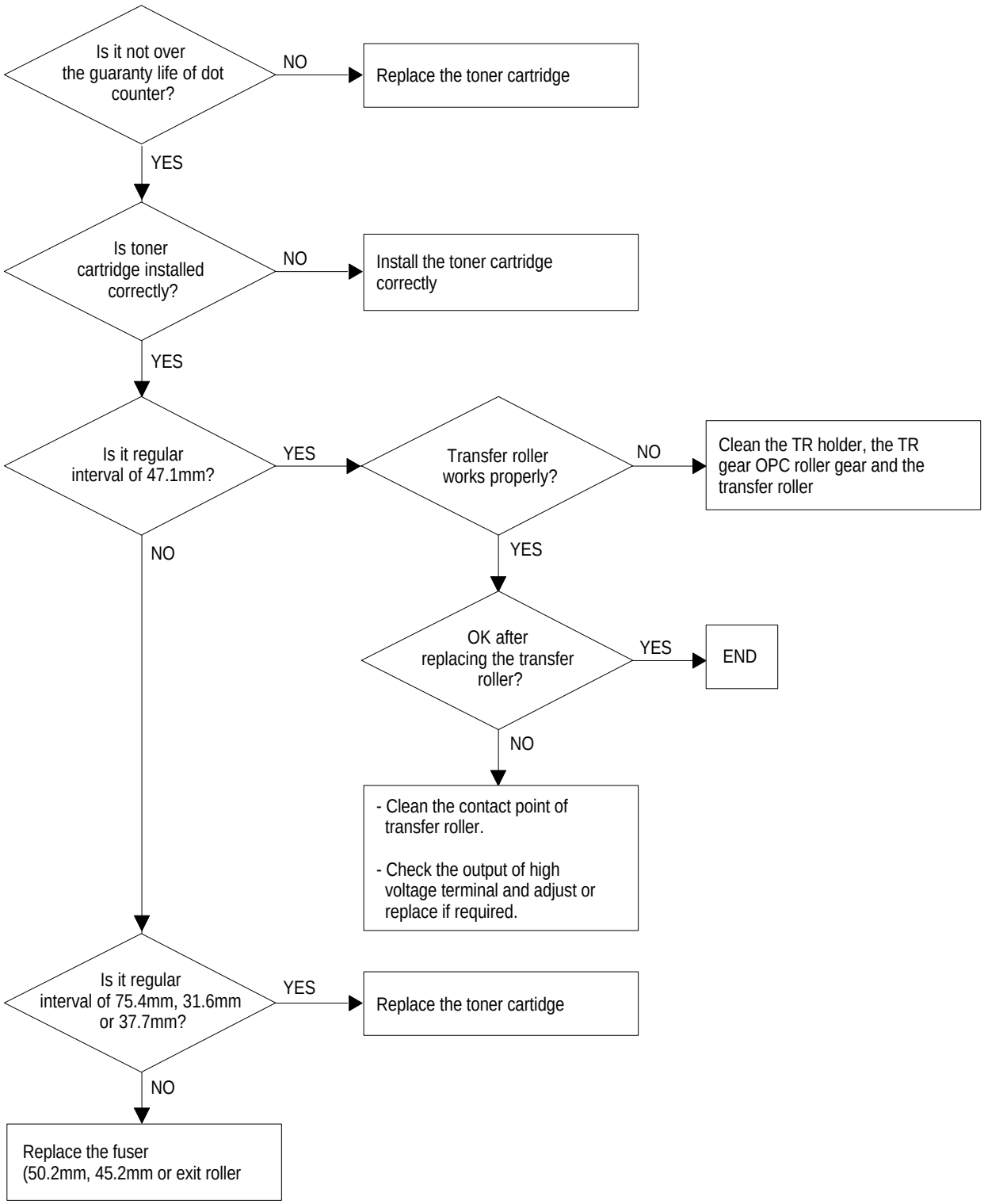
Toner Contaminations on Back of Paper



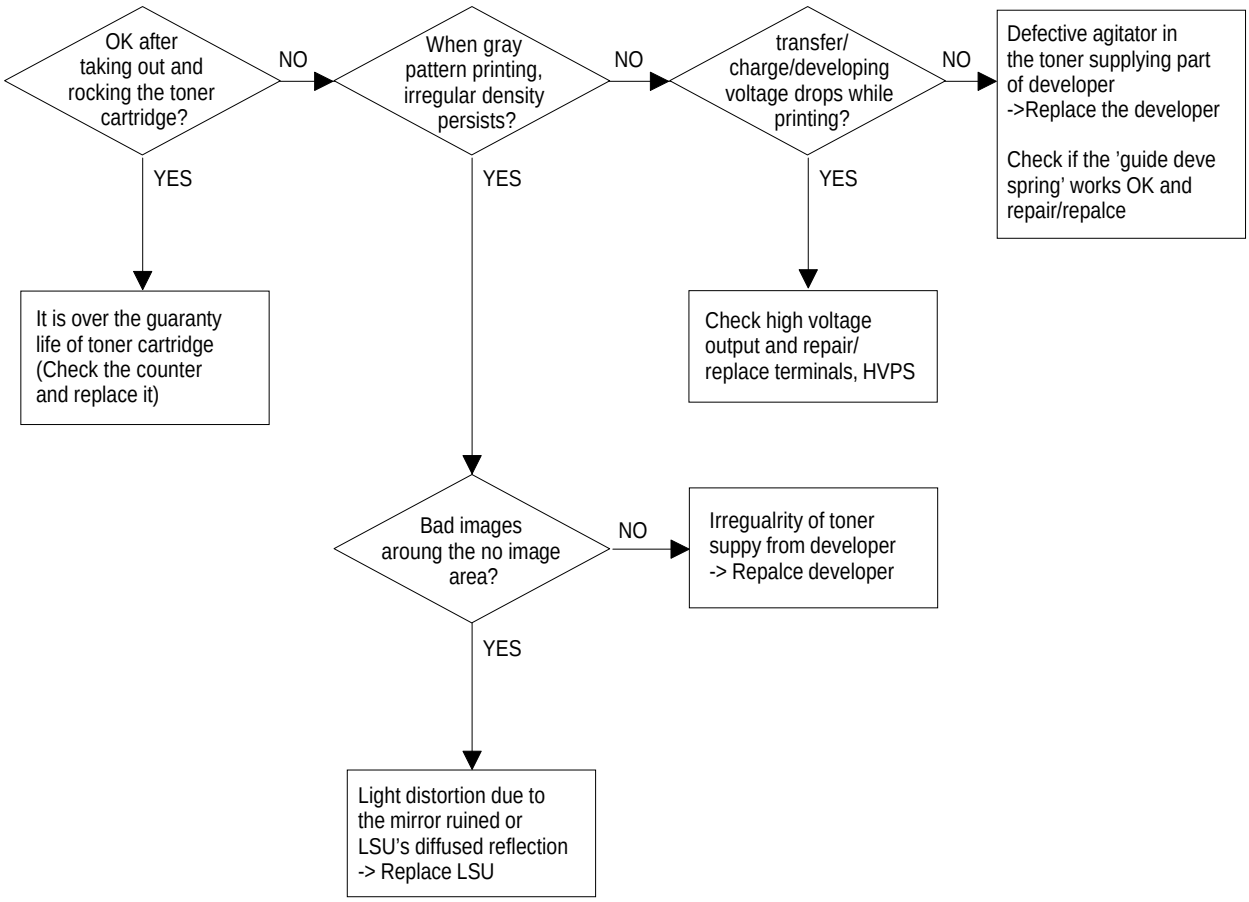
Partial Blank Image (not Periodic)



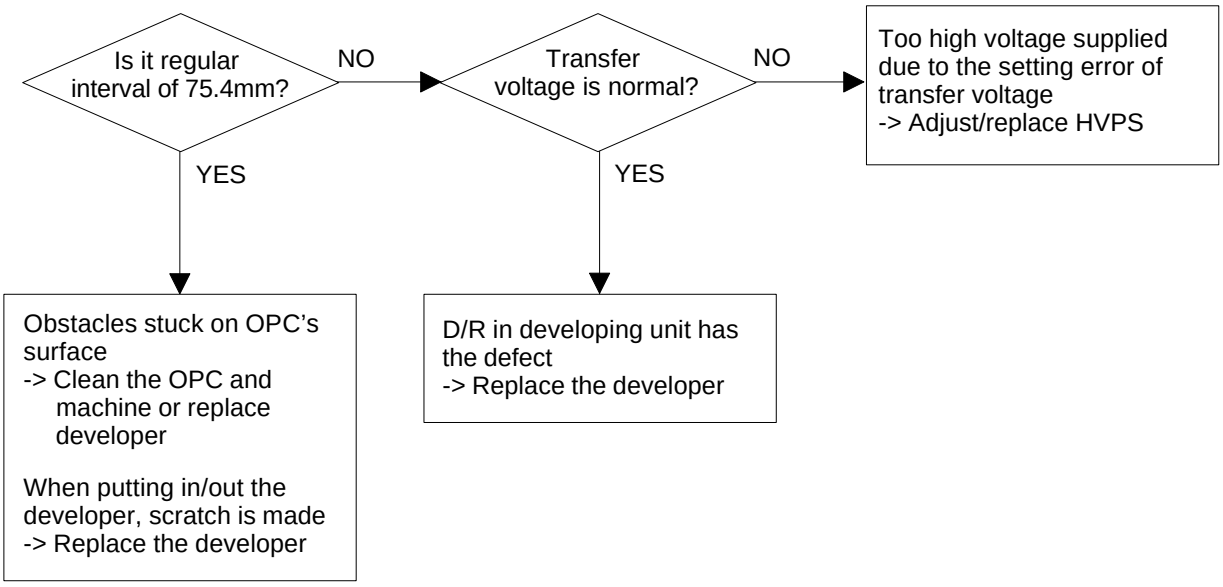
Partial Blank Image (Periodic)



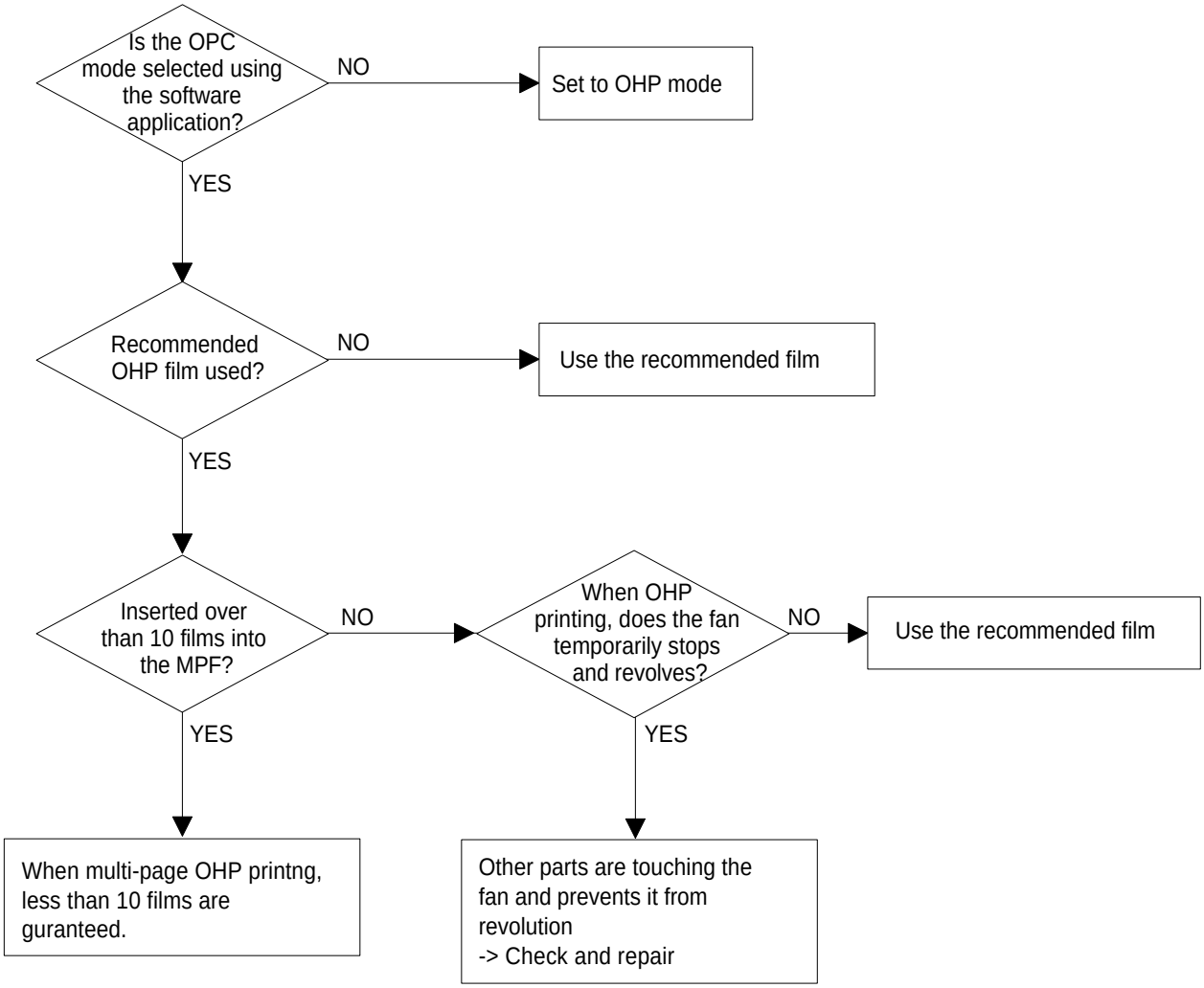
Irregular Density



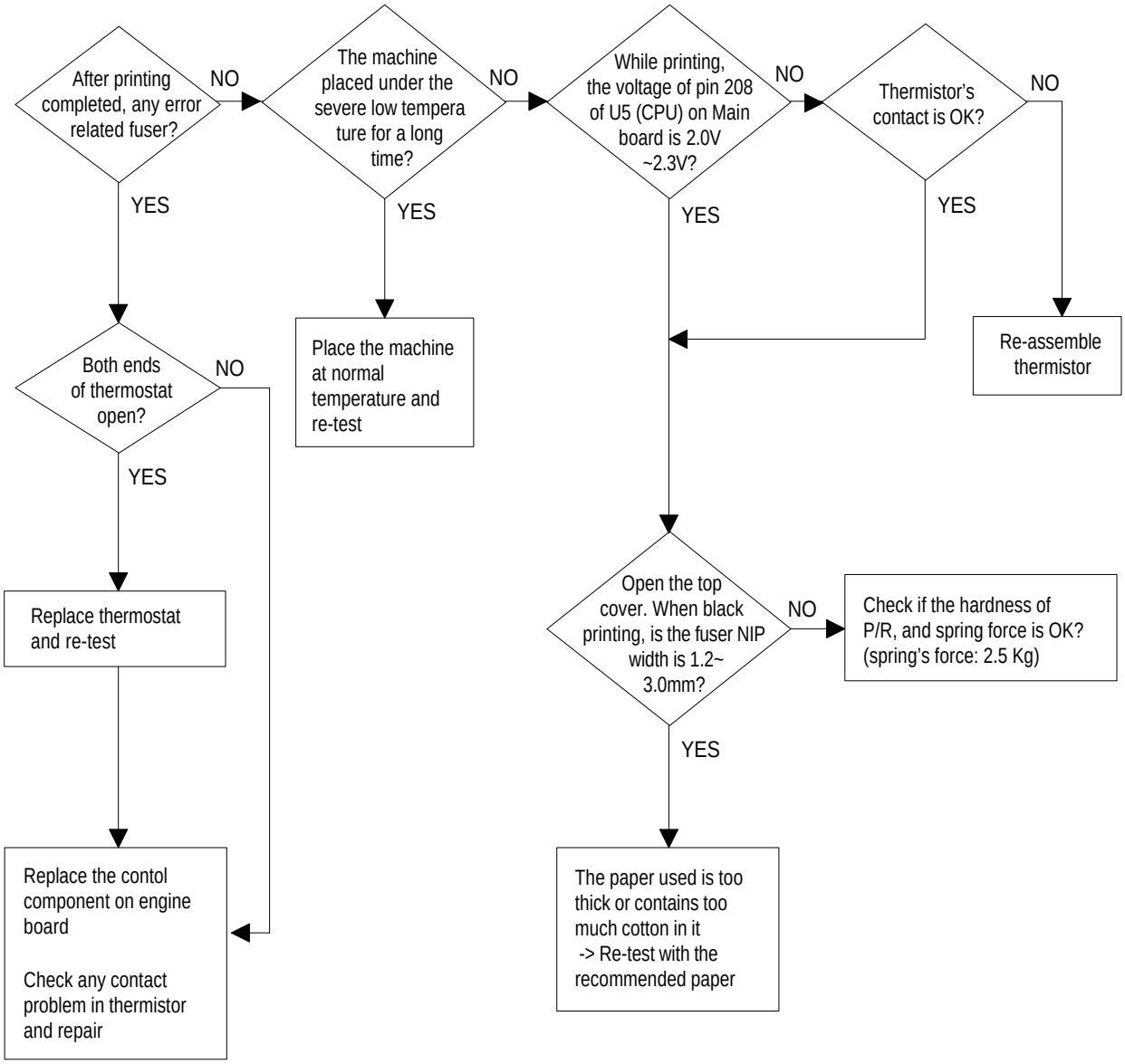
White Spot


Is it regular interval of 75.4mm?
NO
Transfer voltage is normal?
NO
Too high voltage supplied due to the setting error of transfer voltage
-> Adjust/replace HVPS
YES
YES
Obstacles stuck on OPC's surface
-> Clean the OPC and machine or replace developer
When putting in/out the developer, scratch is made
-> Replace the developer
D/R in developing unit has the defect
-> Replace the developer

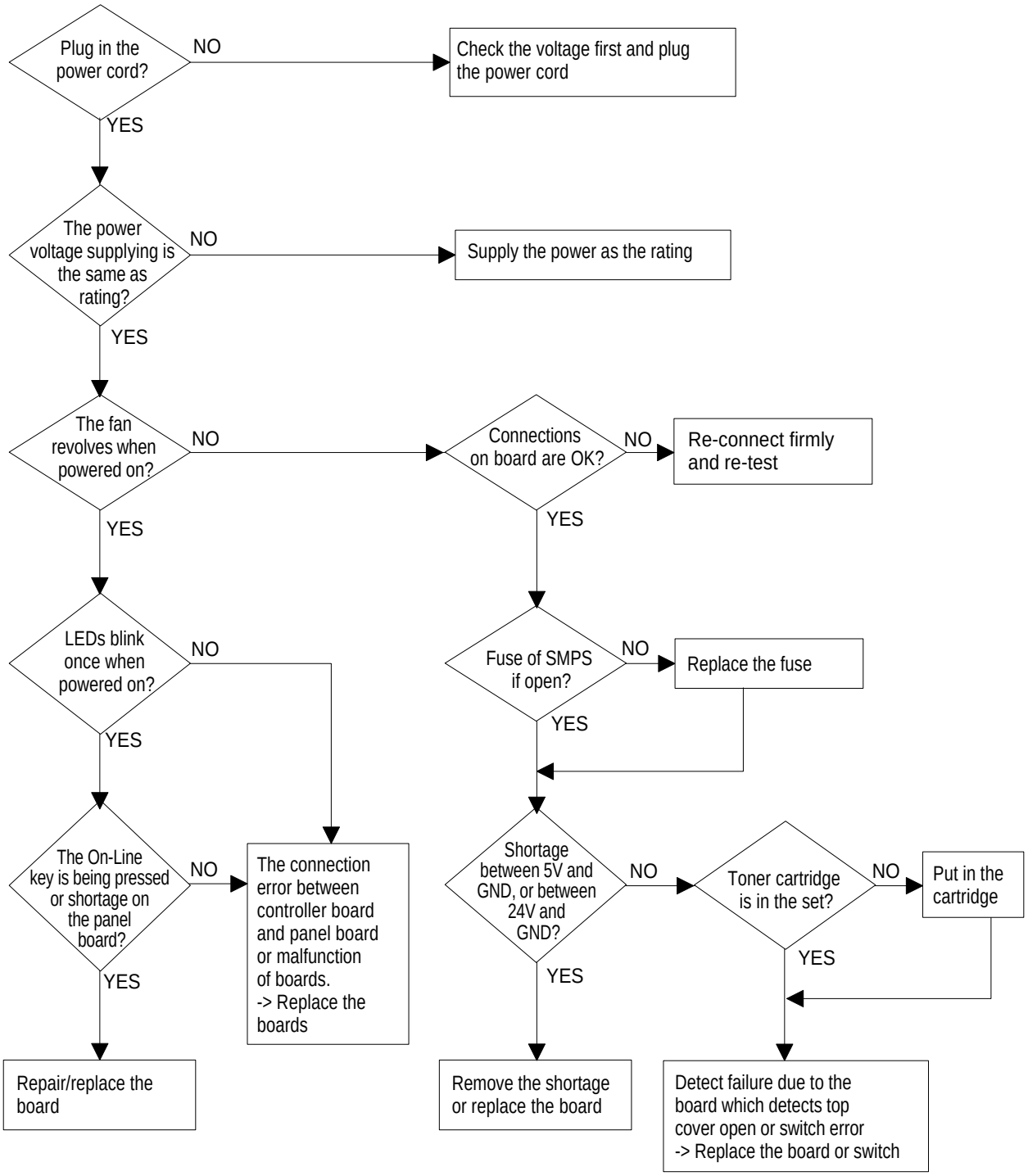
Trembling at the End When OHP Printing



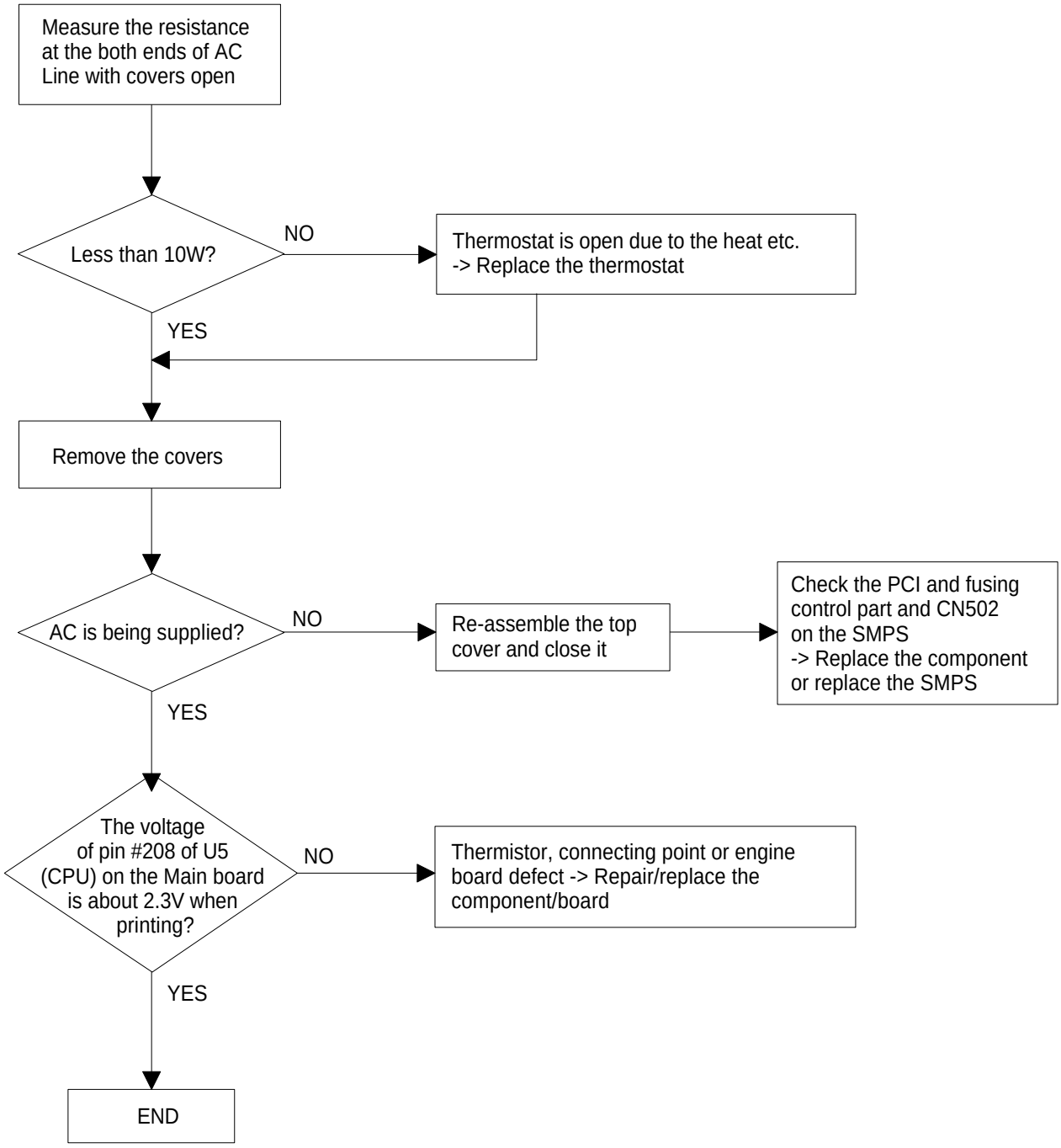
Poor Fusing Grade



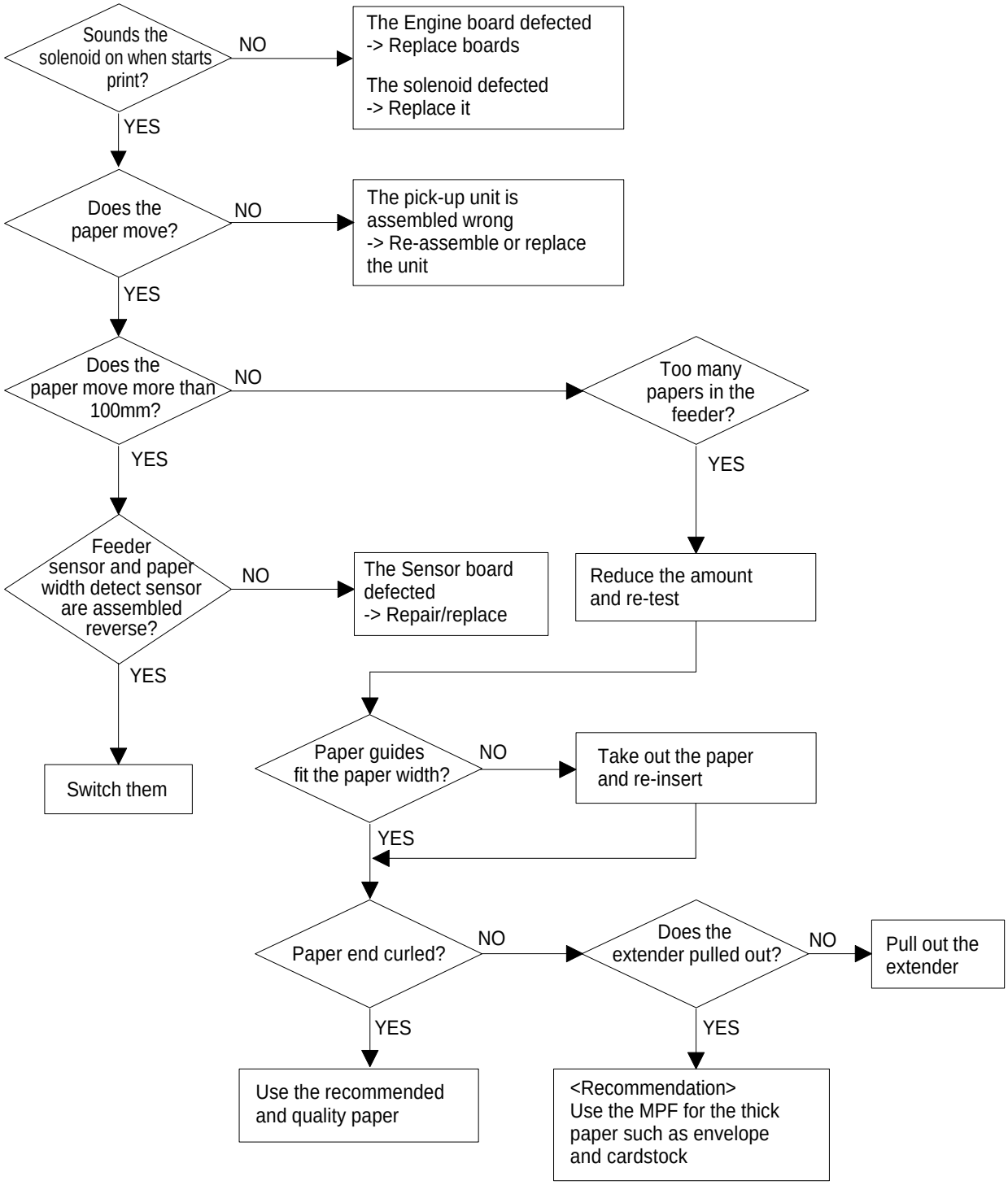
No Power (LCD NO display LED Off)



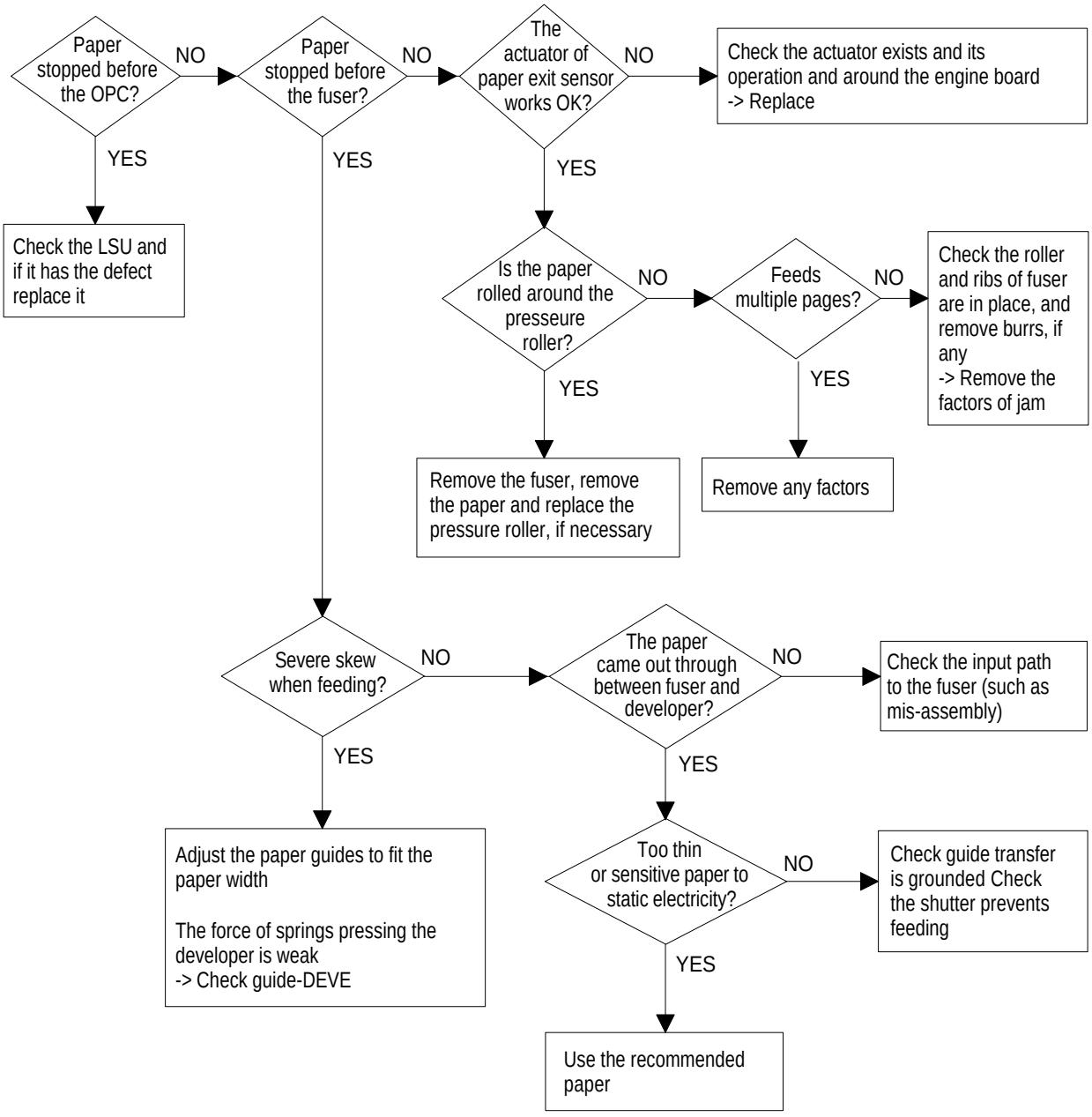
Fuser Error


Measure the resistance at the both ends of AC Line with covers open
Less than 10W?
NO
Thermostat is open due to the heat etc. -> Replace the thermostat
YES
Remove the covers
AC is being supplied?
NO
Re-assemble the top cover and close it
Check the PCI and fusing control part and CN502 on the SMPS -> Replace the component or replace the SMPS
YES
The voltage of pin #208 of U5 (CPU) on the Main board is about 2.3V when printing?
NO
Thermistor, connecting point or engine board defect -> Repair/replace the component/board
YES
END

