ORDER NO. KM7961008901
F7

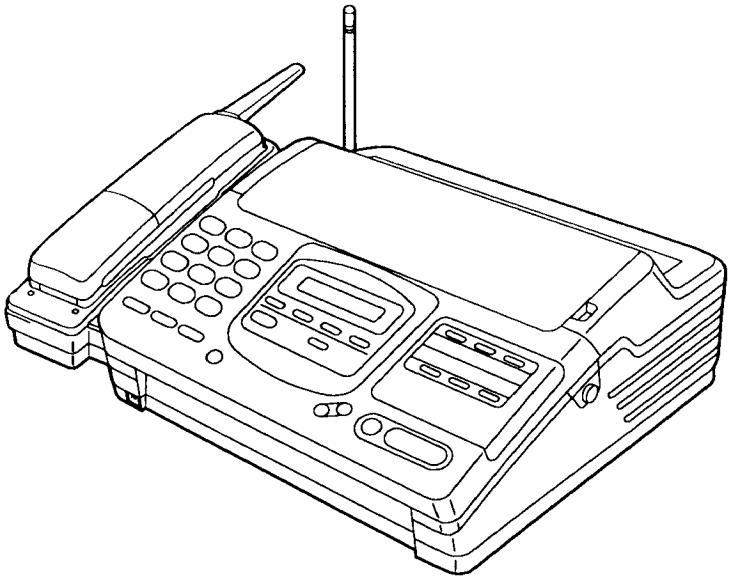
Service Manual

and Technical Guide

900MHz CORDLESS FAX

KX-F900

(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

CIRCUIT OPERATIONS

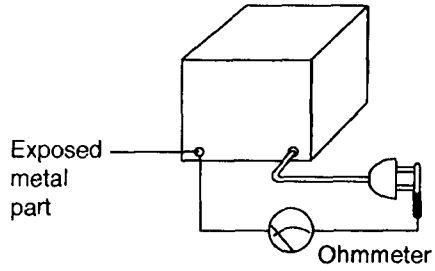
INTRODUCTION

SAFETY PRECAUTIONS

1. Before servicing, unplug the 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:

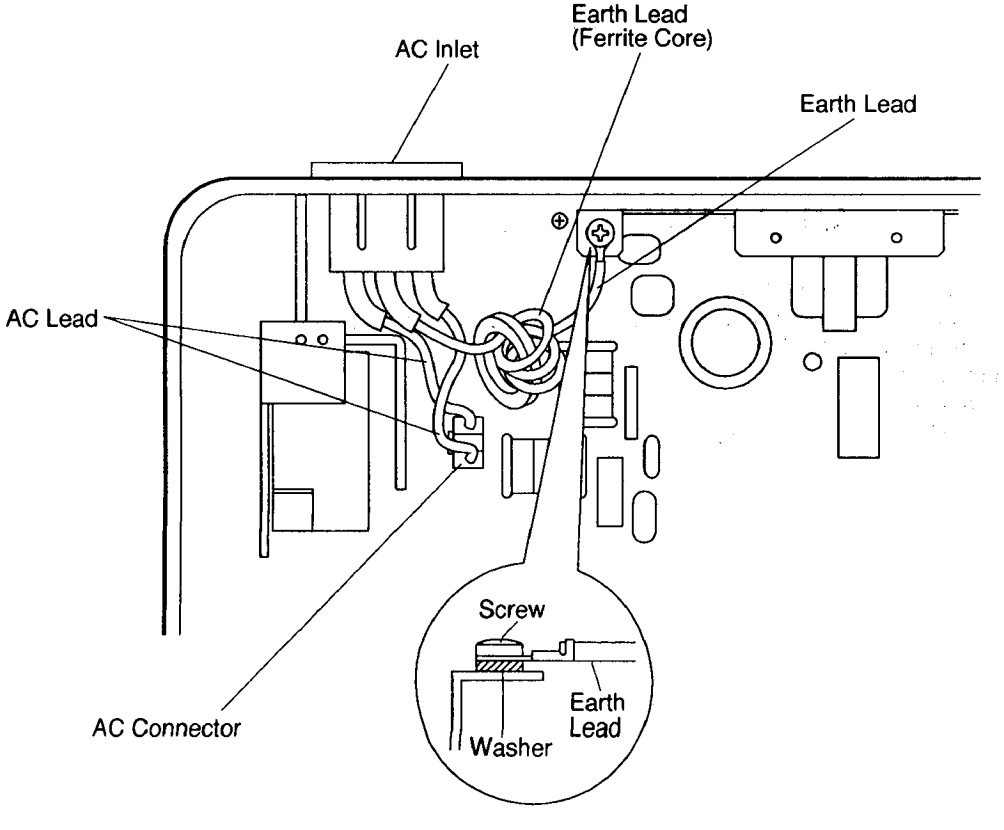
Disposal of lithium batteries should be performed by permitted, professional disposal firms knowledgeable in state government federal and local hazardous materials and hazardous waste transportation and disposal requirements.
Battery continues to have no transportation limitations as long as they are 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.
③ Wrap the AC lead around the core 3 times.

(BOTTOM VIEW)



STANDARD BATTERY LIFE

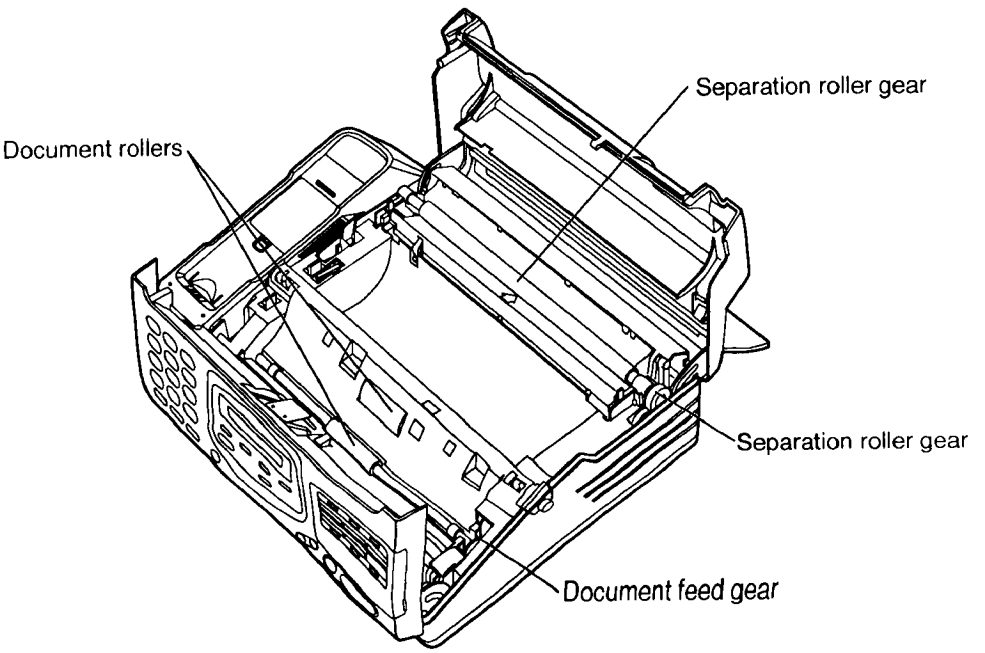
If your Panasonic battery is fully charged;

While in use (TALK)	Up to about 4.5 hours
While not in use (Stand-By)	Up to about 14 days

- Battery life may vary depending on usage conditions and ambient temperature.
- **Clean the handset and the main unit charge contacts with a dry soft cloth once a month**, or the battery may not charge properly.
- Once the battery is fully charged, you do not have to place the handset on the main unit until the TALK/BATT LOW indicator flashes slowly.
- The battery cannot be overcharged.

PERSONAL SAFETY PRECAUTIONS

Be careful not to let your hair, clothes fingers, accessories, etc., become caught in any moving sections of the unit. These are driven by the carriage monitor, and the slow down gear, the paper feed roller, the pressure roller, the eject roller, the spur, the pick-up roller, etc., which are driven by the paper feed motor. These separation roller and document feed roller which are rotated by the document feed motor and a gear which makes the two rollers rotate.
Also, the spurs are metal and sharply pointed. Be careful not to touch them accidentally by hand.



SPECIFICATIONS

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

■ Main unit

1. Applicable Lines:	Public Switched Telephone Network
2. Document Size:	Max. 216 mm (8 1/2") in width Max. 600 mm (23 5/8") in length
3. Effective Scanning Width:	208 mm(8 3/16")
4. Printing Paper Size:	216 mm × max. 50 m (8 1/2" × 164') roll
5. Effective Printing Width:	216 mm (8 1/2")
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 mode 7.7 lines/mm (196 lines/inch) -Fine/Halftone mode 15.4 lines/mm (392 lines/inch) -Superfine mode
8. Halftone Level:	64-level
9. Scanner Type:	CCD image sensor
10. Printer Type:	Thermal printing
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), 45-80 % RH (Relative Humidity)
14. Dimensions (H×W×D):	Approx. 118×366×265 mm (4 21/32" × 13 3/8" × 10 7/16")
15. Mass (Weight):	Approx. 3.4 kg (7.5 lb.)
16. Power Consumption:	Standby: Approx. 5W / Transmission: Approx. 15W Reception: Approx. 35W / Copy: Approx. 40W Maximum: Approx. 100W
17. Power Supply:	120V AC, 60Hz (This unit will not function at 50 Hz.)

■ Handset

1. Operating Environment:	5-35°C (41-95 °F), 45-80 % RH (Relative Humidity)
2. Dimensions (H×W×D):	Approx. 39×55×271 mm (1 17/32" × 2 3/32" × 10 11/16")
3. Weight:	Approx. 200 g (0.4 lb.)
4. Power Supply:	Ni-Cd battery (3.6 V, 600 mAh)
5. Frequency:	902-904 MHz, 926-928 MHz (30 channels)
6. Security Codes:	1,000,000

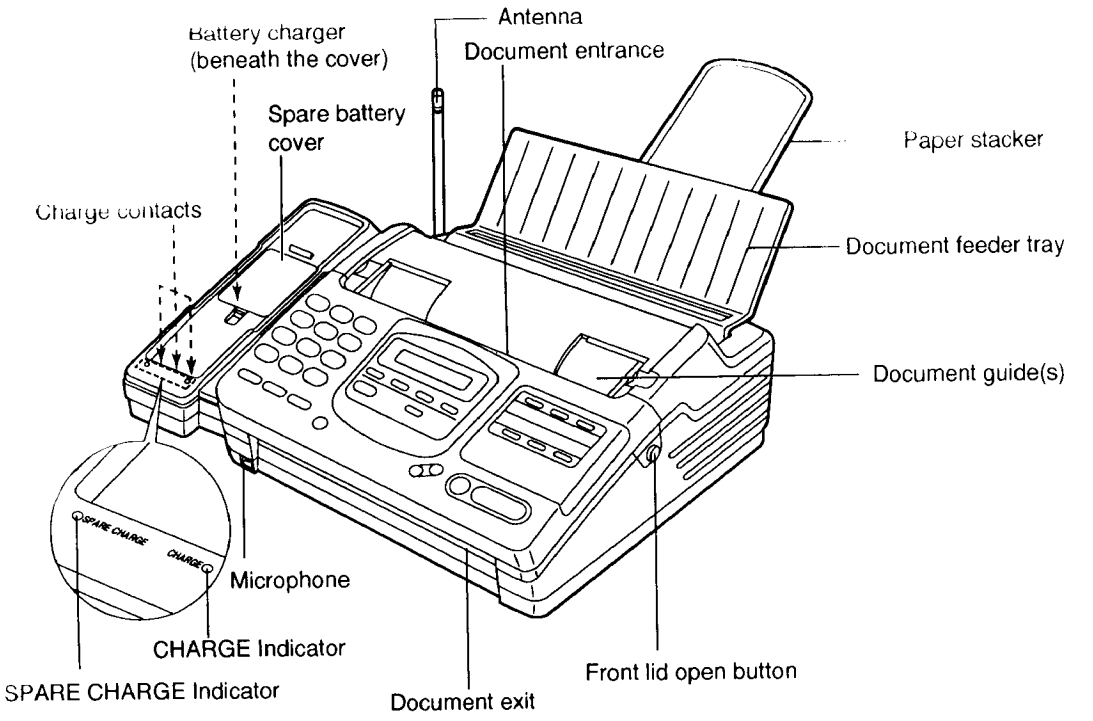
*Transmission speed depends upon the contents of the pages, resolution, telephone line conditions and capability of receiving unit. 15 second speed based upon CCITT No.1 Test Chart.
•Design and specifications are subject to change without notice.

OPTIONAL ACCESSORIES

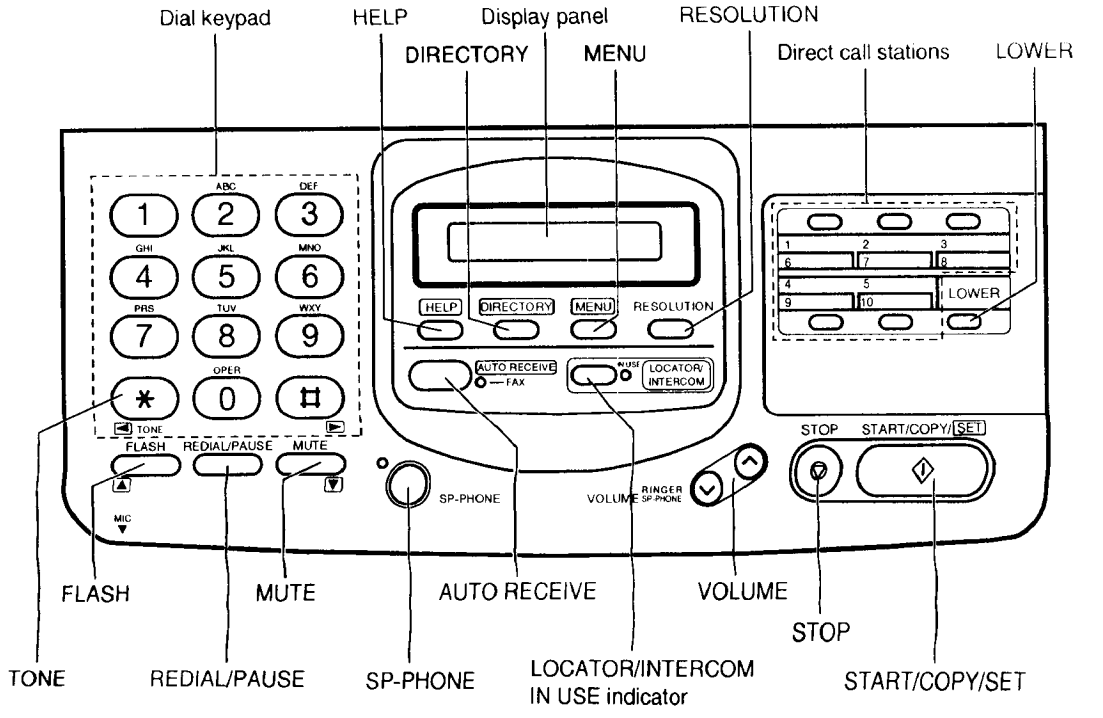
Parts No.	Description	Comment
KX-A106	Standard Thermal Recording Paper	216 mm × 30 m (8 1/2" × 98') roll, with 25 mm (1") core
KX-A116	Standard Thermal Recording Paper	216 mm × 50 m (8 1/2" × 164') roll, with 25 mm (1") core
KX-A125	Super Thermal recording Paper (Like plain paper)	216 mm × 30 m (8 1/2" × 98') roll, with 25 mm (1") core

LOCATION OF CONTROLS

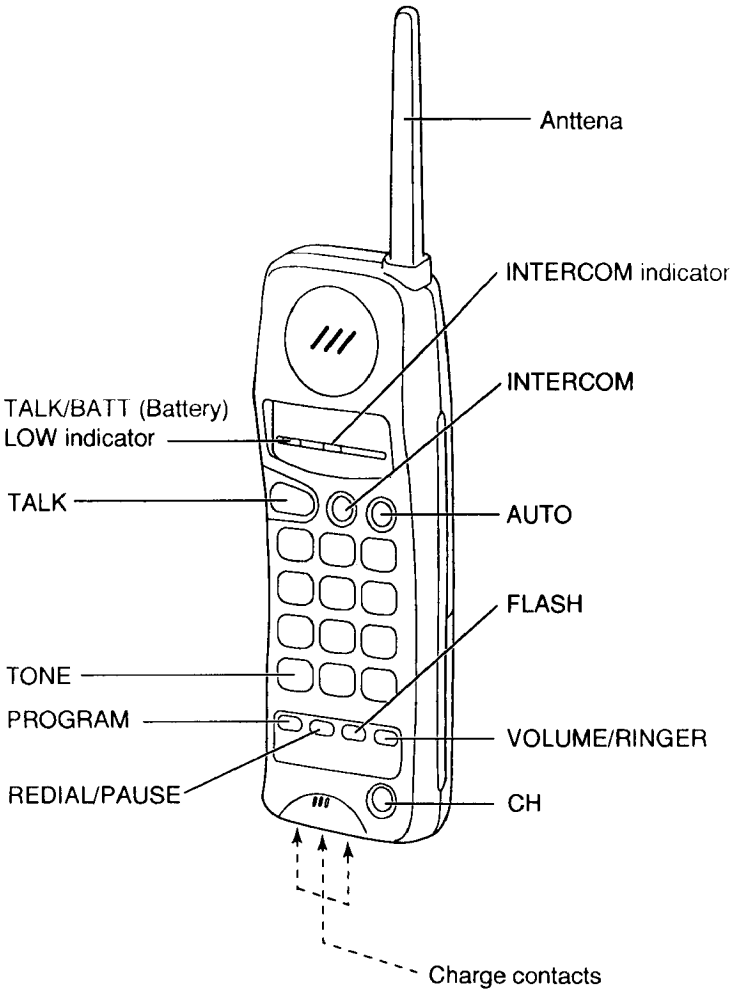
Front View



Control panel



Handset



FEATURES

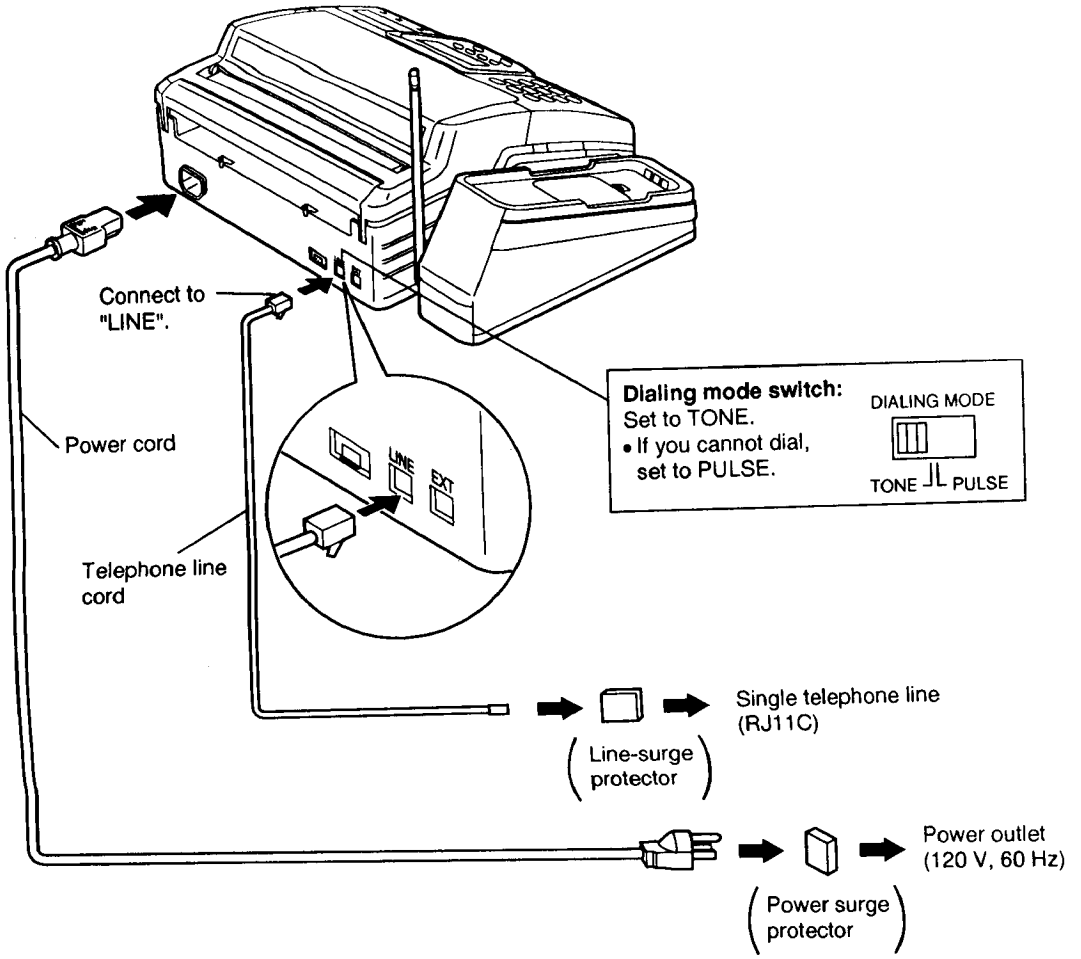
General
- *Automatic paper cutter*
- *Answering machine interface*
- *64-Level halftones resolution*
- *Large 165 ft. paper roll*
- *Help printout*

Facsimile
- *Easy-to view LCD (16-character)*
- *Automatic document feeder (up to 15 sheets)*
- *Paper curl reduction technology*
- *Resolution: Standard/Fine/Super Fine/Half Tone*
- *Distinctive ring detection*
- *Super thermal paper*
- *Correct order reception printout*

900MHz Cordless
- *Fax activation from handset*
- *Intercom with 2-way paging*
- *Lighted keypad*
- *14-day battery life*
- *Sound Charger™ technology*
- *10-station speed dial*
- *Spare battery charger*

Integrated Telephone System
- *Speakerphone*
- *Telephone directory with alpha-search*
- *One touch dialer (10 phone-number)*
- *50-station speed dialer*

CONNECTION

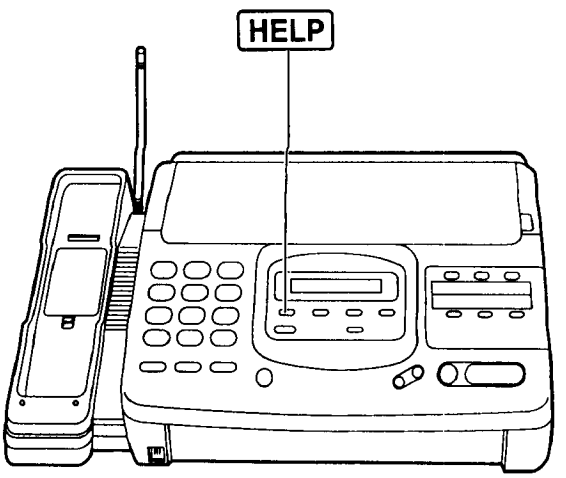


Note:

- For additional equipment protection, we recommend the use of a surge protector. The following types are available; TELESPIKE BLOK MODEL TSB (TRIPPE MFG. CO.), SPIKE BLOK MODEL SK6-0 (TRIPPE MFG. CO.), SUPER MAX (PANAMAX) or MP1 (ITW LINX).
- You can connect an extension phone or a telephone answering machine to the unit after removing the stopper on the external telephone jack (EXT).
- When you operate this product, the power outlet should be near the product and easily accessible.

Helpful hint:

If assistance is needed, press (HELP) . The unit will print a quick reference.



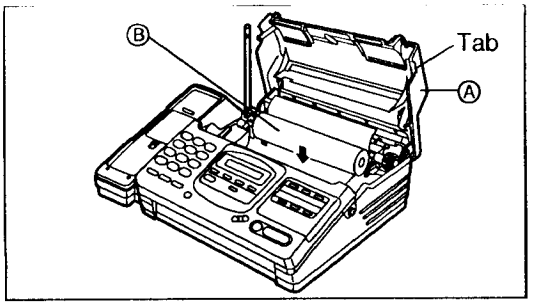
INSTALLATION

1. Installing the recording paper

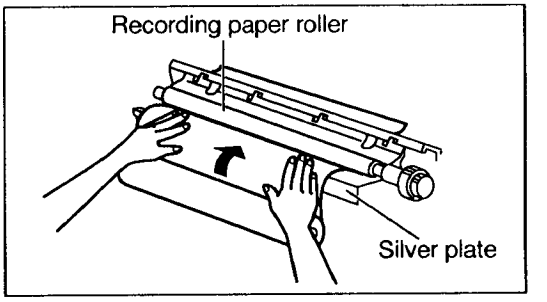
1 Ⓐ Open the back lid by lifting up the tabs located on the both sides.

Ⓑ Install a recording paper roll in the main unit.
- Make sure that the shiny side of the paper is facing down and there is no stack, tape, or glue residue on the paper roll.

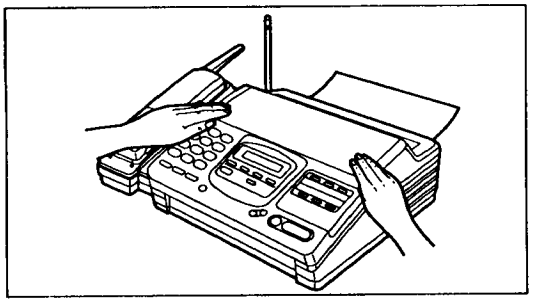
correct incorrect



2 Insert the leading edge of the recording paper between the recording paper roller and the silver plate.



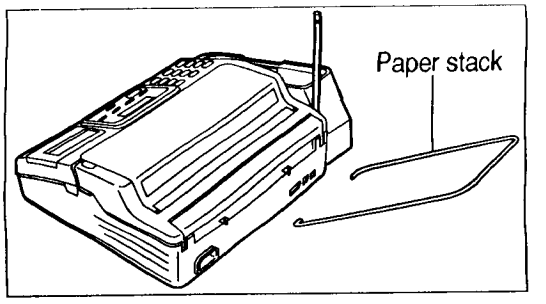
3 Close the back lid by gently pressing down on both ends.



Note:
- Only use the included roll of paper or specified recording paper, or else the print quality may be affected and/or excessive thermal head wear may occur.
- The beginning of some recording paper rolls are secured with glue or tape. Cut approximately 150 mm (6 inches) from the new roll of paper prior to installation.

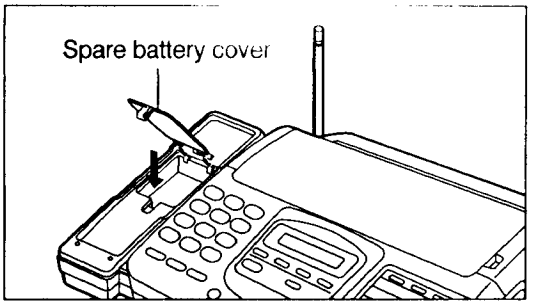
2. Installing the paper stacker

Install the paper stacker.



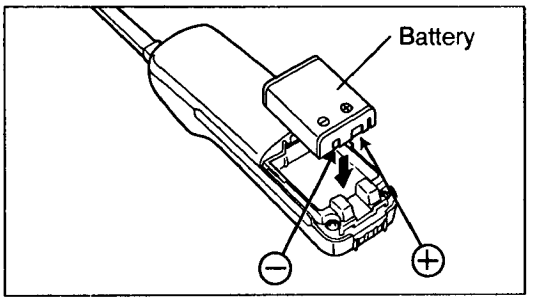
3. Installing the spare battery cover on the main unit

Close the spare battery cover.

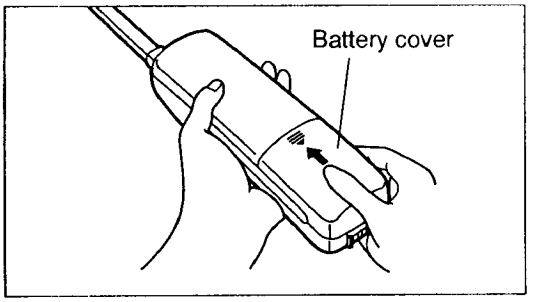


4. Installing the battery in the handset

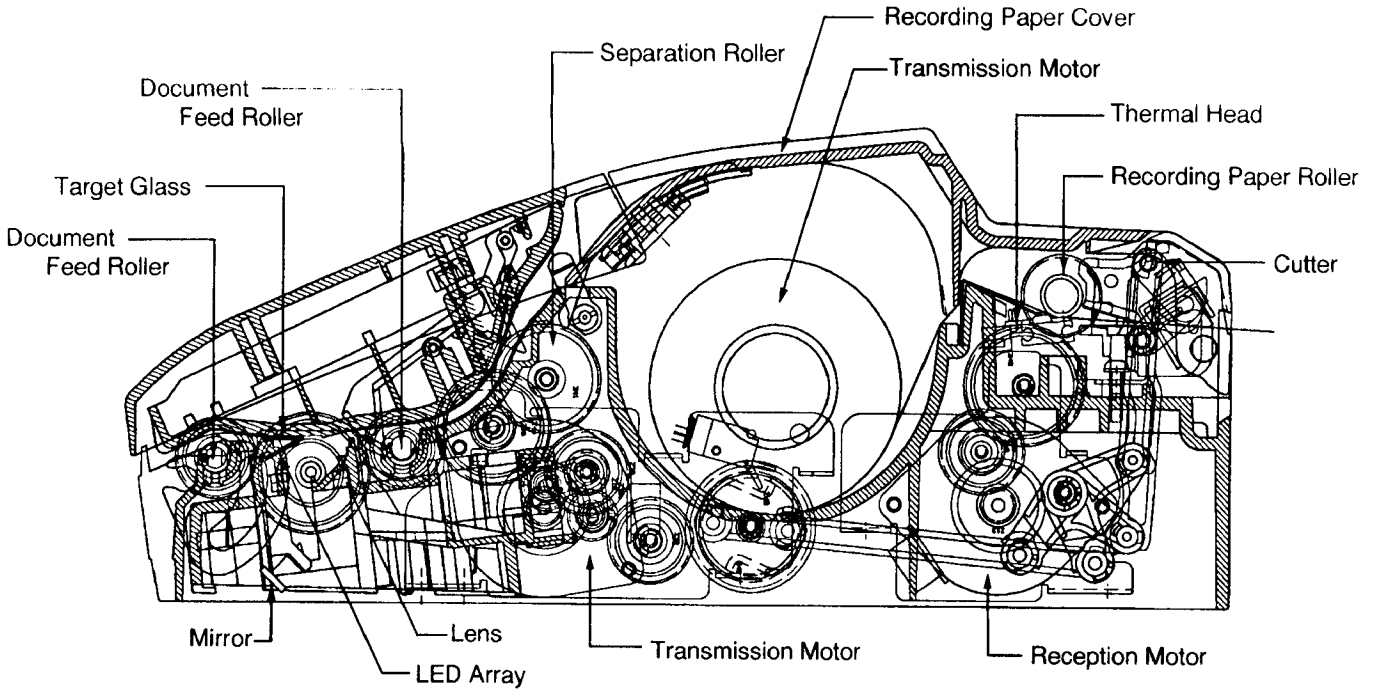
1 Install the battery as shown observing the proper polarity.



2 Install the battery cover.



COMPONENT LOCATIONS



MAINTENANCE ITEM

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 still be used, perform copying, self-testing or communications testing.

3) Check equipment

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

4) Determine causes

Determine the causes of the 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 communications 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.

2-1. MAINTENANCE LIST

NO.	OPERATION	CHECK ITEM	REMARKS
1	Document Path	Remove any foreign matter such as scrap of paper.	———
2	Rollers	If a roller is dirty, clean it with a damp cloth, then let dry thoroughly.	See page 16.
3	Recording Paper Roller	If the platen is dirty, clean it with a damp cloth, then let dry thoroughly. Remove the paper before cleaning.	See page 121.
4	Thermal Head	If the thermal head is dirty, clean the printing surface with a cloth moistened with denatured alcohol (alcohol without water), then let dry thoroughly.	See page 123.
5	LED Array	If the LED array is dirty, clean the glass with a dry soft cloth.	See page 16.
6	Sensors	Confirm the operation of the following sensors: recording paper sensor (SW273), Document sensor (PI302), Read position sensor (PI301), Cover open sensor (SW271), and JAM sensor (SW272).	See pages 77, 78.
7	Mirrors and Lens	If the mirror and lens are dirty, clean them with a dry soft cloth.	———
8	Abnormal, wear and tear or loose parts	Replace the part. Be sure that all part's screws are tight.	———

2-2. MAINTENANCE CYCLE

No.	Items	Cleaning		Replacement		Remarks
		Cycle	Procedure	Cycle	Procedure	
1	Separation Roller (Ref. No. 58)	3 months	See P. 16.	7 years (63,000 documents)	See page 120.	
2	Separation Rubber (Ref. No. 23)	3 months	– – – –	7 years (63,000 documents)	– – – –	
3	Feed Roller (Ref. No. 49, 53)	3 months	See P. 16.	7 years (63,000 documents)	See page 120.	
4	Target Glass (Ref. No. 171)	3 months	See P. 16.	7 years (63,000 documents)	– – – –	
5	Thermal Head (Ref. No. 59)	3 months	See P. 123.	7 years (63,000 documents)	See page 123.	
6	Recording Paper Roller (Ref. No. 112)	3 months	See P. 121.	7 years (63,000 documents)	See page 121.	

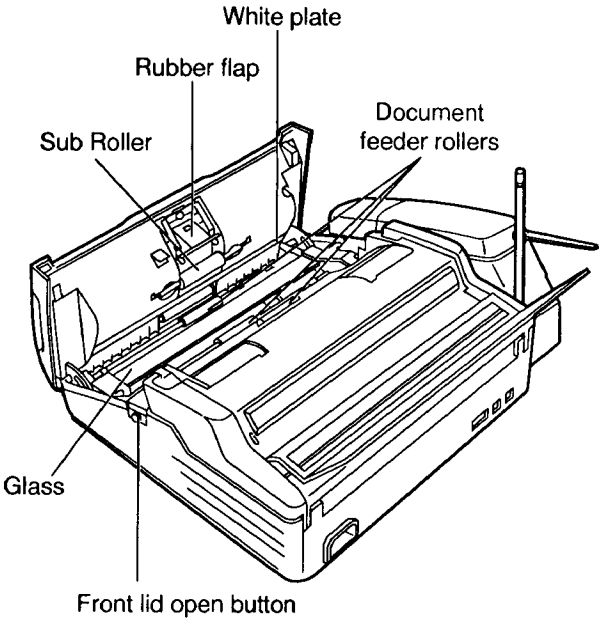
These values are only standard ones and may vary depending on usage conditions.

CLEANING THE UNIT

Cleaning the inside of the unit

If misfeeding occurs frequently, or 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.

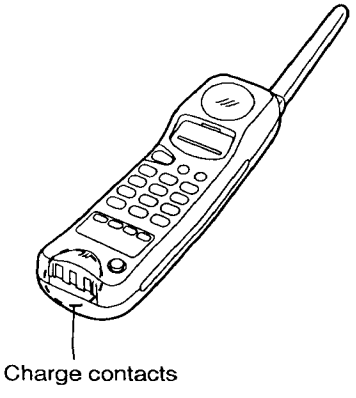
1. Disconnect the power cord and the telephone line cord.
2. Open the front lid by pressing the front lid open button.
3. Clean the document feeder rollers and roller with a cloth moistened with isopropyl rubbing alcohol, and let dry thoroughly.
4. Clean the rubber flap with a cotton swab moistened with isopropyl rubbing alcohol, and let dry thoroughly.
5. Clean the white plate and glass with a soft dry cloth.
6. Clean the front lid by gently pressing down on both ends.
7. Connect the power cord and the telephone line cord.

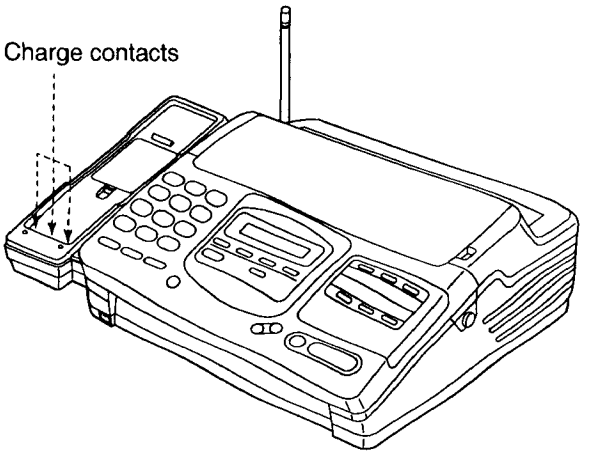


Caution:
- Do not use paper products (such as paper towels or tissues) to clean the inside of the unit.

Cleaning the charge contacts

Clean the main unit and the handset charge contacts with a dry soft cloth once a month, or the battery may not charge properly.





TROUBLESHOOTING GUIDE

1. TROUBLESHOOTING SUMMARY

1-1. TROUBLESHOOTING

After having confirmed the abnormal condition by asking the user, troubleshoot according to the instructions 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 meets 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 shock and short-circuits.
4) After troubleshooting, double check 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 in the display.

DISPLAY MESSAGE	CAUSE AND REMEDY
CALL SERVICE	● There is something wrong with the unit.
CHECK COVER	● The back lid is open. Close it.
CHECK DOCUMENT	● The document is not fed into the unit properly. Reinsert the document. If the misfeeding occurs frequently, clean the document feeder rollers inside the unit. If the problem remains, adjust the feeder pressure.
CHECK MEMORY	● Memory (phone numbers, parameters, etc.) has been erased. Re-program.
NO RESPONSE	● The receiving unit is busy or ran out of recording paper. Try again.
OUT OF PAPER	● The unit ran out of recording paper. Install a new recording paper.
PAPER JAMMED	● A recording paper jam occurred. Clean the jammed paper.
POLLING ERROR	● The other fax machine does not provide the polling function. Check with the other party.
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.
TRANSMIT ERROR	● A transmission error occurred. Try again.
UNIT OVERHEATED	● The unit is too hot. Let the unit cool down.

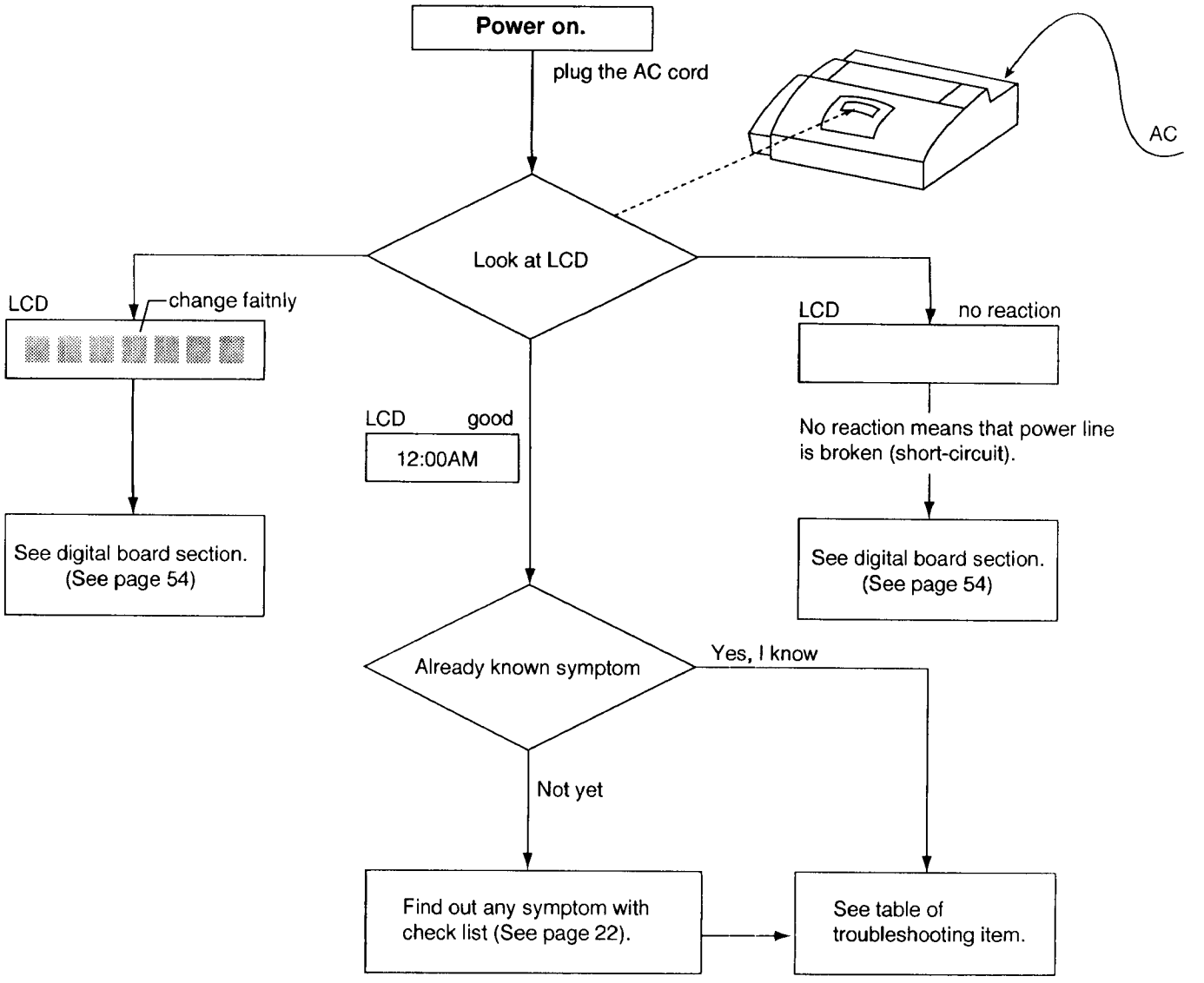
3. DETAIL OF TROUBLESHOOTING

3-1. OUTLINE

Troubleshooting is to make quality and reliability recover by finding out the broken component and exchange or adjustment or cleaning. We have to find out symptoms and then arrange troubleshooting method.
If it's tough to finding out just a broken component, we should so arrange that block or section are specified, for example "digital board" or image sensor".
A claim tag from customer or dealer gives us many kinds of expression for same trouble. Because they are not technician or engineer. But we should carefully read it on our supposition comes from experience, and sufficiently test the function related to that tag. Returns from customer or dealers often have to claim tag. In this case we need to find out the symptoms. Therefore please test the unit following simple-check-list. A problem difficult to find out may lurk, so we need to test repeatedly, for example make copy 10 pages or receiving 10 pages,.....

3-2. STARTING UP TROUBLESHOOTING

- Find out the symptom and troubleshooting method



3-3. TABLE OF TROUBLESHOOTING ITEMS

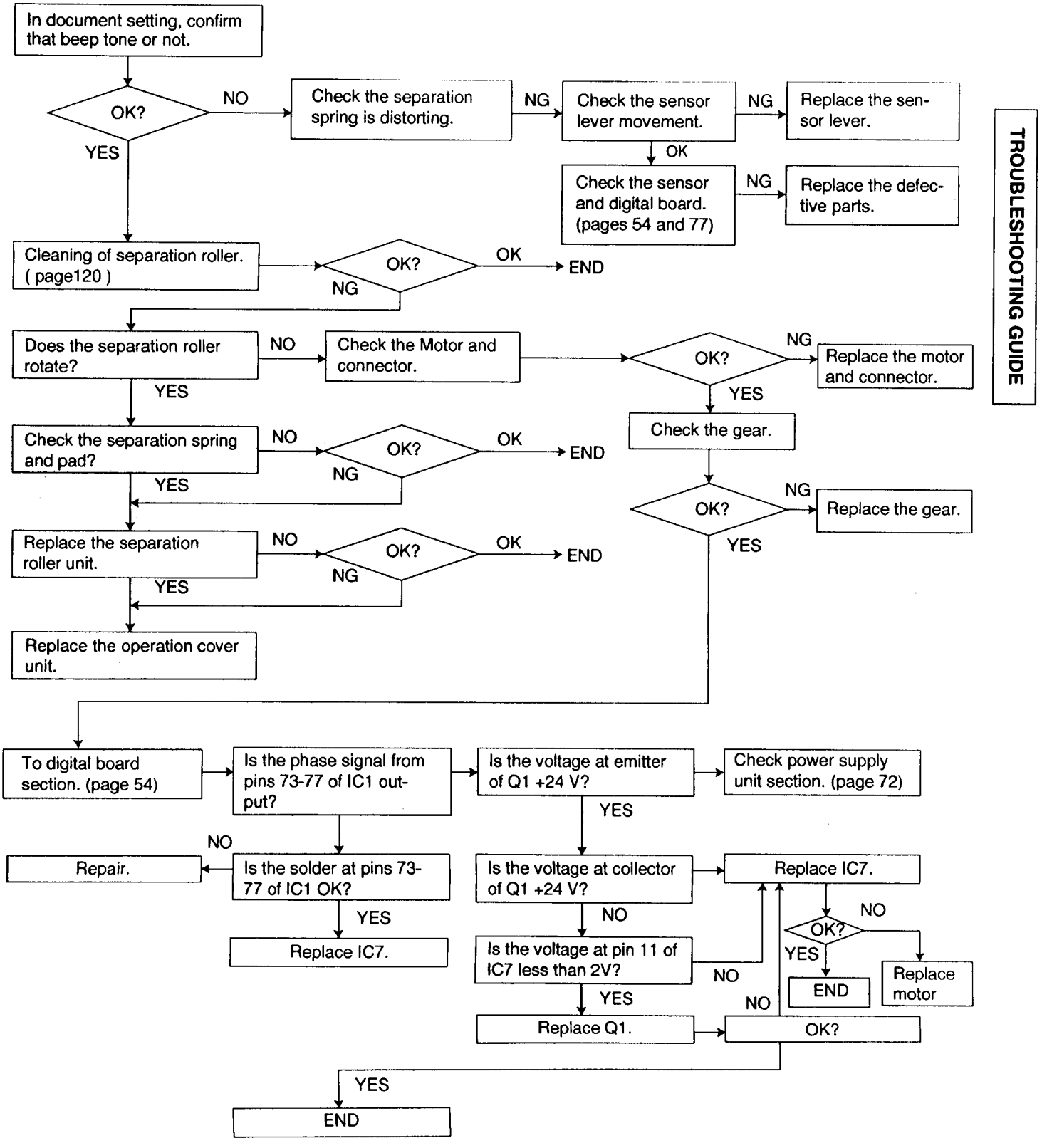
FUNCTION	SYMPTOM	SEE THIS PAGE
Unit doesn't work at all	No character or faint response in the LCD	
Printing	Skewed sending image Expanded print Image is distored Black or White lateral line on printing	Page 30 Page 30 Page 27 Page 28
ADF (Auto Document Feeder)	No feed Paper jam Multiple feed Skew	Page 23 Page 24 Page 25 Page 26
Paper feed	No feed Paper jam Multiple feed Skew	Page 23 Page 24 Page 25 Page 26
Abnormal mechanical sound	Abnormal sound from the product	Page 31
Cutter	Can not cut the recording paper	Page 29
Power supply	Voltage output is abnormal	Page 72
Operation panel	Keys are not accepted	Page 76
Sensor	"PAPER JAM" is displayed "CHECK COVER" is displayed	Page 77
Communication FAX, TEL (Analog board)	Can not fax communicate Error code is displayed Can not talk DTMF tone doesn't work Monitor sound, volume	Page 33 Page 33 Page 68 Page 68 Page 68
Cordless	No link Battery won't charge No voice reception No voice transmission	Page 87 Page 85 Page 86 Page 86

3-4. EASY-CHECK-LIST

FUNCTION		JUDGEMENT	REFERENCE
FAX operation	transmission	OK / NG	
	receiving	OK / NG	
Copy operation	FINE mode	OK / NG	
	HALF TONE mode	OK / NG	
Telephone operation	Monitor 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
Clock		OK / NG	
External TAM	Handset Transceiver/receiver	OK / NG	gain correctly? compare to your watch.
	Remote control	OK / NG	
Cordless operation	Portable handset transmission/receiver	OK / NG	Change to FAX receiving by dialing ✱✱ (Refer to user mode #41 on page 52.)
	Link	OK / NG	
	Battery charge	OK / NG	

3-5. ADF (Auto document feed) SECTION

(1) No document feed



(2) Paper JAM

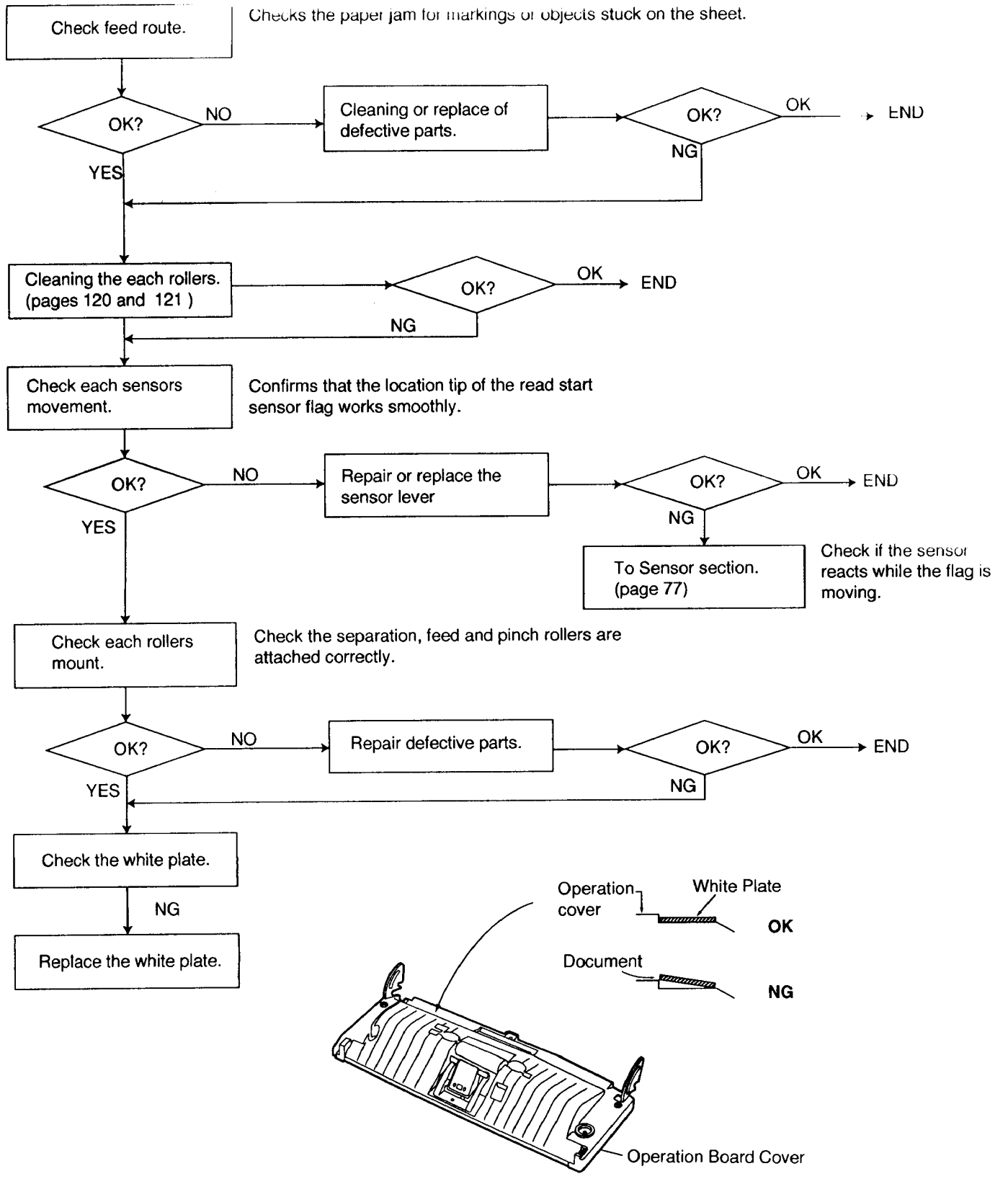
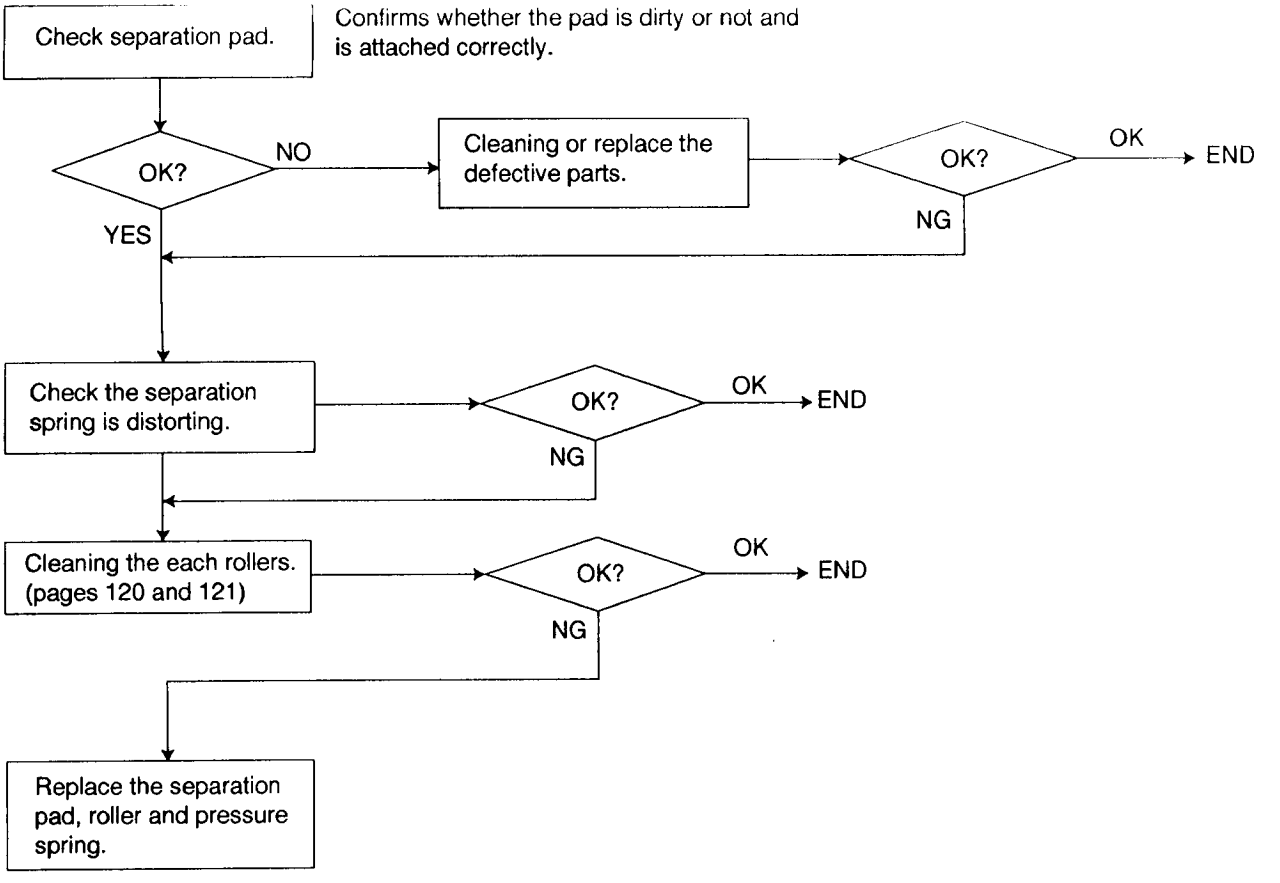
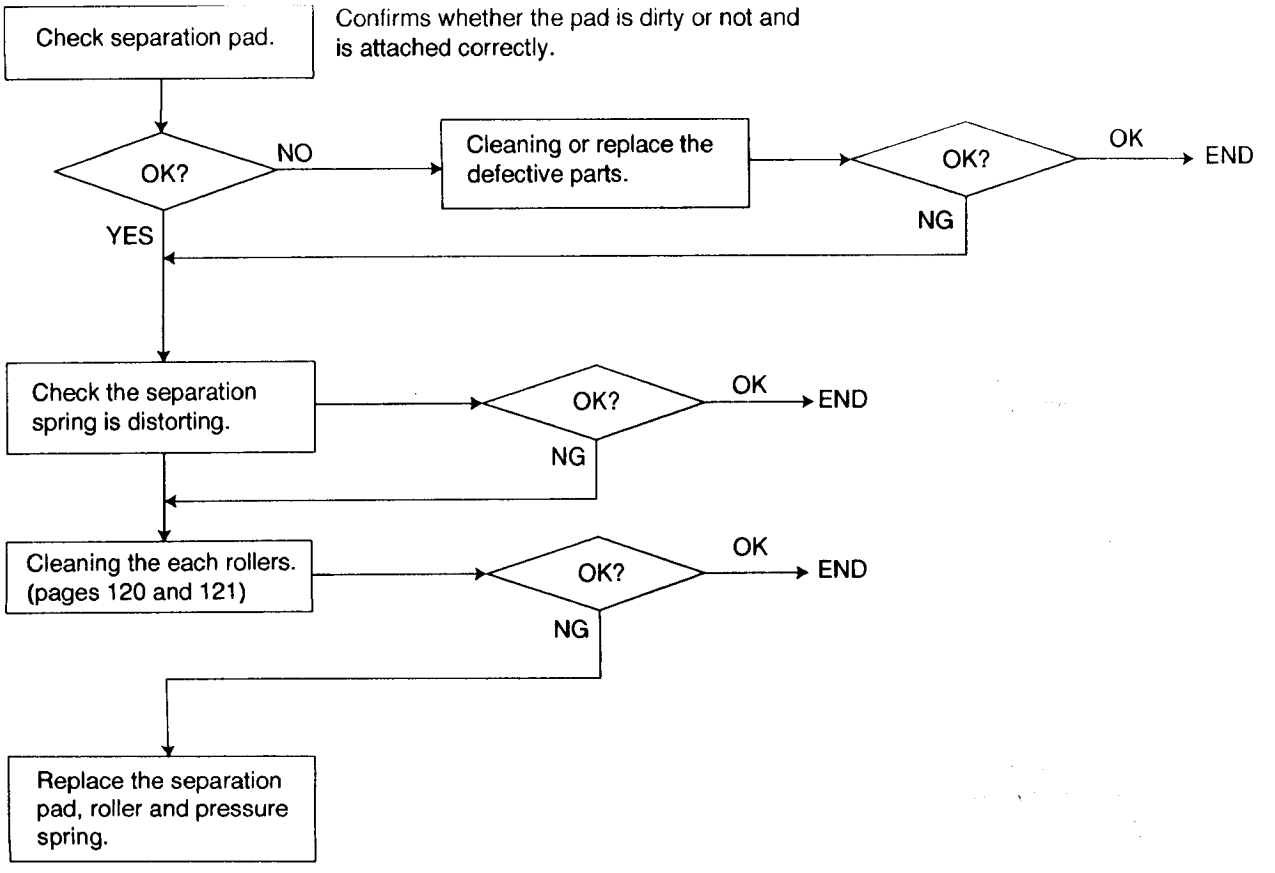


Fig. A

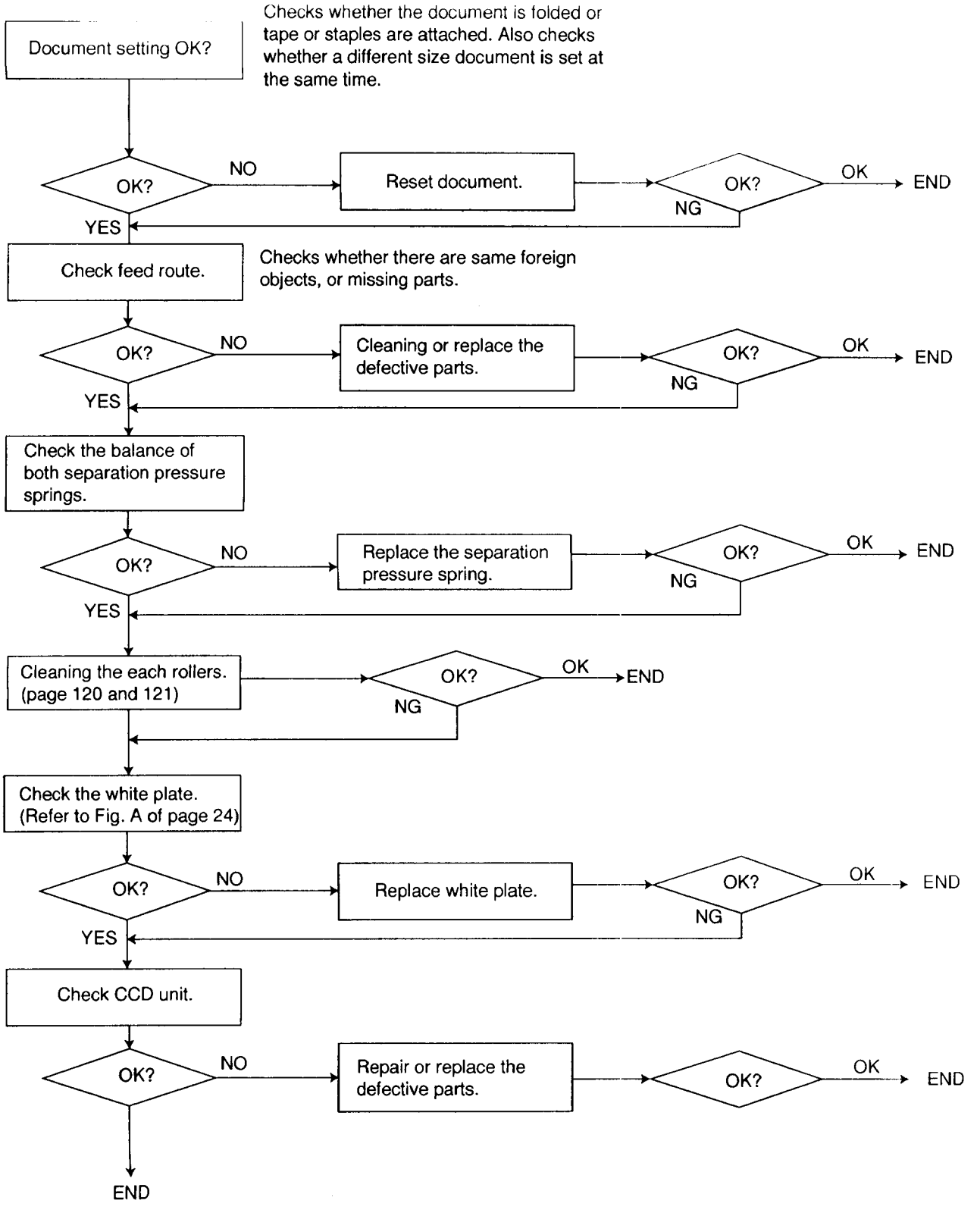
(3) Multiple feed



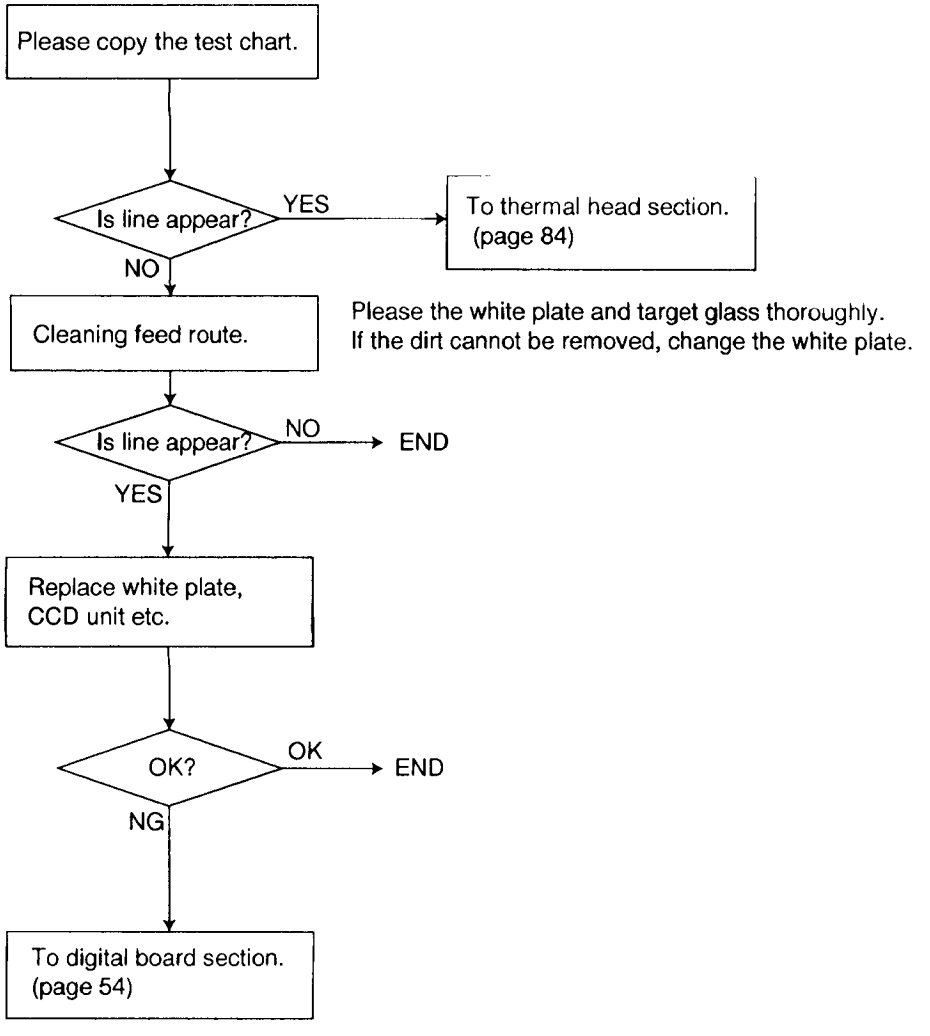
(3) Multiple feed



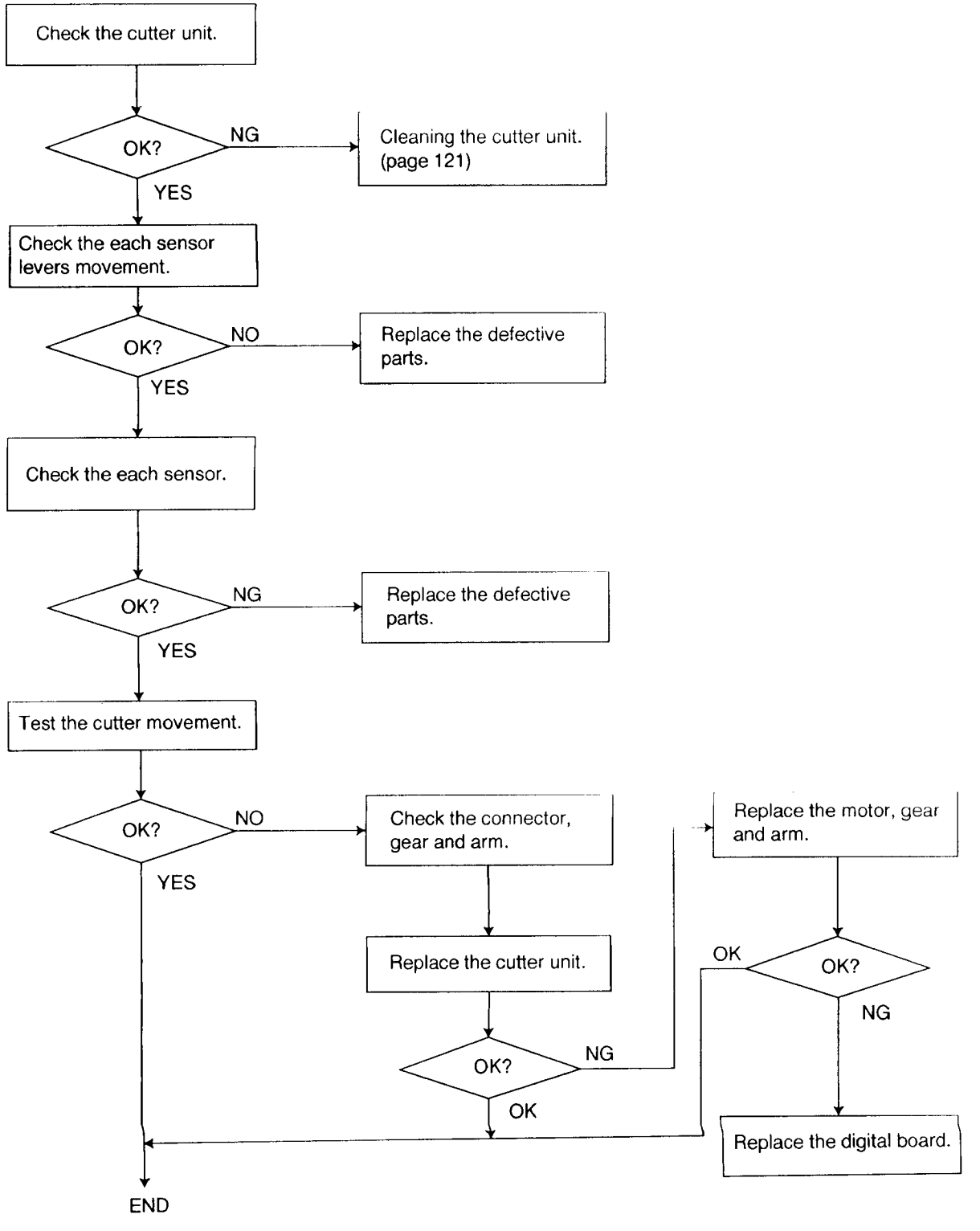
(4) Skew


Document setting OK?
Checks whether the document is folded or tape or staples are attached. Also checks whether a different size document is set at the same time.
OK?
NO
Reset document.
OK?
OK
END
NG
YES
Check feed route.
Checks whether there are same foreign objects, or missing parts.
OK?
NO
Cleaning or replace the defective parts.
OK?
OK
END
NG
YES
Check the balance of both separation pressure springs.
OK?
NO
Replace the separation pressure spring.
OK?
OK
END
NG
YES
Cleaning the each rollers. (page 120 and 121)
OK?
OK
END
NG
Check the white plate. (Refer to Fig. A of page 24)
OK?
NO
Replace white plate.
OK?
OK
END
NG
YES
Check CCD unit.
OK?
NO
Repair or replace the defective parts.
OK?
OK
END
END

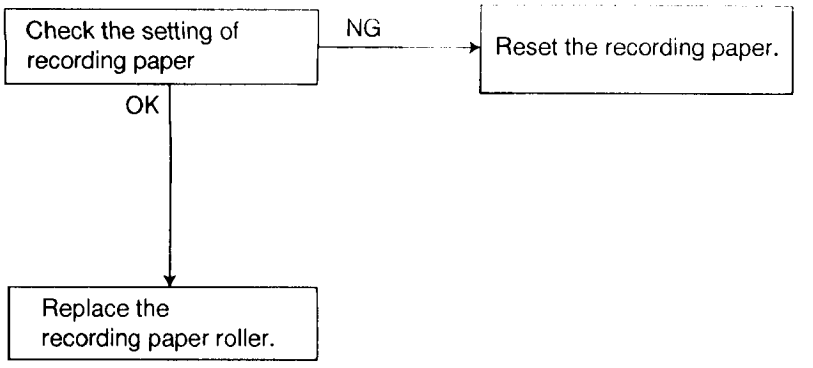
(6) Black or white vertical lines appear.



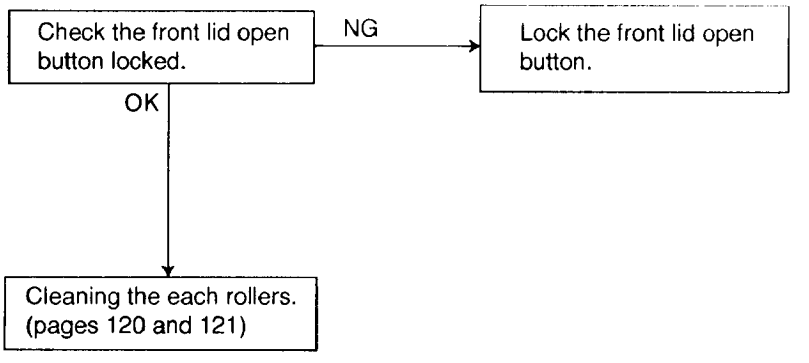
(7) Can not cut the recording paper.



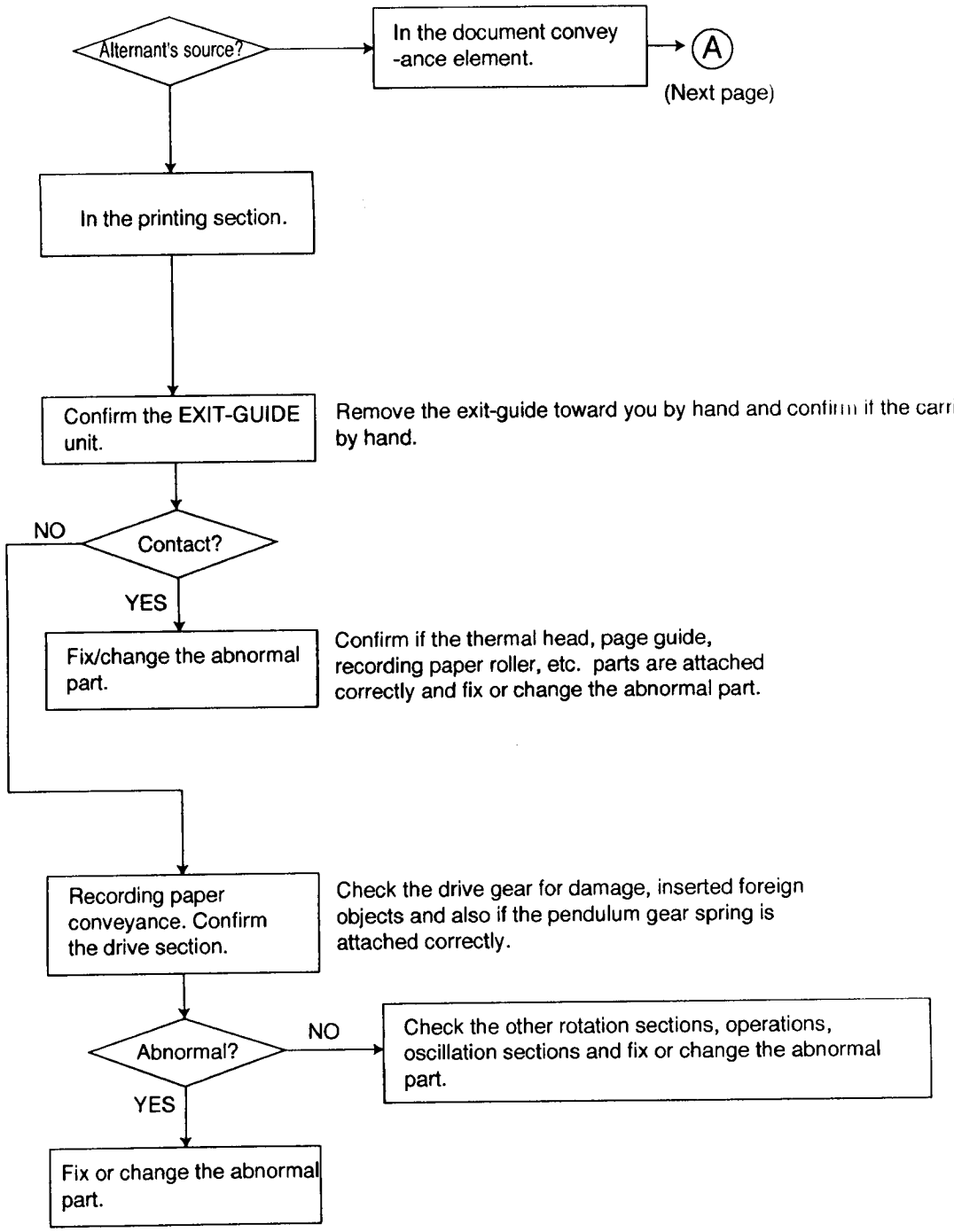
(8) Skewed sending image

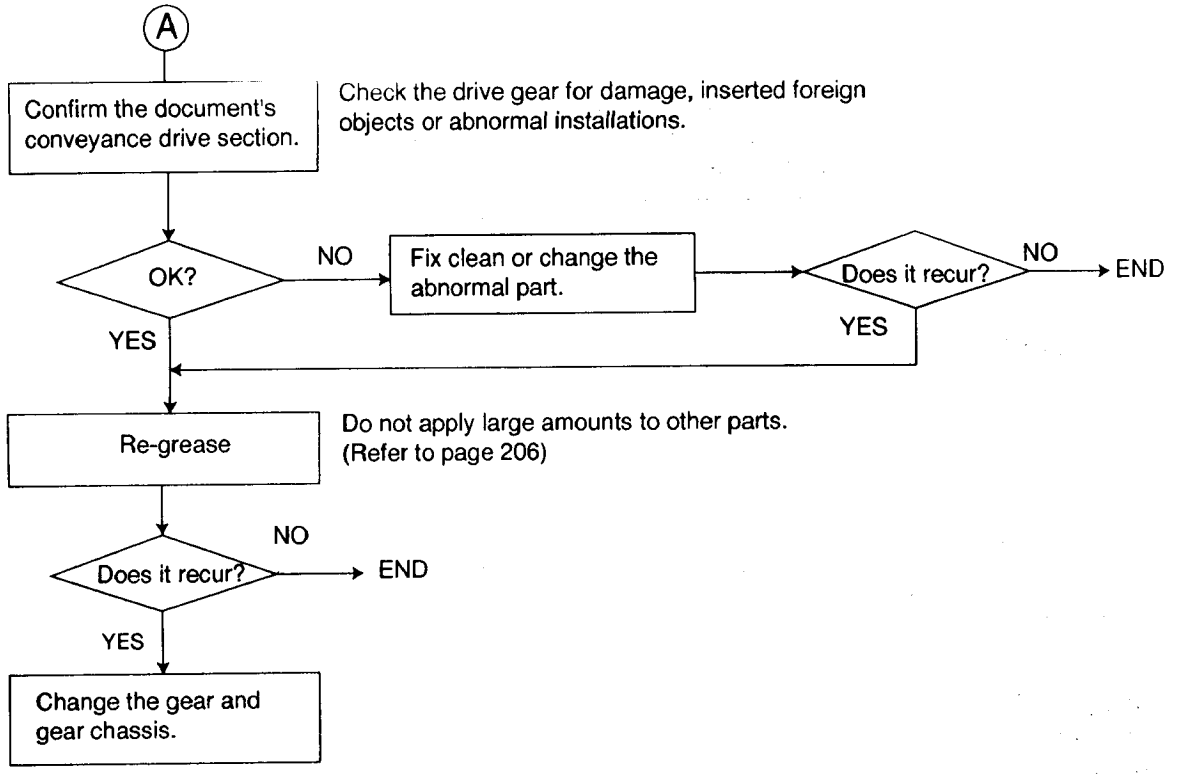


(9) Expanded print



(10) When copying or printing an abnormal sound is heard from the unit.




A
Confirm the document's conveyance drive section.
Check the drive gear for damage, inserted foreign objects or abnormal installations.
OK?
NO
Fix clean or change the abnormal part.
Does it recur?
NO
END
YES
YES
Re-grease
Do not apply large amounts to other parts.
(Refer to page 206)
Does it recur?
NO
END
YES
Change the gear and gear chassis.

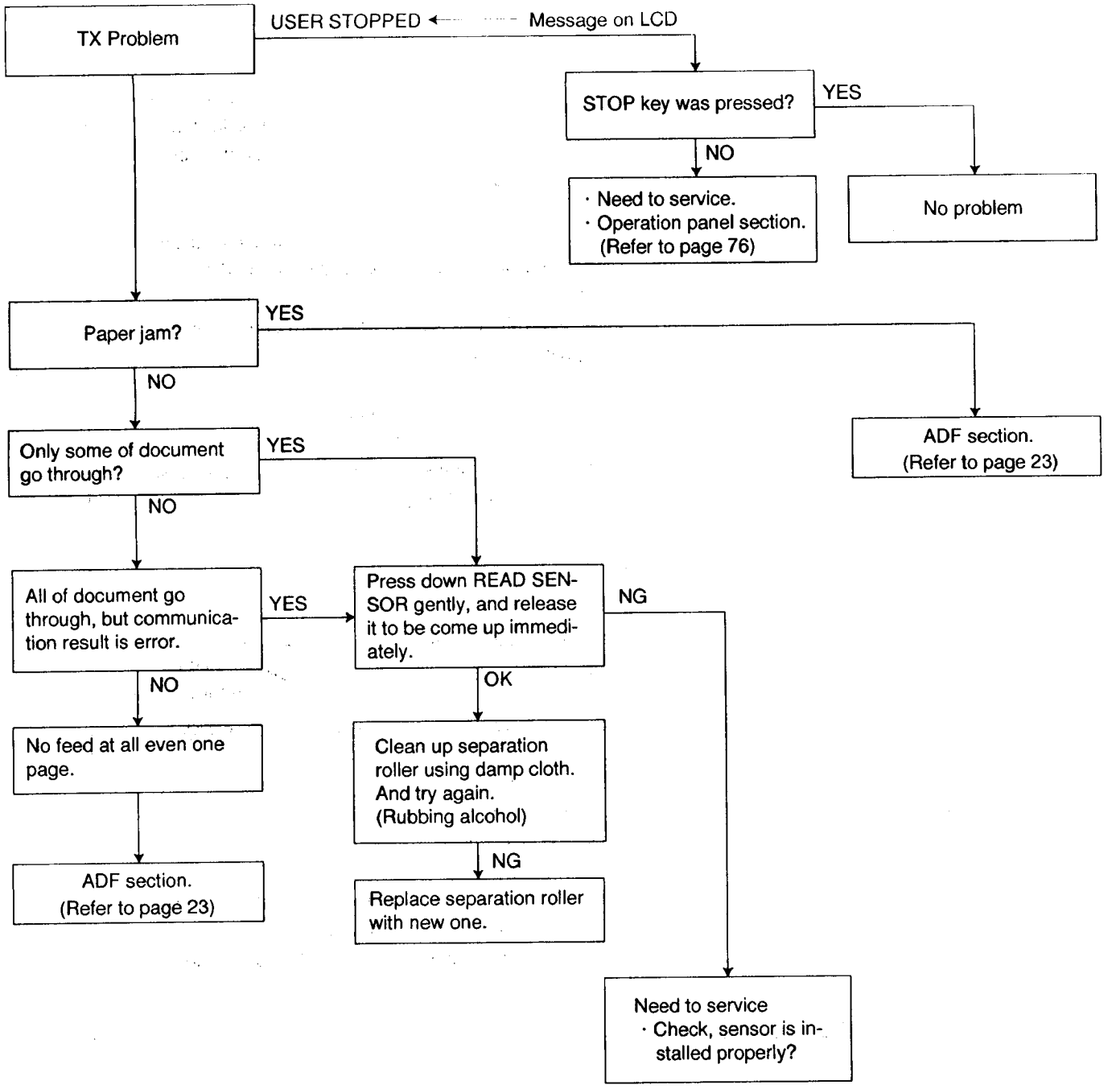
3-6. COMMUNICATION SECTION

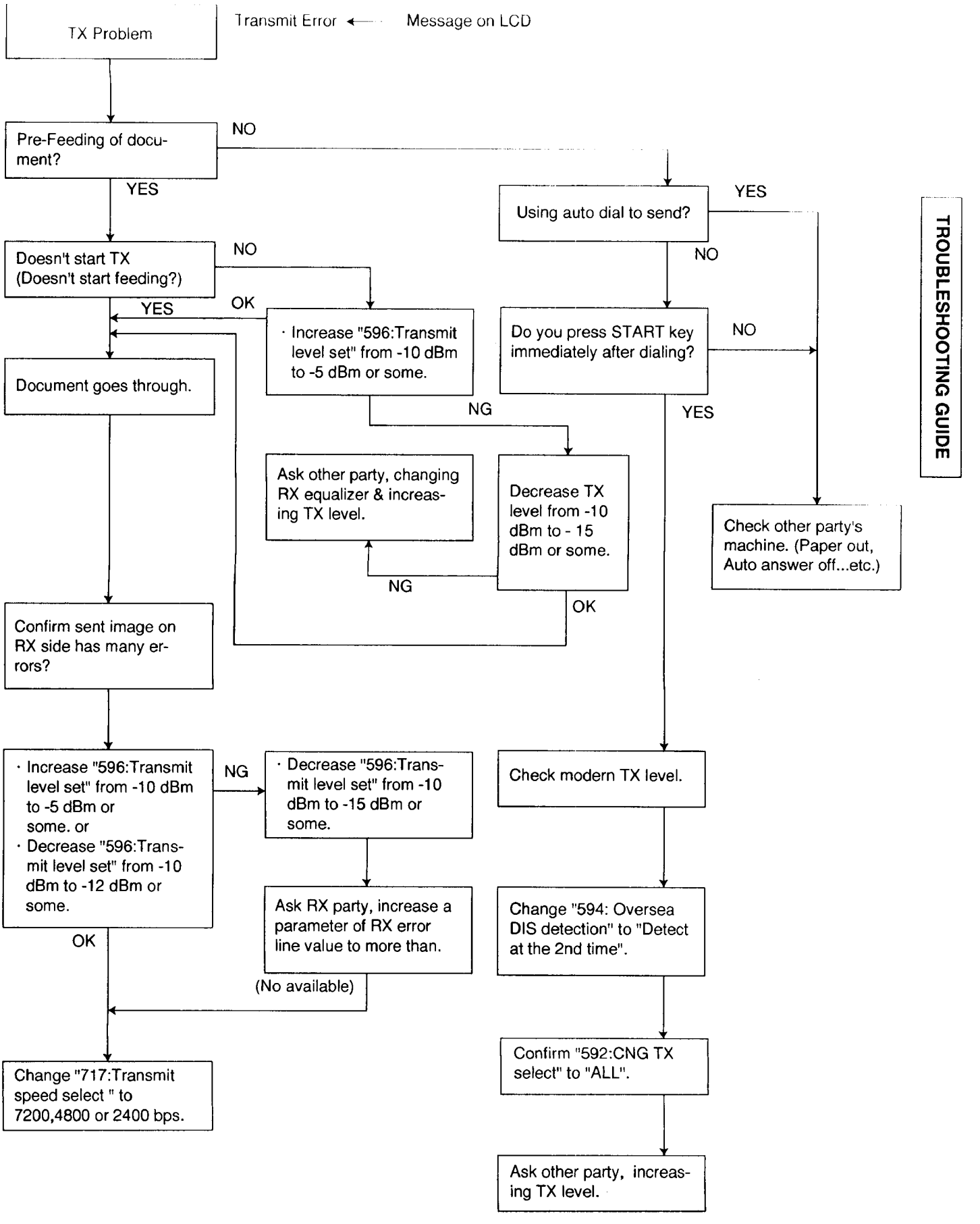
Communication connection (modem)
(Print defect in FAX communication)

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 buss.
① Paper is not output		The transmitted sending side's signal was not received. If the DTMF tone is not heard, change the IC11 modem. If the DTMF tone is heard, there is a problem in the signal pass route. ↓ Another problem Confirm the repair method in the DEFECTIVE FACSIMILE SECTION. (Refer to page 34)
② The picture is out of order		A communication error has arose. → Refer to the error code (Refer to page 41) The sending side's signal was cut during receiving.
③ The picture was cut off halfway		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

① Transmit problem

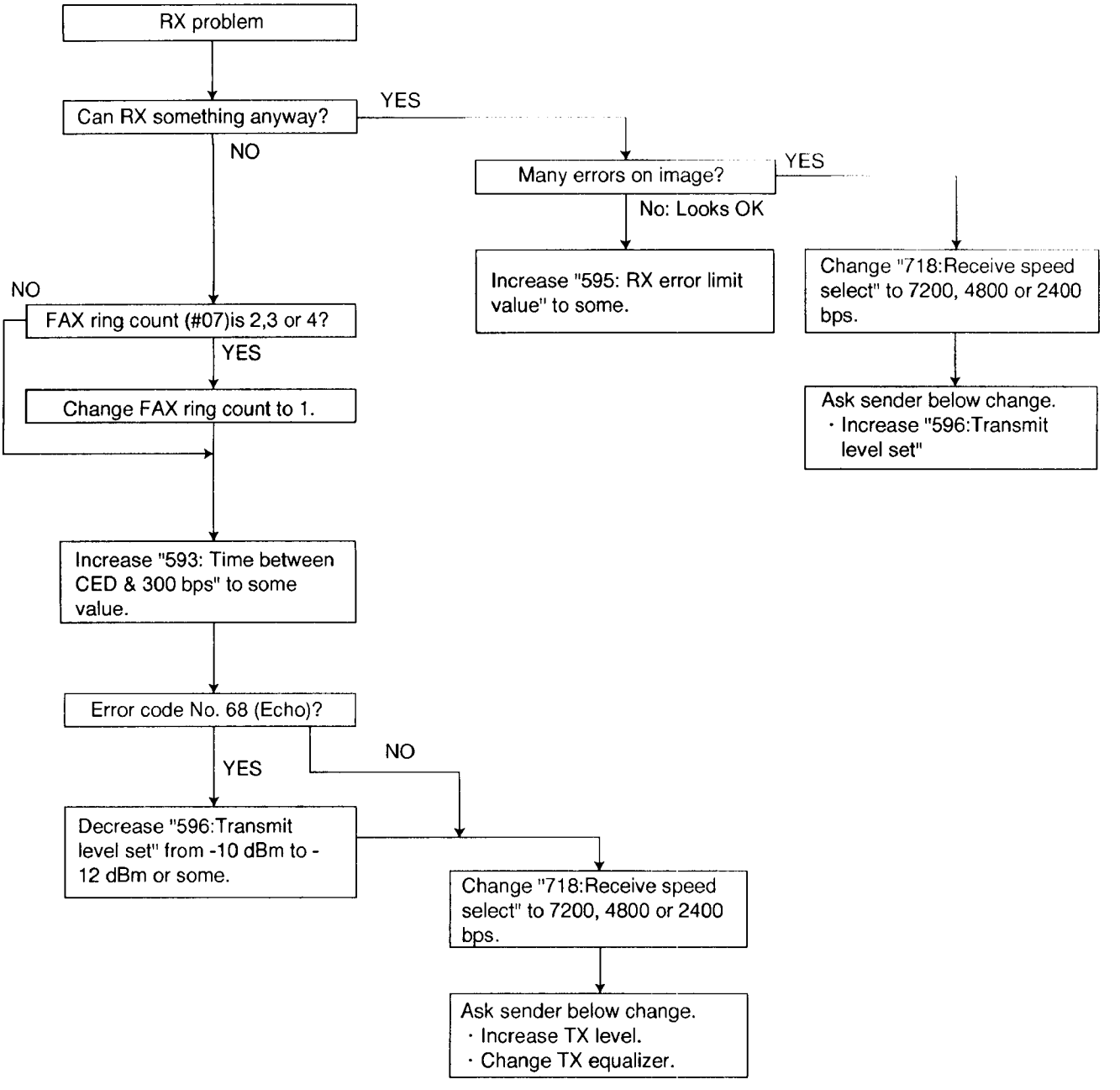



TX Problem
Transmit Error ← Message on LCD
Pre-Feeding of document?
NO
YES
Doesn't start TX (Doesn't start feeding?)
NO
YES
OK
· Increase "596:Transmit level set" from -10 dBm to -5 dBm or some.
Document goes through.
Confirm sent image on RX side has many errors?
· Increase "596:Transmit level set"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

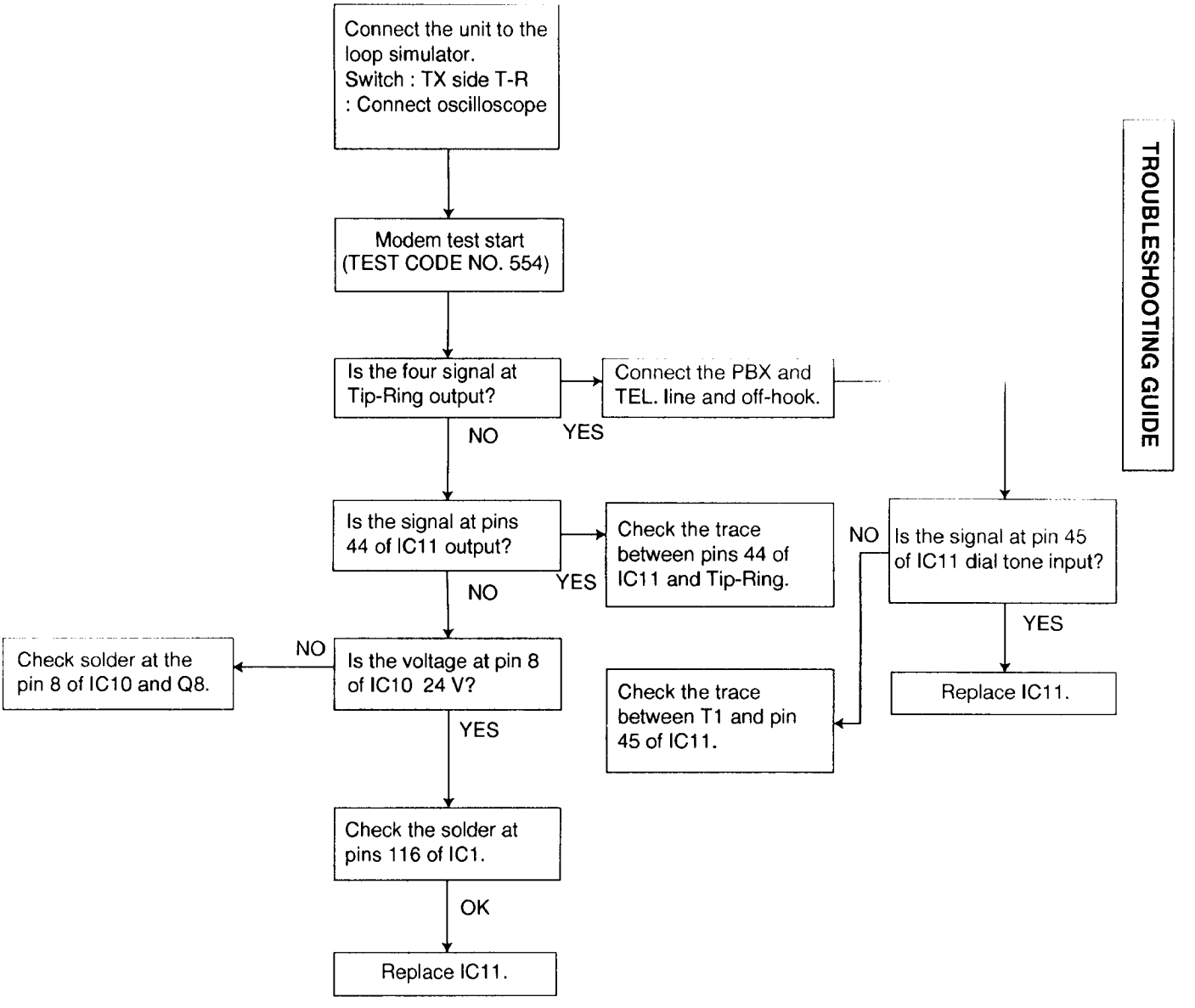


Confirm below before starting troubleshooting.

