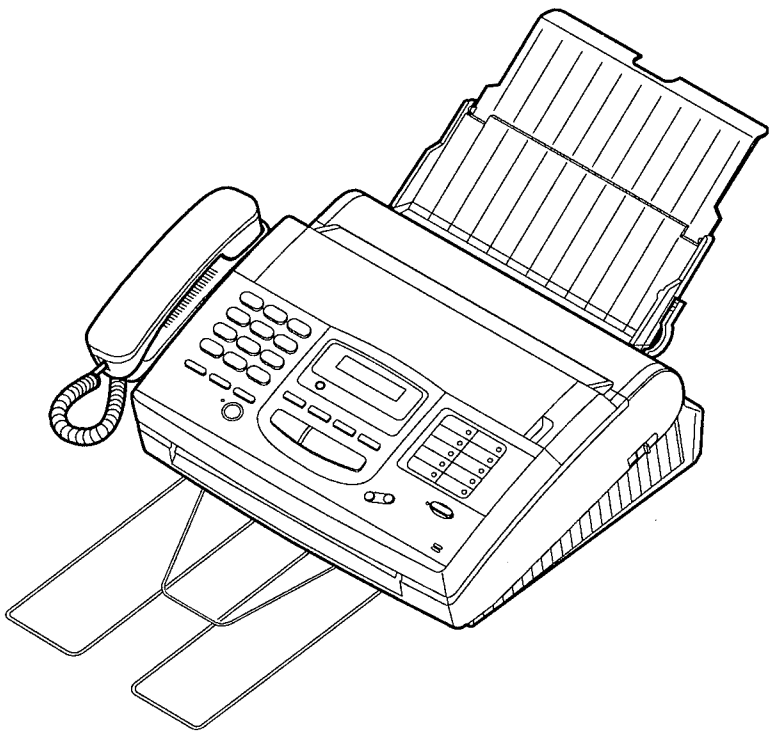
ORDER NO. KM79704120C1
F7

Service Manual

COMPACK PLAIN PAPER FACSIMILE

KX-FP200

(for U.S.A.)



⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public.
It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians.
Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

Panasonic

When you mention the serial number, write down the 11 digits. The serial number may be found on the bottom of the unit.

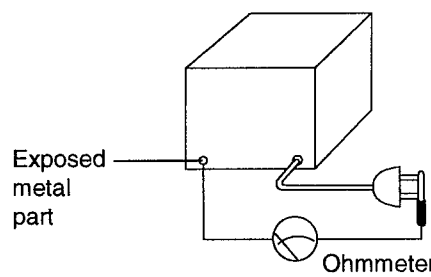
TABLE OF CONTENTS (General)

SAFETY PRECAUTIONS

1. Before servicing, unplug the AC power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to perform the following insulation resistance test to prevent the customer from being exposed to shock hazards.

INSULATION RESISTANCE TEST

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part (screwheads, control shafts, handle brackets, etc.).
   "Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.
4. If the measurement is outside the specified limits, there is a possibility of a shock hazard.
   The equipment should be repaired and rechecked before it is returned to the customer.



Resistance = more than 1MΩ
(at DC 500 V)

FOR SERVICE TECHNICIANS

ICs and LSIs are vulnerable to static electricity.
When repairing, the following precautions will help prevent recurring malfunctions.

1) Cover the plastic parts boxes with aluminum foil.
2) Ground the soldering irons.
3) Use a conductive mat on the worktable.
4) Do not touch IC or LSI pins with bare fingers.

BATTERY CAUTION

CAUTION

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacture. Discard used batteries according to following caution:

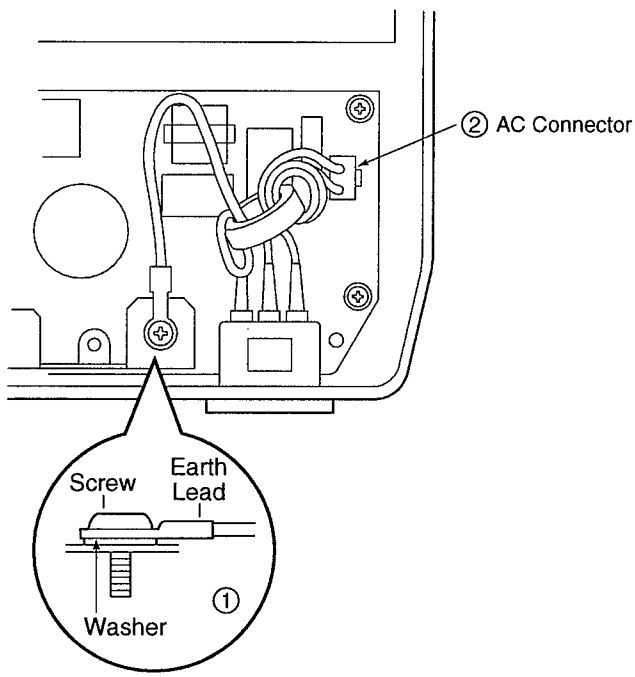
Disposal of lithium batteries should be performed by permitted, professional disposal firms knowledgeable in state government federal and local hazardous materials and hazardous waste transportation and disposal requirements.
Battery continues to have no transportation limitations as long as they are separated to prevent short circuits and packed in strong packaging.
Commercial firms that dispose of any quantity of lithium cells should have a mechanism in place to account for their ultimate disposition. This is a good practice for all types of commercial or industrial waste.

Recommend Type Number: CR2032 (BATT) Manufactured by MATSUSHITA
CR2032 (BATT) Manufactured by SONY

AC CAUTION

For safety, before closing the lower cabinet , please make sure of the following precautions.
① The earth lead is fixed by the screw.
② The AC connector is connected properly.

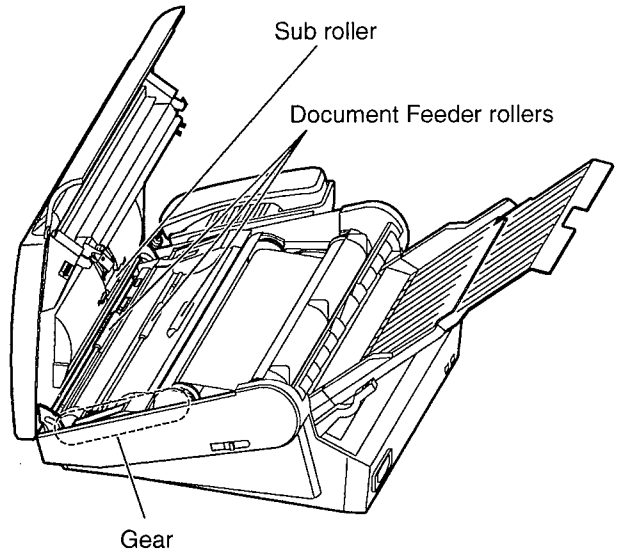
(BOTTOM VIEW)



PERSONAL SAFETY PRECAUTIONS

1. MOVING SECTIONS OF THE UNIT

Be careful not to let your hair, clothes, fingers, accessories, etc., become caught in any moving sections of the unit. The moving sections of the unit are a roller and a gear. There are a separation roller and a document feed roller which are rotated by a document feed motor, and the gear rotates the two rollers . Be careful not to touch them accidentally by hand.

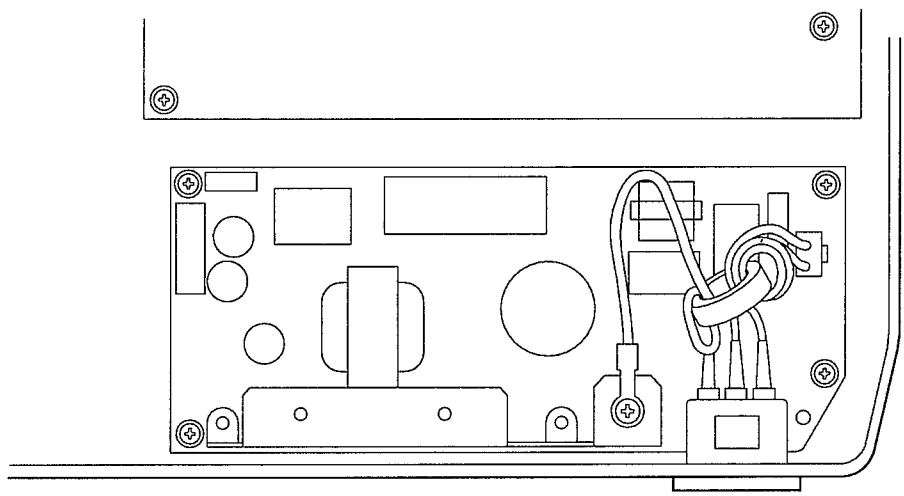


2. ELECTRICALLY LIVE SECTIONS

All the electrical sections of the unit supplied with AC power with the AC power cord are ellectrically live.
Never disassemble the unit for service with the AC power supply plugged in.

AC voltage is supplied as is to the primary side of the power supply unit.
Therefore, always unplug the AC power cord before disassembling for service.

Be careful "High Voltage" in this area.



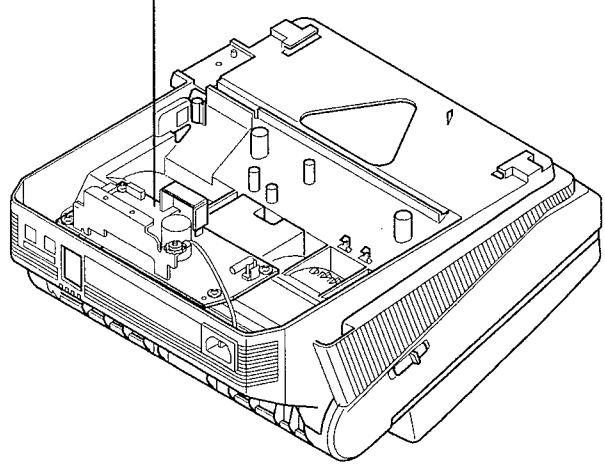
(Bottom view)

PRECAUTIONS FOR SERVICE

1. PRECAUTIONS TO PREVENT DAMAGE FROM STATIC ELECTRICITY

The electrical charge is accumulated on a person. For instance, clothes rub can damage electric elements or change their electrical characteristics. In order to prevent static electricity, make sure to touch some metallic part that is grounded to release the static electricity, never touch the electrical sections which are the power supply unit, etc.

Electrostatic Discharge!



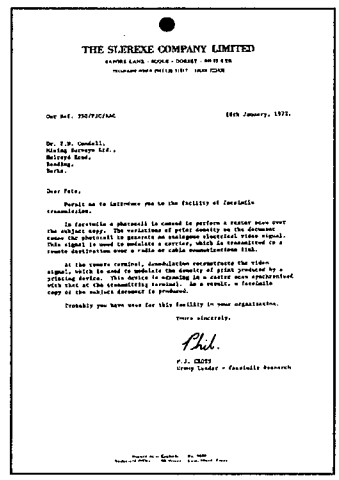
SPECIFICATIONS

This specifications are for U.S.A. version only.
Refer to the simplified manual (cover) for other areas.

1. Applicable Lines:	Public Switched Telephone Network
2. Document Size:	Max. 216 mm (8½") in width Max. 600 mm (23⅝") in length
3. Effective Scanning Width:	208 mm (8$^{3}/_{16}$")
4. Recording Paper Size:	Letter: 216×279 mm (8$^{1}/_{2}$"×11") Legal: 216×356 mm (8$^{1}/_{2}$"×14")
5. Effective Printing Width:	208 mm (8$^{3}/_{16}$")
6. Transmission Time*:	Approx. 15 sec./page (Original mode) Approx. 30 sec./page (G3 Normal mode)
7. Scanning Density:	Horizontal: 8 pels/mm (203 pels/inch) Vertical: 3.85 lines/mm (98 lines/inch)—Standard 7.7 lines/mm (196 lines/inch)—Fine/Halftone 15.4 lines/mm (392 lines/inch)–Superfine Mode
8. Halftone Level:	64-level
9. Scanner Type:	CCD Image Sensor
10. Printer Type:	Thermal Transfer
11. Data Compression System:	Modified Huffman (MH), Modified READ (MR)
12. Modem Speed:	9600/7200/4800/2400 bps; Automatic Fallback
13. Operating Environment:	5–35°C (41–95°F), 20–80 % RH(Relative Humidity)
14. Dimensions (H×W×D):	149×367×355 mm (5⅞"×14$^{7}/_{16}$"×13$^{31}/_{32}$")
15. Mass (Weight):	Approx. 5.2 kg (11.4 lb.)
16. Power Consumption:	Transmission: Approx. 16 W / Reception: Approx. 38 W Copy: Approx. 52 W / Standby: Approx. 7.0 W Maximum: Approx. 160 W
17. Power Supply:	120 V AC, 60 Hz (This unit will not function at 50 Hz.)
18. Memory Capacity:	Approx. 28 pages (Based on CCITT No. 1 Test Chart in standard resolution)

*Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of receiving unit. 15 second speed based upon CCITT No.1 Test Chart.

CCITT No. 1 Test Chart



THE STJERXE COMPANY LIMITED

Design and specifications are subject to change without notice.

OPTIONAL ACCESSORIES

Parts No.	Description	Comment
KX-FA135	Film cartridge	1 cartridge & 1film : 216mm × 100m (8 1/2"×328') roll
KX-FA136	Replacement film	2films : 216mm × 100m (8 1/2"×328') rolls

FEATURES

Multi-function system by using one telephone line

General

- Help function
- LCD (Liquid Crystal Display) readout
- TAM (Telephone answering machine) interface

Plain Paper Facsimile Machine

- 15 second transmission speed *
- Letter/Legal, G3 compatible
- Automatic document feeder
- 18 stations one-touch dialer
- 100 stations speed dialer
- 1 broadcast key for multistation transmission
- Resolution : Standard/Fine/Super fine/Half tone (64 level)
- Contrast : Normal/Darker
- Delayed transmission
- Polling function
- Multistation transmission
- Paper/film save function
- Overseas transmission function
- Remote FAX receiving using an extension phone
- Junk mail prohibitor

* Transmission times apply to text data by using CCITT test chart, between the same models at maximum modem speed and vary in actual usage.

Large Memory (28 pages)

- Memory reception and transmission **

** Memory capacity (about 28 pages) applies to text data by using CCITT test chart in standard resolution.

Integrated Telephone System

- Electric telephone directory
- On-hook dialing
- SP-phone
- Voice muting
- Redialing function
- Temporary tone dialing

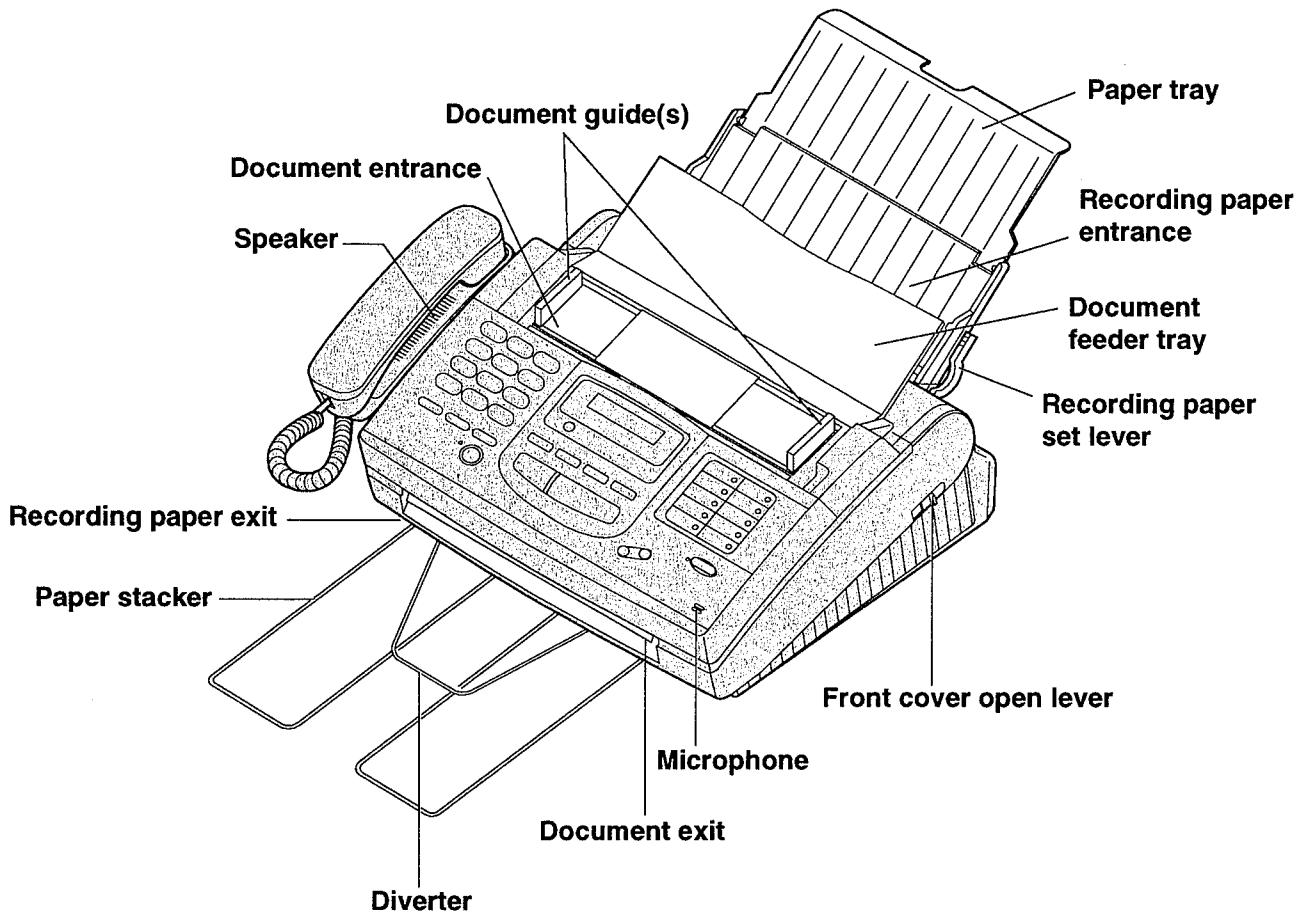
Copier function

- Extension copy

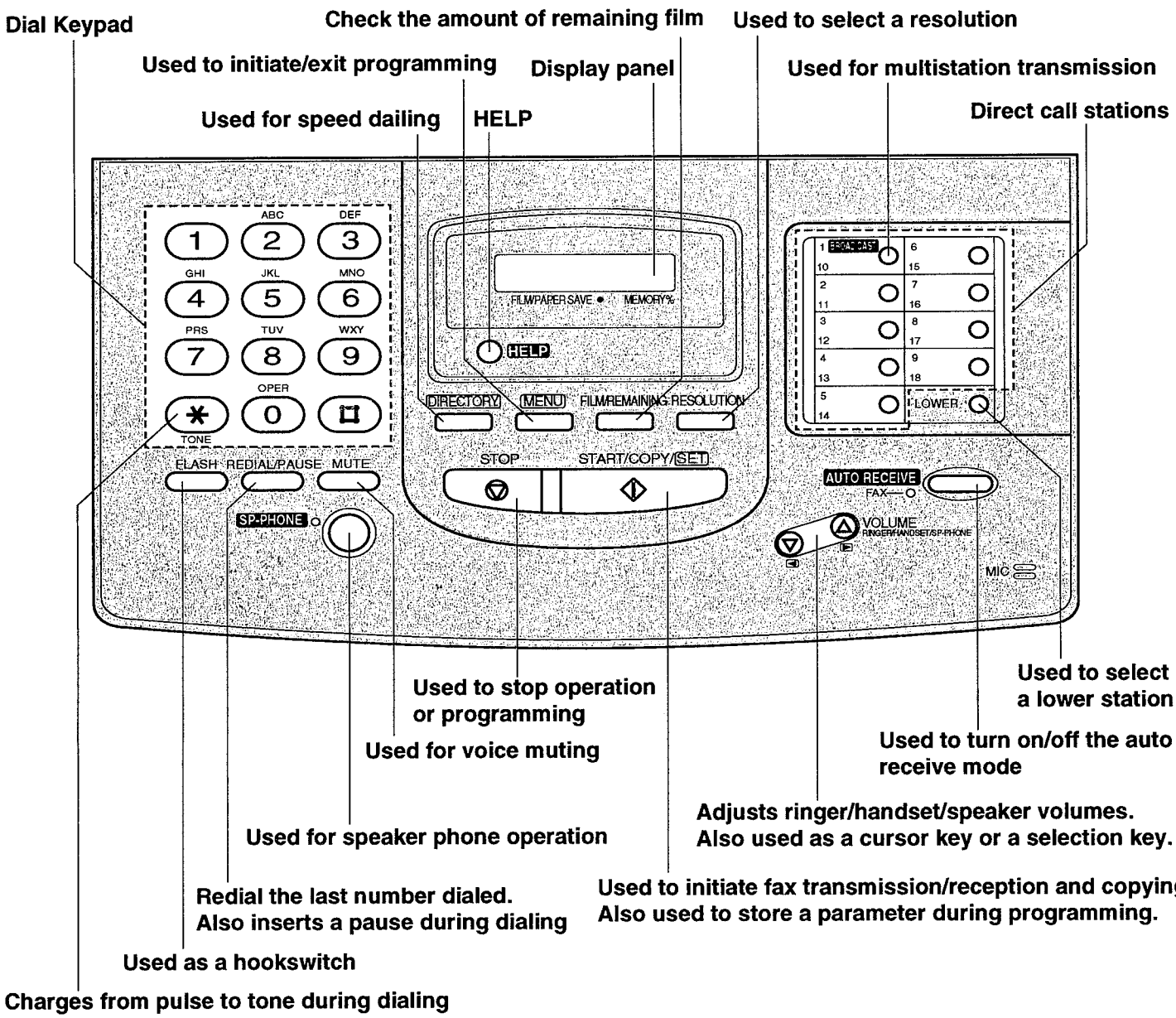
KX-FP200

LOCATION OF CONTROLS

1.OVERVIEW



2. CONTROL PANEL

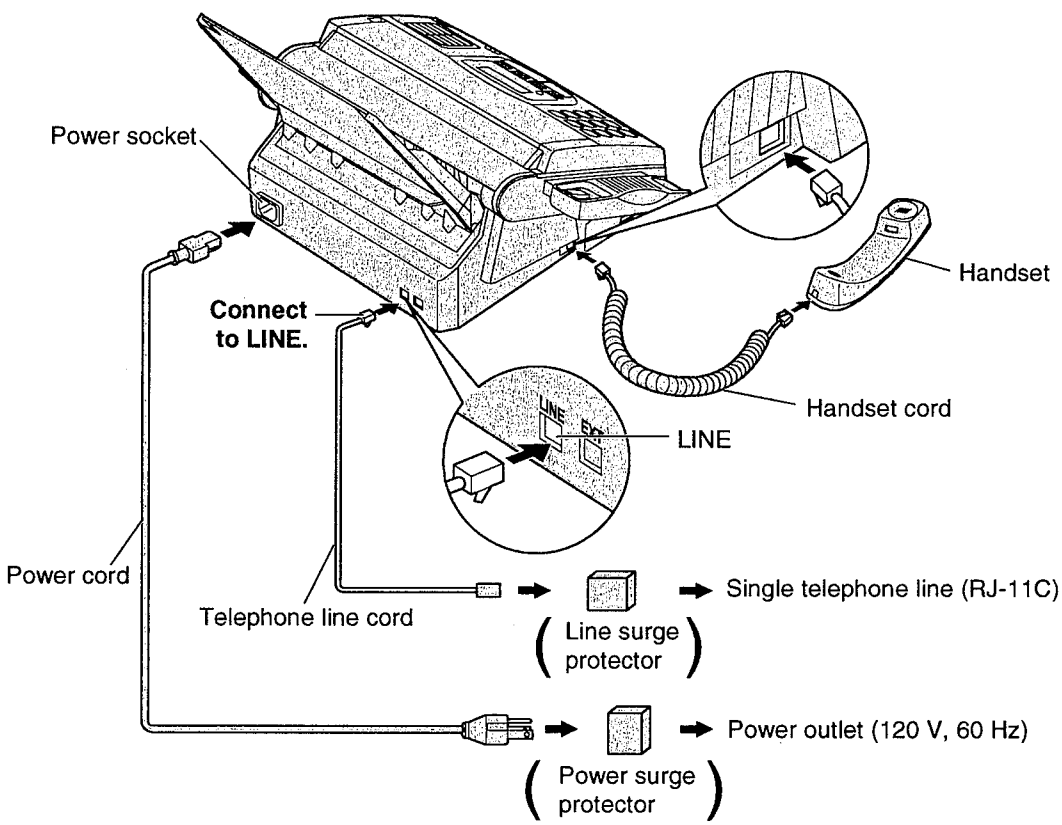


KX-FP200

CONNECTION

This connection is for U.S.A. version only.
Refer to the simplified manual (cover) for other areas.

1. **Connect the handset and handset cord.**
2. **Connect the telephone line cord.**
3. **Connect the power cord.**



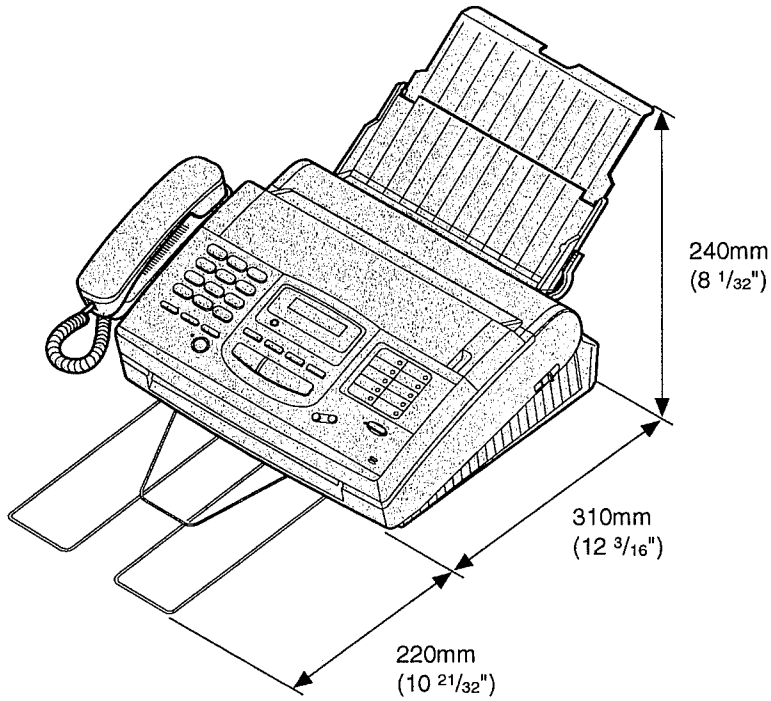
Note:

- For additional equipment protection, we recommend the use of a surge protector. The following types are available; TELESPIKE BLOK MODEL TSB (TRIPPLE MFG. CO.), SPIKE BLOK MODEL SK6-0 (TRIPPLE MFG. CO.), SUPER MAX (PANAMAX) or MP1 (1TW LINX).
- When you operate this product, the power outlet should be near the product and easily accessible.
- The unit will not function during a power failure.

INSTALLATION

1. INSTALLATION SPACE

The space required to install the unit is shown below.
The dimensions given are necessary for the unit to be operated effciently.



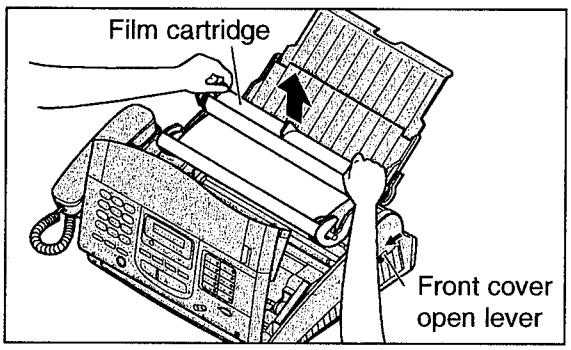
NOTE

Avoid excessive heat or humidity.
Use the unit within the following ranges of temperature and humidity.
Ambient temperature: 5℃ to 35℃
Relative humidity: 20% to 80% (without condensation)
Power cord length should be less than 5 meters (16.4 feet). Use of a longer cord may reduce the voltage or cause malfunctions.
Avoid direct sunlight.
Do not install near devices which contain magnets or generate magnetic fields.
Do not subject the unit to strong physical shock or vibration.
Keep the unit clean. Dust accumulation can prevent the unit from functioning properly.
To protect the unit from damage, hold both sides when you move it.

2. REPLACING THE FILM OR FILM CARTRIDGE

When the unit detects the end of the film, the following message will be displayed.

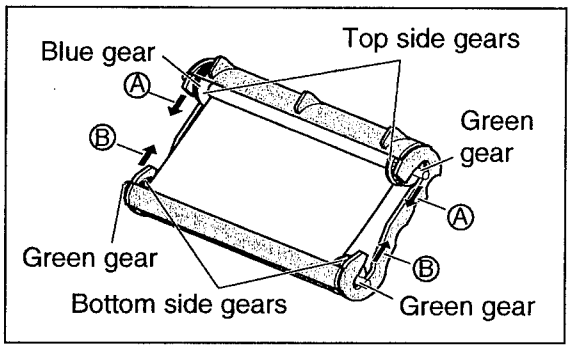
FILM NEAR EMPTY	The remaining film produces approx. 15 letter size documents. Prepare a new film or film cartridge.
FILM EMPTY	The film is empty. Replace the film or filmcartridge with a new one.



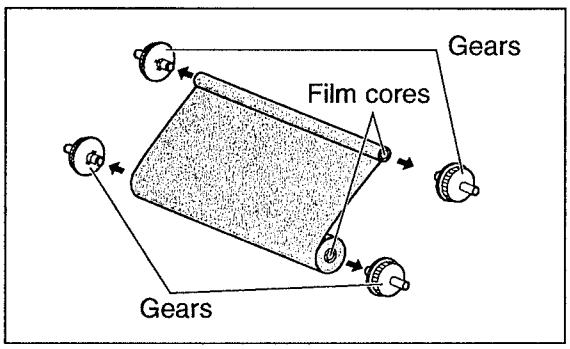
(1) Slide the front cover open lever forwards to open the front cover.

(2) Remove the film cartridge.

- If you have purchased a film cartridge (Model no. KX-FA135) for replacement, skip to step 9.
- To replace only the film, go to step 3.



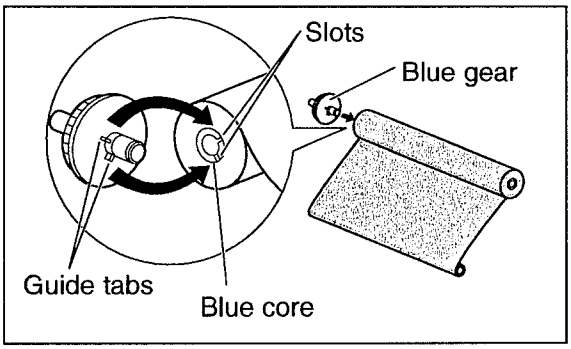
(3) Unlock the four gears by (Ⓐ) pulling the top side gears (blue and green gears) forwards and (Ⓑ) pushing back the bottom side gears (green gears) and remove the used film.



(4) Remove the four gears from the used film cores.

Caution:

- The film is not reusable. You can order a new film for replacement through your nearest Panasonic dealer.

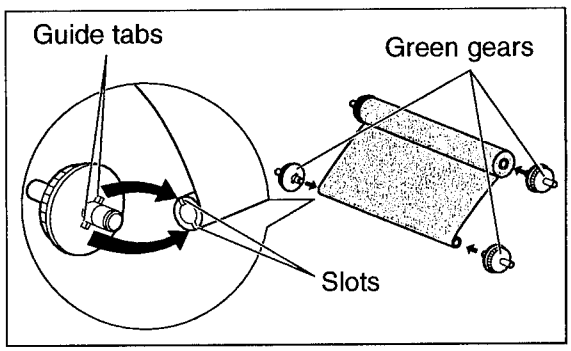


(5) Insert the blue gear into the blue core of the new film.

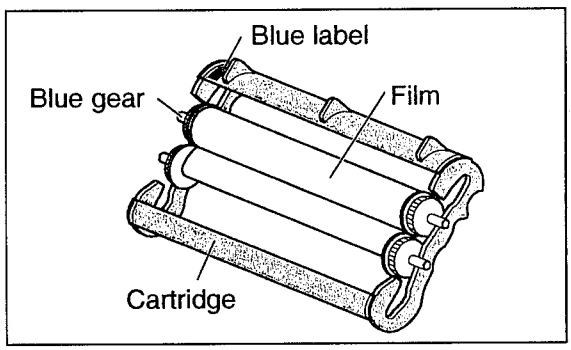
When the unit detects the end of the film, the following message will be displayed.

FILM EMPTY

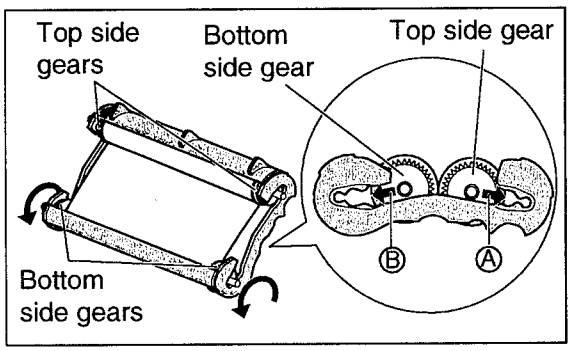
Replace the film or film cartridge with new one.



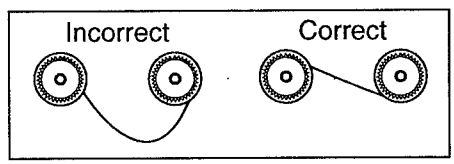
(6) Insert the three green gears into the remaining cores of the new film.

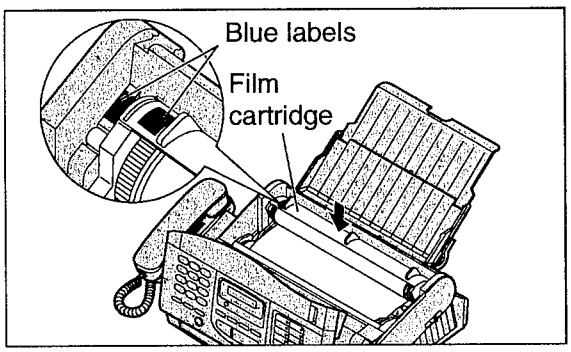


(7) Insert the film into the cartridge so that the blue gear matches the blue label on the cartridge.



(8) Lock the four gears of the film by (Ⓐ) pushing back the top side gears and (Ⓑ) pulling the bottom side gears forwards until they click into place.
- If the film is slack, tighten it by winding the bottom side gears.





(9) Insert the film cartridge by matching the blue label on the cartridge with that on the unit.

(10) Close the front cover securely by pushing down on both ends.
- The unit will check the film is set correctly and the following message will be displayed.

- If the following message is displayed, the film is not correctly inserted in the cartridge.

Reinsert it correctly.

MAINTENANCE ITEM AND COMPONENT LOCATIONS

1. OUTLINE

MAINTENANCE AND REPAIRS ARE PERFORMED USING THE FOLLOWING STEPS.

1) Periodic maintenance

Inspect the equipment periodically and if necessary, clean any contaminated parts.

2) Check for breakdowns

Look for signs of trouble and consider how the problems arose.

If the equipment can be still used, perform copying, self testing or communication testing.

3) Check equipment

Perform copying, self testing and communication testing to determine if the problem originates from the transmitter, the receiver or the telephone line.

4) Determine causes

Determine the causes of equipment trouble by troubleshooting.

5) Equipment repairs

Repair or replace the defective parts and take appropriate measures at this stage to ensure that the problem does not recur.

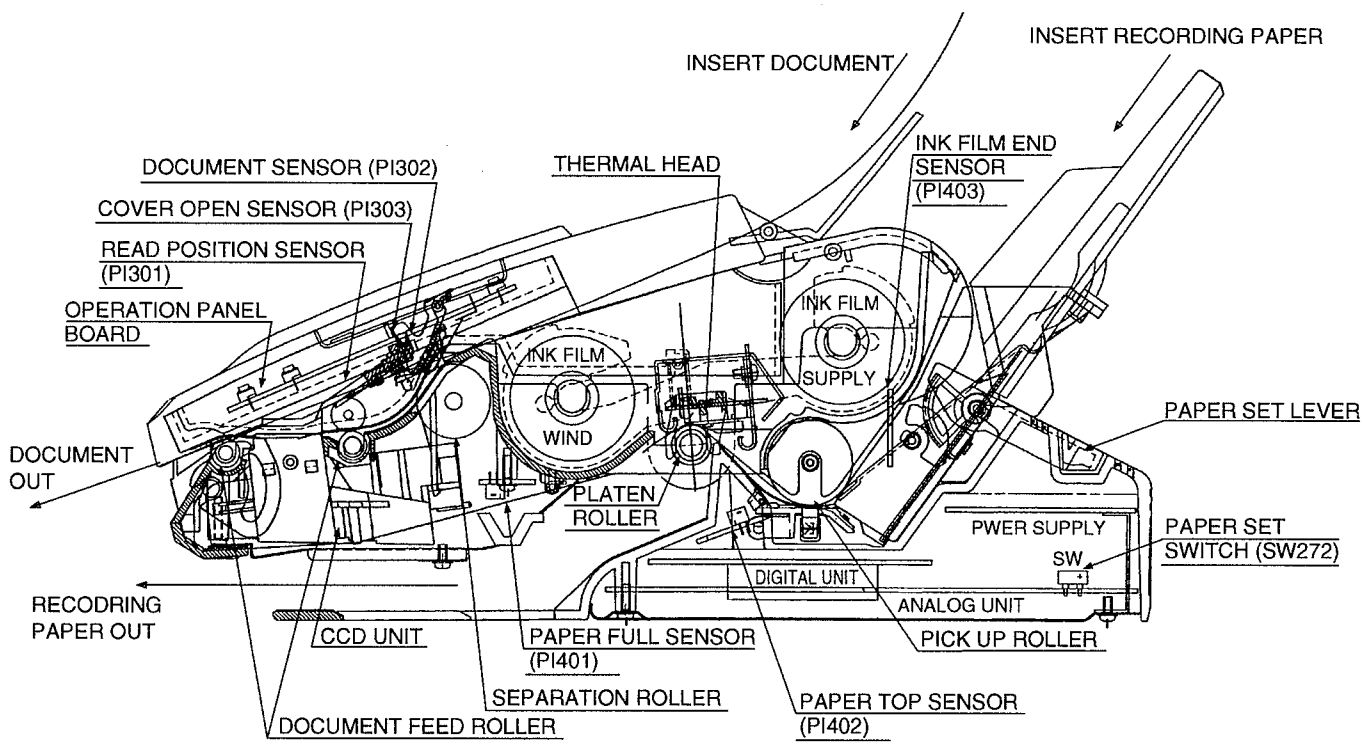
6) Confirm normal operation of the equipment

After completing the repairs, conduct copying, self testing and communication testing to confirm that the equipment operates normally.

7) Record keeping

Make a record of the measures taken to rectify the problem for future reference.

2. MAINTENANCE CHECK ITEMS/COMPONENT LOCATIIONS



2.1 MAINTENANCE LIST

NO.	OPERATION	CHECK ITEM	REMARKS
1	Document Path	Remove any foreign matter such as paper.	———
2	Rollers	If the roller is dirty, clean it with a damp cloth then dry thoroughly.	See page 18.
3	Platen Roller	If the platen is dirty, clean it with a damp cloth then dry thoroughly. Remove the paper before cleaning.	———
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then dry thoroughly.	See pages 18 and113.
5	LED Array	If the LED array is dirty, clean the glass with a soft dry cloth.	See page 18.
6	Sensors	Document sensor (PI302), Read position sensor (PI301), Hook switch (SW401), Paper top sensor (PI402), Paper full sensor (PI401), Film end sensor (PI403), Cover open sensor (PI303). Confirm operation of sensors.	See pages 16 and 82.
7	Mirrors and Lens	If the mirror and lens are dirty, clean them with a soft dry cloth.	———
8	Abnormal, wear and tear or loose-ness of parts	Exchange the part. Check the tightness of screws on all parts.	———

2.2 MAINTENANCE CYCLE

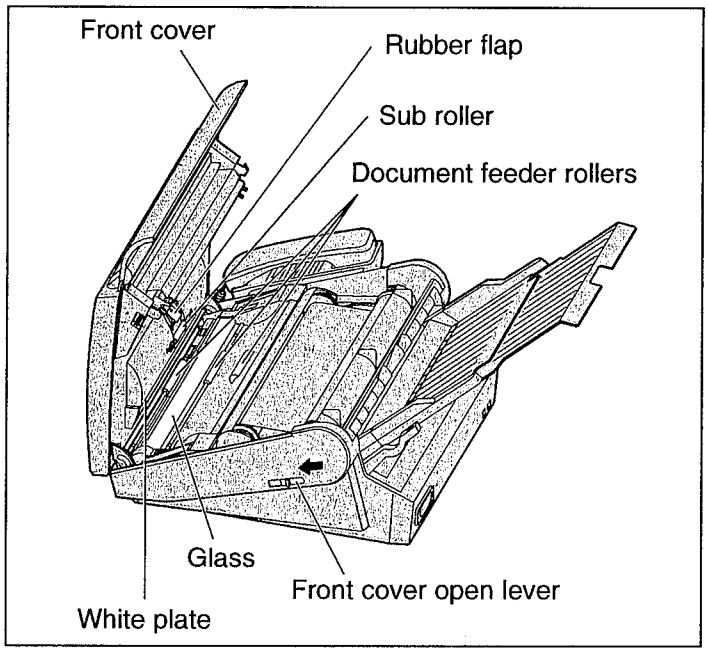
No.	Items	Cleaning		Replacement		Remarks
		Cycle	Procedure	Cycle	Procedure	
1	Separation Roller (Ref. No. 143)	3 months	See P. 18.	7 years (100,000 documents)	See P. 116.	
2	Separation Rubber (Ref. No. 59)	3 months	See P. 18.	7 years (100,000 documents)	See P. 113.	
3	Feed Roller (Ref. No. 135,139)	3 months	See P. 18.	7 years (100,000 documents)	See P. 117.	
4	Target Glass (Ref. No. 201)	3 months	See P. 18.	7 years (100,000 documents)	See P. 190.	
5	Thermal Head (Ref. No. 69)	3 months	See P. 18.	7 years (100,000 documents)	See P. 112.	
6	Platen Roller (Ref. No. 133)	3 months	See P. 117.	7 years (100,000 documents)	See P. 117.	

These values are only standard ones and may vary depending on usage conditions.

3. MAINTENANCE

3.1 CLEANIG THE DOCUMENT FEEDER UNIT

If misfeeding occurs frequently or when dirty patterns or black bands appear on a copied or transmitted document, clean the document feeder rollers, sub roller, rubber flap, white plate and glass.



(1) Disconnect the power cord and the telephe line cord.

(2) Slide the lever forwards to open the front cover.

(3) Clean the document feeder rollers, sub roller and rubber flap with a cloth moistened with isopropyl rubbing alcohol, and let dry thoughly.

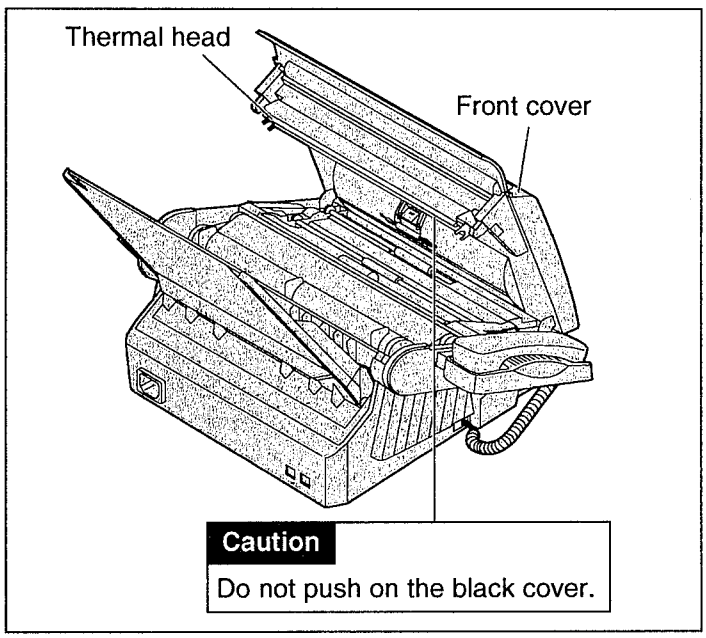
(4) Clean the white plate and the glass with a soft dry cloth.

(5) Close the front cover by gently pressing down on both ends.

(6) Connect the power cord and telephone line cord.

3.2 CLEANING THE THERMAL HEAD

If dirty patterns or black bands appear on a copied or received document, clean the thermal head.



(1) Disconnect the power cord and the telephone line cord.

(2) Slide the lever forwards to open the front cover.

(3) Clean the thermal head with a cloth moistened with isopropyl rubbing alcohol, then dry thoroughly.

(4) Close the front cover by gently pressing down on both ends.

(5) Connect the power cord and telephone line cord.

Caution:
•To prevent malfunction due to static electricity, do not use a dry cloth and do not touch the thermal head directly with your finger.

TROUBLERSHOOTING GUIDE

1. TROUBLERSHOOTING SUMMARY

1.1 TROUBLESHOOTING

After having confirmed the abnomal condition by asking the user, troubleshoot according to the instructiions in Observe the following precautions when troubleshooting.

1.2 PRECAUTIONS

1) If there is trouble with the print quality or the paper feed, first check that the installation space and the print paper meet the specifications, that the paper selection lever/paper thickness lever is set correctly, and that the paper is set correctly without any looseness.
2) Before troubleshooting, first check that the connectors and cables are connected correctly without any looseness. Especially, if the abnormality occurs randomly, check very carefully.
3) When connecting the AC power cord with the unit case and checking the operation, exercise utmost care in handling the electric parts in order to avoid electric shocks and short-circuits.
4) After troubleshooting, check again that you have not forgotten any connectors, left any loose screws, etc.
5) And always test to verify that the unit is working normally.

2. USER RECOVERABLE ERRORS

If the unit detects a problem, the following messages will appear on the display.

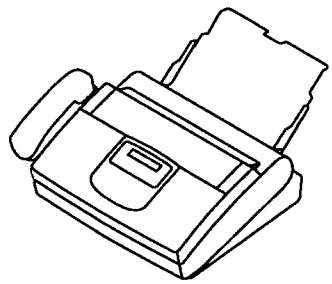
DISPLAY MESSAGE	CAUSE AND REMEDY
CALL SERVICE	• There is something wrong with the unit. Contact our service personnel. [Check the thermistor on the thermal head and connector lead. (for technicians)]
CHECK COVER	• The front cover is open. Close it.
CHECK DOCUMENT	• The document is not fed into the unit properly. Reinsert the document. If misfeeding occurs frequently, clean the document feeder rollers inside the unit. If the problem remains, adjust the feeder pressure.
CHECK FILM	• The film cartridge is not inserted Properly. Reinsert it correctly.
CHECK LEVER	• The recording paper lever is released. Push it back to set the lever.
CHECK MEMORY	• Memory (phone numbers, parameters, etc.) has been erased. Re-program.
CHECK PAPER	• The recording paper is not installed or the unit ran out of paper. Install paper. • The recording paper is not fed into the unit properly or has been jammed near the recording paper entrance. Clear the jammed paper.
FAX IN MEMORY	• The unit has a document(s) in memory. See the other message's instructions to print out the document(s).
FILM EMPTY	• Film is empty. Replace the film or film cartridge with a new one.
FILM NEAR EMPTY	• The remaining film produces approx. 15 pages of letter size documents. Prepare a new film or film cartridge for replacement.
MEMORY FULL	• The memory is full of received documents due to lack of recording paper, a recording paper jam, etc. Install paper or clear the jammed paper.
NO RESPONSE	• The receiving unit is busy or ran out of recording paper. Try again.
PAPER JAMMED	• A recording paper jam occurred near the film cartridge. Clear the jammed paper.
PLEASE WAIT	• The unit is checking the film is set correctly. Wait for a while.
POLLING ERROR	• The other fax machine does not have a polling feature. Check with the other party.

CAUSE AND REMEDY

DISPLAY MESSAGE	
REDIAL TIME OUT	•The receiving unit is busy or ran out of recording paper. Try again.
REMOVE DOCUMENT	•The document is jammed. Remove the jammed document . •Attempted to transmit a document longer than 600 mm ($23^5/_8$"). Press the STOP button and remove the document. Divide the document into two or more sheets and try again.
REMOVE PRINTOUT	•There is too much paper on the paper stacker. Remove the printed paper. If the display message still remains after removing the paper, a paper jam may have occurred. Remove the jammed paper.
STARTER FILM END	•The starter film is empty. Replace the film or film cartridge with a new one.
TRANSMIT ERROR	•A transmission error occurred. Try again.
UNIT OVERHEATED	•The unit is too hot. Let the unit cool down.

3. DETAIL OF TROUBLESHOOTING

3. 1 CONTENTS



You are standing by him,
and you are the man who
can bring him back to life.

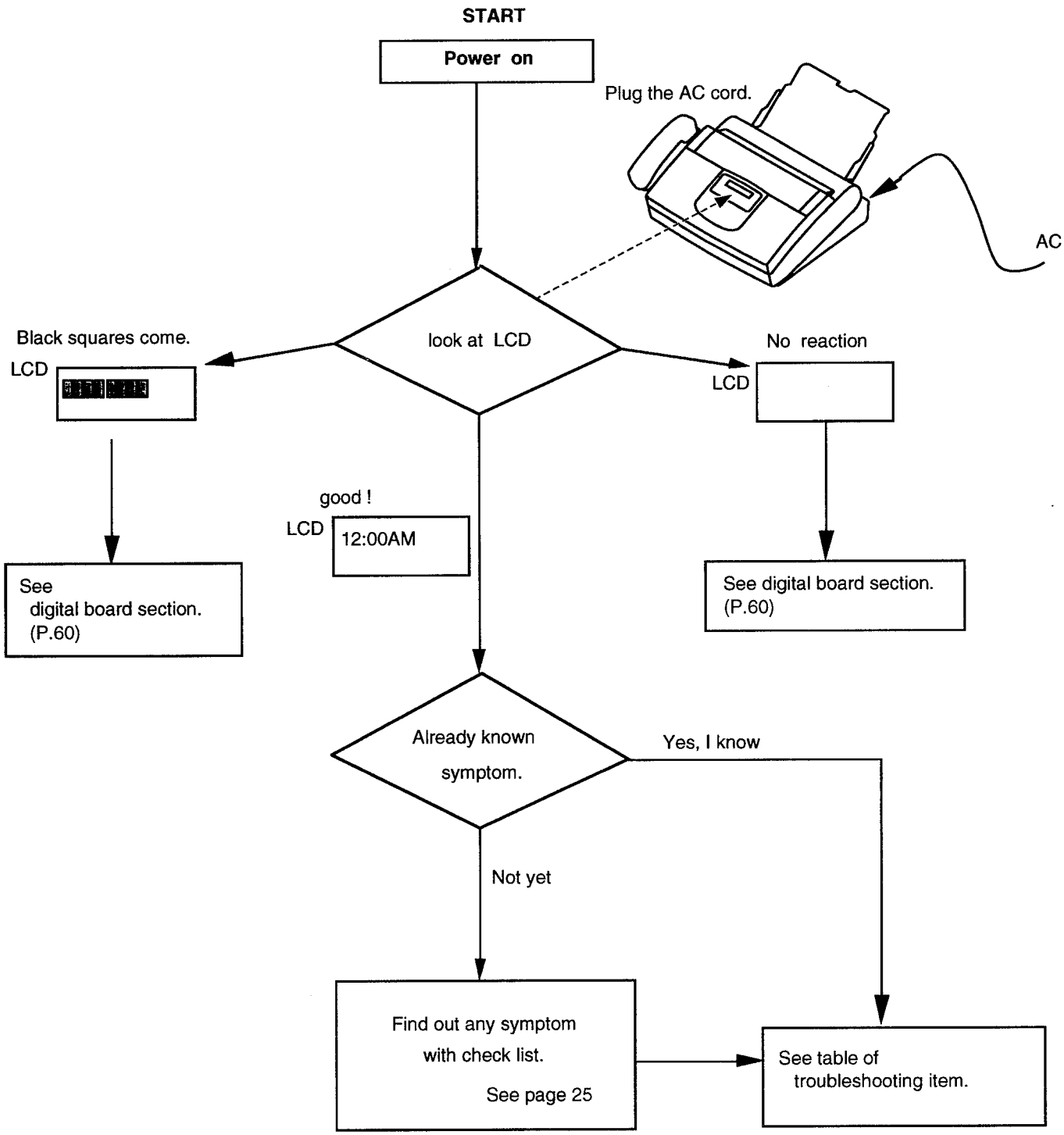
3. 2 OUTLINE

Troubleshooting is to make quality and reliability recovery by exchanging, adjusting or changing the defective component.
You have to find out symptoms and then arrange troubleshooting method.
If it is tough to find out just a broken component, you should so arrange that block or section are specified, for example, "digital board" or "image sensor."
Claim tags from customers and dealers give you much kind of expression for same trouble because they are not either technicians or engneers. However, you should carefully read them on your supposition come from your experience, and sufficiently test the function related to those tags.
Returns from customers or dealers often have no claim tag. In this case you need to find out the symptoms. Therefore, test the unit following simple-check-list. To find out a problem may not be easy, so you need to test repeatedly.

Let the unit bring back to life.

3.3 STARTING UP TROUBLESHOOTING

Find out the symptom and arrange the troubleshooting method



3.4 TABE OF TROUBLESHOOTING ITEMS

FUNCTION	SYMPTOM	SEE THIS PAGE
Unit doesn't work at all.	No character or black squares on the LCD	Digital board section. (P.60)
Printing	Skewed sending image Skewed receiving image Expanded print Blank print is copied Blank print is received abnormal image is printed Black or White vertical line on printing. Black or White lateral line on printing.	PRT-1 (P.32) PRT-2 (P.32) PRT-3 (P.32) PRT-4 (P.33) PRT-5 (P.35) PRT-6 (P.35) PRT-7 (P.36) PRT-8 (P.37)
ADF (Auto Document Feeder)	No Document feed Paper jam Multiple feed Skew	ADF-1 (P.26) ADF-2 (P.27) ADF-3 (P.28) ADF-4 (P.29)
Paper feed	No Recording paper feed Paper jam Multiple feed	REC-1 (P.30) REC-2 (P.31) REC-3 (P.31)
Power supply	Voltage output is abnormal	Power supply board section (P.79)
Operation panel	Keys are not accepted.	Operation board section (P.81)
Sensor	Film end sensor doesn't work correctly "PAPER JAM" is displayed "CHECK COVER" is displayed	Sensor boaed section (P.82)
Communication FAX , TEL (analog board)	Can not fax communicate Error cord is displayed Can not talk Ext.TAM operation doesn't work DTMF tone does't work Handset/Monitor sound,volume Mute or does't work	Communication section (P.38) ↓ Analog board section (P.75) ↓

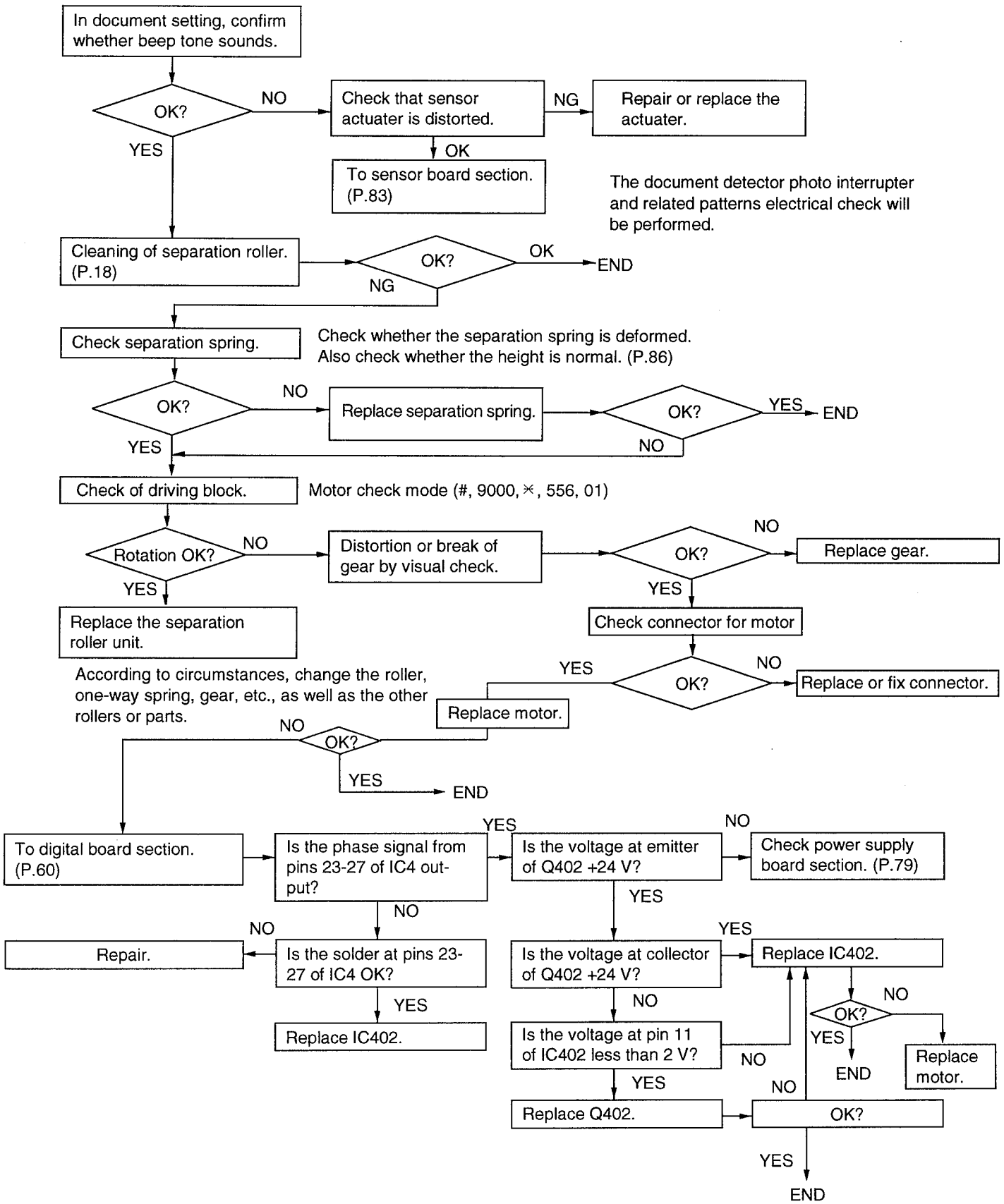
3.4.1 Easy check list

SERIAL NO. _____ DATE _____

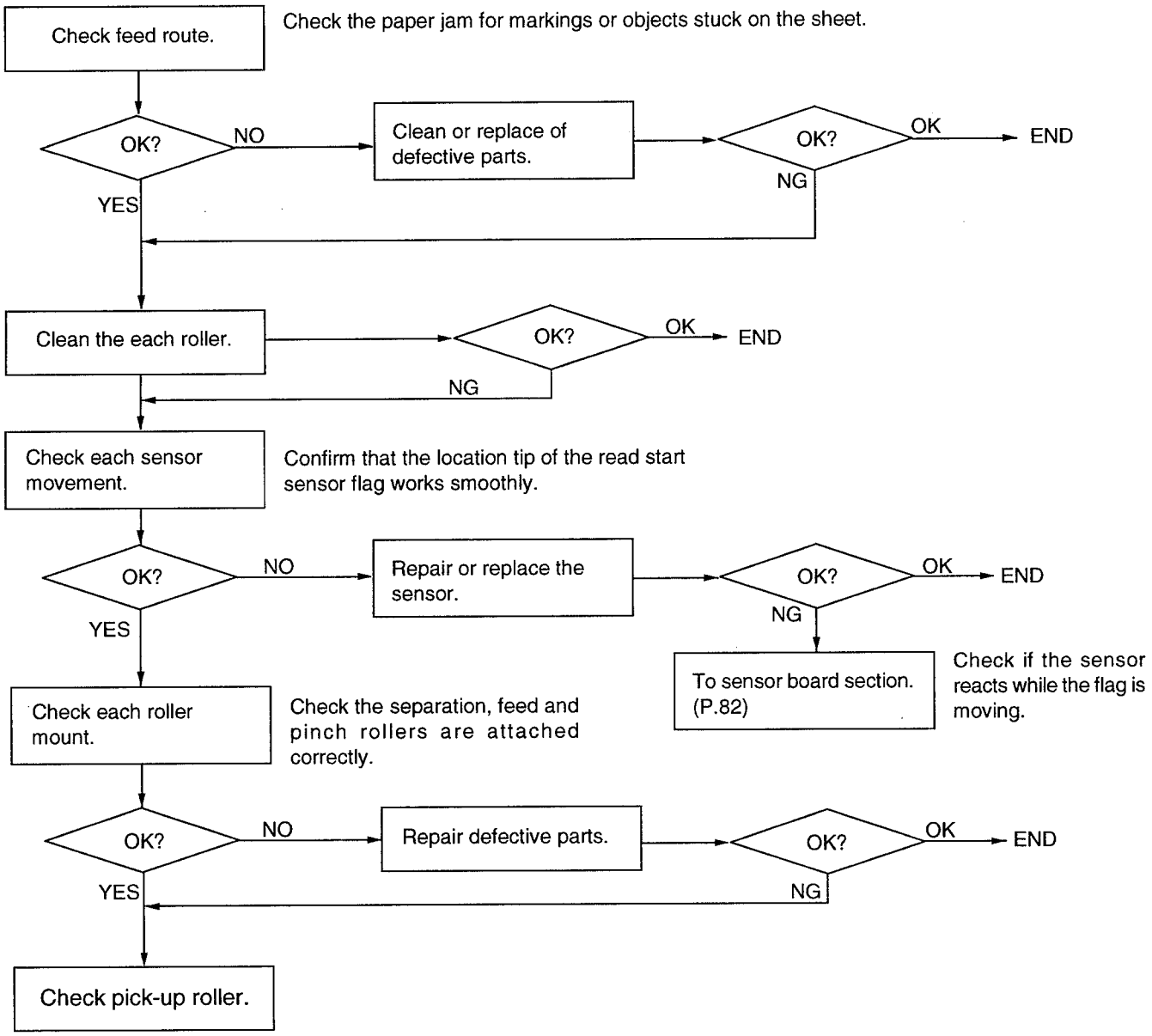
FUNCTION		JUDGEMENT	REFERENCE
FAX operation	Transmittion	OK / NG	
	Receiving	OK / NG	
Copy operation		OK / NG	
Telepone operation	Handset transceiver / receiver	OK / NG	
	SP-PHONE sound	OK / NG	
	Ringer sound	OK / NG	
	Dial operation	OK / NG	
	Volume operation	OK / NG	
	VOX detection	OK / NG	Service code 815
Operation panel	Key check	OK / NG	Service code 561
	LED check	OK / NG	Service code 557
	LCD check	OK / NG	Service code 558
Sensor	Sensor check	OK / NG	Service code 815
EXT. TAM	Handset trans./receive	OK / NG	
	Remote control	OK / NG	
Clock		OK / NG	Gain correctly? Compare to your watch.

3.4.2 ADF(Auto document feed) section

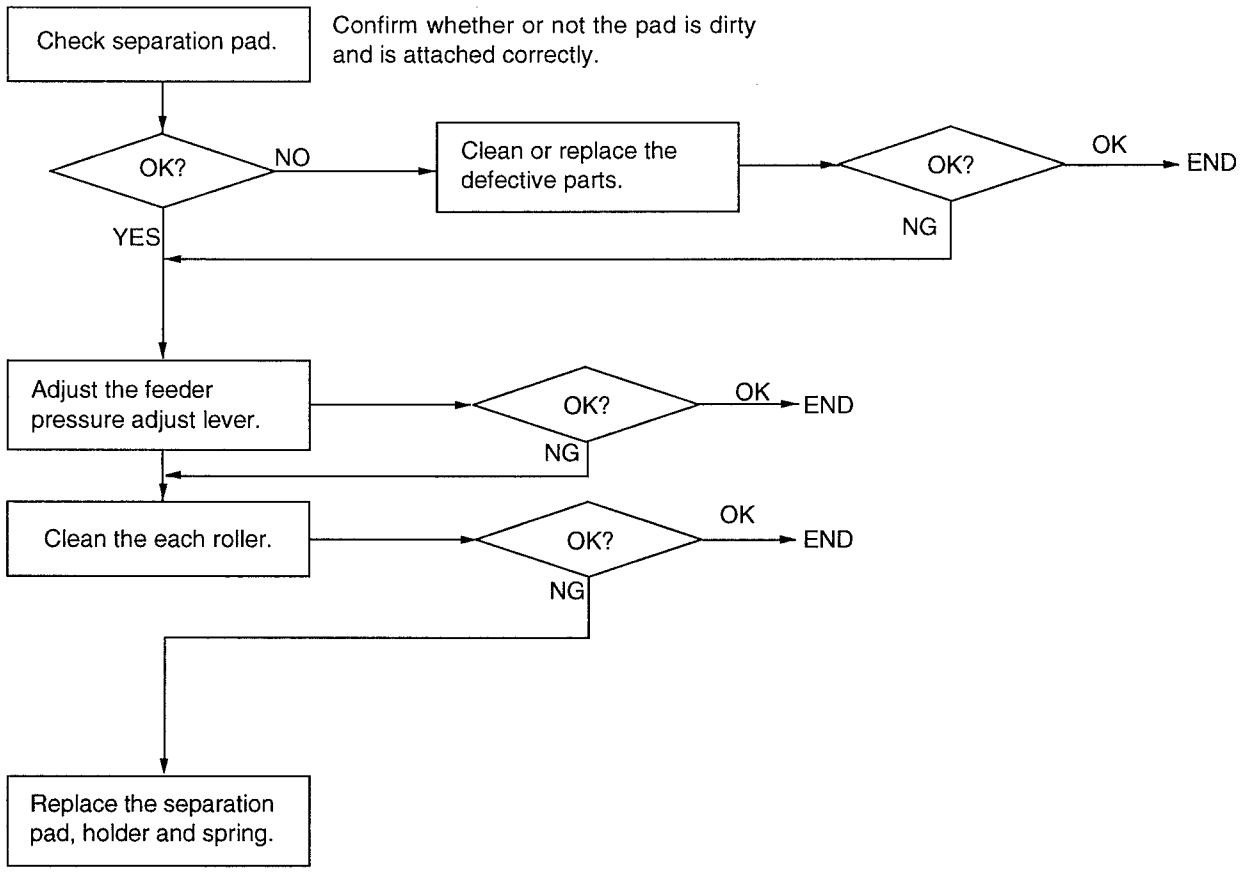
ADF-1 **No document feed**



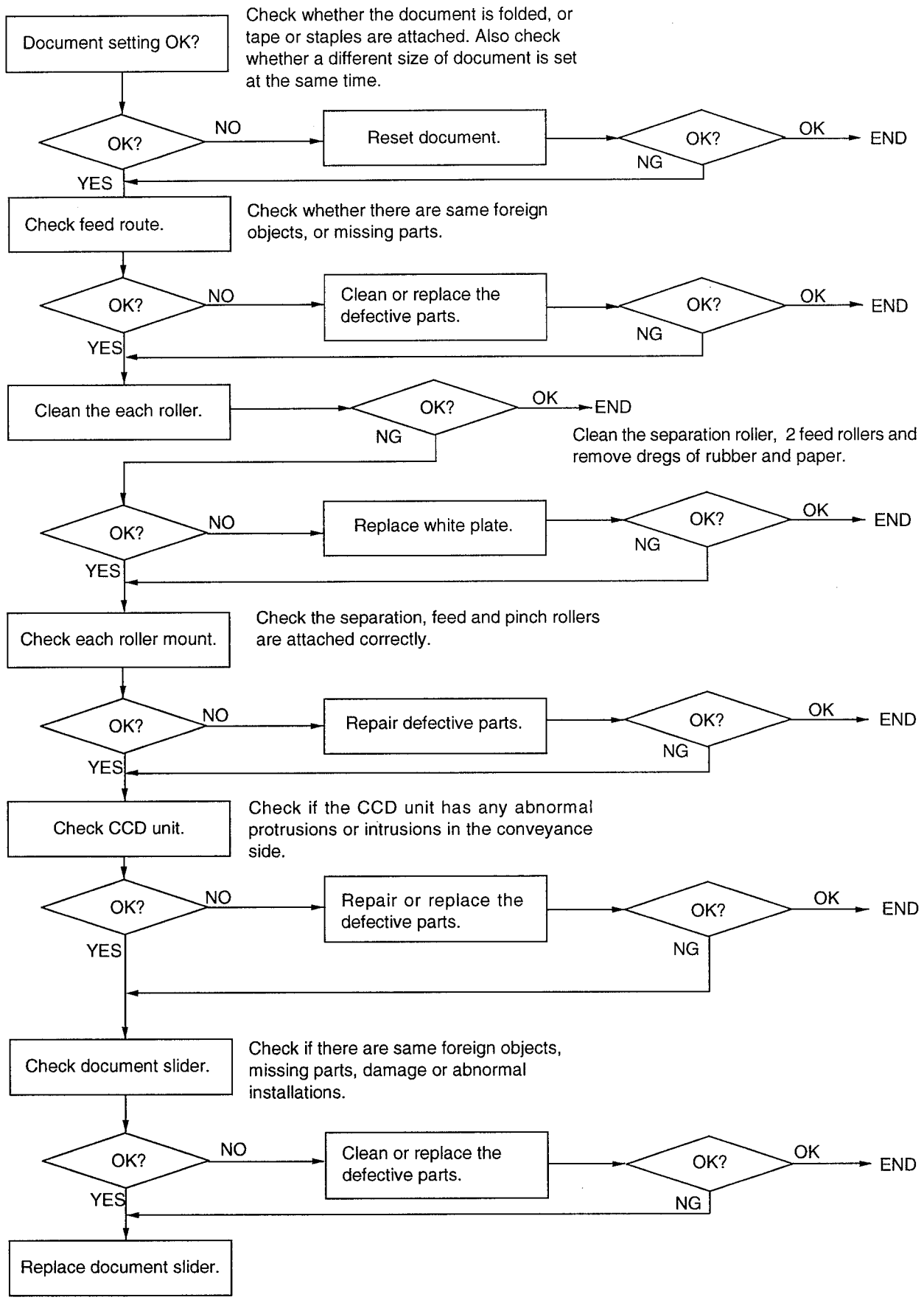
ADF-2 **Paper JAM**



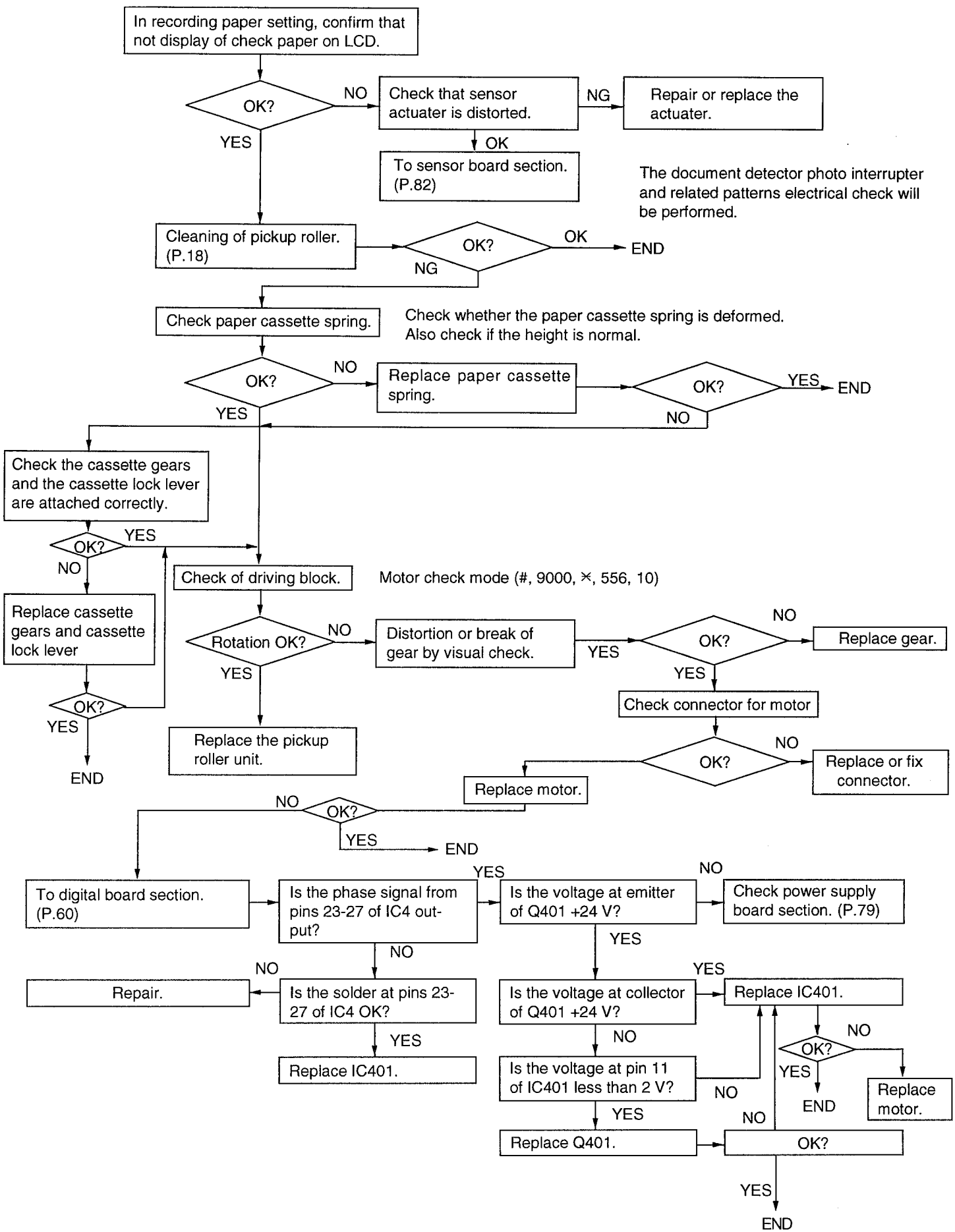
ADF-3 **Multiple feed**



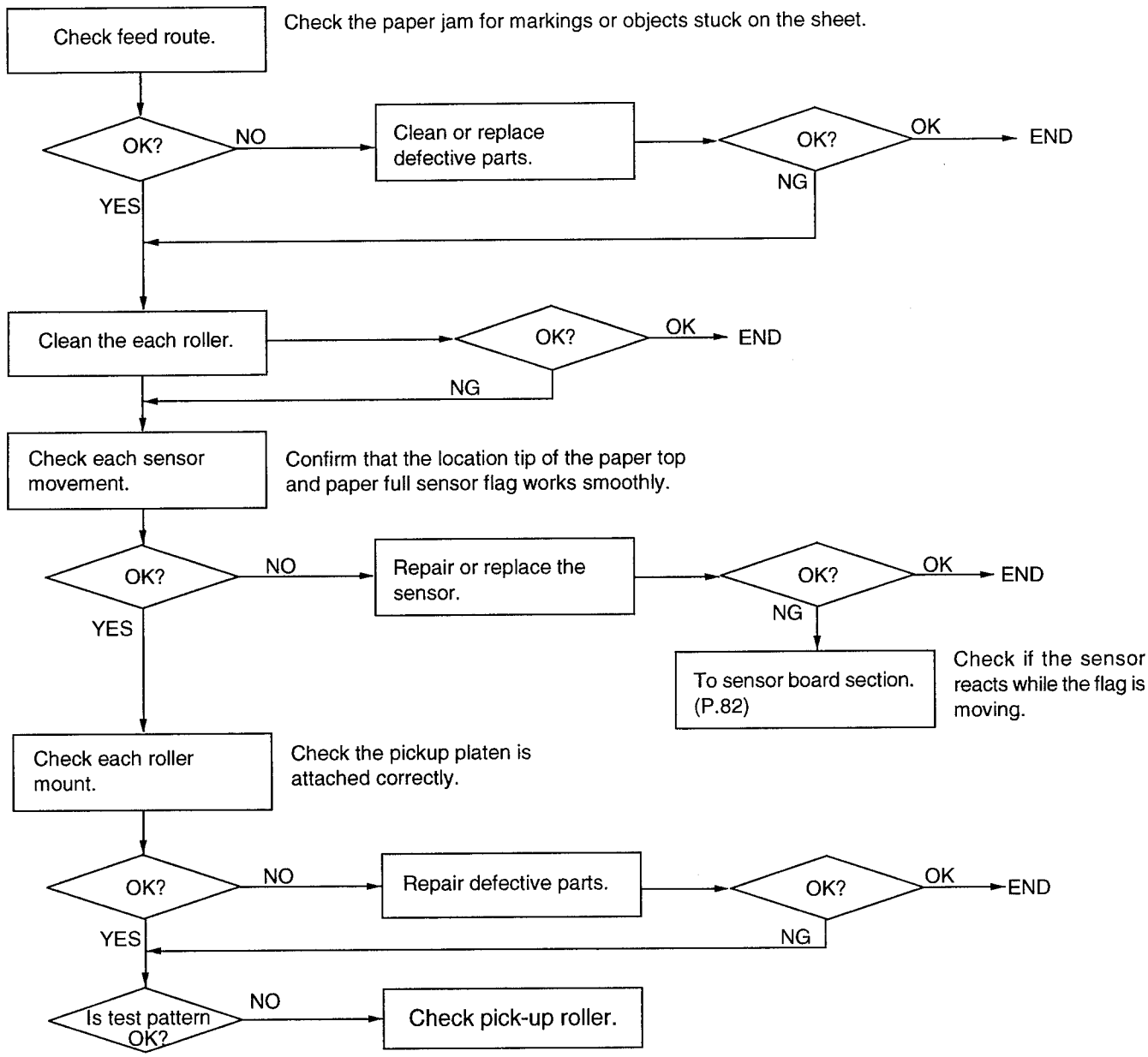
ADF-4 **Skew**


Document setting OK?
Check whether the document is folded, or tape or staples are attached. Also check whether a different size of document is set at the same time.
OK?
NO
Reset document.
OK?
OK
END
NG
YES
Check feed route.
Check whether there are same foreign objects, or missing parts.
OK?
NO
Clean or replace the defective parts.
OK?
OK
END
NG
YES
Clean the each roller.
OK?
OK
END
NG
Clean the separation roller, 2 feed rollers and remove dregs of rubber and paper.
OK?
NO
Replace white plate.
OK?
OK
END
NG
YES
Check each roller mount.
Check the separation, feed and pinch rollers are attached correctly.
OK?
NO
Repair defective parts.
OK?
OK
END
NG
YES
Check CCD unit.
Check if the CCD unit has any abnormal protrusions or intrusions in the conveyance side.
OK?
NO
Repair or replace the defective parts.
OK?
OK
END
NG
YES
Check document slider.
Check if there are same foreign objects, missing parts, damage or abnormal installations.
OK?
NO
Clean or replace the defective parts.
OK?
OK
END
NG
YES
Replace document slider.

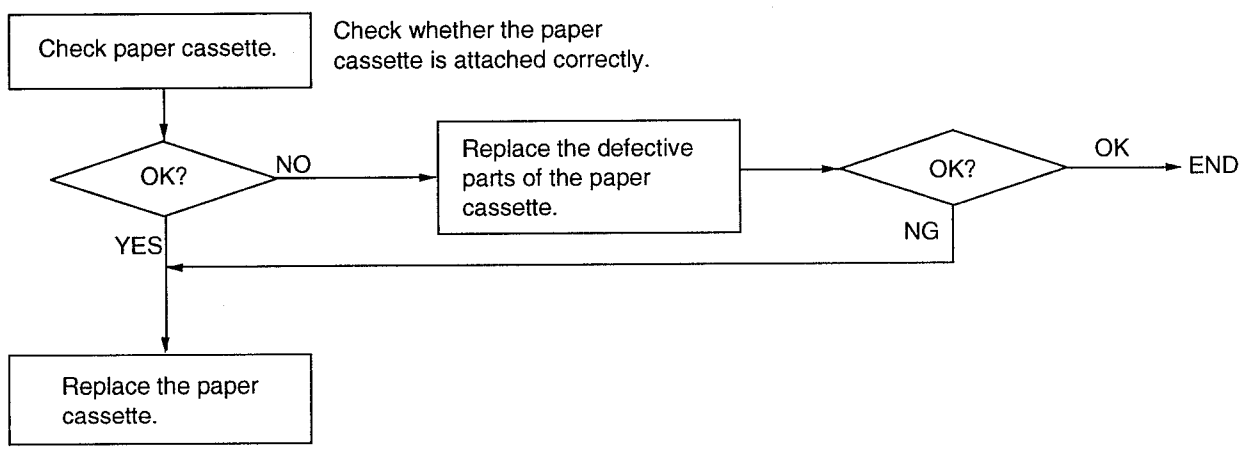
REC-1 No recording paper feed



REC-2 Paper JAM

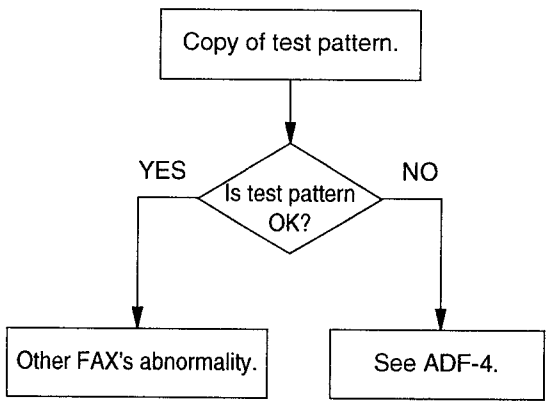


REC-3 Multiple feed and skew

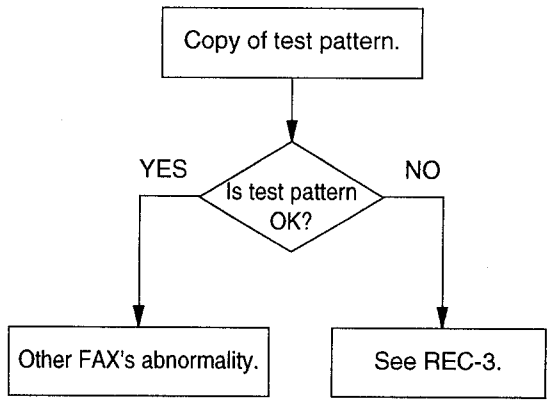


KX-FP200

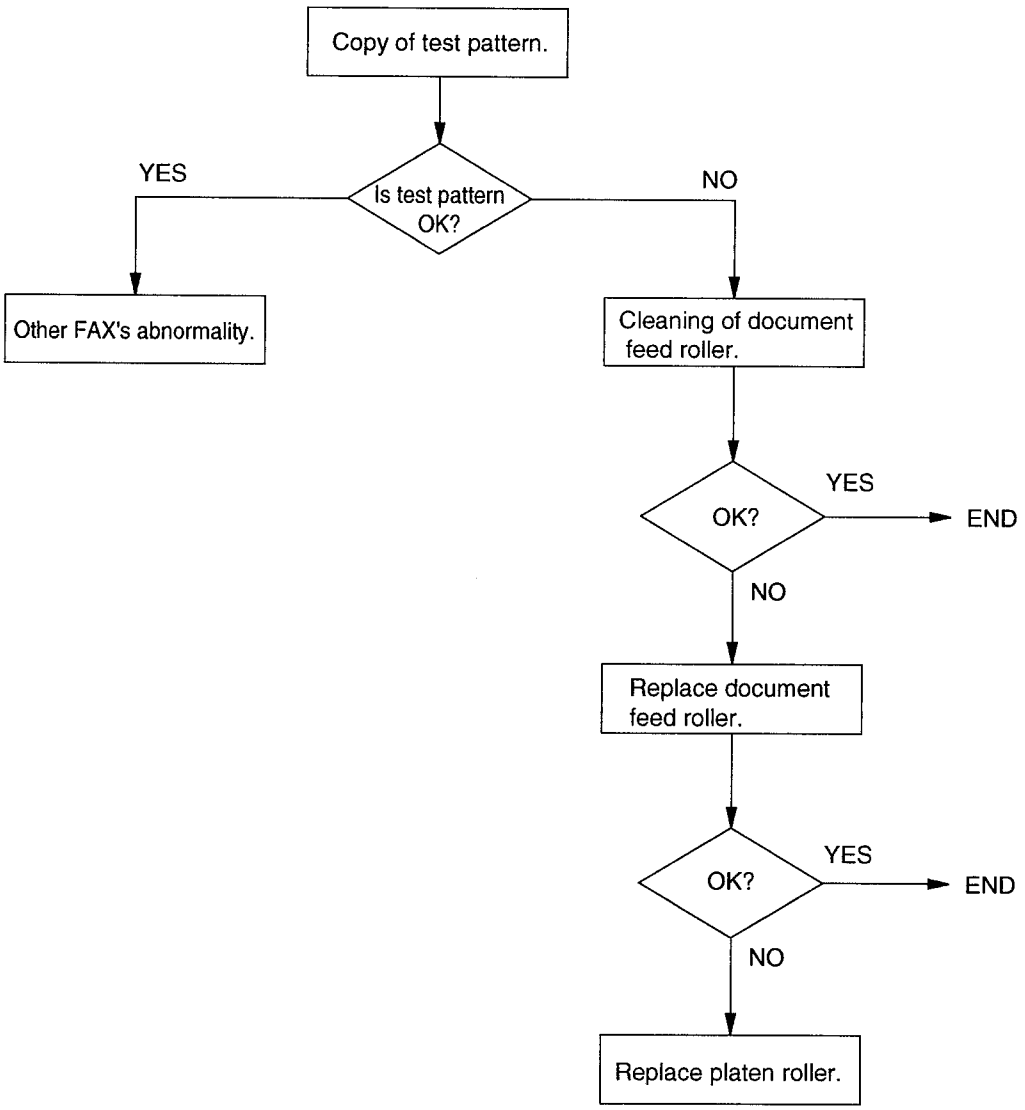
PRT-1 **Skewed sending image**



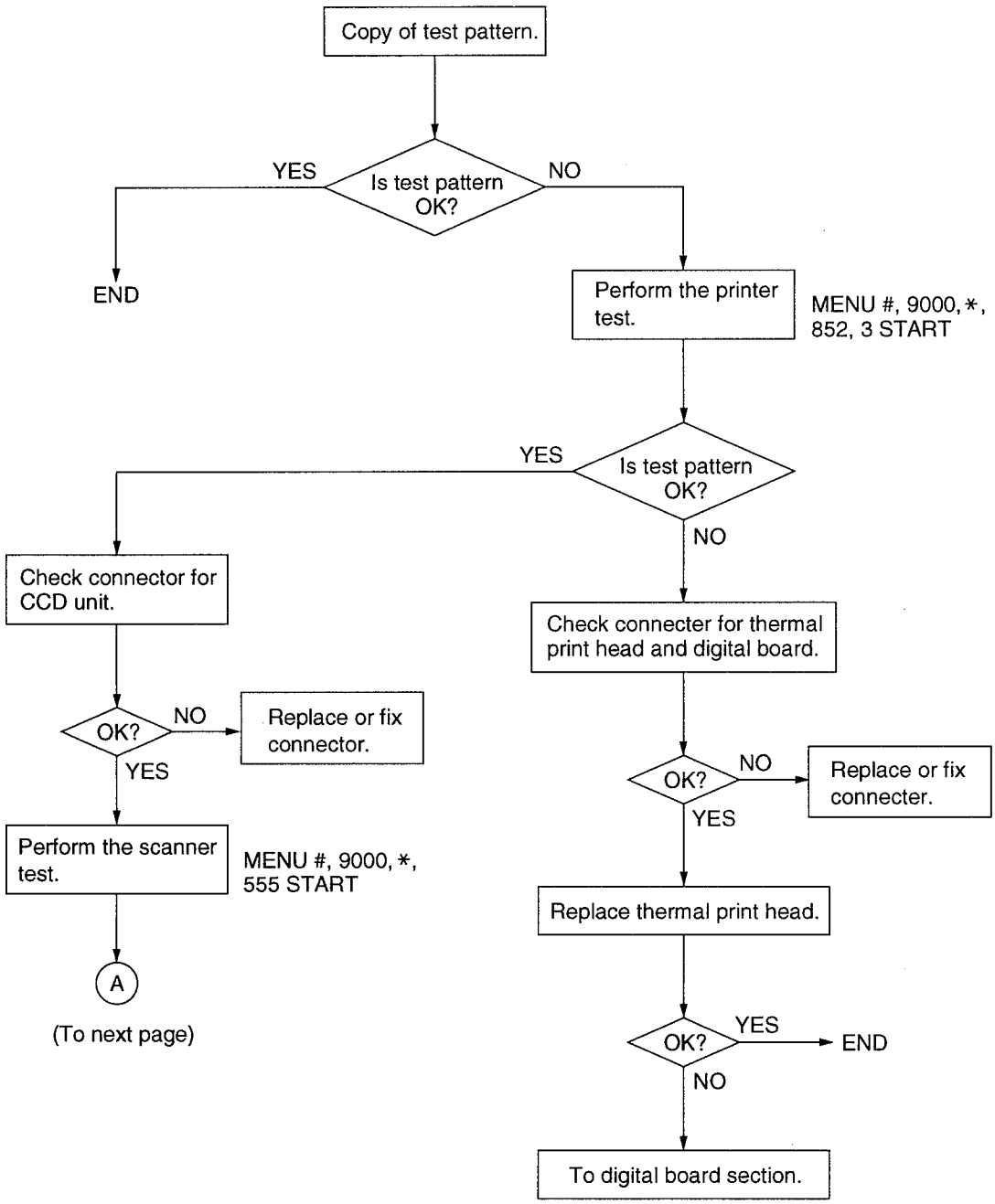
PRT-2 **Skewed receiving image**



PRT-3 **Expanded print**



PRT-4 **Blank print is copied.**



Perform the scanner test. (Refer to page 104.)