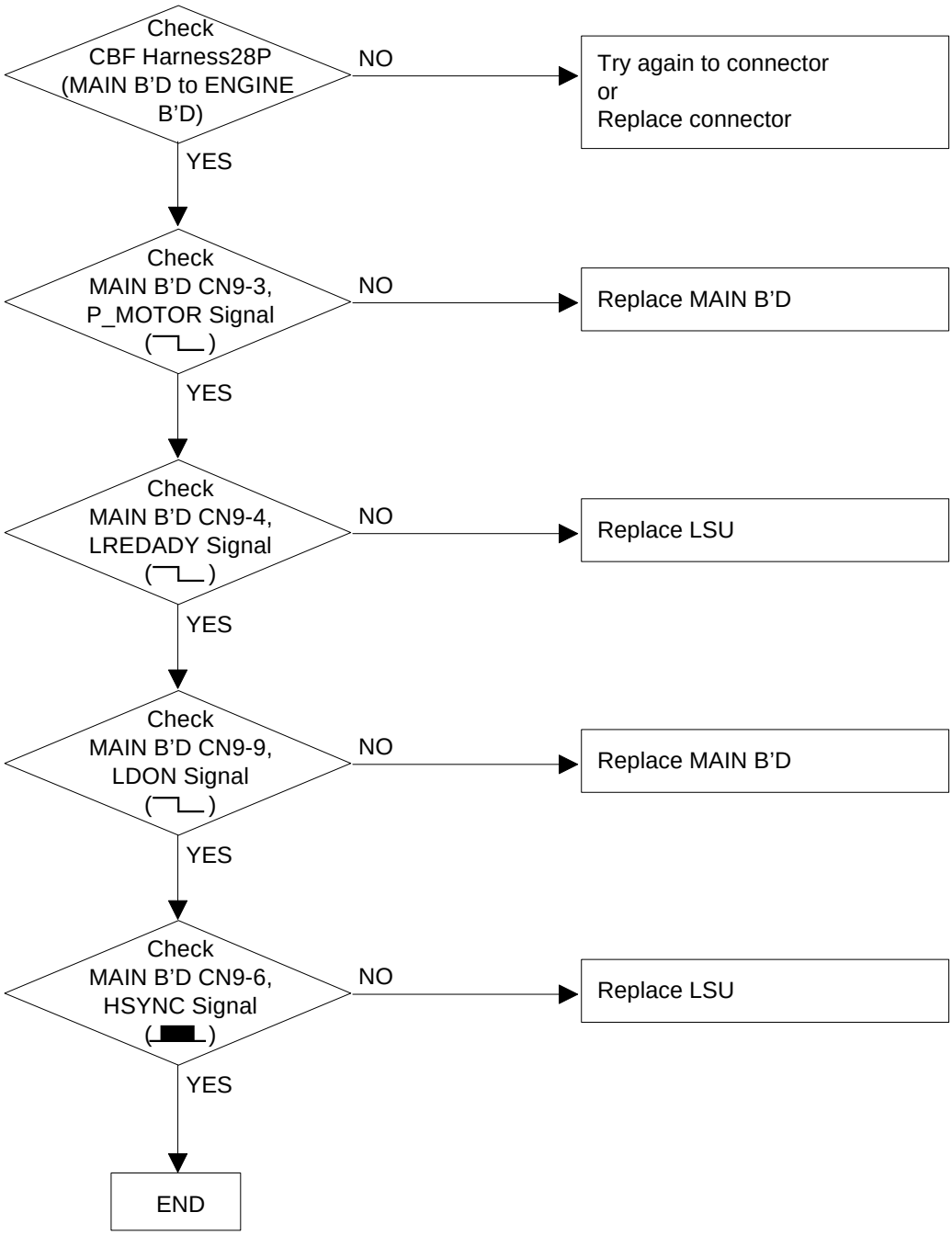
Paper Jam (Mis-feeding)



Paper Jam (Jam1)

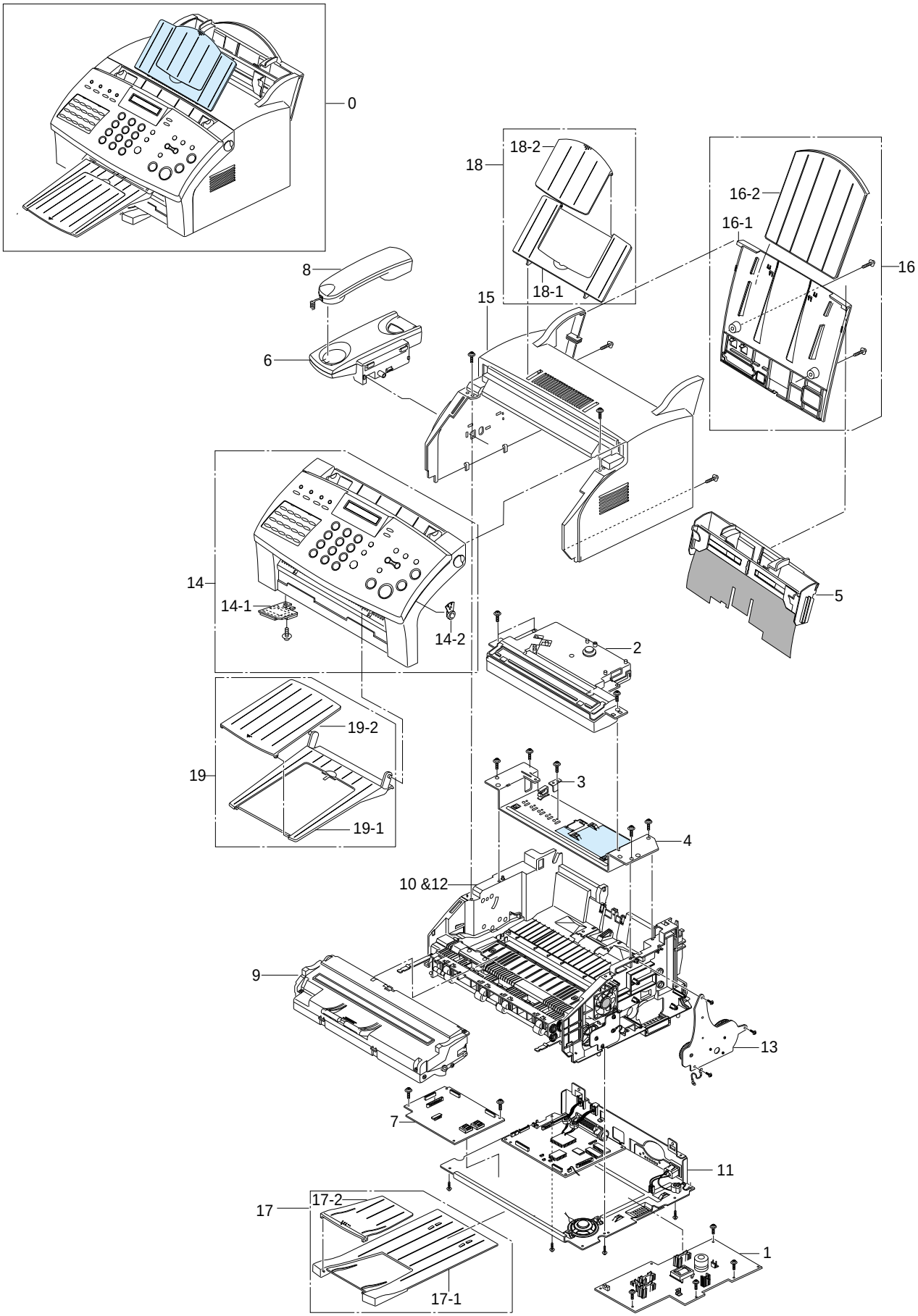


LSU Error


Check
CBF Harness28P
(MAIN B'D to ENGINE
B'D)
NO
Try again to connector
or
Replace connector
YES
Check
MAIN B'D CN9-3,
P_MOTOR Signal
NO
Replace MAIN B'D
YES
Check
MAIN B'D CN9-4,
LREDADY Signal
NO
Replace LSU
YES
Check
MAIN B'D CN9-9,
LDON Signal
NO
Replace MAIN B'D
YES
Check
MAIN B'D CN9-6,
HSYNC Signal
NO
Replace LSU
YES
END

5. Exploded Views and Parts List

5-1 Main Assembly

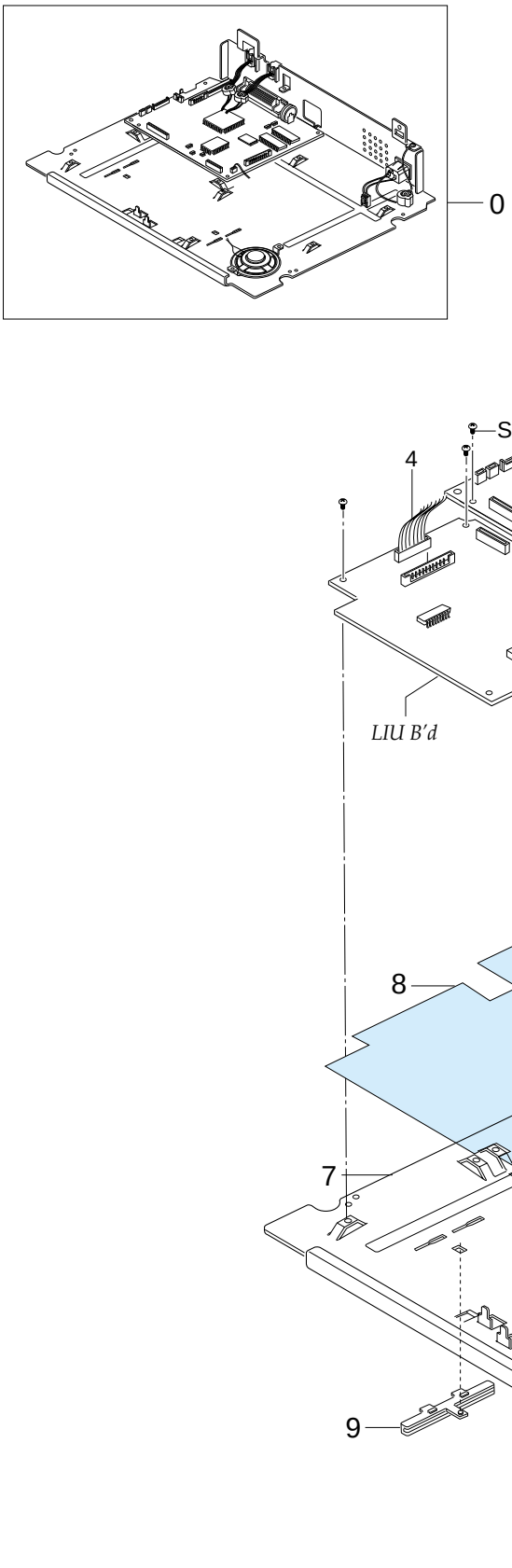


Main Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
	SF-530 / 531P				
1	SMPS-V1	JC44-00032A	1	O	⚠ 110V
	SMPS-V2(4CH)	JC44-00023A	1	O	⚠ 220V
2	UNIT-LSU	JC59-00006A	1	O	
3	IPR-PLATE_CHANNEL	JC70-00058A	1	O	
4	MEC-PLATE UPPER	JC75-00057A	1	O	
5	MEC-TRAY	JC75-00062A	1	O	SF-530
	MEC-TRAY(P)	JC75-00075A	1	O	SF-531P
6	MEC-CRADLE	JC75-00083A	1	O	
7	PBA MAIN-LIU PBA	JC92-01379A	1	O	
8	ELA HOU-HANDSET	JC96-01629B	1	O	
9	ELA-UNIT DEV APO6 E	*	1	X	
10	ELA HOU-ENGINE ASS'Y	*	1	X	
11	ELA HOU-SHIELD ENGINE	*	1	X	SF-530
	ELA HOU-SHIELD ENGINE	*	1	X	SF-531P
12	ELA HOU-FRAME LOWER	JC96-02094B	1	O	⚠110V
	ELA HOU-FRAME LOWER	JC96-02094A	1	O	⚠220V
13	ELA HOU-RX DRIVE	JC96-01755A	1	O	
14	MEA HOU-OPE FRONT	JC97-01463L	1	O	SF-530
	MEA HOU-OPE FRONT	TBD	1	O	SF-531P
14-1	PBA MAIN-SCAN	JC81-00441A	1	O	
14-2	PMO-BASHING WHITE	JF72-41306A	1	O	
15	PMO-COVER TOP	JC72-00128A	1	O	
16	MEC-COVER REAR	JC75-00059A	1	O	
16-1	PMO-COVER_REAR	*	1	X	
16-2	PMO-TRAY_LARGE	*	1	X	
17	MEC-STCKER	JC75-00060A	1	O	
17-1	PMO-STACKER_MAIN	*	1	X	
17-2	PMO-STACKER_SUB	*	1	X	
18	MEA UNIT-CHUTE ASS'Y	JC97-01187E	1	O	
18-1	PMO-CHUTE	*	1	X	
18-2	PMO-DUMMY CHUTE	*	1	X	
19	MEC-STACKER	JC75-00084A	1	O	
19-1	PMO-STACKER TX(APOLLO)	JC72-00223A	1	O	
19-2	PMO-STACKER TX(B)	*	1	X	

5-2 Shield Engine Unit Assembly

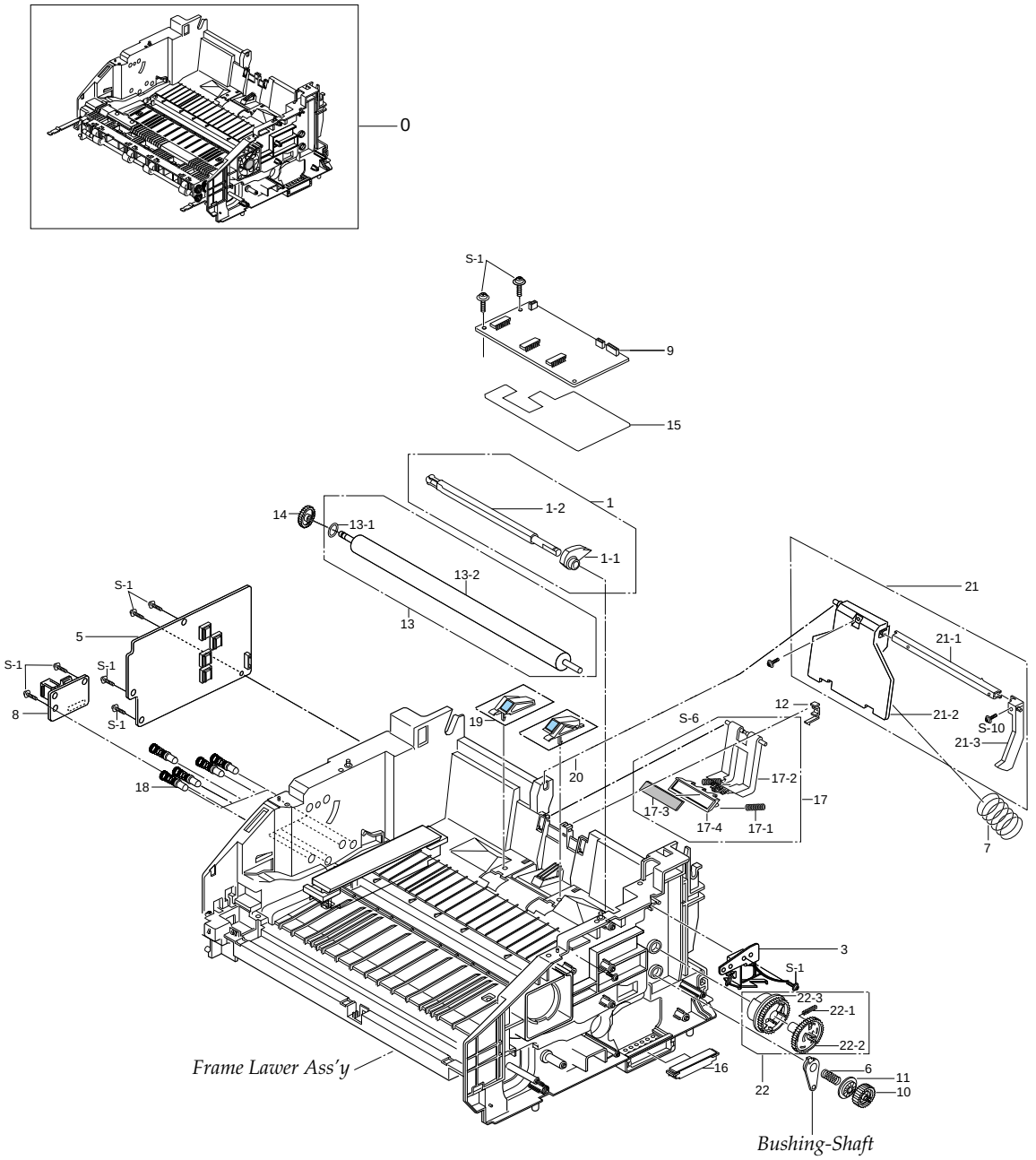


Shield Engine Unit Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-SHIELD ENGINE	*	1	X	SF-530
	ELA HOU-SHIELD ENGINE	*	1	X	SF-531P
1	CABLE-FLAT	3809-001161	1	O	
2	CBF HARNESS-LSU	JC39-00043A	1	O	
3	CBF HARNESS-MAIN-HVPS	JC39-00193A	1	O	
4	CBF HARNESS-LIU/HOOK 2	JC39-00174A	1	O	
5	CBF HARNESS-MODULA 2	JC39-00175A	1	O	
6	CBF HARNESS	JC39-40022A	1	O	INLET
7	IPR-SHIELD ENGINE	JC70-00200A	1	O	
8	IPR-SHILED SMPS	JC70-00263A	1	O	
9	MEC-GUIDE STAKE ASS'Y	JC75-00087A	2	O	
10	PBA MAIN-MAIN	JC92-01308B	1	O	SF-530
	PBA MAIN-MAIN	JC92-01308D	1	O	SF-531P
11	ELA M/MEDIO AUD-SPEAKER	JC96-01607A	1	O	
12	WASHER-E.T	*	1	X	
13	CBF HARNESS-THERMISTOR	JC39-00045A	1	O	
S2	SCREW-MACHINE	6001-000568	2	O	
S8	SCREW-TAPTITE	6003-000221	1	O	
S9	SCREW-TAPTITE	6003-000264	11	O	

5-3 Engine Assembly

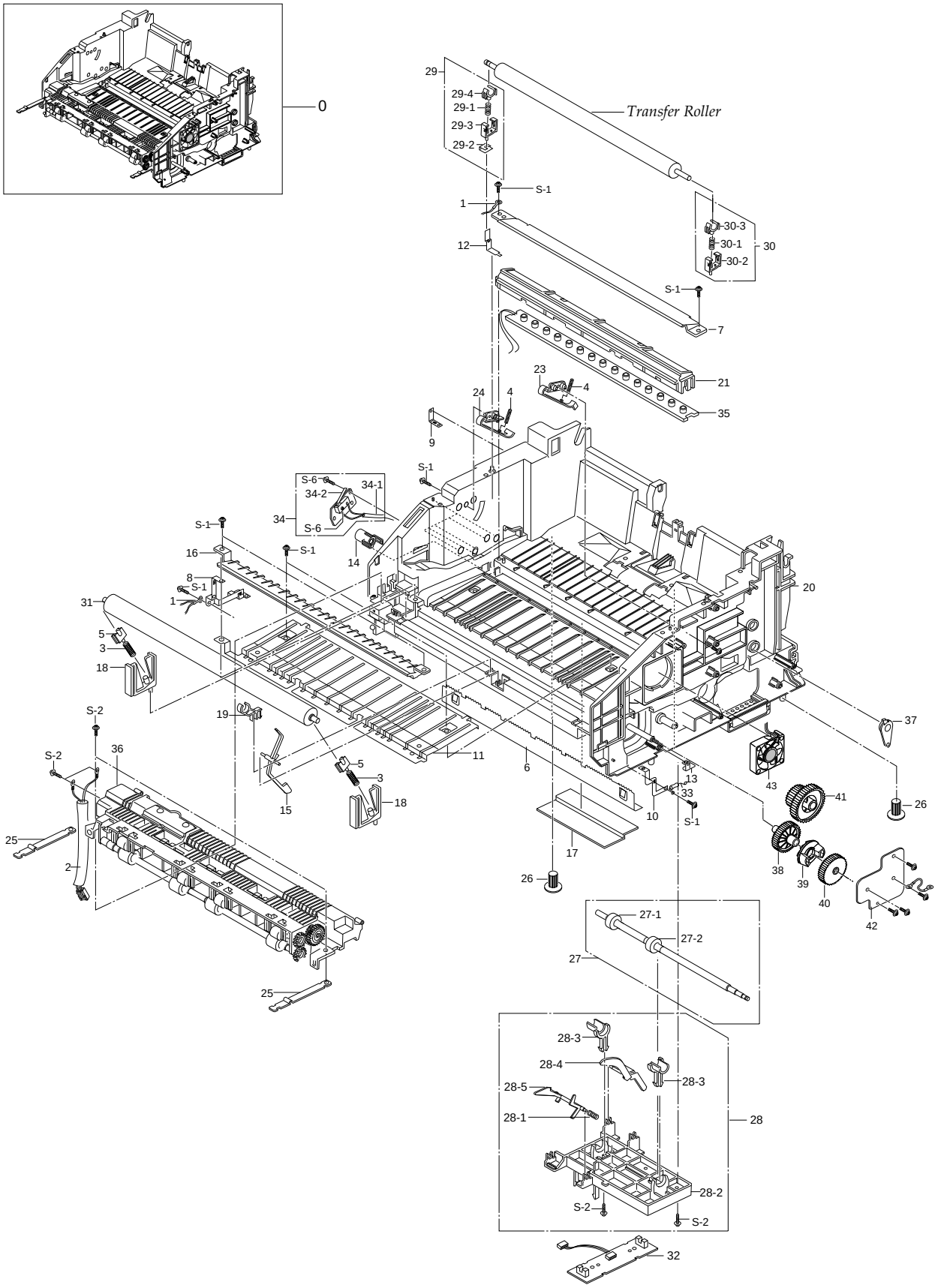


Engine Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-ENGINE ASS'Y	*	1	X	
1	MEC-CAM PICK UP	JC75-00072A	1	O	
1-1	PMO-CAM_PICKUP	*	1	X	
1-2	PMO-SHAFT_PICKUP	*	1	X	
2	CBF HARNESS-EARTH (TX MOTOR)	JB39-00017A	1	O	
3	SOLENOID-(APOLLO)	JC33-00002A	1	O	
5	SMPS-HVPS	JC44-00017A	1	O	
6	SPRING-CLUTCH	JC61-00012A	1	O	
7	SPRING-KNOCK UP	JC61-00023A	1	O	
8	PBA MAIN-HOOK 2	JC92-01378A	1	O	
9	PBA MAIN-ENGINE	JC92-01320A	1	O	
10	PMO-GEAR_FEED	JC72-00115A	1	O	
11	PMO-CLUTCH_FEED	JC72-00116A	1	O	
12	PMO-CAP_PAD	JC72-00124A	1	O	
13	MEA RACK-TR ASS'Y	*	1	X	
13-1	PPR-SPACER DR	*	1	X	
13-2	MEC-TRANSFER ROLLER	JC75-00035A	1	O	
14	PMO-GEAR_TRANSFER	JC72-00179A	1	O	
15	PCT-INSULATOR ENG BD	*	1	X	
16	PMO-DUMMY SIDE	*	1	X	
17	MEC-HOLDER PAD	JC75-00156A	1	O	
17-1	SPRING-PAD	JC61-00054A	2	O	
17-2	PMO-HOLDER PAD	JC72-00535A	1	O	
17-3	PMO-HOLDER PAD LARGE	JC72-00536A	1	O	
17-4	RPR-PAD FRICTION	*	1	X	
18	MEC-TERMINAL	JC75-00049A	5	O	
19	MEC-SIDE PAD(L)	JC75-00050B	1	O	
20	MEC-SIDE PAD(R)	JC75-00051B	1	O	
21	MEC-KNOCKUP ASS'Y	JC75-00053A	1	O	
21-1	IPR-BAR_KNOCKUP	*	1	X	
21-2	PMO-PLATE-KNOCKUP	*	1	X	
21-3	PMO-CAM-KNOCKUP	*	1	X	
22	MEC-GEAR PICK UP	JC75-00056A	1	O	
22-1	SPRING-PICK UP GEAR	*	1	X	
22-2	PMO-GEAR_PICKUP,1	*	1	X	
22-3	PMO-GEAR_PICKUP,2	*	1	X	
S7	SCREW-TAPTITE	6003-000196	7	O	
S10	SCREW-TAPTITE	6003-000266	2	O	
S11	SCREW-TAPTITE	6003-000119	17	O	

5-4 Frame Lower Assembly

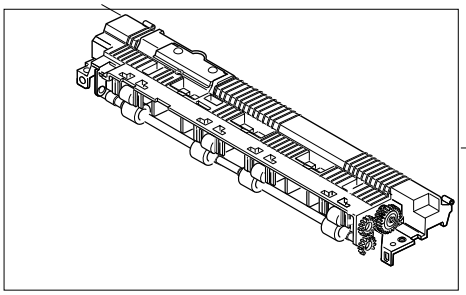


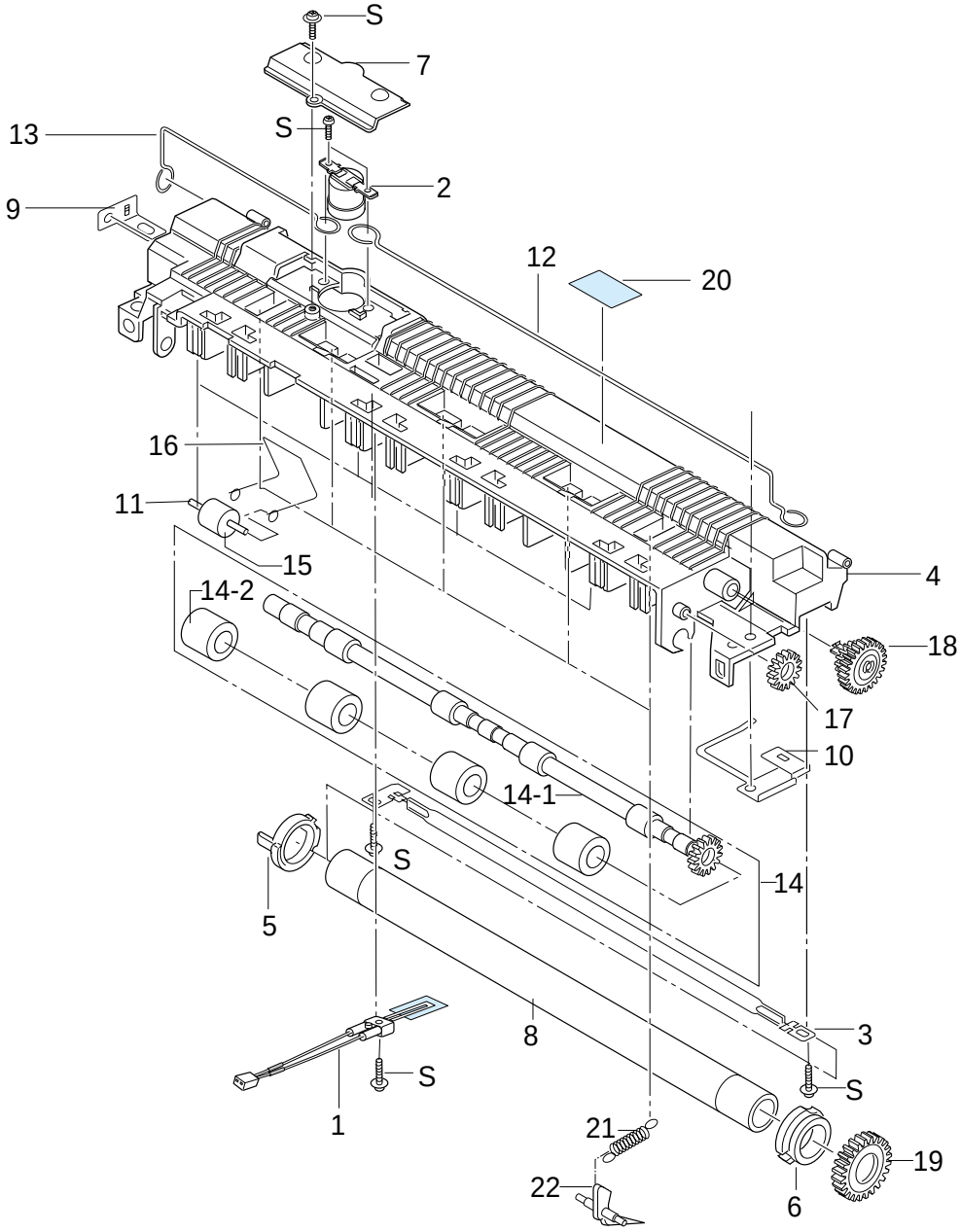
Frame Lower Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-FRAME LOWER	JC96-02094B	1	O	⚠ 110V
	ELA HOU-FRAME LOWER	JC96-02094A	1	O	⚠ 220V
1	CBF HARNESS-OPE GND	*	1	X	
2	CBF HARNESS-FUSER	JC39-00061A	1	O	
3	SPRING-P/R (APOLLO)	*	2	X	
4	SPRING-GUIDE DEVE	*	2	X	
5	BEARING-PRESSURE R	*	2	X	
6	IPR-SAW_PLATE	*	1	X	
7	IPR-EARTH_TRANS	*	1	X	
8	IPR-GROUND_GUIDE	*	1	X	
9	IPR-GROUND_HVPS	*	1	X	
10	IPR-GROUND_FUSER	*	1	X	
11	IPR-GUIDE-TR	*	1	X	
12	IPR-PLATE-TERMINAL	*	1	X	
13	IPR-GROUND DRIVE	*	1	X	
14	PMO-BUSHING_TERMINAL	*	1	X	
15	PMO-ACTUATOR_EXIT	JC72-00130A	1	O	
16	PMO-GUIDE_INPUT	*	1	X	
17	PCT-FILM SAW	*	1	X	
18	PMO-HOLDER PR	JC72-00531A	2	O	
19	PMO-HOLDER EXIT	JC72-00532A	2	O	
20	PMO-FRAME LOWER	JC72-00533A	1	O	
21	PMO-COVER PTL	JC72-00534A	1	O	
23	PMO-CAP PLTE G/DEV R	JC72-41135A	1	O	
24	PMO-CAP PLTE G/DEV L	JC72-41173A	1	O	
25	PMO-STOPPER EXIT	*	2	X	
26	RMO-RUBBER_FOOT	*	2	X	
27	MEC-ROLLER FEED	JC75-00054A	1	O	
27-1	RPR-ROLLER FEED	*	2	X	
27-2	MEC-SHAFT FEED	*	1	X	
28	MEC-HOLDER FEED	JC75-00055A	1	O	
28-1	SPRING-ACT, FEED	*	1	X	
28-2	PMO-HOLDER_FEED	*	1	X	
28-3	PMO-BUSHING_FEED	*	2	X	
28-4	PMO-ACTUATOR_EMPTY	*	1	X	
28-5	PMO-ACTUATOR_FEED	JC72-00119A	1	O	
29	MEC-HOLDER TR L	JC75-00106C	1	O	
29-1	SPRING-TR(300)	*	1	X	
29-2	IPR-PLATE_TR	*	1	X	
29-3	PMO-HOLDER TR	JC72-00100C	1	O	
29-4	PMO-BUSHING_TR(L)	JC72-00102A	1	O	
30	MEC-HOLDER TR R	JC75-00107C	1	O	
30-1	SPRING-TR(300)	*	1	X	
30-2	PMO-HOLDER TR	JC72-00100C	1	O	
30-3	PMO-BUSHING_TR(R)	JC72-00101A	1	O	
31	MEC-ROLLER_PR 1210	JC75-00130A	1	O	
32	PBA MAIN-SENSOR	JC92-01197A	1	O	
33	ELA HOU-MOTOR GND	JC96-01579A	1	O	
34	ELA HOU-OPEN SENSOR	JC96-01584A	1	O	
34-1	CBF HARNESS-COVER	JC39-00041A	1	O	
34-2	IPR-BRKT-SENSOR	*	1	X	
35	ELA HOU-PTL ASS'Y	JC96-02312A	1	O	
36	ELA HOU-FUSER 110V	JC81-00439A	1	O	⚠110V
	ELA HOU-FUSER 220V(531P)	JC81-00440A	1	O	⚠220V
37	PMO-BUSHING SHAFT	JG72-40849A	1	O	
38	GEAR-FU_IN 47	JC66-00306A	1	O	
39	PMO-HUB GEAR	JC72-00676A	1	O	
40	GEAR-FU_OUT 47	*	1	X	
41	PMO-GEAR_83/35	JC72-00154A	1	O	
42	IPR-BRACKET FUSER DRV	*	1	X	
43	FAN-DC	3103-001085	1	O	
S6	SCREW-TAPTITE	6003-000152	1	O	
S7	SCREW-TAPTITE	6003-000196	2	O	
S11	SCREW-TAPTITE	6003-000119	17	O	

5-5 Fuser Assembly



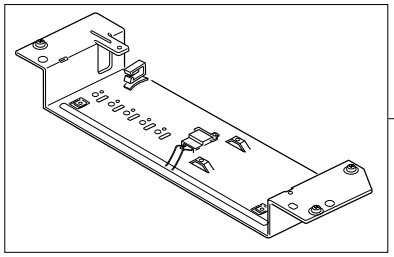


Fuser Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-FUSER 110V	JC81-00439A	1	O	⚠110V
	ELA HOU-FUSER 220V(531P)	JC81-00440A	1	O	⚠220V
1	THERMISTOR-NTC	1404-001188	1	O	
2	THERMOSTAT	4712-000001	1	O	
3	LAMP-HALOGEN	4713-001120	1	O	⚠110V
	LAMP-HALOGEN	4713-001121	1	O	⚠220V
4	PMO-FUSER_UPPER	*	1	X	
5	PMO-BUSHING H/R L	JC72-00530A	1	O	
6	PMO-BUSHING H/R R	JC72-00529A	1	O	
7	PMO-COVER_THERMOSTAT	*	1	X	
8	NPR-ROLLER HEAT	JC71-00012B	1	O	
9	IPR-ELECTRODE_PLATE	*	1	X	
10	IPR-GROUND_FU	*	1	X	
11	IPR-PIN ROLLER EXIT	*	4	X	
12	IPR-ELECTRODE WIRE1	*	1	X	
13	IPR-ELECTRODE WIRE,S	*	1	X	
14	MEA ETC-SHAFT EXIT	*	1	X	
14-1	PMO-SHAFT_EXIT(Z15)	JC72-00150A	1	O	
14-2	RMO-RUBBER_EXIT	*	4	X	
15	PMO-ROLLER_IDLE EXIT	JC72-00567A	4	O	
16	SPRING-EXIT	JC61-00017A	4	O	
17	PMO-GEAR_EXIT_DRV16	*	1	X	
18	PMO-GEAR_EXIT_IDLE	*	1	X	
19	GEAR-FUSER 1210	JC66-00037B	1	O	
20	LABEL(R)-CAU_HOT_FU	*	1	X	
21	SPRING-CLAW	*	5	X	
22	PMO-GUIDE CLAW	*	5	X	
S	SCREW-TAPTITE	6003-000119	5	O	
S	SCREW-TAPTITE	6003-000196	1	O	