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

Please refer to "2. User Recoverable Errors" (Refer to page 19) 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

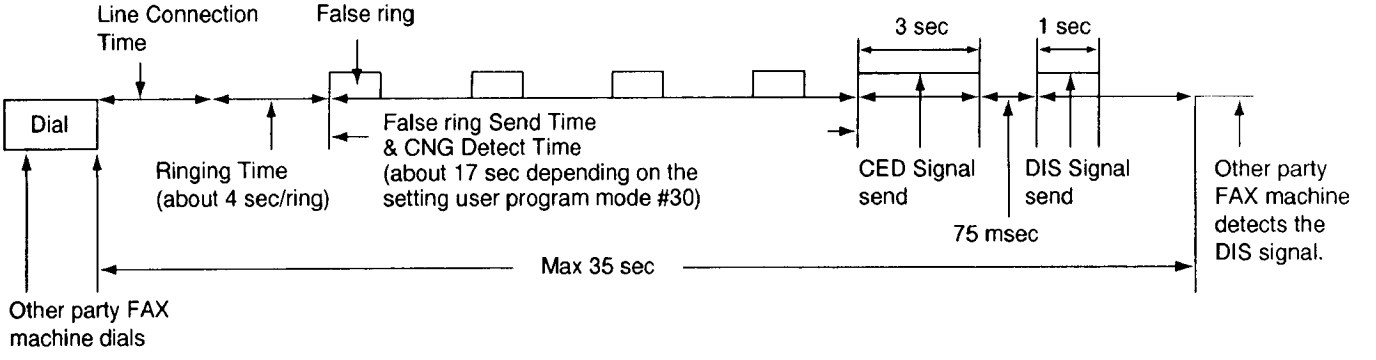


④ Unit can copy, but can not transmit/receive long distance or international communication

The following 2 causes can be considered for this.

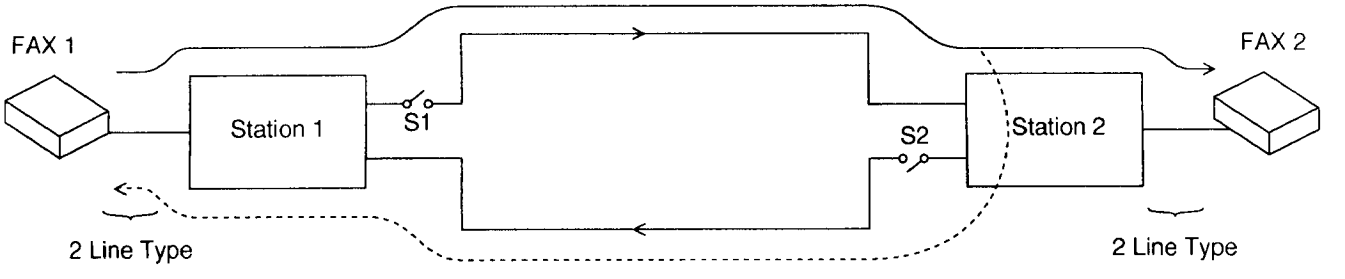
Cause 1:
The other party is executing automatic calling, the call has been received by this unit, and this time until response with a CED or DIS signal has been too long. (In almost case, this unit detects CNG signal and can respond to CED or DIS.) (According to the ITU-T standard, the communication 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) The TEL/FAX DELAYED RING count should be 1. (user parameter: code No. 06)
(B) 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-F900 shall be assumed for FAX1 and a set of a different company shall be assumed for FAX2.
In case of transmission from the KX-F900 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-F900 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-F900 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-F900 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. The TEL/FAX DELAYED RING count should be 1. (user parameter: code No. 06) 2. If possible, manual transmission should be made from the transmission side. 3. If possible, two pauses should be inserted at the end of the auto dial number of the transmission side. 4. 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 is incorrect (Long distance or international communication operation)

This depends widely on the transmission and reception capability of the other FAX set and the line conditions. The countermeasures for this 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 should be incorrect, set the receiving speed to 4800BPS. (service mode: code No. 718)

(2) Communication error functions

① **Operation:**

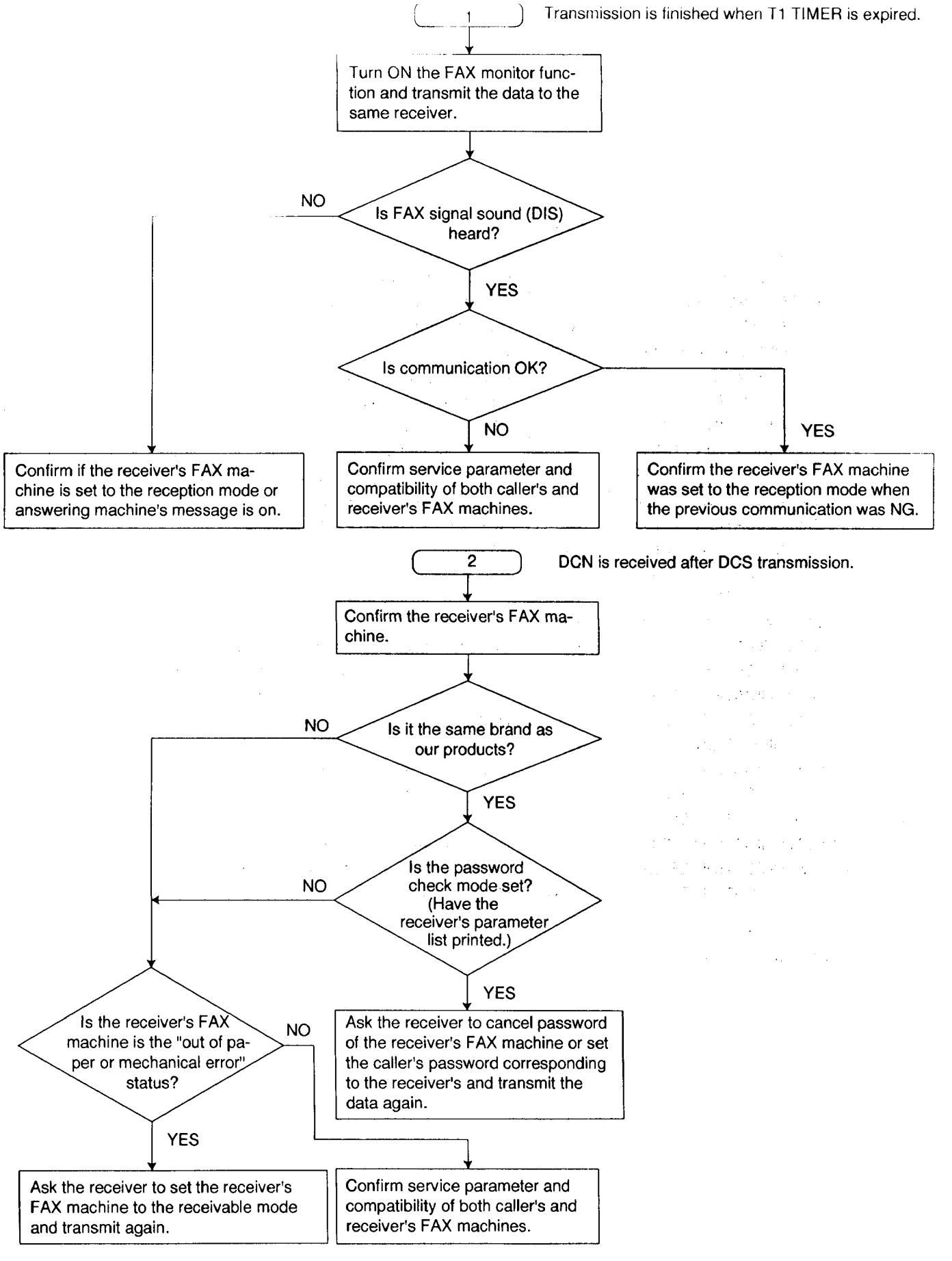
1. Press the MENU button 3 times.
2. Press the START/SET button and ▼ button 4 times.
3. Press the START/SET button.
4. Print out.

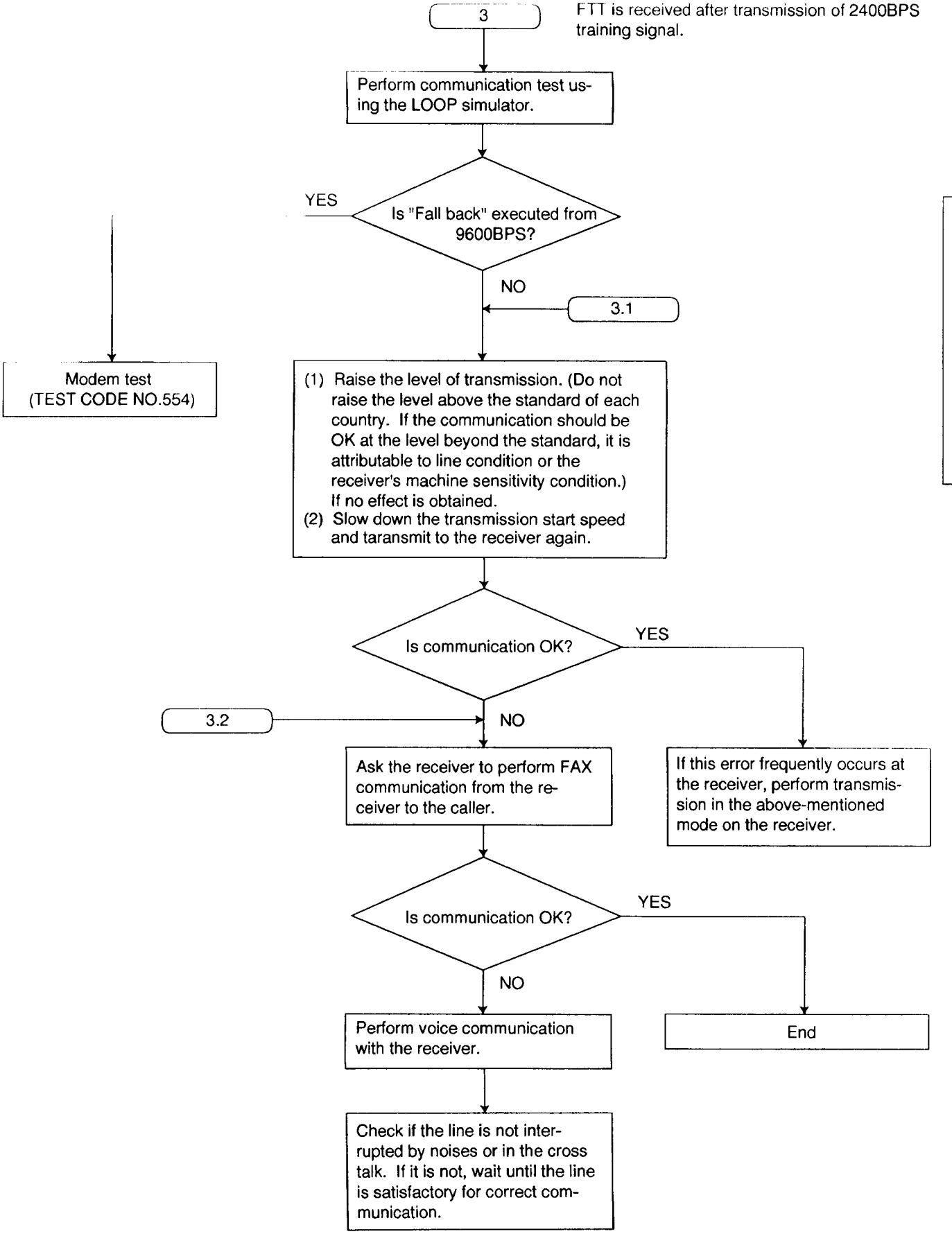
② **Error code table:**

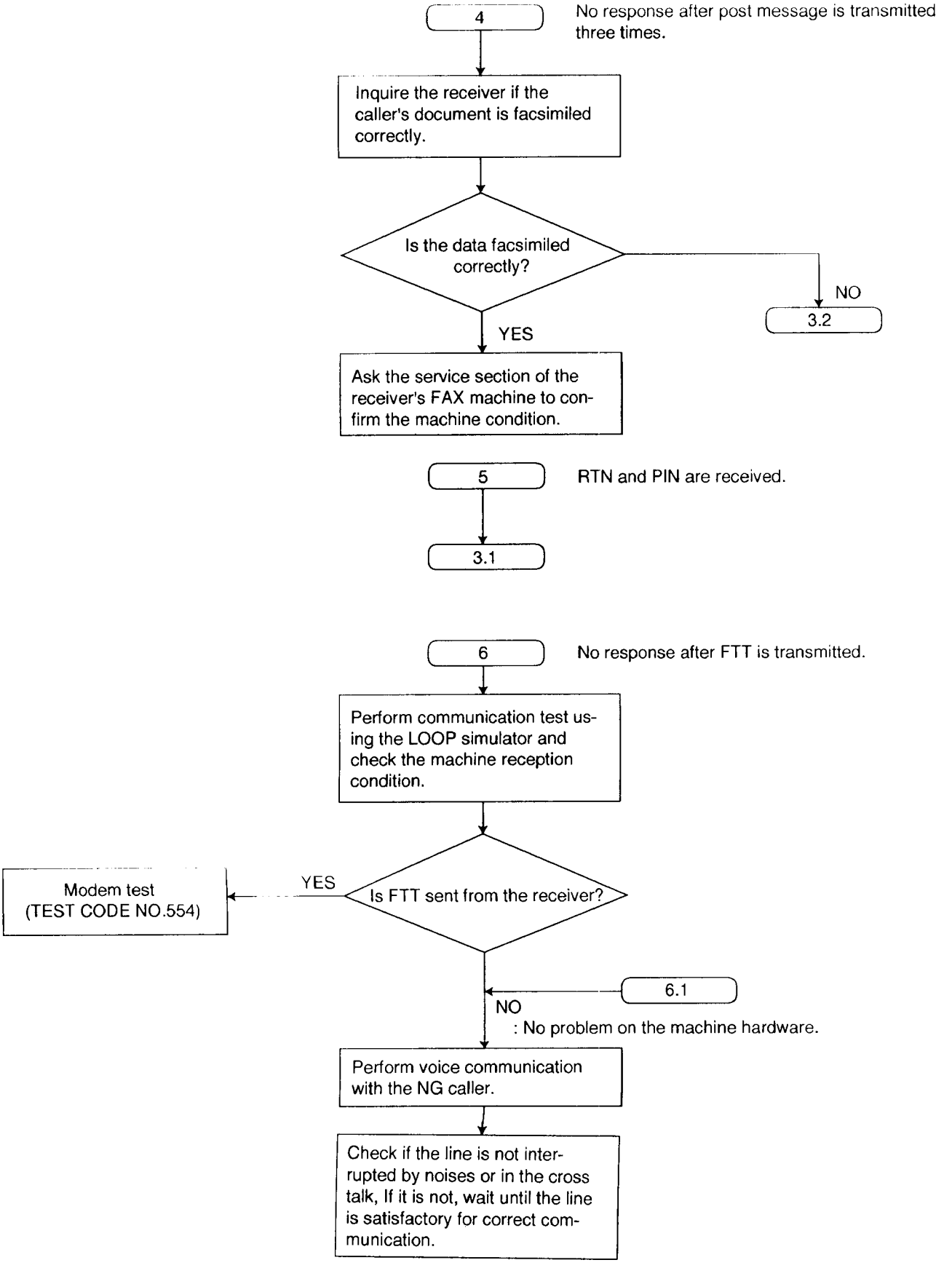
CODE	RESULT	MODE	SYMPTOM	Counter-measure
	PRESSED THE STOP KEY	TX & RX	Communication was interrupted with the STOP button	
	DOCUMENT JAMMED	TX	Document paper is jammed	
	NO DOCUMENT	TX	No document paper	
	PRINTER OVERHEATED	RX	Thermal head is overheated	
	PAPER OUT	RX	Out of thermal paper	
	THE COVER WAS OPENED	TX & RX	Cover is open	
	PAPER JAMMED	RX	Recording paper is jammed	
	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
	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
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
FF	COMMUNICATION ERROR	TX & RX	Modem error	12

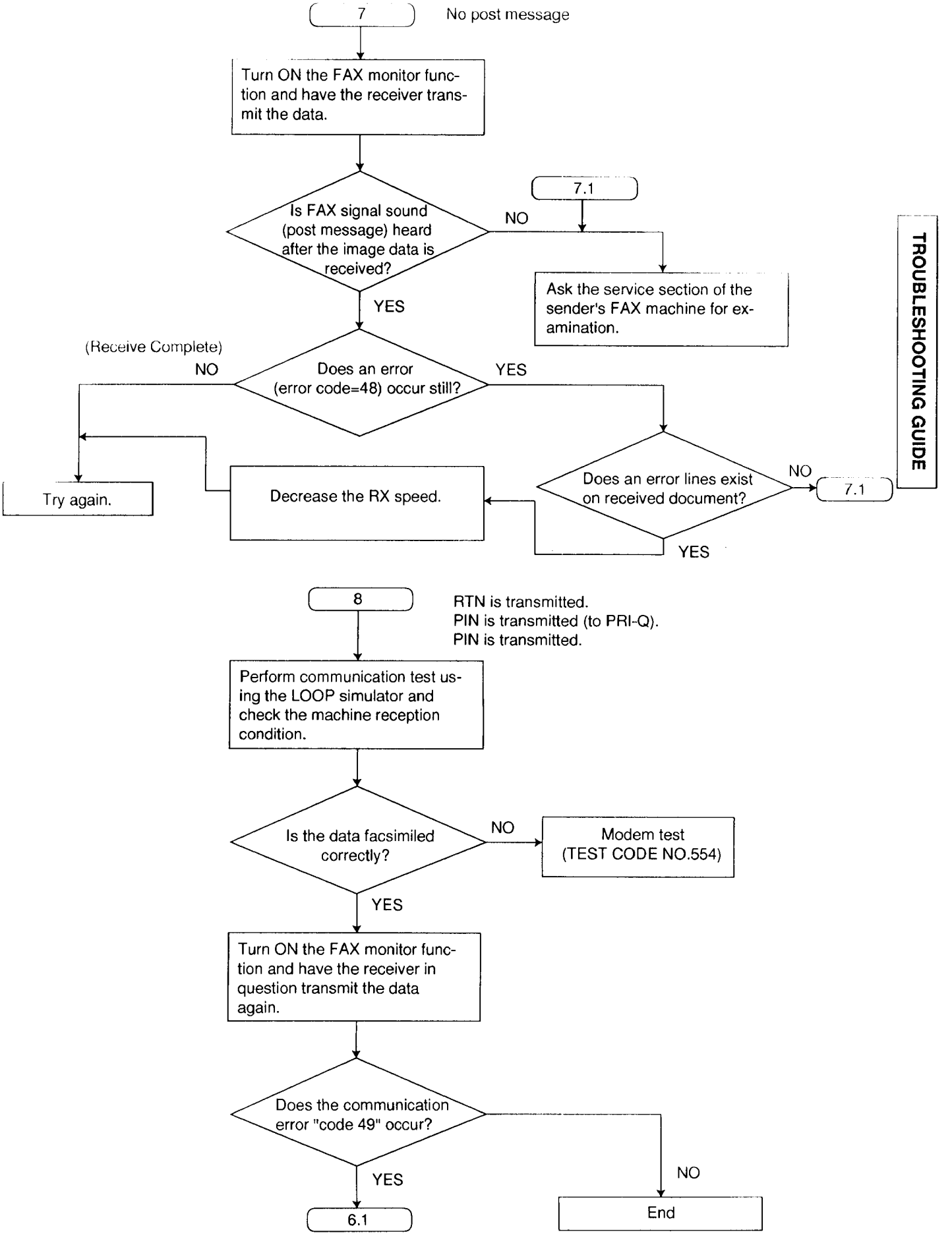
TX=TRANSMISSION RX=RECEPTION

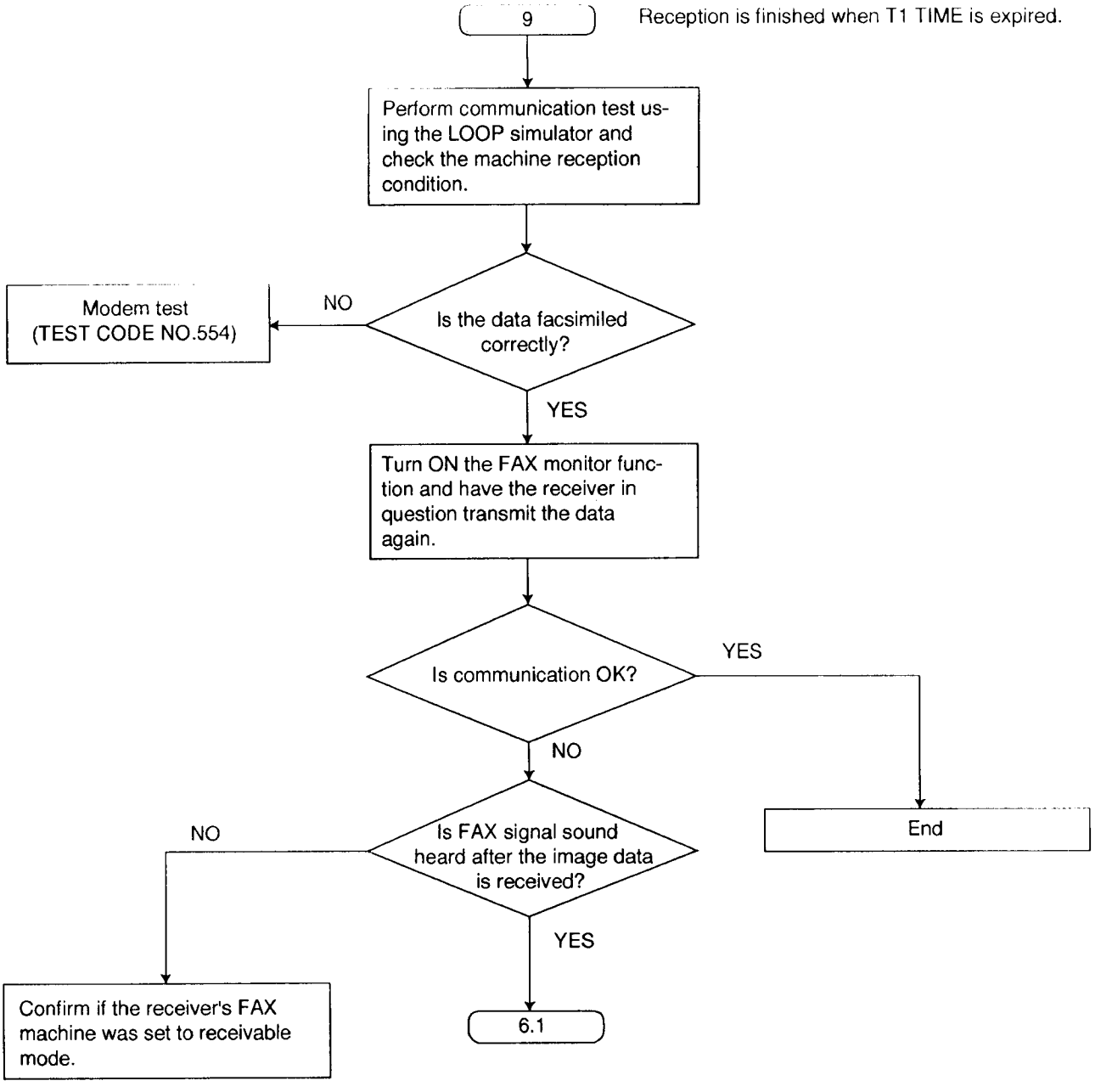
③ Countermeasure

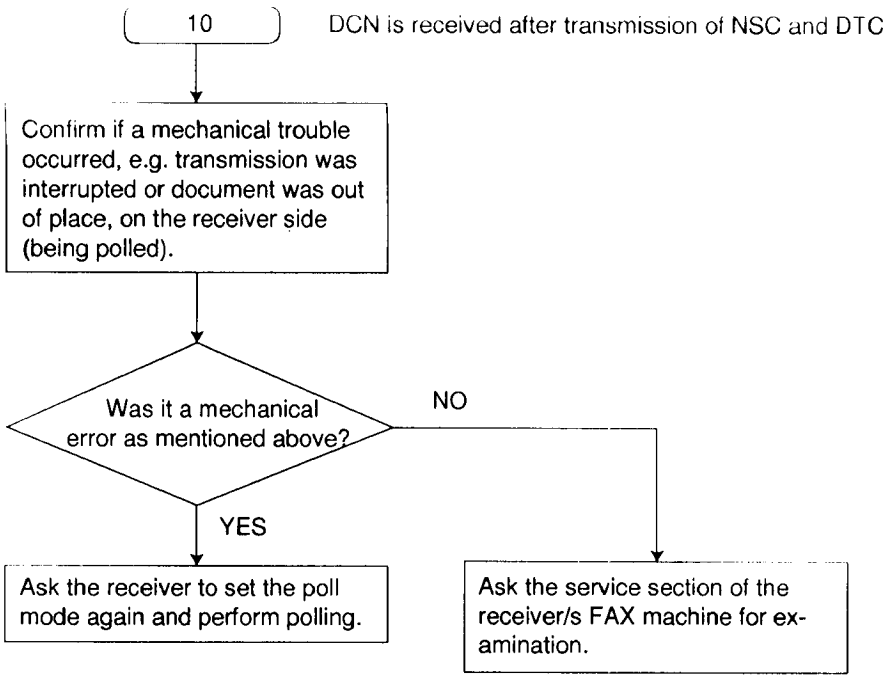


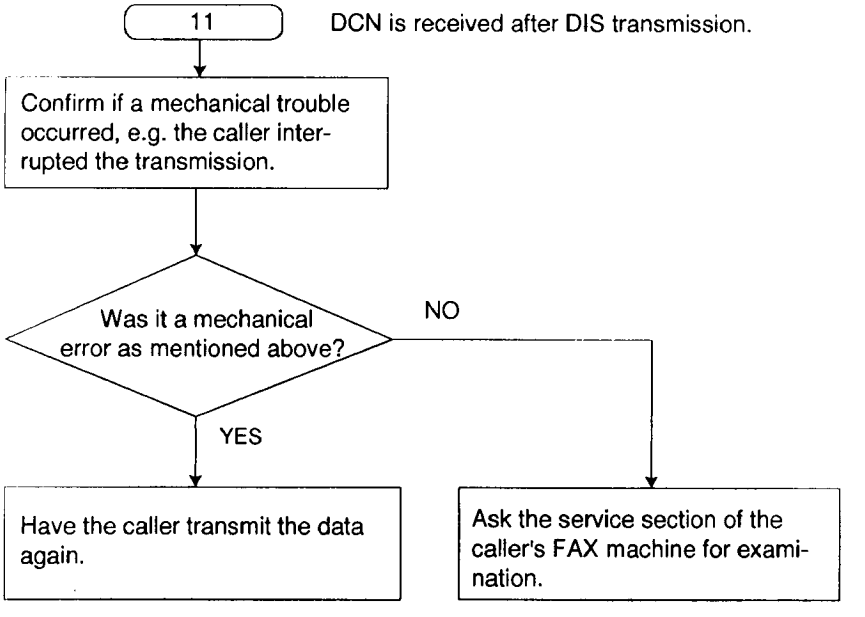

3
FTT is received after transmission of 2400BPS training signal.
Perform communication test using the LOOP simulator.
YES
Is "Fall back" executed from 9600BPS?
NO
3.1
Modem test (TEST CODE NO.554)
(1) Raise the level of transmission. (Do not raise the level above the standard of each country. If the 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 taransmit 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.

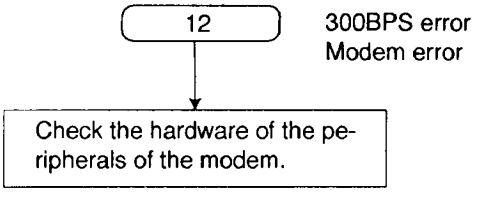

4
No response after post message is transmitted three times.
Inquire the receiver if the caller's document is facsimiled correctly.
Is the data facsimiled correctly?
NO
3.2
YES
Ask the service section of the receiver's FAX machine to confirm the machine condition.
5
RTN and PIN are received.
3.1
6
No response after FTT is transmitted.
Perform communication test using the LOOP simulator and check the machine reception condition.
Modem test (TEST CODE NO.554)
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.

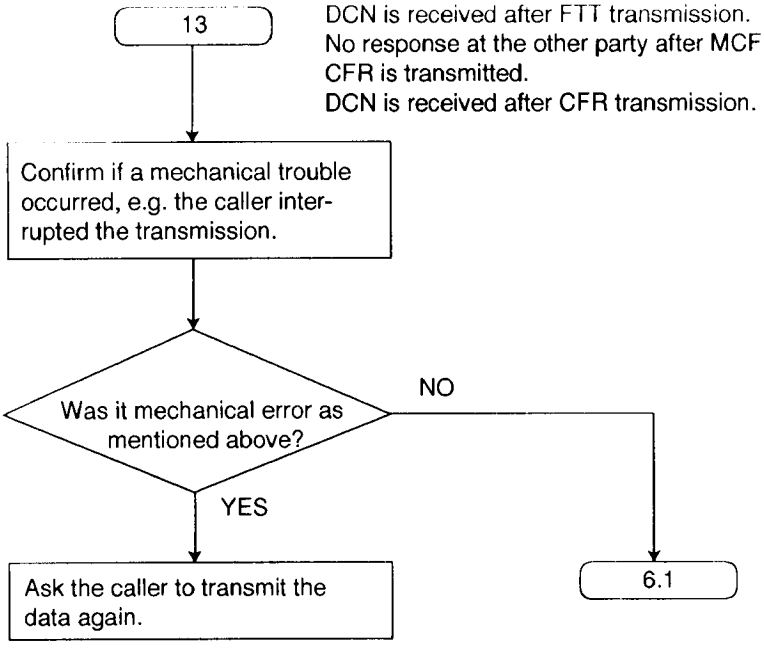

7
No post message
Turn ON the FAX monitor function and have the receiver transmit the data.
Is FAX signal sound (post message) heard after the image data is received?
NO
7.1
Ask the service section of the sender's FAX machine for examination.
YES
(Receive Complete)
NO
Does an error (error code=48) occur still?
YES
Try again.
Decrease the RX speed.
Does an error lines exist on received document?
NO
7.1
YES
TROUBLESHOOTING GUIDE
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.
Is the data facsimiled correctly?
NO
Modem test (TEST CODE NO.554)
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

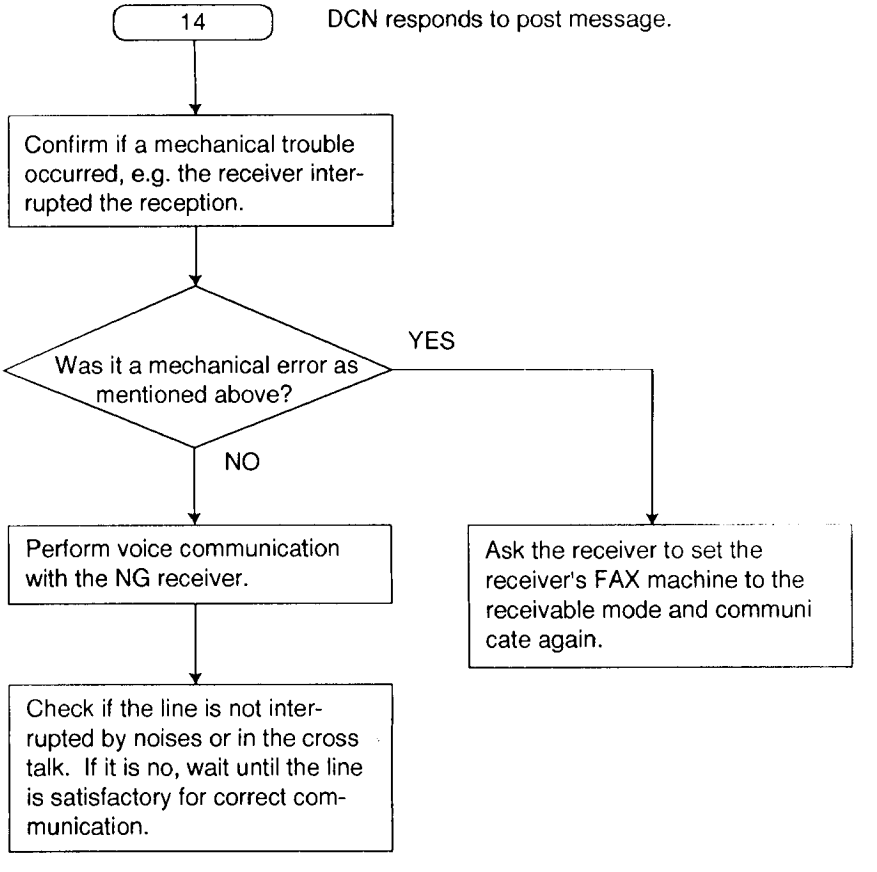

9
Reception is finished when T1 TIME is expired.
Perform communication test using the LOOP simulator and check the machine reception condition.
Is the data facsimiled correctly?
NO
Modem test (TEST CODE NO.554)
YES
Turn ON the FAX monitor function and have the receiver in question transmit the data again.
Is communication OK?
YES
End
NO
Is FAX signal sound heard after the image data is received?
NO
YES
Confirm if the receiver's FAX machine was set to receivable mode.
6.1

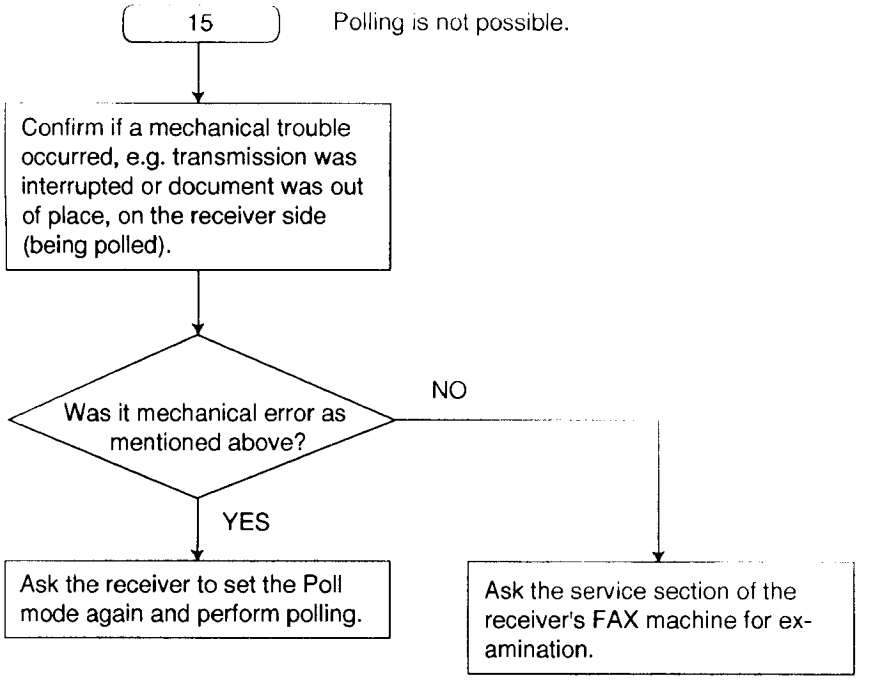

10
DCN is received after transmission of NSC and DTC.
Confirm if a mechanical trouble occurred, e.g. transmission was interrupted or document was out of place, on the receiver side (being polled).
Was it a mechanical error as mentioned above?
NO
YES
Ask the receiver to set the poll mode again and perform polling.
Ask the service section of the receiver/s FAX machine for examination.

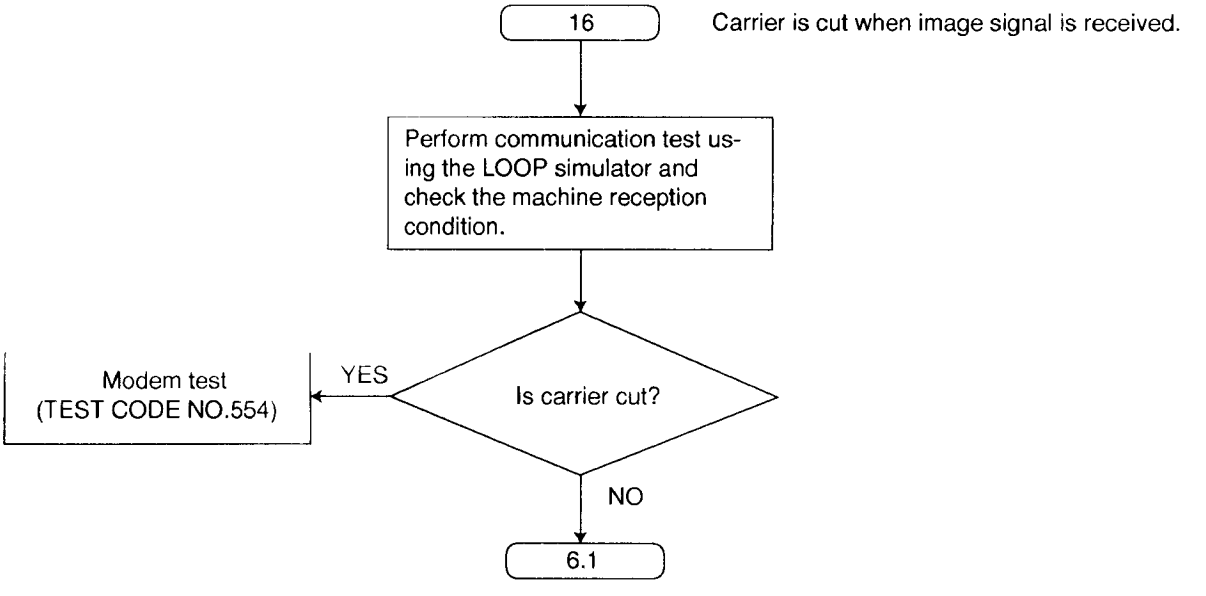

11
DCN is received after DIS transmission.
Confirm if a mechanical trouble occurred, e.g. the caller interrupted the transmission.
Was it a mechanical error as mentioned above?
NO
YES
Have the caller transmit the data again.
Ask the service section of the caller's FAX machine for examination.


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?
NO
YES
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?
YES
NO
Perform voice communication with the NG receiver.
Ask the receiver to set the receiver's FAX machine to the receivable mode and communi cate again.
Check if the line is not interrupted by noises or in the cross talk. If it is no, 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 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.


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
(TEST CODE NO.554)
NO
6.1

(3) Remote programming

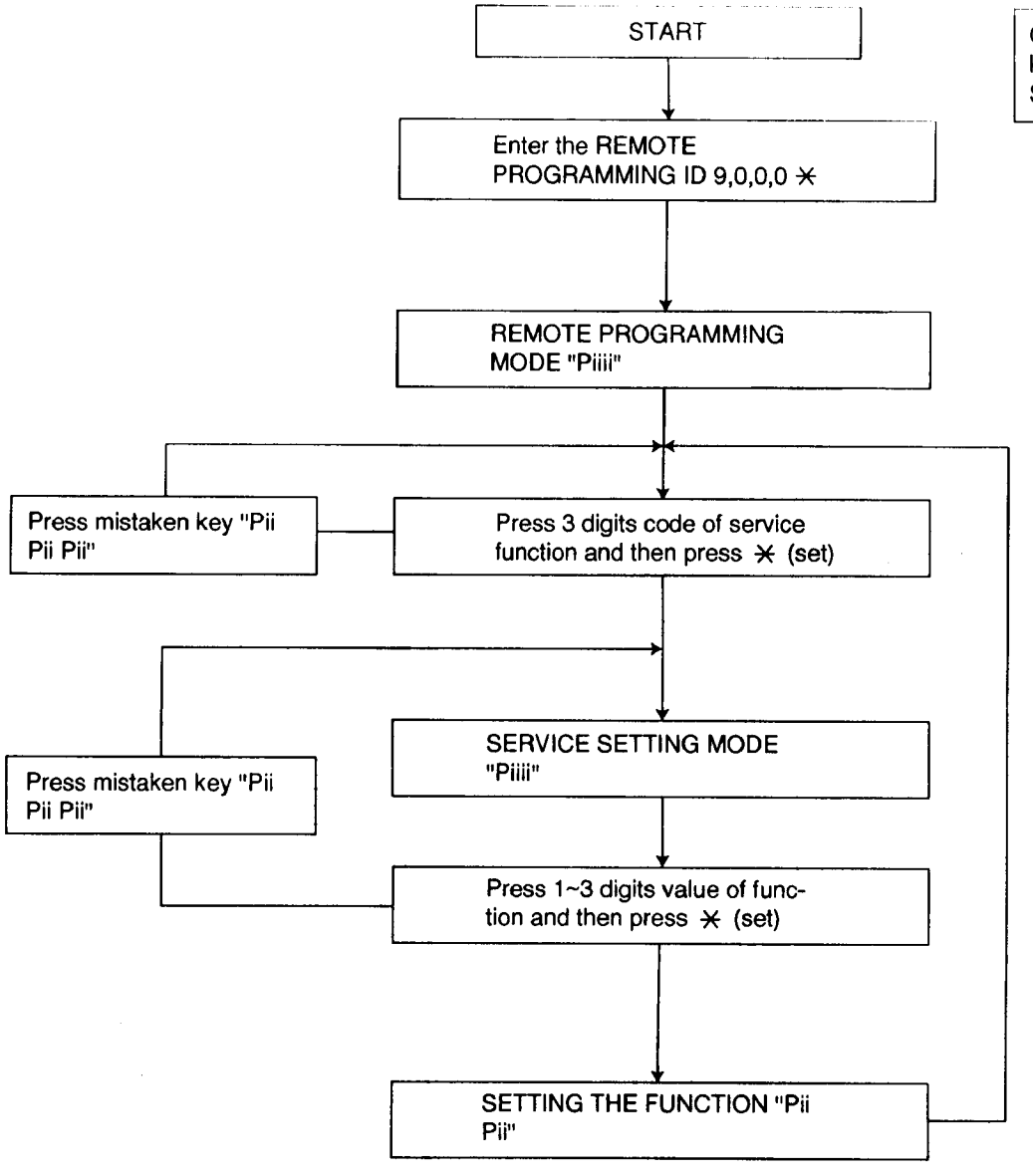
While a user is talking on the phone, a technician can set the function parameters of customer's unit from service center.

1. A call comes in service center.
2. A technician gets a claim from a customer.
3. He says to the customer "Please change to the speaker phone if talking with the portable handset. And then please press MEMU 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 page 52)
   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 a technician wishes to end the REMOTE PROGRAMMING MODE, he says to the customer, "Please press the STOP button to exit the REMOTE PROGRAMMING MODE. And then press the SP-Phone 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. 991,992, 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. 991,992, 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	- - - - -	NG
002	Your logo	- - - - -	- - - - -	NG
003	Your telephone number	- - - - -	- - - - -	NG
004	Print transmission report	1:ERROR/2:ON/3:OFF	ERROR	OK
005	Auto receive mode	1:FAX 2:EXT TAM	FAX	OK
007	FAX ring count	1 to 4 rings	1 ring	OK
008	Manual receive mode	1:TEL, 2:TEL/FAX	TEL	OK
009	TEL/FAX delayed ring	1 to 4 rings	1 ring	OK
012	Remote TAM activation	1:ON/2:OFF	OFF/ID=11	NG
021	Logo position	1:OUT/2:IN	OUT	OK
022	Journal auto print	1:ON/2:OFF	ON	OK
023	Overseas mode	1:ON/2:OFF	OFF	OK
024	Junk mail prohibitor	ON/OFF	OFF/ID=22	NG
025	Delayed transmission	ON/OFF	OFF	NG
030	Silent FAX recognition ring	3 to 6 rings	3 rings	OK
031	Ring detection	0:OFF/1:A/2:B/3:C/4:D	OFF	OK
039	LCD contrast	NORMAL/DARKER	NORMAL	NG
040	Silent Detection	1:ON/2:OFF	ON	OK
041	Remote FAX activation code	ON/OFF	ON/ID=＊＊	NG
046	Friendly reception	1:ON/2:OFF	ON	OK
070	FAX pager	ON/OFF	OFF	NG
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 set	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
544	Document feed position adjustment value set	01~99 step	- - - - -	OK
550	Memory clear	"START" push	- - - - -	NG
551	ROM check	"START" push	- - - - -	NG
553	Monitor on FAX communication select	1:OFF/2:P-B/3:ALL	OFF	OK
554	Modem test	"START" push	- - - - -	NG
555	Scanner test	"START" push	- - - - -	NG
556	Motor test	"START" push	- - - - -	NG
557	LED test	"START" push	- - - - -	NG
558	LCD test	"START" push	- - - - -	NG
559	Paper jam detection select	1:ON/2:OFF	ON	OK
560	Cutter select	1:ON/2:OFF	ON	OK
561	Key test	Press any key	- - - - -	NG
562	Cutter test	"START" push	- - - - -	NG
563	CCD position adjustment value set	00~30 mm	- - - - -	OK
570	Break % select	1:61/2:67%	61%	OK
571	ITS auto redial time set	00~99	014	OK
572	ITS auto redial line disconnection time set	001~999	030	OK
573	TEL ring count	01~99	15	OK

Code	Function	Set Value	Default	Remote setting
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 300 bps	1:75/2:500/3:1s	75ms	OK
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
700	Ext. TAM OGM time	01~99 sec.	10	OK
701	Silent detect time	01~99 x 100 msec	50	OK
702	Ext. TAM 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 cancel time	1:350msec/2:1800msec/3:OFF	350msec	OK
763	Friendly reception CNG detection select	1:10S/2:20S/3:30S	20S	OK
771	T1 timer	1:35sec/2:60sec	35sec	OK
815	Sensor check	"START" push	- - - - -	NG
844	Original setting	1:NORMAL/2:LIGHT/3:DARKER	NORMAL	OK
909	Handset remote FAX ACT	0~9,* 2~4 digits	* *	NG
991	Transmit basic list	1:START	- - - - -	OK
992	Transmit advanced list	1:START	- - - - -	OK
994	Transmit journal report	1:START	- - - - -	OK
999	Transmit service list	1:START	- - - - -	OK

OK : Can set the valve by remote programming featureor print list
NG : Can not set the valve.

3-7. DIGITAL BOARD SECTION

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

(1) OVER VIEW

If you see a human being down on the street, what will you do?
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 or 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)
2. SOLDERING of ICs
3. OSCILLATOR (CLK) (SYSTEM CLK: 24MHz, MODEM CLK: 24MHz)
4. RESET
5. SIGNALS
   - ADDRESS BUS (A0~A15)
   - DATA BUS (D0~D7)
   - READ, WRITE (RD, WR)
   - CS (Chip select) (ROMCS, MDMCS)

"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 ---

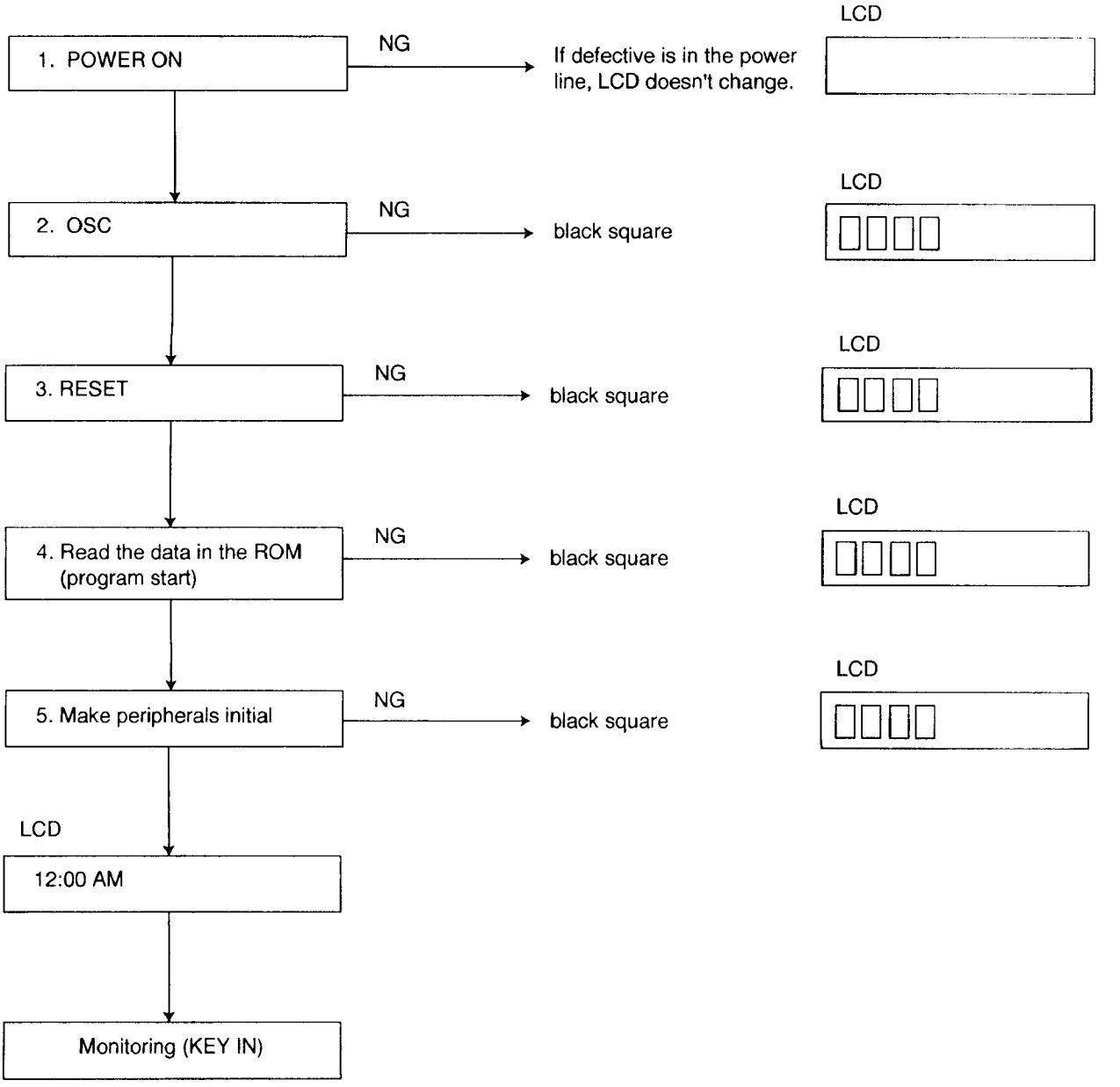
MDM:	modem (modulator/demodulator)
CLK:	clock
ROM:	read only memory
RAM:	random access memory (SRAM: static RAM. DRAM: dynamic RAM)
RTC:	real time clock
adr:	address
RD:	read
WR:	write

(2) CHECK LCD ON THE MACHINE

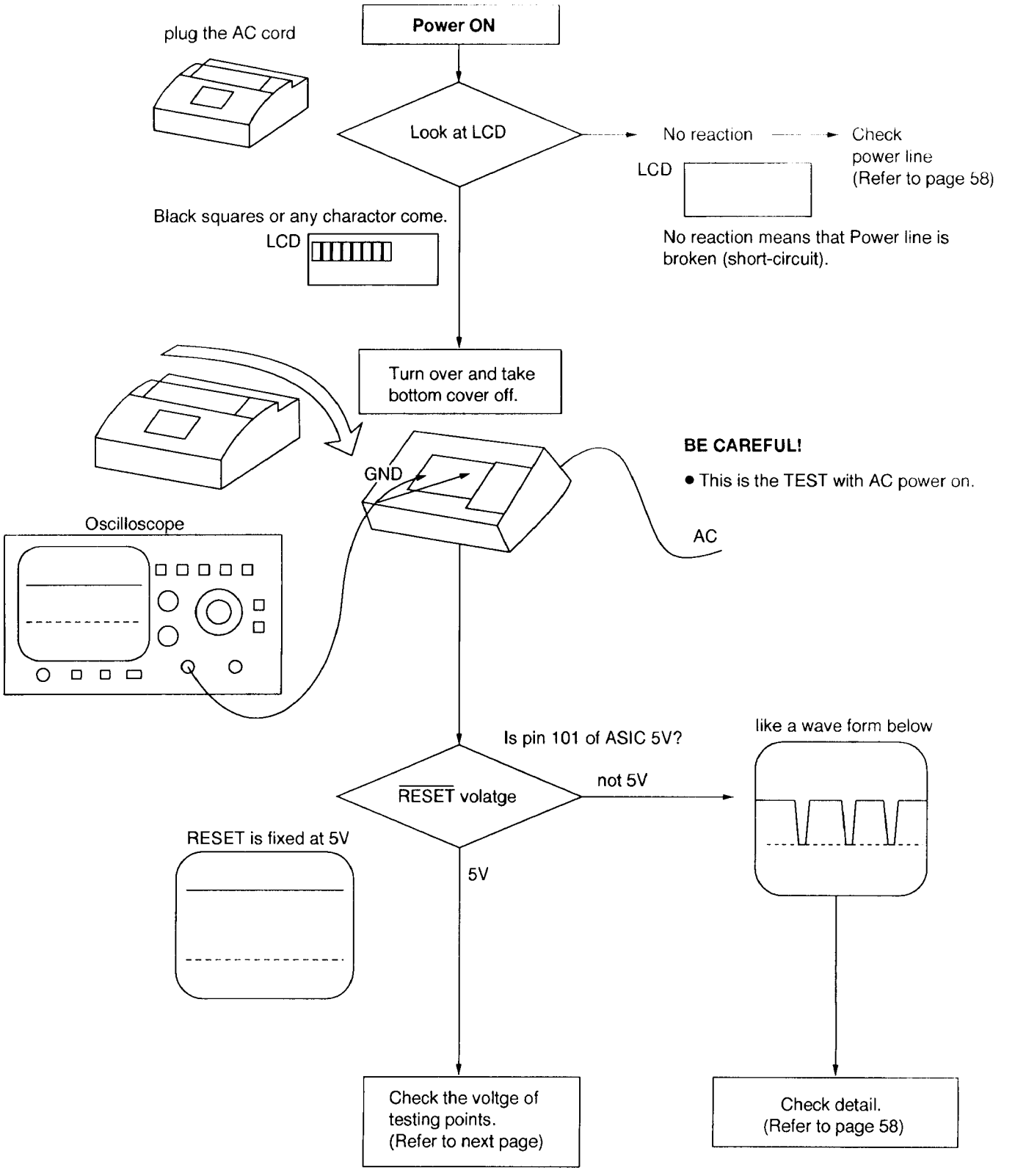
If the digital board had broken, machine does not react at all and black square will be on the LCD.

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

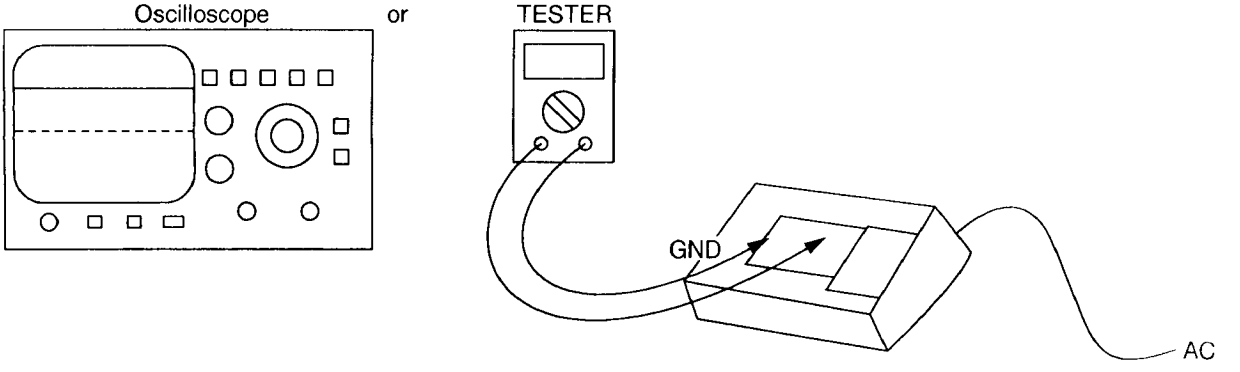
If processes were not complete, black square will be on the LCD.



(3) PROCEDURE FROM OUR EXPERIENCE TO FIX



Pleas check the status (voltage) of pin 56, pin 58 and pin 60 of IC1.
These status may tell you defective point. (Please use the ROM for IC status checked) [Ref No. EC22]

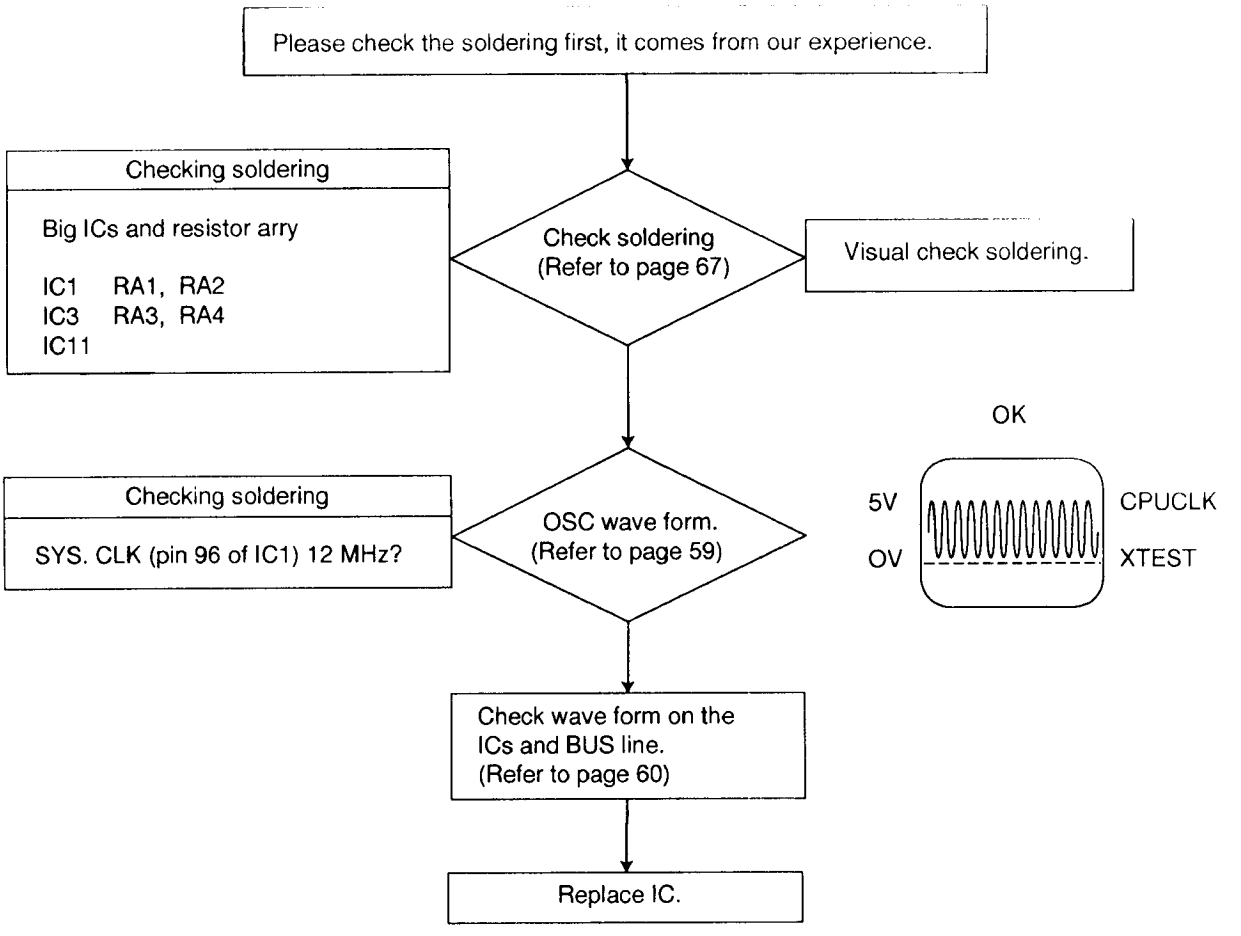


This could be defective point	status (voltage) of check points			Please check here!
	IC1 (ASIC)			
	pin 56	pin 58	pin 60	
SRAM IC3	0v	0v	5v	R68,R69 IC3,IC1 (pin 48)
MODEM IC11	0v	5v	5v	IC11 (pin 95, pin 116),IC11,L2,L5,RA1,RA2 R39,C87
OPE.PANEL IC301	5v	0v	0v	IC1 (pin 14~17, pin 20) R79~R86
Thermal Head TEMP.	5v	0v	5v	R47~R49, C37~C39 IC1 (pin 38, pin 49) **Note:** If the thermal head temperature is abnormal, "CALL SERVICE" will appear in the dispaly.
Cordless	0v	5v	0v	Change the Cordless Base unit P.C.B.
ALL OK	0v	0v	0v	

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

If you still have problem, please go to "3-1 check detail" (page 58).

(1) CHECKING DETAIL



(2) POWER SUPPLY (5V, 24V)

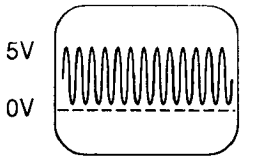
① With AC power off
Please check Short Circuit of power line.
1. 5V line at CN1 between pin 6 and 4 pin, is it short?
2. 24V line at CN1 between pin 2 and 3 pin, is it short?

② With AC power on
Please check voltage of power line.
1. 5V line at CN1 between pin 6 and 4 pin is 5V?
2. 24V line at CN1 between pin 2 and 3 pin is 24V?

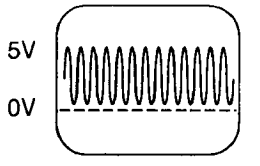
(3) OSCILLATOR (CLK)

SYSTEM CLK: 24 MHz, MODEM CLK: 24 MHz

24 MHz SYSTEM CLK
(pin 96 of ASIC:IC1)
• This point is 1/2 the MHz of the SYSTEM CLK 12MHz.



24 MHz MODEM CLK
(pin 70 of MODEM:IC11)
• This point is 1/2 the MHz of the MODEM CLK 12MHz.

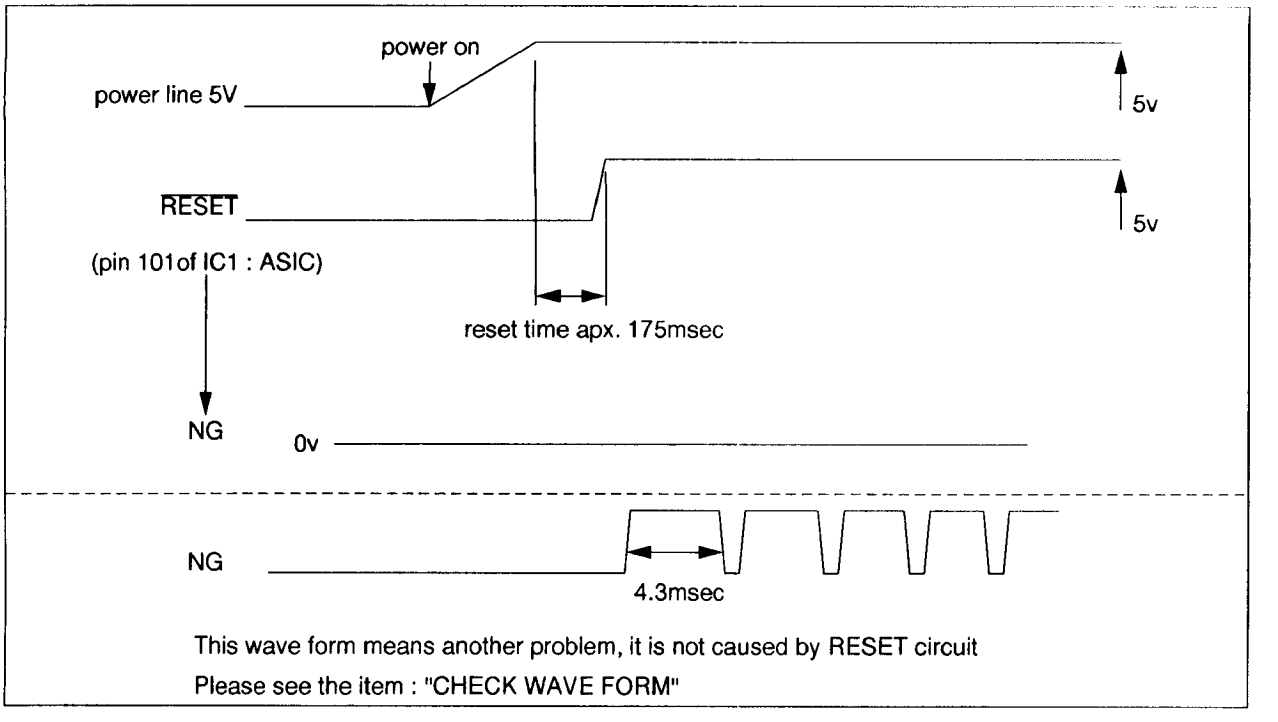


(4) RESET

$\overline{\text{RESET}}$ signal makes system initial state just after power on.

If RESET signal is defect, please check IC11 and components that is connected to these ICs.

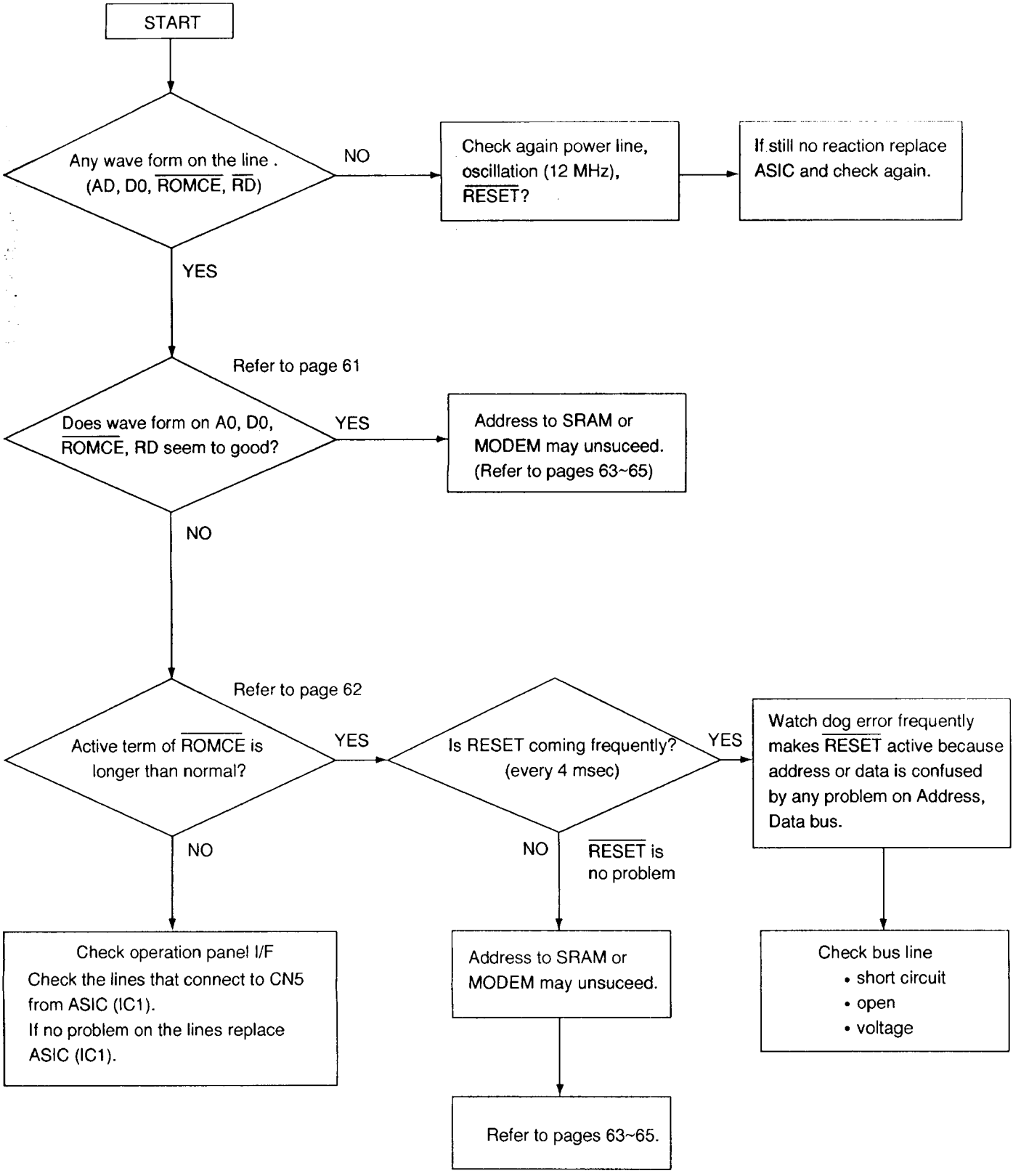
Check $\overline{\text{reset}}$ voltage 5v?



This wave form means another problem, it is not caused by RESET circuit
Please see the item : "CHECK WAVE FORM"

(5) CHECK WAVE FORM

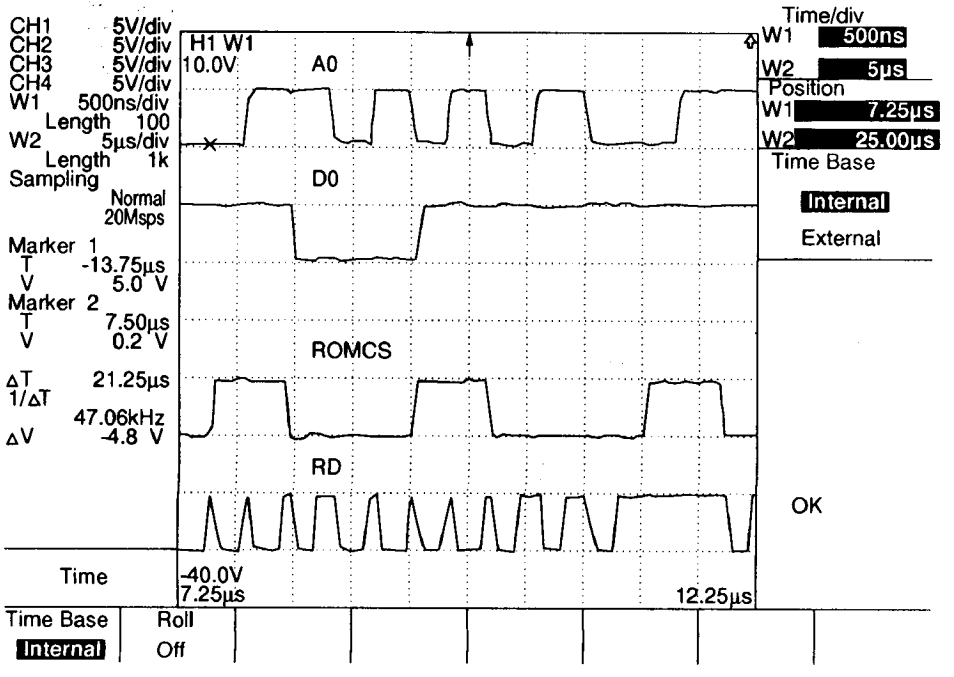
This check needs 4 channels digital storage oscilloscope higher than 400 MHz.

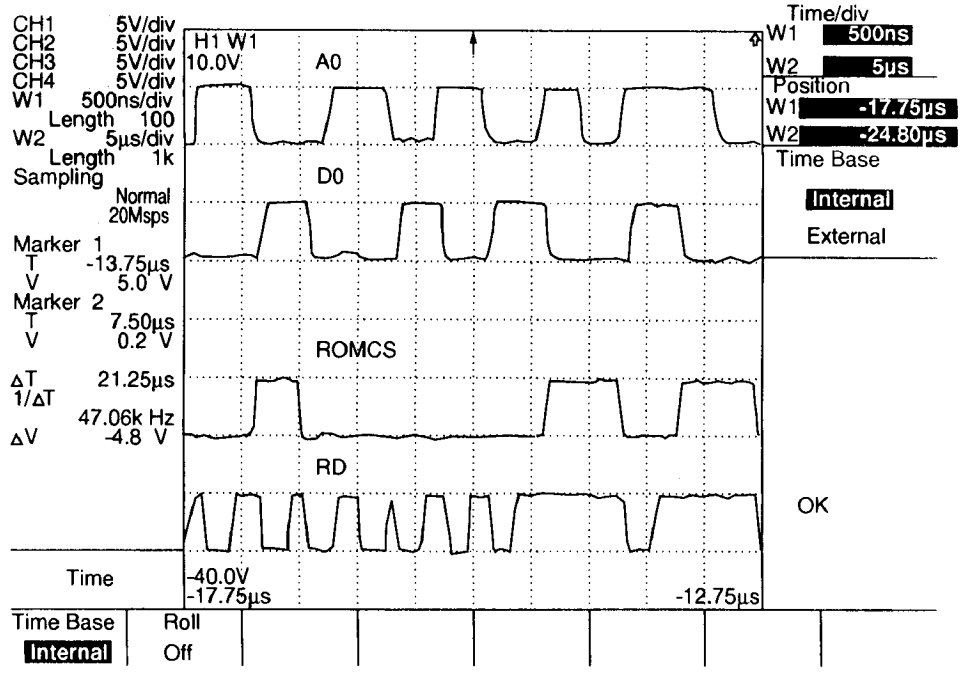


Let's observe the wave form to fix the defective IC.

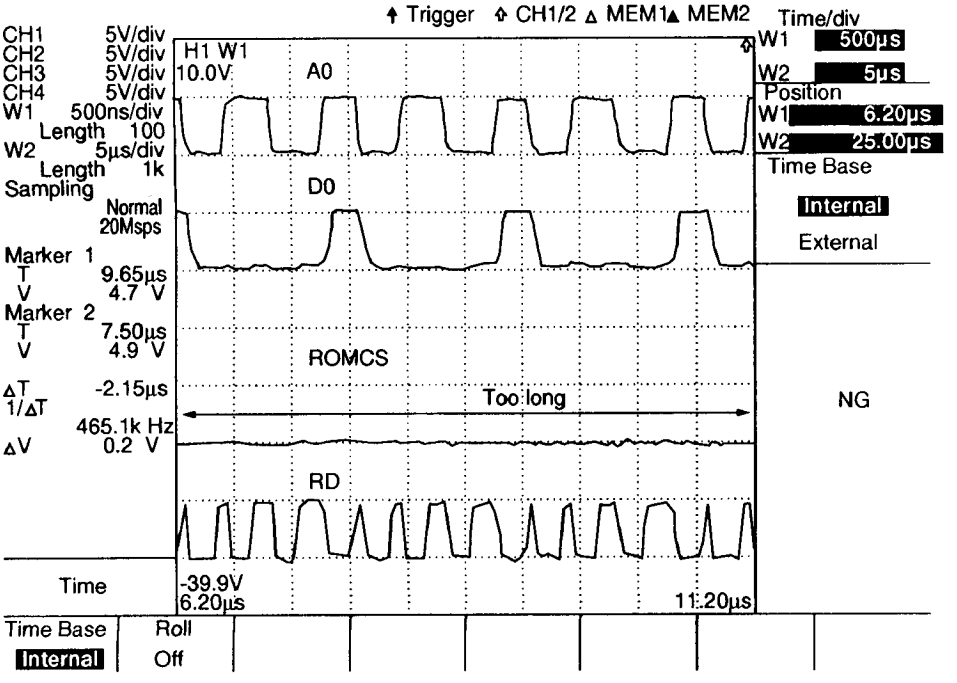
Please observe A0, D0, ROMCE, RD by using digital oscilloscope. Below graph show you the wave form that is observed when unit (board) is working correctly. Both graph are good wave. Wave form is rapidly changing by one (like below graph). Because many kind of data or program are rapidly executed,
so you can see some kind of wave forms that is seem to below graph.

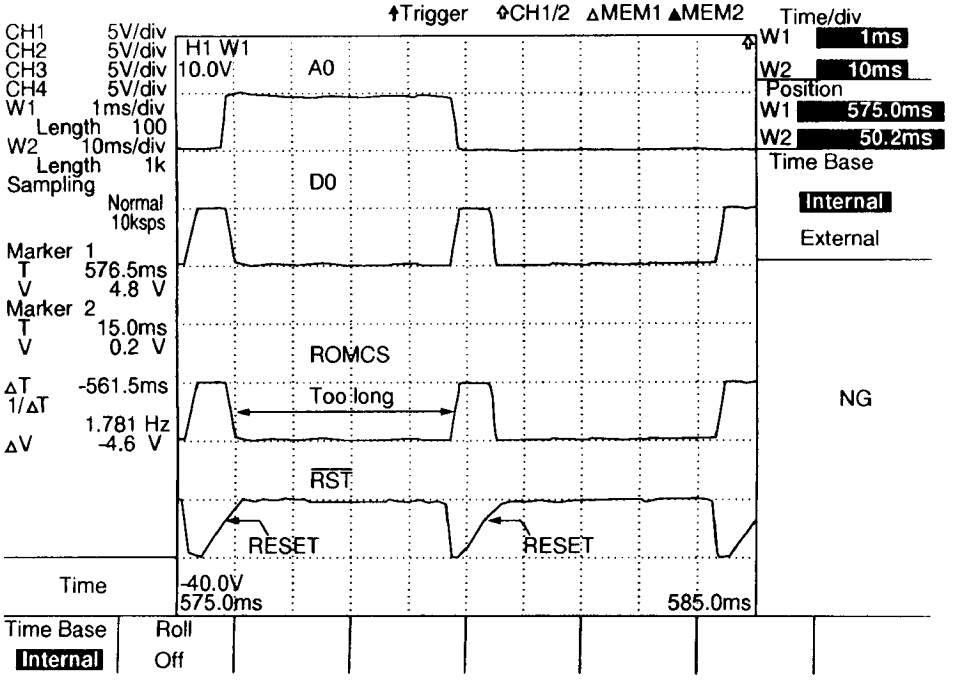
name	location
A0	: pin 132 of ASIC (IC1)
D0	: pin 131 of ASIC (IC1)
ROMCE	: pin 22 of ROM (IC2)
RD	: pin 24 of ROM (IC2)
SRAMCS:	: pin 20 of SRAM(IC3)
MDMCS	: pin 54 of MODEM(IC11)



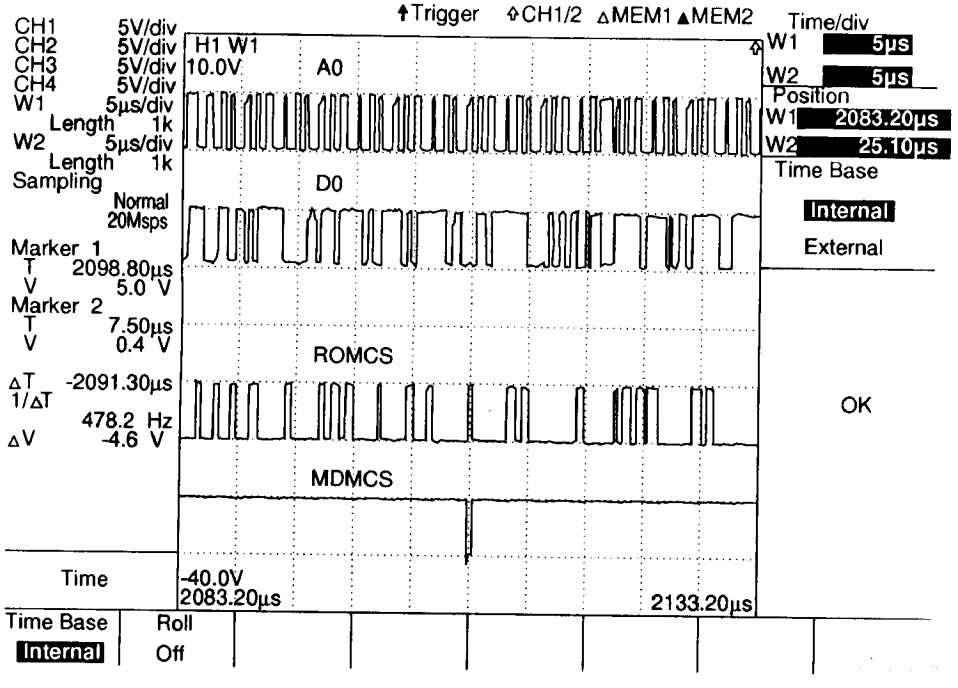


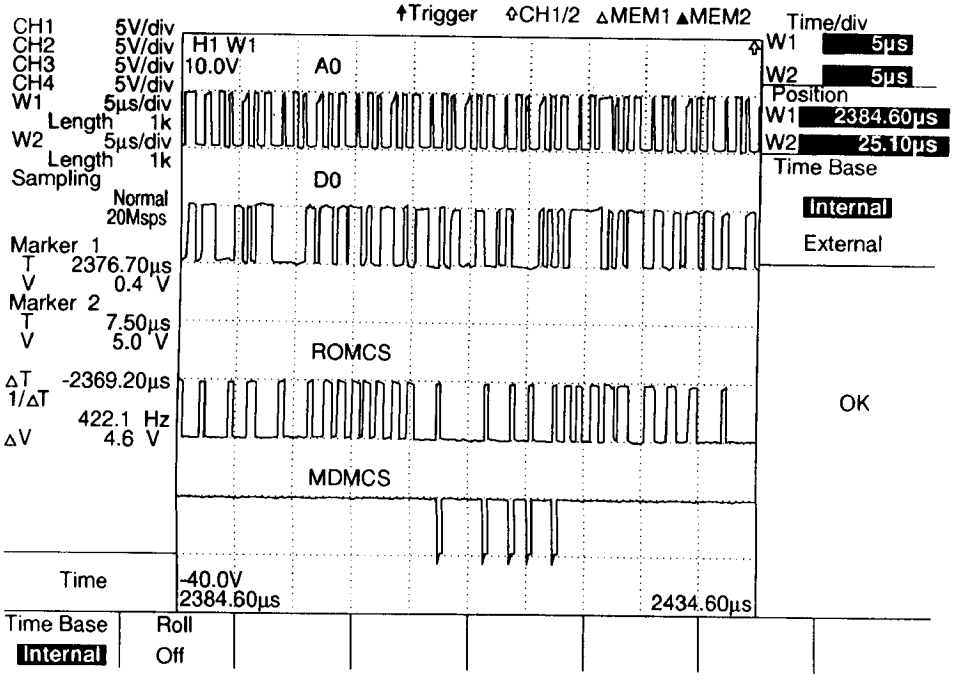
The graphs below show you the wave form that is observed when unit (board) doesn't work. (A3 is intentionally opened at pin 135 of ASIC in this board.)
Please check that active (low level) term of ROMCE is longer than good wave form, **ROMCE is active (low level) excepting RESET is active.** and RESET is frequently coming on every 4 msec.
In the case of this wave form ASIC (IC1), ROM (IC2) or on the way of bus line route is possibly defect. If soldering, conductance is no problem, we need to replace these ICs.



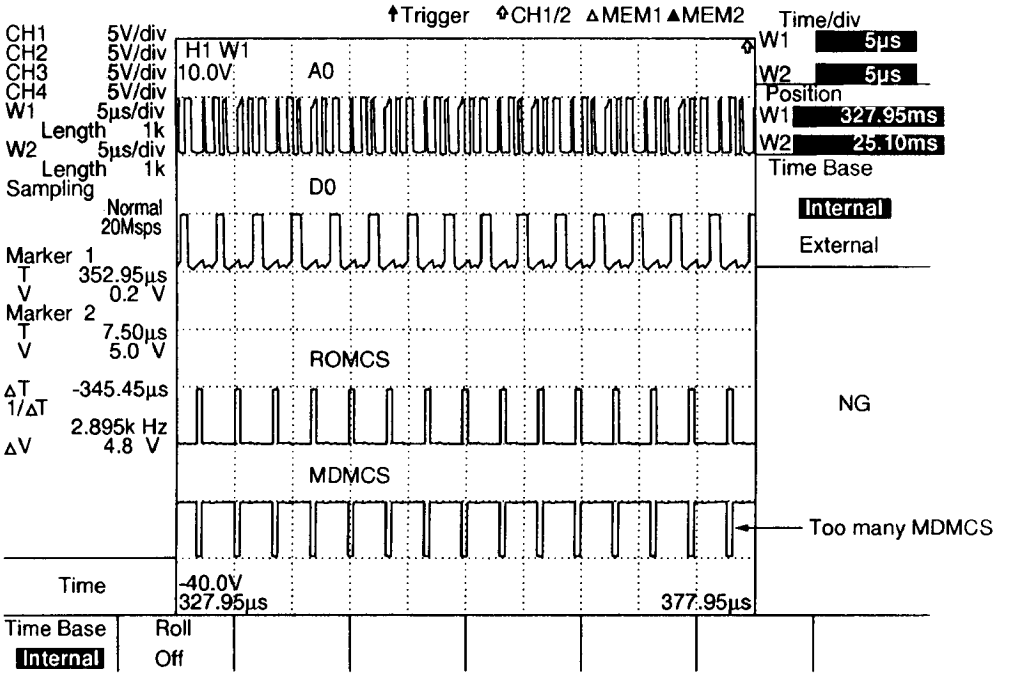


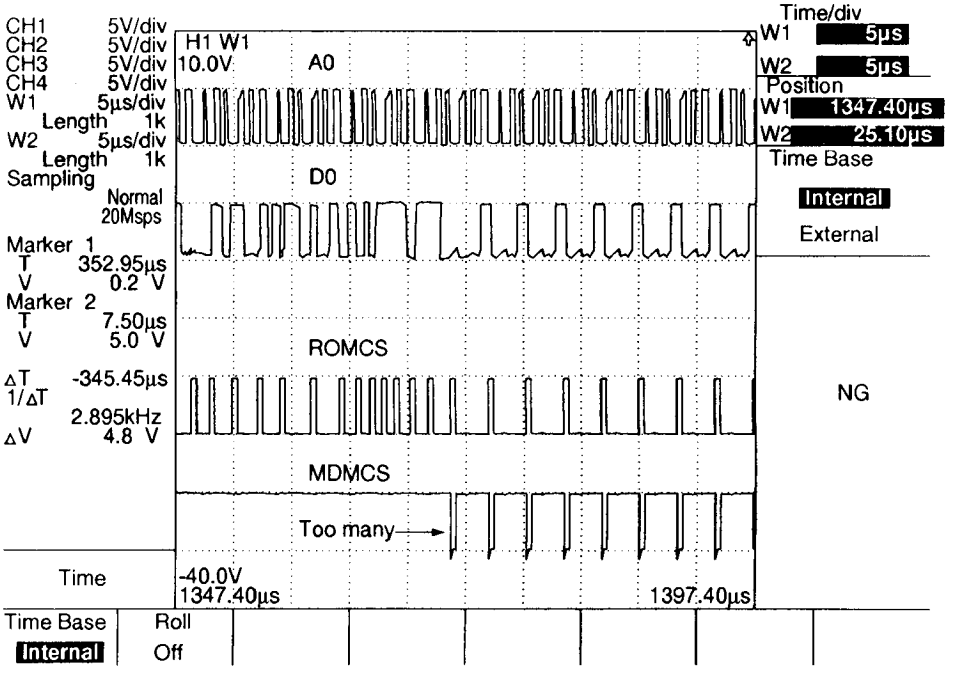
Please observe A0, D0, ROMCE, MDMCS.
Below graph show you the wave form that is observed when unit (board) is working correctly. Both graph are good wave.



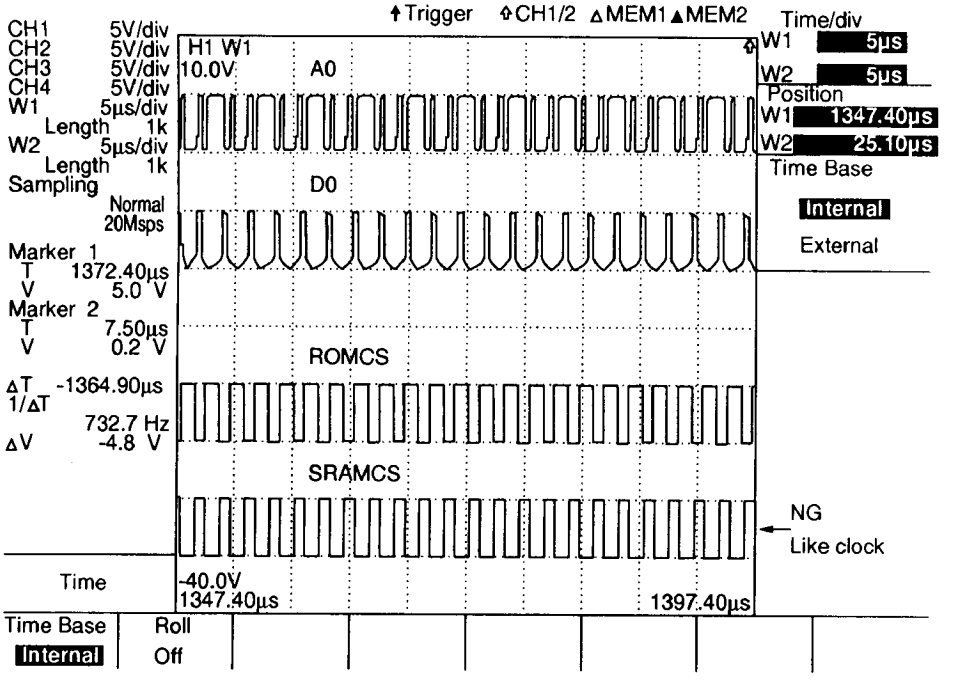


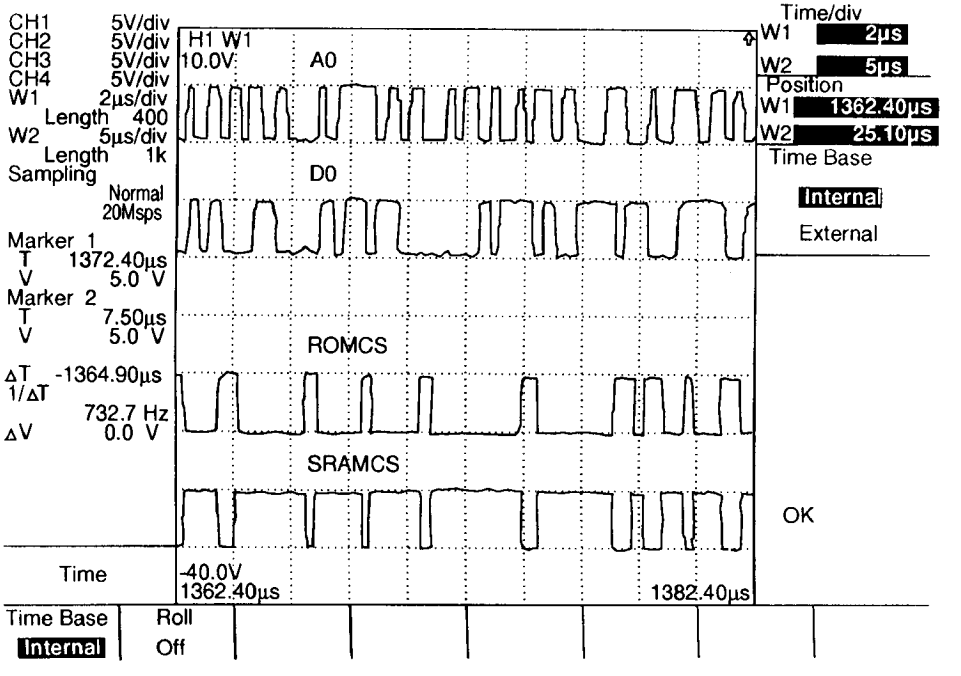
The graphs below show you the wave form that is observed when MODEM doesn't work. (Oscillation is not intentionally supplied to MDM.)
Please compare OK form to NG form.
MDMCS (pin 54 of IC11) signal is coming many times more than good wave form.
In the case of this wave form MODEM doesn't work. If soldering, conductance is no problem, we need to replace MODEM (IC11).





Below graph 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). SRAMCS (pin 20 of IC3) signal is coming like clock.
In the case of this wave form SRAM access doesn't work. If soldering, conductance is no problem, we need to replace SRAM (IC3).





(6) CHECK SOLDERING

We should check soldering at first.
Because many problem are caused by a defective soldering.

How to Visual-Check the soldering

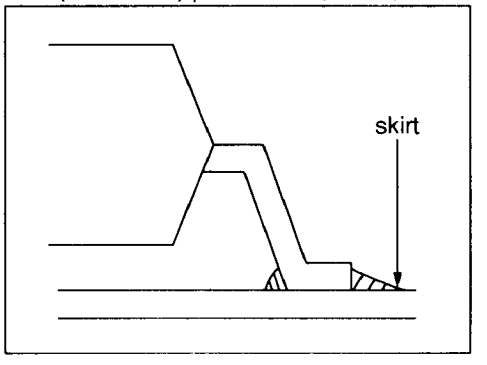
Defective soldering (shorted, un-welded, oxidized...) doesn't have a good looking outward.
In order words outward (gloss, brightness, form) is important for soldering. So we should do visual inspection.

A basis of soldering is skirt!

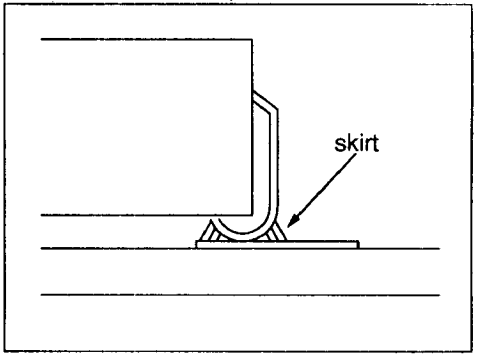
Smooth skirt is shaped by surface tension as melting cream solder in reflow machine or lifting P.C. Board from DIP.