Is the amplitude at pins 2~5 of CN801 (CCD board) 4~5 Vp-p?

NO

YES

Take out CN801 (CCD board), and check the amplitude at pins 2~5 of CN1 (Digital board). (4~5 Vp-p)

NG

OK

Check the waveform at pin 7 of CN801 (CCD board). (Refer to Fig. 1.)

NG

OK

Check the short at pins 2~5 of CN801. (CCD board)

Check the solder at pins 12~15 of IC4 (Digital board).

END

OK

OK

Check the waveform at pin 1 of IC801 (CCD board). (Refer to Fig. 1.)

NG

Check R801~804.

Replace IC4.

OK

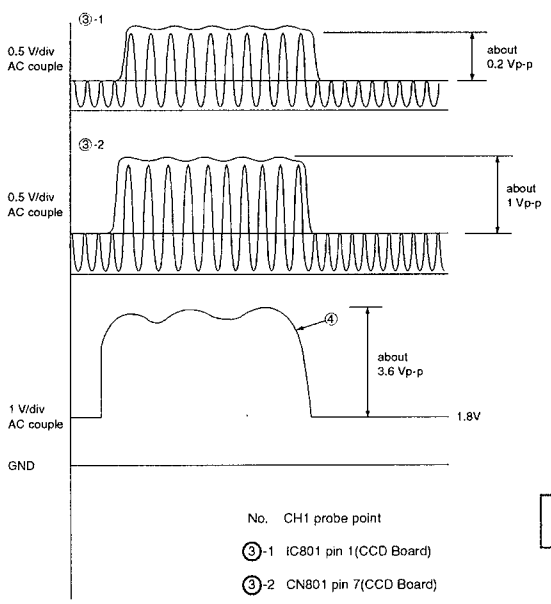
Replace Q801, Q802 (CCD board), or perform CCD adjust.

Check R801~804.

NG

Replace R801~R804. (CCD board).

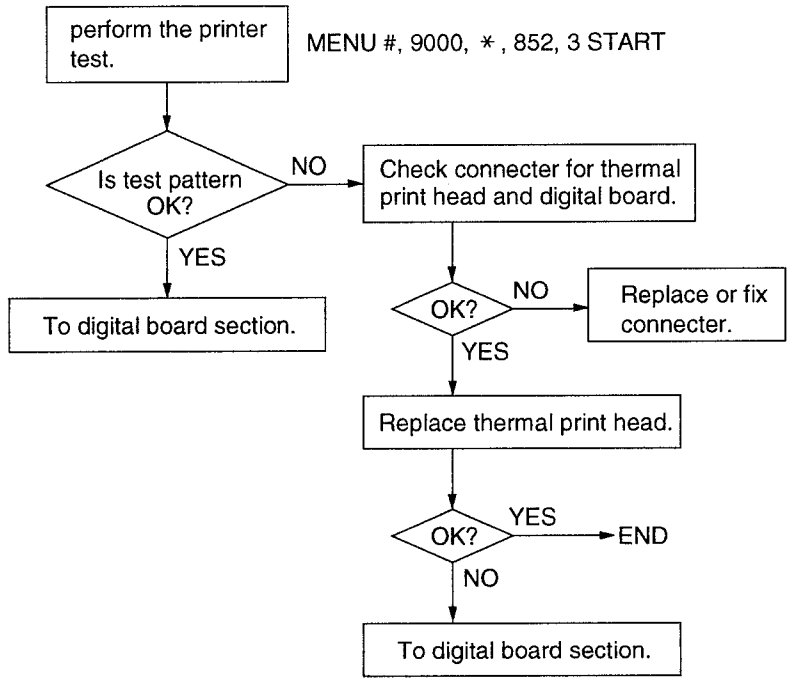
OK



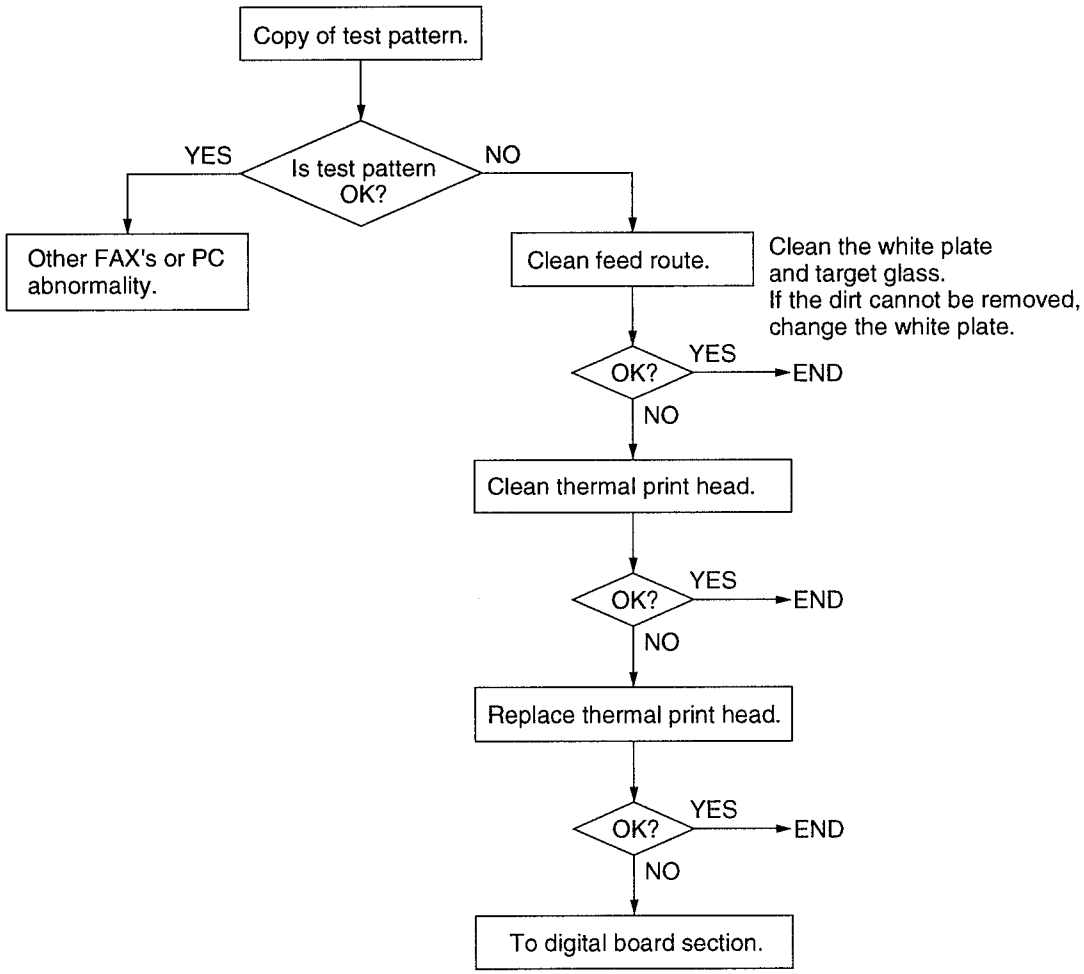
Replace IC801 (CCD board).

Fig-1

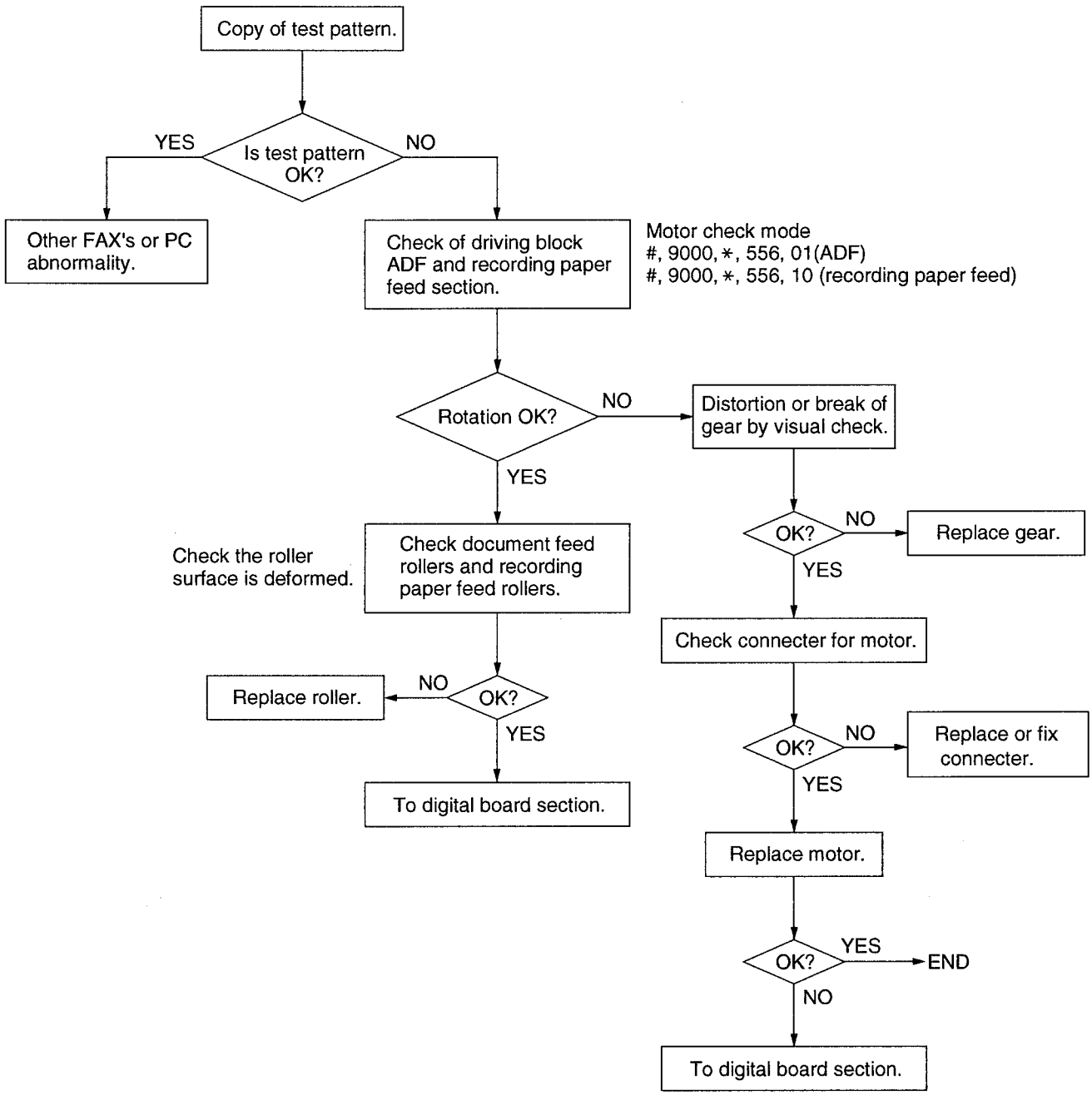
PRT-5 **Blank print is received.**



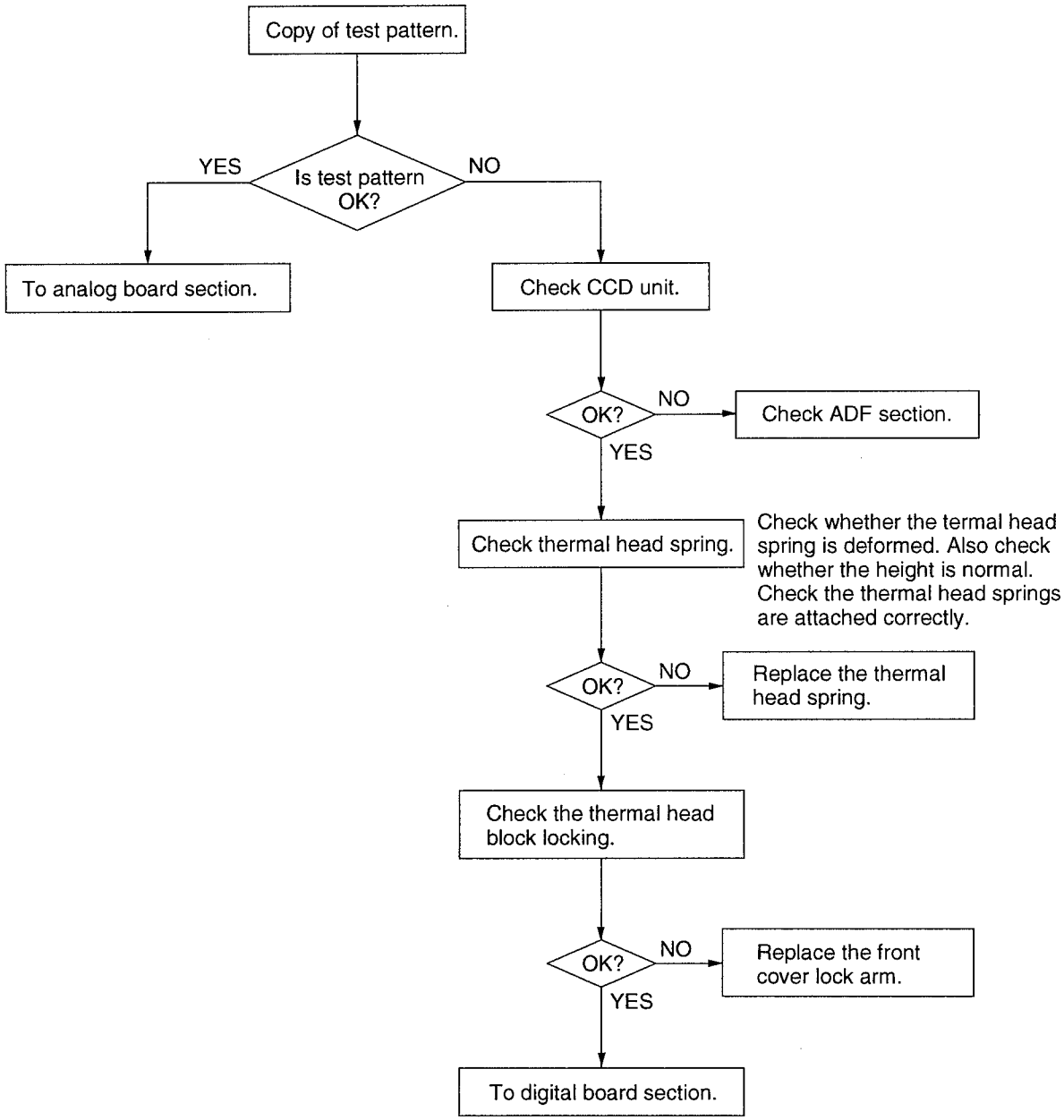
PRT-6 **Black or white vertical line on printing.**



PRT-7 **Black or white lateral line on printing.**



PRT-8 **Abnormal image is printed.**



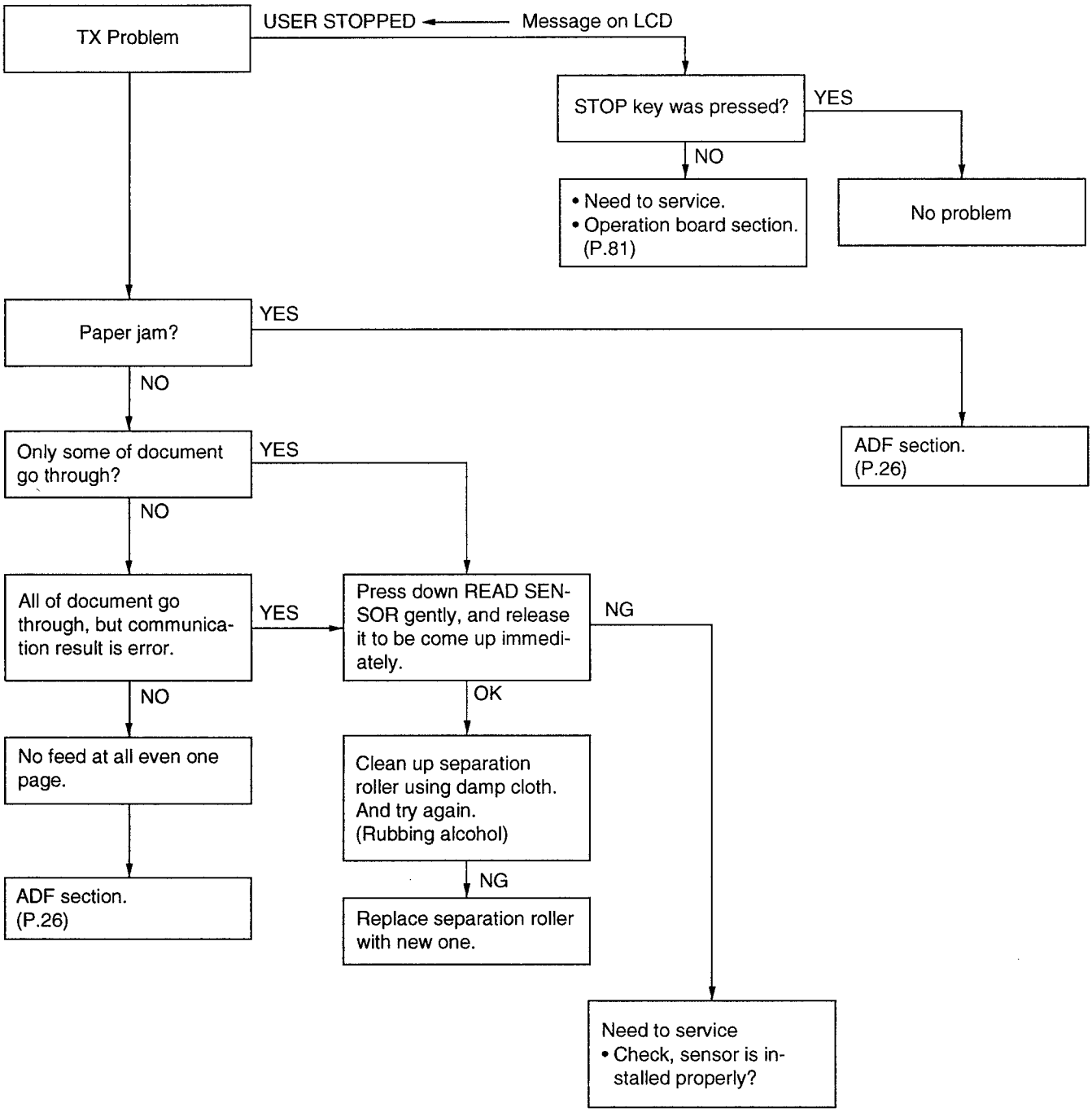
3.4.3 Communication section

Communication connection (modem)
(Print defect in FAX communication)

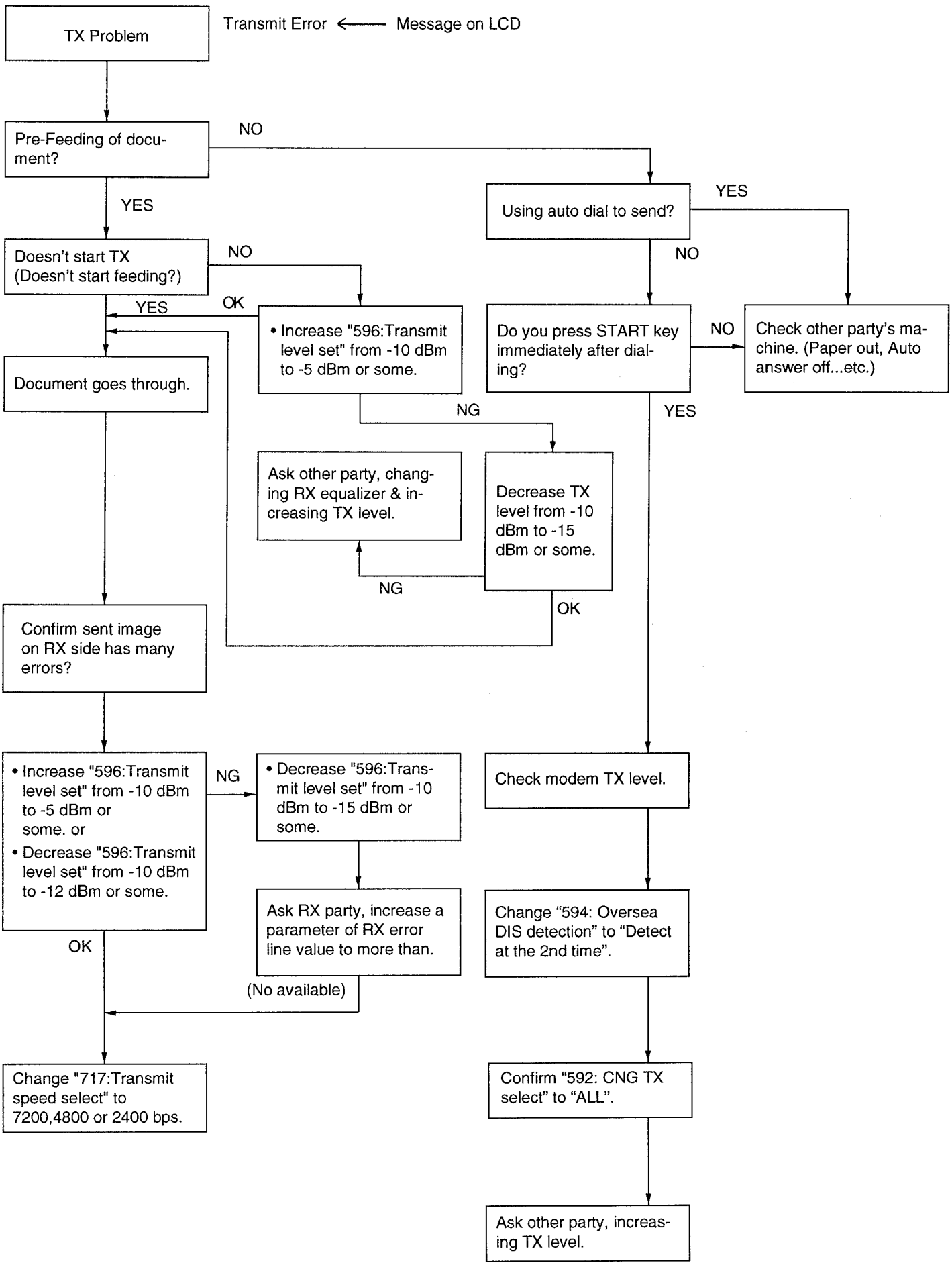
Symptom	General Classification	Hint
Referring to the printer	Print a communication	TEST : If only the print communication is NG and other printing is OK, there is a high possibility that there is a problem in the digital board's modem and analog board bus.
① Paper is not output		The transmitted sending side's signal was not received. If "MODEM ERROR" is displayed,change the IC5 modem. If the DTMF tone does not sound, change the IC5 modem. If the DTMF tone sounds, there is a problem in the signal pass route. ↓ Another problem Confirm the repair method in the DEFECTIVE FACSIMILE SECTION. (P.39)
② The picture is out of order ③ The picture was cut off halfway		A communication error has arisen. → Refer to the error code (P.47) The sending side's signal was cut during receiving. Communication error causes : 1. User (unit) 2. Circuit condition 3. Other party (unit) It is possible that there are other causes than the user. Try communication in redial a few times. Also, try communication speed in 4800 bps or lower.

1) Defective facsimile section

①Transmit problem



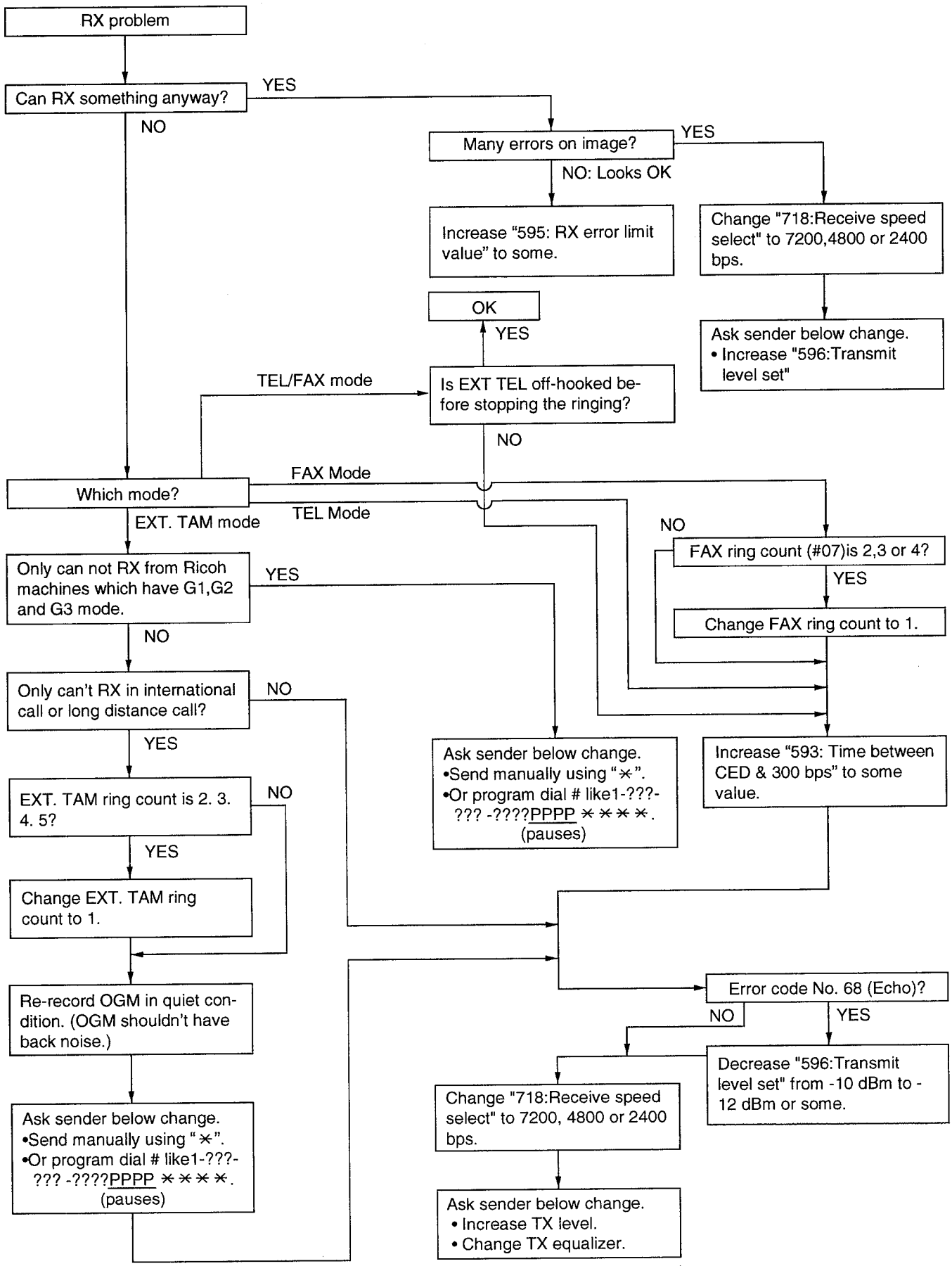
KX-FP200


TX Problem
Transmit Error ← Message on LCD
Pre-Feeding of document?
NO
YES
Using auto dial to send?
YES
NO
Doesn't start TX (Doesn't start feeding?)
NO
YES
OK
• Increase "596:Transmit level set" from -10 dBm to -5 dBm or some.
Do you press START key immediately after dialing?
NO
Check other party's machine. (Paper out, Auto answer off...etc.)
Document goes through.
NG
YES
Ask other party, changing RX equalizer & increasing TX level.
Decrease TX level from -10 dBm to -15 dBm or some.
NG
OK
Confirm sent image on RX side has many errors?
• Increase "596:Transmit level set" from -10 dBm to -5 dBm or some. or
• Decrease "596:Transmit level set" from -10 dBm to -12 dBm or some.
NG
• Decrease "596:Transmit level set" from -10 dBm to -15 dBm or some.
Check modem TX level.
OK
Ask RX party, increase a parameter of RX error line value to more than.
(No available)
Change "594: Oversea DIS detection" to "Detect at the 2nd time".
Change "717:Transmit speed select" to 7200,4800 or 2400 bps.
Confirm "592: CNG TX select" to "ALL".
Ask other party, increasing TX level.

② Receive problem

Confirm below before starting troubleshooting.

- Recording paper is installed properly?



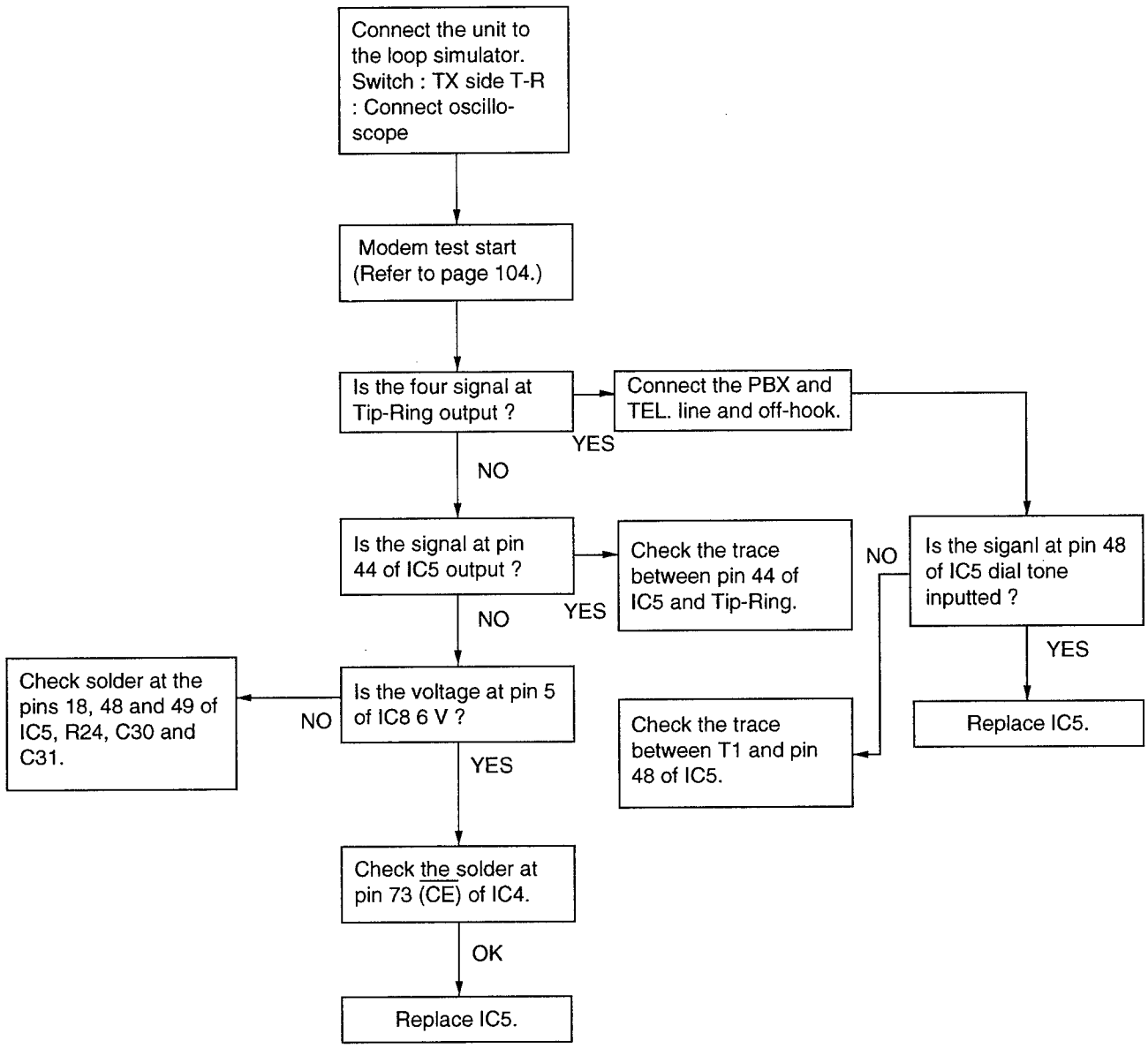
Confirm below before starting troubleshooting.
- Is recording paper installed properly?

1. With the receiving problem, we have thought of causes other than in the software. Some causes may be when the fax turns into the memory receiving mode (for example when out of paper), and the memory becomes full of the unprinted fax data. In this case, [MEMORY FULL] and its main cause (for example "ADD PAPER") are displayed on the LCD (Refer to page 55). Accordingly, by getting rid of the main cause, [MEMORY FULL] can be canceled and the receiving problem can be resolved. The causes of the display errors are shown below.

   ADD PAPER
   CHECK COVER
   INK EMPTY
   OVERHEATED (doesn't return automatically, COVER OPEN, etc., it is necessary to reset)
   PAPER JAM
   FILM EMPTY

   Please refer to "2. User Recoverable Errors" (Refer to page 20) for the above items.
   Also, when it actually becomes a hardware deformity, please check each sensor.

③ Unit can copy, but can not transmit/receive

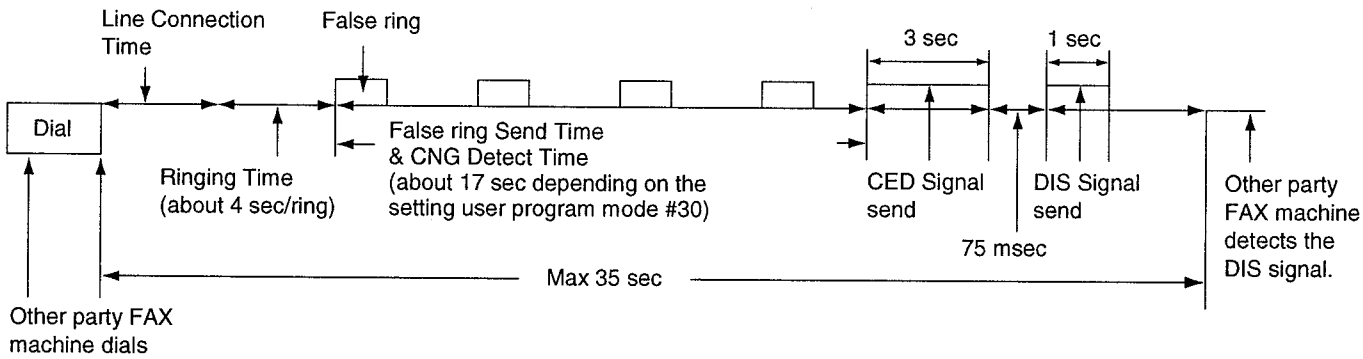


④ Unit can copy, but can not either transmit/receive long distance or international communication

The following 2 causes can be considered for this.

Cause 1:
The other party is executing automatic calling, the call has been received by this unit, and this time until response with a CED or DIS signal has been too long. (In most case, this unit detects CNG signal and can respond to CED or DIS.) (According to the CCITT standard, the communication procedure is stopped when there is no response from the other party within 35sec, so that the other party releases the line.)

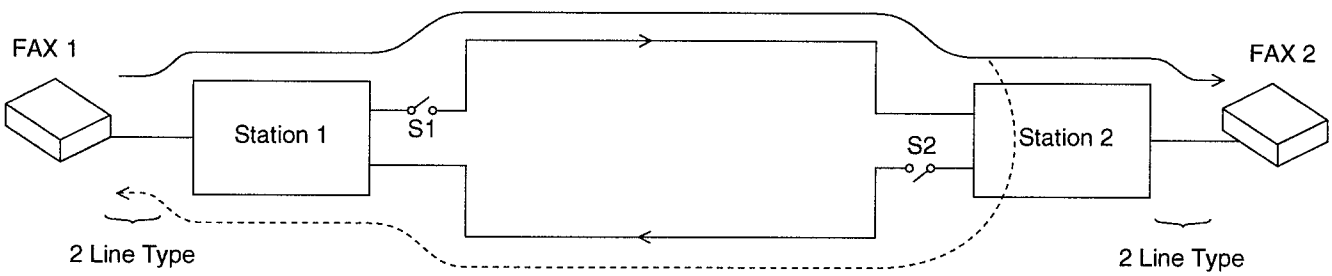
(Time until Response)



(Cause and Countermeasure)
As shown in the above chart, the total handshaking time must be reduced, but because of the long distance connection and linking of several stations, the line connection time can not be reduced. Accordingly, the following countermeasures should be tried.

(A) As the count of 35 sec is started directly after dialing or directly after the START button has been pressed for models with a START button, the other party should be called manually, if possible.
Another possibility is entry of two pauses at the end of the auto dial number of the transmission side, In this way, the start time for the count can be delayed by 2 pauses (about 10sec).

Cause 2:
Erroneous detection because of echo or erroneous detection because of an echo canceler.



The sea bottom cable or satellite communication path. (4 Line Type)

(Echo/Echo Canceler)
The signal from FAX1 reaches FAX2 via the stations 1 and 2, but the reflection signal at station 2 also returns via station 1 (echo). As the distance between station 1 and station 2 is long, the echo returns to FAX 1 max. 600msec after transmission, so than there is the possibility that this signal is detected erroneously as the signal from FAX2 and that trouble is caused. In the case of a normal call, there is also the possibility that the echo of the own voice will make the call difficult to understand. For this reason, each station (station 1, station 2) attaches echo cancelers (S1, S2) in case of international lines or long distance lines. For the echo canceler, the level of the transmission signal from FAX 1 is compared with the level of the reception signal from the FAX2, and when transmission signal is larger, S1 is closed, while S2 is opened when it is smaller. In other words, with transmission from FAX1, S1 is closed and S2 is open, so that the echo does not return to FAX1.

(Cause and Countermeasure)
(Cause A)
When the training signal is transmitted from FAX1 during the communication procedure at the time of transmission from FAX1 to FAX2, there is a delay until the echo canceler operates and S1 is closed, so that a part of the head of the training signal may drop out, normal reception by FAX2 may not be possible, and transmission may not be started.
(Countermeasure A)
When the international line mode becomes ON service mode (code No. 521), a dummy signal is attached to the head of the training signal to prevent this problem. As this normally is ON, it is necessary to reconfirm that this has not becomes OFF. When the international mode is switched OFF, the transmission side will try the training signal three times at each speed (9600BPS, 4800BPS and 2400BPS), and in case of NG, it will drop the speed by one rank (fall-back). When the international mode is switched ON, each speed will be tried only twice. In other words, the slower speed with fewer errors are reached more easily. This is done as the line conditions may deteriorate and the picture may be disturbed more easily during communication in case of international lines or long distance communication, even when the training has been OK. The default value is ON as preference is given to clearer pictures rather than speed.

(Cause B)
The echo canceler operation is stopped with a signal of 2100Hz (i.e. S1 and S2 become ON).
Accordingly, when FAX1 has executed automatic reception, a CED signal is output, and if this signal should be 2100Hz, S1 and S2 will become ON. Then the echo of the DIS signal output afterwards may be received and FAX1 may execute erroneous operation, preventing start of communication.
(Countermeasure B)
In service mode, the CED signal frequency is set to 1100 Hz (code No.520) or the time setting between the CED signal and the DIS signal is set from 75msec to 500msec in service mode (code No.593). This is done because the echo canceler operation stop mode is cancelled with an interval of 250msec or more.

(Cause C)
KX-FP200 shall be assumed for FAX1 and a set of a different company shall be assumed for FAX2.
In case of transmission from the KX-FP200 to FAX2, FAX2 executes automatic reception and transmits a CED signal (2100 Hz), followed by a DIS signal. As here the echo cancelers stops as described in cause B, the echo of the DIS signal returns to FAX2. On the other hand, the KX-FP200 detects the DIS signal and transmits a DCS signal. In other words, it is possible that the echo of the DIS signal and the DCS signal transmitted from the KX-FP200 reach FAX2 one after the other, FAX2 executes erroneous detection, and communication are not started.
(Countermeasure C)
When international DIS detection setting is made effective in service mode (code No.594), the KX-FP200 does not respond to the first DIS signal and returns a DCS signal only for the second DIS signal.
In other words, there is an interval of 250msec between transmission of the first and the second DIS signal, so that the echo cancelers operation recovers and no echo is generated for the second DIS signal.
Note:
When the other FAX does not respond with a DCS signal after DIS signal transmission, the DIS signal is transmitted three times for trial.

Summary:
Long distance and international communication operation

SYMPTOM	COUNTERMEASURE
Does not receive in automatic mode.	1. If possible, manual transmission should be made from the transmission side. 2. If possible, two pauses should be inserted at the end of the auto dial number of the transmission side. 3. If possible, the Function Selector Switch should be switched to FAX.
Does not transmit.	1. Confirm the international line mode ON. (service mode: code No. 521) 2. International DIS detection setting is made effective. (service mode: code No. 594)
Does not receive.	1. The time setting between the CED signal and the DIS signal is set to 500msec. (service mode: code No. 593) 2. The CED frequency is set to 1100Hz. (service mode: code No. 520)

⑤ Unit can copy, but the transmission and reception image are incorrect (Long distance or international communication operation)

These widely depend on the transmission and reception capability of the other FAX set and the line conditions. The countermeasures for their set are shown below.

Transmission Operation:
The transmitting speed is set to 4800BPS (service mode: code No. 717) or select overseas mode. (Individual correspondence according to the other set is desirable.)

Reception Operation:
If 80% or more of the reception is incorrect, set the receiving speed to 4800BPS. (service mode: code No. 718)

2) Communication error functions

① Operation:

1. Press the MENU button 4 times.
2. press the START/SET button and STATION 17(▼) button 3 times.
3. Press the START/SET button.
4. Print out.

② Error code table:

CODE	RESULT	MODE	SYMPTOM	Counter-measure
	PRESSED THE STOP KEY	TX & RX	Communication was interrupted with the STOP button.	
	DOCUMENT JAMMED	TX	Document paper is jammed.	
	NO DOCUMENT	TX	No document paper.	
	THE COVER WAS OPENED	TX & RX	Cover is open.	
40	NO RESPONSE	TX	Transmission is finished when T1 TIMER is expired.	1
41	COMMUNICATION ERROR	TX	DCN is received after DCS transmission	2
42	COMMUNICATION ERROR	TX	FTT is received after transmission of 2400BSP training signal.	3
43	COMMUNICATION ERROR	TX	No response after post message is transmitted three times.	4
44	COMMUNICATION ERROR	TX	RTN and PIN are received.	5
46	COMMUNICATION ERROR	RX	No response after FTT is transmitted.	6
48	COMMUNICATION ERROR	RX	No post message.	7
49	COMMUNICATION ERROR	RX	RTN is transmitted.	8
50	COMMUNICATION ERROR	RX	PIN is transmitted (to PRI-Q).	8
51	COMMUNICATION ERROR	RX	PIN is transmitted.	8
52	NO RESPONSE	RX	Reception is finished when T1 TIME is expired.	9
53	COMMUNICATION ERROR	TX	DCN is received after transmission of NSC and DTC.	10
54	COMMUNICATION ERROR	RX	DCN is received after DIS transmission.	11
57	COMMUNICATION ERROR	TX	300BPS error.	12
58	COMMUNICATION ERROR	RX	DCN is received after FTT transmission.	13
59	COMMUNICATION ERROR	TX	DCN responds to post message.	14
64	COMMUNICATION ERROR	TX	Polling is not possible.	15
65	COMMUNICATION ERROR	TX	DCN is received before DIS reception.	2
65	COMMUNICATION ERROR	RX	Reception is other than EOP, EOM PIP, PIN, RTP and RTN.	2
68	COMMUNICATION ERROR	RX	No response at the other party after MCF or CFR is transmitted.	13
70	COMMUNICATION ERROR	RX	DCN is received after CFR transmission.	13
72	COMMUNICATION ERROR	RX	Carrier is cut when image signal is received.	16
75	MEMORY FULL	RX	The document was not received due to memory full.	
79	CANCELLED	TX	The multistation transmission is rejected by user.	
FF	COMMUNICATION ERROR	TX & RX	Modem error.	12

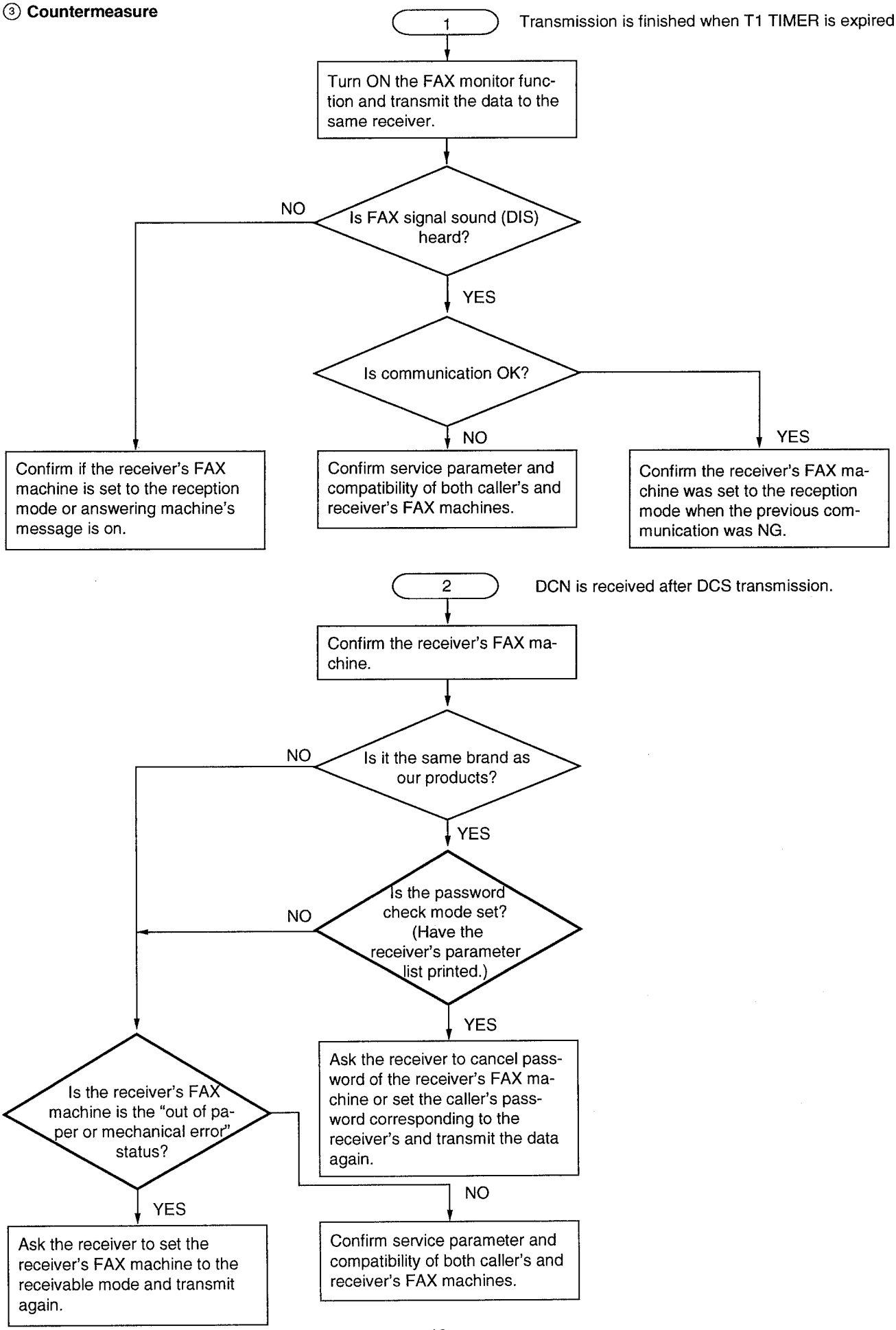
TX=TRANSMISSION RX=RECEPTION

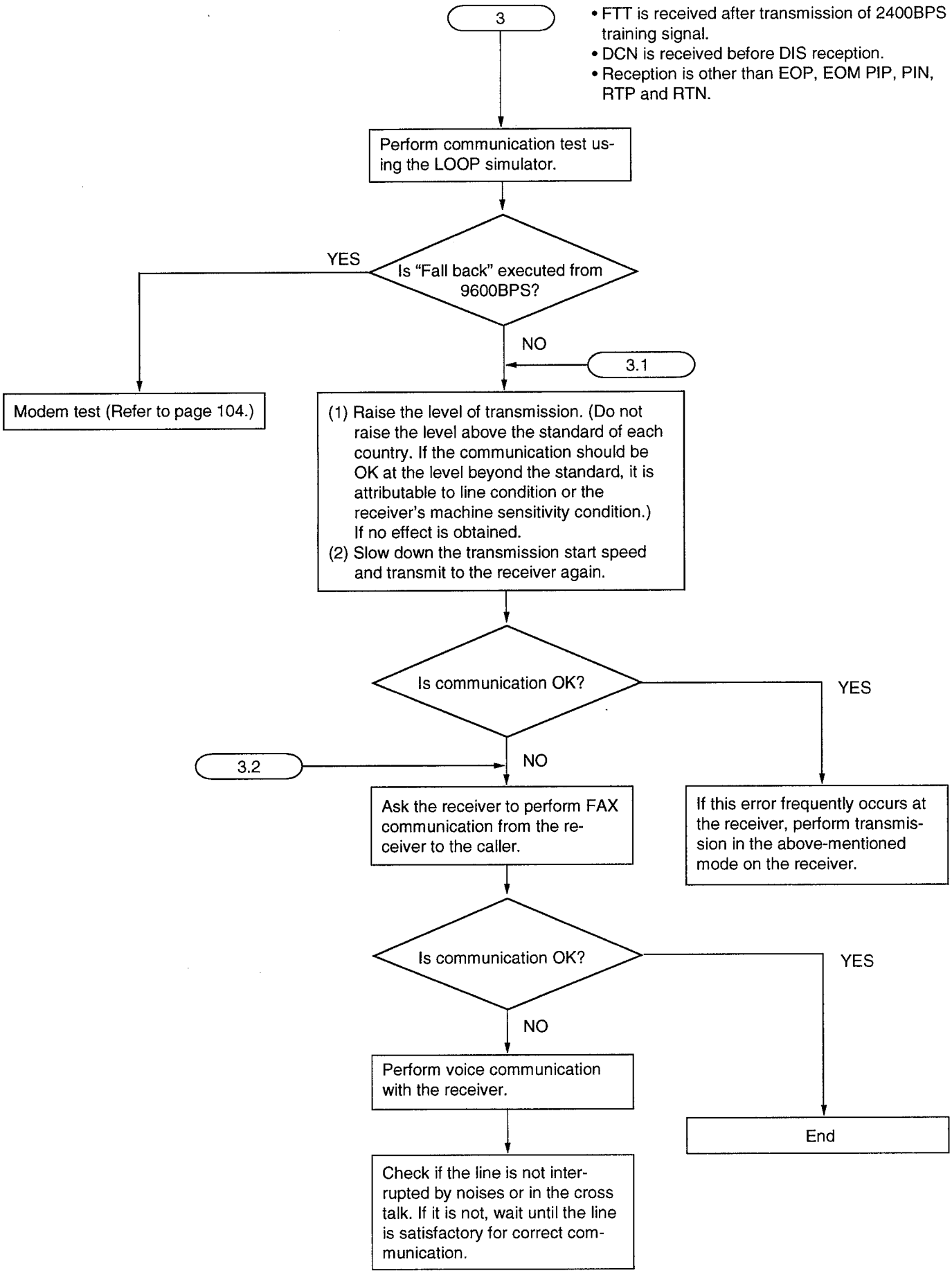
※Most fax communication problems can be resolved by the following steps.

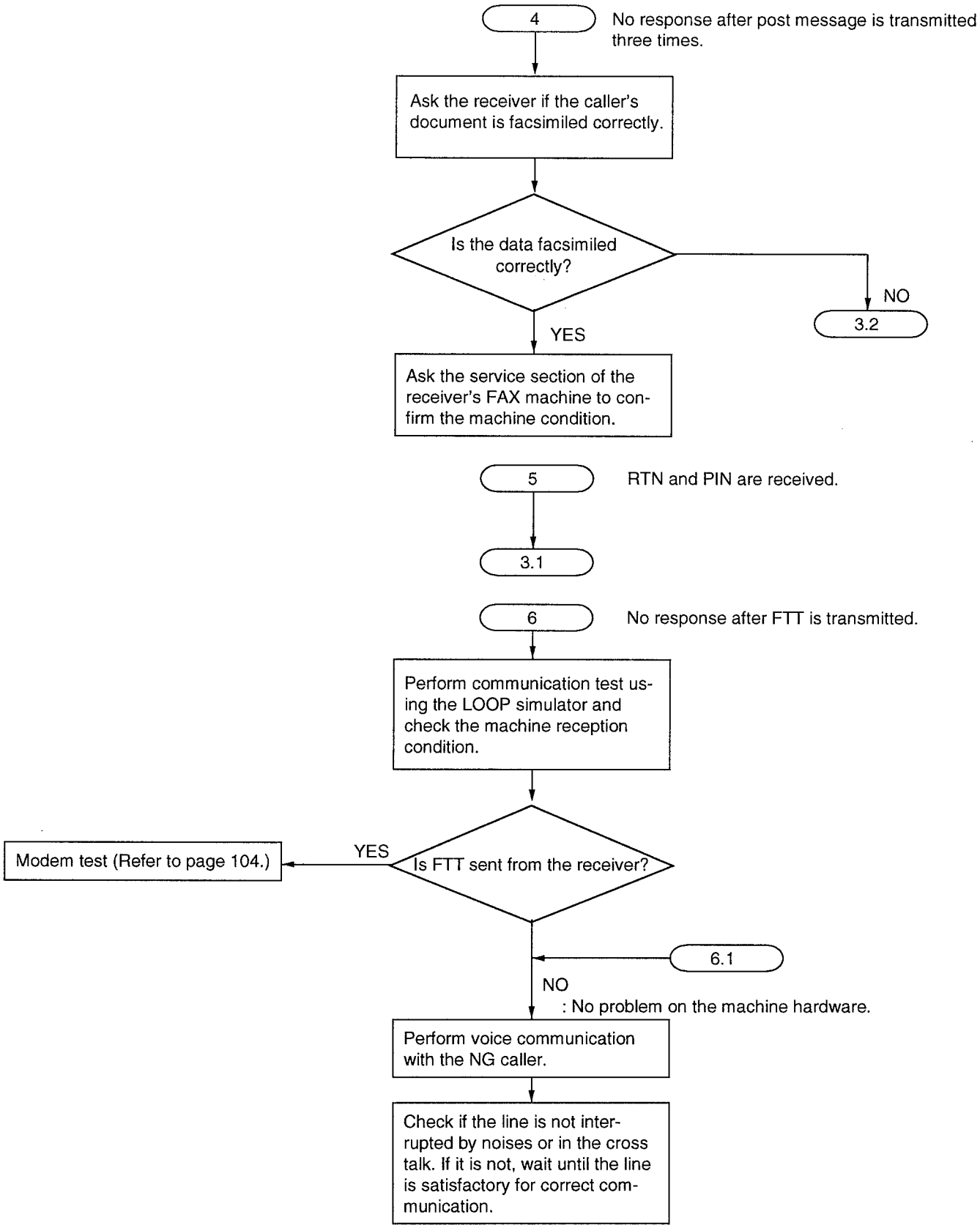
1) Change the transmit level.
2) Change the TX speed/RX speed.

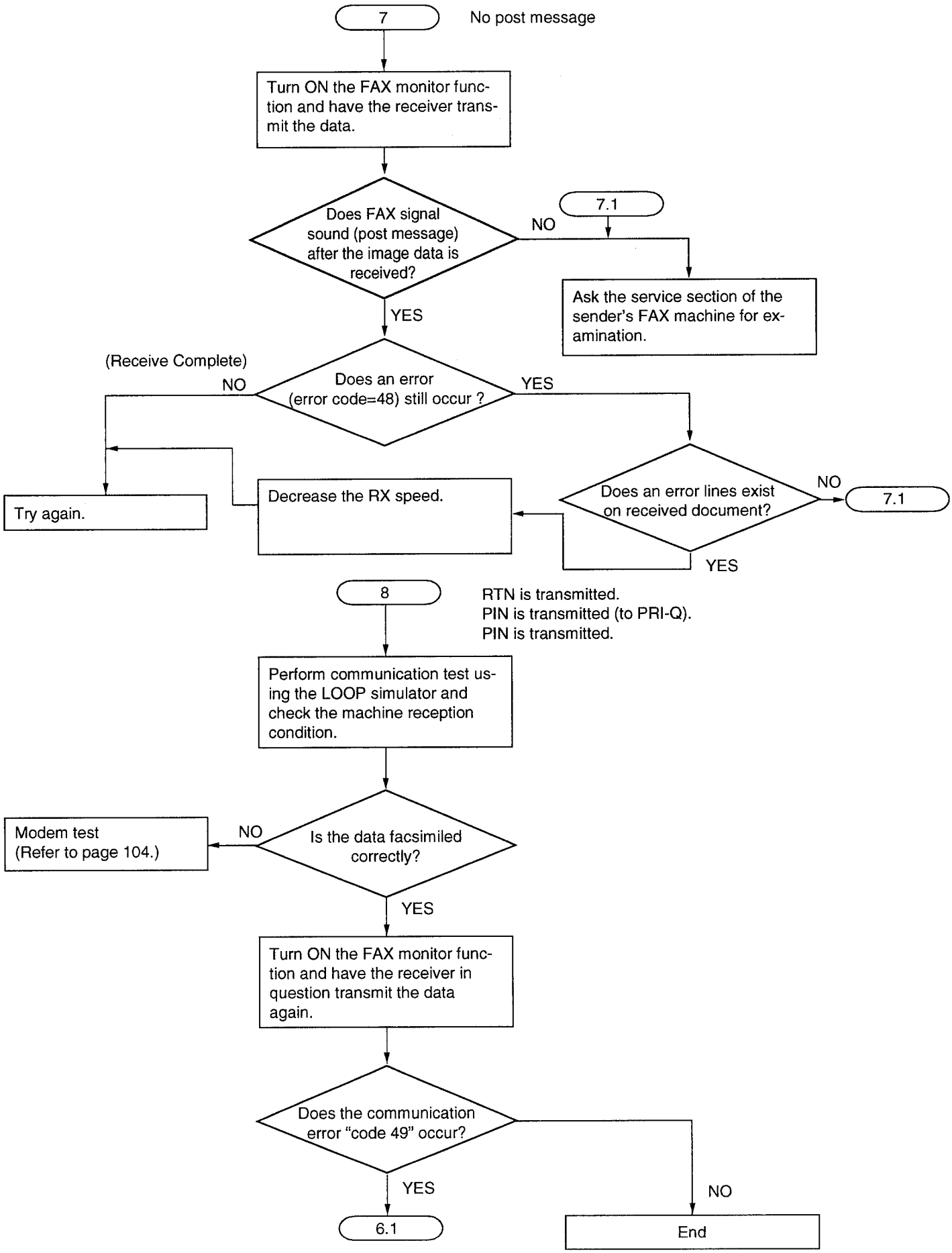
If not resolved, see the next page.

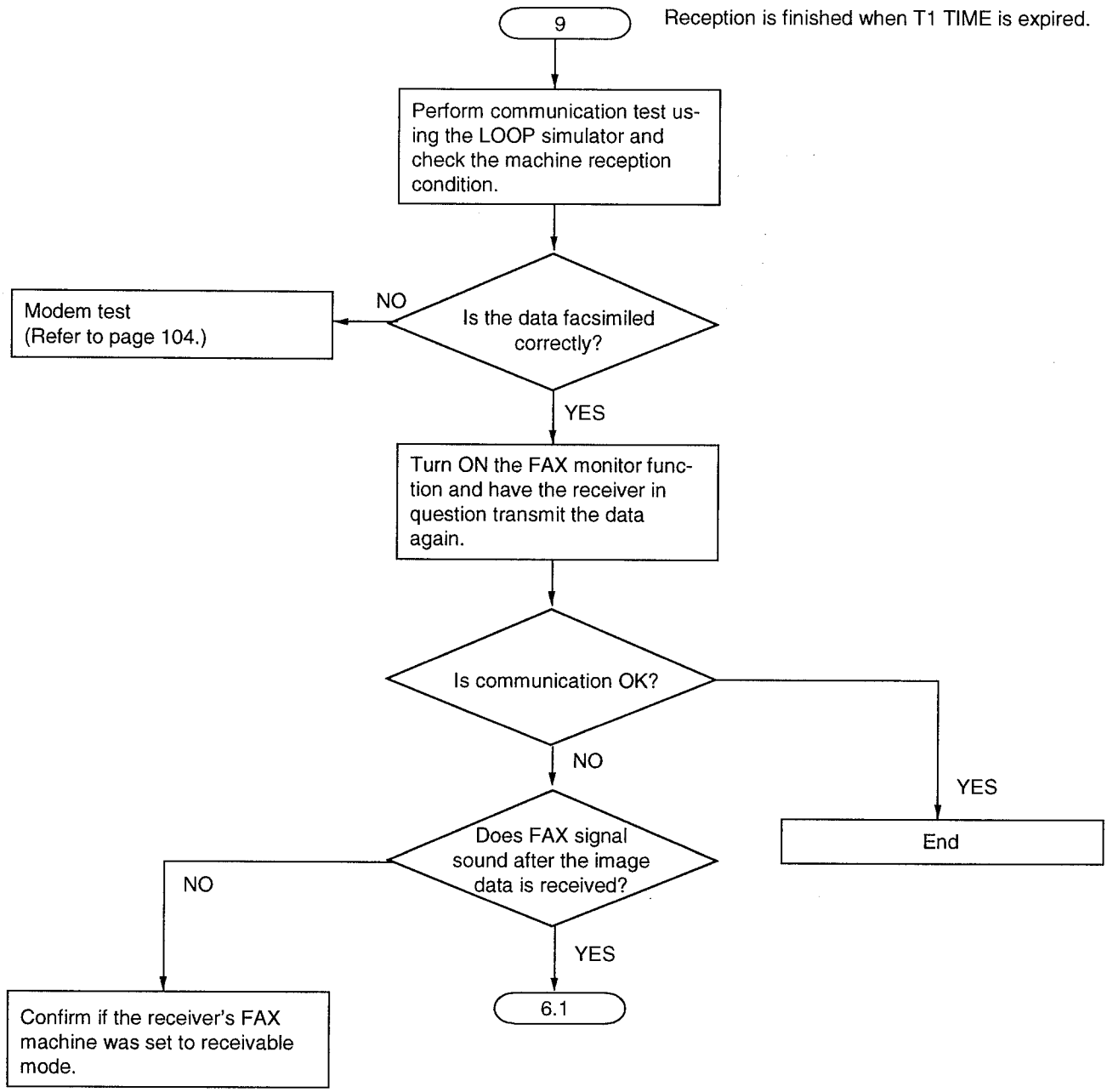
③ **Countermeasure**

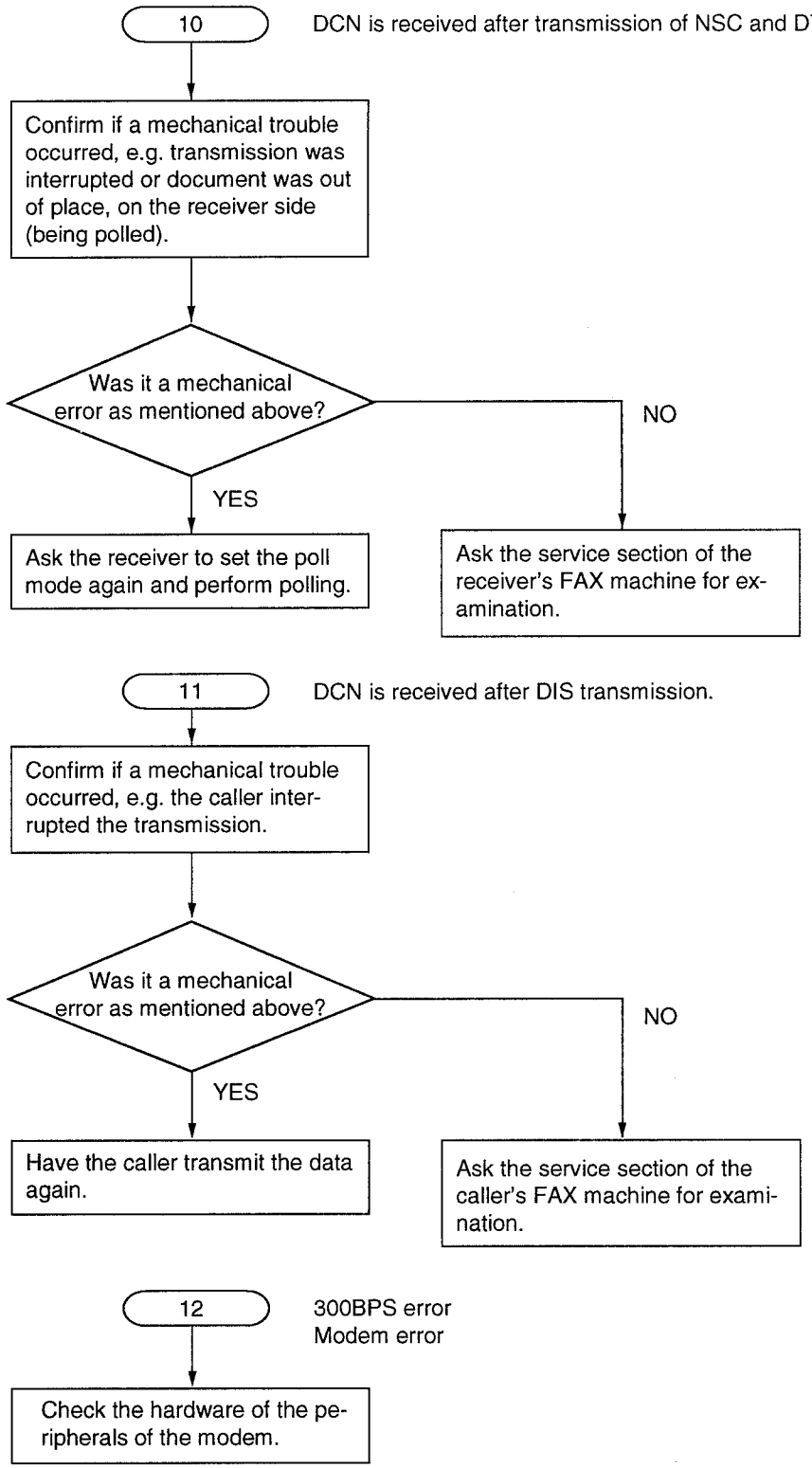


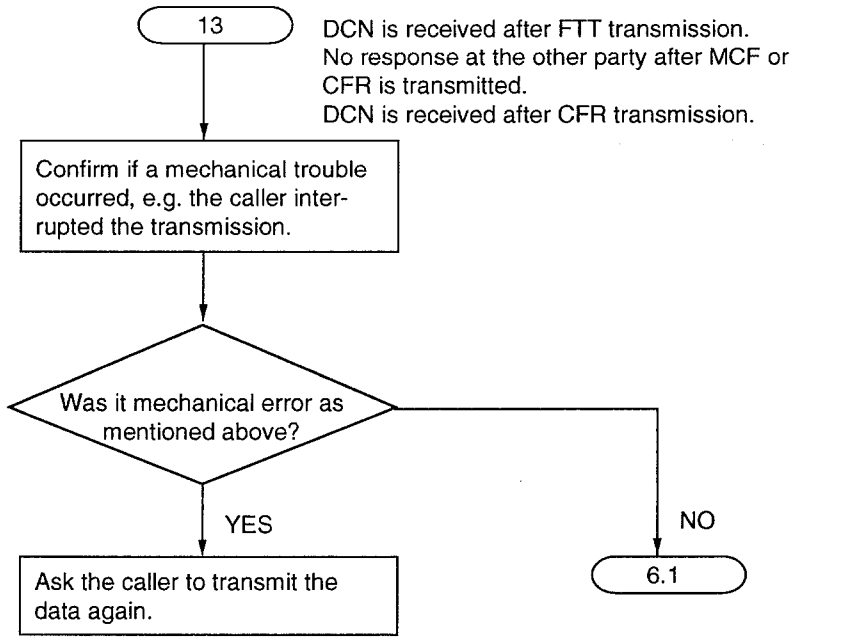

3
• FTT is received after transmission of 2400BPS training signal.
• DCN is received before DIS reception.
• Reception is other than EOP, EOM PIP, PIN, RTP and RTN.
Perform communication test using the LOOP simulator.
Is "Fall back" executed from 9600BPS?
YES
NO
3.1
Modem test (Refer to page 104.)
(1) Raise the level of transmission. (Do not raise the level above the standard of each country. If the communication should be OK at the level beyond the standard, it is attributable to line condition or the receiver's machine sensitivity condition.) If no effect is obtained.
(2) Slow down the transmission start speed and transmit to the receiver again.
Is communication OK?
YES
3.2
NO
Ask the receiver to perform FAX communication from the receiver to the caller.
If this error frequently occurs at the receiver, perform transmission in the above-mentioned mode on the receiver.
Is communication OK?
YES
NO
Perform voice communication with the receiver.
End
Check if the line is not interrupted by noises or in the cross talk. If it is not, wait until the line is satisfactory for correct communication.

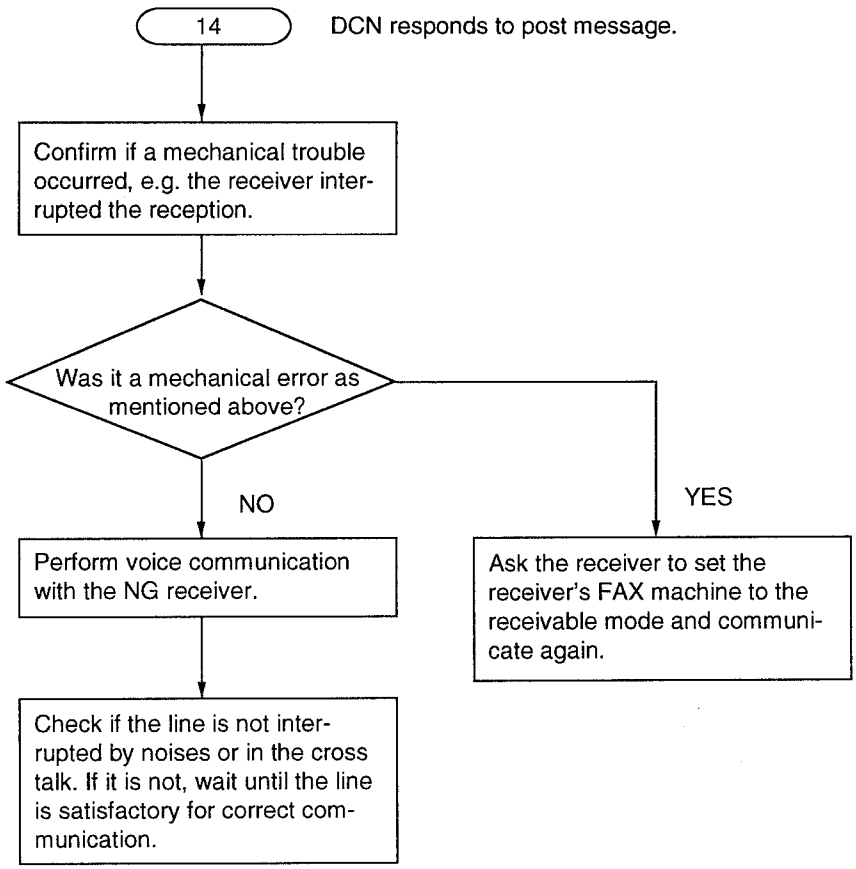

4
No response after post message is transmitted three times.
Ask the receiver if the caller's document is facsimiled correctly.
Is the data facsimiled correctly?
NO
3.2
YES
Ask the service section of the receiver's FAX machine to confirm the machine condition.
5
RTN and PIN are received.
3.1
6
No response after FTT is transmitted.
Perform communication test using the LOOP simulator and check the machine reception condition.
Modem test (Refer to page 104.)
YES
Is FTT sent from the receiver?
6.1
NO
: No problem on the machine hardware.
Perform voice communication with the NG caller.
Check if the line is not interrupted by noises or in the cross talk. If it is not, wait until the line is satisfactory for correct communication.

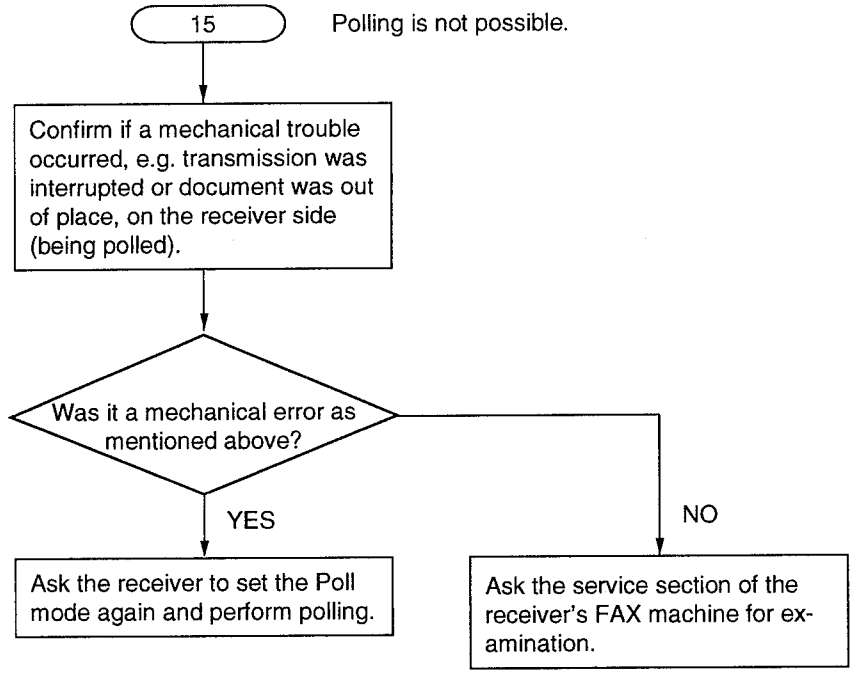

7
No post message
Turn ON the FAX monitor function and have the receiver transmit the data.
Does FAX signal sound (post message) after the image data is received?
NO
7.1
Ask the service section of the sender's FAX machine for examination.
YES
(Receive Complete)
Does an error (error code=48) still occur ?
NO
YES
Try again.
Decrease the RX speed.
Does an error lines exist on received document?
NO
7.1
YES
8
RTN is transmitted.
PIN is transmitted (to PRI-Q).
PIN is transmitted.
Perform communication test using the LOOP simulator and check the machine reception condition.
Modem test
(Refer to page 104.)
NO
Is the data facsimiled correctly?
YES
Turn ON the FAX monitor function and have the receiver in question transmit the data again.
Does the communication error "code 49" occur?
YES
NO
6.1
End

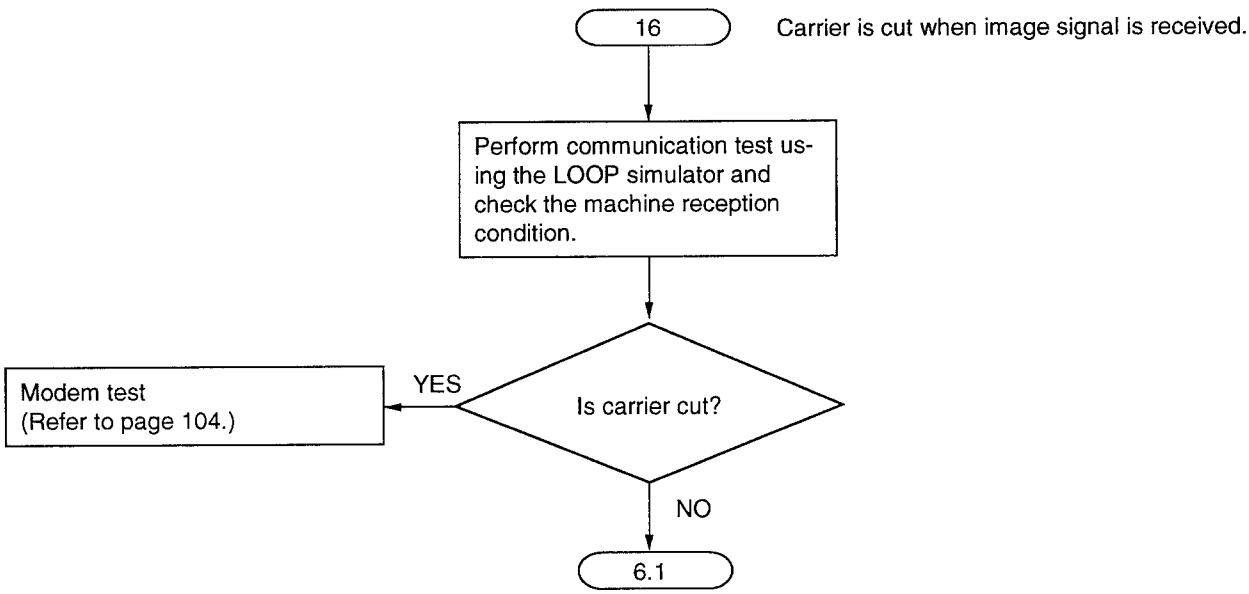

9
Reception is finished when T1 TIME is expired.
Perform communication test using the LOOP simulator and check the machine reception condition.
Is the data facsimiled correctly?
NO
Modem test
(Refer to page 104.)
YES
Turn ON the FAX monitor function and have the receiver in question transmit the data again.
Is communication OK?
NO
YES
End
Does FAX signal sound after the image data is received?
NO
YES
Confirm if the receiver's FAX machine was set to receivable mode.
6.1


10
DCN is received after transmission of NSC and DTC.
Confirm if a mechanical trouble occurred, e.g. transmission was interrupted or document was out of place, on the receiver side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section of the receiver's FAX machine for examination.
11
DCN is received after DIS transmission.
Confirm if a mechanical trouble occurred, e.g. the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Have the caller transmit the data again.
Ask the service section of the caller's FAX machine for examination.
12
300BPS error
Modem error
Check the hardware of the peripherals of the modem.


13
DCN is received after FTT transmission.
No response at the other party after MCF or CFR is transmitted.
DCN is received after CFR transmission.
Confirm if a mechanical trouble occurred, e.g. the caller interrupted the transmission.
Was it mechanical error as mentioned above?
YES
NO
Ask the caller to transmit the data again.
6.1


14
DCN responds to post message.
Confirm if a mechanical trouble occurred, e.g. the receiver interrupted the reception.
Was it a mechanical error as mentioned above?
NO
YES
Perform voice communication with the NG receiver.
Ask the receiver to set the receiver's FAX machine to the receivable mode and communicate again.
Check if the line is not interrupted by noises or in the cross talk. If it is not, wait until the line is satisfactory for correct communication.


15
Polling is not possible.
Confirm if a mechanical trouble occurred, e.g. transmission was interrupted or document was out of place, on the receiver side (being polled).
Was it a mechanical error as mentioned above?
YES
NO
Ask the receiver to set the Poll mode again and perform polling.
Ask the service section of the receiver's FAX machine for examination.


16
Carrier is cut when image signal is received.
Perform communication test using the LOOP simulator and check the machine reception condition.
Is carrier cut?
YES
Modem test
(Refer to page 104.)
NO
6.1

3) Remote programming

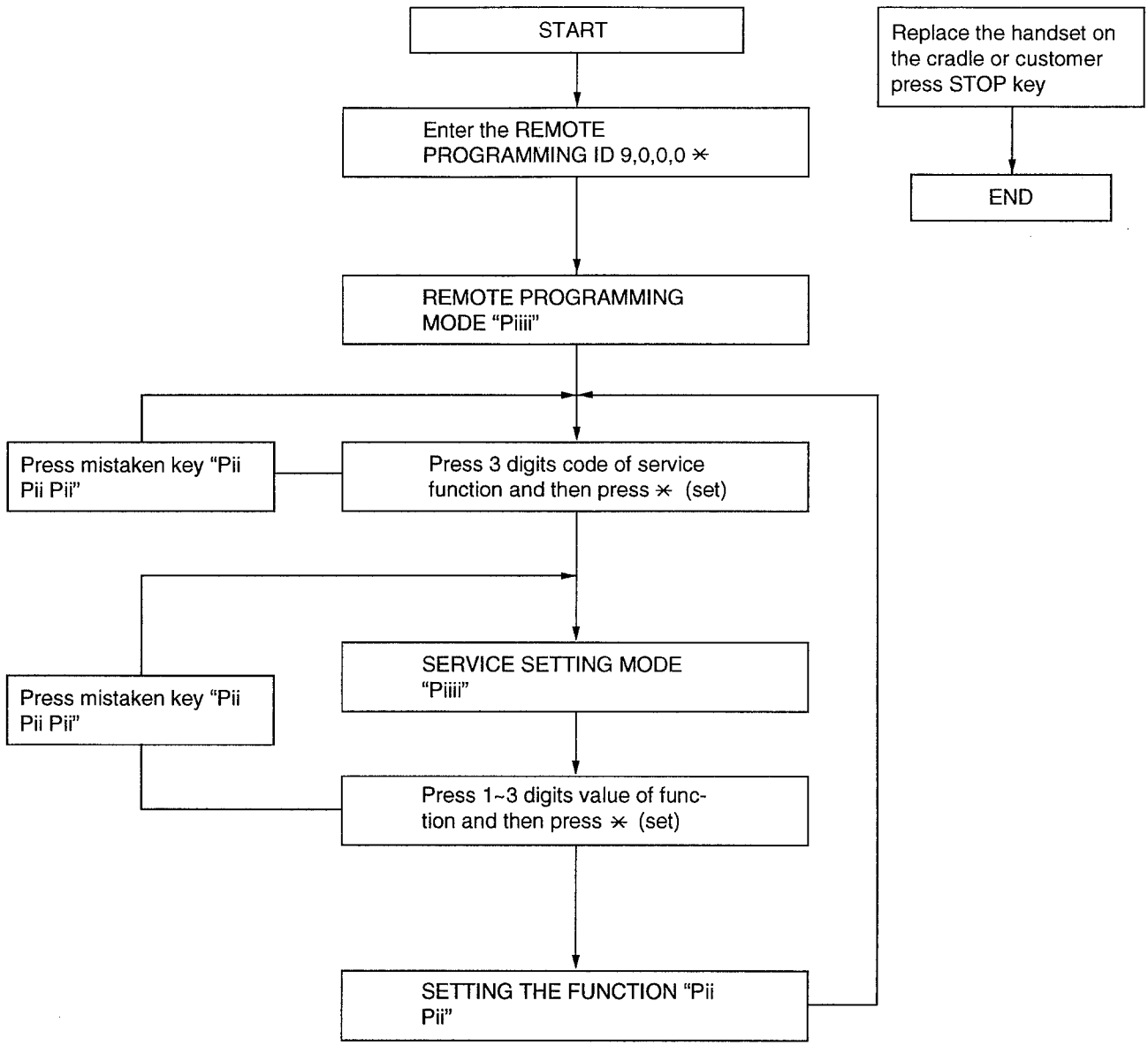
While a user is talking on the phone, a technician can set the function parameters of customer's unit from service center.

1. A call comes in service center.
2. A technician gets a claim from a customer.
3. He says to the customer "please press MENU button and wait for a moment".
4. The technician dial '9,0,0,0, ✳' from his telephone.
   The customer's unit is set REMOTE PROGRAMMING MODE and generates remote beep sound.
   He hears "Piiii' (one long beep).
5. He presses 3 digits code of service function written in service manual by dial keypad. (See ② program mode table)
   And presses ✳ (set).
   The customer's unit receives the service code.
   He hears "Piiii" (one long beep).
6. He presses 1~3 digits value of function written in service manual by dial keypad.
   And presses ✳ (set).
   The customer's unit receives the service value.
   He hears "Pii Pii" (double short beeps).
7. Then he can repeat from step 5.
8. When he wishes to end the REMOTE PROGRAMMING MODE, he replaces the handset on the cradle or the customer presses the STOP button.

Note:

1) To enter the REMOTE PROGRAMMING MODE is necessary in Step 3. Because the unit can not easily enter the REMOTE PROGRAMMING by DTMF signal from the other party.
2) If he presses wrong buttons when his operation is in step 5 or 6. he hears "Pii Pii Pii" (triple short beeps). Then he can repeat from the same step.
3) When customer's unit finishes transmitting a list (No. 911,994,999), he can have a voice conversation.
   And he can continue the REMOTE PROGRAMMING MODE.
4) When customer's unit start transmitting a list (No. 991,994,999), he does not hear "Pii Pii" (double short beeps).
   The unit generate CNG sound.

① **Summary of remote programming mode**



② Program mode table

Code	Function	Set Value	Default	Remote setting
001	Set date and time	mm/dd/yy hh:mm	(Jan/01/97)	NG
002	Your logo	- - - - -	(NONE)	NG
003	Your telephone number	- - - - -	(NONE)	NG
004	Transmission report mode	1:ERROR/2:ON/3:OFF	OFF	OK
005	Auto receive mode	1:EXT.TAM/2:FAX	FAX	OK
007	FAX ring count	1 to 4 rings	1	OK
008	Manual receive	1:TEL/2:TEL/FAX	TEL	OK
009	TEL/FAX ring	1 to 4 rings	1	OK
012	Remote TAM activation	ON/OFF	OFF/ID=11	NG
013	Dialing mode	1:PULSE/2:TONE/3:AUTO	AUTO	OK
015	Memory XMT	1:ON/2:OFF	ON	OK
021	Logo position	1:OUT/2:IN	OUT	OK
022	Auto journal print	1:ON/2:OFF	ON	OK
023	Overseas mode	ON/OFF	OFF	NG
024	Junk mail proh.	1:ON/2:OFF	OFF	OK
025	Delayed transmission	ON/OFF	ON	NG
030	Silent FAX recognition ring	3 to 6rings	3	OK
031	Distinctive ring	1:OFF/2:A/3:B/4:C/5:D	OFF	OK
033	Film/Paper save	1:ON/2:OFF	OFF	OK
034	Extension copy	- - - - -	- - - - -	NG
035	Copy reduction	92%/72%/OFF	OFF	NG
036	RX reduction	1:92%/2:86%/3:72%/4:OFF	92%	OK
039	LCD contrast	1:NORMAL/2:DARKER	NORMAL	OK
040	Silent detection	1:ON/2:OFF	ON	OK
041	Remote FAX activation code	1:ON/2:OFF	ON ID=＊9	NG
044	Receive alert	1:ON/2:OFF	ON	OK
046	Friendly rcv.	1:ON/2:OFF	ON	OK
070	FAX pager	ON/OFF	OFF	NG
079	Film detection	1:ON/2:OFF	ON	OK
080	Set default	YES/NO	NO	NG
501	Pause time set	001~600×100msec	050	OK
502	Flash time set	01~99×10msec	70	OK
503	Dial speed	1:10/2:20pps	10	OK
520	CED frequency select	1:2100/2:1100Hz	2100	OK
521	International mode select	1:ON/2:OFF	ON	OK
522	Auto standby select	1:ON/2:OFF	ON	OK
523	Receive equalizer select	1:ON/2:OFF	OFF	OK
550	Memory clear	- - - - -	- - - - -	NG
551	ROM check	- - - - -	- - - - -	NG
552	DTMF signal tone test	1:ON / 2:OFF	OFF	NG
553	Monitor on FAX communication select	1:OFF/2:Phase B/3:ALL	OFF	OK
554	Modem test	- - - - -	- - - - -	NG
555	Scanner test	- - - - -	- - - - -	NG
556	Motor test	- - - - -	- - - - -	NG
557	LED test	- - - - -	- - - - -	NG
558	LCD test	- - - - -	- - - - -	NG
559	Document jam detection select	1:ON/2:OFF	ON	OK
561	Key test	- - - - -	- - - - -	NG
563	CCD position adjustment value set	00~30	- - - - -	OK
570	Break % select	1:61%/2:67%	61%	NG
571	ITS auto redial time set	00~99	14	OK
572	ITS auto redial line disconnection time set	001~999	030	OK
573	Remote turn-on ring number set	01~99	15	OK
590	FAX auto redial time set	00~99	05	OK
591	FAX auto redial line disconnection time set	001~999	045	OK
592	CNG transmit select	1:OFF/2:ALL/3:AUTO	All	OK
593	Time between CED and 300bps	1:75ms/2:500ms/3:1sec	75ms	OK

Code	Function	Set Value	Default	Remote setting
594	Overseas DIS detection select	1:1st/2:2nd	1st	OK
595	Receive error limit value set	001~999	100	OK
596	Transmit level set	-15~00dBm	-10	OK
626	Paper full sensor detection	1:ON/2:OFF	ON	OK
700	EXT. TAM OGM REC. time	01~99	10sec	OK
701	No voice defect time	01~99	50 X100msec	OK
702	EXT. TAM/FAX ring count	0~9	5	OK
717	Transmit speed select	1:9600/2:7200/3:4800/4:2400bps	9600bps	OK
718	Receive speed select	1:9600/2:7200/3:4800/4:2400bps	9600bps	OK
719	Ringer off in TEL/FAX mode	1:ON/2:OFF	ON	OK
721	Pause tone detect	1:ON/2:OFF	ON	OK
722	Redial tone detect	1:ON/2:OFF	ON	OK
732	Auto disconnect	1:350msec/2:180msec/3:OFF	350msec	OK
745	Power ON film feed	1:ON/2:OFF	ON	OK
763	CNG detect time for friendly reception	1:10s/2:20s/3:30s	20s	OK
771	T1 timer	1:35sec/2:60sec	35sec	OK
815	Sensor & VOX test	-----	-----	NG
852	Print test pattern	-----	-----	NG
853	Top margin	1~9	-----	OK
854	Left margin	1~8	-----	OK
861	A4 size set	1:ON/2:OFF	OFF	OK
880	Special service journal	1: Start	-----	OK
890	TEL/FAX ring back tone	1:ON/2:OFF	ON	OK
991	Set up list	1: Start	-----	OK
994	Journal list	1: Start	-----	OK
999	Service list	1: Start	-----	OK

OK means "can set"
NG means "can not set"

3.4.4 Digital board section

How to fix the digital board that doesn't start up the unit.