5-6 Plate-Upper Unit Assembly



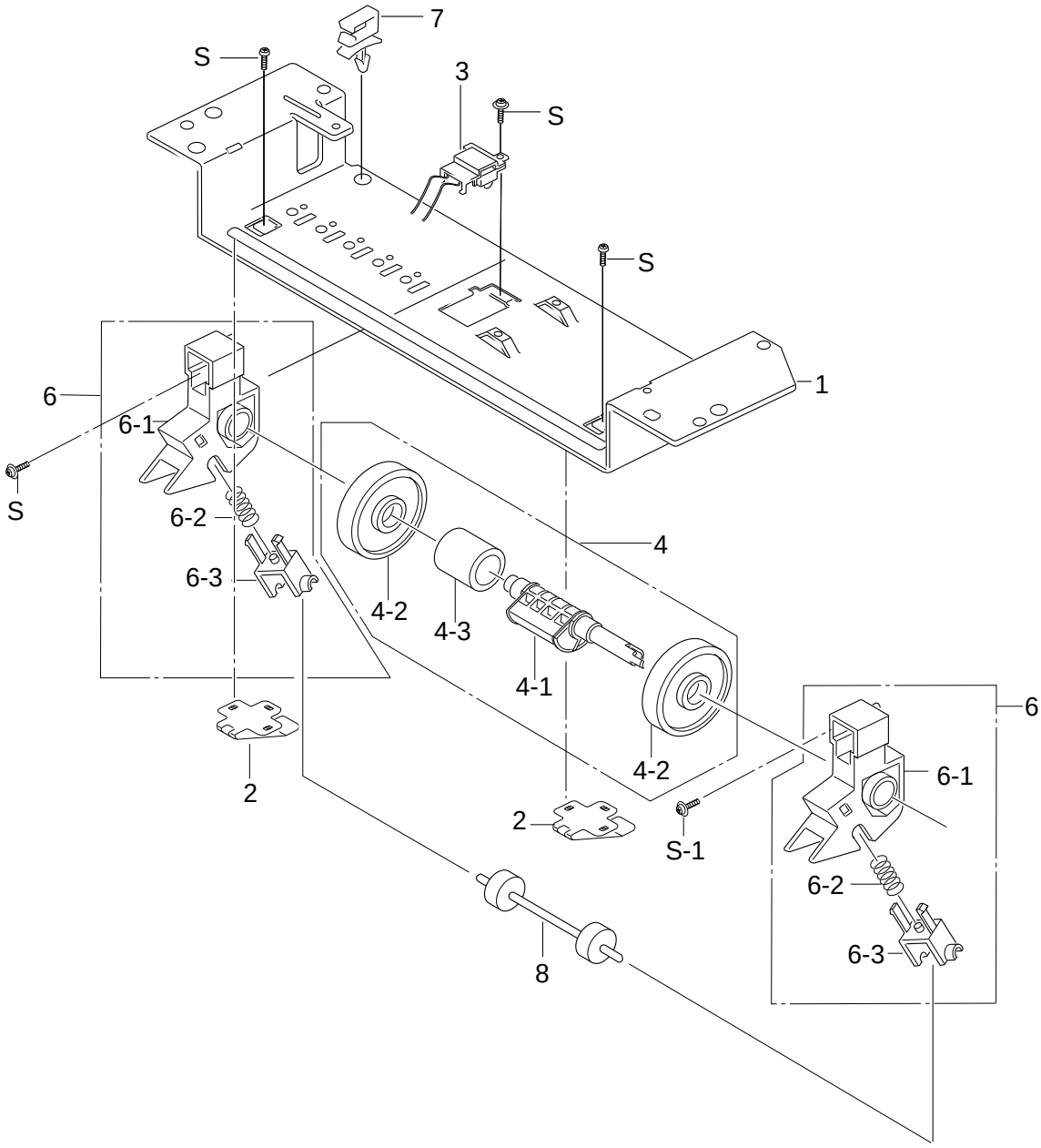
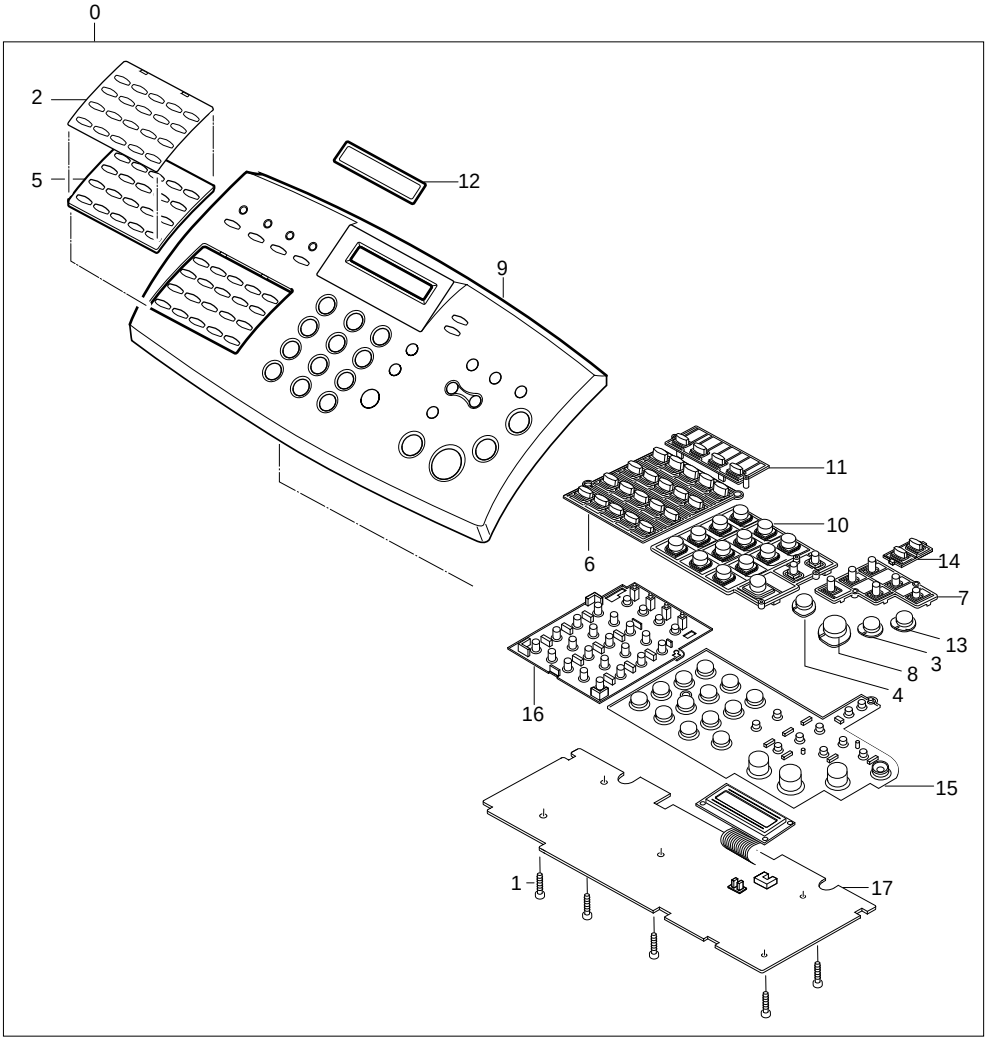


Plate-Upper Unit Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	MEC-PLATE UPPER	JC75-00057A	1	O	
1	IPR-UPPER-PLATE	*	1	X	
2	IPR-PLATE SPRING DEV	JC70-10223A	2	O	
3	ELA UNIT-FUSE DEVE	*	1	X	
4	MEA ETC-ROLLER PICK UP	*	1	X	
4-1	PMO-HOUSING_PICKUP	JC72-00109A	1	O	
4-2	RMO-ROLLER_PICKUP	*	1	X	
4-3	PMO-IDLE_PICKUP	*	2	X	
6	MEA ETC-IDLE FEED	*	2	X	
6-1	PMO-HOLDER_PICKUP	*	1	X	
6-2	SPRING-FEED	*	1	X	
6-3	PMO-HOLDER_IDLE,FEED	*	1	X	
7	CABLE CLAMP	6502-000130	1	O	
8	ICT-ROLLER IDEL FEED	*	1	X	
S5	SCREW-TAPTITE	*	2	X	
S10	SCREW-TAPTITE	6003-000266	1	O	
S10	SCREW-TAPTITE	6003-000266	2	O	

5-7 OPE Unit

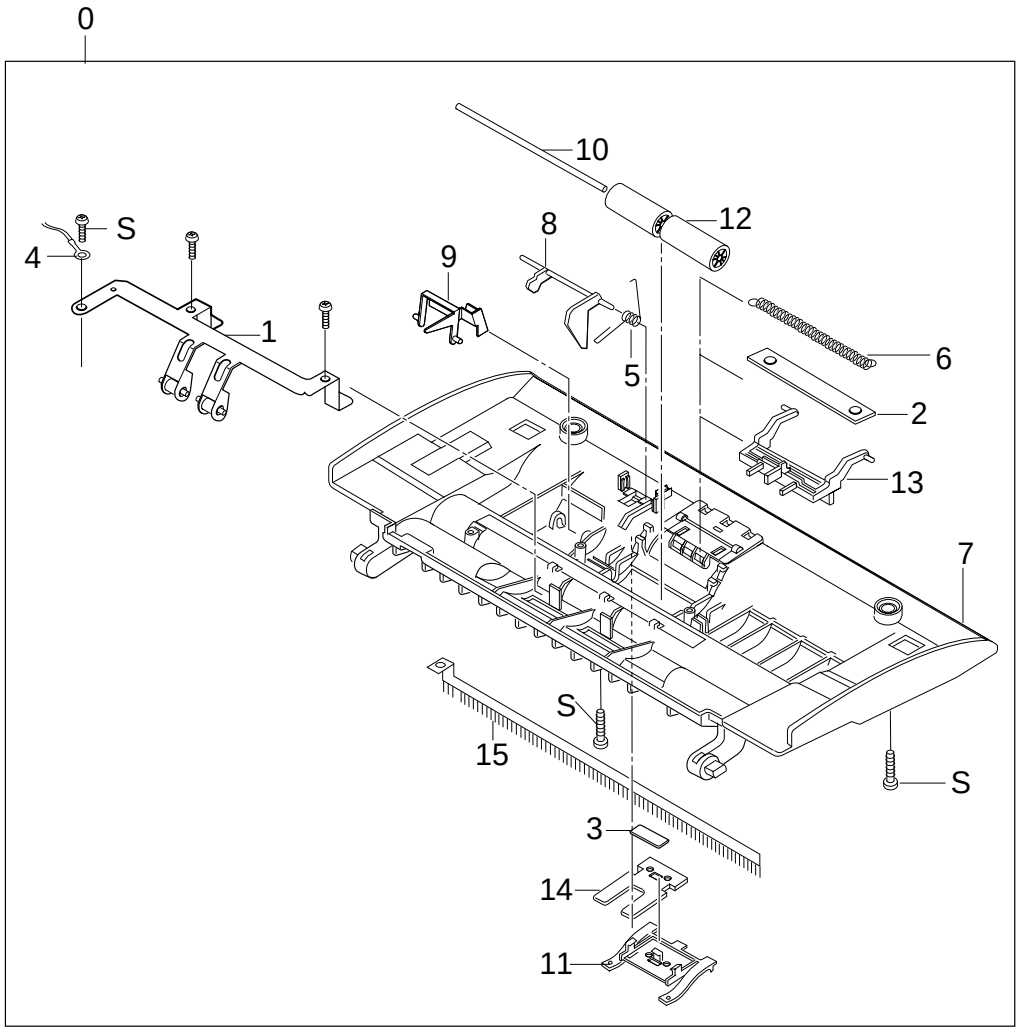


OPE Unit Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-OPE ASS'Y	JC81-00442A	1	O	SF-530
	ELA HOU-OPE ASS'Y	JC81-00468A	1	O	SF-531P
1	SCREW-TAPTITE	6003-000119	6	O	
2	MPR-COVER ADRESS	JG74-10543A	1	O	
3	PMO-KEY COPY	JB72-00102A	1	O	
4	PMO-KET STOP	JB72-00108A	1	O	
5	LABEL(P)-ONE TOUCH	*	1	X	
6	PMO-KEY OT	JC72-00275A	1	O	
7	PMO-KEY FUNCTION	*	1	X	
8	PMO-KEY START	*	1	X	
9	PMO-OPE COVER	JC72-00665L	1	O	SF-530
	PMO-OPE COVER	TBD	1	O	SF-531P
10	PMO-KEY TEL	JC72-00667A	1	O	
11	PMO-KEY SAVE	JC72-00668A	1	O	
12	PCT-LCD WINDOW	JC72-00672A	1	O	
13	PMO-KEY FOWARD	JC72-00886A	1	O	
14	PMO-KEY MODE(B)	JC72-41320A	1	O	
15	RMO-TEL	JC73-00072A	1	O	
16	RMO-ONE TOUCH	JC73-00073A	1	O	
17	PBA MAIN-OPE	JC81-00456A	1	O	

5-8 Scan Upper Assembly

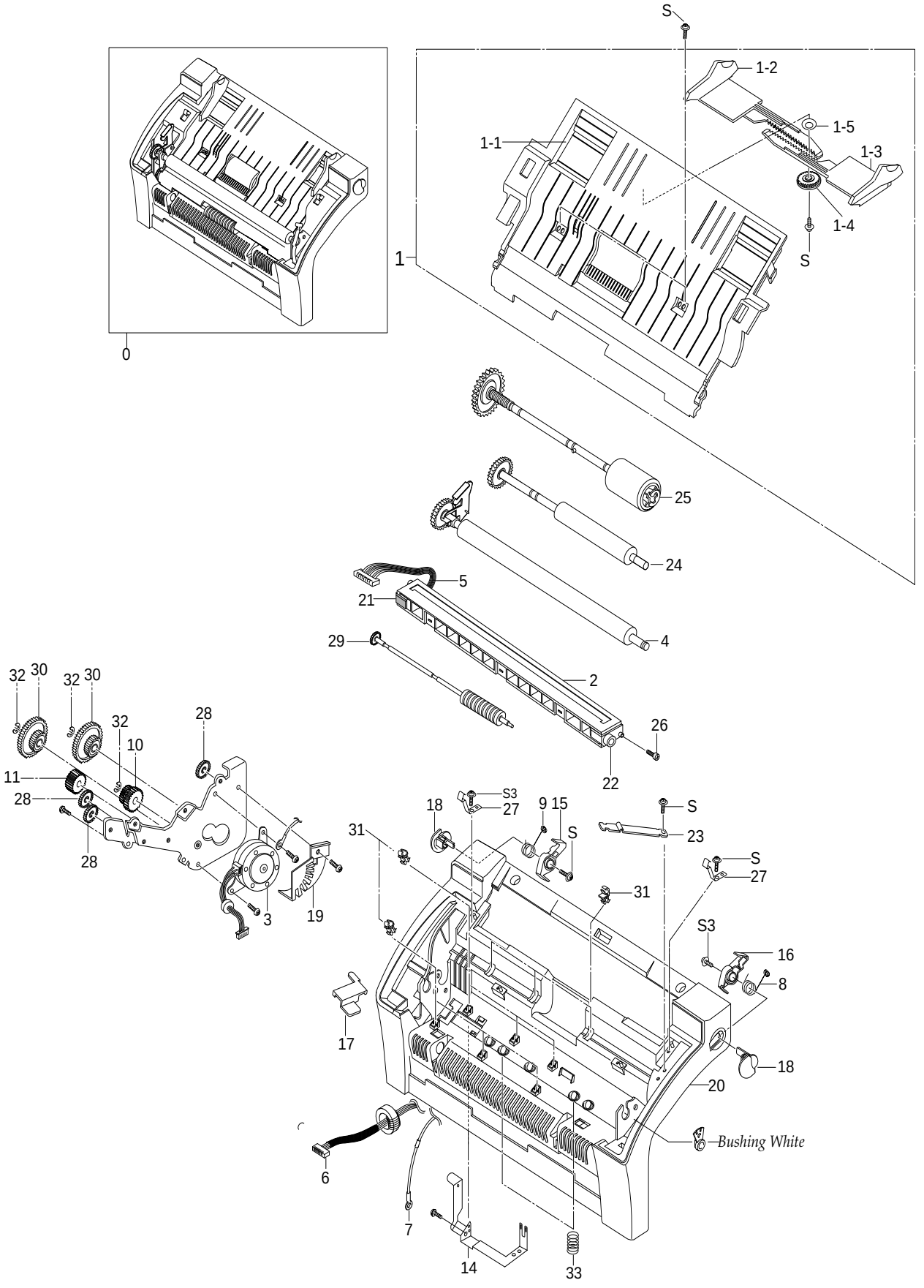


Scan Upper Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-SCAN UPPER	JC81-00457A	1	O	
1	MEC-PINCH	JG75-10015A	1	O	
2	RPR-SPONGE ADF	*	1	X	
3	MPR-TAPE ADF	*	1	X	
4	CBF HARNESS-SCAN GND	JC39-00101A	1	O	
5	SPRING-SENSOR	*	1	X	
6	SPRING-COIL ADF	JC61-00040A	1	O	
7	PMO-SCAN UPPER	JC72-00671A	1	O	
8	PMO-LEVER SENSOR DOC	JC72-00823A	1	O	
9	PMO-LEVER SENSOR	JC72-41322A	1	O	
10	ICT-SHAFT PINCH	JF70-40521B	1	O	
11	PMO-HOLDER RUBBER	JG72-40044A	1	O	
12	PMO-ROLL PINCH	JG72-40663A	2	O	
13	PMO-SUPPORT ADF	JG72-41083A	1	O	
14	RPR-RUBBER ADF	JC73-00032A	1	O	
15	MEC-BRUSH ANTISTATIC	JG75-10004A	1	O	

5-9 Front Assembly

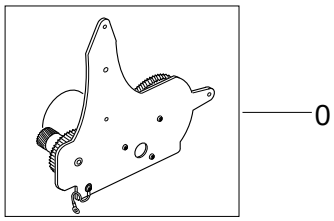


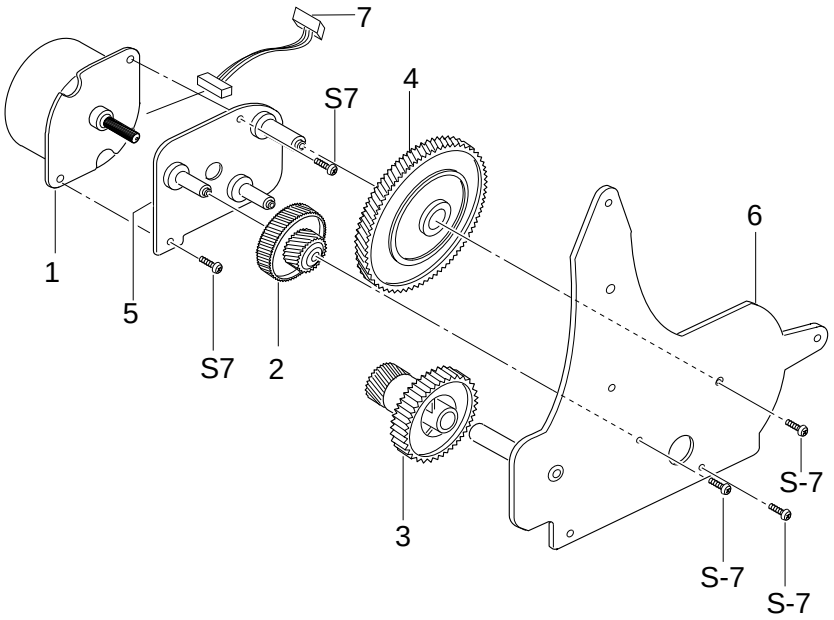
Front Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-FRONT ASS'Y	JC81-00458A	1	O	
1	MEA ETC-GUIDE PAPER	*	1	X	
1-1	PMO-GUIDE PAPER	*	1	X	
1-2	PMO-GUIDE DOC L	*	1	X	
1-3	PMO-GUIDE DOC R	*	1	X	
1-4	GEAR-PINION	JG66-40003A	1	O	
1-5	IPR-WASHER SPRING CU	JF70-10616A	1	O	
2	CONTACT IMAGE SENSOR	0609-001127	1	O	SF-530
	CONTACT IMAGE SENSOR	0609-001125	1	O	SF-531P
3	MOTOR STEP-SCAN	JC31-00011A	1	O	
4	MEC-ROLLER WHITE	JC75-00126A	1	O	
5	CBF HARNESS-SCAN/CIS(200)	JC39-00049A	1	O	SF-530
	CBF HARNESS-SCAN/CIS(300)	JC39-00136A	1	O	SF-531P
6	CBF HARNESS-MAIN/SCAN	JC39-00192A	1	O	
7	CBF HARNESS-SCAN GND	JC39-00101A	1	O	
8	SPRING-LOCKER R	JC61-00027A	1	O	
9	SPRING-LOCKER L	JC61-00028A	1	O	
10	GEAR- 39/20	JC66-00304A	1	O	
11	GEAR- IDLE 30	JC66-00305A	1	O	
13	IPR-BRKT MOTOR	*	1	X	
14	NPR-GROUND CIS	*	1	X	
15	PMO-OPEN LOCKER L	*	1	X	
16	PMO-OPEN LOCKER R	*	1	X	
17	PMO-BRKT SCAN B'D	JC72-00222A	1	O	
18	PMO-OPEN BUTTON	JC72-00273A	2	O	
19	PMO-COVER MOTOR	JC72-00670A	1	O	
20	PMO-COVER FRONT	JC72-00673A	1	O	
21	PMO-DUMMY CIS L SF-530	JC72-00880A	1	O	SF-530
	PMO-DUMMY CIS L	JC72-00495A	1	O	SF-531P
22	PMO-DUMMY CIS R SF-530	JC72-00881A	1	O	SF-530
	PMO-DUMMY CIS R	JC72-00496A	1	O	SF-531P
23	PMO-STOPPER EXIT	*	1	X	
24	MEC-ROLLER DRIVE	JC75-00123A	1	O	
25	MEA ETC-ROLLER ADF	*	1	X	
26	SPECIAL SCREW	JG60-10001A	2	O	
27	LOCKER-TX	JG64-30001A	2	O	
28	GEAR-IDLE25	JG66-40036A	3	O	
29	PMO-SHAFT EXIT	JG72-40042A	1	O	
30	PMO-GEAR TRANS(B4)	JG72-40741A	2	O	
31	PMO-BUSHING TX(B4)	JG72-40744A	9	O	
32	RING-C	6044-000159	3	O	
33	SPRING CIS	JG61-70533A	2	O	
S1	SCREW-MACHINE	6001-000131	2	O	
S3	SCREW-TAPPING	6002-000175	2	O	
S4	SCREW-TAPPING	6002-001078	1	O	
S7	SCREW-TAPTITE	6003-000196	2	O	
S11	SCREW-TAPTITE	6003-000119	2	O	
S11	SCREW-TAPTITE	6003-000119	6	O	

5-10 RX Drive Unit Assembly



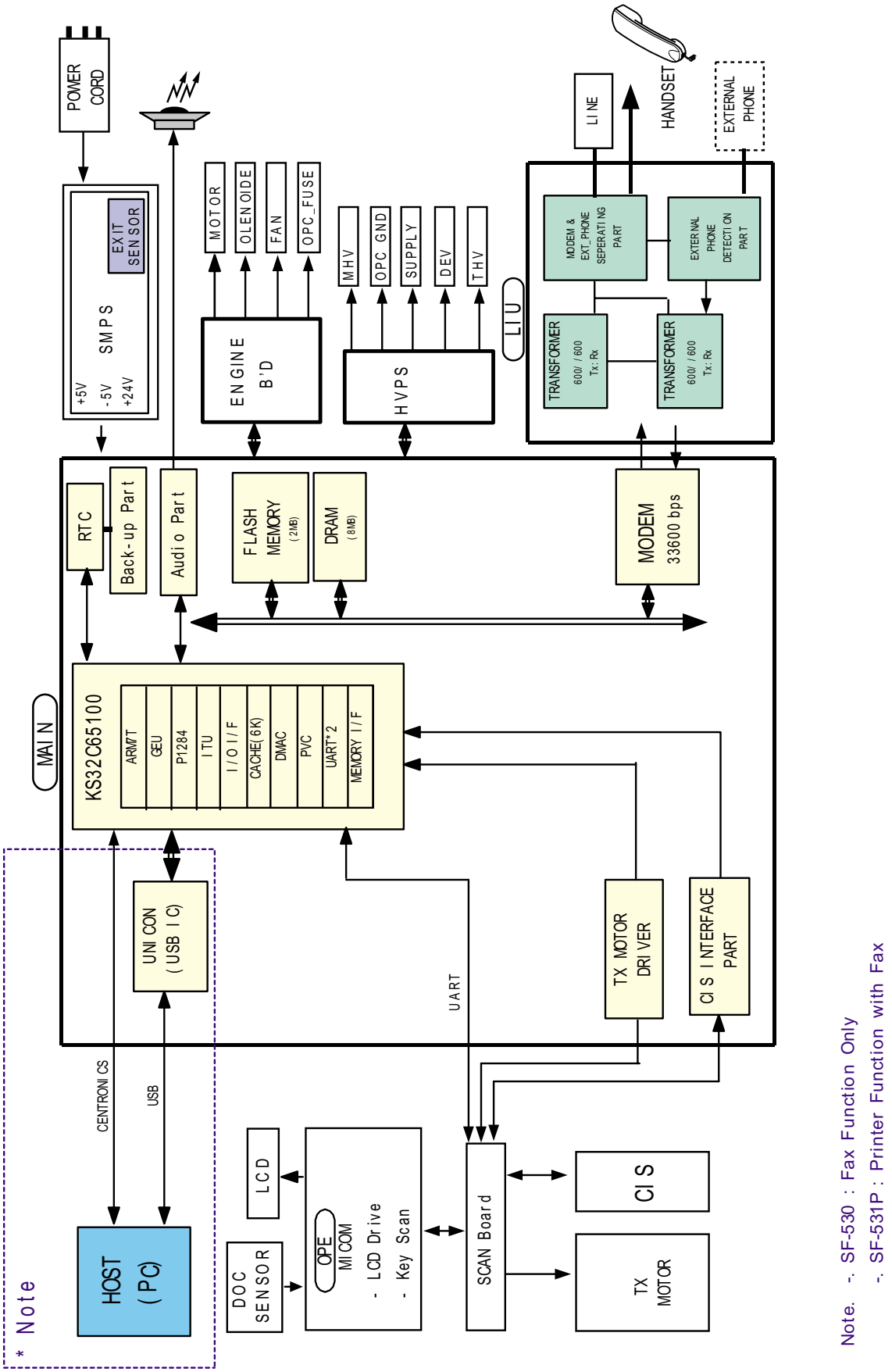


RX Drive Assembly Parts List

O : Service available **X** : Service not available

No.	Description	SEC.Code	Q'ty	SA	Remark
0	ELA HOU-RX DRIVE	JC96-01755A	1	O	
1	MOTOR-STEP	JC31-00005A	1	O	
2	PMO-GEAR_71/28	*	1	X	
3	PMO-GEAR_73/22	*	1	X	
4	PMO-GEAR_132/19	*	1	X	
5	IPR-BRKT_MOTOR	*	1	X	
6	IPR-BRKT_GEAR	JC70-00129A	1	O	
7	CBF-HARNESS_MOTOR	JC39-00110A	1	O	
S-7	SCREW-MACHINE	6001-000131	5	O	YELLOW

6. Block Diagram



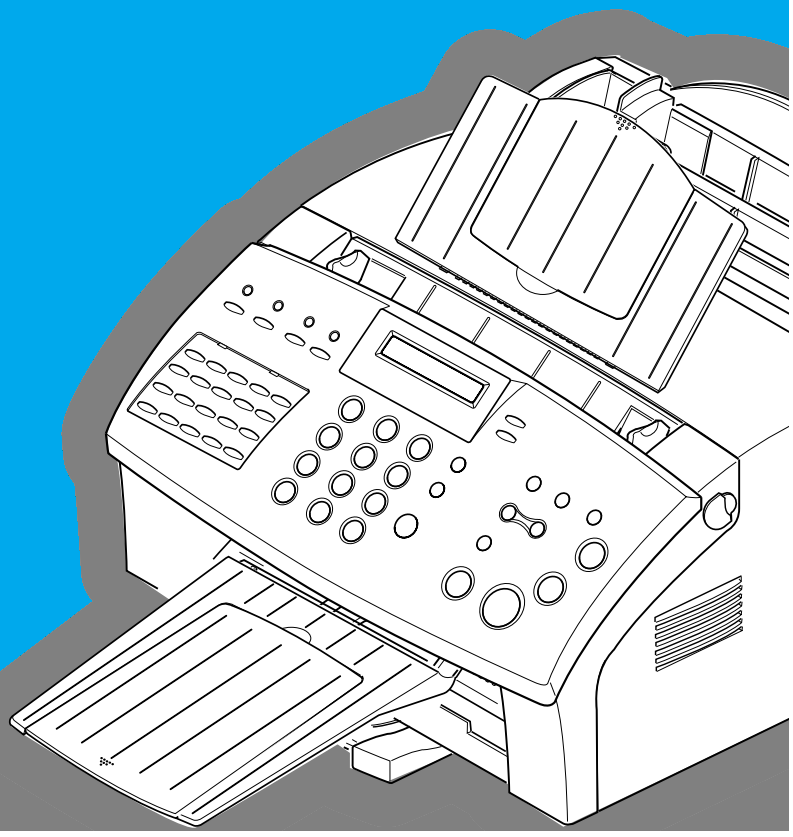
Note. -. SF-530 : Fax Function Only
-. SF-531P : Printer Function with Fax

Repair Manual

SAMSUNG FACSIMILE

SF-530/531P

CONTENTS

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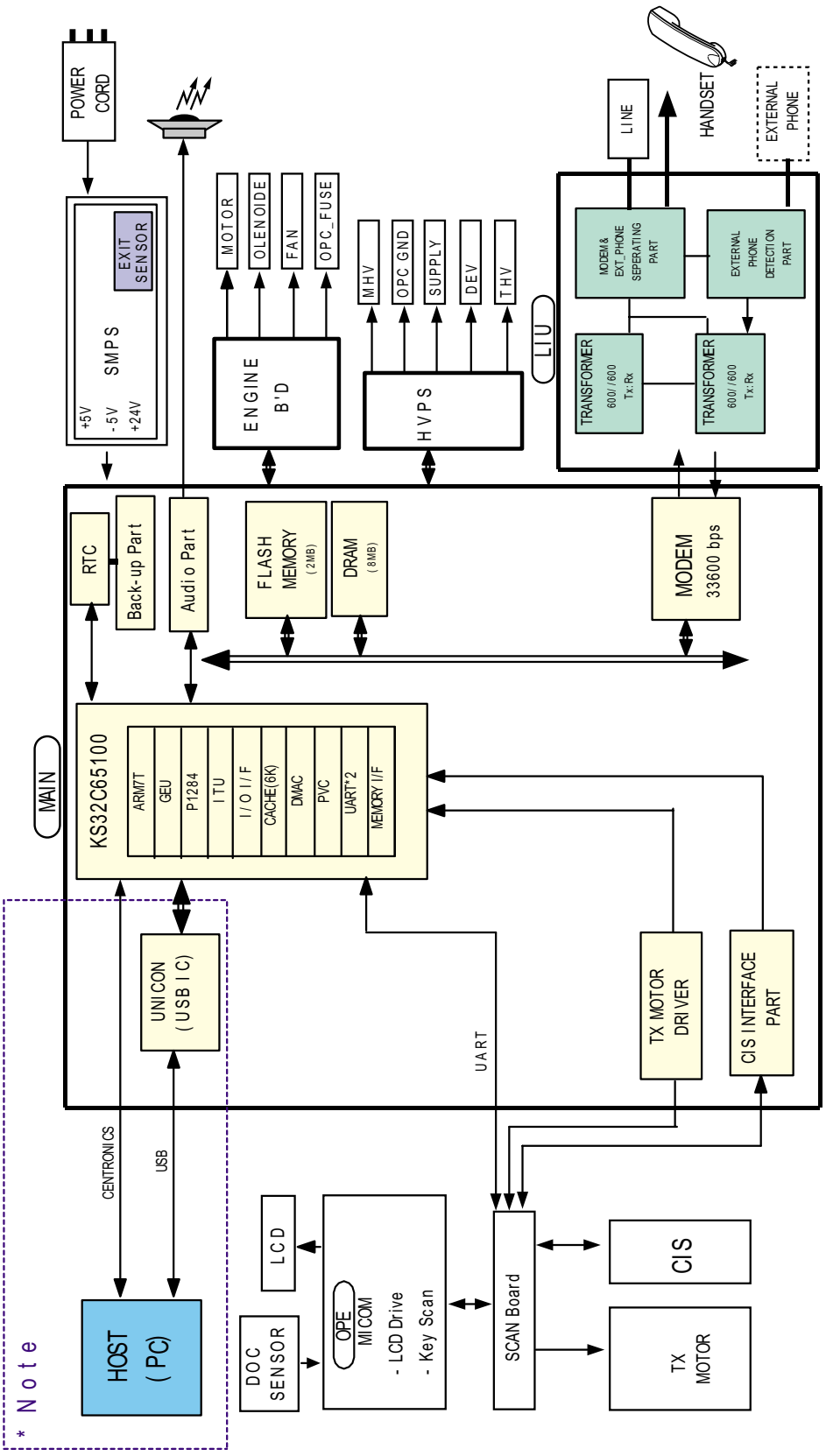
This manual is made and described centering around circuit diagram and circuit description needed in the repair center in the form of appendix.