Section of Soldering Skirt

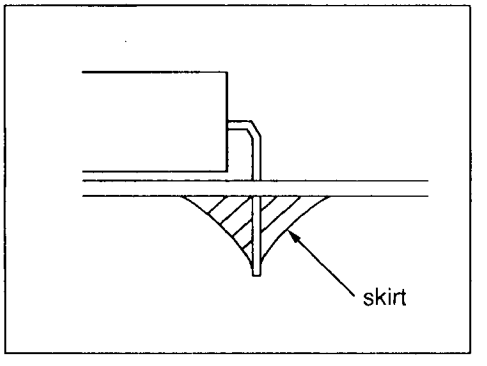
SMT (QFP. SOP) parts : ASIC, MDM, SRAM



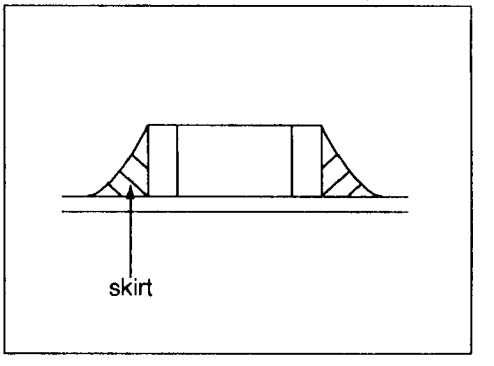
SMT (PLCC) parts : CODEC



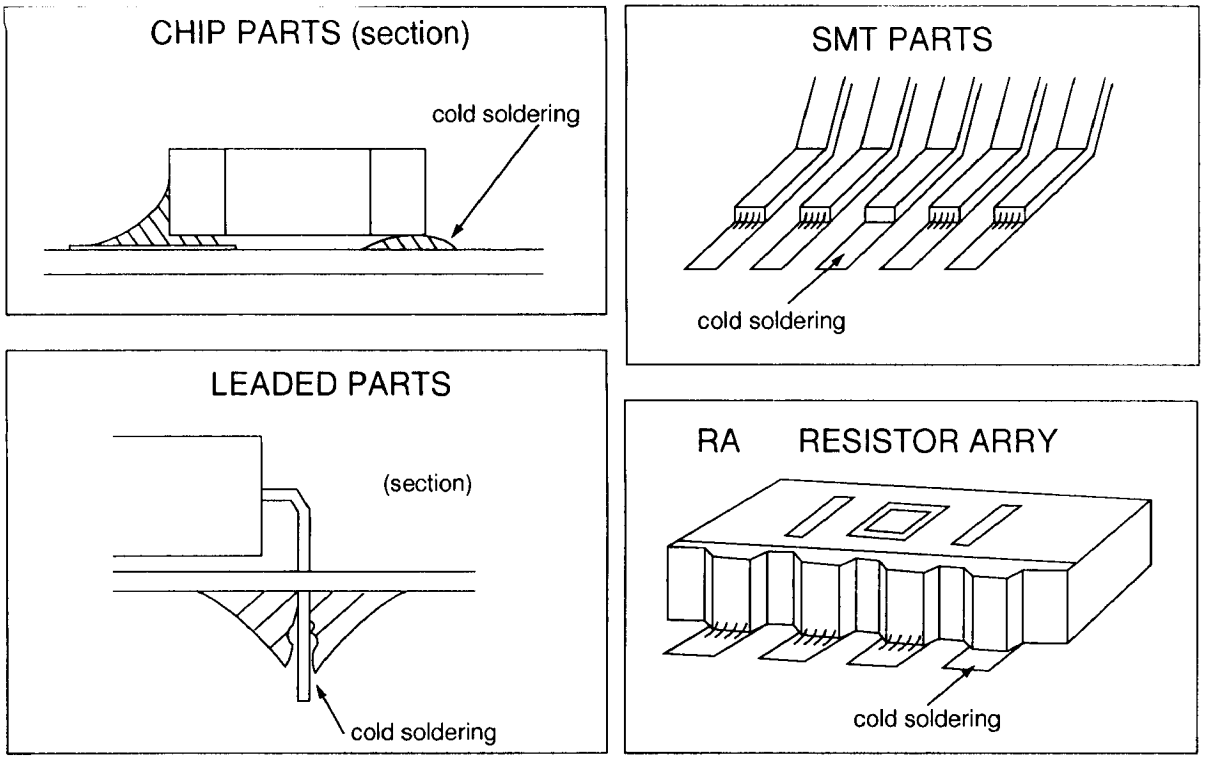
Leaded parts



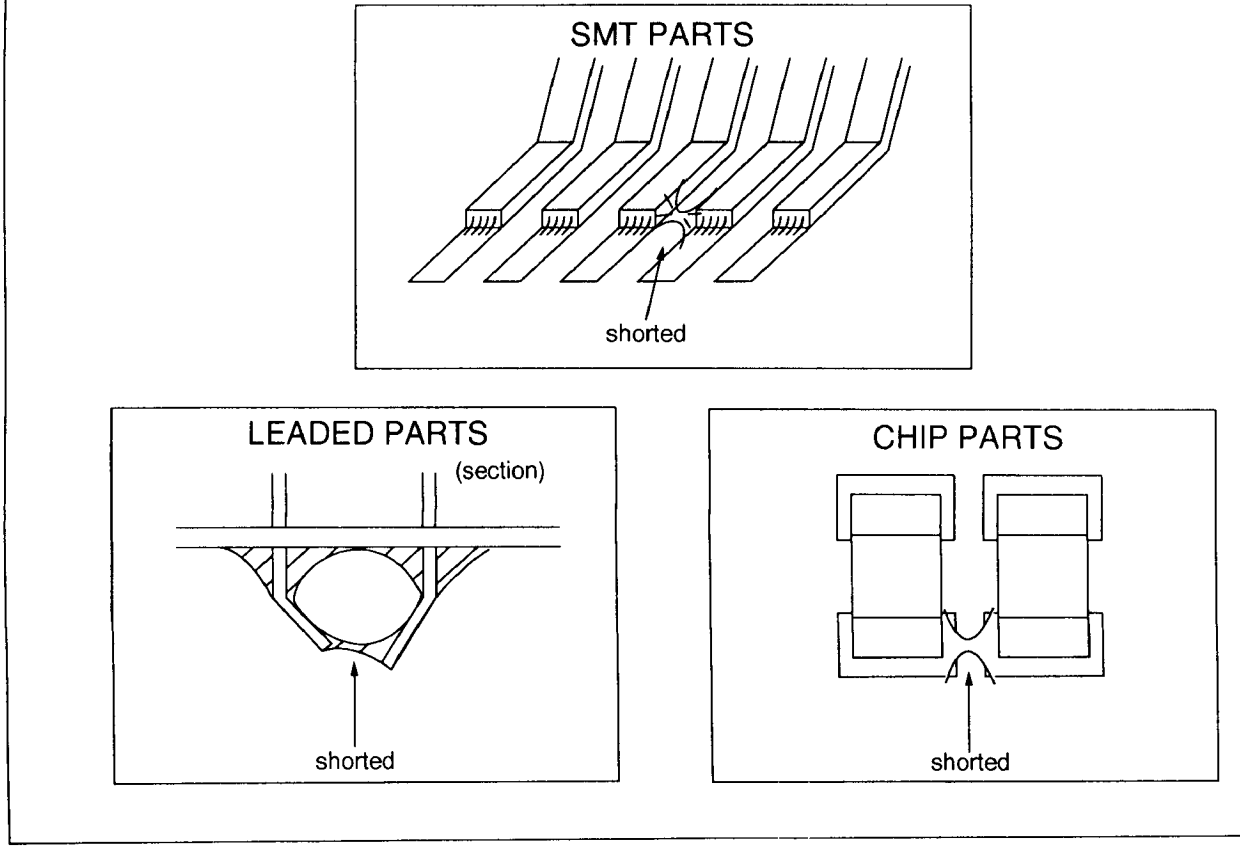
Chip parts Resistor array



COLD (nu-welded) SOLDERING



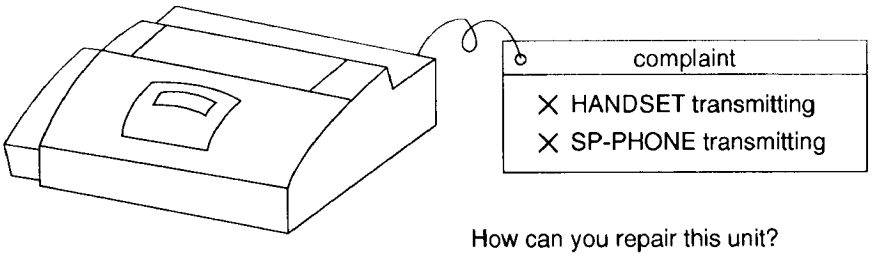
SHORTED SOLDERING



3-8. ANALOG BOARD SECTION

For example

Returns from the customer has 2 of the defects.



How can you repair this unit?

We usually check the signal flow with the circuit schematic.
(If defect is only one item, we check only one of the signal routes.
Maybe something is defective 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)-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-C146-IC151 (40-38)-R245-C245-IC241 (4-5,8)-SPEAKER
Portable Handset Tx	PORTABLE HANDSET MIC-R283-C214-Q208-C233-R232-IC202(19-17)-C232-R231-IC202(16-13)-R230-R228-R227-IC202(11-10)-C225-R229-VR201-R458-R410-TX VCO-R459-C412-R460-IC401(4-2)-C409-C408-Q402-C405-Q401-L422-FL401-L421-C492-L406-ANTTENA- RF UNIT L306-C392-L319-FL302-Q304-C322-Q303-C328-IC301(23-13)-FL303-Q305-C338-IC302(16-3)-FL304-IC302(5-9)-R322-R335-CN301(3)- CORDLESS BASE UNIT CN502(3)-VR501-C540-R593-Q511-R505-C553-C536-R579-R578-R577-IC502(2-5)R576-C534-R575-R562-R561-R557-R558-C561-L506-CN501(5)- ANALOG BOARD CN153(5)-R160-C159-IC151(50-63)-C203-R210-IC201(2-1)-C202-R201-T101(2-5)-C109-R116-Q101-D101-R102-L105-R101-POS101-TEL JACK
Portable Handset Rx	ANALOG BOARD TEL JACK-POS101-R101-L105-R102-D101-Q101-R116-C109-T101(5-2)-R202-C205-IC201(6-7)-C210-C173-R172-R173-C174-IC151(59-35)-C193-CN153(6)-CORDLESS BASE UNIT CN501(6)-L507-C571-R553-C572-C518-IC502(21-20)-C568-R569-IC502(19-17)-R570-C522-IC502(16-13)-R571-R573-R574-IC502(11-10)-C537-R581-R582-VR502-CN502(10) RF UNIT CN301(10)-R358-R310-TX VCO-R359-C312-R360-IC301(4-2)-C309-C308-Q302-C305-Q301-C303-FL301-C354-C392-L306-ANTTENA-PORTABLE HANDSET L406-C492-C491-L419-FL402-L420-Q404-C422-Q403-C428-IC401(23-13)-FL403-Q405-C438-IC402(16-3)-FL404-IC402(5-9)-R432-R435-VR202-C235-R224-R223-IC202(2-5)-R225--C217-IC203(3-4)-C259-R247-C238-R234-IC208(4-5, 8)-SPEAKER
DTMF monitor / Speaker	{IC11(44)-C73-R90-IC10 (6-7)-CN1(10)}-CN271(10)-C184-R184-IC151(76-41)-C158-R161--IC151(40-38)-R245-C245-IC241(4-5,8)-SPEAKER
DTMF for TEL LINE / FAX Tx	{IC11(44)-C73-R90-IC10 (6-7)-CN1(10)}-CN271(10)-C184-R182-IC151(73-63)-C203-R210--IC201(2-1)-C202-R201-T101-TEL LINE
Beep for TEL LINE	{IC1(86)-CN1(11)}-CN271(11)-R185-C186-IC151(77-63)-C203-R210-IC201(2-1)-C202-R201-T101--TEL LINE
Dummy Ring Back tone	{IC1(85,87)-R59-C56-CN2(1)}-CN272(1)-R186-C187-IC151(78-63)-C203-R210-IC201(2-1)-C202-R201--T101-TEL LINE
Ringing	{IC1(85,87)-R59-C56-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	{IC1(86)-CN1(11)}-CN271(11)-R185-C186-IC151(77-41)-C158-R161-IC151(40-38)-R245-C245-IC241(4-5,8)-SPEAKER
CNG / DTMF/VOX detection / FAX Rx	TEL LINE-T101-R202-C205-IC201(6-7)-C210-C212-R215-C213-IC202(1-2)-C217-CN271(9)-{CN1(9)-R97-IC10(2-1)-C82-R95-IC11(45)}

Note:

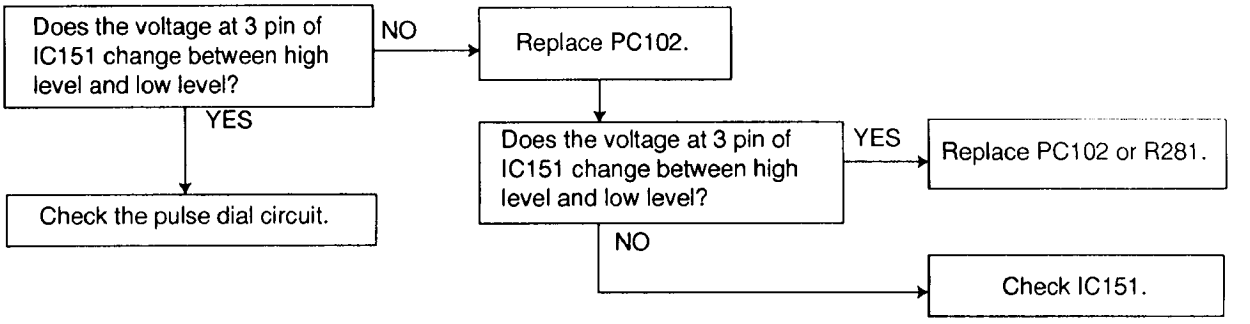
{ }: digital board

(1) Defective ITS (Integrated telephone system) section

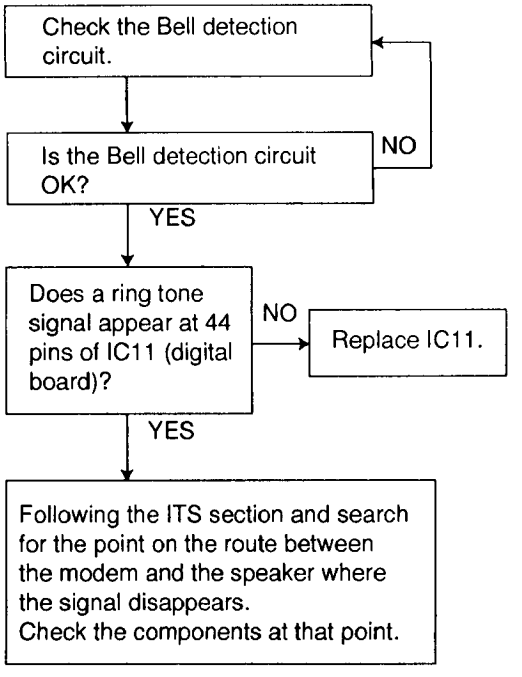
① No speakerphone transmission/reception

Following the ITS section or NCU section, search for the route 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.

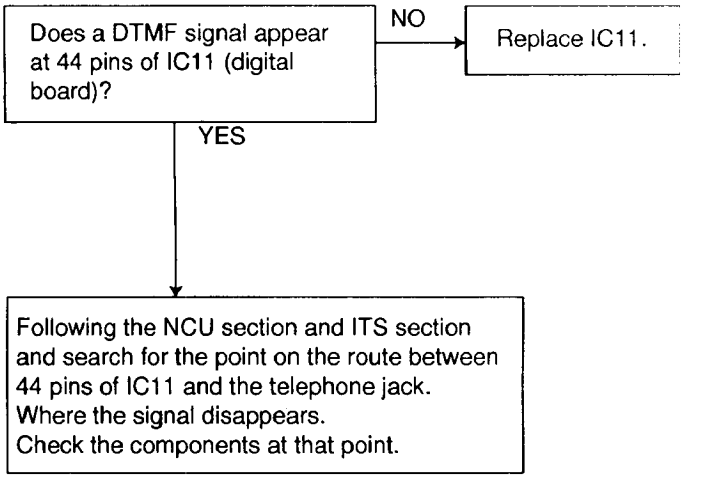
② No pulse dialing



③ No ring tone

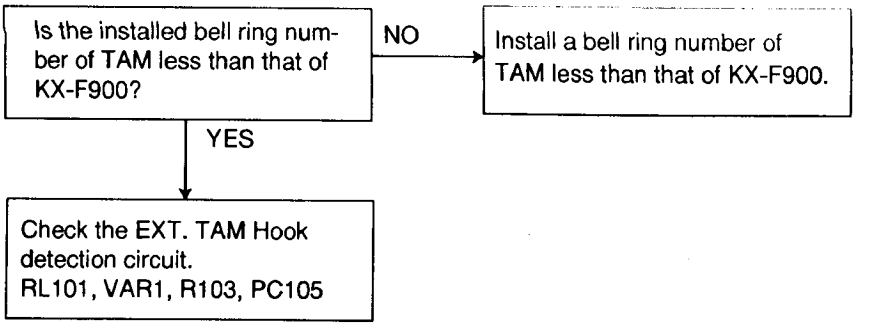


④ No tone dialing

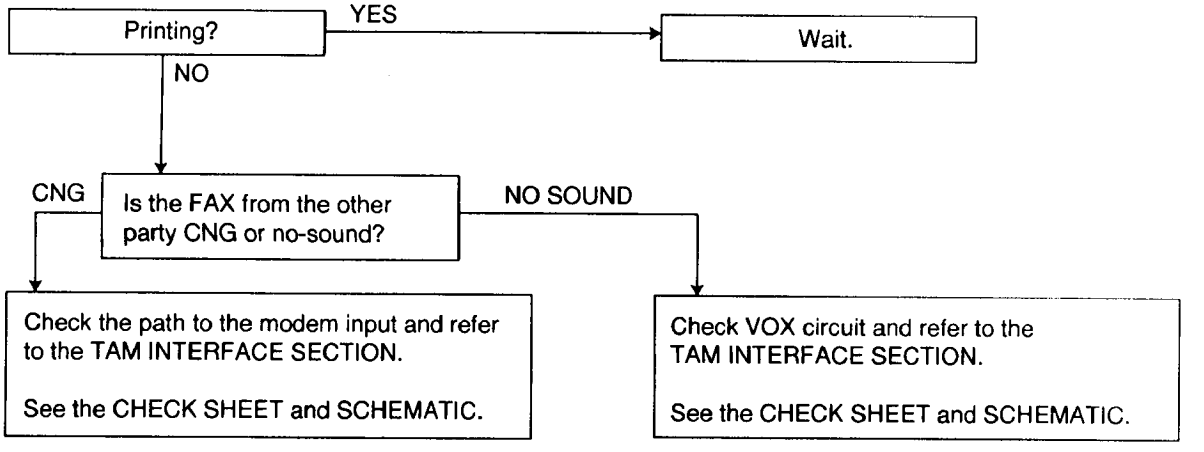


(2) Defective TAM interface section

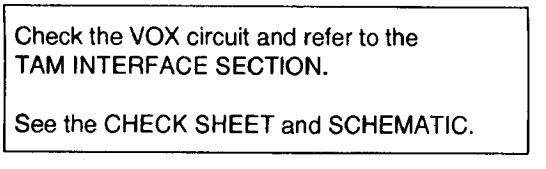
① Not arriving in TAM, FAX turn on.



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, "Vx" will be shown on the LCD.

3-9. POWER SUPPLY SECTION

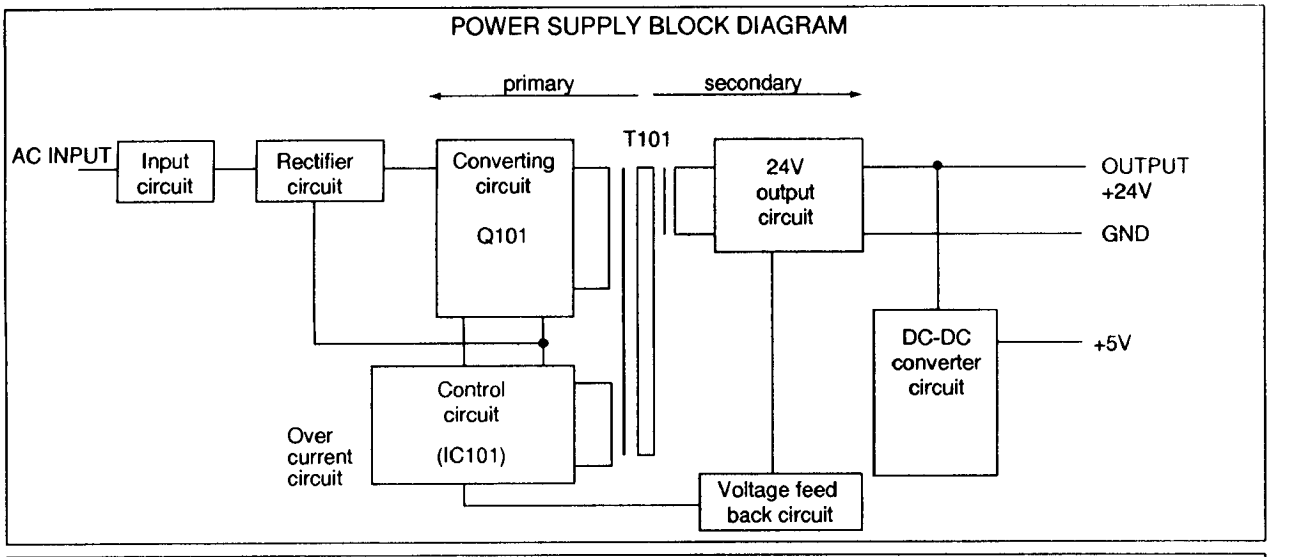
(1) Key components for troubleshooting

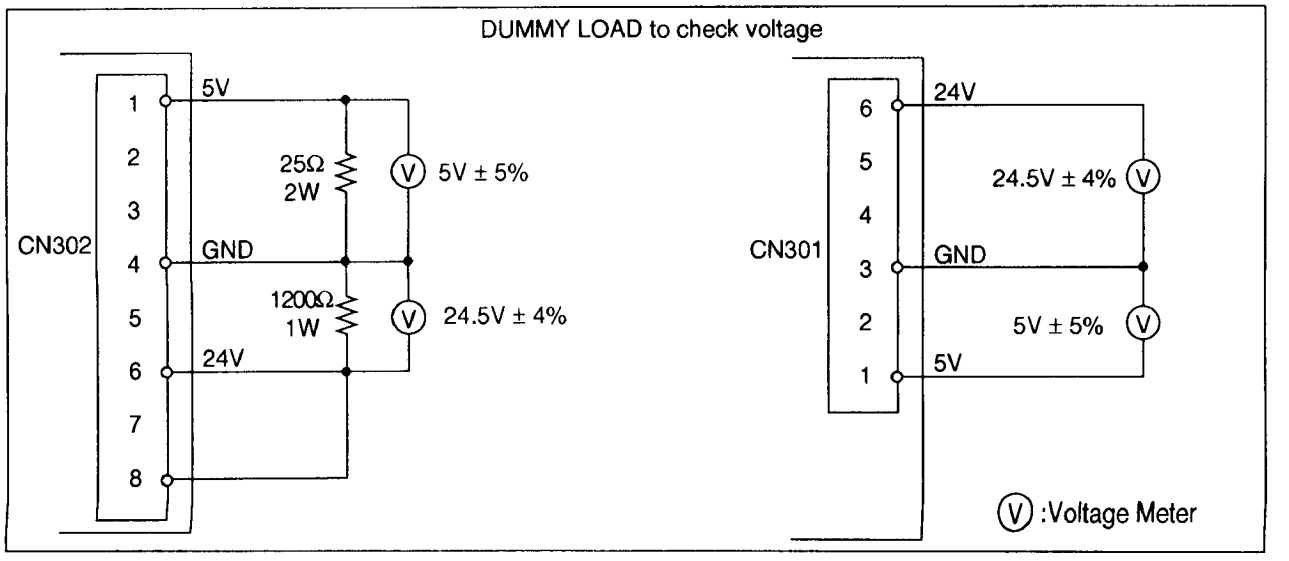
The following components have been known to break frequently :
F101, D101, Q101, IC101, D201, D202
This comes from our experience of experimental test. For example : power supply, lighting surge voltage test, withstanding voltage test, intentional short circuit test.....etc.

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 compostion :
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.



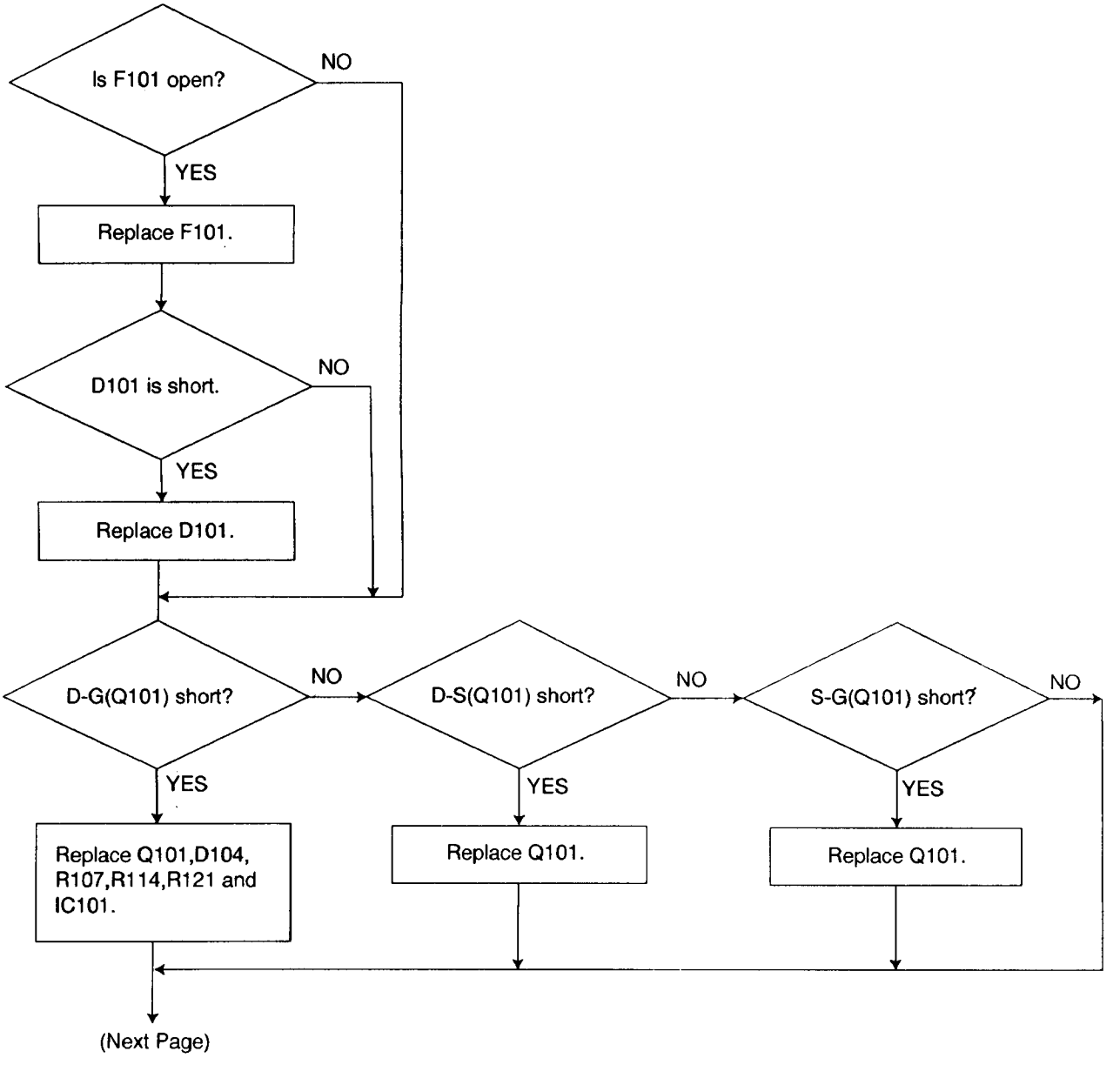


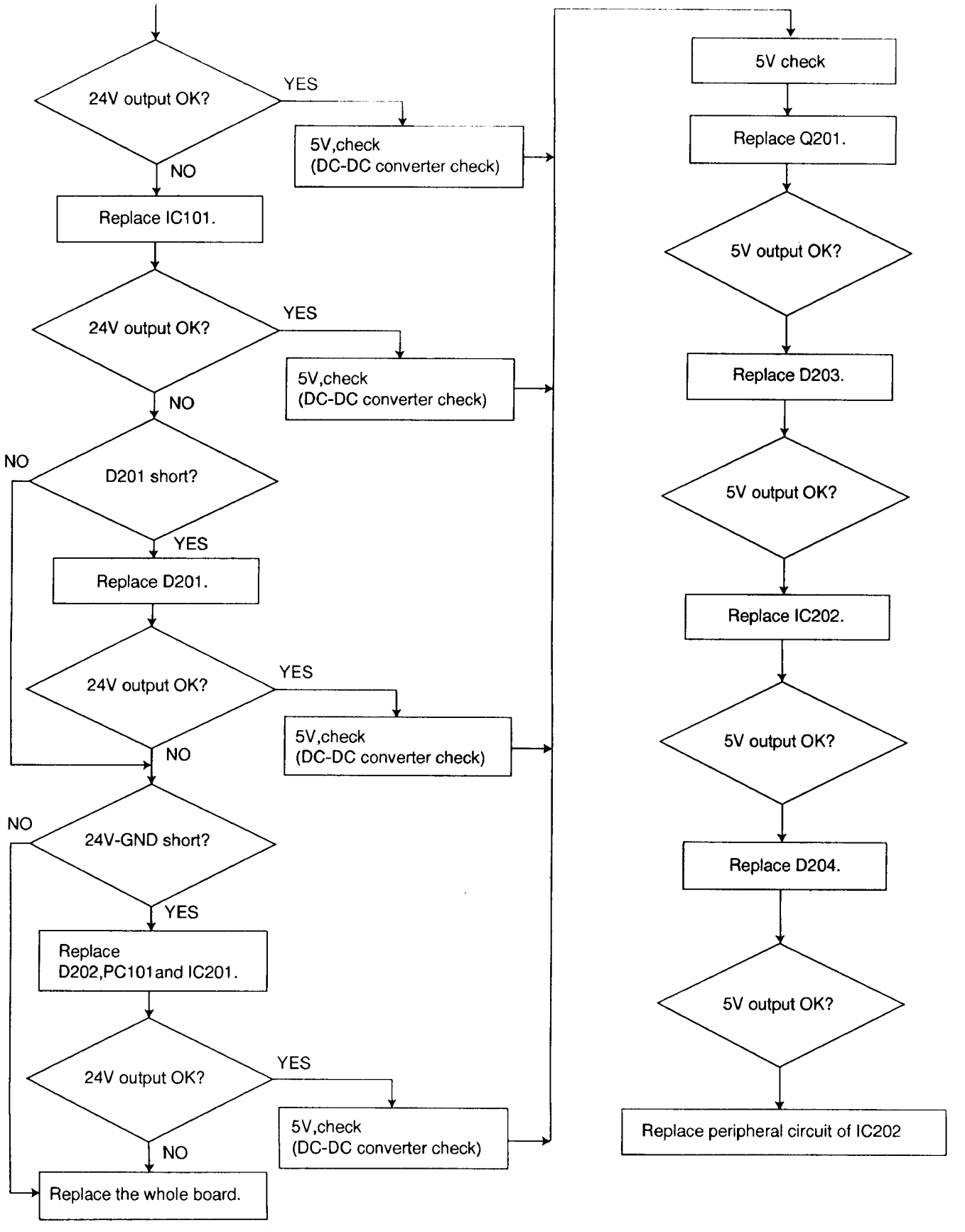
(2) Troubleshooting flow chart

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.





(It is difficult to fix by testing other parts.)

(3) The broken parts repairing details

(D101)

Check short-circuit of terminal 4. If D101 is short-circuited, F101 will be melted (open). So in this case, replace the 60th parts (D101, F101).

(Q101)

The worst case of Q101 is a short-circuit between the Drain and Gate because damage expands to IC101. This is due to of very high voltage through the Gate circuit which is composed of D104, R107, R114 and R121. Then you should change all of the parts listed as follows:

F101, Q101, D104, R107, R114, R121, IC101.

(IC101)

Occasionally, it exists as the sole case of a broken IC101. You should exchange.

(D201)

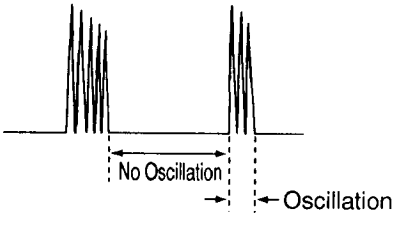
If D201 is broken, the oscillation circuit of the power supply cannot operate. Check it with an electric tester.

(D202)

Occasionally, this part short-circuits. In this case, you can listen to the click sound of intermittent oscillation*. Check the resistance between 24V and GND.

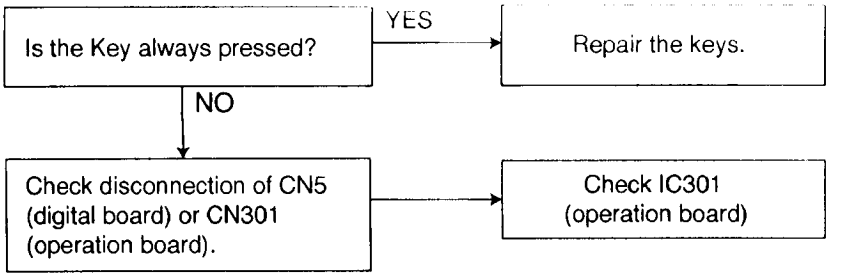
*Intermittent Oscillation:

This happens when the power supply balance is broken and loads as a perfect open or short-circuit of output. The graph of Intermittent Oscillation is shown as follow.

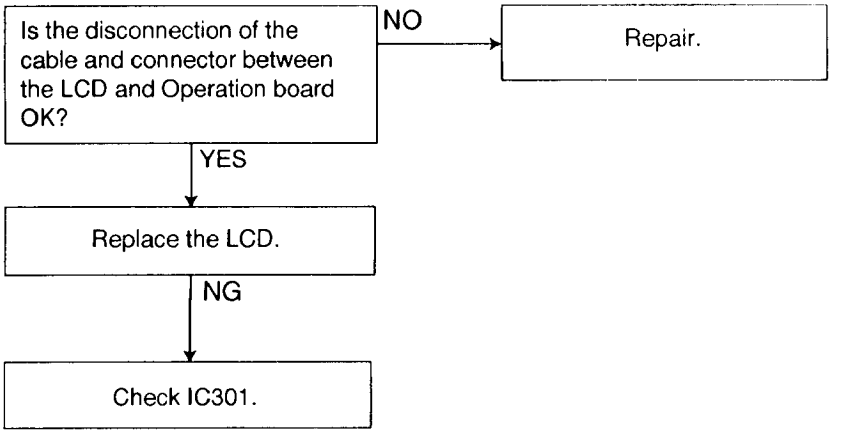


3-10. OPERATION BOARD SECTION

(1) No key operation

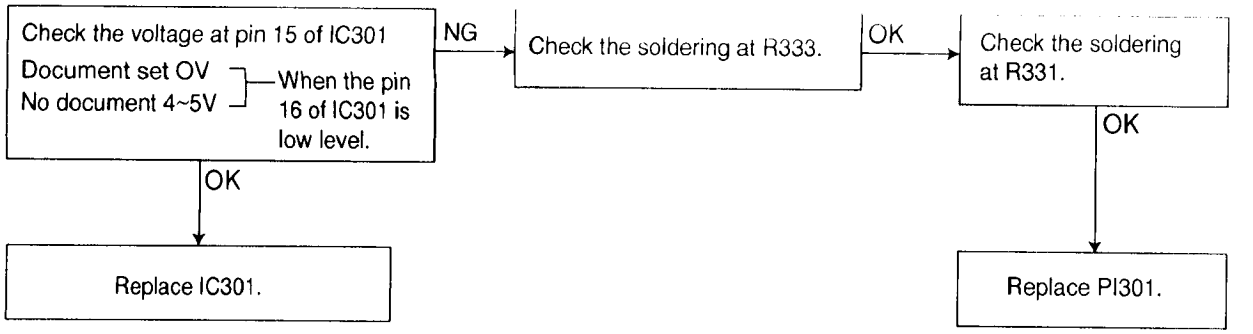


(2) No LCD indication

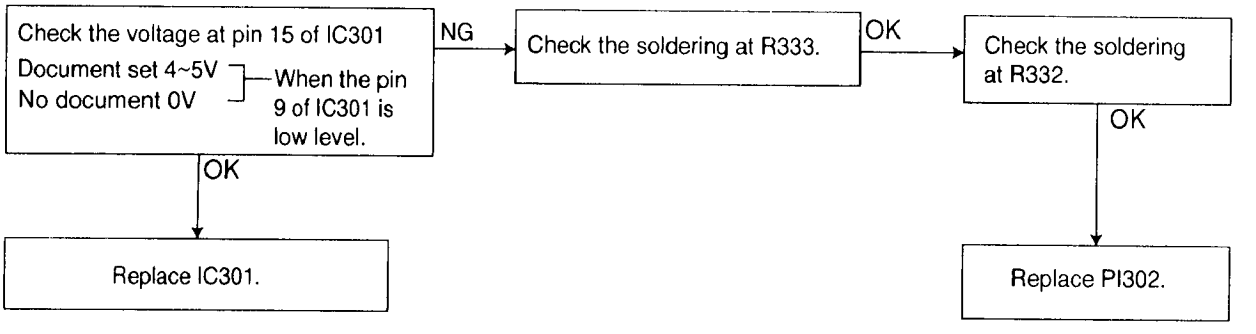


3-11. SENSOR SECTION

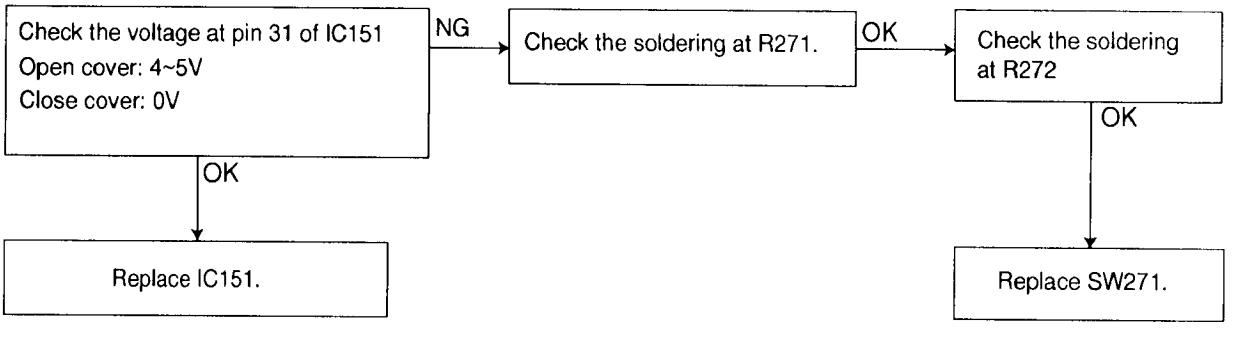
(1) Check the read position sensor(PI301)



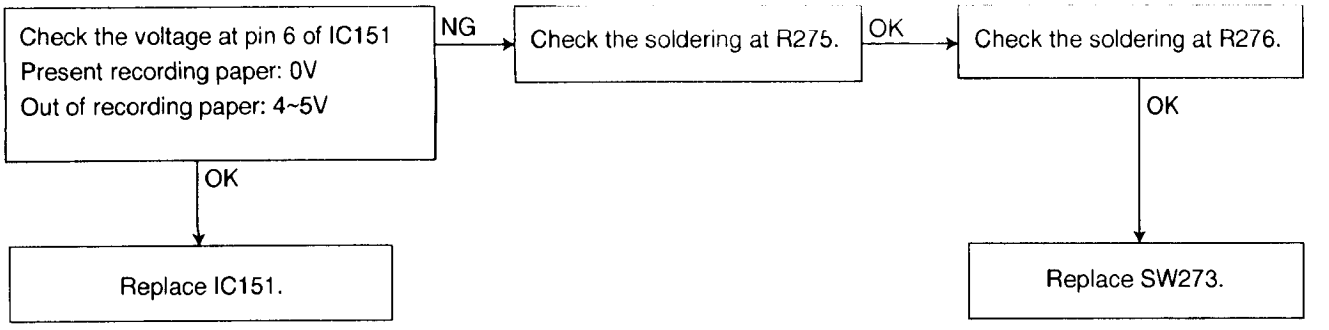
(2) Check the document sensor (PI302)



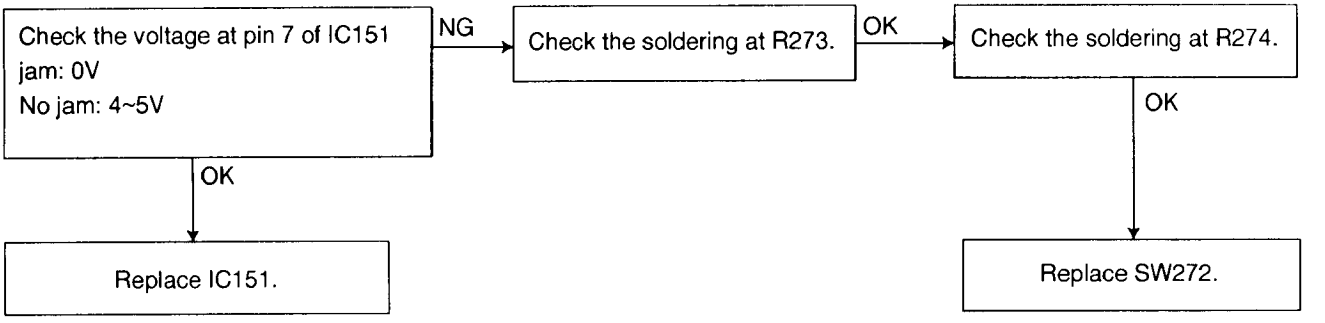
(3) Check the cover open sensor(SW271)



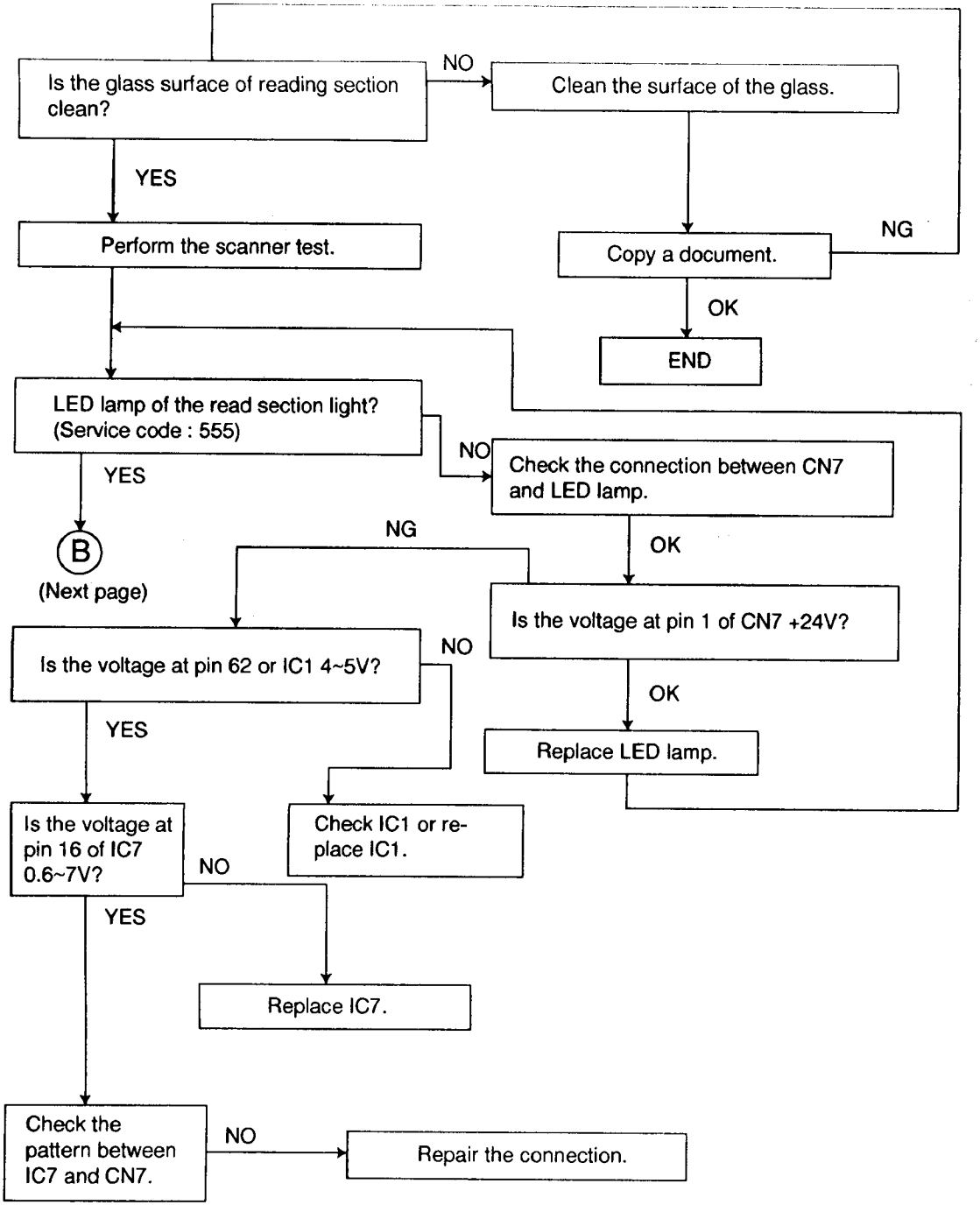
(4) Check the recording paper sensor (SW273)

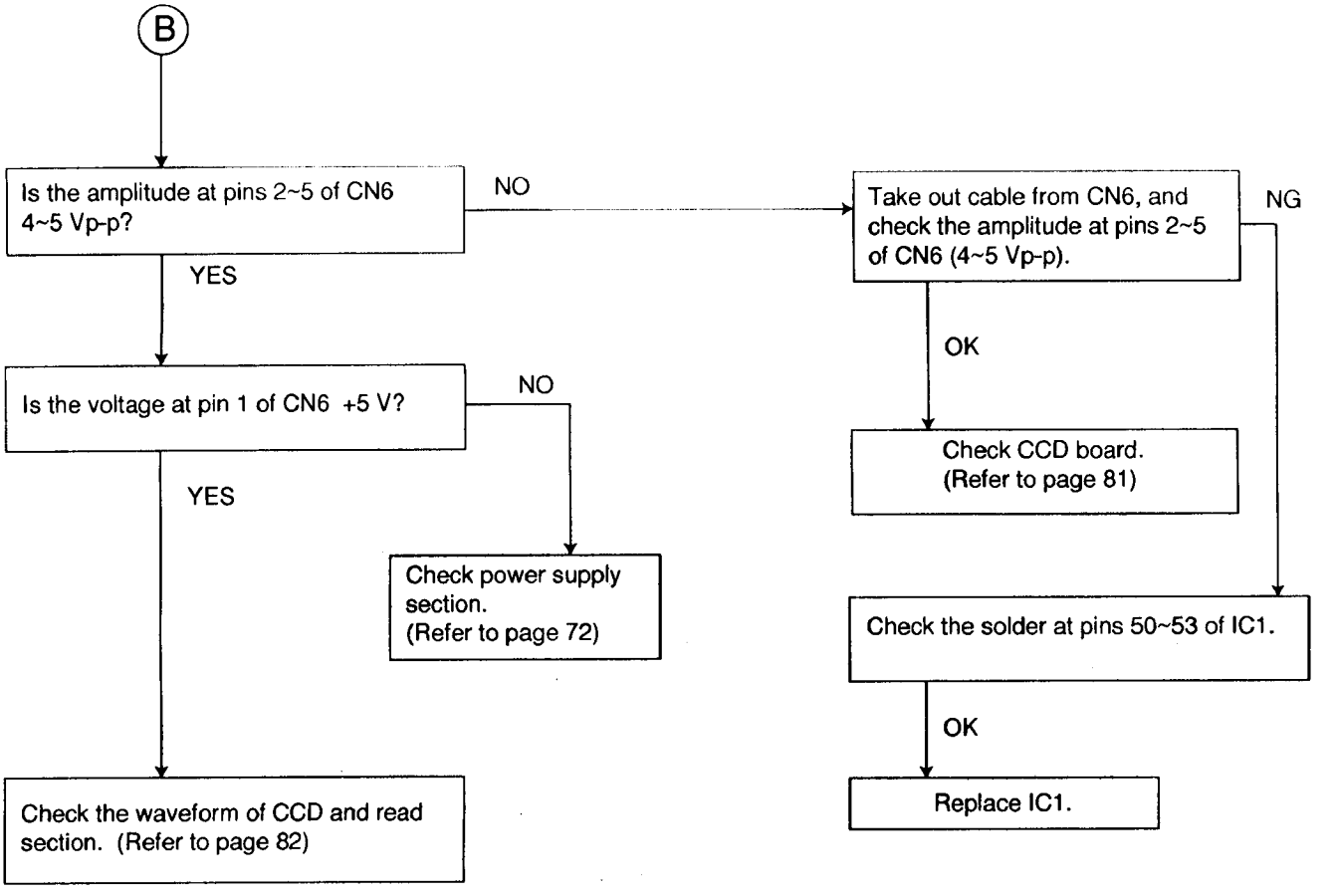


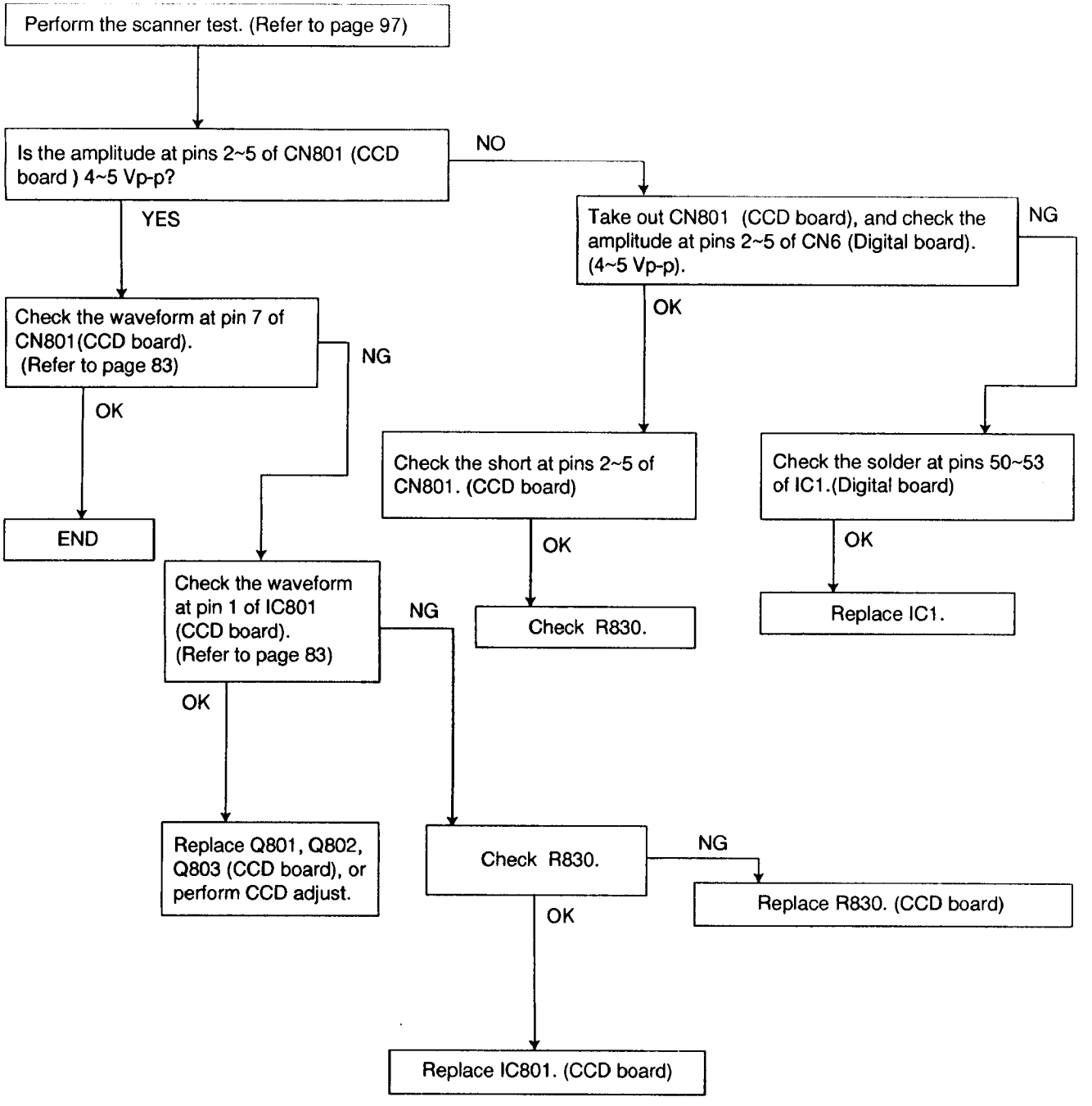
(5) Check the jam sensor (SW272)



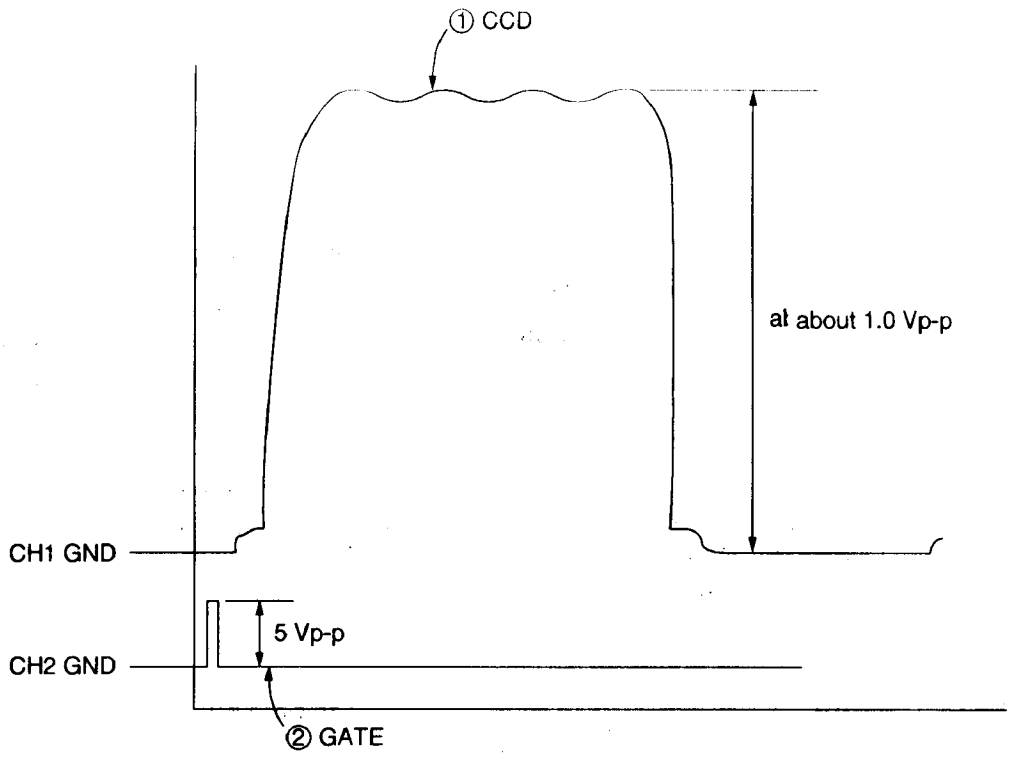
3-12. READ SECTION




B
Is the amplitude at pins 2~5 of CN6 4~5 Vp-p?
NO
Take out cable from CN6, and check the amplitude at pins 2~5 of CN6 (4~5 Vp-p).
NG
YES
OK
Is the voltage at pin 1 of CN6 +5 V?
NO
Check CCD board. (Refer to page 81)
YES
Check power supply section. (Refer to page 72)
Check the solder at pins 50~53 of IC1.
OK
Check the waveform of CCD and read section. (Refer to page 82)
Replace IC1.


Perform the scanner test. (Refer to page 97)
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 CN6 (Digital board). (4~5 Vp-p).
NG
OK
Check the waveform at pin 7 of CN801(CCD board). (Refer to page 83)
NG
OK
Check the short at pins 2~5 of CN801. (CCD board)
Check the solder at pins 50~53 of IC1.(Digital board)
END
OK
OK
Check the waveform at pin 1 of IC801 (CCD board). (Refer to page 83)
NG
Check R830.
Replace IC1.
OK
Replace Q801, Q802, Q803 (CCD board), or perform CCD adjust.
Check R830.
NG
Replace R830. (CCD board)
OK
Replace IC801. (CCD board)

waveform of read section



Oscilloscope setting

V: CH1 0.5 V/div
CH2 5 V/div
DC couple, CHOP mode

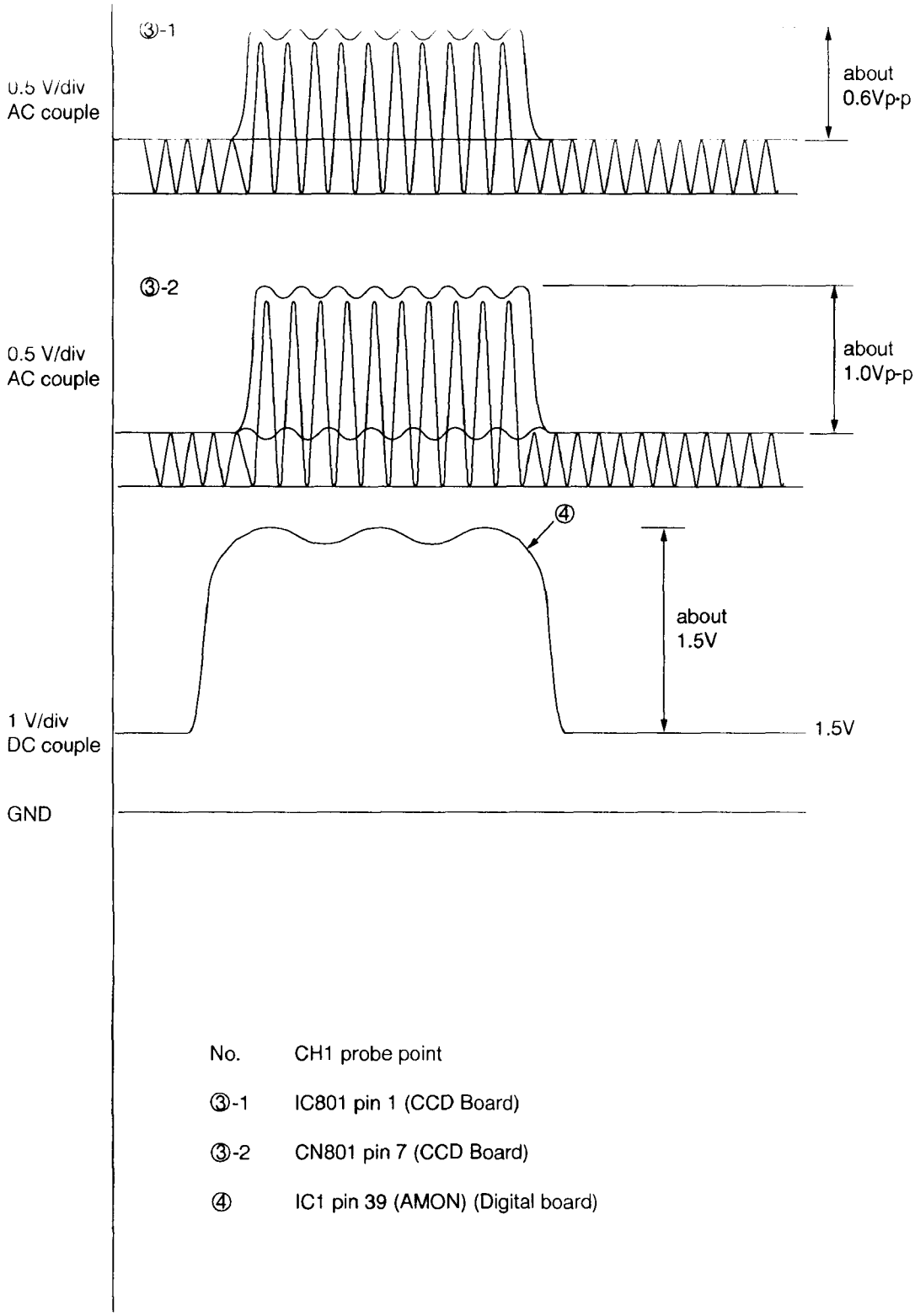
H: 1 msec / div

Trigger: CH2 SLOPE (+)

Probe point: GND Test point "AG"
CH1 Test point "VID"
CH2 Test point "FTG"

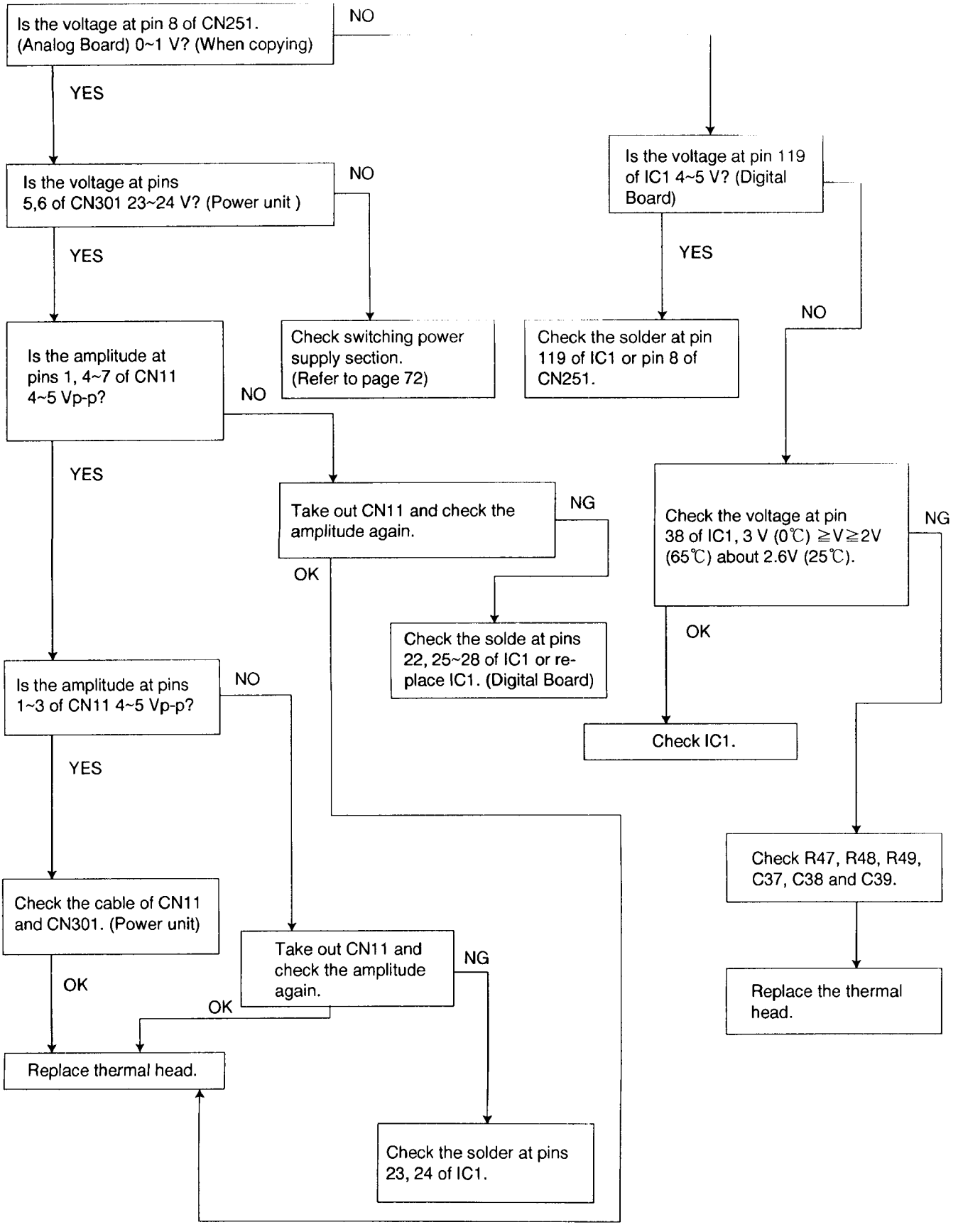
Waveform: ① CH1: CCD signal
② CH2 FTG: GATE signal (trigger)

Note: This waveform will be shown when the CCD reads the white plate of document cover.



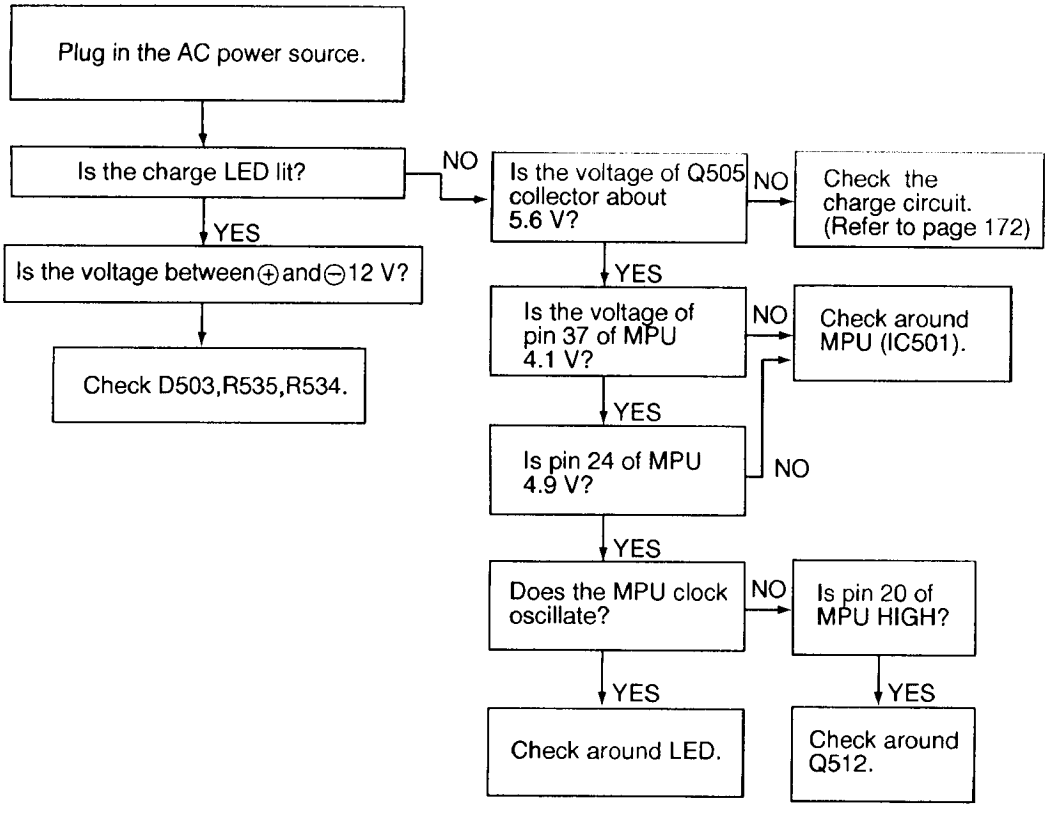
No.	CH1 probe point
③-1	IC801 pin 1 (CCD Board)
③-2	CN801 pin 7 (CCD Board)
④	IC1 pin 39 (AMON) (Digital board)

3-13. THERMAL HEAD SECTION

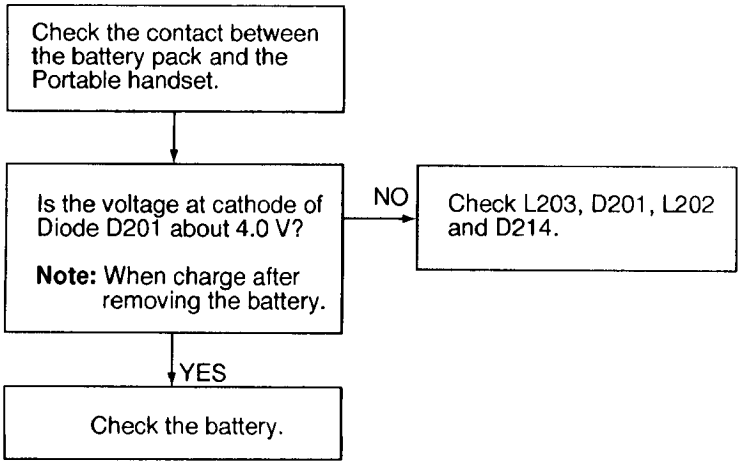


3-14. CORDLESS SECTION

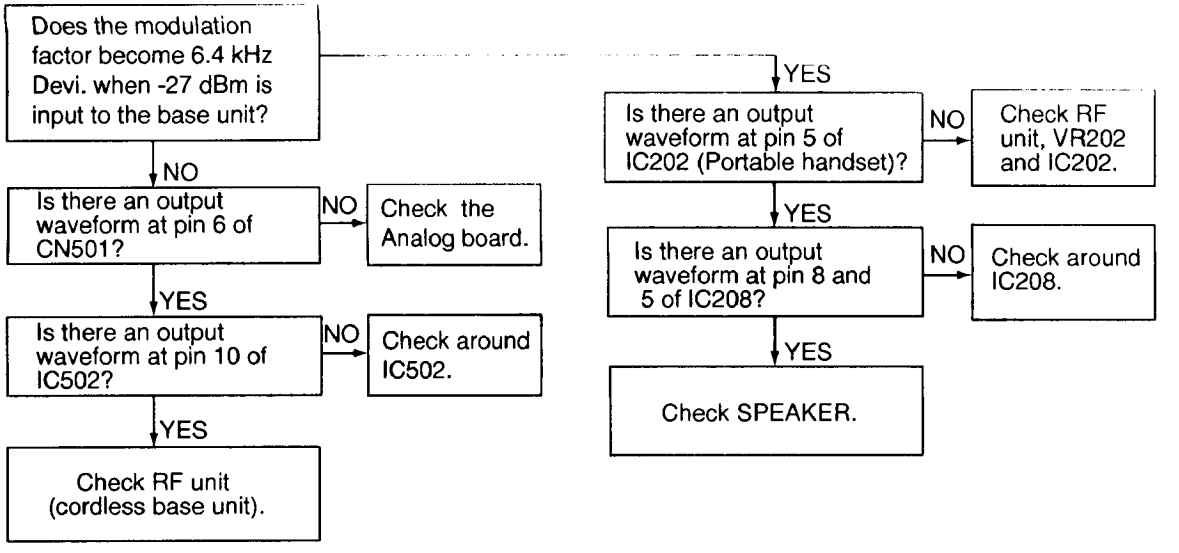
(1) Battery won't charge (Cordless Base unit)



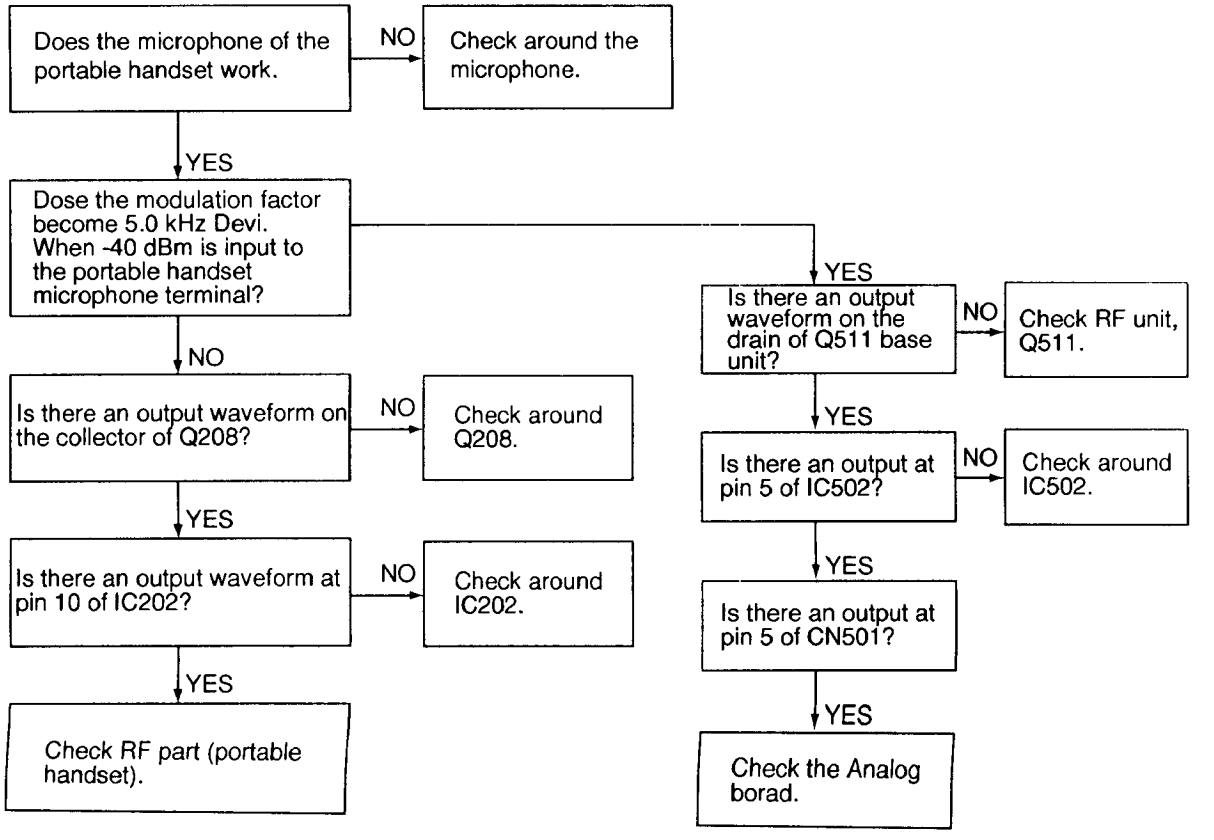
(2) Battery won't charge (Portable handset)



(3) No voice reception

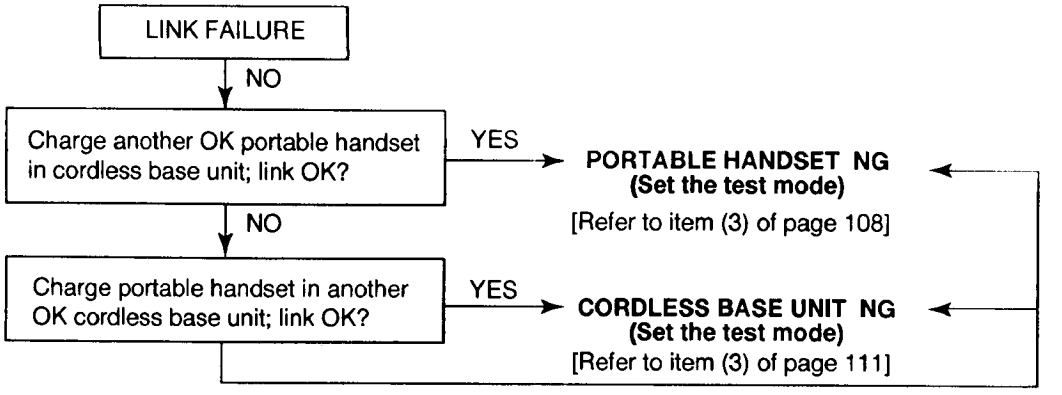


(4) No voice transmission



(5) No link

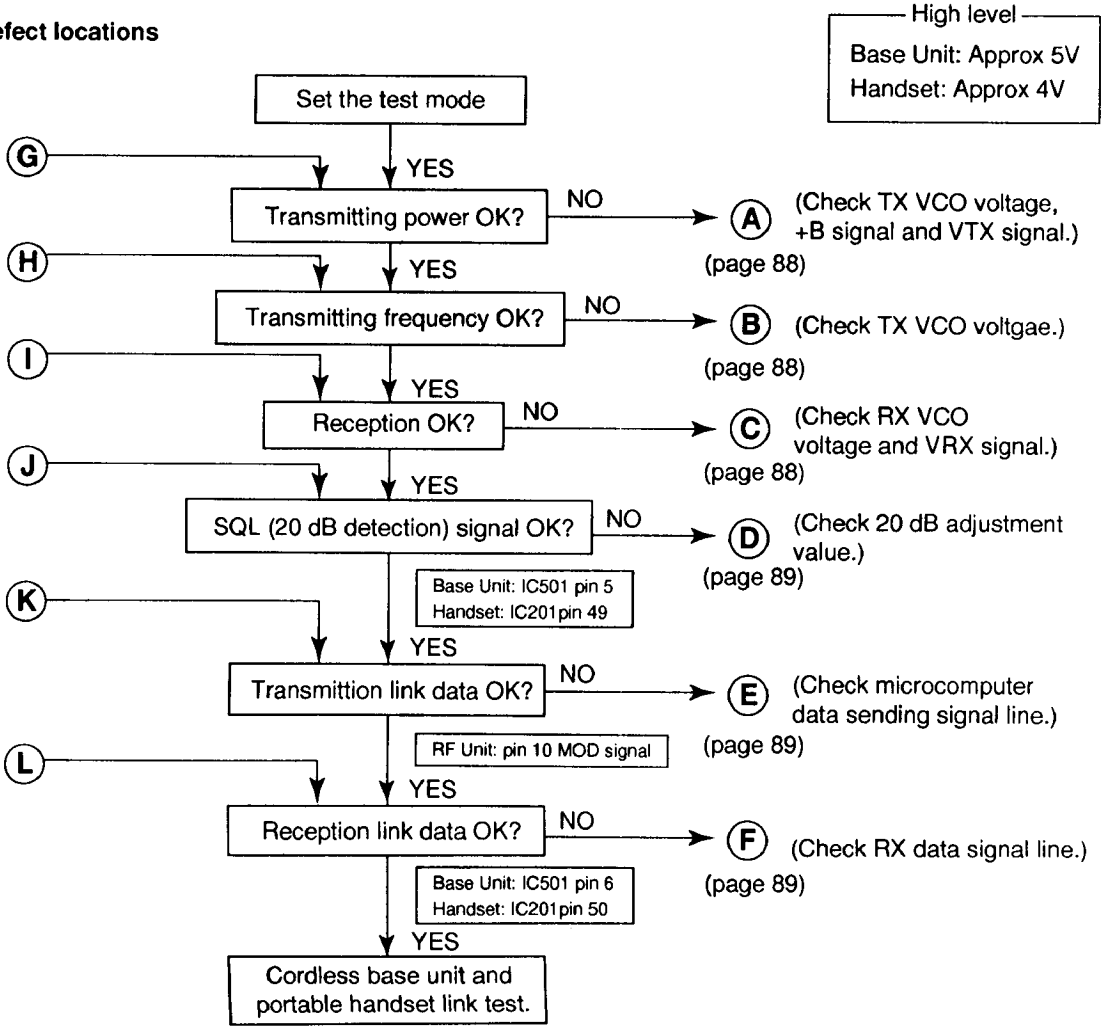
① How to check whether the portable handset or the cordless base unit

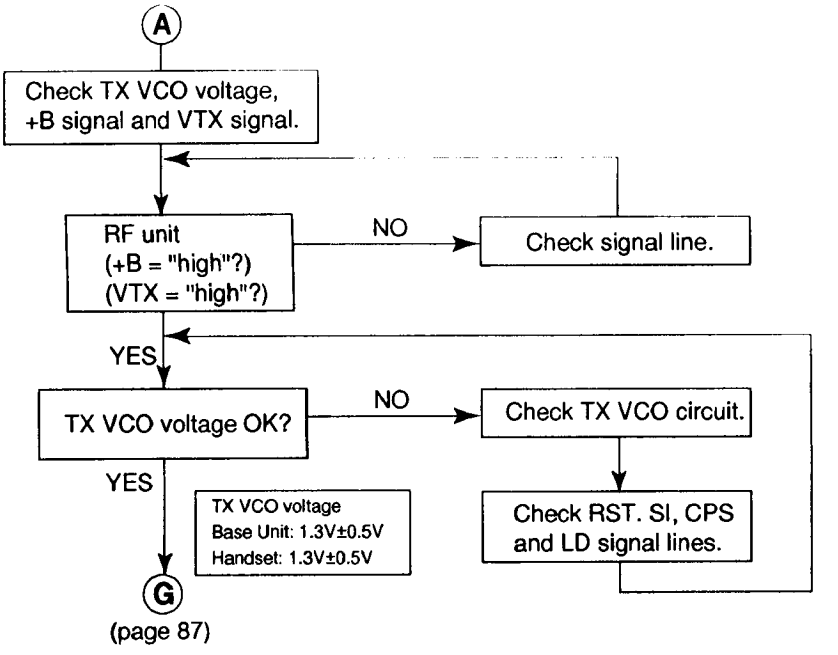


② Link condition

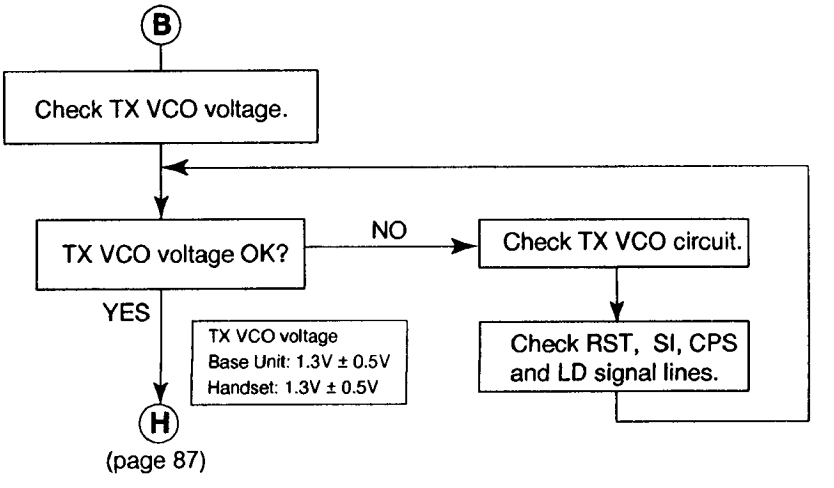
1. Transmitting power OK? (Cordless base unit: -9.0 ± 4 dBm; portable handset: -7.5 dBm ± 4 dB)
2. Transmitting frequency OK? (CH1 cordless base unit: 902.1 MHz ± 4 kHz; portable handset:926.1 MHz ± 4 kHz)
3. Reception OK? (CH1 cordless base unit: 926.1 MHz ; portable handset: 902.1 MHz, f=1 kHz, MOD=5 kHz DEV)
4. SQL (20 dB detection) signal OK? (When SG is ON: "high"; when SG is OFF: "Low")
5. Transmittion link data OK? (cordless base unit: 744 Hz and 425 Hz frequencies mixed; portable handset: 372 Hz and 270 Hz frequencies mixed)
6. Reception link data OK? (portable handset: 744 Hz and 425 Hz frequencies mixed; cordless base unit: 372 Hz and 270 Hz frequencies mixed)

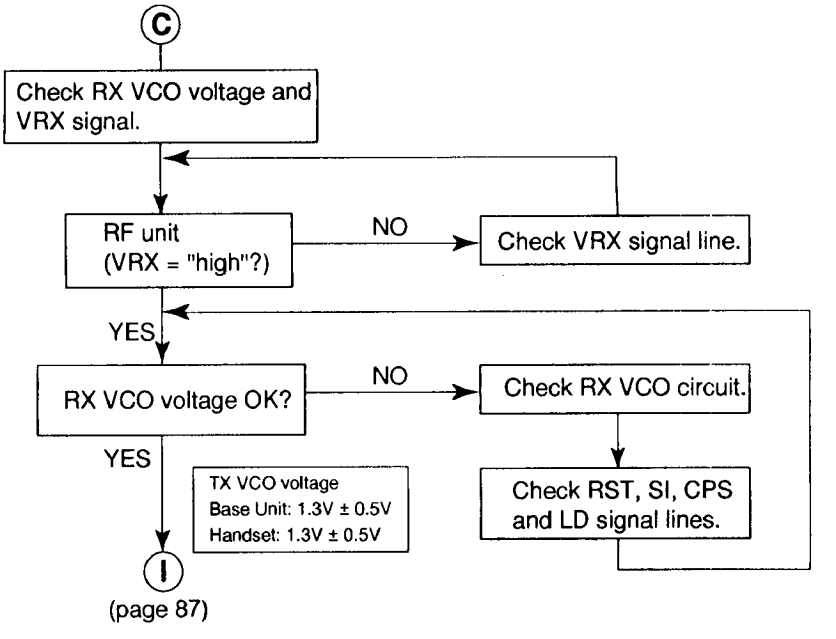
③ Analysis of defect locations



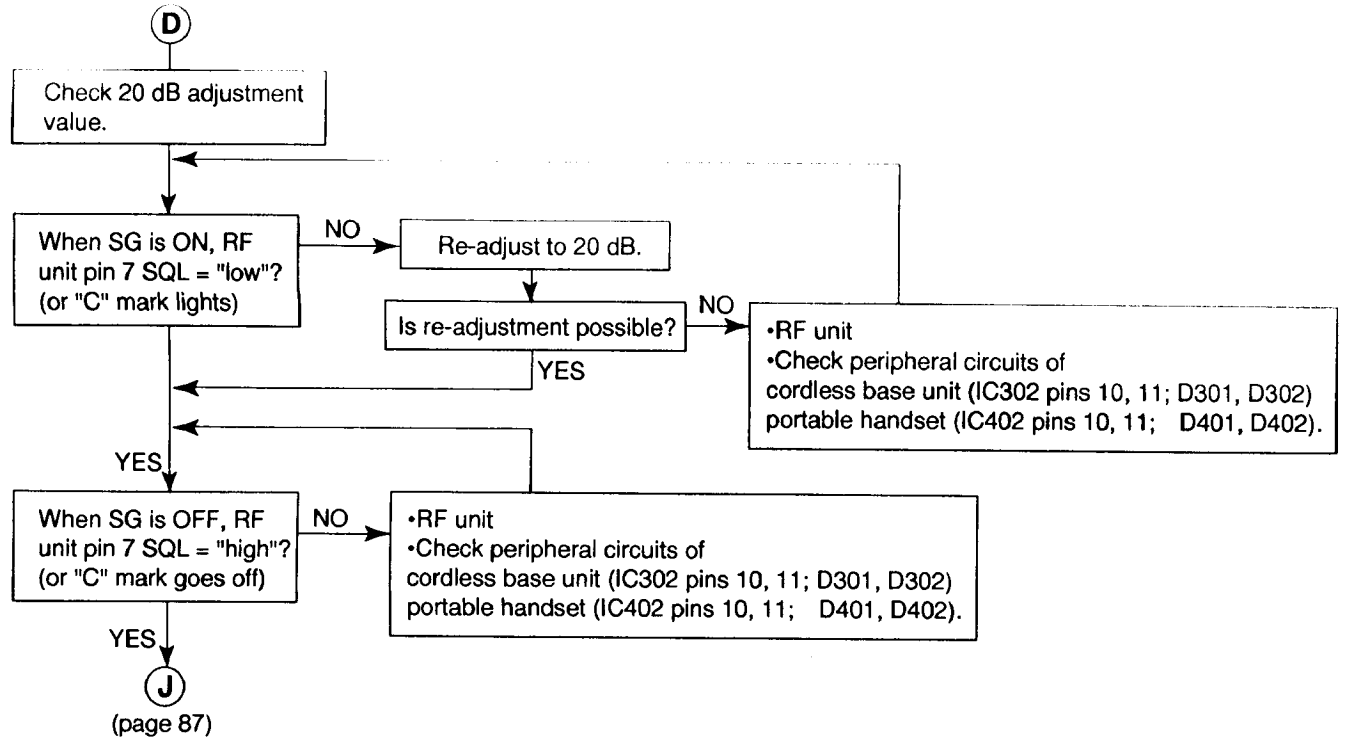


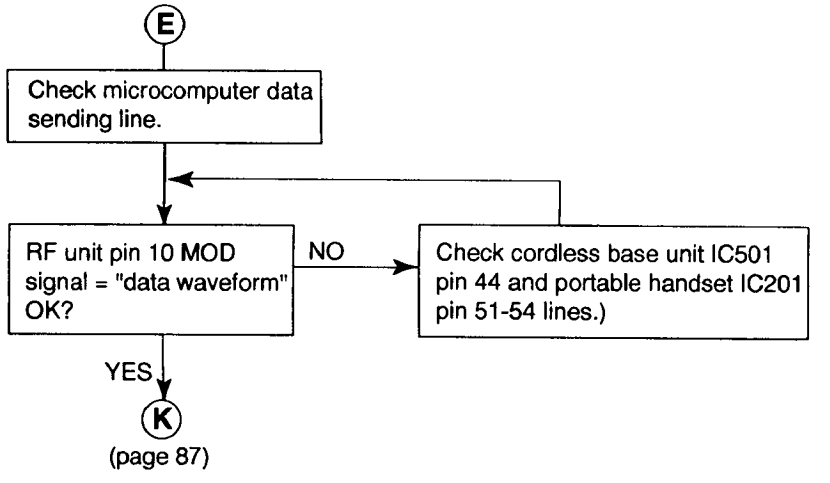
High level
Base Unit: Approx 5V
Handset: Approx 4V

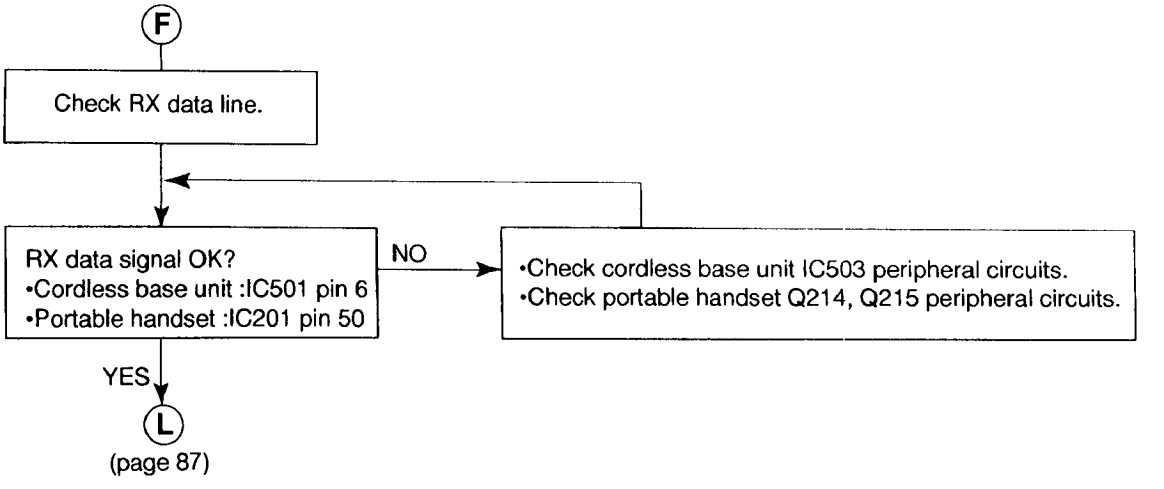




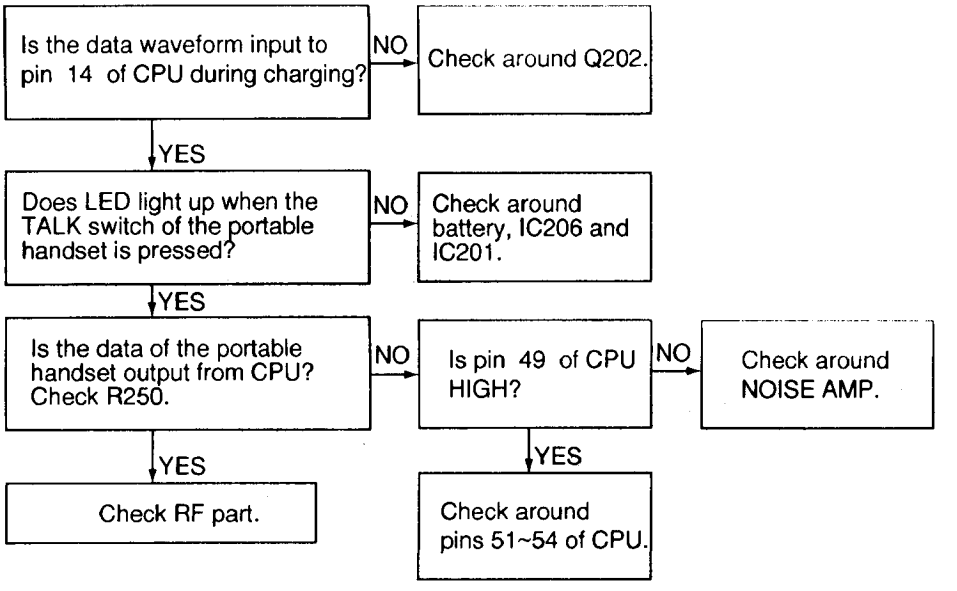
High level
Base Unit: Approx 5V
Handset: Approx 4V


D
Check 20 dB adjustment value.
When SG is ON, RF unit pin 7 SQL = "low"? (or "C" mark lights)
NO
Re-adjust to 20 dB.
Is re-adjustment possible?
NO
•RF unit
•Check peripheral circuits of cordless base unit (IC302 pins 10, 11; D301, D302) portable handset (IC402 pins 10, 11; D401, D402).
YES
YES
When SG is OFF, RF unit pin 7 SQL = "high"? (or "C" mark goes off)
NO
•RF unit
•Check peripheral circuits of cordless base unit (IC302 pins 10, 11; D301, D302) portable handset (IC402 pins 10, 11; D401, D402).
YES
J
(page 87)

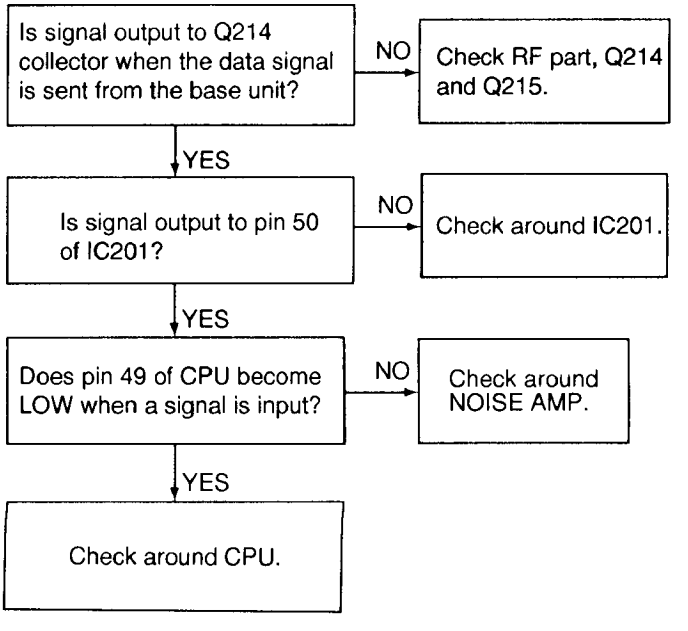

E
Check microcomputer data sending line.
RF unit pin 10 MOD signal = "data waveform" OK?
NO
Check cordless base unit IC501 pin 44 and portable handset IC201 pin 51-54 lines.)
YES
K
(page 87)


F
Check RX data line.
RX data signal OK?
•Cordless base unit :IC501 pin 6
•Portable handset :IC201 pin 50
NO
•Check cordless base unit IC503 peripheral circuits.
•Check portable handset Q214, Q215 peripheral circuits.
YES
L
(page 87)

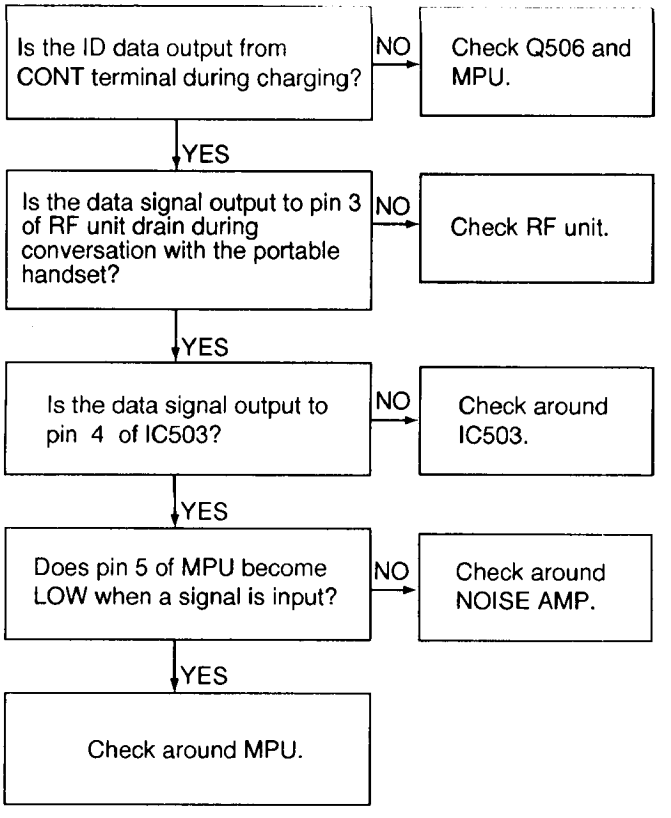
④ **(No link (Portable handset TX)**



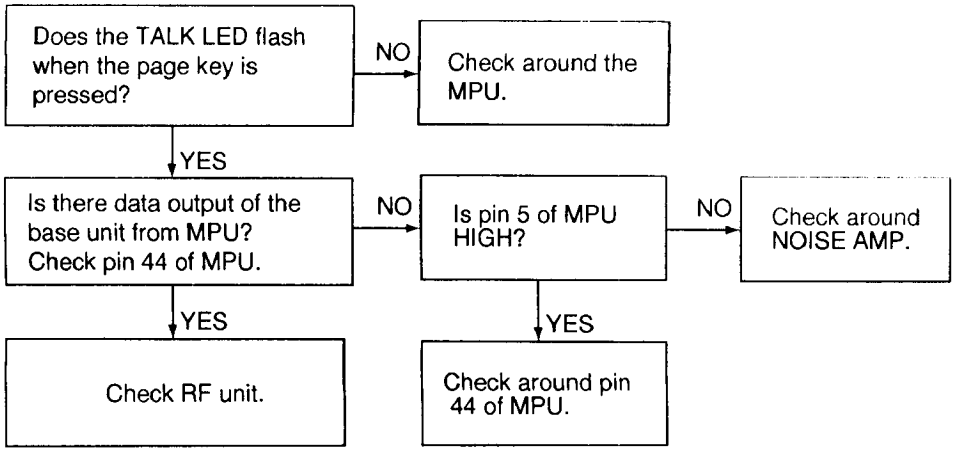
⑤ **No link (Portable handset RX)**



⑥ No link (Base unit RX)



⑦No link (Base unit TX)



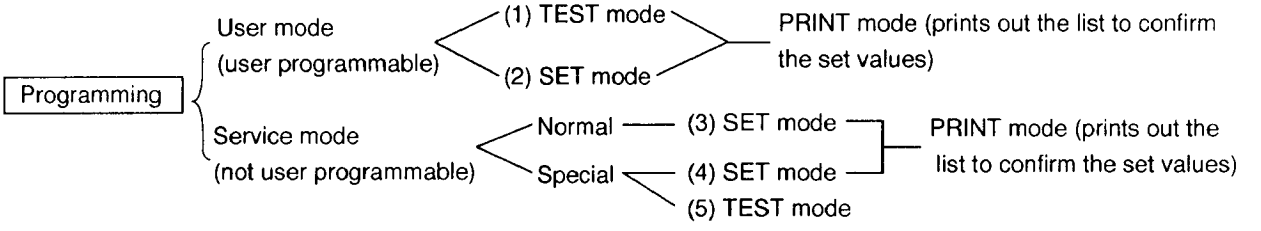
4. PROGRAMMING AND LISTS

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.