① Overview

If you see a human being down on the street, what will you do for him?
You may talk to him.
But if he doesn't answer, you check his breath or pulse, don't you.
Why do we check them?
Breath, pulse....We needs must do it to live.
We start to check from most basic things to live.

Checking (or repair) the Board doesn't work is similar to it.
We should start to check from most basic things to work.

What is most basic to work ?

1. POWER SUPPLY (+5V, +24V, +3.3V)
2. SOLDERING of ICs
3. OSCILLATOR (CLK) (CPU CLK :16MHz , SYSTEM CLK : 24MHz ,MODEM CLK: 24MHz)
4. RESET
5. SIGNALS
   - ADD/DATA BUS (AD0 ~AD7)
   - ALE
   - READ, WRITE (RD , WR)
   - CS (Chip select) (ROMCS)
   - IR (Interrupt) (INT , IRQ)

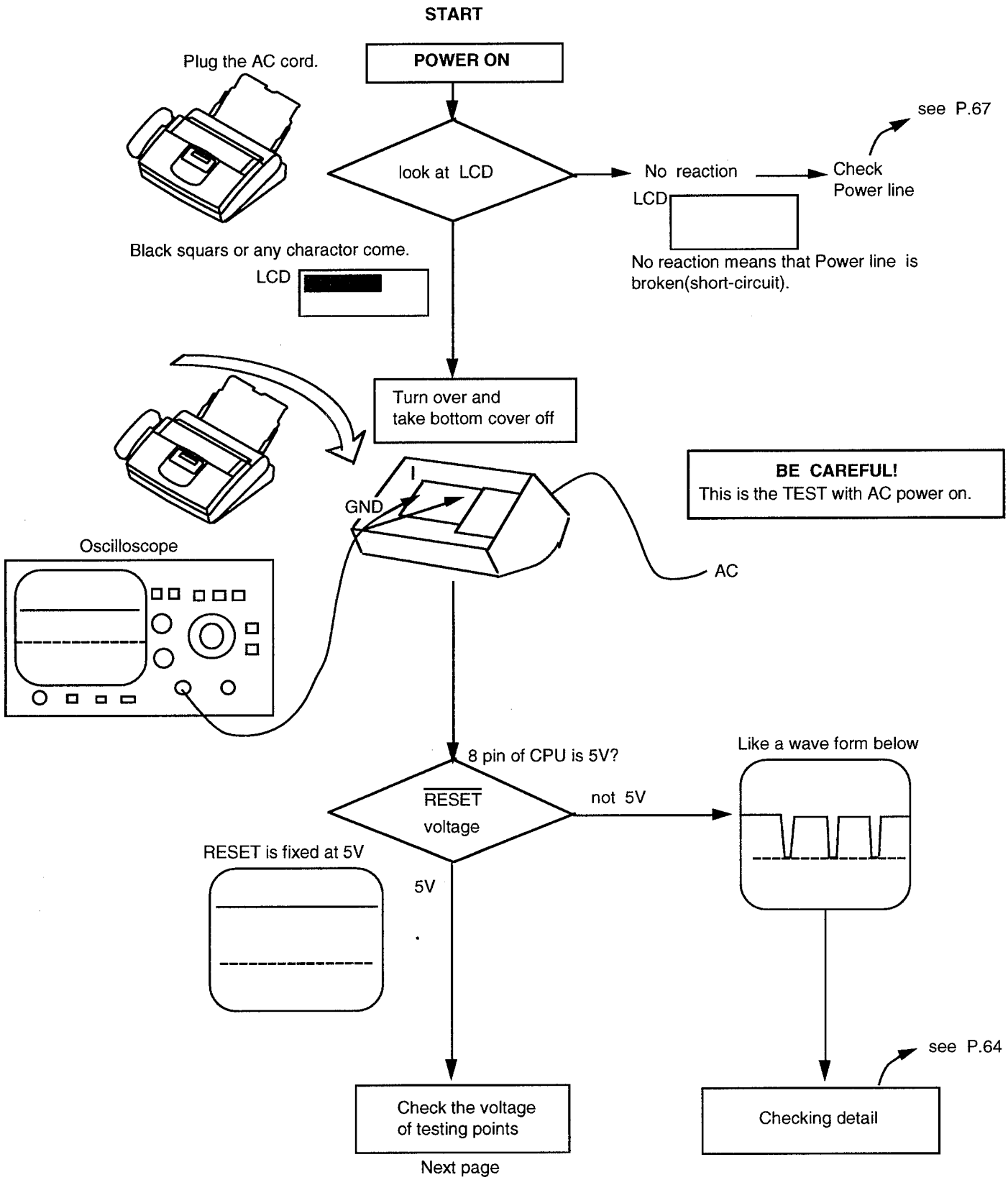
"board doesn't work " means that board has any problems in these most basic things.

This document is going to explaining the order of repair with flow chart at first and then explaining individual point of those items in detail.

— memo —

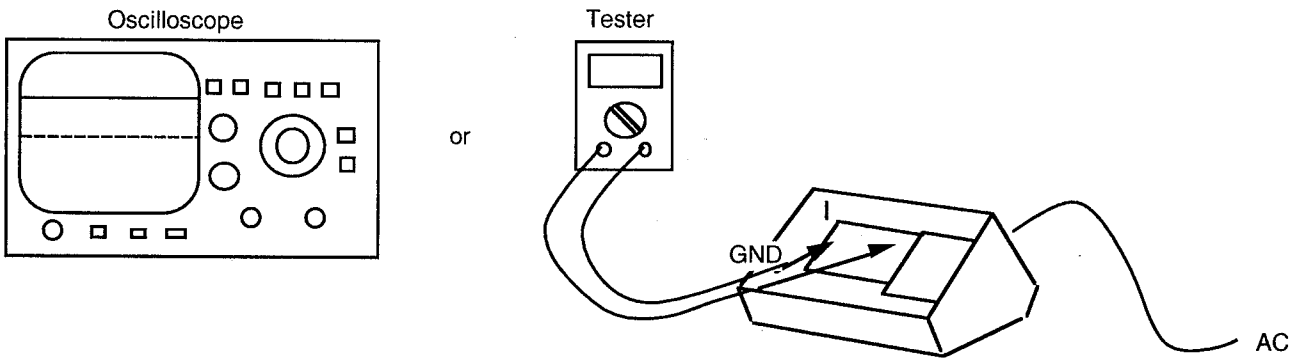
CPU : central processing unit	for control the unit.
MDM : modem (modulater/demodulater)	for fax communication.
CLK : clock	to provide a pulse.
ROM : read only memory	to store a program(software).
RAM : randum access memory	to store a data.
(SRAM :static RAM, DRAM : dinamic RAM)	
RTC : rial time clock	timing device.
adr : address	whereabouts of a stored data.
RD : read	to read a data.
WR : write	to write a data.

② **Procedure from our experience to fix.**



KX-FP200

Please check the status (voltage) of test land A, B and C.
These status may tell you defective point.



When you check that, short between the test land and +5V land.

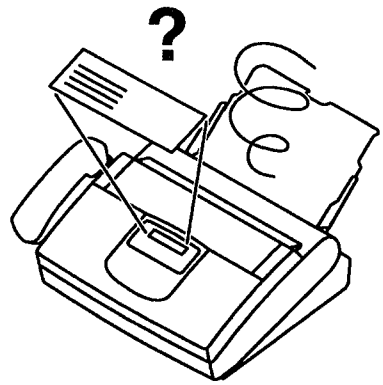
This could be defective point	Status(voltage) of check points			
	C	B	A	Please check here!
	0V	0V	0V	
RTC(IC4)	0V	0V	5V	IC4
DRAM(IC6)	0V	5V	5V	IC6, IC1(42,53,57pin), IC4(103-115pin), L2, RA1-RA4, R51, R52, R522, R523
MODEM(IC5)	5V	0V	0V	IC5, IC4(69pin), RA5, RA6, R36, LC2, L3
ASIC(IC4)	5V	0V	5V	IC4
	5V	5V	0V	
ALL OK	5V	5V	5V	

↓

Please check soldering and conduction of these components.
If it is no problem, replace ICs.

↓

If you still have problem, please go to "checking detail".



③ Check LCD on the machine

If digital board had broken,
machine does not react at all
and black squear will be on the LCD.

There are 5 processes to display some letters
(12:00 AM) on LCD.

If processes were not complete, black squear will be on the LCD.

1. POWER ON — NG → if defective is in the power line, LCD doesn't change. LCD: □
2. OSC — NG → black squear LCD: □□□□
3. RESET — NG → black squear LCD: □□□□
4. Read the data in the ROM (program start) — NG → black squear LCD: □□□□
5. Make periphrals initial — NG → black squear LCD: □□□□

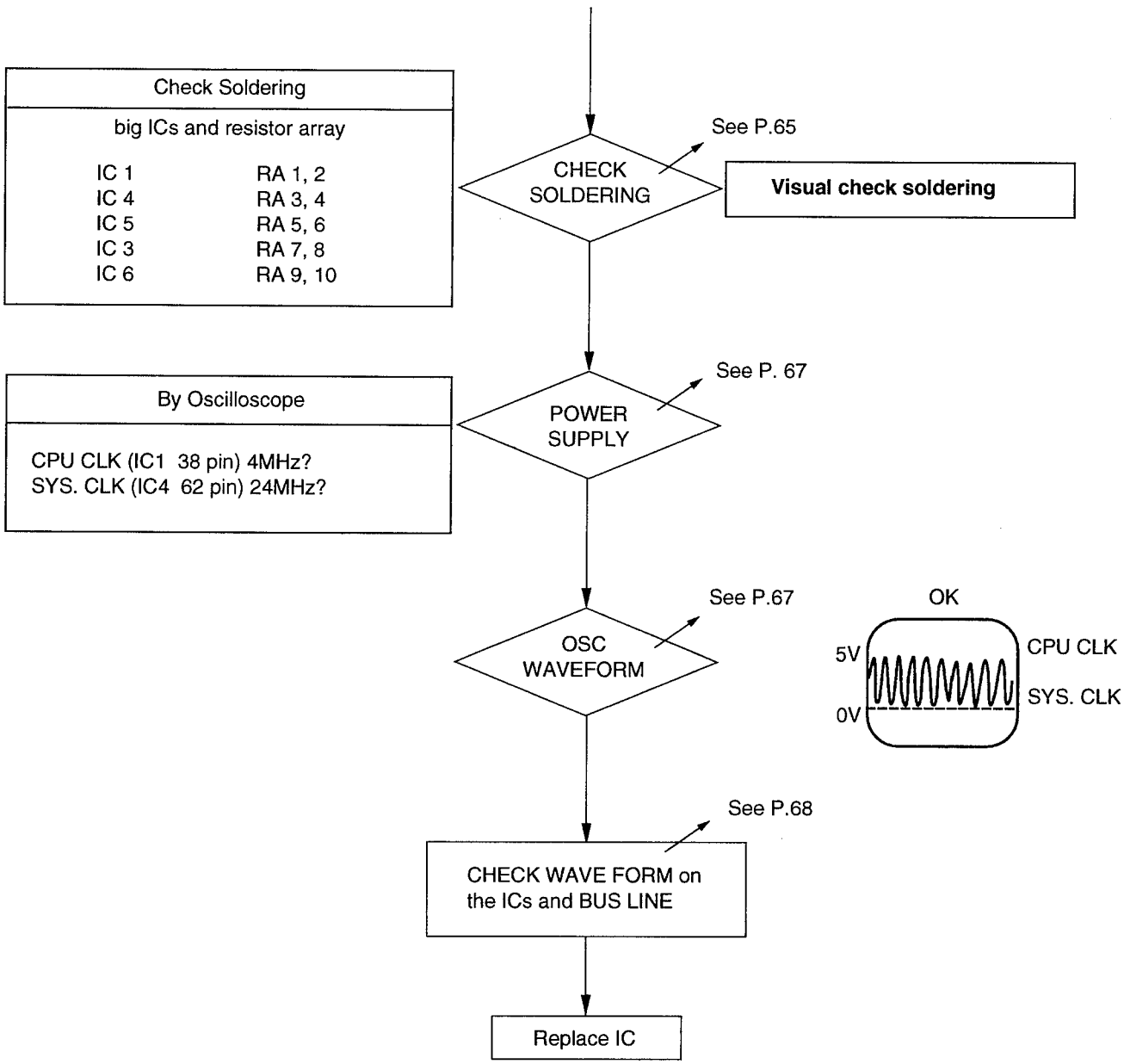
LCD 12:00 AM

Monitoring(KEY IN)

Let's begin to repair !

A. CHECKING DETAIL

Please check the soldering first, it comes from our experience.



B. CHECK SOLDERING

You should check soldering at first because many problems are caused by defective soldering.

How to Visual-Check the soldering

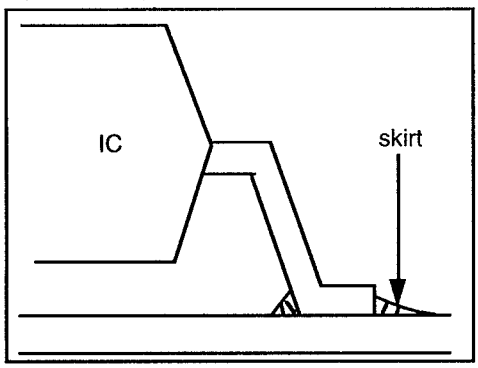
Defective soldering (shorted, un-welded, oxidized.....)
doesn't have a good looking outward.
In other words outward (gloss, brightness, form) is important for soldering.
So we should do visual inspection.

A basis of soldering is skirt !

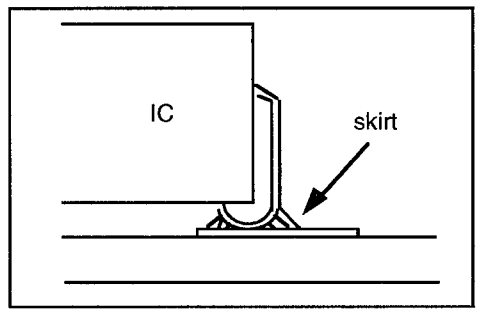
Smooth skirt is shaped by surface tension
as melting cream solder in reflow machine or lifting PCB from DIP.

SECTION OF SOLDERING SKIRT

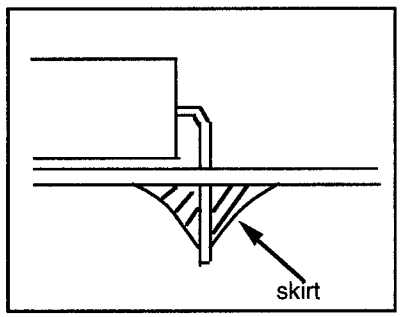
SMT(QFP, SOP) parts : ASIC , MDM, SRAMCPU



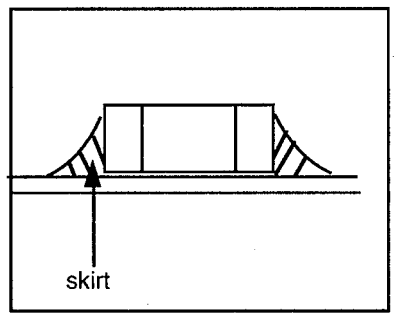
SMT(SOJ) parts : DRAM



leaded parts

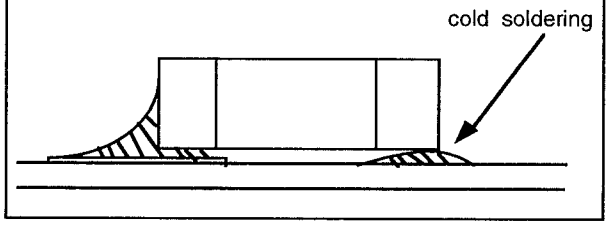


chip parts resistor arry

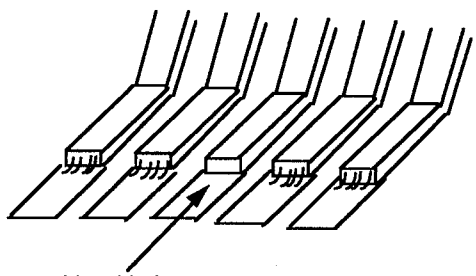


COLD (un-welded) SOLDERING

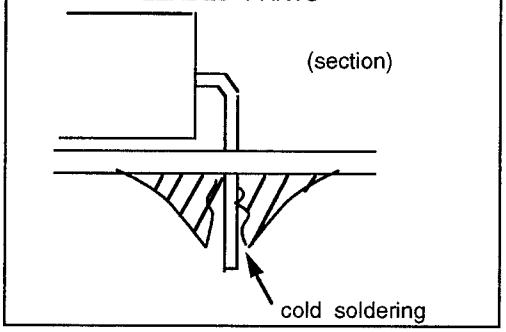
CHIP PARTS (section)



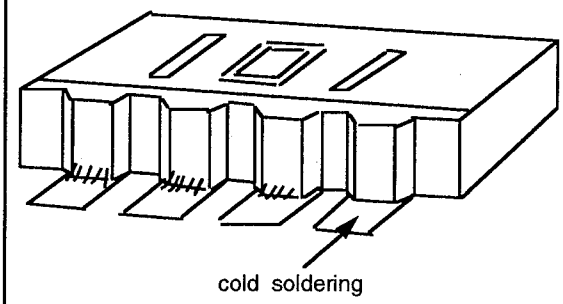
SMT PARTS



LEADED PARTS

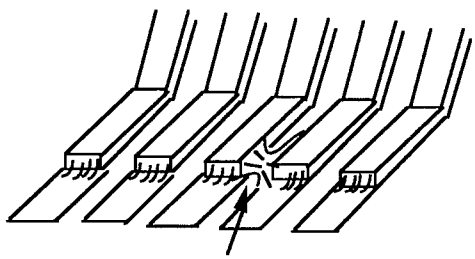


RA RESISTOR ARRAY

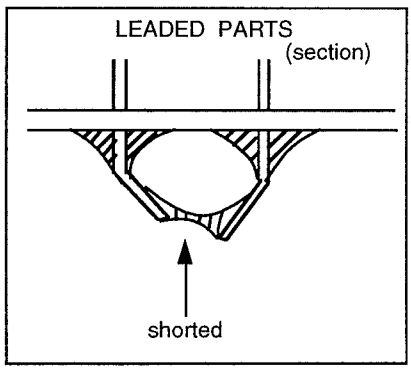


SHORTED SOLDERING

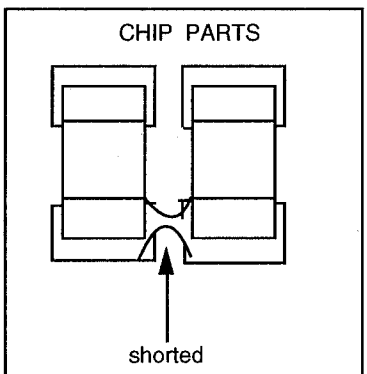
SMT PARTS



LEADED PARTS (section)



CHIP PARTS



C. POWER SUPPLY

(5V, 24V, 3.3V)

1. With AC power off

Please check SHORT CURCUIT of power line.

1). 5V line at CN1 between 4 pin and 6 pin, is it short?
2). 24V line at CN1 between 2 pin and 5 pin, is it short?
3). 3.3V line between collector of Q 12 and 4 pin of CN1, is it short?

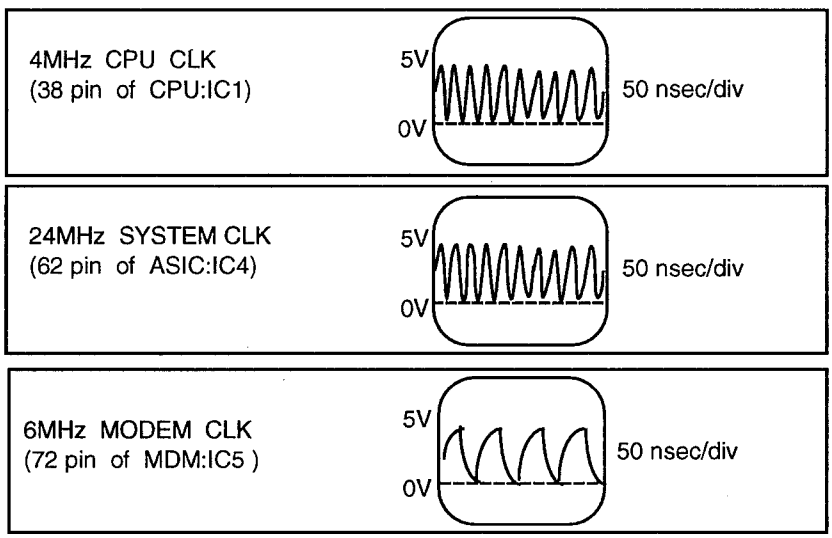
2. With AC power on

Please check VOLTAGE of power line.

1). 5V line at CN1 between 4 pin and 6 pin, is 5V ?
2). 24V line at CN1 between 2 pin and 5 pin, is 24V ?
3). 3.3V line between collector of Q12 and 4 pin of CN1, is it 3.3V ?

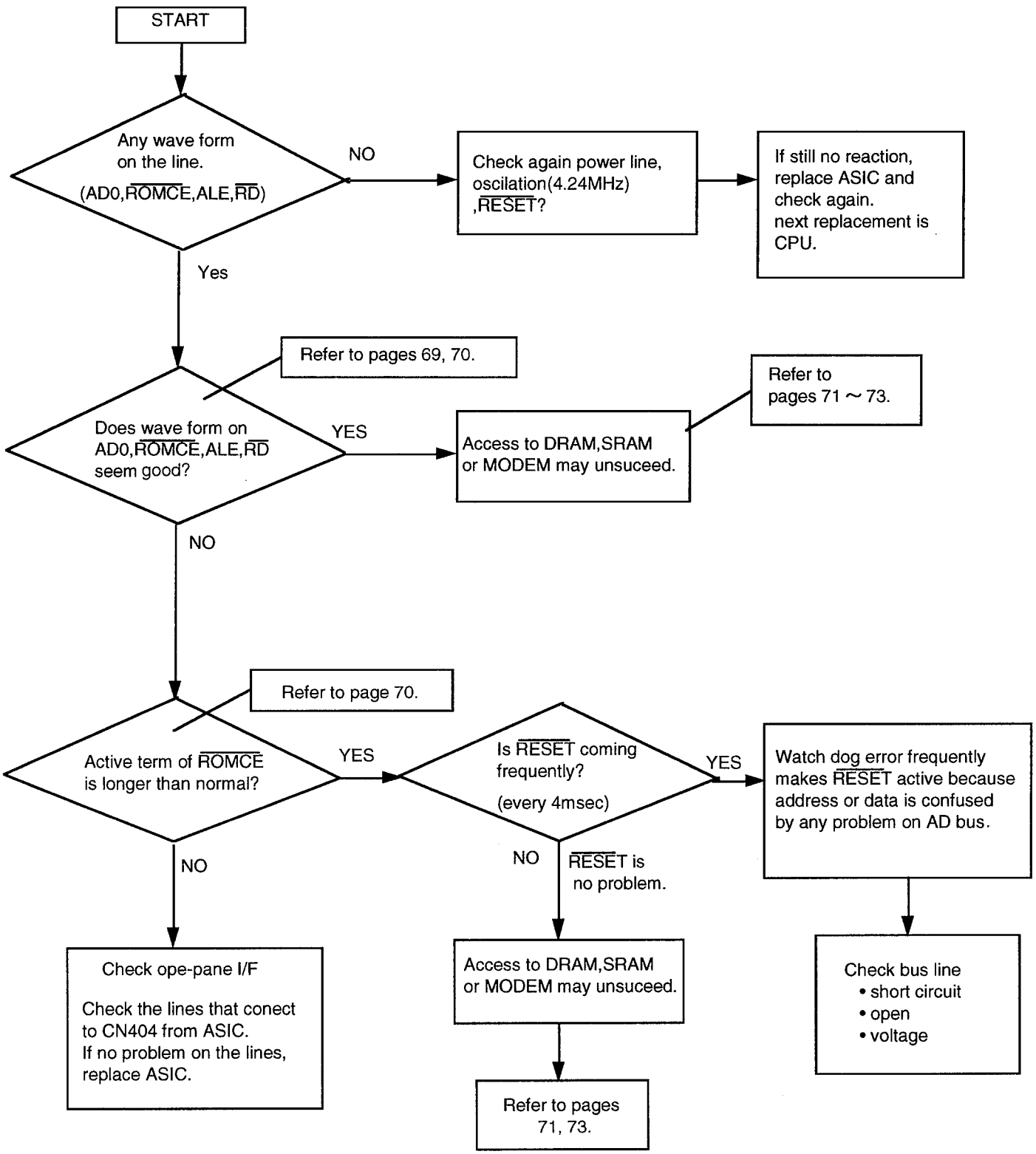
D. OSCILATER (CLK)

CPU CLK: 4MHz, SYSTEM CLK: 24MHz, MODEM CLK: 6MHz



E. CHECK WAVE FORM

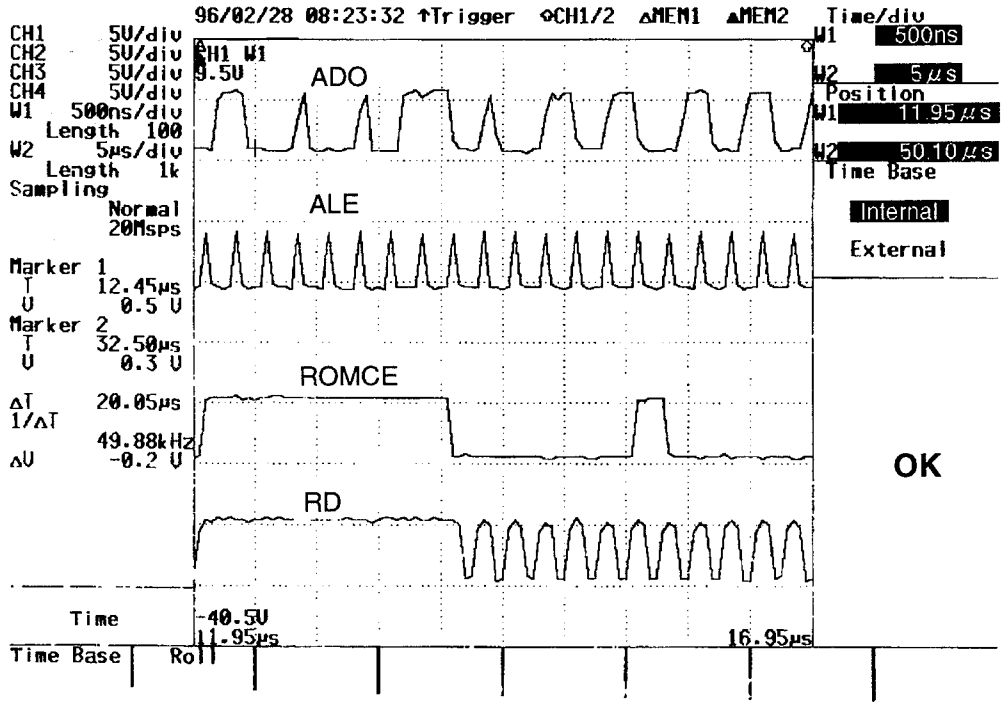
This check needs 4 channels digital storage oscilloscope higher than 400MHz.

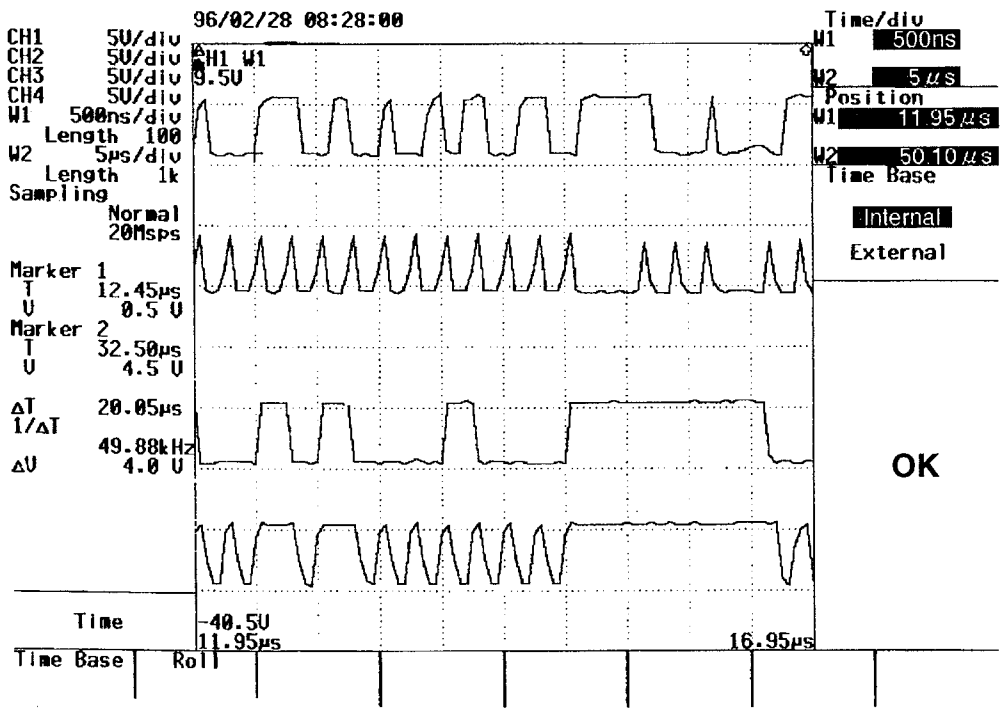


Let's observe the wave form to fix the defective IC.

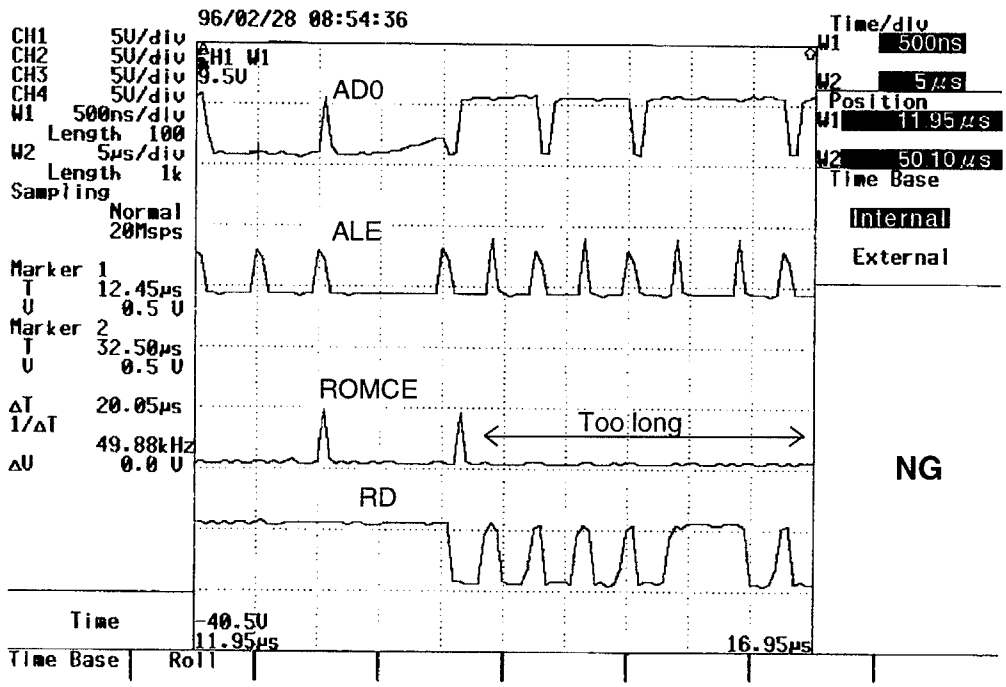
Please observe AD0, ALE, ROMCE, and RD by using digital oscilloscope.
Wave form is rapidly changing one by one (like below graphs) because many kinds of data or programs are immediately executed.
The followng graphs show you the wave forms that are ovserved when unit(board) is working correctly. Both graphs show normal wave.

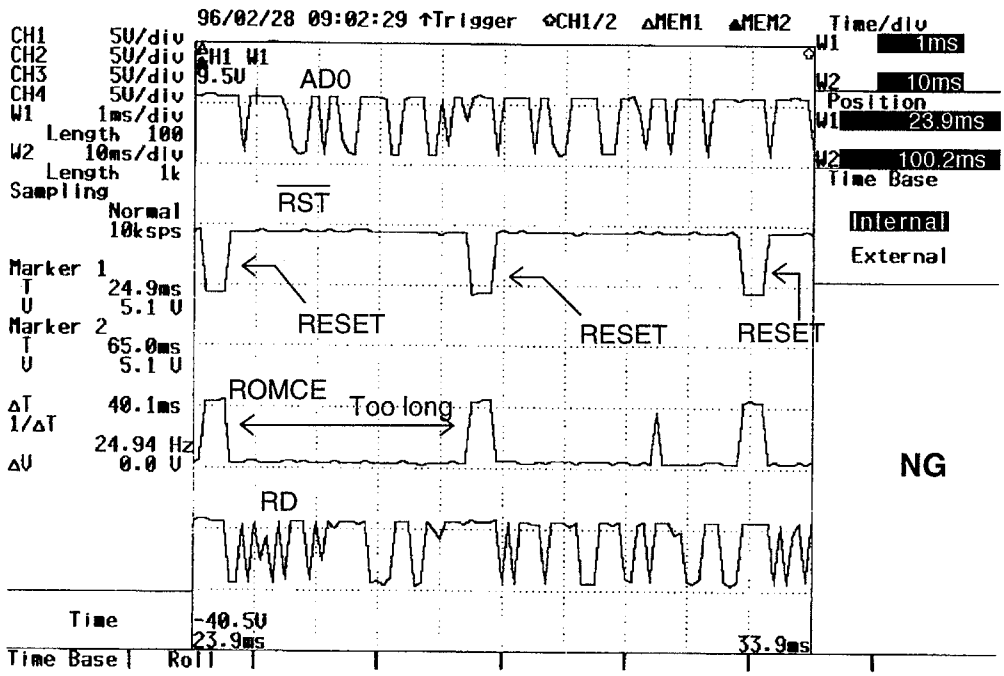
Name	Location
AD0	:PIN17 of CPU(IC1)
ALE	:PIN25 of CPU(IC1)
ROMCE	:PIN22 of ROM(IC2)
RD	:PIN24 of ROM(IC2)
RAS	:PIN8 of DRAM(IC6)
SRAMCS	:PIN20 of SRAM(IC3)
MDMCS	:PIN69 of ASIC(IC4)



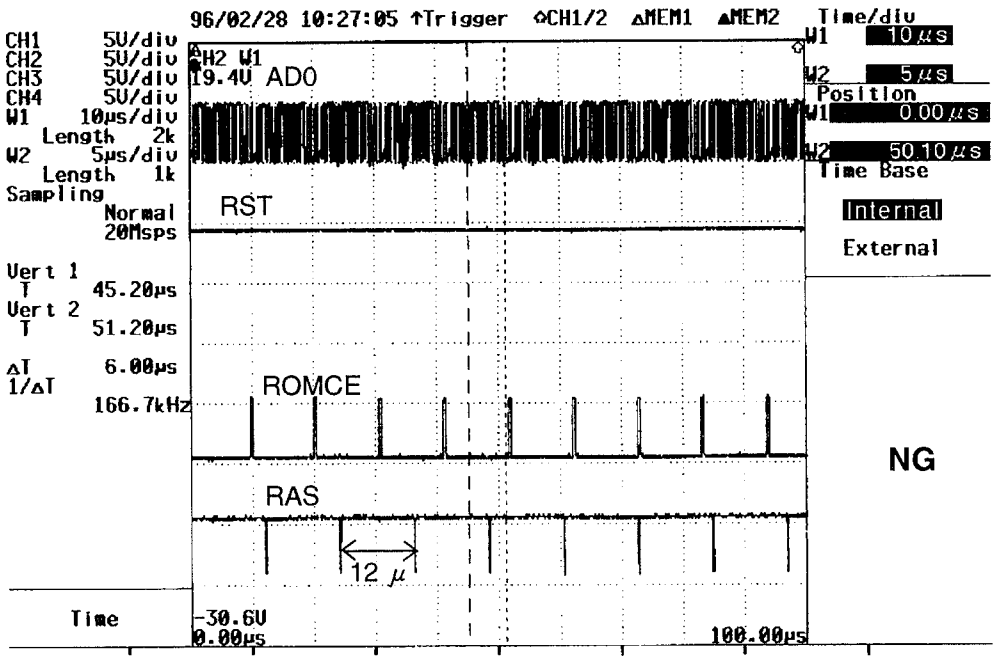


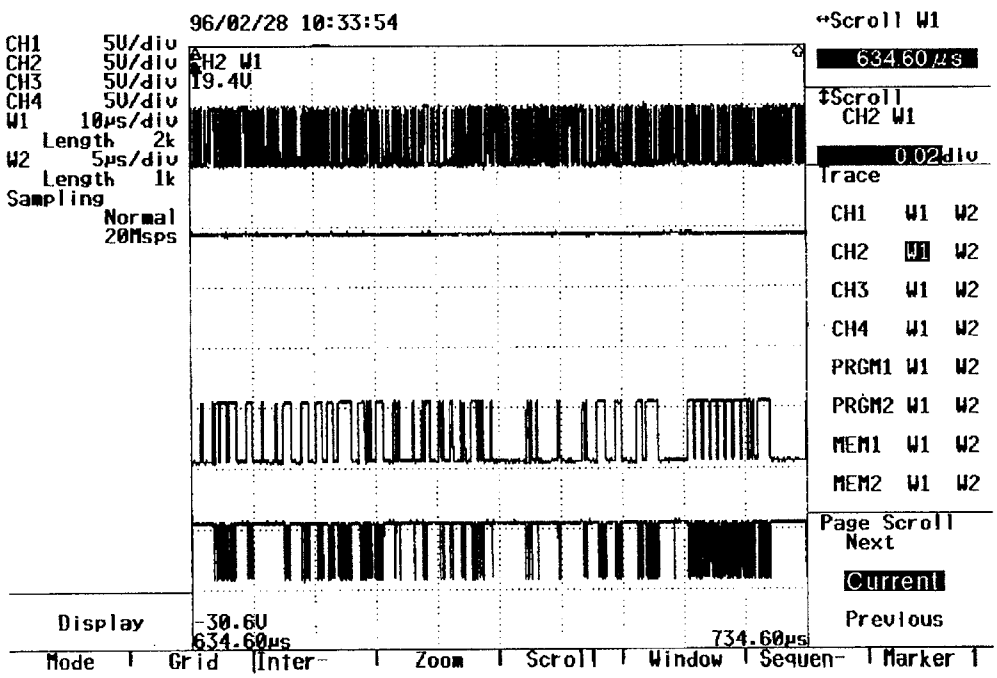
The graphs below show you the wave form that is observed when the unit(board) doesn't work.
(AD3 is intentionally opened at pin 20 of the CPU in this board.)
Please chek that active(low level) term of ROMCE is longer than the normal wave form.
"ROMCE is active(low level) except when RESET is active."
In the case of this wave form, CPU(IC1), ASIC(IC4), ROM(IC2) or the bus line route is possibly a defect. If soldering, conductance is no problem. You need to replace these ICs.



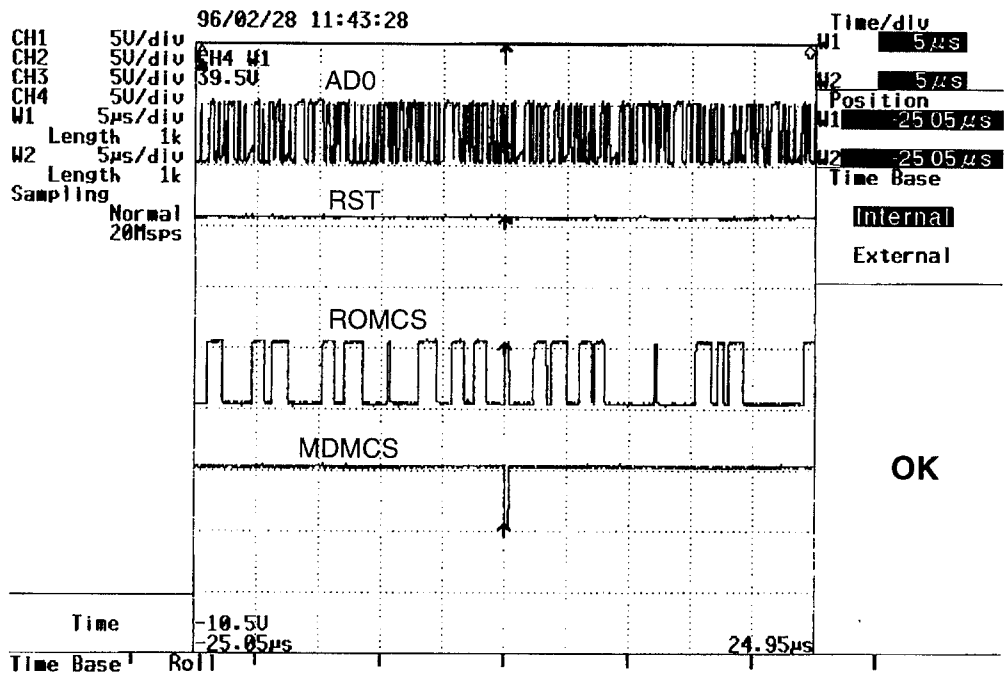


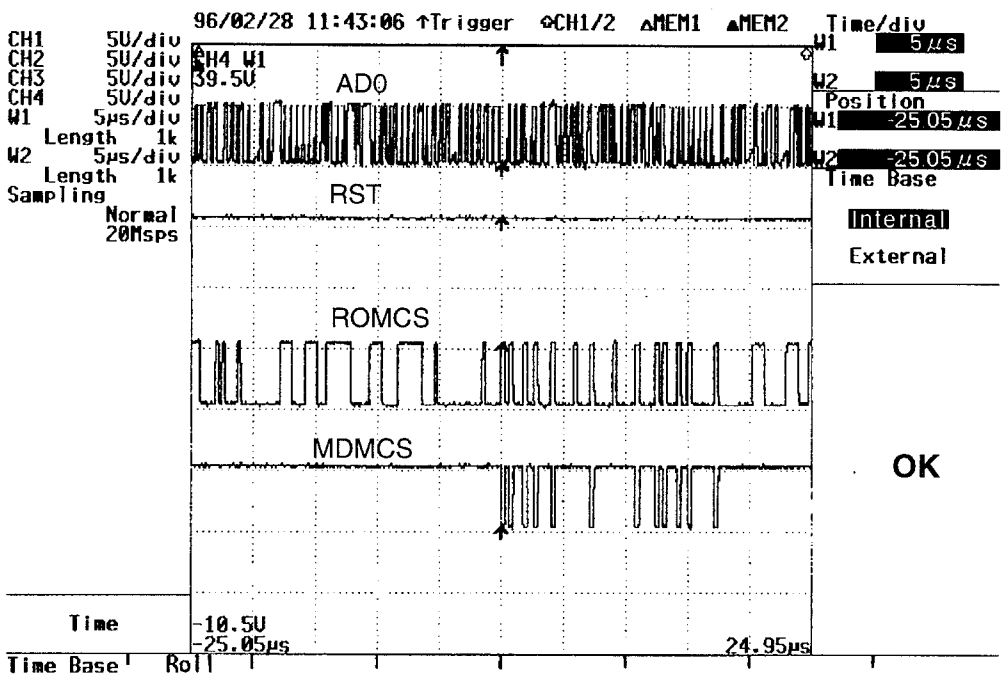
The graphs below show you the wave form that is observed when the unit(board) doesn't work.
DA9 is intentionally opened at pin 9 of DRAM:IC6 in the board.)
Please chek that RAS (8pin of IC6) signal is periodically coming every 12µsec.
Please compare OK(under) to NG(upper).
In the case of this wave form DRAM access is not succeeded.
If soldering, conductance is no problem, you need to replace DRAM(IC6) or ASIC or CPU.



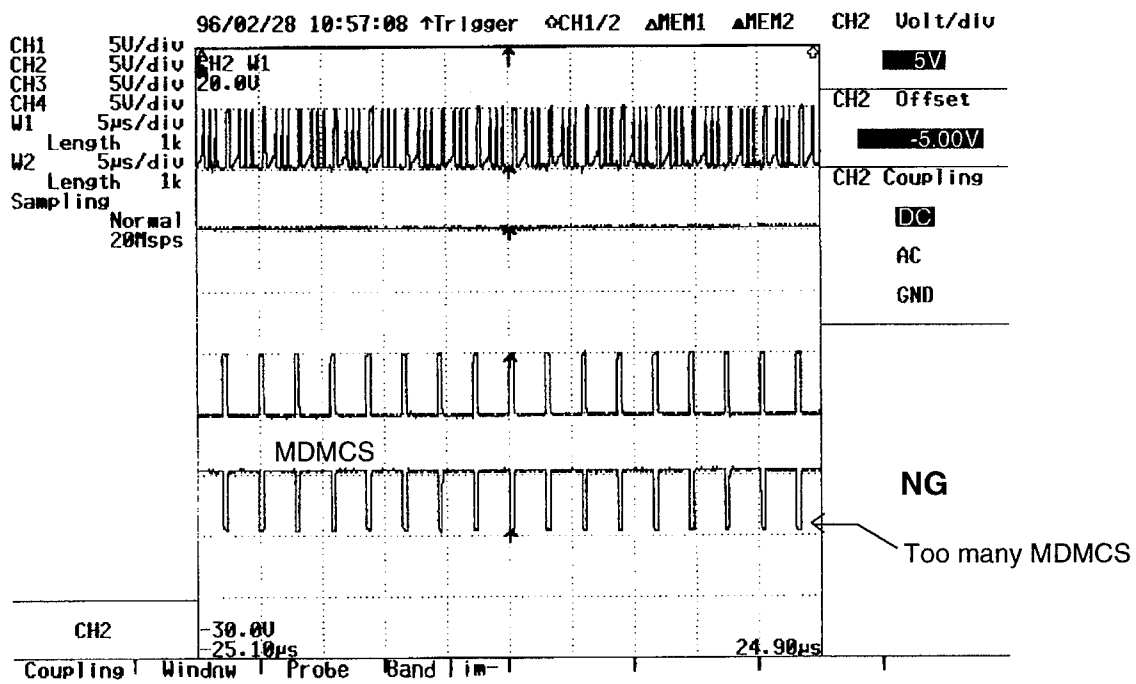


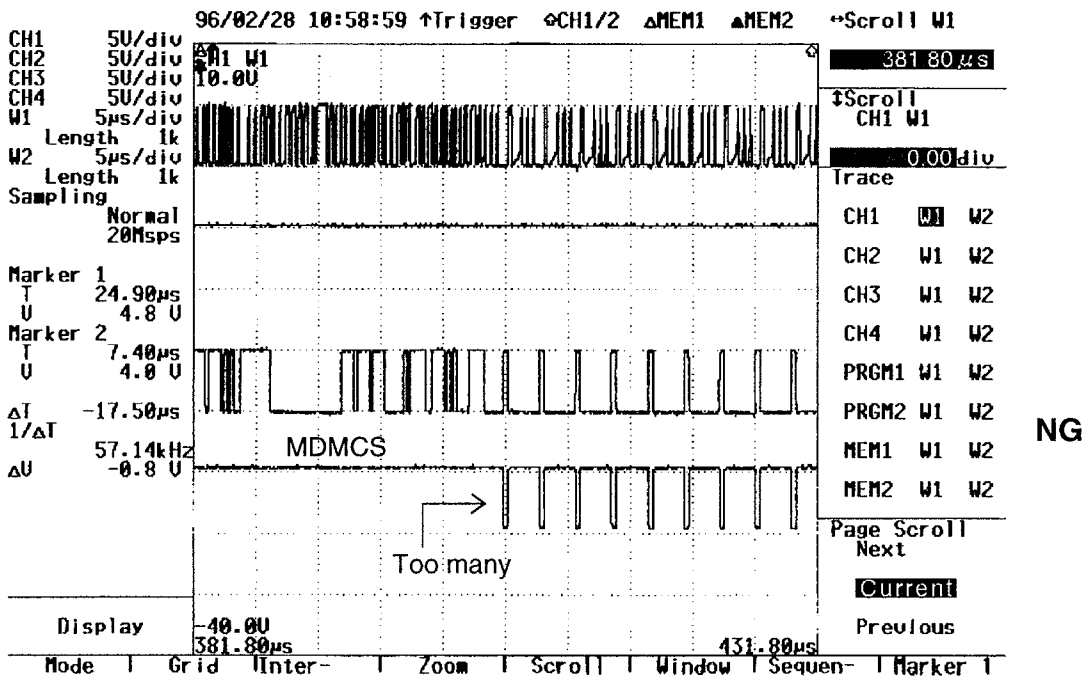
Please observe AD0, RESET, ROMCE, and MDMCS.
The graphs below show you the wave forms that are ovserved when unit(board) is working correctly.
Both graphs show normal wave.



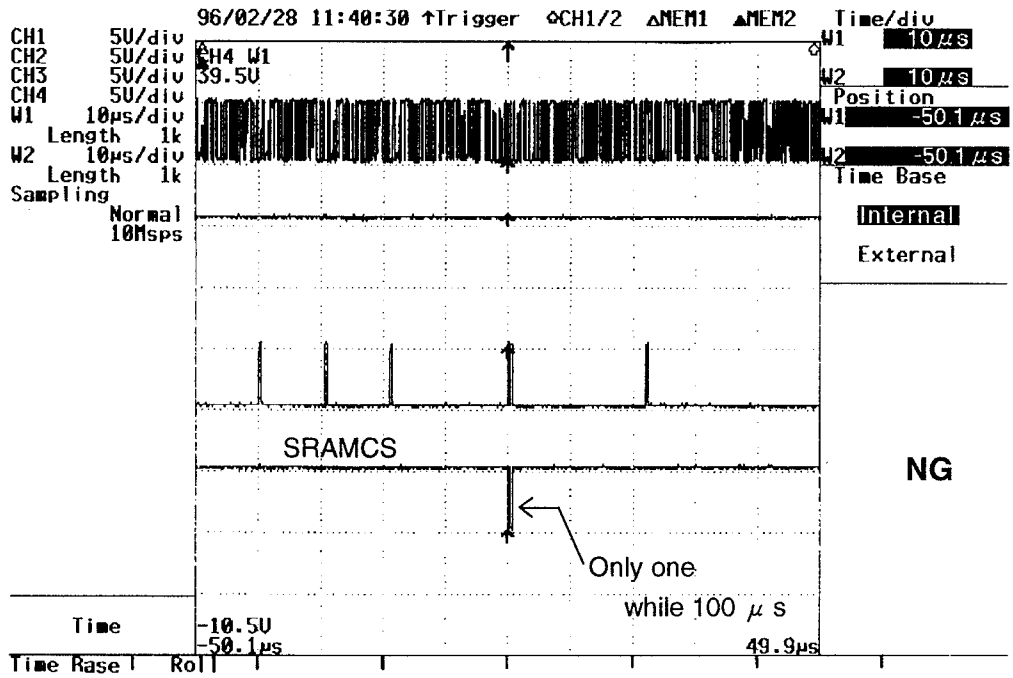


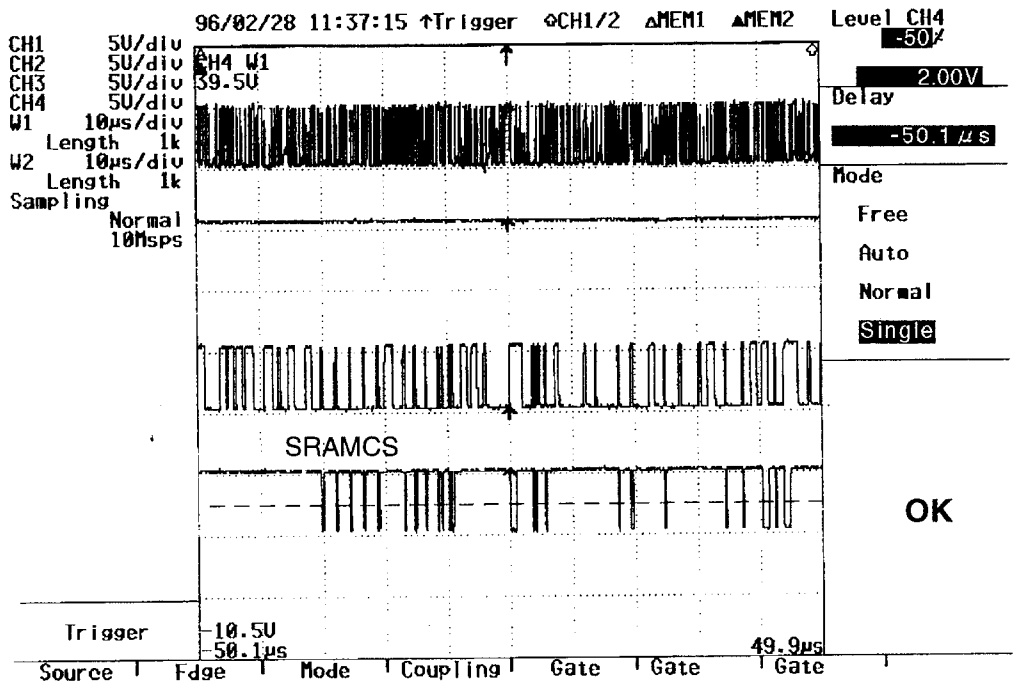
The graphs below show you the wave form that is observed when the MODEM doesn't work.
Oscillation is not intentionally supplied to MDM.)
Please compare OK(under) to NG(upper).
The MDMCS(69 pin of IC4) signal comes more times than the normal wave form.
In the case of this wave form, the MODEM doesn't work.
If soldering, conductance is no problem. You need to replace the MODEM(IC5).





The graphs below show you the wave form that is observed when SRAM doesn't work.
BUS line at SRAM is intentionally opened.)
Please compare OK(under) to NG(upper).
The SRAMCS(20 pin of IC3) signal comes only one time in 100µsec.
In the case of this wave form, the SRAM access is not successful.
If soldering, conductance is no problem. You need to replace the SRAM(IC3).

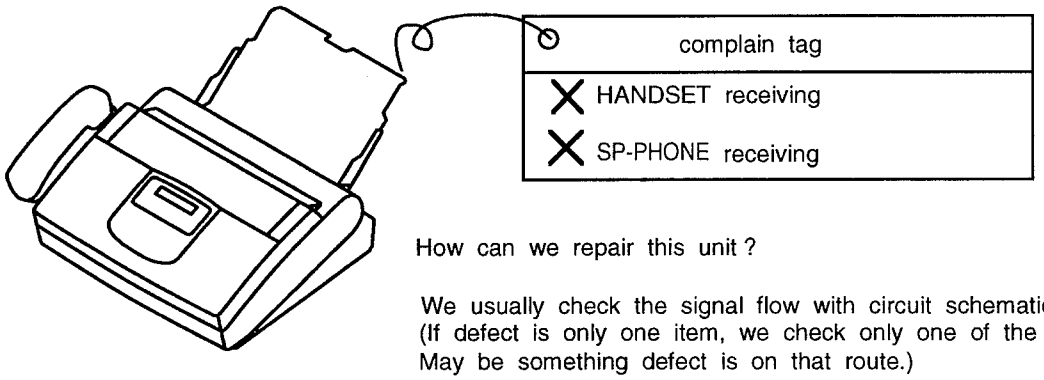




3.4.5 Analog Board Section

For example

Returns from customers have 2 of the defects.



How can we repair this unit ?

We usually check the signal flow with circuit schematic.
(If defect is only one item, we check only one of the signal route. May be something defect is on that route.)

If there is more than one defect, you need to check some of the routes. At first, you should check the area where there are common components on these signal routes.

Please see the check sheet (next page).

CHECK SHEET

(SYMPTOM) ITEMS TO CHECK	IN → Signal ROUTE → OUT
SP-PHONE Tx	MIC-J270-C138-IC109(13-27)-C143-R145-IC151(75-63)-C203-R210-IC201(2-1)-C202-R201-T101-TEL LINE
SP-PHONE Rx	TEL LINE-T101-R202-C205-IC201(6-7)-C210-C173-R172-R173-C174-IC151(59-71)-C142-R143-IC109(22-30)-C145-IC109(4-7)-R146-IC151(40-38)-R245-C245-IC241(4-5,8)-Speaker
HANDSET Tx	MIC ─ L151-R154-C167 ─ IC151(52,54-63)-C203-R210-IC201(2-1)-C202-R201-T101-TEL LINE L152-R155-C168
HANDSET Rx	TEL LINE-T101-R202-C205-IC201(6-7)-C210-C173-R172-R173-C174-IC151(59-45,46) C154-L154 ─ Speaker L153
DTMF monitor – Speaker	{IC5(44)-C26-R14-IC8(6-7)-CN1(10)}-CN271(10)-C184-R184-IC151(76-41)-C158-R161-IC151(40-38)-R245-C245-IC241(4-5,8)-Speaker
DTMF monitor – Handset	{IC5(44)-C26-R14-IC8(6-7)-CN1(10)}-CN271(10)-C184-R184-IC151(76-45,46) C154-L154 ─ Speaker L153
DTMF for TEL LINE FAX Tx	{IC5(44)-C26-R14-IC8(6-7)-CN1(10)}-CN271(10)-C184-R182-IC151(73-63)-C203-R210-IC201(2-1)-C202-R201-T101-TEL LINE
Dummy Ring Back tone	{IC4(41)-R45-R512-C506-CN2(1)}-CN272(1)-R186-C187-IC151(78-63)-C203-R210-IC201(2-1)-C202-R201-T101-TEL LINE
RINGING	{IC4(40)-R47-C506-CN2(1)}-CN272(1)-R186-C187-IC151(78-41)-C158-R161-IC151(40-38)-R245-C245-IC241(4-5,8)-Speaker
Alarm / Beep / Key tone	{IC4(39)-R514-CN1(11)}-CN271(11)-R185-C186-IC151(77-41)-C158-R161-IC151(40-38)-R245-C245-IC241(4-5,8)-Speaker
CNG / DTMF detection	TEL LINE-T101-R202-C205-IC201(6-7)-C210-C212-R215-C213-IC202(1-2)-C217-CN271(9)-R20-IC8(2-1)-C35-R22-IC5(45)
VOX	TEL LINE-T102-C176-R176-IC151(61-67)-C179-R177-IC151(68-70)-C291-D290-R296-IC101(6-7)-R290-IC151(30)
FAX Rx	TEL LINE-T101-R202-C205-IC201(6-7)-C210-C173-R172-R173-C174-IC151(59-67)-R217-C214-IC202(10-11)-C217-CN271(9)-{CN1(9)-R20-IC8(2-1)-C35-R22-IC5(45)}

Note:

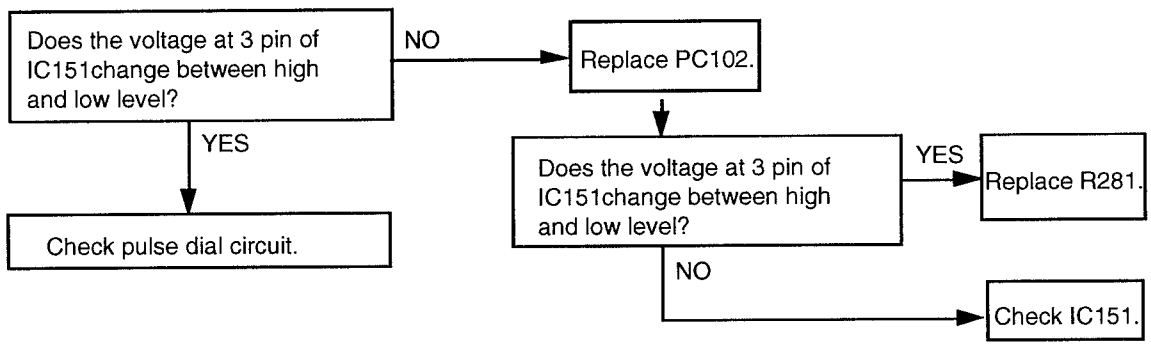
{ }: digital board

1) Defective ITS (Integrate Telephone System) section

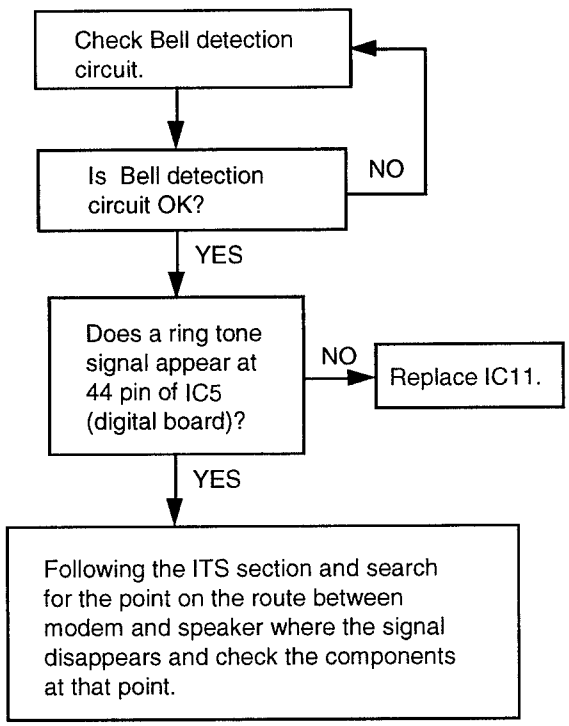
① No handset and speakorphone transmisson / reception

Following the ITS section or NCU section, search for the route between the handset microphone and telephoneline (sending), or between the telephone line and the handset spearker (receiving), or between the microphone and the telephone line (sending) or between the telephone line and the speaker(receiving) where the signal disappears. Check the components at that point.

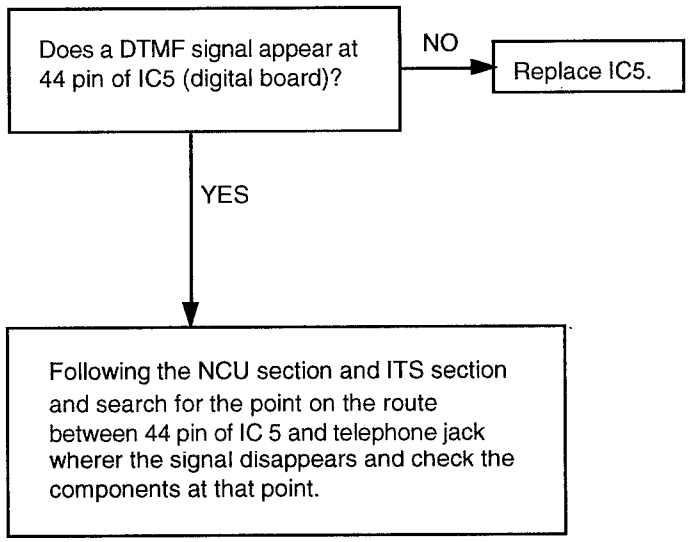
② No pulse dialing



③ No ring tone

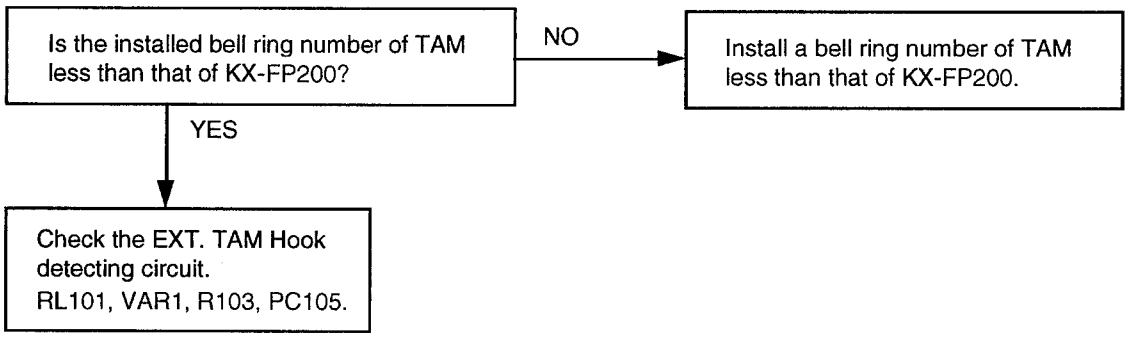


④ No tone dialing

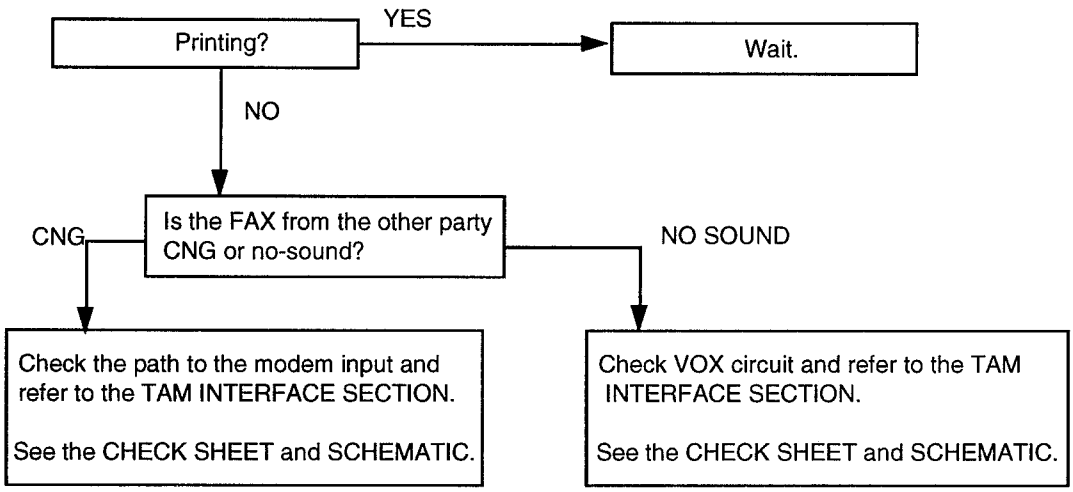


2) Defective TAM interface section

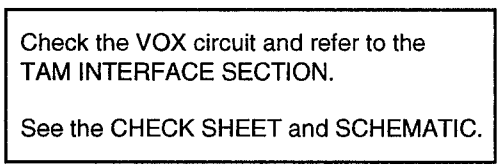
① **Not arriving in TAM, FAX turns on.**



② **A FAX is coming but won't switch from TAM to FAX.**



③ **A voice is coming in but switches to FAX.**



Hint : You can monitor the VOX signal on service mode 815.
When a VOX(sound) is detected, you can see "Vx" in the display.

3.4.6 Power supply board section

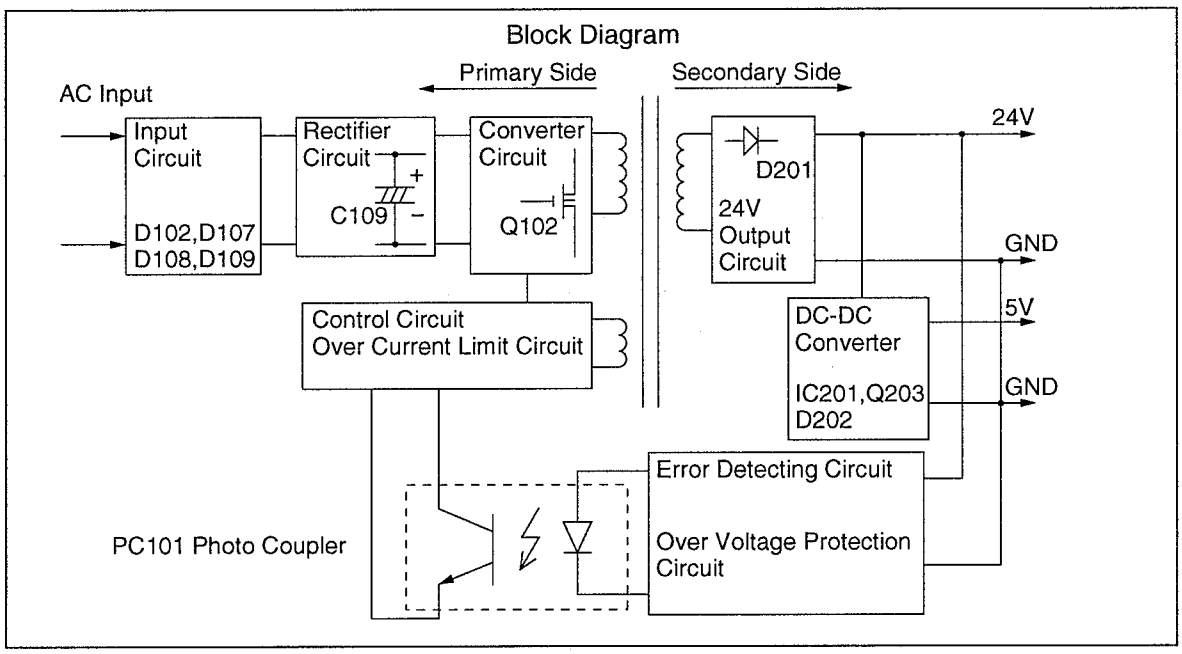
① Key components for troubleshooting

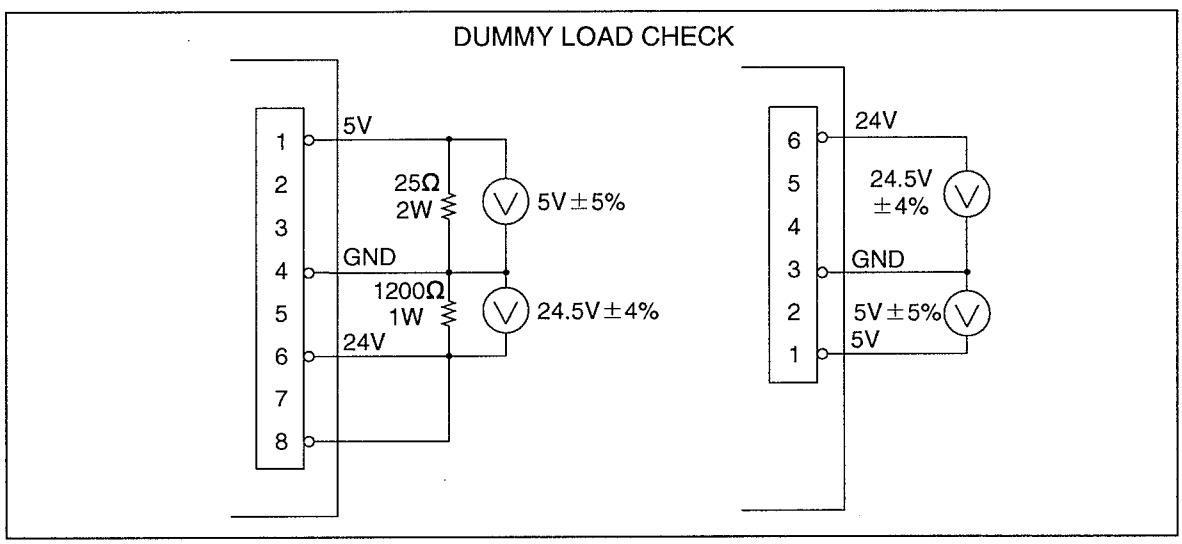
The following components have been known to break frequently :
F101, D102, D107, D108, D109, D201, C102, C103, C108
This comes from our experience of experimental test. For example : power supply, lighting surge voltage test, withstanding voltage test, intentional short circuit test.....etc.

Caution:
If you find a melted fuse in the unit, don't turn the power on without repairing the unit first. (Except the fuse.)
If you do the fuse will melt again. It has not been repaired. The cause exists same where else.

Because of circuit composition :
If 24V is not output, don't output.

In most cases (our experience) the symptom is that nothing is output.
There is a high possibility in the primary side more than the secondary side.



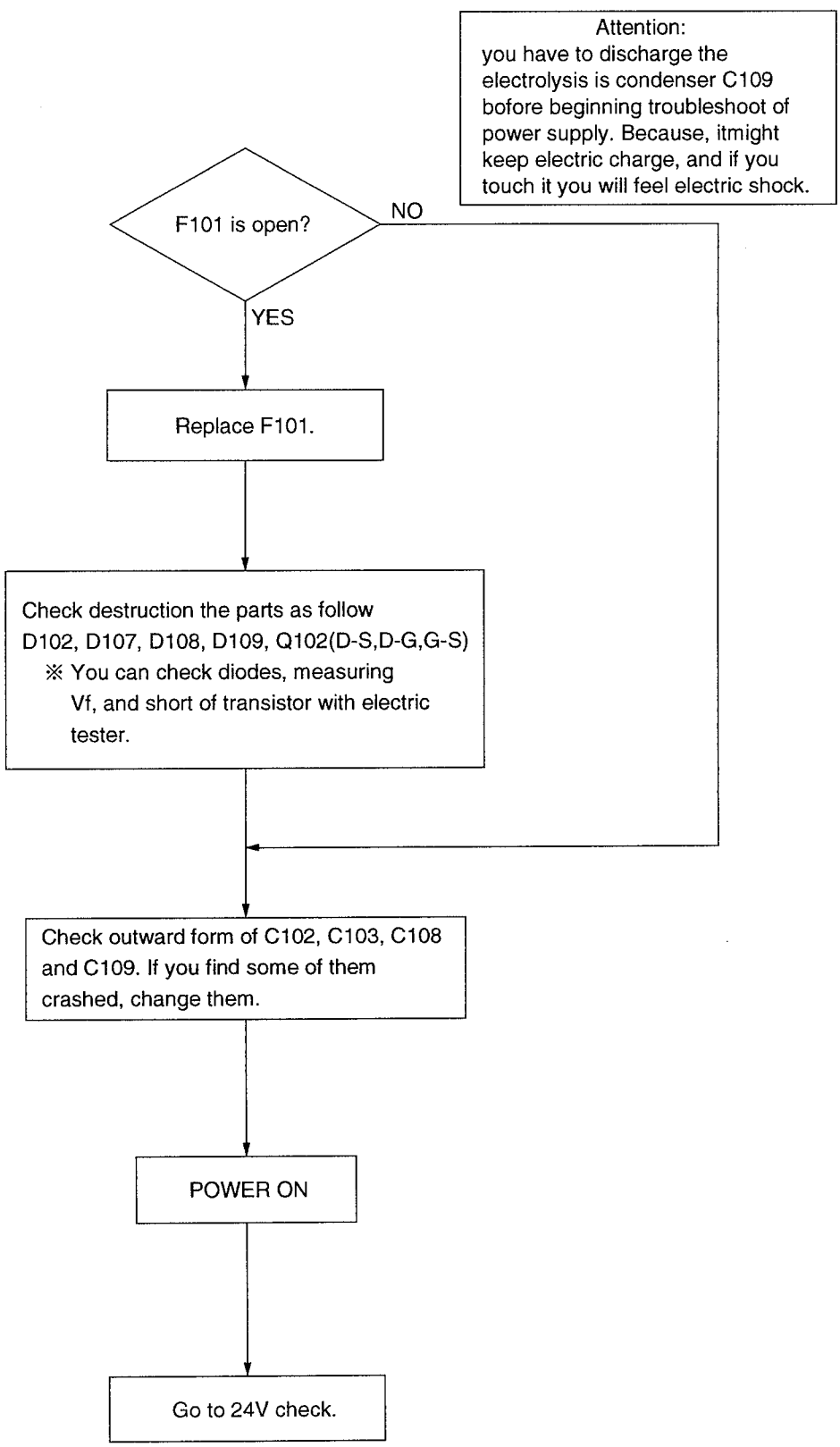


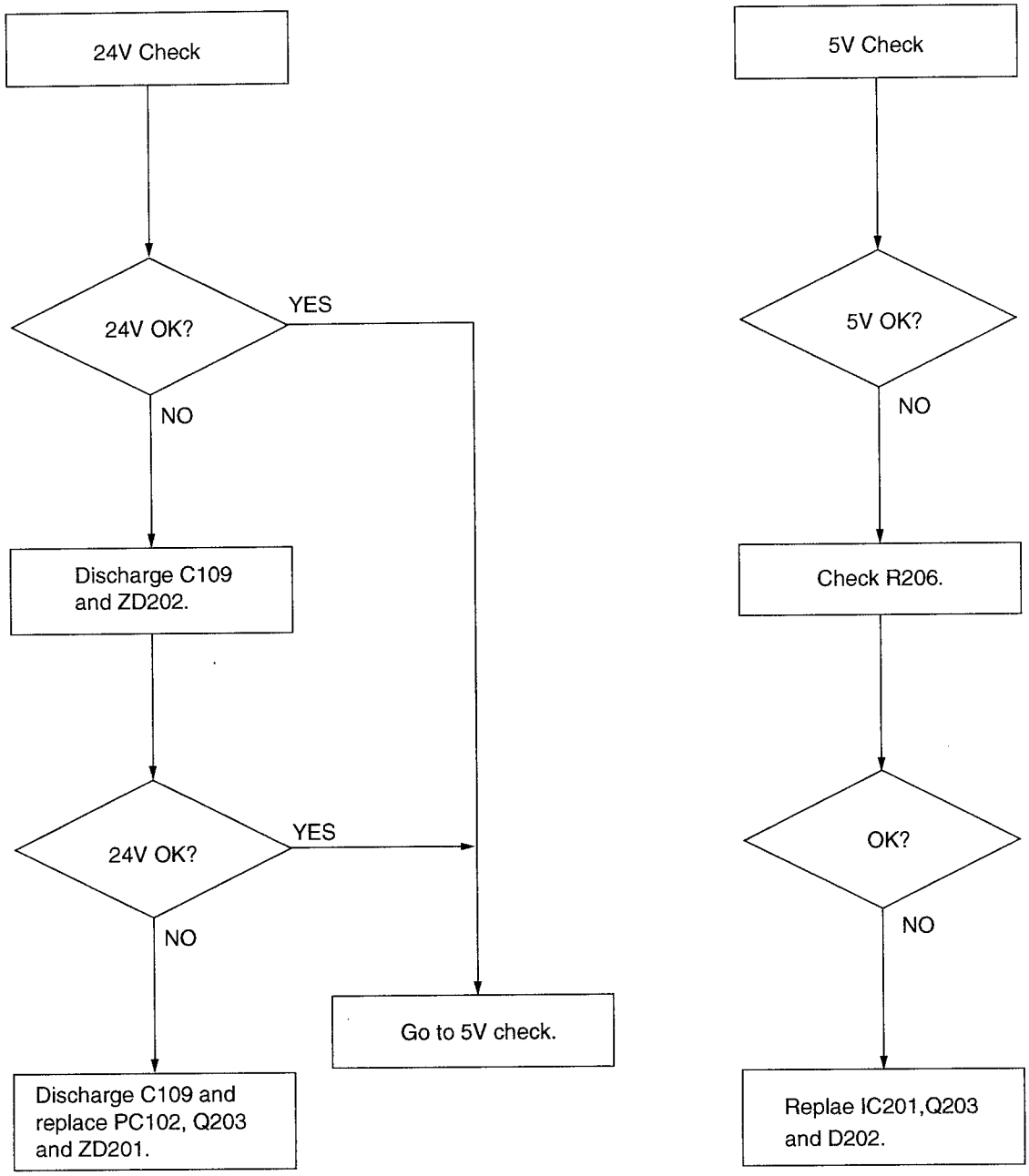
② Troubleshooting flow chart

Our recommendation for troubleshooting is as follows.

This procedure comes from our experience of troubleshooting in our lab.

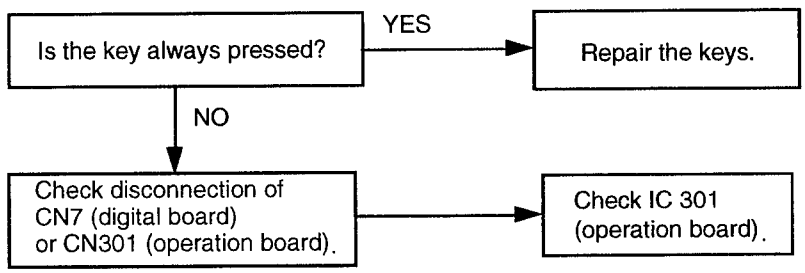
※ Before turning on the power supply, you should check F101.