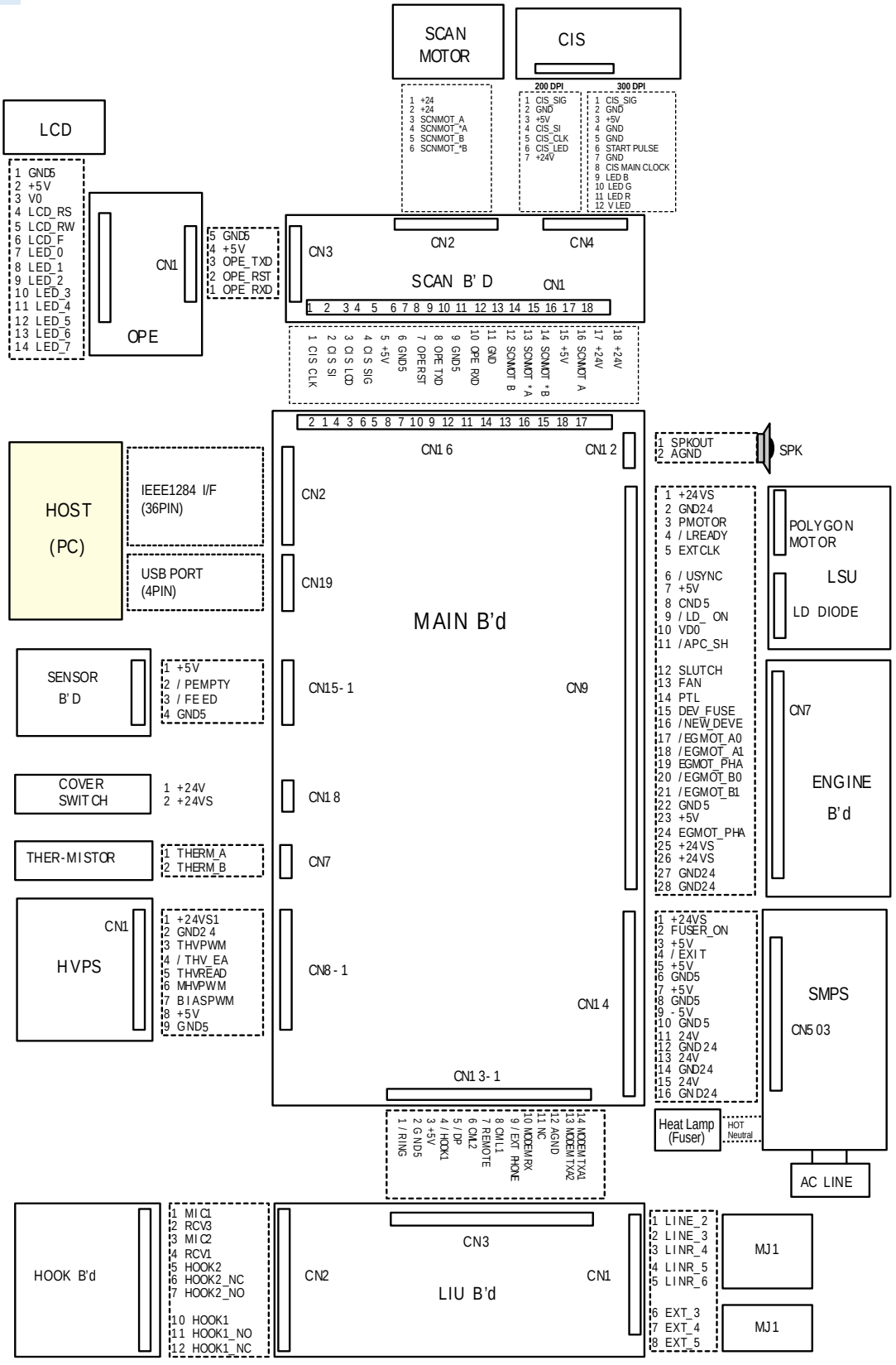
Samsung Electronics Digital Printing
CS Group

1. Block Diagram



Note. -. SF-530 : Fax Function Only
-. SF-531P : Printer Function with Fax

2. Connection Diagram

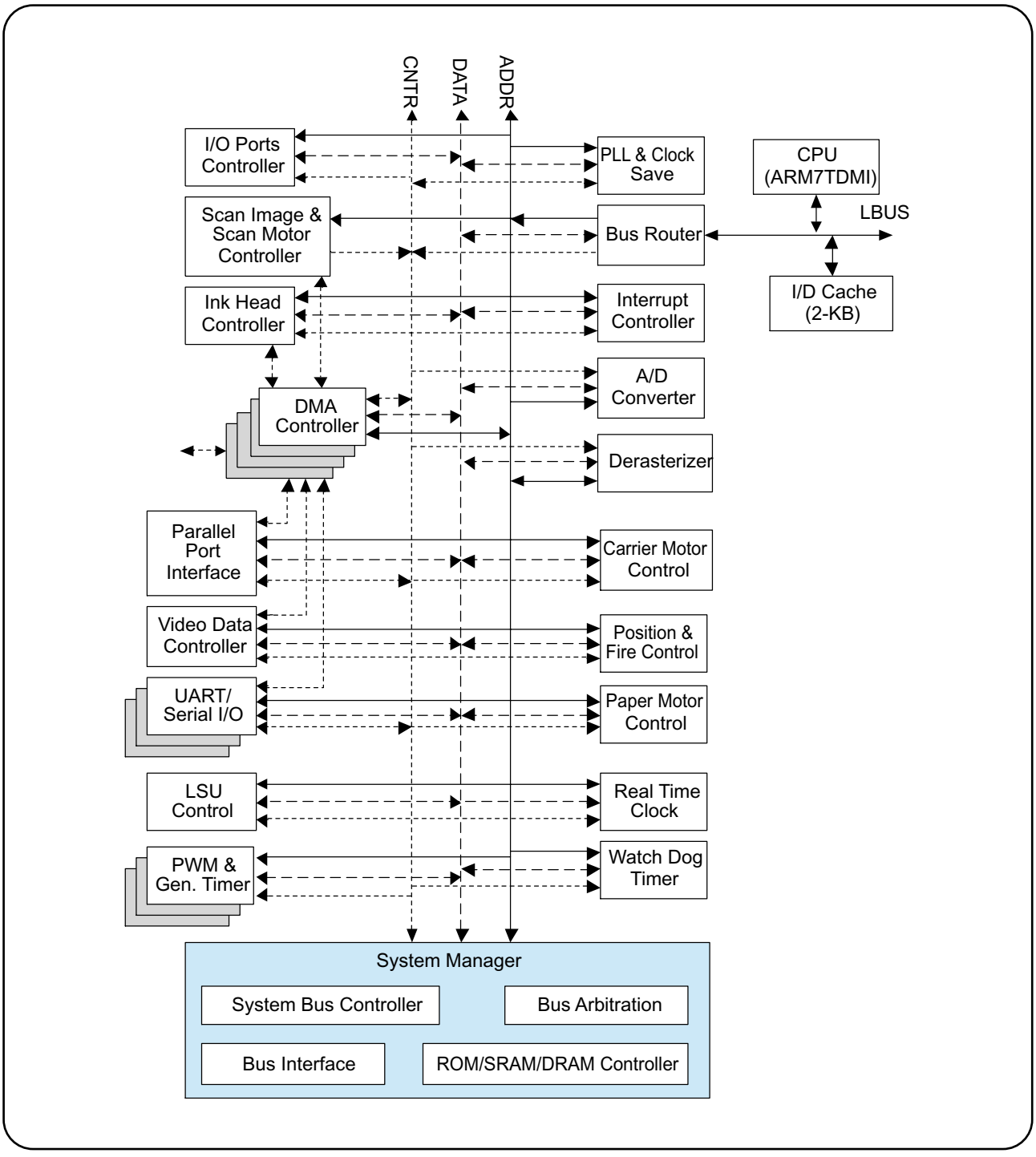


3. Circuit Description

3-1 Main PBA

3-1-1 Summary

The main circuit that consists of CPU, MFP controller 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:



3-1-2 Circuit Operation

• CLOCK

1) System Clock
   Device Oscillator
   Frequency 9.500132 MHz
   KS32C65100 RISC PROCESSOR: drives PLL internally and uses 37.17 MHz.

2) Video Clock
   Device Oscillator
   Frequency 28.7448 MHz

3) USB Clock
   Device Oscillator
   Frequency 48 MHz±%

• KS32C65100 MICROPROCESSOR

1) KS32C65100 MICROPROCESSOR PIN & INTERFACE

Signal	Pin No.	I/O Type	Description
OSCI	184	I7	KS32C65100 master clock input.
OSCO	185	O7	KS32C65100 master clock output.
PLL_FILTER	183	I5	PLL filter
nRESET	182	I4	Not reset. nRESET is the global reset input for the KS32C65100. For a system reset, nRESET must be held to low level for at least 65 machine cycles.
nSLCTIN/GIP[16]	152	I1	Not select information. This input signal is used by parallel port interface to request 'on-line' status information.
nSTROBE	151	I1	Not strobe. The nSTROBE input indicates when valid data is on parallel port data bus, PPD[7:0]
nAUTOFD/GIP[17]	154	I1	Not auto feed. The nAUTOFD input indicates whether data on the parallel port data bus, PPD[7:0], is an auto feed command. Otherwise, the bus signals are interpreted as data only.
nINIT/GIP[15]	153	I1	Not initialization. The nINIT input signal initializes the parallel port's input control.
nACK	159	I1	Not parallel port acknowledge. The nACK output signal is issued whenever a transfer on the parallel port data bus is completed.
BUSY	158	O1	Parallel port busy. The BUSY output signal indicates that the KS32C65100 parallel port is currently busy.
SELECT	156	O1	Parallel port select. The SELECT output signal indicates whether the device connected to the KS32C65100 parallel port is 'on-line' or 'off-line'.
PERROR	157	O1	Parallel port paper error. PERROR output indicates that a problem exists with the paper in the ink-jet printer. It could indicate that the printer has a paper jam or that the printer is out of paper.
nFAULT	155	O1	Not fault. The nFAULT output indicates that an error condition exists with the printer. This signal can be used to indicate that the printer is out of ink or to inform the user that the printer is not turned on.
PPD[7:0]	142~149	I/O2	arallel port data bus. This 8-bit, tri-state bus is used to exchange data between the KS32C65100 and an external host(peripheral).
SAVRT	2	I6	Top reference voltage for IP ADC
SAIN	3	I6	Analog input for IP ADC
SAVRB	4	I6	Bottom reference voltage for IP ADC

Signal	Pin No.	I/O Type	Description
CIS_CLK	6	O1	CIS shift clock
CIS_SI	7	O1	CIS latch signal
PHA_IA0	164	O1	Line feed motor phase signal A
PHA_IA1	165	O1	Line feed motor phase signal AZ
PHB_IB0	167	O1	Line feed motor phase signal B
PHB_IB1	168	O1	Line feed motor phase signal BZ
LF_PH0/GOPA[21]	163	O1	Line feed motor control signal 0
LF_PH1/GOPA[22]	166	O1	Line feed motor control signal 1
CR_PHA/GOPA[23]	110	O1	Direction control line for phase A
CR_PHB/GOPA[24]	113	O1	Direction control line for phase B
CRIA0/GOPA[25]	109	O1	Current control line 0 for phase A
CRIA1/GOPA[26]	111	O1	Current control line 1 for phase A
CRIB0/GOPA[27]	112	O1	Current control line 0 for phase B
CRIB1/GOPA[28]	114	O1	Current control line 1 for phase B
CHX/GIP[8]	116	I3	Encode sensor
CHY/GIP[9]	117	I3	Encode sensor
ADDR[21:0]	77~80, 82~88, 90~100	O5	Address bus. The 22bit address bus, ADDR[21:0], covers the full 4M half-words address range of each ROM/SRAM, DRAM, and external I/O bank
DATA[15:0]	59~66, 68~75	I/O3	External bi-directional 16-bit data bus.
nRAS[1:0]	52,53	O1	Not row address strobe for DRAM. The KS32C65100 supports up to two DRAM banks. One nRAS output is provided for each bank.
nCAS[1:0]	54,55	O1	Not column address strobe for DRAM. The two nCAS outputs indicate the byte selections whenever a DRAM bank is accessed.
nOE	56	O1	Not output enable. Whenever a memory access occurs, the nOE output controls the output enable port of the specific memory device.
nWE	57	O6	Not write enable. Whenever a memory access occurs, the nWE output controls the write enable port of the specific memory device.
nPHGA[13:1]/ GOPB[12:0]	16~24, 26~29	O1	Gate control line for print head.
PHOE[16:1]/ GIOP[26:11]	31~38, 40~47	I/O1	Drain control line for print head.

Signal	Pin No.	I/O Type	Description
RXD0/GIP[0]	194	I1	Receive data input for the UART0. RXD0 is the UART0 channel's input signal for receiving serial data.
RXD1/GIP[1]	192	I1	Receive data input for the UART1. RXD1 is the UART1 channel's input signal for receiving serial data.
RXD2/GIP[2]	190	I1	Receive data input for the UART2. RXD2 is the UART2 channel's input signal for receiving serial data.
nEINT0/GIP[3]	8	I3	External interrupt request input nEINT0.
nEINT1/GIP[4]	9	I3	External interrupt request input nEINT1.
nEINT2/GIP[5]	10	I3	External interrupt request input nEINT2.
nXDREQ/GIP[6]	199	I3	External DMA request.
TXD0/GOPA[0]	193	O1	Transmit data output for the UART0. TXD0 is the UART0 channel's output for transmitting serial data.
TXD1/GOPA[1]	191	O1	Transmit data output for the UART1. TXD1 is the UART1 channel's output for transmitting serial data.
TXD2/GOPA[2]	189	O1	Transmit data output for the UART2. TXD2 is the UART2 channel's output for transmitting serial data.
nXDACK/GOPA[5]	200	O1	External DMA acknowledge. This active low output signal is generated whenever a DMA transfer is completed.
TONEOUT/GOPA[3]	188	O1	Tone generator output.
nWDTO/GOPA[4]	187	P3	Reset out by watch dog timer.
nIOWR/GOPA[10]	161	O1	External output write strobe
nIORD/GOPA[9]	162	O1	External output read strobe
CLKOUT/GOPA[6]	180	O1	Clock for external chip
nECS2/GOPA[8]	14	O1	External memory chip select 2.
TCK	132	I2	JTAG TCK interface in MDS mode.
TMS	135	I2	JTAG TMS interface in MDS mode.
TDI	133	I2	JTAG TDI interface in MDS mode.
nTRST	136	I2	JTAG nTRST interface in MDS mode.
TDO	134	O1	JTAG TDO interface in MDS mode.
GIOP[10:0]	137~140, 173~179	I/O4	General I/O port.
TEST0	169	I2	Test 0 pin. At normal operation this pin must be connected to GND.
TEST1	170	I2	Test 1 pin. At normal operation this pin must be connected to GND.
TEST2	171	I2	Test 2 pin. At normal operation this pin must be connected to GND.

Signal	Pin No.	I/O Type	Description
nECS[1:0]	12,13	O1	Not external chip select. Three I/O banks are provided for external memory-mapped I/O operations. Each I/O bank contains up to 4M half-word. The nECS signals indicate that an external I/O bank is selected.
nRCS[2]	51	O2	Not ROM/SRAM chip select. The KS32C65100 can access up to three external ROM/SRAM banks. nRCS[0] corresponds to ROM/SRAM bank 0, nRCS[1] to bank 1, and nRCS[2] to bank 2. By controlling the nRCS signals, CPU addresses can be mapped into the physical memory banks.
nRCS[1]/GOPA[7]	50	O1	
nRCS[0]	49	O1	
SC_CONPHA/ GOPA[19]	102	O1	Scan motor control/Bi-phase
SC_CONPHB/ GOPA[20]	105	O1	Scan motor control/Bi-phase
SC_CUR[3:0]	103, 104, 106, 107	O1	Scan motor bi-current/uni-phase
PWMO[2:0]/ GOPA[13:11]	118~120	O1	PWM out signal
VDO2/GOPA[29]	121	O4	Video out from PIFC
VDO1/GOPA[14]	122	O5	Video out from LSU control
LSU_CLK/ GOPA[15]	123	O1	Clock for LSU motor
nHSYNC1/GIP[10]	125	I1	HSYNC1
nLREADY/GIP[11]	126	I1	LSU ready
nHSYNC2/GIP[12]	127	I1	HSYNC2
VDI/GIP[13]	128	I2	Video data input from RET
VCLK/GIP[14]	129	I2	External video clock
nEXTWAIT/GIP[7]	130	I3	External wait
RTCXIN	202	I7	RTC oscillator clock input.
RTCXOUT	203	O7	RTC oscillator clock output.
SLED[2:0]/ GOPA[18:16]	196~198	O1	CIS LED signals
GAVRT	205	I5	Top reference voltage for general ADC
GAIN[2:0]	206~208	I5	Analog inputs for general ADC
RTC_VDD	201		RTC VDD.

Signal	Pin No.	I/O Type	Description
VDD_PLL	186		PLL power (3.3V).
SAVDD	1		Analog power for scan ADC and general ADC (3.3V).
SAVSS	5		Scan ADC ground.
GAVSS	204		General ADC ground
3VDD	15, 30, 81, 115, 131, 160		3.3V internal power. Externally connected to the 3.3V regulator.
5VDD	48, 67, 89, 141, 195		5V I/O power. Externally connected to the VCC board plane.
VSS	11, 25, 39, 58, 76, 101, 108, 124, 150, 172, 181		System ground. Externally connected to the ground board plane.

3-1-3 PROGRAM ROM (FLASH MEMORY)

1) DEVICE

TYPE No.	AM29F800B
CAPACITY	2 Mbit (512K * 16bit * 2)

2) PROGRAMMING

BEFORE ASS'Y	EPROM PROGRAMMER or PROGRAMMING at the factory
AFTER ASS'Y	DOWNLOAD from PC

3-1-4 DRAM CONTROL

1) DEVICE

TYPE NO.	K4E641611D-TC50(EDO Type)
CAPACITY	64 Mbit (4M * 16bit)

2) OPERATING PRINCIPLE

DRAM can either read or write. The data can be stored in the DRAM only when the power is on. It stores data white the CPU processes data. The address to read and write the data is specified by RAS SIGNAL and CAS SIGNAL. DRAMWE*SIGNAL is activated when writing data and DRAMOE*SIGNAL, when reading.

3-1-5 USB (Universal Serial Bus)

SAMSUNG'S UNICON is used as the interface IC and 48MHz clock is used.
When the data is received through the USB port, USBIRQ SIGNAL is activated to send interrupt to CPU, then it directly sends the data to DRAM by USB_CS SIGNAL through D(0;7).

3-1-6 Modem and TX-and RX Related Circuits

MODEM

The Conexant™ FM336 modem is a V.34 half-duplex modem that supports Group 3 facsimile send and receive speeds up to 33600 bps using the V.34 half-duplex mode. Using a V.34 technique to optimize modem configuration for line conditions, the modem connects at the optimal selected data rate that the channel can support from 33600 bps to 2400 bps.

The modem can operate over the public switched telephone network (PSTN) through a line terminator provided by a Data Access rrangement (DAA). The modem satisfies the requirements specified inITU-T recommendations V.34, V.17, V.29, V.27 ter, V.23, V.21, and meets the binary signal ingrequirements of V.8 and T.30. Internal HDLC support eliminates the need for an external serial input/output (SIO) device in the DTE for products incorporating error detection and T.30 protocol. The modem can perform HDLC framing per T.30 at all data speeds. CRC generation/checking along with zero insertion/deletion enhances DLC/HDLC frame operations. An FSK flag pattern detector facilitates FSK detection during high speed reception.The modem features a programmable DTMF transmitter/receiver and three programmable tone detectors which operate in the tone mode.

The modem offers lower power consumption and small size to allow the design of compact system enclosures for use in industrial, office, and home environments.The modem is available in a 100-pin PQFP package.

FM336 FEATURES

- 2-wire half
  - duplex fax modem modes with send and receive data rates up to 33600 bps.
  - V.34, V.17, V.29, V.27 ter, and V.21 channel 2
  - Short train option in V.17 and V.27 ter
- 2-wire full
  - duplex data modem modes
  - V.21, V.23 (75 bps TX/1200 bps RX or 1200 bps TX/ 75 bps RX)
- PSTN session starting
  - V.8 signaling
- HDLC support at all speeds
  - Flag generation, 0 bit stuffing, ITU CRC
  - 16 or CRC
  - 32 calculation and generation
  - Flag detection, 0 bit deletion, ITU CRC
  - 16 or CRC
  - 32 check sum error detection
  - FSK flag pattern detection during high speed receiving
- Tone modes and features
  - Programmable single or dual tone generation
  - DTMF receive
  - Tone detection with three programmable tone detectors
- Serial synchronous data
- Parallel synchronous data
- Automatic Rate Adaptation (ARA) in V.34 Half-Duplex
- TTL and CMOS compatible DTE interface
  - ITU-T V.24 (EIA/TIA-232-E) (data/control)
  - Microprocessor bus (data/configuration/control)
- Receive dynamic range: 0 dBm to –43 dBm for V.17, V.33, V.29, V.27terand V.21, –9 dBm to –43 dBm for V.34 half-duplex
- Programmable RLSD turn-on and turn-off thresholds
- Programmable transmit level: 0 to -15 dBm
- Adjustable speaker output to monitor received signal
- DMA support interrupt lines
- Two 16-byte FIFO data buffers for burst data transfer with extension up to 255 bytes
- NRZI encoding/decoding
- Diagnostic capability
- +3.3V operation with +5V tolerant inputs
- +5V analog signal interface
- Typical power consumption:- Sleep mode: 20 mW
  - Normal mode: 250 mWa
- 100-pin PQFP package

Signaling Rates, and Data Rates

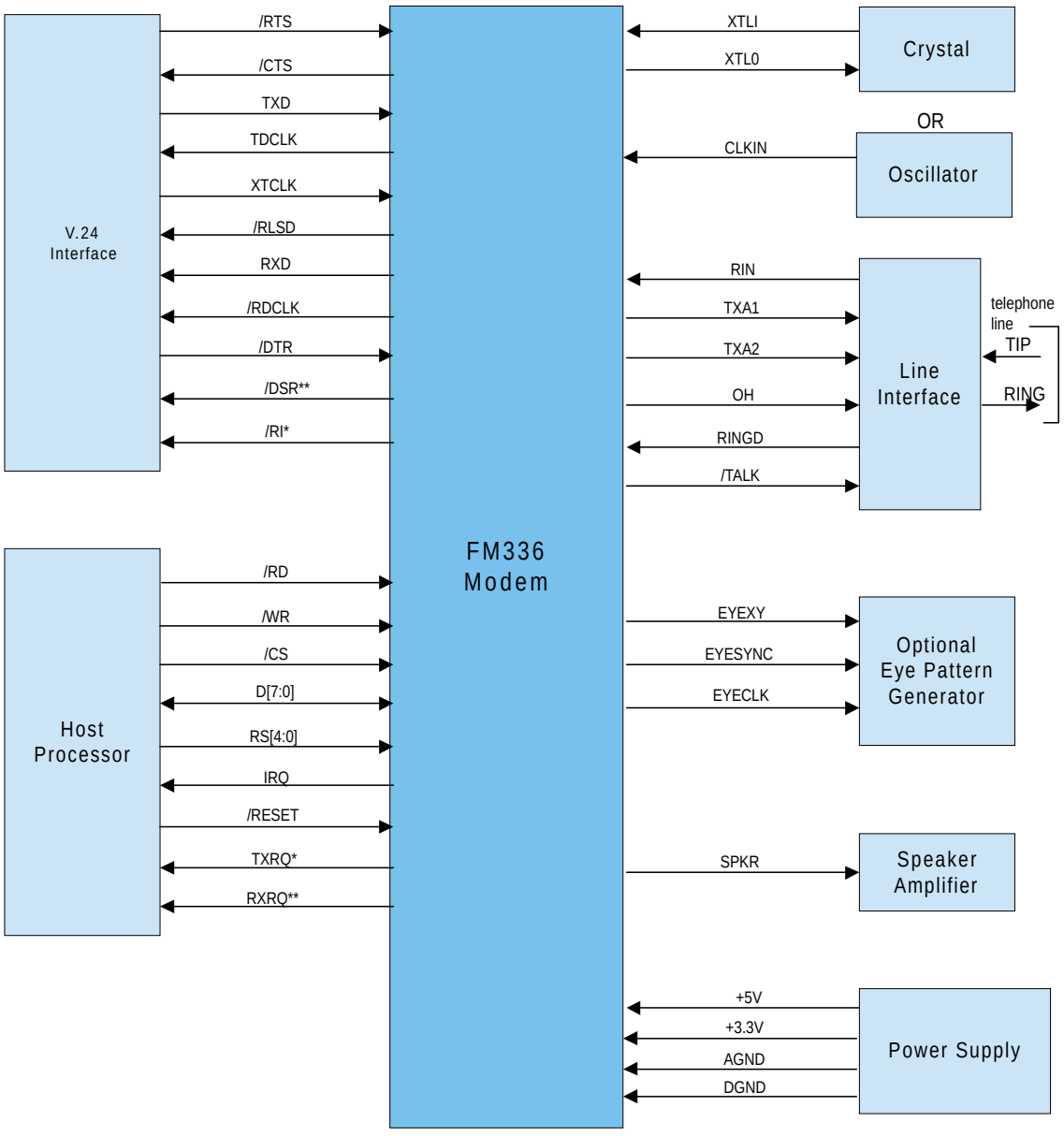
Configuration	Modulation1	Carrier Frequency (Hz) –0.01%	Data Rate (bps) –0.01%	Symbol Rate (Symbols/Sec.)	Bits/Symbol - Data	Bits/Symbol - TCM	Constellation Points
V.34 33600 TCM	TCM	Note 2	33600	3429 only	Note 2	Note 2	Note 2
V.34 31200 TCM	TCM	Note 2	31200	3200 min	Note 2	Note 2	Note 2
V.34 28800 TCM	TCM	Note 2	28800	3000 min	Note 2	Note 2	Note 2
V.34 26400 TCM	TCM	Note 2	26400	2800 min	Note 2	Note 2	Note 2
V.34 24000 TCM	TCM	Note 2	24000	2800 min	Note 2	Note 2	Note 2
V.34 21600 TCM	TCM	Note 2	21600	2400 min	Note 2	Note 2	Note 2
V.34 19200 TCM	TCM	Note 2	19200	2400 to 3429	Note 2	Note 2	Note 2
V.34 16800 TCM	TCM	Note 2	16800	2400 to 3429	Note 2	Note 2	Note 2
V.34 14400 TCM	TCM	Note 2	14400	2400 to 3429	Note 2	Note 2	Note 2
V.34 12000 TCM	TCM	Note 2	12000	2400 to 3429	Note 2	Note 2	Note 2
V.34 9600 TCM	TCM	Note 2	9600	2400 to 3429	Note 2	Note 2	Note 2
V.34 7200 TCM	TCM	Note 2	7200	2400 to 3429	Note 2	Note 2	Note 2
V.34 4800 TCM	TCM	Note 2	4800	2400 to 3429	Note 2	Note 2	Note 2
V.34 2400 TCM	TCM	Note 2	2400	2400 only	Note 2	Note 2	Note 2
V.23 1200/75	FSK	1700/420	1200/75	1200	1	0	—
V.21	FSK	1080/1750	Up to300	300	1	0	—
V.17 14400 TCM	TCM	1800	14400	2400	6	1	128
V.17 12000 TCM	TCM	1800	12000	2400	5	1	64
V.17 9600 TCM	TCM	1800	9600	2400	4	1	32
V.17 7200 TCM	TCM	1800	7200	2400	3	1	16
V.29 9600	QAM	1700	9600	2400	4	0	16
V.29 7200	QAM	1700	7200	2400	3	0	8
V.29 4800	QAM	1700	4800	2400	2	0	4
V.27 ter 4800	DPSK	1800	4800	1600	3	0	8
V.27 ter 2400	DPSK	1800	2400	1200	2	0	4
V.21 Channel 2	FSK	1750	300	300	1	0	—

Notes:

1. Modulation legend: TCM:Trellis-Coded Modulation QAM: Quadrature Amplitude Modulation
   FSK:Frequency Shift Keying DPSK: Differential Phase Shift Keying
2. Adaptive; established during handshake:

	Carrier Frequency (Hz)	
Symbol Rate (Baud)	V.34 Low Carrier	V.34 High Carrier
2400	1600	1800
2800	1680	1867
3000	1800	2000
3200	1829	1920
3429	1959	1959

Modem Functions Interface Signals



* Selectable; TXRQ output replaces /RI output.
** Selectable; RXRQ output replaces /DSR output.

1176DG F2-1

FM336 Pin Signals

Pin	Signal Label	I/O Type 1	Interface 3	Pin	Signal Label	I/O Type 1	Interface 3
1	RESERVED	-	-	51	RESERVED	-	-
2	RS2	IA	HOST Interface	52	VSUB	GND	-
3	RS3	IA	HOST Interface	53	VSS	GND	-
4	RS4	IA	HOST Interface	54	NC	-	NC
5	/CS	IA	HOST Interface	55	NC	-	NC
6	/WR	IA	HOST Interface	56	Sleep	MI	Modem Interconnect
7	/RD	IA	HOST Interface	57	VDD1	PWR	-
8	/RDCLK	OA	DTE Serial Interface	58	RESERVED	-	-
9	/RLSD	OA	DTE Serial Interface	59	RESERVED	-	-
10	TDCLK	OA	DTE Serial Interface	60	NC	-	NC
11	TXD	IA	DTE Serial Interface	61	SR1IO	MI	Modem Interconnect
12	/CTS	OA	DTE Serial Interface	62	VCORE	PWR	-
13	VDD1	PWR	-	63	VDD1	PWR	-
14	RESERVED	-	-	64	XTCLK	IA	DTE Serial Interface
15	RESERVED	-	-	65	VSS	GND	-
16	VSS	GND	-	66	RESERVED	-	-
17	NC	-	NC	67	RXD	OA	DTE Serial Interface
18	/RESET	OA	Modem Interconnect	68	/DTR	IA	DTE Serial Interface
19	SR4OUT	OA	Modem Interconnect	69	VDD1	PWR	-
20	NC	-	NC	70	IA_SLEEP	MI	Modem Interconnect
21	SR4IN	IA	Modem Interconnect	71	VGG	PWR	-
22	CLK_OUT	OA	Modem Interconnect	72	YCLK	OA	Overhead Signal
23	EYESYNC	OA	Diagnostic Signal	73	XCLK	OA	Overhead Signal
24	EYECLK	OA	Diagnostic Signal	74	EYEXY	OA	Diagnostic Signal
25	MAVSS	GND	-	75	/DSR	OA	DTE Serial Interface
26	MAVDD	PWR	-	76	/RI	OA	Telephone Line Interface
27	SPKR	O(DF)	Telephone Line Interface	77	RINGD	IA	Telephone Line Interface
28	TXA2	O(DD)	Telephone Line Interface	78	/RTS	IA	DTE Serial Interface
29	TXA1	O(DD)	Telephone Line Interface	79	IRQ	OA	HOST Interface
30	VREF	MI	Modem Interconnect	80	VSS	GND	-
31	VC	MI	Modem Interconnect	81	GPO0	MI	Modem Interconnect
32	RIN	I(DA)	Telephone Line Interface	82	RESERVED	-	-
33	MAVSS	AGND	-	83	RESERVED	-	-
34	/POR	IA	Modem Interconnect	84	VDD1	PWR	-
35	RESERVED	-	-	85	XTALI/CLKIN	I	Overhead Signal
36	RESERVED	-	-	86	XTALO	O	Overhead Signal
37	/TALK	O(DD)	Telephone Line Interface	87	D0	IA/OB	HOST Interface
38	VDD	PWR	-	88	D1	IA/OB	HOST Interface
39	RESERVED	-	-	89	D2	IA/OB	HOST Interface
40	RESERVED	-	-	90	D3	IA/OB	HOST Interface
41	NC	-	NC	91	D4	IA/OB	HOST Interface
42	M_CNTRL_SIN	IA	Modem Interconnect	92	VDD1	PWR	-
43	M_CLKIN	IA	Modem Interconnect	93	D5	IA/OB	HOST Interface
44	M_TXSIN	IA	Modem Interconnect	94	D6	IA/OB	HOST Interface
45	M_SCK	IA	Modem Interconnect	95	D7	IA/OB	HOST Interface
46	M_RXOUT	IA	Modem Interconnect	96	RS0	IA/OB	HOST Interface
47	M_STROBE	IA	Modem Interconnect	97	RS1	IA/OB	HOST Interface
48	RESERVED	-	-	98	PLL_VDD	PWR	-
49	OH	O(DD)	Telephone Line Interface	99	VSS	GND	-
50	VDD	PWR	-	100	PLL_GND	GND	-

Notes:

1. I/O types:
   - MI = Modem interconnect.
   - IA, IB = Digital input.
   - OA, OB = Digital output.
   - I(DA) = Analog input.
   - O(DD), O(DF) = Analog output.
2. NC = No external connection required.
   RESERVED = No external connection allowed.
3. Interface Legend:
   - HOST = Modem Control Unit (Host)
   - DTE = Data Terminal Equipment

FM336 Signals Definitions

Label	I/O Type	Signal Name/Description
TELEPHONE LINE INTERFACE/AUXILIARY		
TXA1, TXA2	O(DD)	**Transmit Analog 1 and 2.** The TXA1 and TXA2 outputs are differential outputs 180 degrees out of phase with each other. Each output can drive a 300 load.
RIN	O(DA)	**Receive Analog.** RIN is a single-ended receive data input from the telephone line interface or an optional external hybrid circuit.
RINGD	IA	**Ring Detect.** The RINGD input is monitored for pulses in the range of 15 Hz to 68 Hz. The frequency detection range may be changed by the host in DSP RAM. The circuit driving RINGD should be a 4N35 optoisolator or equivalent. The circuit driving RINGD should not respond to momentary bursts of ringing less than 125 ms in duration, or less than 40 VRMS (15 Hz to 68 Hz) across TIP and RING. Detected ring signals are reflected on the /RI output signal as well as the RI bit.
/TALK	O(DD)	**Relay B Control.** The /TALK open collector output can directly drive a +5V reed relay coil with a minimum resistance of 360 ohms (13.9 mA max. @ 5.0V) and a must-operate voltage no greater than 4.0 VDC. A clamp diode, such as a 1N4148, should be installed across the relay coil. An external transistor can be used to drive heavier loads (electro-mechanical relays). /TALK is controlled by host setting/resetting of the RB bit. In a typical application, /TALK is connected to the normally closed Talk/Data relay (/TALK). In this case, /TALK active opens the relay to disconnect the handset from the telephone line.
OH	O(DD)	**Relay A Control.** The OH open collector output can directly drive a +5V reed relay coil with a minimum resistance of 360 ohms (13.9 mA max. @ 5.0V) and a must-operate voltage no greater than 4.0 VDC. A clamp diode, such as a 1N4148, should be installed across the relay coil. An external transistor can be used to drive heavier loads (electro-mechanical relays). OH is controlled by host setting/resetting of the RA bit. In a typical application, OH is connected to the normally open Off-Hook relay (OHRC). In this case, OH active closes the relay to connect the modem to the telephone line. Alternatively, in a typical application, OH is connected to the normally open Caller ID relay (CALLID). When the modem detects a Calling Number Delivery (CND) message, the OH output is asserted to close the CALLID relay in order to AC couple the CND information to the modem RIN input (without closing the off-hook relay and allowing loop current flow which would indicate an off-hook condition).
/RI	OA	**Ring Indicator.** /RI output follows the ringing signal present on the line with a low level (0 V) during the ON time, and a high level (+3.3 V) during the OFF time coincident with the ringing signal. The RI status bit reflects the state of the /RI output.
DIAGNOSTIC SIGNALS		
		Three signals provide the timing and data necessary to create an oscilloscope quadrature eye pattern. The eye pattern is a display of received baseband constellation. By observing this constellation, common line disturbances can usually be identified.
EYEXY	OA	**Serial Eye Pattern X/Y Output.** EYEXY is a serial output containing two 11-bit diagnostic words (EYEX and EYEY) for display on the oscilloscope X axis (EYEX) and Y axis (EYEY). EYEX is the first word clocked out; EYEY follows. Each word has 8-bits of significance. EYEXY is clocked by the rising edge of EYECLK. This serial digital data must be converted to parallel digital form by a serial-to-parallel converter, and then to analog form by two digital-to-analog (D/A) converters.
EYECLK	OA	**Serial Eye Pattern Clock.** EYECLK is a 336 kHz output clock for use by the serial-to-parallel converters. The low-to-high transitions of RDCLK coincide with the low-to-high transitions of EYECLK. EYECLK, therefore, can be used as a receiver multiplexer clock.
EYESYNC	OA	**Serial Eye Pattern Strobe.** EYESYNC is a strobe for loading the D/A converters.
SPEAKER INTERFACE		
SPKR	O(DF)	**Speaker Analog Output.** The SPKR output reflects the received analog input signal. The SPKR on/off and three levels of attenuation are controlled by bits in DSP RAM. When the speaker is turned off, the SPKR output is clamped to the voltage at the VC pin. The SPKR output can drive an impedance as low as 300 ohms. In a typical application, the SPKR output is an input to an external LM386 audio power amplifier.