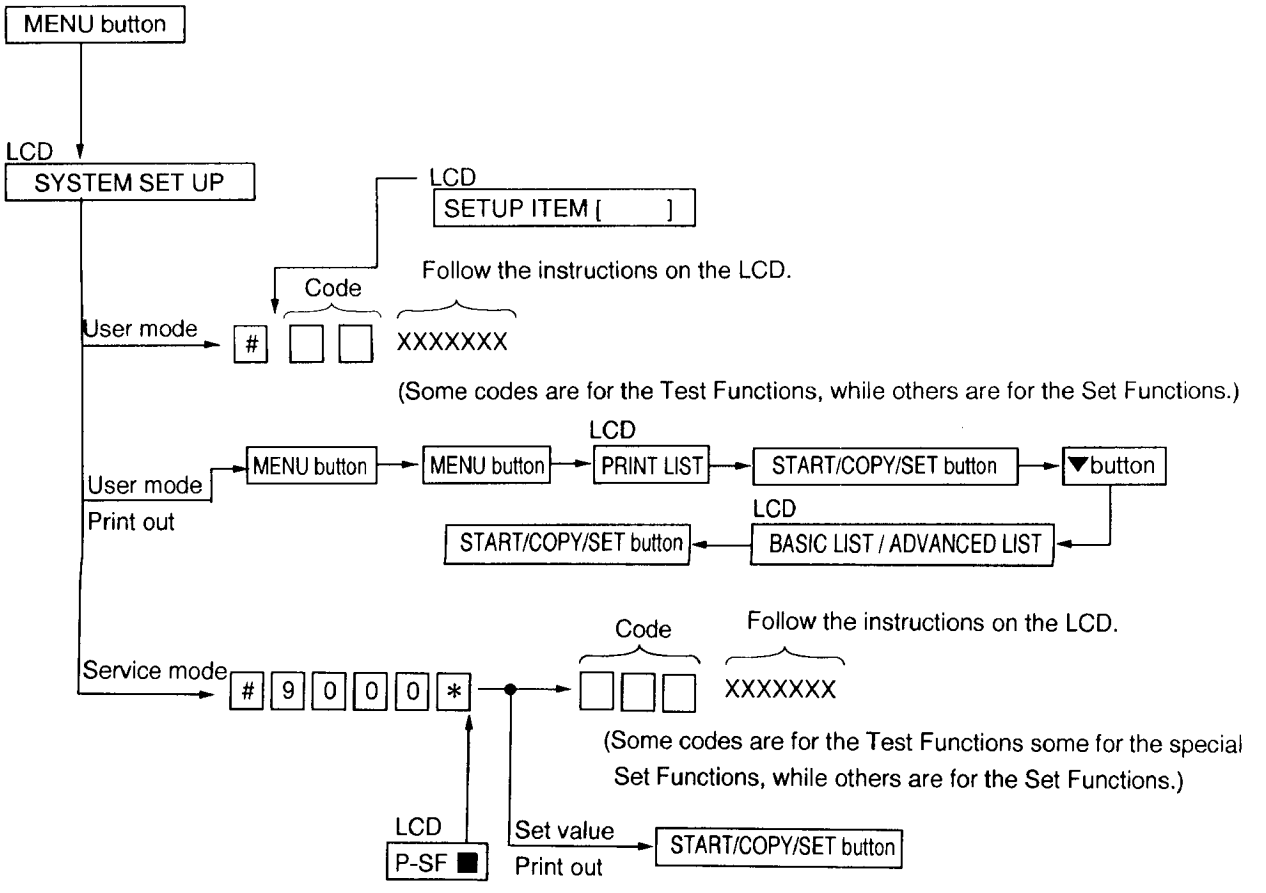
4-1. OPERATION

There are 2 basic categories of programming functions, the User Mode and the 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.

4-2. OPERATION FLOW



Operating Procedure



4-3. USER MODE (The list below is an example of the SYSTEM SETUP LIST the unit prints out.)

BASIC FEATURE LIST

NO.	FEATURE	CURRENT SETTING	
#01	SET DATE & TIME	JAN. 01 1996 12:00AM	
#02	YOUR LOGO		
#03	YOUR TELEPHONE NUMBER		
#04	PRINT TRANSMISSION REPORT	ERROR	[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	

Code

Set Value

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	[A,B,C,D,OFF]
#39	LCD CONTRAST	NORMAL	[NORMAL,DARKER]
#40	SILENT DETECTION	ON	[ON,OFF]
#41	REMOTE FAX ACTIVATION CODE	ON	[ON,OFF]
	CODE =	**	
#46	FRIENDLY RECEPTION	ON	[ON,OFF]
#70	FAX PAGER	OFF	[ON,OFF]
	DESTINATION =		
#80	SET DEFAULT		

Code

Set Value

Note:
The above values are default

4-4. SERVICE FUNCTION TABLE

Code	Function	Set Value	Effective Range	Default	Remarks
501	Setting of pause time	001~600X100 msec	001~600	05000 msec	Selects the pause time in 100 msec step.
502	Setting of flash time	01~99X10msec	01~99	700 msec	Selects the line break time during flashing in 10 msec step.
503	Setting of pulse dial speed	1 : 10 pps 2 : 20 pps	1, 2	10 pps	Sets the pulse dial speed.
520	Setting of CED frequency	1 : 2100 Hz 2 : 1100 Hz	1, 2	2100 Hz	When international communications cannot be performed smoothly, select 1100 Hz.
521	Setting of international line mode	1 : ON 2 : OFF	1, 2	ON	Selects the international line mode during of FAX communication.
522	Setting of return to default mode	1 : ON 2 : OFF	1, 2	ON	Sets the resolution and contrast conditions of FAX or copy returning to the default.
523	Setting of reception equalizer	1 : ON 2 : OFF	1, 2	OFF	When a station is quite a distance from the unit or reception cannot be performed correctly, set to "ON".
544	Selection of document feed position	01~99 step	01~99	- - -	When ADF function is improper, adjust feed position. (8 step=1mm)
550	Memory clear				Press "START/COPY/SET".
551	ROM version and sum check				Press "START/COPY/SET".
553	Setting of FAX monitor function	1 : OFF 2 : PHASE B 3 : ALL	1, 2, 3	OFF	To monitor the line signal with the unit's speaker during FAX communication or not.
554	Modem test				"START" press.
555	Scanner test				"START" press.
556	Motor test				"START" press.
557	LED test				"START" press.
558	LCD test				"START" press.
559	Setting of document jam detection	1 : ON 2 : OFF	1, 2	ON	Selects the jam detection of document during FAX transmission/copying.
560	Cutter select	1 : ON 2 : OFF	1, 2	ON	———
561	KEY test				Press any key.
562	Cutter test				"START" press.
563	CCD position adjustment value set	00~30X1 mm	00~30	–	Lets you select the correction value for main scanning direction of the dislocated scanner.
570	Setting of the % break	1 : 61% 2 : 67%	1, 2	61%	Sets the % break of the pulse dial.

Code	Function	Set Value	Effective Range	Default	Remarks
571	Setting of number of times that ITS is redialed	00~99	00~99	14 times	Selects the number of times that ITS is redialed (not including the first dialing).
572	Setting of ITS redial interval	001~999 sec	001~999	030 sec	Sets the interval of ITS redial.
573	TEL ring count	01~99	01~99	15 times	Sets the number of rings that unit starts to receive a document in TEL mode.
590	Setting of number of times of FAX redial	0~99	00~99	5 times	Selects the number of times of redial during FAX communication (not including the first dialing).
591	Setting of FAX redial interval	001~999 sec	001~999	045 sec	Sets the interval of FAX redial during FAX communication.
592	Designation of CNG sending	1 : OFF 2 : ALL 3 : AUTO	1, 2, 3	ALL	Lets you select the CNG output during FAX transmission. ALL: CNG is output at phase A. AUTO: CNG is output only when the automatic dialing is performed. OFF: CNG is not output at phase A.
593	Setting of interval between CED and 300 bps signal.	1 : 75 msec 2 : 500 msec 3 : 1000 msec	1, 2, 3	75 msec	Sets the interval between the CED signal and subsequent 300 bps signal.
594	Setting of overseas DIS detection	1 : Detects at the 1st time 2 : Detects at the 2nd time	1, 2	Detects at the 1st time	Sets the recognizing format of DIS signal. 1: Detects the first DIS signal sent from the receiver during FAX transmission. 2: Ignores the first DIS signal sent from the receiver during FAX transmission.
595	Setting of the acceptable value of reception error	001~999X number of times	001~999	100	Sets the number of error acceptable lines when the FAX reconstructs the received data.
596	Setting of transmit level	-15~00	-15~00	-10 dBm	Selects the FAX transmission level. (Increase the level when the telephone line condition is poor.)
700	EXT TAM OGM time	×second	01~99	10 sec	Sets the start time of silence detect.
701	Silence detect time	×100 ms	01~99	50 ms	Sets the silence of call confirmation times.
702	EXT TAM ring count	×number of rings	0~9	5 times	Sets the number of rings that unit start to receive a document in EXT-TAM mode.
717	Transmit speed select	1 : 9600 BPS 2 : 7200 BPS 3 : 4800 BPS 4 : 2400 BPS	1~4	9600 BPS	Adjusts the speed to start training during FAX transmission.
718	Receive speed select	1 : 9600 BPS 2 : 7200 BPS 3 : 4800 BPS 4 : 2400 BPS	1~4	9600 BPS	Adjusts the speed to start training during FAX reception.

Code	Function	Set Value	Effective Range	Default	Remarks
719	Ringer off in TEL/FAX mode	1 : ON 2 : OFF	1, 2	ON	Selects ringer off switch when a call is received in the TEL/FAX mode.
721	Pause tone detect	1 : ON 2 : OFF	1, 2	ON	Selects the tone detection in the pauses of the dialing.
722	Redial tone detect	1 : ON 2 : OFF	1, 2	ON	Selects the tone detection mode after redialing.
732	AUTO disconnect	1 : 350 ms 2 : 1.8 sec 3 : OFF	1, 2, 3	350 ms	Selects the start time of detection of auto disconnect.
763	CNG detect time	1 : 10 sec 2 : 20 sec 3 : 30 sec	1, 2, 3	20 sec	Selects the CNG detect time of friendly reception.
771	T1 timer	1 : 35 sec 2 : 60 sec	1, 2	35 sec	Set to the higher value when the response from the other party needs much time during FAX transmission.
815	Sensor check				"START" press.
844	Original setting	1 : NORMAL 2 : LIGHT 3 : DARKER	1, 2, 3	NORMAL	Use this feature when you need to transmit and copy a document with very faint writing on very dark writing.
909	Handset Remote FAX Actication	0~9, *	2~4 digits	* *	You can change the remote FAX activation code using the portable handset.