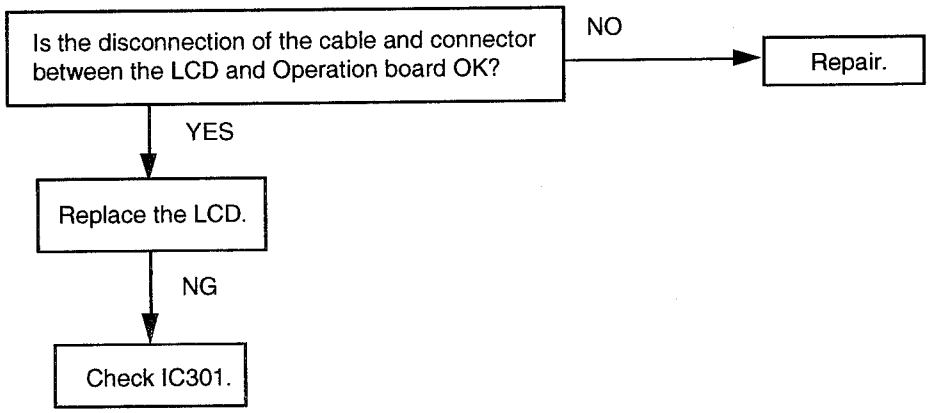


3.4.7 Operation panel section

① **No key operation**

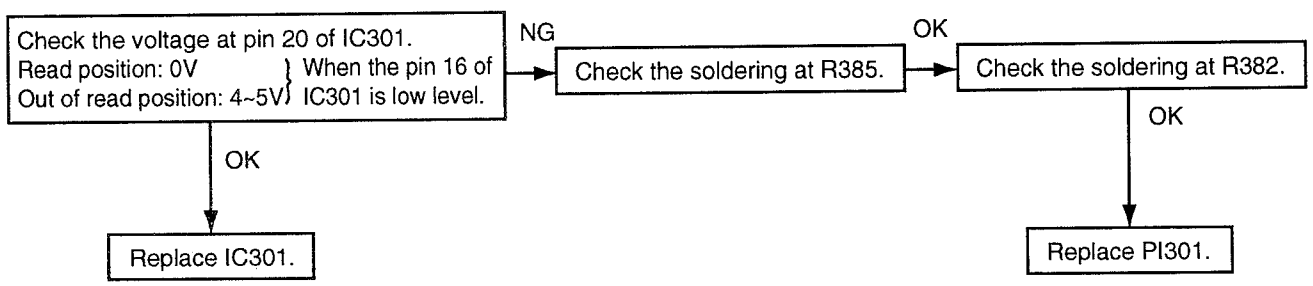


② **No LCD indication**

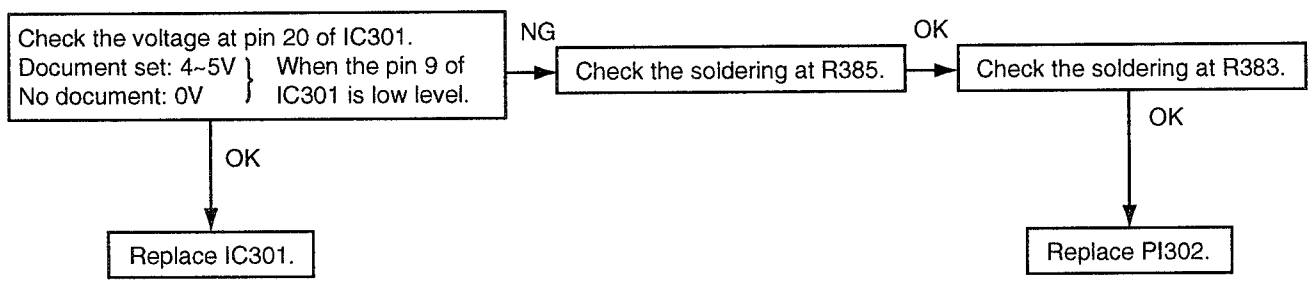


3.4.8 Sensor board section

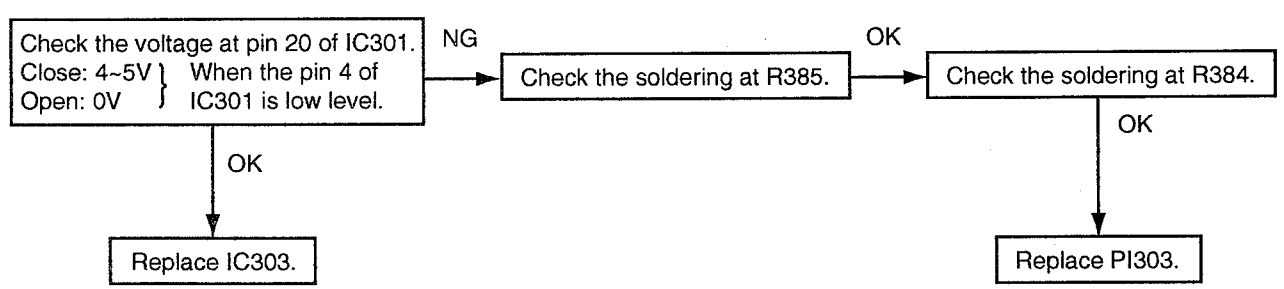
① **Check the read position sensor (PI301)**



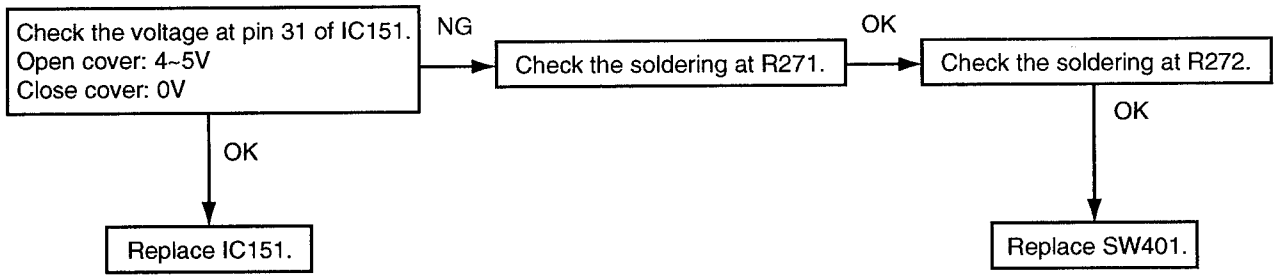
② **Check the document sensor (PI302)**



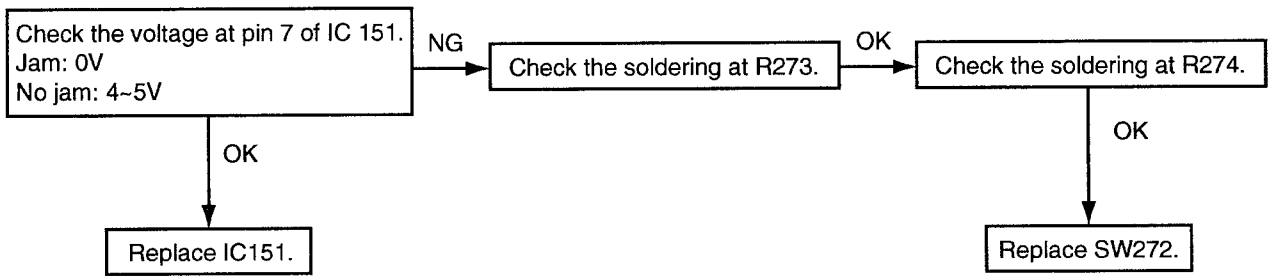
③ **Check the cover open sensor (PI303)**



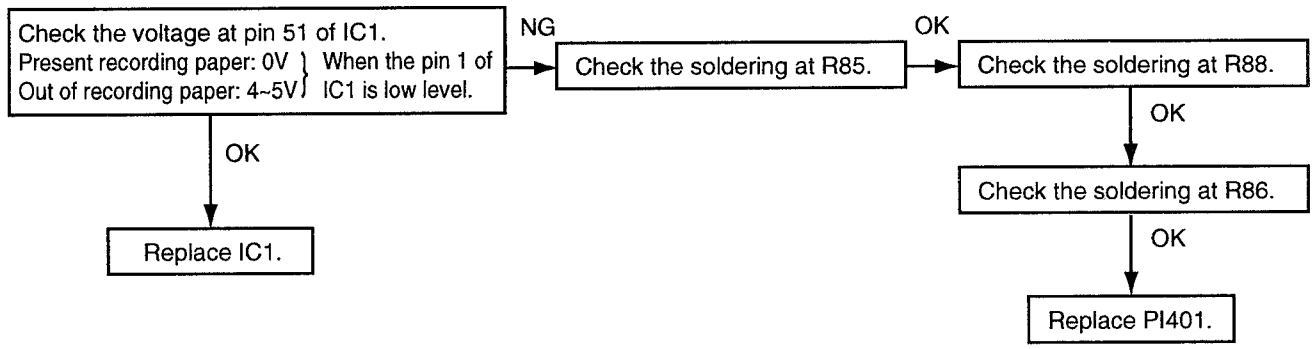
④ **Check the hook switch (SW401)**



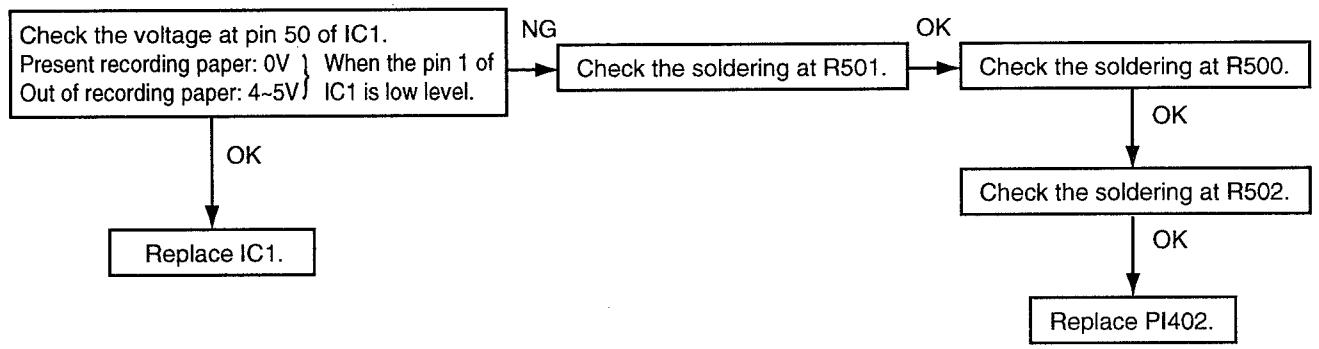
⑤ **Check the paper set switch (SW272)**



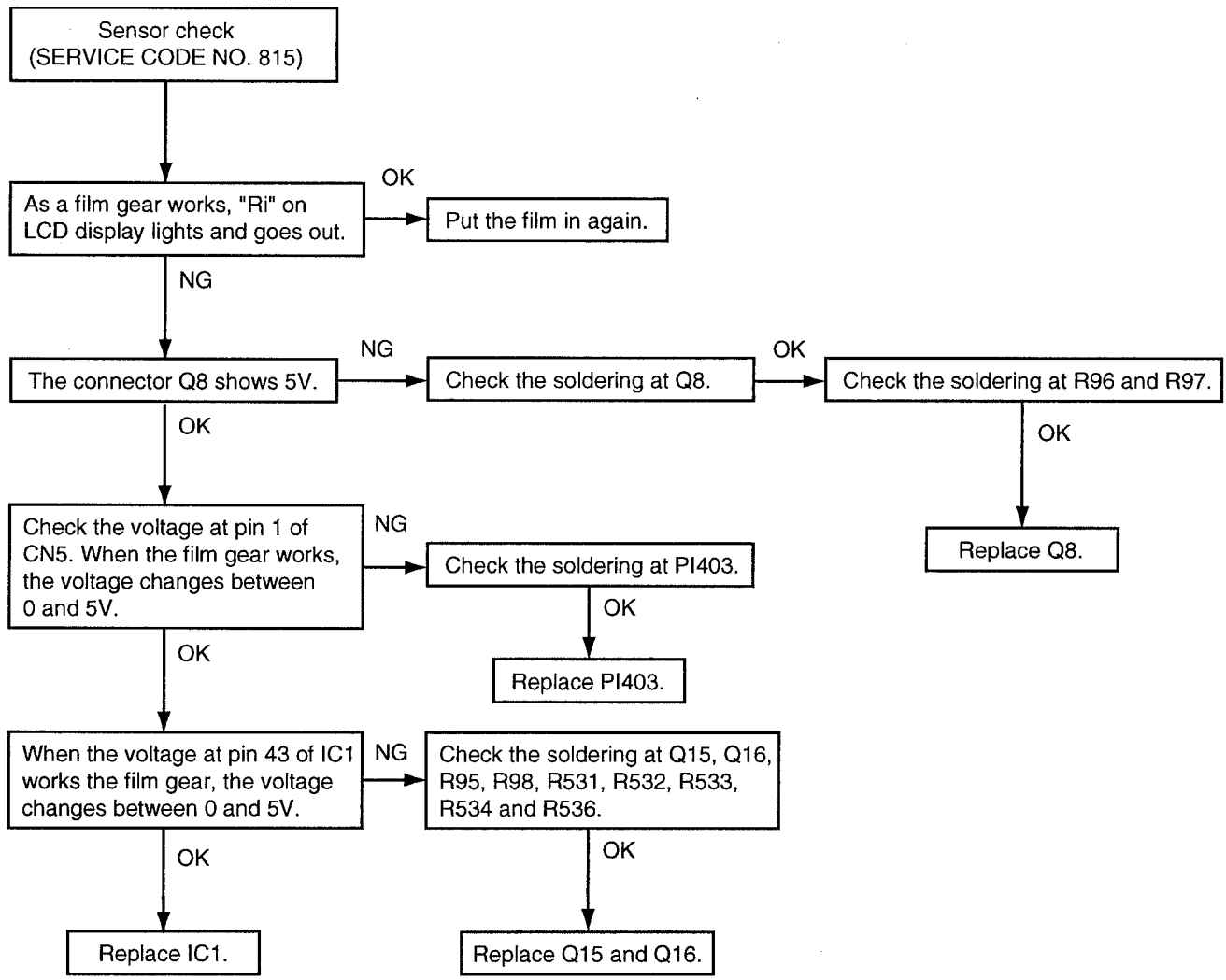
⑥ **Check the paper full sensor (PI401)**



⑦ **Check the paper top sensor (PI402)**



⑧ Check the Film End Sensor (PI403)

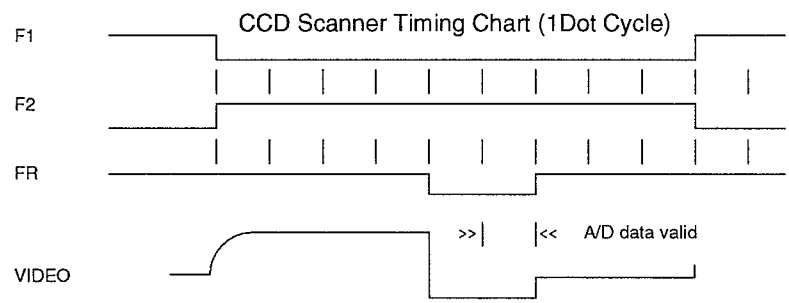


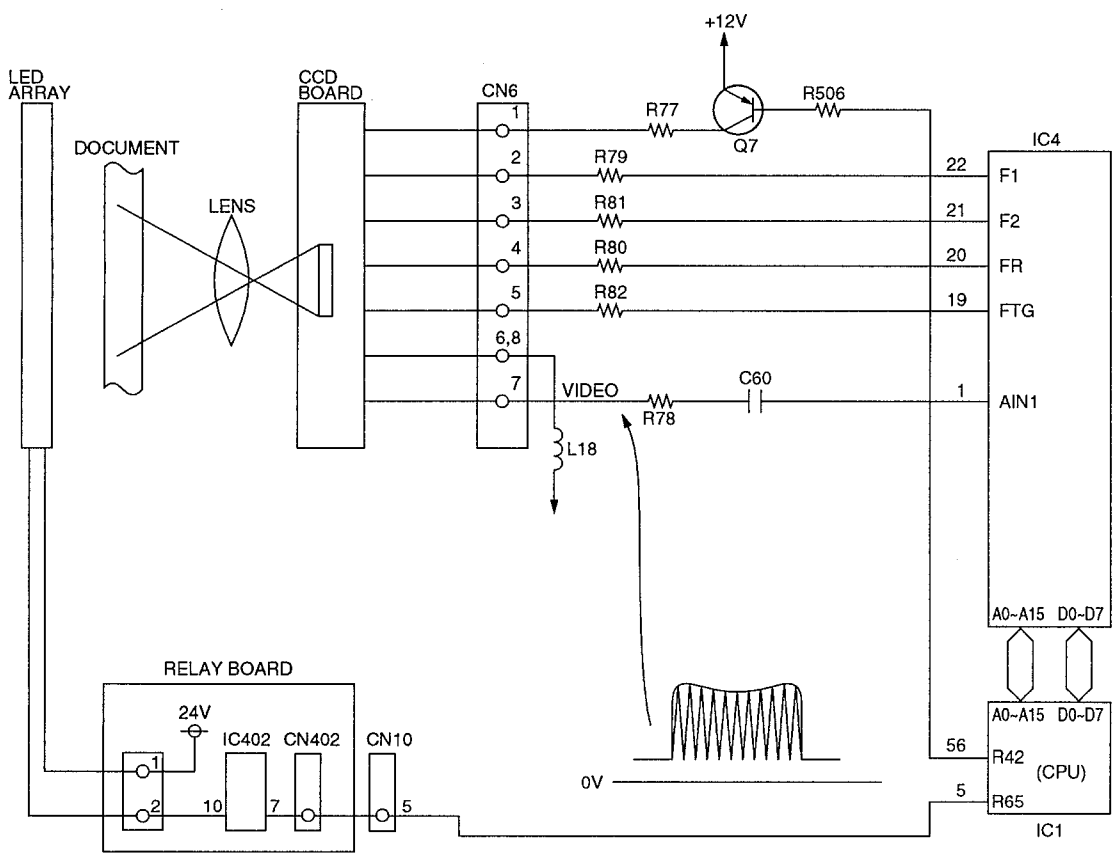
3.4.9 CCD board section

**CCD BOARD installing on the CCD UNIT is presicely adjusted in our production line.
Therefore, you need to readjust it after troubleshooting.

When receiving or print-test is printed correctly but copying is not correctly, read section is possibly broken.
It is caused by the CCD UNIT or ASIC (IC4).

CONDITION	CAUSE	DISPOSAL
IC4 outputs the signal for CCD UNIT correctly. But CCD UNIT doesn't output analog image signal.	CCD board is broken.	Replace CCD board.
IC4 outputs the signal for CCD UNIT correctly. But CCD UNIT output analog image signal correctly.	Analog part in ASIC is broken.	Replace IC4.
IC4 doesn't output the signal for CCD UNIT correctly.	Logic part in ASIC is broken.	Replace IC4.





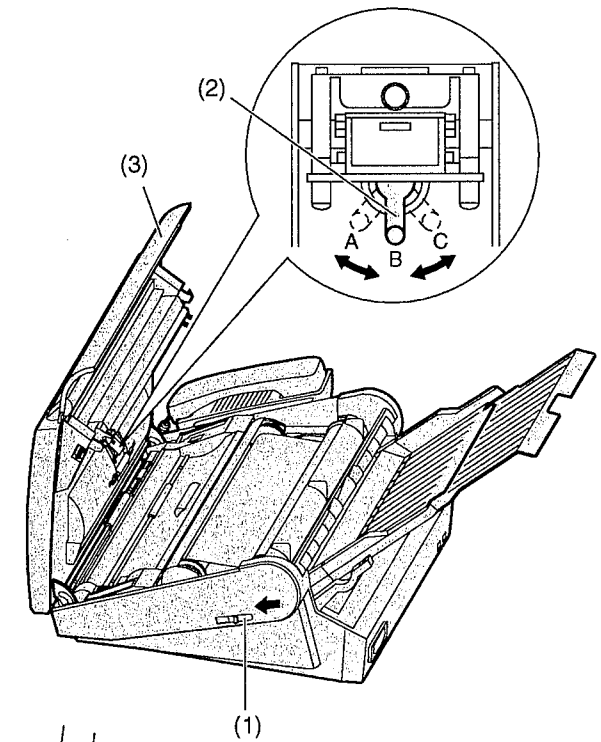
4. ADJUSTMENTS

4.1 TABLE OF TEST EQUIPMENTS AND TOOL

No.	Test Equipment and Jig Name	Jig No.
1	Oscilloscope	———
2	CCD Tool	PFZZ1F780M
3	Extension Cord	PQZZ2K12Z, PQZZ8K18Z
4	Spring Height Tool	PFZZ2F780M

4.2 ADJUSTING THE FEEDER PRESSURE

If misfeeding of document such as multiple feeding and no feeding occurs frequently, try to adjust the feeder pressure by following steps.



(1) Slide the front cover open lever forwards to open the front cover.
(2) Shift the position of the lever by using an instrument with a pointed end, like a clip or ball-point pen.
Position A: Select this when documents are not fed.
Position B: Standard position (pre-selected)
Position C: Select this when documents are fed multiply.
(3) Close the front cover securely by pushing down on both ends.

4.3 CONFIRMATION OF SEPARATION SRING

1. Open the front cover.
2. Check the highest level of the separation spring with the spring height tool (PFZZ2F780M). Please make sure that the separation spring does not touch the tool during this operation. (Both right and left) (See Fig. 1).
3. Check the lowest level of the separation spring with the opposite side of the spring height tool. Please make sure that the separation spring touches the tool during this operation.

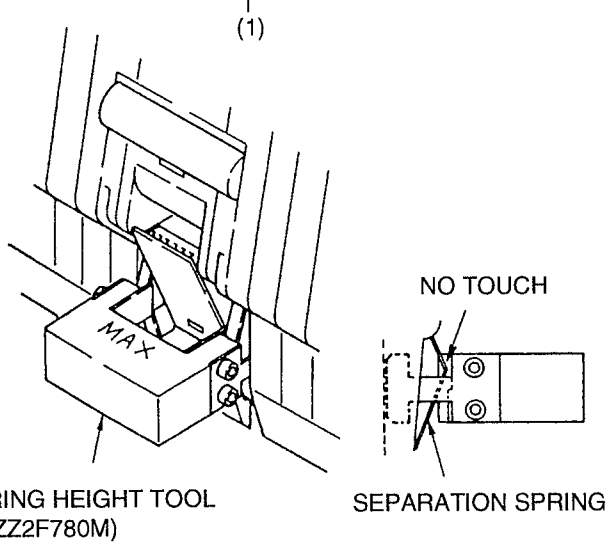


Fig. 1

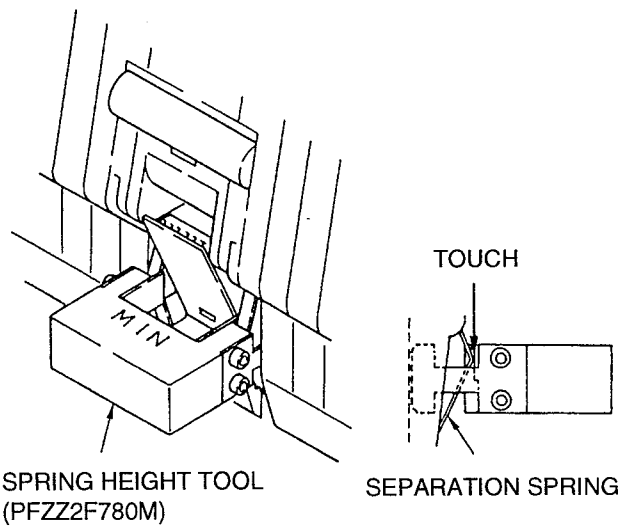


Fig. 2

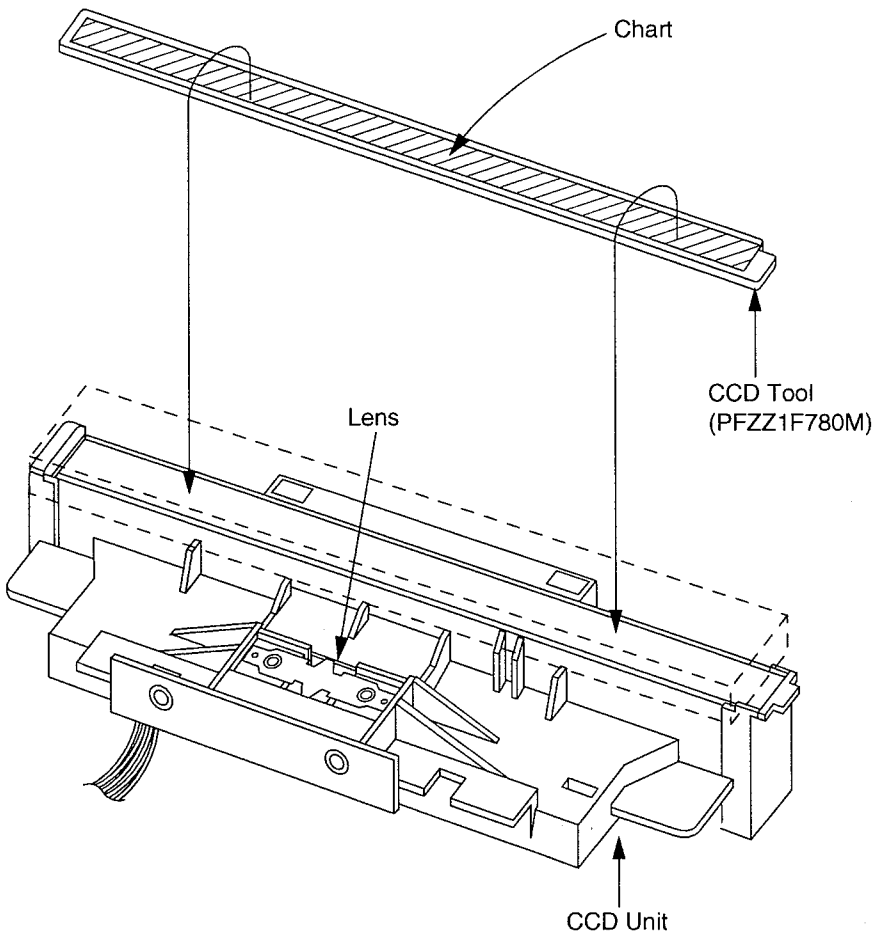
4.4 CCD ADJUSTMENTS

Perform the following adjustment after replacing lens and CCD board.

Preparation:
1) Remove the CCD unit from set. (Refer to page 115)
2) Make oscilloscope connections as shown in next page.
3) Attach the CCD TOOL on the CCD unit.
4) Connect between CCD unit and digital board with extension cord (Part No. PQZZ8K18Z). (Refer to next page).
5) Connect between LED array and digital board with extension cord (Part No. PQZZ2K12Z). (Refer to next page).
6) Connect AC cord.
7) Press the MENU button.
8) Press the #,9,0,0,0, and ✳ buttons.
9) Press the 5,5 and 5 buttons.

Notes:
1) Install the lens so that the marking (RED) is on its upper side.
2) Do not touch the glass face of the lens with bare hands.
3) If you have no instrument to repair the unit, trim off the chart on page 91, then attach on the target glass (This is a temporary treatment. You should use an instrument for this adjustment for proper repair.)

Cleaning:
If the lens is dirty, clean it with a soft dry cloth.

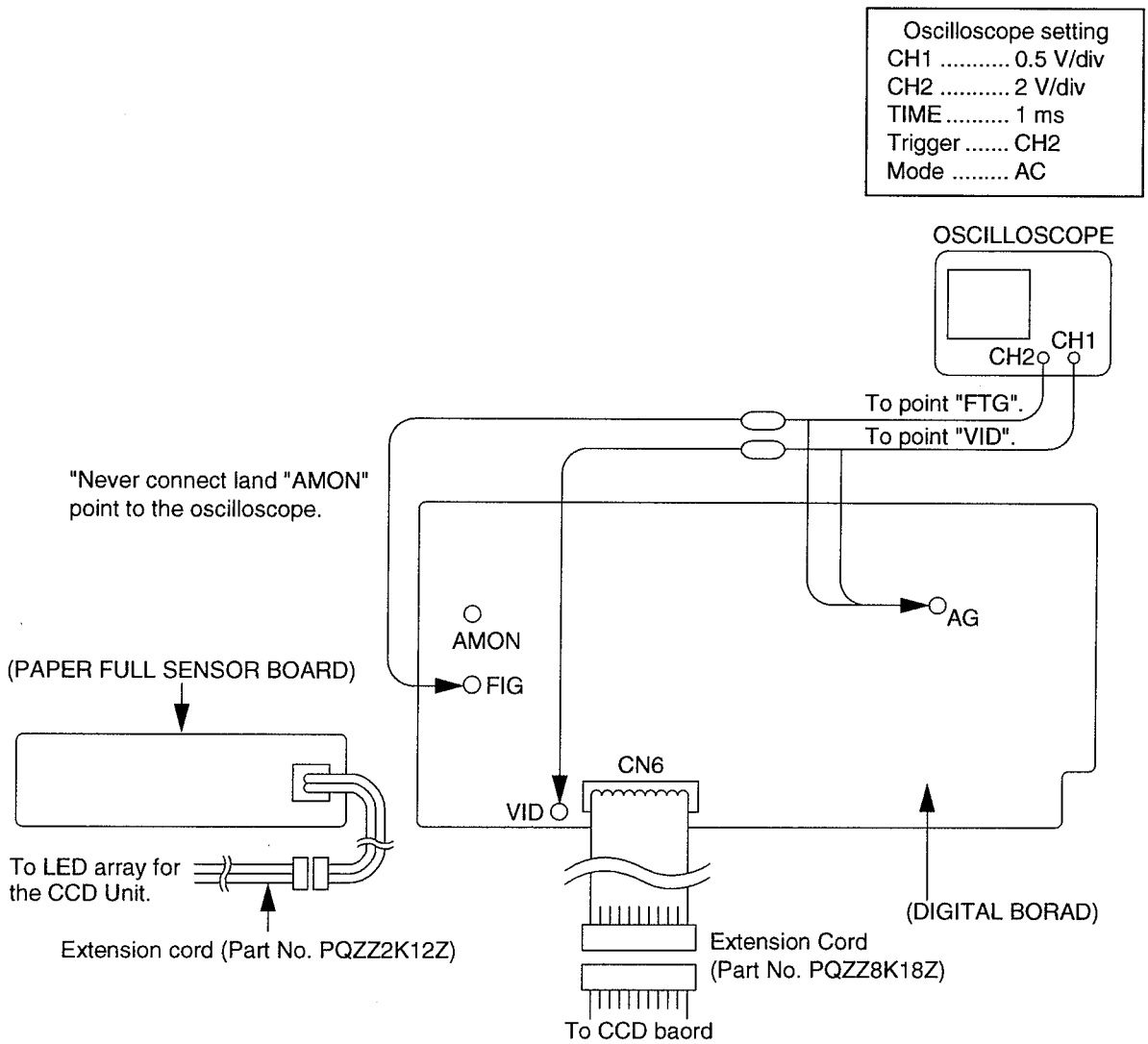


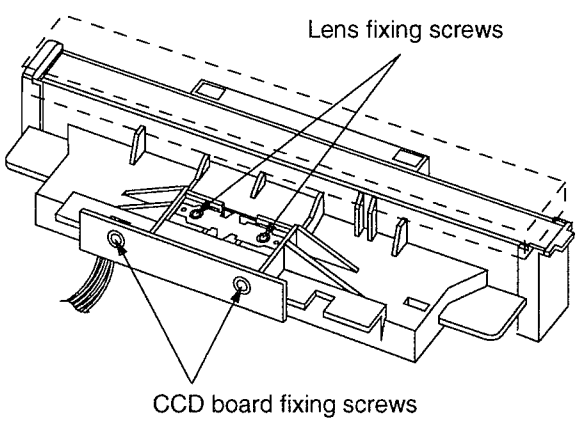
Note:
Please adjust with covering topside of the lens by hands in order not to let in outdoor daylight.

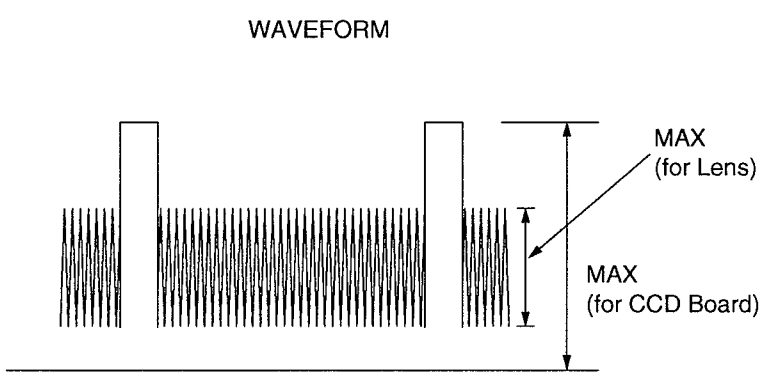
ADJUSTMENTS:

LENS AND CCD READ POSITION ADJUSTMENT

1) Loosen the lens screws and CCD board screws.
2) Adjust the position of the lens and CCD board so that the waveform appears as shown in the figure below.
3) Tighten the lens screws and CCD board screws.



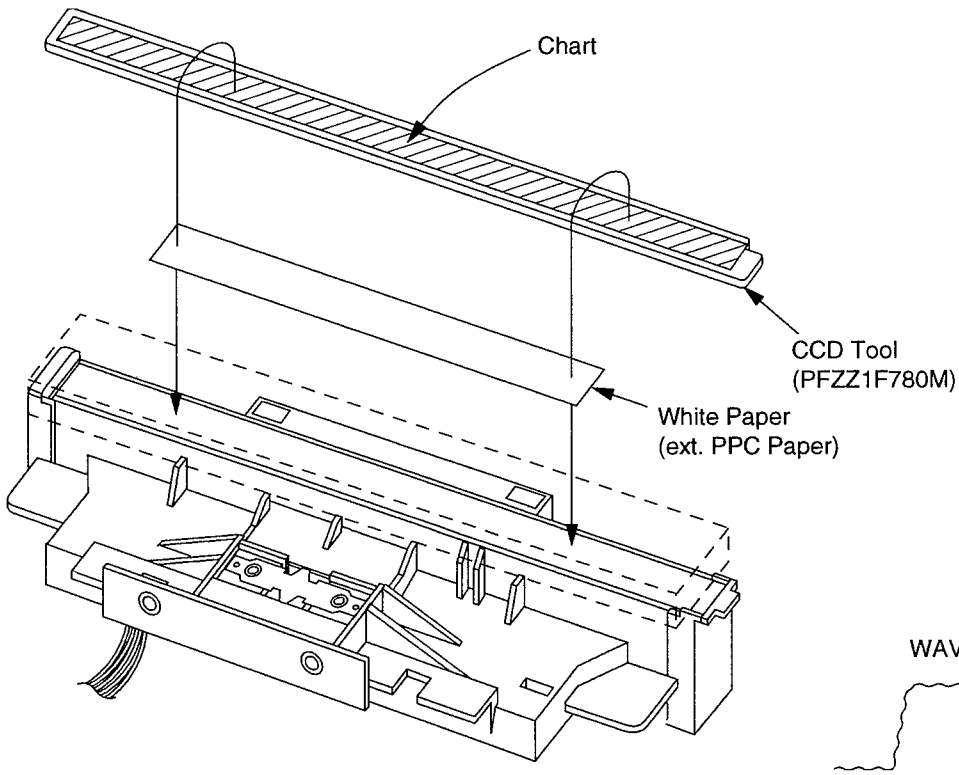




WHITE LEVEL ADJUSTMENT

1) Remove the CCD TOOL from CCD unit.
2) Attach the white paper on the CCD unit.
3) Attach the CCD TOOL on the CCD unit.
4) Adjust VR801 on the CCD board so that the waveform becomes 1.2± 0.2V.

Notes: 1. After the adjustment is finished, assemble the unit by reversing above procedure.
2. Please adjust with covering topside of the lens by hands in order not to let in outdoor daylight.
3. If you have no instrument to repair, trim off the chart on next page, then attach on the target glass. (This is a temporary treatment. You should use an instrument for this adjustment purpose, if you require an accurate repairment.)



4.5 DOCUMENT READ START POSITION ADJUSTMENT

1) Connect AC cord.
2) Copy the document, and confirm the read start position of the document.
3) If get out of position, adjust the read position.
4) Press the MENU button.
5) Press the #, 9, 0, 0, 0, * and 5, 6, 3 buttons.
6) Press the □,□, SET and MENU buttons.

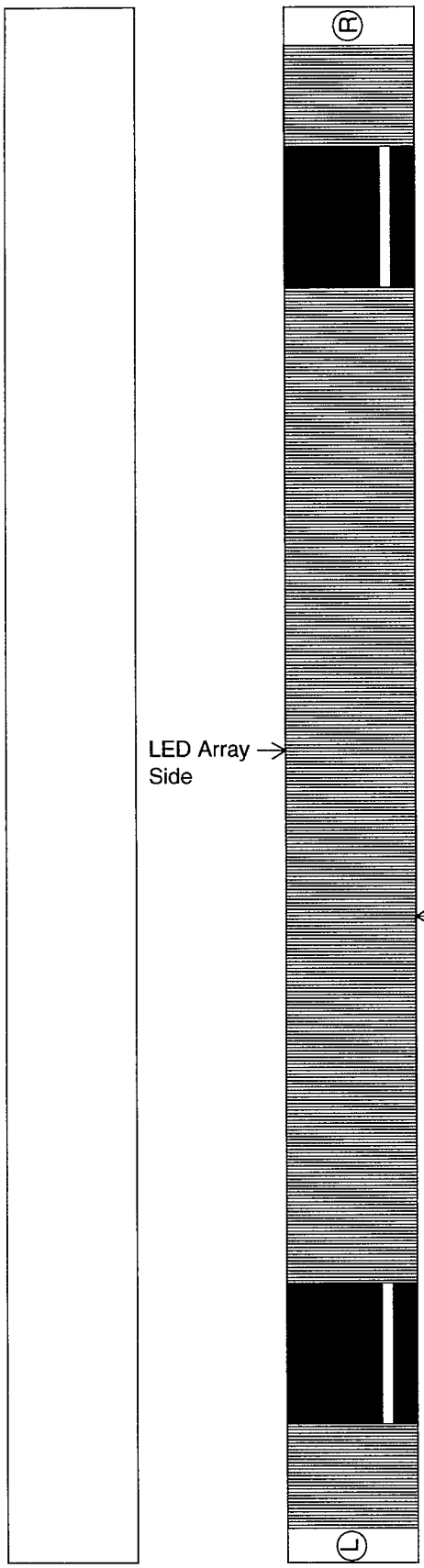
30
.
. To move the image to the right direction
.
16
15 ← Standard (Default)
14
.
. To move the image to the left direction
.
00

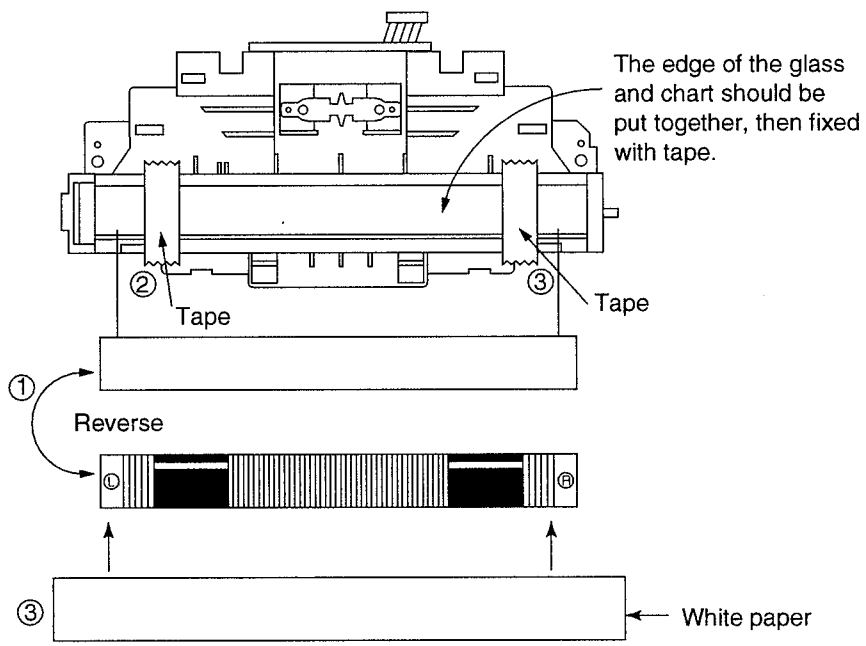
The starting position of reading shifts 1 mm as number of changes.

MEMO

(for white level adjustment)

(for lens and CCD read position adjustment)





MEMO

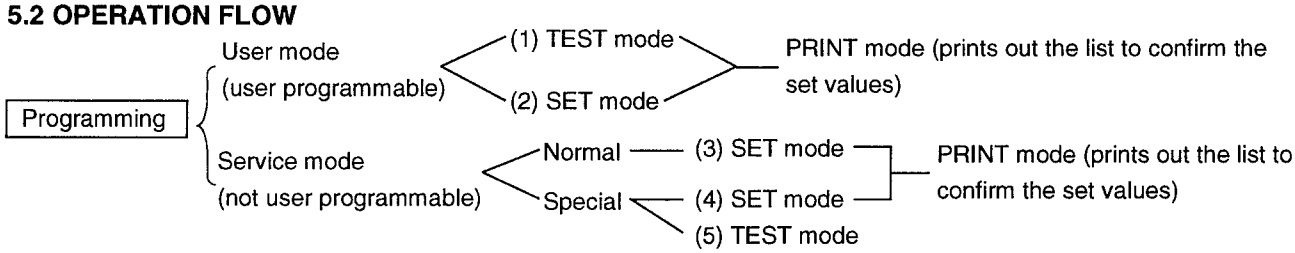
5. PROGRAMMING AND LISTS

The programming functions are used to program the various features and functions of the machine, and to test the machine. Programming can be done in both the on-hook and off-hook conditions. This facilitates communication between the user and the service while programming the machine.

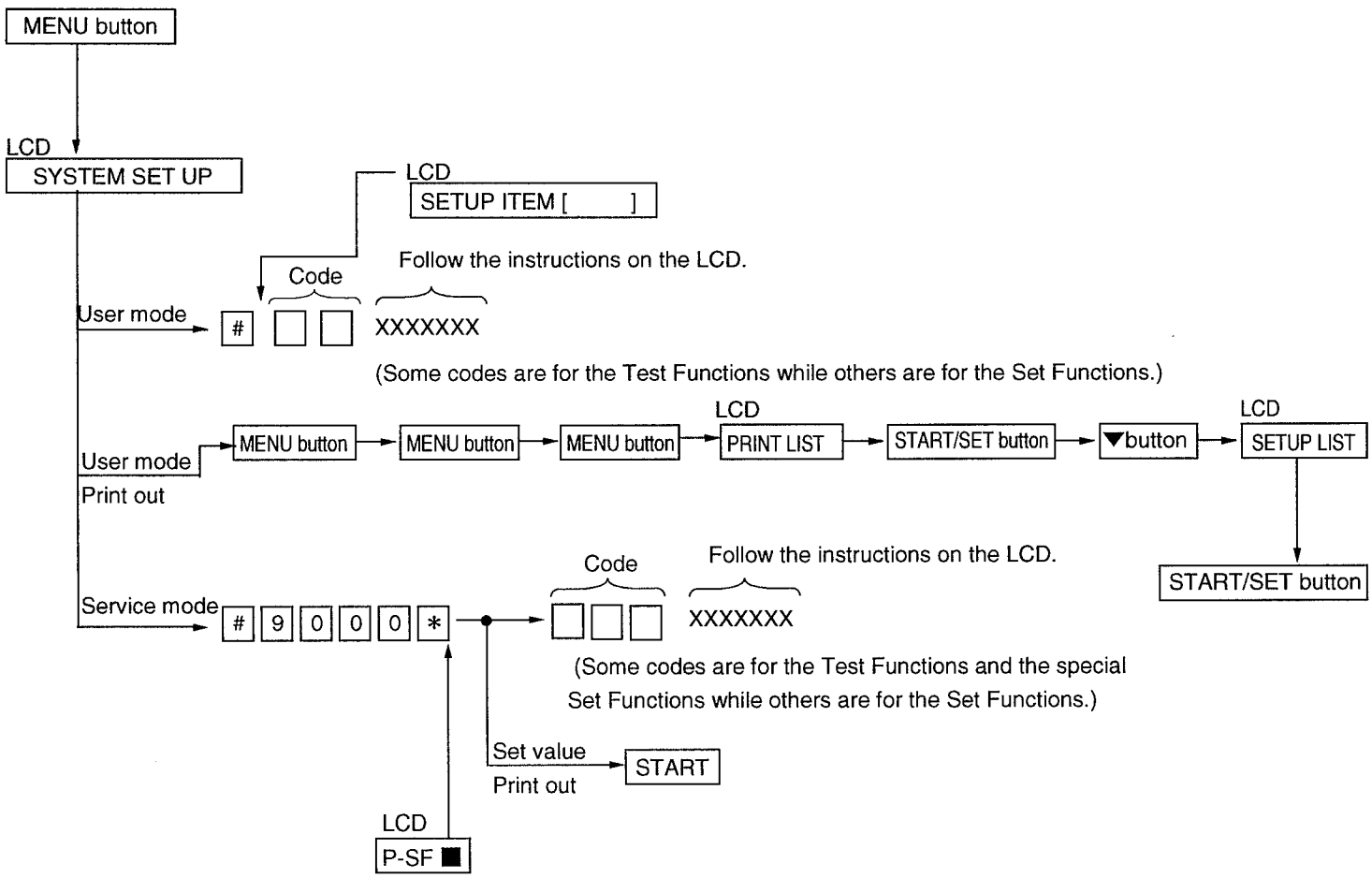
5.1 OPERATION

There are 2 basic categories of programming functions such as a User Mode and a Service Mode. The Service Mode is further broken down into the normal and the special programs. The normal programs are those listed in the Operating instructions and available to the user. The special programs are those listed only here and not displayed to the user. In both User and Service Mode, there are Set Functions and Test Functions. The Set Functions are used to program various features and functions, and the Test Functions are used to test various functions . The Set Functions are accessed by entering their code, changing the appropriate value, then pressing the SET key. The Test Functions are accessed by entering their code and pressing the key listed on the menu. While programming, to cancel any entry, press the STOP key.

5.2 OPERATION FLOW



Operating Procedure



5.3 USER MODE (The list below is an example of the SYSTEM SETUP LIST the unit prints out.)

SETUP LIST

[BASIC FEATURE LIST]

NO.	FEATURE	CURRENT SETTING	
#01	SET DATE & TIME	Jan. 01 1997 12:00AM	
#02	YOUR LOGO		
#03	YOUR TELEPHONE NUMBER		
#04	PRINT TRANSMISSION REPORT	OFF	[ERROR,ON,OFF]
#05	AUTO RECEIVE MODE	FAX	[FAX,EXT.TAM]
#07	FAX RING COUNT	1	[1...4]
#08	MANUAL RECEIVE MODE	TEL	[TEL,TEL/FAX]
#09	TEL/FAX DELAYED RING	1	[1...4]
#12	REMOTE TAM ACT.	OFF	[ON,OFF]
	ID =	11	
#13	DIALING MODE	AUTO	[AUTO,TONE,PULSE]
#15	MEMORY XMT	OFF	[ON,OFF]

Code (points to NO. column)

Set Value (points to CURRENT SETTING column)

[ADVANCED FEATURE LIST]

NO.	FEATURE	CURRENT SETTING	
#21	LOGO POSITION	OUT	[OUT,IN]
#22	JOURNAL AUTO PRINT	ON	[ON,OFF]
#23	OVERSEAS MODE	OFF	[ON,OFF]
#25	DELAYED TRANSMISSION	OFF	[ON,OFF]
	DESTINATION =		
	START TIME =	12:00AM	
#30	SILENT FAX RECOGNITION RING	3	[3...6]
#31	RING DETECTION	OFF	[OFF,A,B,C,D]
#33	FILM/PAPER SAVE	OFF	[ON,OFF]
#34	EXTENSION COPY		
#35	COPY REDUCTION	OFF	[92,72,OFF]
#36	RX REDUCTION	92%	[92,86,72,OFF]
#39	LCD CONTRAST	NORMAL	[NORMAL,DARKER]
#40	SILENT DETECTION	ON	[ON,OFF]
#41	REMOTE FAX ACTIVATION CODE	ON	[ON,OFF]
	CODE =	*9	
#44	RECEIVE ALERT	ON	[ON,OFF]
#46	FRIENDLY RECEPTION	ON	[ON,OFF]
#70	FAX PAGER	OFF	[ON,OFF]
	DESTINATION =		
#79	FILM DETECTION	ON	[ON,OFF]
#80	SET DEFAULT		

Code (points to NO. column)

Set Value (points to CURRENT SETTING column)

IF YOU HAVE A PROBLEM WITH YOUR FAX, CALL TOLL-FREE 1-800-HELP-FAX

Note:

The above values are default.

5.4 SERVICE FUNCTION TABLE

Code	Function	Set Value	Effective Range	Default	Remarks
501	Pause time set	×100 ms.	001~600	050	
502	Flash time set	×10 ms.	01~99	70	
503	Dial speed select	1..10 PPS 2..20 PPS	1, 2	1	
520	CED frequency select	1.. 2100 Hz 2.. 1100 Hz	1, 2	1	See page 46.
521	International mode select	1..On 2..Off	1, 2	1	See page 46.
522	Auto standby select	1..On 2..Off	1, 2	1	
523	Receive equalizer select	1..On (1.8 km) 2..Off (Auto)	1, 2	2	Set RX equalizer to automatical mode.
550	Memory clear: To reset the value to the default one, except the top margin (853) and left margin (854).				"START" input
551	ROM check				"START" input
552	DTMF single tone test	1..On 2..Off	1, 2	2	See page 104.
553	Monitor on FAX communication select	1..Off 2..Phase B 3..All phases	1~3	1	
554	Modem test				See page 104.
555	Scan check				See page 104.
556	Motor test			00	See page 104.
557	LED test				See page 104.
558	LCD test				See page 104.
559	Paper jam detection select	1..On 2..Off	1, 2	1	
561	KEY test				See page 104.
563	Scanner position adjustment value set	× 1 mm	00~30	–	
570	BREAK % select	1..61% 2..67%	1, 2	1	
571	ITS auto redial time set	× number of times	00~99	14	

Code	Function	Set Value	Effective Range	Default	Remarks
572	ITS auto redial line disconnection time set	× second	001~999	030	
573	Remote turn-on ring number set	× number of rings	01~99	15	
590	FAX auto redial time set	× number of times	00~99	05	
591	FAX auto redial time disconnection time set	× second	001~999	045	
592	CNG transmit select	1..Off 2..All 3..Auto	1~3	2	
593	Time between CED and 300 bps	1..75 ms 2..500 ms 3..1 sec	1, 2, 3	1	See page 46.
594	Overseas DIS detection select	1..detects at the 1st time 2..detects at the 2nd time	1, 2	1	See page 46.
595	Receive error limit value set	× number of times	001~999	100	
596	Transmit level set	× dBm	−15~00	10	The values entered without "minus sing" will be regarded as negative.
626	Paper full sensor defection	1..On 2..Off	1, 2	1	
700	EXT.TAM OGM REC. time	× second	01~99		See page 162.
701	No Voice detect time	× 100 msec	01~99		See page 162.
702	EXT. TAM/FAX ring count		0~9		See page 162.
717	Transmit speed select	1..9600BPS 2..7200BPS 3..4800BPS 4..2400BPS	1~4	1	Sets fall back speed in the transmitting mode. (See page 46.)
718	Receive speed select	1..9600BPS 2..7200BPS 3..4800BPS 4..2400BPS	1~4	1	Sets fall back speed in the receiving mode. (See page 46.)

Code	Function	Set Value	Effective Range	Default	Remarks
719	Ringer Off in TEL/FAX mode	1..On 2..Off	1, 2	1	Selects whether the ring is on or off when the unit receives an incoming signal in the TEL/FAX mode when the ringer.
721	Pause tone detect	1..On 2..Off	1, 2	1	Sets the tone detecrtion mode in pause.
722	Redial tone detect	1..On 2..Off	1, 2	1	Sets the tone detection mode after redialing.
732	Auto disconnect cancel time	1..350msec 2..1800msec 3..Off	1~3	1	
745	Power ON film feed	1..On 2..Off	1, 2	1	
763	CNG detect time for friendly reception	1..10sec 2..20sec 3..30sec	1~3	2	
771	T1 Timer	1..35sec 2..60sec	1, 2	1	Sets the time out.
815	Sensor & VOX check				See page 105.
852	Print test pattern				See page 106.
853	Top margin		1~9	—	
854	Left margin		1~8	—	
861	A4 size set	1..On 2..Off	1, 2	2	Factory use.
880	Special service journal				See page 102.

5.5 SERVICE MODE SETTING VALUES (Example of a printed out list)

```
[ SERVICE DATA LIST ]
 Code                                  Set Value
501 PAUSE TIME                 =  050*100ms        [001...600]*100ms
502 FLASH TIME                 =  70*10ms          [01...99]*10ms
503 DIAL SPEED                 =  10pps            [1=10     2=20]pps
520 CED FREQ.                  =  2100Hz           [1=2100   2=1100]Hz
521 INTL. MODE                 =  ON               [1=ON     2=OFF]
522 AUTO STANDBY               =  ON               [1=ON     2=OFF]
523 RX EQL.                    =  OFF              [1=ON     2=OFF]
700 EXT.TAM OGM REC. TIME      =  10sec            [01...99]sec
701 NO VOICE DETECT TIME       =  50*100msec       [01...99]*100msec
702 EXT.TAM/FAX RING COUNT     =  5                [0...9]
853 TOP MARGIN                 =  5                [1...9]
854 LEFT MARGIN                =  5                [1...8]


[ SPECIAL SERVICE SETTINGS ]

 552   553   559   563   570   571   572   573   590   591   592   593   594
   2     1     1    15     1    14   030    15    05   045     2     1     1
Code  Set Value
 595   596   626   717   718   719   721   722   732   745   753   771   861
 100    10     1     1     1     1     1     1     1     1     2     1     2

 890
   1


[ HISTORY ]

1.DATE
  Jan. 01 1997 12:00AM
  TIME=00002 HOURS
2.KEY OPERATION
  1ST. 25:
  01 01 20 31 08 01 20 3C 3A 35 01 3A 38 04 25 04 20 20 3C 3A 38 04 25 04 20
  LAST 25:
  01 0C 31 04 04 20 3C 39 3A 3A 3A 3B 38 38 3A 04 38 38 3A 04 38 38 3A 04 04
3.NUMBER OF COPY
  =00000
4.NUMBER OF RX
  =00013
5.NUMBER OF TX
  =00002
```

Note:

The above values are default.

KX-FP200

JOURNAL 2

NO.	RCV. MODE	SPEED	RESOLUTION	RX-TRIG. (CNT.)	ERROR->MEMORY
01	TEL/FAX	9600BPS	STD.	CNG OGM (00001)	
02	TEL	9600BPS	STD.		
03	EXT. TAM	9600BPS	STD.	RMT DTMF(00001)	
04	FAX	9600BPS	STD.	FAX MOD	
05	TEL	9600BPS	STD.	MAN RCV (00002)	
06	TEL	9600BPS	STD.	MAN RCV (00003)	
07	TEL	?	?	MAN RCV (00004)	
08	FAX	9600BPS	STD.	FAX MOD	
09	FAX	9600BPS	S-FINE.	FAX MOD	
10	EXT. TAM	9600BPS	STD.	CNG OGM (00002)	
11	EXT. TAM	9600BPS	FINE.	TIMEOUT (00013)	
12	TEL/FAX	7200BPS	STD.	CNG OGM (00003)	
13	TEL/FAX	4800BPS	STD.	CNG OGM (00004)	
14	FAX	2400BPS	S-FINE.	FAX MOD	
15	FAX	?	?	FAX MOD	
16	FAX	?	?	FAX MOD	
17	TEL/FAX	?	?	MAN RCV (00005)	
18	TEL	?	?	MAN RCV (00006)	
19	TEL	?	?	MAN RCV (00007)	
20	TEL	?	?	MAN RCV (00008)	
21	TEL	?	?	MAN RCV (00009)	
22	TEL	?	?	MAN RCV (00010)	
23	TEL	?	?	MAN RCV (00011)	
24	TEL	?	?	MAN RCV (00012)	
25	TEL	?	?	MAN RCV (00013)	
26	TEL	?	?	MAN RCV (00014)	
27	TEL	?	?	MAN RCV (00015)	
28	TEL	?	?	MAN RCV (00016)	
29	TEL	?	?	MAN RCV (00017)	
30	TEL	?	?	MAN RCV (00018)	
31	TEL	?	?	MAN RCV (00019)	
32	TEL	?	?	MAN RCV (00020)	
33	TEL	?	?	MAN RCV (00021)	
34	TEL	?	?	MAN RCV (00022)	
35	FAX	9600BPS	STD.	FAX MOD	PAPER OUT

NO RESPONSE DISAPPEARED ON JOURNAL

NO.	START TIME	RX MODE	RX-TRIG. (CNT.)
01	Jan. 01 12:09AM	TEL/FAX	TIMEOUT (00003)
02	Jan. 01 01:15AM	TEL/FAX	TIMEOUT (00004)
03	Jan. 01 01:16AM	TEL/FAX	TIMEOUT (00005)
04	Jan. 01 01:17AM	TEL/FAX	TIMEOUT (00006)
05	Jan. 01 01:18AM	TEL/FAX	TIMEOUT (00007)
06	Jan. 01 01:21AM	TEL/FAX	TIMEOUT (00008)
07	Jan. 01 01:22AM	TEL/FAX	TIMEOUT (00009)
08	Jan. 01 01:23AM	TEL/FAX	TIMEOUT (00010)
09	Jan. 01 01:25AM	TEL/FAX	TIMEOUT (00011)

5.6 SERVICE LIST

[HISTORY]

1. DATE

Date and time which are set by a user for the first time after purchase.
Time is the expiration from the first power on after purchase.

2. KEY OPERATION

1st.25: History of the key operation from 1st to 25th after purchase.
Last.25: History of the last 25 key operations.

3. NUMBER of COPY:

The number of pages copied.

4. NUMBER of RX

The number of pages received.

5. NUMBER of TX

The number of pages sent.

5.7 SPECIAL SERVICE JOURNAL

The journal shown below is printed by pressing [MENU] and then #9000 *880 [START]. It can be taken out by remote control (together with the existing journal).

JOURNAL 2

The journal 2 displays the additional detailed information about the last 35 communications.
Only the No. is the same information as journal (user mode).

RCV MODE
Indicates which receive mode the unit was in when the unit received a fax message.
This information is also displayed when the unit transmitted a fax messege.

SPEED
Indicates speed of the communication. If multiple pages are transmitted or received, it indicates the last page's communication speed. In the case of communication error, "?" is displayed in this field.

RESOLUTION
Indicates resolution at the communication. If multiple pages are transmitted or received, it indicates the last page's resolution. In the case of communication error, "?" is displayed in this field.

RX-TRIG (CNT)
Indicates the trigger which turns to fax receiving.
The values in the parentheses indicate how many times the trigger has been used.

• FAX MODE
Means the unit received a fax message in the FAX mode. In this case, the valnes in the parentheses are not displayed.

• MAN RCV
Means the unit received a fax message by manual operetion.

• FRN RCV
Means the unit received a fax messege by friendly signal detection.

• CNG OGM
Means the unit detected the CNG while it was sending the Dummy Ring Back Tone in the TEL/FAX mode or answering a call in the EXT-TAM mode.
OR
Means the unit detected the CNG while it was sending OMG in the ANS/FAX mode.

• CNG ICM
Means the unit detected the CNG while it was recording ICM in the ANS/FAX mode.

• VOX
Means the unit defected silence.

• RMT DTMF
Means the unit detected DTMF entered remotely.

• PAL DTMF
Means the unit detected DTMF entered by a para-Tel.

• TURN-ON
Means the unit started to receive after the expiry of 15-time rings. (Remote Turn On)

• TIME OUT
Means the unit started to receive after Ring Time Out in the EXT-TAM or TEL/FAX mode.

• IDENT
Means the unit detected Ring Detection.

ERROR→MEMORY
Indicates the reason why the unit received a fax message in memory.

NO RESPONSE DISAPPEARED ON JOURNAL

The NO RESPONSE DISAPPEARED ON JOURNAL displays the information about the last 10 communications terminated with No Response. (Some of the communication terminated with No Response were not displayed in the JOURNAL.)

6. TEST FUNCTIONS

Test mode	Type of Mode	• Code □□ • Operation after code input.	Function
MOTOR TEST	Service Mode	Operation: 1)Idle mode: Press the MENU,#,9,0,0,0, ✳,5,5,6 buttons 2)LCD P-SF556 □□ 3)Input the 2 digits (Input code) 00..Stop, 10..Forward RX motor, 01..Forward TX motor, 11..Froward RX, TX motor, 20..Backward RX motor, 02..Backward TX motor, 22..Backward RX, TX motor 4)Press the start button (Stop: press the stop button)	Rotate the transmission and reception motors to check the operation of the motors.
MODEM TEST	Service Mode	5 5 4 START	Sp-phone button ON. Send FAX signals to check the sending function of the modem by START key. 1) OFF →2) 9600bps →3) 7200bps →4) 4800bps →5) 2400bps →6) 300bps →7) 2100Hz →8) 1100Hz
ROM CHECK	Service Mode	5 5 1 START	Indicate the version and check sum of the ROM.
SCAN CHECK	Service Mode	5 5 5 START	Turn on the LEDs of the image sensor and operate the read system.
LCD CHECK	Service Mode	5 5 8 START	Check the LCD indication. Illuminate all dots to check if they are normal.
DTMF SINGLE TEST	Service Mode	5 5 2 1..On 2..Off	Output the DTMF by single tone. (See page 105.)
LED TEST	Service Mode	5 5 7 START	All LEDs flashes on and off, or is illuminated.
KEY CHECK	Service Mode	5 6 1 START { any key }	Check the operation button. Indicate the button code at LCD while the button is pressed. (See 6.1 Button Code Table .)
FACTORY SET	Service Mode	5 5 0 START	Clear the memory in which the user can store data.

CCD AUTO POSITION ADJUSTMENT	Service Mode	[5][6][4] START	
SENSOR CHECK & VOX CHECK	Service Mode	[8][1][5] START	[Do Sn Co Pf Pl Pt Ri Vx] Do: Document Set Sensor : Paper inserted Sn: Read Position Sensor : At the Read Position Co: Cover Open Sensor : Cover Open Pf: Paper Full Sensor : Sensor On Pl: Paper Lever : Sensor On Pt: Paper Top Sensor : Sensor On Ri: Ribbon encoder : Sensor On Vx: Vox signal : there is sound from LINE or EXT-TEL
PRINTER FEED TEST	Service Mode	[8][5][1] START	
PRINT TEST PATTERN	Service Mode	[8][5][2][0] START	Print out the test pattern. Can select 1~4. (See page 106.)

DTMF single tone transmit select

When set to ON (=1), the 12 keys and transmission frequencies are as shown.

key	Frequency (Hz)	Key	Frequency (Hz)
"1"	697	"5"	1209
"2"	770	"6"	1336
"3"	852	"7"	1477
"4"	941		

When set to OFF (=2), the 12 keys and transmission frequencies are as shown.

High (Hz) / Low (Hz)	1209	1336	1477
697	"1"	"2"	"3"
770	"4"	"5"	"6"
852	"7"	"8"	"9"
941	*	"0"	"#"

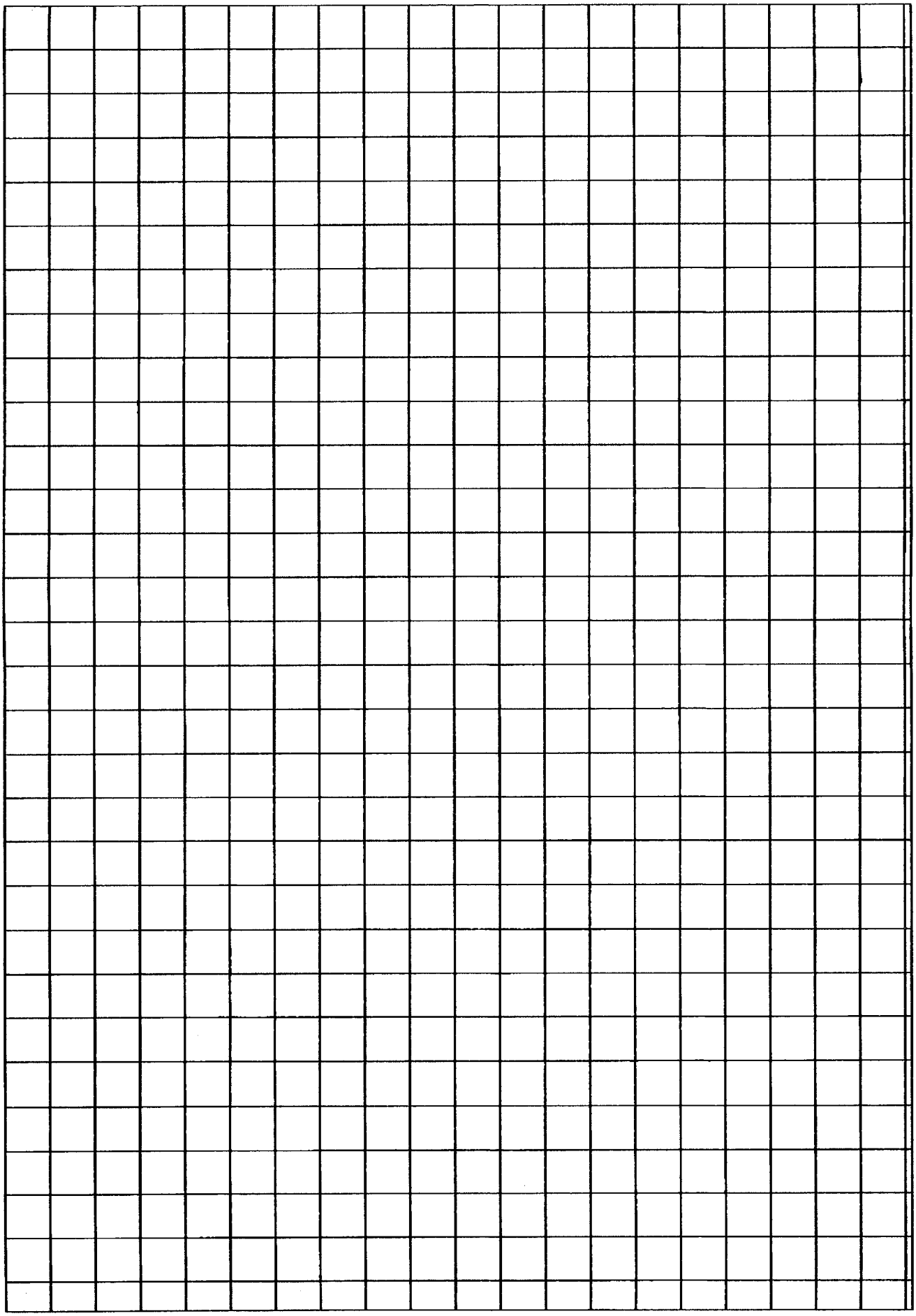
6.1 BUTTON CODE TABLE

Code	Button Name	Code	Button Name	Code	Button Name
02	RESOLUTION	35	5	3D	REDIAL/PAUSE
04	START/COPY/SET	36	6	3E	FLASH
05	LOWER	37	7	64	STATION 1
07	FILM REMAINING	38	8	65	STATION 2
08	SP-PHONE	39	9	66	STATION 3
0A	MUTE	3A	0	67	STATION 4
0C	RECEIVE MODE	3B	#	68	STATION 5
20	MENU	3C	*	69	STATION 6
22	HELP			6A	STATION 7
24	DIRECTORY			6B	STATION 8
25	▲ VOLUME			6C	STATION 9
26	▼ VOLUME				
31	1				
32	2				
33	3				
34	4				

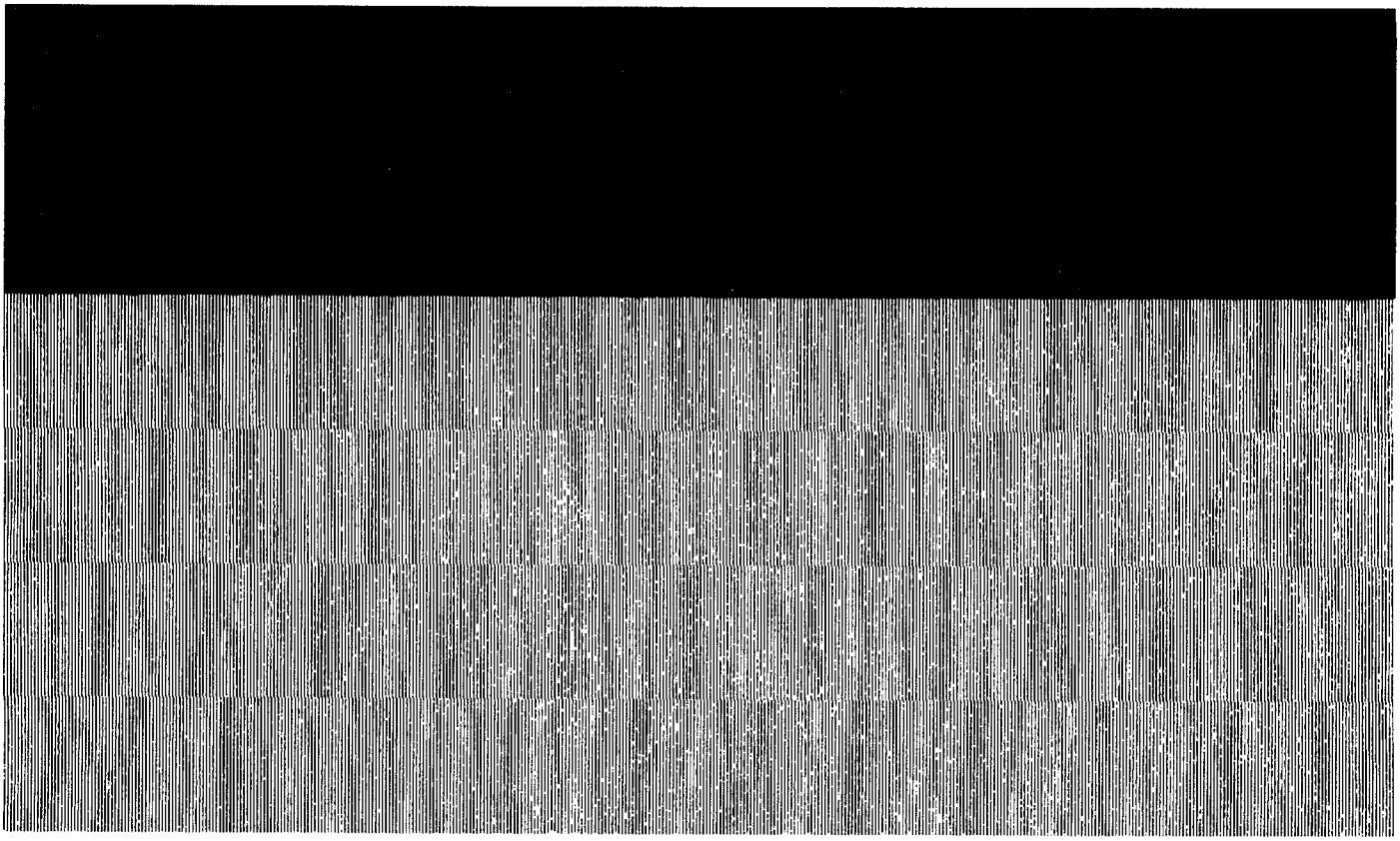
6.2 PRINT TEST PATTERN

1) Platen feed

2) Left margin/Upper margin



3) Head dot out

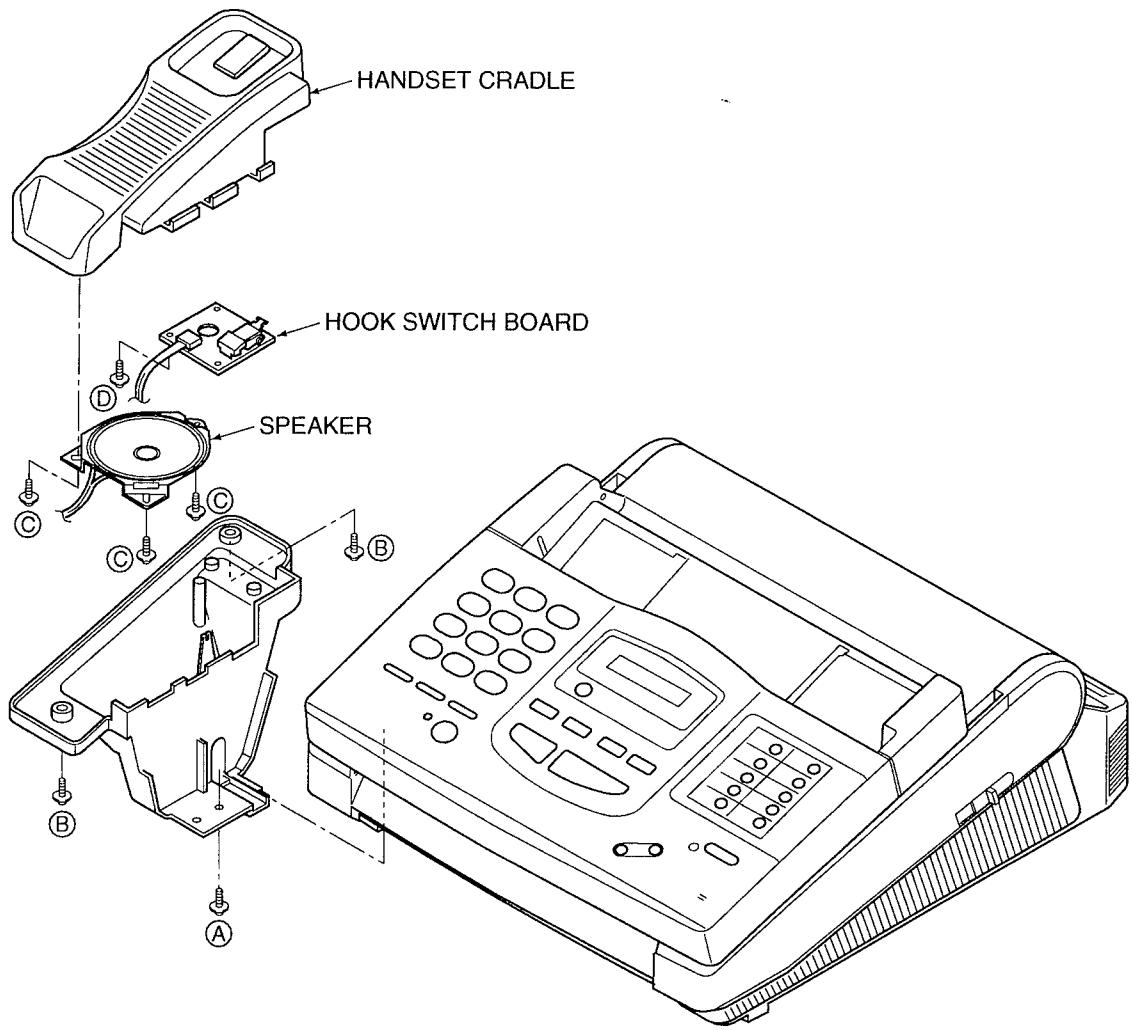


4) Ribbon pull out

DISASSEMBLY INSTRUCTIONS

Ref. No. 1	HOW TO REMOVE THE HANDSET CRADLE, SPEAKER AND HOOK SWITCH BOARD
Procedure 1	

1) Remove the 1 screw Ⓐ.
2) Remove the 2 screws Ⓑ.
3) Remove the handset cradle.
4) Remove the 3 screws Ⓒ.
5) Remove the speaker.
6) Remove the 1 screw Ⓓ.
7) Remove the hook switch board.



Ref. No. 2	**HOW TO REMOVE THE OPERATION PANEL BLOCK**
Procedure 2	

1) Push the front lid open lever in the direction of the arrow to the open the operation panel block.
2) Pull the both sides of the arms. (See Fig. A.)
3) Remove the operation panel block.

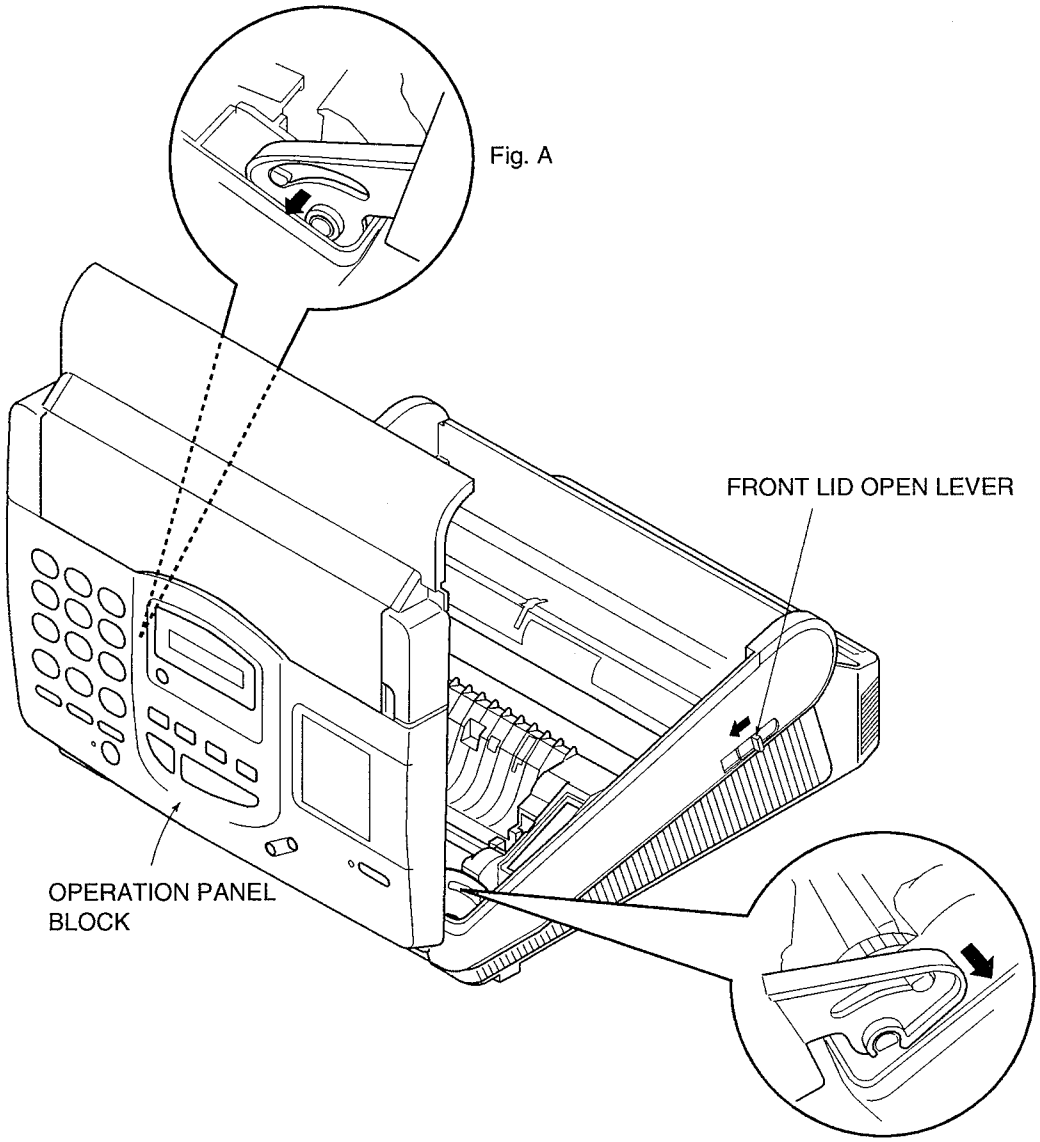
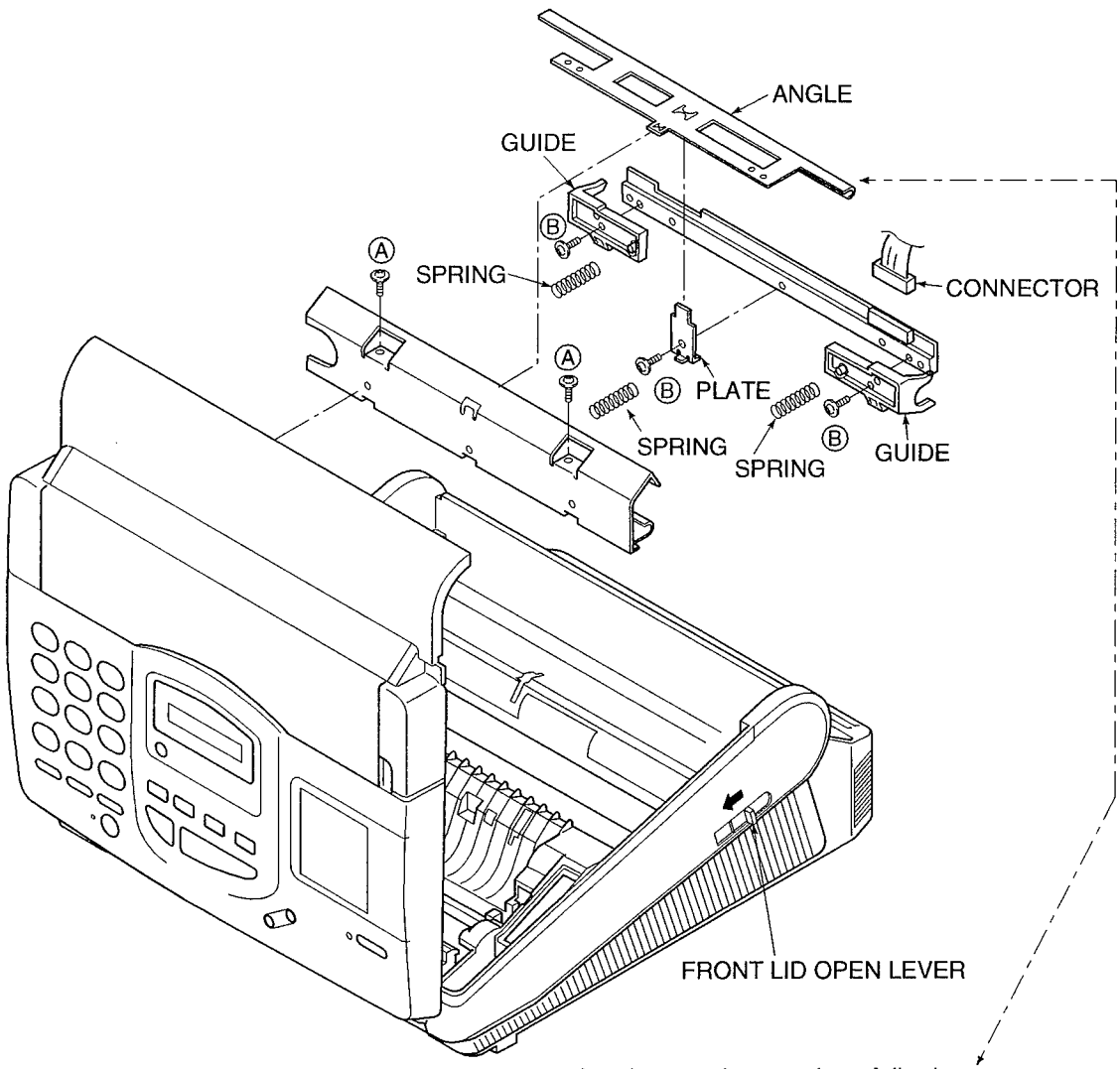


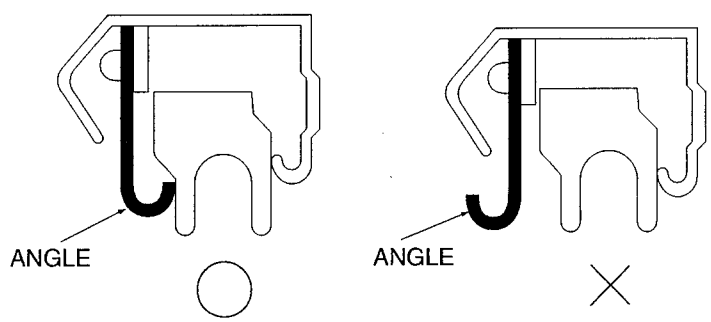
Fig. A

Ref. No. 3	**HOW TO REMOVE THE THEAMAL HEAD**
Procedure 3	

1) Push the front lid open lever in the direction of the arrow to open the operation panel.
2) Remove the 2 screws Ⓐ.
3) Remove the thermal head block.
4) Remove the angle.
5) Pull out the connector.
6) Remove the 3 screws Ⓑ.
7) Remove the 2 guides and plate.
8) Remove the 3 springs.
9) Replace the thermal head.

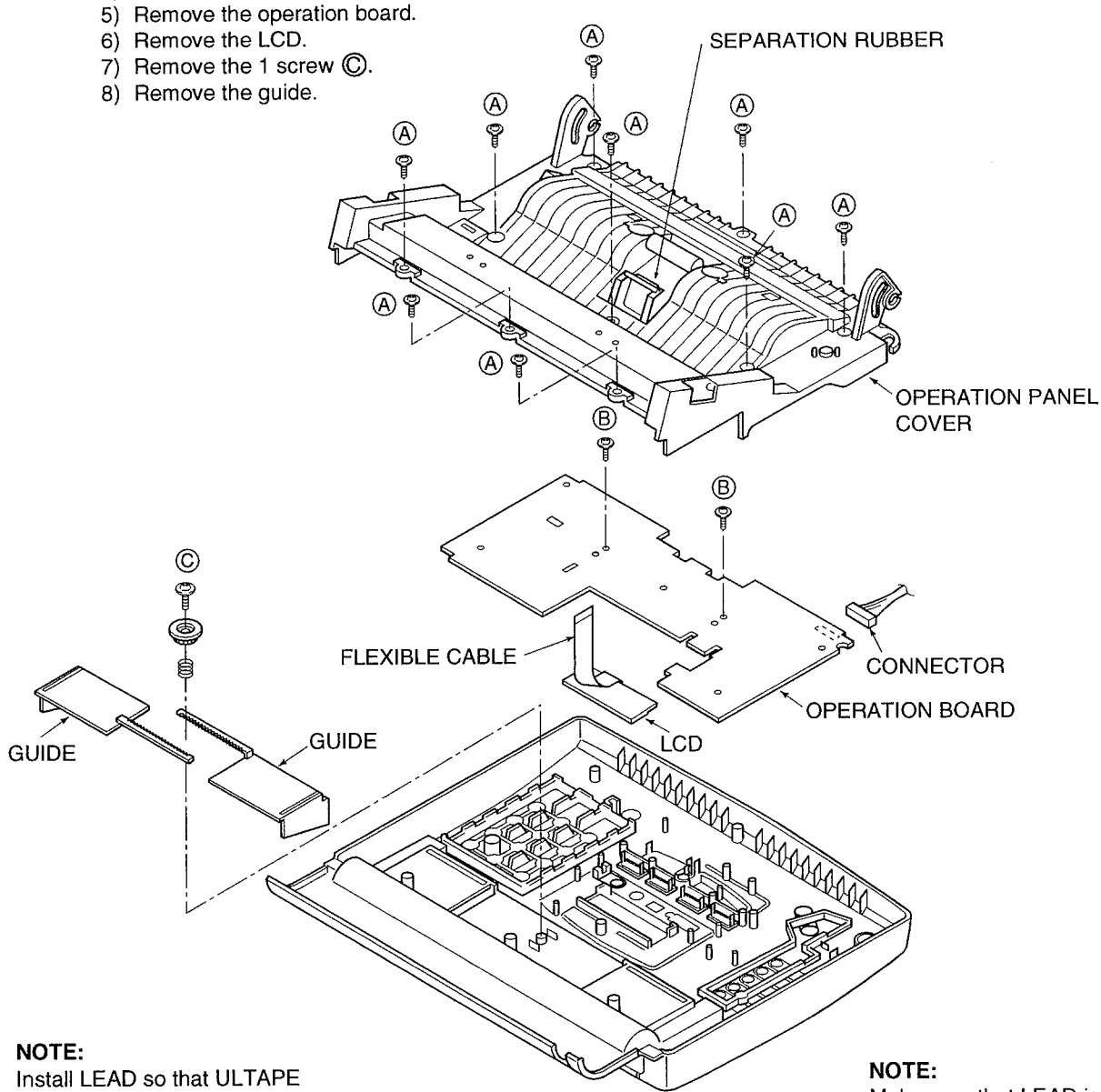


Attach an angle properly as following.

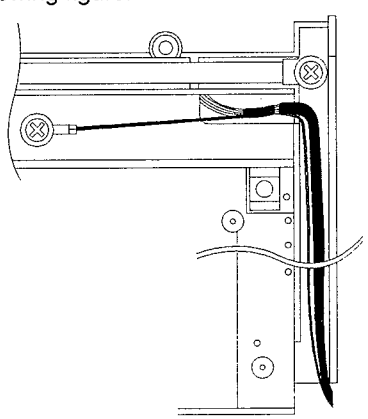


Ref. No. 4	HOW TO REMOVE THE OPERATION BOARD, LCD AND DOCUMENT GUIDE
Procedure 2→4	

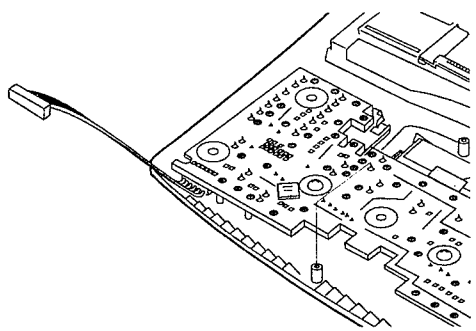
1) Remove the 9 screws Ⓐ.
2) Remove the operation panel cover.
3) Remove the 2 screws Ⓑ.
4) Pull out the connector and flexible cable.
5) Remove the operation board.
6) Remove the LCD.
7) Remove the 1 screw Ⓒ.
8) Remove the guide.



NOTE:
Install LEAD so that ULTAPE position of start rolling is on the line as following figure.

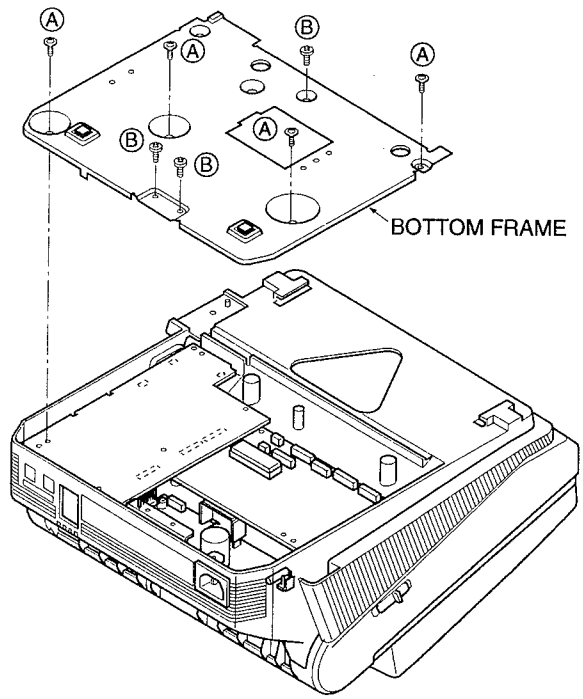


NOTE:
Make sure that LEAD is not on a substrate.
Don't hold LEAD between an operation panel and the substrate.



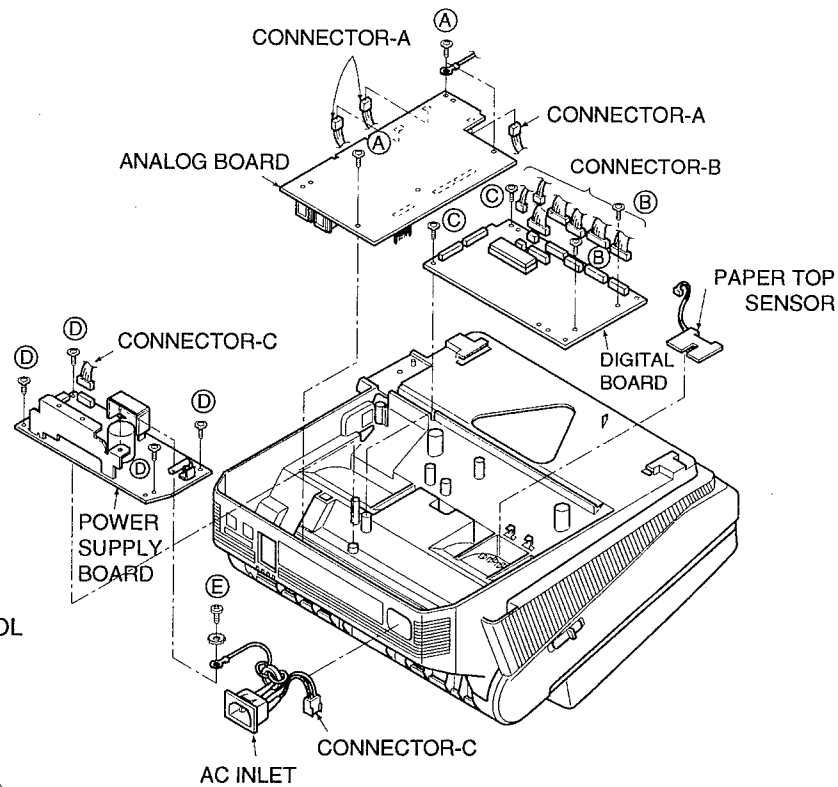
Ref. No. 5	**HOW TO REMOVE THE BOTTOM FRAME**
Procedure 5	

1) Remove the 4 screws Ⓐ.
2) Remove the 3 screws Ⓑ.
3) Remove the bottom frame.

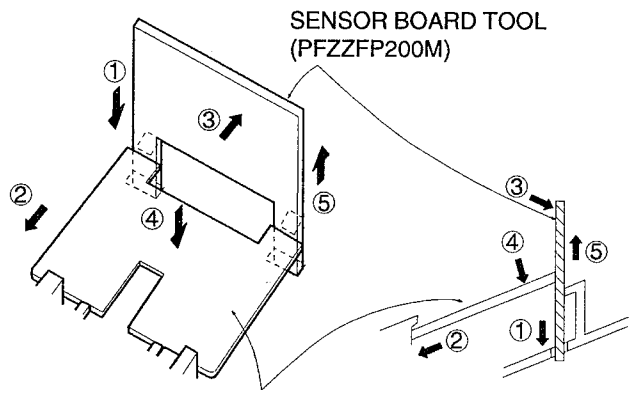


Ref. No. 6	**HOW TO REMOVE THE ANALOG, DIGITAL, POWER SUPPLY, PAPER TOP SENSOR BOARDS AND AC INLET**
Procedure 1→5→6	

1) Remove the 3 screws Ⓐ.
2) Remove the analog board.
3) Pull out the 3 connectors-A.
4) Remove the 7 connectors-B.
5) Remove the 2 screws Ⓑ.
6) Remove the 2 screws Ⓒ.
7) Remove the digital board.
8) Remove the 4 screws Ⓓ.
9) Remove the 1 screw Ⓔ.
10) Pull out the 2 connectors-C.
11) Remove the power supply board.
12) Remove the AC inlet.
13) Remove the paper top sensor board.



NOTE:
Use a sensor board tool when you set and remove a paper top sensor board .

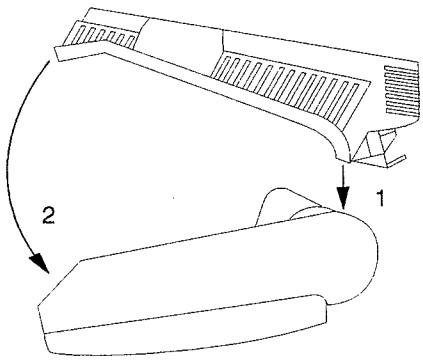


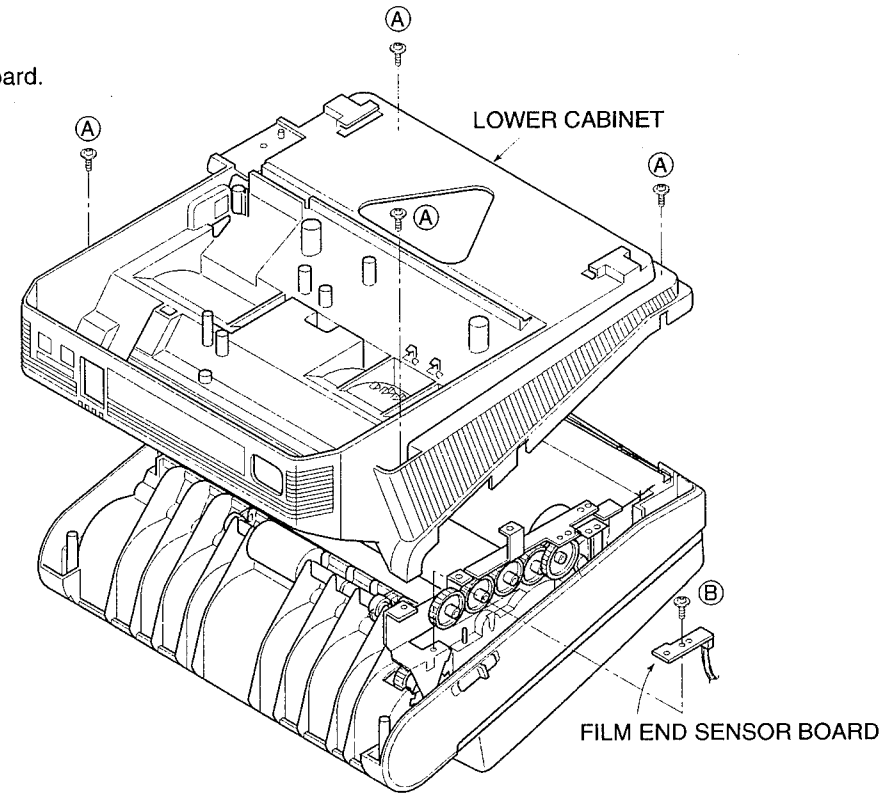
NOTE:
Refer to page 118 for installation position of a lead wire.