FM336 Signals Definitions (Cont'd)

Label	I/O Type	Signal Name/Description
REFERENCE SIGNALS AND MODEM INTERCONNECT		
VC	MI	**Low Voltage Reference.** Connect to analog ground through 10 F (polarized, + terminal to VC) and 0.1 F (ceramic) in parallel.
VREF	MI	**High Voltage Reference.** Connect to VC through 10 F (polarized, + terminal to VREF) and 0.1 F (ceramic) in parallel.
/POR	IA	**Power-On-Reset**. Connects to /RESET.
/RESET	OA	**Reset.** Connects to /POR.
CLK_OUT	MI	**IA Clock.** Connect to M_CLKIN.
SR4OUT	OA	**SR4OUT.** Connect to M_TXSIN.
SR4IN	IA	**SR4IN**. Connect to M_RXOUT.
SR1IO	OA	**SR1IO.** Connect to M_CNTRL_SIN.
M_CNTRL_SIN	IA	**M_CNTRL_SIN.** Connect to SR1IO.
M_CLKIN	IA	**M_CLKIN.** Connect to CLK_OUT.
M_TXSIN	IA	**M_TXSIN.** Connect to SR4OUT.
M_SCK	IA	**M_SCK.** Connect to EYECLK.
M_RXOUT	IA	**M_RXOUT.** Connect to SR4IN.
M_STROBE	IA	**M_STROBE.** Connect to EYESYNC.
SLEEP	MI	**SLEEP.** Connect to IA_SLEEP.
IA_SLEEP	MI	**IA_SLEEP.** Connect to SLEEP
GPO0	MI	**GPO0.** Connect to /RDCLK.
DTE SERIAL INTERFACE		
/RDCLK	OA	**Receive Data Clock.** The modem outputs a synchronous Receive Data Clock (/RDCLK) for USRT timing. The /RDCLK frequency is the data rate (–0.01%) with a duty cycle of 50 –1%. The /RDCLK low-to-high transitions coincide with the center of the received data bits.
/RLSD	OA	**Received Line Signal Detector.** For V.17, V.33, V.29, and V.27 ter; RLSD goes active at the end of the training sequence. If energy is above the turn-on threshold and training is not detected, the /RLSD off-to-on response time is 816 baud times for V.17/V.33, V.29, and V.27 ter long train; 492 baud times for V.17/V.33; and 486 baud times for V.27 ter short train. The /RLSD on-to-off time is 40 – 5 ms for V.17/V.33, 35 – 5 ms for V.29 or 11.6 – 5 ms for V.27 ter. The /RLSD on-to-off time ensures that all valid data bits have appeared on RXD. The /RLSD programmable threshold levels default to —43dBm for off-to-on and to —48dBm for on-to-off. A minimum hysteresis of 2 dBm exists between the actual off-to-on and on-to-off transition levels. The threshold level and hysteresis are measured with an unmodulated 2100 Hz tone applied to the Receiver Analog (RXA) input. **Note:** Performance may be degraded when the received signal level is less than —43dBm.
TDCLK	OA	**Data Clock.** The modem outputs a synchronous Data Clock (DCLK) for USRT timing. The DCLK frequency is the data rate (–0.01%) with a duty cycle of 50 –1%. The DCLK low-to-high transitions coincide with the center of the data bits. Transmit Data (TXD) must be stable during the one microsecond period immediately preceding the rising edge of DCLK and following the rising edge of DCLK.
TXD	IA	**Transmit Data.** The modem obtains serial data to be transmitted from the local DTE on the Transmit Data (TXD) input in serial data mode (TPDM bit = 0), or from the interface memory Transmit Data Register (TBUFFER) in parallel data mode (TPDM bit = 1).

FM336 Signals Definitions (Cont'd)

<table>
<tr><th>Label</th><th>I/O Type</th><th>Signal Name/Description</th></tr>
<tr><td>/CTS</td><td>OA</td><td>Clear To Send. /CTS active indicates to the local DTE that the modem will transmit any data present on TXD. /CTS response times from an active condition of /RTS are shown in Table 1-3.</td></tr>
<tr><td>XTCLK</td><td>IA</td><td>External Transmit Clock. In synchronous communication, an external transmit data clock can be connected to the modem XTCLK input. The clock supplied at XTCLK must exhibit the same characteristics as TDCLK. The XTCLK input is then reflected at the TDCLK output.</td></tr>
<tr><td>RXD</td><td>OA</td><td>Received Data. The modem presents received serial data to the local DTE on the Received Data (RXD) output and to the interface memory Receive Data Register (DBUFFER) in parallel data mode.</td></tr>
<tr><td>/DTR</td><td>IA</td><td>Data Terminal Ready. In V.8 and V.34 configuration, activating /DTR initiates the handshake sequence. The DATA bit must be set to complete the handshake.
In V.21 or V.23 configuration, activating /DTR causes the modem to enter the data state provided that the DATA bit is a 1. If in answer mode, the modem immediately sends answer tone. During the data mode, deactivating /DTR causes the transmitter and receiver to turn off and return to the idle state.
The /DTR input and the /DTR control bit are logically ORed.</td></tr>
<tr><td>/DSR</td><td>OA</td><td>Data Set Ready. DSR ON indicates that the modem is in the data transfer state. DSR OFF indicates that the DTE is to disregard all signals appearing on the interchange circuits except Ring Indicator (/RI). /DSR is OFF when the modem is in a test mode (local analog or remote digital loopback). The /DSR status bit reflects the state of the /DSR output.</td></tr>
<tr><td>/RTS</td><td>IA</td><td>Request to Send. The active low /RTS input allows the modem to transmit data present at TXD in the serial data mode (TPDM bit = 0), or in DBUFFER in the parallel data mode (TPDM bit = 1), when /CTS becomes active.
The /RTS hardware control input is logically ORed with the /RTSP bit by the modem to form the resultant control signal.</td></tr>
<tr><td colspan="3">HOST INTERFACE</td></tr>
<tr><td>/CS</td><td>IA</td><td>Chip Select. The active low /CS input selects and enables the modem DSP for parallel data transfer between the DSP and the host over the microprocessor bus.</td></tr>
<tr><td>/WR</td><td>IA</td><td>Write. Writing is controlled by the host pulsing /WR input low during the microprocessor bus access cycle. The write timing is:
<table>
<tr><th>Parameter</th><th>Symbol</th><th>Min.</th><th>Max.</th><th>Units</th></tr>
<tr><td>CS Setup Time</td><td>TCS</td><td>0</td><td>—</td><td>ns</td></tr>
<tr><td>RSi Setup Time</td><td>TRS</td><td>10</td><td>—</td><td>ns</td></tr>
<tr><td>Control Hold Time</td><td>THC</td><td>10</td><td>—</td><td>ns</td></tr>
<tr><td>Write Data Setup Time</td><td>TWDS</td><td>20</td><td>—</td><td>ns</td></tr>
<tr><td>Write Data Hold Time</td><td>TDHW</td><td>10</td><td>—</td><td>ns</td></tr>
</table>
Note: A read or write operation following a write operation must be delayed by at least 4 XCLK cycles.</td></tr>
<tr><td>/RD</td><td>IA</td><td>Read Enable. Reading is controlled by the host pulsing /RD input low during the microprocessor bus access cycle. The read timing is:
<table>
<tr><th>Parameter</th><th>Symbol</th><th>Min.</th><th>Max.</th><th>Units</th></tr>
<tr><td>CS Setup Time</td><td>TCS</td><td>0</td><td>—</td><td>ns</td></tr>
<tr><td>RSi Setup Time</td><td>TRS</td><td>10</td><td>—</td><td>ns</td></tr>
<tr><td>Data Access Time</td><td>TDA</td><td>—</td><td>45</td><td>ns</td></tr>
<tr><td>Data Hold Time</td><td>TDHR</td><td>10</td><td>—</td><td>ns</td></tr>
<tr><td>Control Hold Time</td><td>THC</td><td>10</td><td>—</td><td>ns</td></tr>
</table>
Notes:
1. /CS and /RD must not both be continuously active.
A read or write operation following a read operation must be delayed by at least 2 XCLK cycle.</td></tr>
</table>

FM336 Signals Definitions (Cont'd)

Label	I/O Type	Signal Name/Description
IRQ	OA	**Interrupt Request.** Interrupt request outputs may be connected to the host processor interrupt request input in order to interrupt host program execution for immediate modem service. The IRQ output can be enabled in DSP interface memory to indicate immediate change of conditions in the modem. The use of IRQ is optional depending upon modem application. The IRQ output structure is an open-drain field-effect-transistor (FET). The IRQ output can be wire-ORed with other IRQ lines in the application system. Any of these sources can drive the host interrupt input low, and the host interrupt servicing process normally continues until all interrupt requests have been serviced (all IRQ lines have returned high). Because of the open-drain structure of IRQ#, an external pull-up resistor to +3.3V is required at some point on the IRQ line. The resistor value should be small enough to pull the IRQ line high when all IRQ drivers are off (it must overcome the leakage currents). The resistor value should be large enough to limit the driver sink current to a level acceptable to each driver. If only the modem IRQ# output is used, a resistor value of 5.6K ohms, 20%, 0.25 W, is sufficient.
D0-D7	IA/OB	**Data Lines.** Eight bi-directional data lines (D0—D7) provide parallel transfer of data between the host and the modem. The most significant bit is D7. Data direction is controlled by the Read Enable (READ#-¿2) and Write Enable (WRITE#-R/W#) signals. During a read cycle, data from the DSP interface memory register is gated onto the data bus via three-state drivers in the DSP. These drivers force the data lines high for a one bit, or low for a zero bit. When not read, the three-state drivers assume their high-impedance (off) state. During a write cycle, data from the data bus is copied into the selected DSP interface memory register, with high and low bus levels representing one and zero bit states, respectively.
RS0-RS4	IA/OB	**Register Select Lines.** Five active high Register Select inputs (RS0—RS4) address interface memory registers within the DSP when /CS is low. These lines are typically connected to address lines A0-A4. When selected by /CS low, the DSP decodes RS0 through RS4 to address one of 32 8-bit internal interface memory registers (00-1F). The most significant address bit is RS4 while the least significant address bit is RS0. The selected register can be read from, or written into, via the 8-bit parallel data bus (D0—D7).
OVERHEAD SIGNALS		
VDD1	PWR	3.3V Supply Voltage for DSP Digital Circuits.
VSS	DGND	Digital ground.
VGG	PWR	5V Supply Voltage for DSP Digital Circuits.
MAVSS	AGND	Analog ground.
MAVDD	PWR	5V Supply Voltage for IA Analog Circuits.
VDD	PWR	5V Supply Voltage for IA Digital Circuits.
VSUB	GND	Connect to analog ground.
XCLK	OA	**XCLK Output.** Output clock at 63.5045 MHz, which runs during normal operational mode and turned off during Sleep Mode.
YCLK	OA	**YCLK.** Output clock at 28.224 MHz, which runs during normal operational mode and turned off during Sleep Mode..
Label	**I/O Type**	**Signal Name/Description**
XTALI/CLKIN	I/O	**Crystal In/Clock In.** Connect to an external 28.224 MHz crystal circuit or an external 28.224 MHz oscillator circuit. **Label** **Crystal** **Oscillator** XTALI/CLKIN XTALI CLKIN
XTALO/NC	I/O	**Crystal Out/NC.** Connect to the external crystal circuit return or leave open. **Label** **Crystal** **Oscillator** XTALO/NC XTALO NC
PLL_VDD	PWR	PLL Supply Voltage.
PLL_GND	DGND	PLL Supply Voltage return.
VCORE	PWR	3.3V Supply Voltage. Connect to VDD1.
RESERVED	-	Reserved pins are used for future development and should not be connected to any circuitry.

3-1-7 Scanner Part

CIS DRIVER, INPUT PROCESSOR

CIS contacl signal is consist of BLED, RLED, GLED, CIS_CLK CIS_SI. CIS driver power supply is +5v, LED driver power supply is +5v also. As CIS input signal, minc-Vref values O, MAXC+Vref Values is about 1.2V.

SPECIFICATION

Readable width	216mm
Number of sensor elements	2552 dots(21~2572 dots available)
Resolution	75 ms/line
Scanning speed	7.5 ms/line
Light source	Color LEDs
	Red (640 mm)
	Green(525mm)
	Blue(470mm)
Data output	1 analogue
Outward dimension(WXHXL)	18.0 X 12.2 X 231.0 mm (attachment)

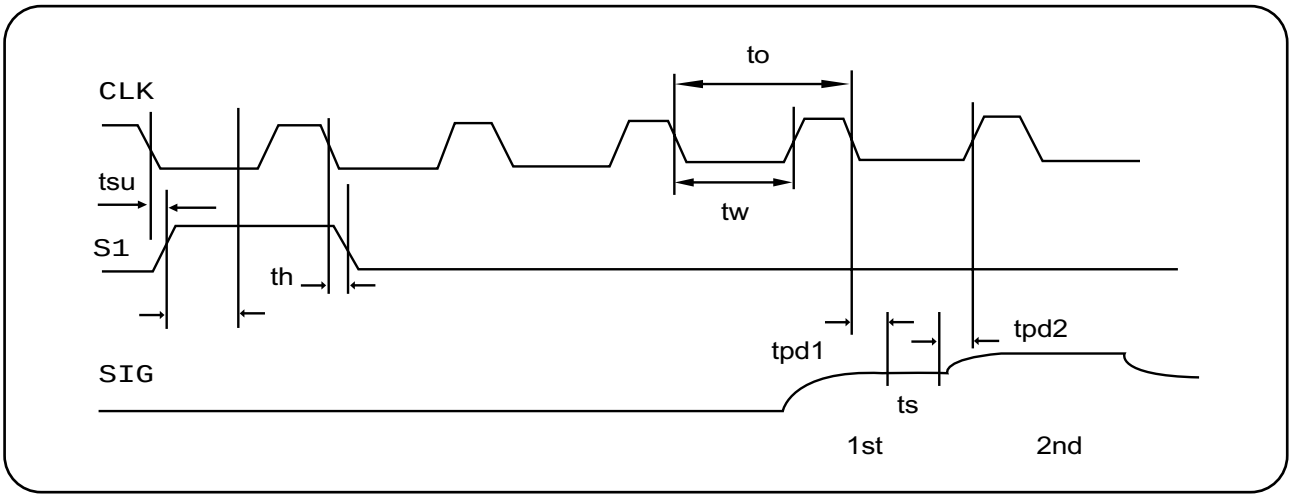
PIN FUNCTION DESCRIPTION

No.	Signature	Name	Description
1	SIG	signal output	Video output signal
2	GND	Ground	0V DC ; reference point
3	VDD	Supply voltage	+5V DC supply (ref. to GND)
4	GND	Ground	0V DC ; reference point
5	GND	Ground	0V DC ; reference point
6	SI	Start pulse	Start pulse
7	GND	Ground	0V DC ; reference point
8	CLK	Clock	CIS main clock
9	LEDB	LED Ground (blue)	LED POWER SUPPLY BLUE
10	LEDG	LED Ground (green)	LED POWER SUPPLY GREEN
11	LEDR	LED Ground (red)	LED POWER SUPPLY RED
12	VLED	Supply voltage	LED POWER SUPPLY

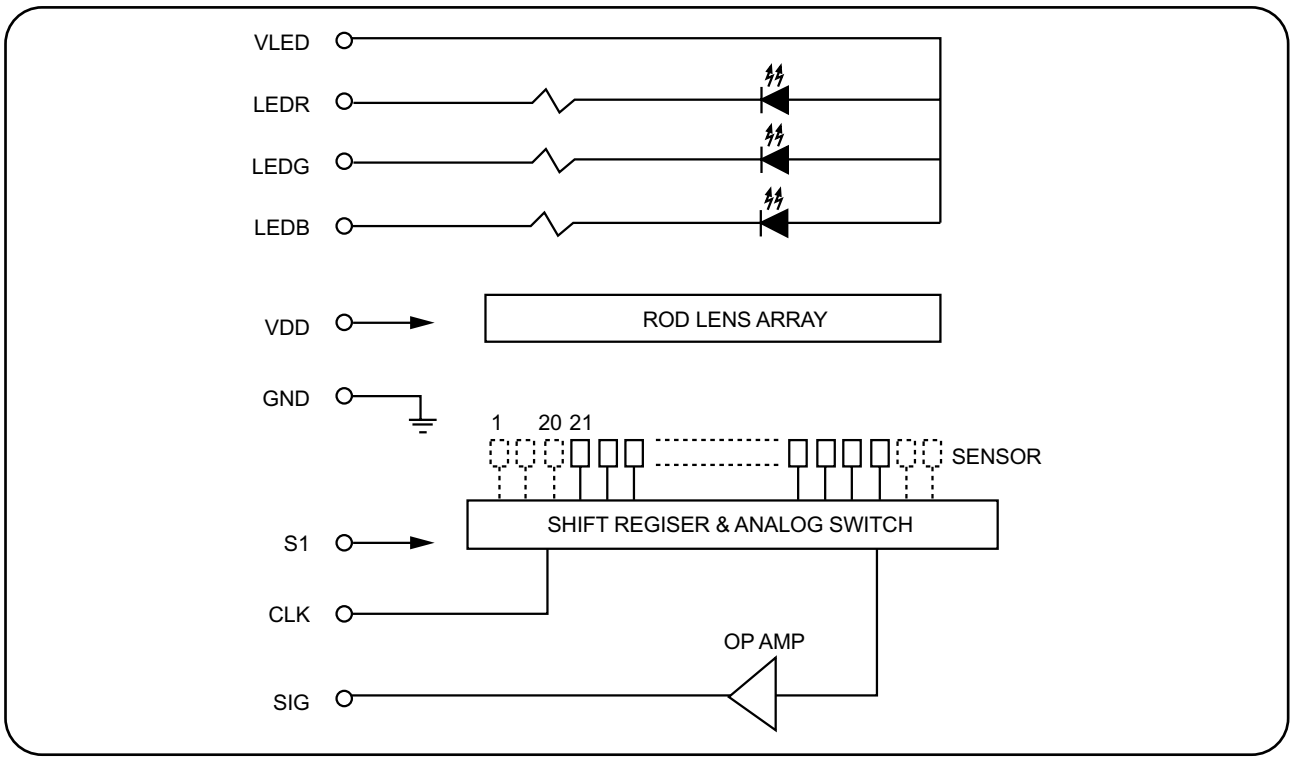
ELECTRICAL CHARACTERISTICS (TA=25˚C)

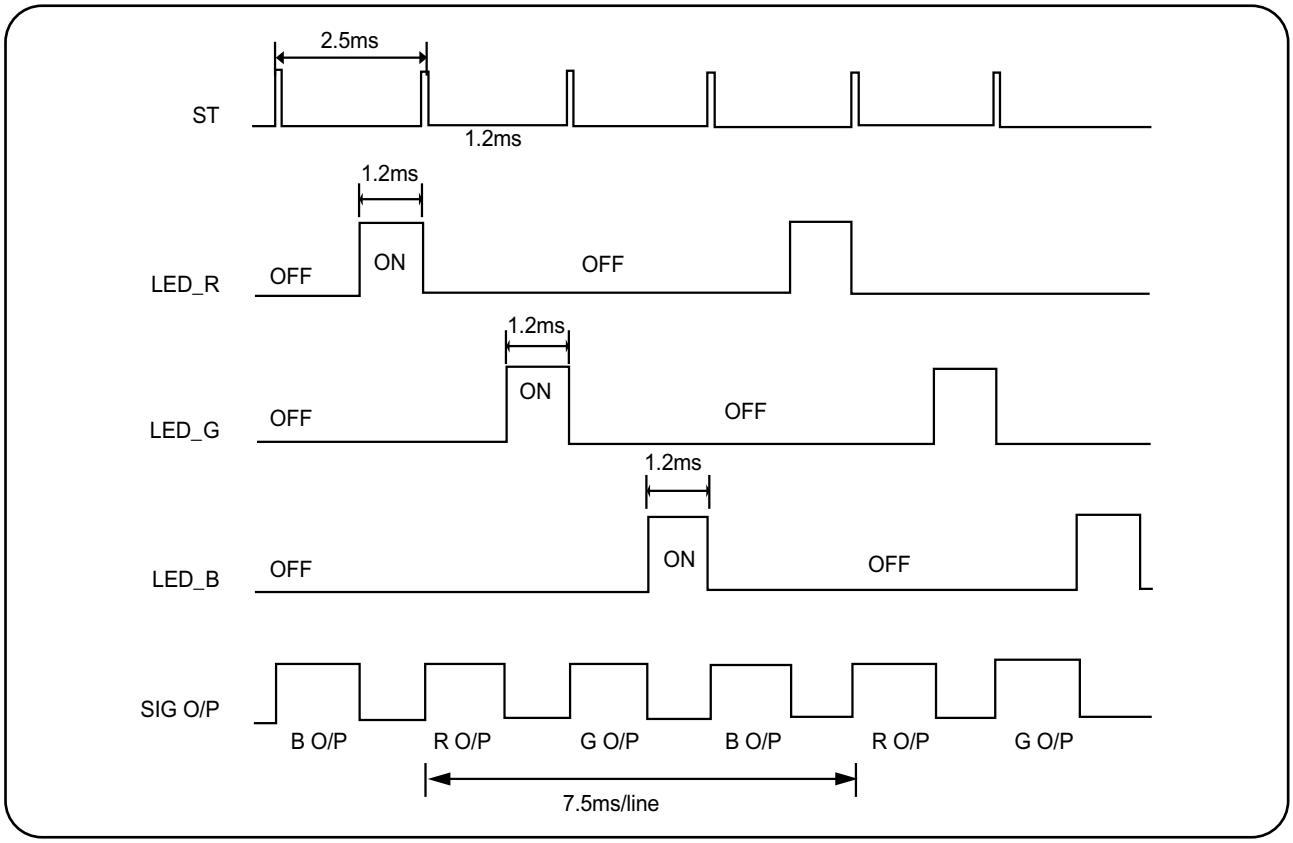
Item	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Power Supply	VDD	4.75	5.0	5.25	V	
	VLED	4.75	5.0	5.25	V	
Input Voltage	VIH	3.2			V	SI & CLK
	VIL			0.8	V	
Input Current	IIH			20	µA.	SI & CLK
	IIH			0.2	mA.	
LED Current	ILEDr			30	mA.	REF.
	ILEDg			60	mA.	REF.
	ILEDb			60	mA.	REF.
Clock Frequency.	CLK		2		MHz	
Clock Pulse “L” Duty			15		%	tw/to
Setup Time	tsu	0		tw/2	ns	
Hold Time	th			tw/2	ns	
SIG Delay Time	tpd 1		250		ns	
	tpd 2		30		ns	
Sampling Reriod	ts		90		ns	

CIS Driver Clock Timing



CIS Block Diagram



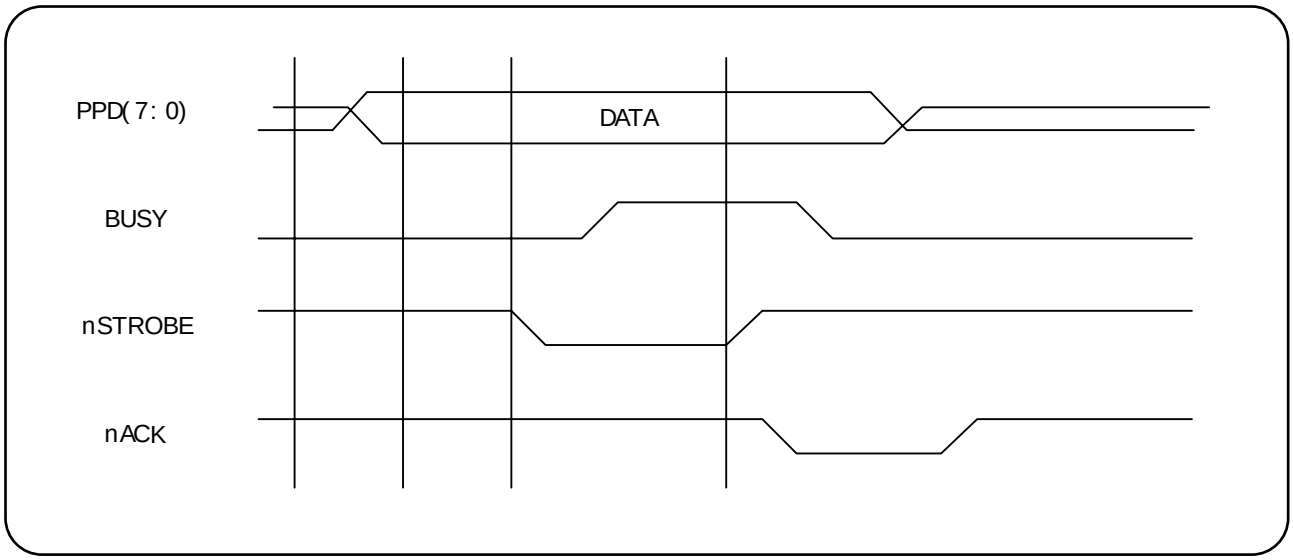


3-1-8 HOST INTERFACE:

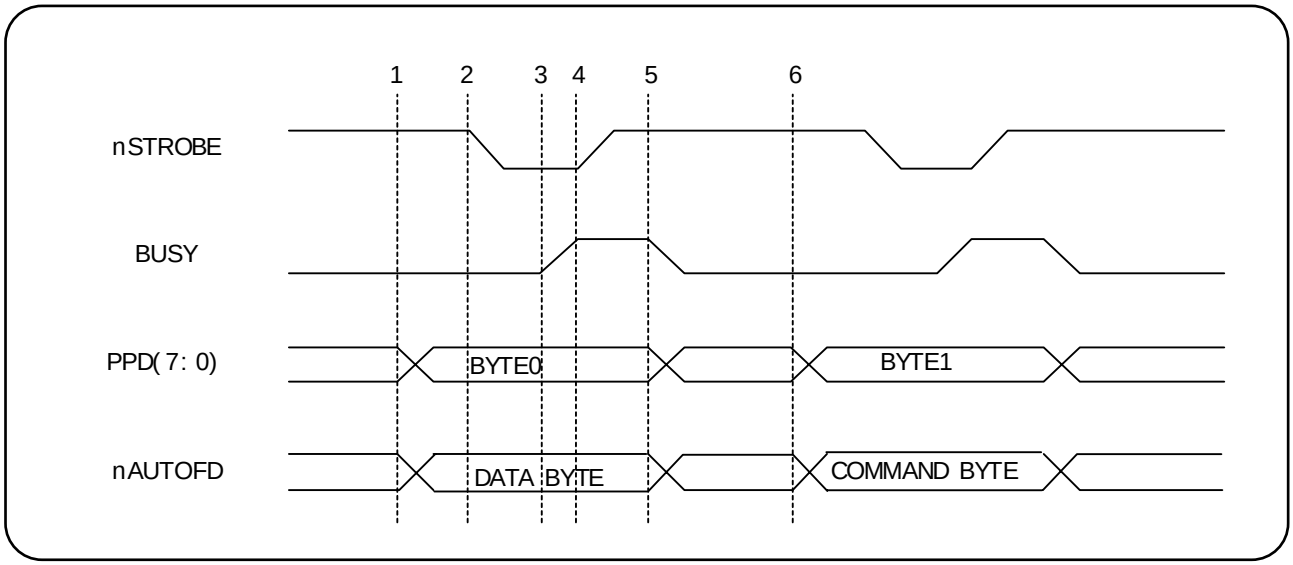
Parallel Port Interface

PARALLEL PORT INTERFACE PART KS32C61100 has the Parallel Port Interface Part that enables Parallel Interface with PC. This part is connected to PC through Centronics connector. It generates major control signals that are used to actuate parallel communication. It is comprised of/ERROR, PE, BUSY, /ACK, SLCT, /INIT, /SLCTIN, /AUTOFD and /STB. This part and the PC data transmission method support the method specified in IEEE P1283 Parallel Port Standard (http://www.fapo.com/ieee1284.html). In other words, it supports both compatibility mode (basic print data transmitting method), the nibble mode (4bit data; supports data uploading to PC) and ECP (enhanced capabilities port: 8bits data - high speed two-way data transmission with PC). Compatibility mode is generally referred to as the Centronics mode and this is the protocol used by most PC to transmit data to the printer. ECP mode is an improved protocol for the communication between PC and peripherals such as printer and scanner, and it provides high speed two-way data communication. ECP mode provides two cycles in the two-way data transmission; data cycle and command cycle. The command cycle has two formats; Run-Length Count and Channel Addressing. RLE (Run-Length Count) has high compression rate (64x) and it allows real-time data compression that it is useful for the printer and scanner that need to transmit large raster image that has a series of same data. Channel Addressing was designed to address multiple devices with single structure. For example, like this system, when the fax/printer/scanner have one structure, the parallel port can be used for other purposes while the printer image is being processed.This system uses RLE for high speed data transmission. PC control signals and data send/receive tasks such as PC data printing, high speed uploading of scanned data to PC, upload/download of the fax data to send or receive and monitoring the system control signal and overall system from PC are all processed through this part.