4-5. 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]
524 TX EQL.                 =  OFF            [1=ON     2=OFF]
700 EXT. TAM OGM TIME       =  10sec          [01...99]sec
701 SILENT DETECT TIME      =  50*100msec     [01...99]*100msec
702 EXT. TAM RING COUNT     =  5              [0...9]
909 HANDSET REMOTE FAX ACT. =  **
```

SPECIAL SERVICE SETTING

(Code / Set Value)

544	553	559	560	563	570	571	572	573	590	591	592	593
50	1	1	1	15	1	14	030	15	05	045	2	1

594	595	596	717	718	719	721	722	732	763	771	844
1	100	10	1	1	1	1	1	1	2	1	1

Note:
The above values are default

5. TEST FUNCTIONS

Test mode	Type of Mode	• Code □□ • Operation after code input.	Function
PRINT TEST	User mode	[8] [5] START	Print a test pattern and check the thermal head for abnormalities (missing dots, etc.), and also check the operation of the reception motor.
MOTOR TEST	Service Mode	[5] [5] [6] START	Rotate the transmission and reception motors to check the operation of the motors.
MODEM TEST	Service Mode	[5] [5] [4] START	Send four kinds of FAX signals to check the sending function of the modem. 1) 1100 Hz: Consecutive signal of EOM for tonal. 2) 2100 Hz: G2 carrier signal Consecutive of CED signal 3) G3, V29 training signal [modulation wave of carrier signal (1700 Hz)]
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.
LED TEST	Service Mode	[5][5][7] START	All LEDs flashes on and off, or is illuminated.
KEY CHECK	Service Mode	[5][6][1] {any key}	Check the operation button. Indicate the button code at LCD while the button is pressed.
FACTORY SET	Service Mode	[5][5][0] START	Clear the memory in which the user can store data.
CUTTER TEST	Service Mode	[5][6][2] START	Check the cutter operation.
SENSOR CHECK	Service Mode	[8][1][5] START	CHECK SENSOR OPERATION [Do Sn Co Ja Pa Vx Cu] : LCD DISPLAY Do : Document Sensor : Paper inserted Sn : Read Position Sensor : at the read Position Co : Cover Open Sensor : Cover open Ja : Jam Sensor : Jam Pa : Recording Paper Sensor : Set Recording Paper Vx : Vox Sensor : Vox detected Cu : Cutter Position SW : Home Position

5-1. BUTTON CODE TABLE

Code	Button Name	Code	Button Name	Code	Button Name	Code	Button Name
02	RESOLUTION	0D	∧ VOLUME	35	5	3E	FLASH
03	AUTO RECEIVE	0E	∨ VOLUME	36	6	87	STATION 1/6
04	START/COPY/SET	16	ERASE	37	7	88	STATION 2/7
05	MENU	18	NEW MSGS. PLAY BACK	38	8	89	STATION 3/8
07	HELP	19	MAIL BOX	39	9	8A	STATION 4/9
08	SP-PHONE	31	1	3A	0	8B	STATION 5/10
0A	MUTE	32	2	3B	*	09	LOCATOR/ INTERCOM
0B	LOWER	33	3	3C	#		
0C	DIRECTORY	34	4	3D	REDIAL/PAUSE		

ADJUSTMENT

1. TABLE OF TEST EQUIPMENTS AND TOOL

Main Unit (FAX)

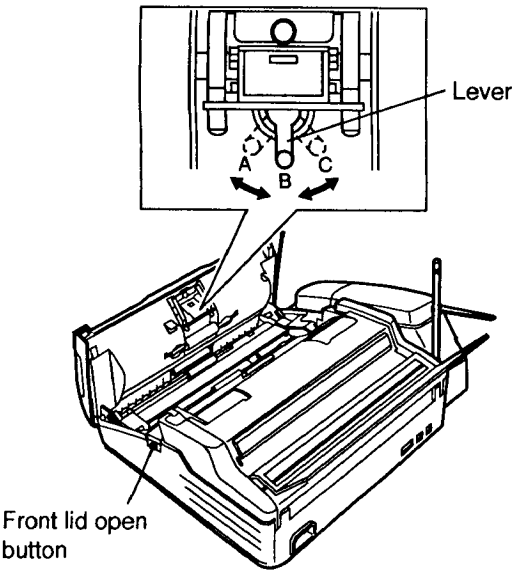
No.	Test Equipment and Jig Name	Jig No.
1	Oscilloscope	———
2	CCD Tool	PFZZ1F780M
3	Extension Cord	PQZZ2K12Z, PQZZ8K18Z
4	Spring Height Tool	PFZZ2F780M

Portable Handset (Cordless)

No.	Equipment
1.	Radio Tester : Marconi Model 2295A or later.
2.	4.5 digit Digital Multimeter : B&K Model 2833 or compatible.
3.	Oscilloscope, single or dual channel : Panasonic VP-5512P100 or compatible.
4.	Telephone Analyzer : B&K Model 1050 or compatible.
5.	DC Power Supply, capable of supply 3.9V DC at 100mA NOTE : only needed if Telephone Analyzer does not have DC VOLTS output available.
6.	High Frequency Attenuator, 10dB or greater.
7.	Corded Telephone.
8.	High Frequency Cable : BNC end to open end.
9.	Audio Cable : BNC end to alligator clip end.
10.	High Frequency Adjustment Tool:
11.	Isolation Capacitors, quantity of 2, 10 μF maximum, 50V DC or greater.
12.	Soldering Iron, solder, and various tools.

2. ADJUSTING THE FEEDER PRESSURE

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



(1) Open the front lid by pressing the front lid open.
(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 do not feed.
Position B: Standard position (pre-selected)
Position C: Select this when documents multiplefeed.
(3) Close the front lid by gently pressing down on both ends.

3. CONFIRMATION OF SEPARATION SPRING

1. Open the operation grille.
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. (Both right and left) (See Fig. 2).

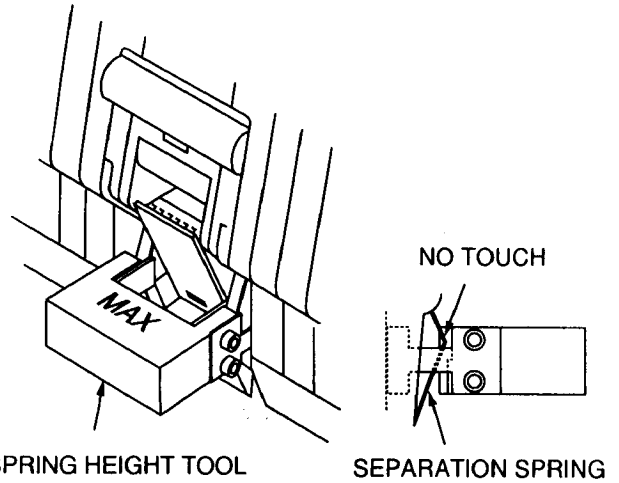


Fig. 1

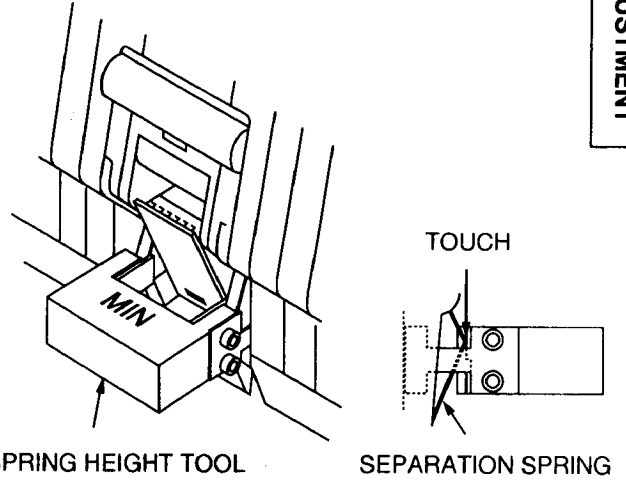


Fig. 2

4. CCD ADJUSTMENTS

Perform the following adjustment after replacing lens and CCD board.

PREPARATION:

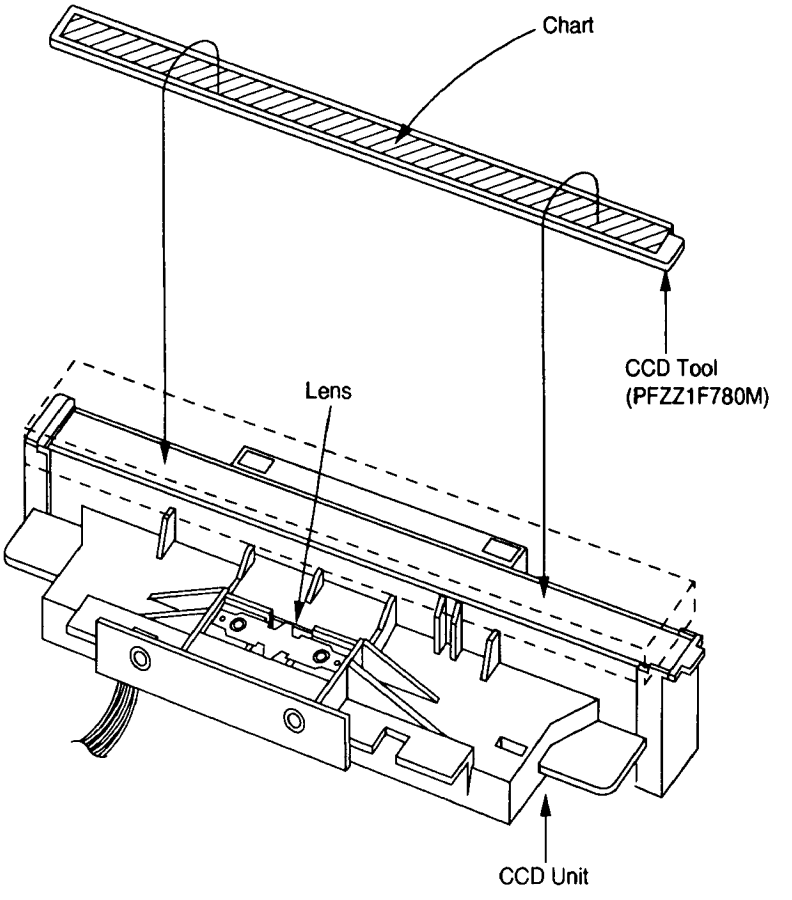
1) Remove the CCD unit from set. (Refer to page 120.)
2) Make oscilloscope connections as shown in next page.
3) Attach the CCD TOOL on the CCD unit.
4) Connect between CCD unit and digital board with extension cord (Part No. PQZZ8K18Z). (Refer to next page).
5) Connect between LED array and digital 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) on it is upper side.
2) Do not touch the glass face of the lens with the bare hands.
3) If you have no instrument to repair, trim off the chart on page 97, then attach on the target glass (This is a temporary treatment. You should use an instrument for this adjustmen purpose, if you require an accurate repairment.)

Cleaning:

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



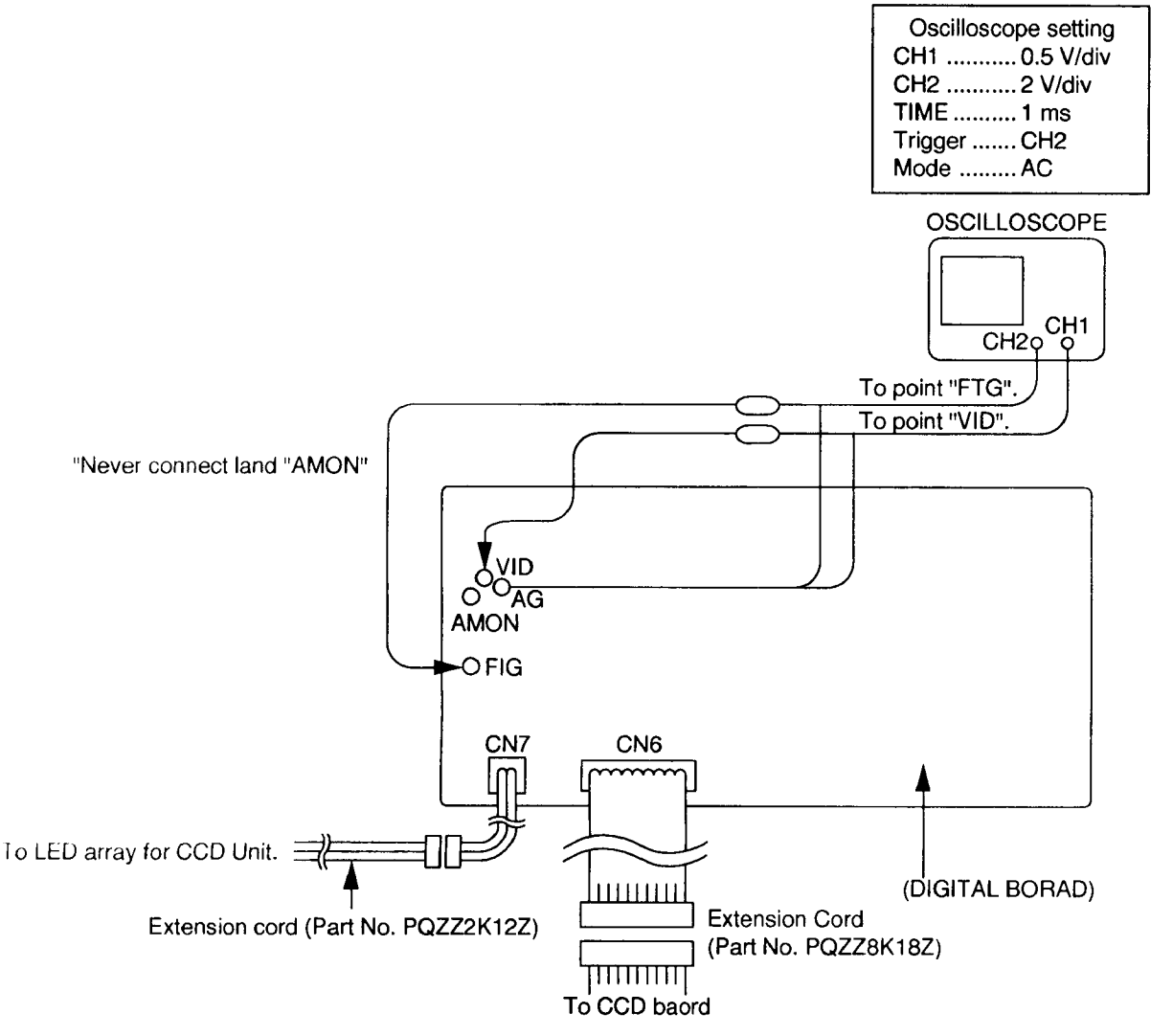
Note:

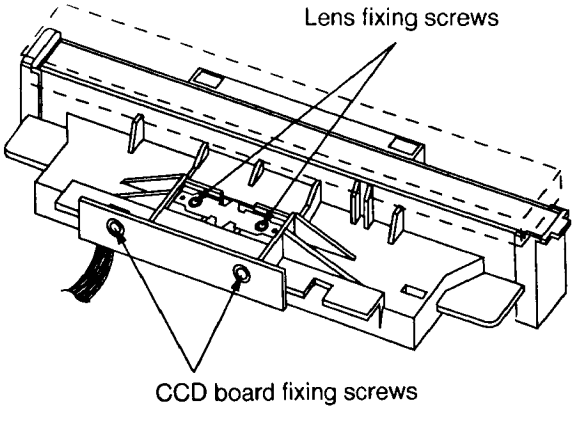
Please adjust with covering topside of the lens by hands in order not to let in outdoor daylight.

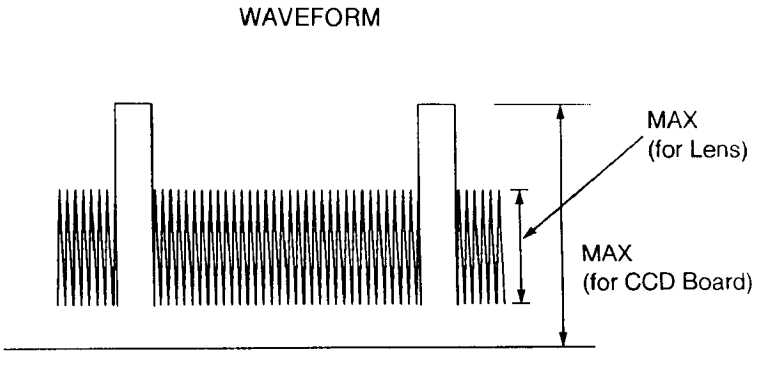
ADJUSTMENT:

LENS AND CCD READ POSITION ADJUSTMENT

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



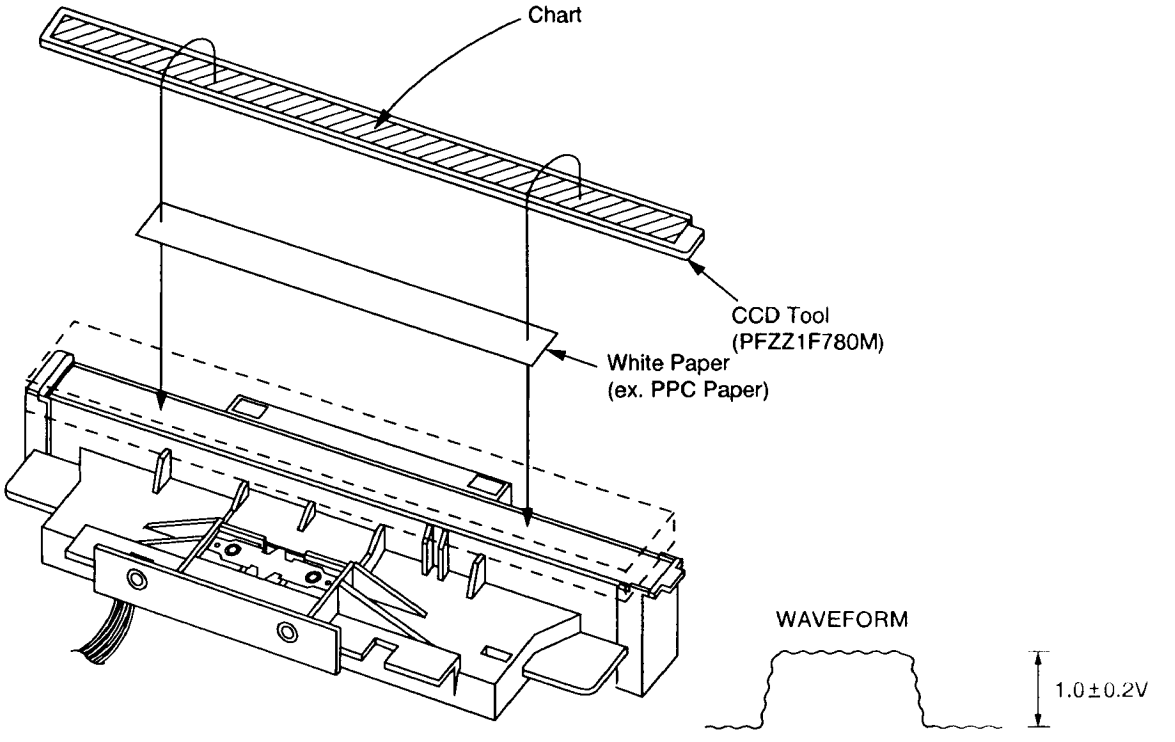




WHITE LEVEL ADJUSTMENT

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 1.0± 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.)



5. DOCUMENT READ START POSITION ADJUSTMENT

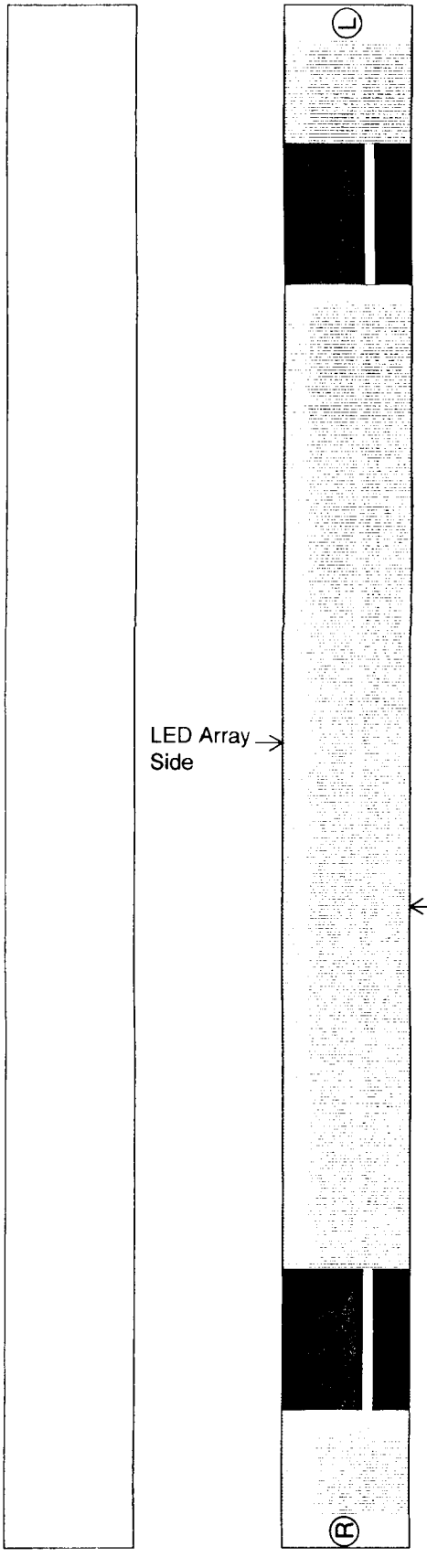
1) Connect AC cord.
2) Copy the document, and confirm the read start position of the document.
3) If get out of position, adjust the read position.
4) Press the MENU button.
5) Press the #, 9, 0, 0, 0, * and 5, 6, 3 buttons.
6) Press the □,□, SET and MENU buttons.

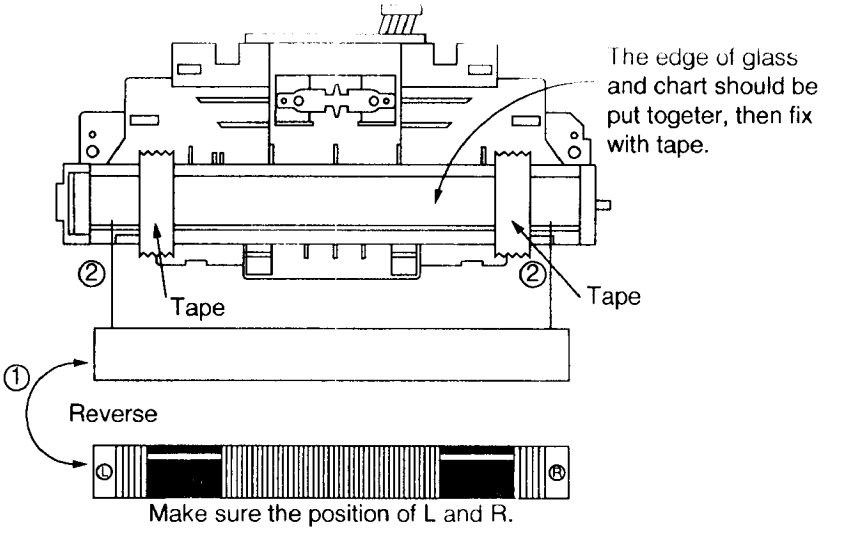
30
.
. To move the image to the right direction
.
16
15 ← Standard (Default)
14
.
. To move the image to the left direction
.
00

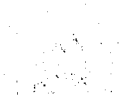
The starting position of reading shifts 1 mm as number of changes.

(for white level adjustment)

(for lens and CCD read position adjustment)







6. CORDLESS ADJUSTMENT

6-1. OBJECTIVE

This procedure will enable the technician to make adjustments to the KX-F900 PORTABLE HANDSET and CORDLESS BASE UNIT.

6-2. GENERAL INFORMATION

This procedure has 2 sections. The first section instructs the technician on how to align the PORTABLE HANDSET. We recommend aligning the PORTABLE HANDSET first, since you will need the PORTABLE HANDSET to align the CORDLESS BASE UNIT. The second section aligns the CORDLESS BASE UNIT. You can use either section separately, or together to align the entire cordless phone unit.

At the beginning of each section, you will find a preparation procedure instructing you on how to prepare the unit to the point of placing the unit in TEST mode. Please follow this procedure to insure proper alignment.

Each section's procedure consists of Adjustment Items adjusting one specific variable hardware component.
Each Item lists the equipment needed, how to connect and setup the equipment, how to make the adjustment, and how to verify the adjustment if necessary.

Before the actual procedure, you will find a procedure detailing how to place that part in TEST mode. You will have to perform this procedure before each individual Adjustment Item.

Once aligned, please remove all equipment connections and solder points, and reassemble the unit. As a final check, power up the phone and check for PORTABLE HANDSET linking with the CORDLESS BASE UNIT.

PORTABLE HANDSET

(1)PREPARATION

Please perform the following steps to prepare the PORTABLE HANDSET for alignment. Please refer to the HANDSET REFERENCE DRAWING for connection and test point locations.

1. Remove battery cover and battery.
2. Remove both screws at the case bottom.
3. Grabbing hold of the back near the bottom, gently pry off the back of the case.
4. Remove the antenna mounting screw.
   While heating the antenna solder connection, pull out the antenna. (Refer to page 125)
5. Remove the top P.C.Board mounting screw.
6. Unsolder both speaker connections on P.C.Board.
7. Remove the PORTABLE HANDSET P.C.Board.
8. Remove the keypad membrane.
9. Solder High Frequency Cable open end to ANT and RF GND points.
10. Using the Digital Multimeter, measure DC VOLTS output on the Telephone Analyzer.
    Adjust the output voltage to 3.9V DC.
11. Solder battery connection wires at the points shown in the PORTABLE HANDSET REFERENCE DRAWING. Solder the positive lead to IC204, towards the bottom of the P.C.Board. Solder the negative lead to the **MIC** minus lead, closest to IC204. **DO NOT APPLY POWER TO THE PORTABLE HANDSET AT THIS TIME!!!!!!**
12. Solder a small, insulated piece of wire to **GND** as well.
13. Solder 1 isolation capacitor's positive lead to **SP+** test point (TP4). When soldering, keep the lead close to the P.C.Board as possible since you will lay the keypad membrane over part of this lead.
14. Solder a small, short, insulated wire to **MIC** test point (TP8).
15. Lay the keypad membrane over the keypad switch contacts.

(2) SYMPTOM/REMEDY TABLE

If you have one of the listed symptoms, please refer to this table and make the appropriate adjustments.

SYMPTOM	REMEDY
Does not link with CORDLESSBASE UNIT	Check Items (A) and (B). If both items are OK, adjust Items (D) and (E).
Speaker level is unstable	Check Items (A) and (B). If both items are OK, adjust Items (C).
Tx sound is unstable	Check Items (A) and (B). If both items are OK, adjust Items (F).

(3) ADJUSTMENT PREPARATION

Please perform the following procedure before starting the Adjustment Procedure. You only have to perform this procedure only once to complete all Items, but you will have to perform this procedure to make an individual Adjustment Item.

1. You will need all equipment listed in the Item's EQUIPMENT section.
2. Setup all equipment as specified in the Item's PROCEDURE section SETUP portion.
3. On the PORTABLE HANDSET under test, press and hold down the 1, 9, and ✳ keys.
4. Apply power to the PORTABLE HANDSET.
5. Release the 3 keys. You should hear the PORTABLE HANDSET beep. If you do not hear a beep, remove the power from the PORTABLE HANDSET and repeat the last 2 steps.
6. Press the **INTERCOM** key, then press the **TALK** key. PORTABLE HANDSET should now be in TEST MODE (CH 1 TALK). The IN USE/BATT LOW LED should be on. If the PORTABLE HANDSET is not in TEST MODE, remove the power and repeat the last 3 steps.
7. Remove the keypad membrane and lay it a side.

(4) ADJUSTMENT PROCEDURE

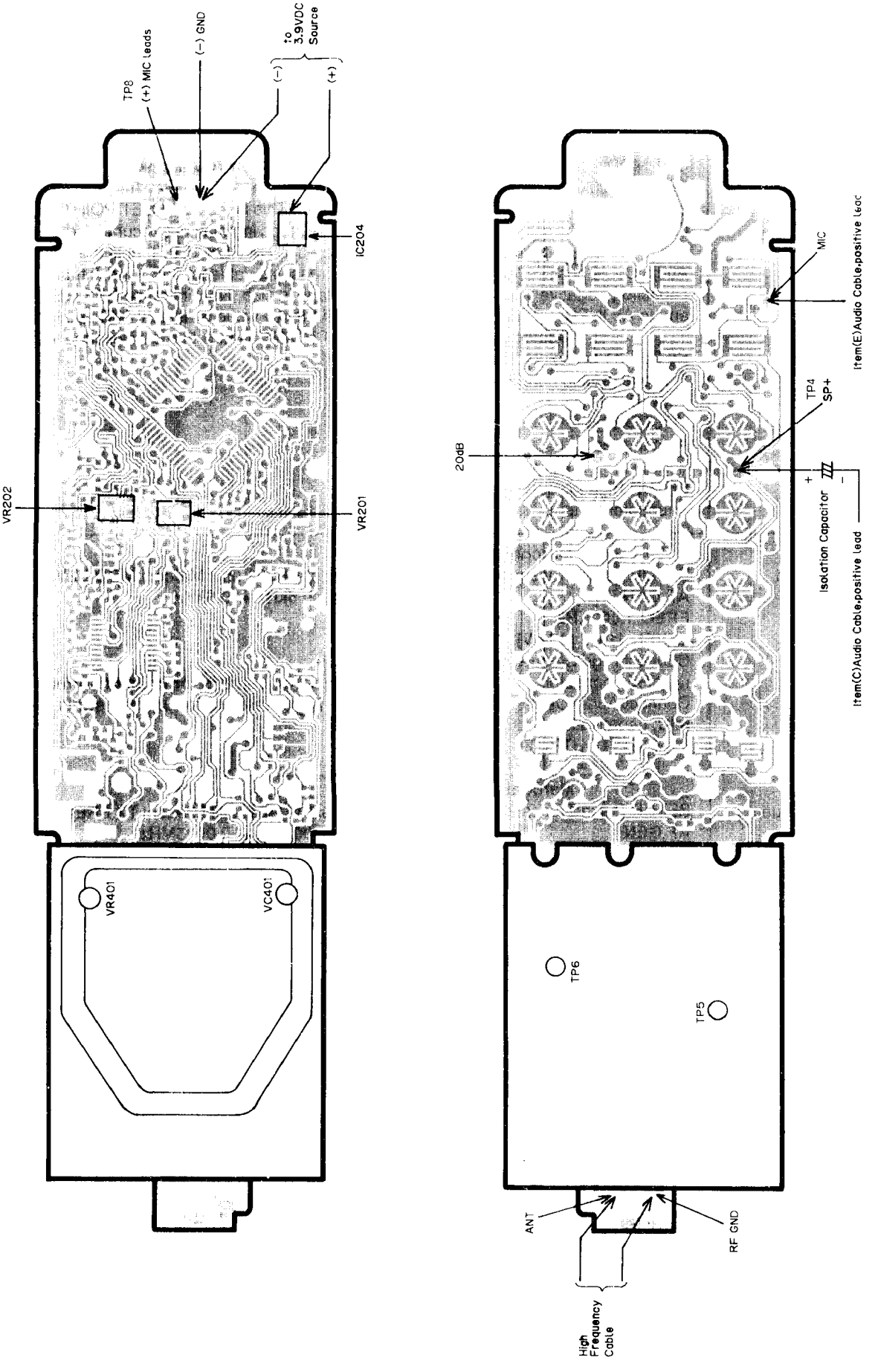
ADJUSTMENT ITEM DESCRIPTION	EQUIPMENT	PROCEDURE
(A) Rx VCO Voltage Confirmation only	**Digital Multimeter** SETUP to measure DC Voltage, 20V range	Connect negative lead to RF module metal cover and positive lead to **TP5**. Measure voltage and confirm that this voltage is between 0.8V DC and 1.8V DC. DO NOT PROCEED IF NOT IN RANGE!!
(B) Tx VCO Voltage Confirmation only	**Digital Multimeter** SETUP to measure DC Voltage, 20V range	Connect negative lead to RF module metal cover and positive lead to **TP6**. Measure voltage and confirm that this voltage is between 0.8V DC and 1.8V DC. DO NOT PROCEED IF NOT IN RANGE!!
(C) SP Output	**Marconi** SETUP Put in Receiver Test Mode. RF GEN FREQ 902.1000MHz LEVEL 60dBμV SET MOD FREQ 1.000kHz LEVEL 5.000kHz High Frequency Cable to left RF Connector. Audio Cable positive lead to isolation capacitor, negative lead to **GND**, BNC end to AF INPUT connector.	Adjust **VR202** until **AF VOLTS** equals **-33dBV +/-1dBV** Note This voltage reading is with no speaker or load attached to the PORTABLE HANDSET P.C.Board.

ADJUSTMENT ITEM DESCRIPTION	EQUIPMENT	PROCEDURE
(D) 20dB Electric Detection	**Marconi** SETUP Put in Receiver Test Mode. RF GEN FREQ 902.1000MHz LEVEL 60dBμV SET MOD FREQ 1.000kHz LEVEL 5.000kHz One end of BNC cable to left RF connector, other end to Attenuator Input. Audio Cable positive lead to isolation capacitor, negative lead to **GND**, BNC end to AF INPUT connector. **Oscilloscope** SETUP X1 probe connected to INPUT 1. Probe ground connected to **GND**. TIME/DIV 1ms VOLT/DIV 1V Auto trigger **Attenuator** SETUP High Frequency Cable to Attenuator Output.	On Marconi, press SINAD until the display shows the SINAD value and press **dB**. Then press RF **GEN** and **LEVEL**. Attach the oscilloscope probe to 20dB test point (TP7). Using the **VARIABLE** knob on the Marconi, decrease RF GEN LEVEL until SINAD v alue is between **7dB** and **9dB**. NOTE: this value will not be stable. Adjust **VR401** until oscilloscope voltage toggles. This is the 20dB SET POINT. NOTE: toggling may not occur at regular intervals. Decrease RF GEN LEVEL until the SINAD value decreases by at least 3dB. Check that oscilloscope voltage is high. Now increase REF GEN LEVEL until SINAD value is at least 3dB above the 20dB SET POINT. Check that oscilloscope voltage is low.
(E) MIC Input	**Marconi** SETUP Put in Transmitter Test mode. **AF GEN** **FREQ 1.000KHZ** **LEVEL 41mV [23mV]** *Connect High Frequency Cable to* right RF connector. Connect Audio Cable positive lead to **MIC**, negative lead to **GND**, BNC end to AF GEN OUTPUT.	Adjust **VR201** until Marconi **MOD LEVEL** equals **5kHz +/-0.5kHz** **Note** **The 41mV value is for units of suffix A and the 23mV value is for units of suffix B~.**
(F) Standard Frequency	**Marconi** SETUP Put in Transmitter Test mode. **AF GEN** **FREQ 1.000kHz** **LEVEL 21mV** Connect High Frequency Cable to right RF connector. Connect Audio Cable positive lead to **MIC**, negative lead to **GND**, BNC end to AF GEN OUTPUT	Adjust **VC401** until Marconi **TX FREQ** equals **926.100MHz +/-0.0005MHz** Note This Item's setup is exactly the same as Item (E). If you have done Item (E), simply look at TX FREQ and make the adjustment.

Once aligned, please perform the following procedure.

1. Disconnect all equipment and solder connections. Use solder wick to clean up any solder you added.
2. Install the keypad membrane on top of the PORTABLE HANDSET keys.
3. Install the PORTABLE HANDSET P.C.Board.
4. Solder speaker wires back onto the P.C.Board observing correct polarity.
5. If you will align Item (E) RX Input in CORDLESS BASE UNIT, then solder a short wire across the MIC leads. Remember to unsolder this wire after you completed the CORDLESS BASE UNIT alignment.
6. Insert antenna into the case.
7. Install antenna and top P.C.Board mounting screws and solder antenna connection.
8. Install case back and bottom mounting screws.
9. DO NOT INSTALL THE BATTERY AT THIS TIME!!!!!!

PORTABLE HANDSET REFERENCE DRAWING



CORDLESS BASE UNIT

(1) PREPARATION

Please prepare the BASE UNIT before performing any adjustment procedures. Refer to the CORDLESS BASE UNIT REFERENCE DRAWING for connection and test point locations.

1. Remove the 3 screws on the bottom cabinet of the handset cradle.
2. Remove the bottom cabinet of the handset cradle.
3. Remove the soldering on the antenna wires of the RF module.
4. Remove the base unit anchoring screw.
5. Use the telephone cord to connect the fax machine line and **PHONE TEST #1** on the telephone analyzer.
6. Use the telephone cord to connect the corded telephone and **PHONE TEST #2** on the telephone analyzer.
7. Solder the plus and minus sides of the RF coaxial cable to ANT and RF GND, as shown on the page 113.
8. Connect the BNC connector on the RF coaxial cable to ANT on the Marconi.

(2) SYMPTOM/REMEDY TABLE

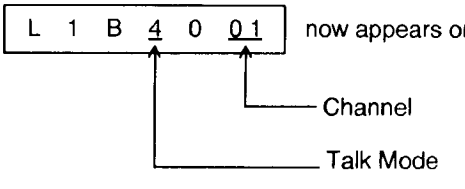
If you have one of the listed symptoms, please refer to this table and make the appropriate adjustments.

SYMPTOM	REMEDY
Does not link with PORTABLE HANDSET	Check Items (A) and (B). If both are OK, adjust Items (E) and (F).
Transmission sound to PORTABLE HANDSET receiver is unstable	Check Items (A) and (B). If both are OK, adjust Items (C) and (D).

(3) ADJUSTMENT PREPARATION

Please perform the following steps to prepare the CORDLESS BASE UNIT for the Adjustment procedure.

1. While pressing the **1** and **START/COPY/SET KEYS**, turn on the power to the fax machine.
   [Cordless Test] appears on the machine's LCD display.
2. Press the **MUTE KEY** four times.
   [4. Talk Mode] now appears on the machine's LCD display.
3. Press the **START/COPY/SET KEY**.
   [Channel=01] now appears on the machine's LCD display.
   * Any channel can now be keyed in using the 10 numeric keys on the machine.
4. Press the **START/COPY/SET KEY** twice.
   The talk mode is now established for the channel displayed in step 3.



now appears on the machine's LCD display.

5. Establish the standard settings of the Marconi.

•First, set the RX test items.

GEN	FREQ:	926.1 MHz	
	LEVEL:	60 dBμV	
MOD1	FREQ:	1 kHz	off
	LEVEL:	5 kHz	
MOD2			off

•Next, set the TX test items.

RF GEN		ON	
AF1	FREQ:	1 kHz	off
	LEVEL:	-27 dBm	
AF2			off
TX	FREQ:	902.1 MHz	

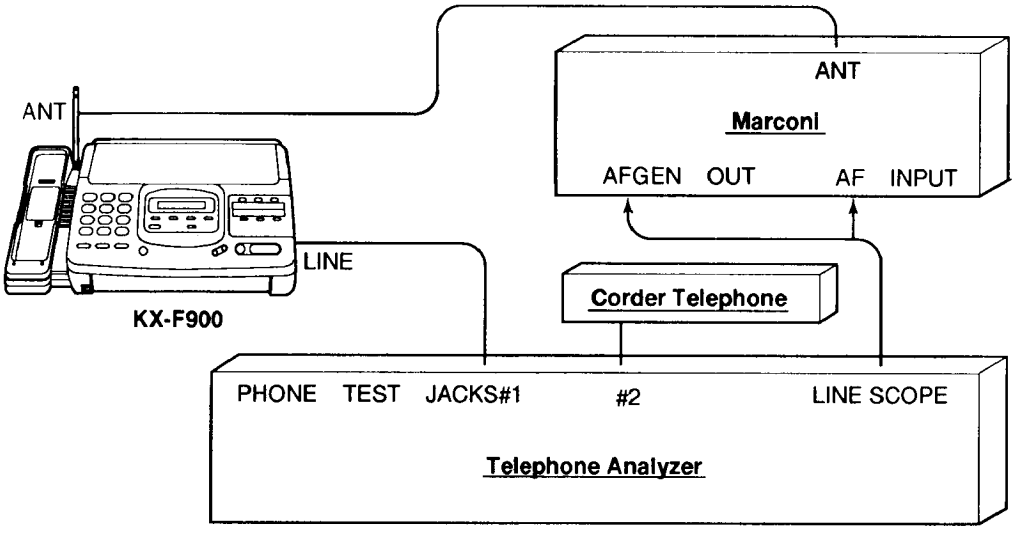
(4) ADJUSTMENT PROCEDURE

ADJUSTMENT ITEM DESCRIPTION	EQUIPMENT	PROCEDURE
(A) Rx VCO Voltage Confirmation only	**Digital multimeter** Set to the DC voltage measurement in the 20V range.	Connect the minus wire to the metal cover of the module and the plus wire to **TP5**, measure the voltage, and check that it comes within the 0.7 to 1.8 Vdc range. Proceed no further if the voltage is outside the designated range.
(B) Tx VCO Voltage Confirmation only	**Digital multimeter** Set to the DC voltage measurement in the 20V range.	Connect the minus wire to the metal cover of the module and the plus wire to **TP6**, measure the voltage, and check that it comes within the 0.8 to 1.8 Vdc range. Proceed no further if the voltage is outside the designated range.
(C) Standard Frequency	**Marconi** Press the TX test key. **Telephone Analyzer** Take the corded phone off the hook.	Adjust **VC301** is such a way that the **TX FREQ** offset value comes within the ± **500 Hz** range.
(D) TX Output	**Marconi** Press the RX test key. Set MOD1 to ON. Connect LINE SCOPE on the telephone analyzer and AF INPUT on the Marconi. **Telephone Analyzer** Take the corded phone off the hook.	Adjust **VR501** is such a way that the audio level is set to **-19 ± 1 dBm.**
(E) Standard Modulation	**Marconi** Press the RX test key. Set MOD1 to OFF. Press the TX test key. Set AF1 to ON. Connect LINE SCOPE on the telephone analyzer and AFGEN OUT on the Marconi. Press the * key. **Telephone Analyzer** Place the corded phone on the hook.	Adjust **VR502** is such a way that the FM level is set to **6.4 ± 0.5 kHz.**
(F) 20 dB Electric Detection	**Marconi** Press the TX test key. Set AF1 to OFF. Press the * key. Press the RX test key. Set MOD1 to ON. Connect LINE SCOPE on the telephone analyzer and AF INPUT on the Marconi. **Telephone Analyzer** Take the corded phone off the hook.	Adjust GEN LEVEL on the Marconi in such a way that the SIAND is set to **20 ± 1 dB.** Adjust **VR301** in such a way that the letter "**C**" flashes on the machine's LCD display. C L 1 B 4 0 01 Flashes

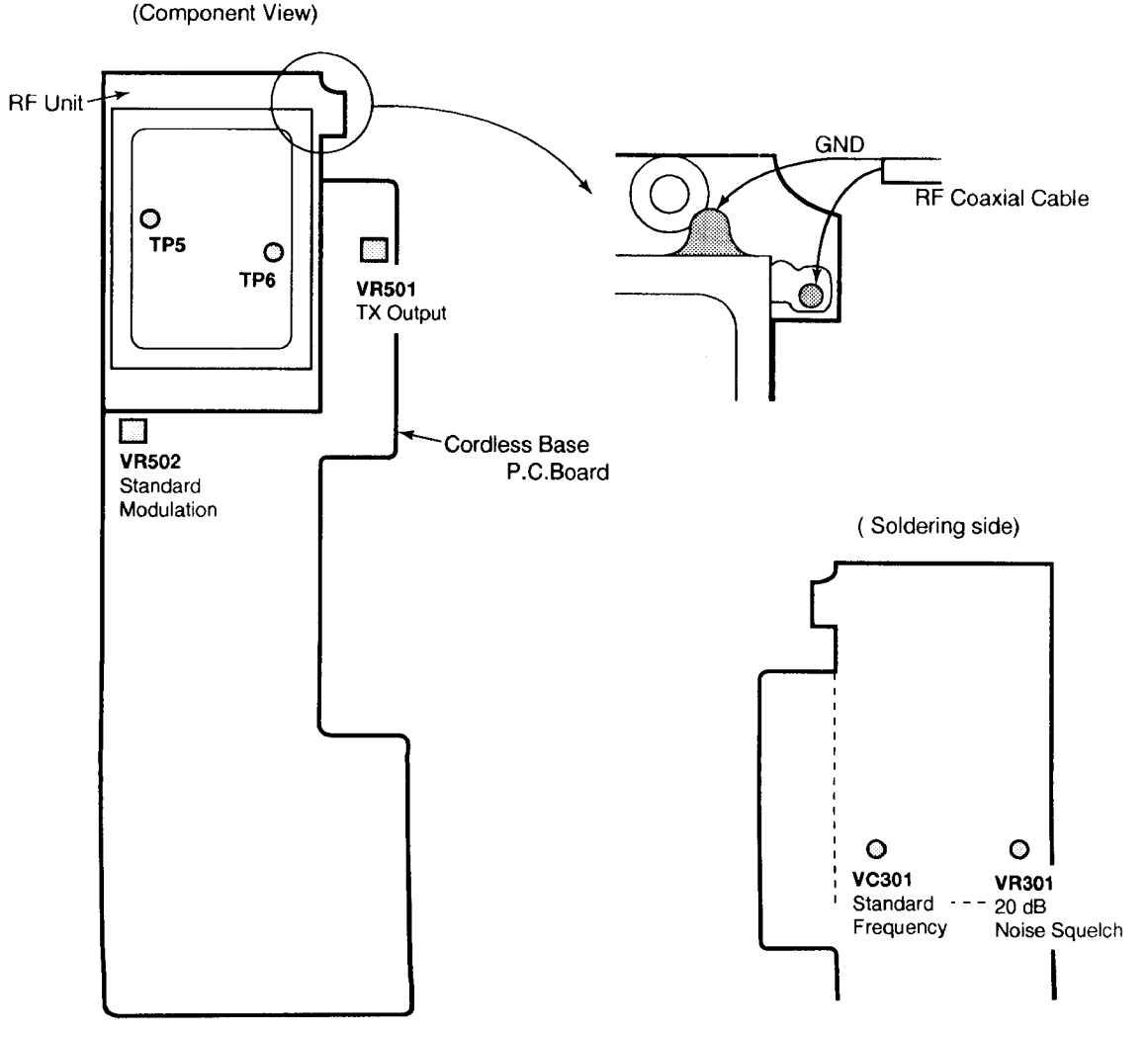
Once aligned, please reassemble the base unit. Also take off the back of the PORTABLE HANDSET and unsolder the MIC lead short wire if you previously installed it.

CORDLESS BASE UNIT REFERENCE DRAWING

•CONNECTION



•CORDLESS BASE UNIT P.C.BOARD

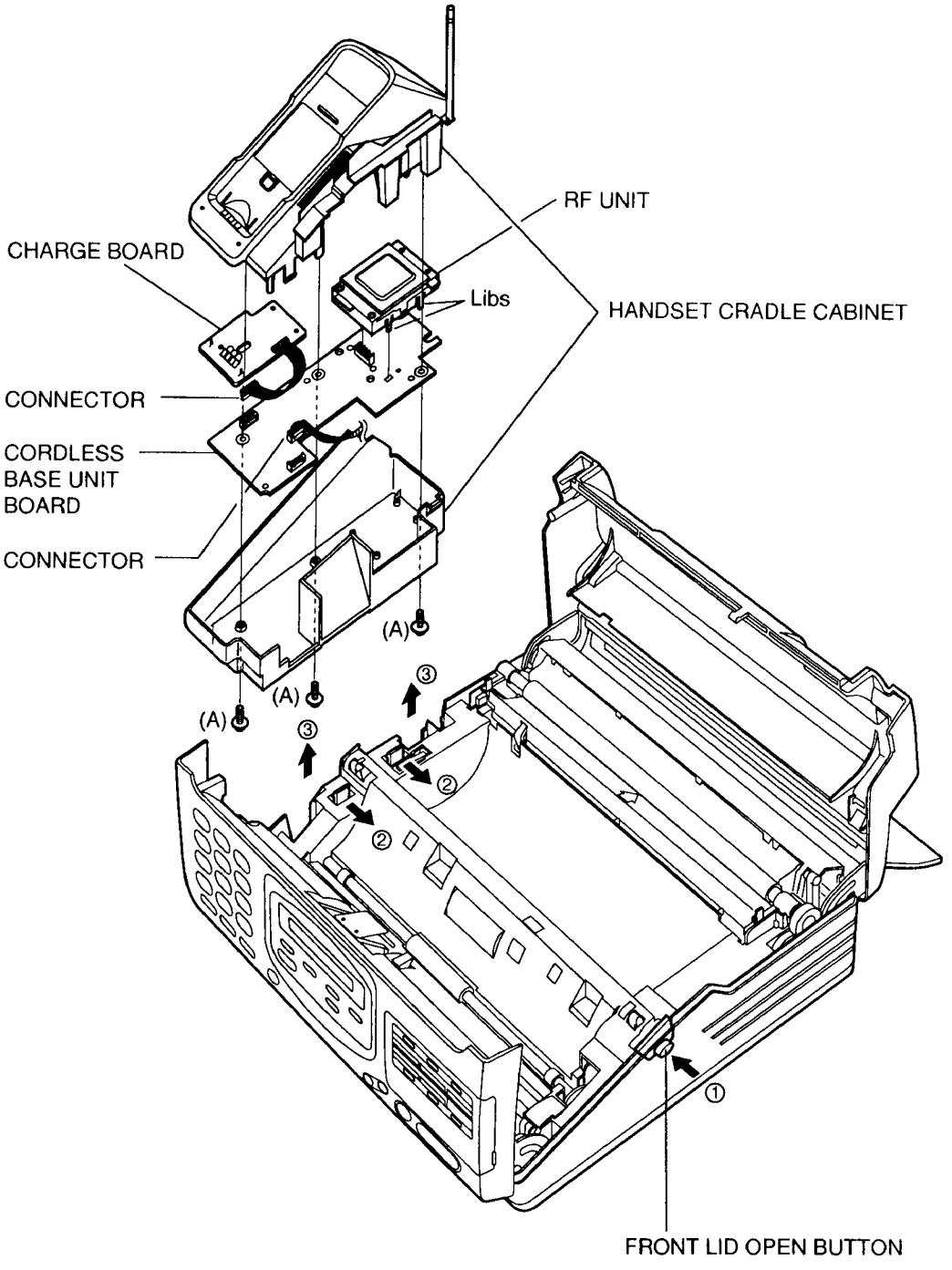


DISASSEMBLY INSTRUCTIONS

Ref. No. 1	HOW TO REMOVE THE PORTABLE HANDSET CRADLE CAB, CORDLESS BASE UNIT BOARD AND RF UNIT

Procedure 1

1) Push the front lid open button to open the operation block.
2) Pull the libs of unit.
3) Remove the handset cradle cabinet.
4) Remove the 3 screws (A).
5) Remove the 2 connectors.
6) Pull the libs of the RF unit and pull up the RF unit.



Ref. No. 1	HOW TO REMOVE THE OPERATION BLOCK
Procedure 2	

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

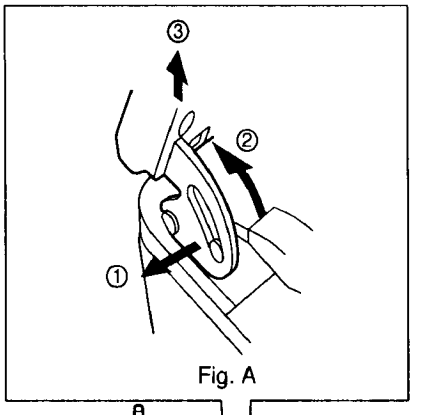
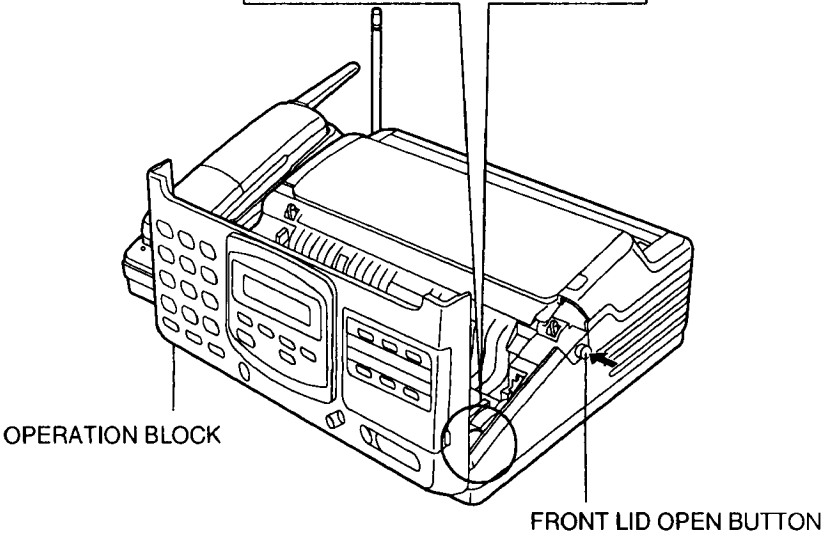


Fig. A



● HOW TO ATTACH THE OPERATION BLOCK:

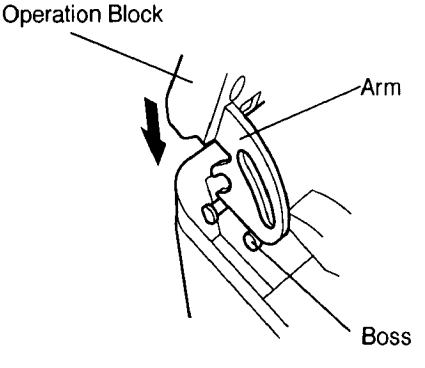
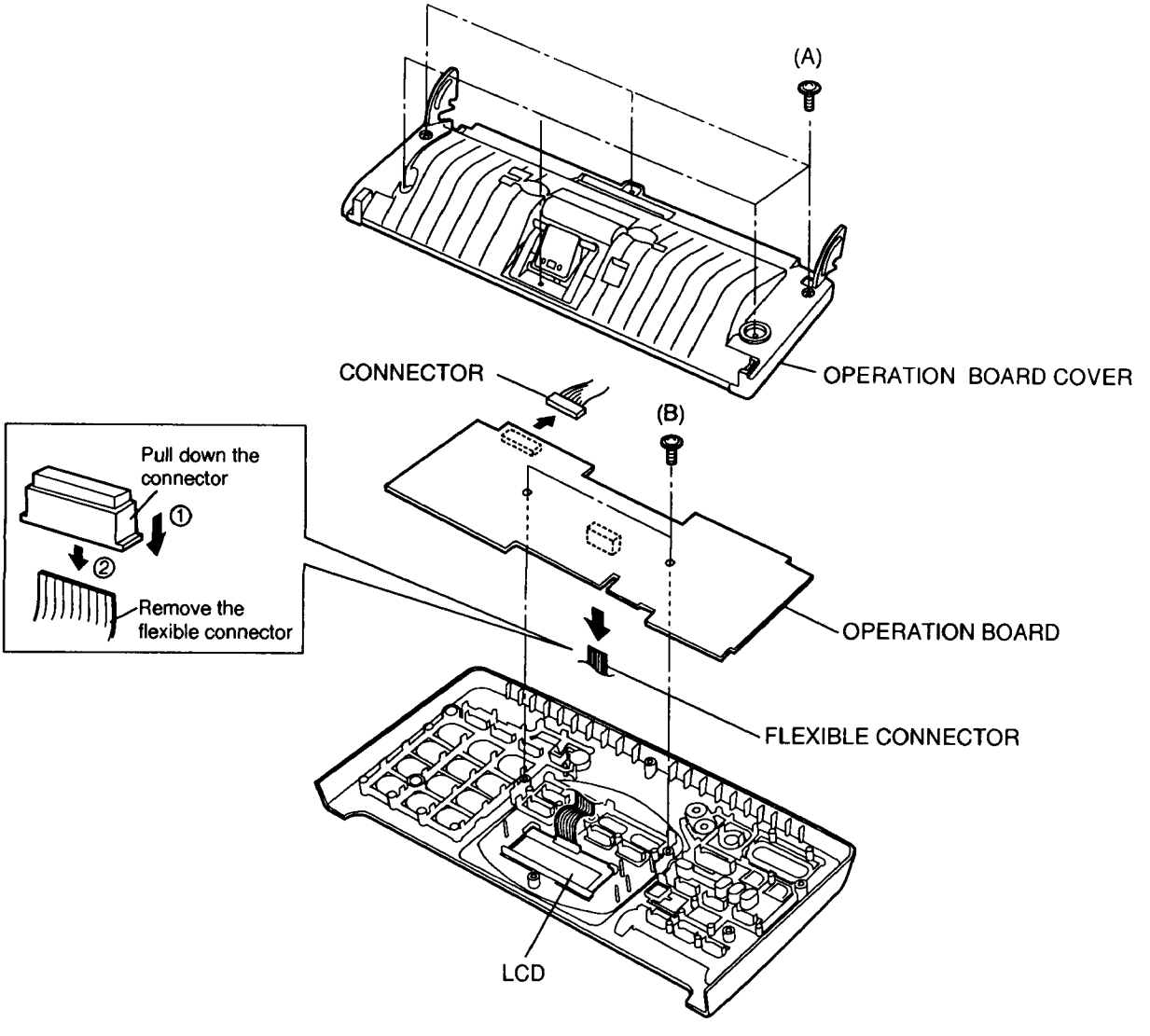


Fig. B

1) Set the both arms on the boss as showing in following Fig. B.
2) Push the operation block down.

Ref. No. 3	HOW TO REMOVE THE OPERATION BOARD AND LCD
Procedure 2→3	

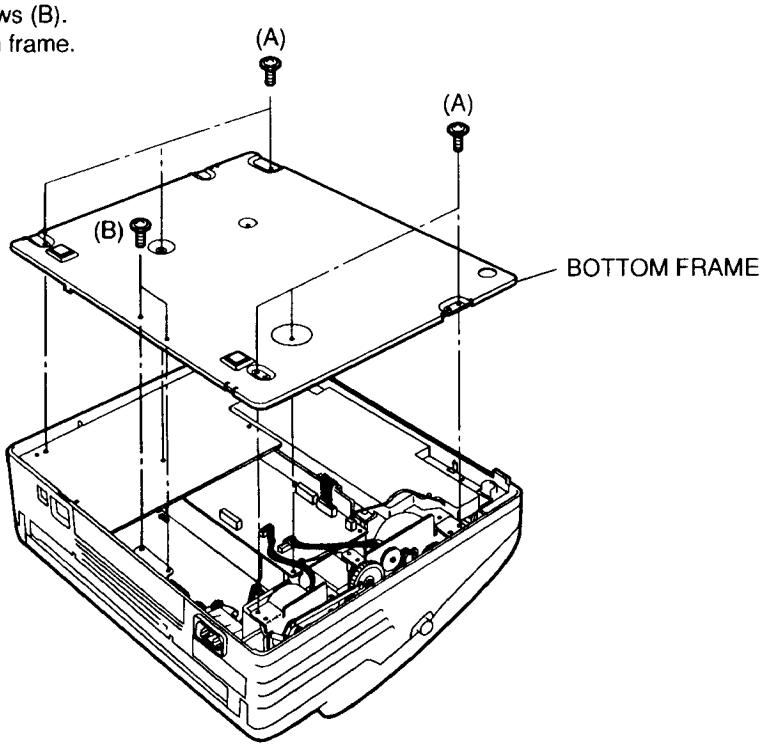
1) Remove the 6 screws (A) and the operation block cover.
2) Remove the 2 screws (B).
3) Pull out the 1 connector and remove the 1 flexible connector.
4) Remove the operation board.
5) Remove the LCD.



Ref. No. 4	HOW TO REMOVE THE BOTTOM FRAME

Procedure 4

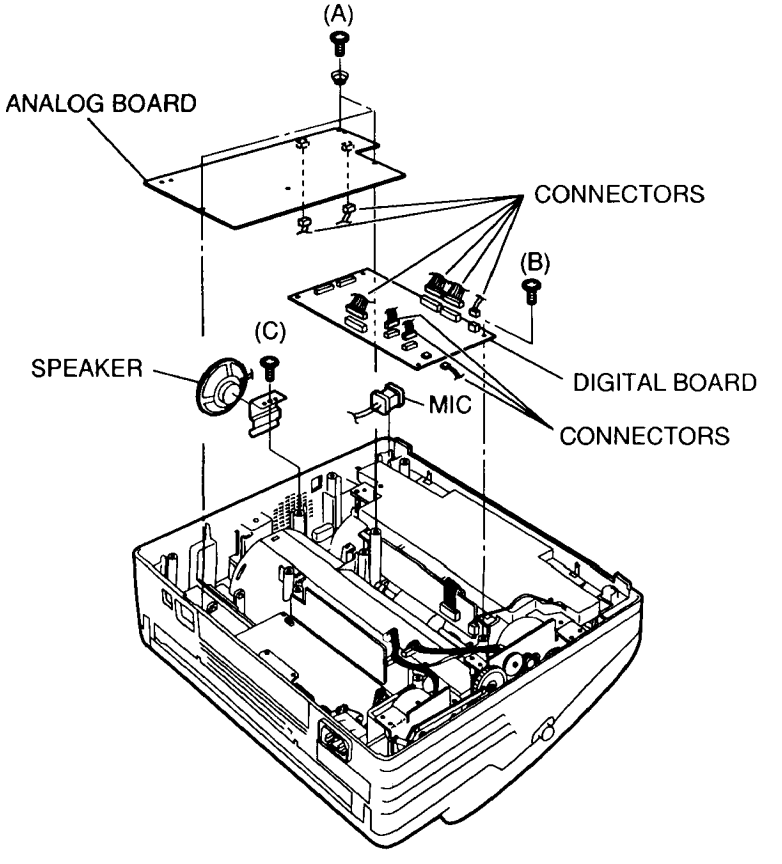
1) Remove the 6 screws (A).
2) Remove the 2 screws (B).
3) Remove the bottom frame.



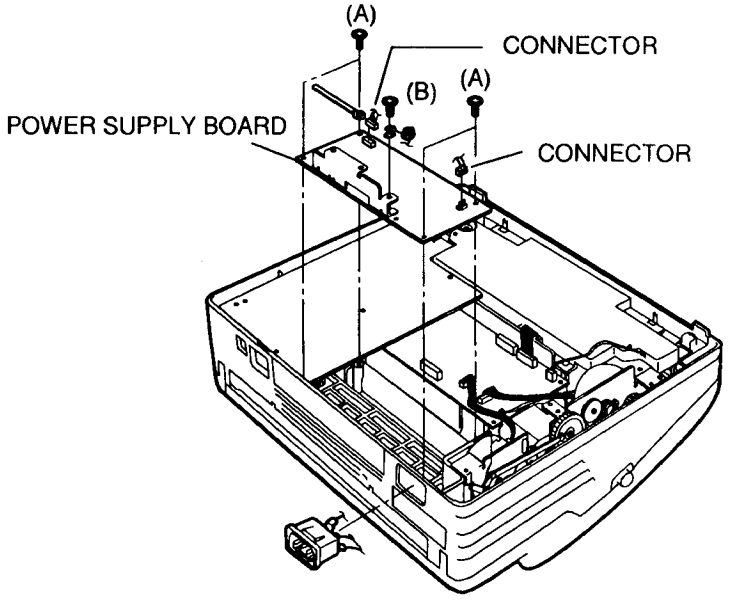
Ref. No. 5	HOW TO REMOVE THE ANALOG, DIGITAL BOARDS, SPEAKER AND MIC

Procedure 4→5

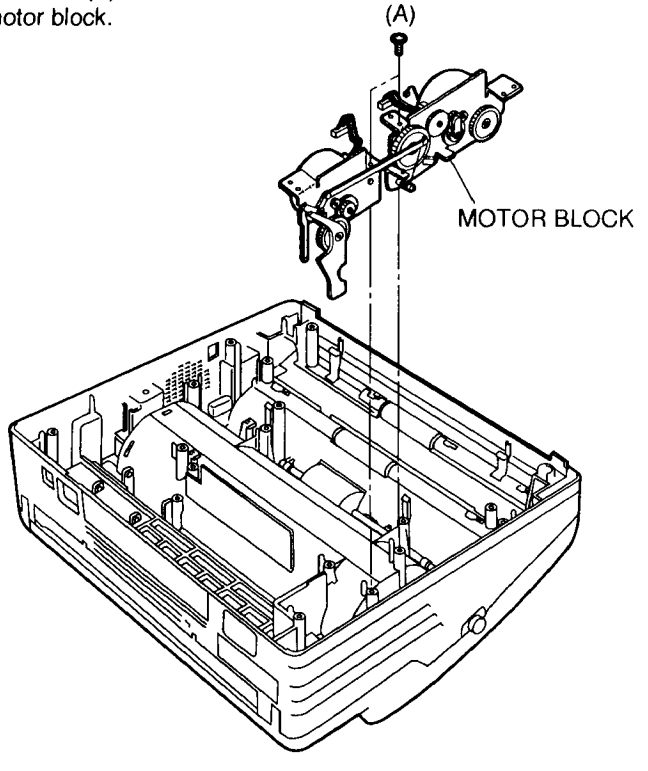
1) Remove the 3 screws (A).
2) Remove the analog board.
3) Remove the 2 connectors.
4) Remove the 7 connectors.
5) Remove the 1 screws (B).
6) Remove the digital board.
7) Remove the 1 screw (C).
8) Remove the speaker.
9) Remove the MIC.



Ref. No. 6	HOW TO REMOVE THE POWER SUPPLY BOARD AND AC INLET
Procedure 4, 6	1) Remove the 4 screws (A) and remove the power supply board. 2) Remove the 1 screw (B). 3) Remove the 2 connectors. 4) Remove the AC inlet.



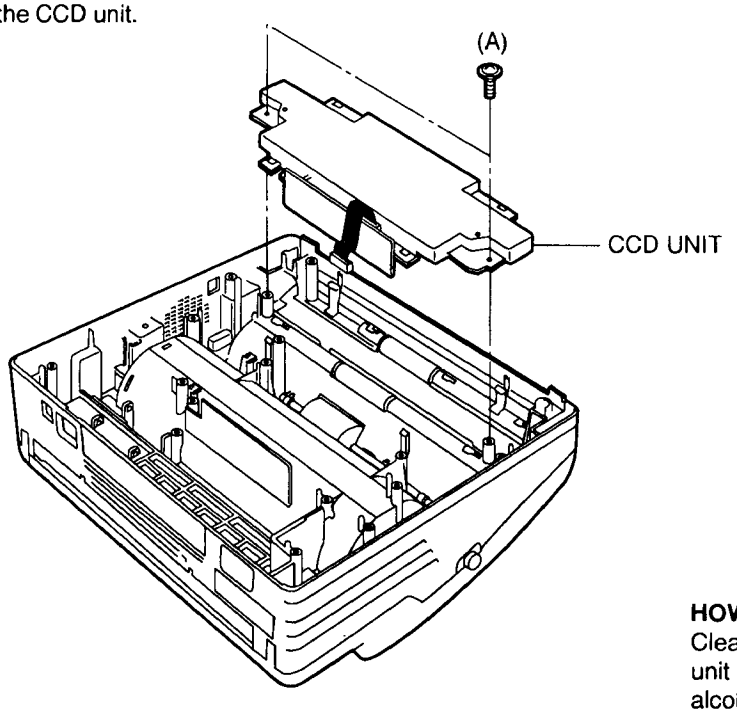
Ref. No. 7	HOW TO REMOVE THE MOTOR BLOCK
Procedure 4→10→7	1) Remove the paper cutter. (See Ref. No. 10) 2) Remove the 2 screws (A). 3) Remove the motor block.



Ref. No. 8	**HOW TO REMOVE THE CCD UNIT**

Procedure 4→8

1) Remove the 2 screws (A).
2) Remove the CCD unit.

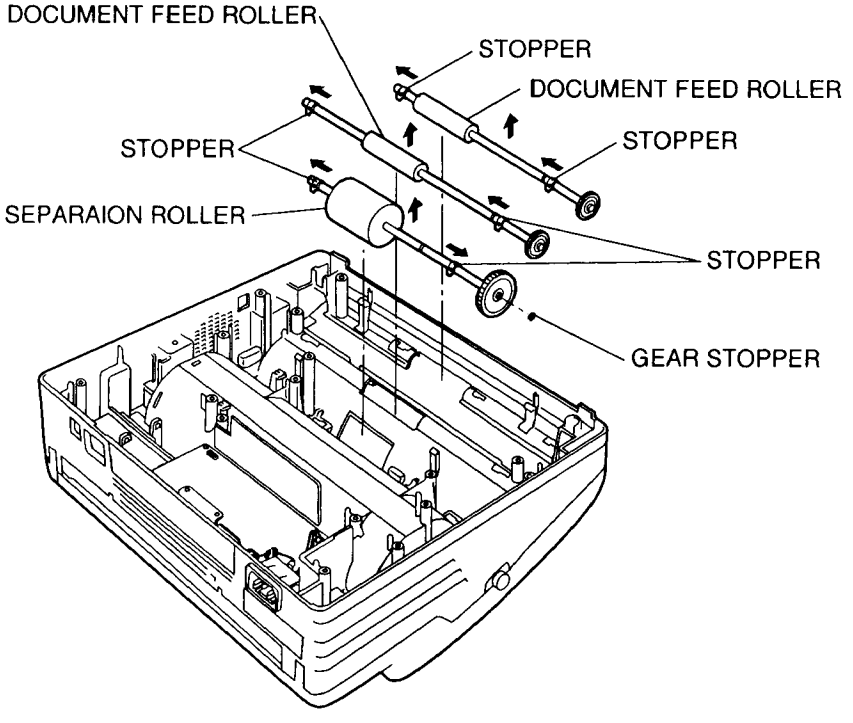


HOW TO CLEAN:
Clean the glass of CCD unit with cloth soaked in alcohol.

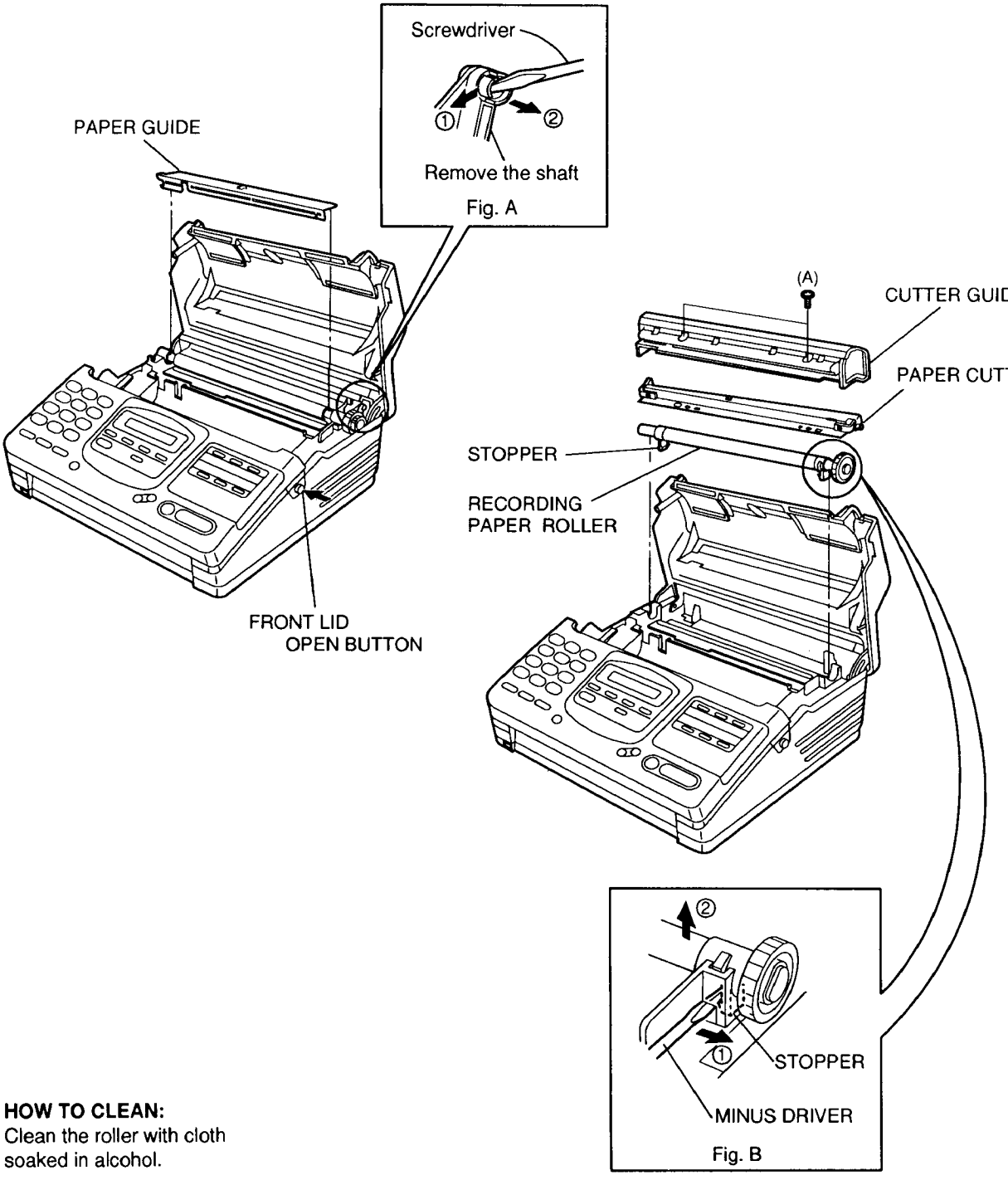
Ref. No. 9	**HOW TO REMOVE THE ROLLERS**

Procedure 4→5→7→8→9

1) Remove the motor block. (See Ref. No. 7)
2) Remove the stopper with minus screwdriver.
3) Remove the rollers.
4) Remove the gear and stoppers from roller shaft and replace roller.



Ref. No. 10	HOW TO REMOVE THE CUTTER BLOCK
Procedure 10	1) Push the front lid open button in the direction of the arrow to open the operation block. 2) Remove the upper guide. 3) Remove the 2 screws (A). 4) Remove the shaft with minus screwdriver (small size) as showning in following Fig. A. 5) Remove the paper cutter block. 6) Remove the cutter guide. 7) Replace the paper cutter. 8) Remove the stopper with minus screwdriver (small size) as showing in following Fig. B. 9) Remove the recording paper roller.



HOW TO CLEAN:
Clean the roller with cloth soaked in alcohol.

Ref. No. 11	HOW TO REMOVE THE RECODING PAPER COVER
Procedure 10→11	1) Pull out the both arms as showing in following Fig. A. 2) Remove the recoding paper cover.

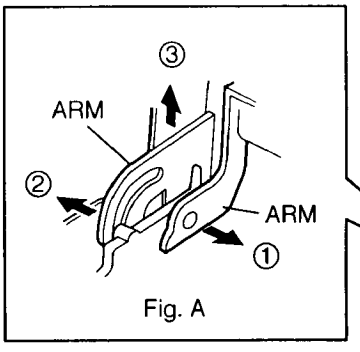
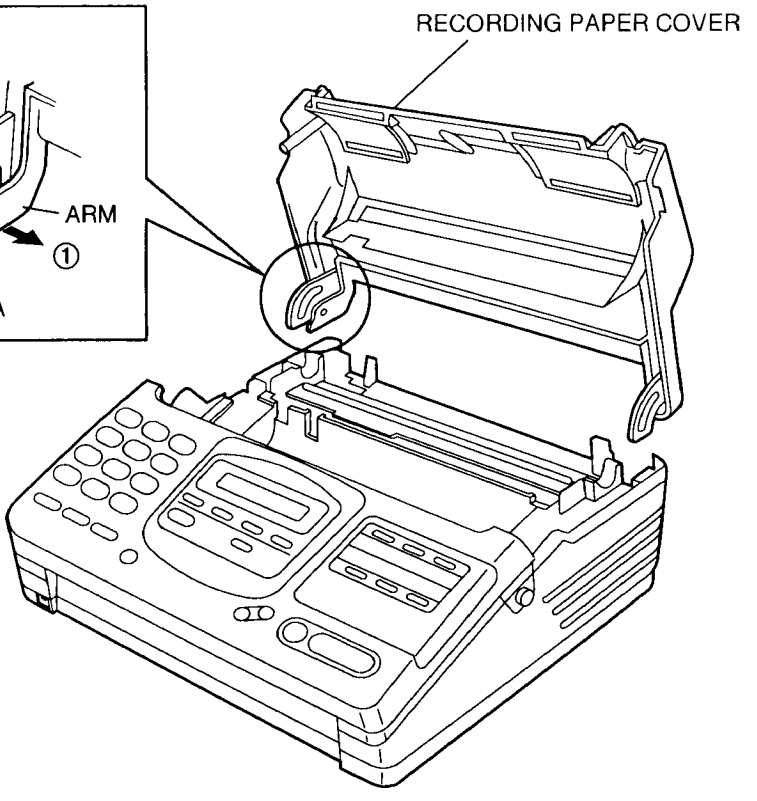
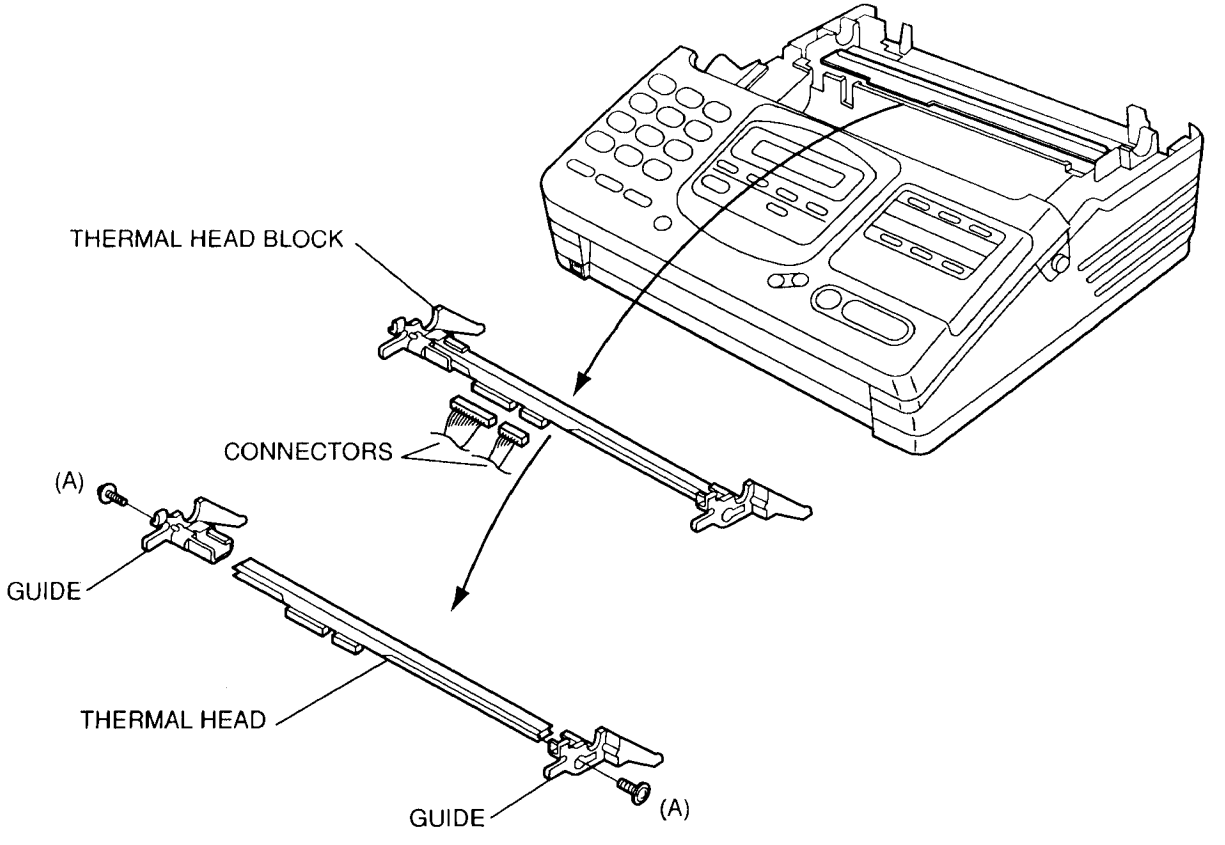


Fig. A

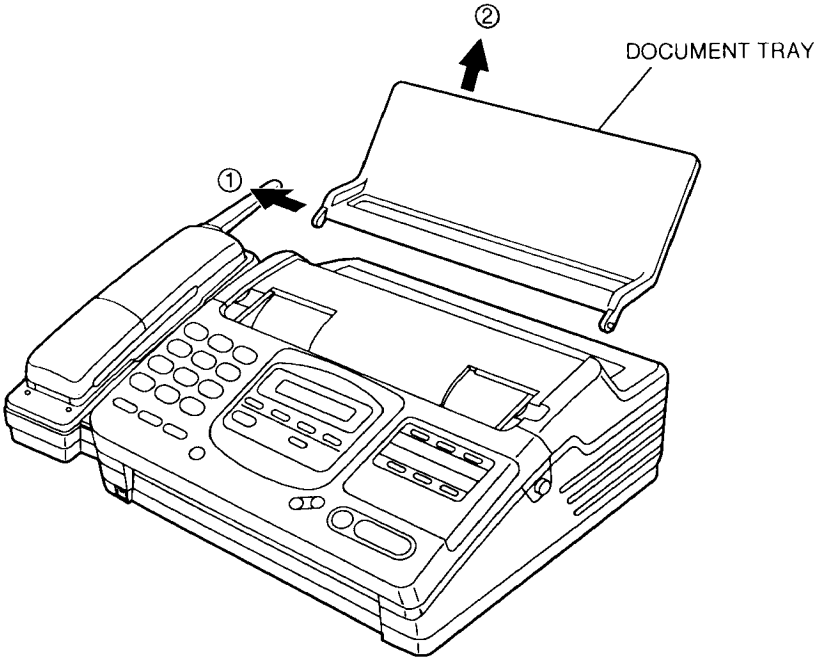


Ref. No. 12	HOW TO REMOVE THE THERMAL HEAD ROLLER
Procedure 10→12	1) Remove the thermal head block. 2) Pull out the 2 connectors. 3) Remove the 2 screws (A) of thermal head to remove the guides. 4) Replace the thermal head.



HOW TO CLEAN:
Clean the printing surface of thermal head with cloth soaked in alcohol.

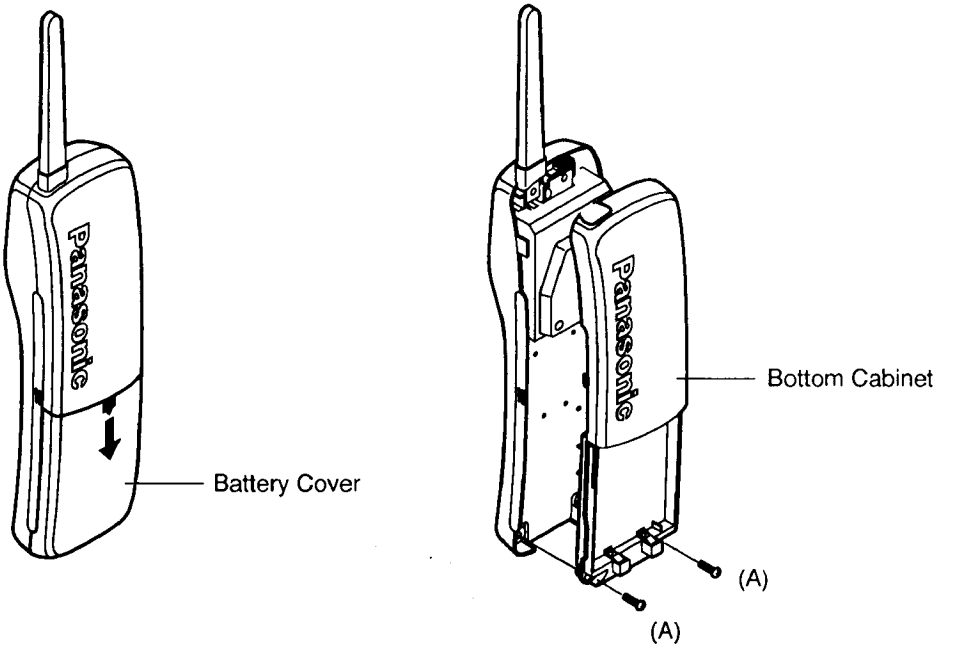
Ref. No. 13	HOW TO REMOVE THE DOCUMENT TRAY
Procedure 13	1) Push the installing section in the direction of the arrow to remove the document tray.



Ref. No. 14	HOW TO REMOVE THE BOTTOM CABINET OF PORTABLE HANDSET

Procedure 14

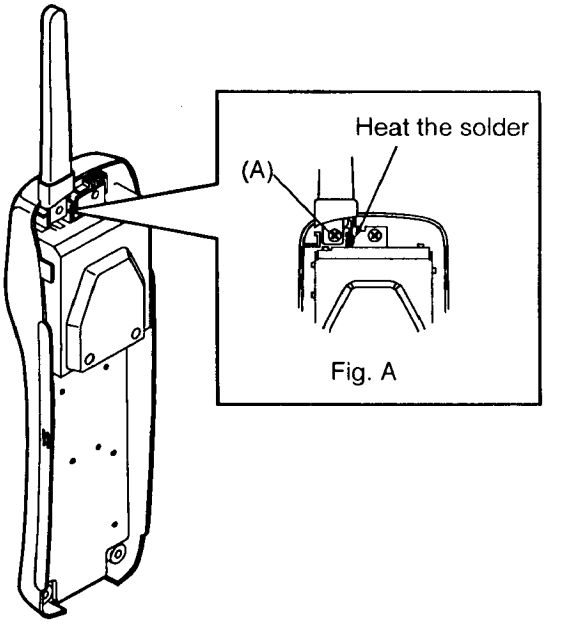
1) Remove the battery cover in direction of arrow.
2) Remove the 2 screws (A) and remove the bottom cabinet.



Ref. No. 15	HOW TO REMOVE THE ANTENNA AND PORTABLE HANDSET BOARD

Procedure 14→15

1) Remove the 1 screws (A).
2) Heat the solder as showing in folloing Fig. A
3) Pull up the Anttena.



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℃)

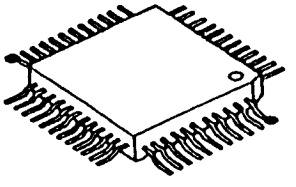
(An expert may handle 60~80 W iron, but beginner might damage foil by overheating.)

· Flux - - - - - - - - - - HI115 Specific gravity 0.863

(Original flux will be replaced daily.)

■ PROCEDURE

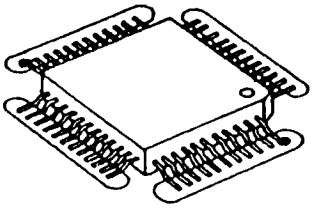
1. Temporarily fix FLAT PACKAGE IC by soldering on two marked pins.

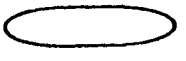


●- - - - - -Temporary soldering point.

*Check accurate setting of IC to the corresponding soldering foil.

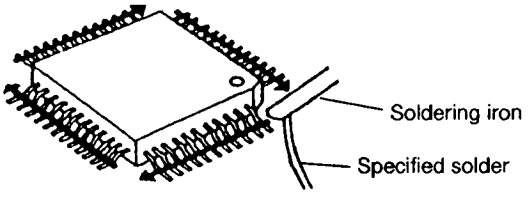
2. Apply flux for all pins of FLAT PACKAGE IC.





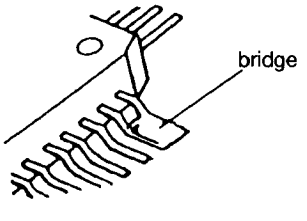
- - - - - Flux

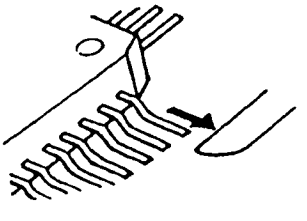
3. Solder using specified solder, in direction of arrow, by sliding the soldering iron.



■ MODIFICATION PROCEDURE OF BRIDGE

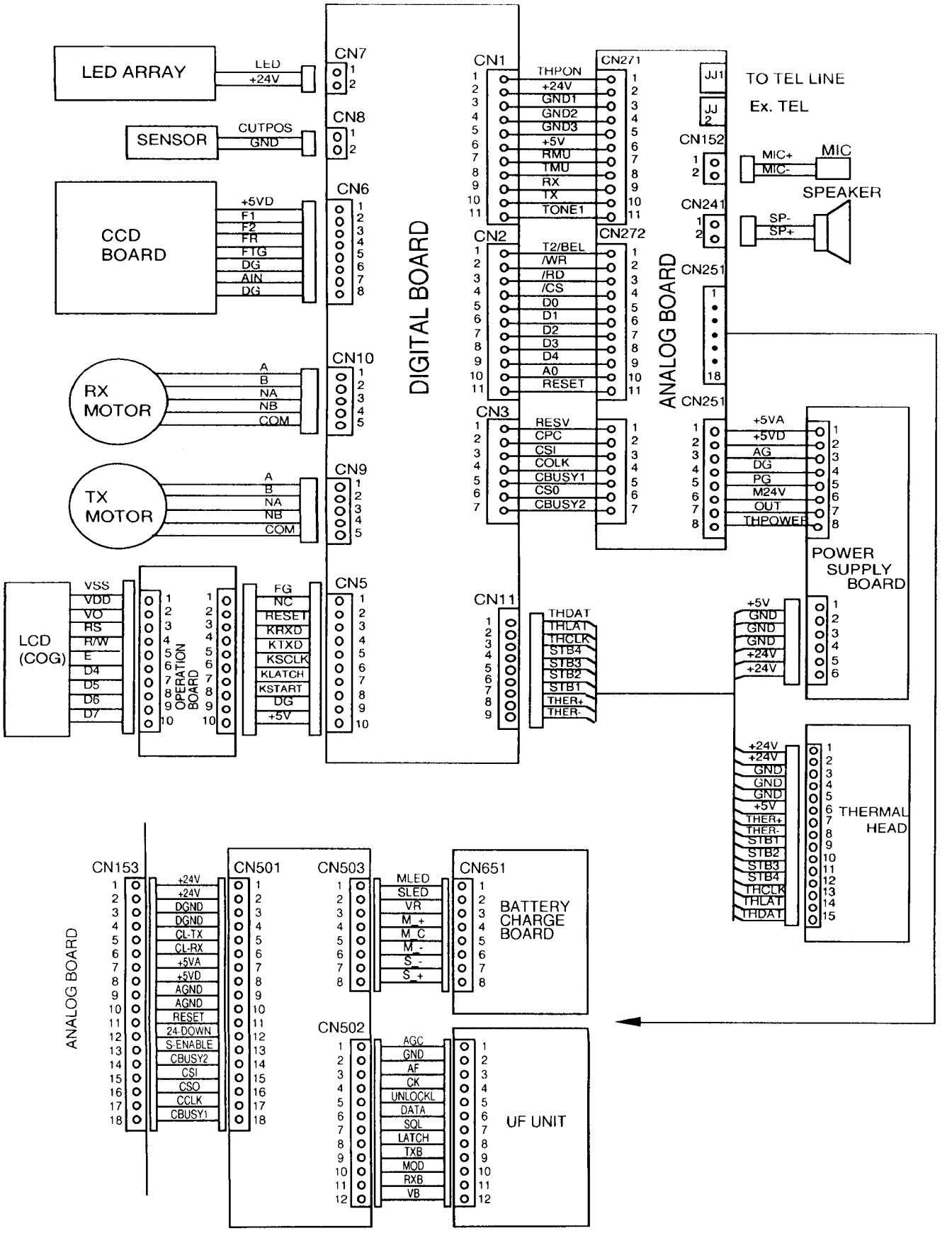
1. Re-solder slightly on bridged portion.
2. Remove remaining solder along pins using soldering iron as shown in below figure.





CIRCUIT OPERATIONS

1. CONNECTION DIAGRAM



2. GENERAL BLOCK DIAGRAM

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

(1) ASIC (IC1) ..... Composed mainly address decoder, modem control section, CPU and RTC.
Control the general FAX operation.
Control the operation panel I/F.
Control the thermal head I/F and CCD I/F.
Executing image processing.

(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) MODEM (IC11) ..... Executes modulation and demodulation for FAX.

(5) Read section ..... Composed of the LED array light source, CCD image sensor to read transmitting documents.

(6) Thermal Head ..... Contains heating elements for dot matrix image printing.

(7) Motor driver (IC7, IC8) . Drivers the transmission motor and the reception motor.

(8) Reset circuit (IC9) ..... Provides reset pulse to each of the major IC's.

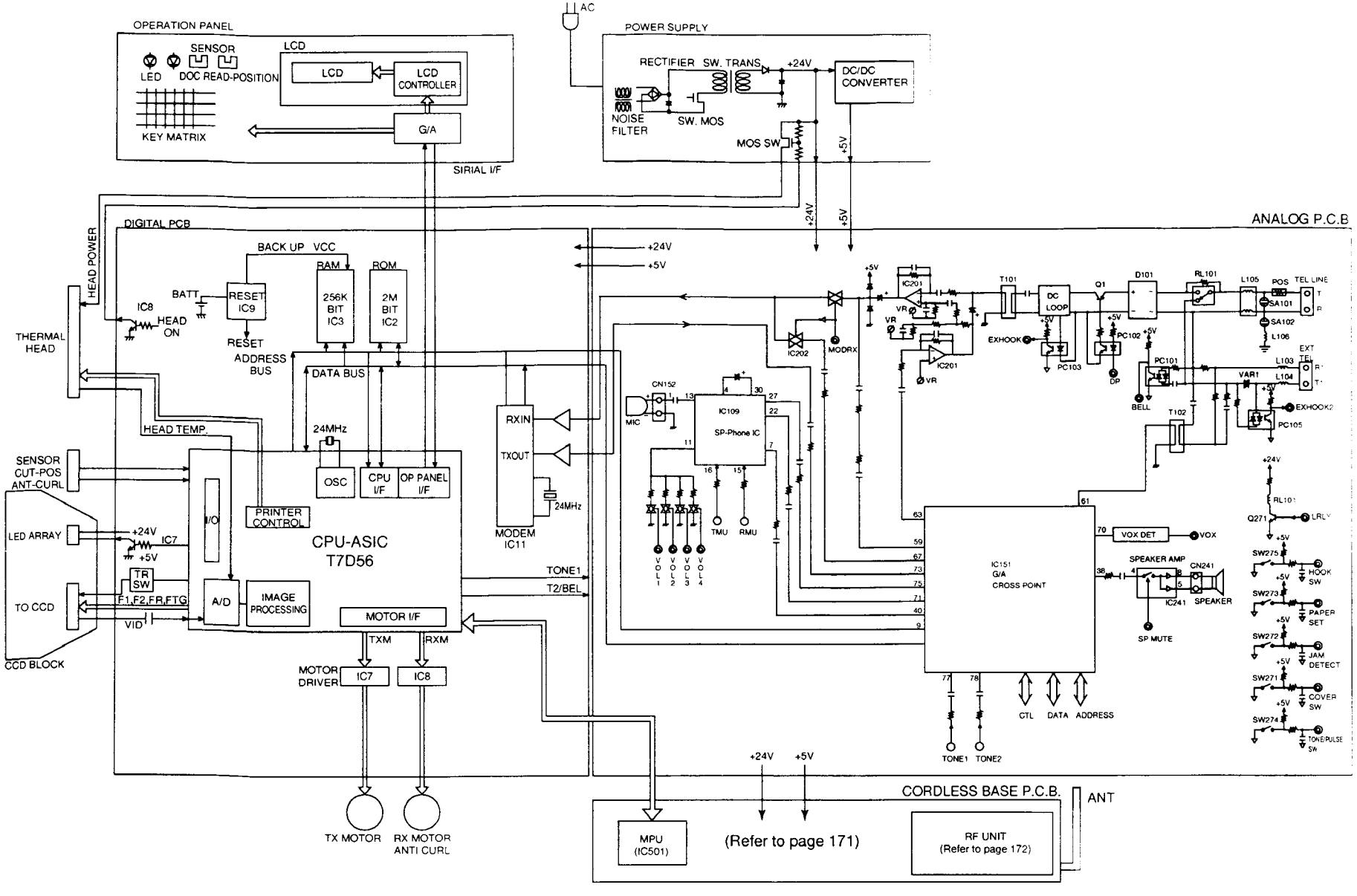
(9) Analog board ..... Composed of ITS circuit and NCU circuit.

(10) Sensor section ..... Composed of cover open sensor, document sensor, recording paper sensor, cutter position switch, read position sensor, and jam sensor.

(11) Switching power supply section ..... Supplies +5V and +24V to the unit.

(12) Cordless section ..... Composed of Cordless base unit, portable handset and battery charge unit. (900MHz Cordless)

General BLock Diagram (FAX)



3. CONTROL SECTION

① ASIC (IC1)

This custom IC is used for general FAX operation

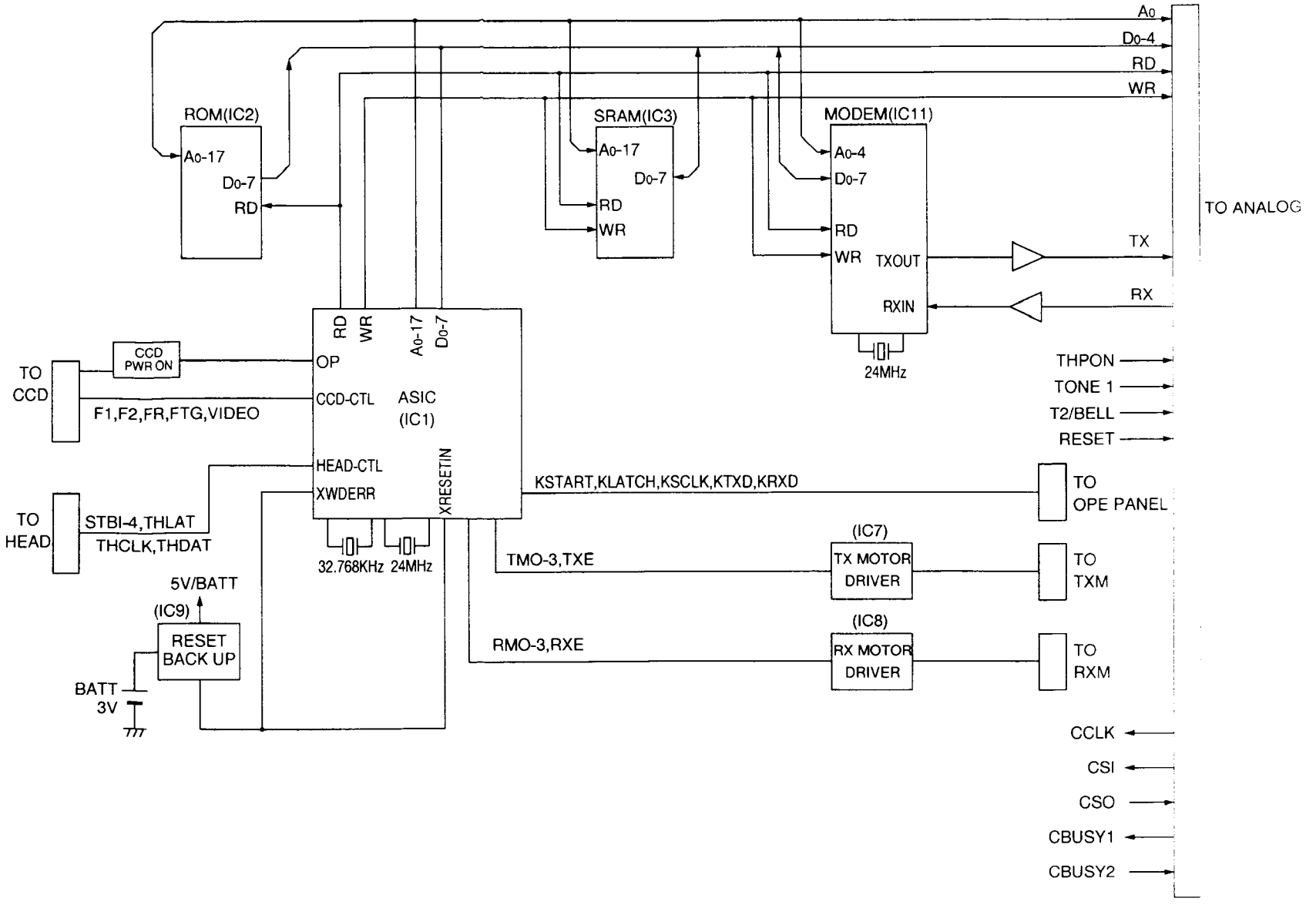
(1)	CPU:	The KX-F900 uses a Z80 equivalent CPU operating at 12MHz. Many of the peripheral functions are handled by custom designed LSI. As a result, the CPU only needs to process the result.
(2)	RTC:	Real time clock.
(3)	DECODER:	Decodes the address.
(4)	ROM/RAM I/F:	Controls the SELECT signal of ROM or RAM and bank switching.
(5)	CCD I/F:	Controls document reading.
(6)	IMAGE DATA RAM:	Inside ASIC and 8KB which is used by image processing.
(7)	THERMAL HEAD I/F:	Transmits the recorded data to the thermal head.
(8)	TX MOTOR I/F:	Controls the transmission motor which feeds the document.
(9)	RX MOTOR I/F:	Controls the receiving motor which feeds the reading document.
(10)	OPERATION PANEL I/F:	Serial interface with Operation Panel.
(11)	I/O PORT:	I/O Port Interface (Exa. Sensor etc.)

② ROM (IC2)

This 128 KB ROM (EPROM or MASKROM) has 32 KB of common area and bank area (BK4~BK15).
The capacity of each bank is 8 KB.
The addresses of the common area are from 0000H to 7FFFH, and addressed from 8000H to 9FFFH are for the bank area.

③ RAM (IC3)

This 32 KB RAM has 8 KB of common area and bank area (BK0, BK1).
The capacity of each bank is 12 KB.
The addresses of the common area are from D000H to EFFFH, and the addresses from A000H to CFFFH are for the bank area.

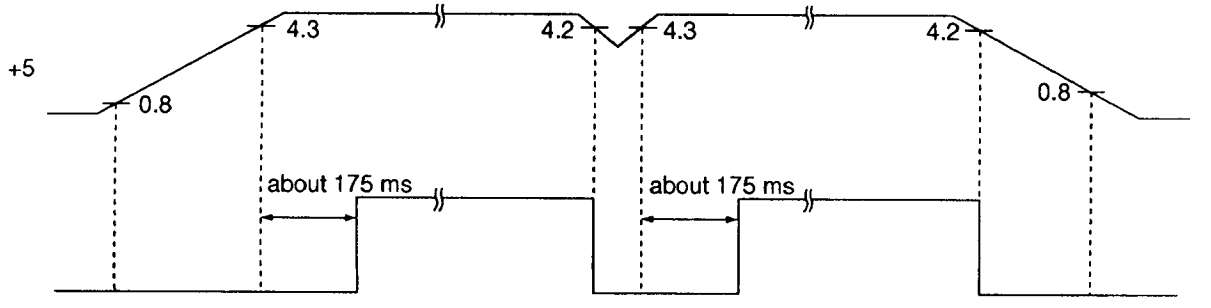

A0
D0-4
RD
WR
ROM(IC2)
A0-17
D0-7
RD
SRAM(IC3)
A0-17
D0-7
RD
WR
MODEM(IC11)
A0-4
D0-7
RD
WR
TXOUT
RXIN
24MHz
TO ANALOG
TX
RX
RD
WR
A0-17
D0-7
CCD PWR ON
TO CCD
OP
CCD-CTL
F1,F2,FR,FTG,VIDEO
ASIC (IC1)
HEAD-CTL
XWDERR
XRESETIN
TO HEAD
STBI-4,THLAT
THCLK,THDAT
32.768KHz
24MHz
THPON
TONE 1
T2/BELL
RESET
KSTART,KLATCH,KSCLK,KTXD,KRXD
TO OPE PANEL
(IC7)
TX MOTOR DRIVER
TMO-3,TXE
TO TXM
(IC8)
RX MOTOR DRIVER
RMO-3,RXE
TO RXM
5V/BATT
(IC9)
RESET BACK UP
BATT 3V
CCLK
CSI
CSO
CBUSY1
CBUSY2

3-2. RESET CIRCUIT

The output from pin 3 of the Reset IC (IC9) resets the gate array (IC1), the modem (IC11), the gate array on the operating board (IC301), the Port IC (IC151) on the analog board through the IC1.

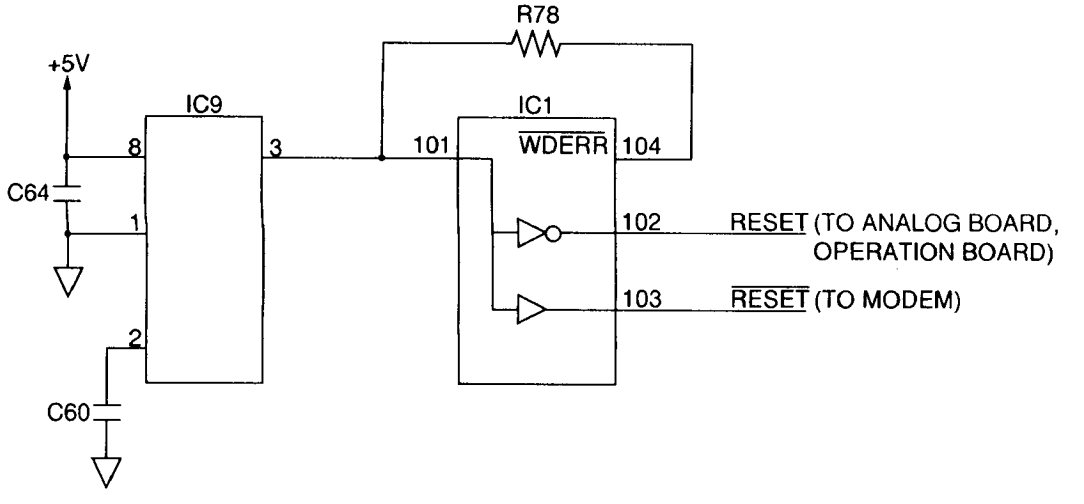
(1) During to momentary power interruption, a positive reset pulse of 175 msec or more is generated and the system is reset completely.
This is done to prevent partial resetting and system runaway during power fluctuation.

Timing Chart



(2) When pin 3 of the IC9 becomes low level, it will prohibit the RAM (IC3) from changing data.
The RAM (IC3) go into the backup mode, when it is backed up by the lithium battery.

Circuit Diagram



(3) The watch dog timer, built-in the gate array (IC1), is initialized about every 1.5 ms.
When the watch dog error occurs, pin 104 of the gate array (IC1) 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.

3-3. 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 (RTC,Integrated into ASIC:IC1). The user parameter of autodial numbers, the transmission ID, the system setup date and so on are stored in the RAM (IC3).

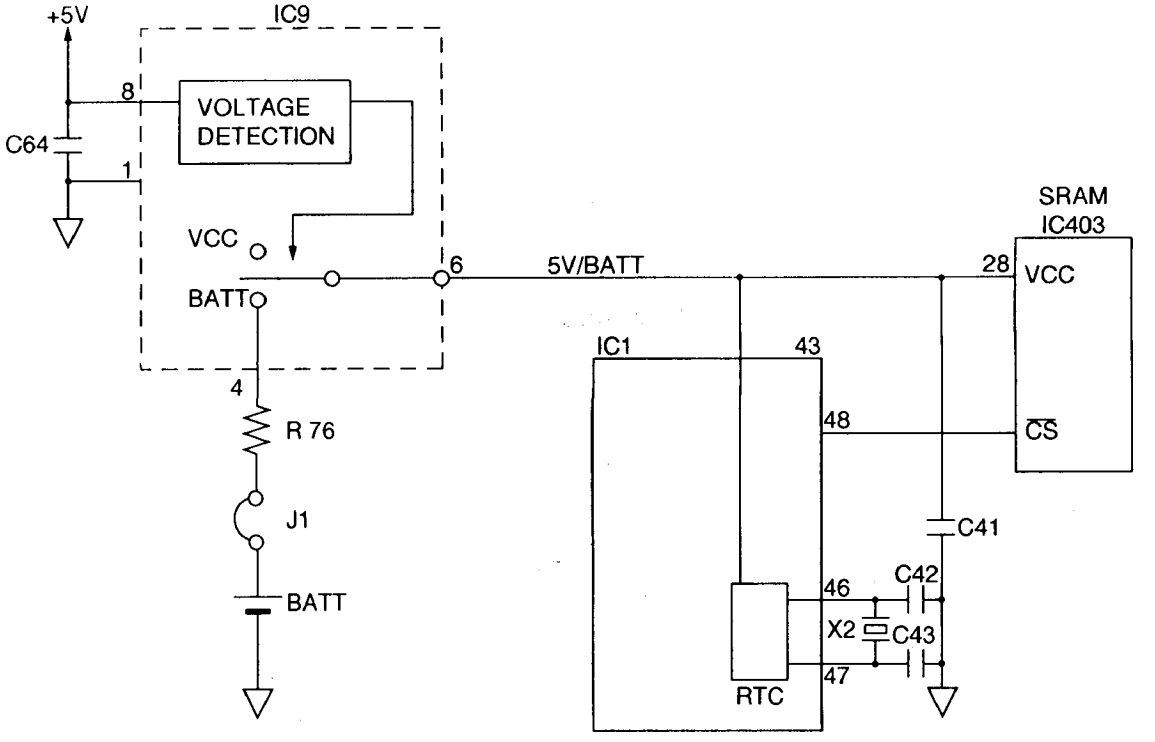
The RTC continues functioning, even when the power switch is OFF, back up by the lithium battery.

(2)Circuit Operation

When the power switch is turned ON, thus supplying the power through the IC9 to the RAM (IC3) and RTC.

At this time, the voltage at pin 28 of the RAM and pin 43 of the RTC are +5 V. When the power switch is turned OFF, the BATT supplies the power to the RAM and RTC through the J1, R76 and IC9. At the time, the voltage at pin 28 of the RAM and pin 43 of the RTC are about +2.5 V. When the power switch is OFF and the voltage of +5 V goes down, the Reset IC. (IC9) outputs the reset signals. Pin 28 of the RAM (IC3) and pin 43 of the RTC become low level, then the RAM and RTC go into the back up mode, when the power consumption is less.

Circuit Diagram

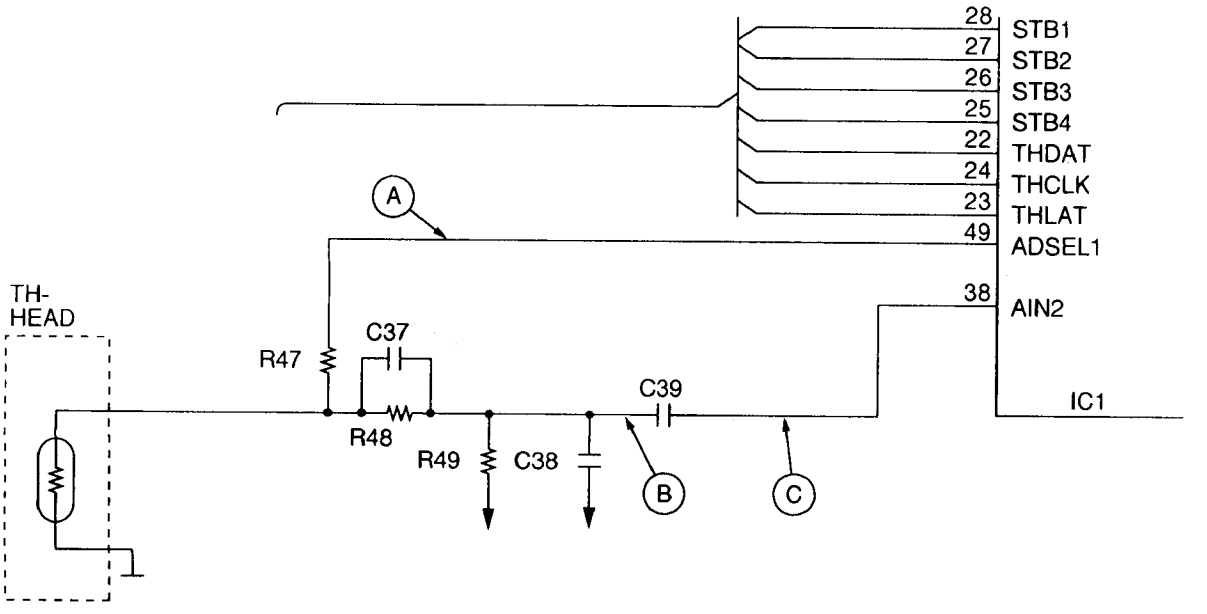


3-4. SUPERVISION CIRCUIT FOR THERMAL HEAD TEMPERATURE

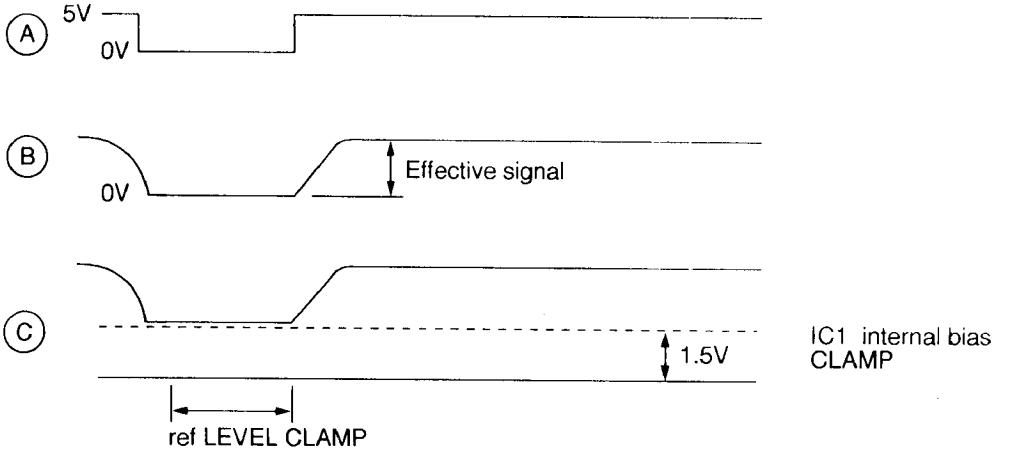
(1) Function