Ref. No. 7	**HOW TO REMOVE THE LOWER CABINET AND FILM SENSOR BOARD**
Procedure 5→6→7	

1) Remove the 4 screws Ⓐ.
2) Remove the lower cabinet.
3) Remove the 1 screw Ⓑ.
3) Remove the film end sensor board.

NOTE:
When you close a lower cabinet, insert back side first then set front side.

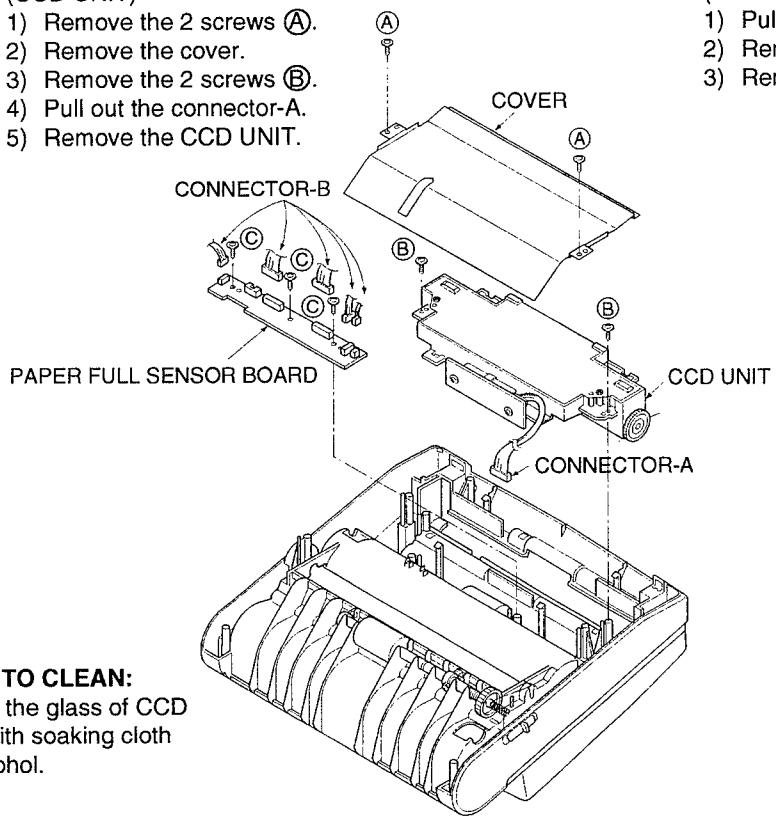


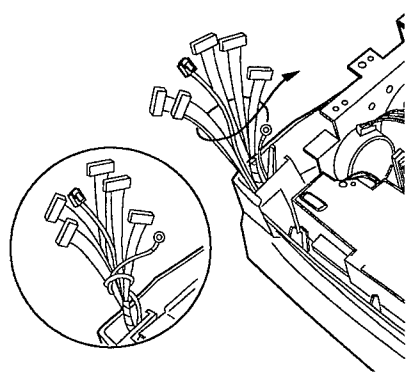


Ref. No. 8	**HOW TO REMOVE THE CCD UNIT AND PAPER FULL SENSOR BOARD**
Procedure 1→5→6→7→8	

(CCD UNIT)
1) Remove the 2 screws Ⓐ.
2) Remove the cover.
3) Remove the 2 screws Ⓑ.
4) Pull out the connector-A.
5) Remove the CCD UNIT.

(PAPER FULL SENSOR BOARD)
1) Pull out the 5 connectors-B.
2) Remove the 3 screws Ⓒ.
3) Remove the paper full sensor board.



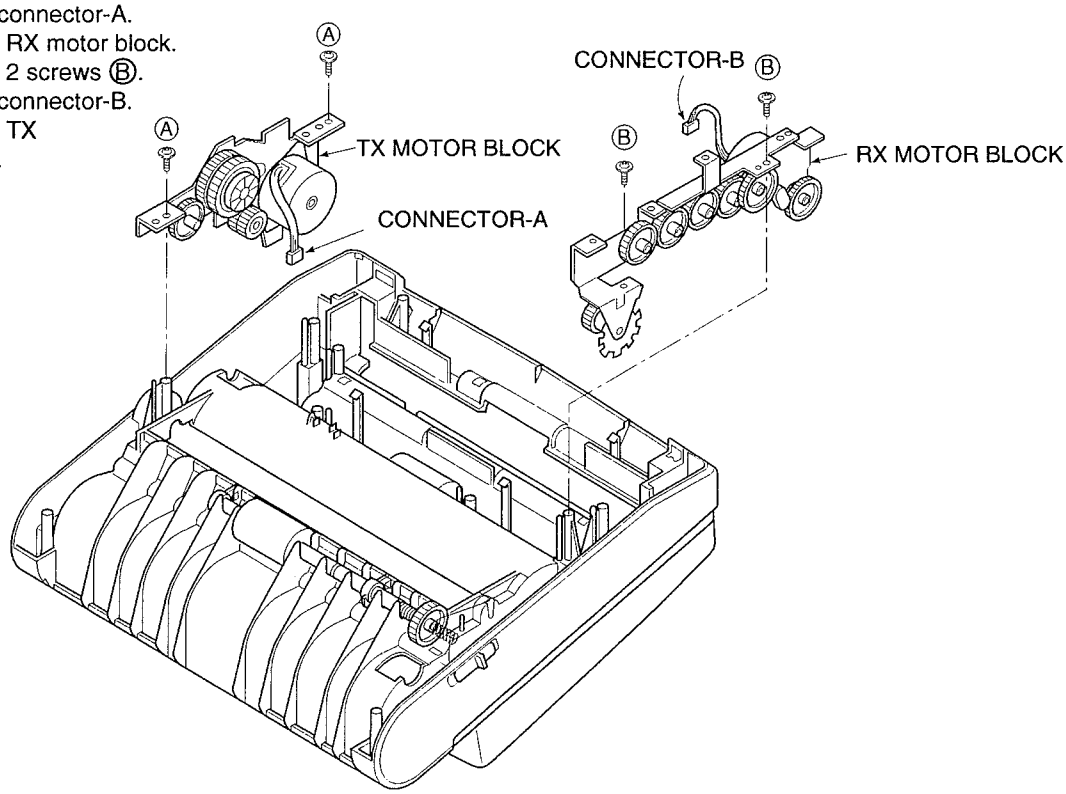


HOW TO CLEAN:
Clean the glass of CCD unit with soaking cloth in alcohol.

Ref. No. 9	**HOW TO REMOVE THE MOTOR BLOCK**

Procedure
7→8→9

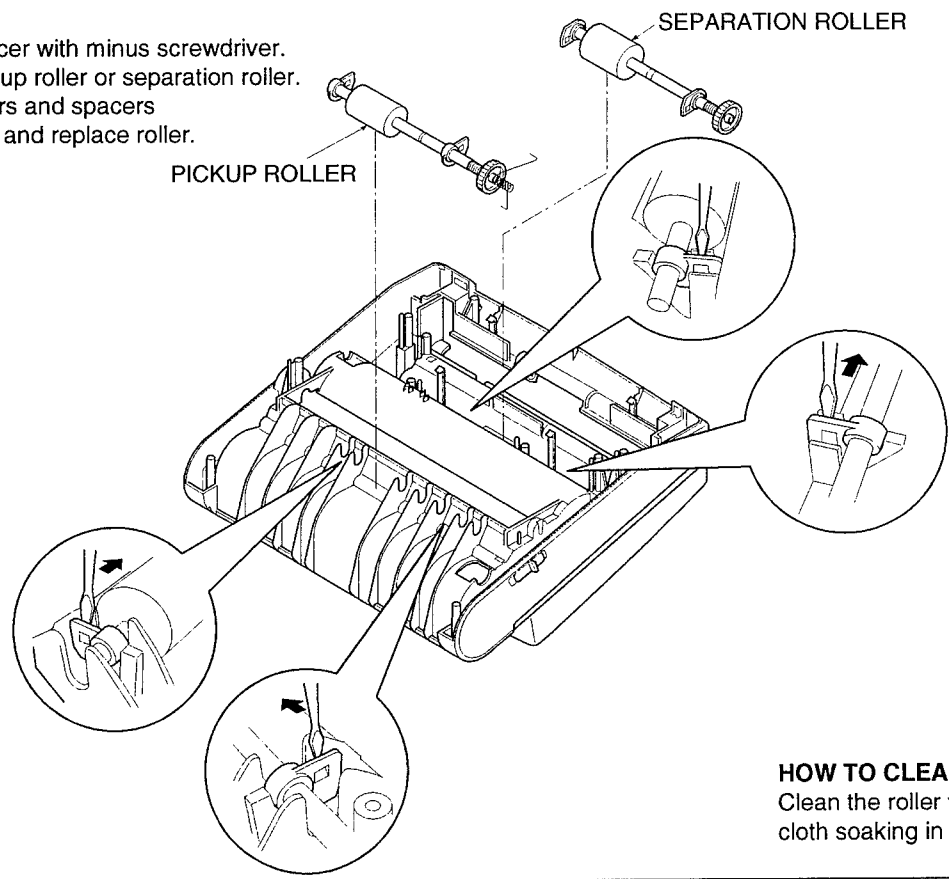
1) Remove the 2 screws Ⓐ.
2) Pull out the connector-A.
3) Remove the RX motor block.
4) Remove the 2 screws Ⓑ.
4) Pull out the connector-B.
6) Remove the TX motor block.



Ref. No. 10	**HOW TO REMOVE THE PICKUP AND SEPARATION ROLLERS**

Procedure
7→8→9→10

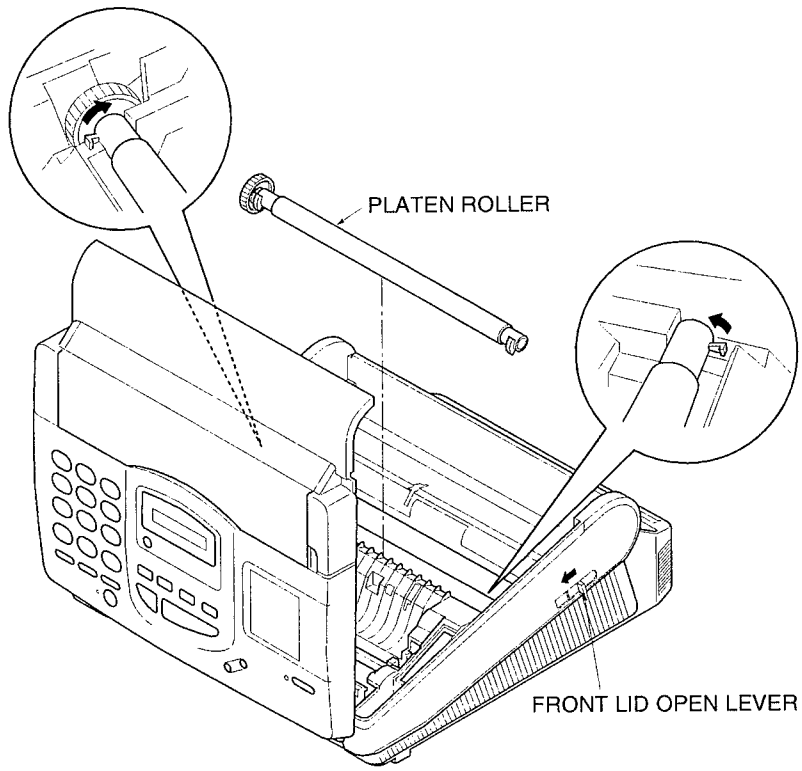
1) Remove the spacer with minus screwdriver.
2) Remove the pickup roller or separation roller.
3) Remove the gears and spacers from roller shaft, and replace roller.



HOW TO CLEAN:
Clean the roller with cloth soaking in alcohl.

Ref. No. 11	**HOW TO REMOVE THE PLATEN ROLLER**
Procedure 11	

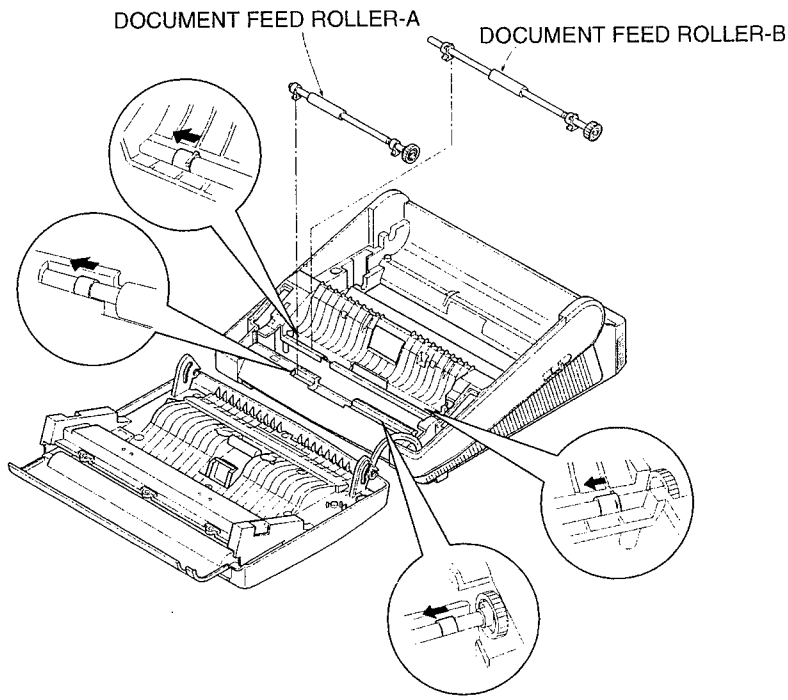
1) Push the front lid open lever in the direction of the arrow to the operation panel.
2) Remove the platen roller.



Ref. No. 12	**HOW TO REMOVE THE DOCUMENT FEED ROLLER**
Procedure 2→12	

(DOCUMENT FEED ROLLER-A)
1) Slide the spacer and remove the roller.

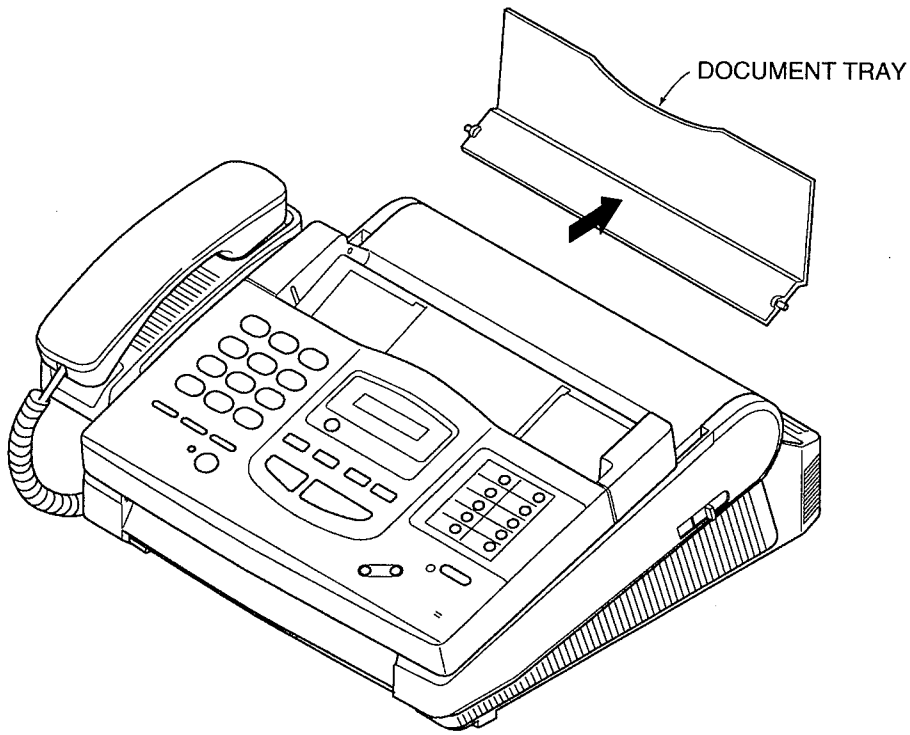
(DOCUMENT FEED ROLLER-B)
1) Remove the RX motor block. (See Ref. No. 9)
2) Slide the spacers and remove the roller.



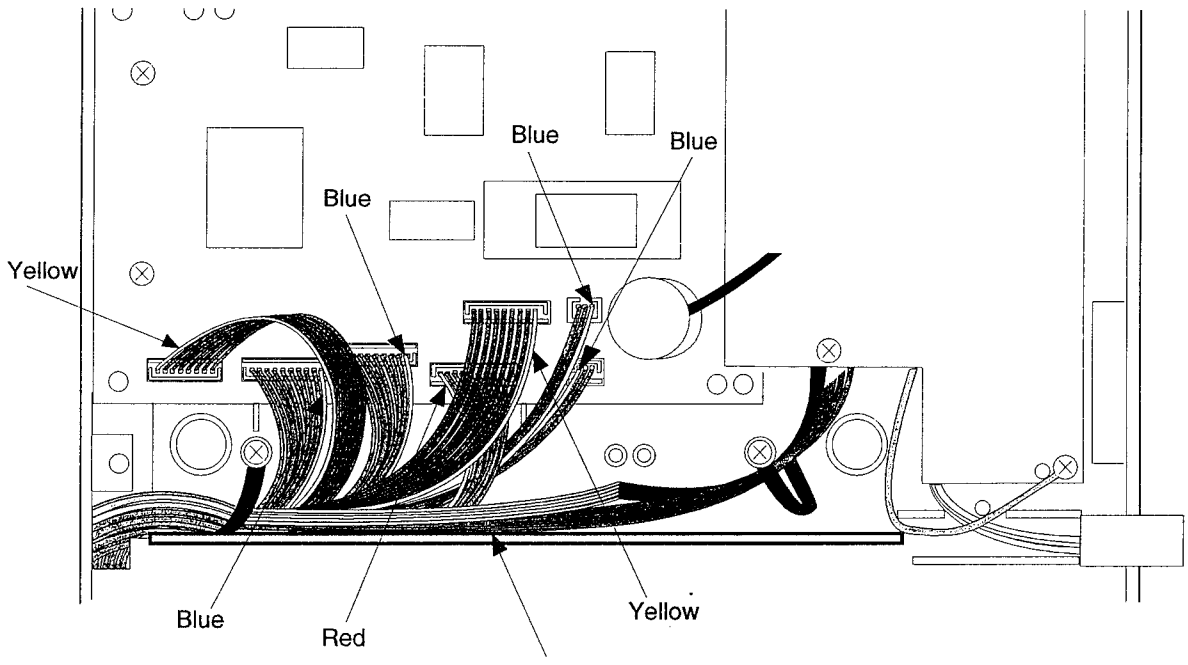
HOW TO CLEAN:
Clean the roller with cloth soaking in alcohl.

Ref. No. 13	HOW TO REMOVE DOCUMENT TRAY.
Procedure 13	

1) Push the center section in the direction of the arrow to remove the document tray.



Installation position of lead wire



HOW TO REPLACE FLAT PACKAGE IC

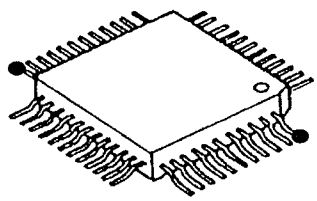
■ PREPARATION

- SOLDER ..... Sparkle Solder 115A-1, 115B-1
  OR
  Almit Solder KR-19, KR-19RMA
- Soldering iron ..... Recommended power consumption will be between 30 W to 40 W.
  Temperature of Copper Rod 662 ±50 °F(350 ±10 °C)

  (An expert may handle 60~80 W iron, but a beginner might damage the foil by overheating.)
- Flux ..... HI115 Specific gravity 0.863
  (Original flux will be replaced daily.)

■ PROCEDURE

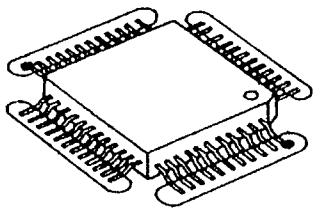
1. Temporarily fix the FLAT PACKAGE IC by Soldering on two marked pins.



● ..... Temporary soldering point.

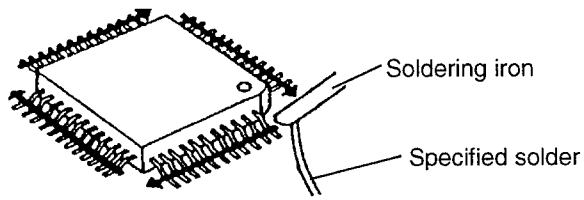
*Accurate setting of the IC to the corresponding soldering foil is vital.

2. Apply flux to the all pins of the FLAT PACKAGE IC.



⬭ ..... Flux

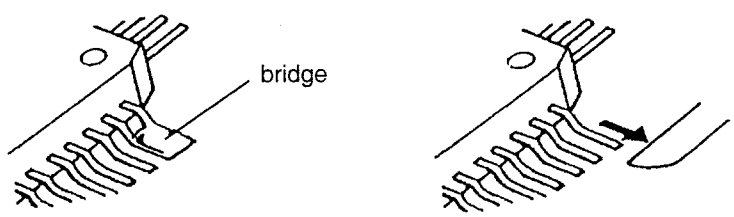
3. Solder the specified solder in the direction of the arrow, while slide the soldering iron.



■ MODIFICATION PROCEDURE OF BRIDGE

1. Re-solder slightly on bridged portion.

2. Remove any remaining solder along the pins using soldering iron as shown below.



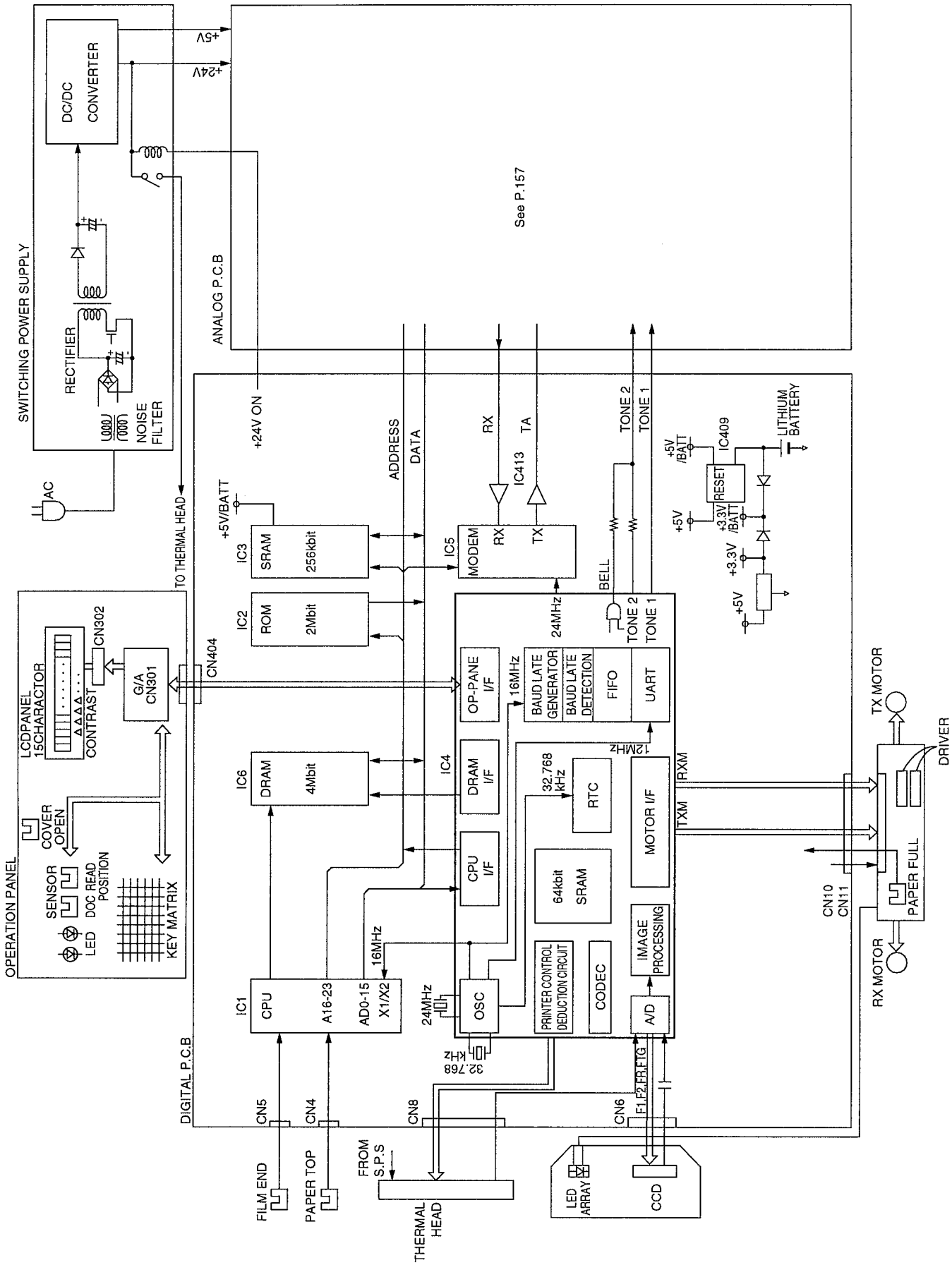
CIRCUIT OPERATIONS

1. GENERAL BLOCK DIAGRAM

The control section will be explained as shown in the block diagram.

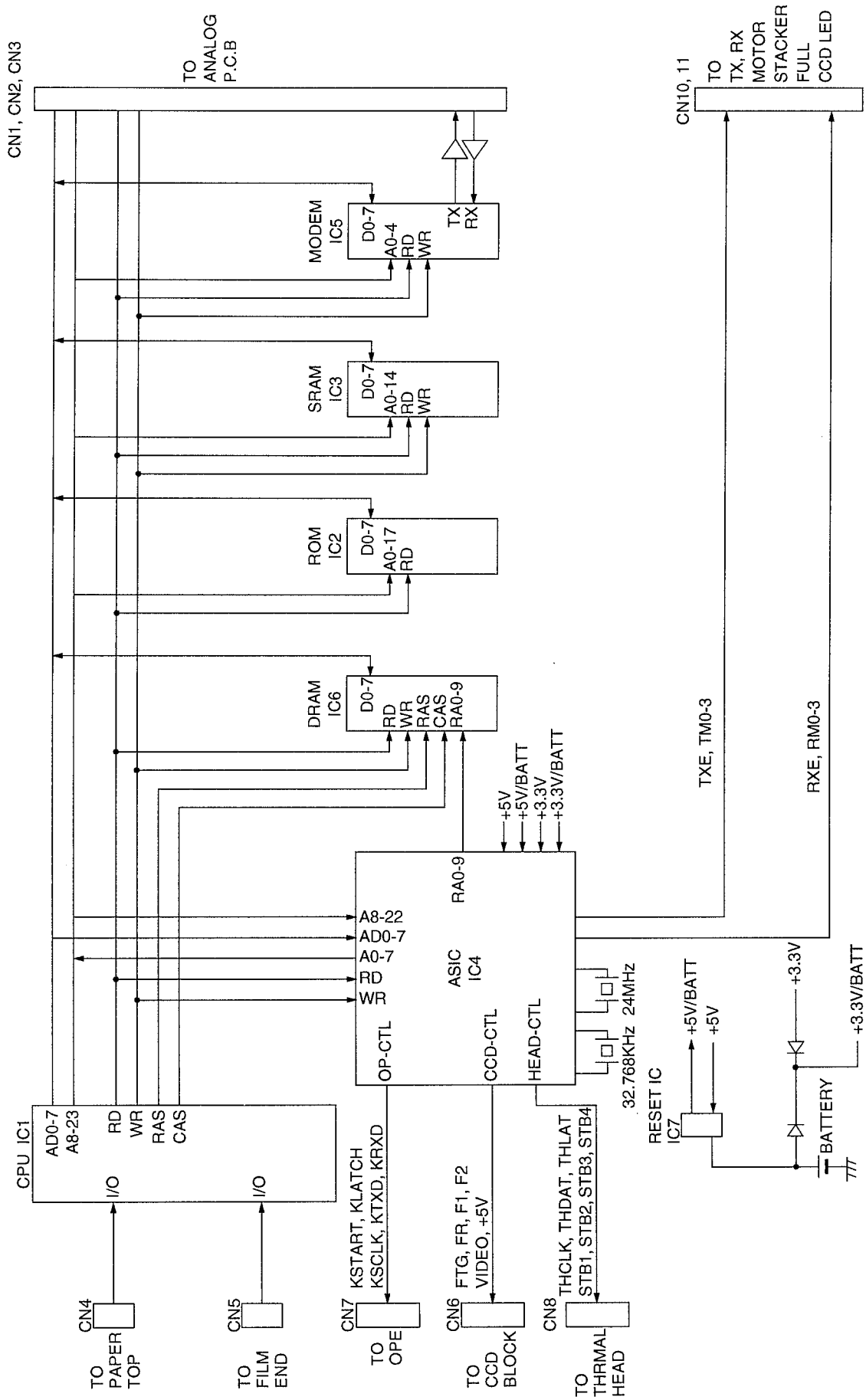
1) CPU (IC1)	The CPU fetches and executes instructions from ROM, writes (reads) data to (from) RAM, writes commands to the ASIC and reads status information from ASIC.
2) ROM (IC2)	Contains all of the program instructions for unit operations.
3) Static RAM (IC3)	This memory is used mainly for parameter working storage area.
4) Dynamic RAM (IC6)	This memory is used mainly for parameter working storage area.
5) ASIC (IC4)	Composed mainly address decoder and modem control section. Control the general FAX operation. Control the operation panel I/F. Control the thermal head I/F and CCD I/F. Execution image processing. Real time clock.
6) MODEM (IC5)	Executes modulation and demodulation for FAX communication.
7) Read Section	CCD image sensor to read transmitting documents.
8) Motor Driver (IC401,IC402)	Drives the transmission motor and the reception motor.
9) Reset Circuit (IC7)	Provides reset pulse to each of the major IC's.
10) Thermal Head	Contains heating elements for dot matrix image printing.
11) Analog Board	Composed of ITS circuit, NCU circuit.
12) Sensor Section	Composed of cover open sensor, document sensor, read position sensor, paper set switch, paper full sensor, paper top sensor, film end sensor.
13) Switching Power Supply Board Section	Supplies +5 V and +24 V to the unit.

General Block Diagram



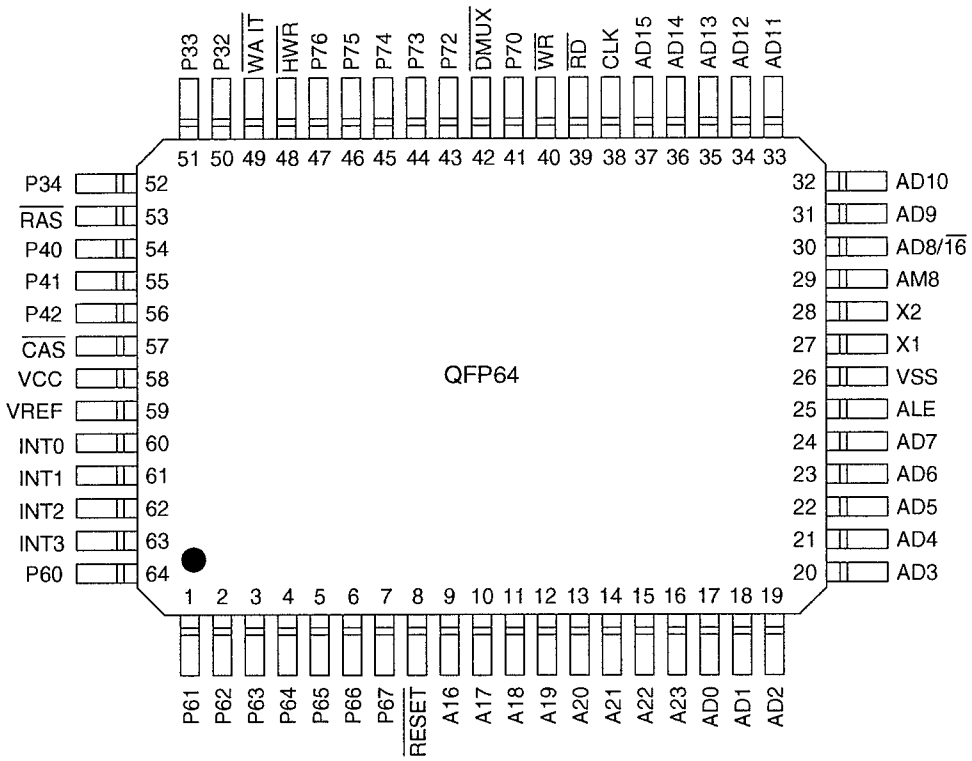
2. CONTROL SECTION

2.1 BLOCK DIAGRAM



2.2 CPU (IC1)

The KX-FP200 uses a TMP96C031 CPU operating at 16MHz. Read and write cycle timing chart is shown below.



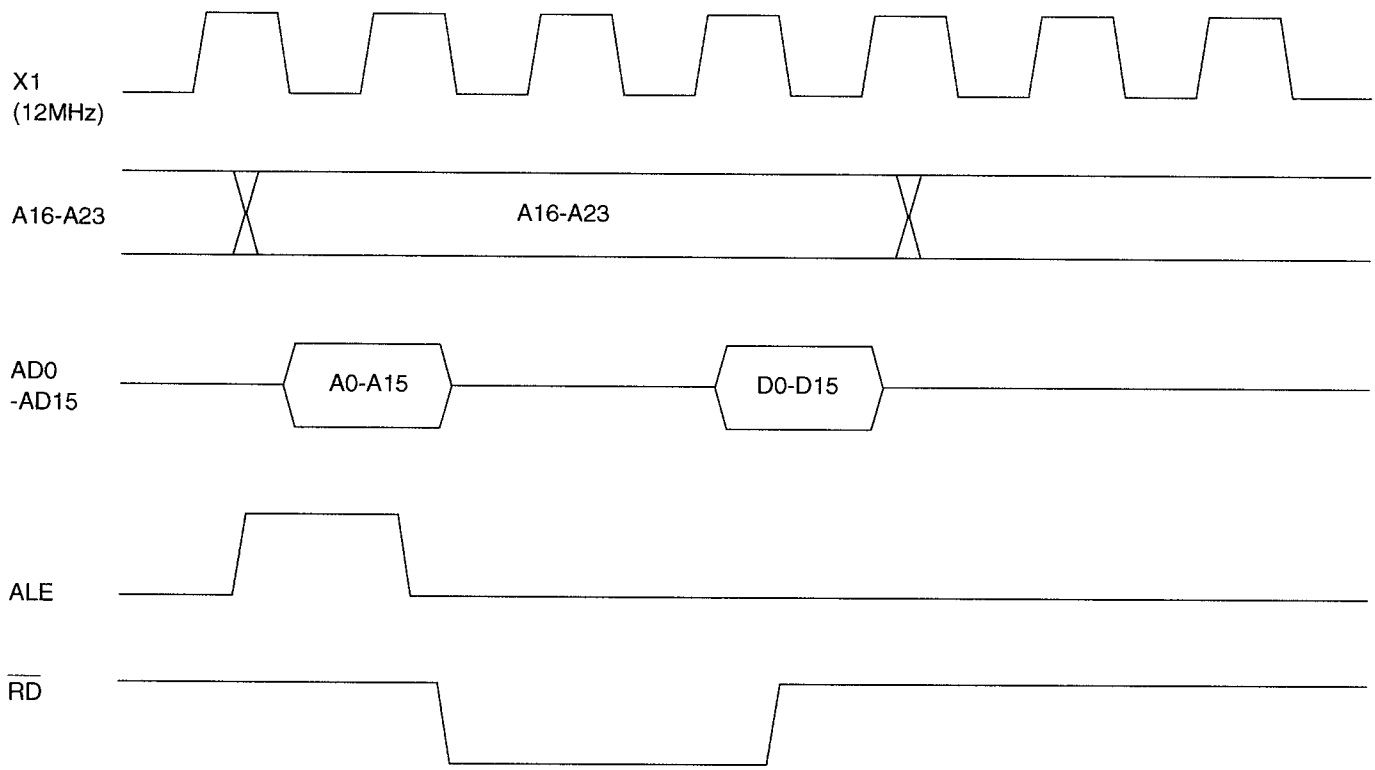
Pin Chip Carrier Pin Assignmets

1) Pin Descriptions

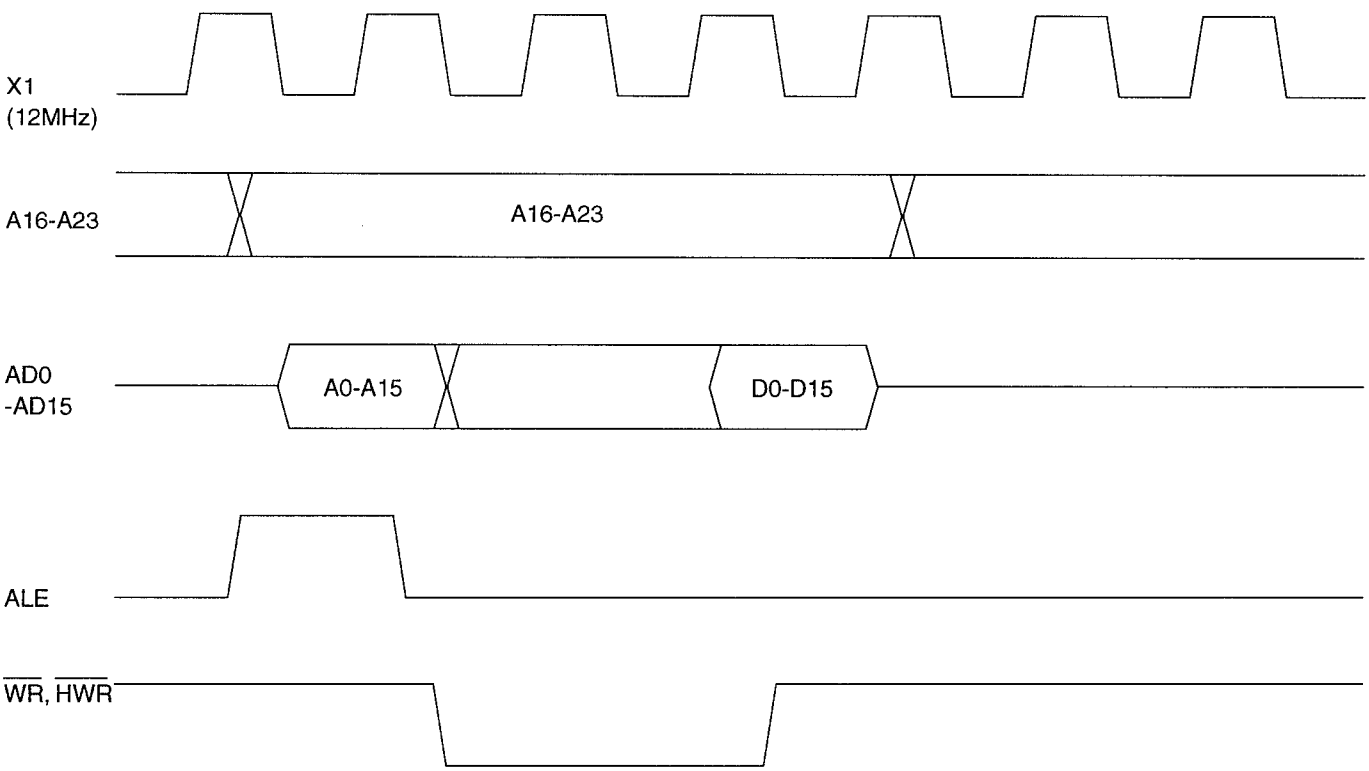
AD0 - AD15	Address/Date Bus (input/output).
A16 - A23	Address Bus (output).
$\overline{RD}$	Read (output, active Low). $\overline{RD}$ indicate that the CPU wants to read date from AD0 - AD15.
$\overline{WR}$	Write (output, active Low). $\overline{WR}$ indicate that the CPU Address/Data bus (AD0 - AD7) holds valid data.
$\overline{HWR}$	Write (output, active Low). $\overline{HWR}$ indicate that the CPU Address/Data bus (AD8 - AD15) holds valid data.
ALE	Address Latch Enable (output, active High). ALE indicate that the CPU Address/Data bus (AD0 - AD15) holds valid address.
$\overline{RESET}$	Reset (input, active Low).
$\overline{RAS}$	Row Address Strove (output, active Low). DRAM interface.
$\overline{CAS}$	Colomn Address Strove (output, active Low). DRAM interface.
$\overline{DMUX}$	DRAM address MU1tipleX (output).
INT1	Interrupt Request (input).

2) CPU Timing

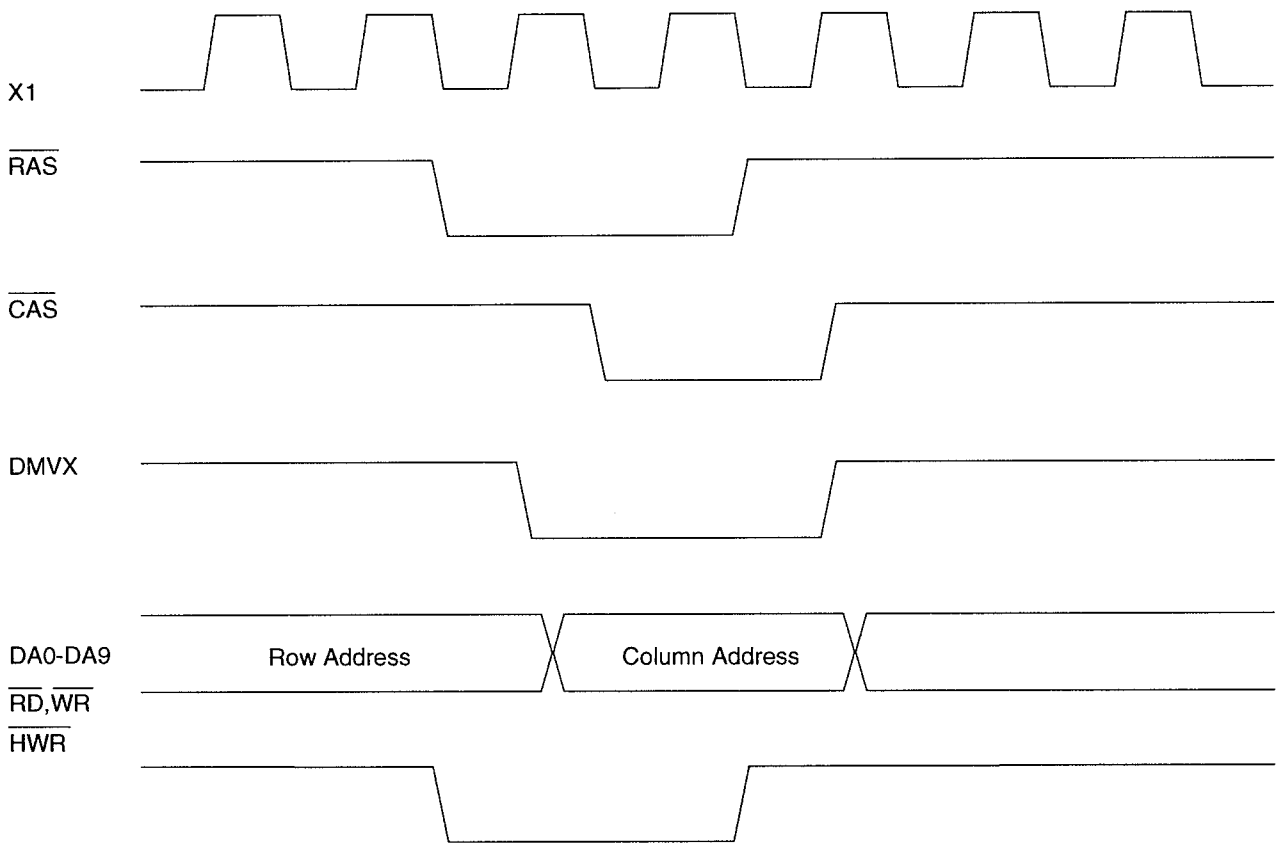
Read Cycle



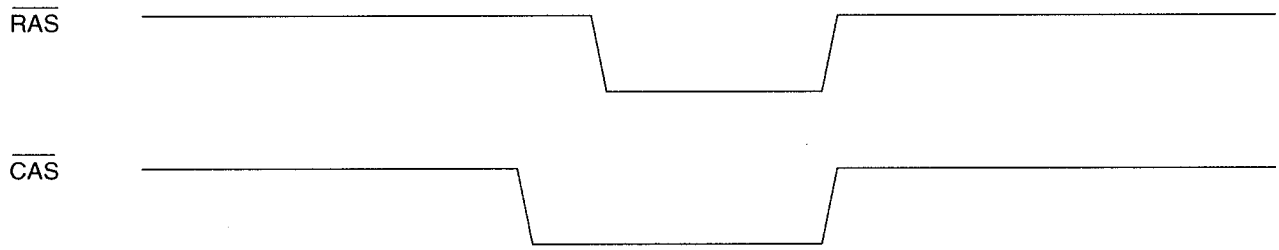
Write Cycle



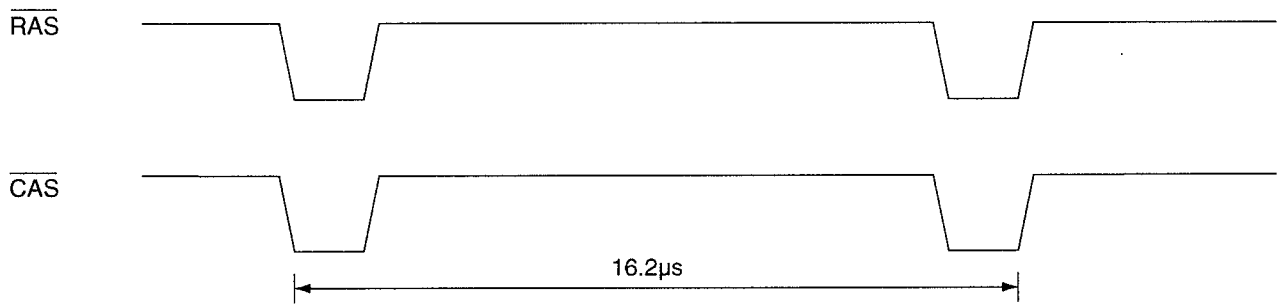
Read, Write Timing



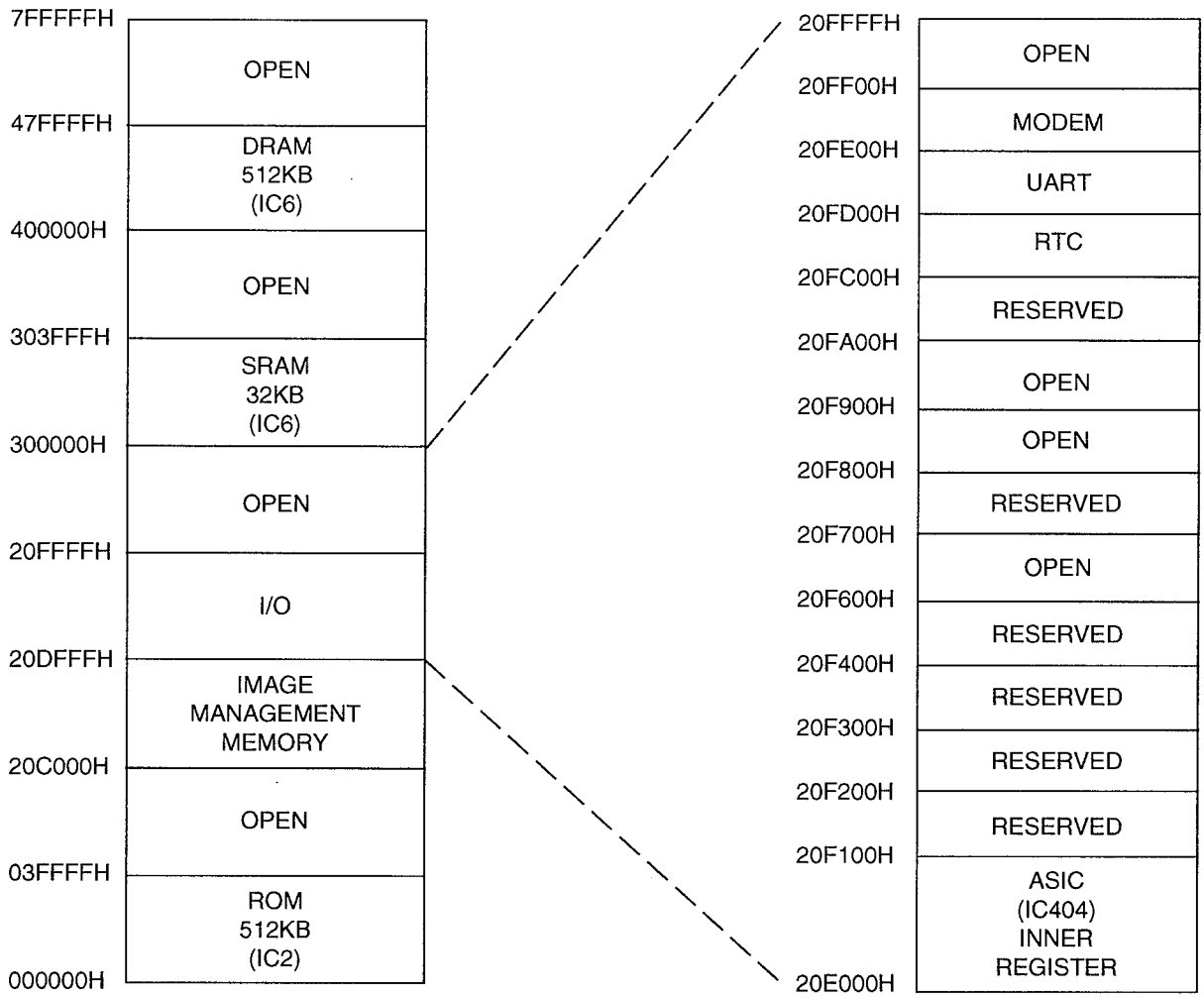
CAS before RAS Refresh Timing



Refresh Cycle



2.3 MEMORY MAP



2.4 ROM (IC2)

The 256KB ROM (EPROM or MASKROM) is used to store program. The address is 000000H - 03FFFFH.

2.5 STATIC RAM (IC3)

The 32KB SRAM that is backed up with lithium battery is used. This holds one-touch dial, automatic dial and ID, etc. The address is 300000H - 307FFFH.

2.6 DYNAMIC RAM (IC6)

This DRAM is used for CPU work, sending and receiving memory. The address is 400000H - 47FFFFH.

1) Read, Write, Refresh timing

Refresh is excuted evey 16.2μs.

2.7 ASIC (IC4)

This custom IC is used for general FAX operation.

1) DECODER: Decodes the address of the CPU (IC1) according to the memory map.
2) CPU I/F: Outputs the INTERRUPT signal.
3) ROM/RAM I/F: Controls the SELECT signal of ROM or RAM.
4) CCD I/F: Controls document reading.
5) IMAGE DATA RAM: Inside ASIC and 8KB. Fig. A indicates the mapping which is used image processing.
6) THERMAL HEAD I/F: Transmits the recorded data to the thermal head.
7) TX MOTOR I/F: Controls the transmission motor which feeds the document.
8) RX MOTOR I/F: Controls the receiving motor which feeds the recording paper.
9) OPE. PANEL I/F: Serial Interface with Operation panel
10) I/O PORT: I/O Port Interface (Exa. Sensor etc.)
11) RTC: Real time clock.

This memory is built-in to ASIC (IC4) to be used for image processing.
Memory map of Image Data RAM is shown below.

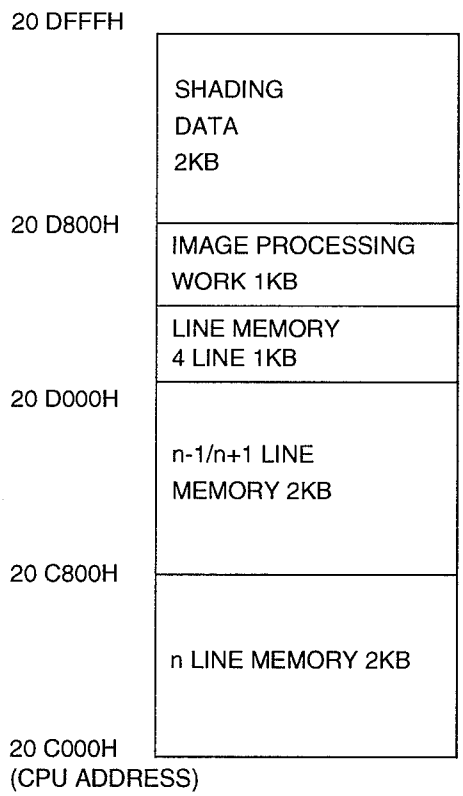
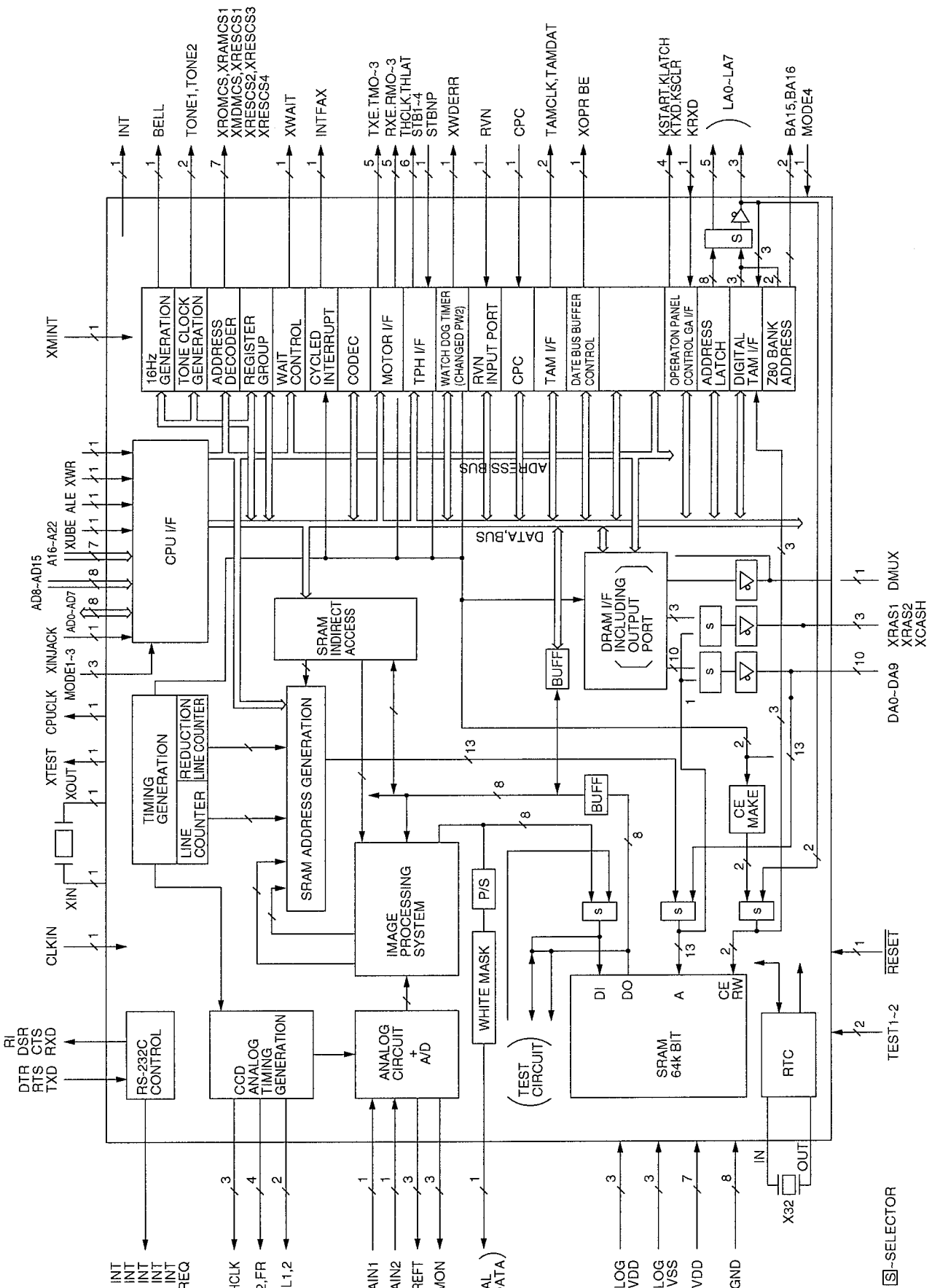


Fig. A

IC 4 Block Diagram (Fig.A)



Explanation of Pin Distribution (IC4)

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
1	AIN1	A	3.3V	CCD IMAGE SIGNAL INPUT
2	AIN2	A	3.3V	THERMISTER TEMPERATURE WATCH INPUT
3	AMON	A	3.3V	ANALOG SIGNAL MONITOR TERMINAL
4	VSSB		GND	POWER SOURCE (ANALOG GND)
5	VDDB		3.3V	POWER SOURCE (ANALOG +3.3V)
6	VDD (3.3V/B)		3.3V/BATT	POWER SOURCE (+3.3V/LITHIUM BATTERY)
7	X32OUT	O	3.3V/BATT	RTC (32.768KHz) CONNECTION
8	X32IN	I	3.3V/BATT	RTC (32.768KHz) CONNECTION
9	VSS		GND	GND
10	XBACEN	I	5V/BATT	BACKUP ENABLE
11	VDD (5V/B)		5V/BATT	POWER SOURCE (+5V/LITHIUM BATTERY)
12	XRAMCS	O	5V/BATT	RAM (IC3) CHIP SELECT
13	ALARM	O	5V	NOT USED
14	ADSEL2	I/O	5V	CANNEL SELECT SIGNAL FOR AIN2
15	ADSEL1	O	5V	CANNEL SELECT SIGNAL FOR AIN2
16	DARKON	I/O	5V	S/H CLOCK SIGNAL FOR LIGHT SCHIELD OUTPUT CLAMP
17	SPHCLK	I/O	5V	IMAGE SIGNAL S/H CLOCK SIGNAL
18	VIDRST	I/O	5V	CLAMP CONTROL SIGNAL FOR DC PLAY BACK
19	FTG	O	5V	SH SIGNAL OUTPUT FOR CCD
20	FR	O	5V	RS SIGNAL OUTPUT FOR CCD
21	F2	O	5V	02 SIGNAL OUTPUT FOR CCD
22	F1	O	5V	01 SIGNAL OUTPUT FOR CCD
23	VDD (5V)		5V	POWER SOURCE (+5V)
24	VSS		GND	POWER SOURCE (GND)
25	FMEMCLK	I/O	5V	NOT USED
26	FMEMDI	I/O	5V	NOT USED
27	FMEMDO	I/ O	5V	NOT USED
28	FMEMCS	I/O	5V	NOT USED
29	RM0	I/O	5V	TRANSFER MOTOR A PHASE
30	RM1	I/O	5V	TRANSFER MOTOR B PHASE
31	RM2	I/O	5V	TRANSFER MOTOR /A PHASE
32	RM3	I/O	5V	TRANSFER MOTOR /B PHASE
33	RXE	I/O	5V	TRANSFER MOTOR ENABLE SIGNAL
34	TM0	I/O	5V	TRANSFER MOTOR A PHASE
35	TM1	I/O	5V	TRANSFER MOTOR A PHASE
36	TM2	I/O	5V	TRANSFER MOTOR A PHASE
37	TM3	I/O	5V	TRANSFER MOTOR A PHASE
38	TXE	I/O	5V	TRANSFER MOTOR ENABLE SIGNAL
39	TONE1	O	5V	TONE OUTPUT
40	TONE2	O	5V	TONE OUTPUT
41	BELL	O	5V	16Hz GENERATES
42	RVN	I	5V	NOT USED
43	CPC	I	5V	NOT USED
44	VSS		GND	POWER SOURCE (GND)
45	VDD (5V)		5V	POWER SOURCE (+5V)
46	LA0	I/O	5V	LATCH ADDRESS LA0
47	LA1	O	5V	LATCH ADDRESS LA1
48	LA2	O	5V	LATCH ADDRESS LA2
49	LA3	O	5V	LATCH ADDRESS LA3
50	LA4	O	5V	LATCH ADDRESS LA4
51	LA5	O	5V	LATCH ADDRESS LA5
52	LA6	I/O	5V	LATCH ADDRESS LA6
53	LA7	I/ O	5V	LATCH ADDRESS LA7

KX-FP200

NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
54	TEST1	I	5V	LOW FIXED
55	TEST2	I	5V	LOW FIXED
56	TEST3	I	5V	HIGH FIXED
57	VDD (3.3V)		3.3V	POWER SOURCE (+3.3V)
58	XOUT	O	3.3V	SYSTEM CLOCK (24MHz)
59	XIN	I	3.3V	SYSTEM CLOCK (24MHz)
60	VSS		GND	POWER SOURCE (GND)
61	VDD (5V)		5V	POWER SOURCE (+5V)
62	XTEST	O	5V	NOT USED
63	CPUCLK	O	5V	NOT USED
64	XRESCS4	O	5V	NOT USED
65	XRESCS3	O	5V	NOT USED
66	XRESCS2	O	5V	NOT USED
67	XRESCS1	O	5V	ANALOG BOARD (IC1) CHIP SELECT
68	XROMCS	O	5V	ROM (IC2) CHIP SELECT
69	XMDMCS	O	5V	MODEM (IC5) CHIP SELECT
70	VSS		GND	POWER SOURCE (GND)
71	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
72	HSTRD	I /O	5V	NOT USED
73	HDTWR	I/O	5V	NOT USED
74	XOPRBE	O	5V	NOT USED
75	ALE	I	5V	CPU (IC1) ALE
76	XWR	I	5V	CPU (IC1) WR
77	XRD	I	5V	CPU (IC1) RD
78	AD15	I	5V	CPU (IC1) ADDRESS BUS AD15
79	AD14	I	5V	CPU (IC1) ADDRESS BUS AD14
80	AD13	I	5V	CPU (IC1) ADDRESS BUS AD13
81	AD12	I	5V	CPU (IC1) ADDRESS BUS AD12
82	AD11	I	5V	CPU (IC1) ADDRESS BUS AD11
83	AD10	I	5V	CPU (IC1) ADDRESS BUS AD10
84	AD9	I	5V	CPU (IC1) ADDRESS BUS AD9
85	AD8	I	5V	CPU (IC1) ADDRESS BUS AD8
86	AD7	I/O	5V	CPU (IC1) ADDRESS/DATA BUS AD7
87	AD6	I/ O	5V	CPU (IC1) ADDRESS/DATA BUS AD6
88	AD5	I/O	5V	CPU (IC1) ADDRESS/DATA BUS AD5
89	AD4	I/O	5V	CPU (IC1) ADDRESS/DATA BUS AD4
90	VSS		GND	POWER SOURCE (GND)
91	VDD (5V)		5V	POWER SOURCE (+5V)
92	AD3	I/O	5V	CPU (IC1) ADDRESS/DATA BUS AD3
93	AD2	I/O	5V	CPU (IC1) ADDRESS/DATA BUS AD2
94	AD1	I/O	5V	CPU (IC1) ADDRESS/DATA BUS AD1
95	AD0	I/O	5V	CPU (IC1) ADDRESS/DATA BUS AD0
96	A22	I	5V	CPU (IC1) ADDRESS BUS A22
97	A21	I	5V	CPU (IC1) ADDRESS BUS A21
98	A20	I	5V	CPU (IC1) ADDRESS BUS A20
99	A19	I	5V	CPU (IC1) ADDRESS BUS A19
100	A18	I	5V	CPU (IC1) ADDRESS BUS A18
101	A17	I	5V	CPU (IC1) ADDRESS BUS A17
102	A16	I	5V	CPU (IC1) ADDRESS BUS A16
103	DA0	I/ O	5V	DRAM (IC6) ADDRESS A0
104	DA1	I/O	5V	DRAM (IC6) ADDRESS A1
105	DA2	I/O	5V	DRAM (IC6) ADDRESS A2
106	DA3	I/O	5V	DRAM (IC6) ADDRESS A3

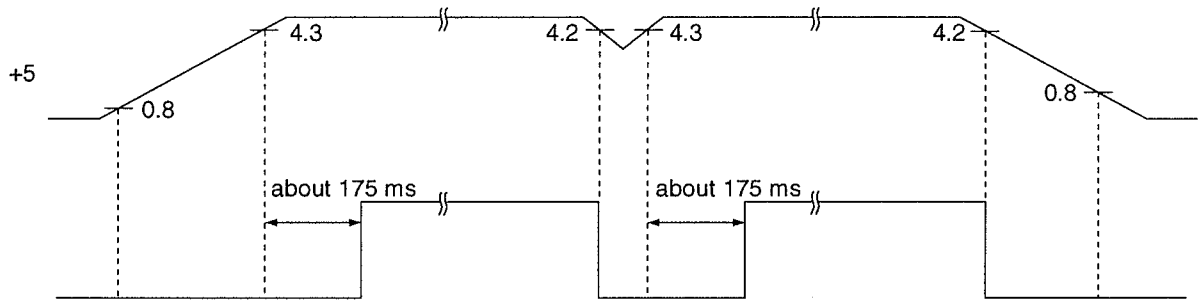
NO.	SIGNAL	I/O	POWER SUPPLIED VOLTAGE	EXPLANATION
107	DA4	I/O	5V	DRAM (IC6) ADDRESS A4
108	VSS		GND	POWER SOURCE (GND)
109	VDD (5V)		5V	POWER SOURCE (+5V)
110	DA5	I/O	5V	DRAM (IC6) ADDRESS A5
111	DA6	I/O	5V	DRAM (IC6) ADDRESS A6
112	DA7	I/O	5V	DRAM (IC6) ADDRESS A7
113	DA8	I/O	5V	DRAM (IC6) ADDRESS A8
114	DA9	I/O	5V	DRAM (IC6) ADDRESS A9
115	DMUX	I	5V	CPU (IC1) DMUX
116	INT	O	5V	CPU (IC1) INT1
117	UARTINT	I/O	5V	CPU (IC1) INT4
118	TRDYINT	I/O	5V	NOT USED
119	RRDYINT	I/O	5V	NOT USED
120	BDINT	I/O	5V	NOT USED
121	TEMPINT	I/O	5V	CPU (IC1) INT6
122	VDD (5V)		5V	POWER SOURCE (+5V)
123	VSS		GND	POWER SOURCE (GND)
124	TXD	O	5V	SERIAL I/F TXD
125	RXD	I	5V	SERIAL I/F RXD
126	RTS	O	5V	SERIAL I/F RTS
127	CTS	I	5V	SERIAL I/F CTS
128	DSR	I	5V	SERIAL I/F DSR
129	DCD	O	5V	SERIAL I/F DCD
130	DTR	I/O	5V	SERIAL I/F DTR
131	RI	I/O	5V	SERIAL I/F RI
132	VDD (3.3V)		3.3V	POWER SOURCE (3.3V)
133	VSS		GND	POWER SOURCE (GND)
134	XRESET	I	5V	SYSTEM RESET SIGNAL INPUT
135	XRESETO	O	5V	SYSTEM RESET SIGNAL OUTPUT
136	RESETO	O	5V	SYSTEM RESET SIGNAL OUTPUT
137	XWDERR	O	5V	WATCHED ERROR OUTPUT SIGNAL
138	CREQ	I/O	5V	CPU (IC1) INT5
139	THDAT	O	5V	RECORDED IMAGE OUTPUT TO THERMAL HEAD
140	THLAT	O	5V	CLOCK OUTPUT FOR DATA TRANSFER TO THERMAL HEAD
141	THCLK	O	5V	PULSE OUTPUT FOR DATA LATCH TO THERMAL HEAD
142	VDD (5V)		5V	POWER SOURCE (+5V)
143	VSS		GND	POWER SOURCE (GND)
144	STBNP	I	5V	LOW FIXED
145	STB4	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
146	STB3	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
147	STB2	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
148	STB1	O	5V	STROBE SIGNAL OUTPUT TO THERMAL HEAD
149	KRXD	I/O	5V	OPERATION PANEL CONTROL
150	KTXD	I/O	5V	OPERATION PANEL CONTROL
151	KSCLK	I/O	5V	OPERATION PANEL CONTROL
152	KLATCH	I/O	5V	OPERATION PANEL CONTROL
153	KSTART	I/O	5V	OPERATION PANEL CONTROL
154	VSSC		GND	POWER SOURCE (ANALOG GND)
155	VDDC		3.3V	POWER SOURCE (ANALOG +3.3V)
156	VSSA		GND	POWER SOURCE (ANALOG GND)
157	VDDA		3.3V	POWER SOURCE (ANALOG +3.3V)
158	VREFB	A	3.3V	A/D CONVERTER'S ZERO STANDARD VOLTAGE OUTPUT
159	VCL	A	3.3V	ANALOG PART STANDARD VOLTAGE SIGNAL
160	VREFT	A	3.3V	A/D CONVERTER'S FULL SCALE VOLTAGE OUTPUT

2.8 RESET CIRCUIT

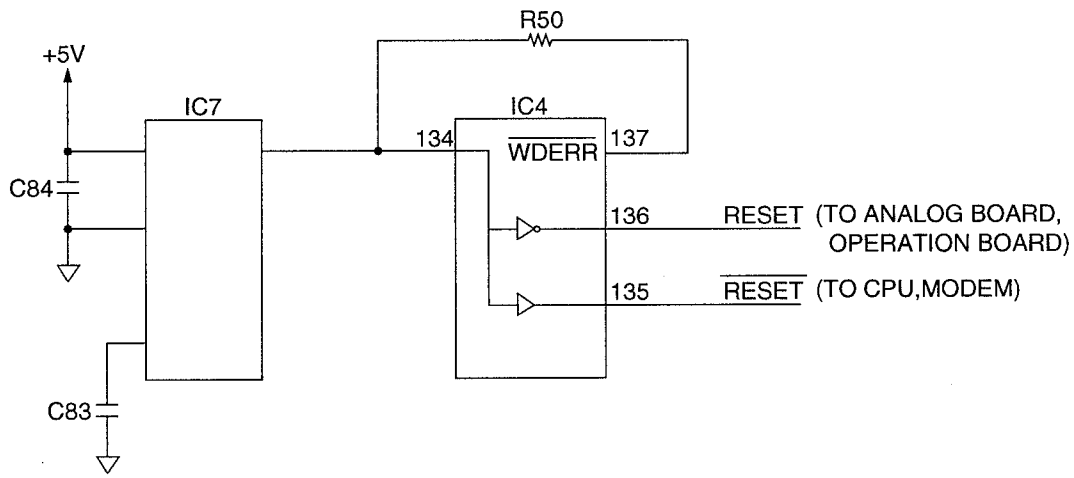
The output from pin 3 of the Reset IC (IC7) resets the CPU (IC1), ASIC (IC4), the modem (IC5), the gate array on the operating board (IC301), the Port IC (IC151) on the analog board through the IC4.

(1) During to momentary power interruption, a positive reset pulse of 175 msec or more is generated and the system is reset completely.
This is done to prevent partial resetting and system runaway during power fluctuation.

Timing Chart



(2) When pin 3 of the IC7 becomes low level, it will prohibit the RAM (IC3) from changing data.
The RAM (IC3) go into the backup mode, when they are backed up by the lithium battery.



(3) The watch dog timer, built-in the ASIC (IC4), is initialized by the CPU (IC1) about every 1.5 ms.
When the watch dog error occurs, pin 137 of the gate array (IC4) becomes low level.
The terminal of $\overline{\text{WDERR}}$ signal is connected to the reset line, so $\overline{\text{WDERR}}$ signal works as the reset signal.

2.9 SRAM AND RTC BACK UP CIRCUIT

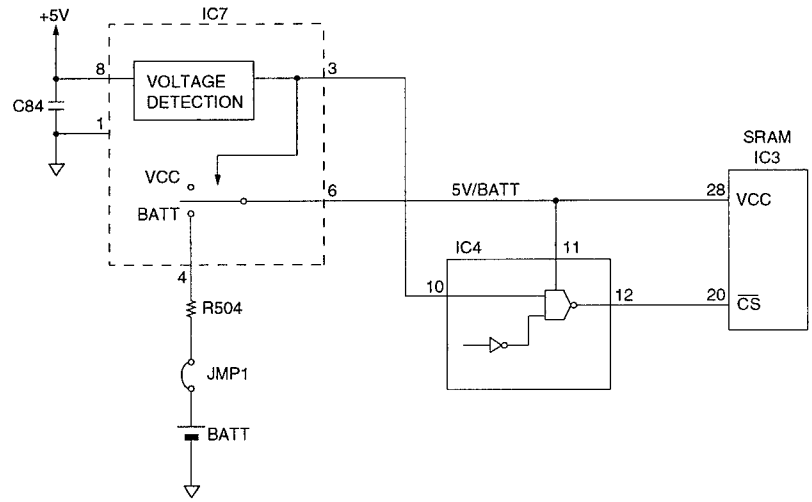
1) Function

This unit has a lithium battery (BATT), which works for the RAM (IC3) and Real Time Clock IC (IC4).
The user parameter of autodial numbers, the transmission ID, the system setup date and so on are stored in the RAM (IC3).
The RTC (IC4) continues functioning, even when the power switch is OFF, back up by the lithium battery.

2) SRAM (IC3) Backup Circuit Operation

When the power switch is turned ON, thus supplying the power through the IC7 to the RAM (IC3). At this time, the voltage at pin 28 of the RAM. When the power switch is turned OFF, the BATT supplies the power to the RAM through the JMP1, R504 and IC7. At the time, the voltage at pin 28 of the RAM are about +2.5 V. When the power switch is OFF and the voltage of +5 V goes down, the Reset IC. (IC7) outputs the reset signals. Pin 28 of the RAM (IC3) become low level, then the RAM go into the back up mode, when the power consumption is less.

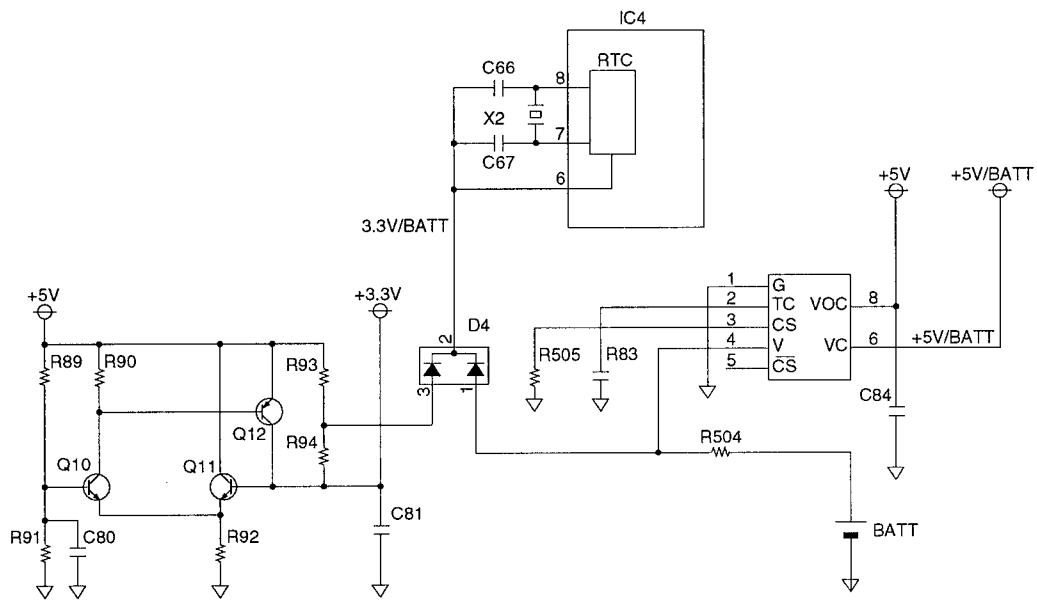
Circuit Diagram



3) RTC (IC4) Backup Circuit Operation

When the power switch is turned ON, thus supplying the power through the D4 to the RTC (IC4). At this time, the voltage at pin 6 of the RTC are +3.3 V. When the power switch is turned OFF, the BATT supplies the power to the RTC through the D4. At the time, the voltage at pin 6 of the RTC are about +2.5 V. When the power switch is OFF and the voltage of +3.3 V goes down. Pin 6 of the RTC (IC4) become low level, then the RTC go into the back up mode, when the power consumption is less.

Circuit Diagram

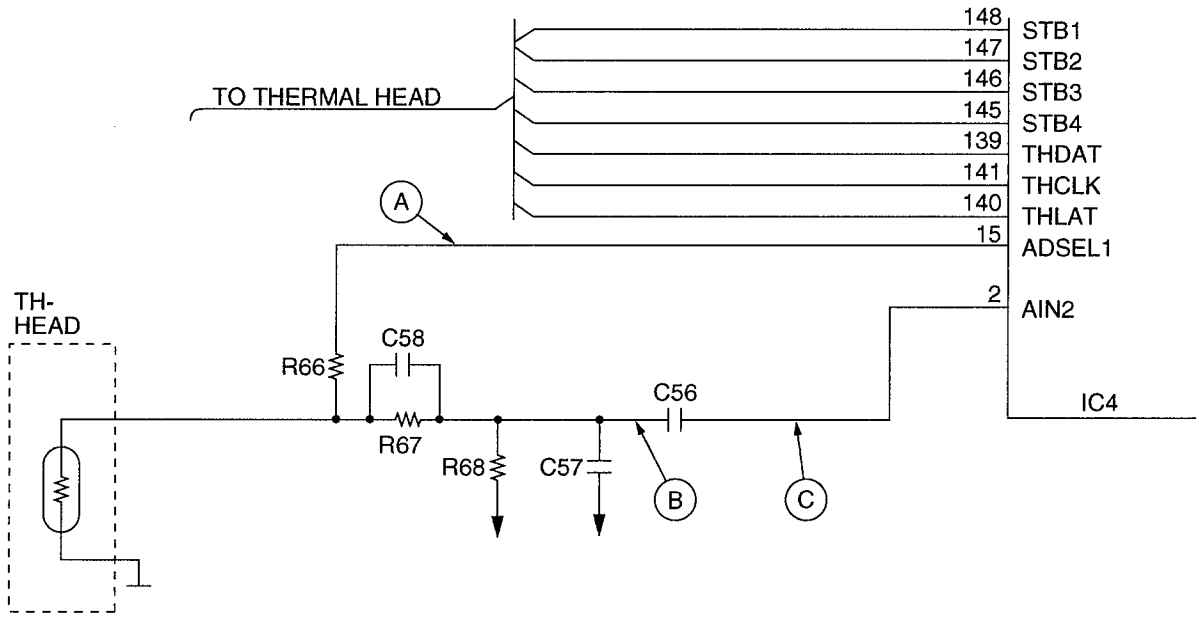


2.10 SUPERVISION CIRCUIT FOR THERMAL HEAD TEMPERATURE

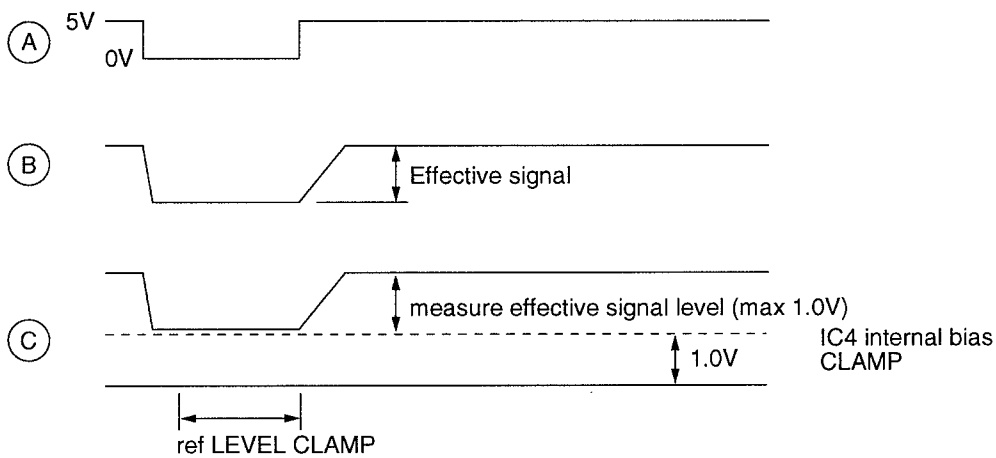
1) Function

Thermal head temperature is disposed to convert voltage to digital data by using A/D converter of IC4. The CPU decides the strobe width of the thermal head according to this value. Therefore, this circuit can keep the thermal head at an even temperature in order to stabilize the printing density and prevent the head from being overheated.

Circuit Diagram



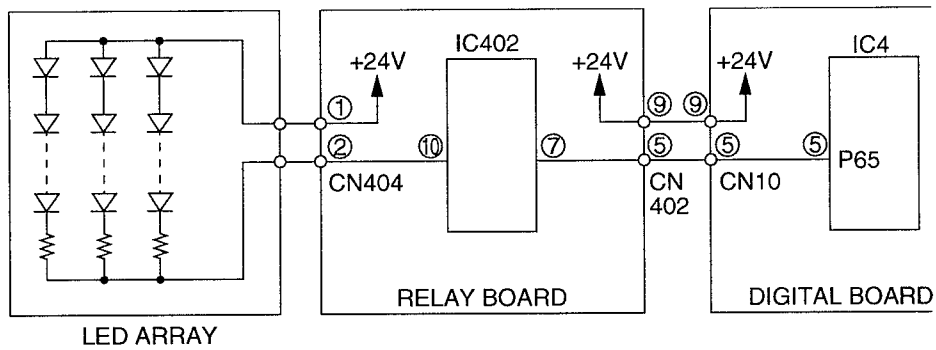
Timing Chart



2.11 LED ARRAY

The LED ARRAY will light during transmission and copying as a light source to recognize document characters, patterns, or graphics on a document.
It is also possible to light the LED ARRAY in the test mode.

Circuit Diagram



3. FACSIMILE SECTION

3.1 IMAGE DATA FLOW DURING FACSIMILE OPERATION

COPY (Fine, Super-Fine, Half Tone)

1) Line information is read by CCD, by way of route ①, it is inputted to IC4.
2) In IC4, data is adjusted to suitable level for A/D conversion at Analog Signal Processing Section, and by way of route ② it is inputted to A/D conversion (8 bit). After finishing A/D conversion, data is inputted to Image Processing Section by way of route ③, and by way of routes ④ and ⑤, it is stored in RAM as shading data.
3) Draft's information that is read by CCD is inputted to IC4 by way of route ①, and after adjusting to suitable level for A/D conversion by way of route ②, draft's information is converted to A/D (8 bit), and it is inputted to Image Processing Sec tion. The other side, the shading data which flows from RAM by way of routes ⑥ and ⑦, it is inputted to Image Process ing Section, and after finishing of draft's information's image processing, white is regarded as "0" and black is regarded as "1", and by way of routes ④ and ⑤, they are stored in RAM.
4) White/Black data stored as above description 3), by way of routes ⑥ and ⑧, it is inputted to P/S converter. White/Black data converted to serial data in P/S converter is inputted to Thermal Head by way of route ⑨ and it is printed out on re cording paper.

Note: Standard; Read 3.58 times/mm
Fine; Read 7.7 times/mm
Super-Fine; Read 15.4 times/mm

Transmission

1) Same processing of **COPY** items 1) - 3).
2) Data stored in RAM of IC4 is outputted from IC4 by way of routes ⑥ and ⑩, and it is stored in system bus, and by way of route ⑪, it is stored in communication buffer inside DRAM (IC6).
3) While fetching data stored in communication buffer synchronous with modem, CPU (IC1) inputs data to modem along route ⑫, where it is converted to serial analog data and forwarded over telephone lines via NCU Section.

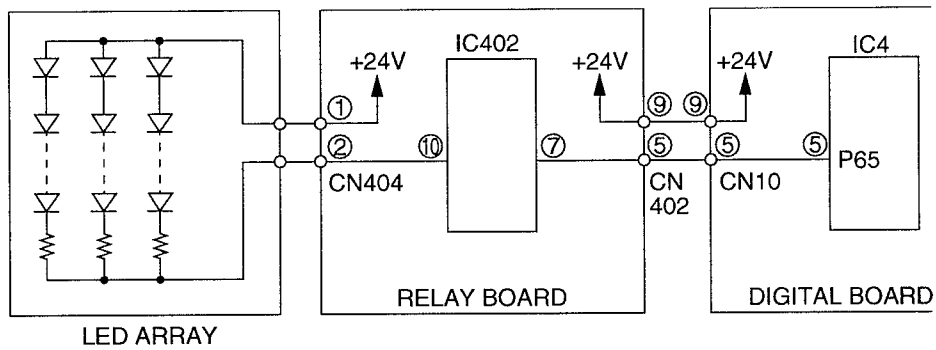
Reception

1) Serial analog image data is received over telephone lines and input to the modem via NCU section, where it is demodu lated to parallel digital data. Then the CPU (IC1) stores the data in the communication buffer DRAM (IC6) along route ⑫.
2) Data stored in DRAM (IC6) is decoded by CPU (IC1) by way of route ⑫, and it is stored in DRAM (IC6) by way of routes ⑬ and ⑤.
3) Same processing of **COPY** item 4).

2.11 LED ARRAY

The LED ARRAY will light during transmission and copying as a light source to recognize document characters, patterns, or graphics on a document.
It is also possible to light the LED ARRAY in the test mode.

Circuit Diagram



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1) Same processing of **COPY** items 1) - 3).
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Reception

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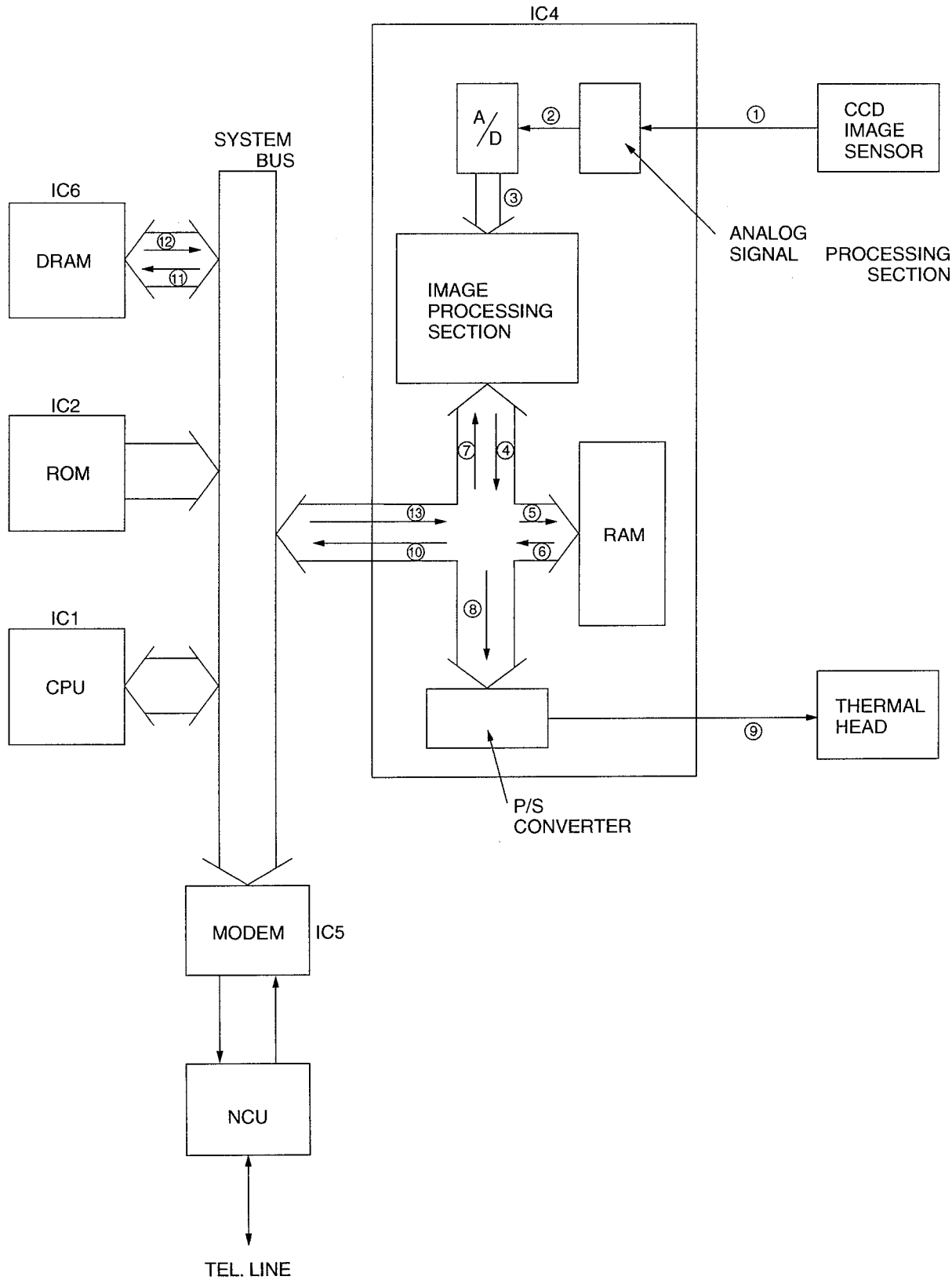
2) Data stored in DRAM (IC6) is decoded by CPU (IC1) by way of route ⑫, and it is stored in DRAM (IC6) by way of routes ⑬ and ⑤.
3) Same processing of **COPY** item 4).