COMPATIBILITY HARDWARE HANDSHAKING TIMING

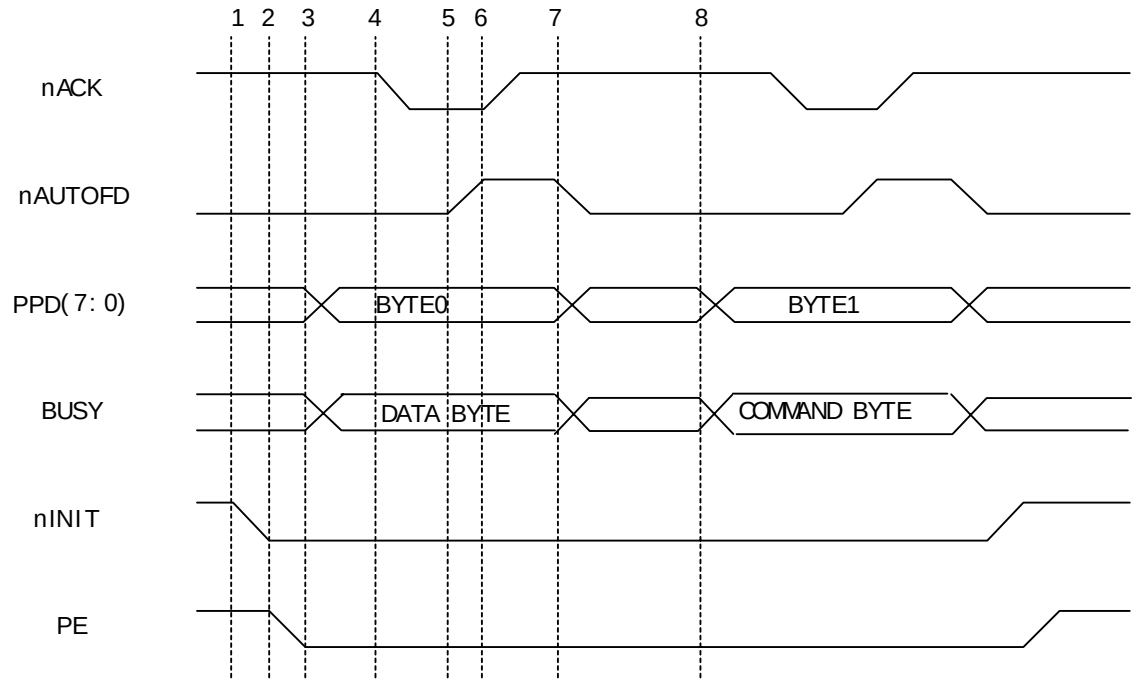


ECP HARDWARE HANDSHAKING TIMING (FORWARD)



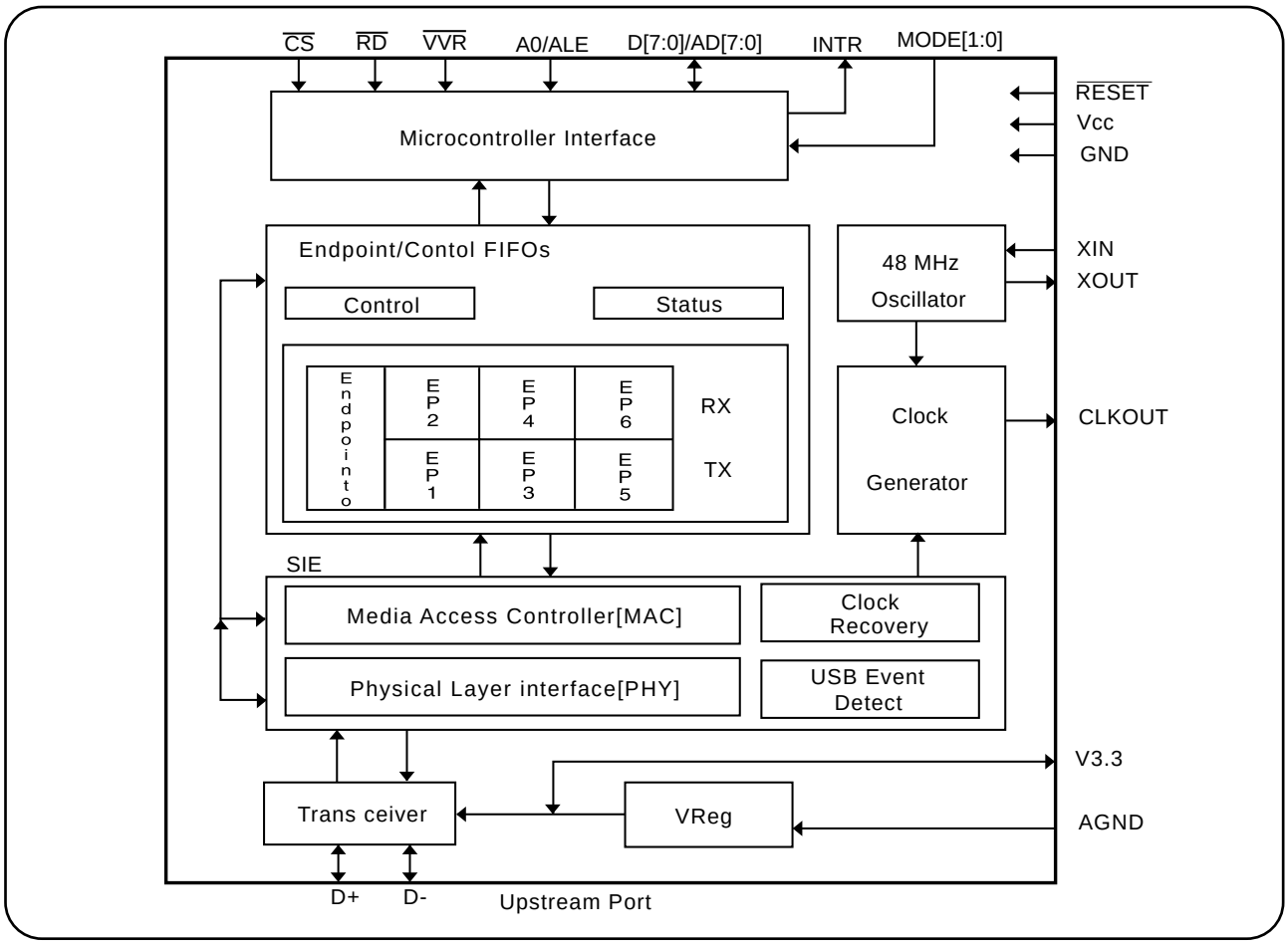
1. The host places data on the data lines and indicates a data cycle by setting nAUTOFD
2. Host asserts nSTROBE low to indicate valid data
3. Peripheral acknowledges host by setting BUSY high
4. Host sets nSTROBE high. This is the edge that should be used to clock the data into the Peripheral
5. Peripheral 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

ECP HARDWARE HANDSHAKING TIMING (REVERSE)



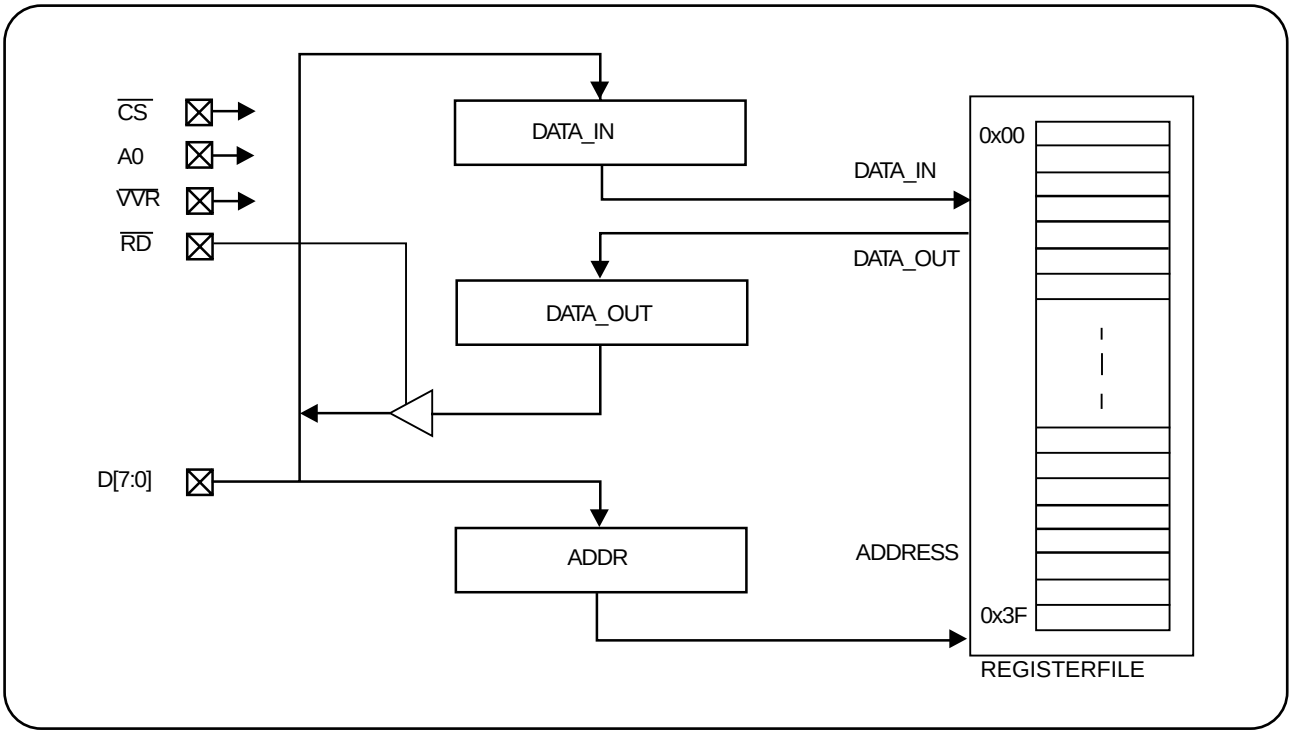
1. The host request a reverse channel transfer by setting nINIT low
2. The peripheral signals that it is OK to proceed by setting PE low
3. The peripheral places data on the data lines and indicates a data cycle by setting BUSY high
4. Peripheral asserts nACK low to indicate valid data
5. Host acknowledges 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

USB INTERFACE

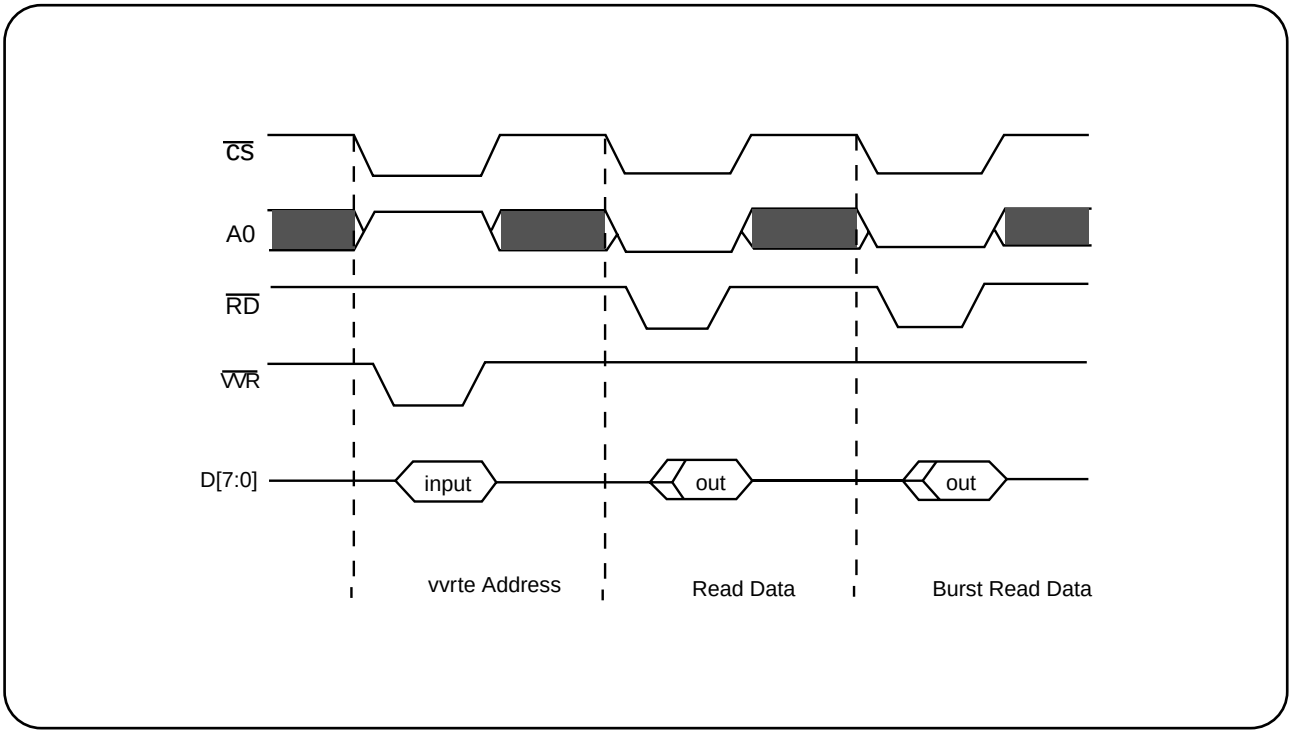


- Full-Speed USB Node Device
- USB transceiver
- 3.3V signal voltage regulator
- 48 MHz oscillator circuit
- Programmable clock generator
- Serial Interface Engine consisting of Physical Layer In-terrace (PHY) and Media Access Controller (MAC), USB Specification 1.0 compliant
- Control/Status Register File
- USB Function Controller with seven FIFO-based End-points :
  - One bidirectional Control Endpoint 0 (8bytes)
  - Three Transmit Endpoints (2*32 and 1*64 bytes)
  - Three Receive Endpoints (2*32 and 1*64 bytes)
- 8-bit parallel interface with two selectable modes :
  - non-multiplexed
  - multiplexed (Inter compatible)
- DMA support for parallel interface
- MICROWIRE/PLUS Interface
- 28-pin SO package

NON-MULTIPLEXED MODE INTERFACE BLOCK DIAGRAM



NON-MULTIPLEXED MODE BASIC TIMING DIAGRAM



3-2 OPE PBA

3-2-1 SUMMARY

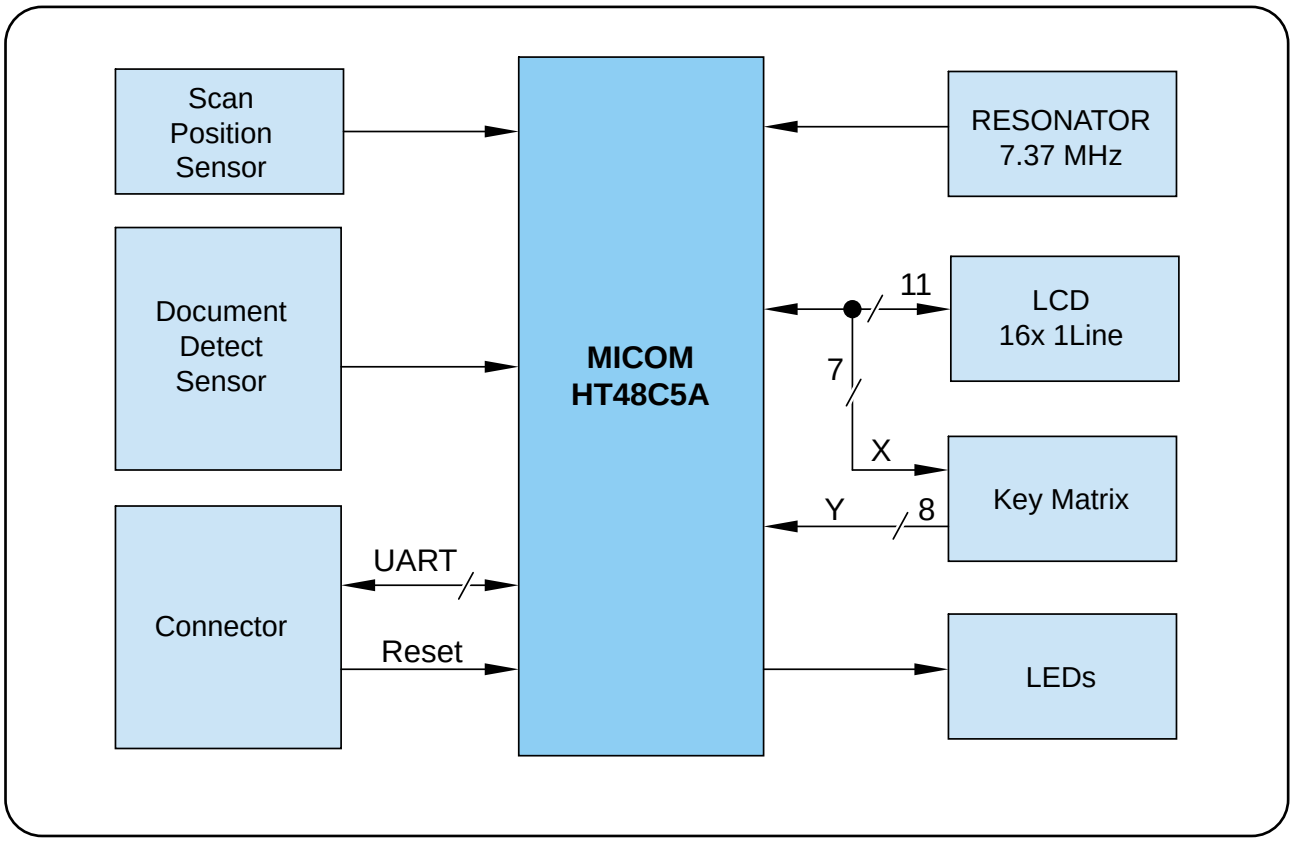
OPE Board is separated functionally from the main board and operated by the micom(HT48C5A) in the board. OPE and the main use UART (universal asynchronous receiver/transmitter) channel to exchange information. OPE reset can be controlled by the main.

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, it 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, HT48C5A),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.

- Display from the controller is received at U2 pin 47 (RX DATA).
- LCD drive signals are sent from P1-x pin group, P1-4~P1-14 pins.
- Machine status LED drive signals are sent from U2 LED0~LED4.
- Document detect sensor output is received at U2 pin 1.
- Scan position sensor output is received at U2 pin7



<OPE BLOCK DIAGRAM>

3-3 LIU PBA

The LIU (Line Interface Unit) using the discrete method is comprised of the following.

(1) Tel_line Interface Circuit that connects the PSTN(exchange) and the system (Facsimile)
(2) Telephone circuit composed of dial/speech circuit.

3-3-1 Tel_Line interface Circuit

Tel_Line Interface is the path that connects the signals between PSTN(exchange) and the system (Facsimile) and it is comprised of Tel-Line Interface Circuit and Impedance Matching Trans Circuit.

(1) TEL_LINE Interface Circuit
(2) TRANS Circuit for IMPEDANCE MATCHING

3-3-2 Telephone Circuit (Ringer/Dial/Speech Circuit, etc)

The telephone circuit is comprised of ring detect circuit, dialer circuit, speech circuit, external hook detect circuit and recall circuit.

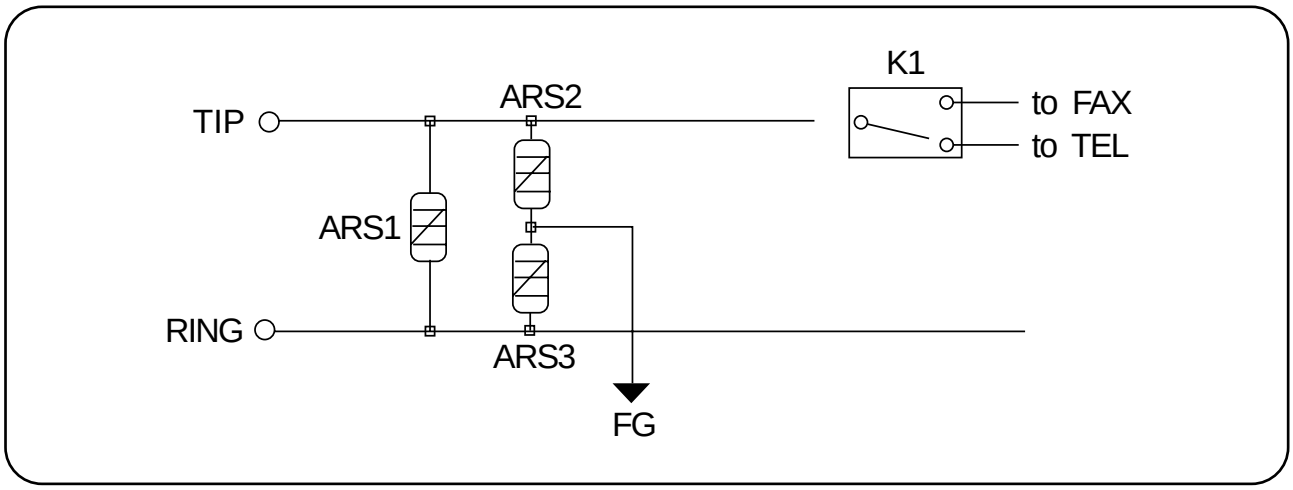
(1) Ring Detect Circuit
(2) Dialling Circuit (including MF Dialling Signal Transmitting Circuit)
(3) Speech Circuit
(4) External Hook Detect Circuit
(5) Recall Circuit

3-3-3 Detailed Spec.

TEL_LINE INTERFACE CIRCUIT

1) TEL_LINE INTERFACE CIRCUIT

- It is an interface that physically connects facsimile to the PSTN (public switching telephone network) through TIP and RING as in fig. 1.
- ARS 1-3 protects the system from voltage overload such as the surge coming through PSTN. ARS 2 and ARS 3 are used as overload protection in common mode (between TIP/RING and FRAME GROUND). ARS 1 is used as overload protection in normal mode (between TIN and RING) and it uses ARRESTOR for 600V. However, arrestor's rated voltage differs from European and USA(400v).
- CML (CONNECT MODEM to LINE) RELAY K1 is a switch designed to selectively connect the PSTN to system voice communication path and fax communication path. In STAND_BY MODE and voice communication mode, it is connected to TEL PART and FAX PART while communicating and dialing.
- CML Relay (K1): CML relay interfaces with T2(600:600) TRANS in communication mode.
- DC Impedance: DC impedance is determined in the DC Feeding Unit. It represents DC characteristic of the computer connected through -48V DC power of the switch and lines. The DC characteristic of required by the communication standards of a number of countries is the DC resistance of 50Ω~300Ω to the current range of 20mA~120mA. (value varies depend on countries).
- AC Impedance or Return Loss: AC impedance is determined by the peripheral circuits of T2 Transformer. It is the standard required for optimum signal transmission between computer and switch. When the AC impedance of the computer for AC signal transmission and the AC impedance of the switch matches, the signal can be transmitted without loss. Therefore, communication standards specifies the AC impedance of the computer and it implies the return loss. The communication standards of each country, considering the characteristic of their lines, requires 600Ω or the return loss of 14dB and higher against the AC impedance of Complex and the AC signals of 300Hz~400Hz. The AC impedance of transformer changes depending on the load resistance, the core material, coil inductance and resistance, but generally its characteristic against load resistance is considered.



<TEL_LINE INTERFACE CIRCUIT>

RINGER DIAL CIRCUIT

1) Ringer Circuit
- The ring detect circuit detects the ring signal by sending the bell signal sent from PSTN to the primary photo coupler (PC814). At this point, C(1uF/250V) is used to match the ring impedance and R is coupled directly in order to prevent any damage to the photo coupler due to ring voltage.

2) Dialing Circuit
- Dialing circuit is initiated only when the power is on and it is transmitted to line through the modem of main part (T2 trans)

3) External Hook Detect Circuit
- In the discrete LIU method, the external hook detect circuit is designed to use both the photo coupler and current detector in order to be used in all countries including the countries with low series resistance (Germany, Switzerland, Belgium, Austria, etc.). To use photo coupler (PC814), you must carefully select the resister connected parallel (75Ω) to the photo coupler in order to satisfy the voltage drop standards of England and a few other countries. The diode connected to the current detector pin (5/6) was used to detect the external hook all through when the line parity turns over.

4) Recall Circuit
- In the discrete LIU method, we used the recalling method using low cost photo coupler instead of using photo MOS relay in order to initiate the recalling for handset hook off dialling after the power is turned on. In this case, the time break recall was enabled by switching the power transistor of the telephone circuit using the secondary CPU control.

3-4 Engine PPA

3-4-1 Engine Configuration

3-4-1-1. Video Controller Board

Video Controller Board receives image data from the host computer and converts it into bitmap (binary) image or receives bitmap image directly from the host computer and sends it to the engine controller board.

3-4-1-2. SMPS Board

It basically receives AC input and generates ripple-free DC level +5V and -5V +24V. Next, it supplies these voltages to each unit appropriately.

It also supplies AC power to heat lamp of fixing unit.

3-4-1-3. HVPS Board

HVPS board generates high voltages of THV/MHV/Supply/Dev and supplies them to the developing unit to create images. It is designed to realize optimum conditions for the images.

This board includes LSU interface unit and cover open sensing unit that it intercepts +24V voltage to the main motor, LSU, fan, clutch and fixing unit when you open the front cover.

3-4-1-4. Developer

Using the digital picture process, developing unit generates visible images. It is comprised of charge roller, OPC drum, developer roller, supply roller and toner.

3-4-1-5. LSU (Laser Scanning Unit)

This is controlled by engine controller. Using laser beam control, exposure of OPC drum and the rotational principle of polygon mirror, it forms electro-static latent image in the OPC drum with the video data received from engine. It is the core part of LBP. OPC drum synchronizes with the feeding speed of the paper and rotates. When the laser beam inside LSU reaches at the end of polygon mirror, it generates /HSYNC signal and send it to engine. Then the engine detects /HSYNC signal and adjusts the lengthwise row of the image on the paper. After detecting /HSYNC and after set time period, it sends the video data to LSU to adjust the left margin on the paper.

The one side of the polygon mirror is the one line scanned.

3-4-1-6. Transfer

Transcribing unit is comprised of PTL(pre-transfer lamp) and transcribing roller. PTL detects the beam of the OPC drum, lowers the electric potential of the developing unit and lower the adhesiveness of toner to enhance transcription coefficient.

And the transcribing roller transfers the toner (constituting element of video image) on OPC drum to the paper.

3-4-1-7. Fixer

It is comprised of heat lamp, heat roller, pressure roller, thermistor and thermostat. It fixes the toner powder transferred to the paper on the paper using pressure and high heat in order to finish the final printing job.

3-4-2. Developing Process

3-4-2-1 Feeder

Engine operates this unit. Solenoid rotates the feed roller and feeds one paper. Then the paper is fed into the set and hits the actuator of the feed sensor. At this point, the engine detects the signal and prepares to spray according to the image data. If any problem happens to this feed sensor operation, the system displays “paper jam error” on the OP panel.

Also, feed sensor unit is closely related to the paper margin.

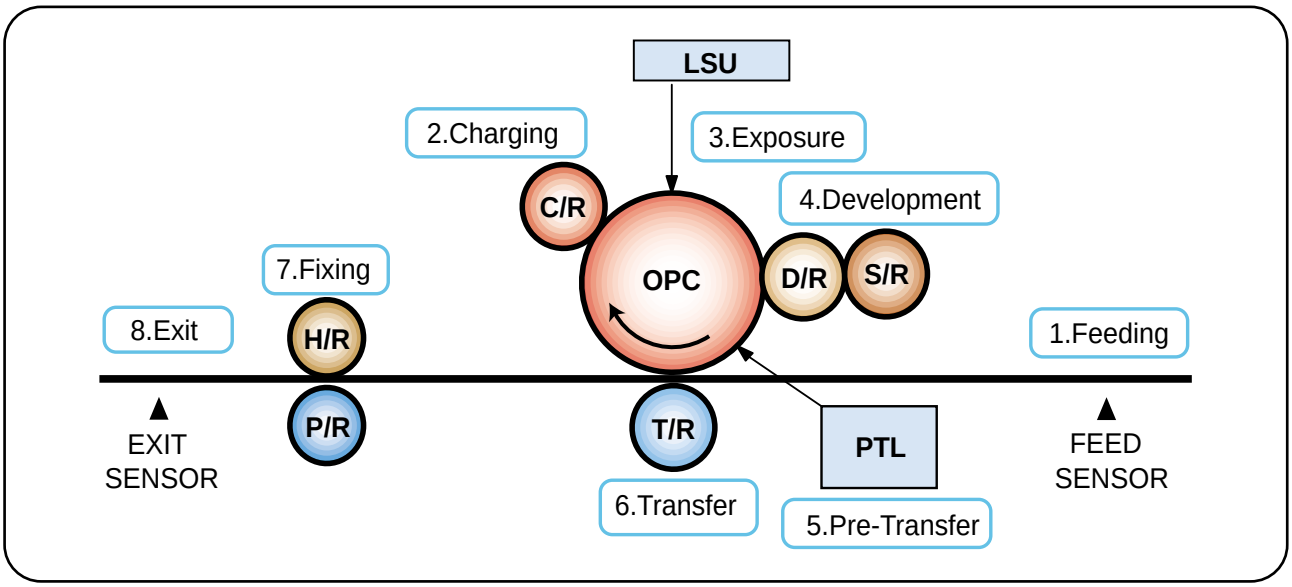
3-4-2-2. Electrifier

This unit electrifies consistent negative voltage to OPC. When the high negative voltage (-1550V) is allowed to charge roller, the OPC drum surface will be consistently electrified with approximately +1300V. This is the first process in generating the digital picture.

3-4-2-3. Exposer

After receiving bitmap image data from engine board, LSU turns the laser diode either on or off depending on whether the digital data is present or absent in order to expose the OPC drum with the switched laser beam data. The difference between the voltages generated at this point is presented above. In other words, the part exposed to the laser will have -50V and its relative electric potential will increase and form electrostatic latent image.

The part unexposed to the laser as it did not have the video data will consistently retain -800V. Eventually, the image will form in the part electrified and rose to -50V(forms black dot) and the part retaining -800V will be white in order to make the basic condition to form the video data.

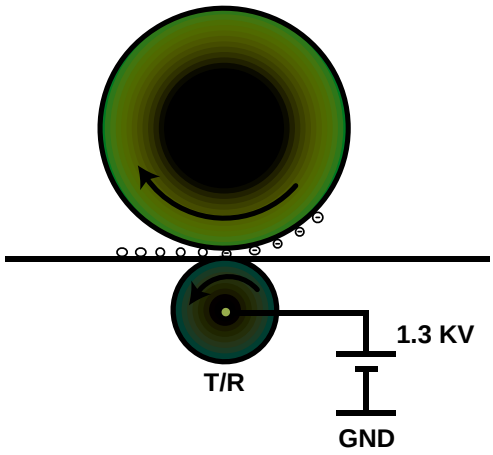


< Engine Operating Description >

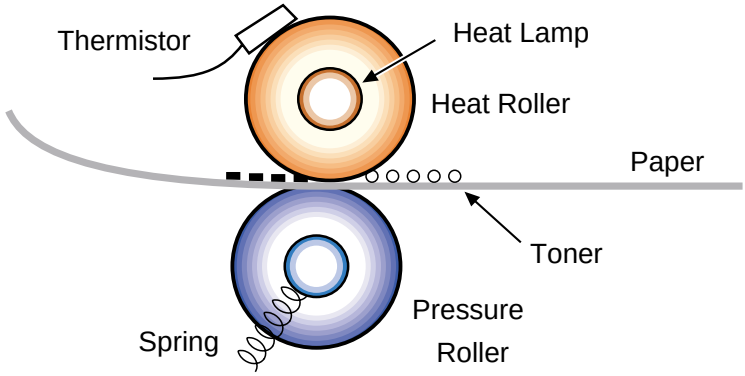
3-4-2-4. Developer Unit

On the surface where OPC drum and developer roller (rotate in opposite direction) meet, the toner that has negative electric characteristic moves to the exposed part (-50V) due to the electric potential difference, but it will not move to the unexposed part (-800V).

3-4-2-5. Transfer Unit



Toner on the OPC drum is transferred to paper by transfer unit. In other words, the toner on the OPC drum surface is inducted by the transfer roller electrified to approximately +1.3KV(600~2800V variable) to the paper.
At this point, the voltage (600~2800V variable) is determined by temperature and humidity.
The above process is called “transfer”.



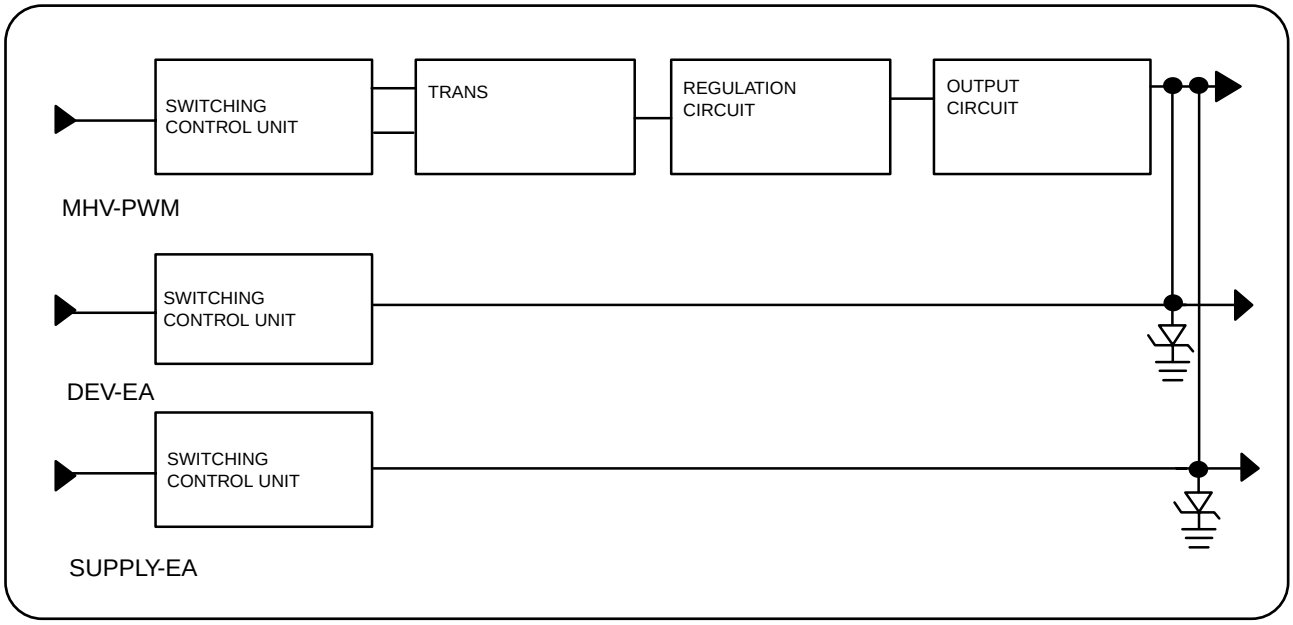
3-4-2-6. Anchorage unit

The toner transferred on to the paper is at the electronically low state and it can be easily scattered. Considering this fact, we used heat (180°C) and pressure (4kg) to fix the toner on the paper permanently. Then the image formed will remain on the paper permanently. Heat roller transfers the heat from the heat lamp inside to the paper. The surface of the heat roller specially coated with Teflon repels toner melted by the heat from the surface.
The pressure roller on the bottom of the heat roller is made of silicon resin and its surface is also coated with Teflon. The thermistor of the fixer unit detects the surface temperature of the heat roller and feeds this information back in order to retain 180°C while printing and 135°C, while on standby. The thermostat is used as the secondary safety device and it prevents overheat by shutting the main power when the heat lamp
is overheated.