Thermal head temperature is disposed to convert voltage to digital data by using A/D converter of IC1. 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



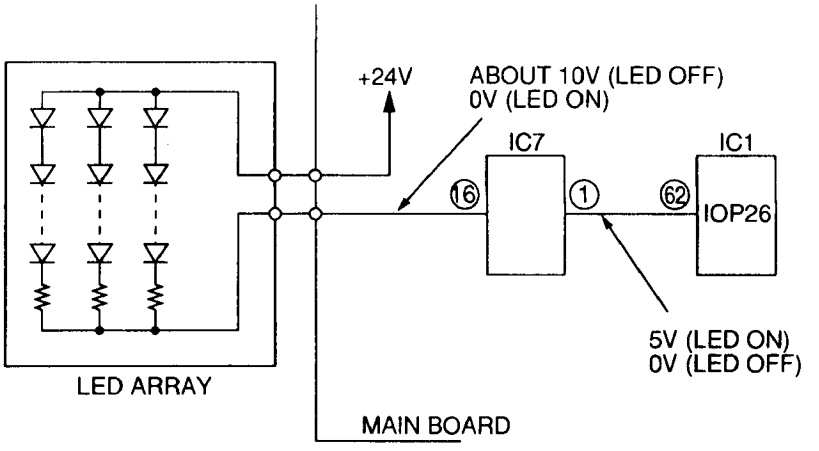
Timing Chart



3-5. 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



4. FACSIMILE SECTION

4-1. 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 IC1.
(2) In IC1, 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 IC1 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 Section. The other side, the shading data which flows from RAM by way of routes ⑥ and ⑦ , it is inputted to Image Processing 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 recording paper.

Note: Standard; Read 3.85 times/mm
Fine; Read 7.7 times/mm
Super-Fine; Read 15.4 times/mm

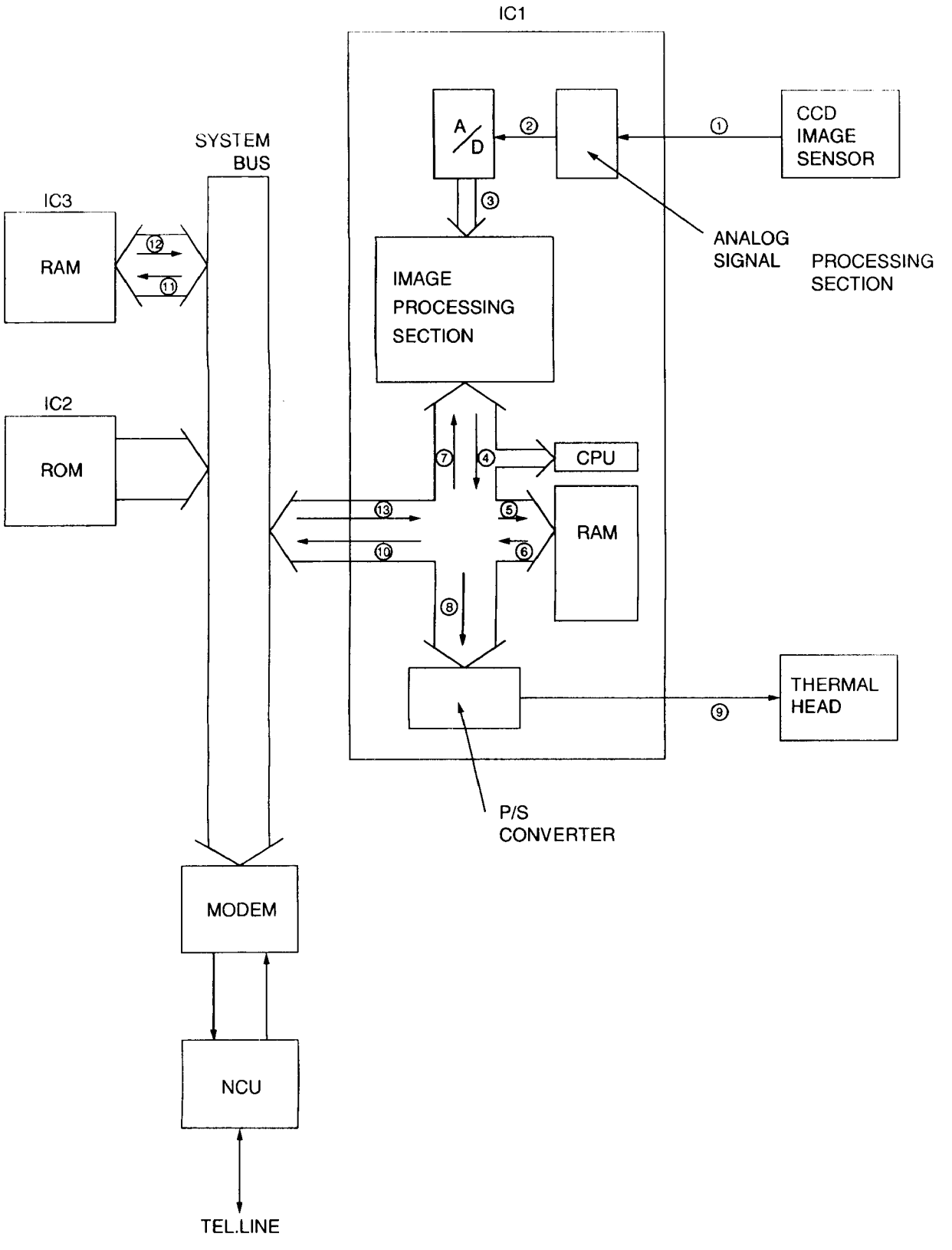
Transmission

(1) Same processing of **COPY** items 1) - 3).
(2) Data stored in RAM of IC1 is outputted from IC1 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 RAM (IC3).
(3) While fetching data stored in communication buffer synchronous with modem, CPU 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 demodulated to parallel digital data. Then the CPU stores the data in the communication buffer of RAM (IC3) along route 12 .
(2) Data stored in RAM (IC3) is decoded by CPU by way of way of route ⑫ , and it is stored in RAM by routes ⑬ and ⑤ .
(3) Same processing of **COPY** item 4).

Block Diagram

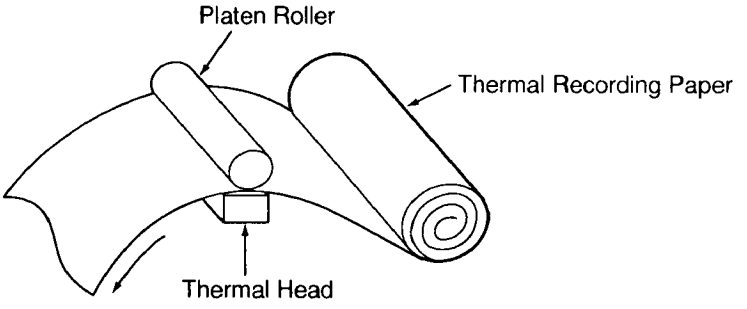


4-2. THERMAL HEAD

(1)Function

This unit utilizes state of the art thermal printer technology.
The recording paper (roll paper) is chemically processed. When the thermal head contacts this paper it emits heat momen tarily, black dots (appearing almost as a point) are printed on 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)

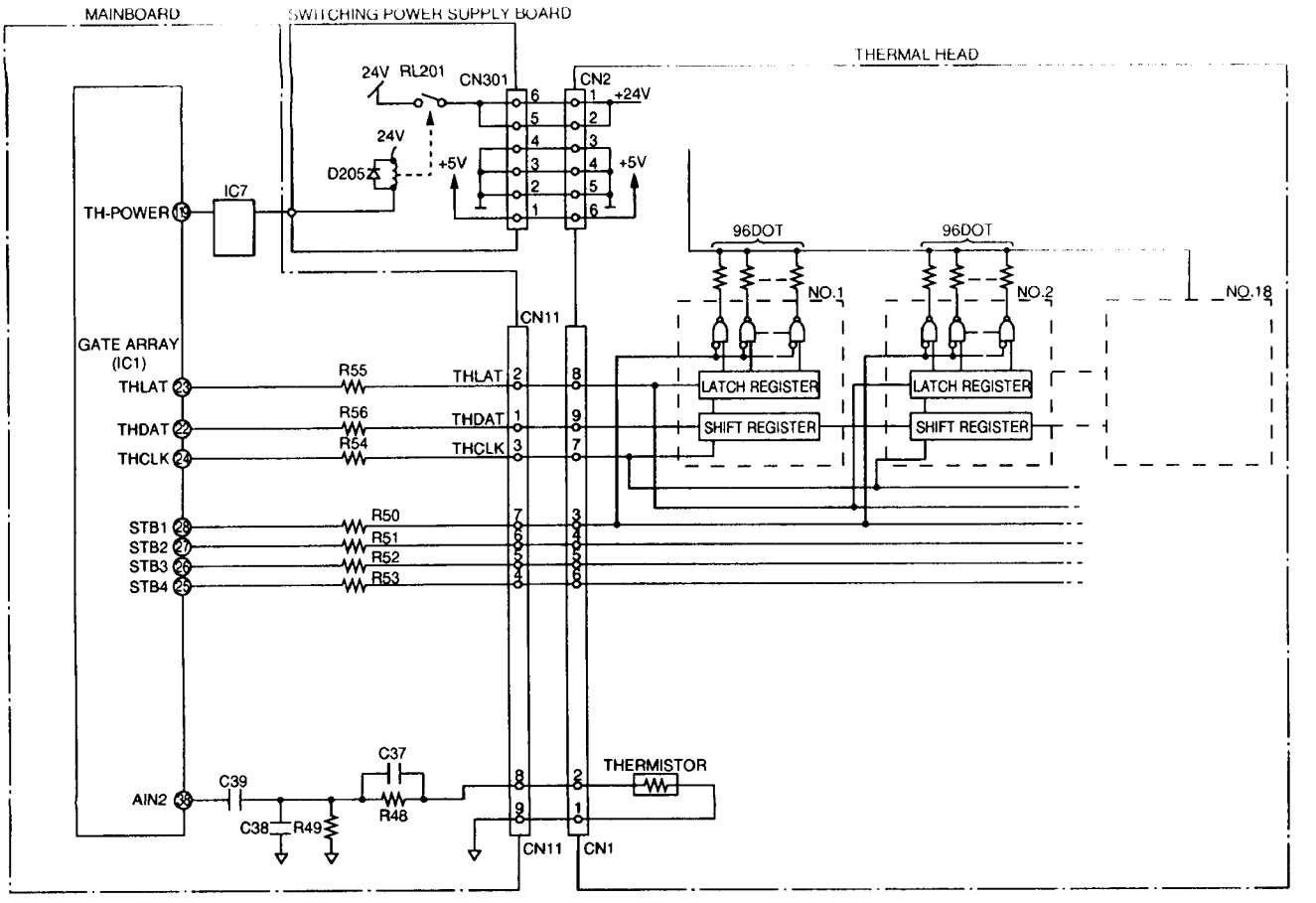


(2)Circuit Operation

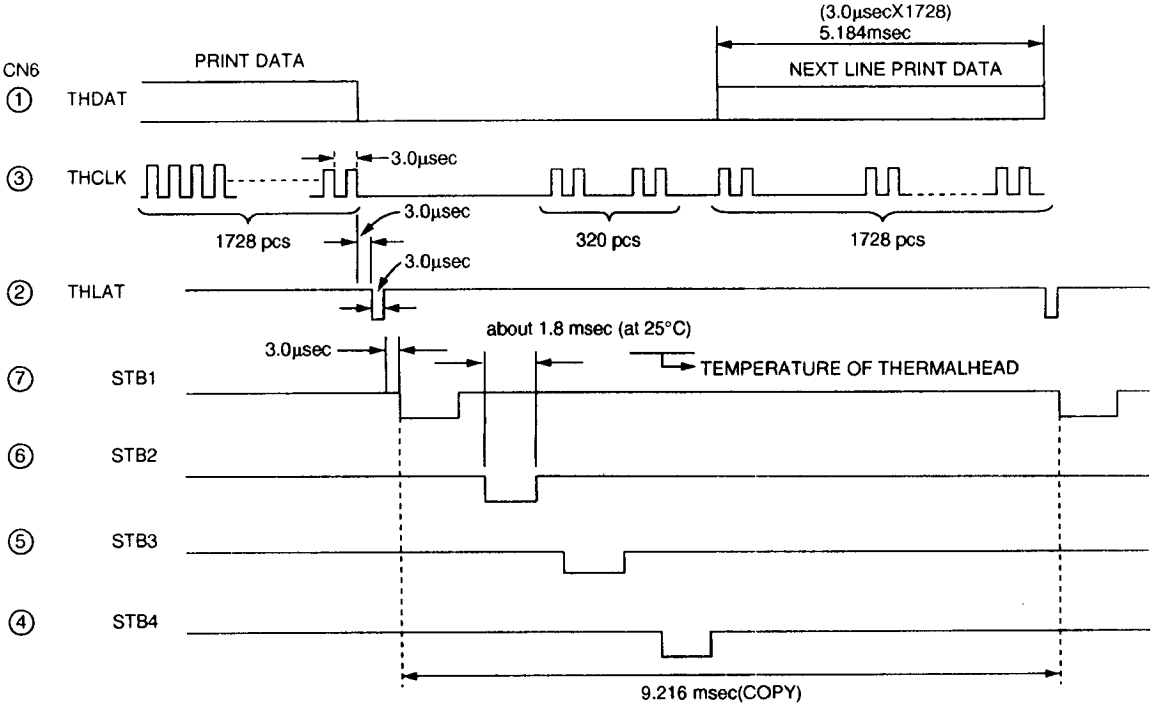
There are 18 driver ICs aligned horizontally on the thermal head and each one of these ICs can drive 96 heat emitting registers. This means that one line is at a density of 96×18=1728 dots=(8 dots/mm).
White/Black (white=0, black=1) data in one line increments is synchronized at IC1 pin 24 (THCLK) and sent from IC1 pin 22 (THDAT) to the shift register of the ICs. The shift registers of the 18 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 IC1 pin 23 (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 IC1 pins (25, 26, 27, 28) 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 18 IC unit (4 unit or 5 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 IC1 pin 38, and vales from the ROM (IC2) table corresponding to temperatures eliminate temperature changes of density through setting by CPU.]
When the thermal head is not used, the IC1 (119, TH-POWER) becomes low level, IC7 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



4-3. 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 (IC1) and then is coverted into a digital data.

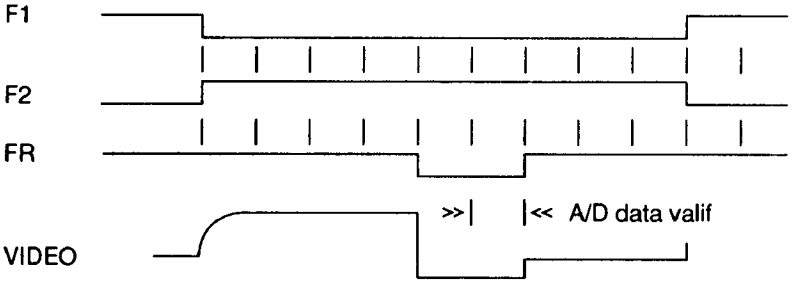
(2) Circuit Operation

[Start]

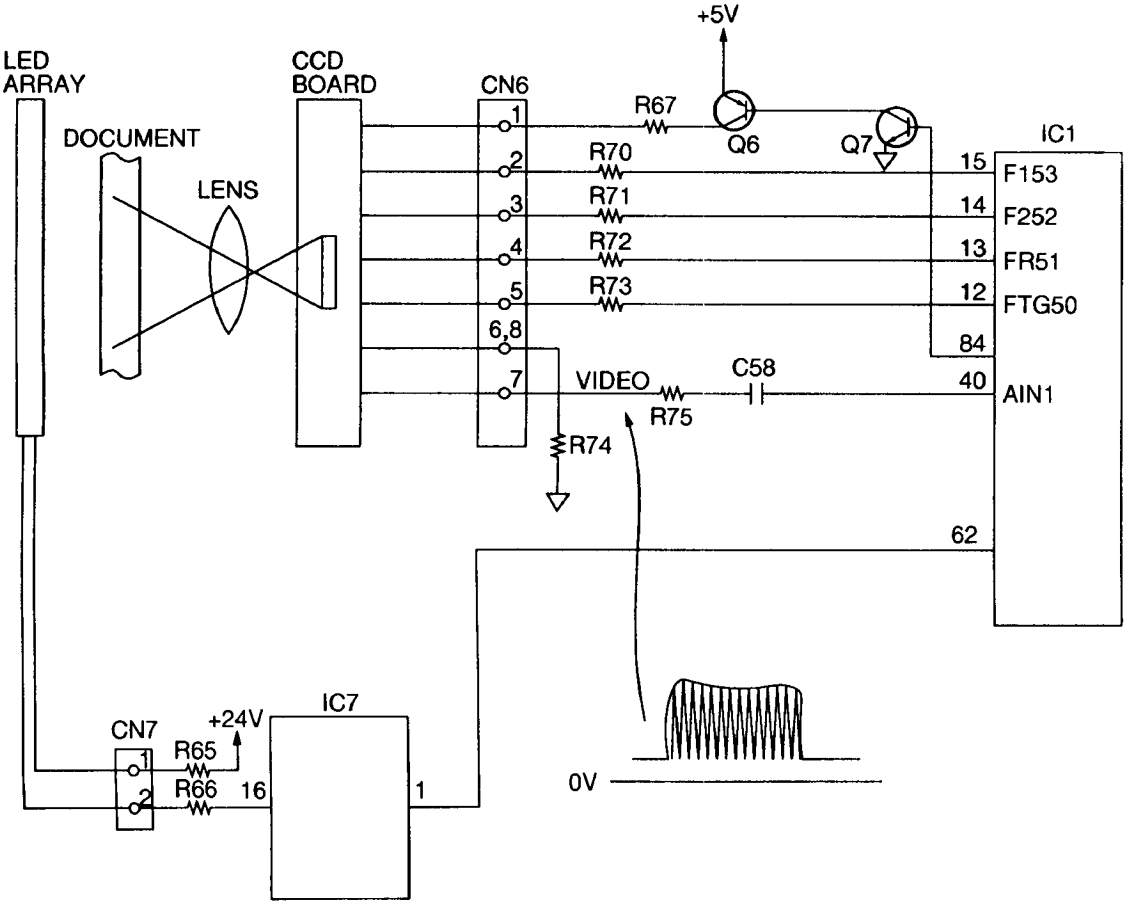
When the START/COPY/SET button is pressed, IC1 pin 62 goes to a high level and IC7 is turned ON, which makes CN7 pin 2 go to a low level and the voltage applied to the LED array to turn on the LED.

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 CN5 pin 7.

CCD Scanner Timing Chart (1 Dot Cycle)



Block Diagram



4-4. STEPPING MOTOR DRIVE CIRCUIT

(1) Function

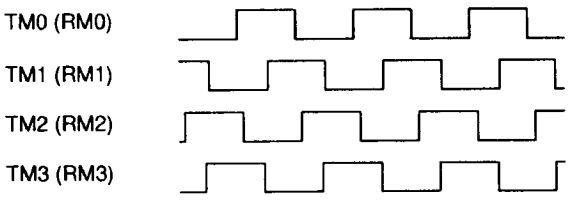
Two individual stepping motors are used for transmission and reception. They feed document or recording paper synchronized for reading or printing.

(2) Circuit Operation

During motor drive, gate array IC1 pin 77/pin 71 becomes high level, Q2/Q4 are turned ON, and Q1/Q3 go ON as a result, +24 V is supplied to the motor coil.

Stepping pulses are output form gate array IC1, causing driver IC7/IC8 to go ON. The motor coil is energized sequentially in 2 phase increments, which causes a 1-step rotation. Rotation of 1-step 0.13mm of recording paper or document paper. Timing chart is below.

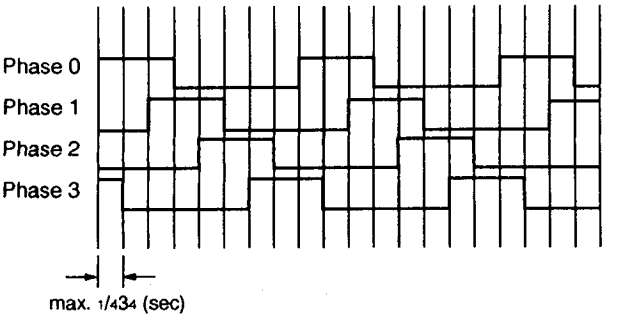
Timing Chart



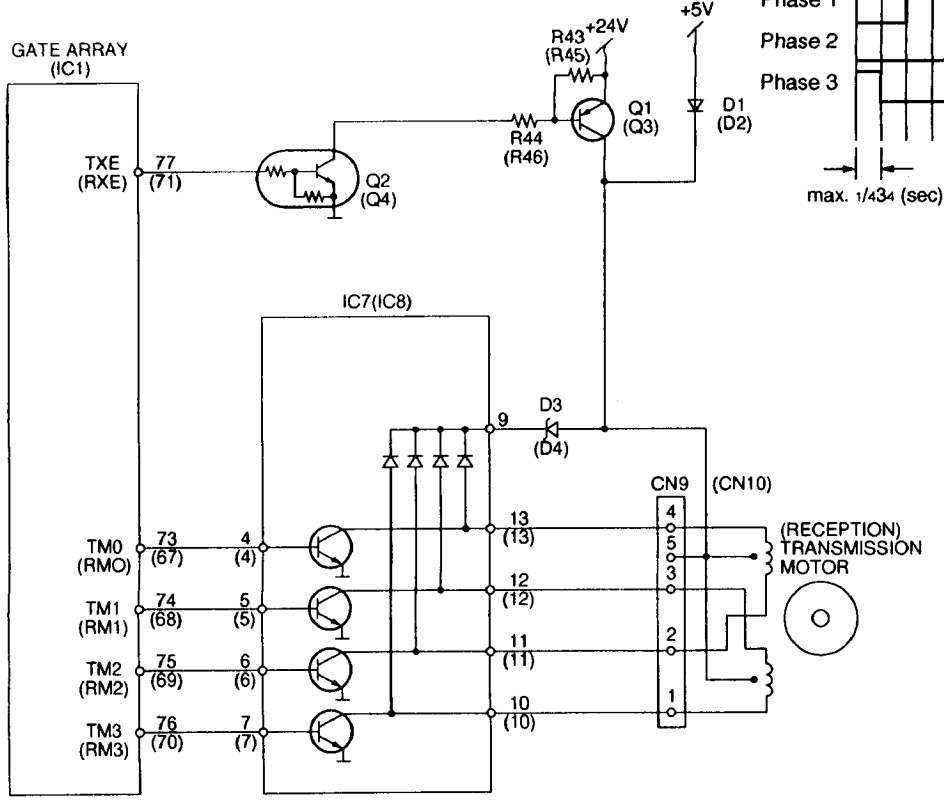
Stepping Motor Phase Pattern

Function	Mode	Drive Phase Pattern	Speed
Copy	STD	1-2	434 pps
	Fine/Half Tone	1-2	434 pps
	Super Fine	1-2	217 pps
FAX	STD	1-2	434 pps
	Fine/Half Tone	1-2	434 pps
	Super Fine	1-2	217 pps
———	Paper Feed	1-2	217 pps

1-2. Phase (Asic TM0-TM3, RM0-RM3 output)



Circuit Diagram

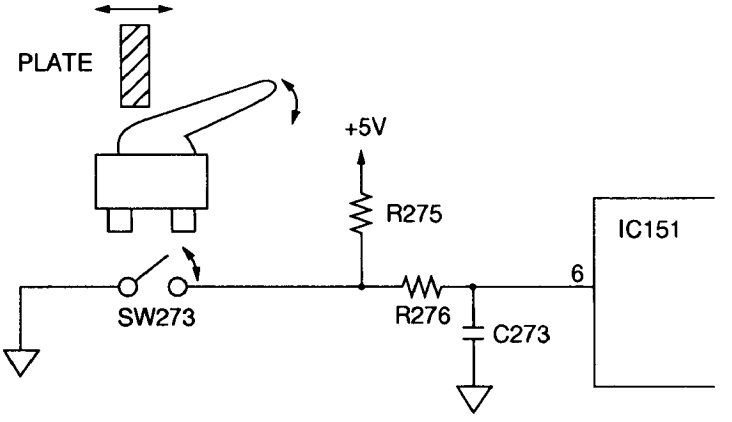


When the motor is OFF, gate array IC1 pin 77/pin 71 becomes low level and Q2/Q4 are turn OFF. This causes Q1/Q3 to also go OFF and inserted of +24V, +5V is supplied through D1/D2 so that the motor is held in place.

4-5. SENSORS AND SWITCHES

[Recording Paper Sensor (SW273)]

When recording paper is present, the plate push the switch lever, the input signal of IC151-6 pin (ANALOG) becomes low level. When the set runs out of recording paper, the plate leaves the switch lever, the input signal of IC151-6 pin (ANALOG) becomes high level.

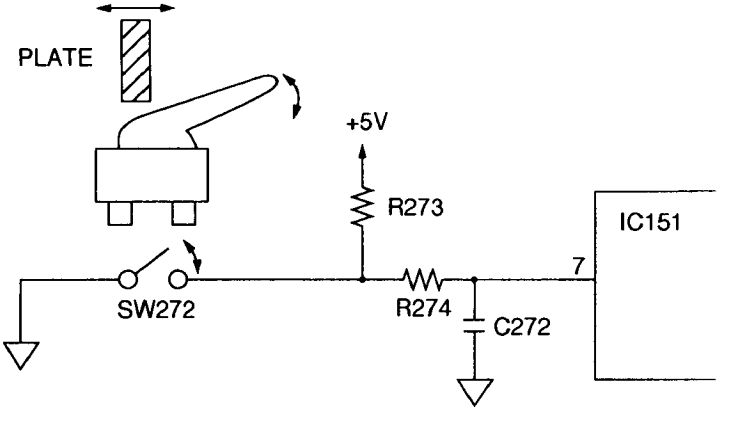


Analog Board

	Signal (IC151-6 Pin)
Set Recording Paper	Low level
No recording Paper	High level

[JAM Sensor (SW272)]

When recording paper is jammed, the plate push the switch lever, the input signal of IC151-7 pin (ANALOG) becomes low level. Usually, the plate leaves the switch lever the input signal of IC151-7 pin (ANALOG) becomes high level.

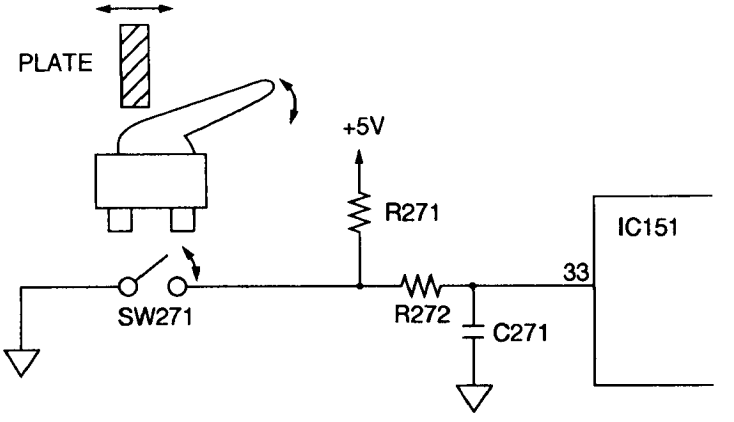


Analog Board

	Signal (IC151-7 Pin)
JAM	Low level
NO JAM	High level

[Cover Open Sensor (SW271)]

When the upper cabinet is closed, the plate push the switch lever, the input signal of IC151-33pin (ANALOG) becomes low level. When there is opened, the plate leaves the switch lever, the input signal of IC151-33pin (ANALOG) becomes high level.

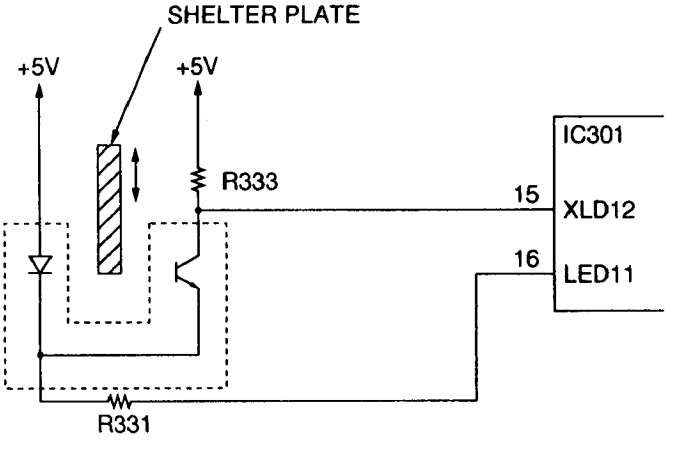


Analog Board

	Signal (IC151-33 Pin)
Close	Low level
Open	High level

[Read Position Sensor (PI301)]

When an document is brought to read position, the shelter plate pass the sensor light, the phototransistor becomes ON, and the input signal of IC301-15pin (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 IC301-15pin (Operation) becomes high level. (When checking this sensor condition, IC301-16 pin becomes low level).

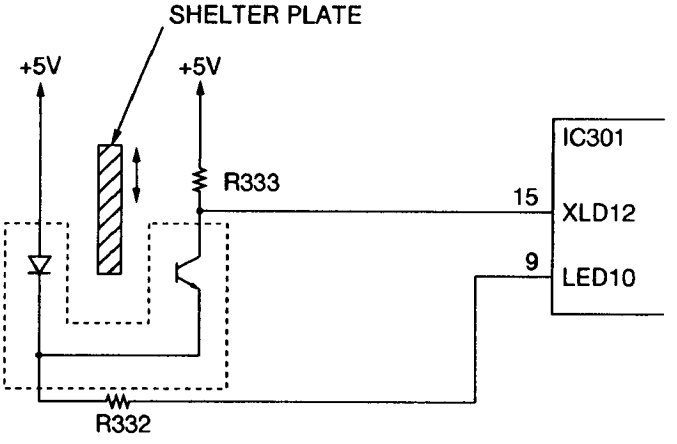


Operation Board

	Phototransistor	Signal (IC301-15 Pin)
Out of the Read Position	OFF	High level
At the Read Position	ON	Low level

[Document Sensor (PI302)]

When a document is set, the shelter plate shuts the sensor ligh, the phototransist or becomes OFF, and the input signal of IC301-15 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 IC301-15 pin (Operation) becomes low level.
(When checking this sensor condition, IC301-9 pin becomes low level.)



Analog, Digital and Operation Board

	Phototransistor	Signal (IC301-15 Pin)
No document	ON	Low level
Set document	OFF	High level

5. MODEM SECTION

5-1. FUNCTION

The unit uses a 1 chip modem (IC11), 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 ITU-T. This 1 chip modem (IC11) has hardware which sends and detects all of the necessary signals for FAX communication and DTMF.
It can be controlled by writing commands from the ASIC (IC1) to the register in the modem (IC11).
This modem (IC11) also sends DTMF signals, generates a call tone (from the speaker), and detects a busy tone and dial tones and DTMF.

Overview of Facsimile Communication Procedures (ITU-T Recommendation):

(1) ON ITU-T (International Telecommunications' Union.)

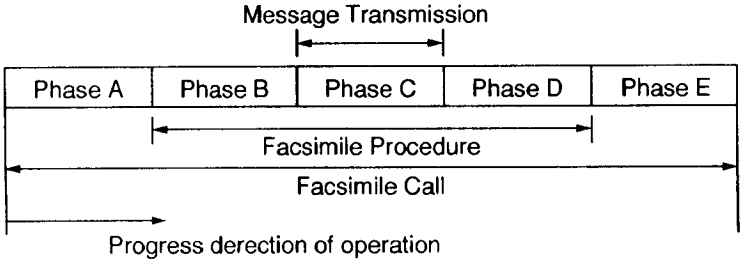
The No. XIV Group of ITU-T, one of the four permanent organizations of the International Telecommunications Union (ITU), investigates and make recommendations on international standards for facsimile.

(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 communications 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 ter-minal control. It implements terminal preparation status, determines and displays terminal constants, confirms synchronization status, etc. and prepares for transmission of facsimile messages.
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 in fact sent, and to check for telephone reservations and/or the existence of continuous transmission.

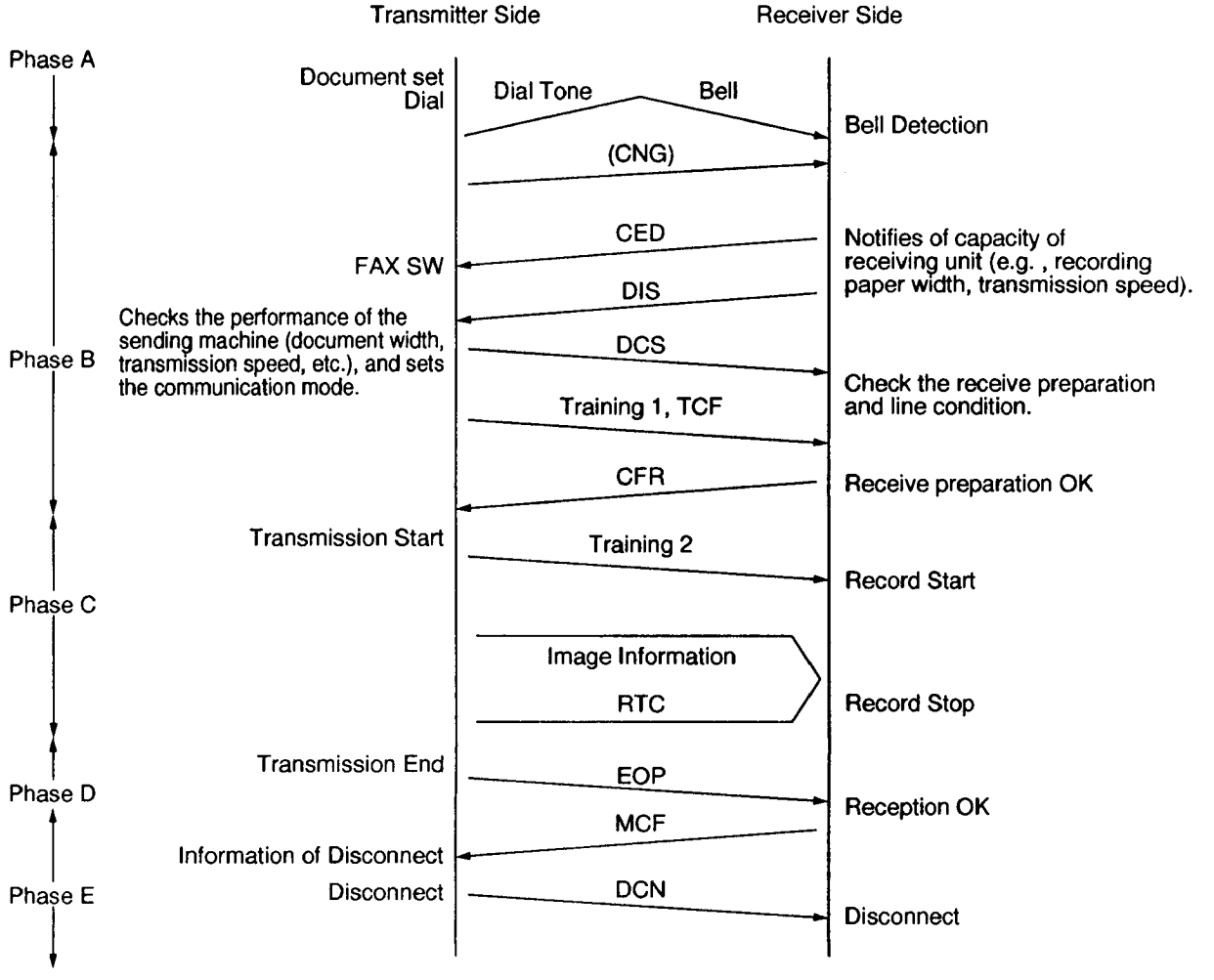
(5) Facsimile Standard

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)

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

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

Identification Signal Format.....X1000001

(Example)

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.

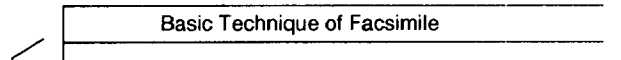
Signal	Identification Signal Format	Function
Training 1	————	Fixed pattern is transmitted to receiving side at speed (2400 to 9600 bps) designated by DCS, and the receiving side optimizes the automatic equalizer, etc., according to this signal.
TCF (Training Check)	————	Sends 0 continuously for 1.5 seconds 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.

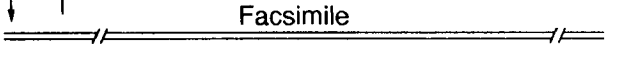
② Redundancy Compression Process Coding Mode
This set uses one-dimensional MH format.

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

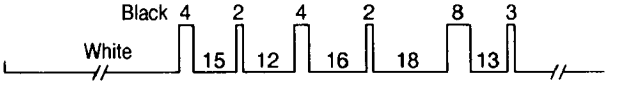
(a) Document



(b) Part of document



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



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

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)

CIRCUIT OPERATION

5-2.MODEM CIRCUIT OPERATION

The modem (IC11) has all the hardware satisfying the ITU-T standards mentioned previously.
When the gate array IC1 (116) is brought to low level, the modem (IC11) is chip-selected and resistors inside IC are selected by select signals from ASIC (IC1) A0-A4, commands are written through data bus, and all processing is controlled at the ASIC (IC1) according to ITU-T procedures. Here the signal $\overline{INT}$ dispatched from $\overline{IRQ}$ (pin 52 of IC11) to the ASIC (IC1) when preparation for acceptance of transmission data is OK and when demodulation of reception data is complete, the ASIC (IC1) implements post processing. This modem (IC11) has an automatic application equalizer. With training signal 1 or 2 at time of G3 reception, it can automatically establish the optimum equalizer. Also, the modem (IC11) generates an internal clock of 24.00014MHz by means of an external crystal oscillator (X1).

(1) Facsimile Transmission/DTMF Line Send

The digital image data on the data bus is modulated in the modem (IC11), and sent from pin 44 via amplifier IC10 (6 → 7), the NCU section to the telephone line.

IC11 (44) → C73 → R90 → IC10(6-7) → CN1(10) → CN271(10) → C184 → R182 → IC151(73-63) →
C74
[C203 → R210 → IC201(2-1) → C202 → R201 → T101] → TEL LINE.

[ ]: NCU section

(2) Facsimile Reception

The analog image deta Which is received from the telephone line passes through the NCU section and enters pin 45 of the modem (IC11). The signals that enter pin 45 of the modem (IC11) 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) → R11 → IC10(2-1) → C19 → R13 → IC11(45)

(3) DTMF Transmission (Monitor tone)

The DTMF signal generated in the modem (IC11) is output from pin 44, then passes through the analog G/A IC151, and the NCU section to the telephone line as same as facsimile transmission signals.

(DTMF Monitor Tone)

IC11 (44) → C73 → R90 → IC10(6-7) → CN1(10) → CN271(10) → C184 → R184 → IC151(76-41) → C158 → R161 →
C74
IC151 (40-38) → R245 → C245 → IC241(4-5,8) → Speaker

(4) Call Tone Transmission

The call signal which is generated in the ASIC (IC1) passes through analog G/A IC151 and IC241 (4 → 8, 5) to the speaker.

IC1(85,87) → R59 → C56 → CN2(1) → CN272(1) → R186 → C187 → IC151(78-41) → C158 → R161 →
R60 → C57
IC151 (40-38) → R245 → C245 → IC241(4-5,8) → Speaker

(5) 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 (IC11) becomes 1, and this status is monitored by the ASIC (IC1).

6. EXPLANATION OF ANALOG SECTION BLOCK DIAGRAM

(1)Function

The analog section serves as interface with the telephone line. The digital board (IC11) for transmission reception of FAX signals, and the speech network IC (IC109) are connected to the NCU section. Switching between the digital board (IC11) and the other sections is executed by means of a multiplexer in the NCU section. The control signals to the individual analog sections are output mainly from the ASIC IC1, and the status information for the various sections also is held in the ASIC IC1. 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.

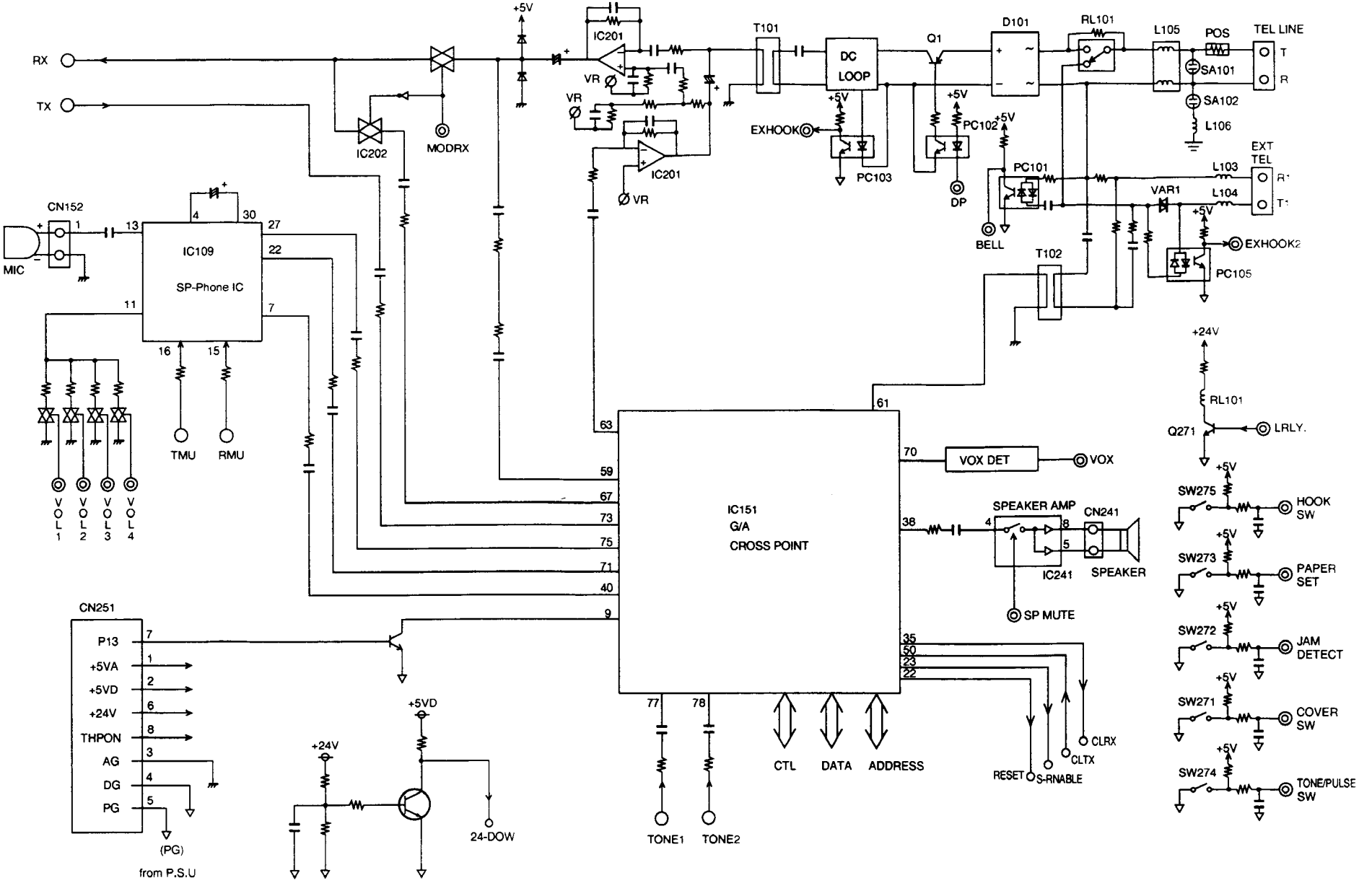
[Modem (IC11)]

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 outputted after passage through the power amplifier (IC241) and the DTMF monitor tone and the pulse dial monitor tone output from IC11 (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



7 NCU Section

7-1. 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.

7-2. 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.

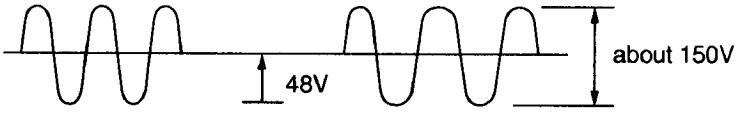
IC151 (32) High Level → Q271 ON → RL101 (make)

7-3. BELL DETECTION CIRCUIT

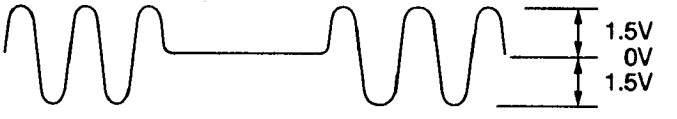
(1) Circuit Operation

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.

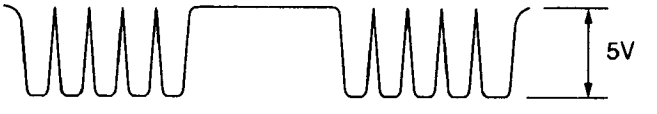
Between Tip and Ring



Between PC101(1) and (2)



PC101(4)/Gate Array IC151 (4)



TEL LINE → PC101(1,2-4) → IC151 (4)

7-4. 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 PC4 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

7-5. 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.

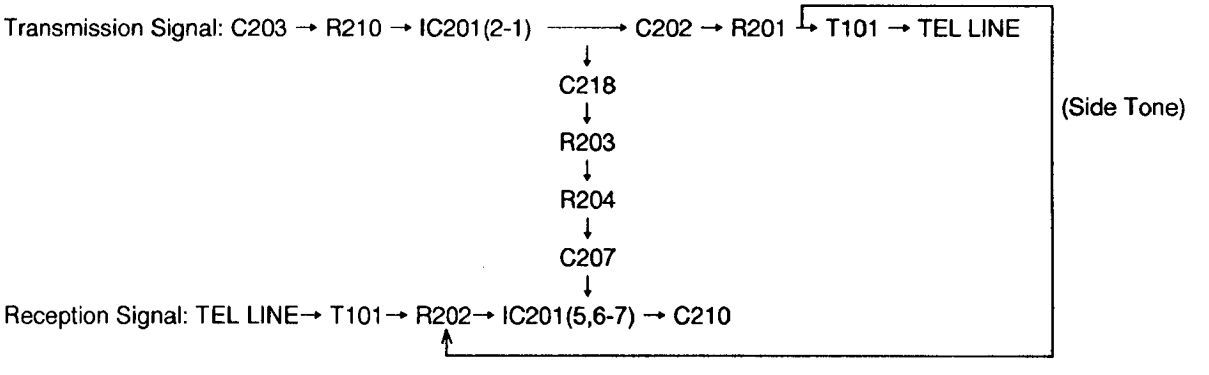
7-6. TAM INTERFACE CIRCUIT

This circuit is for 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, VOX detect circuit.
In details please refer to page 142. TAM INTERFACE SECTION.

7-7. LINE AMPLIFIER AND SIDE TONE CIRCUITS

(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), anc it is inputted to the reception system at an amplifier gain 10.1 dB from pin 7.
The transmission signal given as input to IC201 pin (2) via R210, C203 is amplified to about 15 dB, It is outputted form pin 1 of IC201 and it is transmittted to T101 via R201, C202,T101. Without side tone circuit, the transmission signal here would returr completely to the reception amplifier via R201, C202. Here, the signal output from IC201 pin (1) passes through C218, R203, R204, C207 and enters the amplifier IC201 pin (5), and this is used to cancel the return part of the transmission signal.
This is the side tone circuit.



8. ITS (Integrated telephone System) and MONITOR SECTION

8-1. 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 (IC11: digital board). The alarm tone, the key tone, and the beep are outputted from the gate array IC151 (digital board). At the time of pulse dial operation, the monitor tone is outputted from the gate array IC151.

8-2. SPEAKER PHONE 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 simultaneously. 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, compara tor 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.

8-3. MONITOR CIRCUIT

(1) DTMF Monitor

(Speaker Operation)

IC11 (44) → C73 / C74 → R90 → IC10(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)

IC11 (44) → C73 / C74 → R90 → IC10(6-7) → CN1(10) → CN271(10) → C184 → R184 → IC151(76-41) → C154 → L154 / L153 → Speaker

(2) Alarm/Beep/Key tone

IC1(86) → CN1(11) → CN271(11) → R185 → C186 → IC151(77-41) → C158 → R161 → IC151(40-38) → R245 → C245 IC241(4-5,8) → Speaker

(3) Bell Signal

IC1(85,87) → R59 → C56 / R60 → C57 → CN2(1) → CN272(1) → R186 → C187 → IC151(78-41) → C158 → R161 → IC151(40-38) → R245 → C245 → IC241(4-5,8) → Speaker

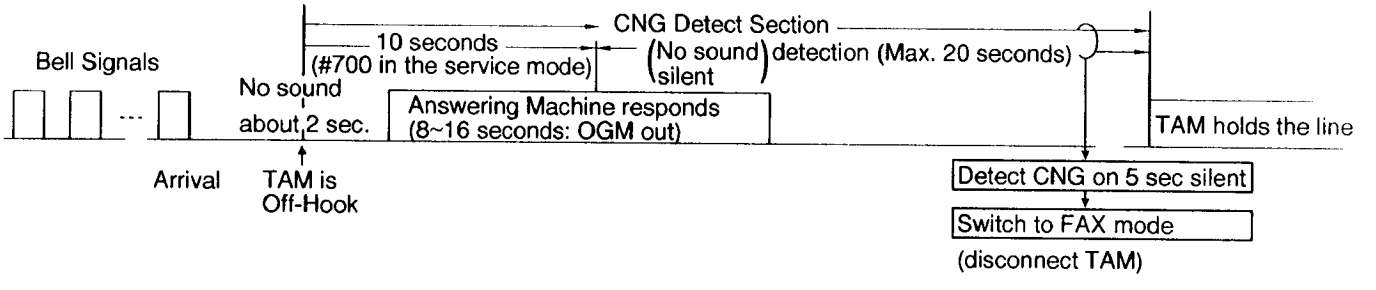
9. TAM INTERFACE SECTION

9-1. 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.

9-2. 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 RL101 (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 → POS101 → L105 → RL101 (7 → 6) → VAR1 → L104 → Tip1 → (EXT.TAM) → Ring 1 → L103 → R103 → L105 → Ring
VAR1 → R192 → PC105

(2) CNG signal detection circuit
CNG signal from the party's FAX is detected in MODEM IC11 (digital board).

(Signal path)
TEL LINE → C104 → T102 → C176 → R176 → IC151 (61)(67) → R217 → C214 → IC202 (10)(11) → C217 → CN271(9) → CN1 (9) → R97 → IC10 (2) (1) → C82 → R95 → IC11 (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.

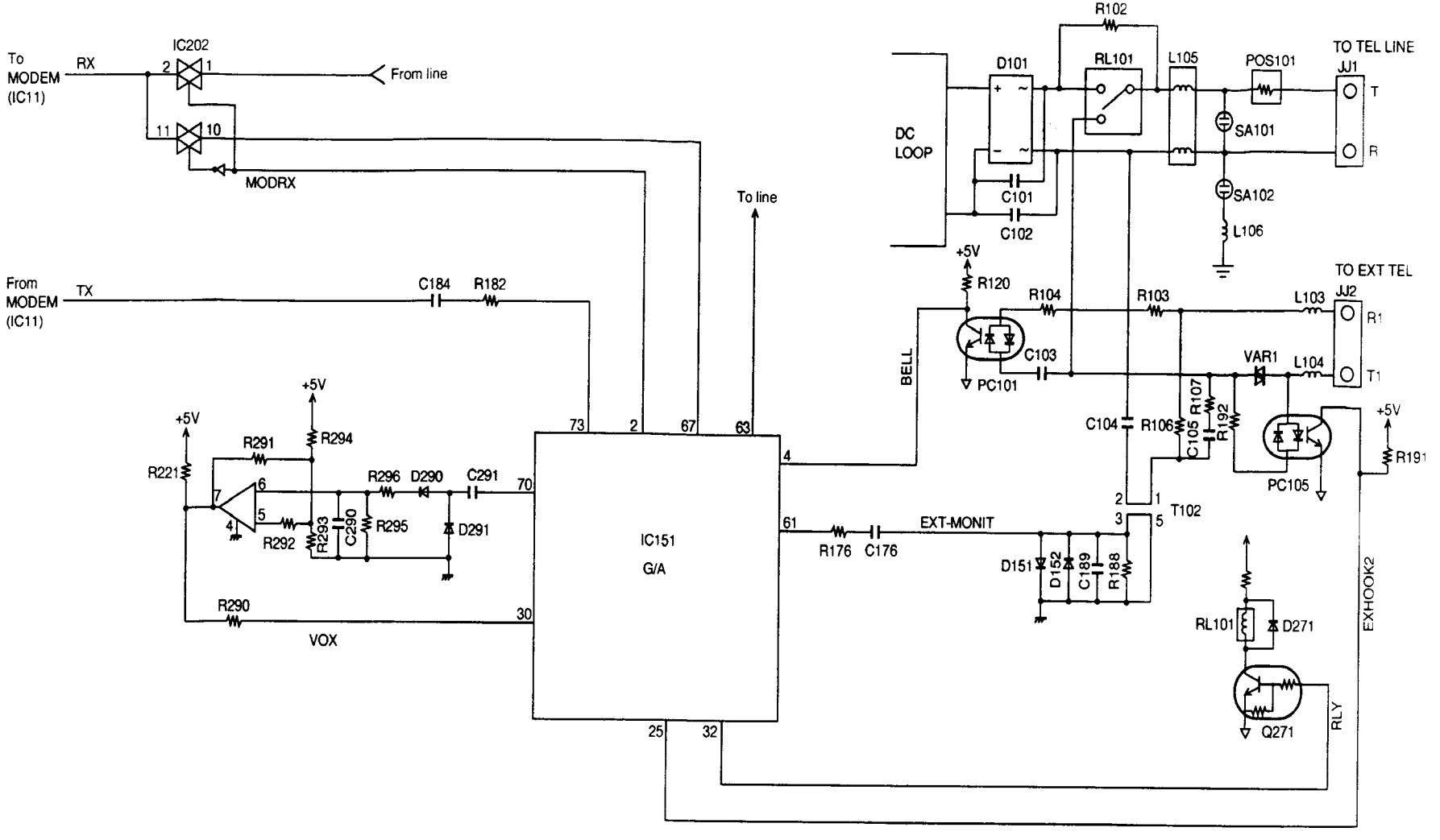
(Signal path)
TEL LINE → C104 → T102 → C176 → R176 → IC151 (61-70) → C291 → D290 → R296 → IC101 (6)(7) → R290
→ IC151 (30)
EXT.TEL Line → VAR1

(4) RL101
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(32) High Level → Q271 → ON → RL101(make)
IC151(32) 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.


To MODEM (IC11)
RX
IC202
From line
MODRX
From MODEM (IC11)
TX
C184
R182
To line
DC LOOP
D101
RL101
R102
L105
POS101
TO TEL LINE
JJ1
T
R
SA101
SA102
L106
C101
C102
+5V
R120
BELL
PC101
C103
R104
R103
L103
TO EXT TEL
JJ2
R1
T1
VAR1
L104
C104
R106
C105
R107
R192
PC105
R191
T102
EXT-MONIT
R176
C176
D151
D152
C189
R188
RL101
D271
EXHOOK2
RLY
Q271
IC151
G/A
73
2
67
63
4
70
61
30
25
32
R221
R291
R294
R296
D290
C291
R292
R293
C290
R295
D291
R290
VOX

10. OPERATION PANEL

The unit consists of LCD (Liquid crystal display), KEYs and LEDs (light-emitting diode). They are controlled by the Gate Array (IC301) and AS IC (IC1: On the DIGITAL BOARD). (Fig.-a)

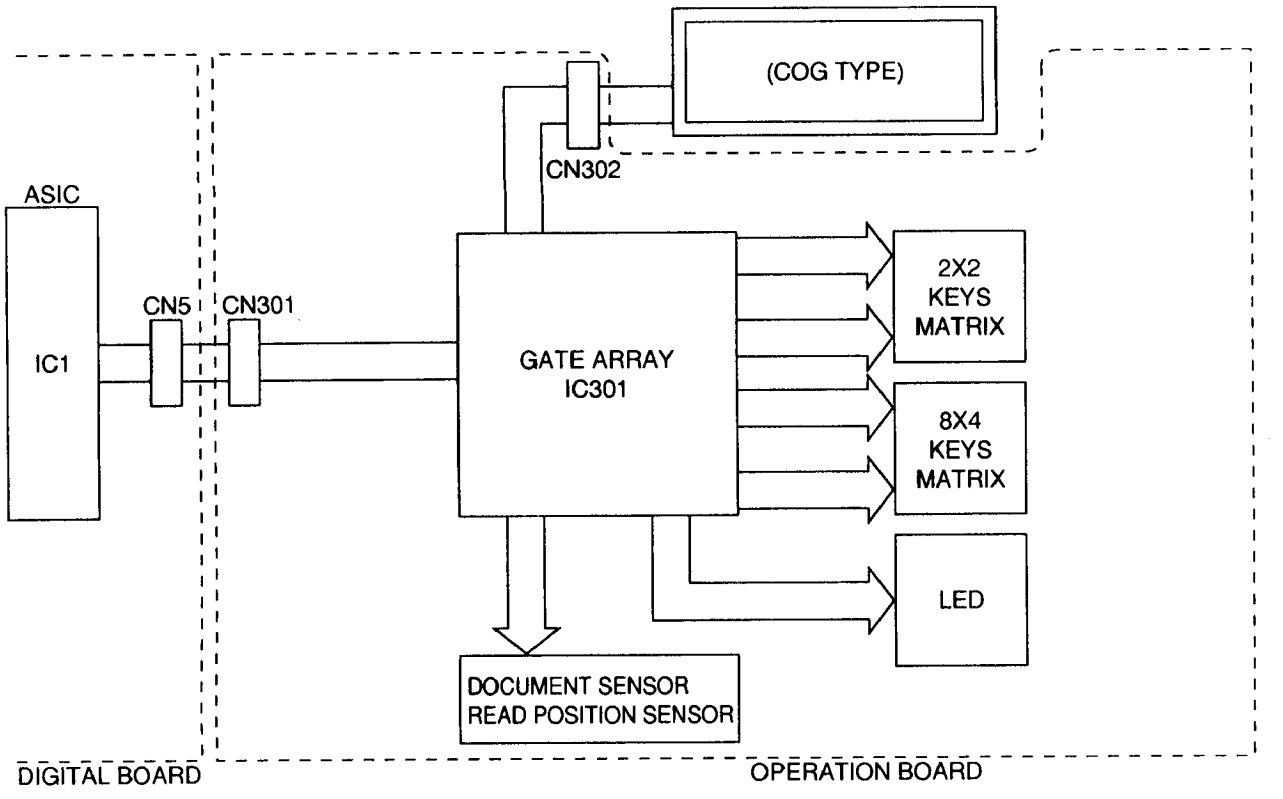


Fig-a DIAGRAM

Key Matrix

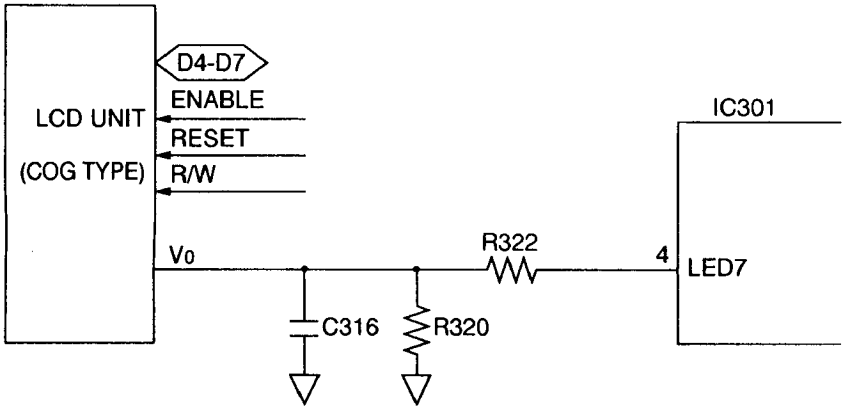
I / O	KIN 0	KIN 1	KIN 2	KIN 3	KIN 4	KIN 5	KIN 6	KIN 7
KSL0	VOLUME (S301)	STOP (S305)	START /COPY/SET (S309)	VOLUME (S313)	SP-PHONE (S317)	HELP (S321)	DIRECTORY (S325)	AUTO RECEIVE (S329)
KSL1				3 (S314)	MUTE (S318)	6 (S322)	9 (S326)	# (S330)
KSL2	ONE-TOUCH 4 (S303)	ONE-TOUCH 5 (S307)	LOWER (S311)	2 (S315)	REDIAL/ PAUSE (S319)	5 (S323)	8 (S327)	0 (S331)
KSL3	ONE-TOUCH 1 (S304)	ONE-TOUCH 2 (S308)	ONE-TOUCH 3 (S312)	1 (S316)	FLASH (S320)	4 (S324)	7 (S328)	* (S332)

I / O	LED11	LED8
XLD 13	LOCATOR INTERCOM (S335)	MEMU (S333)
XLD 14		RESOLUTION (S334)

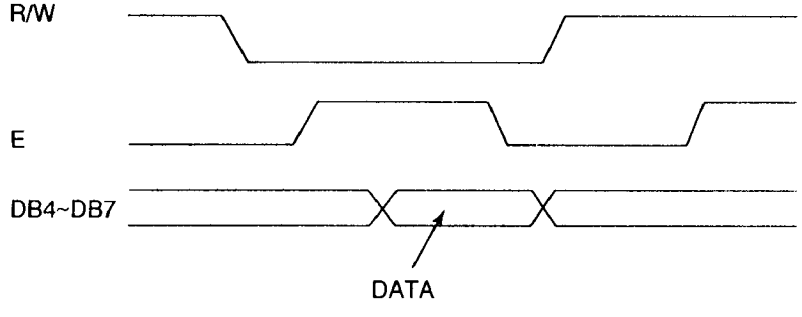
11. LCD COG TYPE

The Gate Array (IC301) needs only write ASCII code from the data bus (D4~D7). V0 is power supplies for crystal drive. R320, 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



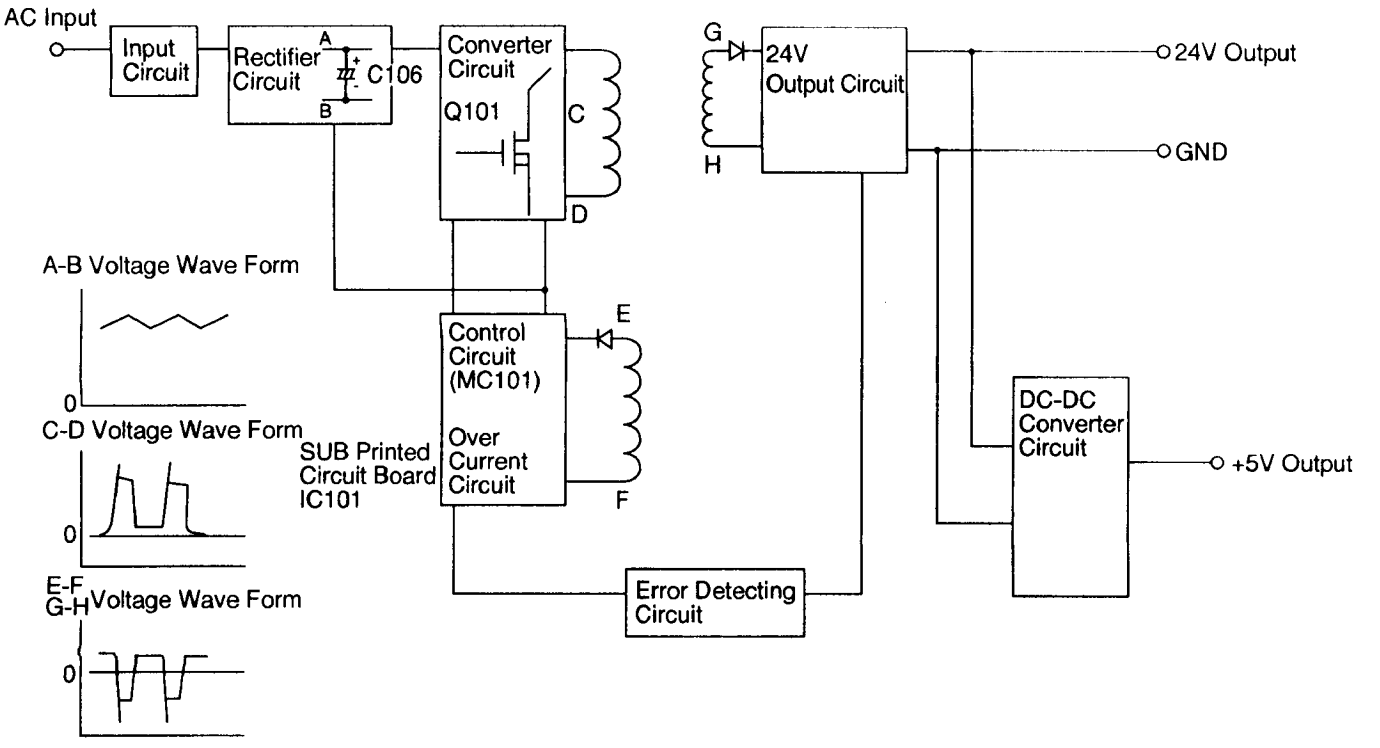
Timing Chart



Density	Normal	Dark
LED 7 (IC301-4 pin)	H	L

12. SWITCHING POWER SUPPLY SECTION

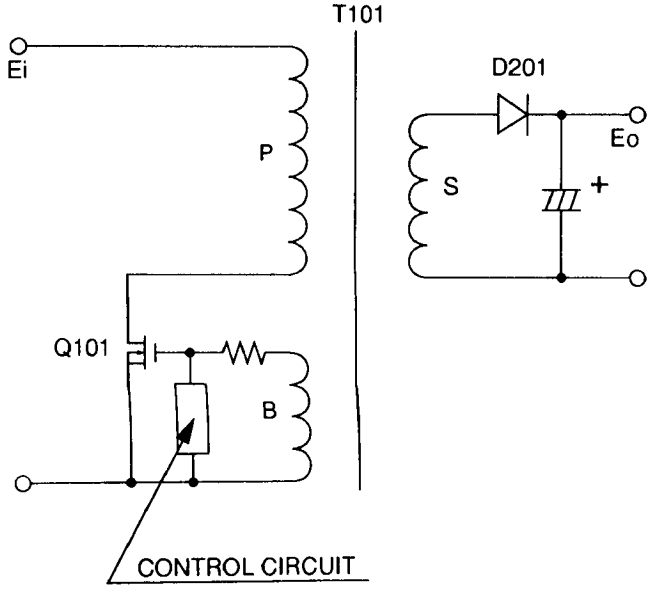
Block Diagram



[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 D101 and charge C106 to make DC voltage, then supply power to converter circuit. Voltage is supplied to control IC's kick-on voltage through R102 and R103. Inrush current is limited by thermistor TH101.

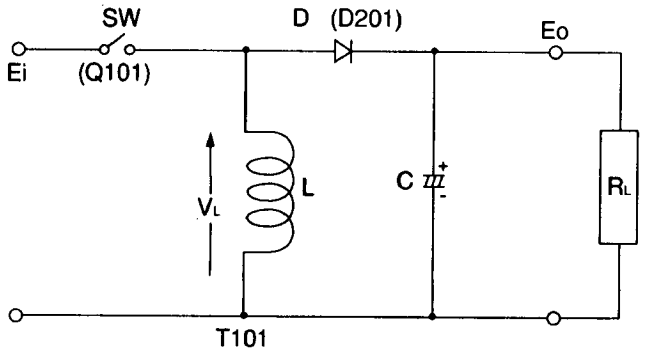
[Converter circuit]
The converter circuit of this power supply circuit is called fly back converter.
We explain the operation of this circuit with the simple circuit.

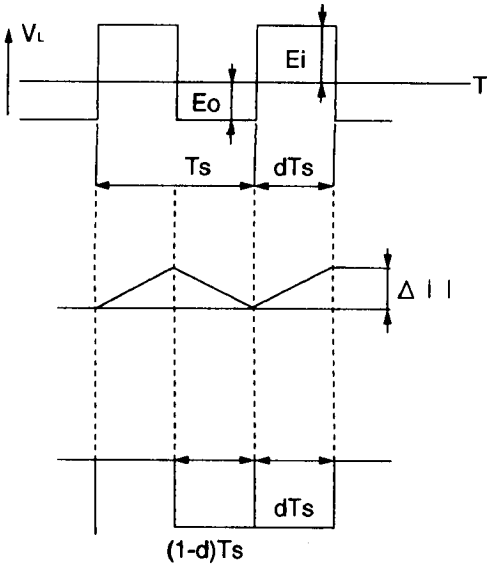


P...PRIMARY WINDING
S...SECONDARY WINDING
B...CONTROL WINDING

The circuit in the previous page, when the transistor Q101 is ON, secondary rectifier diode D201 is OFF and the energy is charged in the transformer T101. Q101 continues being ON while the voltage is generated by control winding (B). Q101 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 Q101contines being OFF state. When all energy is discharged through D201, Q101 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 ON period of Q101 becomes shorter, and when load current is high, the ON period of Q101 becomes longer.
The value of output voltage is

Eo = d/(1-d)*Ei
d = Ton/Ts





T_{on}: ON TIME OF Q101
T_s : PERIOD OF OSCILLATION

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

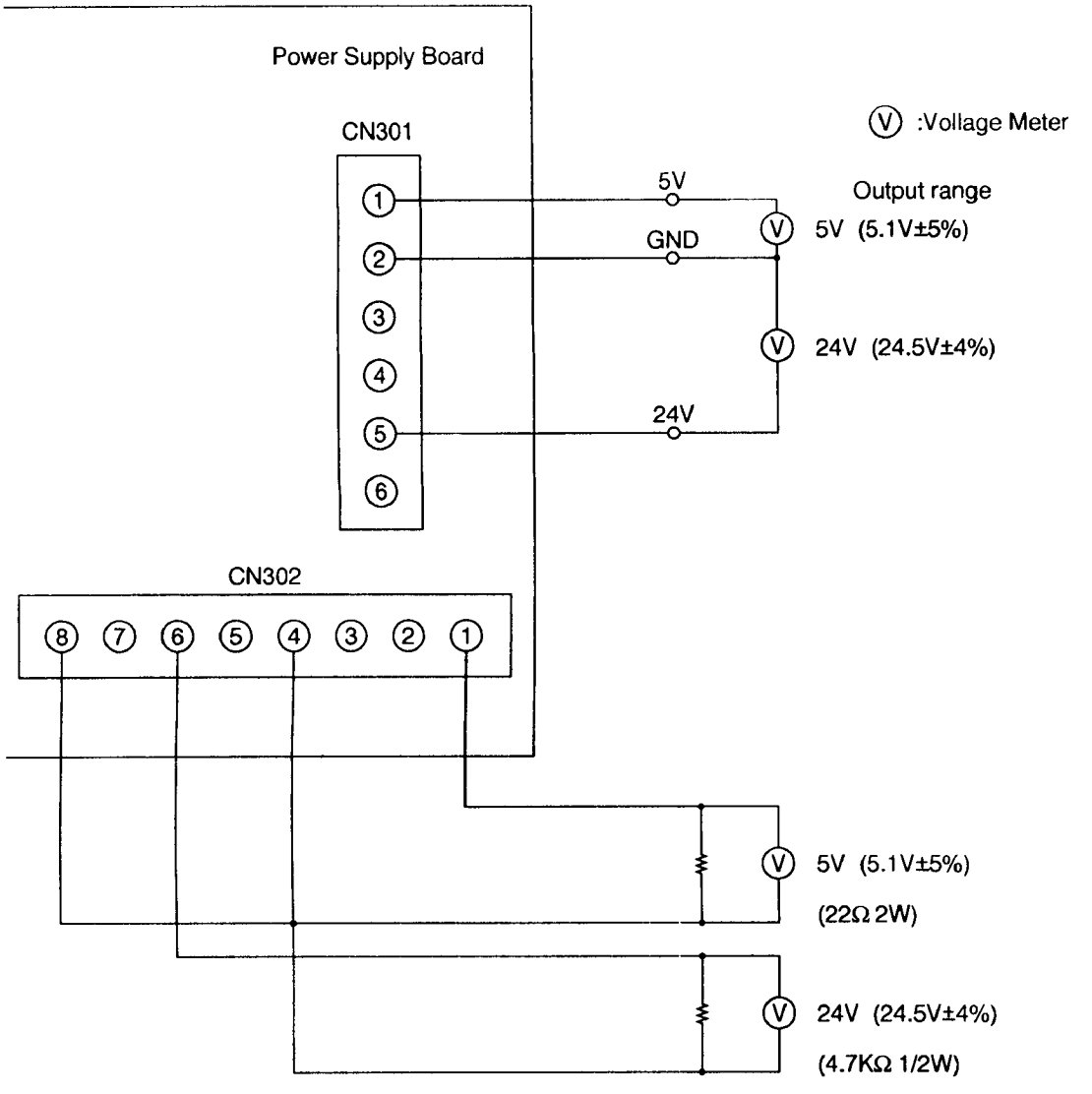
In the actual circuit, the fixed output voltage can be obtained by changing the winding ration of transformer T101. In this converter circuit, the duty ratio of ON period and OFF period of the transistor produces output. In this power supply, the bias winding is also built-in in the transformer and the output value is one. 24V output voltage is stabilized and changes the duty ratio.

[Control Circuit And Error Detecting Circuit]
The control circuit amplifies the output with increased voltage detected in the error detecting circuit, then drives the main transistor. In this power supply the duty ratio is defined by changing the ON period of main transistor.
This is shown as follows.
When the output voltage of 24V circuit becomes higher, the current of photo coupler PC101 increases, the pulse width of output control IC becomes narrow and the ON period of Q101 becomes shorter.

[Over Current Limiter (O.C.L.)]
IC101 rectifiers the highest voltage with resistors R105 and R106 detecting the current in the primary side. When the current is supplied higher than the highest voltage, it switches to ratch mode which stops oscillating.

[DC-DC converter]
Output 5V, is made by DC-DC Converter. 5V output is rectified by IC202, Q201, L201, D203.

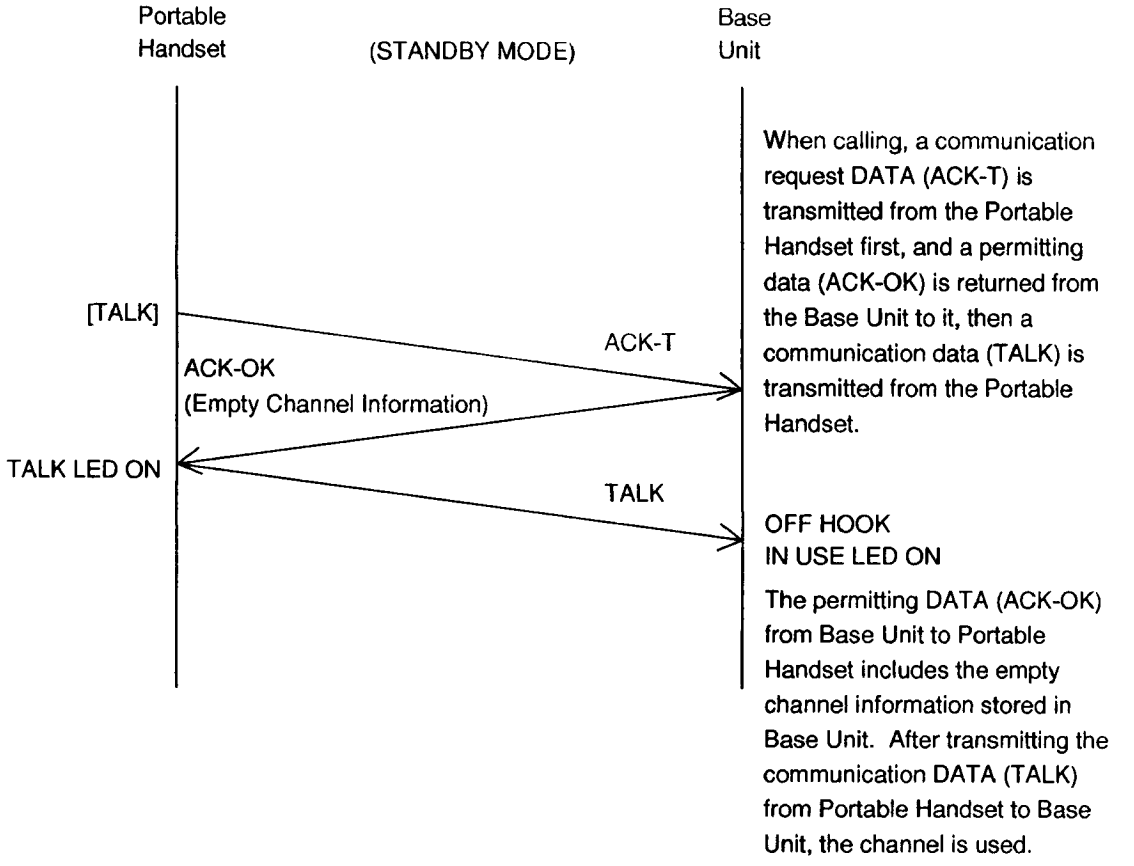
Dummy load method (for the quick check of power supply output)



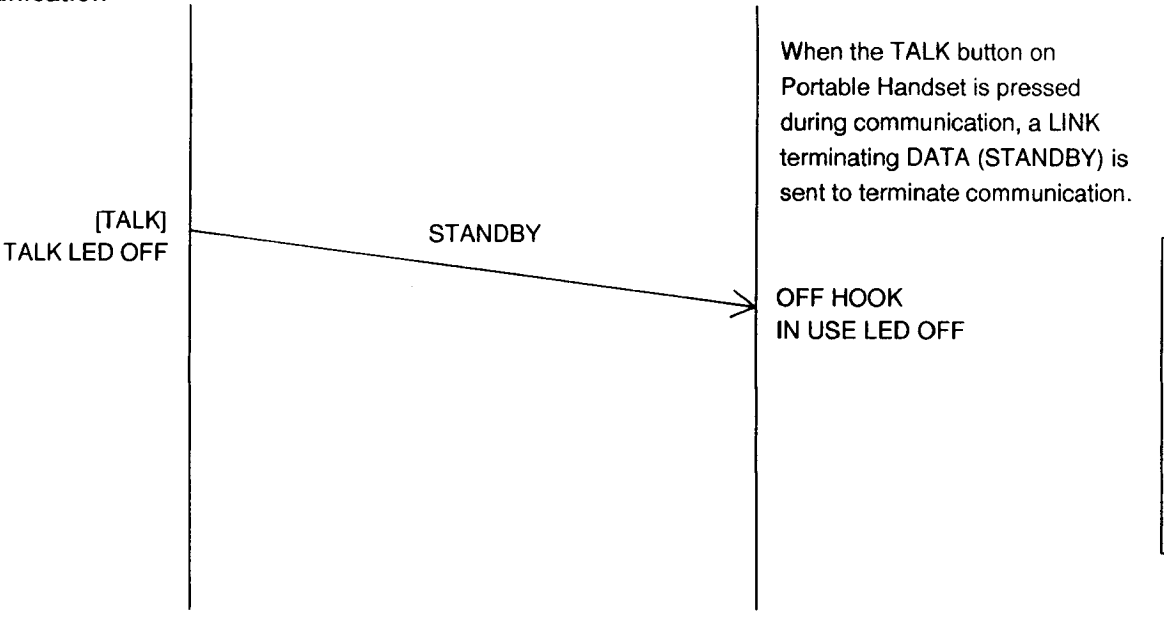
13. CORDLESS SECTION

13-1. EXPLANATION OF CPU DATA COMMUNICATION

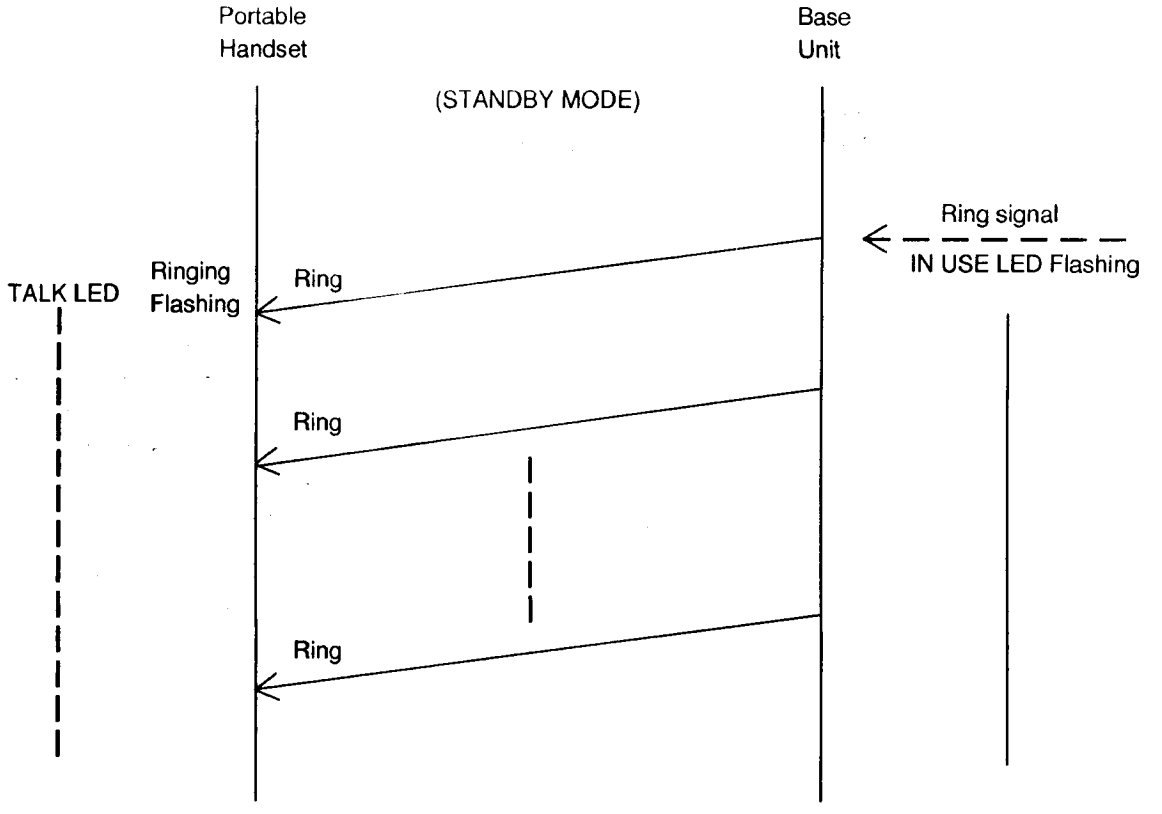
(1) Calling



(2) To terminate Communication



(3) Ringing



After detecting the Ring signal from circuit, Base Unit sends a ring signal DATA (Ring), then the Portable Handset starts ringing.

(4) Ports for transmitting and receiving of data

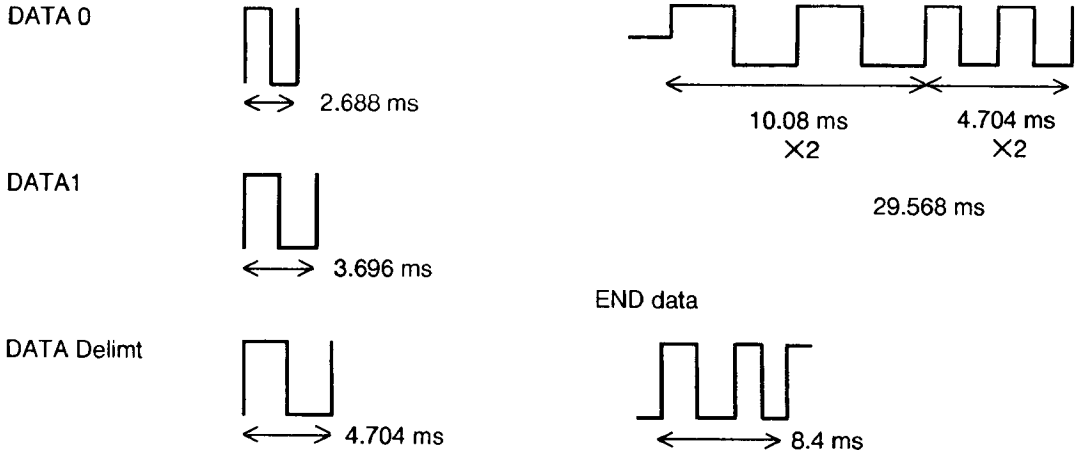
Portable Handset :	transmitting ... 54 Pin	receiving ... 50 Pin
Base Unit :	transmitting ... 48 Pin	receiving ... 58 Pin

(5) Waveform of DATA used for cordless transmission and reception

The DATA which is transmitted from the Portable Handset to the Base Unit is combination of DATA 0, DATA 1, DATA Delimt, Pre data and End data.
The DATA which is transmitted from the Base Unit to the Portable Handset is combination of DATA 0, DATA 1, DATA Delimt, Pre data and End data.

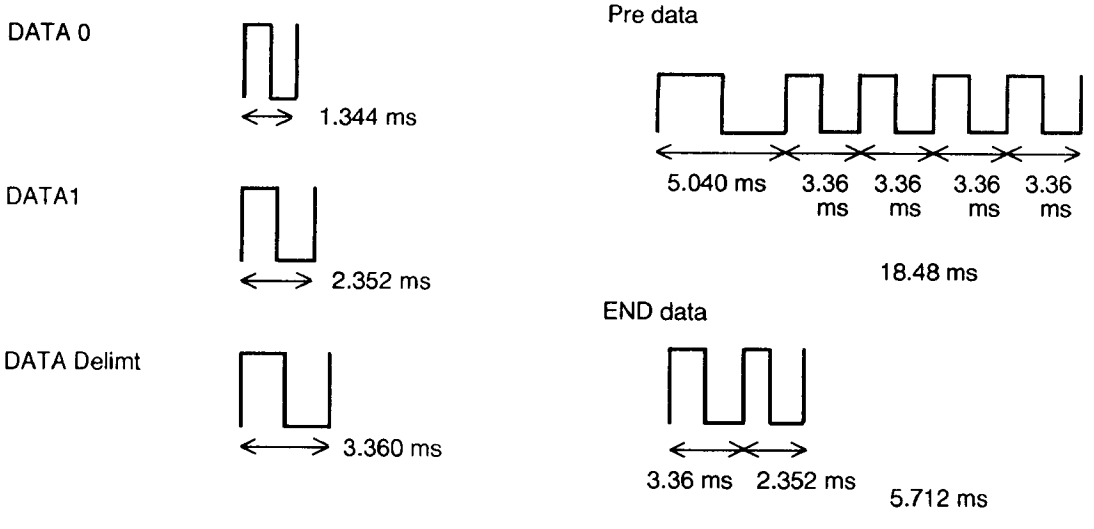
PORTABLE HANDSET

Transmitting DATA Format

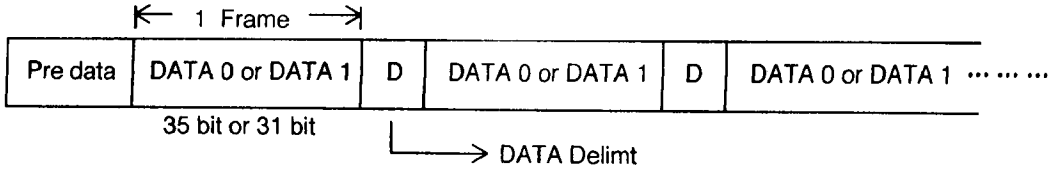


BASE UNIT

Transmitting DATA Format

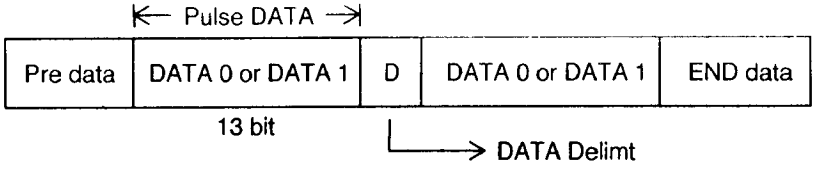


(6) When linking



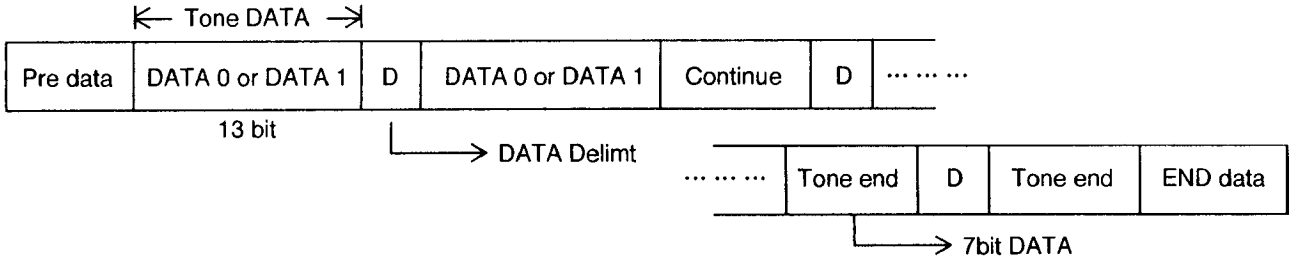
When LINKing from the Portable Handset (when becoming STBY to TALK), DATA is transmitted in above format. The combined portion of DATA 0 and DATA 1 is transmitted in LINK requesting DATA (35bit) format first. Then, when LINK OK (ACK-OK) DATA (19bit) is returned from the Base Unit, it is sent as LINK from DATA after changing the combination of DATA 0 and DATA 1. And the DATA Delimt is between each Frame as a stop.
The contents of LINK requesting DATA and LINK form DATA are different depending on each operation.

(7) Pulse Dial



When executing Pulse Dial,the Pulse Dial DATA is transmitted from the Portable Handset to the Base Unit in above format. The combination of DATA 0 and DATA 1 are changed by each Dial No. And the DATA Delimt is between each Frame as a stop. The number of Frame is 2.

(8) Tone Dial



When executing Tone Dial, Tone Dial DATA is transmitted from the Portable Handset to the Base Unit in above format. The DATA is changed by Dial No. as same as Pulse Dial. When Tone Dialing, DATA (Continue DATA) that the key is pressed continuously is sent to the Base Unit during the key is pressed. When depressing the key, the TONE Dial exterminating DATA (Tone end DATA) is send, and the END data is sent finally.

NOTE

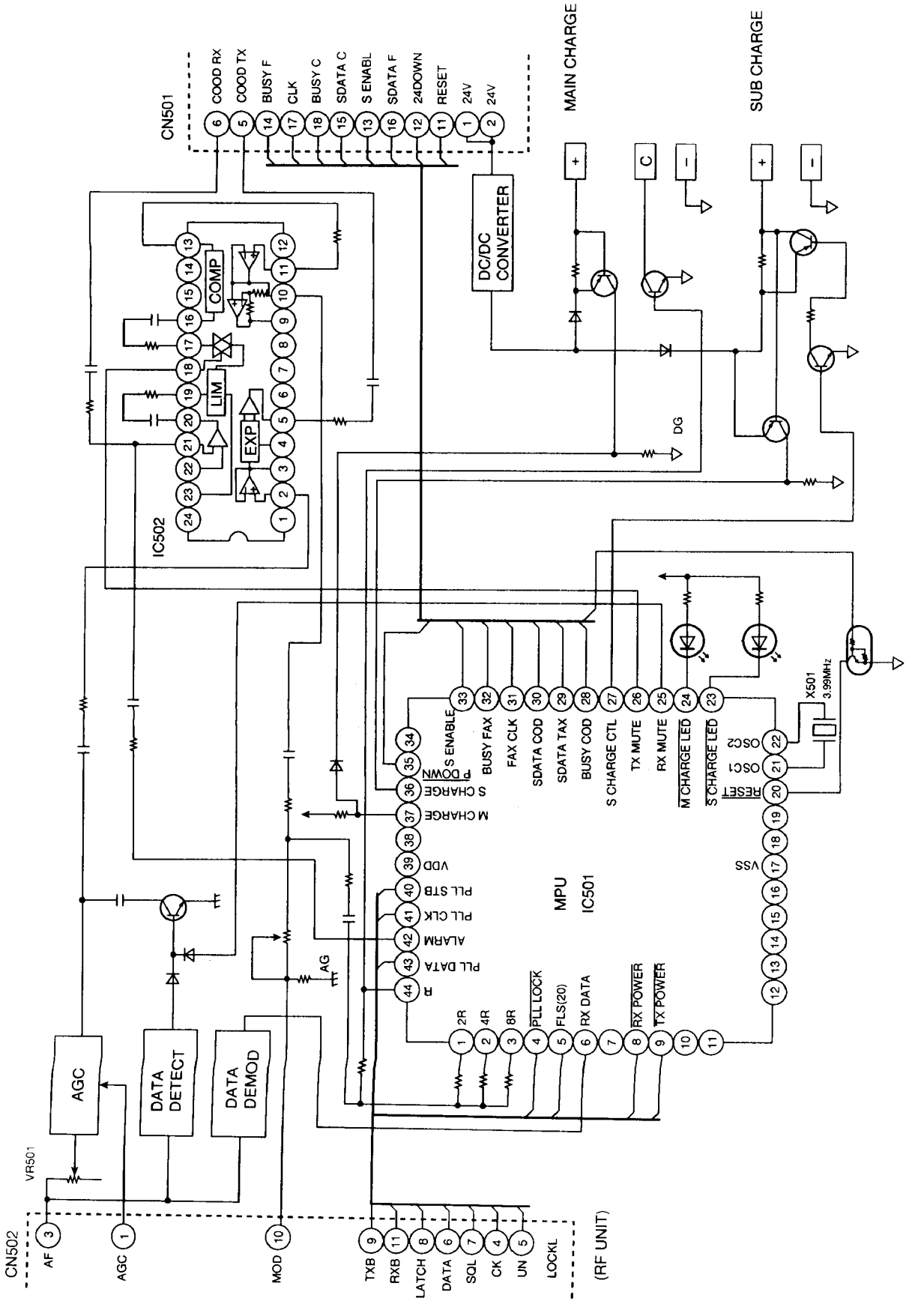
1,000,000 kinds of the security code are available for the model KX-F900. Each time the portable handset is set on the cradle of the base unit (for charging), the CPU automatically change the security code.

13-2. FREQUENCY TABLE (MHz)

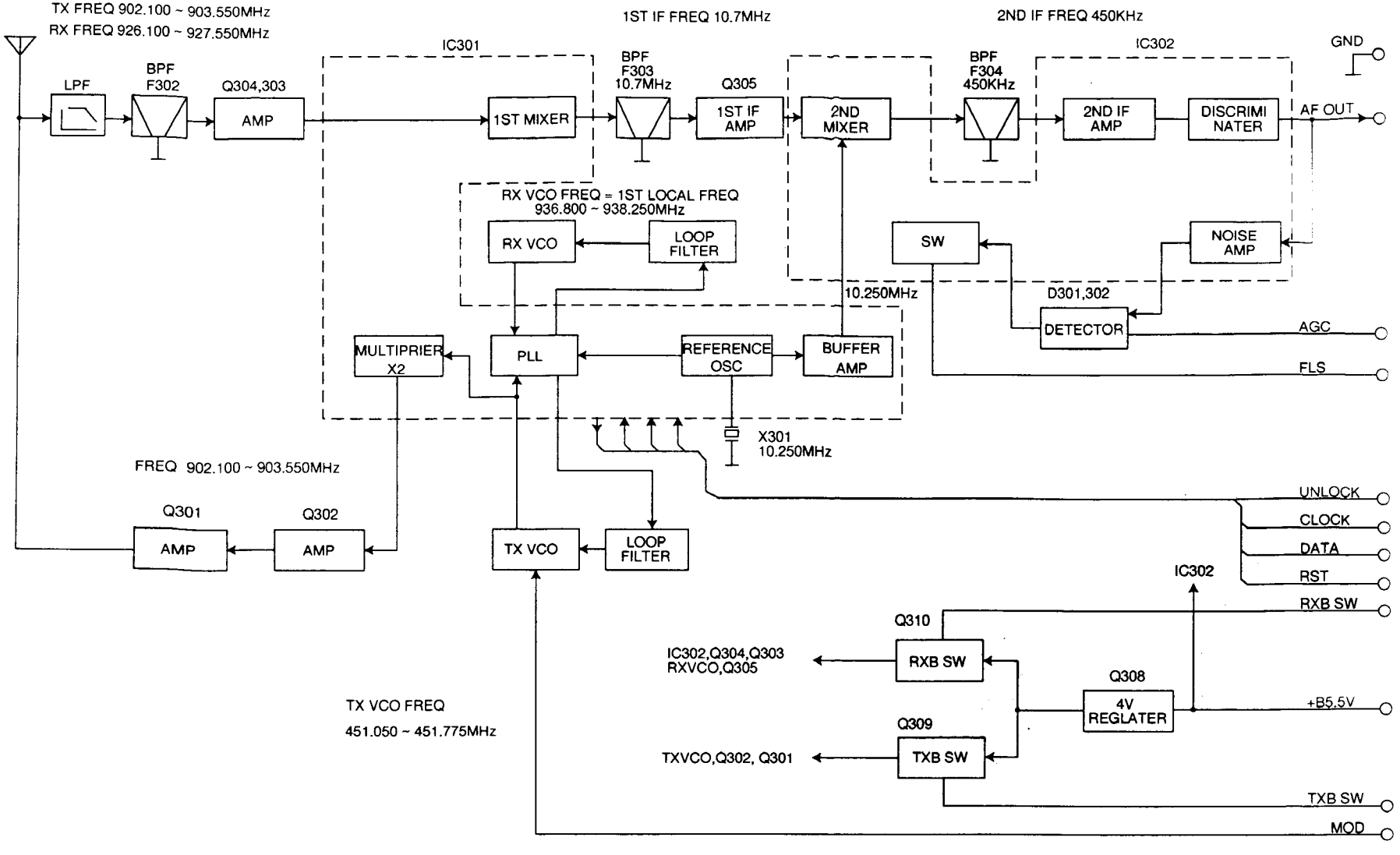
CH	Base Unit TX Portable Handset RX	Base Unit RX Portable Handset TX	CH	Base Unit TX Portable Handset RX	Base Unit RX Portable Handset TX
1	902.100 MHz	926.100 MHz	16	902.850 MHz	926.850 MHz
2	902.150 MHz	926.150 MHz	17	902.900 MHz	926.900 MHz
3	902.200 MHz	926.200 MHz	18	902.950 MHz	926.950 MHz
4	902.250 MHz	926.250 MHz	19	903.000 MHz	927.000 MHz
5	902.300 MHz	926.300 MHz	20	903.050 MHz	927.050 MHz
6	902.350 MHz	926.350 MHz	21	903.100 MHz	927.100 MHz
7	902.400 MHz	926.400 MHz	22	903.150 MHz	927.150 MHz
8	902.450 MHz	926.450 MHz	23	903.200 MHz	927.200 MHz
9	902.500 MHz	926.500 MHz	24	903.250 MHz	927.250 MHz
10	902.550 MHz	926.550 MHz	25	903.300 MHz	927.300 MHz
11	902.600 MHz	926.600 MHz	26	903.350 MHz	927.350 MHz
12	902.650 MHz	926.650 MHz	27	903.400 MHz	927.400 MHz
13	902.700 MHz	926.700 MHz	28	903.450 MHz	927.450 MHz
14	902.750 MHz	926.750 MHz	29	903.500 MHz	927.500 MHz
15	902.800 MHz	926.800 MHz	30	903.550 MHz	927.550 MHz

13-3. BLOCK DIDAGRAM OF CORDLESS BASE UNIT

(Main P.C.BOARD)



CIRCUIT OPERATION

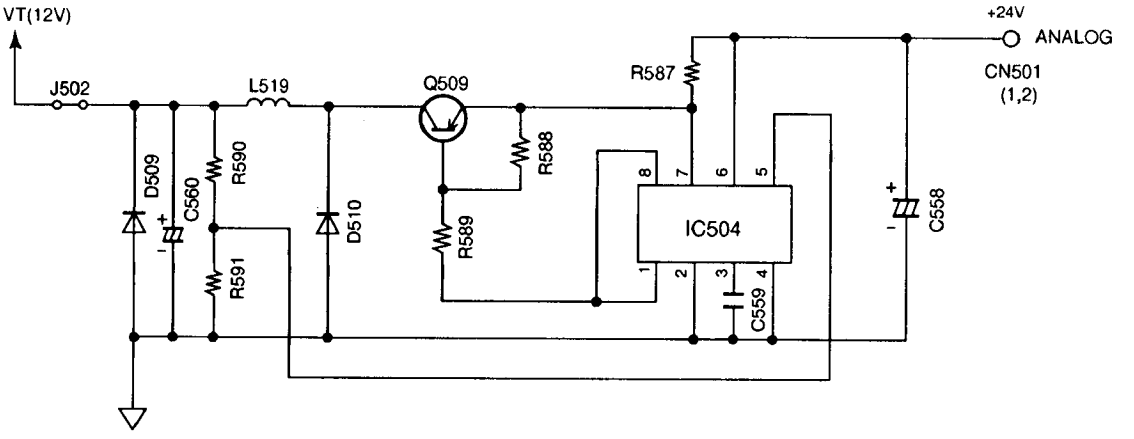

TX FREQ 902.100 ~ 903.550MHz
RX FREQ 926.100 ~ 927.550MHz
1ST IF FREQ 10.7MHz
2ND IF FREQ 450KHz
IC301
IC302
GND
LPF
BPF F302
Q304,303
AMP
1ST MIXER
BPF F303 10.7MHz
Q305
1ST IF AMP
2ND MIXER
BPF F304 450KHz
2ND IF AMP
DISCRIMI NATER
AF OUT
RX VCO FREQ = 1ST LOCAL FREQ
936.800 ~ 938.250MHz
RX VCO
LOOP FILTER
SW
NOISE AMP
10.250MHz
D301,302
DETECTOR
AGC
FLS
MULTIPRIER X2
PLL
REFERENCE OSC
BUFFER AMP
X301
10.250MHz
FREQ 902.100 ~ 903.550MHz
Q301
Q302
AMP
AMP
TX VCO
LOOP FILTER
UNLOCK
CLOCK
DATA
RST
IC302
RXB SW
Q310
IC302,Q304,Q303
RXVCO,Q305
RXB SW
Q308
4V REGLATER
+B5.5V
TX VCO FREQ
451.050 ~ 451.775MHz
Q309
TXVCO,Q302, Q301
TXB SW
TXB SW
MOD

13-4. CIRCUIT OPERATION OF CORDLESS BASE UNIT

(1) Power Circuit (charging circuit power supply)

Pins 1 and 8 are switched in the clock period which is determined by capacitor C559 connected to pin 3 of the switching regulator IC (IC504). The switching output turns Q509 ON or OFF and reduces the 24V voltage to 12V. Pin 5 of IC504 is the feedback input pin whose input signal is used to stabilize the output voltage.

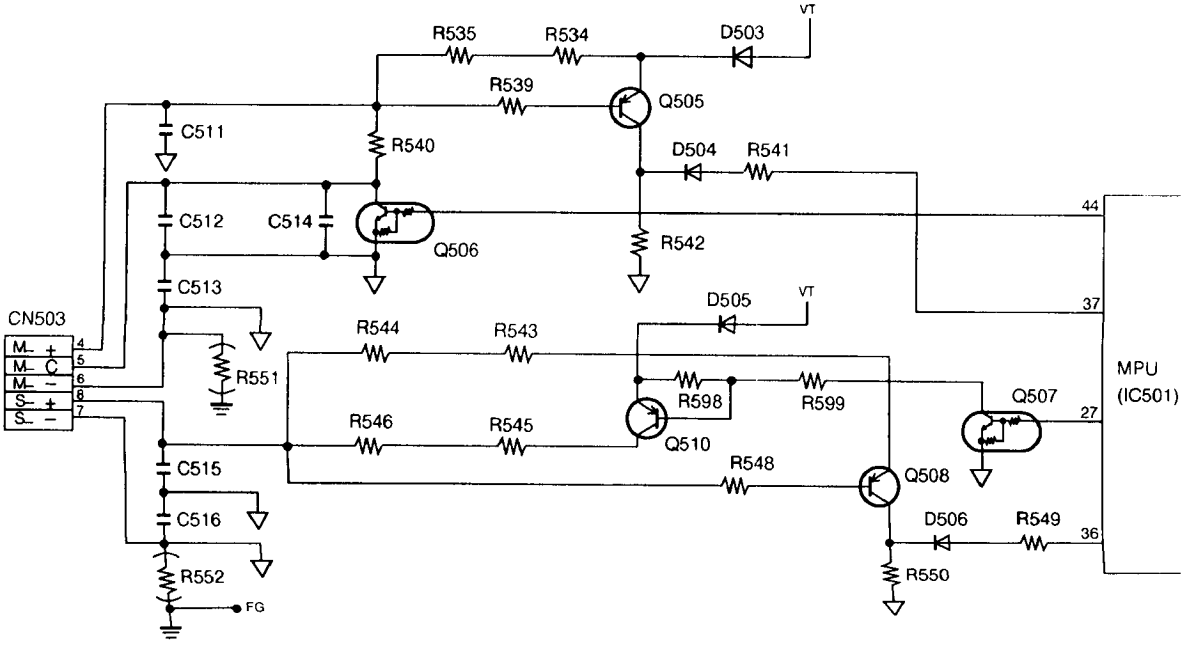
Circuit Diagram



(2) Charge Circuit

When the portable handset is places on the charging stand, Q505 is turned ON, and the charging information is supplied to MPU pin 37 as a logical high signal. When the charging information is supplied to the MPU, the MPU sends the ID signal from pin 44. This ID signal switches Q506, and it is supplied to the portable handset via the charging pin of Q506. In the same way, when the spare battery is inserted into the charging stand, Q508, is turned ON, and the charging information is supplied to MPU pin 36. When both the portable handset and spare battery are to be charged, the MPU outputs a logical low signal from pin 27 which turns Q507 OFF and also turns Q510 OFF, thereby limiting the charging current to the spare battery. When only the spare battery is to be charged, the MPU outputs a logical high signal from pin 27 which turns Q507 and Q510 ON so that the charging current is increased.

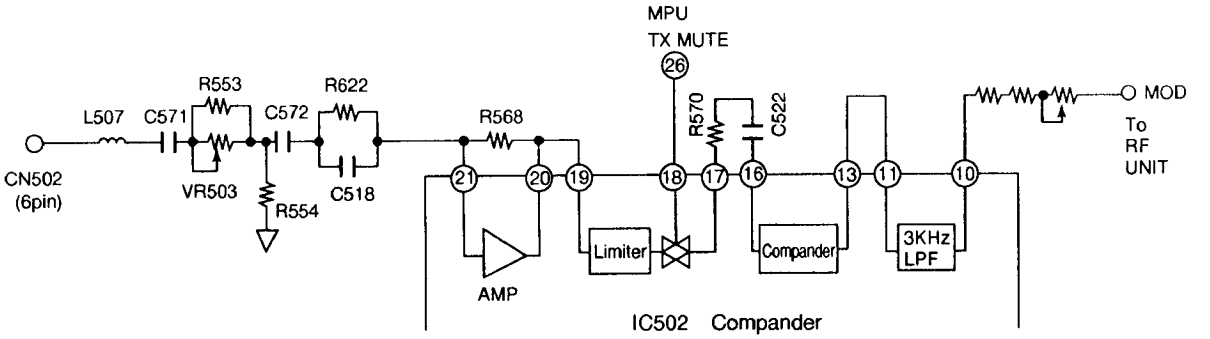
Circuit Diagram



(3) Line Receiving Signal

The signal supplied from the line is input from pin 6 of CN501 through the analog board, and ti is output from pin 10 of the RF unit via IC502 pins 21, 20, 19, 17, 16, 13, 11 and 10 in this order.

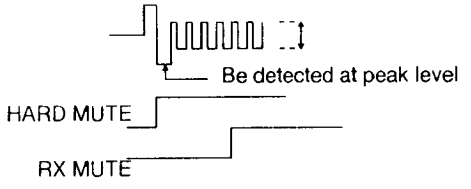
Circuit Diagram



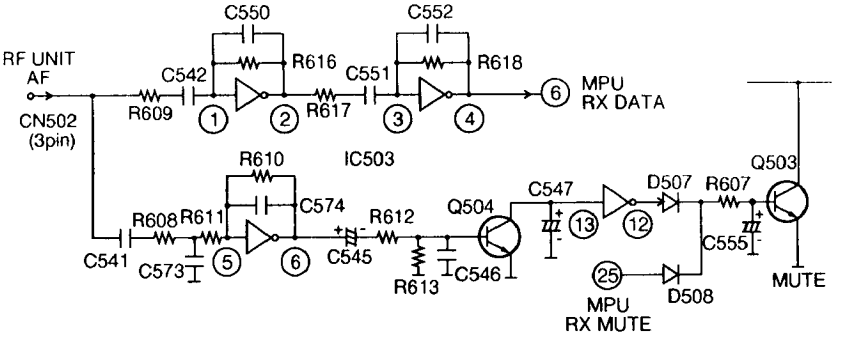
(4) RX Data Circuit/Hard Mute Circuit

The AF signal output from the RF unit is filtered and amplified by a filter amplifier with a 500 Hz cutoff connected to pins 1 through 4 of IC503. The resulting demodulated data waveform is then input to RX DATA pin 6 of the MPU.
If there is data from the portable handset during talk operation, the portable handset data is as shown below to prevent the data from leaking onto the line. Hardware muting is applied as the leading edge of the data as soon as the data arrives. After this, muting is applied by the MPU.

Timing Chart



Circuit Diagram



(5) ID Code Setting

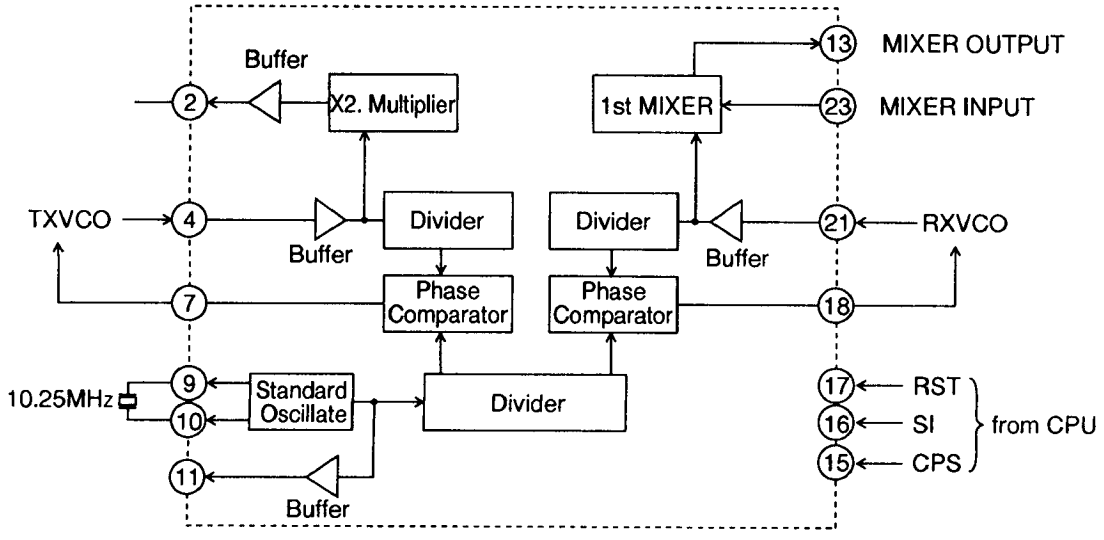
When the portable handset is placed on the cordless base unit, the charge detector operates and ID data is output from pin 44 of the MPU. After passing through data amplifier Q506 and the charge terminal, the data is sent to the portable handset.

13-5. CIRCUIT OPERATION OF RF UNIT

(1) PLL Circuit

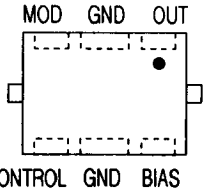
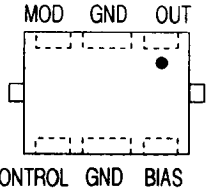
The PLL IC comprises two PLL blocks, one for transmission and one for reception, a transmission multiplier circuit, and a reception first mixer circuit.
The 900 MHz band frequency from the RX VCO, the 450 MHz band frequency from the TX VCO, and the 10.25 MHz reference oscillator frequency are frequency divided by a frequency divider controlled by the CPU to create the 12.5 kHz comparison frequency. The phase comparator determines the phase difference between the TX and RX frequencies and the reference frequency, and supplies a control voltage via pin 7 or pin 18 to the appropriate VCOs so that the desired TX and RX frequencies are maintained.
The output from the TX VCO is multiplied by 2 internally by the IC, resulting in a 900 MHz band signal that is then output to pin 2. Also, the RX VCO signal is supplied to the first mixer built into the IC.

Circuit Diagram



(2) TX VCO, RX VCO

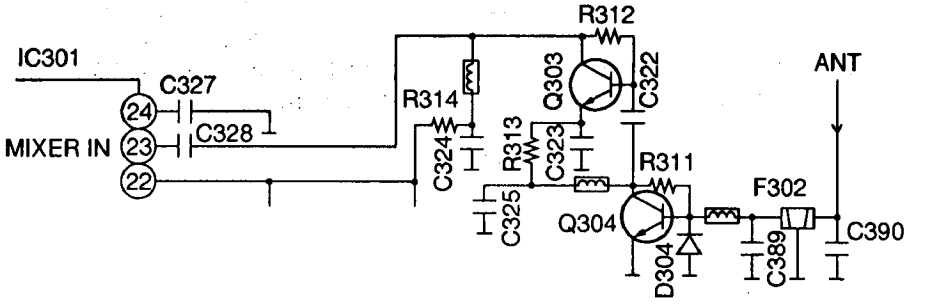
TX VCO and RX VCO are module as shown below table.

	TX VCO	RX VCO
Pin Layout	 Shield Case side View	 Shield Case side View
Oscillator Frequency	Portable Handset 463.05~463.775MHZ Base Unit 451.05~451.775MHZ	Portable Handset 891.4~892.85MHZ Base Unit 936.8~938.25MHZ
Output Level	-6dB ±2dB	
Control Voltage	0.5~2.5VDC	

(3) Receiver RF Circuit ( ): Portable Handset

The electric wave received from the antenna ia attenuated by the SAW filter F302 (F402) except the received frequency band Then it is amplifier Q304 (Q404) and Q303 (Q403), and supplied to the IC301 (IC401) pin 23 (MIXER input).

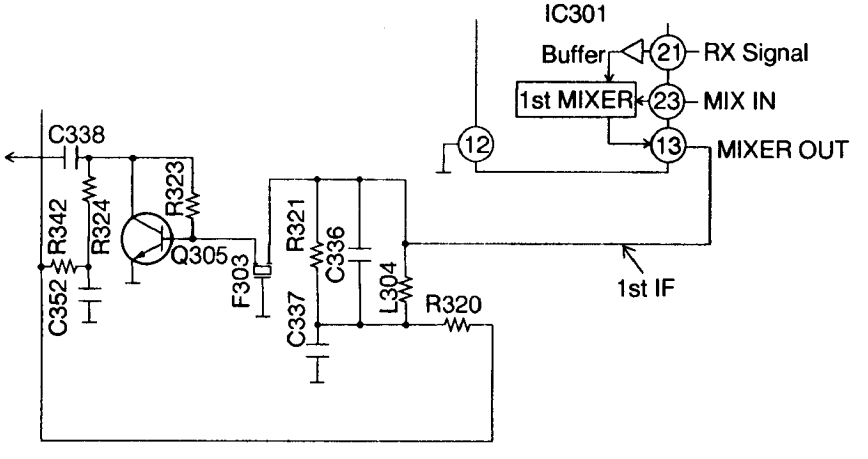
Circuit Diagram



(4) MIXER IF Circuit ( ): Portable Handset

The reception frequency band signal supplied to the pin 23 MIXER input of IC301 (IC401) is converted into a 10.7 MHz first IF signal by the mixer circuit, using the reception local signal. The result is then output to pin 13 MIXO. The resonator circuit consisting of L304, C336 (L404, C436) resonates at 10.7 MHz. The 10.7 MHz IF signal is filtered by ceramic filter F303 (F403) and then supplied to IF amplifier Q305 (Q405).