Block Diagram

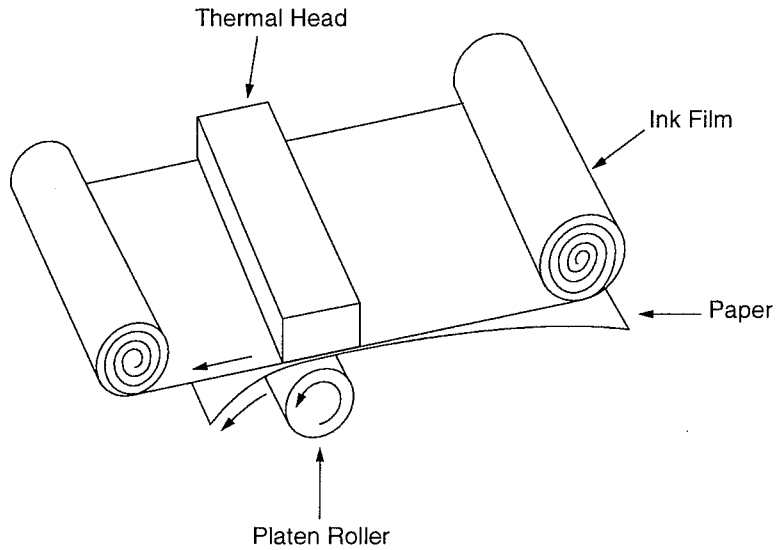


3.2 THERMAL HEAD

1) Function

This unit utilizes state of the art thermal printer technology.
The ink film is chemically processed. When the thermal head contacts this ink film it emits heat momentarily, ink film is melted and transfered to the paper. If this point is continued, litters and/or diagrams appear, and the original document is reproduced.

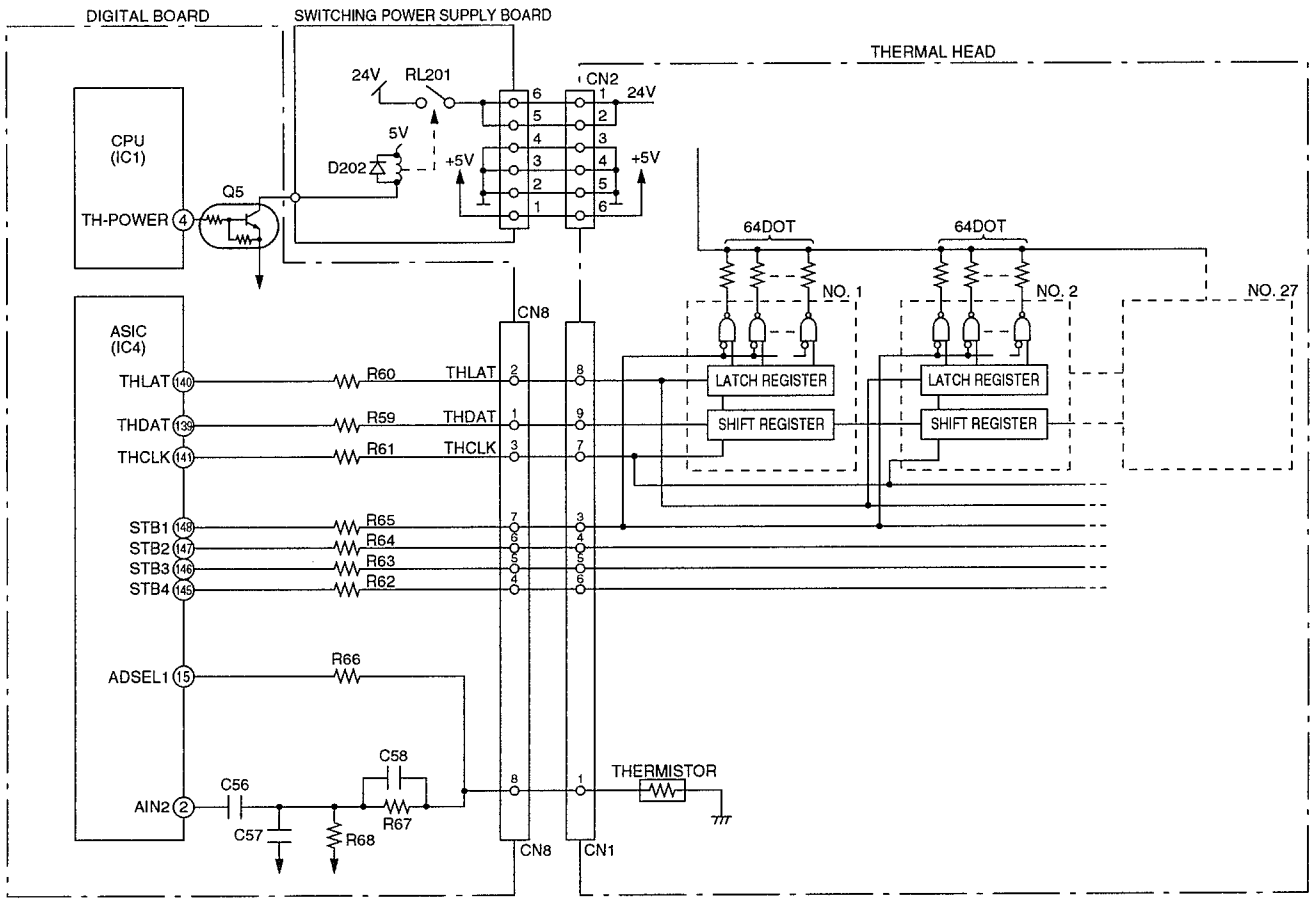
COMPOSITION OF THE RECEIVE RECORD SECTION (THERMAL RECORDING FORMAT)



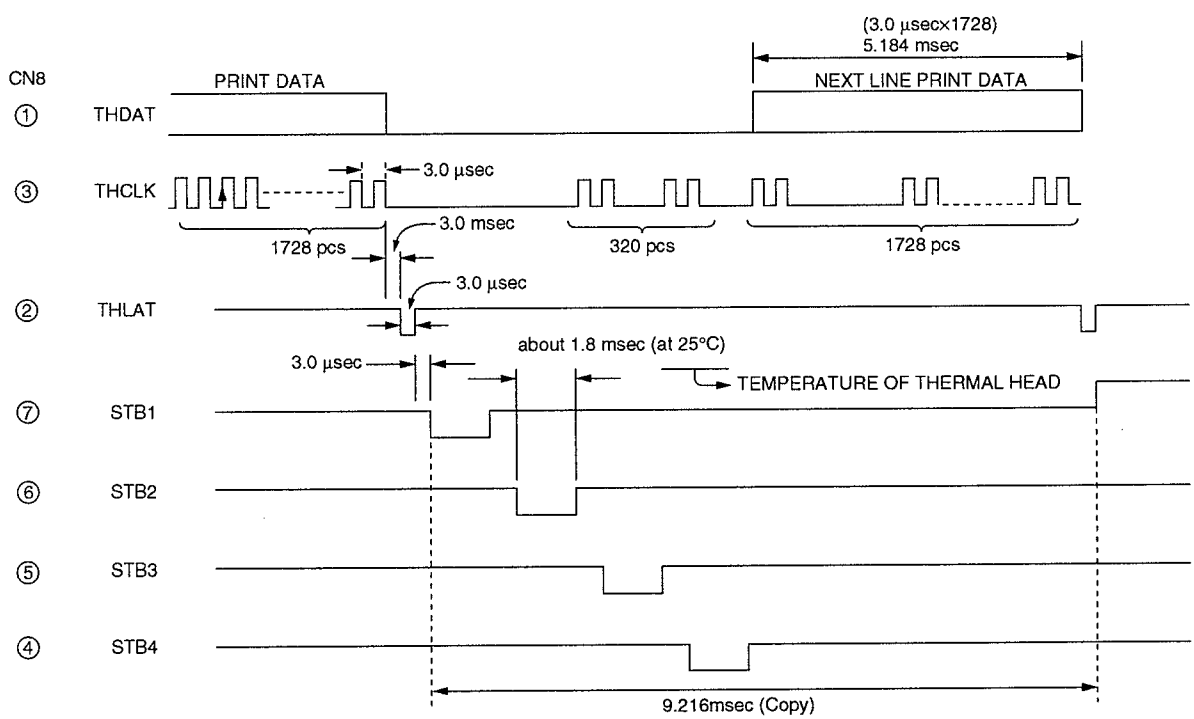
2) Circuit Operation

There are 27 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 64 heat emitting registers. This means that one line is at a density of 64×27=1728 dots=(8 dots/mm).
White/Black (white=0, black=1) data in one line increments is synchronized at IC4 pin 141 (THCLK) and sent from IC4 pin 139 (THDAT) to the shift register of the ICs. The shift registers of the 27 ICs are connected in series, and upon shift of 1728 dot increment, all the shift register become filled with data, and a latch pulse is emitted to each IC from IC4 pin 140 (THLAT). With this latch pulse, all the contents of shift registers are latched to the latch registers. Thereafter, through the addition of strobe from the IC4 pins (145, 146, 147, 148) only dot of location of black (=1) among latched data activates driver, and current passes to heat emitting body to cause heat emission.
Here the strobe of four lines STB1 to STB4 impresses at intervals of 9.216 msec, as required for one-line printout, for each 1/4th of 27 IC unit (6 unit or 7 unit) upon each time interval divided into four equal increments.
The sequence is as shown below. [Moreover, in the case of strobe width, the resistance value of the thermistor inside the thermal head is constantly detected by IC4 pin 2, and vales from the ROM (IC2) table corresponding to temperatures eliminate temperature changes of density through setting by CPU (IC1).]
When the thermal head is not used, the IC1 (4, HEAD) becomes low level, Q5 becomes OFF, RL201 breaks, and the +24 V power supply for the thermal head driver is not impressed to protect the IC.

Circuit Diagram



Timing Chart



3.3 READ SECTION

1) Function

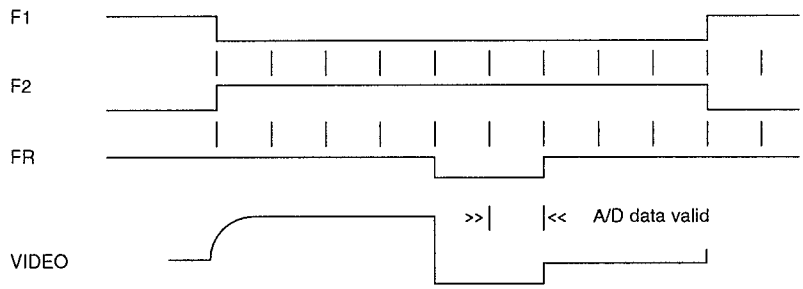
- A document is illuminated by the LED array, and the reflections pass through the reduction-projection lens and are imaged on the CCD image sensor.
- The document image is photoelectrically transferred by the CCD image sensor, and an analog image signal corresponding to one line of the document is continuously output.
- The analog image signal enters the image signal processing circuit in ASIC (IC4) and then is coverted into a digital data.

2) Circuit Operation

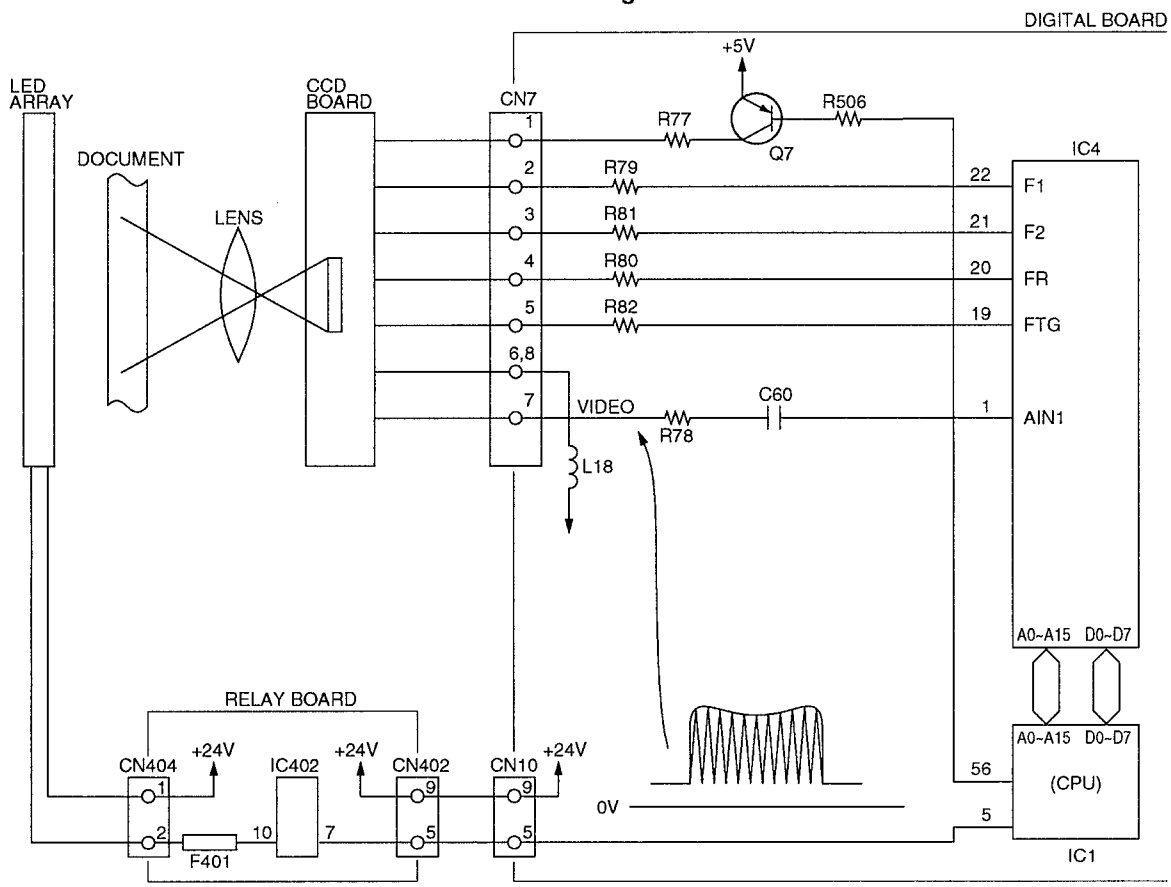
[Start]

When the START/COPY button is pressed, IC1 pin 56 goes to a low level and Q7 is turned ON, which makes IC1 pin 5 go to a high level and the voltage applied to the LED array to turn on the LED.
F1, F2, FR and FTG signals are output to the CCD board to drive the CCD image sensor. Therefore, when the LED is turned ON, the VIDEO (analog image signal) is output from the CCD board to CN7 pin 7.

CCD Scanner Timing Chart (1 Dot Cycle)



Block Diagram



3.4 STEPPING MOTOR DRIVE CIRCUIT

1) Function

Two individual stepping motors are used for transmission and reception. They feed document or recording paper synchronized for reading or printing.

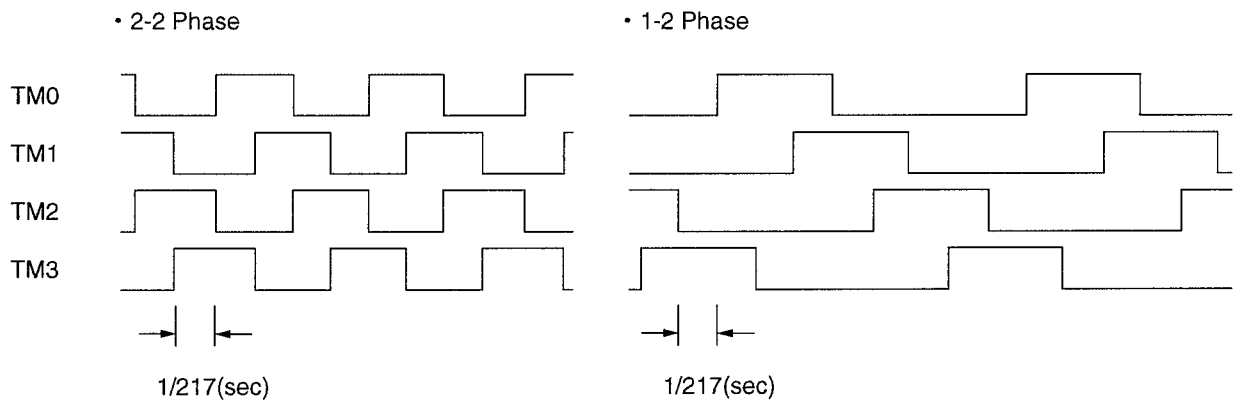
2) TX Motor

During motor drive, ASIC IC4 pin 38 becomes high level, driver IC402 pin 12 becomes low level, and Q402 go ON as a result, +24 V is supplied to the motor coil.

Stepping pulses are output form gate array IC4 pins, 34~37, causing driver IC402 pins, 16~13 drives TX Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. Rotation of 1-step feeds 0.13mm of recording paper or document paper.

Timing chart is below.

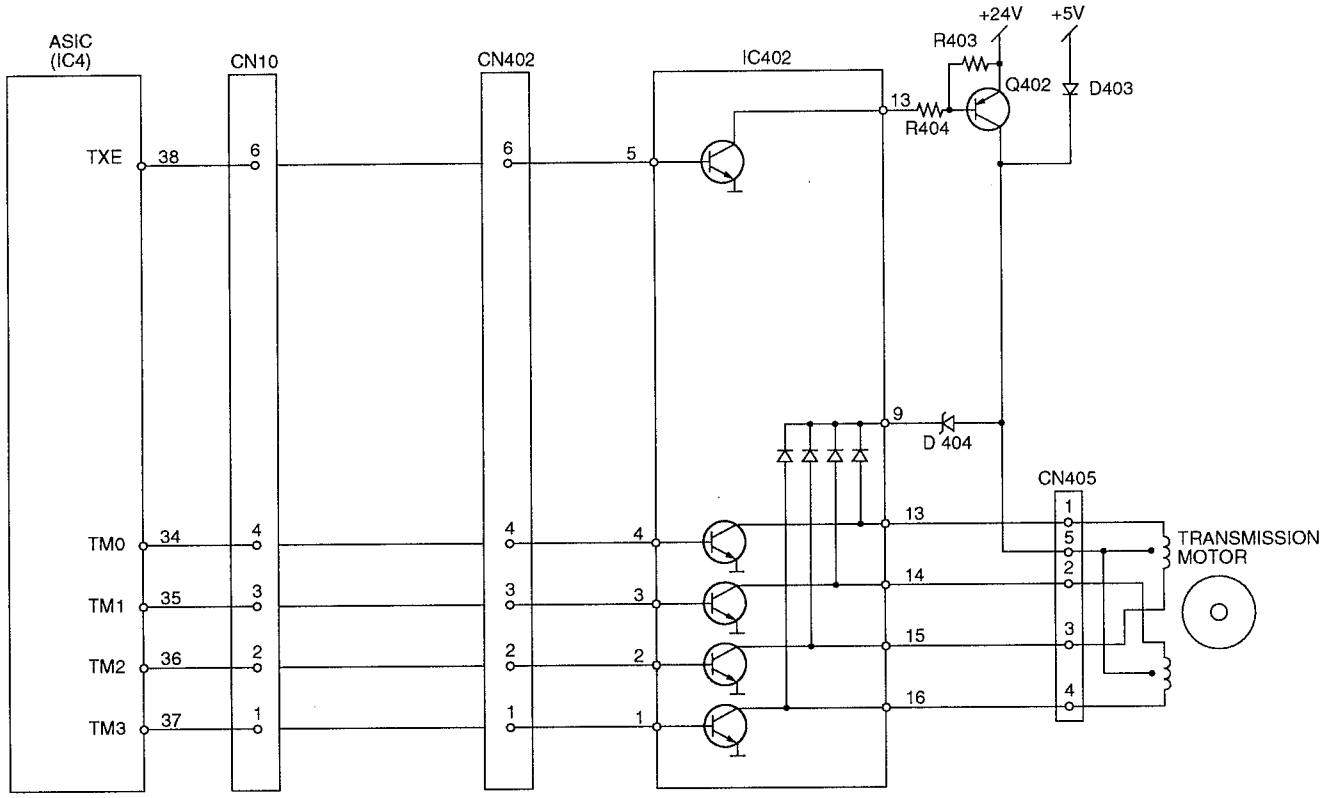
Stepping Motor Timing Chart



Stepping Motor Drive Mode

Function	Mode	Phase Pattern	Speed
Copy	Fine	1-2	217 pps
FAX	Standard	2-2	217 pps
	Fine or Half tone	1-2	217 pps
Paper Feed	———	2-2	217 pps
Stand-by	———	All phase current off.	Stopped

Circuit Diagram



When the motor is stopped long time (about 70~80 msec) at receive mode, ASIC IC4 pin 38 becomes low level and driver IC402 pin 13 becomes high level. This causes Q402 to also go OFF, and instead of +24 V, +5 V is supplied through D403 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistor is OFF. Therefore the motor current is OFF.

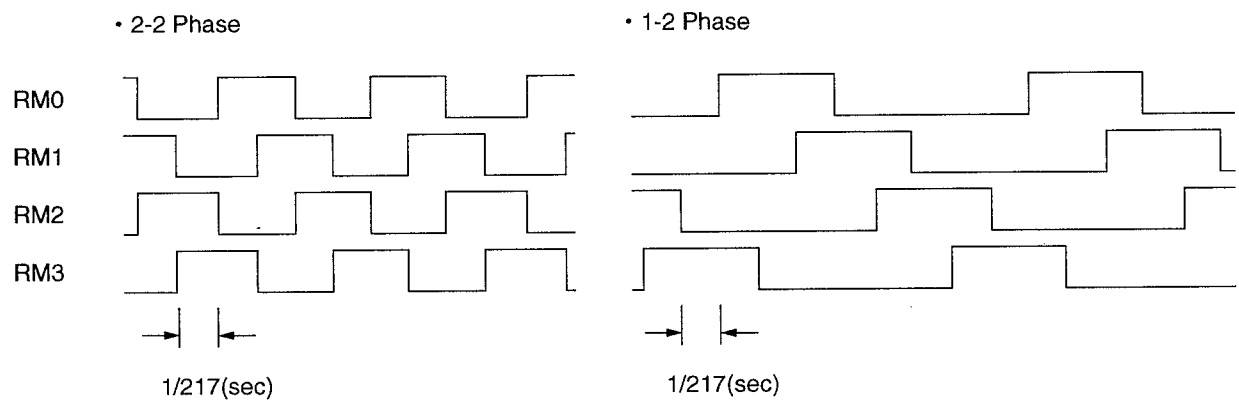
3) RX Motor

During motor drive, ASIC IC4 pin 33 becomes high level, driver IC401 pin 14 becomes low level, and Q401 go ON as a result, +24 V is supplied to the motor coil.

Stepping pulses are output form gate array IC4 pins, 29~32, causing driver IC401 pins, 13~10 drives RX Motor Coil. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. Rotation of 1-step feeds 0.13mm of recording paper or document paper.

Timing chart is below.

Stepping Motor Timing Chart



Stepping Motor Drive Mode

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FAX	Standard	2-2	217 pps
	Fine or Half tone	1-2	217 pps
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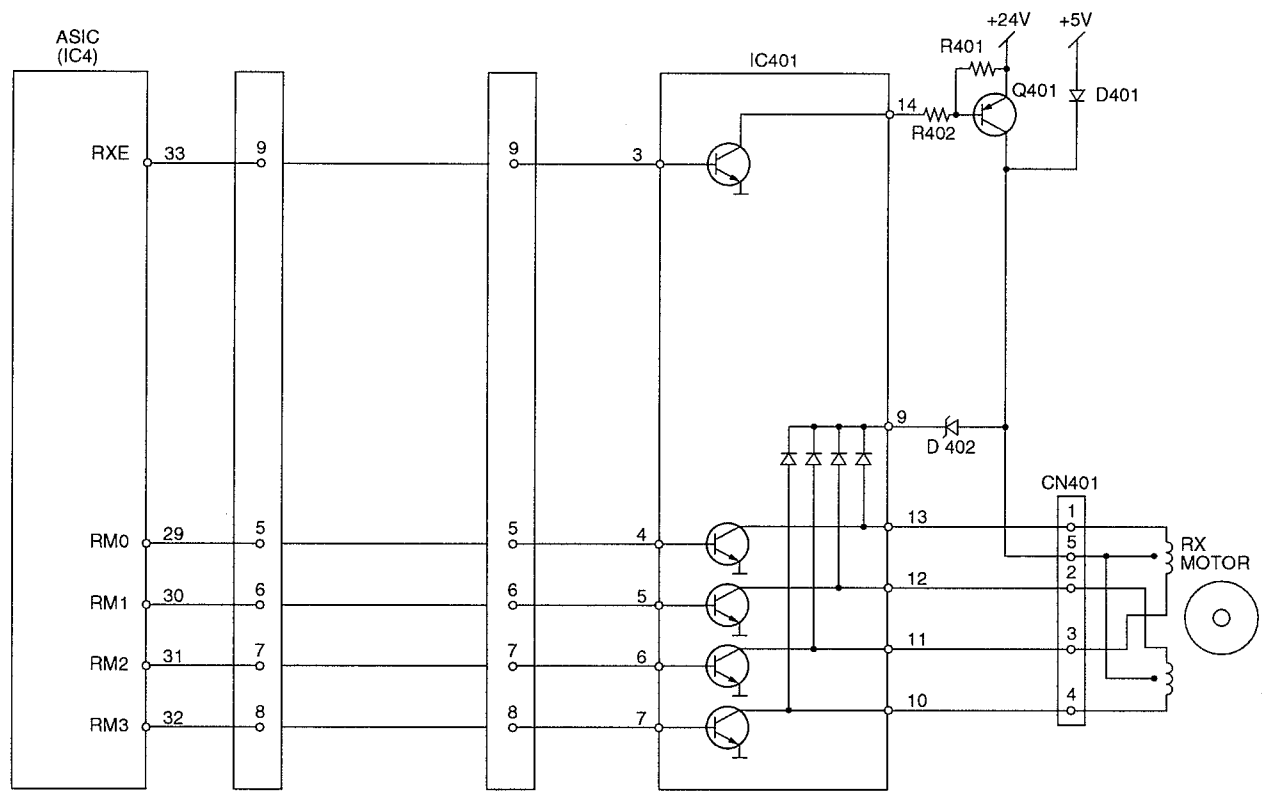
Stand-by	———	All phase current off.	Stopped

Circuit Diagram



When the motor is stopped long time (about 70~80 msec) at receive mode, ASIC IC4 pin 33 becomes low level and driver IC401 pin 14 becomes high level. This causes Q401 to also go OFF, and instead of +24 V, +5 V is supplied through D401 so that the motor is held in place. When the system is in the stand-by mode, all of the motor drive transistor is OFF. Therefore the motor current is OFF.

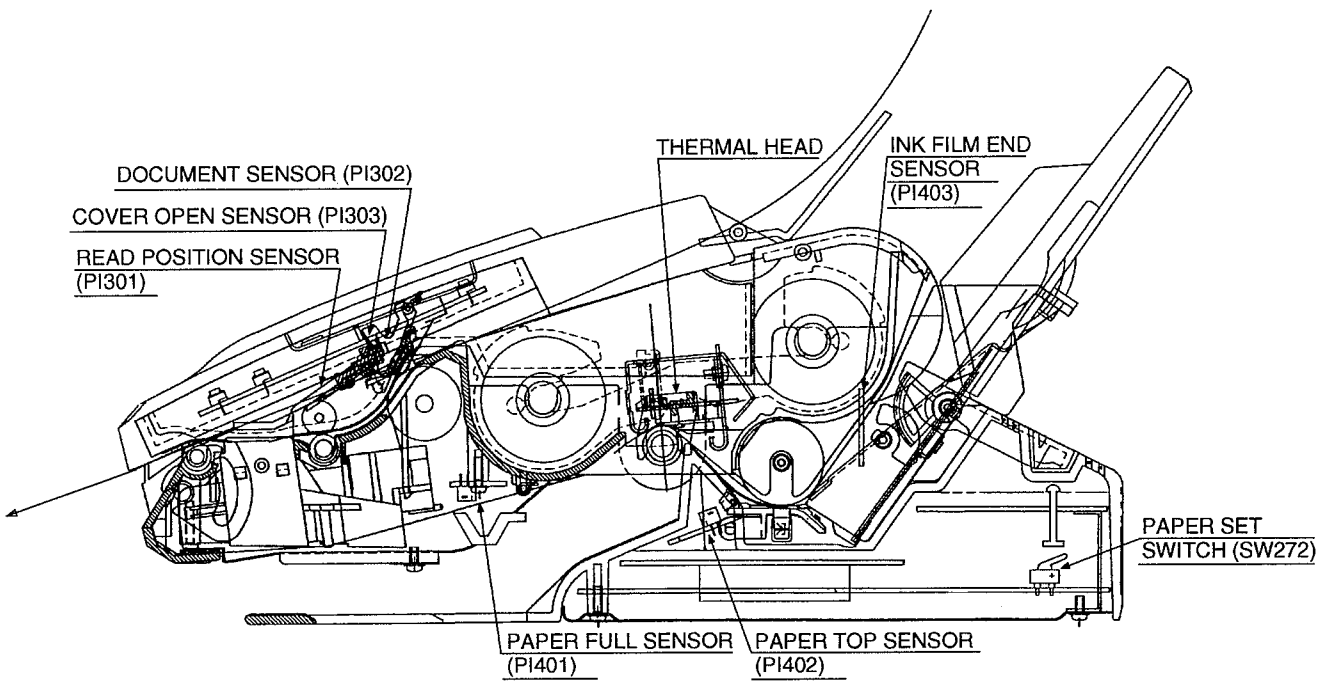
3.5 SENSORS AND SWITCHES

KX-FP200 has many paper, film handring and check cover sensor. All of sensor shows below.

Sensor Circuit Location	Sensor	Sensor name	Mainly LCD Error Message at sensor fail
Operation Panel	PI302	Document	「CHECK DOCUMENT」
	PI301	Document Read Position	「REMOVE DOCUMENT」
Digital PCB & Sensor PCB	SW272	Paper Set	「CHECK LEVER」
	PI402	Paper Top	「PAPER JAMMED」
	PI401	Paper Full	「REMOVE PRINT OUT」
	PI403	Film End	「FILM EMPTY」
	PI303	Cover Open	「CHECK COVER」

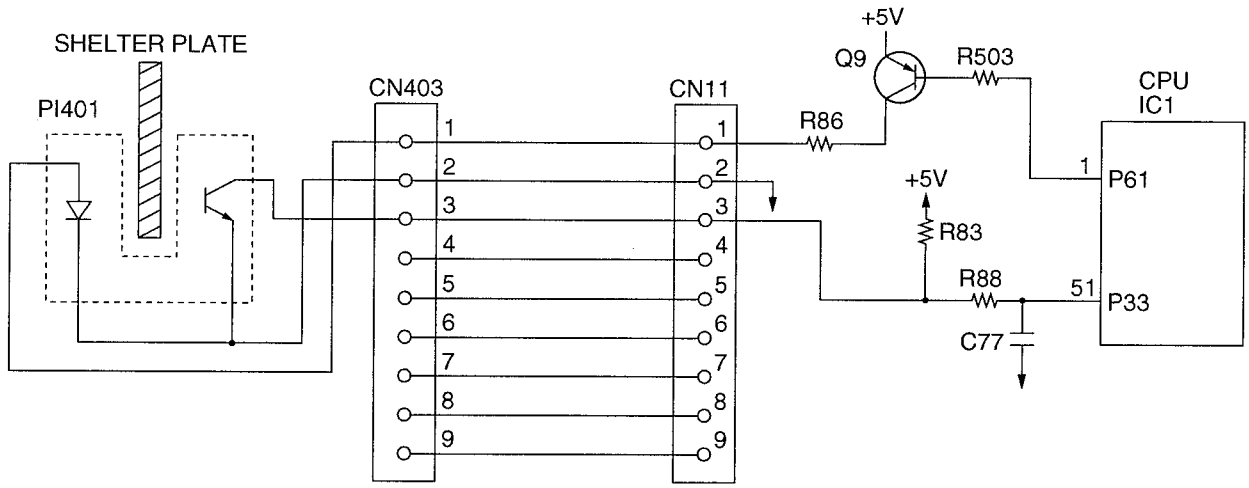
※ See TEST FUNCTION - SENSOR CHECK SECTION for sensor test. (c.f. #815 of Service Mode test.)

Sensor Location



[Paper Full Sensor (PI401)]

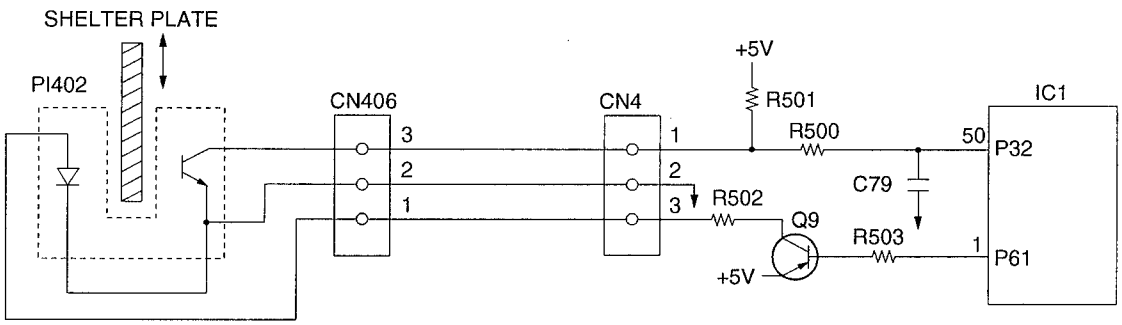
When the amount of paper after printing is increased (to about 150 sheets), the shelter plate cuts off the sensor light, the phototransistor is set OFF, and the input signal at IC1-51pin (CPU) becomes high level. Usually, the shelter plate passes the sensor light, the phototransistor, becomes ON, and the input signal of IC1-51 pin becomes low level.



	Phototransistor	Signal (IC1-51 pin)
Empty	ON	Low level
Full	OFF	High level

[Paper top Sensor (PI402)]

When the recording paper is loaded to print head, the shelter plate shuts the sensor light, the phototransistor becomes OFF. And the input signal of IC1-50 pin (CPU) becomes high level. Usually, the shelter plate passes the sensor light, the phototransistor becomes ON, and the input signal of IC1-50 pin becomes low level.



	Phototransistor	Signal (IC151-50 pin)
Paper Pass	OFF	High level
No Paper	ON	Low level

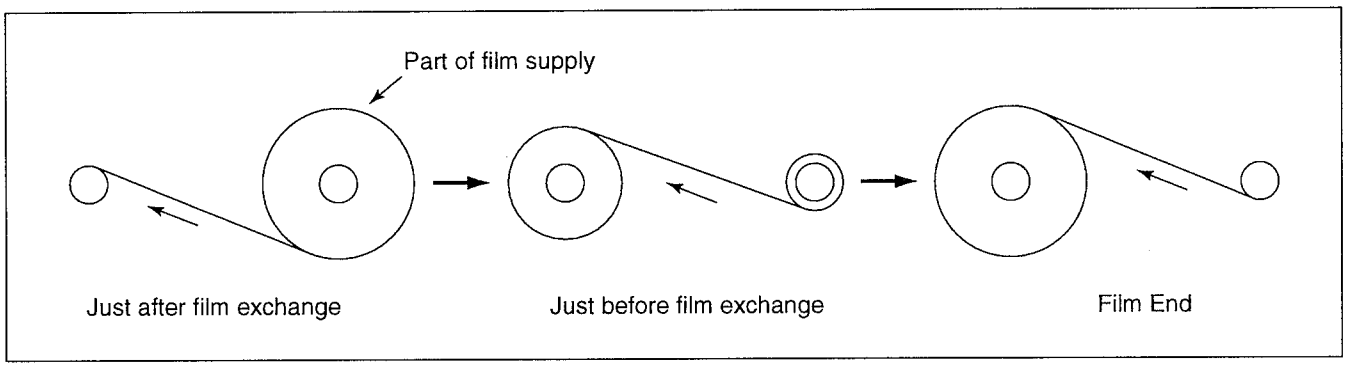
All interrupt Sensor LED current is controlled by IC1-1 pin.
(e.g. PI402, PI401)

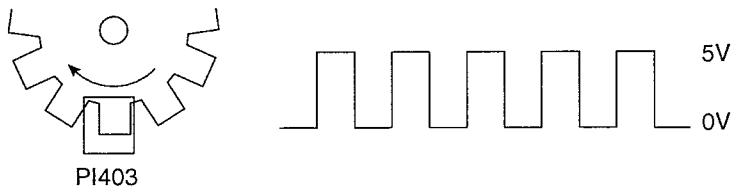
[Check the Film End Sensor (PI403)]

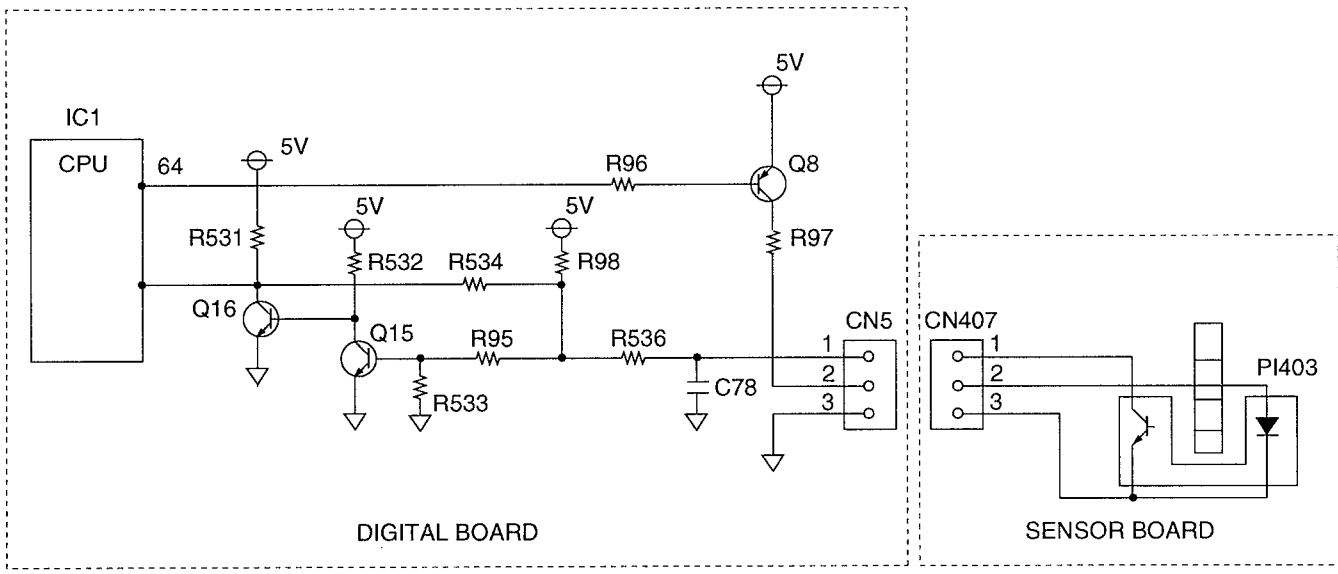
As film is used, revolving speed of the rolled film becomes faster.
In addition, when the film is used up, it comes off from a paper pipe.

Check film remains by the revolving speed.
Also check the film end after the revolution stops.

Establish rotary encoder at a part of film supply. After that, check change of pulse numbers that photo-interrupter outputs.

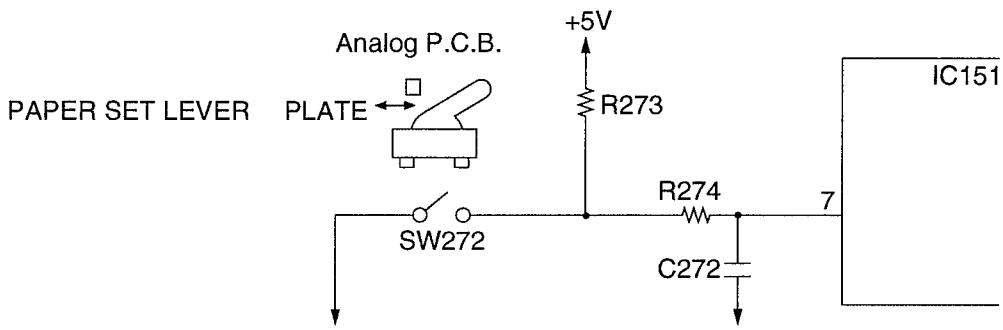






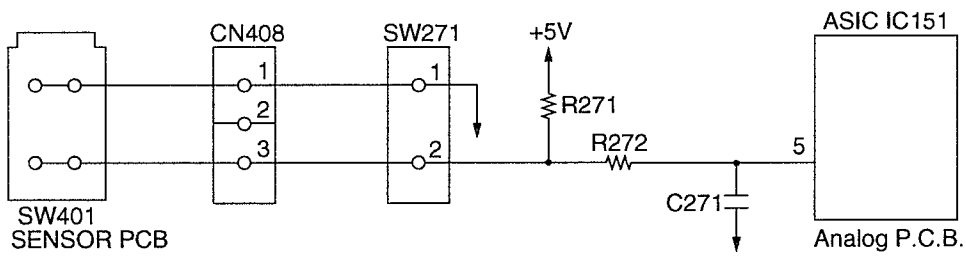
[Paper Set Swifch (SW272)]

When the recording paper is readied and the PAPER SET LEVER is pulled toward you, the plate is separated from the switch lever, causing the signal at IC151 pin 7 to be set high.
When the recording paper is installed and the PAPER SET LEVER is pushed back, the plate presses down on the switch lever, causing the signal at IC151 pin 7 to be set low.



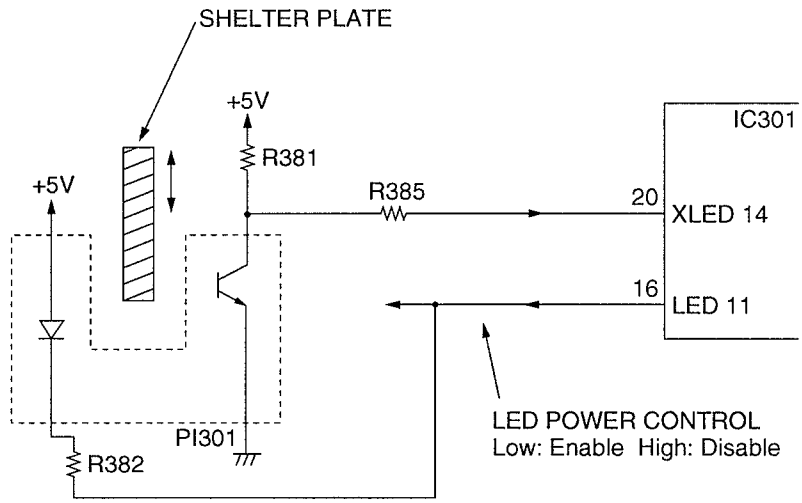
	Phototransistor	Signal (IC151-7 pin)
Set Recording Paper	ON	Low level
No Recording Paper	OFF	High level

[Hook Sensor (SW401)]
When the handset is raised, the switch is set ON, and the signal at IC151pin 5 is set low.
When the handset is returned, the switch is set OFF, and the signal at IC151 pin 5 is set high.



[Read Position Sensor (PI301)]

When an document is brought to read position, the shelter plate passes the sensor light, the phototransistor becomes ON, and the input signal of IC301-20 pin (Operation) becomes low level. When there is no document at the read position, the shelter plate shuts the sensor light, the phototransistor becomes OFF, and the input signal of IC301-20 pin (Operation) becomes high level.

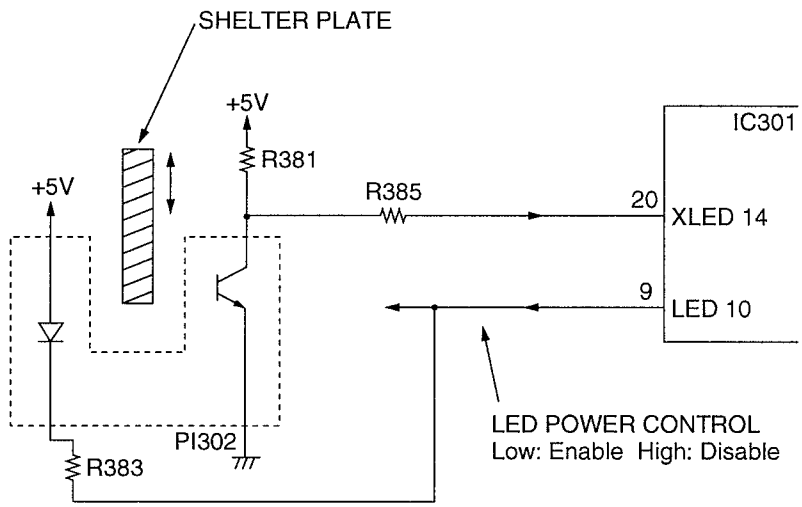


Operation Board

	Phototransistor	Signal (IC301-20 pin)
Out of the Read Position	OFF	High level
At the Read Position	ON	Low level

[Document Sensor (PI302)]

When a document is seen, the shelter plate shuts the sensor light, the phototransistor becomes OFF, and the input signal of IC301-20 pin (Operation) becomes high level. When there is no document, the shelter plate passes the sensor light, the phototransistor becomes ON, and the input signal of IC301-20 pin (Operation) becomes low level.

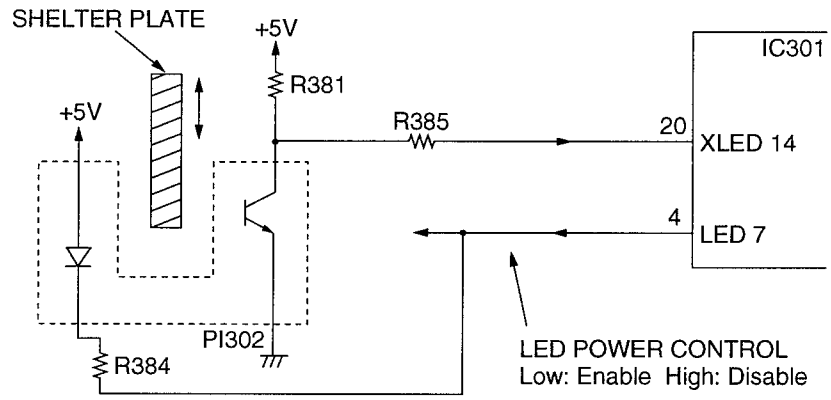


Operation Board

	Phototransistor	Signal (IC301-20 pin)
No Document	ON	Low level
Set Document	OFF	High level

[Cover Open Sensor (PI303)]

When the operation panel cover is closed, the shelter plate passes the sensor light, the phototransistor becomes ON, and the input signal of IC301-20 pin (Operation) becomes low level. When the cover is opened, the shelter plate shuts the sensor light, the phototransistor becomes OFF, and the input signal of IC301-20 pin (Operation) becomes high level.



Operation Board

	Phototransistor	Signal (IC301-20 pin)
Open	ON	Low level
Close	OFF	High level

4. MODEM SECTION

4.1 FUNCTION

The unit uses a 1 chip modem (IC5), enabling it to act as an interface between the control section for FAX sending and receiving, and the telephone line. During a sending operation, the digital image signals are modulated and sent to the telephone line, while during a receiving operation, the analog image signals which are received via the telephone line are demodulated and converted into digital image signals. The communication format and procedures for FAX communication are standardized by CCITT. This 1 chip modem (IC5) has hardware which sends and detects all of the necessary signals for FAX communication.

It can be controlled by writing commands from the CPU (IC1) to the register in the modem (IC5).

This modem (IC5) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones.

Overview of Facsimile Communication Procedures (CCITT Recommendation):

1) ON CCITT (International Telegraph and Telephone Consultative Committee)

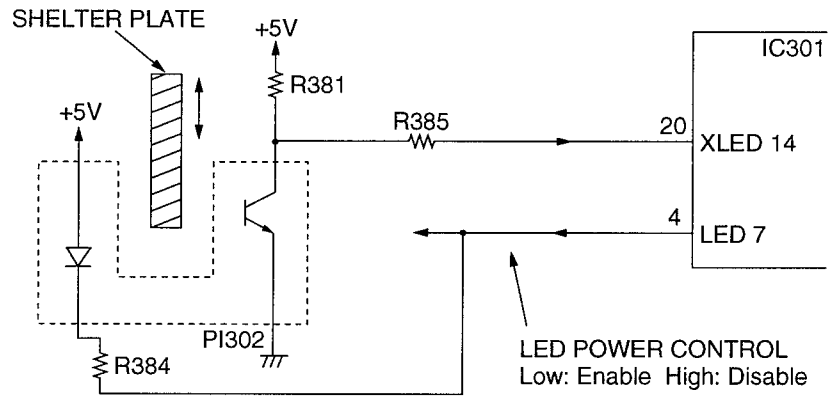
The No. XIV Group of CCITT, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimile.

2) Definition of Each Group

- Group Ⅰ (G1)
  A-4 size documents official without using formats which reduce the band width of signal sent over telephone lines.
  Determined in 1968.
  Transmission for about 6 minutes at scanning line density of 3.85 lines/mm.
- Group Ⅱ (G2)
  Using reduction technology in the modulation/demodulation format, A-4 size document is sent at an official scanning line density of 3.85 lines/mm for about 3 minutes.
  Methods to suppress redundancy are not used.
  Determined in 1976.
- Group Ⅲ (G3)
  Method of suppressing redundancy in the image signal prior to modulation is used. A-4 size document is sent within about one minute.
  Determined in 1980.
- Group Ⅳ (G4)
  Transmission is via data network. Method is provided for suppressing redundancy in signals prior to transmission, and error-free reception of transmission is possible.
  The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

[Cover Open Sensor (PI303)]

When the operation panel cover is closed, the shelter plate passes the sensor light, the phototransistor becomes ON, and the input signal of IC301-20 pin (Operation) becomes low level. When the cover is opened, the shelter plate shuts the sensor light, the phototransistor becomes OFF, and the input signal of IC301-20 pin (Operation) becomes high level.



Operation Board

	Phototransistor	Signal (IC301-20 pin)
Open	ON	Low level
Close	OFF	High level

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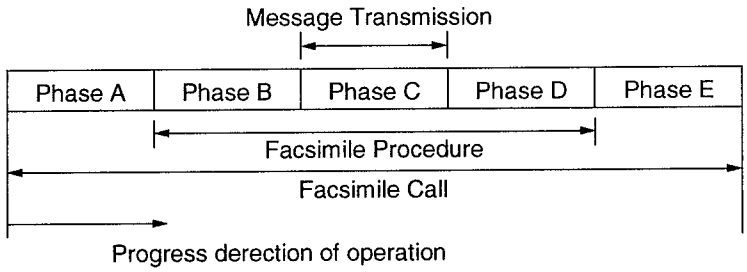
  The scope of these facsimile applications is not limited simply to transmission of written statements. Through symbiotic linkages with other communication methods, it can be expected to expand to include integrated services.

3) Facsimile Call Time Series

As shown in the following diagram, the facsimile call time series is divided into five phases.



Phase A: Call setting
Call setting can be manual/automatic.
Phase B: Pre-message procedure
Phase B is a pre-processing procedure and a sequence for confirming status of terminal, transmission route, etc. and for terminal control. It executes terminal preparation status, determines and displays terminal constants, confirms synchronization status, prepares for transmission of facsimile messages, etc.
Phase C: Message transmission
Phase C is the procedure for transmission of facsimile messages.
Phase D: Post message procedure
Phase D is the procedure for confirming that the message is completed and received. In the case of continuous transmission, return is made repeatedly to phase B or phase C for transmission.
Phase E: Call retrieval
Phase E is the procedure for call retrieval, that is, for circuit disconnection.

4) Concerning Transmission of Time

Transmission Time = Control Time + Image Transmission Time + Hold Time

Transmission time consists of the following.
Control time : This is time at the start of transmission when functions at the sending and receiving sides are confirmed, transmission mode is established, and transmission and reception are synchronized.
Image transmission time:
This is the time required for transmission of document contents (image data). In general, this time is recorded in the catalog, etc.
Hold time: This is the time required after the document contents have been sent to confirm that the document was actually sent, and to check for telephone reservations and/or the existence of continuous transmission.

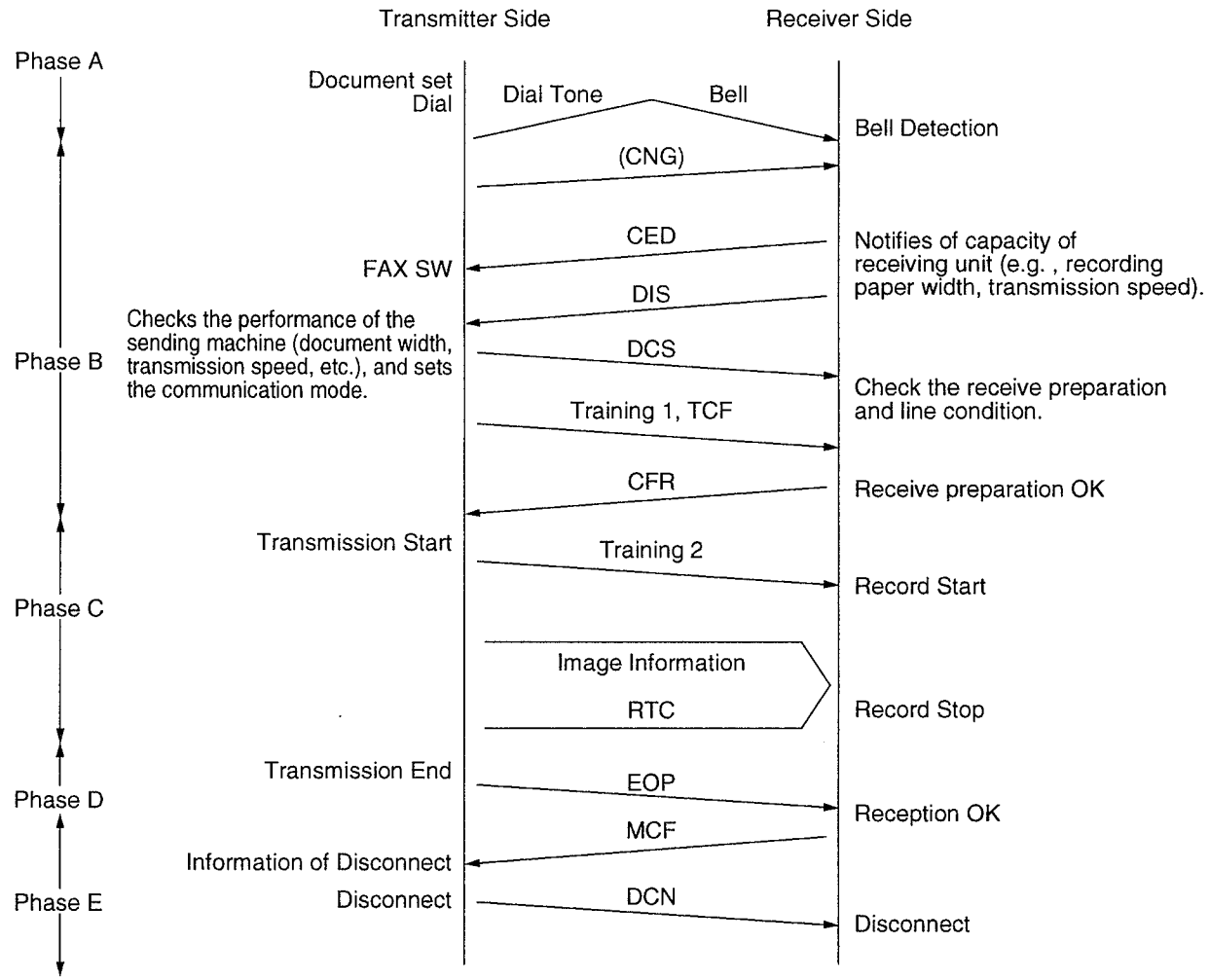
5) Facsimile Standard

Item	Telephone Network Facimile G3 Machine
Connection Control Mode	Telephone Network Signal Mode
Terminal Control Mode	T. 30 Binary
Facsimile Signal Format	Digital
Modulation Mode	PSK (V. 27 ter) or QAM (V. 29)
Transmission Speed	300 bps (control Signal) 2400, 4800, 7200, 9600 bps (FAX Signal)
Redundancy Compression Process (Coding Mode)	1 dimension : MH Mode 2 dimension : MR Mode (K=2.4)
Resolution	Main Scan : 8 pel/mm Sub Scan : 3.85, 7.7l/mm
Line Synchronization Signal	EOL Signal
1 Line Transmission Time [ms/line]	Depends on degree of data reduction. Minimum Value : 10, 20 Can be recognized in 40ms.

6) Explanation of Technology

(1) G3 Communication Signals (T. 30 Binary Process)

In G3 Facsimile communication, this is the procedure for exchange of control signals between the sending and receiving machines both before and after transception of image signals.



Control signals at 300 bps FSK are: 1850 Hz...0, 1650Hz...1.

An example of binary process in G3 communication is shown below.

Explanation of Signals

Control signals are comprised mainly of 8-bit identification signals and the data signals added to them. Data signals are added to DIS and DCS signals.

Signal.....DIS (Digital Identification Signal)

Identification Signal Format.....00000001

Function:

Notifies of capacity of receiving unit

The added data signals are as follows.

(Example)

Signal.....DCS (Digital Command Signal)

Identification Signal Format.....X1000001

(Example)

Bit No.	DIS/DTC	DCS
1	Transmitter - T. 2 operation	
2	Receiver - T. 2 operation	Receiver - T. 2 operation
3	T.2 IOC = 176	T. 2 IOC = 176
4	Transmitter - T. 3 operation	
5	Receiver - T. 3 operation	Receiver - T. 3 operation
6	Reserved for future T. 3 operation features	

Bit No.	DIS/DTC	DCS
7	Reserved for future T.3 operation features	
8	Reserved for future T.3 operation features	
9	Transmitter - T.4 operation	
10	Receiver - T.4 operation	Receiver - T.4 operation
11, 12	Data signalling rate	Data signalling rate
(0, 0)	V.27 ter fallback mode	2400 bit/s V.27 ter
(0, 1)	V.27 ter	4800 bit/s V.27 ter
(1, 0)	V.29	9600 bit/s V.29
(1, 1)	V.27 ter and V.29	7200 bit/s V.29
13	Reserved for new modulation system	
14	Reserved for new modulation system	
15	Vertical resolution = 7.7 line/mm	Vertical resolution = 7.7 line/mm
16	Two-dimensional coding capability	Two-dimensional coding
17, 18	Recording width capabilities	Recording width
(0, 0)	1728 picture elements along scan line length of 215 mm ± 1%	1728 picture elements along scan line length of 215 mm ± 1%
(0, 1)	1728 picture elements along scan line length of 215 mm ± 1% and 2048 picture elements along scan line length of 255 mm ± 1% and 2432 picture elements along scan line length of 303 mm ± 1%	2432 picture elements along scan line length of 303 mm ± 1% and
(1, 0)	1728 picture elements along scan line length of 215 mm ± 1% and 2048 picture elements along scan line length of 255 mm ± 1%	2048 picture elements along scan line length of 255 mm ± 1% and
(1, 1)	Invalid (see Note 7)	Invalid
19, 20	Maximum recording length capability	Maximum recording length
(0, 0)	A4 (297 mm)	A4 (297 mm)
(0, 1)	Unlimited	Unlimited
(1, 0)	A4 (297 mm) and B4 (364 mm)	B4 (364 mm)
(1, 1)	Invalid	Invalid

Function:
Notifies of capacity of receiving machine obtained at DIS and announces the transmission mode of the sender. The added data signals are as follows.

Bit No.	DIS/DTC	Standard setting	DCS
21, 22, 23	Minimum scan line time capability at the receiver		Minimum scan line time
(0, 0, 0)	20 ms at 3.851/mm: T7.7=T3.85		20 ms
(0, 0, 1)	40 ms at 3.851/mm: T7.7=T3.85		40 ms
(0, 1, 0)	10 ms at 3.851/mm: T7.7=T3.85		10ms
(1, 0, 0)	5 ms at 3.851/mm: T7.7=T3.85		5ms
(0, 1, 1)	10 ms at 3.851/mm: T7.7=1/2 T3.85		
(1, 1, 0)	20 ms at 3.851/mm: T7.7=1/2 T3.85		
(1, 0, 1)	40 ms at 3.851/mm: T7.7=1/2 T3.85		
(1, 1, 1)	0 ms at 3.851/mm: T7.7=T3.85		0ms

Bit No.	DIS/DTC	Standard setting	DCS
24	Extend field	1	Extend field
25	2400 bit/s handshaking	0	2400 bit/s handshaking
26	Uncompressed mode	0	Uncompressed mode
27	Error correction mode	0	Error correction mode
28	Set to "0"	0	Frame size 0 = 256 octets 1 = 64 octets
29	Error limiting mode	0	Error limiting mode
30	Reserved for G4 capability on PSTN	0	Reserved for G4 capability on PSTN
31	Unassigned	0	
32	Extend field	1	Extend field
33 (0) (1)	Validity of bits 17,18 Bits 17,18 are valid Bits 17,18 are invalid	0	Recording width Recording width indicated by bits 17,18 Recording width indicated by this field bit information
34	Recording width capability 1216 picture elements along scan line length of 151 mm ± 1%	0	Middle 1216 elements of 1728 picture elements
35	Recording width capability 864 picture elements along scan line length of 107 mm ± 1%	0	Middle 864 elements of 1728 picture elements
36	Recording width capability 1728 picture elements along scan line length of 151 mm ± 1%	0	Invalid
37	Recording width capability 1728 picture elements along scan line length of 107 mm ± 1%	0	Invalid
38	Reserved for future recording width capability	0	
39	Reserved for future recording width capability	0	
40	Extend field	1	Extend field
41	Semi super time / mm	1	
42	Semi super time / inch	0	
43	Super time	0	
44	inch	0	
45	mm	1	
46	MSC/SF	0	
47	Select polling	0	
48	EXT	0	

Note 1 - Standard facsimile units conforming to T.2 must have the following capability : Index of cooperation (IOC)=264.
Note 2 - Standard facsimile units conforming to T.3 must have the following capability : Index of cooperation (IOC)=264.
Note 1 - Standard facsimile units conforming to T.4 must have the following capability : Paper length=297 mm.

Signal	Identification Signal Format	Function
Training 1	————	Fixed pattern is transmitted to receiving side at speed (2400 to 9600 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.
TCF (Training Check)	————	Sends 0 continuously for 1.5 seconds at the same speed as the training signal.
CFR (Confirmation to Receive)	X0100001	Notifies sending side that TCF has been properly received. If TCF is not properly received, FTT (Failure To Train) X0100010 is relayed to sender. Sender then reduces transmission speed by one stage and initiates training once again.
Training 2	————	Used for reconfirmation of receiving side the same as training 1.

Signal	Identification Signal Format	Function
Image Signal	Refer to next page.	————
RTC (Return to Control)	————	Sends 12 bit (0...01 × 6 times to receiver at same speed as image signal and notifies of completion of transmission of first sheet.
EOP (End of Procedure)	X1110100	End of one communication
MCF (Message Confirmation)	X0110001	End of 1 page reception
DCN (Disconnect)	X1011111	Phase E starts.
MPS (Multi-Page Signal)	X1110010	Completion of transmission of 1 page. If there are still more documents to be sent, they are output instead of EOP. After MCF reception, sender transmits image signal of second sheet.
PRI-EOP (Procedural Interrupt-EOP)	X1111100	If there is an operator call from the sender, it is output after RTC.
PIP (Procedural Interrupt Positive)	X0110101	Output in the case of operator call from receiver.

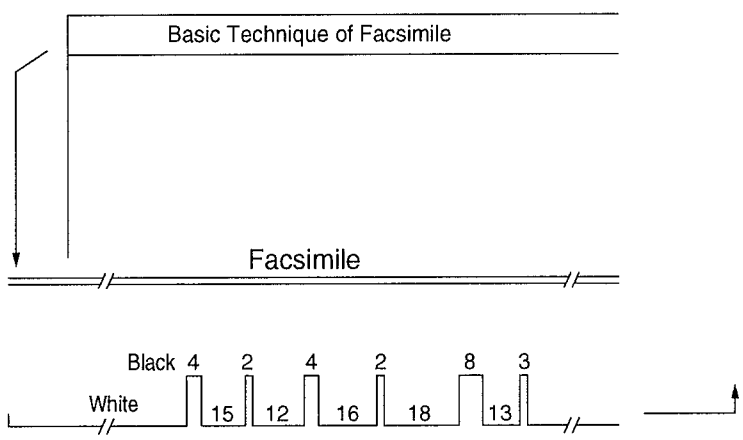
(2) Redundancy Compression Process Coding Mode
This set uses one-dimensional MH format.

(a) Document

(b) Part of document

(c) Run length and image signals equivalent to (b)

(d) Codification of (c) according to MH formula



Modified Huffman (MH) Code		
Run length	Code for White Line	Code for Black Line
0	00110101	0000011011
1	000111	010
2	0111	11
3	1000	10
4	1011	011
5	1100	0011
6	1110	0010
7	1111	00011
8	10011	000101
9	10100	000100
10	00111	0000100
11	01000	0000101
12	001000	0000111
13	000011	00000100
14	110100	00000111
15	110101	000011000
16	101010	0000010111
17	101011	0000011000
18	0100111	0000001000

00110111101010 011 110101 11 001000 011 101010
(White 400) (Black 4) (White 15) (Black 2) (White 12) (Black 4) (White 16)

11 0100111 000101 000011 10
(Black 2) (White 18) (Black 8) (White 13) (Black 3)

(c) Total bit number before MH codification (497 bit)
(d) Total bit number after MH codification (63 bit)

4.2 MODEM CIRCUIT OPERATION

The modem (IC5) has all the hardware satisfying the CCITT standards mentioned previously.
When the gate array IC4 (69) is brought to low level, the modem (IC5) is chip-selected and resistors inside IC are selected by select signals from ASIC (IC4) LA0-LA4, commands are written through data bus, and all processing is controlled at the ASIC (IC4) according to CCITT procedures. Here the signal $\overline{INT}$ dispatched from $\overline{IRQ}$ (pin 52 of IC5) to the ASIC (IC4) implements post processing.
This modem (IC5) has an automatic application equalizer. With training signal 1 or 2 at time of G3 reception, it can automatically establish the optimum equalizer. The modem (IC5) clock is supplied by pin 62 of ASIC (IC4).

1) Facsimile Transmission/DTMF Line Send
The digital image data on the data bus is modulated in the modem (IC5), and sent from pin 44 via amplifier IC8 (6→7), the NCU section to the telephone line.

IC5(44) → C26 → R14 → IC8(6 → 7) → CN1(10) → CN271(10) → C184 → R182 → IC151(73 → 63) →
NCU Section [C203 → R210 → IC201 (2 → 1) → C202 → R201 → T101] → TEL. Line.

2) Facsimile Reception
The analog image data which is received from the telephone line passes through the NCU section and enters pin 45 of the modem (IC5). The signals that enter pin 45 of the modem (IC5) are demodulated in the board to digital image signals, then placed on the data bus.
In this case, the image signals from the telephone line are transmitted serially. Hence they are placed on the bus in 8 bit units.
Here, internal the equalizer circuit reduces the image signals to the long-distance receiving level.
It is designed to correct the characteristics of the frequency band centered about 3 kHz and maintain a constant receiving sensitivity.
It can be set in the service mode.
TEL. Line → T101 → R202 → C205 → IC201(6-7) → C210 → C212 → R215 → C213 → IC202(1-2) → C217 →
CN271(9) → R20 → IC8(2-1) → C35 → R22 → IC5(45)

3) DTMF Transmission (Monitor tone)
The DTMF signal generated in the modem (IC5) is output from pin 44, then passes through the G/A. IC151, and the NCU section to the telephone line as same as facsimile transmission signals.

(DTMF Monitor Tone)
IC11(44) → C26 → R14 → IC8 (6 → 7) → CN1 (10) → CN271 (10) → C184 → R184 → IC151 (76 → 41) → C158 →
R161 → IC151 (40-38) → R245 → C245 → IC241 (4-5,8) → Speaker

4) Busy/Dial Tone Detection
The path is the same as for FAX receiving. When it is detected, the carrier detect bit of the resistor in the modem (IC5) becomes 1, and this status is monitored by ASIC (IC4).

MEMO

5 EXPLANATION OF ANALOG SECTION BLOCK DIAGRAM

1) Function

The analog section serves as interface with the telephone line and external telephone. The digital board (IC5) for transmission and reception of FAX signals and the speech network IC (IC109) are connected to the NCU section. Switching between the digital board (IC5) and the other sections is executed by means of a multiplexer in the NCU section. The control signals to the individual analog sections are outputted mainly from the ASIC IC4, and the status information for the various sections is also held in the gate array ASIC IC4. Simple explanations for the various sections are given below.

2) Circuit Operation

[NCU Section]

Interface with the telephone line and external telephone. This is composed of bell detection circuit, pulse dial generation circuit, EXT.TAM OFF-HOOK detect circuit, vox circuit, amplifier circuit for line transmission and reception, sidetone circuit multiplexer circuit, etc. See below for details.

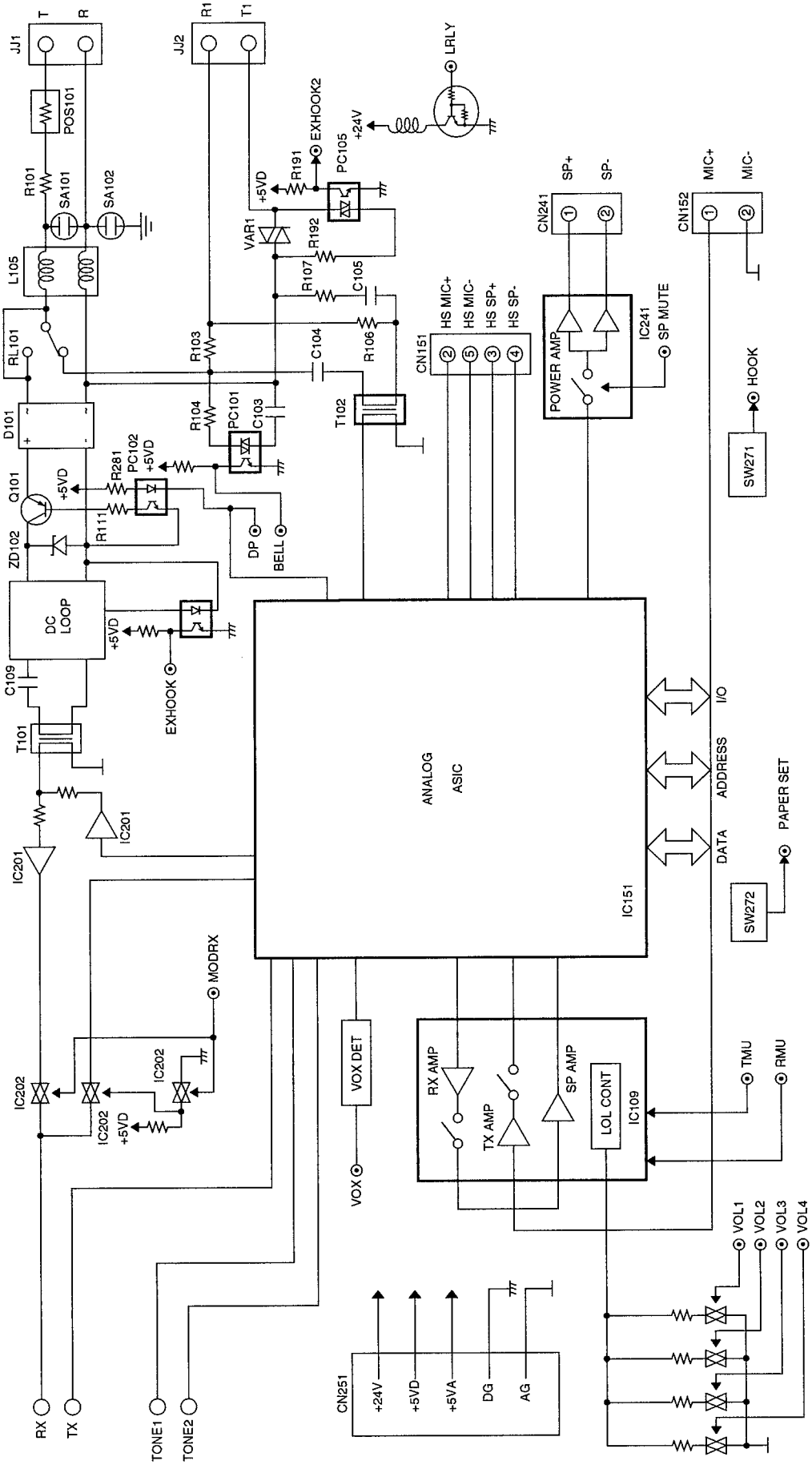
[Modem (IC5)]

This is used for FAX signal tone modulation, DTMF signal transmission, ring tone generation, and line transmission beep generation. The DTMF signal and Beep are placed onto the TX system. The ring tone passes through the analog switch. Output to the speaker via the power amplifier (IC241).

[Speech Network IC (IC109)]

This is special IC combining the hands-free and handset circuits in 1 chip. The handset and microphone are connected to this circuit. At the time of hands-free operation, the SP output is output after passage through the power amplifier (IC241) and the DTMF monitor tone and the pulse dial monitor tone output from IC5 (Digital Board and IC151 (Analog Board) are given as input to this IC and become the monitor tone at the time of handset dialing.

Analog Unit Block Diagram



6 NCU SECTION

6.1 GENERAL

This section is the interface with the telephone line and external telephone. It is composed of EXT. TEL Line relay (RL101), bell detection circuit, pulse dial circuit, Auto Disconnect circuit, TAM Interface circuit, line amplifier and sidetone circuits and multiplexer.

6.2 EXT. TEL. LINE RELAY (RL101)

1) Circuit Operation

Normally this relay switches to the external telephone side (break) and it switches to the open side (make) when the set starts facsimile communication.

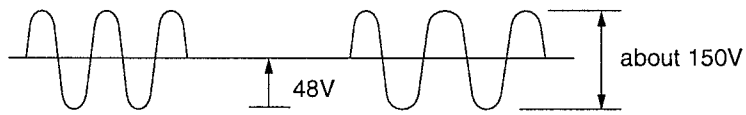
IC151 (23) High Level → Q271 ON → RL101 (make)

6.3 BELL DETECTION CIRCUIT

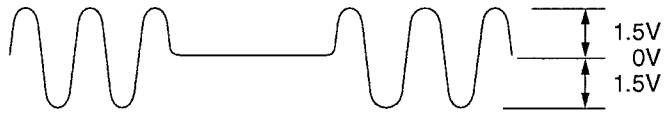
1) Circuit Operation

Signal waveform of each section are indicated below. Signal (low level section) input to pin 4 of gate array IC151 are read out at CPU and judged as bell.

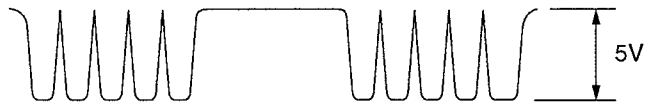
Between Tip and Ring



Between PC101(1) and (2)



PC101(4)/Gate Array IC151 (4)



TEL. LINE → PC101(1,2-4) → IC151 (4)

6.4 PULSE DIAL CIRCUIT

1) Circuit Operation

In OFF-HOOK Condition, the photocoupler PC102 pin (2) is low level by IC151 pin (3) and PC102 pin (4) is low level so Q101 is ON. At the time of pulse dial operation, PC102 pin (2) becomes high level by IC151 pin (3), so that PC102 pin (4) becomes high level, and Q101 becomes OFF line ON/OFF by high/low control for IC151 pin (3) makes pulse dial operation possible.

IC151 (3) High Level → PC102 (2) High level → PC102 (4) High Level → Q101 OFF → Telephone Line

6.5 AUTO DISCONNECT CIRCUIT

1) Function:
This circuit is used to detect the fact that another telephone connected to the same line is OFF-Hook while the unit is in the time of TEL/FAX's arrival bell ringing operation.

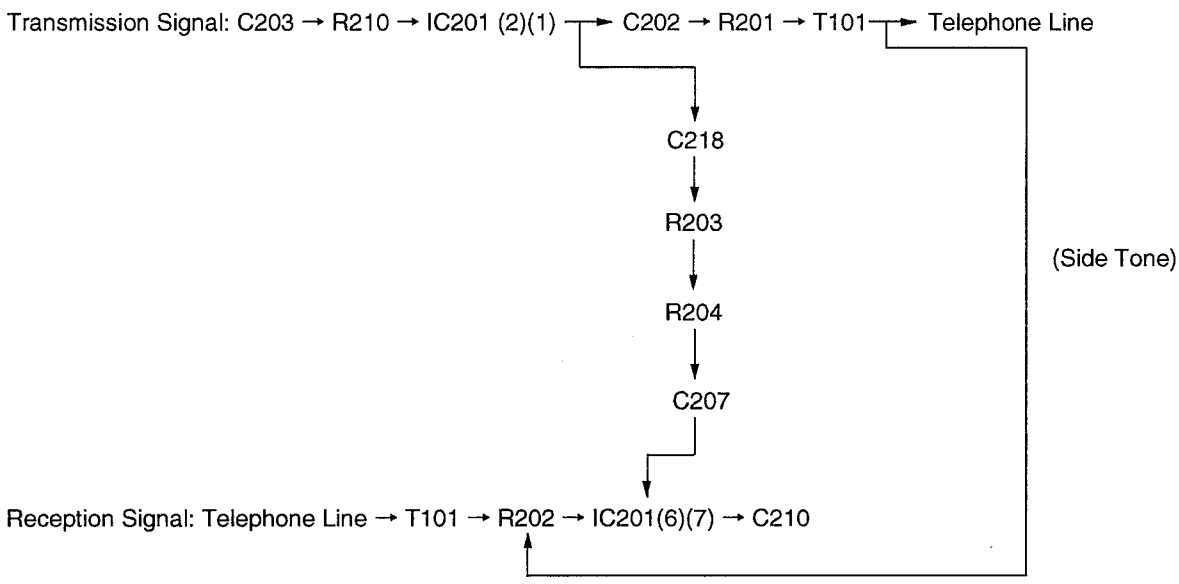
2) Circuit Operation:
Tip (Ring) → D101 → Q101 → C107 → D102 → R114 → Q102 → PC103.
During this interval C107 charges and the base of Q102 becomes high, and PC103 pin(2) becomes low, causing PC103 to go ON.
If a parallel-connected telephone or external telephone is put into an OFF-HOOK status, charge ceases to flow C107 and the base of Q102 becomes low, causing PC103 to go OFF.
When a line is connected, Q102 and PC103 go ON, causing pin 5 of IC151 to go low. When the line is disconnected, Q102 and PC103 go off, causing pin 5 of IC151 to go high.

6.6 TAM INTERFACE CIRCUIT

This circuit is to switch between FAX receiving and external TAM's message recording automatically. This circuit consists of EXT. TAM OFF-HOOK detect circuit, Monitor Transformer, Multiplexer, Amplifier, and VOX detect circuit.
In details please refer to 162. TAM INTERFACE SECTION.

6.7 LINE AMPLIFIER AND SIDE TONE CIRCUIT

1) Circuit Operation
The reception signal received as output from the line transformer T101 is given as input to R202, C205 to IC201 pin (6), and it is inputted to the reception system at an amplifier gain 5.9dB from pin7.
The transmission signal given as input to IC201 pin(2) via C203, R210 is amplified to about 15dB, it is outputted form pin 1 of IC201 and it is transmitted to T101 via C202, R201. Without side tone circuit, the transmission signal here would return completely to the reception amplifier via R202, C205. Here, the signal output from IC201 pin(1) passes through C218, R203, R204, C207 and enters the reversion amplifier IC201 pin(5), and this is used to cancel the return part of the transmission signal. This is the side tone circuit.



7 ITS (Integrated telephone System) AND MONITOR SECTION

7.1. GENERAL

The general ITS operation is executed by the special IC109. This IC has a speakerphone circuit and a handset circuit in 1 chip, and control to each mode is executed from the outside (IC151). At the time of speakerphone operation the speaker output passes through the power amplifier (IC241). The DTMF signal and the bell tone are output from the modem (IC5: digital board). The alarm tone, the key tone, and the beep are output from the gate array IC4 (digital board). At the time of pulse dial operation, the monitor tone is output from the gate array IC151.

7.2. SPEAKERPHONE CIRCUIT

(1)Function

This circuit controls the automatic switching of the transmitted and received signals, to and from the telephone line, when the unit is used in the hands-free mode.

(2)Circuit Operation

The speakerphone can only provide a one-way communication path.
In other words, it can either transmit an outgoing signal or receive an incoming signal at a given time, but cannot do both si multaneously. Therefore, a switching circuit is necessary to control the flow of the outgoing and incoming signals.
This switching circuit is contained in IC109 and consists of voice detector, TX attenuator, RX attenuator, comparator and attenuator control. The circuit analyzes whether the TX (transmit) or the RX (receiver) signal is louder, and then it processes the signals such that the louder signal is given precedence. The voice detector provides a DC input to the attenuator control corresponding to the TX signal. The comparator receives a TX and RX signals and supplies a DC input to the attenuator control corresponding to the RX signal. The attenuator control provides a control signal to the TX and the RX attenuator to switch the appropriate signals ON and OFF. The attenuator control also detects the level of the volume control to automatically adjust for changing ambient conditions.

(Transmission Signal Path)
The input signal from the microphone is sent through the circuit via the following path:
MIC → J270 → C138 → IC109 (13-27) → R145 → IC151 (75-63) → C203 → R210 → IC201 (2-1) → C202 → R201 → T101 → TEL LINE

(Reception Signal Path)
Signals received from the telephone line are outputted at the speaker via the following path.
TEL LINE → T101 → R202 → C205 → IC201(6-7) → C210 → C173 → R172 → R173 → C174 → IC151(59-71) → C142 → R143 → IC109 (22-30) → C145 → IC109 (4-7) → R146 → C146 → IC151 (40-38) → R245 → C245 → IC241 (4-5,8) → SPEAKER

(Control Signal Path)
Control signals for transmission and reception are inputted to IC109 via following path.

(Transmission Control Signal Path)
MIC → J270 → C138 → IC109 [(13) → MC AMP → SW4 → (31)] → C130 → R130 → IC109 [(1) → AMP → Comparator]

(Reception Control Signal Path)
TEL LINE → NCU Section [IC201(6-7)] → C173 → R172 → R173 → C174 → IC151(59-71) → C142 → R143 → IC109[(22) → SW3 → RX ATT → (30)] → C145 → IC109 [(4) → SW5 → SP AMP → (7)] → C132 → R131 → IC109 [(3) → AMP → Comparator]

(Voice Detector)
The transmission signal given as input from the microphone to IC109 pin (1) passes through the built-in amplifier and enters the voice detection circuit for judgment of voice noise. In case of noise, the TX attenuator is made effective via the attenuator control.

(Attenuator Control)
The attenuator control detects the setting of the volume control through pin 11 of IC109 to automatically adjust for changing ambient conditions.

7.3. HANDSET CIRCUIT

(1) Transmission signal
Handset MIC → L151 → R154 → C167 → IC151(52,54-63) → C203 → R210 → IC201(2-1) → C202 → R201 →
Handset MIC → L152 → R155 → C168 → IC151(52,54-63)
T101 → TEL LINE

(2) Reception Signal
TEL LINE → T101 → R202 → C205 → IC201(6-7) → C210 → C173 → R172 → R173 → C174 → IC151(59-45,46)
→ C154 → L154 → Speaker
→ L153 → Speaker

7.4. MONITOR CIRCUIT

(1) DTMF Monitor
(Speaker Operation)
IC5 (44) → C26 → R14 → IC8(6-7) → CN1(10) → CN271(10) → C184 → R184 → IC151(76-41) → C158 → R161
→ IC151(40-38) → R245 → C245 → IC241(4-5,8) → Speaker

(Handset Operation)
IC5 (44) → C26 → R14 → IC8(6-7) → CN1(10) → CN271(10) → C184 → R184 → IC151(76-45,46) → C154 → L154 → Speaker
IC151(76-45,46) → L153 → Speaker

(2) Alarm/Beep/Key tone
IC4(39) → R514 → CN1(11) → CN271(11) → R185 → C186 → IC151(77-41) → C158 → R161 → IC151(40-38) → R245
C245 → IC241(4-5,8) → Speaker

(3) Bell Signal
IC4(40) → R47 → C506 → CN2(1) → CN272(1) → R186 → C187 → IC151(78-41) → C158 → R161 →
IC151(40-38) → R245 → C245 → IC241(4-5,8) → Speaker

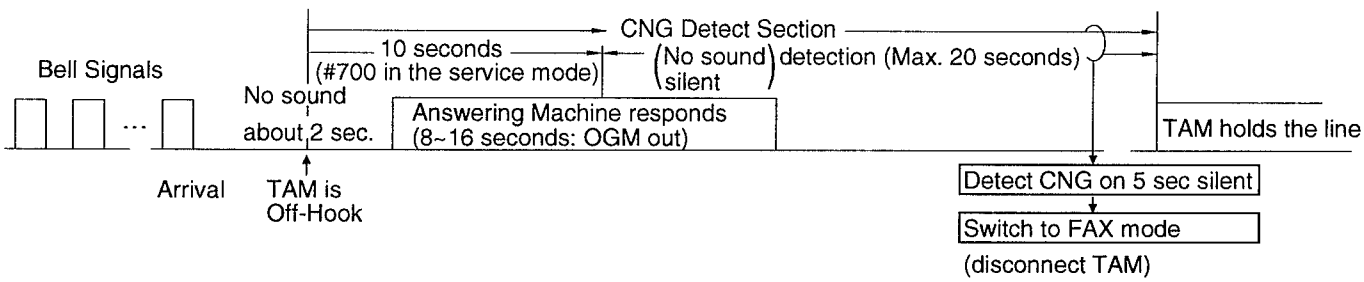
8 TAM INTERFACE SECTION

8.1 FUNCTION

In case that EXT. TAM position is selected in Receive mode, the unit receives documents for FAX call or the external TAM records a voice message automatically.

To switch between answering machine and facsimile in EXT. TAM Mode.

	OPERATION	EXPLANATION
	When bell signal rings as many as the numbers which installed in the connected answering machine, the answering machine seizes the line, then answering massage is out to the line.	The length of response messages should be 8~16 seconds. While response massage is being played, the unit starts to detect CNG signal. When CNG signal is received, the unit switches to FAX receiving.
	10 seconds after the answering machine gets the telephone call, no-sound detection begins.	When there is approximately 5 seconds' no sound situation for 20 seconds after being passed 10 seconds, the unit switches to FAX receiving. During this period it detects CNG signal also. When it cannot detect no-sound nor CNG, it doesn't switch to FAX receiving, the unit doesn't catch the line. (The answering system hangs up the line.)



Attention 1: No sound detection lasts 20 seconds after the telephone call comming in to the answering machine. If there is no sound situation for more than 5 seconds (#701 in the service mode) it is switched to the facsimile.

Attention 2: When answering machine can't catch the telephone call because of the disconnection or no capacity in the tape, the unit catches the call after 5 times' bell ring (#702 in the service mode), then switches to facsimile. When you install in Service, it is possible for the unit not to catch phone calls.

8.2 CIRCUIT OPERATION

TAM INTERFACE circuit consists of EXT. TAM HOOK detection circuit, CNG signal from the party's detection circuit, VOX detection circuit (to judge sound/no-sound) and RLY1 (to separate EXT. TAM).

1) EXT. TAM HOOK detection circuit
The bell comes to EXT. TAM and EXT. TAM seizes the line, causing to make DC LOOP. PC105 detects this voltage. During detection PC105 (4) becomes low.

(DC LOOP)
Tip → POS1 → L105 → RL104 (7 → 6) → VAR1 → L104 → Tip1 → (EXT.TAM) → Ring 1 → L103 → R103 → L105 → Ring
VAR1 → R192 → PC105 → L104

2) CNG signal detection circuit
CNG signal from the party's FAX is detected in MODEM IC5 (digital board).

(Signal path)
Telephone Line → C104 → T102 → C176 → R176 → IC151(61)(67) → R217 → C214 → IC202(10)(11) → C217 → CN271(9) → CN1(9) → R20 → IC8(2)(1) → C35 → R22 → IC5(45)

3) VOX
VOX circuit detects if there is a signal or voice in the line. That's why VOX circuit reacts to OGM of EXT.TAM and ICM from the party.