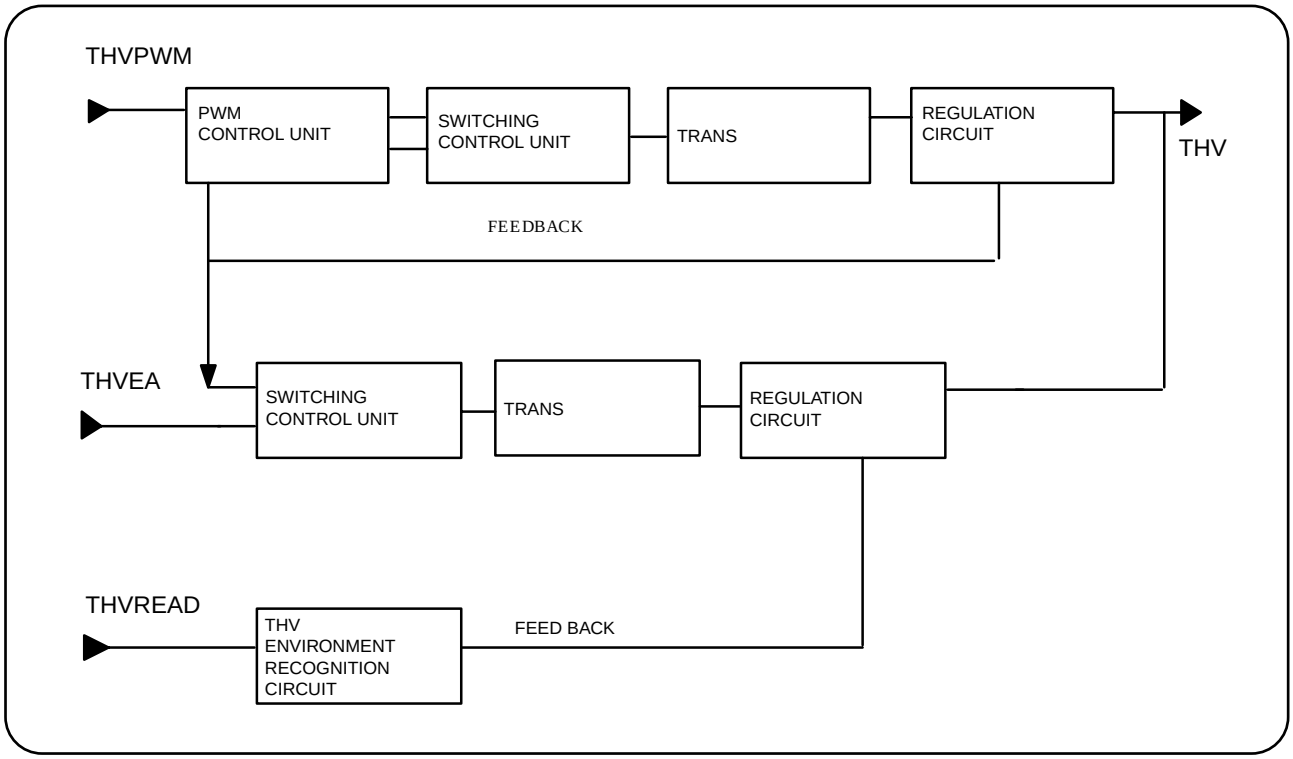
3-4-2-7. Exit

After the digital picture process is finished, the printed paper will come out of the set through the exit sensor. The signal detected will be transferred to the engine and provide the position information. If the actuator and the sensor do not work normally, the system will display “Paper Jam 2 Error”.

BIAS OUTPUT UNIT BLOCK DIAGRAM



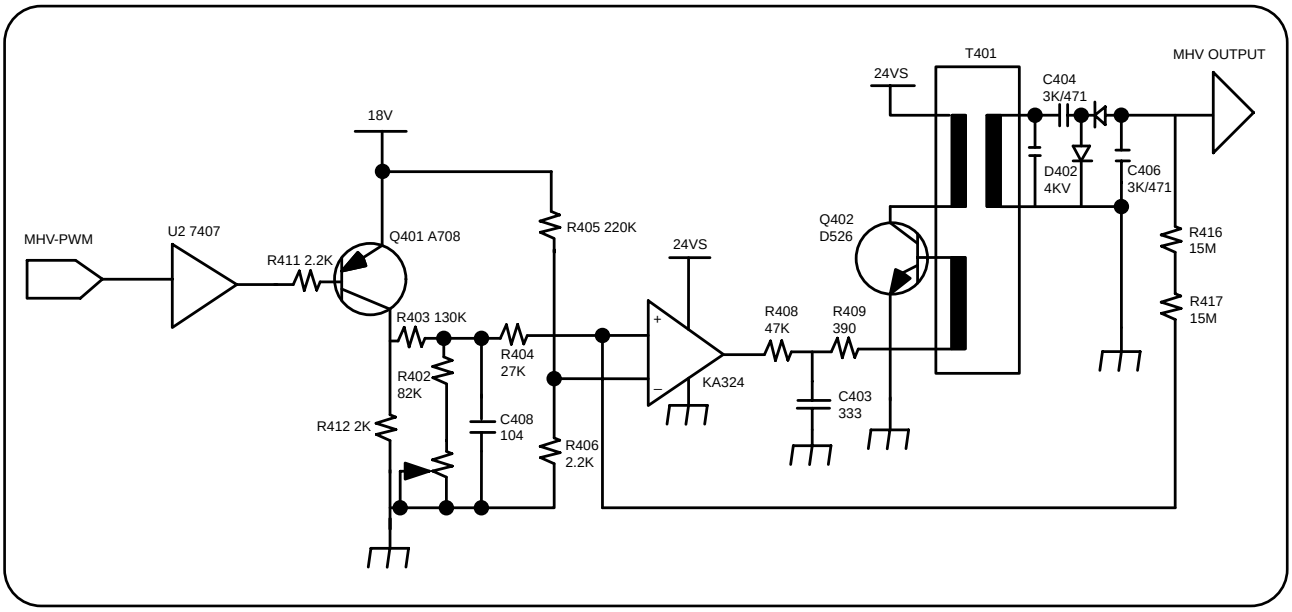
TRANSFER OUTPUT UNIT BLOCK DIAGRAM



3-4-2-8. MHV (Electrification Output Enable)

Electrification Output Enable is the electrification output control signal 'PWM-LOW ACTIVE'.
When MHV-PWM LOW signal is received, Q401 turns on and the steady voltage will be accepted to the non-inverting terminal of OP-AMP 324. As the voltage higher than the inverting reference voltage of OP-AMP, which is set to R405 and R406, OP-AMP output turns high.

This output sends IB to the TRANS auxiliary wire through current-restricting resistance Q402 via R408 and C403 and Q402 turns on. When the current is accepted to Q402, Ic increases to the current proportional to time through the T401 primary coil, and when it reaches the Hfe limit of Q402, it will not retain the "on" state, but will turn to "off". As Q402 turns 'off', TRANS N1 will have counter-electromotive force, discharge energy to the secondary unit, sends current to the load and outputs MHV voltage through the high voltage output enable, which is comprised of Regulation– circuit.



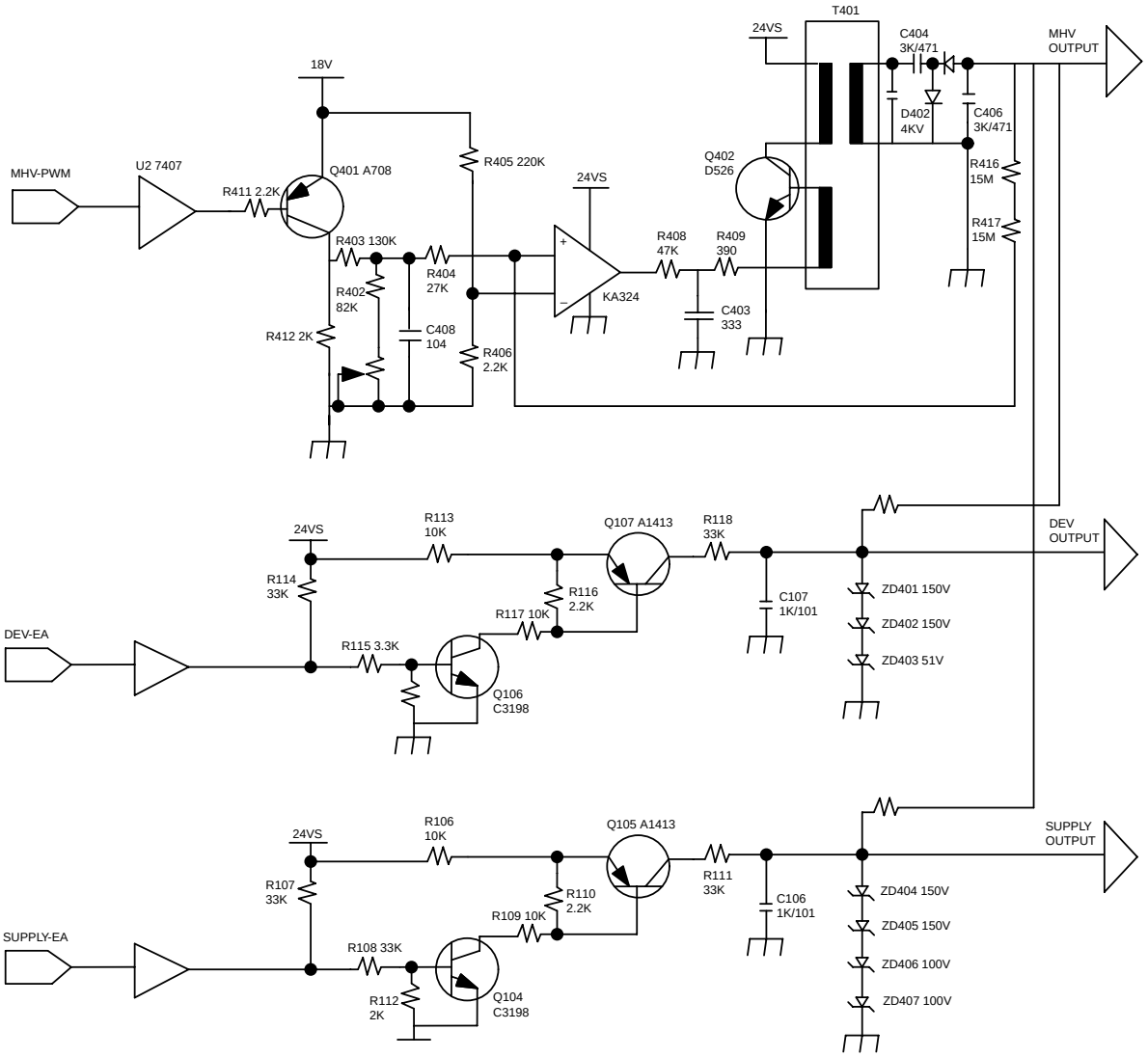
3-4-2-9. BIAS (supply/dev output unit)

BIAS voltage output is generated only when electrification voltage is set to output. In the circuit presented above, it organizes enough zener-diodes required to output dev/supply voltage from electrification output.

Supply voltage is output when the supply-ea signal is 'L'. When supply-ea is 'L', Q104 turns off and as Q105 does not turn on, the electric potential of the output unit retains the electric potential of zener and thus -500V is output as the supply voltage.

In case supply-ea signal is 'H', both Q104 and Q105 will turn on and the electric potential of the output unit will not retain the electric potential of zener and become GND level and thus the output voltage will become .

The output condition of developer voltage is the same as that of the supply voltage.



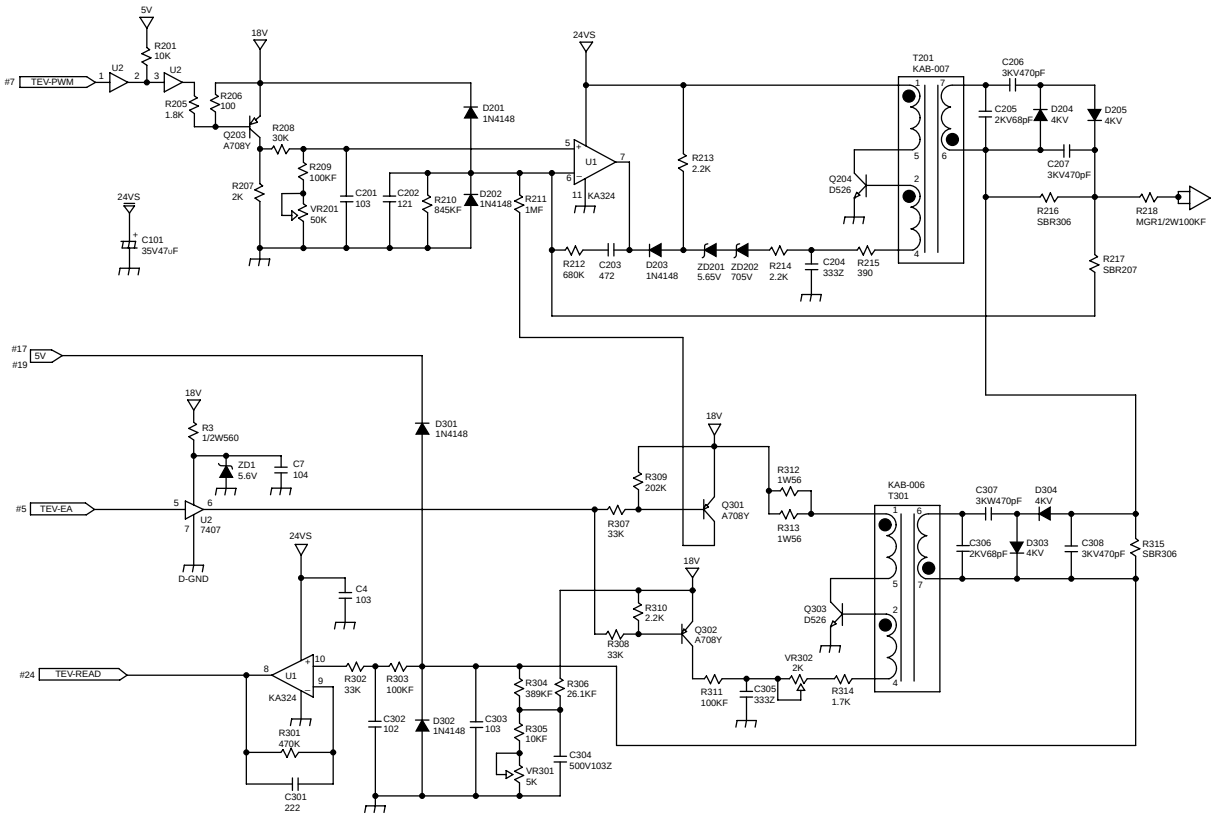
3-4-2-10. THV(THV(+)/THV(-) Output Unit)

Transfer(+) output unit is the transfer output control signal 'PWM-LOW ACTIVE'.

When THV-PWM LOW signal is received, Q203 turns on and the steady voltage will be accepted to the non-inverting terminal of OP-AMP 324. As the voltage is higher than the inverting reference voltage of OP-AMP, OP-AMP output turns high.

The 24V power adjusts the electric potential to ZD201 and ZD202, sends IB to TRANS auxiliary wire through current-restricting resistance R215 via R212 and C204, and eventually Q204 will turn on. When the current is accepted to Q402, Ic increases to the current proportional to time through the T201 primary coil, and when it reaches the Hfe limit of Q204, it will not retain the "on" state, but will turn to "off". As Q402 turns 'off', TRANS N1 will have counter-electromotive force, discharge energy to the secondary coil, sends current to the load and outputs THV voltage through the high voltage output enable, which is comprised of Regulation– circuit. The output voltage is determined by the DUTY width. Q203 switches with PWM DUTY cycle to fluctuate the output by fluctuating the OP-AMP non-inverting end VREF electric potential, and the maximum is output at 0% and the minimum, at 100%.Transfer(-) output unit is THV-EA 'L' enable.

When THV-EA is 'L', Q302 turns on and the VCE electric potential of Q302 will be formed and sends IB to TRANS auxiliary wire through R311, C305 and VR302 via current-restricting resistance R314, and eventually Q303 will turn on. When the current is accepted to Q303, Q303's Ic increases to the current proportional to time through the T301 primary coil, and when it reaches the Hfe limit of Q303, it will not retain the "on" state, but will turn to "off". As Q303 turns 'off', TRANS N1 will have counter-electromotive force, discharge energy to the secondary coil, send current to load and output THV(-) voltage through the high voltage output enable, which is comprised of Regulation– circuit.



3-4-2-11. Environment Recognition

THV voltage recognizes changes in transfer roller environment and allows the voltage suitable for the environment in order to realize optimum image output. The analog input is converted to digital output by the comparator that recognizes the environmental changes of the transfer roller. It is to allow the right transfer voltage to perform appropriate environmental response considering the environment and the type of paper depending on this digital output by the programs that can be input to the engine controller ROM.

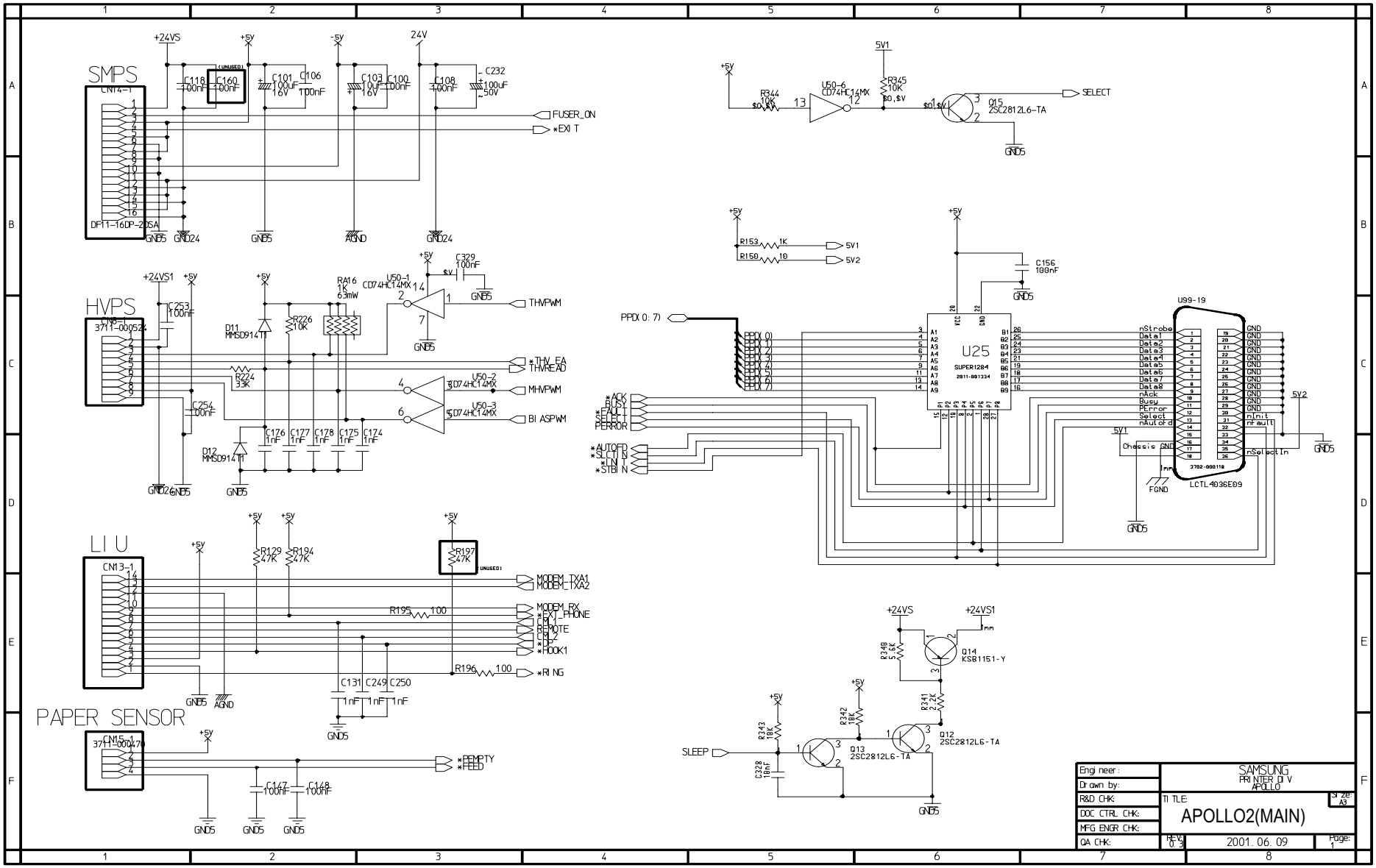
For ML-5000 or ML-5200 series, this environment recognition setting is organized as follows: First, set the THV(+) standard voltage. Allow 200MΩ load to transfer output, enable output and set the standard voltage 800V using VR201. Then set 78 (CPU's recognition index value) as the standard using VR302. This standard value with CPU makes sure that the current feedback is 4μA when output voltage is 800V and load is

200MΩ.If the load shows different resistance value when 800V is output, the current feedback will also be different and thus the index value will also be different. according to the index value read by CPU, the transfer voltage output will differ according to the preset transfer table.

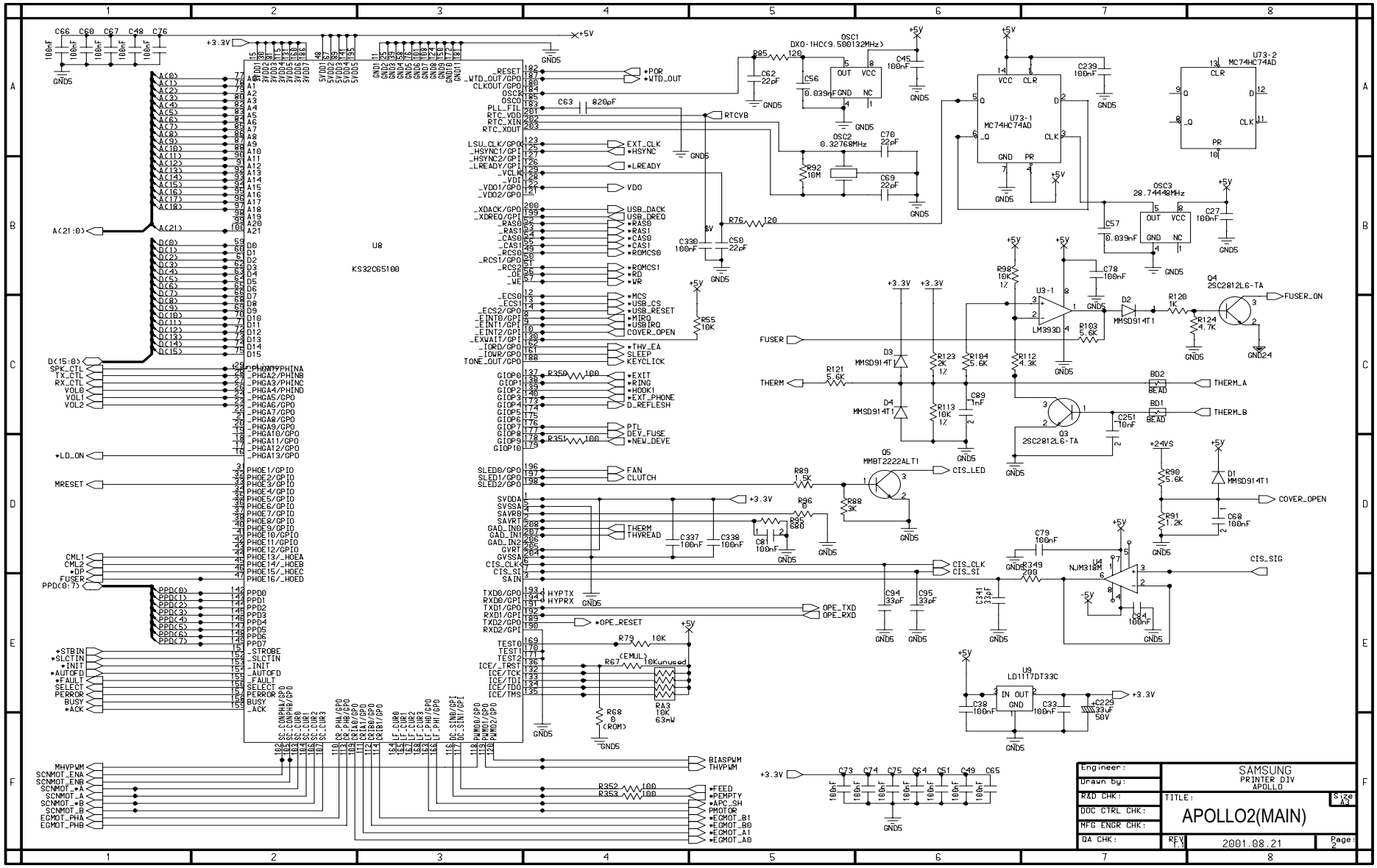
The changes in transfer output required by each load is controlled by PWM-DUTY.

4.Schematic Diagrams

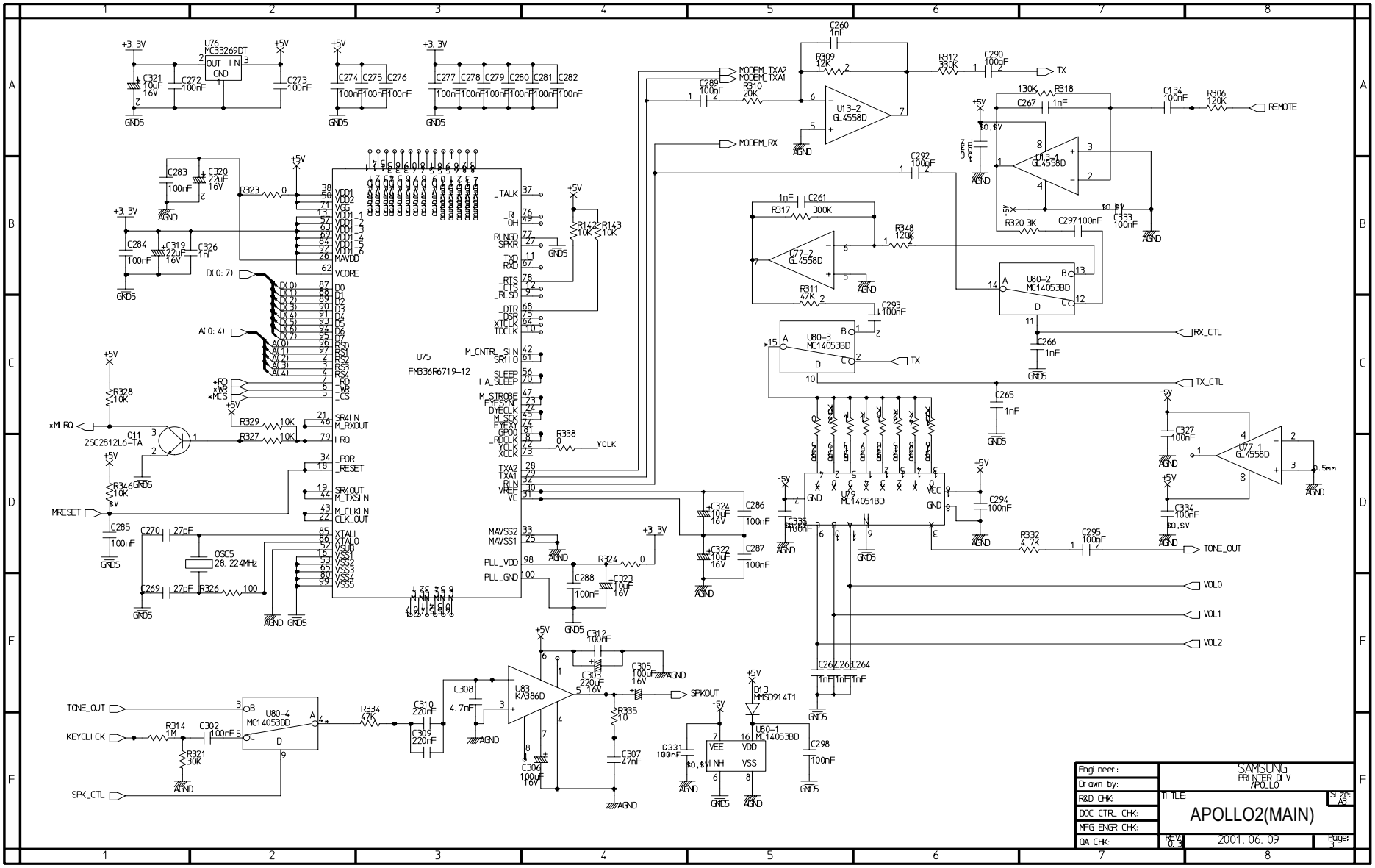
4-1 Main Circuit Diagram (1/6)



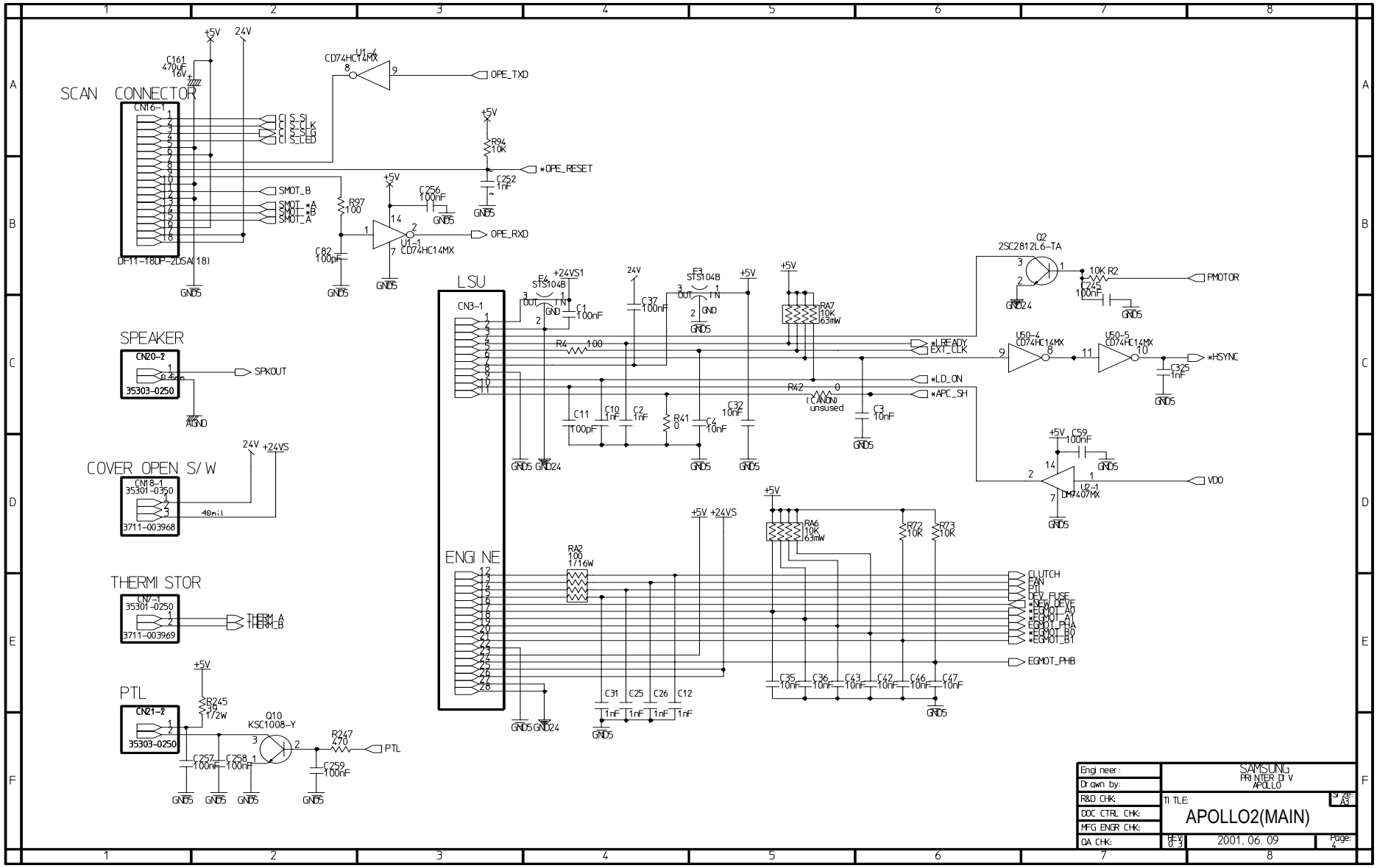
4-2 Main Circuit Diagram (2/6)