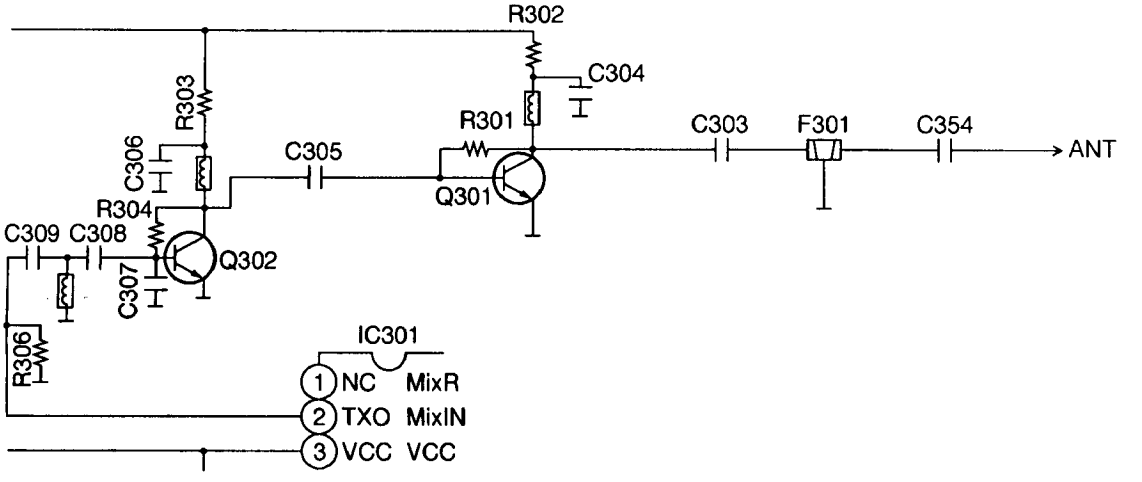
Circuit Diagram



(5) TX Power Circuit ( ): Portable Handset

After being multiplied by 2 inside IC301 (IC401) to make it a 900 MHz band frequency, the transmission signal is amplified by Q301 and Q302 (Q401 and Q402) and frequency elements outside of the transmission frequency are attenuated by dielectric filter F301 (F401). The signal then passes through a transmission-reception matching circuit and supplied to the antenna terminal.

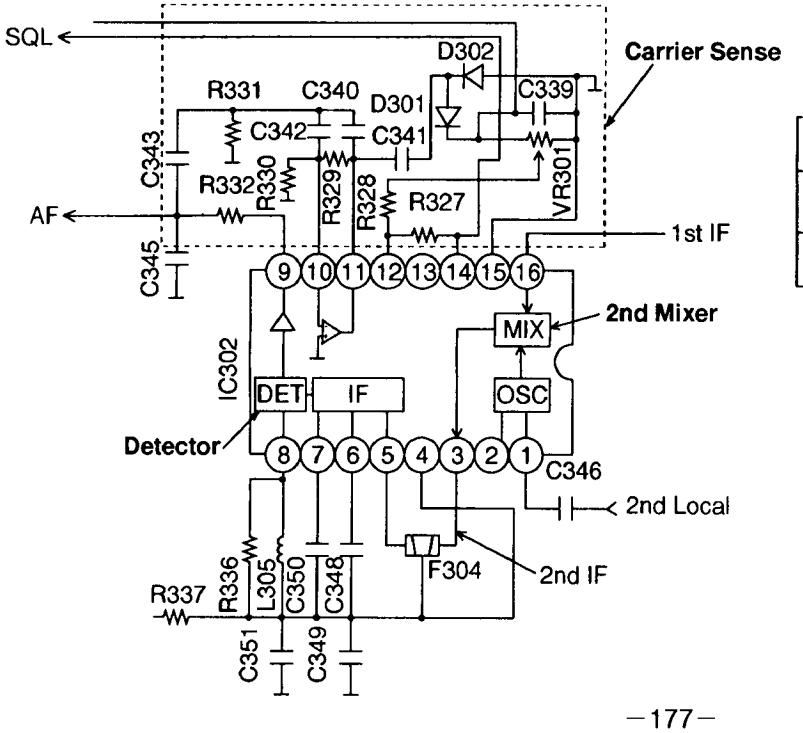
Circuit Diagram



(6) Second Mixer, Detector, Carrier Sense Circuit ( ): Portable Handset

The 10.7 MHz IF signal from Q305 (Q405) passes through pin 16 of IC302 (IC402) and is input to the second mixer built into the IC. The reference oscillator frequency from IC301 (IC401) is used as the second local signal. After being converted into a 450 kHz second IF by the second mixer, the signal is wave detected and output to pin 9 as a low-frequency signal. This signal is output as the AF output signal and, at the same time, used for electric field determination. The FM noise is filtered by a 10 kHz BPF comprising pins 10 and 11 and then amplified. Then it is rectified by D301 (D401) and D302 (D402), and input to the switching block consisting of pins 12 through 14.

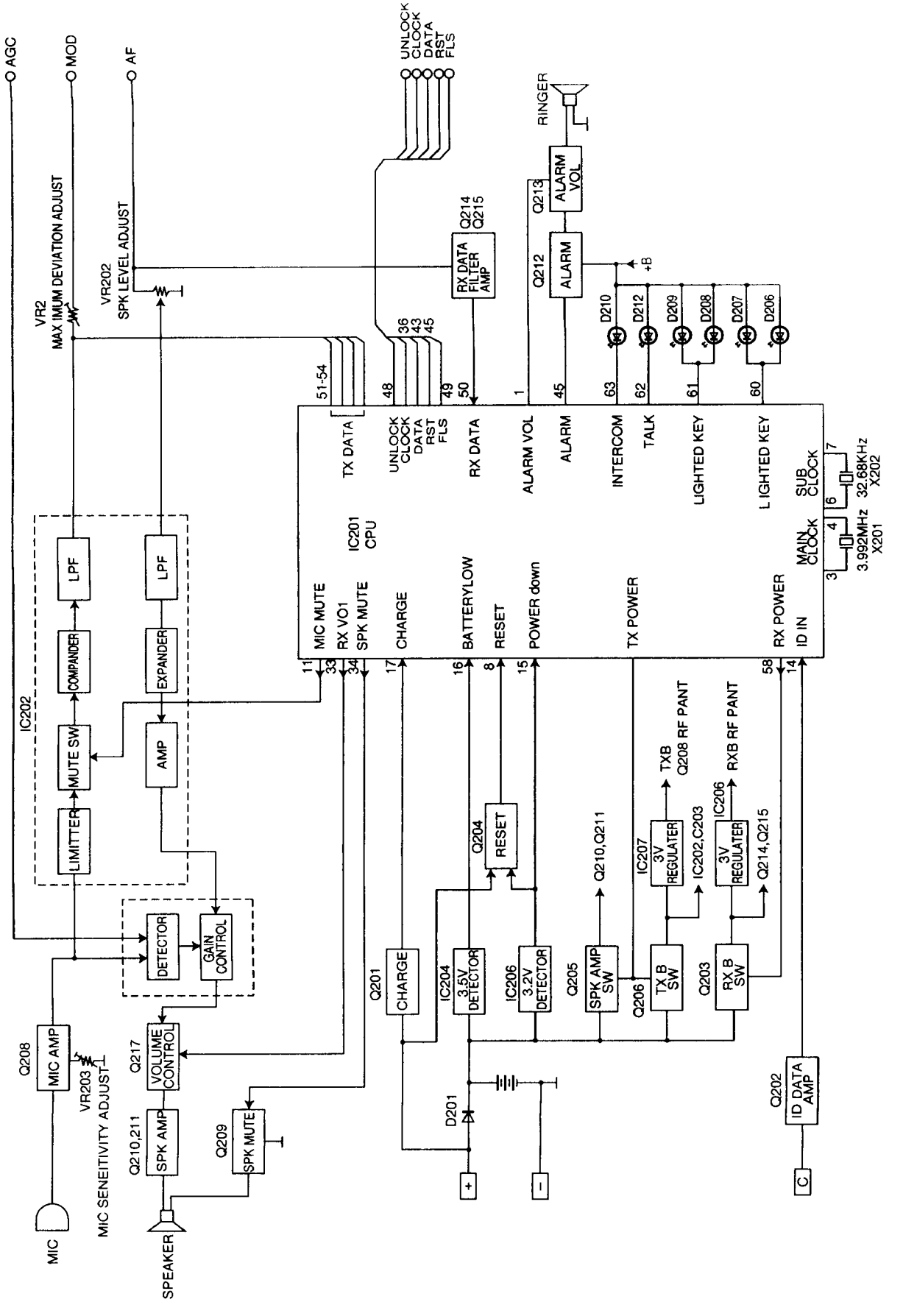
Circuit Diagram

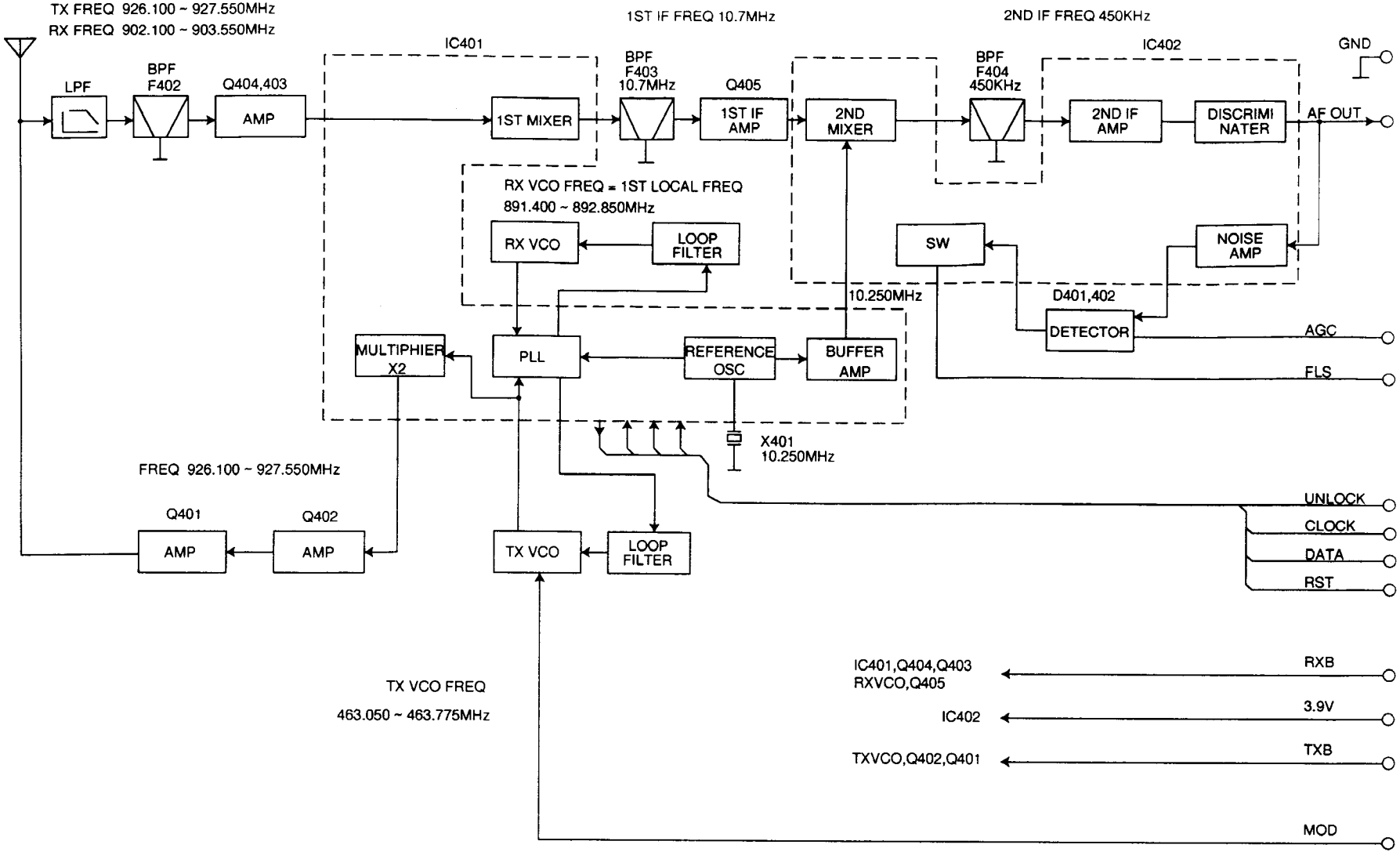


	14 Pin
Enable to Electric Field	"L"
Disable to Electric Field	"H"

13-6. BLOCK DIAGRAM OF PORTABLE HANDSET

(Control Bolck)



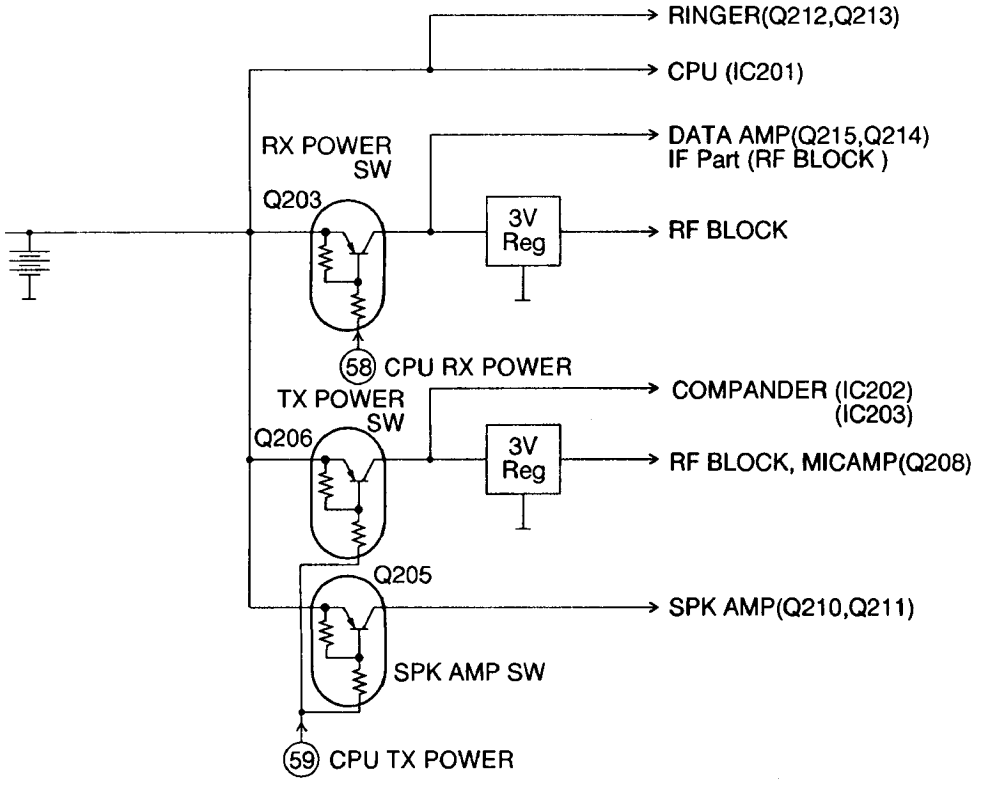

TX FREQ 926.100 ~ 927.550MHz
RX FREQ 902.100 ~ 903.550MHz
1ST IF FREQ 10.7MHz
2ND IF FREQ 450KHz
IC401
IC402
GND
LPF
BPF F402
Q404,403
AMP
1ST MIXER
BPF F403 10.7MHz
Q405
1ST IF AMP
2ND MIXER
BPF F404 450KHz
2ND IF AMP
DISCRIMI NATER
AF OUT
RX VCO FREQ = 1ST LOCAL FREQ
891.400 ~ 892.850MHz
RX VCO
LOOP FILTER
SW
NOISE AMP
10.250MHz
D401,402
DETECTOR
AGC
FLS
MULTIPHIER X2
PLL
REFERENCE OSC
BUFFER AMP
X401
10.250MHz
FREQ 926.100 ~ 927.550MHz
Q401
Q402
AMP
AMP
TX VCO
LOOP FILTER
UNLOCK
CLOCK
DATA
RST
TX VCO FREQ
463.050 ~ 463.775MHz
IC401,Q404,Q403
RXVCO,Q405
RXB
IC402
3.9V
TXVCO,Q402,Q401
TXB
MOD

13-7. CIRCUIT OPERATION OF PORTABLE HANDSET

(1) Power Supply Ciurcuit

As indicated in Fig.40, voltage is supplied separately to each block. In order to ensure that the RF block in particular has a stable fixed-voltage power supply, the RF block is equipped with a dedicated stabilized power supply. In the standby mode, pin 58 drops at set intervals from high to low level, resulting in an intermittent reception signal. In the talk mode, pins 59 and 58are low level and power is supplied to all the circuitry.

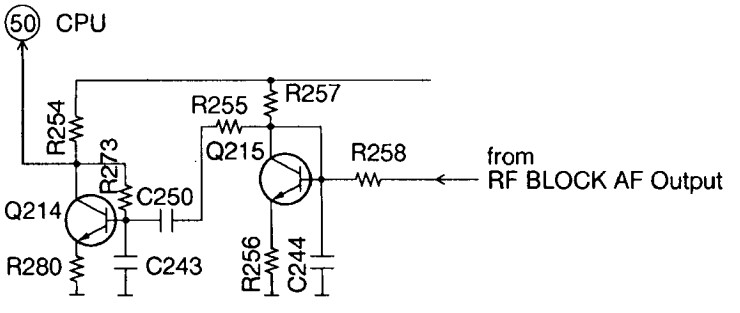
Circuit Diagram



(2) Data Reception Circuit

The wave detection signal from the RF block has high frequency elements eliminated by a CR filter consisting of R258 and C244. Then it is amplified by Q215 and, once again, high frequency elements are eliminated by R255 and C243. After this, the signal is amplified by Q214 and input to pin 50 of the CPU. (The cutoff frequency is 500 Hz.) The data output waveform is a block pulse. To inhibit block pulse noise, the gain of the amplifier is limited and modulation is clipped at 3 kHz.

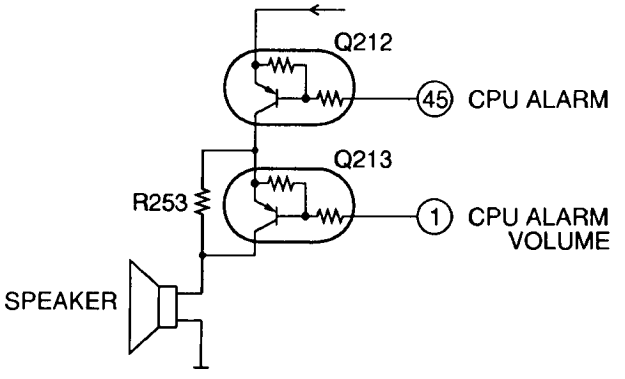
Circuit Diagram



(3) Ringer Circuit

If the ringer volume is set to low and the key is entered occurs, an alarm tone is output from pin 45 of the CPU and input to Q212. This causes Q213 to turn off and results in a softer beep tone.
If the ringer volume is set to high, Q213 turns on and results in a louder beep tone.

Circuit Diagram

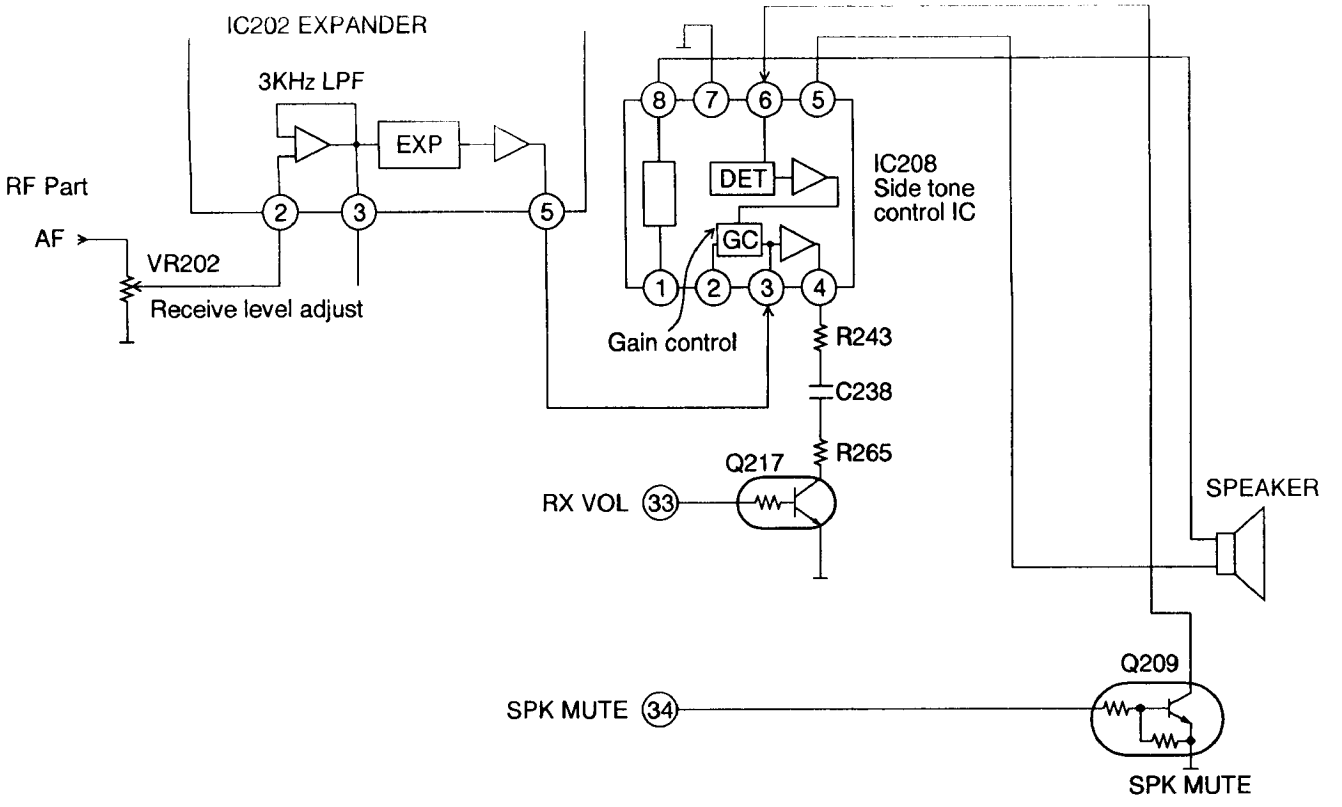


(4) Reception Signal Circuit

The receiver circuit comprises expander IC202, side tone control IC IC208, and a speaker amplifier.
After being adjusted to the appropriate level by VR202, the signal passes through a 3 kHz LPF and an expander built into IC202. It is then input to side tone IC IC208. The side tone IC is connected to the microphone amplifier. If a large input is input to the microphone, the gain control built into IC208 lowers the gain to reduce the output of the speaker amplifier. If there is no large input being input to the microphone, the amplifier in IC208 is set to standard gain. Consequently, the sound of the received audio signal becomes fainter when the user is talking in a loud voice and the side tone level is lowered. When the user talks more softly, the received audio signal is audible at the standard level.
Also, in addition to the input from the microphone, the ACG signal from the RF block is input to the side tone IC. When the base unit and portable handset are separated from each other, causing the signal to become weaker, the DC voltage rises and this voltage is input to pin 5 of IC208. When the DC voltage input to pin 5 rises, the gain control built into IC208 lowers the gain. Consequently, the reception level is lowered when the reception signal is weak and there is more noise. This prevents the noise from becoming too noticeable.
The reception signal passes through receiver volume selector switch Q217, and then drives the receiver speaker.

RX VOL	H	:	LOW LEVEL
	L	:	HIGH LEVEL
SPK MUTE	H	:	SPEAKER ON
	L	:	SPEAKER OFF

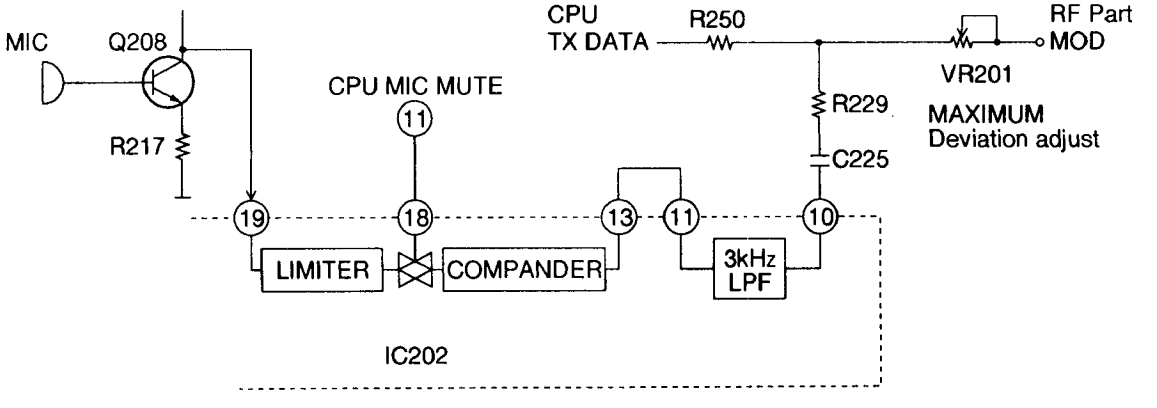
Circuit Diagram



(5) Sending Signal

The audio signal from the microphone is amplified by Q208 and then passes through a limiter, mute circuit, compander, and 3 kHz LPF built into IC202. It is then mixed with the TX DATA signal from the CPU, the maximum modulation is adjusted by VR201, and input to the modulator in the RF block.

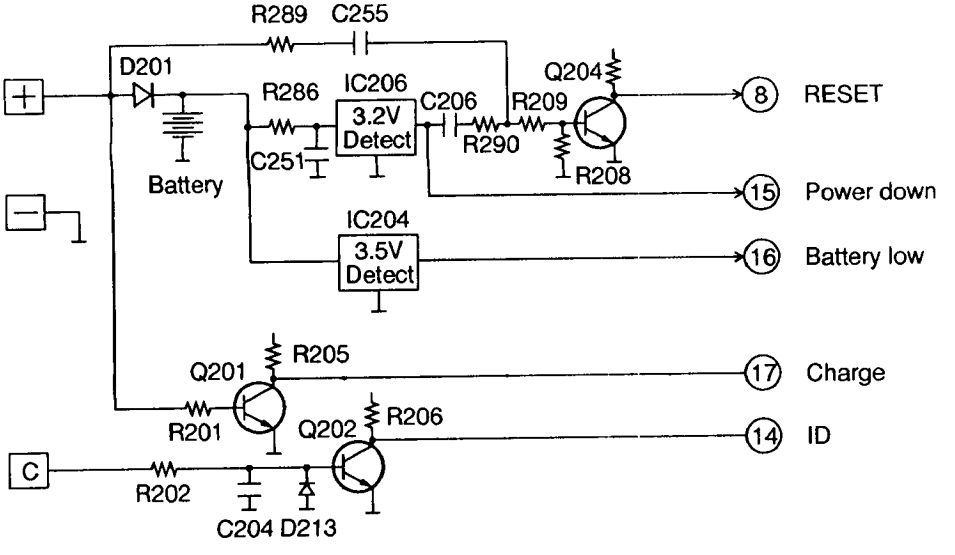
Circuit Diagram



(6) Reset/Power Down/Battery Low/ID

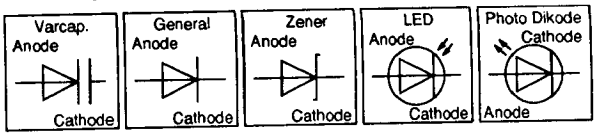
When the battery is installed in the portable handset, the reset circuit consisting of R289, C255, and Q204 functions, inputting a reset signal to the CPU. This ensures that the unit will operate normally without the user's needing to switch the power off and on. When the voltage from the batteries drops to 3.5 V, 3.5 V voltage detector IC204 operates and inputs a battery low signal to the CPU. This causes the battery low LED to flash on and off. If voltage continues to drop and reaches 3.2 V, 3.2 V voltage detector IC206 operates and outputs a power down signal to the CPU. This causes power to be cut off automatically and prevents the battery from over discharging. Q201 is a charge detector that informs the CPU whether or not the portable handset is currently being charged. During charging, ID data is sent from the base unit. Q202 receives this ID data and sends it to the CPU.

Circuit Diagram



■ FOR SCHEMATIC DIAGRAM

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.

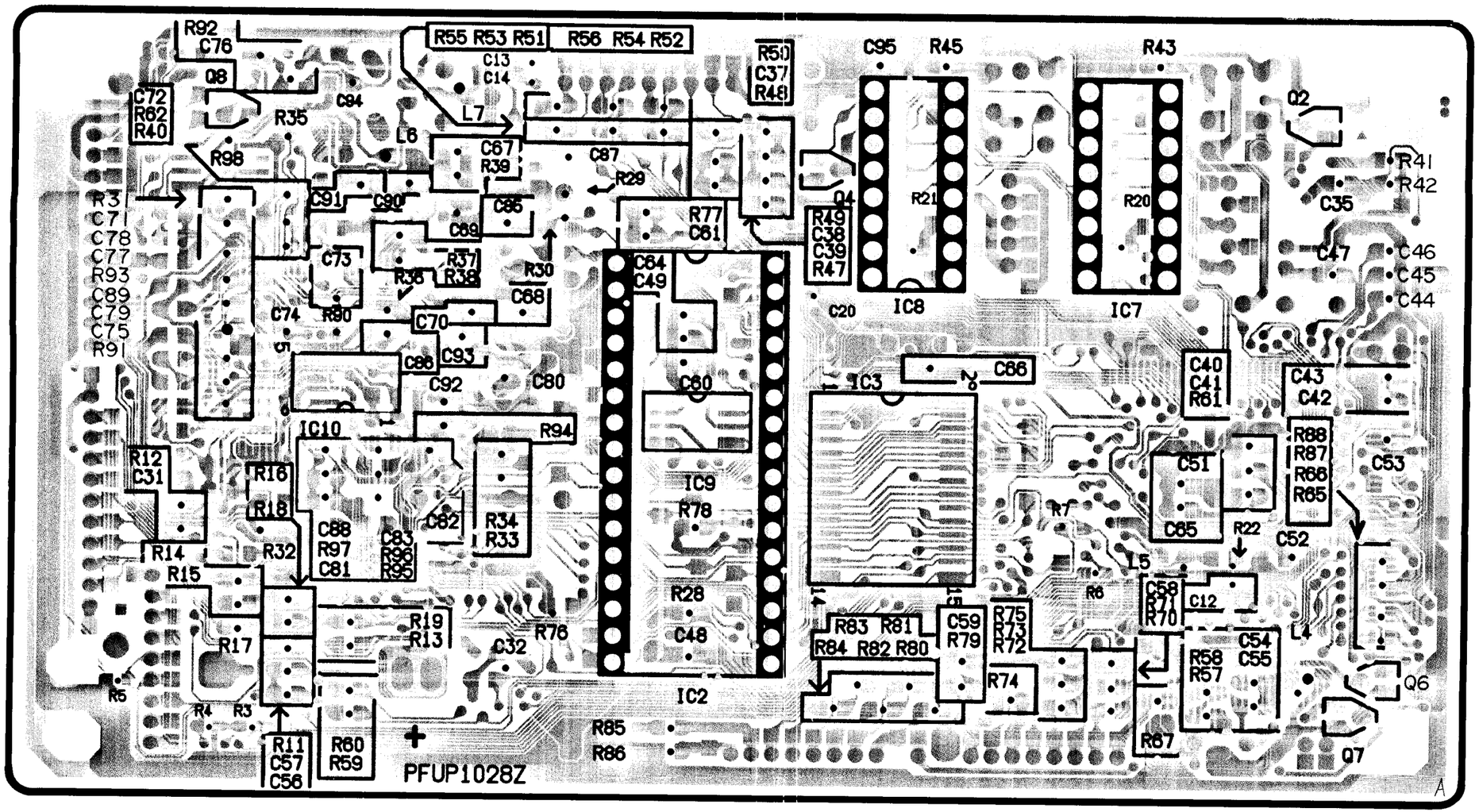


Important safety notice

The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards.
When servicing, it is essential that only manufacturer's specified parts can be used for the critical components in the shaded areas of the schematic.

PRINTED CIRCUIT BOARD (DIGITAL BOARD)

(Bottom View)



Note:

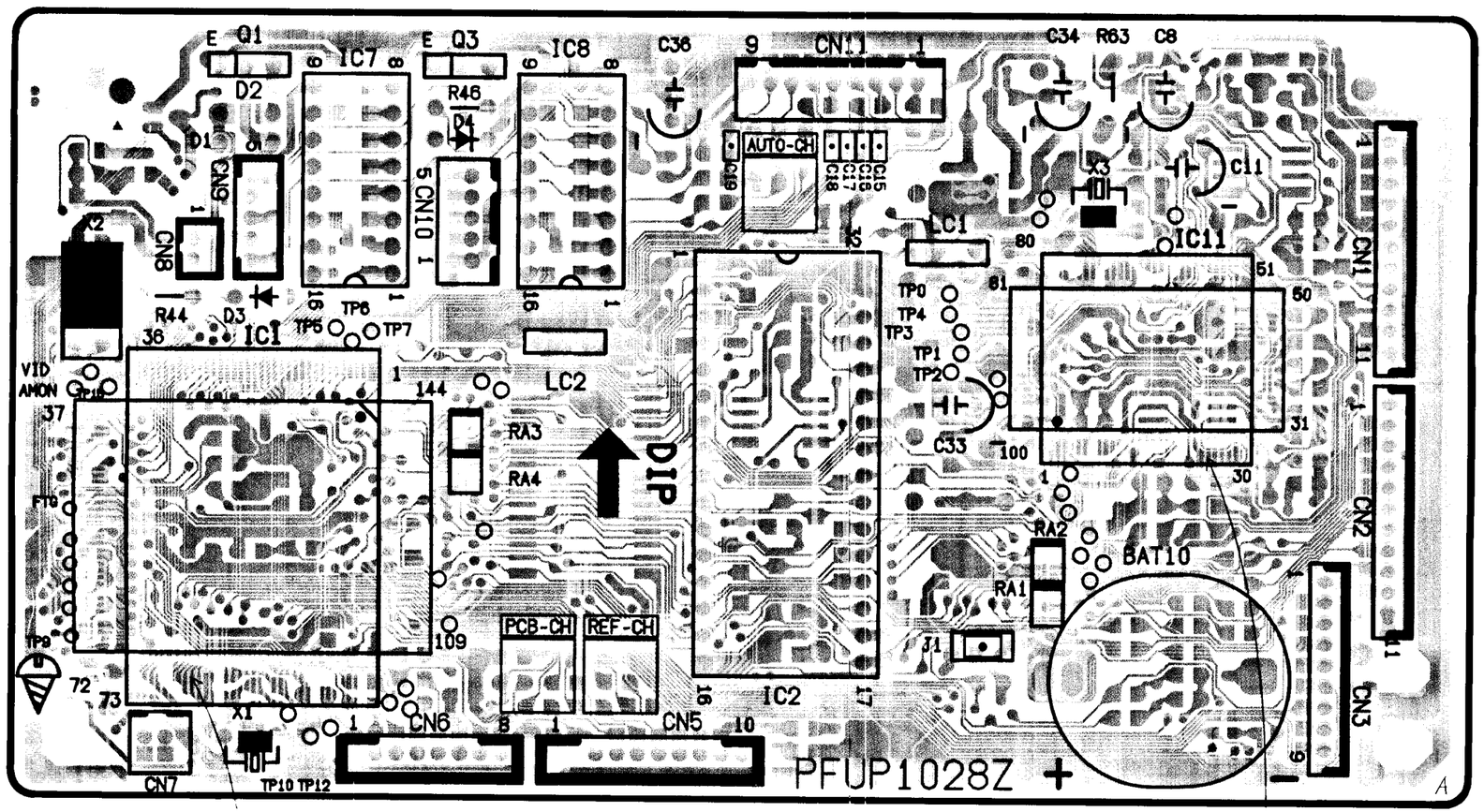
1. This circuit shown in [ ] on the conductor indicates printed circuit on the back side of the printed circuit board.

Note:

1. This circuit shown in [ ] on the conductor indicates printed circuit on the front side of the printed circuit board.

PRINTED CIRCUIT BOARD (DIGITAL BOARD)

(Component View)



Pin No.	Waveform
93	24MHz

Pin No.	Waveform
69	49.92MHz

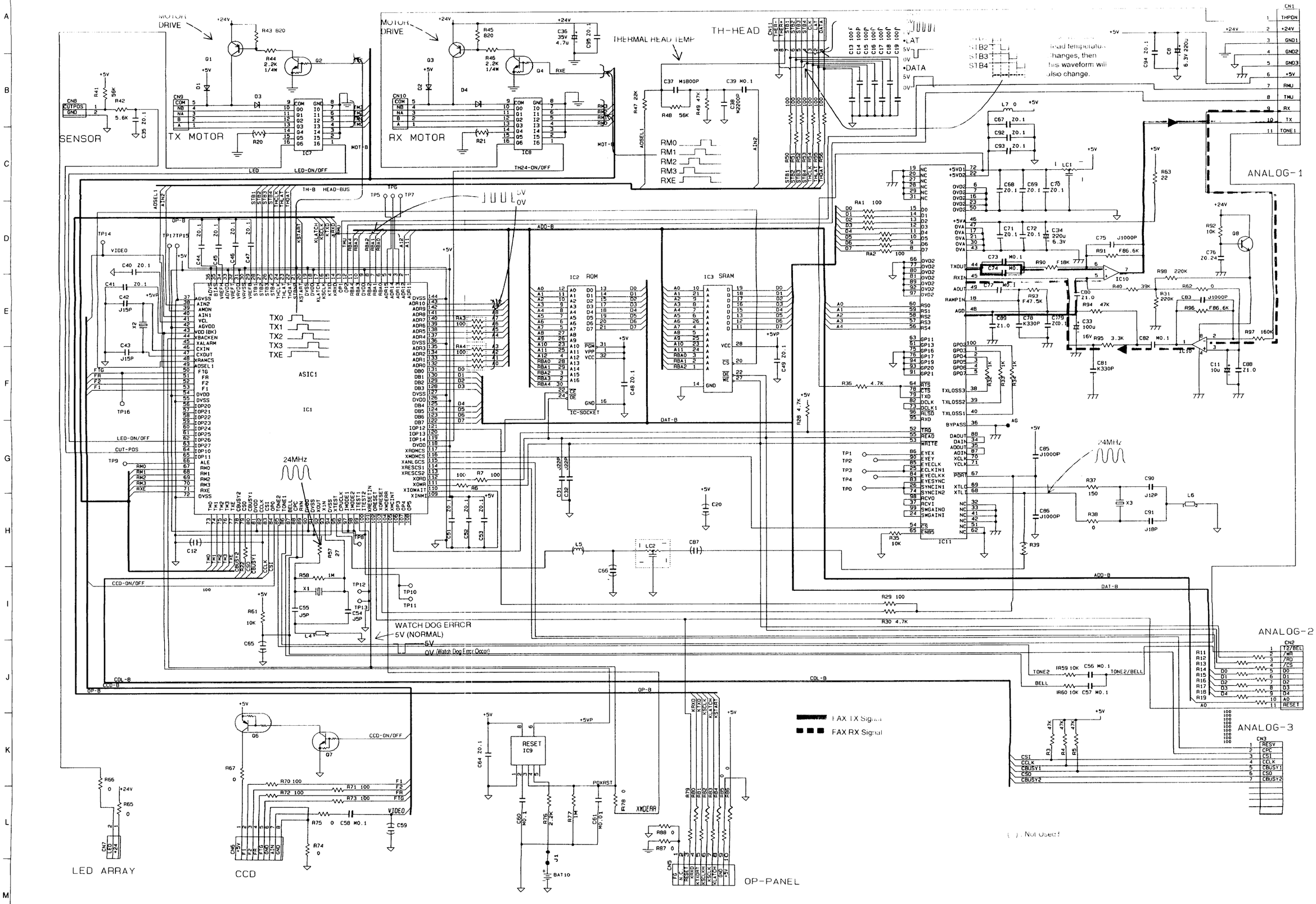
Note:

1. This circuit shown in [ ] on the conductor indicates printed circuit on the back side of the printed circuit board.

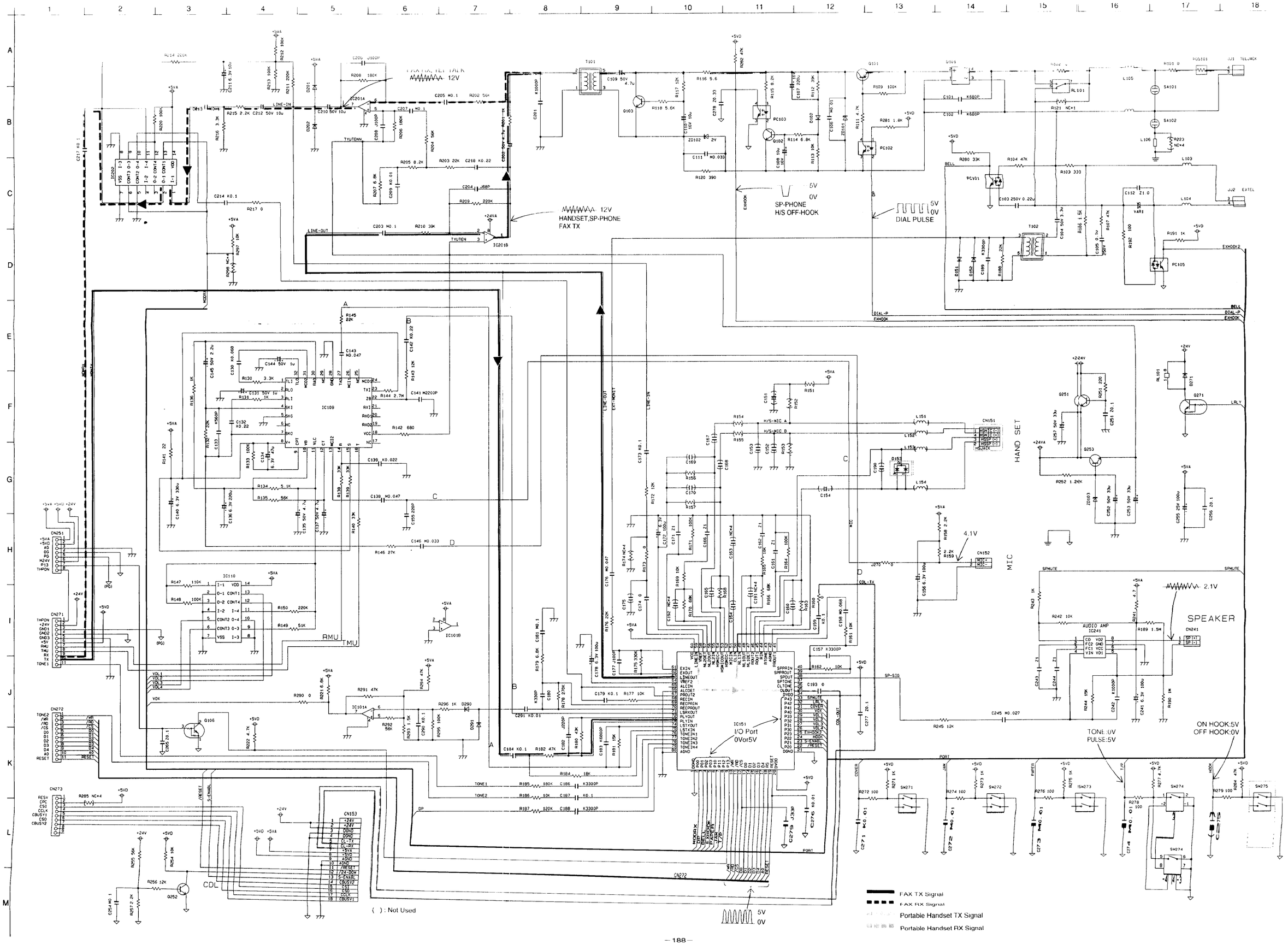
Note:

1. This circuit shown in [ ] on the conductor indicates printed circuit on the front side of the printed circuit board.

SCHEMATIC DIAGRAM (DIGITAL CIRCUIT)

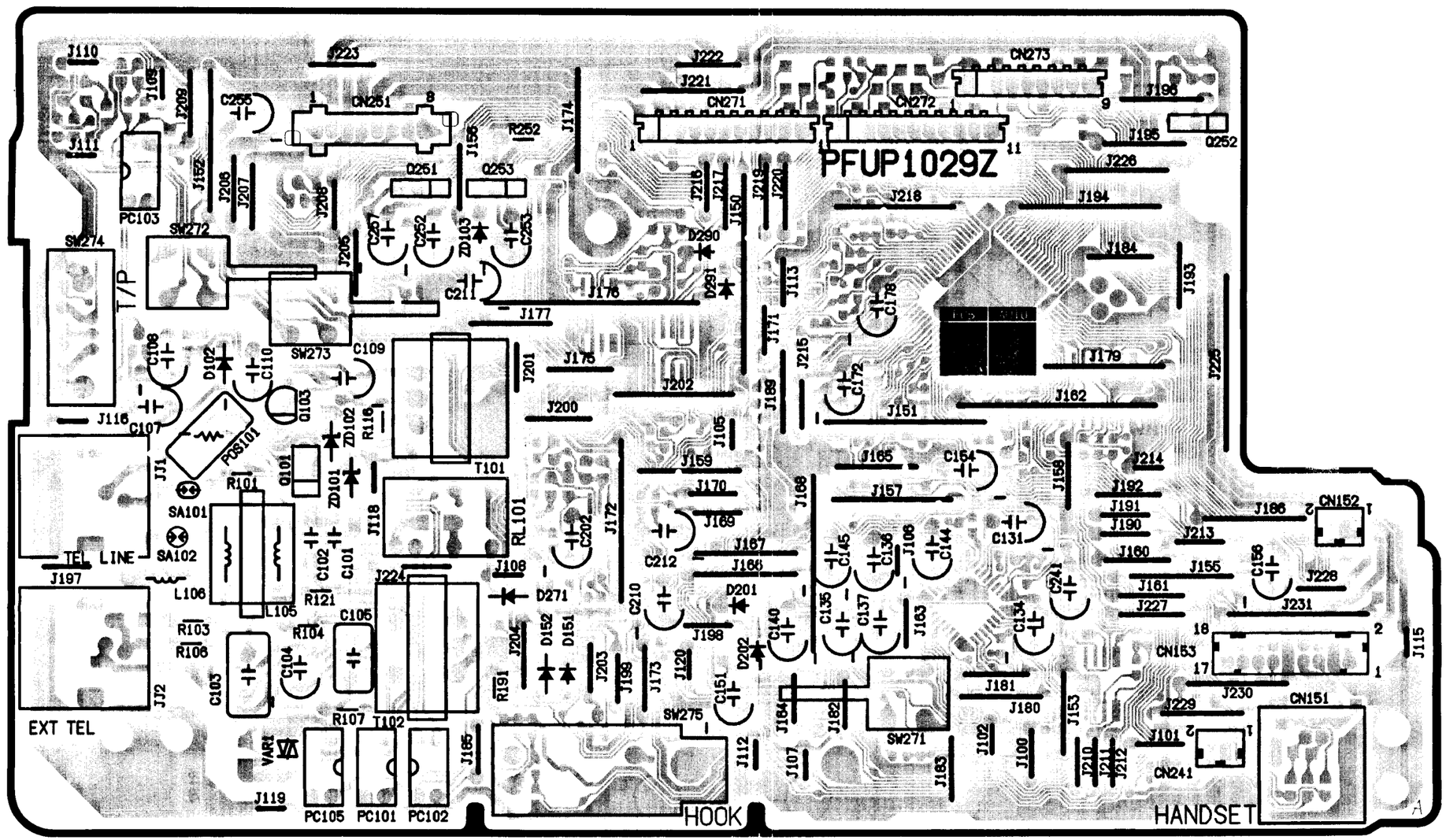


SCHEMATIC DIAGRAM (ANALOG CIRCUIT)



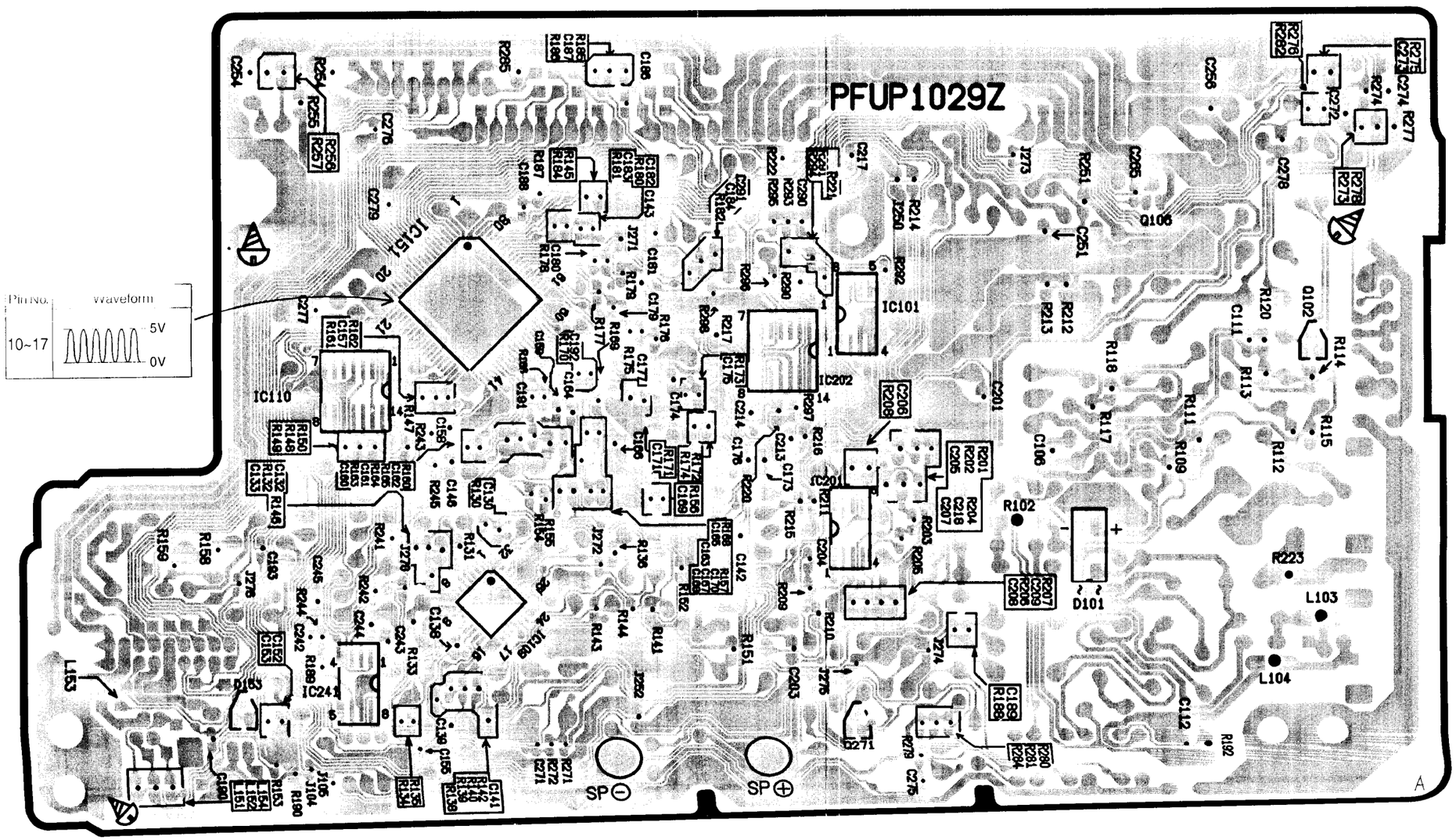
PRINTED CIRCUIT BOARD (ANALOG BOARD)

(Component View)



PRINTED CIRCUIT BOARD (ANALOG BOARD)

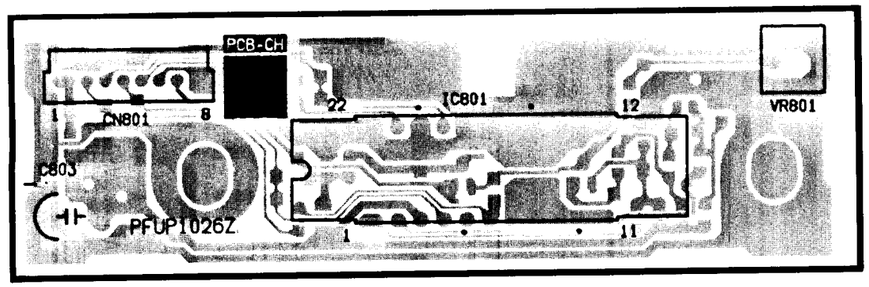
(Bottom View)



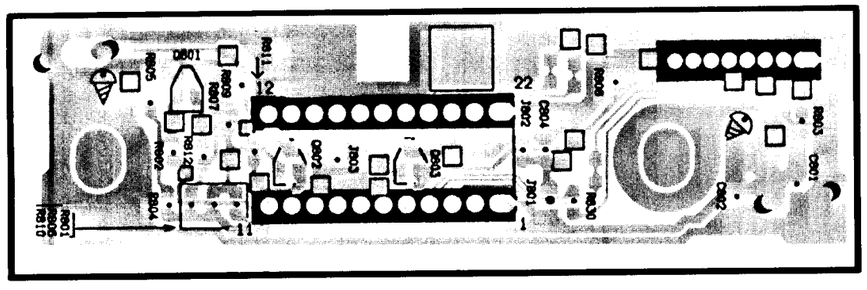
PRINTED CIRCUIT BOARD AND SCHEMATIC DIAGRAM (CCD)

CCD BOARD

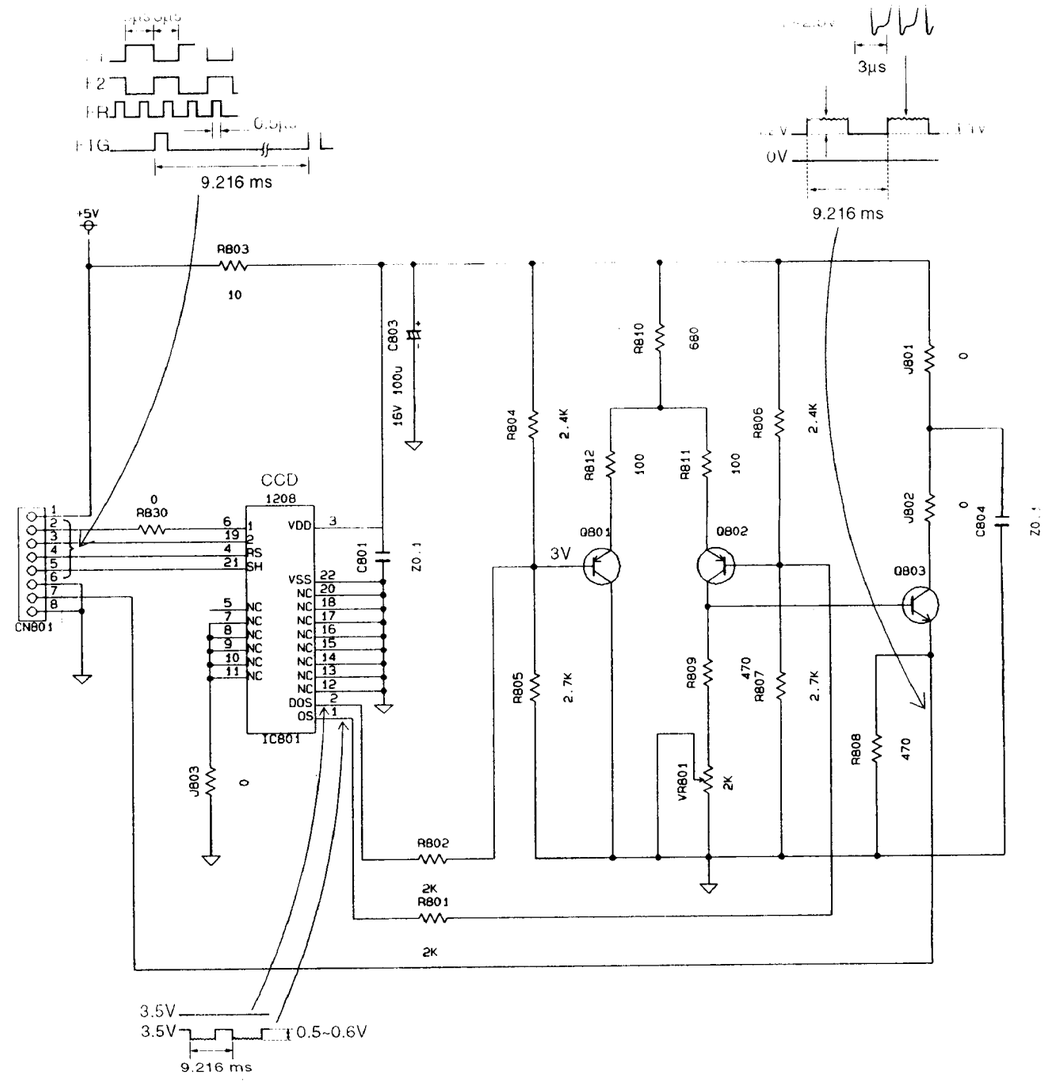
(Component View)



(Bottom View)

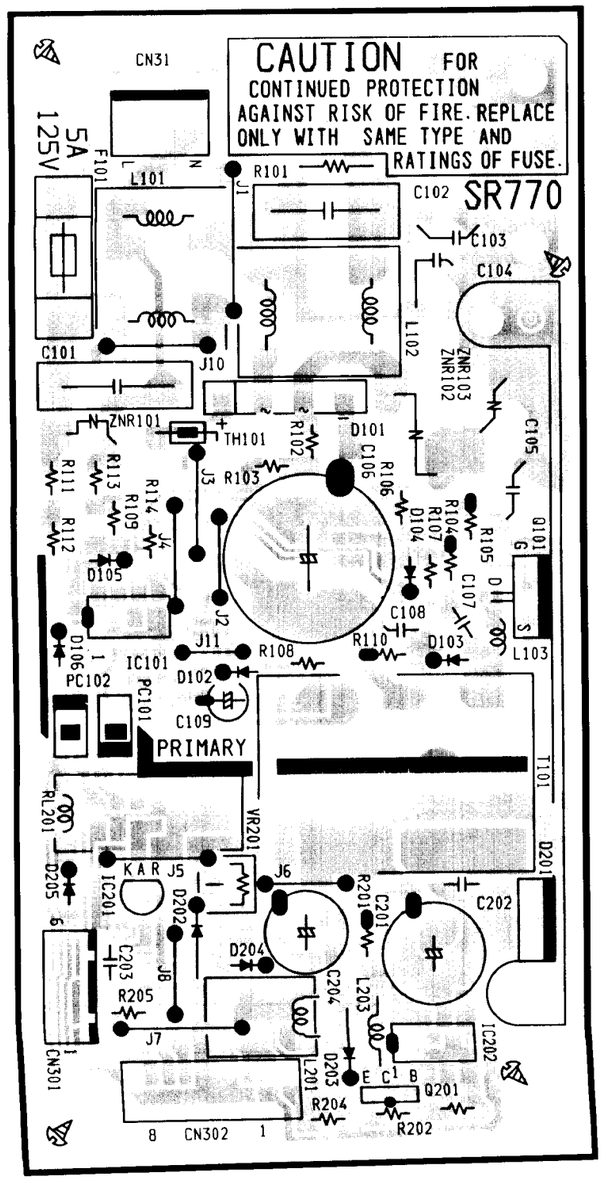


CCD CIRCUIT

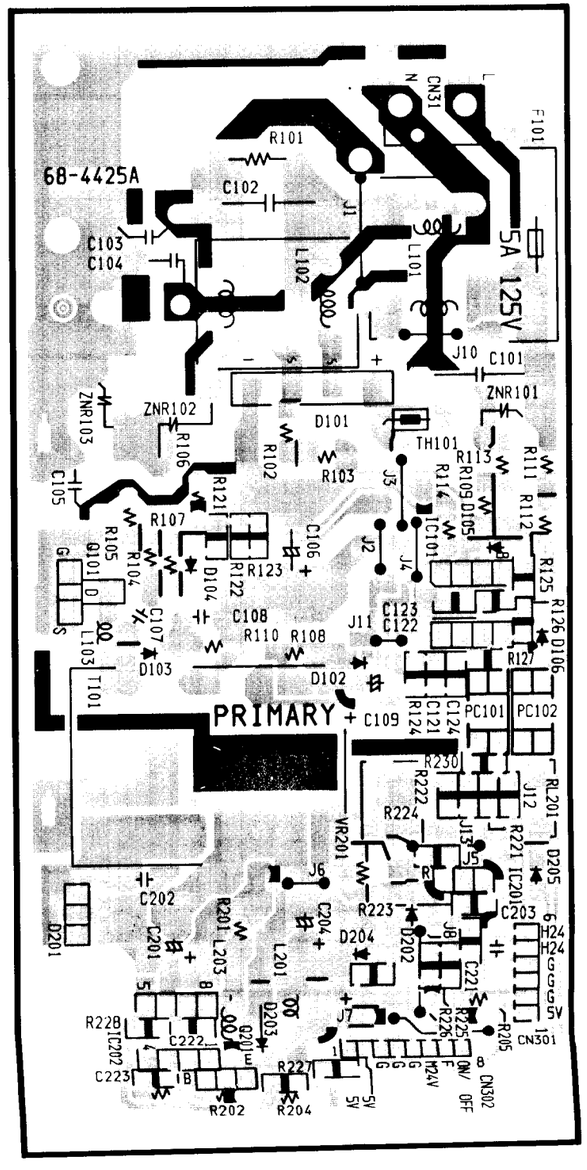


PRINTED CIRCUIT BOARD (SWITCHING POWER SUPPLY)

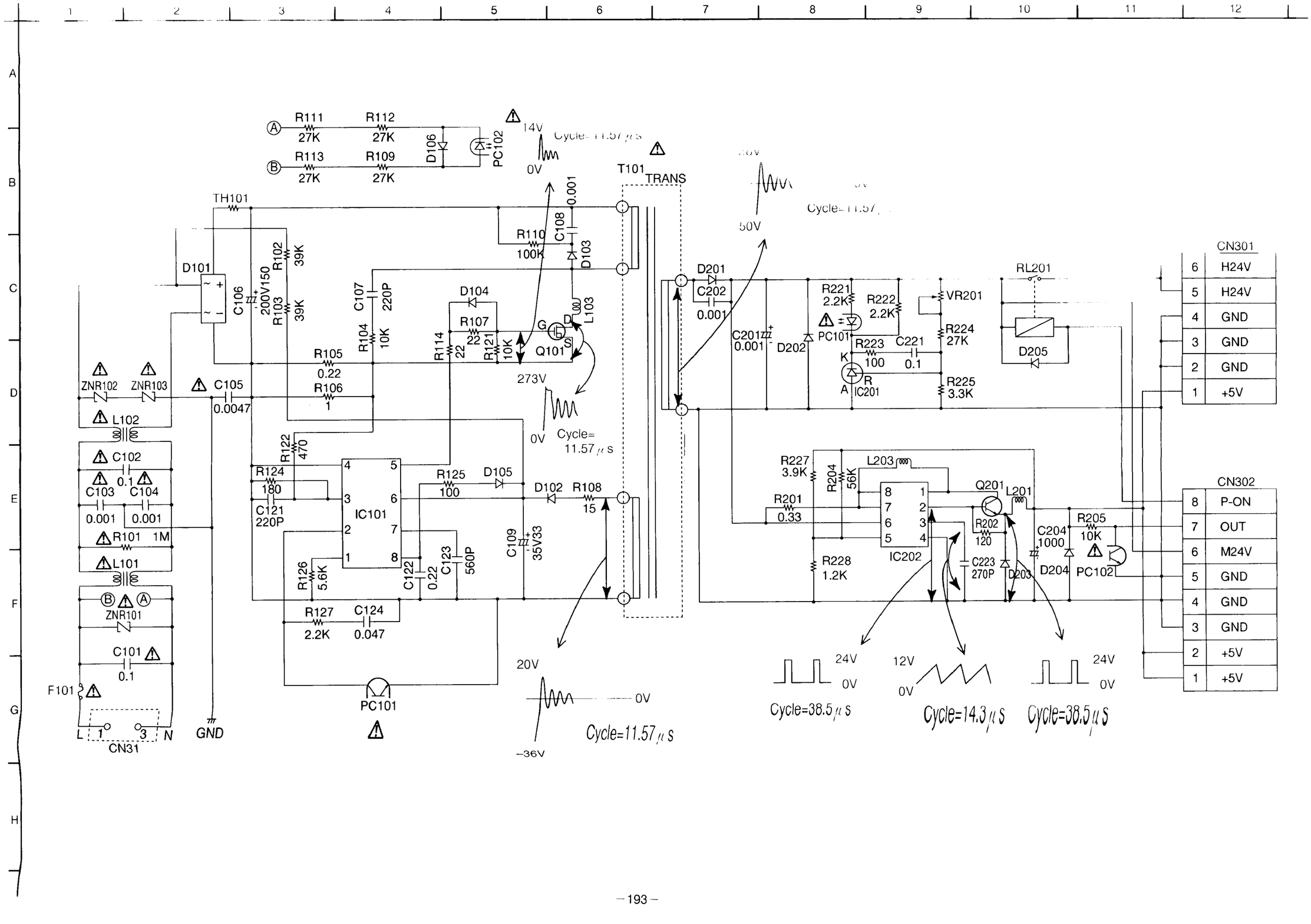
(Component View)



(Bottom View)

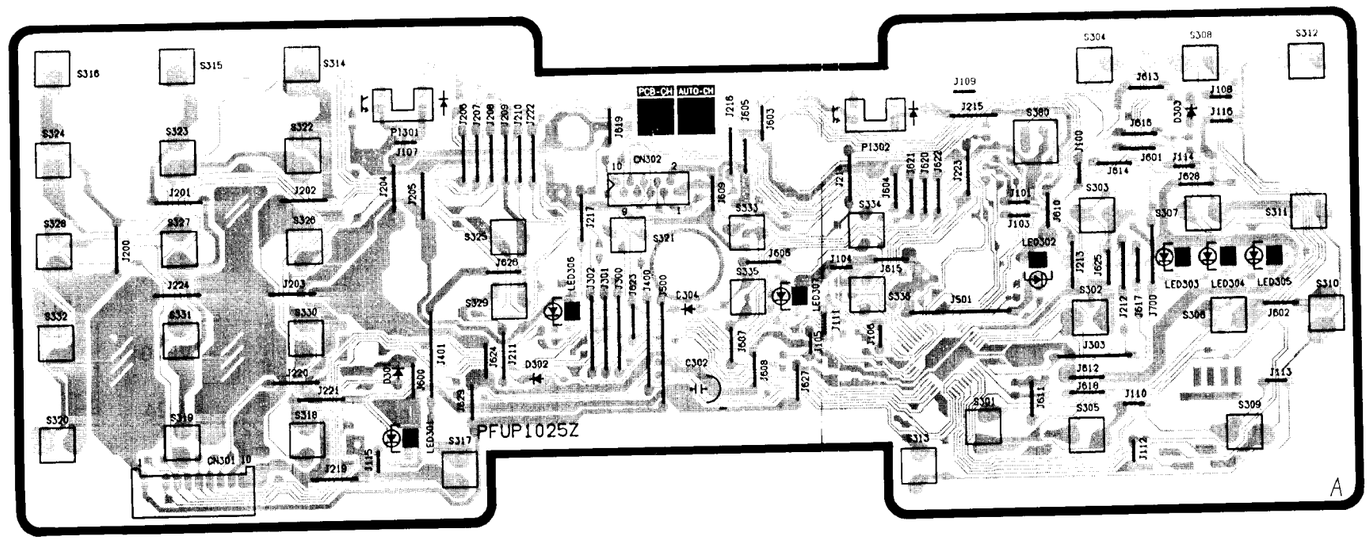


SCHEMATIC DIAGRAM (SWITCHING POWER SUPPLY)

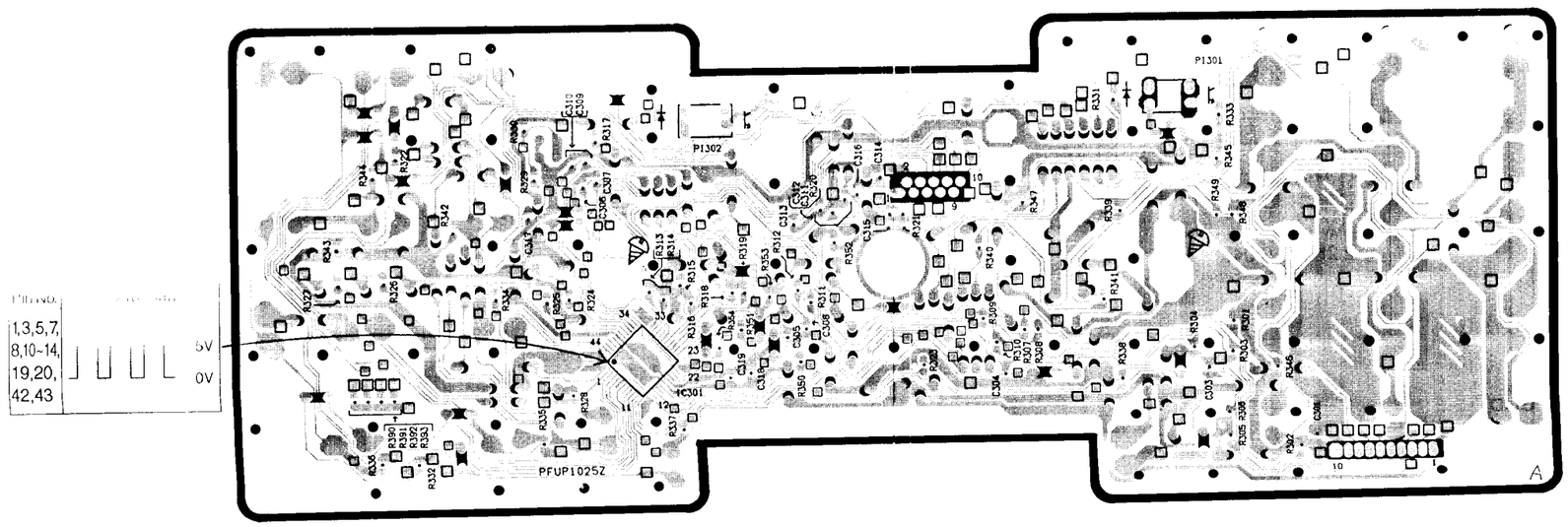


PRINTED CIRCUIT BOARD (OPERATION PANEL BOARD)

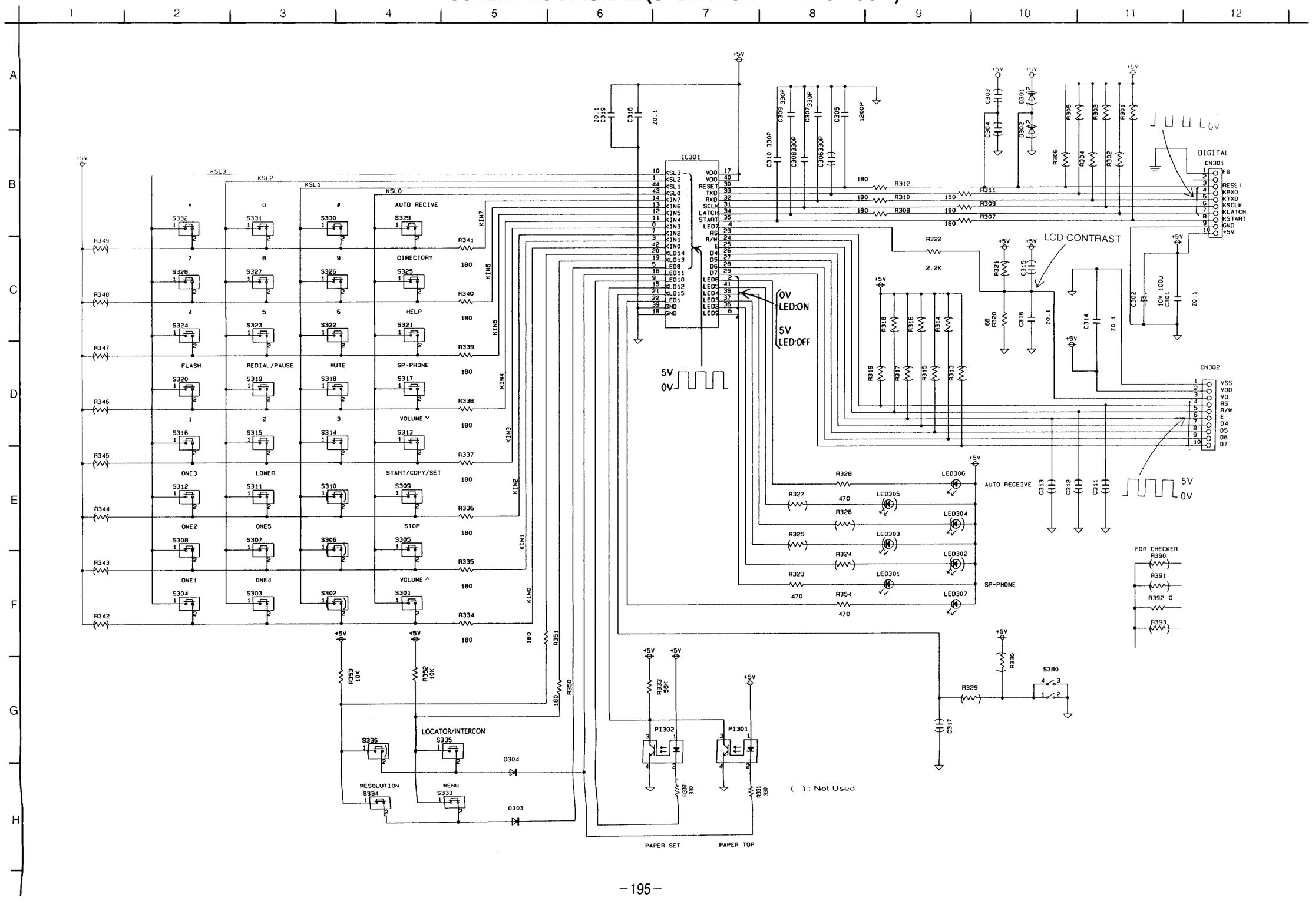
(Component View)



(Bottom View)

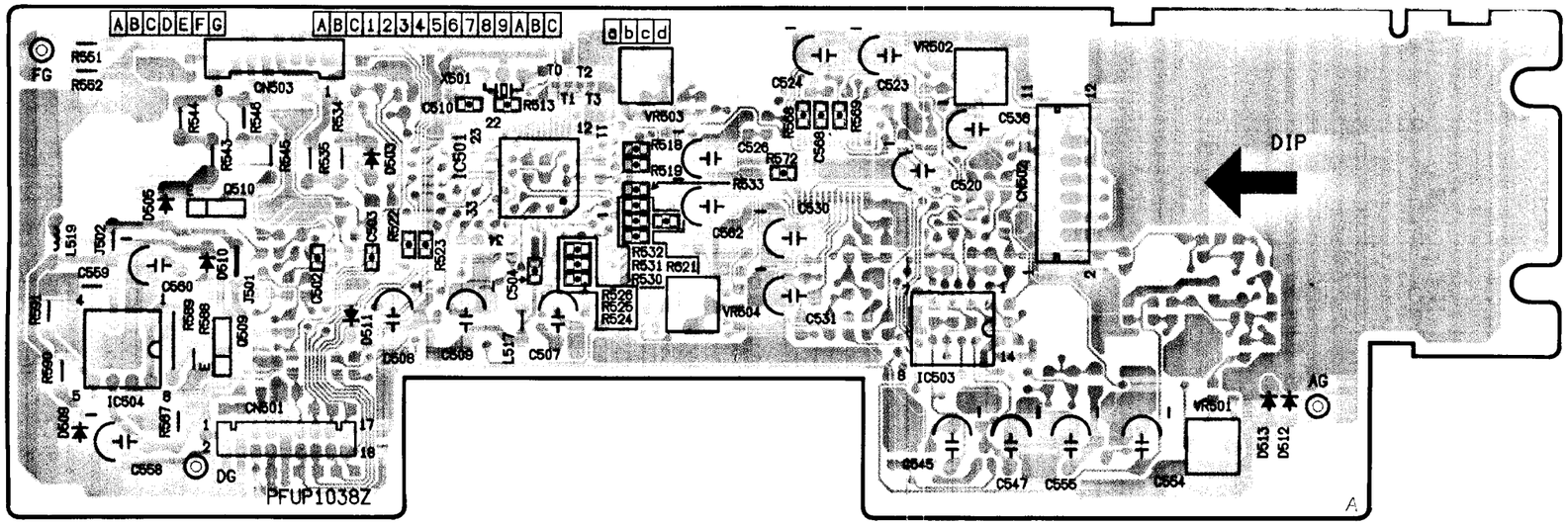


SCHEMATIC DIAGRAM (OPERATION PANEL CIRCUIT)

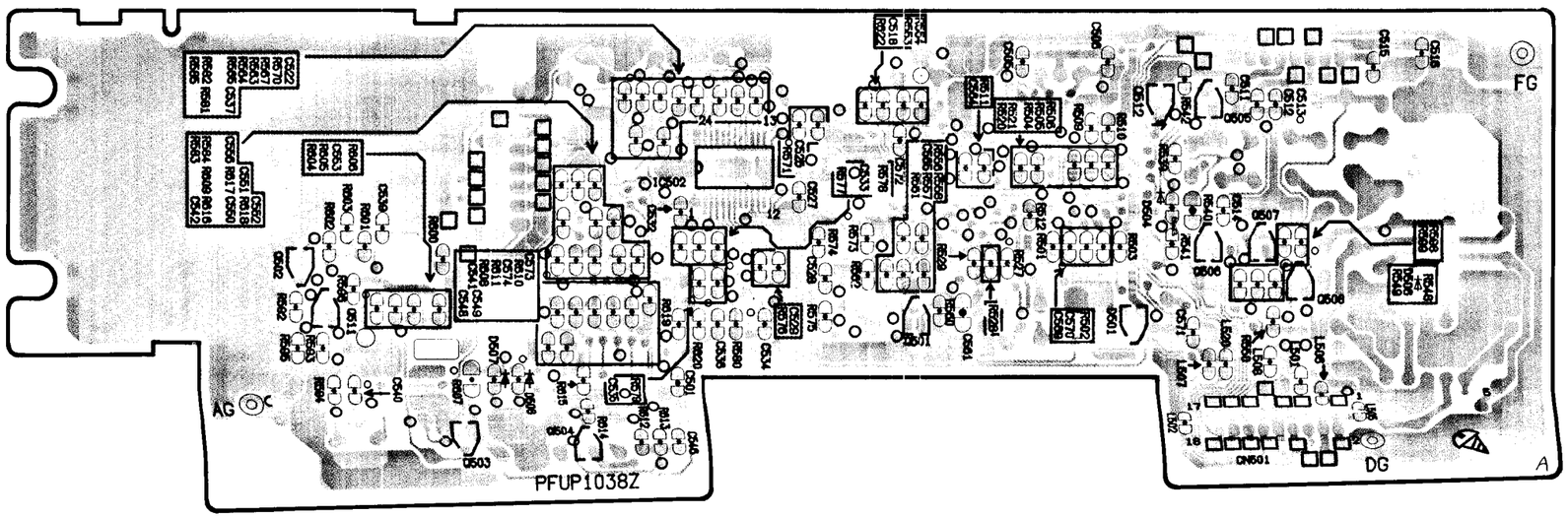


PRINTED CIRCUIT BOARD (CORDLESS BASE UNIT)

(Component View)



(Bottom View)



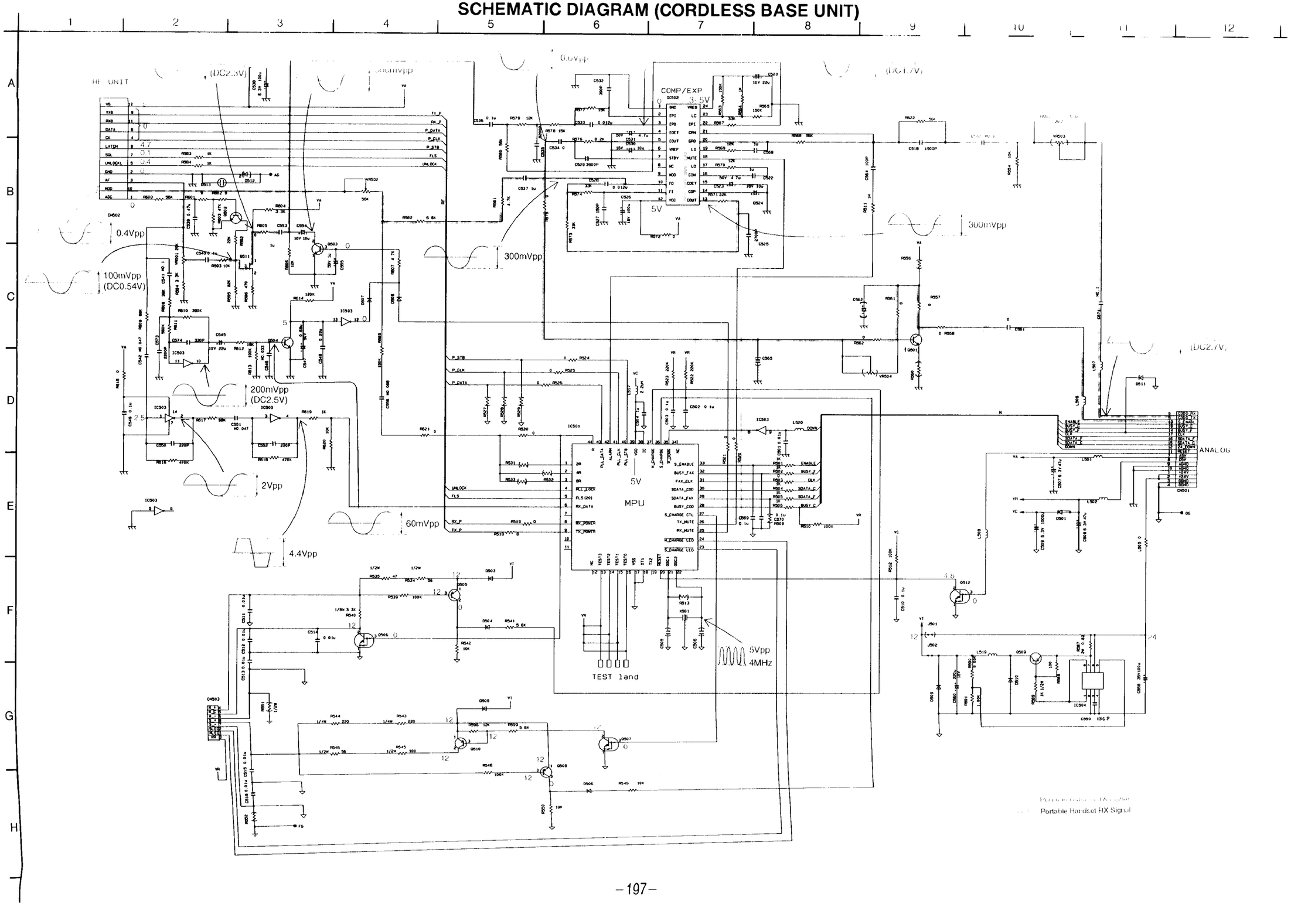
Note:

1. This circuit shown in [____] on the conductor indicates printed circuit on the back side of the printed circuit board.

Note:

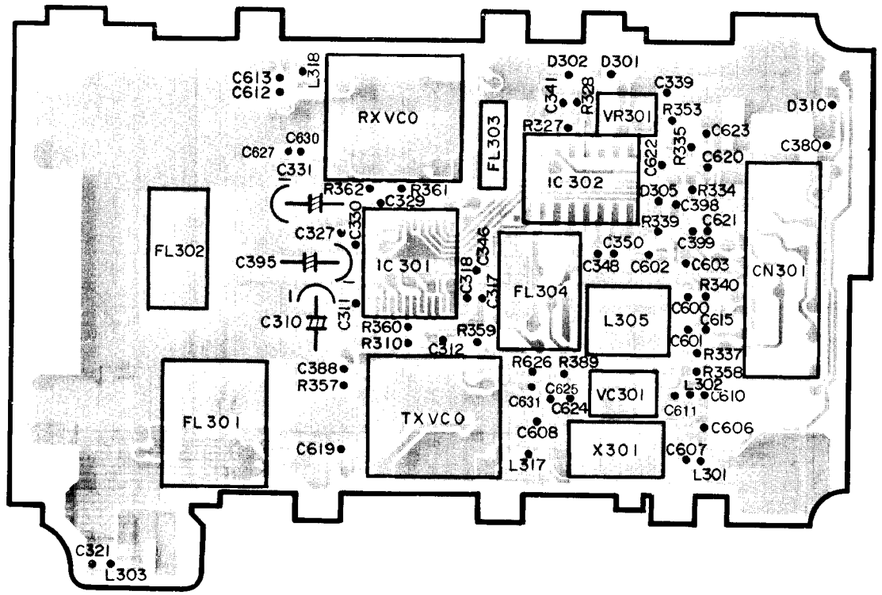
1. This circuit shown in [____] on the conductor indicates printed circuit on the front side of the printed circuit board.

SCHEMATIC DIAGRAM (CORDLESS BASE UNIT)

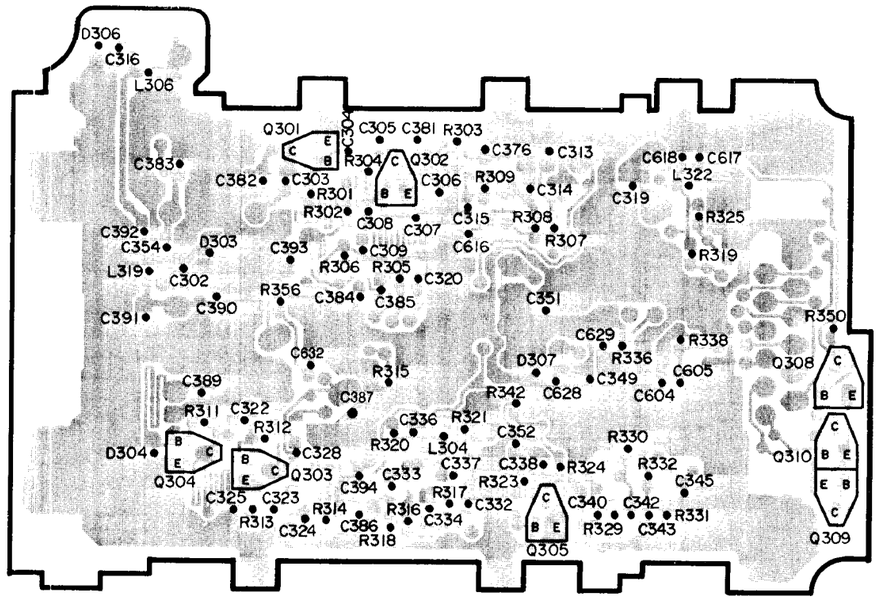


PRINTED CIRCUIT BOARD (RF UNIT)

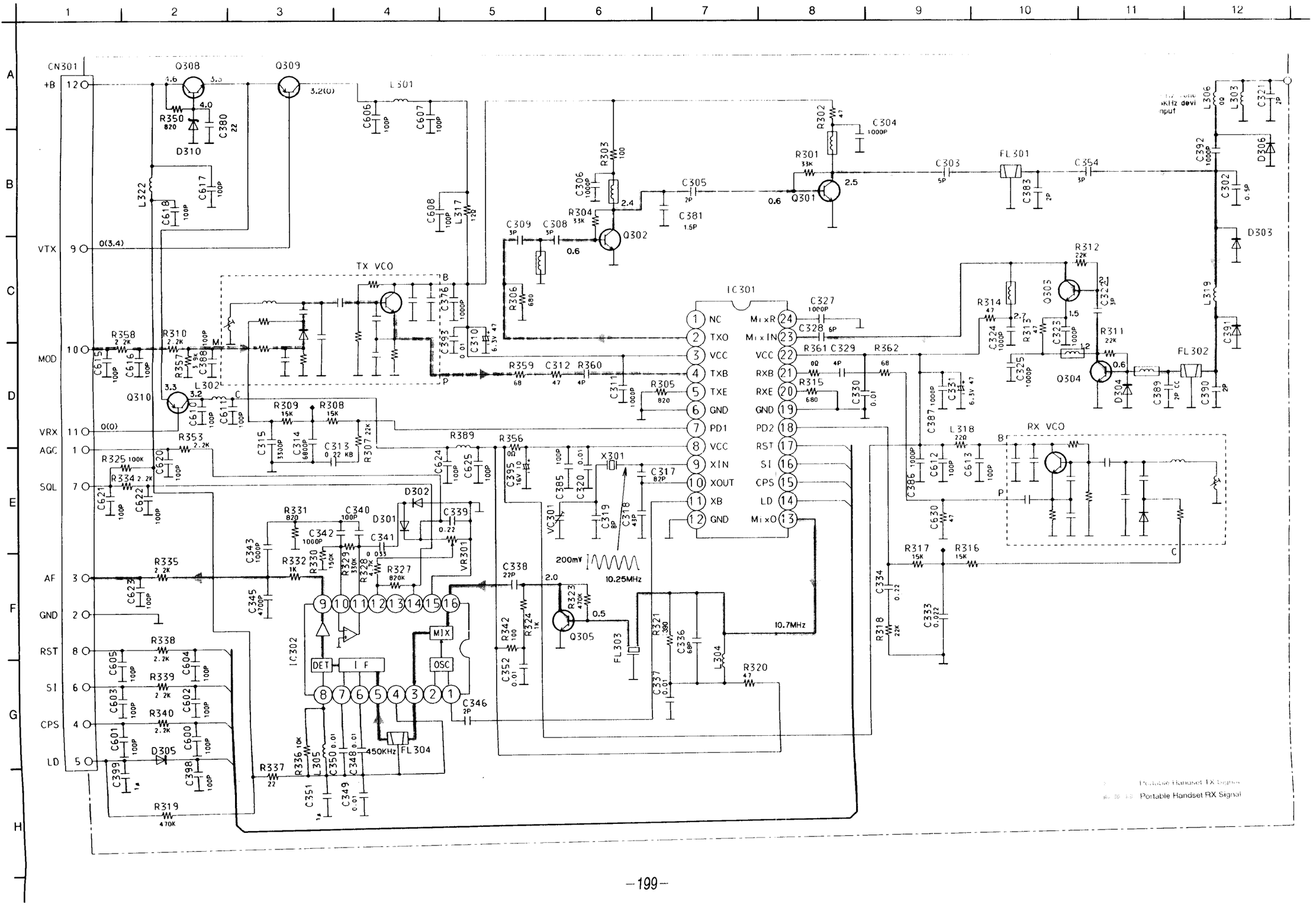
(Component View)



(Flow Solder Side View View)

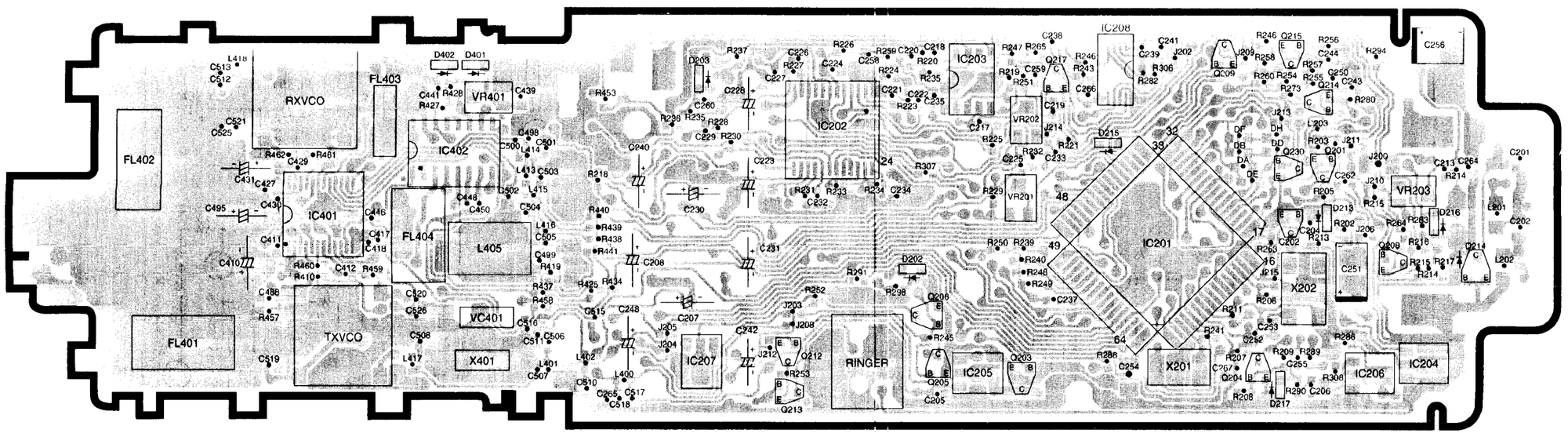


SCHEMATIC DIAGRAM (RF UNIT)

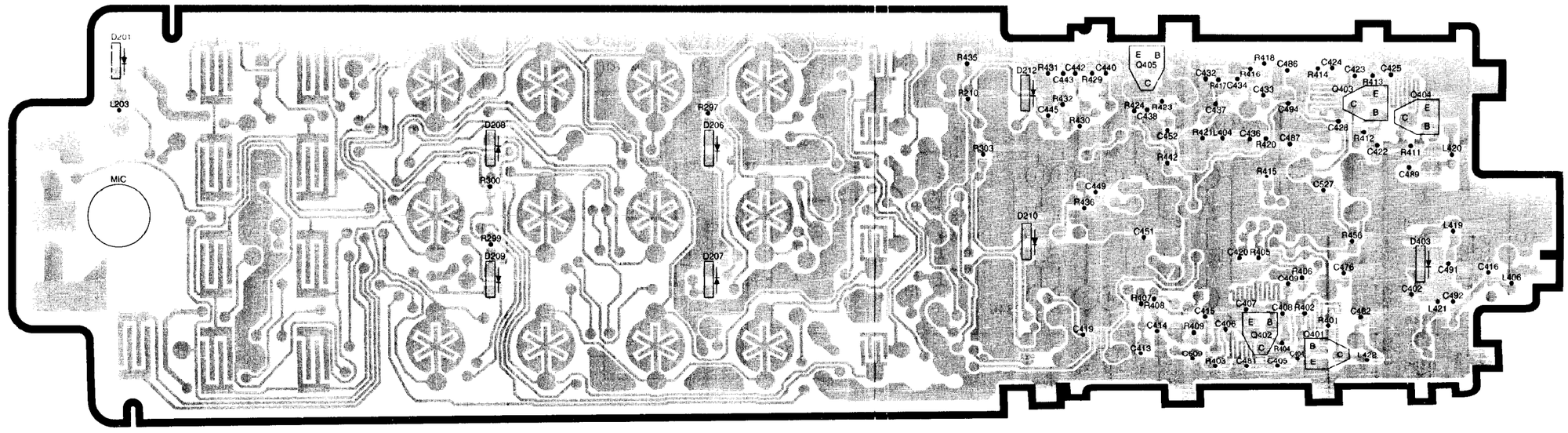


PRINTED CIRCUIT BOARD (PORTABLE HANDSET)

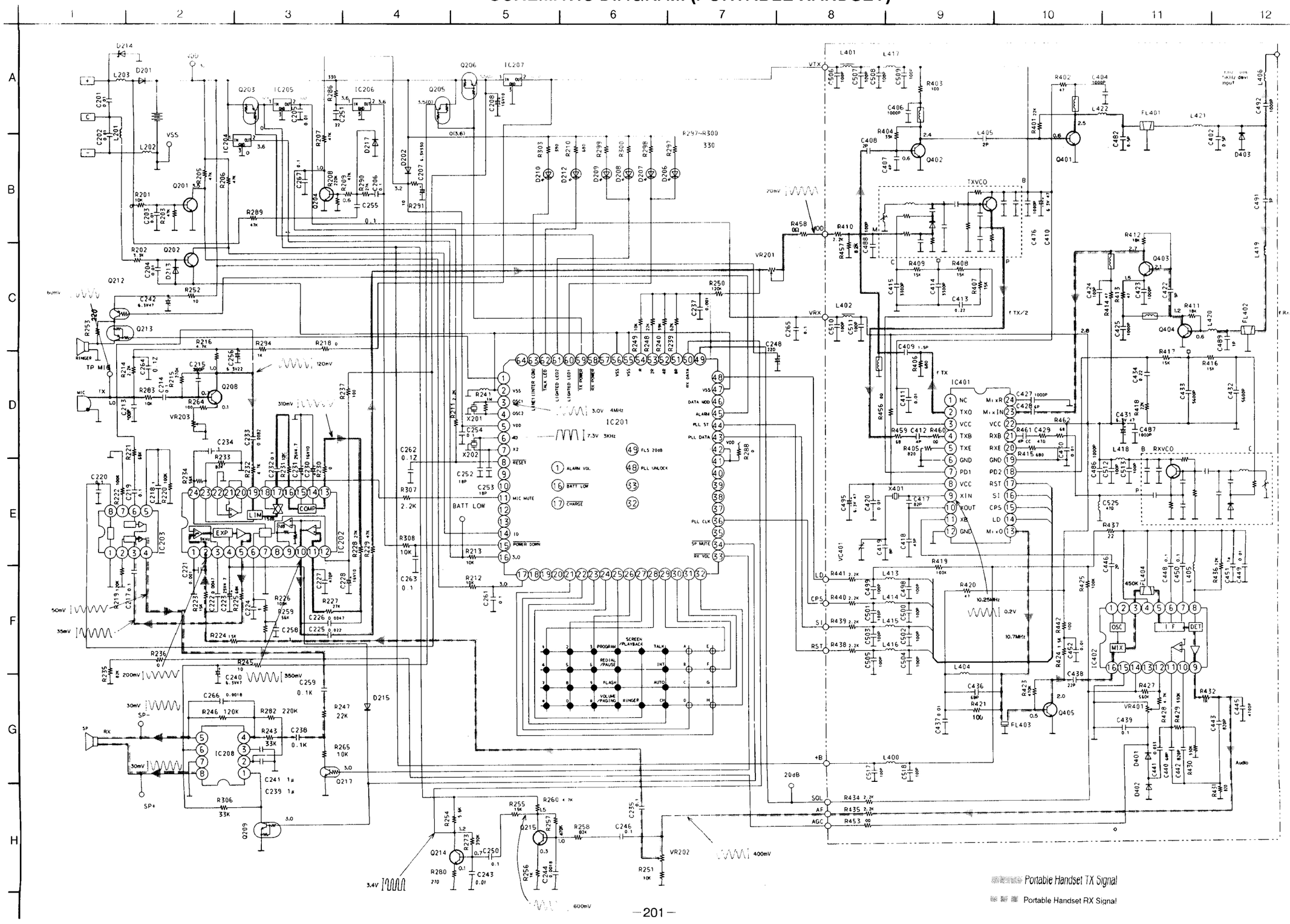
(Flow Solder Side View View)



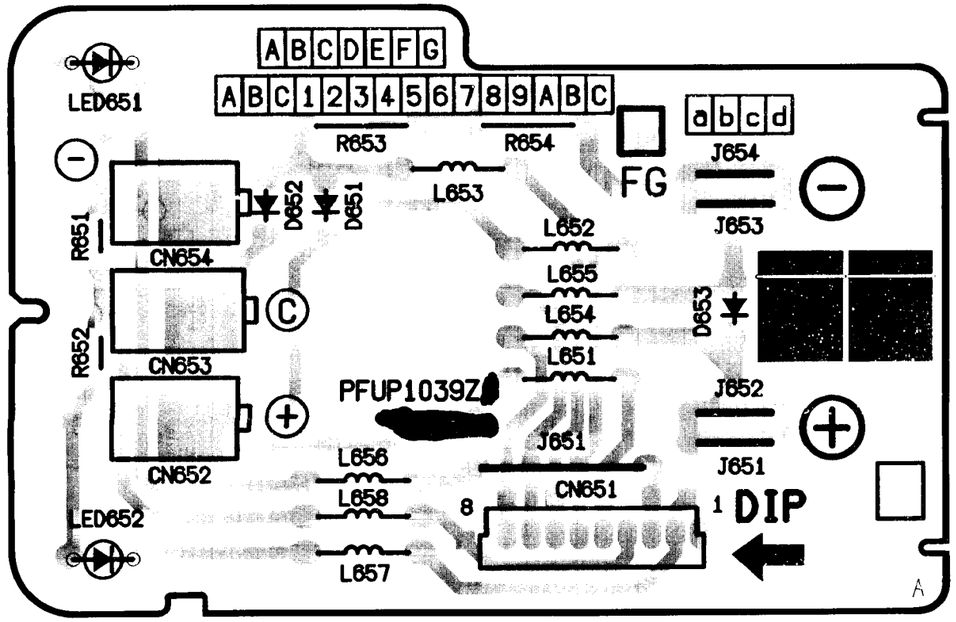
(Component View)



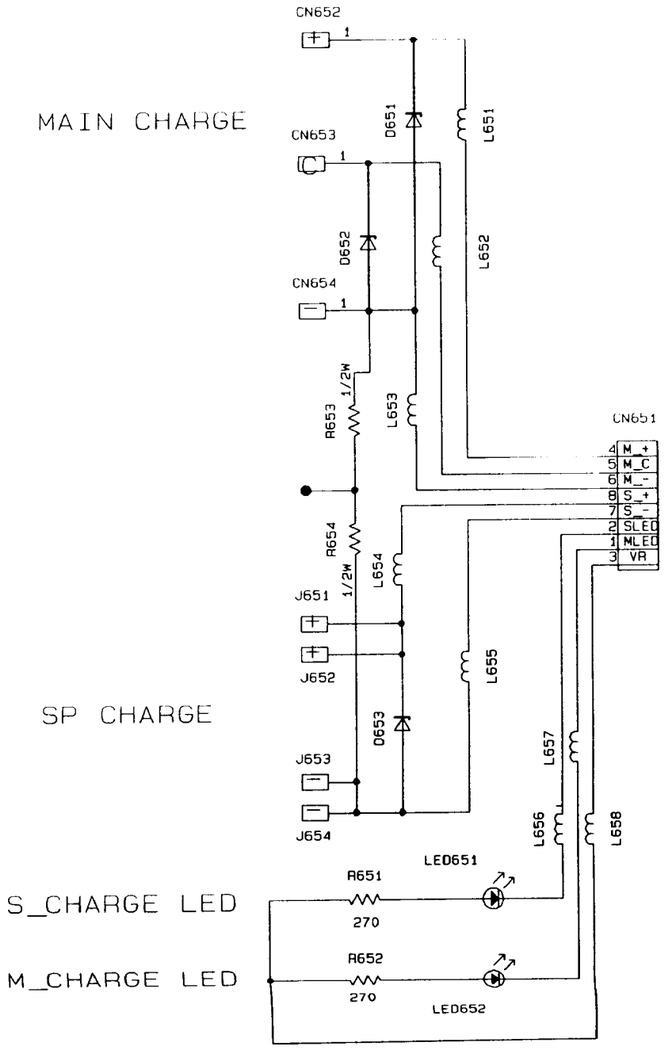
SCHEMATIC DIAGRAM (PORTABLE HANDSET)



PRINTED CIRCUIT BOARD AND SCHEMATIC DIAGRAM (CHARGE)



MAIN CHARGE

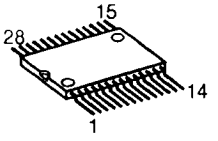


SP CHARGE

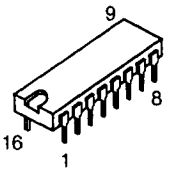
S_CHARGE LED

M_CHARGE LED

TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES



PQVICX58257C



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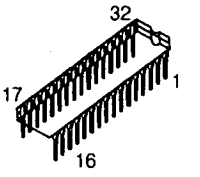
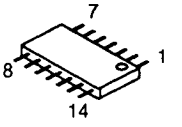
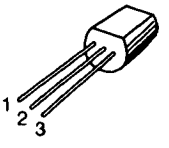


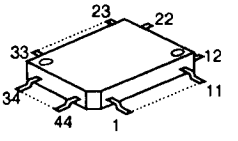
PFWIF900M



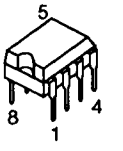
PQVITC4066BF



AN1431T



MN53007QAF
PQVI0008GE12



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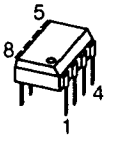
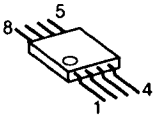


PFVINJ2360D



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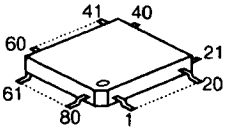
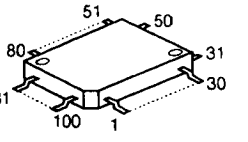
PQVIMC34119M PQVINJM2113V
PQVINJM4558M PQVINJM2903M



AN6116FAQ



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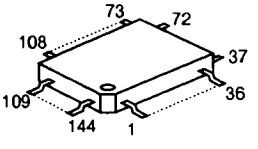
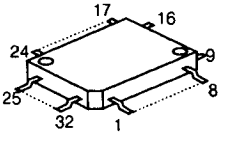
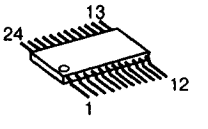


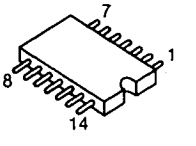
PFVIT7D56



PQVIS79164FU



AN6165SB
PQVIM64084AF



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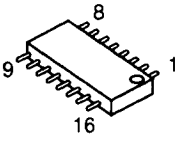
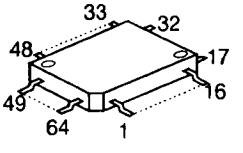
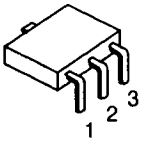


PQVIDBL5018



MN151233KZAB



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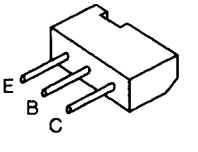
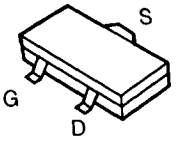
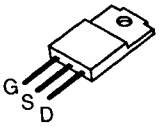
PQVIXC3002PR
PQVIXCC3202P



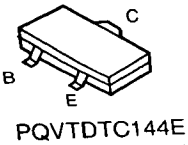
2SD1858R
2SD1921Q 2SB1322



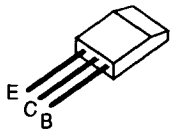
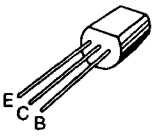
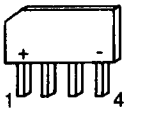
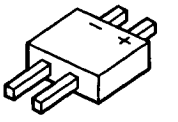
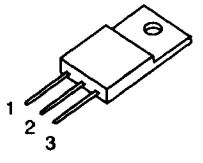
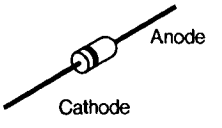
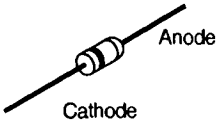
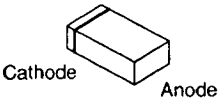
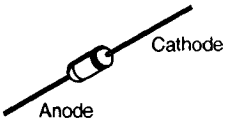
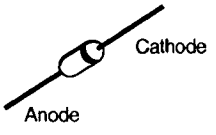
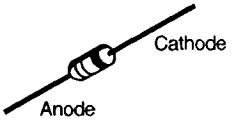
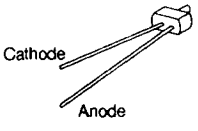
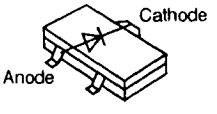
2SK543



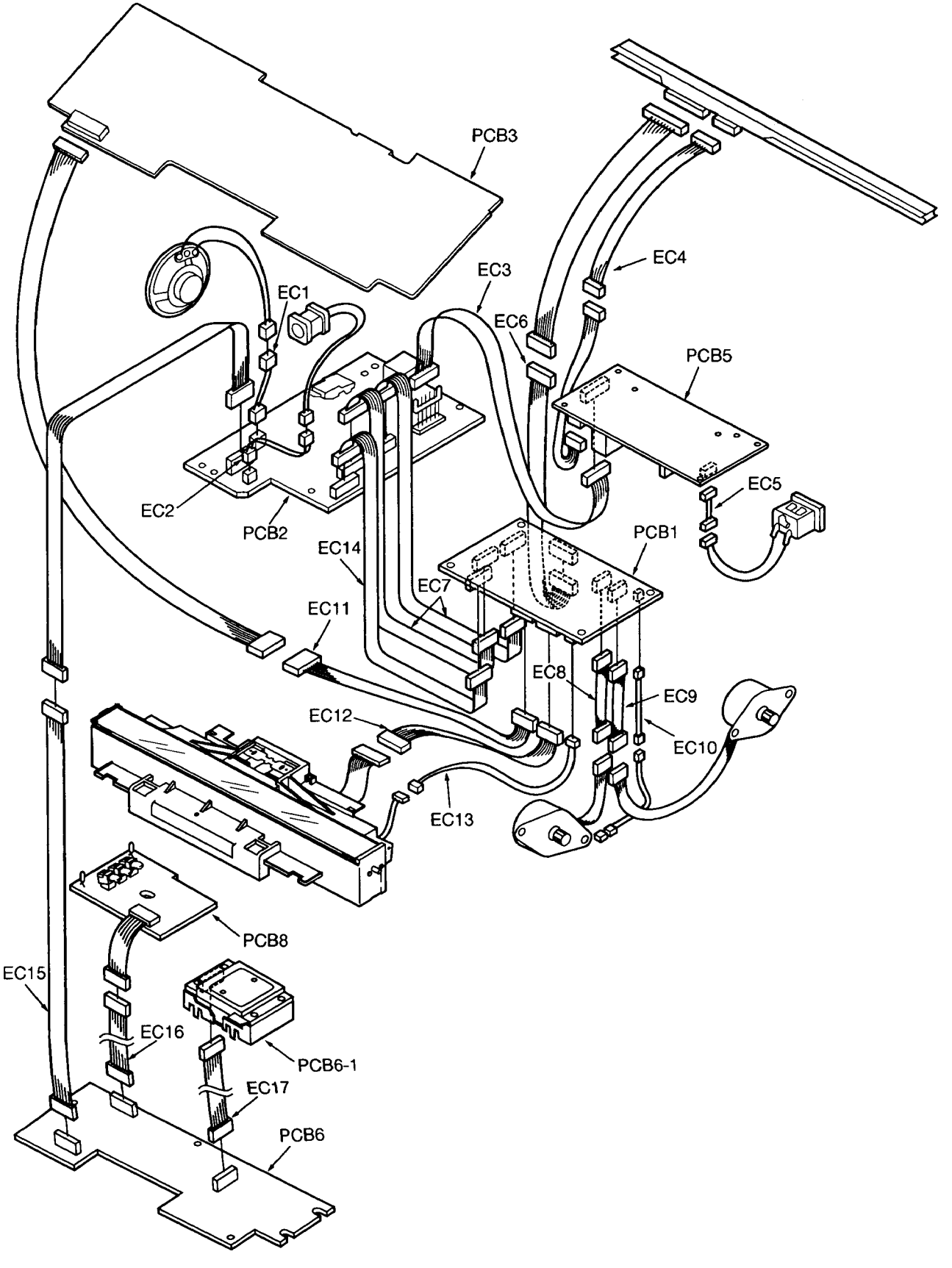
PQVTFS10KM10



PQVTDTC114EU PQVTDTC144E PQVTDTC143E
PQVTDTA143EU PQVTD123J106 PQVTDTB123E
PQVTD123T146 PQVTDTC144TU 2SB970A
2SD1819A 2SD601R 2SC4571R77
2SC4226R24 2SC4227R34 2SC4116

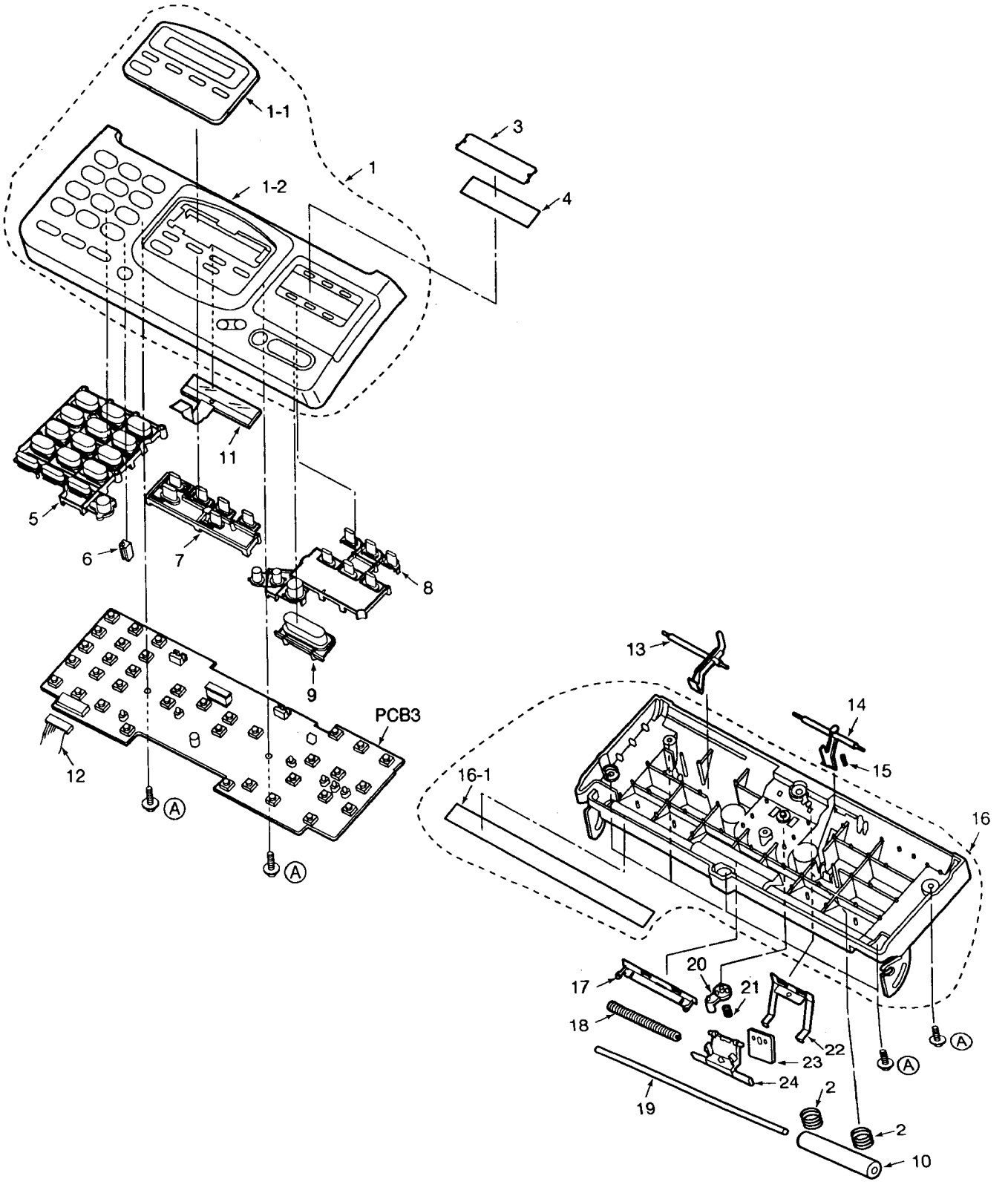
 2SA1627	 2SC4604 2SC2235	 PQVDD2SBA60	 PQVDS1ZB40F1
 MA6D49	 PQVDAK04A PQVDS5688G PQVDERA1802 PQVDERA81004 PFVDAG01A MA165	 MA4220 MA4180 MA7200	 RLS71 MA110
 MA2S111 MA8047 PQVDRB751H4 PQVDPY1112H PQVDBR1112H	 MA2300	 1SS131 1SS119	 MA4075 PQVDHZS2B1
 PQVDSLR325MC PQVDSR325CA47	 MA3062 PQVDSB703Q		

TOOLS

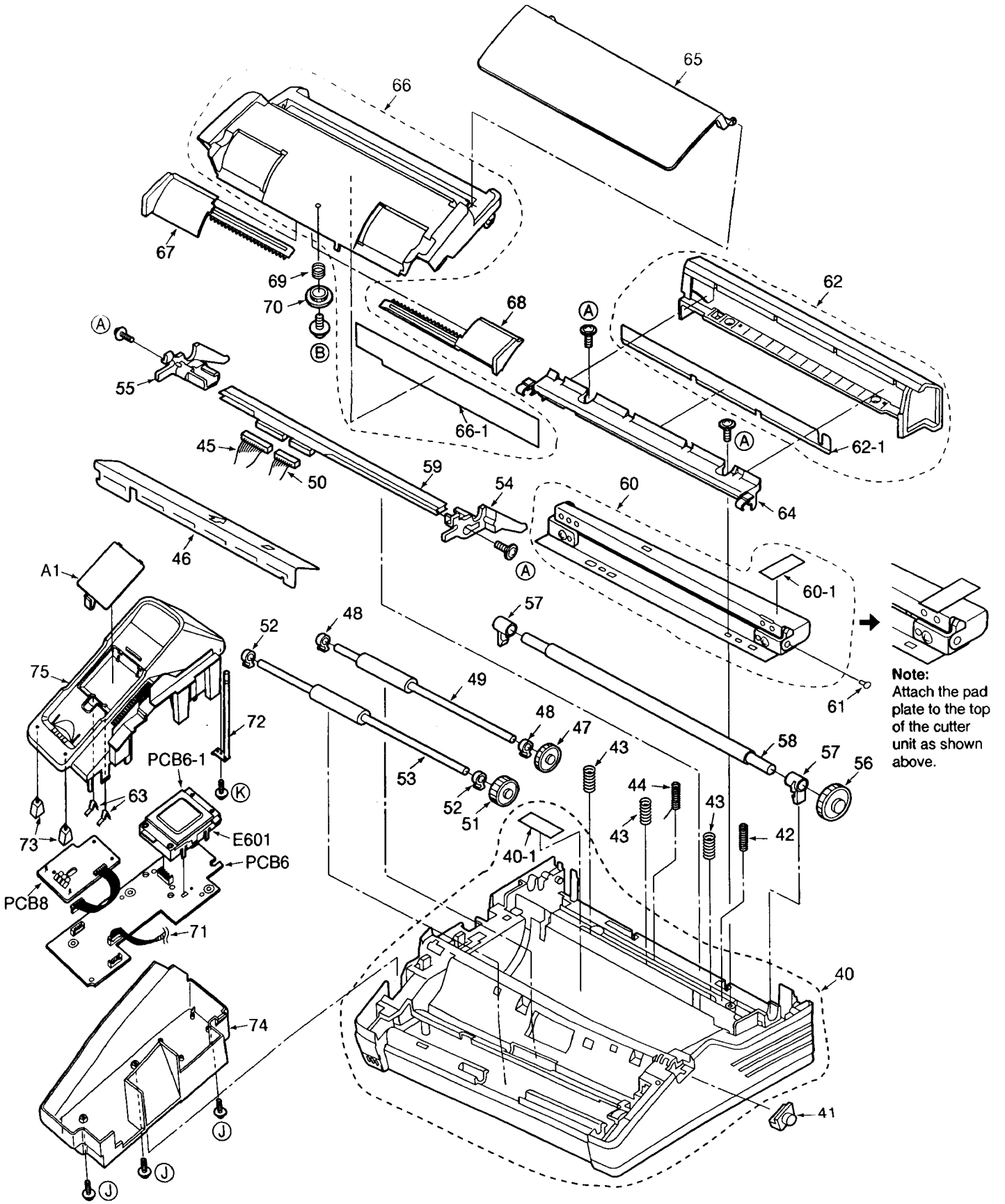

PCB3
EC4
EC3
EC1
EC6
PCB5
EC5
EC2
PCB2
PCB1
EC14
EC7
EC11
EC8
EC9
EC12
EC10
EC13
PCB8
EC15
EC16
PCB6-1
EC17
PCB6

CABINET , MECHANICAL AND ELECTRICAL PARTS LOCATION

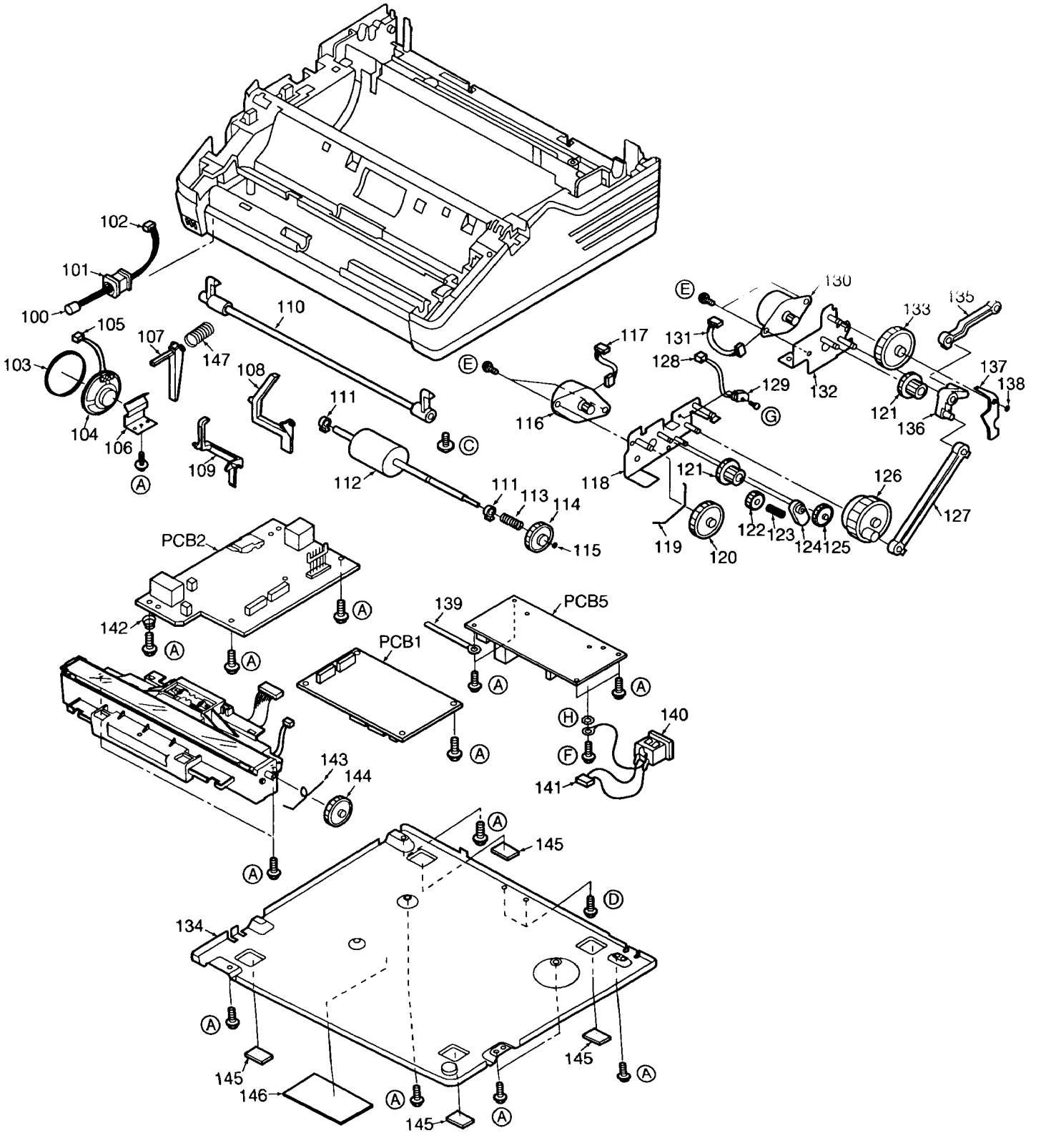
1. Operation Panel Section



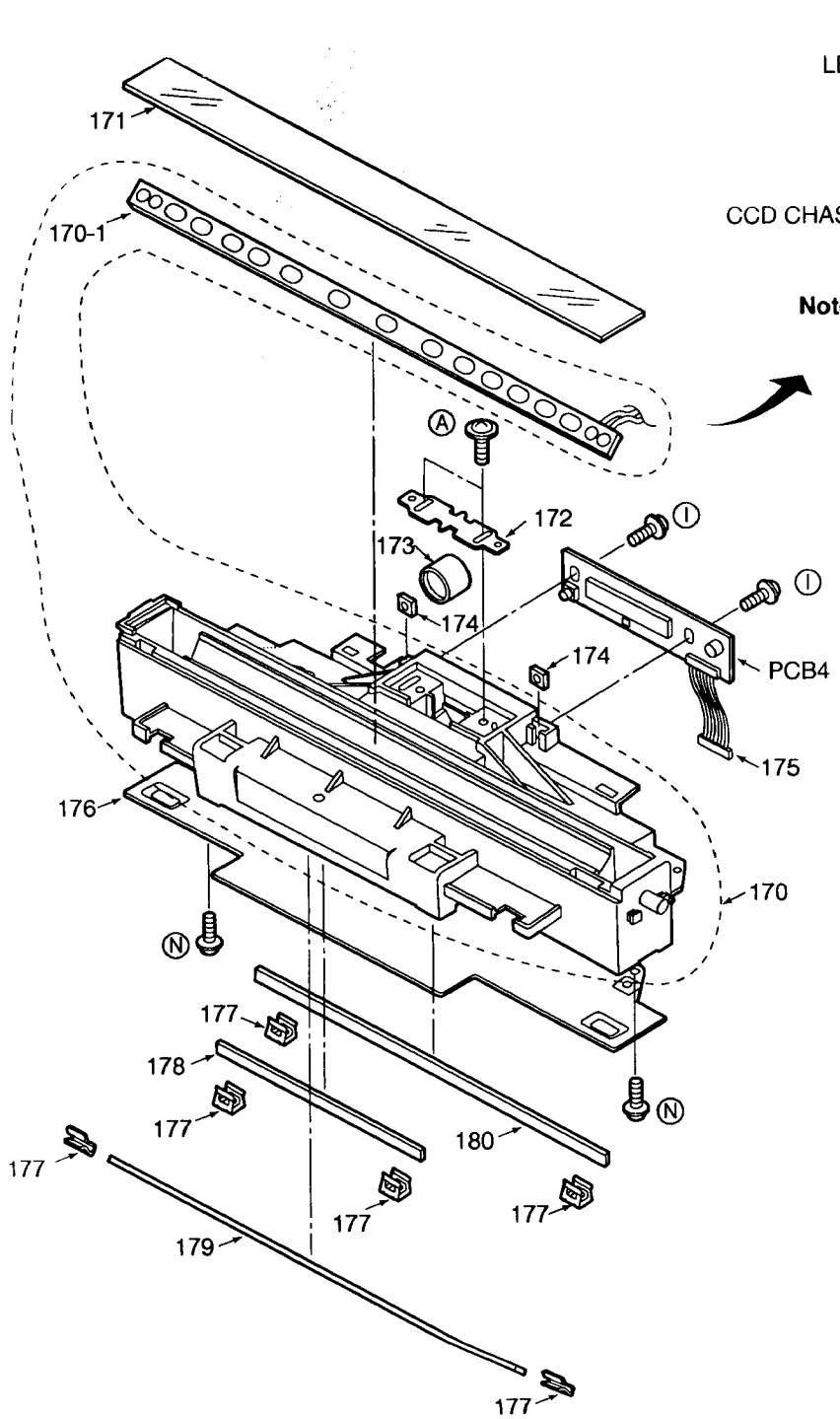
2.Upper Section

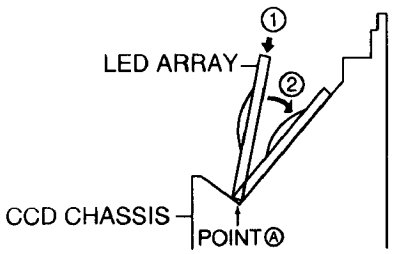


3.Lower Section



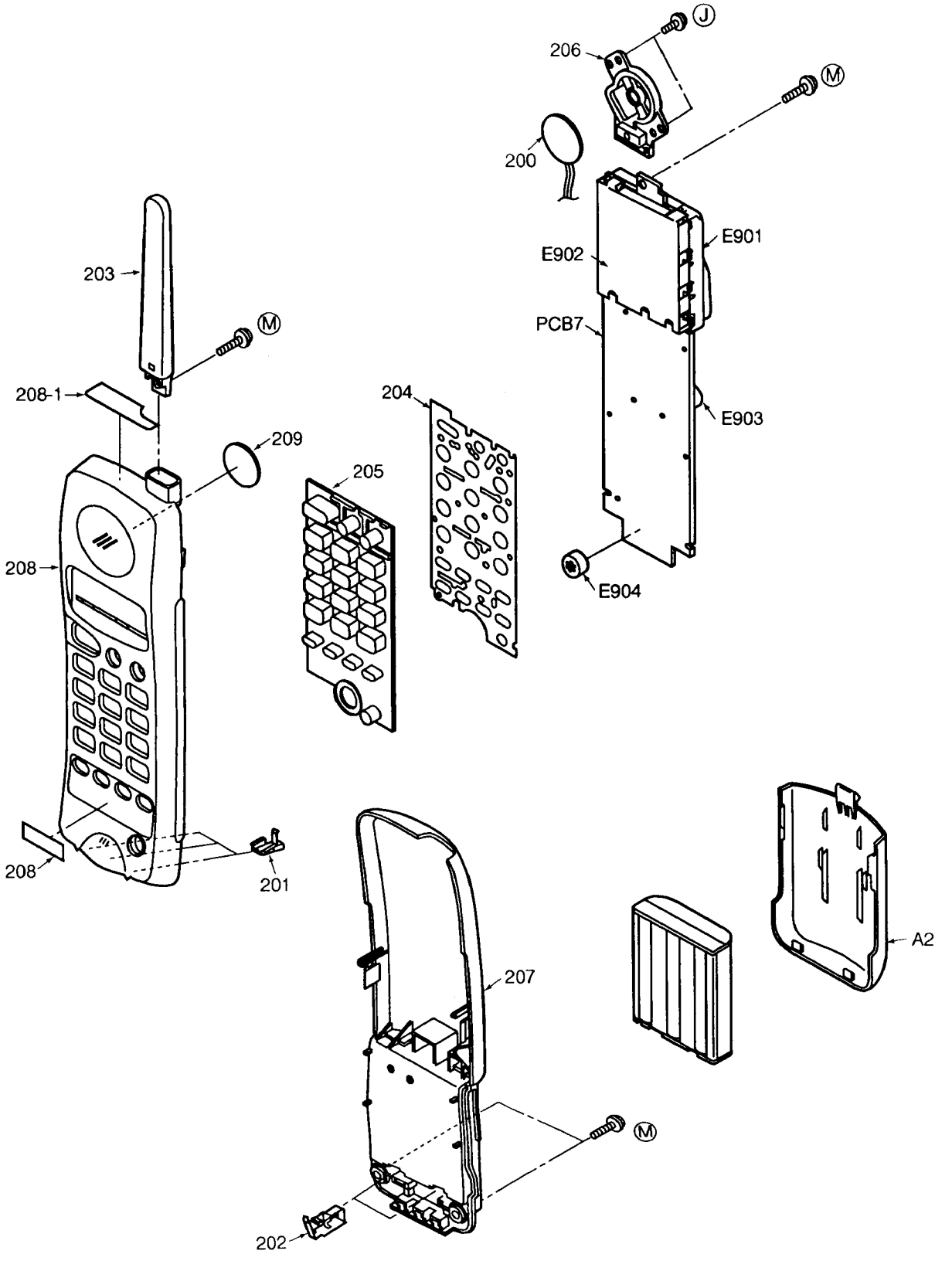
4. CCD Section



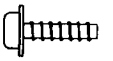
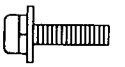
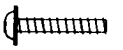
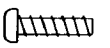


Note: Place the LED Array in the center of pointⒶ as shown above.

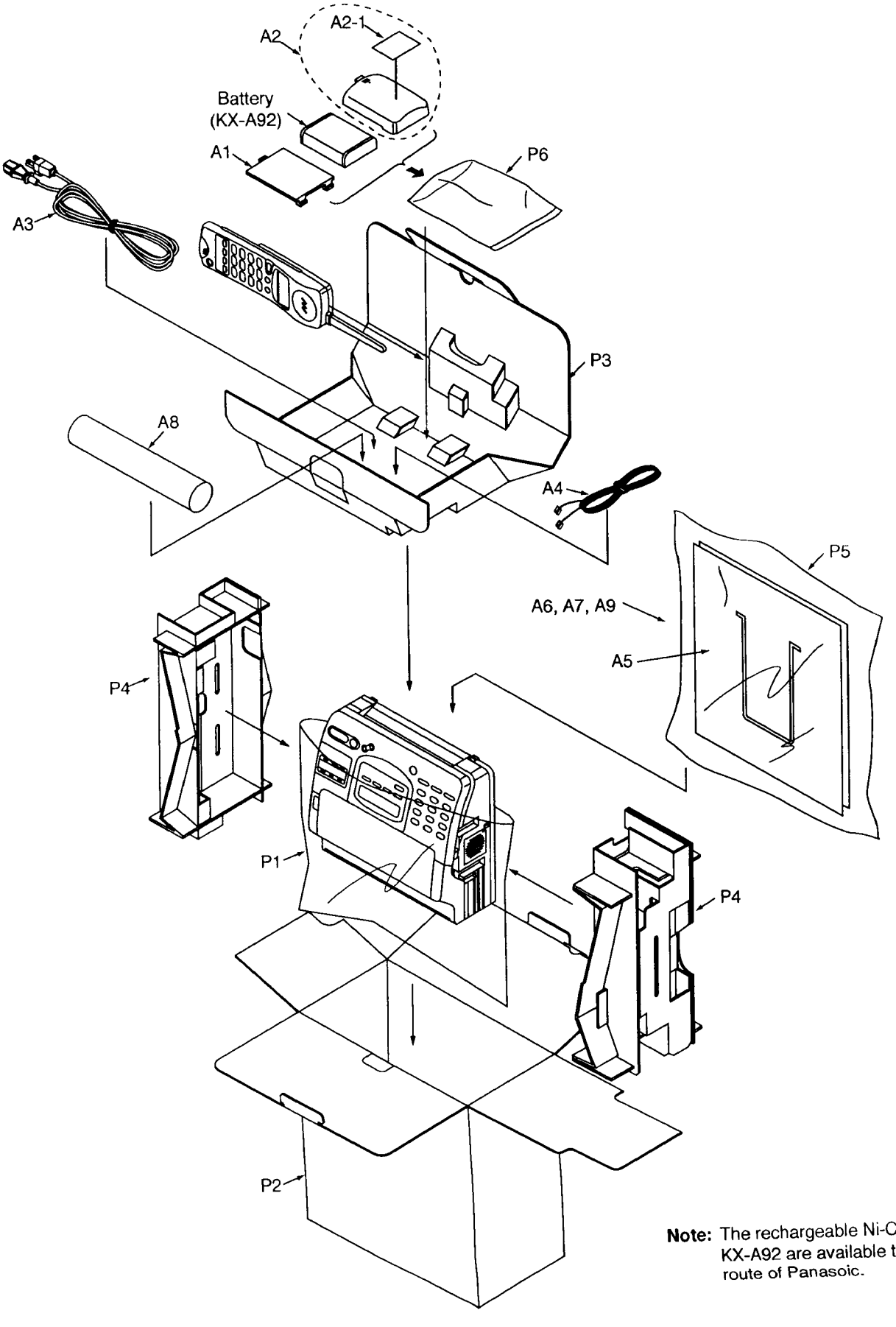
5. PORTABLE HANDSET



6. ACTUAL SIZE OF SCREWS AND WASHER

	Part No.	Figure
Ⓐ	XTW3+S10P	
Ⓑ	XTW3+W6P	
Ⓒ	PJHE5065Z	
Ⓓ	XSN3+W6FZ	
Ⓔ	XYC3+CF6	
Ⓕ	XSB4+6	
Ⓖ	XYN2+C8	
Ⓗ	XWC4B	
Ⓘ	XYN3+F10	
Ⓙ	XTB3+12G	
Ⓚ	XTW3+CS12P	
Ⓛ	XTB26+8J	
Ⓜ	XTW26+12F	
Ⓝ	XTB3+10G	

ACCESSORIES AND PACKING MATERIALS



Note: The rechargeable Ni-Cd battery KX-A92 are available through sales route of Panasoic.

REPLACEMENT PARTS LIST

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

Model KX-F900

Notes:

1. RTL (Retention Time Limited)
   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	PQ4R: Carbon
ERD: Carbon	ERG: Metal Oxide	ERS: Fusible Resistor
PQRD: Carbon	ER0: Metal Film	ERF: Cement Resistor

Wattage

10, 16: 1/8W	14, 25: 1/4W	12: 1/2W	1: 1W	2: 2W	3: 3W

*Type &Voltage of Capacitor
Type

ECFD: Semi-Conductor	ECCD, ECKD, ECBT, PQCBC: Ceramic
ECQS: Styrol	ECQE, ECQV, ECQG: Polyester
PQCUV: Chip	ECEA, ECSZ: Electrolytic
ECQMS: Mica	ECQP: Polypropylene

Voltage

ECQ Type	ECQG ECQV Type	ECSZ Type	Others	
1H: 50V	05: 50V	0F: 3.15V	0J: 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		0J: 6.3V	1E, 25: 25V	2A: 100V

CABINET, MECHANICAL AND ELECTRICAL PARTS

Ref. No.	Part No.	Part Name & Description		Pcs
		(1. OPERATION PANEL SECTION)		
1	PFYGF900M	OPERATION GRILLE ASS'Y		1
1-1	PFGP1025Z	LCD PANEL		1
1-2	PFGG1008X2	GRILLE	S	1
2	PFUS1025Z	SPRING, ROLLER		2
3	PFGV1002Z	TRANSPARENT PLATE (for TEL. CARD)		1
4	PFGD1004Z	TEL. CARD		1
5	PFBX1011Z1	BUTTON, DIAL		1
6	PFGP1017Z	LED COVER		1
7	PFBX1013X1	BUTTON, FUNCTION		1
8	PFBX1012Y2	BUTTON, DIALER		1
9	PFBC1004Z1	BUTTON, START/COPY/SET		1
10	PQDR9685Z	ROLLER, SUPPORT		1
11	PFAVLMG161C8	LIQUID CRYSTAL DISPLAY		1
12	PFJS10R21Z	CONNECTOR, 10 PIN		1
13	PFDE1020Z	LEVER, READ DETECTION		1
14	PFDE1019Z	LEVER, DOCUMENT DETECTION		1
15	PFUS1027Z	SPRING, DOCUMENT LEVER		1
16	PFYC2F780M	OPERATION GRILLE COVER ASS'Y		1
16-1	PFHX1081Z	COVER (READING SHEET)		1
17	PFUS1026Y	SPRING, SUPPORT ROLLER		1
18	PQDR10005Z	ROLLER, SUPPORT EXIT PRINT		1
19	PFDF1005Z	SHAFT, SUPPORT RLLER		1
20	PFHR1019Z	LEVER, SEPARATE SPRING ADJUST		1
21	PFUS1024Z	SPRING, SEPARATION		1
22	PFUS1023Y	SPRING, DOCUMENT FEED		1
23	PFHG1020Z	RUBBER, SEPARATION		1
24	PFHR1018Z	SEPARATION RUBBER HOLDER		1

Ref. No.	Part No.	Part Name & Description	Pcs
		(2. UPPER CABINET/ THERMAL HEAD SECTION)	
40	PFYM1F900M	UPPER CABINET ASS'Y	1
40-1	PFHS1010Z	TAPE	1
41	PFBD1002Z2	KNOB, FRONT LID OPEN	1
42	PFUS1022Y	SPRING, EARTH	1
43	PFUS1042Z	SPRING, THERMAL HEAD	3
44	PFUS1039Y	SPRING, EARTH	1
45	PFJS09R22Z	CONNECTOR, 9 PIN	1
46	PFMH1021Y	COVER, PAPER GUIDE	1
47	PFDG1004Z	GEAR, DOCUMENT FEED ROLLER	1
48	PFDJ1007Z	SPACER, ROLLER	2
49	PFDN1006Z	ROLLER, DOCUMENT FEED	1
50	PFJS6R23Z	CONNECTOR, 6 PIN	1
51	PFDG1003Z	GEAR, DOCUMENT FEED	1
52	PFDJ1006Z	SPACER, ROLLER	2
53	PFDN1005Z	ROLLER, DOCUMENT FEED	1
54	PFDE1008X	GUIDE, HEAD (RIGHT)	1
55	PFDE1007X	GUIDE, HEAD (LEFT)	1
56	PFDG1013Z	GEAR, RECORDING PAPER ROLLER	1
57	PFDJ1005Y	SPACER, PLATEN	2
58	PFDN1003Z	ROLLER, RECORDING PAPER	1
59	PFJHS004Z	THERMAL HEAD	1
60	PFZEF780M	CUTTER ASS'Y	1
60-1	PFHG1025Z	PAD PLATE	1
61	PFHD1003Y	REVET, HEADER PIN	1
62	PFYC3F900M	CUTTER LOWER GUIDE ASS'Y	1
62-1	PFHX1098Z	SPACER (CUTTER SHEET)	1
63	PFJT1001Y	BATTERY CHARGE TERMINAL	2
64	PFUG1006Z	GUIDE, CUTTER	1
65	PFKS1006Z2	TRAY, DOCUMENT	1
66	PFYC1F900M	ROLL COVER ASS'Y	1
66-1	PFQT1134Z	CAUTION LABEL	1
67	PFKR1004Z2	GUIDE, DOCUMENT (LEFT)	1
68	PFKR1005Z2	GUIDE, DOCUMENT (RIGHT))	1
69	PFUS1034Z	SPRING, DOCUMENT	1
70	PFDG1002Z	GEAR, DOCUMENT GUIDE	1
71	PFJS18R31Z	CONNECTOR, 18 PIN	1
72	PQSA10047Z	ANTENNA	1
73	PFGP1027Z	LED COVER	2
74	PFYFF900M	BOTTOM CABINET ASS'Y (for Handset Cradle)	1
75	PFKM1009Z2	UPPER CABINET(for Handset Cradle)	1
		(3. LOWER CABINET SECTION)	
100	PQJM128Z	MICROPHONE	1
101	PQHG556Z	RUBBER, MIC COVER	1
102	PQJS02Q62Z	CONNECTOR, 2 PIN	1
103	PFHG1024Z	SPACER, SPEAKER	1
104	PFAS50PTC01Z	SPEAKER	1
105	PFJS02R20Z	CONNECTOR, 2 PIN	1
106	PFUS1029Y	SPRING, SPEAKER	1
107	PFDE1010Z	LEVER, OPEN SENSOR	1
108	PFDE1009Y	LEVER, JAM SENSOR	1
109	PFDE1011Z	LEVER, PAPER SENSOR	1
110	PFZLF780M	LOCK LEVER ASS'Y	1
111	PFDJ1007Z	SPACER, ROLLER	2
112	PFDN1004Z	ROLLER, SEPARATION	1
113	PQUS10014Z	SPRING, ONE WAY	1
114	PFDG1012Z	GEAR, SEPARATION ROLLER	1
115	XUC2FY	RETAINING RING	1

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Ref. No.	Part No.	Part Name & Description	Pcs
116	PFJQ1003Z	TX MOTOR	1
117	PFJS05R24Z	CONNECTOR, 5 PIN	1
118	PFUA1002Z	CHASSIS, TX GEAR	1
119	PFUS1018X	SPRING, STATIC ELECTRIC	1
120	PFDG1008Z	GEAR, IDLER	1
121	PFDG1009Z	GEAR, IDLER	2
122	PFDG1005Z	GEAR, CHANGEOVER	1
123	PFUS1019Z	SPRING, THRUST	1
124	PFDE1014Z	ARM, CHANGEOVER	1
125	PFDG1010Z	GEAR, IDLER	1
126	PFDG1006Z	GEAR, CUTTER	1
127	PFDE1015Z	ARM, CUTTER	1
128	PFJS02R25Z	CONNECTOR, 2 PIN	1
129	PQST2A04Z	SEESAW SWITCH	1
130	PFJQ1004Z	RX MOTOR	1
131	PFJS05R27Z	CONNECTOR, 5 PIN	1
132	PFUA1003Z	CHASSIS, RX GEAR	1
133	PFDG1011Z	GEAR, IDLER	1
134	PFMD1006Z	FRAME, BOTTOM	1
135	PFDE1017Z	ARM, CUTTER	1
136	PFDE1016Z	ARM, CUTTER	1
137	PFDE1028Z	LEVER, REMOVE	1
138	PQFN51Z	WASHER	1
139	PQHM112Z	CLAMPER	1
140	PQJP03S07Z	CONNECTOR, AC IN LET ⚠	1
141	PQJS02Q59Y	CONNECTOR, 2 PIN	1
142	PFUS1040Z	SPRING, EARTH	1
143	PFUS1017Y	SPRING, STATIC ELECTRIC	1
144	PFDG1007Z	GEAR, IDLER	1
145	PFHA1001Z	RUBBER, LEGS	4
146	PFGT1135Z	NAME PLATE	1
147	PFUS1043Z	SPRING, COVER OPEN SENSOR	1
		(4. CCD SECTION)	
170	PFWLF780M	CHASSIS ASS'Y	1
170-1	PFVDSLA30222	LED ARRAY	1
171	PF0G1001Z	TARGET GLASS	1
172	PFUS1021Z	SPRING, LENS	1
173	PF0L1001Z	LENS	1
174	PFHE1004Z	NUT	2
175	PFJS08R26Z	CONNECTOR, 8 PIN	1
176	PFMD1007Z	COVER, CHASSIS	1
177	PFUS1028Z	SPRING, MIRROR	6
178	PF0M1003Z	MIRROR, SMALL	1
179	PF0M1001Z	MIRROR, LARGE	1
180	PF0M1002Z	MIRROR, MIDDLE	1
		(5. PORTABLE HANDSET SECTION)	
200	PQAX2P04Z	SPEAKER	1
201	PQJT10112Z	CHARGE TERMINAL	3
202	PQJT10113Z	CHARGE TERMINAL	2
203	PQSA10048Z	ANTENNA	1
204	PQSX10043Z	KEYBOARD SWITCH	1
205	PQSX10045Z	KEYBOARD SWITCH	1
206	PQHR10486Z1	SPEAKER HOLDER	1
207	PQKF10183Z1	CABINET COVER	1
208	PFYM2F900M	FRONT CABINET	1
208-1	PFGT1163Z	NAME PLATE	1
208-2	PFQT1205Z	FAX REMOTE LABEL	1
209	PQHS10293Z	COVER	1

Ref. No.	Part No.	Part Name & Description		Pcs
		ACCESSORIES AND PACKING MATERIALS		
A1	PQKK10065Z1	BATTERY COVER (for HANDSET CRADLE)		1
A2	PFYC4F900M	BATTERY COVER ASS'Y (for HANDSET)		1
A2-1	PQQT11236Y	RECYCLE LABEL		1
A3	PQJA200Z	POWER CORD	⚠	1
A4	PQJA59V	TELEPHONE CORD	⚠ S	1
A5	PQUS10136Z	PAPER STACK		1
A6	PFQW1087Z	QUICK REFERENCE GUIDE		1
A7	PFQX1060Z	INSTRUCTION BOOK		1
A8	PQHP10023Z	RECORDING PAPER		1
A9	PQQV10276Z	ADVANTAGE PROGRAM SHEET		1
P1	PFPH1004Z	PROTECTION COVER (for UNIT)		1
P2	PFPK1139Z	GIFT BOX		1
P3	PFPN1045Z	ACCESSORY BOX		1
P4	PFPN1056Z	COMPLETED PAD		1
P5	PQPP10005Z	PROTECTION COVER (for PRINTED MATERS)		1
P6	XZB10X15A04	PROTECTION COVER (for BATTERY COVERS)		1
		DIGITAL BOARD PARTS		
PCB1	PFWP1F900M	DIGITAL P.C.BOARD ASS'Y (RTL)		1
		(ICS)		
IC1	PFVIT7D56	IC		1
IC2	PFWIF900M	IC		1
IC3	PQVICX58257C	IC	S	1
IC7	PQVIBA12003	IC	S	1
IC8	PQVIBA12003	IC	S	1
IC9	PQVIMM1245BF	IC		1
IC10	PQVINJM4558M	IC	S	1
IC11	PQVIR96DFXL	IC		1
		(TRANSISTORS)		
Q1	2SB1322	TRANSISTOR(SI)	S	1
Q2	PQVTDTC114EU	TRANSISTOR(SI)		1
Q3	2SB1322	TRANSISTOR(SI)	S	1
Q4	PQVTDTC114EU	TRANSISTOR(SI)		1
Q6	PQVTDTA143EU	TRANSISTOR(SI)		1
Q7	PQVTDTC114EU	TRANSISTOR(SI)		1
Q8	2SD1819A	TRANSISTOR(SI)	S	1
		(DIDES)		
D 1	RLS71	DIODE(SI)		1
D 2	RLS71	DIODE(SI)		1
D 3	MA7200	DIODE(SI)	S	1
D 4	MA7200	DIODE(SI)	S	1

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Ref. No.	Part No.	Part Name & Description		Pcs
		(BATTERY)		
BAT10	PQPCR2032H09	PRIMARY BATTERY	S	1
		(CONNECTORS)		
CN 1	PQJP11A19Z	CONNECTOR, 11 PIN		1
CN 2	PQJP11A19Z	CONNECTOR, 11 PIN		1
CN3	PQJP07A19Z	CONNECTOR, 7 PIN		1
CN 5	PQJP10G30Y	CONNECTOR, 10 PIN		1
CN 6	PQJP8G30Y	CONNECTOR, 8 PIN		1
CN 7	PQJP02G100Z	CONNECTOR, 2 PIN		1
CN 8	PQJP2G30Z	CONNECTOR, 2 PIN		1
CN 9	PQJP5G30Y	CONNECTOR, 5 PIN		1
CN10	PQJP05G100Z	CONNECTOR, 5 PIN		1
CN11	PQJP09G100Z	CONNECTOR, 9 PIN		1
		(COILS)		
L4	PQLQR1ET	COIL		1
L6	PQLQR1ET	COIL		1
R79	PQLQR2BT	COIL	S	1
R80	PQLQR2BT	COIL	S	1
R81	PQLQR2BT	COIL	S	1
R82	PQLQR2BT	COIL	S	1
R83	PQLQR2BT	COIL	S	1
R84	PQLQR2BT	COIL	S	1
		(CRYSTAL OSCILLATIONS)		
X1	PQVCJ2400N5Z	CRYSTAL OSCILLATOR		1
X2	PQVCL3276N6Z	CRYSTAL OSCILLATOR		1
X3	PQVCJ2400N5Z	CRYSTAL OSCILLATOR		1
		(COMPONENTS COMBINATIONS)		
RA1	EXRV8V101JV	COMPONENTS COMBINATION		1
RA2	EXRV8V101JV	COMPONENTS COMBINATION		1
RA3	EXRV8V101JV	COMPONENTS COMBINATION		1
RA4	EXRV8V101JV	COMPONENTS COMBINATION		1
		(CERAMIC FILTER)		
LC1	EXCEMT222D	CERAMIC FILTER		1

Ref. No.	Part No.	Value	Pcs
		(RESISTORS)	
R 3	ERJ3GEYJ473	47K	1
R 4	ERJ3GEYJ473	47K	1
R 5	ERJ3GEYJ473	47K	1
R 6	ERJ3GEYJ101	100	1
R 7	ERJ3GEYJ101	100	1
R11	PQ4R10XJ101	100	1
R12	PQ4R10XJ101	100	1
R13	PQ4R10XJ101	100	1
R14	PQ4R10XJ101	100	1
R15	PQ4R10XJ101	100	1
R16	PQ4R10XJ101	100	1
R17	PQ4R10XJ101	100	1
R18	PQ4R10XJ101	100	1
R19	PQ4R10XJ101	100	1
R22	ERJ3GEYJ101	100	1
R28	PQ4R10XJ472	4.7K	1
R29	PQ4R10XJ101	100	1
R30	PQ4R10XJ472	4.7K	1
R31	PQ4R10XJ224	220K	1
R32	PQ4R10XJ102	1K	1
R33	PQ4R10XJ102	1K	1
R34	PQ4R10XJ102	1K	1
R35	PQ4R10XJ103	10K	1
R36	PQ4R10XJ472	4.7K	1
R37	PQ4R10XJ151	150	1
R38	PQ4R10XJ000	JUMPER, 0Ω	1
R40	PQ4R10XJ393	39K	1
R41	PQ4R10XJ563	56K	1
R42	PQ4R10XJ562	5.6K	1
R43	PQ4R10XJ821	820	1
R44	ERD25TJ222	2.2K	1
R45	PQ4R10XJ821	820	1
R46	ERD25TJ222	2.2K	1
R47	PQ4R10XJ223	22K	1
R48	PQ4R10XJ563	56K	1
R49	PQ4R10XJ473	47K	1
R50	PQ4R10XJ101	100	1
R51	PQ4R10XJ101	100	1
R52	PQ4R10XJ101	100	1
R53	PQ4R10XJ101	100	1
R54	PQ4R10XJ101	100	1
R55	PQ4R10XJ101	100	1
R56	PQ4R10XJ101	100	1
R57	PQ4R10XJ270	27	1
R58	PQ4R10XJ105	1M	1
R59	PQ4R10XJ103	10K	1
R60	PQ4R10XJ103	10K	1
R61	PQ4R10XJ103	10K	1
R62	PQ4R10XJ000	JUMPER, 0Ω	1
R63	ERD25TJ220	22	1
R65	PQ4R10XJ000	JUMPER, 0Ω	1
R66	PQ4R10XJ000	JUMPER, 0Ω	1
R67	PQ4R10XJ000	JUMPER, 0Ω	1
R70	PQ4R10XJ101	100	1
R71	PQ4R10XJ101	100	1
R72	PQ4R10XJ101	100	1
R73	PQ4R10XJ101	100	1
R74	PQ4R10XJ000	JUMPER, 0Ω	1
R75	PQ4R10XJ000	JUMPER, 0Ω	1
R76	PQ4R10XJ222	2.2K	1
R77	PQ4R10XJ105	1M	1
R78	PQ4R10XJ000	JUMPER, 0Ω	1

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Ref. No.	Part No.	Value		Pcs
R85	PQ4R10XJ000	JUMPER, 0Ω		1
R86	PQ4R10XJ000	JUMPER, 0Ω		1
R87	PQ4R10XJ000	JUMPER, 0Ω		1
R88	PQ4R10XJ000	JUMPER, 0Ω		1
R90	PQ4R10XF1802	18K		1
R91	PQ4R10XF8662	86.6K		1
R92	PQ4R10XJ103	10K		1
R93	ERJ6ENF4752	47.5K		1
R94	PQ4R10XJ473	47K		1
R95	PQ4R10XJ332	3.3K		1
R96	PQ4R10XF8662	86.6K		1
R97	PQ4R10XJ164	160K		1
R98	PQ4R10XJ224	220K		1
L7	PQ4R18XJ000	JUMPER, 0Ω		1
		(CAPACITORS)		
C 8	ECEA0JK221	220	S	1
C11	ECEA1CKS100	10	S	1
C13	ECUV1H101JCV	100P		1
C14	ECUV1H101JCV	100P		1
C15	ECUV1H101JCV	100P		1
C16	ECUV1H101JCV	100P		1
C17	ECUV1H101JCV	100P		1
C18	ECUV1H101JCV	100P		1
C19	ECUV1H101JCV	100P		1
C31	PQCUV1H220JC	22P		1
C32	PQCUV1H220JC	22P		1
C33	ECEA1CK101	100	S	1
C34	ECEA0JK221	220	S	1
C35	PQCUV1E104MD	0.1	S	1
C36	ECEA1VKS4R7	4.7		1
C37	PQCUV1H182KB	0.0018	S	1
C38	PQCUV1H222KB	0.0022	S	1
C39	PQCUV1E104MD	0.1	S	1
C40	PQCUV1E104MD	0.1	S	1
C41	PQCUV1E104MD	0.1	S	1
C42	PQCUV1H150JC	15P		1
C43	PQCUV1H150JC	15P		1
C44	PQCUV1E104MD	0.1	S	1
C45	PQCUV1E104MD	0.1	S	1
C46	PQCUV1E104MD	0.1	S	1
C47	PQCUV1E104MD	0.1	S	1
C48	PQCUV1E104MD	0.1	S	1
C49	PQCUV1E104MD	0.1	S	1
C51	PQCUV1E104MD	0.1	S	1
C52	PQCUV1E104MD	0.1	S	1
C53	PQCUV1E104MD	0.1	S	1
C54	PQCUV1H050DC	5P		1
C55	PQCUV1H050DC	5P		1
C56	PQCUV1E104MD	0.1	S	1
C57	PQCUV1E104MD	0.1	S	1
C58	PQCUV1E104MD	0.1	S	1
C60	PQCUV1E104MD	0.1	S	1
C61	PQCUV1H103KB	0.01	S	1

Ref. No.	Part No.	Part Name & Description & Value		Pcs
C64	PQCUV1E104MD	0.1	S	1
C67	PQCUV1E104MD	0.1	S	1
C68	PQCUV1E104MD	0.1	S	1
C69	PQCUV1E104MD	0.1	S	1
C70	PQCUV1E104MD	0.1	S	1
C71	PQCUV1E104MD	0.1	S	1
C72	PQCUV1E104MD	0.1	S	1
C73	PQCUV1E104MD	0.1		1
C74	PQCUV1E104MD	0.1		1
C75	PQCUV1H102J	0.001		1
C76	PQCUV1E224MD	0.22	S	1
C77	PQCUV1E104MD	0.1	S	1
C78	PQCUV1H331JC	330P	S	1
C79	PQCUV1E104MD	0.1	S	1
C80	PQCUV1H105JC	1	S	1
C81	PQCUV1H331JC	330P	S	1
C82	PQCUV1E104MD	0.1	S	1
C83	PQCUV1H102J	0.001		1
C85	PQCUV1H102J	0.001		1
C86	PQCUV1H102J	0.001		1
C88	PQCUV1H105JC	1	S	1
C89	ECUV1E105ZF	1	S	1
C90	PQCUV1H120JC	12P		1
C91	PQCUV1H180JC	18P		1
C92	PQCUV1E104MD	0.1	S	1
C93	PQCUV1E104MD	0.1	S	1
C94	PQCUV1E104MD	0.1	S	1
C95	PQCUV1E104MD	0.1	S	1

ANALOG BOARD PARTS

PCB2	PFWP3F900M	ANALOG P.C.BOARD ASS'Y (RTL) ⚠	1
		(ICS)	
IC101	PQVINJM2903M	IC	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	PQVIMC34119M	IC	1
		(TRANSISTORS)	
Q101	2SA1627	TRANSISTOR(SI)	1
Q102	2SD1819A	TRANSISTOR(SI) S	1
Q103	2SC2235	TRANSISTOR(SI)	1
Q106	PQVTDTC143E	TRANSISTOR(SI)	1
Q251	2SD1921Q	TRANSISTOR(SI)	1
Q252	2SD1921Q	TRANSISTOR(SI) S	1
Q253	2SD1858R	TRANSISTOR(SI) S	1
Q271	PQVTDTC143E	TRANSISTOR(SI)	1

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Ref. No.	Part No.	Part Name & Description	Pcs
		(DIODES)	
D101	PQVDS1ZB40F1	DIODE(SI)	1
D102	1SS119	DIODE(SI)	1
D151	1SS119	DIODE(SI)	1
D152	1SS119	DIODE(SI)	1
D201	1SS119	DIODE(SI)	1
D202	1SS119	DIODE(SI)	1
D271	RLS71	DIODE(SI)	1
D290	1SS119	DIODE(SI)	1
D291	1SS119	DIODE(SI)	1
ZD101	MA4180	DIODE(SI)	1
ZD102	PQVDHZS2B1	DIODE(SI)	1
ZD103	MA7120	DIODE(SI)	1
		(JACKS)	
JJ1	PFJJ1T01Z	JACK, TELEPHONE LINE	1
JJ2	PFJJ1T01Z	JACK, TELEPHONE LINE	1
		(CONNECTORS)	
CN152	PQJP2G30Z	CONNECTOR, 2 PIN	1
CN153	PFJP18A02Z	CONNECTOR, 18 PIN	1
CN241	PQJP02G100Z	CONNECTOR, 2 PIN	1
CN251	PQJP08B11Z	CONNECTOR, 8 PIN	1
CN271	PQJS11A10Z	CONNECTOR, 11 PIN	1
CN272	PQJS11A10Z	CONNECTOR, 11 PIN	1
CN273	PQJS07A10Z	CONNECTOR, 7 PIN	1
		(SWITCHES)	
SW271	PFSH1A02Z	SWITCH, SENSOR	1
SW272	PFSH1A02Z	SWITCH, SENSOR	1
SW273	PFSH1A02Z	SWITCH, SENSOR	1
SW274	PQSS2A27Z	SWITCH, DIALING MODE	1
		(COILS)	
L103	PQLQR1E32A07	COIL	1
L104	PQLQR1E32A07	COIL	1
L105	PFLE003	COIL	1
		(PHOTO COUPLERS)	
PC101	PQVIPC814K	PHOTO ELECTRIC TRANSDUCER ⚠	1
PC102	PQVITLP627	PHOTO ELECTRIC TRANSDUCER ⚠	1
PC103	PQVIPC817CD	PHOTO ELECTRIC TRANSDUCER ⚠	1
PC105	PQVIPC814K	PHOTO ELECTRIC TRANSDUCER ⚠	1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(VARISTORS)	
SA101	PQVDDSS301L	VARISTOR	1
SA102	PFVDRA102M	VARISTOR	1
		(TRANSFORMERS)	
T101	PQLT8E7A	TRANSFORMER ⚠	1
T102	PQLT8E6A	TRANSFORMER ⚠	1
		(OTHERS)	
L106	EXCELDR35	COMPONENTS COMBINATION	1
POS101	PQRPBC120N	THERMISTOR	1
RL101	PQSL119Z	RELAY ⚠	1
VAR1	PQVDVR61B	VARISTOR S	1
		(RESISTORS)	
R102	PQ4R18XJ000	JUMPER, 0Ω	1
R103	ERDS1TJ330	33	1
R104	ERDS1TJ473	47K	1
R106	ERDS2TJ152	1.5K	1
R107	ERDS1TJ473	47K	1
R109	PQ4R10XJ104	100K	1
R111	PQ4R10XJ472	4.7K	1
R112	PQ4R10XJ393	39K	1
R113	PQ4R10XJ103	10K	1
R114	PQ4R10XJ682	6.8K	1
R115	PQ4R10XJ822	8.2K	1
R116	ERDS2TJ5R6	5.6	1
R117	PQ4R10XJ123	12K	1
R118	PQ4R10XJ562	5.6K	1
R120	PQ4R10XJ391	390	1
R130	ERJ3GEYJ332	3.3K	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	ERJ3GEYJ333	33K	1
R139	ERJ3GEYJ333	33K	1
R140	ERJ3GEYJ333	33K	1
R141	PQ4R10XJ220	22	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
R158	ERJ3GEYJ222	2.2K	1
R159	ERJ3GEYJ222	2.2K	1

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Ref. No.	Part No.	Value	Pcs
R160	ERJ3GEY0R00	JUMPER, 0Ω	1
R161	ERJ3GEYJ103	10K	1
R162	ERJ3GEYJ103	10K	1
R164	ERJ3GEYJ104	100K	1
R165	ERJ3GEYJ103	10K	1
R166	ERJ3GEYJ683	68K	1
R169	ERJ3GEYJ103	10K	1
R170	ERJ3GEYJ683	68K	1
R171	ERJ3GEYJ104	100K	1
R172	ERJ3GEYJ123	12K	1
R173	ERJ3GEY0R00	JUMPER, 0Ω	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	ERJ3GEYJ153	15K	1
R182	ERJ3GEYJ473	47K	1
R184	ERJ3GEYJ183	18K	1
R185	ERJ3GEYJ184	180K	1
R186	ERJ3GEYJ103	10K	1
R187	ERJ3GEYJ124	120K	1
R188	ERJ3GEYJ223	22K	1
R189	ERJ3GEYJ155	1.5M	1
R190	PQ4R10XJ105	1M	1
R191	ERDS2TJ102	1K	1
R192	PQ4R18XJ101	100	1
R201	ERJ3GEYJ102	1K	1
R202	ERJ3GEYJ563	56K	1
R203	ERJ3GEYJ223	22K	1
R204	ERJ3GEYJ563	56K	1
R205	ERJ3GEYJ822	8.2K	1
R206	ERJ3GEYJ184	180K	1
R207	ERJ3GEYJ682	6.8K	1
R208	PQ4R10XJ184	180K	1
R209	ERJ3GEYJ224	220K	1
R210	ERJ3GEYJ393	39K	1
R211	ERJ3GEYJ224	220K	1
R212	PQ4R10XJ104	100K	1
R213	PQ4R10XJ104	100K	1
R214	PQ4R10XJ224	220K	1
R215	ERJ3GEYJ222	2.2K	1
R216	ERJ3GEYJ332	3.3K	1
R217	ERJ3GEY0R00	JUMPER, 0Ω	1
R220	PQ4R10XJ104	100K	1
R221	ERJ3GEYJ682	6.8K	1
R222	ERJ3GEYJ472	4.7K	1
R241	PQ4R10XJ4R7	4.7	1
R242	ERJ3GEYJ103	10K	1
R243	ERJ3GEYJ102	1K	1
R244	ERJ3GEYJ153	15K	1
R245	ERJ3GEYJ123	12K	1
R251	PQ4R10XJ221	220	1
R252	ERDS1TJ122	1.2K	1
R254	PQ4R10XJ103	10K	1
R255	PQ4R10XJ563	56K	1
R256	PQ4R10XJ123	12K	1
R257	PQ4R10XJ222	2.2K	1
R271	ERJ3GEYJ102	1K	1
R272	ERJ3GEYJ101	100	1
R273	ERJ3GEYJ102	1K	1
R274	PQ4R10XJ101	100	1

Ref. No.	Part No.	Value	Pcs
R275	PQ4R10XJ102	1K	1
R276	ERJ3GEYJ101	100	1
R277	PQ4R10XJ472	4.7K	1
R278	PQ4R10XJ101	100	1
R279	ERJ3GEYJ101	100	1
R280	ERJ3GEYJ333	33K	1
R281	ERJ3GEYJ182	1.8K	1
R282	ERJ3GEYJ473	47K	1
R284	ERJ3GEYJ473	47K	1
R290	PQ4R10XJ000	JUMPER, 0Ω	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
R297	ERJ3GEYJ103	10K	1
J108	ERDS2TJ681	680	1
J104	ERJ3GEY0R00	JUMPER, 0Ω	1
J105	ERJ3GEY0R00	JUMPER, 0Ω	1
J250	PQ4R10XJ000	JUMPER, 0Ω	1
J252	PQ4R10XJ000	JUMPER, 0Ω	1
J270	ERJ3GEY0R00	JUMPER, 0Ω	1
J271	ERJ3GEY0R00	JUMPER, 0Ω	1
J272	ERJ3GEY0R00	JUMPER, 0Ω	1
J273	ERJ3GEY0R00	JUMPER, 0Ω	1
J274	ERJ3GEY0R00	JUMPER, 0Ω	1
J275	ERJ3GEY0R00	JUMPER, 0Ω	1
J276	ERJ3GEY0R00	JUMPER, 0Ω	1
C193	ERJ3GEY0R00	JUMPER, 0Ω	1

(CAPACITORS)