(Signal path)
Telephone Line → C104 → T102 → C176→ R176 → C151(61-67) → C179 → R177 → IC151(68-70) → C291 →D290 → R296→ IC101(6)(7) → R290

EXT.TEL Line → VAR1 → T102

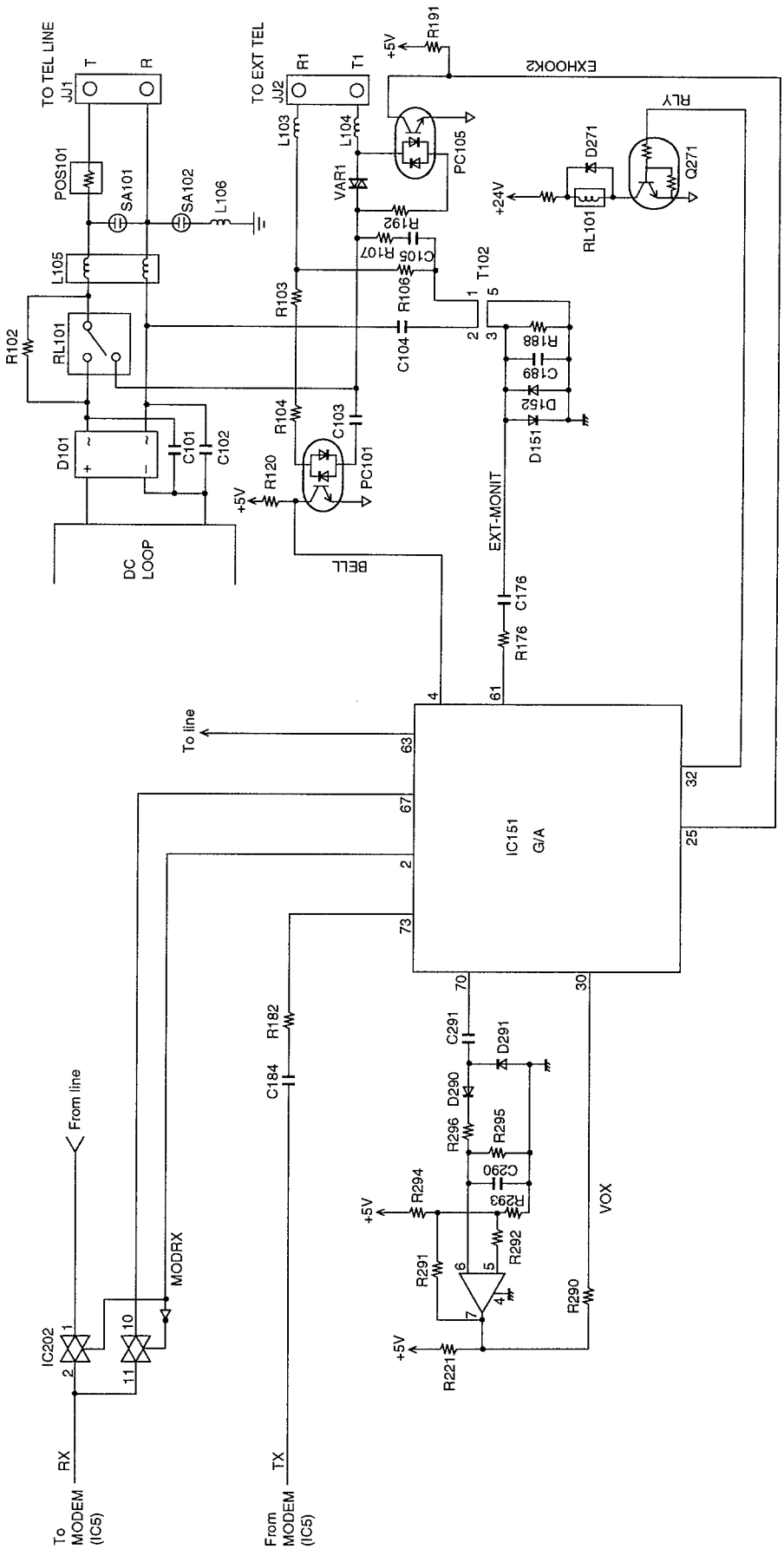
4) RLY1
Normally this relay switches to the external telephone side (break) and it switches to the open side (make) when the set changes to facsimile communication from EXT.TAM operation.

IC151(23) High Level → Q271 → ON → RL101(make)
IC151(23) Low Level → Q271 → OFF → RL101(break)

5) Remote receiving
This is the DTMF signal of parallel connection TEL or EXT.TEL between T and R. When the party is FAX, this turns unit to FAX receiving.

(Signal Path)
To defect DTMF signal in MODEM.

Circuit Diagram



9. OPERATION BOARD SECTION

The unit consists of LCD (Liquid crystal display), KEYs and LEDs (light-emitting diode). They are controlled by the Gate Array (IC301) and ASIC (IC4: On the DIGITAL BOARD). (Fig.-a)

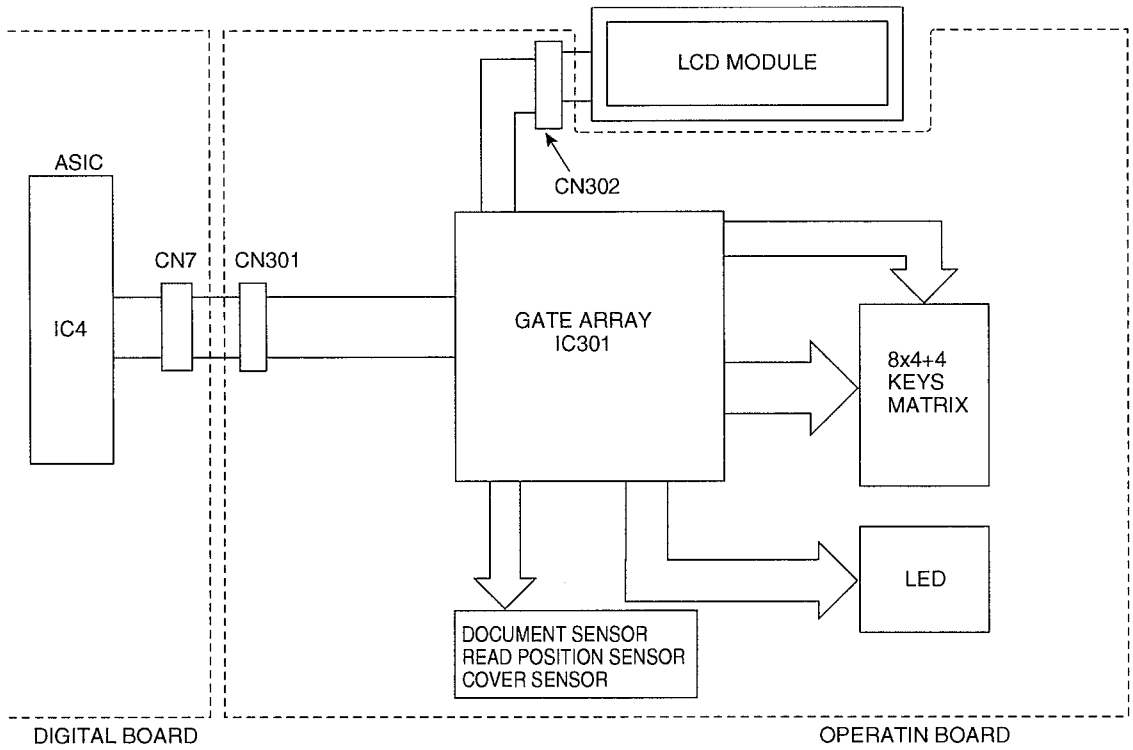


Fig-a DIAGRAM

Key Matrix

	KIN0	KIN1	KIN2	KIN3	KIN4	KIN5	KIN6	KIN7
KSL0	S301 FLASH	S305 0	S309 *	S313 #	S317 FILM REMAINING	S321 LOWER	S325 ONE 8	S329 ONE 3
KSL1	S302 REDIAL/PAUSE	S306 8	S310 7	S314 9	S318 V	S322 ONE 5	S326 ONE 9	S330 ONE 4
KSL2	S303 MUTE	S307 5	S311 4	S315 6	S319 STOP	S323 ^	S327 ONE 6	S331 ONE 1
KSL3	S304 MONITOR	S308 2	S312 1	S316 3	S320 START/ COPY/SET	S324 AUTO RECEIVE	S328 ONE 7	S332 ONE 2

	LED6	LED7	LED10	LED11
XLD12		S339	S338 DIRECTOR	S337 HELP
XLD13	S336	S335	S334 MENU	S333 DIRECTORY

SENSOR

	LED6	LED7	LED10	LED11
XLD14		PC303 COVER OPEN=1	PC302 DOCUMENT SET=1	PC301 READ POSITION SENSOR

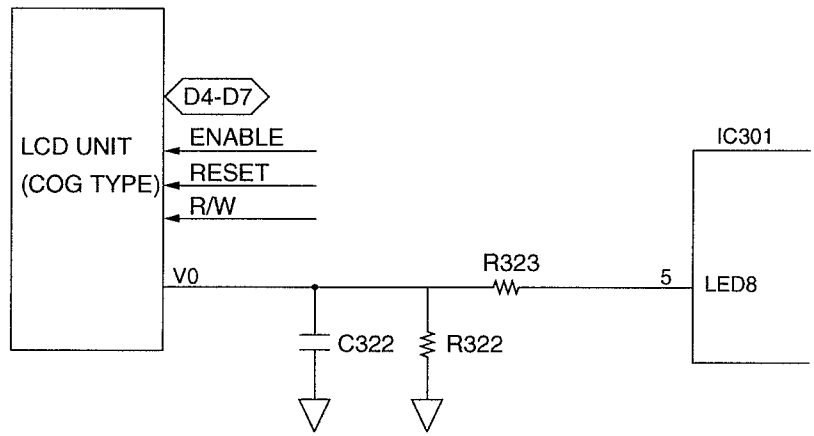
LED

	LED1	LED2	LED3	LED4	LED8
	LED301	LED302	LED303 AUTO RECEIVE	LED304 SP-PHONE	LCD CONT 0=D 1=N

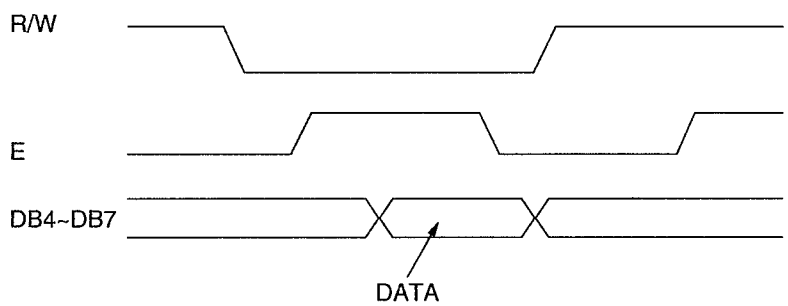
10. LCD SECTION

The Gate Array (IC301) needs only write ASCII code from the data bus (D4~D7). V0 is supplied for crystal drive. R323 and R322 are density control resistors.
Consequently, in this set the timing (mainly positive clock) is generated by the LCD interface circuitry of the gate array (IC301).

Circuit Diagram



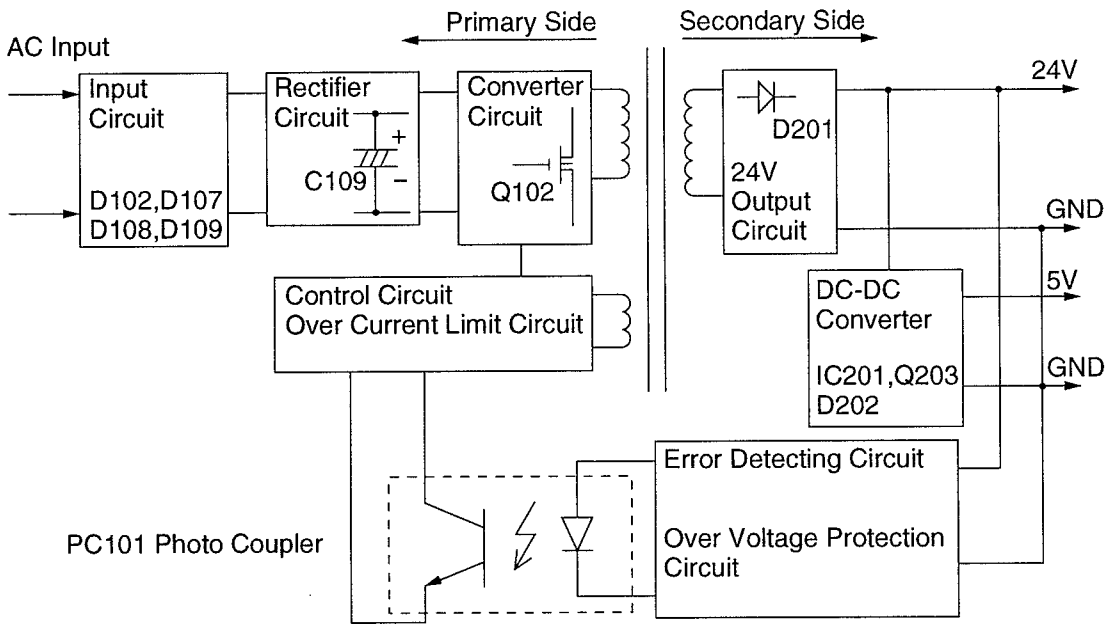
Timing Chart



Density	Norma	Dark
LED8 (IC301-5pin)	H	L

11. SWITCHING POWER SUPPLY BOARD SECTION

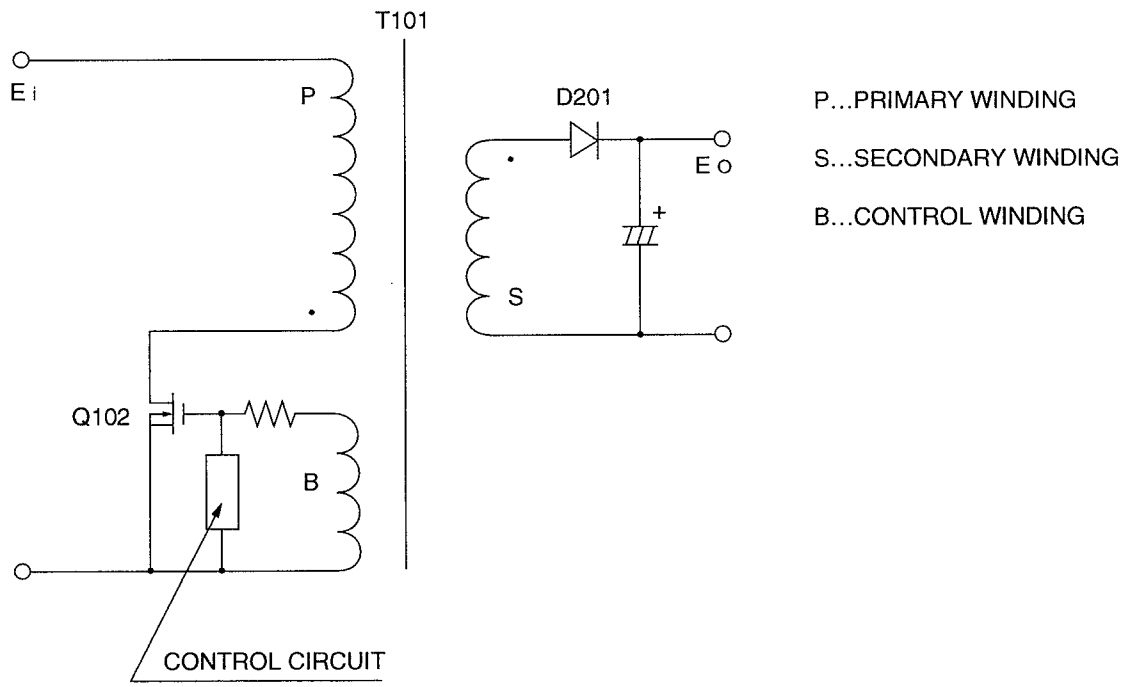
Block Diagram



[Input Circuit]
Input current goes into input rectifier circuit through filter circuit. Fitter circuit decreases noise terminal voltage and noise electric field strength.

[Rectifier Circuit]
Input current is rectified by D102, D107 D108, D109 and C109 to make DC voltage, then supply power to converter circuit.
Inrush current is limited by thermistor TH101.

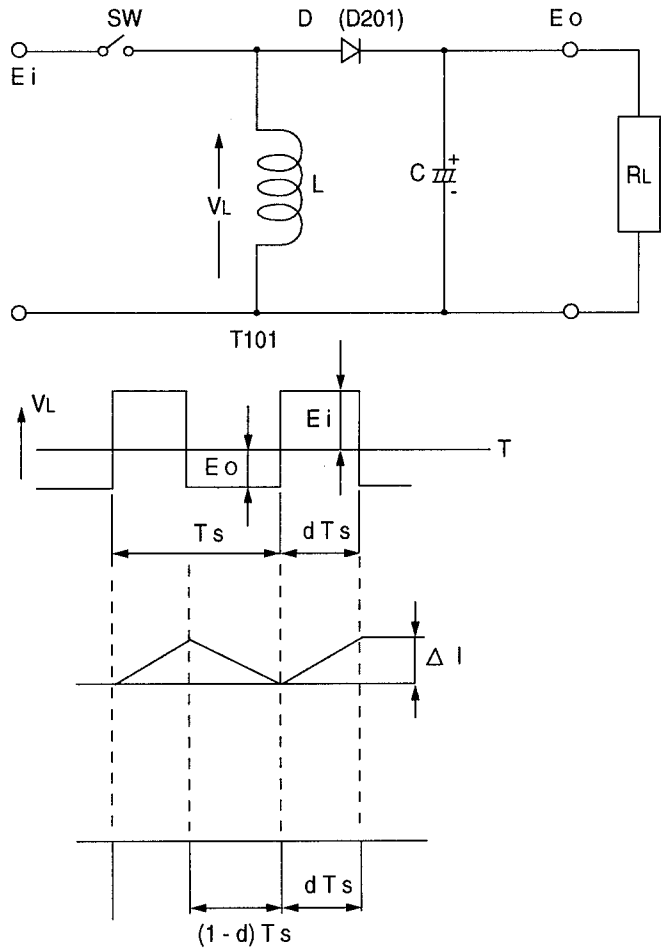
[Converter circuit]



We explain the operation of this circuit with the simple circuit. The circuit in the previous page, when the transistor Q102 is ON, secondary rectifier diode D201 is OFF and the energy is charged in the transformer T101. Q102 continues being ON while the voltage is generated by control winding (B). Q102 is tuned OFF by control circuit, then each windings of T101 changes the polarity and rectifier diode D201 truns ON.
The charged energy of T101 supplies power through D201 to output load. And the voltage of control winding is decreased and Q102contines being OFF state. When all energy is discharged through D201, Q102 is turned ON again and it makes the polarity of each windings of T101 in reverse and goes to self oscillation. When input voltage Ei is high, the operation frequency is stopped up, and when load current is high, the operation frequency is stopped down.

Eo = d/(1-d)*Ei

d = Ton/Ts



T_{on}: ON TIME OF Q102

T_s : PERIOD OF OSCILLATION

In the equivalent circuit:
When SW is ON, current flows
SW → L
When SW is OFF, Current flows
L → R → R_L

The value of inductance rectifiers increasing current during ON period.

IL = Ei / L*d*Ts (1)

The value of inductance rectifiers decreasing current during OFF period.

IL = Eo/L(1-d) * Ts (2)

From equations (1) and (2),
Eo = d/(I-d) * Ei

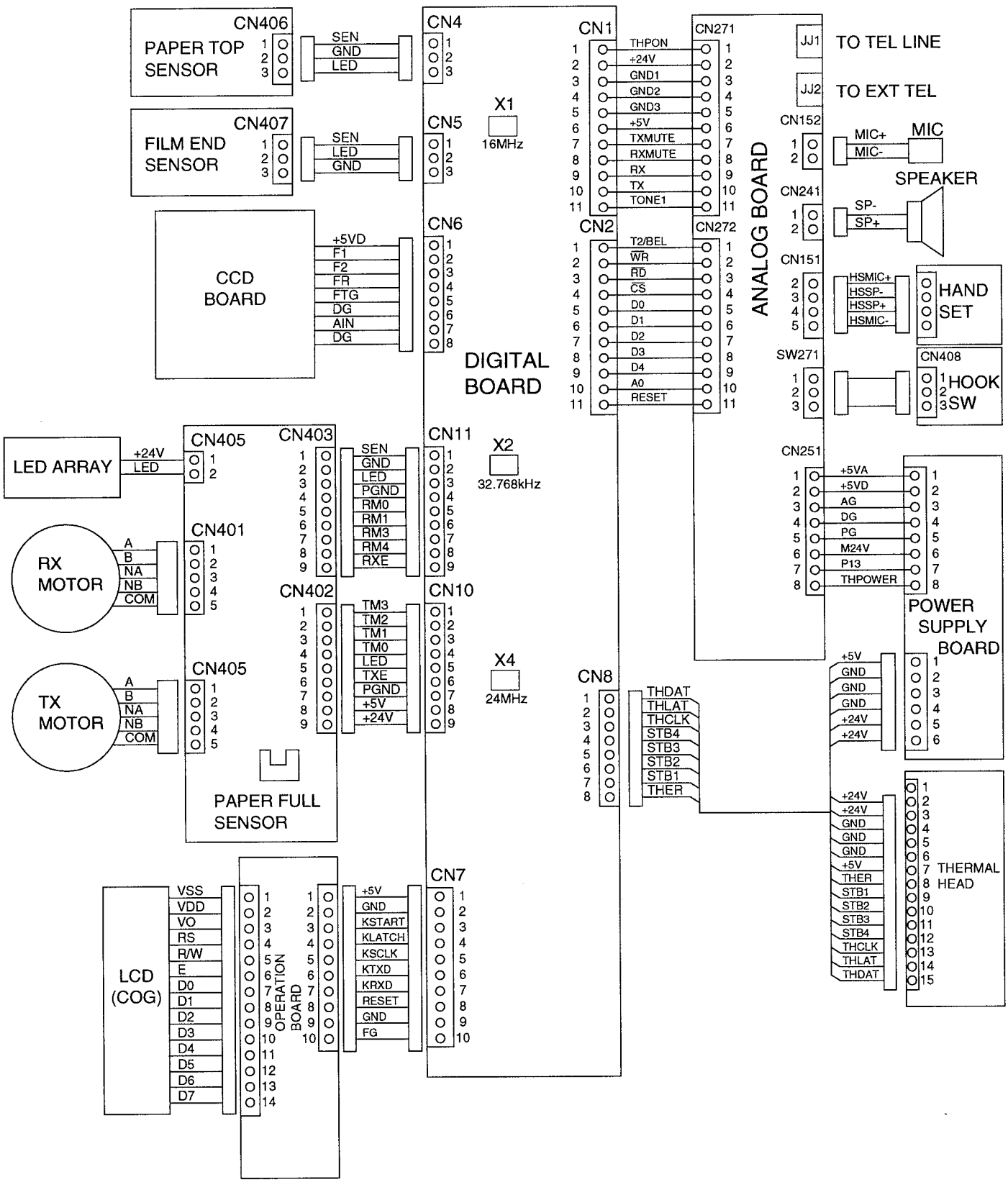
Because of the repetition of this operation, the voltage, which is stepped down by winding ratio of transformer, is produced at the secondary side of transformer. And after rectified, it's supplied as a DC voltage.

[Control Circuit And Error Detecting Circuit]
Error detection circuit compares 24V output with the internal reference voltage, and transmits this error signal to control circuit of primary side through PC101. The control circuit drives the main transistor Q102 and controls the ON period according to the error signal in order to keep stability of output.
This is shown as follows.
When the output voltage of 24V circuit steps up, the current of photo coupler PC101 increases, the pulse width of gate signal of Q102 and the ON period of Q102 becomes shorter.

[Over Current Limiter (O.C.L.)]
The output of 24V has the function of over current protection, with limiting ON period of Q102 in the control circuit.

[DC-DC converter]
In case of over voltage, the output of 24V is protected by short mode destruction of zener diode ZD202 installed at the output section.

CONNECTION DIAGRAM

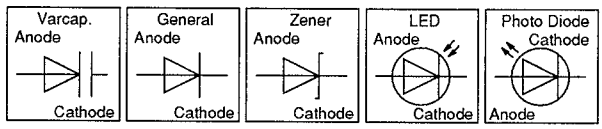


FOR SCHEMATIC DIAGRAM

Notes:

1. DC voltage measurements are taken with oscilloscope or tester from ground .
2. The schematic diagram and circuit board may be modified at any time with the development of new technology.

3.

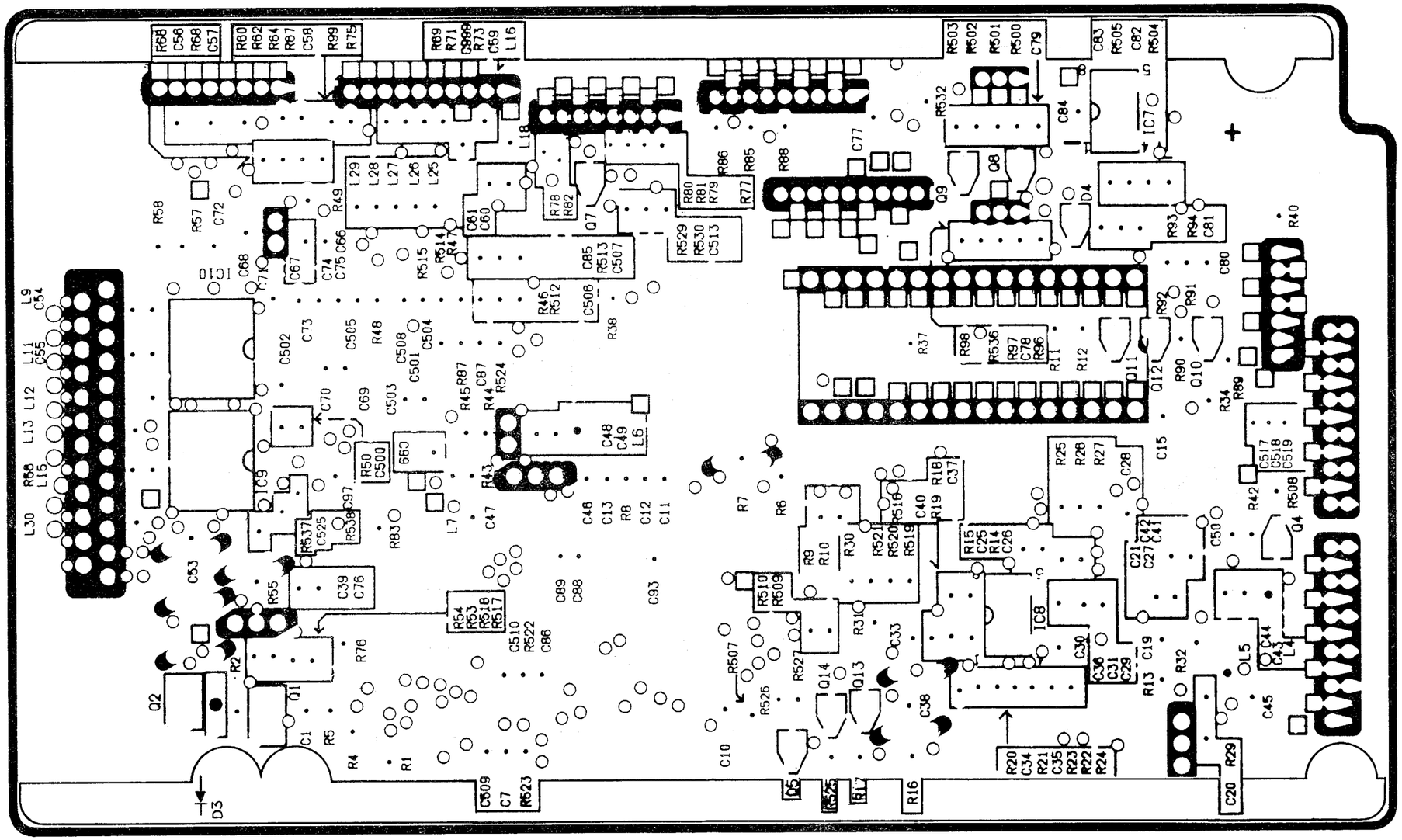


Important safety notice

Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

PRINTED CIRCUIT BOARD (DIGITAL BOARD)

(BOTTOM VIEW)



Notes:

1. The circuit shown in ▭ on the conductor indicates printed circuit on the back side of the printed circuit board.

Notes:

1. The circuit shown in ▭ on the conductor indicates printed circuit on the front side of the printed circuit board.

PRINTED CIRCUIT DIAGRAM (DIGITAL BOARD)

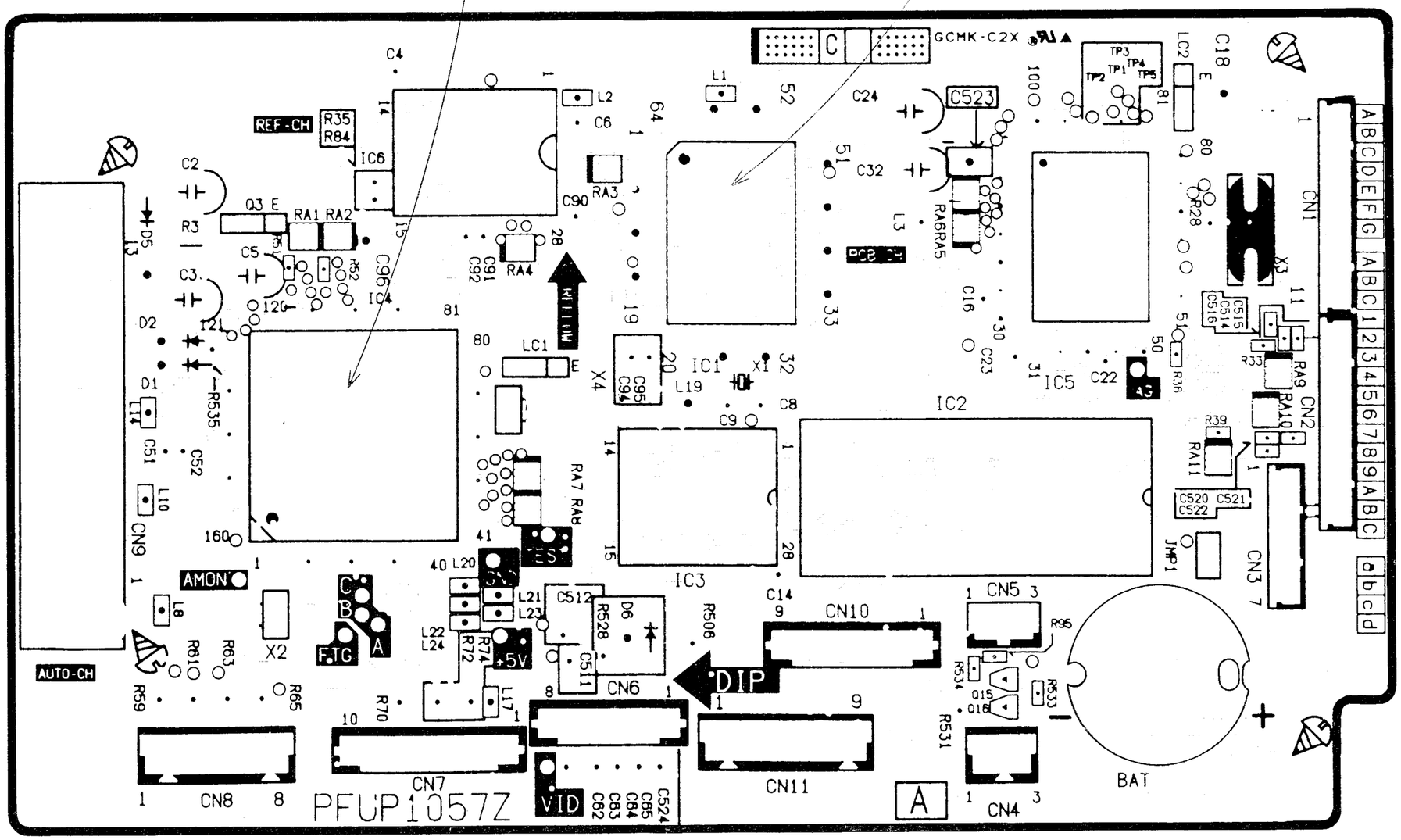
(COMPONENT VIEW)

IC 4

PIN NO.	WAVEFORM	PIN NO.	WAVEFORM
7, 8	32kHz	58, 59	24MHz

IC 1

PIN NO.	WAVEFORM
27, 28	16MHz



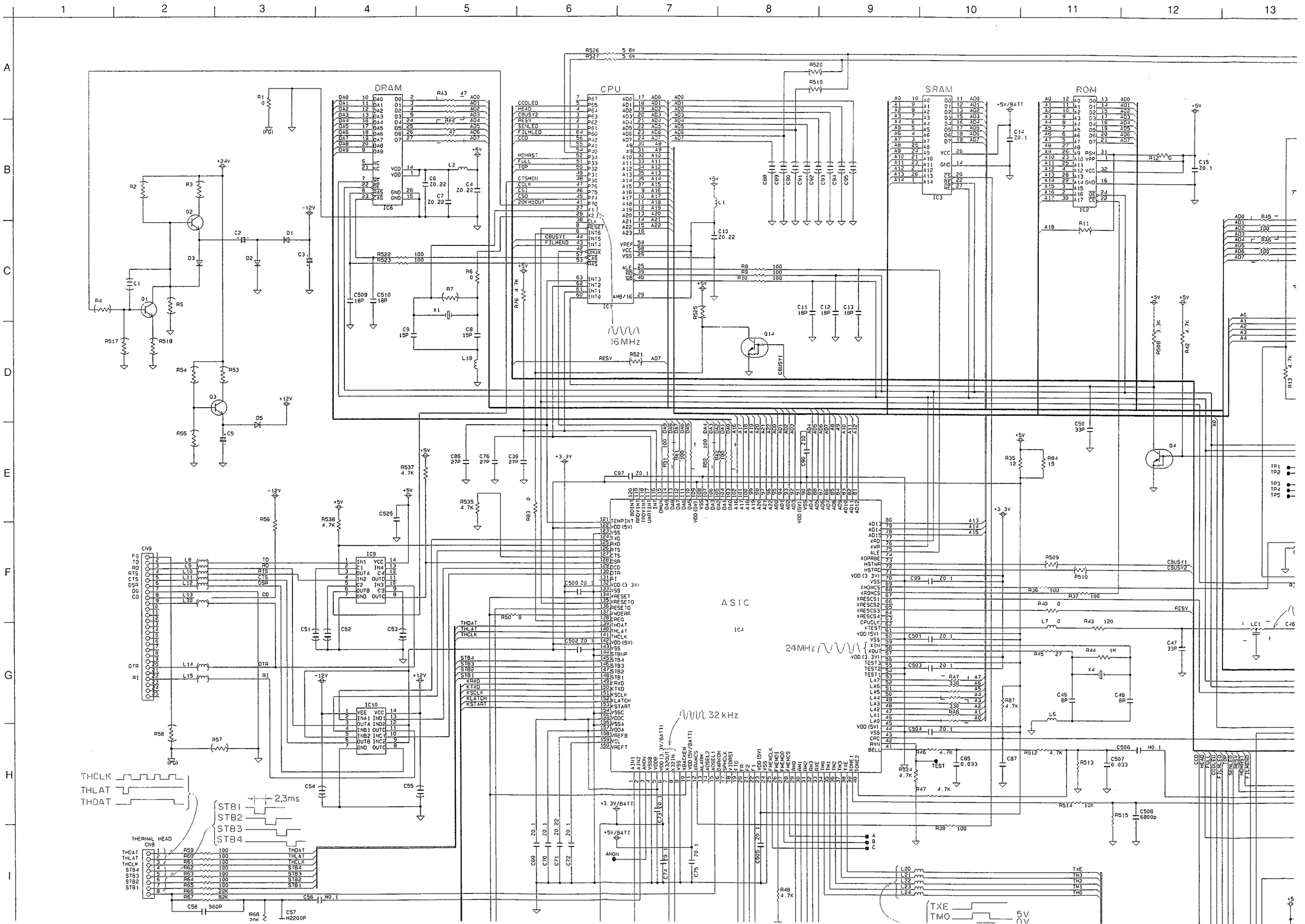
Notes:

1. The circuit shown in ▭ on the conductor indicates printed circuit on the back side of the printed circuit board.

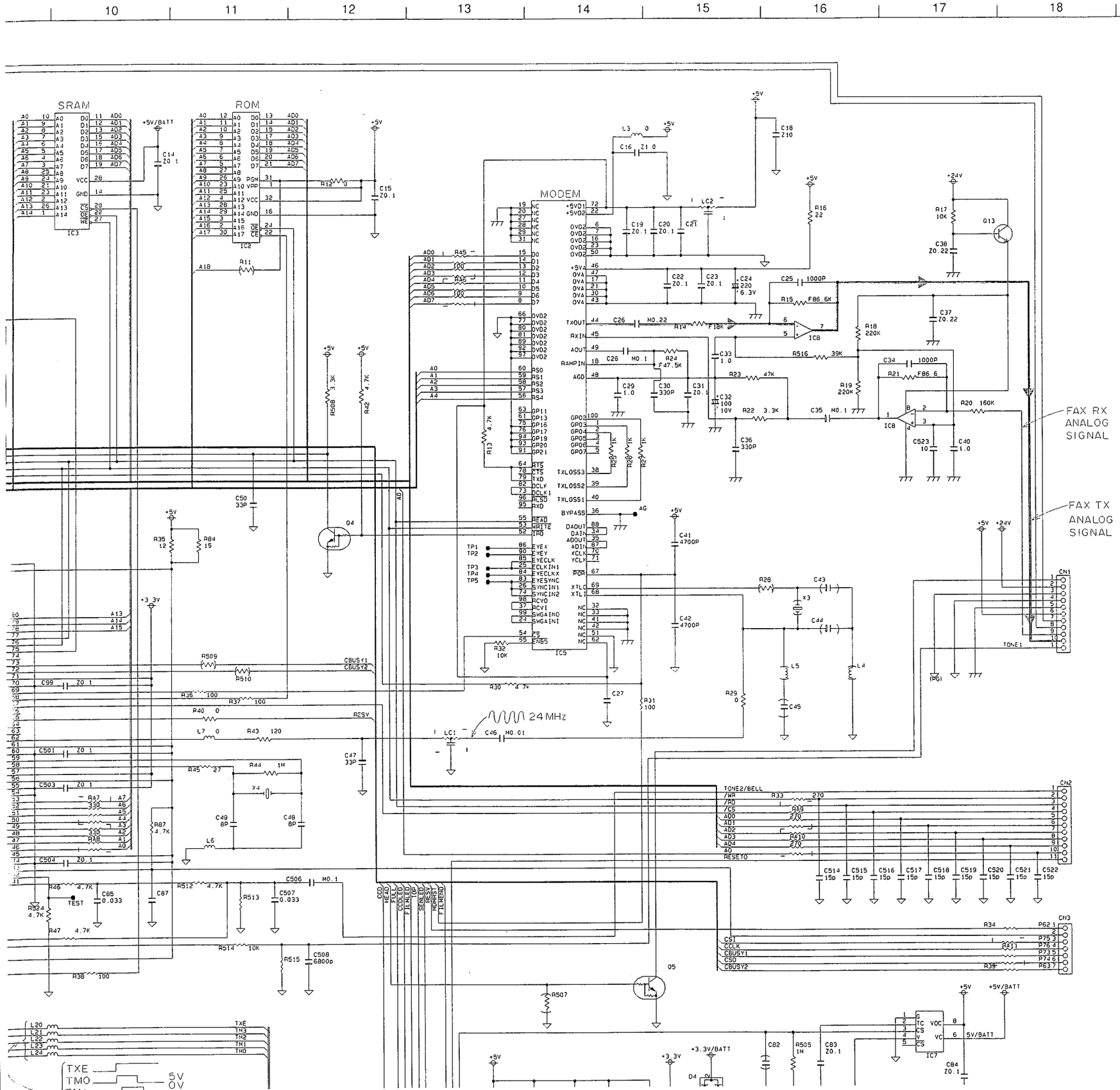
Notes:

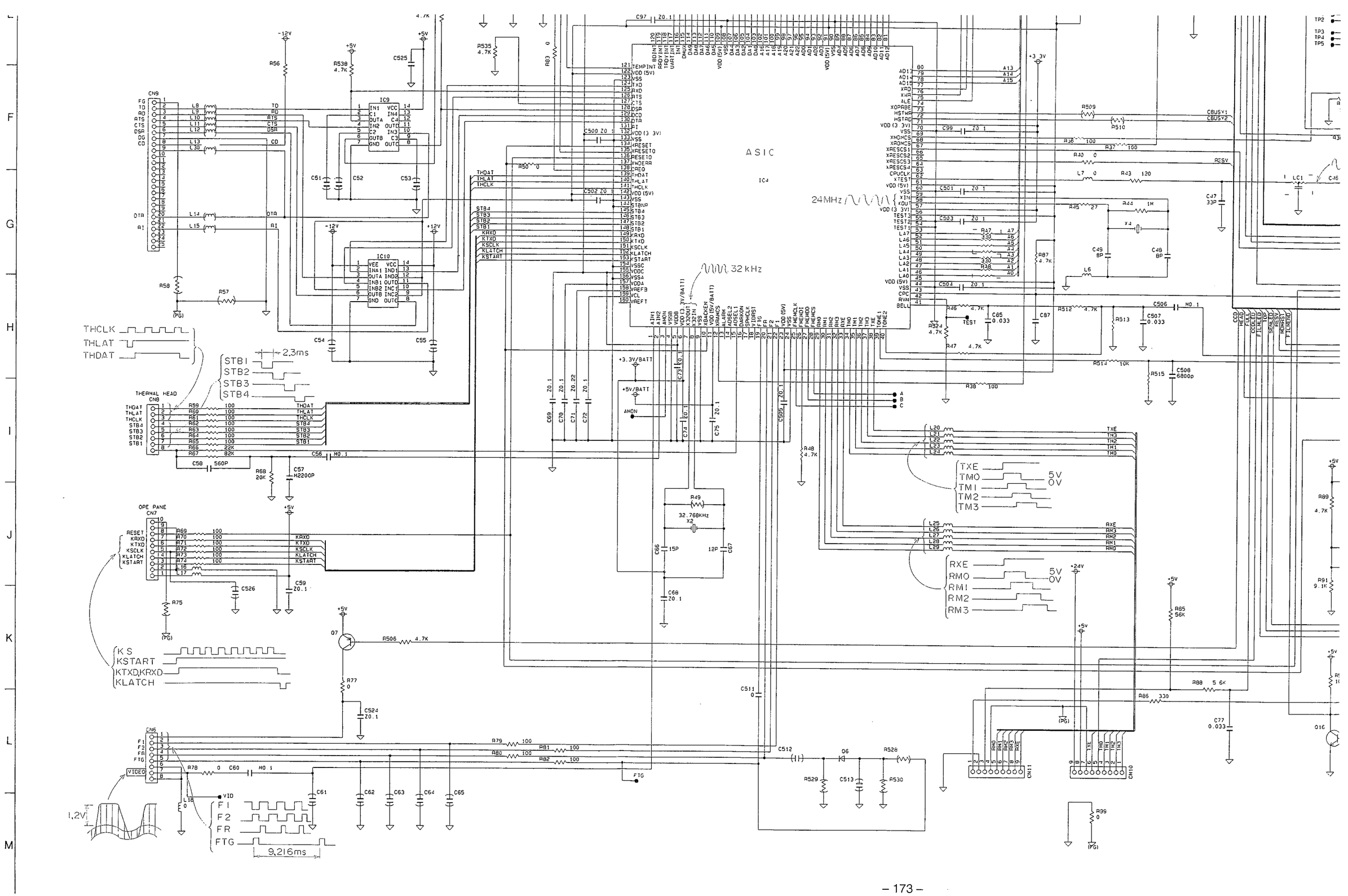
1. The circuit shown in ▭ on the conductor indicates printed circuit on the front side of the printed circuit board.

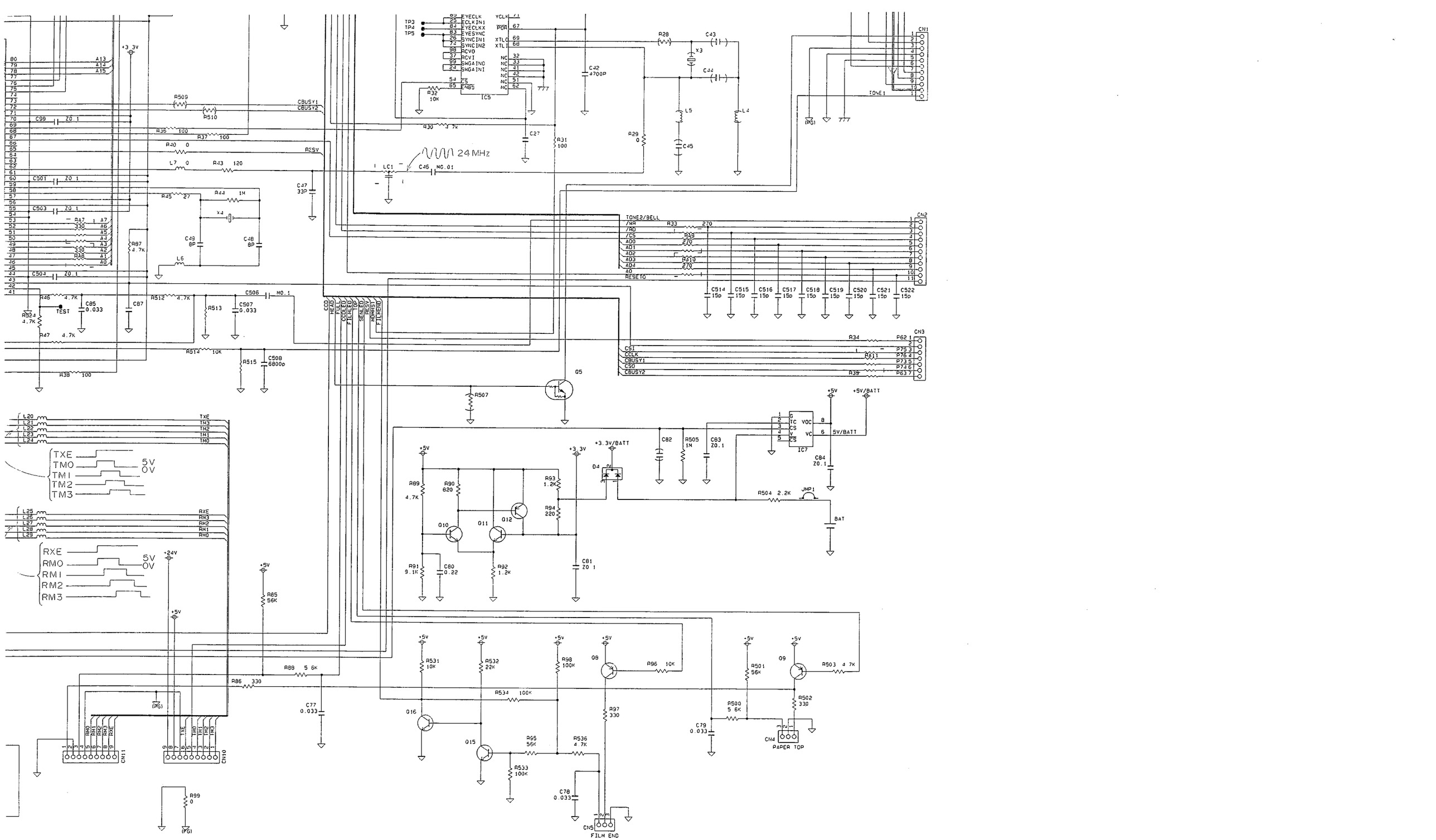
SCHEMATIC DIAGRAM (DIGITAL CIRCUIT)



(DIGITAL CIRCUIT)




ASIC
IC4
24MHz
32kHz
IC9
IC10
CN9
CN8
CN7
CN6
CN10
CN11
THERMAL HEAD
OPE PANE
THCLK
THLAT
THDAT
STB1
STB2
STB3
STB4
2.3ms
KS
KSTART
KTXD,KRXD
KLATCH
VIDEO
1.2V
FI
F2
FR
FTG
9.216ms
TXE
TM0
TM1
TM2
TM3
RXE
RM0
RM1
RM2
RM3
5V
0V
+3.3V/BATT
+5V/BATT
AMON
+3.3V
+5V
+24V
-12V
(PG)
TP2
TP3
TP4
TP5


+3.3V
24MHz
TONE2/BELL
CN1
CN2
CN3
CN4
PAPER TOP
CN5
FILM END
IC5
IC7
Q5
Q10
Q11
Q12
Q15
Q16
D4
D8
D9
BAT
JMP1
TXE
TM0
TM1
TM2
TM3
RXE
RM0
RM1
RM2
RM3
5V
0V
+24V
+5V
+5V/BATT
+3.3V/BATT
CCD
HEAD
FUEL
CONCEAL
FLICKER
TOP
SENSOR
RESET
NOWAIT
FLICKER0

SCHEMATIC DIAGRAM (ANALOG CIRCUIT)

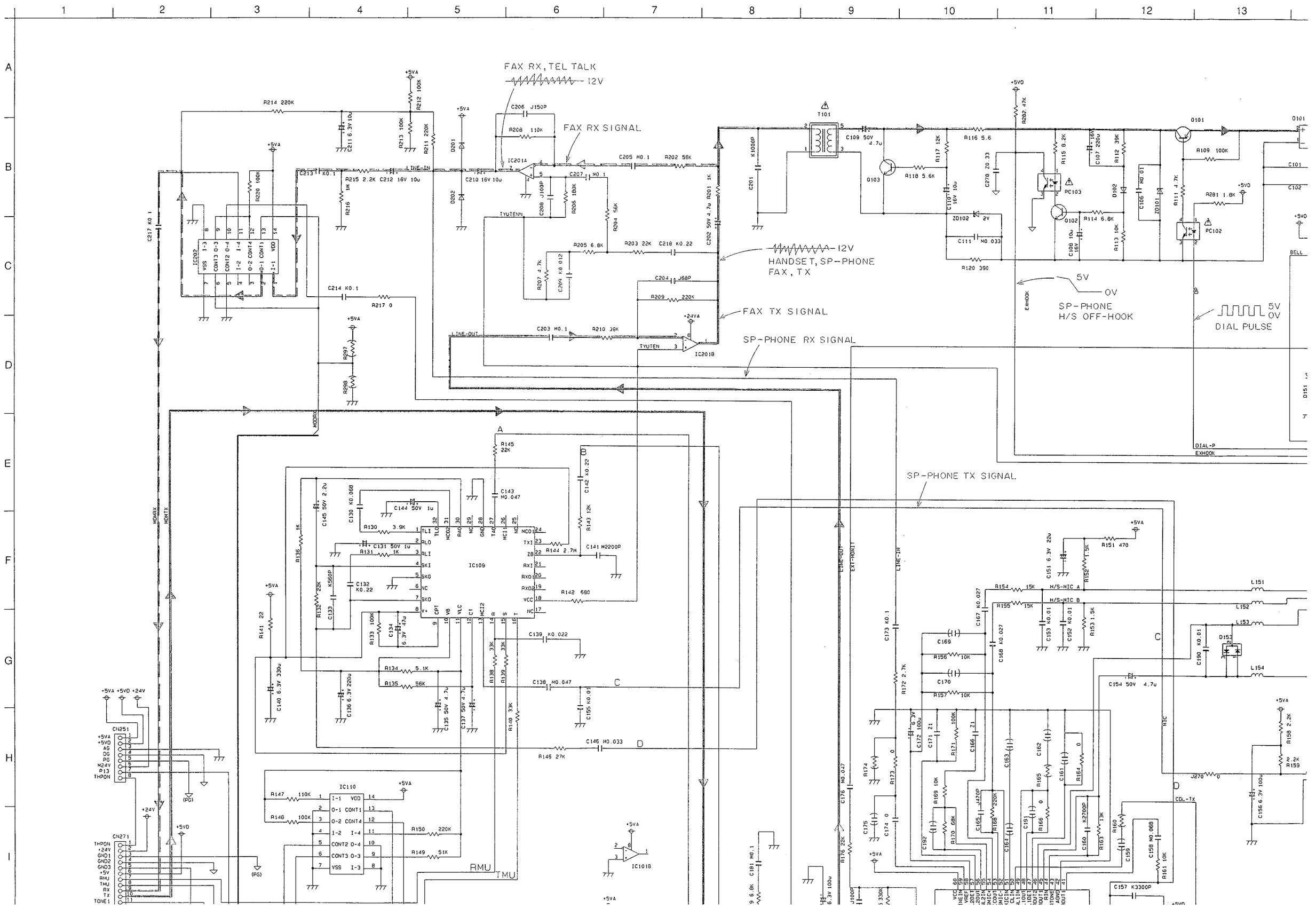
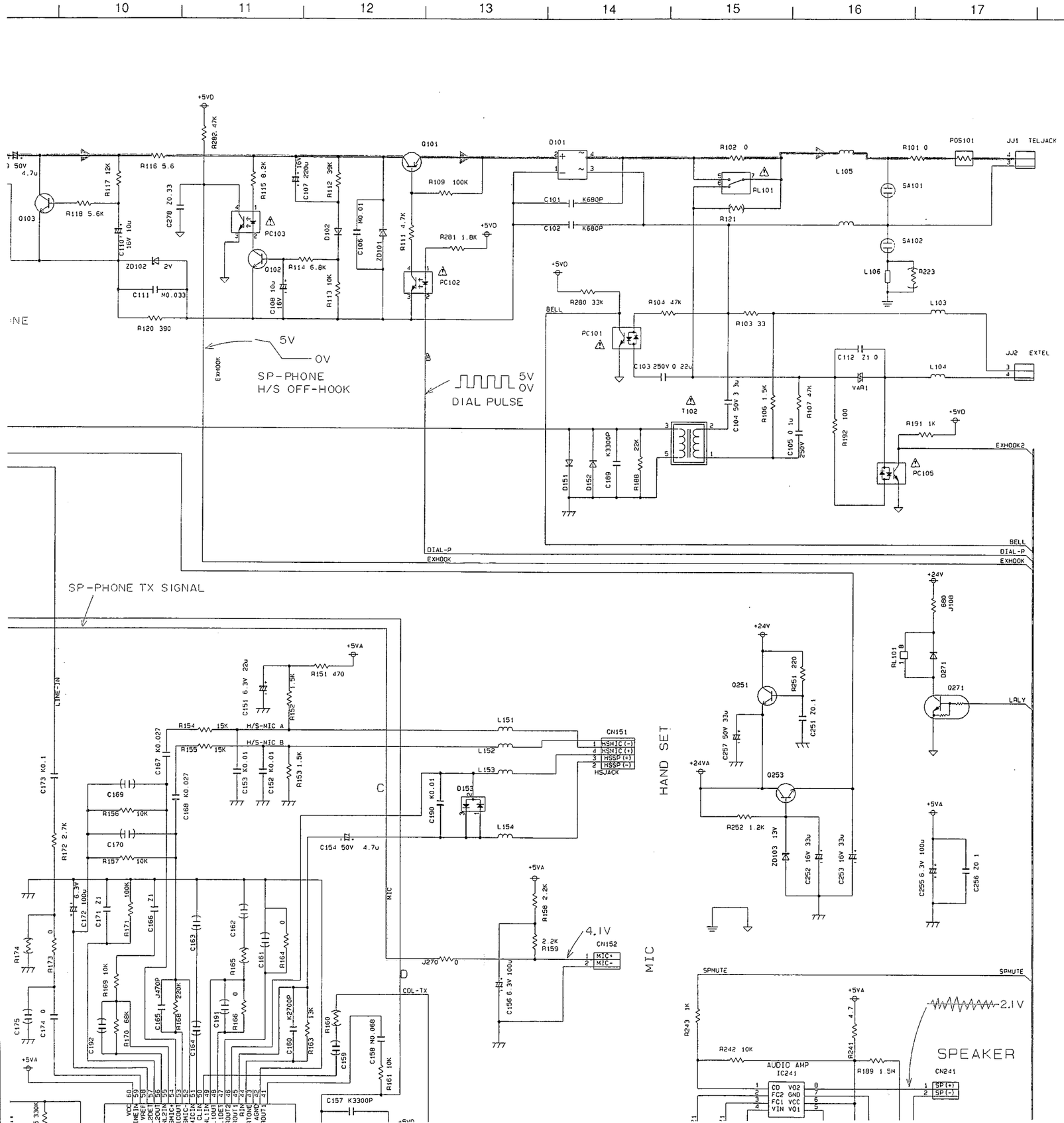
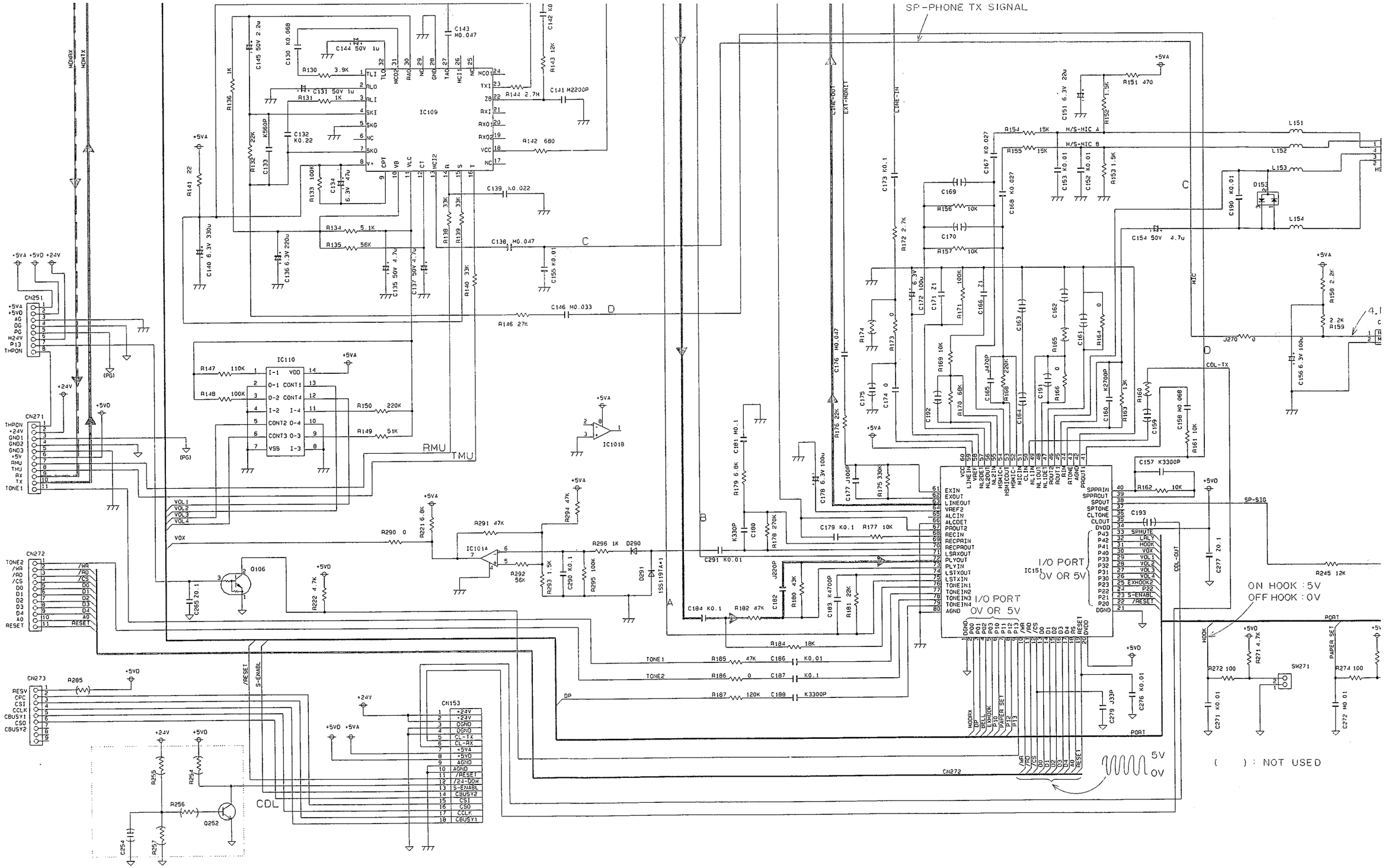
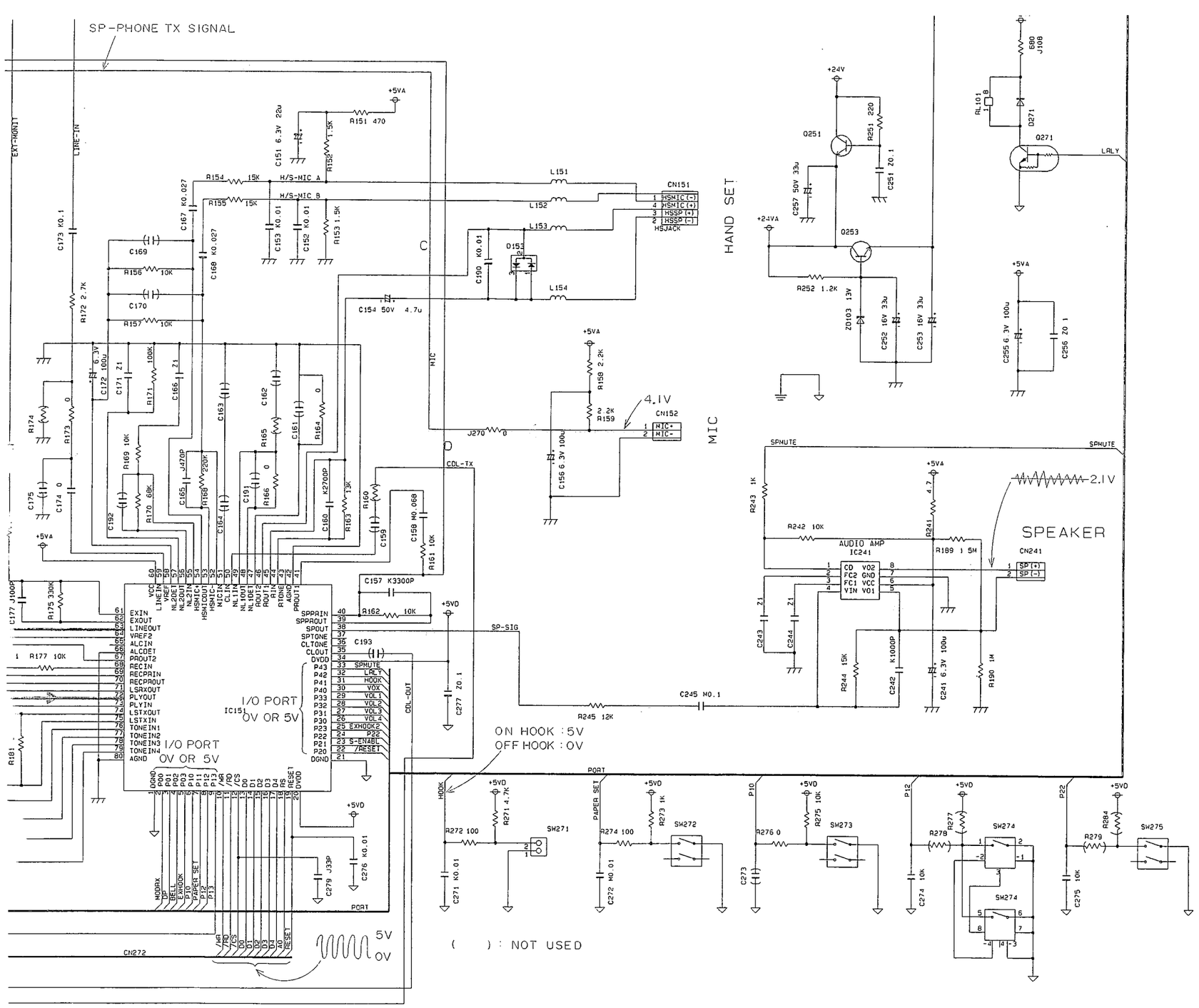


DIAGRAM (ANALOG CIRCUIT)

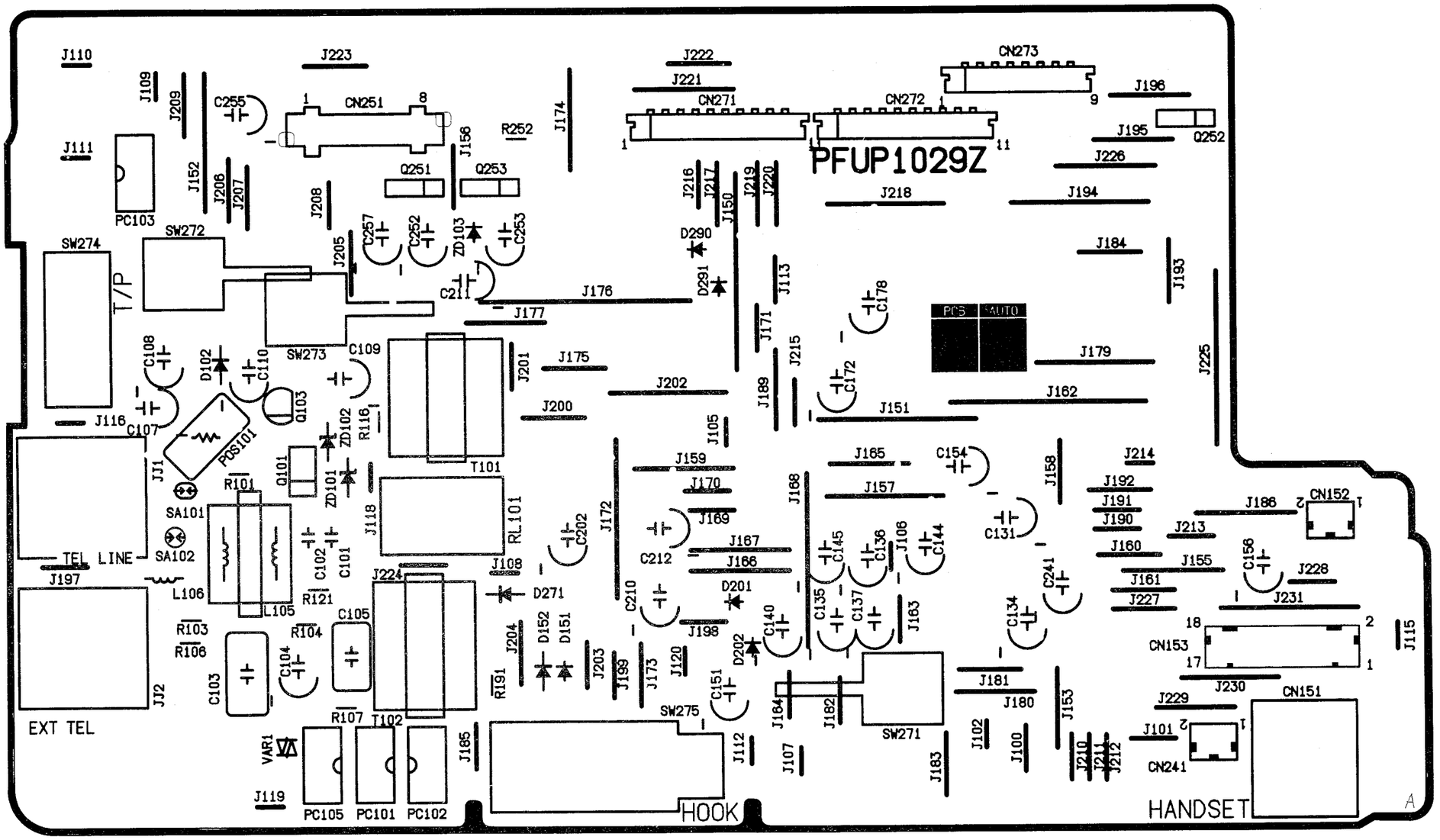



SP-PHONE TX SIGNAL
IC109
IC110
IC101A
IC101B
IC151
I/O PORT
0V OR 5V
CN251
CN271
CN272
CN273
CN153
RMU
TMU
CDL
COL-TX
COL-OUT
SP-SIG
MIC
ON HOOK : 5V
OFF HOOK : 0V
( ) : NOT USED
5V
0V


SP-PHONE TX SIGNAL
EXT-MONI
LINE-IN
HAND SET
MIC
H/S-MIC A
H/S-MIC B
CN151
HSJACK
CN152
4.1V
COL-TX
SP-SIG
SPMUTE
SPEAKER
2.1V
AUDIO AMP
IC241
CN241
I/O PORT
IC151
0V OR 5V
ON HOOK : 5V
OFF HOOK : 0V
PORT
CN272
5V
0V
( ) : NOT USED

PRINTED CIRCUIT BOARD (ANALOG BOARD)

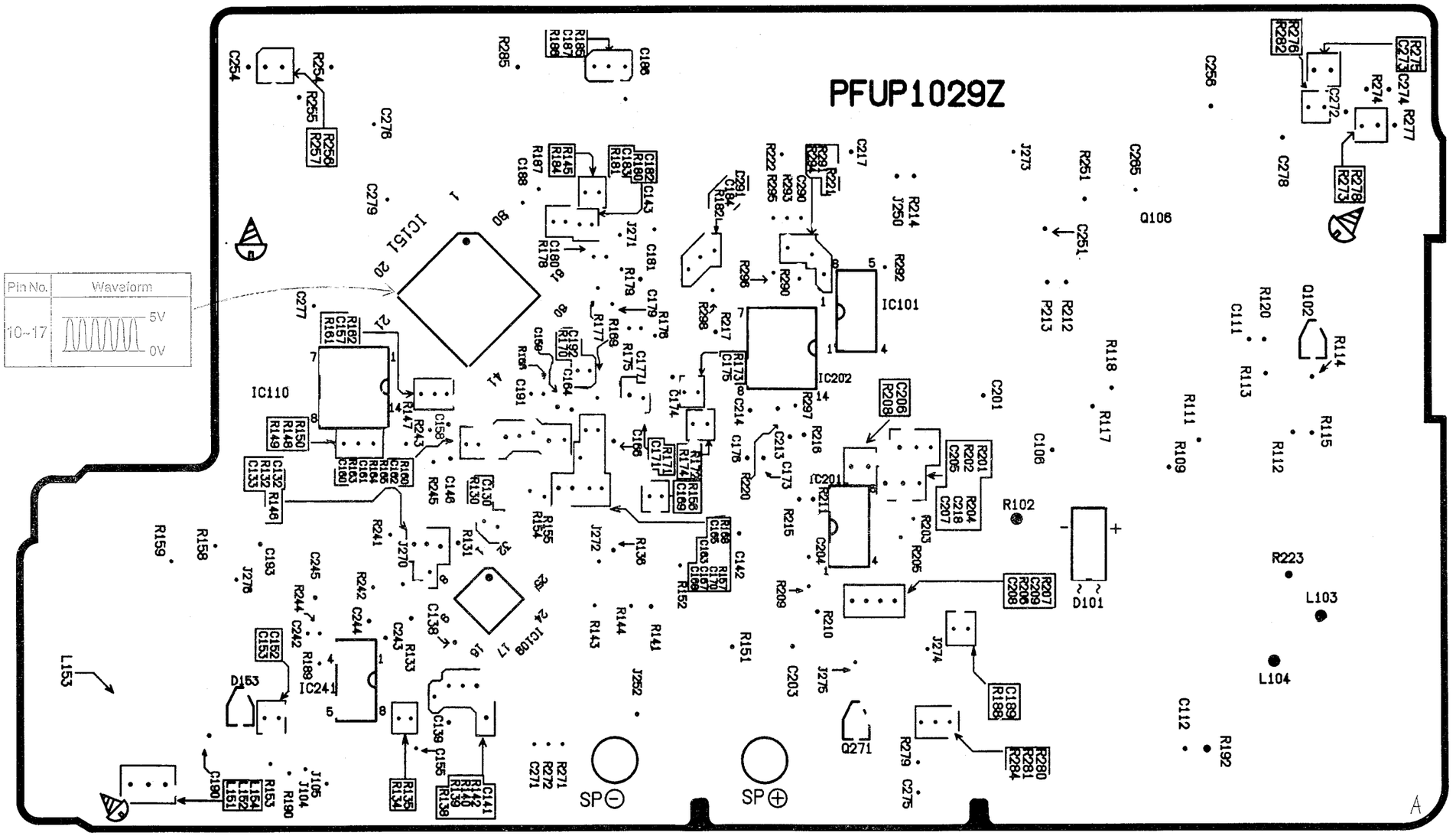
(COMPONENT VIEW)



PRINTED CIRCUIT BOARD (ANALOG BOARD)

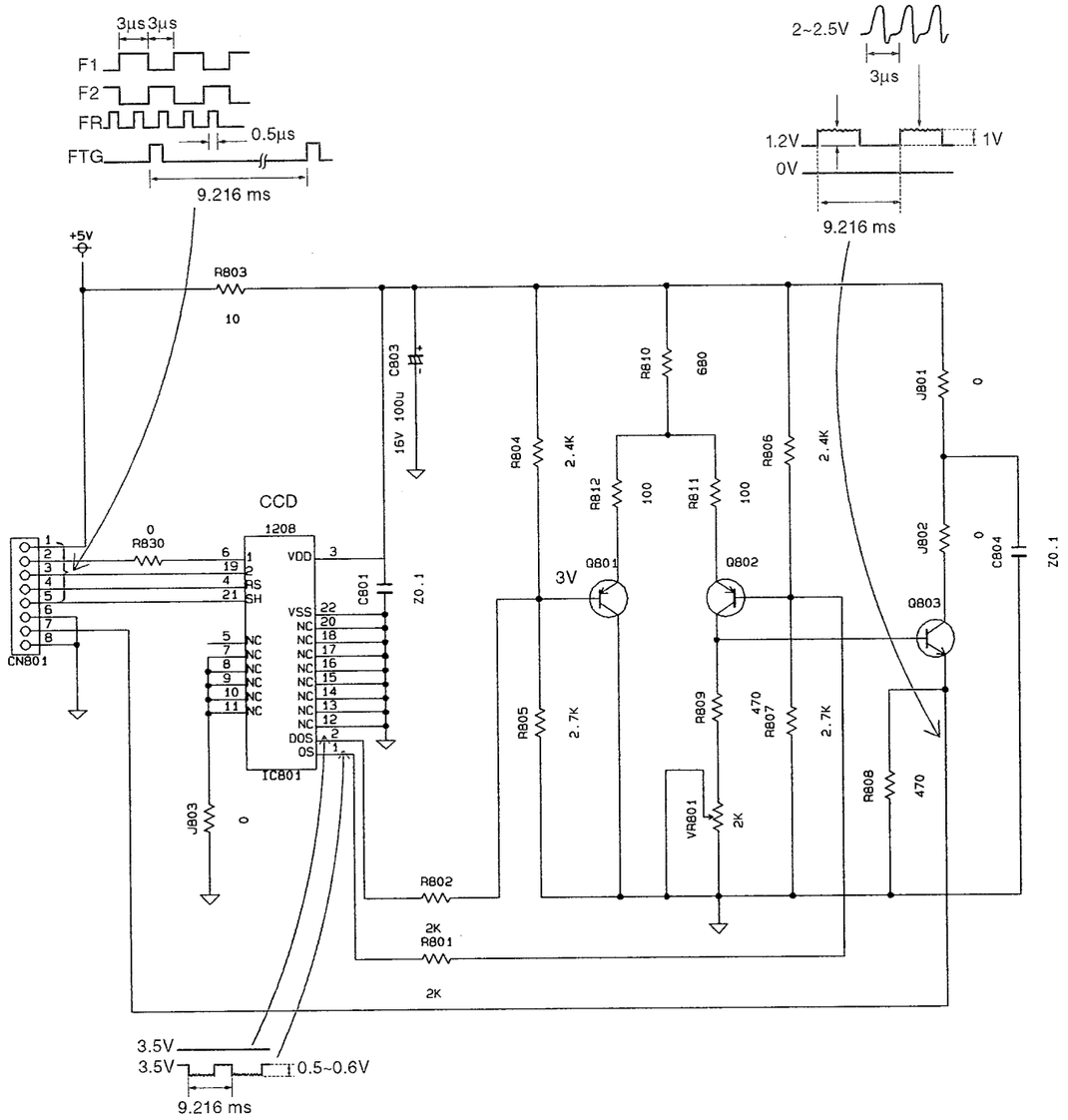
(BOTTOM VIEW)

Pin No.	Waveform
10~17	5V / 0V



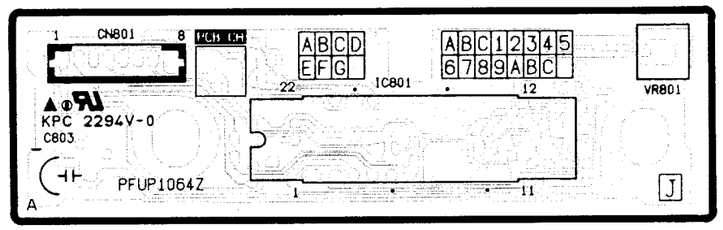
SCHEMATIC DIAGRAM AND PRINTED CIRCUIT BOARD (CCD)

CCD CIRCUIT

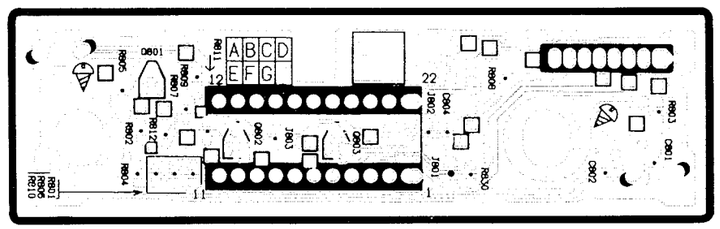


CCD BOARD

(COMPONENT VIEW)

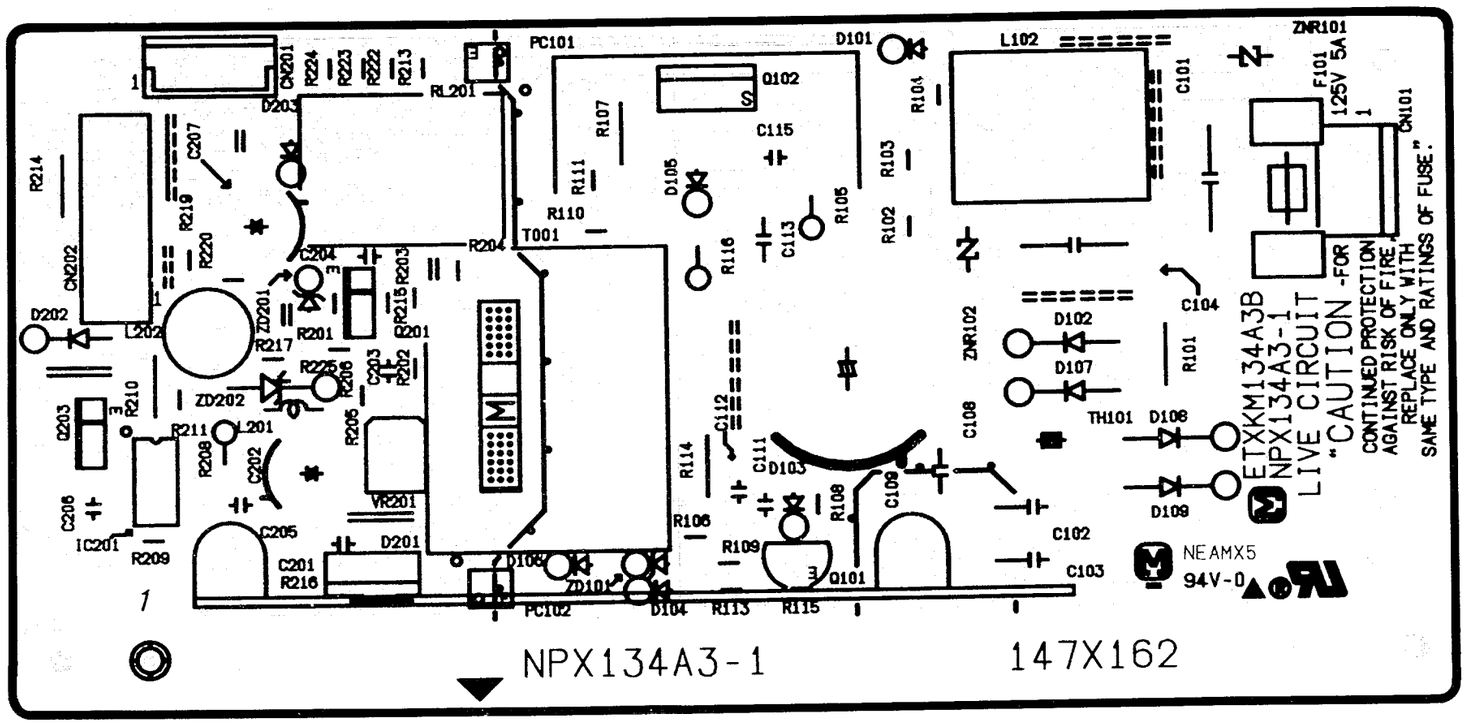


(BOTTOM VIEW)

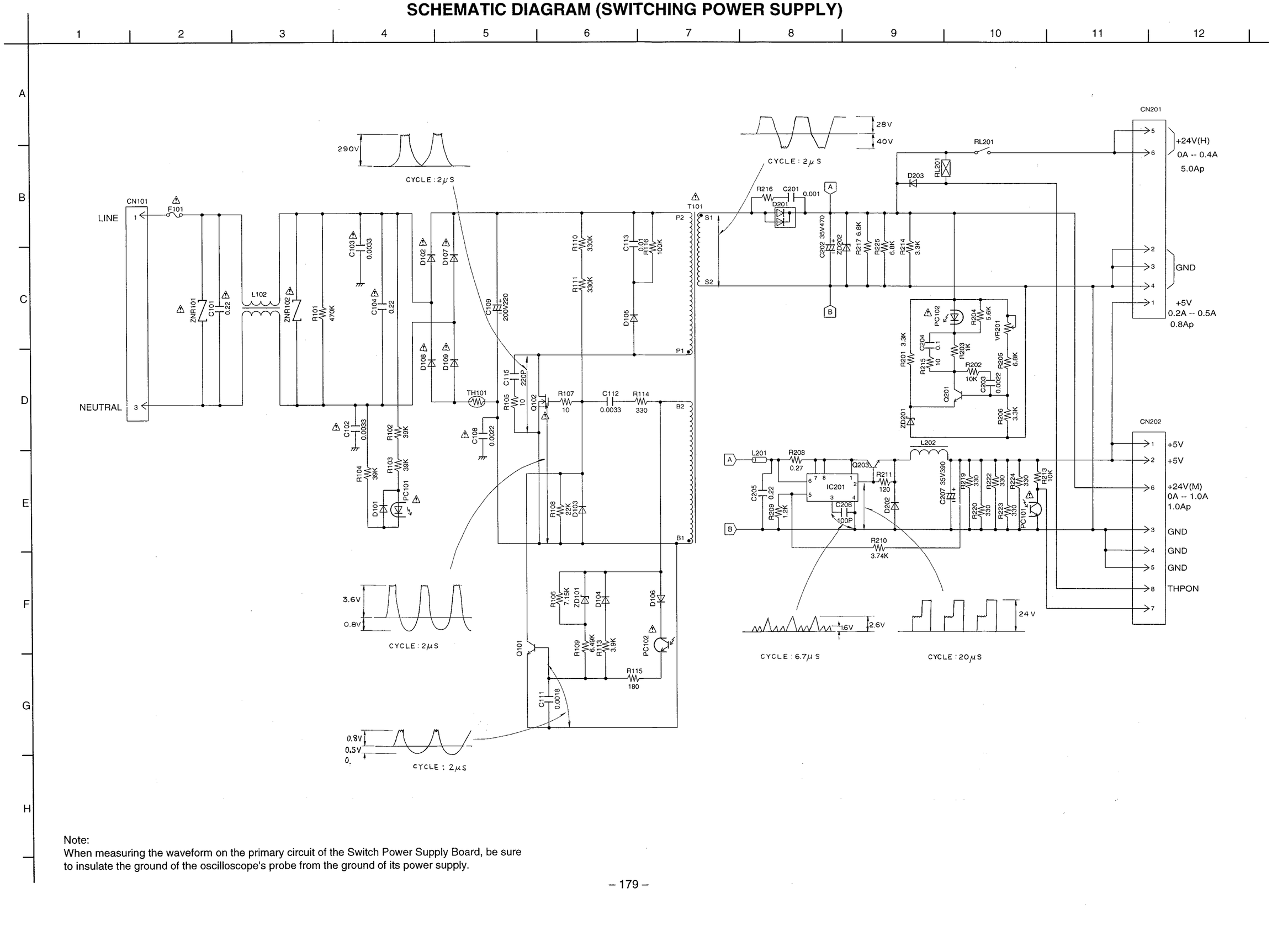


PRINTED CIRCUIT BOARD (SWITCHING POWER SUPPLY)

(COMPONENT VIEW)



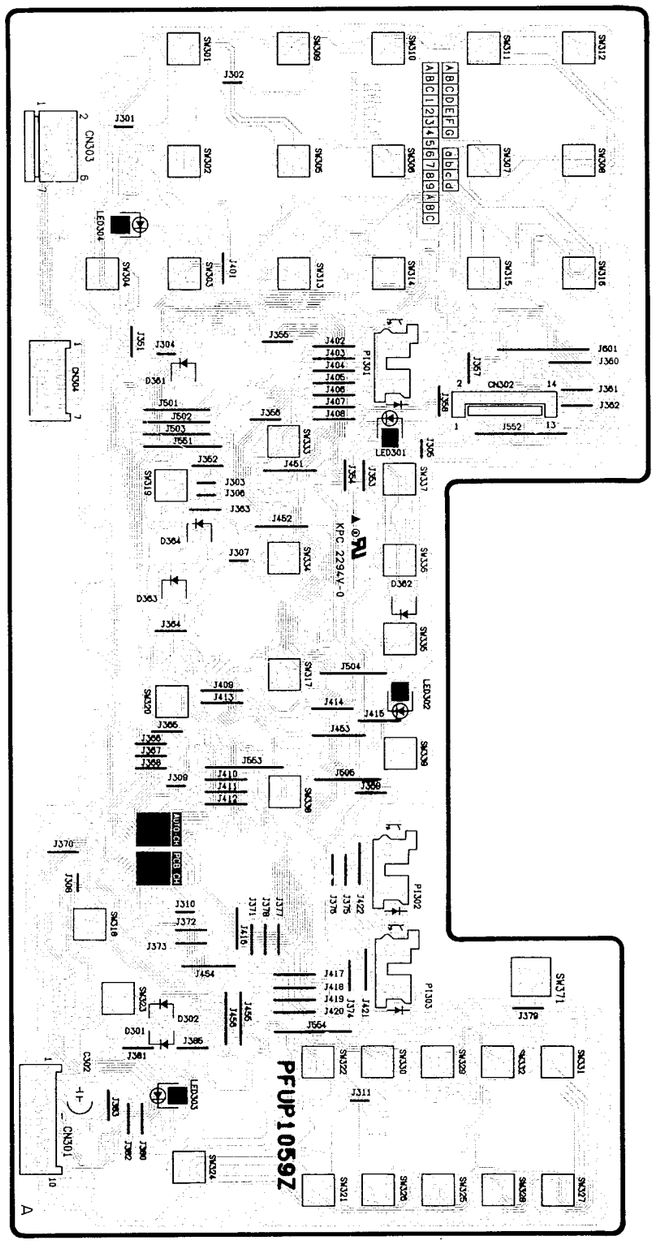
SCHEMATIC DIAGRAM (SWITCHING POWER SUPPLY)



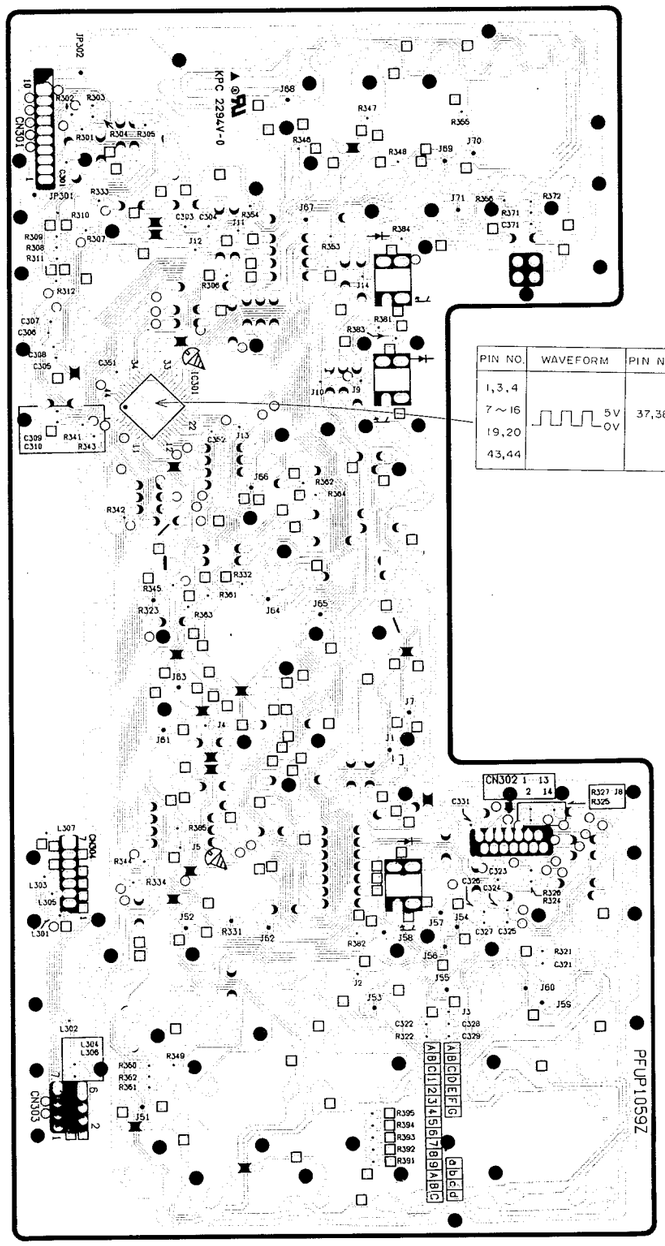
Note:
When measuring the waveform on the primary circuit of the Switch Power Supply Board, be sure to insulate the ground of the oscilloscope's probe from the ground of its power supply.