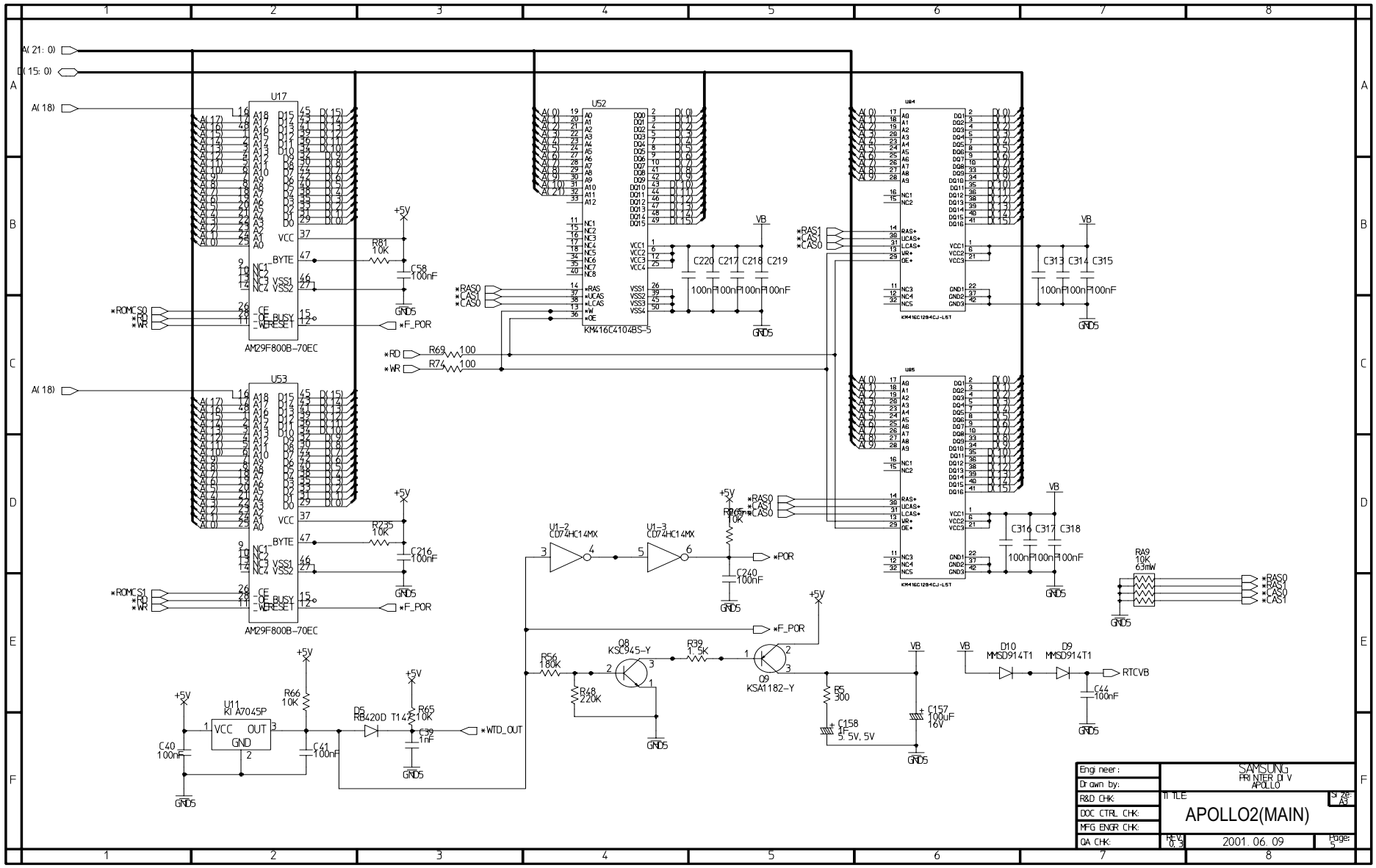
4-3 Main Circuit Diagram (3/6)



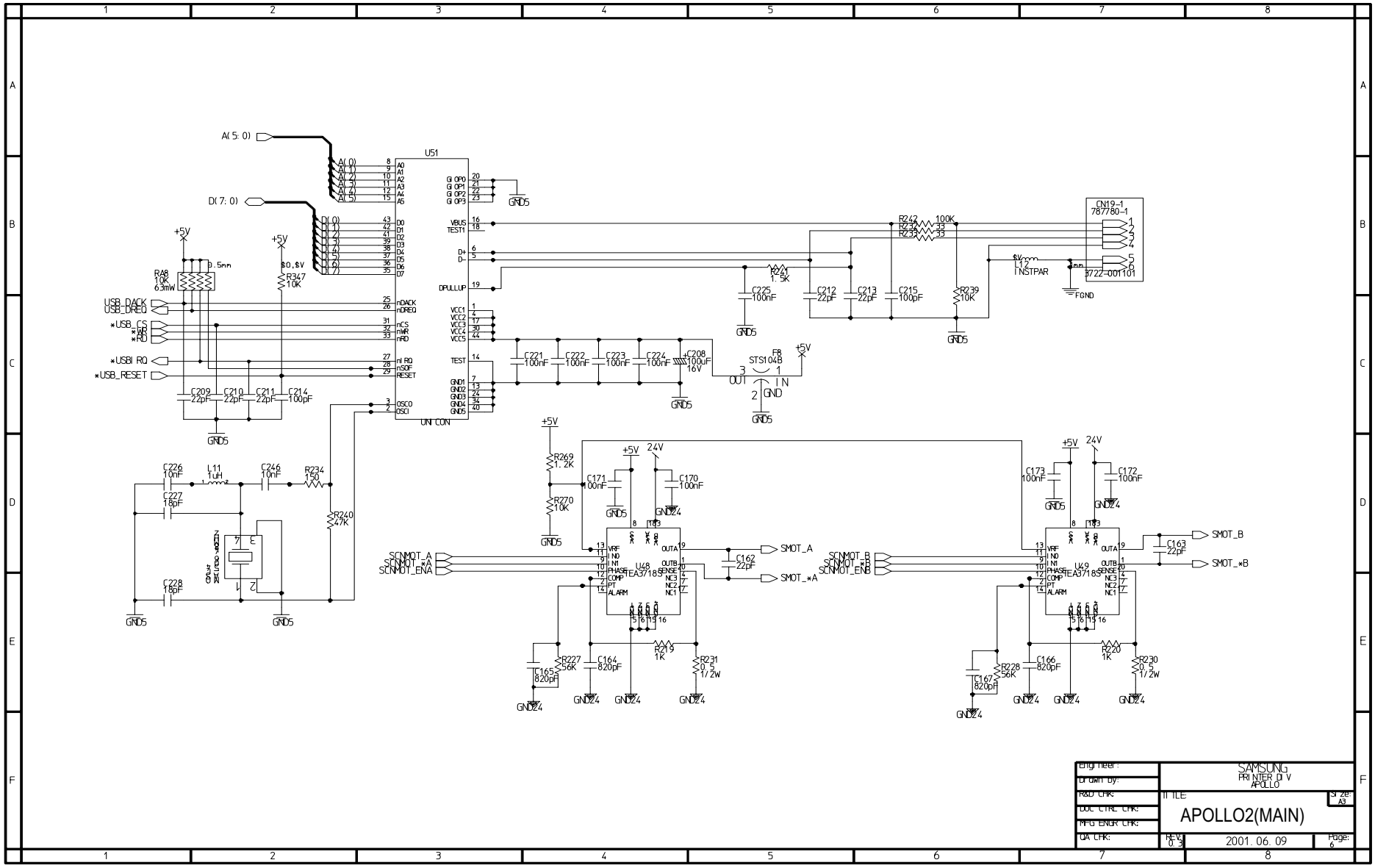
4-4 Main Circuit Diagram (4/6)



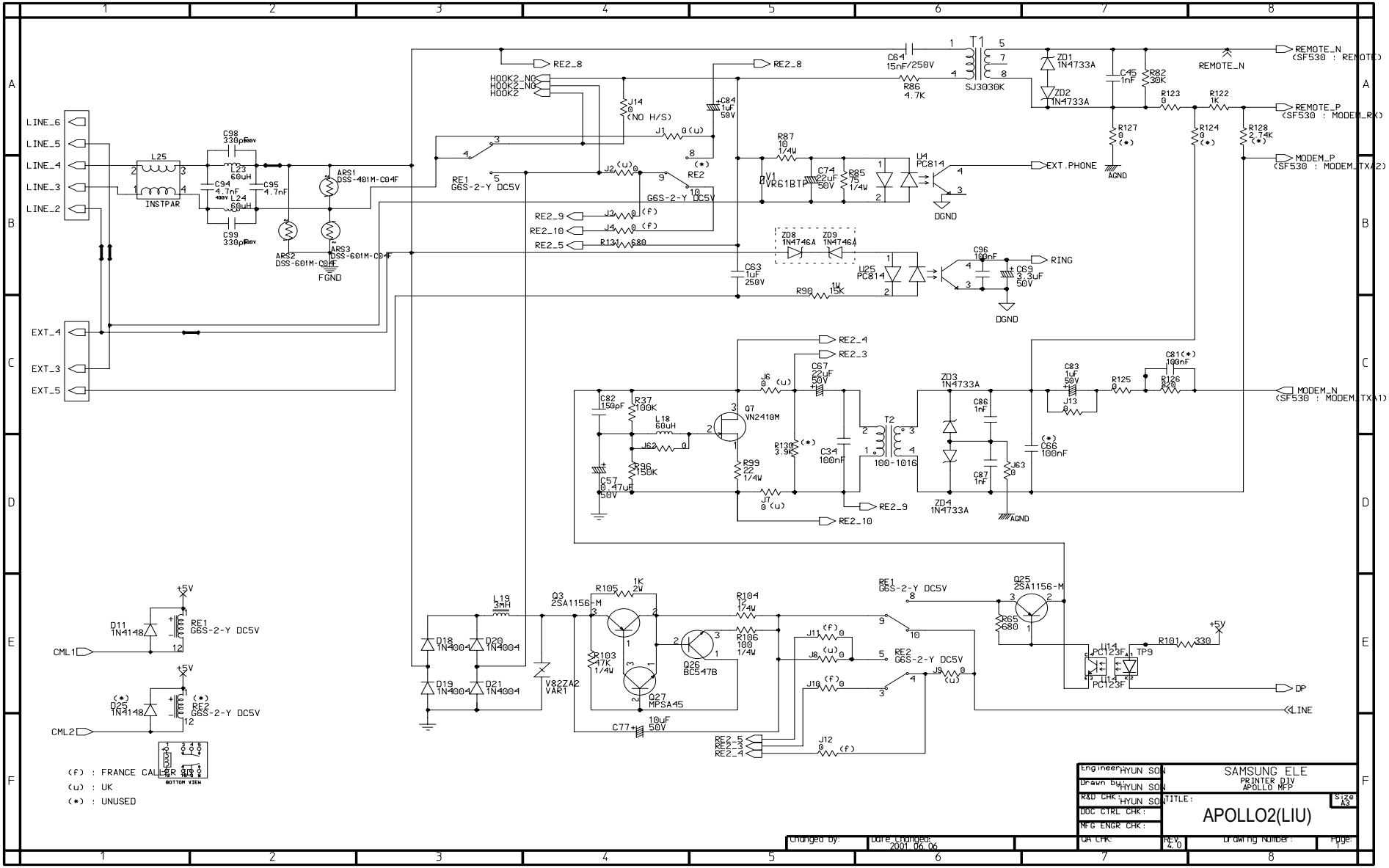
4-5 Main Circuit Diagram (5/6)



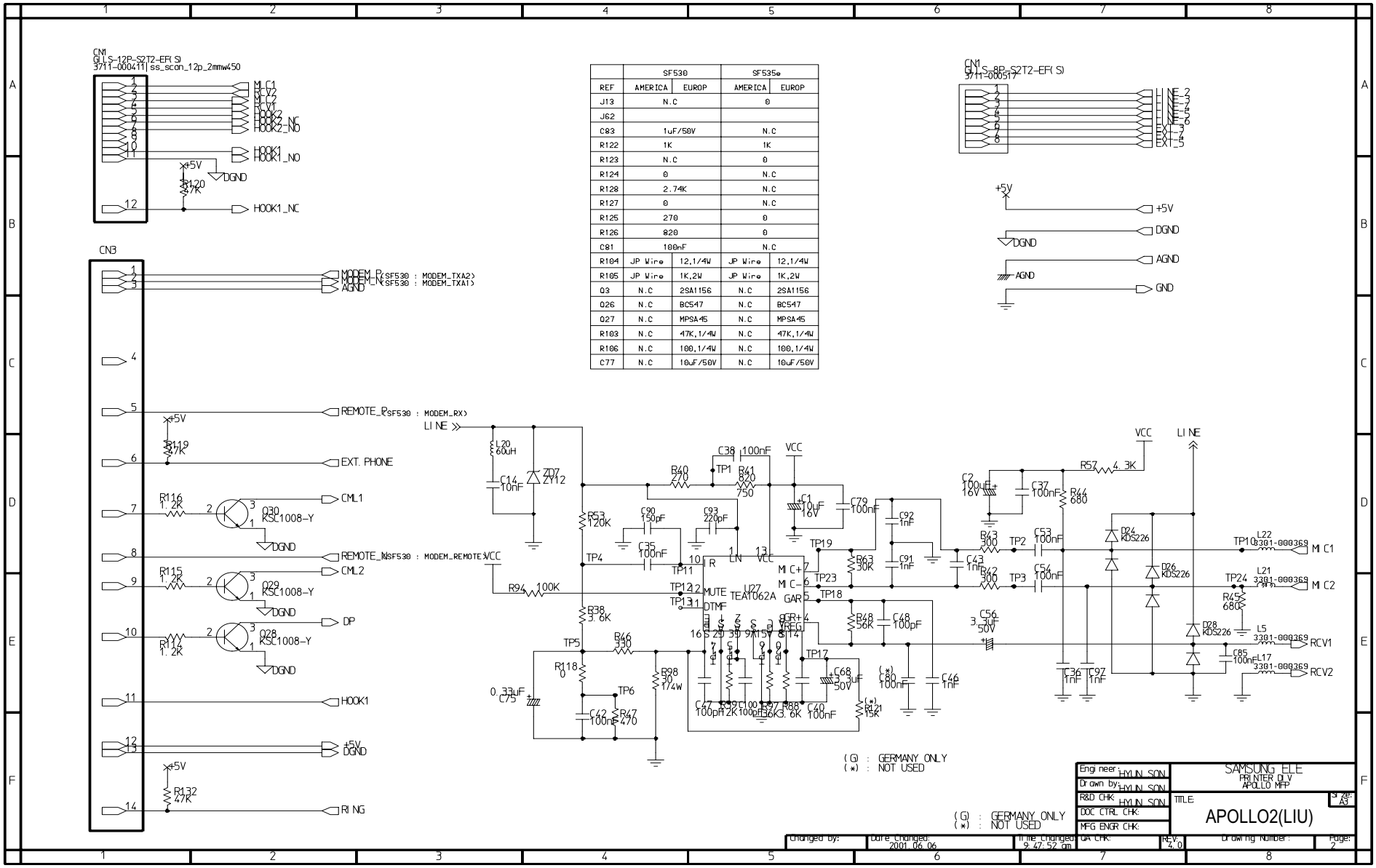
4-6 Main Circuit Diagram (6/6)



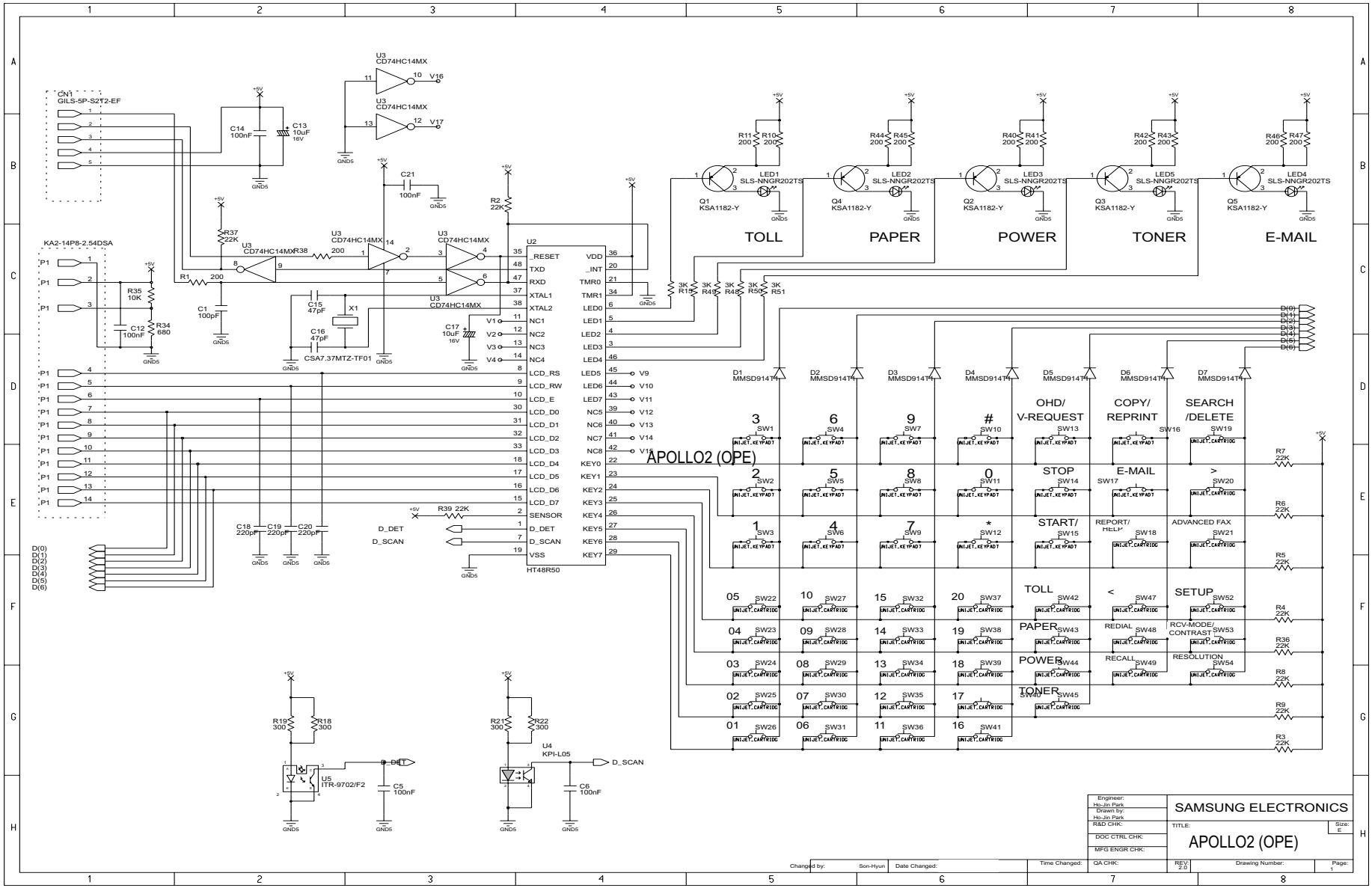
4-7 LIU Circuit Diagram (1/2)



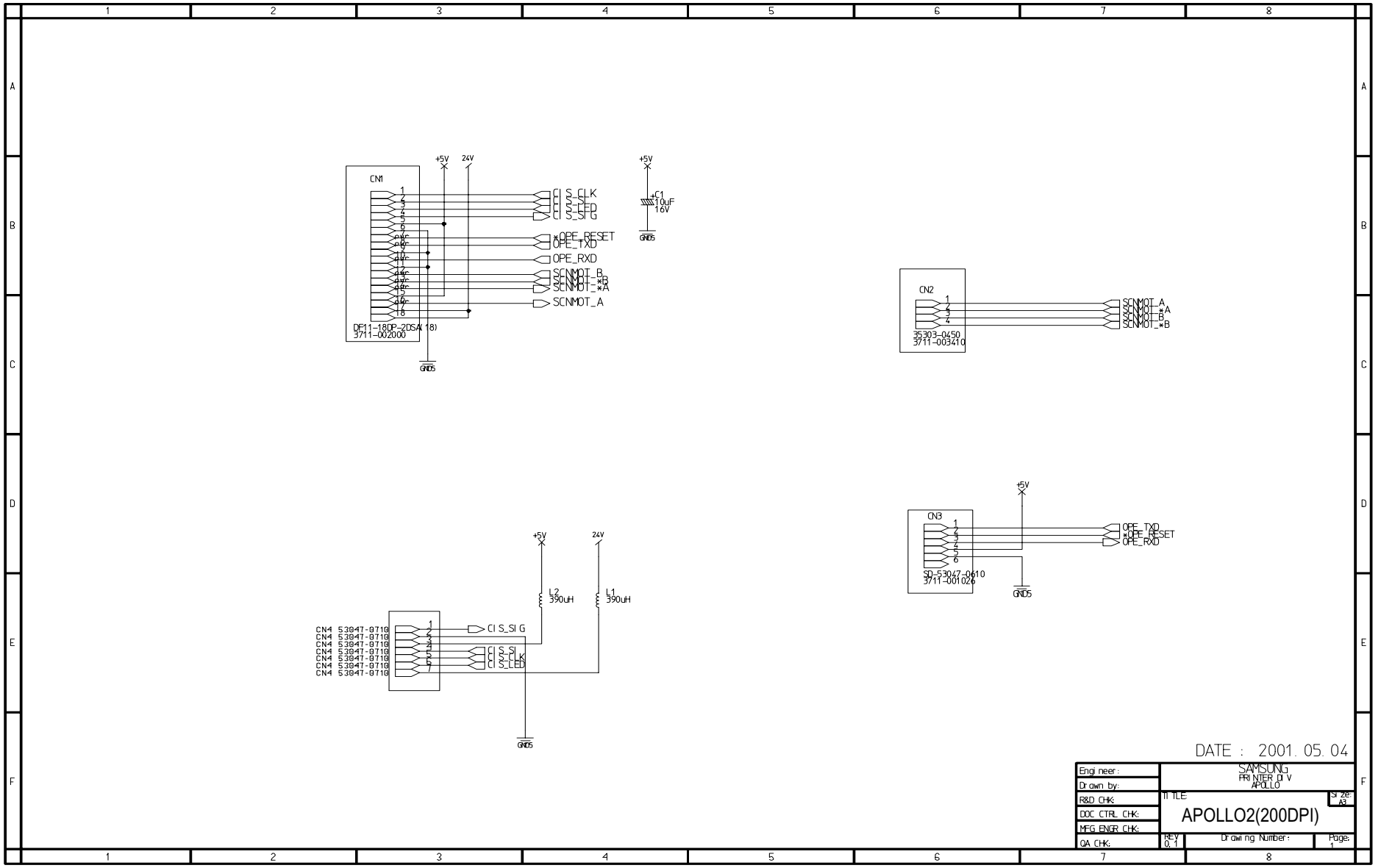
4-8 LIU Circuit Diagram (2/2)



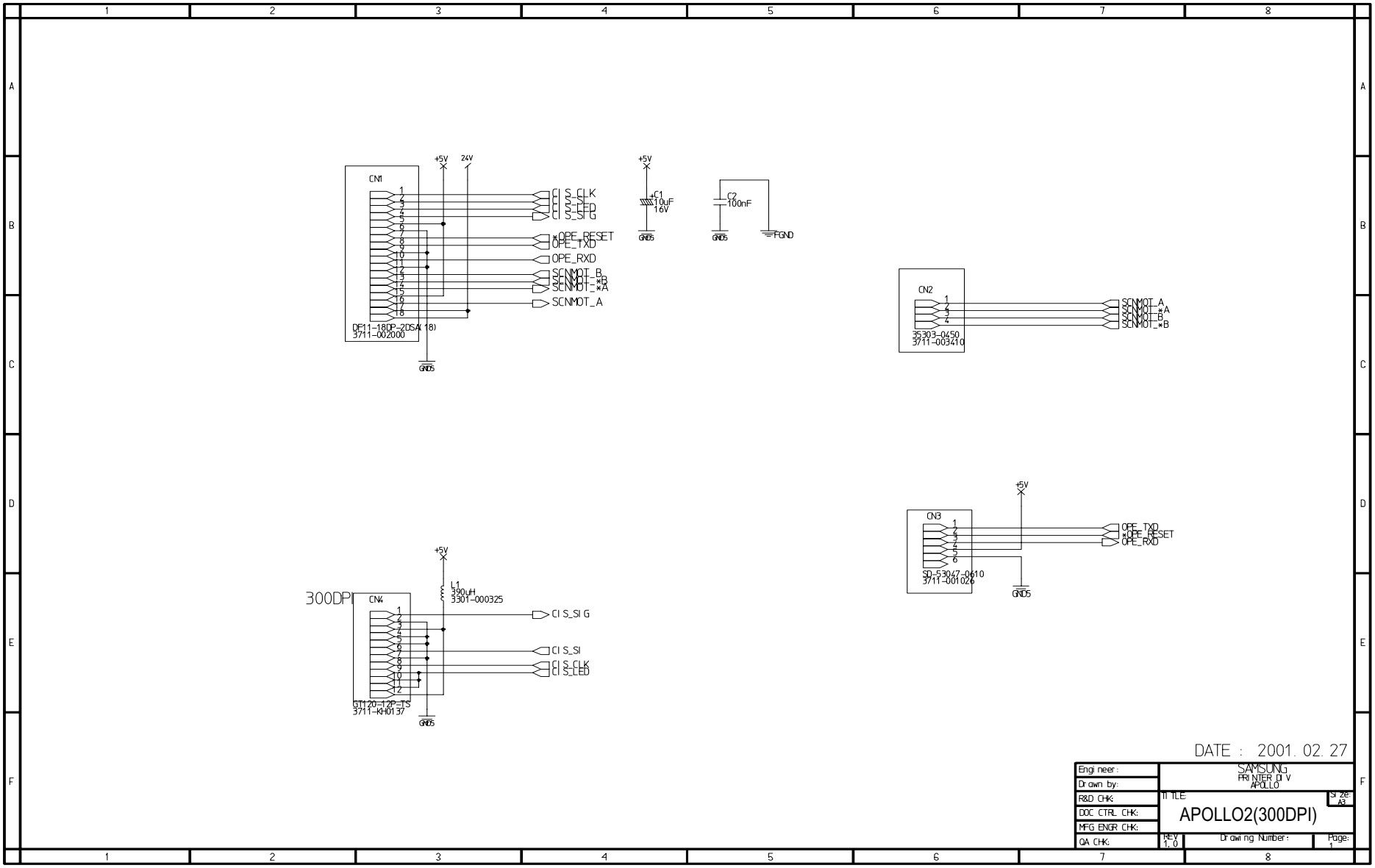
4-9 OPE Circuit Diagram



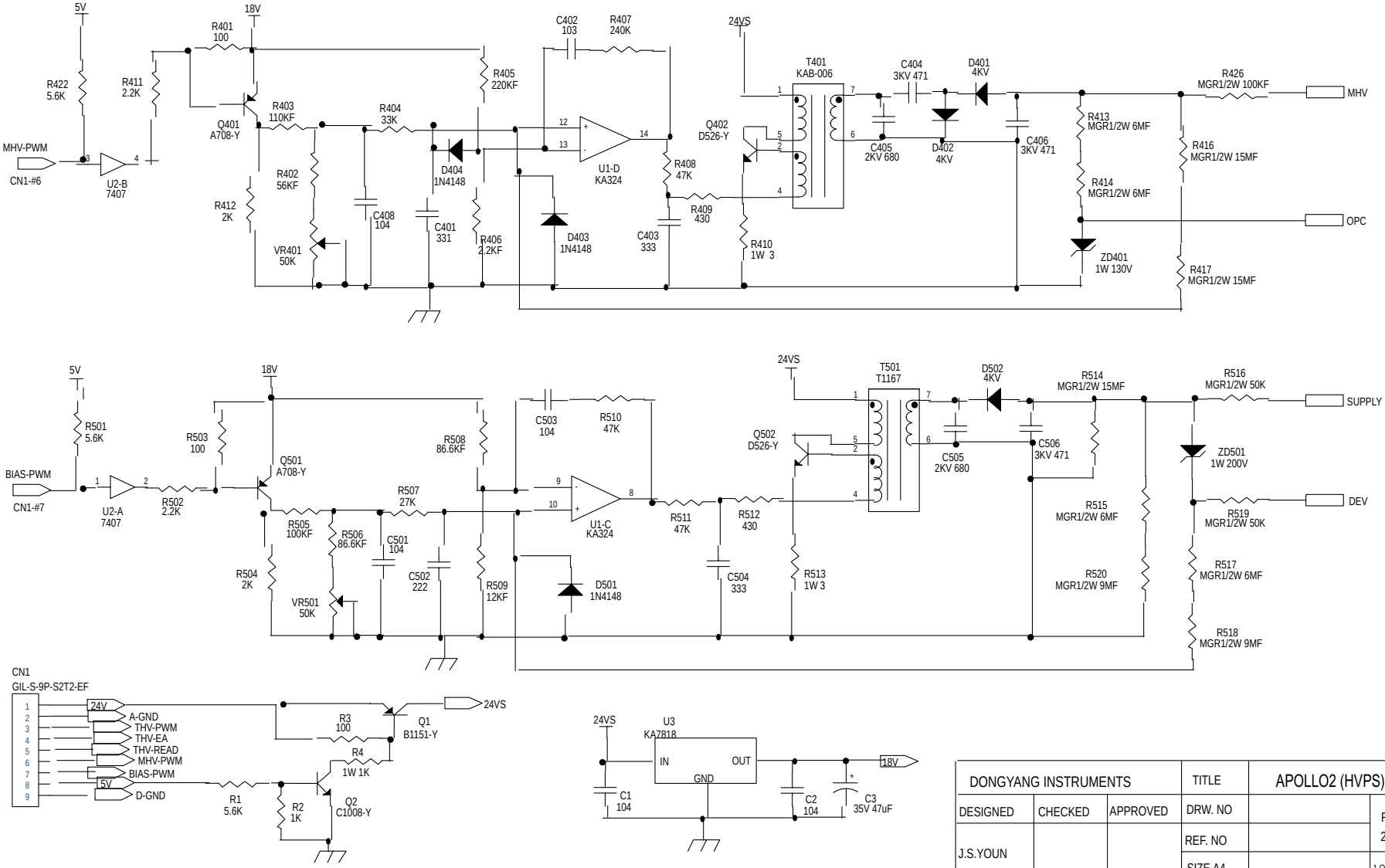
4-10 Scan Circuit Diagram (200DPI)



4-11 Scan Circuit Diagram (300DPI)

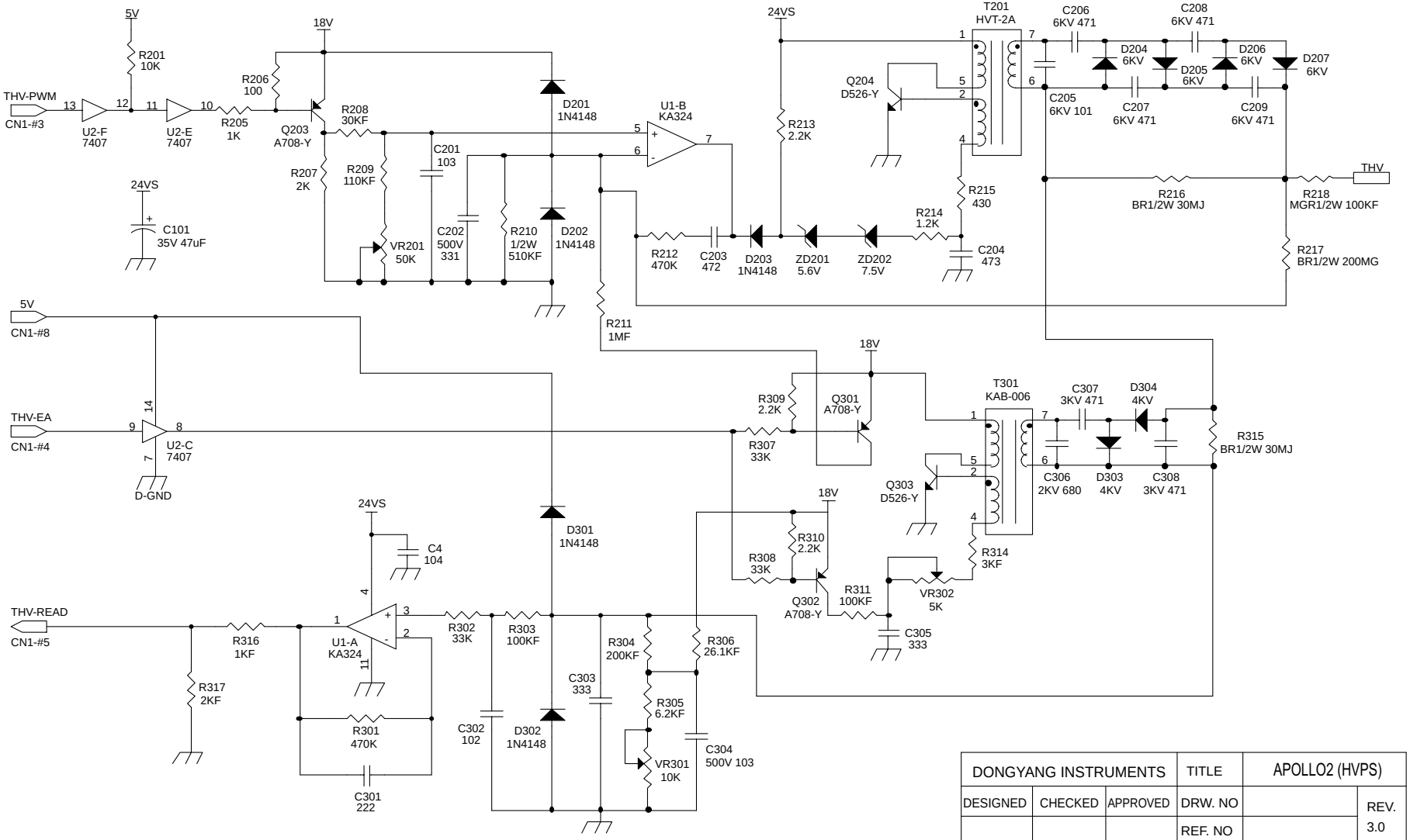


4-12 HVPS Circuit Diagram (1/2)



DONGYANG INSTRUMENTS			TITLE	APOLLO2 (HVPS)	
DESIGNED	CHECKED	APPROVED	DRW. NO		REV. 2.0
J.S.YOUN			REF. NO		
			SIZE A4		1 OF 2

4-13 HVPS Circuit Diagram (2/2)



DONGYANG INSTRUMENTS			TITLE	APOLLO2 (HVPS)	
DESIGNED	CHECKED	APPROVED	DRW. NO		REV. 3.0
J.S.YOUN			REF. NO		
			SIZE A4		2 OF 2

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