C101	ECKD2H681KB	680P	S	1
C102	ECKD2H681KB	680P	S	1
C103	ECQE2E224JZ	0.22	S	1
C104	ECEA1HN3R3S	3.3		1
C105	ECQE2E104KZ	0.1		1
C106	PQCUV1H103KB	0.01	S	1
C107	ECEA1CKS221	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	PQCUV1C224ZF	0.22		1
C133	ECUV1H561JCV	560P	S	1
C134	ECEA1CKS470	47	S	1
C135	ECEA1HKS4R7	4.7	S	1

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Ref. No.	Part No.	Value		Pcs
C136	ECEA0JK221	220	S	1
C137	ECEA1HKS4R7	4.7	S	1
C138	ECUV1C473KBV	0.047		1
C139	ECUV1H223KBV	0.022	S	1
C140	ECEA0JSJ331	330	S	1
C141	PQCUV1H222KB	0.0022	S	1
C142	PQCUV1C224ZF	0.22		1
C143	ECUV1C473KBV	0.047		1
C144	ECEA1HKS010	1	S	1
C145	ECEA1HKS2R2	2.2	S	1
C146	PQCUV1H333JC	0.033	S	1
C155	ECUV1H221JCV	220P		1
C156	ECEA0JKS101	100		1
C157	ECUV1H332KBV	0.0033		1
C158	ECUV1C683KBV	0.068		1
C159	ECUV1C104KBV	0.1		1
C161	PQCUV1H105JC	1	S	1
C162	PQCUV1H105JC	1	S	1
C166	PQCUV1H105JC	1	S	1
C171	PQCUV1H105JC	1	S	1
C172	ECEA0JKS101	100		1
C173	ECUV1C104KBV	0.1		1
C174	ERJ3GEY0R00	JUMPER, 0Ω		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	ECUV1H682KBV	0.0068		1
C184	ECUV1C104KBV	0.1		1
C186	ECUV1H332KBV	0.0033		1
C187	ECUV1C104KBV	0.1		1
C188	ECUV1H332KBV	0.0033		1
C189	ECUV1H332KBV	0.0033		1
C201	PQCUV1H102J	0.001	S	1
C202	ECEA1HKS4R7	4.7		1
C203	PQCUV1E104MD	0.1		1
C204	ECUV1H680JCV	68P		1
C205	PQCUV1E104MD	0.1		1
C206	PQCUV1H101JC	100P		1
C207	PQCUV1E104MD	0.1		1
C208	ECUV1H101JCV	100P		1
C209	ECUV1H103KBV	0.01		1
C210	ECEA1HKS100	10		1
C211	ECEA1CKS100	10	S	1
C212	ECEA1HKS100	10		1
C213	ECUV1C104KBV	0.1		1
C214	ECUV1C104KBV	0.1		1
C217	ECUV1C104KBV	0.1		1
C218	PQCUV1C224ZF	0.22		1
C241	ECEA0JKS101	100		1
C242	ECUV1H102KBV	0.001		1
C243	PQCUV1H105JC	1	S	1
C244	PQCUV1H105JC	1	S	1
C245	PQCUV1E273MD	0.027		1
C251	PQCUV1H104ZF	0.1		1
C252	ECEA1HU330	33		1
C253	ECEA1HU330	33		1
C254	PQCUV1E104MD	0.1		1
C255	ECEA1EU101	100		1
C256	PQCUV1H104ZF	0.1		1

Ref. No.	Part No.	Value		Pcs
C257	ECEA1HU330	33		1
C265	ECUV1H104ZFV	0.1		1
C271	ECUV1H103KBV	0.01		1
C272	PQCUV1H103KB	0.01	S	1
C273	PQCUV1H103KB	0.01	S	1
C274	PQCUV1H103KB	0.01	S	1
C276	ECUV1H103KBV	0.01		1
C277	ECUV1H104ZFV	0.1		1
C278	PQCUV1C334ZF	0.33		1
C279	ECUV1H330JCV	33P		1
C290	ECUV1C104KBV	0.1		1
C291	ECUV1H103KBV	0.01		1

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Ref. No.	Part No.	Part Name & Description		Pcs
		OPERATION BOARD PARTS		
PCB3	PFLP1058M	OPERATION P.C.BOARD ASS'Y (RTL)		1
		(IC)		
IC301	MN53007QAF	IC		1
		(DIODES)		
D303	1SS131	DIODE(SI)		1
D304	1SS131	DIODE(SI)	S	1
LED301	PQVDR325CA47	LED	S	1
LED306	PQVDR325CA47	LED	S	1
LED307	PQVDSLR325MC	LED		1
		(SWITCHES)		
S301	PQSH1A105Z	SWITCH, VOLUME	S	1
S303	PQSH1A105Z	SWITCH, ONE-TOUCH	S	1
S304	PQSH1A105Z	SWITCH, ONE-TOUCH	S	1
S305	PQSH1A105Z	SWITCH, STOP	S	1
S307	PQSH1A105Z	SWITCH, ONE-TOUCH	S	1
S308	PQSH1A105Z	SWITCH, ONE-TOUCH	S	1
S309	PQSH1A105Z	SWITCH, START/COPY/SET	S	1
S311	PQSH1A105Z	SWITCH, LOWER	S	1
S312	PQSH1A105Z	SWITCH, ONE-TOUCH	S	1
S313	PQSH1A105Z	SWITCH, VOLUME	S	1
S314	PQSH1A105Z	SWITCH, DIAL "3"	S	1
S315	PQSH1A105Z	SWITCH, DIAL "2"	S	1
S316	PQSH1A105Z	SWITCH, DIAL "1"	S	1
S317	PQSH1A105Z	SWITCH, SP-PHONE	S	1
S318	PQSH1A105Z	SWITCH, MUTE	S	1
S319	PQSH1A105Z	SWITCH, REDIAL/PAUSE	S	1
S320	PQSH1A105Z	SWITCH, FLASH	S	1
S321	PQSH1A105Z	SWITCH, HELP	S	1
S322	PQSH1A105Z	SWITCH, DIAL "6"	S	1
S323	PQSH1A105Z	SWITCH, DIAL "5"	S	1
S324	PQSH1A105Z	SWITCH, DIAL "4"	S	1
S325	PQSH1A105Z	SWITCH, DIRECTORY	S	1
S326	PQSH1A105Z	SWITCH, DIAL "9"	S	1
S327	PQSH1A105Z	SWITCH, DIAL "8"	S	1
S328	PQSH1A105Z	SWITCH, DIAL "7"	S	1
S329	PQSH1A105Z	SWITCH, AUTO RECEIVE	S	1
S330	PQSH1A105Z	SWITCH, DIAL "#"	S	1
S331	PQSH1A105Z	SWITCH, DIAL "0"	S	1
S332	PQSH1A105Z	SWITCH, DIAL " * "	S	1
S333	PQSH1A105Z	SWITCH, MEMU	S	1
S334	PQSH1A105Z	SWITCH, RESOLUTION	S	1
S335	PQSH1A105Z	SWITCH, LOCATOR/INTERCOM	S	1
		(CONNECTORS)		
CN301	PQJP10G43Y	CONNECTOR, 10 PIN		1
CN302	PQJS10X59Z	CONNECTOR, 10 PIN		1

Ref. No.	Part No.	Part Name & Description & Value		Pcs
		(PHOTO COPLERS)		
PI301	CNA1006N	PHOTO ELECTRIC TRANSDUCER		1
PI302	CNA1006N	PHOTO ELECTRIC TRANSDUCER		1
		(RESISTORS)		
R307	PQ4R10XJ181	180		1
R308	PQ4R10XJ181	180		1
R309	PQ4R10XJ181	180		1
R310	PQ4R10XJ181	180		1
R311	PQ4R10XJ181	180		1
R312	PQ4R10XJ181	180		1
R320	PQ4R10XJ680	68		1
R322	PQ4R10XJ222	2.2K		1
R323	PQ4R10XJ471	470		1
R328	PQ4R10XJ471	470		1
R329	PQ4R10XJ102	1K		1
R330	PQ4R10XJ472	4.7K		1
R331	PQ4R10XJ331	330		1
R332	PQ4R10XJ331	330		1
R333	PQ4R10XJ563	56K		1
R334	PQ4R10XJ181	180		1
R335	PQ4R10XJ181	180		1
R336	PQ4R10XJ181	180		1
R337	PQ4R10XJ181	180		1
R338	PQ4R10XJ181	180		1
R339	PQ4R10XJ181	180		1
R340	PQ4R10XJ181	180		1
R341	PQ4R10XJ181	180		1
R350	PQ4R10XJ181	180		1
R351	PQ4R10XJ181	180		1
R352	PQ4R10XJ103	10K		1
R353	PQ4R10XJ103	10K		1
R354	PQ4R10XJ471	470		1
R392	PQ4R10XJ000	JUMPER, 0Ω		1
		(CAPACITORS)		
C301	PQCUV1E104MD	0.1	S	1
C302	ECEA1AKS101	100		1
C305	PQCUV1H122KB	0.0012	S	1
C307	PQCUV1H331JC	330P		1
C308	PQCUV1H331JC	330P		1
C309	PQCUV1H331JC	330P		1
C310	PQCUV1H331JC	330P		1
C314	PQCUV1E104MD	0.1	S	1
C316	PQCUV1E104MD	0.1	S	1
C318	PQCUV1E104MD	0.1	S	1
C319	PQCUV1E104MD	0.1	S	1

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Ref. No.	Part No.	Part Name & Description & Value		Pcs
		CCD BOARD PARTS		
PCB4	PFWP2F780M	CCD P.C.BOARD ASS'Y (RTL)		1
		(TRANSISTORS)		
Q801	2SB1218A	TRANSISTOR(SI)	S	1
Q802	2SB1218A	TRANSISTOR(SI)	S	1
Q803	2SD1819A	TRANSISTOR(SI)	S	1
		(CONNECTOR)		
CN801	PFJS08R26Z	CONNECTOR, 8 PIN		1
		(OTHERS)		
VR801	EVNDXAA03B23	VARIABLE RESISTOR		1
E500	PQHR5135Z	SPACER		1
		(RESISTORS)		
R801	PQ4R10XJ202	2K		1
R802	PQ4R10XJ202	2K		1
R803	PQ4R10XJ100	10		1
R804	PQ4R10XJ242	2.4K		1
R805	PQ4R10XJ272	2.7K		1
R806	PQ4R10XJ242	2.4K		1
R807	PQ4R10XJ272	2.7K		1
R808	PQ4R10XJ471	470		1
R809	PQ4R10XJ471	470		1
R810	PQ4R10XJ681	680		1
R811	PQ4R10XJ101	100		1
R812	PQ4R10XJ101	100		1
R830	PQ4R10XJ000	JUMPER, 0Ω		1
J801	PQ4R18XJ000	JUMPER, 0Ω		1
J802	PQ4R10XJ000	JUMPER, 0Ω		1
J803	PQ4R10XJ000	JUMPER, 0Ω		1
		(CAPACITORS)		
C801	PQCUV1E104MD	0.1	S	1
C803	ECEA1CKS101	100		1
C804	PQCUV1E104MD	0.1	S	1

Ref. No.	Part No.	Part Name & Description		Pcs
		SWITCHING POWER SUPPLY BOARD PARTS		
PCB5	PFLP1038MM1	POWER SUPPLY P.C.BOARD ASS'Y (RTL)	⚠	1
		(ICS)		
IC101	PFVIFA5317P	IC		1
IC201	AN1431T	IC	S	1
IC202	PFVINJ2360AD	IC		1
		(TRANSISTORS)		
Q101	PQVTFS10KM10	TRANSISTOR(SI)		1
Q201	2SC4604	TRANSISTOR(SI)		1
		(DIODES)		
D101	PQVDD2SBA60	DIODE(SI)		1
D102	PQVDERA1802	DIODE(SI)	S	1
D103	PFVDAG01A	DIODE(SI)		1
D104	MA165	DIODE(SI)	S	1
D105	MA4220	DIODE(SI)	S	1
D106	MA165	DIODE(SI)	S	1
D201	MA6D49	DIODE(SI)	S	1
D202	MA2300	DIODE(SI)	S	1
D203	PQVDERA81004	DIODE(SI)		1
D204	MA4075	DIODE(SI)	S	1
D205	MA165	DIODE(SI)	S	1
		(CONNECTORS)		
CN31	PQJP2D98Z	CONNECTOR, 2 PIN		1
CN301	PQJP6G100Z	CONNECTOR, 6 PIN		1
CN302	PQJS08A36Z	CONNECTOR, 8 PIN		1
		(COILS)		
L101	ELF18D290	COIL	⚠ S	1
L102	ELF18D290	COIL	⚠ S	1
L201	PQLQXL471K	COIL		1
		(VARISTORS)		
ZNR101	ERZV10DK471U	VARISTOR	⚠ S	1
ZNR102	ERZV10DK182U	VARISTOR	⚠ S	1
ZNR103	ERZV10DK751U	VARISTOR	⚠ S	1

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Ref. No.	Part No.	Part Name & Description & Value		Pcs
		(COMPONENTS COMBINATIONS)		
L103	EXCELDR35	COMPONENTS COMBINATION		1
L203	EXCELDR35	COMPONENTS COMBINATION	S	1
		(PHOTO COUPLERS)		
PC101	ON3131S	PHOTO ELECTRIC TRANSDUCER	⚠	1
PC102	ON3131S	PHOTO ELECTRIC TRANSDUCER	⚠	1
		(OTHERS)		
F101	PQBA1C50NBKL	FUSE	⚠	1
T101	PFLTR297101	TRANSFORMER	⚠	1
TH101	PFRTM8R207C	THERMISTOR	S	1
VR201	EVNDJAA03B53	VARIABLE RESISTOR	S	1
RL201	PQSLG5P1	RELAY	S	1
		(RESISTORS)		
R101	ERDS1FJ105	1M	⚠	1
R102	ERDS2TJ393	39K		1
R103	ERDS2TJ393	39K		1
R104	ERG1SJU100	10		1
R105	ERX2SJR22	0.22		1
R106	ERDS2TJ010	1		1
R107	ERDS2TJ220	22		1
R108	ERDS2FJ150	15		1
R109	ERDS2TJ273	27K		1
R110	ERG1SJ104	100K		1
R111	ERDS2TJ273	27K		1
R112	ERDS2TJ273	27K		1
R113	ERDS2TJ273	27K		1
R114	ERDS2TJ220	22		1
R121	PQ4R10XJ103	10K		1
R122	PQ4R10XJ471	470		1
R124	PQ4R10XJ181	180		1
R125	PQ4R10XJ101	100		1
R126	PQ4R10XJ562	5.6K		1
R127	PQ4R10XJ222	2.2K		1
R201	ERG1SJR33	0.33		1
R202	ERDS2TJ121	120		1
R204	ERDS2TJ563	56K		1
R205	ERDS2TJ103	10K		1
R221	PQ4R10XJ222	2.2K		1
R222	PQ4R10XJ222	2.2K		1
R223	PQ4R10XJ101	100		1
R224	PQ4R10XJ273	27K		1
R225	PQ4R10XJ332	3.3K		1
R227	PQ4R10XJ392	3.9K		1
R228	PQ4R10XJ122	1.2K		1
J12	PQ4R18XJ000	JUMPER, 0Ω		1
J13	PQ4R10XJ000	JUMPER, 0Ω		1

Ref. No.	Part No.	Part Name & Description & Value		Pcs
		(CAPACITORS)		
C101	ECQU2A104MV	0.1	⚠	1
C102	ECQU2A104MV	0.1	⚠	1
C103	ECKDRS102MB	0.001	⚠	1
C104	ECKDRS102MB	0.001	⚠	1
C105	ECKDKC472KB	0.0047	⚠	1
C106	EETLD2D151	150		1
C107	ECKD3A221KBP	220P		1
C108	ECKD3A102KBP	0.001		1
C109	ECA1VHG330	33		1
C121	ECUV1H221KBM	220P		1
C122	ECUV1C224KBX	0.22		1
C123	ECUV1H561KBM	560P		1
C124	ECUV1H473KBW	0.047		1
C201	EEUFA1V103	0.001		1
C202	ECKD3A102KBP	0.001		1
C204	PQCEA10B1000	1000		1
C221	ECUV1H104KBW	0.1		1
C223	ECUV1H271KBM	270P		1

CORDLESS BASE BOARD PARTS

PCB6	PFLP1056M	CORDLESS BASE P.C.BOARD ASS'Y (RTL)	1
		(ICS)	
IC501	PFVI0008GE12	IC	1
IC502	AN6165SB	IC	1
IC503	PQVITC4069UBF	IC	1
IC504	PQVINJ2360D	IC	1
		(TRANSISTORS)	
Q502	2SD601R	TRANSISTOR(SI)	1
Q503	2SD601R	TRANSISTOR(SI)	1
Q504	2SD601R	TRANSISTOR(SI)	1
Q505	2SB970A	TRANSISTOR(SI)	1
Q506	PQVTDTC144E	TRANSISTOR(SI)	1
Q507	PQVTDTC144E	TRANSISTOR(SI)	1
Q508	2SB970A	TRANSISTOR(SI)	1
Q509	2SB1416	TRANSISTOR(SI)	1
Q510	2SB1322	TRANSISTOR(SI)	1
Q511	2SK543	TRANSISTOR(SI)	1
Q512	PQVTDTC144E	TRANSISTOR(SI)	1

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Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(DIODES)	
D501	PQVDSB703Q	DIODE(SI)	1
D503	1SS131	DIODE(SI)	1
D504	MA110	DIODE(SI)	1
D505	1SS131	DIODE(SI)	1
D506	MA110	DIODE(SI)	1
D507	MA110	DIODE(SI)	1
D508	MA110	DIODE(SI)	1
D509	PQVDS5688G	DIODE(SI)	1
D510	PQVDAK04A	DIODE(SI)	1
D511	MA4075	DIODE(SI)	1
D513	PQVDDSS301L	VARISTOR	1
		(CONNECTORS)	
CN501	PFJP18A02Z	CONNECTOR, 18 PIN	1
CN502	PQJP12B44Z	CONNECTOR, 12 PIN	1
CN503	PQJP8G30Y	CONNECTOR, 8 PIN	1
AG	PQJP18Z	CONNECTOR LEAD	1
DG	PQJP18Z	CONNECTOR LEAD	1
		(COILS)	
L501	PQLQR1KT	COIL	1
L502	PQLQR1KT	COIL	1
L506	PQLQR1KT	COIL	1
L507	PQLQR1KT	COIL	1
L508	PQLQR1KT	COIL	1
L517	PQLQZM2R2K	COIL	1
L519	PQLQXH152J	COIL	1
L520	PQLQR1KT	COIL	1
		(OTHERS)	
PCB6-1	PQLP10179M	RF UNIT P.C.BOARD	1
E601	PQHR10484Z	HOLDER for RF UNIT	1
VR501	EVNDXAA03B24	VARIABLE RESISTOR	1
VR502	EVNDXAA03B54	VARIABLE RESISTOR	1
X501	PQVBT3.99G1	CERAMIC FILTER	1
		(RESISTORS)	
R501	PQ4R10XJ102	1K	1
R502	PQ4R10XJ102	1K	1
R503	PQ4R10XJ000	JUMPER, 0Ω	1
R504	PQ4R10XJ102	1K	1
R505	PQ4R10XJ102	1K	1
R506	PQ4R10XJ102	1K	1
R510	PQ4R10XJ104	100K	1
R511	PQ4R10XJ105	1M	1
R512	PQ4R10XJ104	100K	1
R518	PQ4R10XJ000	JUMPER, 0Ω	1

Ref. No.	Part No.	Value	Pcs
R519	PQ4R10XJ000	JUMPER, 0Ω	1
R520	PQ4R10XJ000	JUMPER, 0Ω	1
R521	PQ4R10XJ000	JUMPER, 0Ω	1
R522	PQ4R10XJ224	220K	1
R523	PQ4R10XJ224	220K	1
R524	PQ4R10XJ000	JUMPER, 0Ω	1
R525	PQ4R10XJ000	JUMPER, 0Ω	1
R526	PQ4R10XJ000	JUMPER, 0Ω	1
R530	PQ4R10XJ000	JUMPER, 0Ω	1
R534	ERDS1TJ560	56	1
R535	ERDS1TJ470	47	1
R539	PQ4R10XJ104	100K	1
R540	PQ4R18XJ332	3.3K	1
R541	PQ4R10XJ562	5.6K	1
R542	PQ4R10XJ103	10K	1
R543	ERDS2TJ221	220	1
R544	ERDS2TJ221	220	1
R545	ERDS1TJ101	100	1
R546	ERDS1TJ560	56	1
R548	PQ4R10XJ104	100K	1
R549	PQ4R10XJ103	10K	1
R550	PQ4R10XJ103	10K	1
R553	PQ4R10XJ562	5.6K	1
R554	PQ4R10XJ103	10K	1
R557	PQ4R10XJ000	JUMPER, 0Ω	1
R558	PQ4R10XJ000	JUMPER, 0Ω	1
R561	PQ4R10XJ000	JUMPER, 0Ω	1
R562	PQ4R10XJ000	JUMPER, 0Ω	1
R563	PQ4R10XJ154	150K	1
R564	PQ4R10XJ105	1M	1
R565	PQ4R10XJ154	150K	1
R567	PQ4R10XJ333	33K	1
R568	PQ4R10XJ563	56K	1
R569	PQ4R10XJ123	12K	1
R570	PQ4R10XJ123	12K	1
R571	PQ4R10XJ223	22K	1
R572	PQ4R10XJ000	JUMPER, 0Ω	1
R573	PQ4R10XJ333	33K	1
R574	PQ4R10XJ333	33K	1
R575	PQ4R10XJ000	JUMPER, 0Ω	1
R576	PQ4R10XJ822	8.2K	1
R577	PQ4R10XJ153	15K	1
R578	PQ4R10XJ153	15K	1
R579	PQ4R10XJ123	12K	1
R580	PQ4R10XJ563	56K	1
R581	PQ4R10XJ472	4.7K	1
R582	PQ4R10XJ682	6.8K	1
R583	PQ4R10XJ102	1K	1
R584	PQ4R10XJ102	1K	1
R585	PQ4R10XJ154	150K	1
R587	ERX2SJR82	0.82	1
R588	ERDS2TJ101	100	1
R589	ERDS1TJ102	1K	1
R590	ER0S2TKF8661	8.66K	1
R591	ER0S2TKF1001	1K	1
R592	PQ4R10XJ223	22K	1
R593	PQ4R10XJ103	10K	1
R594	PQ4R10XJ332	3.3K	1
R595	PQ4R10XJ823	82K	1
R596	PQ4R10XJ471	470	1
R598	PQ4R10XJ123	12K	1
R599	PQ4R10XJ562	5.6K	1

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Ref. No.	Part No.	Value		Pcs
R600	PQ4R10XJ563	56K		1
R601	PQ4R10XJ000	JUMPER, 0Ω		1
R602	PQ4R10XJ000	JUMPER, 0Ω		1
R603	PQ4R10XJ473	47K		1
R604	PQ4R10XJ332	3.3K		1
R605	PQ4R10XJ000	JUMPER, 0Ω		1
R606	PQ4R10XJ123	12K		1
R607	PQ4R18XJ472	4.7K		1
R608	PQ4R10XJ393	39K		1
R609	PQ4R10XJ683	68K		1
R610	PQ4R10XJ394	390K		1
R611	PQ4R10XJ564	560K		1
R612	PQ4R10XJ183	18K		1
R613	PQ4R10XJ104	100K		1
R614	PQ4R10XJ124	120K		1
R615	PQ4R10XJ000	JUMPER, 0Ω		1
R616	PQ4R10XJ474	470K		1
R617	PQ4R10XJ683	68K		1
R618	PQ4R10XJ474	470K		1
R619	PQ4R10XJ102	1K		1
R620	PQ4R10XJ103	10K		1
R621	PQ4R10XJ000	JUMPER, 0Ω		1
R622	PQ4R10XJ563	56K		1
L505	PQ4R10XJ000	JUMPER, 0Ω		1
		(CAPACITORS)		
C501	PQCUV1H103KB	0.01	S	1
C502	PQCUV1E104MD	0.1	S	1
C503	PQCUV1E104MD	0.1	S	1
C504	PQCUV1H105JC	1	S	1
C507	ECEA1EU470	47	S	1
C508	ECEA1EU470	47	S	1
C509	ECEA0JU102	1000		1
C510	PQCUV1E104MD	0.1	S	1
C511	PQCUV1H103KB	0.01	S	1
C512	PQCUV1H103KB	0.01	S	1
C513	PQCUV1H103KB	0.01	S	1
C514	PQCUV1H103KB	0.01	S	1
C515	PQCUV1H103KB	0.01	S	1
C516	PQCUV1H103KB	0.01	S	1
C518	PQCUV1H152KB	0.0015	S	1
C520	ECEA1HU220	22	S	1
C522	PQCUV1H105JC	1	S	1
C523	ECEA1HU4R7	4.7		1
C524	ECEA1HU100	10	S	1
C525	PQCUV1H272KB	0.0027		1
C526	ECEA1EU101	100	S	1
C527	PQCUV1H151JC	150P		1
C528	PQCUV1H123MD	0.012	S	1
C529	PQCUV1H392KB	0.0039		1
C530	ECEA1HU100	10	S	1
C531	ECEA1HU4R7	4.7		1
C532	PQCUV1H391JC	390P		1
C533	PQCUV1H123MD	0.012	S	1
C534	PQ4R10XJ000	0		1
C535	PQCUV1H822KB	0.0082		1

Ref. No.	Part No.	Part Name & Description & Value		Pcs
C536	PQCUV1E104MD	0.1		1
C537	PQCUV1H105JC	1	S	1
C538	ECEA1CK101	100	S	1
C539	PQCUV1C474ZF	0.47		1
C540	PQCUV1E104MD	0.1		1
C541	PQCUV1E104MD	0.1		1
C542	PQCUV1E473MD	0.047		1
C545	ECEA1HU220	22	S	1
C546	PQCUV1E333MD	0.033		1
C547	ECQV1H684JM	0.68		1
C548	PQCUV1C224ZF	0.22		1
C549	PQCUV1E104MD	0.1	S	1
C550	PQCUV1H221JC	220P		1
C551	PQCUV1E473MD	0.047		1
C552	PQCUV1H221JC	220P		1
C553	PQCUV1H105JC	1	S	1
C554	ECEA1HU100	10	S	1
C555	ECEA1HU010	1		1
C556	PQCUV1C683MD	0.068		1
C558	ECEA1VGE101	100		1
C559	ECCD1H151JC	150P	S	1
C560	ECEA1CKS221	220	S	1
C561	PQ4R18XJ000	0		1
C564	PQCUV1H101JC	100P	S	1
C568	PQCUV1H105JC	1	S	1
C569	PQCUV1E104MD	0.1	S	1
C570	PQCUV1E104MD	0.1	S	1
C571	PQCUV1E104MD	0.1		1
C572	PQCUV1E104MD	0.1		1
C573	PQCUV1H222KB	0.0022		1
C574	PQCUV1H331JC	330P		1
		RF UNIT PARTS		
PCB6-1	PQLP10179M	RF UNIT P.C.BOARD ASS'Y (RTL)		1
		(ICS)		
IC301	PQVIM64084AG	IC		1
IC302	PQVIDBL5018V	IC		1
		(TRANSISTORS)		
Q301	2SC4571R77	TRANSISTOR(SI)	S	1
Q302	2SC4571R77	TRANSISTOR(SI)	S	1
Q303	2SC4226R24	TRANSISTOR(SI)		1
Q304	2SC4226R24	TRANSISTOR(SI)		1
Q305	2SC4116	TRANSISTOR(SI)		1
Q308	2SD601A	TRANSISTOR(SI)		1
Q309	PQVTD123J106	TRANSISTOR(SI)		1
Q310	PQVTD123J106	TRANSISTOR(SI)		1

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Ref. No.	Part No.	Part Name & Description	Pcs
		(DIODES)	
D301	PQVDRB751H4	DIODE(SI)	1
D302	PQVDRB751H4	DIODE(SI)	1
D303	MA110	DIODE(SI)	1
D304	MA110	DIODE(SI)	1
D305	MA2S111	DIODE(SI)	1
D306	MA110	DIODE(SI)	1
D310	MA8047	DIODE(SI)	1
C391	MA110	DIODE(SI)	1
		(CONNECTOR)	
CN301	PQJS12A99Z	CONNECTOR, 12 PIN	1
		(CERAMIC FILTERS)	
FL301	PQVSM903C10L	CERAMIC FILTER	1
FL302	PQVS705CE927	CERAMIC FILTER	1
FL303	PQVFSFE107MJ	CERAMIC FILTER	1
FL304	PQVFCFH450B1	CERAMIC FILTER	1
		(COILS)	
L301	PQLQR1RM601	COIL	1
L302	PQLQR1RM601	COIL	1
L303	MQLRE10NJF	COIL	1
L304	PQLQR2N3R3KT	COIL	1
L322	PQLQR1RM601	COIL	1
R389	PQLQR1RM601	COIL	1
		(CRYSTALS)	
RX VCO	PQV030Z	CRYSTAL OSCILLATOR	1
TX VCO	PQV031Z	CRYSTAL OSCILLATOR	1
		(OTHERS)	
E650	PQMC10214Z	MAGNETIC SHIELD COVER	1
E651	PQMC10215Z	MAGNETIC SHIELD COVER	1
L305	PQLI2B201	I.F. TRANSFORMER	1
VC301	ECRLA010A53R	TRIMMER CAPACITOR	1
VR301	EVN5ESX50B54	VARIABLE RESISTOR	1
X301	PQVCJ1025N0Z	VARIABLE CAPACITOR	1

Ref. No.	Part No.	Value	Pcs
		(RESISTORS)	
R301	ERJ3GEYJ333	33K	1
R302	ERJ3GEYJ470	47	1
R303	ERJ3GEYJ101	100	1
R304	ERJ3GEYJ333	33K	1
R305	ERJ3GEYJ821	820	1
R306	ERJ3GEYJ681	680	1
R307	ERJ3GEYJ223	22K	1
R308	ERJ3GEYJ153	15K	1
R309	ERJ3GEYJ153	15K	1
R310	ERJ3GEYJ222	2.2K	1
R311	ERJ3GEYJ223	22K	1
R312	ERJ3GEYJ223	22K	1
R313	ERJ3GEYJ470	47	1
R314	ERJ3GEYJ470	47	1
R315	ERJ3GEYJ681	680	1
R316	ERJ3GEYJ153	15K	1
R317	ERJ3GEYJ153	15K	1
R318	ERJ3GEYJ223	22K	1
R319	ERJ3GEYJ474	470K	1
R320	ERJ3GEYJ470	47	1
R321	ERJ3GEYJ391	390	1
R323	ERJ3GEYJ474	470K	1
R324	ERJ3GEYJ102	1K	1
R325	ERJ3GEYJ104	100K	1
R327	ERJ3GEYJ824	820K	1
R328	ERJ3GEYJ472	4.7K	1
R329	ERJ3GEYJ334	330K	1
R330	ERJ3GEYJ154	150K	1
R331	ERJ3GEYJ821	820	1
R332	ERJ3GEYJ102	1K	1
R334	ERJ3GEYJ222	2.2K	1
R335	ERJ3GEYJ222	2.2K	1
R336	ERJ3GEYJ103	10K	1
R337	ERJ3GEYJ220	22	1
R338	ERJ3GEYJ222	2.2K	1
R339	ERJ3GEYJ222	2.2K	1
R340	ERJ3GEYJ222	2.2K	1
R342	ERJ3GEYJ101	100	1
R350	ERJ3GEYJ821	820	1
R353	ERJ3GEYJ222	2.2K	1
R356	ERJ3GEYJ000	JUMPER, 0Ω	1
R357	ERJ3GEYJ392	3.9K	1
R358	ERJ3GEYJ222	2.2K	1
R359	ERJ3GEYJ680	68	1
R360	ECUV1H040CCV	4P	1
R361	ERJ3GEYJ000	JUMPER, 0Ω	1
R362	ERJ3GEYJ680	68	1
L306	ERJ3GEYJ000	JUMPER, 0Ω	1
L317	ERJ3GEYJ120	12	1
L318	ERJ3GEYJ220	22	1
C630	ERJ3GEYJ470	47	1
C632	ERJ3GEYJ000	JUMPER, 0Ω	1
C312	ERJ3GEYJ470	47	1
C394	ERJ3GEYJ000	JUMPER, 0Ω	1

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Ref. No.	Part No.	Value		Pcs
		(CAPACITORS)		
C302	ECUV1H0R5CCV	0.5		1
C303	ECUV1H050CCV	5P		1
C304	ECUV1H102KBV	0.001		1
C305	ECUV1H020CCV	2P		1
C306	ECUV1H102KBV	0.001		1
C308	ECUV1H030CCV	3P		1
C309	ECUV1H030CCV	3P		1
C310	ECEA1CKS470	47	S	1
C311	ECUV1H102KBV	0.001		1
C313	PQCUV1C224ZF	0.22		1
C314	ECUV1H682KBV	0.0068		1
C315	ECUV1H332KBV	0.0033		1
C317	ECUV1H820JCV	82P		1
C318	ECUV1H430JCV	43P		1
C319	ECUV1H080DCV	8P		1
C320	ECUV1H103KBV	0.01		1
C321	ECUV1H020CCV	2P		1
C322	ECUV1H030CCV	3P		1
C323	ECUV1H102KBV	0.001		1
C324	ECUV1H102KBV	0.001		1
C325	ECUV1H102KBV	0.001		1
C327	ECUV1H102KBV	0.001		1
C328	ECUV1H060DCV	6P		1
C329	ECUV1H040CCV	4P		1
C330	ECUV1H103KBV	0.01		1
C331	ECEA1CKS470	47	S	1
C333	ECUV1H223KBV	0.022	S	1
C334	PQCUV1C224ZF	0.22		1
C336	ECUV1H680JCV	68P		1
C337	ECUV1H103KBV	0.01		1
C338	ECUV1H220JCV	22P		1
C339	PQCUV1C224ZF	0.22	S	1
C340	ECUV1H101JCV	100P		1
C341	ECUV1H333KDV	0.033	S	1
C342	ECUV1H102KBV	0.001		1
C343	ECUV1H102KBV	0.001		1
C345	ECUV1H472KBV	0.0047		1
C346	ECUV1H020CCV	2P		1
C348	ECUV1H103KBV	0.01		1
C349	ECUV1H103KBV	0.01		1
C350	ECUV1H103KBV	0.01		1
C351	PQCUV1H105JC	1	S	1
C352	ECUV1H103KBV	0.01		1
C354	ECUV1H060DCV	6P		1
C376	ECUV1H102KBV	0.001		1
C380	ECST0JX336	330		1
C381	ECUV1H1R5CCV	1.5		1
C385	ECUV1H101JCV	100P		1
C386	ECUV1H102KBV	0.001		1
C387	ECUV1H102KBV	0.001		1
C388	ECUV1H101JCV	100P		1
C389	ECUV1H020CCV	2P		1
C390	ECUV1H020CCV	2P		1
C392	ECUV1H102KBV	0.001		1
C393	ECUV1H103KBV	0.01		1
C395	ECEA1CKS100	10	S	1
C398	ECUV1H101JCV	100P		1
C399	ECUV1A105ZFV	1		1
C600	ECUV1H101JCV	100P		1
C601	ECUV1H101JCV	100P		1
C602	ECUV1H101JCV	100P		1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
C603	ECUV1H101JCV	100P	1
C604	ECUV1H101JCV	100P	1
C605	ECUV1H101JCV	100P	1
C606	ECUV1H101JCV	100P	1
C607	ECUV1H101JCV	100P	1
C608	ECUV1H101JCV	100P	1
C610	ECUV1H101JCV	100P	1
C611	ECUV1H101JCV	100P	1
C612	ECUV1H101JCV	100P	1
C613	ECUV1H101JCV	100P	1
C615	ECUV1H101JCV	100P	1
C616	ECUV1H101JCV	100P	1
C617	ECUV1H101JCV	100P	1
C618	ECUV1H101JCV	100P	1
C620	ECUV1H101JCV	100P	1
C621	ECUV1H101JCV	100P	1
C622	ECUV1H101JCV	100P	1
C623	ECUV1H101JCV	100P	1
C624	ECUV1H101JCV	100P	1
C625	ECUV1H101JCV	100P	1
		PORTABLE HANDSET BOARD PARTS	
PCB7	PQWP1TC910BR	PORTABLE HANDSET P.C.BOARD ASS'Y (RTL)	1
		(ICS)	
IC201	MN151233KZAB	IC	1
IC202	AN6165SB	IC	1
IC203	AN6183SE1	IC S	1
IC204	PQVIXCC3501P	IC	1
IC205	PQVIXC3002PR	IC	1
IC206	PQVIXCC3202P	IC	1
IC207	PQVIXC3002PR	IC	1
IC208	PQVINJM2113V	IC	1
IC401	PQVIM64084AG	IC	1
IC402	PQVIDBL5018V	IC	1
		(TRANSISTORS)	
Q201	2SD1819A	TRANSISTOR(SI)	1
Q202	2SD1819A	TRANSISTOR(SI)	1
Q203	PQVTDTB123E	TRANSISTOR(SI)	1
Q204	2SD1819A	TRANSISTOR(SI)	1
Q205	PQVTDTA143EU	TRANSISTOR(SI)	1
Q206	PQVTDTB123E	TRANSISTOR(SI)	1
Q208	2SD1819A	TRANSISTOR(SI)	1
Q209	PQVTDTC143E	TRANSISTOR(SI)	1
Q212	PQVTD123T146	TRANSISTOR(SI)	1
Q213	PQVTD123J106	TRANSISTOR(SI)	1
Q214	2SD1819A	TRANSISTOR(SI)	1
Q215	2SD1819A	TRANSISTOR(SI)	1
Q217	PQVTDTC144TU	TRANSISTOR(SI)	1
Q401	2SC4571R77	TRANSISTOR(SI) S	1
Q402	2SC4571R77	TRANSISTOR(SI) S	1
Q403	2SC4226R24	TRANSISTOR(SI)	1
Q404	2SC4227R34	TRANSISTOR(SI)	1
Q405	2SC4116	TRANSISTOR(SI)	1

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Ref. No.	Part No.	Part Name & Description	Pcs
		(DIODES)	
D201	MA110	DIODE(SI)	1
D202	PQVDRB751H4	DIODE(SI)	1
D206	PQVDPY1112H	DIODE(SI)	1
D207	PQVDPY1112H	DIODE(SI)	1
D208	PQVDPY1112H	DIODE(SI)	1
D209	PQVDPY1112H	DIODE(SI)	1
D210	PQVDPY1112H	DIODE(SI)	1
D212	PQVDBR1112H	DIODE(SI)	1
D213	MA110	DIODE(SI)	1
D214	MA3062	DIODE(SI)	1
D215	MA110	DIODE(SI)	1
D217	MA110	DIODE(SI)	1
D401	PQVDRB751H4	DIODE(SI)	1
D402	PQVDRB751H4	DIODE(SI)	1
D403	MA110	DIODE(SI)	1
DA	MA110	DIODE(SI)	1
DF	MA110	DIODE(SI)	1
		(COILS)	
L201	PQLQR3ER10K	COIL	1
L202	PQLQR3ER10K	COIL	1
L203	PQLQR3ER10K	COIL	1
L400	PQLQR1RM601	COIL	1
L401	PQLQR1RM601	COIL	1
L402	PQLQR1RM601	COIL	1
L404	PQLQR2N3R3KT	COIL	1
L406	MQLRE2N7DF	COIL	1
L413	PQLQR1RM601	COIL	1
L414	PQLQR1RM601	COIL	1
L415	PQLQR1RM601	COIL	1
L416	PQLQR1RM601	COIL	1
L417	PQLQR1RM601	COIL	1
L418	PQLQR1RM601	COIL	1
L419	MQLRE6N8JF	COIL	1
L420	MQLRE10NJF	COIL	1
L421	MQLRE15NJF	COIL	1
L422	MQLRE6N8JF	COIL	1
J206	PQLQR2TR10K	COIL	1
		(CERAMIC FILTERS)	
FL401	PQVSM927C11L	CERAMIC FILTER	1
FL402	PQVS705CF903	CERAMIC FILTER	1
FL403	PQVFSFE107MJ	CERAMIC FILTER	1
FL404	PQVFCFH450B1	CERAMIC FILTER	1
		(VARIABLE RESISTORS)	
VR201	EVN5ESX50B15	VARIABLE RESISTOR	1
VR202	EVN5ESX50B54	VARIABLE RESISTOR	1
VR203	EVM1YSX50B52	VARIABLE RESISTOR	1
VR401	EVN5ESX50B54	VARIABLE RESISTOR	1

Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(CRYSTALS)	
RXVCO	PQV032Z	CRYSTAL OSCILLATOR	1
TXVCO	PQV033Z	CRYSTAL OSCILLATOR	1
X201	PQVBTCC3.99M	CRYSTAL OSCILLATOR	1
X202	PQVCE3276N9Z	CRYSTAL OSCILLATOR	1
		(OTHERS)	
E901	PQMC10217Z	MAGNETIC SHIELD COVER	1
E902	PQMC10218Z	MAGNETIC SHIELD COVER	1
E903	PQEFBDB111GP	BUZZER	1
E904	PQJM122Z	MICROPHONE	1
L405	PQLI2B201	I.F. TRANSFORMER	1
VC401	ECRLA010A53R	TRIMMER CAPACITOR	1
X401	PQVCJ1025N0Z	VARIABLE CAPACITOR	1
		(RESISTORS)	
R201	ERJ3GEYJ103	10K	1
R202	ERJ3GEYJ332	3.3K	1
R203	ERJ3GEYJ473	47K	1
R205	ERJ3GEYJ473	47K	1
R206	ERJ3GEYJ473	47K	1
R207	ERJ3GEYJ473	47K	1
R208	ERJ3GEYJ224	220K	1
R209	ERJ3GEYJ473	47K	1
R210	ERJ3GEYJ681	680	1
R211	ERJ3GEYJ222	2.2K	1
R212	ERJ3GEYJ103	10K	1
R213	ERJ3GEYJ103	10K	1
R214	ERJ3GEYJ222	2.2K	1
R215	ERJ3GEYJ274	270K	1
R216	ERJ3GEYJ472	4.7K	1
R218	ERJ3GEY0R00	JUMPER, 0Ω	1
R219	ERJ3GEYJ124	120K	1
R220	ERJ3GEYJ104	100K	1
R221	ERJ3GEYJ683	68K	1
R222	ERJ3GEYJ104	100K	1
R223	ERJ3GEYJ153	15K	1
R224	ERJ3GEYJ153	15K	1
R225	ERJ3GEYJ683	68K	1
R226	ERJ3GEYJ104	100K	1
R227	ERJ3GEYJ273	27K	1
R228	ERJ3GEYJ273	27K	1
R229	ERJ3GEYJ473	47K	1
R230	ERJ3GEY0R00	JUMPER, 0Ω	1
R231	ERJ3GEYJ123	12K	1
R232	ERJ3GEYJ472	4.7K	1
R233	ERJ3GEYJ823	82K	1
R234	ERJ3GEYJ563	56K	1
R235	ERJ3GEYJ823	82K	1
R236	ERJ3GEY0R00	JUMPER, 0Ω	1
R237	ERJ3GEYJ101	100	1
R239	ERJ3GEYJ823	82K	1
R240	ERJ3GEYJ393	39K	1
R241	ERJ3GEYJ105	1M	1
R243	ERJ3GEYJ333	33K	1
R245	ERJ3GEYJ100	10	1

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Ref. No.	Part No.	Value	Pcs
R246	ERJ3GEYJ124	120K	1
R247	ERJ3GEYJ223	22K	1
R248	ERJ3GEYJ223	22K	1
R249	ERJ3GEYJ103	10K	1
R250	ERJ3GEYJ124	120K	1
R251	ERJ3GEYJ103	10K	1
R252	ERJ3GEYJ100	10	1
R253	ERJ3GEYJ221	220	1
R254	ERJ3GEYJ562	5.6K	1
R255	ERJ3GEYJ153	15K	1
R256	ERJ3GEYJ102	1K	1
R257	ERJ3GEYJ474	470K	1
R258	ERJ3GEYJ823	82K	1
R259	ERJ3GEYJ563	56K	1
R260	ERJ3GEYJ472	4.7K	1
R264	ERJ3GEYJ101	100	1
R265	ERJ3GEYJ103	10K	1
R273	ERJ3GEYJ394	390K	1
R280	ERJ3GEYJ271	270	1
R282	ERJ3GEYJ224	220K	1
R283	ERJ3GEYJ103	10K	1
R286	ERJ3GEYJ331	330	1
R288	ERJ3GEY0R00	JUMPER, 0Ω	1
R289	ERJ3GEYJ473	47K	1
R290	ERJ3GEYJ273	27K	1
R291	ERJ3GEYJ100	10	1
R294	ERJ3GEYJ102	1K	1
R297	ERJ3GEYJ331	330	1
R298	ERJ3GEYJ331	330	1
R299	ERJ3GEYJ331	330	1
R300	ERJ3GEYJ331	330	1
R303	ERJ3GEYJ391	390	1
R306	ERJ3GEYJ333	33K	1
R307	ERJ3GEYJ222	2.2K	1
R308	ERJ3GEYJ103	10K	1
R401	ERJ3GEYJ223	22K	1
R402	ERJ3GEYJ470	47	1
R403	ERJ3GEYJ101	100	1
R404	ERJ3GEYJ333	33K	1
R405	ERJ3GEYJ821	820	1
R406	ERJ3GEYJ681	680	1
R407	ERJ3GEYJ153	15K	1
R408	ERJ3GEYJ153	15K	1
R409	ERJ3GEYJ153	15K	1
R410	ERJ3GEYJ222	2.2K	1
R411	ERJ3GEYJ183	18K	1
R412	ERJ3GEYJ183	18K	1
R413	ERJ3GEYJ470	47	1
R414	ERJ3GEYJ470	47	1
R415	ERJ3GEYJ681	680	1
R416	ERJ3GEYJ153	15K	1
R417	ERJ3GEYJ153	15K	1
R418	ERJ3GEYJ223	22K	1
R419	ERJ3GEYJ104	100K	1
R420	ERJ3GEYJ470	47	1
R421	ERJ3GEYJ101	100	1
R423	ERJ3GEYJ474	470K	1
R424	ERJ3GEYJ152	1.5K	1
R425	ERJ3GEYJ104	100K	1
R427	ERJ3GEYJ564	560K	1
R428	ERJ3GEYJ472	4.7K	1
R429	ERJ3GEYJ334	330K	1

Ref. No.	Part No.	Value		Pcs
R430	ERJ3GEYJ334	330K		1
R431	ERJ3GEYJ821	820		1
R432	ERJ3GEYJ102	1K		1
R434	ERJ3GEYJ222	2.2K		1
R435	ERJ3GEYJ222	2.2K		1
R436	ERJ3GEYJ123	12K		1
R437	ERJ3GEYJ220	22		1
R438	ERJ3GEYJ222	2.2K		1
R439	ERJ3GEYJ222	2.2K		1
R440	ERJ3GEYJ222	2.2K		1
R441	ERJ3GEYJ222	2.2K		1
R442	ERJ3GEYJ101	100		1
R453	ERJ3GEY0R00	JUMPER, 0Ω		1
R456	ERJ3GEY0R00	JUMPER, 0Ω		1
R457	ERJ3GEYJ822	8.2K		1
R458	ERJ3GEY0R00	JUMPER, 0Ω		1
R459	ERJ3GEYJ680	68		1
R460	ERJ3GEY0R00	JUMPER, 0Ω		1
R461	ECUV1H040CCV	4P		1
R462	ERJ3GEYJ680	68		1
J200	PQ4R18XJ000	JUMPER, 0Ω		1
J202~205	ERJ3GEY0R00	JUMPER, 0Ω		4
J208~15	ERJ3GEY0R00	JUMPER, 0Ω		8
C494	ERJ3GEY0R00	JUMPER, 0Ω		1
C527	ERJ3GEY0R00	JUMPER, 0Ω		1
		(CAPACITORS)		
C201	PQCUV1H103KB	0.01		1
C202	PQCUV1H103KB	0.01		1
C203	ECUV1H103KBV	0.01		1
C204	ECUV1H103KBV	0.01		1
C205	ECUV1H103KBV	0.01		1
C206	ECUV1C104KBV	0.1		1
C207	ECEA0JKA331	330		1
C208	ECEA1CKS100	10	S	1
C213	ECUV1H101JCV	100P		1
C214	ECUV1C104KBV	0.1		1
C215	ECUV1H391JCV	390P		1
C217	ECUV1H104ZFV	0.1	S	1
C218	ECUV1A105ZFV	1		1
C219	ECUV1H104ZFV	0.1	S	1
C220	ECUV1H104ZFV	0.1	S	1
C221	ECUV1H102KBV	0.001		1
C222	ECUV1H472KBV	0.0047		1
C223	ECEA1VKS4R7	4.7	S	1
C224	PQCUV1H105JC	1	S	1
C225	ECUV1H223KBV	0.022	S	1
C226	ECUV1H472KBV	0.0047		1
C227	ECUV1H471JCV	470P		1
C228	ECEA1CKS100	10	S	1
C230	ECEA1CKS100	10	S	1
C231	ECEA1VKS4R7	4.7	S	1
C232	ECUV1H104ZFV	0.1	S	1
C233	ECUV1H822KBV	0.0082		1
C234	ECUV1A105ZFV	1		1
C235	ECUV1H104ZFV	0.1	S	1

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Ref. No.	Part No.	Part Name & Description & Value		Pcs
C237	ECUV1H102KBV	0.001		1
C238	ECUV1C104KBV	0.1		1
C239	ECUV1A105ZFV	1		1
C240	ECEA1CKS470	47	S	1
C241	ECUV1A105ZFV	1		1
C242	ECEA1CKS470	47	S	1
C243	ECUV1H103KBV	0.01		1
C244	ECUV1H182KBV	0.0018		1
C246	ECUV1C104KBV	0.1		1
C248	ECEA0JK221	220	S	1
C250	ECUV1C104KBV	0.1		1
C251	ECST0JX226	220		1
C252	ECUV1H180JCV	18P		1
C253	ECUV1H180JCV	18P		1
C254	ECUV1H104MD	0.1	S	1
C255	ECUV1C104KBV	0.1		1
C256	ECST0JX226	220		1
C256	ECUV1A105ZFV	1		1
C259	ECUV1C104KBV	0.1		1
C261	ECUV1H104ZFV	0.1	S	1
C262	ECUV1H104ZFV	0.1	S	1
C263	ECUV1H104ZFV	0.1	S	1
C264	ECUV1H104ZFV	0.1	S	1
C265	ECUV1H104ZFV	0.1	S	1
C266	ECUV1H182KBV	0.0018		1
C267	ECUV1H104ZFV	0.1	S	1
C402	ECUV1H0R5CCV	0.5		1
C404	ECUV1H102KBV	0.001		1
C405	ECUV1H020CCV	2P		1
C406	ECUV1H102KBV	0.001		1
C407	ECUV1H040CCV	4P		1
C408	ECUV1H020CCV	2P		1
C409	ECUV1H1R5CCV	1.5		1
C410	ECEA1CKS470	47	S	1
C411	ECUV1H103KBV	0.01		1
C412	ECUV1H040CCV	4P		1
C413	PQCUV1C224KB	0.22		1
C414	ECUV1H332KBV	0.0033		1
C415	ECUV1H332KBV	0.0033		1
C417	ECUV1H820JCV	82P		1
C418	ECUV1H430JCV	43P		1
C419	ECUV1H080DCV	8P		1
C420	ECUV1H103KBV	0.01		1
C422	ECUV1H030CCV	3P		1
C423	ECUV1H102KBV	0.001		1
C424	ECUV1H102KBV	0.001		1
C425	ECUV1H102KBV	0.001		1
C427	ECUV1H102KBV	0.001		1
C428	ECUV1H060DCV	6P		1
C429	ERJ3GEYJ470	47		1
C430	ECUV1H103KBV	0.01		1
C431	ECEA1CKS470	47	S	1
C432	ECUV1H562KBV	0.0056		1
C433	ECUV1H562KBV	0.0056		1
C434	PQCUV1C224KB	0.22		1
C436	ECUV1H680JCV	68P		1
C437	ECUV1H103KBV	0.01		1
C438	ECUV1H220JCV	22P		1
C439	PQCUV1E104MD	0.1	S	1
C440	ECUV1H680JCV	68P		1
C441	ECUV1H333KDV	0.033	S	1
C442	ECUV1H821KBV	820P		1
C443	ECUV1H821KBV	820P		1
C445	ECUV1H472KBV	0.0047		1
C446	ECUV1H020CCV	2P		1
C448	ECUV1C104KBV	0.1		1
C449	ECUV1H103KBV	0.01		1
C450	ECUV1C104KBV	0.1		1
C451	PQCUV1H105JC	1	S	1
C452	ECUV1H103KBV	0.01		1
C476	ECUV1H102KBV	0.001		1
C482	ECUV1H0R5CCV	0.5		1
C486	ECUV1H102KBV	0.001		1
C487	ECUV1H102KBV	0.001		1
C488	ECUV1H101JCV	100P		1
C489	ECUV1H010CCV	1P		1
C491	ECUV1H030CCV	3P		1
C492	ECUV1H102KBV	0.001		1
C495	ECEA1CKS470	47	S	1
C498	ECUV1H101JCV	100P		1
C499	ECUV1H101JCV	100P		1
C500	ECUV1H101JCV	100P		1
C501	ECUV1H101JCV	100P		1
C502	ECUV1H101JCV	100P		1
C503	ECUV1H101JCV	100P		1
C504	ECUV1H101JCV	100P		1
C505	ECUV1H101JCV	100P		1
C506	ECUV1H101JCV	100P		1
C507	ECUV1H101JCV	100P		1
C508	ECUV1H101JCV	100P		1
C509	ECUV1H101JCV	100P		1
C510	ECUV1H101JCV	100P		1
C511	ECUV1H101JCV	100P		1
C512	ECUV1H101JCV	100P		1
C513	ECUV1H101JCV	100P		1
C517	ECUV1H101JCV	100P		1
C518	ECUV1H101JCV	100P		1
C525	ERJ3GEYJ470	47		1

CHARGER BOARD PARTS

PCB8	PFLP1057M	CHARGER P.C.BOARD ASS'Y (RTI		1
		(DIODES)		
D651	MA4220	DIODE(SI)		1
D652	MA4220	DIODE(SI)		1
D653	MA4220	DIODE(SI)		1
LED651	PQVDR325CA47	LED	S	1
LED652	PQVDR325CA47	LED	S	1

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Ref. No.	Part No.	Part Name & Description & Value	Pcs
		(CONNECTORS)	
CN651	PFJS08R26Z	CONNECTOR	1
CN652	PQJT10119Z	BATTERY TERMINAL	1
CN653	PQJT10119Z	BATTERY TERMINAL	1
CN654	PQJT10119Z	BATTERY TERMINAL	1
		(COILS)	
L651	PQLQZK330K	COIL	1
L652	PQLQZK330K	COIL	1
L653	PQLQZK330K	COIL	1
L654	PQLQZK330K	COIL	1
L655	PQLQZK330K	COIL	1
		(RESISOTRS)	
R651	ERDS2TJ271	270	1
R652	ERDS2TJ271	270	1
		FIXTURES AND TOOLS	
EC 1	PQZZ2K12Z	EXTENTION CORD, 2 PIN	1
EC 2	PQZZ2K6Z	EXTENTION CORD, 2 PIN	1
EC 3	PFZZ8K23Z	EXTENTION CORD, 8 PIN	1
EC 4	PQZZ6K14Z	EXTENTION CORD, 6 PIN	1
EC 5	PQZZ2K13Z	EXTENTION CORD, 2 PIN	1
EC 6	PQZZ9K7Z	EXTENTION CORD, 9 PIN	1
EC 7	PQZZ11K8Z	EXTENTION CORD, 11 PIN	2
EC 8	PQZZ5K6Z	EXTENTION CORD, 5 PIN	1
EC 9	PFZZ5K13Z	EXTENTION CORD, 5 PIN	1
EC10	PQZZ2K6Z	EXTENTION CORD, 2 PIN	1
EC11	PQZZ10K4Z	EXTENTION CORD, 10 PIN	1
EC12	PQZZ8K18Z	EXTENTION CORD, 8 PIN	1
EC13	PQZZ2K12Z	EXTENTION CORD, 2 PIN	1
EC14	PFZZ7K15Z	EXTENTION CORD, 7 PIN	1
EC15	PFZZ18K4Z	EXTENTION CORD, 18 PIN	1
EC16	PFZZ8K24Z	EXTENTION CORD, 8 PIN	1
EC17	PQZZ10K11Z	EXTENTION CORD, 10 PIN	1
EC20	PFZZ1F780M	CCD ADJUSTMENT TOOL	1
EC21	PFZZ2F780M	SPRING HEIGHT TOOL	1
EC22	PFZZ3F900M	IC TOOL (for STATUS CHECKING)	1
		[Refer to page 57]	

Notes:

1. Tools (EC20~EC22) and Extension Cords (Ref. No. EC12, EC13) are necessities for servicing.
2. Extension Cords (Ref. No. EC1~EC17, EC14~EC17) are useful for servicing. (They make servicing easy.)

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