PRINTED CIRCUIT BOARD (OPERATION BOARD)

(COMPONENT VIEW)

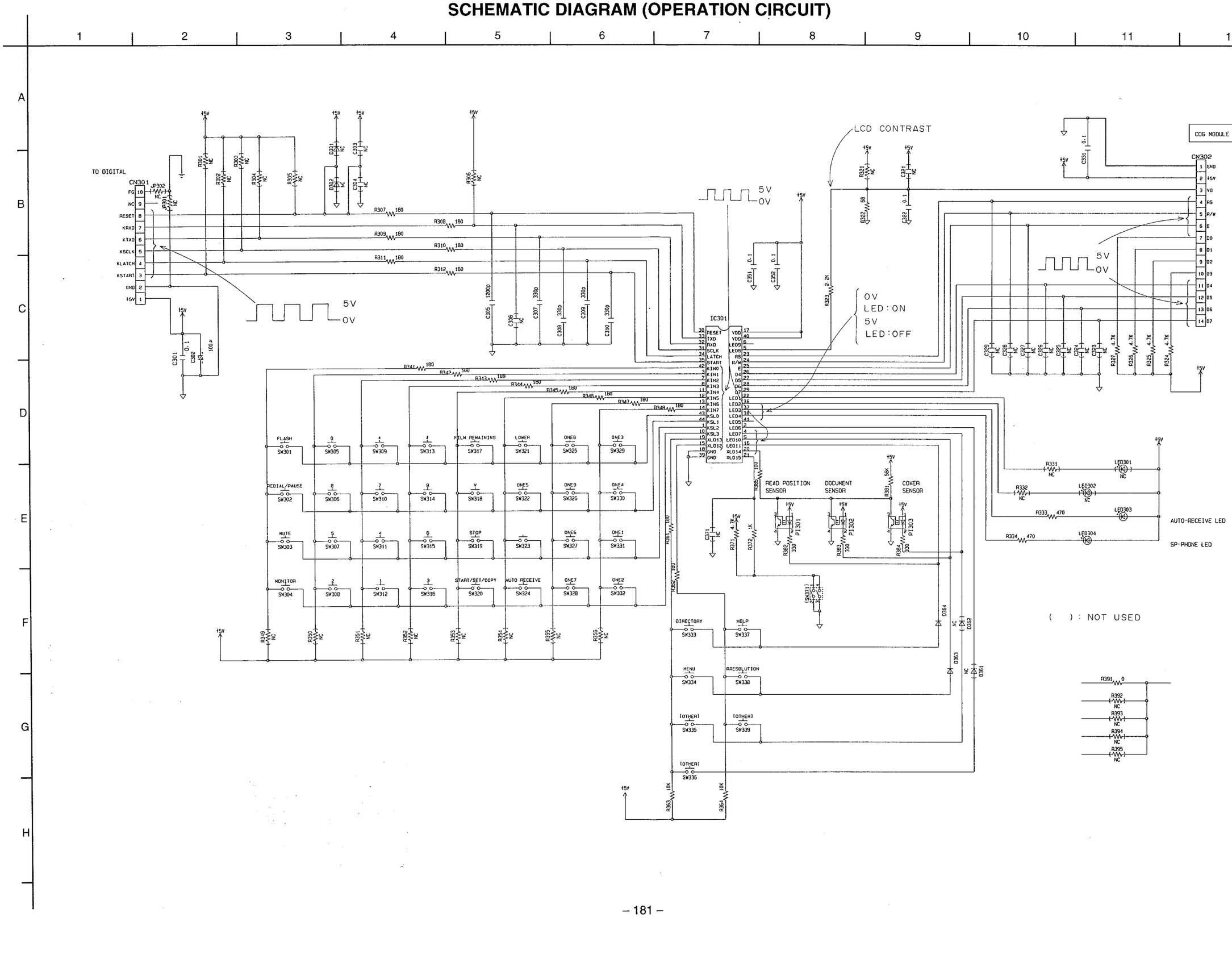


(BOTTOM VIEW)



PIN NO.	WAVEFORM	PIN NO.	VOLTAGE
1,3,4 7~16 19,20 43,44	5V 0V	37,38	LED ON : 0V LED OFF : 5V

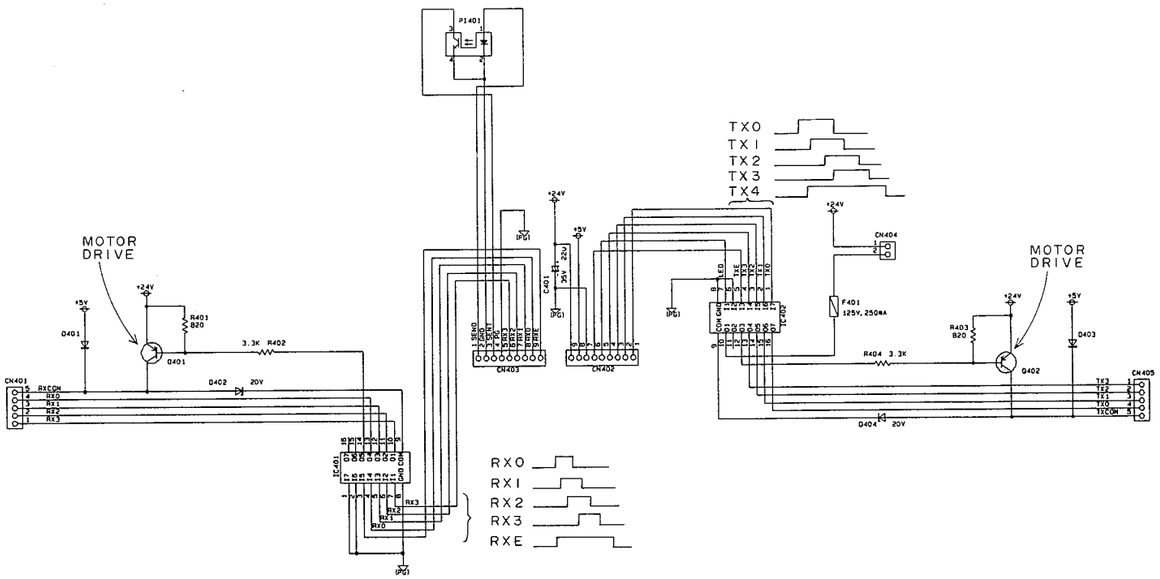
SCHEMATIC DIAGRAM (OPERATION CIRCUIT)



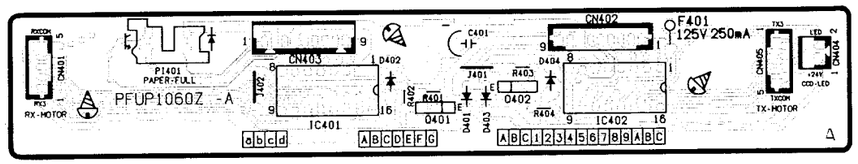
( ) : NOT USED

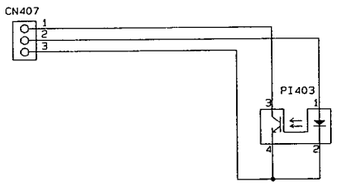
SCHEMATIC DIAGRAM/PRINTED CIRCUIT BOARD (SENSOR)

PAPER FULL SENSOR

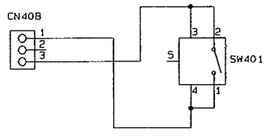


(COMPONENT VIEW)

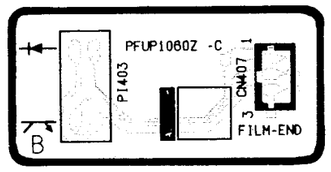


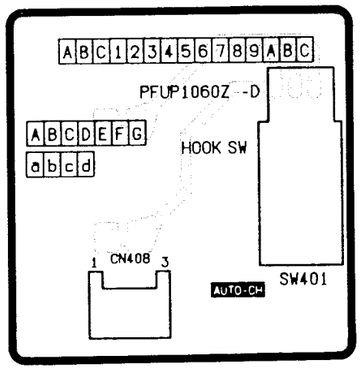


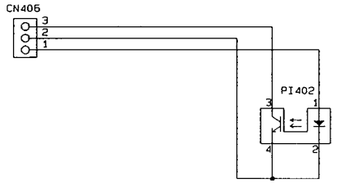
FILM END SENSOR



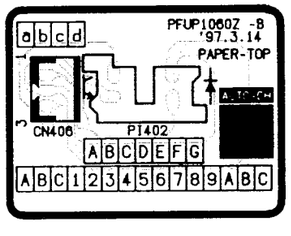
HOOK SWITCH



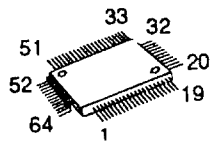
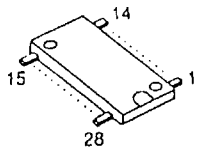
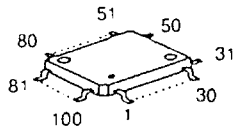
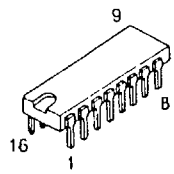
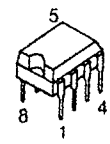
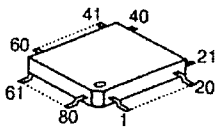
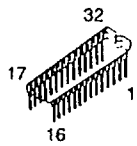
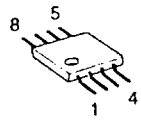
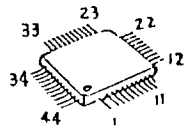
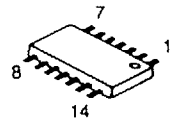
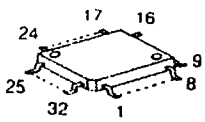
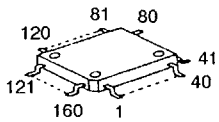
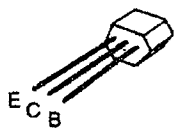
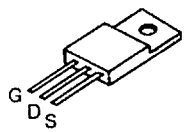
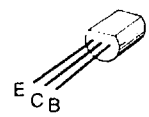
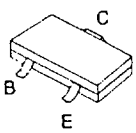
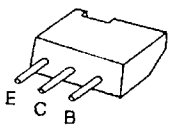
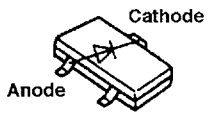
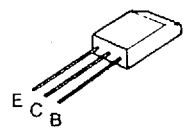
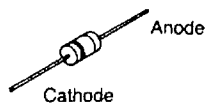
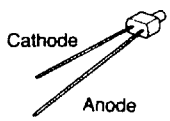
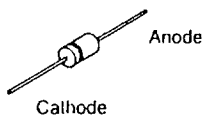
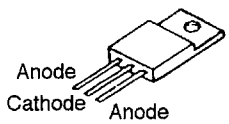
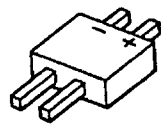
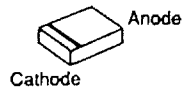
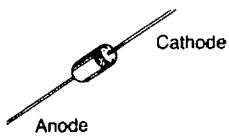
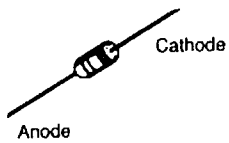




PAPER TOP SENSOR

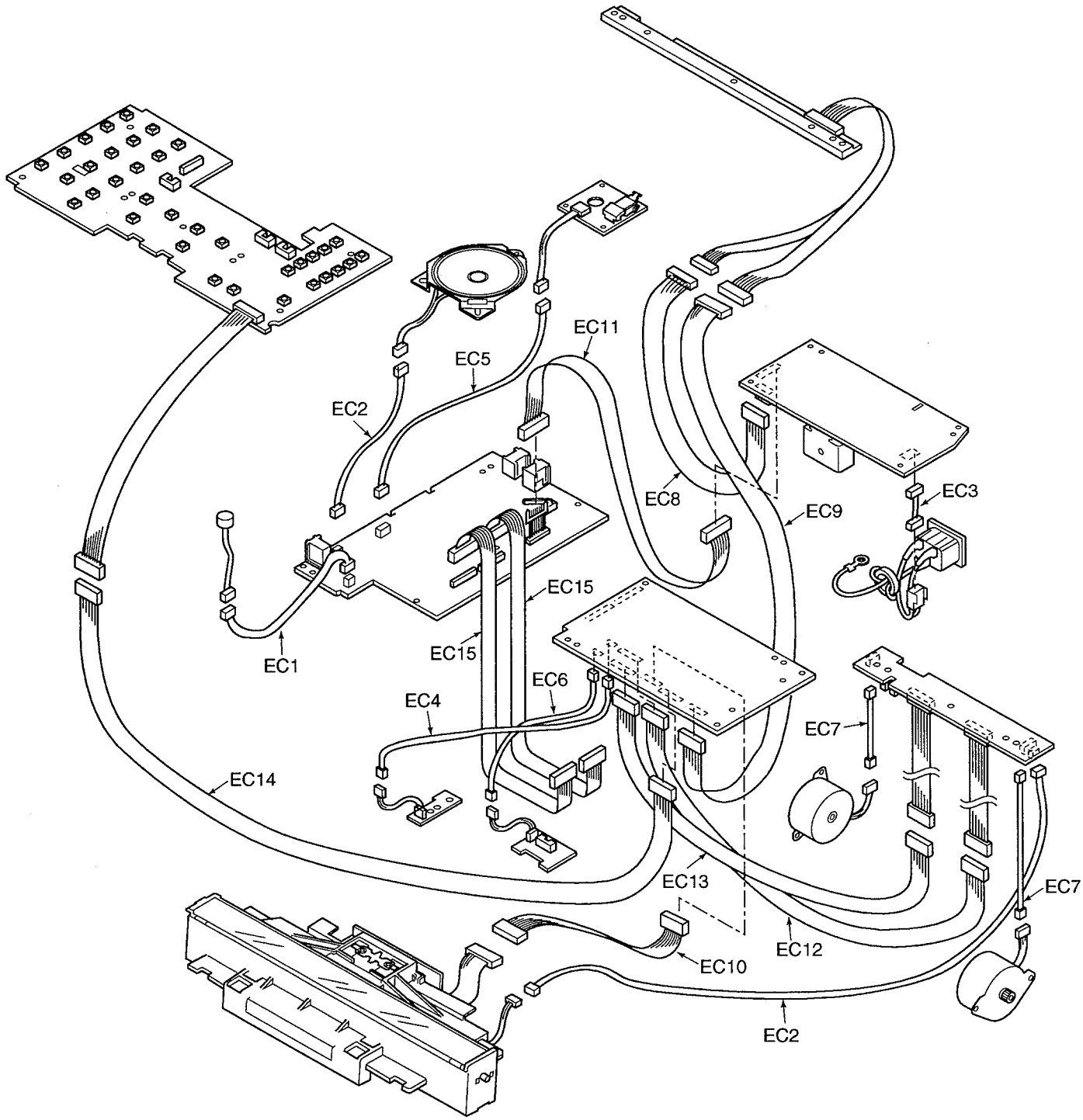


TERMINAL GUIDE OF IC'S TRANSISTORS ANS DIODES

 PFVI96031FKG	 PFVIM4480CF PQVICX58257C	 PQVIR96DFXL	 PQVIBA12003	 PQVIKA34063A
 AN6116FAQ	 PFWIFP200M	 PQVINJM2113M PQVINJM4558M PQVINJM2903M PQVIMM1245BF	 MN53007QAF	 PQVITC4066BF
 PQVIS79164FU	 PFVIM66379FP	 2SC1740S, 2SC3311	 2SK2237	 2SC5029Y, 2SC2235 2SD1302
 PFVTMUN5232 PQVTDTC114EU PQVTDTC141ZU 2SB1197K, 2SB1218A, 2SD1819A	 2SB1322, 2SD1921Q	 MA141WK	 2SA1627	 MA2270B, MA4130L MA7200, 1SS147
 PQVDR325CA47	 PQVDERA81004 PQVDERA1506 PQVDERA2208 MA165	 MA6D50	 PQVDS1ZB40F1	 MA143
 MA4180 1SS119, 1SS131	 PQVDHZS2B1 MA4047, MA4062			

MEMO

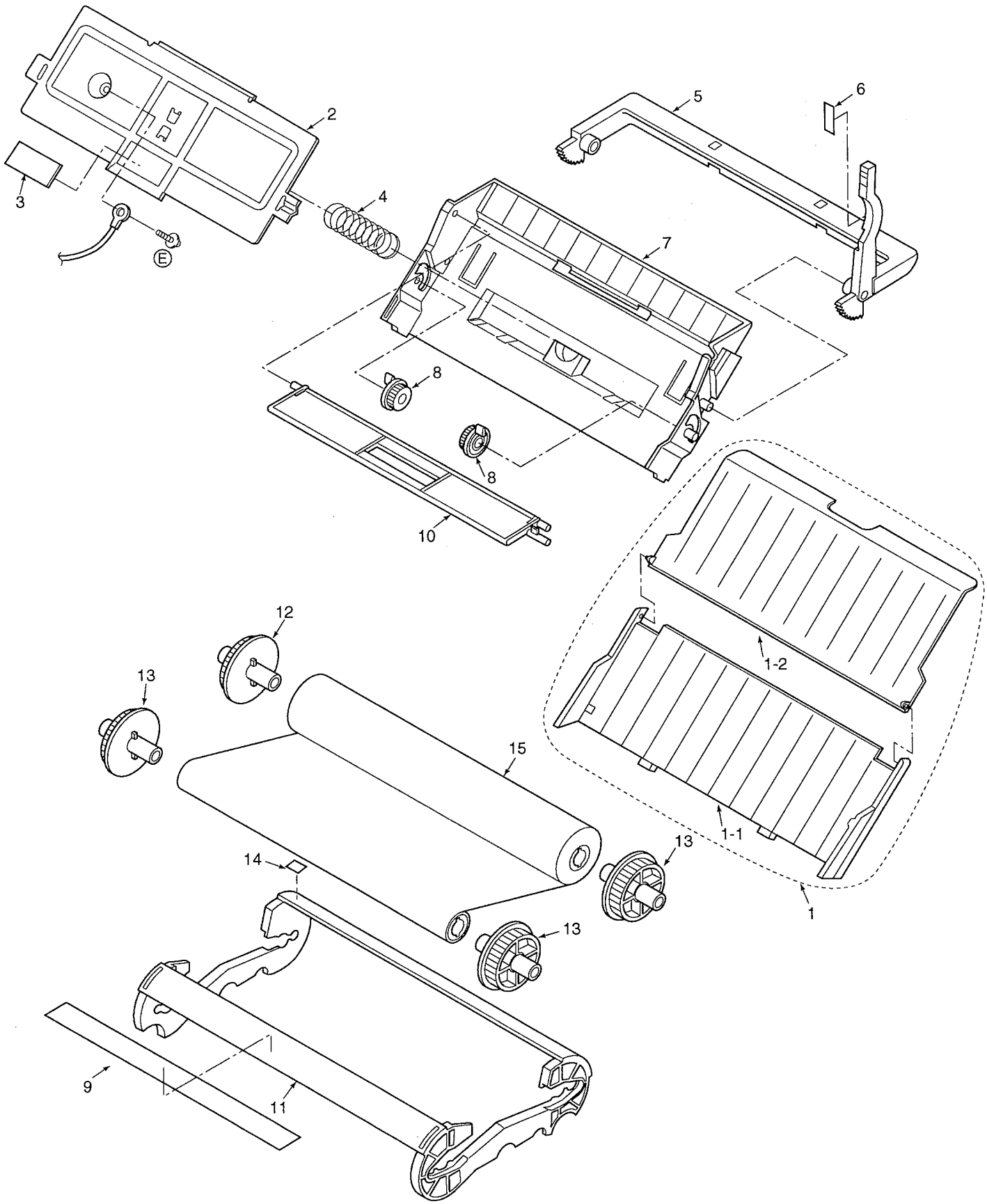
FIXTURES AND TOOLS



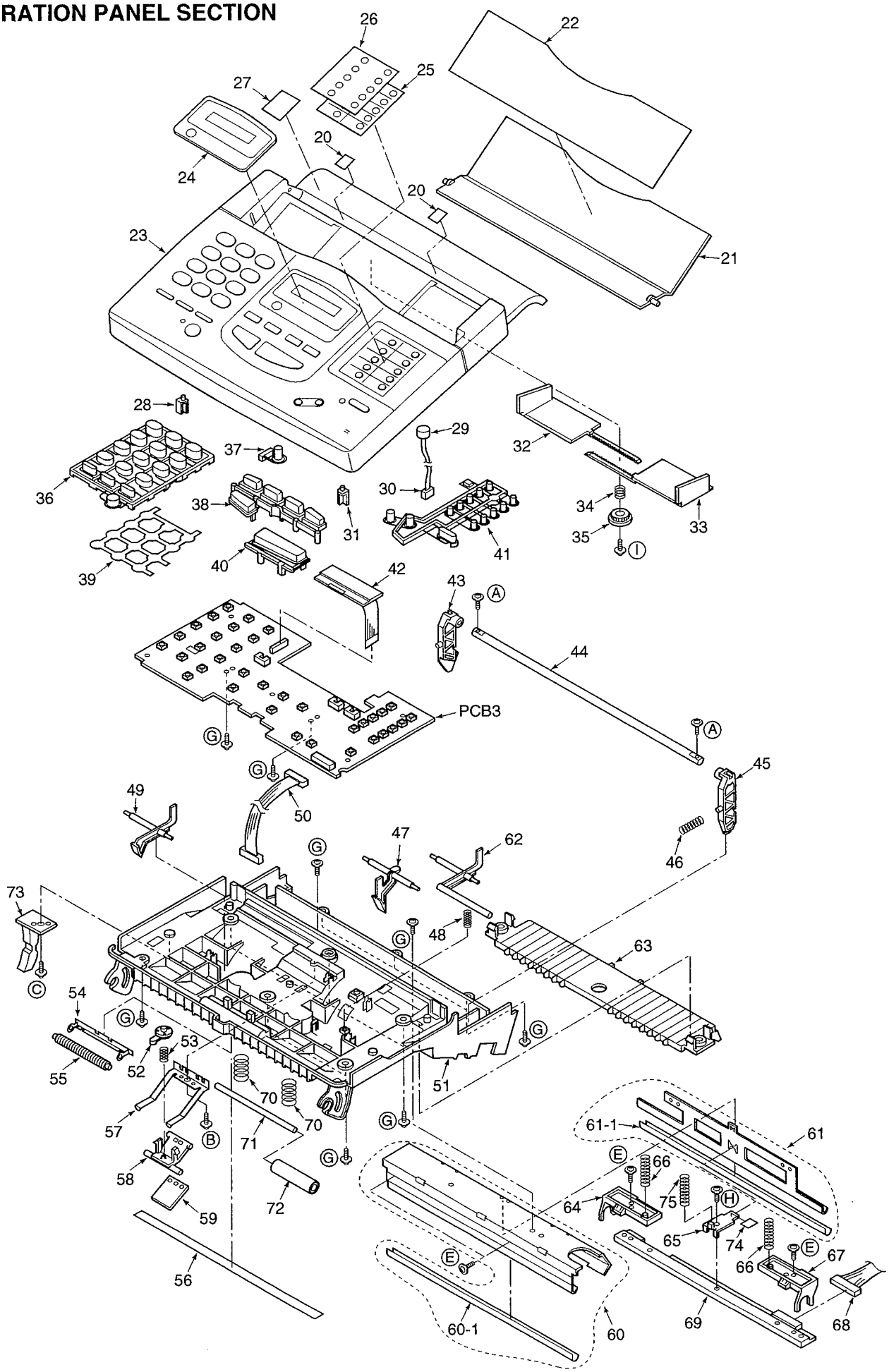
KX-FP200

CABINET, MECHANICAL AND ELECTRICAL PARTS LOCATION

1. PAPER CASSETTE SECTION

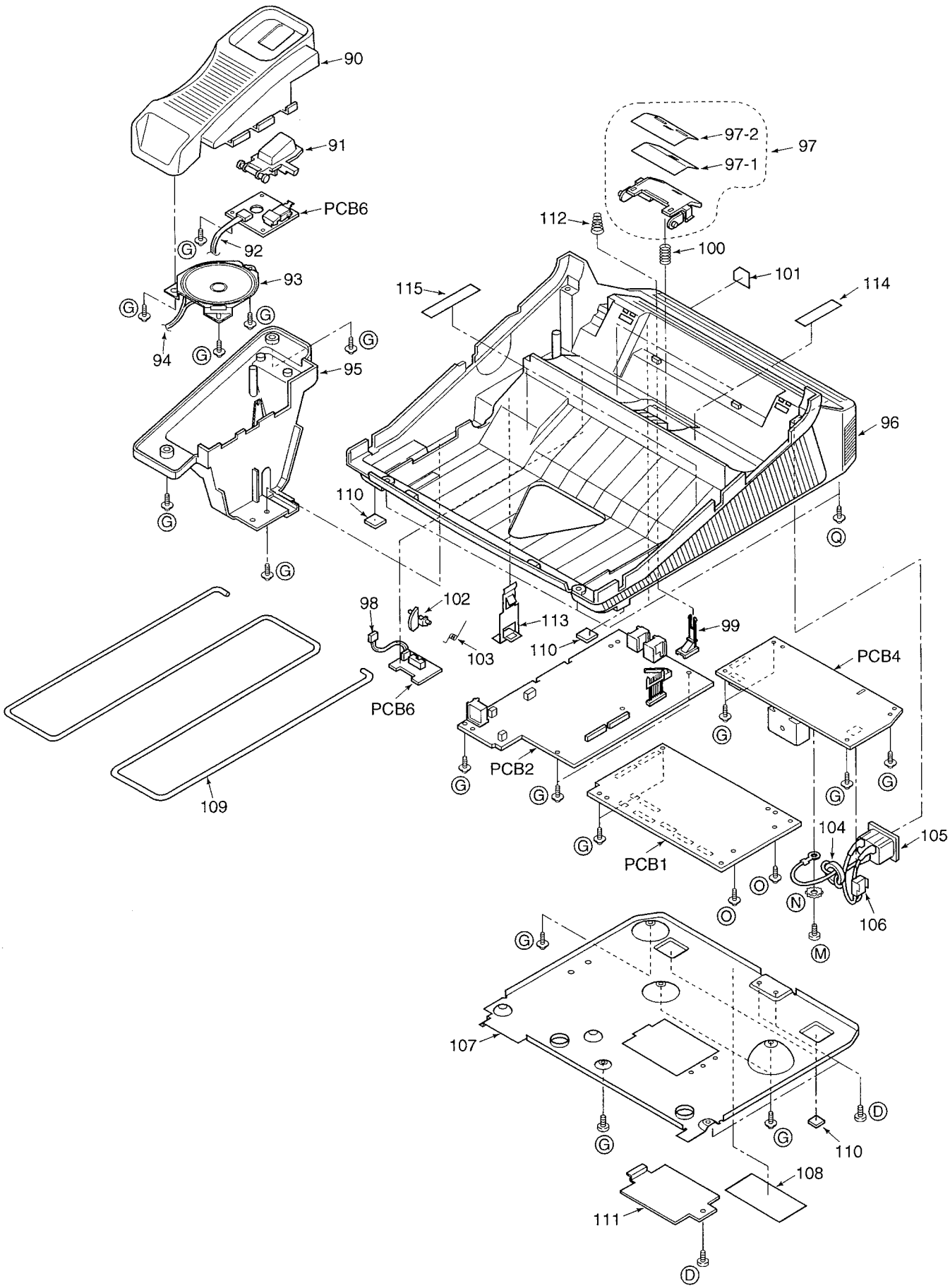


2. OPERATION PANEL SECTION

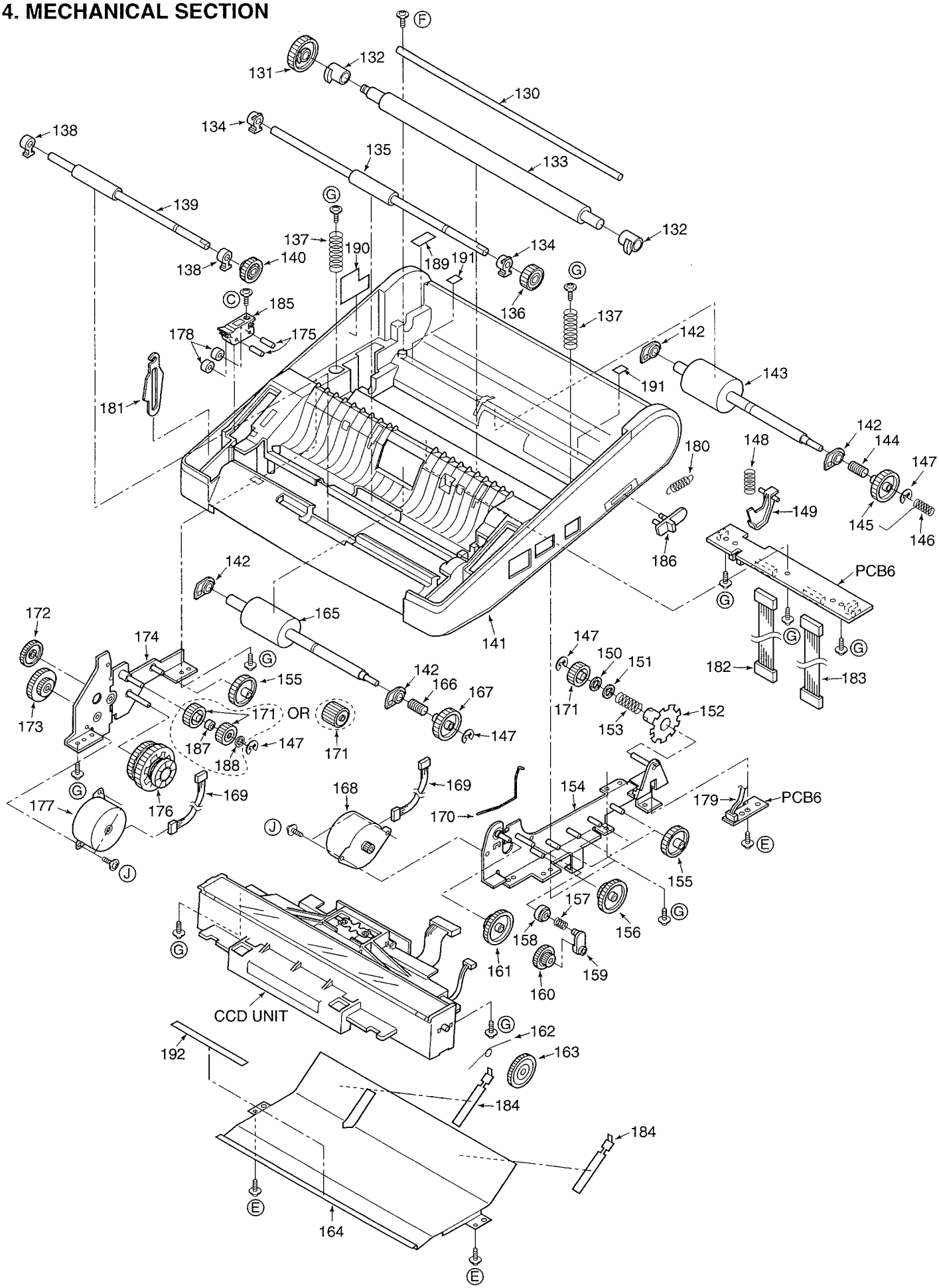


KX-FP200

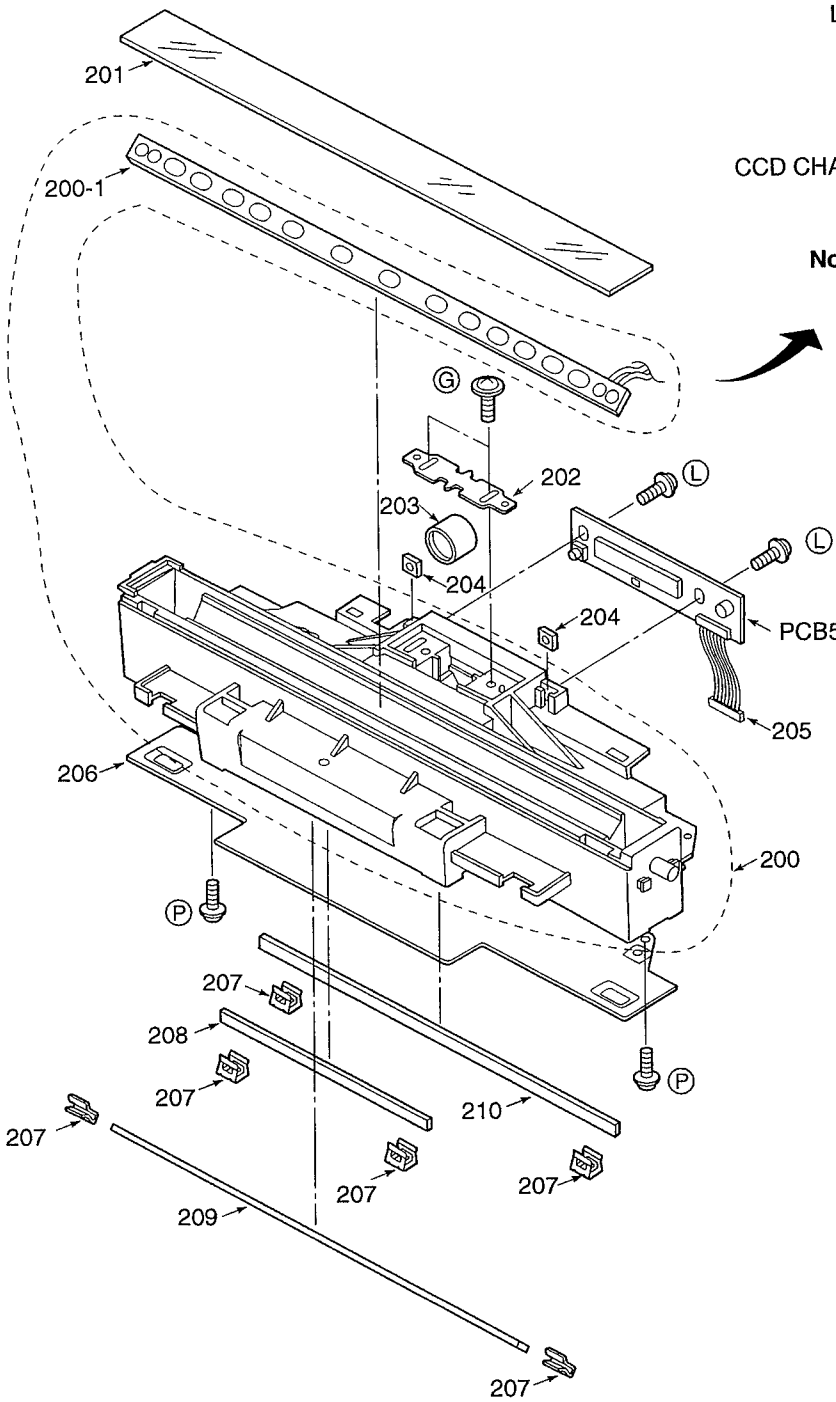
3. UPPER CABINET/P.C.B. SECTION

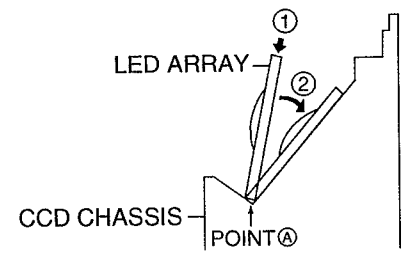


4. MECHANICAL SECTION



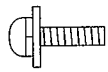
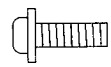
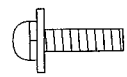
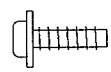
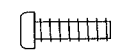
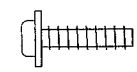
5. CCD UNIT SECTION



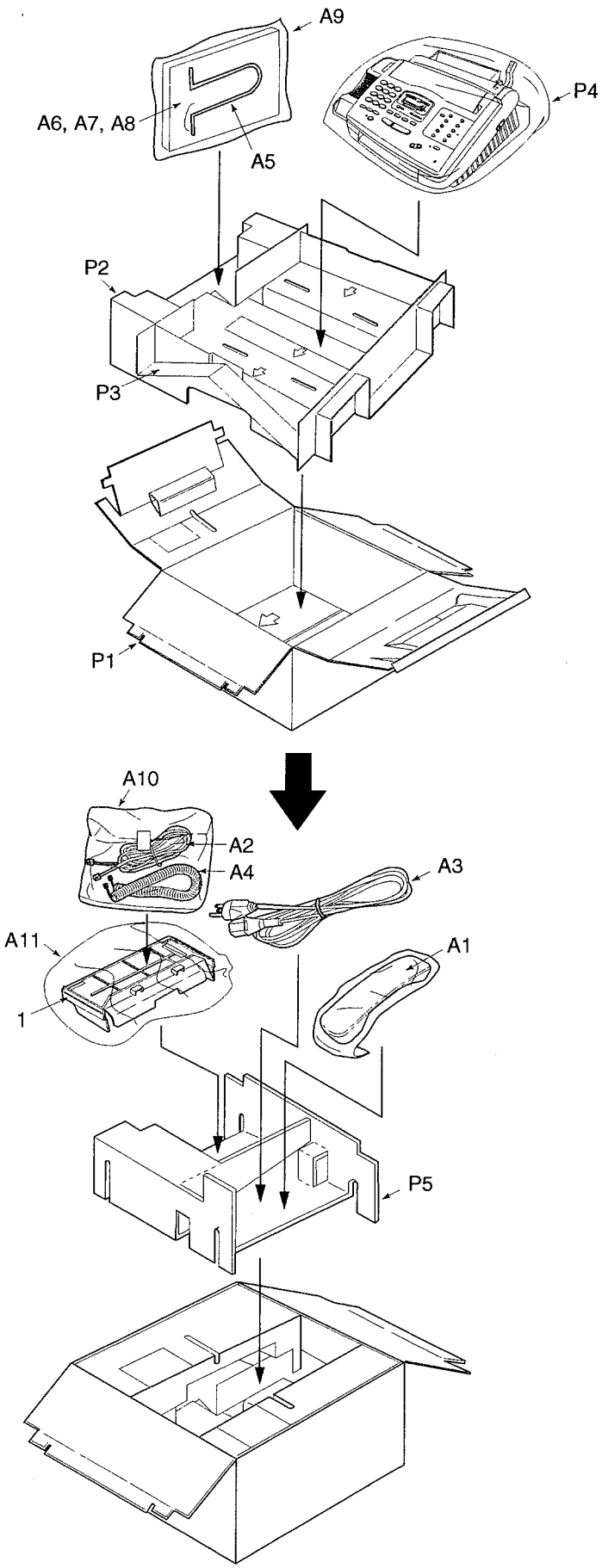


Note: Place the LED Array in the center of pointⒶ as shown above.

6. ACTUAL SIZE OF SCREWS AND WASHER

Ref. No.	Part No.	Figure	Ref. No.	Part No.	Figure
Ⓐ	XYN3+F8		Ⓘ	XTW3+W6P	
Ⓑ	XTW3+S6PR		Ⓙ	XTW3+6L	
Ⓒ	XTW3+S8PFZ		Ⓚ	XTW3+U10L	
Ⓓ	XTW3+U6LFZ		Ⓛ	XYN3+F10	
Ⓔ	XTW3+U6L		Ⓜ	XSB4+6	
Ⓕ	XTW3+W8P		Ⓝ	XWC4B	
Ⓖ	XTW3+S10P		Ⓞ	XTW3+U6LR	
Ⓗ	XTW3+5LR		Ⓟ	XTB3+10G	
			Ⓠ	XTW3+S12P	

ACCESSORIES AND PACKING MATERIALS



This replacement parts list is for U.S.A. only. Refer to the simplified manual (cover) for other areas.

REPLACEMENT PARTS LIST

Model KX-FP200

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retention period of availability is dependent on the type of assembly, and in accordance with the laws governing part and product retention. After the end of this period, the assembly will no longer be available.
2. Important safety notice.
   Components identified by the ⚠ mark special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
3. The S mark indicates service standard parts and may differ from production parts.
4. RESISTORS & CAPACITORS
   Unless otherwise specified.
   All resistors are in ohms (Ω) k=1000Ω, M=1000kΩ
   All capacitors are in MICRO FARADS(μF) P= μμF
   *Type &Wattage of Resistor

Type

ERC:Solid	ERX:Metal Film	PQRD:Carbon
ERD:Carbon	ERG:Metal Oxide	PQRQ:Fuse
PQ4R:Chip	ERO:Metal Film	ERF:Wire Wound

Wattage

10,16,18:1/8W	14,25,S2:1/4W	12,50,S1:1/2W	1:1W	2:2W	5:5W

ECFD:Semi-Conductor	ECCD,ECKD,PQCBC,PQVP : Ceramic
ECQS:Styrol	ECQM,ECQV,ECQE,ECQU,ECQB : Polyester
PQCBX,ECUV:Chip	ECEA,ECSZ,ECOS : Electrolytic
ECMS:Mica	ECQP : Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	OF:3.15V	OJ :6.3V	1V :35V
2A:100V	1:100V	1A:10V	1A :10V	50,1H:50V
2E:250V	2:200V	1V:35V	1C :16V	1J :63V
2H:500V		OJ:6.3V	1E,25:25V	2A :100V

Ref. No.	Part No.	Part Name & Description		Pcs
		CABINET AND ELECTRICAL PARTS		
		(1. PAPER CASSETTE SECTION)		
1	PFYEFP200M	PAPER TRAY		1
1-1	PFYE2FP200M	SUB PAPER TRAY		1
1-2	PFKS1013Z1	TRAY		1
2	PFMD1019Z	COVER, PAPER CASSETTE		1
3	PFHG1032Z	RUBBER PARTS, CASSETTE SEP.		1
4	PFUS1087Z	SPRING		1
5	PFDE1041Z1	LEVER, CASSETTE LOCK		1
6	PFQT1259Z	INDICATION LABEL		1
7	PFKS1011Z1	PAPER CASSETTE	S	1
8	PFDG1034Z	GEAR		2
9	PFQT1258Y	INDICATION LABEL		1
10	PFKK1004Z	SHUTTER		1
11	PFHR1043Z1	RIBBON CASSETTE		1
12	PFDG1038Z1	GEAR		1
13	PFDG1037Z	GEAR		3
14	PFQT1221Z	INDICATION LABEL		2
15	PFPE1031Z	INK FILM (20m)		1
		(2. OPERATION PANEL SECTION)		
20	PFHX1148Z	SHEET, VIBRATION		2
21	PFKS1010Y1	TRAY, DOCUMENT		1
22	PFQT1260Y	INDICATION LABEL		1
23	PFGG1012Z1	OPERATION PANEL	S	1
24	PFGP1037Z	PANEL		1
25	PFGD1012Z	TEL. NO. CARD		1
26	PFGV1003Z	TRANSPARENT PLATE		1
27	PQQT11004Z	INDICATION LABEL		1
28	PFGP1038Z	COVER, LED		1
29	PQJM128Z	MICROPHONE		1
30	PFJS02R53Z	CONNECTOR, 2P		1
31	PFGP1036Z	COVER, LED		1
32	PFKR1006Z1	DOCUMENT GUIDE-L		1
33	PFKR1007Z1	DOCUMENT GUIDE-R		1
34	PFUS1034Z	SPRING		1
35	PFDG1002Z	GEAR		1
36	PFBX1023Z1	BUTTON, DIAL		1
37	PFBX1024Z1	BUTTON, HELP		1
38	PFBX1022Z1	BUTTON, STOP etc.		1
39	PFHG1033Z	RUBBER PARTS,DUMMY SHEET		1
40	PFBC1008Z1	BUTTON, START		1
41	PFBX1025Z1	BUTTON, ONE TOUCH		1
42	PFAV161C16TR	LIQUID CRYSTAL DISPLAY		1
43	PFDE1037Z	LEVER, LOCK		1
44	PFDF1016Z	SHAFT		1
45	PFDE1038Z	LEVER, LOCK		1
46	PFUS1080Z	SPRING		1
47	PFDE1019Z	LEVER, DOCUMENT DETECTION		1
48	PFUS1027Z	SPRING		1
49	PFDE1020Z	LEVER, READ DETECTION		1
50	PFJS10R47Z	CONNECTOR, 10P		1
51	PFUV1007Y	COVER, OPERATION PANEL		1
52	PFHR1019Z	LEVER, ADJUST		1
53	PFUS1084Z	SPRING		1
54	PFUS1026Y	SPRING		1
55	PQDR10005Z	ROLLER		1
56	PFHX1081Z	SHEET, READING		1
57	PFUS1082Z	SPRING		1
58	PFHR1042Z	GUIDE, SEPARATION RUBBER		1
59	PFHG1020Z	RUBBER PARTS, SEPARATION		1
60	PFZU1FP200M	HEAD FRAME ASS'Y		1
60-1	PFHX1115Z	SHEET, RIBBON GUIDE		1
61	PFZU2FP200M	ANGLE ASS'Y		1
61-1	PFHX1115Z	SHEET, RIBBON GUIDE		1
62	PFDE1043Z	LEVER, SENSOR		1
63	PFKF1009Z1	SUB CABINET, OPERATION		1
64	PFDE1034Z	GUIDE-L		1
65	PFMH1038Z	ANGLE		1
66	PFUS1083Z	SPRING		2
67	PFDE1035Z	GUIDE-R		1
68	PFJS15R48Y	CONNECTOR, 15P		1
69	PFJHS008Z	THERMAL HEAD		1
70	PFUS1025Z	SPRING		2
71	PFDF1005Z	SHAFT		1
72	PQDR9685Z	ROLLER, SUPPORT		1
73	PFHR1047Y	ARM-L		1
74	PFHX1154Z	SHEET		1
75	PFUS1088Z	SPRING		1
		(3. UPPER CABINET/P.C.B. SECTION)		
90	PFKM1014Y1	HANDSET CRADLE, UPPER	S	1
91	PFBH1004Z1	BUTTON, HOOK		1
92	PFJS03R49Z	CONNECTOR, 3P		1
93	PQAS5P13Y	SPEAKER		1
94	PFJS02R54Z	CONNECTOR, 2P		1
95	PFKM1015Z1	HANDSET CRADLE, LOWER		1
96	PFKF1008Z1	UPPER CABINET		1
97	PFZEFP200M	GUIDE, SEPARATION RUBBER		1
97-1	PFHG1031Z	RUBBER PARTS, P. SEPARATION		1
97-2	PFHX1114Z	SEPARATION SHEET		1
98	PFJS03R52Z	CONNECTOR, 3P		1

KX-FP200

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Ref. No.	Part No.	Part Name & Description		Pcs
99	PFDE1042Z	LEVER, SENSOR		1
100	PFUS1068Z	SPRING		1
101	PQHX10155Z	COVER		1
102	PQDE10055Z	LEVER, SENSOR		1
103	PFUS1076Z	SPRING		1
104	PQLB1E1	FERRITE CORE		1
105	PQJP03S07Z	AC INLET		1
106	PQJS02Q59Y	CONNECTOR, 2P		1
107	PFMD1017Y	COVER		1
108	PFGT1194Z	NAME PLATE		1
109	PFUS1079Z	PAPER STACKER		1
110	PFHA1001Z	FOOT		4
111	PQHM171Z	ROM LID		1
112	PFUS1086Z	SPRING		1
113	PFUS1081Z	SPRING		1
114	PFHX1153Z	SHEET, CASSETTE		2
115	PFHX1152Z	SHEET		2
		(4. MECHANICAL SECTION)		
130	PFDF1018Z	SHAFT		1
131	PFDG1027Z	GEAR		1
132	PFDJ1011Z	SPACER		2
133	PFDN1010Z	ROLLER, PLATEN		1
134	PFDJ1007Z	SPACER		2
135	PFDN1006Z	ROLLER, DOCUMENT FEED		1
136	PFDG1004Z	GEAR		1
137	PFUS1073Z	SPRING		2
138	PFDJ1006Z	SPACER		2
139	PFDN1005Z	ROLLER, DOCUMENT FEED		1
140	PFDG1003Z	GEAR		1
141	PFKM1013Z1	CABINET BODY	S	1
142	PQDJ10002Z	SPACER		4
143	PFDN1004Z	ROLLER, SEPARATION		1
144	PQUS10014Z	SPRING	S	1
145	PFDG1012Z	GEAR		1
146	PFUS1072Z	SPRING		1
147	XUC2FY	RETAINING RING		4
148	PFUS1085Z	SPRING		1
149	PFDE1040Z	LEVER, SENSOR		1
150	PFHG1030Z	RUBBER PARTS, SPACER		1
151	XWE5VW	WASHER		1
152	PFDG1036Z	GEAR		1
153	PFUS1065Z	SPRING		1
154	PFUA1009Z	CHASSIS, TX GEAR		1
155	PFDG1032Z	GEAR		5
156	PFDG1033Z	GEAR		1
157	PFUS1019Z	SPRING		1
158	PFDG1005Z	GEAR		1
159	PFDE1014Z	ARM		1
160	PFDG1009Z	GEAR		1
161	PFDG1008Z	GEAR		1
162	PFUS1017Y	SPRING		1
163	PFDG1007Z	GEAR		1
164	PFMD1016Z	COVER		1
165	PFDN1011Z	ROLLER, PICK UP		1
166	PFUS1067Z	SPRING		1
167	PFDG1028Z	GEAR		1
168	PFJQ1005Z	MOTOR, TX		1
169	PFJS05R50Z	CONNECTOR, 5P		2
170	PFUS1018X	SPRING		1
171	PFDG1039Z	GEAR		3
172	PFDG1031Z	GEAR		1
173	PFDG1030Z	GEAR		1
174	PFUA1008Z	CHASSIS, RX GEAR		1
175	PFDF1019Z	SHAFT		2
176	PFDX1008Z	GEAR		1
177	PFJQ1007Z	MOTOR, RX		1

Ref. No.	Part No.	Part Name & Description		Pcs
178	PFDR1005Z	ROLLER, DUMPER		2
179	PFJS03R57Z	CONNECTOR, 3P		1
180	PFUS1071Z	SPRING		1
181	PFHR1048Z	ARM		1
182	PFJS09R55Z	CONNECTOR, 9P		1
183	PFJS09R56Z	CONNECTOR, 9P		1
184	PFHX1139Z	ROLLING SHEET		2
185	PFHR1044Z	GUIDE		1
186	PFYTFP200M	KNOB, OPEN		1
187	PFHE1007Z	SPACER		1
188	PQNW320Y	WASHER		1
189	PFQT1221Z	INDICATION LABEL		1
190	PFHX1147Z	SHEET, SUDE		1
191	PFHX1142Z	SHEET, RIBBON GUIDE SGAFT		2
192	PFHX1141Z	COVER, VIBRATION		1
		(5. CCD UNIT SECTION)		
200	PFWLF780M	CHASSIS ASS'Y		1
200-1	PFVDSLA30222	LED ARRAY		1
201	PF0G1001Z	TARGET GLASS		1
202	PFUS1021Z	SPRING		1
203	PF0L1001Z	LENS		1
204	PFHE1004Z	NUT		2
205	PFJS08R58Z	CONNECTOR, 8P		1
206	PFMD1007Z	COVER		1
207	PFUS1028Z	SPRING		6
208	PF0M1003Z	MIRROR, SMALL		1
209	PF0M1001Z	MIRROR, LARGE		1
210	PF0M1002Z	MIRROR, MIDDLE		1
		ACCESSORIES AND PACKING MATERIALS		
A1	PFJXE0105Z	HANDSET		1
A2	PQJA59V	CORD, TEL	⚠ S	1
A3	PQJA200Z	POWER CORD, AC	⚠	1
A4	PQJA212M	CORD, HANDSET		1
A5	PFUS1074Z	SPRING (STACKER)		1
A6	PFQX1105Z	INSTRUCTION BOOK		1
A7	PFQW1150Z	QUICK REFERENCE		1
A8	PFQV1036Z	ADVANTAGE PROGRAM SHEE'		1
A9	XZB30X45A03	BAG,POLYETHYLENE		1
A10	XZB20X20A04	BAG,POLYETHYLENE	S	1
A11	XZB20X35A04	BAG,POLYETHYLENE		1
P1	PFPK1181Z	PACKING CASE		1
P2	PFPN1066Z	CUSHION-A		1
P3	PFPN1067Z	CUSHION-B		1
P4	PFPH1008Z	SOFT SHEET		1
P5	PFPE1036Z	CUSHION-C		1
		DIGITAL BOARD PARTS		
PCB1	PFWP1FP200M	DIGITAL BOARD ASS'Y (RTL)		1
		(ICs)		
IC1	PFVI96031FKG	IC		1
IC2	PFWIFP200M	IC (ROM)		1
IC3	PQVICX58257C	IC	S	1
IC4	PFVIM66379FP	IC		1
IC5	PQVIR96DFXL	IC	S	1
IC6	MN414800CSJ07	IC	S	1
IC7	PQVIMM1245BF	IC		1
IC8	PQVINJM4558M	IC	S	1
		(TRANSISTORS)		
Q4	PQVTDTC114EU	TRANSISTOR(SI) (or UN5211T)	S	1
Q5	PQVTDTC143ZU	TRANSISTOR(SI)	S	1
Q7,8,9	2SB1197K	TRANSISTOR(SI) (or 2SK1051K)	S	3
Q10,11	2SD1819A	TRANSISTOR(SI) (or 2SC4155R)	S	2
Q12	2SB1197K	TRANSISTOR(SI) (or 2SK1051K)	S	1
Q13,15,16	2SD1819A	TRANSISTOR(SI) (or 2SC4155R)	S	3

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Ref. No.	Part No.	Part Name & Description		Pcs
		(DIODES)		
D4	MA141WK	DIODE(Si)		1
		(BATTERY)		
BAT	PQPCR2032H09	LITHIUM BATTERY	S	1
		(CONNECTORS)		
CN1,2	PQJP11A19Z	CONNECTOR, 11P		2
CN4	PQJP03G100Z	CONNECTOR, 3P		1
CN5	PQJP3G30Y	CONNECTOR, 3P		1
CN6	PQJP8G30Y	CONNECTOR, 8P		1
CN7	PQJP10G30Y	CONNECTOR, 10P		1
CN8	PQJP08G100Z	CONNECTOR, 8P		1
CN10	PQJP9G30Y	CONNECTOR, 9P		1
CN11	PQJP09G100Z	CONNECTOR, 9P		1
		(CAPACITORS)		
C4,6,7	PQCUV1C224ZF	0.22		3
C8,9	PQCUV1H150JC	15P		2
C10	PQCUV1C224ZF	0.22		1
C11,12,13	PQCUV1H180JC	18P		3
C14,15	PQCUV1E104MD	0.1	S	2
C16	PQCUV1H105JC	1	S	1
C18	PFCX1AW106ZF	10		1
C19	PQCUV1E104MD	0.1	S	1
C20,22,23	PQCUV1E104MD	0.1	S	3
C24	ECEA0JK221	220	S	1
C25	PQCUV1H102J	0.001	S	1
C26	PQCUV1C224ZF	0.22	S	1
C28	PQCUV1E104MD	0.1	S	1
C29	PQCUV1H105JC	1	S	1
C30	PQCUV1H331JC	330P	S	1
C31	PQCUV1E104MD	0.1	S	1
C32	ECEA1CK101	100	S	1
C33	PQCUV1H105JC	1	S	1
C34	PQCUV1H102J	0.001	S	1
C35	PQCUV1E104MD	0.1	S	1
C36	PQCUV1H331JC	330P	S	1
C37,38	PQCUV1H224JC	0.22	S	2
C39	PQCUV1H270JC	27P		1
C40	PQCUV1H105JC	1	S	1
C41,42	PQCUV1H472KB	0.0047	S	2
C46	PQCUV1H103KB	0.01	S	1
C47	PQCUV1H330JC	33P		1
C48,49	PQCUV1H080DC	8P		2
C50	PQCUV1H330JC	33P		1
C56	PQCUV1E104MD	0.1	S	1
C57	PQCUV1H222KB	0.0022	S	1
C58	PQCUV1H561JC	560P	S	1
C59	PQCUV1E104MD	0.1	S	1
C60	PQCUV1E104MD	0.1	S	1
C66,67	PQCUV1H150JC	15P		2
C68,69	PQCUV1E104MD	0.1	S	2
C70	PQCUV1E104MD	0.1	S	1
C71	PQCUV1C224ZF	0.22		1
C72-75	PQCUV1E104MD	0.1	S	4
C76	PQCUV1H270JC	27P		1
C77,78,79	PQCUV1E333MD	0.033		3
C80	PQCUV1C224ZF	0.22		1
C81,83,84	PQCUV1E104MD	0.1	S	3
C85	PQCUV1E333MD	0.033		1
C86	PQCUV1H270JC	27P		1

Ref. No.	Part No.	Part Name & Description		Pcs
C96	PFCX1AW106ZF	10		1
C97,99	PQCUV1E104MD	0.1	S	2
C500-505	PQCUV1E104MD	0.1	S	6
C506	PQCUV1H104KB	0.1	S	1
C507	PQCUV1E333MD	0.033		1
C508	PQCUV1H682KB	0.0068		1
C509	PQCUV1H180JC	18P		1
C510	PQCUV1H180JC	18P		1
C514-519	ECUV1H150JCV	15P		6
C520,521 ,522	ECUV1H150JCV	15P		3
C523	PFCX1EY106ZF	10		1
C524	PQCUV1E104MD	0.1	S	1
		(CERAMIC FILTERS)		
LC1	EXCEMT220B	CERAMIC FILTER		1
LC2	EXCEMT222D	CERAMIC FILTER		1
		(COILS)		
L1,2	PQLQR2BT	COIL	S	2
L6	PQLQR1ET	COIL		1
L16,17	PQLQR2BT	COIL	S	2
L19	PQLQR1ET	COIL		1
L20-29	PQLQR2BT	COIL	S	10
R72	PQLQR2BT	COIL	S	1
		(COMPONENTS PARTS)		
RA1,2	EXRV8V101JV	RESISTOR ARRAY		2
RA3,4	EXRV8V470JV	RESISTOR ARRAY		2
RA5,6	EXRV8V101JV	RESISTOR ARRAY		2
RA7,8	EXRV8V331JV	RESISTOR ARRAY		2
RA9,10	EXRV8V271JV	RESISTOR ARRAY		2
		(RESISTORS)		
C511	PQ4R10XJ000	0	S	1
L3,7,18	PQ4R18XJ000	0	S	3
R1,6	PQ4R10XJ000	0	S	2
R8,9	PQ4R10XJ101	100	S	2
R10	PQ4R10XJ101	100	S	1
R12	PQ4R10XJ000	0	S	1
R13	PQ4R10XJ472	4.7K	S	1
R14	PQ4R10XF1802	18K	S	1
R15	PQ4R10XF8662	86.6K	S	1
R16	PQ4R18XJ220	22	S	1
R17	PQ4R10XJ103	10K	S	1
R18,19	PQ4R10XJ224	220K	S	2
R20	PQ4R10XJ164	160K	S	1
R21	PQ4R10XF8662	86.6K	S	1
R22	PQ4R10XJ332	3.3K	S	1
R23	PQ4R10XJ473	47K	S	1
R24	ERJ6ENF4752	47.5K	S	1
R25,26,27	PQ4R10XJ102	1K	S	3
R29	PQ4R10XJ000	0	S	1
R30	PQ4R10XJ472	4.7K	S	1
R31	PQ4R10XJ101	100	S	1
R32	PQ4R10XJ103	10K	S	1
R33	ERJ3GEYJ271	270		1
R35	PQ4R10XJ120	12	S	1
R36,37,38	ERJ3GEYJ101	100		3

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Ref. No.	Part No.	Part Name & Description		Pcs
R40	PQ4R10XJ000	0	S	1
R42	PQ4R10XJ472	4.7K	S	1
R43	PQ4R10XJ121	120	S	1
R44	PQ4R10XJ105	1M	S	1
R45	PQ4R10XJ270	27	S	1
R46,47,48	PQ4R10XJ472	4.7K	S	3
R50	PQ4R10XJ000	0		1
R51	ERJ3GEYJ101	100		1
R52	ERJ3GEYJ101	100		1
R59	PQ4R10XJ101	100	S	1
R60-65	PQ4R10XJ101	100	S	6
R66	PQ4R10XJ223	22K	S	1
R67	PQ4R10XJ823	82K	S	1
R68	PQ4R10XJ203	20K	S	1
R69	PQ4R10XJ101	100	S	1
R70,71	PQ4R10XJ101	100	S	2
R73,74	PQ4R10XJ101	100	S	2
R76	PQ4R10XJ472	4.7K	S	1
R77	PQ4R10XJ000	0	S	1
R78	ERJ3GEY0R00	0		1
R79	ERJ3GEYJ101	100		1
R80,81,82	ERJ3GEYJ101	100		3
R83	PQ4R10XJ000	0	S	1
R84	PQ4R10XJ150	15	S	1
R85	PQ4R10XJ563	56K	S	1
R86	PQ4R10XJ331	330	S	1
R87	PQ4R10XJ472	4.7K	S	1
R88	PQ4R10XJ562	5.6K	S	1
R89	PQ4R10XJ472	4.7K	S	1
R90	PQ4R10XJ821	820	S	1
R91	PQ4R10XJ912	9.1K	S	1
R92,93	PQ4R10XJ122	1.2K	S	2
R94	PQ4R10XJ471	470	S	1
R95	ERJ3GEYJ563	56K		1
R96	PQ4R10XJ103	10K	S	1
R97	PQ4R10XJ331	330	S	1
R98	PQ4R10XJ104	100K	S	1
R99	PQ4R10XJ000	0	S	1
R500	PQ4R10XJ562	5.6K	S	1
R501	PQ4R10XJ563	56K	S	1
R502	PQ4R10XJ331	330	S	1
R503	PQ4R10XJ472	4.7K	S	1
R504	PQ4R10XJ222	2.2K	S	1
R505	PQ4R10XJ105	1M	S	1
R506	PQ4R10XJ472	4.7K	S	1
R508	PQ4R10XJ332	3.3K	S	1
R512	PQ4R10XJ472	4.7K	S	1
R514	PQ4R10XJ103	10K	S	1
R516	PQ4R10XJ393	39K	S	1
R522,523	PQ4R10XJ101	100	S	2
R524	PQ4R10XJ472	4.7K	S	1
R526,527	ERJ3GEYJ562	5.6K		2
R531	PQ4R10XJ103	10K	S	1
R532	PQ4R10XJ223	22K	S	1
R533,534	ERJ3GEYJ104	100K		2
R535	PQ4R10XJ472	4.7K	S	1
R536,537	PQ4R10XJ472	4.7K	S	2
R538	ERJ3GEYJ472	4.7K		1
		(CRYSTAL OSCILLATORS)		
X1	PFVBA16.00XZ	CRYSTAL OSCILLATOR		1
X2	PFVCCFS32Z	CRYSTAL OSCILLATOR		1
X4	PFVCCSA24Z	CRYSTAL OSCILLATOR		1

Ref. No.	Part No.	Part Name & Description		Pcs
		ANALOG BOARD PARTS		
PCB2	PFLP1083MZ	ANALOG BOARD ASS'Y (RTL)		1
		(ICs)		
IC101	PQVINJM2903M	IC	S	1
IC109	PQVIS79164FU	IC		1
IC110	PQVITC4066BF	IC	S	1
IC151	AN6116FAQ	IC		1
IC201	PQVINJM4558M	IC	S	1
IC202	PQVITC4066BF	IC	S	1
IC241	PQVINJM2113M	IC	S	1
		(TRANSISTORS)		
Q101	2SA1627	TRANSISTOR(SI)		1
Q102	2SD1819A	TRANSISTOR(SI) (or 2SC4155	S	1
Q103	2SC2235	TRANSISTOR(SI)		1
Q106	PQVTDTC143EU	TRANSISTOR(SI) (or UN521L)	S	1
Q251	2SD1921Q	TRANSISTOR(SI) (or 2SD1944A	S	1
Q253	2SC1740S	TRANSISTOR(SI) (or 2SD1858C	S	1
Q271	PQVTDTC143EU	TRANSISTOR(SI) (or UN521L)	S	1
		(DIODES)		
D101	PQVDS1ZB40F1	DIODE(SI)		1
D102	1SS119	DIODE(SI) (or 1SS131)	S	1
D151,152	1SS119	DIODE(SI) (or 1SS131)	S	2
D153	MA143	DIODE(SI)		1
D201,202	1SS119	DIODE(SI) (or 1SS131)	S	2
D271	1SS119	DIODE(SI) (or 1SS131)	S	1
D290,291	1SS119	DIODE(SI) (or 1SS131)	S	2
ZD101	MA7180	DIODE(SI)		1
ZD102	PQVDHZS2B1	DIODE(SI)	S	1
ZD103	MA4130L	DIODE(SI)	S	1
		(JACK & CONNECTORS)		
CN151	PQJJ1TB18Z	JACK		1
CN152	PQJP2G30Z	CONNECTOR, 2P		1
CN241	PQJP02G100Z	CONNECTOR, 2P		1
CN251	PQJP08B11Z	CONNECTOR, 8P		1
CN271	PQJS11A10Z	CONNECTOR, 11P		1
CN272	PQJS11A10Z	CONNECTOR, 11P		1
SW271	PFJP02A09Z	CONNECTOR, 2P		1
		(CAPACITORS)		
C101,102	ECKD2H681KB		S	2
C103	ECQE2E224JZ	0.22	S	1
C104	ECEA1HN3R3S	3.3		1
C105	ECQE2104KF	0.1		1
C106	PQCUV1H103KB	0.01	S	1
C107	ECEA1CU221	220		1
C108	ECEA1CKS100	10	S	1
C109	ECEA1HKS4R7	4.7	S	1
C110	ECEA1CKS100	10	S	1
C111	PQCUV1E333MD	0.033		1
C112	PQCUV1H105JC	1	S	1
C130	ECUV1C683KBV	0.068		1
C131	ECEA1HKS010	1	S	1
C132	RQCUV1C224KB	0.22		1
C133	ECUV1H561JCV	560P	S	1
C134	ECEA1CKS470	47	S	1
C135	ECEA1HKS4R7	4.7	S	1
C136	ECEA0JK221	220	S	1
C137	ECEA1HKS4R7	4.7	S	1
C138	ECUV1C473KBV	0.047		1
C139	ECUV1H223KBV	0.022	S	1

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Ref. No.	Part No.	Part Name & Description		Pcs
C140	ECEA0JKA331	330	S	1
C141	PQCUV1H222KB	0.0022	S	1
C142	RQCUV1C224KB	0.22		1
C143	ECUV1C473KBV	0.047		1
C144	ECEA1HKS010	1	S	1
C145	ECEA1HKS2R2	2.2	S	1
C146	PQCUV1E333MD	0.033		1
C151	ECEA0JKS220	22		1
C152,153	ECUV1H103KBV	0.01		2
C154	ECEA1HKS4R7	4.7	S	1
C155	ECUV1H103KBV	0.01		1
C156	ECEA1AU101	100	S	1
C157	ECUV1H332KBV	0.0033		1
C158	ECUV1C683KBV	0.068		1
C160	ECUV1H272KBV	0.0027		1
C165	ECUV1H471JCV	470P		1
C166	PQCUV1H105JC	1	S	1
C167,168	ECUV1E273KBV	0.027	S	2
C171	PQCUV1H105JC	1	S	1
C172	ECEA0JKS101	100		1
C173	ECUV1C104KBV	0.1		1
C174	ERJ3GEY0R00	0		1
C176	ECUV1C473KBV	0.047		1
C177	ECUV1H101JCV	100P		1
C178	ECEA0JKS101	100		1
C179	ECUV1C104KBV	0.1		1
C180	ECUV1H331JCV	330P	S	1
C181	PQCUV1E104MD	0.1		1
C182	ECUV1H221JCV	220P		1
C183	ECUV1H472KBV	0.0047		1
C184	ECUV1C104KBV	0.1		1
C186	ECUV1H103KBV	0.01		1
C187	ECUV1C104KBV	0.1		1
C188,189	ECUV1H332KBV	0.0033		2
C190	ECUV1H103KBV	0.01		1
C201	PQCUV1H102J	0.001	S	1
C202	ECEA1HKS4R7	4.7	S	1
C203	PQCUV1E104MD	0.1		1
C204	ECUV1H680JCV	68P		1
C205	PQCUV1E104MD	0.1		1
C206	PQCUV1H151JC	150P		1
C207	PQCUV1E104MD	0.1		1
C208	ECUV1H101JCV	100P		1
C209	ECUV1H123KBV	0.012		1
C210,211 ,212	ECEA1CKS100	10	S	3
C213,214	ECUV1C104KBV	0.1		2
C217	ECUV1C104KBV	0.1		1
C218	RQCUV1C224KB	0.22		1
C241	ECEA1AU101	100	S	1
C242	ECUV1H102KBV	0.001		1
C243,244	PQCUV1H105JC	1	S	2
C245	PQCUV1E104MD	0.1		1
C251	PQCUV1H104ZF	0.1		1
C252,253	ECEA1VU330	33	S	2
C255	ECEA1AU101	100	S	1
C256	PQCUV1E104MD	0.1	S	1
C257	ECEA1HU330	33		1
C265	ECUV1C104KBV	0.1	S	1

Ref. No.	Part No.	Part Name & Description		Pcs
C271	ECUV1H103KBV	0.01		1
C272	PQCUV1H103KB	0.01	S	1
C276	ECUV1H103KBV	0.01		1
C277	ECUV1C104KBV	0.1	S	1
C278	PQCUV1C334ZF	0.33		1
C279	ECUV1H330JCV	33P		1
C290	ECUV1C104KBV	0.1		1
C291	ECUV1H103KBV	0.01		1
		(JACKS)		
JJ1,2	PFJJ1T01Z	JACK		2
		(COILS)		
L103,104	PQLQR1E32A07	COIL		2
L105	PFLE003	COIL	S	1
L106	EXCELDR35	COIL		1
L151-154	PQLQR2BT	COIL	S	4
		(PHOTO ELECTRIC TRANSDUCERS)		
PC101	PQVIPC814K	PHOTO COUPLER	⚠	1
PC102	PQVITLP627	PHOTO COUPLER	⚠ S	1
PC103	PQVIPC817CD	PHOTO COUPLER	⚠ S	1
PC105	PQVIPC814K	PHOTO COUPLER	⚠	1
		(THERMISTOR)		
POS101	PQRPBC120N	THERMISTOR (POSISTOR)		1
		(RELAY)		
RL101	PQSL119Z	RELAY	⚠	1
		(RESISTORS)		
C174	ERJ3GEY0R00	0		1
C274	PQ4R10XJ103	10K	S	1
C275	ERJ3GEYJ103	10K		1
J104,105	ERJ3GEY0R00	0		2
J108	ERDS2TJ681	680		1
J250,252	PQ4R10XJ000	0	S	2
J270-276	ERJ3GEY0R00	0		7
R102	PQ4R18XJ000	0	S	1
R103	ERDS1TJ330	33	S	1
R104	ERDS1TJ473	47K	S	1
R106	ERDS2TJ152	1.5K		1
R107	ERDS1TJ473	47K	S	1
R109	PQ4R10XJ104	100K	S	1
R111	PQ4R10XJ472	4.7K	S	1
R112	PQ4R10XJ393	39K	S	1
R113	PQ4R10XJ103	10K	S	1
R114	PQ4R10XJ682	6.8K	S	1
R115	PQ4R10XJ822	8.2K	S	1
R116	ERDS2TJ5R6	5.6		1
R117	PQ4R10XJ123	12K	S	1
R118	PQ4R10XJ562	5.6K	S	1
R120	PQ4R10XJ391	390	S	1
R130	ERJ3GEYJ392	3.9K		1
R131	ERJ3GEYJ102	1K		1
R132	ERJ3GEYJ223	22K		1
R133	ERJ3GEYJ104	100K		1
R134	ERJ3GEYJ512	5.1K		1
R135	ERJ3GEYJ563	56K		1
R136	ERJ3GEYJ102	1K		1
R138,139	ERJ3GEYJ333	33K		2

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Ref. No.	Part No.	Part Name & Description		Pcs
R140	ERJ3GEYJ333	33K		1
R141	PQ4R10XJ220	22	S	1
R142	ERJ3GEYJ681	680		1
R143	ERJ3GEYJ123	12K		1
R144	ERJ3GEYJ275	2.7M		1
R145	ERJ3GEYJ223	22K		1
R146	ERJ3GEYJ273	27K		1
R147	ERJ3GEYJ114	110K		1
R148	ERJ3GEYJ104	100K		1
R149	ERJ3GEYJ513	51K		1
R150	ERJ3GEYJ224	220K		1
R151	PQ4R10XJ471	470	S	1
R152,153	ERJ3GEYJ152	1.5K		2
R154,155	ERJ3GEYJ153	15K		2
R156,157	ERJ3GEYJ103	10K		2
R158,159	ERJ3GEYJ222	2.2K		2
R161,162	ERJ3GEYJ103	10K		2
R163	ERJ3GEYJ133	13K		1
R164,166	ERJ3GEY0R00	0		2
R168	ERJ3GEYJ224	220K		1
R169	ERJ3GEYJ103	10K		1
R170	ERJ3GEYJ683	68K		1
R171	ERJ3GEYJ104	100K		1
R172	ERJ3GEYJ272	2.7K		1
R173	ERJ3GEY0R00	0		1
R175	ERJ3GEYJ334	330K		1
R176	ERJ3GEYJ223	22K		1
R177	ERJ3GEYJ103	10K		1
R178	ERJ3GEYJ274	270K		1
R179	ERJ3GEYJ682	6.8K		1
R180	ERJ3GEYJ433	43K		1
R181	ERJ3GEYJ223	22K		1
R182	ERJ3GEYJ473	47K		1
R184	ERJ3GEYJ183	18K		1
R185	ERJ3GEYJ473	47K		1
R186	ERJ3GEY0R00	0		1
R187	ERJ3GEYJ124	120K		1
R188	ERJ3GEYJ223	22K		1
R189	ERJ3GEYJ155	1.5M		1
R190	PQ4R10XJ105	1M	S	1
R191	ERDS2TJ102	1K		1
R192	PQ4R18XJ101	100	S	1
R201	ERJ3GEYJ102	1K		1
R202	ERJ3GEYJ563	56K		1
R203	ERJ3GEYJ223	22K		1
R204	ERJ3GEYJ563	56K		1
R205	ERJ3GEYJ682	6.8K		1
R206	ERJ3GEYJ184	180K		1
R207	ERJ3GEYJ472	4.7K		1
R208	PQ4R10XJ114	110K	S	1
R209	ERJ3GEYJ224	220K		1
R210	ERJ3GEYJ393	39K		1
R211	ERJ3GEYJ224	220K		1
R212,213	PQ4R10XJ104	100K	S	2
R214	PQ4R10XJ224	220K	S	1
R215	ERJ3GEYJ222	2.2K		1
R216	ERJ3GEYJ105	1M		1
R217	ERJ3GEY0R00	0		1
R220	PQ4R10XJ104	100K	S	1
R221	ERJ3GEYJ682	6.8K		1
R222	ERJ3GEYJ472	4.7K		1

Ref. No.	Part No.	Part Name & Description		Pcs
R241	PQ4R10XJ4R7	4.7	S	1
R242	ERJ3GEYJ103	10K		1
R243	ERJ3GEYJ102	1K		1
R244	ERJ3GEYJ153	15K		1
R245	ERJ3GEYJ123	12K		1
R251	PQ4R10XJ221	220	S	1
R252	ERDS1TJ122	1.2K	S	1
R271	ERJ3GEYJ472	4.7K		1
R272	ERJ3GEYJ101	100		1
R273	ERJ3GEYJ102	1K		1
R274	PQ4R10XJ101	100	S	1
R275	PQ4R10XJ103	10K	S	1
R276	ERJ3GEY0R00	0		1
R280	ERJ3GEYJ333	33K		1
R281	ERJ3GEYJ182	1.8K		1
R282	ERJ3GEYJ473	47K		1
R290	PQ4R10XJ000	0	S	1
R291	ERJ3GEYJ473	47K		1
R292	ERJ3GEYJ563	56K		1
R293	ERJ3GEYJ152	1.5K		1
R294	ERJ3GEYJ473	47K		1
R295	ERJ3GEYJ104	100K		1
R296	ERJ3GEYJ102	1K		1
		(VARISTORS)		
SA101	PQVDDSS301L	VARISTOR (SURGE ABSORBER)		1
SA102	PFVDRA102M	VARISTOR (SURGE ABSORBER)		1
VAR1	PQVDVR61B	VARISTOR	S	1
		(SWITCH)		
SW272	PFSH1A02Z	SWITCH		1
		(TRANSFORMERS)		
T101	PQLT8E7A	TRANSFORMER	⚠ S	1
T102	PQLT8E6A	TRANSFORMER	⚠	1

OPERATION BOARD PARTS

PCB3	PFLP1077MZ	OPERATION BOARD ASS'Y (RTL)		1
		(IC)		
IC301	MN53007QAF	IC		1
		(DIODES)		
D363,364	1SS131	DIODE(SI) (or 1SS119)	S	2
LED303	PQVDR325CA47	LED	S	1
LED304	PQVDR325CA47	LED	S	1
		(CONNECTORS)		
CN301	PQJP10G43Y	CONNECTOR, 10P		1
CN302	PQJS14A30Z	CONNECTOR, 14P		1

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Ref. No.	Part No.	Part Name & Description		Pcs
		(CAPACITORS)		
C301	PQCUV1E104MD	0.1	S	1
C302	ECEA1AKS101	100		1
C305	PQCUV1H122KB	0.0012	S	1
C307-310	PQCUV1H331JC	330P		4
C322	PQCUV1E104MD	0.1	S	1
C331	PQCUV1E104MD	0.1	S	1
C351,352	PQCUV1E104MD	0.1	S	2
		(PHOTO ELECTRIC TRANSDUCERS)		
PI301	CNA1006N	SENSOR	S	1
PI302	CNA1006N	SENSOR	S	1
PI303	CNA1006N	SENSOR	S	1
		(RESISTORS)		
J1	PQ4R18XJ000	0	S	9
J2-5	PQ4R10XJ0000	0	S	4
J7	PQ4R18XJ000	0	S	1
J8,9	PQ4R10XJ000	0	S	2
J10-14	PQ4R10XJ000	0	S	5
J51-59	PQ4R18XJ000	0	S	9
J60-69	PQ4R18XJ000	0	S	10
J70,71	PQ4R18XJ000	0	S	2
R307,308	PQ4R10XJ181	180	S	2
R309	PQ4R10XJ181	180	S	1
R310,311	PQ4R10XJ181	180	S	2
R312	PQ4R10XJ181	180	S	1
R322	PQ4R10XJ680	68	S	1
R323	PQ4R10XJ222	2.2K	S	1
R324-327	PQ4R10XJ472	4.7K	S	4
R333,334	PQ4R10XJ471	470	S	2
R341-348	PQ4R10XJ181	180	S	8
R361,362	PQ4R10XJ181	180	S	2
R363, 364	PQ4R10XJ103	10K	S	2
R371	PQ4R10XJ472	4.7K	S	1
R372	PQ4R10XJ102	1K	S	1
R381	PQ4R10XJ563	56K	S	1
R382,383	PQ4R10XJ331	330	S	2
R384	PQ4R10XJ331	330	S	1
R385	PQ4R10XJ101	100	S	1
R391	PQ4R10XJ000	0		1
		(SWITCHES)		
SW301-309	PQSH1A105Z	SWITCH	S	9
SW310-319	PQSH1A105Z	SWITCH	S	9
SW320-329	PQSH1A105Z	SWITCH	S	9
SW330-334	PQSH1A105Z	SWITCH	S	5
SW337,338	PQSH1A105Z	SWITCH	S	2
		POWER SUPPLY BOARD PARTS		
PCB4	ETXKM134A3B	POWER SUPPLY BOARD ASS'Y⚠ (RTL)		1
		(IC)		
IC201	PFVIKA34063A	IC		1
		(TRANSISTORS)		
Q101	2SD1302	TRANSISTOR(SI)		1
Q102	2SK2237	TRANSISTOR(SI)	⚠	1
Q201	2SC3311	TRANSISTOR(SI)		1
Q203	2SC5029Y	TRANSISTOR(SI)		1
		(DIODES)		
D101	MA165	DIODE(SI)		1
D102	PQVDERA1506	DIODE(SI)	⚠	1
D103,104	MA165	DIODE(SI)		2

Ref. No.	Part No.	Part Name & Description		Pcs
D105	PFVDERA2208	DIODE(SI)		1
D106	MA165	DIODE(SI)		1
D107-109	PQVDERA1506	DIODE(SI)	⚠	3
D201	MA6D50	DIODE(SI)		1
D202	PQVDERA81004	DIODE(SI)		1
D203	MA165	DIODE(SI)		1
ZD101	MA4047	DIODE(SI)		1
ZD201	MA4062	DIODE(SI)		1
ZD202	MA2270B	DIODE(SI)		1
		(CONNECTORS)		
CN101	PQJP2D98Z	CONNECTOR, 2P		1
CN201	PQJP6G100Z	CONNECTOR, 6P		1
CN202	PQJS08A36Z	CONNECTOR, 8P		1
		(CAPACITORS)		
C101	PFCQEMKP2224	0.22	⚠	1
C102	ECKDKC332KB	0.0033	⚠ S	1
C103	ECKDKC332KB	0.0033	⚠ S	1
C104	PFCQEMKP2224	0.22	⚠	1
C108	ECKDKC222KB	0.0022	⚠ S	1
C109	EETLD2D221B	220		1
C111	ECQB1H182JF	0.0018		1
C112	ECQB1H332JF	0.0033		1
C113	ECQE6103KF	0.01		1
C115	ECKD3A221KBP	220P	S	1
C201	PFCKD2R102K	0.001		1
C202	EEUFA1V471	470		1
C203	ECQB1H222JF	0.0022		1
C204	ECQV1H104JZ	0.1		1
C205	ECQV1H224JZ	0.22		1
C206	ECQB1H101KF	100P		1
C207	EEUFA1V391	390		1
		(FUSE)		
F101	PQBA1C50NBKL	FUSE	⚠	1
		(RELAY)		
RL201	PQSL138Z	RELAY		1
		(COILS)		
L102	PFLE1280W0R6	COIL		1
L201	PQLE53	COIL	S	1
L202	ELC10E560	COIL		1
		(PHOTO ELECTRIC TRANSDUCER)		
PC101,102	PQVIPS25011L	PHOTO COUPLER	⚠	2
		(RESISTORS)		
R101	ERDS1TJ474	470K		1
R102,103	ERDS2TJ393	39K		2
R104	ERDS2TJ393	39K		1
R105	ERG2SJ100E	10		1
R106	ER0S2TKF7151	7.15K		1
R107	ERG12SJ100P	10		1
R108	ERDS2TJ223	22K		1
R109	ER0S2TKF6491	6.49K		1
R110,111	ERDS2TJ334	330K		2
R113	ERDS2TJ392	3.9K		1
R114	ERDS1TJ331	330		1
R115	ERDS2TJ181	180		1
R116	ERG2SJ104	100K		1

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Ref. No.	Part No.	Part Name & Description		Pcs
R201	ERDS2TJ332	3.3K		1
R202	ERDS2TJ103	10K		1
R203	ERDS2TJ102	1K		1
R204	ERDS2TJ562	5.6K		1
R205	ERDS2TJ682	6.8K		1
R206	ERDS2TJ332	3.3K		1
R208	ERX2SJR27E	0.27		1
R209	ER0S2TKF1201	1.2K		1
R210	ER0S2TKF3741	3.74K		1
R211	ERDS2TJ121	120		1
R213	ERDS2TJ103	10K		1
R214	ERDS1TJ332	3.3K		1
R215	ERDS2TJ100	10		1
R216	ERX12SJ1R0	1		1
R217	ERDS2TJ682	6.8K		1
R219,220	ERDS2TJ331	330		2
R222,223	ERDS2TJ331	330		2
R224	ERDS2TJ331	330		1
R225	ERDS2TJ682	6.8K		1
		(THERMISTOR)		
TH101	PFRT57235S80	THERMISTOR		1
		(TRANSFORMER)		
T101	ETB29AE185	TRANSFORMER	⚠	1
		(VARIABLE RESISTOR)		
VR201	EVTEASA01B23	SEMI-FIXED RESISTOR 2K		1
		(VARISTORS)		
ZNR101 ,102	ERZVGAD471	VARISTOR	⚠	2
		CCD BOARD PARTS		
PCB5	PFWP2FP200M	CCD BOARD ASS'Y (RTL)		1
		(ICs)		
IC801	PFWP2FP200M	CCD BOARD ASS'Y (RTL)		1
		(TRANSISTORS)		
Q801 ,802	2SB1218A	TRANSISTOR(SI) (or 2SA1576R)	S	2
Q803	2SD1819A	TRANSISTOR(SI) (or 2SC4155S)	S	1
		(CONNECTOR)		
CN801	PQJP8G30Y	CONNECTOR, 8P		1
		(CAPACITORS)		
C801	PQCUV1E104MD	0.1	S	1
C803	ECEA1CKS101	100		1
C804	PQCUV1E104MD	0.1	S	1
		(RESISTORS)		
J801	PQ4R18XJ000	0	S	1
J802,803	PQ4R10XJ000	0	S	2
R801,802	PQ4R10XJ202	2K	S	2
R803	PQ4R10XJ100	10	S	1
R804	PQ4R10XJ242	2.4K	S	1
R805	PQ4R10XJ272	2.7K	S	1

Ref. No.	Part No.	Part Name & Description		Pcs
R806	PQ4R10XJ242	2.4K	S	1
R807	PQ4R10XJ272	2.7K	S	1
R808,809	PQ4R10XJ471	470	S	2
R810	PQ4R10XJ681	680	S	1
R811,812	PQ4R10XJ101	100	S	2
R830	PQ4R10XJ000	0	S	1
		(VARIABLE RESISTOR)		
VR801	EVNDXAA03B23	SEMI-FIXED RESISTOR, 2K		1
		HOOK SWITCH AND SENSOR BOARD PARTS		
PCB6	PFWP3FP200M	HOOK SW/SENSOR BOARD ASS'Y (RTL)		1
		(IC)		
IC401,402	PQVIBA12003	IC	S	2
		(TRANSISTOR)		
Q401,402	2SB1322	TRANSISTOR(SI) (or 2SB1237R)	S	2
		(DIODES)		
D401	1SS147	DIODE(SI)		1
D402	MA7200	DIODE(SI)	S	1
D403	1SS147	DIODE(SI)		1
D404	MA7200	DIODE(SI)	S	1
		(CONNECTORS)		
CN401	PQJP5G30Y	CONNECTOR, 5P		1
CN402	PQJP9G30Y	CONNECTOR, 9P		1
CN403	PQJP09G100Z	CONNECTOR, 9P		1
CN404	PQJP02G100Z	CONNECTOR, 2P		1
CN405	PQJP5G30Y	CONNECTOR, 5P		1
CN406	PQJP03G100Z	CONNECTOR, 3P		1
CN407	PQJP3G30Y	CONNECTOR, 3P		1
CN408	PQJP3G38Z	CONNECTOR, 3P		1
		(CAPACITOR)		
C401	ECEA1VKA220	22		1
		(FUSE)		
F401	PQBA1N025NMA	FUSE		1
		(PHOTO ELECTRIC TRANSDUCERS)		
PI401	CNA1006N	SENSOR	S	1
PI402	CNA1006N	SENSOR	S	1
PI403	PQVIPS4506	SENSOR	S	1
		(RESISTORS)		
R401	ERDS2TJ821	820		1
R402	ERDS2TJ332	3.3K		1
R403	ERDS2TJ821	820		1
R404	ERDS2TJ332	3.3K		1
		(SWITCH)		
SW401	ESE14A211	SWITCH, HOOK		1

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Ref. No.	Part No.	Part Name & Description	Pcs
		FIXTURES AND TOOS	
EC1	PQZZ2K6Z	EXTENSION CORD, 2P	1
EC2	PQZZ2K12Z	EXTENSION CORD, 2P	2
EC3	PQZZ2K13Z	EXTENSION CORD, 2P	1
EC4	PQZZ3K5Z	EXTENSION CORD, 2P	1
EC5	PQZZ3K7Z	EXTENSION CORD, 2P	1
EC6	PQZZ3K12Z	EXTENSION CORD, 2P	1
EC7	PFZZ5K13Z	EXTENSION CORD, 2P	2
EC8	PQZZ6K14Z	EXTENSION CORD, 2P	1
EC9	PQZZ8K15Z	EXTENSION CORD, 2P	1
EC10	PQZZ8K18Z	EXTENSION CORD, 2P	1
EC11	PFZZ8K23Z	EXTENSION CORD, 2P	1
EC12	PQZZ9K4Z	EXTENSION CORD, 2P	1
EC13	PQZZ9K7Z	EXTENSION CORD, 2P	1
EC14	PQZZ10K4Z	EXTENSION CORD, 2P	1
EC15	PQZZ11K8Z	EXTENSION CORD, 2P	2
	PFZZ2F780M	SEPARATION SPRING HEINGHT TOOL (See P.86)	1
	PFZZ1F780M	CCD TOOL (See P.86)	1
	PFZZFP200M	SENSOR BOARD TOOL (See P. 114)	1
			1
		Notes: 1. Sensor Board Tools and Extension Cords (Ref. No. EC2, EC18) are necessites for servicing. 2. Extension Cords (Ref. No. EC1, EC3-EC9, EC11-15) (They make servicing easy.)	